

# KDG Rotameter®

## Variable Area Flowmeter

### Metal Tube Series 250

**Data sheet**  
**1718**

#### Features

- Choice of connections
- Industry standard length
- High accuracy calibration option
- Robust design
- Magnetically coupled local indicator, transmitter option
- Alarm options
- PTFE versions available
- Fastrack delivery on selective models

#### Applications

The metal tube 250 series variable area flowmeter is a specially designed instrument for measuring the flow of liquids and gases.

Its robust design makes it highly suitable for use on hazardous and corrosive applications as found in most industrial processes.

#### Principle

The instrument must be mounted in a vertical pipe with fluid circulation in the upwards direction.

The self guiding cylindrical float is positioned inside a tapered tube. When the flow passes through the meter the float rises to a position of equilibrium where the weight of the float is balanced by the net force due to the fluid pressure. The float is magnetically coupled to a pointer indicating the rate of flow on the front scale.

#### Description

The instrument comprises :

- A body formed in stainless steel with fixed flange connection
- A stainless steel or an alloy float fitted with a magnet, with guide rods at each end
- Two end stops in stainless steel used as a guide for the float
- An indicator housing unit in aluminium alloy.



## Technical Characteristics

|                           |  |                                 |   |
|---------------------------|--|---------------------------------|---|
| <b>MATERIALS</b>          |  | <b>MECHANICAL</b>               |   |
| <b>Body &amp; stops:</b>  | 316 Stainless steel, PTFE optional   | <b>Fluid temp.:</b>             | -40°C to +200°C, high temp. versions available on request (PTFE reduced temp.)                          |
| <b>Float:</b>             | 316 Stainless steel, PTFE optional   | <b>Ambient temp.:</b>           | -40°C to +80°C, (with transmitter +70°C)  |
| <b>Indicator housing:</b> | Aluminium, 316 st. st. optional  | <b>Max. operating pressure:</b> | 40 bar standard, higher on request  |
| <b>Finish:</b>            | Polyester paint, epoxy paint optional  | <b>Connections:</b>             | Flanged ANSI or BS4504<br>Flange rating options, threaded ends or hygienic connections refer to factory |
| <b>Backplate:</b>         | Anodised alloy   | <b>EMC COMPLIANCE</b>           |   |
| <b>Connections:</b>       | 316 Stainless steel  | <b>Emissions:</b>               | EN50081-1 (1992)  |
| <b>PERFORMANCE</b>        |  | <b>Immunity:</b>                | EN50082-1 (1992)  |
| <b>Accuracy:</b>          | +/-2% of full scale.<br>Class 1.6 available on request.<br>PTFE version +/-3% of max. flow |                                 |   |
| <b>Turndown ratio:</b>    | 1 to 10 nominally  |                                 |   |
| <b>Protection :</b>       | IP65   |                                 |   |

## Flow Range Table

Maximum capacities shown. Turndown ratio typically 10:1

| Normal size                     | LIQUID  |                                 | GAS       |  | PRESSURE DROP | PTFE LINED |                           |
|---------------------------------|---------|---------------------------------|-----------|--|---------------|------------|---------------------------|
|                                 | M code  | Max liquid flow rates<br>SG = 1 | MG code   | Flow capacity<br>Air - 20°C Atmospheric pressure | mbar          | Code MP    | Max liquid flow<br>SG = 1 |
| 15<br>(½")                      | M1      | 100 l/h                         |           |  | 35            |            |                           |
|                                 | M2      | 160 l/h                         | MG2       | 5 m³/h   | 60            | MP2        | 160 l/h                   |
|                                 | M3      | 250 l/h                         | MG3       | 7.5 m³/h   | 60            | MP3        | 250 l/h                   |
|                                 | M4      | 400 l/h                         | MG4       | 12 m³/h  | 60            | MP4        | 400 l/h                   |
|                                 | M5      | 600 l/h                         | MG5       | 18 m³/h  | 65            | MP5        | 600 l/h                   |
|                                 | M6      | 1 m³/h                          | MG6       | 30 m³/h  | 70            | MP6        | 1 m³/h                    |
| 25<br>(1")                      | M5      | 600 l/h                         | MG5       | 18 m³/h  | 45            | MP5        | 600 l/h                   |
|                                 | M6      | 1 m³/h                          | MG6       | 30 m³/h  | 80            | MP6        | 1 m³/h                    |
|                                 | M7      | 1.6 m³/h                        | MG7       | 48 m³/h  | 55            | MP7        | 1.6 m³/h                  |
|                                 | M8      | 2.5 m³/h                        | MG8       | 75 m³/h  | 80            | MP8        | 2.5 m³/h                  |
|                                 | M9      | 4 m³/h                          | MG9       | 120 m³/h   | 85            | MP9        | 4 m³/h                    |
| 50<br>(2")                      | M10     | 6 m³/h                          | MG10      | 180 m³/h   | 125           |            |                           |
|                                 | M8      | 2.5 m³/h                        | MG8       | 75 m³/h  | 55            | MP8        | 2.5 m³/h                  |
|                                 | M9      | 4 m³/h                          | MG9       | 120 m³/h   | 80            | MP9        | 4 m³/h                    |
|                                 | M10     | 6 m³/h                          | MG10      | 180 m³/h   | 55            | MP10       | 6 m³/h                    |
|                                 | M11     | 10 m³/h                         | MG11      | 300 m³/h   | 80            | MP11       | 10 m³/h                   |
|                                 | M12     | 16 m³/h                         | MG12      | 480 m³/h   | 95            |            |                           |
| 80<br>(3")<br>or<br>100<br>(4") | M13     | 25 m³/h                         | MG13      | 750 m³/h   | 130           |            |                           |
|                                 | M11     | 10 m³/h                         | MG11      | 300 m³/h   | 60            | MP10       | 6 m³/h                    |
|                                 | M12     | 16 m³/h                         | MG12      | 480 m³/h   | 90            | MP11       | 10 m³/h                   |
|                                 | M13     | 25 m³/h                         | MG13      | 750 m³/h   | 60            | MP12       | 16 m³/h                   |
|                                 | M14     | 40 m³/h                         | MG14      | 1000 m³/h  | 125           | MP13       | 25 m³/h                   |
|                                 | M15     | 50 m³/h                         | MG15      | 1500 m³/h  | 140           |            |                           |
| M16                             | 60 m³/h | MG16                            | 1800 m³/h | 165  |               |            |                           |
| M17                             | 80 m³/h | MG17                            | 2400 m³/h | 220  |               |            |                           |

## Alarm Contacts Option

**Alarm type:** Inductive detector to NAMUR and DIN 19324 standards. Two adjustable contacts (high and low alarm) over whole scale. Settings with indicator on flow scale. Can be used with electronic transmitter.

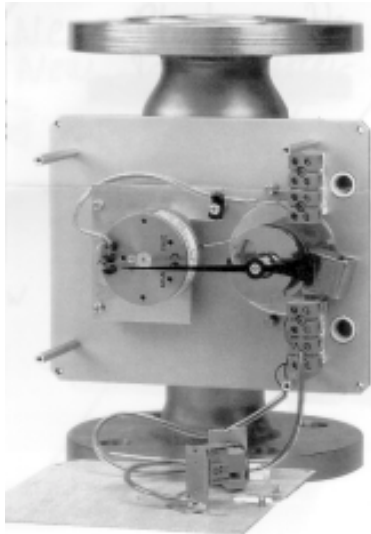
**Repeatability:** <0.5% of scale maximum.

**Detector features:** 2-wire dc current detector.  
Rated voltage : 8V = (R ~ 1 KR).  
Operating voltage : 5 to 25 V.  
Typical power consumption: >3 mA.  
Control line resistance: <100W

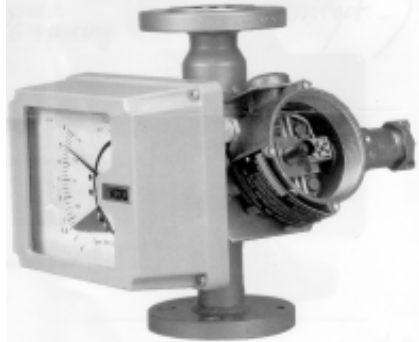
### Characteristics of associated relay amplifier:

Mains supply: 220V 50/60 Hz (other voltages on request).  
Switch Rating:  
Maximum voltage : 250 V ac.  
Maximum current : 4 A.  
Maximum power : 500 VA.  
Mounted on 35mm DIN rail or individual attachment by screws with IP20 protection.  
Ambient temperature : -25°C to +60°C.  
Fail-safe version EEx ia II C to CENELEC

## Two wire electronic transmitter option

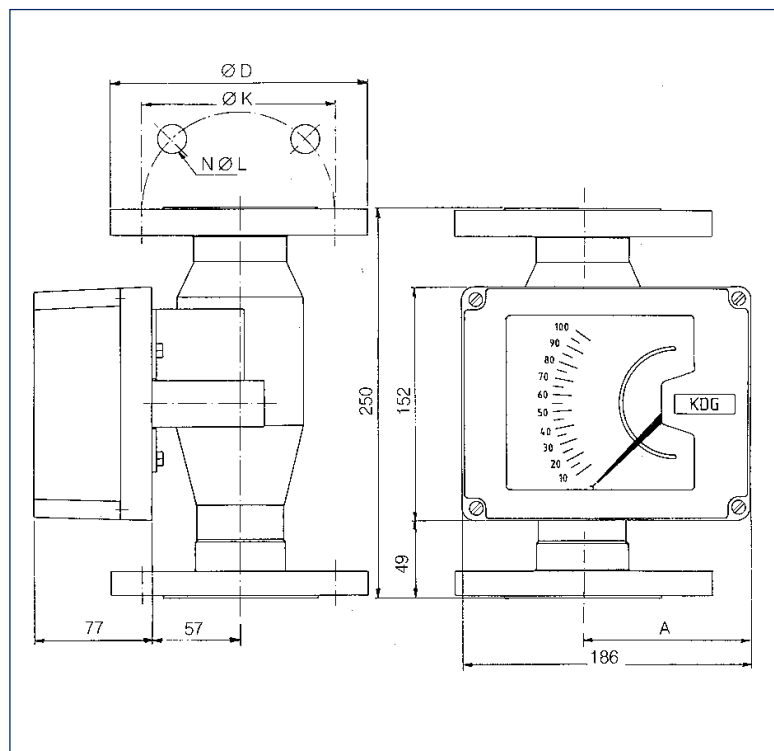
|   |   |   |
|---|---|---|
| <b>Output signal:</b>   | 4-20 mA proportional to flow            |  |
| <b>Power supply voltage:</b>  | V = 12 to 30 V dc, residual ripple <10% |   |
| <b>Maximum load k Ω:</b>  | $\frac{V_B - 12 V}{20}$                 |   |
| <b>Ambient temperature:</b>   | -20°C to 70°C                           |   |
| <b>Linearity:</b>   | <± 0.4% of full scale                   |   |
| <b>Temperature deviation:</b>   | <0.02% per °C                           |   |
| <b>Output current residual ripple:</b>  | <0.3%                                   |   |
| <b>Response time:</b>   | <5ms                                    |   |
| <b>INTRINSICALLY SAFE VERSION:</b>  |   |   |
| CENELEC EEx ia IIC T6   |   |   |
| No-load power supply <30V. P<1W   |   |   |
| Short circuit current <160 mA.  |   |   |
| The system circuit must conform with IS barriers to the relevant certification standard |   |   |
| Pneumatic transmitter also available on request   |   |   |

## Flowmeter with reed switch option

|  |                            |  |
|--|----------------------------|--|
| <b>SPDT Reed Switch contact inside EExd IIC T6 housing</b> |                            |  |
| <b>Contact:</b>  | Bi-stable change over SPDT |  |
| <b>Max voltage:</b>  | 220V                       |  |
| <b>Max current:</b>  | 1A                         |  |
| <b>Max power:</b>  | 60VA, 30W resistive load   |  |
| <b>Service life:</b>                                       | 10 <sup>6</sup> operations |  |
| <b>Protection Class:</b>                                   | IP54                       |  |

## Dimensions

| Standard model dimensions |         |       |       |      |   |       |
|---------------------------|---------|-------|-------|------|---|-------|
| Size                      | PN      | ∅ D   | ∅ K   | ∅ L  | N | A     |
| 15                        | 16      | 95    | 65    | 14   | 4 | 80    |
|                           | 40      | 95    | 65    | 14   | 4 | 80    |
| ½"                        | 150 lbs | 88.9  | 60.3  | 15.9 | 4 | 80    |
|                           | 300 lbs | 95.2  | 66.7  | 15.9 | 4 | 80    |
| 25                        | 16      | 115   | 85    | 14   | 4 | 92    |
|                           | 40      | 115   | 85    | 14   | 4 | 92    |
| 1"                        | 150 lbs | 107.9 | 79.4  | 15.9 | 4 | 92    |
|                           | 300 lbs | 123.8 | 88.9  | 19   | 4 | 92    |
| 50                        | 16      | 165   | 125   | 18   | 4 | 108   |
|                           | 40      | 165   | 125   | 18   | 4 | 108   |
| 2                         | 150lbs  | 152.4 | 120.6 | 19   | 4 | 108   |
|                           | 300 lbs | 165.1 | 127   | 19   | 8 | 108   |
| 80                        | 16      | 200   | 160   | 18   | 8 | 122.5 |
|                           | 150 lbs | 190.5 | 152.4 | 19   | 4 | 122.5 |
| 100                       | 16      | 220   | 180   | 18   | 8 | 124   |
|                           | 150 lbs | 228.6 | 190.5 | 19   | 8 | 124   |



## Ordering Information

| 250 Series 250 metal tube VA meter |  |
|------------------------------------|--|
| Code                               | Connection code  |
| 15                                 | DN15 ISO flanges NFE 29 203  |
| 25                                 | DN25 ISO flanges NFE 29 203  |
| 50                                 | DN50 ISO flanges NFE 29 203  |
| 80                                 | DN80 ISO flanges NFE 29 203  |
| 100                                | DN100 ISO flanges NFE 29 203   |
| ½"                                 | Flanges ANSI B16-ND ½"   |
| 1"                                 | Flanges ANSI B16-ND 1"   |
| 2"                                 | Flanges ANSI B16-ND 2"   |
| 3"                                 | Flanges ANSI B16-ND 3"   |
| 4"                                 | Flanges ANSI B16-ND 4"   |
| Code                               | Construction code & end connections  |
| C1                                 | 316ss PN16 (DIN 2635)  |
| C2                                 | 316ss PN 40 (DIN 2635)   |
| C3                                 | 316ss ANSI 150lb RF  |
| C4                                 | 316ss ANSI 300lb RF  |
| C5                                 | PTFE PN16 (DIN 2635)   |
| C6                                 | PTFE ANSI 150 RF   |
| CX                                 | Special - Threaded, hygienic or higher pressure - please state                                 |
| Code                               | Measuring element code   |
| M*                                 | See flow range tables  |
| Code                               | Transmitter code   |
| T0                                 | No transmitter   |
| T1                                 | Electronic transmitter, 4-20mA std   |
| T2                                 | Electronic transmitter, 4-20mA - IS version  |
| T3                                 | Pneumatic transmitter, 0.2-1 bar with ¼" NPT connection<br>(alarms code "S" are not available) |
| Code                               | Alarm code   |
| S0                                 | No alarms  |
| S1                                 | 1 contact, low alarm (without relay)   |
| S2                                 | 1 contact, high alarm (without relay)  |
| S3                                 | 2 contacts, high and low alarms (without relay)  |
| S4                                 | 1 contact, low alarm (with relay)  |
| S5                                 | 1 contact, high alarm (with relay)   |
| S6                                 | 2 contacts, high and low alarms (with relay)   |
| Code                               | Options  |
| Z0                                 | No options   |
| Z1                                 | Damping system essential with all gas flows  |
| Z2                                 | High temperature screen  |
| Z4                                 | Accuracy class 1.6 (liquid within viscosity limits)  |
| Z5                                 | Intrinsic safety for codes T or S  |
| Z6                                 | Special scale (non standard units)   |
| Z9                                 | Epoxy painted aluminium indicator housing  |
| Z10                                | Degreasing   |
| Z13                                | Calibration certificate  |

250 25 C1 M8 T1 S3 Z0 Example of coding to be suffixed with all fluid information, flow range, scale units

### Information required for quote or order:

Fluid type to be measured.

Maximum and minimum flow rate required.

Specific gravity and viscosity at operating conditions.

Normal working temperature of fluid to be measured.

### Installation and maintenance:

Make sure the Rotameter is positioned as upright as possible and fluid flow is upwards.

Keep the inside of the instrument in a good clean state.

Maximum temperature of fluid to be measured.

Normal pressure of fluid to be measured.

Maximum pressure of fluid to be measured.

Scale flow units M<sup>3</sup>/hr or litres per min.

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