



User Manual

RLSW[®]9

24 V DC



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1. SAFETY INSTRUCTIONS



Read the product description before commissioning the device. Make sure that the product is fully suitable for your application without any restrictions.

Improper use can lead to malfunctions of the device or to undesirable effects on your application.

For this reason, installation, electrical connection, commissioning, operation and maintenance of the device may only be carried out by trained personnel.

2. GENERAL INFORMATION

The RLSW®9 is a microcontroller-based air flow monitor that monitors gaseous flows or the volume flow in the range of approx. 0.1 ... 200 m/s (up to 64,000m³/h, 64,000l/min) – depending on your configuration. A linear 4 ... 20 mA and a 0 ... 10 V DC output are available as output signals for the flow. To increase operational safety, the sensor and the evaluation electronics are monitored for function and errors during operation. The sensor connection cable is continuously monitored for short circuits and wire breaks.

2.1 Proper use

The flow monitors of the RLSW®9 series are designed for monitoring gaseous media or the volume flow within the specified technical data. The main areas of application are industrial ovens, industrial drying processes and extraction systems as well as HVAC in the field of building automation.

2.2 Functional principle

Flow monitors in the RLSW®9 series work according to the calorimetric principle. The relay of the device switches when the flow velocity reaches the set 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 with it its resistance value. This change is analysed 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 is only used to measure the temperature.

3. TECHNICAL DATA

Type	RLSW®9	RLSW®9 M8
Device type	Compact device with permanently mounted sensor	Separate sensor and electronics connected by cable
Article no.	1362Fx	1362FxM8
Operating voltage	24 V DC	
Voltage tolerance	20 ... 36 V DC	
Overtoltage category	II	
Voltage signal display	Mains available, green LED	
Power consumption max.	5 VA	
Ambient temperature Device	-20 ... 50°C	
Signal output flow (V) Burden	0 ... 10 V, linear Ra = 0.4 kOhm	
Signal output flow (mA) Burden	4 ... 20 mA, linear Ra = 0.4 kOhm	
Relay output	1 changeover contact (terminals 8/ 9 close and terminals 7/8 open in case of flow)	
Switching function with flow	Switching point adjustable via potentiometer	
Reproducibility of the output signal	±2%	
Temperature dependence of the output signal	±1%	
Accuracy (reference at 22°C, 35% r. h. 1013 mbar)	±5% of the measuring range end value	
Linearity error	±1% of full scale / ±0.5K / ±1 mbar	
Relay output	175 V AC/DC, 0.25 A	
Minimum switching capacity	10 mA / 5 V DC	
Signal display with flow	LED indicator and display	
Standby time (without start-up bridging)	Approx. 5 s	
Media temperature range	-25 ... 80°C	-25 ... 80°C (optionally available up to 250°C or 350°C)
Temperature gradient	30 K/min	
Maximum measuring range	0.1 ... 30.0 m/s, optionally up to 200.0 m/s	
Speed dimension	m/s, l/min, m ³ /h	
Maximum volume flow	63,000 m ³ /h, 63,000 l/min	
Immersion depth approx.	50 mm, 130 mm, 165 mm, 300 mm, 400 mm, 500 mm (special lengths optionally available)	
Process connection	PG7, mounting flange (optional M16x1.5, G ½", M20x1.5)	
Sensor material	MS, nickel-plated, optionally stainless steel	
Compressive strength	10 bar	
Electrical connection	9 screw terminals, max. 1.5 mm ²	
Protection class	IP67	
Pollution class	II	
Housing dimensions	113 mm x 80 mm x 60 mm (L x W x H)	

Reference conditions: Inlet section >5 x DN, outlet section > 5 x DN laminar flow, at 0°C and 1.013 bar.



Increased operational reliability for your machine/system thanks to continuous monitoring of the sensor, the sensor elements and the connecting cable for short circuits and wire breaks during operation. In addition, the electronics are continuously monitored by internal test routines. If one of the aforementioned faults occur, the output switches off and the fault is indicated by an error code in the display and on the LED strip.

After switching on the operating voltage, the following sequences are displayed:

LCD line 1: start 5 s The time shows the set start-up delay (5s).
LCD line 2: version 703 Shows the installed software version (1.703 or higher)

After the start time has elapsed, the device switches to monitoring mode and displays the current airflow in the first line as a percentage of the maximum set airflow. The second line shows the airflow speed or the flow rate, depending on the setting.

The following LEDs light up as standard:

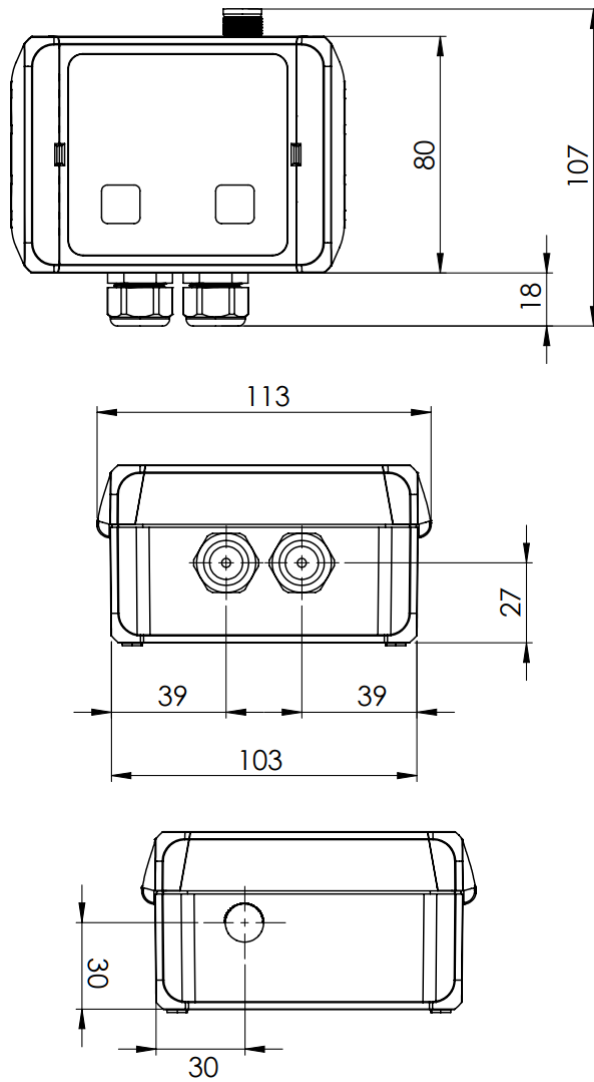
- One green LED for operating voltage
- A yellow LED as soon as the flow exceeds the set switching value
- Up to 10 continuously lit red LEDs, with one red LED corresponding to 10% of the maximum flow



The switching value flashes from the red LEDs (ex works LED no. 5 for 50% of the flow). If the first red LED flashes, the current flow velocity is below 10% of the measuring range. If the last red LED flashes, the flow velocity is above the set maximum value.

Any errors that occur (see "Explanation of the error code") are also displayed on the LCD. All outputs then switch off. A restart (disconnect from the mains for at least 4 seconds) cancels any errors displayed.

3.1 Dimensions



4. INSTALLATION AND COMMISSIONING



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

The connection to the main supply (L, N) must be made via a protected circuit breaker with standard fuses. The general VDE regulations must always be observed (VDE 0100, VDE 0113, VDE 0160). If the potential-free contact is connected to a safety extra-low voltage, the connecting cables must be sufficiently 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 0.25 A. If necessary, the circuit of the potential-free contact must be fused accordingly.

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. If necessary, determine the area of the strongest flow in the pipe cross-section and correct the sensor position. The through-hole in the shaft of the sensor must be completely inside the duct.
- There is a small notch in the metal at the end of the sensor. This marking is intended as a mounting aid and should be placed in the direction from which the flow is coming.
- With vertical ducts, the direction of flow should be upwards, especially for small air flows (up to 1 m/s), in order to avoid influences from thermally rising air.
- For optimum measurement results, observe at least $5 \times D$ (pipe inside diameter) of the free inlet and $5 \times D$ of the outlet to avoid incorrect measurements due to turbulence.
- Only screw in the flow monitor via the sensor tube / hexagon of the sensor housing.
- Condensation and contamination in the medium can falsify the measurement result.
- Check the electrical connection.
- The volumetric measuring device must be started before the fan (flow generator / compressed air...).

Optimum measurement results can only be achieved if the sensor is installed in the optimum position and the inlet and outlet distances are observed. At high and borderline temperatures, the radiant heat of the pipe network can possibly influence the signal output. The device works even if the inlet distances are not adhered to, which means that the reproducibility, accuracy and linearity errors may have tolerances.



The sensor and device are calibrated in pairs and are only intended for use with each other. Interchanging them can cause malfunctions.

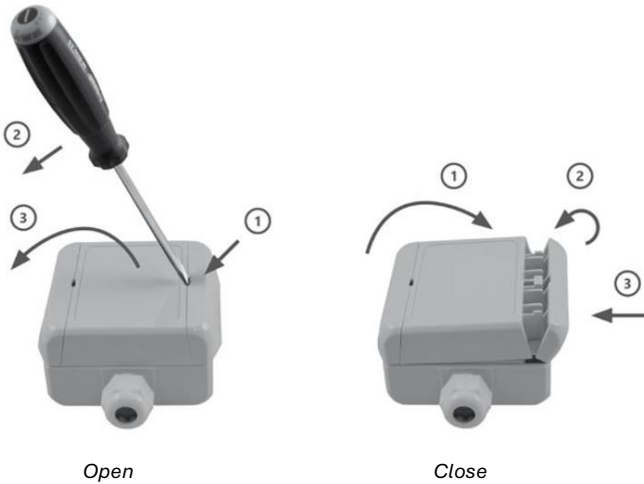
The cable must not be shortened, extended or replaced as this may cause malfunctions. A longer sensor connection cable can be ordered if required.

The remote sensor must not be removed from the appliance before or during operation.

4.2 Electrical connections / terminal assignment

The electrical connections are located in the housing under the cover with the membrane keypad. The cover is opened by inserting a flat, approx. 4 mm wide screwdriver into the slot on the right and then pushing the screwdriver slightly inwards/leftwards.

The cover then opens to the left. Please ensure that the membrane keypad is not damaged when opening.



To close, press the lid shut again and click the catch into place. Please ensure that no cables are trapped and that the foil cable is not damaged.

The numbers below correspond to the terminals of the green terminals on the circuit board.



Clamp	Occupancy	Value
1	Power supply plus	+ 24 V DC
2	Power supply minus	Ground / Earth
3	Temperature voltage output plus	0 ... 10 V
4	Flow/current voltage output plus	0 ... 10 V

5	Flow/current current output minus	4 ... 20 mA
6	Flow/current current output plus	4 ... 20 mA
7	Relay contact NC contact	NC ('normally closed')
8	Relay contact centre /Common contact	COM ('common')
9	Relay contact NO contact	NO ('normally open')

Voltage outputs 0 ... 10 V to earth

- Temperature voltage output: between terminals 2 and 3
- Air flow voltage output: between terminals 2 and 4

Current output 4 ... 20 mA

- Air flow current output: between terminals 5 and 6



Terminals 2 and 5 must not be bridged

4.3 Setting the switching point

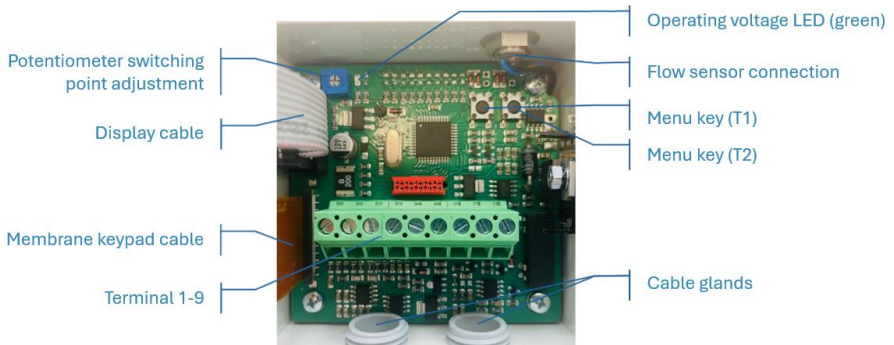
The device is already preset at the factory and can be put into operation immediately after installation and wiring without any further settings. Please refer to the device description on the delivery note for the preset parameters. Customisation is possible at any time and can be carried out as shown in the menu description. Depending on the specification, not all options are available in the menu. See chapter 4.4 for the menu settings.

The switching points are set using the potentiometer on the evaluation unit of the airflow monitor. An LED in the ten-part LED chain flashes twice per second to indicate the set switching point.

The current airflow is displayed relative to the maximum set airflow via the LED chain (e.g.: maximum airflow = 10 m/s, three illuminated LEDs correspond to 30% of the maximum airflow. This means that an airflow of 3 m/s is measured).

If the percentage value is constantly above 100%, the LED on the far right flashes at a high frequency. In this case, an upward adjustment in the "Max. speed" menu item is advisable.

If the air flow is permanently at a very low level, the LED on the far left flashes at a low frequency. A downward adjustment in the "Max. speed" menu item is then recommended.



Further switching point setting options 1 (optional): Relative

If the switching point is set to "flow%" under menu item 4: "Alarm", you will be prompted to set a number between 1 and 99 when you press Menu/T1. This number corresponds to the switching point as a percentage of the set maximum flow, e.g: Maximum flow = 10 m/s, switching point 50%, real switching point is then 5 m/s.

Further switching point setting options 2 (optional): Reference

If the switching point is set to "ref%" under menu item 4: "Alarm", you are prompted to set a number between 1 and 99 by pressing Menu/T1. This number corresponds to the switching point in per cent of a value that is automatically recorded as soon as the menu is exited or the device is restarted. The recording takes 120 s. During this time, the flow is measured and an average value is calculated at the end of the time. The switching point is determined from this average value.

4.4 Menu settings

You can access the setting mode by pressing and holding (approx. 3 s) the "Menu" button on the cover or T1 in the appliance itself. Please note that the number and type of menu items may vary depending on the specification and design. The programme sequence is fixed and cannot be changed by the user.

Menu control via button T1 (Menu) and button T2 (Mode):

T1 / Menu = next/ continue

T2 / Mode = select

Menu item German	Menu item English	Meaning	Selection Possibility of	Standard Setting
language	language	Menu language customisation	German English	German
start delay	start del	Start delay/start-up delay (in seconds): Time after switching on/starting up the device before the switching function of the volumetric flow meter is activated	3 ... 300	5
dim	flow dimens	Definition of the air flow (speed or volume)	m/s m ³ /h l/m	m/s
pipe throughm	pipe diam	Pipe diameter (in mm) for calculating the volume flow; menu item only active if m ³ /h or l/m was previously selected	1 ... 2.500	100
sw max	flow max	Setting the maximum air flow speed or volume	1 ... 64.000	30
alarm hyst	alarm hyst	Alarm hysteresis (in seconds); time between switching the alarm on and off	0-99	1
alarm delayed	alarm del	Alarm delay (in seconds); delay between reaching the switching point and activating the switching function	0-255	0
relay fct	relay fct	Relay function; setting the relay function (normally open or normally closed)	NOP (normally open) NOC (normally closed)	NOP
slower	slow down	Delay of the measurement result; so that short changes in the air flow do not change the display and do not activate the alarm	1-255	80
Cal fact	cal fact	Calibration factor (in per cent); multiplier of the measured value. Attenuated (<100) or amplified (>100); to compensate for structural measurement conditions or deviations, for example.	30-255	100
backlight	backlight	Backlight	ON OFF	AN
more	continue	Exit the settings	continue exit save and exit	more

To finalise the changes, exit the menu under "Display ok" with "Save and exit", otherwise the data will be lost.



If the dimension of the display is changed (e.g. from m/s to l/min), it is essential to readjust the switching threshold and, if necessary, the measuring range. If, for example, 5 m/s was previously set, the device will also react to the value "5" in the new dimension.

When ordering, please specify whether you would like to change the dimension and/or which dimension should be displayed. The default setting can be made at the factory on request.

There is a protective film on the membrane keypad at the factory to protect it from scratches. It can be carefully removed.

4.5 Presentation of the measurement results on the display

The RLSW®9 LCD offers various options for displaying the current air flow/volume flow and the media temperature. By default, the relative flow is displayed in the first line. The second line is used to display the absolute air flow. By pressing Mode/T2, the display switches between air flow, temperature of the air flow/medium or a combined display of temperature and air flow volume/speed.

Note: the sensors are heated by the calorimetric measuring principle, so the temperature display is only meaningful if there is sufficient air flow.

Outputs

The output relay provides a changeover contact. The switching threshold of the optional transistor output (alarm OC/open collector/) is also set via the potentiometer in the same way as the relay output.

The following analogue, linear outputs are also available:

Output	Dependence	Electrical connection
0 ... 10 V DC	Air flow / volume flow	Terminal 2 (ground) and 4 (+)
4 ... 20 mA	Air flow / volume flow	Terminal 5 (-) and 6 (+)

Information on the RLSW®9 M8 with remote sensor

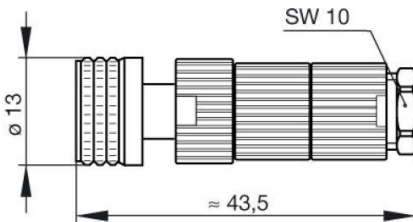
The RLSW®9 is also available with a remote sensor. The supplied sensor has a connection cable with a length of 2.5 metres as standard (special lengths are available on request).

This length must not be changed due to the calibration. The connection is made via an M8 plug. The plug must not be removed from the cable.

When installing the evaluation unit, please ensure that neither the plug nor the cable are kinked. Only the supplied installation kit may be used for installation.



Please allow sufficient space for the plug during installation.

Dimensions M8 connector

5. MAINTENANCE INSTRUCTIONS

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

- Dismantling the airflow monitor
- Carefully soak the airflow monitor in lukewarm soapy water for approx. 10 minutes (depending on the degree of soiling)
- Carefully rinse the airflow monitor with lukewarm water
- Fitting the airflow monitor
- Commission the airflow monitor and carry out a new adjustment with the evaluation electronics if necessary)



Please do not clean the sensor tip with hard objects such as screwdrivers, wire brushes or similar. There is a risk of damage to the sensor elements.

6. TROUBLESHOOTING

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

Problem	Possible cause	Solution
The device does not work.	Missing or incorrect power supply.	Check supply voltage and connection.
The device does not recognise any air flow.	The sensor is not installed correctly.	Check that the sensor has been installed so that its mark is in the direction of the air flow source and close to the centre of the duct.
	Flow rate is outside the measuring range	Adjust the diameter of the pipe to increase or decrease the flow rate.
The device recognises an air flow, even if there is no air flow.	Air flow is also present at standstill, e.g. through ventilation flaps, air flowing in from outside or convection.	Set the switching point of the sensor upwards.
The device reacts with a delay.	The sensor tip is dirty.	Clean the sensor carefully with water.
	Sensor is not installed correctly	Check the installation conditions. Connect the sensors to the device as assigned.
The device has no output signal	Terminal 2 + 5 bridged	Disconnect terminal 2 + 5 and restart the device If the error message appears again, contact SEIKOM Support

<p>Device switches when the media temperature rises rapidly.</p>	<p>The temperature gradient is outside the technical specifications.</p>	<p>Turn the potentiometer slightly further clockwise. Set the switching point in a hot media environment.</p>
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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:

RLSW®9

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

Mettmann, 28th March 2024



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