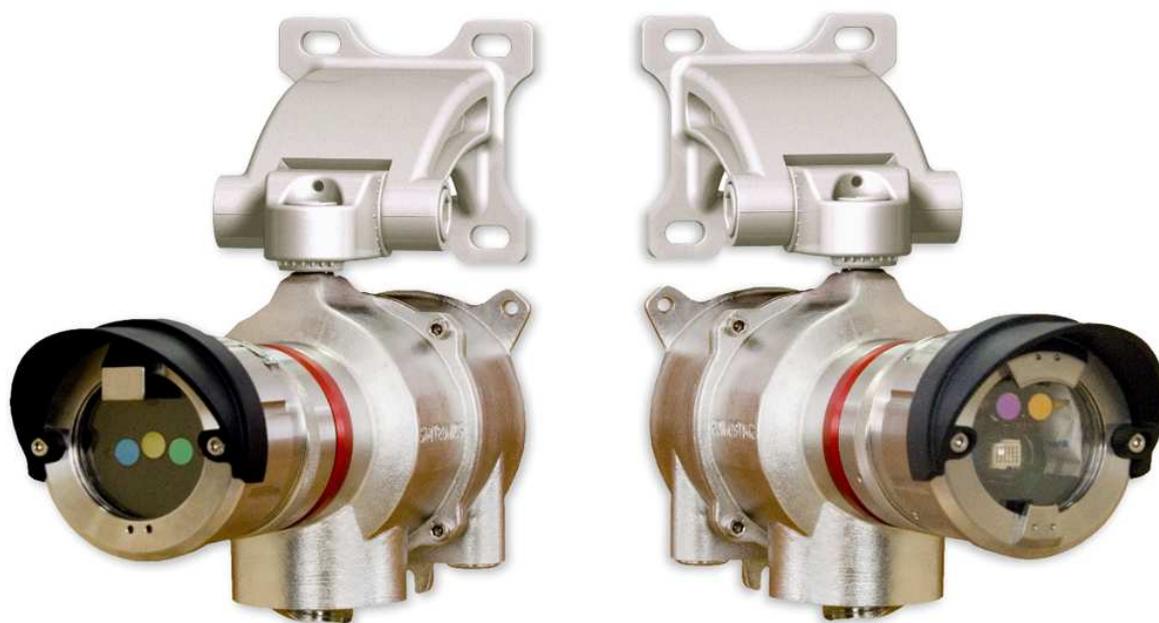


# Operating manual

## Optical Flame Detector MultiFlame DF-TV7



DF-TV7-T Multi-spectrum IR

DF-TV7-V Combined UV/IR



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## Note

This manual must be carefully read by those who have or will have the responsibility for the operation or maintenance of this product. The product may not perform as designed if it is not used and maintained in accordance with the manufacturer's instructions.

The warranties made by Simtronics with respect to the product are voided if the product is not used and maintained as described in this manual.

Please read the general warnings in chapter 9

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## 1. PRODUCT DESCRIPTION

MultiFlame DF-TV7-T was designed to detect hydrocarbon fires, while minimizing false alarms. This detector is equipped with an intelligent optical self-test. It is certified and may be installed in SIL2 level system. It can be directly connected to a wide range of traditional or fire controllers and on Programmable Logic Controllers (PLC).

DF-TV7-T can be fully configured using the portable communication terminal (TLU600), providing flexibility to the user. Time delay, sensitivity and outputs configuration can be full set up via the TLU600, a hazardous area approved remote control. Optical and electronic parts, and outputs (current, relay...) of the detector can be controlled by the TLU.

The MultiFlame product family consists of two detector versions:

- DF-TV7-T multi-spectrum IR Flame detector
- DF-TV7-V combined UV and IR

The MultiFlame models are also available for use in an addressable network system with distributed intelligence SYNTEL. This version is named DF-RV7-\*. For more information, please refer to the Syntel module interface operating manual.

### 1.1. Applications

- Refineries
- Drilling and Production Platforms
- FPSO
- Fuel Loading Facilities
- Compressor Stations
- LNG/LPG Processing and Storage
- Gas Turbines
- Chemical Plants
- Aircraft Hangars
- Sports (Stadia / Gymnasia)

The sensitivity of flame detector depends on many factors including, fuel type, fire size, atmospheric conditions (wind, rain, fog, etc...), the angle between the fire and detector as well as line of sight obstructions.

## 1.2. DF-TV7-T: multi-spectrum IR

The DF-TV7-T is a multi-spectrum flame detector using three individual infrared wavelengths. The use of three different IR bands and a unique signal processing algorithm allows excellent flame detection performances, while offering a very low rate of false alarms.



The detector can be supplied with

- A "standard range" sensor cartridge covering most applications
- A "high sensitivity" sensor cartridge for special applications where the maximum sensitivity is required.

## 1.3. DF-TV7-V: combined UV and IR

Designed to cover a large detection range while ensuring excellent immunity against false alarms, the DF-TV7-V is the alternative when multi-spectrum IR cannot be used.

False alarms are minimized by the use of two infrared wavelengths plus a fast acting UV wavelength to confirm detection. This version is useful in difficult environmental conditions, such as combined rain and wind, rapid sunshine variations, hot sources modulations, industrial lighting etc.

The DF-TV7-V is also configurable for special applications, where using just dual IR or just direct UV detection is required.

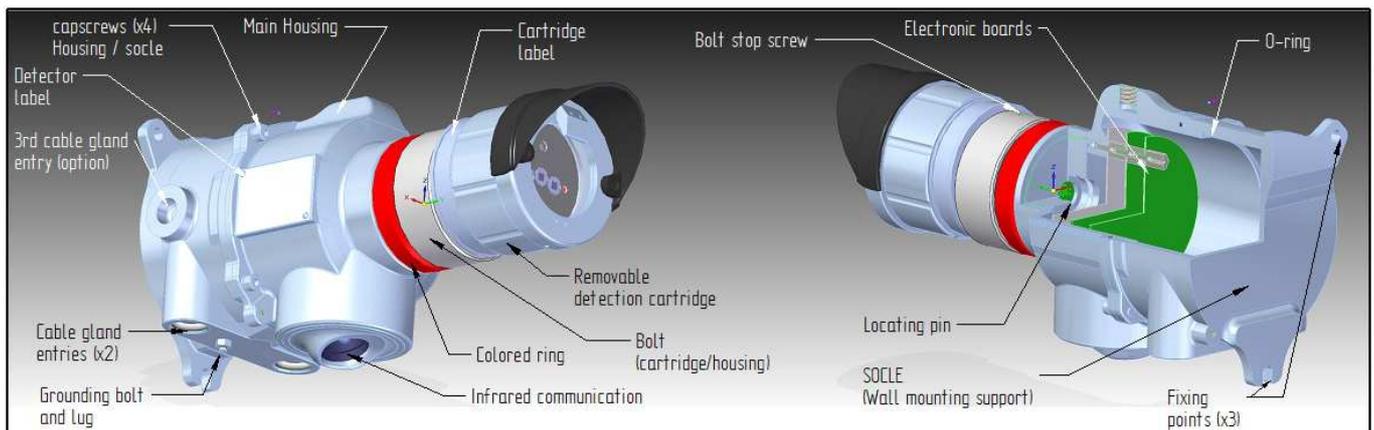
The UV detector can be sensitive to UV welding radiation or lightning, X rays and gamma rays.



## 1.4. Technical specifications

Each detector is constructed as follows:

- A wall-mounted support secured by three screws and including cable gland (M20) (optional). There are 2 standard entries and an optional one.
- A stainless steel (316L) explosion-proof housing containing:
  - A set of tropicalized electronic cards
  - A display and infrared communication electronic card allowing the communication with the remote control (TLU600)
- The sensor cartridge contains the flame detection circuitry. So, it is possible to change the cartridge easily. The multispectrum IR detector is also available in a high sensitivity version.
- An IR communication head is located below the detector housing. It is used for communication with the maintenance hand-held terminal (TLU).
- A metallic support cable (optional) connects the wall mounting support and the housing, making the maintenance easier.



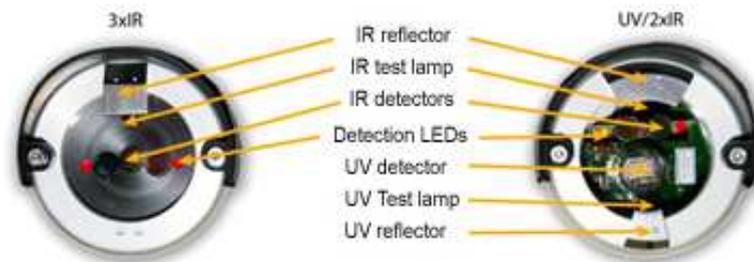
*Figure 1 : Detector presentation*

(Overall dimension drawings, see Figure 2)

## 1.5. Detection Cartridge

Cartridges are explosion proof designed. They are common to all MultiFlame line of products in order to reduce spares parts.

- DF-RV7-T and DF-RV7-V: Network “Telecaptor” flame detector line,
- DF-TV7-T and DF-TV7-V: “Telecaptor” flame detector line.



Alarms information is indicated by the flashing of a red LED in the communication head and of two LEDs located in front of the detection cartridge. Information and detector status is also available via the remote control TLU 600/610 display.



**The cartridge must not be removed when the detector is powered.**

## 1.6. Optical self-test function

Sensor cartridges have one or more self-test optical lamps allowing detection integrity test. This is a full optical test where the signal from each test lamp is transmitted through the sensor window and reflected back to the detecting elements via a polished stainless steel reflector.

In addition to this cyclic self-test, the test lamps can be used when a “flame simulation test” is initiated by the maintenance terminal. Further testing is not required to confirm correct operation.

## 1.7. Wireless Configuration Tool

Information and status of the detector are available via the wireless configuration tool TLU600/610.

Configuration and tests are performed using this wireless configuration tool (IrDA protocol). This tool is common for all Simtronics MultiFlame, MultiXplo and MultiTox products.

The TLU600/610 provides access to devices which, otherwise, would require major logistic operations for maintenance or for configuration (calibration ...).

For more details, please refer to the wireless configuration tool operating manual.



**Some versions are equipped with the HART communication protocol, enabling the use of all functions available with the TLU (see §7)**

## 1.8. Product Code

Product codes are created from functional codes: DF-ξV7-X#σ0-0αβ-0ρ-00ε-μ-φ-0

| Detector type   |  |   |          |    |    |   |   |    |   |      |    |    |    |
|---|--|---|----------|----|----|---|---|----|---|------|----|----|----|
| ξ   | V  | 7 | XV<br>XT | σ0 | -0 | α | β | -0 | ρ | -00ε | -μ | -φ | -0 |
| T**   | Télécapteur  |   |          |    |    |   |   |    |   |      |    |    |    |
| R**   | Network version  |   |          |    |    |   |   |    |   |      |    |    |    |
| <b>Families</b>   |  |   |          |    |    |   |   |    |   |      |    |    |    |
| *V*   | Flame  |   |          |    |    |   |   |    |   |      |    |    |    |
| <b>Version</b>  |  |   |          |    |    |   |   |    |   |      |    |    |    |
| **7   | BT10 housing   |   |          |    |    |   |   |    |   |      |    |    |    |
| <b>Type</b>   |  |   |          |    |    |   |   |    |   |      |    |    |    |
| XV  | UVIR2  |   |          |    |    |   |   |    |   |      |    |    |    |
| XT  | IR3  |   |          |    |    |   |   |    |   |      |    |    |    |
| XW  | UV   |   |          |    |    |   |   |    |   |      |    |    |    |
| <b>Detection range</b>                                    |  |   |          |    |    |   |   |    |   |      |    |    |    |
| A0  | Standard range   |   |          |    |    |   |   |    |   |      |    |    |    |
| B0  | Long range   |   |          |    |    |   |   |    |   |      |    |    |    |
| <b>Type</b>   |  |   |          |    |    |   |   |    |   |      |    |    |    |
| 0**   | Not used or flame  |   |          |    |    |   |   |    |   |      |    |    |    |
| <b>Variant</b>  |  |   |          |    |    |   |   |    |   |      |    |    |    |
| *A*   | Aluminium  |   |          |    |    |   |   |    |   |      |    |    |    |
| *X*   | SS316  |   |          |    |    |   |   |    |   |      |    |    |    |
| <b>Interface</b>  |  |   |          |    |    |   |   |    |   |      |    |    |    |
| **A   | 0-22mA protocol (fault signalling in 0-4mA range)  |   |          |    |    |   |   |    |   |      |    |    |    |
| **E   | 4-20 mA protocol (Common fault signal 2 mA)  |   |          |    |    |   |   |    |   |      |    |    |    |
| **H   | 4 – 20 mA / 0-22 mA configurable & HART protocol   |   |          |    |    |   |   |    |   |      |    |    |    |
| **C   | 4 – 20 mA / 0-22 mA configurable   |   |          |    |    |   |   |    |   |      |    |    |    |
| **L   | LON  |   |          |    |    |   |   |    |   |      |    |    |    |
| <b>Cartridges</b>   |  |   |          |    |    |   |   |    |   |      |    |    |    |
| 0*  | No cartridge or not specified or flame   |   |          |    |    |   |   |    |   |      |    |    |    |
| <b>Semicond. Sensor type &amp; special configurations</b> |  |   |          |    |    |   |   |    |   |      |    |    |    |
| *0  | Not specified or standard  |   |          |    |    |   |   |    |   |      |    |    |    |
| *M  | Special version MarED (TX6 and TV6 in type A only)   |   |          |    |    |   |   |    |   |      |    |    |    |
| *N  | Special version with ALRM LED not memorized (not in compliance with EN 54-10) (flame version only) |   |          |    |    |   |   |    |   |      |    |    |    |
| *R  | With relay board for HW type D   |   |          |    |    |   |   |    |   |      |    |    |    |
| *1  | Customized EPR (special follow up, SP4M20) (DM and DMi only)                                       |   |          |    |    |   |   |    |   |      |    |    |    |
| <b>Configuration</b>                                      |  |   |          |    |    |   |   |    |   |      |    |    |    |
| 000   | Standard   |   |          |    |    |   |   |    |   |      |    |    |    |
| 00A   | Absolutely no grease   |   |          |    |    |   |   |    |   |      |    |    |    |
| 00B   | Special version MarED (old code) (TX6 and TV6 in type A only)                                      |   |          |    |    |   |   |    |   |      |    |    |    |
| 00G   | Hydrocentrifugon paint (nuclear applications)  |   |          |    |    |   |   |    |   |      |    |    |    |
| 00H   | Special paint : light grey (10A03 according to « British standards 4800/5252 »)                    |   |          |    |    |   |   |    |   |      |    |    |    |
| <b>Language</b>   |  |   |          |    |    |   |   |    |   |      |    |    |    |
| 0   | Fr / GB  |   |          |    |    |   |   |    |   |      |    |    |    |
| F   | French   |   |          |    |    |   |   |    |   |      |    |    |    |
| E   | English  |   |          |    |    |   |   |    |   |      |    |    |    |
| P   | Portuguese   |   |          |    |    |   |   |    |   |      |    |    |    |
| C   | Chinese  |   |          |    |    |   |   |    |   |      |    |    |    |
| <b>Hardware version</b>                                   |  |   |          |    |    |   |   |    |   |      |    |    |    |
| A   | Type 63  |   |          |    |    |   |   |    |   |      |    |    |    |
| B   | Type 65  |   |          |    |    |   |   |    |   |      |    |    |    |
| C   | Type 67 (HART)   |   |          |    |    |   |   |    |   |      |    |    |    |
| D   | Type 69 (magnet)   |   |          |    |    |   |   |    |   |      |    |    |    |
| <b>Software version</b>                                   |  |   |          |    |    |   |   |    |   |      |    |    |    |
| 0   | Standard   |   |          |    |    |   |   |    |   |      |    |    |    |



|            |  |
|------------|--|
| Protection | IP66                                     |
| RFI/EMI    | Complies with EN 50130-4 (2011 AMD 2014) |

## PERFORMANCE

|          |                    |
|----------|--------------------|
| European | EN 54-10/A1 (2005) |
|----------|--------------------|

## EXPLOSION PROOF HOUSING

|            |   |
|------------|---|
| Material   | 316 L stainless steel   |
| Weight     | 5.1 kg  |
| ATEX/IECEX |  II 2 G / Ex d II C T6 Gb<br>-40°C < Ta < + 65°C |

## FONCTIONNAL SAFETY

|     |  |
|-----|--|
| SIL | SIL certified according IEC/EN 61508 parties 1 to 3 standard<br>Certification body : LCIE Bureau Véritas |
|-----|--|

| DETECTOR   | FACTOR.                           | DEFINITIONS                                 | VALUE                   |        |
|--|-----------------------------------|---|-------------------------|--------|
|  <p>Multi IR<br/>DF-TV7-T</p> | MTBF                              | Mean Time Between Failure                   | 191 500 h               |        |
|  | $\lambda$                         | Failure rate per hour                       | $0.52 \times 10^{-5}/h$ |        |
|  | SFF                               | Safety fraction failure (T1=6 h)            | 99.2%                   |        |
|  | PFD                               | Probability of failure on Demande           | $1.21 \times 10^{-6}$   |        |
|  | PFH                               | Probability of failure / h (1oo1)           | $4.2 \times 10^{-8}$    |        |
|  | MTTR                              | Mean Time To Repair                         |                         |        |
|  |                                   |   | Fault on cartridge      | 16 min |
|  |                                   |   | Fault on Detector       | 26 min |
| SIL compliance   | HFT = 0 / G.Fixed / 30°C / type B | 3   |                         |        |
|  <p>UVIR2<br/>DF-TV7-V</p>    | MTBF                              | Mean Time Between Failure                   | 162 000 h               |        |
|  | $\lambda$                         | Failure rate per hour                       | $0.62 \times 10^{-5}/h$ |        |
|  | SFF                               | Safety fraction failure                     | 98.4%                   |        |
|  | PFD                               | Probability of failure on demand (T1=2.5 h) | $1.45 \times 10^{-6}$   |        |
|  | PFH                               | Probability of failure / h (1oo1)           | $9.8 \times 10^{-8}$    |        |
|  | MTTR                              | Mean Time To Repair                         |                         |        |
|  |                                   |   | Fault on cartridge      | 16 min |
|  |                                   |   | Fault on Detector       | 26 min |
| SIL compliance   | HFT = 0 / G.Fixed / 30°C / type B | 2   |                         |        |

## DIMENSIONS

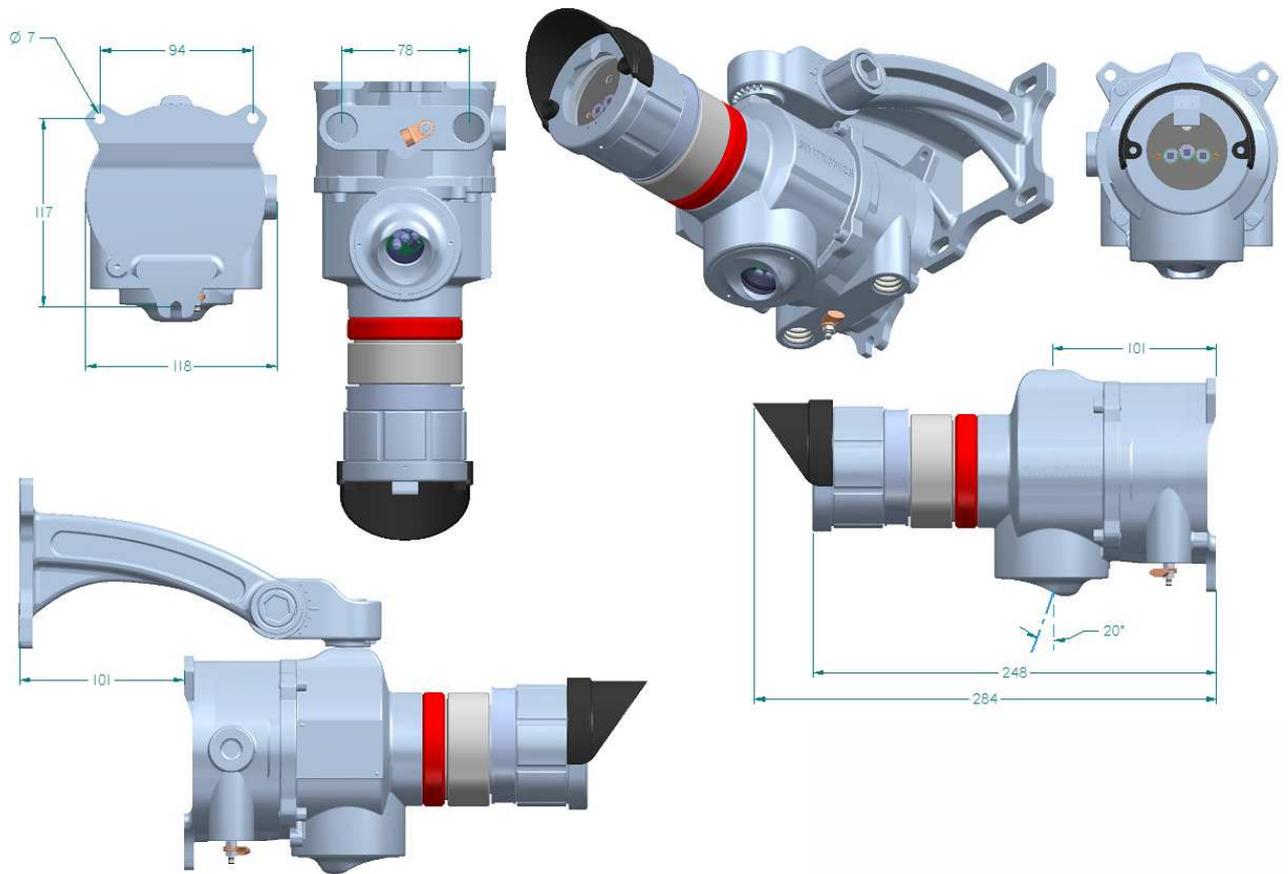


Figure 2 : Dimension drawings

### 3. PERFORMANCES

#### 3.1. Sensitivity

##### 3.1.1. Fire class

Classification according to §5.5.3 –NF EN 54-10 (2006), (ethanol and n-heptane fires)

##### DF-TV7-XVA0 ET DF-TV7-XTA0

| Sensitivity  | 50%     | 75%     | 100%    |
|--------------|---------|---------|---------|
| Time delay   |         |         |         |
| Min          | Class 2 | Class 1 | Class 1 |
| Max (20 sec) | Class 2 | Class 2 | Class 1 |

##### DF-TV7-XTB0

**Class 1** for any combinations of sensitivity and time delay settings.

##### 3.1.2. Fire range of detection

Detection range for a standard 1 square foot (0.33 x 0.33m) fire except where stated.

|                                  | XTB0                            |                        | XTA0                              |                                 | XVA0                             |
|----------------------------------|---------------------------------|------------------------|-----------------------------------|---------------------------------|----------------------------------|
|                                  | (IR <sup>3</sup> – Long range)  |                        | (IR <sup>3</sup> –Standard range) |                                 | (UVIR <sup>2</sup> )             |
| Sensitivity /<br>time delay      | 75 % / 5 sec<br>(Fact. Setting) | 100 % / 5 sec          | 50 % / 5 sec                      | 100% / 5 sec<br>(Fact. Setting) | 100 % / 2 sec<br>(Fact. Setting) |
| <b>Ethyl alcohol**</b>           | <i>37 m (122 ft.)</i>           | <b>50m (164 ft.)</b>   | <i>12 m (40 ft.)</i>              | <b>25m (82 ft.)</b>             | <b>25m (82 ft.)</b>              |
| <b>Methanol*</b>                 | <b>36m (120 ft.)</b>            | <i>48 m (160 ft.)</i>  | <b>12m (40 ft.)</b>               | <b>30 m (100 ft.)</b>           | <b>19 m (62 ft.)</b>             |
| <b>Diesel**</b>                  | <i>37 m (122 ft.)</i>           | <b>50 m (164 ft.)</b>  | <i>12 m (40 ft.)</i>              | <b>25m (82 ft.)</b>             | <b>30m (100 ft.)</b>             |
| <b>Gasoline**</b>                | <i>49 m (161 ft.)</i>           | <b>65 m (213 ft.)</b>  | <i>16 m (52 ft.)</i>              | <b>32m (105 ft.)</b>            | <b>35m (115 ft.)</b>             |
| <b>JP4 (2x2 ft<sup>2</sup>)*</b> | <b>55 m (180 ft.)</b>           | <i>73 m (239 ft.)</i>  | <b>21 m (70 ft.)</b>              | <i>42 m (138 ft.)</i>           | <b>55 m (180 ft)</b>             |
| <b>N-heptane*</b>                | <b>65 m (215 ft.)</b>           | <i>80 m (265 ft.)</i>  | <b>27 m (90 ft.)</b>              | <i>54 m (177 ft.)</i>           | <b>45m (147 ft)</b>              |
| <b>*** Methane</b>               | <i>45 m (147 ft.)</i>           | <i>60 m (200 ft.)</i>  | <i>15 m (49 ft)</i>               | <b>30 m (100 ft.)</b>           | <b>35m (115 ft.)</b>             |
| <b>Propane<br/>(10in.)*</b>      | <b>6.4 m (252in.)</b>           | <i>8.5 m (336 in.)</i> | <i>2.4 m (95 in.)</i>             | <b>4.8 m (190in.)</b>           | <b>4.8 m (190 in.)</b>           |

[\*] Tested according to the FM 3260 standard

[\*\*] Other measurements (*Italic*: calculated Extrapolation)

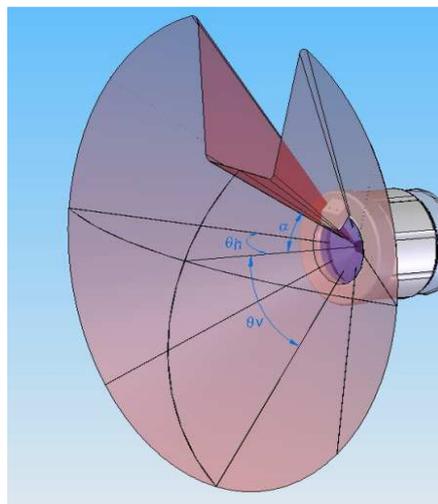
[\*\*\*] Measured on a 0.17x0.17 size fire with a plume height of about 0.8 m

Bold = experimental measures, italic =extrapolations

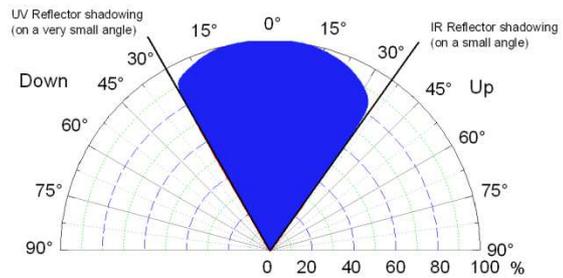
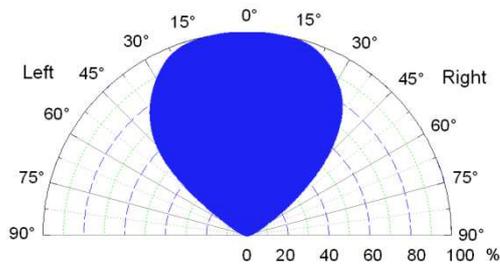
### 3.2. Field of View (Cone of Vision)

|   |                    | DF-TV7-XVA0 | DF-TV7-XTA0<br>and<br>DF-TV7-XTB0 |
|---|--------------------|-------------|-----------------------------------|
| $\alpha_{max}$ : Maximum angle as defined in standard EN 54-10 (2006) - § 5.4 |                    | 30°         | 35°                               |
| Angle at 50% sensitivity<br>(in accordance with FM 3260<br>standard)          | Horizontal total   | 97°         | 104°                              |
|   | Vertical Up / Down | 20° / 35°   | 30° / 52°                         |

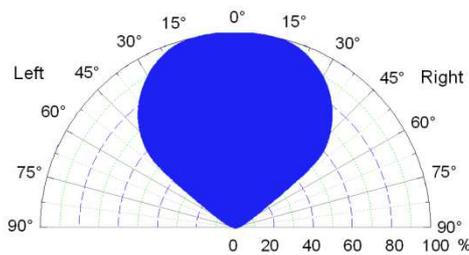
The vertical viewing angle is limited by the self-test reflectors on a thin solid angle



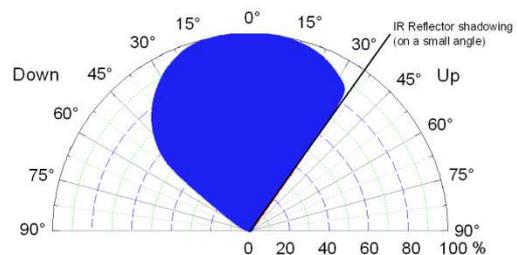
#### DF-TV7-XVA0



#### DF-TV7-XTA0 AND DF-TV7-XTB0



Typical horizontal detection:



Typical vertical detection:

### 3.3. False alarm immunity (FM 3260)

|  | Distance<br>m (ft.)   | XTB0 (IR3)<br>Long range        | XTA0 (IR3)<br>Standard<br>range | XVA0 (UVIR <sup>2</sup> )           |
|--|-----------------------|---------------------------------|---------------------------------|-------------------------------------|
|  | Modulated /<br>Steady | 75 % / 5 sec<br>(fact. setting) | 100% / 5 sec<br>(fact. setting) | 100 % / 2 sec<br>(fact. setting)    |
| <b>Arc welding, steady,<br/>#7014, 3/16 in,<br/>190A</b> | 3.6 / 3.6 (12/12)     | No False Alarm                  | No False Alarm                  | No false Alarm<br>7.6 / 7.6 (25/25) |
| <b>1.5 kW heater</b>                                     | 3.0 / 1.8 (10/6)      | No False Alarm                  | No False Alarm                  | No False Alarm                      |
| <b>100 W incandescent<br/>lamp</b>                       | 0.9 / 0.9 (3/3)       | No False Alarm                  | No False Alarm                  | No False Alarm                      |
| <b>Two 40 W<br/>fluorescent lamps</b>                    | 0.9 / 0.9 (3/3)       | No False Alarm                  | No False Alarm                  | No False Alarm                      |
| <b>100 W halogen<br/>lamp</b>                            | 2.4 / 2.4 (8/8)       | No False Alarm                  | No False Alarm                  | No False Alarm                      |

## 4. INSTALLATION



The detector must be installed in accordance with its certification and with the standards of the appropriate authority in the country concerned.

### 4.1. Location

The detector should be positioned above the targeted danger zone and at a distance corresponding to the type of fire it have to detect.

Be aware of potential radiation sources as these may trigger a false alarm. If possible, put the detector in clean zone, sheltered from major vibrations. For maximum effectiveness, avoid to expose the head of sensor to alternation of light and shade (passing vehicles, tree branches...).

IR sources (particularly if modulated) like hot machinery, exhaust outlets, etc. may also desensitize the detector, masking the radiation from a small fire.

For detectors using the UV wavelength:

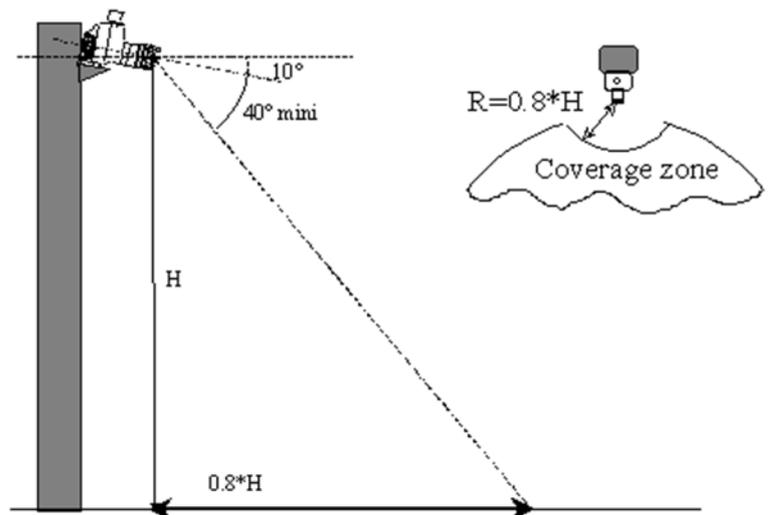


Do not position the detector behind a glass window as this blocks UV radiation. Locations where smoke, gas or vapours capable of absorbing UV radiation could accumulate (e.g. ceilings) should be avoided as well.

Detector fields of vision may be overlapped, particularly if the devices are used in a voting configuration.

The detector should have a direct line-of-sight to the potential fire source. Partial obstruction may reduce detection rate.

For an inclination of  $10^\circ$ , there is a semicircle blind zone, directly below the detector, with a radius of 0.8 times the detector height. With this angle, the optical axis "touch" the ground at a distance of 5.7 times the height.



## 4.2. Mounting

Use the two 7 mm diameter holes and the half slotted hole to secure the support.

It is highly recommended to install the support with cable-gland downward in order to avoid water infiltrations. In case of horizontal position, it is advised to make one or two loops with the cable at the entry of the cable-gland.

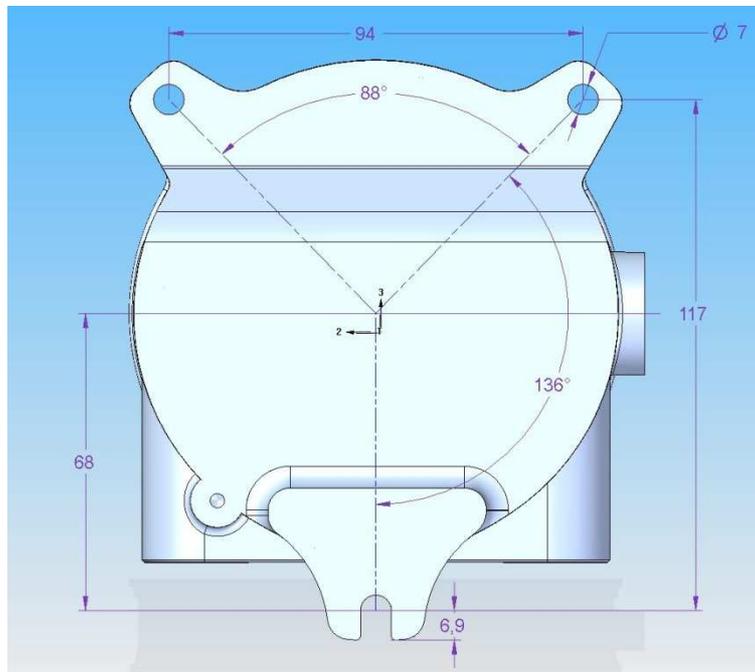


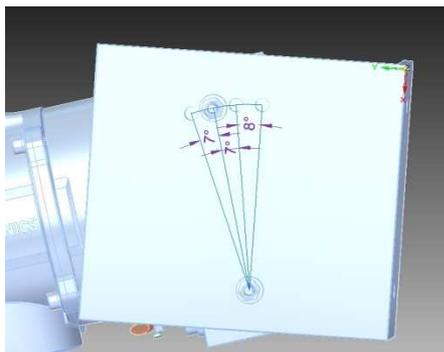
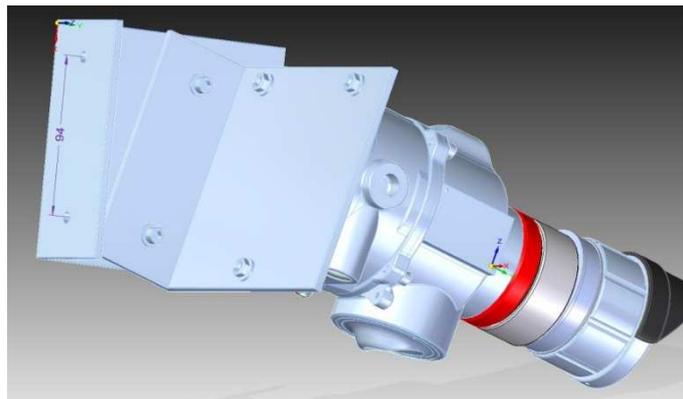
Figure 3 : Drilling dimensions for support fixing.

### 4.2.1. Multi-position support

#### 4.2.1.1. Multi-position wall mount bracket AS054

In this configuration, the support is made by two brackets connected each other by two CHC M6 screws.

The main bracket is fixed on the wall, allowing the detector to be in horizontal position, perpendicular to the wall. The vertical angle is adjusted using one of the 4 top holes of bracket.



Start by fixing the base support. The adjustment and termination of cables are performed into the base only. This limits the exposure of the electronic components in the housing to a minimum.

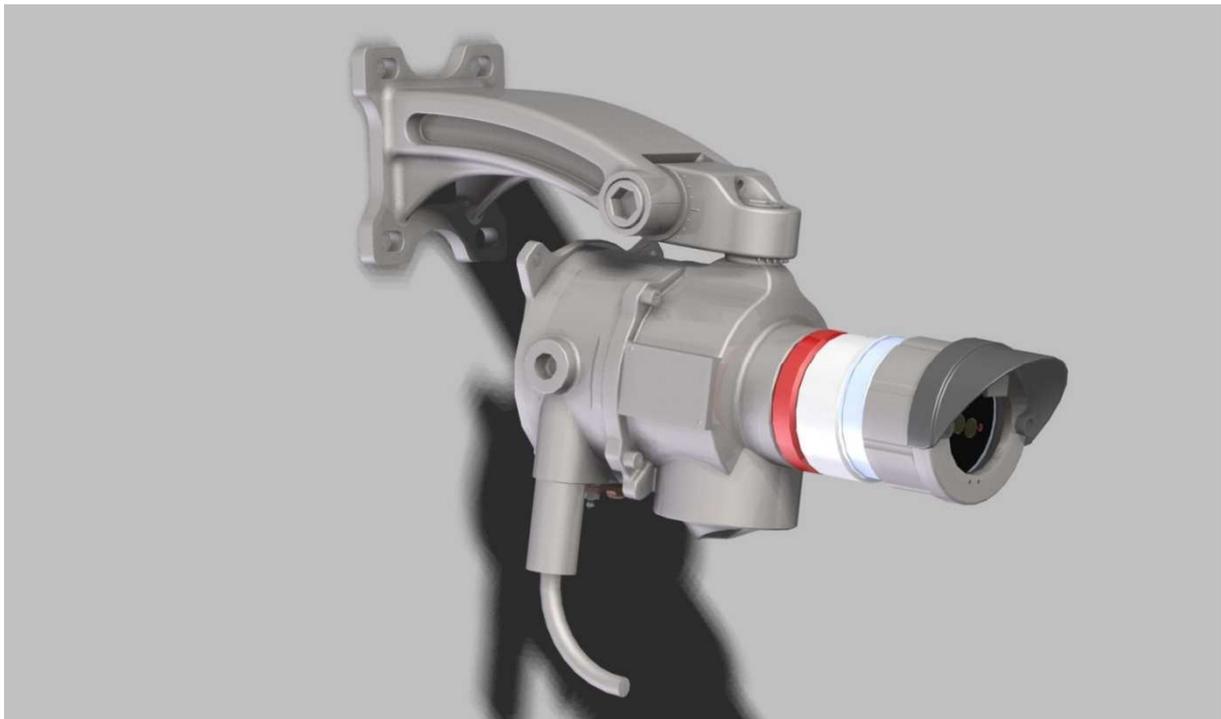
#### 4.2.1.2. Ball pivot bracket – AS048

The detector is supported by a completely adjustable support. The assembly of the bracket with the device is done by a CHC M14 x 24 screw. This one is used to set the lateral orientation.

4 fixations (M8) fix the support to the wall or on a tube (2 inch or 2.5 inch). Tighten two CHC M14 screws allows the vertical orientation.



The whole weigh approximately 7 Kg.



#### 4.2.2. Detector assembly

Check the presence of the O-ring on explosion proof seal, make sure that it is correctly greased and has no visible damage.

Plug connectors to the base, as described in paragraph “Electric connection”.

Fit the main housing on the base, placing the cable excess in the base. Put in place and tighten the four M5 screws with their grower rings.

It is possible to set up a suspension cable (not supplied) between the base and the housing (at the lower part) with the two threaded holes (M4 x 6).

### 4.2.3. Sunshade / bad weather protection

A sunshade / weather protection (AS056-450) in light and resistant material (UV resistant) is available. Mounted above the detector, it gives an additional protection against sun and bad weather.



### 4.2.4. Detector cartridge visor

The detector is fitted with a short visor for protection of the optical detector window (standard). There are two additional models available if further protection is required.

AS040: Long visor with no horizontal coverage reduction

AS041: Long visor with side blinker.



### 4.2.5. Cable's inputs (as an option)



**Connection cables must pass through a cable gland (Explosion Proof certified)**

For installation details, refer to the instructions provided by the manufacturer of the cable gland used.



**The unassigned cable glands entries must be blanked with explosion proof certified plugs (M20). They are glued with Loctite (tubétanche 577) or equivalent compound. If a plug is moved or removed, it must be glued again with Loctite or an equivalent.**

### 4.3. Electric Connection



**Never adjust electric connections when detectors are powered. Maintenance must be undertaken by qualified staff. Observe safety site rules.**

MultiFlame DF-TV7 is a sensor with standard current output 4-20mA. The connection can be on 3 or 4 wires. The 4 wires configuration allows insulation between the signal and power loops.

In addition, two independent relays outputs can be connected directly to a controller or signal device.

We recommend using an armoured and shielded cable, type NF M 87 202, in accordance with the requirements for hazardous areas and NF C 15 100. Other cables can be used if they are compliant with the local regulations and standards.

The table below shows the maximum cable lengths (2-wires) based on a minimum supply voltage.

|   |          |           |           |
|---|----------|-----------|-----------|
| Min. single wire cross area mm <sup>2</sup> /AWG  | 0.5 (20) | 0.9 (18)  | 1.5 (16)  |
| Supply voltage 20VDC, max. cable length in m/ft.* | 250/820  | 400/1310  | 700/2300  |
| Supply voltage 24VDC, max. cable length in m/ft.* | 650/2130 | 1100/3600 | 2000/6560 |

\* Those values are indicative ones, for a considered consumption power about 3.5 W

#### 4.3.1. Installation recommendation

This detector version is supplied in an electronic version **Type-C**. The terminal V- is isolated from the electric ground of the housing

The detector is supplied with a configurable current output type C (4-20 mA, factory configuration). But it can be modified in format 0-22 mA by the user, using one of the menus of the TLU 600.

Example: DF-TV7-\*\*\*\*-\*\*C-\*\*-\*\*\*-\*-C-\*

This electronic Type C also allows the detector to get a HART output (as an option) superimposed to the output current. The current output format follows the same logic as the one described above but the product code contains an H:

Example: DF-TV7-\*\*\*\*-\*\*H-\*\*-\*\*\*-\*-C-\*

That version also embeds two electrical connectors for the two relays.

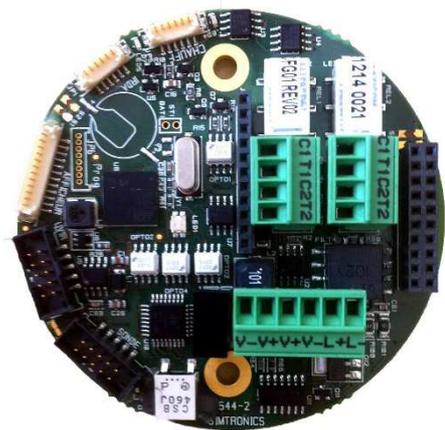


Figure 4 : Terminal blocks

| Point | JP12 & JP13 | Description |
|-------|-------------|-------------|
| 1     | T2          | Relay 2     |
| 2     | C2          | Relay 2     |
| 3     | T1          | Relay 1     |
| 4     | C1          | Relay 1     |

| Point | JP11 | Description                                     |
|-------|------|---|
| 1     | V-   | 0 V   |
| 2     | V+   | +24VDC power supply                             |
| 3     | V+   | +24VDC power supply loop (connected to point 2) |
| 4     | V-   | 0 V, Connected to point 1                       |
| 5     | L+   | 20mA Current loop: entry                        |
| 6     | L-   | 20mA Current loop: output                       |

#### 4.3.2. Connection of the electrical ground braid

Use a shield connection clamp (not supplied) to connect the shielding of the cable to the electric ground of the housing (see below).

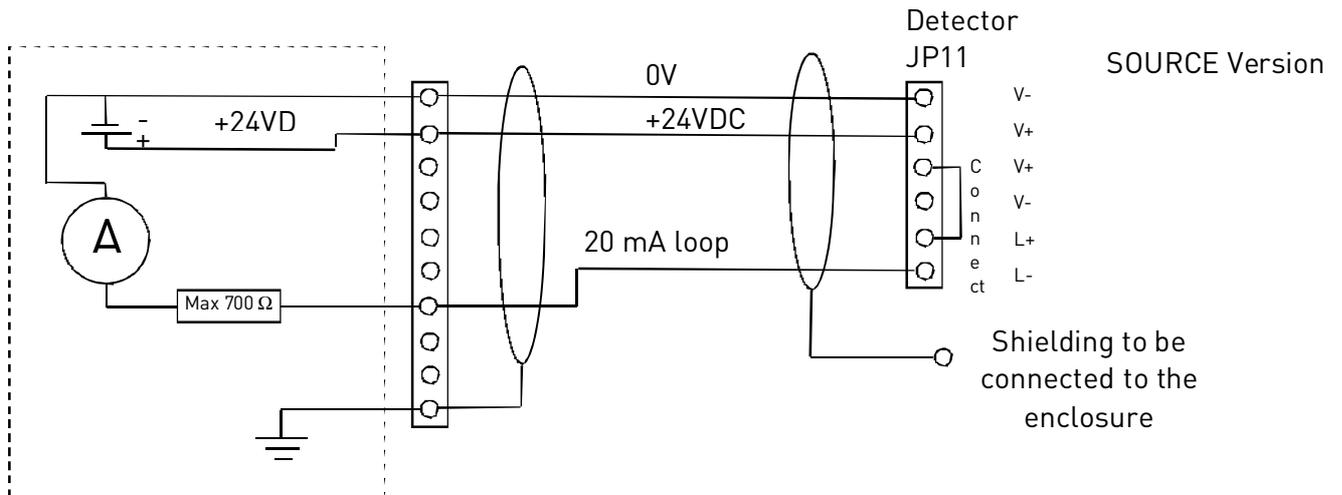
#### 4.3.3. Grounding

A M4 screw passes through the body of the enclosure, enabling the electronic ground of the housing to be connected to the local ground.

It is recommended to use a yellow / green wire with a ring lug (minimum diameter 1.5 mm). The armour of the power cable is normally connected to the ground of the detector, but it may depend on site practices.

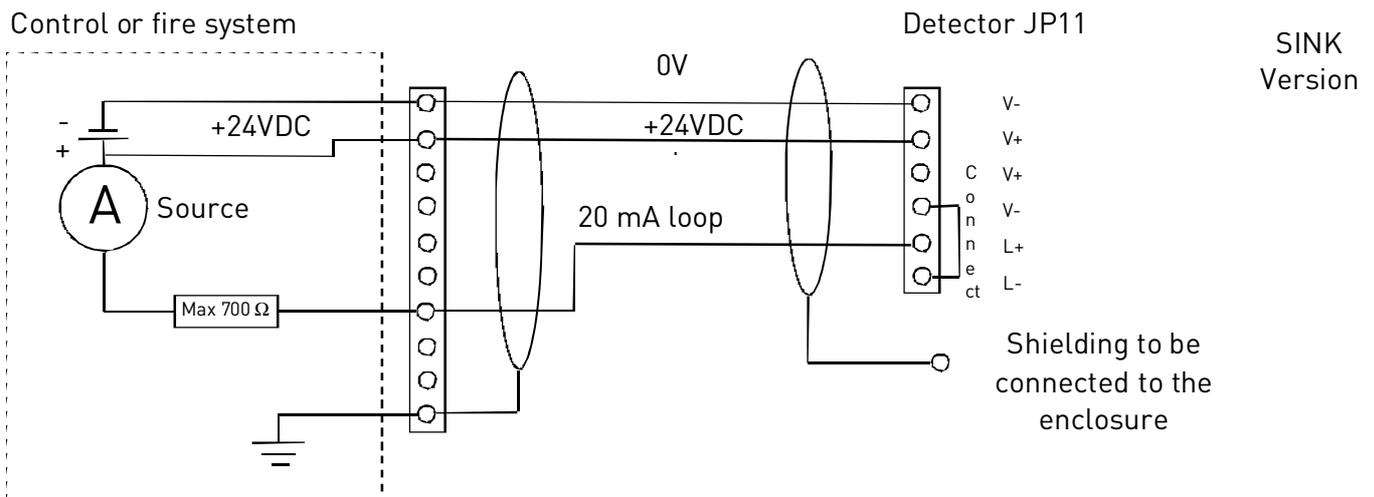


### 4.3.4. 3-wires connection (source)



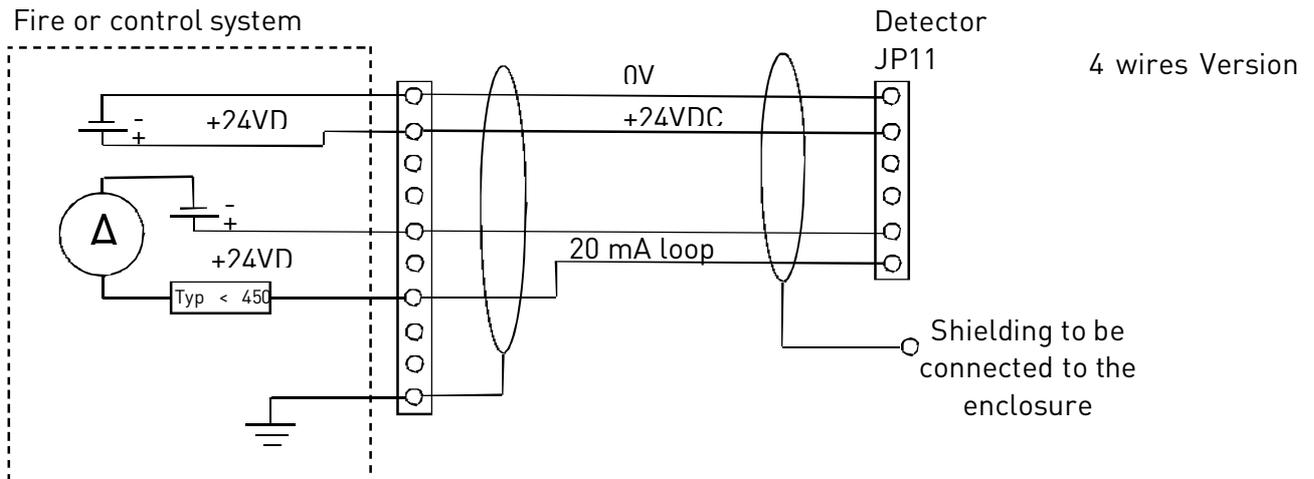
For a standard 3-wires connection, the 20mA current loop must be supplied with 24 V at terminal L+. To proceed, connect the 3 (V +) and 5 (L +) terminals at the terminal block level of the device.

### 4.3.5. 3-wire connection (Sink)



For a standard 3-wires connection in sink mode, the 20mA current loop must be supplied with a PLC. The current return must be connected to the 0V at the level of the L- terminal. To proceed, please connect the 4 (V-) and 6 (L-) terminals at the terminal block level of the device.

#### 4.3.6. 4-wires connection (isolated power)

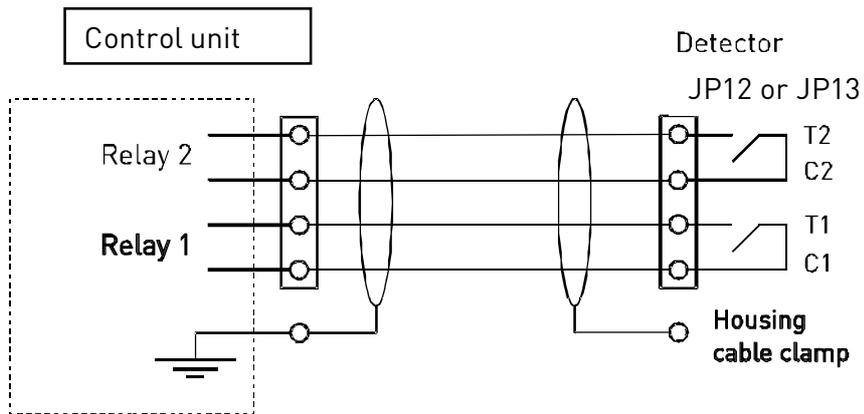


When using a 4 wires connection, the current loop is provided by the input module or PLC. The loop (L + and L-) is optically isolated from the detector. 4-20mA or 0-22mA input module of the PLC has to power up the current loop with, at least 8V at the terminal level, for 22 mA. This reduces the resistance of the loop as defined in the relationship below.

$$R_{\text{maxi}} = \frac{\text{Powersupply voltage} - 8V}{22\text{mA}}$$

In practice, the total loop resistance should not exceed 450  $\Omega$  with a voltage >18Vdc

### 4.3.7. Relay



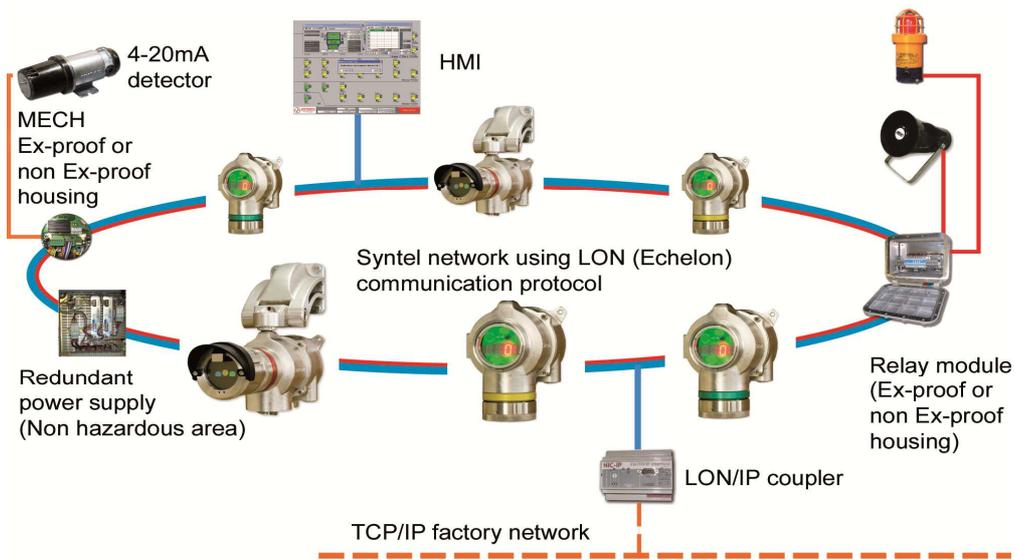
The two relays can be configured normally closed or normally open. If normally open, the relays are opened when they are not powered (power loss).

The circuits' relays are isolated from each other and from other parts of the detector. The two relays can be activated on one or more states of the detector, as shown below:

| Activated on | Relay 1<br>"Alarm" | Relay 2<br>"Fault" | Comments               |
|--------------|--------------------|--------------------|------------------------|
| Alarm        | Normally: closed   |                    | Confirmed alarm        |
| UV fault     |                    | Normally: open     | self-test fault        |
| IR fault     |                    | Normally: open     | self-test fault        |
| Other fault  |                    | Normally: open     |                        |
| Inhibition   |                    | Normally: open     |                        |
| Detection UV |                    |                    | In expertise mode only |
| Detection IR |                    |                    | In expertise mode only |
| Pre-alarm    |                    |                    | In expertise mode only |

With an electronic configuration type C, two terminal blocks are available. The pins are connected to each other, from a terminal to the other one.

### 4.3.8. Syntel connection



In this network version, an electronic board is inserted in the detector body and is used for electric connection.

Connecting the ground terminal should be performed thanks to 3-wire shielded cables.

The connection of power supply wires (4 on side A and 4 on side B).

- Two red wires on V +: +24 V
- Two white wires on V -: 0 V

Connexion of the media wires (2 on side A and 2 on side B)

- A red wire on one of the N
- A white wire on the other N (no specific edge)

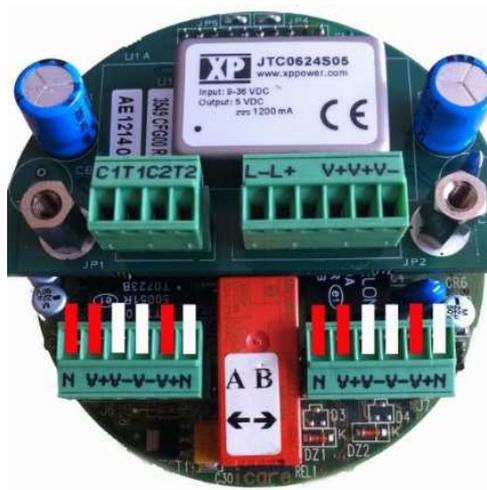


Figure 5 : Connecting drawing of the network versions



For more detail, thanks to refer to the operating manual NOSP 15251

## 4.4. Detection cartridge



The cartridge is separated from the detector to enable its replacement. Its dismantling is extremely easy and does not need to touch the rest of the unit.



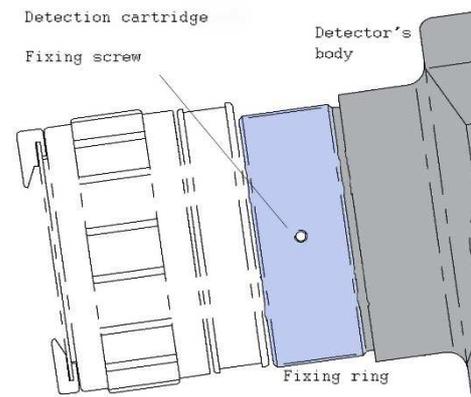
Be careful when plugging or removing the detection cartridge.

- Align the centring pin of the cartridge with the corresponding hole in the housing.
- Insert the cartridge in the bell, holding the two parts as parallel as possible.
- Introduce the pin in the hole without damaging the cartridge bottom connector when tightening the two parts.

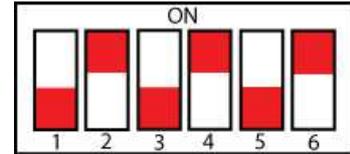


These interventions imperatively requires power to be off.

The Cartridge is fixed with a threaded fixing ring. Loosen the fixing screw in order to unscrew the cartridge.



Default detection mode of the XVA0 (UVIR<sup>2</sup>) may be changed using DIP switches at the back of the cartridge



Switches S1 and S2 are used for the UV/IR detection mode as shown in the table below. The configuration is frozen, and cannot be changed with the TLU. Switches S1 and S2 are not used for the multispectrum sensor cartridges (3IR).

| Detector mode | S1  | S2  | Comments  |
|---------------|-----|-----|---|
| UV + 2xIR     | ON  | ON  | Factory setting                                 |
| UV + 2xIR     | OFF | OFF |   |
| UV only       | ON  | OFF | The detector is now a single UV flame detector. |
| IR only       | OFF | ON  | The detector is now a 2xIR flame detector       |



**UV only and IR only configurations are not compliant with CE DPC certificate. Moreover, those configurations are more susceptible to trigger false alarms.**

Switches 3 and 4 sets the sensitivity. However, it is overwritten by the software and can be changed with the TLU600.

| Detector mode    | S3  | S4  | S5 | S6 | Comments          |
|------------------|-----|-----|----|----|-------------------|
| 100% sensitivity | ON  | ON  | ON |    | Default           |
| 100% sensitivity | OFF | OFF | ON |    |                   |
| 75% sensitivity  | OFF | ON  | ON |    |                   |
| 50% sensitivity  | ON  | OFF | ON |    |                   |
| 5 sec delay      |     |     | ON | ON | OFF = 2 sec delay |



**S5 always on ON**

## 5. COMMISSIONING

### 5.1. Visual inspection

Make certain that all the operations of the “Installation” chapter have been achieved correctly.

Pay particular attention on installation conformity, check the cables entry, the presence of O-rings, and the connexion of the cartridge.

- Check if the detection mode (UV/IR, 3IR) match with the marking

### 5.2. Power-up

The sensor is powered and operating when the green LED on the communication head is flashing.

- Check the connection to the control unit

### 5.3. Operational tests

All MultiFlame detectors are delivered set and tested. Some additional tests are necessary to check the good working of the loop. Please make sure to have all authorizations needed before running the following operations:

- Check the states/information using the wireless configuration tool (TLU)
- Check alarms delay setting : (factory settings)
  - 5 seconds for XT versions
  - 2 seconds for XV versions
- Eventually, adjust the value up to 20 sec



The alarm state needs the fire detection to be continuously detected over the full temporisation delay to be activated

### SENSITIVITY SETTING

- Factory settings :
  - 100%
  - Except for XTBO version (high sensitivity) 75%
- Eventually adjust the sensitivity between 50% / 75% and 100% of the maximum coverage distance
- Test the channel by triggering an alarm using the LT15 test lamp or force the output to 20mA via the TLU600.

## 5.4. Using the LT15 test lamp

The LT15 is a flashing test lamp used for functional test of flame detectors.

The emission spectrum of the lamp is between 280 nm (UV) and 5  $\mu\text{m}$  (IR).

The emission is pulsed to simulate the typical flickering of flames.

LT15 is certified Ex d IIC T6-T5 and suitable for operation in areas with explosion hazard, (zone 1 and 2) in accordance with the EN 60079-0 and EN 60079-1 standards.

Using the TLU600 to enter in LT15 TEST mode, then activate the LT15 at a distance of 3-5m in the axis of the flame detector to be tested.

The TLU menu commands are described in §6.6

For general information about the test lamp, refer to the LT15 Operating manual.



## 6. OPERATION

### 6.1. Environmental conditions

- Dust: Dust on the window may limit UV sensitivity
- Oil vapour: Oil vapour on the window can reduce UV sensitivity
- Water/Ice: The presence of Water or ice can reduce flame detector performances at an infrared level.

### 6.2. Inhibition

Maintenance Inhibition is temporary. It appears during power up and maintenance phases. Inhibition stops automatically when the operator leaves the maintenance menus or 10 minutes after the end of communication with the TLU.

Maintenance inhibition can be configured in "frozen" mode (factory setting) or in "free" mode.

- In "frozen" mode, outputs (current and relay) remain in their previous state. For example, if the device indicated a failure (2.0 mA), this state would be maintained during the inhibition.
- If the unit is configured in "free" inhibition mode, the output current will be on the same level as for the permanent inhibition

The permanent inhibition is activated by an order issued by the TLU when an operation is performed at/or around the device, or when the operator wants to inhibit a faulty device. The permanent inhibition must be removed by an operator's deliberate action using the TLU.

When working with the LT15 test lamp, the detector must be in TEST-mode. The default output is in maintenance inhibition; but the detector's outputs (current loop and relays) may be activated in order to test the complete loop (Requires access level 2 on the TLU).

Local LED and Information on the TLU are activated anyway.

### 6.3. Signal current loop

| Status  | "4-20"<br>[mA]               | "0-22"<br>[mA]               | TLU state                |
|---|------------------------------|------------------------------|--------------------------|
| Line fault  | 0.0                          | 0.0                          |                          |
| Configuration fault                                       | 2.0                          | 2.0                          | DEF                      |
| Hardware fault  | 2.0                          | 2.0                          | DEF                      |
| Sensor fault (Optical self-test)                          | 2.0                          | 2.6                          | DEF                      |
| Start-up inhibit  | 2.0                          | 3.4                          | Countdown                |
| Permanent inhibit.  | 2.0                          | 3.4                          | INH                      |
| Maintenance inhibit.<br>Default / ("Free mode") *         | Previous<br>value /<br>(2.0) | Previous<br>value /<br>(3.4) | INH                      |
| Operation, No faults, No Alarm                            | 4.0                          | 4.0                          | No detection<br>No alarm |
| IR detection **   | (8.0)                        | (8.0)                        | (IR detection)           |
| UV detection **   | (12.0)                       | (12.0)                       | (UV detection)           |
| Pre alarm (Detection but still waiting for time delay) ** | (16.0)                       | (16.0)                       | (Pre-alarm)              |
| Confirmed Alarm   | 20.0                         | 20.0                         | Alarm                    |

[\*] The maintenance inhibit can be set to "Frozen mode" (factory setting), or "Free mode".

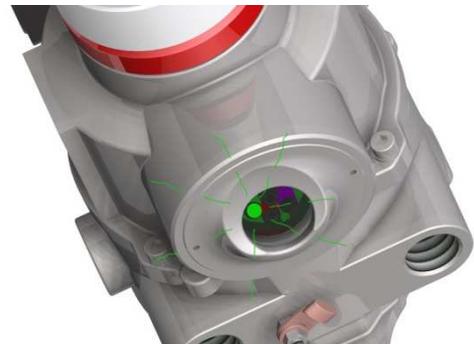
[\*\*] The standard detector alarm output is either No alarm = 4mA or Confirmed alarm = 20mA. Pre-alarm states (8 / 12/ 16 mA) are available when the detector is in "Service mode".

### 6.4. Power and fault indications

A green LED placed in the communication head flashes (0.5 Hz) in normal mode.

When the device communicates with the TLU, the flashing frequency increase up to 1Hz.

In case of fault state, its flashing decrease to 0.3Hz

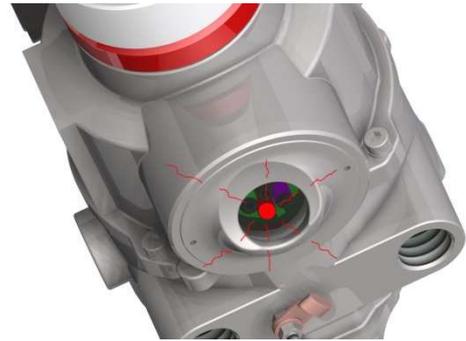


## 6.5. Alarm indication (LED)

A red LED placed in the communication head flashes in case of confirmed alarm state.

In standard configuration, the alarm LED is memorized. The flashing continues until be acknowledged with the TLU or until the detector is powered off, then powered on again.

For DF-TV7-X##0-0X#-0N versions, the alarm LED memorization is off. The LED stops flashing when the alarm disappears.



**DF-TV7-X##0-0X#-0N** version is not fully EN 54-10 compliant



If the alarm is memorized, the flashing red LED remains until the alarm is acknowledged (TLU/TLH or OFF/ON)

## 6.6. Wireless communication tool TLU600

All settings and tests of detectors can be done by the wireless communication tool TLU600.

This communication tool and its software are compatible with all Simtronics detectors: MultiFlame, MultiTox and MultiXplo.

Communication is made via infrared link (IrDA), similar but more efficient than infrared links for computers. IrDA head should not be placed facing the sun as it significantly reduces the communication with the TLU600.

Please refer to the wireless communication tool operating manual for more details



**When a device is in communication with the TLU, the frequency of the green LED (in the head of communication) flashing is set to 1Hz. By this way, the user can ensure he communicates with the requested device.**

The TLU600 menu is composed of 2 access levels allowing both settings and obtaining information about detector's status.

- level 1 : exploitation
- level 2 : Maintenance

### 6.6.1. Main screen

The main screen is composed into several data fields.

|     |  |     |  |     |             |  |
|-----|--|-----|--|-----|-------------|--|
| C 1 |  | C 2 |  | C 3 | C<br>1<br>0 |  |
| C 4 |  |     |  |     |             |  |
| C 5 |  |     |  |     |             |  |
| C 6 |  | C 7 |  | C 8 |             |  |

- C1: Detector name field
- C2: Field blank if normal operation; INH- if inhibited
- C3: Field blank if normal operation; FLT- if at least one fault has occurred
- C4: State of detection: no detection, cartridge fault
- C5: State of alarm: alarm, no alarm
- C6, C7, C8 and C9: Name of keys F1, F2, F3 and F4
- C10: Wireless communication tool pictograms

Main screen displays identity and state of the detector.

```

IR3 - A2
no detection
no alarm
INFO|ADJT|MAIN|FCNX
  
```

### 6.6.2. General operation

The user can navigate through the menu with the F1 to F4 keys, whose functions change depending on the fields displayed above each key. Standard functions:

- >>>> Scroll function / next screen.
- ESC Exit the current menu and return to the previous one.
- CHG Changing displayed value.
  - VAL Validation and Check-in of the changed value.



The changed value must be confirmed by pressing [VAL] key, otherwise the old value will be kept when leaving the menu.

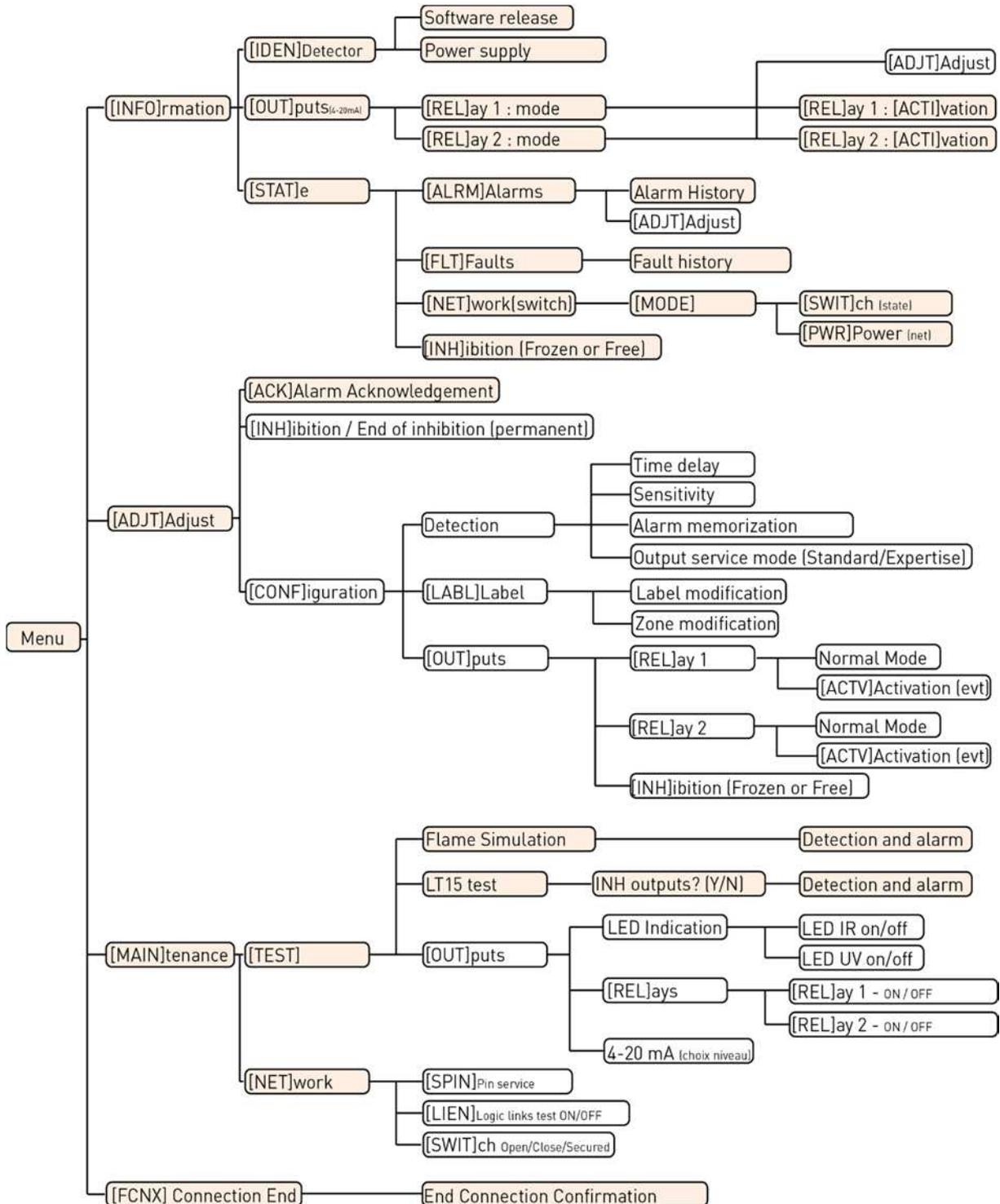
### 6.6.3. Menu structure

- **Exploitation :**

This level enables access to the information and the status of the detectors. It does not allow the configuration operations or write access.

- **Maintenance :**

The access to the parameters and other maintenance operations is protected by a password. Default password (6 digits which can be changed): **012345**.



## 6.7. Information menu [INFO]

The information menu contains all information concerning the identity and settings of the detector. The first screen gives the detector's reference and its serial number.

### 6.7.1. [IDEN]tity submenu

Presentation of:

- detector operation mode (UV/2IR, UV, IR(2IR or 3IR))
- Sensor sensitivity (50, 75, 100%)
- Alarm time delay (seconds)

Sub-menus present the board software version and the power supply voltage.

### 6.7.2. [OUT]put submenu

Presentation of:

- Current protocol (0-22 mA or 4-20 mA)
- Normal state of the relays (normally open or normally closed)
- Conditions of relays activation

Relays can be set with a level 2 access.

### 6.7.3. [STAT]e Information sub-menu

Presentation of:

- Alarms history
- Alarm activation
- Faults list (use F1 key to scroll faults)
- Alarm count since last reset
- Failed optical self-test count since last reset

#### 6.7.3.1. [ALRM] Alarm screen

Allows Alarms history display.

#### 6.7.3.2. [FLT.] Fault screen

Displays a list of eventual faults (press F1 key to scroll through the list)

#### 6.7.3.3. Network Screen Switch

This menu and its sub-menus are used for the network detector settings. For any further details, please refer to the Syntel system operating manuals.

### MODE SCREEN

The first line shows the operating mode of the sensor in the network (logic link test/out of order/emulation).

The second line shows if the network part of the detector is "operating" or "out of order". For any further details, please refer to the Syntel system operating manuals.

### NETWORK SCREEN: ALIM

Information displayed:

- Voltage A: ON / OFF
- Voltage B: ON / OFF

For any further details, please refer to the Syntel system operating manuals

#### 6.7.3.4. [INH] screen

This screen is dedicated to verify the inhibition mode configuration (frozen or free). If the access level permits it, it is possible to change this setting.

### 6.8. Adjustment menu [ADJT]

This menu presents all the detector settings. All the functionalities, except alarms acknowledgment, request access level 2.

#### 6.8.1. Alarms Acknowledgement

This menu enables the acknowledgement of the memorized alarms. An alarm can be acknowledged only if the alarm condition has disappeared.

#### 6.8.2. Inhibition / End of inhibition

The inhibition (called permanent inhibition) is activated or deactivated manually using the menu. This function is used for deactivating the detector outputs (example: during maintenance).

The « inhibition » menu is available if the sensor is not in inhibition, maintenance inhibition or simulation. Selecting the inhibition mode will switch the detector in inhibition mode.

The message “End of inhibition” is displayed on the TLU.

Press on “End of inhibition” to get the detector back to normal operating mode.

#### 6.8.3. [CONF]figuration sub-menu

This menu gives access to the configuration of the detection, (time delays, sensitivity, alarm memorization), of the label and zone, of the relay output as well as the configuration of the outputs states control.

##### 6.8.3.1. Detection

[Adjust] / [Config] / [Detection]

#### ALARM / PRE ALARM TIME DELAY SETTINGS:

Time delay can be changed to suit the application. Some locations need a longer delay to suppress interference (Example: Gas turbines). Delay is adjustable in a range of 0 to 20 seconds. Please use TLU600 to enter the two digits number.

- DF-TV7-V factory setting: 2 sec (minimum 2 sec)
- DF-TV7-T factory setting: 5 sec (minimum 3 sec). Also valid for UV and 2IR mode.

#### SENSITIVITY SETTINGS:

Detection range is available in three steps: 100%, 75% and 50%. This percentages refers to the actual detection range and not to the optical signal strength.

#### ALARM MEMORIZATION SETTINGS:

Alarm and pre alarms can be memorized. Use the CHG key to move from “memorized” to “not memorized” (yes / no). Current status is indicated by a flashing “yes” or “no”.

If the memorization of alarms is activated, the alarms have to be manually acknowledged either using the TLU, or shutting down the detector power supply and switching it on again from the controller.

**OUTPUT SERVICE MODE:**

- “Standard mode”  
All pre-alarms, UV or IR detections are disabled. Information is sent in case of confirmed alarm only.
- “Expertise mode”  
Current outputs, relays and LEDs, will be activated on pre-alarm, UV or IR detection (Ref 6.3).

**6.8.3.2. Label and zone sub-menu**

This menu allows label and zone’s modification. After selecting a label or a zone, the modification function operates in the same manner.

Both “Label” and “Zone” fields are free text type for identification of the detector (name and position of the detector).

To edit fields, Select [label] or [zone]:

- Press on the corresponding numeric key to select a figure.
- Press [>>] to go to the next figure in the field.
- Press [PAGE] to go next page.

**6.8.3.3. Output**

[Set] / [Config] / [Outputs]

This menu gives access to the configuration of the relay operating mode and to conditions of activations.

**STATE OF THE RELAYS:**

Each relay can be configured:

- Normally open (not energized)
- Normally closed (energized)

**ACTIVATION OF THE RELAYS:**

Each relay can be activated on one or several following conditions:

- IR detection (Service mode only)
- UV detection (Service mode only)
- Pre-alarm (Service mode only)
- Alarm
- UV detection fault
- IR detection fault
- On all fault
- Inhibition

**MAINTENANCE INHIBITION:**

Sets how the temporary maintenance inhibition (power up, optical test, etc.) affects the outputs. Choose “Frozen” (factory setting) or “Free”. More details in §6.2.

## 6.9. The maintenance menu [MAIN]

### 6.9.1. Test sub-menu

The maintenance menu handles tests on the detector:

- Flame simulation using the integrated test lamps
- Detection tests using the LT15 test lamp or a test fire
- Relay output and LED tests

Entering the test menu enables the temporary maintenance inhibition mode.

Without any manual intervention, the sensor come back to normal mode after 10 minutes.

#### 6.9.1.1. Flame simulation

This menu initiates an optical test using the integrated test lamps.

Test results are indicated by the detector LEDs and on the TLU (message). However, there is no action on the outputs (Relays and 4-20mA interface).

#### 6.9.1.2. LT15 test menu

This menu enables manually tests on detection, using either a test fire or a test lamp (Type LT 15 SIMTRONICS).

In this mode, "false alarms rejection" algorithms are by-passed, to make a simulated alarm easier to achieve.

All local indicators are activated (front cartridge LEDs, communication head red flashing LED, remote controller display). While entering into the menu, the detector will ask for outputs (current loop and relay) activation.

#### 6.9.1.3. Output test menu

This menu allows the user to force the detector output state for loop testing:

- Individual test of the UV and IR LEDs.
- Individual activation of each relay.
- Setting analogue 4-20mA output. Available values are: 0 mA, 2 mA, 3.4 mA, 4 mA, 8 mA, 12 mA, 16 mA and 20 mA by pressing on ++ or -- pad.

### 6.9.2. Network

This menu is related to the Network variant of the detector (Syntel system).

## 7. HART COMMUNICATION

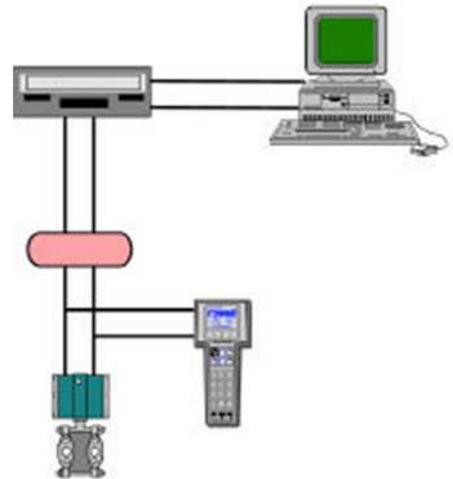
The HART communication authorizes an addressing of devices, allowing the communication in read/write mode.

It consists in getting connection on the current loop on which the numerical data are superimposed.

Most of the HART terminal can read these information and send commands

The use of a DD (Device Descriptor) facilitates the interface Man-Device. It can be uploaded on our website.

**HART**<sup>®</sup>  
COMMUNICATION PROTOCOL



The HART output is an option. It is available only on the devices equipped with an electronic type C, in HART configuration (H):

DF-TV7-\*\*\*\*-\*\*H-\*\*-\*\*\*-\*C-\*



SIMTRONICS devices under HART protocol enable the use of all the functions available with the TLU600 via the HART terminal

You will find the description of the commands in a separate document (NOSP16074)

## 8. MAINTENANCE



The interventions described in this chapter must be performed by competent and qualified staff. Device performances may be affected if the present instructions are not respected.

Cartridge unplug or device opening imperatively require power to be OFF.

### 8.1. Periodic maintenance

We recommend, at least, a biannual check.

#### 8.1.1. Visual inspection

Check detector positioning to be sure that there are no obstacle between the sensor and the potential source of fire.

#### 8.1.2. Cleaning optical parts

Maintenance of flame detectors mainly relates to keeping the optical surfaces clean (window and reflector inside surface). In most installations a periodic cleaning is required.

Clean the detector window and the test reflectors, using a soft cloth soaked in a 50/50 mixture of Ethanol and water.

#### 8.1.3. Flame simulation

Initiate a flame test using the integrated test lamps as described in §6.9.1.1. This can also be achieved using the LT15 test lamp as described in the LT15 operating Manual. Make sure that the detector is set in LT15 test mode as described in §6.9.1.2.

This test inhibits the outputs (relays and current loop), so test results are displayed on the TLU, as well as the alarm LED.

#### 8.1.4. Loop test

To test the full loop there are two options:

- Force sensor outputs manually with the TLU as described in §6.9.1.3.
- An end to end test may also achieved by setting the detector in service mode (§6.9.1.2) And initiate an alarm with the LT15 test lamp.

Make sure that connections to the control system or fire panel and other links to extinguishing equipment are under control, avoiding unwanted alarms.

## 8.2. List of main faults

In addition of the current loop faults, other information are available from the wireless communication tool TLU600/610 (refer to § 6.6). If the detector does not work properly, the following table can help you to determine the causes and effects of different possible troubles.

| Symptom                              | Possible cause                  | Action / Check  |
|--------------------------------------|---------------------------------|---|
| Green LED goes out                   | Power supply fault              | Check power supply voltage at power supply and then at detector   |
| No signal (4-20mA)                   | Power supply fault              | Check power supply voltage at power supply and then at detector   |
|                                      | Line fault                      | Check line continuity.  |
| No connection with remote controller | Current loop power supply fault | Check by inserting a milliamp meter into the loop. 4 wire connections only.   |
|                                      | No power supply to sensor       | Is the green LED is flashing?   |
| UV or IR detection fault.            | Dialogue problem                | Try to use the TLU on another detector to confirm TLU operation.  |
|                                      | Detector window contaminated    | Clean the detector window and test reflectors.  |
| (The optical self-test has failed)   | Faulty sensor.                  | If a LT15 flame test fails, then one or more of the optical sensors are faulty. Return the sensor cartridge to the factory                  |
|                                      | Faulty self-test lamp.          | If the above test succeeds, the sensors are OK, but the integrated test lamp is probably faulty. Return the sensor cartridge to the factory |
| Detector fault                       | Faulty electronics              | Replace the detector.   |

### DEFAULT IR OU DEFAULT UV

This particular fault occurs when the transmission of optical radiation to the detectors is no longer satisfactory.

This defect can appear following an unsatisfactory internal optical self-test and lead the device fault state. The self-test is carried out every 2 hours, and is checked several times in the following half hour before leading to the fault state.

In most cases, an cleaning of the front window is enough to release the fault within the following five minutes.

### DEFAULT MATERIEL

This type of failure is caused by electronic faults at the level of the detection cartridge or at the main electronics level (main housing).

This fault can also appears when communication between the cartridge and the transmitter is damaged, through a damaged link connector, for instance.

Usualy this kind of fault requires a material change.

**FAULT INFORMATIONS**  
I.R fault  
>> |REC. |ACK. |ESC

### 8.3. Replacing the cartridge

Follow the instruction in §4.4.

### 8.4. Replacing the complete detector

If the operator needs to replace the complete detector, the easiest way is to take off the main housing from the base of the detector (for more details, refer to § 4.2.2).

As the base of the detector remains in place, cable glands do not need to be dismantled. If the detector is not replaced immediately, the "open" base must be protected against humidity, dust and shocks



**No intervention should be performed when the detector is powered.**

## 9. WARNINGS

This document is not contractual. The product characteristics may be modified without prior notice for improvement purposes or for upgrading to meet applicable standards.

### 9.1. Safety

These devices are certified to be used in hazardous areas. Install and use the detectors in accordance with local and national regulations.

The detector must be properly grounded for protection against electric shocks and minimize electrical interferences.

The detector must be installed and handled only by qualified personnel.

There is no part that can be changed or repaired by the user. Calibration is done at the factory, it must be checked periodically. Return the product to the factory for any maintenance or repair outside the scope of calibration.

### 9.2. Ownership and confidentiality

The information, design data, drawings and diagrams contained in this document remain the property of SIMTRONICS and are confidential.

The information contained in this document cannot be used, either partially or wholly, nor divulged or reproduced without the prior agreement of SIMTRONICS.

## 10. WARRANTY

DF-TV7 are warranted 2 years. Application of the equipment warranty is subject to compliance with the best practices and the operating instructions contained in this manual.

The SIMTRONICS warranty shall not apply; furthermore SIMTRONICS declines all liability, for damage to equipment or harmful accidents caused by negligence, failure to supervise the equipment or failure to use the equipment in compliance with the applicable recommendations, standards and regulations stipulated in the present manual.

The SIMTRONICS warranty shall not apply to faults resulting either, from materials supplied by the Purchaser, from design imposed by the Purchaser, from servicing or maintenance carried out on SIMTRONICS equipment by a third party not explicitly authorized, or from the use of unsuitable storage conditions.

In order to guarantee correct operation of the system, any addition of equipment to the system or any modification of the installation must be validated by SIMTRONICS.

## 11. CERTIFICATIONS AND STANDARDS

### 11.1. Standards

The MultiFlame DF-TV7 has been certified according to ATEX Directive 2014/34/UE, EMC Directive 2014/30/UE, RPC 305/2011 and requirements lay down by the following standards:

|                                       |  |
|---------------------------------------|--|
| EN 60079-0/IEC 60079-0                | Electrical apparatus for potentially explosive atmospheres. General requirements   |
| EN 60079-1/IEC 60079-1                | Electrical apparatus for potentially explosive atmospheres. Flameproof enclosure "d"   |
| EN 54-10 (2002)<br>EN 54-10/A1 (2005) | Fire detection and fire alarm systems. Part 10 : Flame detectors – Point detectors   |
| EN 50130-4<br>(2011 AMD 1 2014)       | Electromagnetic compatibility - Product family standard: Immunity requirements for components of fire, intruder and social alarm systems |

### 11.2. Functional Safety

DF-TV7-V and DF-TV7-T are **SIL2** and **SIL3** certified respectively

LCIE FS-\*-T-20131104R0

LCIE FS-\*-T-20131103R0

|                       |  |
|-----------------------|--|
| IEC 61508 part 1 to 3 | Functional safety of electrical/electronic/ programmable electronic safety (SIL 2) |
|-----------------------|--|

### 11.3. Approvals

|       |                     |
|-------|---------------------|
| ATEX  | LCIE 13 ATEX 3025X  |
| IECEX | IECEX LCIE 13.0022X |

### 11.4. CE-RPC

|   |                   |                         |
|---|-------------------|-------------------------|
|  | 0333              | CPR-075534 / CPR-075535 |
| <b>SIMTRONICS SAS</b>   |                   |                         |
| 792, Av. de la Fleuride   BP 11061,<br>13781 Aubagne Cedex, France                  |                   |                         |
| EN 54-10 : détecteur de flamme – détecteurs ponctuels                               |                   |                         |
| DF-ξV7-XTσ0-0αβ-0ρ-00ε-μ-φ-0<br>(2015)  | (DF-TV7-T)        |                         |
| DF-ξV7-XVA0-0αβ-0ρ-00ε-μ-φ-0  | (DF-TV7-V) (2015) |                         |



This is not applicable to DF-TV7-X##0-0X#-0N version which is not fully compliant with EN 54-10 standard

### 11.5. Marking

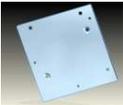
### 11.5.1. ATEX / IECEx versions

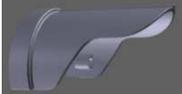
The MultiFlame identification labels are located on the main detector housing in accordance with the ATEX directive 2014/34/UE and “règlement Produits de Constructions” (UE, n°305/2011)

- Manufacturer: SIMTRONICS
- Model: DF-TV7...
- Serial no.: S/N: xxxxxxxxx (xxxxaamm)
- Approval type: CE RPC : 0333 CPR-075534 / CPR-075535  
CE0081  II 2 G / Ex d IIC T6 Gb
- Certification number: ATEX: LCIE 13 ATEX 3025X  
IECEX: IECEX LCIE 13.0022X
- Temperature:  $-40^{\circ}\text{C} < T_a < +65^{\circ}\text{C}$
- Warnings: Warning - Do not open when energized
- Protection: IP66
- Voltage: VDC: 24V
- Power consumption: 5 W

## 12. ACCESSORIES AND SPARE PARTS

### 12.1. Accessories

| Accessories   | Description  | References      |
|---|--|-----------------|
|    | Wireless hand held terminal for configuration and maintenance.   | TLU610          |
|    | Remote control unit HART : Available for adjustments and maintenance   | TLU700          |
|    | Test lamp  | LT15            |
|    | Adapter plate from the former generation of detectors (BT05-BT606) to the new one (BT10 : DG, DGi)                                   | AS0049          |
|   | Multi-position wall mount bracket<br>Pipe or wall mounting   | AS054 (2 parts) |
|  | Ball pivot bracket<br>Pipe or wall mounting  | AS048           |
|  | Tag identification plate   | AS215           |
|  | Tube mounting adapter<br>Enables DM-T#6, DMi-TT6, DG-T#7, DGi-TT7 et GD10P lines to be mounted on a 2 inch to 2.5 inch diameter tube | AS053           |
|  | Sunshade. Plate to be wall or pipe mounted   | AS056-450       |
|  | Sensor cartridge visor. Standard, fitted on detector.  | AS039           |
|  | Sensor cartridge visor, long type, no viewing angle restriction.   | AS040           |

|   |  |         |
|---|--|---------|
|  | Sensor cartridge visor, long type, vertical angle restriction. | AS041   |
|   | O-ring. kit for housing and sensor cartridge.                  | 4000284 |

## 12.2. Spare parts

| Spare parts                           | Ordering code      |
|---------------------------------------|--------------------|
| Sensor 3IR Standard range Aluminium,  | DM-SV6-XTA0-0A0-00 |
| Sensor 3IR Standard range SS316       | DM-SV6-XTA0-0X0-00 |
| Sensor 3IR Long range Aluminium       | DM-SV6-XTB0-0A0-00 |
| Sensor 3IR Long range SS316           | DM-SV6-XTB0-0X0-00 |
| Sensor UV2IR Standard range Aluminium | DM-SV6-XVA0-0A0-00 |
| Sensor UV2IR Standard range SS316     | DM-SV6-XVA0-0X0-00 |
| Set of O-rings, including grease      | 4000284            |

## 13. CONFORMITY CERTIFICATE

|   |   |                              |
|---|---|------------------------------|
|  | <b>DECLARATION UE DE CONFORMITÉ</b><br><b>EU CONFORMITY DECLARATION</b> | Réf : +NOSP0017343<br>Rév. 0 |
|---|---|------------------------------|

Nous, **SIMTRONICS**  
 We, **792, Avenue de la Fleuride**  
**13400 AUBAGNE**

Déclarons, sous notre seule responsabilité, que le matériel suivant:  
 Declare, under our sole responsibility that the following equipment:

|   |  |
|---|--|
| Type / Type   | DETECTEUR DE FLAMME / FLAME DETECTOR   |
| Modèle / Models   | DF   |
| Marquage / ATEX marking   | CE 0081  II 2 G / Ex d IIC T6 Gb -40°C ≤ Ta ≤ +65°C |
| N° attestation CE de type /<br>EC type-examination certificate N°                               | LCIE 13 ATEX 3025 X  |
| Notification de l'Assurance Qualité de la production /<br>Quality Assurance Notification Number | LCIE 03 ATEX Q 8046  |

Est conçu et fabriqué en conformité avec les Directives applicables et les normes harmonisées suivantes :  
 Is designed and manufactured in compliance with the following applicable Directives and standards:

|             |  |   |
|-------------|--|---|
| ATEX        | Directive 94/9/CE (jusqu'au 19 avril 2016)<br>Directive 2014/34/UE (à partir du 20 avril 2016)     | EN 60079-0:2012+A11 :2013(*)<br>EN 60079-1 : 2014 (*) |
|             | Directive 94/9/EC (up to 19 April 2016)<br>Directive 2014/34/EU (from 20 April 2016)               |   |
| CEM<br>/EMC | Directive 2004/108/CE (jusqu'au 19 avril 2016)<br>Directive 2014/30/UE (à partir du 20 avril 2016) | EN 54-10 :2002+A1 :2005<br>NF EN 50130-4 :2011        |
|             | Directive 2004/108/EC (up to 19 April 2016)<br>Directive 2014/30/EU (from 20 April 2016)           |   |

La Directive Basse Tension 2006/95/CE ou 2014/35/UE n'est pas applicable à ce produit  
 Low Voltage Directive 2006/95/EC or 2014/35/EU is not applicable to this equipment.

|  |   |
|--|---|
| L'organisme notifié en charge du suivi de la Directive ATEX est<br>The notified body in charge of monitoring the ATEX Directive is | LCIE<br>33, Avenue du Général Leclerc<br>92260 FONTENAY AUX ROSES<br>France |
| Numéro d'identification / Identification Number :  | 0081  |

Ce matériel ne doit être utilisé qu'à ce pour quoi il a été conçu et doit être installé en conformité avec les règles applicables et suivant les recommandations du fabricant.  
 This equipment shall be used for the purpose for which it has been designed and be installed in accordance with relevant standards and with manufacturer's recommendations.

Nous, soussignés SIMTRONICS, déclarons par la présente que le produit spécifié ci-dessus est conforme aux Directives et aux Normes listées.  
 We, undersigned SIMTRONICS, declare that the product specified above conforms to the listed Directives and standards.

A Aubagne le 13 avril 2016/ Aubagne, April 13th , 2016

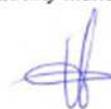
Salvator LA PIANA  
 Directeur d'établissement  
 Plant Manager



Eric CALVO  
 Responsable ATEX  
 ATEX Manager



Elodie VENEZIANO  
 Responsable qualité  
 Quality Manager



(\*) La conformité à la EN 60079-0 et EN 60079-1 a été obtenue sur la base de la version 2012 et 2007, cependant les modifications apportées par l'amendement 2013 ainsi que la version 2014 ne la remettent pas en cause / Compliance with the EN 60079-0 and EN 60079-1 has been obtained on the basis of the 2012 and 2007 version, however, the changes of the 2013 amendment and 2014 version does not affect it.

|    | <b>DECLARATION OF PERFORMANCE</b><br>N°CPR-075534   | Réf : <b>+NOSP0017160</b><br>Rév. 0 |                                    |   |                    |                             |                       |        |                             |        |   |        |  |        |   |        |  |        |  |        |  |  |
|---|---|-------------------------------------|------------------------------------|---|--------------------|-----------------------------|-----------------------|--------|-----------------------------|--------|---|--------|--|--------|---|--------|--|--------|--|--------|--|--|
| <p><b>1. Unique identification code of the product-type :</b> DF-ξV7-XTσ0-0αβ-0ρ-00ε-μ-φ-0</p> <p><b>2. Intended use:</b> Point flame detectors for fire detection system and fire alarm in building</p> <p><b>3. Manufacturer :</b> SIMTRONICS<br/>792, Avenue de la Fleuride - 13400 AUBAGNE FRANCE</p> <p><b>4. System of assessment and verification of constancy of performance :</b> System 1</p> <p><b>5. Harmonised standard:</b> EN 54-10 :2002 + A1:2005</p> <p><b>Notified body :</b> 0333 – AFNOR Certification</p>   |   |                                     |                                    |   |                    |                             |                       |        |                             |        |   |        |  |        |   |        |  |        |  |        |  |  |
| <p><b>6. Declared performances</b></p>  |   |                                     |                                    |   |                    |                             |                       |        |                             |        |   |        |  |        |   |        |  |        |  |        |  |  |
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| Essential characteristics   | Performance   | Harmonized technical specification  |                                    |   |                    |                             |                       |        |                             |        |   |        |  |        |   |        |  |        |  |        |  |  |
| Nominal activation conditions/ Sensitivity, response delay (response time) and performances under fire conditions   | Classe 1, classe 2  | EN 54-10 :2002<br>+ A1:2005         |                                    |   |                    |                             |                       |        |                             |        |   |        |  |        |   |        |  |        |  |        |  |  |
| Operating reliability   | Passed  |                                     |                                    |   |                    |                             |                       |        |                             |        |   |        |  |        |   |        |  |        |  |        |  |  |
| Tolerance on supply voltage   | Passed  |                                     |                                    |   |                    |                             |                       |        |                             |        |   |        |  |        |   |        |  |        |  |        |  |  |
| Durability of operational reliability and response delay : temperature resistance   | Passed  |                                     |                                    |   |                    |                             |                       |        |                             |        |   |        |  |        |   |        |  |        |  |        |  |  |
| Durability of operational reliability : vibration resistance  | Passed  |                                     |                                    |   |                    |                             |                       |        |                             |        |   |        |  |        |   |        |  |        |  |        |  |  |
| Durability of operational reliability : Humidity resistance   | Passed  |                                     |                                    |   |                    |                             |                       |        |                             |        |   |        |  |        |   |        |  |        |  |        |  |  |
| Durability of operational reliability : corrosion resistance  | Passed  |                                     |                                    |   |                    |                             |                       |        |                             |        |   |        |  |        |   |        |  |        |  |        |  |  |
| Durability of operational reliability : Electrical stability  | Passed  |                                     |                                    |   |                    |                             |                       |        |                             |        |   |        |  |        |   |        |  |        |  |        |  |  |
| <p>The performance of the product identified in point 1 is in conformity with the declared performance in point 6. According to regulation EU no 305/2011, this declaration of performance is issued under the sole responsibility of the manufacturer identified in point 3.</p>   |   |                                     |                                    |   |                    |                             |                       |        |                             |        |   |        |  |        |   |        |  |        |  |        |  |  |
| <p>Aubagne, September 16th, 2015</p>  |   |                                     |                                    |   |                    |                             |                       |        |                             |        |   |        |  |        |   |        |  |        |  |        |  |  |
| <p>Salvator LA PIANA<br/>Plant Manager</p>   | <p>Elodie VENEZIANO<br/>Quality Manager</p>  |                                     |                                    |   |                    |                             |                       |        |                             |        |   |        |  |        |   |        |  |        |  |        |  |  |

|    | <b>DECLARATION OF PERFORMANCE</b><br>N°CPR-075535   | Réf : <b>+NOSP0017162</b><br>Rév. 0 |                           |             |                                    |   |                    |                             |                       |        |                             |        |   |        |  |        |   |        |  |        |  |        |
|---|---|-------------------------------------|---------------------------|-------------|------------------------------------|---|--------------------|-----------------------------|-----------------------|--------|-----------------------------|--------|---|--------|--|--------|---|--------|--|--------|--|--------|
| <p><b>1. Unique identification code of the product-type</b> : DF-ξV7-XVσ0-0αβ-0ρ-00ε-μ-φ-0</p> <p><b>2. Intended use</b>: Point flame detectors for fire detection system and fire alarm in building</p> <p><b>3. Manufacturer</b> : SIMTRONICS<br/>792, Avenue de la Fleuride - 13400 AUBAGNE FRANCE</p> <p><b>4. System of assessment and verification of constancy of performance</b> : System 1</p> <p><b>5. Harmonised standard</b>: EN 54-10 :2002 + A1:2005</p> <p><b>Notified body</b> : 0333 – AFNOR Certification</p> <p><b>6. Declared performances</b></p>  |   |                                     |                           |             |                                    |   |                    |                             |                       |        |                             |        |   |        |  |        |   |        |  |        |  |        |
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| Essential characteristics   | Performance   | Harmonized technical specification  |                           |             |                                    |   |                    |                             |                       |        |                             |        |   |        |  |        |   |        |  |        |  |        |
| Nominal activation conditions/ Sensitivity, response delay (response time) and performances under fire conditions   | Classe 1, classe 2  | EN 54-10 :2002<br>+ A1:2005         |                           |             |                                    |   |                    |                             |                       |        |                             |        |   |        |  |        |   |        |  |        |  |        |
| Operating reliability   | Passed  |                                     |                           |             |                                    |   |                    |                             |                       |        |                             |        |   |        |  |        |   |        |  |        |  |        |
| Tolerance on supply voltage   | Passed  |                                     |                           |             |                                    |   |                    |                             |                       |        |                             |        |   |        |  |        |   |        |  |        |  |        |
| Durability of operational reliability and response delay : temperature resistance   | Passed  |                                     |                           |             |                                    |   |                    |                             |                       |        |                             |        |   |        |  |        |   |        |  |        |  |        |
| Durability of operational reliability : vibration resistance  | Passed  |                                     |                           |             |                                    |   |                    |                             |                       |        |                             |        |   |        |  |        |   |        |  |        |  |        |
| Durability of operational reliability : Humidity resistance   | Passed  |                                     |                           |             |                                    |   |                    |                             |                       |        |                             |        |   |        |  |        |   |        |  |        |  |        |
| Durability of operational reliability : corrosion resistance  | Passed  |                                     |                           |             |                                    |   |                    |                             |                       |        |                             |        |   |        |  |        |   |        |  |        |  |        |
| Durability of operational reliability : Electrical stability  | Passed  |                                     |                           |             |                                    |   |                    |                             |                       |        |                             |        |   |        |  |        |   |        |  |        |  |        |
| <p>The performance of the product identified in point 1 is in conformity with the declared performance in point 6. According to regulation EU no 305/2011, this declaration of performance is issued under the sole responsibility of the manufacturer identified in point 3.</p>   |   |                                     |                           |             |                                    |   |                    |                             |                       |        |                             |        |   |        |  |        |   |        |  |        |  |        |
| <p>Aubagne, September 16th, 2015</p>  |   |                                     |                           |             |                                    |   |                    |                             |                       |        |                             |        |   |        |  |        |   |        |  |        |  |        |
| <p>Salvator LA PIANA<br/>Plant Manager</p>   | <p>Elodie VENEZIANO<br/>Quality Manager</p>  |                                     |                           |             |                                    |   |                    |                             |                       |        |                             |        |   |        |  |        |   |        |  |        |  |        |

With the following correspondences:

| ξ                                | v  | 6<br>7 | XV<br>XT | σ0 | -0 | α | β | -0 | ρ | -00ε | -μ | -φ | -0 |
|----------------------------------|--|--------|----------|----|----|---|---|----|---|------|----|----|----|
| T**                              | Télécapteur  |        |          |    |    |   |   |    |   |      |    |    |    |
| R**                              | Capteur réseau / Network version   |        |          |    |    |   |   |    |   |      |    |    |    |
| <b>Famille / Families</b>        |  |        |          |    |    |   |   |    |   |      |    |    |    |
| *V*                              | Flamme / Flame   |        |          |    |    |   |   |    |   |      |    |    |    |
| <b>Génération</b>                |  |        |          |    |    |   |   |    |   |      |    |    |    |
| **6                              | BT606 Boîtier / housing  |        |          |    |    |   |   |    |   |      |    |    |    |
| **7                              | BT10 Boîtier / housing   |        |          |    |    |   |   |    |   |      |    |    |    |
| <b>Type Flamme</b>               |  |        |          |    |    |   |   |    |   |      |    |    |    |
| XV                               | UVIR?  |        |          |    |    |   |   |    |   |      |    |    |    |
| XT                               | IR3  |        |          |    |    |   |   |    |   |      |    |    |    |
| <b>Portée de détection</b>       |  |        |          |    |    |   |   |    |   |      |    |    |    |
| A0                               | Portée standard / Standard range   |        |          |    |    |   |   |    |   |      |    |    |    |
| B0                               | Longue Portée (Version XT uniquement) / Long range (only XT versions)                              |        |          |    |    |   |   |    |   |      |    |    |    |
| <b>Type</b>                      |  |        |          |    |    |   |   |    |   |      |    |    |    |
| 0**                              | Non utilisé ou flamme / not used or flame  |        |          |    |    |   |   |    |   |      |    |    |    |
| <b>Variante</b>                  |  |        |          |    |    |   |   |    |   |      |    |    |    |
| *A*                              | Aluminium  |        |          |    |    |   |   |    |   |      |    |    |    |
| *X*                              | SS316L   |        |          |    |    |   |   |    |   |      |    |    |    |
| <b>Interface</b>                 |  |        |          |    |    |   |   |    |   |      |    |    |    |
| **A                              | Protocole 0-22mA (Défaut sur le 0-4 mA/ fault on range 0-4mA)                                      |        |          |    |    |   |   |    |   |      |    |    |    |
| **E                              | Protocole 4-20 mA (Défaut commun / Common fault signal : 2 mA)                                     |        |          |    |    |   |   |    |   |      |    |    |    |
| **H                              | 4 – 20 mA / 0-22 mA configurable & protocole HART  |        |          |    |    |   |   |    |   |      |    |    |    |
| **C                              | 4 – 20 mA / 0-22 mA configurable   |        |          |    |    |   |   |    |   |      |    |    |    |
| **L                              | LON  |        |          |    |    |   |   |    |   |      |    |    |    |
| <b>Cartouches</b>                |  |        |          |    |    |   |   |    |   |      |    |    |    |
| 0*                               | Cartouche flamme / flame cartridge   |        |          |    |    |   |   |    |   |      |    |    |    |
| <b>configurations. spéciales</b> |  |        |          |    |    |   |   |    |   |      |    |    |    |
| *0                               | Standard   |        |          |    |    |   |   |    |   |      |    |    |    |
| *M                               | Version spéciale MarED (TX6 et TV6 type A uniquement)  |        |          |    |    |   |   |    |   |      |    |    |    |
| *1                               | Customisation EPR (suivi spécial – SP4M20) (DM et DMI uniquement)                                  |        |          |    |    |   |   |    |   |      |    |    |    |
| <b>Configuration</b>             |  |        |          |    |    |   |   |    |   |      |    |    |    |
| 000                              | Standard   |        |          |    |    |   |   |    |   |      |    |    |    |
| 00A                              | Exempt de toute trace de graisse / grease free   |        |          |    |    |   |   |    |   |      |    |    |    |
| 00B                              | Version spéciale MarED (ancien code) (TX6 et TV6 type A uniquement)                                |        |          |    |    |   |   |    |   |      |    |    |    |
| 00G                              | Peinture hydrocentrifugon (applications nucléaire) / Hydrocentrifugon paint (nuclear applications) |        |          |    |    |   |   |    |   |      |    |    |    |
| 00H                              | Peinture light grey (10 A03 selon « British standards 4800/5252 »)                                 |        |          |    |    |   |   |    |   |      |    |    |    |
| <b>Langue / Language</b>         |  |        |          |    |    |   |   |    |   |      |    |    |    |
| 0                                | Fr / GB  |        |          |    |    |   |   |    |   |      |    |    |    |
| F                                | Français / French  |        |          |    |    |   |   |    |   |      |    |    |    |
| E                                | Anglais / English  |        |          |    |    |   |   |    |   |      |    |    |    |
| P                                | Portugais / Portuguese   |        |          |    |    |   |   |    |   |      |    |    |    |
| C                                | Chinois / Chinese  |        |          |    |    |   |   |    |   |      |    |    |    |
| <b>Hardware version</b>          |  |        |          |    |    |   |   |    |   |      |    |    |    |
| A                                | Type 63  |        |          |    |    |   |   |    |   |      |    |    |    |
| B                                | Type 65  |        |          |    |    |   |   |    |   |      |    |    |    |
| C                                | Type 67 (HART)   |        |          |    |    |   |   |    |   |      |    |    |    |
| <b>Software version</b>          |  |        |          |    |    |   |   |    |   |      |    |    |    |
| 0                                | Standard   |        |          |    |    |   |   |    |   |      |    |    |    |

## 14. CONTACT DETAILS

You will find an updated list of distributors on our web site:

<https://gasdetection.3m.com>

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