



# RF1

## Residential Diaphragm Gas Meter

The RF1 is a compact residential gas meter designed to accurately measure volumes of natural gas, LPG and all non-corrosive gases. Several versions and options are available to meet various application requirements. Its design minimizes installation costs and enables future field upgrades.

### APPLICATION

The RF1 long-term metrology stability makes it the right choice for demanding, high consumption residential gas markets.

### METROLOGY

The RF1 gas meter meets strict metrological requirements such as MID, O.I.M.L and EN1359 as well as different national requirements and standards (such as PTB, DVGW and KVGn).

The RF1 is a combination of proven and reliable gas meter concepts and includes:

- » A reciprocating synthetic diaphragm
- » Crank-controlled and oscillating slides
- » Robust and tight connections between components
- » The use of precise, light-weight and operating noise optimized plastic parts

During the preliminary test controls on sonic nozzle test benches, all meters are tested at  $Q_{min}$ ,  $0.2 Q_{max}$  and  $Q_{max}$ . In accordance with EC regulations, the maximum permissible error is  $\pm 3\%$  from  $Q_{min}$  to  $0.2 Q_{max}$ , and  $\pm 1.5\%$  from  $0.2 Q_{max}$  to  $Q_{max}$ .

### OPERATING PRINCIPLE

The RF1 is a positive displacement diaphragm gas meter with a stand-alone twin chamber measuring unit.

The twin chambers are each fitted with a flexible and gas-tight diaphragm which is moved by the differential between the inlet and outlet pressure. The gas enters one side of the diaphragm plate, and comes out on the other side through a separate port

### KEY BENEFITS

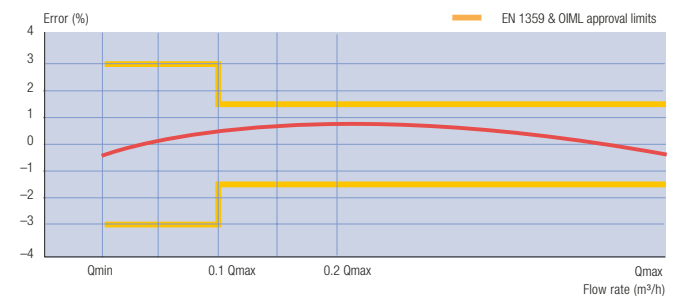
- » Ready for remote reading and data management
- » Robust construction
- » Outstanding endurance performance
- » Multi-range G1.6, G2.5, G4 & G6

on the valve. When one side is full, the sliding valve moves on to the next position, allowing the gas to fill the empty side.

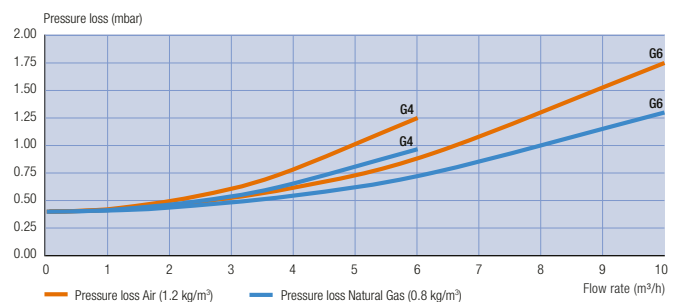
A transmission gear and either a magnetic coupling or stuffing box transfer the reciprocating motion to the mechanical or electrical index.

The measuring unit is housed in a robust gas-tight casing.

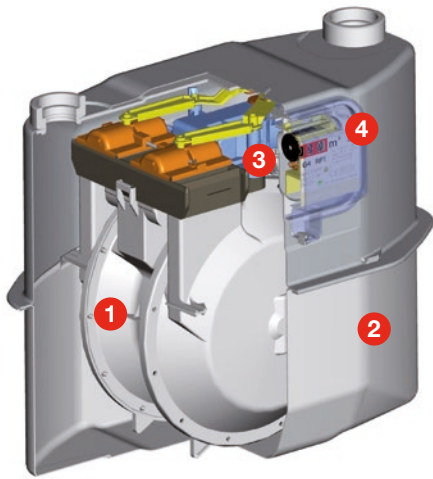
### ACCURACY CURVE



### PRESSURE LOSS CURVE



## CONSTRUCTION



RF1 Parts



RF1 Measuring Unit

## The RF1 meter contains four main parts:

### 1 Measuring Unit

- » Two-litre measuring unit
- » Plastics selected to facilitate meter recycling (when possible)
- » Resistance to chemicals and gas
- » High gliding properties to reduce wear on moving parts
- » Optimum long-term operation
- » A back-run stop prevents the meter from running backwards
- » An optional available backflow flap for 210-250 mm versions protects the meter against the backflow of gas

### 2 Casing

- » High-quality casing material with unique corrosion resistance (aluminum / zinc-coated sheet steel)
- » Additional coating with solvent-free paint
- » Also available in a sturdy aluminum casing for high pressure applications up to 1.5 bar (G6 size with 6" connection distance only)
- » Molded connections ensure optimum resistance to corrosion
- » Material protected against corrosion (500h salt spray test)
- » Available with different connections
- » Integrated crimp prevents water residue
- » Crimped belt version for PN 0.1, PN 0.2, PN 0.5.
- » Safe, DVGW-approved sealing material

### 3 Transmission

A magnetic coupling (standard) or stuffing box transmits the movement of the measuring unit to the totalizer

### 4 Totalizer

Different totalizers are available depending on the application required:

- » "e" series: electronic index for a 2-way wired/wireless M-Bus communication, with optional electronic temperature correction and optional internal shut-off valve
- » "c" series: mechanical index equipped with a Cyble target for retrofittable AMR communication systems. The standardized interface allows you to connect various Cyble communication devices: Pulse, M-Bus, or radio frequency wireless links
- » "o" series: mechanical index available with a permanent magnet in an index drum. Can be refitted with a low frequency pulse transmitter (Reed switch)

## QUALITY ASSURANCE

Gas meter produced in accordance with DIN EN ISO 9001/BS 5750 and DIN EN ISO 14001 requirements, to guarantee quality, accuracy and long-term stability.

## Technical Specifications

Gas Type	Natural gas, air, propane butane, nitrogen and all non-corrosive gases		
Cyclic Volume	2 dm <sup>3</sup>		
Temperature Range	Operating	-25°C to +55°C	
	Storage	-40°C to +70°C	
Maximum Operating Pressure	Steel	0.5 bar (0.1 bar HTL version)	
	Aluminum	1.0 bar (1.5 bar optional)	
Measuring Range	G1.6	Qmin	0.016 m <sup>3</sup> /h
		Qmax	2.5 m <sup>3</sup> /h
	G2.5	Qmin	0.025 m <sup>3</sup> /h
		Qmax	4 m <sup>3</sup> /h
	G4	Qmin	0.04 m <sup>3</sup> /h
		Qmax	6 m <sup>3</sup> /h
	G6	Qmin	0.06 m <sup>3</sup> /h
		Qmax	10 m <sup>3</sup> /h
Casing Material	Aluminum/Zinc-coated sheet steel Aluminum alloy		
Accuracy	Class 1.5		
Approval	MID (04/22/EC) module B & D (steel body) Local approvals like IRAM2717:2000 & Portaria 31/1997 (aluminum body)		
Totalizer	IP 54		
Connections	Single or double pipe connections Different connection threads are available (ISO 228-1 and BS746 standards, national) Special threads available upon request		
Colour	Light grey RAL 7035 (steel body) Window grey RAL 7040 (aluminum body)		

## TOTALIZER FEATURES

With the ECO series, Itron offers a complete portfolio to address today's and future energy resource and environmental challenges.

### "e" series

Supporting the prevailing European Communication Standards and ensuring interoperability

This smart meter equipped with an electronic index is designed to facilitate integration into wired and wireless fixed networks. It has built-in communications capabilities which detect reversed operation, magnetic tampering and backflow.

- » High accuracy error curve correction
- » Optional temperature conversion
- » Built-in two-way wired/wireless M-Bus communication
- » Optional internal shut-off valve
- » Safe data transmission with AES
- » Tamper protection and detection

### "c" series

Smart ready, allowing for future AMR capabilities.

Itron's latest-generation mechanical index meter comes standard with our Cyble™ target, and can be upgraded in the field to implement AMR and enable remote reading via different communication technologies.

- » Smart reading possible with additional modules
- » Can be retrofitted on site without recalibrating the meter
- » Reliability of an electronic switch (no wear or bouncing)
- » Proven, tested design backed by 20 years' experience
- » Protection against magnetic tampering

### "o" series

Retrofit enabling smart upgrades to existing meter park

The "o" series addresses traditional meters with a mechanical index, already installed in the field, to minimize stranded assets when AMR/AMI is required. LF transmitters - via a Reed switch - and a Pulse RF radio module transform pulses into transmittable data.



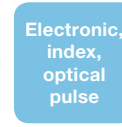
"o" series Totalizer with LF transmitter "cable"

Special features of each totalsier version:

- » UV-resistant cover
- » Customized name plate available, e.g. bar code, logo, customer serial number.



Base Meter



Index



Communication Module

### Totalizer characteristics "e" series

Meter Size	G1.6 / G2.5 / G4 / G6*
European Metrological Approval (04/22/EC - Module B)	N° DK-0200-MI002-019
Maximum Operating Pressure	0.5 bar (0.2 for valve version, 0.1 bar for HTL)
Temperature Range	Temperature (converted): -10°C to +40°C (-25°C to +55°C optional for G4/G6) Storage temperature: -40°C to +70°C (>55°C for up to 4 hours)
ATEX Approval	II 2G Ex ib IIB T3
Relative Humidity	Max. 93% non-condensing between -25°C and +55°C
Display	LCD with 9 digits (4 decimals)
M-Bus Interface	300 bps / 2400 bps / one bus load, wireless
Battery	Lithium batter with an minimum average lifetime of 15 years under reference conditions
Standards	Conformity with EN1359:1998-A1:2006, EN12405-1:2007-08, Directive 2004/108/EC (EMC) and OIML D11 (EMC), NTA8130 August 2007, DSMR V4.2.1/V4.2.2
Serial Bus	M-Bus slave (wired: EN13757-2/3, wireless: EN13757-4)
Customer Port	IR service interface (EN62056-21)
Mechanical Environment	M1
Electronical Environment	E2

\* G6 version with integrated valve not EN1359:1998/A1:2006 compliant due to pressure absorption



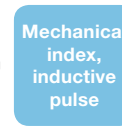
Steel version



Aluminum version



Base Meter



Index



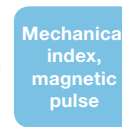
Communication Module

### Totalizer characteristics "c" series

Meter Size	G1.6 / G2.5 / G4 / G6
European Metrological Approval (04/22/EC - Module B)	N° DE-07-MI002-PTB014 N° DE-08-MI002-PTB006 (with mechanical temperature correction)
Display	Mechanical index with 8 drums (3 decimals)
Transmission Rate	0.01 m³/rotation
Transmission System	Cyble™ target
Mechanical Environment	M1
Electronical Environment	E2



Base Meter



Index



Communication Module

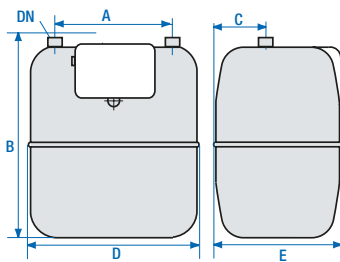
### Totalizer characteristics "o" series

Meter Size	G1.6 / G2.5 / G4 / G6
European Metrological Approval (04/22/EC - Module B)	N° DE-07-MI002-PTB014 N° DE-08-MI002-PTB006 (with integrated mechanical temperature correction)
Display	Mechanical index with 8 drums (3 decimals)
Pulse Rate	Standard 0.1 m³ / pulse (optional 0.01 m³ / pulse)
Pulse Transmitter	Retrofittable LF system, 12 Vdc max – 10 mA max. standard 0.1 m³/pulse. Different versions: with 1m cable, terminal block or binder plug (Double LF pulse transmitter)
Mechanical Environment	M1
Electronical Environment	E2

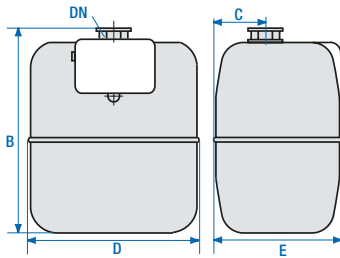
## Dimensions and Weight

Version Casing and Connection	G Size	DN	Threads Standard	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)		Weight (kg)	
								"e" series	"c" & "o" series	"e" series	"c" & "o" series
Single	G1.6 to G6	25	G 2" ISO228-1	-	274	71	233	192	177	2.7	2.5
Double Compact	G1.6 to G4	25	G 1 1/4" A ISO228-1	110	269	71	233	192	177	2.7	2.5
Double Compact	G1.6 to G4	25	G 1 1/4" A ISO228-1	130	274	71	233	192	177	2.7	2.5
Double Compact	G1.6 to G4	25	1" BS746	152.4 (6")	279	71	233	192	177	2.7	2.5
Double	G1.6 to G4	20	G 1" A ISO228-1	250	273	71	325	192*	177	2.9	2.7
Double	G1.6 to G4	20	G 1" A (AT) ISO228-1	250	275	61.5	325	192*	177	2.9	2.7
Double	G1.6 to G6	20	GM 3/4" NEN 2373	220/250	272	71	325	192*	177	2.9	2.7
Double	G1.6 to G6	25	G 1 1/4" A ISO228-1	210/250	267	71	325	192*	177	2.9	2.7
Double	G1.6 to G6	25	GM 1" NEN 2373	250	273	71	325	192*	177	2.9	2.7
Double	G6	32	G 1 1/2" A ISO228-1	220	273	71	325	192*	177	2.9	2.7
Double	G6	32	G 1 3/4" A ISO228-1	250	272	71	325	192*	177	2.9	2.7
Double	G6	32	MFIT001	250	270	71	325	192*	177	2.9	2.7
Double Aluminum (SA)**	G6	25	G 1 1/4" A ISO228-1	152 (6")	295	85	272***	n/a	204	n/a	3

\*available with internal shut-off valve \*\*Stuffing Box transmission \*\*\*Eccentric casing SA = South America



Double Pipe Version



Single Pipe Version

### OPTIONS

- » Aluminum HP version - 6" connection distance
- » Mechanical temperature conversion (-10°C to +40°C standard, other temperatures on request)\*
- » Electronical temperature conversion (-10°C to +40°C standard, other temperatures on request)\*

\* The compensated volume on the index refers to a base temperature of 15°C / mTC for "c" and "o" Series, eTC for "e" Series. Not available for aluminum.



G4 RF1-MM  
Double Pipe  
110 mm version

G4 RF1 eV SW  
Double Pipe Version



G6 RF1 Double Pipe 6"  
HP Aluminum Version

### ENVIRONMENTAL ASPECTS

The RF1 range is designed to help protect the environment:

- » Environment-friendly coating process (water-based paint)
- » Lead-free sheet metal
- » Reduced weight
- » Low noise
- » Same-class plastic parts used as much as possible
- » All plastic parts are recyclable and marked accordingly

### Ordering Information

- » Measuring range (G1.6, G2.5, G4, G6)
- » Maximum working pressure (0.1-0.5bar)
- » Meter interaxis and connection type
- » Specific marking (serial number, logo, bar code)
- » Options (e.g. valve, temperature compensation, wired/wireless communication)



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