



Design and applications

Measuring units RA 60 and FA 60 are based on the variable area float principle.

In pipelines the RA 60 is installed by means of pipe unions and the

FA 60 is mounted between flanges. The

borosilicate glass measuring cone is located inside a protection steel tube with an inspection window.

VA flow meters RA 60 and FA 60 are most suitable for the flow measurement of transparent liquids and gases. Each unit is customized with a scale specific for the medium to be measured. RA 60 and FA 60 are used e.g. in plant and process engineering.

By installation of electrical limit value switches, which are adjustable throughout the entire measuring range, this devices can be used as detectors.

Our technical documents provide a detailed explanation of the function and measuring principle of VA flow meters.

RA 60 / FA 60



- **calibrated borosilicate measuring cone**
- **armature with protective steel tube**
- **perspex half-shell as shatter protection**
- **reliable due to simple mode of operation**
- **scales specific for the media to be measured**
- **optionally**
 - **limit value switches**
 - **analogue output 4 ... 20 mA**
 - **explosion-proof design**





RA 60 / FA 60

Variable area flow meters

Type series

| | |
|------------------|---|
| RA 60 | with pipe union connection |
| FA 60 | with flange connection |
| RA / FA 60-MSK1 | with limit value switch (normally open) |
| RA / FA 60-MSK12 | with limit value switch (normally closed) |
| RA / FA 60-MSKW | with limit value switch (change over) |
| RA / FA 60-EM * | with analogue output 4 ... 20 mA * |
| RA / FA 60... Ex | explosion-proof design |

* only for sizes 100 to 110

Technical data

| | |
|-------------------------|--|
| Nominal pressure | FA 60: PN 10 at 20 °C RA 60: PN 10 at 20 °C |
| Max. operating pressure | see table measuring ranges on page 3 |
| Thermal endurance | 80 °C, optionally 100 °C |
| Ambient temperature | max. 90 °C |
| Turn-down ratio | 1:10 |
| Accuracy class | VDE/VDI 3513 page 2 (08/2008) |
| Error limit (G) | 1,6 % |
| Linear limit (qG) | 50 % |
| Connection RA 60 | two-part pipe union: Insert with cylindrical internal thread to DIN EN 10226-1 (ISO 7-1) |
| Connection FA 60 | flange PN 10 acc. to DIN EN 1092-1, other connections on request |
| Corrosion protection | Epoxy powder coating, traffic blue (RAL 5017) glossy |
| Corrosion class | C3 |

Materials

| | |
|---|---|
| Protective sleeve | precision steel tube made of P235 |
| Heads RA 60 | S355 (size 19), EN-GJL-200 (size 30 - 36), cast aluminium (from size 43) |
| Threaded joint | malleable cast iron, zinc plated |
| Flanges FA 60 | S355 |
| Measuring glass | borosilicate glass |
| Splinter shield | perspex |
| Gaskets | standard: NBR, optionally FKM, EPDM, FFKM (Perlast) |
| Floats for liquids ¹⁾ | standard: 1.4571 optionally: PVC, PP, PVDF or PTFE with lead core |
| Floats for gases ¹⁾ | standard: Aluminium anodized optionally: PVC, PP, PTFE, PVDF or 1.4571 |
| with limit value switches ¹⁾ | liquids: 1.4571 with magnetic core gases: PVC with magnetic core |

other materials on request

¹⁾ Floats at small sizes unguided, from size 30 partly with guide rod.

We will send you a detailed table on request.

Dimensions

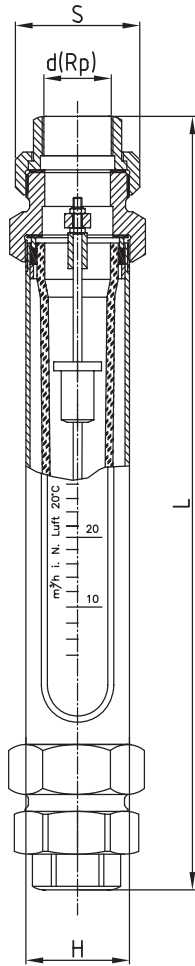
| RA 60 | | | | | |
|-------|------------|-----|-----------------|-----|-----|
| Size | Pipe union | S | d ¹⁾ | L | H |
| 10 | Rp ¼ | 28 | 12 | 388 | 28 |
| | Rp ⅜ | 32 | 16 | 390 | |
| | Rp ½ | 39 | 20 | 393 | |
| 19 | Rp ½ | 39 | 20 | 405 | 45 |
| | Rp ¾ | 48 | 25 | 407 | |
| | Rp 1 | 55 | 32 | 415 | |
| 30 | Rp 1 | 55 | 32 | 415 | 60 |
| | Rp 1 ¼ | 67 | 40 | 430 | |
| | Rp 1 ½ | 74 | 50 | 436 | |
| 36 | Rp 1 ¼ | 67 | 40 | 430 | 75 |
| | Rp 1 ½ | 74 | 50 | 436 | |
| | Rp 2 | 90 | 63 | 446 | |
| 43 | Rp 1 ½ | 74 | 50 | 440 | 95 |
| | Rp 2 | 90 | 63 | 446 | |
| | Rp 2 ½ | 111 | 75 | 460 | |
| | Rp 3 | 131 | 90 | 470 | |
| 100 | Rp 2 | 90 | 63 | 446 | 115 |
| | Rp 2 ½ | 111 | 75 | 458 | |
| | Rp 3 | 131 | 90 | 470 | |
| 110 | Rp 2 ½ | 111 | 75 | 462 | 133 |
| | Rp 3 | 131 | 90 | 474 | |

¹⁾ d for bonding and welding sleeves

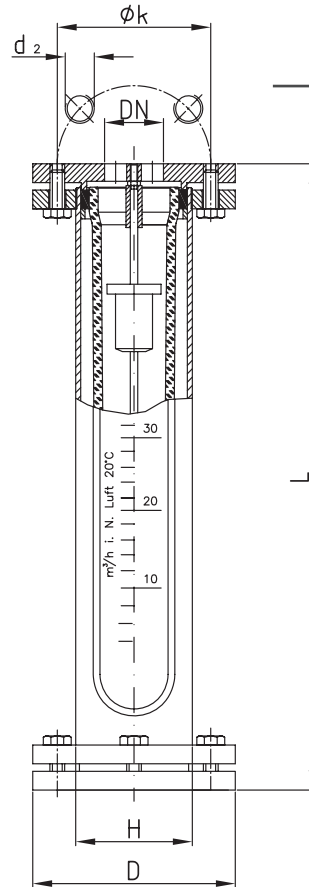
| FA 60 | | | | | | | |
|-------|------------------|-----|-----|-----|-----|-------------|-----------------|
| Size | DN | L | H | D | k | Screws Qty. | d ²⁾ |
| 10 | 10 | 340 | 28 | 90 | 60 | 4 | M12 |
| | 15 | | | 95 | 65 | 4 | M12 |
| | 20 | | | 105 | 75 | 4 | M12 |
| | 25 | | | 115 | 85 | 4 | M12 |
| 19 | 10 | 340 | 45 | 90 | 60 | 4 | M12 |
| | 15 | | | 95 | 65 | 4 | M12 |
| | 20 | | | 105 | 75 | 4 | M12 |
| | 25 | | | 115 | 85 | 4 | M12 |
| 30 | 25 | 340 | 60 | 115 | 85 | 4 | M12 |
| | 32 | | | 140 | 100 | 4 | M16 |
| | 40 | | | 150 | 110 | 4 | M16 |
| 36 | 32 | 340 | 75 | 140 | 100 | 4 | M16 |
| | 40 | | | 150 | 110 | 4 | M16 |
| | 50 | | | 165 | 125 | 4 | M16 |
| 43 | 40 | 340 | 95 | 150 | 110 | 4 | M16 |
| | 50 | | | 165 | 125 | 4 | M16 |
| | 65 | | | 185 | 145 | 4 | M16 |
| 100 | 65 | 340 | 115 | 185 | 145 | 4 | M16 |
| | 80 | | | 200 | 160 | 8 | M16 |
| | 100 | | | 220 | 180 | 8 | M16 |
| 110 | 65 | 340 | 133 | 185 | 145 | 4 | M16 |
| | 80 | | | 200 | 160 | 8 | M16 |
| | 100 | | | 220 | 180 | 8 | M16 |
| 150 | 80 ¹⁾ | 640 | 178 | 220 | 160 | 8 | M16 |
| | 100 | | | 220 | 180 | 8 | M16 |
| | 125 | | | 250 | 210 | 8 | M16 |
| | 150 | | | 285 | 240 | 8 | M20 |
| 180 | 150 | 640 | 219 | 285 | 240 | 8 | M20 |
| | 200 | | | 340 | 295 | 8 | M20 |

¹⁾ Installation length: 655 mm

RA60



FA60



Measuring range (min. and max.; all intermediate measuring ranges are possible)

| Size | measuring range H ₂ O | | measuring range Air at STP ¹⁾ | | RA 60 Pipe union | | FA 60 Flange connection DN | | max. operating pressure at 20 °C in bar | | |
|------|-------------------------------------|--------|---|--------------|---------------------|--------|-------------------------------|--------------|--|-------------------------|----|
| 10 | 0,1 15 | – – | 1 150 | l/h l/h | 0,3 0,25 | – – | 3 2,5 | l/h m³/h | Rp ¼ Rp ¾ Rp ½ | 10 15 20 25 | 10 |
| 19 | 12 0,12 | – – | 120 1,2 | l/h m³/h | 0,15 1,6 | – – | 1,5 16 | m³/h m³/h | Rp ½ Rp ¾ Rp 1 | 10 15 20 25 | 10 |
| 30 | 0,1 0,3 | – – | 1 3 | m³/h m³/h | 1,3 3,6 | – – | 13 36 | m³/h m³/h | Rp 1 Rp 1¼ Rp 1½ | 25 32 40 | 10 |
| 36 | 0,4 0,8 | – – | 4 8 | m³/h m³/h | 4 8 | – – | 40 80 | m³/h m³/h | Rp 1¼ Rp 1½ Rp 2 | 32 40 50 | 8 |
| 43 | 0,9 1,6 | – – | 9 16 | m³/h m³/h | 5 16 | – – | 50 160 | m³/h m³/h | Rp 1½ Rp 2 Rp 2½ Rp 3 | 40 50 65 | 8 |
| 100 | 1,6 2 | – – | 16 20 | m³/h m³/h | 12 28 | – – | 120 280 | m³/h m³/h | Rp 2 Rp 2½ Rp 3 | 65 80 100 | 6 |
| 110 | 2,5 3 | – – | 25 30 | m³/h m³/h | 14 44 | – – | 140 440 | m³/h m³/h | Rp 2½ Rp 3 | 65 80 100 | 5 |
| 150 | – | – | – | – | 30 100 | – – | 300 1000 | m³/h m³/h | – | 80 100 125 150 | 4 |
| 180 | – | – | – | – | 30 150 | – – | 300 1500 | m³/h m³/h | – | 150 200 | 3 |

measuring ranges for other substances and operating conditions on request

1) at STP: at standard conditions (0 °C and 1013 mbar abs.)

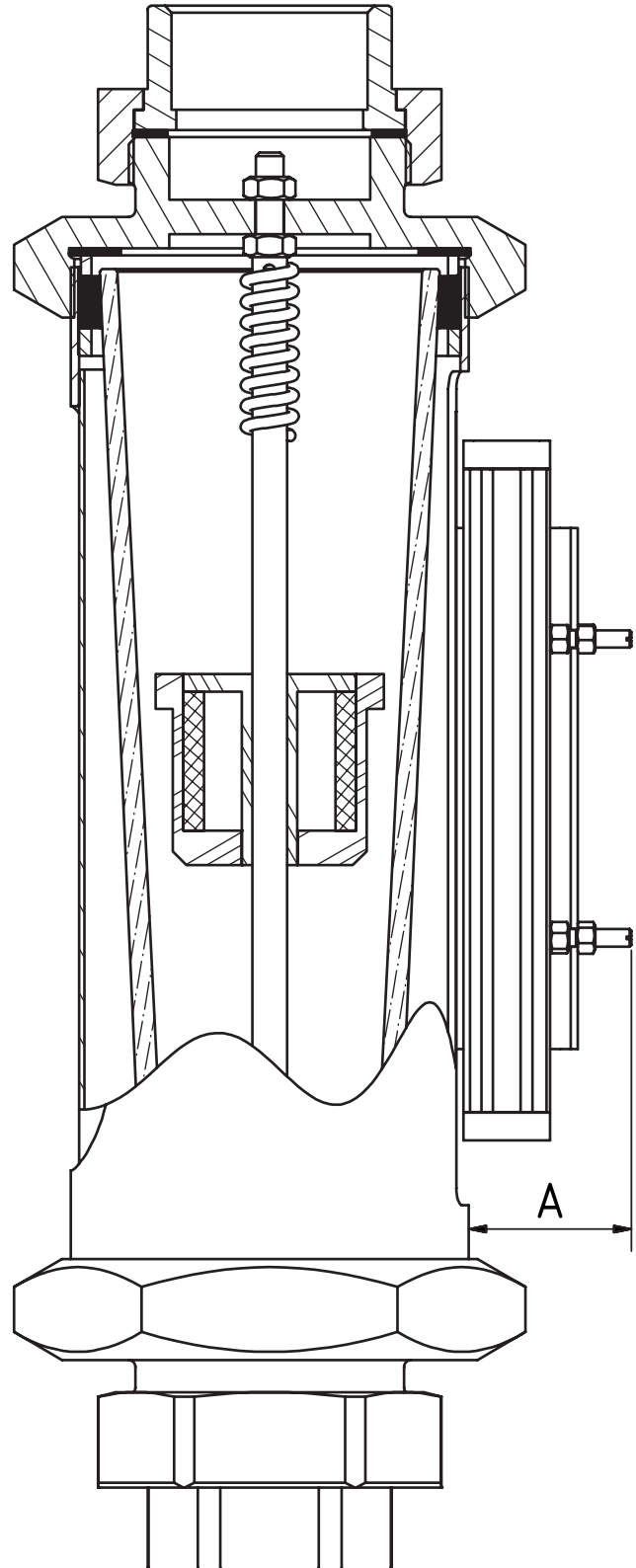


RA 60 / FA 60

Variable area flow meters

RA / FA 60-EM

| Size | A |
|------|----|
| 100 | 47 |
| 110 | 47 |



Limit value switches MSK1/MSK12/MSKW

In order to realise a local display with a monitoring function the flowmeter can be equipped with limit value switches.

The limit value switch consists of a connector housing and a bistable reed switch.

A magnet integrated in the float switches this reed switch. The limit value switch is guided in a guide slot on the back of the protective tube and can be adjusted throughout the entire measuring range. In case of inductive or capacitive load applications, e.g. caused by contactors or solenoid valves, uncontrolled current and voltage peaks may occur. In dependence on their geometry such peaks also occur in lines if they exceed a certain length. It is therefore recommended to use an additionally available arc suppression relay "MSR". This increases the switching capacity and avoids the appearance of inductive and capacitive peaks. It thereby ensures a long lifetime of the contact.

Technical data of the limit value switches

| Design | MSK1 | MSK12 |
|---------------------------------|-------------------|-------------------|
| Switching voltage | 50 V AC/75 V DC | 50 V AC/75 V DC |
| Switching current | 0,5 A | 0,5 A |
| Switching capacity | 10 W/VA | 10 W/VA |
| Dielectric strength | 230 V AC/400 V DC | 230 V AC/400 V DC |
| Temperature range ¹⁾ | -20 ... +90 °C | -20 ... +90 °C |
| Switching function | normally closed | normally open |
| Connection | | |

| Design | MSKW | |
|---------------------------------|-------------------|--|
| Switching voltage | 50 V AC/75 V DC | |
| Switching current | 0,5 A | |
| Switching capacity | 5 W/VA | |
| Dielectric strength | 110 V AC/200 V DC | |
| Temperature range ¹⁾ | -20 ... +90 °C | |
| Switching function | change over | |
| Connection | | |

¹⁾ The thermal endurance of the flow meter is crucial.

Linear displacement sensor EM

The linear displacement sensor based on the Hall principle delivers an output signal proportional to the height setting of the flow meter. This signal can be displayed in 4 ... 20 mA or 0 ... 10 V to realise a remote indication. The sensor is connected via the enclosed M12 x 1 plug.

- Compact Design
- High level of reproducibility
- Measuring range indication via LED
- Most helpful for SPS integration
- Realise remote indication

Please notice that the sensor has a blind zone in the range of 3.7 mA to around 4 mA and only performs stable operation from approx. 4 mA.

Technical Data

| | |
|-----------------------------------|--|
| Measurement range [A...B] | 160mm |
| Repeatability | ≤ 0,1 % from measurement range ≤ dependent upon position sensor |
| Linearity deviation | ≤ 1 % v.E. |
| Temperature drift | ≤ ± 0,006 %/K |
| Ambient temperature | -25 ... +70 °C |
| Operating voltage | 15 ... 30 V DC |
| Idle current | ≤ 15 mA |
| Output function | Four-wire, analogue output |
| Voltage output → Load resistor | 0 ... 10 V ≥ 4,7 kΩ |
| Current output → Load resistor | 4 ... 20 mA ≤ 0,4 kΩ |
| Sampling rate | 200 Hz |
| Connection | Connector, M12 x 1 |
| Protection class | IP67 |
| Operating voltage display | LED, green |
| Measurement range display | LED, yellow, position sensor in detection range |
| Connection diagram | |

¹⁾ The thermal endurance of the flow meter is crucial.



RA 60 / FA 60

Variable area flow meters

Low Voltage Directive

Above 50 V AC/75 V DC, electrical components are subjected to the EU Low Voltage Directive (LVD). The user is required to verify their use accordingly.

Proper use

The user is responsible for assessing the suitability of the flow meters for his case of application, for use as prescribed and for material compatibility as regards the fluid product used in his process.

The manufacturer shall not be liable for any damage arising from incorrect or improper use of the devices.

Pressure surges can cause glass breakage and should therefore generally be avoided. The limit values given in the data sheet should be observed.

In all other respects we advise following the installation recommendations specified in Code VDI/VDE 3513, Sheet 3.

The equipment from **Kirchner und Tochter** has been tested in compliance with applicable CE-regulations of the European Community. The respective declaration of conformity is available on request. Subject to change without notice. The current valid version of our documents can be found at www.kt-flow.de

The **Kirchner und Tochter** QM-System is certified in accordance with DIN EN ISO 9001:2015. The quality is systematically adapted to the continuously increasing demands.