SecuriSens MHD 535 linear heat detector

System description

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Table of Contents

1 General information

Line type heat detector

The SecuriSens MHD 535 line type heat detector is a resettable line type heat detector designed to European product standard EN54-22. Line type heat detectors comprise a sensor element and a processor unit. In the case of the SecuriSens MHD 535 the sensor element consists of an electrical multipoint sensor cable with a multitude of temperature sensors.

Line type heat detectors are used for fire detection purposes primarily in areas where conventional fire detectors cannot be used due to aggressive and critical ambient conditions. They include:

- high levels of (also condensing) humidity
- outdoor installations
- aggressive gases
- extreme temperatures
- dust pollution
- salt spray mist and/or marine environments

Line type heat detectors may also be used for cost efficiency reasons in cases where a multitude of temperature detectors is required due to the size or length of the areas to be monitored. Another indicated use includes applications where the area in question becomes difficult or impossible to access once the automatic fire detectors have been installed; line type heat detectors are, as a rule, maintenance-free.

Applications

Examples of such applications include:

- road, railway and underground railway tunnels
- cable conduits and supply tunnels, e.g. at power plants or airports
- multi-storey car parks, underground car parks
- cold stores and freezers
- industrial plant surveillance e.g. along conveyor belts, production lines
- loading ramps
- refineries, gas and district heating lines
- incineration plants, waste disposal installations
- saw mills, farms
- areas subject to explosion hazards

2 SecuriSens MHD 535

Concept

The SecuriSens MHD 535 line type heat detector is based on the acquisition of data from a multitude of temperature sensors, which are integrated in the sensor cable at regular intervals. The temperature data is forwarded via the sensor cable to the processor unit(s) at the cable extremity. There a potential alarm is determined through comparison with preset thresholds; the alarm is then forwarded to the fire alarm system or the process control system via relay contacts or digital interfaces.

Measurement principle

The basic principle of temperature measurement used by the SecuriSens MHD 535 is the band gap effect, i.e. the temperature dependence of a semiconductor. At a constant voltage the basic emitter current of a transistor depends on the temperature. Here this effect is used for temperature measurement.

But we go further still. Using a special patented readout process, the HS bus, data acquisition is faster than with any other line type heat detector on the market. What's more the sensors react not only to convection heat but also to infrared radiation. This means the radiated heat from an open fire is detected regardless of the flow speed of the ambient air, contributing in turn to swift fire detection.

Advantages

Main advantages of the SecuriSens MHD 535:

- fastest detection through IR sensitivity and HS bus
- maximum sensor programming flexibility with regard to sensitivity ranges, grouping, cross-linking
- unambiguous localisation through fixed sensor positions
- installation across fire sections
- networking possibilities for larger premises
- output of the temperature profile
- version available with ATEX approval
- maintenance-free

3 Design and installation

3.1 Components

Processor units

All the main data is collected in the processor unit. Here the temperature values from the sensor cable are scanned on a cyclical basis. The thresholds used to create pre-signals or alarms are also stored in the processor unit. The alarm itself can be defined using both an absolute temperature value (maximum temperature evaluation) and a temperature rise within a set period of time (differential temperature evaluation).

Alarms and temperature data are output via relay contacts, digital interfaces or network, depending on the type.

SSP 535 Stand-alone Signal Processor
The SSP 535 is the basic processor unit of the SecuriSens MHD 535. It features an LED display as well as a group alarm and a fault relay. The alarm and temperature data can also be output via an RS 232, RS 422 or an optional RS 485 modbus interface.

SRG 535 Stand-alone Response Generator
Compared with the SSP 535 the SRG 535 also features 8 group relays, which can be assigned individual sensor groups. For additional group relays up to 6 RCU 535 Relay Control Units with 32 relay outputs and 4 digital inputs each can be connected. In addition 6 digital inputs are available, which can be used to acquire external alarm or status data for alarming purposes.

RSP 535 Remote Signal Processor
The RSP 535 is the networking variant of the SSP 535 for integration into the FT-NET. Here the alarm readings are also transmitted via the FT-NET. The alarm and temperature information can also be output via the RS 232 interface.

RXG 535 Remote eXtended Generator
The RXG 535 is the networking variant of the SRG 535 for integration into the FT-NET. Here the alarm readings are also transmitted via the FT-NET. The alarm and temperature information can also be output via the RS232 interface. Compared with the RSP 535 the RXG 535 also features 8 group relays, which can be assigned individual sensor groups. For additional group relays up to 6 RCU 535 Relay Control Units with 32 relay outputs and 4 digital inputs each can be connected. In addition 6 digital inputs are available, which can be used to acquire external alarm or status data for alarming purposes.

RRG 535 Remote Response Generator
The RRG 535 is a relay output unit that can be operated in the FT-NET. The RRG 535 is used to output alarm data centrally from SecuriSens MHD 535 line type heat detectors that are also connected in the FT-NET, to a fire alarm system. The RRG 535 has 8 group relays, which can be assigned individual sensor groups. For additional group relays up to 6 RCU 535 Relay Control Units with 32 relay outputs and 4 digital inputs each can be connected. In addition 6 digital inputs are available, which can be used to acquire external alarm or status data for alarming purposes.

RAP 535 Remote Access Point
RSS 535 Remote System Server
The RAP 535 and RSS 535 are central transfer points for system data (pre-signals, alarms, sensor and group status, error messages) and can be operated in the FT-NET.

RCU 535 Relay Control Unit
The RCU 535 can be connected to SRG, RXG and RRG to expand the relay outputs. Each RCU 535 has 32 relay outputs and 4 digital inputs.

MBI Modbus Interface
As an option the SSP 535 and SRG 535 processor units can be equipped with a Modbus card for data output via RS 485 Modbus RTU.

FOO Fibre Optic Option
As an option the RSP 535, RXG 535, RRG 535, RAP 535 and RSS 535 processor units can be equipped with one or two FOO cards for connection in the FT-NET for data transmission via fibre optics. This is mandatory for distances in excess of 1200 m and recommended in the case of an increased EMC load.

Overview of processor units

	Sensor cable connection	Collective alarm	Collective disturbance	8 group relays	RCU 535 connection	RS 232 interface	RS 422 / RS 485 Modbus	FT-NET interface
SSP 535	X	X	X			X	X	
SRG 535	X	X	X	X	X	X	X	
RSP 535	X	X	X			X		X
RXG 535	X	X	X	X	X	X		X
RRG 535		X	X	X	X	X		X
RAP 535		X	X			X		X
RSS 535		X	X			X		X

Sensor cables

The sensor cable is available in 3 versions and various sensor intervals. The standard sensor intervals are 2, 4, 7, 10 and 20 m. Customised sensor intervals ranging between 2 and 20 m can also be implemented on request. The maximum cable length is 2000 m or 250 sensors. The exception concerns installations with a 2 m sensor interval, where the system length is limited to 125 sensors.

SD cable
The SD (or standard) sensor cable can be used for most applications. It has a polyurethane outer sheath with a temperature resistance of between -40 °C and 85 °C.

HD cable
The HD (or Heavy Duty) sensor cable was developed to meet higher requirements. It has an ECTFE outer sheath with an enhanced resistance to chemicals and a temperature range of -55 °C to 125 °C.

FX cable
The FX sensor cable was developed mainly for installation in enclosed spaces such as dropped ceilings and raised floors. With its high level of flexibility it is also easy to lay in complex arrangements.

Modules

Besides the processor units and the sensor cable the SecuriSens MHD 535 also features various modules designed to ensure its functionality and increase its resistance to external influences.

CFM 535 Connection Filter Module
The CFM 535 is used as a connection module to ensure that two sensor cables are connected properly. It can be used when installing longer cable sections and for repairs.

CTM 535 Cable Terminator Module
The CTM 535 is used on a stub line to terminate the extremity of the sensor cable.

SSM 535 Sensor Separator Module
The SSM 535 is used to separate the sensor cable into sections. This means that if a fault occurs in a particular section the rest of the system remains fully operational ➔ see also double-sided power supply.

PFM 535 Protection and Filter Module
The PFM 535 is installed at the start of the sensor cable to protect it against overvoltage, e.g. in the event of a lightning strike.

CPM 535 Connection Protection Module
The CPM 535 is a special protection module for double-sided power supply.

ECB 535 Earth Connection Box
The ECB 535 is used to define the earth connection of the SecuriSens MHD 535, thereby minimising the influence of electromagnetic interference and protecting the processor unit against voltage peaks.

Accessories

Various accessories are available for the operation, installation and maintenance of the SecuriSens MHD 535 line type heat detector.

Compact Flash Card
A standard commercially available Compact Flash Card can be used in the processor units to store temperature readings, alarms and status information over a longer period. This can be useful if the SecuriSens MHD 535 is not continuously connected to a management system or processor.

CMC 535 mounting clip
The CMC 535 mounting clip is used to firmly secure the sensor cable to ceilings, walls or other surfaces. The sensor cable itself can be mounted both flat or upright. The maximum interval between individual mounting clips is 1 m. Elements with a diameter of up to 6 mm such as CMS 511 cable mounting screws can be used to secure the clips.

STE 515 Sensor Testing Device
The response characteristics can easily be tested (even in hard-to-reach areas inside tunnels) using the optional STE 515 sensor testing device. The sensor, which is easily identifiable by its marking, is heated specifically in order to test the complete reaction chain through to the fire alarm system.

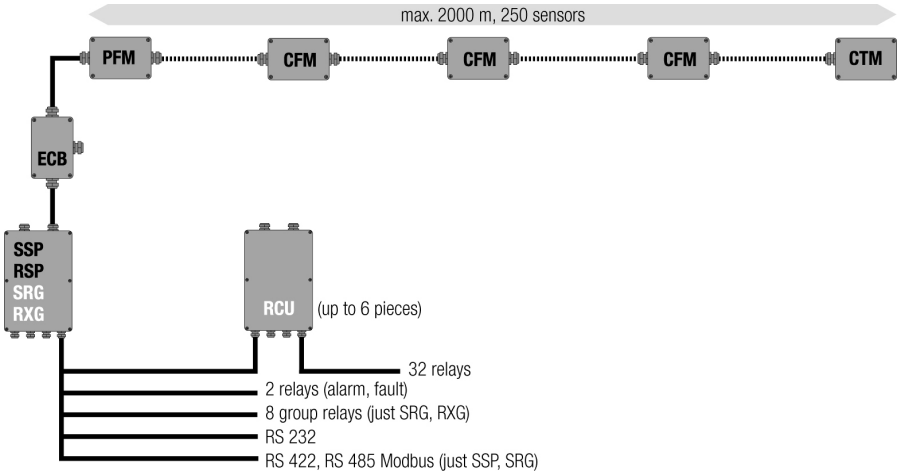
3.2 Structure

Depending on requirements the SecuriSens MHD 535 can be installed in different structures. Among other factors availability in the event of damage can be influenced as a result.

Stub line

The simplest installation is the stub line with a processor unit at the cable extremity.

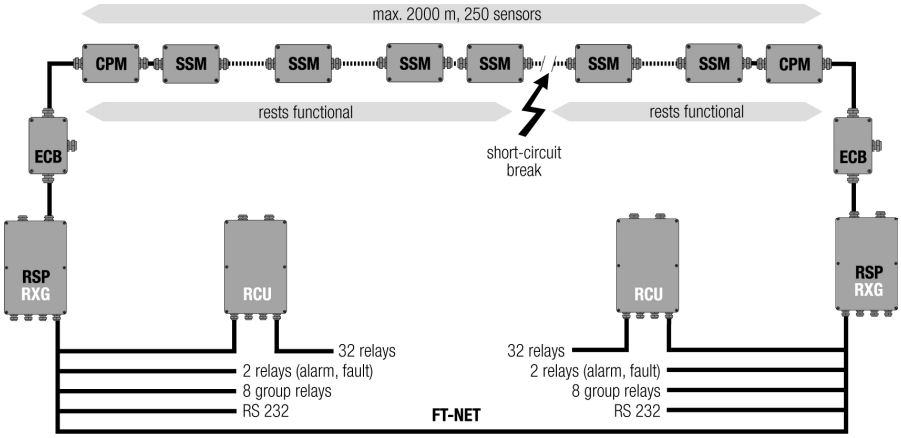
Stub-type installation



Double-sided power supply

The double-sided power supply for the sensor cable was newly developed to increase the availability of this line type heat detector, particularly in the event of damage to the sensor cable. A processor unit is connected to each sensor cable extremity to evaluate the section of sensor cable assigned to it. The SSM 535 separator modules divide the sensor cable into several sections, each of which can be isolated in the event of a fault (short-circuit and interruption). The SecuriSens MHD 535 then automatically reconfigures itself so that the remaining sections of cable can be evaluated by the connected processor unit. The two processor units communicate via the FT-NET, which ensures that all the alarm data is still available as before at the same point of output (relay contact). The use of two separate processor units, which should be installed in two different places whenever possible, is also important. This means a partial failure of the line type heat detector can be reduced to a minimum.

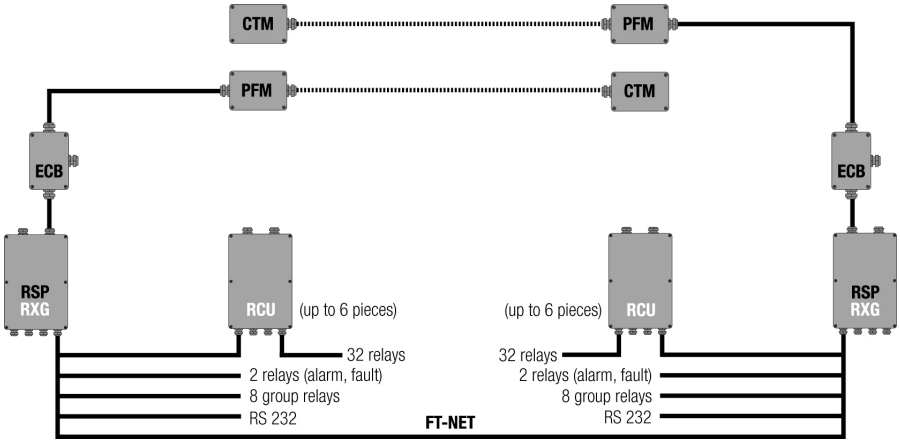
Double-sided power supply



Redundant design

Two sensor cables can of course also be installed in parallel to create a redundant design. Here again the processor units can be connected via FT-NET so that in the event of a cable failure all the alarm data is still available at the same output.

Redundant installation

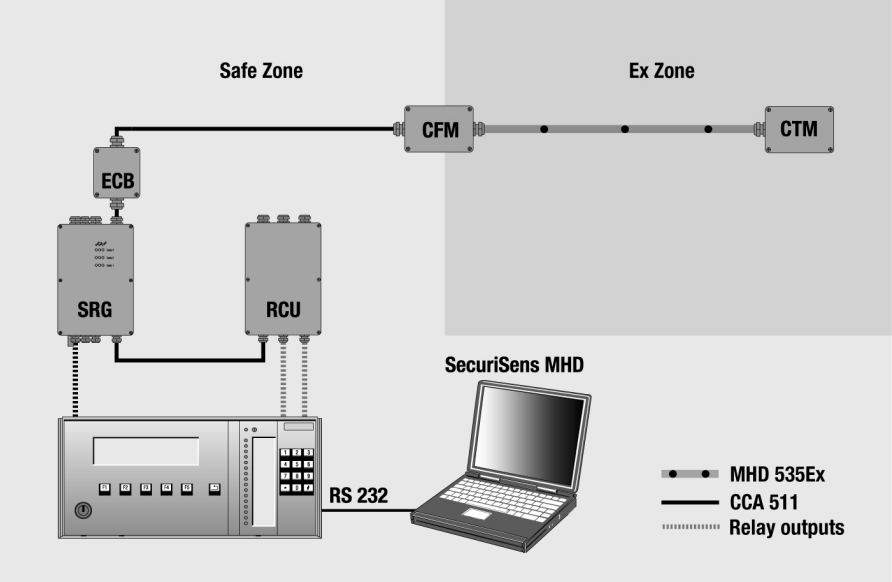


Network

The SecuriSens MHD 535 can also be installed as a network for more complex designs ➔ see Section 4.

ATEX applications

A version with ATEX approval is available for installation in areas subject to explosion hazards. The sensor cables, connection and termination module are then installed in the area subject to explosion hazards while the processor unit and the CCA 535 connecting cable are installed in the safe area.



3.3 Operation

Alarm and fault output

The normative signalling is provided via the potential-free relay contacts. The signals are also available at the digital interface on the processor unit. At the same time normal operation, alarms and faults are displayed by 3 separate LEDs on the cover of the processor unit.

The individual signals are usually reset via the superordinate fire alarm system or the management system. The relevant reset inputs are provided for this purpose on each processor unit.

Measured value output

The temperature readings can be output via the digital interface, an installed Compact Flash Card or the MHD Config configuration software.

4 FT-NET fault-tolerant network

Applications

With large monitored areas such as industrial plants or tunnels with access and exit routes it sometimes makes sense to network several SecuriSens MHD 535 line type heat detectors with one another.

The same applies if the alarm data is to be accessed from a point other than the processor unit.

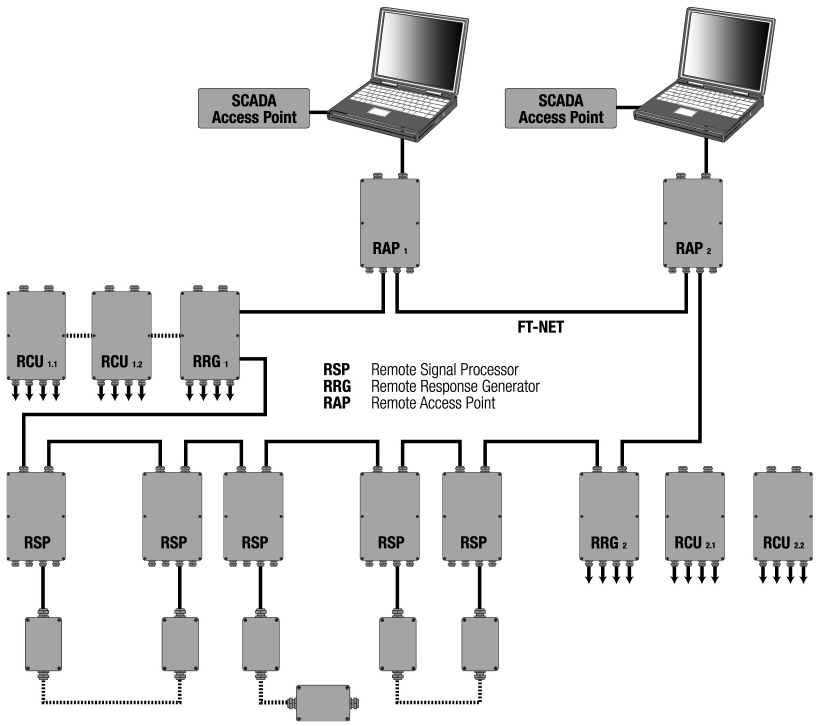
Advantages

The network provides central access to alarm and status data via the additional RRG relay output units. This means that not every processor unit has to be connected with a fire alarm control panel, which in turn considerably reduces the amount of cabling and installation required.

What's more data from different sensor cables can be combined, resulting in the implementation of more complex alarm mechanisms.

Structure

The FT-NET is an error-tolerant network. A maximum of 16 processor or output units can be connected via a double ring circuit. If at any point the connection is interrupted, the network automatically re-configures itself into two stub lines. This means that all the participants can continue to forward their data to the central processor units.



5 MHD Config Software

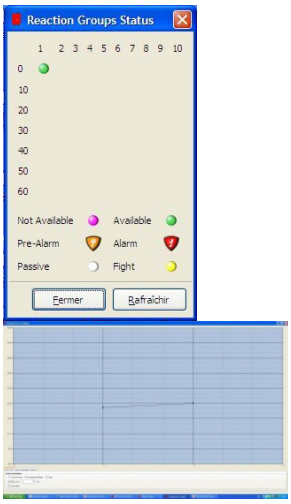
The MHD Config configuration software was specially developed for the operation and programming of the SecuriSens MHD 535. It features a Windows interface and wizards to support the user with all the main programming steps.

Tasks

Programming
The most important function by far is configuring the line type heat detector with regard to its response and reaction behaviour. There is a great deal of flexibility, for instance:

- possibility of grouping sensors (even if they are not adjacent)
- possibility of setting pre-alarms and alarm thresholds (different thresholds for different sensors, even within a group)
- two-sensor dependency to prevent false alarms
- links to external data using digital inputs

Programming is made particularly easy through the use of sequence-controlled wizards and templates.



Visualisation
If the SecuriSens MHD 535 is not connected to a process control system, the MHD Config can also be used for visualisation purposes. It can display temperature profiles as readily as alarm and status data relating to sensors and groups.

Calibration
The SecuriSens MHD 535 is factory-calibrated with a precision of ±2°C. No recalibration is required during its service life. If however the measurement is to be adapted to other sensors, it can be done with the aid of the MHD Config software for both individual sensor points and the entire cable.

Servicing
The MHD Config configuration software is also used to read out a log file after an alarm has been triggered. The log file contains precise data on the alarm and three complete temperature scans of the cable before and after the alarm.

6 After commissioning

6.1 Servicing

Maintenance and inspection work (servicing) on danger detection systems is subject in principle to the provisions of the country in which the system is operated. For example:

- in GERMANY, DIN VDE 0833 Part 2 and DIN 14675
- in SWITZERLAND, the VKF (Cantonal Fire Insurance Union) guideline and the SES technical guidelines
- in AUSTRIA, Austrian standard OENORM F 3070

These national provisions refer in part to the equipment manufacturer's indications with regard to inspection intervals.

The system itself does not require any maintenance per se. In particular no intervention is needed on the sensor cable. The SecuriSens MHD 535 is equipped with a self-monitoring feature, which detects and signals faults if they cannot be corrected by themselves. It is useful however to carry out a performance check at regular intervals and to check the triggering of the entire reaction chain using the STE 515 sensor testing device.

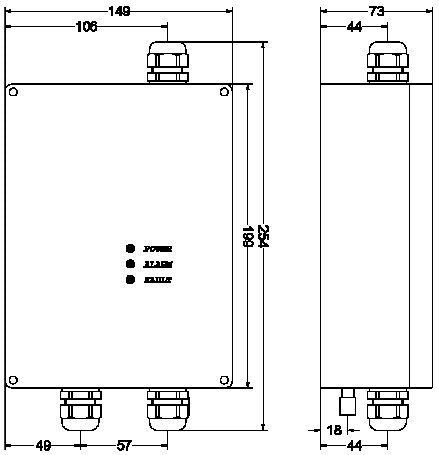
Securiton recommends that:

- maintenance and inspection work be carried out at regular intervals and by trained and qualified personnel only (qualified electrician).
- a performance check be carried out at least once a year according to the instructions contained in the operating instructions.

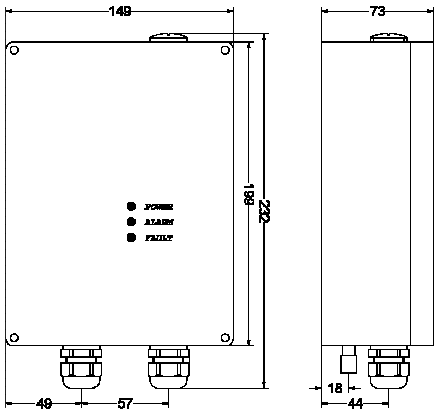
7 Technical specifications

7.1 Dimensions

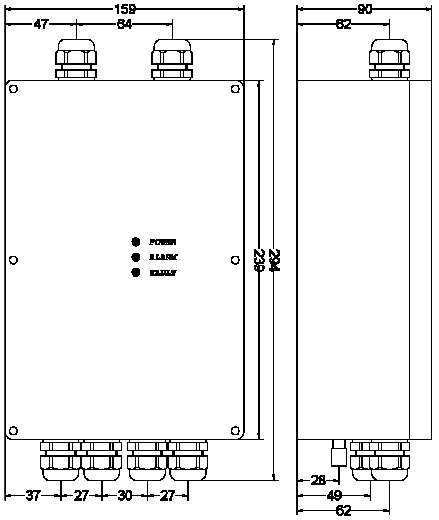
Processor units



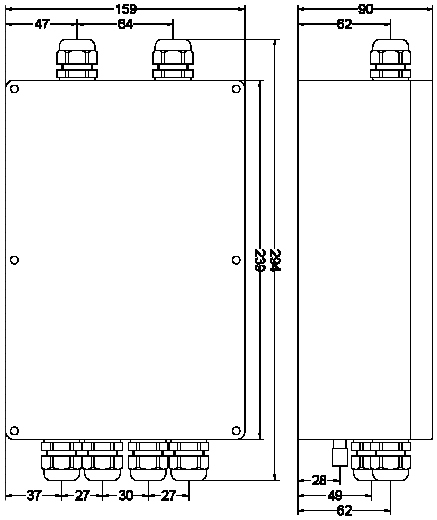
SSP 535, RSP 535



RAP 535, RSS 535

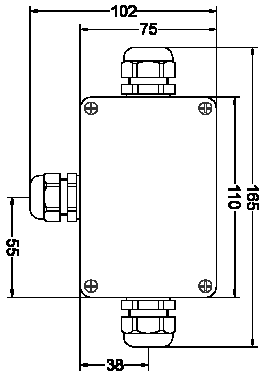


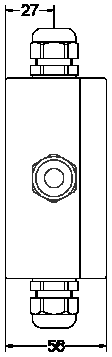
SRG 535, RRG 535, RXG 535



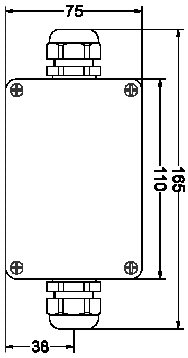
RCU 535

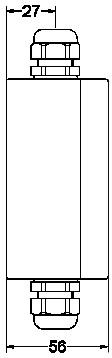
Modules



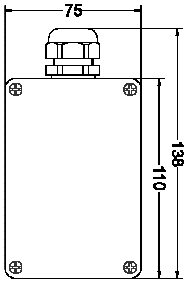


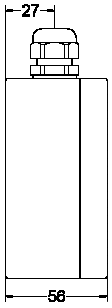
ECB 535





CFM 535, CFM 535 EX, CPM 535, PFM 535, SSM 535

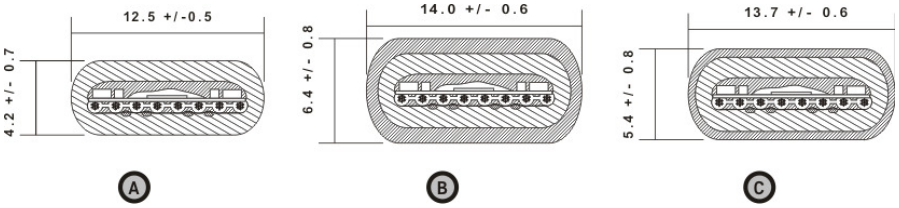




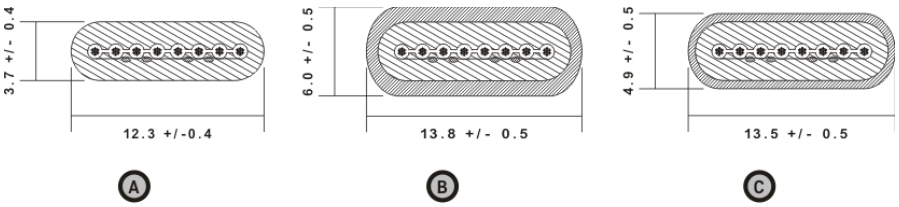
CTM 535, CTM 535-3EX

Sensor cables

A=FX
B=SD
C=HD



Cable at the sensor location



Cable between the sensors

7.2 Technical data

SecuriSens MHD 535 line type heat detector:	Approval	VdS EN 54-Part 5 Response class A1 to C G208190
	Response characteristics	Free setting max./diff. response behaviour
Processor units (all)	Material	Polycarbonate
	Colour	light grey RAL 7035
	Operating voltage	10 … 36 V DC
	Permitted operating temperature	–25 °C … +85 °C
	Relative humidity	95% transient, without condensation 70% continuous
	Type of protection IEC 529 / EN 60529	IP 65
	Relays	1 collective alarm relay 1 fault relay - potential-free -
	Loading capacity, relay contacts	max. 1500 VA (250 VAC / 6 A) min. 12 V / 0.1 A
SSP 535, RSP 535, RAP 535, RSS 535	Power consumption (idle / max at 24 V DC)	114 …154 mA / 134 … 174 mA
	Weight	920 g
SRG 535, RXG 535, RRG 535	Current consumption (idle / max at 24 V DC)	124 … 164 mA / 254 … 356 mA
	Group relays	8
	Digital inputs	6
	Weight	1350 g
FOO (for RSP 535, RXG 535, RRG 535, RSS 535, RAP 535)	Fibre optic connection	Multimode fibre 125/62.5 µm ST connector
RCU 535	Operating voltage	10 … 36 VDC
	Current consumption (idle / max at 24 V DC)	110 mA / 540 mA
	Group relays	32 relays, potential-free
	Loading capacity, relay contacts	max. 1500 VA (250 VAC / 6 A) min. 12 V / 0.1 A
	Digital inputs	4
	Weight	1270 g
Modules (all)	Operating voltage	10-20 V DC (via sensor cable)
	Class of protection IEC 529 / EN	IP 65

	60529	IP 66 on request
	Housing material	glass fibre reinforced polyester
	Temperature range	-40 … +85 °C
	Humidity	95% rel/h transient without condensation 70% rel/h continuous
ECB 535	Current consumption	0 mA
	Weight	460 g
CFM 535	Current consumption	0 mA
	Weight	420 g
CFM 535 3EX	Approval	3G Ex nA II X II 3D Ex tD A22 IP65 T80°C / T85°C / T120°C / T140°C X
	Housing material	EX glass fibre reinforced polyester
	Current consumption	0 mA
	Weight	420 g
CTM 535	Current consumption	8.5 mA
	Weight	380 g
CTM 535-3EX	Approval	3G Ex nA II X II 3D Ex tD A22 IP65 T80°C / T85°C / T120°C / T140°C X
	Housing material	EX glass fibre reinforced polyester
	Current consumption	8.5 mA
	Weight	380 g
PFM 535	Current consumption	11 mA
	Weight	420 g
CPM 535	Current consumption	0 mA
	Weight	420 g
SSM 535	Current consumption	8.5 mA
	Weight	420 g
Sensor cables (all)	Standard sensor interval	2 m, 4 m, 7 m, 10 m, 20 m (others in the 2 – 20 m range on request)
	Maximum cable length	250 m, 1000 m, 1750 m, 2000 m (depending on the sensor interval)
	Maximum number of sensors	125, 250 (depending on the sensor interval)
	Measurement range	-55 … 125 °C
	Relative humidity	95% rel. hum.
	Installation temperature range	5 … 45 °C

	Tensile force during laying (briefly)	500 N
	Tensile force in operation	0 N
	Bending radius	100 mm
	Maximum length connecting cable	200 m
MHD 535 SD	Outer material	PUR
	Colour	red RAL 3000
	Operating temperature, continuous	- 40 … + 85°C
	Operating temperature long-term (up to 5 hrs)	- 40 … + 95°C
	Operating temperature short-term (up to 1 min, 10 times in 24 hrs)	- 40 … + 120°C
	Weight	80 g/m
MHD 535 HD	Outer material	ECTFE
	Colour	grey
	Operating temperature, continuous	- 55 … + 125°C
	Weight	79 g/m
MHD 535 SD-3EX, MHD 535 HD-3EX	Approval	Ⓔx 3G Ex nA II X Ⓔx 3D Ex tD A22 X
MHD 535 FX	Outer material	TPE
	Colour	red
	Operating temperature, continuous	- 40 … + 85°C
	Operating temperature long-term (up to 5 hrs)	- 40 … + 95°C
	Operating temperature short-term (up to 1 min, 10 times in 24 hrs)	- 40 … + 120°C
	Weight	53 g/m

7.3 Product line

Processor units	SSP 535	Stand-alone Signal Processor
	SRG 535	Stand-alone Response Generator
	RSP 535	Remote Signal Processor
	RXG 535	Remote eXtended Generator
	RRG 535	Remote Response Generator
	RAP 535	Remote Access Point
	RSS 535	Remote System Server
	RCU 535	Relay control unit with 32 relays (cascadable)
Modules	CFM 535	Connection and Filter Module
	CFM 535EX	Connection and Filter Module for explosive areas, Zone 2, Zone 22
	CTM 535	Cable Terminator Module
	CTM 535 EX	Cable Terminator Module for explosive areas, Zone 2, Zone 22
	PFM 535	Protection and Filter Module

	SSM 535	Sensor Separator Module as per EN 54-17
	ECB 535	Earth Connecting Box
	CPM 535	Connection and Protection Module
Sensor cables	MHD 535-2SD	Multipoint heat detector with 2 m sensor interval for property surveillance
	MHD 535-4SD	Multipoint heat detector with 4 m sensor interval for property and space surveillance
	MHD 535-7SD	Multipoint heat detector with 7 m sensor interval for space surveillance and for use in tunnels
	MHD 535-10SD	Multipoint heat detector with 10 m sensor interval for use in tunnels
	MHD 535-20SD	Multipoint heat detector with 20 m sensor interval
	MHD 535-2HD	Multipoint heat detector with 2 m sensor interval with enhanced chemical and temperature resistance for property surveillance
	MHD 535-4HD	Multipoint heat detector with 4 m sensor interval with enhanced chemical and temperature resistance for property and area surveillance
	MHD 535-7HD	Multipoint heat detector with 7 m sensor interval with enhanced chemical and temperature resistance for space surveillance
	MHD 535-10HD	Multipoint heat detector with 10 m sensor interval with enhanced chemical and temperature resistance
	MHD 535-20HD	Multipoint heat detector with 20 m sensor interval with enhanced chemical and temperature resistance
	MHD 535-2FX	Multipoint heat detector with 2 m sensor interval for property surveillance in protected areas
	MHD 535-4FX	Multipoint heat detector with 4 m sensor interval for property and space surveillance in protected areas
	MHD 535-7FX	Multipoint heat detector with 7 m sensor interval for space surveillance in protected areas
	MHD 535-10FX	Multipoint heat detector with 10 m sensor interval for space surveillance in protected areas
	MHD 535-20FX	Multipoint heat detector with 20 m sensor interval for space surveillance in protected areas
	MHD 535-2SD-3EX	Multipoint heat detector with 2 m sensor interval for property surveillance in areas subject to explosion hazards, Zone 2, Zone 22
	MHD 535-4SD-3EX	Multipoint heat detector with 4 m sensor interval for property and space surveillance in areas subject to explosion hazards, Zone 2, Zone 22
	MHD 535-7SD-3EX	Multipoint heat detector with 7 m sensor interval for space surveillance and for use in tunnels in areas subject to explosion hazards, Zone 2, Zone 22
	MHD 535-10SD-3EX	Multipoint heat detector with 10 m sensor interval for use in tunnels in areas subject to explosion hazards, Zone 2, Zone 22

	MHD 535-20SD-3EX	Multipoint heat detector with 20 m sensor interval for surveillance in areas subject to explosion hazards, Zone 2, Zone 22
	MHD 535-2HD-3EX	Multipoint heat detector with 2 m sensor interval with enhanced chemical and temperature resistance for property surveillance in areas subject to explosion hazards, Zone 2, Zone 22
	MHD 535-4HD-3EX	Multipoint heat detector with 4 m sensor interval with enhanced chemical and temperature resistance for property and space surveillance in areas subject to explosion hazards, Zone 2, Zone 22
	MHD 535-7HD-3EX	Multipoint heat detector with 7 m sensor interval with enhanced chemical and temperature resistance for space surveillance in areas subject to explosion hazards, Zone 2, Zone 22
	MHD 535-10HD-3EX	Multipoint heat detector with 10 m sensor interval with enhanced chemical and temperature resistance for use in areas subject to explosion hazards, Zone 2, Zone 22
	MHD 535-20HD-3EX	Multipoint heat detector with 20 m sensor interval with enhanced chemical and temperature resistance for use in areas subject to explosion hazards, Zone 2, Zone 22
Accessories	MHD Config	Configuration and operating software
	CMC 535	Mounting clip
	CCA 535	Connecting cable
	STE 515	Mobile heat sensor testing device, complete with carrying case

Securiton AG, Alarm and Security Systems
www.securiton.com, info@securiton.com

Securiton d.o.o., Serbia
www.securiton.rs, info@securiton.rs

Securiton Kft., Hungary
www.securiton.hu, info@securiton.hu

Securiton (M) Sdn Bhd. Malaysia
www.securiton.com, asia@securiton.com.my

Securiton RUS, Russia
www.securiton.ru, info@securiton.ru

Securiton Slovakia s.r.o.
www.securitonslovakia.sk, info@securitonslovakia.sk

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