

Operating Manual

MultiTox Detector



MultiTox DGi-TT7-E
 DGi-TT7-0
 DG-TT7-S

Note

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

The warranty made by Simtronics with respect to the product is 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

The DGi-TT7-E is designed to monitor poisoning risk induced by the presence of toxic gases or vapours (hydrogen sulphide, carbon monoxide, ammonia...).

The DGi-TT7-O is designed to monitor the oxygen concentration in %vol either for inerting (scales 1 or 5%vol.) or in breathable atmosphere control (Scale 0-25%vol).

Both versions are equipped with electrochemical cells.

The DGi-TT7-S is designed to monitor poisoning risk induced by the presence of toxic gases or vapours, such as hydrogen sulphide. This version is equipped with semiconductor cells.

Detectors can be connected to a large range of controllers or PLC.

These detectors may be configured using the portable communication terminal (TLU600), providing flexibility to the user.

Thus, calibration and maintenance operations can be undertaken by a single operator.

MultiTox are also available for use in an addressable network system with distributed intelligence SYNTEL. For more information, please refer to the Syntel module interface operating manual.

1.1. Application

The DGi-TT7 and DG-TT7 are suitable for indoor or outdoor use and offer a fast response time. Typical applications include:

- Storage of toxic products
- Monitoring of processes with toxic products
- Oxygen detection in inert atmosphere (DG-TT7-O)
- Chemical and petrochemical plants
- Drilling platforms
- Refineries



1.2. DGi-TT7-E

The DGi-TT7-E is a MultiTox detector based on a transducer with electrochemical cell, which requires oxygen to function properly.

The measuring principle is based on a redox reaction.

In the event of a long period without oxygen, the measurement will not be representative of gases or vapours concentration.

The characteristics of the device can also be altered by exposures to high concentrations or by extended periods in hot and dry atmosphere.

1.3. DGi-TT7-O

The DGi-TT7-O is a MultiTox detector based on a transducer with electrochemical cell. The measurement range is expressed in %vol O₂.

The measuring principle is based on one of the principle of the « oxygen cell ».

Characteristics of the device can also be altered by exposures to extended periods in hot and dry atmosphere.

1.4. DG-TT7-S

Le DG-TT7-S is a MultiTox detector based on a transducer with semi-conductor cells, which requires oxygen to function properly. It is used mainly for hydrogen sulphide detection in difficult industrial environment.

The measuring principle is based on oxidation and adsorbing reactions on films surface of heated semi-conductor.

This sensor uses a sensitive element that only requires half-yearly calibration and does not require any injection of high concentration gas to reactivate his sensitive element.

The measurement will not be representative anymore of the concentration of gases or vapours if the detector is exposed too long time without oxygen or in a very dry atmosphere.

Characteristics of the device can also be altered by the presence of some poisons, such as silicon vapours.

1.5. Heating

In hard environmental conditions, with condensation or frost, gases and vapours may not reach the sensor. The device takes into account this difficulty and keeps its temperature slightly above that of the ambient atmosphere.

1.6. 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 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)
- A colour coded cartridge with a label located in the lower part of the detector, a green one for the toxic gas detectors with electrochemical cell (DGi-TT7-E), a blue one for the oxygen deficiency gas detectors with electrochemical cell (DGi-TT7-O) and an orange one for semi-conductor toxic gas detectors (DG-TT7-S)

The cartridge is connected to the detector's body by an open ring leaving the label visible.

A colored ring enables the identification of the device type at a larger distance.

- A metallic support cable (optional) connects the wall mounting support and the housing, which makes the maintenance easier.

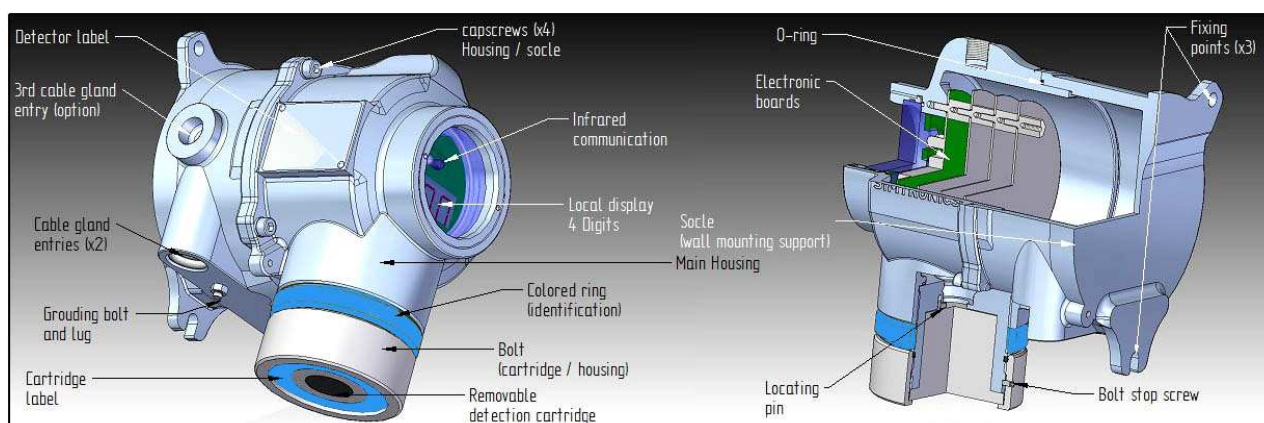


Figure 1 : Layout drawing

(Outline drawing – see Figure 2 :)

1.7. Detection cartridge

Detection cartridges are:

- Intrinsic safety “ia” for the DGi-TT7-E- and DGi-TT7-O versions. They can be removed when the detector is powered.
- Explosion proof “d” for the DG-TT7-S versions. They cannot be removed when the detector is powered.

They are common to all Simtronics MultiTox products in order to reduce the number of spares parts.

- DGi-RT7-E / DGi-RT7-O et DG-RT7-S: Network versions for Syntel loop,
- DGi-TT7-E / DGi-TT7-O et DG-TT7-S: « Telecapteur » versions,

Storing electrochemical cartridges (green or blue label) for long periods is not recommended, as their shelf-life is short. Cartridges should be used within 6 months (from the date of purchase).

In order to guarantee the metrological characteristics of the device, the cartridges must be stored in their original packaging until commissioning. For a long-term storage, the cartridges will be stored in a dry place, between 0°C and 20°C.

After a long storage period, more than one month, the cartridge will be stabilized for several hours, in order to perform the nominal characteristics.

1.8. 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 that, 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)



1.9. Product Code

Product codes are created from functional codes defined as below:

DGj-T7-****-***-**-***-**-* et DG-T7-****-***-**-***-**-*

Detector type													
T	T	7	31	AF	-S	X	H	-C	0	-00J	-0	-C	-0
C**	Compact Sensor												
T**	Télécapteur												
R**	Network version												
S**	Replacement cell												
X**	Accessories												
Families													
T	Toxic												
V	Flame												
X	Flammable gas												
0	None												
Version													
**6	BT606 housing												
**7	BT10 housing												
Gas type													
**	Refer to gas matrix												
	Measurement range												
**	Refer to gas matrix												
Type													
XV	UVIR2												
XT	IR3												
XW	UV												
Detection range													
A0	Standard range												
B0	Long range												
Input Type													
0**	Not used or flame												
E**	Electrochemical												
S**	Semi-conductor												
K**	Catharometer												
X**	Catalytic												
M**	MECH												
R**	TOR input												
C**	Current input 0/22 mA												
I**	Infrared												
W**	½ Wheatstone bridge												
Variant													
A	Aluminium												
X	SS316												
Output Interface													
**M	1-2 mA protocol												
**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												
**W	Wheatstone												
**L	LON												
**X	4 – 24 mA for compact explosimeter												

T	T	7	31	AF	-S	X	H	-C	0	-00J	-0	-C	-0	
DGi-TT7-O / Dmi-TT6-O Dgi-TT7-E / Dmi-TT6-E Dgi-TT7-O / Dmi-TT6-O DG-TT7-S / DM-TT6-S Half Wheatstone bridge probes DG-TT7-I / DM-TT6-I DG-TT7-I / DM-TT6-I								Cartridges						
								0*	No cartridge or not specified or flame					
								M*	Electrochemical type M					
								Y*	Electrochemical type Y					
								N*	Electrochemical type N					
								G*	Electrochemical type G					
								X*	Catalytic					
								S*	Semi-conductor (general designation for semiconductor type C)					
								F*	Semi-conductor type 30 (previously SF) since 2015					
								C*	Semi-conductor type 31 since 2015					
								K*	Catharometer					
								E*	Ex05 (external)					
								T*	SX202-10					
								U*	SX202-14					
								V*	SX202-17					
								H*	MTHX-S					
								W*	SD122					
D*	Infrared type D													
P*	Infrared type P													
DG-TT7-S / DM-TT6-S								Semicond.Sensor type & special configurations						
								*0	Not specified or standard					
								*A	20					
								*B	23					
								*C	24					
								*D	25					
Options								*E	27					
								*F	30 (become obsolete to release *R association)					
								*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					
Customized versions								*1	Customized EPR (special follow up, SP4M20)					
									(DM and Dmi only)					
								Configuration						
								000	Standard					
								00A	Absolutely no grease					
								00B	Special version MarED (old code)					
									(TX6 and TV6 in type A only)					
								00C	Not EN 54-10 compliant version (not latched ALRM LED) (type A only)					
								00D	IRDA cap instead of display					
								00E	0V not connected to housing ground on Tox type C					
								00F	TCM02 instead of IRDA cap					
								00G	Hydrocentrifugon paint (nuclear applications)					
								00H	Special paint : light grey (10A03 according to « British standards 4800/5252 »)					
								00J	Special paint : red (RAL 3001)					
									Language					
								0	Fr / GB					
								F	French					
								E	English					
								P	Portuguese					
								C	Chinese					
A	Type 63													
B	Type 65													
C	Type 67 (HART)													
D	Type 69 (magnet)													
								Software version						
								0	Standard					

2. TECHICAL FEATURES

GENERAL

Type	Gas detector
DGi-TT7-E	MultiTox (electrochemical for toxic components)
DGi-TT7-O	MultiTox (electrochemical for measurement of oxygen)
DG-TT7-S	MultiTox (semi-conductor for toxic components)
DGi-RT7 / DG-RT7	Network detector
Calibration*	Factory set. A test is recommended every 3-4 months on DGi -TT7-E and DGi-TT7 and every 6 months on DG-TT7-S.

OUTPUT SIGNALS

Loop 4-20mA signal	Type active (source) maximum load impedance 700Ω												
E version - « 4-20mA » (Factory set)	4-20mA with one fault level <table> <tr> <td>- 0% full scale</td><td>4 mA</td></tr> <tr> <td>- 100% full scale</td><td>20 mA</td></tr> <tr> <td>- 105% full scale</td><td>20.8 mA</td></tr> <tr> <td>- Fault or inhibition</td><td>2 mA</td></tr> </table>	- 0% full scale	4 mA	- 100% full scale	20 mA	- 105% full scale	20.8 mA	- Fault or inhibition	2 mA				
- 0% full scale	4 mA												
- 100% full scale	20 mA												
- 105% full scale	20.8 mA												
- Fault or inhibition	2 mA												
Version A- « 0-22mA »	4-20mA with several fault levels, for PLC and some recent control units <table> <tr> <td>- 0% full scale</td><td>4 mA</td></tr> <tr> <td>- 100% full scale</td><td>20 mA</td></tr> <tr> <td>- >105% full scale</td><td>20.8 mA</td></tr> <tr> <td>- Inhibition</td><td>3.4 mA</td></tr> <tr> <td>- Fault measure</td><td>2.6 mA</td></tr> <tr> <td>- Device fault (HW/SW)</td><td>2.0 mA</td></tr> </table>	- 0% full scale	4 mA	- 100% full scale	20 mA	- >105% full scale	20.8 mA	- Inhibition	3.4 mA	- Fault measure	2.6 mA	- Device fault (HW/SW)	2.0 mA
- 0% full scale	4 mA												
- 100% full scale	20 mA												
- >105% full scale	20.8 mA												
- Inhibition	3.4 mA												
- Fault measure	2.6 mA												
- Device fault (HW/SW)	2.0 mA												
Output relays	2 x configurable relays max 1A / 30V AC/DC												

ELECTRICAL

Power supply	24VDC, (18 – 28 V DC on versions DGi-TT7 or DG-TT7-S) (18 – 30 V DC on versions DGi-RT7 or DG-RT7-S)
Consumption	2 W (typical), 3.5 W (output 20 mA and max brightness display) 7.8 W Max (output 20 mA, max heating, max brightness) (DGi-TT7-E/O only)
Wiring	0,5mm ² (20AWG)-1,5mm ² (16AWG).

* These frequencies of calibration control are provided for information purposes only. The frequency depends on the operating conditions, the experience and safety requirements.

MTBF	100 000 h (Version DGi-TT7-E/O out of the EC cell)
	136 100 h (Version DG-TT7-S including the cell, SIL2 certified)

ENVIRONMENT

Storage temperature	-40°C to +70°C without cartridges -10°C to +50°C (recommended between 0°C - 20°C) with the cartridges type -E or -O -35°C to +55°C with the cartridges type -S Please refer to comments on storage conditions - §1.7
Operating	Please refer to table §3
Pressure	1013 Hpa ± 10%
Humidity	15 - 90% RH non condensing (version DGi-TT7-E/O) 5-100% RH non condensing (version DG-TT7-S)
Protection	IP66
RFI/EMI	EN 50270
Heating time*	60 sec to 120 sec depending on the version
Stabilization time	stabilization time 1st implementation or up to 24h after being powered off: <ul style="list-style-type: none"> - DGi-TT7-E : 2 hours - DGi-TT7-O : 10 min - DG-TT7-S : 16 to 24 hours

EXPLOSION PROOF HOUSING

Material	Stainless steel 316 L
Weight	4.0 kg
ATEX/IECEX : DGi-TT7	⊕ II 2 G / Ex d ia II C T6 Gb -20°C < Ta < + 60°C
ATEX/IECEX : DG-TT7	⊕ II 2 G / Ex d II C T6 Gb -40°C < Ta < + 65°C
Dimensions	Please refer to Fig 2

* The indicated warm-up time corresponds to the duration of inhibition measurement when powered on. It prevents from triggering alarms while signal is reaching its stabilised level. Nominal performances might be reached only after a stabilisation period.

FUNCTIONAL SAFETY


SIL

SIL certified based on IEC/EN 61508 part 1 to 7 (2011) standards


Certification delivered by LCIE Bureau Véritas

- The safety function is either integrating the 4/20 mA current loop, as an output, or the relays one
- PFD calculation is based on a 12 months verification frequency and a 5 hours MTTR

Current output

Detector	Datas	Definitions	Values
MultiTox DG-TT7-S 	MTBF	Mean Time Between Failure	136 100 h
	λ	Failure rate per hour	$7.35 \times 10^{-6}/h$
	SFF	Safety fraction failure (T1= 12 mois)	91.4 %
	PFD	Probability of failure on Demande	2.80×10^{-3}
	PFH	Probability of failure / h (1001)	6.34×10^{-7}
	MTTR	Mean Time To Repair	
		Fault on cartridge	16 min
		Fault on Detector	26 min
		MTTR used for PFD calculation	300 min
	SIL compliance	HFT = 0 / G.Fixed / 30°C / type B	1

Relay output

Detector	Datas	Definitions	Values
MultiTox DG-TT7-S 	MTBF	Mean Time Between Failure	139 300 h
	λ	Failure rate per hour	$7.18 \times 10^{-6}/h$
	SFF	Safety fraction failure (T1= 12 mois)	88.9 %
	PFD	Probability of failure on Demande	3.50×10^{-3}
	PFH	Probability of failure / h (1001)	7.94×10^{-7}
	MTTR	Mean Time To Repair	
		Fault on cartridge	16 min
		Fault on Detector	26 min
		MTTR used for PFD calculation	300 min
	SIL compliance	HFT = 0 / G.Fixed / 30°C / type B	1

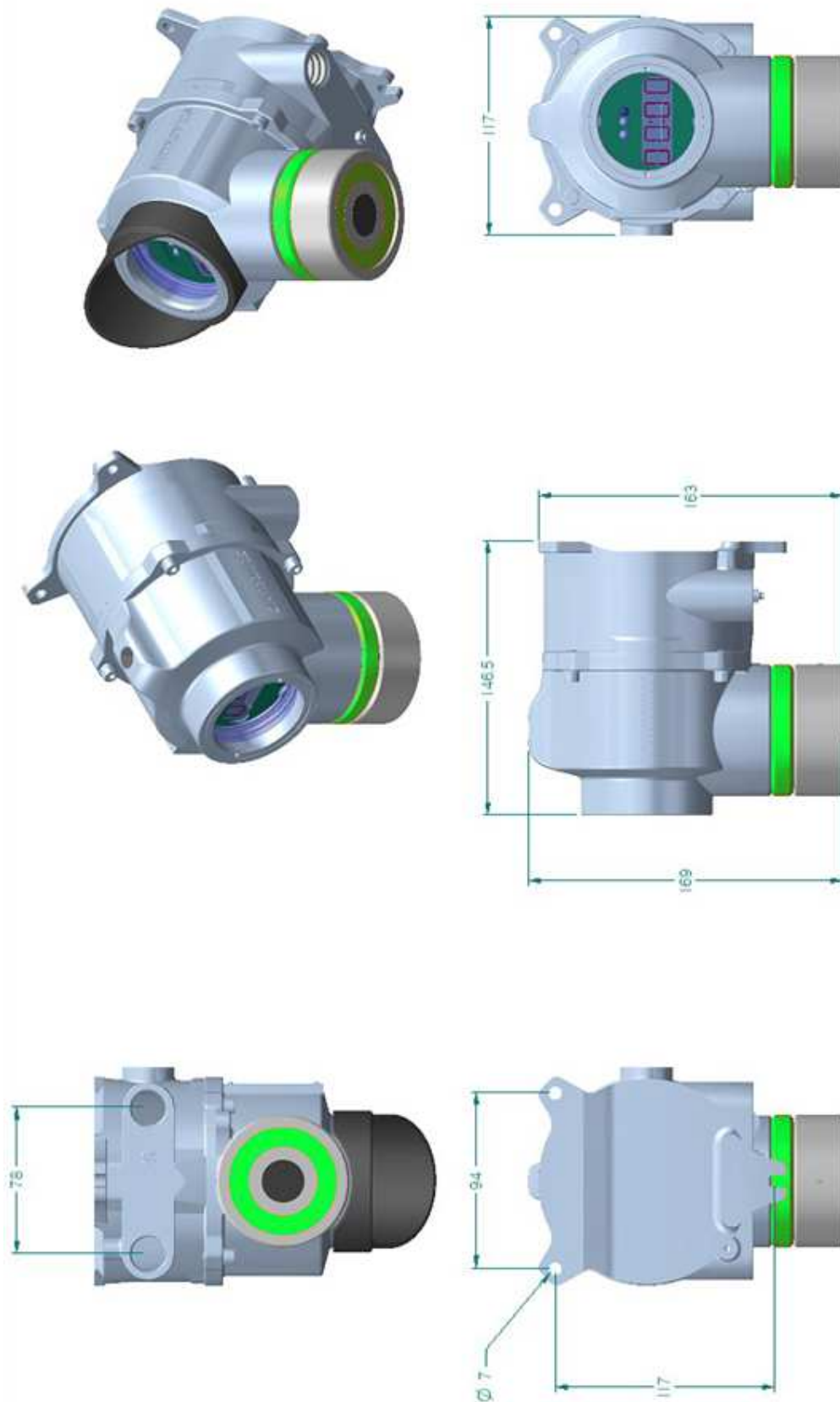


Figure 2: Outline drawing (mm)

3. SCALES AND TECHNICAL DATA

	O ₂ DGI-TT7-O	H ₂ S DGI-TT7-E	H ₂ S DG-TT7-S	NH ₃ DGI-TT7-E	CO	NO	NO ₂	H ₂	SO ₂	Cl ₂	HCl	HCN
Measurement range ❶	0-5 %vol	0-20 0-50	0-20 0-50	0-50 0-100	0-100 0-200	0-100	0-20	0-2000	0-20	0-10	0-50 0-100	0-50
	0-25 %vol	0-100 0-200	0-100	0-1000	0-500 0-1000			0-10000		0-50		
τ (0-50%) (sec)	< 8	< 15	< 30									
τ (0-90%) (sec)	< 25	< 60	< 70	< 120	< 35	< 20	< 45	< 70	< 30	< 30 ❷	< 150	< 60
Zero stability ❷ point	< 0.1 %vol	± 1 ppm ± 2 ppm	< 1 ppm	± 2 ppm ± 20 ppm	± 4 ppm ± 10 ppm	± 3 ppm	± 0.5 ppm	± 40 ppm ± 200 ppm	± 0.5 ppm	± 0.5 ppm	± 3 ppm	± 1 ppm
T° range (°C)	-10/+40	-20/+50	-40/+65	-20/+40	-20/+50	-20/+50	-20/+50	-20/+50	-20/+50	-20/+40	-20/+50	-20/+40
Accuracy ❸ ❹ ❺	5 % Ech.	± 2 ppm ± 10 % reading		± 4 ppm ± 10 % reading	± 4 ppm ± 10 % reading			± 50 ppm ± 5 % reading				
	4 % Ech	± 4 ppm ± 10 % reading	± 2 ppm ± 10 % reading	± 25 ppm ± 10 % reading	± 15 ppm ± 10 % reading	± 4 ppm ± 10 % reading	± 2 ppm ± 10 % reading	± 50 ppm ± 5 % reading	± 2 ppm ± 10 % reading	± 2 ppm ± 10 % reading	± 4 ppm ± 10 % reading	± 2 ppm ± 10 % reading
Shelf-life (months)	12 à 18	24	60	24	36	36	24	24	24	24	24	18
Warming-up time or polarisation ❶	< 10 min	< 10 min	< 60 min	< 10 min	< 10 min	< 60 min	< 10 min	< 10 min	< 10 min	< 10 min	< 60 min	< 10 min
Gas injection time (ref)	1'	3'	3'	4'	2'	1'	2'	4'	2'	2'	4'	3'

Table 1: performances

- ❶ In ppm unless otherwise indicated.
- ❷ Long term stability (21 days) under stable environmental conditions.
- ❸ On the range: 0°C to 40 °C.
- ❹ < 120 seconds at the 1st exposure.
- ❺ The precision is estimated based on replication, linearity and temperature parameters.
- ❻ Select the higher value where two tolerances are proposed.
- ❼ For a 6 hours powered-off time



DG-TT7-S detectors: The silicone compounds are known to have poisoning effects on the semi-conductor element.



DG-TT7-O detectors: High CO₂ concentration (several %vol.) is known to have poisoning effect on the cell. In a similar way, solvents higher than 1000 ppm will gradually damage the cell.



DG-TT7-O detectors: The measure is proportional to the partial pressure of oxygen in the measured mixture.

4. INSTALLATION

The detectors described in this manual are safety instruments intended to be installed in explosive atmospheres and have been designed in compliance with standards EN60079-0, EN60079-1, EN 60079-11, CEI 60079-0, CEI 60079-1 and CEI 60079-11.



Intervention in some sites may be subject to restrictions that we invite you to follow for your own safety and those of others.

4.1. Positioning

The detector must be positioned as close as possible to sources of potential leakages, taking into account airflows (e.g. upper and lower ventilation). The height is determined by the density of gas to detect.

Generally speaking, a detector will not be placed in front of an air inlet which brings clean air

This height may be adjust to take into account the specific conditions which may interfere on the risk level (gas density, ambient temperature....)

4.2. Assembly

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.

On stainless steel housings, plugs are sealed with Loctite. If the plugs are moved or removed, it must be sealed again, using Loctite or equivalent.

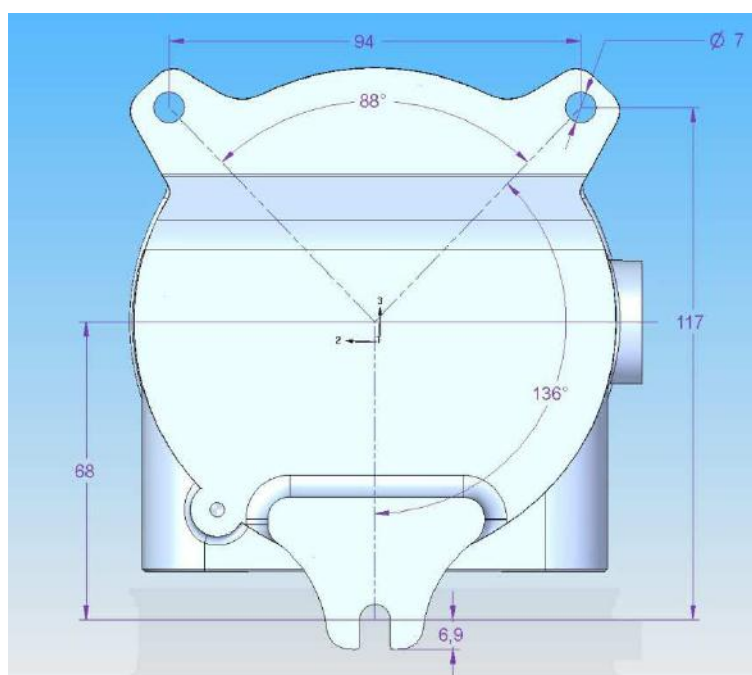


Figure 3 : Drilling dimensions for support fixing.

4.2.1. 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 two threaded holes (M4 x 6).

4.2.2. 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 (type tubétanche 577) or equivalent compound. If a plug is moved or removed, it must be glued again with Loctite or an equivalent.

4.2.3. Communication using the TLU 600

Communication elements are located above the display.



The orientation enables a communication with an $\frac{1}{2}$ horizontal angle about 35° , an $\frac{1}{2}$ vertical-up angle about 30° and a vertical-down angle about 50° .

The maximum communication distance is between 7 to 9 m.

4.3. Electric Connection



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

MultiTox are sensors with standard current output 4-20mA or 0-22mA. 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 in meter (ft) based on the wire cross section and the supply voltage.

Min. single wire cross section mm ² /AWG	0.5 (20)	0.9 (18)	1.5 (16)
Supply voltage 24VDC / consumption power ≤ 2W	580 (1900)	1000 (3280)	1000 (3280)
Supply voltage 24VDC -10% / consumption power ≤ 2W	340 (1110)	600 (1960)	1000 (3280)
Supply voltage 24VDC / 2W < consumption power ≤ 3.5W	330 (1080)	580 (1900)	1000 (3280)
Supply voltage 24VDC -10% / 2W < consumption power ≤ 3.5W	200 (650)	340 (1110)	600 (1960)
Supply voltage 24VDC / 3.5W < consumption power ≤ 5W	230 (750)	400 (1310)	710 (2320)
Supply voltage 24VDC -10% / 3.5W < consumption power ≤ 5W	140 (450)	240 (780)	430 (1410)

NB : Those values are calculated considering the minimum supply voltage at 18VDC at the sensor level

4.3.1. Installation recommendation

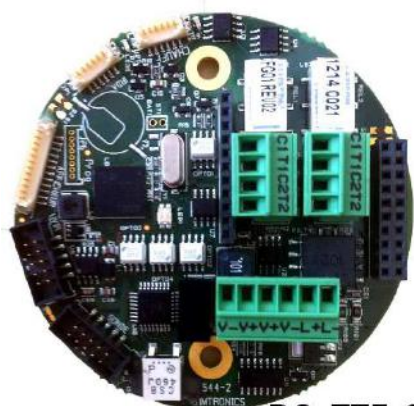
This detector version is supplied in an electronic version Type-C. The terminal V- is isolated from the electric ground of the housing

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: DGi-**-7-****-**-C-**-***-**-C-*

DGi-TT7-E

DGi-TT7-O



DG-TT7-S

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: DGi-**-7-****-**-H-**-***-**-C-*

The DG-TT7-S version embeds two parallel connectors for the two relays while DGi-TT7-E and DGi-TT7-O versions embed only one connector.

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).

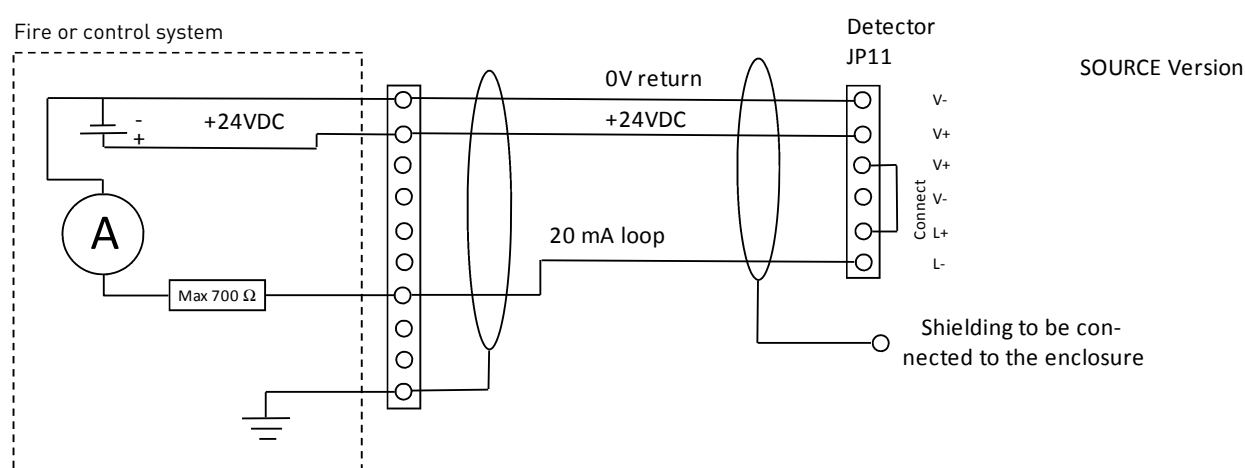
4.3.3. Grounding

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.

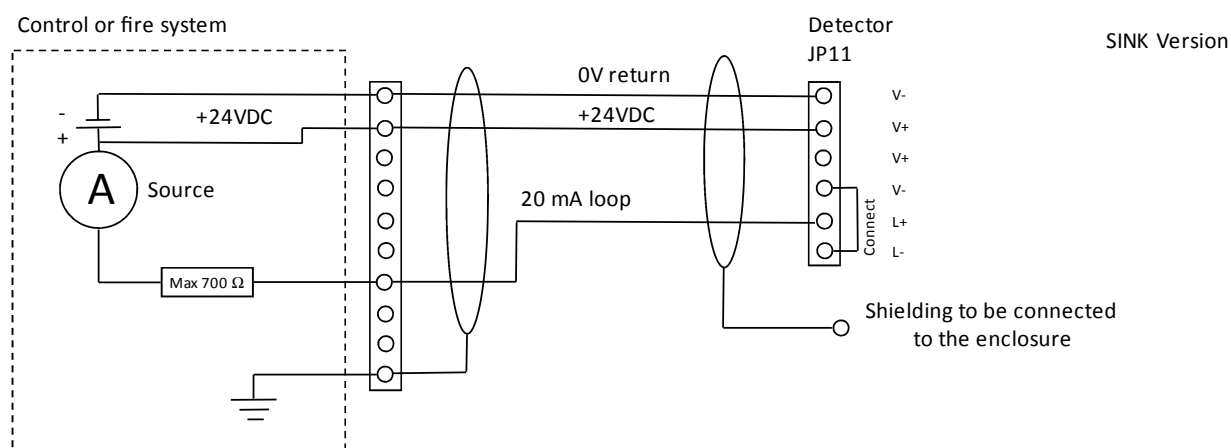


4.3.4. 3-wires connection(source)



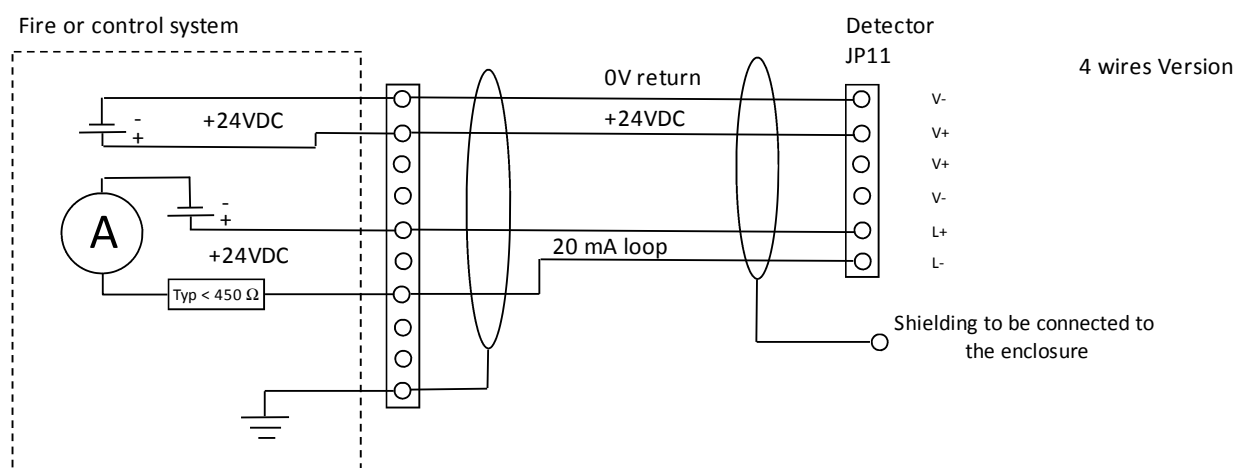
For a standard 3-wires connection, the 20mA current loop must be supplied with 24 V at terminal L+. To proceed, connect the 3 (V +) and 5 (L +) terminals at the terminal block level of the device

4.3.5. 3-wires 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 devise.

4.3.6. 4-wires connection (isolated power)

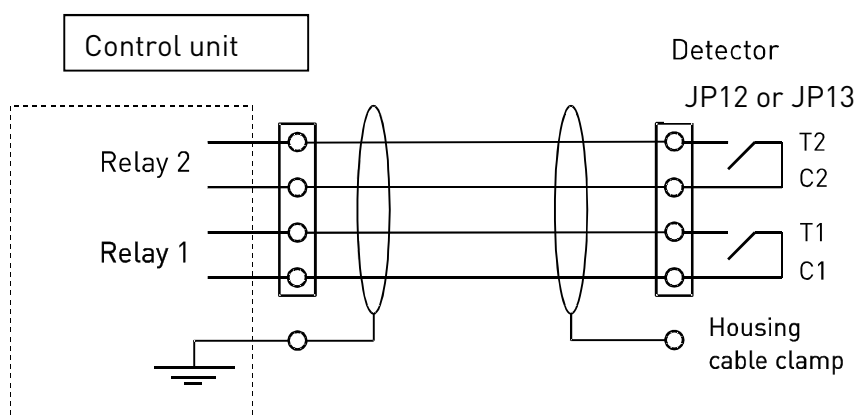


When using a 4 wires connection, the current loop is provided by the input module or PLC. The loop (L + and L-) is optically isolated from the detector. 4-20mA or 0-22mA input module of the PLC has to power up the current loop with, at least 8V at the terminal level, for 22 mA. This reduces the resistance 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 Ω with a voltage >18Vdc

4.3.7. Relay



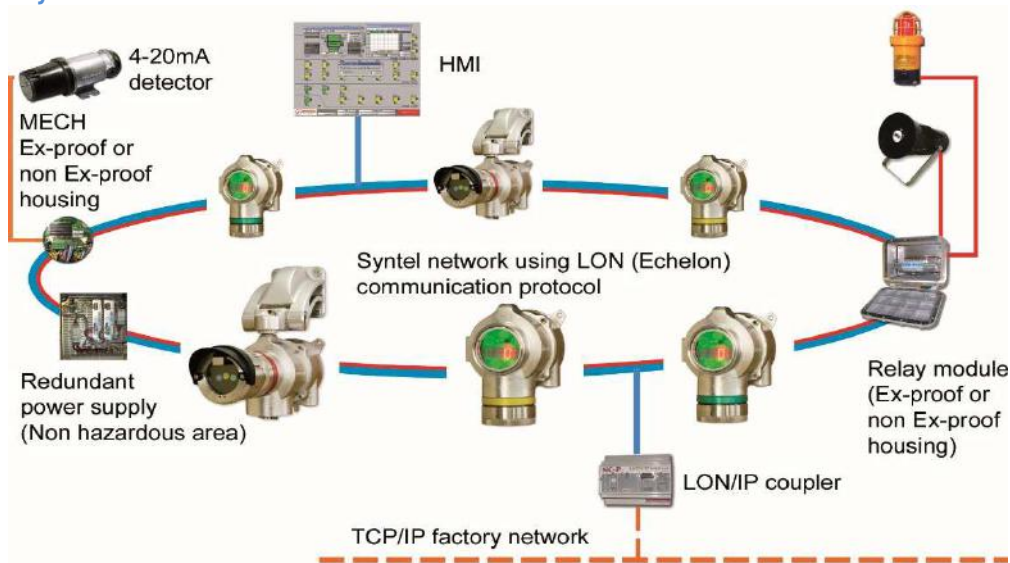
The two relays can be configured normally closed or normally open. If normally open, the relays are opened when they are not powered (power loss).

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 "Alarm"	Relay 2 "Fault"	Comments
Alarm	Normally Open		4 possible levels
Fault		Normally closed	2 types of fault
Inhibition		Normally closed	2 types of inhibition

For DG-TT7-S version, two terminal blocks are available per relay. 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

Connection 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)

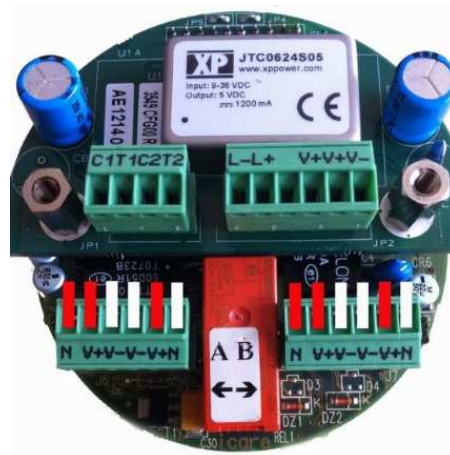


Figure 4 : Connecting drawing of the network versions



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.



Caution during the assembly and the disassembly of the cartridge on the detector:

- Slide the positioning pin of the cartridge into the corresponding hole in the housing (at the bottom of the receiver).
- Take care to not damage the cartridge connector when tightening the two parts.
- On DGi-TT7-E and DGi-TT7-O versions, these operations can be performed when powered.
- On DG-TT7-S version, these operations imperatively require power to be off



Loosen the locking screw on the side of the nut (see Figure 1), then unscrew the nut, along the first part of the thread. With the nut, pull on the cartridge to remove it and then unscrew the cartridge from the nut.

Cartridges have an identification colour ring (see §1.6).

Insert a new cartridge of the same colour into the case respecting the position defined by the centring pin, screw the nut until it stops ensuring the presence of O-ring. Then, tighten the locking screw.

Switch on the device in order to make the calibration of the new cartridge and the zero adjustment.

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 connection of the cartridge.

- The label on the smart sensor indicates the type of detector, the type of gas and the range for which the instrument has been calibrated,
- The cartridge colour must correspond to the type of detector:
 - Green for toxic gas detectors with electrochemical cell
 - Blue for oxygen deficiency gas detectors
 - Orange for toxic gas detectors with semi-conductor cell

5.2. Power-up

The detector is powered through the multichannel detection unit or the Programmable Logic Controller.

- The backlight turns violet
- The display (red) appears. It displays, among other information, the INH which indicates the start-up inhibition and the warming-up remaining time in *min* and *sec*.
- After this warming up time, the backlight turns green and the current concentration is displayed.

5.3. Operational tests

All MultiTox 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 the alarm levels
- Zero point:
If there are no polluting gases or, if necessary, by injecting clean air at 30 l/h using the calibration kit equipped with an air cylinder
- Sensitivity:
By injecting a suitable gas mixture at 30 l/h using the calibration kit
- Check the servo controls

6. OPERATION

6.1. Environmental conditions

The lifetime of the **electrochemical cartridges** for toxic gas detector depends on the operating environment related to temperature, humidity and high exposures.

One will take care to avoid long exposures to a hot and dry atmosphere ($T^{\circ} > 30^{\circ}\text{C}$ and $\text{RH} < 10\%$), and gas exposures 4 times higher to the scale.

The lifetime of the **cartridges for semi-conductor toxic gas detector** depends on the operating environment related to certain compounds.

One will take care to avoid exposures to some vapored products as silicone. Moreover, an exposure in area with a low rate of hygrometry for several hours can temporarily damage the sensitivity. In order to retain stability of the factory span calibration, we recommend to leave in place the protection cap with a desiccant packet on the front of the cartridge during storage, shipping or any periods without power lasting more than 1 hour.



Don't forget to remove the protection cap after power ON and before inserting the eventual splash-guard.

Store the protection caps with the desiccant packet in a sealed container (zip-lock bag). Dry the bag before using it again

In general, a dusty and humid atmosphere must be avoided. Indeed, a clogging of the gas barriers is then possible, slowing down or stopping the detection process.

6.2. Inhibition

Maintenance Inhibition is temporary. It appears during power up and maintenance.

Inhibition stops automatically when the operator gets out of the maintenance menus or after 10 minutes if communication with the TLU has been interrupted.

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 with the TLU. In a similar way as the maintenance inhibition, this mode will lead to a purple switch of the backlight.

6.3. Signal current loop

State	"4-20" [mA]	"0-22" [mA]	Display	TLU state
Line fault	0.0	0.0		
Configuration fault	2.0	2.0	DEF & yellow Backlight	DEF
Detector fault (electronic)	2.0	2.0	DEF & yellow Backlight	DEF
Measure fault	2.0	2.6	DEF & yellow Backlight	DEF
Start inhibition	2.0	3.4	INH & violet Backlight & cycle**	Warming-up Remaining time including power up
Permanent inhibition	2.0	3.4	INH & violet Backlight & cycle**	INH
Maintenance inhibition Fixed configuration (fault) / ["free mode"] *	Previous value / (2.0)	Previous value/ (3.4)	INH & violet Backlight & cycle**	INH
0% of full scale	4.0	4.0	Cycle** & green Backlight 0	No detection No alarm
25% of full scale	8.0	8.0	Cycle** AL1 or AL2 if reached	Alarm if level exceeded
50% of full scale	12.0	12.0	Cycle** AL1 or AL2 if reached	Alarm if level exceeded
75% of full scale	16.0	16.0	Cycle** AL1 or AL2 if reached	Alarm if level exceeded
100% of full scale	20.0	20.0	Cycle**	Alarm
105% of full scale	20.8	20.8	& red Backlight 100 - AL2	Alarm

(*) Maintenance inhibition may be available in frozen or free mode.

(**) The cycle is the display sequence of the concentration, unit of measure and target gas.

6.4. Alarm indication

When an alarm status is confirmed, the backlight turns red. Moreover, the display indicates the alarm level and the current concentration.

The remaining information which is usually recorded in the display cycle are not provided anymore, in order to keep the detection and current alarm level as a priority.

If the alarm memorization is enabled, the backlight remains red and the alarm indication appears in the display cycle until the alarm is acknowledged with the TLU or until the detector is powered off, then powered on again.

If the alarm memorization is disabled, the backlight turns green when the alarm fades.

6.5. Display indication

The 4 Digits display provides several information, depending on the state of the device:

STARTING:

- Display cycle : concentration and measuring scale (meas then % or ppm then gas)
- Alternately indicates the inhibition mode and the remaining warming up time

NORMAL OPERATING MODE:

The digital readout provides the following information:

- Concentration
- Measuring scale
- Abbreviation of the gas used
- Label of the device



IN CASE OF ALARM:

- the display of concentration flashes
- alternation with « AL1 » or « AL2 » depending on the levels



IN CASE OF DEFAULT:

- The display shows « DEF »



IN CASE OF INHIBITION :

- The display shows « INH »



The modes of the backlight are:

Green	Normal use, no alarm
Red	Superior to the alarm level 1
Yellow	Fault mode
Violet	Inhibition mode ; maintenance (temporized) or permanent



At factory setting, the intensity of the backlight and the display self-adapt, depending on the brightness of the environment. The brightness can be adjusted at fixed levels, between 0 (off) and 5 (maximum)



The electric consumption of the device depends on the background light level (see technical specifications).

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 mode with the TLU, its background light flashes. It enables the user to 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	
C 4						1
C 5						0
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.

```

DG1-TT7
    0 ppm H2S
[0 ----- 100%]
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:

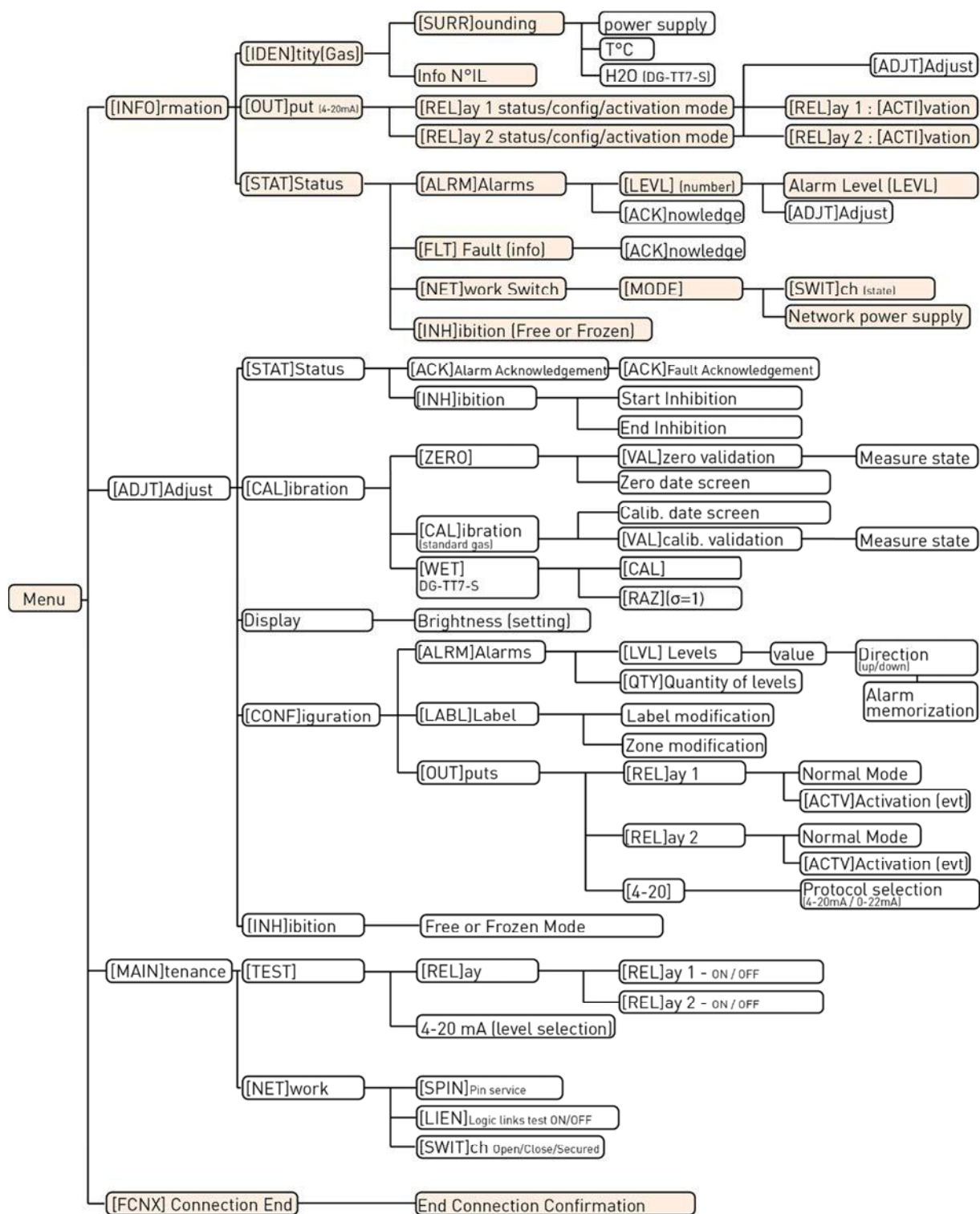
- >>>> Scroll function / next screen.
- ESC Exit the current menu and return to the previous one.
- CHG Changing displayed value.
 - VAL Validation and Check-in of the changed value.



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:

- The serial number
- The device reference
- The scale and the targeted gas

Sub-menus present the board software version, the power supply voltage and the temperature read in the cartridge.

6.7.2. [OUT]put submenu

Presentation of:

- Current protocol (0-20 mA or 4-20 mA).
- Normal state of the relays (normally open or normally closed).
- Condition of relay activation.

Relays can be set with a level 2 access.

6.7.3. [STAT]e Information submenu

Presentation of:

- Number and value of activated alarm levels.
- List of eventual faults (press F1 key to scroll through the list)
- Possibility to acknowledge alarms

6.7.3.1. [ALRM] Alarm screen

Allows setting of levels and alarms acknowledgement.

6.7.3.2. [FLT.] Fault screen

Displays a list of eventual faults (press F1 key to scroll through the list) and allows their acknowledgment.

6.7.3.3. Network screen: switch state

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. The 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 alarm level acknowledgment, request access level 2.

6.8.1. [STAT]us sub-menu

6.8.1.1. Alarm Acknowledgement

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

6.8.1.2. 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.

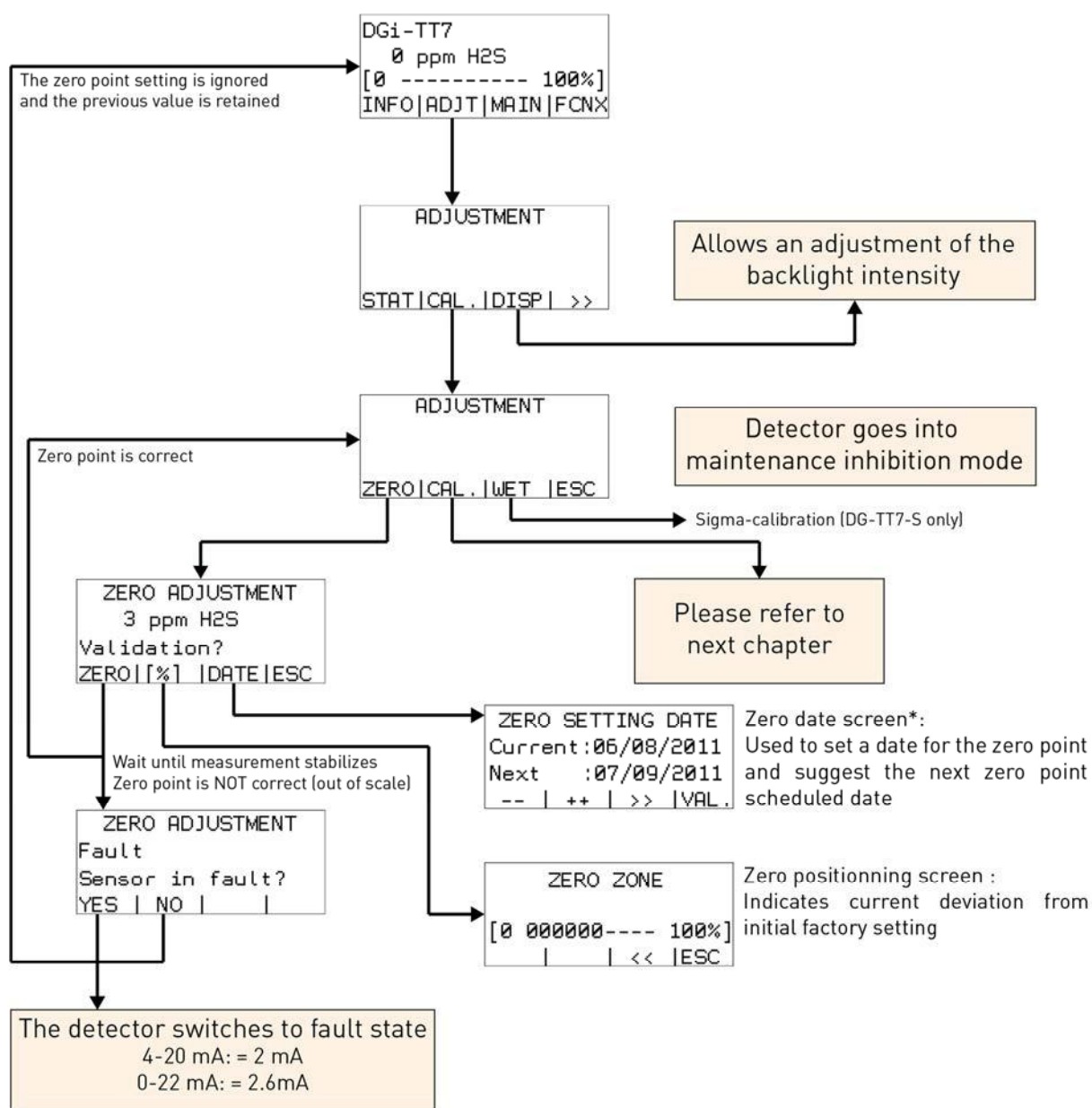
Press on “End of inhibition” to get the detector back to normal operating mode.

6.8.2. CALIBRATION sub-menu

6.8.2.1. Zero point setting

The operator can set the zero point with the wireless communication tool TLU600/610. The detector is in maintenance inhibition mode for 10 minutes after it goes back to main screen. Use the setting menu and validate the INH command for acknowledgement. Press F4 key to stop communication between TLU600/610 and the detector.

With DG-TT7-S versions, if the environmental air potentially contains contaminants, the zero point setting should be carried out with a pressurized clean air cylinder. Use the calibration kit with in-line humidifying tube (specific calibration kit). Open the analytic air (30l/h) for 5 min and then start the zero point setting.



* The device doesn't embed battery, it is then not able to keep real time. The date indication for zero or calibration points, as well as the next expected date for similar operations, are entered manually by the operator. Those data are for information only and their update is optional. mise à jour est facultative.

6.8.2.2. Calibration

Calibration must be made with the gas the detector is set to detect, with the SET menu (F2 key) of the wireless communication tool TLU600/610 and a calibration kit.

The calibration gas should be injected at a flow rate between 30 l/h and 60 l/h. For the DGi-TT7-O version, on a 25%vol scale, ambient air at 21%vol O₂ generally fits.

For DG-TT7-S series, it is necessary to have a humidifier tube into the gas circuit. Use the specific calibration kit.

Open the flow regulator (0.5 l / min), wait for stabilization (about 2-3 min)* and calibrate.

If one wants to carry out another bump test or calibration and expect an accurate measurement, a 60 minutes clean air recovery is considered as a minimum interval. This interval increases up to 90 minutes if the gas exposure has been about 5 minutes and extended to, at least, 2 hours if the gas exposure has exceeded 5 min.

*When the splash guard (AS019) is used with the calibration cup, stabilization time increases slightly (approximately 1 minute) during an injection with cup.

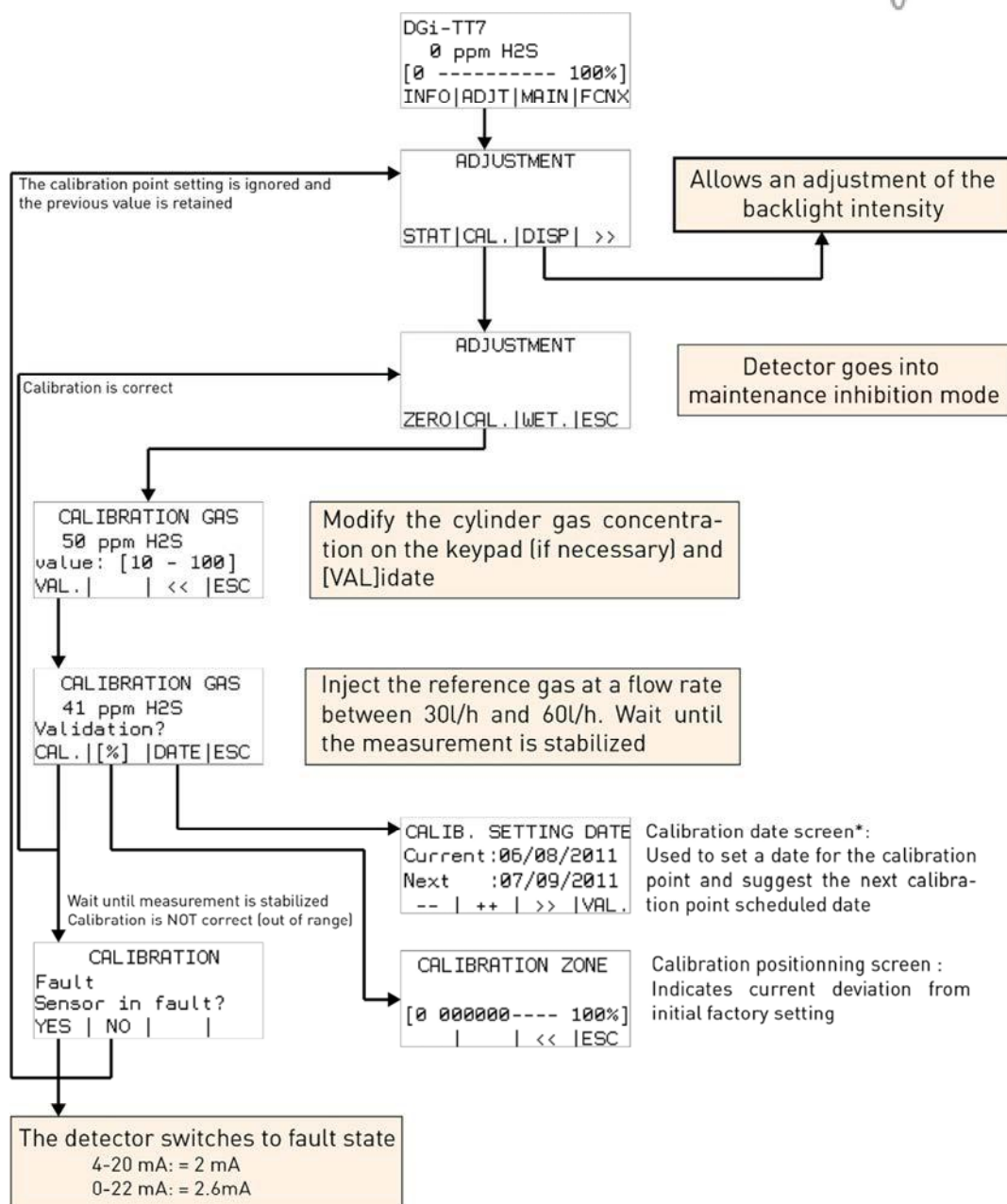
NB : The humidifier tube provided in the calibration kit has to be change when the color becomes dark brown



For DG-TT7-S versions, the H₂S mixture must be in air and not in nitrogen otherwise a significant calibration error is made

The detector is in maintenance inhibition mode for 10 minutes after it goes back to main screen. Use the setting menu and validate the INH command for acknowledgement.

To end of communication between the TLU600/610 and the detector is done by pressing F4 key on main menu.



* The device doesn't embed battery, it is then not able to keep real time. The date indication for zero or calibration points, as well as the next expected date for similar operations, are entered manually by the operator. Those data are for information only and their update is optional. mise à jour est facultative.

6.8.3. [DISP]LAY sub-menu

This menu gives access to the light intensity setting of the backlight and display:

- AUTO : Automatic adjustment depending on the lighting environment
- Level 0 : Backlight is switched off, minimum display
- Levels 1 to 4 : Intermediary levels
- Level 5 : Maximum backlight intensity

6.8.4. [CONF]iguration

6.8.4.1. Alarm sub-menu

The menu gives access to:

- The number of alarms levels used (0 to 4).
- The trigger's value of the alarm (levels values)
- The alarm's trigger sense (up or down)
- The alarm's memorization (yes/no)

On one hand, the alarm memorization maintains relays and alarm information on the wireless communication tool. On the other hand, the current output and the concentration displayed on the wireless communication tool are always updated with the real concentration

6.8.4.2. 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.

The numeric keys correspond to different alphanumeric characters. For each displayed page, the numeric keys have a different assignment.

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

The label or zone modification must be confirmed by pressing the key VALID, otherwise the modification is not taken into account

6.8.4.3. Output configuration sub-menu

[Adjust] / [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 relays:

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

- Alarm
- Fault
- Inhibition

Factory setting:

- Relay 1: normally open (not energized) activated on alarm levels
- Relay 2: normally closed (energized) activated by any fault or inhibition

This menu allows you to switch the format of the output current between 4-20 mA and 0-22 mA.

6.8.5. [INH]ibition submenu

Maintenance inhibition can be configured in « frozen » mode (Factory setting) or « free » mode.

- In « frozen » mode, the outputs (current and relay) remain in their previous state. For example, if the device displays a fault (2.0 mA), it will remain in this mode during the inhibition
- If the device is configured in « free » mode, the current output will remain at the same level than the permanent inhibition

6.9. Maintenance menu [MAIN]

The maintenance menu allows the user to check if the detector is in normal operation conditions

- (Test of the relay and current outputs).

6.9.1. [TEST] sub-menu

6.9.1.1. Relay menu

This menu gives access to activation or deactivation of the relays.

The detector switches to inhibition mode. The detector will stay in inhibition mode if the user goes back through the steps to the main menu. Otherwise, the detector will return to its "current" state.

6.9.1.2. The 4-20 mA screen

This menu allows the output current to be set at a chosen value. The possible output values are: 2mA, 4mA, 8mA, 12mA, 16mA, 20mA or 22mA.

During this phase, the detector switches automatically to inhibition mode. The detector will stay in inhibition mode if the user goes back through the steps to the main menu. Otherwise, the detector will return to its "current" state.

6.9.2. NETWORK sub-menu

This menu gives direct access to different tests for the network. For any further details, please refer to the additional network operating manual:

- SPIN sends the detectors network identification.
- LIEN switches from normal mode to logic link mode.
- SWITCH enables the switches to go on mode open/closed/open secured.

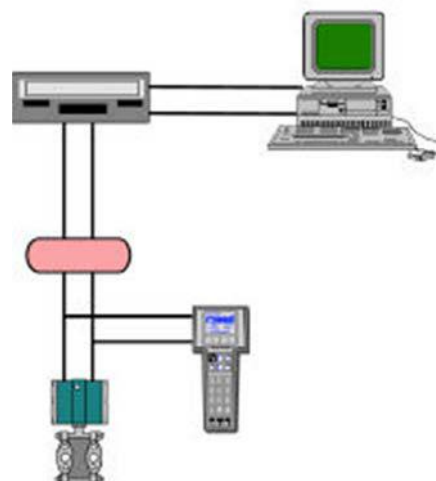
7. HART COMMUNICATION

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.



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

DGi-**-7-****-**-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 (NOSP16092)

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 replacement (DG-TT7-S only) and any other operation, imperatively require power to be off.

Cartridges on DGi-TT7 can be unplugged while power is on.

8.1. Periodic maintenance

Calibration control periodicity are provided for information purposes only. The frequency depends on the operating conditions, the experience and safety requirements.

8.1.1. Preventive maintenance

A test is recommended every four months for the DGi-TT7-E or DGi-TT7-O versions, and every six months for the DG-TT7-S version.

Run a calibration if necessary. A zero point calibration with clean air (nitrogen for the DGi-TT7-O versions) has to be done first.



We recommend to use a mixture of the target gas with a 50% of the measuring range concentration. The complement of the mixture should, preferably, be Air (this is imperative for the DM-TT6-S version).

8.1.2. Corrective maintenance

If the detection unit or the PLC signals a detector fault, the detector must be tested directly with the wireless communication tool to determine the type of fault.

If the detector is configured in 0-22 mA output, it is possible to have a pre-diagnostic of the fault.

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

FAULTS	CAUSES	SOLUTIONS
Backlight display switched off	Power supply failure	Check the power supply (18 and 28 V _{DC}) at the detection unit or the PLC output
	Continuity issue	Check line continuity
No 4-20 mA / 0-22 mA signal 3-wire cabling	Power supply failure	Check the power supply (18 and 28 V _{DC}) at the detection unit or the PLC output
	Continuity issue	Check line continuity
	No shunt between V+ and L+	Place the shunt
No 4-20 mA / 0-22 mA signal 4-wire cabling	Power supply fault	Check the loop with an ammeter.
ZERO_FAULT (Zero point fault)	Zero point resetting impossible	Fault memorized, even on a power supply shut down. To acknowledge this fault, make a full calibration (in general, the sensor needs to be replaced).
DRIFT_FAULT (Zero point drift)	Sensor drift: the measure is below -10%	Non-memorized fault. Automatic acknowledgement when the measure goes back above -10%. Resetting the zero point is necessary.
CALIB_FAULT (Calibration fault)	Calibration resetting impossible	Memorized fault, even on a power supply shut down. To acknowledge this fault, make a full calibration (in general, the sensor needs to be replaced).
SELFTEST_FAULT SENSOR_FAULT (Fault material)	Material trouble (electronic part failure) on the sensor or on the electronic board of the detector This fault is triggered if there is no sensor in the detector.	Non-memorized fault. Automatic acknowledgement when the detector is back to normal operation conditions. An electronic failure of the detector hardly happens. Replacing the cartridge will solve the problem most of the time.
TEMPERATURE_FAULT (Temperature fault)	Temperature sensor is out of order or disconnected. The temperature sensor is in the cartridge.	Non-memorized fault. Automatic acknowledgement when the detector is back to normal operation conditions. Replace the cartridge.
No wireless communication tool connection	Detector unpowered	Check that the green LED flashes.
	Dialogue problem	Check the wireless communication tool by using it on another detector.
Detector fault (Material fault)	Electronic fault	Replace the detector

troubles.

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 § 4.2.1).

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 while power is ON.

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 interference.

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

MultiTox Detectors are warranted 1 year. Application of the equipment warranty is subject to compliance with the state of the art 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. Product standards

MultiXplo and MultiTox detectors have been certified according to ATEX directive 2014/34/UE, EMC Directive 2014/30/UE 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 60079-11 / IEC 60079-11	Electrical apparatus for potentially explosive atmospheres. Equipment protection by intrinsic safety « i ».
EN 50270	Electromagnetic compatibility. Electrical apparatus for the detection and measurement of combustible gases, toxic gases or oxygen

11.2. Approvals

11.2.1. DG line of product

Protection mode « d »

ATEX	LCIE 11 ATEX 3081X
IECEx	LCI 11.0060X

11.2.2. DGi line of product

Protection mode « d ia »

ATEX	LCIE 13 ATEX 3024X
IECEx	IECEx LCIE 13.0021X

11.2.3. Functional Safety

DG-TT7-S is **SIL2** certified : LCIE SF-*-T-20160617R0
(Ref to §2 for further details)

IEC 61508 part 1 to 3	Functional safety of electrical/electronic/ programmable electronic safety (SIL 2)
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11.3. Marking

11.3.1. ATEX / IECEx versions


The detector identification label is placed on the main housing, according to directives ATEX 2014/34/UE

- Manufacturer	SIMTRONICS
- Model	DGi-TT7... DG-TT7...
- Serial Number	S/N: xxxxxxxxx (xxxxaamm)

DGi-TT7



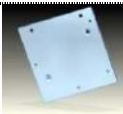

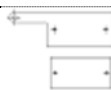


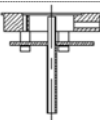
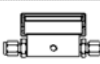

- Type of certification	CE0081  II 2 G / Ex d ia IIC T6 Gb -20°C < Ta < + 60°C
- Certificate number	ATEX : LCIE 13 ATEX 3024X IECEx LCIE 13.0021X

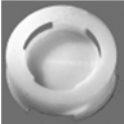





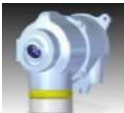
DG-TT7

- Type of certification	CE0081  II 2 G / Ex d IIC T6 Gb -40°C < Ta < + 65°C
- Certificate number	ATEX: LCIE 11 ATEX 3081X IECEx: LCI 11.0060X
- Warnings	Warning - Do not open when energized.
- Ingress rate	IP66
- Power supply voltage	VDC: 24V
- Consumption	w: 8 w

12. ACCESSORIES AND SPARE PARTS

12.1. Accessories

Accessories	Designation	Description	Part Number
	IRDA Remote control unit TLU 600	Required for adjustments and maintenance	TLU 600/610
	Remote control unit HART	Available for adjustments and maintenance	TLH 700
	Adapting Plate (BT05-BT606-BT10)	Used to adapt old detector (BT05-BT606) attachments to fit new generation detectors (BT10 : DG, DGi)	AS049
	Calibration cup	Fits all cartridges	AS005 ❶
	Tag plate	For on-site identification of detectors	AS215
	Calibration kit	<p>The kit comprises:</p> <ul style="list-style-type: none"> • One air cylinder and one pressurized cylinder containing a mixture of air and a gas of titrated concentration, • A 30 l/H flow rate pressure reducing and regulating valve, • A 3 meter pipe. <p>The calibrating cup is not included in the kit except for H₂ DM-TX6-X</p>	CAL-K##-....
	Filter support	For use in certain situations with molecular filters in order to block out interfering gases.	AS015 ❷
	Remote calibration connection	Accessory enabling a gas supply tube to be attached near the cartridge.	AS016 ❶
	Stainless steel sample flow with 2 ways	For use with gas circuit systems.	AS011-2X ❶
	Duct mounting	A series of accessories for installing detectors on different types of ducts	AS02x ❶

	Water, sand and dust protection	Adaptation to all cartridges, the assembly is directly in front of cartridge thanks to the nut of maintain (black on version -A).	AS019 ③
	Suspension cable enclosure/body	Enables to connect the enclosure with the body during the maintenance operations	AS052
	Tube mounting adapter	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
	Display protection	Enables to protect the infrared communication zone in order to better the dialog with the TLU in full sun	AS047
	Multiposition socket (wall or tube mounting)	Enables to fix the device from the top. Can be orientated in all directions.	AS048
	Weather protection (wall or tube mounting)	Dedicated to protect apparatus from sun / rain / snow.	AS056-250
	IRDA cap	Replaces the display and its backlight by a fixed IRDA communication head	Configuration use type 00D : DG- 7 -****-***- 00D -*-*

① Detector sensitivity is not modified, response time depend on the flow rate used for injection. A flow rate between 0.5 L/min and 1 L/min should comply with “standard” response time.

② Detector sensitivity is not modified; response time can increase depending on the molecular filter used.

③ Detector sensitivity is not modified, response time (T90) (natural diffusion condition) is increased by 50%.

12.2. Spare parts

- O-ring spare parts
 - For the base (All models) - O-ring kit BT10
 - For cartridge receiver
- Lubricant for explosion proof seal and thread: MOLYKOTE Brand, reference P40.
- Cartridges toxic gas detectors type -E: DMi-ST6-F1F2-EX0-ww
(F1&F2 to be specified, ww to be specified).
- Cartridges toxic gas detectors type -O: DMi-ST6-42F2-EX0-ww
(F1&F2 to be specified, ww=G0 or M0).
- Cartridges toxic gas detectors type -S: DM-ST6-F1F2-SX0-ww
(F1&F2 to be specified, ww=SF or SA).

12.3. Gas table codes & range table codes

According to the new references: **DGi-TT7-F1F2-X□□-□□-□□□-□-□-□**
DG-TT7-F1F2-X□□-□□-□□□-□-□-□

F1	Formula	Gas name	Comment	F2	Range
01	AsH ₃	Arsine		00	Pas
02	C ₂ H ₂	Acetylene		AA	1 ppm
03	C ₂ H ₄	Ethylene		AB	2 ppm
04	C ₂ H ₄ O	Ethylene oxide		AC	5 ppm
05	C ₂ H ₆ O	Ethanol		AD	10 ppm
06	C ₂ H ₆ O	Dimethylene		AE	20 ppm
07	C ₃ H ₆	Propene		AF	50 ppm
08	C ₃ H ₆ O	Acetone		AG	100 ppm
09	C ₃ H ₈	Propane		AH	200 ppm
10	i-C ₄ H ₁₀	i-Butane		AJ	500 ppm
11	C ₅ H ₁₂	Pentane		AK	1000 ppm
12	C ₆ H ₁₄	Hexane		AL	2000 ppm
13	C ₆ H ₆	Benzene		AM	5000 ppm
14	C ₇ H ₈	Toluene		AN	10000 ppm
15	C ₈ H ₈	Styrene		AP	3000 ppm
16	CH ₂ Cl ₂	Dichloromethane		AQ	25 ppm
17	CH ₄	Methane		BA	1 %Vol
18	CH ₄	Methane	(Biogas)	BB	2 %Vol
19	CH ₄ O	Methanol		BC	5 %Vol
20	Cl ₂	Chlorine		BD	10 %Vol
21	CO	Carbon monoxide	(H ₂ S comp)	BE	20 %Vol
22	CO	Carbon monoxide		BF	50 %Vol
23	CO ₂	Carbon dioxide		BG	100 %Vol
24	CO ₂	Carbon dioxide	(CH ₄ immune)	BH	3 %Vol
25	COCl ₂	Phosgene		BJ	25 %Vol
26	X	All gases		BK	4 %Vol
27	CTFE	CTFE		BL	21 %Vol
28	CVM	Vinylchloride		BM	24 %Vol
29	F ₂	Fluorine		BN	17 %Vol
30	H ₂	Hydrogen		BZ	Other % vol
31	H ₂ S	Hydrogen sulphide		DE	20 %LIE (1)
32	HCl	Hydrogen chloride		DF	50 %LIE (1)
33	HCN	Hydrogen cyanide		DG	100 %LIE (1)
34	He	Helium		DH	30 %LIE (1)
35	HF	Hydrogen fluoride		DJ	15 %LIE (1)
36	MCPE	MCPE		DP	125 %LIE (1)
37	N ₂	Nitrogen		EE	20 %LIE (2)
38	n-C ₄ H ₁₀	n-Butane		EF	50 %LIE (2)
39	NH ₃	Ammonia		EG	100 %LIE (2)
40	NO	Nitric oxide		GC	5 LELm
41	NO ₂	Nitrogen dioxide		KA	1 ppm*m
42	O ₂	Oxygen		JB	2 ppm*m
43	O ₃	Ozone		KC	5 ppm*m
44	PFBA	PFBA		KD	10 ppm*m
45	R22	Chlorodifluoromethane		KE	20 ppm*m
46	R23	Trifluoromethane		KF	50 ppm*m
47	SO ₂	Sulphur dioxide		KG	100 ppm*m
48	C ₅ H ₁₀	Cyclopentane		KH	200 ppm*m
49	VC ₂	VC2		KJ	500 ppm*m


F1	Formula	Gas name	Comment	F2	Range
50	D40	White Spirit		KK	1000 ppm*m
51	/	Gasoil		KL	2000 ppm*m
52	/	Super 95		KM	5000 ppm*m
53	/	Super 98		KN	10000 ppm*m
54	/	LPG		ZZ	Other
55	C ₂ H ₅ Cl	Ethyl chloride			
56	C ₂ H ₆	Ethane			
57	C ₃ H ₃ N	Acrylonitrile/Vinyl cyanide			
58	C ₃ H ₆ Cl ₂	Dichloroethane			
59	C ₃ H ₆ O	Propylene oxide			
60	C ₃ H ₈ O	Isopropyl alcohol			
61	C ₃ H ₈ O	Propyl alcohol			
62	C ₄ H ₁₀ O	Butanol			
63	C ₄ H ₆	Butadiene			
64	C ₄ H ₈	Butene			
65	C ₄ H ₈ O	Butanal			
66	C ₄ H ₈ O	Methyl-ethyl-ketone(MEK)			
67	C ₄ H ₉ O ₂	Ethyl acetate			
68	C ₅ H ₁₀ O	Methyl-isopropyl-ketone			
69	C ₅ H ₁₀ O ₂	Propyl acetate			
70	C ₅ H ₁₂ O	Isopentanol			
71	C ₅ H ₈	Isoprene			
72	C ₆ H ₁₀	D-limonene			
73	C ₆ H ₁₂	Cyclohexane			
74	C ₆ H ₁₂	Hexene-1			
75	C ₆ H ₁₂ O ₂	Butyl acetate			
76	C ₇ H ₁₆	Heptane			
77	C ₆ H ₄ (CH ₃) ₂	Xylene			
78	C ₇ H ₁₂ O ₂	N-butyacrylate			
79	C ₂ H ₄	Ethylene	(special)		
80	C ₃ H ₈	Propane	(special : low CH ₄)		
81	CH ₄	Methane			
82	C ₈ H ₁₈	Octane			
83	CF ₃ -CFH ₂	R134a			
84	/	Kerosene			
85	C ₂ Cl ₄	Tetrachloroethene			
86	C ₂ H ₄	Ethylene			
87	HC lourd	F1850	Special customer		
88	(CH ₃) ₃ COCH ₃	MTBE			
SA	Xs	Special combustible gas	App SA		
CS	H ₂	Hydrogen in Argon	Complement Argon		
CU	H ₂	Hydrogen in Azote	Complement Azote		

13. DECLARATION OF CONFORMITY

	DECLARATION UE DE CONFORMITÉ EU CONFORMITY DECLARATION	Réf : +NOSP0017344 Rév. 0
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Nous,
We,
SIMTRONICS
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 MULTIGAZ / MULTIGAZ DETECTOR
Modèle / Models	DG
Marquage / ATEX marking	CE 0081  II 2 G / Ex d IIC T6 Gb -40°C ≤ Ta ≤ +65°C
N° attestation CE de type / EC type-examination certificate N°	LCIE 11 ATEX 3081X
Notification de l'Assurance Qualité de la production / 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) Directive 2014/34/UE (à partir du 20 avril 2016)	EN 60079-0:2012+A11 :2013(*) EN 60079-1 : 2014 (*)
	Directive 94/9/EC (up to 19 April 2016) Directive 2014/34/EU (from 20 April 2016)	
CEM /EMC	Directive 2004/108/CE (jusqu'au 19 avril 2016) Directive 2014/30/UE (à partir du 20 avril 2016)	EN 60079-29-1 :2007 EN 50270 : 2006
	Directive 2004/108/EC (up to 19 April 2016) 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 The notified body in charge of monitoring the ATEX Directive is	LCIE 33, Avenue du Général Leclerc 92260 FONTENAY AUX ROSES 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 2009 et 2007, cependant les modifications apportées par la version 2013 et 2014 ne la remettent pas en cause / Compliance with the EN 60079-0 and EN60079-1 has been obtained on the basis of the 2009 and 2007 version, however, the changes of the 2013 and 2014 version does not affect it.

	DECLARATION UE DE CONFORMITÉ EU CONFORMITY DECLARATION	Réf : +NOSP0017345 Rév. 0
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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 MULTIGAZ / MULTIGAZ DETECTOR
Modèle / Models	DGI
Marquage / ATEX marking	CE 0081  II 2 G/ Ex d ia IIC T6 Gb -20°C ≤ Ta ≤ +60°C
N° attestation CE de type / EC type-examination certificate N°	LCIE 13 ATEX 3024 X
Notification de l'Assurance Qualité de la production / 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) Directive 2014/34/UE (à partir du 20 avril 2016)	EN 60079-0:2012+A11 :2013(*) EN 60079-1 : 2014 (*) EN 60079-11 :2012
	Directive 94/9/EC (up to 19 April 2016) Directive 2014/34/EU (from 20 April 2016)	
CEM /EMC	Directive 2004/108/CE (jusqu'au 19 avril 2016) Directive 2014/30/UE (à partir du 20 avril 2016)	EN 50270 :2006
	Directive 2004/108/EC (up to 19 April 2016) 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 The notified body in charge of monitoring the ATEX Directive is	LCIE 33, Avenue du Général Leclerc 92260 FONTENAY AUX ROSES 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.

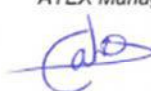
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A Aubagne le 13 avril 2016/ Aubagne, April 13th, 2016

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 la version 2013 et 2014 ne la remettent pas en cause / Compliance with the EN 60079-0 and EN60079-1 has been obtained on the basis of the 2012 and 2007 version, however, the changes of the 2013 and 2014 version does not affect it.

