



Zertifiziertes
QM-System
DIN EN ISO 9001
Zertifikat-Nr. 01017

Electronic Flowmonitor for liquids



measuring
•
monitoring
•
analysing

KAL



- Range: approx. 4-200 cm/s
- Max. pressure: 100 bar
- Temperature of medium: -20...+80 °C
Option: -30...+120 °C
- Process connection:
G 1/4, G 1/2, G 3/4
M12x1, 1/4 NPT, 1/2 NPT, 3/4 NPT
Tri-Clamp®
- Material sensor:
stainless steel 1.4404
- Intelligent temperature compensation
- No moving parts
- Minimal pressure loss



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Method of Operation

The model KAL-... electronic flow monitor continuously monitors liquid media. It is suited for securely monitoring flows with minimum pressure loss. Sensitivity to soiling is significantly reduced by means of a single-part sensor.

Theory of Operation

The operation of the model KAL-... electronic flow monitor is based on the calorimetric principle. The end face of the sensor is heated to a few degrees above the temperature of the flow medium. When the medium flows, the heat generated in the sensor is transferred to the medium, i.e. the sensor is cooled. The cooling procedure is an accurate measure of the flow velocity.

The sensor signal is compared with the reference data stored in a microcontroller. An alarm signal and/or an analogue signal (4-20 mA) that is proportional to the flow velocity is output if the actual flow velocity deviates from the desired flow velocity. The microcontroller allows the flow indicator to be easily calibrated and the temperature to be compensated.

Features

- Optimal temperature compensation
- Intelligent switching
- Measuring range adjustment
- No moving parts
- Easy to install and commission
- Minimal pressure loss
- Easy to use

Measuring/Switching Ranges

NW [mm]	Approx. measuring range [L/min] water	NW [mm]	Approx. measuring range [L/min] water
8	0.12 - 6.0	40	3.0 - 150
10	0.19 - 9.4	50	4.7 - 235
15	0.42 - 21.8	60	6.8 - 340
20	0.75 - 37.7	80	12.0 - 603
25	1.18 - 59.0	100	18.8 - 942
30	1.7 - 84.8	150	42.4 - 2120

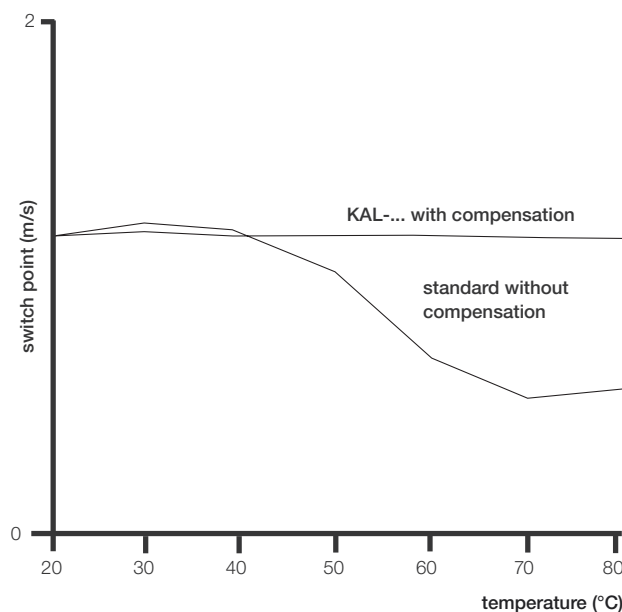
Important: The flow velocity has been converted for the nominal pipe size for the specified measuring ranges. Please note that the flow velocity approaches zero in the pipeline in the direction of the wall. Depending on the nominal pipe size, depth of engagement of the sensor, and flow profile, the deviations from the specified flow rates can be of considerable magnitude.

Temperature Compensation

The temperature of the KOBOLD flow monitor is compensated with a microcontroller. All data required for temperature compensation are stored in EEPROMS, and are maintained for at least 10 years after power failure. The instruments may be easily adjusted by the customer to suit process conditions.

The measured flow rate is compared with the zero-point adjustment values stored in the EEPROM and the stored characteristic curves. The data is processed by the microcontroller and controls the alarm signal or the analogue output. The sensor switch point is absolutely consistent, as the sensors has been adapted to suit the process data.

Drift of the Switch Point by Temperature Influence



Range of Models

Compact devices

- KAL-A... Flowmeter with analogue output (4-20 mA)
- KAL-AK Flowmeter/-monitor with analogue output (4-20 mA) and alarm signal (PNP/NPN, contact)
- KAL-K... Flow indicator alarm signal (PNP/NPN, contact)

Technical Details (Electronics)

Case material:	glass-fibre-reinforced polyamide	Switch output:	24 V_{DC} version: semiconductor, PNP/NPN switchable,max. 400 mA, short-circuit proof
Sensor material:	stainless steel 1.4404		110 V_{DC} version: relay max. 0.2 A / 110 V _{DC}
Power supply:	24 V _{DC} ±10% 110 V _{DC} ±30%, 110, 230 V _{AC} ±20%,		110 V_{AC}, 230 V_{AC} version: relay max.. 5 A
Power input:	max. 4.5 W (typically 1.2 W) max. 3.6 W for 24 V _{DC}	N/O function:	actual value ≥ setpoint value; (standard setting: green LED is energized) output switched
Ambient temperature:	-20°C...+60°C	N/C function:	available as option
Medium temperature:	-20°C...+80°C (standard version) -30°C...+120°C (high temp.version)	Protection:	IP 65
CIP compatibility:	max. 140°C non-operating		
Max. pressure:	100 bar		
Warm up time:	max. 12 s		
Switching range:	approx. 4 cm/s to 200 cm/s		
Temperature gradient:	unlimited		
Response time:	5.6...12 s typically on request: 2-5.6 s (KAL-KS...)		
Flow rate indication:	LED bargraph		
Switch point adjustm.:	with potentiometer, optical indication on LED chain with flashing LED		
Output indicator:	LED, red = alarm, green = flow OK		
Electrical connection:	cable gland M16x1.5 connector M12x1 (only 24 V _{DC} version) circular connector 7/8" with socket (230/115 V versions) connector M12x1 with socket and 2 m cable, 24 V _{DC} version		



Order Details (Example: KAL-K4440 S PG 3)

Version	Connection	Order numbers for material st. st. 1.4404	Type of contact	Electrical connection	Power supply
standard version (-20...+80°C)	Tri-Clamp®, DIN 32676	KAL-K4440	S = N/O contact Ö = N/C contact	PG = Pg 13.5 ST = plug M12x1 SK = circular connector with socket	0 = 230 V _{AC} 1 = 110 V _{AC} 3 = 24 V _{DC} 6 = 110 V _{DC}
high temp. version (-30...+120°C)	Tri-Clamp®, DIN 32676	KAL-KH4440	S = N/O contact Ö = N/C contact	PG = Pg 13.5 ST = plug M12x1 SK = circular connector with socket	0 = 230 V _{AC} 1 = 110 V _{AC} 3 = 24 V _{DC} 6 = 110 V _{DC}

Please find further versions of the KOBOLD flowmonitor KAL- in the S5 brochure



Technical Details

Case material:	glass-fibre-reinforced polyamide Polyamid
Sensor material:	st.st.1.4404
Power supply:	24 V _{DC} ±20%
Power input:	max. 3.6 W (typically 1.2 W)
Ambient temperature:	-20°C...+60°C
Temperature of medium:	-20°C...+80°C
Max. Pressure:	100 bar
Warm up time:	max. 12 s
Measuring range:	approx. 4 cm/s to 200 cm/s
Temperature gradient:	unlimited
Response time:	5.6...12 s
Accuracy:	±10% of reading
Repeatability:	±1% of reading
Signal output:	4-20 mA
Flow rate indication:	LED bargraph
Protection:	IP 65



Electrical Connection

KAL-A...

1		4...20 mA
2		+24 V _{DC}
3		Ground

KAL-AK...

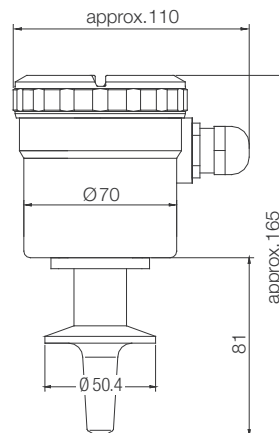
1		4...20 mA
2		+24 V _{DC}
3		Ground
4		PNP/NPN-Switch

For KAL-AK... only

Switching function:	N/O contact
Switch point adjustment:	with potentiometer, optical indication on LED chain with flashing LED
Output indicator:	LED, red = alarm, green = flow OK
Switching output:	semiconductor, PNP/NPN switchable, max. 400 mA, short-circuit proof

Dimensions

KAL-...4440 with Tri-Clamp®
counterpart according to DIN 32676 for
NW32/NW40



Order Details (Example: KAL-A4440A4 PG)

Output/contact	Connection	Order numbers for material stainless steel 1.4404	Electrical connection
4-20 mA without contact	Tri-Clamp®, DIN 32676	KAL-A4440A4	PG =Pg 13.5 SK =circular connector with socket
4-20 mA N/O contact NPN/PNP switchable	Tri-Clamp®, DIN 32676	KAL-AK4440AS	PG =Pg 13.5 SK =circular connector with socket

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