

CE DECLARATION OF MACHINE CONFORMITY

(DIRECTIVE 89/392/EEC, ANNEX II, PART B)

Manufacturer : FAAC S.p.A.

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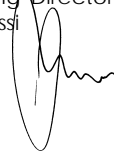
Declares that: Operator mod. 540 and 541

- is manufactured to be incorporated in a machine or for assembly with other machines to constitute a machine under the provisions of Directive 89/392/EEC, and subsequent amendments 91/368/EEC, 93/44/EEC, 93/68/EEC;
- conforms to the essential safety requirements of the following further EEC Directives:
73/23/EEC and subsequent amendment 93/68/EEC.
89/336/EEC and subsequent amendment 92/31/EEC and 93/68/EEC

and, furthermore, declares that putting the machine into service is forbidden until the machine in which it will be incorporated or of which it will become a part has been identified and it has been declared as conforming to the conditions of Directive 89/392/EEC and subsequent amendments enacted by the national implementing legislation.

Bologna, 01 January 2003

The Managing Director
A. Bassi



WARNINGS FOR THE INSTALLER

GENERAL SAFETY OBLIGATIONS

- 1) **ATTENTION! To ensure the safety of people, it is important that you read all the following instructions. Incorrect installation or incorrect use of the product could cause serious harm to people.**
- 2) Carefully read the instructions before beginning to install the product.
- 3) Do not leave packing materials (plastic, polystyrene, etc.) within reach of children as such materials are potential sources of danger.
- 4) Store these instructions for future reference.
- 5) This product was designed and built strictly for the use indicated in this documentation. Any other use, not expressly indicated here, could compromise the good condition/operation of the product and/or be a source of danger.
- 6) FAAC declines all liability caused by improper use or use other than that for which the automated system was intended.
- 7) Do not install the equipment in an explosive atmosphere: the presence of inflammable gas or fumes is a serious danger to safety.
- 8) The mechanical parts must conform to the provisions of Standards EN 12604 and EN 12605.
For non-EU countries, to obtain an adequate level of safety, the Standards mentioned above must be observed, in addition to national legal regulations.
- 9) FAAC is not responsible for failure to observe Good Technique in the construction of the closing elements to be motorised, or for any deformation that may occur during use.
- 10) The installation must conform to Standards EN 12453 and EN 12445.
For non-EU countries, to obtain an adequate level of safety, the Standards mentioned above must be observed, in addition to national legal regulations.
- 11) Before attempting any job on the system, cut out electrical power.
- 12) The mains power supply of the automated system must be fitted with an all-pole switch with contact opening distance of 3mm or greater. Use of a 6A thermal breaker with all-pole circuit break is recommended.
- 13) Make sure that a differential switch with threshold of 0.03 A is fitted upstream of the system.
- 14) Make sure that the earthing system is perfectly constructed, and connect metal parts of the means of the closure to it.
- 15) The safety devices (EN 12978 standard) protect any danger areas against **mechanical movement Risks**, such as crushing, dragging, and shearing.
- 16) Use of at least one indicator-light (e.g. FAACLIGHT) is recommended for every system, as well as a warning sign adequately secured to the frame structure, in addition to the devices mentioned at point "15".
- 17) FAAC declines all liability as concerns safety and efficient operation of the automated system, if system components not produced by FAAC are used.
- 18) For maintenance, strictly use original parts by FAAC.
- 19) Do not in any way modify the components of the automated system.
- 20) The installer shall supply all information concerning manual operation of the system in case of an emergency, and shall hand over to the user the warnings handbook supplied with the product.
- 21) Do not allow children or adults to stay near the product while it is operating.
- 22) Keep remote controls or other pulse generators away from children, to prevent the automated system from being activated involuntarily.
- 23) Transit under the door is permitted only when the automated system is idle.
- 24) The user must not attempt any kind of repair or direct action whatever and contact qualified personnel only.
- 25) Maintenance: check at least every 6 months the efficiency of the system, particularly the efficiency of the safety devices (including, where foreseen, the operator thrust force) and of the release devices.
- 26) **Anything not expressly specified in these instructions is not permitted.**

AUTOMATED SYSTEM 540-541

These instructions apply to the following models:

FAAC 540 and FAAC 541

The 540 and 541 automated systems are designed for automating balanced industrial sectional doors.

They consist of an electro-mechanical operator, and either on-board electronic control equipment (540) or an interconnection board for a remote control equipment (541). Installation is possible either directly on the shaft of the rope-winding drums, or by chain transmission (optional item) with a reduction ratio of 1:1.5 or 1:2.

The non-reversing system ensures mechanical locking of the door when the motor is not operating and, therefore, no lock needs to be installed; the manual release and the manual opening system (in models for which it is supplied) make it possible to move the door in case of a power cut or malfunction.

The 540 and 541 automated systems were designed and built for indoor and outdoor use.

1. TECHNICAL SPECIFICATIONS

| | |
|-------------------------------------|--|
| Power supply (Vac 50-60Hz) | 230 (+6 -10%) |
| Electric motor | single-phase induction 1450rpm |
| Maximum absorbed power (W) | 800 |
| Absorbed current (A) | 3,5 |
| Starting capacitor (µF) | 20 |
| Winding thermal protection (°C) | 140 |
| Use frequency (S3) | 40% |
| Max number consecutive cycles | 5 |
| Power take-off | Hollow through shaft diam. 25,4mm (1") |
| Power take-off rotation speed (rpm) | 23 |
| Rated torque of power take-off (Nm) | 50 |
| Power take-off max revs | 24 |
| Protection class | IP54 |
| Operating ambient temperature (°C) | -20 / +55 |
| Gearmotor max weight (Kg) | 14 |
| Type of oil | FAAC XD220 |
| Oil quantity (l) | 0,9 |

Note: consult Table 1 for chain transmission applications

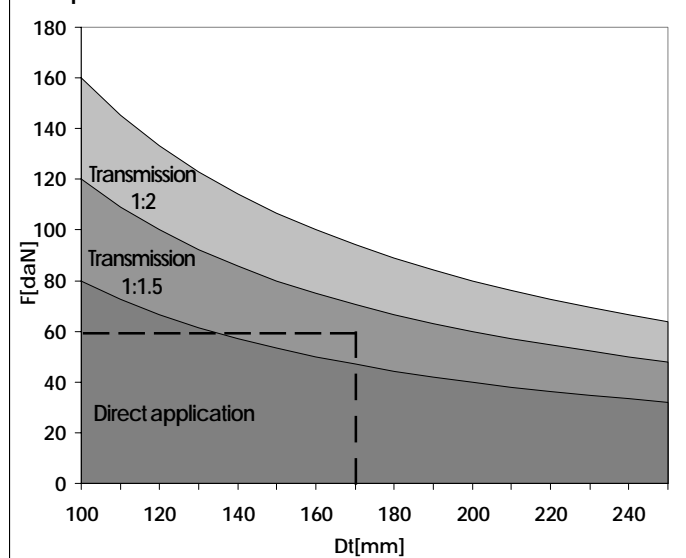
Table 1

| Type of application | Rated torque (Nm) | Rope shaft speed (rpm) | Rope shaft max revs |
|-----------------------|-------------------|------------------------|---------------------|
| Direct | 50 | 23 | 24 |
| Reduction ratio 1:1.5 | 75 | 17,2 | 18 |
| Reduction ratio 1:2 | 100 | 11,5 | 12 |

Graph 1 shows with which type of application the 540 can be installed, considering the maximum force required to manually move the door F , in daN (1daN = force required to lift 1,02 kg), and the diameter of the rope-winding drum D in millimetres. For example, if a door can be moved with a force of 60daN and the drum diameter is 170 mm, a 540 with chain transmission of 1:1.5 must be installed.

N.B. Force F can be measured with a dynamometer. It is not directly related to the weight of the door, but to its balance.

Graph 1



2. DIMENSIONS AND DESCRIPTION

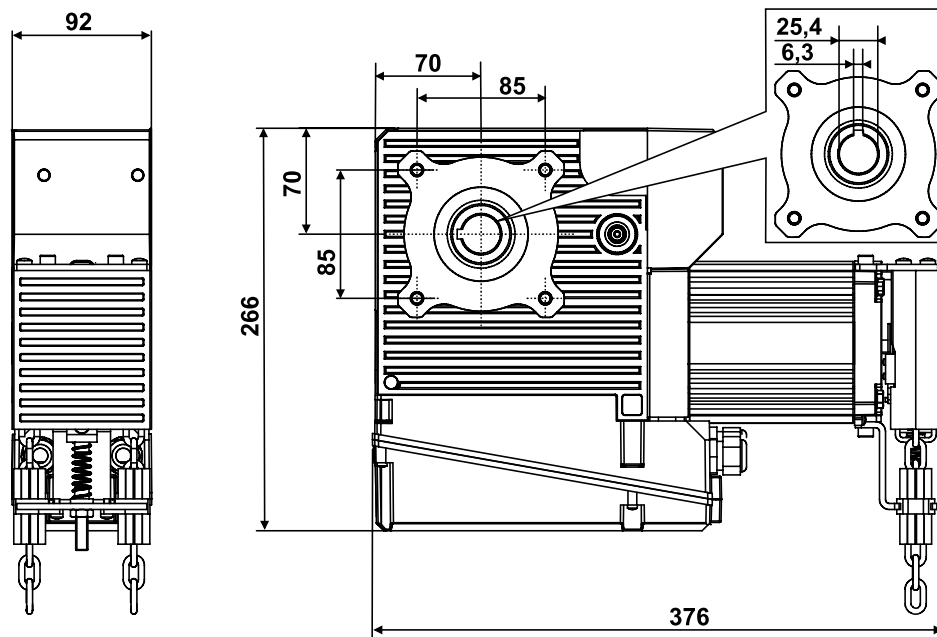


Fig. 1

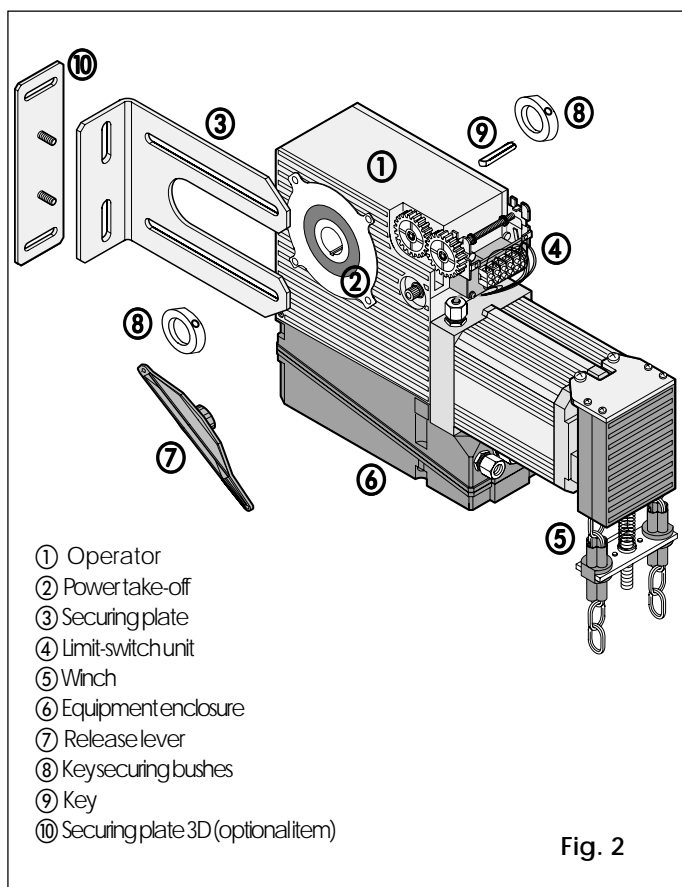


Fig. 2

3. ELECTRICAL EQUIPMENT ARRANGEMENT

Figure 3 shows the layout of the electrical equipment required for installing the 540 operator.

Figure 4 shows the layout of the electrical equipment required for installing the 541 operator with 578D remote equipment.

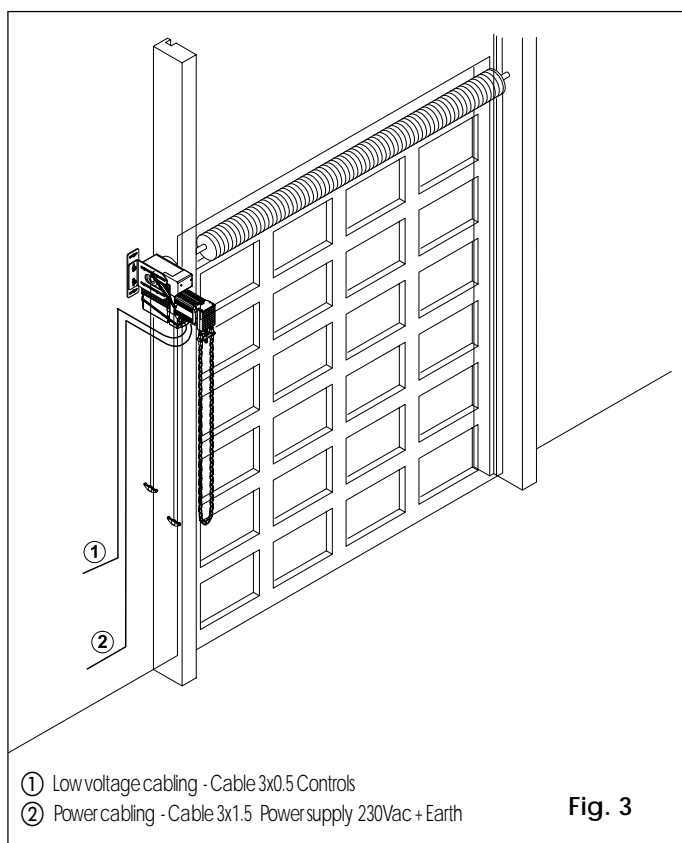


Fig. 3

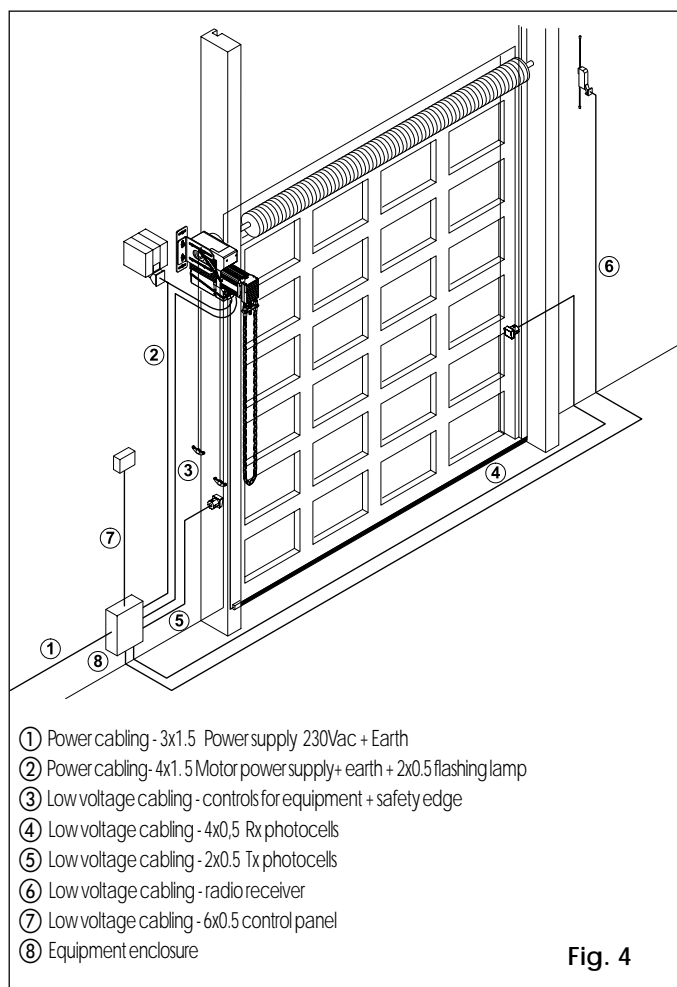


Fig. 4

4. PRELIMINARY CHECKS

The door structure must be suitable to be automated and must conform to standards EN12604 and EN 12605.

The rope winding shaft must have a keyway. It must project laterally by a width sufficient to install the operator and the key locking collars (operator mounted directly on shaft) or to secure the crown-gear (mounting with chain transmission - optional item). Some door manufacturers supply special joints with shaft, which makes it possible to motorise doors which were built without the required facility.

Check the efficiency of bearings, wheels, parachute system, door rail and joints. Also make sure that the traction ropes are perfectly fitted in the grooves of the drums, do not come into contact with mechanical parts or fixed parts of the structure, and are subjected to the same degree of tension.

Make sure that there is no friction on the door: the door must slide smoothly when both opening and closing.

Check if the door is well balanced: if stopped in any position, it must remain still.

Remember that European standards EN12604 and EN12453 prescribe 260N, for manually moved doors, as the maximum limit of force applied to the handles for manual manoeuvre, and 390N for motorised doors.

Consult the technical documentation of the door to find out the shaft torque required for movement and the number of revs necessary for complete opening.

Consult table 1 to see which type of installation (directly on shaft or chain transmission with reduction) satisfies the declared specifications.

The efficiency and safety of the automated system are closely linked to the above. You therefore must get in touch with the door manufacturer or installer if you encounter any problems. Remove the door mechanical closures to ensure the door is locked by the automated system.

Remove the manual activation device if supplied.

Check if an efficient earthing system is available for electrical connection to the operator.

5. INSTALLING THE OPERATOR

To work under safe conditions, we advise you to install the operator while keeping the door fully closed and to read the whole of this chapter before starting to install.

The 540 operator has a 25.4 mm (1") power take-off. If the drive shaft is of a different size, the chain transmission (optional item) must be installed.

The manual activation devices (release and chain drive) are designed for installation at a height of up to 4 metres. To install at greater heights, use the extension kits (optional items).

The operator is equipped with four microswitches with the following functions:

- Opening limit-switch
- Closing limit-switch
- Winch safety switch (only on models supplied with the manual manoeuvring system)
- Release control safety switch

The supplied support plate will enable you to secure the operator at a maximum distance of 125mm between the anchoring point (wall or metal structure) and the power take-off axis.

Before installing, we advise you to check the rotation direction of the power take-off (see paragraphs 5.2.1 and 5.2.2).

For all matters referring to the electrical system, please consult the chapter entitled "Warnings for the installer" and chapters 3 and 6 of these instructions.

The supplied *Cordura* handle can be installed, using the plate fastening points, on the operator, to facilitate the shifting operations during the preliminary stages of installation.

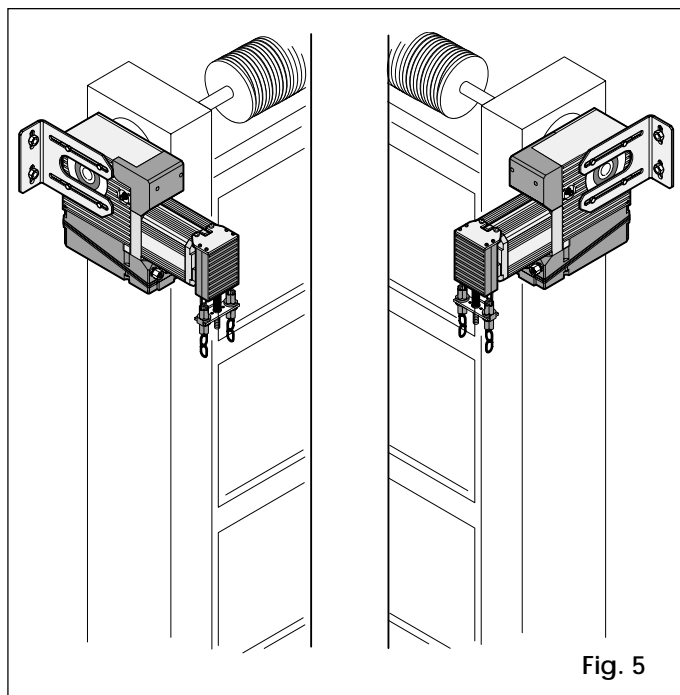


Fig. 5

5.1 OPERATOR WORK POSITION

The operator - supplied with a chain-operated manual motion device - must be installed in the position shown in figure 5. In the absence of the winch, the operator can be installed in any position.

If you wish to install the remote release control, first check that the release lever does not interfere with the operator's external parts.

The securing plate can be installed on any of the operator's two sides.

5.2.1 IDENTIFYING ROTATION DIRECTION (540 operator with 200BT equipment)

Remove the cover of the limit-switch unit.

Figure 6 shows rotation directions Dir1 and Dir2, activated by commands IN1 and IN2 (see figure 15), and the position of limit-switches FC1 and FC2.

The motion controlled by IN1 is stopped by FC1 and the motion controlled by IN2 is stopped by FC2. Consequently, if, for example, Dir2 is the rotation direction causing the door to close, IN2 is the input of the closing command, IN1 is the input of the opening command, FC2 determines the closing stop point, and FC1 determines the opening stop point.

The stop spring of the ring-nuts activating the limit-switches, is kept lifted up by the square - the latter must not be removed until the door stop points are adjusted.

5.2.2 IDENTIFYING ROTATION DIRECTION (operator with 578D equipment)

Remove the cover of the limit-switch unit.

Figure 6 shows rotation directions Dir1 and Dir2. Motion in Dir1 direction is stopped by FC1 and motion in Dir2 direction by FC2. Consequently, if, for example, Dir2 is the rotation direction causing the door to close, FC2 determines the stop closing point and FC1 determines the opening stop point.

The closing stop point can be corrected also by varying the post-travel limit deceleration parameter on the 578D equipment. The OPEN command is normally associated with Dir1 motion - consult the equipment instructions if the rotation directions have to be reversed.

The stop spring of the ring-nuts activating the limit-switches, is kept lifted up by the square - the latter must not be removed until the door stop points are adjusted.

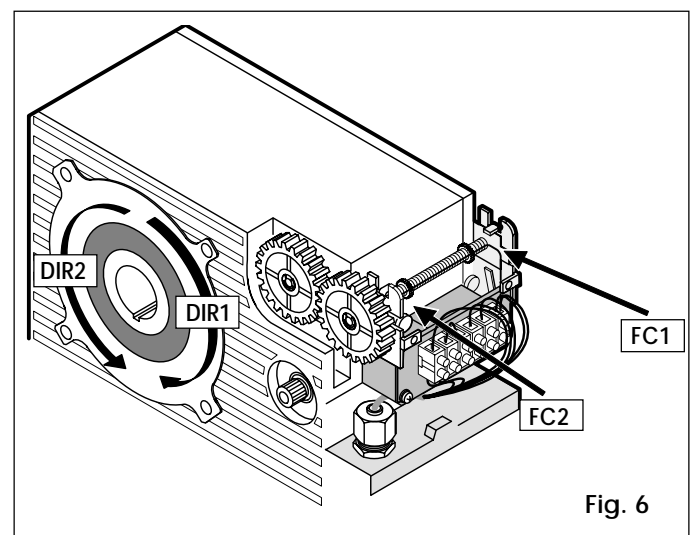


Fig. 6

5.3 INSTALLING THE OPERATOR

- Release the operator with the appropriate lever.
- Fit the securing plate on the operator without tightening the screws.
- Engage the power take-off on the drive shaft.
- Position the operator (see paragraph 5.1) and rest the plate on the support (wall or metal structure) on which you have decided to secure it (see figure 7.).
- Tighten the screws without forcing them, while resting the plate on the support.
- Trace the position of the installation holes.
- Remove the operator.
- Carry out the securing preparation work.
- Insert the first key securing bush and the key itself in the shaft (see fig.2 ref. 8 and 9).
- Re-install the operator with the plate released.
- Secure the plate to the support, tighten the fastening screws on the operator to a maximum torque of 18Nm and insert the second key securing bush.
- Secure the two bushes after positioning them in contact with the operator's power take-off.
- Lock the operator.

If you wish to weld the securing plate to the support, do the welding with the operator uninstalled, and protect the drive shaft in the power take-off engagement zone. If the operator cannot be removed, it must be protected.

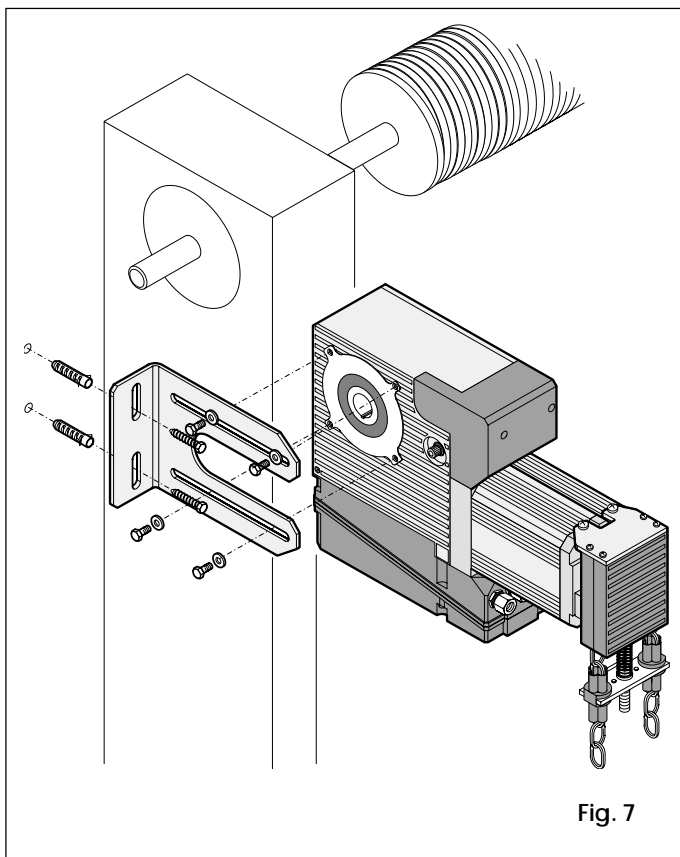


Fig. 7

5.4 WINCH ADJUSTMENT

Fully unwind the supplied chain and unite one of its ends to the one already inserted in the winch, using one of the supplied chain links (see figure 8.).

Cut the chain to measure, preventing the lower part of the "chain-loop" from touching the ground (see figure 9) and assemble the other two ends of the chains.

Cut the service tie.

Adjust the screw of the balancing spring (see figure 10) so that the winch support completely disappears inside the plastic enclosure (see figure 11).

Make sure that the traction of just one of the chain branches causes the winch to engage, and return to idle position on being released.

Secure the fastening nut and make sure that operator activation

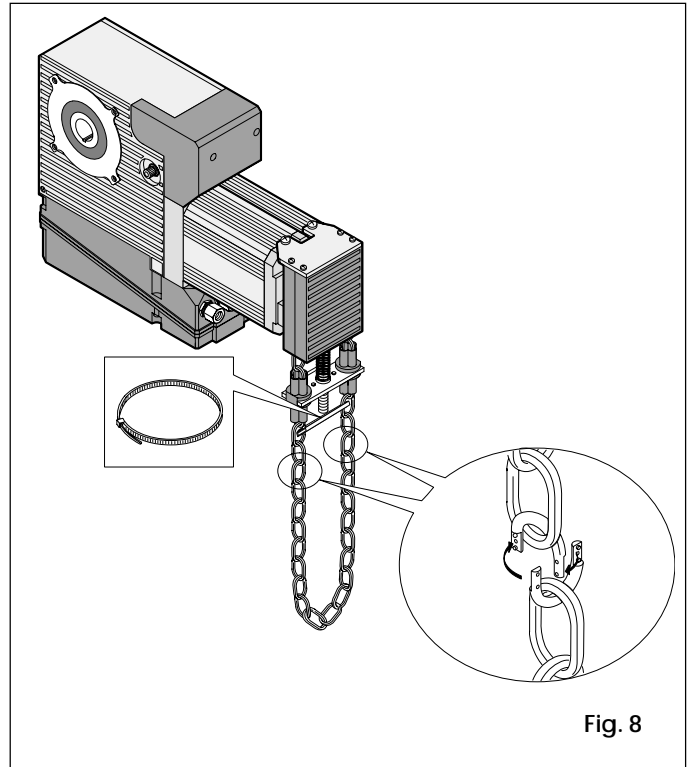


Fig. 8

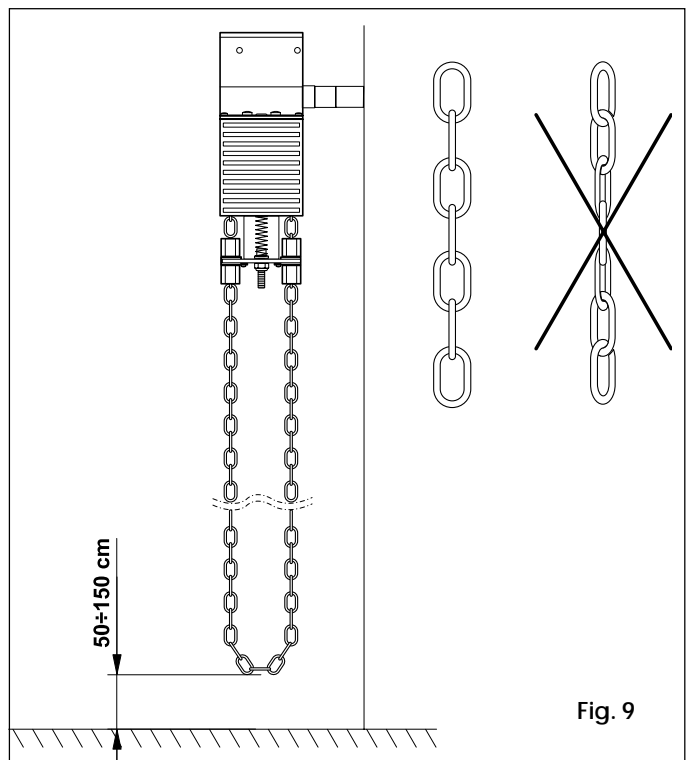
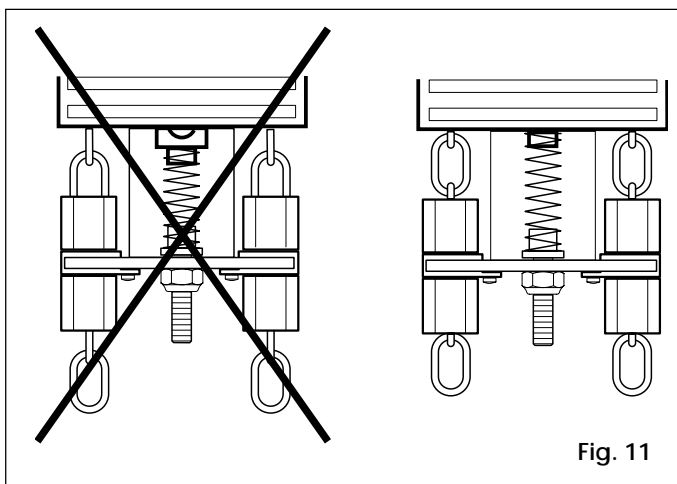
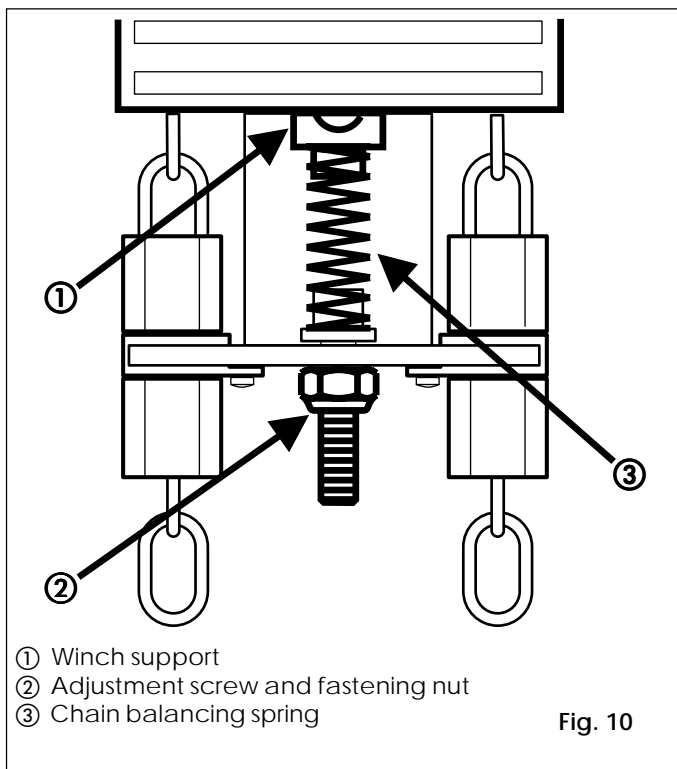


Fig. 9

is not prevented or interrupted by the tripping of the winch's safety microswitch.

We advise you to create an anchoring point for the lower part of the chain so that the chain cannot interfere with transit of persons or operational means, and fix the sticker showing the opening and closing directions, so that it is clearly visible.

If using the chain extension kit, replace the balancing spring (fig.10 ref.3) with the one in the kit. Furthermore, we advise you to glue together the chain links during assembly (see fig.8).



5.5 INSTALLING THE REMOTE RELEASE LEVER

Carry out the operations with the door closed.

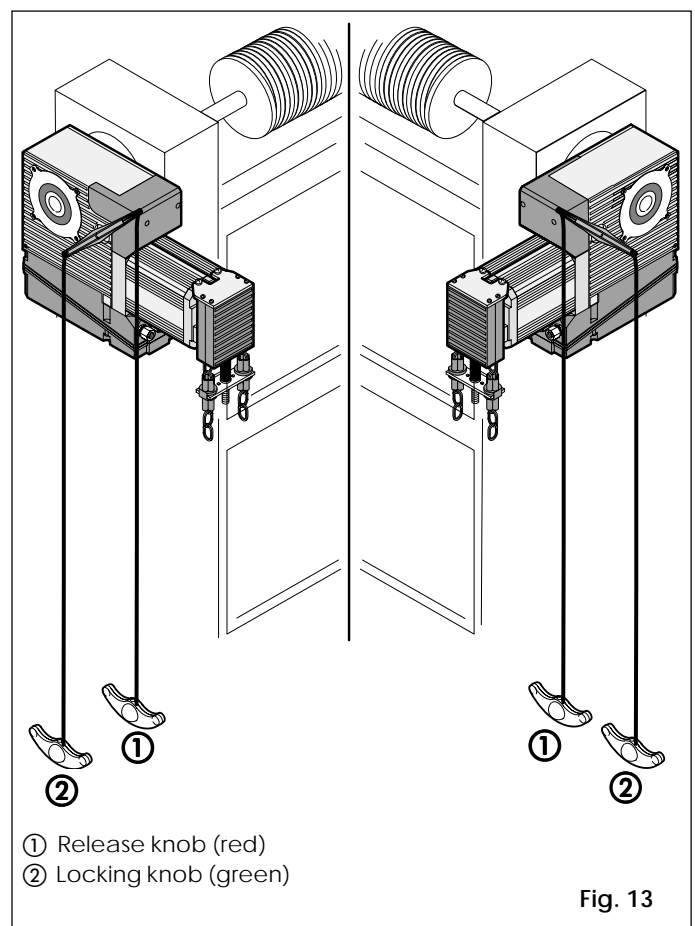
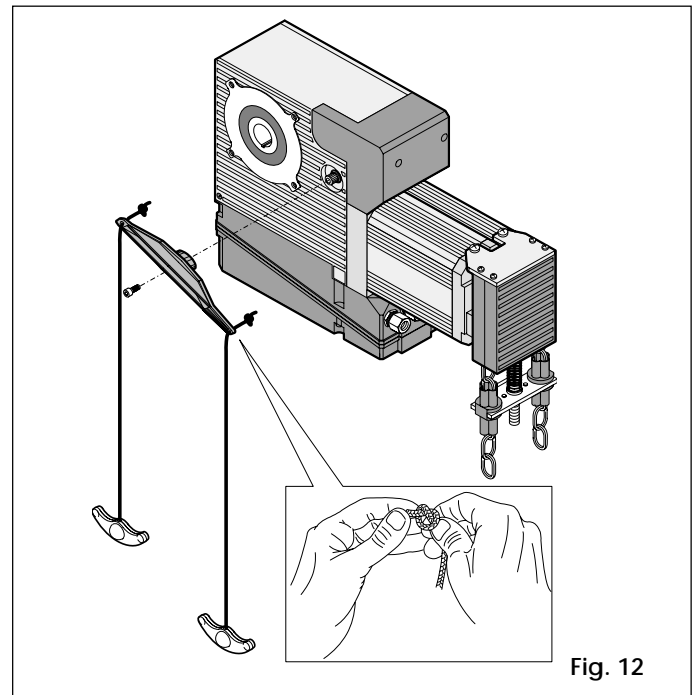
Cut the drive ropes to measure and assemble them with the lever and knobs (see figure 12), bearing in mind that the green one must act on the lever's short arm.

In figure 13, the two side views show the position of the lever with locked operator, and the relevant positions of the release ropes (with red knob) and locking ropes (with green knob).

Fit the lever and make sure that it reaches the travel limits in the two directions, at an inclination of about 45-50°.

Fit the lever fixing screw.

Make sure that the remote manoeuvre is correct and that, when the operator is in locked position, it is not prevented from operating by the release safety microswitch.



5.6 ADJUSTMENT OF LIMIT-SWITCH UNIT

Fully close the door.

Remove the square under the ring-nuts stop spring.

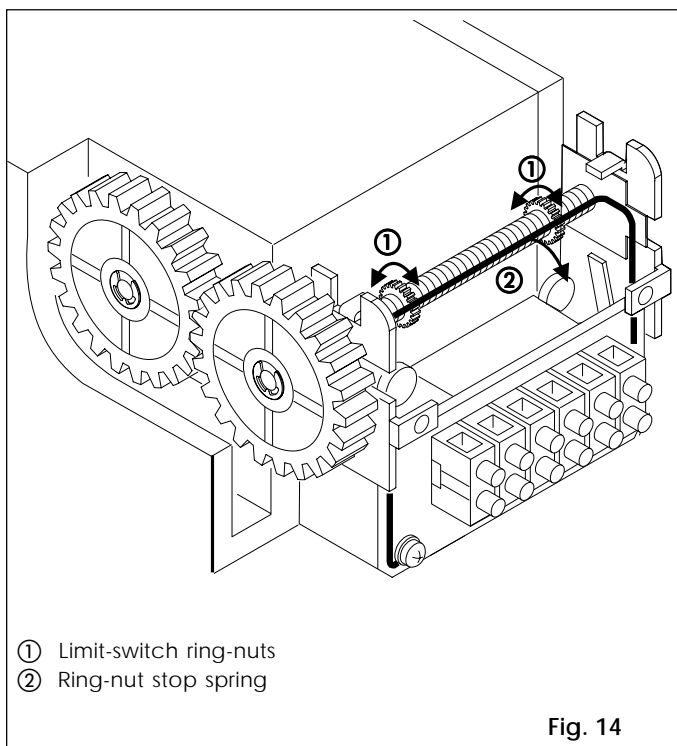
Keep the spring lifted up (see figure 14) and turn the ring-nut of the closing limit-switch until the latter is activated. Turn the other ring-nut until it is near the first one and re-position the stop spring on the ring-nuts.

Move the door by hand to open position until the mechanical buffers are slightly compressed.

Lift up the spring, turn the ring-nut of the opening limit-switch until the latter is activated and re-position the spring.

Check if the operator activation makes it possible to reach the required positions. If not, correct the position of the ring-nuts.

If using the 578D equipment, you can correct the closing stop point also by varying the post-travel limit deceleration parameter.



6. ELECTRICAL SYSTEM

ATTENTION: Before attempting any work on the board (connections, maintenance), always turn off power.

The specifications of the electrical system are included in the chapter "Warnings for the installer". Always separate power cables from control cables.

To prevent any electric noise whatever, use separate sheaths. The 540 operator is supplied with the 200BT equipment on board. The 541 operator is supplied with an on-board inter-connection board.

6.1 CONNECTIONS OF 200BT ELECTRONIC EQUIPMENT

Lay the raceways as shown in fig. 3 and make the 200BT operator external connections as shown in fig. 15.

To assign OPEN and CLOSE commands to inputs IN1 and IN2, refer to paragraph 5.2.1.

Do not modify the operator internal connections.

If you wish to use the 541 operator (with on-board inter-connection board) and the 200BT remote equipment, take the 230Vac power supply only to the equipment and connect the terminals of the latter to those of the inter-connection board, observing correct wire matching.

The 200BT equipment operates in "dead-man" mode: the opening and closing command must be manually maintained through the entire manoeuvre.

The command generators - consistently and univocally identified - must be installed in a position enabling the manoeuvring person to have direct visual control of the door and surrounding area.

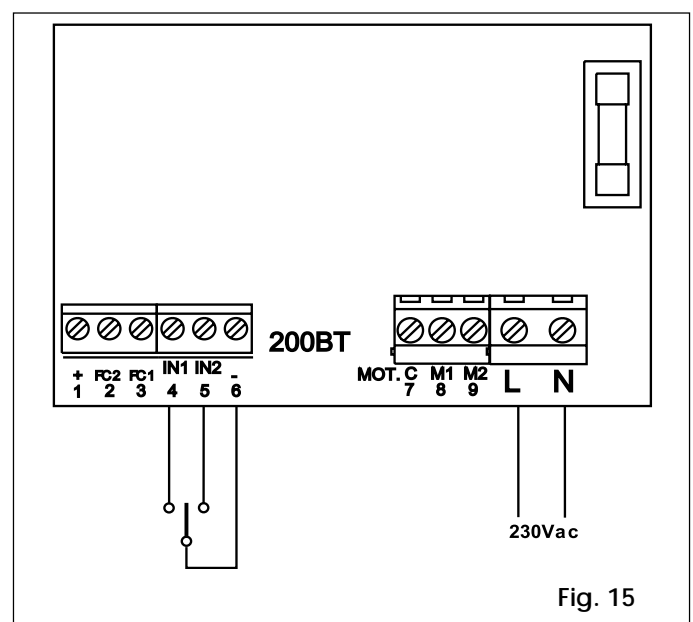
6.2 CONNECTIONS OF 578D ELECTRONIC EQUIPMENT

Lay the raceways according to the instructions in figure 4.

Make the connections between the 578D equipment and the inter-connection board mounted on the operator, observing the diagram in fig.16.

A STOP push-button, if any, must be located in series with respect to the connection between the STOP input of 578D and the SAFETY of the 541 INTERFACE.

For wiring and programming the 578D, consult the instructions for the equipment.



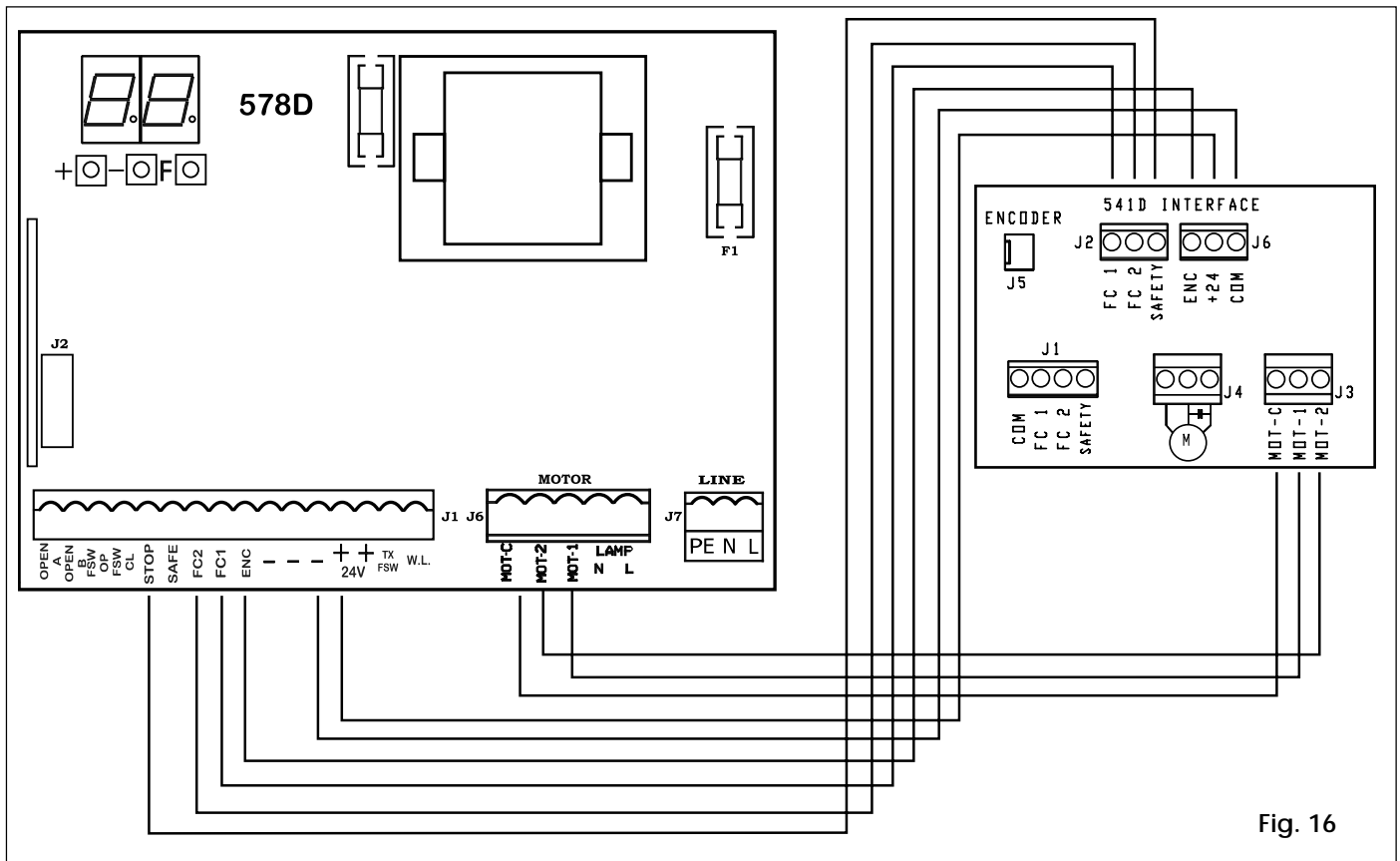


Fig. 16

7. START-UP

When you have carried out all the electrical connections, locked the operator, and checked that the door cannot be moved by hand, power up the system.

If the operator is supplied with a winch, fix - in the immediate vicinity of the chain - the sticker indicating the traction directions for the opening and closing manual manoeuvres.

7.1 540 and 541 with 200BT equipment

- Run a few complete cycles to check the efficiency of the automated system.
- Hand over the "User's guide" page to the customer, and describe how the system works, as well as the operator release and locking operations indicated in the said guide.

7.2 541 with 578D equipment

- Program the equipment.
- Check the state of the equipment inputs and verify if all safety devices are correctly connected (the relevant LEDs must be lighted).
- Run a few complete cycles to check if the automated system and the accessories connected to it are operating correctly, giving special attention to safety devices and to the adjustment of the operator's thrust force.
- Hand over the "User's guide" page to the customer, and describe how the system works, as well as the operator release and locking operations indicated in the said guide.

8. MAINTENANCE

Maintenance: check at least every 6 months the efficiency of the system, particularly the efficiency of the safety devices (including, where foreseen, the operator thrust force) and of the release devices.

9. REPAIRS

For repairs contact an authorised FAAC Repair Centre.

USER'S GUIDE

540 AND 541 AUTOMATED SYSTEMS

Read the instructions carefully before using the product and store them for future use.

GENERAL SAFETY REGULATIONS

If correctly installed and used, 540 and 541 automated systems ensure a high degree of safety.

Some simple rules on behaviour can prevent accidental trouble:

- Do not, under any circumstances, stand under the sectional door.
- Do not allow children, persons or things to stand near the automated systems, especially while they are operating.
- Keep remote-controls, or other pulse generators that could open the door, well away from children.
- Do not allow children to play with the automated system.
- Do not willingly obstruct door movement.
- Prevent any branches or shrubs from interfering with door movement.
- Keep warning-lights efficient and easy to see.
- Do not attempt to activate the door by hand unless you have released it.
- Make sure that there are no persons, animal or things near the door before releasing the door.
- In the event of malfunctions, manually activate or release the door to allow access and wait for qualified technical personnel to do the necessary work.
- When the operator is released, before restoring motorised operation, make sure that the system is not powered.
- Do not in any way modify the components of the automated system.
- Do not attempt any kind of repair or direct action whatever and contact qualified FAAC personnel only.
- At least every six months: arrange for qualified personnel to check efficiency of the automated system, safety devices and earth connection.
- Arrange for qualified personnel to check the door at the intervals recommended by the manufacturer, addressing special attention to the safety systems and balancing.
- Transit under the door is permitted only when the automated system is idle.

DESCRIPTION

The 540 and 541 automated systems are ideal for activating balanced industrial sectional doors.

They consist of an electro-mechanical operator and on-board or remote electronic control equipment. The non-reversing system ensures mechanical locking of the door when the motor is not operating and, therefore, no lock needs to be installed. Operator release and a manual manoeuvring system (the latter is only supplied on the models for which it is specified), make the door manoeuvrable in the event of a power cut or malfunction.

The door is normally closed; when opening is commanded, the equipment activates the electric motor which drives the door to opening position to permit access. In "dead-man" systems, the command push-button must be kept pressed for the whole duration of the opening or closing manoeuvre.

In the automatically operating systems:

- If the automatic logic was set, the door closes after pause time has elapsed.
- If the semi-automatic logic was set, a second pulse must be sent to close the door.
- A stop pulse (if supplied) always stops movement.

For full details on the behaviour of the automated system in the different logics, consult the installation Technician.

Automated systems may include safety devices (sensitive edges, photocells) that prevent the door from closing and/or opening when there is an obstacle in the area they protect. Emergency manual opening is possible by using the release system.

Manual command is possible by activating the chain-operated winch (for models with which it is supplied).

Electric command is disabled during the manual manoeuvre or when the operator is released.

The warning-light, where supplied, indicates that the door is currently moving.

MANUAL OPERATION (540 and 541 with winch)

If the door has to be activated and the automated system is inactive due to a power-cut or malfunction, the door opening and closing manoeuvres can be done by hand, by using the chain-operated winch. Check the indicator sign to see which branch of the chain has to be activated to perform the required manoeuvre. Pull downward only the branch involved.

If no indicator sign is present, pull one of the chain branches without forcing and check if the door tends to move in the required direction. If not, activate the other branch.

While the winch is operating, the operator's electrical control is disabled.

RELEASING THE OPERATOR AND RESTORING AUTOMATIC OPERATION

The 540 and 541 operators are provided with an emergency system which can be activated from the inside.

The operator release operation must be effected with the door closed if possible. In any event, the presence of persons, animals and objects in the immediate vicinity of the operator is absolutely forbidden.

If the door has to be moved manually due to a power cut or malfunction of the automated system, cut out power to the system and use the release device as follows: release the operator by pulling the rope with the red knob (see figure 1) downward until the lever reaches the travel-limit stop. To restore automatic operation, fully close the door and pull the rope with the green knob until the lever returns to its original position.

