Differential Pressure and Flow Meter

Media 5 · Indicator 160∅ · PN 50

Application

Transmitter for measuring and indicating the differential pressure or measured variables derived from it · Suitable for gases or liquids · Measuring ranges between 0 to 40 and 0 to 3600 mbar Static pressures up to 50 bar · Optionally with limit switch with three inductive alarm contacts

Measurement tasks

- Liquid level measurement in pressure tanks, especially for cryogenic gases
- Differential pressure measurement between flow and return flow pipe
- Pressure drop measurement across valves and filters
- Flow rate measurement according to the differential pressure method

Special features

- Suitable for liquids, gases or vapors
- Limit switch easily retrofitted
- Overloadable on one side up to the permissible static pressure
- Suitable for field installation (degree of protection IP 54/ IP 65) and panel mounting
- Zero adjustment from the front
- Adjustment of measuring span 1:2
- Housing of indicating unit with burst protection
- Directly connectable valve block (optional) with connection to monitor the tank pressure and with connection for pressure switch

Versions (Fig. 1)

Media 5 consisting of:

Indicator NG 100 with pointer mechanism · dp cell made of CW617N (brass CuZn40Pb) or stainless steel · PN 50 · Free of oil and grease for oxygen · Measuring ranges from 40 to 3600 mbar · ECO measuring diaphragm · Zero adjustment at the front · Process connections G ⅜ A

Options available:

- Dials · Scale 0 to 100 % linear or square root graduation, dial plates according to DIN EN 837-3, detachable dial plates for different media, special dial plates
- Inductive limit switch with max. three alarm contacts A1/ A2/A3 (proximity switches) · Version for hazardous locations
- Valve block which can be directly mounted onto Media 5 devices
- Screw fittings
- Pressure gauge

Special versions on request

1 Housing of indicating unit
2 Zero point adjustment
3 Limit switch with two alarm contacts
4 Valve block with pressure gauge and shut-off valves
5 Screw fittings

Fig. 1: *Media 5 with limit switch, indicator Ø 160 mm with attached valve block and pressure gauge for operating pressure*

Principle of operation (Fig. 2)

The dp cell works according to the deflection method and contains an ECO measuring diaphragm (1.5) which is designed to handle measuring spans from 40 to 3600 mbar. The diaphragm shaft (1.7) is connected to a lever (1.8) and is supported and guided by the range springs. The lever leads the deflection of the measuring system out of the pressure chamber. The pressure chamber is sealed by a flexible disk (1.9). The range springs, which are connected to the housing, and the diaphragm ensure that the position of the lever is independent of the static pressure. The dp cell can be overloaded on one side as the measuring diaphragm flexes against the housing wall whenever the measured values are out of range.

The differential pressure $\Delta p = p_1 - p_2$ creates a force at the measuring diaphragm (1.5) which is balanced by the range springs (1.4). The deflection of the measuring diaphragm and the lever (1.8) is proportional to the differential pressure measured and is transferred to the pointer (2.4) over the adjustable transmission element (2.1) and the pointer mechanism (2.2) with jewelled bearings.

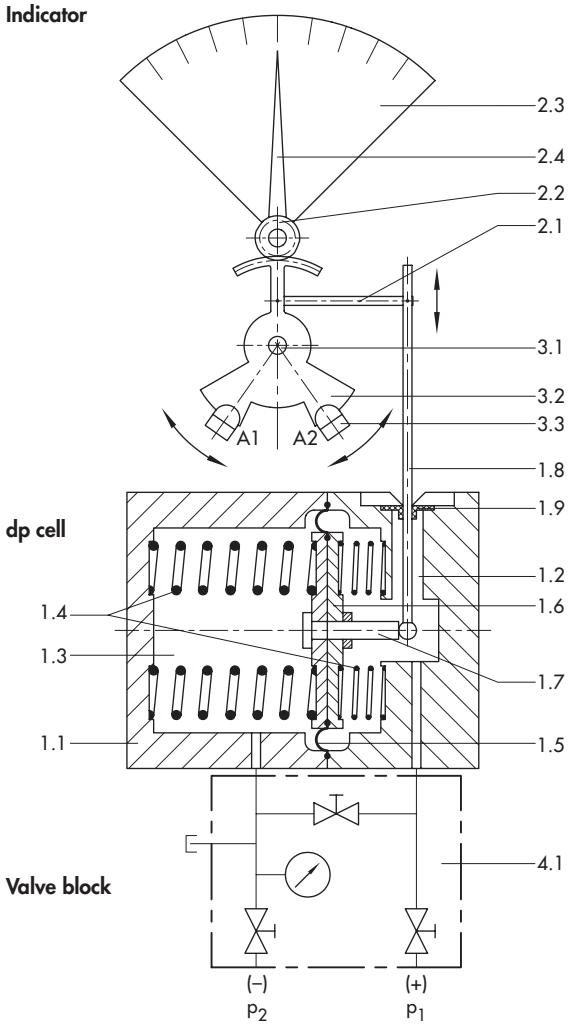
The range springs (1.4) installed in the dp cell determine the upper and lower limit of each measuring span (measuring span limit) of the device. The span can be continuously adjusted within these limits in the ratio of 1:2 at the transmission element. This adjustment changes the transmission ratio between the lever (1.8) and the pointer mechanism (2.2).

The shaft of the measuring unit (3.1) carries the metal tags (3.2) and moves them according to the operating direction into the limit switch unit with the two alarm contacts (proximity switches) A1 and A2 (3.3).

When the metal tag enters the inductive field of the associated proximity switch, it assumes a high resistance (contact open). When the metal tag leaves the inductive field, it assumes a low resistance (contact closed). This function is similar to that of a mechanical-type switching contact.

The proximity switches can be adjusted independently from one another. They provide a signal when the differential pressure either increases or decreases and the metal tags enter or leave the inductive field of the switch. The proximity switches have a LED indicator, allowing the limit values to be easily adjusted on site.

Isolating switch amplifiers conforming to EN 60947-5-6 must be connected in the output circuit of the inductive alarm contacts A1/A2 to ensure they meet the operational requirements of any connected control and signaling equipment.



1 **Differential pressure cell**
1.1 dp cell
1.2 High pressure chamber
1.3 Low pressure chamber
1.4 Range springs (6 pcs. per measuring range)
1.5 Measuring diaphragm
1.6 Diaphragm plates
1.7 Diaphragm shaft
1.8 Lever
1.9 Flexible disk

2 **Housing of indicating unit**
2.1 Transmission element
2.2 Pointer mechanism
2.3 Dial plate
2.4 Pointer

3 **Limit switch** (optional)
3.1 Shaft of measuring unit
3.2 Metal tag
3.3 Alarm contacts A1/A2

4 **Valve block** (accessories)
4.1 Valve block with pressure gauge, shut-off valves, screw fittings and test connection

Fig. 2: *Functional diagram of the indicating unit with alarm contacts*

Table 1: *Technical data · All pressure stated as gauge pressure*

Media 5 Differential Pressure and Flow Meter										
Measuring range in mbar		0 to 60	0 to 100	0 to 160	0 to 250	0 to 400	0 to 600	0 to 1000	0 to 1600	0 to 2500	0 to 3600
Measuring span in mbar	min.	40 to 60	50 to 100	80 to 160	125 to 250	200 to 400	300 to 600	500 to 1000	800 to 1600	1250 to 2500	1800 to 3600
	max.										
Nominal pressure		PN 50, overloadable on one side up to 50 bar									
Indicator		Ø160 mm									
Characteristic		Reading linear to the differential pressure									
Deviation from terminal-based linearity		<±2.5 %	<±1.6 % including hysteresis								
Sensitivity		<±0.5 %	<0.25 %								
Effect of static pressure		<0.03 %/1 bar									
Limit switch		Max. 3 alarm contacts A1, A2 and A3 (limit contacts) with inductive pick-up and LED according to EN 60947-5-6									
Control circuit		Values corresponding to connected isolating switch amplifier according to EN 60947-5-6, e.g. KFA6-SR2-Ex2.W									
Proximity switch		SJ3,5N-LED for hazardous areas according to PTB 99 ATEX 2219X									
Switching accuracy		<±2 %									
Dead band, approx.		<0.6 %									
Media 5 with gaseous oxygen max. temperature max. oxygen pressure		 +60 °C 30 bar									
Perm. ambient temperature range for oxygen		−40 to +80 °C −40 to +60 °C									
Perm. storage temperature range		−40 to +100 °C									
Degree of protection according to DIN 40050		IP 54									
Weight without valve block with valve block		 Approx. 3 kg Approx. 5 kg									

Note

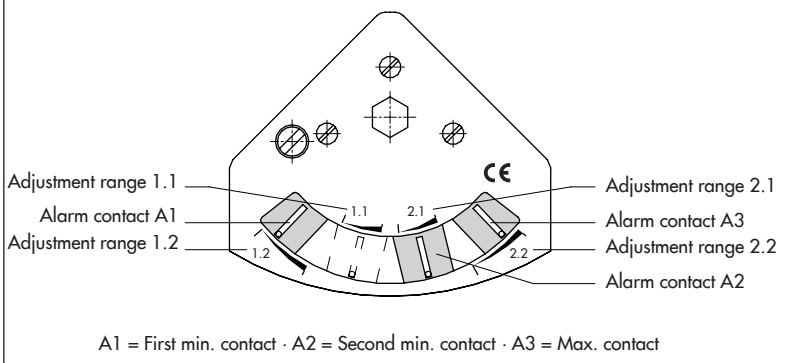
- All pressure stated as gauge pressure
- All errors and deviations are specified in % of the adjusted measuring span.
- The Media 5 Differential Pressure and Flow Meter without limit switch may be used to measure flammable gases and liquids in which hazardous area conditions of Zone 0 are to be expected. The relevant regulations on the measurement of flammable gases and liquids of Zone 0 must be observed.
- Oxygen service: When the device is used for oxygen service, make sure that the dp cell and any SAMSON accessories (e.g. valve block) only come into contact with gaseous oxygen.
- Refer to ▶ EB 9519 EN for more details.

Table 2: *Materials*

Media 5 Differential Pressure and Flow Meter	
dp cell	CW617N (brass) or CrNi steel
Measuring diaphragm and seals	ECO [1]
Springs, diaphragm plates and functional parts, lever	CrNi steel
Housing of indicating unit	Polycarbonate

[1] Other on request

Limit switch with alarm contacts A1, A2 and A3



Proximity switches with normally closed function

Metal tag outside the inductive field

Switching signal "ON" (L signal of the proximity switch) · Function: Contact closed or output effectively conducting, low resistance (undamped), power consumption ≥ 3 mA

Metal tag inside the inductive field

Switching signal "OFF" (0 signal of the proximity switch) · Function: Contact opened or output effectively non-conducting, high resistance (damped), power consumption ≥ 1 mA

Fig. 3: *Limit switch with three alarm contacts in the housing of the indicating unit*

Table 2: *Overview of functions for two alarm contacts A1 and A2*

Overview of functions	**Adjustment ranges**			
Proximity switch for ...	Min. contact (gas withdrawal)		Max. contact (tank filling)	
Alarm contacts	A1	A2	A1	A2
Metal tag **inside** field	1.2	2.1	1.1	2.2
Metal tag **outside** field	1.1	2.2	1.2	2.1

Table 3: *Overview of functions for three alarm contacts A1, A2 and A3*

Overview of functions	**Adjustment ranges**		
Proximity switch for ...	Two min. contacts (gas withdrawal)		One max. contact (tank filling)
Alarm contacts	A1	A2	A3
Activation when metal tag **inside** field	1.2	2.1	2.2

Switching points

Min. contact with decreasing reading

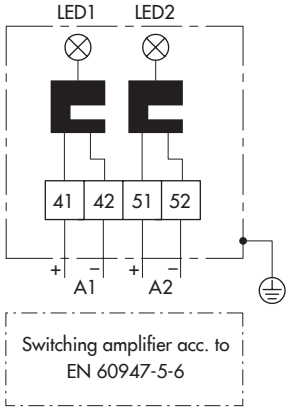
Max. contact with increasing reading

Table 4: *Technical data for limit switch in type of protection EEx ia IIC T6 (PTB 99 ATEX 2219 X)*

Circuit	**Type 1**			**Type 2**		
U_i	16 V			16 V		
I_i	25 mA			25 mA		
P_i	34 mW			64 mW		
C_i	50nF			50nF		
L_i	250 µH			250 µH		
Temperature class	T6	T5	T4	T6	T5	T4
	73 °C	88 °C	100 °C	66 °C	81 °C	100 °C

Electrical connection of alarm contacts

Limit switch with **two** alarm contacts
– Terminal assignment –



Limit switch with **three** alarm contacts
– Terminal assignment –

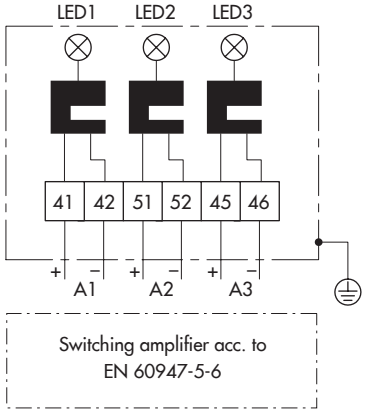


Fig. 4: *Terminal assignment of A1, A2 and A3*

Installation

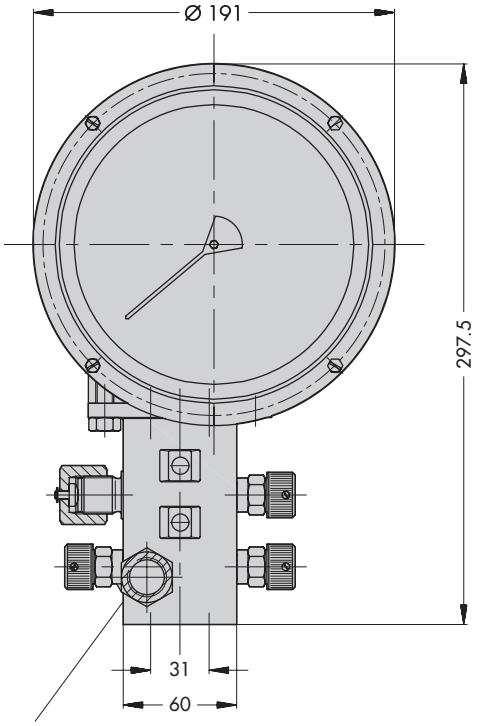
Pipe mounting with mounting part and clamp for attachment to a vertical or horizontal 2″ pipe.

Wall/panel mounting · Using two M8 tapped holes located in the valve block or at the back of the dp cell

Panel mounting optionally with M4 cap screws, M4 thread in the control panel or hex bolts with M4 hex nuts.

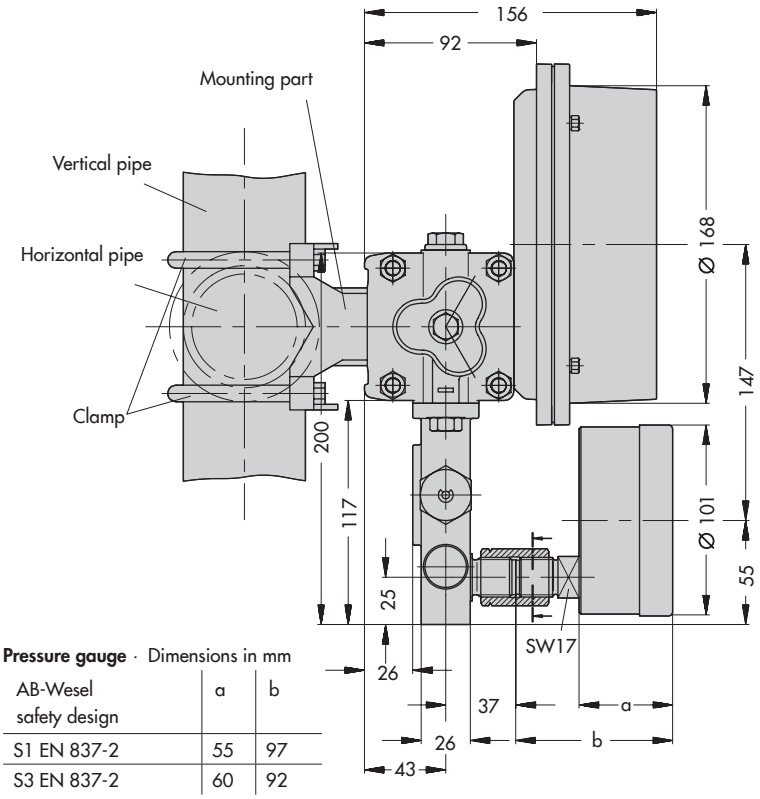
Process medium connection: Tapped hole ISO 228 G ⅜

Dimensions in mm



Pressure gauge connections:
Pressure gauge NG 100 · Male thread G ½ B-LH with coupling sleeve G ½ DIN 16283 and O-ring 12x2
Pressure gauge NG 63 · Female thread G ¼ with seal

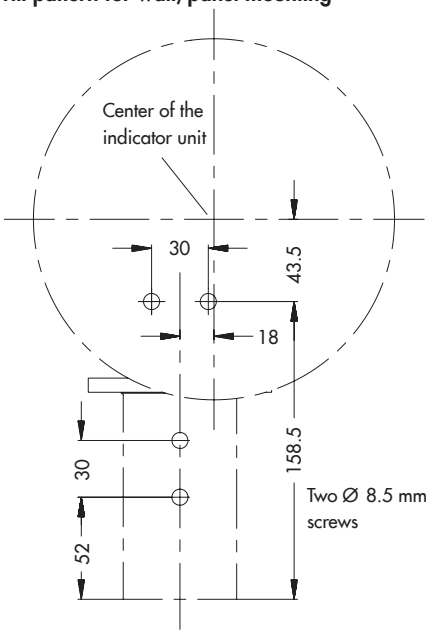
Pipe mounting



Pressure gauge · Dimensions in mm

AB-Wesel safety design	a	b
S1 EN 837-2	55	97
S3 EN 837-2	60	92

Drill pattern for wall/panel mounting



Panel mounting

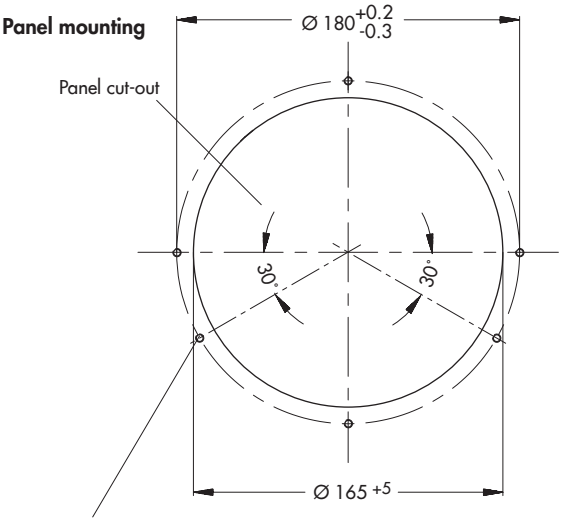


Fig. 5: *Dimensional drawing*

Table 5: *Device configuration with order numbers*

Complete the order number with the order codes for the selected options

Order no.		Type 5005A-	...	...	...	...	...	...
Device	Media 5, dp cell made of CW617N (brass)		**0**					
	Media 5, dp cell made of 1.4581 (stainless steel)		**1**					
Version	Standard version			**0**				
	Free of oil and grease for oxygen acc. to SAMSON Standard 1.34-2, sheet 1			**1**				
Measuring range (measuring span)	0 to 60 mbar/min. 40 mbar · max. 60 mbar				**0**	**2**		
	0 to 100 mbar/min. 50 mbar · max. 100 mbar				**0**	**3**		
	0 to 160 mbar/min. 80 mbar · max. 160 mbar				**0**	**4**		
	0 to 250 mbar/min. 125 mbar · max. 250 mbar				**0**	**5**		
	0 to 400 mbar/min. 200 mbar · max. 400 mbar				**0**	**6**		
	0 to 600 mbar/min. 300 mbar · max. 600 mbar				**0**	**7**		
	0 to 1000 mbar/min. 500 mbar · max. 1000 mbar				**2**	**0**		
	0 to 1600 mbar/min. 800 mbar · max. 1600 mbar				**2**	**1**		
	0 to 2500 mbar/min. 1250 mbar · max. 2500 mbar				**2**	**2**		
	0 to 3600 mbar/min. 1800 mbar · max. 3600 mbar				**2**	**3**		
Zero screw	With zero screw (standard version)						**0**	
	With concealed zero screw						**1**	
Limit switch [1]	Without alarm contacts							**0**
	With two inductive alarm contacts SC3,5-NO-BU							**2**
	With three inductive alarm contacts SC3,5-NO-BU							**3**
	With three-wire alarm contacts SB3,5-E2							**6**
	With two inductive alarm contacts SJ3,5-SN							**7**

Additionally required ordering specifications	**Measured value setting** [2]	**Unit**
Adjusted to	0 to ...	mbar

		Alarm contacts					
		Contact **A1**		Contact **A2**		Contact **A3**	
Min. contacts = Value decreasing	Metal tag:	Inside	Outside	Inside	Outside	Inside	Outside
Max. contacts = Value increasing	When measured value ...	Increasing/ decreasing	Increasing/ decreasing	Increasing/ decreasing	Increasing/ decreasing	Increasing/ decreasing	Increasing/ decreasing
	For switching value ...	... mbar		... mbar		... mbar	

[1] When delivered with installed limit switch: without settings
[2] With default settings of measured value: 0 to max. measured value

Accessories ▶ T 9555 EN · **Dial plates** ▶ T 9545 EN

Certificates and approvals

- CE compliance
- Registered by the metrological service of the federal agency for technical regulation and metrology for use in the Russian Federation
- Oxygen service, test report No. 2012/R249a based on DIN EN ISO 7291

Ordering text

Media 5 Differential Pressure and Flow Meter

Order no.: **Type 5005A-... ... ...**

Special version ...

Specifications subject to change without notice

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