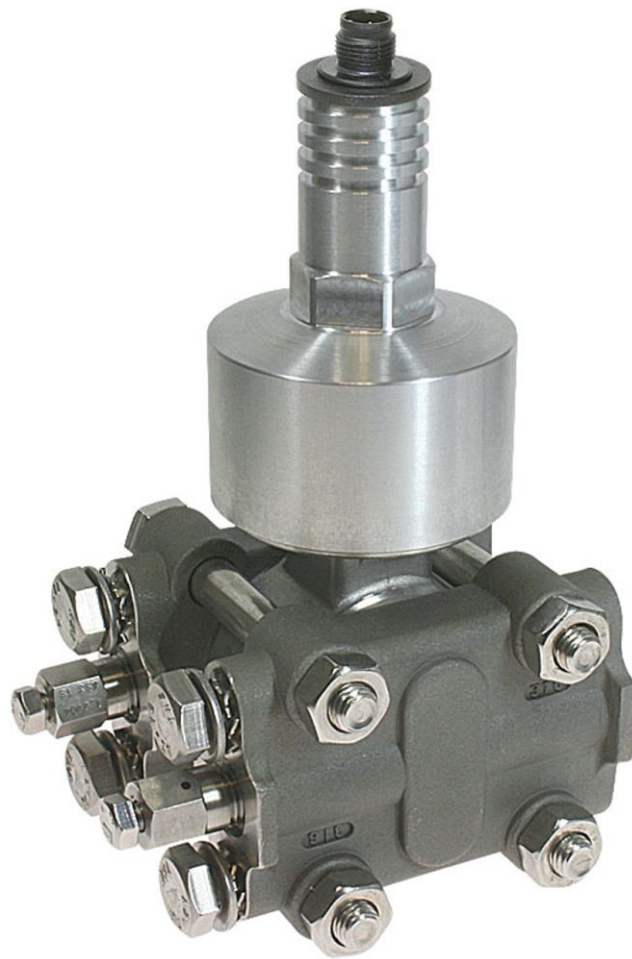


**Technical documentation**

# MKDS



---

**● Content**

Page 2: Characteristics - applications - technical data

Page 3: Technical data - input quantity - output quantity

Page 4: Process connection

Page 5: Electrical connection

Page 6: Dimensions - wall- and tube mounting - HART communication

Page 7: Definitions

Page 8: Ordering code

## ● Characteristics

- Input:	differential pressure (Measuring range: 75 mbar up to 420 bar)
- Output:	4...20 mA current loop (12...45 VDC), HART-protocol
- Turn down:	up to 100:1
- Accuracy:	0,075%, 0,1, 0,2% of range (URL, LRL)
- Electrical connection:	several options (see page 5)
- Configuration:	with software
- Material enclosure:	stainless steel (degree of protection: IP65)
- Process connection:	1/4-18 NTP (pressurized parts: stainless steel 1.4435)
- Temperature medium:	-40...+104°C

## ● Applications

The pressure sensor is suitable to measure differential pressure. From this can be derived: flow rate (volumetric- and mass flow) and level (level, volume, mass). Typical areas of use are chemical industry and process engineering.

## ● Technical data

### Input

Differential pressure:	75 mbar / 400 mbar / 2 bar / 7 bar / 21 bar / 70 bar / 200 bar / 420 bar
Static pressure:	30...420 bar

### Output

Analog:	4...20 mA, 2-wire, with superimposed communication signal (HART-protocol)
Signal range:	3,6...22,8 mA
Signal failure:	3,6 mA

### Accuracy

Type 75 mbar:	0,1% of FS up to turn down 5:1 $\pm(0,1+0,01*URL/URV)$ for turn down 5:1 to 50:1
Types 400 mbar / 2 bar:	0,075% of FS up to turn down 10:1 $\pm(0,0751+0,00751*URL/URV)$ for turn down 10:1 to 100:1
Types 7 bar / 21 bar / 70 bar:	0,075% of FS up to turn down 10:1 $\pm(0,0751+0,00751*URL/URV)$ for turn down 10:1 to 100:1
Types 200 bar / 420bar:	0,2% of FS up to turn down 10:1 $\pm(0,2+0,01*URL/URV)$ for turn down 10:1 to 100:1
Influences:	
static pressure:	zero: $\pm 0,1\%/70$ bar - range: $\pm 0,2\%/70$ bar
supply:	<0,005% of nominal range/1V
vibration:	<0,01% of nominal range/g at 200 Hz
fitting position:	zero drift, to compensate
span drift:	without
temperature:	<0,45%/55°C
stability:	$\pm 0,1\%$ of nominal range / 1 year

### Settings

Rise-delay time:	5 s
Cycle time, update:	0,25 s
Damping:	200 ms (without consideration of electronic damping)
Filter adjustment:	0...160µA

### Supply

Voltage:	12...45 VDC (current loop)
Insulation resistance:	>250 MOhm
Short circuit-proof:	permanent
Reverse battery protection:	yes (no destruction, no function)
Overvoltage protection:	500V

### Environmental conditions

Operating temperature:	-40...+85°C
Ambient temperature:	-40...+85°C
Temperature medium:	-40...+104°C
Storing temperature:	-40...+85°C
Humidity:	5...98% relative humidity

## ● Technical data (continued)

### Mechanics

#### Material:

Enclosure electronics: stainless steel 1.4571  
 Electrical connection: PTB GF30 (insert)  
 Measuring membrane: stainless steel 1.4435 / option:Hastelloy  
 Ventilating valve: stainless steel 1.4435  
 Joint pieces: stainless steel 1.4435  
 O-ring: Viton (FKM, FPM), is in contact with medium  
 Flange screws: plain carbon steel, zinc coated

Process connection: 1/4-18 NPT  
 Dimensions: see page 7  
 Protection: degree IP 65  
 Weight: approx. 3,3 kg  
 Electrical connection: several plugs, cable (see page 5)  
 Principle of measurement: capacitive  
 Standards: EMC directive 2004/108/EC / Pressure equipment directive 97/23/EC

## ● Input

**Measurand:** differential pressure  
 derived from this: flow rate (volumetric- and mass flow)  
 level (level, volume, mass)

**Measuring ranges:** 75 mbar up to 420 bar

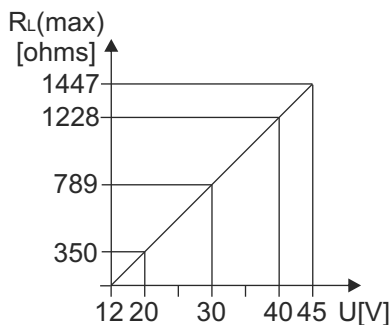
nominal range [mbar]	range limit lower (LRL) [mbar]	range limit upper (URL) [mbar]	working range smallest adjustable [mbar]	overload [bar]
75	-75	+75	1,5	130
400	-400	+400	4	130
2000	-2000	+2000	20	130
7000	-7000	+7000	70	130
21000	-21000	+21000	210	130
70000	-70000	+70000	700	125% of range
200000	-200000	+200000	2000	125% of range
420000	-420000	+420000	4200	115% of range

## ● Output

**Output signal:** 4...20 mA, 2-wire connection  
 with superimposed communication signal for HART protocol

**Signal range:** 3,6...22,8 mA

**Load:**  $R_{Lmax} = (U - 12 \text{ V}) / 0,0228 \text{ A}$



Voltage supply: 12...45 VDC

$R_{Lmax}$ : maximum load resistance

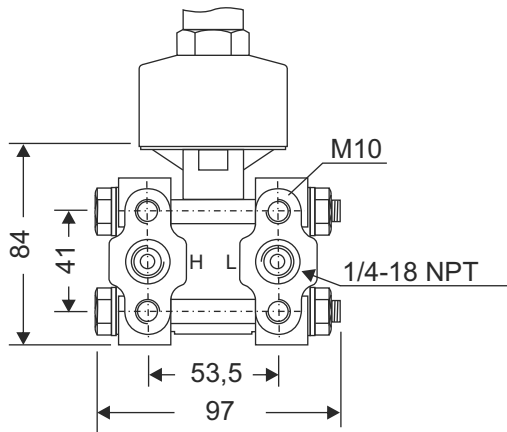
U: Voltage supply

Please note: When using communication via HART modem, a communication resistance of 250  $\Omega$  has to be taken into account.

**Resolution:** current output: 16 bit

**Read cycle time:** HART commands all 200 ms.

**Damping:** continuously adjustable from 0 to 160  $\mu\text{A}$  via hand-held equipment or PC-software.  
 Factory configuration: 0  $\mu\text{A}$



**Pressure connection:**  
1/4-18 NPT AISI 316L (1.4435)

**Measuring membrane:**  
stainless steel 1.4435

**Mounting:**  
M10

**Supplied accessories:**  
2 ventilating valves AISI 316L (1.4435)  
Holder for wall and tube mounting

● **Electrical connection**

M12x1	Super Seal	Deutsch	Deutsch	Bajonett	Valve <sup>1)</sup>	Cable
						
4-pole 5-pole 8-pole	3-pole	3-pole	4-pole	4-pole	4-pole	2-pole 5-pole

1) According to EN 175301-803, type A

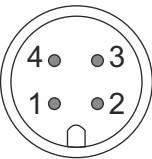
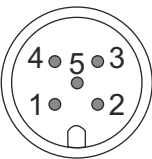

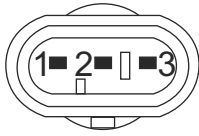
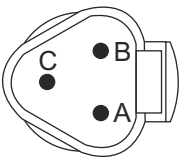
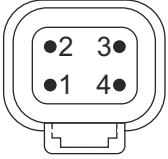
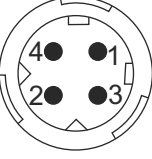
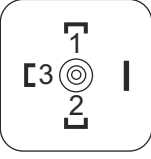
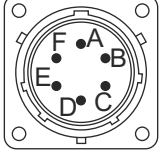
The device has a protective system against overvoltage peaks, RF interferences and wrong polarity.  
 Voltage supply: between 12 ...45 VDC  
 Residual ripple: no influence on mA-signal up to 5% within nominal voltage range  
 Influence supplied power: <0,005% of nominal range / 1V  
 Recommended cable: shielded and twisted 2-wire

Pin assignment

Connection	Current loop 4...20 mA (HART)	
	U+	U-
M12, 4-pole	1	3
M12, 5-pole	1	3
M12, 8-pole	1	3
Super Seal, 3-pole	1	3
Deutsch DT04, 3-pole	A	B
Deutsch DT04, 4-pole	1	3

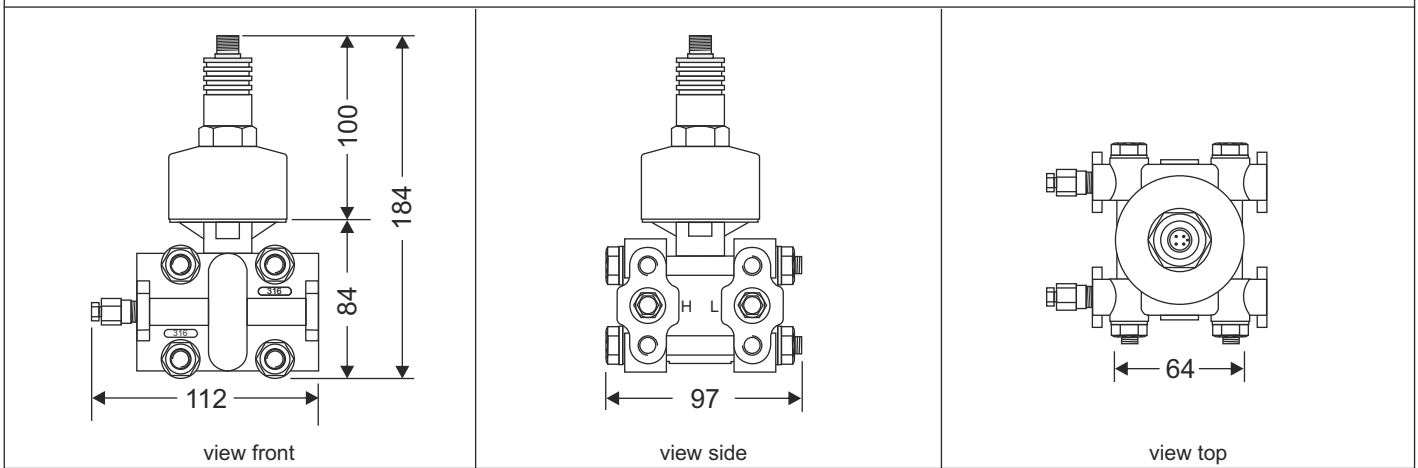
Connection	Current loop 4...20 mA (HART)	
	U+	U-
Bayonet DIN, 4-pole	1	2
Valve (L-plug), 4-pole	1	2
Cable, 4-pole	yellow	white
Cable, 6-pole	yellow	white
MIL, 6-pole	A	C

View: plug pins of male connector

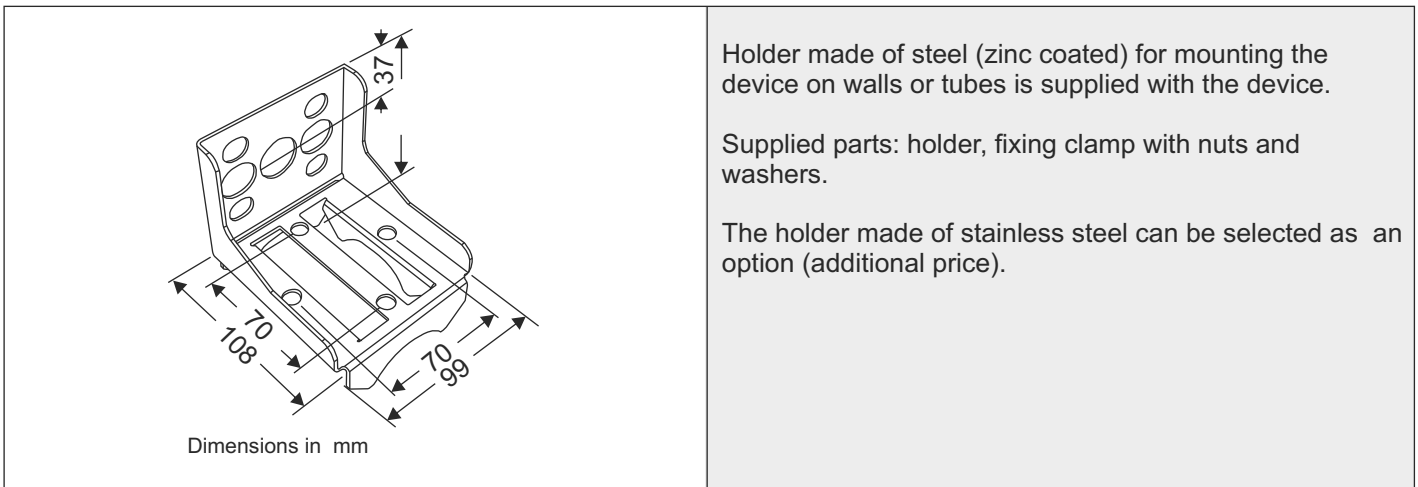
M12, 4-pole 	M12, 5-pole 	M12, 8-pole 	Super Seal, 3-pole 	Deutsch DT04, 3-pole 
Deutsch DT04, 4-pole 	Bayonet DIN, 4-pole 	Valve (L-plug), 4-pole 	MIL, 6-pole 	Cable, 4-, 6-pole LIYCY 4 or 6x0,25 mm <sup>2</sup> grey

● **Dimensions in mm**

Example for plug M12x1



● **Wall- and tube mounting**



● **HART Communication and configuration**

The HART-Tool is a graphical user interface for the ME series with menu-driven program for configuration. It can be used for putting into operation, configuration, analysis of signals, data backup and documentation of the device.

Operating systems: Windows 2000, Windows XP

Connection via HART interface (modem) with USB interface of a PC or hand-held HART communicator

- Settings:
- Adjustment of output current
  - Limits of measuring range
  - HART TAG number
  - 11-point calibration (linearization)
  - Simulation of output current
  - Linear / square root output signal
  - 2-point calibration
  - Filter function
  - HART address

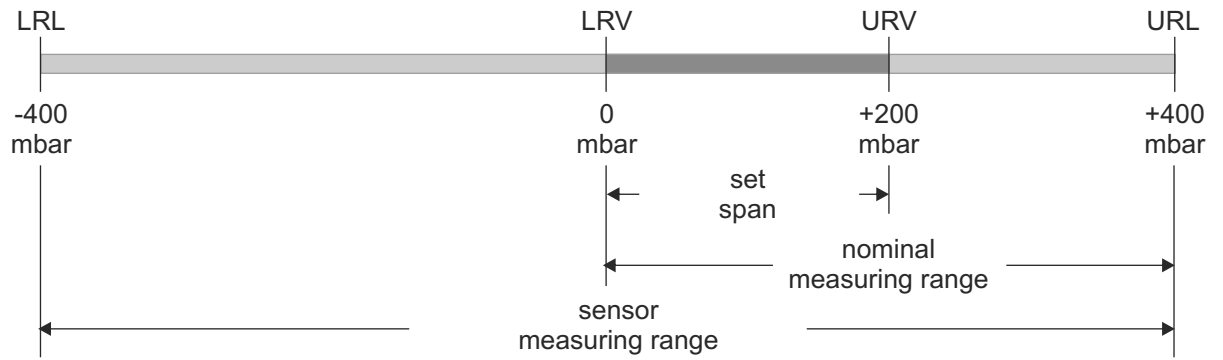
**Please note:** When using communication via HART modem, a communication resistance of 250 Ω has to be taken into account.

**Definitions**

LRL: lower range limit  
LRV: lower range value

URL: upper range limit  
URV: upper range value

**Example 1**

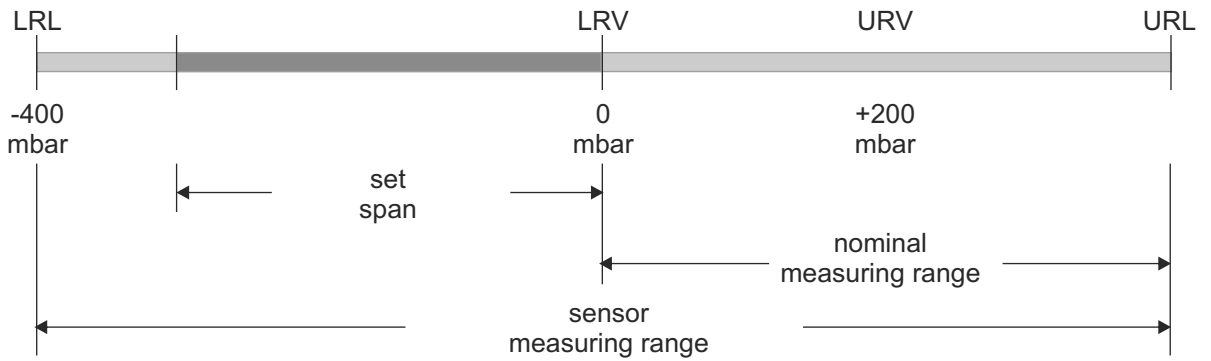


**|LRV| < |URV|** lower range value (LRV) = 0 mbar upper range value (URV) = 200 mbar  
upper range limit (URL) = 400 mbar

**Turn down:**  $URL / |URV| = 400 \text{ mbar} / 200 \text{ mbar}$  Turn down = 2 : 1

**Set span:**  $URV - LRV = 200 \text{ mbar} - 0 \text{ mbar}$  set span = 200 mbar  
(The span is based on the zero point)

**Example 2**



**|LRV| > |URV|** lower range value (LRV) = -300 mbar upper range value (URV) = 0 mbar  
upper range limit (URL) = 400 mbar

**Turn down:**  $URL / |LRV| = 400 \text{ mbar} / 300 \text{ mbar}$  Turn down = 1,33 : 1

**Set span**  $URV - LRV = 0 \text{ mbar} - (-300 \text{ mbar})$  set span = 300 mbar  
(The span is based on zero point)

● **Ordering code**

**M P X X X X X X - X X X**

<b>Output:</b>	4...20 mA (HART)	0																		
	CANopen	1																		
<b>Electrical connection:</b>	M12, 4-pole	0																		
	M12, 5-pole	1																		
	M12, 8-pole	2																		
	Deutsch DT04, 3-pole	3																		
	Deutsch DT04, 4-pole	4																		
	Super Seal 1.5, 3-pole	5																		
	bayonet (DIN), 4-pole	6																		
	valve plug, 4-pole	7																		
	cable, 2 m	8																		
<b>Δ P-range:</b>	0...75 mbar (turn down 50:1)	0																		
	0...400 mbar (turn down 100:1)	1																		
	0...2 bar (turn down 100:1)	2																		
	0...7 bar (turn down 100:1)	3																		
	0...21 bar (turn down 100:1)	4																		
	0...70 bar (turn down 100:1)	5																		
	0...200 bar (turn down 100:1)	6																		
	0...420 bar (turn down 100:1)	7																		
<b>Membrane:</b>	stainless steel 1.4435	0																		
	Hastelloy (on request)	1																		
<b>Process connection:</b>	1/4-18 NPT 1.4435 (316L)									0										
<b>Seal:</b>	Viton (FKM)										0									
<b>Configuration:</b>	factory configuration with output signal linear <sup>3)</sup>																			0
	customized configuration (please indicate) <sup>4)</sup>																			1
	factory configuration with square root output signal <sup>3)</sup>																			2
<b>Options:</b>	without																			0
	holder for wall- / tube mounting, stainless steel (additional price) <sup>5)</sup>																			1
<b>Other / accessories:</b>	special model																			0

3) zero: 4,000 mA / span: 20,000 mA / zero offset compensation: without / turn down: without / calibration points: 2 / damping: without / output on alarm: 3,6 mA / fixed output: without  
 4) the possibilities which are specified in the technical data can be selected. For not given values the details of factory-set are used.  
 5) as standard, the differential pressure transmitter is supplied with a holder made of steel (zinc coated). For an additional price, a holder made of stainless steel can be selected

**Accessories:**  
 Interface HART, USB, software Order No.: