



BRIDEX

FE Fuji Electric
Innovating Energy Technology

FIPRES

Fire Prevention and Overheating Control system

product presentation

© streamer

Overview

25%

of building fires are due to electrical malfunctions*

32%

of fires in Germany are related with electricity**

\$ 3,2B

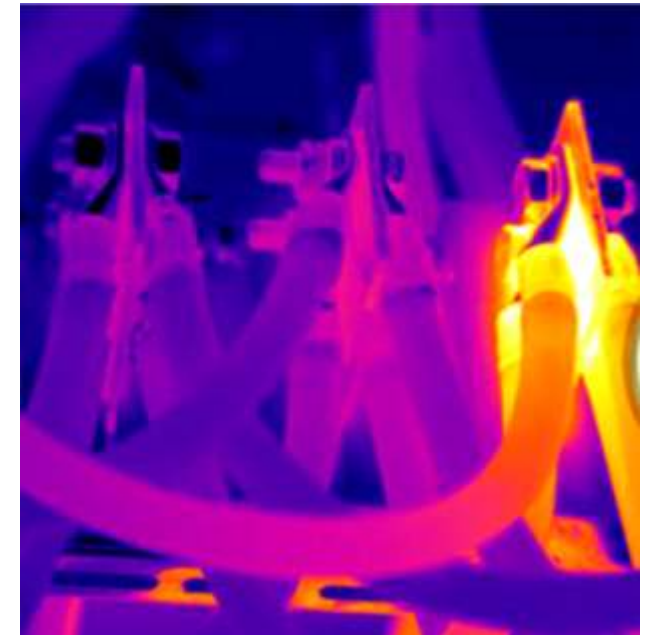
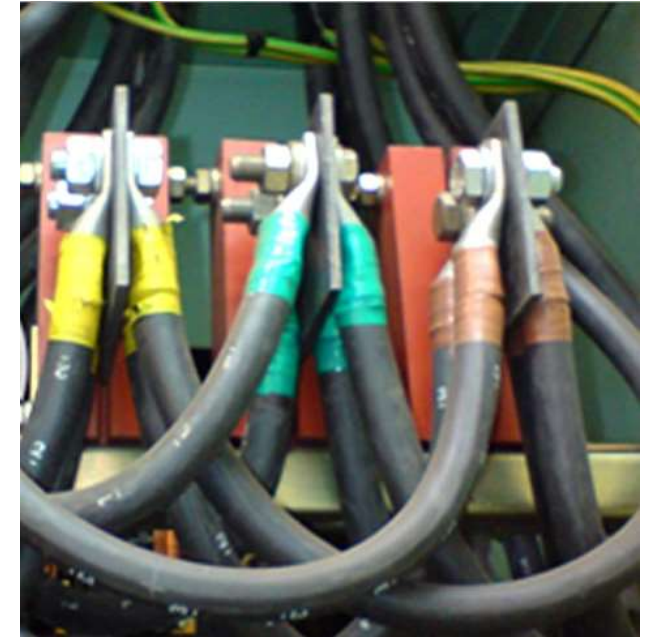
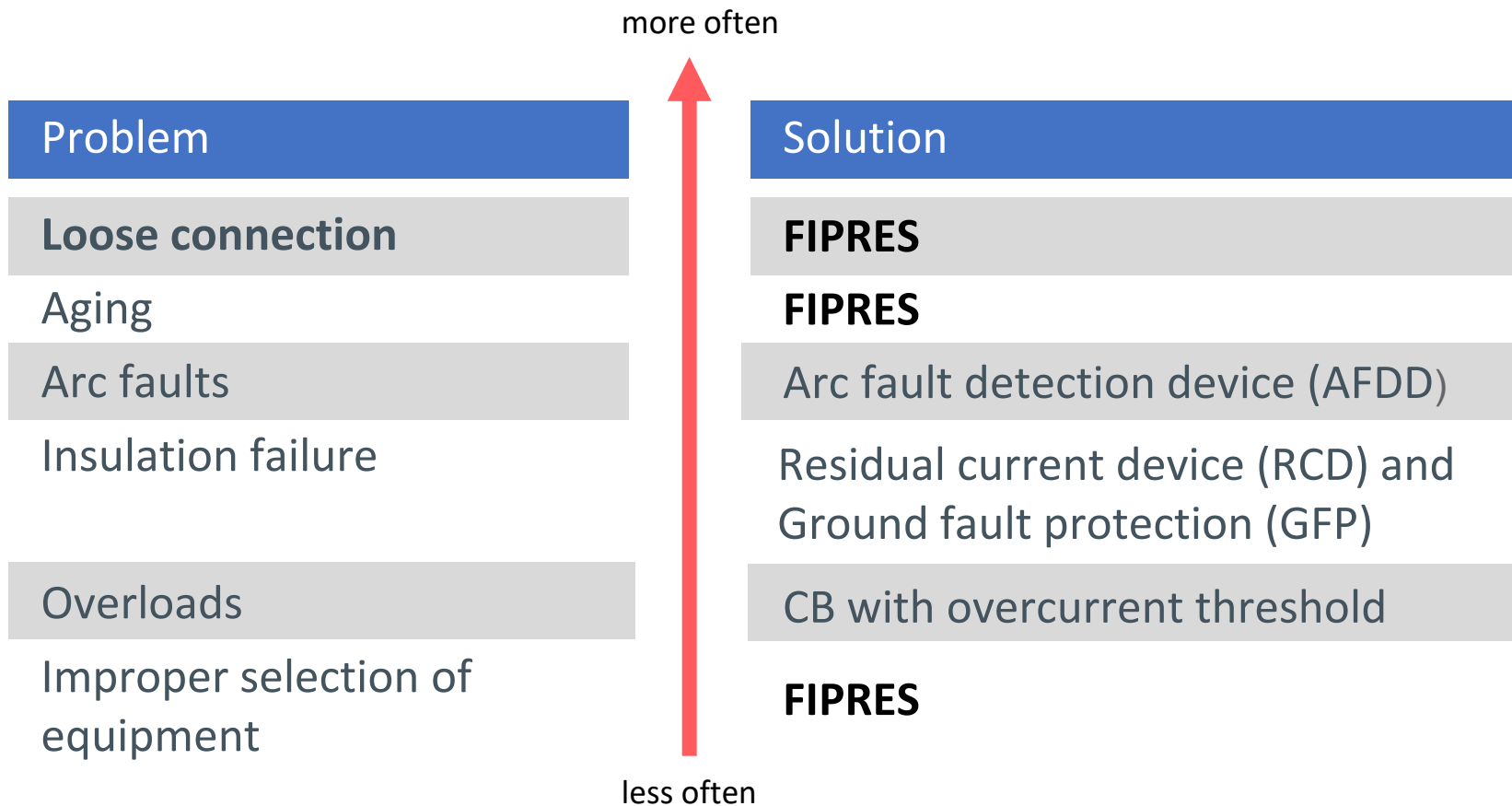
of damage annual damage in the U.S. and Europe due to electrical fires ***

* according to European Fire Academy (EFA)

** according to German Insurance Association

*** according to the National Fire Protection Association (NFPA) and the European Fire Safety Alliance (EFSA)

Reasons of Overheating/Fire



Loose connection ?

Improper torque, corrosion, vibration, current/temperature fluctuations, withdrawals of moving contacts

MECHANICALLY LOOSE CONNECTION

OVERHEATING

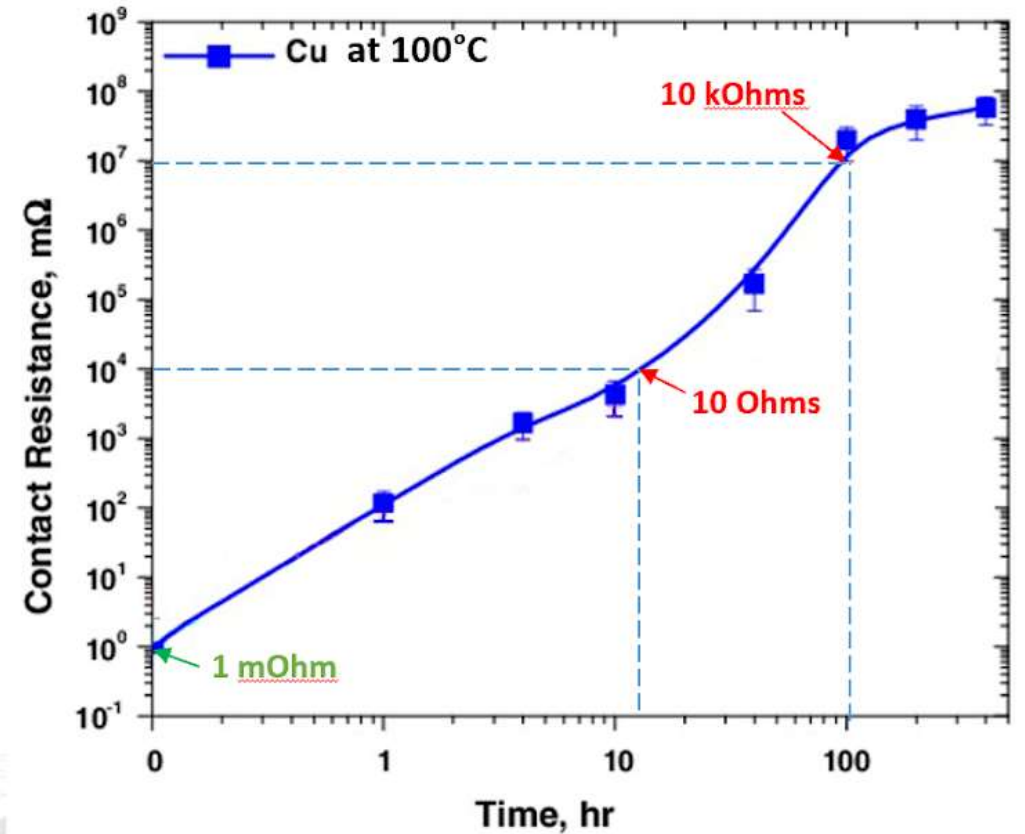
OXIDATION

INCREASE OF RESISTANCE

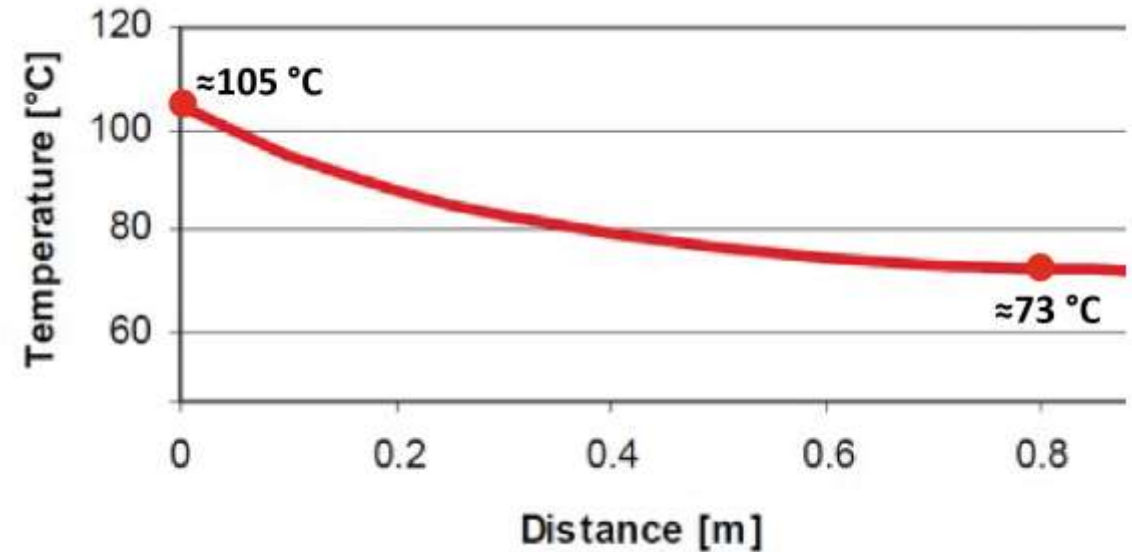
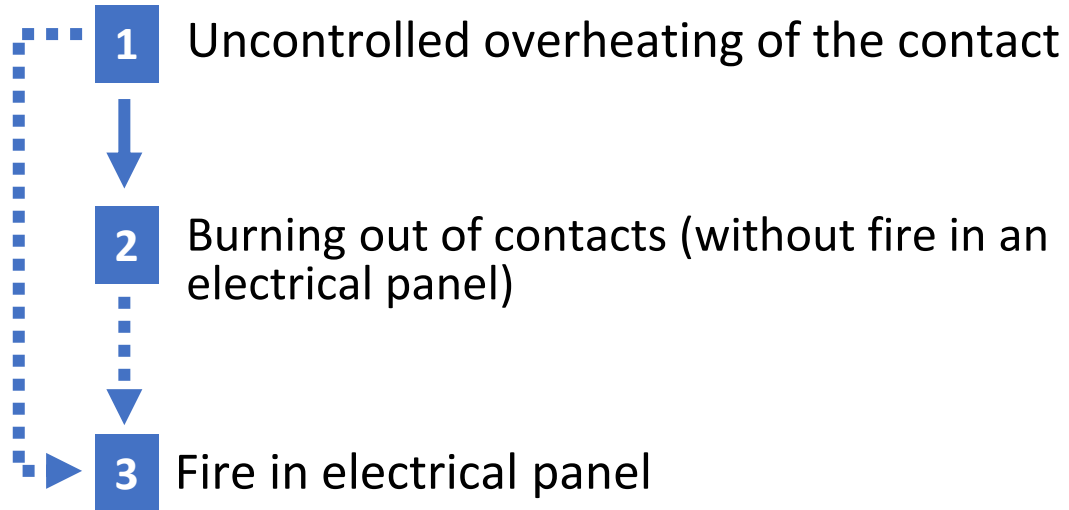
UNCONTROLLED
THERMAL
RUNAWAY

FIRE

Oxidation at connections



Overheating/Fire consequences



Material damage

- Electrical equipment
- Facility

Power supply interruption

- Stop of production process
- Profit loss

Threat to life

- evacuation

How to solve this issue

Fire system



IRT



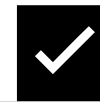
Temperature sensors



FIPRES



Preventive



Continuous



Affordable



Easy to implement / retrofit



IRT limitations



Periodic basis

Infrared thermography is carried out regularly every 6, 12 or 24 months, so it gives an indication of the condition of the equipment only for the time of inspection.

Depends on load level

The load at the time of inspection should be at least 60% to see weak points. If the load level is less than required, an additional fictitious load must be connected. Otherwise, you won't be able to see overheated parts of the connections even if they already occurred.

Limited access

Complex layout and partitions in an electrical panel might not allow to inspect 100% of the contact connection. In case of MV panels (which are locked during operations) the inspection can be done only through small IR windows

Depends on the human factor

The quality of survey largely depends on the diligence and professionalism of the employee

Unsafe for personnel

Maintenance personnel have to stay close to live parts during inspection



FIPRES. How it works

remote FIRE PREVENTION THERMOLABEL (rFPT)

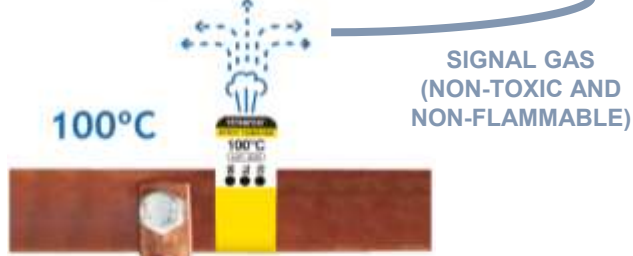
FIRE PREVENTION ALARM (FPA)

FIRE PREVENTION CONCENTRATOR (FPC)

1 rFPT must be wrapped around all the contacts and the gas sensor installed into the switchgear

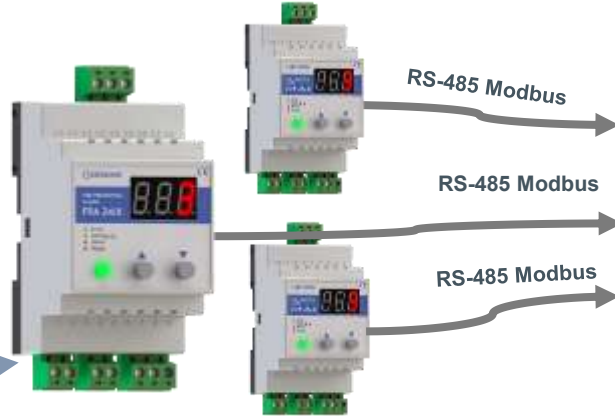


2 When heated above 50 - 90 °C indicator marks will irreversibly change their colors



3 At 100 °C rFPT releases signal gas, which is detected by FPA

4 FPA transmits alarm signals to SCADA or BMS system through Modbus RTU, or to local alarm systems using dry contact output



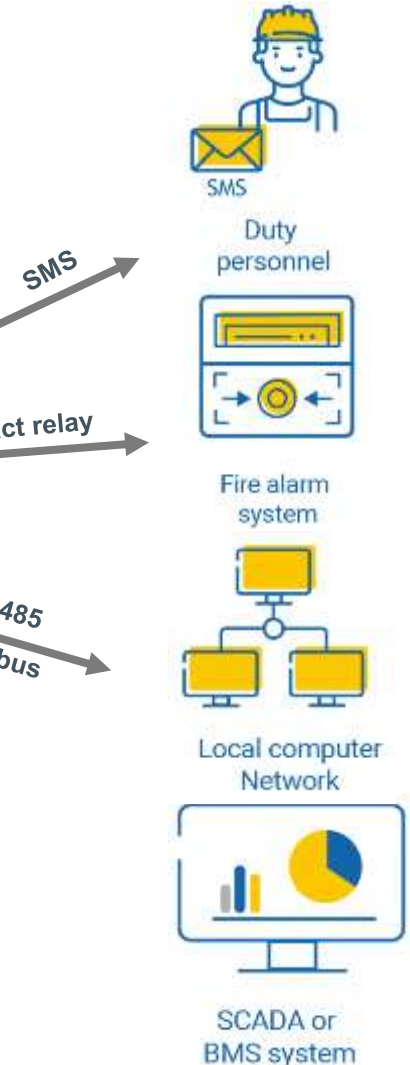
FPA has "dry contact" type output

Local ALARM system

5 FPC monitors the status of up to 32 FPA, displays and records Alarm signals. When FPA is triggered, the FPC transmits information to the central fire alarm system, SCADA or BMS. FPA has a speaker for audible notification



you can use similar device which supports RS 485 Modbus instead of FPC

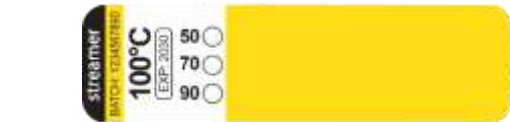


FIPRES. How it works

remote FIRE PREVENTION
THERMOLABEL (rFPT)

+

FIRE PREVENTION
ALARM (FPA)



1 rFPT must be wrapped around all the contacts and the gas sensor installed into the switchgear



2 When heated above 50 - 90 °C indicator marks will irreversibly change their colors



3 At 100 °C rFPT releases signal gas, which is detected by FPA

SIGNAL GAS
(NON-TOXIC AND
NON-FLAMMABLE)

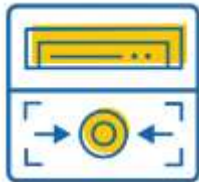
FPA has "dry contact" type output

4 FPA transmits alarm signals to SCADA or BMS system through Modbus RTU, or to local alarm systems using dry contact output



Dry contact relay

RS-485 Modbus



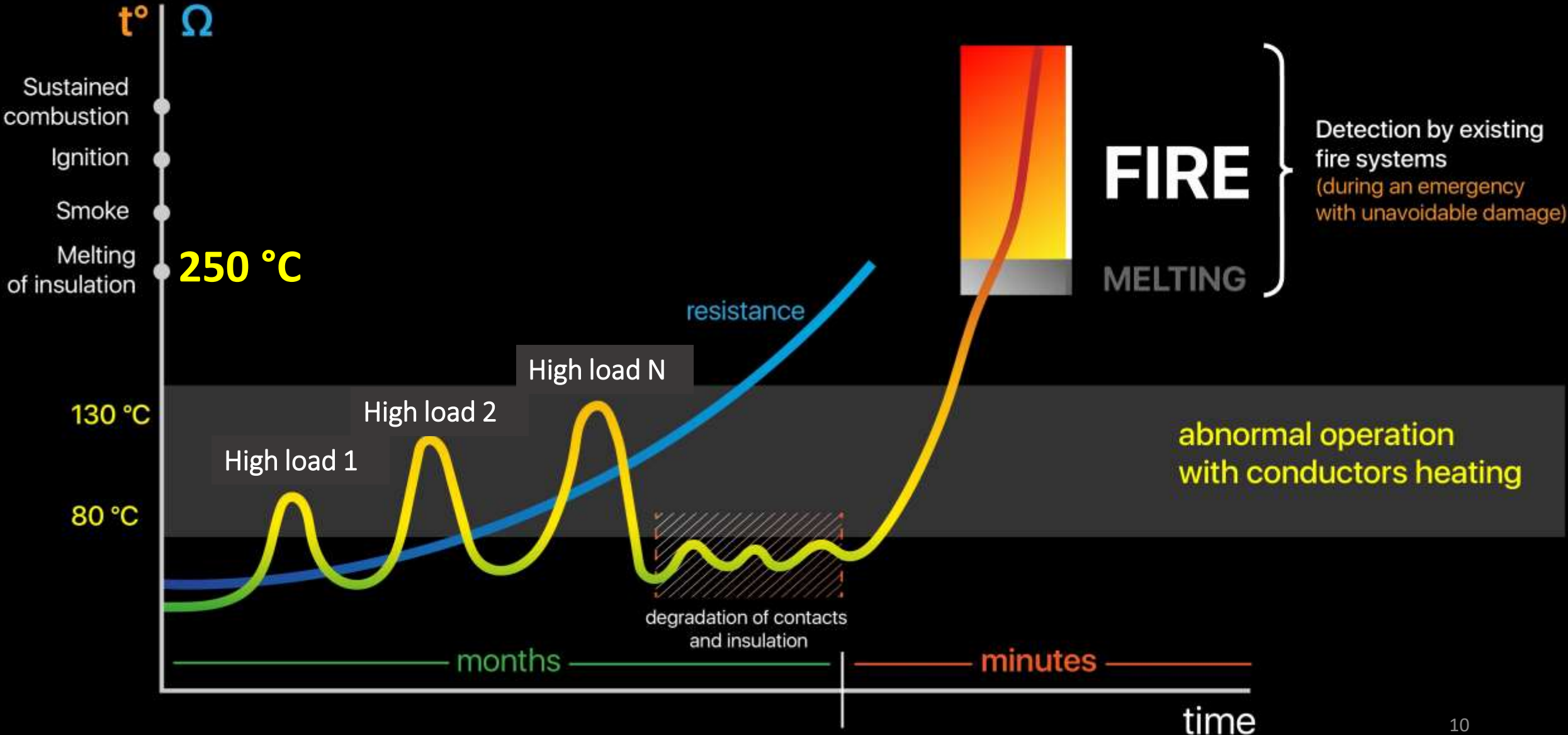
Fire alarm system



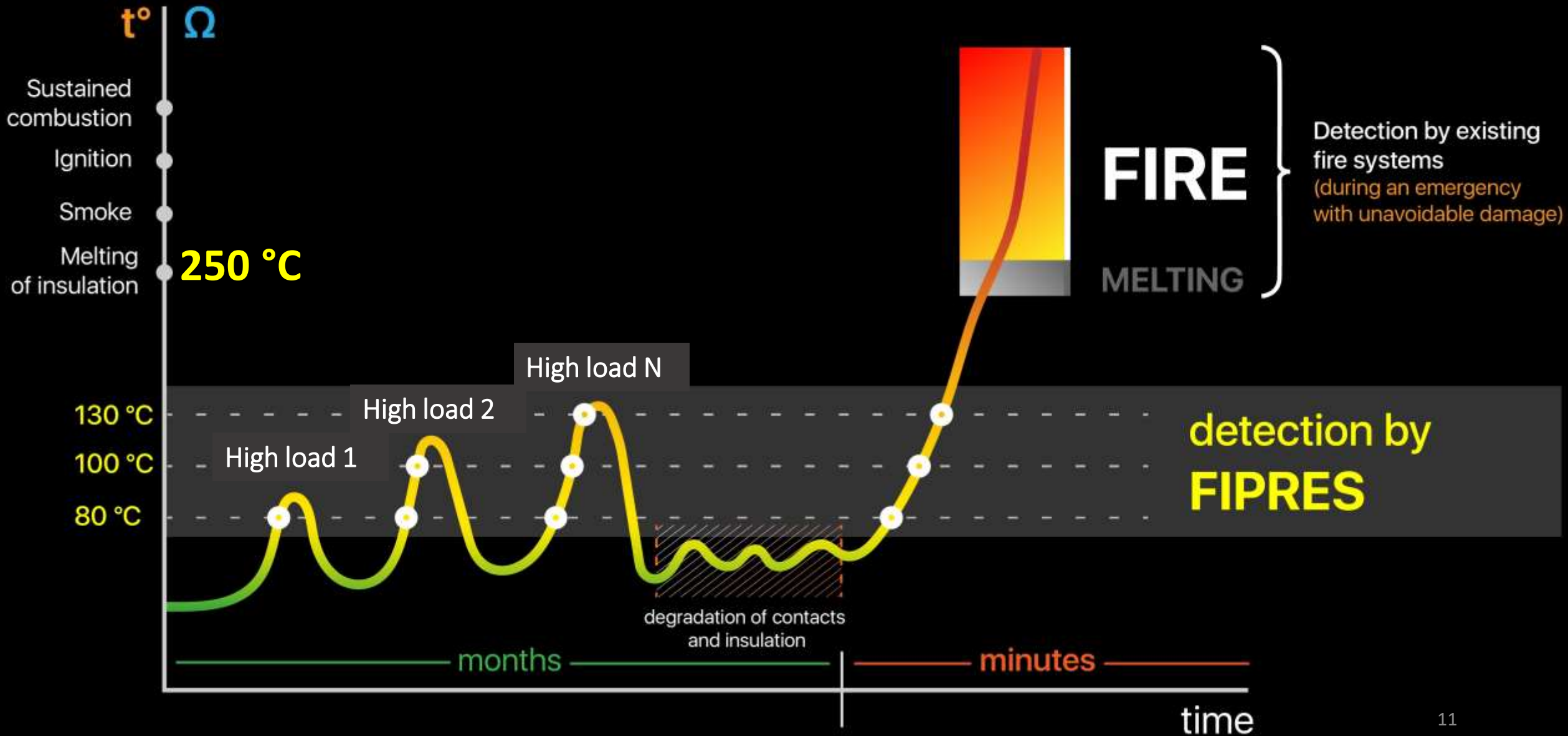
SCADA or BMS system

LIGHT
VERSION

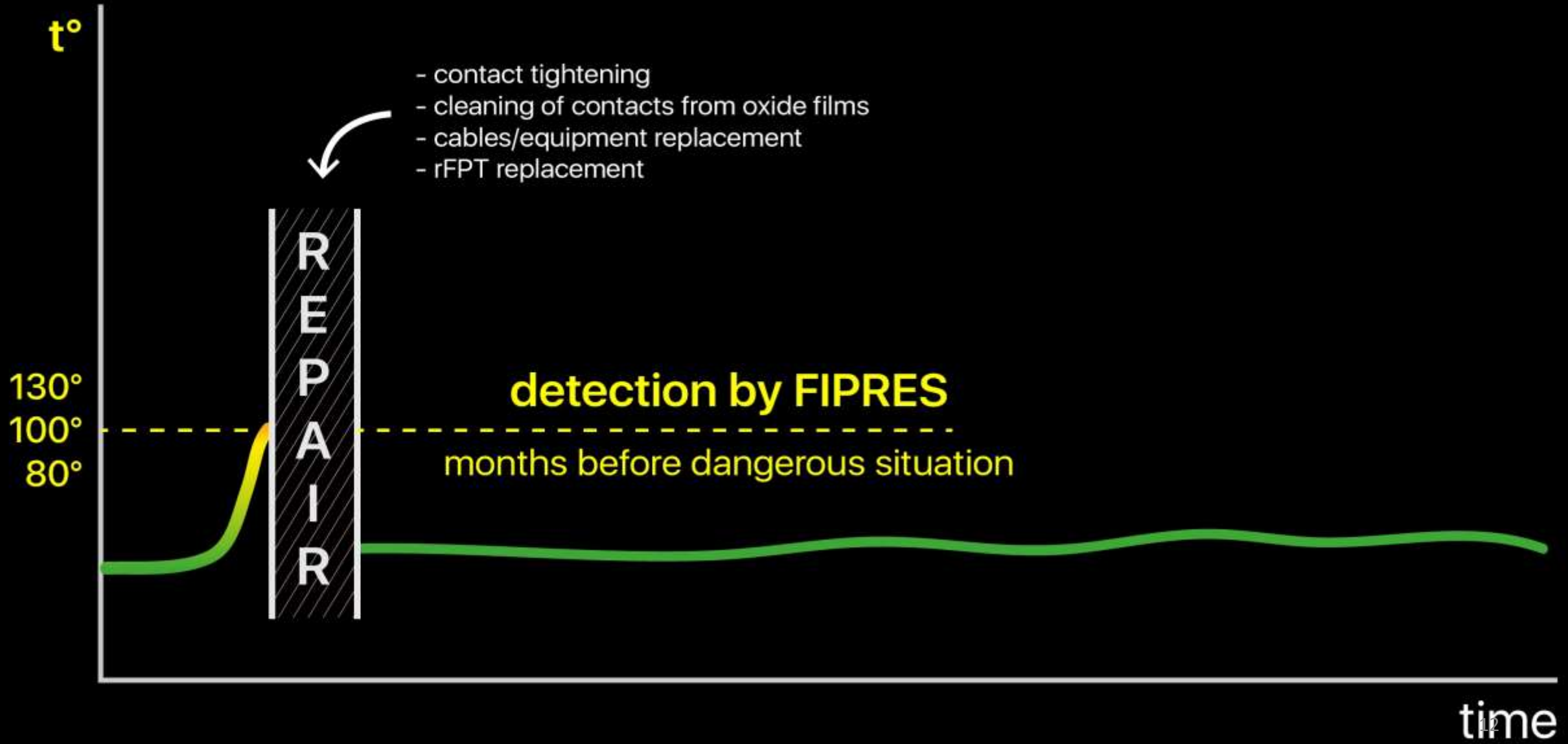
Standard scenario of fire



Preventive detection by FIPRES



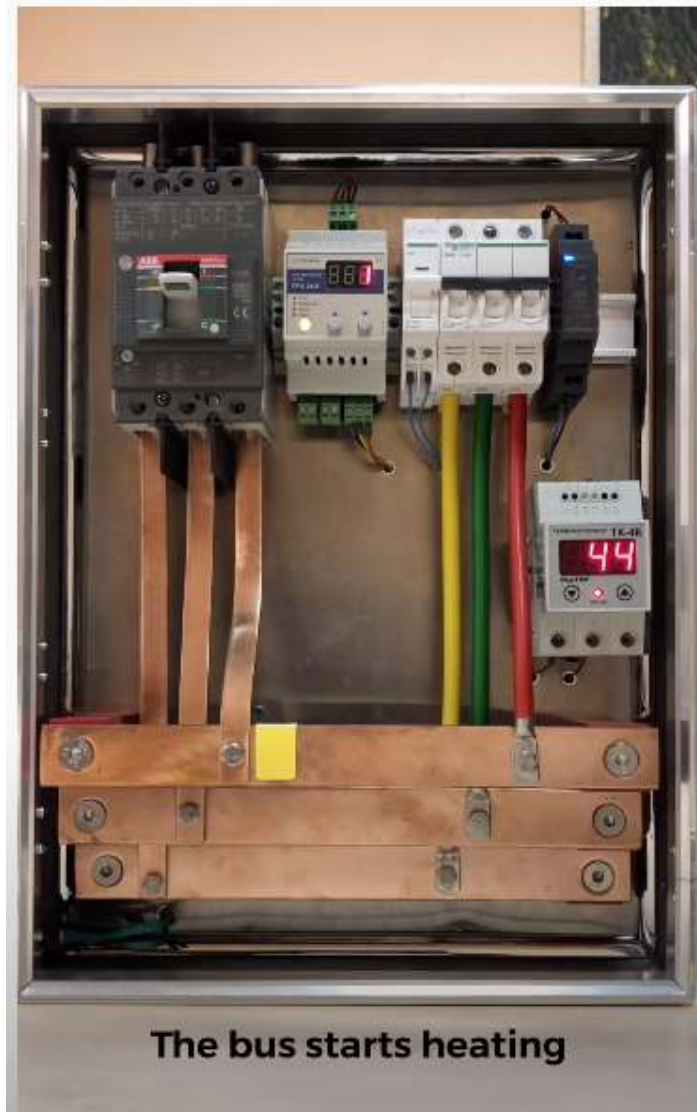
Standard scenario of FIPRES using



FIPRES democase

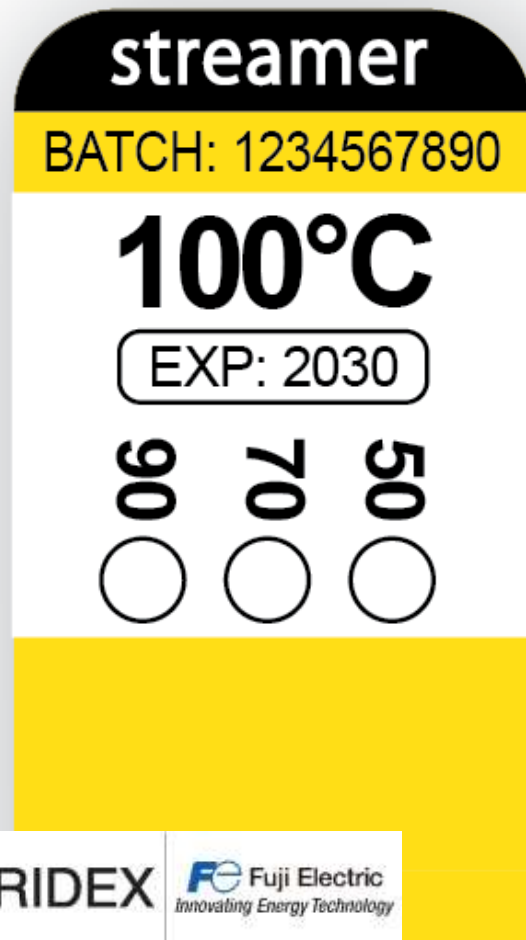
<https://www.youtube.com/watch?v=eFU3nWpY3ak>

OneDrive\3.a PRODUCT DATA\PD_FIPRES\01. MARKETING TOOLS\Video\democase video



rFPT – remote Fire Prevention Thermolabel

rFPTs are installed at the contact connection points, on electrical wires or some parts of electrical equipment which are potentially prone to overheating. When heated to activation temperature, a signal gas is emitted from the rFPT and is detected by Fire Prevention Alarm



Batch number

Used to encode production information and counterfeit protection.

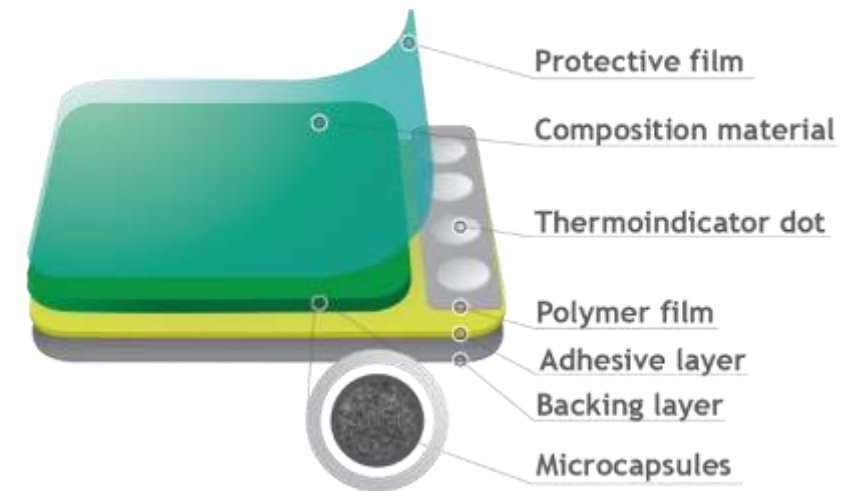
Activation temperature When the contact/cable is heated above the activation temperature, rFPT emits signal gas

Expiration date

Thermoindication dots

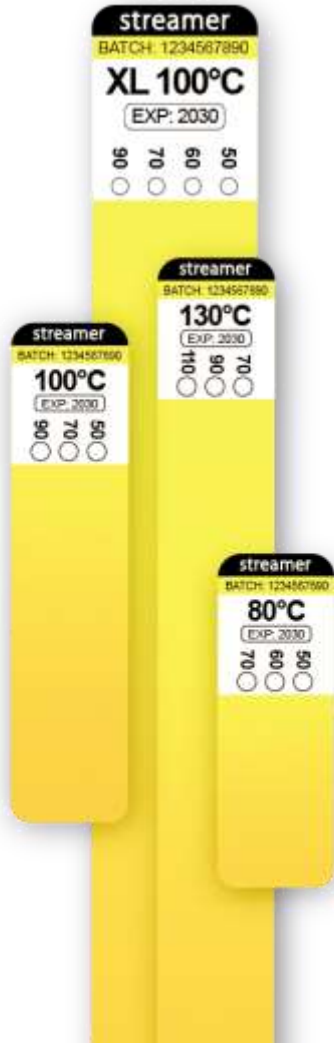
When the contact/cable is heated above the thermoindication temperature, the dot irreversibly changes its color to black

Composite material with signal gas



rFPT – remote Fire Prevention Thermolabel


- Innovative system of gas encapsulation
- 4 sizes to cover 0.1 m³ ... 4 m³ electrical panel
- 3 levels of activation temperature: 80°, 100° or 130° C
- Validity period is 10 years
- Safe, non-toxic and non-flammable gas inside
- Easy installation without additional accessories



	0.1	0.3	1	XL
Length, mm	50	80	138	210
Width, mm	20	20	20	35
Thickness, mm	1,75	1,75	1,75	1,75
Weight, g	1,1	2,2	4,3	11,0



Signal gas safety



Solkane 365/227 93/7
by SOLVAY company (max 70%) +

- Polyvinyl acetate (PVA) (max 30%)
- Polyurea (max 10%)
- Wax (max 1%)
- Colorant (max 2%)



**ENCAPSULATION
CALIBRATION**
(>20 consecutive technological steps)



**RAW material for
rFPT manufacturing**

Solvay Fluor Solkane® 365/227 Blends

Product Description

- Colourless liquid
- Chemically stable
- Faintly ethereal odour
- Non flammable blends

Solkane® 365/227 are liquid hydrofluorocarbon blends of the third generation without ozone depletion potential. Solkane® 365mfc is currently under notification procedure within the European Authorities. The ELINCS No. is 430-250-1. A SNAP approval has been received.

Flammability

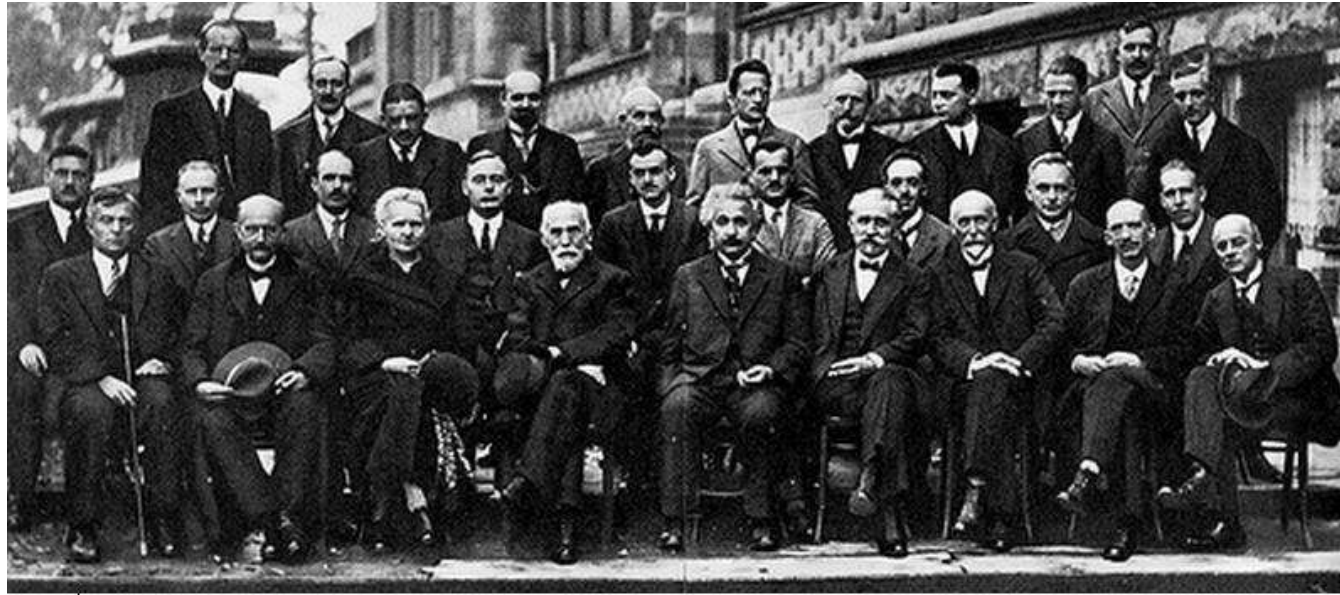
Solkane® 365/227 blends have no flash point (ISO 1516/1523) and are not subject to flammable liquid regulation.

Toxicity

Toxicity testing (28 days, 90 days) shows no acute toxicity and the "no effect levels" are even higher than for Solkane® 141b.

*Screenshot from official TDS

Full version is available on <https://www.solvay.com/>



Front Row:

I. Langmuir, M. Planck, Mme. Curie, H.A. Lorentz, A. Einstein, P. Langevin, Ch. E. Guye, C.T.R. Wilson, O.W. Richardson

Middle Row:

P. Debye, M. Knudsen, W.L. Bragg, H.A. Kramers, P.A.M. Dirac, A.H. Compton, L. de Broglie, M. Born, N. Bohr

Back Row:

A. Piccard, E. Henriot, P. Ehrenfest, Ed. Herzen, Th. De Donder, E. Schrödinger, E. Verschaffelt, W. Pauli, W. Heisenberg, R.H. Fowler, L. Brillouin

Solvay Conference (1927)

The initiator and investor of these conferences is the Belgian scientist and industrialist Ernest Solve, the founder of the Solvay company.

FPA – Fire Prevention Alarm

- Highly sensitive gas sensor inside (metal-oxide semiconductor sensor)
- Automatically adjusts to environment
- Modbus interface and dry contact output to connect to SCADA, BMS or local alarm system
- Can be used in environment up to 36 kV

FPA 24/X



for single volume cabinets up to 1 m³

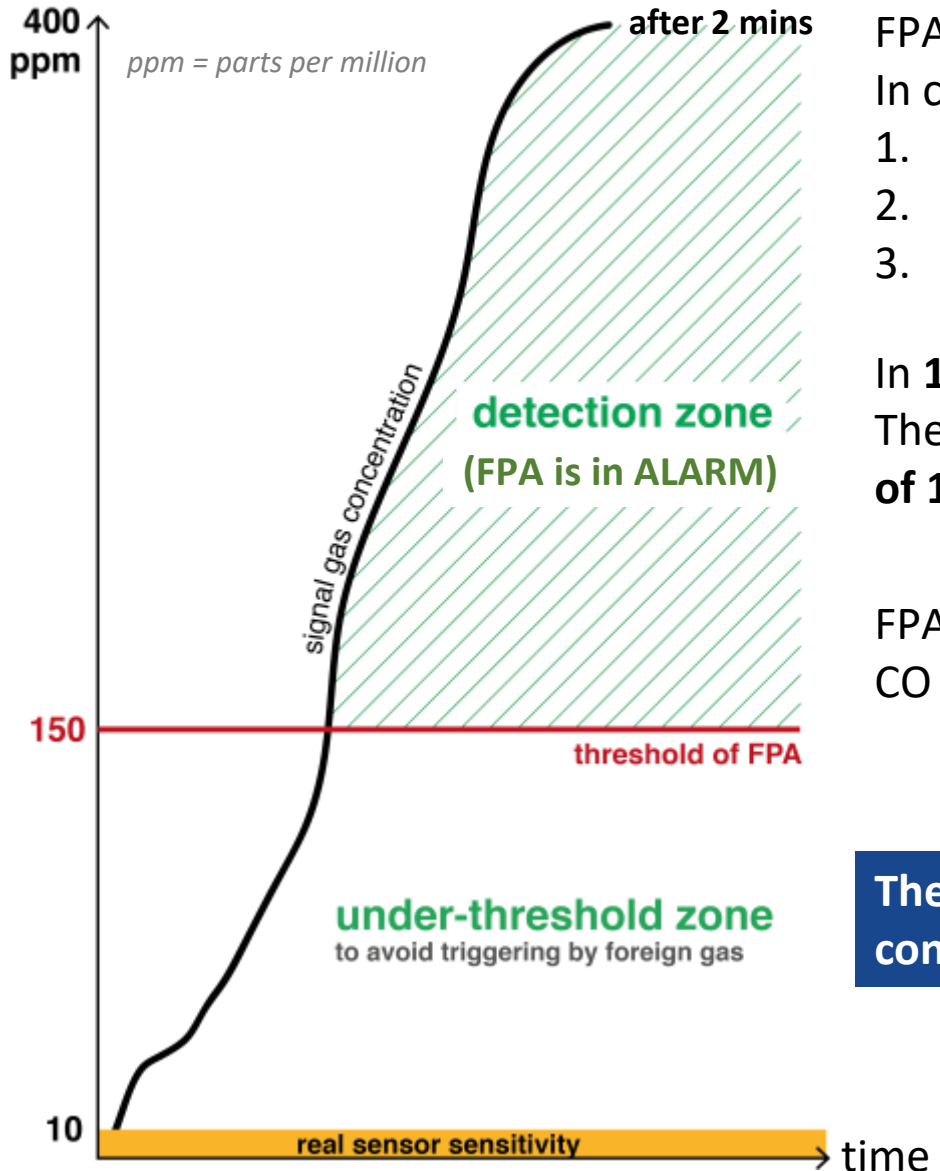
FPA 24(4S)

FPA with 4 corded sensor



To cover large compartments (up to 4 m³)
or to use for several compartments up to 1 m³

FPA: detection and calibration



FPA constantly checks the ambient air for the presence of rFPT signal gas. In case of signal gas detection FPA goes into ALARM mode:

1. It sends ALARM signal via Modbus RS-485 to SCADA or BMS
2. Dry contact output closes
3. FPA stays in ALARM mode until concentration goes down below the threshold

In 1 m^3 compartment a rFPT 100/1 generates up to **400 ppm of gas concentration**. The safety margin in detection is represented by the gap between a concentration of **150 ppm and 400 ppm**

FPA can detect other (not signal gas) gases, such as CO at high concentrations. CO gas can be produced by melting of cable insulation in neighbour panel

The FPA automatically calibrates itself every few hours to adjust to the ambient conditions (zero-drift technology)

FPA 24/X



- Built-in display shows the Modbus address
- Volume can be set in a range from 0.1 to 1m³
- Dry contact output has normally open and normally closed contact

2 modes of operation:

1. Default mode:

FPA goes into ALARM mode when the gas concentration gets higher than the threshold and stays there **until concentration drops down below the threshold**

2. ALARM sticking mode:

FPA goes into ALARM mode when the gas concentration gets higher than the threshold and stays there **until one of the buttons is pressed**

FPA 24(4S)

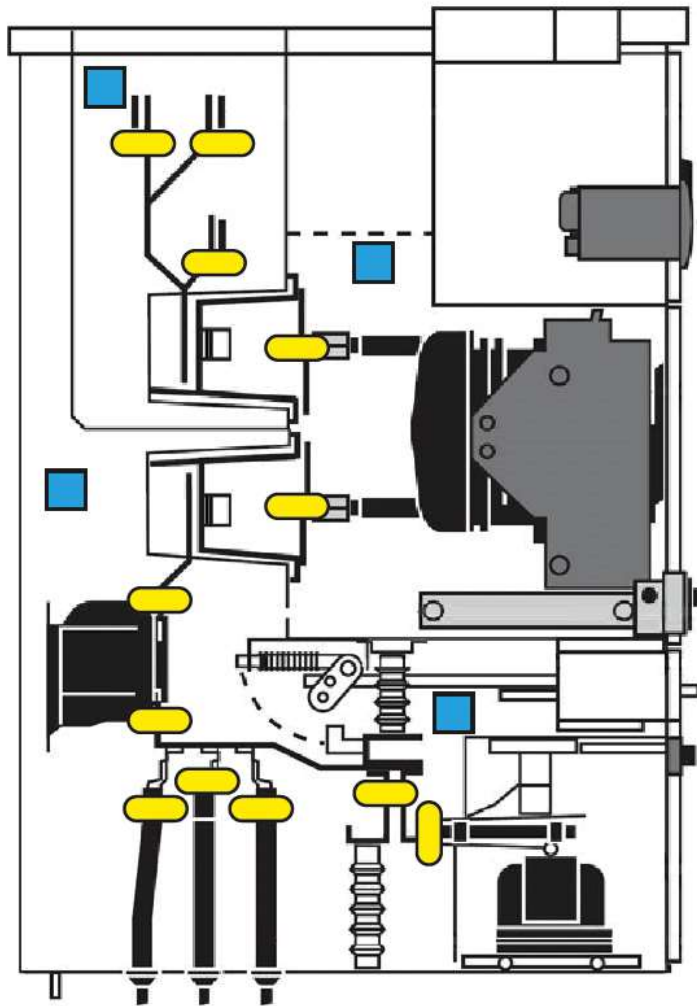


- Built-in display shows the Modbus address
- Has 4 corded sensors, max length between corded sensor and main body is 10 meters
- Can be used for large volumes (up to 4m³)
- Can be used for 4 different compartments with volume up to 1m³ each
- One of the corded sensors can be used as external one (for facilities with presence of intermittent parasite gases)

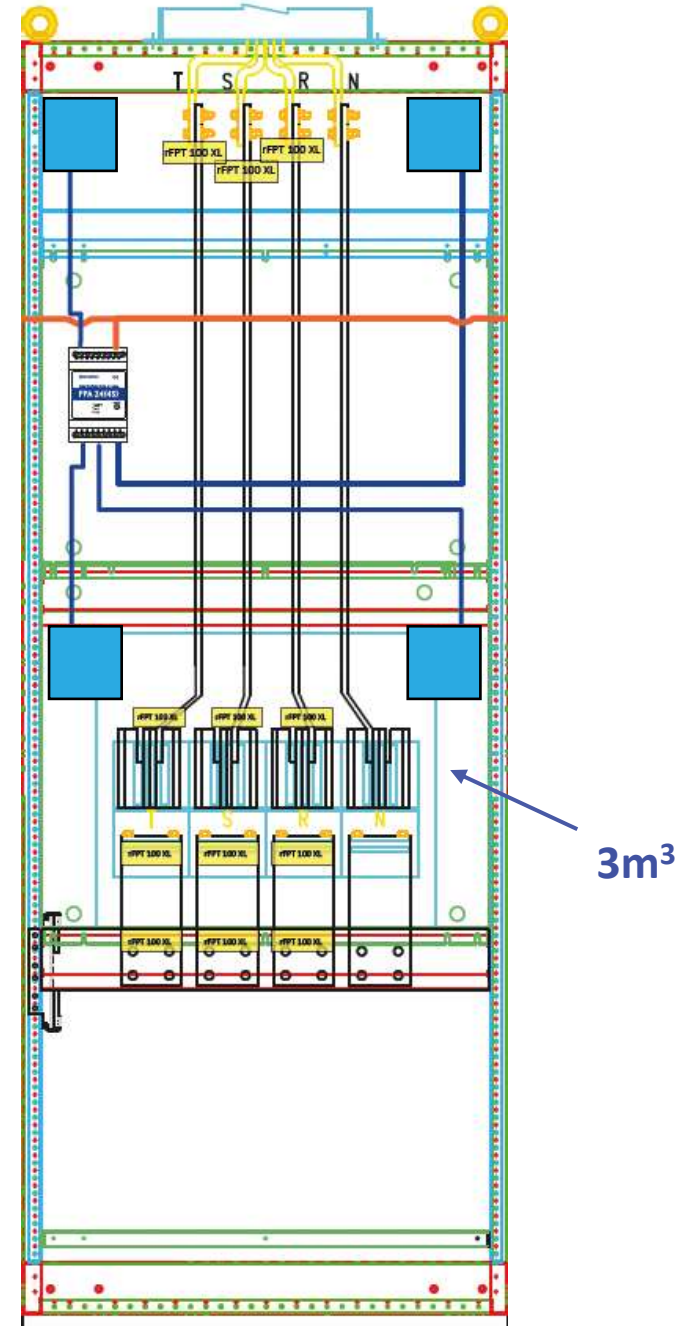
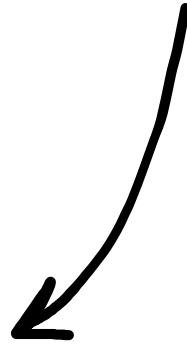
4 modes of operation:

1. Default mode
2. ALARM sticking mode
3. One corded sensor acts as external one
4. Combination of modes 2 and 3

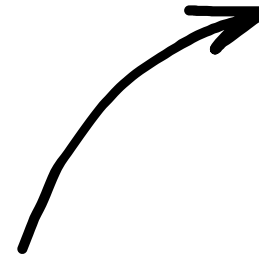
FPA 24(4S)



Switchgear with separated compartments



Panel with large volume



FPC – Fire Prevention Concentrator

- Gather information from up to 32 FPAs
- LCD display for easy access by maintenance personnel
- Events log, speaker and powerful dry contact output
- Optional GSM module to send an SMS to duty staff
- Can transmit information to SCADA/BMS

 **ALARM speaker**

 **LED indication of FPA status**

 **SMS notification about ALARM (For GSM version)**

Supply voltage: 100-240 V AC (50/60Hz)

Event log capacity: 1024 events

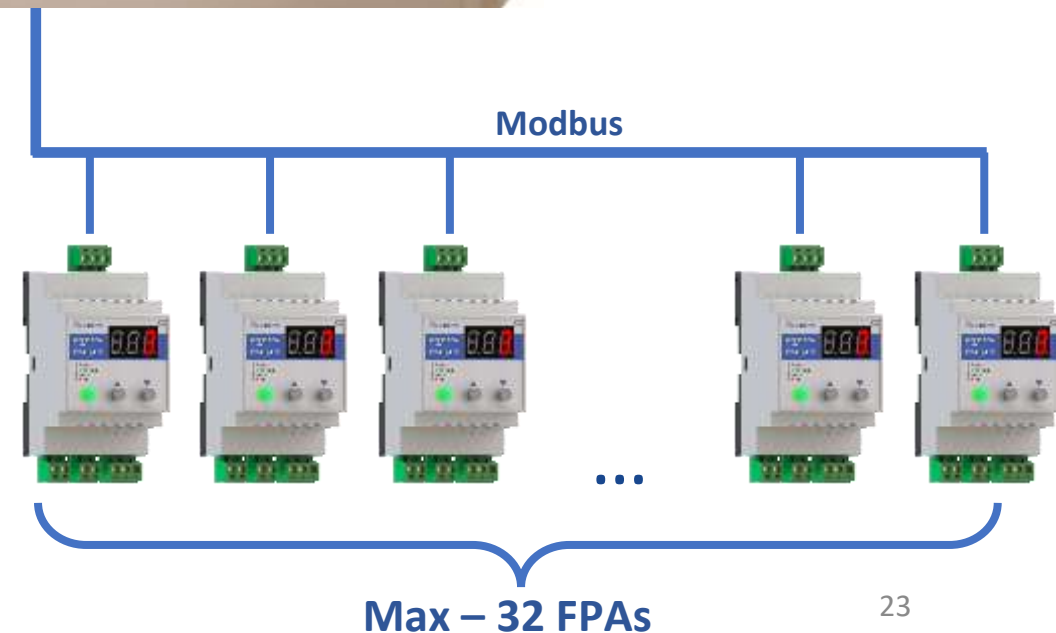
Dimensions: 270x220 mm



2 versions

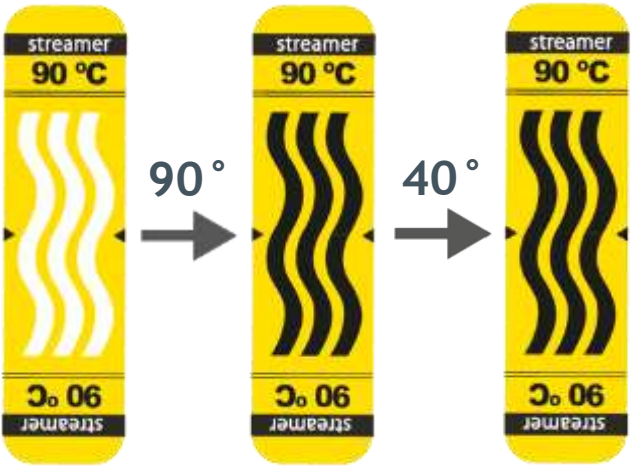
FPC 220S

FPC 220S (GSM)



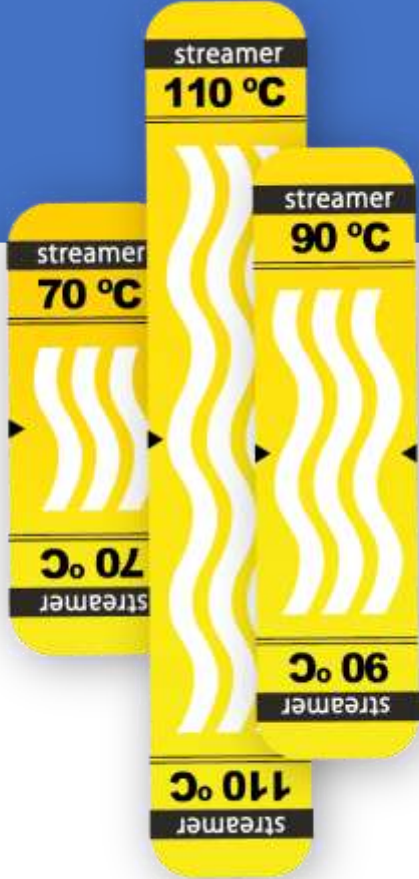
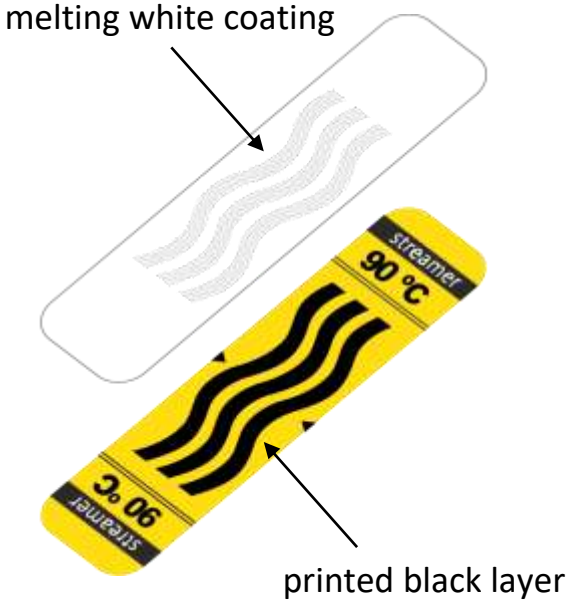
vFPT – visual Fire Prevention Thermolabel

- vFPT provides information on overheating occurred between 2 checks
- Efficient and affordable addition to traditional visual inspection and IRT
- Long strips allow to get 360° view
- 70 °C, 90 °C and 110 °C of activation temperature



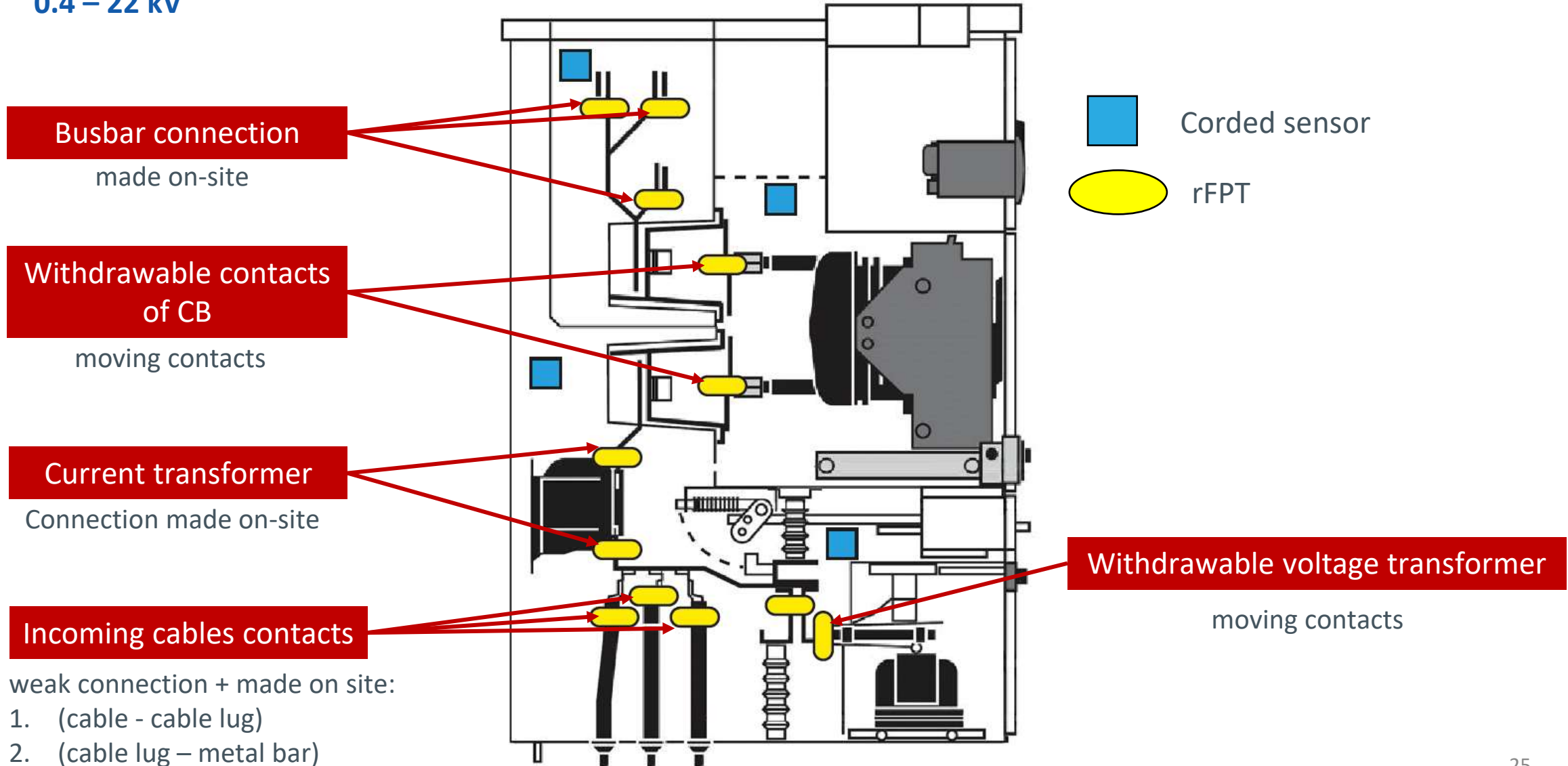
One-time indication

	S	M	L
Length, mm	42	57	82
Width, mm	16	16	16



Scope of application: switchgear

0.4 – 22 kV



Busbar connection
made on-site

Withdrawable contacts of CB
moving contacts

Current transformer
Connection made on-site

Incoming cables contacts

- weak connection + made on site:
1. (cable - cable lug)
 2. (cable lug – metal bar)

■ Corded sensor
● rFPT

Withdrawable voltage transformer
moving contacts

Switchgear



Withdrawable contacts loosen with number of operations



Current transformers contacts

Switchgear

Corded sensor



FPA 24(4S) main body



0.44 kV MDB panel



6.6kV Feeder panels for VFD



FIPRES for capacitors

Overheating and explosion of capacitor banks are common problems in reactive power control systems due to inadequate ventilation, loose connections, bad design, or the overvoltage during lower demand period.

Solution:

The top part of the capacitor overheats the most, that's why Streamer suggests installing vFPTs on top.

Overheating of the capacitor banks



Installation of the vFPTs on capacitors



Case study: FM200 in compensate panel

Overheating of one of capacitors led to smoke and further FM200 operation. The cost of refilling FM200 is much higher than actual damage and FM200 operation forces the equipment to be switched off. Preventive ALARM regarding overheating might have helped to plan outage and repair more accurately with less cost.



5k \$

panel cost

1k \$

repair cost

13.5k \$

refill FM200

Thank you for your attention



Testing liquid

FP.GS.TEST.01.WW

Liquified signal gas to test FPA during commissioning or annual inspection

- 100 ml aerosol can with signal gas inside
- non-flammable
- non-toxic
- not under pressure
- keep in place with less than 50°C environment

FIPRES Testing Liquid Operation Manual

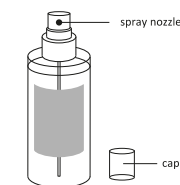
1 Introduction

The FPA sensor can be tested with the FIPRES Testing Liquid during commissioning or as required by the customer. The FPA must be tested only with Testing Liquid provided by Streamer Electric AG or local representative.

⚠ WARNING

- Don't inhale content of the can, don't spray towards face
- Store a can in a dry, cool place
- Don't heat up higher than 50 °C

2 Technical data



Volume: 100 ml

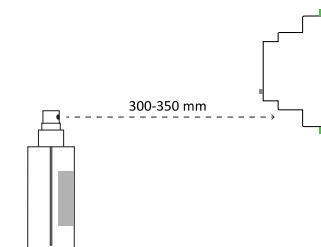
Content:

- colour- and odorless
- has no flashpoint
- nonflammable
- non-toxic
- chemically stable

Shelf life is not limited

3 Testing procedure

1. Before testing ensure that all power supplying equipment, except FPA is off
2. FPA should be in «READY» mode (LED is glowing with green with rare blinking)
3. Remove cap from a can with testing liquid
4. Position the can so that the spray nozzle points towards the FPA (or corded sensor) approximately 30-35 centimeters away from it
5. Hold the can in this position and spray 2 times in a row towards the FPA (or corded sensor)
6. Put the cap back onto the can and check results:
 - a. If the FPA goes into «ALARM» mode (LED is glowing by red) within 10-15 seconds after spray then the test is successful.
 - b. If the FPA stays in «READY» mode after 15 seconds after spray, repeat steps 2-5. If the test still is not successful after repeating these steps, contact local representative of Streamer Electric AG



Contact us

Streamer Electric AG, HQ
Masanserstrasse 17
CH-7000
Chur, SWITZERLAND
Phone: +41 81 2500525
office@streamer-electric.com

Streamer Asia-Pacific
Asoke Towers - The Pride, room 203
219/2 Sukhumwit 21, Asoke
Klong Toei Nua, Wattana
10110 Bangkok, THAILAND
Phone: +66 (0)2 1209600

Streamer China
You Town Center Block A
Chaoyang Qu,
Beijing Shi, CHINA
Phone: +86 8565 1663

Streamer Indonesia
Wilson Walton Building
Jl. Raya Tanjung Barat 155 Jagakarsa,
Jakarta, INDONESIA
Phone: +62 21 7884 0737



Democase



Contents

No	Designation
1	circuit breaker ABB
2	circuit breaker Schneider
3	shunt trip device Schneider
4	heating controller Digitop
5	24 DC power supply unit
6	2x tubular cartridge heater

