

MANUAL

D3620

Precise SMART pressure sensor with HART communication



- Only six basic ranges cover pressures from 2 kPa to 40 MPa.
- 4 to 20 mA programmable current output with HART communication.
- Easily configurable and scalable up to 1:20, sensor zeroing.
- Accuracy of 0.1% in reference conditions and 0.25% FS over the entire ambient temperature range -20 to 80 °C.
- Stainless steel separating diaphragm.
- Robust aluminium housing with display.
- Can be reconfigured using built-in buttons, HARTConf configurator or HARTWinConf and standard HART modem.

Contents

1. General instructions and information	3	4. Installation, operation and maintenance	7
1.1 Symbols used	3	4.1 Installation and commissioning	7
1.2 Safety warnings and cautions	3	4.2 Operation and maintenance	9
1.3 Scope of delivery	3	4.3 Troubleshooting	9
1.4 Description of the delivery and packing	3	4.4 Display interface	10
1.5 Storage	3	5. Product parameters	11
1.6 Installation, operation and maintenance	3	5.1 Technical parameters	11
1.7 Spare parts	3	5.2 Additional parameters	12
1.8 Repairs	3	5.3 Standards	12
1.9 Warranty	3	6. Ordering	13
2. End of service and disposal	4	6.1 Ordering table	13
2.1 End of service	4		
2.2 Disposal	4		
3. Product description	5		
3.1 Application	5		
3.2 Description	5		
3.3 Dimensional drawings	6		

1. General instructions and information

1.1 Symbols used



Symbol of warning; for safe use it is necessary to proceed according to the instructions



Symbol CE certifies compliance of the product with the respective EU and government directives



Symbol „Output“



Symbol „Power Supply“



This product does not belong to public waste and it is subjected to separate collection

1.2 Safety warnings and cautions



The equipment shall be supplied from a safe voltage source that meets all requirements of the standard EN 61010-1 and must be installed in compliance with national requirements and standards providing safety.

The equipment may only be installed by a qualified personnel who are familiar with national and international laws, directives, standards and with the instructions manual. The instrument may not be used for other purposes than as specified in this instruction manual

For elimination of a risk of injury from electric shock or fire the maximum operational parameters of the instrument may not be exceeded, particularly range of operating temperature because of exposure to heat from connected or surrounding technological equipment must not be exceeded!

The equipment should be installed in suitable environment without any direct sunlight, occurrence of dust, high temperatures, mechanical vibrations and shocks and protected against rain and excessive moisture.

1.3 Scope of delivery

With the product is delivered:

- Manual for installation, operation and maintenance
- Certificate of calibration (only with calibrated sensors)

1.4 Description of the delivery and packing

The product is packaged in a protective cover and provided with an identification label with a mark of the output control.

The product must not be exposed to direct rain, vibrations and shocks during transport.

1.5 Storage

Store the instrument in dry rooms at temperatures from -40 to +85 °C without condensation of water vapours.

1.6 Installation, operation and maintenance

During installation, commissioning, operation and maintenance follow the instructions in chapter 4.

1.7 Spare parts

Spare parts are not supplied as standard. If required, please contact the manufacturer.

1.8 Repairs

Products are repaired by the manufacturer. The products for repair should be sent together with description of the fault or defect in a packing that guarantees damping of shocks and vibrations and protects against damage during transport.

1.9 Warranty

Products are covered by a warranty for a period of 24 months from the delivery date on the delivery note. The manufacturer guarantees technical and operational parameters of the products within scope of the applicable documentation. Warranty period is specified with individual items and begins from the day of takeover of the goods by the purchaser or delivery to the carrier. Any claims concerning to defects of the goods together can be filed with the seller within the warranty period and the claimed product shall be presented. The claiming party shall give identification of the product, number of the delivery note and description of the fault or defect.

The manufacturer is not responsible for any defects caused by improper storage, incorrect connection, damages caused by external effects, in particular by effects of factors with excessive values, unqualified installation, improper operation or common wearing.

2. End of service and disposal

2.1 End of service

Dismounting and disposal of the device is possible after disconnecting of power supply.

2.2 Disposal



When disposing the packing and destroyed or irreparably damaged product proceed according to the local regulations.

3. Product description



D3620 – Precise SMART pressure sensor with HART communication

- Only six basic ranges cover pressures from 2 kPa to 40 MPa.
- 4 to 20 mA programmable current output with HART communication.
- Easily configurable and scalable up to 1:20, sensor zeroing.
- Accuracy of 0.1% in reference conditions and 0.25% FS over the entire ambient temperature range -20 to 80 °C.
- Stainless steel isolation diaphragm.
- Robust aluminium housing with display.
- Can be reconfigured using built-in buttons, HARTConf configurator or HARTWinConf and standard HART modem.

3.1 Application

The D3620 pressure sensor is designed for universal use in all areas of industry. It converts the pressure of gases or liquids into an electrical current or voltage signal. The output is a 4 to 20 mA current loop signal with the ability to zero, re-scale and reverse the output using HART communication over the output line. The reversed range is set by specifying a higher pressure value for the beginning of the range and a lower pressure value for the end of the range.

Due to the adjustable damping, it allows to suppress unwanted rapid changes and oscillations of the output signal. The pressure medium to be measured must be compatible with stainless steel 1.4571, 1.4435 and the gasket used (see ordering table).

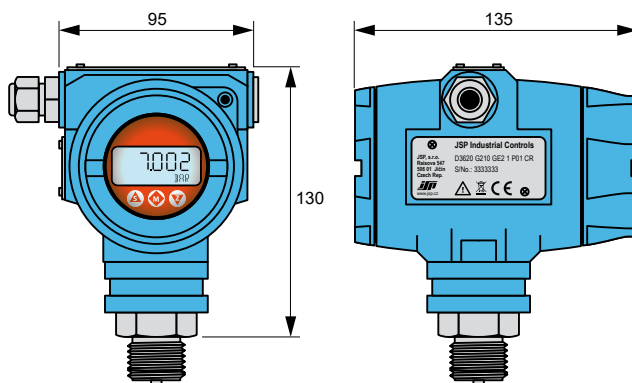
3.2 Description

The output signal of the pressure sensor is converted to a digital signal and is further processed by a microcomputer. These values are converted to a digital pressure value via factory calibration constants. Depending on this value and the set range, an output current is sent via the D/A converter and output circuits.

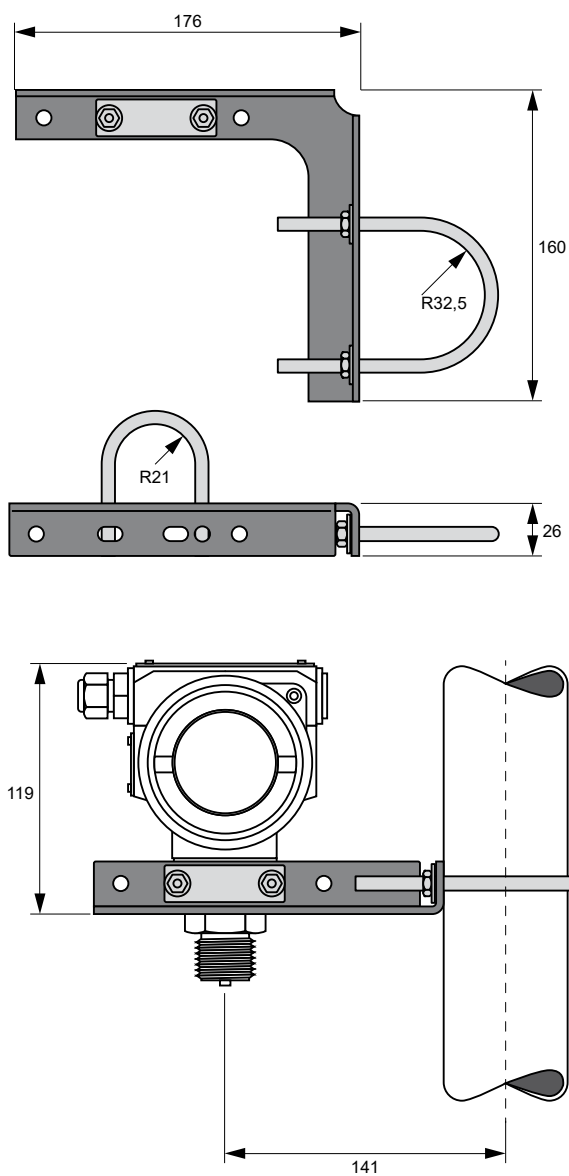
The output of the converter is an analog signal of a 4 to 20 mA current loop. The output can also be used to test the current loop and related devices.

To set up the transmitter, you need a standard HART communicator (475, etc.), a manual HARTConf configurator or a PC with the HARTWinConf program and a HART modem HARTMod (MH-02) or equivalent communication interface. The transmitter communicates using the standard HART protocol version 5. The communication is used not only for the configuration of the transmitter but also for the continuous transmission of digital data to the higher-level system up to a distance of 1 km.

3.3 Dimensional drawings



Mounting bracket (B4)



4. Installation, operation and maintenance

4.1 Installation and commissioning

4.1.1 General information

Do not use force when assembling the device!

Keep in mind that this is an electronic device.

Handle it carefully and correctly to avoid damage.

If a protective cap is fitted to the pressure connection, only remove it immediately before installation to prevent damage to the diaphragm.

Keep the protective cap! After dismantling the device, the protective cap must be fitted immediately.

Be aware that the diaphragm in many instruments is very sensitive and can be easily damaged if mishandled.

After installation and fault-free connection, check the pressure connection for leaks.

The device is put into operation by switching on the power supply voltage.

4.1.2 Special information

Make sure to no assembly stress occurs at the pressure connection, since this may cause a shifting of the characteristic curve. This is especially important for very small pressure ranges.

If there is any danger of damage by lightning or overvoltage when the device is installed outdoors, we suggest putting a sufficiently dimensioned overvoltage protection between the supply or switch cabinet and the device.

In addition, the following instructions must be observed in outdoor or damp environment:

- If possible, choose such assembly position and location, that the sensor is protected against rain and that the condensation water can freely flow-off on the surface and doesn't stay in the holes for screw, seal grooves or in vent opening (small hole next to the electrical connection)
- Avoid permanent fluid at sealing surfaces!
- Install the device in such way that it is protected from direct solar irradiation. Adverse conditions can cause that the permissible operating temperature can be overstepped and the operability of the device can be affected or damaged. In addition, if the internal pressure increases due to solar irradiation, temporary measurement errors may be caused.

For devices for gauge pressure with gauge reference (small hole next to the electrical connection), take note to:

- Check and verify if the IP protection is sufficient for the intended environment.
- Install the device in such a way, that the gauge reference necessary for the correct measurement of gauge pressure (small hole next to the electrical connection) is protected

from dirt and moisture. If the gauge reference is clogged by liquid or dirt, the device will not function properly and will not measure precisely. Furthermore, getting moisture inside the sensor can lead to permanent damage of the device.

4.1.3 Installation steps

Connection according to DIN 3852

DO NOT USE ANY ADDITIONAL SEALING MATERIALS, LIKE YARN, HEMP OR TEFLON TAPE!

- Ensure that the O-ring is not damaged and is properly seated in groove.
- Ensure that the sealing surface of the taking part is perfectly smooth and clean.
- Screw the device into the corresponding thread by hand.
- If you have a device with a knurled ring, the transmitter has to be screwed in by hand only.
- Devices with a spanner flat have to be tightened with an open-end wrench (for G1/4": approx. 5 Nm; G1/2" and M20x1.5: approx. 10 Nm).

Connection according to EN 837

- Use a suitable seal, corresponding to the medium and the pressure input (e. g. a cooper gasket). Sealing is not part of the supply.
- Ensure that the sealing surface of the taking part is perfectly smooth and clean.
- Screw the device into the corresponding thread by hand.
- Tighten it with a wrench (for G1/4": approx. 20 Nm; G1/2": approx. 50 Nm).

Connection according to NPT

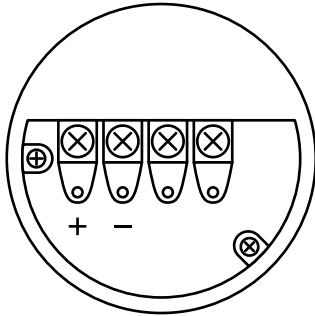
- Use a suitable seal (e. g. a PTFE-strip).
- Screw the device into the corresponding thread by hand.
- Tighten it with a wrench (for 1/4" NPT: approx. 30 Nm; 1/2" NPT": approx. 70 Nm).



When both connections of threaded parts are made of stainless steel, there is danger of galling (formation of cold weld). This can also occur during ordinary screwing by hand without using tightening key. If the cold weld is made, the thread is then damaged and parts are unusable. Before first screwing, it is therefore necessary to check whether threads are free of impurities (and clean if needed) and then treat the threads against galling (formation of cold weld) by appropriate lubricant. For example use paste G-Rapid plus. For tapered threads is usually used Teflon tape.

4.1.4 Electrical connection

The output cable is connected to the internal terminal block through a sealed cable gland. For small relative pressure measurements, it is necessary to use an electrical cable with a pass-through capillary to provide ambient atmospheric pressure towards the measuring diaphragm and to ensure correct measurement results.



4 to 20 mA output, current loop supply:

- 1 ... PLUS output and power supply
- 2 ... MINUS output and power supply

The modem or configurator is connected to terminals 1 and 2. To ensure communication, the loop impedance must be at least 250 Ohm.

4.1.5 Steps for changing the range

a) Using the HARTWinConf software and the HARTMod modem (or the HARTConf configurator as a modem)

1. From the 24 VDC power supply apply the supply voltage to terminals 1 and 2 of the sensor across the 250 Ohm resistor. Connect the modem output to terminals 1 and 2 and connect the serial communication cable of the modem to the free RS232 port of the PC or to the USB port if you are using the HARTConf configurator as a modem instead of the HARTMod modem.
2. Run the HARTWinConf program, the program will find the communication modem by itself. If the program has not found the modem, you can direct it to a specific port by tapping the HART Driver icon in the lower right corner of the screen. This will bring up the HART Driver panel and you can set the appropriate port (COM1 to COM10).
3. Follow the steps in the program. From the keyboard you can perform e.g. zeroing, range readjustment by using a precision pressure source.
4. Other parameters of the output can be set using the configurator, e.g. error current signal, output fluctuation damping, units, text notes. It is also possible to test the current output, etc.

b) Using the HARTConf configurator

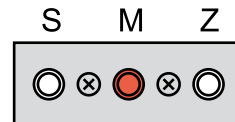
1. Connect the output of the configurator to terminals 1 and 2 of the sensor.
2. Switch on the configurator and if you have not set the sensor power supply from the configurator, switch it on (Options | Power supply | Internal). In the menu "Configuration | Lower RV" and "Configuration | Upper RV" make the necessary range settings. If you are using a precision pressure source set the pressure and select "Apply value", if you want to make the adjustment by entering a value select "Enter value", enter and confirm the change of the value. If you also want to trim digital pressure values select "Sensor zeroing" in the "Service" menu.
3. Other parameters of the output can be set using the configurator, e.g. error current signal, jump response time, units, text note. It is also possible to test the current output, etc.

c) Using the built-in buttons

Ex. factory parameters, pressure range -10 to +100 kPa relative, mA units.

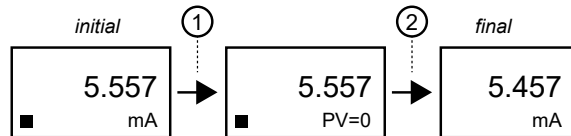


Loosen the screw of the top plate to reveal the buttons.



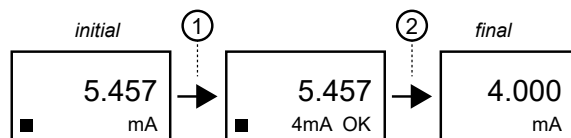
Setting PV=0 (Sensor zeroing)

1. Press the S + Z buttons simultaneously for a min. of 5 s.
2. Uvolněte tlačítka S + Z.



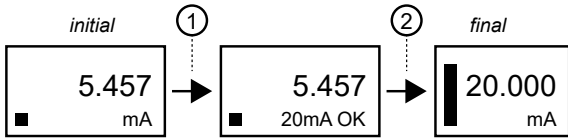
4 mA range setting

1. Press first Z, then M, then simultaneously Z+M for min. 5 sec.
2. Release the Z + M buttons.



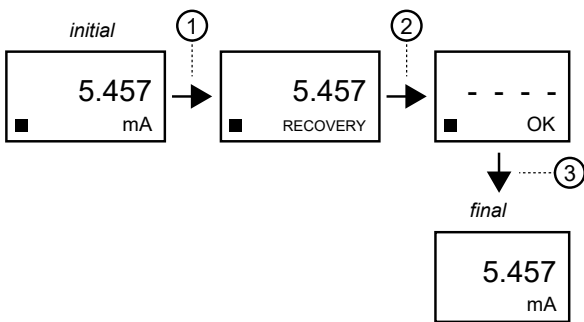
20 mA range setting

1. Press S first, then M, then S+M simultaneously for min. 5 sec.
2. Release the Z + M buttons.



Restore factory settings

1. Press S for at least 5 seconds.
2. Release S, then Z for min. 2 sec.
3. Wait a moment.



Detailed description of the display interface is given in chapter 4.4.

4.2 Operation and maintenance

With a correctly installed instrument, the operator can read the settings and measured values via the communicator. Operator may change the instrument settings only if a sudden change in the output current cannot cause a malfunction of the process equipment or the control (switch the controller to manual control if applicable)!

The instrument does not require any maintenance. If the sensor becomes dirty, please clean the pressure connection regularly, independently of the medium and contamination. Do not use aggressive cleaning solvents. Do not use pressurised water.

4.3 Troubleshooting

- No output signal -

Possible causes	Solution
faulty connection	check connection
broken wiring	check the entire wiring to the supply of the device (including connectors)
faulty ammeter (signal input)	check ammeter (fuse) or PLC analog input

- Analog output signal too low -

Possible causes	Solution
load resistor too large	check the value of the load resistor
supply voltage too low	check the output voltage of the power supply
faulty power	supply check the power supply and the applied voltage to the device

- Small output signal deviation -

Possible causes	Solution
membrane is highly contaminated	carefully clean with a non-aggressive cleaning solution and a soft brush or sponge; improper cleaning may cause irreparable damage to the membrane.
the diaphragm is calcified or clogged	we recommend sending the equipment to the JSP, s.r.o. for decalcification or cleaning.

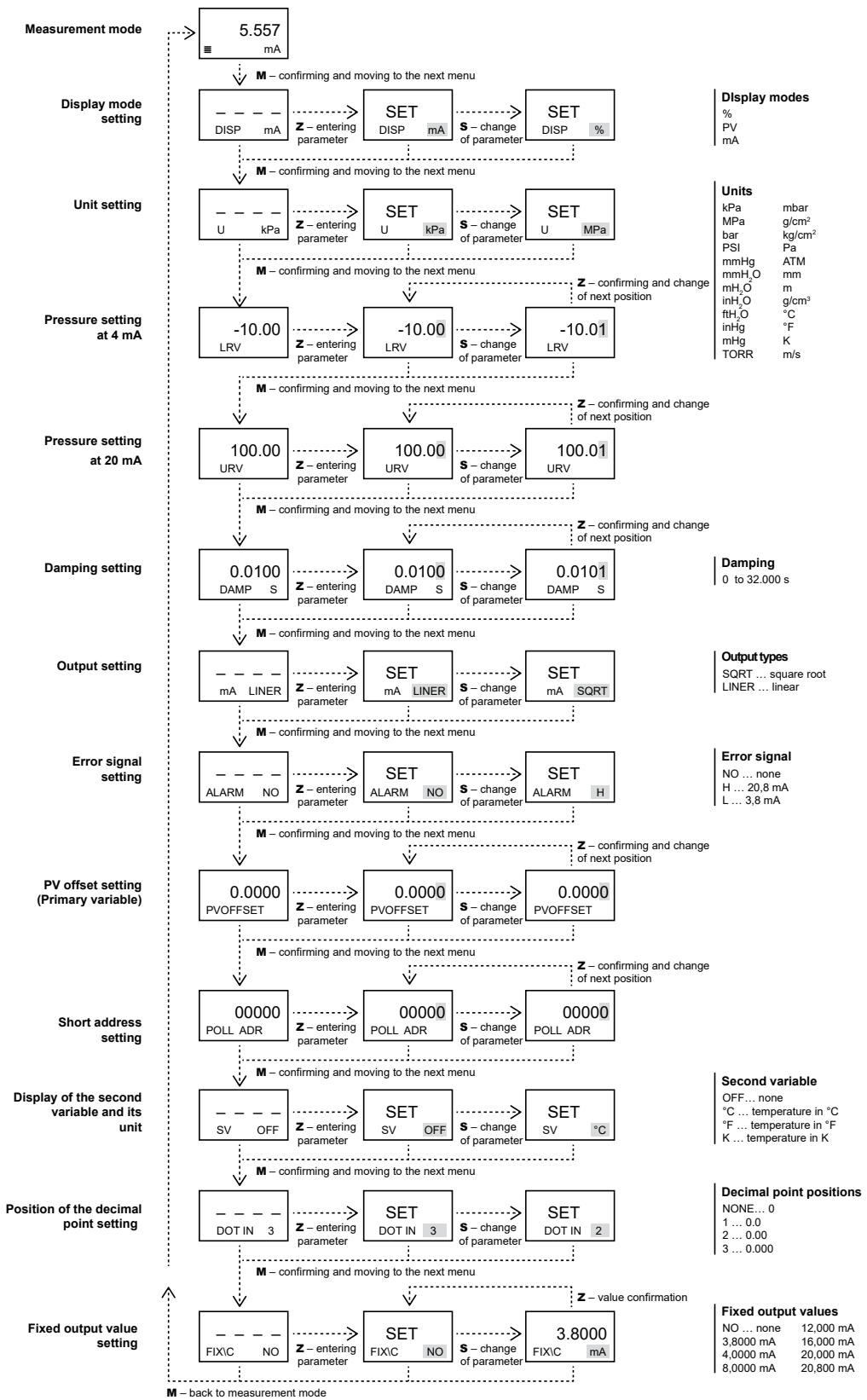
- Large output signal deviation -

Possible causes	Solution
diaphragm is damaged (pressurize or mechanically)	check the diaphragm; if damaged send the device for repair to JSP, s.r.o.

- Faulty or no output signal -

Possible causes	Solution
mechanically, thermally or chemically damaged cable	check the cable; a possible consequence of cable damage is a pitting corrosion on the stainless steel cover; in this case send the device to JSP, s.r.o. for repair.

4.4 Display interface



5. Product parameters

5.1 Technical parameters

Supply voltage:

11.5 to 55 V DC for 4 to 20 mA output versions
(internal reverse polarity protection)

Loop resistance:

without communication
 $0 - 2119 \Omega, R_{max} = (U - 11,5) / 0,022 \Omega$
 with communication
 $250 \text{ to } 600 \Omega, R_{max} = (U - 11,5) / 0,022 \Omega$

Power consumption:

$\leq 500 \text{ mW @ } 24 \text{ V DC, } 20,8 \text{ mA}$

Ambient operating temperature range:

-20 to +85 °C
 -40 to 60 °C with sealing Viton PARKER

Medium temperature:

-40 to 120 °C

Humidity:

5 to 100 % r. v. @ 40 °C

Working position:

Any (for low pressures is required to perform zero calibration after installation)

Wire connections:

screw terminals 0,5 až 1,5 mm²

Housing:

IP 67

Dimensions:

see dimensional drawing

Weight:

approx. 1.56 kg without bracket and connection fitting

Housing material:

Aluminium alloy

Materials in contact with the measured medium:

pressure connection - stainless steel 1.4571
 separating diaphragm - stainless steel 1.4435
 sealing - see ordering table

Reference conditions:

Temperature $23 \pm 5 \text{ °C}$
 vertical working position with bottom pressure connection
 range starting at zero with a span 20 % to 100 % of max. span
 power supply 24 V DC
 load resistance 250 Ohm
 damping set to 0.1 s

5.1.1 Input

Input pressure ranges:

see ordering table

Type of input connection:

see ordering table

Overload capacity:

see ordering table

5.1.2 Output

Output signal:

4 to 20 mA or 20 to 4 mA current signal

Characteristics:

linear with pressure

Maximum measured error:

$\leq \pm 0.1\%$ of span (0.075% for P01)
 (Applies for reference conditions. In the range of $\pm 5\%$ to $\pm 20\%$ of the max. value of the range, the maximum measured error is $\leq \pm 0.02\% \times \text{max. span} / \text{span of the range}$ and for ranges with damped start, the error is multiplied by the damping factor = end of range / span of the range)

Non-linearity:

$\leq \pm 0.1\%$ of span

Hysteresis:

$\leq \pm 0.1\%$ of span

Span adjustment:

$\pm 5\%$ to $\pm 100\%$ of the maximum range value (negative range values apply to the reversed range)

Offset adjustment:

between min. and max. value of the range

Damping setting range:

0 to 100 s

Step response time (63 %):

$< 0.2 \text{ s}$ at 0.0 s damping value

Load resistance:

$R_{max} = (U - 11,5) / 0,022 \Omega$

Electrical strength:

500 VAC output to metal housing

Isolation resistance:

min. 20 M Ω @ 100 V DC

5.2 Additional parameters

Output current limitation:

3.8 to 20.5 mA signal according to NAMUR NE43

Sensor or electronics error indication:

optional by current > 21 mA or < 3.6 mA
according to NAMUR NE43

Supply voltage effect:

$\leq \pm 0,005$ % of span / V

Effect of ambient temperature on measurement accuracy:

$\pm (0,1 + 0,15 \text{ TD})\%$ URL
at ambient temperatures between -20 °C and 80 °C
TD ... turndown ratio (maximum range value / actual range)

Warm-up time:

8 s

Long-term stability:

$\leq \pm 0.2\%$ max margin over 5 years

5.3 Standards

Metrological parameters:

according to EN 60770-1

Electromagnetic compatibility:

according to EN 61326-1

6. Ordering

6.1 Ordering table

Precise SMART pressure transmitter with HART communication				D3620 ① ② ③ ④ ⑤ ⑥ ⑦
Base range				D3620 ① ② ③ ④ ⑤ ⑥ ⑦
1. code	Relative pressure	Min. span	Overload	
G040	adjustable from -40 to 40 kPa	2 kPa	1 MPa	
G125	adjustable from -100 to 250 kPa	12,5 kPa	4 MPa	
G210	adjustable from -0,1 to 1 MPa	50 kPa	6 MPa	
G230	adjustable from -0,1 to 3 MPa	150 kPa	15 MPa	
G310	adjustable from -0,1 to 10 MPa	500 kPa	20 MPa	
G340	adjustable from -0,1 to 40 MPa	5 MPa	80 MPa	
1. code	Absolute pressure	Min. span	Overload	
A040	adjustable from 0 ÷ 2 kPa do 0 ÷ 40 kPa	2 kPa	1 MPa	
A125	adjustable from 0 ÷ 12,5 kPa do 0 ÷ 250 kPa	12,5 kPa	4 MPa	
A210	adjustable from 0 ÷ 50 kPa do 0 ÷ 1 MPa	50 kPa	6 MPa	
A310	adjustable from 0 ÷ 500 kPa do 0 ÷ 10 MPa	500 kPa	20 MPa	
Pressure connection				D3620 ① ② ③ ④ ⑤ ⑥ ⑦
2. code	Description			
GD2	G1/2" DIN 3852			
GE2	G1/2" EN 837-1/-3 (manometric)			
ME2	M20×1,5 EN 837-1/-3 (manometric)			
N2	1/2" NPT			
999	other			
Sealing				D3620 ① ② ③ ④ ⑤ ⑥ ⑦
3. code	Description			
1	welded stainless steel			
Accuracy				D3620 ① ② ③ ④ ⑤ ⑥ ⑦
4. code	Description			
P02	0,1 % (standard)			
P01	0,075 %			
Cable outlet				D3620 ① ② ③ ④ ⑤ ⑥ ⑦
5. code	Description			
R1	1× M20×1,5 for cables Ø 6-8 mm, IP 67			
Output signal				D3620 ① ② ③ ④ ⑤ ⑥ ⑦
6. code	Description			
CR	current 4 to 20 mA with HART communication			
MB	MODBUS / RS 485			

Setting requirement D3620 ① ② ③ ④ ⑤ ⑥ ⑦

7. code	Description
NR	without setting
QR	sensor settings according to the following parameters

Software settings of sensor (only for code QR) D3620 ① ② ③ ④ ⑤ ⑥ ⑦ ⑧

8. code	Range setting	
RL(____) RH(____)	minimum (4 mA) and maximum (20 mA) of range	enter pressure and units in brackets
8. code	Damping setting	
DP(____)	output damping	enter value in seconds in brackets
8. code	Error indication setting	
ECL	error current at fault is less than 3.6 mA	
ECH	error current at fault is greater than 21 mA	

Optional accessories

Code	Description
BZS	Customer label with description according to the order
KTL	ACL / AMC Services – Calibration and verification of pressure gauges
HARTConf	Handheld configurator for transmitters with HART communication and HART-USB modem
HARTWinCom	Setup kit for setting up transmitters with HART communication
B4	Galvanized steel mounting bracket with screws and clamp for 2" pipe

Example of order:

D3620 ① ② ③ ④ ⑤ ⑥ ⑦ → D3620 G310 GE2 1 P02 R1 CR NR



JSP Industrial Controls

JSP, s.r.o.

Raisova 547, 506 01 Jičín

Czech Republic

+420 493 760 811

jsp@jsp.cz

www.jsp.cz

JSP Service Line

+420 605 951 061

www.jsp.cz