



**SISTEMA DE CONTROL DEL MOVIMIENTO**

**INCONTROLADO DE LA CABINA**

**UNINTENDED CAR MOVEMENT CONTROL SYSTEM**

**SYSTÈME DE CONTRÔLE DU MOUVEMENT**

**INCONTRÔLÉ DE LA CABINE**

**KONTROLLSYSTEM FÜR UNBEABSICHTIGTE**

**FAHRKORBBEWEGUNGEN**

**SD-BOX**

**INSTRUCCIONES DE USO Y MANUTENCIÓN/**

**INSTRUCTIONS FOR USE AND MAINTENANCE/**

**INSTRUCTIONS D'USAGE ET ENTRETIEN/**

**GEBRAUCHS- UND WARTUNGSANLEITUNG/**

# CERTIFICADO

## CERTIFICATE

**Examen UE de Tipo para componentes de seguridad**  
*EU Type-Examination of safety components*  
**Según el anexo IV parte A de la Directiva 2014/33/UE**  
*According annex IV part A of Directive 2014/33/EU*

**Certificado N°.: TRI/DAS.IV-A/001315/20**  
*Certificate-No.:*

<b>Organismo Notificado</b> Notified Body	<b>TÜV Rheinland Ibérica Inspection, Certification &amp; Testing, S.A.</b> Parc de Negocis Mas Blau Ed. Océano c/ Garrotxa, 10-12 E-08820 El Prat de Llobregat
<b>Propietario del Certificado</b> Certificate holder	<b>DYNATECH DYNAMICS &amp; TECHNOLOGY S.L.U</b> Pol. Ind. Pina de Ebro, Sector C, P-9 50750 - Zaragoza España (Spain)
<b>Fabricante del ejemplo ensayado</b> Manufacturer of the test sample <b>Fabricante autorizado</b> Authorized manufacturer	<b>DYNATECH DYNAMICS &amp; TECHNOLOGY S.L.U</b> Pol. Ind. Pina de Ebro, Sector C, P-9 50750 - Zaragoza España (Spain)
<b>Descripción</b> Description	<b>Sistema de control de protección contra movimientos incontrolados de la cabina.</b> Control system to prevent unintended car movement.
<b>Tipo</b> Type	<b>Sistema electrónico programable (SIL 2 PESSRAL)</b> Programmable electronic system (SIL 2 PESSRAL)
<b>Modelo</b> Model	<b>SD-BOX</b>
<b>Informe n° y fecha</b> Test report Nr. and date	<b>92570408 (02.04.2020)</b>
<b>Norma de Referencia</b> Standards	<b>EN 81-20:2014</b> <b>EN 81-50:2014</b> <b>IEC 61508 Partes 1-7:2010</b>
<b>Fecha emisión certificado:</b> <i>Date of issue:</i>	<b>06.04.2020</b>

**Este certificado consta de esta portada y el anexo técnico (2 hojas). Su reproducción carece de validez si no se realiza totalmente.**

*This certificate consists of this main page and the technical annex (2 pages). It must be reproduced with all its pages to be considered valid.*

**Este certificado perderá su validez debido a cambios de diseño, procedimiento, cambios en la legislación o en la normativa aplicable. El fabricante deberá poner en conocimiento de este Organismo Notificado cualquier cambio de diseño previsto**

*This certificate would lose its validity in case of design or procedure modifications, changes in the applicable law or standards. Manufacturer must communicate to this Notified Body any foreseeable change in the design*

**Este componente puede formar parte de un sistema de protección contra el movimiento incontrolado de la cabina. En este caso, deberá evaluarse el sistema completo y certificarse por parte de un Organismo Notificado en caso de ser necesario.**

*This component can be part of a protection against unintended car movement. In this case, the complete system must be evaluated and certified by a Notified Body if necessary.*



**Javier Mediavilla / Armand Hernandez**  
*(Director Servicios Industriales) / (Director Técnico Elevadores)*  
Organismo Notificado N° 1027  
Notified Body, ID-No

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# 1. INTRODUCTION

## 1.1. DESCRIPTION

This equipment is to detect any type of unintended movement of the car (UCM) with the doors open. If there is unintended movement, it opens the safety line output connected to the safety chain and locks the overspeed governor by de-energising the associated rotation coil and engaging the safety gear. This corresponds to the following device in table A.1 in the standard EN 81-20: 2017.

- “Detection of unintended car movement with open doors”, with a minimum SIL of 2.

This device must be used in combination with an overspeed governor equipped with a governor rotation locking coil. When energised, the coil allows the governor to turn and locks it when it is de-energised. The coil must be designed to be powered continuously (100% duty cycle) at 24 V<sub>DC</sub> and consume a current of 150-800 mA while energised.

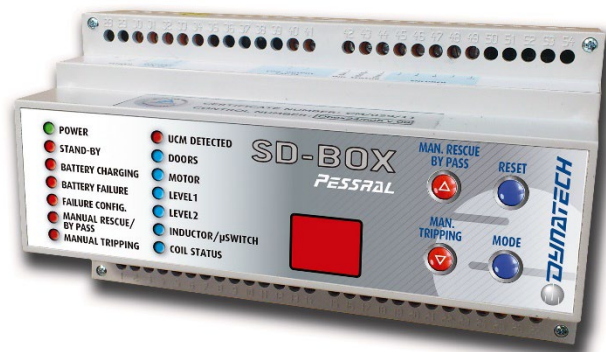
This system compares the car door status with the unlocking zone at all times. If it detects that the car has left the unlocking zone with open doors, it locks the overspeed governor.


Facing the appearance of an UCM, a competent technician is needed to make the installation operational again. Once the problem causing the UCM is resolved, the "RESET" button on the SD-BOX is pressed to re-establish the safety line and make the system operational again.

No intervention of the lift control is needed to make the overspeed governor coil act, as the system described acts directly on it.

If a fault occurs in this contact or in the coil that may pose a risk, a system failure signal is activated to inform the controller. When this signal is received it prevents the lift from starting the following travel.


If batteries are used as an auxiliary power supply, an external charger between the batteries and the SD-BOX must not be connected under any circumstances. The SD-BOX is capable of charging the batteries itself.



	<p>Important note</p>	<p>Do not connect a charger between the batteries and SD-BOX, it may burn. For further details on how to connect the SD-BOX to your control panel, please refer to “5.3 ELECTRICAL DIAGRAMS” in this manual.</p>
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## 2. RISKS AND SAFETY WARNINGS

### 2.1. ELECTRICAL RISK


	<p>Electrical risk</p>	<p>Do not handle or open the box when its terminals are connected to the power supply system.</p>
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## 3. USE

### 3.1. TYPE OF LIFTS

It can be used in the following lifts:

- With or without a machine room.
- With or without re-levelling.
- With or without pre-opening doors.

	<p>Important note</p>	<p>Lifts with a pre-opening door system must be certified according to the EN 81-20 standard, table A.1, section <b>5.12.1.4.a) Control of levelling, re-levelling and preliminary controls</b> or section <b>5.12.1.8.2 Device for bridging the landing door and car contacts</b></p>
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### 3.2. EXCLUSION OF LIABILITY

DYNATECH DYNAMICS & TECHNOLOGY, SL will not be held responsible for damages caused by not observing any of the points in this document.




**Strictly prohibited:**

Intervening on any component within the box.

## 4. MAIN FEATURES

### 4.1. TECHNICAL FEATURES

Power supply	INPUT	24 V <sub>DC</sub> (1.5A max.) SELV/PELV
Rechargeable battery power	INPUT	12 V <sub>DC</sub> , 1,5 Ah <sup>1</sup>
Power supply for the governor unlocking electric coil	OUTPUT	24 V <sub>DC</sub> ; max 800 mA
Power supply for the governor unlocking sensor	OUTPUT	24 V <sub>DC</sub> 10mA max.
Max. safety line current	OUTPUT	1A max. <sup>2</sup>
Control system response time	-	30ms
Door signal <sup>3</sup>	INPUT	24 - 230 V <sub>DC</sub> , 24 - 230 V <sub>AC</sub> (±10%) 50mA @ 24 V, 20mA @ 230 V
Motor signal <sup>4</sup>	INPUT	24 - 230 V <sub>DC</sub> , 24 - 230 V <sub>AC</sub> (±10%) 50mA @ 24 V, 20mA @ 230 V
Level 1 signal	INPUT	24 V <sub>DC</sub>
Level 2 signal	INPUT	24 V <sub>DC</sub>
External manual rescue signal	INPUT	24 V <sub>DC</sub>
External reset signal	INPUT	24 V <sub>DC</sub>
Box IP protection index	-	SD-BOX: IP20

	Important note	The response time is the interval from the SD-BOX receiving the signal to performing the relevant action. It does NOT include the lift unlocking zone sensor detection time, the coil activation time or the drift control sensor state change.
	Important note	The batteries are rechargeable and are charged by the SD-BOX itself. Under no circumstances should any extra charger be connected between the batteries and the SD-BOX.
	Important note	The coil is overexcited to 30 V <sub>DC</sub> for a brief period of time to prevent possible failures in the overspeed unlocking.

### 4.2. ENVIRONMENTAL OPERATING CONDITIONS

Temperature	5 - 40°C
Humidity	15 - 85% without condensation

<sup>1</sup> The battery charger has been optimised for Ni-Cd batteries. If you use other types of batteries their life will be reduced. Dynatech is not responsible for the use of batteries other than the Ni-Cd type.

<sup>2</sup> 1A protection fuse is required

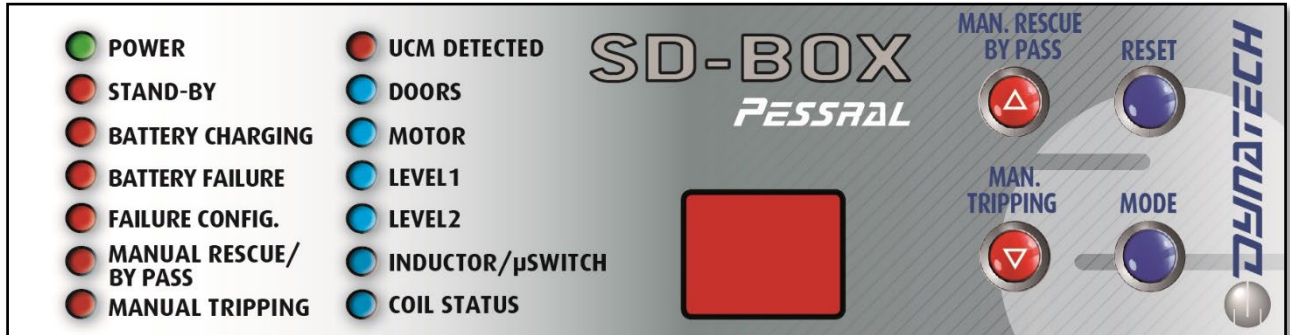
<sup>3</sup> If the SD-BOX is placed in locations 2000-4000m above sea level, the maximum voltage at the door input is limited to 160V<sub>AC/DC</sub>.

<sup>4</sup> If the SD-BOX is placed in locations 2000-4000m above sea level, the maximum voltage at the motor input is limited to 160V<sub>AC/DC</sub>.






### 4.3. GENERAL DESCRIPTION

The control button functions and the general information supplied by the LEDs and the display are described below.



#### Control buttons

- **RESET<sup>5</sup>**: Press briefly to activate; it is not necessary to keep it pressed to activate it. Enables the system after the following: the first start-up, an UCM, a bypass action, manual locking of the overspeed governor (MANUAL TRIPPING) or a fault/error.
- **MANUAL RESCUE/BYPASS**: This button must be held down for more than 3 seconds to be activated. It can be used in maintenance work and for a manual rescue if the lift has no power. A periodic warning beep will sound while the bypass is activated. The bypass function can be turned off by pressing the “MANUAL RESCUE/BYPASS” button again or by pressing the “RESET” button. The maximum duration of this mode when the SD-BOX is powered by batteries is 10 minutes, whereupon it automatically returns to a resting state. As many rescues as necessary can be performed by pressing the button again as long as the battery has enough charge. The maximum duration of this mode with an external power supply is not established.

	MAX. 10 minutes	The maximum duration of this mode when the SD-BOX is powered by batteries is 10 minutes, whereupon the SD-BOX automatically returns to a resting state. To warn of the automatic disconnection, the beep frequency increases during the final minute.
	Application of bypass during the process of disengaging the safety gear	After an UCM or a manual lock (MANUAL TRIPPING), the bypass must be applied to prevent the overspeed governor from locking in the opposite direction when the car is moved to disengage the safety gear.
	RESET	If the equipment becomes inoperative and activating the RESET has no effect, the battery (terminals 34-35) have to be removed before disconnecting and reconnecting the main power (terminals 32-33) to restart the equipment completely.

- **MANUAL TRIPPING**: This is to lock the governor during maintenance work. It is used in combination with the “MODE” button and with an indication on the display to prevent the governor from being locked accidentally or by mistake.

<sup>5</sup> The RESET function will not work when the “MOTOR” input is activated.



- **MODE<sup>6</sup>**: This enables the use of the manual lock (MANUAL TRIPPING), the setting of the de-energisation wait time at floor level and the output relay FAILURE.

The following steps are needed to activate the MANUAL TRIPPING mode:

- Press the “MODE” and “MANUAL TRIPPING” buttons simultaneously for 3 seconds until the number 55 appears on the display.
- Press (▲) 20 times until the number 75 appears. Press “MODE” and the MANUAL TRIPPING LED lights up indicating this option is activated.
- When the “MANUAL TRIPPING” button is pressed, the overspeed governor is locked.
- When the “MANUAL TRIPPING” button is released, the overspeed governor is unlocked.
- To disable the MANUAL TRIPPING mode and return to normal status, press the “MODE” and “MANUAL TRIPPING” buttons at the same time. It can also be disabled by pressing the “RESET” button.

To configure the de-energisation wait time at the floor level, follow the instructions in section “6.2 *SETTING THE COIL DE-ENERGISATION WAIT TIME WITH THE CAR AT LEVEL*”.

To configure the FAILURE output relay, follow the instructions in section “6.3 *SETTING THE FAILURE OUTPUT RELAY*”.

#### LED indicators

- **POWER**: Flashes when the SD-BOX is receiving power externally or from the batteries.
- **STAND-BY**: When the SD-BOX is in low consumption mode with the display and LEDs off.
- **BATTERY CHARGING**: Indicates the battery charging status: “Off” if it is charged, “on” if it is charging and flashing when checking the battery status.
- **BATTERY FAILURE**: “Flasing” indicates a battery fault (damaged and impossible to charge) or battery disconnection.
- **FAILURE CONFIG.**: Indicates the FAILURE output relay setting: “Off” indicates the SD-BOX will act on the relay if it detects any fault or error, and “on” indicates the SD-BOX will act on the relay according to the coil status. FAILURE output is a non-safety related signal.
- **MANUAL RESCUE/BY PASS**: “On” indicates the coil is being powered manually by performing a rescue manoeuvre.
- **MANUAL TRIPPING**: “On” indicates the manual locking function is active and will manually lock the overspeed governor when the “MANUAL TRIPPING” button is pressed.
- **UCM DETECTED**: “Flasing” indicates the system has detected unintended movement of the car (UCM). The safety line contact will open and the fault “F2” will appear on the display.
- **DOORS**: “On” indicates the door series is closed. If it is flashing, there is a discrepancy in the internal DOORS1/DOORS2 signals.
- **MOTOR**: “On” indicates the motor is running.

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<sup>6</sup> If the “MOTOR” input is activated, no configuration can be made.

- LEVEL1: “On” indicates the car is at floor level.
- LEVEL2: “On” indicates the car is at floor level.
- INDUCTOR/ $\mu$ SWITCH: “On” indicates the unlocking sensor detects the overspeed governor is unlocked.
- COIL STATUS: “On” indicates the governor coil is powered and the governor is unlocked.

DISPLAY:The figures appearing on the display indicate the following:

- F1 – F9: Lift faults. See “4.5 DESCRIPTION OF FAULTS” for more detailed information on each.
- A1: The batteries are not connected or have discharged.
- A2: Failure in the external power supply.
- E1 – E9: Internal SD-BOX errors. See “4.5 DESCRIPTION OF FAULTS” for more detailed information on each.
- 63: Access to the coil de-energisation time setting. For more information see “6.2 SETTING THE COIL DE-ENERGISATION WAIT TIME WITH THE CAR AT LEVEL”.
- 75: The manual lock function (MANUAL TRIPPING) and “MANUAL TRIPPING” button are enabled, when the button is pressed with the car in movement the overspeed governor will be locked and safety gear engaged on further movement of the car.
- 81: Access to the FAILURE output relay setting. For further information, please see “6.3 SETTING THE FAILURE OUTPUT RELAY”.

#### 4.4. OPERATION DESCRIPTION

Depending on the input signals the controller receives, the SD-BOX is able to detect unintended car movement and lock the overspeed governor only when this happens; and not during normal stops.

The basic operation is as follows:

The following input signals are needed from the lift:

- Doors closed (DOORS).
- 2 independent unlocking zone sensors (LEVEL1 and LEVEL2).
- Motor contactor (MOTOR).

When the car reaches a floor, the level inputs are activated and the coil remains energised keeping the overspeed governor unlocked. The doors open, the closed doors signal is lost and, if UCM occurs, the level inputs will be lost. At that moment, the safety line contact opens, the coil de-energises and the overspeed governor is locked. If UCM does not occur, the doors will be closed and a travel made.

#### 4.5. DESCRIPTION OF FAULTS

Once an error has occurred, the SD-BOX will inform the user through the LEDs and the display showing the status in which the error occurred and will remain in safe mode until it is restarted.

The faults that can occur during the operation of the SD-BOX and their possible causes and solutions are listed below.

### **Fault F0:**

This will appear if the DOORS signal is lost (changing from ON to OFF) during a lift movement (MOTOR ON signal).

As soon as an F0 fault is detected, the SD-BOX will open the safety chain and de-energise the coil.

Possible causes of the fault are:

- Connection problem. Check the connection in the SD-BOX DOORS 49-50 terminals.
- Improper opening of the series of doors. Check that no doors have actually opened in the complete series of lift doors, thus causing an error.


### **Fault F1:**

This will appear if the inductive sensor does not detect that the coil has been powered when it should.

The SD-BOX will power the coil in 2 different situations:

- When starting movement: If the coil is discharged with the lift stopped (MOTOR OFF signal) and a new movement is initiated (MOTOR ON signal).
- When opening the doors while at level: If the coil is de-energised when the lift has stopped at a level (MOTOR OFF and LEVEL 1/2 ON signal) and the DOORS change from closed to open (DOORS change from ON to OFF).

As soon as an F1 fault is detected, the SD-BOX will open the safety chain and try to power the coil several times in an attempt to free it if it has been mechanically stuck. If it cannot be detected by the inductive sensor after these retries, the SD-BOX will reboot and repeat this process. If the fault persists after these retries, the error will be validated and displayed indefinitely on the screen and the safety chain will remain open. If, on the other hand, it is successfully detected during retries, the fault F1 will be automatically cleared and the safety chain will be closed, allowing it to return to normal operating mode.

	Important note	FW versions prior to 5.52 will only perform 7 retries but will not reboot the device automatically.
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Possible causes of the fault are:

- Mechanical problem: Check that there is no mechanical impediment preventing the coil from being properly energised and not being detected by the inductive sensor.
- Incorrect inductive sensor setting: Check that the inductive sensor is correctly adjusted and that it detects the coil supply correctly (this can be checked easily by the light on the sensor itself being on/off).
- Incorrect inductive sensor operation: Check the inductive sensor operation (this can be checked easily by the light on the sensor itself being on/off).

### **Fault F2:**

This appears when an unintended car movement (UCM) is detected; that is, whenever 1 or 2 LEVEL signals are lost (LEVEL1, LEVEL2 or LEVEL1 and LEVEL2 simultaneously change from ON to OFF) with the DOORS open (DOORS OFF).

As soon as an F2 fault is detected, the SD-BOX will open the safety chain and de-energise the coil if it is powered.

Possible causes of the fault are:

- UCM: An unintended car movement has occurred with the doors open.
- Improper loss of door signal: Check the connection in the SD-BOX DOORS 49-50 terminals since, if this signal is lost (changes from ON to OFF) just when the LEVEL signal is also lost (when starting movement from a floor, for example), it will interpret it as a false UCM.
- Improper loss of level signal: Check the connection for the SD-BOX LEVEL1 22-23 and LEVEL2 24-25 terminals and adjustment of their associated sensors. For example, if the sensor is set to the level limit and a drift occurs when passengers enter the lift, it can cause the sensor to stop detecting and be interpreted as a false UCM.

### **Fault F3:**

This will appear when the coil is switched off or the inductive sensor signal is lost with the coil powered.

As soon as an F3 fault is detected, the SD-BOX will open the safety chain and de-energise the coil.

Possible causes of the fault are:

- Coil connection error: Check the connection at the SD-BOX COIL OUTPUT 42-43 terminals and the wiring/connection up to the coil.
- Damaged coil: Check the condition of the coil by ensuring the resistance between the terminals is between 42 and 52  $\Omega$
- Incorrect inductive sensor setting: Check that the inductive sensor is correctly adjusted and that it detects the coil supply correctly (this can be checked easily by the light on the sensor itself being on/off).
- Incorrect operation of the inductive sensor: Check the inductive sensor operation (this can be checked easily by the light on the sensor itself being on/off).

### **Fault F4:**

This will appear due to incorrect inductive sensor detection when the coil is de-energised.

This fault can appear for 2 reasons:

- If the inductive sensor remains active after the coil is de-energised (changes from ON to OFF)
- If the inductive sensor is activated while the coil is de-energised

As soon as an F4 fault is detected, the SD-BOX will open the safety chain and de-energise the coil.

Possible causes of the fault are:

- Detection of unwanted metallic object: Check that there are no metallic parts in the vicinity of the inductive sensor that could affect its functionality.
- Blocking of the parking system: Check that the parking system is properly mobile, and can descend completely without being hindered while not being detected by the inductive sensor.
- Incorrect operation of the inductive sensor: Check the inductive sensor operation (this can be checked easily by the light on the sensor itself being on/off).

### **Fault F5:**

This will appear if the inductive sensor does not detect the coil activation after activating the MAN.RESCUE function (either via the button or the EXT.MAN RESCUE 26-27).

As soon as an F5 fault is detected, the SD-BOX will remain with the safety chain closed and the coil energised.

Possible causes of the fault are:

- Mechanical problem: Check that there is no mechanical impediment preventing the coil from being properly energised while not being detected by the inductive sensor.
- Incorrect inductive sensor setting: Check that the inductive sensor is correctly adjusted and that it detects the coil supply correctly (this can be checked easily by the light on the sensor itself being on/off).
- Incorrect operation of the inductive sensor: Check the inductive sensor operation (this can be checked easily by the light on the sensor itself being on/off).

**Fault F6:**

This will appear if the MAN.RESCUE function is activated (either via the button or the EXT.MAN RESCUE 26-27) after a UCM and the inductive sensor does not detect coil activation.

As soon as an F6 fault is detected, the SD-BOX will remain with the safety chain closed and the coil energised.

Possible causes of the fault are:

- Mechanical engagement: The safety gear has engaged after an UCM and the overspeed governor is blocked by the parking system, which cannot unlock the assembly due to the coil being energised. To release the system, the lift has to be moved in the opposite direction to the engagement while fault F6 is shown on the SD-BOX display.
- Mechanical problem: Check that there is no mechanical impediment preventing the coil from being properly energised while not being detected by the inductive sensor.
- Incorrect inductive sensor setting: Check that the inductive sensor is correctly adjusted and that it detects the coil supply correctly (this can be checked easily by the light on the sensor itself being on/off).
- Incorrect operation of the inductive sensor: Check the inductive sensor operation (this can be checked easily by the light on the sensor itself being on/off).

**Fault F7:**

This will appear when the inductive sensor does not detect the coil supply again after activating, pressing and releasing the MAN.TRIPPING function button.

As soon as the F7 fault is detected, the SD-BOX will open the safety chain and de-energise the coil.

Possible causes of the fault are:

- Mechanical engagement: The safety gear has engaged after MAN.TRIPPING and the overspeed governor is blocked by the parking system, which cannot unlock the assembly due to the coil being energised. To release the system, the lift has to be moved in the opposite direction to the engagement, after activating MAN.RESCUE, while fault F7 is shown on the SD-BOX display.
- Incorrect inductive sensor setting: Check that the inductive sensor is correctly adjusted and that it detects the coil supply correctly (this can be checked easily by the light on the sensor itself being on/off).
- Incorrect operation of the inductive sensor: Check the inductive sensor operation (this can be checked easily by the light on the sensor itself being on/off).

**Fault F8:**

This will appear when the inductive sensor does not detect the coil de-energising after activating and pressing the MAN.TRIPPING function button.

As soon as the F8 fault is detected, the SD-BOX will open the safety chain and de-energise the coil.

Possible causes of the fault are:

- Incorrect inductive sensor setting: Check the inductive sensor is correctly adjusted and that it detects the coil supply correctly (this can be checked easily by the light on the sensor itself being on/off).
- Incorrect operation of the inductive sensor: Check the inductive sensor operation (this can be checked easily by the light on the sensor itself being on/off).

**Fault F9:**

This will appear when a short circuit occurs in the coil while it is being powered.

As soon as an F9 fault is detected, the SD-BOX will open the safety chain and de-energise the coil.

Possible causes of the fault are:

- Coil connection error: Check the connection at the SD-BOX COIL OUTPUT 42-43 terminals and the wiring/connection up to the coil.
- Damaged coil: Check the condition of the coil by ensuring the resistance between the terminals is between 42 and 52  $\Omega$

**Warning A1:**

This will appear when the SD-BOX detects the battery is discharged or not connected to terminals 34-35.

Possible causes of the warning are:

- Battery connection error. Check the connection in the SD-BOX BATTERY 34-35 terminals and the wiring/connection to the battery.
- Damaged battery: Check the condition of the battery according to verification test 3, "Checking the battery charge".

**Warning A2:**

This will appear when the SD-BOX has no main power at the POWER 32-33 terminals and is operating solely on battery power.

Possible causes of the warning are:

- Connection error: Check the connection in the POWER 32-33 terminals and the wiring/connection to the power supply.
- Incorrect voltage range: Check that the input voltage is adequate for the requirements of point 4.1 *TECHNICAL FEATURES*.

**Error E0:**

This will appear when the SD-BOX detects an internal short circuit in any of its safety signals (DOORS or LEVEL1/2) after performing a periodic self-test.

As soon as error E0 is detected, the SD-BOX will open the safety chain and de-energise the coil.

Possible causes of the fault are:

- Internal signal short-circuit: An internal short-circuit in any of the safety signals (DOORS or LEVEL1/2) may be detected. If so, Dynatech must be contacted to analyse the equipment.
- Incorrect signal reading sequence: If the signals being tested (DOORS or LEVEL1/2) change status during the self-test carried out by SD-BOX, error E0 may be recorded as the test will be interrupted. Rapid changes (< 1 second) in the DOORS or LEVEL1/2 signals that follow the ON-OFF-ON sequence should be avoided. The SAFETY LINE output should be



connected as the last item in the lift safety chain to prevent this line from opening during the SD-BOX self-check and affecting the door signal, which may lead to the error E0.

### **Error E1:**

This will appear if there is a discrepancy between the LEVEL1 and LEVEL2 signals.

As soon as error E1 is detected, the SD-BOX will open the safety chain and de-energise the coil.

Possible causes of the fault are:

- Connection error: Check the connection on the LEVEL1 22-23 and LEVEL2 24-25 terminals as well as the wiring/connection to the sensors.
- Incorrect level sensor adjustment: Check that the level sensors corresponding to LEVEL1 and LEVEL2 are installed correctly so that the reading of both signals is simultaneous and synchronised. The error cannot be cancelled or the equipment reset until the signals are in accordance with each other.

### **Error E2:**

This will appear if there is an internal discrepancy in the DOORS signal (DOORS1 and DOORS2).

As soon as error E2 is detected, the SD-BOX will open the safety chain and de-energise the coil.

Possible causes of the fault are:

- Connection error: Check the connection in the DOORS 49-50 terminals and the wiring/connection up to the DOORS series.
- Damaged internal components: If this is suspected as causing an internal discrepancy in the DOORS signal, Dynatech must be contacted to analyse the equipment.

### **Error E3:**

This will appear when there is an error in the SEPIC booster responsible for feeding the coil.

As soon as error E3 is detected, the SD-BOX will open the safety chain and de-energise the coil.

Possible causes of the fault are:

- Connection error: Check the wiring in the terminals of COIL 42-43 and the wiring/connections up to the coil.
- Damaged internal components: If the coil cannot be powered, Dynatech must be contacted to analyse the equipment.

### **Error E4:**

This will appear when there is an error in the PWM responsible for powering the coil.

As soon as error E4 is detected, the SD-BOX will open the safety chain and de-energise the coil.

Possible causes of the fault are:

- Connection error: Check the wiring in the terminals of COIL 42-43 and the wiring/connections up to the coil.
- Damaged internal components: If the coil cannot be powered, Dynatech must be contacted to analyse the equipment.

### **Error E5:**

This will appear when the SD-BOX detects a failure in the SAFETY LINE relay 1 while performing one of its periodic self-tests.

As soon as the E5 error is detected, the SD-BOX will carry out 7 verification retries. If this does not solve the problem, it will open the safety chain and de-energise the coil.



Possible causes of the fault are:

- Damaged internal components: If this is suspected as causing a failure in the SAFETY LINE relay 1, Dynatech must be contacted to analyse the equipment.

#### **Error E6:**

This will appear when the SD-BOX detects a failure in the SAFETY LINE relay 2 while performing one of its periodic self-tests.

As soon as the E6 error is detected, the SD-BOX will carry out 7 verification retries. If this does not solve the problem, it will open the safety chain and de-energise the coil.

Possible causes of the fault are:

- Damaged internal components: If this is suspected as causing a failure in the SAFETY LINE relay 2, Dynatech must be contacted to analyse the equipment.

#### **Error E7:**

This will appear when the SD-BOX detects a synchronisation error in the safety processes.

As soon as error E7 is detected, the SD-BOX will open the safety chain and de-energise the coil.

Possible causes of the fault are:

- Program synchronisation error: If a FW desynchronisation is found, Dynatech must be contacted to analyse the equipment.

#### **Error E8:**

This will appear when the SD-BOX detects a FLASH memory read/write error.

As soon as error E8 is detected, the SD-BOX will open the safety chain and de-energise the coil.

Possible causes of the fault are:

- FLASH memory error: If a read/write error is found in the FLASH memory, Dynatech must be contacted to analyse the equipment.

#### **Error E9:**

This will appear when the SD-BOX detects a RAM read/write error.

As soon as error E9 is detected, the SD-BOX will open the safety chain and de-energise the coil.

Possible causes of the fault are:

- RAM error: If a read/write error is found in the RAM, Dynatech must be contacted to analyse the equipment.

#### **Error L0:**

This will appear when the SD-BOX detects an EEPROM read/write error.

As soon as the L0 error is detected, the SD-BOX will open the safety chain and de-energise the coil.

Possible causes of the fault are:

- EEPROM error: If a read/write error is found in the EEPROM, Dynatech must be contacted to analyse the equipment.

## 5. ASSEMBLY

### 5.1. GENERAL

The assembly electrical connection and commissioning must be performed by properly trained, specialist personnel.

The various connection terminals operate at different voltages, e.g. some are at 24 V<sub>DC</sub> and others at 230 V<sub>DC/AC</sub>. If the 230V is connected to a 24V input, the SD-BOX will be destroyed.

Protect the box and connection terminals from dust and humidity.




The system is contained inside an electrical box for easy placement. On its lower side, it has some tabs so it can be easily installed on a 35mm DIN rail. In its final position, the box must be properly secured.

Before assembly, it must be verified that the box has not been damaged during transport.

The box dimensions are:

- Length: 157 mm
- Width: 90 mm
- Height: 71 mm

### 5.2. ELECTRICAL CONNECTION

	Before the electrical connection, check there is no safety risk for the installer.
	Before connecting the batteries, check the voltage at the battery's terminals is 11-13 V.
	Having an UCM control can affect the lift maintenance work. During lift maintenance procedures, it must be taken into account that the UCM control is connected. The operator must consider that any action to open the doors from outside floor level will result in the safety line opening and the overspeed governor being locked.

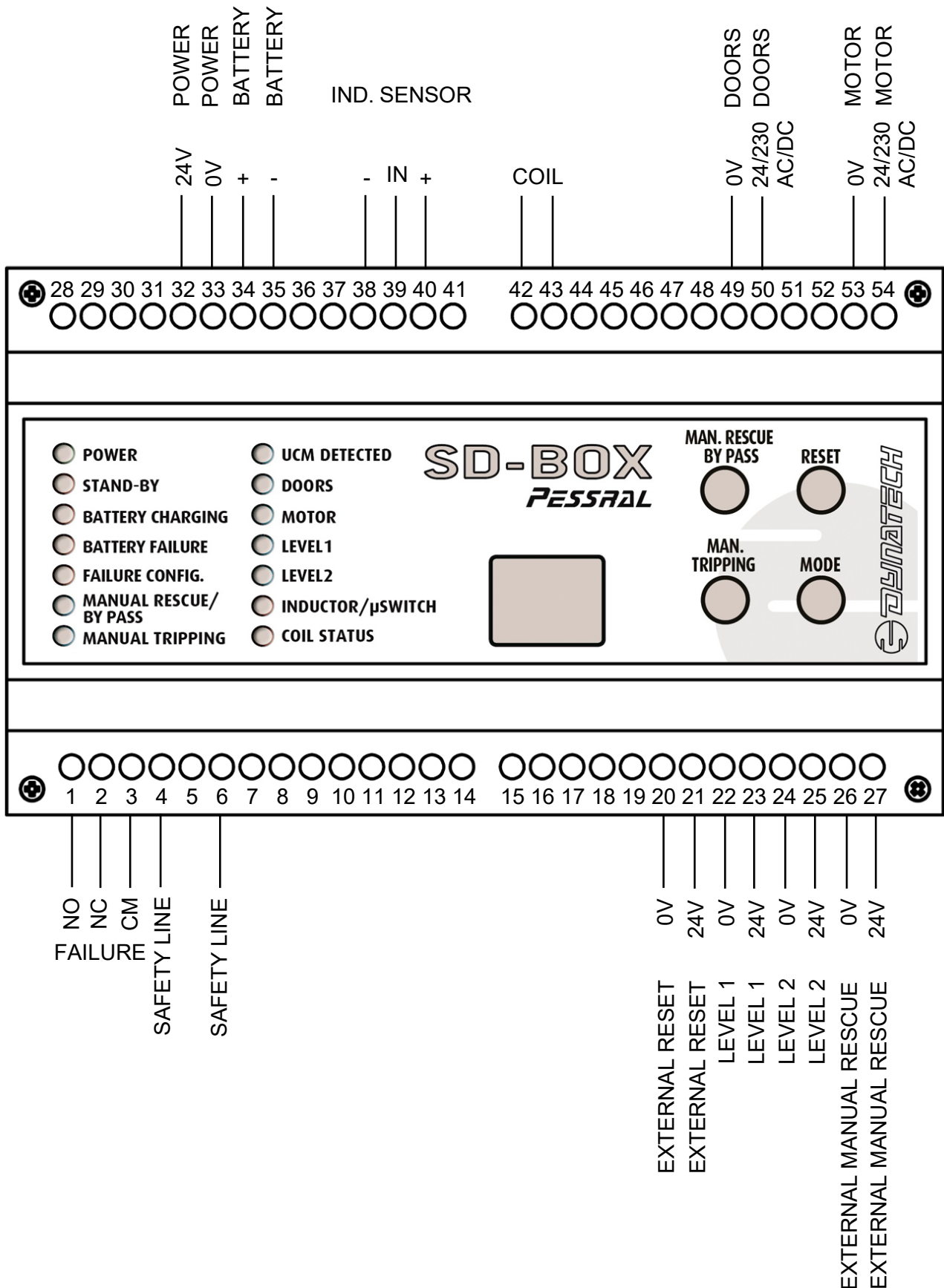



Diagram 1: Main electrical connections


Electrical power supply

- The electrical power of the system, terminals 32-33, must be connected to a 24 V<sub>DC</sub> SELV/PELV source.
- Terminals 34-35 are used for battery power, when the main power fails, to prevent the safety gear from engaging. These same terminals are also used for charging the battery, so no intermediate charger need be connected.

	External battery charger	Do not connect a charger between the batteries and the SD-BOX, as it may burn.
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Necessary input signals from the lift

- DOORS, terminals 49-50, to indicate the doors are closed. The car door must be connected in series with the floor doors. The input allows the use voltages from 24 to 230 V<sub>DC/AC</sub>.
- MOTOR, terminals 53-54, to indicate the motor is running. A lack of voltage means the machine is not working. The input allows the use voltages from 24 to 230 V<sub>DC/AC</sub>.
- Unlocking zone (LEVEL1/LEVEL2), terminals 22-23 LEVEL1 and 24-25 LEVEL2. This indicates the car is at floor level. The input must be connected to a 24 V<sub>DC</sub> signal.

	Floor level information	Two unlocking zone sensors must be used: one for LEVEL1 and another for LEVEL2.
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Optional installation inputs

In addition to the physical MANUAL RESCUE and RESET buttons, the SD-BOX can be used for the optional inputs discussed below for a manual rescue or remote reset from the control panel or another controller.

- Remote manual rescue signal (EXTERNAL MANUAL RESCUE), terminals 26-27, to implement a manual rescue or bypass command. If there is a voltage applied for more than 3 seconds, the overspeed governor will be unlocked. The input requires a 24 V<sub>DC</sub> signal, whose use is optional. The bypass can be performed using the “MANUAL RESCUE/BYPASS” button on the SD-BOX.
- Remote reset signal (EXTERNAL RESET)<sup>7</sup>, terminals 20-21, to implement the reset command from the control panel. If there is a voltage applied, the reset function must be performed. The input is activated with a 24 VDC pulse greater than 3 seconds, whose use is optional. The bypass can be performed using the “RESET” button on the SD-BOX.


<sup>7</sup> The RESET function will not work when the “MOTOR” input is activated

### Outputs

- The output connected into the SAFETY chain, terminals 4 and 6, is part of two relays in series which open when an UCM or fault is detected as described above, causing the safety line to open. If there is no UCM or failure, these contacts will remain closed. If there is a power cut, the contacts open, thus opening the safety line. If the coil has a fault, the contacts will also open, once the motor input is deactivated, so the car can complete the travel being taken when the fault occurs. If the motor is deactivated, it opens immediately if a fault is found in the coil.
- The SD-BOX performs a self-test function of the safety relays every time the MOTOR signal changes from ON to OFF or every time the RESET function is activated, consisting of momentarily opening and closing it to detect a possible short circuit. Therefore, this outlet should be connected to the end of the complete lift safety line as the last component in the chain so that opening the line does not affect the rest of the lift components.
- SYSTEM FAILURE information, terminals 1-2-3, is a non-safety related signal with a configurable output to inform the control panel of 2 different options:
  - A. The relay will change status when one of the aforementioned faults/errors is detected in “4.5 DESCRIPTION OF FAULTS”. The normally open (NO) 1-3 FAILURE relay contact will be closed and the normally closed contact (NC) 2-3 will open.
  - B. The relay will change status according to the coil status: when this is powered, the normally open (NO) 1-3 FAILURE relay contact will be closed and the normally closed contact (NC) 2-3 will open.

### Overspeed governor connection components

- The action of the coil releases the overspeed governor and allows its free rotation. If the coil is not powered, a spring activated system locks the overspeed governor. If there is no power reaching the coil with the car in motion, the overspeed governor will lock which could engage the safety gear. This is why batteries must be used to prevent unwanted engagement of the safety gear if there is a power failure in the lift.
- An inductive sensor or  $\mu$ Switch (IND SENSOR), terminal 38 (inductive sensor supply 0 V<sub>DC</sub>), terminal 49 (detection), terminal 40 (inductive sensor power supply 24 V<sub>DC</sub>). The inductive sensor/ $\mu$ Switch is a control sensor on the overspeed governor to check the proper operation of the coil. This signal indicates the overspeed governor is unlocked; the absence of voltage indicates the overspeed governor is locked.

	Important note	The batteries must be connected for proper operation.
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### 5.3. ELECTRICAL DIAGRAMS

- 1 OUTPUT. Normally open (NO) for fault indicator/coil status. This contact is closed if there is a fault or the coil is activated.
- 2 OUTPUT. Normally closed (NC) for fault indicator/coil status. This contact is open if there is a fault or the coil is activated.
- 3 OUTPUT. Common for fault indicator.
- 4 OUTPUT. SAFETY LINE: Common safety contact to connect to safety line.
- 5 No connection.
- 6 OUTPUT. SAFETY LINE: Normally open contact to connect to safety line.
- 7-19 No connection.
- 20 INPUT. External reset. 0 V
- 21 INPUT. External reset, 24 V. If there is voltage, the reset action is performed.
- 22 INPUT. Level 1. 0 V
- 23 INPUT. Level 1. 24 V.
- 24 INPUT. Level 2. 0 V
- 25 INPUT. Level 2. 24 V.
- 26 INPUT. Remote manual rescue, 0 V.
- 27 INPUT. Remote manual rescue, 24 V. If there is voltage for more than 3 seconds, the manual or bypass rescue action is performed.
- 28-31 No connection.
- 32 INPUT. 24 V<sub>DC</sub> power supply.
- 33 INPUT. 0 V power supply.
- 34 INPUT. Batteries +
- 35 INPUT. Batteries -
- 36 No connection.
- 37 No connection.
- 38 OUTPUT. Inductive sensor, 0 V power supply.
- 39 INPUT. Inductive sensor, Detection.
- 40 OUTPUT. Inductive sensor, 24 V<sub>DC</sub> power supply.
- 41 No connection.
- 42 OUTPUT. Coil, 24 V<sub>DC</sub>
- 43 OUTPUT. Coil, 0 V<sub>DC</sub>
- 44-48 No connection.
- 49 INPUT. Doors, 0 V

- 50 INPUT. Doors, 24-230 V<sub>DC</sub> or 24-230 V<sub>AC</sub>. If there is voltage, the door safety line is closed.
- 51 No connection.
- 52 No connection.
- 53 INPUT. Motor. 0 V
- 54 INPUT. Motor, 24-230 V<sub>DC</sub> or 24-230 V<sub>AC</sub>. If there is voltage, the motor is running.



Electrical connections

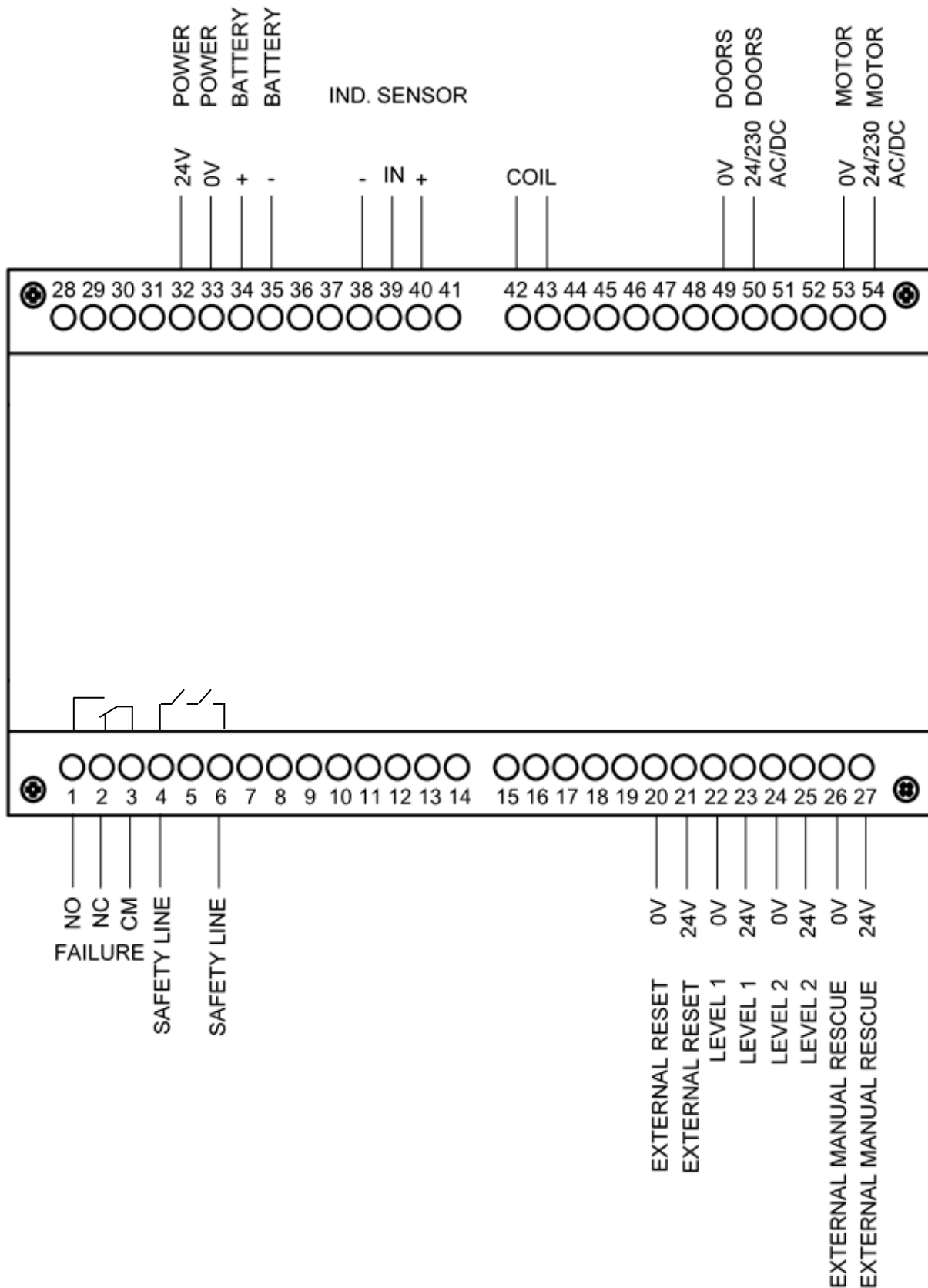


Figure 2: Internal relays electrical connection

## 6. OPERATING REQUIREMENTS

### 6.1. FIRST START UP

After the first start-up, the "RESET" button has to be pressed to restart the system.

The "RESET" button does not have to be pressed after a power cut.

### 6.2. SETTING THE COIL DE-ENERGISATION WAIT TIME WITH THE CAR AT LEVEL

The SD-BOX coil de-energisation wait time can be modified when the car is at floor level without moving it. The default value is 10 minutes but can be changed in the range from 1 second to infinite.

### 6.3. SETTING THE FAILURE OUTPUT RELAY

- "1" – The FAILURE output will change status, the normally open (NO) contact will close and the normally closed (NC) contact will open if any error is detected in the SD-BOX.
- "0" – The output is set to show the status of the coil. At this value, the output will change status: the normally open (NO) contact will close and the normally closed contact (NC) will open, depending on the coil status, whether energised or at rest.

### 6.4. AUTOCHECK TEST FUNCTION

This test the proper operation of the SD-BOX, such as the LEDs, relays and coil control.

### 6.5. VERIFICATION TESTS

Before commissioning and also periodically, the following verification test procedure must be performed:

**Test 1** - Arrival at floor level and opening the doors:

- Press the "RESET" button.
- Make a call.
- Wait for the car to reach its destination and for the doors to open.
- Check the LEDs are in the status indicated in the following table:

LED	On	Off
POWER	X	
STAND-BY		X
BATTERY CHARGING	X (if the battery is charging)	X (if the battery is charged)
BATTERY FAILURE	X (if the battery is discharged or not connected)	X (if the battery is charged and connected)
FAILURE CONFIGURATION	X (if configured to show system fault at output)	X (if configured to show coil status at output)

MANUAL RESCUE/BYPASS		X
MANUAL TRIPPING		X
UCM DETECTED		X
DOORS		X
MOTOR		X
LEVEL1	X	
LEVEL2	X	
INDUCTOR/ $\mu$ SWITCH	X	
COIL STATUS	X	

**Test 2** - Doors closing and normal travel operation

- Press the “RESET” button.
- Make a call.
- Check the LEDs are in the status indicated in the following table during the travel between floors:

LED	On	Off
POWER	X	
STAND-BY		X
BATTERY CHARGING	X (if the battery is charging)	X (if the battery is charged)
BATTERY FAILURE	X (if the battery is discharged or not connected)	X (if the battery is charged and connected)
FAILURE CONFIGURATION	X (if configured to show system fault at output)	X (if configured to show coil status at output)
MANUAL RESCUE/BYPASS		X
MANUAL TRIPPING		X
UCM DETECTED		X
DOORS	X	
MOTOR	X	
LEVEL1	Flashes when passing through each level during the travel	X
LEVEL2	Flashes when passing through each level during the travel	X
INDUCTOR/ $\mu$ SWITCH	X	
COIL STATUS	X	

**Test 3** - Checking the battery charge

This test should be carried out only if batteries are used as an auxiliary power source.

- Press the “RESET” button.
- Check the battery is properly connected to the corresponding terminals.
- Check that the “BATTERY CHARGING” LED is on (or off if it is fully charged) and the “BATTERY FAILURE” LED is off. If the “BATTERY FAILURE” LED is on:
  - Note down the voltage of the batteries.
  - Leave for a few minutes.
  - If the "BATTERY FAILURE" LED does not turn off during this time, check the battery voltage: this must be higher than previously noted.

**Test 4** - Performing the rescue operation without power in the lift

- Press the “RESET” button.
- Cut the power supply to the lift. This can be done at the floor level; it does not need to be done outside of the level.
- Check the “BATTERY FAILURE” is not lit. If it is, perform Test 3, “Checking the battery charge”.
- Wait 4 seconds for the overspeed governor to be locked.
- Press the “MANUAL RESCUE/BYPASS” button for more than 3 seconds.
- Check the overspeed governor is unlocked.
- Check the SD-BOX beeps intermittently during the “MANUAL RESCUE/BYPASS” mode.
- Check the LEDs are in the status indicated in the following table:

LED	On	Off
POWER	X	
STAND-BY		X
BATTERY CHARGING	X (if the battery is charging)	X (if the battery is charged)
BATTERY FAILURE	X (if the battery is discharged or not connected)	X (if the battery is charged and connected)
FAILURE CONFIGURATION	X (if configured to show system fault at output)	X (if configured to show coil status at output)
MANUAL RESCUE/BYPASS	X	
MANUAL TRIPPING		X
UCM DETECTED		X
DOORS		X
MOTOR		X
LEVEL1		X
LEVEL2		X
INDUCTOR/ $\mu$ SWITCH	X	
COIL STATUS	X	

- Press the “MANUAL RESCUE/BYPASS” button.
- Check the intermittent beep disappears.
- Reconnect the lift power supply.
- Check the SD-BOX recovers its normal operating status.

The maximum time for the “MANUAL RESCUE/BYPASS” status with battery power is 10 minutes. After this time, the SD-BOX automatically returns to a state of rest.

**Test 5** – Check wait time after arriving at a floor (default is 10 minutes):

- Press the “RESET” button.
- Make a call and wait longer than the programmed time (which by default is 10 minutes).
- Check the LEDs are in the status indicated in the following table:

LED	On	Off
POWER	X	
STAND-BY		X
BATTERY CHARGING	X (if the battery is charging)	X (if the battery is charged)
BATTERY FAILURE	X (if the battery is discharged or not connected)	X (if the battery is charged and connected)
FAILURE CONFIGURATION	X (if configured to show system fault at output)	X (if configured to show coil status at output)
MANUAL RESCUE/BYPASS		X
MANUAL TRIPPING		X
UCM DETECTED		X
DOORS	X (while waiting, the doors can either be open or closed)	X (while waiting, the doors can either be open or closed)
MOTOR		X
LEVEL1	X	
LEVEL2	X	
INDUCTOR/ $\mu$ SWITCH		X
COIL STATUS		X


- Make a call.
- Check the overspeed governor is unlocked before the car moves and the safety gear is disengaged.

**Test 6** - Unintended car movement (UCM)

- Press the “RESET” button.
- Place the car at floor level with the doors open.
- Disconnect the floor level signals LEVEL1 and LEVEL2 simultaneously to simulate the car leaving floor level with the doors open.
- UCM should be detected when perceiving the level output with doors open.
- Check the overspeed governor is locked.
- Check the safety line has opened.
- Check the fault “F2” appears on the display.
- Check the LEDs are in the status indicated in the following table:

LED	On	Off
POWER	X	
STAND-BY		X
BATTERY CHARGING	X (if the battery is charging)	X (if the battery is charged)
BATTERY FAILURE	X (if the battery is discharged or not connected)	X (if the battery is charged and connected)
FAILURE CONFIGURATION	X (if configured to show system fault at output)	X (if configured to show coil status at output)
MANUAL RESCUE/BYPASS		X
MANUAL TRIPPING		X
UCM DETECTED	X (Flashing)	
DOORS		X
MOTOR		X
LEVEL1		X
LEVEL2		X
INDUCTOR/μSWITCH		X
COIL STATUS		X

- Reconnect floor level signals.
- Press the “RESET” button.
- Check the overspeed governor has been released.

	<p>Important note</p>	<p>If the LEVEL1 and LEVEL2 signals are not switched off simultaneously, the signal discrepancy error E1 will appear instead of an UCM being detected and the fault “F2” appearing on the display. See “4.5 DESCRIPTION OF FAULTS”.</p>
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## 7. MAINTENANCE

### 7.1. GENERAL

No specific maintenance is required, except for periodic checks.

At least every year, a system operation verification test shall be carried out as described in section "6.5 VERIFICATION TESTS".

### 7.2. CLEANING

Neither the box nor electrical connections must be cleaned with liquids or items that could affect the correct functioning of the electrical system.

### 7.3. STORAGE CONDITIONS AND USEFUL LIFE

The SD-BOX should be stored in a cool, dry place protected from excessive light. It should never be exposed to bad weather conditions.

Storage temperature: 5-40°C

Storage humidity: 15-85%

The SD-BOX must remain clean to be clearly identified.

When placing products or product packaging in layers, the storage height must be according to load and stability.

The useful life of the component is considered to be at least 20 years and must be replaced when this time has been reached. The SD-BOX should not be used outside the previously established ranges or its useful life could be affected. In addition, exposure to environmental conditions other than those marked during operation has not been considered.

### 7.4. INSPECTIONS

	Installation and commissioning	Revision every 3 months	Revision every 12 months
Verification tests	X		X
AUTOCHECK test	X	X	
Coil performance		X	
Battery charging		X	

The SD-BOX performs automatic periodic tests every cycle to check the proper operation of the SAFETY LINE output safety relays and battery condition and charge.

### 7.5. SPARE PARTS

	Change every 2 years
Change batteries	X

Contact Dynatech or an authorised distributor to purchase the corresponding spare parts.

## 8. OPTIONS

### 8.1. BATTERIES



Rechargeable batteries	12 V <sub>DC</sub> , 1.5Ah
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The batteries are necessary for the proper functioning of the SD-BOX if there is a power cut. They are not included in the SD-BOX, as some customers have their own battery suppliers.

The batteries must be 12 V<sub>DC</sub> and 1.5Ah Ni-Cd with the SD-BOX having its own charger of 2 charging currents, fast and slow. It also detects if the battery is discharged or disconnected.

The LED charge indicator will stay ON when performing a fast charge and will turn OFF when the battery is fully charged.

The SD-BOX will perform a periodic test to check the status of the batteries if it detects they are damaged, whereupon the BATTERY FAILURE LED will light up.

	Important note	Rechargeable batteries are required for proper operation, but are not included in the SD-BOX
	Important note	The disposal of the batteries will be carried out in accordance with Directive 2006/66/EC