

USER MANUAL



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1. DIREX. INFRARED TECHNOLOGY SENSORS

DIREX are sensors that use infrared technology to detect, CO₂, N₂O, SF₆, refrigerants and explosive gases.

The available detection ranges:

CO₂ from 0 to 2% vol.

N₂O from 0 to 1000 ppm.

Explosive gases from 0 to 100% L.E.L

Safety class A1 refrigerants and SF₆, from 0 to 2000 ppm

Safety class A2 refrigerants from 0 to 100% L.F.L (Lower Flammability Limit)

Available formats



- > **DIREX**
IP65 enclosure

2. DURTEX:

Available gases

- > **DURTEX HC:** Available for methane, natural gas, butane, propane and hydrogen.
- > **DURTEX HC PRO** and **DURTEX X-HC PRO:** Available for methane-natural gas, hydrogen, butane, propane, heptane, hexane, pentane, methanol, styrene, ethane, ethanol, ethylene, propylene, acetone, ammonia, cyclohexane, cyclopentane, dioxane, butyl acetate, ethyl acetate, acetic acid, isobutyl alcohol, isopropyl alcohol, decane, benzene, isooctane, methyl ethyl ketone -butanone-, nonane, propanol, toluene, xylene, kerosene, propyl alcohol and isobutyl methyl ketone and acetylene (other gases consult).

Available formats

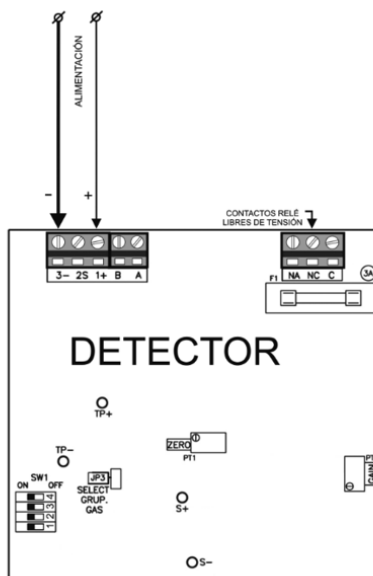


- > **DURTEX**
IP65 enclosure

2.1 Sensitivity selection table of the gas group to detect explosive gases

Group	Gas	Relative sensitivity	Installation height
1	Methane	100%	30 cm from the ceiling ▲
	Hydrogen		30 cm from the ceiling ▲
	Ammonia		30 cm from the ceiling ▲
2	Ethane	75%	100 cm from the floor ▼
	Methanol		100 cm from the floor ▼
	Ethylene		100 cm from the floor ▼
	Propane		100 cm from the floor ▼
	Ethanol		100 cm from the floor ▼
	Propylene		100 cm from the floor ▼
	Cyclopentane		30 cm from the floor ▼
3	Cyclohexane	60%	30 cm from the floor ▼
	Dioxane		30 cm from the floor ▼
	Isopropyl alcohol (IPA)		30 cm from the floor ▼
	Butane		30 cm from the floor ▼
	Hexane		30 cm from the floor ▼
	Pentane		30 cm from the floor ▼
	Propyl alcohol		30 cm from the floor ▼
4	Butyl alcohol	45%	30 cm from the floor ▼
	Iso-Octane		30 cm from the floor ▼
	Heptane		30 cm from the floor ▼
	Toluene		30 cm from the floor ▼
	Xylene		30 cm from the floor ▼
	Kerosene		30 cm from the floor ▼
	Benzene		30 cm from the floor ▼
5	Acetone	25%	30 cm from the floor ▼
	Acetic acid		30 cm from the floor ▼
	Decane		30 cm from the floor ▼
	Isobutyl alcohol		30 cm from the floor ▼
	Nonane		30 cm from the floor ▼
	Styrene		30 cm from the floor ▼
	Isobutyl methyl ketone		30 cm from the floor ▼
	Ethyl acetate		30 cm from the floor ▼
	Methyl ethyl ketone (MEK)		30 cm from the floor ▼
	Propanol		30 cm from the floor ▼

2.2. IP65 sensor wiring



IP65 enclosure

With the sensor powered, remove the jumper JP3 and carefully observe the flashing of the external LED (see Table 1).

When the number of flashes of the LED coincides with the gas group we want to detect, again place the jumper JP3 and observe that the corresponding LED confirms its group position memorised by the number of flashes

Note: If JP3 is removed and after 90s no group has been selected, it will automatically select the last group memorised. The default programming is GR1.

Table 1

GR1	☉	1 Flash
GR2	☉☉	2 Flashes
GR3	☉☉☉	3 Flashes
GR4	☉☉☉☉	4 Flashes
GR5	☉☉☉☉☉	5 Flashes

2.2 TEST AND RECALIBRATION

- All the sensors manufactured by **DURAN ELECTRONICA** have been calibrated in the factory with standard gas. Therefore, a recalibration is not necessary nor recommendable once installed.
- Infrared technology sensors can be replaced in the installation by incorporating the calibration parameters in their internal memory.

No adjustment or calibration in the installation is permitted since, due to the technology used, these operations can only be performed in the factory.

Perform a verification test at least once per year using suitable gas canisters for each gas. The use of any other medium may "dope" or destroy the sensor and, as a consequence, invalidate the guarantee.

All the sensors manufactured by **DURAN ELECTRONICA** have been calibrated in the factory with standard gas suitable for each case. Therefore, no type of manipulation is necessary or recommendable once installed.

2.3. DURTEX HC and HC PRO (IP65 enclosure)

VERIFICATION OF OUTPUT ZERO:

The sensor must be functioning for a minimum time of 1 hour and we ensure that in the environment there is no presence of the gases that the sensor can detect.

If this condition is not fulfilled, the sensor must be subjected to a concentration of pure nitrogen with a flow of 0.5l/minute during at least 2 minutes and proceed as described below:

1. Connect a measurement instrument, between terminals S+ and S-. It must have a voltage of 000V DC. If necessary, adjust using the ZERO potentiometer until obtaining said reading.

CALIBRATION WITH GAS – only LORAWAN sensors-

1. Configure the sensor to detect Group 1 gases as described on page 12 or page 13 (**DURTEX HC PRO**) (selection table of the gas group -not applicable to Acetylene sensors)
2. Release a precise mixture of 2.5% v/v methane, equivalent to 50% L.E.L., with a flow rate of 0.5 l/ minute and adjust the GAIN potentiometer until the measurement instrument indicates 1.0 V DC between the TP+ and TP- terminals. (12mA if current is being measured between terminals 2 and 3 of the connection clamp in 4-20mA sensors).
3. When it has finished, remember to again reprogram the sensor for the gas group required as described on page 12 or page 13 (**DURTEX HC PRO**) (selection table of the gas group -not applicable to Acetylene sensors)

ATTENTION:

The aforementioned procedures ARE NOT APPLICABLE TO DIREX since the ZERO and GAIN parameters have been previously memorised in Eprom inside the sensor by computer procedures.

3. DURTOX

Toxic gas and oxygen sensor with electrochemical technology

Available formats



> **DURTOX**
IP65 enclosure

3.1. TABLE OF AVAILABLE GASES

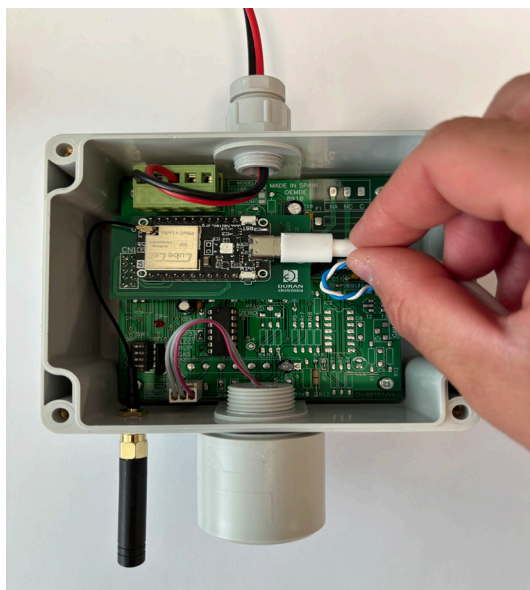
AVAILABLE GASES	STANDARD RANGE	INSTALLATION HEIGHT	COVERAGE AREA	LEVEL 1/LEVEL 2
Hydrogen sulphide (H ₂ S)	0-100 ppm	1.50 m from the floor	100 m2 approx.	20-30 ppm
Hydrochloric acid (HCl)	0-50 ppm	1 m from the floor	25 m2 approx.	10-15 ppm
Ammonia (NH ₃)	0-100 ppm	30 cm from the	75 m2 approx.	20-30 ppm
Chlorine (Cl ₂)	0-10 ppm	ceiling	100 m2 approx.	2-3 ppm
Sulphur dioxide (SO ₂)	0-20 ppm	1 m from the floor	75 m2 approx.	4-6 ppm
Nitrogen dioxide (NO ₂)	0-20 ppm	30/40 cm from the	100 m2 approx.	4-6 ppm
Formaldehyde (CH ₂ O)	0-5 ppm	floor	25 m2 approx.	0.5-1 ppm
Carbon monoxide (CO)	0-300 ppm	40/50 cm from the	200 m2 approx.	60-90 ppm
Nitrogen monoxide (NO)	0-100 ppm	floor	25 m2 approx.	20-30 ppm
Oxygen (O ₂)	0-25% vol.	1.70 m to 2 m from	100 m2 approx.	17% - 15%
Ozone (O ₃).	0-10 ppm	the floor	25 m2 approx.	1-1.5 ppm

Levels 1 and 2 of the models with relay output are programmed in the factory
Consult other available levels



4. INSTALLATION AND CONFIGURATION

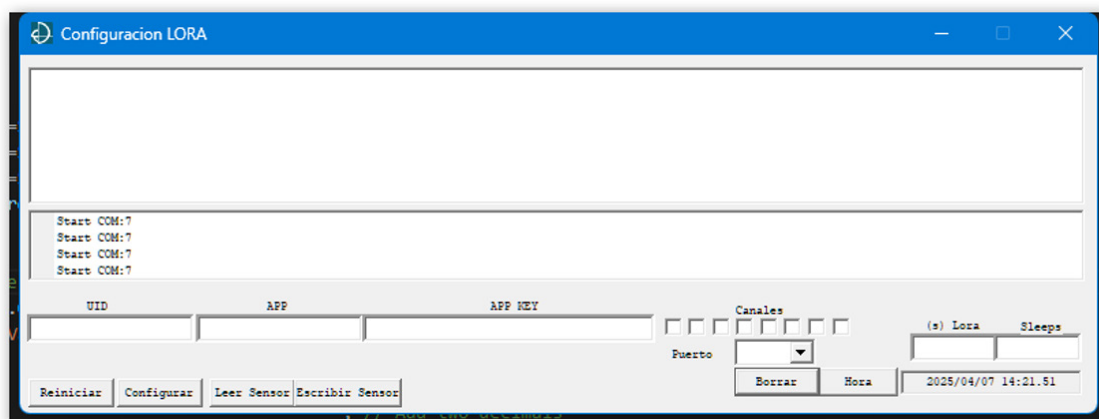
1. Copy the folder in LORA in your computer with the Windows operating system.
2. Connect the LoRa device to the computer through a USB port.



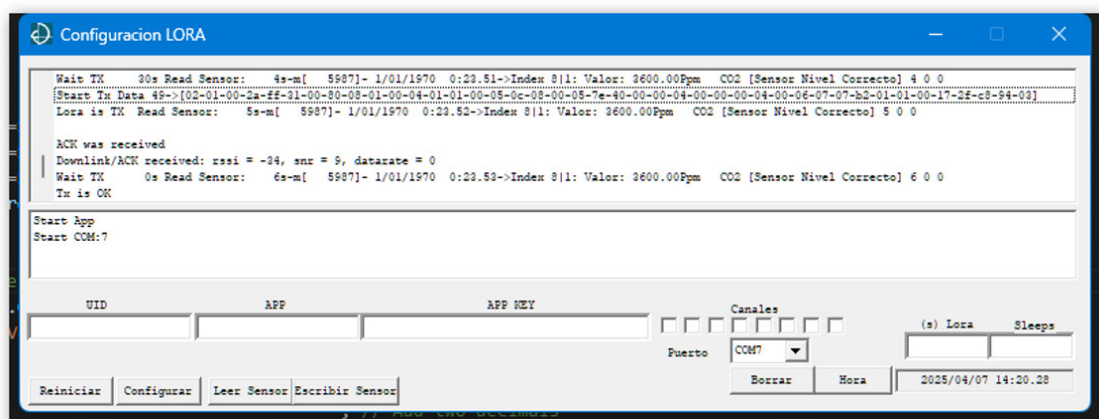
3. Run LORAconfig in a computer with a Windows operating system.

A	07/04/2025 11:41	Script de comandos de ...	1 KB
CubeCellflash	17/06/2024 14:56	Aplicación	6.131 KB
LogMgr.dll	04/10/2022 7:38	Extensión de la aplicación	588 KB
LORAConfig	07/04/2025 13:50	Aplicación	740 KB
LORAConfig	07/04/2025 13:59	Opciones de configurac...	1 KB
MemoMgr.dll	04/10/2022 7:40	Extensión de la aplicación	589 KB
POS_LORAConfig	07/04/2025 13:58	Opciones de configurac...	1 KB
QueueMgr.dll	19/10/2022 15:25	Extensión de la aplicación	600 KB
SrIMgr.dll	03/08/2022 13:21	Extensión de la aplicación	402 KB
ThreadMgr.dll	04/10/2022 7:40	Extensión de la aplicación	600 KB
V18_REGION_EU868.cyacd	07/04/2025 9:45	Archivo CYACD	187 KB
Win32APIMgr.dll	04/10/2022 7:38	Extensión de la aplicación	735 KB

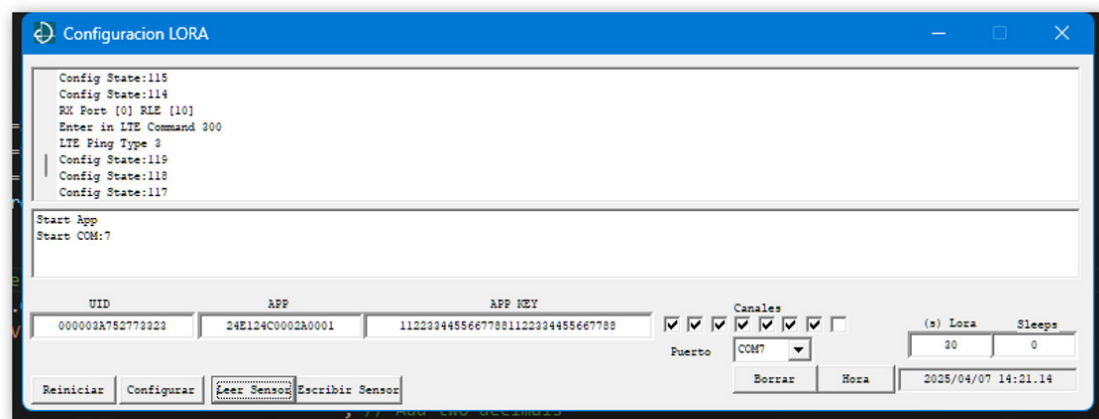
4. **Select the port.** You can consult the port in the Windows Device Manager (observe the colour LED flash).



5. **Read the sensor.** The default values will appear.



6. Configure the APP and APPKE of the LoRaWAN network.



7. Configure the radio channels through which you want to transmit.

8. Enter the data resending seconds by LoRaWAN (transmission seconds).

9. Configure the Sleep mode for the battery devices. When a correct transmission is performed, the device shall go into standby mode during these seconds.

10 installation of sensor and supply voltage

LED INDICATOR

Green normal operation

Violet send data

Red Does not receive data

4.1 DESCRIPTION OF THE FRAME SENT BY LORA

Descripcion de la Trama enviada por Lora cada x segundos:																															
02-01-00-2a-ff-02-00-80-22-01-00-04-01-01-00-05-0c-22-00-00-00-12-00-00-04-00-00-02-00-06-07-07-b2-01-01-00-00-16-49-aa-03																															
0201002aff01008022010004010100050c2200fffffd000300000d00060707b2000d00001de003																															
STXData																															
TIPO LRE (fijo)																															
Total Lenth of frame002a42 Bytes en total incuido STX y ETX																															
Destination FF (depende del protocolo, si es poll sera del 0-254 (FF Broadcast)																															
Msg Id;0100Big Endian: mesage 1 (incrementandose)																															
Formato Message: LTE (siempre fijo 80)																															
22Modelo del Sensor (Según Gas)32(ver tabla de gases)																															
01Version del sensor																															
000401010004Tag Canal01Mide 101Canal1																															
0005Tag Valor Gas0cLo que mide el comando12																															
Tipo de gas (ver tabla)																															
Valor del Gas * 100:0fffffdSemnsor Not Ready																															
00Unidades (ver tabla)																															
00Decimales Si/NO																															
03Estatus																															
Segundos esde que se leyo00000d135gs																															
Tag tiempo en que se lego0006mide 07																															
Año: 07b2 - 1970 (z2023 hora invalida)																															
00 Mes 0																															
Dia 0																															
Hora 0																															
Minuto 0																															
Segundo 0																															
CRC1de0																															
03ETX																															

#define SENSOR_NOT_READY	0x0FFFFFFDu1	// Sensor not ready
#define SENSOR_SATURATION	0x0FFFFFFEu1	
#define SENSOR_ERROR	0x0FFFFFFFu1	
o valor/100		

#define ST_HW_ERROR	0u	// general HW Error																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
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[illegible]

5. DIREX AND DURTEX TECHNICAL CHARACTERISTICS

Technology	Catalytic sensor and microprocessor	Dual wavelength infrared sensor with temperature compensation and microprocessor inside
Supply voltage	From 10V to 30V DC	From 10V to 30V DC
Maximum consumption	95mA at 12V DC / 141mA with relay activated	60mA to 12V DC in 4-20mA models / ±47mA more with the relay activated
Maximum consumption Pro vers.	75mA at 12V DC / 125mA with relay activated	
Maximum loop resistance	250 Ω (4-20mA)	250 Ω (4-20mA)
Maximum output current	21.3mA (Tip) (4-20mA)	21.3mA (Tip) (4-20mA)
Loop fault current	< 2mA (4-20mA)	< 2mA (4-20mA)
EXP gases measurement range	0-100% L.E.L. (5% vol. Methane) - linear full scale -	0-100% L.E.L. (5% vol. Methane) - linear full scale -
CO ₂ measurement range	-not applicable-	0-20,000 ppm (0-2% vol) - linear full scale -
N ₂ O measurement range	-not applicable-	0-1000 ppm linear at full scale
Refrigerants A1 and SF ₆	-not applicable-	0-2,000 ppm
Refrigerants A2	-not applicable-	0-100% L.F.L. (Lower Flammability Limit)
Resolution	±1% L.E.L. of measurement range	EXP> 0.5% L.E.L./CO ₂ > 1.2% measurement range N ₂ O>2% measurement range >1% refrigerants and SF ₆
Zero drift	± 7mV/year (DURTEX HC PRO) ± 10mV/year (DURTEX HC)	EXP: maximum 3% L.E.L. / year at 20°C CO ₂ : ± 0.7%/year / N ₂ O: ± 1% year ± 0.7%/year refrigerants and SF ₆
Span drift	± 9% L.E.L./year (DURTEX HC PRO) ± 10% L.E.L./year (DURTEX HC)	EXP: ± 3% L.E.L. / year at 20°C CO ₂ : ± 0.7% F.S/year / N ₂ O: ± 1% F.S year / ± 0.5%/year refrigerants and SF ₆
Stabilisation time	Arial15 minutes all specifications	< 30 min -all specifications-
Resistance to H ₂ S	Short periods of exposure	If totally immune
T50/T90 Response time	3s / 8s resp.(DURTEX HC PRO) 6s / 10s resp.(DURTEX HC)	<15s / 30s. respectively EXP/CO ₂ /N ₂ O / Refrigerants and SF ₆
Useful life (MTBF)	Approx. 4 years	> 6 years
Maintenance periods	Every year -recommended- or pursuant to current standards	3 years -recommended- or pursuant to current standards
Temperature range	-10°C to +50°C (DURTEX HC AND DURTEX HC PRO)	-20°C to +50°C (DIREX)
Humidity range	0 to 90% RH no condensation	0 to 95% RH no condensation
Atmospheric pressure limit	80 to 110kPa (0.8 to 1.1 bar)	80 to 110kPa (0.8 to 1.1 bar)
RS485 connections	4 wires	4 wires
4-20mA connections	3 wires + earthing mesh	3 wires + earthing mesh
Optical indicators Loop fault and sensor fault	External – IP65 enclosure	External – IP65 enclosure
Optical indicator of communication statuses	External – IP65 enclosure	External – IP65 enclosure
Local Alarm relay module Programmable (optional)	Models 4-20mA	Models 4-20mA (Not in refrigerants 4-20mA) Relay output included in refrigerants and SF ₆
EXP coverage area	16 m ² approx.	16 m ² approx.
CO ₂ / N ₂ O coverage area	-not applicable-	75 m ² approx. / 30 m ² approx. / Refrigerants**
Height of installation CO ₂ / N ₂ O	-not applicable-	75 cm -100 cm from the floor / 30-50 cm floor N ₂ O / Refrigerants**
Protection grade	IP65 (all models)	IP65 (all models)
IP65 box material	Makrolon & ABS	Makrolon & ABS

Cable diameter	10.1-13 mm ²	10.1-13 mm ²
Cable type (RS485)	* 4 wires: 2 x 1.5 and 2 x 0.25 ø	4 wires: 2 x 1.5 and 2 x 0.25 ø
Cable type (4-20mA)	* Shielded 3 x 1.5mm ø	Shielded 3 x 1.5 mm ø
Maximum distance Installation Metres	* 300/400 maximum (4-20mA) * 1000 for RS485	* 300/400 maximum (4-20mA) * 1000 for RS485
Dimensions (mm) / weight (g) – IP65	120 x 160 x 60 / 288	120 x 160 x 60 / 288
Frequency	868 MHz.	868 MHz.
Programmable bit speed	of up to 62.5 kbps.	of up to 62.5 kbps.
Transmission power	of up to +22 dBm.	of up to +22 dBm.

*Supply cable sections and maximum distances vary depending on the quality of cable used, the sensor distribution across the total cable length and the supply voltage in the case of 4-20mA sensors.

**For the refrigerants, protect all possible sources of leaks, connections, elbows, gas inlets/outlets, valves, welds, compressors, etc.

Height of installation and coverage apply the local legislation in force in each case.

6. DURTOX TECHNICAL CHARACTERISTICS

Technology	12bit microprocessor and electrochemical sensors
Supply voltage	10 to 15V (DC)
Approximate maximum consumption	43mA at 12V DC
Useful life	± 2 years all gases (in clean air)
Precision	1 ppm CO, 2 ppm NH ₃ , 0.1 ppm NO ₂ , H ₂ S, Cl ₂ , SO ₂ , 0.5 ppm NO, and 2% O ₂ .
Repeatability	± 1% of the full scale
Stabilisation Initial Delay -all features-	5 minutes -approx-
T90 Response times	SO ₂ and NH ₃ ≤30s - H ₂ S ≤ 20s - O ₂ ≤ 15s NO ≤40s - Cl ₂ ≤ 60s - NO ₂ ≤ 20s
Temperature and humidity ranges	-10°C to +50°C 20-90% RH
Operating atmospheric pressure	90-110kPa
Maximum permitted air speed	<0.1-0.5m/s (depending on the gas)
Maintenance periods	1 year -recommended-
Protection grade	IP65
Enclosure material	Makrolon & ABS
Alarm relay (optional)	Fuse-protected dry contact switch output 3A 250V AC
Cable gland material and cable diameter	ABS 6-10 mm ²
Type of cable and communication system	*4 wire shielding (2 x 1.5 supply + 2 x 0.25 braided pair communications A and B) RS485
Maximum installation distance	*1000 m
Dimensions (mm) and weight (g)	125 x 150 x 63 / 300
Frequency	868 MHz.
Programmable bit speed	of up to 62.5 kbps.
Transmission power	of up to +22 dBm.

7. WARRANTY

DIREX, **DURTEX** and **DURTOX** sensors are guaranteed against any manufacturing defects for 1 year from the equipment's date of purchase. If you detect any fault in this period, inform your supplier or installer.

The warranty covers the complete repair of equipment that the Technical Service of **DURAN ELECTRÓNICA** consider to be defective, to reinstate it for normal use. This warranty will be valid provided the equipment has been installed by a competent person and following this manual's instructions. A negligent use or installation will exempt **DURAN ELECTRÓNICA** from liability for any damage caused to property and/or people and compliance with the terms of this warranty. In the event of undue handling, or failure to observe the conditions, characteristics and observations described in this manual, **DURAN ELECTRÓNICA WILL NOT BE LIABLE FOR DAMAGE THAT COULD ARISE THROUGH INCORRECT USE OF THIS PRODUCT.**

The warranty does not cover: installations, periodic inspections and maintenance, damage caused by undue handling, inappropriate use, negligence, overloading, inadequate powering or abandonment of the equipment, voltage shorts, defective installations and all other external causes, repairs or fixes made by personnel not authorised by DURAN ELECTRÓNICA, the transport costs of the equipment.

DURAN ELECTRÓNICA reserves the right to make improvements or modify the equipment without prior warning.



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