FISCHER MESS- UND REGELTECHNIK

Data sheet

DE05 | Differential pressure transducer

Applications

The differential pressure transducer is suitable for measuring over-pressure, under-pressure and differential pressure in industrial measuring technology.

Important features

- highly corrosion-resistant
- sturdy wear-resistant measuring unit
- rinsable pressure chambers
- can also be used in aggressive media

Typical applications

- filling level measurement
- Flow rate metering
- monitoring of filters and compressors

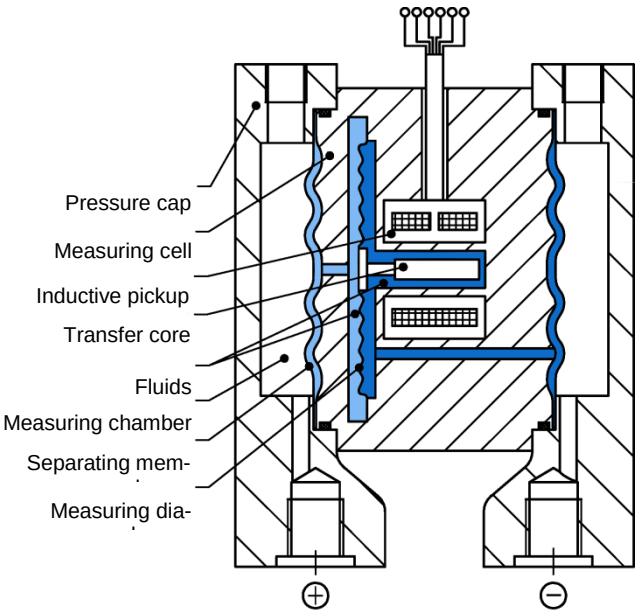
Design and mode of operation

The differential pressure transducer DE05 has a modular design. Together, the measuring cell and pressure caps form the differential pressure measuring mechanism. The electronics comprising the power supply, amplifier and control PCB are located in a housing with protection class IP65. The differential pressure measuring cell and electronics housing are screwed to each other.

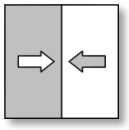
If the pressure conditions are the same on both sides of the measuring cell, the separating membranes, measuring membranes and inductive pickup system are in idle. If there is a differential pressure ΔP between the (+) and (-) side, the separating membranes move and the measuring membranes leave their idle position due to the hydraulic coupling via the filling fluid. The measuring membrane compensates the pressure force.

Due to the changed position of the measuring membrane with the differential transformer core, a differential pressure-proportional voltage change takes place in the inductive pickup system. The downstream electronics convert the voltage change into a direct current signal.

Functional Schematic



Measuring media con-



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Technical data

Measuring ranges	mbar 0…100	mbar 0…160	mbar 0…250	mbar 0…400	mbar -40…+60	mbar -60…+100	mbar -100…+150	mbar -150…+250	bar 0…0.6	bar 0…1	bar 0…1.6	bar 0…2.5	bar 0…4	bar 0…6	bar[1] 0…10	bar 0…16	bar 0…25
Max. static pressure	250 bar																

General points

Measuring principle	Fluid-filled membrane system with inductive pickup system (see function chart page 1)
Measuring media	Gases, vapours, fluids (that are compatible with EPDM O-rings)
Max. static pressure	PN 250
Measuring ranges	100 mbar … 25 bar (Customer-specific measuring ranges possible)
Measuring span	Can be set steplessly from 20% … 100% of the max. measuring range
Measuring start	Can be set steplessly from 0% to 100% of the measuring range when the characteristic curve falls (switchable) can be set steplessly from 100% to 0% of the measuring range
Overload limit	On each side of the measuring unit 100% PN
Temperature or measuring media	-10 °C … +70 °C

Ambient conditions

Ambient temperature	-10 °C … +70 °C
Storage temperature	-25 °C … +80 °C
Humidity	≤95% annual mean value, moisture condensation permissible
Electromagnetic compatibility	DIN EN 61000-6-2 (interference resistance in the industrial field) DIN EN 61000-6-4 (emitted interference in the industrial field)

Electrical data

Technology	Analogue
Electrical connection type	4-conductor, electrically isolated
Auxiliary energy	24V DC +50 % / -25 % 5 W
Output signal	0/4 … 20 mA
Test socket	Checking the output signal
Admissible resistance	0 … 750 Ohm
Characteristic curve	Linear, rising or falling (switchable)
Square root extraction (optional)	root-extracted, useful range between 10 % and 100 %
Zero-point suppression	≤ 0.6%
Rising time (damping module)	0.3; 0.6; 1.0; 1.5; 3; 5 and 10s (pluggable)

[1] can be electrically expanded to 11 bar

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Technical data (cont'd)

	Measuring chamber
Measuring chamber volume	21 cm³
Displacement volume	2.0 cm³
Fluids	Baysilone oil PD 5
Measuring membranes	Nickel-Beryllium / Duratherm
	Materials that come into contact with the measuring media
Measuring chamber	Chromium nickel steel 1.4571 (AISI 316Ti)
Separating membrane	Chromium nickel steel 1.4571 (AISI 316Ti)
Pressure caps	Chromium nickel steel 1.4571 (AISI 316Ti)
Pressure caps O-rings	EPDM
Prozessanschluss	Chromium nickel steel 1.4571 (AISI 316Ti)
Screw plugs	Chromium nickel steel 1.4571 (AISI 316Ti)
	Housing
Device structure	Compact design
Housing (amplifier housing)	Copper-free aluminium (AlMgSiPb)
Protection class as per EN 60 529/IEC 529	IP65
Assembly type	Direct assembly flanged to the fitting Wall and pipe assembly, material 1.4301 (AISI 304) Deviation from the vertical ±10 °
Nominal position, installation position	Vertical, amplifier in front position
Device blockage (optional)	Device blockage for 3/5-set valve blocks, can be directly flanged acc. to DIN EN 61518, with connection thread 7/16 - 20 UNF
colour	2K-epoxy coloured paint RAL 5021 silk-gloss
	Ports
Device connection	Plug / plug connection Harting HAN 7D
Prozessanschluss	Oval flange in compliance with DIN EN 61518, G ¼ inner thread
	Weight
Differential pressure transducer	≤ 8.8 kg
Assembly parts	≤ 0.6 kg (wall mount)

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Technical data (cont'd)

Error tolerances according to DIN EN 60770

	Characteristic curve conformity[2]		
	Linear characteristic curve	Rooted characteristic curve for flow rate measurements	
		at Q = 10 … 30%	at Q > 30 … 100%
Measurement deviation (Non-linearity, hysteresis, non-repetitive)	≤ 0.75 %	≤ 2 %	≤ 1 %
Non-linearity/noncompliance	≤ 0.4 %	≤ 0.65 %	≤ 0.65 %
Hysteresis	≤ 0.4 %	≤ 0.4 %	≤ 0.4 %
Non-repetitive	≤ 0.3 %	≤ 0.3 %	≤ 0.3 %
	Temperature influence[2]		
on the zero-point/useful start	≤ 0.2 % / 10 K	≤ 1 % / 10 K (at Q=10%) [3]	
on the measuring span	≤ 0.2 % / 10 K	≤ 1 % / 10 K	
on the measured value at Q = 20%		≤ 0.5 % / 10 K	
on the measured value at Q = 30%		≤ 0.4 % / 10 K	
on the measured value at Q = 50%		≤ 0.2 % / 10 K	
on the measured value at Q = 100%		≤ 0.2 % / 10 K	
	Static pressure influence[2]		
on the zero-point/useful start	≤ 0.1 % / 10 bar	≤ 0.5 % /10bar (at Q=10%) [3]	
on the measuring span	≤ 0.15 % / 10 bar	≤ 0.75 % /10bar (at Q=10 100%)	
on the measured value at Q = 20%		≤ 0.25 % / 10 bar	
on the measured value at Q = 30%		≤ 0.2 % / 10 bar	
on the measured value at Q = 50%		≤ 0.1 % / 10 bar	
on the measured value at Q = 100%		≤ 0.1 % / 10 bar	
	Impact of range overstepping by 50% of the measuring range in both directions[2]		
on the zero-point/useful start	≤ 0.2 %	≤ 1 %/25 bar (at Q=10%) [3]	
on the measuring span	≤ 0.2 %	≤ 1 %/25 bar (at Q=10…100%)	
	Impact of range overstepping in both directions with PN[2]		
on the zero-point/useful start	≤ 0.2 % / 25 bar	≤ 1 %/25 bar (at Q=10%) [3]	
on the measuring span	≤ 0.2 % / 25 bar	≤ 1 %/25 bar (at Q=10…100%)	
	Electrical influences		
Power supply influence	≤ 0.01% / V		
Output load influence	≤ 0.01 % / 100 Ohm		
Output ripple	≤ 3 %		
Grounding influence	≤ 0.1 %		
Energy input	≤ 5 W		
Insulation resistance	> 1 MΩ		
Withstand voltage	≤ 500 V AC		

[2] All deviations do not refer to the non-spread measuring range. These deviations increase proportionally to the set spread.

[3] 2.5 times the value of the useful start apply for the zero-point (Q=0%) for root-extracted characteristic curves

Technical data (cont'd)

Error tolerances according to DIN EN 60770

Jump response

	Linear characteristic curve		Rooted characteristic curve for flow rate measurements	
Measuring range	≤160 mbar	≥ 250 mbar	≤160 mbar	≥ 250 mbar
Time constants (0…63 %)	< 0.8 s	< 0.4 s	< 0.8 s	< 0.4 s
Rising time (0…90 %) (without damping module)	< 1.2 s	< 0.8 s	< 1.2 s	< 0.8 s

Other influences[4]

	Linear characteristic curve	Rooted characteristic curve for flow rate measurements
		at Q > 30 … 100%
Long-term stability (long-term drift) / every six months	≤ 0.2 %	≤ 0.2 %
Behaviour in case of system-related pressure oscillations (at a max. amplitude of ±10 % FS and a frequency of 10 … 80 Hz)	The constant component of the output signal is not impacted on impermissibly by the superimposed pressure oscillations.	

Position dependency for ±10° [4]

	Linear characteristic curve	Rooted characteristic curve for flow rate measurements	
Measuring range		at Q = 10 … 30%	at Q > 30 … 100%
100 mbar	< 1.2 %		
160 mbar	< 0.8 %		
250 mbar	< 0.6 %	Please note the root extracting function	
400 mbar	< 0.4 %		
> 400 mbar	< 0.3 %		

[4] All deviations do not refer to the non-spread measuring range. These deviations increase proportionally to the set spread.

Technical data (cont'd)

for the scope, power station KTA 3505'

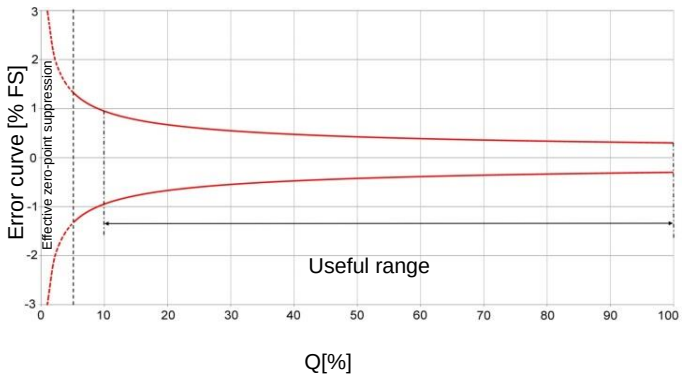
	Design 'K'
Product qualification	in compliance with KTA 3505
Area of application	Reactor protection system "KMV incident - ring room leak 1"
Safety-relevant classification	according to DIN IEC 61226 in category A
Manufacturer qualification	KTA 1401
Assembly type	Assembly in compliance with operating equipment installation plan
allowed deviation during mechanical load in compliance with KTA3505 Sec. 5.8	≤ 3% [5] Test was carried out in compliance with the operating equipment installation plan DE05 (09.005.00.35144.3)

Measurement deviation for KMV incident loss of coolant[6]

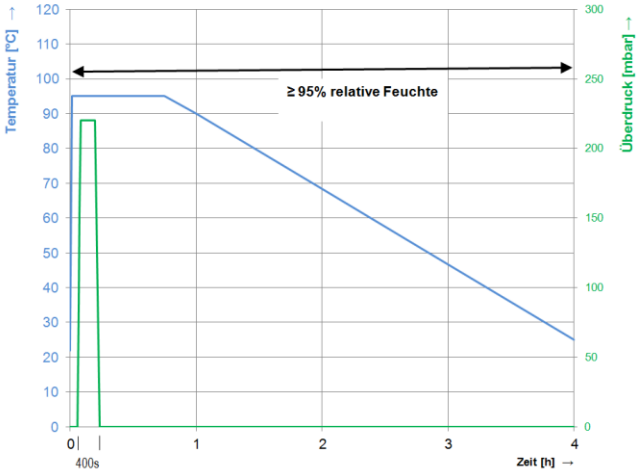
	Linear characteristic curve	Rooted characteristic curve for flow rate measurements	
		at Q = 10 … 30%	at Q = 30 … 100%
Behaviour in case of pressure, temperature and moisture load	≤ 5 %	Please note the root extracting function	
Measuring deviation after pressure, temperature and moisture load	≤ 2 %	Please note the root extracting function	
Behaviour in case of radiation load[7]	≤ 5 %	Please note the root extracting function	

Incorrect information about root-extracted characteristic curve

The relatively large allowed deviations for measuring transducers with root-extracted characteristic curves are based on the curves of the root-extraction function graph. An example curve is shown in the following figure.



Unique allowed incident load



[5] Deviation after the load: see information under measuring deviation page 4

[6] All deviations do not refer to the non-spread measuring range. These deviations increase proportionally to the set spread.

[7] Behaviour in case of a dosing output 5Gy/h < Ḋ ≤ 25 Gy/h up to a total dose of 1000 kGy.

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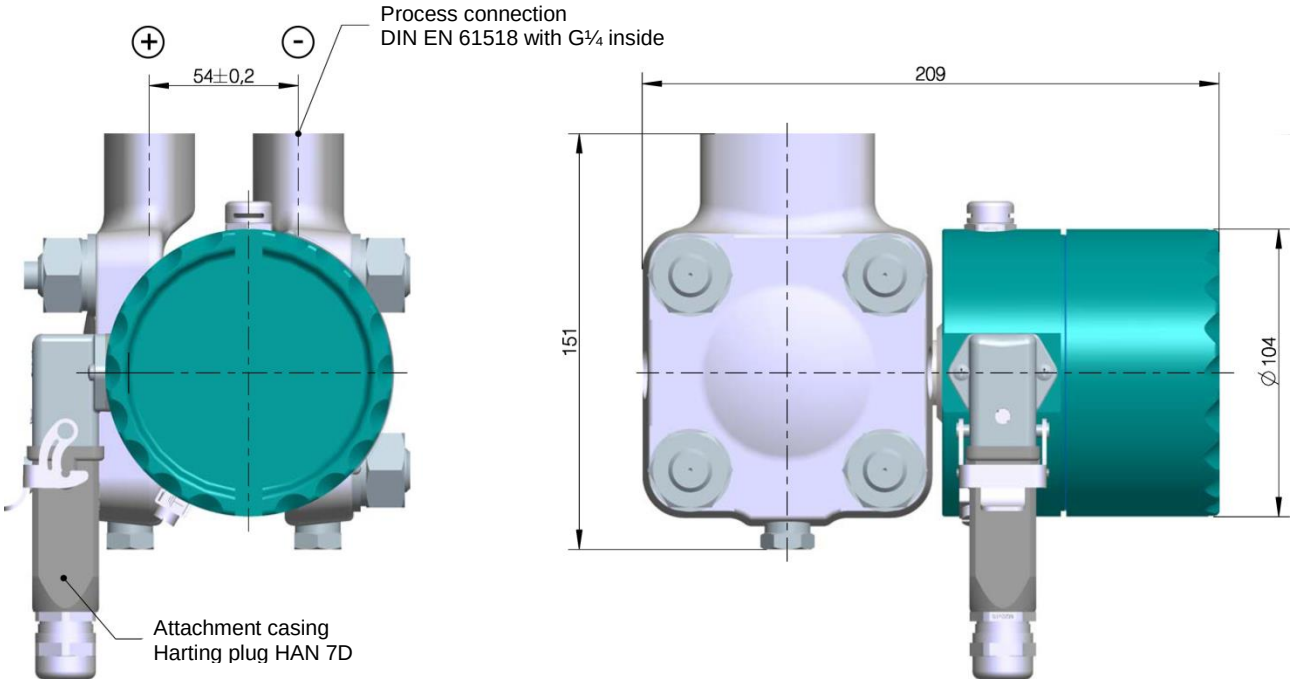
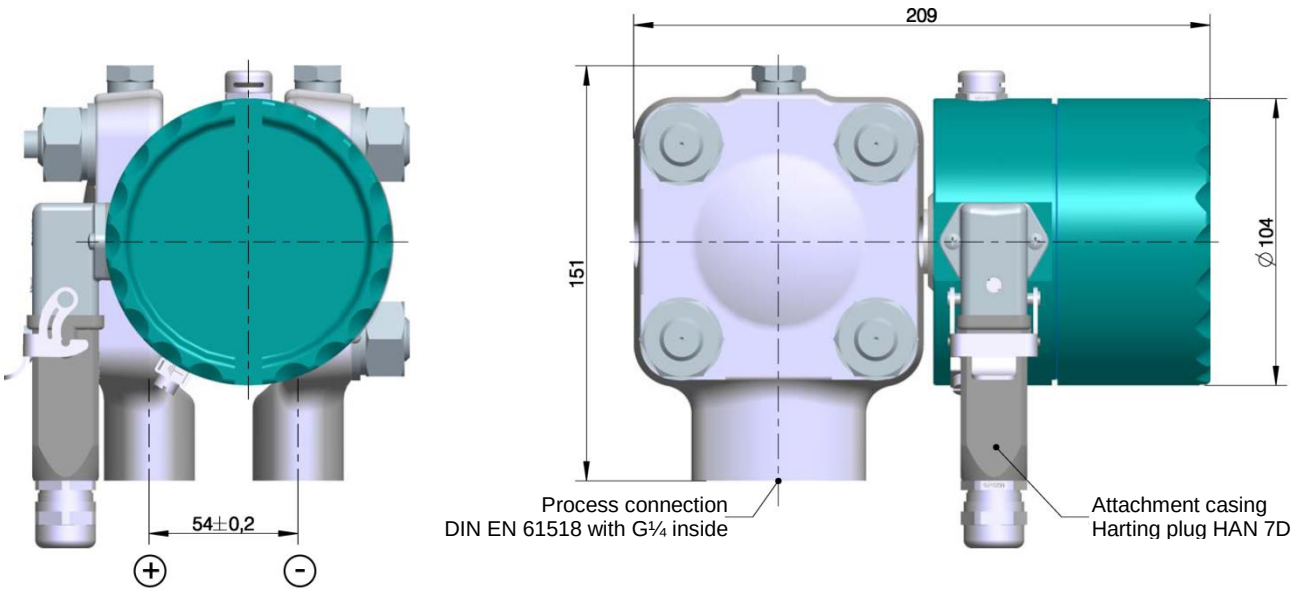
Dimensional drawings (all dimensions in mm unless otherwise specified)

Process connection design above



Process connection design below



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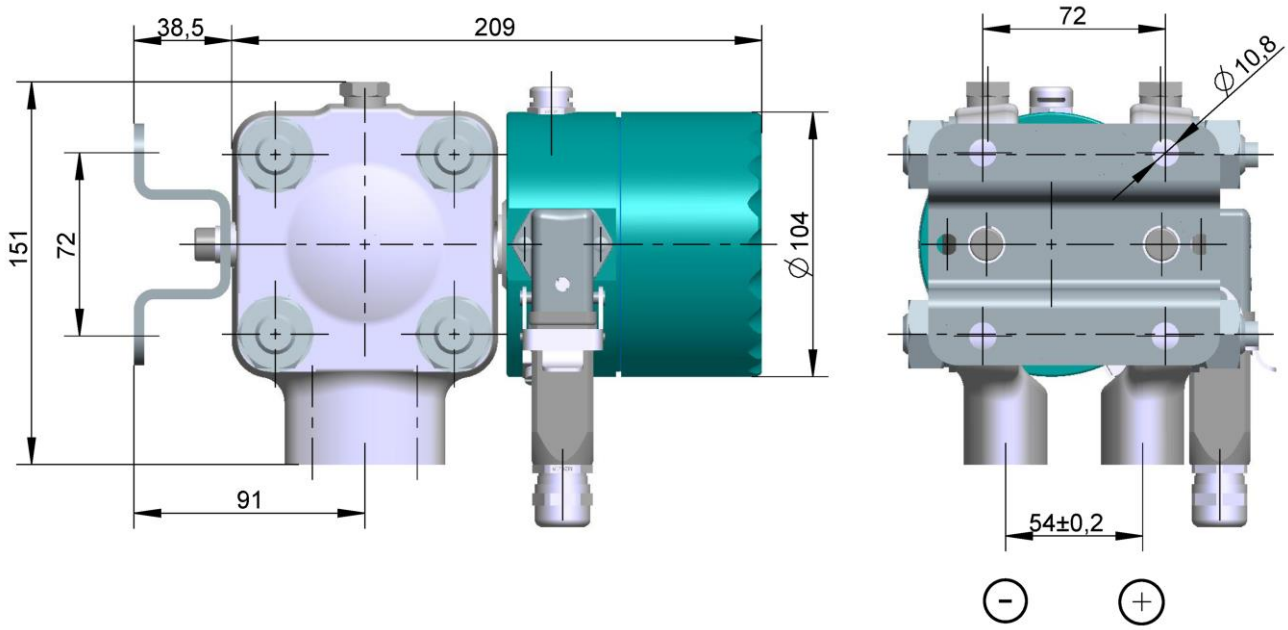
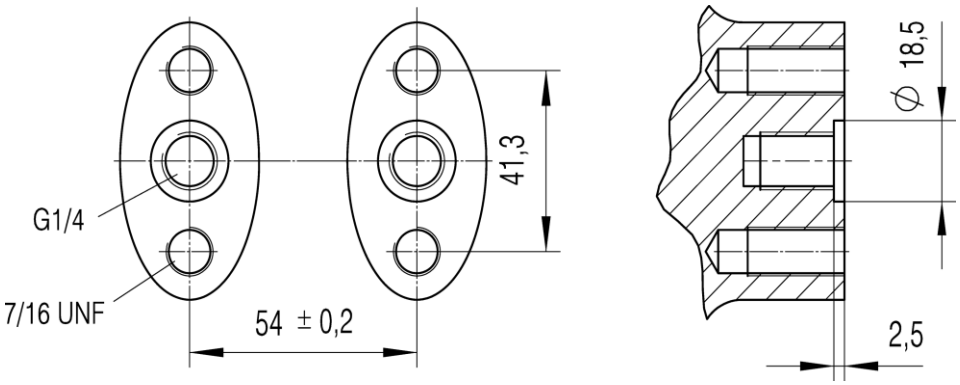
Dimensional drawings (cont'd)

Wall mounting version



Flange connection



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Order Codes

Differential pressure transducer

Type DE05 | | | | **0** | **0** | **4** | | **9** | | | | | **U####**

Measurement range

0 100	mbar	> **5 9**
0 160	mbar	> **6 0**
0 250	mbar	> **8 2**
0 400	mbar	> **8 3**
-40 ..... +60	mbar	> **7 0**
-60 ... +100	mbar	> **7 2**
-100 . +150	mbar	> **7 4**
-150 . +250	mbar	> **7 6**
0 0,6	bar	> **0 1**
0 1	bar	> **0 2**
0 ..... 1.6	bar	> **0 3**
0 ..... 2.5	bar	> **0 4**
0 4	bar	> **0 5**
0 6	bar	> **0 6**
0 10	bar	> **0 7**
0 16	bar	> **0 8**
0 25	bar	> **0 9**

Area of application

Industry ..... > **0**
Power station KTA 3505..... > **K**

Pressure connection

Flange connection according to DIN 61518 with G1/4 **0 4**

Electrical output signal

0–20 mA linear, 4-conductor ..... > **A**
0–20 mA root extracted, 4-conductor ..... > **E**
4–20 mA root extracted, 4-conductor ..... > **F**
4–20 mA linear, 4-conductor ..... > **P**

Operating voltage

24 V DC (18 - 36 V DC)..... > **9**

Assembly

Direct assembly ..... > **0**
Wall mounting ..... > **W**
Pipe mounting ..... > **R**

Design

Process connection above ..... > **0**
Process connection below..... > **U**

Electronic attenuation

without ..... > **0**
0.3 s..... > **1**
0.6 s..... > **2**
1.0 s..... > **3**
1.5 s..... > **4**
3.0 s..... > **5**
5.0 s..... > **6**
10.0s..... > **7**

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Order Codes (cont'd)

Differential pressure transducer

Type DE05				0	0	4		9					U####

AKZ (Please clearly state the system code in plain text on the order!)

without system code ..... > **0**
with system code on the type plate..... > **1**

Customer-specific measuring range:

When a customer-specific measuring range is ordered, the next largest standard measuring range is selected.
The customer-specific measuring range must be stated in plain text on the order.
The order code is supplemented with an attached code ex works to securely identify the device.

Example: DE05020004A9W000 **U####**

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