

Operating and installation instructions

DS200 - Differential pressure sensor

Low-pressure sensor with display and selectable measuring ranges



This documentation, including all its parts, is protected by copyright. Any use or modification outside the narrow limits of copyright law is prohibited and punishable without the consent of Arthur Grillo GmbH. This applies in particular to reproductions, translations, microfilming, and storage and processing in electronic systems.

Table of contents

1	General safety instructions	04
1.1	Signal words for warnings	04
1.2	Pictograms and symbols used	04
1.3	General information	04
2	Product description	05
2.1	Type plate	05
2.2	Intended Use	05
2.3	Functional description	05
3	Assembly	06
3.1	Dimensions	06
3.2	wall mounting	06
4	commissioning	07
	DS200 Overview	07
4.1	4.2 Schematic interior view	07
4.3	Pressure connections	07
4.4	Electrical connection	08
4.5	Zero Point Setting	08
5	Operation	08
5.1	Start menu	09
5.2	Adjustable parameters - Software	10
5.3	Adjustable parameters - Hardware	11
5.4	Error limits	12
5.5	Function: Alarm output	12
6	maintenance	14
7	Warranty	14
8	Error messages / malfunctions	14
9	Disposal	14
10	Technical Specifications	15
10.1	CE marking	16

1. General safety instructions

1.1 Signal words for warnings

The safety instructions in this user manual are for hazard prevention.

You are in the operating instructions before an action / work / activity is described in which a hazard may occur.

CAUTION

Identification of a low-risk hazard that may result in property damage or minor bodily injury.

A NOTICE

Signal word for important product information that should be highlighted in particular.

Danger word



Type of hazard

Source of danger
Hazard prevention

1.2 Pictograms and symbols used

The following symbols are used in this guide:



General hazard symbol
(Danger, warning, caution)



General note

1.3 General Information

A NOTICE



This instruction manual contains information on the proper installation and operation of the DS200 and is intended solely for the operator and authorized personnel. Following this manual will help prevent hazards and downtime.

2. Product description

The DS200 differential pressure sensors are used to measure small differential pressures of non-aggressive gases, especially air.

Table 1

2.1 Type plate

1. Type designation
2. Measuring range
3. Serial number
4. Supply voltage
5. Output signal
6. Manufacturer

Differential Pressure Sensor 1.		DS200-10	
Measurement range:	2.	0 ... 1000 Pa	
Serial number:	3.	17372	Part number: 2561 IP54
supply voltage:	4.	US (1+ 2-) = 17 ... 30 Vdc / 24 Vac	
signal output:	5.	Uout (3+ 4-) = 0/2 ... 10 V O 0/4 ... 20 mA	
		O 0...1000 Pa	O 0...500 Pa
		O 0...300 Pa	O 0...200 Pa
Arthur Grillo GmbH • Ratingen 6.		Made in Germany	

2.2 Intended Use

Applications include, for example, air conditioning, fan control, room pressure monitoring, and filter control. Another application is airflow measurement using dynamic pressure sensors or differential pressure transmitters (orifice plates, Venturi tubes, etc.).

2.3 Functional description

A soft silicone diaphragm is used as the sensor. Under the influence of differential pressure, it moves against a measuring spring until the spring force compensates for the pressure acting on the diaphragm. The diaphragm's deflection is measured contactlessly using a differential transformer and converted into a standardized output signal by electronics. The device has four calibrated measuring ranges, selectable via the software menu. A two-line alphanumeric LCD displays the measured pressure in physical units. In conjunction with a differential pressure sensor (orifice plate, Venturi tube, or Pitot tube), the flow rate in a pipeline can also be displayed directly. For this purpose, the differential pressure of the differential pressure sensor is taken as the square root and multiplied by a factor stored in the device for the differential pressure sensor.

Flow factors for calculating volumetric flow can be entered manually.

The attenuation of the output signal in case of fluctuating measured values can be set in four stages via DIP switches.

The DS200 differential pressure sensor provides an analog output signal of 0/2...10 V or 0/4...20 mA. It requires a DC voltage of 17...30 Vdc or an AC voltage of 24 Vac for operation.

3. Assembly

To guarantee measurement accuracy, the DS200 differential pressure sensor should be mounted vertically. The device is designed for wall mounting. The pressure lines are connected using plastic tubing with an inner diameter of 5 or 6 mm. Please follow the instructions in section 3.2 for connecting the cables.

CAUTION



Property damage

Read the operating instructions carefully before assembly and commissioning. The device may only be connected and commissioned by experienced personnel.

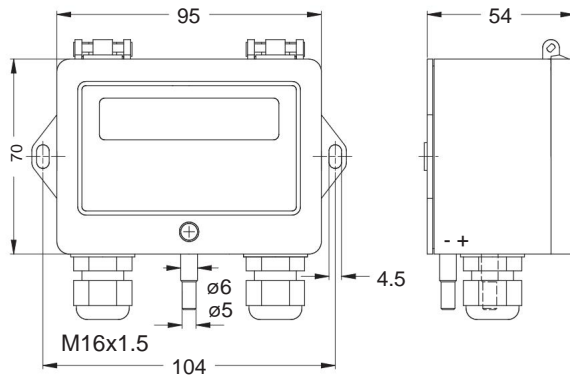
NOTICE



- The device is position-dependent
- The DS200 must be mounted vertically.
- The DS200 can be mounted on a wall.

3.1 Dimensions

All dimensions in mm.



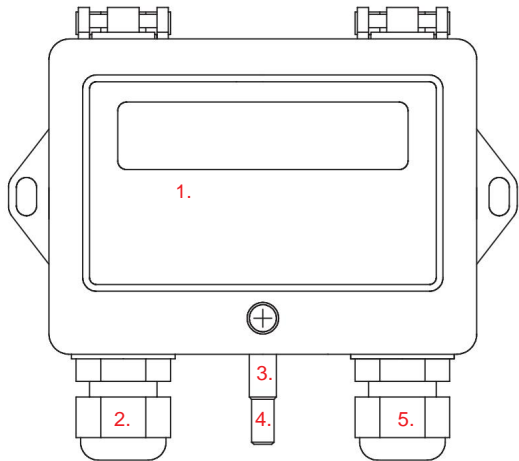
3.2 Wall mounting

1. Hold the DS200 against the wall and mark the mounting holes.
2. Drill mounting holes for adequately sized screws or dowels.
3. Press in the dowel.
4. Guide the fastening screws through the screw channels of the housing screws so that
The screws protrude from the back of the housing.
5. Fit the housing with the screws precisely into the mounting holes with the dowels.
place.
6. Tighten the screws.

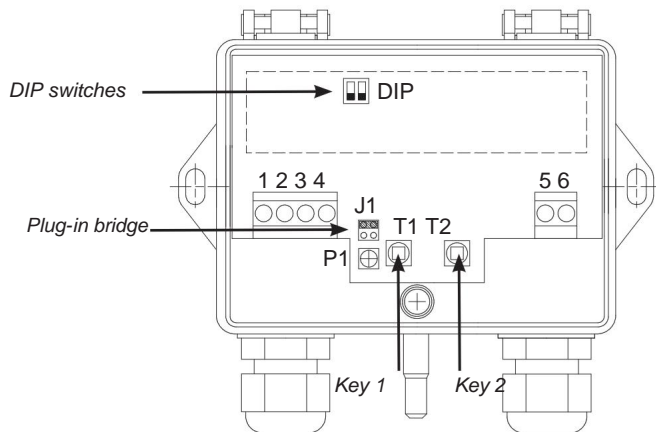
4. Commissioning

4.1 Overview DS200

1. Front cover
2. Cable entry (M16 x 1.5)
3. Pressure connection 1
4. Pressure connection 2
5. Cable entry (M16 x 1.5)



4.2 Schematic interior view



Buttons: Buttons 1 and 2 are for operating the menu.

DIP switches: Different damping levels can be set using DIP switches to compensate for fluctuating measured values. (see Chapter 5.3)

Jumper: The jumper sets the analog output to voltage or current. (see Chapter 5.3)

4.3 Pressure connections

All pressure connections properly fitted with plastic hoses (inner diameter 5 and Arthur Gmlo GmbH · Ratin connect 6 mm).

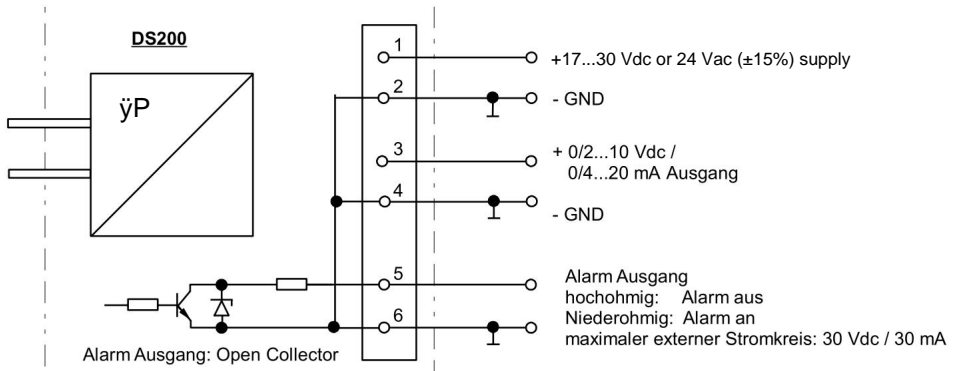
scale

designation

1:1

DS 200_2 Operation

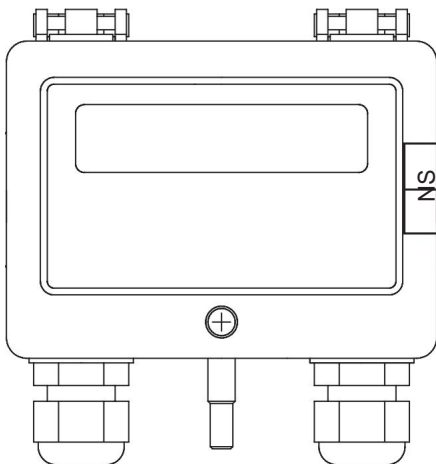
4.4 Electrical connection



1. Screw on the screws for the front cover.
2. Open the front cover.
3. Two M16 x 1.5 screw connections are provided for cable entry.

4.5 Zero point setting

The device's zero point can be readjusted externally using a small rod magnet, independent of the menu.



The device must not be in menu mode.

Adjustment:

1. Disconnect the pressure hoses from the nozzles.
2. Briefly touch the bar magnet (N/S) to the adjustment side.
Hold zero point.

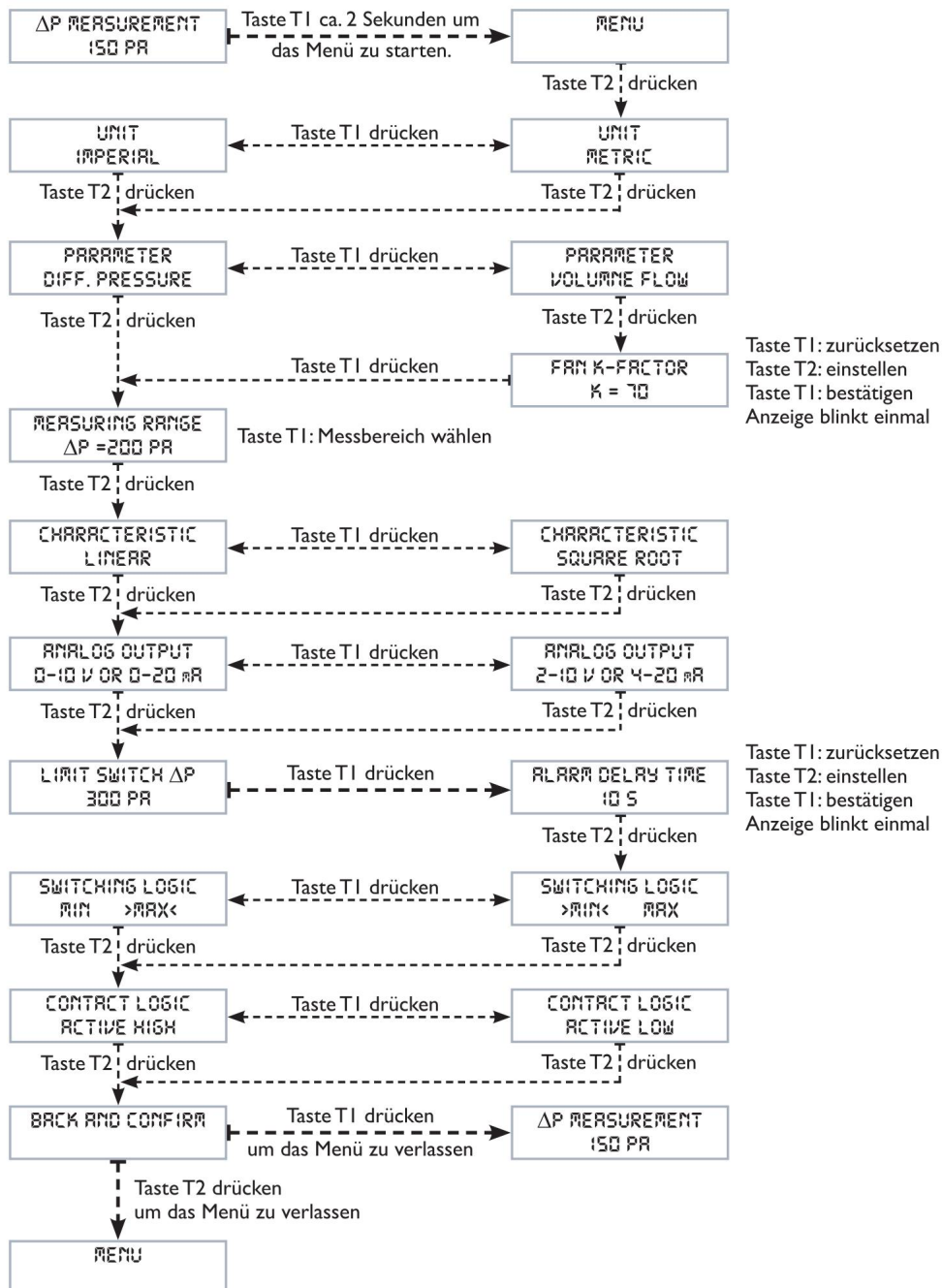
The new zero point is saved.

5. Operation

5.1 Start menu

To operate the menu, unscrew the front cover to access the T1 and T2 buttons.

Menu structure



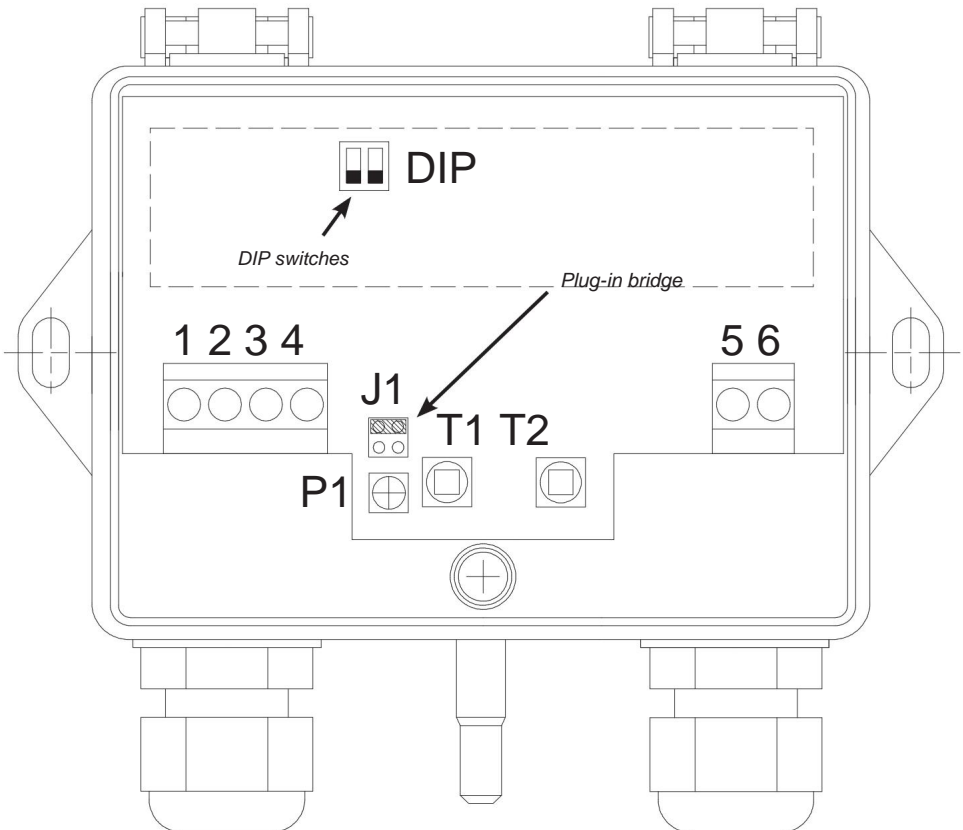
5.2 Adjustable Parameters - Software

parameter	Selection or setting range	standard
Unit	metric or imperial	metric
Measured variable	Differential pressure $\ddot{y}P$ [Pa or lnH2 O] Volume flow rate V [m ³ /h or cfm]	[Pa or lnH2O]
K-factor:	<p>Volume flow rate calculation according to: $V = k \cdot \sqrt{\ddot{y}p}$</p> <p>with: V = Volume flow rate in m³ /h or cfm k = flow factor, adjustment range: 1...10,000 $\ddot{y}p$ = differential pressure in Pa or lnH2O</p> <p>Display range up to 999,999 m³ /h (587,999 cfm)</p> <p>Maximum volume flow rate (V_{max}) Measuring range: 200 Pa, $k = 10,000$ $V_{max} = 141,421$ m³ /h; (83,155 cfm)</p> <p>Measuring range: 1000 Pa, $k = 10,000$ $V_{max} = 316,228$ m³ /h; (185,942 cfm)</p> <p>Measuring range: 6000 Pa, $k = 10,000$ $V_{max} = 774,597$ m³ /h; (37,188 cfm)</p>	$K = 70$
Measuring range:	<p>MB1 MB2 MB3 MB4</p> <p>DS200-2 - 200Pa 150Pa 100Pa 50Pa DS200-10 - 1,000Pa 500Pa 300Pa 200Pa DS200-60 - 6,000Pa 4,000Pa 3,000Pa 2,000Pa</p>	MB1
Characteristic curve:	linear or square root	linear
Analog output:	0...10 V / 0...20 mA or 2...10 V / 4...20 mA	0...10 V / 0...20 mA
Limit:	Differential pressure from 0% to 100% of the measuring range; volume flow rate from 5% to 100% of the measuring range; k -factor is taken into account.	OFF
Alarm delay time	Switching delay adjustment range: <ul style="list-style-type: none"> • 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

5.3 Adjustable Parameters - Hardware Damping: In case of

fluctuating measured values, different damping values can be set using DIP switches No. 1 and No. 2.

		DIP 1	DIP 2
No damping		off	off
Time constant:	0.5 s	on	off
Time constant:	1	off	on
Time constant:	s 1.5 s	on	on



Selection of the analog output:

The analog output can be switched from voltage 0/2...10 V (horizontal, bottom) to current 0/4...20 mA (horizontal, top) using the plug-in jumper. Potentiometer P1 allows for fine-tuning of the current output or load matching.

5.4 Error limits (depending on the measuring range)

zero-point deviation formal value deviation linearity deviation resolution Hysteresis

DS200-2

0...200 Pa ± 0.5%	± 0.5% ± 0.25% ± 0.6%	0.1%	1%
0...150 Pa ± 0.75%	± 0.4% ± 0.7% ± 0.5%	0.2%	0.7%
0...100 Pa ± 1 %	± 1% ± 1%	0.2%	0.5%
0...50 Pa ± 2 %		0.3%	0.5%

DS200-10

0...1000 Pa ± 0.5%	± 0.5% ± 0.25% ± 0.7%	0.1%	0.2%
0...500 Pa ± 0.7%	± 0.5% ± 0.9% ± 0.9%	0.2%	0.2%
0...300 Pa ± 0.9%	± 1.25%	0.3%	0.2%
0...200 Pa ± 1 %	± 1%	0.3%	0.2%

DS200-60

0...6000 Pa ± 0.5%	± 0.5% ± 0.25% ± 0.7%	0.1%	0.2%
0...4000 Pa ± 0.7%	± 0.4% ± 0.9% ± 0.6%	0.15%	0.2%
0...3000 Pa ± 0.9%	± 0.75%	0.2%	0.2%
0...2000 Pa ± 1 %	± 1%	0.25%	0.2%

5.5 Alarm output function

The DS200 has an open collector alarm output.

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

The open collector output has two different states:

- high resistance, to block an external circuit
- low resistance, to close an external circuit with maximum load of 30 Vdc / 30 mA

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

After the menu item "*limit switch*" there are three menu items that influence the switching behavior of the open collector output:

1. "*alarm delay time*" – this menu item allows you to set the switching delay time. The setting range is 1...60 seconds or 2...15 minutes. In its default state, this is... Value set to 10 seconds
2. "*Switching logic*" here you now have the option to set the limit values to MAX or MIN. To adjust. In MAX mode, an alarm is triggered when the measured value exceeds the limit. If the value exceeds the limit, the alarm is triggered when the limit is undershot at MIN.
3. "*Contact logic*" the idle state, or switching state of the open collector output can These settings can be adjusted differently. "*Active high*" means that when an alarm occurs, the open collector output becomes low-impedance. "*Active low*" means that the alarm does not trigger the output. open collector output high impedance switching

The following circuit pattern can be summarized:

switching logic	contact logic	Pressure	Alarm output	Display
MAX	active high	$\ddot{y}P > \text{Threshold}$	Alarm ON, low impedance	!
		$\ddot{y}P < \text{Threshold}$	Alarm OFF, high impedance	
MAX	active low	$\ddot{y}P > \text{Threshold}$	Alarm ON, high impedance	!
		$\ddot{y}P < \text{Threshold}$	Alarm OFF, low impedance	
MIN	active high	$\ddot{y}P > \text{Threshold}$	Alarm OFF, high impedance	
		$\ddot{y}P < \text{Threshold}$	Alarm ON, low impedance	!
MIN	active low	$\ddot{y}P > \text{Threshold}$	Alarm OFF, low impedance	
		$\ddot{y}P < \text{Threshold}$	Alarm ON, high impedance	!

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

MAX	<i>Alarm ON, low impedance</i> when $\ddot{y}P > \text{limit}$ for set switching delay time
	Switching logic: <i>Alarm OFF, high impedance</i> if $\ddot{y}P < 0.95 \times \text{limit}$ for set switching delay time
MIN	<i>Alarm ON, low impedance</i> if $\ddot{y}P < \text{limit value}$ for set switching delay time
	Switching logic: <i>Alarm OFF, high impedance</i> if $\ddot{y}P > 1.05 \times \text{limit}$ for set switching delay time

6. Maintenance

The DS200 contains no wear or consumable parts. Maintenance is not required. Upon request, Arthur Grillo GmbH offers annual calibration with a factory certificate. For more information, please contact:

7. Warranty

Warranty and liability claims for personal injury and property damage are excluded if they are due to one or more of the following causes:

- Improper use of the device.
- Improper assembly, commissioning, operation and maintenance of the device.
- Unauthorized structural modifications to the device beyond its intended purpose.
- Improperly performed repairs.
- Disasters caused by foreign bodies and force majeure.

8. Error messages / malfunctions

Description	Activity
The display shows nothing.	Check electrical connection
The measured value remains at zero.	Functional test with slight pressure in the Differential pressure measurement mode
Measurement error	Perform zero point adjustment according to chapter 4.5.
Errors persist	Contact manufacturer
Display shows: !	The device is in alarm mode; see chapter 5.5.

9. Disposal

When disposing of electronic components and devices, please observe the legal regulations in the user's country regarding their disposal.

10. Specifications

Overload protection:	0.2 bar
Static pressure:	max. 0.2 bar
Zero-point calibration:	Adjustable via reed contact, no cyclic zero-point calibration required. Immediate measuring
Response time:	mode: air or
Operating mode:	non-aggressive
Measuring medium:	gases. Electromechanical diaphragm
Sensor:	measuring device. Pa / InH ₂ O or m ³ /h or cfm 0...50
Unit of measurement:	Pa (0.5 mbar)
Smallest measuring span:	
Largest measuring range:	0...6000 Pa (60 mbar)
Measuring ranges:	DS200-P2: 0...200 Pa, 0...150 Pa, 0...100 Pa, 0...50 Pa DS200-P10: 0...1000 Pa, 0...500 Pa, 0...300 Pa, 0...200 Pa DS200-P60: 0...6000 Pa, 0...4000 Pa, 0...3000 Pa, 0...2000 Pa Selectable via software menu: linear
Measuring range selection:	or square root Selectable via software
Characteristic curve:	menu Adjustable in 3 steps: -10...+50 °C, -25...+60 °C 1 limit value adjustable via software menu
Damping: Ambient temperature:	software menu
Storage temperature:	
Setpoint setting: Limit	
signal output / Alarm	
output: Open collector, max 30 V / 30 mA Alarm time delay:	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 ABS lid, 95 x 70 x 54 mm (W x H x D),
Dimensions:	approx. 250 g, IP 54; UL 94 HB
Weight:	according
Protection class:	to EN 60529, two-line alphanumeric LCD
Advertisement:	display, 2 x 16 characters, cable entry M16x1.5, screw terminals, electronics protected against reverse polarity, hose barbs 5 mm ø + 6 mm ø, vertical, depending on position,
Electrical connections:	
Pressure connections:	approx. 25 Pa when rotated 90°
Usage position:	
Supply voltage:	17...30 Vdc or 24 Vac ± 15% approx. 6
Power consumption:	mA @ 17 Vdc and 0...10 V output approx. 19 mA @ 30 Vdc and 0...10 V output Output: 0/2...10 V (I _{max} = 10 mA @ 20 Vdc, I _{max} = 17 mA @ 30 Vdc) / 0/4...20 mA, max load 200 ÿ

CE MARKING

10.1 CE marking

As an electrical device, the DS200 falls within the scope of Directive 2004/108/EC (EMC Directive). The following standards were applied within the framework of the EMC Directive:

DIN EN 61000-6-2:2006-03 Correction 1:2011-06	Electromagnetic compatibility (EMC) - Part 6-2: Technical standards - Immunity to interference for industrial areas
DIN EN 61000-6-3:2011-09	Electromagnetic compatibility (EMC) - Part 6-3: Technical basic standards - Interference emission for residential areas, Business and commercial sectors as well as small businesses

You can request the declaration of conformity here: