ASD 535 ASPIRATING SMOKE DETECTOR

The ASD 535 aspirating smoke detector is the new generation of a highly sensitive, active smoke detection system. It offers application specific sensitivity adjustment alongside pre-signaling and pollution analyses. The ASD 535 detects even minuscule glowing and smouldering fires and can be deployed in many different applications.

Design and function

The ASD 535 consists of the detector housing and one or two sampling pipe tube networks. The sampling pipes have several sampling holes whose size is such that each hole withdraws the same amount of air. The sampling pipes may be I-, U-, T-, H-, or E-shaped. The sampling pipes are usually symmetrically designed. Asymmetrical sampling pipe tube networks can also be implemented using the “ASD PipeFlow” calculation software. Air flow monitoring ensures that the sampling lines are constantly checked for pipe breakage and the sampling holes monitored for pollution. A high-performance ventilator sucks the air from the room or facility being monitored through the sampling line to the evaluating processor unit. There the air is continuously evaluated by the smoke sensors. The display and control panel of the evaluating processor unit indicate the smoke concentration of the sampled air and other alarm, fault and status messages. Any increase in the smoke concentration is detected very early. Three pre-signals and one main alarm can be programmed for each and signalled via potential-free relay contacts.

There are four expansion slots for accommodating modular option boards.

Highly sensitive smoke sensor

The smoke sensor was specially developed for the ASD 535. Use of a high power LED combined with a large volume smoke chamber results in unparalleled, adjustable sensitivity with low aerodynamic resistance and supreme resistance to pollution and soiling. This ensures a long service life.

Easy to plan and commission

For straightforward, standard installations the ASD 535 with EasyConfig offers fast, foolproof, computer-free commissioning. More complex installations are calculated using the ASD PipeFlow calculation software and configured with ASD Config, the commissioning and maintenance software. This allows for better-value asymmetrical pipe layouts.

Description

The ASD 535 is available in four versions:

- ASD 535-1 for 1 sampling tube, and 1 smoke sensor without smoke level indicator
- ASD 535-2 for 2 sampling tubes, and 2 smoke sensors without smoke level indicator
- ASD 535-3 for 1 sampling tube, and 1 smoke sensor with smoke level indicator
- ASD 535-4 for 2 sampling tubes, and 2 smoke sensors with smoke level indicator

The ASD 535 can be equipped with the following smoke sensor types:

- SSD 535-1 Sensitivity range 0,5%/m to 10%/m
- SSD 535-2 Sensitivity range 0,1%/m to 10%/m
- SSD 535-3 Sensitivity range 0,02%/m to 10%/m

The ASD 535 aspirating smoke detector has four slots for expansion modules. The following modules can be added:

- RIM 35 Relay Interface Module with 5 relays (max. 2 units)
- MCM 35 Memory Card Module

The ASD 535 aspirating smoke detector can be used for:

- **Equipment monitoring**: EDP systems, electrical distributors, switch cabinets, etc.
- **Space surveillance:** EDP rooms, clean rooms, warehouses, high-rack storage buildings, refrigerated warehouse, hollow floors, protection of cultural objects, transformer stations, prison cells, etc.

The ASD 535 is also deployed in areas where conventional point type detectors are used. The local provisions and regulations must be observed from case to case. The response behaviour of the ASD 535 has been tested in compliance with EN 54-20, Class A, B and C.

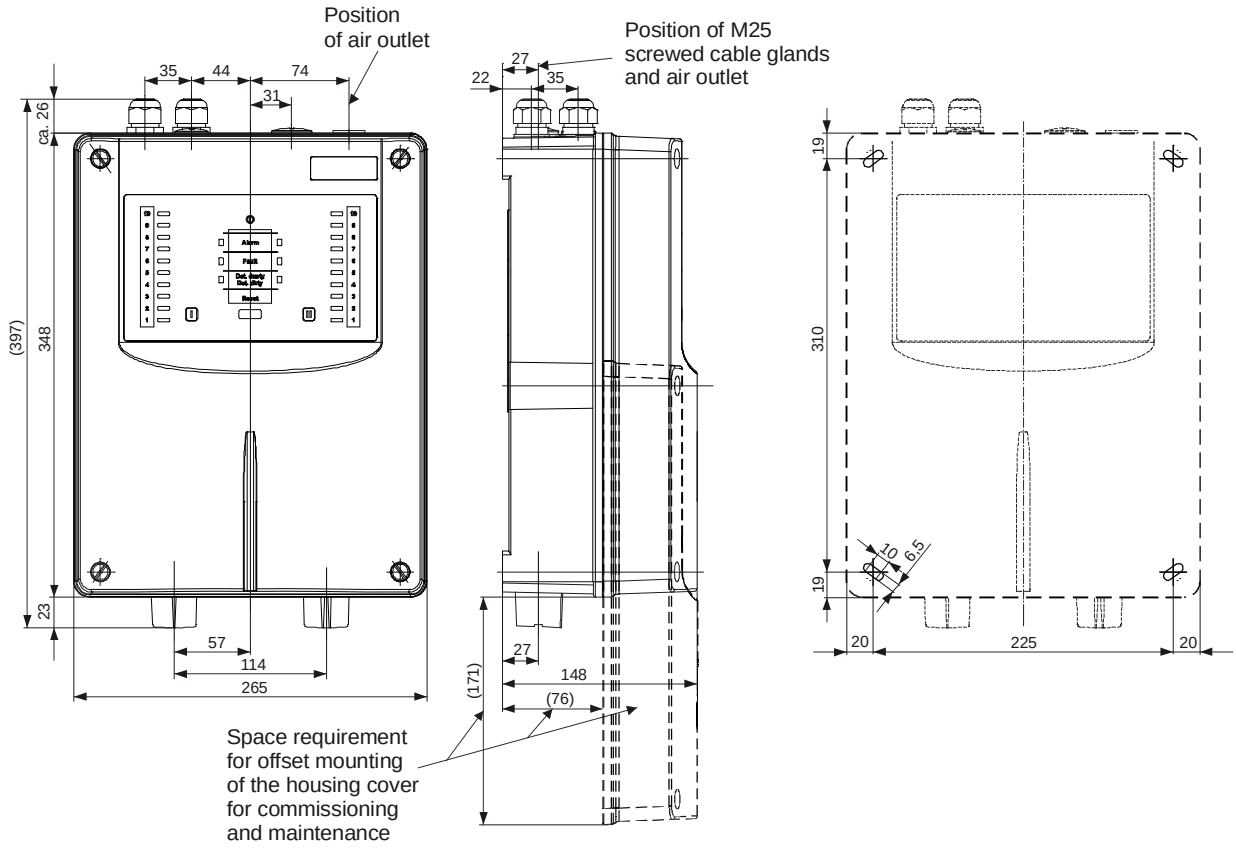
Technical data

Operating voltage		10,5 – 30 VDC
Operating current, quiescent (typical)		* 290 mA typical (at 24 VDC)
Alarm sensitivity		0,02%/m–10%/m (0.00087–0.457 dB/m)
Presignals 1, 2 and 3		0,002–10%/m, programmable in 10% increments
Interfaces		3 relays/open collector (alarm, fault, programmable)
Service interface		USB
Number of expansion slots		4 (SLM 35, MCM 35 and 2 × RIM 35)
Relay contact load		30 VDC / 1 A
Standards		EN 54-20, Class A, B and C
Ambient operating temperature		–30 °C to +60 °C
ICE 529 protection class		IP 54 (achieved without limitations)
Housing dimensions		263 × 397 × 146 mm (W × H, with entries × D)
Housing colour		Light grey RAL 280 70 05, Charcoal RAL 300 20 05
Housing material		ABS blend, UL 94-V0
Weight		Approx. 3850 g
Display and control	Standard	POWER: 1 LED (green) Fault: 1 or 2 LEDs (yellow) Alarm/Pollution: 1 or 2 LEDs (yellow) Reset button 1
	Deluxe design	Supplementary: 10 or 20 LEDs (yellow) for smoke level display
Event data memory/ analogue value logging	Standard	Max. 430 events
	With MCM 35	Analogue value logging up to 1 year
Cable entries		4 × M20, 1 × M25
Ventilator		Radial, 5 speeds
Ventilator service life		65,000 hours (at 40 °C)
Suction pressure		> 400 Pa (performance level 5)
Suction noise		** 43 dBA (ventilator level 3, standard), 32 dBA (ventilator level 1), Complies with ISO 11690-1: Acoustics – Recommended practice for the design of low-noise workplaces containing machinery
System criteria tested to EN 54-20**		Max. 2 × 200 m (Easy Config), max. 2 × 240 m (ASD PipeFlow), max. 2 × 24 sampling apertures
System criteria without standard conformity		Max. 2 × 400 m (ASD PipeFlow), max. 2 × 50 sampling apertures (ASD PipeFlow)

* The real current consumption in an applications must be calculated separately (see page 12).

** Adhere to the planning instructions.

Mechanical dimensions



Connections

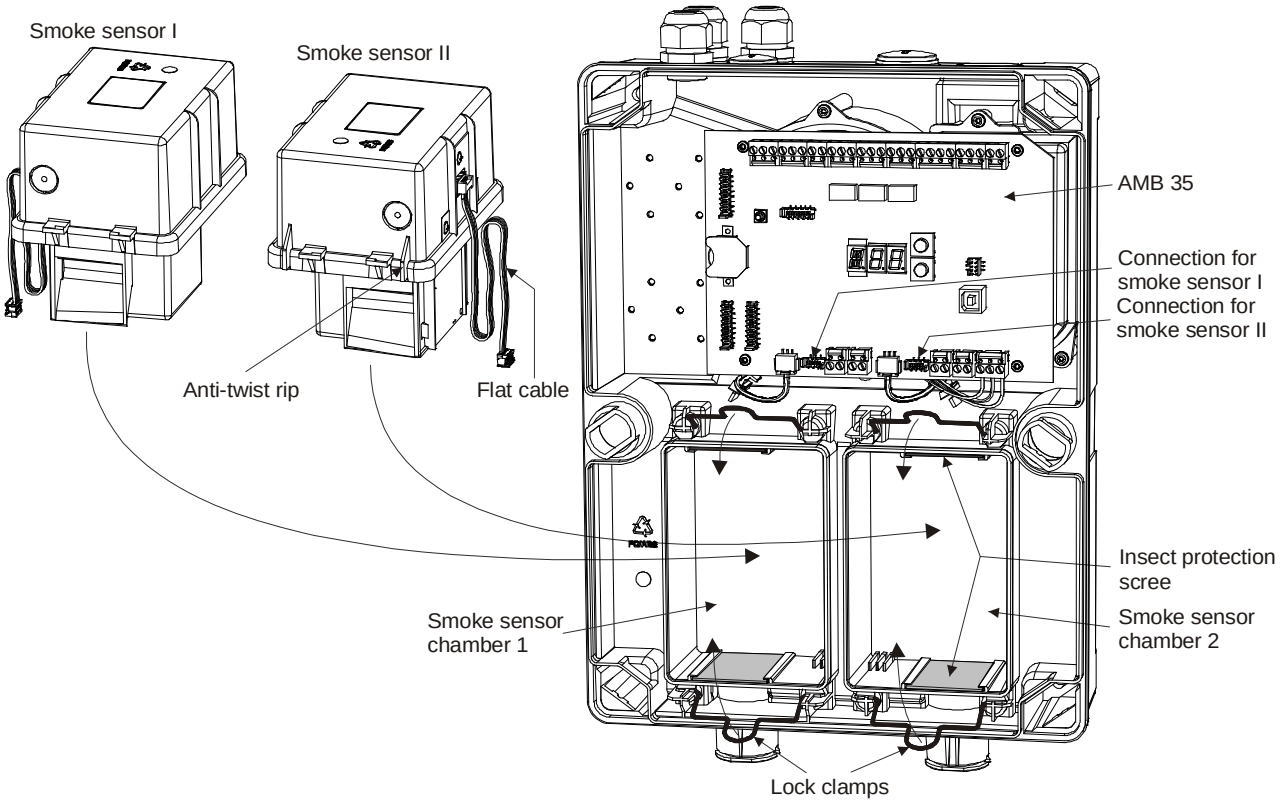
The electrical connection is implemented by means of plug-in terminals.

Terminal	Signal	Note
1	+10,5 to +30 VDC	Main power supply line
2	0 V	
3	+10,5 to +30 VDC	Redundant supply line
4	0 V	
5	+ Supply (for OC consumers)	
6	Output fault, OC (all events)	
7	Output alarm I, OC	
8	Output alarm II or freely programmable, OC	
9	unused	
10	Rel. 1 “(NO)”	Fault Contact (te. 10/12) closed in idle state
11	Rel. 1 “(NC)”	
12	Rel. 1 “COM”	
13	Rel. 2 “NO”	Alarm I
14	Rel. 2 “NC”	
15	Rel. 2 “COM”	
16	Rel. 3 “NO”	Alarm II or freely programmable
17	Rel. 3 “NC”	
18	Rel. 3 “COM”	
19	External reset input +	Optocoupler input
20	External reset input -	

Deploying smoke sensors

Smoke sensors are not fitted when the ASD 535 is delivered. They are application specific (according to required sensitivity range), purchased from the manufacturer and installed after the detector housing is mounted (see Fig. below).

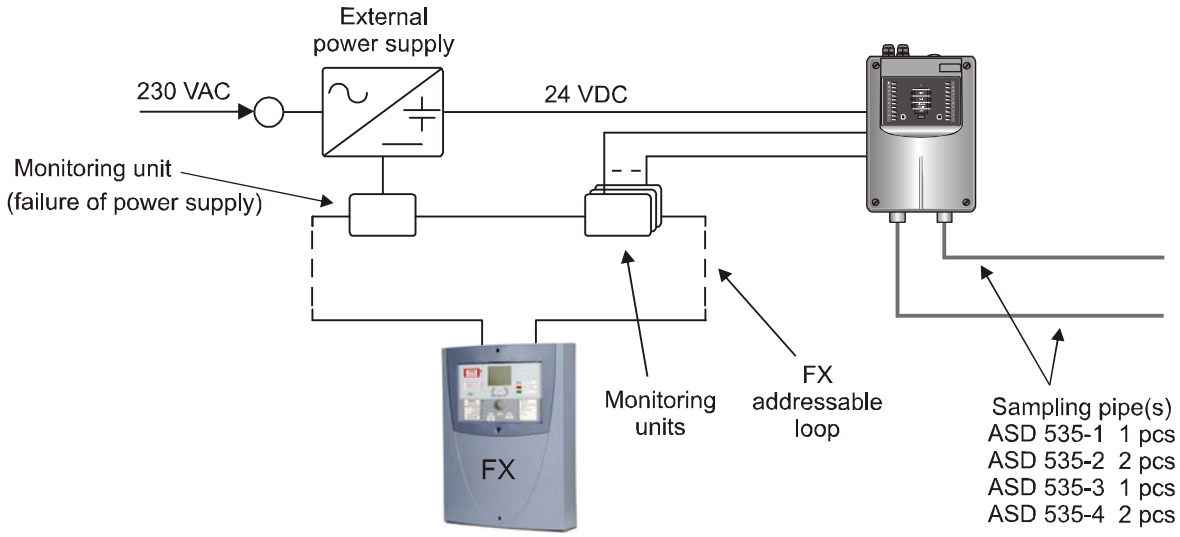
- The smoke sensors should always be removed from their protective packaging just before deployment in the detector housing.
- Depending on the situation (e.g. if there is a long time between mounting and commissioning or if the environment is very dusty due, for example, to construction), the smoke sensors should be installed just before commissioning the ASD 535.
- Before installing the smoke sensors, check that the protective screens against insects are properly fitted to the air inlet and outlet in the smoke sensor chambers.
- The smoke sensor chamber must be absolutely free of dirt and dust. Any waste or other materials resulting from mounting the detector housing must be removed.



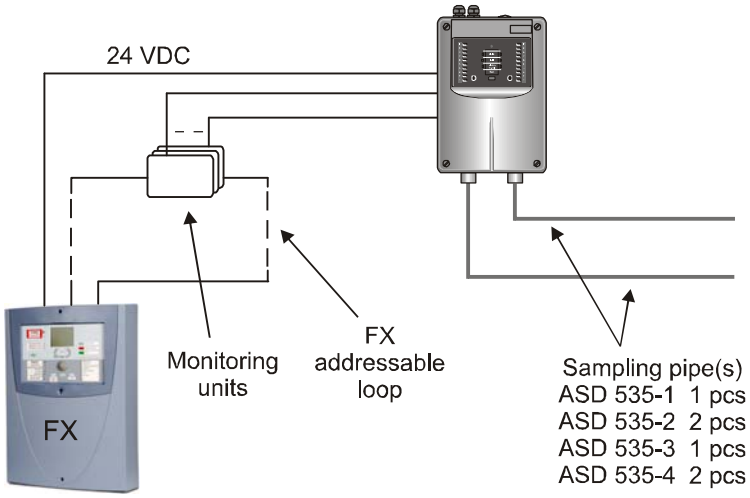
Deploying the smoke sensors

FX connection

FX-SLC and FX-ALC loop controllers



External power supply



Power supply from FX_ control panel

System planning, installation and commissioning

Only qualified persons trained by the supplier can do system planning, installation and commissioning. The standard EN54-20, class A, B or C requirements must be applied.

System limit without “ASD PipeFlow” calculation

The system limits apply to planning without the “ASD PipeFlow” calculation software. There are two areas with the following meaning:

- Normative system limits compliant to EN 54-20, Class A to C, switch settings A11 to C32
- Non-normative system limits, switch settings W01 to W48

Normative system limits
Switch settings A11 to C32 have configured values which are necessary for alarm response sensitivity and airflow monitoring compliance with EN 54-20 Class A to C. The switch setting designation is deciphered as follows:

- First character Response class A, B, C compliant with EN 54-20
- Second character System limit 1, 2, 3 (pipe topology)
- Third character Number of pipe networks 1, 2

Example: B22 Response class B / system limit 2 / 2 pipe networks.

Non-normative system limits
Switch settings W01 to W48 contain system limits which fulfil only the alarm response sensitivity for EN 54-20 Class A to C but not the normative limits concerning airflow monitoring. Since these are identical to system limits A11 to C32 concerning pipe topology (pipe network length, number of sampling holes), switch settings W01 to W48 are also included in the tables below.

Switch settings W01 to W48 may be used only after consulting with the manufacturer. The configured values they contain concerning airflow monitoring are not tested in accordance with EN.

System limits table for planning without "ASD PipeFlow" calculation

Shape	System limit	Switch setting to EN 54-20		Switch setting Non-normative		Smoke sensor type SSD 535	Alarm threshold (%/m)	Length from ASD to the last T-piece/cross	Max. length from ASD to the farthest sampling hole	Number of sampling holes per sampling branch	Max. total length of the sampling pipe per pipe network (smoke sensor)
		1 tube	2 tube	1 tube	2 tube						
EN 54-20 compliance, Class A (highly sensitive)											
I	1	A11	A12	W01 - W04	W05 – W08	-3	0,03	---	50 m	1 - 7	50 m
U/T	1	A11	A12	W01 - W04	W05 – W08	-3	0,03	1 – 20 m	40 m	1 - 4	80 m
H	1	A11	A12	W01 - W04	W05 – W08	-3	0,03	1 – 20 m	40 m	1 - 2	160 m
E	1	A11	A12	W01 - W04	W05 – W08	-3	0,03	1 – 20 m	40 m	1 - 3	120 m
EN 54-20 compliance, Class B (sensitive)											
I	1	B11	B12	W09 – W12	W13 – W16	-3	0,09	---	50 m	1 - 7	50 m
	2	B12	B22	W17 – W20	W21 – W24	-3	0,06	---	70 m	5 - 9	70 m
U/T	1	B11	B12	W09 – W12	W13 – W16	-3	0,09	1 – 20 m	40 m	1 - 3	80 m
	2	B12	B22	W17 – W20	W21 – W24	-3	0,06	1 – 20 m	55 m	3 - 5	110 m
H	1	B11	B12	W09 – W12	W13 – W16	-3	0,09	1 – 20 m	35 m	1 - 2	140 m
	2	B12	B22	W17 – W20	W21 – W24	-3	0,06	1 – 20 m	45 m	2 - 3	180 m
E	1	B11	B12	W09 – W12	W13 – W16	-3	0,09	1 – 20 m	40 m	1 - 2	120 m
	2	B12	B22	W17 – W20	W21 – W24	-3	0,06	1 – 20 m	50 m	2 - 3	150 m
EN 54-20 compliance, Class C (standard)											
I	1	C11	C12	W25 – W28	W29 – W32	-1	0,8	---	40 m	1 - 5	40 m
	2	C21	C22	W33 – W36	W37 – W40	-2	0,35	---	80 m	3 - 9	80 m
	3	C31	C32	W41 – W44	W45 – W48	-2	0,13	---	110 m	7 - 16	110 m
U/T	1	C11	C12	W25 – W28	W29 – W32	-1	0,8	1 – 20 m	30 m	1 - 3	60 m
	2	C21	C22	W33 – W36	W37 – W40	-2	0,35	1 – 20 m	60 m	3- 5	120 m
	3	C31	C32	W41 – W44	W45 – W48	-2	0,13	1 – 20 m	70 m	5 - 9	140 m
H	1	C11	C12	W25 – W28	W29 – W32	-1	0,8	1 – 25 m	35 m	1 - 2	140 m
	2	C21	C22	W33 – W36	W37 – W40	-2	0,35	1 – 25 m	45 m	2 - 3	180 m
	3	C31	C32	W41 – W44	W45 – W48	-2	0,13	1 – 25 m	60 m	3 - 5	240 m
E	1	C11	C12	W25 – W28	W29 – W32	-1	0,8	1 – 20 m	30 m	1 - 2	90 m
	2	C21	C22	W33 – W36	W37 – W40	-2	0,35	1 – 20 m	50 m	2 - 3	150 m
	3	C31	C32	W41 – W44	W45 – W48	-2	0,13	1 – 20 m	60 m	3 - 6	180 m

Pipeflow topology and sampling holes

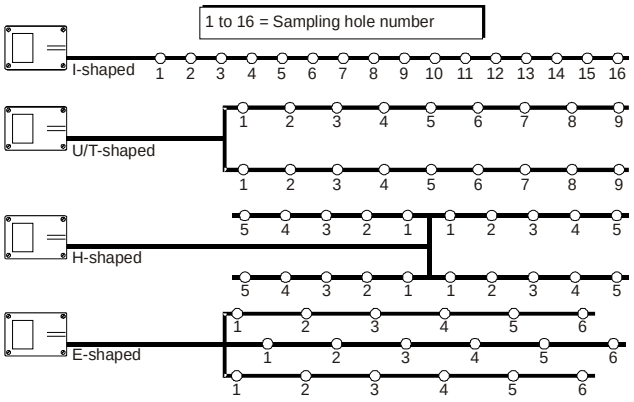
Sampling holes for planning without "ASD PipeFlow"-calculation

The tables below show the respective hole diameters for the numbers in Fig. below as a function of the number of sampling holes per sampling branch.

I-shaped sampling pipes																
Number of sampling holes per sampling branch	Hole diameter in mm for the sampling hole number from ASD															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	5,0															
2	4,0	5,0														
3	4,0	4,0	5,0													
4	3,5	3,5	4,0	5,0												
5	3,5	3,5	3,5	4,0	5,0											
6	2,5	2,5	2,5	2,5	3,0	5,0										
7	2,5	2,5	2,5	2,5	2,5	2,5	5,0									
8	2,5	2,5	2,5	2,5	2,5	2,5	2,5	5,0								
9	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	5,0							
10	2,0	2,0	2,0	2,5	2,5	2,5	2,5	2,5	3,0	7,0						
11	2,0	2,0	2,0	2,0	2,5	2,5	2,5	2,5	2,5	4,0	7,0					
12	2,0	2,0	2,0	2,0	2,0	2,0	2,5	2,5	2,5	2,5	4,0	7,0				
13	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,5	2,5	2,5	2,5	4,0	7,0			
14	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,5	2,5	2,5	4,0	7,0		
15	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,5	2,5	4,0	7,0	
16	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,5	4,0	7,0

U/T-shaped sampling pipes									
Number of sampling holes per sampling branch	Hole diameter in mm for the sampling hole number from ASD								
	1	2	3	4	5	6	7	8	9
1	5,0								
2	4,0	5,0							
3	4,0	4,0	5,0						
4	4,0	4,0	4,0	5,0					
5	4,0	4,0	4,5	5,0	6,5				
6	3,0	3,0	3,5	3,5	4,0	6,5			
7	2,5	3,0	3,0	3,5	3,5	4,0	6,5		
8	2,5	2,5	3,0	3,0	3,5	3,5	3,5	7,0	
9	2,5	2,5	3,0	3,0	3,5	3,5	3,5	3,5	7,0

H/E-shaped sampling pipes						
Number of sampling holes per sampling branch	Hole diameter in mm for the sampling hole number from ASD					
	1	2	3	4	5	6
1	5,0					
2	4,0	5,0				
3	4,0	4,0	5,5			
4	3,0	3,0	3,5	5,5		
5	2,5	3,0	3,0	3,0	6,0	
6 (E-shaped only)	2,5	2,5	3,0	3,0	3,5	6,0



Configuration options, Table A:

The following criteria can be set for each smoke sensor / sampling pipe. Also, the criteria for day/night control can be separately set. Configuration changes are saved on one of the freely programmable switch settings **X01** to **X03**.

Sector • Parameter	**Default Setting**	**Range**	**Resolution / Levels**	**Saving after change**
Alarm				
• Alarm threshold (dependent on smoke sensor type and response class according to EN 54-5)	C11 / C12	0.02 – 10%/m 0.1 – 10%/m 0.5 – 10%/m	0,001%/m	X01 – X03
• Smoke level average value formation (number)	4	1 – 10	1	X01 – X03
• Alarm delay	2 s	0 s – 60 s	1 s	X01 – X03
• Alarm self-hold	On	On / Off		X01 – X03
Pre-signal				
• Pre-signal 1 On / Off	On	On / Off		X01 – X03
• Pre-signal 2 On / Off	On	On / Off		X01 – X03
• Pre-signal 3 On / Off	On	On / Off		X01 – X03
• Pre-signal 1 (100% = alarm threshold)	30%	10 – 90%	10%	X01 – X03
• Pre-signal 2 (100% = alarm threshold)	50%	VS 1 + 10 – 90%	10%	X01 – X03
• Pre-signal 3 (100% = alarm threshold)	70%	VS 2 + 10 – 90%	10%	X01 – X03
• Pre-signal delay (VS 1 – VS 3)	2 s	0 s – 60 s	1 s	X01 – X03
• Pre-signal self-hold	Off	Off / On		X01 – X03
Smoke sensor dust/dirt				
• Smoke sensor dust On / Off	On	On / Off		X01 – X03
• Smoke sensor dirt On / Off	On	On / Off		X01 – X03
• Dust threshold (% of Al)	50%	5 – 60%	5%	X01 – X03
• Dirt threshold (% of Al)	75%	65 – 90%	5%	X01 – X03
• Dust self-hold	On	On / Off		X01 – X03
• Dirt self-hold	On	On / Off		X01 – X03
• Fault delay of smoke sensor	30 s	0 s – 60 s	1 s	X01 – X03
Airflow monitoring				
• LS-Ü blockage On / Off	On	On / Off		X01 – X03
• LS-Ü pipe breakage On / Off	On	On / Off		X01 – X03
• LS-Ü sensitivity	±20% 1)	±10 – ±70%	± 10%	X01 – X03
• LS-Ü average value formation (number)	20	1 – 30	1	X01 – X03
• LS-Ü delay time	300 s 1)	2 min – 60 min	10 s / 1 min	X01 – X03

1) The default settings of the LS-Ü sensitivity and LS-Ü delay time correspond to the above specifications for switch settings **A01** to **C32**. Increased values are configured for switch settings **W01** to **W48**; these are **not** tested for EN compliance.

Configuration options, Table B:

The following criteria apply to the entire ASD 535. Saving a configuration after changes is performed in the context of the adaptations in Table A on one of the freely programmable switch settings **X01** to **X03**.

Sector • Parameter	**Default Setting**	**Range**	**Resolution / Levels**	**Saving after change**
Autolearning				
• Autolearning On / Off	Off	On		X01 – X03
• Autolearning duration	3 days	1 min to 14 days	min, h, days	X01 – X03
• Autolearning factor (of measured AI threshold)	1.5	1.1 – 10 x		X01 – X03
Day/night control / day of the week control				
• Day/night control On / Off	Off	Off / clock / FACP		X01 – X03
• Day start time	06:00	00:00 – 24:00	15 min	X01 – X03
• Night start time	20:00	00:00 – 24:00	15 min	X01 – X03
• Day of the week control	On	Mo to Su	days	X01 – X03
General faults				
• Lithium battery / clock fault	On	On / Off		X01 – X03
Ventilator				
• Fan speed	Level III	Level I to V	1	X01 – X03
Sensor activation				
• Smoke sensor I / Smoke sensor II	On	On / Off		X01 – X03

Configuration options, Table C:

Independent configurations. These can be changed independently of the switch settings in the ASD 535.

Sector • Parameter	**Default Setting**	**Selection**
Time		
• Year, month, day, hour, minute	---	Minutes - year
Relay / OC module / reset button / various		
• Relay 3 and OC module 3, AMB 35	Alarm II	According to ***"Configuration options relay allocation"***
• Relay 1, 1st RIM 35	Pre-signal 1 smoke sensor I	
• Relay 2, 1st RIM 35	Pre-signal 2 smoke sensor I	
• Relay 3, 1st RIM 35	Pre-signal 3 smoke sensor I	
• Relay 4, 1st RIM 35	Smoke sensor I dirty	
• Relay 5, 1st RIM 35	Sampling tube I blockage	
• Relay 1, 2nd RIM 35	Pre-signal 1 smoke sensor II	
• Relay 2, 2nd RIM 35	Pre-signal 2 smoke sensor II	
• Relay 3, 2nd RIM 35	Pre-signal 3 smoke sensor II	
• Relay 4, 2nd RIM 35	Smoke sensor II dirty	
• Relay 5, 2nd RIM 35	Sampling tube II blockage	
• Reset button On / Off	On	On / Off
• Heating control, subsequent heating time	2 min	1 – 60 min
• MCM settings, recording interval	1 s	1 – 120 s
• MCM smoke peak value memory	Off	Off / On
• Start initial reset	---	On / Off
• Smoke sensor operation mode (smoke sensor I / II)	SSD/DMB	SSD/DMB or OEM inputs (single or in combination) Switched off

Relay allocation configuration options:

The following criteria can be programmed on a max. of 11 relays (1 AMB 35 unit on ASD 535-1 and ASD 535-3, units on 1st RIM 35, 5 units on 2nd RIM 35):

Smoke sensor I / LS-Ü I	Smoke sensor II / LS-Ü II	General
Smoke sensor I alarm	Smoke sensor II alarm	Fan fault
Pre-signal 1 smoke sensor I	Pre-signal 1 smoke sensor II	Operating voltage fault
Pre-signal 2 smoke sensor I	Pre-signal 2 smoke sensor II	Initial reset fault
Pre-signal 3 smoke sensor I	Pre-signal 3 smoke sensor II	Lithium battery / clock fault
Smoke sensor I dusty	Smoke sensor II dusty	
Smoke sensor I dirty	Smoke sensor II dirty	
Smoke sensor I fault	Smoke sensor II fault	
Sampling tube I pipe blockage	Sampling tube II pipe blockage	
Sampling tube I pipe breakage	Sampling tube II pipe breakage	
Heating control sampling pipe I	Heating control sampling pipe II	

The criteria can also be allocated with the **OR** function (example: smoke sensor dust or dirt together on one relay).

Current consumption

Units and modules		Max. current consumption (mA), measured in Fan speed level V	
		Operation voltage 18 VDC	Typical, 24 VDC
ASD 535-1	Idle/fault	approx. 340	approx. 260
	Alarm 1	approx. 390	approx. 295
ASD 535-2	Idle/fault	approx. 380	approx. 290
	Alarm I + II	approx. 450	approx. 350
ASD 535-3	Idle/fault	approx. 340	approx. 260
	Alarm I	approx. 405	approx. 310
ASD 535-4	Idle/fault	approx. 380	approx. 290
	Alarm I + II	approx. 490	approx. 385
Additionally with 1 RIM 35 unit		approx. 10	approx. 7
Additionally with 2 RIM 35 units		approx. 20	approx. 14
Switch-on current peak (caused by EMC protection elements on the ASD supply input)			approx. 5 A for max. 1 ms

Product Codes

Product	Description	Product Code
ASD535-1	Aspirating smoke detector 1 channel	06432541
ASD535-2	Aspirating smoke detector 2 channel	06432542
ASD535-3	Aspirating smoke detector 1 channel with advanced display	06432543
ASD535-4	Aspirating smoke detector 2 channel with advanced display	06432544
SSD535-1	Smoke sensor standard sensitivity	06432545
SSD535-2	Smoke sensor enhanced sensitivity	06432546
SSD535-3	Smoke sensor high sensitivity	06432547
ASD 535 V	Fastener plate	06432548
RIM35	Relay interface module	06432549
MCM35	Memory card module	06432550
FBS 25 PC	Filter box, small	06432551
FBL 25 PC	Filter box, large	06432552
DFU 535L	Dust filter unit	06432553
DFU 535XL	Dust filter unit, extra large	06432554
ASD PIPEFLOW	Planning and calculating software	06432555
ASD CONFIG	Configuration software	06432556
CLIP SET (45 pcs)	Holes 2,0 to 7,0, pipe 25 mm	06432557
SP M20 PVC SET	Sampling point set with pipe	06432569
SP M20 ABS SET	Sampling point set with pipe	06432570
DTP 25 PC	Dirt trap box 25 mm	06432571
WRB 25 PVC	Water retaining box 25 mm	06432572

Spare parts		
FMS	Filter material, small	06432580
FML	Filter material, large	06432581
DFU 535 RC	Replacement cartridge DFU535L	06432582
DFU 535XL RC	Replacement cartridge DFU535XL	06432583

CLIP SET (06432557) content

Clip hole size mm	Quantity pcs
2,0	12
2,5	8
3,0	4
3,5	3
4,0	3
4,5	3
5,0	2
5,5	2
6,0	2
6,5	2
7,0	2
Clip without hole	2