



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
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

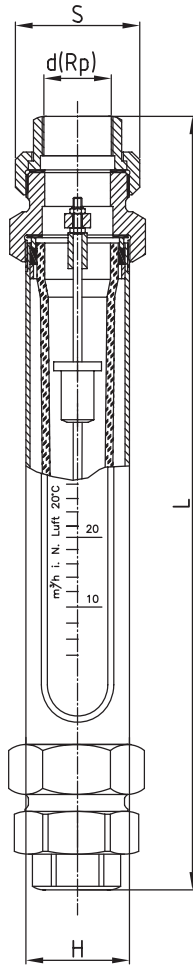
RA 60					
Size	Pipe union	S	d ¹⁾	L	H
10	Rp ¼	28	12	388	28
	Rp ⅜	32	16	390	
	Rp ½	39	20	393	
19	Rp ½	39	20	405	45
	Rp ¾	48	25	407	
	Rp 1	55	32	415	
30	Rp 1	55	32	415	60
	Rp 1 ¼	67	40	430	
	Rp 1 ½	74	50	436	
36	Rp 1 ¼	67	40	430	75
	Rp 1 ½	74	50	436	
	Rp 2	90	63	446	
43	Rp 1 ½	74	50	440	95
	Rp 2	90	63	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

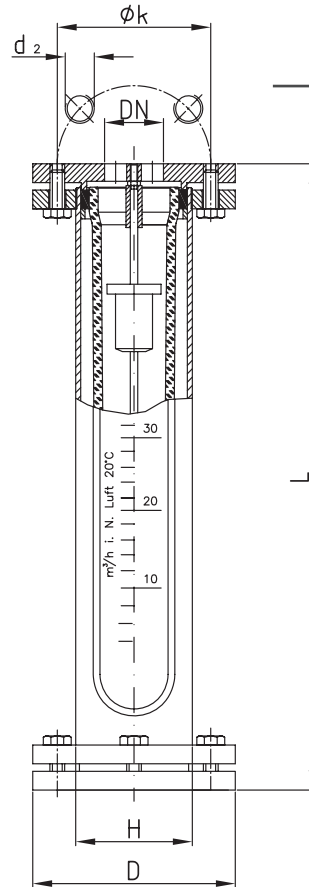
FA 60							
Size	DN	L	H	D	k	Screws Qty.	d ²
10	10	340	28	90	60	4	M12
	15			95	65	4	M12
	20			105	75	4	M12
	25			115	85	4	M12
19	10	340	45	90	60	4	M12
	15			95	65	4	M12
	20			105	75	4	M12
	25			115	85	4	M12
30	25	340	60	115	85	4	M12
	32			140	100	4	M16
	40			150	110	4	M16
36	32	340	75	140	100	4	M16
	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	– 150	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.)

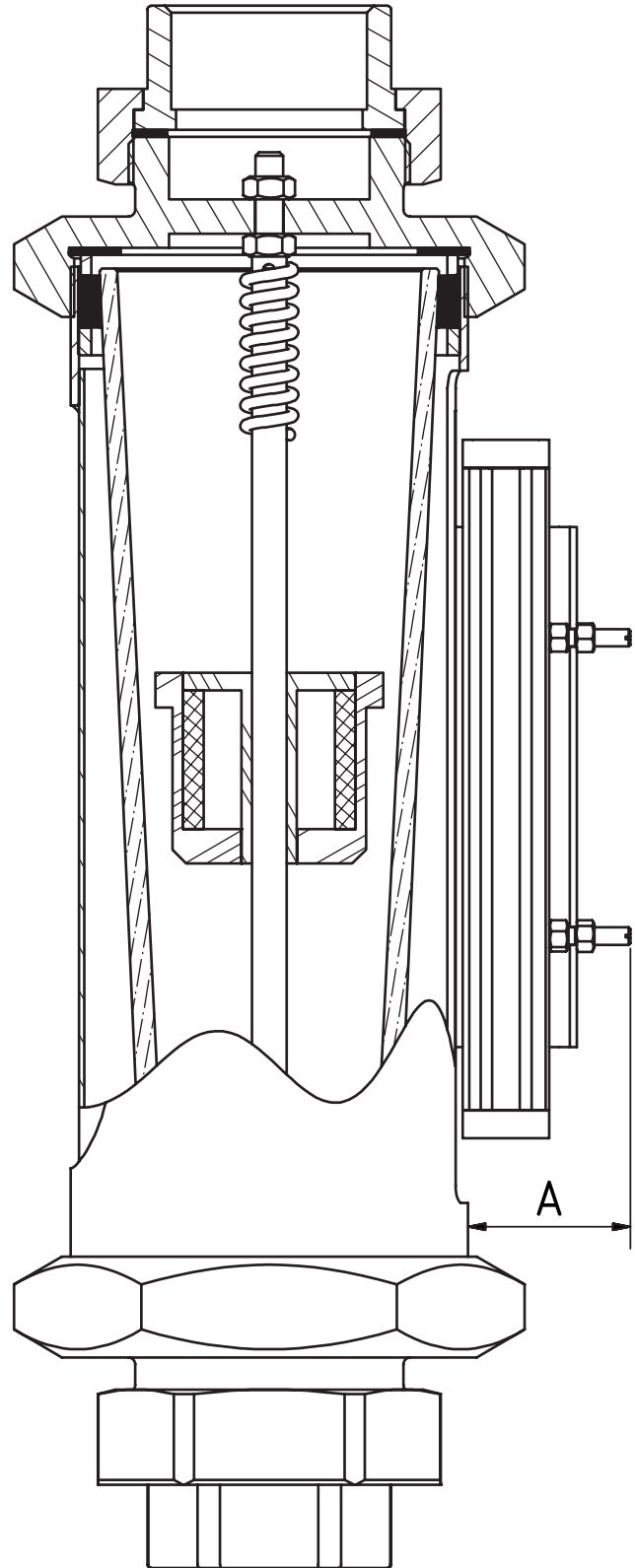


RA 60 / FA 60

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.