FAP-420/FAH-420 Automatic Fire Detectors LSN improved version

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Invented for life

- Combination of optical, thermal and chemical sensors with intelligent evaluation electronics.
- Earliest detection of lightest smoke (TF1 & TF9) with the double-optical smoke detectors featuring Dual-Ray technology
- Detector properties adapted to cater for room usage
- Drift compensation in optical and gas measurement section
- Maintains LSN loop functions in the event of wire interruption or short-circuit thanks to two integrated isolators

The 420 Series Automatic Fire Detectors offer a superb accuracy as well as detection speed and precision.
The versions with dual-optical sensor (DO-detectors: FAP-DO420, FAP-DOT420, FAP-DOTC420) are able to detect lightest smoke (TF1 and TF9).
These detectors provide all advantages of LSN improved version. The addressing of the detectors can be configured with the integrated turning switches.

System Overview

Operating mode	Detector type		
	FAP-DOTC420	FAP-DOT420	FAP-DO420
Combined	x	x	-
Optical	x	x	x
Dual-Optical	x	x	x
Thermo-max.	x	x	-
Thermal differential	x	x	-
Chemical (+ optical)	x	-	-

Operating mode	Detector type			
	FAP-OTC 420	FAP-OT 420	FAP-O 420 (KKW)	FAH-T 420 (KKW)
Combined	x	x	-	-
Optical	x	x	x	-
Dual-Optical	-	-	-	-
Thermo-max.	x	x	-	x

Thermal differential	x	x	-	x
Chemical (+ optical)	x	-	-	-

Functions

Sensor technology and signal processing
The individual sensors can be configured manually or timer-based via the LSN network.
All sensor signals are analyzed continually by the internal evaluation electronics (Intelligent Signal Processing – ISP) and are linked with each other via an inbuilt microprocessor. The link between the sensors means that the combined detectors can also be used where light smoke, steam or dust must be expected during the course of normal operation.
Only if the signal combination corresponds to that for the programming of the selected usage site field code will the alarm be triggered automatically. This results in a higher level of security against false alarms.
In addition, the time of the sensor signals on fire and fault detection is analyzed, resulting in an increased detection reliability for each individual sensor.
In the case of the optical and chemical sensor, the response threshold (drift compensation) is actively adjusted. Manual or time-controlled switch-off of individual sensors is required for adjustment to extreme interference factors.

Optical sensor (smoke sensor)
The optical sensor uses the scattered-light method. An LED transmits light to the measuring chamber, where it is absorbed by the labyrinth structure. In the event of a fire, smoke enters the measuring chamber and the smoke particles scatter the light from the LED. The amount of light hitting the photo diode is converted into a proportional electrical signal.
The DO detectors use two optical sensors with different wavelength. The Dual Ray Technology works with an infrared and a blue LED, so that light smoke can be detected reliably (TF1 and TF9 detection).

Thermal sensor (temperature sensor)
A thermistor in a resistance network is used as a thermal sensor, from which an analog-digital converter measures the temperature-dependent voltage at regular intervals.
Depending on the specified detector class, the temperature sensor triggers the alarm status when the maximum temperature of 54 °C or 69 °C is exceeded (thermal maximum), or if the temperature rises by a defined amount within a specified time (thermal differential).

Chemical sensor (CO gas sensor)
The main function of the gas sensor is to detect carbon monoxide (CO) generated as a result of a fire, but it will also detect hydrogen (H) and nitrous monoxide (NO). The sensor signal value is proportional to the concentration of gas. The gas sensor delivers additional information to effectively suppress deceptive values.
Since the service life of the gas sensor is limited, the C sensor of the FAP-DOTC420 detector shuts down automatically after 6 years of operation, and the C sensor of the FAP-OTC 420 detector after 5 years of operation. The FAP-DOTC420 detector will then still operate as a DOT detector and the FAP-OTC 420 detector as an OT detector. The detectors should be exchanged immediately in order to keep the higher detection reliability of the DOTC/OTC versions.

Improved LSN features
The 420 Series Fire Detectors offer all the features of the improved LSN technology:
- Flexible network structures, including "T-tapping" without additional elements
- Up to 254 LSN improved elements per loop or stub line
- Automatic or manual detector addressing selectable via rotary switch, in each case with or without auto-detection
- Power supply for connected elements via LSN bus
- Unscreened fire detection cable can be used
- Cable length up to 3000 m (with LSN 1500 A)
- Downwards compatibility to existing LSN systems and central units

LSN features

Operating data display
In addition, the FAP/FAH-420 detectors offer all the established benefits of LSN technology. The RPS programming software can be used to change the detection characteristics of the respective room utilization. In addition, each configured detector, with the exception of the KKW, can provide the following data:
- Serial number,
- Contamination level of the optical section,
- Operating hours,
- Current analog values.

Analog values:
- Optical system values: current measured value of the scattered light sensor; the measuring range is linear and covers from 170 (new) to 700 (dirty).
- Contamination: the contamination value shows how much the current contamination value has increased relative to the original condition.
- CO value: display of the current measured value (max. 550).

Self-monitoring of sensor technology
The sensor is self-monitoring. The following errors are indicated on the fire panel:
- Fault indication in the event of the failure of the detector electronics
- Continuous display of contamination level during service
- Fault indication if heavy contamination is detected (in place of false alarms)

In the event of wire interruption or short-circuit, integrated dividing elements maintain the functional security of the LSN loop.
In the event of an alarm, individual detector identification is transmitted to the fire panel.

Further performance characteristics
The detector alarm indication takes the form of a red flashing LED that is easily visible 360°.
It is possible to activate a remote external detector alarm display. The detector base no longer has to be directed due to the centralized position of the individual display.
The integrated strain relief for interfloor cables prevents the removal of cables from the terminal after installation. The terminals for cable cross-sections up to 2.5 mm^2 are very easily accessible.
The detector bases have a mechanical removal lock (can be activated/deactivated).
The detectors have a dust-repellent labyrinth and cap construction.

Certifications and Approvals

The detectors comply with:
- EN 54-7: 2000/A2 (2006)
- EN 54-5: 03/2001 only detectors with thermal sensor
- EN 54-17:2005
- prEN 54-29: 2008 only FAP-DOT420, FAP-DOTC420
- CEA 4021:07:2003

Region	Certification	
Europe	CE	FAP-/FAH-420 KKW
	CE	FAP-/FAH-420/FAA-MSR420/FAA-MS-R-SP
	CE	FAP-DO420/FAP-DOT420/FAP-DOTC420
	CPD	0786-CPD-20117 FAP-O 420
	CPD	0786-CPD-20118 FAP-OT 420
	CPD	0786-CPD-20119 FAP-OT 420
	CPD	0786-CPD-20120 FAP-OTC 420
	CPD	0786-CPD-20121 FAP-OTC 420
	CPD	0786-CPD-20125 FAP-O 420 KKW
	CPD	0786-CPD-20128 FAH-T 420 KKW
	CPD	0786-CPD-20129 FAH-T 420
	CPD	0786-CPD-20973 FAP-DOTC420
	CPD	0786-CPD-20974 FAP-DOT420
	CPD	0786-CPD-20975 FAP-DO420
Germany	VdS	G 205080 FAP-OTC 420_G205080
	VdS	G 205081 FAP-OT 420_G205081
	VdS	G 205082 FAP-O 420_G205082
	VdS	G 205083 FAH-T 420_G205083
	VdS	G 205088 FAP-O 420 KKW_G205088
	VdS	G 205089 FAH-T 420 KKW_G205089
	VdS	G 210055 FAP-DOTC420
	VdS	G 210056 FAP-DO420
	VdS	G 210057 FAP-DOT420
Hungary	TMT	TMT-17/2006 FAP-O 420, FAP-O 420 KKW
	TMT	TMT-18/2006 FAH-T 420, FAH-T 420 KKW
	TMT	TMT-19/2006 FAP-OT 420, FAP-OT 420 KKW, FAP-OTC 420
Poland	CNBOP	2567/2007 FAP-O420
	CNBOP	2568/2007 FAH-T420
	CNBOP	2587/2007 FAP-OT420
	CNBOP	2588/2007 FAP-OTC420
	MOE	UA1.016.0070213-11 FAP-OTC420
	MOE	UA1.016-0070210-11 FAP-OT420
	MOE	UA1.016-0070215-11 FAP-DO420
	MOE	UA1.016-0070218-11 FAP-DOT
	MOE	UA1.016-0070221-11 FAP-DOTC
	MOE	UA1.016-0091995-09 FAP-O420_MS400 _MSF400_FAA-420-RI
	MOE	UA1.016-0091997-09 FAH-T420_MS400_MSF400
		000017/01 FAP-O420

Installation/Configuration Notes

- Connectable to the fire panels FPA-5000 and FPA-1200 with the improved LSN system parameters
- You can use the DO detectors only with the Panel Controller MPC version B and higher. The Panel Controller MPC-xxxx-A cannot be used.
- In "Classic Mode" connectable to the LSN fire panels BZ 500 LSN, UEZ 2000 LSN, UGM 2020 and to other panels or their receiver modules with identical connection conditions, although with the previous LSN system parameters
- During planning works, it is essential to adhere to national standards and guidelines.
- The detector can be painted (cap and base) and thereby adapted to the surrounding colour scheme. Note the information in the Painting Instructions (Document Number F.01U.089.231).

Installation/configuration notes in accordance with VdS/VDE
- The FAP-DOTC420, FAP-DOT420, FAP-OTC 420, and FAP-OT 420 types are planned in accordance with the guidelines for optical detectors if operated as optical detectors or as combined optical/thermal detectors (see DIN VDE 0833 Part 2 and VDS 2095)

- If occasional disconnection of the optical unit (scattered light sensor) is required, planning must be based on the guidelines for heat detectors (see DIN VDE 0833 Part 2 and VDS 2095)
- When planning fire barriers according to DIBt, note that the FAH-T 420 (KKW) must be configured in accordance with class A1R.

Parts Included

Detector type	Qty.	Components
FAP-DOTC420	1	Multisensor Detector Dual-Optical, Thermal, Chemical
FAP-OTC 420	1	Multisensor Detector Optical/Thermal/ Chemical
FAP-DOT420	1	Multisensor Detector Dual-Optical, Thermal
FAP-OT 420	1	Multisensor Detector Optical/Thermal
FAP-DO420	1	Dual-Optical Smoke-Detector
FAP-O 420	1	Optical Smoke Detector
FAH-T 420	1	Heat Detector (Thermal Differential/ Thermal Maximum)
FAP-O 420 KKW	1	Optical Smoke Detector *
FAH-T 420 KKW	1	Heat Detector (Thermal Differential/ Thermal Maximum) *

* For use in areas with increased radioactive radiation

Technical Specifications

Electrical

Operating voltage	15 V DC to 33 V DC
Current consumption	< 0.55 mA
Alarm output	Per data word by two-wire signal line
Indicator output	Open collector connects 0 V over 1.5 kΩ through, max. 15 mA

Mechanics

Dimensions	
• Without base	Ø 99.5 x 52 mm
• With base	Ø 120 x 63.5 mm
Housing	
• Material	Plastic, ABS (Novodur)
• Color	White, similar to RAL 9010, matt finish
Weight	Without / With packaging
• FAP-DOTC 420	Approx. 80 g / Approx. 135 g
• FAP-DOT 420, FAP-DO 420	Approx. 75 g / Approx. 125 g
• FAP-OTC 420	Approx. 80 g / Approx. 125 g
• FAP-OT 420, FAP-O 420, FAP-O 420 KKW, FAH-T 420, FAH-T 420 KKW	Approx. 75 g / Approx. 115 g

Environmental conditions

Permissible operating temperature	
• FAP-DOTC420 • FAP-OTC 420	-10 °C to +50 °C
• FAP-DOT420 • FAP-OT 420 • FAH-T 420 • FAH-T 420 KKW	-20 °C to +50 °C
• FAP-DO420 • FAP-O 420 • FAP-O 420 KKW	-20 °C to +65 °C
Permissible storage temperature	
• FAP-DOTC420	-20 °C to +50 °C
• FAP-DOT420	-25 °C to +80 °C
• FAP-DO420	-25 °C to +80 °C
Permissible relative humidity	95% (non-condensing)
Permissible air speed	20 m/s.
Protection class as per EN 60529	IP 40, IP 43 detector base with damp room seal

Further characteristics

Response sensitivity	
• Optical part	In accordance with EN 54 T7 (programmable)
• Thermal maximum part	> 54 °C / >69 °C
• Thermal differential part: FAH-T 420, FAH-T 420 KKW	A2S / A2R / A1 / A1R / BS / BR, in line with EN 54-5 (programmable)
• Thermal differential part: FAP-DOTC420, FAP-DOT420, FAP-OTC420, FAP-OT420	A2S / A2R / BS / BR, in line with EN 54-5 (programmable)
• Gas sensor	In ppm range
Individual display	LED red
Color code	
• FAP-DOTC420	2 yellow concentric loops

• FAP-OTC 420	Yellow loop
• FAP-DOT 420	2 black concentric loops
• FAP-OT 420	Black loop
• FAP-DO420	2 gray concentric loops
• FAP-O 420, FAP-O 420 KKW	No marking
• FAH-T 420, FAH-T 420 KKW	Red loop

Planning

Monitoring area	
• FAP-DOTC 420, FAP-DOT 420, FAP-DO 420, FAP-OTC 420, FAP-OT 420, FAP-O 420	Max. 120 m^2 (Heed local guidelines!)
• FAH-T 420 FAH-T 420 KKW	Max. 40 m^2 (Heed local guidelines!)
Maximum installation height	16 m (Heed local guidelines!)
• FAP-DOTC 420, FAP-DOT 420, FAP-DO 420, FAP-OTC 420, FAP-OT 420, FAP-O 420, FAP-O 420 KKW	Max. 16 m (Heed local guidelines!)
• FAH-T 420, FAH-T 420 KKW	Max. 7.5 m (Heed local guidelines!)

Ordering Information

FAP-OTC 420 Multisensor Detector Optical/Thermal/Chemical
for LSN improved version
Order number **FAP-OTC 420**

FAP-OT 420 Multisensor Detector Optical/Thermal
for LSN improved version
Order number **FAP-OT 420**

FAP-O 420 Optical Smoke Detector
for LSN improved version
Order number **FAP-O 420**

FAH-T 420 Heat Detector
thermal differential/thermal maximum, for LSN improved version
Order number **FAH-T 420**

FAP-O420 KKW Optical Smoke Detector
for use in areas with increased radioactive radiation, for LSN improved version
Order number **FAP-O420-KKW**

FAH-T420 KKW Heat Detector
thermal differential/thermal maximum, for use in areas with increased radioactive radiation, for LSN improved version
Order number **FAH-T420-KKW**

FAP-DO420 Dual-Optical Smoke Detector
for LSN improved version
Order number **FAP-DO420**

FAP-DOT420 Multisensor Detector Dual-Optical, Thermal
for LSN improved version
Order number **FAP-DOT420**

FAP-DOTC420 Multisensor Detector Dual-Optical, Thermal, Chemical
For LSN improved version
Order number **FAP-DOTC420**

Accessories

MS 400 Detector Base
Order number **MS 400**

MSC 420 Additional Base with Damp Room Seal
for surface-mounted cable feed
Order number **MSC 420**

FAA-MSR 420 Detector Base with Relay
with a change-over relay (Form C)
Order number **FAA-MSR 420**

MS 420 LSN Detector Base with Spring
With integrated jumper elements that preserve the loop function if the detector is removed
Order number **MS 420**

FNM-420-A-BS-WH Base Sounder Indoor, white
for signaling an alarm directly at the fire location, can be employed either as base sounders or stand-alone sounders, for LSN improved technology
Order number **FNM-420-A-BS-WH**

MSS 401 LSN Detector Base Sounder White
for direct connection to the LSN with direct separate power supply
Order number **MSS 401**

SSK 400 Protective Dust Cover
(packing unit = 10 units)
Order number **SSK 400**

TP4 400 Support Plate for Detector Identification
(packing unit = 50 units)
Order number **TP4 400**

TP8 400 Support Plate for Detector Identification
(packing unit = 50 units)
Order number **TP8 400**

SK 400 Protective Basket
prevents damage
Order number **SK 400**

MH 400 Detector Heating Element
usable at locations where the functional safety of the detector might be impaired by condensation
Order number **MH 400**

MK 400 Detector Console
Console for DIBt compliant mounting of detectors above doors etc., including detector base
Order number **MK 400**

Mounting Bracket for Fire Detectors on False Floor Stilts
Order number **FMX-DET-MB**

MPA External Detector Alarm Display according to DIN 14623
the transparent red alarm display conforms to DIN 14623
Order number **MPA**

FAA-420-RI Remote Indicator
required if the detector is not directly visible or has been mounted in false ceilings or false floors
Order number **FAA-420-RI**

	FAP-DOTC420 Multisensor Detector Dual-Optical, Thermal, Chemical	FAP-DOT420 Multisensor Detector Dual-Optical, Thermal	FAP-DO420 Dual-Optical Smoke Detector	FAP-OTC 420 Multisensor Detector Optical/Thermal/ Chemical	FAP-OT 420 Multisensor Detector Optical/Thermal
					
Detector type	Dual-optical/thermal/ chemical	Dual-optical/thermal	Dual-optical	optical/thermal/ chemical	optical/thermal
Operating voltage	15 V DC . . . 33 V DC	15 V DC . . . 33 V DC	15 V DC . . . 33 V DC	15 V DC . . . 33 V DC	15 V DC . . . 33 V DC
Current consumption	< 0.55 mA	< 0.55 mA	< 0.55 mA	< 0.55 mA	< 0.55 mA
Protection category	IP 40, IP 43 with MSF 400	IP 40, IP 43 with MSF 400	IP 40, IP 43 with MSF 400	IP 40, IP 43 with MSF 400	IP 40, IP 43 with MSF 400
Permissible operating temperature	-10 °C . . . +50 °C	-20 °C . . . +50 °C	-20 °C . . . +65 °C	-10 °C . . . +50 °C	-20 °C . . . +50 °C
Monitoring area	max. 120 m²	max. 120 m²	max. 120 m²	max. 120 m²	max. 120 m²
Maximum installation height	16 m	16 m	16 m	16 m	16 m
Use in areas with increased radioactive radiation	–	–	–	–	–
Color code	2 yellow loops	2 black loops	2 gray loops	yellow loop	black loop

	FAP-O 420 Optical Smoke Detector	FAH-T 420 Heat Detector	FAP-O420 KKW Optical Smoke Detector	FAH-T420 KKW Heat Detector
				
Detector type	optical	thermal differential/ thermal maximum	optical	thermal differential/ thermal maximum
Operating voltage	15 V DC . . . 33 V DC	15 V DC . . . 33 V DC	15 V DC . . . 33 V DC	15 V DC . . . 33 V DC
Current consumption	< 0.55 mA	< 0.55 mA	< 0.55 mA	< 0.55 mA
Protection category	IP 40, IP 43 with MSF 400	IP 40, IP 43 with MSF 400	IP 40, IP 43 with MSF 400	IP 40, IP 43 with MSF 400
Permissible operating temperature	-20 °C . . . +65 °C	-20 °C . . . +50 °C	-20 °C . . . +65 °C	-20 °C . . . +50 °C
Monitoring area	max. 120 m²	max. 40 m²	max. 120 m²	max. 40 m²
Maximum installation height	16 m	7.5 m	16 m	7.5 m
Use in areas with increased radioactive radiation	–	–	•	•
Color code	no marking	red loop	no marking	red loop

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