



testo 6341 / testo 6343 / testo 6349  
Differential pressure transmitters

Bedienungsanleitung

de

Instruction manual

en





# Foreword / Copyright

## Foreword

Dear Testo customer

We are delighted that you have chosen a product from Testo. We hope that the product will give you a long period of satisfaction and will aid you in your work.

If problems should occur which you cannot rectify yourself, please consult our service department or your dealer. We will endeavour to provide fast and competent assistance to avoid lengthy down times.

## Copyright

This documentation is subject to the copyright of testo AG. Reproduction and use contrary to the legitimate interests of Testo AG are prohibited without the prior, written consent of the company.

We reserve the right to modify technical details from the descriptions, specifications and illustrations contained in this documentation.

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# General Information

This documentation contains important information about the features and use of the product. Please read this document through carefully and familiarise yourself with the operation of the product before putting it to use. Keep this documentation to hand so that you can refer to it when necessary.

## Pictograms

The instrument may be dangerous if operated incorrectly. Particularly important information is highlighted in this Instruction manual by pictograms:

Warnings are indicated by a warning triangle. The corresponding **Warning word** indicates the danger level:



**Warning word**

**Warning!** means: Serious physical could be caused if the specified precautionary measures are not taken.

**Caution!** means: Slight physical injury or damage to equipment could occur if the specified precautionary measures are not taken.

Read the warning advice carefully and take the specified precautionary measures in order to avoid danger.

**!** Information about special cases or particularities when handling the instrument are highlighted by an exclamation mark.

## Standards/Approvals



According to the conformity certificate, this product fulfills guidelines in accordance with 89/336/EEC.



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# 1. Basic safety information

## **Avoid electrical hazards:**

- ▶ Never take measurements with the instrument and its probes on or near live components unless the instrument is expressly approved for current and voltage measurements.

## **Protect the instrument:**

- ▶ Never store the unit together with solvents (e.g. acetone).

## **Preserving product safety/warranty entitlement:**

- ▶ **Do not blow into the pressure connections!**
- ▶ Operate the instrument only within the parameters specified in the Technical data.
- ▶ Handle the instrument appropriately and according to its intended purpose.
- ▶ Never apply force!
- ▶ Protect measuring instruments from direct sunlight!
- ▶ Avoid use in corrosive gases.
- ▶ Do not seal off inputs (otherwise barometric pressure changes could damage instruments with low measurement ranges).
- ▶ Temperature data on sensors/probes refer only to the measurement range of the sensors. Do not subject handles and lines to temperatures greater than 70°C if they are not expressly approved for higher temperatures.
- ▶ Open the instrument for maintenance and repair purposes only if specifically described in the Instruction Manual.
- ▶ Maintenance work should only be carried out if described in the Instruction Manual. Please adhere to the steps described. For safety reasons, please only use spare parts from Testo.

Any additional work should only be carried out by authorised trained personnel. Otherwise Testo does not accept responsibility for the functioning of the instrument following maintenance and for the validity of approvals.

## **Dispose of carefully:**

- ▶ Once its service life has come to an end, return the instrument to us and we will dispose of it.



## 6 2. Intended use

# 2. Intended use

The **testo 6341 / testo 6343 / testo 6349** pressure transmitters are pneumatic electrical transmitters for pressure measurement (positive, negative and differential pressure). The most important part is a pressure cell with a membrane made of beryllium bronze which is moved between the two chambers of the pressure cell in accordance with differential pressure. The movement is measured without contact via an inductive displacement transmitter. The instruments do not have any frictional or mechanical wearing parts.

## 3. Product description

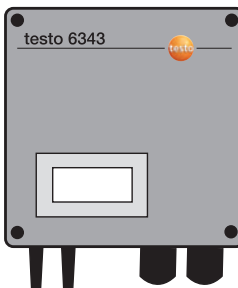


Pneu-  
matic  
connections

Cable  
connections

### testo 6341:

Differential pressure transmitter 0 to 10 Pa with automatic zero point adjustment, without display



### testo 6343

Differential pressure transmitter 0 to 10 Pa with automatic zero point adjustment, with display

### testo 6349

Based on **testo 6341** or **testo 6343**, but with custom-designed version, e.g. special measuring range

## 4. Initial operation

### 4.1 Operating mode of automatic zero point adjustment

Once supply voltage has been connected, an automatic zero point adjustment is carried out three times during the first hour (starting time for the sensor) which is then repeated approximately every hour. It is not possible to measure during the zeroing phase which lasts approx. 1 second. The value last measured is frozen and output during this phase. Automatic zero point adjustment compensates temperature drift and positional errors of the sensor in addition to the zero point error. A manual zero point adjustment (e. g. via potentiometer) is neither necessary nor possible.

### 4.2 Overload capacity



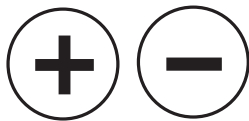
"Blowing into" the pressure connections could result in the maximum values being exceeded.

Such a "test" should be avoided.

If pressure is applied to one of the inputs which is greater than the maximum limit value (140% of the measurement range), a solenoid valve separates the process pressure from the pressure cell so that it remains undamaged. The measurement cell is vented from both sides. The valves to the process pressure are then reopened or the procedure repeats itself. The last value measured is output at the signal output.

If idle, the sensor is safe at both inputs up to 200 kPa positive pressure. During operation, it provides positive pressure safety at both inputs of up to 200 times the full scale value of the measurement range (with 10Pa measurement cells therefore 2000Pa, i.e. 20mbar), but in measurement cells  $\geq 25$ mbar: overload maximum 6 bar.

### 4.3 Mounting and pneumatic connection



The **testo 6341**, **testo 6343** and **testo 6349** pressure transmitters are precision measuring instruments and should be handled with care in spite of their robustness. Avoid mounting near heat and radiation sources. It is advisable to attach (with screws) the instruments to a vibration-free wall in a **vertical position** (hose connections for pressure  $\oplus$  and negative pressure  $\ominus$  should point downward).

**Generally, the higher pressure is connected to the pressure connection  $\oplus$ .** Positive pressure can be measured at the  $\oplus$  input of the sensor or negative pressure at the  $\ominus$  input where the pressure measurement ranges go from 0 to the measurement range full scale value.



Example: Sensor with measurement range 0 to 10 Pa and output 4 to 20mA

Positive pressure measurement: 0 to +10 Pa at the  $\oplus$  input; 4 to 20mA at output (standard)

Negative pressure measurement: 0 to - 10 Pa at  $\ominus$  input; 4 to 20mA at output

Positive pressure can be measured at the  $\oplus$  input of the sensor while negative pressure can be measured at the  $\ominus$  input where the pressure measurement ranges are 0 to  $\pm$  of the measurement range full scale value.

Example: Sensor with measurement range 0 to  $\pm$ 10 Pa and output 4 to 20mA:

-10 Pa at  $\oplus$  input; 4mA at output

0 Pa at  $\oplus$  input; 12mA at output

+10 Pa at  $\oplus$  input; 20mA at output

## 4.4 Analog outputs



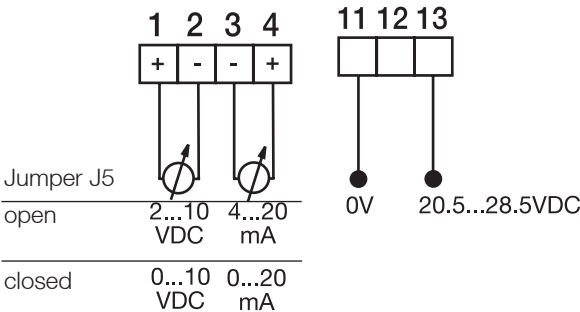
Before the supply voltage is connected it must first be defined, via jumper J5 and rotary switch S1, as to which analog signal is to be used (see below and diagram on page 10).

20.5...28.5VDC supply voltage is connected to the terminals (11 and 13) in accordance with the connection diagram in the housing lid.

The output signals are available at the signal terminals (1 to 4):

### Signal output

### Power supply

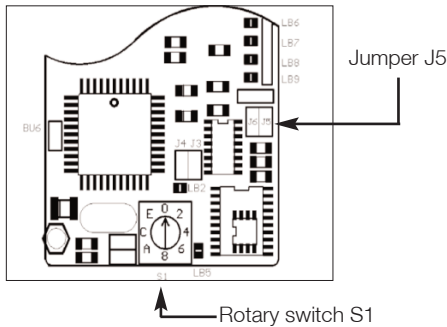


Using a jumper (J5), the voltage output can be configured to 2 to 10V or 0 to 10V or the current output can be reconfigured from 4 to 20mA to 0 to 20mA (compare above diagram).

10 4. Initial operation  
4.4 Electric connection and analog outputs

Using a jumper (J5), the voltage output can be configured to 2 to 10V or 0 to 10V or the current output can be reconfigured from 4 to 20mA to 0 to 20mA (compare above diagram).

Using the S1 switch, the time constant of the sensor can be set in accordance with the following table. The higher the time constant, the more dampened the reaction of the output signal (floating mean value).



Switch position	Time constant	Output signal
0	None	linear
1	1s	inear
2	2.5s	linear
3	5s	linear
4	10s	linear
5	20s	linear
6	30s	linear
7	40s	linear

Switch position 8 - F only relevant for volume flow measurements in connection with orifice plates, pitot tubes or similar.

Setting will be carried out on request by factory. The following information is necessary:

Max. signal  $\hat{=}$  max dP  $\hat{=}$  max. velocity / flow

Example: 20mA  $\hat{=}$  95mbar  $\hat{=}$  20m<sup>3</sup>/h

## 4.5 Adjustment

A manual zero adjustment (at 0 Pa) is generally not necessary, see chapter 4.1. The automatic zero adjustment makes such handling superfluous.

Thanks to the excellent long-term stability also an adjustment of span (full scale) is usually not necessary.

In case the user wants or has to perform the adjustment, and he has a very precise pressure reference (pressure generator), here is the description of the adjustment procedure:

**!** The display value is driven by the voltage signal, so it makes sense to calibrate the voltage signal rather than the current signal. Anyhow, this description gives both values. The current values (range 0..20 mA, no matter how jumper J5 is set) are given in squared brackets [...].

**!** There are three types of dP ranges. Please identify your type (see table) and perform the corresponding procedure (steps 1, 2 etc.). Grey areas in the table show steps that are not used for the adjustment (e.g. for ranges type B there is no adjustment at 25%, 50% or 75% of full scale).

Hint

Ranges of type B can be treated as type C in case 5 instead of 2 adjustment points shall be used.

Range type	Characteristical range	Example	Adjustment point in percent of full scale (pressure scale)				
			0%	25%	50%	75%	100%
			The following pressure values (in Pa, referring to the examples) have to be supplied by the reference pressure generator.				
A	Ranges 0...xx Pa	0..50 Pa	0	12,5	25	37,5	50
B	Ranges +/- xx Pa	-100..+100 Pa	-100				100
C	Asymmetric ranges	-10..+60 Pa	-10	7,5	25	42,5	60

### 4.5.1 Start teaching mode

Testo 6341 / 6343 gets adjusted in "teaching mode". Please perform as follows:

- Interrupt the power supply of the instrument
- Close Jumper J1, see drawing
- Disconnect pressure connections (dP=0)



- Supply the instrument again; it is now in "teaching mode"
- An eventual offset is now set to zero

### 4.5.2 Adjusting 0%:

You will now measure a value of 1,25 VDC between the voltage output connectors and 2 [respectively 2,5 mA between connectors 3 and 4]. Close Jumper J2 shortly and open it again (this way it is written into the EEPROM). Now the voltage output (connectors 1 and 2) shows 0 VDC [the current output, connectors 3 and 4, shows 0 mA]. If it doesn't, you can now adjust the zero signal by turning potentiometer P2 until the voltage output is at 0 VDC [until the current output is at 0 mA].

Now pressurize as follows (using the reference pressure generator):

- For ranges type A: Leave the pressure connections open ( $dP = 0$ )
- For ranges type B: Pressurize the pneumatic "minus" with 100% (full scale value, e.g. 100 Pa) supplied by the pressure reference.
- For ranges type C: Supply the minimum pressure range value, e.g. 10 Pa, to the pneumatic minus (or to pneumatic plus, if the minimum range is  $> 0$  Pa)
- Then (for all types) close jumper J2 shortly and open it again.

### 4.5.3 Adjusting 100%

Now the voltage output (connectors 1 and 2) shows 10 VDC [20 mA]. If it doesn't, you can now adjust the span signal by turning potentiometer P3 until the voltage signal reaches exactly 10 VDC [by turning potentiometer P4 until the current signal reaches exactly 20 mA]. Then pressurize the pneumatic "plus" with 100% of full scale. Then close jumper J2 shortly and open it again.

- For ranges type B: Please stop pressurizing the instrument ( $dP=0$  Pa). Please check if the voltage output now shows 5 VDC [the current output 10 mA] and close jumper J2 shortly and open it again. Then please check if the voltage output now shows 2,5 VDC [the current output 5 mA] and close jumper J2 shortly and open it again. The output will now change to 18 VDC [34 mA]. Disconnect jumper J1, switch the instrument off and then on again. Testo 6341/6343 is now ready to use; do not perform steps 4.5.4, 4.5.5, 4.5.6 and 4.5.7.

### 4.5.4 Adjusting 50% (only types A or C)

Now the voltage output (connectors 1 and 2) shows 5,0 VDC [10 mA]. Now please pressurize the pneumatic "plus" with 50% of full scale. Then close jumper J2 shortly and open it again.

### 4.5.5 Adjusting 25% (only types A or C):

Now the voltage output (connectors 1 and 2) shows 2,5 VDC [5 mA]. Now please pressurize the pneumatic "plus" with 25% of full scale. Then close jumper J2 shortly and open it again.

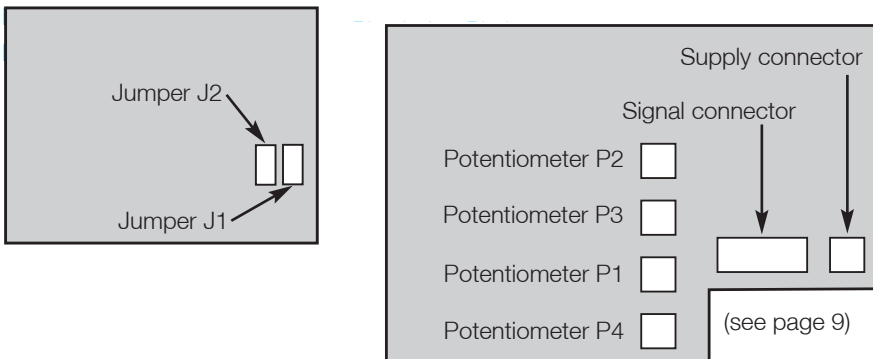
### 4.5.6 Adjusting 75% (only types A or C)

Now the voltage output (connectors 1 and 2) shows 7,5 VDC [15 mA]. Now please pressurize the pneumatic "plus" with 75% of full scale. Then close jumper J2 shortly and open it again.

### 4.5.7 Finish (only types A or C):

Now the voltage output shows 1,25 VDC [2,5 mA]. Now please again pressurize the pneumatic "plus" with 75% of full scale. Then close jumper J2 shortly and open it again. The voltage output now goes to 18 VDC [34 mA]. Disconnect jumper J1, switch the instrument off and then on again. Testo 6341/6343 is now ready to use.

Simplified drawing of electronics boards:



Else please check page 14 for our calibration offers.



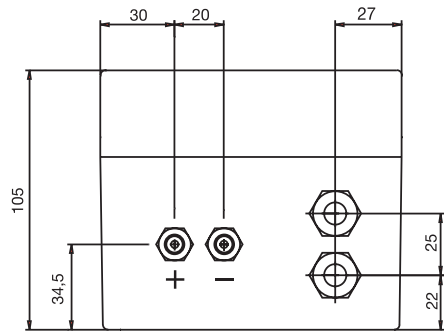
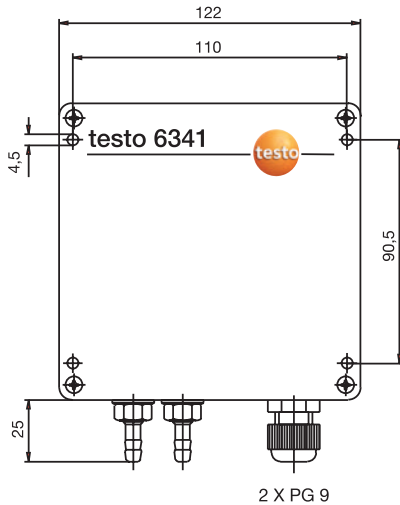
## 5. Error description

Error description	Possible cause	Troubleshooting
No output signal	Supply voltage not connected	Connect correct supply voltage
	Incorrect supply voltage connected	Connect correct supply voltage (see type plate)
	Fuse defective	Replace fuse S1 or S2
	Input protection diode defective	Replace D3 (P6KE30A) at 230VAC, D2 (1N4007) at 24VDC
Defective output signal	Output protection diode defective	Replace D7/D8 (PKE18A)
	Pressure connections were interchanged	Connect pressure connections correctly (watch out for +/-)
	Pressure measurement cell defective	Send instrument to manufacturer for repair
	Load too high at current output	Adhere to max. load of 500Ω
Cyclical "clicking" of valve	Max. nominal pressure is exceeded, the instrument goes into the positive pressure mode	Connect max. pressure (see type plate)
No display	Display plug is inserted incorrectly	Turn display plug

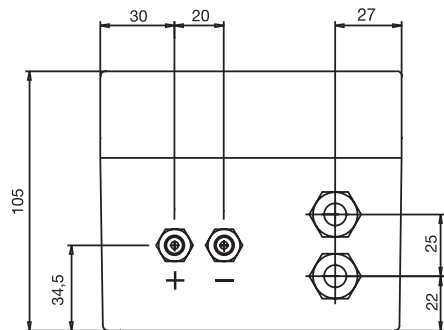
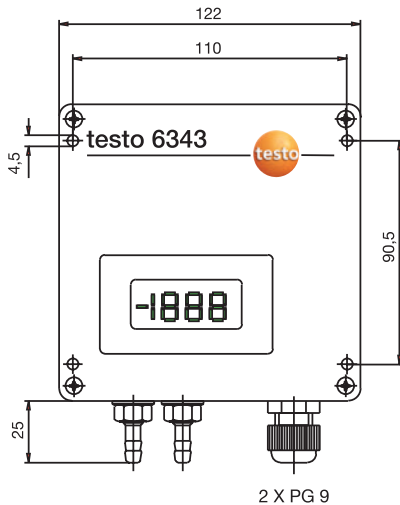
If we have not answered your question, please contact your local distributor or Testo's Customer Service. You will find contact details in the Warranty booklet or in Internet at [www.testo.com](http://www.testo.com).

## 6. Dimensioned drawings

testo 6341 / testo 6349 (on the basis of 6341)



testo 6343/testo 6349 (on the basis of 6343)



# 7. Technical data

Feature	Values
Measurement ranges	0 to 10Pa to 0 to 100kPa or $\pm 10\text{Pa}$ to $\pm 100\text{kPa}$ (standard testo 6341/6343: 0 to 10Pa)
Output signal	4 to 20mA linear (standard; load $R_L \leq 500\Omega$ ) Can also be set: 0 to 10V/2 to 10V, ( $R_L \geq 2\Omega$ ) 0/4 to 20mA; ( $R_L \leq 500\Omega$ )
Medium	Air, all non-aggressive gases
Supply voltage	20.5 to 28.5VDC
Measurement inaccuracy	0.35Pa* +0.6% of full scale, measurement inaccuracy of reference is 0.3Pa
Hysteresis	0.1% of full scale value
Overload capacity	200 times (above 25 mbar: 6 bar) <b>Please note:</b> Measurement cell may be damaged at higher pressures
Zero point drift	0, on account of periodic zero adjustment
Drift measurement range	$(0.03\% \text{ of full scale value}) \times \frac{ t-22 }{^\circ\text{C}}$
Time constants	1s, 2.5s, 5s, 10s, 20s, 30s, 40s can be switched (rotary switch S1)
Utilisable measurement range	-5% to 110% of full scale value (See Fig. 1 and 2)
Working temperature	0°C to 60°C
Storage temperature	-10°C to +70°C
Power consumption	Approx. 5VA
Protection class	IP65 with pressure and electricity lines installed
Connections	Electric: 2 PG 9 screw connections, screw terminals $\varnothing 2.5\text{mm}^2$ Pneumatic: Hose connections $\varnothing 6.5\text{mm}$ , for hose with nominal width 4 or 5mm
Housing in mm (l x b x h):	122 x 120 x 105
Weight	Approx. 1500g
EMC	acc. to 89/336/EWG

\* The measurement inaccuracy of the reference is 0.3Pa

Voltage output 0...10V depending on full scale value. 100% = Full scale value of diff. pressure meas. range

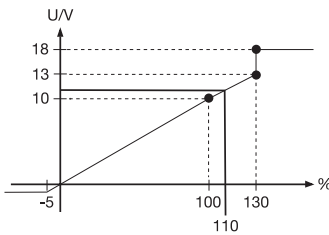


Fig. 1

Current output depending on full scale value. 100% = Full scale value of differential pressure measurement range

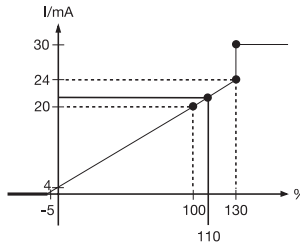


Fig. 2



## 8. Accessories

Name	Part no.
dP transmitter 0 to 10Pa, automatic zeroing, without display	0555 6341
dP transmitter 0 to 50Pa, without display	0555 6342
dP transmitter 0 to 10Pa, automatic zeroing, with display	0555 6343
dP transmitter 0 to 50Pa, with display	0555 6344
ISO calibration with 5 points (0-25-50-75-100-0 (all points in % of full scale value))	0520 0005
ISO calibration at freely selectable points	0520 0105
Silicone hose, 5m long, 4mm inner diameter, 1.5mm wall thickness	0554 0440
External display testo 54-2AC, 2 relay outputs (to 300VAC, 3A), 230VAC	5400 7553
Power unit (DIN rail mounting) 90 to 264VAC / 24VDC (3A)	0554 1749



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