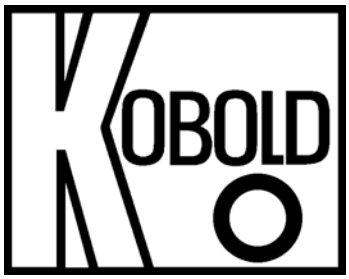
Operating Instruction

for

Calorimetric flow switch for air

Model: KAL-L



1. Contents

Manufactured and sold by:

Kobold Messring GmbH
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D-65719 Hofheim
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Fax: +49(0)6192-23398
E-Mail: info.de@kobold.com
Internet: www.kobold.com

2. Note

Please read and take note of these operating instructions before unpacking and setting the unit for operation, and follow the instructions precisely as described herein.
The devices are only to be used, maintained and serviced by persons familiar with these operating instructions and with the prevailing regulation applying to procedural safety and the prevention of accidents.

3. Regulated usage

The KAL-L is to be installed only in the specified applications. Every usage which exceeds the specifications is considered to be non-specified. Any damages resulting therefrom are not the responsibility of the manufacturer. The user assumes all risk for such usage. The application specifications include the installation, start-up and service requirements specified by the manufacturer.

The devices from the KAL-L model series are used for the monitoring of air flow. The devices can be used from a pipe size of 20 mm upwards.

Flow range:	1 m/s ... 20 m/s (at 20 °C, 1 bar rel) Please note that the flow range is reduced if any other operating pressure or temperature applies.
Temperature range:	-25 °C ... +120 °C
max. pressure:	8 bar

Limiting signal
For monitoring the velocity of air these devices with terminal connection are equipped with a potential free change over contact; devices with plug-connection are with N/O or N/C contact.

Trend indication
A LED bar graph display shows the current flow value and the set switch point via a flashing LED.

Duo-LED
displays the actual status of the relay.

Material

Sensor:	Brass nickel plated
Electronic housing:	Glass fibre reinforced Polyamid.

The devices of the series KAL-L are used for monitoring air flow only.

4. Operating Principle

The electronic flowswitch uses the calorimetric principle. One electronic sensing element is heated up a few degrees higher than the medium. In case of flow the heat is taken off the sensing element down stream, i.e. the sensing element is cooled. This cooling represents a measurement of the velocity. A second sensing element measures the temperature of the medium. The electronic compares by use of a Wheatstone bridge the resistant of both elements and switches in case of falling below the setpoint value a relay.

5. Instrument Inspection

These devices are checked before dispatch and sent away in perfect condition. Should the damage to a device be visible, we recommend a thorough inspection of the delivery packing. In case of damage, please inform your parcel service/ forwarding agent immediately, since they are responsible for damages during transit.

Scope of delivery:

- Sensor with integrated electronic
- Compression fitting or flange (not with model KAL-L8100..)

6. Mechanical connection

Before installation

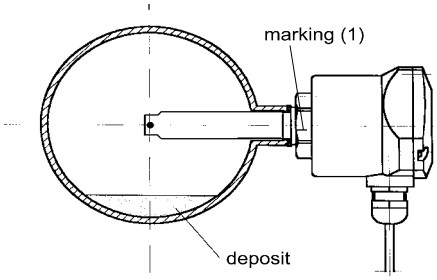
Ensure that the actual system velocity is within the switching range of the device.
Ensure that the permitted maximum operating pressure and temperature for the device is not beeing exceeded. (See section 10. Technical data).

Installation

Mount the sensor by using the compression fitting or the flange into the corresponding pipe and ensure that the sensing elements are in contact with the flowing medium. The tip of the probe has to project into the pipe minimum 10 mm (better > 15 mm) (see sketch below).
Optimally the probe is that far inserted that the sensing elements is located approx. in the centre of the pipe. For pipe sizes larger than 50 mm the sensor shall be mounted as far as possible into the pipe.

Fitting position

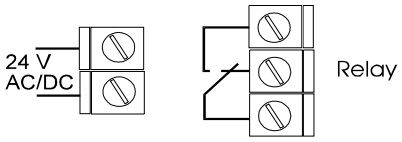
The function of the sensor is not dependent on their fitting position. Please note that the marking (1), which is on the hexagon of the sensor, is absolutely parallel to the flow direction. To avoid incorrect function of the sensor the straight pipe upstream should be 10 times ID and downstram 5 times ID.



7. Electrical connection

Terminal connection

- Unscrew the cover of the electronics.
- Connect the device according to the information at the terminal ports.
  When DC voltage is used no polarity is to be watched.



Warning: Ensure that the power is disconnected during the connection of the cable.

- Put supply voltage to the device (24 VAC/DC, -15%, +10%)

Plug connection (Plug M12 x 1)

PIN 1	brown	24 VAC/DC
PIN 2	white	24 VAC/DC
PIN 3	blue	relais N/O or N/C
PIN 4	black	relais N/O or N/C

8. Operation

LED-trend indication

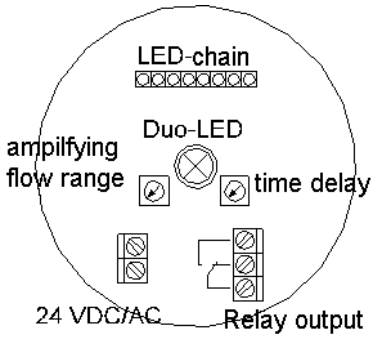
The LED-trend indication (8 LED) is used to display

- the actual flow value (LED-chain starts to light from left end)

flow too low	⊗	⊗	⊗	O	O	O	O	O
flow is OK	⊗	⊗	⊗	⊗	⊗	O	O	O

- the set point
  (third LED from left flashing)

set point	O	O	⊗	O	O	O	O	O



Duo-LED
The Duo-LED is used to display

- the status of the relay
  red = Alarm (set point not reached; relay is deactivated)
  green = Flow (set point exceeded; relay is activated)

Terminal ports
The terminal ports are used to connect the power supply and the relay output. The device needs 24 VDC/VAC. No polarity is to be watched.

Potentiometer for set point adjustment
With the left potentiometer the amplification of the range (set point) is adjusted. The LED-display of the maximum value is changed according to the adjustment with the

Potentiometer for time delay after start up
With the right potentiometer the time delay (1 to 60 seconds) can be adjusted. If the power supply is switched on the relay is activated until the delay time is passed. The flowswitch indicates "FLOW". After the time delay passed the device switches into measuring mode.

9. Commissioning

The use of this switch in machines acc. to directive 89/392/EWG is prohibited until the complete machine complies to this directive.
After mechanical and electrical installation of the sensor the device has to be put into operation as described in this section.

Switch on the supply voltage to the device.

Adjustment of the time delay after start up
If the power supply is switched on the relay is activated until the delay time is passed. The flowswitch indicates "FLOW" even if the flowrate is lower.
The time delay can be adjusted in a range of 1 to 60 seconds. After the time delay passed the device switches into measuring mode.

- Turning the potentiometer clockwise increases the time delay.

Set point adjustment
The set point is factory preset. It is indicated by the third LED from left hand side flashing. The adjustment of the set point is done by an adjustment of the amplification of the range.
Regulate the flow to the required flowrate.

- **Max. monitoring:** Adjust the amplification with the left potentiometer until one or two LEDs left from the set point (third LED) are lit.

  1 LED left of set point LED

⊗	O	⊗	O	O	O	O	O

  --> setpoint close above actual flow rate, relay deactivated

- **Min. monitoring:** Adjust the amplification with the left potentiometer until some LEDs right from the set point (third LED) are lit.

  1 LED right of set point LED

⊗	⊗	⊗	⊗	O	O	O	O

  --> setpoint close below actual flow rate, relay activated

  5 LED`s right of set point LED

⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗

  --> set point far below actual flow rate, relay activated

After mounting of the cover the flow switch is rady for use.

10. Technical Data

Supply voltage:	24 VAC/DC - 15%, +10%
Ambient temperature:	-10 °C...+60 °C
Medium temperature:	-25 °C...+120 °C
max. pressure:	8 bar
Start-up delay:	max. 30 s
Flow range:	1 to 20 m/s (at 20 °C, 1 bar relative)
Accuracy:	+/- 10% of full scale value
Reproducability:	+/- 1% of full scale value
Temperature gradient:	30 K/min. (at 8 m/s, 90 °C)
Time delay:	1..60 sek. adjustable
Flow indication:	trend indication by 8-digit LED-chain
Output:	Relay, potential free change over contact for terminal connection, N/O or N/C for plug connection
Contact rating:	max. 250 VAC/1000 VA
Current:	max. 4 A
Protection:	IP 65
Housing material:	glass fibre reinforced Polyamid
Sensor material:	Brass, nickel plated

11. Maintenance

The device is maintenance free. The sensor shall be visually checked and possibly cleaned with air.

12. Ordering

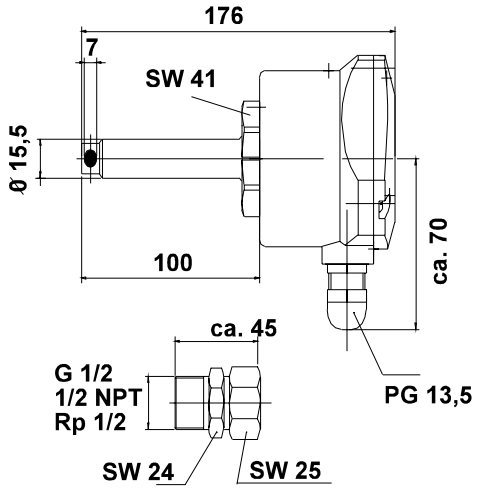
Connection	Order No.	Electrical connection
Smooth shank D=15 mm	KAL L8100 WK	PG=PG 13,5 ST=connector M12x1
Compression fitting G ½	KAL L81G1 WK	
Compression fitting Rp ½	KAL L81R1 WK	
Compression fitting ½" NPT	KAL L81N1 WK	
with clamping flange according to DIN 43 743	KAL L81FL WK	

Example of order: KAL L81FL WK ST

13. Recommended spare parts

We do not recommend any spare parts. In case of defect the device has to be returned to the supplier.

14. Dimensions



15. Declaration of Conformance

We, KOBOLD-Messring GmbH, Hofheim-Ts, Germany, declare under our sole responsibility that the product:

Calorimetric Flowswitch Model: KAL-L

to which this declaration relates is in conformity with the standards noted below:

EN 55011

Grade B of limit value for static elimination

EN 50082-2

EMC General Immunity Requirements

DIN EN 61001

Safety requirements for electr. equipment for measuring control and laboratory use.

following the provision of European Directives:

89/336/EWG, **73/23/EWG**

Signed: date: 30.09.02

H. Peters M. Wenzel