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<sup>™</sup> 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.





## 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.

△P is the differential pressure signal received by the transmitter, P0 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; h1 is the height from the process zero point to the pressure opening on the upper part of the container; h2 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 = P0 + + rho gh1 + rho gh

P = P0 + rho gh2 + rho ghDelta P = P + - P - = rho gh1 - rho gh2

When the liquid level changes from h2=0 to h2=h1, 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/dm³						
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 <sup>®</sup> 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**

Image: Product of the produ	Precision	Limit point adjustment: ≤ 0.075% full scale (according to DIN 16 086)							
Response time         ≤ 0.02% Full scale; According to DIN 16086           Response time         150 msec Approximately, undamped           Domping coefficient         Adjustable 0 – 100 sec           Five-year stability         ≤ 0.1% Full scale (reference condition IEC 770)           Power source         11.5 – 36V DC           11.5 – 36V DC         11.5 – 36V DC           Power supply error         ≤ 0.1% Full scale; change explosion protection )           Scale         ×1.0 × 0.10 C (Intrinsically safe explosion protection )           Storage temperature         -40-485°C           • Medium temperature         -40-40°C (Filled with fluorine oil -10-10°C)           • Medium temperature         -40-40°C (Filled with fluorine oil -10-10°C)           • Medium temperature         -40-40°C (Cos 15           • Medium temperature         -40-40°C (Cos 15           • Medium temperature         -40-40°C (Cos 15           • Mechanical in	Return difference	≤ 0.02% Full scale; According to DIN 16086							
Response time         150 msec Approximately, undamped           Damping coefficient         Adjustable 0 - 100 sec           Five-year stability         < 0.1% Full scale (reference condition IEC 770)	Repeatability	≤ 0.02% Full scale; According to DIN 16086							
Damping coefficient         Adjustable 0 - 100 sec           Five-year stability         5.0.1% Full scale (reference condition IEC 770)           Power source         11.5 - 36V DC (Intrinsically safe explosion protection ) Security gates with or without HART protocol communications are data sheet (Nete: HART communication at least TYDOC (25800))           Power supply error         4.0.1% Full scale: change every 10V (standard voltage 24V DC)           Temperature         -40+485°C           • Medium temperature         -40+485°C; According to DIN 16 086 (LCD cannot be displayed below -20 ° C)           • Medium temperature         -40+85°C; According to DIN 16 086 (LCD cannot be displayed below -20 ° C)           • Mediam temperature         -40+85°C; According to DIN 16 086 (LCD cannot be displayed below -20 ° C)           • Mediam temperature         -40+85°C; According to DIN 16 086 (LCD cannot be displayed below -20 ° C)           • Mediam temperature         -40+85°C; According to DIN 16 086 (LCD cannot be displayed below -20 ° C)           • Methanical impact         50g/rtmsc           Mechanical impact         50g/rtmsc           Mechanical impact         50g/requercy :10 - 2000Hz           Class of protection         1765 class T6           Italiation resistance         100 MQ; 50 V DC           Breakdown voltage         2 500 Veff.           Shell         Cast aluminium GDAISi12           Fla	Response time	150 msec Approximately, undamped							
Five-year stability       \$ 0.1% Full scale (reference condition IEC 770)         Power source       11.5 - 36V DC         11.5 - 30V DC (Intrinsically sofe explosion protection )         Storage temperature       \$ 0.1% Full scale: change every 10V (standard voltage 24V DC)         Temperature       -40+85°C         • Medium temperature       -40+85°C - 40+85°C (class T4         • Medium temperature       -40+85°C class T4         • Intrinscollay sofe       +85°C class T5         • Intrinscollay sofe       +60°C class T6         Electromagnetic compatibility       (EMC) basis EN 61 326         Mechanical impact       50g/ftlmsec         Class of protection       Tope connection coble         IP65 basis EN 60529       100 MQ; 50 V DC         Braudotion resistance       100 MQ; 50 V DC         Braddown voltage       > 500 VFI.         Shell       Cast aluminium GDAIS12         Florge relief bolt       Steel, chromic acid passivation treatment         Optional: stainless steel       Muthage steel of romagnetic regimerers         Ambient humidity       5-100% RH @ 400°C (Inclusive annual mean)         Electrical connection       With 2 removable tight housing covers. With 2 screw holes         Muthage scale connection below)       Wuthit plastic scal for scaling 6-12mm cable <tr< td=""><td>Damping coefficient</td><td colspan="8">Adjustable 0 — 100 sec</td></tr<>	Damping coefficient	Adjustable 0 — 100 sec							
Power source         11.5 – 36V DC           International statement in the stateme	Five-year stability	≤ 0.1% Full sc	ale (reference condition IEC 770)						
11.5 — 30/ DC (Intrinsically safe explosion protection )           Sense: IARR communication at least 170/DC (2500)]           Power supply error         ≤ 0.1% Full scale: change every 10V (standard voltage 24V DC)           Temperature         -40+85°C           • Medium temperature         -40+85°C (cliled with fluorine oil -10+100°C)           • Ambient temperature         -40+85°C, class T4           • Ambient temperature         -40+85°C, class T5           • htrinsically safe         +85°C class T6           Electromagnetic compatibility         (EMC) basis EN 61 326           Mechanical vibration         50g/finase           Machanical vibration         50g/finase           Insulation resistance         100 MC; S0 V DC           Breakdown voltage         ≥ 500 Veff.           Shell         Cast atuminium GDAIS12           Flange relief bolt         Steel, chromic acid passivation treatment           Optional: stainless steel         M2X1.5, One of them has a seal cover for installation; 1 tube with plastic seal for sealing 6-12mm cable           Flange relief bolt         Fractory clinarulor: Vertical           (Process connection below)         Working position: Nry           Weight         ≥3.9 kg           Ambient humidity         5-100% clinarulor: Vertical           (Process connection below)	Power source	11.5 — 36V DC							
Security gates with or without LART protocol communication: see data sheet           Power supply error         \$ 0.1% Full scale: change every 10V (standard voltage 24V DC)           Temperature         -40+85°C           * Medium temperature         -40+85°C (According to DIN 16 086 (LCD cannot be displayed below -20 ° C)           Intrinsically soft         -40+85°C (According to DIN 16 086 (LCD cannot be displayed below -20 ° C)           Intrinsically soft         +75°C class T4           explosion proof         \$ 175°C class T5           Vpe         +85°C class T6           Mechanical impact         \$ 000/11msc           Mechanical vibration         \$ 5g frequency :10 - 2000Hz           Class of protection         Tape connection cable           IP65 basis EN 60529         Insulation resistance           Insulation resistance         100 M0; \$ 50 V DC           Breakdown voltage         \$ 500 Veff.           Shell         Cast aluminium GDAIS112           Flange relief bolt         \$ 100% RI @ 40°C (Inclusive annual mean)           Electrical connection         With 2 removable tight housing covers. With 2 screw holes           Mudicity position:         \$ 100% RI @ 40°C (Inclusive annual mean)           Electrical connection         With 2 removable tight housing covers. With 2 screw holes           Mudicity colination:         \$		11.5 — 30V D	C (Intrinsically safe explosion protection )						
Power supply error         \$ 0.1% Full scale: change every 10V (standard voltage 24V DC)           Temperature         -40-+85°C           • Medium temperature         -40-100°C (Filled with fluorine oil -10-+100°C)           • Ambient temperature         -40-100°C (Filled with fluorine oil -10-+100°C)           • Ambient temperature         -40-100°C (Filled with fluorine oil -10-+100°C)           • Ambient temperature         -40-185°C; According to DIN 16 086 (LCD cannot be displayed below -20 ° C)           • Ambient temperature         -40-185°C; According to DIN 16 086 (LCD cannot be displayed below -20 ° C)           • Ambient temperature         -40-185°C; According to DIN 16 086 (LCD cannot be displayed below -20 ° C)           • Ambient temperature         -40-185°C; According to DIN 16 086 (LCD cannot be displayed below -20 ° C)           • Medium temperature         -40-185°C; According to DIN 16 086 (LCD cannot be displayed below -20 ° C)           • Medium temperature         -40-185°C; According to DIN 16 086 (LCD cannot be displayed below -20 ° C)           • Mechanical impact         Stogramme         -45°C class T6           • Electrical origitation         Stogramme         -10°C           • Insulation resistance         100 MC; S0 V DC         -2000Hz           Breakdown voltage         > 500 Veff.         -           Flange relief bolt         Steel, chromic acid passivation treatment         -		Security gates [Note: HART co	Security gates with or without HART protocol communication: see data sheet						
Temperature       -40-+85°C         • Medium temperature       -40-+85°C (Filled with fluorine oil -10-+100°C)         • Ambient temperature       -40-+85°C According to DIN 16 086 (LCD connot be displayed below -20 ° C)         • Ambient temperature       -40-+85°C According to DIN 16 086 (LCD connot be displayed below -20 ° C)         • Intrinscally safe explosion-proof type       +85°C class T4         • for C class T5       +60°C class T6         Electromagnetic compatibility       (EMC) basis EN 61 326         Mechanical impact       50g/11msec         Class of protection       5g frequency :10 - 2000Hz         Class of protection       Tape connection cable         Insulation resistance       100 MC; 50 V DC         Breakdown voltage       > 500 Veff.         Shell       Cast aluminium GDAIS112         Shell       Cast aluminium GAIS112         Florage relief bolt       Steel, chromic acid passivation treatment         Optional: stailess steel       Muth 2 removable tight housing covers. With 2 screw holes         Max201.5, One of them has a seal cover for installation;       11 tube with plastic seal for sealing 6-12mm cable         Installation position       Factory calibration: Vertical         (Process connection below)       Working position: Any         Weight       25.9 kg       Stainless steel ac	Power supply error	≤ 0.1% Full sc	ale: change every 10V (standard voltage 24V DC)						
• Storage temperature       -40+85°C         • Medium temperature       -40+85°C; According to DIN 16 086 (LCD cannot be displayed below -20°C)         • Ambient temperature       -40+85°C; According to DIN 16 086 (LCD cannot be displayed below -20°C)         • Intrinsically safe       +85°C class T4         • Horizon and temperature       +75°C class T5         • Horizon and temperature       (EMC) basis EN 61 326         Mechanical impact       50g/Timser         5 g frequency : 10 - 2000Hz       (EMC) basis EN 61 326         Class of protection       5g frequency : 10 - 2000Hz         Class of protection       Tape connection cable         IP65 basis EN 60529       Intrinsical state         Insulation resistance       100 MQ; 50 V DC         Breakdown voltage       > 500 Veff.         Shell       Cast aluminum GDAISI12         Flange relief bolt       Steil, chromic acid passivation treatment         Optional: stailess steel       M20X1.5, One of them has a seal cover for installation;         Installation position       Yettic seal for sealing 6-12mm cable         Installation position       Factory callipation: Vertical         (Process connection below)       Working position: Any         Weight       > 3.9 kg         Attachments       Connect the PC serial port to the transmitt	Temperature								
• 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       +85°C class T4         • Processor       +75°C class T5         type       +60°C class T6         Electromagnetic compatibility       (EMC) basis EN 61 326         Mechanical impact       50g/11msc         Mechanical vibration       5g frequency :10 - 2000Hz         Class of protection       Tape connection cable         Insulation resistance       100 MQ; 50 V DC         Breakdown voltage       > 500 Veff.         Shell       Cast aluminum GDAIS112         Flange relief bolt       Steel, chromic acid passivation treatment         Optional: stainless steel       Optional: stainless steel         Ambient humidity       5-100% RH @ 400°C (Inclusive annual mean)         Electrical connection       With 2 removable tigh housing covers. With 2 screw holes         Installation position       Factory calibration: Vertical         (Process connection below)       Working position: Any         Weight       2.3 kg         - Attachments       -         • HART® modem       Connect the PC serial port to the transmitter         • HART® modem       Con	Storage temperature	-40-+85°C							
• Ambient temperature         -40-+85°C; According to DIN 16 086 (LCD cannot be displayed below -20 ° C)           Intrinsically safe explosion protection         +65°C class T4 +75°C class T5 +60°C class T6           Electromagnetic compatibility         (EMC) basis EN 61 326           Mechanical impact         50g/11msc           Mechanical vibration         5g frequency :10 – 2000Hz           Class of protection         Tope connection cable           Insulation resistance         100 MΩ; 50 V DC           Breakdown voltage         ≥ 500 Veff.           Shell         Cast aluminium GDAIS112           Flange relief bolt         Steel, chromic acid passivation treatment           Optional: stainless steel         Mith 2 screw holes           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 seel for sealing 6-12mm cable           Installation position         Factory calibration: Vertical           (Process connection below)         Working position: Any           Weight         ≥3.9 kg           Attachments         Connect the PC serial port to the transmitter           • HART® modem         Connect the PC serial port to the transmitter	Medium temperature	-40-+100°C (F	illed with fluorine oil -10-+100°C)						
Intrinsically safe explosion-proof type         +85°C class T4 +75°C class T5 +60°C class T5           Electromagnetic compatibility         (EMC) basis EN 61326           Mechanical impact         50g/11msc           Mechanical vibration         5g frequency :10 – 2000Hz           Class of protection         Tape connection cable           Insulation resistance         100 MΩ; 50 V DC           Breakdown voltage         ≥ 500 Veff.           Shell         Cast aluminium GDAIS112           Flange relief bolt         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           M2X1.5, One of them has a seal cover for installation;         1           1 tube with plastic seal for sealing 6-12mm cable         (Process connection below)           Working position: Any         Working position: Any           Weight         ≥3.9 kg         Attachments           • 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	Ambient temperature	-40-+85°C; Ad	ccording to DIN 16 086 (LCD cannot be displayed below -20 $^{\circ}$ C)						
explosion-proof type         +75°C class T5 +60°C class T6           Electromagnetic compatibility         (EMC) basis EN 61 326           Mechanical impact         50g/11msc           Mechanical vibration         5g frequency :10 – 2000Hz           Class of protection         Tape connection cable           Insulation resistance         100 MQ; 50 V DC           Breakdown voltage         > 500 Veff.           Shell         Cast aluminium GDAIS112           Flange relief bolt         Steel, chromic acid passivation treatment           Optional: stainless steel         Ambient humidity           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: Xery           Weight         >3.9 kg           Attachments         Connect the PC serial port to the transmitter           • 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		Intrinsically safe	+85°C class T4						
wpe         +60°C class T6           Electromagnetic compatibility         (EMC) basis EN 61 326           Mechanical impact         50g/TImsec           Mechanical vibration         5g frequency :10 – 2000Hz           Class of protection         Tape connection cable           Insulation resistance         100 MQ; 50 V DC           Breakdown voltage         > 500 Veff.           Shell         Cast aluminium GDAIS12           Flange relief bolt         Steel, chromic acid passivation treatment           Optional: stainless steel         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         >3.9 kg           Attachments         Stainless steel according to DIN 19213; Other forms of valve user requirements           • 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		explosion-proof	+75°C class T5						
Electromagnetic compatibility         (EMC) basis EN 61 326           Mechanical impact         50g/11msec           Mechanical vibration         5g frequency :10 – 2000Hz           Class of protection         Tape connection cable           Insulation resistance         100 MΩ; 50 V DC           Breakdown voltage         ≥ 500 Veff.           Shell         Cast aluminium GDAIS112           Flange relief bolt         Steel, chromic acid passivation treatment           Optional: stainless steel         Mode with 2 screw holes           Ambient humidity         5-100% RH @ 400°C (Inclusive annual mean)           Electrical connection         With 2 removable tight housing covers. With 2 screw holes           M20X15, One of them has a seal cover for installation; 1 tube with plastic seal for sealing 6-12mm cable           Installation position         Factory callbration: Vertical           (Process connection below)         Working position: Any           Weight         ≥3.9 kg           Attachments         Connect the PC serial port to the transmitter           • HART® modem         Connect the PC serial port to the transmitter           • Isolation capsule         When the common process connection cannot meet the requirements, select the isolation capsule		type	+60°C class T6						
Mechanical impact         50g/11msec           Mechanical vibration         5g frequency :10 - 2000Hz           Class of protection         Tape connection cable           Insulation resistance         100 MΩ; 50 V DC           Breakdown voltage         ≥ 500 Veff.           Shell         Cast aluminium GDAIS112           Flange relief bolt         Steel, chromic acid passivation treatment           Optional: stainless steel         0ptional: 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         ≥3.9 kg           Attachments         Stainless steel according to DIN 19213; Other forms of valve user requirements           • 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, select the isolation capsule	Electromagnetic compatibility	(EMC) basis E	N 61 326						
Mechanical vibration       5g frequency :10 - 2000Hz         Class of protection       Tape connection cable         IP65 basis EN 60529       Insulation resistance         Insulation resistance       100 MQ; 50 V DC         Breakdown voltage       ≥ 500 Veff.         Shell       Cast aluminium GDAISi12         Flange relief bolt       Steel, chromic acid passivation treatment         Optional: stainless steel       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         1 tube with plastic seal for sealing 6-12mm cable       Installation position         Factory calibration: Vertical       (Process connection below)         Working position: Any       ≥3.9 kg         Attachments       Stainless steel according to DIN 19213; Other forms of valve user requirements         • 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	Mechanical impact	50g/11msec							
Class of protection       Tape connection cable         IP65 basis EN 60529         Insulation resistance       100 MΩ; 50 V DC         Breakdown voltage       ≥ 500 Veff.         Shell       Cast aluminium GDAISi12         Flange relief bolt       Steel, chromic acid passivation treatment         Optional: stainless steel       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         1 tube with plastic seal for sealing 6-12mm cable       (Process connection below)         Working position: Any       Weight       ≥3.9 kg         Attachments       Connect the PC serial port to the transmitter         • 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	Mechanical vibration	5g frequency :10 — 2000Hz							
IP65 basis EN 60529           Insulation resistance         100 MΩ; 50 V DC           Breakdown voltage         ≥ 500 Veff.           Shell         Cast aluminium GDAISI12           Flange relief bolt         Steel, chromic acid passivation treatment           Optional: stainless steel         Ambient humidity           F-100% RH @ 400°C (Inclusive annual mean)         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         Recover for installation; 1 tube with plastic seal for sealing 6-12mm cable           Installation position         Factory calibration: Vertical         Working position: Any           Weight         >3.9 kg         Stainless steel according to DIN 19213; Other forms of valve user requirements           • HART® modem         Connect the PC serial port to the transmitter         select the isolation capsule	Class of protection	Tape connection cable							
Insulation resistance         100 MΩ; 50 V DC           Breakdown voltage         ≥ 500 Veff.           Shell         Cast aluminium GDAISi12           Flange relief bolt         Steel, chromic acid passivation treatment           Optional: stainless steel         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           I tube with plastic seal for sealing 6-12mm cable         Factory calibration: Vertical           (Process connection below)         Working position: Any           Weight         ≥ 3.9 kg           Attachments         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		IP65 basis EN 60529							
Breakdown voltage         ≥ 500 Veff.           Shell         Cast aluminium GDAISI12           Flange relief bolt         Steel, chromic acid passivation treatment           Optional: stainless steel         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         ≥3.9 kg           Attachments         Connect the PC serial port to the transmitter           • HART® modem         Connect the PC serial port to the transmitter           • Isolation capsule         When the common process connection cannot meet the requirements, select the isolation capsule	Insulation resistance	100 MΩ; 50 V	100 MΩ; 50 V DC						
Shell         Cast aluminium GDAISi12           Flange relief bolt         Steel, chromic acid passivation treatment           Optional: stainless steel         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         ≥3.9 kg           Attachments         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	Breakdown voltage	≥ 500 Veff.							
Flange relief bolt       Steel, chromic acid passivation treatment         Optional: stainless steel       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         1 tube with plastic seal for sealing 6-12mm cable       Factory calibration: Vertical         (Process connection below)       Vorking position: Vertical         (Process connection below)       Working position: Any         Weight       ≥3.9 kg         Attachments       Connect the PC serial port to the transmitter         • HART® modem       Connect the PC serial port to DIN 19213; Other forms of valve user requirements         • Isolation capsule       When the common process connection cannot meet the requirements, select the isolation capsule	Shell	Cast aluminium GDAISi12							
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           1 tube with plastic seal for sealing 6-12mm cable         1           Installation position         Factory calibration: Vertical           (Process connection below)         Working position: Any           Weight         ≥3.9 kg           Attachments         Connect the PC serial port to the transmitter           • HART® modem         Connect the PC serial port to The transmitter           • Isolation capsule         When the common process connection cannot meet the requirements, select the isolation capsule	Flange relief bolt	Steel, chromic acid passivation treatment							
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         1 tube with plastic seal for sealing 6-12mm cable       Factory calibration: Vertical         (Process connection below)       Vorking position: Any         Weight       ≥3.9 kg         Attachments       Connect the PC serial port to the transmitter         • HART® modem       Connect the PC serial port to the transmitter         • Isolation capsule       When the common process connection cannot meet the requirements, select the isolation capsule		Optional: stainless steel							
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       ≥ 3.9 kg         Attachments         • 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, select the isolation capsule	Ambient humidity	5-100% RH @ 400°C (Inclusive annual mean)							
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       ≥3.9 kg         Attachments         • 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	Electrical connection	With 2 removable tight housing covers. With 2 screw holes							
1 tube with plastic seal for sealing 6-12mm cable         Installation position         Factory calibration: Vertical         (Process connection below)         Working position: Any         Weight       ≥3.9 kg         Attachments         • 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		M20X1.5, One of them has a seal cover for installation;							
Installation position       Factory calibration: Vertical         (Process connection below)         Working position: Any         Weight       ≥3.9 kg         Attachments         • 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		1 tube with plastic seal for sealing 6-12mm cable							
(Process connection below)         Working position: Any         Weight       ≥3.9 kg         Attachments         ■ 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	Installation position	Factory calib	ration: Vertical						
Working position: Any         Weight       ≥3.9 kg         Attachments         ■ 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		(Process connection below)							
Weight       ≥3.9 kg         Attachments         ■ 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		Working position: Any							
Attachments            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	Weight	≥3.9 kg							
• 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	Attachments								
• 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	■ HART <sup>®</sup> modem	Connect the PC serial port to the transmitter							
<ul> <li>Isolation capsule</li> <li>When the common process connection cannot meet the requirements, select the isolation capsule</li> </ul>	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		Liquid crystal	13 pressure units, %, custom units or output mA values		
	Set measuring range (Blind school)	Set the maximum and minimum values to reset		display	Medium temperature		
	Set damping and time constant	Set line or root output		display	Measurement failure, out of the measurement range		
	Set test current	Set medium density			Maximum and minimum measurements		
	Set fault signal	Set temperature unit $^\circ\!C$ or $^\circ\!F$			Display both measurement and temperature values		

1) It can also be programmed with a manual operator with HART protocollt 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 T6T1				
		II 1/2G、II 2G Ex d ia IIC T6T1				
Environmental condition						
CE-mark	-	EMC 2004/108/EC for interference emission and interference resistance for industrial applications in accordance with EN 61 326-1				
		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<sup>®</sup> 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	Wiri	ng
Power source DC 12 to 36 V	1L+ 2L-	
exportation 4 to 20 mA, two-wire	C l-	(4-20mA proportional to input) (in power supply)
Test the connection current output Inherent resistance of ammeter≤ 10 Ω	TEST	Γ+ Γ-
HART®Test connection There must be resistance!	HAR HAR	T + T -
Potential balance (intrinsic safety explosion-proof type)	<u>_</u> .	
Shield		
Terminal diagram		e: Ground the transmitter! cess connection and shielding)





## Attachment



## Display and operation module

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





5P30-2-Selec 	tior election	on example	ositio e SP30	)-2/F	= / D 2	) / E 3	/ G 4	/ P / 5 6	V /	C /	U / \ °	( / L / N / V / P 10 11 12 15		
1.Pressure type	G	Man	ometei	rpressi	ure									
	Α	Abs	olute pr	ressure	<u>)</u>									
	Ν	Neg	ative p	ressure	9									
	F	Diffe	erentia	Ipressi	ure									
2.Measuring range A 0 ~ 0.01 10					)MPa (0	G-gaug	e press	sure)						
		В	0~60	MPa (A	- absolu	ute pre	ssure)							
				·0kPa (r	n-negat	ive pre	ssure)							
		D	D -20~10MPa (D-differential pressure)											
3.	Disp	lav type	Е	E Live LED digital display										
			F	On-site LCD digital display										
	Γ		romont	G	0.1%	angrean	anopray							
		accuracy	/	н	0.075	5%								
		- /		T()	Othe	raccu	racy							
		5	Output	signal	N	0~5\	/ DC (tł	nree-wi	ire)					
		5.	Sutput	Signul	0	1~10		hree-w	vire)					
					D	1~20		ince w	110)					
					0	4~20	mA H	A P T a a	roomo	nt				
					Q D	4×20			roomor					
					C N	EE bu	100,117	an i ugi	center	ιι				
					7	Drofi	huc							
				la atuta al lu	<u>ک</u>	Prom		рт						
			0.EI	lectrical li										
					V M20*1.5									
				7.0		VV	GI/2	DNO	(110.0	0500				
				7.Pr	ocess cor	nnection	A	DN20	20 (HG-20592 standard)					
							Б	DNZ5	(HG-2	G-20592 standard)				
									(HG-2	20592 standard)				
							F	DN65	(HG-2	0572 8	rd)			
							F	DN80	(HG-2	0592	(592 standard)			
							G	DN10	0 (HG-20592 standard)					
							T( )	Othe	rconne	connection specifications				
					8.	Fillina	Filling fluid		Silico	icone oil				
						5		V	Fluori	nert®F	C-43			
								T( )	Other	fillina	fluids			
						9.9	Shell m	aterial	Х	Alum	inum. r	olvurethane coatina		
									Y	Stain	less ste	el		
							10	.Bodv m	aterial	S	304			
										L	316L			
										T( )	Othe	r materials		
								11 I	iauid m	aterial	N	316L		
											0	Hastellov C		
											P	titanium		
											0	tantalum		
											T()	Other materials		
											1()			

# LUDWIG

#### SP30-2-Selection composition Selection example SP30-2

12.Re	mote	R	2	Single flange cartridge type							
(optio	onal)	<sup>1</sup> V	/	Sing	Single flange (direct mounting)						
		N	V	Sing	le flan	ge					
		N	1	Sing	le flan	ge car	tridge type				
		Т(	)	Othe	er						
	13.Moun	ting brac	:ket	Α	2-inc	h pipe	mounting (stainless steel)				
	(optiona	)		В	Pane	lmour	ting bracket (stainless steel)				
C Othe			Othe	r brack	bracket types						
		14.Instru	ument valve G			316L	three-valve group				
		group ac	ccess	ories	Н	316L	five-valve group				
	L.				Ι	Other	r valve group types				
	15.Authentication			ication	L	flameproof					
				S	Intrinsic safety						
				Ν	SIL						
				0	CE						
				Р	Non-explosion proof						
						T()	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;



