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

WIKA data sheet PM 01.01







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.

WIKA data sheet PM 01.01  $\cdot$  11/2022

Page 1 of 11



# **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	<ul> <li>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</li> <li>For water level indication (hydrometer) and heating systems</li> <li>Scale ranges 0 0.6 to 0 25 bar, with second scale in mWS and red mark pointer</li> </ul>
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	<ul> <li>Lower mount (radial)</li> <li>Centre back mount <sup>1)</sup></li> </ul>
Window <sup>2)</sup>	Plastic, crystal-clear, snap-fitted in case
Case	
Design	■ Without safety level ■ Safety level "S1" per EN 837-1: With blow-out device
Material <sup>3)</sup>	■ Plastic, black ■ Steel, black
Mounting	<ul> <li>Without</li> <li>Panel mounting flange</li> <li>Surface mounting flange 4)</li> <li>Triangular profile ring with mounting bracket 5)</li> </ul>
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 · 10 <sup>-3</sup> 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: $\leq \pm 0.4$ % per 10 °C [ $\leq \pm 0.4$ % 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 <sup>1)</sup>
0 4	0 160 <sup>1)</sup>
06	0 250 <sup>1)</sup>
0 10	0 315 1)
0 16	0 400 1)
0 20	

kg/cm <sup>2</sup>	
0 0.6	0 25
01	0 40
0 1.6	0 60 1)
0 2.5	0 100 1)
0 4	0 160 <sup>1)</sup>
06	0 250 1)
0 10	0 315 <sup>1)</sup>
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 <sup>1)</sup>
0 600	0 25,000 <sup>1)</sup>
0 1,000	0 31,500 <sup>1)</sup>
0 1,600	0 40,000 <sup>1)</sup>
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 <sup>1)</sup>
0 0.4	0 16 <sup>1)</sup>
0 0.6	0 25 1)
0 1	0 31.5 1)
0 1.6	0 40 1)
0 2.0	

psi	
0 10	0500
0 15	0 600 1)
0 30	0 800 1)
0 60	0 1,000 1)
0 100	0 1,500 <sup>1)</sup>
0 150	0 2,000 1)
0 160	0 3,000 1)
0 200	0 4,000 1)
0 300	0 5,000 <sup>1)</sup>
0 400	0 6,000 <sup>1)</sup>

<sup>1)</sup> Not available for NS 160 [6"]

## Vacuum and +/- scale ranges

bar	
-0.6 0 <sup>1)</sup>	-1 +5
-1 0	-1 +9
-1 +0.6	-1 +15
-1 +1.5	-1 +24
-1 +3	-1 +30

MPa	
-0.06 0 <sup>1)</sup>	-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 <sup>1)</sup>	-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 <sup>1)</sup>	-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

## 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 sca	le 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 <sub>3</sub> : 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	<ul> <li>■ Without</li> <li>■ Red mark pointer on dial, fixed <sup>1)</sup></li> <li>■ Red mark pointer on window, adjustable</li> </ul>		
Pointer stop pin	■ Without ■ At zero point		

<sup>1)</sup> Red mark pointer with measuring ranges 0 ... 0.6 to 0 ... 60 bar

<sup>1)</sup> Not available for NS 160 [6"]

Process connection	
Standard	■ EN 837-1 ■ ISO 7 ■ ANSI/B1.20.1
Size	
EN 837-1	■ G 1/2 B, male thread ■ G 1/2 B, male thread 1)
ANSI/B1.20.1	■ 1/8 NPT, male thread ■ 1/4 NPT, male thread ■ 1/2 NPT, male thread 1)
ISO 7	■ R 1/8, male thread ■ R 1/4, male thread ■ R 1/2, 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

<sup>1)</sup> Not available for NS 40 [1  $1\!\!/\!\!2"$ ], NS 50 [2"] and NS 63 [2  $1\!\!/\!\!2"$ ]

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 <sup>1)</sup>		
	NS 80 [3"], NS 100 [4"]	IP42		

<sup>1)</sup> 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
<b>©</b>	PAC Russia Metrology, measurement technology	Russia
6	PAC Kazakhstan Metrology, measurement technology	Kazakhstan
-	MChS Permission for commissioning	Kazakhstan
<b>(</b>	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 <sup>1)</sup> FM 2311, Use in fire protection systems	International
(ĥF)	UL <sup>1)</sup> UL 393, Use in fire protection systems	International
NSF	NSF NSF/ANSI 61-G and NSF/ANSI 372, Suitability for drinking water	USA

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

## Manufacturer's information and certificates

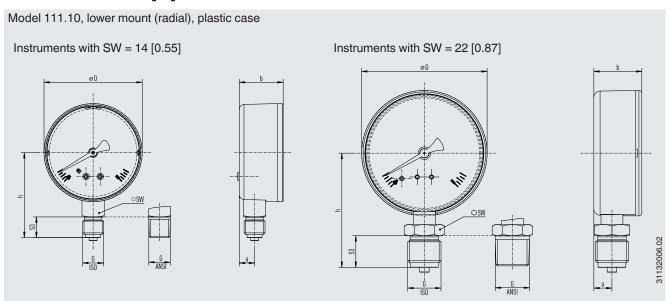
Logo	Description
-	Pressure equipment directive (PED) for maximum allowable pressure PS ≤ 200 bar
-	Suitability of wetted materials for drinking water in accordance with the European 4MS initiative

# **Certificates (option)**

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

 $<sup>\</sup>rightarrow$  For approvals and certificates, see website

# Dimensions in mm [in]



NS	G <sup>1)</sup>	Dimensions in mm [in]					
		h ±1 [0.04]	S3	а	b ±0.5 [0.02]	D	SW
40 [1 ½"]	G 1/8 B, 1/8 NPT, R 1/8	36.0 [1.42]	12.0 [0.47]	9.6 [0.38]	26.4 [1.04]	38.9 [1.53]	14 [0.55]
	G 1/4 B, 1/4 NPT, R 1/4	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 1/8 B, 1/8 NPT, R 1/8	44.0 [1.73]	12.0 [0.47]	10.0 [0.39]	27.4 [1.08]	49.0 [1.93]	14 [0.55]
	G 1/4 B, 1/4 NPT, R 1/4	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 1/8 B, 1/8 NPT, R 1/8	52.5 [2.07]	12.0 [0.47]	9.6 [0.38]	27.6 [1.09]	62.0 [2.44]	14 [0.55]
	G 1/4 B, 1/4 NPT, R 1/4	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 1/8 B, 1/8 NPT, R 1/8	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 1/8 B, 1/8 NPT, R 1/8	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 1/2 B, 1/2 NPT, R 1/2	83.5 [3.29]	20.0 [0.79]	11.5 [0.45]	30.3 [1.19]	99.0 [3.90]	22 [0.87]

<sup>1)</sup> The G 1/8 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"]

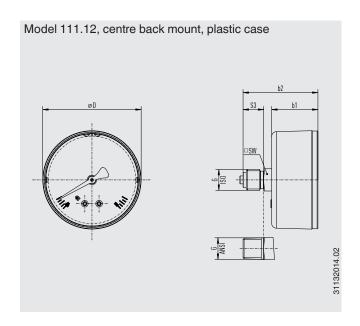
NS 160 [6"]

NS 100 [4"]

NS	G 1)	Dimensions in	mm [in]				
		h ±1 [0.04]	S3	а	b ±0.5 [0.02]	D	SW
40 [1 ½"]	G 1/8 B, 1/8 NPT, R 1/8	38.0 [1.50]	12.0 [0.47]	9.6 [0.38]	25.8 [1.02]	39.0 [1.54]	14 [0.55]
	G 1/4 B, 1/4 NPT, R 1/4	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 1/8 B, 1/8 NPT, R 1/8	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 1/8 B, 1/8 NPT, R 1/8	52.5 [2.07]	12.0 [0.47]	9.6 [0.38]	27.9 [1.10]	61.9 [2.44]	14 [0.55]
	G 1/4 B, 1/4 NPT, R 1/4	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 1/8 B, 1/8 NPT, R 1/8	60.0 [2.36]	12.0 [0.47]	10.0 [0.39]	28.8 [1.13]	79.0 [3.11]	14 [0.55]
	G 1/4 B, 1/4 NPT, R 1/4	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 1/8 B, 1/8 NPT, R 1/8	70.0 [2.76]	12.0 [0.47]	10.0 [0.39]	28.8 [1.13]	99.0 [3.90]	14 [0.55]
	G 1/4 B, 1/4 NPT, R 1/4	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]

<sup>1)</sup> The G 1/6 B process connection of this instrument is manufactured without a centring spigot and with a thread runout instead of a thread undercut.

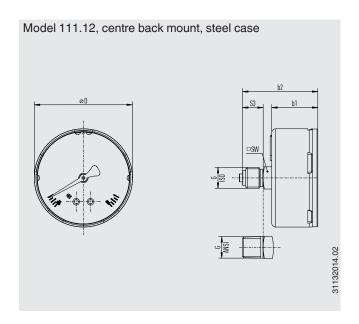
NS	Weight in kg [lb]
40 [1 ½"]	0.09 [0.2]
50 [2"]	0.11 [0.24]
63 [2 ½"]	0.15 [0.33]
80 [3"]	0.26 [0.57]
100 [4"]	0.31 [0.68]
160 [6"]	0.88 [1.94]



NS	G <sup>1)</sup>	Dimensions in m	nm [in]				
		b1 ±0.5 [0.02]	b2 ±1 [0.04]	S3	D	sw	
40 [1 ½"]	G 1/8 B, 1/8 NPT, R 1/8	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 1/8 B, 1/8 NPT, R 1/8	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 1/8 B, 1/8 NPT, R 1/8	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 1/8 B, 1/8 NPT, R 1/8	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]	

<sup>1)</sup> The G 1/8 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]



NS	G <sup>1)</sup>	Dimensions in mm [in]				
		b1 ±0.5 [0.02]	b2 ±1 [0.04]	S3	D	SW
40 [1 ½"]	G 1/8 B, 1/8 NPT, R 1/8	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 1/8 B, 1/8 NPT, R 1/8	27.9 [1.10]	46.5 [1.83]	12.0 [0.47]	49.0 [1.93]	14 [0.55]
	G 1/4 B, 1/4 NPT, R 1/4	27.9 [1.10]	47.5 [1.87]	13.0 [0.51]	49.0 [1.93]	14 [0.55]
63 [2 ½"]	G 1/8 B, 1/8 NPT, R 1/8	29.2 [1.14]	47.2 [1.86]	12.0 [0.47]	62.0 [2.44]	14 [0.55]
	G 1/4 B, 1/4 NPT, R 1/4	29.2 [1.14]	48.2 [1.91]	13.0 [0.51]	62.0 [2.44]	14 [0.55]
80 [3"]	G 1/8 B, 1/8 NPT, R 1/8	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 1/8 B, 1/8 NPT, R 1/8	30.8 [1.21]	47.8 [1.89]	12.0 [0.47]	99.0 [3.90]	14 [0.55]
	G 1/4 B, 1/4 NPT, R 1/4	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]

<sup>1)</sup> The G 1/8 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
-2 000 8 8 1 10 10 10 10 10 10 10 10 10 10 10 10 1	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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Page 11 of 11