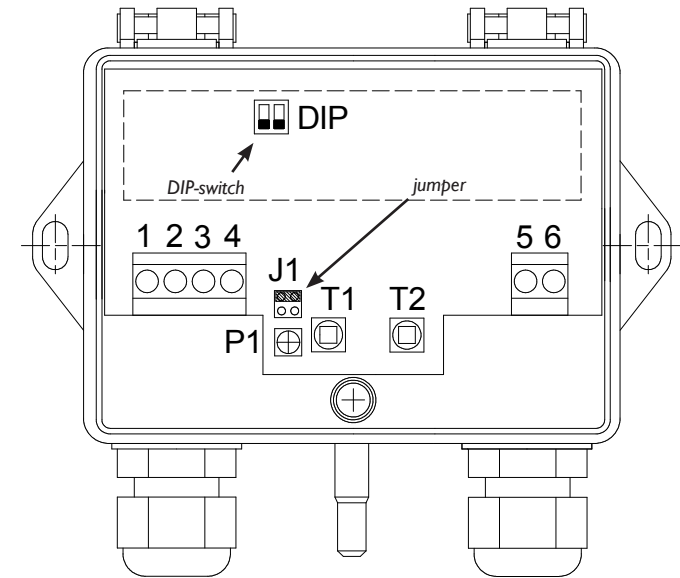


5.3 Adjustable parameters - hardware
Damping levels: In case of fluctuating measured values different damping levels can be adjusted via the DIP-switches no.1 and no. 2.

		DIP 1	DIP 2
No damping		off	off
Time constant	0,5 s	on	off
Time constant	1s	off	on
Time constant	1,5 s	on	on



Choice of analogue input:
The analogue output can be switched via a jumper from voltage 0/2...10V (horizontal down) to 0/4...20 mA (horizontal up). The potentiometer P1 allows fine tuning of the current output or a burden adjustment.

5.4 Error limits (related to the actual range)

DS200-2	Zero deviation	Final value deviation	Linearity	Resolution	Hysteresis
0...200 Pa	± 0.5 %	± 0.5 %	± 0.25 %	0.1 %	1 %
0...150 Pa	± 0.75 %	± 0.6 %	± 0.4 %	0.2 %	0.7 %
0...100 Pa	± 1 %	± 0.7 %	± 0.5 %	0.2 %	0.5 %
0...50 Pa	± 2 %	± 1 %	± 1 %	0.3 %	0.5 %

DS200-10	Zero deviation	Final value deviation	Linearity	Resolution	Hysteresis
0...1000 Pa	± 0.5 %	± 0.5 %	± 0.25 %	0,1 %	0.2 %
0...500 Pa	± 0.7 %	± 0.7 %	± 0.5 %	0.2 %	0.2 %
0...300 Pa	± 0.9 %	± 0.9 %	± 0.9 %	0.3 %	0.2 %
0...200 Pa	± 1 %	± 1 %	± 1.25 %	0.3 %	0.2 %

DS200-60	Zero deviation	Final value deviation	Linearity	Resolution	Hysteresis
0...6000 Pa	± 0.5 %	± 0.5 %	± 0.25 %	0.1 %	0.2 %
0...4000 Pa	± 0.7 %	± 0.7 %	± 0.4 %	0.15 %	0.2 %
0...3000 Pa	± 0.9 %	± 0.9 %	± 0.6 %	0.2 %	0.2 %
0...2000 Pa	± 1 %	± 1 %	± 0.75 %	0.25 %	0.2 %

5.5 Function alarm output
The DS200 has an open collector alarm output.

When an alarm occurs, an exclamation mark (!) indicates the alarm state (2nd line / 16th character).

The open collector output has two different states:

- Highly resistive to disable external circuit
- Low-resistance, to connect an external circuit with maximum load of 30 Vdc / 30 mA

For limit value monitoring, a limit value can be entered under the menu item “limit switch”.The previously set parameters are taken into account (unit, measured variable, k-factor and the measuring range). In the basic state, the limit values are not active, and the menu item “limit switch” shows “OFF” in the second line.

Three menu items, which influence the switching behavior of the open collector output, follow the „limit switch“ menu item:

1.“alarm delay time” with this menu item the switching delay time can be set. The setting range is 1...60 s or 2...15 min. In the basic state, this value is set to 10 seconds

2.“switching logic” here you have the possibility to set the limit values to MAX or MIN.At MAX, an alarm is triggered, when the measured value exceeds the limit value; at MIN, the alarm is triggered when the limit value is exceeded.

3.“Contact logic” the rest state or the switching state of the open collector output can be set differently.“Active high” means that when an alarm occurs, the open collector output becomes low-impedance.“Active low” means that the alarm switches the open collector output high-impedance

The following switching pattern can be summarized:

switching logic	contact logic	pressure	alarm output	display
MAX	active high	$\Delta P > \text{limit value}$ $\Delta P < \text{limit value}$	alarm ON, low resistance alarm OFF, high resistance	!
MAX	active low	$\Delta P > \text{limit value}$ $\Delta P < \text{limit value}$	alarm ON, high resistance alarm OFF, low resistance	!
MIN	active high	$\Delta P > \text{limit value}$ $\Delta P < \text{limit value}$	alarm OFF, high resistance alarm ON, low resistance	!
MIN	active low	$\Delta P > \text{limit value}$ $\Delta P < \text{limit value}$	alarm OFF, low resistance alarm ON, high resistance	!

The output is subject to the following logic with regard to hysteresis and the set switching delay time:

MAX switching logic:	alarm ON, low resistance if $\Delta P > \text{limit value}$ for set switching delay time alarm OFF, high resistance if $\Delta P < 0,95 \times \text{limit value}$ for set switching delay time
MIN switching logic:	Alarm ON, low resistance if $\Delta P < \text{limit value}$ for set switching delay time Alarm OFF, high resistance if $\Delta P > 1,05 \times \text{limit value}$ for set switching delay time

6. Maintenance

The DS200 contains no wearing or consumable parts. Servicing is not required. On request,Arthur Grillo GmbH offers an annual calibration with factory certificate. For information, please contact:



Arthur Grillo GmbH
Am Sandbach 7
40878 Ratingen

Phone: 0 21 02 - 47 10 22
Fax: 0 21 02 - 47 58 82
E-mail: info@grillo-messgeraete.de

7. Warranty

Warranty and liability claims for personal and property damage are excluded, if they are caused by one or more of the following reasons:

- Improper use of the device.
- Improper installation, commissioning, operation and maintenance of the device.
- Unauthorized modifications to the device beyond the intended use.
- Disasters due to external influences and force majeure.

8. Troubleshooting

Description	Activity
Display does not show anything	Check electrical connection
Measurement stays zero	Function test with a slight pressure increase in measuring mode for differential pressure
Measuring error	Perform zeroing as described in chapter 4.5.
Error remains	Contact manufacturer
Display shows: !	Device is in state of alarm, please see chapter 5.5

9. Disposal

Dispose of parts so as not to endanger the health or environment. Follow the laws in the country of use for disposing of electronic components and devices during disposal.

10. CE-labelling

As an electric device the DS200 falls within the scope of the directive 2004/108/EG (EMV-directive). In the scope of the EMV-directive the following norms were applied:

DIN EN 61000-6-2:2006-03 correction 1:2011-06	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments
DIN EN 61000-6-3:2011-09	Electromagnetic compatibility (EMC) - Part 6-3: Generic standards - Emission standard for residential, commercial and light industrial environments

The declaration of conformity can be requested directly from us.

11. Specifications

Overpressure protection:	0,2 bar	PERFORMANCE:
Static pressure:	max. 0,2 bar	
Zero point calibration:	adjustable by REEDcontact, no cyclic zero-point calibration required	
Response time:	direct	
Operating mode:	measuring mode	TECHNICAL SPECIFICATIONS:
Measuring medium:	air or non-aggressive gases	
Measuring principle:	electromechanical diaphragm measuring system Pa / InH20 or m3/h or cfm	
Measuring unit:	0...50 Pa (0.5 mbar)	
Smallest measuring range:	0...6000 Pa (60 mbar)	
Largest measuring range:	DS200-P2: 0...200 Pa (2 mbar), 0...150 Pa, 0...100 Pa, 0...50 Pa (0.5 mbar)	

Measuring range:	DS200-P10: 0...1000 Pa (10mbar), 0...500 Pa, 0...300 Pa, 0...200 Pa (2 mbar) DS200-P60: 0...6000 Pa (60 mbar), 0...4000 Pa, 0...3000 Pa, 0...2000 Pa (20 mbar)
Measuring range selection:	by software menu
Characteristic:	linear or radiated selectable by software menu
Damping:	adjustable in 3 steps
Ambient temperature:	-10...+50 °C
Storage temperature:	-25...+60 °C
Setpoint settings:	1 limit can be set via software menu
Limit signal Output / alarm output:	open collector, max 30V / 30 mA
Alarm delay time:	freely adjustable in the range of 0 ... 60 seconds - 2 ... 15 minutes
Switching logic:	MIN or MAX
Contact Logic:	active high or active low

Housing:	UL 94 HB; Ultramid with hinged lid of ABS	PHYSICALLY:
Dimensions:	95 x 70 x 54 mm (w x h x d)	
Weight:	approx. 250 g	
Protection class:	IP 54 according EN 60529	
Display:	two-line alphanumeric LCD display, 2 x 16 characters	
Electrical connections:	cable entry M16x1.5, screw terminals, electronics protected against incorrect polarity	
Pressure connections:	hose connections 5 mm ø and 6 mm ø	
Operational position:	vertical, position dependence when rotated through 90° approx. 25 Pa	

Power supply:	17...30 Vdc or 24Vac ± 15 %	ELECTRONIC:
Power consumption:	approx. 6 mA @ 17Vdc and 0...10V output	
Output:	approx. 19 mA @ 30Vdc and 0...10V output 0/2...10V(lmax = 10 mA @ 20Vdc, lmax = 17 mA @ 30Vdc) / 0/4...20 mA, max load 200 Ω	
EMC:	EN 61000-6-2, EN 61000-6-3, CE-mark	CONFORMITY:
RoHS:	according RoHS-directive 2011/65/EU	



Installation and operation manual

DS200
DIFFERENTIAL PRESSURE SENSOR

Low pressure sensor with display, analogue output and selectable measurement range.



Doc.-no.: DS200_02_EN Issue: 03/2017



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Specifications

1. General safety instructions

1.1 Signal words for safety instructions

The safety instructions in this operation manual are designed to prevent hazards. They can be found in the operation manual before an operation / task / activity is described, which can entail a possible hazard.

CAUTION Identification of a hazard with a low risk, which can lead to material damage or minor or moderate bodily injuries.

NOTICE Signal word for important information regarding the product, which needs to be specifically pointed out.

Hazard word
Type of hazard
Hazard source
Hazard prevention

1.2 Used pictograms and symbols

In this manual the following symbols are used:

	General hazard symbol (danger, warning, caution)
	General information

1.3 General notes

NOTICE This manual contains information for installation and operation of the pressure sensor and is exclusively for the operator and expert staff. The guidelines in this manual will help to avoid danger and downtime.

2. Product description

The differential pressure sensor DS200 measures low pressure of non-aggressive gases, particularly of air.

Table of content

1 General safety instructions

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11 Specifications

2.1 Type plate

1. Product name
2. Measuring range
3. Supply voltage
4. Signal output
5. Serial no.
6. Manufacturer

Differential Pressure Sensor **1.** **DS200-10**
measurement range: **2.** 0 ... 1000 Pa
serial-no.: 17.372 **3.** part-no.: 2561 IP54
supply voltage: **4.** U_s (1+ 2-) = 17 ... 30 Vdc / 24 Vac
signal output: **5.** U_{out} (3+ 4-) = 0/2 ... 10 V 0/4 ... 20 mA
0 ... 1000 Pa 0 ... 500 Pa
0 ... 300 Pa 0 ... 200 Pa
Arthur Grillo GmbH • Ratingen **6.** Made in Germany

2.2 Intended use

The application range of the DS200 is for example: Fan control in air conditioning systems, pressure or filter control in rooms. As analogue output the operator can use a signal from 0...10V DC. The output signal proceeds proportional to the measured pressure.

2.3 Functional description

A soft silicone diaphragm is used as sensor. Under the influence of the differential pressure the membrane displaces against a measuring spring until spring force compensates the pressure charging on the diaphragm. A contactless differential transformer and suitable electronics convert this displacement into a continuously variable output voltage signal.

The DS200 has four calibrated measuring ranges, which can be selected via the software menu. A two-line alphanumeric LCD display shows the measured pressure in the physical unit.

In combination with a differential pressure transducer (orifice plate, venturi or pitot tube), the DS200 also directly display the flow in a pipeline. For this purpose, the differential pressure of the transducer is square root and multiplied by an adjustable factor of the transducer.

A damping of output signal because of fluctuating measured values, can be adjusted in four stages via DIP switches.

The differential pressure sensor DS200 delivers an analogue output signal of 0/2...10 V or 0/4...20 mA. The supply voltage is 17...30 Vdc or 24 Vac.

3. Installation

The differential pressure sensor DS200 has to be mounted vertically, to assure the accuracy. The connection of the pressure lines is done by plastic tubes with an internal

diameter of 5 mm or 6 mm. To connect the cable, please follow the instructions in Section 3.2.

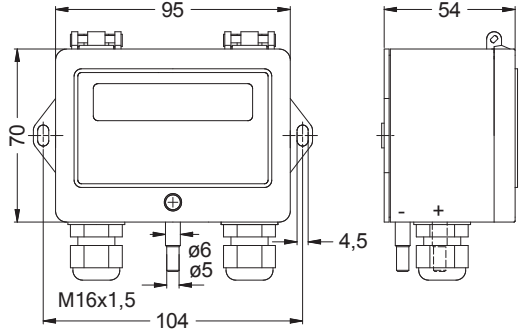
CAUTION **Material damage**
Read the manual carefully before installation and operation
Only experienced stuff may connect the device and bring it into operation.

NOTICE

- The device is position depended.
- It is important that the assembly is vertical.
- The DS200 can be mounted on a wall.

3.1 Dimensions

All dimensions in mm.



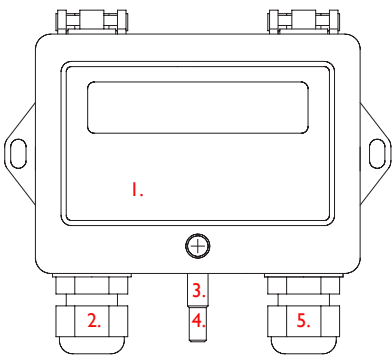
3.2 Wall mounting

1. Hold the DS200 against the wall. Mark the mounting holes.
2. Bore mounting holes for sufficiently dimensioned screws resp. dowels.
3. Press in dowels.
4. Put the screws through the tightening channels of the housing screws so that the screws stick out on the backside of the housing.
5. Place the device with the screws exactly onto the mounting holes with the dowels.
6. Tighten screws.

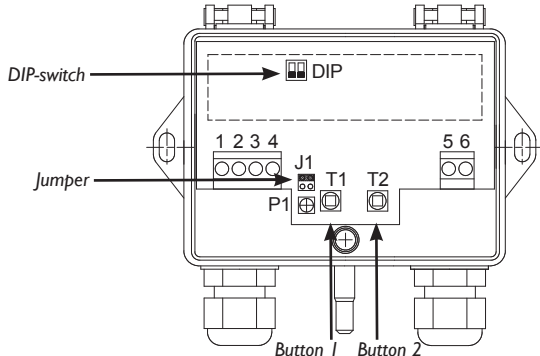
4. Start up

4.1 Overview DS200

1. Front cover
2. Cable gland M16x1.5
3. Pressure connection 1
4. Pressure connection 2
5. Cable gland M16x1.5



4.2 Schematic view inside



Button: The button 1 and 2 are for the menu operation.

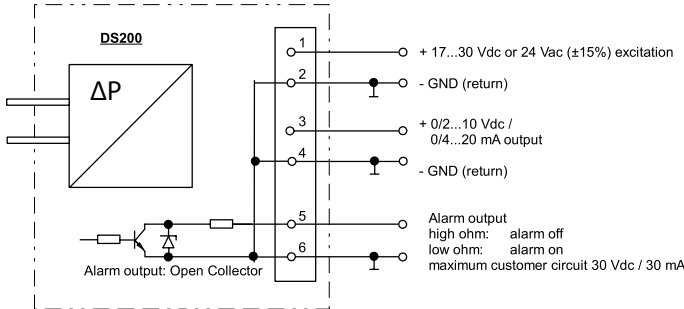
DIP-switch: The fluctuating measurement values can be lowered via a DIP-switch.

Jumper: The analogue output can be switched from voltage to power via a jumper.
(For more information please check chapter 5.3)

4.3 Pressure connections

Connect all pressure connections properly with plastic tubing (inner diameter 5 or 6mm).

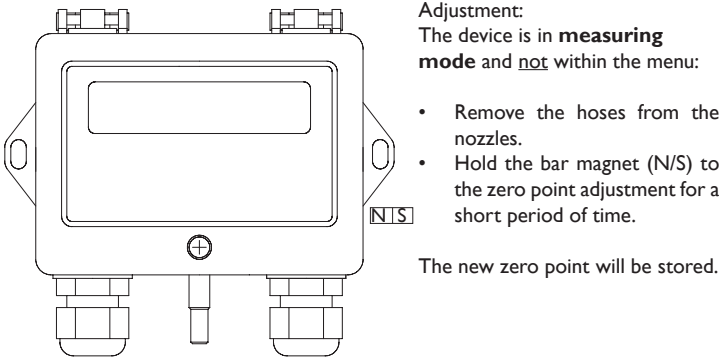
4.4 Electrical connection



1. Unscrew screws of the front cover.
2. Open front cover.
3. Use the M16 x 1.5 screw for connecting to terminals.

4.5 Zero adjustment

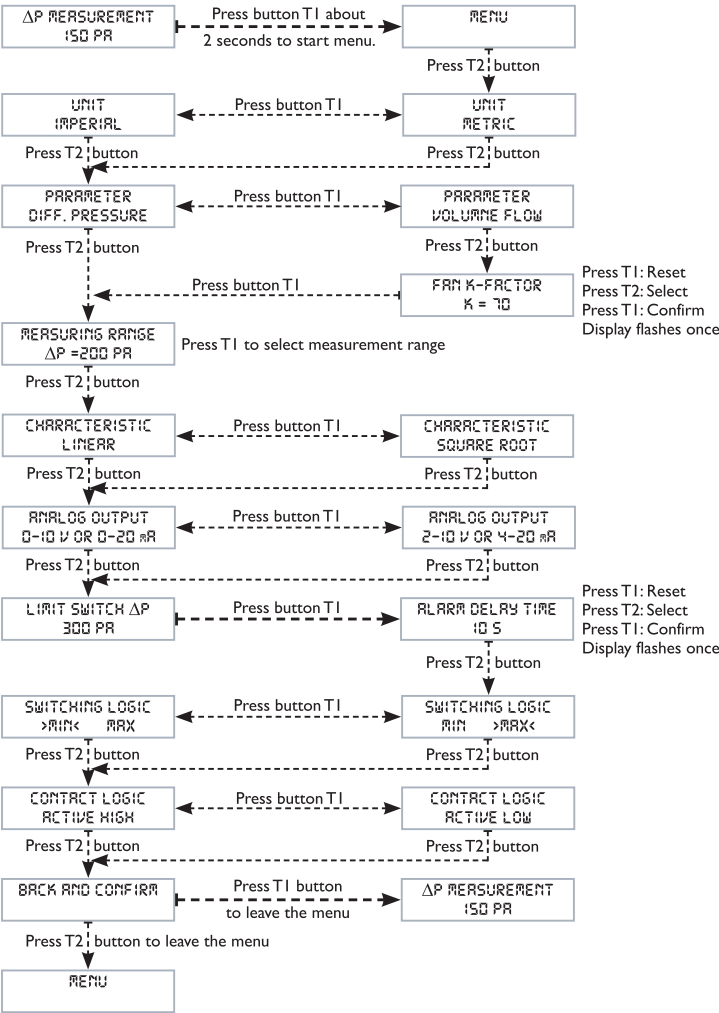
The zero point can be adjusted independently from the menu. For readjusting please use the small bar magnet and be sure that the device is not in menu mode.



5. Operation

5.1 Start menu

For operating the menu, unscrew the front cover to reach buttons T1 and T2.



5.2 Adjustable parameters - Software

Parameters	Selection or parameter range	Default
Unit	metric or imperial	metric
Parameter	Differential pressure ΔP [Pa or lnH ₂ O] Volume flow v [m ³ /h or cfm]	differential pressure ΔP [Pa]
	Volume flow calculation according to: $V = k \cdot \sqrt{\Delta p}$ with: V = Volume flow in m ³ /h or cfm k = flow factor, adjustment range: 1...10.000 Δp = differential pressure in Pa or lnH ₂ O	
	Volume flow calculation up to: 999.999 m ³ /h (587.999 cfm)	
K-factor:	Maximum volume flow (V_{max}): Measuring range: 200 Pa, k=10.000 V _{max} = 141.421 m ³ /h; (83.155 cfm) Measuring range: 1000 Pa, k=10.000 V _{max} = 316.228 m ³ /h; (185.942 cfm) Measuring range: 6000 Pa, k=10.000 V _{max} = 774.597 m ³ /h; (37.188 cfm)	K = 70
Measurment range:	MB1 MB2 MB3 MB4 DS200-2 - 200 Pa 150 Pa 100 Pa 50 Pa DS200-10 - 1.000 Pa 500 Pa 300 Pa 200 Pa DS200-60 - 6.000 Pa 4.000 Pa 3.000 Pa 2.000 Pa	MB1
Characteristic:	linear or square rooted	linear
Analogue output:	0...10V / 0...20 mA or 2...10V / 4...20 mA	0...10 V / 0...20 mA
Limit value:	Differential pressure from 0% up to 100% of measuring range. Volume flow from 5% up to 100% of measuring range, k-factor is considered.	OFF
alarm delay time	Switching delay time adjustment range: 1...60 seconds or 2...15 minutes	10 s
Switching logic	Switching logic MIN or MAX	MAX
Contact logic	Contact logic active high or active low	active high