DURAN electrónica

DIREX & DURTEX

INFRARED & CATALITIC DETECTORS

Installation & User Manual

ATEX

IP65

bsi. ISO 9001 Quality Management
Certificate nº FS82426

DIREX

DURTEX

TABLE OF CONTENTS

1. DIREX. Infrared detectors

DIREX are detectors using infrared technology for detection of carbon dioxide CO_2 and explosive gases (detection ranges from 0 to 2% vol and 0 to 100% L.E.L. respectively)

Available formats

These detectors are available in two housings:

DIREX
IP65 housing

DIREX X
Exproof housing (ATEX)
Certificate LOM08ATEX2059X

And in two communication formats:

- RS485C addressable, 4 wire connection, compatible with EUROSONDELCO and SIEMENS CC62P control panels. Up to 16 detectors connected in parallel on the same loop.
- 4-20mA, 3 wire connection, compatible with any system provided with this type of inputs.

Available gases

- Explosive gases: Methane, Natural Gas, Butane, Propane, Propylene, Ethylene Oxide, Ethane, Pentane, Ethanol Ethylene, Hexane, Methyl Bromide and Nitrous Oxide. For other gases, please consult availability.
- Toxic gases: Carbon Dioxide CO_2

Applications

Installations with presence of inhibitant or poisonous gases for catalytic detectors – pellistors. In atmospheres with no oxygen presence. At those installations with special conditions where maintenance operations must be reduced to the minimum.

DIREX X –exproof detectors – has been designed for ambients where an explosive atmosphere is probable to occur due to vapours, gases, fogs or suspended dust, assuring a high protection level (Group of aparattus II – ATEX Directive Category 2)

Other features

- Optical indications for loop and sensor faults.
- Optional relay alarm output (RS485)
- Optional programmable relay alarm module (4-20mA exproof housing).

IMPORTANT:
DIREX detectors are calibrated at factory for the specific gas to detect therefore, gas type should be clearly indicated beforehand, when ordering these detectors.

2. DURTEX. Detectors using catalytic technology –pellistors

DURTEX are detectors for explosive gases using of catalytic technology (pellistor) for a detection range from 0 to 100% LEL. Silicon vapours resistant sensors (HDMS)

Available formats

Available in two different housings:

DURTEX HC
DURTEX HC PRO
Housing IP65

DURTEX X-HC PRO
Exproof (ATEX)
Certificate LOM08ATEX2059X

And in two communication formats:

- RS485C addressable, 4 wire connection, compatible with EUROSONDELCO and SIEMENS CC62P control panels. Up to 16 detectors can be connected in parallel on the same loop.
- 4-20mA, 3 wire connection, compatible with any system provided with this type of inputs.

Available gases

- DURTEX HC: Available for natural gas-methane, butane-propane, and hydrogen.
- DURTEX HC PRO & DURTEX X-HC PRO: Available for natural gas-methane, hydrogen, butane, propane, heptane, hexane, pentane, methanol,styrene, ethane, ethanol, ethylene, propylene, acetone, ammonia, acetylene, cyclo-hexane, cyclo-pentane, dioxane, butyl acetate, ethyl acetate,acetic acid, iso-butyl alcohol, iso-propyl alcohol, decane, benzene, octane, methyl ethyl ketone, nonane, propanol, toluene, xylene, kerosene. Other gases, consult.

Applications

DURTEX X-HC PRO –exproof detectors – has been designed for ambients where an explosive atmosphere is probable to occur due to vapours, gases, fogs or suspended dust, assuring a high protection level.
(Group of aparattus II – ATEX Directive Category 2)

Other features

- Optical indications for loop and sensor faults
- Optional relay alarm output (RS485)
- Optional programmable relay alarm module (4-20mA exproof housing).

IMPORTANT
All 4-20mA detectors should be ordered specifying the gas type to detect due that these detectors must be adequately calibrated at factory.

Do not use these detectors in environments where there might be presence of hydrogen sulphide, fluorine, methyl chloride, trichloroethylene, sulphur dioxide, silicon vapours or sulphuric acid: the presence of these gases could either inhibit sensor's response or damage it.

3. RELAY MODULE (optional)

Detectors 4-20mA housing exproof (ATEX)

Switch off the detector before connecting this module to the main circuit board.

PROGRAMMABLE PARAMETERS:

SW1	ON position	OFF position	Programming
1	Activated	Deactivated	Initial status: Idle mode relay[1]
2	Instantaneous	Retarded	Relay disconnection type[2]
3	5min. retard	15m retard	Relay disconnection retard[3]
4	EXP: Alarm 20% L.E.L. CO_2: 10.000ppm	EXP: Alarm 50% L.E.L. CO_2 : 15.000ppm	Relay alarm activation level[4]

[1] Idle mode relay. It allows to select an activated relay without alarm, or a deactivated relay. To be used with electrovalves it is recommended to activate in idle mode.

[2] Relay disconnection type. It allows to select the instantaneous disconnection of the relay once alarm condition is over or if retard selected is used.

[3] Relay disconnection retard. It allows to select a retard or the instantaneous disconnection since the level selected has disappeared as an alarm condition. It has no effect if INSTANTANEOUS was previously selected.

[4] Relay alarm activation level. It allows to select, in between two, the relay actuation level, local and independently.

PROGRAMMING DEFAULT:

Activated, instantaneous –no retard-
20% LEL alarm for explosive gases, 10.000ppm for CO_2

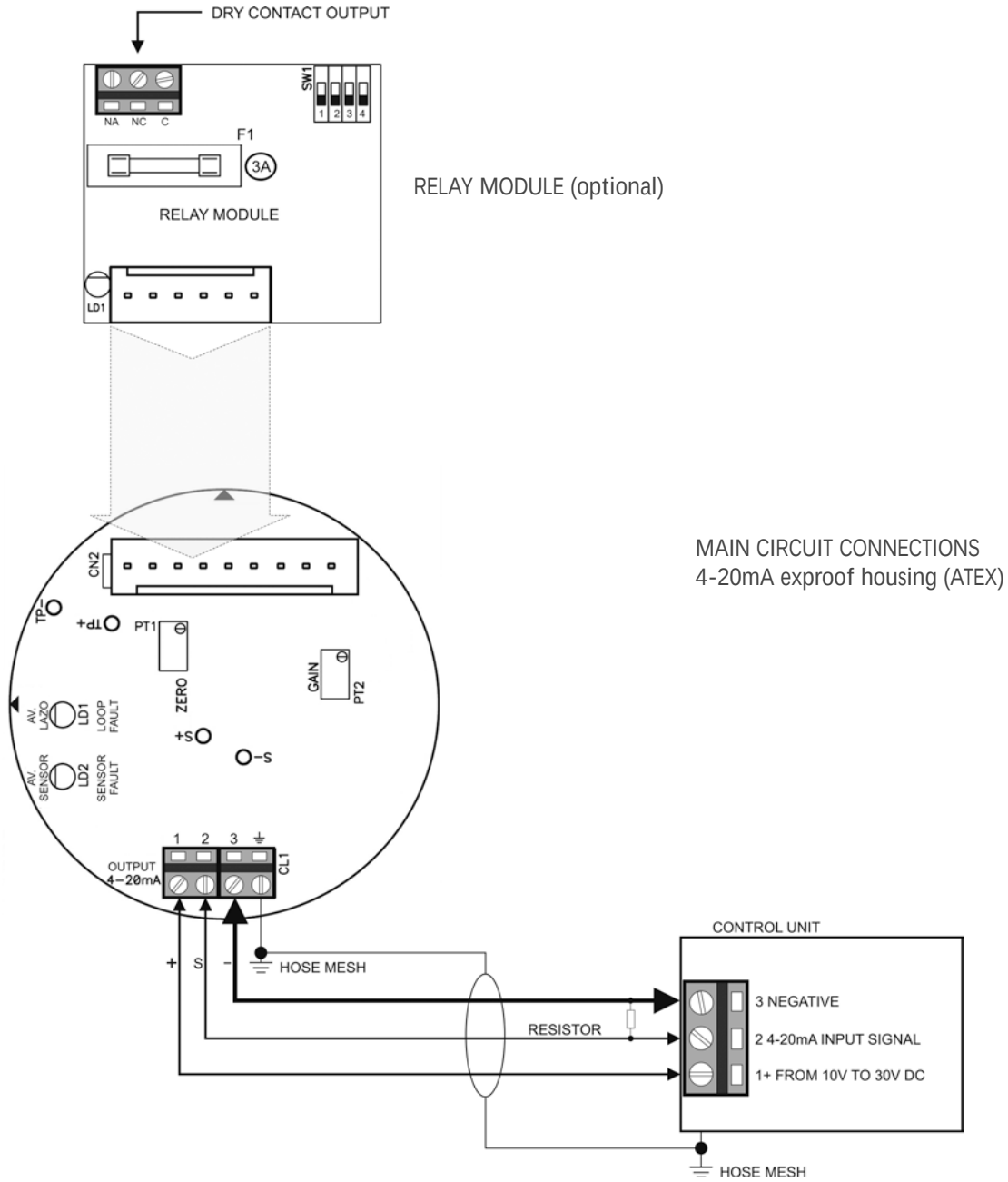
RS485C detectors:

In these type of detectors parameters are programmed with default values.

4. CONNECTIONS

Install the detectors in places where gas tends to accumulate at 1.5 m over the horizontal points of gas consumption or smoke output avoiding air flows. Under no circumstances inmerse the detector in water or any other liquid.

These detectors have been designed to operate in atmospheres with values lower than 100% L.E.L. of the gas it is calibrated for and with a normal oxygen presence.



RELAY MODULE (optional)

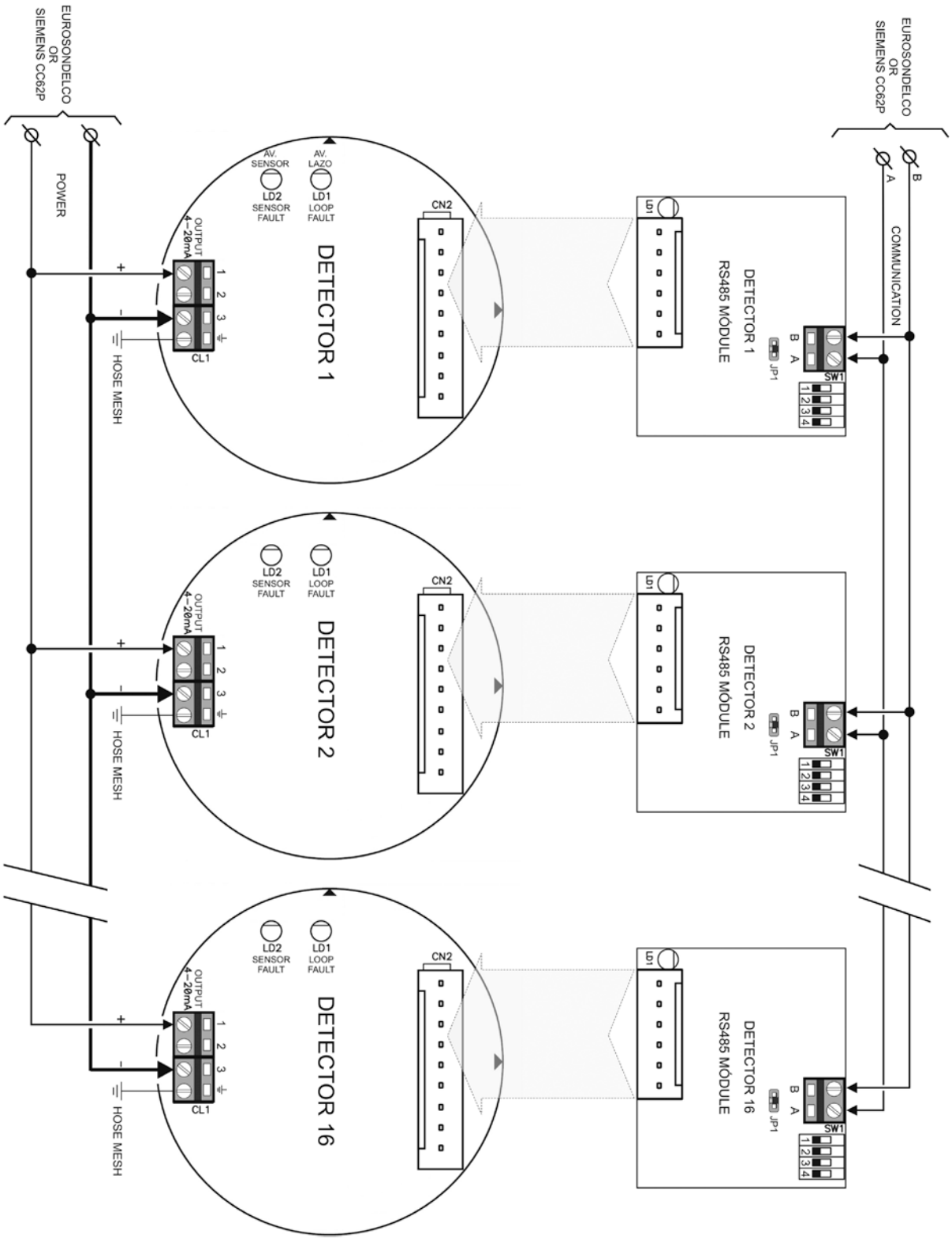
MAIN CIRCUIT CONNECTIONS
4-20mA exproof housing (ATEX)

IMPORTANT: If the system where detectors are connected does not have 4-20mA inputs but 0-5V or 0-10V DC tension inputs, a resistance must be connected between the negative (-) and the S signal, on the receptor device.
Resistance value will depend on the detector power tension accordingly to the following table:

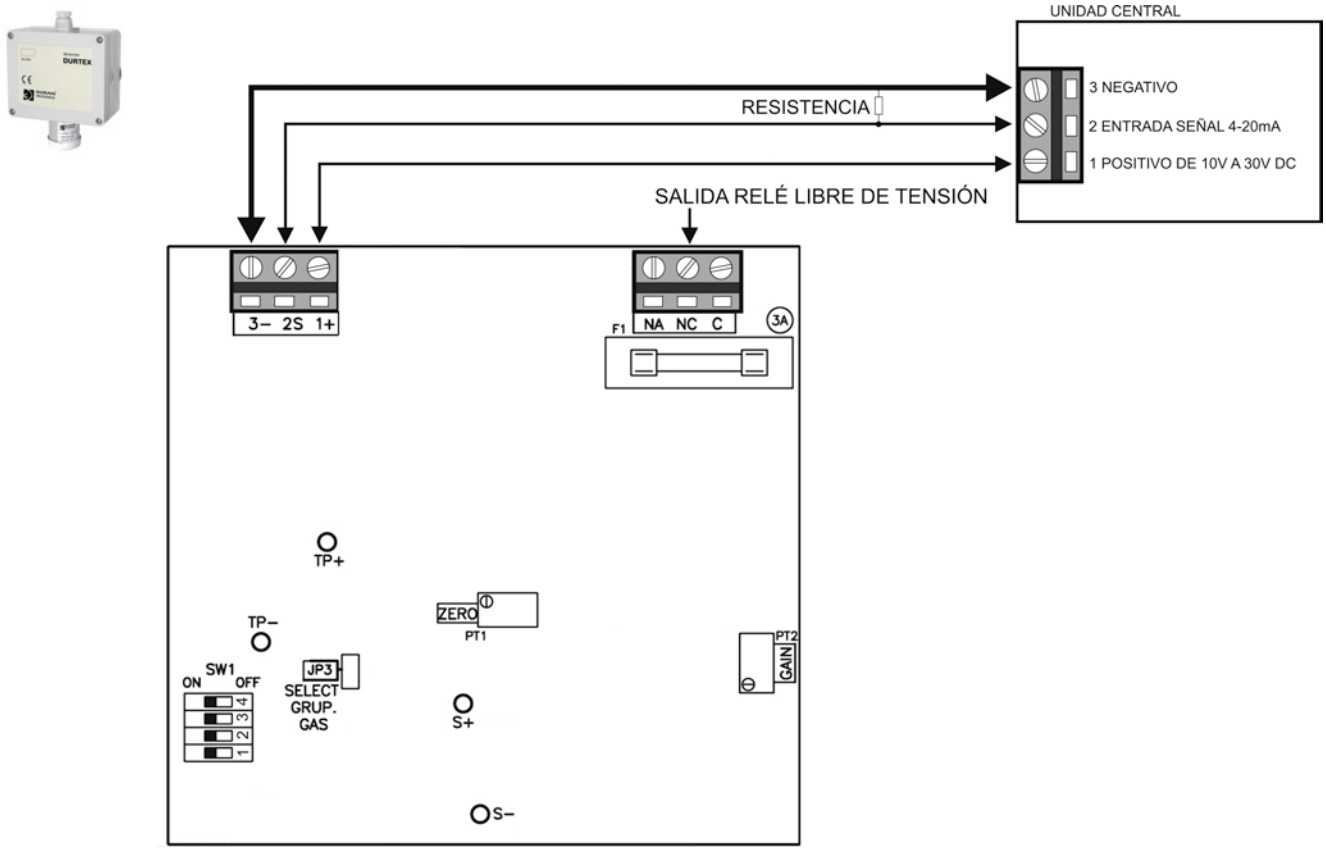
Detector Tension	Load resistance	Tension range (4-20mA)
Between 10V & 18V DC	250 Ω 1%	From 1V to 5V DC
Between 18V & 30V DC	500 Ω 1%	From 2V to 10V DC

DETECTORS CONNECTIONS RS485C (ATEX exproof housing)

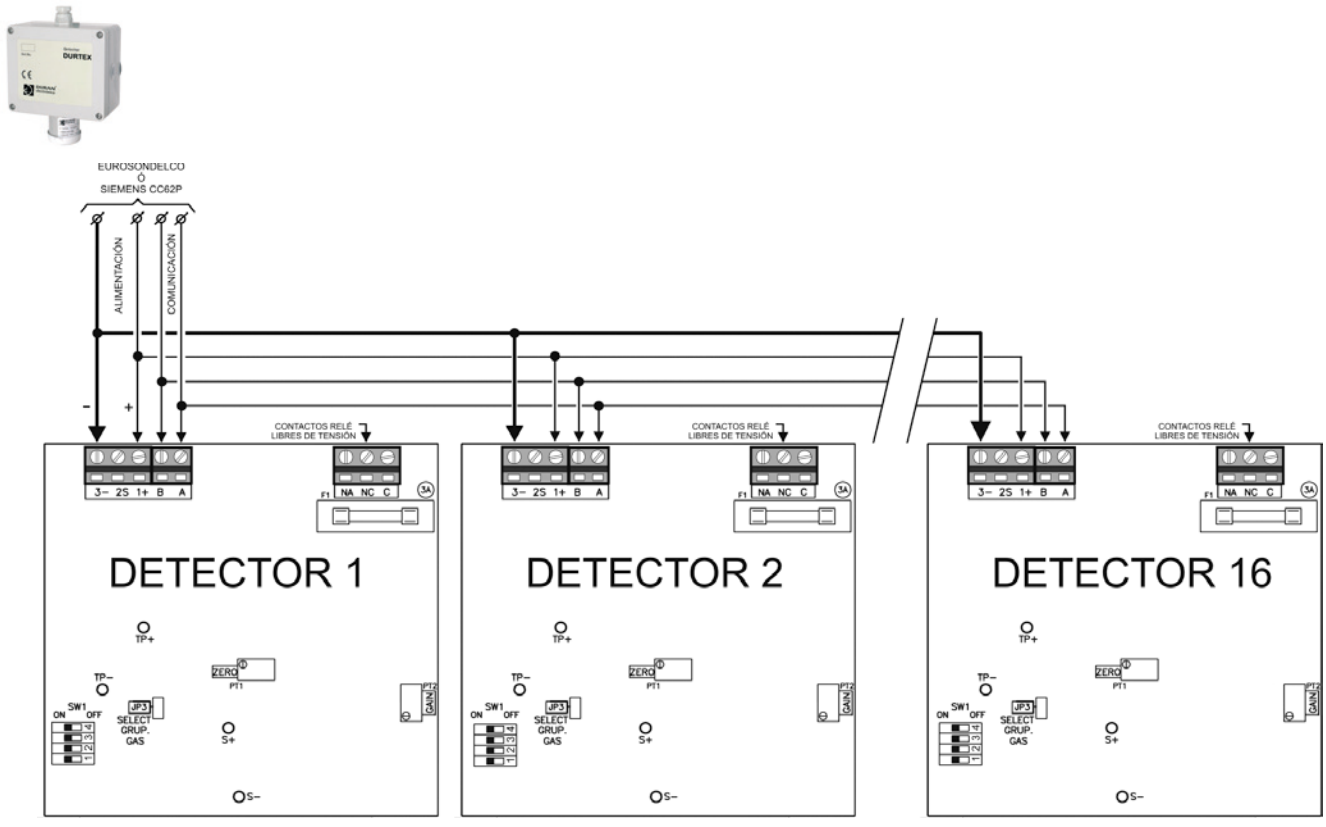
IMPORTANT – CABLE GLAND INSTRUCTIONS: the user should be sure the cable is well fixed. The minimum torque setting applicable to the cap is 20 Nm. Check cable entry tightness after any maintenance operation: thight the cap up again; If the cable has been moved. In case thighting was not possible, return the detector to factory for cable gland replacement.



DETECTORS CONNECTIONS 4-20mA IP65



DETECTORS CONNECTIONS RS485C IP65



5. RS485C DETECTORS ADDRESSING

Before connecting DIREX or DURTEX detectors to EUROSONDELCO or SIEMENS CC62P, they must be addressed. If more than one detector is connected to the same loop, number all of them according to table 1.

Table 1 - NUMBERING DETECTORS USING SW1 (addressing):

Detector Nº	1	2	3	4
01	On	On	On	On
02	Off	On	On	On
03	On	Off	On	On
04	Off	Off	On	On
05	On	On	Off	On
06	Off	On	Off	On
07	On	Off	Off	On
08	Off	Off	Off	On
09	On	On	On	Off
10	Off	On	On	Off
11	On	Off	On	Off
12	Off	Off	On	Off
13	On	On	Off	Off
14	Off	On	Off	Off
15	On	Off	Off	Off
16	Off	Off	Off	Off

Programming and gas group selection for detection

RS485C detectors connected to EUROSONDELCO and SIEMENS CC62P are provided with a microprocessor for functioning control. This is a great advantage due that, through software and adequate algorithms, these detectors can be reprogrammed at installation for auto-calibration and sensitivity auto-adjust without using gas. In addition, it allows selecting among an extensive list of gases without ordering new detectors or storing detectors calibrated for different gases.

Exproof housing (ATEX)
Remove JP1 located at the vertical module with the detector powered. Watch carefully the LD1 LED blinking (see table 2 page 12).

When the number of LED blinking fits in with the gas group to be detected, place again JP1 jumper and watch that the corresponding LED confirms its memorized group position by the number of blinkings.

Note: If JP1 is removed and after 90s no group has been chosen, the last memorized group will be automatically chosen. Default programming is GR1.

IP65 housing

Remove JP3 located at the vertical module with the detector powered. Watch carefully the external LED blinking (see table 2 below).

When the number of LED blinking fits in with the gas group to be detected, place JP3 jumper again and watch that the corresponding LED confirms its memorized group position by the number of blinkings.

Note: If JP3 is removed and after 90s no group has been chosen, the last memorized group will be automatically chosen. Default programming is GR1.

Table 2

GR1	☼	1 Blink
GR2	☼☼	2 Blink
GR3	☼☼☼	3 Blink
GR4	☼☼☼☼	4 Blink
GR5	☼☼☼☼☼	5 Blink

Sensibility selection table for the gas group to be detected (Only pellistors)

DURTEX HC

Group	Gas	Relative response	Installation height	
1	Methane	100%	30 cm from ceiling	▲
	Hydrogen		30 cm from ceiling	▲
	Natural gas		30 cm from ceiling	▲
2	Butane	55%	30 cm from floor	▼
	Propane		100 cm from floor	▼

DURTEX HC PRO & DURTEX X-HC PRO

Group	Gas	Relative response	Installation height
1	Methane	100%	30 cm from ceiling ▲
	Hydrogen		30 cm from ceiling ▲
	Methanol		100 cm from floor ▼
2	Ethane	75%	100 cm from floor ▼
	Ethanol		100 cm from floor ▼
	Ethylene		100 cm from floor ▼
	Propane		100 cm from floor ▼
	Propylene		100 cm from floor ▼
3	Acetone	55%	30 cm from floor ▼
	Ammonia		30 cm from ceiling ▲
	Cyclo-Hexane		30 cm from floor ▼
	Cyclo-Pentane		30 cm from floor ▼
	Dioxane		30 cm from floor ▼
	Ethyl Acetate		30 cm from floor ▼
	Iso-Propyl Alcohol (IPA)		30 cm from floor ▼
	Methyl Ethyl Ketone (MEK)		30 cm from floor ▼
	Butane		30 cm from floor ▼
	Hexane		30 cm from floor ▼
	Pentane		30 cm from floor ▼
	Propanol		30 cm from floor ▼
	Propyl Alcohol		30 cm from floor ▼
4	Butyl Acetate	42%	30 cm from floor ▼
	Iso-Octane		30 cm from floor ▼
	Heptane		30 cm from floor ▼
	Toluene		30 cm from floor ▼
	Xylene		30 cm from floor ▼
	Kerosene		30 cm from floor ▼
	Benzene		30 cm from floor ▼
5	Acetic Acid	25%	30 cm from floor ▼
	Decane		30 cm from floor ▼
	Iso-Butyl Alcohol		30 cm from floor ▼
	Nonane		30 cm from floor ▼
	Styrene		30 cm from floor ▼
	Iso-Butyl Methyl Ketone		30 cm from floor ▼

Acetylene: Factory configuration only - exclusive model for this gas
Installation height: 180 cm from floor

6. OPTICAL INDICATIONS: LEDs messages & functioning

RS485C format. Exproof ATEX housing & IP65

Internal LEDS and exproof housing –ATEX- and external in IP65 housing

LD1. Located at the vertical module –RS485C format-.

- Fast intermittent: at initialising and recognition of the loop by the module line
- Periodical intermittent: under normal functioning, the detector communicates correctly with the module line. Periodicity will correspond to the assigned number of the detector, between 1 and 16s.
- 6 blinking burst: fault loop indicates that A or B communication line are cut off.
- 1s interval ON/OFF: fault or cut in A and B communication lines. It informs that there has been no communication with the module line for the last 5 minutes.

4-20mA:

LD1. Located at the main module. It will lit up to indicate a fault loop.

LD2. Located at the main module. it will be lit up indicating a sensor fault. This condition will be also sent on digital format to its corresponding module line –in RS485C detectors-

4-20mA Format. IP65 Housing:

External LED

These detectors are equipped with a two-colour LED indicating the following status:

- Switched off: right functioning
- Red lit up: fault loop : (4-20mA)
- Amber lit up: sensor fault

7. TEST & RECALIBRATION

All detectors manufactured by DURAN ELECTRONICA have been calibrated at factory with target gas. Therefore, it is neither required, nor recommendable recalibration once installed.

DURTEX X- HC PRO (exproof housing - ATEX-)

IMPORTANT: Do not open these detectors while powered.

No calibration adjustments are allowed at installation. Certification only covers the possibility of mandatory calibration at the installations of the manufacturer. It is recommendable to return the detectors to the manufacturer for checking once after 2 years for DURTEX and 3 years for DIREX.

4-20mA detectors
ZERO OUTPUT VERIFYING. 4mA, in absence of gas.

The detector should be operating for a minimum period of 1 hour, assuring that there is no other gases presence, which might be affecting to the detector.

If this condition is not fulfilled, the detector must be submitted to a concentration of pure nitrogen, with a 0.5ml/min flow, by using the optional adaptor for at least 2 minutes, and proceed as indicated next:

1. Connect a measuring instrument between terminals 2 and 3 of the detector and the corresponding ones of the control panel or central control unit. The results obtained must be the following:

Detector Tension	Load resistance	Zero tension (4mA)
Between 10V & 18V DC	250 Ω 1%	1V
Between 18V & 30V DC	500 Ω 1%	2V

RS485C detectors
Verify that the detector indicates 000% L.E.L. in the control unit display

DURTEX HC & HC PRO (IP65 housing)

4-20mA detectors & RS485C detectors
ZERO OUTPUT VERIFYING

Before proceeding the detector should be operating for 1 hour minimum in a clean ambient, being sure that there are no presence of gases affecting to the detector.

In case this condition is not fulfilled, the detector must be subjected to a concentration of pure nitrogen with a 0.5ml/min flow for 2 minutes minimum using the optional CECALIBR adaptor. Then proceed as indicated next:

1. Connect a measuring instrument between S+ and S- terminals, and thus tension must be 000V DC. If it is necessary, make an adjustment with the ZERO potentiometer until obtaining that measurement.

CALIBRATION WITH GAS –RS485C detectors-

1. Set the detector for Group 1, as it is described on on page 12 (DURTEX HC) and 13 (DURTEX HC PRO) (gas group selection scheme non applicable to Acetylene)

2. Insert CECALIBR adapter into the detector and release a precise mixture of methane, at 2,5% v/v, equivalent to 50% LEL, with a 0,5l/min flow and adjust the GAIN potentiometer until the measuring instrument indicates 1.0V DC between TP+ and TP- terminals.

3. Afterwards, do not forget to reprogram the detector again for the required gas group, as described on page 12 (DURTEX HC) and 13 (DURTEX HC PRO) (gas group selection scheme non applicable to Acetylene)

CALIBRATION WITH GAS - 4-20mA detectors-

Only applicable to detectors specially calibrated for methane detection. For other gases, due to their complexity and the need to use different correction factors for each gas, they will necessarily have to be sent to factory.

1. Insert CECALIBR adapter in the detector and release an accurate mixture of methane, at 2,5% v/v, equivalent to 50% LEL, with a 0,5l/min flow and adjust the GAIN potentiometer until measuring instrument indicates 1.0V DC between TP+ and TP- terminals. (12mA if operating with current between terminals 2 and 3 of connectors in 4-20mA detectors).

IMPORTANT NOTICE:
Procedures described above ARE NOT APPLICABLE TO DIREX, due that ZERO and GAIN parameters have been previously memorized in a Eprom, inside the sensor, by computerized procedures.

8. TECHNICAL CHARACTERISTICS

	DURTEX (pellistors)	DIREX (Infrared)
Technology	Catalytic sensor and microprocessor	Infrared double wave length sensor, with thermal compensation and microprocessor
Power supply	10V to 30V DC	10V to 30V DC
Max. consumption	95mA to 12V DC / 141mA with activate relay	60mA to 12V DC in models 4-20mA / ± 47mA with activate relay
Max. consumption Pro. version	75mA to 12V DC / 125mA with activate relay	107mA to 12V DC in models 4-20mA / ± 47mA with activate relay
Loop max. resistance	250Ω	250Ω
Max current output	21.3 mA (Tip)	21.3 mA (Tip)
Fault loop current	< 2mA	< 2mA
Exp gases measurement range	0-100% LEL (5% methane), linear in full scale	0-100% LEL (5% methane), linear in full scale
CO_2 measurement range	-non applicable-	0-20.000 ppm (0-2% vol) – linear in full scale
Resolution	±1% L.E.L. of the measuring range	EXP > 0.5% L.E.L. CO_2 > 1,2% measuring range
Zero deviation	± 7mV/year (DURTEX X & DURTEX HC PRO) ± 10mV/year (DURTEX X & DURTEX HC)	EXP: Máx. 3% L.I.E./year CO_2: ± 0,7%/year
Span deviation	± 9% L.E.L year (DURTEX X & DURTEX HC PRO) ± 10% L.E.L year (DURTEX X & DURTEX HC)	EXP: ± 3% L.E.L./year CO2: ± 0,7% F.S./year
Stabilization time	< 15 minutes -all specifications-	< 30 minutes -all specifications-
Resistance to H_2S and (HDMS)	Short time exposures	Yes totally immune
Response time T50/T90	3s / 8s resp.(DURTEX HC PRO & X-HC PRO) 6s / 10s resp.(DURTEX HC)	<15s / 30s. respectively
Useful life (MTBF)	3 years approximately	> 6 years
Maintenance period	Annual – recommended-	3 years –recommended-
Temperature range	-10ºC to +50ºC (DURTEX HC & DURTEX HC PRO) -20ºC to +70ºC (DURTEX X HC PRO)	-20ºC to +50ºC (DIREX & DIREX X)
Humidity range	0 to 90% HR without condensation	0 to 95% HR without condensation
Atmospheric pressure limit	80 to 110 kPa (0.8 to 1.1 bar)	80 to 110 kPa (0.8 to 1.1 bar)
RS485C Connections	4 wires	4 wires
4-20mA Connections	3 wires + earthed mesh	3 wires + earthed mesh
Fault & sensor loop optical indications	Internal –Exproof housing (ATEX RS485) External IP65 models	Internal –Exproof housing (ATEX RS485) External IP65 models
Communication status optical indications	Internal –Exproof housing (ATEX RS485) External IP65 models	Internal –Exproof housing (ATEX RS485) External IP65 models
Local relay programmable alarm module (optional)	4-20mA models	4-20mA models
EXP Coverage area	16 m^2 approx.	16 m^2 approx.
CO2 Coverage area	Non applicable	75 m^2 approx.
Installation height for CO2	Non applicable	75cm-100cm from floor
Protection grade	IP65 (all models)	IP65 (all models)
IP65 box material	Makrolon & ABS	Makrolon & ABS
Exproof ATEX box material/head	Aluminum / Stainless steel	Aluminum / Stainless steel
Cable Diameter	6-10mm^2	6-10mm2
Cable Type (RS485C)	*4 wires: 2 x 1,5mm / 2 x 0,25mm ø	4 wires: 2 x 1,5mm / 2 x 0,25mm ø
Cable Type (4-20mA)	*Shield 3 x 1,5mm ø	Shield 3 x 1,5mm ø
Max distance	*350/400m (4-20mA) *650/700m RS485C	350/400m (4-20mA) 650/700m RS485C
Dimensions (mm) & weight (gr) IP65	120x160x60 / 288	120x160x60 / 288
Dimensions (mm) & weight (gr) ATEX	155x180x110 / 1.700	155x180x110 / 1.700

* Diameter of the supply cables and maximum distances vary depending on the quality of the cable being used, the distribution of detectors throughout total cable length and supply tension, in the case of 4-20mA detectors..

9. INFORMATION ABOUT ATEX MARKING

CE 0163	CE marking in conformity with Directive 94 / 9 / EC (ATEX). (the number 0163 corresponds to the Notified Body, in this case the J.M.Madariaga Official Laboratory – LOM).
 II 2 G Ex d IIC T6 Gb	Materials with “d” enclosure protection (flameproof) for use in explosive gas atmospheres and with a “high” level of protection (Gb).
 II 2GD Ex d IIC T6 Gb Ex tb IIIC T85 ºC Db	Materials with “d” enclosure protection (flameproof) for use in explosive gas atmospheres and with a “high” level of protection (Gb). Materials with “t” enclosure protection for use in explosive dust atmospheres and with a “high” level of protection (Db).
LOM 08ATEX2059 X	EC Type Examination Certificate

10. GUARANTEE

DIREX X and DURTEX X-HC PRO detectors are guaranteed against any manufacturing defect for a 1 year period after the acquisition of the equipment. If, during this period of time, any anomaly was detected, please inform your provider or installer.

Guarantee covers the full repair of the equipment which DURAN ELECTRÓNICA Technical Department considers to be defective, with the purpose of bringing them back to their normal use. This warranty will be valid as long as the equipment has been installed by a competent person, and always following the specifications contained in this manual. Negligent installation or use will exempt DURAN ELECTRÓNICA from any responsibility from damages caused to objects and/or people, and from the fulfillment of the terms of this warranty. In case of improper handling, or not respecting the conditions, characteristics and observations described in this manual, DURAN ELECTRÓNICA will not hold itself responsible for damages caused by improper use of this product.

Guarantee does not include: installations, periodic tests and maintenance, damages caused by inadequate handling, inappropriate use, negligence, overload, inadequate power or equipment abandonment, tension deviations, defective installations and all other external causes, repairs or amendments made by personnel not authorized by DURAN ELECTRÓNICA and transportation costs of the equipments.

DURAN ELECTRÓNICA reserves the right to carry out improvements or to include modifications the equipment without prior notice.

11. DECLARATION CE OF CONFORMITY

Víctor Manuel Andrés González, Managing Director of:

DURAN ELECTRÓNICA, S. L.
Tomás Bretón, 50 - 28045 MADRID (Spain)

Declares the conformity of gas detector model DIREX X and DURTEX X-HC PRO with the dispositions contained in the following European Parliament and Council directives:

2004/108/EC	Electromagnetic compatibility
94/9/EC	Equipment and protective systems intended for use in potentially explosive atmospheres

conformity assumed in relation to the following standards:

EN 60079-0:2009 EN 60079-1:2007 EN 60079-31:2009

Year of affixing of regulatory marking: Ex d IIC T6 Gb: 2012
Ex tb IIIC T85 ºC Db: 2012

EC Type examination certificate number LOM 08ATEX2059 X

Product Quality Guarantee Notification number: LOM 08ATEX9073
Issued by notified body number 0163: Laboratorio Oficial J. M. Madariaga (LOM)
C/ Eric Kandel, nº 1 28906 Getafe - MADRID (Spain), that authorizes the legal marking to be affixed on the product.

CE 0163 Ex II 2 G

Ex II 2GD

The LOM 08ATEX2059 X certificate does not cover that indicated in the paragraph 2, Article I of the 94/9/EC directive related to safety, controlling and regulating devices, nor the Essential Health and Safety Requeriments indicated in the paragraphs 1.5.5, 1.5.6 and 1.5.7 of the Annex II of the Directive 94/9/EC related to devices with a measuring function.

In witness whereof and for such purposes as may arise

ENTIDAD DURAN ELECTRONICA SL - CIF B80418965 - NOMBRE ANDRES GONZALEZ VICTOR MANUEL - NIF 05244956J

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Certificate nº FS82426