Instruction Manual

DTL04

Calorimetric flow sensor

for air -switching output-

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Safety Information

General Instructions

To ensure safe operation, the device should only be operated according to the specifications in the instruction manual. The requisite Health & Safety regulations for a given application must also be observed. This statement also applies to the use of accessories.
Every person who is commissioned with the initiation or operation of this device must have read and understood the operating instructions and in particular the safety instructions!

The liability of the manufacturer expires in the event of damage due to improper use, non-observance of this operating manual, use of insufficiently qualified personnel and unauthorized modification of the device.

Proper Usage

The calorimetric compact flowmeters type DTL04 are used for monitoring air flows. Any other use of the device is prohibited and outside the scope of application.

In particular, applications in which shock loads occur (for example, pulsed operation) should be discussed and checked in advance with our technical staff.

The series DTL04 flow meter devices should not be deployed as the sole agents to prevent dangerous conditions occurring in plant or machinery. Machinery and plant need to be designed in such a manner that faulty conditions and malfunctions do not arise that could pose a safety risk for operators.

Dangerous substances

For dangerous media such as e.g. Oxygen, Acetylene, flammable or toxic substances as well as refrigeration systems, compressors, etc. must comply with the relevant regulations beyond the general rules.

Qualified Personnel

The DTL04 devices may only be installed by trained, qualified personnel who are able to mount the devices correctly. Qualified personnel are persons, who are familiar with assembling, installation, placing in service and operating these devices and who are suitably trained and qualified.

Inward Monitoring

Please check directly after delivery the device for any transport damages and deficiencies. Additional with reference to the accompanying delivery note the number of parts must be checked.
Claims for replacement or goods which relate to transport damage can only be considered valid if the delivery company is notified without delay.

Functional Description

The flow monitors of the type series DTL04 operate according to the calorimetric principle. The devices switch when a set threshold value is reached. With the calorimetric measuring principle, a temperature-sensitive resistance is heated. The heating process is carried out by a separate heating resistor.
A flow in the medium dissipates heat from the measuring resistor, the temperature of the resistor changes and so does its resistance value. This change is evaluated.
However, not only the velocity of the flowing medium, but also its temperature has an influence on the amount of heat dissipated, so a relation between flow and temperature must be established. This is done via a second temperature-dependent measuring resistor in the vicinity of the first one. The second measuring resistor (temperature compensation) is not heated and is only used for temperature measurement.

Installation

In order to avoid malfunctions, the following points must be observed:

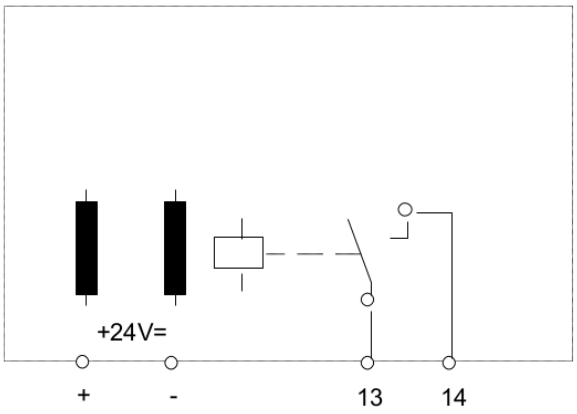
- The mounting is simple and quick via a flange mounting (for duct mounting) or via the PG7 or 1/2” threaded connection piece.
- The sensor tip should be located in the middle of the pipe if possible. The gaseous medium must flow through the transverse hole in the sensor shaft.
- The marking serves as a mounting aid. Align the sensor tube exactly in the duct!
- If the pipes are installed vertically, the direction of flow should be from bottom to top.
- Observe free inlet distance 5xD (pipe diameter) before the sensor and 3xD outlet distance after the sensor.
- Screw in the flow monitor only over the hexagon of the sensor housing.
- The flow monitor is independent of the mounting position.
- Optimum measurement results can only be achieved with an optimum installation arrangement while maintaining the inlet and outlet distances!

Electrical Connection

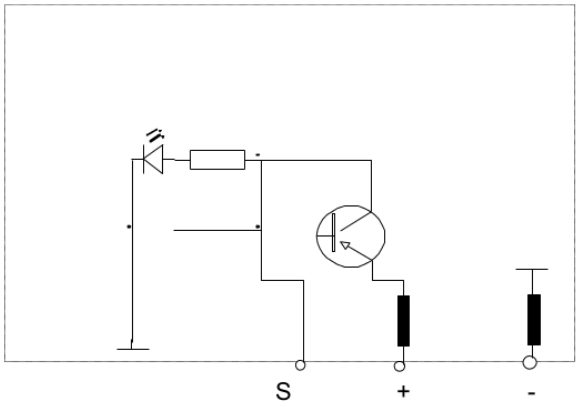
Attention: Before the electrical connection of the device, it must be ensured that the supply voltage corresponds to the required one and that the supply voltage is switched off.

- The general VDE regulations (VDE0100, VDE0113, VDE0160) must always be observed for the electrical installation.
- If a safety extra-low voltage is applied to the potential-free contact, care must be taken to ensure sufficient insulation of the connecting cables up to the terminal point, otherwise the double insulation on the mains voltage side will be impaired.
- The electrical connection is made via the terminals in the connection head.
- The exact pin assignment can be found in the drawings.

Relay:



Transistor:



Option plug connector M8:

PIN	Color	Connection
1	brown	$+U_V$
2	white	GND
3	black	contact 13 N/O (S)
4	blue	contact 14 N/O (GND)

Switching Point Adjustment

The switching point can be selected steplessly via an integrated potentiometer. The transistor output (or closing contact for relay outputs) is switched through when flow is present (yellow LED in the device lights up). Temperature fluctuations of the medium to be monitored are compensated by temperature compensation.

The relationship between air velocity and resistance change is not linear. In the lower range (small flows) the change of the resistance is very large. In the upper range, the change in resistance becomes less and less with the same flow changes.

When setting the switching point, the change to be monitored should be taken into account, as different settings have certain disadvantages.

The following requirements shall be considered:

Low flow change in the high flow velocity range

The switching point must be selected very close to the measured value of the normal flow, since the change in measured value is very small when the flow changes. Since the temperature compensation has a certain delay compared to the actual temperature change, such a switching point adjustment only makes sense for applications with slow temperature changes.

Low flow change in the low flow velocity range:

The switching point can be selected at a greater distance from the measured value of the normal flow, since the change in measured value is large when the flow changes. A temperature change has no effect on the switching behaviour.

Big flow change:

Here a yes / no statement is usually desired (e.g. fan running or fan stopped). A safety distance can therefore be selected which is so large that neither temperature changes nor turbulence have any influence on the switching behaviour.

Commissioning

The following procedure is advisable for commissioning and setting the devices:

1. Install the device
2. Connect the device according to the wiring instructions.
3. Set trimmer “Sensitivity” to minimum sensitivity (left stop).
4. Apply mains voltage; the device is immediately ready for operation.
5. Switch on the flow generator.
6. Turn trimmer “Sensitivity” slowly towards maximum until the yellow LED lights up and the transistor output switches through (with DTL04.R relay output the output relay switches into on-position). In order to achieve stable switching conditions, you should turn slightly above the switching point.
7. To check the flow monitoring, reduce or switch off the flow generation. The yellow LED goes out (the output relay at DTL04.R drops out).

Flow ≥ threshold	Signal output switches	Yellow LED airflow lights up
Flow < threshold	Signal output not switched	Yellow LED airflow noes not light up

Maintenance and Care

The calorimetric flow monitors described here are basically maintenance-free. They do not contain any components that have to be repaired or replaced on site. Repairs are only carried out at the manufacturer´s works.

If the sensor becomes dirty, it should be cleaned carefully with water at regular intervals.

Troubleshooting

Problem	**Cause**	**Solution**
Device does not work at all	No or wrong mains voltage connected	Check mains voltage and connection
Device does not detect flow	Sensor is not installed correctly	Check installation conditions
Device has changed response behaviour	Sensor is heavily contaminated by the medium	Carefully clean the sensor with water
Device switches when the temperature of the medium rises rapidly	Temperature gradient is outside the technical data	Turn potentiometer “Sensitivity” slightly further clockwise. Check the temperature gradient of the system

DTL04

Calorimetric Compact Flow Sensor for Air -Switching Output-

- **relay or transistor output**
- **measuring range: 0,1...15 m/s**
- **max. pressure: 10 bar**
- **max. temperature: 80 °C**
- **insignificant pressure loss**
- **no moving parts**
- **independent of nominal sizes, pressure and temperature**

Description:

The air flow sensor operate according to the proven calorimetric principle. A temperature-independent resistor at the sensor tip is electronically heated. The flowing air withdraws heat from it, which changes the resistance value. A second unheated resistor is used to measure the medium temperature.
The temperature difference of both resistors is proportional to the flow velocity and thus to the volume flow. The switching point of the DTL04 is easily adjusted by an built-in potentiometer.

Typical applications:

The DTL04 calorimetric flow sensors are characterised by their particularly good price-performance ratio. The devices are used wherever laminar air flows have to be monitored: For example in building services engineering, exhaust and supply air control, filter monitoring, compressor monitoring, leakage monitoring, cooling circuits etc.

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Models:

DTL04.R...	1 relay output
DTL04.T...	1 transistor output

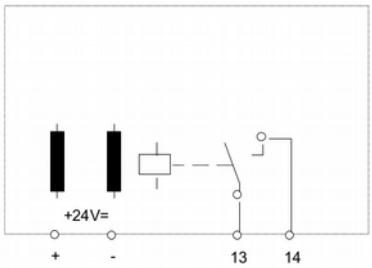
Technical Data:

Measuring range	0,1...15 m/s
Relay output	1 N/O
current / capacity:	250 VAC, 5 A, 1,2 kVA
min. switching capacity:	10 mA, 5 VDC
function at flow:	relay picks up
display at flow:	yellow LED
Transistor output:	PNP, max. 150 mA
display at flow:	yellow LED
Operating voltage:	24 VAC/DC, +/- 5%
Power input:	1 VA
Temperature range:	
Environment:	–20 … +60 °C
Medium:	–10 … +80 °C
Temperature gradient:	15 K/min (optional 30 K/min)
Compression strength:	10 bar
Process connection:	PG 7 mounting flange G ½ reduction
Immersion depth:	50 mm 140 mm (optional)
Sensor material:	MS58 nickel plated (optional stainless steel)
Protection cl. (housing):	IP65
Protection cl. (sensor):	IP67
Accuracy*:	+/- 5 % F.S.
Reproducibility of the output signal:	+/- 3 %

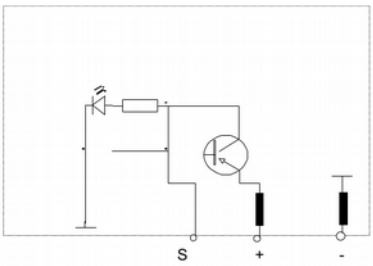
* reference conditions: 20 °C, 48 % RH, 1016 mbar

Electrical connection:

Relay:



Transistor:



Order Code:

Order number: DTL04. | R. | 15. | 1. | K. | 0

Calorimetric compact flow sensor for air – switching output-

Models:
R = relay output
T = transistor output

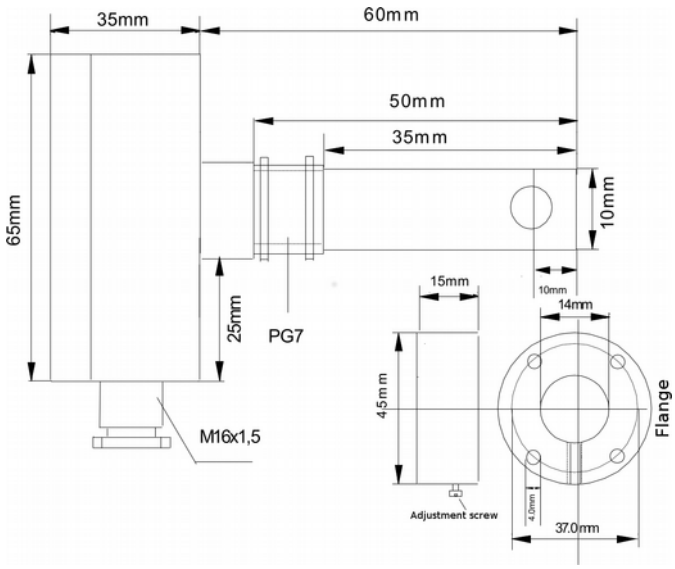
Measuring range:
15 = 0,1...15 m/s

Process connection:
1 = PG7 thread (standard)
2 = mounting flange
3 = G ½ reduction

Immersion depth:
K = ca. 50 mm (standard)
L = ca. 140 mm

Options:
0 = without
9 = please specify in plain text

Dimensions:



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