

Diaphragm monitoring system

For the chemical and petrochemical industries

Model DMS27

WIKA data sheet DS 95.23

Applications

- Suitable for applications with hydrofluoric acid content
- For aggressive, contaminated or hot media
- Pressure/vacuum monitoring on pipelines or transport of critical media
- Pressure measurement for the chemical/petrochemical sectors, oil/gas industries and water/wastewater plants

Special features

- Double-diaphragm system to ensure the separation of the process and the pressure measuring instrument
- Process connection with flange to provide for direct threaded connection
- All welded design with flush diaphragm
- System entirely from Hastelloy
- Patent applied for in various countries, e.g. DE 19 94 98 31



Diaphragm monitoring system, model DMS27

Description

The WIKA combination of diaphragm seal, pressure measuring instrument and monitoring instrument is ideally suited for the harshest measurement tasks. The system can withstand aggressive, contaminated or hot media and ensures a secure connection between the medium and the diaphragm monitoring system.

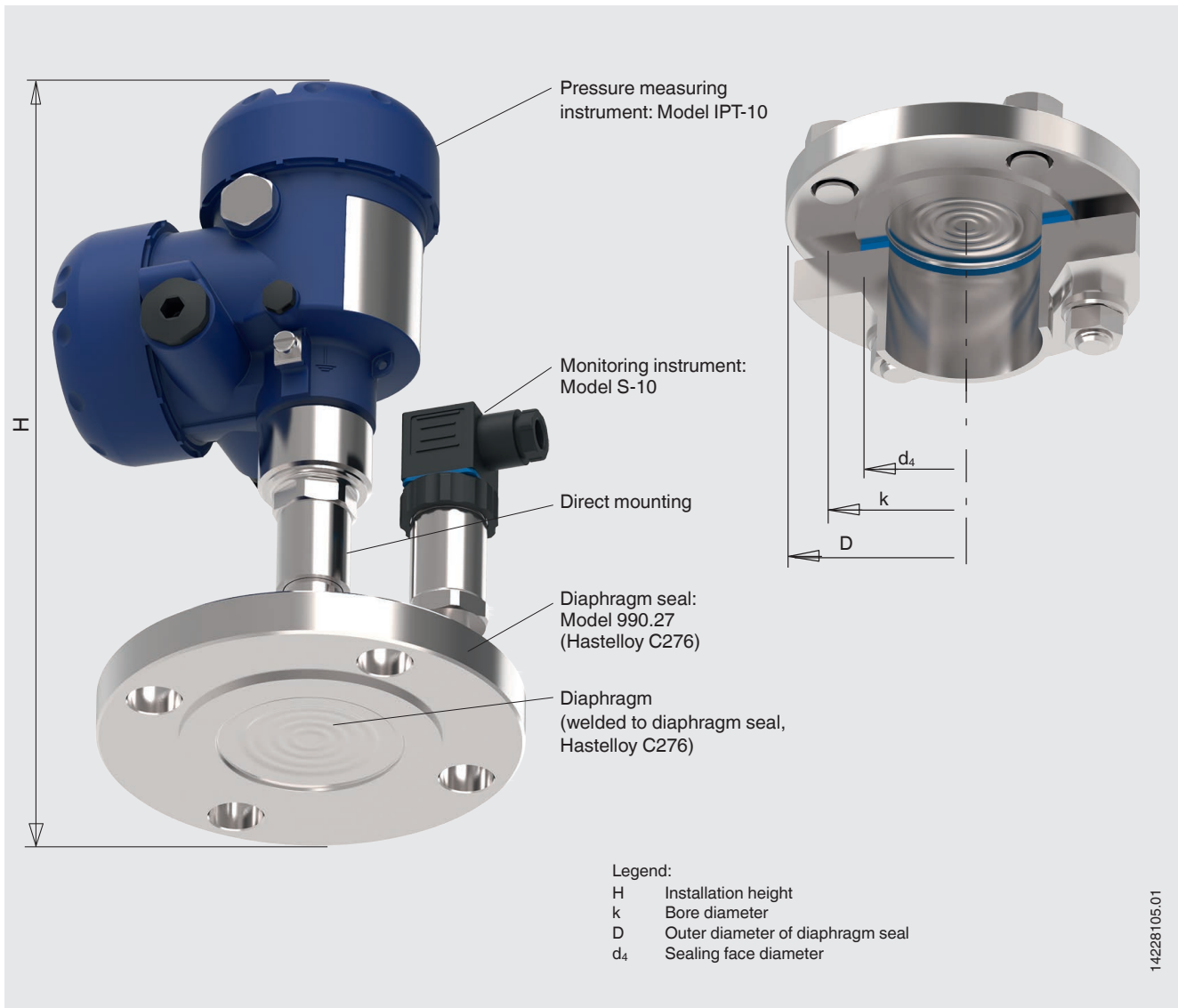
The patented diaphragm monitoring has been designed specifically for the highest safety requirements in the chemical and petrochemical industries. Through the diaphragm monitoring, the risk of an unnoticed rupture of the diaphragm is avoided, since this is immediately indicated on the monitoring instrument. In addition, an electrical signal can be transmitted to the system control.

In the event of a diaphragm rupture, a second diaphragm in the pressure measuring instrument ensures the reliable separation of the environment and the process.

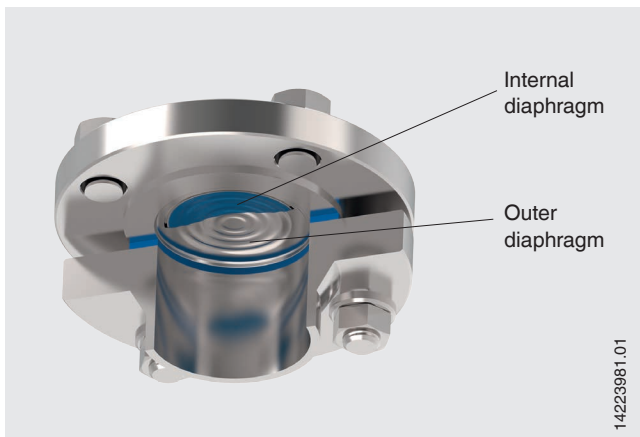
Mounting of the diaphragm seal to the pressure measuring instrument is made as direct mounting as standard. A fluid inside the system, which is explicitly chosen to suit the particular application, hydraulically transmits the pressure to the pressure measuring instrument.

Diaphragm monitoring systems with the WIKA model 990.27 diaphragm seals are used successfully in applications with hydrofluoric acid content.

Installation example of the diaphragm monitoring system



Functional principle of diaphragm monitoring, diaphragm seal model 990.27



WIKA's patented double-diaphragm design (patent no. DE19949831) is the solution for critical processes where neither the medium should find its way into the environment, nor should the system fill fluid find its way into the product.

The space (shown in blue in the picture) between the two diaphragms shown is evacuated. As a result, in normal operation, the two diaphragms act as a single diaphragm and transfer the pressure from the medium to a system fill fluid behind it. This feeds the pressure through, hydraulically, to the pressure measuring instrument.

The vacuum between the two diaphragms is monitored by the monitoring instrument. Should there be a diaphragm rupture, the vacuum breaks immediately and there will be an electrical warning through the selected monitoring instrument.

Specifications

Diaphragm seal system				
Design	Process transmitter welded to diaphragm seal			
Scale range	0 ... 2.5 (0 ... 40)	0 ... 4 (0 ... 60)	0 ... 6 (0 ... 1,000)	0 ... 10 (0 ... 150)
Gauge pressure in bar (psi)	0 ... 16 (0 ... 250)	0 ... 25 (0 ... 400)	0 ... 40 (0 ... 600)	
Scale range ¹⁾	-1 ... +1.6 (-30 inHg ... +25)	-1 ... +3 (-30 inHg ... +45)	-1 ... +5 (-30 inHg ... +70)	
Vacuum in bar (psi)	-1 ... +10 (-30 inHg ... +145)	-1 ... +15 (-30 inHg ... +220)	-1 ... +25 (-30 inHg ... +360)	
Permissible temperature range				
Medium	-10 ... +120 °C (-50 ... +248 °F)			
Ambient	+10 ... +40 °C (+50 ... +104 °F)			
Storage	+10 ... +60 °C (+50 ... +140 °F)			
Ingress protection per IEC/EN 60529	IP65 per IEC/EN 60529			
Material ²⁾ wetted	Diaphragm: Hastelloy C276 2.4819; UNS N10276 Upper body of diaphragm seal: Hastelloy C276 2.4819; UNS N10276			
Mounting type	Direct mounting			
Level of cleanliness of wetted parts	Oil and grease free per ASTM G93-03 level E (WIKA standard) and ISO 15001 (< 1,000 mg/m ²)			
System fill fluid	KN 21 halocarbon			

1) Under vacuum, the diaphragm monitoring function is only possible to a limited extent

2) Other materials on request

Operational safety with vacuum

Pressure measuring instruments with vacuum scale ranges are generally suitable for use with full vacuum.

Display behaviour for vacuum

The monitoring instrument is dependent upon the process pressure and can detect the diaphragm rupture up to a maximum of 250 mbar abs.

Specifications, diaphragm monitoring

Monitoring instrument	Model S-10
Design	Pressure sensor
Current output	4 ... 20 mA (2-wire)
Power supply	DC 10 ... 30 V
Accuracy at reference conditions	≤ ±0.5 % of span
Permissible load in Ω	Current output (2-wire) ≤ (power supply - 10 V) / 0.02 A
Current supply	DC 10 ... 30V
Reference conditions (per IEC 61298-1)	Temperature: 15 ... 25 °C (59 ... 77 °F) Atmospheric pressure: 860 ... 1,060 mbar (12.5 ... 15.4 psi) Humidity: 45 ... 75 % r. h. Power supply: DC 24 V Mounting position: Calibrated in vertical mounting position with pressure connection facing downwards
Material	
Case	Stainless steel
Measuring system	Hastelloy
Angular connector DIN EN 175301-803 A	PA
Ingress protection	IP65

For further information see data sheet PE 81.01

Functional description

Diaphragm rupture detection

As soon as the monitoring instrument detects any change in pressure, the diaphragm monitoring system must be replaced.

Process pressure

Should a diaphragm rupture occur, the full process pressure acts on the monitoring instrument. In the event of a diaphragm rupture, the monitoring instrument must therefore be designed for this process pressure.

Medium

In the event of a diaphragm rupture, the measuring system of the monitoring instrument comes into contact with the medium. The measuring system must therefore be suitable for this medium.

Temperatures

The same process conditions apply to the monitoring instrument as to the pressure measuring instrument.

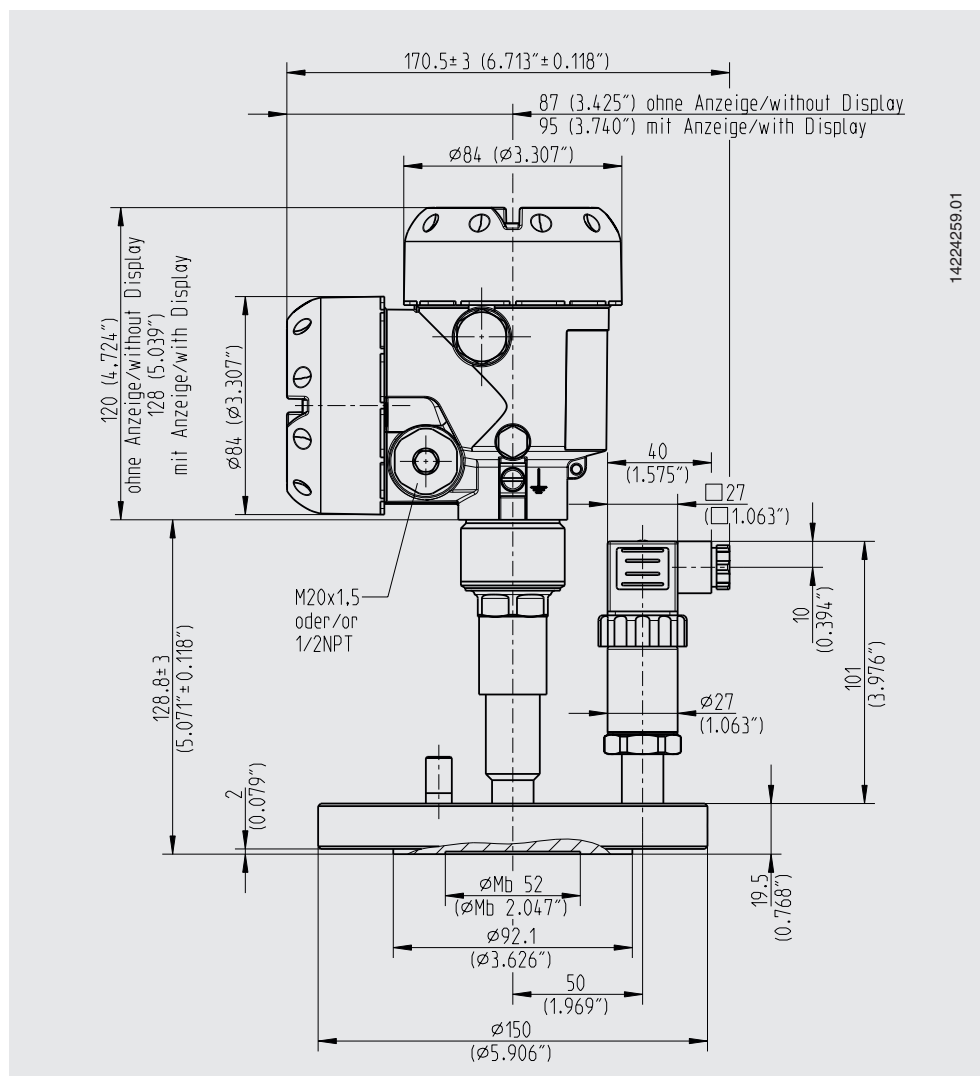
Specifications, model DMS27 with model IPT-10 process transmitter

Model IPT-10	
Output signal	4 ... 20 mA (2-wire with a superimposed HART® communication signal) FOUNDATION™ Fieldbus PROFIBUS® PA
Load in Ω	$(U_B - U_{Bmin}) / 0.023 \text{ A}$
Accuracy at room temperature ¹⁾	Measuring ranges ≤ 40 bar: ≤ 0.1 % of span
Material Case Sensor	Double chamber case, powder-coated aluminium Hastelloy
Display	LC display with backlighting, can be fitted on the top or on the side
Ingress protection per IEC/EN 60529	IP66 / IP67

1) Including non-linearity, hysteresis, zero offset and end value deviation (corresponds to measured error per IEC 61298-2). Calibrated in vertical mounting position with process connection facing downwards.

For further information see data sheet PE 86.11

Dimensions in mm (in)



Diaphragm seal model 990.27

Type of process connection: Flange connection following ASME B16.5

Sealing face: RFSF

DN	Class	Dimensions in mm (in)		
		H	Mb	d ₄
2"	150	155.5 (6.122)	59 (2.323)	92 (3.662)

Certificates (option)

- 2.2 test report per EN 10204
(e.g. surface finish quality of wetted parts)
- 2.2 certification per Nace MR 1705 and MR 103
- 3.1 inspection certificate per EN 10204
(e.g. material proof, wetted metallic parts with suppliers' certificate (melting analysis), measurement accuracy: Listing of the single measured values)
- Others on request

Patents, property rights

- Diaphragm monitoring for diaphragm seals, registered under no. DE 19 94 98 31
- Further patents have been applied for, e.g. DE 102016015447 A1, and also in other countries, e.g. USA and China

Approvals and certificates, see website

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