akribis

USER GUIDE

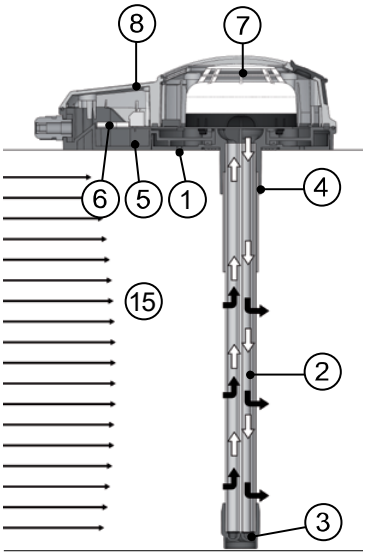
KRM-X

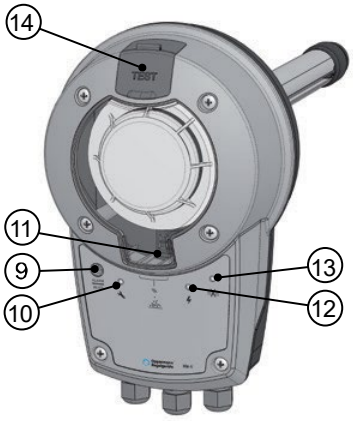
Produal

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SENSOR CONSTRUCTION

1. Adapter plate with gasket
2. Patented measuring tube
3. End cap
4. Rubber bushing
   (only for insulated or circular ducts)
5. Housing base with gasket
6. Electronics
7. Optical smoke detector
8. Housing top with gasket
9. LED red: alarm/reset button
10. LED yellow: failure
11. LED display: sensor contamination in %
12. LED green: in operation
13. LED blue: airflow below 1 m/s
14. Opening for test gas
15. Air duct





ASSEMBLING

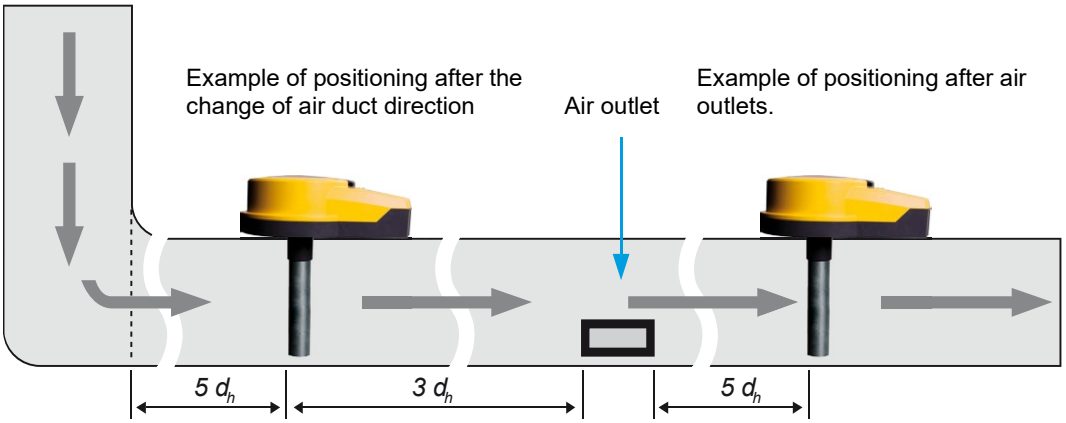
Caution

Device assembly, wiring and commissioning can only be carried out by qualified professionals. Always make the wirings while the power is switched off.

Positioning of the sensor

The KRM-X must be positioned in accordance with the applicable local regulations on ventilation systems. Reliable smoke detection must be ensured. The air collecting tube may be cut to a length of 160 mm, depending on the cross-section of the ventilation duct. It must not be cut to less than this minimum length of 160 mm. Using the KS-X mounting bracket, this makes it possible to monitor ducts up to <100 mm ø. There is no maximum width, height or diameter for air ventilation ducts monitored with the 600 mm long standard air collecting tube under the VdS approval/DIBt certification. The indicated airflow direction must be observed when installing the tube adapter. The air collecting tube may be mounted laterally, below or above the air duct – the location makes no difference.

In the ideal case, as far as is structurally possible, install the KRM-X in a location where flow meters etc. are normally installed, so that there is a laminar airflow along the measuring tube. We recommend mounting and installing the KRM-X at the same distance from heating, cooling and humidity devices and in a similar way as flow sensors. The distance of the KRM-X to fittings, valves, filters, etc. should be 3 times the diagonal of the channel cross-section against the flow direction and 5 times with the flow direction, if this is structurally possible. The KRM-X, including the air collecting tube, may not be installed along the longitudinal edges of ventilation ducts (corner area). The KRM-X must be installed such that the air collecting tube is constantly located in the air stream. In horizontal ventilation ducts the KRM-X, including the air collecting tube, should be installed in the upper third of the ventilation duct or at the top of the ventilation duct, if this is structurally possible.

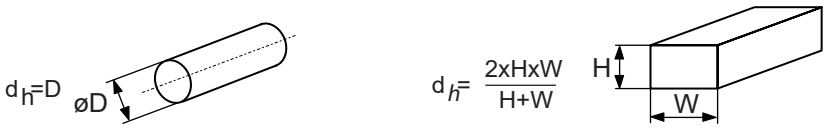


Information is subject to change without prior notice.

If the positioning recommendations cannot be followed for structural reasons, the KRM-X should be mounted such that reliable smoke detection and airflow are nonetheless ensured. The blue airflow LED serves as an airflow indicator (the LED is off with sufficient flow).

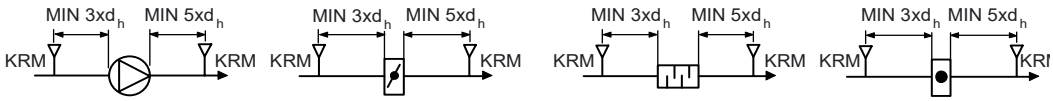
Observe these instructions. All work (such as installation, electrical connection, start-up, operation, and maintenance) must only be performed by sufficiently qualified tradesmen. The respectively applicable local rules and regulations (e.g. national building codes, electrical/VDE regulations, etc.) must be observed. Installers and operating entities are required to sufficiently familiarize themselves before start-up. Read the product description before operating the equipment. Verify that the product can be used for the relevant application without restrictions. We are not liable for printing errors and changes after printing. Appropriate use implies compliance with operating and installation instructions. We are not liable for losses due to inappropriate use. Unauthorized manipulations or modifications of the device render the operating permit, the product warranty and warranty claims null and void.

Hydraulic diameter, d_h

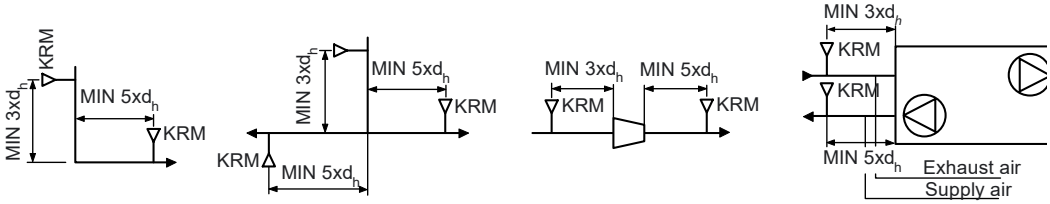


Round duct | Rectangular duct

Example of positioning (recommendation):



Fan | Damper | Silencer | Heater



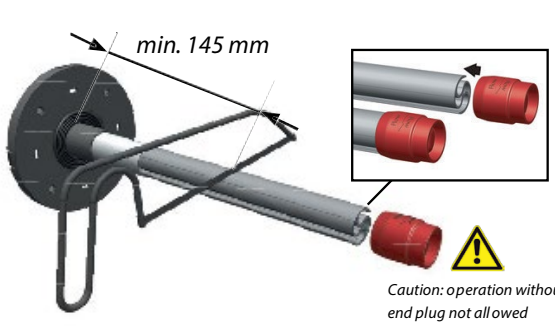
Change in air duct direction | Air duct forking | Air duct narrowing / air duct enlargement | Air duct device

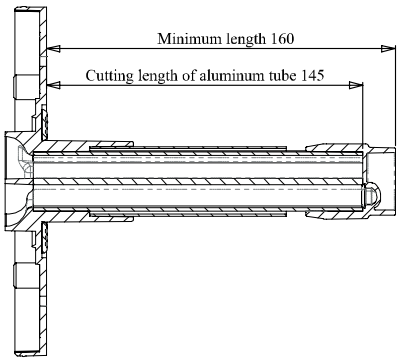
Mounting procedure

1. Drill a hole Ø 43…44 mm in diameter at the intended mounting location.

   NOTE: Installation of the measuring tube is possible either from the top, bottom or side of the channel for all duct cross-sections (for round ducts as well).

2. Determine how long the measuring tube must be. If necessary, shorten the tube. Remove the burr from the cut tube and put the end plug back on up to the stop collar.

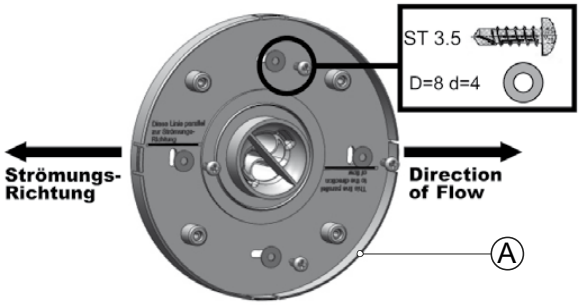




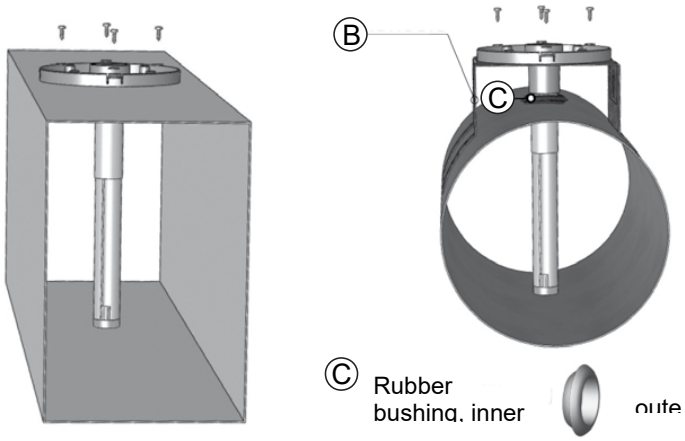
IMPORTANT: Operation without end plug is not allowed. Fit the end plug according to the flow direction marks.

Information is subject to change without prior notice.

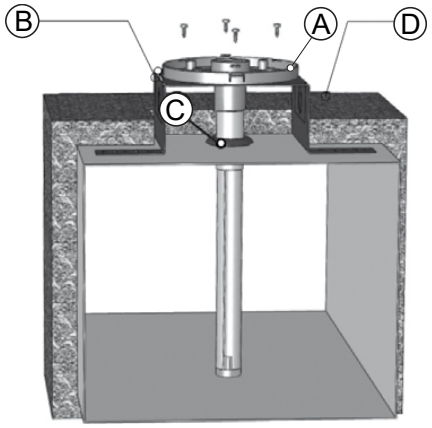
3. Determine the direction of flow and fit the adapter plate (A) so that the line on the adapter plate under the text ”Strömungsrichtung” is parallel to the flow direction. Use four self-tapping screws (not included in delivery) for attaching the plate to the duct.



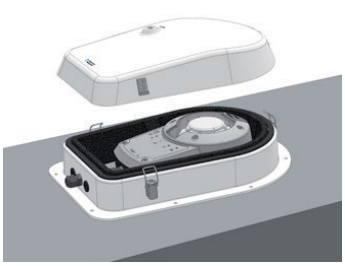
4. When installing on a rectangular air duct, fit the plate directly to the tube. When installing on a circular air duct, use KS-X fitting plate (B) and rubber bushing (C).



5. When installing on the air ducts with insulation, use the rubber bushing and insert it into opening in the air duct. Install the fitting plate (B). Insert the assembled adapter plate (A) into the measuring tube by sliding the measuring tube through the bushing and screw the adapter plate onto the fitting plate (B) using 4 self-tapping screws. Then the insulation (D) can be installed.



6. When installing sensor outdoors or in cold environment, use WDG type housing. Housing prevents the warm air in the smoke detector duct from condensing. The interior of the housing is insulated with foam rubber.

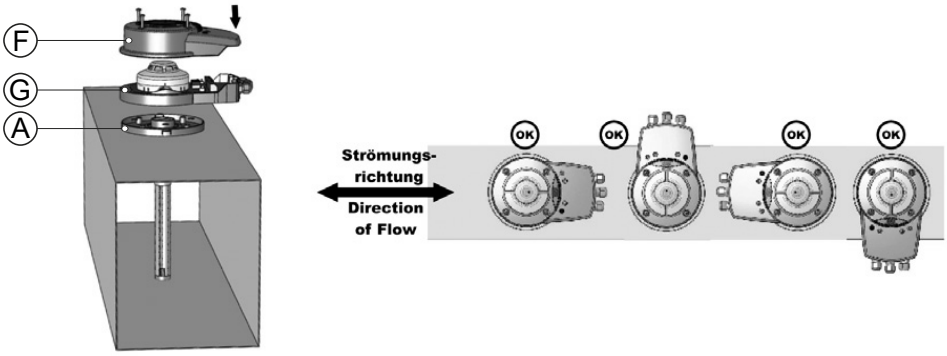




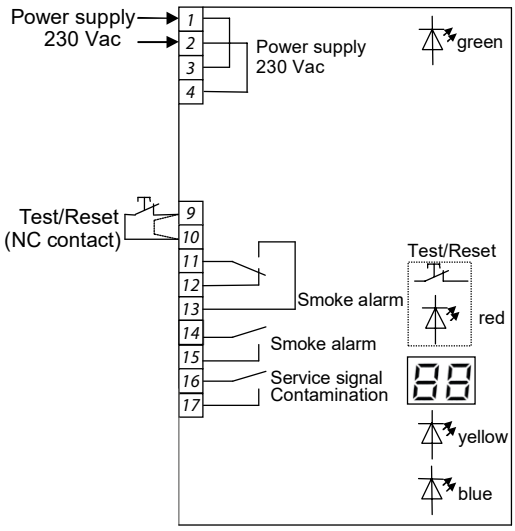
7. Attach the housing bottom part (G) with the electronics and sensor to the adapter plate (A).

   The housing (G+F) can be attached at increments of 90°. The direction of the housing has no effect on the measurement result. You can align the housing with the sensor optimally.

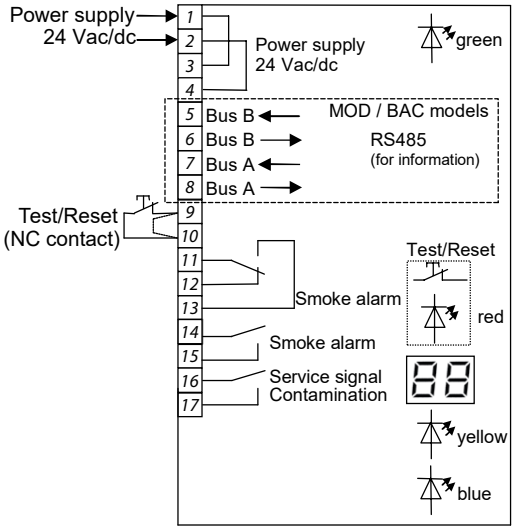
   The cover screw tightening torque is 1.2 Nm.



8. Wire the unit according to the applicable wiring diagram.



KRM-X-1



KRM-X-2, KRM-X-2-MOD, KRM-X-2-BAC

- The cable jacket for field wire connecting must be done as near as possible to the terminal block. For wires longer than 10 mm, the wire must be fixed by a cable clip near the terminal block or insulated in pairs with a suitably protective tube.
- Test/reset (terminal 9 +10): if bridge circuit is removed, a floating NC contact must be connected.
- The floating switching contacts (terminals 11 – 17) should be assigned as uniformly as possible to an installation category according to EN 60730-1. These switching contacts are only to be used for 230 Vac or 24 Vac/dc. Combinations are not permitted unless at least one contact

Information is subject to change without prior notice.

between the potentials remains unassigned. A mixed connection of safety extra-low voltage (SELV) and low voltage are not allowed. The assembly may only be operated on one mains phase. Disconnection / electrical protection equipment must be provided by the customer with a suitable fuse.

Programming the bus address and bus speed for the KRM-2-MOD / KRM-2-BAC

1. Press buttons T3+T4 on the circuit board (to the right, next to the display) at the same time, so that the display changes from contamination level to show the bus address (the display will flash).

   The device returns automatically to previous state after 3 seconds without a button being pressed.
2. Press the T3 or T4 button to set address (1 – 99)
3. Confirm the address with simultaneously pressing of T3 and T4. The value is saved when two underscores appear on the display ("_ _").
4. Set the bus speed.

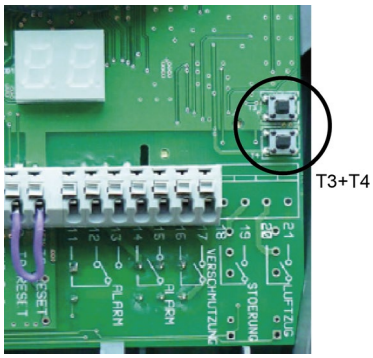
   The available speeds are:

   01 = 9600 bit/s (default)

   02 = 19200 bit/s

   03 = 38400 bit/s

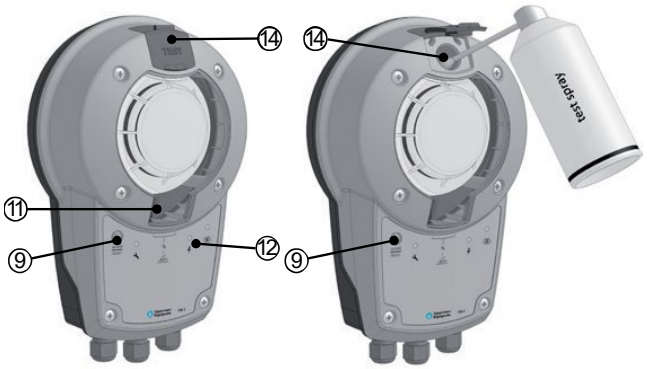
   04 = 76800 bit/s
5. Confirm the bus speed with simultaneously pressing of T3 and T4. The value is saved when two underscores appear on the display ("_ _").



NOTE: The current value is also saved after 6 seconds without a button being pressed.

TESTING THE SENSOR

1. Press the alarm / reset button (9) to perform a simple initial functional test. All LEDs must light up and all relays drop out. The units connected to the relays are activated! The display (11) indicates the current degree of sensor contamination. On releasing the button, all LEDs go out except for LED (12), which shows the supply voltage, and the relays pull in.

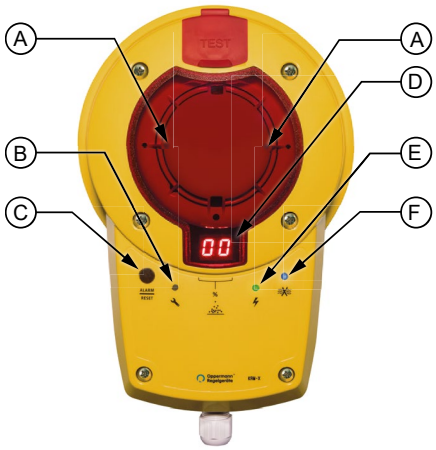


2. Open the test hole cover (14).
3. Insert the test spray's tube fully into the test opening and release as much test gas as needed until the smoke sensor activates. Do not spray too much, otherwise the smoke sensor may display a higher degree of contamination at the next start / reset.

   The alarm / reset button lights up, the relays drop out. The electronics are on alert and locked.
4. Press the Alarm reset button for 2 second to reset the alarm. At the time of the reset, the sensor must be free of smoke and test gas.
5. If there is still test gas in the chamber, the device will indicate a higher contamination level. In this case, wait a while and then perform a reset by disconnecting the voltage or perform an external reset. If necessary, remove the housing cover and blow out the smoke from the detector.

Information is subject to change without prior notice.

DISPLAY AND OPERATION



A. Smoke alarm (red).

B. Failure (yellow).

C. Alarm (red) and alarm/reset button.
Failure reset: briefly press button and release.
Alarm reset: Press button for at least 2 seconds until the red light goes out.

D. Display indicator (contamination in % or status).

E. Power supply (green).

F. Air flow (blue) lights up when there is insufficient air flow

Display	Meaning	Explanation
	Start / calibration	Shortly after starting the software version is displayed (4 digits), e. g. 00 then 20 = Software 0020. The BACnet versions are indicated with “bA”. At startup or after a power failure, this is followed by a rotating segment display.
	Contamination in %	Flashes starting at 70 % (contamination relay drops out). At 99 %, the alarm light illuminates.
	Failure	e.g. Missing smoke detector, disrupted communication with the smoke detector, processor failure. Failure (B) and alarm (A) lights light up at the same time Troubleshooting: change the detector and confirm by pressing the alarm / reset button (C).
 + all lights on the circuit board light up	Confirmation of reset / new start	Occurs when alarm/reset button (C) is pressed for more than 8 seconds, or if bridge circuit/ terminal 9/10 is open (missing bridge circuit or remote reset). Display goes out after releasing the alarm/reset button or closing the bridge circuit between terminal 9 + 10.
00 – 99 flashing	Bus address	Only appears with MOD/BAC versions after pressing the address buttons T3/T4 directly on the circuit board.

Indicator lights	Meaning	Explanation
Alarm / reset (red)	Smoke alarm or failure	**Reset after failure:** Briefly press alarm / reset button. KRM-X immediately restarts. **Reset after alarm:** Press and hold the alarm/reset button for at least 2 seconds until the red alarm light in the button goes out. KRM-X will start again after releasing the button. If the alarm/reset light continues to flash while the button is pressed, the smoke detector is still filled with test gas/test spray/smoke and cannot be reset. In that case, blow out the smoke from the detector or wait.

Information is subject to change without prior notice.

Indicator lights	Meaning	Explanation
Failure (yellow)	Defective circuit board or missing smoke alarm	Check / replace circuit board or smoke detector.
Smoke alarm (2 x red)	Smoke alarm or contamination 99 %	Red LEDs directly on the smoke detector. LEDs permanently on until reset has taken place.
Power (green)	Supply voltage is connected	Green light illuminates if supply voltage is connected.
Air flow (blue)	Air flow is too low	Blue light illuminates when air flow is too low. Check smoke detector position in the duct, check sampling tube for contamination / clean if necessary.

Behaviour of the alarm relay and fault relay and displays, plus reset options

Valid with software 0020	Smoke alarm	Device failure / missing detector
Alarm relay, connectors 11/12/13	Drops out	Drops out
Alarm relay, connectors 14/15	Drops out	Drops out
Alarm / Reset light	Lights up	Lights up
Failure light	Does not light up	Lights up
Alarm reset or failure reset	Disconnect power or press alarm button or reset via terminal 9/10. Detector chamber must have been cleared.	Disconnect power or press alarm button or reset via terminal 9/10. Detector chamber must have been cleared and fault rectified.

MAINTENANCE AND REPAIR

The smoke detector must be tested at least once a year in order to ensure that it performs reliably over long time periods. Without maintenance the sensor will become soiled sooner or later, depending on environmental conditions, and will eventually trigger an alarm, i.e. a false alarm.

NOTE: The sensor will give a specific maintenance requirement signal at a contamination level of 70 % (display flashes, relay contamination drops out). The smoke detector is equipped with a 2-digit digital contamination indicator, allowing maintenance according to demand. The smoke detector must be replaced at a contamination level 70 % or higher. The contact provided for this “contamination” signal should be connected to the automation station.

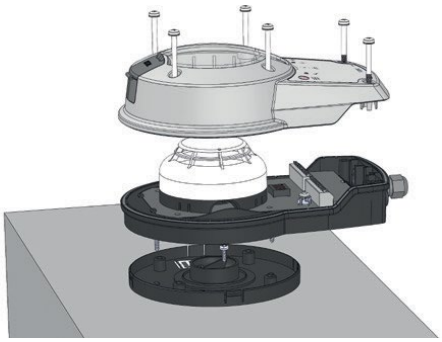
Maintenance and repair procedure

Before starting maintenance work, it must be clarified with the staff whether the unit needs to remain responsive to smoke while work is in progress. If a brief shutdown cannot be tolerated for operational reasons, measures must be taken to prevent a shutdown. If necessary, a bridge can be placed over the alarm contact for this purpose. After completion of maintenance work, any such bridge must be removed, and a complete functional test of all system components must be carried out. Any defects found must be rectified immediately.



Before opening the housing, turn off all supply voltages – The housing may only be opened by a qualified electrician. Supply and switching voltages must be observed.

1. Remove the cover.



2. Turn the white sensor element anticlockwise about 20° to remove it.

   The detector must be replaced by a new detector if it has reached the contamination limit (>70 %) or if the prescribed standard replacement period has expired, whichever is earlier.

3. Clean the cover, measuring tube and the inner housing.
4. Check the electrical connections, tightening the terminals if needed.
5. Make visual inspection and clean the electrical circuit board if needed, as well as the inner housing. Check all seals.
6. Assemble all parts.

   The cover screw tightening torque is 1.2 Nm.

7. Test system by triggering the smoke detector with test spray.



8. Check with the operator about the function of the downstream systems and components, such as:
   - Turning off of fans.
   - Closing of flaps.
   - Notification to the building automation system.
   - When checking network failure and recovery, does the sensor return to its normal function and does it unlock again from the state ”smoke alarm” and return to its normal function when there is no longer any present? Does the detector return to the alarm state and lock up if the smoke alarm persists?
   - The detector can be released by pressing the reset button or briefly disconnecting the voltage.

MODBUS

Modbus properties

Protocol	RS-485 Modbus RTU
Bus speed	9600/19200/38400/76800 bit/s
Data bits	8
Parity	even
Start bits	1
Stop bits	1
Polling	> 100 ms

Information is subject to change without prior notice.

Modbus function codes

Decimal	Hexadecimal	Function
3	0x03	Read Holding Registers

Modbus registers

Holding register	Parameter description	Data type	Values	Range
0	Device status.	U16	1 - 2 - 3 - 4 - 5 - 6	1 = Normal function 2 = Starting 3 = Fault 4 = Alarm 5 = Alarm and fault 6 = 99 % contamination
1	Smoke detector value. If the value is over 255, there is smoke in the detector. The value is only informative.	U16	0...65535	0...65535
2	Contamination value.	U16	0...100	0...100 %
3	Air flow status	U16	0 - 1	0 = Inadequate air flow 1 = Adequate air flow
4	NTC temperature value. The value can be used to determine the ambient temperature. The value is combination of the ambient temperature and self-heating of the circuit board. See the following table for the temperature values according to the Modbus register values.	U16	0...65535	0...65535

Register value	Temp [°C]
75	50,2
79	48,8
83	47,5
87	46,3
91	45,2
95	44,1
99	43,0
103	42,0
107	41,1
111	40,2
115	39,3
119	38,4
123	37,6
127	36,8
135	35,3
143	34,0

Register value	Temp [°C]
147	33,3
155	32,0
159	31,4
167	30,3
175	29,2
183	28,1
191	27,1
199	26,2
207	25,3
218	24,1
226	23,3
234	22,5
250	21,0
262	20,0
274	19,0
286	18,0

Register value	Temp [°C]
298	17,1
314	16,0
326	15,2
342	14,2
350	13,7
362	12,9
378	12,0
396	11,0
417	10,0
437	9,0
458	8,0
482	7,0
505	6,0
530	5,0
558	4,0
586	3,0

Register value	Temp [°C]
615	2,0
647	1,0
681	0,0
716	-1,0
754	-2,0
794	-3,0
839	-4,0
881	-5,0
933	-6,0
979	-7,0
1033	-8,0
1090	-9,0
1150	-10,0

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