# OPERATING AND SERVICE MANUAL

*BUILDERS HOIST*

# JUNIOR

REV 002 CE *04-10*

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| | | | |
|---|---|---|---|
| DATE | | | |
| CUSTOMER | TRADEHOUSE | | |
| ADDRESS | | | |
| TYPE OF HOIST | BUILDER HOIST FOR PERSONS AND MATERIAL | | |
| MODEL | JUNIOR CE | | |
| COUNTRY OF PRODUCTION | ITALY | | |
| YEAR OF MANIFACTURE | | | |
| CE MARK REFERENCE | | | |
| MOTOR GROUP SERIAL NO. | | | |
| GEARMOTOR SERIAL NUMBER NO. | | | |
| EMERGENCY BRAKE SERIAL NO. | | | |
| AUXILIARY CIRCUIT WIRING DIAGRAM NO. | 2.04.57.002_B | DATE | 17/03/2006 |
| AUXILIARY CIRCUIT WIRING DIAGRAM NO. | 2.04.57.003_A | DATE | 17/03/2006 |
| POWER CIRCUIT WIRING DIAGRAM NO. | 2.04.57.001 | DATE | 29/11/2004 |
| JUNCTION TERMINAL BOARD WIRING DIAGRAM NO. | 2.04.57.004_A | DATE | 17/03/2006 |

# 1.0 Guide to consultation

## 1.1 Assembly - Operation - Safety and maintenance

In drawing up this manual, all operations for normal use and maintenance of the machine have been taken into consideration. For correct and optimum use therefore, the instructions must be carefully followed.
The machine must only be used by authorised trained personnel.
All operations requiring dismantling of machine parts must be performed by authorised technical personnel.
SAFI declines all responsibility for damage arising from incorrect use of the machine and failure to observe the instructions given in this manual.
The manual must be kept in good condition within easy reach of the machine operators.

For technical support, please contact:

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# 2.0 Technical specifications

## 2.1 Technical specifications

Table 1: General specifications

| | |
|---|---|
| Model | **JUNIOR** |
| Capacity kg. | **300** |
| Speed | **20 m/min** |
| Max number of persons | **2** |
| Motor power KW | **4 KW** |
| Power supply voltage | **380V/50 Hz three-phase** |
| Secondary circuit voltage | **110 V** |
| Normal absorption | **8.5 A** |
| Absorption at start up | **48.5 A** |
| No. of self-braking motors | **1** |
| Maximum height | **100 metres** |
| Weight at the base (including enclosure) | **1085 kg** |
| Distance between anchoring points | **4.5 metres** |
| Doors | **sliding up-down** |
| Basket at base for collecting the cable during cage descent | **YES** |
| Maximum permitted wind speed in service | **20 m/s** |
| Maximum permitted wind speed erection and dismantling | **12,5 m/s** |

Table 2: Dimensions

| ELEMENT | HEIGHT m. | | LENGTH m. | | WIDTH m. | |
|---|---|---|---|---|---|---|
| Dimensions of column element | **----------** | | **----------** | | **0.15 x 0.15** | |
| Cage internal dimensions | **2.261** | | **1.30** | | **0.950** | |
| Cage overall dimensions | **3.850** | | **1.480** | | **1.320** | |
| Base overall dimensions | **----------** | | **1.290** | | **1.730** | |
| Enclosure overall dimensions | **3.600** | | **1.790** | | **1.446** | |
| Mast dimensions | **1.492** | | **----------** | | **----------** | |

Tabella 3: Weights

| COMPONENTS | kg |
|---|---|
| Complete base | 94 |
| Screw with base | 2,4 |
| Vertical element | 36,5 |
| End element | 31,5 |
| Enclosure frame with door and counterweights | 153 |
| Enclosure rear panel | 28 |
| Enclosure side panel | 33 |
| Complete cage | 622 |
| Cage entrance door with frame | 62 |
| Cage exit door with frame | 70 |
| Electrical panel | 22 |
| Gearmotor | 55 |
| Centrifugal brake | 36 |
| Enclosure door opening slide | 1,1 |
| Mobile sliding block for stroke end | 1,4 |
| Large guardrail | 15,5 |
| Small guardrail | 8,5 |
| Cable basket | 35 |
| Cable guide | 2,8 |
| Anchoring bracket | 9 |
| Anchor fixing bracket | 6,8 |
| 48 mm dia square clamp | 1,8 |
| Cable guide arm | 4,8 |

# 3.0 Description

## 3.1 General desription

The **SAFI** builders hoist, model **Junior**, uses a rack and pinion system driven by a gearmotor to raise the loading cage. The **SAFI** site hoist permits considerable savings in the running of modern building sites. Its special features are:

- Possibility of lifting materials, therefore leaving the site crane free for other uses.
- Easy for personnel to reach the various floors for finishing or inspection work.
- Safe and time-saving when moving personnel and materials.
- Gives the firm greater prestige.
- Simple to use and maintain.
- Possibility of assembly inside lift shafts (even small ones).

This is possible thanks to its compact structure which exploits all available space.
The enclosure and the cage can be dismantled to facilitate transport and loading and unloading operations.

## 3.2 Overall dimensions

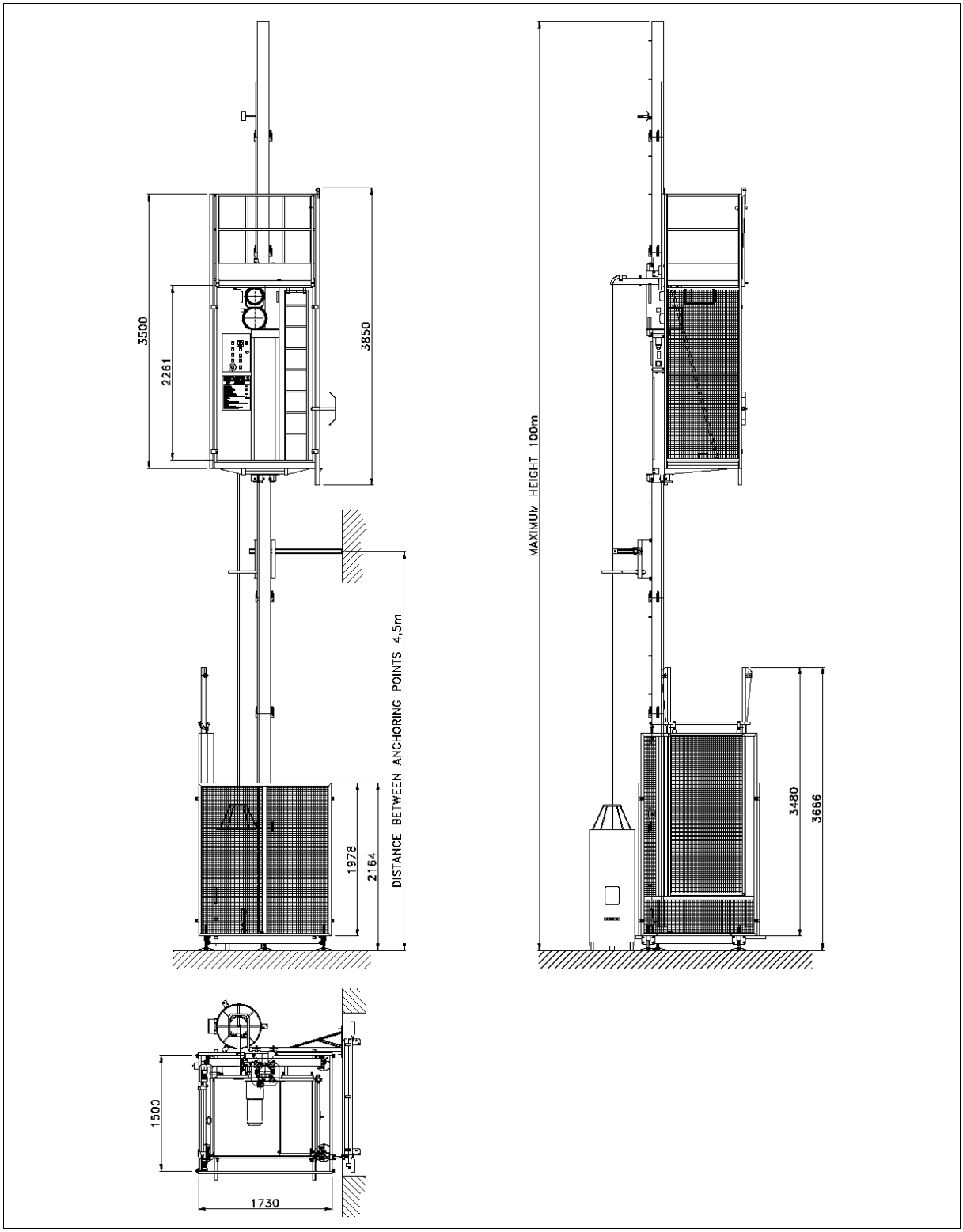


*Figura 3.2.1 Overall dimensions*

# 4.0 Machine components

The machine consists of the following components:

Table 4: List of components

| Paragraph ref. | Assembly |
|---|---|
| **4.0** | Assembly |
| **4.1** | Base with mast and slide |
| **4.2** | Base enclosure |
| **4.3** | Vertical and end elements |
| **4.4** | Cage with forks and screws for lifting |
| **4.5** | Cable collecting basket |
| **4.6** | Electric cable |
| **4.7** | Cable arm |
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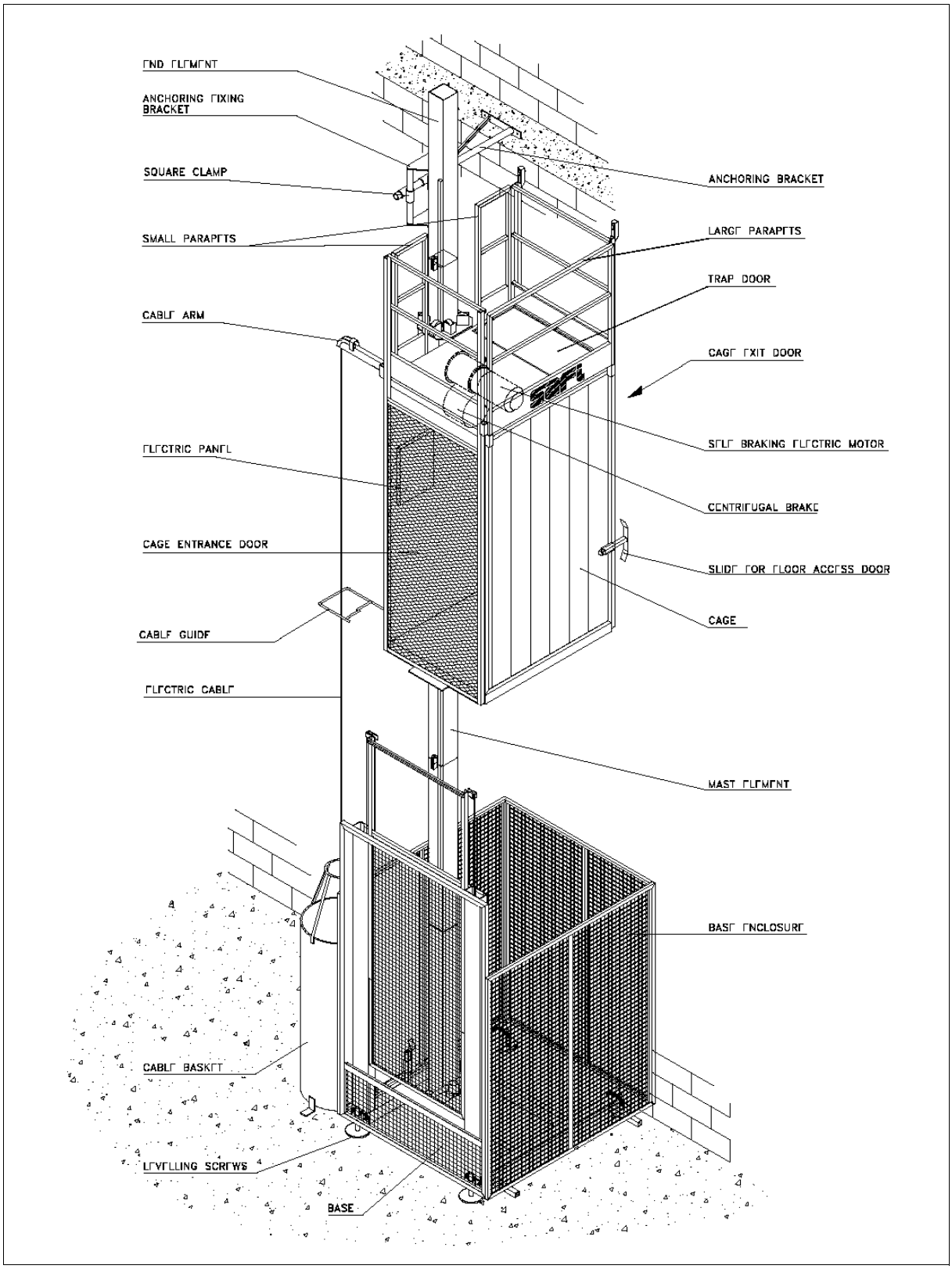



*Figura 4.0.1 Assembly*

## 4.1 Base

The base of the hoist consists of a steel tube base frame which positions and blocks the vertical column and the base enclosure on the ground. The base rests on the ground by means of 5 lifting screws. A rubber shock absorber cushions the motor unit if it overshoots the stroke end and comes into contact with the base frame.

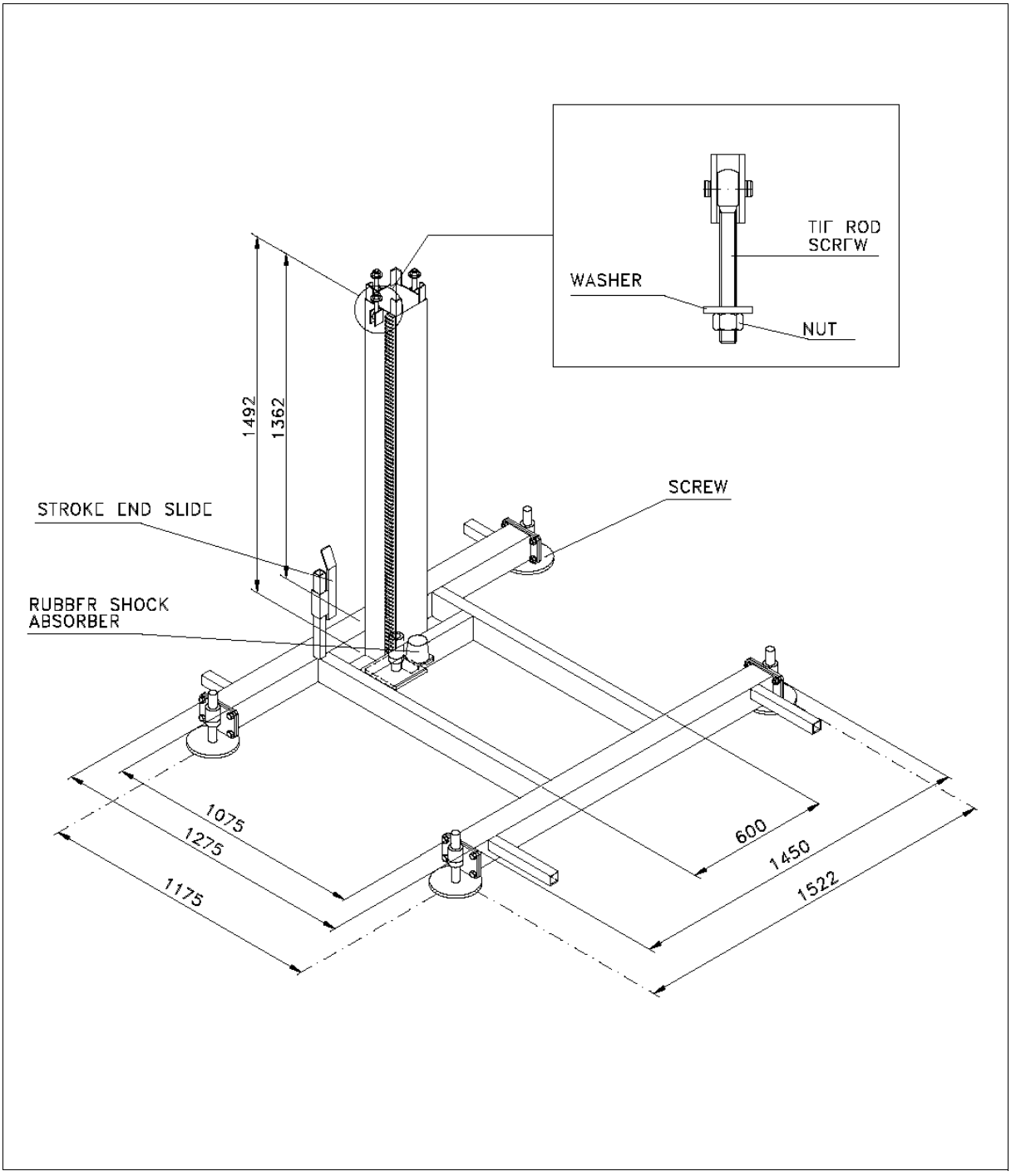



*Figura 4.1.1 Base*

## 4.2 Base enclosure

The base enclosure is made of tubular panels and steel mesh. The various panels are connected to one another and to the base frame by means of steel bolts. A safety device prevents the door from opening without the cage. A cable basket is positioned outside the base enclosure. A spring unwinder can be provided as an optional.

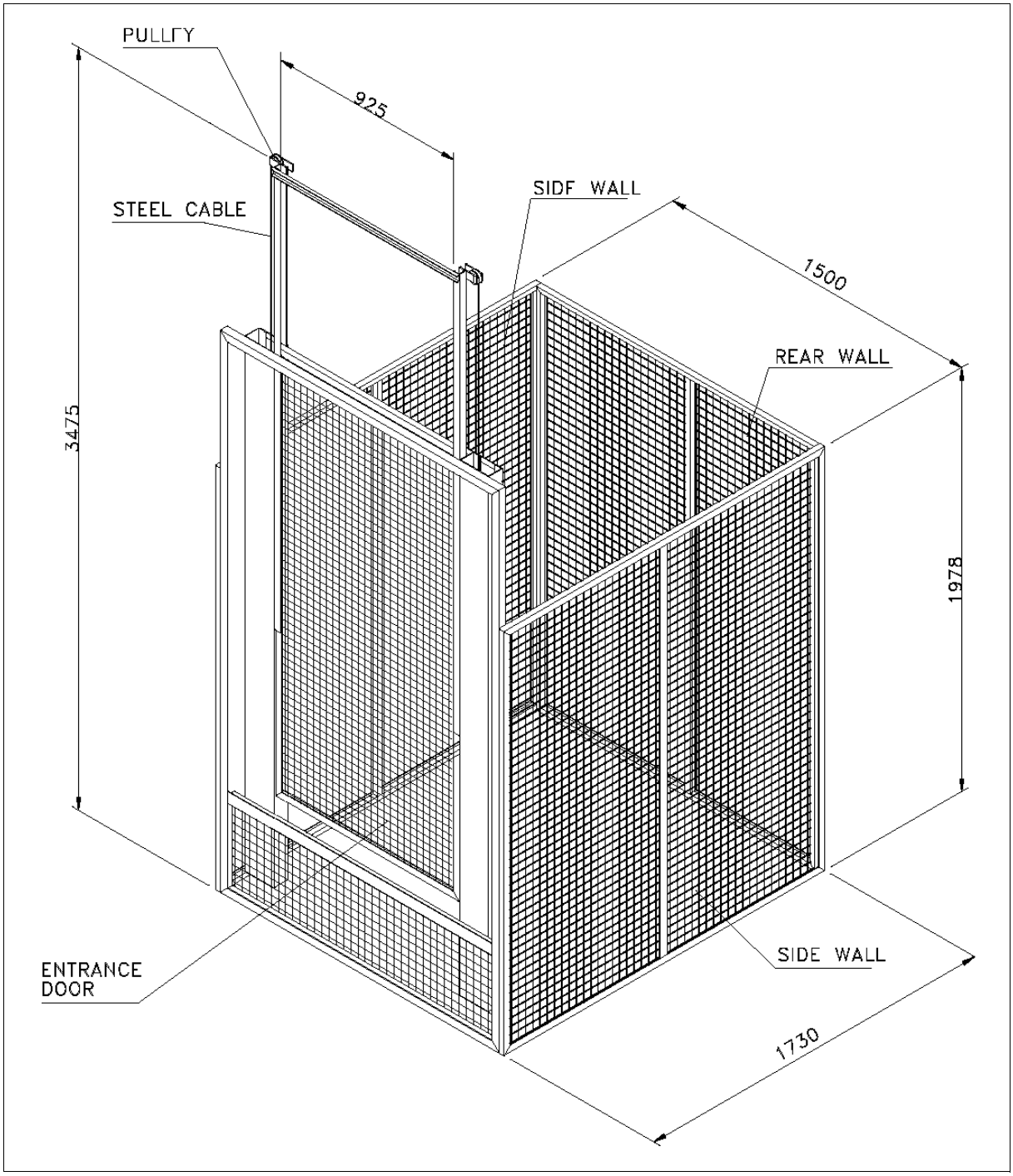



*Figura 4.2.1 Base enclosure*

## 4.3 Vertical and end elements

The vertical column is formed of individual modular components. Each mast is 1492 mm high. The vertical masts are interconnected by means of galvanized steel tie rod screws + nut + 1 flat washer.

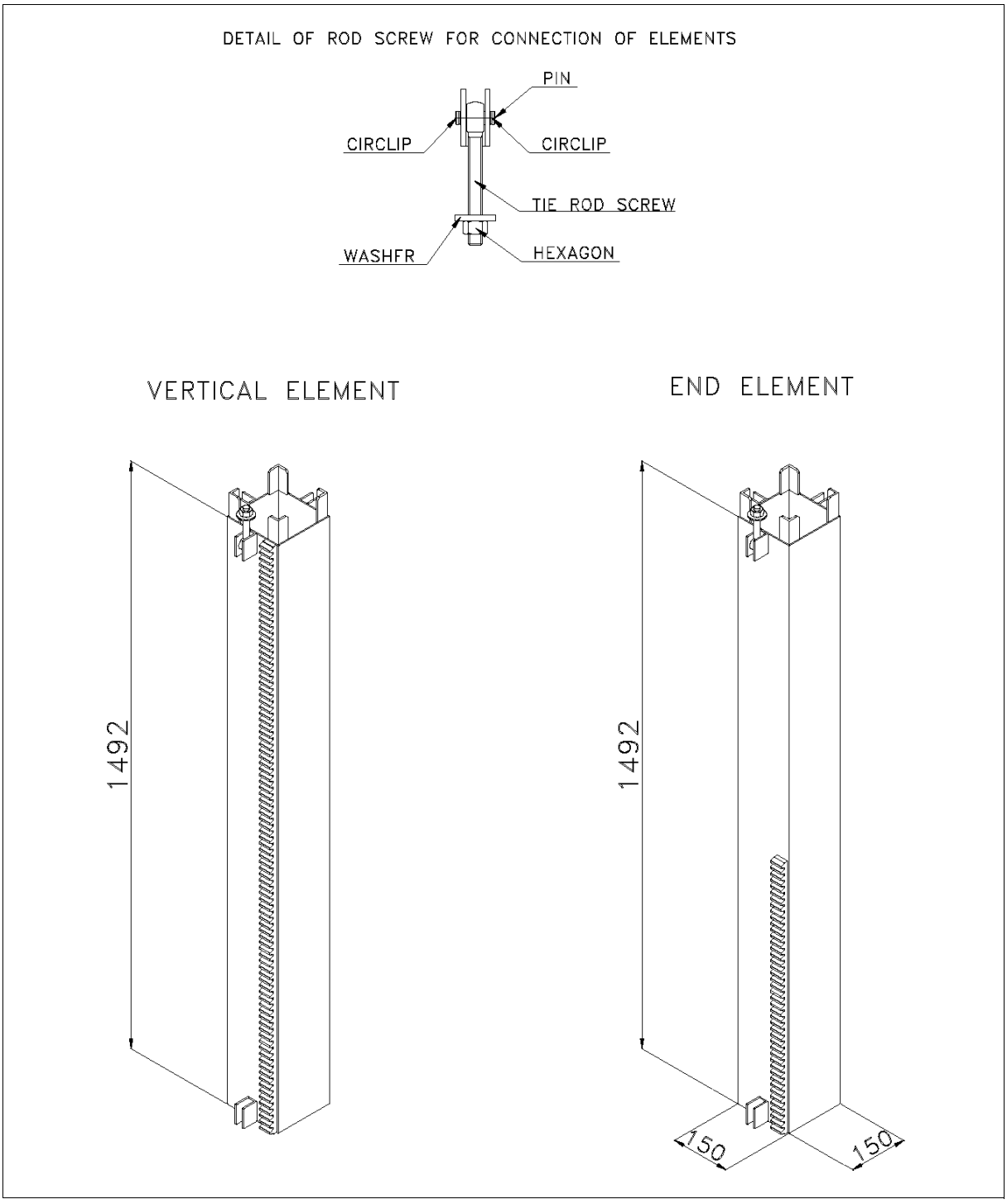



*Figura 4.3.1 Vertical and end elements*

## 4.4 Hoist cage with forks and guardrails

This is the main component of the machine and consists of a framework in which the mechanical and electrical parts for lifting and the safety systems are fitted.
The cage frame consists of a tubular steel structure with perimeter panelling made of insulating panels and sliding doors provided with electrical and mechanical locking system. The walkway and roof are made of non-slip resin-coated multilayer panels.
The lifting unit consists of an alternating current 4 KW self-braking gearmotor (it is supplied in direct current version as an optional).
The hoist is provided with an emergency brake called parachute which cuts in if the rated speed is exceeded during descent.

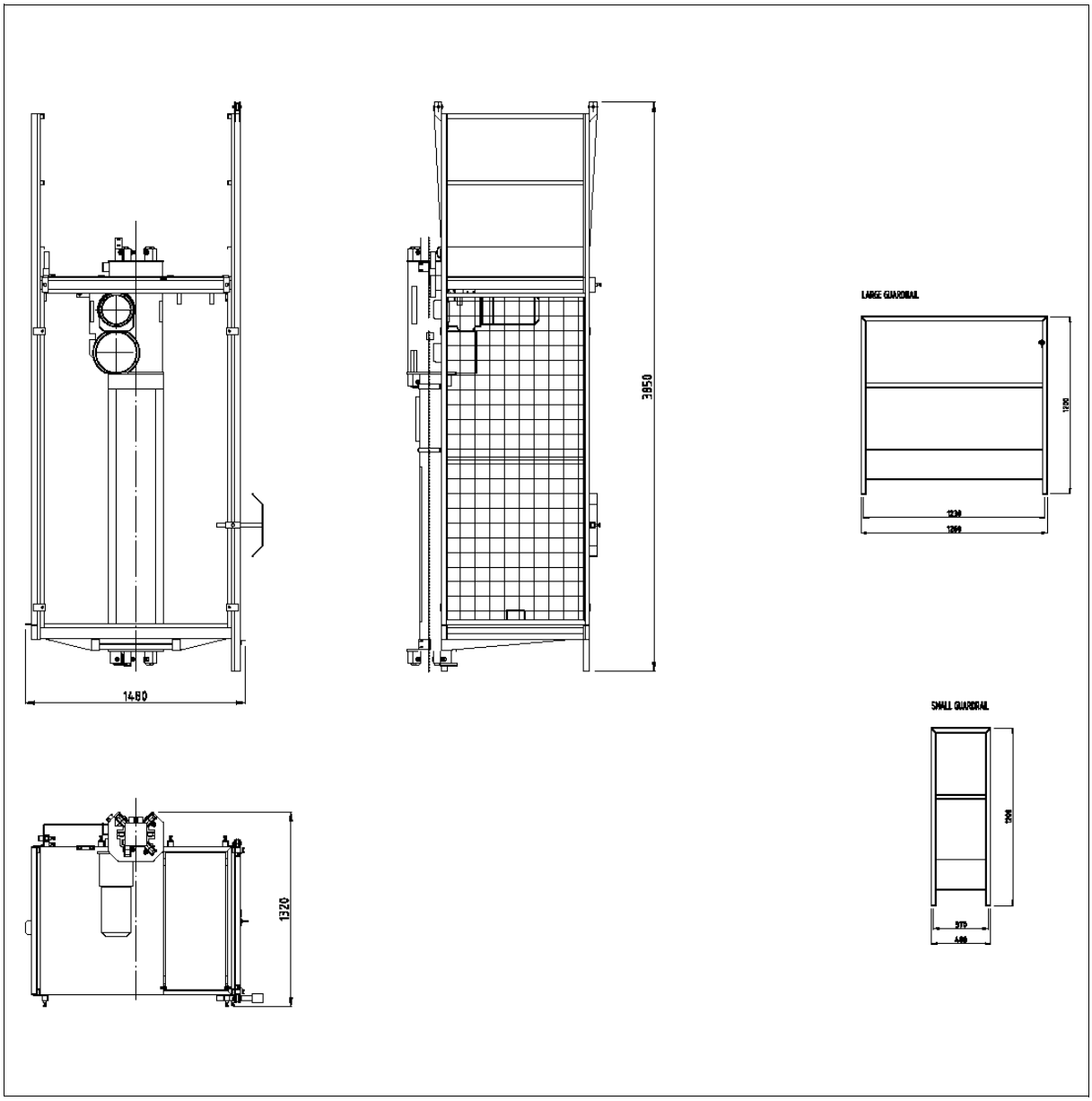



*Figura 4.4.1* Hoist cage with forks and guardrails

## 4.5 Cable basket

The cable basket collects the electrical cable hanging from the cable arm. The cable is collected in tidy coils. The basket is positioned outside the enclosure and is provided with a connector block to which the cables from the cage and power supply network are connected.

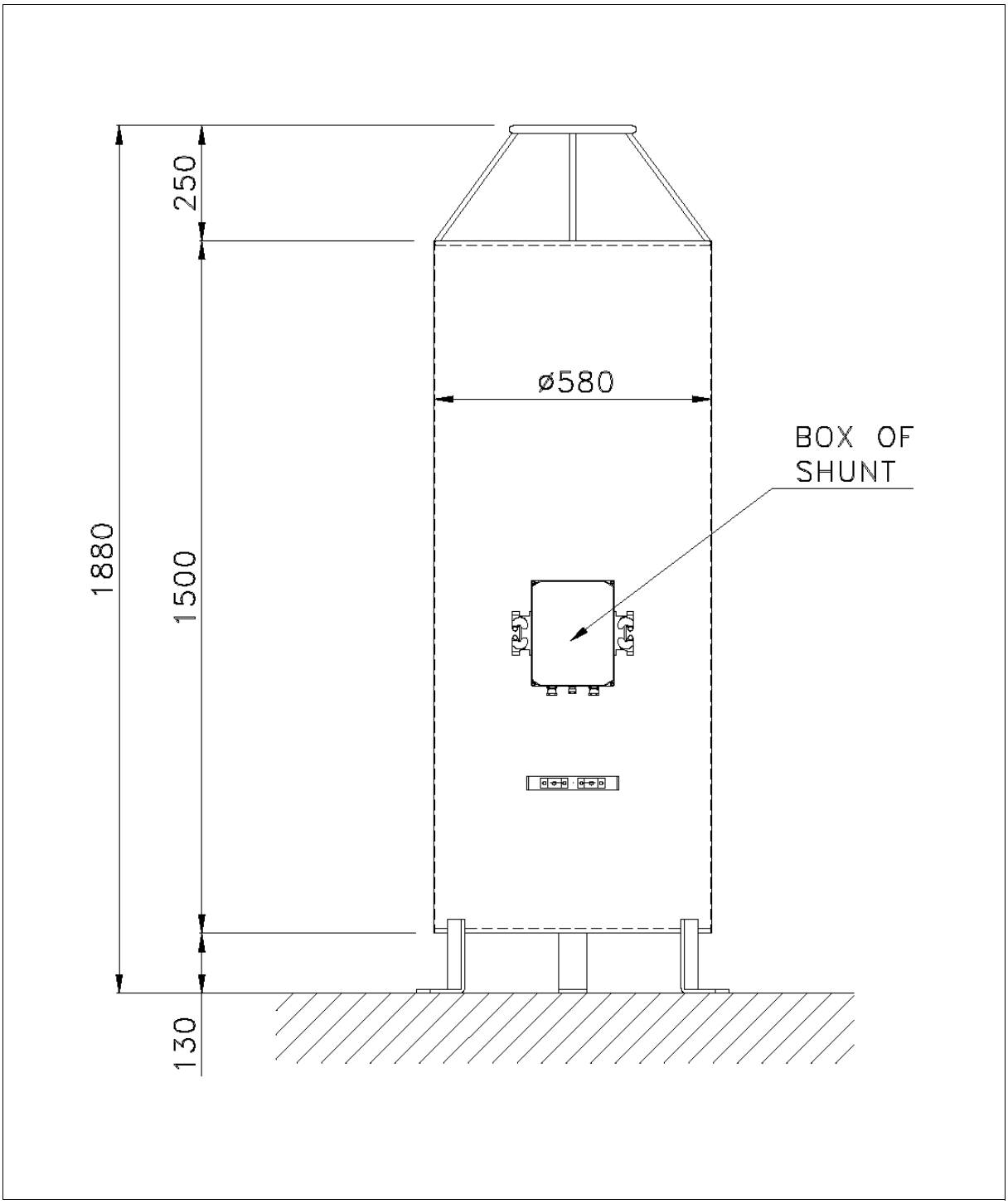



*Figura 4.5.1 Cable basket*

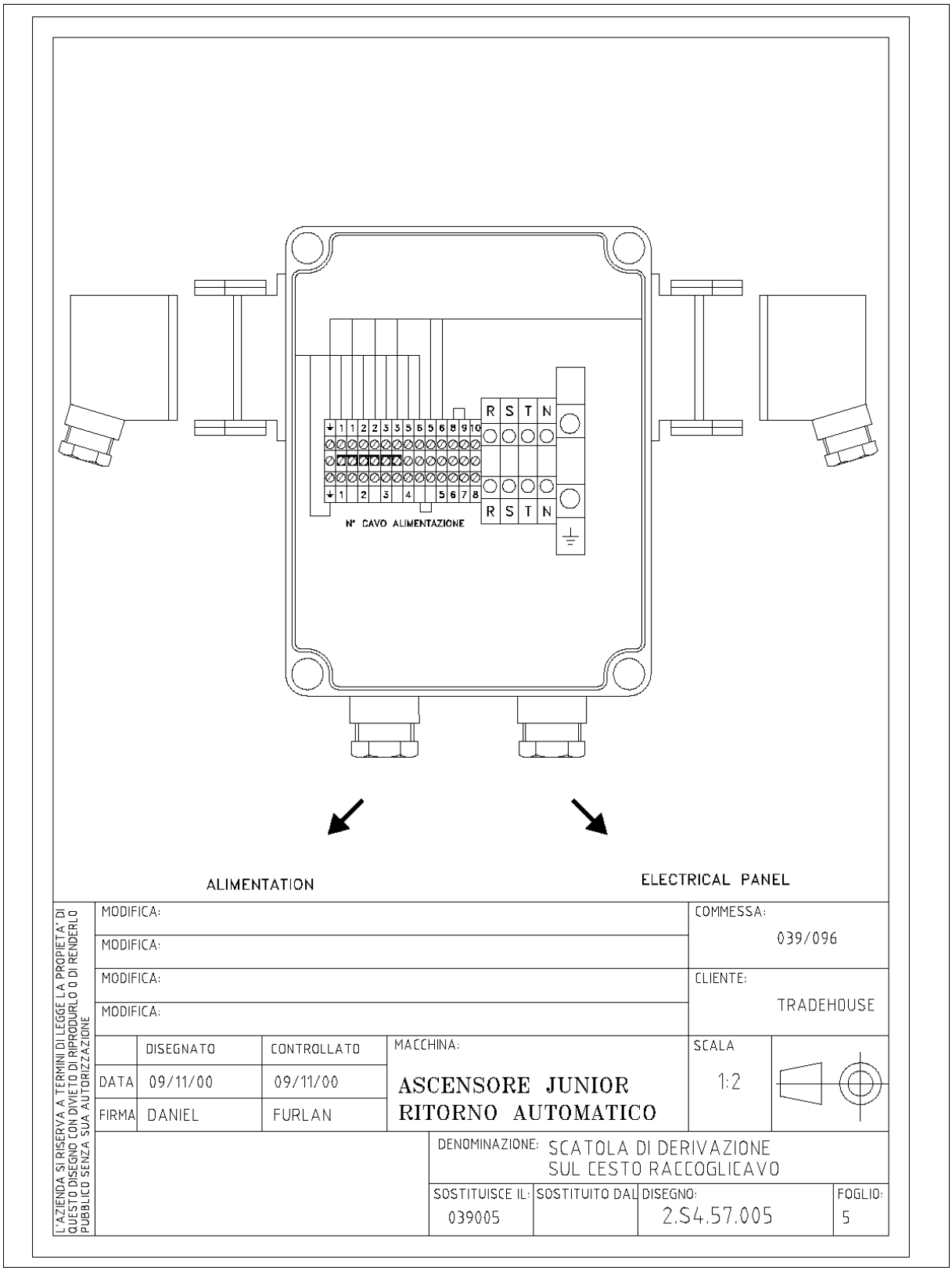



*Figura 4.5.2 Derivation box on the cable basket*

## 4.6 Electrical cable

This is an insulated rubber cable consisting of 3 three-phase leads, an earth lead with adequate section for the machine installed, a neutral lead, three leads with section of 1.5 $mm^2$ for the landing gate, control lines and a steel cable coaxial with the cable to prevent the cable stretching during lifting.

## 4.7 Cable arm

Made of tubular profile with section adequate for the weight of the cable. The cable arm is provided with rounded housing to prevent the cable breaking and coming out. It is fixed to the hoist cage by means of steel bolts.

## 4.8 Cable guide

Designed to contain and vertically guide the electrical cable. The cable guides have the job of guiding the cable into the Basket. They must be fitted at a height according to requirements and will therefore be closer near the basket and more spaced out farther up. Fit the cable guides so that the cable arm provides efficient closure of the cable guides and always check that they are in good working order.

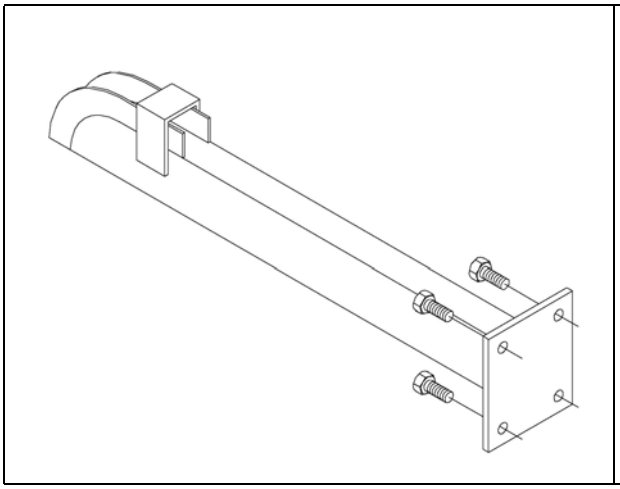


*Figure 4.8.1 - Cable arm*

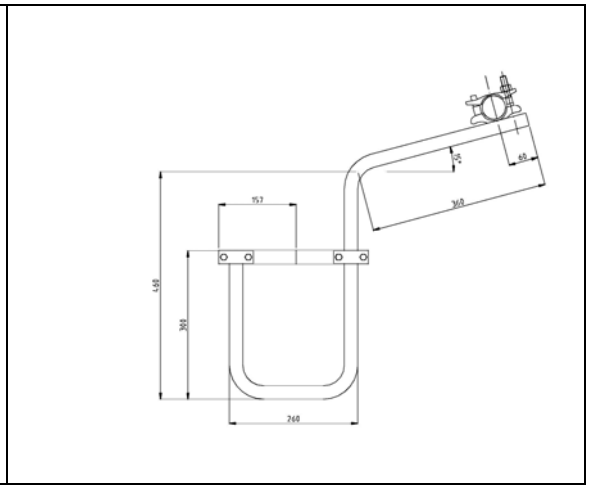


*Figure 4.8.2 - Cable guide*

## 4.9 Anchoring

Wall anchoring must be provided every 4.5 m, normally with anchoring brackets and rawl plugs. The connection between anchoring brackets and mast is by means of vertical mast fixing brackets, square clamps and bolts. The anchoring system is often made to measure in view of the wide range of applications in different building sites.

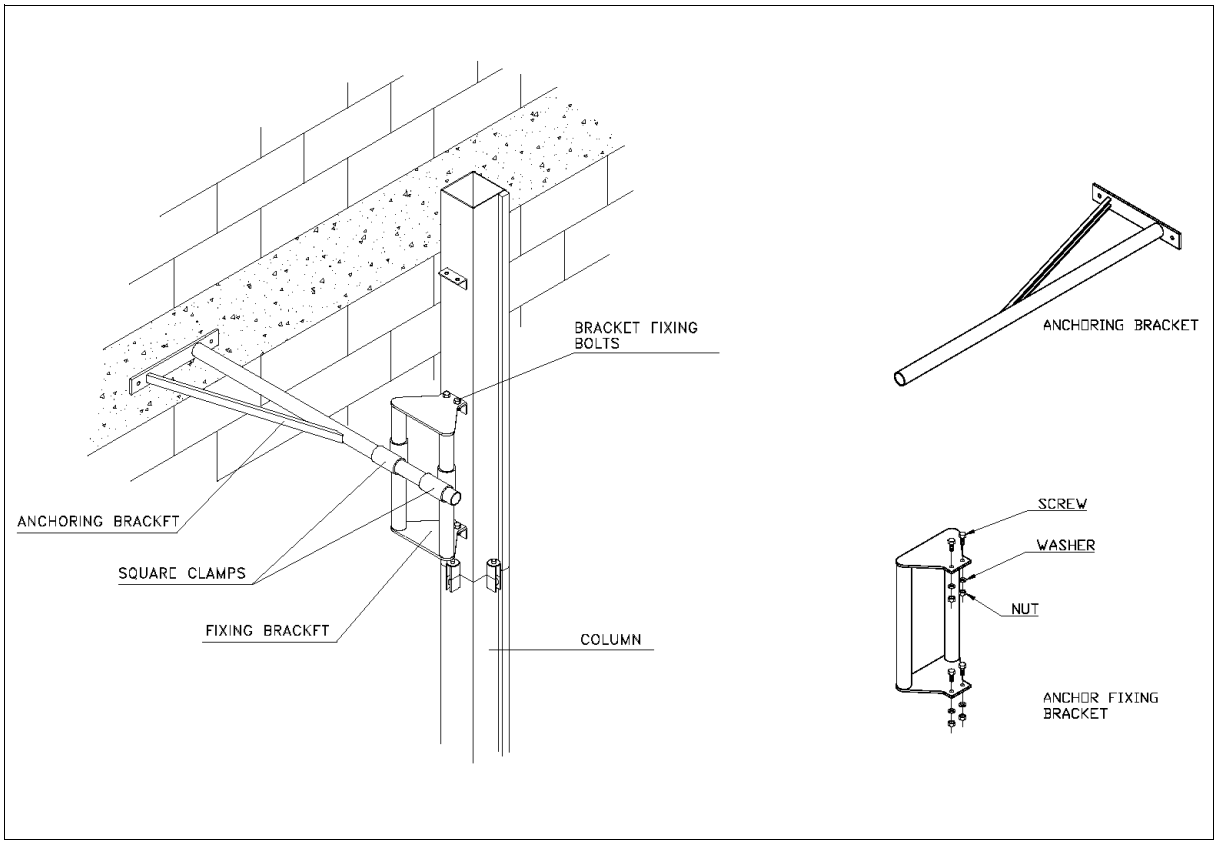



*Figura 4.9.1 Anchoring*

## 4.10 Standard landing gate

The landing gate is used when the hoist stops at the various floors to protect the cage passage area. Every door is provided with a mechanical locking system which prevents the door opening if the cage is not present. When assembling the door, ensure that it is closed and perfectly aligned with the hoist door. Correct assembly helps to save time during use. The choice of fixing system varies from site to site. However, the frame features four horizontal tubes with diameter of 48 mm for the commonest applications using 48 mm tubes and square clamps.

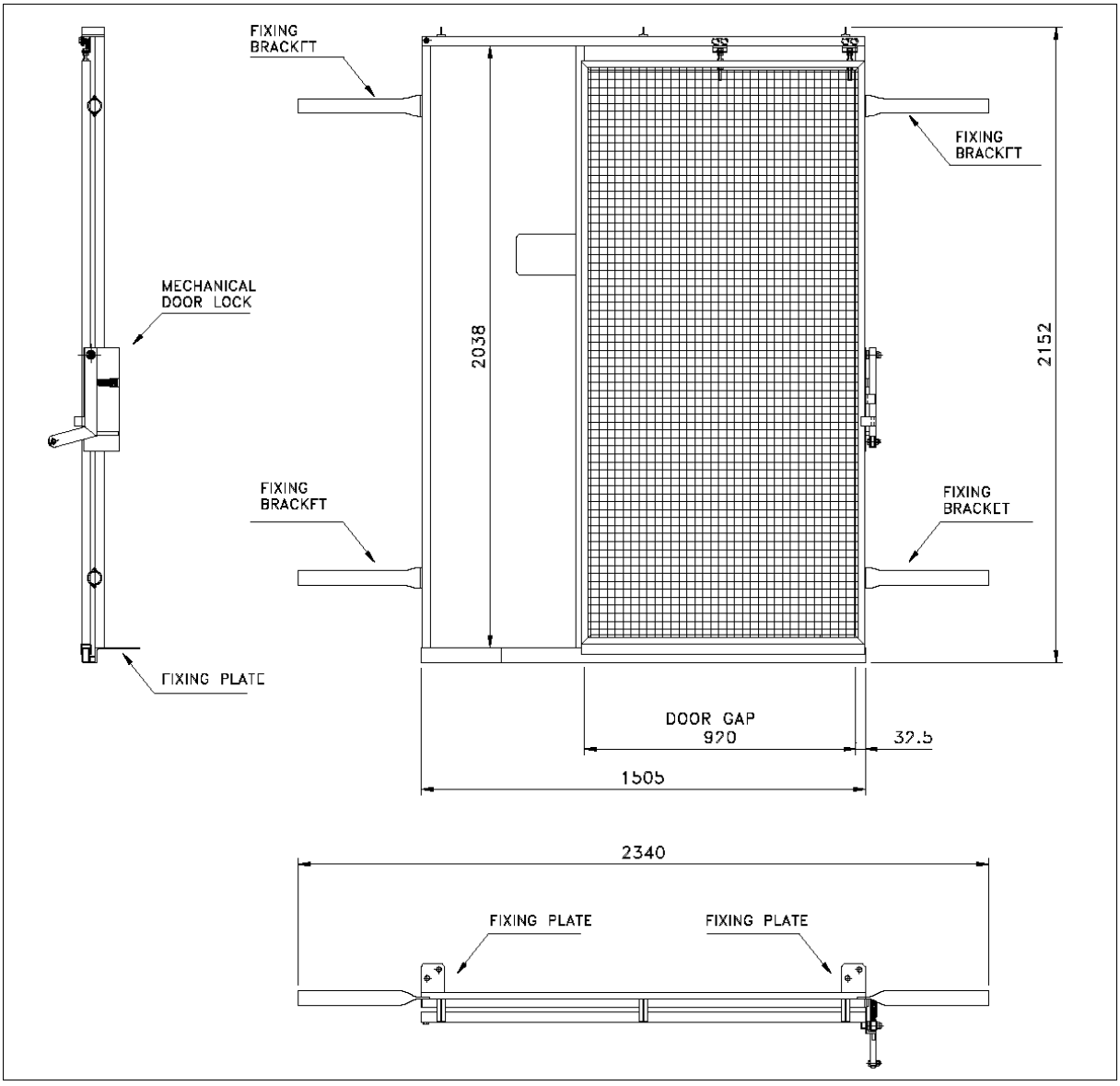



*Figura 4.10.1 Standard landing gate*

## 4.11 Optional for landig gate

The landing gate can be provided with the following optionals:

**a) - Special fitting for hammerhead crane**

This fitting consists of two tubular uprights, fixed to the frame brackets by means of clamps which act as supports and by the special wall fixing brackets. The position of these special brackets can be adjusted and consequently they can adapt to the position and type of wall fitting.

**b) - Landing gate electrical limit switch**

The landing gate can be provided with an electrical limit switch which controls whether the door is closed or open. If it is open, the limit switch cuts off the power supply, thus preventing the cage from starting.

**c) - Floor call button**

This is a push-button panel fixed to the door frame and is used to call the cage to the required floor. The doors are electrically interconnected and connected to the 6-pole plugs of the cable basket.

**d) - Semi - automatic stop at floors**

The hoist can be preset for semi-automatic stop at the floors. Normally the cage is stopped at the floor manually when it arrives at the level of the floor. With semi-automatic stop, a light indicates that the cage is arriving at the floor. By releasing the ascent or descent button, the cage automatically stops at the floor. If you do not wish to stop at the floor, simply keep the ascent or descent button pressed when the light blinks. The cage will pass the floor and continue its stroke. The light will always blink to indicate that the cage is approaching the floor.

**e) - Electronic load limitation system**

This is a system that serves to detect the presence of an overload. It comprises an electronic panel and a device which is installed on the cage floor. Operation is as follows:

- If the load inside the cage progressively increases, at a certain point a light will come on to warn that the load is near the maximum permitted limit. If the load continues to increase, exceeding the limit, an alarm will ring and at the same time a system prevents the cage from moving until the load is reduced to within the limit.

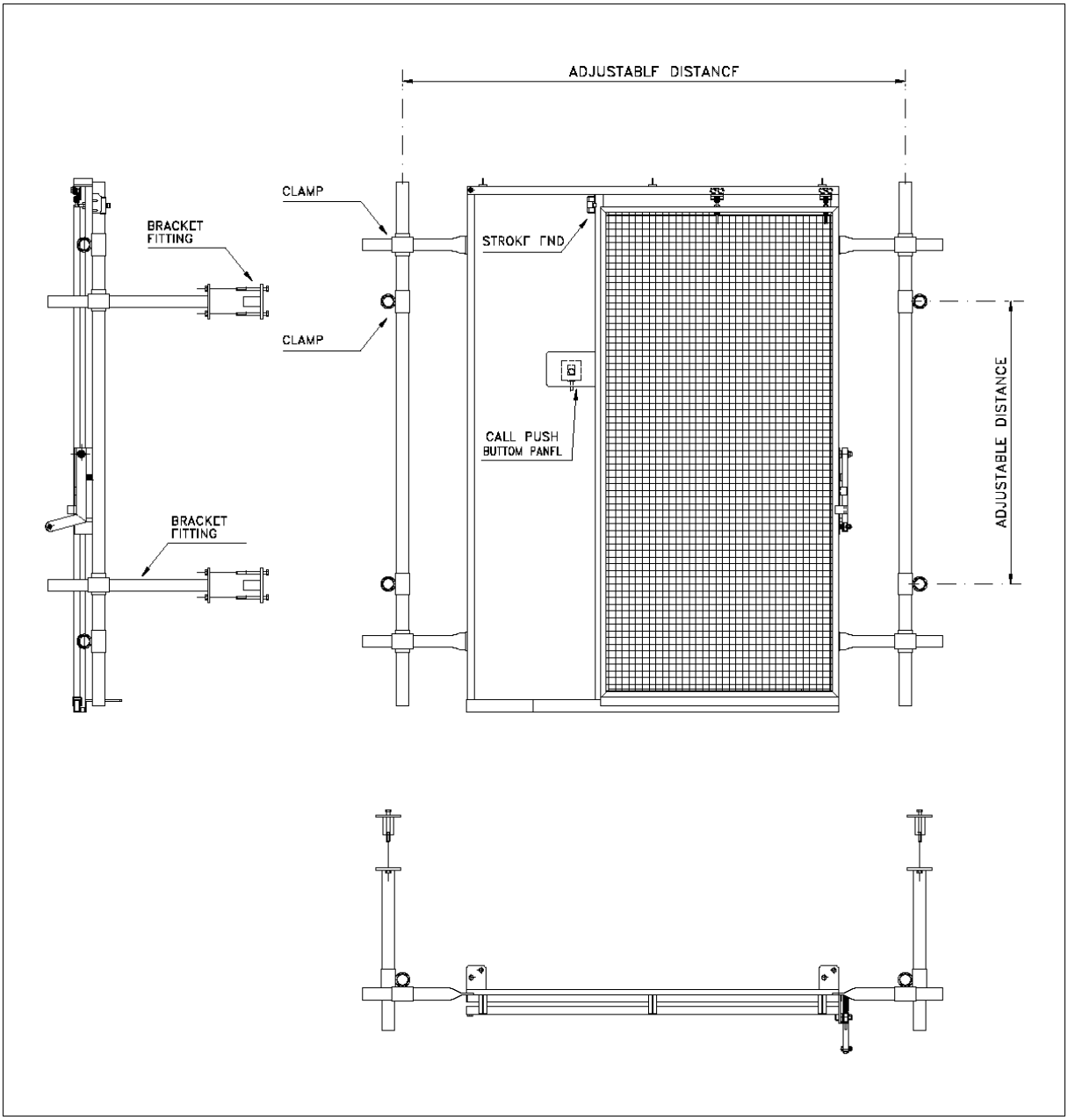



*Figura 4.11.1 Optional for landing gate*

## 4.12 Lifting unit

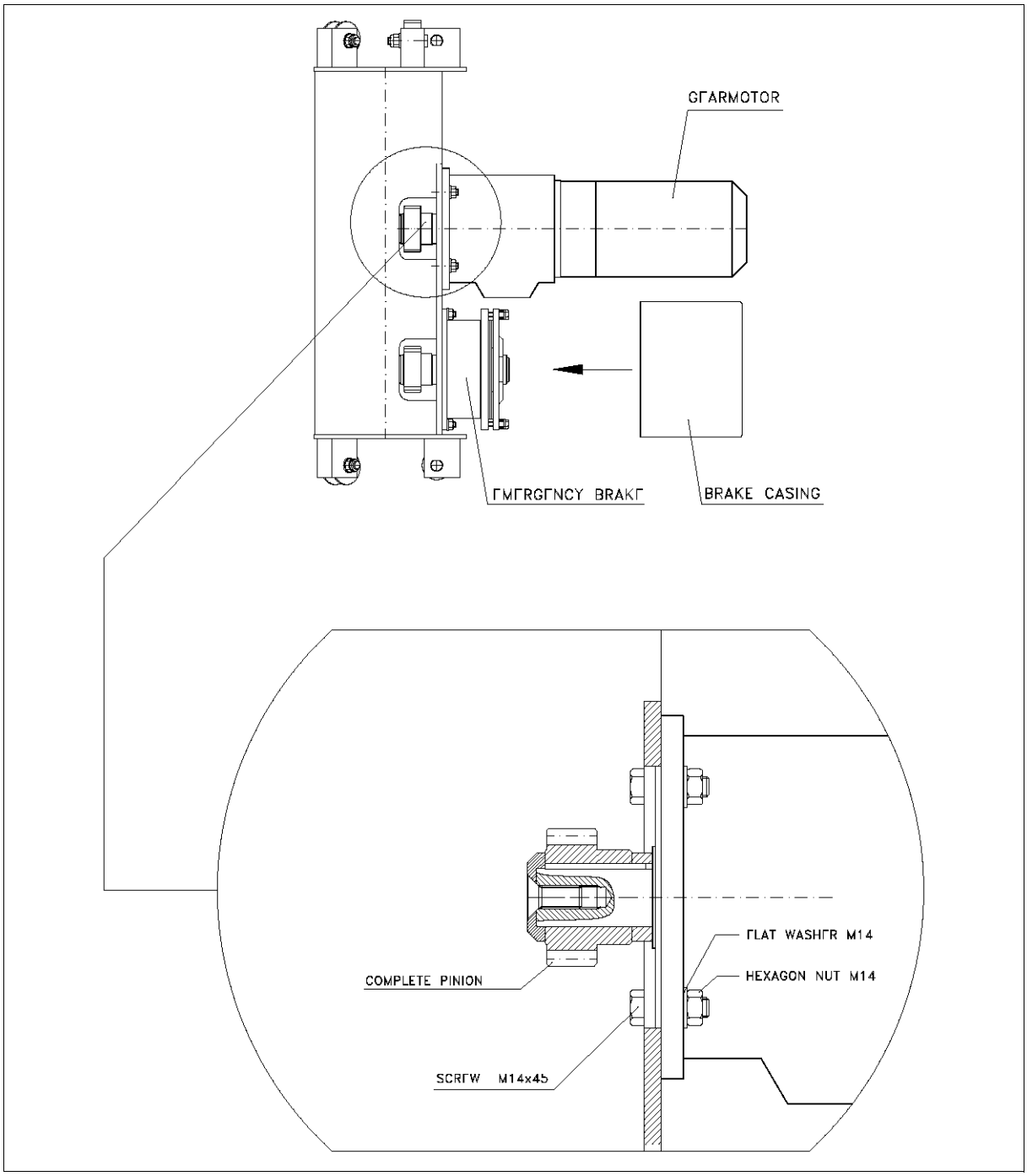



*Figura 4.12.1 Lifting unit*

## 4.13 Fork

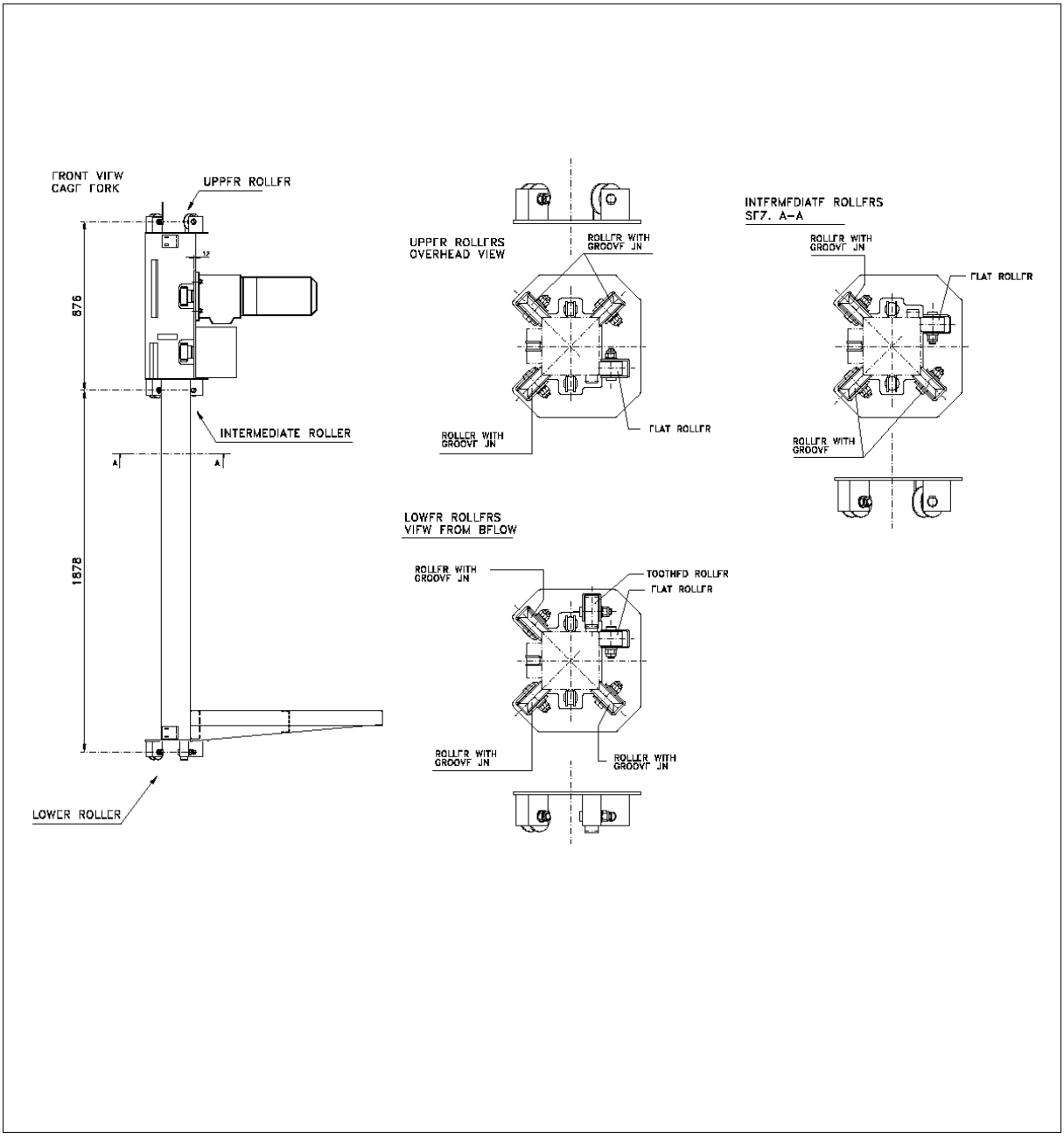



*Figura 4.13.1 Fork*

## 4.14 Guide rollers

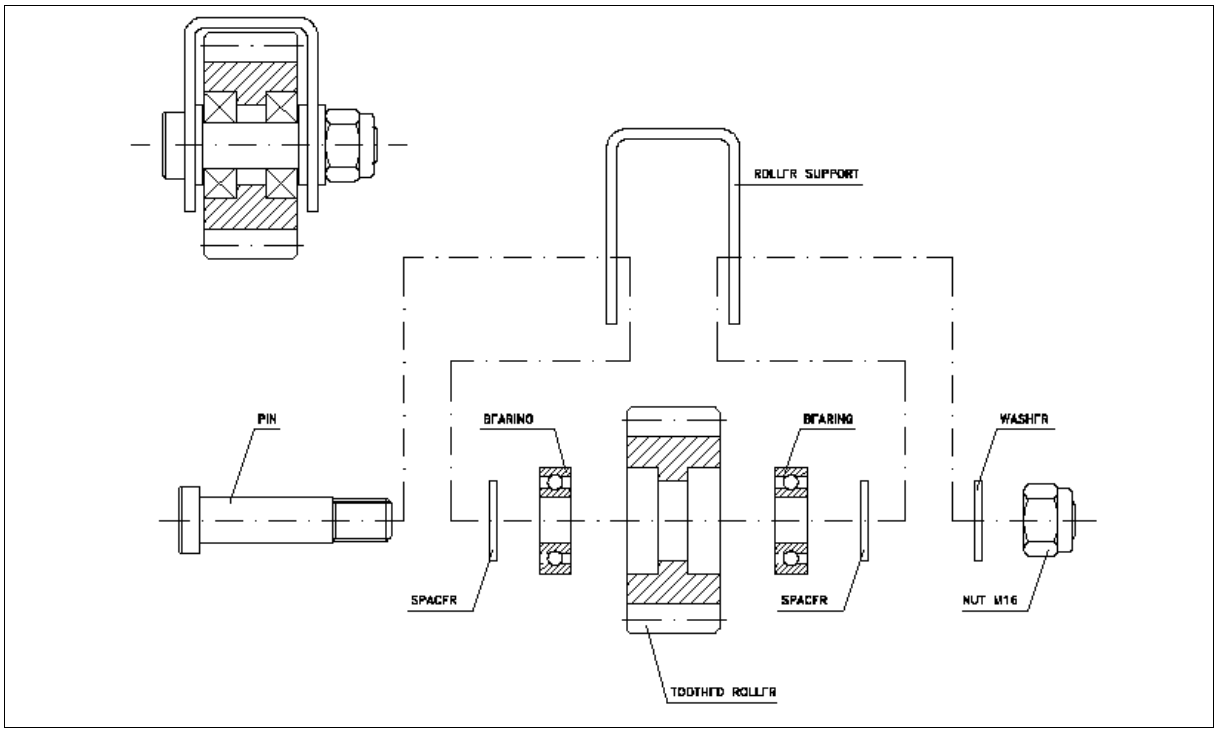



*Figura 4.14.1 Toothed guide roller*

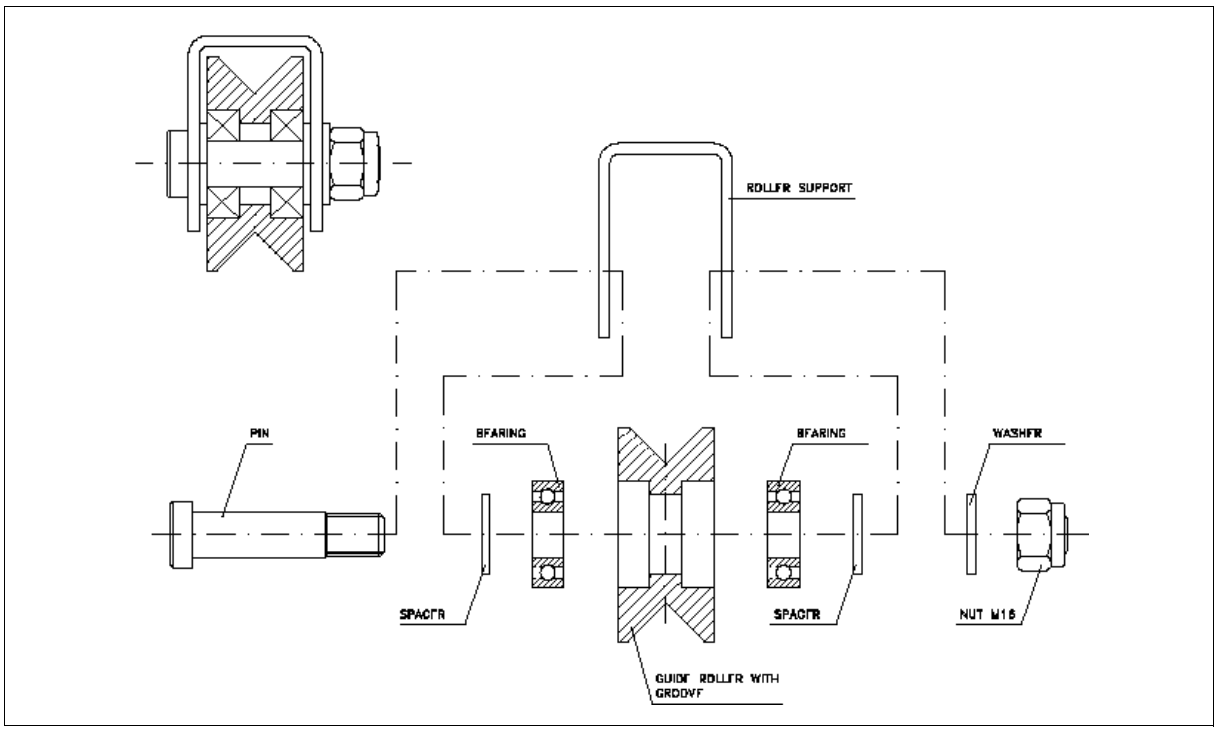



*Figura 4.14.2 Guide roller with groove*

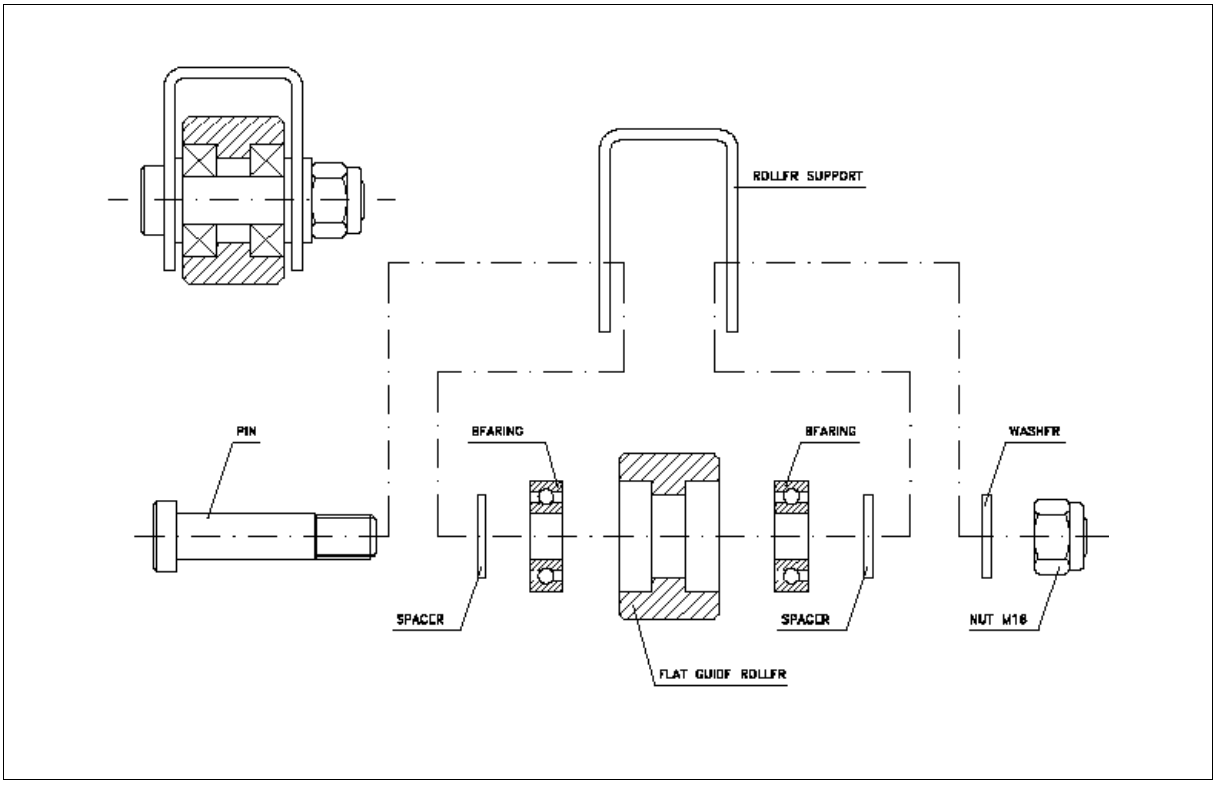



*Figura 4.14.3 Flat guide roller*

## 4.15 Centrifugal brake

Every motor unit is provided with a parachute device which cuts in during descent when the machine exceeds the rated speed (this is exceptional and when it occurs it means that all the keying and transmission organs of the reducer are broken). If the rated speed is exceeded in descent the centrifugal weight (1) expands, coupling with the fixed weight stop (7) and stopping the weight holder flange(6) and closure flange (4). The shoe (5), connected to the shaft (3) via the gear, continues to rotate until compression between weight holder flange and closure flange causes the brake shaft, engaged to the rack via pinion (8), to stop. The braking space is therefore regulated by compression of the springs (2).
The force that counters expansion of the weight at rated speed is caused by a spring. This adjustment can be performed by means of a socket wrench via the window located at the bottom of the flange.
To do this, the screw of the weight must obviously correspond with the window which is normally closed by a seal.
As a further safety precaution, an electrical limit switch (9) has been fitted near the fixed flange stop so that if the weight couples with the stop, the power to the motor is immediately cut off.

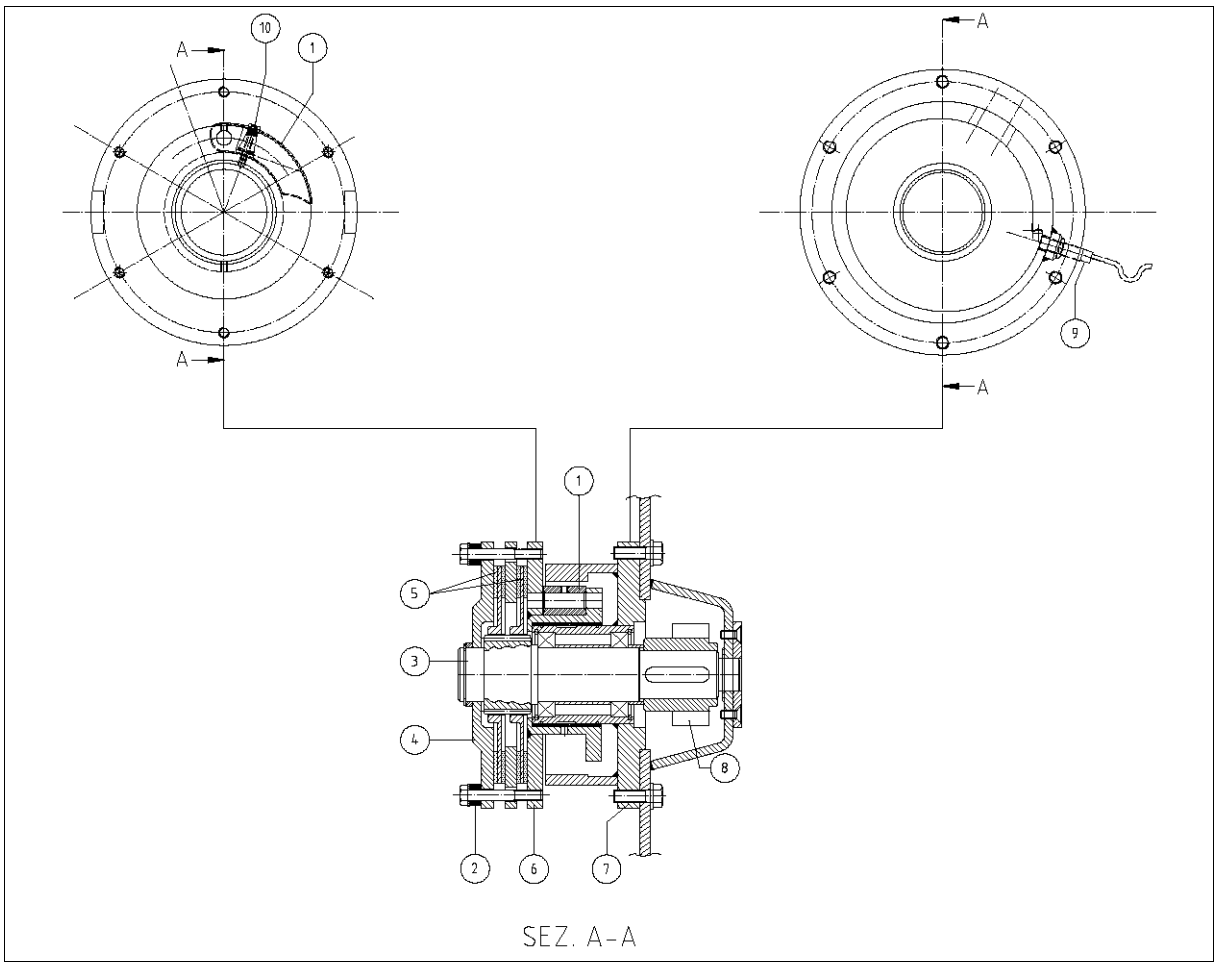



*Figura 4.15.1 Emergency centrifugal brake*

## 4.16 Electrical panel

It is a metal box protected to IP55.
It consists of two circuits, one of which is a power circuit for supplying the gearmotor and the other an auxiliary circuit for the panel commands, the limit switches and the indicator lights.
The internal part of the panel consists of a transformer for the auxiliary circuit and the protections for the overloads and for the short circuits.
The electrical control panel is built in the electrical panel door and provides the following functions:

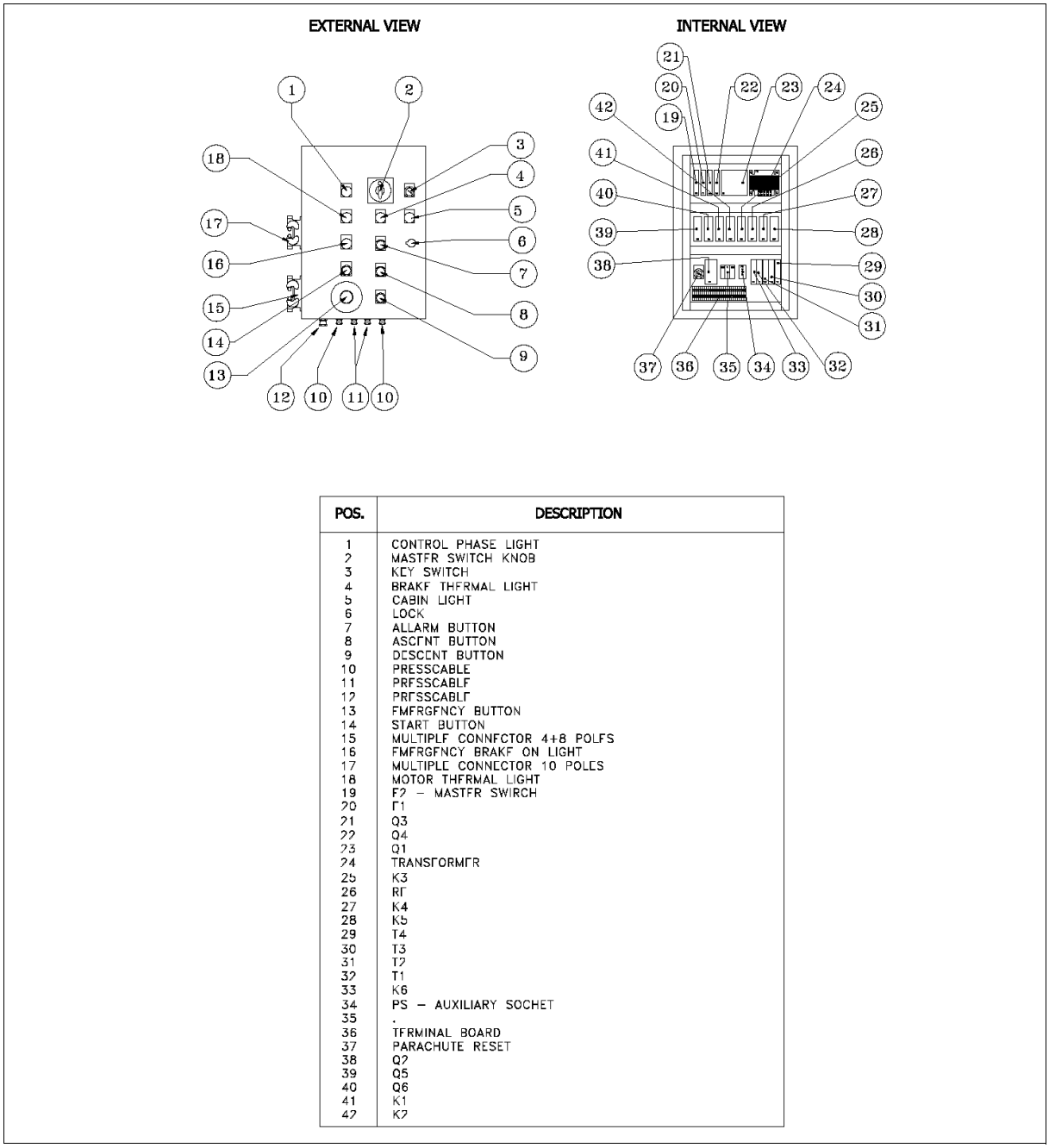
- MASTER SWITCH (19):
  powers the panel.
- KEY SWITCH (4):
  this is a switch operated by means of a key. If it is not activated, it is not possible to use the panel.
- START BUTTON (14):
  sets the motor to start status.
- ASCENT AND DESCENT BUTTON (8) (9):
  used to control the motor. They must be kept pressed during ascent and descent. The hoist stops when they are released.
- STOP BUTTON (13):
  mushroom button which must be activated in the event of an emergency. To release it, turn 1/4 turn.
- EMERGENCY BRAKE ON LIGHT (16):
  indicates that the emergency brake thermal switch has cut in, e.g. overload. Wait for it to cool and then switch back on.
- MOTOR THERMAL SWITCH LIGHT (18):
  Indicates that the motor thermal switch has cut in. Wait for it to cool and then switch back on.
- BRAKE THERMAL SWITCH LIGHT (5):
  Indicates that the motor thermal switch has cut in. Wait for it to cool and then switch back on.
- EMERGENCY LIGHT (2):
  Indicates that the stop button has been activated.
- ALARM BUTTON (7):
  Serves to activate the alarm on one side of the panel.

In addition there are the sockets and plugs with the following functions:

- FIXED POWER SUPPLY PLUG WITH SOCKET (1):
  Serves to bring the power supply to the electrical panel via the cable from the cable basket.
- DOOR PLUG OR ASSEMBLY BUTTON PANEL WITH SOCKETS (17):
  During assembly the button panel with cable is fitted on this socket, with the ascent - descent controls, and taken to the outside for assembly of the masts.

During normal operation of the Hoist, instead of the button panel with cable, the hoist call socket is fitted.

- PLUG AND AUXILIARY SOCKET (28):
  This is a socket which can be used for normal 220V user applications, e.g. drill, lamp, etc.
- BUZZER (15):
  Activated by the alarm button.




| POS. | DESCRIPTION |
|---|---|
| 1 | CONTROL PHASE LIGHT |
| 2 | MASTER SWITCH KNOB |
| 3 | KEY SWITCH |
| 4 | BRAKE THERMAL LIGHT |
| 5 | CABIN LIGHT |
| 6 | LOCK |
| 7 | ALLARM BUTTON |
| 8 | ASCENT BUTTON |
| 9 | DESCENT BUTTON |
| 10 | PRESSCABLE |
| 11 | PRESSCABLE |
| 12 | PRESSCABLE |
| 13 | EMERGENCY BUTTON |
| 14 | START BUTTON |
| 15 | MULTIPLE CONNECTOR 4+8 POLES |
| 16 | EMERGENCY BRAKE ON LIGHT |
| 17 | MULTIPLE CONNECTOR 10 POLES |
| 18 | MOTOR THERMAL LIGHT |
| 19 | F2 – MASTER SWITCH |
| 20 | F1 |
| 21 | Q3 |
| 22 | Q4 |
| 23 | Q1 |
| 24 | TRANSFORMER |
| 25 | K3 |
| 26 | RF |
| 27 | K4 |
| 28 | K5 |
| 29 | T4 |
| 30 | T3 |
| 31 | T2 |
| 32 | T1 |
| 33 | K6 |
| 34 | PS – AUXILIARY SOCHET |
| 35 | . |
| 36 | TERMINAL BOARD |
| 37 | PARACHUTE RESET |
| 38 | Q2 |
| 39 | Q5 |
| 40 | Q6 |
| 41 | K1 |
| 42 | K2 |

*Figura 4.16.1 Electrical panel*

# 5.0 Safety system

1 -Trap door limit switch;

2 -Ascent limit switch;

3 -Descent limit switch;

4 -Emergency limit switch;

5 -Vertical end mast with half rack;

6 -Limit switch on cage entrance and exit doors;

7 -Mechanical lock on cage doors and landing gates;

8 -Automatic cut - in emergency brake;

9 -Motor lock limit switch with emergency brake on;

10 -Flashing light indicating that emergency brake is locked;

11 -Self-braking electronic motor;

12 -Manual brake release device for emergency descent;

13 -Lock out master switch;

14 -Low tension electrical panel with continuos operation type controls and mushroom button for emergency stop;

15 -Landing gate mechanical lock;

16 -Landing gate limit switch;

17 -Emergency light;

18 -Cage exit door locking system with limit switch;

19 -Alarm;

## 5.1 Description of safety system

1.The trap door limit switch cuts in when the trap door is not closed.

2-3.The ascent and descent limit switches cut in when the hoist cage arrives at the stroke end sliding blocks which are fixed during assembly. With frequent use it may be necessary to adjust the position of the stroke end sliding blocks, in particular with a new machine. This is due to bedding in of the braking parts.
Cutting in of a limit switch makes it impossible to carry on the same operation and only allows for a reverse action.

4.The anti slide-out limit switch has a wheel permanently in contact with the vertical tube of the mast and prevents the motor accidentally coming out of the vertical mast. During assembly when the ascent limit switch and the end mast are missing, it prevents ascent once the top has been reached. It must not, however, be considered as a working limit switch but as an emergency device and therefore the operator controlling the cage must operate on the roof in view of the mast

5.The vertical mast is provided with half rack so that if the ascent limit switch sliding block is exceeded, the lifting unit cannot come out of the vertical column even if the ascent limit switch is not working.

6. The cage doors are provided with electrical limit switch preventing movement of the cage if the door is not completely closed.

7. The mechanical lock on the enclosure door is a mechanical device designed to prevent opening of the door if the counterdoor is not present.

8.The automatic cut-in emergency brake is an automatically operated braking device, independent of mechanical and electrical lifting devices.

9. The motor lock limit switch prevents the electric motor coming on until the reason for cut-in of the emergency brake has been identified and normal operating conditions have been restored.

10.Cut-in of the limit switch 8 causes the light on the electrical control panel to blink.

11.The lifting unit consists of a worm-screw gearmotor in an oil bath with self-braking electric motor.

12.The manual release device for emergency descent is a simple threaded knob which moves the anchor near to the electromagnet and therefore releases the brake. Manual descent must be performed only if the power supply fails, following the procedure described in paragraph 17.1.

13.The master switch can be locked out so that the machine can be blocked at the end of the work shift. The key must be kept by personnel authorised by the site manager.

14.Entrance to the floors is prevented by a door fitted with mechanical lock.

15.This is a device that locks the sliding door when closed. Release is automatic by means of a slide on the cage.

16. The landing gate limit switch checks that the door is completely closed. If not, it does not give the consent for the cage to start.
17. The emergency light is located inside the cage and comes on when there is a power failure. It is controlled by a switch in the electrical panel to prevent it staying on when the hoist is not in use.
18. The cage exit door can be provided with a mechanical locking system controlled by an electrical limit switch. This serves to guarantee that the exit door is closed and locked, otherwise the cage is not given the consent to move. The standard locking system only guarantees that the cage exit door is closed.
19. At the bottom of the cage there is a siren that can be heard at a distance of no less than 100 m which signals that the cage is moving.

# 6.0 Electrical system

## 6.1 Wiring diagrams

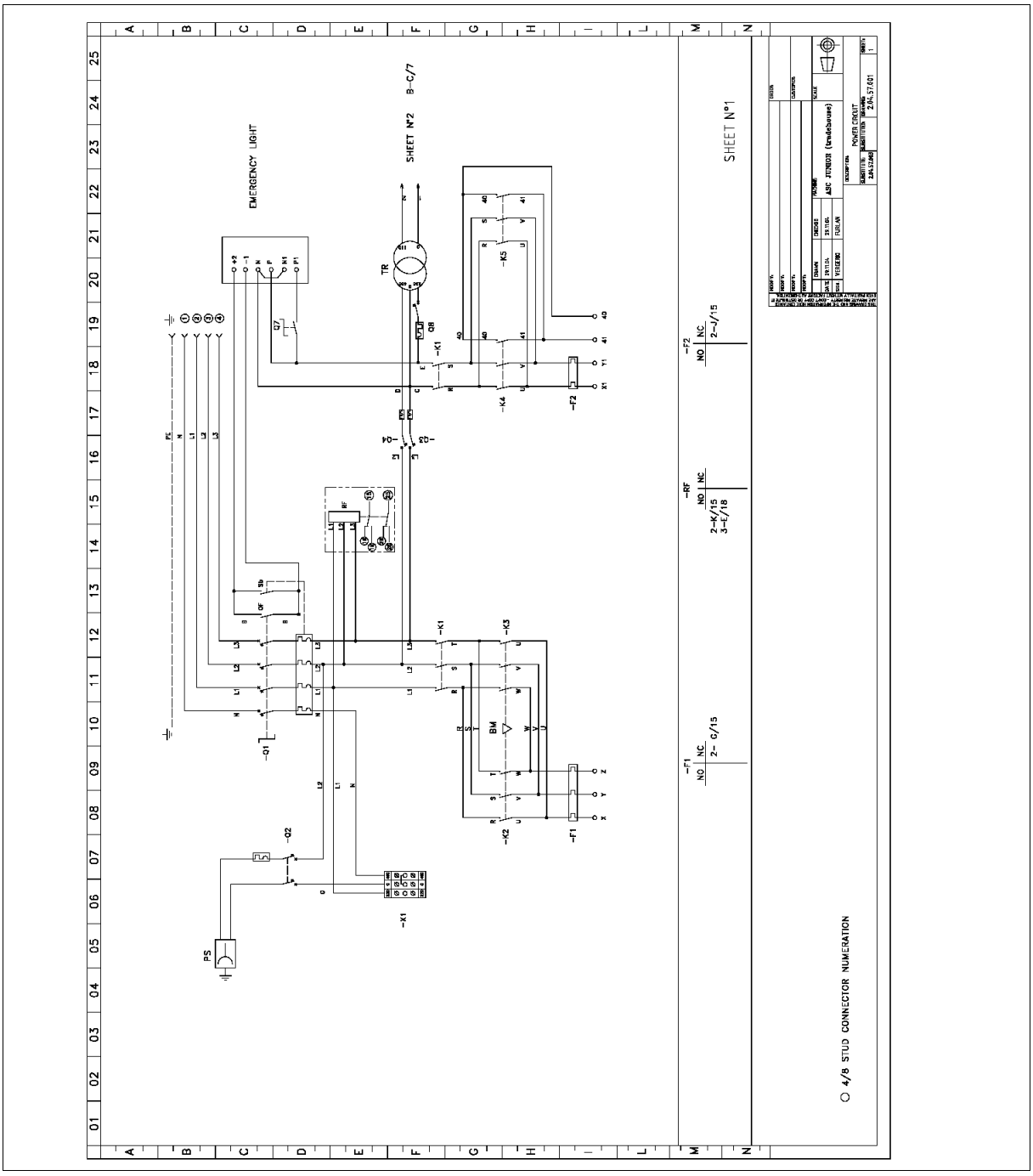



*Figura 6.1.1 Power circuit (with automatic return)*

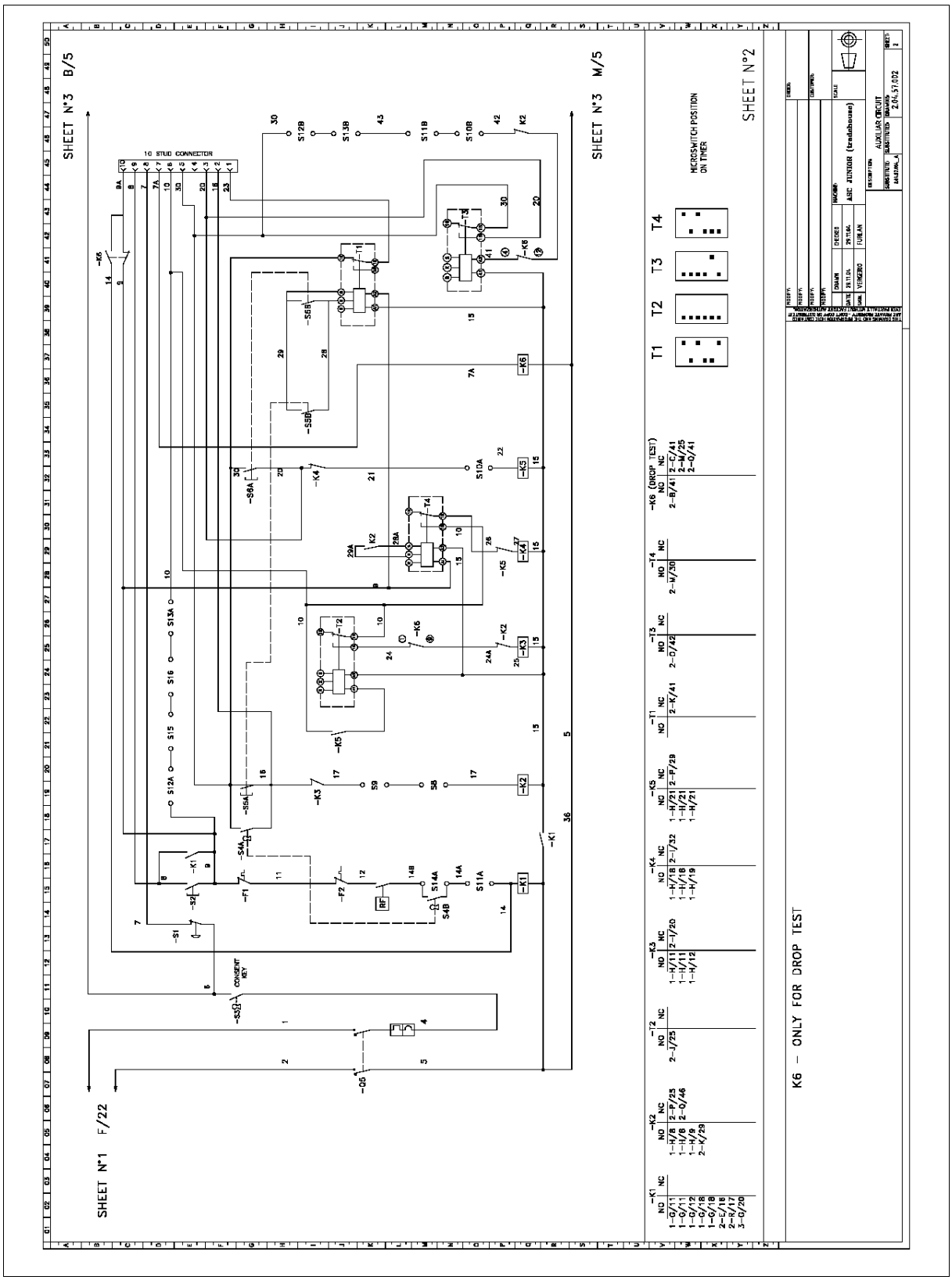



***Figura 6.1.2*** *Auxiliary circuit (with automatic return)*

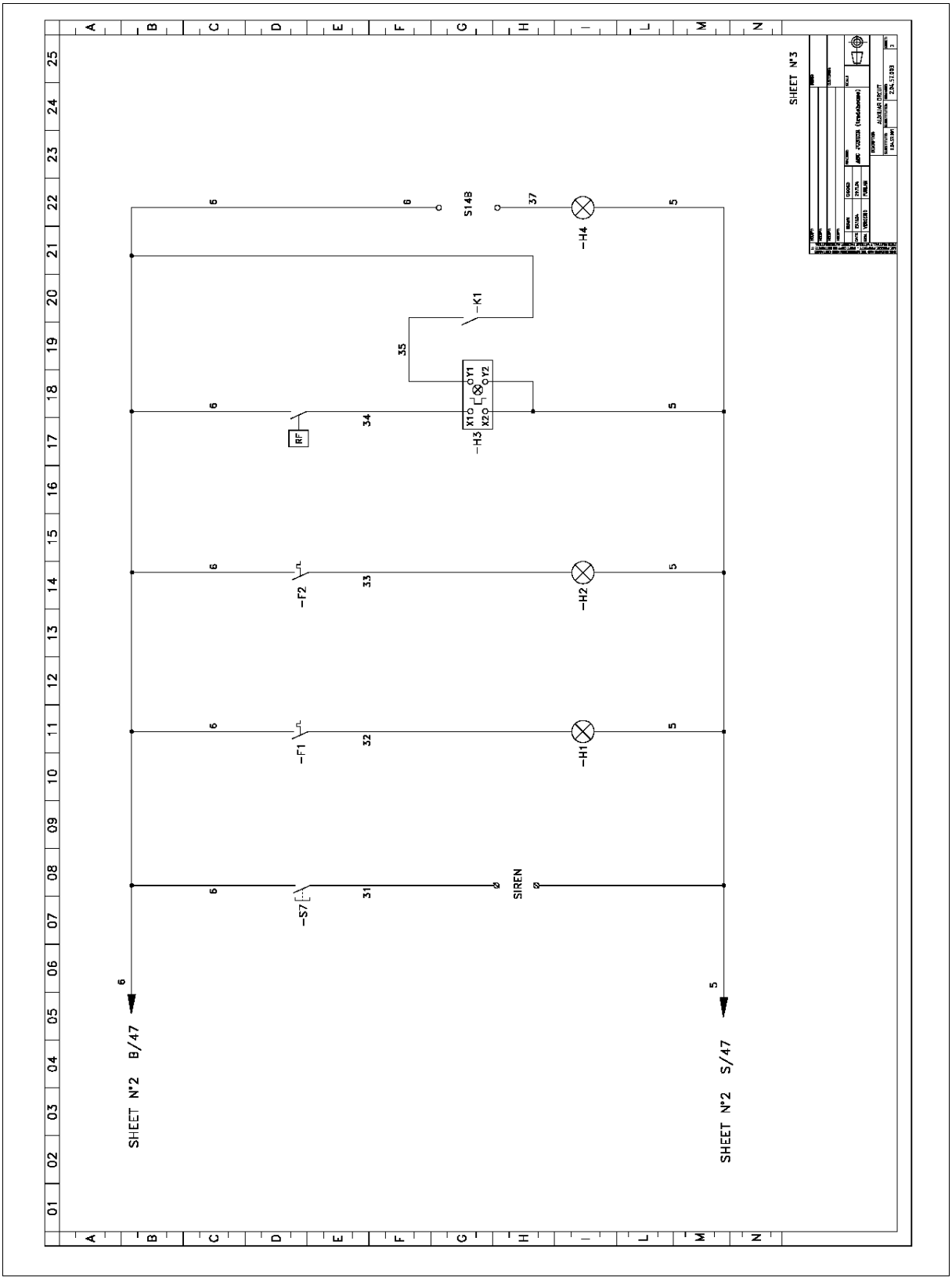



***Figura 6.1.3*** *Auxiliary circuit (with automatic return)*

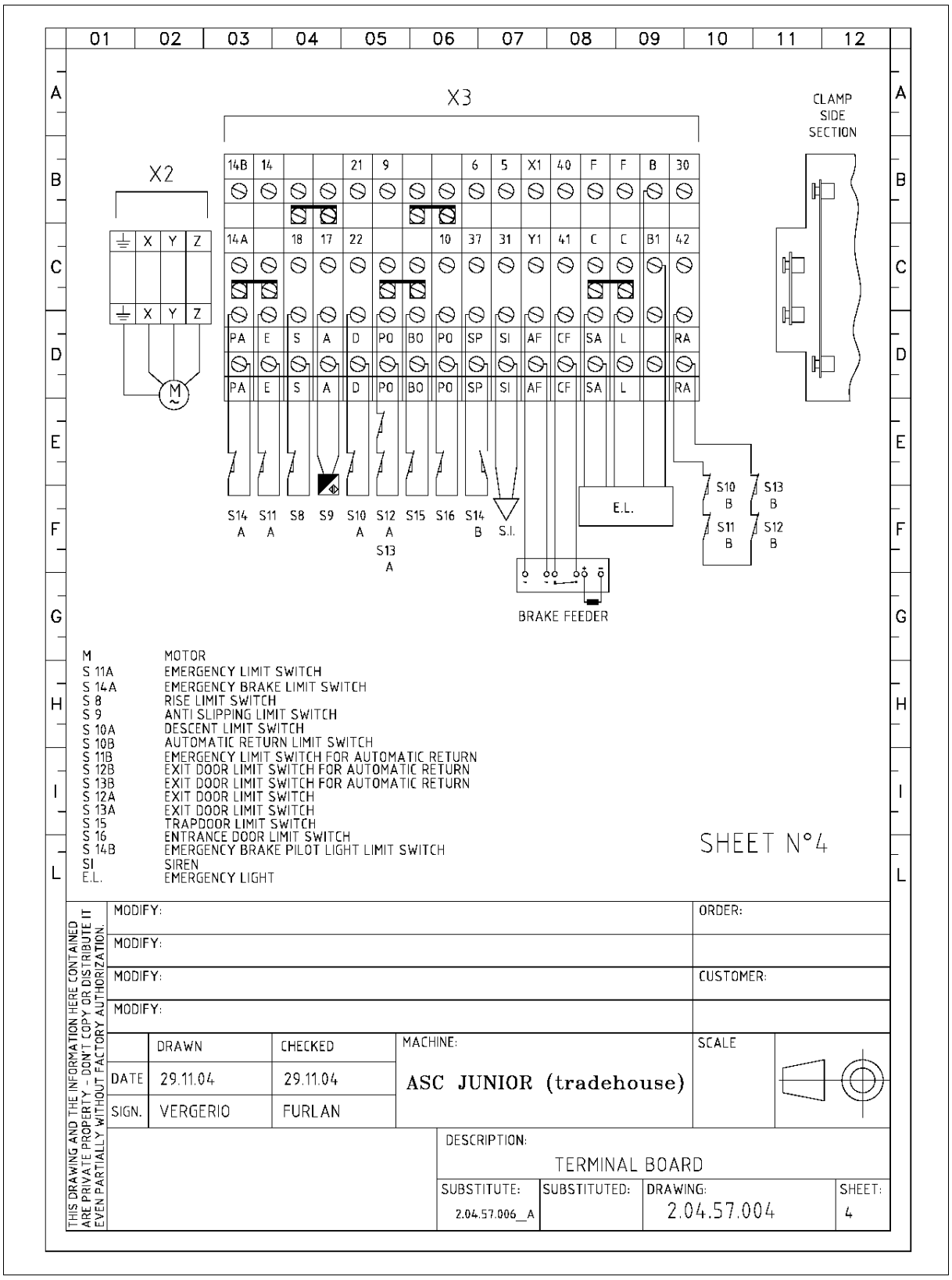



***Figura 6.1.4*** *Junction terminal board (for circuit with automatic return)*

# 7.0 Safety precautions

## 7.1 General precautions

All the safety precautions for prevention of accidents laid down by the current regulations must be observed.

*The machine must be installed in its final position by the site manager who must check that all the safety regulations have been complied with.*

*Before installation the capacity of the machine supporting surface and the distance from the wall must be checked.*

*All assembly, dismantling, operation and maintenance outside the cage must be performed by trained authorised personnel.*

*The assembly area on the ground must be cordoned off and marked with notices.*

*Regularly carry out routine and extraordinary maintenance.*

*During assembly, dismantling and maintenance, disconnect the 6P multiple connector of the power supply cable to prevent operation of the landing gate buttons.*

*Ensure that there is nothing protruding from the building which can obstruct the movement of the hoist.*

*Observe the load limits.*

*Do not remove the mechanical and electrical safety systems.*

*Any mechanical or electrical operation must be performed by personnel authorised by the site manager who must be informed of the type of operation being performed.*

*Do not reverse suddenly.*

*Before pressing a floor call button, ensure that the cage is at a standstill.*

*Lower the hoist to ground level in bad weather conditions.*

*Earth the machine and base enclosure and check that the resistance is below 2 Ohms.*

*In the event of an emergency press the mushroom button and set the master switch to"0".*

*All the personnel working on the hoist must be familiar with the instructions and precautions contained in this manual. Unauthorised persons are forbidden to operate the machine.*

*It is forbidden to exceed the hoist loading capacity, as indicated in the technical specifications.*

*The surface where the base of the hoist rests must be prepared so that it can withstand the load of the entire structure.*

*Avoid concentrating the loads in one single point of the cage - try to distribute them so that the load is shared over the whole of the available surface.*

*Lower the hoist to the ground if wind speeds exceed 20 m/s.*

# 8.0 Assembly

**ATTENTION!**

**INSTALLATION AND ASSEMBLY MUST BE PERFORMED BY QUALIFIED PERSONNEL ONLY WHO MUST SCRUPOLOUSLY FOLLOW THE INSTRUCTIONS IN THIS MANUAL!**

1 - Prepare the supporting surface for the lift according to the position of the floor exit door. The supporting surface sustaining the load should consist, at the supporting points, of wooden blocks at least 5 cm thick.

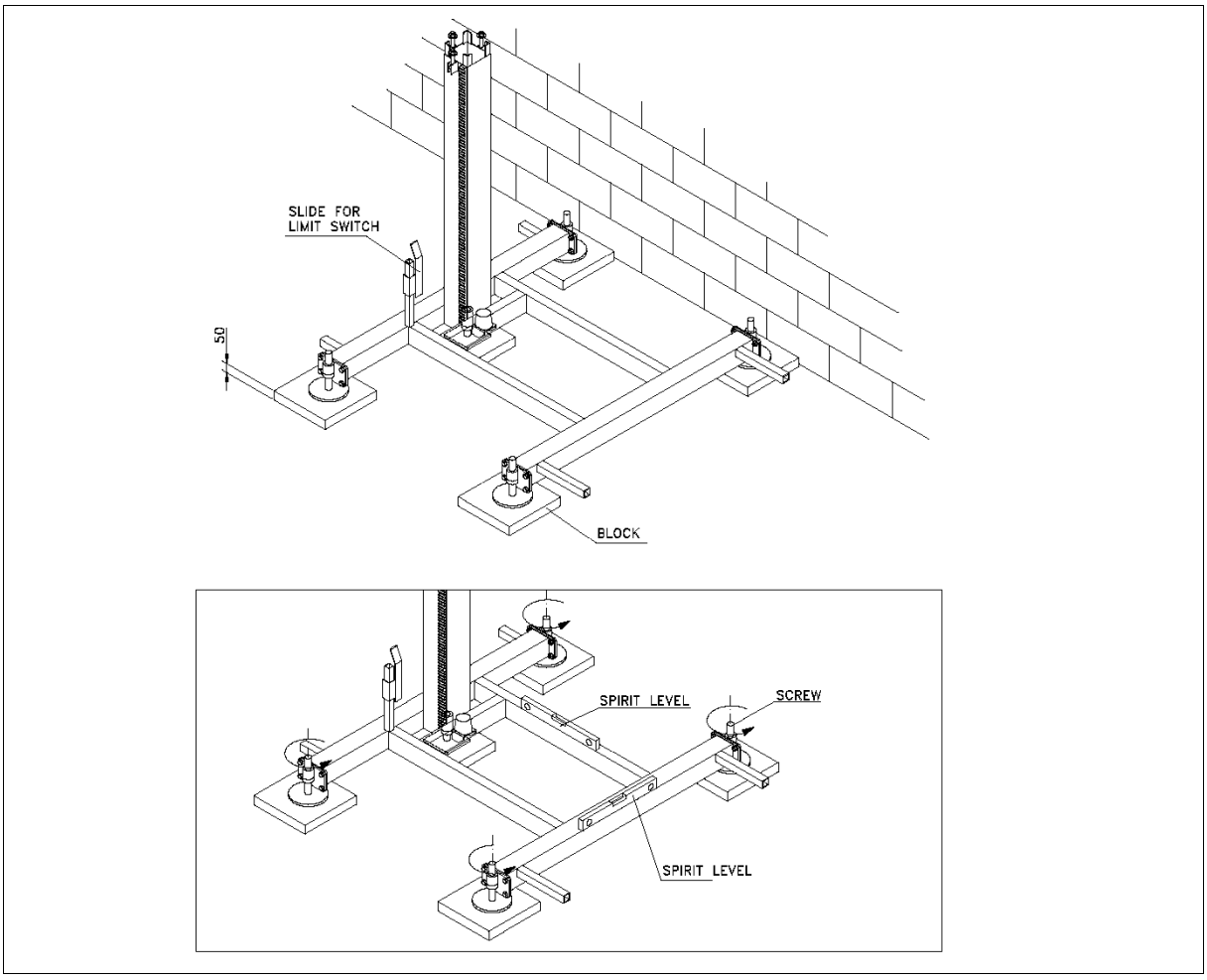



***Figura 8.0.1*** *Preparation of supporting surface*

2 - Position the base and level it by means of the screws (using a spirit level resting on the horizontal parts of the frame).
You are advised to tilt the machine slightly towards the wall so that the anchorings are pushing rather than pulling.

3 - Fit the doors with the frames on the cage, the guardrail on the roof and the cable arm.

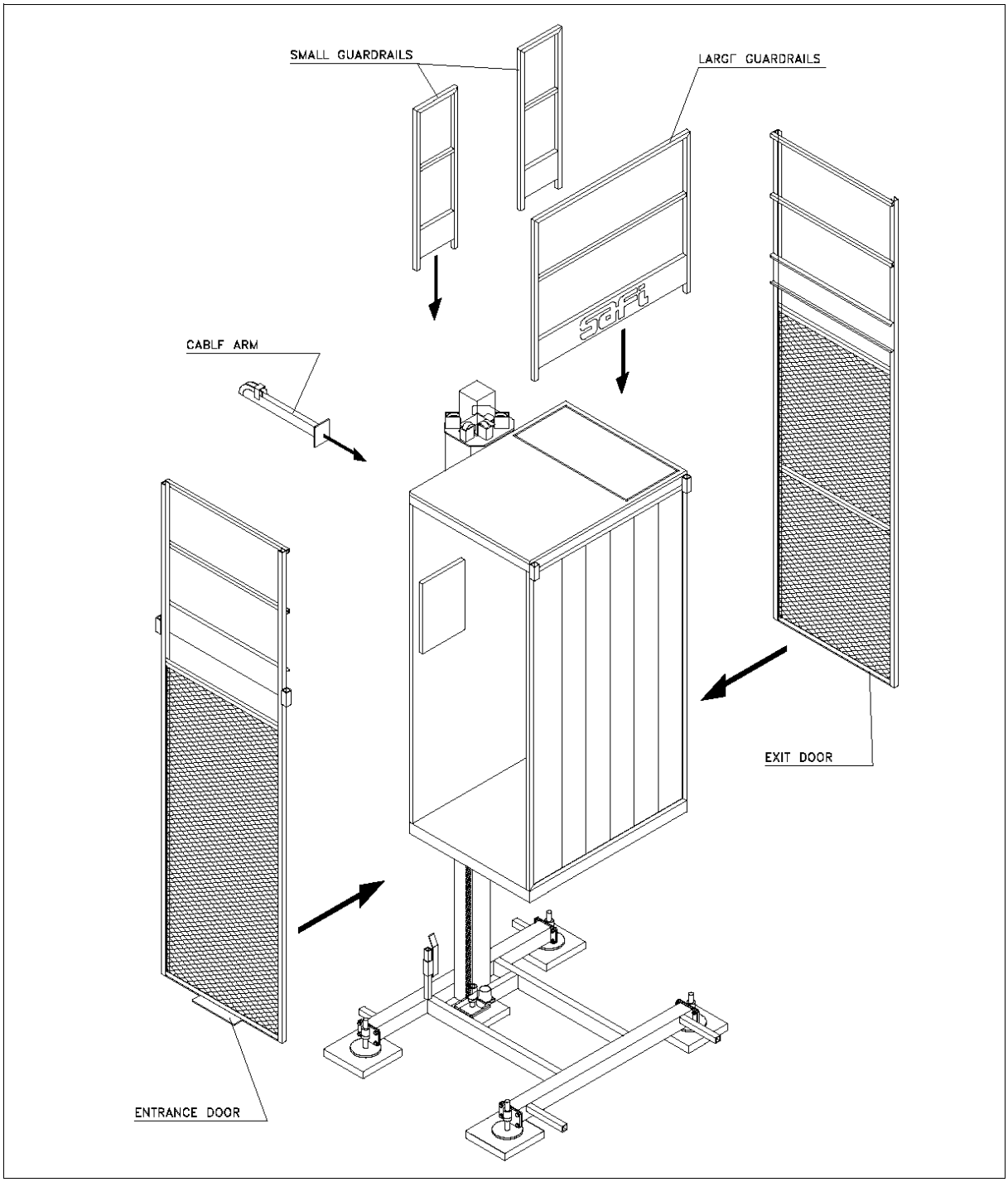



***Figura 8.0.2*** *Assembly of doors, guardrail, cable arm*

4 - Assemble the base enclosure and position the cable basket.

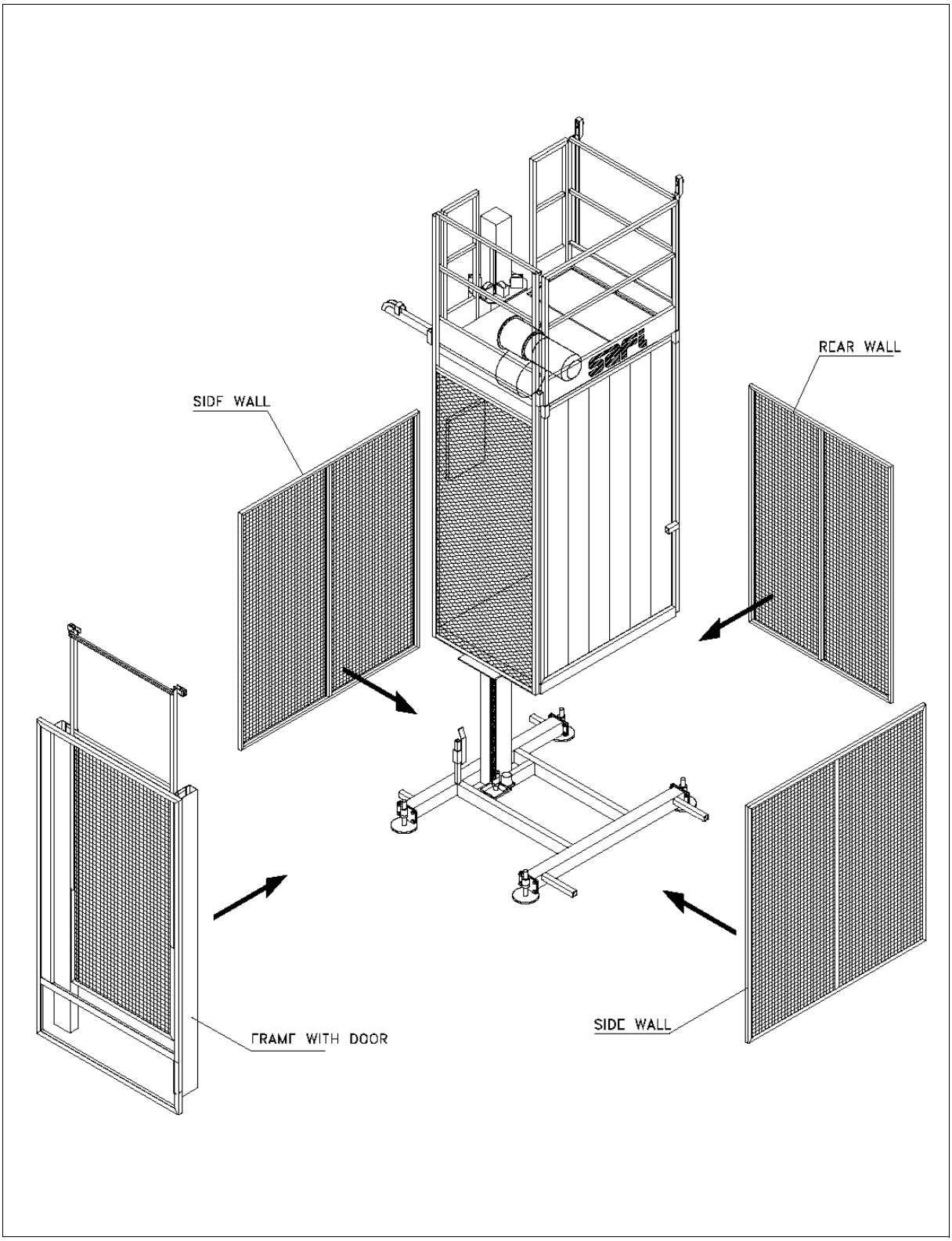



***Figura 8.0.3*** *Assembly of base enclosure*

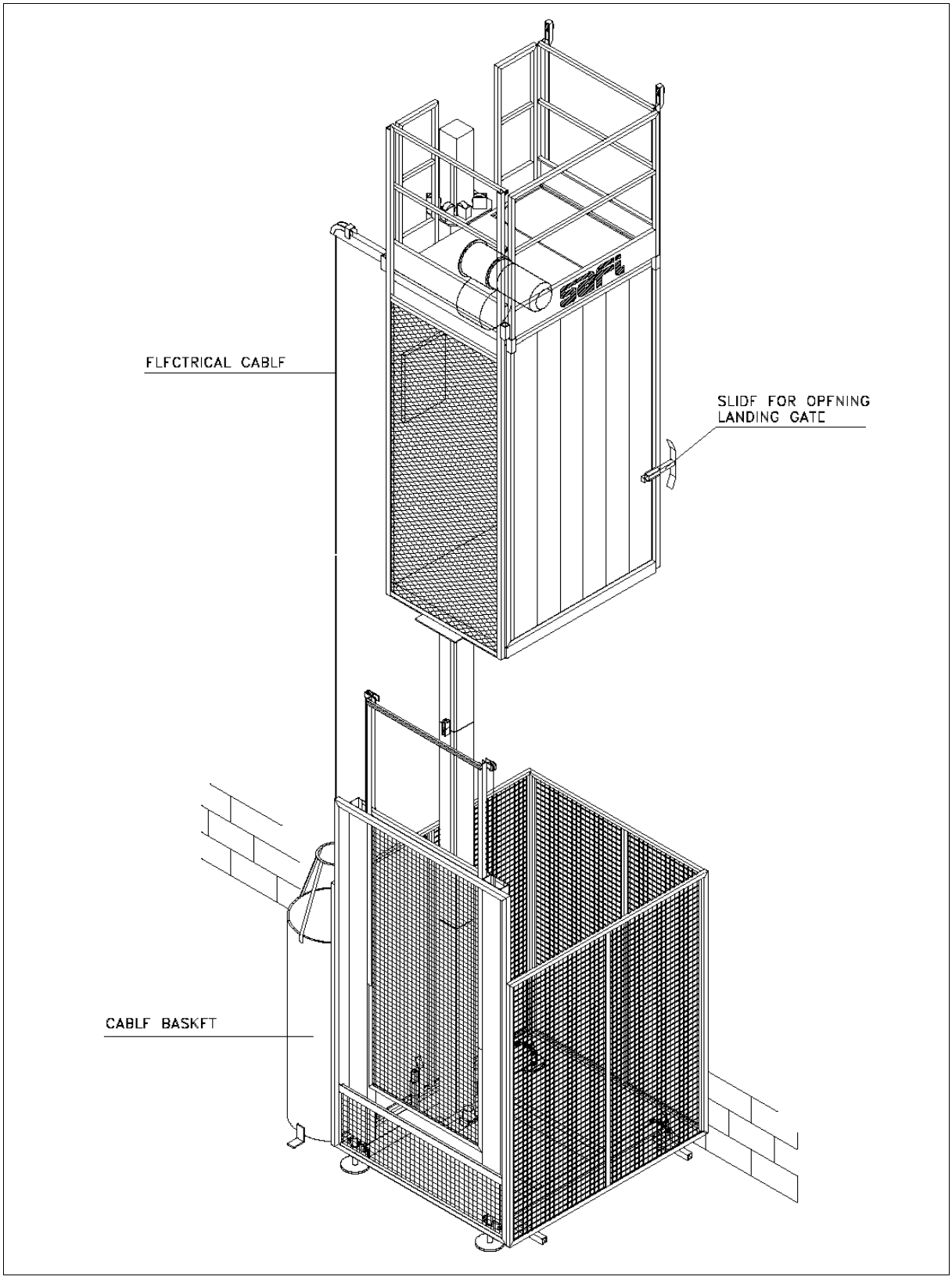



***Figura 8.0.4*** *Base enclosure with cable basket*

5 - Check that the cable is neatly coiled in the basket. The first time the lift is operated, check that the cable unwinds correctly and enters the basket.
Check that all the thermal switches inside the panel are activated. Check the setting of the motor thermal switches according to the specifications on the motor rating plate and check the setting of the motor brake thermal switch, approx. 1 A. Press the reset buttons of the two thermal switches.

6 - Connect the machine to the mains. Leave the multiple socket for the landing gates control circuit free for the moment. In its place insert the assembly push-button panel. When the lift has been assembled at the base, assemble the column for the required height.

7 - Power the cable and then the control panel via the master switch. Check that the emergency button is not pressed. If necessary release it by a quarter of a turn.

8 - Test switch-on of the cage light and siren and operate the push-button panel.
Check correct polarity of the motor phases. If they are inverted, the movement of the lift will also be inverted with respect to the buttons. In this case extreme care must be exercised because if the ascent button is pressed, the lift will move downwards.
The descent limit switch located on the mast will also be inverted and will not block the downward movement of the lift which will be stopped by the rubber shock absorbers.
When the push-button panel is operated, a quick descent test must always be performed so that even if the motor phases are correctly connected, the descent limit switch cuts in stopping the lift.
In this initial assembly phase if there are problems with the motor unit, carry out the following check:
Check the setting of the timers inside the panel. One timer must be set by adjusting the time that elapses from when the descent button is pressed and therefore when the motor brake comes on, to when you require the electric motor to cut in. This adjustment must be performed so that the motor comes on without jerking. Excessively long times must be avoided (more than two seconds) as this will cause the emergency brake to automatically cut in and block the cage.
A second timer must be set by adjusting the time between the moment at which the motor stops and the moment at which you wish the brakes to come on. Finally, a third timer must be set by regulating the time during which the external control buttons remain off from the moment when the lift stops and the personnel can get out

9 - Move the cage so that another mast can be inserted and continue with assembly. The vertical elements are assembled from the roof. Position an anchoring every 4.5 metres.

10 - Check that all the protection devices are in perfect working order.

11 - Once you have reached the required height, fix the end element: this can be recognised by the rack which is half the length of the racks on the other elements. Fix the mobile stroke end slide.

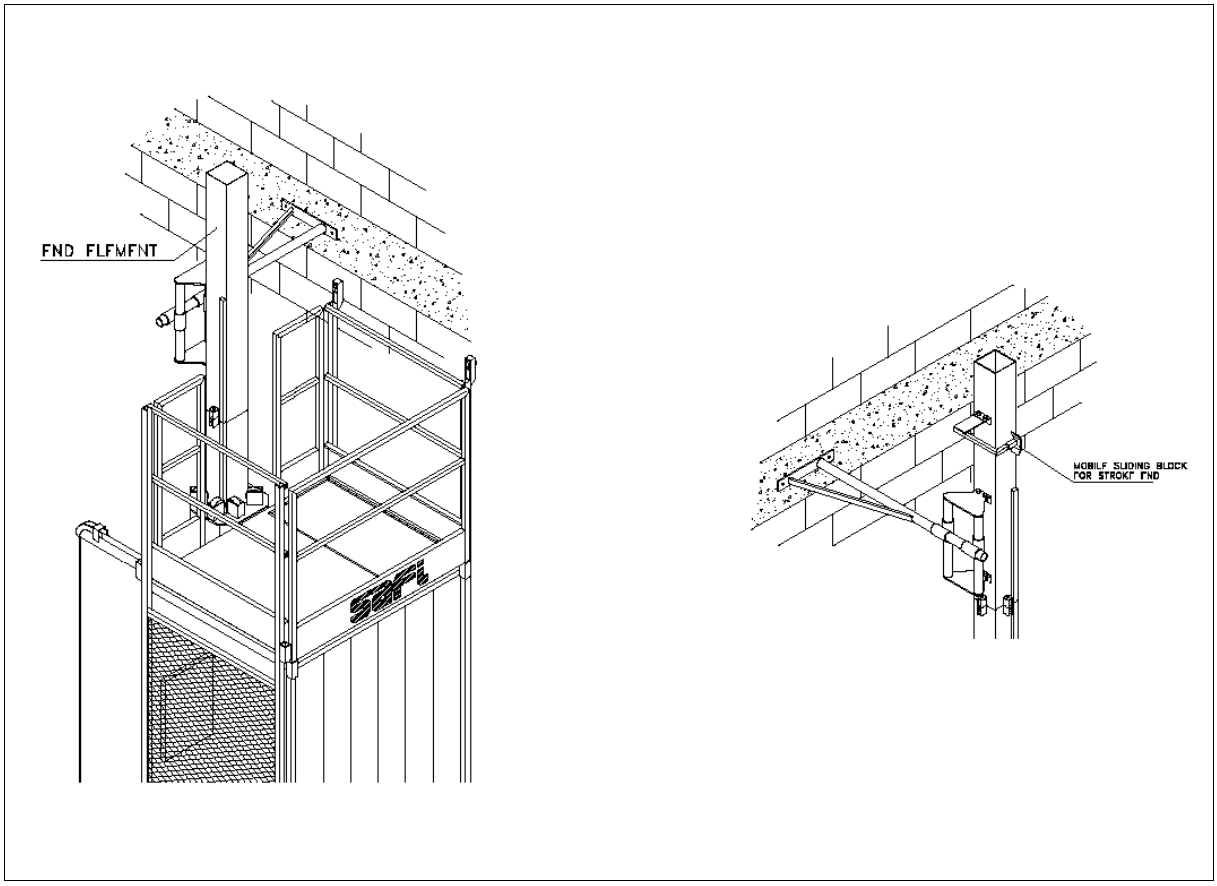



***Figura 8.0.5*** *End element and stroke and mobile sliding block*

## 8.1 Reaction values

Table 5: Maximum reaction values with wind action of single rawl plugs

| | |
|---|---|
| AXIAL STRESS N max | **+/- 480,2 kg** |
| SHEARING STRESS max | **+/- 175,8 kg** |

Table 5/A:Maximum reaction values without wind action of single rawl plugs

| | |
|---|---|
| AXIAL STRESS N max | **+/- 228 kg** |
| SHEARING STRESS max | **+/- 83.5 kg** |

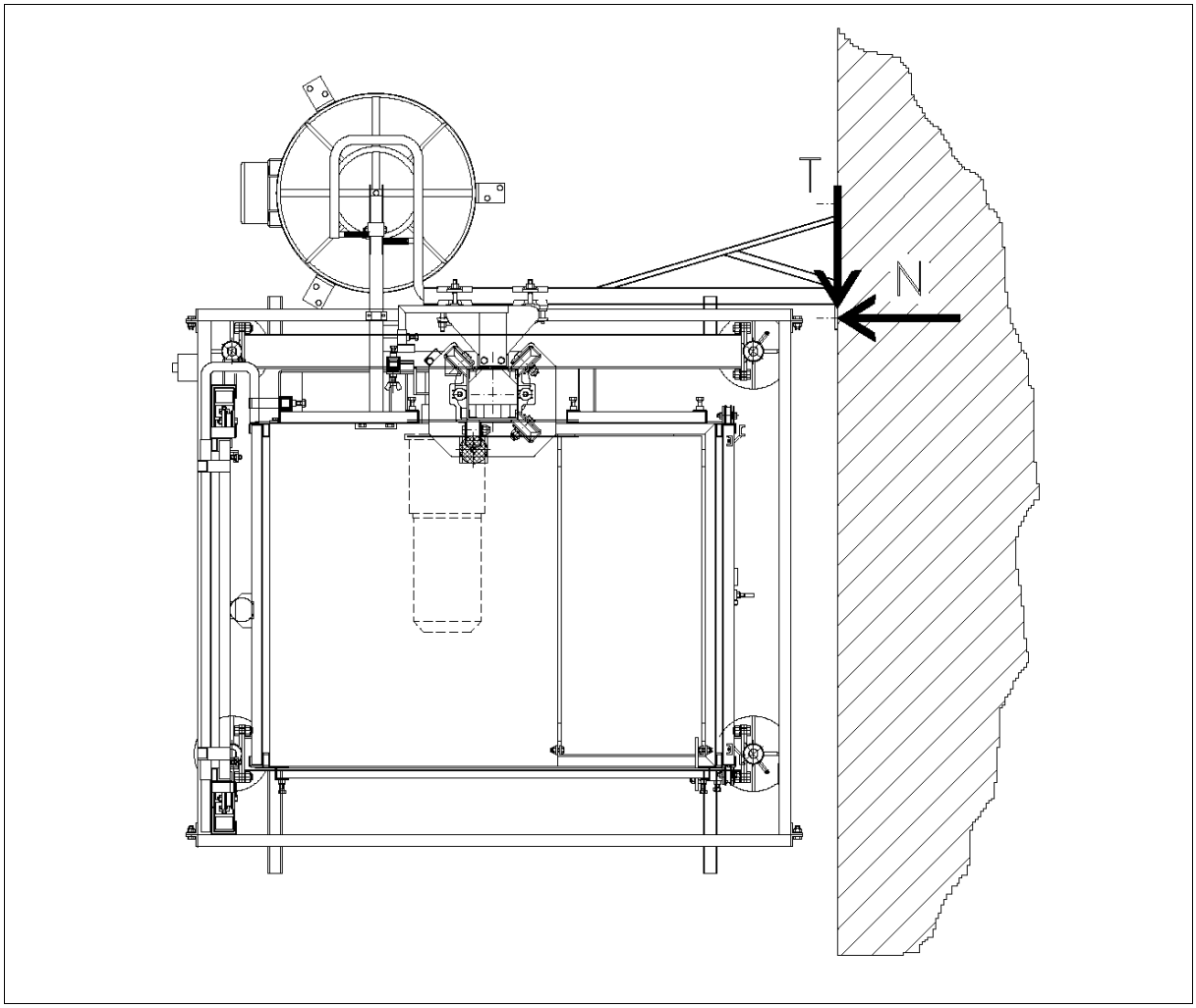



***Figura 8.1.1*** *Direction of stress*

# 9.0 Use

At the beginning of the daily work shift, after setting the master switch to "I", check the following:

- **presence of current (test switch-on of cage lights);**
- **cable neatly coiled in the cable basket;**
- **perfect condition of safety systems, emergency brake, doors limit switch, ascent/ descent limit switch, doors mechanical lock and protective casing;**
- **perfect condition and efficient working order of the anchorings;**
- **locking of mast connection bolts;**
- **check that there is nothing protruding from the building which can interfere with the movement of the cage;**

After carrying out these checks, press the ascent button and keep it pressed until the required height is reached. At this point release the button, open the cage sliding door which in its turn will open the landing gate. With the door open the lift cannot be operated as an electrical limit switch prevents it from starting. During use the loads must not exceed the maximum values given in the rating plate and must be evenly distributed. Do not perform sudden operations or reverse manoeuvres as these unnecessarily stress the mechanical parts of the machine.

**ATTENTION!**

**THE MACHINE MUST BE STARTED UP BY QUALIFIELD PERSONNEL ONLY. PERSONNEL MUST TAKE NOTE OF ALL THE WARNINGS CONTAINED IN THE INSTRUCTION MANUAL. BEFORE STARTING UP, ALL THE DIRECTIONS FOR INSTALLATIONS, ELECTRICAL CONNECTION AND LUBRICATION MUST BE OBSERVED; ALSO CHECK THAT THE MAINS VOLTAGE CORRESPONDS TO THE MACHINE VOLTAGE!**

# 10.0 Dismantling

To dismantle, perform the assembly operations in reverse order.

Remove the 6-pole multiple plug of the landing gates line, fit the plug of the push-button panel for control from the roof and then position yourself at the highest point of the column to begin the dismantling phase.

Dismantle the masts, landing gates, anchorings and cable guides.

Check operation of the ascent overshoot limit switch.

Operate the cage, always keeping the central mast in view and ensuring that you do not overload the cage.

Once you reach ground level, disconnect the power supply, dismantle the base enclosure panelling and dismantle the cage and base using an external crane.

# 11.0 Maintenance

To guarantee perfect operation of the machine, a maintenance programme must be followed in compliance with the general safety precautions; during manual operations the master switch must therefore be set to "0".

Table 6: Periodical checks

| Part to be checked | Procedure | Frequency |
|---|---|---|
| Guide rollers | Grease and replace if worn | ONCE A WEEK |
| Lifting pinions | Grease and check for wear | ONCE A WEEK |
| Speed reducer | Check oil level, eliminate any leaks | ONCE A WEEK |
| Ascent/descent stroke ends | Visual control and test to check locking of stroke end sliding blocks | ONCE A WEEK |
| Cage doors stroke end | Efficiency tests | ONCE A WEEK |
| Masts and anchorings connection bolts | Check tightening | ONCE A WEEK |
| Power supply cable | Check wear on the external sheath and check that it coils neatly in the cable basket | ONCE A WEEK |
| Vertical masts | Check that the tube and racks are in perfect condition, clean and well-greased. Check tightening of the elements | ONCE A WEEK |
| Cage doors at ground level and at floors | Check that they are in perfect condition and clean and lubricate the carriages and locking devices with grease | ONCE A WEEK |
| Motor:<br>pinion<br>lifting rollers<br>electromagnetic brake | <br>Check teeth<br>Check rollers, ball bearings and pins<br>Check shoes | EVERY 4-6 MONTHS |
| Upright:<br>welded parts<br>elements | <br>Check weldings<br>Check locking screws | EVERY 4-6 MONTHS |
| Wall anchorings | Check rawl plugs<br>Check clamps | EVERY 4-6 MONTHS |
| Electrical system | General check<br>Check power supply cables | EVERY 4-6 MONTHS |

**ATTENTION!**

**ENSURE THAT THE TABLE IS DISPLAYED IN A PROMINENT POSITION!**

**Once a week** and in any case after gusts of wind, storms and earth tremors, check:

a. that no screw in the electric motors, reducers, brakes, flanges or frames is broken or loose

b. that the vertical structure locking screws are not loose

c. that the rack teeth are not broken or unsafe for normal engagement and sliding of the pinions

d. that the uprights have not settled unevenly

e. that the wall anchorings are not loose

f. that the stroke end devices are in the correct position

**Once a day**
Electrical and mechanical locking devices (stroke ends, door closure)

**Every 4-6 months**
Test and check efficiency of the centrifugal brake
For all the checks it is essential to draw up a register in which the tests, date, operator and any work carried out are recorded.

Table 7: Lubrication point

| Part | Once a week | Every 8 months | Product |
|---|---|---|---|
| Speed reducer | Check level | Change oil | see table |
| Braking unit reducer | Check level | Change oil | see table |
| Pinions and racks | Grease | | Ordinary grease |
| Stabilizer screws | | Grease | Ordinary grease |
| Mechanical door locking systems | Grease | | Ordinary grease |
| Door pulleys | Grease | | Ordinary grease |
| Masts tube and rack | Grease | | Ordinary grease |
| Lifting pinions | Grease | | Ordinary grease |

Tabella 8: Raccomended lubricants

| Brand | -20° C/+5° C<br>IV 95 min | -5° C/+30° C<br>IV 95 min | -30° C/+50° C<br>IV 95 min | -30° C/+65° C<br>IV 165 min |
|---|---|---|---|---|
| **ISO** | VG 100 | VG 150 | VG 320 | VG 150-200 |
| **AGIP** | Blasia 100 | Blasia 150 | Blasia 320 | Blasia S 220 |
| **ARAL** | Degol BG 100 | Degol BG 150 | Degol BG 320 | Degol GS 220 |
| **BP MACH** | GR XP 100 | GR XP 150 | GR XP 320 | GR XP 220 |
| **CASTROL** | Alpha SP 100 | Alpha SP 150 | Alpha 320 | Alpha SN 6 |
| **CHEVRON** | non leaded gear compound 100 | non leaded gear compound 150 | non leaded gear compound 320 | |
| **ESSO** | Spartan EP 100 | Spartan EP 150 | Spartan EP 320 | Compressor Oil LG 150 |
| **GULF** | | EP Lubricant HD 150 | EP Lubricant HD 320 | |
| **IP** | Mellana 100 | Mellana 150 | Mellana 320 | Telesia Oil 150 |
| **MOBIL** | | Mobilgear 629 | Mobilgear 632 | Glygoyle 22<br>Glygoyle 30<br>SHC 630 |
| **SHELL** | Omala Oil 100 | Omala Oil 150 | Omala Oil 320 | Tivela Oil SA |
| **TOTAL** | Carter EP 100 N | Carter EP 150 | Carter EP 320 N | |
| **KLUEBER** | Lamora 100 | Lamora 155 | Lamora 320 | |
| **ELF** | Reductelf SP 100 | Reductelf SP 150 | Reductelf SP 320 | Elf ORITIS 125 VIS<br>Elf Syntherma P30 |

# 12.0 Self-braking unit

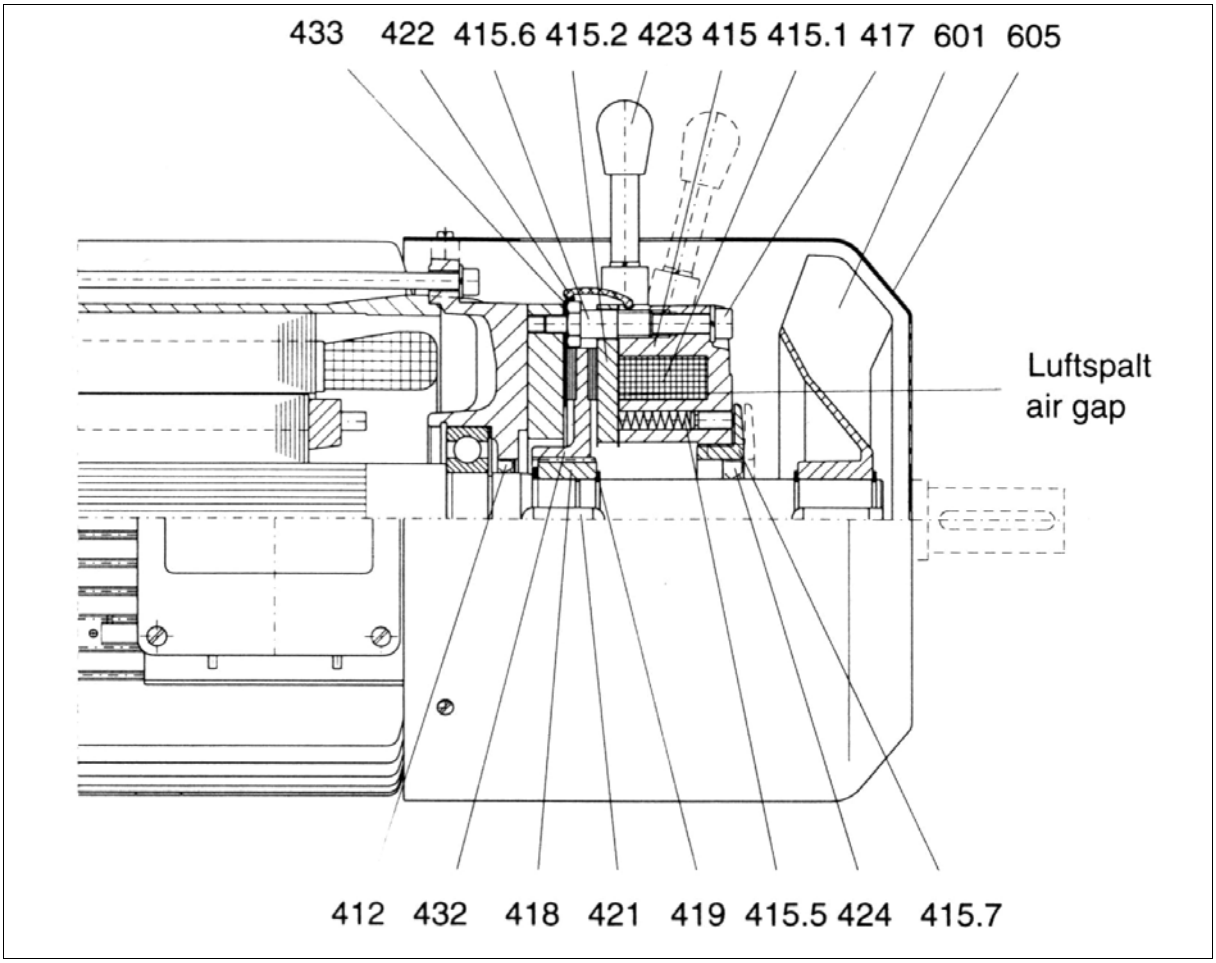



***Figura 12.0.1*** *Electric motor self-braking unit*

## 12.1 Components of the self-braking unit

| N. | DESCRIPTION |
|---|---|
| 412 | Snap ring |
| 415 | Field magnets |
| 415.1 | Brake coil |
| 415.2 | Brake cap |
| 415.5 | Brake springs |
| 415.6 | Adjustment ring nut |
| 415.7 | Adjustment ring |
| 417 | Fixing screw |
| 418 | Broached hub |

| N. | DESCRIPTION |
|---|---|
| 419 | Dust cover ring |
| 421 | Coupling key |
| 422 | Snap ring |
| 423 | Manual release lever |
| 424 | Snap ring |
| 432 | Pad (rotor) |
| 433 | Clutch sheet-steel |
| 601 | Fan |
| 605 | Fan cover |

## 12.2 Air gap adjustment

1 - Disassemble the casing, move aside the protective band and remove any dusty deposit.

2 - Tighten the hexagonal nuts to restore the minimum air gap indicated in the table evenly between the electromagnet and the disk pusher. Using a thickness gauge, check regularity of the air gap near the fixing screws. Put the protective metal band back in place and reassemble the casing.

The air gap value must be checked periodically and the value must be between the min. and max. values shown in the table. Air gap higer than the max. value increase the brake noise and may prevent from brake releasing.

When brake release kit is fitted, the eccessive air gap may annul the brake torque due to the play in the brake release screw. Dimension X must respect the value shown in the table.

Tabella 9: Air gap value

| | |
|---|---|
| Nominal. air gap | **0,3 mm** |
| Max. air gap | **0,75 mm** |

## 12.3 Fitting the manual release

1 - Fully tighten the two stud bolts in the brake pushing disk, gluing them if necessary with Loctite. Insert the spring pin in the solenoid.

2 - Position the release lever. If the manual release is with stop, fit the cylindrical roller. This roller is not used in the automatic return manual release.

3 - Tighten the regulation nuts until the axial play between the flattened tapered springs and the release lever is between 1.5 mm and 2 mm.

4 - Refit the fan and casing. Tighten the hand lever of the automatic return release or the grub screw of the release with stop.

**CAUTION!**

**WITH THE STOP DEVICE, THE ROTOR IS LOCKED WHEN A CERTAIN RESISTANCE IS FELT DURING TIGHTENING OF THE GRUB SCREW (2). IN THE AUTOMATIC RETURN SYSTEM, TO RELEASE THE ROTOR SIMPLY OPERATE THE LEVER BY HAND IN THE DIRECTION OF THE FAN. IN BOTH CASES DO NOT FORCE AS THIS CAN DAMAGE THE RELEASE LEVER!**

## 12.4 Replacing the brake disk

When, due to wear, the brake disk is reduced to a minimum thickness of 9 mm, it must be replaced following the instructions in the paragraph "*Altering the braking torque*".

**ATTENTION!**

**THE NEW BRAKE DISK MUST NOT UNDER ANY CIRCUMSNTANCES COME INTO CONTACT WITH GREASE OR OIL!**

## 12.5 Maintenance

The only maintenance required is cleaning of the cooling air circulation passages and checking of the bearings. If the bearings have to be replaced, only use grease resistant to high temperatures (Esso Unirex N 3).

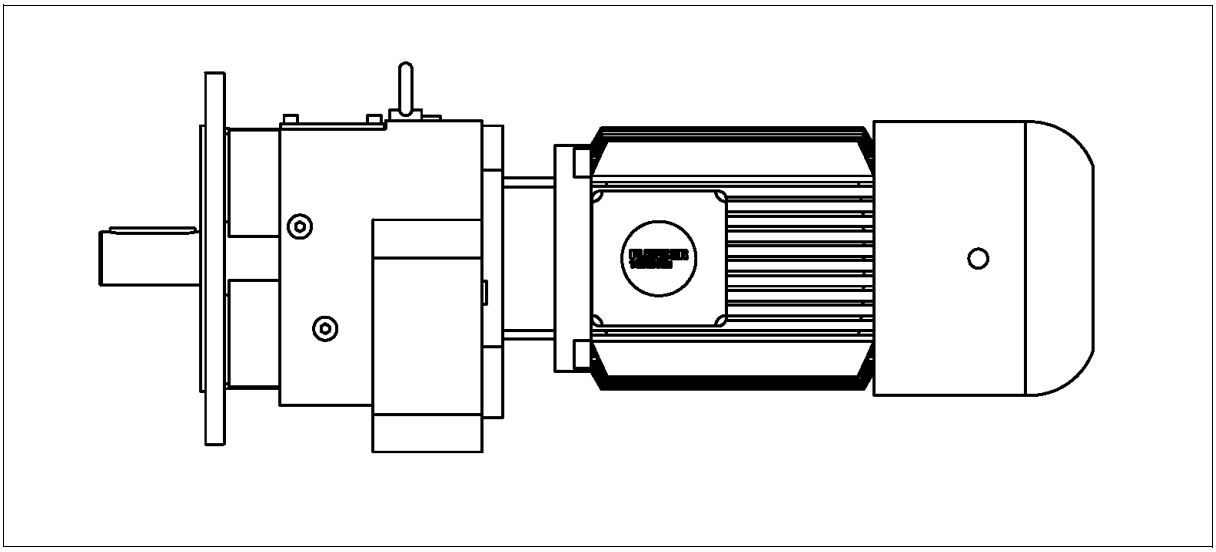


***Figura 12.5.1*** *Speed reducer*

Tabella 10: Speed reducer

| DESCRIPTION |
|---|
| Gearmotor helical in-line |
| type ZF68 M112MB4 I L60GH |
| Shape B5 |
| Reduction 17,82 |
| Outside flange diameter 250mm |
| Speed 81 revs/min |

| DESCRIPTION |
|---|
| Service factor 1,77 |
| Threephased self-braking motor 4 kW power |
| Voltate - Frequence 230/400 V 50Hz |
| Monophase brake supply 190...240 |
| Brake type: L60GH |
| Brake with HR manual release and automatic reversal |

As far as maintenance to the speed reducer are concerned, take into account that:

1 - After the first setting at work of the reducer, change the oil every 10,000 hours of operation, anyway not later than after 2 years.
Subsequent oil changes must always be carried out with these same time intervals.
Check the oil level inside the reducer at least once a month, verifying this way Do not forget to check the level of oil inside the reducer at least once in a month granting normal conditions of working to this component.

**ATTENTION!**

**FOR THE OIL CHANGE IT IS VERY IMPORTANT TO USE THE SAME TYPE OF OIL USED BEFORE. DIFFERENT KINDS OF OILS MUST NOT BE MIXED UP. IN PARTICULAR SYNTHETIC OILS CANNOT BE MIXED WITH MINERAL OILS OR WITH OTHER SYNTHETIC OILS. TO CHANGE FROM MINERAL OIL TO SYNTHETIC OIL OR FROM SYNTHETIC OIL OF A CERTAIN TYPE TO ANOTHER, WASH THE GEAR DRIVE WITH ACCURACY WITH NEW TYPE OF OIL!**

2 - Clean the blow-off plug at least once every 3 months to check its perfect working order.

# 13.0 Transport procedures

The first components to be loaded are the vertical elements, i.e. the machine assembled at minimum height from ground level. These are followed by the cage, the enclosure and finally the base. All the parts must be correctly arranged and tied to prevent risks during transport.

Tabella 11: Weights of the components

| | |
|---|---|
| Cage with forks and lifting unit | **622 kg** |
| Base with 1st mast | **94 kg** |
| Vertical element | **36.5 kg** |

The user firm must appoint a person in charge who must be familiar with all parts of the manual. This person must also supervise running of the hoist by authorised personnel.

Before commencing work, ensure that all the safety systems are in perfect working order and that all the bolts, pins, screws and plugs are correctly fixed in their housings.

Check efficiency of the motor unit braking system.

# 14.0 Emergency procedures

If unexpected problems occur during use of the machinery, identify the exact problem and act accordingly, referring to the relevant chapter in this manual. In particular, the hoist can be lowered manually if there is a power failure (see paragraph 16.1) and the mechanical centrifugal brake (see paragraph 16.1) reset if the rated descent speed is exceeded.

# 15.0 Operating hints

For ascent press the start button and then the ascent button. The hoist automatically locks when the ascent button is released. For descent, press the start button and then the descent button.

The stroke end devices automatically stop the hoist when it reaches the upper or lower limit.

The control panel features a red emergency stop button which must be manually activated.

# 16.0 Troubleshooting

Before delivery, the hoist is tested together with its electrical control panel to check operation of the control, safety and emergency devices in real operating conditions. The hoist is delivered ready for many years of trouble-free operation.

External factors, for example sudden changes in temperature, vibration and normal wear of some components can, however, cause problems.

Below is a list of problems which, in our experience, are most likely to occur on site and which, although not serious, result in stoppage of the hoist and consequent loss of production.

Any work on the electrical system must be carried out by authorised personnel only in compliance with the safety regulations for maintenance of electrical circuits in order to prevent accidents and injuries.

Table 12: Faults

| Fault | Cause | Solution |
|---|---|---|
| **THE HOIST GIVES NO SIGNS OF LIFE** | Check the magnetothermal switches | Eliminate the cause of their cutting in |
| | A phase has been swapped with the earth wire in the power supply socket | Invert connection of the two wires |
| | Cables broken or damaged during loading/ unloading | Replace or repair the cables |
| | Thermal relays have cut in | Press the reset buttons |
| | Control panel transformer burnt | Replace the transformer |
| | A wire in the junction box of the lifting unit is disconnected or loose | Restore the contact |
| **THE MOTOR IS NOISY AND DOES NOT HAVE SUFFICIENT LIFTING FORCE** | Hoist overloaded | Remove the extra load and observe the load limits |
| | Power supply phase missing | Ascertain the causes and put right (magnetothermal switches, cable cut, connection error) |
| | Motor brake burnt or damp | Change the coil and/or the shoes, adjust the distance between the anchor and gap (see paragraph 11.1) |
| | Emergency brake on | Ascertain the cause and after restoring safe conditions, reset the emergency brake |
| **WHEN THE ASCENT/DESCENT BUTTON IS PRESSED, THE HOIST DOES NOT MOVE** | No power | Ensure that power reaches the electrical control panel |
| **WHEN THE ASCENT/DESCENT BUTTON IS PRESSED, THE HOIST DOES NOT MOVE<br>BUT THE ELECTRIC MOTORS EMIT A BUZZING NOISE** | a) Low voltage<br>b) Two-phase instead of three-phase power supply | a) Increase the power at the source<br>b) Check the electrical connection |
| **WHEN THE ASCENT/DESCENT BUTTON IS PRESSED, THE HOIST DOES NOT MOVE** | The phases are inverted | Invert the phase via the plug on the electrical panel |
| **DURING ASCENT/DESCENT, THE MOTOR UNIT MAKES A BUZZING NOISE** | Humidity in the safety system electromagnet | Repeatedly operate the ascent/descent lever. If the problem persists, change the electromagnet. |
| **WHEN THE BUTTON IS RELEASED DURING DESCENT, THE HOIST DOES NOT STOP IMMEDIATELY AND THE EMERGENCY BRAKE COMES ON** | The electromagnetic brake of the electric motor has become worn or has lost power | Immediately call your nearest servicing centre or the manufacturer |
| **THE MACHINE STOPS DURING ASCENT. IT DOES NOT MOVE UP BUT WHEN THE DESCENT LEVER IS PRESSED IT MOVES DOWN.** | The limit switch checking the presence of the vertical element has cut in. | Regulate the limit switch correctly. |
| **WHEN THE ASCENT/DESCENT BUTTON IS PRESSED, THE HOIST DOES NOT MOVE.** | A limit switch has cut in. | Check the following limit switches:<br>a) ascent limit switch<br>b) descent limit switch<br>c) door closure control limit switch<br>d) limit switch controlling presence of vertical element |

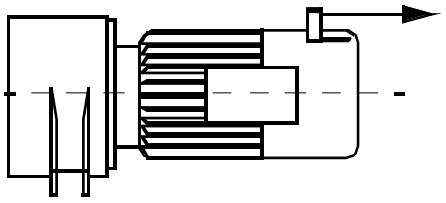
# 17.0 General safety precautions

All the operations given below must be performed only by trained and instructed personnel.

The hoist is operated by insertion of the key in the key switch on the front of the electrical panel.

## 17.1 Manual emergency descent

Manual descent must be performed only if there is a power failure. The following operations must be performed in sequence:



1) Gradually pull the lever until the cage begins to move down slowly.

2) Keep the descent speed constant, gradually releasing the lever if the speed increases.

3) If the descent speed exceeds the set speed, the emergency brake safety system automatically cuts in, blocking the cage and disconnecting the structure.

***Figura 17.1.1*** *Manual emergency descent*

**RESETTING THE EMERGENCY BRAKE**

The emergency brake can be reset:

- After identifying and eliminating the cause of the brake cutting in.
- If the machine is powered normally.

## RESET OPERATION

1) Set the master switch to 0 and open the control panel.

2) Repower with the knob via the master switch inside the panel.

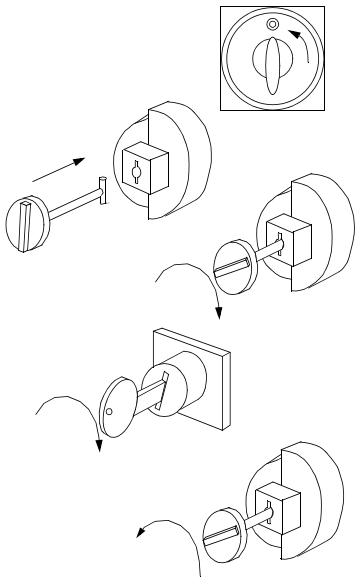
3) Turn the key reset switch and keep it in position for about three seconds. Power will automatically be restored and the hoist will move up, thus resetting the emergency brake.

4) After about three seconds, release the key switch which will automatically return to position.

5) Reset the master switch to 0 inside the panel.

6) Close the control panel.

7) Use the hoist normally.



# 18.0 Spare parts list

## 18.1 Mechanical part

Table 13: Mechanical spare parts

| PARA-GRAPH | REFERENCE | PART NAME |
|---|---|---|
| 4.1 | JN 00301 | BASE |
| 4.1 | JN 00302 | STROKE END SLIDING BLOCK FOR DESCENT LIMIT SWITCH |
| 4.8 | JN 00308 | CABLE ARM |
| 4.3 | JN 00310 | VERTICAL ELEMENT |
| 4.4 | JN 00310 | LARGE GUARDRAIL |
| 4.3 | JN 00311 | END ELEMENT |
| 4.5 | JN 00312 | CABLE BASKET |
| | JN 00314 | CAGE LADDER |
| 4.4 | JN 00315 | SMALL GUARDRAIL |
| 4.10 | JN 00316 | LANDING GATE |
| 4.9 | JN 03001 | ANCHORING BRACKET |
| 4.9 | JN 03002 | ANCHOR FIXING BRACKET |
| 4.2 | JN 03003 | ENCLOSURE SIDE WALL |
| 4.2 | JN 03004 | ENCLOSURE REAR WALL |
| 4.2 | JN 03005 | ENCLOSURE DOOR FRAME |
| 4.2 | JN 03006 | ENCLOSURE DOOR |
| 4.8 | JN 03007 | CABLE GUIDE |
| 4.4 | JN 03008 | CAGE ENTRANCE DOOR |
| 4.4 | JN 03009 | CAGE ENTRANCE DOOR FRAME |
| 4.4 | JN 03010 | CAGE EXIT DOOR |
| 4.4 | JN 03011 | CAGE EXIT DOOR FRAME |
| 4.4 | JN 03012 | SLIDE FOR OPENING LANDING GATE |
| 4.14 | JN 03017 | COMPLETE GUIDE ROLLER WITH GROOVE |
| 4.143 | JN 03018 | COMPLETE FLAT GUIDE ROLLER |
| 4.14 | JN 03019 | COMPLETE TOOTHED GUIDE ROLLER |
| 4.15 | JN 03020 | EMERGENCY BRAKE |
| | JN 03033 | FIXING BRACKET |
| 4.1/4.3 | JN 10001 | TIE ROD SCREW FOR FIXING ELEMENTS |
| 4.1 | JN 10002 | NUT FOR TIE ROD SCREW |
| 4.12 | JN 10005 | GEARMOTOR FIXING NUT |
| 4.9 | JN 10008 | 48 mm DIA SQUARE CLAMP |
| 4.2 | JN 10009 | ENCLOSURE FIXING BOLT |
| 4.8 | JN 10009 | CABLE ARM FIXING SCREWS |
| 4.9 | JN 10009 | FIXING SCREW FOR ANCHOR FITTING BRACKET |
| 4.15 | JN 10010 | EMERGENCY BRAKE FIXING NUT |

Table 13: Mechanical spare parts

| PARA-GRAPH | REFERENCE | PART NAME |
|---|---|---|
| 4.9 | JN 10011 | FIXING WASHER FOR ANCHOR FITTING BRACKET |
| 4.15 | JN 10024 | EMERGENCY BRAKE FIXING WASHER |
| 4.15 | JN 10036 | EMERGENCY BRAKE FIXING SCREW |
| 4.12 | JN 10048 | GEARMOTOR FIXING SCREW |
| 4.12 | JN 10049 | GEARMOTOR FIXING WASHER |
| 4.12 | JN 10050 | GEARMOTOR |
| 12.0 | JN 100200 | SHOE FOR MOTOR BRAKE |
| 12.0 | JN 100201 | ELECTROMAGNET FOR MOTOR BRAKE |
| 4.1/ 4.3 | JN 60002 | WASHER FOR TIE ROD SCREW |
| 4.1 | JN 60013 | LEVELLING SCREW |
| 4.1 | JN 60127 | RUBBER SHOCK ABSORBER |
| 4.12 | JN 60173 | EMERGENCY BRAKE CASING |

## 18.2 Electrical part

Table 14: Electrical spare parts

| PARAGRAPH | REFERENCE | PART NAME |
|---|---|---|
| 5.0 | JN 10202 | COMPLETE LIMIT SWITCH |
| 6.0 | JN 10203 | FIXED POWER SUPPLY PLUG |
| 6.0 | JN 10204 | ELECTRICAL PANEL LIGHT |
| 6.0 | JN 10205 | ELECTRICAL PANEL BUTTON |
| 6.0 | JN 10206 | COMPLETE MASTER SWITCH |
| 6.0 | JN 10207 | KEY SWITCH |
| 6.0 | JN 10208 | ALARM |
| 6.0 | JN 10209 | 6-POLE MULTIPLE CONNECTOR |
| 6.0 | JN 10210 | SINGLE-PHASE MAGNETOTHERMAL SWITCH |
| 6.0 | JN 10211 | MAGNETOTHERMAL SWITCH FOR AUXILIARY SOCKET |
| 6.0 | JN 10212 | REMOTE CONTROL SWITCH |
| 6.0 | JN 10213 | TIMER |
| 6.0 | JN 10214 | THERMAL RELAY |
| 6.0 | JN 10215 | AUXILIARY SOCKET |
| 6.0 | JN 10216 | TRANSFORMER |
| 6.0 | JN 10 217 | MAGNETIC SWITCH |
| 4.16 | JN 10218 | POWER SUPPLY SOCKET |
| 4.6 | JN 03029 | ELECTRICAL POWER SUPPLY CABLE |
| 4.2 | JN 03029 | GROUND CALL BUTTON |
| 4.10 | JN 03023 | FLOOR CALL PUSH-BUTTON PANEL |
|  | JN 00319 | COMPLETE ASSEMBLY PUSH-BUTTON PANEL WITH CABLE |

## *CHECK LIST*

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*SITE .....*

*SAFETY PROVISIONS:* *CHECKED BY*

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*PERSON IN CHARGE: .....*

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*INSTALLATION NO. ..... DATE.....*

*SITE .....*

*SAFETY PROVISIONS:* *CHECKED BY*

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*INSTALLATION NO. ..... DATE.....*

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*INSTALLATION NO. ..... DATE.....*

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*SAFETY PROVISIONS:* *CHECKED BY*

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