



Electronic Flow Monitor for Liquids



measuring
•
monitoring
•
analysing



- Switching range:
approximately 4 - 200 cm/s
- Max. pressure: 100 bar
(not possible with Tri Clamp)
- Temperature of medium:
- 20 to +80 °C
Option: -30 to +120 °C
- Connection:
G 1/4, G 1/2, G 3/4
M12 x1, 1/4 NPT, 1/2 NPT, 3/4 NPT
Tri Clamp
- Material Sensor:
stainless steel 1.4571
- Intelligent temperature
compensation
- No moving parts
- Minimal pressure loss



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Model:
KAL-...
KAL-K...
KAL-A (K)...



Method of operation

The model KAL-... electronic flow monitor continuously monitors liquid medias. 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, ie, 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 fit and put into service
- Minimal pressure loss
- Easy to use

Measuring/switching ranges

NW (mm)	Appr. meas. range L/min water	NW (mm)	Appr. meas. 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.

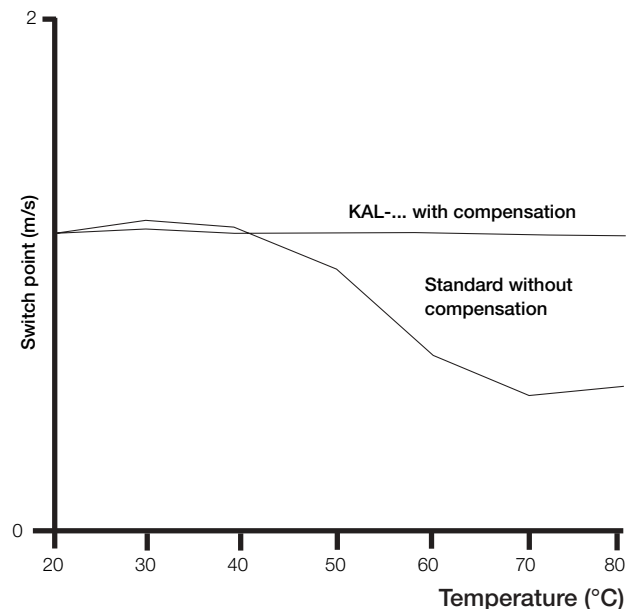
Temperature compensation

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 analog 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... Flow meter with analogue output (4-20 mA)
- KAL-AK Flow meter /-monitor with analogue output (4-20 mA) and alarm signal (PNP/NPN, make contact)
- KAL-K... Flow indicator alarm signal (PNP/NPN, N/O contact)



Technical details

Electronics:

Power supply: 24 V_{DC} ± 10 %
110 V_{DC} ± 30 %, 110, 230 V_{AC} ± 20 %, 110 V_{AC}, 230 V_{AC} version:

Power input: max. 4.5 (typically 1.2 W)
max. 3.6 W for 24 V_{DC}

Ambient temperature: - 20 °C to + 60 °C

Temperature of medium: - 20 °C to + 80 °C
- 30 °C to + 120 °C (High temp. version)

CIP compatibility: max. 140 °C non-operating

Max. pressure: 100 bar (not possible with Tri Clamp)

Response time: max. 12 s

Switching range: approx. 4 cm/s to 200 cm/s

Temperature gradient: unlimited

Response time: typically 5.6...12 s
upon request: 2 - 5.6 s (KAL-KS...)

Flow rate indication: trend indication with 8-LED's

Switch point adjustment: with potentiometer, optical indication on LED chain with flashing LED

Output indicator: LED, red= alarm, green= flow OK

Electrical connection: code PG: cable gland M16x1,5;
code ST: plug M12x1 (only 24 V_{DC} version);
code SK: circular plug 7/8" incl. socket 230/115 V version or
code SK: plug M12x1 incl. socket and 2 m cable (24 V_{DC} version)

Switch output: 24 V_{DC} version: semiconductor PNP/NPN switchable, max. 400 mA, short-circuit proof
110 V_{DC} version: relay max. 0.2 A /110 V_{DC}
110 V_{AC}, 230 V_{AC} version: relay max. 5 A

N/O function: actual value ≥ setpoint value; (standard setting: green LED is energized) output switched through available as option

N/C function: available as option

Protection: IP 65

Case material: polyamide



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

Version	Connection	Order code for material 1.4571	Type of contact	Electrical connection	Power Supply
Standard version (-20 to +80 °C)	Tri Clamp, DIN 32676	KAL-K4440	S=N/O (NPN/PNP switchable) O=N/C (Option)	PG = cable gland M16x1,5 ST* = connector M12x1 SK = circular plug incl. socket	0 = 230 V _{AC} 1 = 110 V _{AC} 3 = 24 V _{DC} 6 = 110 V _{DC}
Version for high temperature (-30 to +120 °C)	Tri Clamp, DIN 32676	KAL-KH4440	S=N/O (NPN/PNP switchable) O=N/C (Option)	PG = cable gland M16x1,5 ST* = connector M12x1 SK = circular plug incl. socket	0 = 230 V _{AC} 1 = 110 V _{AC} 3 = 24 V _{DC} 6 = 110 V _{DC}

*only for 24 V_{DC}

Please refer to our brochure 5 for other versions of KOBOLD flow monitors KAL- .

Technical details

- Power supply: 24 V_{DC} ± 20 %
- Power input: max. 3.6 W (typically 1.2 W)
- Ambient temperature: - 20 °C to +60 °C
- Temperature of medium: - 20 °C to +80 °C
- Max. pressure: 100 bar
(not possible with Tri Clamp)
- Response time: max. 12 s
- Measuring range: approx. 4 cm/s to 200 cm/s
- Temperature gradient: unlimited
- Response time: 5.6 to 12 s
- Accuracy: ± 10 % of measured value
- Repeatability: ± 1 % of measured value
- Signal output: 4 - 20 mA
- Flow rate indication: Trend indication with 8-LED's
- Protection: IP 65
- Case material: glass-fibre-reinforced polyamide

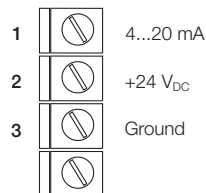
For KAL-AK...only

- 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

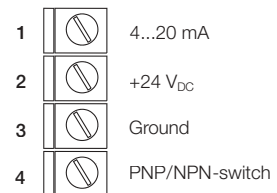


Electrical connection

KAL-A...

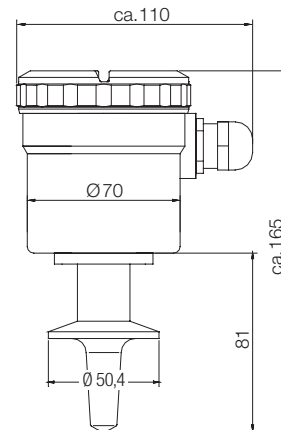


KAL-AK...



Dimensions

KAL-...4440 with Tri Clamp



Order Details (Example: **KAL-A4440A4 PG**)

Output/Contact	Connection	Order Code for Material 1.4571	Electrical Connection
4 - 20 mA without contact	Tri Clamp, DIN 32676	KAL-A4440A4	PG =cable gland M16x1,5 SK =connector M12x1
4 - 20 mA Contact N/O NPN/PNP switch	Tri Clamp, DIN 32676	KAL-AK4440AS	PG =cable gland M16x1,5 SK =connector M12x1

Please refer to our brochure 5 for other versions of KOBOLD flow monitors KAL- .