Bourdon tube pressure gauge, copper alloy
Standard version
Models 111.10, 111.12

for further approvals, see page 6

Applications

- For gaseous and liquid media that are not highly viscous or crystallising and will not attack copper alloy parts
- Pneumatics
- Heating and air-conditioning technology
- Medical engineering

Special features

- Reliable and cost-effective
- Design per EN 837-1 or ASME B40.100
- Nominal size 40 [1 ½"], 50 [2"], 63 [2 ½"], 80 [3"], 100 [4"] and 160 [6"]
- Scale ranges to 0 ... 400 bar [0 ... 6,000 psi]

Fig. left: Model 111.12, back mount
Fig. right: Model 111.10, lower mount (radial)

Description

The model 111 pressure gauges are based on the proven Bourdon tube measuring system. The deflection of the Bourdon tube is transmitted to a movement and indicated.

The modular design enables a multitude of combinations of case materials, process connections, nominal sizes and scale ranges. Due to the high variance, the instrument is suitable for use in a wide range of applications within industry.

For mounting in control panels, the pressure gauges can, depending on the process connection, be fitted with a surface mounting flange or with a triangular profile ring and mounting bracket.

The standard version of the model 111 is manufactured, cost-optimised on modern production lines, in volumes of several million instruments per year.

Data sheets showing similar products:
Panel mounting series; models 111.16, 111.26; see data sheet PM 01.10
With VdS approval; model 111.12.040; see data sheet SP 01.23

Specifications

Basic information	
Standard	■ EN 837-1 ■ ASME B40.100
	For information on the “Selection, installation, handling and operation of pressure gauges”, see Technical information IN 00.05.
Further version	■ For closed heating systems with red mark pointer and adjustable green sector, scale range 0 ... 4 bar, red mark at 2.5 or 3 bar ■ For water level indication (hydrometer) and heating systems Scale ranges 0 ... 0.6 to 0 ... 25 bar, with second scale in mWS and red mark pointer
Nominal size (NS)	■ Ø 40 mm [1 ½"] ■ Ø 50 mm [2"] ■ Ø 63 mm [2 ½"] ■ Ø 80 mm [3"] ■ Ø 100 mm [4"] ■ Ø 160 mm [6"] (only for model 111.10 with steel case)
Connection location	■ Lower mount (radial) ■ Centre back mount [1]
Window [2]	Plastic, crystal-clear, snap-fitted in case
Case	
Design	■ Without safety level ■ Safety level “S1” per EN 837-1: With blow-out device
Material [3]	■ Plastic, black ■ Steel, black
Mounting	■ Without ■ Panel mounting flange ■ Surface mounting flange [4] ■ Triangular profile ring with mounting bracket [5]
Movement	Copper alloy

1) Not available for NS 160 [6"]
2) Model 111.10, NS 160 [6"]: Instrument glass
3) Model 111.10, NS 160 [6"] and model 111.12, NS 100 [4"]: Steel, black
4) Not available for NS 40 [1 ½"], NS 50 [2"] and NS 160 [6"]
5) Not available for NS 40 [1 ½"], NS 50 [2"] and NS 63 [2 ½"]

Measuring element	
Type of measuring element	Bourdon tube, C-type or helical type
Material	Copper alloy
Leak tightness	Leakage rate: $< 5 \cdot 10^{-3}$ mbar l/s

Accuracy specifications	
Accuracy class	
EN 837-1	■ Class 1.6 ■ Class 2.5
ASME B40.100	Grade B
Temperature error	On deviation from the reference conditions at the measuring system: ≤ ±0.4 % per 10 °C [≤ ±0.4 % per 18 °F] of full scale value
Reference conditions	
Ambient temperature	+20 °C [68 °F]

Scale ranges

bar	
0 ... 0.6	0 ... 25
0 ... 1	0 ... 40
0 ... 1.6	0 ... 60 [1]
0 ... 2.5	0 ... 100 [1]
0 ... 4	0 ... 160 [1]
0 ... 6	0 ... 250 [1]
0 ... 10	0 ... 315 [1]
0 ... 16	0 ... 400 [1]
0 ... 20	

kg/cm²	
0 ... 0.6	0 ... 25
0 ... 1	0 ... 40
0 ... 1.6	0 ... 60 [1]
0 ... 2.5	0 ... 100 [1]
0 ... 4	0 ... 160 [1]
0 ... 6	0 ... 250 [1]
0 ... 10	0 ... 315 [1]
0 ... 16	0 ... 400 [1]
0 ... 20	

kPa	
0 ... 60	0 ... 2,500
0 ... 100	0 ... 4,000
0 ... 160	0 ... 6,000 [1]
0 ... 250	0 ... 10,000 [1]
0 ... 400	0 ... 16,000 [1]
0 ... 600	0 ... 25,000 [1]
0 ... 1,000	0 ... 31,500 [1]
0 ... 1,600	0 ... 40,000 [1]
0 ... 2,000	

MPa	
0 ... 0.06	0 ... 2.5
0 ... 0.1	0 ... 4
0 ... 0.16	0 ... 6 [1]
0 ... 0.25	0 ... 10 [1]
0 ... 0.4	0 ... 16 [1]
0 ... 0.6	0 ... 25 [1]
0 ... 1	0 ... 31.5 [1]
0 ... 1.6	0 ... 40 [1]
0 ... 2.0	

psi	
0 ... 10	0 ... 500
0 ... 15	0 ... 600 [1]
0 ... 30	0 ... 800 [1]
0 ... 60	0 ... 1,000 [1]
0 ... 100	0 ... 1,500 [1]
0 ... 150	0 ... 2,000 [1]
0 ... 160	0 ... 3,000 [1]
0 ... 200	0 ... 4,000 [1]
0 ... 300	0 ... 5,000 [1]
0 ... 400	0 ... 6,000 [1]

1) Not available for NS 160 [6"]

Vacuum and +/- scale ranges

bar	
-0.6 ... 0 [1]	-1 ... +5
-1 ... 0	-1 ... +9
-1 ... +0.6	-1 ... +15
-1 ... +1.5	-1 ... +24
-1 ... +3	-1 ... +30

MPa	
-0.06 ... 0 [1]	-0.1 ... +0.5
-0.1 ... 0	-0.1 ... +0.9
-0.1 ... +0.06	-0.1 ... +1.5
-0.1 ... +0.15	-0.1 ... +2.4
-0.1 ... +0.3	-0.1 ... +3

kPa	
-60 ... 0 [1]	-100 ... +500
-100 ... 0	-100 ... +900
-100 ... +60	-100 ... +1,500
-100 ... +150	-100 ... +2,400
-100 ... +300	-100 ... +3,000

psi	
-15 inHg ... 0 [1]	-30 inHg ... +100
-30 inHg ... 0	-30 inHg ... +160
-30 inHg ... +15	-30 inHg ... +200
-30 inHg ... +30	-30 inHg ... +300
-30 inHg ... +60	-30 inHg ... +400

1) Not available for NS 160 [6"]

Other scale ranges on request

Further details on: Scale ranges		
Unit	■ bar ■ psi ■ kg/cm² ■ kPa ■ MPa	
Increased overload safety	■ Without ■ 1.6 times ■ 2 times	
	The possibility of selection depends on scale range and nominal size	
Vacuum resistance	■ Without ■ Vacuum-resistant to -1 bar	
Dial		
Scale colour	Black	
Material	NS 40 [1 ½"], 50 [2"], 63 [2 ½"]	Plastic, white
	NS 80 [3"], 100 [4"], 160 [6"]	Aluminium, white
Customer-specific version	■ Without ■ With temperature scale for refrigerant, e.g. for NH_3: R 717	
	Other scales, e.g. with red mark, circular arcs or circular sectors, on request → Alternatively, adhesive label set for red and green circular arcs; see data sheet AC 08.03	
Pointer		
Instrument pointer	NS 40 [1 ½"] ... 100 [4"]	Plastic, black
	NS 160 [6"]	Aluminium, black
Mark pointer/drag pointer	■ Without ■ Red mark pointer on dial, fixed [1] ■ Red mark pointer on window, adjustable	
Pointer stop pin	■ Without ■ At zero point	

1) Red mark pointer with measuring ranges 0 ... 0.6 to 0 ... 60 bar

Process connection	
Standard	■ EN 837-1 ■ ISO 7 ■ ANSI/B1.20.1
Size	
EN 837-1	■ G ⅛ B, male thread ■ G ¼ B, male thread ■ G ½ B, male thread [1]
ANSI/B1.20.1	■ ⅛ NPT, male thread ■ ¼ NPT, male thread ■ ½ NPT, male thread [1]
ISO 7	■ R ⅛, male thread ■ R ¼, male thread ■ R ½, male thread [1]
Restrictor	■ Without ■ Ø 0.5 mm [0.02"], copper alloy ■ Ø 0.3 mm [0.012"], copper alloy
Material (wetted)	
Process connection	Copper alloy
Bourdon tube	Copper alloy

1) Not available for NS 40 [1 ½"], NS 50 [2"] and NS 63 [2 ½"]

Other process connections on request

Operating conditions		
Medium temperature	-20 ... +60 °C [-4 ... +140 °F]	
Ambient temperature	-20 ... +60 °C [-4 ... +140 °F]	
Pressure limitation		
Steady	3/4 x full scale value	
Fluctuating	2/3 x full scale value	
Short time	Full scale value	
Ingress protection per IEC/EN 60529		
Model 111.10	NS 40 [1 ½"], NS 50 [2"], NS 63 [2 ½"]	IP33
	NS 80 [3"], NS 100 [4"], NS 160 [6"]	IP44
Model 111.12	NS 40 [1 ½"], NS 50 [2"], NS 63 [2 ½"]	IP41 [1]
	NS 80 [3"], NS 100 [4"]	IP42

1) Ingress protection IP44 for steel case

Approvals

Logo	Description	Country
CE	**EU declaration of conformity** Pressure equipment directive PS > 200 bar, module A, pressure accessory	European Union
-	**CRN** Safety (e.g. electr. safety, overpressure, ...)	Canada

Optional approvals

Logo	Description	Country
	PAC Russia Metrology, measurement technology	Russia
	PAC Kazakhstan Metrology, measurement technology	Kazakhstan
-	**MChS** Permission for commissioning	Kazakhstan
	PAC Belarus Metrology, measurement technology	Belarus
-	**PAC Ukraine** Metrology, measurement technology	Ukraine
	PAC Uzbekistan Metrology, measurement technology	Uzbekistan
-	**PAC China** Metrology, measurement technology	China
-	**FM** [1)] FM 2311, Use in fire protection systems	International
	UL [1)] UL 393, Use in fire protection systems	International
NSF	**NSF** NSF/ANSI 61-G and NSF/ANSI 372, Suitability for drinking water	USA

1) Only available for NS 100 [4"] with selected scale ranges and process connections

Manufacturer's information and certificates

Logo	Description
-	Pressure equipment directive (PED) for maximum allowable pressure PS ≤ 200 bar
-	Suitability of wetted materials for drinking water in accordance with the European 4MS initiative

Certificates (option)

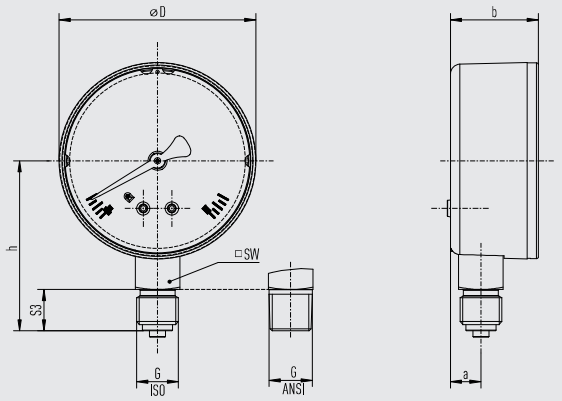
Certificates	
Certificates	■ 2.2 test report per EN 10204 (e.g. state-of-the-art manufacturing, indication accuracy) ■ 3.1 inspection certificate per EN 10204 (e.g. material proof for wetted metal parts, indication accuracy)
Recommended calibration interval	1 year (dependent on conditions of use)

→ For approvals and certificates, see website

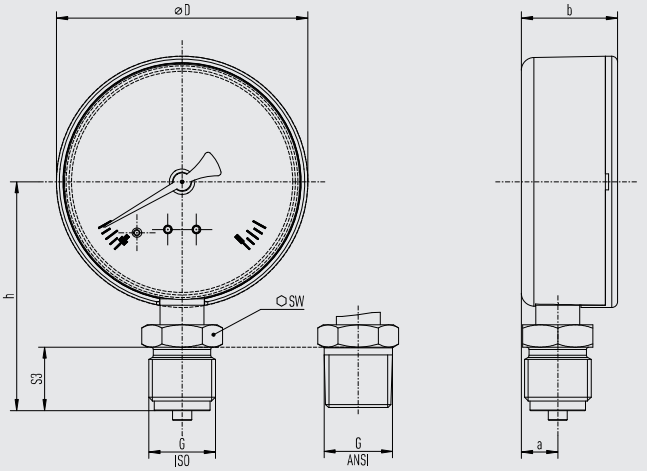
Dimensions in mm [in]

Model 111.10, lower mount (radial), plastic case

Instruments with SW = 14 [0.55]



Instruments with SW = 22 [0.87]



NS	G [1]	Dimensions in mm [in]					
		h ±1 [0.04]	S3	a	b ±0.5 [0.02]	D	SW
40 [1 ½"]	G ⅛ B, ⅛ NPT, R ⅛	36.0 [1.42]	12.0 [0.47]	9.6 [0.38]	26.4 [1.04]	38.9 [1.53]	14 [0.55]
	G ¼ B, ¼ NPT, R ¼	37.0 [1.46]	13.0 [0.51]	9.6 [0.38]	26.4 [1.04]	38.9 [1.53]	14 [0.55]
50 [2"]	G ⅛ B, ⅛ NPT, R ⅛	44.0 [1.73]	12.0 [0.47]	10.0 [0.39]	27.4 [1.08]	49.0 [1.93]	14 [0.55]
	G ¼ B, ¼ NPT, R ¼	45.0 [1.77]	13.0 [0.51]	10.0 [0.39]	27.4 [1.08]	49.0 [1.93]	14 [0.55]
63 [2 ½"]	G ⅛ B, ⅛ NPT, R ⅛	52.5 [2.07]	12.0 [0.47]	9.6 [0.38]	27.6 [1.09]	62.0 [2.44]	14 [0.55]
	G ¼ B, ¼ NPT, R ¼	53.5 [2.11]	13.0 [0.51]	9.6 [0.38]	27.6 [1.09]	62.0 [2.44]	14 [0.55]
80 [3"]	G ⅛ B, ⅛ NPT, R ⅛	60.0 [2.36]	12.0 [0.47]	11.4 [0.45]	30.2 [1.19]	79.0 [3.11]	14 [0.55]
	G ¼ B, ¼ NPT, R ¼	61.0 [2.40]	13.0 [0.51]	11.4 [0.45]	30.2 [1.19]	79.0 [3.11]	14 [0.55]
	G ½ B, ½ NPT, R ½	72.0 [2.83]	20.0 [0.79]	11.4 [0.45]	30.2 [1.19]	79.0 [3.11]	22 [0.87]
100 [4"]	G ⅛ B, ⅛ NPT, R ⅛	70.0 [2.76]	12.0 [0.47]	11.5 [0.45]	30.3 [1.19]	99.0 [3.90]	14 [0.55]
	G ¼ B, ¼ NPT, R ¼	71.0 [2.80]	13.0 [0.51]	11.5 [0.45]	30.3 [1.19]	99.0 [3.90]	14 [0.55]
	G ½ B, ½ NPT, R ½	83.5 [3.29]	20.0 [0.79]	11.5 [0.45]	30.3 [1.19]	99.0 [3.90]	22 [0.87]

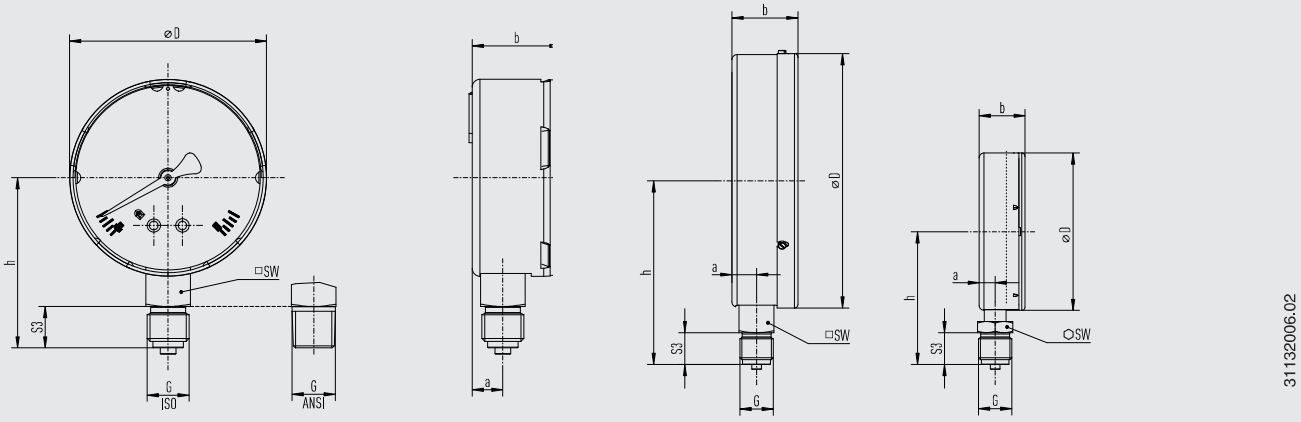
1) The G ⅛ B process connection of this instrument is manufactured without a centring spigot and with a thread runout instead of a thread undercut.

NS	Weight in kg [lb]
40 [1 ½"]	0.08 [0.18]
50 [2"]	0.10 [0.22]
63 [2 ½"]	0.13 [0.29]
80 [3"]	0.18 [0.40]
100 [4"]	0.21 [0.46]

Model 111.10, lower mount (radial), steel case

Instruments with SW = 14 [0.55]
NS 40 [2 ½"] ... 100 [4"]

Instruments with SW = 22 [0.87]
NS 160 [6"] NS 100 [4"]

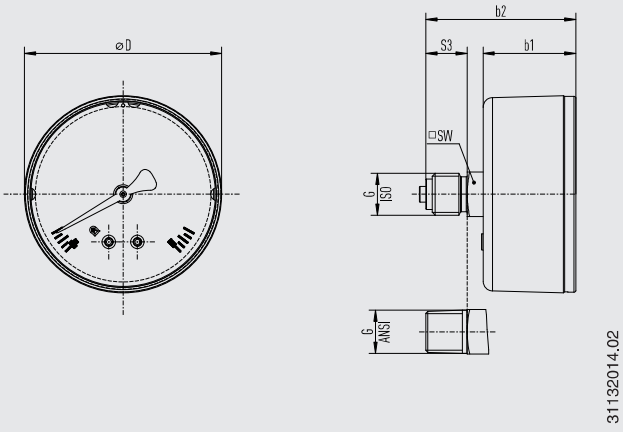


NS	G [1]	Dimensions in mm [in]					
		h ±1 [0.04]	S3	a	b ±0.5 [0.02]	D	SW
40 [1 ½"]	G ⅛ B, ⅛ NPT, R ⅛	38.0 [1.50]	12.0 [0.47]	9.6 [0.38]	25.8 [1.02]	39.0 [1.54]	14 [0.55]
	G ¼ B, ¼ NPT, R ¼	39.0 [1.54]	13.0 [0.51]	9.6 [0.38]	25.8 [1.02]	39.0 [1.54]	14 [0.55]
50 [2"]	G ⅛ B, ⅛ NPT, R ⅛	44.0 [1.73]	12.0 [0.47]	9.6 [0.38]	27.9 [1.10]	49.0 [1.93]	14 [0.55]
	G ¼ B, ¼ NPT, R ¼	45.0 [1.77]	13.0 [0.51]	9.6 [0.38]	27.9 [1.10]	49.0 [1.93]	14 [0.55]
63 [2 ½"]	G ⅛ B, ⅛ NPT, R ⅛	52.5 [2.07]	12.0 [0.47]	9.6 [0.38]	27.9 [1.10]	61.9 [2.44]	14 [0.55]
	G ¼ B, ¼ NPT, R ¼	53.5 [2.11]	13.0 [0.51]	9.6 [0.38]	27.9 [1.10]	61.9 [2.44]	14 [0.55]
80 [3"]	G ⅛ B, ⅛ NPT, R ⅛	60.0 [2.36]	12.0 [0.47]	10.0 [0.39]	28.8 [1.13]	79.0 [3.11]	14 [0.55]
	G ¼ B, ¼ NPT, R ¼	61.0 [2.40]	13.0 [0.51]	10.0 [0.39]	28.8 [1.13]	79.0 [3.11]	14 [0.55]
100 [4"]	G ⅛ B, ⅛ NPT, R ⅛	70.0 [2.76]	12.0 [0.47]	10.0 [0.39]	28.8 [1.13]	99.0 [3.90]	14 [0.55]
	G ¼ B, ¼ NPT, R ¼	76.5 [3.01]	13.0 [0.51]	10.0 [0.39]	28.8 [1.13]	99.0 [3.90]	22 [0.87]
	G ½ B, ½ NPT, R ½	83.5 [3.29]	20.0 [0.79]	10.0 [0.39]	28.8 [1.13]	99.0 [3.90]	22 [0.87]
160 [6"]	G ¼ B, ¼ NPT, R ¼	108.5 [4.27]	13.0 [0.51]	11.5 [0.45]	41.5 [1.63]	160.0 [6.30]	22 [0.87]
	G ½ B, ½ NPT, R ½	115.5 [4.55]	20.0 [0.79]	11.5 [0.45]	41.5 [1.63]	160.0 [6.30]	22 [0.87]

1) The G ⅛ B process connection of this instrument is manufactured without a centring spigot and with a thread runout instead of a thread undercut.

NS	Weight in kg [lb]
40 [1 ½"]	0.09 [0.2]
50 [2"]	0.11 [0.24]
63 [2 ½"]	0.15 [0.33]
80 [3"]	0.26 [0.57]
100 [4"]	0.31 [0.68]
160 [6"]	0.88 [1.94]

Model 111.12, centre back mount, plastic case

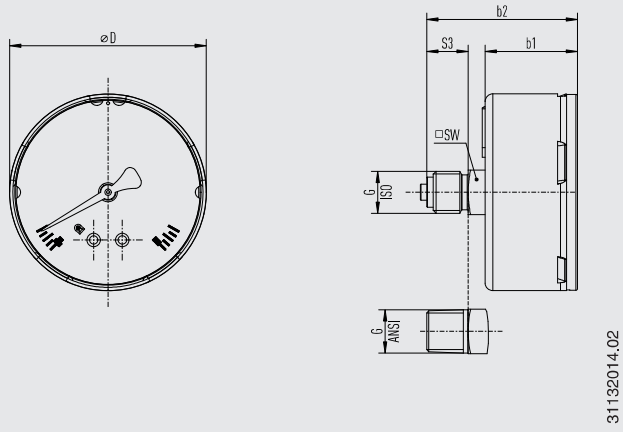


NS	G [1]	Dimensions in mm [in]				
		b1 ±0.5 [0.02]	b2 ±1 [0.04]	S3	D	SW
40 [1 ½"]	G ⅛ B, ⅛ NPT, R ⅛	26.4 [1.53]	44.0 [1.73]	12.0 [0.47]	39.0 [1.53]	14 [0.55]
	G ¼ B, ¼ NPT, R ¼	26.4 [1.53]	45.0 [1.77]	13.0 [0.51]	39.0 [1.53]	14 [0.55]
50 [2"]	G ⅛ B, ⅛ NPT, R ⅛	29.5 [1.87]	47.5 [1.87]	12.0 [0.47]	49.0 [1.93]	14 [0.55]
	G ¼ B, ¼ NPT, R ¼	29.5 [1.87]	48.5 [1.91]	13.0 [0.51]	49.0 [1.93]	14 [0.55]
63 [2 ½"]	G ⅛ B, ⅛ NPT, R ⅛	29.0 [1.15]	47.0 [1.86]	12.0 [0.47]	62.0 [2.44]	14 [0.55]
	G ¼ B, ¼ NPT, R ¼	29.0 [1.15]	48.5 [1.91]	13.0 [0.51]	62.0 [2.44]	14 [0.55]
80 [3"]	G ⅛ B, ⅛ NPT, R ⅛	32.0 [1.25]	48.0 [1.89]	12.0 [0.47]	79.0 [3.11]	14 [0.55]
	G ¼ B, ¼ NPT, R ¼	32.0 [1.25]	49.0 [1.92]	13.0 [0.51]	79.0 [3.11]	14 [0.55]
	G ½ B, ½ NPT, R ½	55.4 [2.18]	55.4 [2.18]	20.0 [0.79]	79.0 [3.11]	14 [0.55]

1) The G ⅛ B process connection of this instrument is manufactured without a centring spigot and with a thread runout instead of a thread undercut.

NS	Weight in kg [lb]
40 [1 ½"]	0.06 [0.13]
50 [2"]	0.07 [0.15]
63 [2 ½"]	0.08 [0.18]
80 [3"]	0.11 [0.24]

Model 111.12, centre back mount, steel case



NS	G [1]	Dimensions in mm [in]				
		b1 ±0.5 [0.02]	b2 ±1 [0.04]	S3	D	SW
40 [1 ½"]	G ⅛ B, ⅛ NPT, R ⅛	25.8 [1.02]	44.0 [1.73]	12.0 [0.47]	39.0 [1.53]	14 [0.55]
	G ¼ B, ¼ NPT, R ¼	25.8 [1.02]	45.0 [1.77]	13.0 [0.51]	39.0 [1.53]	14 [0.55]
50 [2"]	G ⅛ B, ⅛ NPT, R ⅛	27.9 [1.10]	46.5 [1.83]	12.0 [0.47]	49.0 [1.93]	14 [0.55]
	G ¼ B, ¼ NPT, R ¼	27.9 [1.10]	47.5 [1.87]	13.0 [0.51]	49.0 [1.93]	14 [0.55]
63 [2 ½"]	G ⅛ B, ⅛ NPT, R ⅛	29.2 [1.14]	47.2 [1.86]	12.0 [0.47]	62.0 [2.44]	14 [0.55]
	G ¼ B, ¼ NPT, R ¼	29.2 [1.14]	48.2 [1.91]	13.0 [0.51]	62.0 [2.44]	14 [0.55]
80 [3"]	G ⅛ B, ⅛ NPT, R ⅛	30.8 [1.21]	47.8 [1.89]	12.0 [0.47]	79.0 [3.11]	14 [0.55]
	G ¼ B, ¼ NPT, R ¼	30.8 [1.21]	48.8 [1.92]	13.0 [0.51]	79.0 [3.11]	14 [0.55]
	G ½ B, ½ NPT, R ½	55.4 [2.18]	55.2 [2.17]	20.0 [0.79]	79.0 [3.11]	14 [0.55]
100 [4"]	G ⅛ B, ⅛ NPT, R ⅛	30.8 [1.21]	47.8 [1.89]	12.0 [0.47]	99.0 [3.90]	14 [0.55]
	G ¼ B, ¼ NPT, R ¼	30.8 [1.21]	48.8 [1.92]	13.0 [0.51]	99.0 [3.90]	14 [0.55]
	G ½ B, ½ NPT, R ½	55.4 [2.18]	55.2 [2.17]	20.0 [0.79]	99.0 [3.90]	14 [0.55]

1) The G ⅛ B process connection of this instrument is manufactured without a centring spigot and with a thread runout instead of a thread undercut.

NS	Weight in kg [lb]
40 [1 ½"]	0.07 [0.15]
50 [2"]	0.1 [0.22]
63 [2 ½"]	0.15 [0.33]
80 [3"]	0.27 [0.6]
100 [4"]	0.37 [0.82]

Accessories and spare parts

Model		Description
	**910.33**	Adhesive label set for red and green circular arcs → See data sheet AC 08.03
	**910.17**	Sealings → See data sheet AC 09.08
	**910.15**	Syphons → See data sheet AC 09.06
	**910.13**	Overpressure protector → See data sheet AC 09.04
	**IV10, IV11**	Needle valve and multiport valve → See data sheet AC 09.22
	**IV20, IV21**	Block-and-bleed valve → See data sheet AC 09.19
	**IVM**	Monoflange, process and instrument version → See data sheet AC 09.17
	**BV**	Ball valve, process and instrument version → See data sheet AC 09.28

Ordering information

Model / Nominal size / Scale range / Process connection / Connection location / Options

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