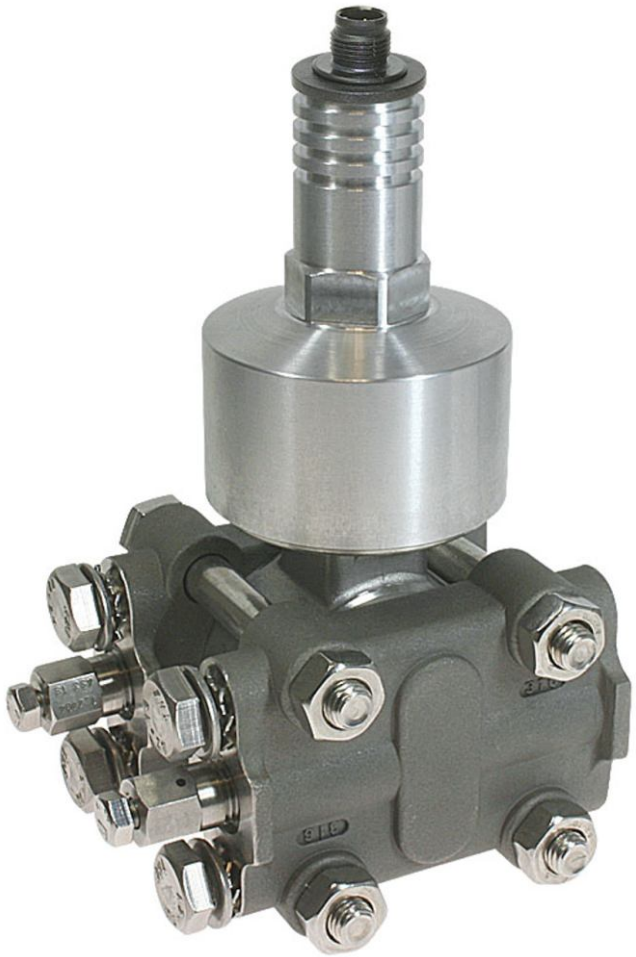
Technical documentation

MKDS



Content

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 ±(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 ±(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 ±(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 ±(0,2+0,01*URL/URV) for turn down 10:1 to 100:1
Influences:	
static pressure:	zero: ±0,1%/70 bar - range: ±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:	±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:	degreeIP 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

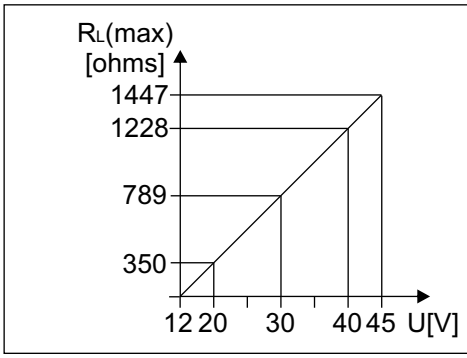
nominal range [mbar]	range limit lower (LRL) [mbar]	range limit upper (URL) [mbar]	working range smallest adjustable [mbar]	overload [bar]
75	-75	+75	1,5	130
400	-400	+400	4	130
2000	-2000	+2000	20	130
7000	-7000	+7000	70	130
21000	-21000	+21000	210	130
70000	-70000	+70000	700	125% of range
200000	-200000	+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 V) / 0,0228 A



Voltage supply: 12...45 VDC

R_{Lmax}: maximum load resistance
U: Voltage supply

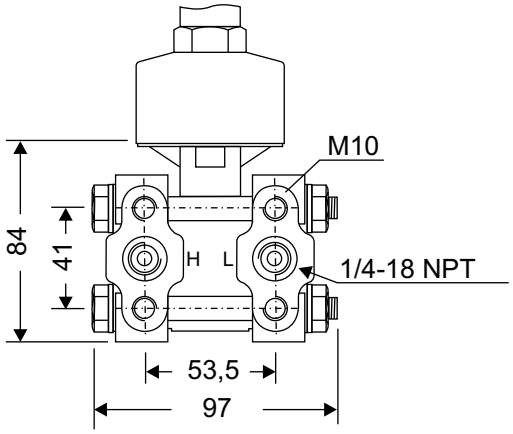
Please note: When using communication via HART modem, a communication resistance of 250 Ω has to be taken into account.

Resolution: current output: 16 bit

Read cycle time: HART commands all 200 ms.

Damping: continuously adjustable from 0 to 160 µA via hand-held equipment or PC-software.
Factory configuration: 0 µA

Process connection



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

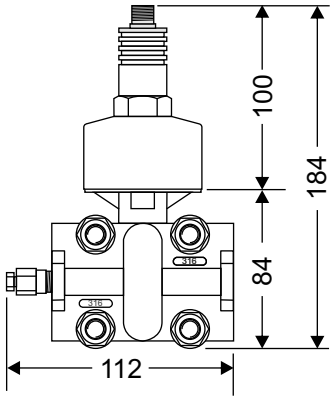
M12x1	Super Seal	Deutsch	Deutsch	Bajonett	Valve[1)]	Cable
						
4-pole 5-pole 8-pole	3-pole	3-pole	4-pole	4-pole	4-pole	2-pole 5-pole

1) Accoding EN 175301-803, type A

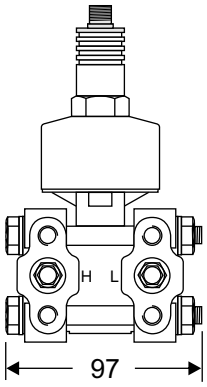
The device has a protective system against overvoltage peaks, RF interferences and wrong polarity.
Voltage supply: between 12 ....45 VDC
Residual ripple: no influence on mA-signal up to 5% within nominal voltage range
Influence supplied power: <0,005% of nominal range / 1V
Recommended cable: shielded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

Dimensions in mm

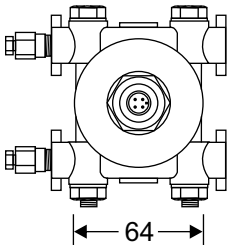
Example for plug M12x1



view front

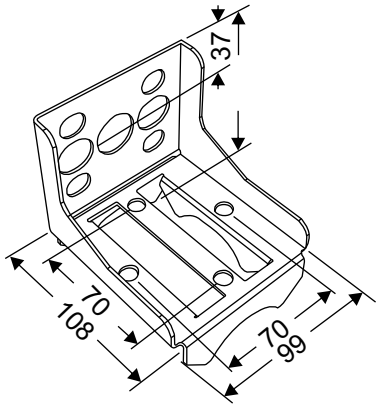


view side



view top

Wall- and tube mounting



Dimensions in mm

Holder made of steel (zinc coated) for mounting the device on walls or tubes is supplied with the device.

Supplied parts: holder, fixing clamp with nuts and washers.

The holder made of stainless steel can be selected as an option (additional price).

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

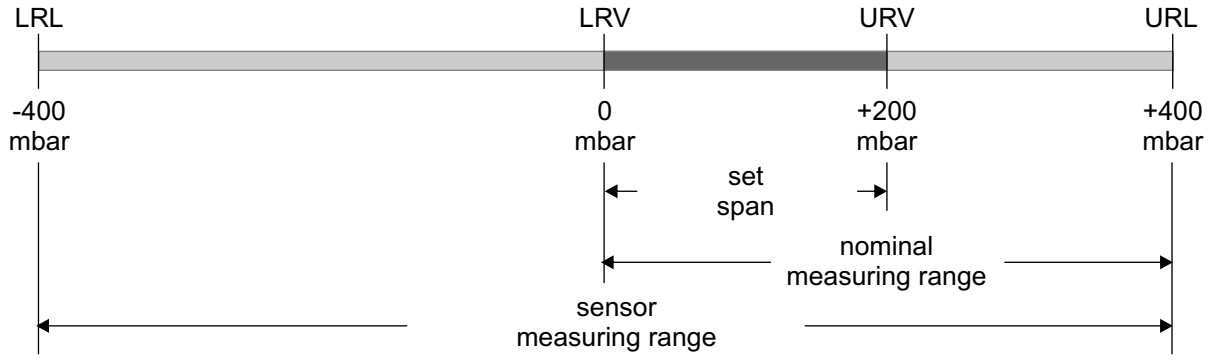
Settings:
- Adjustment of output current
- Limits of measuring range
- HART TAG number
- 11-point calibration (linearization)
- Simulation of output current
- Linear / square root output signal
- 2-point calibration
- Filter function
- HART address

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

Definitions

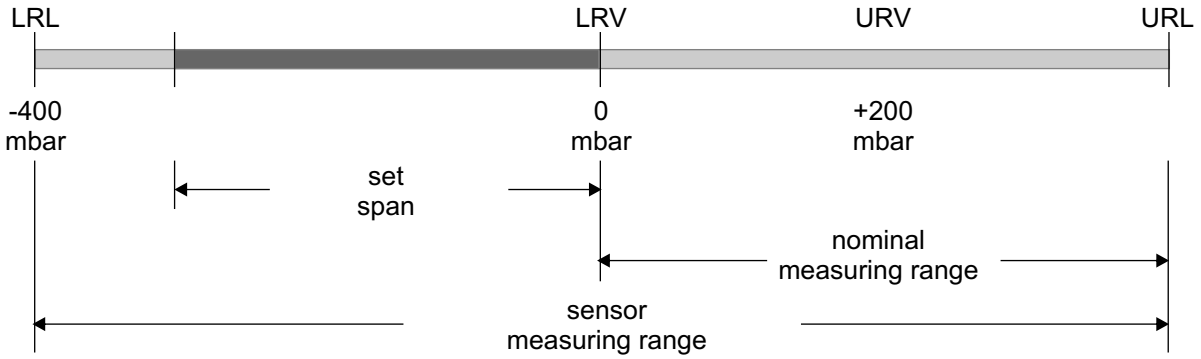
LRL: lower range limit
LRV: lower range value
URL: upper range limit
URV: upper range value

Example 1



|LRV| < |URV|	lower range value (LRV) = 0 mbar upper range limit (URL) = 400 mbar	upper range value (URV) = 200 mbar
Turn down:	URL / |URV| = 400 mbar / 200 mbar	Turn down = 2 : 1
Set span:	URV - LRV = 200 mbar - 0 mbar (The span is based on the zero point)	set span = 200 mbar

Example 2



|LRV| > |URV|	lower range value (LRV) = -300 mbar upper range limit (URL) = 400 mbar	upper range value (URV) = 0 mbar
Turn down:	URL / |LRV| = 400 mbar / 300 mbar	Turn down = 1,33 : 1
Set span	URV - LRV = 0 mbar - (-300 mbar) (The span is based on zero point)	set span = 300 mbar

Ordering code

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

Output:	4...20 mA (HART)	0
Electrical connection:	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
Δ P-range:	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
Membrane:	stainless steel 1.4435	0
	Hastelloy (on request)	1
Process connection:	1/4-18 NPT 1.4435 (316L)	0
Seal:	Viton **(**FKM)	0
Configuration:	factory configuration with output signal linear[3)]	0
	customized configuration (please indicate)[4)]	1
	factory configuration with square root output signal[3)]	2
Options:	without	0
	holder for wall- / tube mounting, stainless steel (additional price)[5)]	1
Other / accessories:	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.: