

Technical documentation

MHPS



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● Characteristics

Input:	overpressure (0,1 bar up to 1000 bar) / absolute pressure (0,25 bar up to 25 bar)
Output:	4...20 mA current loop (15...45 VDC), HART-protocol
Option:	additionally with limit value contacts / PROFIBUS / EtherCat / Modbus / PWM
Turn down:	up to 100:1
Accuracy:	<0,25% of sensor range (up to 0,25 bar: <0,5% of sensor range)
Indication:	LCD-display with backlighting
Configuration:	with keys and/or software
Enclosure for electronics:	diecast aluminium (degree of protection: IP65)
Process connection:	G1/2B / G1/4B / G1/4A / 1/2NPT / 1/4NPT / M20x1,5 (pressurized parts: NiCr steel)

● Applications

The pressure sensor is suitable to measure overpressure (negative, positive) and absolute pressure. From overpressure can be derived: level (level, volume, mass). Typical areas of use are chemical industry and process engineering.

● Technical data

Input	
Overpressure:	0,1 / 0,16 / 0,25 / 0,4 / 0,6 / 1 / 2,5 / 4 / 6 / 10 / 16 / 25 / 40 / 60 / 100 / 250 / 400 / 600 / 1000 bar
Absolute pressure:	0,25 / 0,4 / 0,6 / 1 / 2,5 / 4 / 6 / 10 / 16 / 25 bar
Output	
Analog:	4...20 mA, 2-wire, with superimposed communication signal (HART-protocol)
Signal range:	3,6...22,8 mA (on failure: 3,6 mA)
Option:	additionally with limit value contacts / PROFIBUS / EtherCat / Modbus / PWM
Performance	
Accuracy:	<0,25% of sensor range (up to 0,25 bar: <0,5% of sensor range)
According BFSL:	<0,125% of sensor range (up to 0,25 bar: <0,25% of sensor range) including non-linearity, hysteresis, non-repeatability, zero point and full scale error (according to IEC 61298-2)
Influences:	supply: <0,005% of nominal range/1V vibration: <0,01% of nominal range/g at 200 Hz
Response time 10...90%:	<1ms (<10 ms at medium temperature <-30°C for nominal ranges up to 25 bar)
Non-linearity:	<0,2% of nominal range (BFSL) according IEC 61298-2
Non-repeatability:	<0,1% of nominal range
Stability:	<0,2% of span (1 year, at reference conditions)
Temperature range:	0...80°C (compensated, pressure sensor)
Temperature coefficient:	within compensated range
Mean TC of zero:	<0,2% of nominal range / 10 K (<0,4% for ranges <0,25 bar)
Mean TC of range:	<0,2% of nominal range / 10 K
Settings	
Rise-delay time:	5 s
Cycle time, update:	0,25 s
Damping:	200 ms (without consideration of electronic damping)
Filter adjustment:	0...160µA
Display	
Visible range:	32,5x22,5 mm
Indication:	5-digits 7-segments, 8 mm / 8-digits 14-segments, 5 mm / bargraph with resolution 2%
Range:	-19999...99999
Supply	
Voltage:	15...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	
Temperature:	Operating: -20...70°C / Ambient: -20...70°C / Storing: -40...+85°C Medium: -30...100°C / -40...125°C
Humidity:	5...98% relative humidity
Shock resistance:	1000 g according IEC 60068-2-27 (mechanical shock)
^Vibration resistance:	20 g according IEC 60068-2-6 (vibration at resonance)

● Technical data (continued)

Mechanics

Material:	Enclosure electronics:	diecast aluminium
	Enclosure pressure sensor:	CrNi steel
	Wetted parts:	CrNi steel
	Type plate:	stainless steel 1.4301
	Viewing glass:	laminated glass
	Internal transmission fluid:	syntetic oil
Process connection:	G1/2B / G1/4B / G1/4A / 1/2NPT / 1/4NPT / M20x1,5	
Dimensions:	see page 7	
Protection:	degree IP 65	
Weight:	approx. 1,7 kg	
Connection:	terminal screw (maximum 1,5 mm ²), via srewed cable gland M20x1,5	
Standards:	IEC 61000-4-3 / Pressure equipment directive 97/23/EG	

● Input

Measurand: overpressure (positive, negative), absolute pressure
derived from this: level (level, volume, mass)

Measuring ranges: 0,1 bar up to 1000 bar

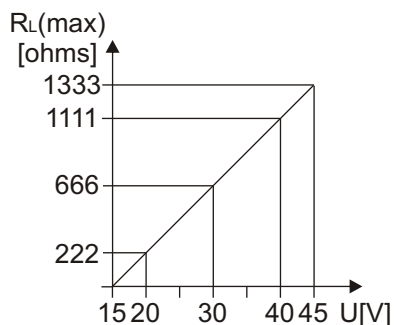
Pressure range	0,1	0,16	0,25	0,4	0,6	1	1,6	2,5
Over pressure safety	1	1,5	2	2	4	5	10	10
Burst pressure	2	2	2,4	2,4	4,8	6	12	12
Pressure range	4	6	10	16	25	40	60	100
Over pressure safety	17	35	35	50	50	80	120	200
Burst pressure	20,5	42	42	96	96	400	550	800
Pressure range	160	250	400	600	1000			
Over pressure safety	320	500	800	1200	1500			
Burst pressure	800	1250	1300	1800	3000			

● Output

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

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

Load: $R_{Lmax} = (U - 15 V) / 0,0228 A$



Voltage supply: 15...45 VDC

R_{Lmax} : maximum load resistance

U: Voltage supply

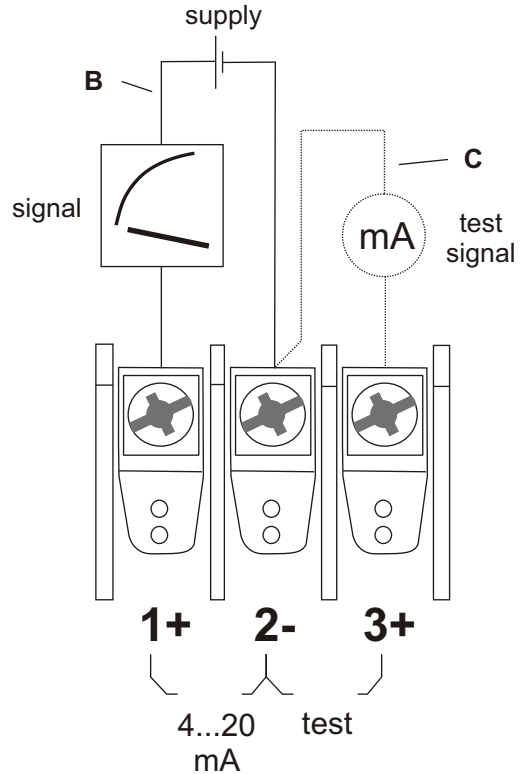
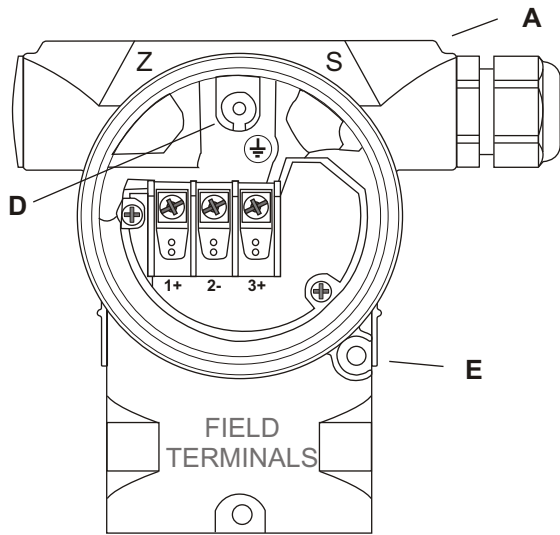
Please note: When using communication via a HART modem, a communication resistance of minimum 250 ohms has to be taken into account.

Resolution: current output: 16 bit
indication: adjustable (factory setting: 0...100%)

Read cycle time: HART commands all 200 ms.

Damping: continuously adjustable from 0 to 160 μA via electronic insert inside the device, hand-held equipment or PC-software. Factory configuration: 0 μA

● **Electrical connection**



Electrical connection 4...20 mA HART

- A: Enclosure
- B: Voltage supply 15...45 VDC (1+ / 2-)
- C: 4...20 mA test signal between 2- and test point 3+
- D: Internal earthing
- E: External earthing

The device has a protective system against overvoltage peaks, RF interferences and wrong polarity.

Voltage supply: between 15 ...45 VDC

Cable entry: screwed cable gland M20x1,5 (metal)

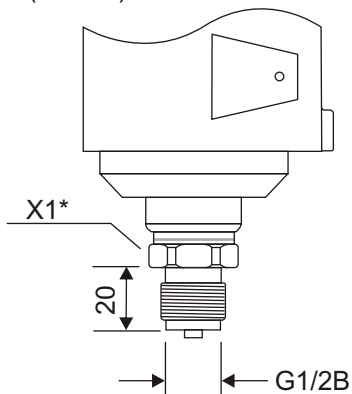
Cable: outer diameter: 6...12 mm
cross-sectional area: 0,5...1,5 mm²
shielded and twisted 2-wire cable (recommended)

Residual ripple: no influence on mA-signal up to 5% within nominal voltage range

Influence supplied power: <0,005% of nominal range / 1V

● **Process connection**

G1/2 (EN837) manometer



Pressure connection:

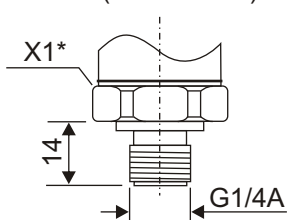
- G1/2B manometer (EN837)
- G1/4B manometer (EN837)
- G1/4A (DIN3852-E)
- M20x1,5
- 1/2NPT
- 1/4NPT

Measuring membrane:

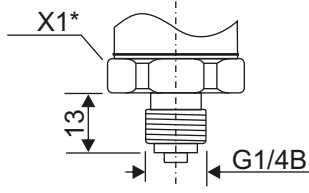
NiCr-steel

*X1: width across 27

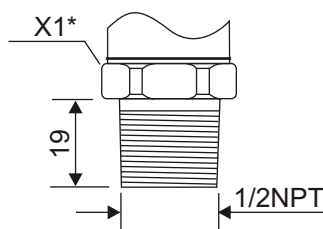
G1/4 (DIN 3852-E)



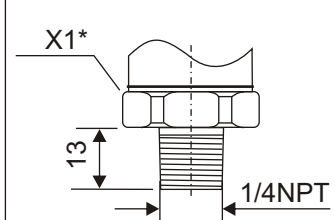
G1/4 (EN837) manometer



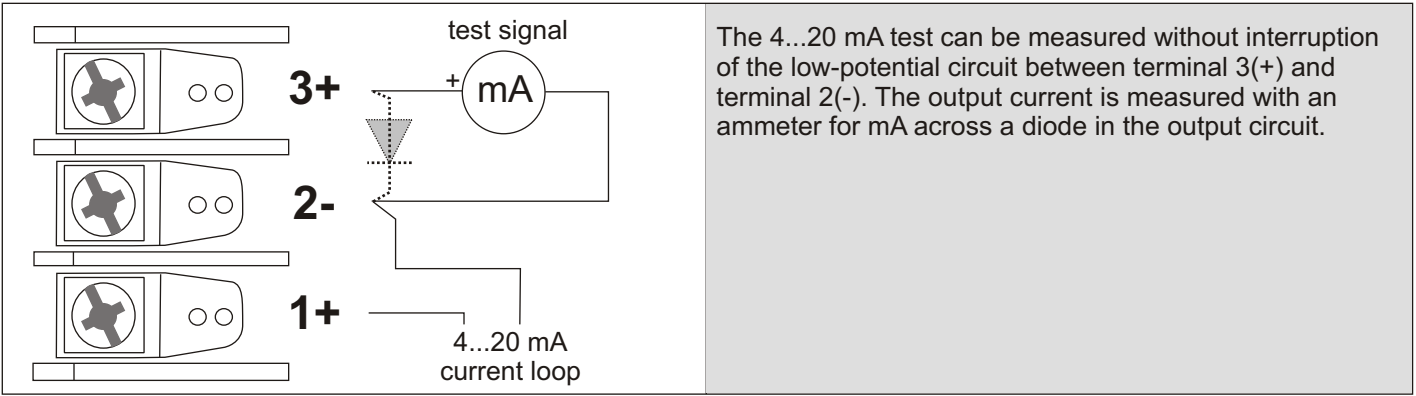
1/2NPT



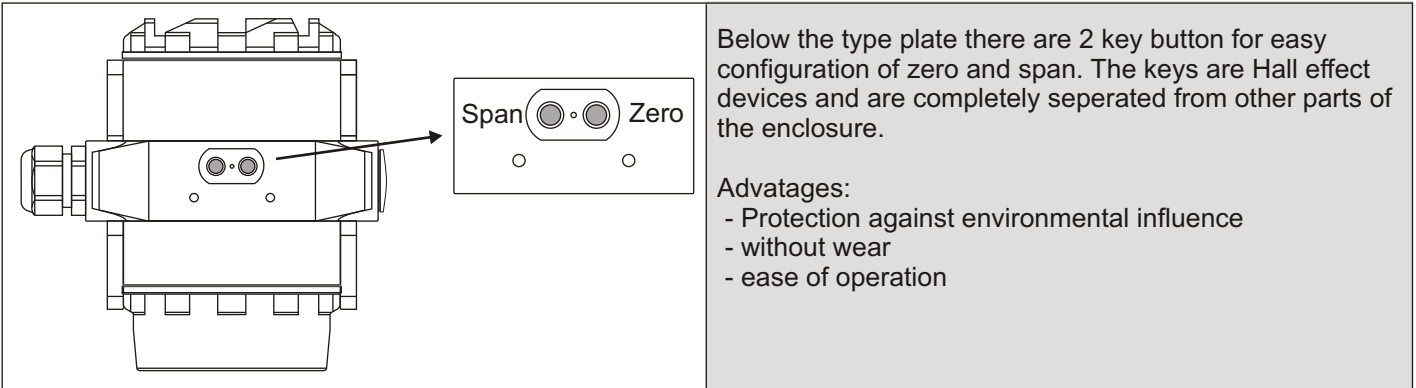
1/4NPT



● **4...20 mA test signal**



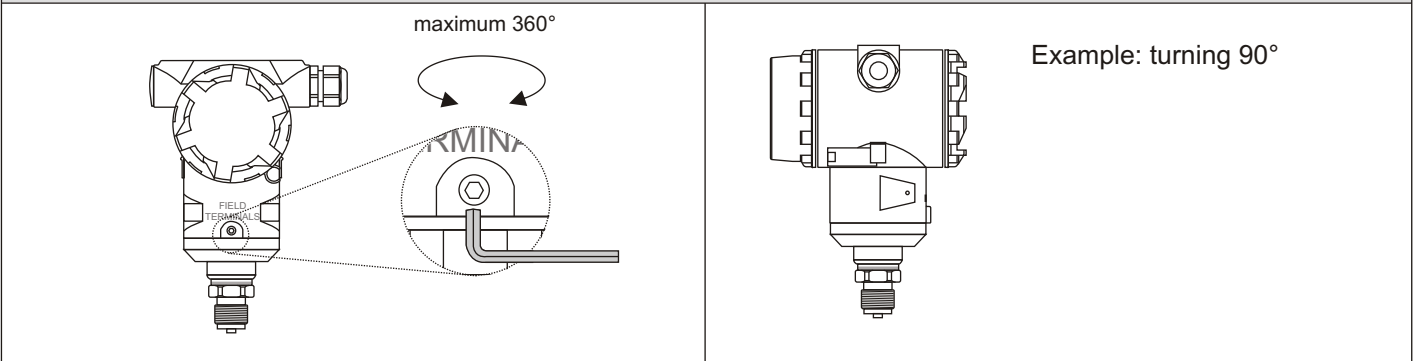
● **External operator's control**



● **Rotating of enclosure**

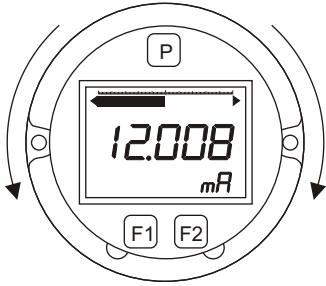
After unscrewing the M6 Allen screw the enclosure can be rotated up to 360°.

Advantages:
 Good reading of the display
 Operator's controls of the device are easy approachable



● Electronic insert with display

Display with key buttons for configuration

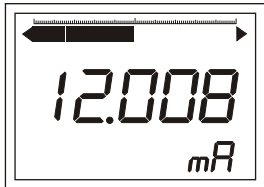


The display is rotatable for approx. 330°

With 3 operator's keys is configurable:

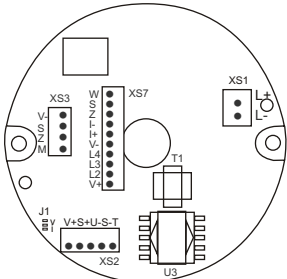
- Starting measuring value (reference pressure has to be supplied)
- Final measuring value (reference pressure has to be supplied)
- Zero offset compensation (compensation of position)
- Reset
- Starting measuring value (reranging without reference pressure)
- Final measuring value (reranging without reference pressure)
- Damping
- Unit (mA, mbar, %)
- Fixed current output

Display



- Visible range 32,5x22,5 mm
- 5-digits 7-segment line, 8 mm high (-19999...99999)
- 8-digits 14-segment line, 5 mm high
- Bargraph with resolution 2%

Electronics



- XS1 voltage supply 15...45 V
- XS2 connection sensor
- XS3 external keys
- XS7 display
- J1 solder bridge to select sensor supply

● HART Communication

HART tool:

The HART-Tool is a graphical user interface for the MH 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

Functions:

- Configuration of the devices in on-line operation
- Loading and storing the devices data (upload / download)
- Linearization of characteristic curve
- Documentation of the measuring point

Possible HART devices to use:

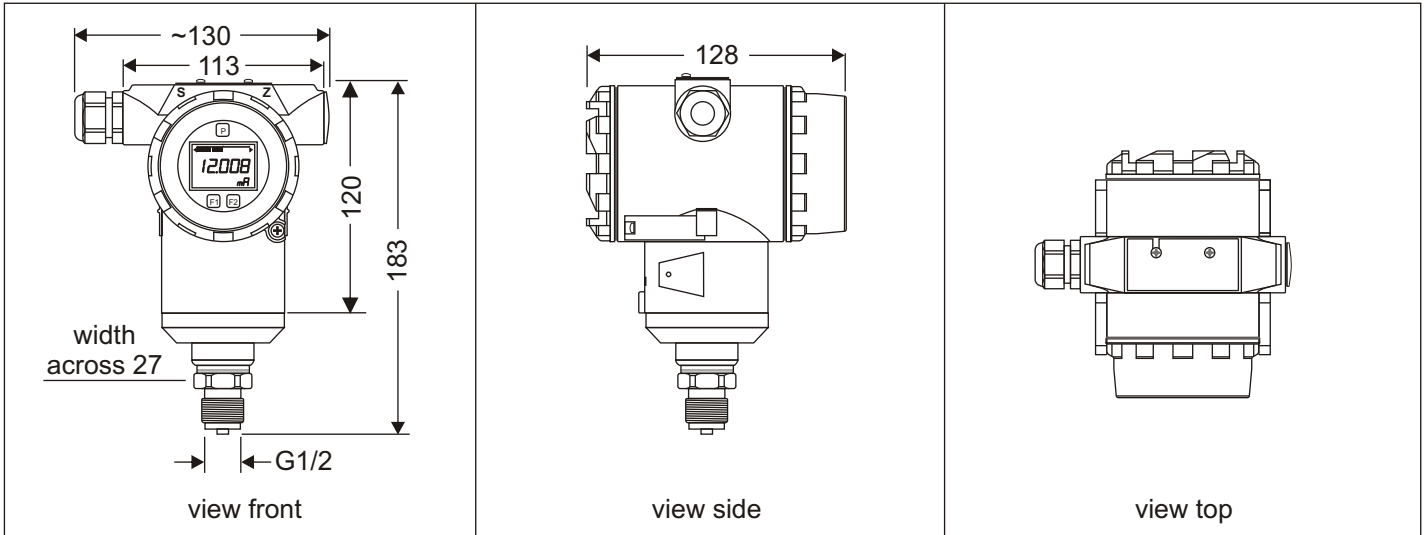
- HART interface (modem) with serial interface of a PC
- HART interface (modem) with USB interface of a PC
- Hand-held HART communicator

● Configuration with software via HART communication

The following settings are possible:

- | | |
|--|-----------------------------------|
| - Adjustment of output current | - Simulation of output current |
| - Configurable characteristic values:
limits of measuring range
filter function
linear / square root output signal for flow | unit for display
decimal-place |
| - HART address | - HART TAG number |
| - 2-point calibration (start and end of value) | - 6-point calibration |

● **Dimensions (in mm)**

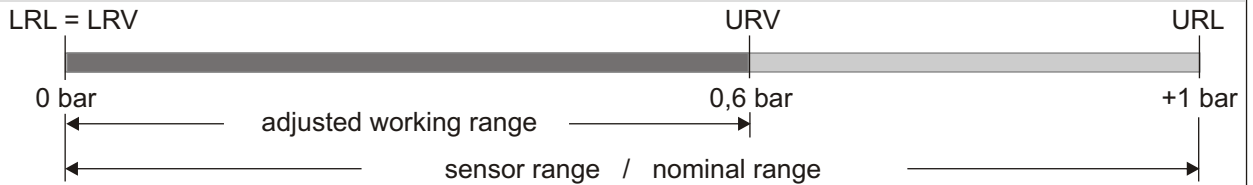


● **Definitions**

LRL: lower range limit
 LRV: lower range value
 TD: turn down

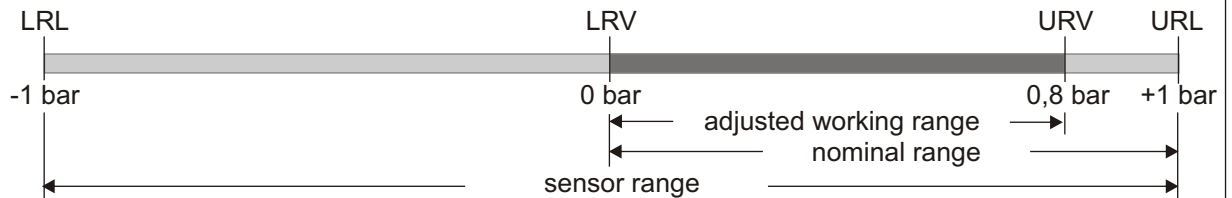
URL: upper range limit
 URV: upper range value

Example 1



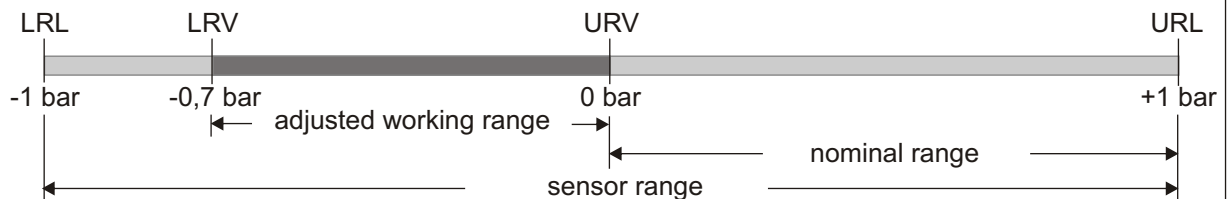
|LRV| < |URV|: lower range value (LRV) = 0 bar upper range value (URV) = 0,6 bar
 upper range limit (URL) = 1 bar
Turn down: URL / |URV| = 1 bar / 0,6 bar Turn down = 1,66 : 1
Set span: URV - LRV = 0,6 bar - 0 bar set span = 0,6 bar
 (adjusted) (The span is based on the zero point)

Example 2



|LRV| < |URV| lower range value (LRV) = 0 bar upper range value (URV) = 0,8 bar
 upper range limit (URL) = 1 bar mbar
Turn down: URL / |LRV| = 1 bar / 0,8 bar Turn down = 1,25 : 1
Set span: URV - LRV = 0,8 bar - 0 bar set span = 0,8 bar
 (adjusted) (The span is based on the zero point)

Example 3



|LRV| > |URV| lower range value (LRV) = -0,7 bar upper range value (URV) = 0 bar
 upper range limit (URL) = 1 bar
Turn down: URL / |LRV| = 1 bar / 0,7 bar Turn down = 1,43 : 1
Set span: URV - LRV = 0 bar - (-0,7 bar) set span = 0,7 bar
 (adjusted) (The span is based on zero point)

