SEIKOM ELECTRONIC

User Manual
NLSW®45-3 SIL2

24 V AC/DC, 230 V AC

Version 1

+49 2058 2044 • info@seikom-electronic.com • www.seikom-electronic.com

TABLE OF CONTENTS

1. SAFETY INSTRUCTIONS

Please read the product description carefully before operating the unit. Make sure that the product is suitable for your application without any restrictions.

Improper use or use not in accordance with the intended purpose can lead to malfunctions of the unit or undesirable effects on your application. For this reason, installation, electrical connection, commissioning, operation and maintenance of the unit may only be carried out by trained personnel.

2. GENERAL INFORMATION

The air flow monitor NLSW®45-3 SIL2 is a flow monitor consisting of two air flow sensors and an evaluation unit. The device operates according to the calorimetric measuring principle. The NLSW®45-3 SIL2 complies with SIL2 standards according to IEC 61508-5:2010. Both the circuitry in the evaluation unit and the sensors have a redundant design.

2.1 Areas of application and practical use

The electronic airflow monitors of the NLSW®45-3 SIL2 type series are used for monitoring fans or control dampers, for airflow-dependent monitoring of humidifiers and electric heating registers in accordance with DIN57100 Part 420 or for use in conjunction with DDC systems.

General areas of application: Fan monitoring, extraction systems, supply air systems, machine and plant construction. Another area of application is the monitoring of motor cooling systems in the direction of flow behind the unit to be cooled.

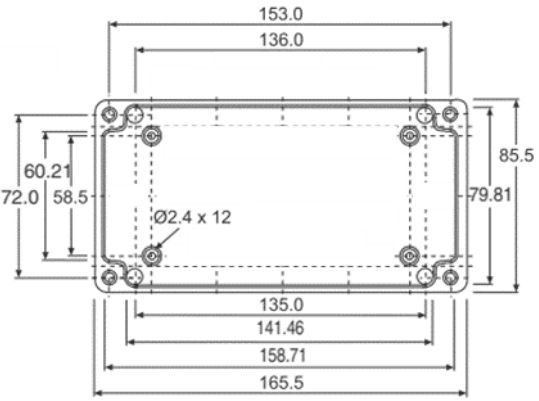
2.2 Operating principle

Flow monitors of the NLSW®45-3 SIL2 series operate according to the calorimetric principle. The unit's relay switches when the flow velocity reaches a preselected threshold value. The calorimetric measuring principle is based on a heated, temperature-sensitive resistor. Heat is extracted from the precision resistor by the flow in the medium. The temperature of the resistor changes and thus its resistance value. This change is evaluated by the device. However, since not only the flow velocity of the medium has an influence on the amount of heat dissipated, but also its temperature, a correlation between flow and temperature must be established. This is achieved by a second, temperature-dependent precision resistor in addition to the first. The second precision resistor (temperature compensation) is not heated and only serves to measure the temperature.

3. TECHNICAL DATA

Typ	**NLSW®45-3 SIL2**	
Article number	77029SIL2	63377SIL2
Operating voltage	24 V AC/DC	230 V AC 50/60 Hz
Voltage tolerance	± 10%	± 5%
Overvoltage category	II	
Signal lamp voltage	Green LEDs	
Power consumption	5 VA	11 VA
Ambient temperature unit	-20°C ... 60°C	
Signal output flow	2 Relay contacts (changeover contact)	
Switching function for flow	Relay activates	
Current and contact load capacity	250 V AC, 8 A, 2 kVA	
Minimum switching capacity of the relays	10 mA / 5 V DC	
Signal lamp flow	Yellow LEDs	
Start-up bridging	5 s ... 60 s	
Signal lamp start-up bypass	Yellow LEDs	
Media temperature range	-20°C ... 120°C	
Temperature gradient	30 K/min	
Switching point adjustment	Adjustable via potentiometer	
Measuring range	0.1 ... 35.0 m/s	
Associated sensor	F3.x SIL2 2 sensors required due to the redundant setup	
Immersion depth probe	50 mm (F3 SIL2), 130 mm (F3.1 SIL2), 165 mm (F3.2 SIL2), 300 mm (F3.3 SIL2), 400 mm (F3.4 SIL2), 500 mm (F3.5 SIL2)	
Process connection	PG7 thread	
Sensor material	MS58, nickel-plated, optionally stainless steel available	
Pressure resistance	10 bar	
Electrical connection	14 clamping plugs, 2.5 mm^2	
Protection class housing	IP65	
Protection class sensor	IP67	
Housing dimension (L x W x H)	165 mm x 85 mm x 55 mm	
SIL certification	SIL2 classification IEC 61508 SIL 2: 03.2023, Typ A	
Further certifications	CE, UKCA	

3.1 Dimensions



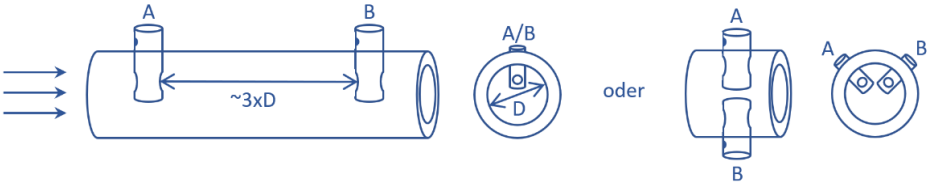
4. INSTALLATION AND COMMISSIONING

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

4.1 Installation conditions of the airflow sensors

The following installation conditions must be observed for the F3.x SIL2 sensor:

- The sensor tip should be in the middle of the pipe and must be fully surrounded by the medium (air/gas).
- Align the marking on the sensors in the direction of the flow.
- The sensors must be mounted in the same pipe in such a way that they do not influence each other (approx. 3 x D (pipe inner diameter) distance behind each other or at the same height in the duct) - see the following drawing:



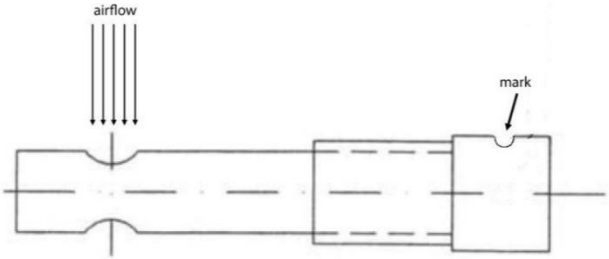
- For vertical ducts, the flow direction should ideally be from bottom to top.
- Keep a free inlet distance 5 x D before the sensor and an outlet distance 3 x D after the sensor.
- Screw in the sensors only via the hexagon of the sensor.

+49 2058 2044 • info@seikom-electronic.com • www.seikom-electronic.com

- The sensors are independent of the installation position.
- The sensors must be connected to the airflow monitor according to the connection diagram. Mixing up the connections will lead to malfunctions and possible damage.
- If the sensor cable is laid in a duct together with other current-carrying cables (e.g. motors or solenoid valves), we recommend shielding the sensor cable (apply shield). Sensors with shielded cables are available from SEIKOM as accessories.
- To avoid malfunctions, the sensor cable must be extended with a cross-section of at least 1.5 mm^2. The maximum cable length should not exceed 50 m.
- Maintenance note: Depending on the application, regular cleaning is necessary. Maintenance intervals must be determined and specified as required.

4.2 Installation

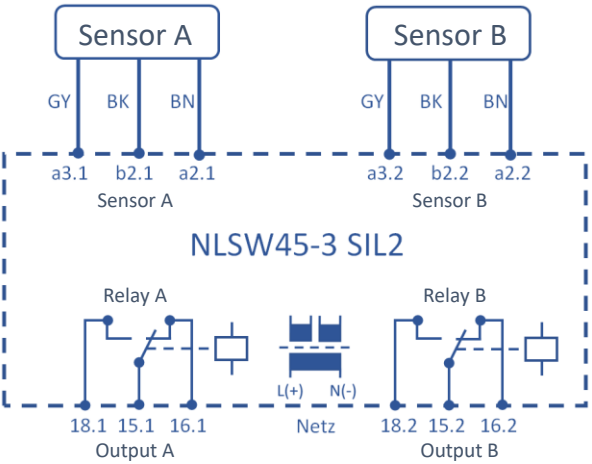
Mounting is done via the PG7 thread on the sensor housing. Mounting is also possible with the aid of the enclosed PG7 nuts. The marking serves as an alignment aid to align the cross hole with the sensors in the air flow. When commissioning with media temperatures below 0°C and strong air flows, the start-up time of the unit may be extended to 60 s until it is ready for operation.



4.3 Electrical connection

The mains connection (L1, N) must be established via a fused disconnector with the usual fuses. The general VDE regulations (VDE0100, VDE0113, VDE0160) must always be observed during electrical installation.

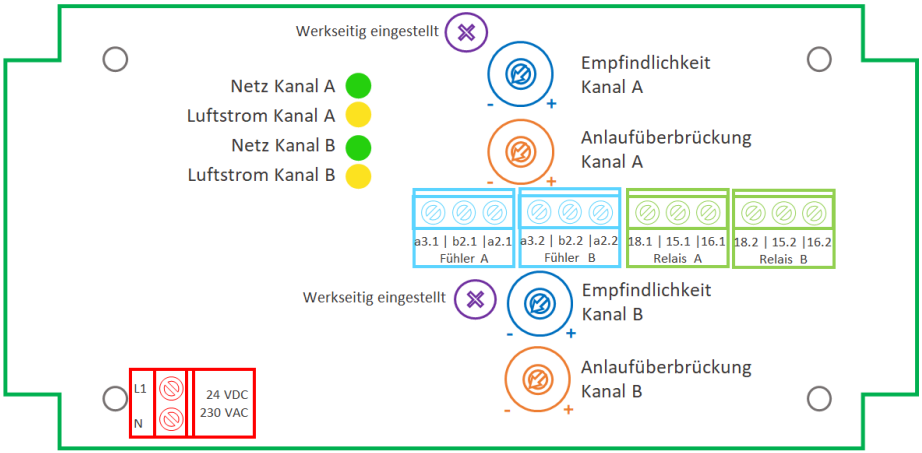
If a safety extra-low voltage is applied to the potential-free contact, care must be taken to ensure that the connection cables are adequately insulated right up to the terminal point, otherwise the double insulation to the mains voltage side will be impaired. The current carrying capacity of the potential-free contact is limited to 8 A.



Colour code: GY = grey | BK = black | BN = brown

4.4 Commissioning the device

The two potentiometers (purple) fixed with protective lacquer are factory-set and must not be adjusted.



When commissioning and adjusting the units, the following procedure is recommended:

a) Connect two suitable probes (F3.x SIL2) to the unit via the supplied terminals; probe A to channel A, probe B to channel B (light blue).

+49 2058 2044 • info@seikom-electronic.com • www.seikom-electronic.com

b) Connect PLC or control to relay output A and B via the supplied terminals (green). Please note the contact assignment NO/NC and switching.
c) Potentiometer „Empfindlichkeit/Sensitivity“ (dark blue) set to left stop (insensitive) for both channels.
d) Potentiometer "Anlaufüberbrückung/ start-up bypass“ (orange) to the desired start-up bridging time approx. 5 s ... 60 s (left stop approx. 5 s/ right stop approx. 60 s) for both sensors.
e) Apply mains voltage (red); The green LEDs light up. The unit is ready for operation within 2 seconds.
f) The yellow LEDs light up (briefly) and go out again as soon as the set start-up hold-up time has elapsed. The relays are energised during this time.
g) Switch on the air flow generator.
h) Before setting the switching point, the unit should run for at least 2 minutes under operating conditions (with flow). The switching point adjustment at low flow velocities requires a sensitive adjustment at the potentiometer.
i) Potentiometer „Empfindlichkeit/ Sensitivity“ channel A (dark blue) slowly to the right until the yellow LED lights up and the output relay picks up. To achieve stable switching conditions, you should turn slightly beyond the switching point. Set the same switching ratio for channel B.
j) *Note: Depending on the installation position and airflow situation in the duct, small switching differences between duct A and duct B are normal.*
k) If the start-up delay is preset, do not adjust the sensitivity until the start-up delay has expired and the yellow LED has gone out.
l) To check the flow monitoring, reduce or switch off flow generation. The yellow LEDs go out and the output relays drop out.

The unit is now set to monitoring function.

Preset values of the NLSW®45-3 SIL2:

- The switching hysteresis is fixed.
- The switching delay is 0.2 s as standard.
- The start-up delay is adjustable from 5 s to 60 s as standard.

4.5 Switching point adjustment

The relationship between air velocity and change in resistance is not linear. In the lower range (small flows) the change in resistance is very large. In the upper range, the change in resistance becomes smaller and smaller for the same flow changes. When setting the switching point, it should therefore be taken into account which change is to be monitored, as different settings entail 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 measured value with flow change is very small. Since the temperature compensation has a certain delay compared to the actual temperature change, such a switching point setting is only possible in applications with slow temperature changes.

Low flow change in the low flow velocity range: The switching point can be selected with a greater distance to the measured value of the normal flow, as the change in measured value is large with a change in flow. A change in temperature does not affect the switching behaviour.

Large flow change: Here, a 'yes/no statement' is usually desired (e.g. fan running or fan stopped). Therefore, such a large safety distance can be selected that neither temperature changes nor

turbulences have an influence on the switching behaviour. The switching points are set on the evaluation unit of the airflow monitor.

5. TROUBLESHOOTING

The following instructions are intended as first aid in case your airflow monitor does not work properly. If you have any further questions, the SEIKOM Electronic team will be happy to assist you by telephone or e-mail at any time.

Problem	Possible cause	Troubleshooting
Unit does not work at all	No or wrong mains voltage connected	Check mains voltage and connection
Unit does not detect flow (on one or both channels)	Sensor(s) is/are not installed correctly or the sensitivity on the evaluation unit is not set correctly	Check installation conditions and sensitivity settings
	Flow rate is outside the measuring range	Adjust the diameter of the pipe to increase or decrease the flow
NLSW®45-3 SIL2 works but both channels switch (very) differently	Sensor of one channel not set correctly or defective	Check sensor and setting; if necessary, replace and readjust the sensor
NLSW®45-3 SIL2 has changed response behaviour	Sensor is heavily contaminated by the medium (deposits on the sensor)	Carefully clean the sensor with water. Never use hard objects for cleaning
NLSW®45-3 SIL2 switches in the event of rapid media temperature increase or decrease	Temperature gradient is out of specification	Check the temperature gradients of the system (max. 30 K/min); In the event of a fault, set the switching point with hot flowing medium

6. EU DECLARATION OF CONFORMITY

SEIKOM Electronic GmbH & Co. KG
Fortunastraße 20
42489 Wülfrath
Telefon: +49 (0) 2058 2044
E-Mail: info@seikom-electronic.com

EU-Declaration of Conformity

The EU declaration of conformity applies to the following unit:

NLSW®45-3 SIL2

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

SEIKOM-Electronic GmbH & Co. KG
Fortunastraße 20
D-42489 Wülfrath
Telefon: +49 (0) 2058 2044

Geschäftsführer Philipp Hein, Philipp Weisser
Handelsregister HRA22514, Amtsgericht Wuppertal
Umsatzsteuer-Ident-Nr. DE260302013
WEEE-Reg.-Nr. DE38909112

www.seikom-electronic.com
info@seikom-electronic.com
Kreissparkasse Düsseldorf
IBAN DE15 3015 0200 0003 6169 84

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

Our Product Portfolio

Flow	Temperature	Pressure
Air Quality and CO^2	Zener Barriers	Universal Transmitters

+49 2058 2044
info@seikom-electronic.com
www.seikom-electronic.com
SEIKOM-Electronic GmbH & Co. KG
Fortunastraße 20
42489 Wülfrath

SEIKOM ELECTRONIC