q

Fig.: BG 4 with “Totalizing Roller Counter”

RITTER bellows-type gas meters are applicable for measuring the volume of flowing inert and dry gases and are particularly effective at high gas flows.

Please note that gases containing aggressive components may reduce the life span of bellows-type gas meters, if the casing of the measuring unit (tinplate), the valve/control elements (polyamide) or the bellows (Perbunan) should be attacked. For more details regarding the materials used which are in contact with the gas, please refer to data sheet 02.02.

The desired measurement range can be selected from among 6 magnitudes (types) extending together as a whole from 40 ltr/h to 160 m^3/h at a gas temperature ranging from -20° to +50° Celsius. The solidly soldered casing on the standard model is designed to withstand a maximum overpressure of 50 – 500 mbar depending on the meter type.

The measurement of **RITTER** bellows-type gas meters works on the principle of displacement. The gas meters employ a twin-chamber measuring unit with a deformable bellow within each chamber. Thus, a compulsory measurement of the gas flow is possible by periodically filling and emptying these chambers.

The design of the measuring chamber is such that the measuring volume per cycle of the bellows is constant. Among other advantages, this design of the measuring unit enables a measuring accuracy of +/- 2% .

BG 10
(Fig. with "Adding Roller Counter")

BG 40
(Fig. with "Adding Roller Counter")

The major advantage and the superiority of volumetric Gas Meter (like Bellows-type Gas Meters) over other measurement principles, which determine gas volume using secondary measurable variables such as speed, heat capacity, hot-wire resistance or similar, is that the volume is **directly** measured. That means that the condition and the composition of the gas has no influence on the measurement accuracy.

Correcting factors which take into account gas type, temperature, humidity etc are therefore **not necessary**. It should be noted that with other, non-volumetric measurement processes, the measurement accuracy given for that process can only be achieved if the correcting factors for the immediate condition of the gas are exactly known.

Equipment: All **RITTER** bellows-type gas meters include the following as standard equipment: twin-chamber measuring unit; 8-digit totalizing counter; large, one-needle dial; and magnetic coupling (between the measuring drum and counting mechanism); gas pipe connection: inch thread.

Performance Data:

- Measuring accuracy: +/- 2% at standard flow and 20° Celsius (exact value is stated in individual Calibration Certificate)
- Maximum gas inlet pressure (overpressure):
  - BG4, BG6: 300 mbar
  - BG10, BG16:50 mbar
  - BG 40, BG100:500 mbar
- Temperature range: -20 to +50° Celsius
  Flow rate (measuring range) and meter indication:

Model	Flow Rate			Minimum Dial Division	Maximum Value
	Minimum [ltr/h]	Maximum [ltr/h]	Standard [ltr/h]	[ltr]	[ltr]
BG 4	40	6,000	3,000	0.1	99,999,999
BG 6	60	10,000	5,000	0.2	999,999,990
BG 10	100	16,000	10,000	0.5	999,999,990
BG 16	160	25,000	15,000	0.4	999,999,990
BG 40	400	65,000	39,000	0.4	999,999,990
BG 100	1,000	160,000	95,000	0.4	999,999,990

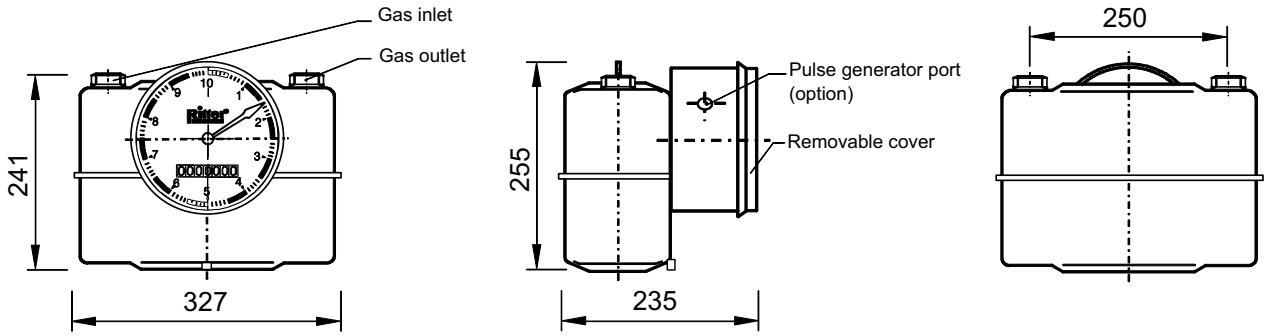
Materials:

- Casing:
  - BG4 – BG16: zinc-coated steel sheet (soldered) with outside also lacquered
  - BG40 – BG100: powder-coated steel sheet with outside also lacquered
- Measuring unit: tinplate
- Bellows (within measuring unit): textile-reinforced Perbunan
- Rod linkage: BG 4: polyamide; all others: polyamide/brass
- Slide gate: Bakelite

Accessories: Thermometer, range 0° to +60°C
Manometer, range 60 mbar differential pressure
Nozzles for flexible tube connection
Electronic Display Unit, including Interface RS 232 and Analog Output (requires Pulse Generator)

Built-in Options:

Resettable Roller Counter, 6-digit (substitutes Totalizing Roller Counter)
Pulse Generator (for connection of Electronic Display Unit or Computer)



Performance Data:

Minimum flow Q_{min}	40	ltr/h	**Maximum gas inlet pressure**	**300**	**mbar**
Standard flow Q_{stand}	3,000	ltr/h	Minimum differential pressure [1]	1	mbar
Maximum flow Q_{max}	6,000	ltr/h	Minimum dial division	0.1	ltr
Measuring cavity capacity	2	ltr	Indication dial plate	10.0	ltr
Measuring accuracy	+/- 2	%	Maximum indication value [2]	99.999.999	ltr
Temperature range	-20 to + 50	°C	Weight	4.6	kg

[1] Differential pressure (= pressure loss) gas inlet ⇒ gas outlet

[2] Standard Totalizing Roller Counter

Materials:

Casing:	zinc-coated steel sheet (soldered) with outside also lacquered
Measuring unit:	Tinplate
Bellows (within measuring unit):	textile-reinforced Perbunan
Rod linkage:	Polyamide
Slide gate:	Bakelite

Standard Equipment:

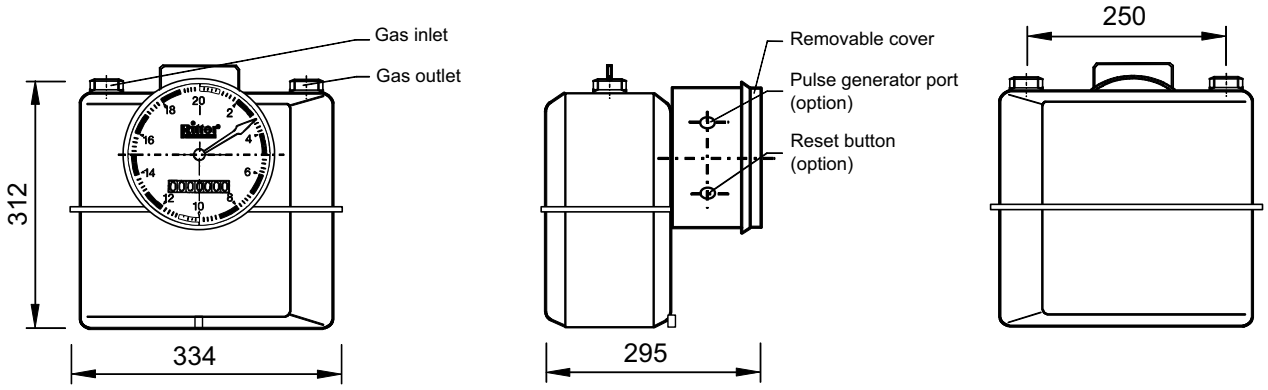
Twin-Chamber Measuring Unit	Totalizing Roller Counter (8-digit)
Magnetic Coupling	Screw Connection 1" (G 1 A, DIN ISO 228)

Accessories:

Thermometer, range 0° to +60°C, scale 1°C
Manometer (capsule pressure gauge), range 0 to 60 mbar, scale 2 mbar
Nozzles for flexible tube connection, outer ∅ 16 mm, inner ∅ 10 mm
Electronic Display Unit, including Interface RS 232 and Analog Output (requires Pulse Generator)

Built-in Options:
Resettable Roller Counter, 6-digit (substitutes Total Roller Counter)
Pulse Generator, standard or Ex-proof version (for connecting Electronic Display Unit/Computer)

Ritter	**BELLOWS-TYPE GAS METERS** **Data Sheet** **Type: BG 6**	**02.05** V 3.0 Rev. 08/00



Performance Data:

Minimum flow Q_{min}	60	ltr/h	**Maximum gas inlet pressure**	**300**	**mbar**
Standard flow Q_{stand}	5,000	ltr/h	Minimum differential pressure [1]	1	mbar
Maximum flow Q_{max}	10,000	ltr/h	Minimum dial division	0.2	ltr
Measuring cavity capacity	3.5	ltr	Indication dial plate	20.0	ltr
Measuring accuracy	±2	%	Maximum indication value [2]	99.999.999	ltr
Temperature range	-20 to + 50	°C	Weight	6.4	kg

[1] Differential pressure (= pressure loss) gas inlet ⇒ gas outlet

[2] Standard Totalizing Roller Counter

Materials:

Casing:	Zinc-coated steel sheet (soldered) with outside also lacquered
Measuring unit:	Tinplate
Bellows (within measuring unit):	textile-reinforced Perbunan
Rod linkage:	Polyamide
Slide gate:	Bakelite

Standard Equipment:

Twin-Chamber Measuring Unit	Totalizing Roller Counter, 9 digits, last digit (unit) = 0
Magnetic Coupling	Screw Connection 1-$^1/_4$" (G 1 A, DIN ISO 228)

Accessories:

Thermometer, range 0° to +60°C, scale 1°C

Manometer (capsule pressure gauge), range 0 to 60 mbar, scale 2 mbar

Nozzles for flexible tube connection, outer ∅ 20 mm, inner ∅ 14 mm

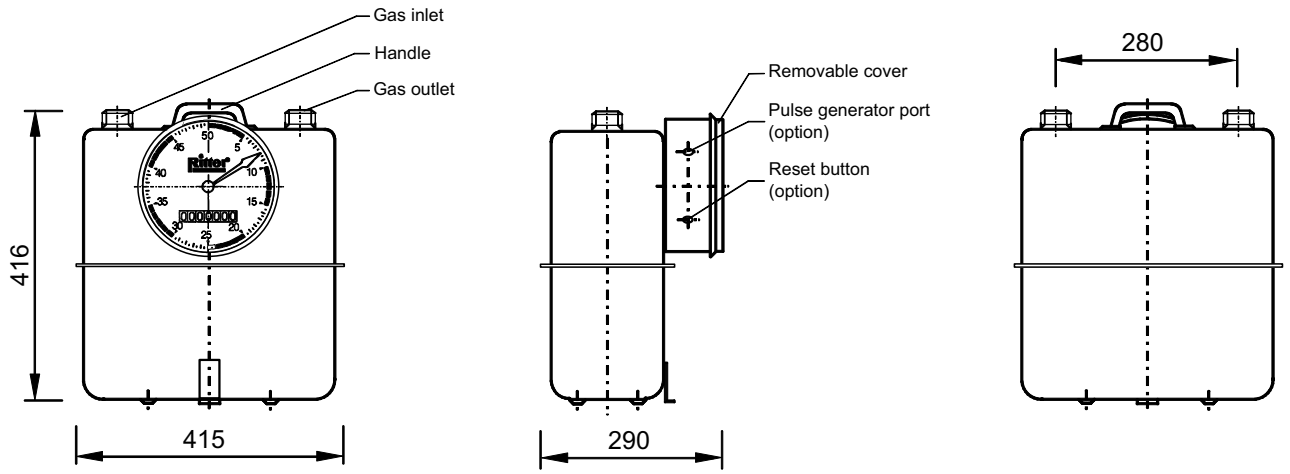
Electronic Display Unit, including Interface RS 232 and Analog Output (requires Pulse Generator)

Built-in Options:

Resettable Roller Counter, 6-digit (substitutes Total Roller Counter)

Pulse Generator, standard or Ex-proof version (for connecting Electronic Display Unit/Computer)

Ritter	**BELLOWS-TYPE GAS METERS** **Data Sheet** **Type: BG 10**	**02.06** V 2.1 Rev. 08/00



Performance Data:

Minimum flow Q_{min}	100	ltr/h	**Maximum gas inlet pressure**	**50**	**mbar**
Standard flow Q_{stand}	10,000	ltr/h	Minimum differential pressure [1]	1	mbar
Maximum flow Q_{max}	16,000	ltr/h	Minimum dial division	0.5	ltr
Measuring cavity capacity	10	ltr	Indication dial plate	50,00	ltr
Measuring accuracy	±2	%	Maximum indication value [2]	999.999.990	ltr
Temperature range	-20 to + 50	°C	Weight	11	kg

[1] Differential pressure (= pressure loss) gas inlet ⇒ gas outlet

[2] Standard Totalizing Roller Counter

Materials:

Casing:	zinc-coated steel sheet (soldered) with outside also lacquered
Measuring unit:	Tinplate
Bellows (within measuring unit):	textile-reinforced Perbunan
Rod linkage:	Polyamide/brass
Slide gate:	Bakelite

Standard Equipment:

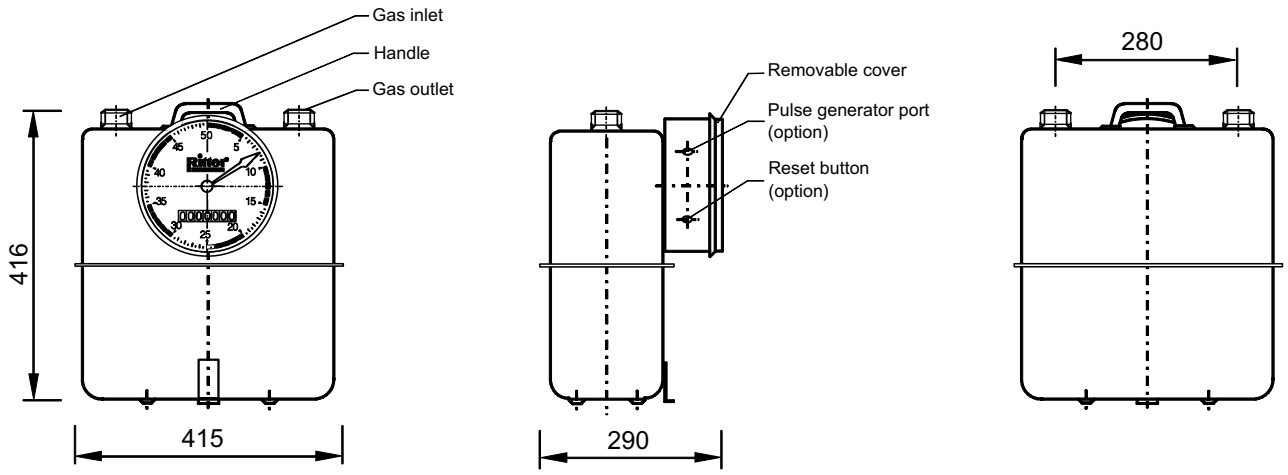
Twin-Chamber Measuring Unit	Totalizing Roller Counter, 9 digits, last digit (unit) = 0
Magnetic Coupling	Screw Connection 2" (G 2 A, DIN ISO 228)

Accessories:

Thermometer, range 0° to +60°C, scale 1°C
Manometer (capsule pressure gauge), range 0 to 60 mbar, scale 2 mbar
Nozzles for flexible tube connection, outer ∅ 25 mm, inner ∅ 19 mm
Electronic Display Unit, including Interface RS 232 and Analog Output (requires Pulse Generator)

Built-in Options:
Resettable Roller Counter, 6-digit (substitutes Total Roller Counter)
Pulse Generator, standard or Ex-proof version (for connecting Electronic Display Unit/Computer)

Ritter	**BELLOWS-TYPE GAS METERS** **Data Sheet** **Type: BG 16**	**02.07** V 2.1 Rev. 08/00



Performance Data:

Minimum flow Q_{min}	160	ltr/h	**Maximum gas inlet pressure**	**50**	**mbar**
Standard flow Q_{stand}	15,000	ltr/h	Minimum differential pressure [1]	1	mbar
Maximum flow Q_{max}	25,000	ltr/h	Minimum dial division	0.4	ltr
Measuring cavity capacity	10	ltr	Indication dial plate	100,00	ltr
Measuring accuracy	+/- 2	%	Maximum indication value [2]	999,999,990	ltr
Temperature range	-20 to + 50	°C	Weight	11	kg

[1] Differential pressure (= pressure loss) gas inlet ⇒ gas outlet

[2] Standard Totalizing Roller Counter

Materials:

Casing:	zinc-coated steel sheet (soldered) with outside also lacquered
Measuring unit:	Tinplate
Bellows (within measuring unit):	textile-reinforced Perbunan
Rod linkage:	Polyamide/brass
Slide gate:	Bakelite

Standard Equipment:

Twin-Chamber Measuring Unit	Totalizing Roller Counter, 9 digits, last digit (unit) = 0
Magnetic Coupling	Screw Connection 2" (G 2 A, DIN ISO 228)

Accessories:

Thermometer, range 0° to +60°C, scale 1°C

Manometer (capsule pressure gauge), range 0 to 60 mbar, scale 2 mbar

Nozzles for flexible tube connection, outer ∅ 32 mm, inner ∅ 22.5 mm

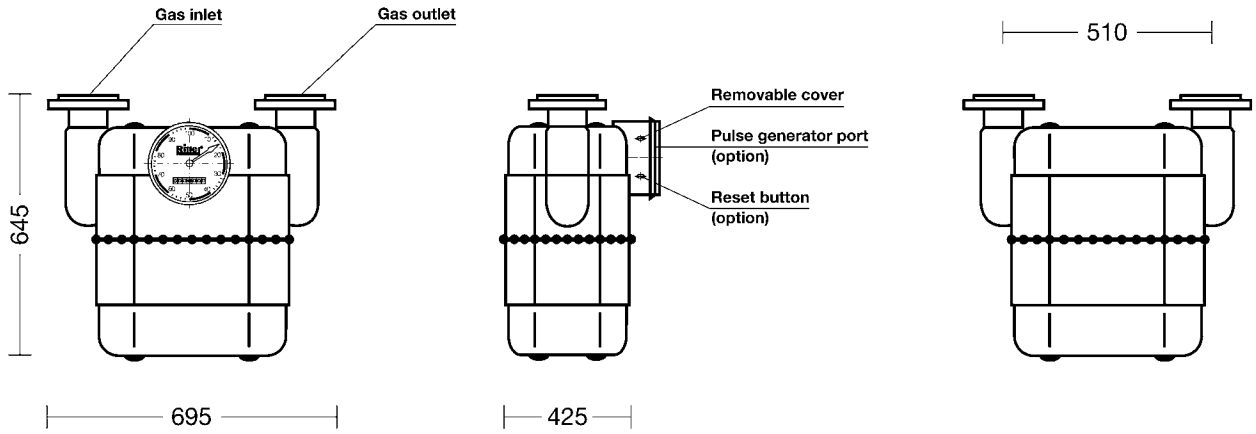
Electronic Display Unit, including Interface RS 232 and Analog Output (requires Pulse Generator)

Built-in Options:

Resettable Roller Counter, 6-digit (substitutes Total Roller Counter)

Pulse Generator, standard or Ex-proof version (for connecting Electronic Display Unit/Computer)

Ritter	**BELLOWS-TYPE GAS METERS** **Data Sheet** **Type: BG 40**	**02.08** V 2.0 Rev. 08/00



Performance Data:

Minimum flow Q_{min}	400	ltr/h	**Maximum gas inlet pressure**	**0.5**	**bar**
Standard flow Q_{stand}	39,000	ltr/h	Minimum differential pressure [1]	1	mbar
Maximum flow Q_{max}	65000	ltr/h	Minimum dial division	0.4	ltr
Measuring cavity capacity	30	ltr	Indication dial plate	100,00	ltr
Measuring accuracy	±2	%	Maximum indication value [2]	99.999.990	ltr
Temperature range	-20 to + 50	°C	Weight	33	kg

[1] Differential pressure (= pressure loss) gas inlet ⇒ gas outlet

[2] Standard Totalizing Roller Counter

Materials:

Casing:	powder-coated steel sheet (screwed) with outside also lacquered
Measuring unit:	Tinplate
Bellows (within measuring unit):	textile-reinforced Perbunan
Rod linkage:	Polyamide/brass
Slide gate:	Bakelite

Standard Equipment:

Twin-Chamber Measuring Unit	Totalizing Roller Counter, 9 digits, last digit (unit) = 0
Magnetic Coupling	Flange connection, diameter 65 mm, according to DIN 2642-PN10

Accessories:

Thermometer, range 0° to +60°C, scale 1°C

Manometer (bourdon tube pressure gauge), range 0 to 0,6 bar

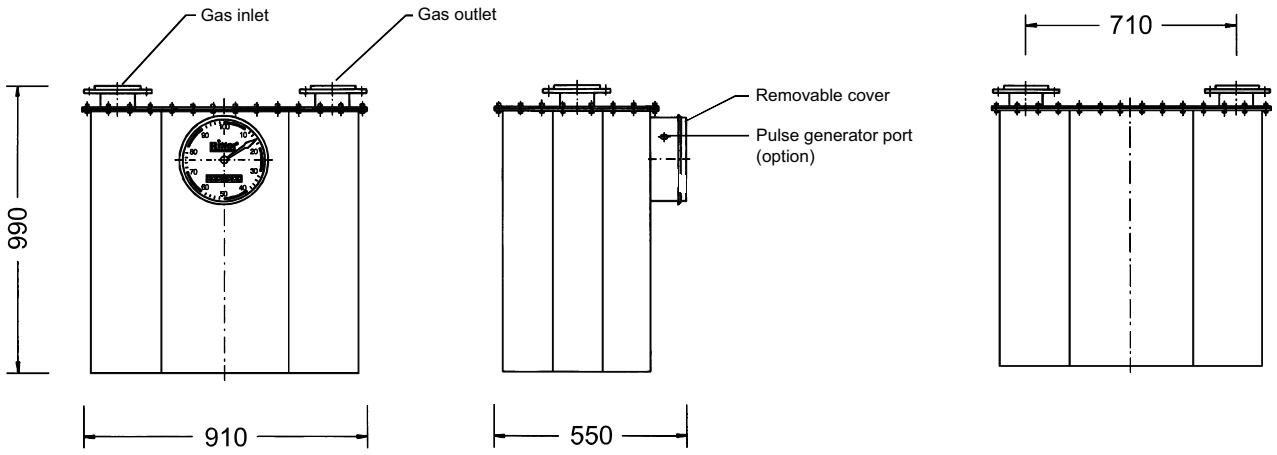
Electronic Display Unit, including Interface RS 232 and Analog Output (requires Pulse Generator)

Built-in Options:

Resettable Roller Counter, 6-digit (substitutes Total Roller Counter)

Pulse Generator, standard or Ex-proof version (for connecting Electronic Display Unit/Computer)

Ritter	**BELLOWS-TYPE GAS METERS** **Data Sheet** **Type: BG 100**	**02.09** V 2.0 Rev. 08/00



Performance Data:

Minimum flow Q_{min}	1,000	ltr/h	**Maximum gas inlet pressure**	**0.5**	**bar**
Standard flow Q_{stand}	95,000	ltr/h	Minimum differential pressure [1]	1	mbar
Maximum flow Q_{max}	160,000	ltr/h	Minimum dial division	0.4	ltr
Measuring cavity capacity	120	ltr	Indication dial plate	100.0	ltr
Measuring accuracy	±2	%	Maximum indication value [2]	999,999,990	ltr
Temperature range	-20 to + 50	°C	Weight	130	kg

[1] Differential pressure (= pressure loss) gas inlet ⇒ gas outlet

[2] Standard Totalizing Roller Counter

Materials:

Casing:	Powder-coated steel (welded, screwed), with outside also lacquered
Measuring unit:	tinplate
Bellows (within measuring unit):	textile-reinforced Perbunan
Rod linkage:	Polyamide
Slide gate:	Bakelite

Standard Equipment:

Twin-Chamber Measuring Unit	Totalizing Roller Counter, 9 digits, last digit (unit) = 0
Magnetic Coupling	Flange connection, diameter 100 mm

Accessories:

Thermometer, range 0° to +60°C, scale 1°C

Manometer (bourdon tube pressure gauge), range 0 to 0,6 bar

Electronic Display Unit, including Interface RS 232 and Analog Output (requires Pulse Generator)

Built-in Options:

Resettable Roller Counter, 6-digit (substitutes Total Roller Counter)

Pulse Generator, standard or Ex-proof version (for connecting Electronic Display Unit/Computer)

1. Installation and measuring

1.1 After unpacking the gas meter, ensure that no pieces of packing material are stuck to the meter casing.

1.2 The bellows-type gas meter can be installed to the piping system either in a standing position or suspended therein. Reduced piping diameters, elbows and shut-off facilities do not have any adverse effect on measuring accuracy. During installation, pay attention to the correct flow direction (refer to the directional arrow on the casing).

For installation to the piping system, the bellows-type gas meters are equipped with inch-threaded screw connection (BG 4 - BG 16) resp. with flange connection (BG 40 – BG 100). There are nozzles for flexible tube connection available as auxiliary equipment.

1.3 Before taking measurements, establish the current counter reading. On resettable roller counters (optional extra), set the counter manually to zero. On adding needle counters (optional extra), set the indicating needles manually to zero. On all counters, set the large indicator needle manually to zero.

The meter is thus ready for use.

1.4 When taking measurements, pay attention to the capacity of the respective gas meter (refer to the attached data sheet).

The maximum pressure load is 50 mbar for bellows-type gas meters models BG4 to BG16, and 0.5 bar for models BG40 and BG100!

2. Maintenance

2.1 **RITTER** bellows-type gas meters do not require any maintenance.

2.2 In the event of inaccurate measurements or other defects, we recommend that the gas meter be returned to the factory for inspection and recalibration.