Differential pressure gauge with microswitches
With integrated working pressure indication (DELTA-comb)
Model DPGS40TA, with component testing

For further approvals, see page 6

DELTA-comb

Applications

Monitoring and control of filtration, flow and level for:
- Boilers and pressure vessels
- Marine boilers, bilge-water collection
- Water and wastewater treatment plants
- Pressure-boosting stations, heating technology, fire-extinguishing systems, heat transfer oil plant

Special features

- Differential pressure gauge with integrated working pressure indication and microswitch
- Shatterproof window and robust aluminium or stainless steel measuring chamber for increased requirements
- TÜV-certified functional safety through SIL certificate
- Flow switch with safety function in accordance with VdTÜV type test leaflet “Flow 100”
- QR code on dial links to instrument-specific information

Fig. left: With aluminium measuring chamber
Fig. right: With stainless steel measuring chamber

Description

The differential pressure gauges of the DELTA-line product family are primarily used for the monitoring and control of low differential pressures where there are high requirements in terms of one-sided overload and static pressure.
Typical markets for the model DPGS40TA are the shipbuilding industry, process heating technology, the heating, ventilation and air-conditioning industries, the water/wastewater industry, and machine building and plant construction.

Wherever a differential pressure has to be indicated on-site and, at the same time, circuits need to be switched safely dependent on a defined differential pressure, the DELTA-comb finds its use.
The differential pressure remains readable on the mechanical indication, even if the voltage supply is lost.

Switch point setting is accessible from the front and can be made in the range of 10 ... 100 % of the end value of the measuring range by means of an assistant scale. As a result of the low measuring range of 0 … 250 mbar or 0 ... 15 psi, the instrument can also be used for applications with low differential pressures.

The special feature of the DELTA-comb with component testing is shown by the variety of approvals and certificates. These ensure the suitability for operation in the respective application.

The QR code on the dial allows instrument-specific information such as the serial number, the order number, certificates and other product data to be retrieved from the internet easily and in the long term.

Data sheets showing similar products:
DELTA-plus; model DPG40; see data sheet PM 07.20
DELTA-switch; model DPS40; see data sheet PV 27.21
DELTA-trans; model DPGT40; see data sheet PV 17.19
DELTA-comb; model DPGS40; see data sheet PV 27.20

Functionality

The indication case ① is connected directly with the measuring chamber ② and the process connections integrated in it.

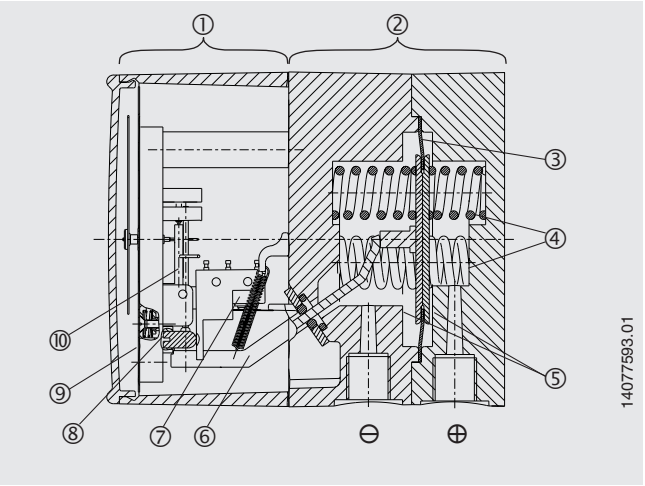
Pressures p_1 and p_2 act on the media chambers ⊕ and ⊖, which are separated by an elastic diaphragm ③.

The differential pressure ($\Delta p = p_1 - p_2$) leads to an axial deflection of the diaphragm against the measuring range springs ④.

The deflection, which is proportional to the differential pressure, is transmitted to the movement ⑩ in the indication case and to the leaf springs of the microswitches ⑦ via a pressure-tight and low-friction rocker arm ⑥.

Overload safety is provided by metal bolsters ⑤ resting against the elastic diaphragm.

With versions without Ex approval, the switch point setting is made using the adjustment screws accessible from the front ⑧. The assistant scales ⑨ simplify the setting of the switch point.
For versions with Ex approval, the switch point setting is made at the factory and cannot be carried out subsequently.



Overview of versions

Measuring chamber material		Working pressure indication		Ex approval
Aluminium	Stainless steel	Without	Ø 22 mm	
x		x		Option
x			x	Option
	x	x		Option

→ For information on approvals, see page 6

Specifications

Basic information	
Nominal size	
Differential pressure indication	Ø 100 mm [4"]
Working pressure indication	■ Without ■ Ø 22 mm [0.9"]
Window	
Non-Ex version	Plastic, with plug screw for switch point setting
Ex version	Plastic (switch point setting can only be carried out at the factory)
Case version	Indication case, aluminium, EN AC-Al Si9Cu3(Fe), black painted
	→ For measuring chamber, see table “Measuring element”

Measuring element	
Type of measuring element	
Differential pressure indication	Measuring chamber with diaphragm and media chambers ⊕ and ⊖
Working pressure indication	■ Without ■ Bourdon tube
Material	
Measuring chamber	■ Aluminium, EN AC–Al Si9Cu3(Fe), black painted ■ Stainless steel 1.4571
Diaphragm, seals	■ FPM/FKM ■ NBR
Bourdon tube (working pressure indication)	Copper alloy

Accuracy specifications	
Accuracy class	
Differential pressure indication	■ 2.5 ■ 1.6 (only selectable for scale ranges from 0 ... 1 bar to 0 ... 10 bar)
Working pressure indication	4
Repeatability	≤ 1.6 % of measuring span
Temperature error	On deviation from the reference conditions at the measuring system: Max. ±0.8 %/10 K of end value of measuring range
Reference conditions	
Ambient temperature	+20 °C [+68 °F]

Differential pressure measuring range

Measuring range	
mbar	**psi**
0 ... 250	0 ... 15
0 ... 400	0 ... 25
0 ... 600	0 ... 40
0 ... 1,000	0 ... 60
bar	**kg/cm²**
0 ... 0.25	0 ... 0.25
0 ... 0.4	0 ... 0.4
0 ... 0.6	0 ... 0.6
0 ... 1	0 ... 1
0 ... 1.6	0 ... 1.6
0 ... 2.5	0 ... 2.5
0 ... 4	0 ... 4
0 ... 6	0 ... 6
0 ... 10	0 ... 10

Measuring range	
kPa	**MPa**
0 ... 25	0 ... 0.025
0 ... 40	0 ... 0.04
0 ... 60	0 ... 0.06
0 ... 100	0 ... 0.1
0 ... 160	0 ... 0.16
0 ... 250	0 ... 0.25
0 ... 400	0 ... 0.4
0 ... 600	0 ... 0.6
0 ... 1,000	0 ... 1

→ Other measuring ranges on request.

Working pressure scale range

Scale range	
bar	
0 ... 10	0 ... 16
0 ... 25	-

Further details on: measuring ranges	
Pressure type	Differential pressure
Unit	■ bar ■ psi ■ mbar ■ kg/cm² ■ MPa ■ kPa
Max. allowable pressure per Pressure Equipment Directive 2014/68/EU	Corresponds to the upper measuring range value / measuring range full scale value. Any permanent operation above the maximum working pressure is not permissible.

Process connections	
Standard	■ EN 837 ■ DIN EN ISO 8434-1
Size	
EN 837	■ 2 x G ¼, female thread, centre distance 26 mm ■ 2 x G ¼ B, male thread, centre distance 26 mm
DIN EN ISO 8434-1	■ 2 x bite-type fitting for pipe Ø 6 mm ■ 2 x bite-type fitting for pipe Ø 8 mm ■ 2 x bite-type fitting for pipe Ø 10 mm
Materials (wetted)	
Measuring chamber	■ Aluminium, Al Si9Cu3(Fe), black painted ■ Stainless steel 1.4571
Process connection	■ Identical to measuring chamber (only 2 x G ¼ female thread) ■ Copper alloy ■ Stainless steel ■ Steel (only bite-type fittings)
Diaphragm, seals	■ FPM/FKM ■ NBR

Output signal	
Connection method	Microswitch
Number of switches	■ Single contact, contact model 850.3 ■ Double contact, contact model 850.3.3
Switching function	Change-over contact
Switch point setting	From the outside at assistant scale by means of adjustment screw(s)
Non-Ex version	■ From the outside at assistant scale by means of adjustment screw(s)
Ex version	■ Factory set (subsequent switch point setting cannot be carried out)
Setting range	From 10 % to 100 % of measuring range
Switch hysteresis	■ Max. 2.5 % of end value of measuring range ■ Max. 5 % of end value of measuring range

Electrical connections	
Connection type	■ Cable gland M20 x 1.5 with 1 m cable, flying leads ■ Cable socket ■ Angular connector
Pin assignment	→ See drawings from page 8

Operating conditions	
Medium temperature range	-10 ... +90 °C [14 ... 194 °F]
Ambient temperature range [1]	
Non-Ex equipment	-10 ... +70 °C [14 ... 150 °F]
Ex equipment	-10 ... +60 °C [14 ... 140 °F]
Storage temperature range	-40 ... +70 °C [-40 ... +150 °F]
Pressure limitation	
Steady	End value of measuring range
Fluctuating	0.9 x end value of measuring range
Overload safety	Max. 25 bar On one, both and alternatingly on the ⊕ and ⊖ sides
Ingress protection per IEC/EN 60529	IP65

1) The specified temperatures comply with the permissible minimum/maximum temperature (TS) in accordance with Pressure Equipment Directive 2014/68/EU

Approvals

Logo	Description	Region
CE	**EU declaration of conformity** ■ Pressure Equipment Directive ■ Low Voltage Directive ■ RoHS directive	European Union

Optional approvals

Logo	Description	Region
Ex	**EU declaration of conformity** ATEX directive Hazardous areas Gas II 2G Ex ia IIC T4/T5/T6 Gb Dust II 2D Ex ia IIIB T135°C Db	European Union
IEC IECEx	**IECEx** Hazardous areas Gas Ex ia IIC T4/T5/T6 Gb Dust Ex ia IIIB T135°C Db	International
EAC Ex	**EAC** ■ EMC Directive ■ Low Voltage Directive ■ Hazardous areas	Eurasian Economic Community
	Ex Ukraine Hazardous areas	Ukraine
	PAC Kazakhstan Metrology, measurement technology	Kazakhstan
-	**MChS** Permission for commissioning	Kazakhstan
DNV	**DNV** Ships, shipbuilding (e.g. offshore)	International
-	**CRN** Safety (e.g. electr. safety, overpressure, ...)	Canada

Manufacturer's information

Logo	Description
SIL 2 PL d	**SIL 3-capable** Functional safety per IEC 61508 Individually installed, the requirements of SIL 2 are fulfilled. For details, see certificate
VdTÜV	Requirements for flow monitors or flow switches and flow limiters in accordance with VdTÜV type test leaflet "Flow 100" (BP STRO 100-RL)

Certificates

Description	
Certificates	■ 2.2 test report per EN 10204 (e.g. state-of-the-art manufacturing, indication accuracy) ■ 3.1 inspection certificate per EN 10204 (e.g. indication accuracy)
Recommended calibration interval	1 year (dependent on conditions of use)

→ For approvals and certificates, see website

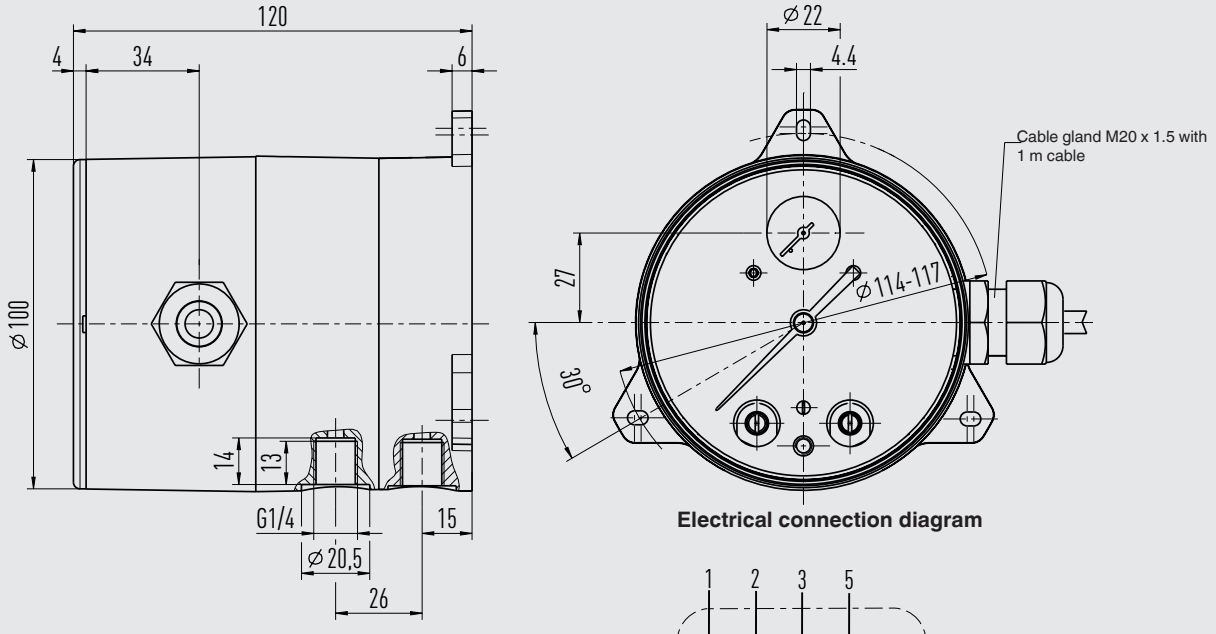
Safety-relevant characteristic values (explosion-protected version)

Safety-related characteristic values (Ex)	
Terminals	
Switch A	„1“ / „4“ / „2“
Switch B	„3“ / „6“ / „5“
Max. input voltage U_i	DC 30 V
Max. input current I_i	100 mA
Max. input power P_i (gas)	1 W
Max. input power Pi (dust)	
Ta ≤ +40 °C	≤ 750 mW
Ta ≤ +60 °C	≤ 650 mW
Effective internal capacitance C_i	Negligible
Effective internal inductance L_i	Negligible

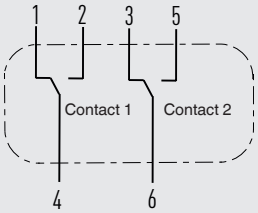
Instruments with two microswitches
If more than one circuit is connected, all conditions for the separation of two intrinsically safe circuits must be observed.

Dimensions in mm

Model DPGS40TA with aluminium measuring chamber, 2 x G ¼ female thread, centre distance 26 mm



Electrical connection diagram



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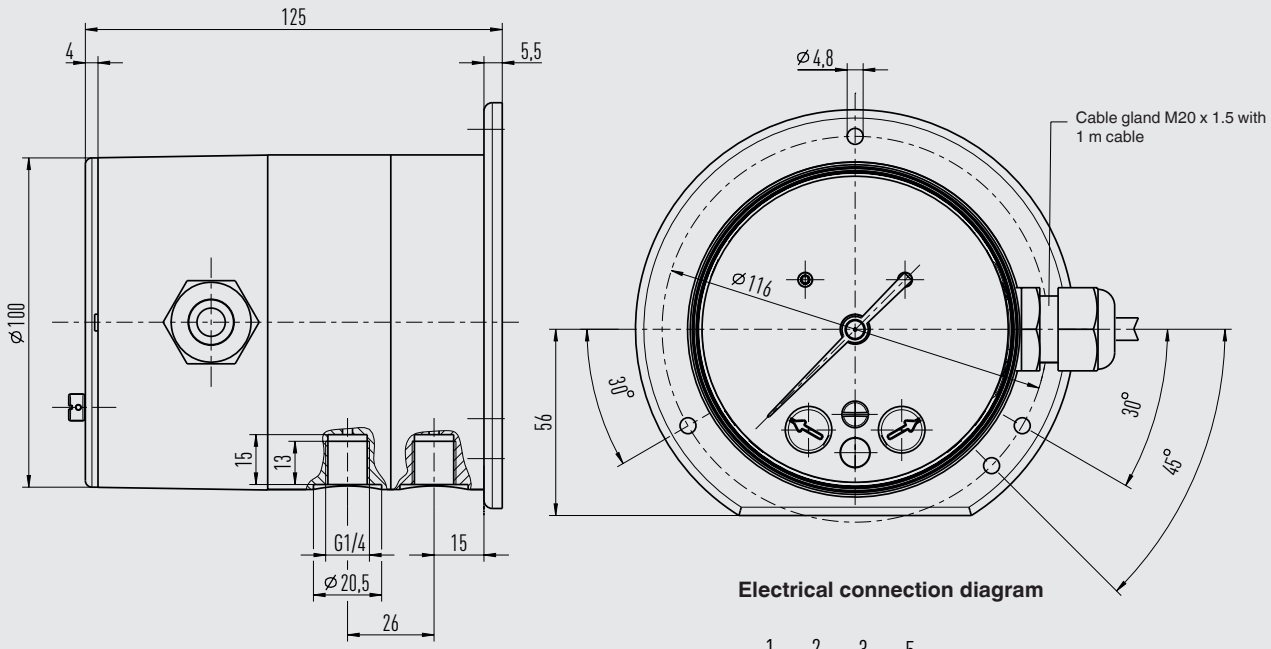
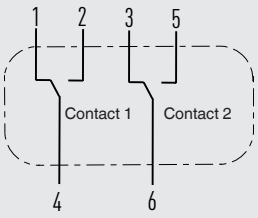
Weight
Approx. 2.0 kg [4.4 lb]

Model DPGS40TA with stainless steel measuring chamber, 2 x G ¼ female thread, centre distance 26 mm



Electrical connection diagram



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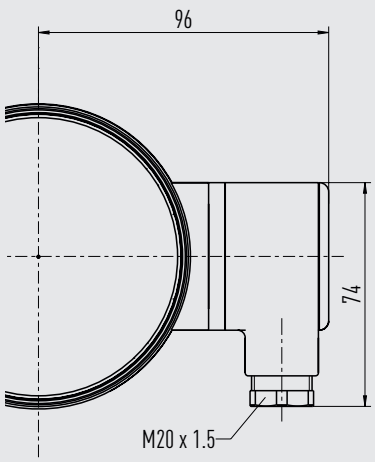
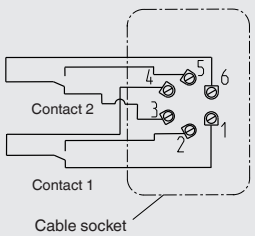
Weight

Approx. 4 kg [10.7 lb]

With cable socket or angular connector



Electrical connection diagram



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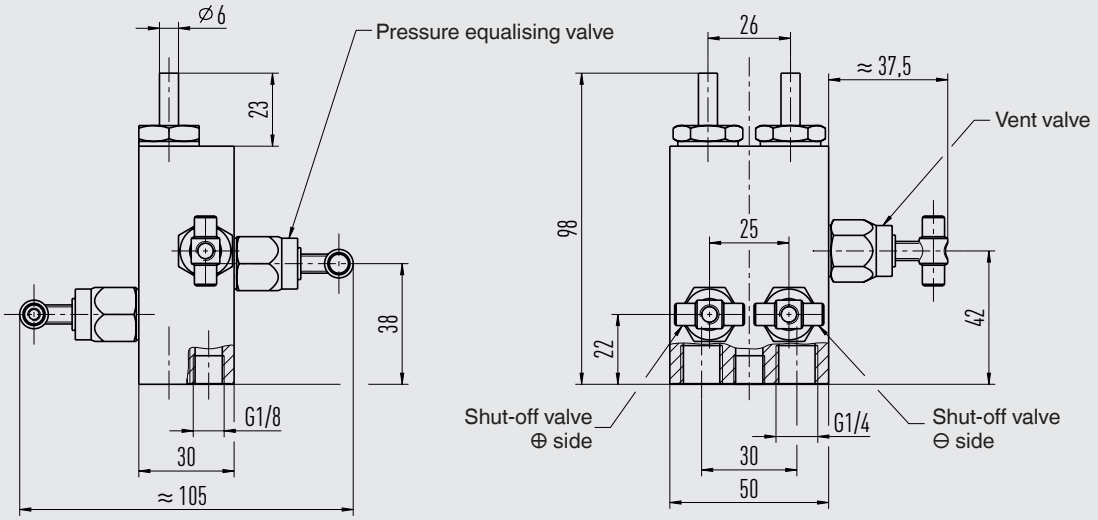
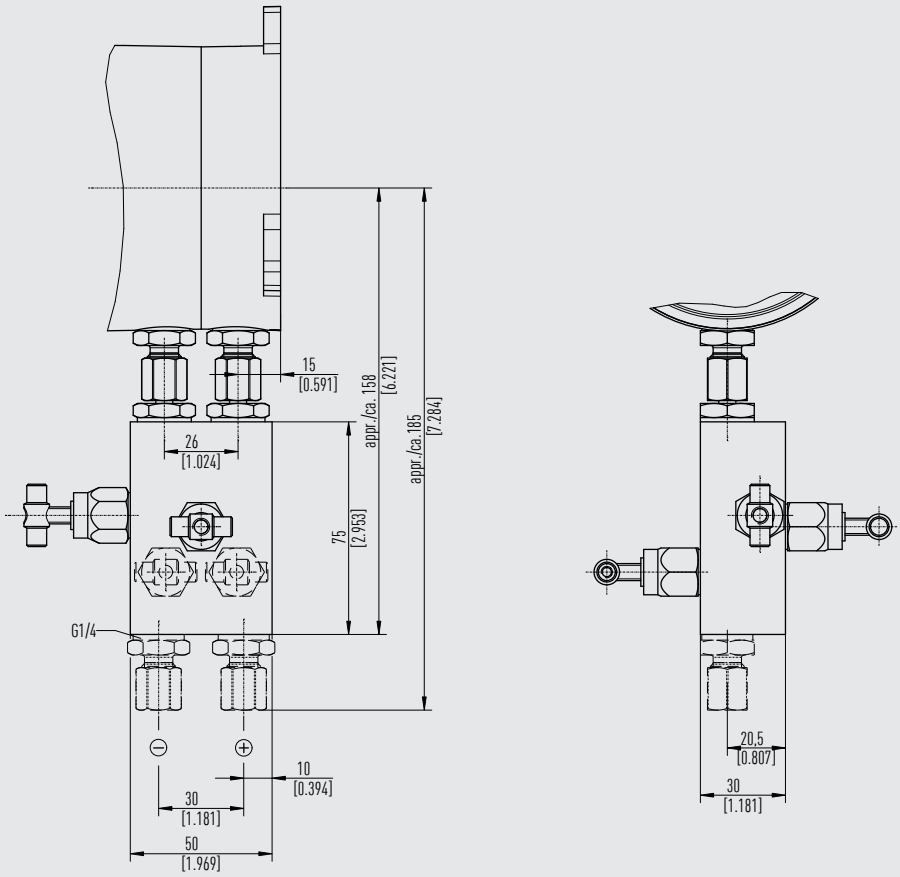
Accessories

Dimensions in mm

4-valve manifold



Model DPGS40TA with mounted 4-valve manifold



Accessories

Model		Description	Order number
	-	Panel mounting flange, aluminium	14074004
		Panel mounting flange, stainless steel	14075088
	**910.17**	Seals → See data sheet AC 09.08	-
	**910.15**	Syphons → See data sheet AC 09.06	-
	**IV3**	4-valve manifold, stainless steel → For dimensions, see page 9	2043559
		4-valve manifold, brass → For dimensions, see page 9	2043567
	-	Bite-type fitting, steel, pipe Ø 6 mm	2122359
		Bite-type fitting, steel, pipe Ø 8 mm	2128217
		Bite-type fitting, steel, pipe Ø 10 mm	1351982
		Bite-type fitting, copper alloy, pipe Ø 6 mm	1550705
		Bite-type fitting, copper alloy, pipe Ø 8 mm	1550713
		Bite-type fitting, copper alloy, pipe Ø 10 mm	1561847
		Bite-type fitting, stainless steel, pipe Ø 6 mm	1581481
		Bite-type fitting, stainless steel, pipe Ø 8 mm	14296672
		Bite-type fitting, stainless steel, pipe Ø 10 mm	1518488

Ordering information

Model / Scale range / Process connection / Material of diaphragm, seals / Number of switches / Options

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