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## 1. CE DECLARATION OF CONFORMITY FOR MACHINES (DIRECTIVE 98/37/CE)

**Manufacturer:** FAAC S.p.a.

**Address:** Via Benini, 1 - 40069 - Zola Predosa - BOLOGNA - ITALY

**Declares that:** 413 mod. operator

- is built to be integrated into a machine or to be assembled with other machinery to create a machine under the provisions of Directive 98/37/CE;
- conforms to the essential safety requirements of the following 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 also declares that the machinery must not be put into service until the machine in which it will be integrated or of which it will become a component has been identified and declared as conforming to the provisions of Directive 98/37/CE.

Bologna, 01.02.2005

The Managing Director  
A. Bassi



## 2. DESCRIPTION

The **413** automated system for swing gates is an electro-mechanical non-reversing operator that transmits motion to the leaf via a worm screw system.

The operator is available in many versions covering therefore every installation requirement. The "LS" versions are equipped with opening and closing limit switches. Every version is supplied with opening and closing mechanical travel stops.

The non-reversing system ensures the leaf is mechanically locked when the motor is not operating. A convenient and safe release system with customised key makes it possible to manually move the leaf in the event of a malfunction or of a power failure.



### ATTENTION:

- The correct operation and the declared specifications only apply if FAAC accessories and safety devices are used.
- As no mechanical clutch device is fitted, a control unit with adjustable electronic clutch is required to ensure the necessary anti-crushing safety.
- The 413 automated system was designed and built for controlling vehicle access. Avoid any other use whatever.

| Pos. | Description          |
|------|----------------------|
| 1    | Operator             |
| 2    | Release device       |
| 3    | Limit switch cover   |
| 4    | Closing limit switch |
| 5    | Opening limit switch |
| 6    | Front bracket        |
| 7    | Rear fitting         |
| 8    | Rear fitting pin     |
| 9    | Rear bracket         |
| 10   | Terminal board cover |

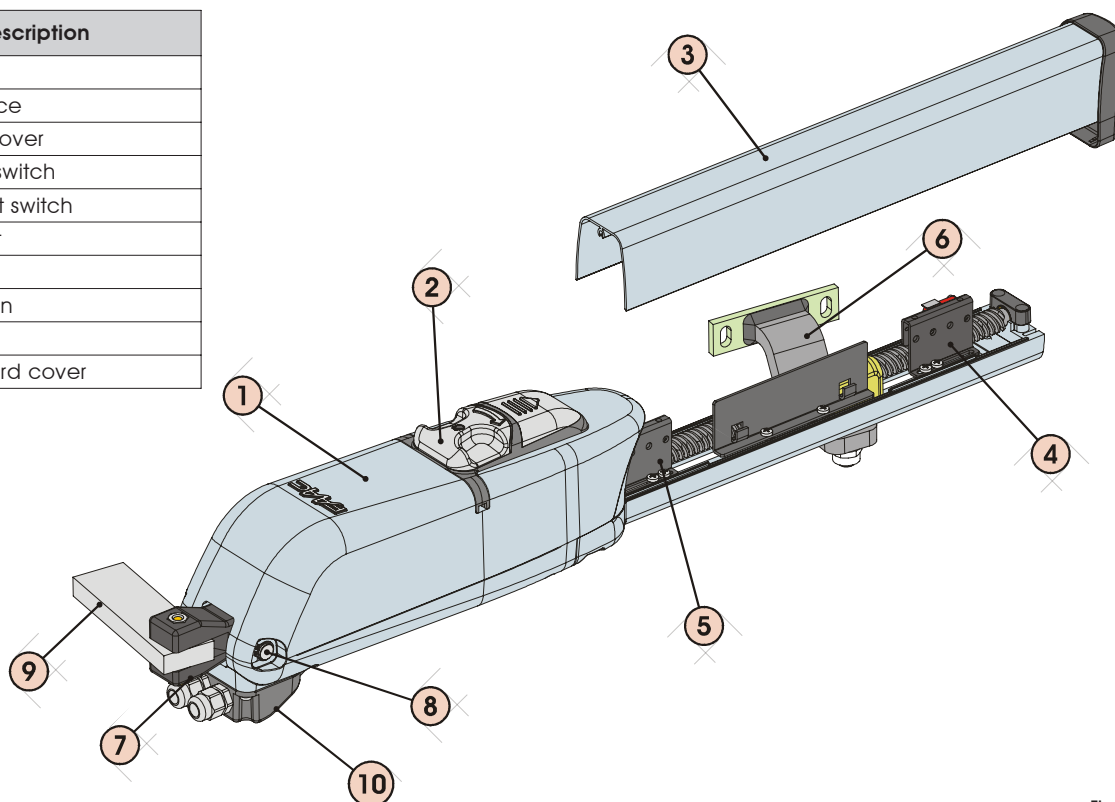


Fig. 1

### 2.1. Dimensions

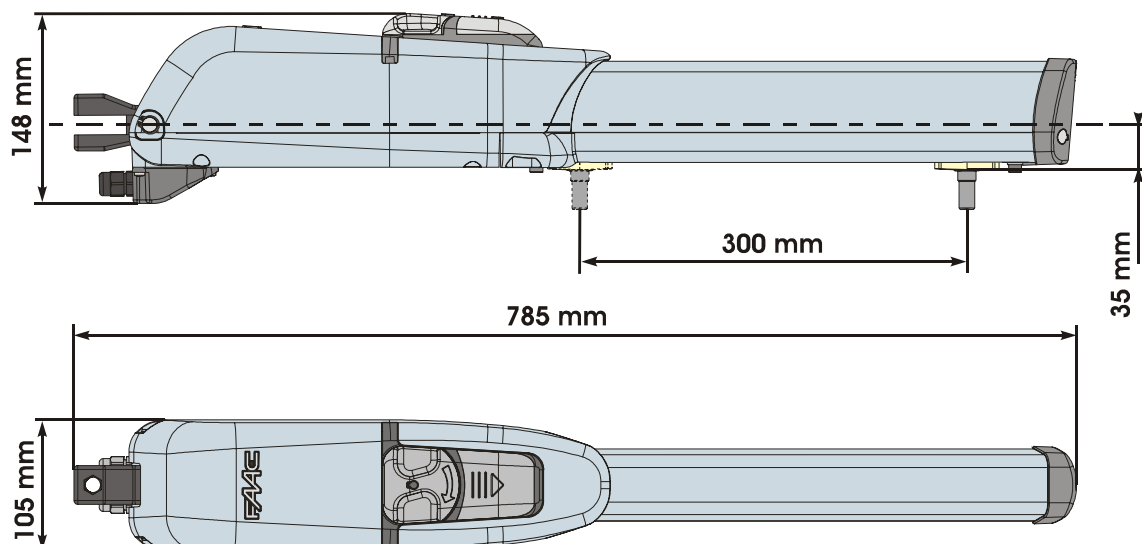


Fig. 2

### 3. TECHNICAL SPECIFICATIONS

| TECHNICAL SPECIFICATIONS             | 413                | 413 LS   | 413 24V | 413 LS 24V | 413 115V | 413 LS 115V |
|--------------------------------------|--------------------|----------|---------|------------|----------|-------------|
| Power supply                         | 230 V~             |          | 24 Vdc  |            | 115 V~   |             |
| Power (W)                            | 250                |          | 70      |            | 260      |             |
| Current (A)                          | 1,1                |          | 3       |            | 2.2      |             |
| Thermal protection (°C)              | 140                |          | -       |            | 140      |             |
| Capacitor (μF)                       | 6,3                |          | -       |            | 20       |             |
| Thrust (daN)                         | 200                |          | 250     |            | 200      |             |
| Travel (mm)                          | 300 <sup>(1)</sup> |          |         |            |          |             |
| Speed (cm/sec)                       | 1,6                |          |         |            | 1,85     |             |
| Leaf max. (m)                        | 2,5 <sup>(2)</sup> |          |         |            |          |             |
| Type and use frequency at 20° C      | S3 - 30%           | S3 - 35% | 100%    |            | S3 - 30% | S3 - 35%    |
| Approximate min. cycle/hour at 20° C | ~30                |          | ~100    |            | ~30      |             |
| Operating ambient temperature (°C)   | -20 +55            |          |         |            |          |             |
| Operator weight (Kg)                 | 6,5                |          |         |            |          |             |
| Operator length (mm)                 | see fig.2          |          |         |            |          |             |
| Operator dimensions (mm)             | see fig.2          |          |         |            |          |             |
| Protection class                     | IP54               |          |         |            |          |             |

- <sup>(1)</sup> If no closing and opening mechanical travel stops are used, the operator travel is 350 mm  
<sup>(2)</sup> With leaves exceeding 1.8 m the fitting of an electric lock is required to ensure the leaf locking

#### 3.1. Versions

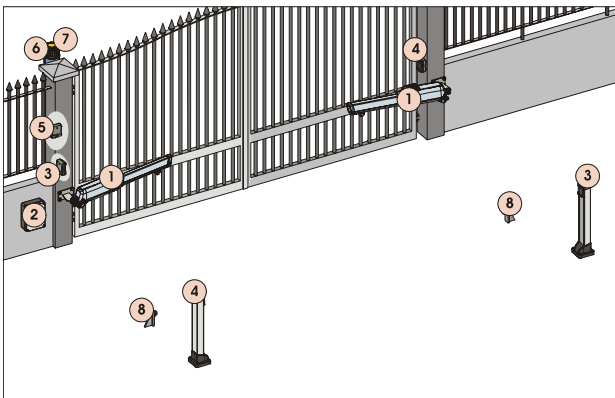
| MODEL                | VERSION  |
|----------------------|--|
| OPERATOR 413         | 230V~ operator with opening/closing mechanical travel stops                                    |
| OPERATOR 413 LS      | 230V~ operator with opening/closing mechanical travel stops and opening/closing limit switches |
| OPERATOR 413 24V     | 24Vdc operator with opening/closing mechanical travel stops                                    |
| OPERATOR 413 LS 24V  | 24Vdc operator with opening/closing mechanical travel stops and opening/closing limit switches |
| OPERATOR 413 115V    | 115V~ operator with opening/closing mechanical travel stops                                    |
| OPERATOR 413 LS 115V | 115V~ operator with opening/closing mechanical travel stops and opening/closing limit switches |



For CSA-UL approved operators, control unit 455 MPS UL 115 must be used in order to maintain the approval.

### 4. INSTALLATION

#### 4.1. Electrical set-up (standard system)



| Pos. | Description                  | Cables   |
|------|------------------------------|--|
| 1    | Operators                    | 4x1.5 mm <sup>2</sup> (2x1.5 mm <sup>2</sup> ) |
| 2    | Control unit                 | 3x1.5 mm <sup>2</sup><br>(power supply)        |
| 3    | TX photocells                | 4x0.5 mm <sup>2</sup>                          |
| 4    | RX photocells                | 2x0.5 mm <sup>2</sup>                          |
| 5    | Key-operated selector switch | 2x0.5 mm <sup>2</sup> (3x0.5 mm <sup>2</sup> ) |
| 6    | Flashing lamp                | 2x1.5 mm <sup>2</sup>                          |
| 7    | Receiver                     | 3x0.5 mm <sup>2</sup>                          |
| 8    | Mechanical stops             | -  |

Fig. 3

#### Notes:

- Use suitable tubes and/or hoses to lay electric cables
- To avoid any kind of interference always separate low-voltage accessories and control cables from 230/115 V~ power supply cables using separate sheaths.

### 4.2. Preliminary checks

To ensure a correct operation of the automated system, make sure the following requirements are observed as for the gate structure (existing or to be realised):

- the mechanical parts must conform to the provisions of Standards EN 12604 and EN 12605.
- leaf length in compliance with the operator specifications (see paragraph 2.1).
- sturdy and stiff structure of the leaves, suitable for automation
- regular and uniform movement of the leaves, without any friction and dragging during their entire opening
- stiff hinges in good conditions
- presence of both opening and closing mechanical limit stops (they are not necessary if opening and closing mechanical travel stops are used)
- presence of an efficient earthing for electrical connection of the operator

Perform any necessary metalwork job before installing the automated system.

**The condition of the gate structure directly affects the reliability and safety of the automated system.**

### 4.3. Installation dimensions

Determine the fitting position of the operator with reference to Fig.4. During this phase it is important to define if the mechanical travel stops are to be used: by eliminating the mechanical travel stops the operator travel increases thus changing the installation dimensions **A** and **B**.

Check with care if the distance between the open leaf and any obstacles (walls, fences etc.) is higher than the operator dimensions

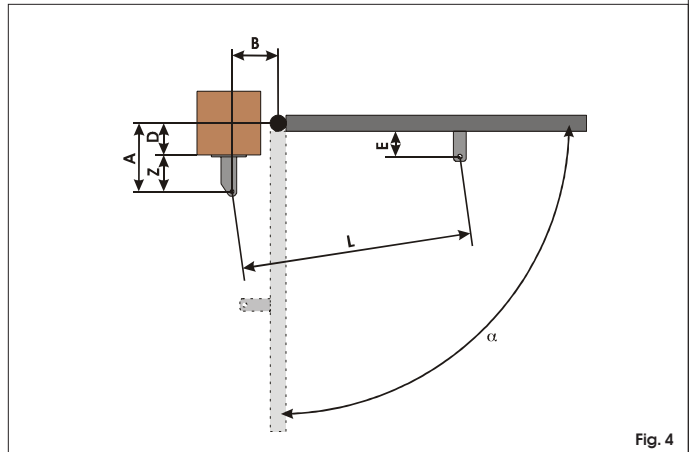


Fig. 4

| Model                                | $\alpha$ | A   | B   | C <sup>(1)</sup> | D <sup>(2)</sup> | Z <sup>(3)</sup> | L   | E <sup>(3)</sup> |
|--------------------------------------|----------|-----|-----|------------------|------------------|------------------|-----|------------------|
| 413 with opening and closing stop    | 90°      | 140 | 140 | 280              | 80               | 60               | 675 | 80               |
|                                      | 110°     | 120 | 135 | 295              | 65               | 55               | 675 |                  |
| 413 with opening stop                | 90°      | 150 | 150 | 300              | 90               | 60               | 690 | 90               |
|                                      | 110°     | 135 | 135 | 310              | 80               | 55               | 690 |                  |
| 413 without opening and closing stop | 90°      | 160 | 160 | 320              | 100              | 60               | 690 | 95               |
|                                      | 110°     | 145 | 145 | 330              | 85               | 60               | 690 |                  |

<sup>(1)</sup> operator useful travel      <sup>(2)</sup> max. dimension      <sup>(3)</sup> min. dimension

#### 4.3.1. General rules to determine the installation dimensions

- to obtain 90° leaf openings : **A+B=C**
- to obtain leaf openings **exceeding 90°** : **A+B<C**
- **Smaller A and B dimensions determine higher peripheral speed of the leaf.**
- **Limit the difference between A and B dimension within 4 cm:** higher differences cause great speed variations during the gate opening and closing movement.
- Keep a **Z** dimension in such a way that the operator does not strike the pillar.
- **in the LS versions the limit switches are triggered for the first and the last 30 mm. Therefore use such A and B dimensions in order to use the whole operator travel. Shorter travels could limit or cancel the limit switch adjustment range.**
- **The mechanical travel stops operate for the first and the last 30 mm of the travel; shorter travels could limit or cancel the adjustment range.**

If the pillar dimensions or the hinge position do not allow the installation of the operator, a niche on the pillar, as shown in Fig. 5, should be created in order to maintain the A dimension as determined. The niche should be dimensioned in such a way to enable easy installation, operator rotation and operation of the release device.

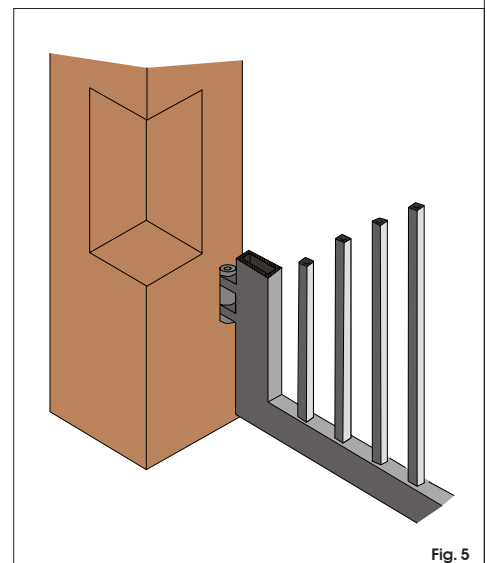


Fig. 5

#### 4.4. Installing the operators

1) Fix the rear bracket in the position determined before. In the event of iron pillar carefully weld the bracket directly on the pillar (Fig.6). In the event of masonry pillar, use the suitable plate (optional) for the fixing to screw (Fig.7) by making use of suitable fastening systems. Then carefully weld the bracket to the plate.

During the fastening operations, check if the bracket is perfectly horizontal by means of a level.

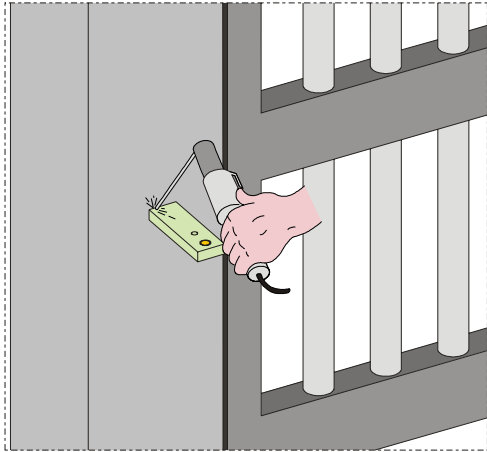


Fig. 6

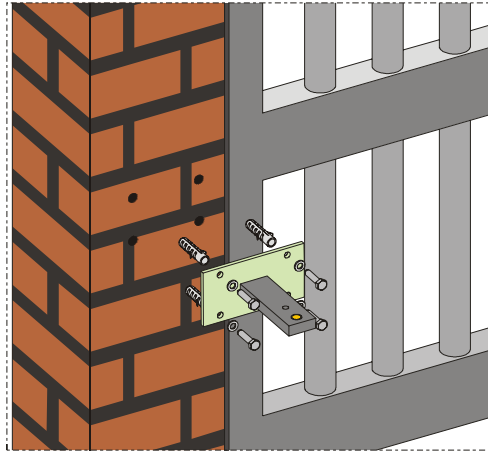


Fig. 7

2) Assemble the rear fitting to the operator as shown in Fig.8.

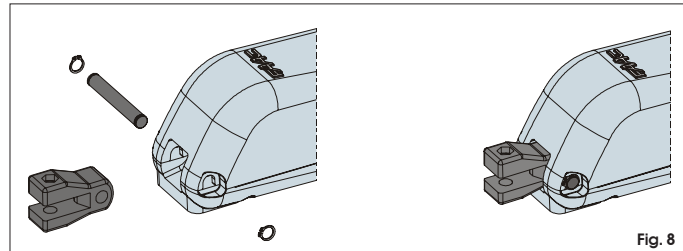


Fig. 8

3) Check if the front fitting is in the correct position as shown in Fig.9 (with closing mechanical travel stop) or in Fig.10 (without closing mechanical travel stop). If this is not the case, temporarily supply power to the operator to position the fitting.



**ATTENTION: The operator can be moved by hand only if it is installed on the gate and in released position (see paragraph 6).**

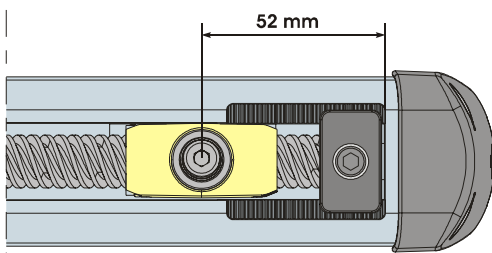


Fig. 9

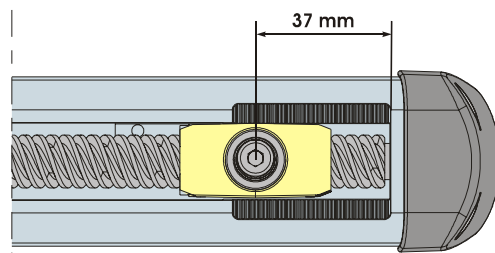


Fig. 10

4) Assemble the front bracket as shown in Fig.11. A hexagonal seat is located in the lower part of the fitting CH=5 (Fig.11 ref. A) to make the assembling operations easier.



**Attention: before fastening the operator on the front bracket you have just welded, wait for the bracket to cool.**

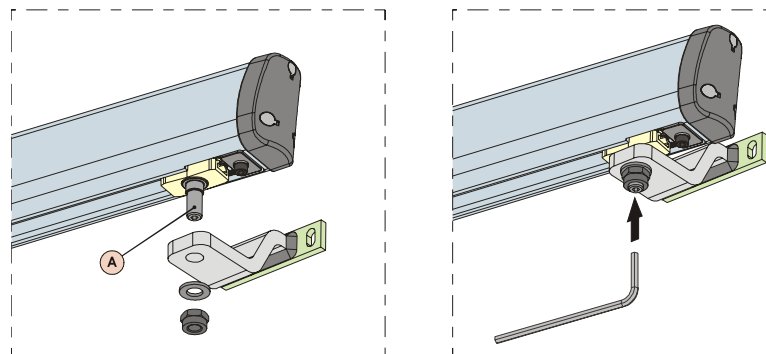


Fig. 11

5) Fix the operator to the rear bracket by means of the supplied pins as shown in Fig.12.

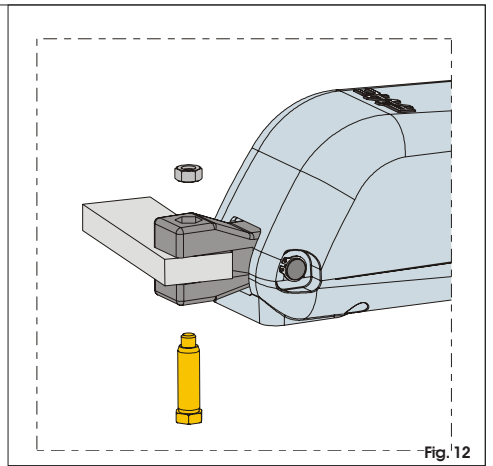


Fig.12

6) Close the leaf and, keeping the operator in a perfect horizontal position, determine the fastening point of the front bracket (Fig.13).  
7) Temporarily fix the front bracket with two welding spots (Fig.13).

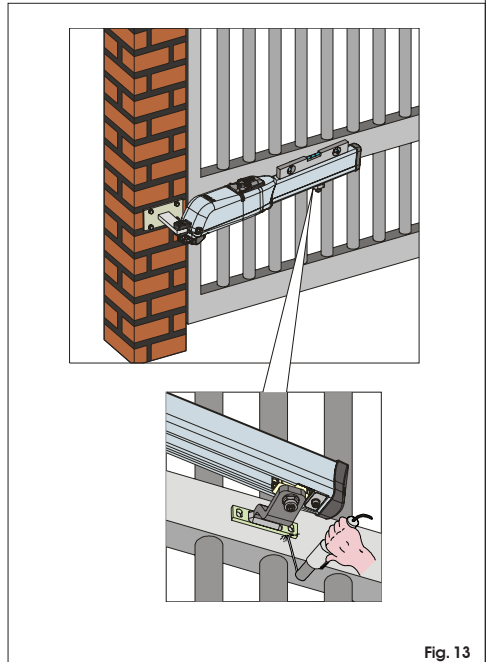


Fig. 13



**Note: if the gate structure does not allow a fix bracket fastening it is necessary to create a sturdy supporting base in the gate structure.**

8) Release the operator (see paragraph 6) and manually check if the gate can completely open without hindrances and stop at the mechanical travel stops as well as if the leaf moves regularly without any friction.  
9) Carry out the necessary corrective measures and repeat from point 8.  
10) Temporarily release the operator from the front bracket and weld the bracket definitively.



**Note: we recommend to grease all the fastening pins of the fittings.**

#### 4.5. Wiring the operator

A terminal board is fitted in the lower part of the operator for the connection of the motor, of any limit switch and for the earthing of the operator.



**IMPORTANT : To connect the motor, the supplied cable must be used for the mobile section, or a cable for mobile laying from the outside.**

Motor wiring operations:

- 1) Open one of the two pre-drilled holes in the supplied cover, Fig.14; in case of operators with limit switches, open both holes.
- 2) Fit the supplied cable gland.
- 3) Connect the motor and the earthing with reference to Fig.15 and to the table.

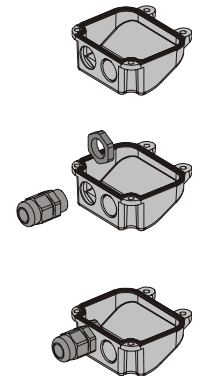
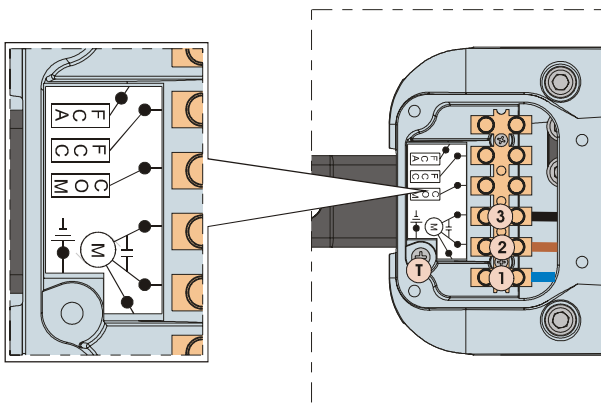


Fig. 14



**To maintain approval for CSA-UL approved operators, position the capacitor (secured in a stable manner) inside a CSA-UL approved enclosure.**



| 413 230 V~ (115V~) |                        |              |
|--------------------|------------------------|--------------|
| POS.               | COLOUR                 | DESCRIPTION  |
| 1                  | Blue (White)           | Common cable |
| 2                  | Brown (Red)            | Phase 1      |
| 3                  | Black (Black)          | Phase 2      |
| T                  | Yellow / Green (Green) | Earthing     |
| 413 24 Vdc         |                        |              |
| POS.               | COLOUR                 | DESCRIPTION  |
| 1                  | Blue                   | Phase 1      |
| 2                  | Not used               | /            |
| 3                  | Brown                  | Phase 2      |
| T                  | Not used               | /            |

Fig. 15

4) Close the cover with the four supplied screws, Fig.16.

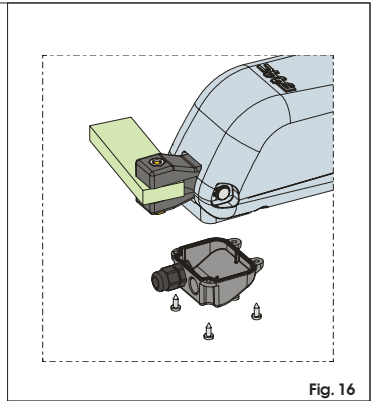


Fig. 16

#### 4.6. Mechanical travel stops

The 413 operators are equipped with opening and closing mechanical travel stops. They can be used instead of the leaf mechanical limit stops. To adjust the mechanical travel stops operate as follows:

##### 4.6.1. Adjusting the opening mechanical travel stop

- 1) Set the operator for manual operation, see paragraph 6
- 2) Manually move the leaf in opening position.
- 3) Loosen the fastening screw, Fig.17 ref.A. Do not remove the screw.
- 4) Move the stop near the fitting as shown in Fig.18.



**IMPORTANT:** The mechanical stop works coupled to a toothed sector, Fig. 17 ref. B. If there are any troubles during the movement, make sure that the coupling is free. **DO NOT FORCE.**

5) Re-tighten the securing screw, checking correct coupling to the toothed sector.

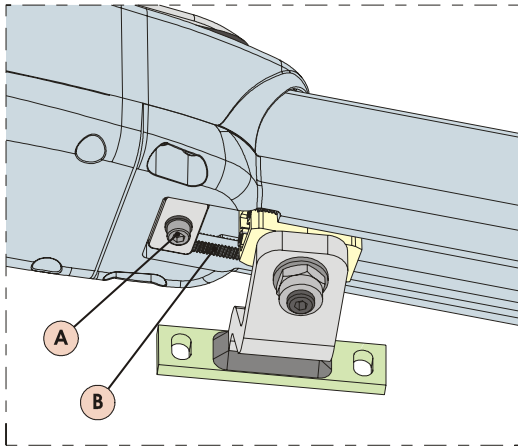


Fig. 17

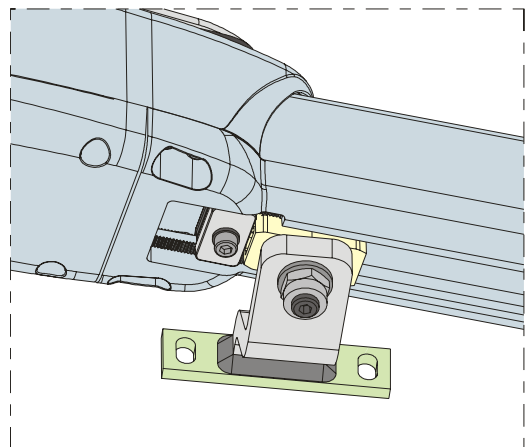


Fig. 18

##### 4.6.2. Adjusting the closing mechanical travel stop

- 1) Set the operator for manual operation, see paragraph 6
- 2) Manually move the leaf in closing position.
- 3) Loosen the fastening screw, Fig.19 ref.A. Do not remove the screw.
- 4) Move the stop near the fitting as shown in Fig.20.



**IMPORTANT:** The mechanical stop works coupled to a toothed sector, Fig. 19 ref. B. If there are any troubles during the movement, make sure that the coupling is free. **DO NOT FORCE.**

5) Re-tighten the securing screw, checking correct coupling to the toothed sector.

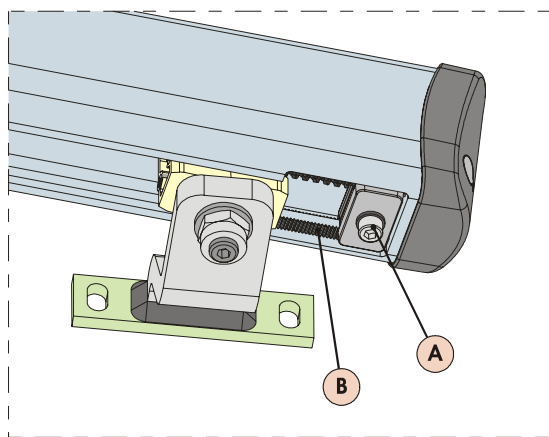


Fig. 19

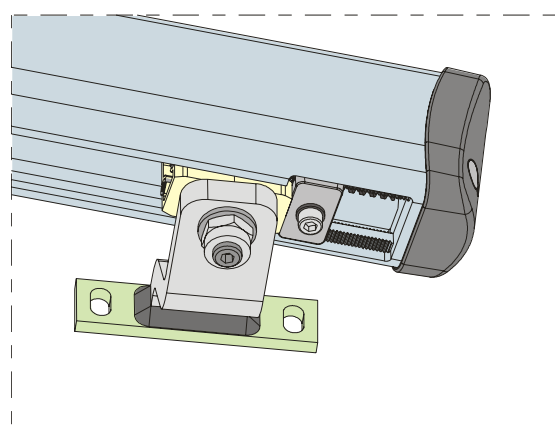


Fig. 20

## 4.7. Limit switches

The "LS" models are equipped with opening and closing limit switches. Therefore they require the use of a control board able to control these inputs.



**Note:** The limit switches are triggered for the first and the last 30 mm of the travel. Therefore the operator should use the whole available travel during the opening phase. Shorter travels can limit or completely cancel the limit switch adjustment range.

### 4.7.1. Wiring the limit switches

The limit switches are wired in the same terminal board where the motor wiring has been carried out. Wire the limit switches as follows:

- 1) Open the second pre-drilled hole in the cover, Fig.21.
- 2) Fit the supplied cable gland, Fig.21
- 3) Insert the cable and connect it to the terminals observing the colours specified in the table of Fig.22.
- 4) Close the cover with the four supplied screws.



**Notes:**

- For the limit switch connection use the cable for the external movable laying with wires having a cross section of 0.5 mm<sup>2</sup>.
- During the wiring operations, observe the wire colours as specified in the table of Fig.22.

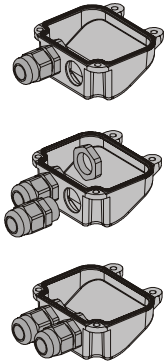
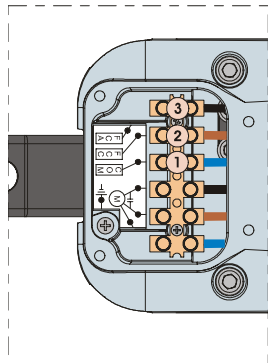


Fig. 21



| POS. | COLOUR | DESCRIPTION                |
|------|--------|----------------------------|
| 1    | Blue   | Common cable               |
| 2    | Brown  | Closing limit switch (FCC) |
| 3    | Black  | Opening limit switch (FCA) |

Fig. 22

### 4.7.2. Adjusting the limit switches

The limit switch adjustment is carried out as follows:

- 1) Remove the two plugs which cover the lower securing screws, Fig.23 ref.1. To facilitate this operation, a slot is provided for inserting a screwdriver.
- 2) Unscrew both lower screws of the front cap and remove the cover, Fig.23.

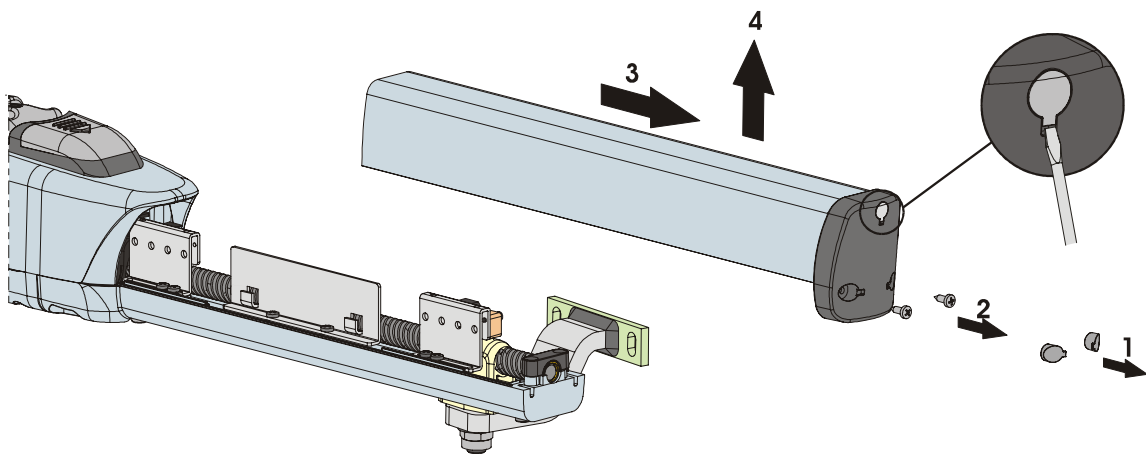


Fig. 23

- 3) Loosen the fastening screws of the limit switch to adjust, Fig.24 ref.A.
- 4) Move the limit switch to the desired position and lock the screws.
- 5) Perform a pair of test cycles to check the correct position of the limit switch. If the adjustment of the limit switch needs to be carried out again, repeat the operation starting from point 2.

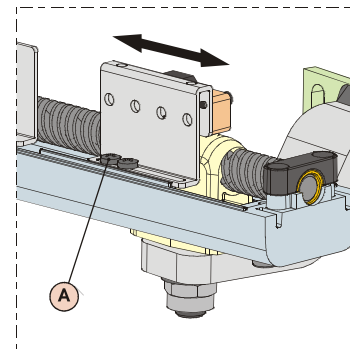


Fig. 24



- 6) Position again the cover by sliding it on the lower casting and make sure that it reaches the stop, Fig.25.
- 7) Screw both lower screws, Fig.25.
- 8) Re-position the two front plugs.

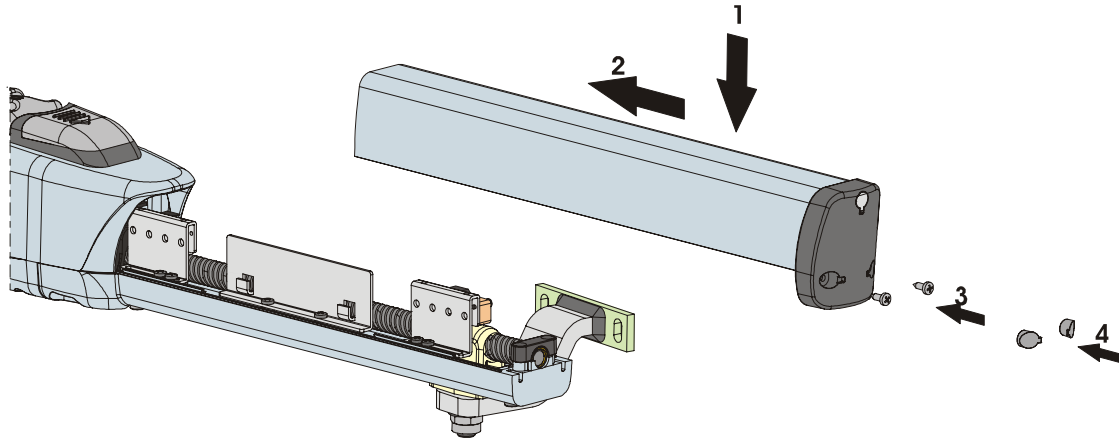


Fig. 25

#### 4.8. Start-up



**ATTENTION:** Cut power before any job on the system or on the operator.

Carefully observe points 10, 11, 12, 13 and 14 of the SAFETY GENERAL RULES.

With reference to the indications in Fig.3, set the ducts and carry out the electrical connections of the control board and of the chosen accessories.

Always separate power cables from control and safety cables (push button, receiver, photocells, etc.). To avoid any electrical noise whatever in the unit, use separate sheaths.

- 1) Power up the system and check the LED condition as shown in the table of the control board instructions.
- 2) Program the control board according to the needs by following the given instructions.

### 5. TESTING THE AUTOMATED SYSTEM

- Carefully check operating efficiency of the automated system and of all accessories connected to it, paying special attention to the safety devices.
- Hand the "User's Guide" to the final user together with the Maintenance sheet.
- Explain correct operation and use of the automated system to the user.
- Indicate the potentially dangerous areas of the automated system to the user.

## 6. MANUAL OPERATION

If the automated system needs to be moved manually due to a power lack or to an operator malfunction, proceed as follows:

- 1) Cut power by means of the safety circuit breaker (even in the event of a power lack).
- 2) Slide the protective cap, Fig.26/1.
- 3) Insert the key and turn it 90°, Fig.26/2.
- 4) To release the operator turn 180° the control lever to the direction indicated by the arrow on the release system, Fig.26/3.
- 5) Open and close the leaf manually.



**Note:** To hold the operator in manual operation the release device should be left in its current positions and the system should be without power.

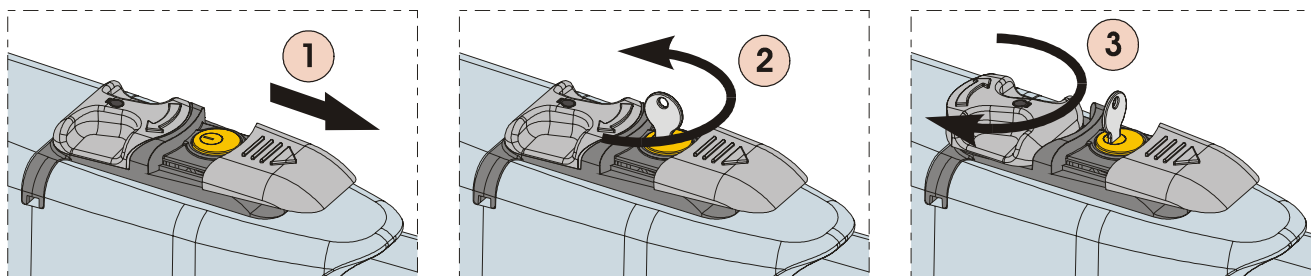


Fig. 26

### 6.1. Restoring normal operation

To restore normal operating conditions, proceed as follows:

- 1) Turn the release system 180° in the opposite direction of the arrow.
- 2) Turn 90° the release key and remove it.
- 3) Close the protection cover.
- 4) Power up the system and perform some movements in order to check the correct restoring of every function of the automated system.

## 7. MAINTENANCE

To ensure trouble-free operation and a constant safety level, an overall check of the system should be carried out every 6 months. A form for recording operations has been included in the "User's Guide" booklet.

## 8. REPAIRS

For any repairs, contact the authorised Repair Centres.

## 9. AVAILABLE ACCESSORIES

Refer to catalogue for available accessories.

## 10. SPECIAL APPLICATIONS

There is no special application other than the described use.