



LINEAR HEAT DETECTION CABLE

DURÁN-SAFE

Installation & User Manual

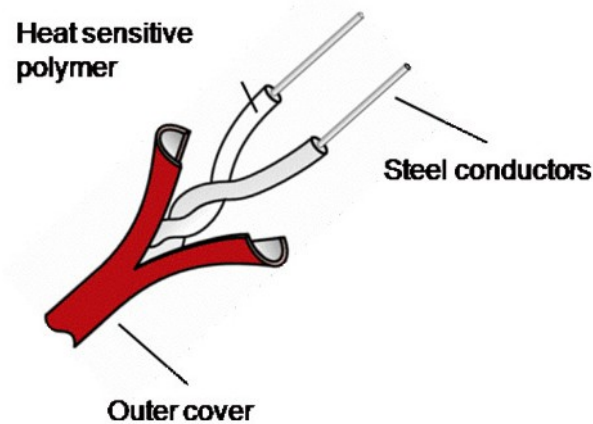


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1. INTRODUCTION

Linear Heat Detection Cable (LHD) for fire detection is provided of two twisted steel conductors, covered by a heat-sensitive polymer. When the programmed temperature is reached, this polymer layer gets broken, making the two conductors contact each other, causing an alarm.



An outer extrusion, which is corrosion and abrasion resistant, protects the two conductors. This makes LHD linear heat sensor cable to be the most adequate fire detection system for extreme environmental conditions.

1.1 Temperature ranges and outer extrusion types

There are 4 different types of LHD heat sensor cables, depending on the alarm temperature chosen: 68°C, 78°C, 88°C and 105°C.

STANDARD	POLYPROPYLENE	NYLON	Maximum room temperature*	Alarm temperature**
CDSFTC68	CDSFTC68P	CDSFTC68N	45°C/113°F	68°C/155°F
CDSFTC78	CDSFTC78P	CDSFTC78N	50°C/122°F	78°C/173°F
CDSFTC88	CDSFTC88P	CDSFTC88N	70°C/158°F	88°C/190°F
CDSFTC105	CDSFTC105P	CDSFTC105N	70°C/158°F	105°C/220°F

*Maximum temperatures recommended, considering potential fluctuations in room temperature

**LHD cable alarm temperature does not depend on the length of the cable.

LHD cable is also available with different outer extrusions, depending on the applications given to the cable:

- Standard: For general applications, resistant to dust, humidity, dirt and common chemical agents, usually aggressive.
- Polypropylene: Thermal stability, durability, chemical resistant to abrasion and corrosive gases.
- Nylon: Extra protection for mechanical risk damage. Covered with nylon, ready to work under harsh industrial environments.

2. FUNCTIONING

When reaching the pre-established temperature, the polymer layer surrounding the two conductors melts, making them to contact each other, and thus producing an alarm.

After the alarm, the affected part of the cable must be replaced. There is no need to replace the whole cable, only the damaged part, using a connections cable or any other useful device for this purpose.

Mechanical tension is kept constant through the whole length of the cable. If continuity is broken, it will lead to an open circuit fault condition.

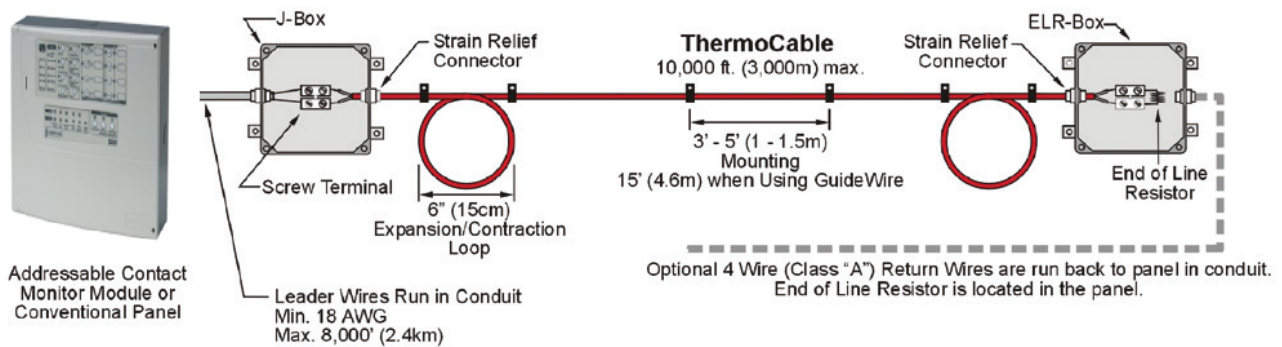
For the continuous monitoring of the cable, it is required to connect it to a conventional fire control panel or an analogical one with a conventional zone module, with no need to use additional software. Take into account that the loop or module line must be compatible with cable resistance levels (164 ohms/km) and capable of giving an alarm short-circuit signal.

The distance locator DLM-Z2 -connected to a fire panel- is capable of detecting the “exact point of alarm” along the cable length, with a maximum distance of 3.000 m.

3. INSTALLATION

LHD thermal cable can be connected to a fire detection conventional panel or an analogical fire panel through a conventional zone module. For its installation with a DLM-Z2 distance locator go to chapter 7 “DLM-Z2 Distance Locator.”

CAUTION: Do not connect LHD linear heat cable to the power supply.



1. At installation, the cable must always start with the junction box and finalize with an end of line box, provided with an end of line resistor, whose values must be adequate to the control unit to which it will be connected.
2. In order to assure an easy and efficient installation, it is recommendable to keep the cable tight while its installation and uncoil only the cable pieces that will be installed.
3. It must be installed without any kind of deviation.
4. Installation should be done at an ambient temperature above -10°C.
5. Install the cable at the ceiling level or in side walls, at 50cm. maximum from the ceiling.
6. Distance between a cable line and another one must not exceed 10,6m – coverage area -.
7. Connect a 1,5mm. copper wire – interconnection cable – from any DLM-Z2 Distance Locator or fire control unit to the risk area, from which the LHD thermal cable will be connected afterwards.
8. Make sure that when installing LHD cable there are no elements at the installation that might make maintenance or repairing operations difficult.
9. The system does not require calibration.

3.1 Recommendations

Follow these recommendations for installing the LHD cable.

1. Check the cable before its installation and make sure that it corresponds to the alarm temperature for which it has been chosen.
2. Throw the cable following installation design.
3. Make sure that junctions have been made correctly, taking care that the maximum distances between the supports follow the specifications from the manufacturer.
4. Make sure that the cable has not been installed on sharp edges and that no curve exceeds the minimum ratio of 7,2cm.
5. Verify that the value for the end of line resistance is correct, and adequate for the equipment to which the cable will be installed.
6. Check that the end of line resistance is 164 ohms/Km per conductor maximum.
7. Disconnect any extinction and/or fire detection system which might be connected to the cable before going on with the installation procedures (please remember to connect them again once the process has ended).
8. Check if the cable is correctly connected, in FAULT situation – open circuit- and FIRE – shortcircuit.
9. If you have installed a DLM-Z2 Distance Locator unit, please proceed as indicated in this manual in chapter 7.

3.2 Accessories

LHD sensor cable is provided with a wide range of accessories, in order to cover all installation needs.

It is advisable to use LHD accessories with LHD sensor cable, in order to guarantee the correct functioning of the product.

See the appendix with accessories listing in page 14.

4. WORKING TEST

Make sure that any element connected to the LHD cable – included those that might receive alarm cable condition – are disconnected before proceeding with the following test.

We recommend choosing one of the two following options – the most adequate selection will depend on the user-.

4.1 Option 1

Fault state: disconnect one of the cable connectors from one of the line endings (beginning-end). After checking that the messages are received correctly, connect the connector again and reset the system.

Alarm state: short-circuit the conductors in any junction, in the control units connection or at the end of the line. After checking that the messages are received correctly, free the short-circuit and reset the system.

4.2 Option 2

Fault state: follow instructions from Option 1.

Alarm state:

1. Disconnect LHD cable from the DLM-Z2 Distance Locator unit or from the junction box.
2. Place a thermal cable of similar characteristics to the LHD thermal cable – or a piece of the LHD cable itself- and place a end of line resistance in order to avoid open circuit fault.
3. Heat the testing piece of cable (with a warm air generator or similar) until the alarm is produced.
4. Connect LHD thermal cable again and reset the system.

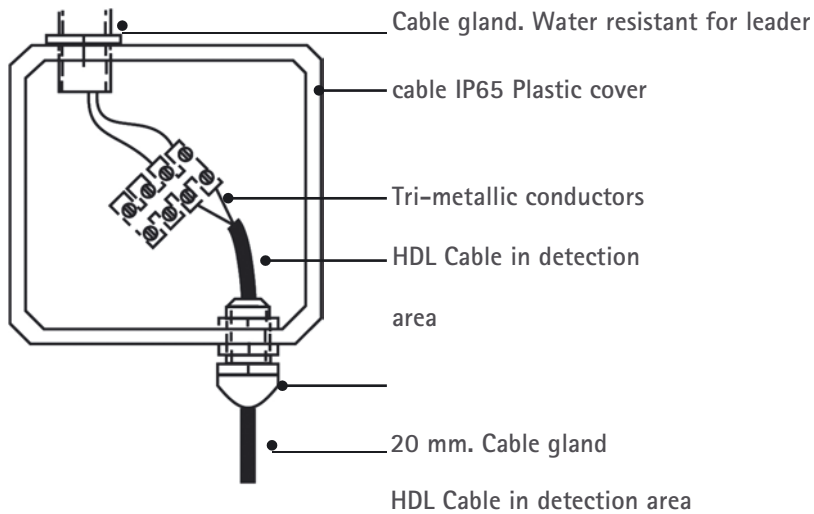
This test must never be done in areas classified as hazardous.

5. TECHNICAL CHARACTERISTICS

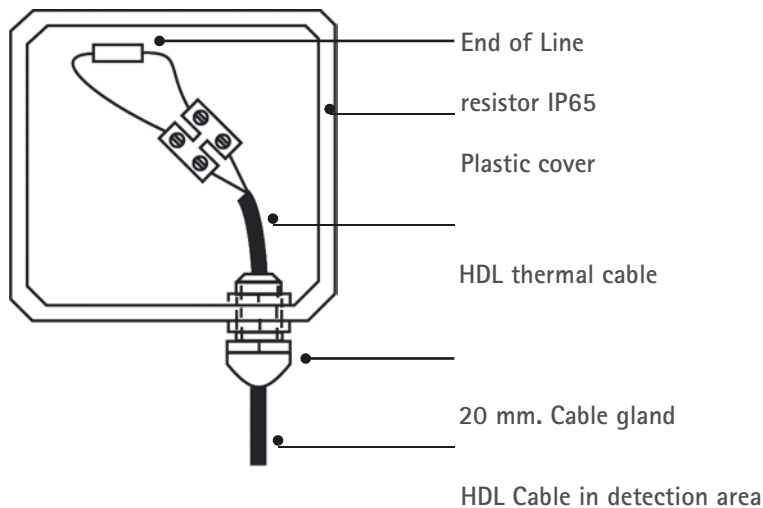
Material	Silvered copper with galvanized steel, covered with a heat sensitive polymer
Outer extrusion diameter	0,912 mm
Conductor diameter	0,294 mm
Resistance	164 ohms/Km
Electrical range	30V AC -42,2V DC- 10A
Dielectric resistance	500V DC -UL tested -
Minimum exposure temperature	-40°C - UL tested -
Minimum installation temperature	-10°C
Accuracy at alarm temperature	+/-3% alarm temperature
Coverage area	10,7m - U.L. verified -
Tension - UTS-	1.700 N/mm ² minimum - EN 60811-1 BS tested
Minimum curve ratio	76.2 mm

6. CONNECTIONS

6.1 Junction box



6.2 End of line box



7. DLM-Z2 DISTANCE LOCATOR UNIT

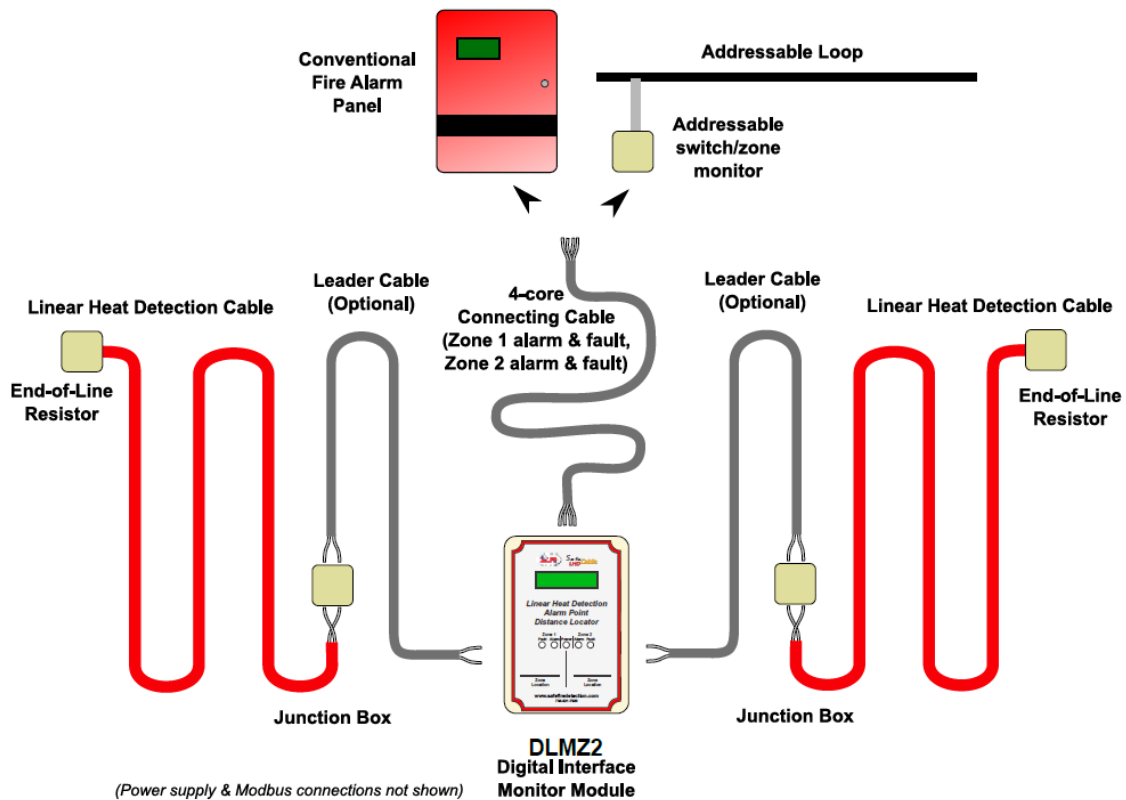
DLM-Z2 Distance locator, connected to LHD thermal cable, displays the exact point of alarm in a cable length of 3.000 meters; making easier to find the point of alarm.

DLM-Z2 Distance locator can be used with the LHD thermal cable and it can be connected to:

- Conventional fire panel system.
- Addressable fire panel, using a conventional two zones module and two relay output module for the alarms.

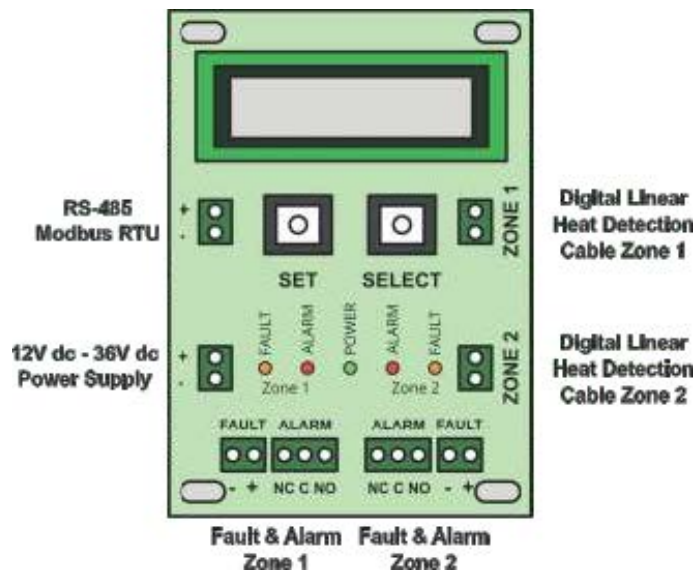
The DLM-Z2 Distance Locator unit works independently from the fire control panel, so if an eventual problem happens – voltage drops- this will not affect the fire panel system.

DLM-Z2 Distance locator is certified by UL 864 10th Ed. and UL (S527-11).



7.1 Installation without leader cable

This picture shows the connections diagram for the DLM-Z2 unit. The unit is provided with a 1kohm end of line resistor in each zone input. If only one zone is required, leave the 1kohm resistor connected across the zone which is not in use. Otherwise the 1kohm resistor should be connected at the end of the Digital Linear Heat Detection cable.



7.2 Operating Modes Wiring Diagram Independent

This is when the DLM-Z2 is used as a one or two zone system. When a fault or overheat condition occurs on an LHD zone, the corresponding fault or alarm output respectively is triggered. The two zones operate independently and both sets of outputs should be connected to a fire alarm control panel.

If the zone is not required leave the End of Line resistor in the zone input terminals as supplied. In this mode, the two zones can either contain identical rated temperature LHD cables or two different rated temperature LHD cables, e.g. a 155 deg F in zone 1 and a 220 deg F in zone 2.

7.3 Operating Modes Wiring Diagram Cross Zone

This mode is for applications which require a fail-safe guarantee that an alarm is only triggered when an overheat condition has been detected. In this case, the same rated temperature LHD cable should be attached to both zones of the DLM-Z2. The alarm output is only activated when both LHD cables trigger an alarm due to an overheat condition. If one LHD cable zone input registers an alarm but the second does not, the alarm output will not be activated.

This is to prevent an alarm if a mechanical or other issue has triggered one LHD cable and not an overheat condition.

- Only use Zone 1 fault and alarm outputs in Cross Zone mode.
- Two linear heat detectors with the same temperature rating must be used and a minimum of two linear heat detectors must be installed in each protected space.
- The spacing between detectors should be less than 0.7 times the rated linear spacing, in accordance with National Fire Alarm Code, NFPA 72.

7.4 Commissioning

1. After wiring the unit up (see wiring diagram) power up the device. Device will show screen including software revision number.
2. If the unit is being setup for the first time the following options will be shown. If the unit has previously been installed the display will automatically cycle through the options, showing the stored settings.
3. Select the operating mode. (see "Operating modes" (page 10) for more detail.
Independent: the two zones operate independently of each other (default). Ww
Cross Zone: Both fault outputs activate when a fault occurs on either zone 1 or zone 2. Both alarm outputs activate only when both LHD zones trigger an alarm.
4. Select the cable type connected to Zone 1

	Alarm temperature
CDSFTC68 (P) (N)	68°C/155°F
CDSFTC78 (P) (N)	78°C/172°F
CDSFTC88 (P) (N)	88°C/190°F
CDSFTC105 (P) (N)	105°C/220°F

5. Select the cable type connected to Zone 2

	Alarm temperature
CDSFTC68 (P) (N)	68°C/155°F
CDSFTC78 (P) (N)	78°C/172°F
CDSFTC88 (P) (N)	88°C/190°F
CDSFTC105 (P) (N)	105°C/220°F

6. If leader cable is connected between the linear heat detection cable and the DLM-Z2 for this zone, press the Select button and select Yes. Press the Set button to continue.
7. The controller will then ask if the zone is ready to be calibrated. The leader cable must be connected to the DLM-Z2 and shorted out at the end where it connects to the START of the LHD cable. Once this is done press the Set button.
8. The DLM-Z2 will display the voltage drop across the leader cable. Remove the short from the leader cable and connect it to the START of the LHD cable as normal.
9. If the Linear Heat Detection cable is connected directly to the DLM-Z2 then select No and press the Set button to continue.

10. Select whether you would like the alarm outputs for both zones to be latching. If set to Yes, then if an alarm is triggered the unit will either require the power supply to be interrupted (min. 10s) or the Set button to be pressed to reset to normal once the alarm conditioned has been cleared.
11. Select whether the Modbus RTU output should be enabled. If this is not enabled then proceed to step 17.
12. Set the Modbus RTU address of this unit. (1 - 247)
13. Cycle through the possible Baud Rates for the Modbus RTU output. (1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200).
14. Select the number of data bits for the Modbus RTU output. (7 or 8)
15. Select the number of stop bits for the Modbus RTU output. (1 or 2)
16. Select the parity for the Modbus RTU output. (even/odd/none)
17. Once the unit has been commissioned the display will show the zone status. In normal operation the display will show OK for each Zone.
18. If an alarm condition occurs the DLM-Z2 automatically calculates the distance along the cable to the trigger point and first displays this value in metres.
19. The display alternates showing the distance along the cable to the trigger point in metres and in feet.
20. If a fault occurs (open circuit) on the Linear Heat Detection Cable the display will show FAULT on the corresponding line.
21. If a ground fault occurs on either zone the display will show a GND

7.5 Two-wire RS-485 Modbus RTU Communications

The SafeCable DLM-Z2 includes a two wire RS-485 Modbus output which can be enabled to output the status of each zone of Digital Linear Heat Detection Cable. The DLM-Z2

Modbus output supports the Modbus RTU protocol and the following functions:

Function code 4 (Read Input Registers)

The request for reading the input registers should be constructed in the following manner:

- Address of first register to be read (16-bit)
- Number of registers to read (16-bit)

The DLM-Z2 will respond in the following manner:

- Number of bytes of register values to be read (8-bit)
- Register values (16-bits per register)

The DLM-Z2 stores the information for each zone of the LHD cable in the following format:

Register	Description	Possible Values
0	Zone 1 status	-1 or 65535=fault on zone 0=zone ok 1-32767=distance in metres to trigger point
1	Zone 2 status	-1 or 65535=fault on zone 0=zone ok 1-32767=distance in metres to trigger point
2	Zone 1 cable type	1=155°F, 2=172°F, 3=190°F, 4=220°F, 5=365°F
3	Zone 2 cable type	1=155°F, 2=172°F, 3=190°F, 4=220°F, 5=365°F

If the start address plus the requested number of registers exceed 4, the DLM-Z2 will return an ILLEGAL DATA ADDRESS error.

If the request contains a function code other than those supported the DLM-Z2 will return an ILLEGAL FUNCTION error.

7.6 Resetting installing parameters

If the incorrect cable type was selected or leader cable calibration was performed incorrectly it is possible to reset the DLM-Z2 Distance Locator unit to the initial state so the installation parameters may be reprogrammed.

To perform a reset:

- Press and hold the SET and SELECT buttons for a minimum of 10 seconds continuously.
- While the SET and SELECT buttons are held down the power LED will flash quickly to confirm this procedure is about to take place.

After approximately 10 seconds, the unit will restart and return to step 1 in the Commissioning procedure (7.4 of this manual).

7.5 Technical characteristics

Operating voltage	12Vdc	36Vdc	
Current consumption	Normal Operation	<12mA	<4mA
	Alarm	<40mA	<15mA
Operating temperature Range	-20°C +50°C (-4F - +122F)		
Sounder	2.4kHz 92dBa @ 10cm Buzzer		
Protection range	NEMA 4, 4X (IP65)		
Accuracy	0,5 provided that the DLM-z2 is properly installed and wired.		
Protection range	IP65 / IK08		
Detection Zones	Up to two zones		
SafeCable Max Zone Length	3000 m (10,000 ft)		
SafeCable Min Zone Length	1m (3ft)		
End of line resistor	1kohm (Included)		
Short circuit current	0.5mA		
Max Voltage	5V		
Ground fault impedance	0ohms		
Enclosure Dimensions (mm)	180 x 210 x 60,5		
Display	2 lines, 16 characters backlit display		
Measurement	Meters and feet		
Enclosure (Cable entries)	Two wire RS-485 Modbus RTU 2x Form C volt-free relay contacts (resistive, common) 2x Optoisolated phototransistor output (resistive, common)		

8.- ACCESSORIES

The correct functioning of the LHD sensor cable will depend on its correct installation. The inadequate subsection of the cable or a wrong cable lying will make protection in the risk area to be lower or even impede detection.

It is recommended to use subsection clips, manufactured or accepted by the manufacturer at 1m. intervals. This way, the user will avoid that the cable gets sagged, minimizing the risk for mechanical damage.

Non-metallic accessories have been halogen-free manufactured.

Be especially careful with adherent accessories. Make sure that the surfaces where they will be placed are totally clean.

8.1 Fastening accessories

Cable clip



Black Nylon. indicated from -40° to 85°C
4.8mm mounting hole

Wallplug holder



Installation with Ø 6 drill bit
30 Kg resistance
Polyamide 6
Halogen free

9. GUARANTEE

DURAN ELECTRONICA guarantees that LHD thermal cable and the DLM-Z2 distance locator have been manufactured to high quality control standards.

CDL thermal cable is guaranteed against any manufacturing defect for 1 year after its purchase. If any anomaly were detected during this period of time, please tell your provider or installer.

Guarantee covers the complete reparation of the equipment which are considered to be defective by the Technical Department of DURAN ELECTRONICA. This guarantee will be valid only if the equipment has been installed by a competent person and following the specifications in this manual.

Its negligent use or installation will exempt DURAN ELECTRONICA from any responsibility for the damages that might have been caused to objects and/or people, and the fulfilling of these guarantees terms.

Guarantee does not cover:

Installations, periodic checks and maintenance operations.

Repairs caused by improper manipulation, inappropriate use, negligence, overload, inadequate power supply or equipment abandonment, tension deviations, defective installations, and other external causes.

Repairs or fixes made by personnel not authorised by DURAN ELECTRONICA.

Equipment transportation costs.

DURAN ELECTRONICA holds the right to make improvements or introduce amendments to this equipment without prior notice.



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