Viscosity-Compensated Flow Meters and Switches

for Viscous Liquids

- Measuring Range:
  Oil 0.1 - 0.45 to 5 - 80 L/min
- Accuracy:
  ±4 % f. s.
- p_{max} 12 bar,
  t_{max} 100 °C
- Viscosity range:
  1 ... 540 mm²/s
- Connection:
  G ¼ ... G 1 female thread
- Material:
  Brass, stainless steel

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Model:
VKG

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Description

The KOBOLD flow meters and switches model VKG have a spring-loaded float, which slides within a cylindrical measuring tube and has an integral orifice which is believed to be unique.

This and other design features means that it has for the first time become possible to create a flow meter and switch which fully compensates for viscosity and to a large extent for density even with very low flows. The float of these patented devices contain permanent magnets which actuate a potential free bistable reed contact mounted outside the flow thus ensuring hermetic separation between the medium and the electrical contact system. The contact is embedded within a height-adjustable plastic housing to prevent damage to the contacts by mechanical action or aggressive atmospheres.

Viscosity compensation

If the viscosity changes from 1 mm²/s to 540 mm²/s the indicated value is still accurate within ±5 %, even with very low flows, for example, 0.1 L/min.

Comparable devices, for instance conventional float-type flow meters, are, if the viscosity changes to such an extent, subject to indicating errors up to 2.500 %, especially with comparable low flows. Other instruments with spring-loaded floats, which are allegedly viscosity compensated, still produce indicating errors of more than 500% with the same change in viscosity and a flow of 0.1 L/min.

Thanks to the virtually perfect viscosity compensation and good density compensation the flow meters and switches of the latest generation are suitable both for water and highly viscous oil, without having to change the scale and without readjustment. This constitutes an extremely important advance especially in the critical area of oil lubrication circuits where measurement and switching are necessary at changing media temperatures.

Applications

- Lubrication circuits
- Paper-making machines
- Machine tools
- Oil lubrication circuits
- Hydraulics
- Extruding plant
- Printing press

Technical Details

Housing:	Aluminium, anodized (not media-contacted)
Screwed fitting:	VKG-x1...: Brass, nickel-plated VKG-x2...: Stainless steel 1.4301
Float:	VKG-x1...: Brass, nickel-plated VKG-x2...: Stainless steel 1.4301
Orifice:	Stainless steel 1. 4310
Spring:	Stainless steel 1. 4310
Magnet:	Ceramic
Measuring glass:	Duran glass
Seals:	VKG-x1...: NBR VKG-x2...: FPM
Max. temperature:	+100 °C
Max. pressure:	12 bar
Installation position:	Any
Basic accuracy:	±4 % f. s. (for a viscosity of 105 mm²/s)
Measuring error with change in viscosity:	For changes in viscosity within 1 - 540 mm²/s the additional deviation is ±5 % f. s. maximum
Viscosity range:	1 - 540 mm²/s
Contacts:	**For VKG-2..., VKG-3..., VKG-4...**
Electrical connection:	Connector DIN 43 650
Electrical switching values:	N/O contact (CSA) max. 240 V_{AC} / 100 VA / 1.5 A
	Changeover contact (CSA) max. 240 V_{AC} / 60 VA / 1 A
	N/O contact (UL) 250 V_{AC} - 0,4 A / 200 V_{DC} - 0.25 A 50 V_{DC} -1.0 A
	Changeover contact (UL) max. 250 V_{DC} / 0.136 A - 30 V_{DC} / 1 A
Protection:	IP 65 (electrical contact) IP 54 (side indicator)

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Four versions

VKG-1...:
Flow meters

VKG-2...:
Flow meters and switches with 1 contact

VKG-3...:
Flow meters and switches with 2 contacts

VKG-4...:
Flow meters and switches with 1 contact and side indicator for turbid and dark media

Order Details (Example: **VKG-1103 R15**)

Viscosity-compensated flow meters model: VKG-1...

Measuring range L/min oil	Pressure loss Δ P [bar] at rated flow* min.	max.	Brass	Stainless steel	Contact	Connection		Option special connect.
0.1...0.45	0.06	0.9	**VKG-1101...**	**VKG-1201...**		**..R08** = G 1/4	**..N08** = 1/4 NPT	
0.2...1.2	0.04	1.0	**VKG-1102...**	**VKG-1202...**				
0.4...2	0.04	1.0	**VKG-1103...**	**VKG-1203...**		**..R08** = G 1/4	**..N08** = 1/4 NPT	
0.6...3.4	0.04	0.9	**VKG-1104...**	**VKG-1204...**		**..R15** = G 1/2	**..N15** = 1/2 NPT	
2...8	0.06	1.0	**VKG-1105...**	**VKG-1205...**				**B** = outlet female thread inlet BVB manifold
3...15	0.04	1.0	**VKG-1106...**	**VKG-1206...**	**...00...** = without contact	**..R15** = G 1/2	**..N15** = 1/2 NPT	
4...20	0.04	1.0	**VKG-1107..**	**VKG-1207...**		**..R20** = G 3/4	**..N20** = 3/4 NPT	
2.5...45	0.08	0.4	**VKG-1108...**	**VKG-1208...**		**..R20** = G 3/4	**..N20** = 3/4 NPT	
5...55	0.1	1.0	**VKG-1109...**	**VKG-1209...**		**..R25** = G 1	**..N25** = 1 NPT	
2.5...70	0.1	1.1	**VKG-1110...**	**VKG-1210...**				
5...80	0.1	1.0	**VKG-1111...**	**VKG-1211...**		**..R25** = G 1	**..N25** = 1 NPT	

* The pressure loss is based on water.

Viscosity-compensated flow meters and switches model: VKG-2...

Measuring range L/min oil	Pressure loss Δ P [bar] at rated flow* min.	max.	Brass	Stainless steel	Contact	Connection		Option special connect.
0.1...0.45	0.06	0.9	**VKG-2101...**	**VKG-2201...**		**..R08** = G 1/4	**..N08** = 1/4 NPT	
0.2...1.2	0.04	1.0	**VKG-2102...**	**VKG-2202...**				
0.4...2	0.04	1.0	**VKG-2103...**	**VKG-2203...**	**..R0..** = 1 N/O contact	**..R08** = G 1/4	**..N08** = 1/4 NPT	
0.6...3.4	0.04	0.9	**VKG-2104...**	**VKG-2204...**	**..U0..** = 1 changeover contact	**..R15** = G 1/2	**..N15** = 1/2 NPT	
2...8	0.06	1.0	**VKG-2105...**	**VKG-2205...**				**B** = outlet female thread inlet BVB manifold
3...15	0.04	1.0	**VKG-2106...**	**VKG-2206...**	**..C0..** = 1 N/O contact (UL)	**..R15** = G 1/2	**..N15** = 1/2 NPT	
4...20	0.04	1.0	**VKG-2107..**	**VKG-2207...**		**..R20** = G 3/4	**..N20** = 3/4 NPT	
2.5...45	0.08	0.4	**VKG-2108...**	**VKG-2208...**	**..D0..** = 1 changeover contact (UL)	**..R20** = G 3/4	**..N20** = 3/4 NPT	
5...55	0.1	1.0	**VKG-2109...**	**VKG-2209...**		**..R25** = G 1	**..N25** = 1 NPT	
2.5...70	0.1	1.1	**VKG-2110...**	**VKG-2210...**				
5...80	0.1	1.0	**VKG-2111...**	**VKG-2211...**		**..R25** = G 1	**..N25** = 1 NPT	

* The pressure loss is based on water.

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Order Details

Viscosity-compensated flow meters and switches with 2 contacts model: VKG-3...

Measuring range L/min oil	Pressure loss Δ P [bar] at rated flow* min.	max.	Brass	Stainless steel	Contact	Connection		
0.1...0.45	0.06	0.9	**VKG-3101...**	**VKG-3201...**	**..RR..** = 2 N/O contacts **..UU..** = 2 changeover contacts **..CC..** = 2 N/O contacts (UL) **..DD..** = 2 changeover contacts (UL)	**..R08** = G 1/4	**..N08** = 1/4 NPT	
0.2...1.2	0.04	1.0	**VKG-3102...**	**VKG-3202...**				
0.4...2	0.04	1.0	**VKG-3103...**	**VKG-3203...**		**..R08** = G 1/4	**..N08** = 1/4 NPT	
0.6...3,4	0.04	0.9	**VKG-3104...**	**VKG-3204...**		**..R15** = G 1/2	**..N15** = 1/2 NPT	
2...8	0.06	1.0	**VKG-3105...**	**VKG-3205...**				
3...15	0.04	1.0	**VKG-3106...**	**VKG-3206...**		**..R15** = G 1/2	**..N15** = 1/2 NPT	
4...20	0.04	1.0	**VKG-3107..**	**VKG-3207...**		**..R20** = G 3/4	**..N20** = 3/4 NPT	
2.5...45	0.08	0.4	**VKG-3108...**	**VKG-3208...**		**..R20** = G 3/4	**..N20** = 3/4 NPT	
5...55	0.1	1.0	**VKG-3109...**	**VKG-3209...**		**..R25** = G 1	**..N25** = 1 NPT	
2.5...70	0.1	1.1	**VKG-3110...**	**VKG-3210...**				
5...80	0.1	1.0	**VKG-3111...**	**VKG-3211...**		**..R25** = G 1	**..N25** = 1 NPT	

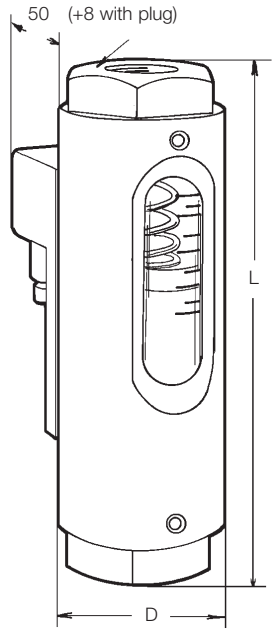
* The pressure loss is based on water.

Viscosity-compensated flow meters and switches with side indicator model: VKG-4...

Measuring range L/min oil	Pressure loss Δ P [bar] at rated flow* min.	max.	Brass	Stainless steel	Contact	Connection		Option special connect.
0.1...0.45	0.06	0.9	**VKG-4101...**	**VKG-4201...**	**..R0..** = 1 N/O contact **..U0..** = 1 changeover contact **..C0..** = 1 N/O contact (UL) **..D0..** = 1 changeover contact (UL)	**..R08** = G 1/4	**..N08** = 1/4 NPT	**B** = outlet female thread inlet BVB manifold
0.2...1.2	0.04	1.0	**VKG-4102...**	**VKG-4202...**				
0.4...2	0.04	1.0	**VKG-4103...**	**VKG-4203...**		**..R08** = G 1/4	**..N08** = 1/4 NPT	
0.6...3.4	0.04	0.9	**VKG-4104...**	**VKG-4204...**		**..R15** = G 1/2	**..N15** = 1/2 NPT	
2...8	0.06	1.0	**VKG-4105...**	**VKG-4205...**				
3...15	0.04	1.0	**VKG-4106...**	**VKG-4206...**		**..R15** = G 1/2	**..N15** = 1/2 NPT	
4...20	0.04	1.0	**VKG-4107..**	**VKG-4207...**		**..R20** = G 3/4	**..N20** = 3/4 NPT	
2.5...45	0.08	0.4	**VKG-4108...**	**VKG-4208...**		**..R20** = G 3/4	**..N20** = 3/4 NPT	
5...55	0.1	1.0	**VKG-4109...**	**VKG-4209...**		**..R25** = G 1	**..N25** = 1 NPT	
2.5...70	0.1	1.1	**VKG-4110...**	**VKG-4210...**				
5...80	0.1	1.0	**VKG-4111...**	**VKG-4211...**		**..R25** = G 1	**..N25** = 1 NPT	

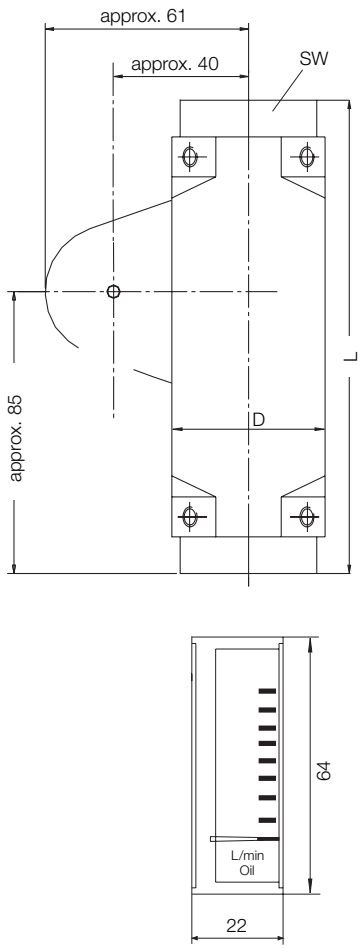
* The pressure loss is based on water.

Dimensions model VKG-1.., VKG-2..., VKG-3...



Model	D [mm]	L [mm]		SW [mm]	Weight [kg] VKG-1..	
		Standard connection	Special connection		Standard connection	Special connection
VKG-..01	48	143	-	41	0.9	0.9
VKG-..02	48	143	143	41	0.9	0.8
VKG-..03	48	143	143	41	0.9	0.8
VKG-..04	48	143	143	41	0.9	0.8
VKG-..05	48	143	143	41	0.9	0.8
VKG-..06	48	143	153	41	0.8	0.8
VKG-..07	48	143	153	41	0.8	0.8
VKG-..08	48	153	153	41	0.8	0.7
VKG-..09	48	153	153	41	0.8	0.7
VKG-..10	48	153	153	41	0.8	0.7
VKG-..11	48	153	-	41	0.7	0.7

Dimensions model VKG-4..



Model	D [mm]	L [mm]		SW [mm]	Weight [kg] VKG-4..	
		Standard connection	Special connection		Standard connection	Special connection
VKG-..01	46 x 46	143	-	41	1.3	1.3
VKG-..02	46 x 46	143	143	41	1.3	1.2
VKG-..03	46 x 46	143	143	41	1.3	1.2
VKG-..04	46 x 46	143	143	41	1.3	1.2
VKG-..05	46 x 46	143	143	41	1.2	1.2
VKG-..06	46 x 46	143	143	41	1.2	1.2
VKG-..07	46 x 46	143	153	41	1.2	1,1
VKG-..08	46 x 46	153	153	41	1.2	1.1
VKG-..09	46 x 46	153	153	41	1.2	1.1
VKG-..10	46 x 46	153	153	41	1.1	1.1
VKG-..11	46 x 46	153	-	41	1.1	1.1

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