SINGLE-ACTING ELECTROMECHANICAL ACTIVATION

DA

INSTRUCTIONS FOR USE AND MAINTENANCE

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	Initial document				Not applicable

CONTENTS

1 DESCRIPTION

The "direct-acting" (hereinafter known as D.A.) electromechanical activation for ASG safety gears consists of a set of spring-activated articulated levers that move the braking roller from the roller holding position or lift operating position to the pre-lock position.

Therefore, the safety gear is activated when the activation spring brings the safety gear roller closer to the pre-lock position. For normal lift operations, the safety gear is reset by a linear solenoid and a holding coil keeps the actuation mechanism in its not-locked or roller holding position.

Below is a diagram of the eASG electromechanical safety gear, formed by the D.A. direct-acting electromechanical activation and the ASG safety gear (Figure 1).

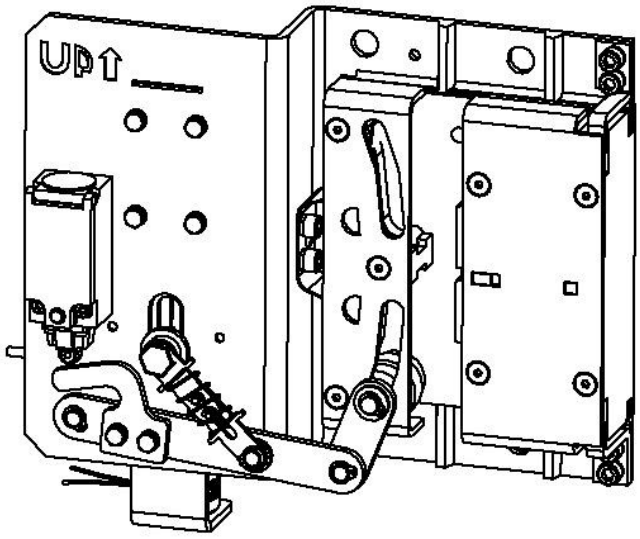

Figure 1 eASG electromechanical safety gear

The DA electromechanical activation can activate the entire range of Dynatech ASG safety gears. Activation is common to any model of safety gear in this range. For further information on the safety gear (P+Q, guide rail type, etc.), please read the manuals corresponding to the ASG range.

Figure 2 shows the part corresponding to the D.A. direct-acting electromechanical activation and the part corresponding to the ASG safety gear.

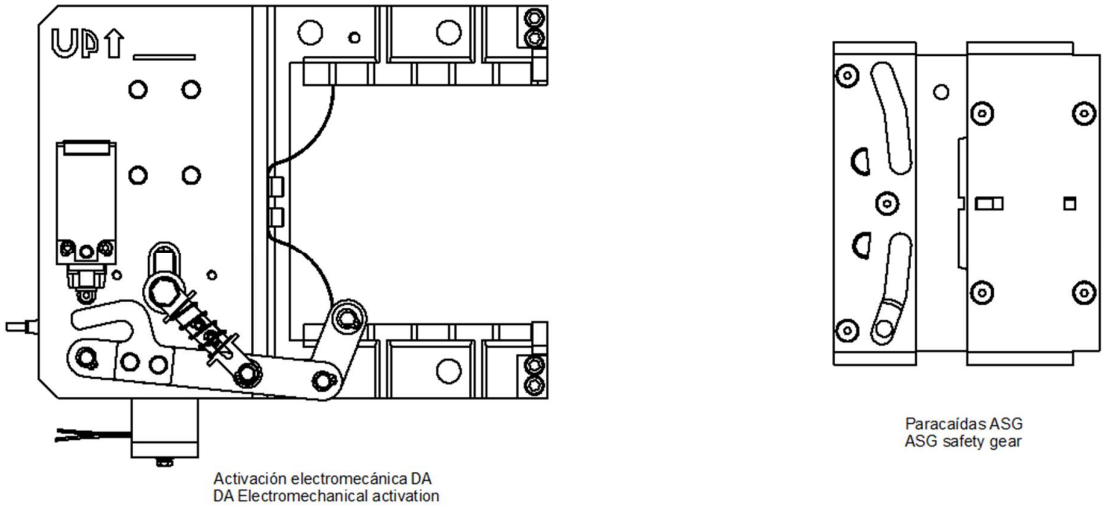

Figure 2. Difference between activation and safety gear

Given its design, the safety gear has the feature of engaging itself when the roller touches the guide rail. Due to this, on these electromechanical models, when the coil is not powered the activation spring forces the roller to touch the guide rail. This means that, if the car were to move downwards, the safety gear would immediately and automatically engage itself. **This is known as positive safety.**

There are therefore 3 modes in the activation: Holding, pre-lock and locked or engaged.

2 DA DIRECT-ACTING ELECTROMECHANICAL ACTIVATION

The electromechanical safety gears must be installed with a linear encoder system or electronic governor capable of reading and detecting the position and speed of the car. This electronic device must be PESSRAL certified and have an SIL 3 safety rating to manage the safety gear output, given by the corresponding notified body.

⚠	The activation is not responsible for detecting any type of fault in the installation. Another component must be responsible for this function.

2.1 Operation

The eASG electromechanical safety gear is shown below in its natural or idle status (no electrical power), i.e. the braking roller in pre-lock position due to the force of the electromechanical activation engagement spring.

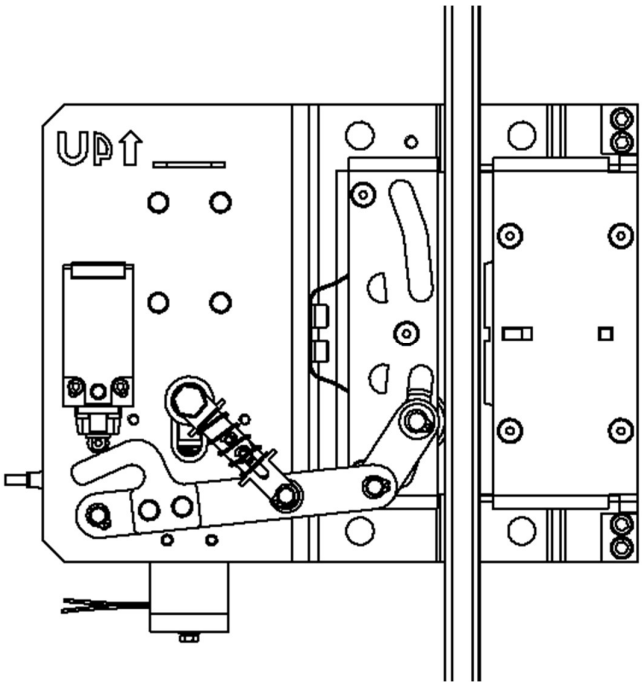

Figure 3 Pre-lock position

The activation resets the safety gear through a linear electromagnet, moving the roller to its holding position and a holding coil is responsible for keeping it in this position. A linear solenoid, therefore, resets the system and a holding coil holds the system.

The electronic overspeed governor, or linear encoder, only controls the holding coil, which is responsible for holding and not the reset coil. If the linear encoder detects overspeed, its internal contacts are opened and the holding coils on both sides are disconnected. When the coils are disconnected, the engagement springs force the rollers against the guide rail (Figure 3), making them brake.

The reset coil must be disconnected when the holding coil is in holding mode.

	It is very important for the reset coil to be disconnected when the system is in its holding position so that there are no problems with system safety.
	The reset coil will burn if it is left connected. It is not a 100% ED coil, and its use is only established for resetting the equipment.

The different components of the eASG system are shown below. Figure 4

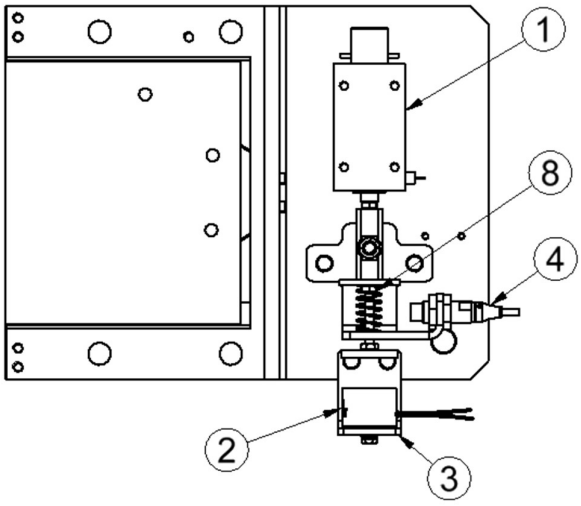

Figure 4. eASG. Rear view

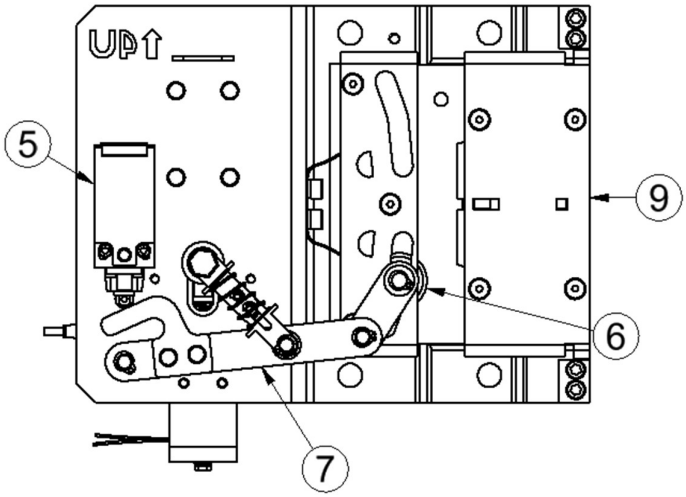

Figure 5. eASG. Front view

1. Linear reset electromagnet
2. Holding coil
3. Holding mount
4. Inductive monitoring sensor
5. Safety limit switch
6. Actuation roller
7. Actuation leverage
8. Engagement spring
9. Mechanical safety gear

2.2 Engagement and reset

2.2.1 ENGAGEMENT

Figure 6 shows the system engaged. When the eASG system is activated (pre-lock position), it is not engaged and a relative downwards movement of the car is required for the safety gear to engage.

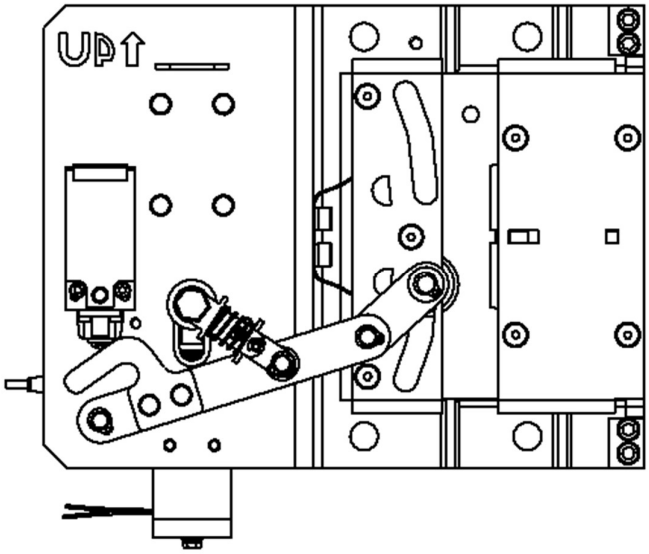

Figure 6. Locked position

When the roller locks, the limit switch located inside the mechanism is enabled. As can be seen in Figure 7, the limit switch is enabled.

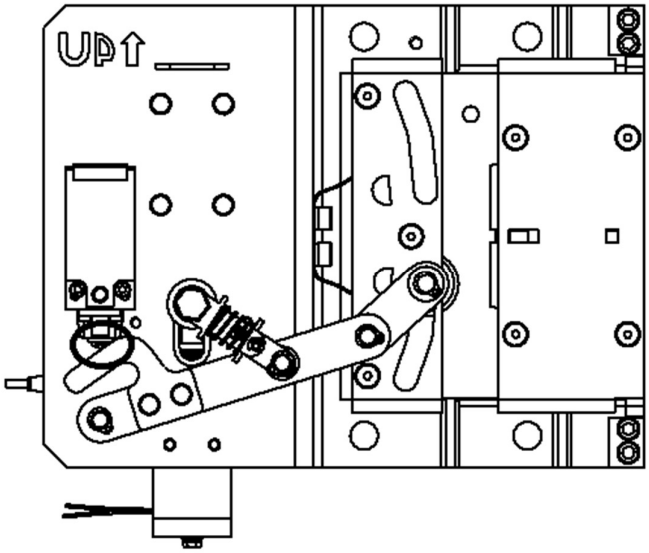

Figure 7 Limit switch triggered at engagement

It is important to note that, when the safety gear is in pre-engagement status (with the coil de-energized and the roller resting on the guide rail), the safety contact is not enabled, and the lift safety line is not interrupted.

⚠	The fact that the safety line only opens when the safety gear is engaged allows for saving modes on the installation, such as STAND-BY and SLEEP MODE.

2.2.2 RESET

When resetting the system, move the car upwards (opposite direction to safety gear engagement). The coils must be powered at this time to set the system to its reset position.

	See Section 4 for the compliances of each model regarding the reset requirements.

The activation includes a monitoring sensor that issues a signal when the safety gear is fully reset. This information is important because, were the system not reset for some reason, either because the coil is faulty or for some other reason, this would cause it to engage when not required. Figure 8

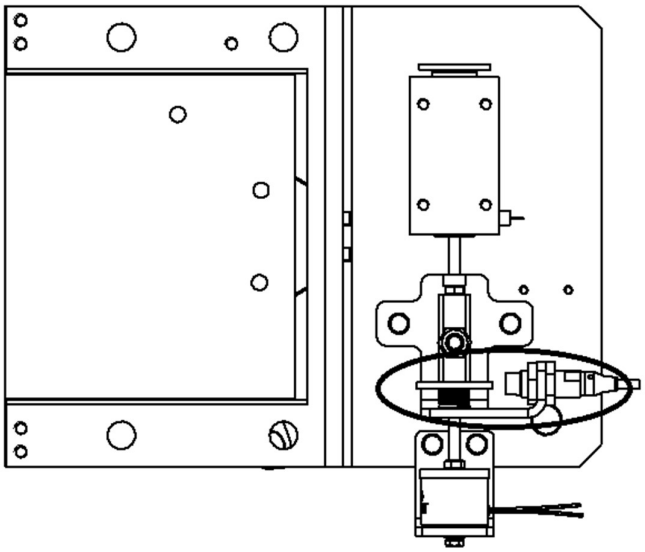

Figure 8. Holding position monitoring

3 INSTALLATION

3.1 General

A safety gear system assembly is formed by two sides; one safety gear for each side of the frame, as can be seen in Figure 9. Special attention must be paid to ensure the "UP" mark is at the top when they are installed. Figure 10

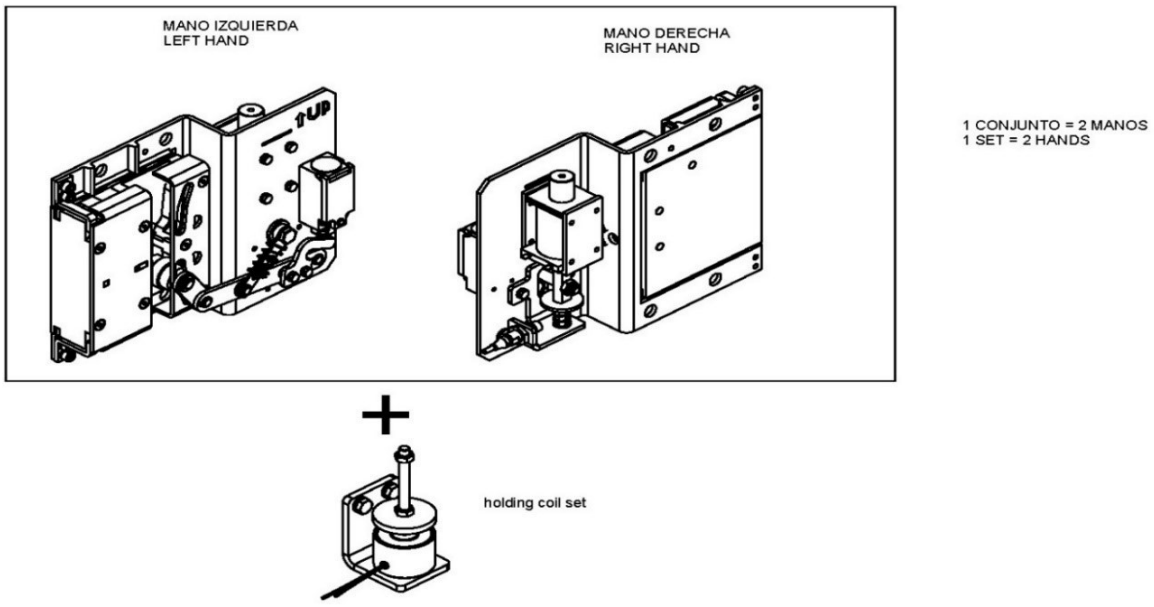

Figure 9 eASG electromechanical safety gear assembly

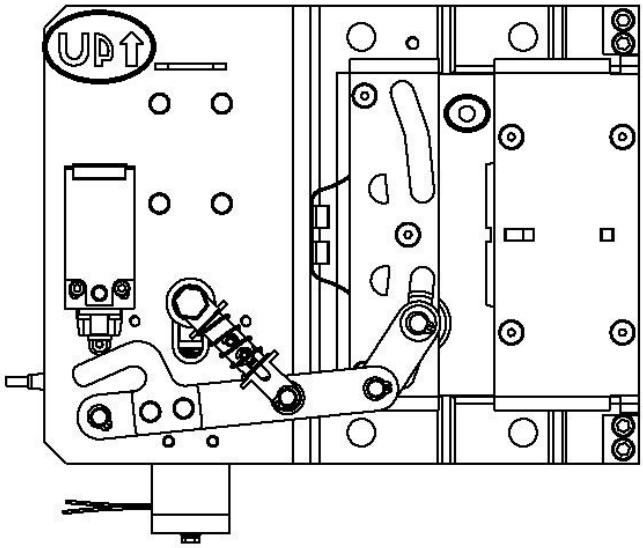

Figure 10 Safety gear installation position

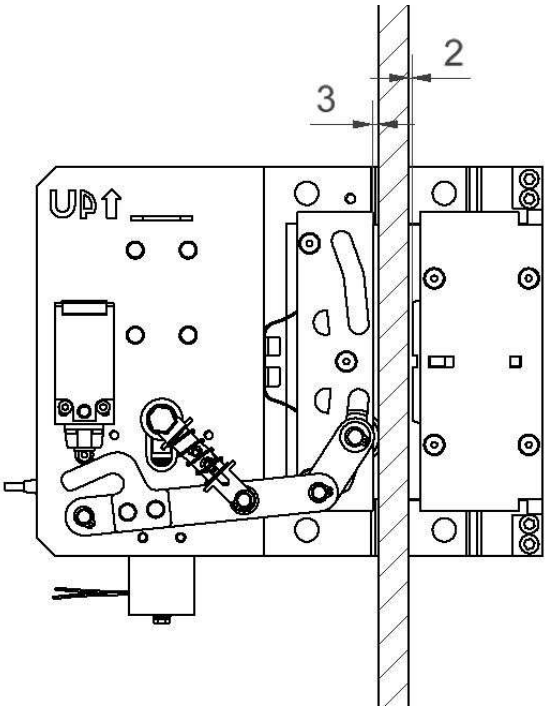

Figure 11 Safety gear adjustment in relation to the guide rail

For correct working order, it is very important for the safety gear to be installed on the frame so that the clearance between the shoe and the guide rail is a maximum of **2 mm**. Figure 11

As can be seen in Figure 11, the safety gear shoe must be positioned 2 mm from the guide rail. Given that the safety gear has a total clearance of 5 mm, the other side of the guide rail will be 3 mm from the plate where the rollers are housed.

It is important to note that the 2 mm distance from the shoe to the guide rail must be respected and must not vary from a tolerance of ± 0.5 mm. The safety gears are factory-positioned depending on the type of guide rail where they are to be fitted. Make sure that the tolerances of the assembling holes in relation to the bolts do not exceed the limits set in this manual.

	These tolerances must be respected, as this type of electromechanical actuation is very sensitive to the position in relation to the guide rail.

The safety gear must be installed as parallel and vertical as possible to the guide rail to guarantee the required tolerance. Figure 12

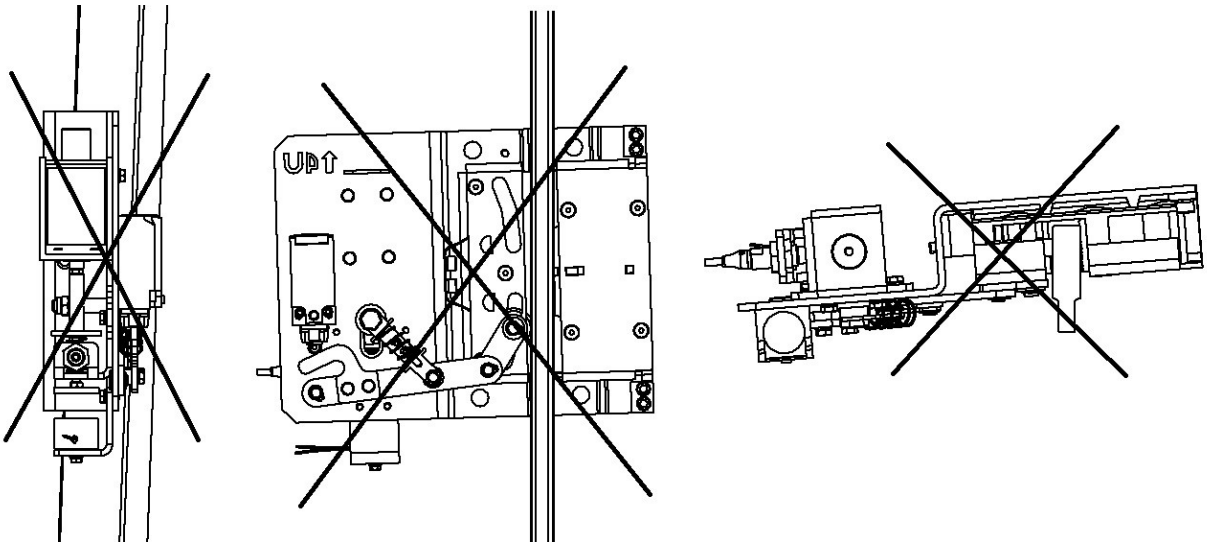

Figure 12 Incorrect installation

3.2 Installing the eASG electromechanical safety gear on the frame:

The activation is supplied in locked mode and must be unlocked before the eASG can be fitted on the frame or the guide rail can be installed. Figure 10

Electrically: The holding coil can be powered to keep the roller in holding position and to fit the eASG on the guide rail. Where batteries are used, they must be strong enough to hold the roller.

Power the holding coil at 24V and move the activation by hand until the holding coil is able to hold the system.

The time you will have to complete the installation will depend on the battery capacity.

Manually: The manual way consists of fitting the manual locking plate, bolted to the shaft of the coil in each activation. This is a coil lock that must be removed once the installation work is complete. The installer is responsible for installing and removing the piece.

⚠	The piece locks the movement of the coil shaft and prevents any movement, thus overriding the safety function.

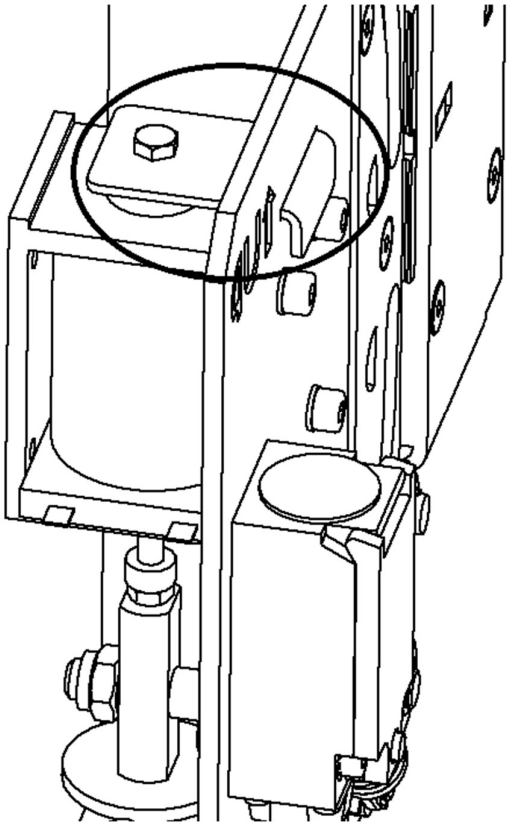

Figure 13 Manual activation lock

The activation has moving parts that must never be prevented from moving. Therefore, make sure that no movement is locked in any of the safety gear modes.

	Always respect the limits of use set in this manual to avoid any damage or wear to the equipment.

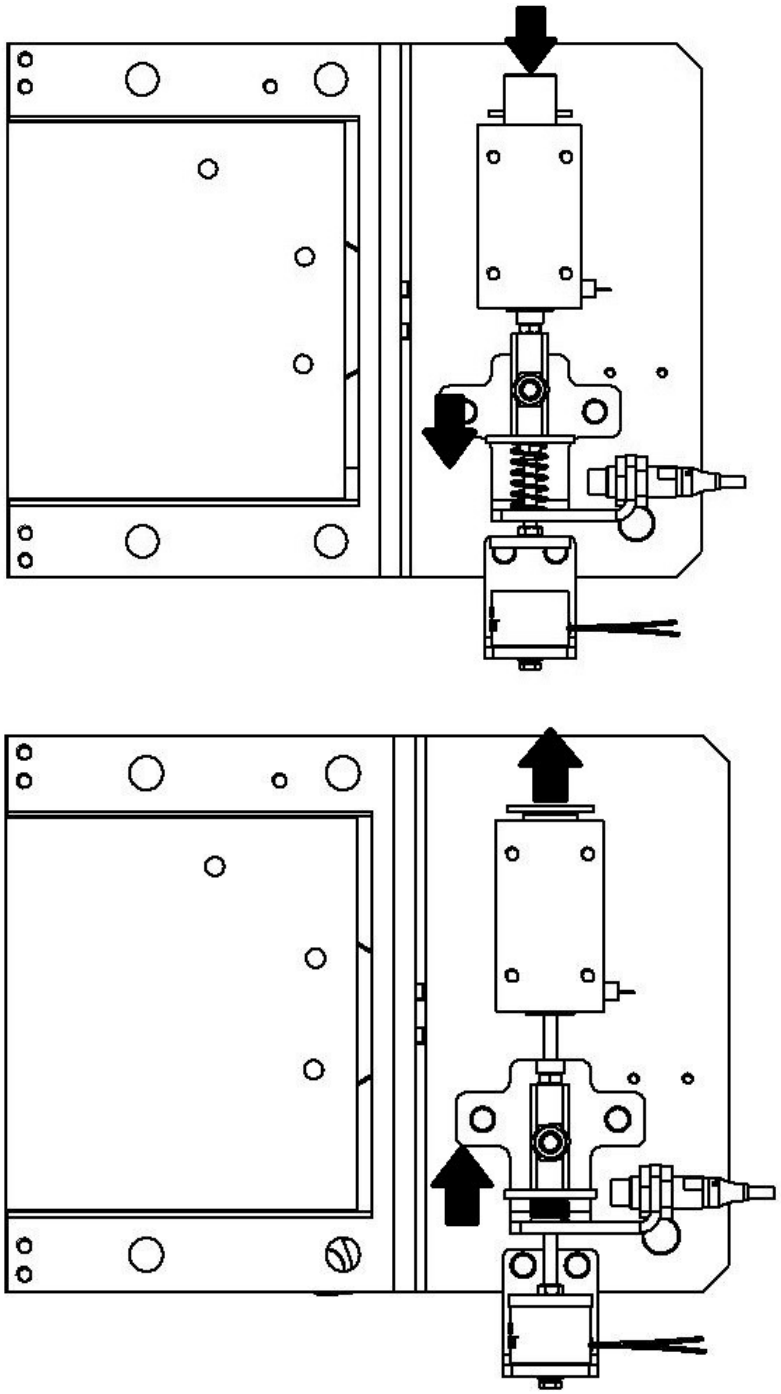

Figure 14 DA electromechanical activation part movement

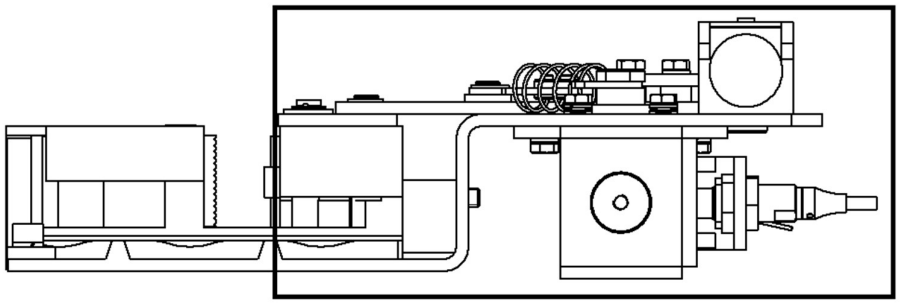

Figure 15 Area clear of obstacles

4 CONNECTION

4.1 General connection

The activation uses the reset coil combined with a holding coil. Only the holding coil is managed by the linear encoder or electronic governor acting as the safety function and must be connected in line with the SGC output. The reset circuit is independent.

	Once the eASG has been installed, make sure that no component is preventing the activation parts from moving.

The connection should be made so that, once the reset coil is powered and the system reaches the end not-locked position, the reset coil is disconnected and only the holding coil is left connected. A diagram is shown below as an example of this connection. Figure 16

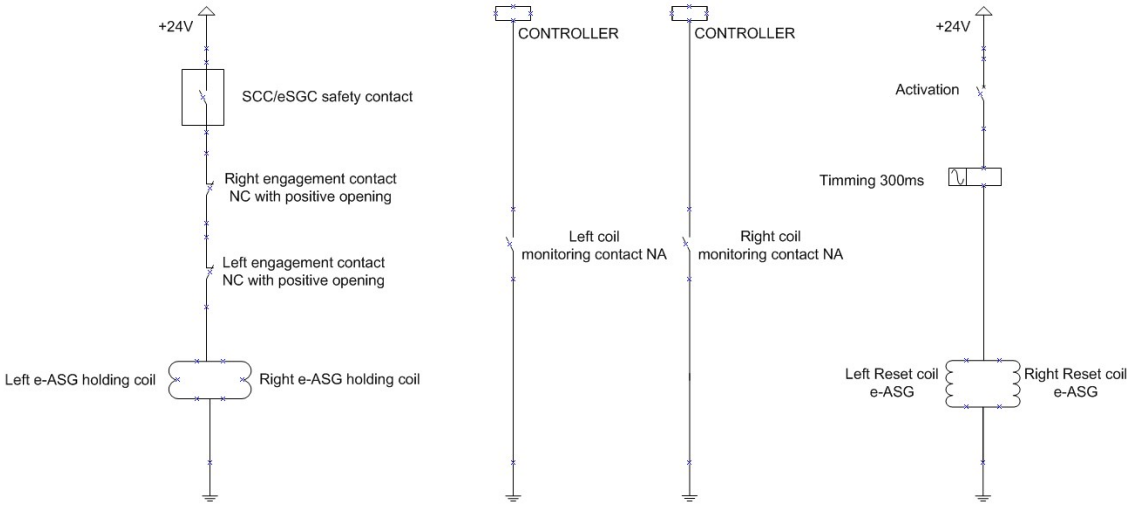

Figure 16 Example of a connection diagram

The SGC (Safety Gear Contact) is the safety contact fitted to the linear encoder system (electronic detection) that, when opened, disconnects the power to the safety gear coils.

	The SGC contact must be provided by the PESSRAL SIL 3 system certified for this use. See EN 81:20:2015 ANNEX A
	The NC engagement contacts included in the activation must be connected in series with the safety line. Where a 2NC engagement contact is installed, this will be connected in series with the safety line and can also be connected as shown in Figure 16.
	In the event of a fault in the main supply, the system will switch to engagement position to cause an unwanted engagement. To avoid this situation, see Point UNWANTED ENGAGEMENTS

The safety contacts in each safety gear are in series and the monitoring contacts independently provide information to the controller. In the case of the latter, they do not have to be safety contacts because their function, as explained above, involves informing the controller that the safety gears have been reset.

	The monitoring signal must be managed appropriately for it to be read correctly by the controller

The connection would be as follows:

Given that the holding coil is responsible for retaining the system, it should be connected in series to the linear encoder safety contact. This means that, in the event of overspeed, the contact would open, and the holding coils would be disconnected, thus making the safety gear fall in pre-lock position.

To return the system to not locked position, the reset coil (linear electromagnet) and the holding coil are powered at the same time. When the reset coil is powered, the controller must consider a time of between 300 ms and 500 ms to allow for resetting to the not-locked position and, at the same time, the disconnection of this reset coil to leave the holding coil in its holding mode. In addition, the monitoring contact/sensor is read to make sure the not-locked position has been reached. Attempts must continue until the monitoring contact/sensor issues the correct reading signal. Determine a maximum of 7 attempts before considering a fault.

Although the controller must manage the power for the reset coils and their disconnection timing, there might be other ways of performing this control provided safe disconnection of the electromagnet can be guaranteed when the holding coil has held the system.

	Use of the monitoring contact/sensor to disconnect the reset coil is not recommended, as the settings do not guarantee syncing. It is the signal, however, that indicates that the system is in holding position.
	The monitoring signal must be managed appropriately for it to be read correctly by the controller

4.2 Disengagement operation

In the event of the full engagement of the safety gear, the reset coil must be powered while the holding coil is powered, and the lift moves upwards (opposite direction to that of safety gear engagement).

A reset after a loss of power to the holding coil, where the roller reaches the pre-engagement position, must be differentiated from a reset after engagement of the safety gear, where the roller has reached the locked position. For disengagement, the requirements for the reset coil are greater. This is why this manual indicates the need to keep the coils powered for longer.

	The power applied to the reset coil must not exceed 2 minutes non-stop.
 	In any case, make sure the reset coil is disconnected. The system implemented must be effective enough to ensure the reset coil does not remain powered after the system is in position for lift operations.

The coils do not have to be powered at any time if, after an inspection, the engagement is to be checked by forcing car movement in the same direction of the engagement, thus ensuring that the lift does not move and the ropes start to slide. This type of check can be made whether or not the coils are powered but remember that the coils cannot be powered non-stop for more than 2 minutes and, therefore, we recommend performing the check without powering the coils.

5 COMPATIBILITY WITH LINEAR ENCODERS

The coil is the device that must be managed by an independent part of the activation and, due to this interaction, the electrical specifications required by each manufacturer must be fulfilled. Values such as voltage, current or the time constant of the coil must be considered when connecting it to the safety output of the linear encoder.

The specifications of the holding coils are:

MODEL	POWER	CURRENT	L/R	ED
VEM 30	24 V	0.16 A	3.5 ms	100%

Since there are 2 coils in total, one for each safety gear, the linear encoder should withstand **0.32 A at 24 VDC**.

Compatible products must be chosen with these values and with the specifications of the electronic governor manufacturers.

	The output of some electronic governors to the safety gear might be incompatible with the requirements of our activations. The installer must make sure that the requirements of both systems are met in order to ensure compatibility.

6 OPERATING CHECKS

6.1 Electrical verification tests

The following verification tests must be performed prior to commissioning and regularly afterwards in order to check the correct installation and working order of the activation. All the tests listed below will be performed once the electromechanical safety gear has been installed and adjusted, as explained in Section INSTALLATION.

6.1.1 Coil power supply voltage check

Check that the coil is powered at 24 V and that there are no voltage drops due to reasons not attributable to the coil.

The measurements must be taken directly on the terminals of the coil to check this correctly.

6.1.2 Engagement contact test

To check that the activation has been installed correctly, make sure the safety contact, Figure 17 , is closed with the system idle and open with the safety gear engaged. This contact must be placed in line with the safety line of the lift, as it is responsible for meeting the requirements of Point **5.6.2.1.5 Electrical control** of Standard **EN 81-20:2015**. The safety contacts on both sides will be placed in series inside the safety line of the lift.

This contact must remain closed, except when the safety gears are engaged.

	The safety contact must not be activated when the coil is disconnected; only in the case of safety gear actuation

Check the correct reading of this contact by disconnecting and connecting the activation coils and making sure the status of this contact does not change. Where the contact switches, adjust the activation by

moving it and bringing the part of the roller towards the guide rail until the contact changes status. If this movement is insufficient, the contact bolts can be loosened. The contact may be moved by moving it far enough away from the drive lever for the contact not to be activated in pre-engagement position.

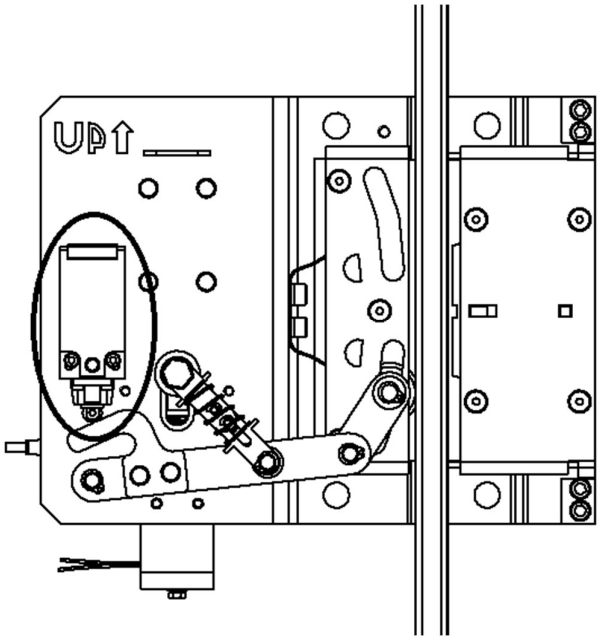

Figure 17 Engagement contact. Pre-lock position

⚠	The safety contact is factory-set. Its opening during actual safety gear engagement must be checked whenever its position is moved.

Check that the safety limit switch contact (5) opens whenever you perform the safety gear engagement test.

⚠	Check that safety contacts open on both sides of the safety gear.

The safety gear engages when the activation holding coil is disconnected and the car moves downwards. The safety line must be bridged to be able to perform this movement.

6.1.3 Monitoring contact test

Make sure the monitoring sensor (4) changes status when the coil is connected and disconnected to check that the activation has been installed correctly. Check the correct reading of this signal by disconnecting and connecting the reset coils (linear) and holding coils, making sure the status of this sensor does not change.

⚠	The monitoring sensor cannot be used to open the reset coil power line because the settings of this sensor could change when used in the installation due to vibrations.

	The monitoring sensor is an information signal for the controller and is not considered a safety component.

	Check that monitoring sensors change status on both sides of the safety gear.

6.1.4 Holding coil test

Once the reset coil has been activated, check that the holding coil keeps the system in the "not locked" position.

To do so, power the holding coil in line with the instructions given in Point 4.1 and check that, once the reset coil is powered, the holding coil holds the unit, keeping the system in its held position and allowing for the lift to move.

	Once the safety gear has been installed, make sure the holding coil does not interfere with any part of the frame or the installation during a movement.
 	Whether it is a reset after a loss in power to the holding coil or following safety gear engagement, you must make sure the reset coil is disconnected. The system implemented must be effective enough to ensure it does not remain powered after the system is in position for lift operations.

6.1.5 Power disconnection test (with and without electronic governor)

Check the correct working order of the system when the power is removed from the coil, simulating the opening of the linear encoder contact, and making sure the coil remains offline and in the pre-engagement position.

These checks are used to validate the installation and working order of the activation. Despite being redundant, this ensures there are no faults.

Remove the power to the coil and check that the monitoring sensor opens, and that the engagement sensor remains closed. In this situation, engagements occur, both wanted and unwanted, when the car moves. Make the checks with the car at a standstill.

6.1.6 No-load reset test

Starting from idle with no power, check the correct working order of the system. When powered, make sure that the coil holds the system in the "not-locked" position after making several movements.

Check that the holding coil is correctly installed and works correctly, holding the system in "not-locked" position after several full movements.

6.1.7 Regular activation/deactivation test

As indicated in Point

MAINTENANCE AND CONDITIONS FOR USE, the controller must perform a full activation/deactivation sequence every day to make sure the system is working properly. Where the controller or the associated electronic governor includes a STAND-BY/SLEEP MODE, the check can be performed during this mode.

With the coil energized, check that the two monitoring sensors open when the power supply to the coil is removed, that this is detected by the controller and that both engagement sensors remain closed.

Once disconnected, check that the two monitoring sensors close when the power supply to the coil is connected, that this is detected by the controller and that both engagement sensors remain closed.

7 UNWANTED ENGAGEMENTS

Several points must be considered in order to avoid unwanted engagements:

1.- Guarantee 24V at the coil terminals. This means that, in the event of losses due to cable length or to the design of the electrical installation, as the coil heats up and its resistance increases, its power and its holding capacity will drop. This can lead to unwanted engagements. Check the voltage at the coil terminals and respect the conditions for use.

2.- Make sure the electronic governor provides a permanent, independent supply of power to the coils in the event of a fault in the main supply. If not, the system will change to engagement position to cause an unwanted engagement.

3.- Monitoring contact/sensor: This signal is essential to guarantee the condition of the activation. The installation must only be allowed to move if the monitoring sensors on both sides are activated.

4-. A correct understanding of the activation will ensure it operates better.

8 TECHNICAL SPECIFICATIONS

The DA activations are compatible with all ASG safety gear:

- ASG 100
- ASG 120
- ASG 121
- ASG 221
- ASG 65

Maximum tripping speed: This is set by the model of safety gear selected. See the speed indicated on the corresponding safety gear certificate.

P+Q: This is set by the model of safety gear selected. See the minimum and maximum ranges for each safety gear.

Guide rail thickness and braking width: indicated on the certificate of each model of safety gear and independent to the activation

Description of the electrical specifications of the activation

	DA	
Coil Power Supply	ER60-10 (x2) 24 V_{DC} 1.9 A	VEM 30 (x2) 24 V_{DC} 0.16 A
L/R time constant	22.5 ms	3.5 ms
Voltage Range	A minimum voltage must be ensured on the coil terminals of 24 V, and a maximum of 28 V. If this power voltage is not guaranteed, operations might be affected due to power losses on the coil. Excessive voltage could damage the components. The voltage drops of the installation must be considered to guarantee the power voltage.	
Temperature range	-5ºC ÷ 40ºC *the thermal rating of coil ER-60-10/C is B	
Relative humidity	<60%, no condensation	

9 MAINTENANCE AND CONDITIONS FOR USE

Modern electronic speed detection systems consist of keeping the coil powered, unless there is overspeed, a power cut, etc. Therefore, Dynatech recommends disconnecting and re-connecting at least **once a day** to keep the system mobile. This ensures that, in the event of emergency action, the system is able to respond mechanically.

The maintainer must pay special attention to the condition of the safety gear during the regular inspections.

The moving parts of the safety gear and its actuation must be free of dirt, dust, or rust. Special attention must be paid to ensuring no external part interferes with the moving parts of the actuation, as a blockage in safety gear movement might mean that it does not brake correctly or that it does not brake at all.

During the regular inspections, disconnect and re-connect to check the mobility of the actuation systems.

The conditions for use inside the shaft must be:

From -5ºC, provided there is no possibility of damp that might freeze, as this would prevent movement of the moving parts.

Up to 40ºC, no condensation.

If a higher temperature is reached inside the shaft, forced ventilation on the coils is highly recommended to prevent them from overheating.

10 APPENDICES

Datasheets of commercial components