SEIKOM ELECTRONIC

Operating instructions **NLSW® 45-4 SIL1**

24 V AC/DC, 230 V AC

Version 1

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Contents

1. SAFETY INSTRUCTIONS

Read the product description thoroughly before putting the device into operation. Make sure that the product is fully suitable for your application.

Improper use can lead to malfunctions or hazards to persons, equipment and the environment. The NLSW®45-4 SIL1 is designed for applications with functional safety in accordance with EN/IEC 61508 (SIL1). This results in additional obligations:
Installation, electrical connection, commissioning, operation and maintenance must only be carried out by trained personnel with knowledge of IEC 61511 and IEC 60079-17. Operators must perform a safety assessment (SIL loop calculation) and document the resulting maximum probability of failure (PFDavg).
The potential-free changeover contact must be protected with a 10.3 A fine-blade fuse so as not to impair the calculated failure behaviour of the relay circuit.

The glycol content in cooling circuits must not exceed 30%. A glycol content of more than 30% can lead to failure or false tripping.

2. GENERAL INFORMATION

The NLSW® 45 series of calorimetric flow switches are an economical alternative to conventional pressure transmitters. Installation is quick and easy using a flange mounting (for duct installation) or a threaded connection. The switching point can be selected using the integrated potentiometer. When flow is present, the switching output is activated (yellow LED on the device lights up).

2.1. Proper use

The NLSW® 45-4 SIL1 flow switches are designed for monitoring gaseous and liquid media within the specified technical data. The sensor line is monitored for short circuits and wire breaks. Typical applications are cooling and heating circuits with glycol content of≤ 30%, engine cooling systems, paint booths and test benches where a safety level SIL1 is required.

2.2. Functional principle

Flow monitors of the NLSW® 45-4 SIL1 series operate according to the calorimetric principle. The relay of a device switches when the flow velocity reaches a preselected threshold value. The calorimetric measuring principle is based on a heated, temperature-sensitive resistor. The flow in the medium extracts heat from the precision resistor, changing the temperature of the resistor and thus its resistance value. This change is evaluated by the device. However, since not only the flow velocity of the medium influences the amount of heat dissipated, but also its temperature, a relationship between flow and temperature must be established. This is achieved by a second, temperature-dependent precision resistor next to the first. The second precision resistor (temperature compensation) is not heated and is only used to measure the temperature.

Flow≥ Threshold value	Relay output activated	Yellow LED lights up
Flow < s threshold value	Relay output not activated	Yellow LED goes out

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3. TECHNICAL DATA

Type	**NLSW®45-4 SIL1**	
Item	75108SIL1	74297SIL1
Operating voltage	24 V AC/DC	230 V AC
Voltage tolerance	± 5	± 6
Overvoltage category	II	
Signal display voltage	Green LED	
Power consumption max.	3 VA	5 VA
Ambient temperature of device	-20 ... 50°C	
Signal output current	Relay, 1 changeover contact	
Switching function with flow	Relay pulls in	
Relay output	250 V AC, 8 A, 2 kVA, to be protected externally with 10.3 A micro fuse	
Minimum switching capacity	10 mA, 5 V DC	
Signal indicator when current is flowing	Yellow LED	
Start-up delay	Optionally available with NLSW evaluation unit® 45-4Z	
Start-up delay display	-	
Media temperature range	-15 ... 80°C	
Switching point setting	Adjustable via potentiometer	
Water/air flow range	0.05 ... 3 m/s, 0.5 ... 20.0 m/s	
Measuring sensor (available separately F6.x SIL1)	Permanently mounted	
Immersion depth depending on sensor, approx.	25 mm, 46 mm, 70 mm, 150 mm	
Process connection	G1/2 inch, G1/4 inch	
Sensor material	Stainless steel (V4A)	
Pressure resistance	10 bar	
Electrical connection	10 terminals, 2.5 mm^2	
Protection class housing	IP40	
Protection class terminals	IP20	
Pollution class	2	
Housing dimensions (L x W x H)	120 mm x 45 mm x 73 mm	
Test mark	Type tested by TÜV Nord in accordance with DIN EN 61010-1:2011-07	

4. INSTALLATION AND COMMISSIONING

Installation and commissioning must be carried out by authorised and qualified personnel.

The connection to the main power supply (L, N) must be made via a protected isolating switch with standard fuses. The general VDE regulations must be observed (VDE 0100, VDE 0113, VDE 0160). If the potential-free contact is connected to a protective low voltage, the connection cables must be adequately insulated up to the terminal, as otherwise the double insulation to the mains voltage side may be impaired. The current carrying capacity of the potential-free contact is limited to 10 A.

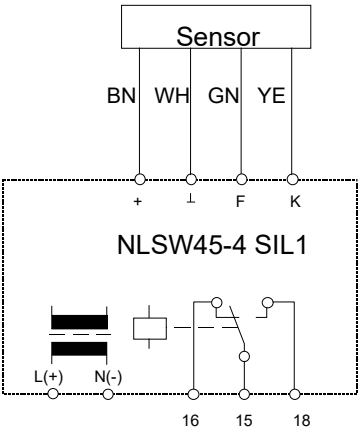
®The NLSW 45-4 SIL1 evaluation unit is designed for mounting on a profile rail (DIN EN 50022-35). If the device is exposed to significant vibrations, it should be mounted on vibration-damping metal. The built-in device in accordance with IP20 (corresponds to VBG4) must be mounted in a housing or in a control cabinet.

4.1. Installation conditions

To avoid malfunctions, please observe the following points:

- The tip of the sensor should be as close as possible to the centre of the pipe.
- There is a small notch in the metal at the end of the sensor. This mark is intended as an installation aid and should be positioned in the direction from which the power is supplied.
- If you are measuring air flows with the device, the following applies:
  - For vertical pipes, the flow direction should be upwards, especially for small air flows (up to 1 m/s), to avoid interference from thermally rising air.
  - For optimum measurement, the sensor requires at least 5 x D (inner pipe diameter) of free inlet and 3 x D of outlet to avoid measurement errors due to turbulence.
- Only screw in the corresponding sensor F6 SIL1 (sold separately) via the hexagon of the sensor housing.
- If there are deposits or air pockets in horizontal pipes, install the sensor sideways. The sensor is not dependent on the installation position.
- If the sensor cable is laid in a duct together with other live cables (e.g. motors or solenoid valves), we recommend shielding the sensor cable (apply shielding).
- Connect the sensor to the device according to the connection diagram. Mixing up the connections will result in malfunctions and possibly damage.
- To avoid malfunctions, the sensor cable must be extended using a cable with a cross-section of at least 1.5 mm^2. The maximum cable length should not exceed 50 m.

4.2 Electrical connections



Colour code: BN=brown WH= white GN= green YE=yellow

The potential-free contact must be externally protected with a 10.3 A slow-blow fuse.

4.3 Setting the switching point

The relationship between flow velocity and resistance change is not linear. In the lower range (low flow rates), the change in resistance is very large. In the upper range, the change in resistance becomes smaller and smaller for the same changes in flow rate. When setting the switching point, it is therefore important to consider which change is to be monitored, as different settings have certain disadvantages. The following requirements should be observed:

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, as the change in the 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 setting is only possible for applications with slow temperature changes.

Low flow variation in the low flow rate range: The switching point can be selected at a greater distance from the normal flow measurement value, as the measurement value changes significantly when the flow changes. A temperature change does not affect the switching behaviour.

Large flow change: In this case, a 'yes/no' statement is usually desired (e.g. fan running or fan stopped). A safety margin can therefore be selected that is large enough to prevent temperature changes or turbulence from influencing the switching behaviour.

The switching point is set on the flow monitor's evaluation unit.

4.4 Instructions for commissioning

The following procedure is recommended for commissioning and adjusting the device:

- Install and connect the flow controller in accordance with the installation instructions and conditions.
- Connect the appropriate sensor (F6.1 – F6.5 SIL1, available separately). Please note: Interchanging sensor connections will result in malfunctions and possibly damage.
- Set the "Sensitivity" potentiometer to minimum sensitivity (left stop).
- Connect the mains voltage. The green LED lights up. The device is ready for operation within a few seconds.
- Switch on the flow generator.
- Set the nominal flow rate.
- Slowly turn the "coarse" potentiometer clockwise until the yellow LED lights up and the signal output switches. To avoid false switching when there are small changes in the flow rate, check the "fine" potentiometer after 2 to 3 minutes and turn it slightly beyond the switching point.
- To check the function of the flow controller, reduce or stop the flow.
- The yellow LED goes out (output relay on the device has dropped out).

The device is now ready for operation.

5. MAINTENANCE AND SERVICING

5.1. Manufacturer's maintenance specifications

Definition of terms according to IEC 60079-17

Maintenance and repair: A combination of all activities performed to maintain an item in a condition or restore it to a condition that meets the requirements of the relevant specification and ensures that the required functions are performed.

Inspection: An activity involving the careful examination of an item with the aim of making a reliable statement about its condition, carried out without dismantling or, if necessary, with partial dismantling, supplemented by measures such as measurements.

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Type of test	Definition	Recommended interval
Visual inspection	A visual inspection is an inspection in which visible defects are identified without the use of access equipment or tools, for example damage to the sensor or dust deposits.	Monthly
Close inspection	An inspection in which, in addition to the aspects of the visual inspection, defects are identified that can only be detected by using access equipment, e.g. steps (if necessary), and tools. For close-up inspections, it is not usually necessary to open the housing or disconnect the equipment from the power supply.	Every 6 months
Detailed inspection	An inspection in which, in addition to the aspects of the close-up inspection, defects such as loose connections are detected that can only be identified by opening enclosures and/or, if necessary, using tools and test equipment.	Every 12 months
Inspection of the entire system	The operator is responsible for	

The air flow sensor should be serviced at regular intervals, i.e. the water and air flow sensor should be cleaned if used in heavily contaminated media.
contaminated media, the water and air flow sensor must be cleaned. The following procedure is
:

- Carefully remove the flow sensor
- Carefully place the flow switch in lukewarm soapy water for approx. 10 minutes (depending on the degree of contamination)
- Carefully rinse the flow switch with lukewarm water
- Install the flow switch
- Switch on the flow monitoring and, if necessary, recalibrate with the evaluation electronics

Please do not clean the sensor tip with a screwdriver, wire brush or similar. There is a risk of damage.

6. TROUBLESHOOTING

The following instructions are intended as first aid if your flow monitor is not working properly.

Problem	Possible cause	Solution
The device is not working.	No power supply or incorrect power supply.	Check the power supply and connection.
The device does not detect any water or air flow.	The sensor is not installed correctly. Flow rate is outside the measuring range. Glycol content is higher than 30%.	Check that the sensor has been installed so that its mark is facing the air flow source and close to the centre of the duct. Adjust the diameter of the pipe to increase or decrease the flow rate. Reduce glycol content to below 30%.
The device detects a flow even when there is no flow.	Flow is also present when the system is at a standstill, e.g. due to ventilation flaps or air flowing in from outside.	Adjust the switch point of the sensor.
The device responds with a delay.	The sensor tip is dirty. Glycol content is higher than 30%.	Carefully clean the sensor with water. Reduce glycol content to below 30%.
The device switches when the media temperature rises quickly.	The temperature gradient is outside the technical specifications.	Turn the "Sensitivity" potentiometer a little further clockwise. Set the switching point in a hot media environment.

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7. EU DECLARATION OF CONFORMITY

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EU-Declaration of Conformity

The EU declaration of conformity applies to the following unit:

NLSW®45-4 SIL1

This declaration of conformity is issued under the sole responsibility of the manufacturer.
We confirm the conformity to the essential requirements of the European directives:

2014/30/EU (EMV-Richtlinie)
2014/35/EU (Niederspannungsrichtlinie)
2011/65/EU (Beschränkung gefährlicher Stoffe)
2015/863/EU (Ergänzung RoHS 3)

The following standards were applied:

DIN EN IEC 63000: 2019-05
DIN EN IEC 61000-6-2: 2019-11
DIN EN 61000-6-3: 2021-03

Wülfrath, 28th March 2023

Philipp Hein
Managing Director

Note

Growing network of local distributors available online
www.seikom-electronic.com

Our product portfolio

Flow	Pressure	Temperature
Air quality and CO^2	Zener barriers	Universal transmitter

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