



TG 05 Model 5 (PVC transparent)

User Benefits

- Highest accuracy
- Use with extremely corrosive and inert gases
- Calibration traceable to National Primary Standard
- Lowest measurable flows
- Largest selection of measuring ranges
- Computer monitoring option
- Real-time electronic display option
- Most durable construction available
- No maintenance

Applications

RITTER™ drum-type (wet-test) gas meters are used universally to measure volumetrically **gas volume** (and **gas flow rate** in conjunction with the RITTER™ EDU 32 FP) for many scientific, petroleum and chemical processes; environmental, pilot plant or test, controlled chamber, laboratory and research applications.

RITTER™ wet-test meters consistently provide the highest accuracy and precision even at the lowest gas flows with the most aggressive or inert gases.

Measurement Principle

RITTER™ gas flow meters function upon the principle of positive displacement. The sample gas stream rotates a measuring drum within a packing fluid, usually water or low viscous white (clear) oil. Coupled to the rotating drum, a needle-dial and counting mechanism record the volume of gas flow as it sequentially fills and empties from the drum's rigid, fixed volume measuring chambers.

Measuring-Ranges

Select from 8 standard measuring ranges from as low as 0.1 litre per hour to 18,000 litres per hour.

Custom meters are available upon request.

Accuracy

Every RITTER™ wet-test gas flow meter provides measuring accuracy of $\pm 0.2\%$ or better at standard flow. Each instrument is manufactured to the most rigorous German standards of quality control and final calibration.

Gas Pressure & Temperature

RITTER™ wet-test gas meters have a maximum gas inlet pressure of 50 mbar (0.725 psi) with plastic casings and 500 mbar (7.25 psi) with stainless steel casings; custom meters up to 16 bars (230 psi).

RITTER™ meters withstand constant use temperatures ranging from -20°C to $+120^{\circ}\text{C}$ (-4°F to $+248^{\circ}\text{F}$), depending on Meter material.

Data Presentation

Standard models provide direct needle-dial readouts and accumulating

counter. Other data logging options include a resettable roller counter; digital display unit "EDU 32 FP" with PC interface and line recorder for unattended or remote operation.

For the EDU 32 FP, Windows software will be available soon for data logging, presentation on screen, printing, and export to e.g. Excel spreadsheets.

Measurement Standard

RITTER™ wet-test meters measure the **actual volume** of gas flow **directly**. This is the major advantage and the superiority of the drum-type Gas Meter over other measurement principles, which determine gas volume using secondary measurable variables such as speed, heat capacity, hot-wire resistance or similar.

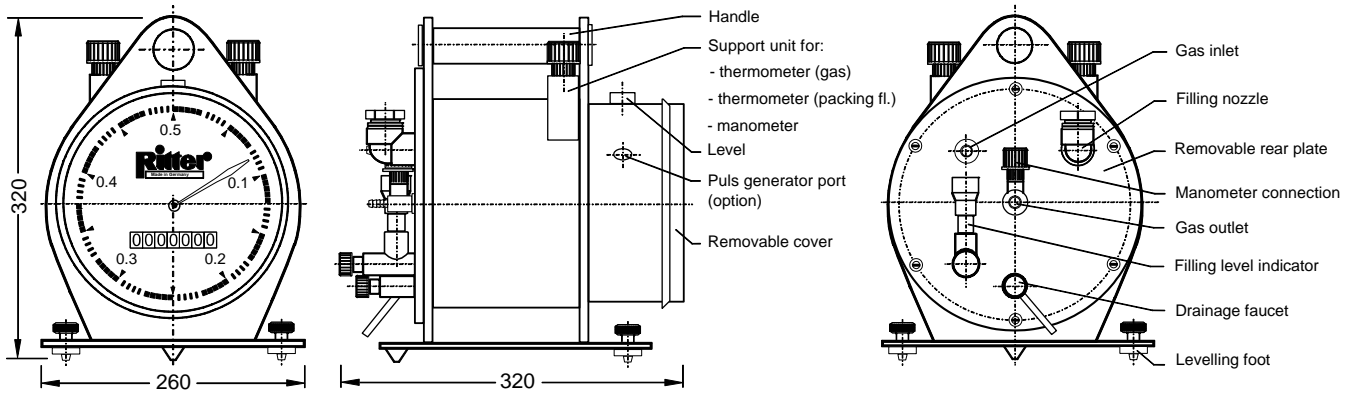
That means that the condition and the composition of the gas has no influence on the measurement accuracy. **Correcting factors** which take into account gas type, temperature, humidity etc are therefore **not necessary**.

Dr.-Ing. Ritter Apparatebau GmbH & Co KG

P.O. Box 70 04 56 • D-44884 Bochum • Germany
Telephone: +49-234-280077 • Fax: +49-234-280078
<http://www.ritter.de> • email: mailbox@ritter.de

*Ritter Gas Meters
... where Perfection becomes Reality*





TG 05 Model 5 - 8

Performance Specifications

Type	Flow Rate			Readout Indication (With TG 01 at EDU 32 FP)		Packing Fluid Required		Measuring Drum Capacity [liters]	Max. Gas-Inlet Pressure [mbar]	Min. Differential Pressure [mbar]
	Min. [l/hr]	Max. [l/hr]	Std (a) [l/hr]	Min. (b) [ltr]	Maximum [liters]	Plastic [ltr] *	SS [ltr] *			
TG 01	0.1	30	10	0.002	999.9999	0.9	1.3	Plastic casing: 50 SS casing: 500	50	0.2
TG 05	1	100	50	0.002	9,999,999.9	2.5	3.5			0.4
TG 1	2	320	100	0.01	99,999,999	3.0	3.5			0.2
TG 3	6	1,000	300	0.02	99,999,999	6.0	11			0.2
TG 5	10	1,500	500	0.02	99,999,999	8.5	11			0.2
TG 10	20	3,000	1,000	0.1	99,999,999	15.5	21			0.1
TG 20	40	4,500	2,000	0.2	999,999,990	28.5	30			0.1
TG 25	50	7,000	5,000	0.1	999,999,990	42	39			0.1
TG 50	100	18,000	10,000	0.5	999,999,990	91	88			0.1

(a) accuracy determined @ standard flow and 20° C (68° F)
 (b) smallest readout

* approximate

Models & Materials of Construction

RITTER™ wet-test gas meters are built to deliver superior performance with the same unbeatable results under the most demanding industrial and environmental gas measurement applications or in controlled laboratory and research environments.

Corrosion-resistant materials ensure continuously reliable measurements even in the presence of the most aggressive gases.

Casing	Measuring Drum	Model No.	Max. Constant Use Temperature	
			°C	°F
PVC-transparent	PVC-grey	5	40	104
PP	PP	6	80	176
PVDF	PVDF	7	120	248
PE-el	PE-el	8	60	140
SS (316 L)	PVC-grey	1	40	104
SS (316 L)	PE-el	2	60	140
SS (316 L)	PP	3	80	176
SS (316 L)	PVDF	4	120	248

PVC = Polyvinyl Chloride PP = Polypropylene
 PE-el = Polyethylene electrically conductive SS = Stainless Steel
 PVDF = Polyvinylidene Fluoride US: 316 L, GER: 1.4571

quires the meter to be partly filled with a so called „packing fluid“. The high accuracy of RITTER™ drum-type gas meters is achieved through the rotation of the precision-made RITTER™ measuring drum in this packing fluid.

Ordinary tap water is a suitable packing fluid for most gases. For those applications in which water is not suitable, RITTER™ recommends and supplies the following alternatives:

Silox is a synthetic oil belonging to the group of polydimethyl siloxane which can be used for gases which are highly soluble in or reactive with water. Appearance: clear with a weak odour.

Autin-B is a paraffin „white“ oil with higher viscosity than Silox, colourless and odourless.

CalRiX Packing Fluid is ideal for use with the most aggressive of gases and under the most exacting of measurement conditions. It is a synthetic fluid which is completely inert to almost all gases. A further advantage of **CalRiX** Packing Fluid is its extremely low evaporation rate. It rarely has to be topped up even after extensive use, and the gas remains dry.

Packing Fluid

The measurement principle of drum-type gas meters re-

Maintenance

None

Standard Equipment

Multi-chamber rotary measuring drum with counting mechanism. Large needle-dial readout. 8-digit accumulating counter. Liquid-level indicator for packing fluid. Supports for thermometer and manometer. Bubble level for levelling with adjustable feet.

Options Available

High Precision Packing Liquid Level Indicator "HPLI" (patented), Thermometer (gas). Thermometer (packing fluid). Manometer. Resettable (6-digit) roller counting mechanism. Pulse Generator. Digital Display Unit "EDU 32 FP" providing real-time, visual readout and electronic port for recorder, PC or other communications interface. Custom meters.

Dimensions: (approximate)

Type	Model	(mm)			(inches)		
		H	W	L	H	W	L
TG 01	1-4	225	195	260	8.9	7.7	10.2
	5-8	250	180	230	9.8	7.1	9.1
TG 05	1-4	310	265	380	12.2	10.4	15.0
	5-8	320	270	350	12.6	10.6	13.8
TG 1	1-4	310	265	380	12.2	10.4	15.0
	5-8	320	270	380	12.6	10.6	15.0
TG 3	1-4	410	363	445	16.1	14.3	17.5
	5-8	375	330	405	14.8	13.0	15.9
TG 5	1-4	410	363	445	16.1	14.3	17.5
	5-8	375	330	460	14.8	13.0	18.1
TG 10	1-4	470	420	590	18.5	16.5	23.2
	5-8	470	410	560	18.5	16.1	22.0
TG 20	1-4	560	484	610	22.0	19.1	24.0
	5-8	545	505	615	21.5	19.9	24.2
TG 25	1-4	560	517	645	22.0	20.4	25.4
	5-8	640	550	665	25.2	21.7	26.2
TG 50	1-4	725	675	740	28.5	26.6	29.1
	5-8	725	680	755	28.5	26.8	29.7



TG 1 Model 7 (PVDF)



TG 5 Model 6 (PP)

Weight (approximate; without packing fluid)

Type	Model 1		Model 2&3		Model 4		Model 5		Model 6&8		Model 7	
	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb
TG 01	2.7	6.0	2.1	4.6	3.2	7.1	2.0	4.4	1.4	3.1	2.5	5.5
TG 05	8.3	18.3	8.2	18.1	8.5	18.7	4.0	8.8	3.0	6.6	5.0	11.0
TG 1	8.5	18.7	8.3	18.3	8.9	19.6	4.3	9.5	3.1	6.8	5.1	11.2
TG 3	15.8	34.8	15.7	34.6	16.2	35.7	6.3	13.9	4.5	9.9	8.1	17.9
TG 5	15.0	33.1	14.8	32.6	15.2	33.5	7.1	15.7	4.9	10.8	9.2	20.3
TG 10	25.6	56.4	25.2	55.6	25.8	56.9	10.6	23.4	7.8	17.2	13.6	30.0
TG 20	31.6	69.7	31.2	68.8	32.4	71.4	18.0	39.2	13.4	29.5	23.2	51.2
TG 25	54.7	121	54.3	120	55.5	122	26.7	58.9	19.4	42.7	34.5	76.1
TG 50	91.0	201	90.0	198	94.2	208	57.0	126	40.7	89.7	73.3	162

User Check List

Gases Measured:

Aggressive

Inert

Line pressure:

Maximum _____

Minimum _____

Max. Gas Temperature:

40°C / 104°F

70°C / 158°F

120°C / 248°F

Packing Fluid:

Water

Rixol-III

Autin-B „White“ Oil

CalRiX

Flow Rate Required:

0.1-30 l/h 20-1,200 l/h

1-60 l/h 100-2,800 l/h

2-120 l/h 100-7,000 l/h

5-360 l/h 200-18,000 l/h

10-600 l/h

Other: _____

Model Number:

1 (SS/PVC) 5 (PVC)

2 (SS/PE-el) 6 (PP)

3 (SS/PP) 7 (PVDF)

4 (SS/PVDF) 7 (PE-el)

Accessories:

Thermometer (Gas)

Thermometer (Pack. Fluid)

Manometer

Pulse Generator

High Prec. Level Indicator

Digital Display Unit EDU 32

Options:

Resettable Counter (5-digit)

Cumulating Needle Counter

Pulse Generators (Option)

Application

The RITTER™ Pulse Generators are rotary encoder with pulsed electronic output. They transfer the measured pulses, which are equivalent to the volume (litres) of measured gas; to an external recording or data processing link such as a chart recorder or PC interface.

Available versions

- V3.1: 200 Pulses per Revolution,
- V4.0: 500 P/Rev, • V4.2: 2x200 P/Rev with forward/backward recognition, • V2.1 For Ex-proof areas with inductive sensor, 50 P/Rev

Components

Slit disk; photo sensor (ex-version: inductive sensor); 5-pin socket (round).

Power Supply/Signal Output

The signal output is automatically

adapted to any supply voltage from 5 to 24 Volts. (Ex-proof PG: supply voltage 5 V only)

Description

The slit/film disk has radial slits and "flags" at its periphery. Disk rotation is synchronised to the rotating measuring drum.

The disk slits rotate through the photo interrupter, first permitting the unobstructed passage of a light beam; then, momentarily, obstructing the beam. Each complete light transmission cycle is registered as a single electronic pulse.

The photo interrupter thus converts each revolution of the measuring drum into a series and sequence of electronic pulses. The number of pulses is directly proportional to the actual gas volume passing through the RITTER™ Gas Meter. The frequency of these pulses indicates the rotational speed of the measuring drum, thus providing a precise measure of the

gas flow rate.

The photo interrupter operates on an external electrical power supply. Power and data processing software, if required, must be provided by the user. The wiring diagram of the photo interrupter and its specifications are available.

When the photo interrupter is used for recording gas flow rate, the output voltage curve (line) may be slightly wavy, even if the gas flow is absolutely constant. This results from the functional characteristics of the rotating measuring drum. Each of the separate drum chambers close and open sequentially. Any chamber must first be closed before the successive chamber opens. This design sequence is the basis for the extremely high measuring accuracy and precision of all RITTER™ wet-test gas flow meters. The slightly wavy output signal at constant flow documents the true gas flow.

Digital Display Unit EDU 32 FP (Accessory)



Front view

Application

The EDU 32 FP accessory is a microcomputer-controlled counter and display apparatus. It is designed to be used in conjunction with all RITTER™ Gas Meters equipped with a Pulse Generator. The EDU 32 FP counts and displays the absolute volume and flow rate of gases flowing through the RITTER™ meter.

It consists of a unit in a separate (desk top) casing with a two-line Text-LCD-Display. The EDU 32 FP is free-programmable and provides the user with a number of adjustment options.

Features

- Large 2-line LCD Display
- Free-programmable functions: Gas Meter type, display language (English/German), etc.
- Display of:
 - measured **gas volume**
 - actual **flow rate**
 - programmed Gas Meter
- Interface **RS 232** for data transmission to PC
- Analogue **output**:
4 - 20 mA & 0 - 1 Volt
- Battery operation

Technical Data

Power supply: 1

Input:	Pulses from Pulse Generator
Digital Output:	Interface 232 Signal: ± 15 Volts Transmission rate: 9,600 Baud Data = 8 Bit, Parity = N, Stopbit = 1
Analog Output:	0 - 1 Volt or 4 - 20 mA
Dimensions:	155 x 200 x 120 mm
Weight:	1.4 kg
Temperature Range:	0°C to + 50°C



Rear view