

The selection is detailed on page 7



# SP30-2

## Single Flange Differential Pressure Level Transmitter

### Product application

Process equipment process  
Food & Pharmaceutical  
Textile, beverage industry  
Petroleum and petrochemical  
Chemical industry, Electric power  
Environmental protection, municipal

### Functional characteristics

Used to measure differential pressures of corrosive and non-corrosive gases, vapors and liquids  
Stainless steel diaphragm box  
Output linear DC current proportional to differential pressure (standard setting)  
Output root DC current proportional to the differential pressure value (can be set, e.g. when measuring flow)  
The intrinsic explosion-proof type (EEx ia IIC T4-T6) can be installed in danger zone 1 and connected to zone 0  
A variety of isolation cartridges are available to meet special applications such as level measurement, aggressive media  
High measurement accuracy  
The measuring range is extensible  
Suitable for all kinds of dangerous places  
Aluminum and stainless steel housing  
Configurable via DTM (Device Type Manager) according to FDT (Field Device Tool) concept (e.g. PACTware software)

### Product description

SP30-2 differential pressure transmitter with intrinsic safety and flameproof (ATEX standard) support 4... 20mA, 4... 20mA+HART, PROFIBUS. PA or FOUNDATION Fieldbus™ output signals to meet application requirements. All electronic components of both transmitters (even the flameproof type) are inherently safe. Therefore, when the instrument is in the working state, it can be adjusted in the EX zone.

The housing is mainly available in plastic, aluminum and stainless steel to suit different operating environments, and for the food industry and pharmaceutical industry with high application requirements, electropolished stainless steel (316L) housing is also available.

Widely used

The SP30-2 is suitable for many industrial measurement applications, such as flow measurement with differential pressure sensors, level measurement or filter and pump monitoring. With diaphragm seals installed, the SP30-2 is also suitable for harsh process conditions. The meter is available in a measurement range from 0... 1 kPa to 0... With 4 MPa and a static pressure limit of 16MPa, the meter is suitable for almost all applications. The combination of internal digital signal processing and proven sensors ensures high accuracy and optimal long-term stability.



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For more product information, please visit [www.ludwig-schneider.com.cn](http://www.ludwig-schneider.com.cn)



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INSTRUMENT

## Working principle

Differential pressure transmitters are usually used to measure the liquid level in closed containers, using the pressure difference generated by the liquid's own gravity to measure the liquid level in the container.

The high pressure side measuring tube is always in a state of full water due to steam condensation, keeping the pressure constant, while the low pressure side measuring tube and the container form a connector, and the pressure changes linearly with the change of the liquid level in the container.

$\Delta P$  is the differential pressure signal received by the transmitter,  $P_0$  is the pressure inside the container,  $P_+$  is the positive pressure side pressure of the transmitter, and  $P_-$  is the negative pressure side pressure of the transmitter.  $\rho$  is the density of the liquid in the container;  $g$  is the gravitational acceleration;  $h_1$  is the height from the process zero point to the pressure opening on the upper part of the container;  $h_2$  is the liquid level of the container process;  $h$  is the height from the transmitter to the zero of the process liquid level.

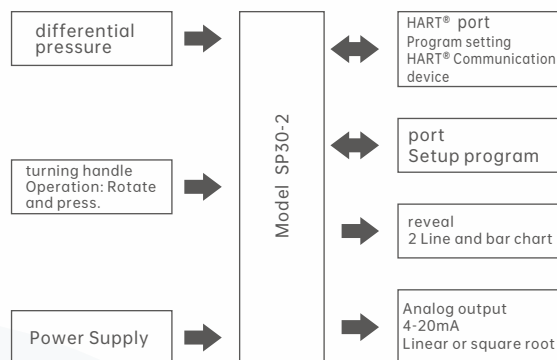
There is:

$$P = P_0 + \rho g h_1 + \rho g h$$

$$P = P_0 + \rho g h_2 + \rho g h$$

$$\Delta P = P_+ - P_- = \rho g h_1 - \rho g h_2$$

When the liquid level changes from  $h_2=0$  to  $h_2=h_1$ , the differential pressure measured by the differential pressure transmitter changes from the maximum value to  $\Delta P=0$ , and the output current changes from 4mA to 20mA by setting the transmitter



## Technical parameter

Explosion-proof type	Intrinsically safe explosion protection
Reference condition	According to DIN 16 086 and IEC 770/5.3
Marked measuring range	See selection instructions
Set measuring range	The measuring range can be set by pressing the button, HART manual operator or setting software: the measuring start and end point are continuously set within the marked measuring range; [The set range should not be less than 10% of the indicated range]
Display unit	mH2O, inH2O, inHg, ftH2O, mmH2O, mm Hg, psi, bar, mbar, kg/cm2, kPa, Torr, MPa; Measured value: % or custom unit Output current: mA
Attached display	Medium temperature Maximum and minimum differential pressure Overload and failure
Density correction	Adjustment range: 0.100-5.000 kg/dm <sup>3</sup>
Static pressure	PN 160
Process connection	See selection instructions
Liquid material	Standard type: stainless steel Mat. Ref. 1.4401, 1.4404 Flange: stainless steel Mat. Ref. 1.4408 O-ring seal : FPM (Viton®) See selection instructions for other materials
Exportation	2-wire 4-20mA
Carrying capacity	( UB-11.5V ) / 0.022A With HART V5.3: 250-1000 Ω (HART® Communication network)
Characteristic curve	Line shape or root, starting point adjustable (9.4% factory)
Load error	< 0.1%
Null shift	≤ 0.01 mA
Static pressure effect	▪ zero ≤ 0.015%/10 bar ▪ range ≤ 0.020%/10 bar
Temperature drift	▪ Temperature range -20-+85°C (temperature compensation range) ▪ zero ≤ 0.005% / °C Typical value ≤ 0.01% / °C Maximum value ▪ range ≤ 0.005% / °C Typical value ≤ 0.01% / °C Maximum value

## Technical parameter

Precision	Limit point adjustment: $\leq 0.075\%$ full scale (according to DIN 16 086)	
Return difference	$\leq 0.02\%$ Full scale; According to DIN 16086	
Repeatability	$\leq 0.02\%$ Full scale; According to DIN 16086	
Response time	150 msec Approximately, undamped	
Damping coefficient	Adjustable 0 — 100 sec	
Five-year stability	$\leq 0.1\%$ Full scale (reference condition IEC 770)	
Power source	11.5 — 36V DC	
	11.5 — 30V DC (Intrinsically safe explosion protection )	
	Security gates with or without HART protocol communication: see data sheet [Note: HART communication at least 17V DC (250 $\Omega$ )]	
Power supply error	$\leq 0.1\%$ Full scale: change every 10V (standard voltage 24V DC)	
<b>Temperature</b>		
▪ Storage temperature	-40-+85°C	
▪ Medium temperature	-40-+100°C (Filled with fluorine oil -10-+100°C)	
▪ Ambient temperature	-40-+85°C; According to DIN 16 086 (LCD cannot be displayed below -20 ° C)	
	Intrinsically safe explosion-proof type	+85°C class T4
		+75°C class T5
+60°C class T6		
Electromagnetic compatibility	(EMC) basis EN 61 326	
Mechanical impact	50g/11msec	
Mechanical vibration	5g frequency :10 — 2000Hz	
Class of protection	Tape connection cable	
	IP65 basis EN 60529	
Insulation resistance	100 M $\Omega$ ; 50 V DC	
Breakdown voltage	$\geq 500$ Veff.	
Shell	Cast aluminium GDAISi2	
Flange relief bolt	Steel, chromic acid passivation treatment	
	Optional: stainless steel	
Ambient humidity	5-100% RH @ 400°C (Inclusive annual mean)	
Electrical connection	With 2 removable tight housing covers. With 2 screw holes	
	M20X1.5, One of them has a seal cover for installation;	
	1 tube with plastic seal for sealing 6-12mm cable	
Installation position	Factory calibration: Vertical	
	(Process connection below)	
	Working position: Any	
Weight	$\geq 3.9$ kg	
<b>Attachments</b>		
▪ HART® modem	Connect the PC serial port to the transmitter	
▪ Three-valve bank	Stainless steel according to DIN 19213; Other forms of valve user requirements	
▪ Isolation capsule	When the common process connection cannot meet the requirements, select the isolation capsule	

Key function <sup>1)</sup>	Set measuring range (with standard pressure)	Set key lock
	Set measuring range (Blind school)	Set the maximum and minimum values to reset
	Set damping and time constant	Set line or root output
	Set test current	Set medium density
	Set fault signal	Set temperature unit °C or °F

Liquid crystal display	13 pressure units, %, custom units or output mA values
	Medium temperature
	Measurement failure, out of the measurement range
	Maximum and minimum measurements
	Display both measurement and temperature values

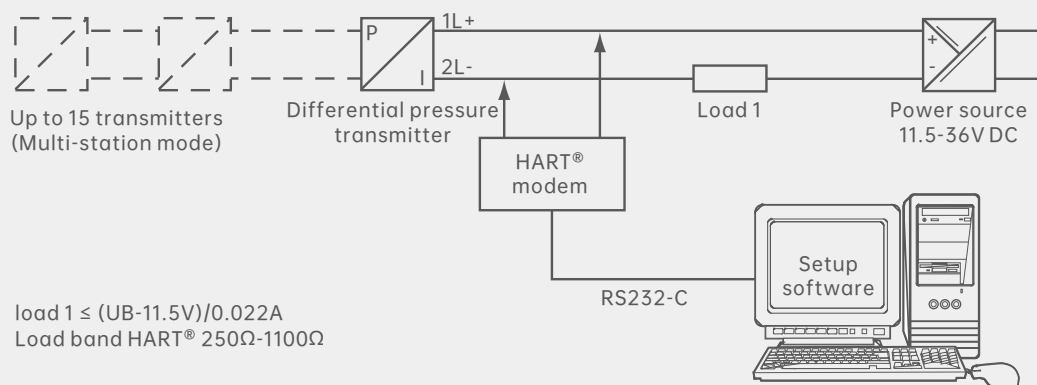
1) It can also be programmed with a manual operator with HART protocol. It can also be programmed through PC and HART MODEM with setup software, and the software running environment is WINDOWS

### Anti-explosion

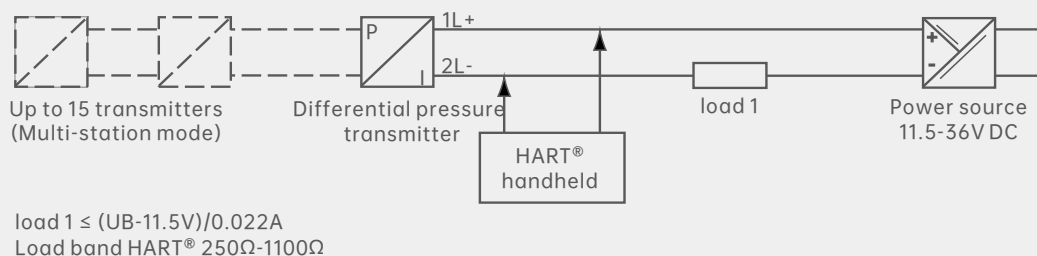
Explosion protection		
Anti-explosion	ATEX	Category: II 1G, II 1/2G, II 2G Ex ia IIC T6...T1 II 1/2G, II 2G Ex d ia IIC T6...T1
Environmental condition		
CE-mark	-	EMC 2004/108/EC for interference emission and interference resistance for industrial applications in accordance with EN 61326-1 Interference emission Restriction Classes A and B, 94/9/EC EN 50 014 (Common) EN 50 020 (intrinsically safe), EN 50 284 (Zone 0) {EN 50 281-1 (Dust protection)}
Impact resistance	g	100, according to IEC 60 068-2-27 (Mechanical Shock)
Vibration resistance	g	4 (5...) 100Hz) (vibration under resonance)
Electrical protection class	-	Class III overvoltage, Class II protection IP66/67 (standard case)

### HART® communication

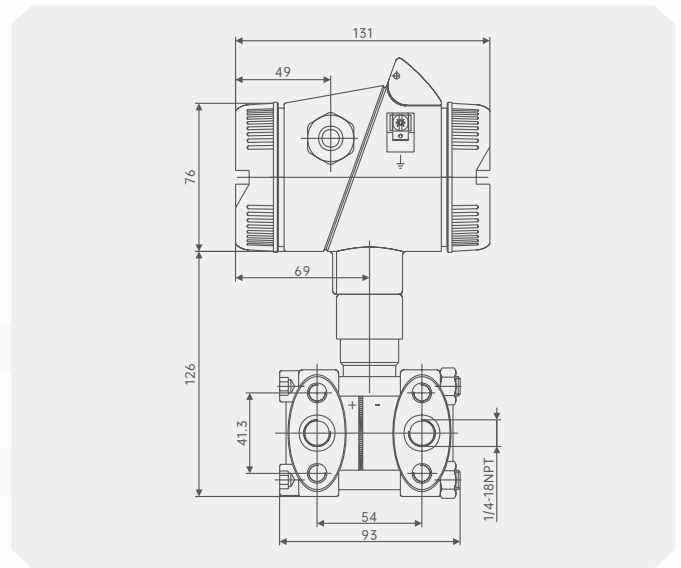
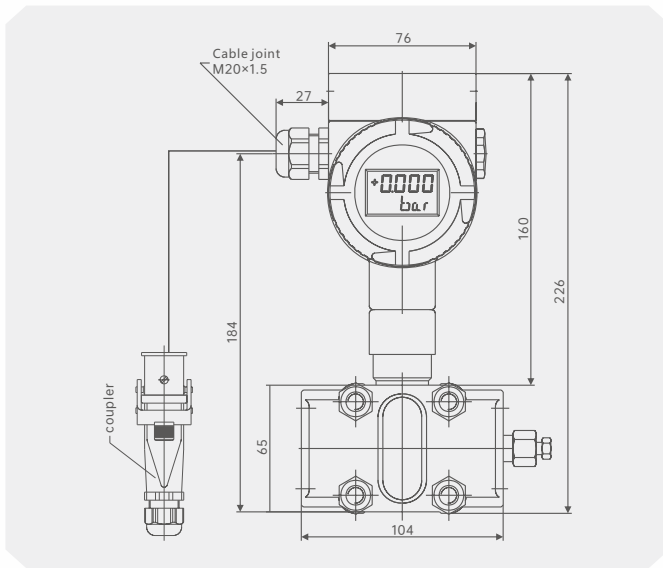
#### PC With differential pressure transmitter



#### HART® Hand operator and differential pressure transmitter



Size mm

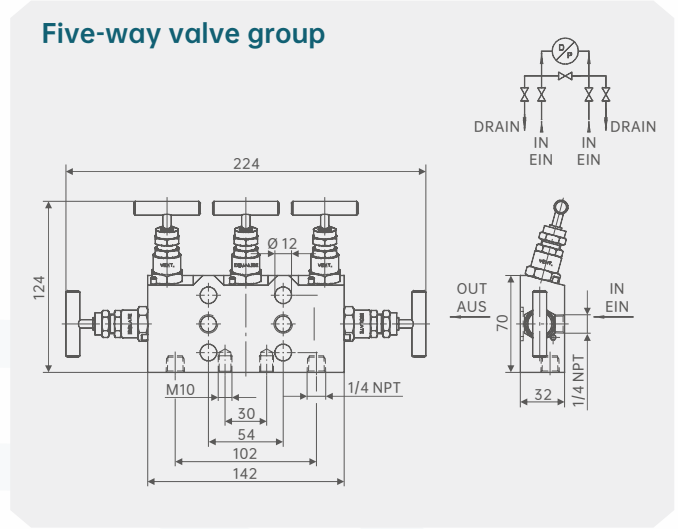
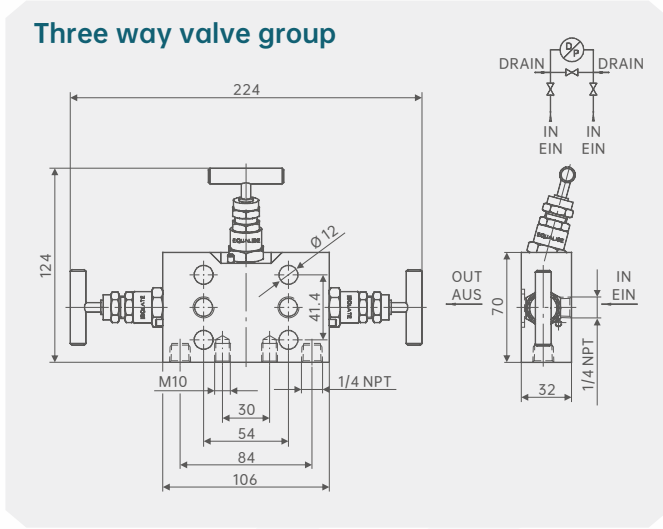


Connection diagram















This includes nonlinearity, hysteresis, non-repeatability, zero point and final value deviations (corresponding to measurement deviations, refer to IEC 61298-2). Calibration in vertical mounting position with process connection at bottom.

Join			Wiring
Power source	DC 12 to 36 V		1 L+ 2 L-
exportation 4 to 20 mA, two-wire			1 L+ (4-20mA proportional to input) 2 L- (in power supply)
Test the connection current output Inherent resistance of ammeter ≤ 10 Ω			TEST + TEST -
HART® Test connection There must be resistance!			HART + HART -
Potential balance (intrinsic safety explosion-proof type)			-
Shield			-
Terminal diagram			Note: Ground the transmitter! (Process connection and shielding)

Attachment



Display and operation module

Model number	Functional characteristics
 <p>SP30-2</p>	<p>Indicator module SP30-5, 5-digit display, 20-segment bar chart, no independent power supply, with additional HART® functions.</p> <p>Automatic adjustment of measuring range and range.</p> <p>Local host function: HART® is available</p> <p>Standard quality sets the measuring range and unit of the connected transmitter.</p> <p>Choose explosion protection according to ATEX.</p>
	<p>HART® modem for USB interface, designed for modern laptops</p> <p>HART® modem with RS232 interface</p> <p>Bluetooth interface [EEx ia] HART® Modem for IIC</p>
	<p>HART® Protocol, Li-ion Battery, Power Supply 100... 240V</p> <p>Color display with backlight, Bluetooth and infrared interface, ATEX, FM, CSA and IECEx(i)</p> <p>(Including FISCO, if applicable.)</p> <p>HART® Protocol, NIMH Battery, Power AC 90... 240V with simple upgrade function</p> <p>ATEX II 2G (1GD) EEx ia IIC T4</p>
	<p>HART® protocol, universal power supply, cable with 250Ω resistor, DOF upgrade, explosion protection</p>
	<p>Includes PACTware, including DTM for field equipment</p>
	<p>Display and operation module, aluminum housing cover, with window</p>
	<p>Display and operation module, cast stainless steel housing cover with window</p>
	<p>Display and operation module, plastic housing cover, with window</p>
	<p>Display and operation module, stainless steel housing cover, electrolytically polished, with window</p>
	<p>Three-way valve - Chrome-nickel steel, PN 420, Shape A, Nace compliant</p>
	<p>Five-way valve - Chrome-nickel steel, PN 420, shape A, Nace compliant</p>
	<p>Oval flange 1/4 NPT chrome-nickel steel, PN 420, shape A, Nace compliant</p>
	<p>Oval flange 1/2 NPT chrome-nickel steel, PN 420, shape A, Nace compliant</p>
	<p>Wall or pipe mounting bracket, stainless steel</p>

## SP30-2-Selection composition

Selection example **SP30-2**

F	D	E	G	P	V	C	U	Y	L	N	V	P
1	2	3	4	5	6	7	8	9	10	11	12	15

1.Pressure type	<b>G</b>	Manometer pressure
	<b>A</b>	Absolute pressure
	<b>N</b>	Negative pressure
	<b>F</b>	Differential pressure
2.Measuring range	<b>A</b>	0 ~ 0.01... 100MPa (G-gauge pressure)
	<b>B</b>	0~60MPa (A- absolute pressure)
	<b>C</b>	-100~0kPa (n-negative pressure)
	<b>D</b>	-20~10MPa (D-differential pressure)
3.Display type	<b>E</b>	Live LED digital display
	<b>F</b>	On-site LCD digital display
4.Measurement accuracy	<b>G</b>	0.1%
	<b>H</b>	0.075%
	<b>T ( )</b>	Other accuracy
5.Output signal	<b>N</b>	0~5V DC (three-wire)
	<b>O</b>	1~10C DC (three-wire)
	<b>P</b>	4~20mA
	<b>Q</b>	4~20mA, HART agreement
	<b>R</b>	0-5V DC, HART agreement
	<b>S</b>	FF bus
	<b>Z</b>	Profibus
6.Electrical Interface	<b>U</b>	1/2NPT
	<b>V</b>	M20*1.5
	<b>W</b>	G1/2
7.Process connection	<b>A</b>	DN20 (HG-20592 standard)
	<b>B</b>	DN25 (HG-20592 standard)
	<b>C</b>	DN40 (HG-20592 standard)
	<b>D</b>	DN50 (HG-20592 standard)
	<b>E</b>	DN65 (HG-20592 standard)
	<b>F</b>	DN80 (HG-20592 standard)
	<b>G</b>	DN100 (HG-20592 standard)
<b>T ( )</b>	Other connection specifications	
8.Filling fluid	<b>U</b>	Silicone oil
	<b>V</b>	Fluorinert®FC-43
	<b>T ( )</b>	Other filling fluids
9.Shell material	<b>X</b>	Aluminum, polyurethane coating
	<b>Y</b>	Stainless steel
10.Body material	<b>S</b>	304
	<b>L</b>	316L
	<b>T ( )</b>	Other materials
11.Liquid material	<b>N</b>	316L
	<b>O</b>	Hastelloy C
	<b>P</b>	titanium
	<b>Q</b>	tantalum
	<b>T ( )</b>	Other materials

## SP30-2-Selection composition

Selection example **SP30-2** **F** **D** **E** **G** **P** **V** **C** **U** **Y** **L** **N** **V** **P**

1    2    3    4    5    6    7    8    9    10    11    12    15

12.Remote transmission (optional)	<b>R</b>	Single flange cartridge type
	<b>V</b>	Single flange (direct mounting)
	<b>W</b>	Single flange
	<b>N</b>	Single flange cartridge type
	<b>T()</b>	Other
13.Mounting bracket (optional)	<b>A</b>	2-inch pipe mounting (stainless steel)
	<b>B</b>	Panel mounting bracket (stainless steel)
	<b>C</b>	Other bracket types
14.Instrument valve group accessories	<b>G</b>	316L three-valve group
	<b>H</b>	316L five-valve group
	<b>I</b>	Other valve group types
15.Authentication	<b>L</b>	flameproof
	<b>S</b>	Intrinsic safety
	<b>N</b>	SIL
	<b>O</b>	CE
	<b>P</b>	Non-explosion proof
	<b>T()</b>	Other

## Instructions:

SP30-2 single flange differential pressure transmitter, pressure type is differential pressure, measuring range is 0~5MPa, with LED digital display, accuracy is 0.1%, output signal is 4-20mA, electrical interface is M20\*1.5, process connection is DN40 flange /HG20592 standard, filling liquid is silicone oil, housing material is stainless steel, Body material is 316L stainless steel, liquid material is 316L stainless steel, single flange, no explosion-proof. Items 13/14 in the above table are not required.

## Product Certification

Compliance and approval; Ludwig pressure gauges meet key standards and certifications for process measurement technology; Thus guaranteeing the highest reliability in such Settings;

