

Electrical Transmitter Type 6051

for gauge and absolute pressure measurements
from 0.02 to 399 bar and 0.04 to 400 bar_{abs}
with or without external diaphragm seal



SAMSON
MATIC

General notes

The Type 6051 Electrical Transmitters are used for measuring gauge pressure and absolute pressure. They transmit an output signal proportional to the measured variable in a 4 to 20 mA format.

Special features include:

- Microprocessor manufactured using SMD technology
- Operation and adjustment using a rotary switch and a button
- LC display, 3½ digits (optionally), display range from -1999 to +1999
- Corrosion-resistant enclosure with degree of protection IP 65
- Suitable for gases, steam and liquids
- Suitable for gauge and absolute pressure measurements
- Interchangeable measuring element
- Capacitive ceramic sensor for spans ranging from 0.02 to 69 bar and 0.04 to 70 bar_{abs}
- Piezoresistive sensor for spans ranging from 31 to 399 bar and 32 to 400 bar_{abs}
- Overload limit ranges from 1.5 to 40 times the span
- Easy adjustment of zero point and span
- Zero point shift adjustable from 0 to 80 %
- Span ratio of 1:5 is adjustable
- Accuracy ≤ 0.2 % (capacitive sensor) or ≤ 0.5 % (piezoresistive sensor)
- 4 to 20 mA output signal in two-wire connection; operating direction >> or << selectable
- Type of protection "Intrinsic safety" II 2 G EEx ia IIC T6 (optionally)
- Damping of the output signal selectable from 0.015 to 15 s
- Error signal is selectable
- Electrical connection by means of a cable gland M 20 × 1.5 screwed to a terminal or with plug-type connector
- Connecting piece G ½ A acc. to DIN 16288
- Screw-type, flange-type, inline or cell diaphragm seal (optionally)
Fill fluid: silicone oil, vegetable oil or vacuum oil for general applications or oxygene service

Principle of operation

The process pressure p is transmitted to the measuring element where it causes a change in the voltage or capacity value. This value is then converted into a 4 to 20 mA output signal which is proportional to the pressure. Operation and adjustment are performed using a rotary switch and a button (see Fig. 2 and Mounting and Operating Instructions EB 6051 EN).

Application notes

Measurement and control of the liquid level

For measurement and control of the liquid level in closed vessels with a low static pressure, two transmitters can be used in conjunction with a SAMSON TROVIS 64X2 Process Control Station with two mA inputs (see Data Sheet T 6412 EN).



Fig. 1 · Type 6051 Electrical Transmitter

Block diagram

Capacitive or piezoresistive sensor

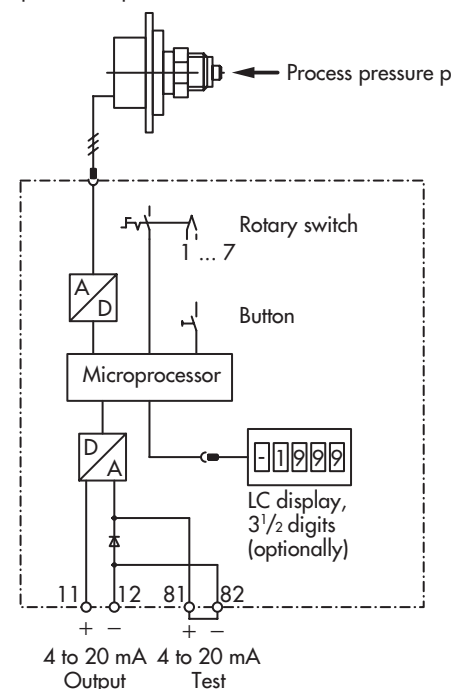


Fig. 2

Technical data

Measuring element	Capacitive ceramic sensor		Piezoresistive sensor
Span	Adjustable to a ratio of 1:5 (see "Versions and ordering data")		
Zero point	0 to 80 % of max. span (zero point + adjusted span ≤ max. span)		
Overload limit	See "Versions and ordering data"		
Process connection	Connecting piece G 1/2 A acc. to DIN 16288, optionally with external diaphragm seal (see "Versions and ordering data")		
Fill fluid	None		Silicone oil
Material	Diaphragm	Ceramics Al ₂ O ₃ (96 %)	Stainless steel 1.4435
	Sensor enclosure	None	Stainless steel 1.4301
	Gasket	FPM	None
	Process connection	Stainless steel 1.4571	
	Enclosure	Aluminum GD AlSi10Mg, powder-coated, grayish beige RAL 1019	
	LC display	Protective glass made of polycarbonate	
	Seals	Nitrile butadiene rubber	
Supply voltage	U _s	11 to 30 V DC	
Output signal	4 to 20 mA, two-wire connection		
Type of protection	Without explosion protection, optionally "Intrinsic safety" II 2 G EEx ia IIC T6 ¹⁾		
Output voltage ²⁾	U _i	≤ 28 V	
Output current ²⁾	I _i	≤ 115 mA	
Power dissipation ²⁾	P _i	≤ 1 W	
Internal inductance ²⁾	L _i	49 µH	
Internal capacitance ²⁾	C _i	5 nF	
Damping of the output signal	15 ms, 60 ms, 240 ms, 960 ms, 3.84 s or 15.36 s selectable		
Error signal	3.6 mA or 22.8 mA selectable		
Permissible load	R _B	(U _s - 11)/0.02 in Ω	
Accuracy	≤ 0.2 %		≤ 0.5 %
Influence of ambient temperature	≤ 0.2 %/10 K on the zero point ³⁾		≤ 0.3 %/10 K on the zero point ³⁾
	≤ 0.2 %/10 K on the span		≤ 0.2 %/10 K on the span
Hysteresis	≤ 0.05 %		
Stability	≤ 0.15 %/a		
Influence of power supply	≤ 0.005 %/V		
Influence of mounting position	Negligible		
Digital display (optionally)	LC display, 3 1/2 digits, display range from -1999 to +1999 (at -20 to +70 °C)		
Ambient temperature	-30 to +80 °C (without explosion protection) -30 to +60 °C (Temperature Class T6) -30 to +70 °C (Temperature Class T5) -30 to +80 °C (Temperature Class T4)		
Humidity	5 to 95 % relative humidity		
Electrical connection	See "Versions and ordering data"		
Degree of protection	IP 65		
Weight approx.	1.1 kg	1.2 kg	

- 1) Acc. to EC Type Examination Certificate PTB 02 ATEX 2075 for zone 1 (addendum for zone 21 is in preparation). A manufacturer's declaration is available for zones 2 and 22.
- 2) Max. permissible values if device is connected to a certified intrinsically safe circuit.
- 3) Additional zero point shift when mounting an external diaphragm seal (see Fig. 3).

Additional zero point shift when mounting an external diaphragm seal

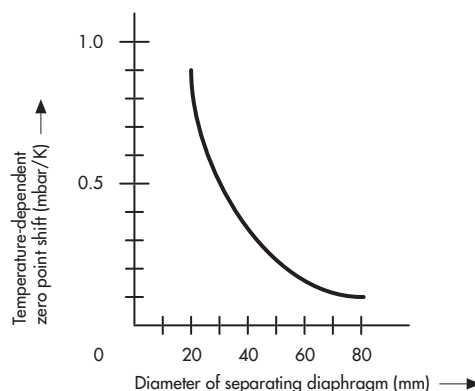


Fig. 3

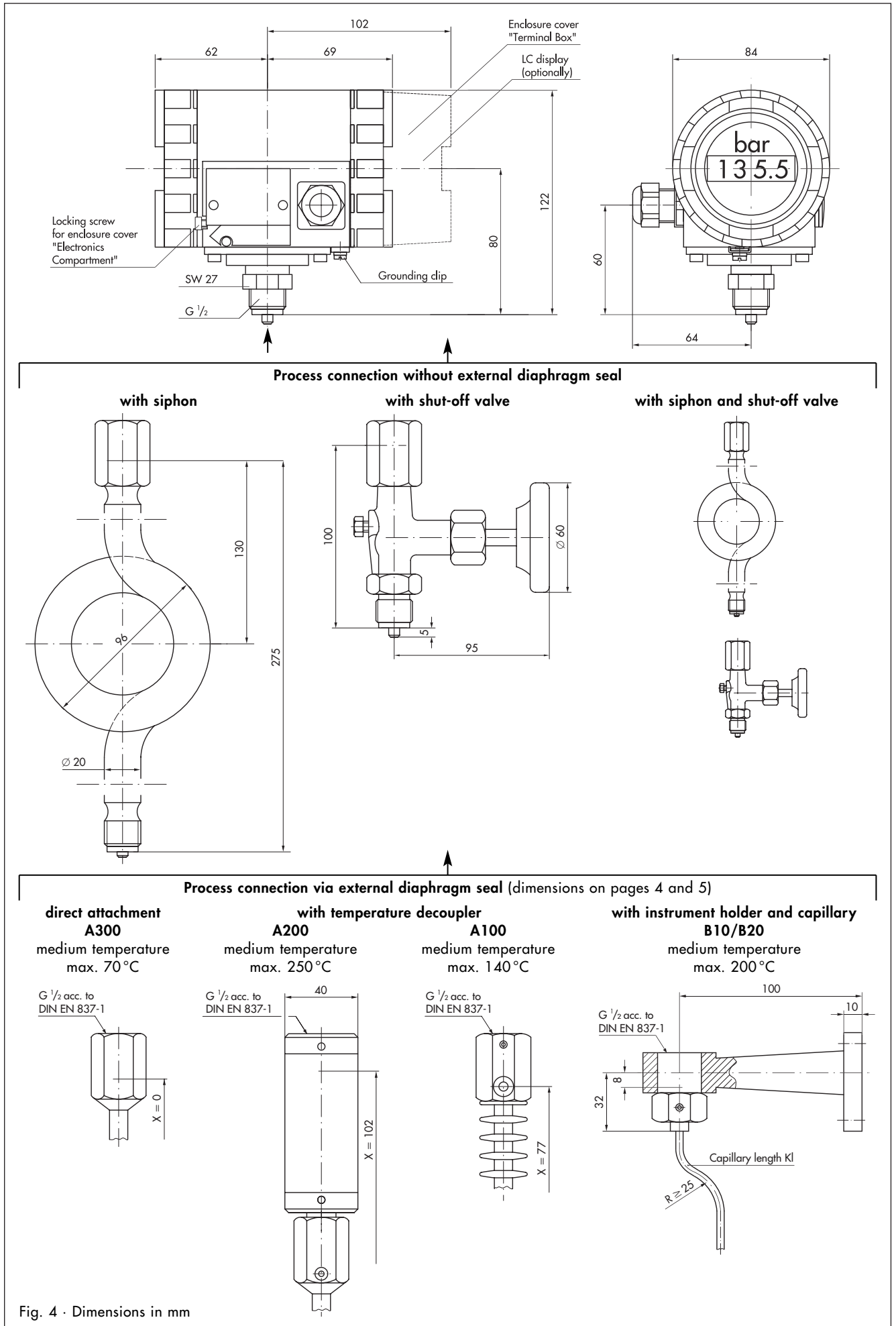
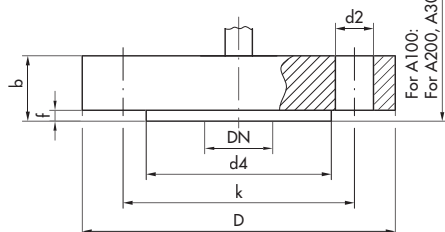


Fig. 4 · Dimensions in mm

Dimensions of external diaphragm seals

Flange-type diaphragm seal, standard type

Type	DN	PN	D	d4	k	d2	Bore holes	b	f	Weight
DA2120	25	10 to 40	115	68	85	14	4	20	4	1.5 kg
DA2150	25	64 to 100	140	68	100	18	4	26	4	2.0 kg
DA2420	50	10 to 40	165	102	125	18	4	21	4	3.2 kg
DA2430	50	64	180	102	134	22	4	27	4	4.1 kg
DA2620	80	10 to 40	200	138	160	18	8	25	4	5.0 kg
DA2710	100	10 to 16	220	158	180	18	8	25	4	6.0 kg
DA2720	100	25 to 40	235	162	190	22	8	29	4	10.0 kg
DA2810	125	10 to 16	250	188	210	18	8	27	4	10.0 kg
DA2820	125	25 to 40	270	188	220	26	8	27	4	11.0 kg



For A100: $b + X$
For A200, A300: $b + 29 + X$

Fig. 5 · Dimensions in mm

Flange-type diaphragm seal, trunk type

Type	DN	PN	D	d4	k	d2	Bore holes	b	b1	f	Weight
DB1420	50	10 to 40	165	102	125	18	4	20	23	3	4.1 kg
DB1620	80	10 to 40	200	138	160	18	8	21	28	3	6.5 kg
DB1720	100	25 to 40	235	162	190	22	8	21	28	3	11.5 kg

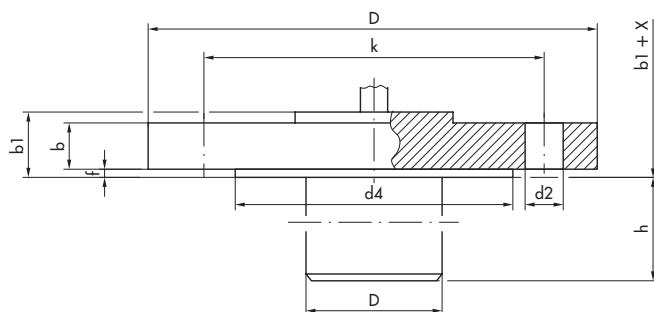


Fig. 6 · Dimensions in mm

Cell diaphragm seal, sandwich type

Type	DN	PN	d4	b	L	d1	Weight
DC1480	50	400	102	20	75	14	1.3 kg
DC1580	65	400	122	20	75	14	1.8 kg
DC1680	80	400	138	20	75	14	2.2 kg
DC1780	100	400	162	22	120	16	3.6 kg
DC1880	125	400	188	22	120	16	4.8 kg

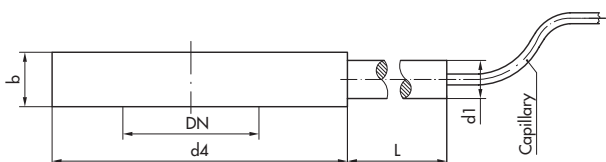
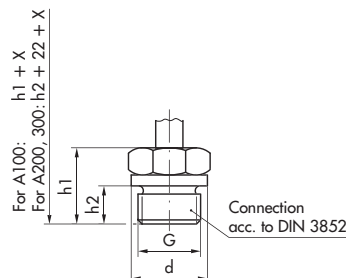


Fig. 7 · Dimensions in mm

Screw-type diaphragm seal

Type	PN	G	h1	h2	d	Weight
DE1180	400	G 1/2 A	27	14	26	0.2 kg
DE1280	400	G 3/4 A	31	16	32	0.3 kg
DE1380	400	G 1 A	33	18	41	0.5 kg
DE1580	400	G 1 1/2 A	40	22	55	1.0 kg
DE1680	400	G 2 A	42	24	68	1.6 kg



For A100: $h1 + X$
For A200, 300: $h2 + 22 + X$

Connection acc. to DIN 3852

Fig. 8 · Dimensions in mm

Diaphragm seal for hygienic pipe joints						
Type	DN	PN	G	h	A	Weight
DL2100	25	40	Rd 52×1/6	45	21	0.3 kg
DL2200	32	40	Rd 58×1/6	45	21	0.4 kg
DL2300	40	40	Rd 65×1/6	45	21	0.5 kg
DL2400	50	25	Rd 78×1/6	46	22	0.6 kg
DL2500	65	25	Rd 95×1/6	47	25	0.9 kg
DL2600	80	25	Rd 110×1/4	47	29	1.2 kg
DL2700	100	25	Rd 130×1/4	50	31	1.6 kg

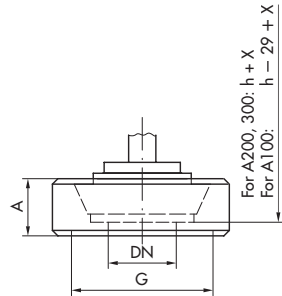


Fig. 9 · Dimensions in mm

Diaphragm seal with clamp connection							
Type	DN	PN	D	i	h	h1	Weight
DL3100	1"	16 to 40	50.5	19	62	14	0.3 kg
DL3200	1 1/2"	16 to 40	50.5	19	60	12	0.3 kg
DL3300	2"	16 to 40	64	19	62	14	0.4 kg
DL3400	2 1/2"	16 to 40	77.5	19	62	14	0.5 kg
DL3500	3"	10 to 40	91	19	62	14	0.8 kg

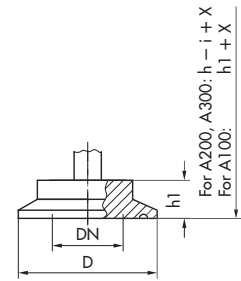


Fig. 10 · Dimensions in mm

Inline diaphragm seal, sandwich type						
Type	DN	PN	D	h	h2	Weight
DP2180	25	400	68	63	111	2.5 kg
DP2380	40	400	88	73	121	3.9 kg
DP2480	50	400	100	80	128	4.6 kg
DP2580	65	400	122	90	137	6.7 kg
DP2680	80	400	138	98	146	7.9 kg
DP2780	100	400	160	109	157	9.7 kg

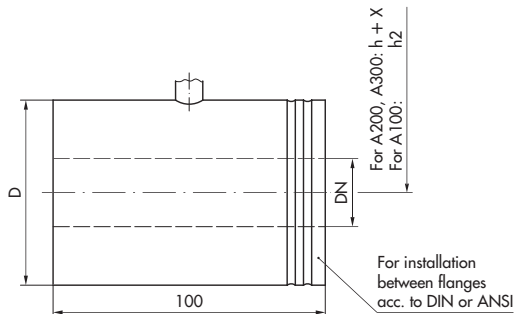


Fig. 11 · Dimensions in mm

Inline diaphragm seal for hygienic pipe joints							
Type	DN	PN	G	l	h	h1	Weight
DR1100	25	40	Rd 52×1/6	120	47	95	0.6 kg
DR1200	32	40	Rd 58×1/6	120	50	98	0.7 kg
DR1300	40	40	Rd 65×1/6	120	54	102	0.9 kg
DR1400	50	25	Rd 78×1/6	122	61	109	1.2 kg
DR1500	65	25	Rd 95×1/6	124	69	117	1.4 kg
DR1600	80	25	Rd 110×1/4	132	76	124	2.0 kg
DR1700	100	25	Rd 130×1/4	60	89	137	2.1 kg

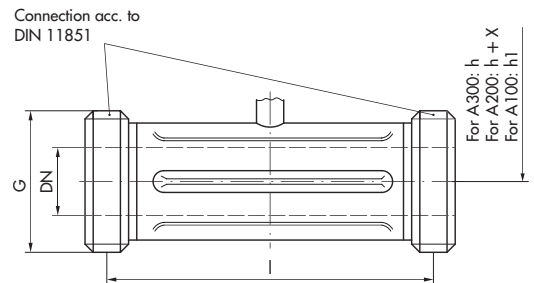


Fig. 12 · Dimensions in mm

Inline diaphragm seal with IDF thread						
Type	DN	PN	l	h	h1	Weight
DR4100	1"	40	142	46	94	0.6 kg
DR4200	1 1/2"	40	150	53	101	0.8 kg
DR4300	2"	25	150	61	109	1.1 kg
DR4400	2 1/2"	25	150	65	113	1.2 kg
DR4500	3"	25	150	73	121	1.6 kg

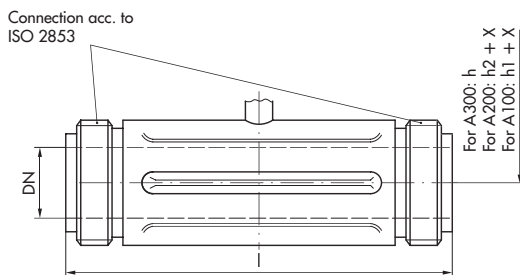


Fig. 13 · Dimensions in mm

Inline diaphragm seal with clamp connection						
Type	DN	PN	l	h	h1	Weight
DR6100	1"	16	126	46	94	0.5 kg
DR6200	1 1/2"	16	126	53	101	0.7 kg
DR6300	2"	16	126	61	109	0.9 kg
DR6400	2 1/2"	10	131	65	113	1.1 kg
DR6500	3"	10	131	73	121	1.3 kg

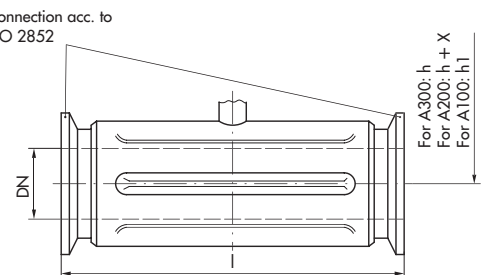


Fig. 14 · Dimensions in mm

Versions and ordering data

Electrical transmitter for gauge pressure and absolute pressure					Order no. 6051-
Type of protection	Without explosion protection				0	↑	↑	↑	↑	↑
	II 2 G EEx ia IIC T6 ¹⁾				1					
Measuring element	Sensor	Span ²⁾		Overload limit	Application					
		Gauge pressure	Absolute pressure							
	Capacitive ceramic	0.02 to 0.1 bar	-	-0.3 to +4 bar		10				
	Capacitive ceramic	0.04 to 0.2 bar	-	6 bar		11				
	Capacitive ceramic	0.08 to 0.4 bar	-	6 bar		12				
	Capacitive ceramic	0.2 to 1.0 bar	-	10 bar		13				
	Capacitive ceramic	0.4 to 2.0 bar	-	18 bar		14				
	Capacitive ceramic	0.8 to 4.0 bar	-	25 bar		15				
	Capacitive ceramic	2.0 to 10.0 bar	-	40 bar		16				
	Capacitive ceramic	-	0.04 to 0.2 bar _{abs}	6 bar		31				
	Capacitive ceramic	-	0.2 to 1.0 bar _{abs}	10 bar		33				
	Capacitive ceramic	-	0.4 to 2.0 bar _{abs}	18 bar		34				
	Capacitive ceramic	-	0.8 to 4.0 bar _{abs}	25 bar		35				
	Capacitive ceramic	-	2.0 to 10.0 bar _{abs}	40 bar		36				
	Capacitive ceramic	3.0 to 19.0 bar	4.0 to 20.0 bar _{abs}	40 bar		37				
	Capacitive ceramic	7.0 to 39.0 bar	8.0 to 40.0 bar _{abs}	60 bar		38				
	Capacitive ceramic	13.0 to 69.0 bar	14.0 to 70.0 bar _{abs}	105 bar		39				
	Piezoresistive	31.0 to 159.0 bar	32.0 to 160.0 bar _{abs}	600 bar		42				
	Piezoresistive	79.0 to 399.0 bar	80.0 to 400.0 bar _{abs}	600 bar		43				
	Capacitive ceramic	0.04 to 0.2 bar ³⁾	-	6 bar		50				
	Capacitive ceramic	0.02 to 0.1 bar	-	-0.3 to +4 bar	Oxygen service	60				
	Capacitive ceramic	0.04 to 0.2 bar	-	6 bar	Oxygen service	61				
	Capacitive ceramic	0.08 to 0.4 bar	-	6 bar	Oxygen service	62				
	Capacitive ceramic	0.2 to 1.0 bar	-	10 bar	Oxygen service	63				
	Capacitive ceramic	0.4 to 2.0 bar	-	18 bar	Oxygen service	64				
	Capacitive ceramic	0.8 to 4.0 bar	-	25 bar	Oxygen service	65				
	Capacitive ceramic	2.0 to 10.0 bar	-	40 bar	Oxygen service	66				
	Capacitive ceramic	-	0.04 to 0.2 bar _{abs}	6 bar	Oxygen service	71				
	Capacitive ceramic	-	0.2 to 1.0 bar _{abs}	10 bar	Oxygen service	73				
	Capacitive ceramic	-	0.4 to 2.0 bar _{abs}	18 bar	Oxygen service	74				
	Capacitive ceramic	-	0.8 to 4.0 bar _{abs}	25 bar	Oxygen service	75				
	Capacitive ceramic	-	2.0 to 10.0 bar _{abs}	40 bar	Oxygen service	76				
	Capacitive ceramic	3.0 to 19.0 bar	4.0 to 20.0 bar _{abs}	40 bar	Oxygen service	77				
	Capacitive ceramic	7.0 to 39.0 bar	8.0 to 40.0 bar _{abs}	60 bar	Oxygen service	78				
	Capacitive ceramic	13.0 to 69.0 bar	14.0 to 70.0 bar _{abs}	105 bar	Oxygen service	79				
	Piezoresistive	31.0 to 119.0 bar	32.0 to 120.0 bar _{abs}	600 bar	Oxygen service	82				
	Capacitive ceramic	0.04 to 0.2 bar ³⁾	-	6 bar	Oxygen service	90				
Process connection	Connecting piece G 1/2 A acc. to DIN 16288				1					
	External diaphragm seal (see specification table on page 7)				5					
Electrical connection	Threaded connection M 20 × 1.5				(-30 to +80 °C)	0				
	Cable gland M 20 × 1.5 made of polyamide, blue				(-20 to +80 °C)	1				
	Cable gland M 20 × 1.5 made of polyamide, black				(-20 to +80 °C)	2				
	Male connector acc. to EN 175301-803, type A ⁴⁾ made of polyamide, black, degree of protection IP 65 ⁴⁾				(-30 to +80 °C)	4				
	Han 7 D male connector (manufactured by Harting), 7 poles, made of aluminum, silvery gray, degree of protection IP 65 ⁴⁾				(-30 to +80 °C)	5				
	Cable gland M 20 × 1.5 made of metal, blue				(-30 to +80 °C)	6				
	Cable gland M 20 × 1.5 made of metal, colorless				(-30 to +80 °C)	7				
LC display	Without LC display					0				
	LC display, 3 1/2 digits (specify span and unit in plain text)				(-20 to +70 °C)	1				
Pressure adjustment	Gauge pressure					0				
	Absolute pressure					1				

Available ex stock

¹⁾ According to EC Type Examination Certificate PTB 02 ATEX 2075 for zone 1 (addendum for zone 21 is in preparation).

A manufacturer's declaration is available for zones 2 and 22.

²⁾ Measuring range: 0 bar to max. span (not for Types 6051-X50/-X90).

Specify pressure adjustment "gauge pressure" or "absolute pressure" in plain text.

³⁾ Measuring range between -0.3 and +0.2 bar adjustable (for Types 6051-X50/-X90 only).

⁴⁾ The female connector is not delivered with the device (see "Accessories and spare parts").

For specification table of external diaphragm seal, see page 7.

Accessories and spare parts

LC display, 3½ digits, with holder

Order no. 1180-8911

Enclosure cover for LC display

Order no. 1790-9644

Female connector acc. to EN 175301-803, type A, made of polyamide, black, with cable gland Pg 9 (for cable \varnothing 4 to 8 mm) and flat gasket made of nitrile butadiene rubber

Order no. 0790-6658

Han 7 D female connector (manufactured by Harting), angular shape, 7 poles, made of aluminum, silvery gray, with cable gland Pg 9 (for cable \varnothing 6 to 9 mm)

Order no. 1400-8298

Shut-off valve for pressure gauges acc. to DIN 16270, type A, with connecting piece G ½ A and coupling sleeve G ½ acc. to DIN 16283,

made of steel C 22.8

Order no. 8502-0505

made of stainless steel 1.4571

Order no. 8502-0503

Circular-shaped siphon for pressure gauges acc. to DIN 16282, type C, with coupling sleeve G ½ acc. to DIN 16283, with welding ends,

made of steel St 35.8

Order no. 8580-5014

with welding ends,

made of stainless steel 1.4571

Order no. 8580-5015

Flat gasket for connecting piece G ½ acc. to DIN 16258, type B, made of vulcanized fiber

Order no. 8502-0513

Sealing ring for connecting piece G ½ acc. to DIN 19207, type B, grooved, made of stainless steel 1.4571

Order no. 8502-0521

Instrument holder acc. to DIN 16281, made of aluminum

Order no. 3994-9582

made of stainless steel 1.4301

Order no. 3994-9583

Adapter acc. to DIN 16281 for instrument holder, made of steel St 37

Order no. 0230-9584

made of stainless steel 1.4571

Order no. 0230-8585

Pressure gauge screw joint G ½ for pipe 12 × 1, made of steel

Order no. 8582-1317

made of stainless steel 1.4571

Order no. 8582-1318

Pressure gauge screw joint G ½ for tube 4 × 1, max. 6 bar, made of polyamide

Order no. 8582-1604

(Specifications subject to change without notice.)

SAMSOMATIC
AUTOMATIONSSYSTEME
GMBH

Weismüllerstraße 20–22
60314 Frankfurt am Main · Germany

Phone: +49 69 4009-0

Fax: +49 69 4009-1644

E-mail: samsomatic@samson.de

Internet: <http://www.samsomatic.de>

– a subsidiary of SAMSON AG

2005-01 A · T 6051 EN