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MANUAL

TRANSPORT PLATFORM

TORGAR PL – 15 EXT

MANUAL TORGAR PL-15 EXT_R05 ENGLISH - JANUARY 2023

MANUAL REVISIONS

REVISION	SUBJECT	N. MACHINE
00	Initial Review	150102 - 150103
01	FRACO MFG, S. L. Electrical Diagrams Updated	150104 - 150109
02	Commentaries of FRACO Doc Team Updated	150110 - …
03	Modification points: 4.3 (base imagen), 4.4 (base inclination), 4.8 (check the verticality of the rack) and 4.10 (the efforts of the anchorages), optional doors floor and base enclosure	150130 - …
04	Modification points: 4.10 (the efforts and anchorages as an option), 4.14 (Floor Protection Doors OPTIONAL)	150148 - …
05	Modification points: 4.2 correct base loads, 4.10 Anchorages (revision), 4.10.4 Modify measures of anchorages	150157 - …

INDEX

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DECLARACIÓN DE CONFORMIDAD
DECLARATION OF CONFORMITY

FRACO MANUFACTURING, S. L. declara que la máquina designada a continuación:
FRACO MANUFACTURING, S. L. declares that the machine designated bellow:

Denominación genérica: Plataforma de Transporte
Type: Transport Platform

Función: Elevación de personas y materiales
Function: Lifting passengers and materials

Modelo: PL-15 EXT
Model: PL-15 EXT

Carga nominal: 1500 Kg
Safety working load: 1500 Kg

Configuración: Simple
Configuration: Single

Número de serie: 150157
Serial number: 150157

Año de fabricación: 2023
Manufacture year: 2023

Cumple las disposiciones aplicables a las siguientes Directivas y las reglamentaciones nacionales que las transponen:
Meets the requirements applicable to the following Directives and national regulations transpose:

Directiva 2006/42/CE de máquinas
Machine Directive 2006/42/EC

Directiva 2014/35/CE sobre material eléctrico
Directive 2014/35/EC on electrical equipment

Directiva 2014/30/CE de compatibilidad electromagnética
EMC Directive 2014/30/EC

Cumple total o parcialmente las disposiciones de las siguientes normas armonizadas: EN 16719: 2018, EN 12015: 2020, EN 60204-1: 2018, EN ISO 12100: 2010, EN ISO 14798: 2013.
Partly or fully fulfilled the provisions of the following harmonized standards: EN 16719: 2018, EN 12015: 2020, EN 60204-1: 2018, EN ISO 12100: 2010, EN ISO 14798: 2013.

Los documentos correspondientes al expediente técnico están custodiados en fábrica.
Documents relating to the technical files are kept in factory.

FRACO MANUFACTURING, S.L.
C.I.F.: B-87952537
C/ Isidoro de Antillón, 13
50014 ZARAGOZA

Fdo. Santiago Gallego Urrea
Director de Fábrica
Factory Manager

Zaragoza, 20 de Enero de 2023
Zaragoza, January 20th, 2023

2. WARRANTY

2.1 DESIGNATION OF THE TRANSPORT PLATFORM

Stamp and Date.

FRACO MANUFACTURING, S. L.

Country of manufacture: Spain.

Name of the transport platform: PL-15 EXT

2.2 GENERAL TERMS OF THE WARRANTY

- Valid for one year.
- The warranty covers the replacement of any part recognized to be faulty but does not include labor, transport and packaging.
- The warranty becomes invalid if the machine is damaged during transport or as a result of an accident, or due to improper use or mishandling on the part of unauthorized personnel.
- No return or refund will be granted.
- The customer shall be not entitled to compensation should the machine be temporarily out of service due to the repair or replacement of parts under warranty.

3. DESCRIPTION OF THE TRANSPORT PLATFORM

3.1 INTRODUCTION

This document contains the necessary information for the correct assembly, use and maintenance of the machine in accordance with European, US and Canada Standards. It also includes the machine warranty.

All the measures corresponding to the International System of Units and close to them appear the USCU units. In case of mistake or bad conversion, the ISU will prevail. All measures of the screws will be in metric and mm.

This instructions manual is delivered with the machine and must be kept with it. It must always be kept available and in good condition so that it can be consulted during the assembly, dismantling, transport and use of the machine. It should also be consulted whenever inspection and maintenance work is to be carried out.

Only authorised and properly trained personnel should be entrusted with operating the machine.

THE USER MUST READ THIS MANUAL AND FULLY UNDERSTAND ITS CONTENTS BEFORE PROCEEDING WITH ANY OPERATION INVOLVING THE INSTALLATION OR OPERATION OF THE MACHINE

FRACO MANUFACTURING, S. L. shall not be held responsible for any possible misinterpretation of the contents of this manual. If you are in any doubt or require technical assistance, please contact the manufacturer or the authorised distributor.

FRACO MANUFACTURING, S. L. shall not accept any responsibility for any problems or damage resulting from the following:

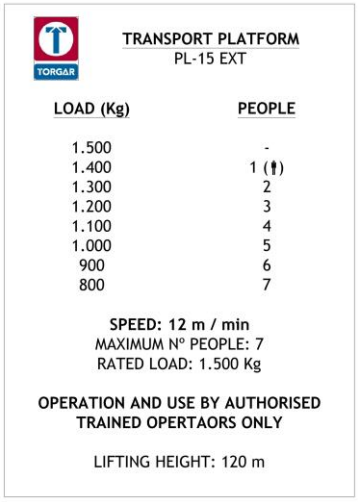
- The improper use of the machine.
- Use of the machine by inexperienced personnel.
- Use of the machine not meeting the safety regulations set out in specific EC and/or national legislation (included local regulations of authorities having jurisdiction).
- The total or partial failure to comply with the instructions laid out in this manual.
- Modifications or repairs that have not been authorized by the manufacturer.
- The use of non-original spare parts.

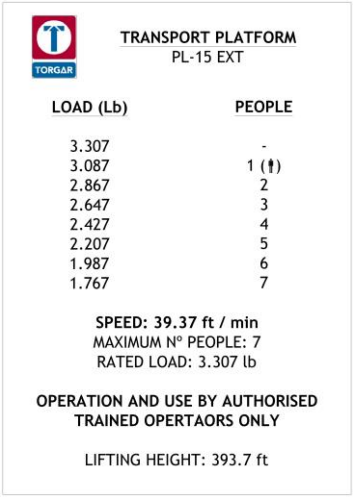
In its capacity as the manufacturer, FRACO MANUFACTURING, S. L. reserves the right to make modifications to its machines in order to improve their performance. It is possible, therefore, that there are some variations between the machines and the information contained in this manual.

3.2 MACHINE SIGNS

Transport platforms are equipped with several information and safety signs located in visible places. These signs are legible, indelible and comprehensible.

- Load capacity and maximum number of people. (The mass of people in platform must be reduced from the total load capacity of the transport platform).





- Speed limiter activation point (52.49 ft/min).

- Name, serial number, motor and date of manufacture.

These signs must be kept clean and legible. If wear and tear or loss, they have to be replaced immediately.

NONE OF THESE SIGNS CAN BE
HIDDEN, REMOVED, DISPLACED, MANIPULATED OR TEMPERED WITH

3.3 GENERAL MECHANICAL DATA

	LOAD		N. PEOPLE	SPEED		POWER	GEAR	TIE DISTANCE	
UNITS	Kg	lb	-	m/min	ft/min	kW	-	m	ft
PL-15	1,500*	3,307*	7*	12	39.37	2 x 4	1 : 48.2	3 / 6	9.84 / 19.68

*Note: The mass of people in platform must be reduced from the total load capacity of the transport platform.

	INNER DIMENSIONS		INSTALATION DIMENSIONS		FREESTANDING HEIGHT		MAXIMUM HEIGHT	
UNITS	m	ft	m	ft	m	ft	m	ft
PL-15	1.6 x 4.4 x 2.1	5.24 x 14.43 x 6.88	2.9 x 3.12	9.5 x 10.23	4.0	13.12	120	393.70

Galvanized platform – mast sections – base - floor protection doors (optional) – base enclosure (optional).

Module rack – pinion: 8.

Platform doors: Small ramp and large ramp to the sides, and in the front hinged doors.

Protection floor door: 1.1 m (3.6 ft) or 2.0 m (6,56) floor protection doors. (OPTIONAL)

Base enclosure: 1.1 m (3.6 ft) or 2.0 m (6,56) enclosure, or anti-crushing mesh. (OPTIONAL)

Electrical and mechanical lock in all doors.

Noise level: less than 80 dB (A). Maximum level of vibration: 0.66 m/s^2 (2.16 ft/s^2).

Work temperature range: -25ºC (-13ºF) to +40ºC (+104ºF). Storage: -40ºC (-40ºF).

3.4 SAFETY EQUIPMENT

a) Electrical and mechanical interlock in access door. It prevents the operation of the machine if any of the doors are open and also deny the opening of the door if the platform is not at level.

b) Emergency manual lower if power cut.

c) Top and bottom end-of-travel detection. A limit switch ensures that the platform stops even if the stop limit switches fail.

d) Rack detector limit switch. Prevents the platform from coming out of the mast.

e) Frontal mesh to protect people from the mast sections controlled by a safety limit switch.

f) Safety mast section without rack.

g) Motor-brakes that hold the platform and its rated load even if power fails.

h) Nonslip surfaces.

i) 3 meters (9.84 ft) limit switch: The platform stops when reach 3 m (9.84 ft) before the bottom floor.

j) Safety device: Operates when the platform exceeds 15% its nominal speed. It is only mechanical and operates automatically even if there is no power. A limit switch cuts off the power to the motors.

k) Overload device: A electronic overload device with a cell prevents the transport platform from operating if the maximum load has been exceeded.

l) Base enclosure or anti-crushing mesh: They prevent any operator from standing under the vertical path of the cabin and when it descends, it can crush or injure him.

4. INSTRUCTIONS FOR ASSEMBLY AND DISMANTLING

Next, the basic procedure for assembling the machine is set out. It is useful to checking out the drawings and pictures in order to understand the following points.

THE MACHINE SHOULD ONLY BE ASSEMBLED AND DISMANTLED BY PROPERLY QUALIFIED AND TRAINED PERSONNEL

FRACO MANUFACTURING, S. L. RECOMMEND THAT ASSEMBLY AND DISMANTLE OPERATIONS SHOULD BE DONE BY THREE PEOPLE

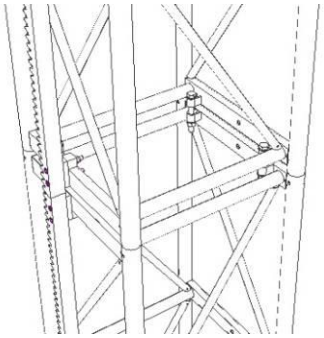
COMPULSORY THE USE OF PERSONAL PROTECTION EQUIPMENT (PPE'S)
GLOVES – HELMET – GOOGLES – BOOTS – SAFETY ARNES – REFLECTIVE VEST

¡MANDATORY!

INSTALLING A SECURITY CABLE IS COMPULSORY WHEN THE TRANSPORT PLATFORM IS BEING ASSEMBLED OR DISMANTLED

¡RECOMMENDATION!

THE SECURITY CABLE MUST BE INSTALLED IN THE SAME LINE OF THE UPRIGHT POST OF THE MACHINE. THE SECURITY CABLE MUST BE INSTALLED ACCORDING TO THE INSTRUCTIONS GIVEN BY THE SECURITY CABLE MAKER, ANCHORED TO ROOFS, BALCONIES OR FORGED THAT SUPPORT THE WEIGHT INDICATED BY THE HARNESS MANUFACTURER

<table>
<tr><td>  </td><td>¡ATTENTION!
¡DANGER!</td><td>  </td></tr>
<tr><td colspan="3">TIGHTEN THE MAST BOLTS WITH THEIR PROPER TORQUE EVERY TIME THAT A MAST SECTION IS PLACED

DO NOT MOVE THE PLATFORM IN ANY DIRECTION IF THERE ARE SECTIONS THAT ARE NOT TIGHTENED AND SECURED BY ALL THE MAST BOLTS: THE PLATFORM COULD BECOME DISCONNECTED FROM THE MAST AND DROP DOWN IMMEDIATELY

THIS TYPE OF ACCIDENT WOULD CAUSE DEATH OF PEOPLE ON BOARD THE UNIT</td></tr>
</table>

4.1 LOCATION

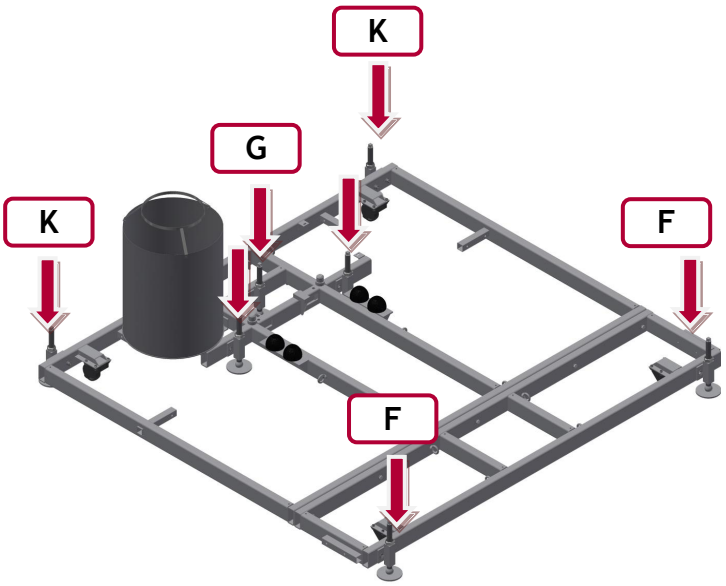
The machine should be placed under the following:

- Proximity to the area where goods are loaded and unloaded.
- Area clear of passing vehicles and other transport and lifting equipment.
- The base should be positioned on firm and solid ground.

The machine should be located as close as possible to the switch board to remove the need for excessively long power cables.

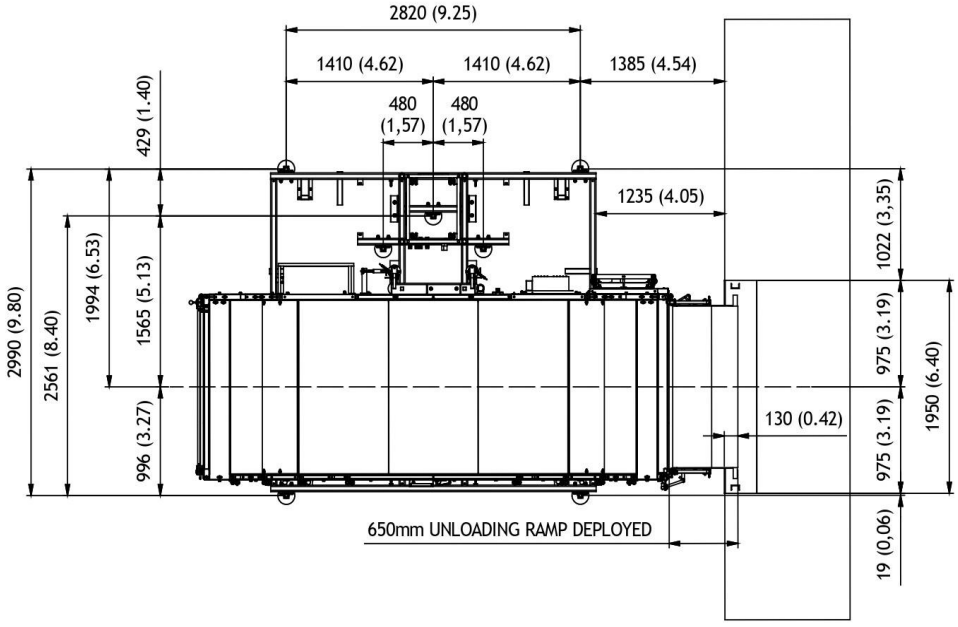
Install in zones without wind in order to avoid additional efforts to the machine.

4.2 FOUNDATION



LOAD TO THE BASE (Kg)					
K		G		F	
Kg	lb	Kg	lb	Kg	lb
2,689	5,929	5,200	11,466	2,010	4,431

The foundation must be executed with these measures (mm and ft), the measures are different according to the modules of the cabin. For each cabin size, the distance from the base to the floor will be different:



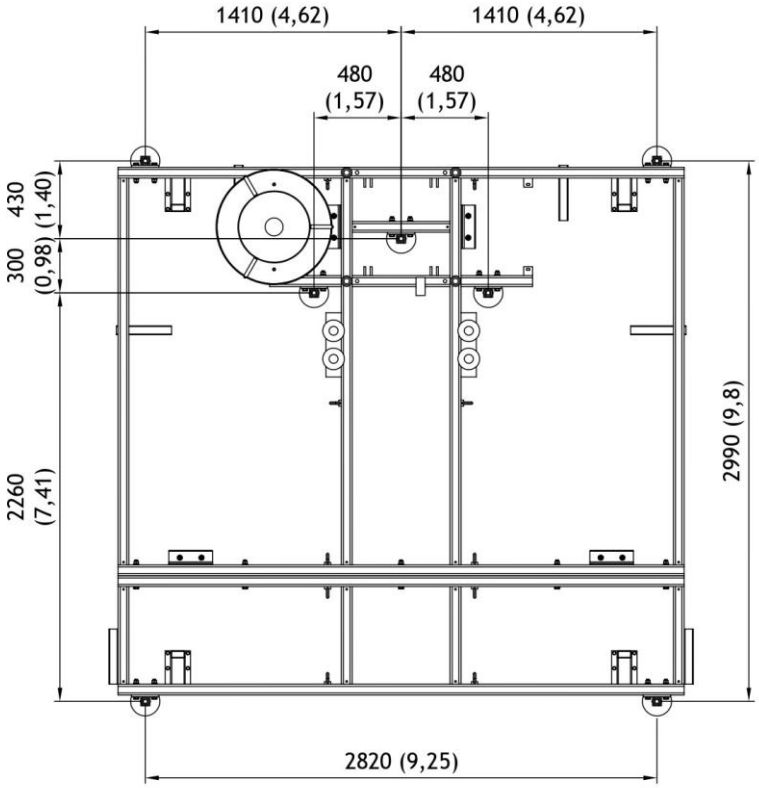
Minimum resistance:

180 Kg/cm^2 (2,560.2 lb/in^2)

Mat reinforcement: Ø 8 x #250 mm (Ø 0.31 x #9.84 in)

Thickness: 200 mm (7.87 in)

Note: Add shoring underneath the jack leg depending on the height of installation or in case of basements.



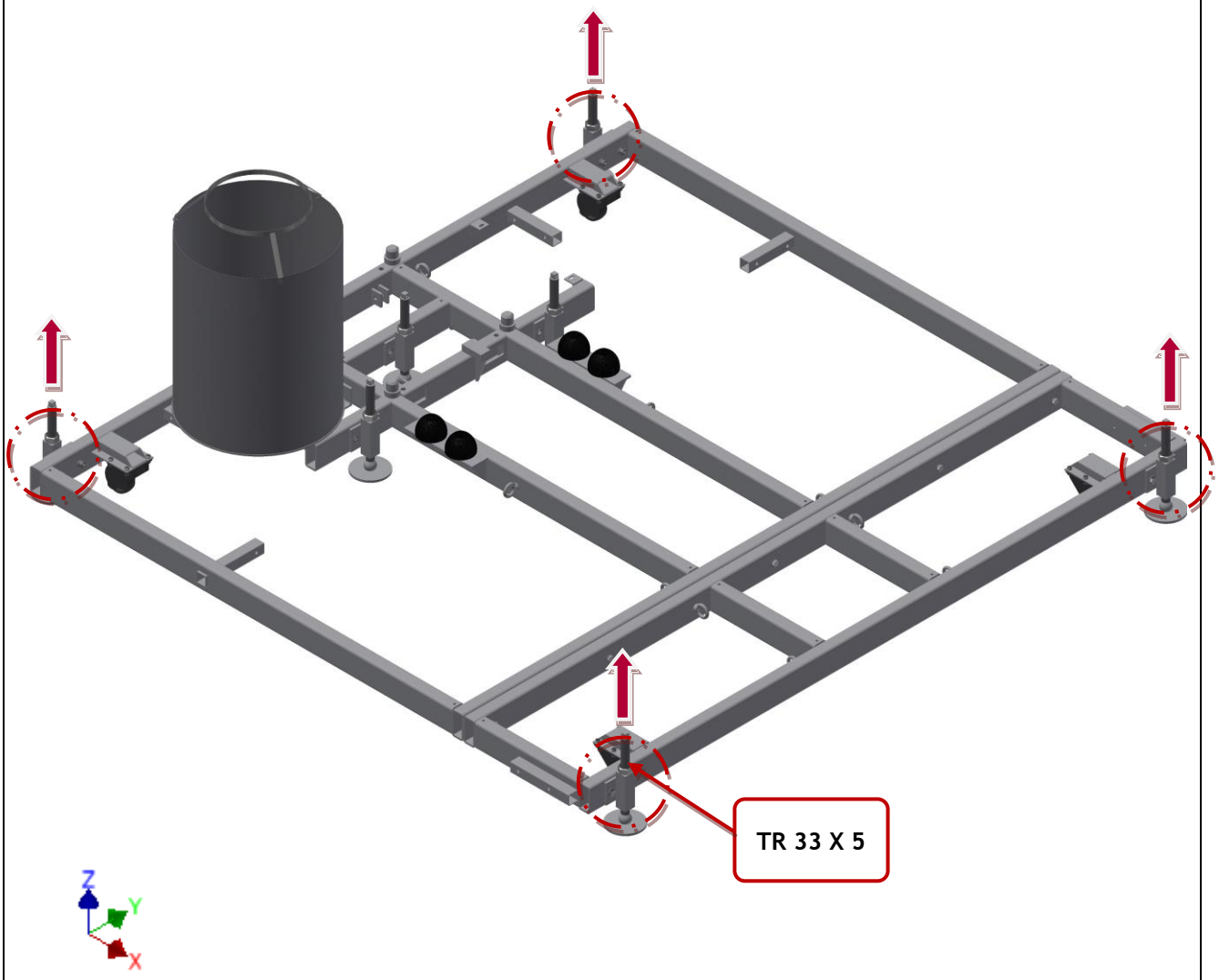
HEIGHT		LOAD	
m	ft	Kg	lb
25	82.02	16,268	35,865.5
50	164.04	17,937	39,545
75	246.06	19,606	43,224.5
100	328.08	21,275	46,904
120	393.70	22,944	50,583.5

4.3 TRANSPORT AND HANDLING OF THE COMPONENTS

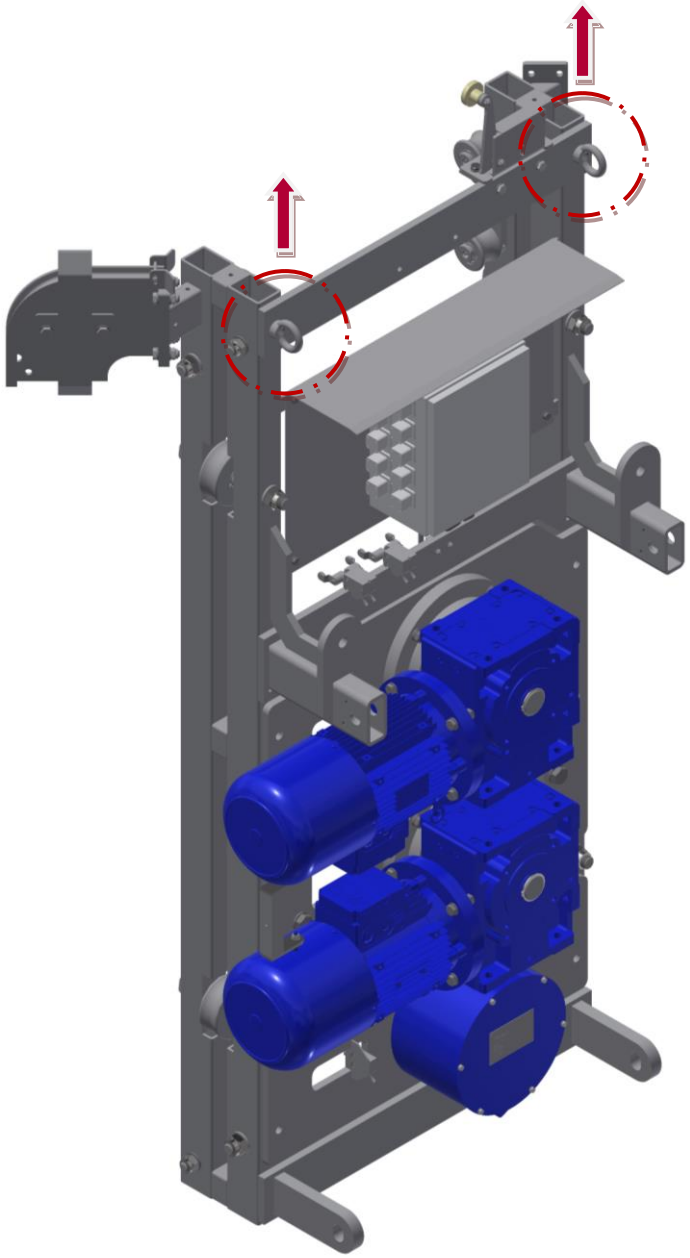
Once the position of the machine has been determined, all the components are moved to the site in order to fulfill the assembly.

Next are the recommended handling points of each component.

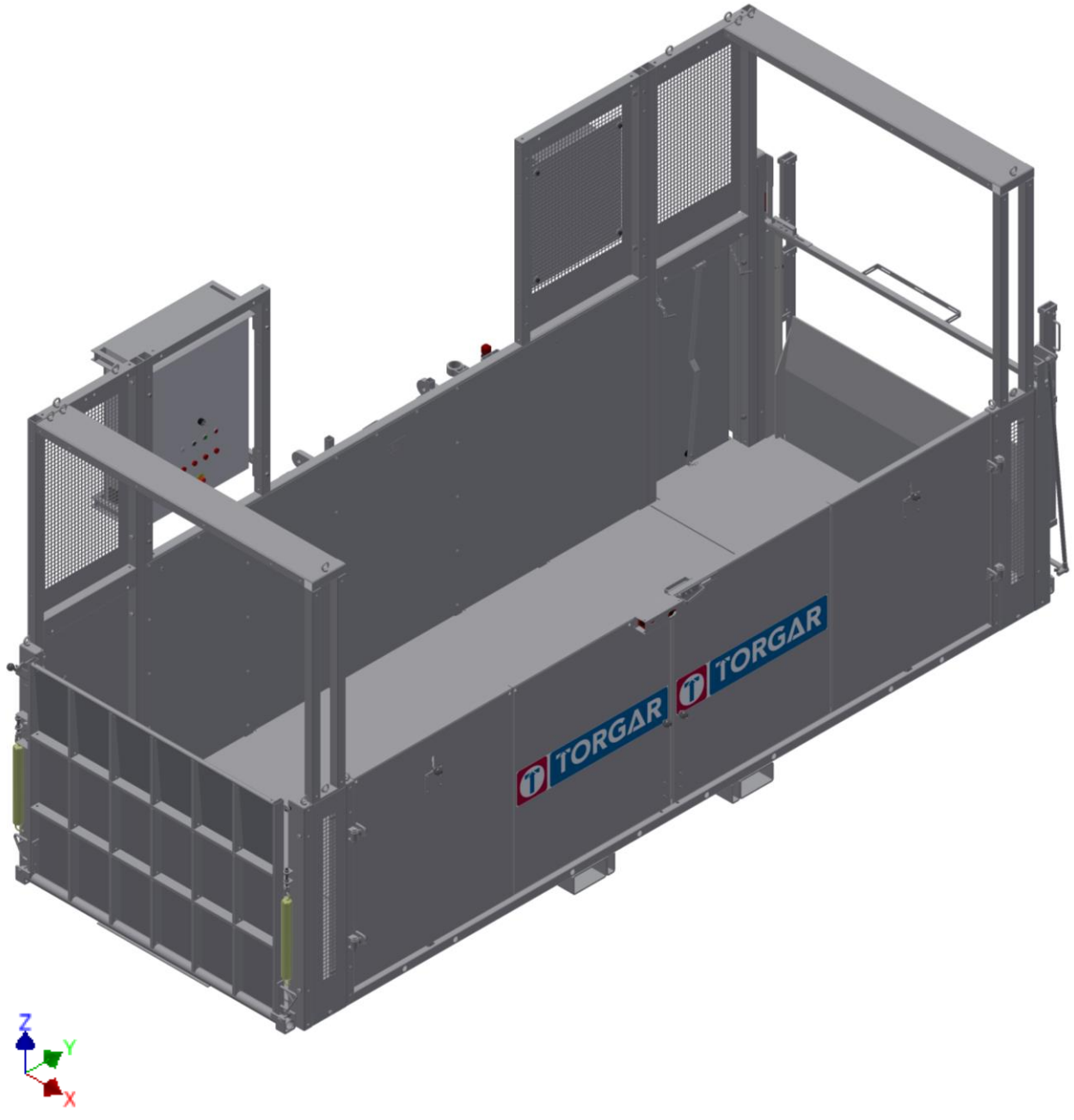
	X		Y		Z		WEIGHT	
BASE	mm	ft	mm	ft	mm	ft	Kg	lb
	2,920	9.58	3,120	10.23	215	0.70	750	1,653



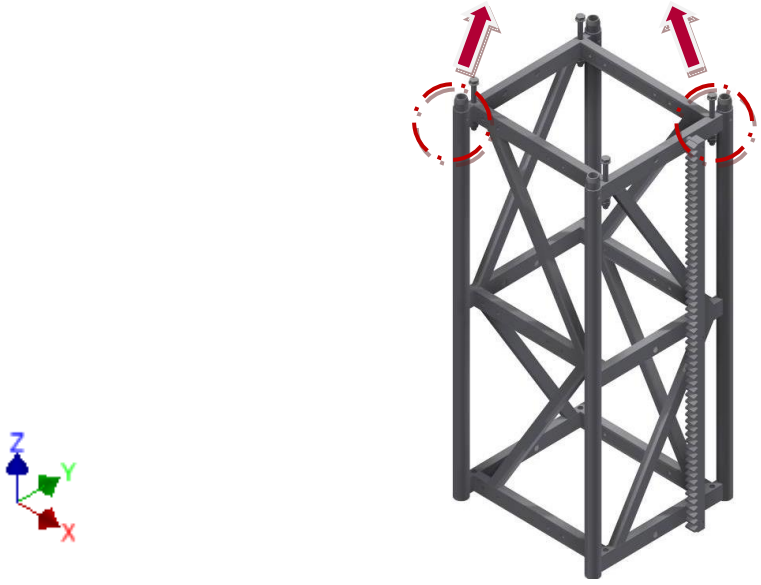
	X		Y		Z		WEIGHT	
MOTOR GROUP	mm	ft	mm	ft	mm	ft	Kg	lb
	460	1.5	820	2.69	2,000	6.56	650	1,433



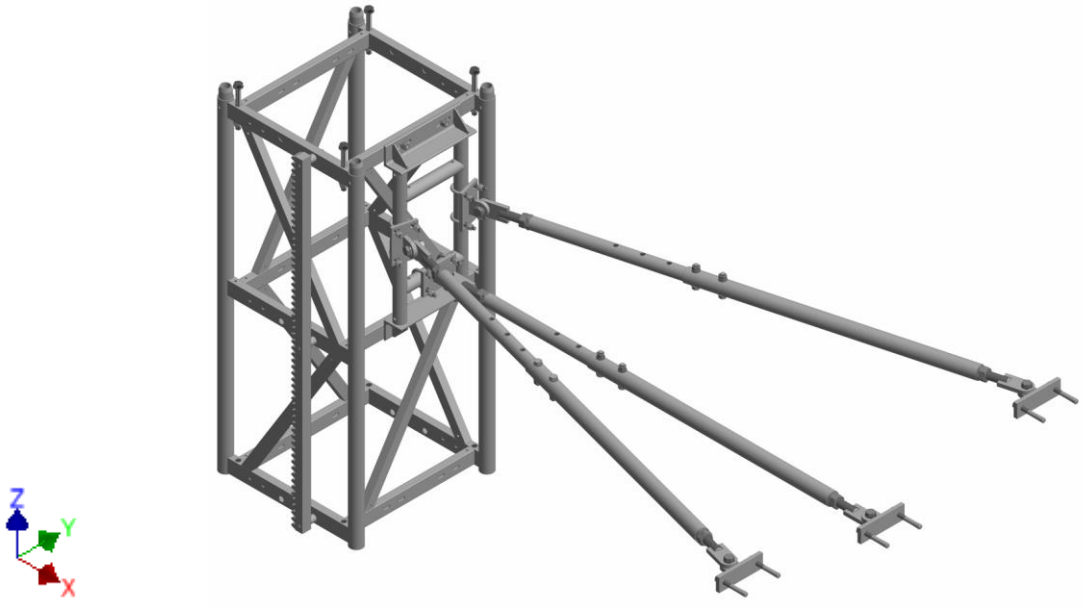
	X		Y		Z		WEIGHT	
PLATFORM	mm	ft	mm	ft	mm	ft	Kg	lb
	1,955	6.41	3,160	10.36	1,250	4.10	2,500	5,511



	X		Y		Z		WEIGHT	
MAST SECTION	mm	ft	mm	ft	mm	ft	Kg	lb
	600	1.96	600	1.96	1,500	4.92	92	202.82

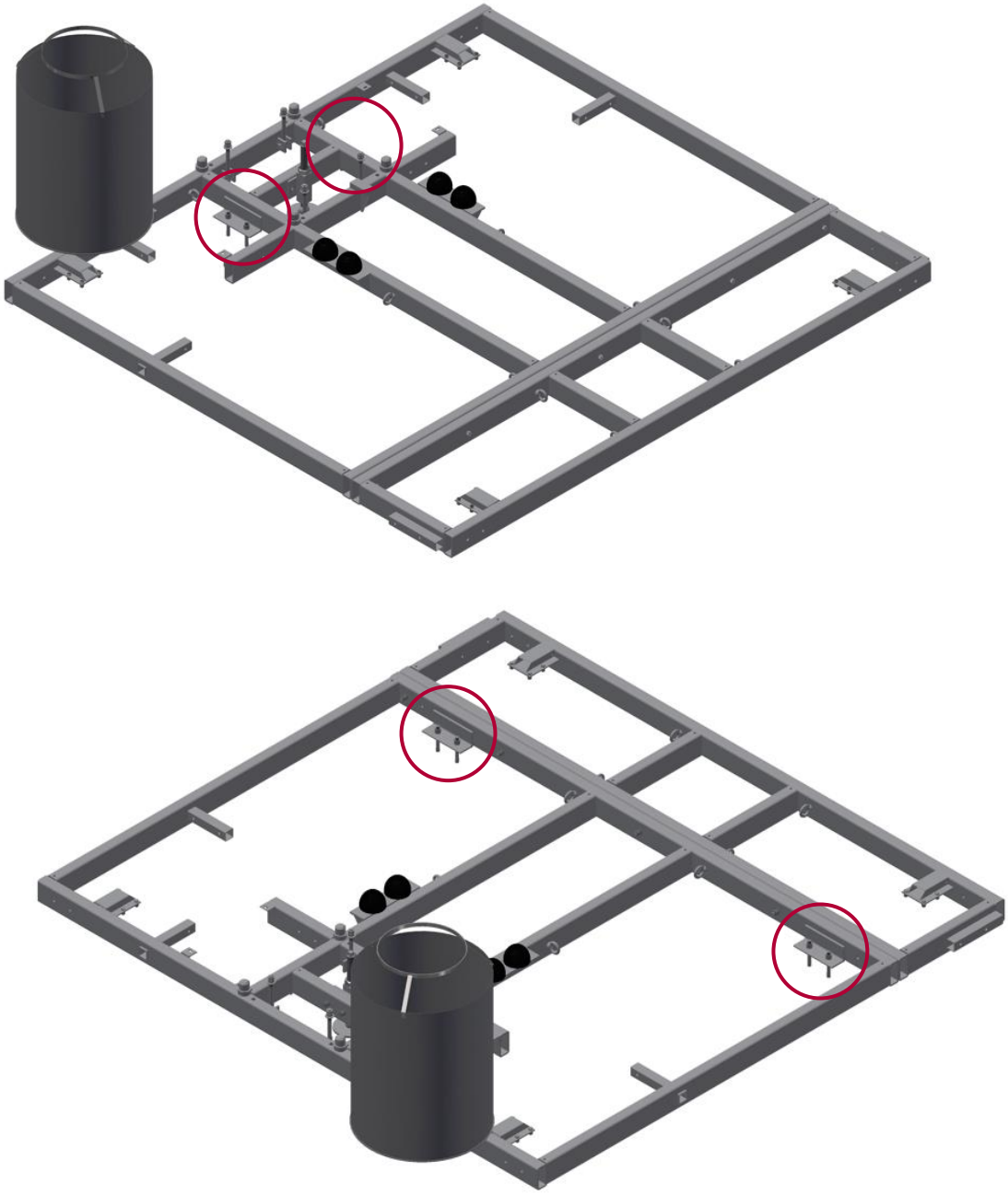


	X		Y		Z		WEIGHT	
ANCHORS	mm	ft	mm	ft	mm	ft	Kg	lb
	2300	4.26	325	1.06	815	2.67	62	137

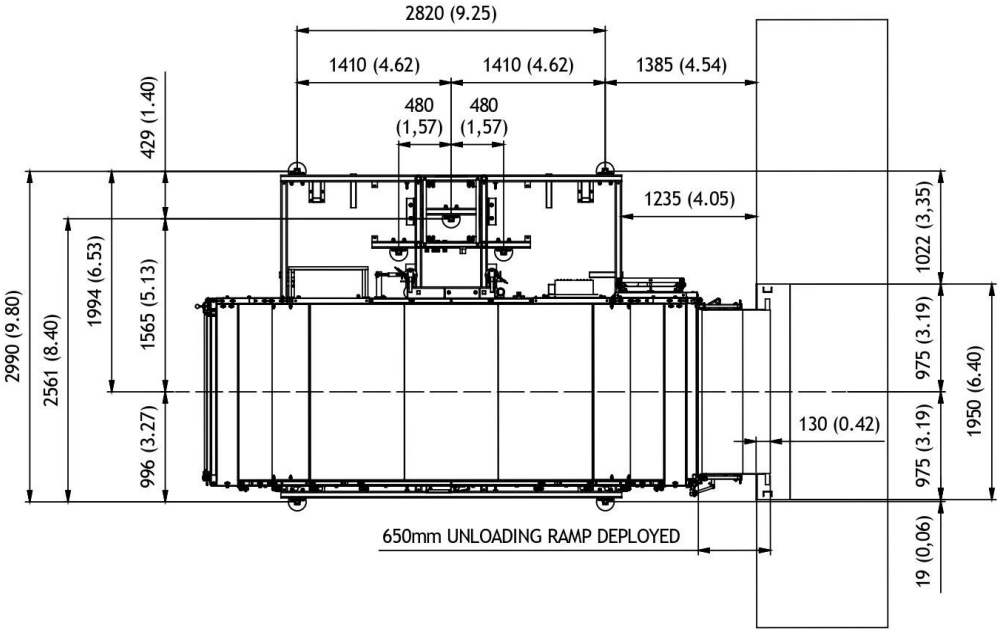


4.4 BASE

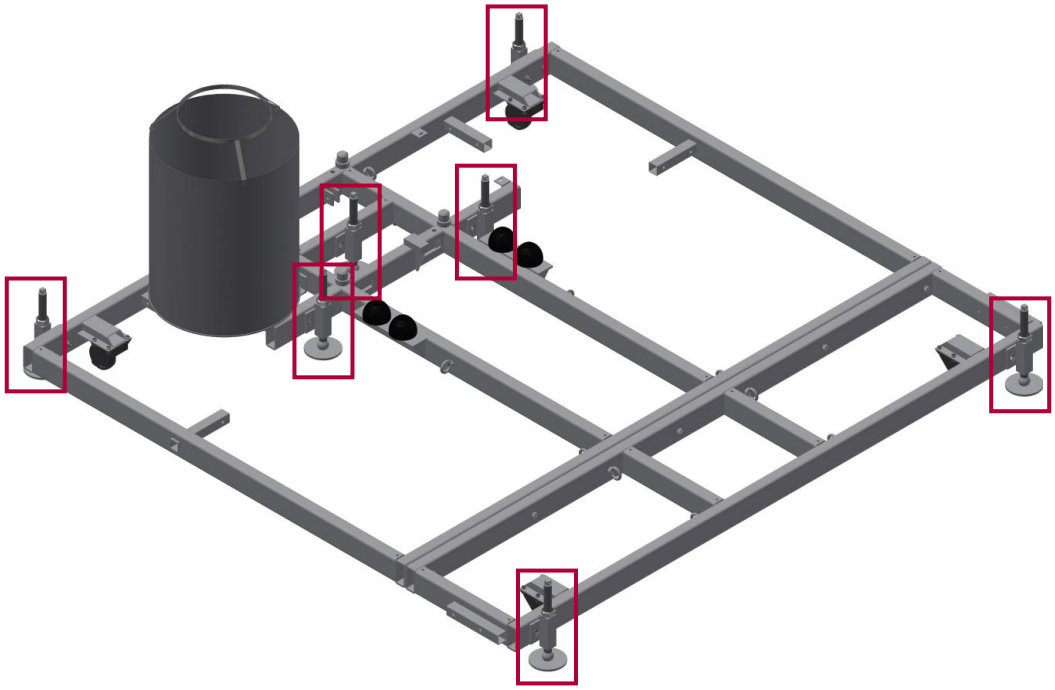
Situate the base. Measures in mm and ft:

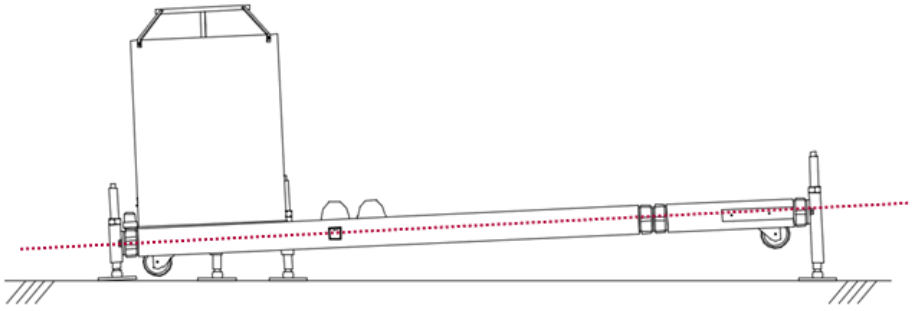


FRACO MANUFACTURING S.L. RECOMMENDS THAT THE PLACEMENT OF THE BASE BE DONE DIRECTLY ON THE CONCRETE FLOOR, USING THE WELDED PLATES MARKET IN THE PREVIOUS IMAGE.



In the case the base is placed on the concrete floor by the levelers, it must be placed with an inclination as show in the following images.



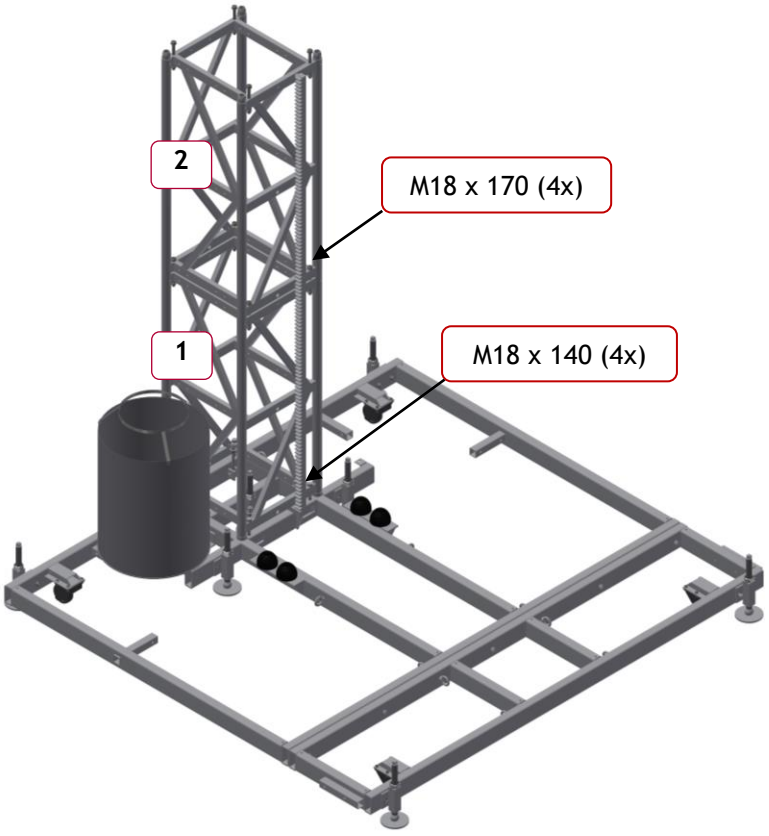


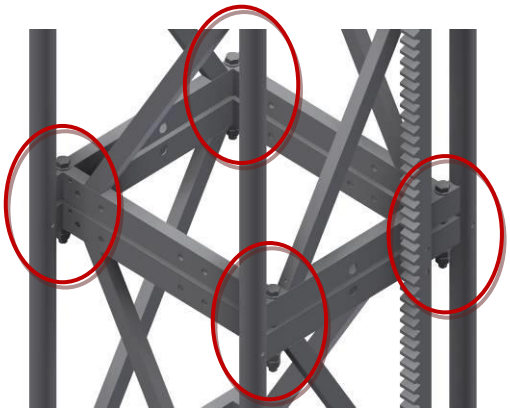
4.5 TIGHTENING TORQUES

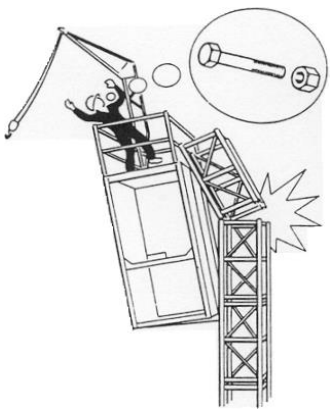
METRICS	RECOMMENDED TORQUE	
	N x m	lb x ft
M6	7	5.16
M8	16	11.80
M10	35	25.81
M12	80	59.00
M16	120	88.50
M18	160	118.01

4.6 ROOT SECTIONS

Two mast sections must be assembled to the base. It is tight by means of screws, washers and nuts.



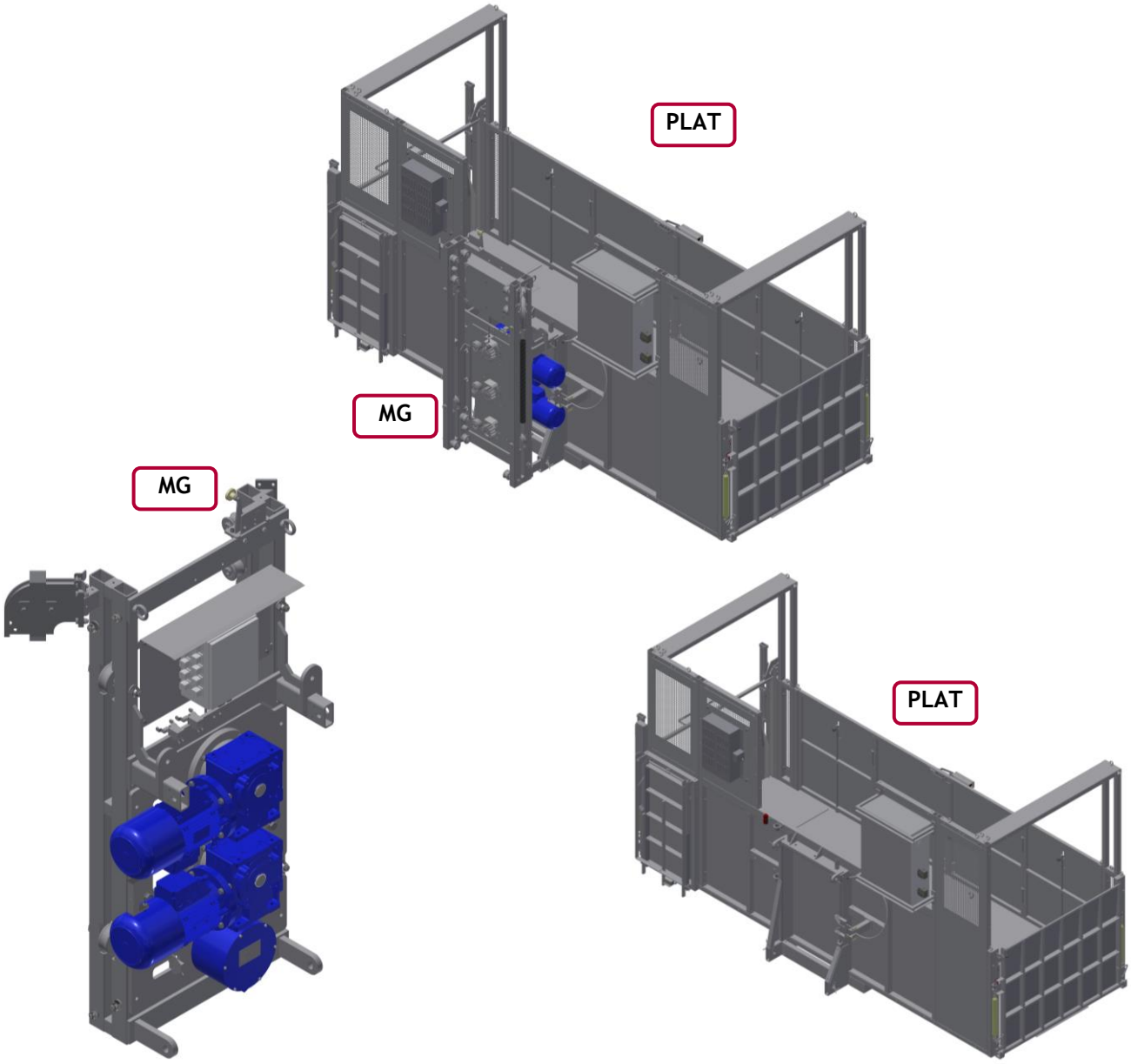




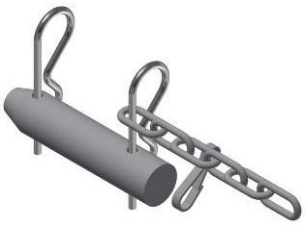
⚠	CHECK THE SCREWS ARE CORRECTLY TIGHTENED BEFORE THE OPERATION OF THE MACHINE

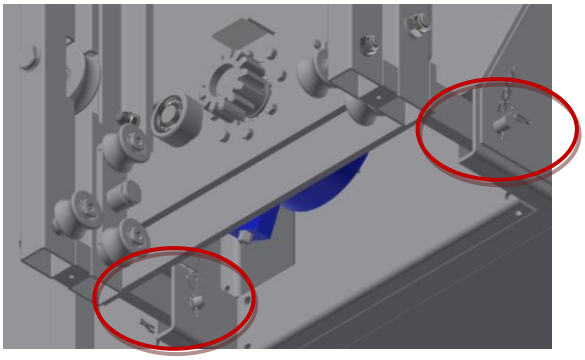
4.7 PLATFORM

The platform could be transported in one or two pieces depending on the truck or container:

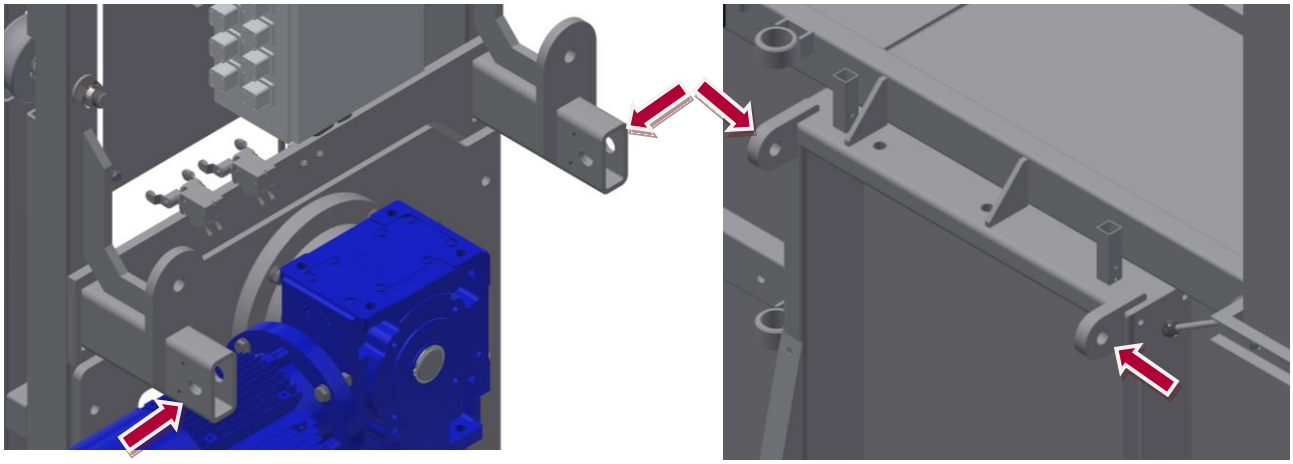


The connection between the motor group and the platform group is done with four pins; two steel pins on the bottom of the joint:

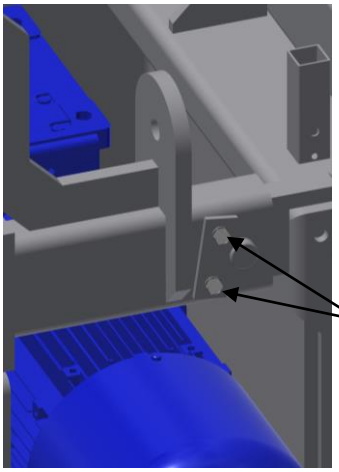
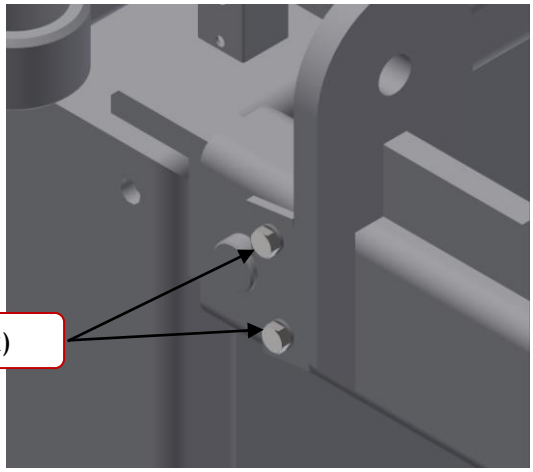




Two load cells on the top of the joint. They have their own position in the assembling as follows:



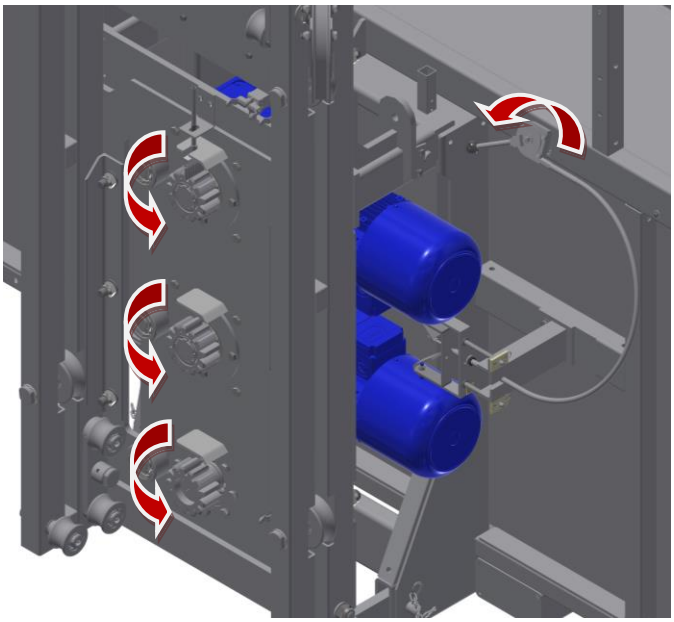
LOAD CELL	PLATE
	

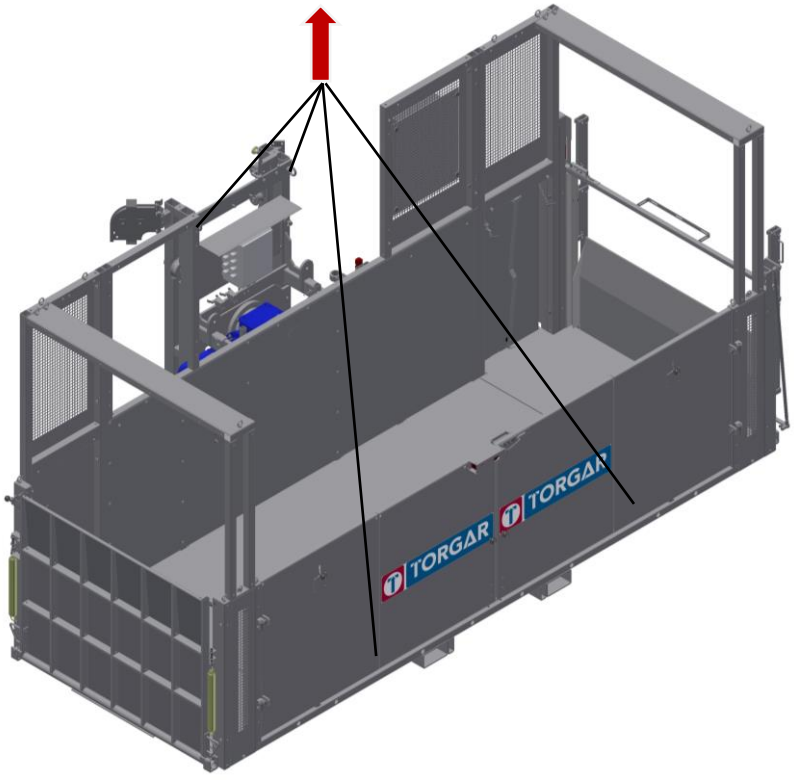
RIGHT SIDE	LEFT SIDE
	

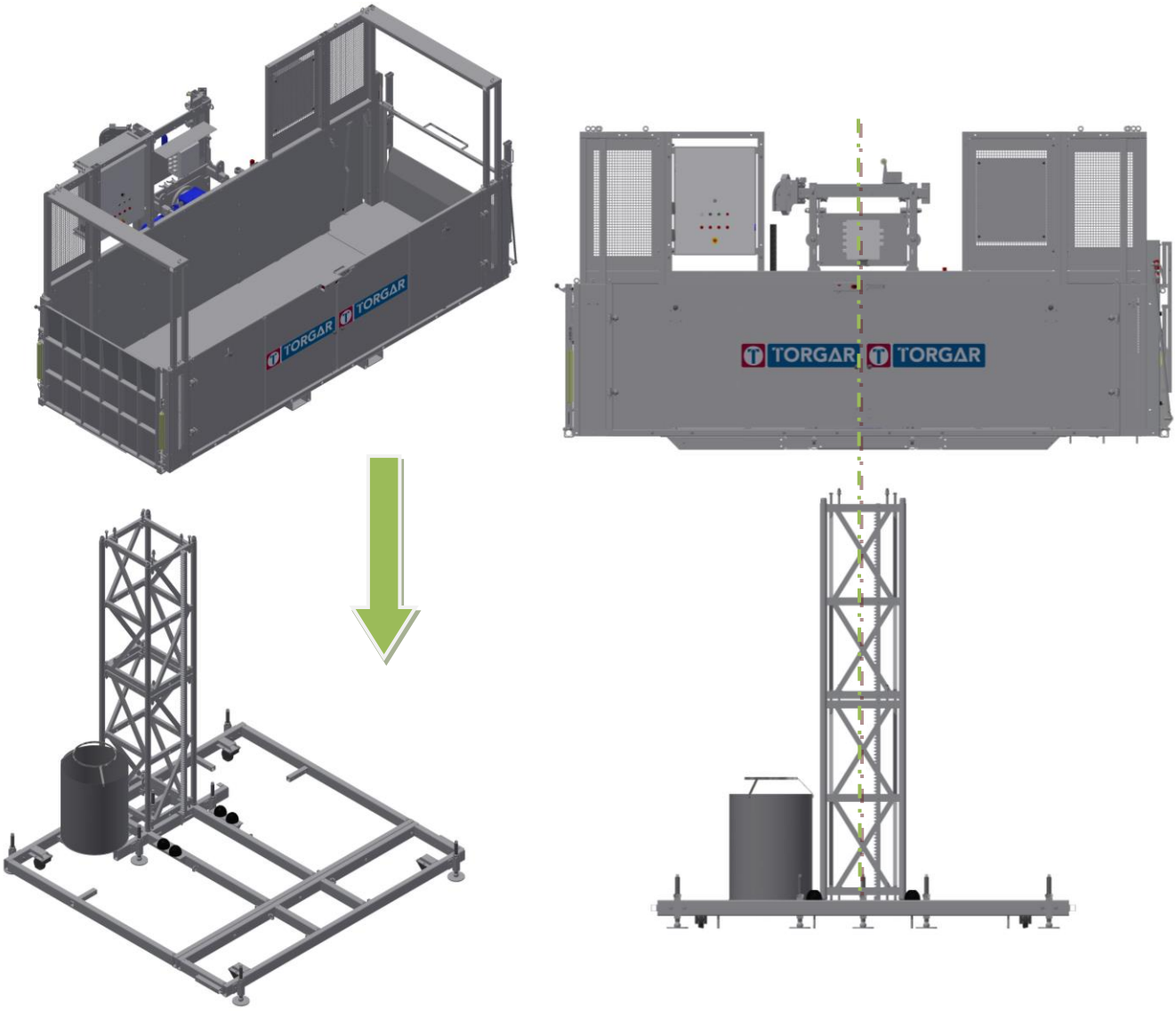
*Note: Plates outer - Cable gland inner

After preparing the transport platform, the platform should then be lifted by a crane and carefully moved into position above the sections. The lift car should be centered in relation to the mast.

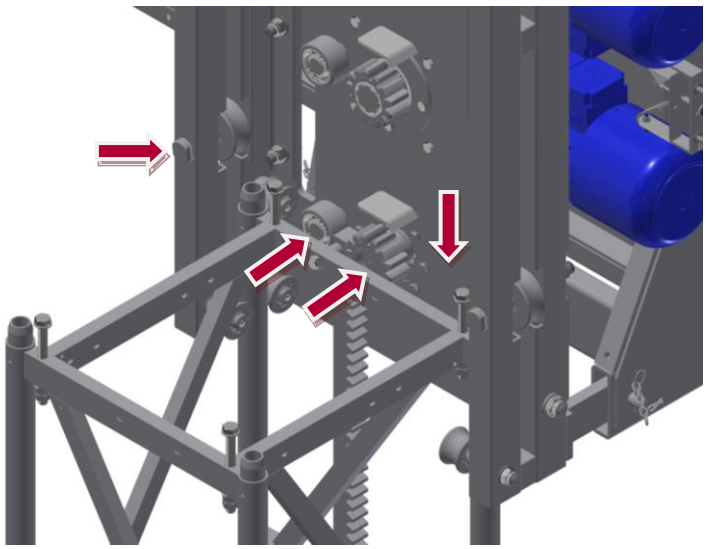
⚠	BEFORE LIFTING THE PLATFORM, THE MOTOR BRAKES MUST BE UNLOCKED OF THEIR WORKING POSITION USING THE HANDLE IN THE PLATFORM THE TWO PINIONS OF THE MOTORS SHOULD BE TURNING FREE



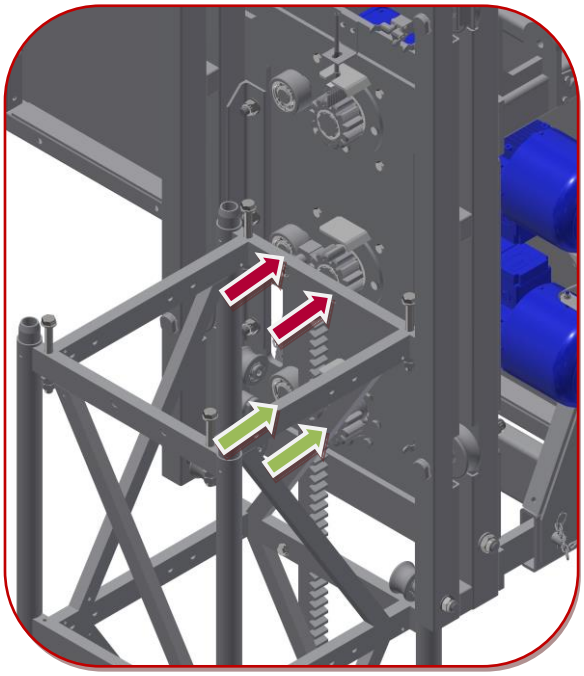


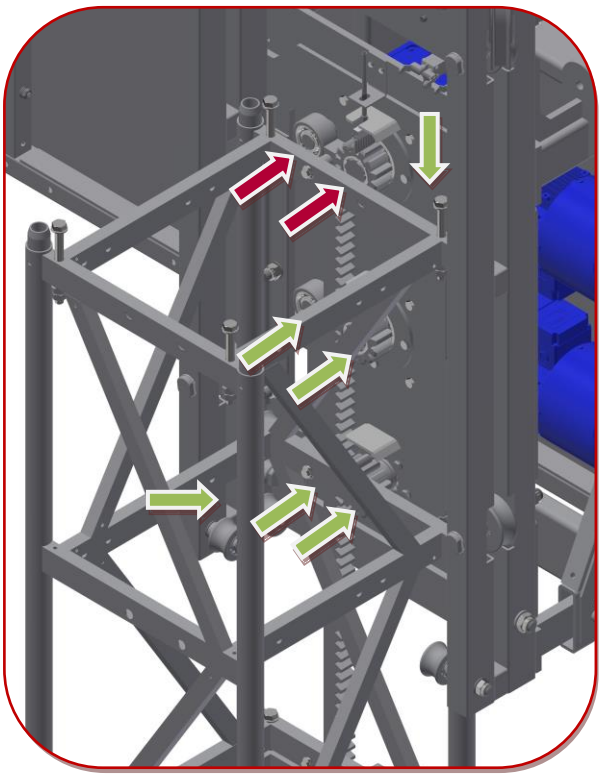


The platform is lowered onto the mast until the guide rollers come into contact with the main tubes on the mast. Pinion of the safety device is engaged in the rack with its corresponding counter-rack roller.

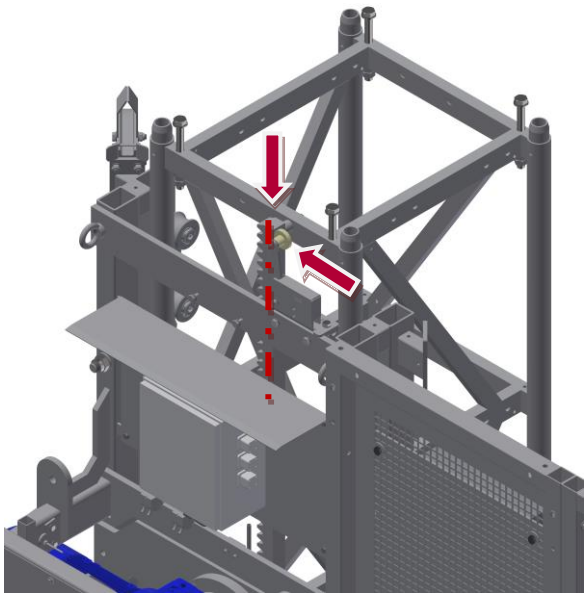


After that, the next is the pinion of the bottom motor. The same procedure: Pinion, counter-rack roller. Be careful the pinion turn totally free. The second pinion of the top motor follows the same steps.

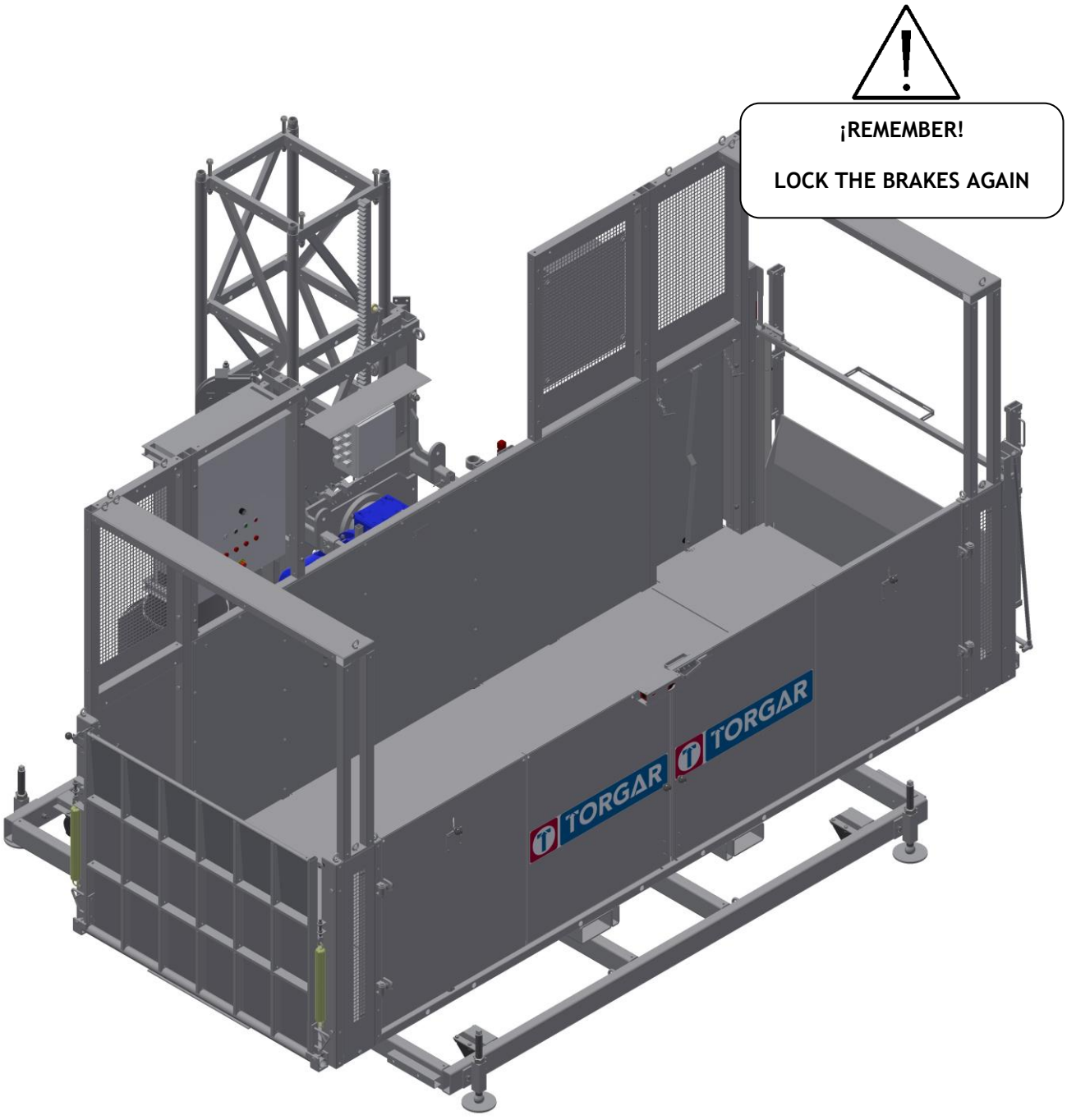




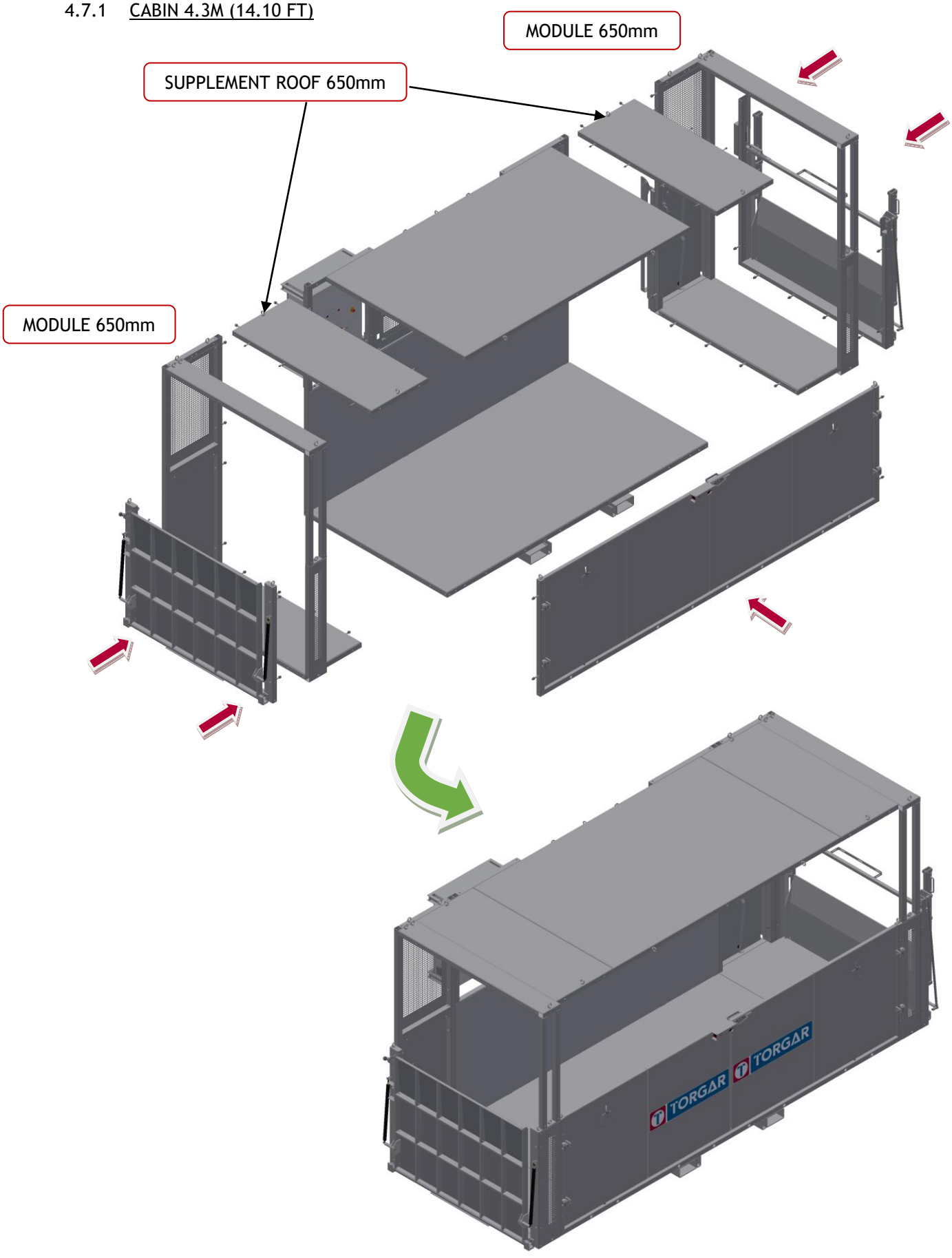
Control the position of the rollers on the top of the motor group in order to assemble them in a right way and the adjusted between the rack limit switch and the flat face of the rack.



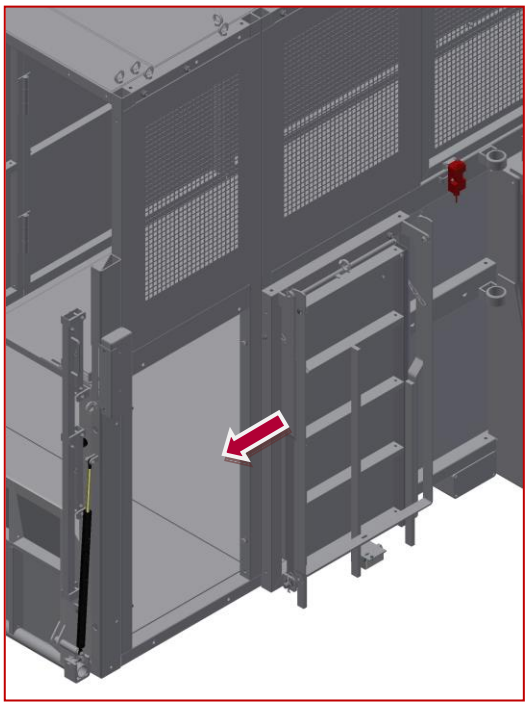
Reach the platform to the bottom position as possible inside the mast sections. After that, lock the brakes of the motors again to maintenance the platform in that final position.



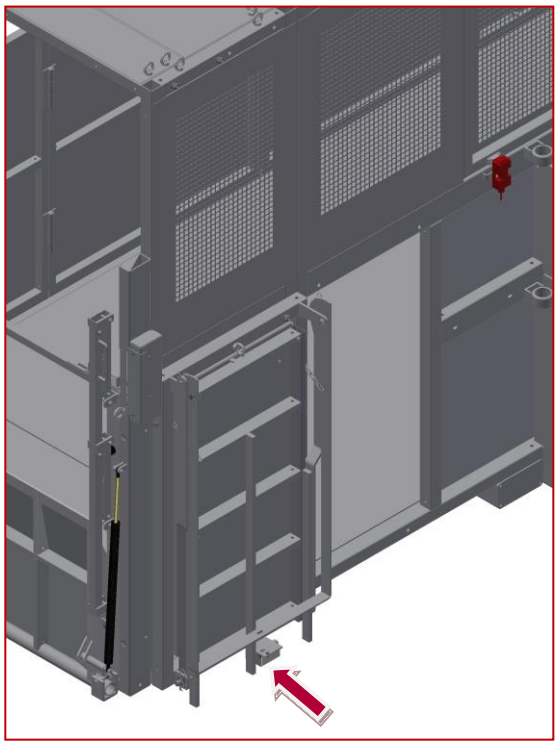
4.7.1 CABIN 4.3M (14.10 FT)



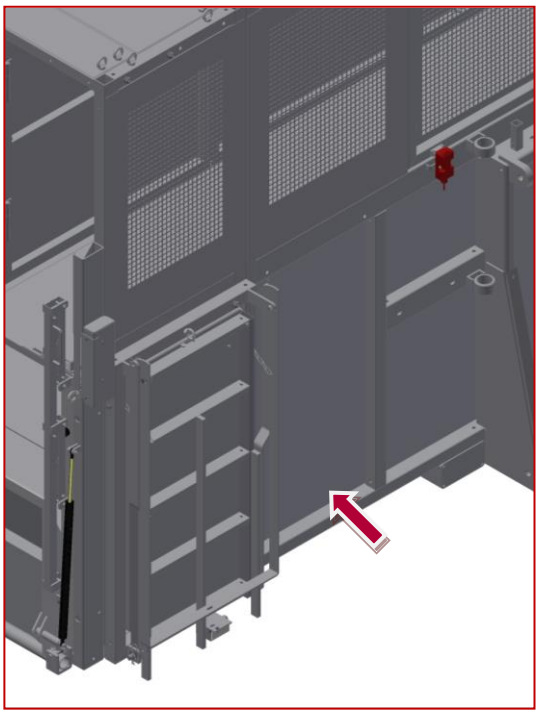
When the large cabin is used, the mounting ramp must be moved and placed on the module that has been fitted and a layer must be placed in the hole left in the chassis.



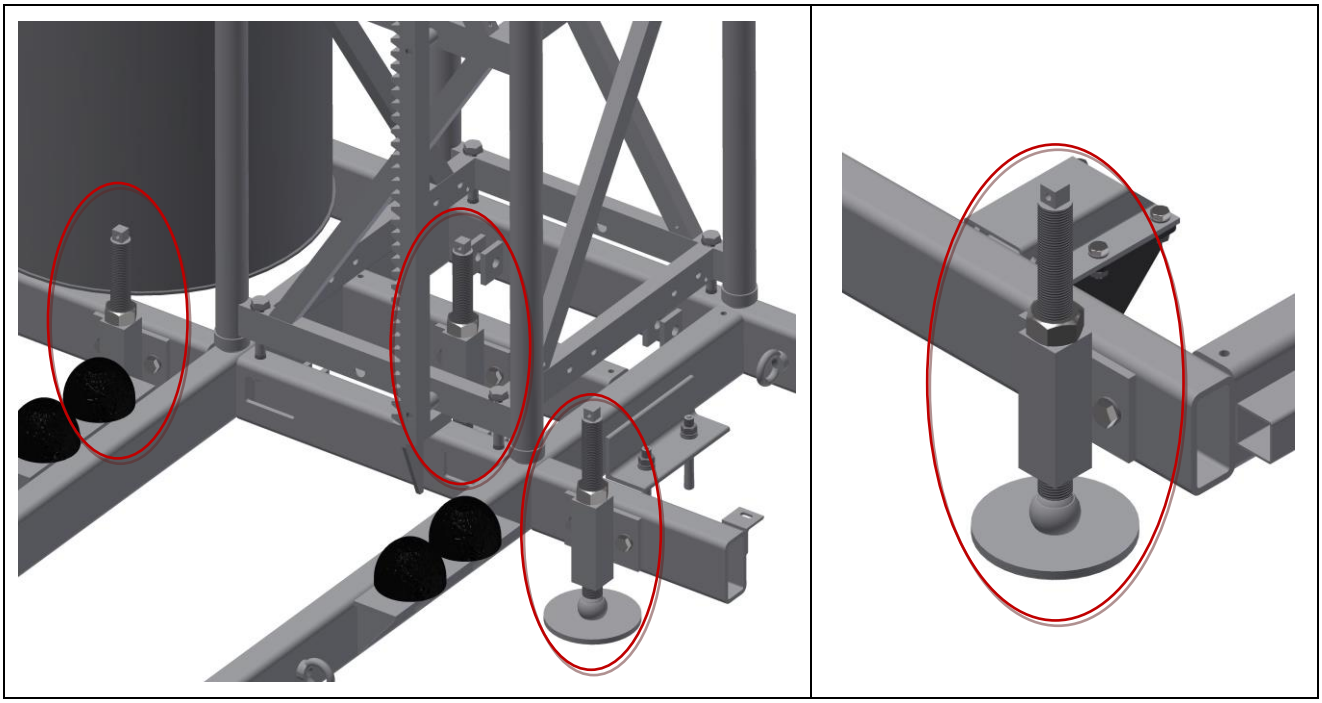
Place the ramp in the module



Screw the sheet into the hole



4.8 LEVELLING OF THE TRANSPORT PLATFORM

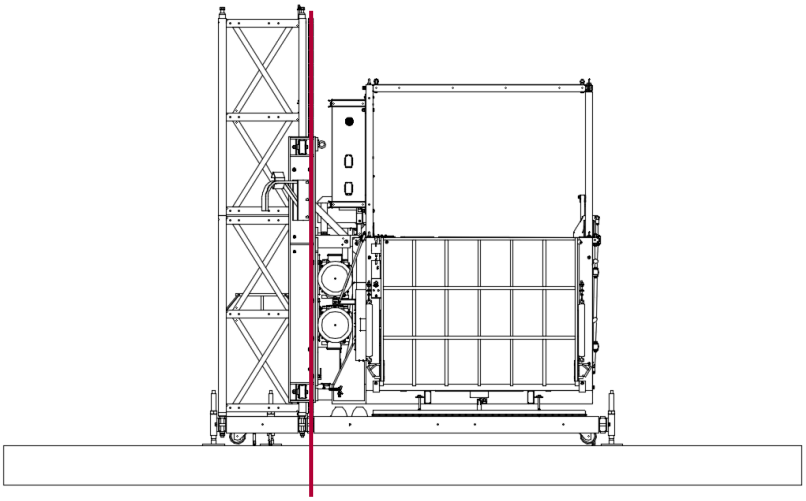


The transport platform will be leveled as long as the installation carries out the following points:

a) Assembly at least four mast sections and one mast tie before tightening the components.

b) The platform cannot climb more than 4 meters (13.12 ft) without ties.

c) Check the verticality of the rack and proceed to tighten the levelers against the floor.



d) If it is needed, check the good installation of the shoring up.

4.9 ELECTRICAL INSTALATION

Once the platform has been installed, power will be necessary to join gradually the mast. Then, it is necessary to do four steps like it is showed:

1. Connect an electric cable from the main switch (customer's supply) to the transport platform's power panel. Check the voltage.
2. The power panel, next to the base, must be positioned in a place where not disturb the correct process of load and unload the platform.
3. The electric cable supplied by TORGAR has to pass from the bottom to the top of the installation. To get that, pass the cable through the bottom of the cable basket.
4. The cable should be going through the superior ring.
5. Join the cable with the support in the platform.
6. Reach the side part of the electric box where it has to be connected. The way of the cable in this connection must follow convenient places.

In the step 5 is very important to fix electric cable on the support by means of galvanize steel wire cable pulling grip, adhesive insulating tape and with staples too.

Finally, it is recommended to deploy all the length of the electric cable and collect the leftover inside the basket, making sure that it is properly coiled.

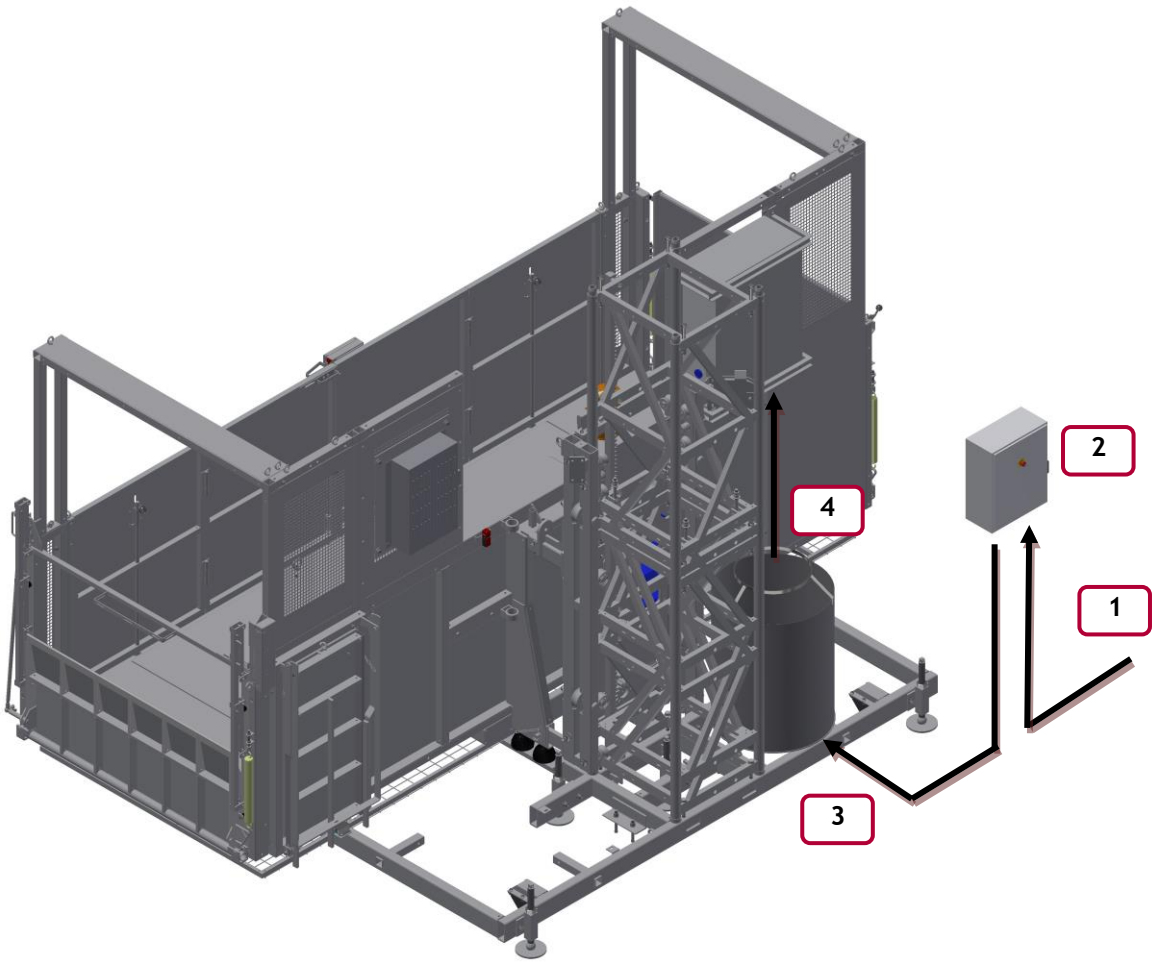
The connection between panels has to be as short as possible to avoid voltage drops that would damage the transport platform running. Furthermore, the electric panel has to be protected against possible clashes and adverse climatologic conditions.

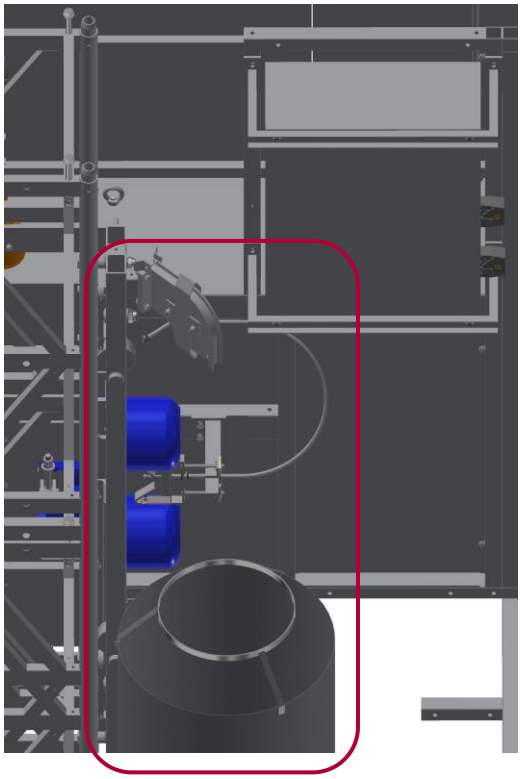
AS A SAFETY RULE, AND IN ORDER TO GUARANTEE THE RIGHT OPERATION OF THE MACHINE, IT HAS TO BE CORRECTLY CONNECTED TO AN ELECTRIC GROUND

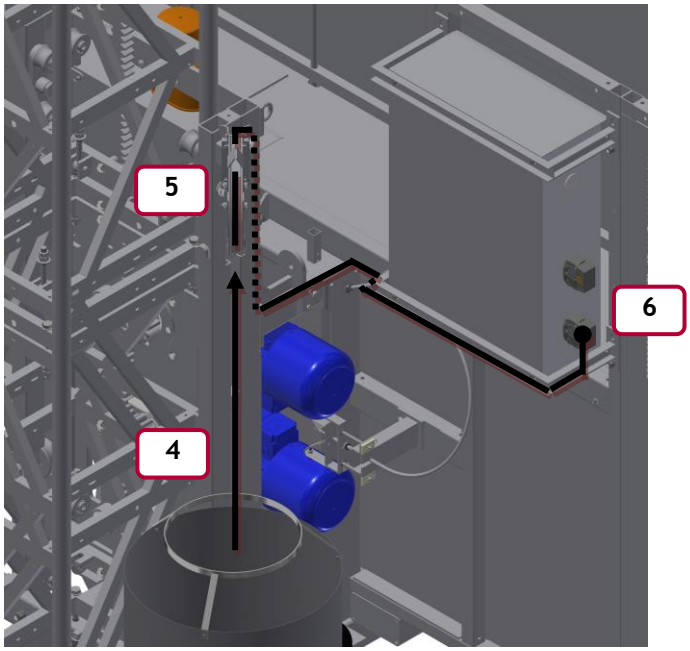
ELECTRICAL PANELS MUST BE CLOSED TO PREVENT INGRESS OF WATER AND DIRT

Electric diagrams are at the end of this instruction manual.

You can see a draft of the electric installation, showing the steps previously mentioned:







4.9.1 BASE ENCLOSURE CONNECTIONS

- In case of having a base enclosure:

  Make the connection according to the page "Enclosure connections" included in the annex of the electrical diagrams.

- According to the EN 16719 standard, if the installation of a base enclosure is not mandatory:

  Make a bridge between terminals, as indicated in the electrical scheme:

THE BRIDGE MENTIONED CANCELS THE SECURITY OF THE BASE ENCLOSURE

The machine will not move if there is no such bridge or a safety switch properly connected according to the page "Enclosure connections" in the annex to the electrical diagrams.

ALWAYS THERE IS AN ENCLOSURE WITH A SAFETY SWITCH, THIS BRIDGE SHOULD NOT BE MADE

4.9.2 FLOOR DOOR CONNECTIONS

During the assembly phase it is necessary to bypass the plant access safety devices. For the above, a bridge must be made between terminals, of the panel located on the base, as indicated in the electrical scheme:

THE MENTIONED BRIDGE CANCELS THE SECURITY OF ACCESS TO PLANTS

Once the assembly phase is finished, it is necessary to remove said bridge and finish the connection according to the page "Floor doors connections" in the annex to the electrical diagrams.

The connection to be made of the doors in the plant during the assembly phase is defined in the page "Plant connections" mentioned previously.

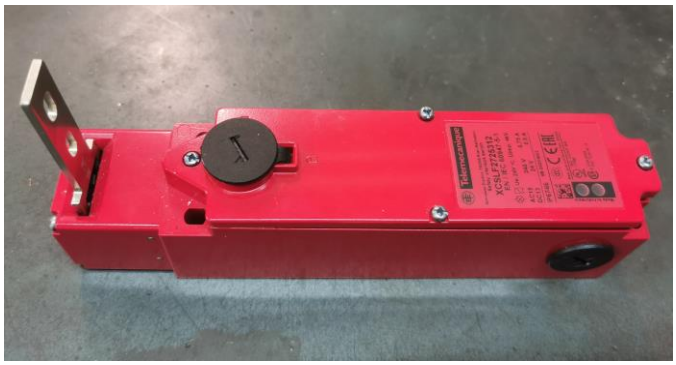
The machine will not move if there is no such bridge and the door connections have not yet been made on the floor doors.

This machine is designed to work with safety switches located on the doors in floor.

Note: If an exclusively mechanical floor door system is used, this system must be duly approved and, in addition, it will be necessary to maintain the aforementioned bridge.

THIS BRIDGE SHOULD NOT EXIST DURING THE NORMAL OPERATION OF THE MACHINE AND THEREFORE IT IS NECESSARY TO REMOVE SAID BRIDGE AFTER THE ASSEMBLY PHASE IS COMPLETED (SEE NOTE)

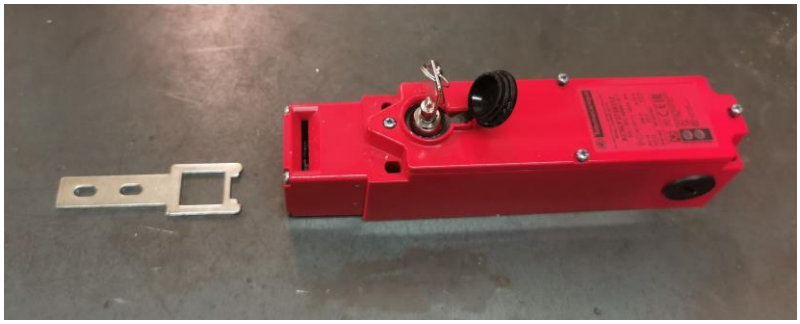
4.9.3 UNLOCK THE ELECTRO-MECHANICAL LIMIT SWITCH



WORKING POSITION - LOCKED LIMIT SWITCH

UNSCREW SECURITY COVER

TURNING THE RELEASE DEVICE



FREE POSITION - UNLOCKED LIMIT SWITCH

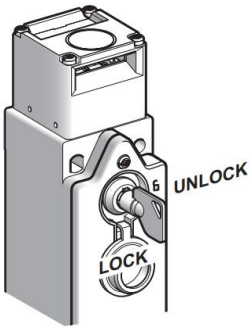
THE MACHINE WILL NOT OPERATE WHEN ANY DOOR IS MANUALLY OPENED AND / OR UNLOCKED WITH A KEY

Unlocking of the safety switch is indicated by a green light on the device itself:

- In the floor door / enclosure, this unlocking can be done either manually (with the key) or because the cabin is stopped in said floor door / enclosure.
- In the cabin, this unlocking can be done either manually (with the key) or because the cabin is stopped.

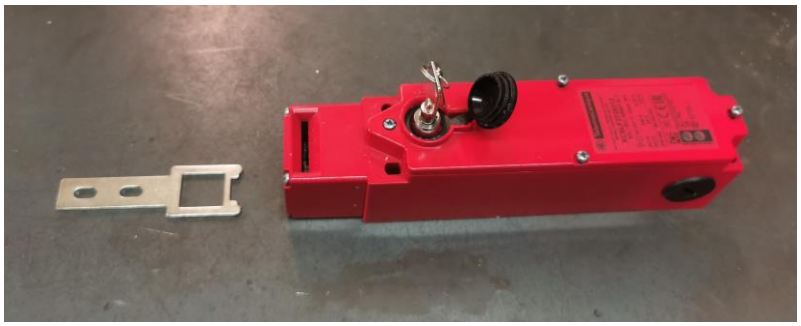
If one of the safety switches is manually unlocked with a key, the machine will not move until this lock is performed.

The search for a key unlocked safety switch can be performed by identifying the green light. However, what is stated in previous points must be taken into account since:

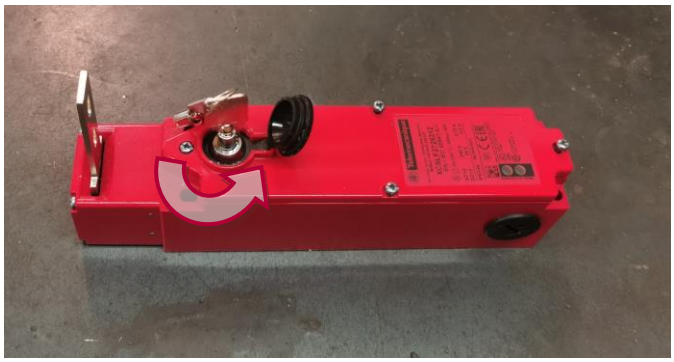


- Even if the floor door / enclosure safety switch is in the correct working position, the green light will remain on as long as the cabin remains in place (because it is allowing the door to open).
- Even if the cabin safety switches are in the correct working position, the green light will remain on as long as the cabin is stopped in a place where the opening of these doors is allowed (see maneuvering annex to see under what conditions it is allowed the opening of each door).

4.9.4 LOCK THE ELECTRO-MECHANICAL LIMIT SWITCH

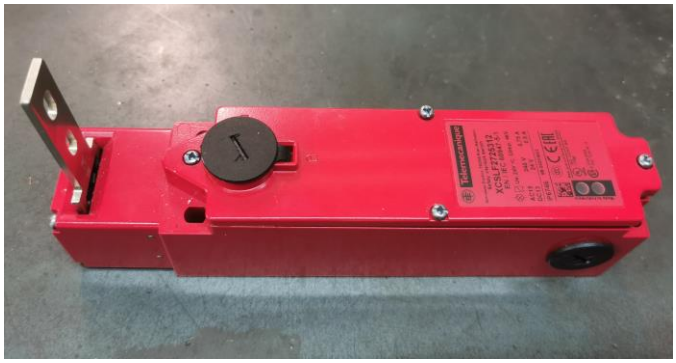


FREE POSITION - UNLOCKED LIMIT SWITCH



TURNING THE RELEASE DEVICE

UNSCREW SECURITY COVER



WORKING POSITION - LOCKED LIMIT SWITCH

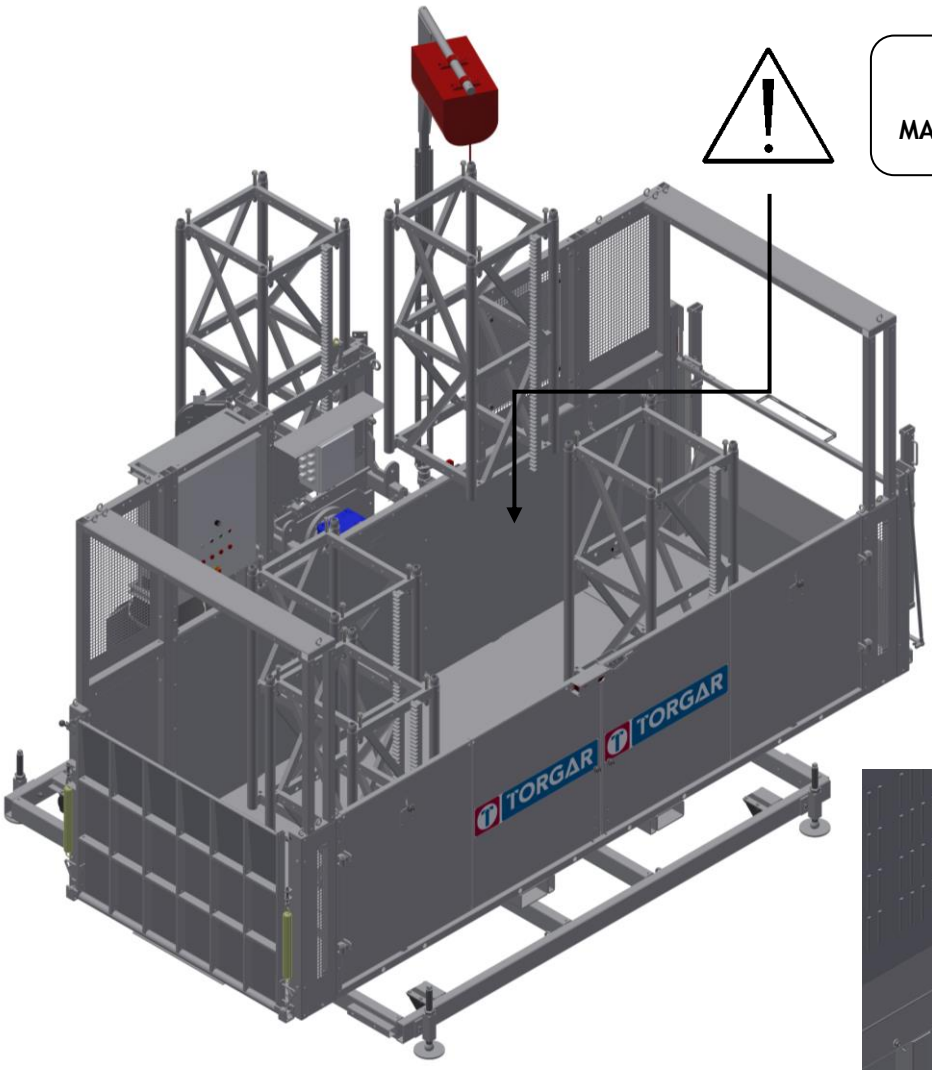
4.10 THE FOLLOWING MAST SECTIONS AND ANCHORAGES (AS AN OPTION)

You can use an optional wire-rope hoist to help the assembling of the rest of the mast sections from inner of the platform.

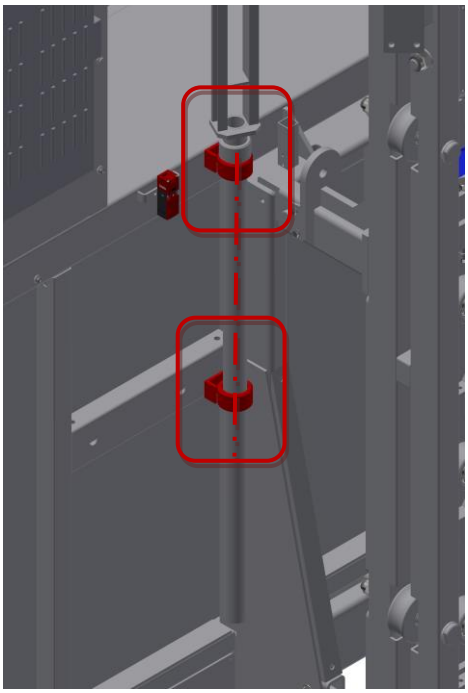
THE MAXIMUM AMOUNT OF MAST SECTIONS ALLOWED IN CARRIAGE DURING ERECTION / DISMANTLE IS FOUR MAST SECTIONS

¡REMEMBER!

MAXIMUM FOUR MAST SECTIONS



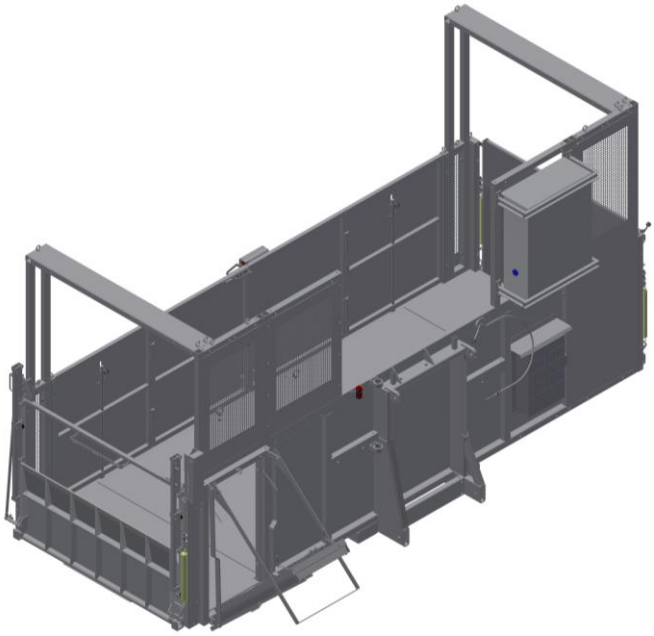
There are two supports for this optional wire-rope hoist welded in the motor group as you can see in the image:



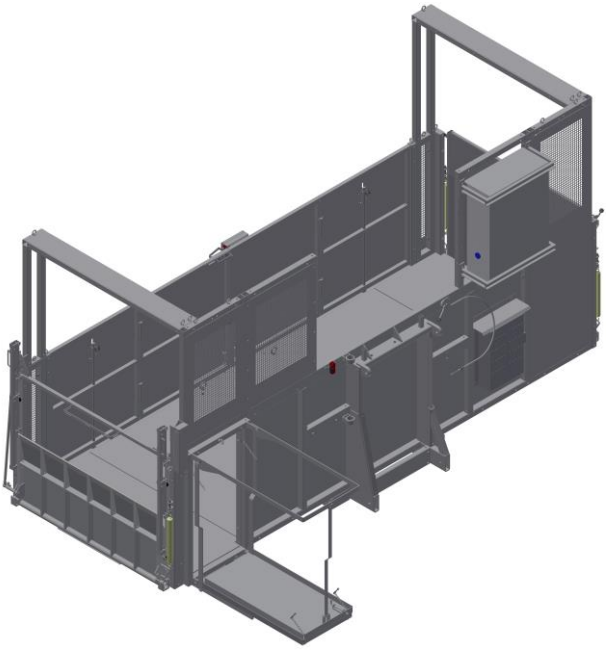
As well, there is a lateral auxiliary ramp to install the anchorages.

This ramp has two positions in order to be safe.

Position 1

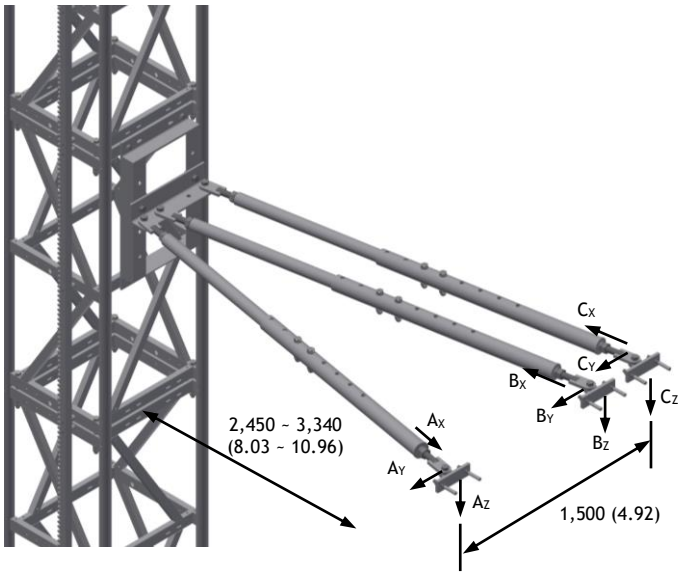


Position 2



Mast sections must to be tied to a stable structure. First anchorage should be done to the first-floor structure [4 meters (13.12 ft) or three mast sections free]. After that, every other anchorage must to be tied every maximum 6 meters (19.68 ft) or four mast sections free.

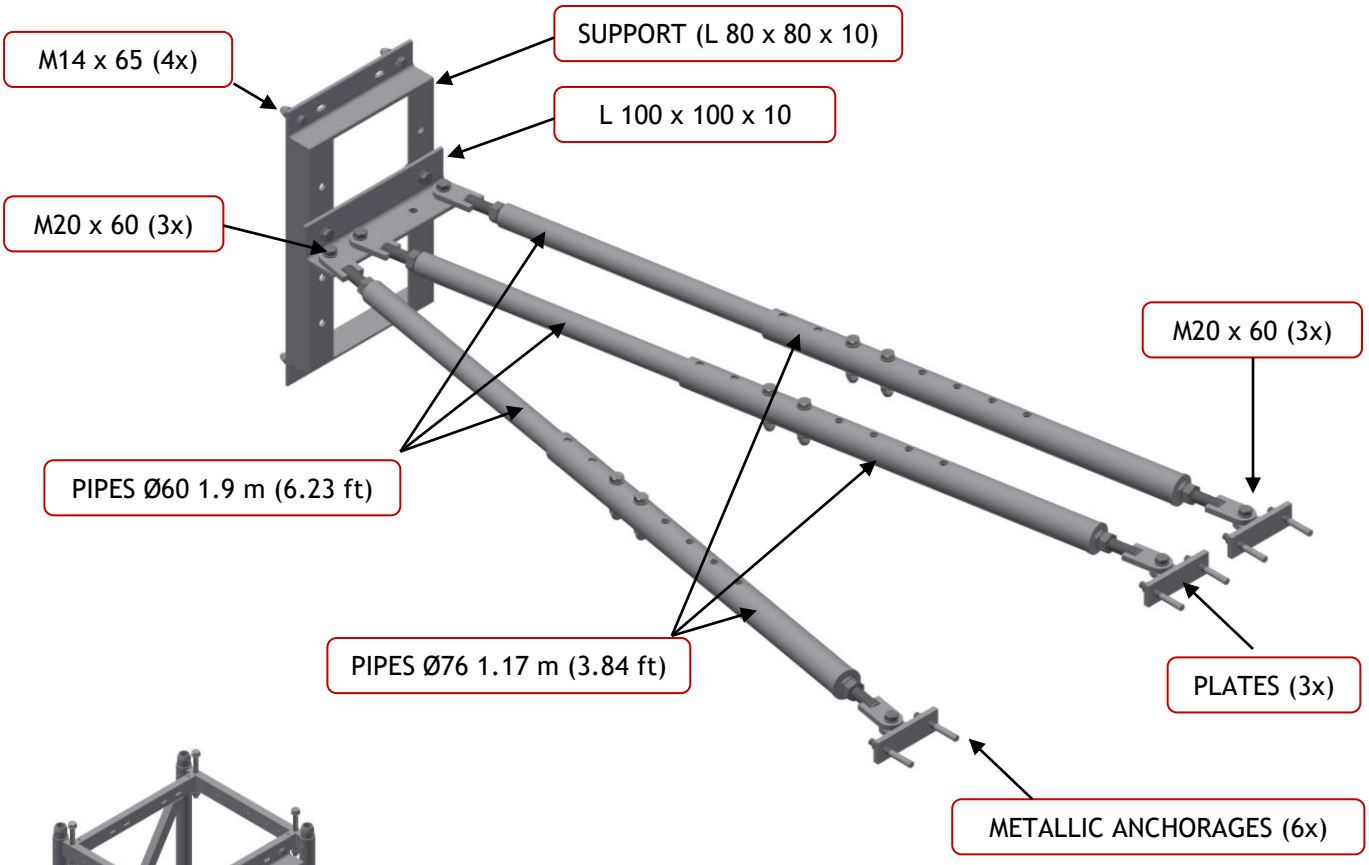
The efforts of the anchorages to the structure are as follow:

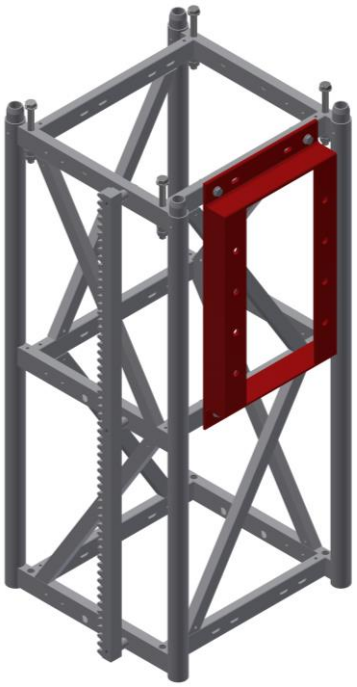


LOAD TRANSMITED TO ANCHORAGES							
A_X		B_X+C_X		$A_Y+B_Y+C_Y$		$A_Z+B_Z+C_Z$	
Kg	lb	Kg	lb	Kg	lb	Kg	lb
552.5	1218	1105	2436	1,243	2,740	350	770

4.10.1 ANCHORAGES ("CANADA" VERSION)

The components of one anchorage are:





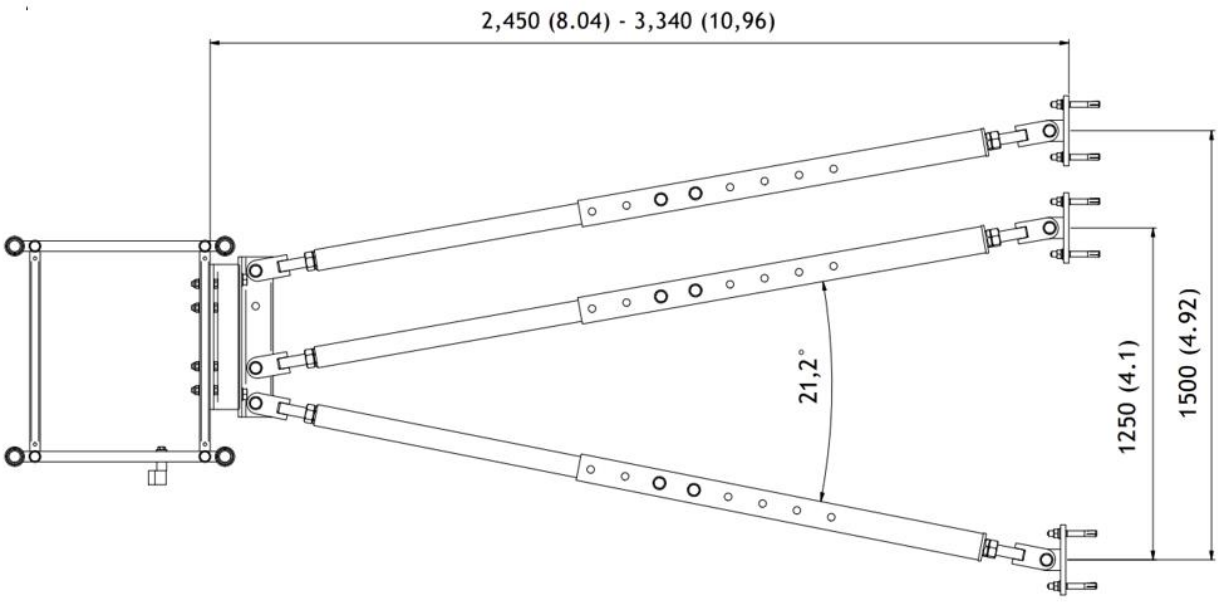
Use the lateral holes of the mast sections to fix the vertical pipes.

Check the rollers do not hit against the anchorages.

4.10.2 POSITIONING OF THE ANCHORS

Three mast tie pipes are fitted onto the vertical pipes; two short pipes are in a direction "perpendicular" to the mast section (20º) and the other one at an angle about the same.

These measurements (mm and ft) are approximate. They will depend on the final installation.



One end of the mast tie pipes are fixed to the vertical pipes using curved rods and the other end is fixed to the structure using fastening plates.

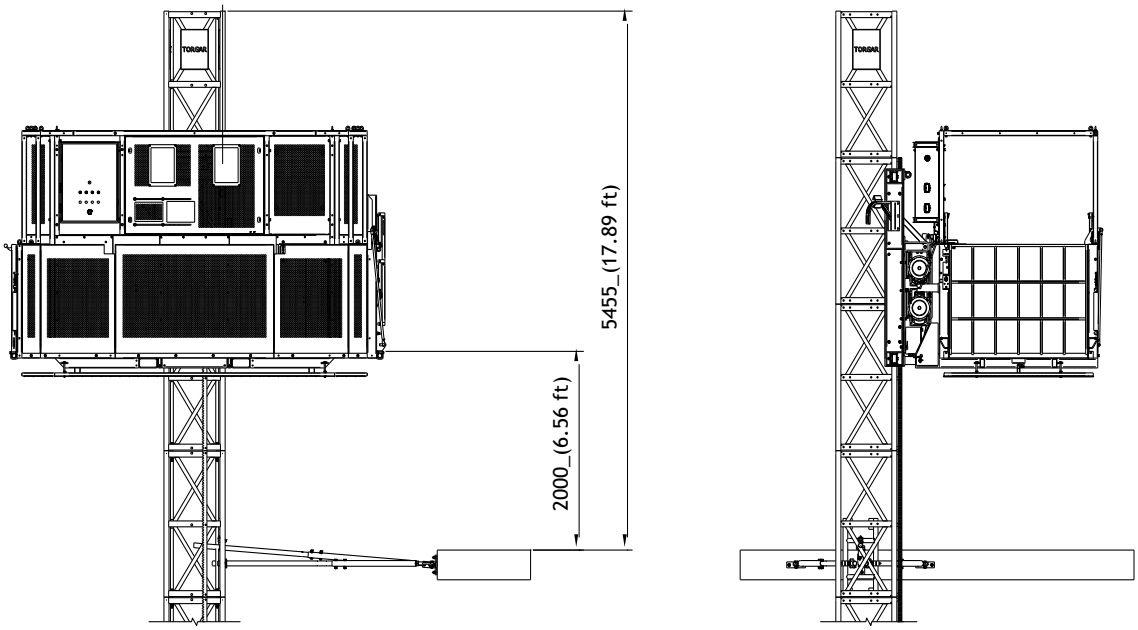
Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.

TO INSTALL THE METAL ANCHOR, FOLLOW THE MANUFACTURER´S INSTRUCTIONS

CHECK THE FACES OF THE RACK ARE VERTICAL
ALLOWED OUT OF LEVEL: 1 / 100 ~ 0.5º

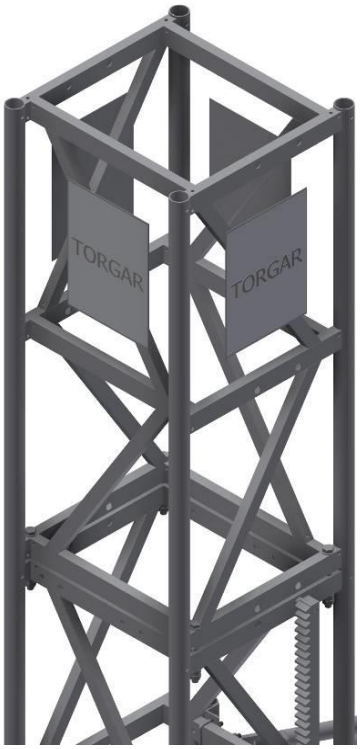
This operation is repeated until the height of the machine is reached. The mast cannot exceed more than three mast sections over the last mast tie.

THE MAXIMUM HEIGHT ALLOWED OVER THE LAST ANCHORAGE IS 2 METERS



4.11 SAFETY MAST SECTION

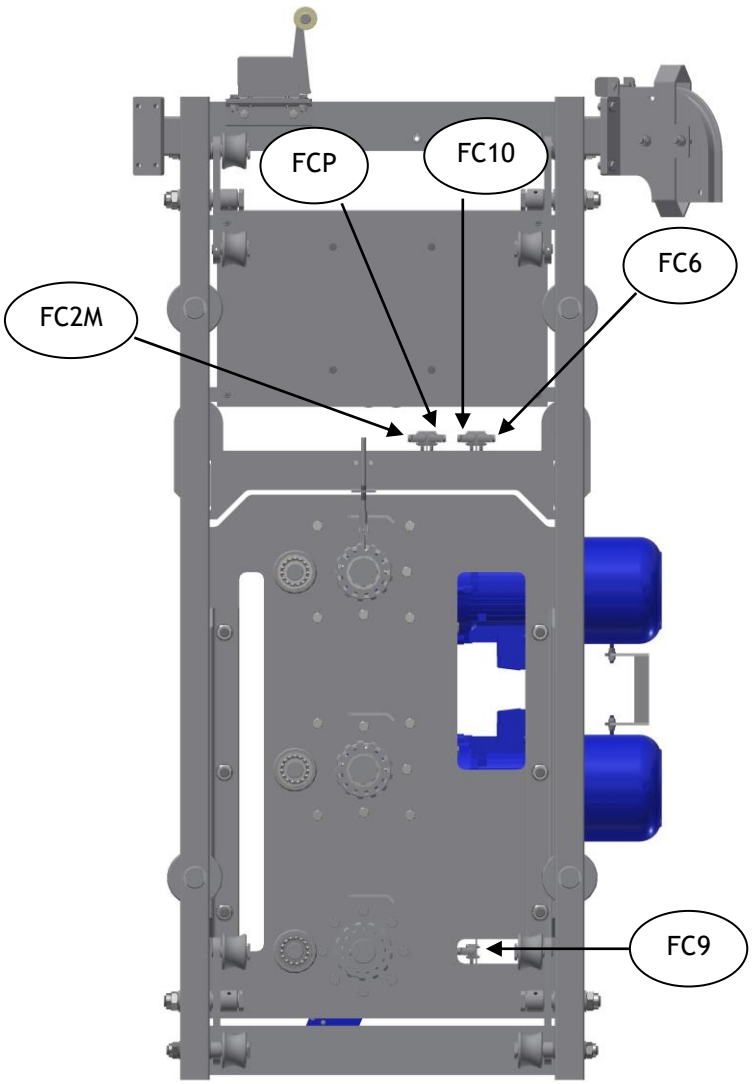
Once you get the work height, assemble the safety mast section (without rack and with logo).



4.12 SKIDS AND LIMIT SWITCHES (STOP AND SAFETY)

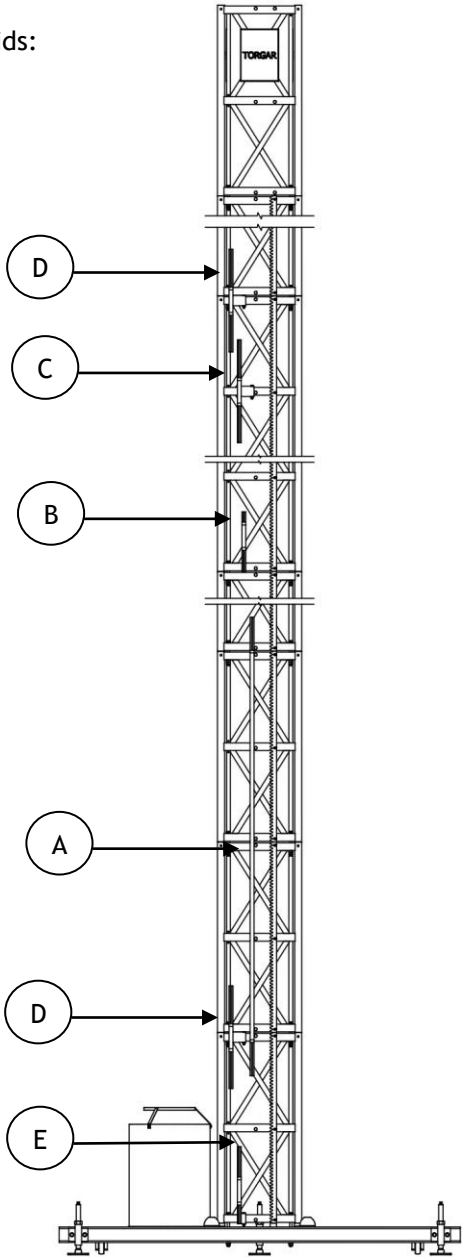
Once the tower is assembled, we have to proceed with the installation of the stop skids in each of the floors.

For this, it is necessary to have an idea of the limit switches in the platform and have very clear about their function as follows:



FC2M	3 meters (9.84 ft) stop
FCP	Intermediate landing doors
FC10	Top landing door
FC6	Safety (Top and bottom)
FC9	Base enclosure

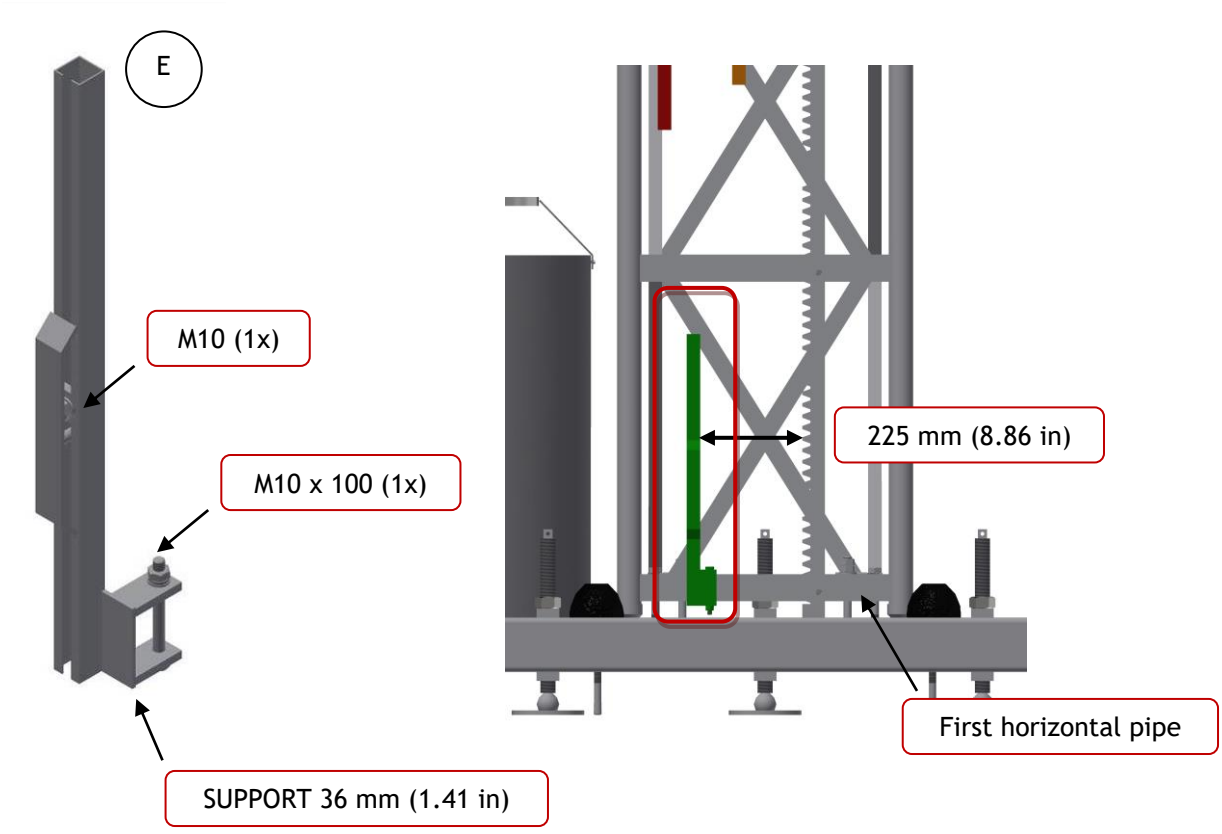
General scheme of the skids:

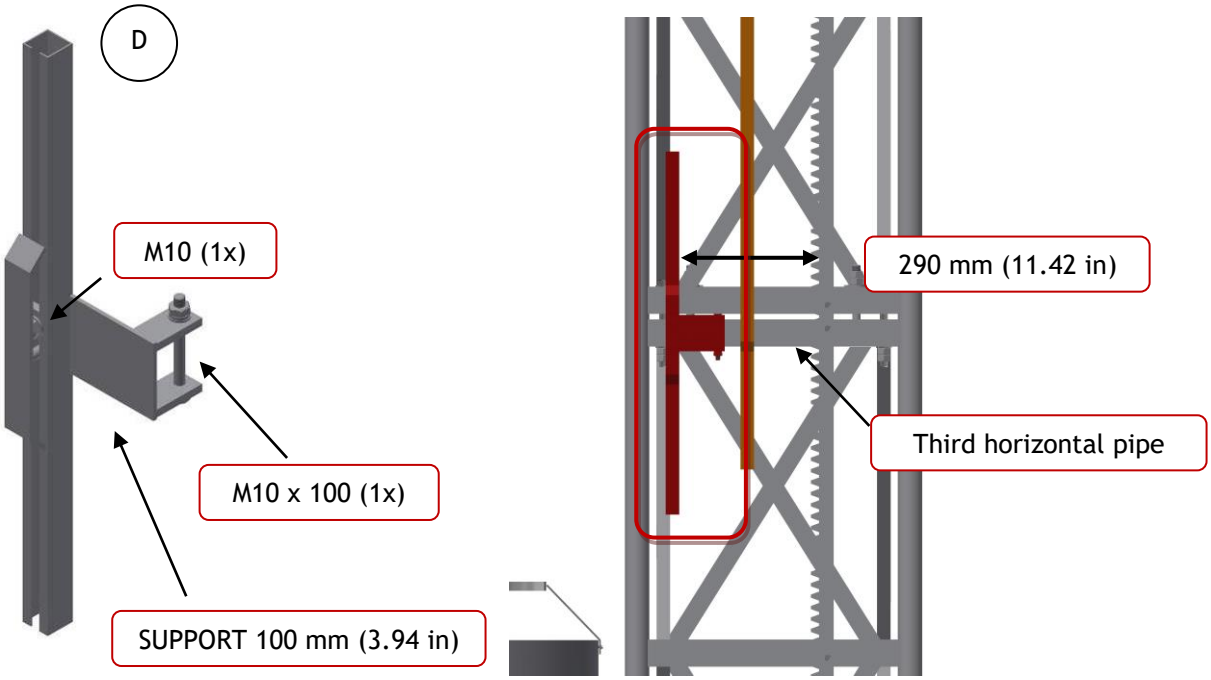


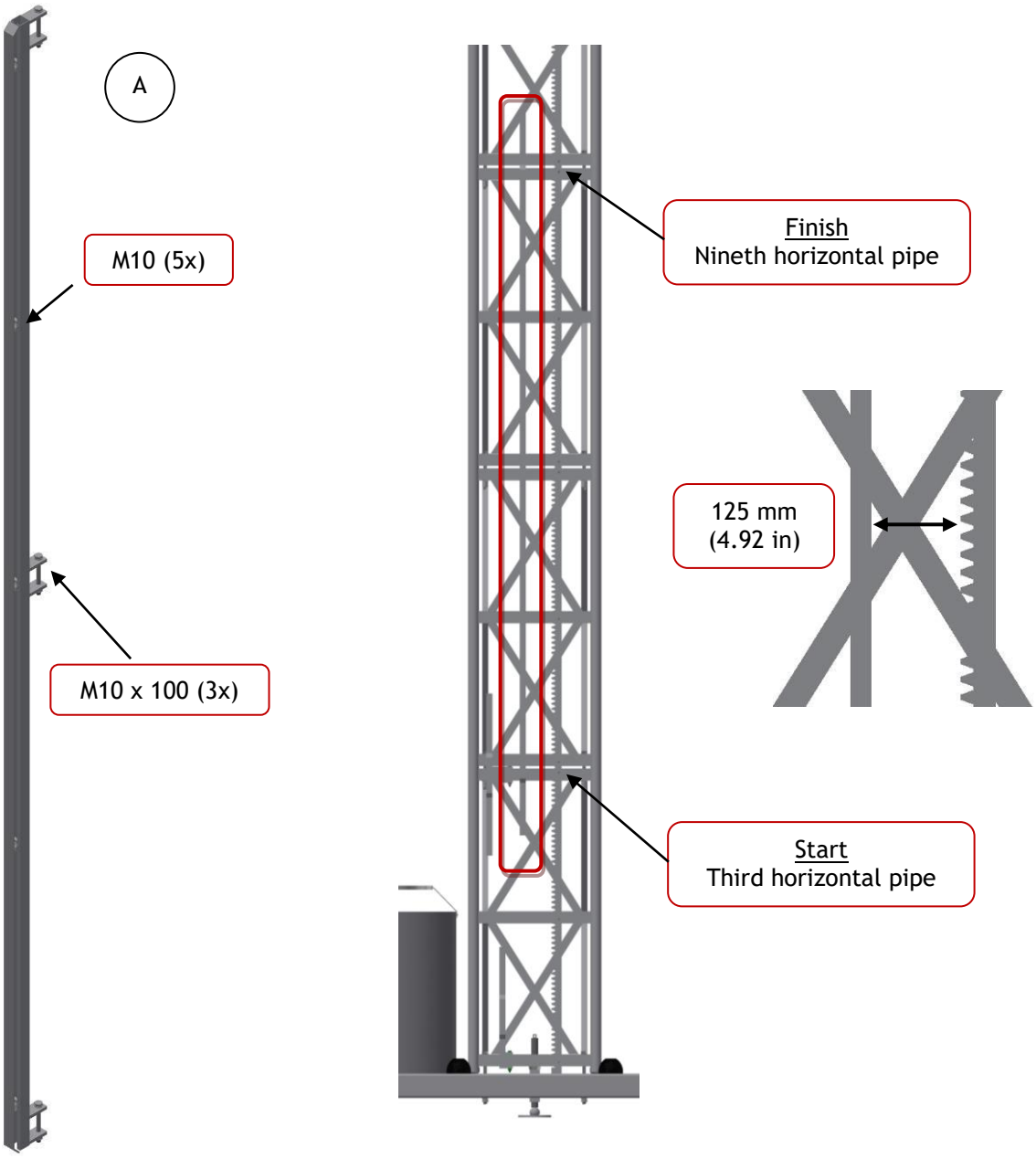
A	3 meters (9.84 ft) stop
B	Intermediate landing doors
C	Top landing door
D	Safety (Top and bottom)
E	Base enclosure

CHECKS SHOULD BE MADE ON EACH FLOOR TO ENSURE THE PLATFORM STOPS IN THE CORRECT POSITION. IF NOT, THE HEIGHT AND DEPTH OF THE SKIDS SHOULD BE ADJUSTED

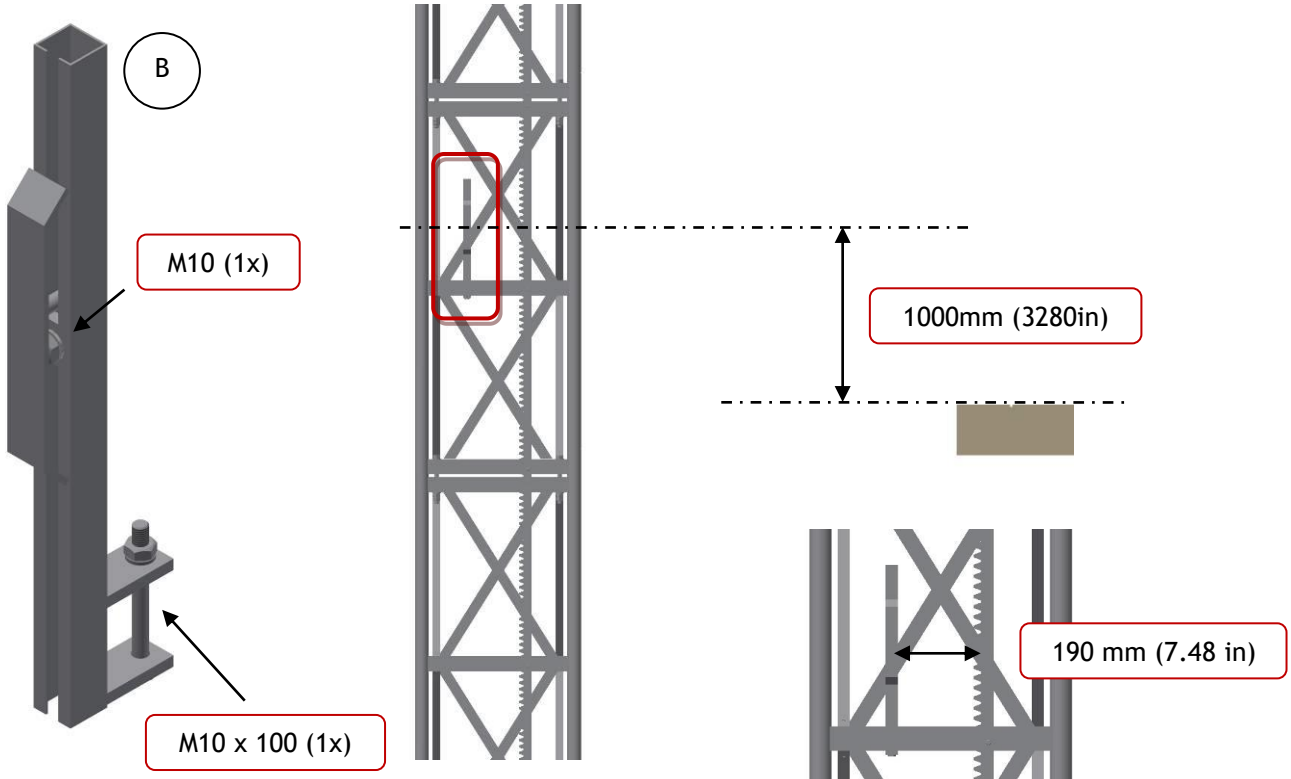
4.12.1 SKIDS AT THE BASE ENCLOSURE



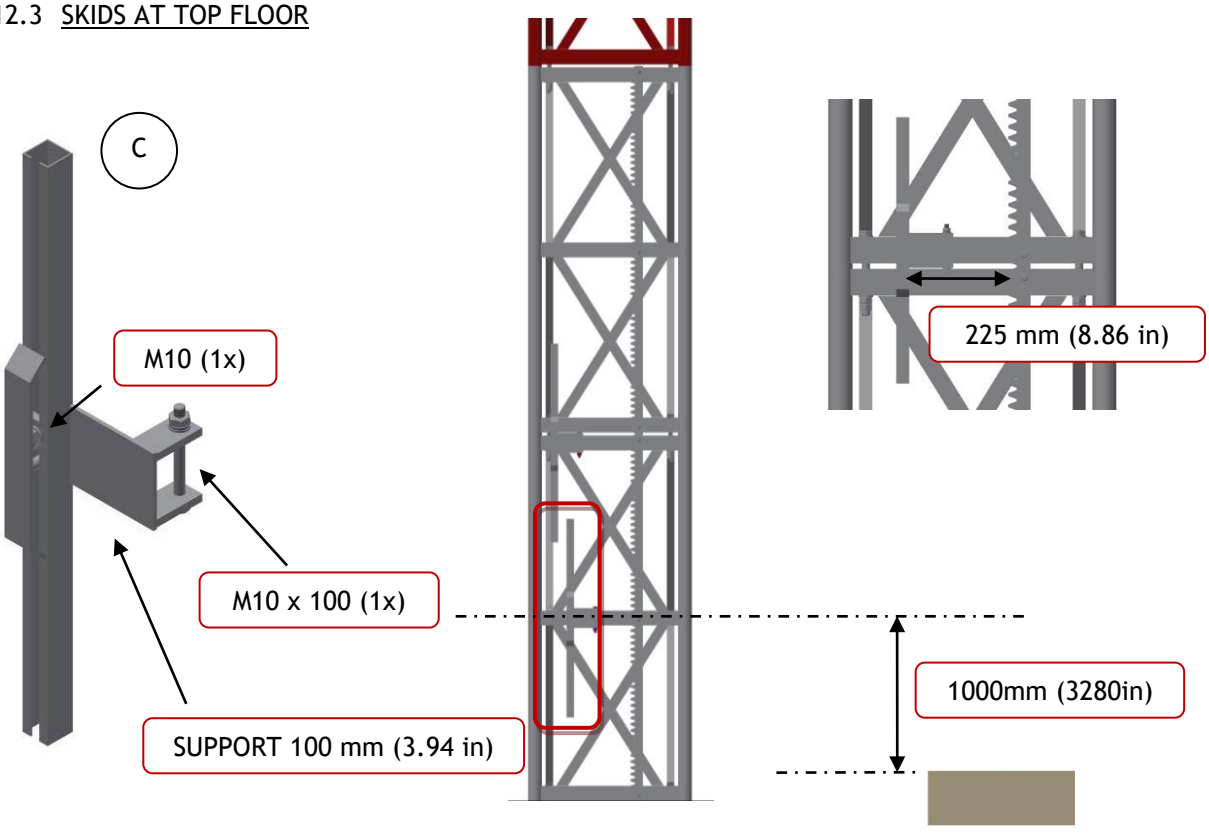


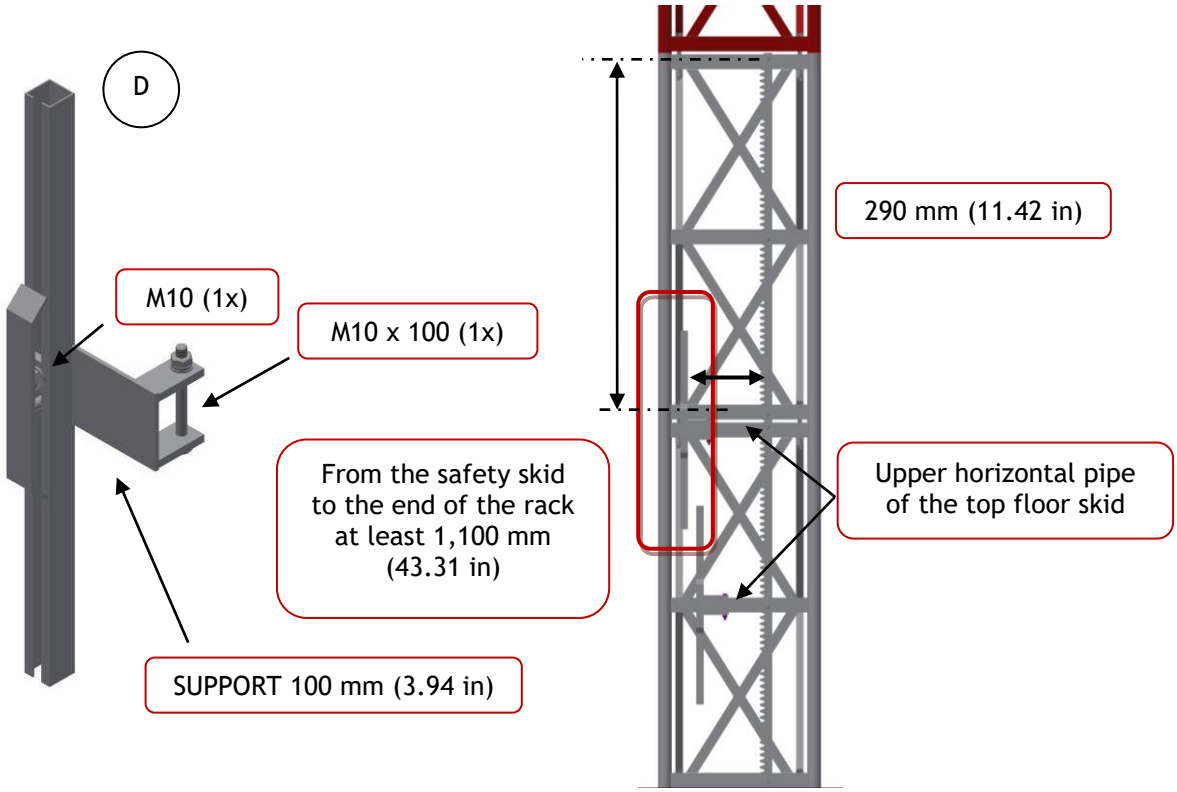

A
M10 (5x)
M10 x 100 (3x)
Finish
Nineth horizontal pipe
125 mm
(4.92 in)
Start
Third horizontal pipe

4.12.2 SKIDS AT INTERMEDIATE LANDING DOORS



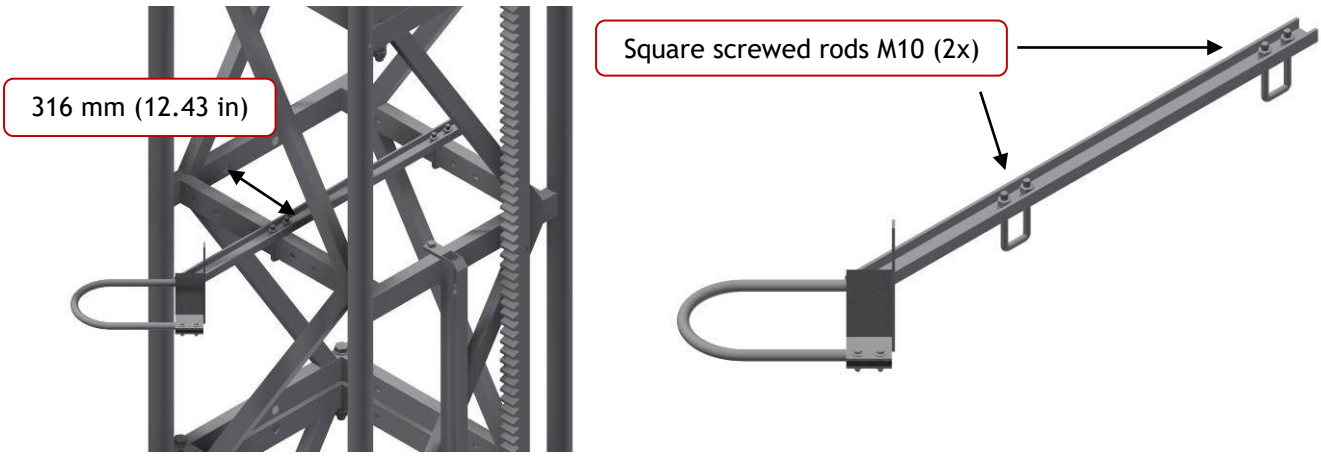
4.12.3 SKIDS AT TOP FLOOR





4.13 CABLE BASKET AND ELECTRIC CABLE GUIDE

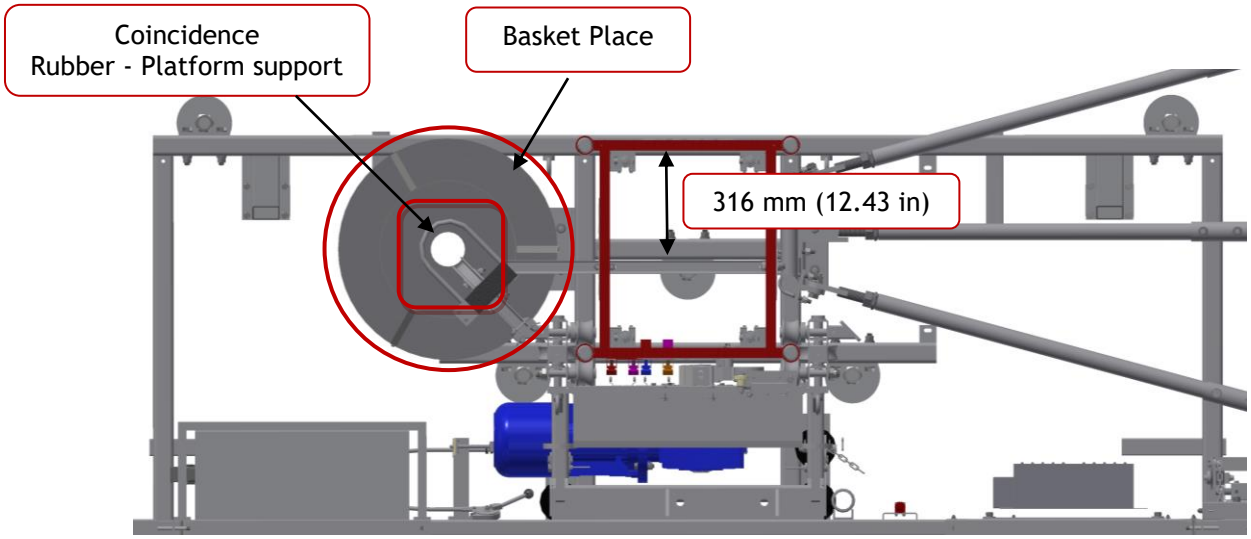
The power cable is fitted to prevent the cable from being blown around by the wind and becoming entangled in the rollers or pinions. The cable guide is bolted to the mast every two mast sections.



The cable guide must be situated vertically above the cable basket so that the support on the platform does not crash against the cable guide rings.

The cable basket measures 600 mm (23.62 in) of diameter by 800 mm (31.49 in) of high. Its function is to reel in any excess power cable.

Next figure shows the position of the cable basket in relation to the base of the machine.

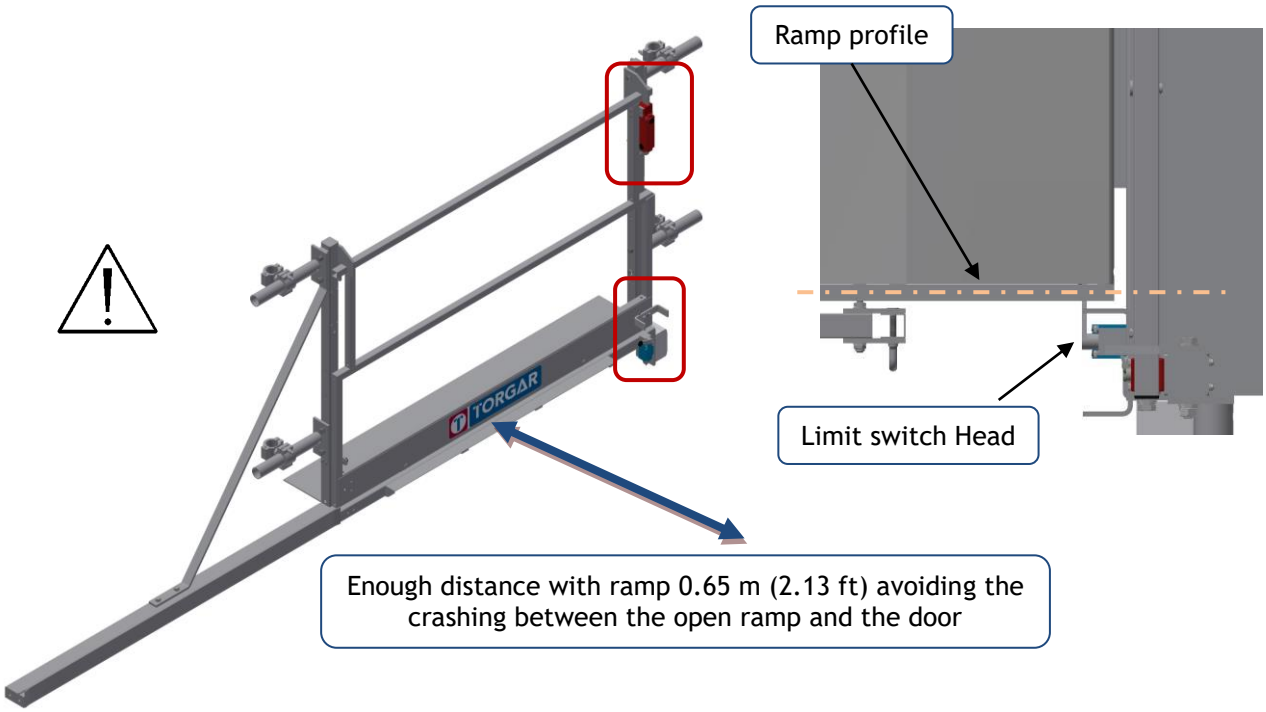


4.14 FLOOR PROTECTION DOORS (OPTIONAL)

There are two types of floor protection door:

4.14.1 FLOOR PROTECTION DOOR OF 1.1 METERS (3.6 FT)

At the same time, protection doors must be installed on every floor. Centre the door with the width of the platform. Keep a distance in order to let the ramp fall to the floor without hitting the floor door. Finally, install the limit switch to the front of the structure so that the transport platform operates mechanically on this device to allow the door opening.



The secuence of function, always will be as follows. Any other option will not be possible:

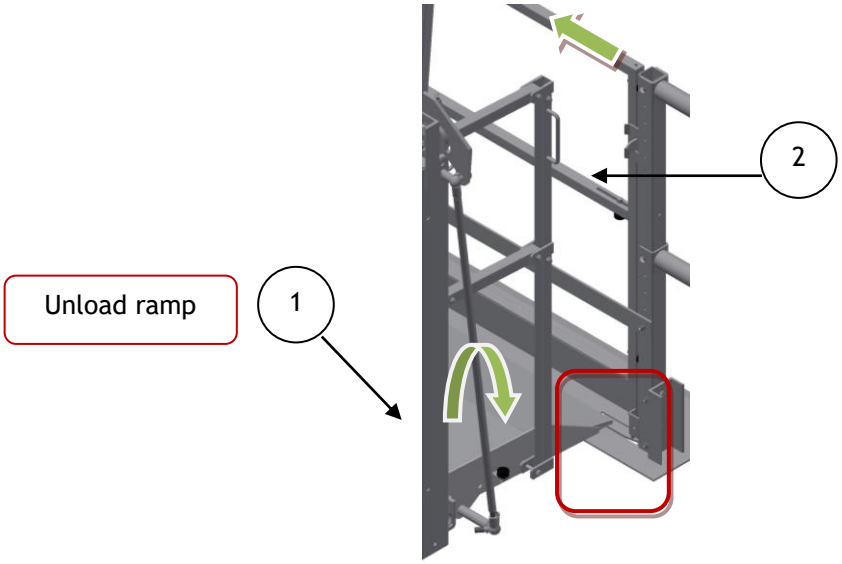
1.- OPEN THE RAMP

2.- OPEN THE SLIDING DOOR

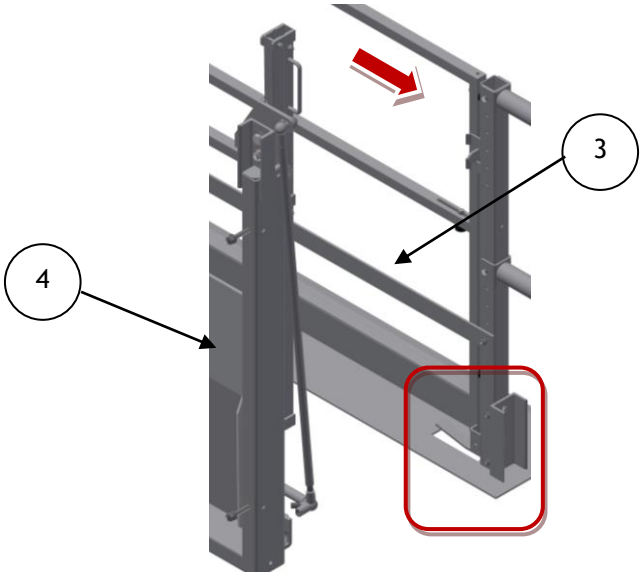
3.- CLOSE THE SLIDING DOOR

4.- CLOSE THE RAMP

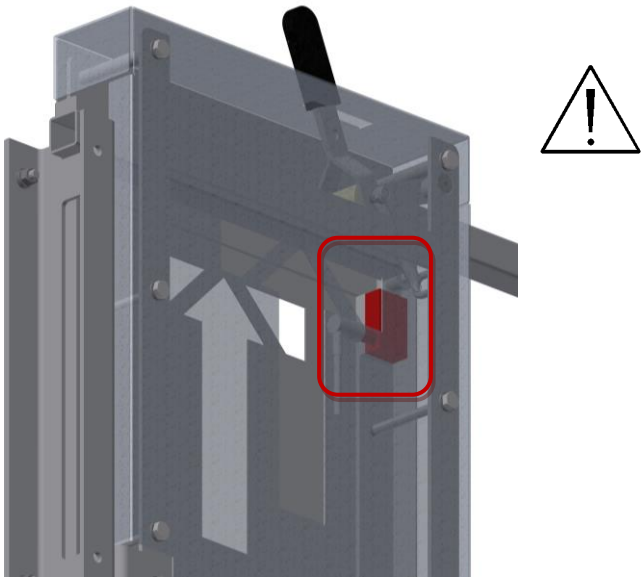
INITIAL POSITION	
ACTIVATED	**CAN BE OPENED**



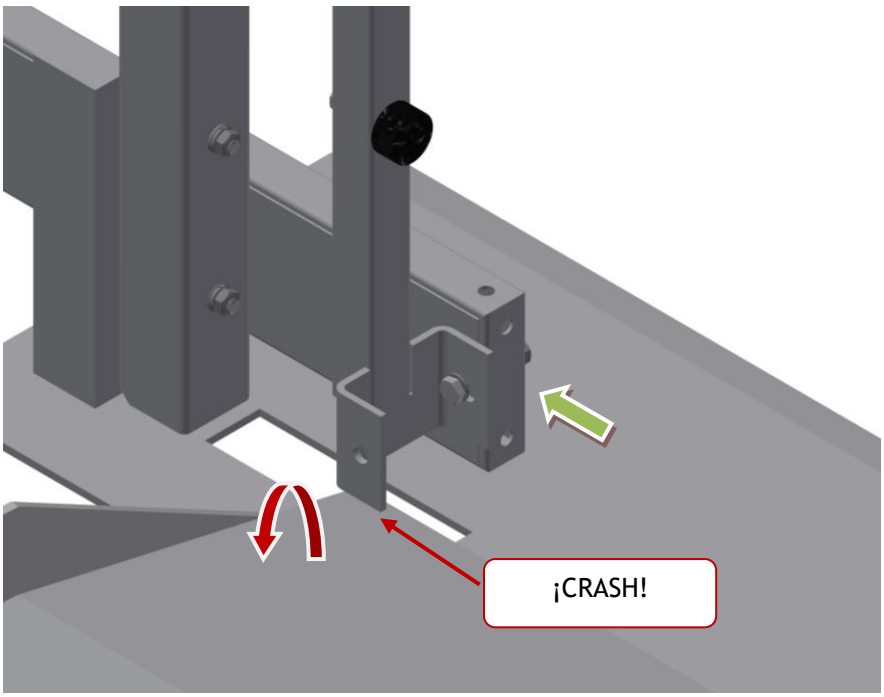
FINAL POSITION	
NO ACTIVATED	**CANNOT BE OPENED**



When the sliding door is open, a limit switch is activated so the machine cannot be moved.

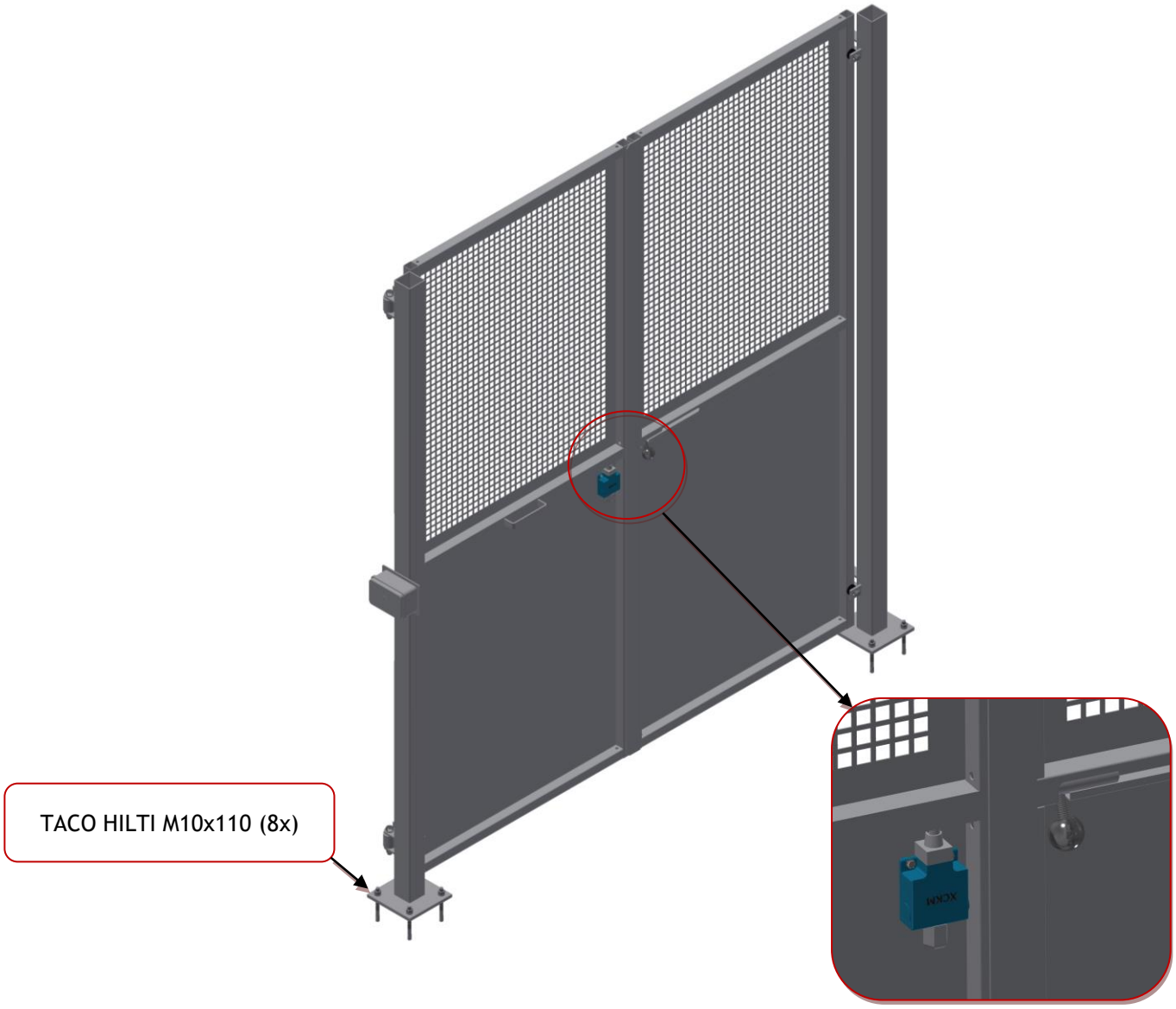


Once the sliding door is opened, it must be checked that the ramp cannot be closed in any position:



CHECK THE SEQUENCE
1 OPEN RAMP - 2 OPEN SLIDING DOOR - 3 CLOSE SLIDING DOOR - 4 CLOSE RAMP

4.14.2 FLOOR PROTECTION DOOR OF 2 METERS (6.56 FT)



This type of door is full height protection, but this door on the floor only has an electric limit switch that prevents the machine from working if any door on the floor is open but it does not prevent it from opening, because it does not have a mechanical lock.

THE FLOOR DOOR SHOULD NOT BE OPENED FOR ANY REASON IF THE CABIN IS NOT STOPPING AT THE LEVEL OF SAID FLOOR DOOR.

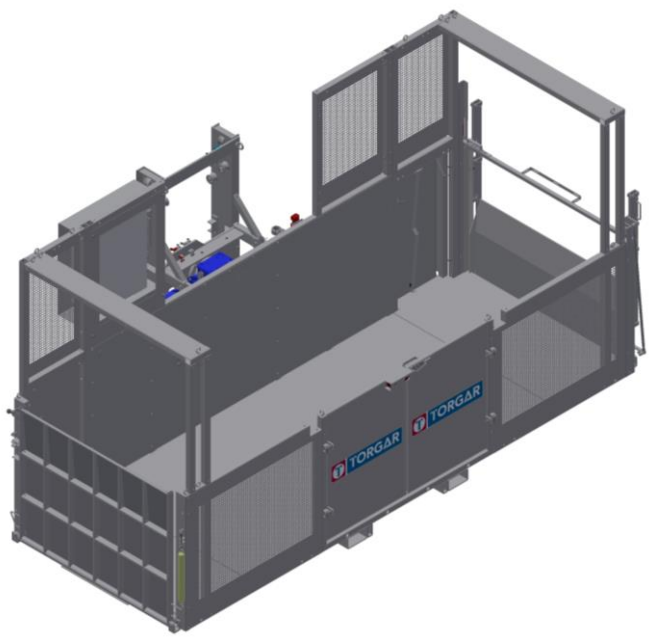
YOU ONLY HAVE TO OPEN THE FLOOR DOOR IN WHICH THE CABIN IS STOPPED TO BE ABLE TO ENTER OR EXIT IT

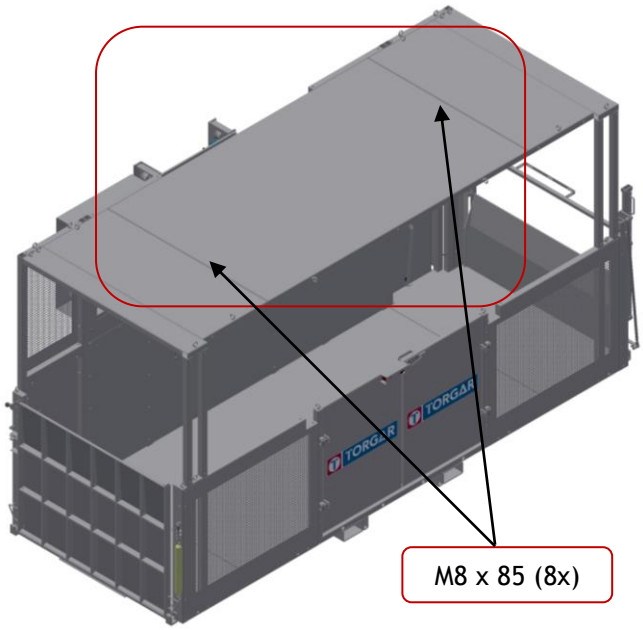
4.15 FINAL STEPS

4.15.1 INTERMEDIATE ROOF

The intermediate roof has the function to help the assembly in order to reach the zone of the mast sections. After finishing the installation of the different elements, this roof can be assembled.

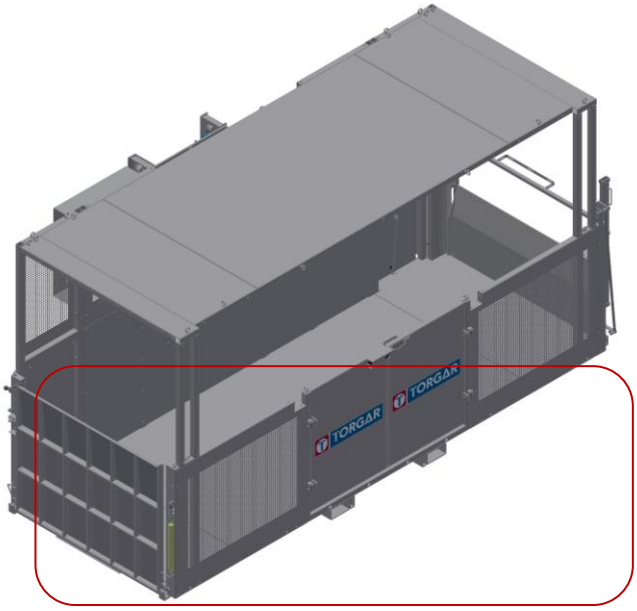
To do that, assemble the intermediate roof to the lateral roofs in the platform. They have holes with this goal.

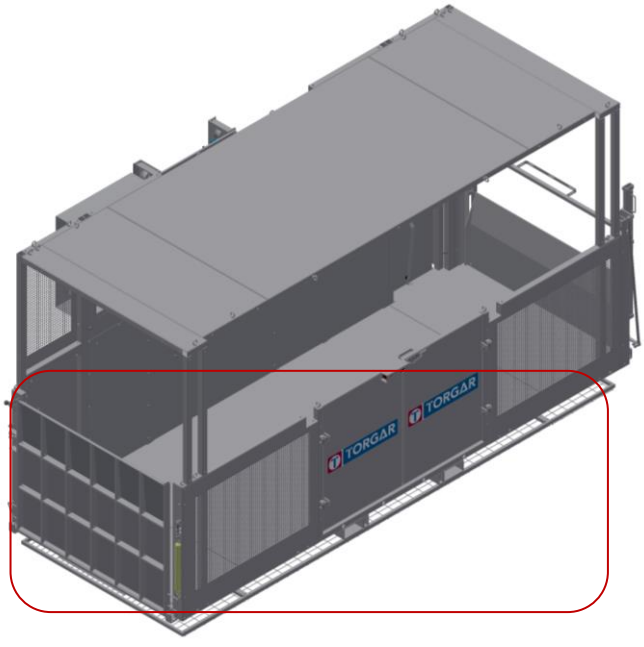




4.15.2 PROTECTION MESH UNDER THE PLATFORM (OPTIONAL)

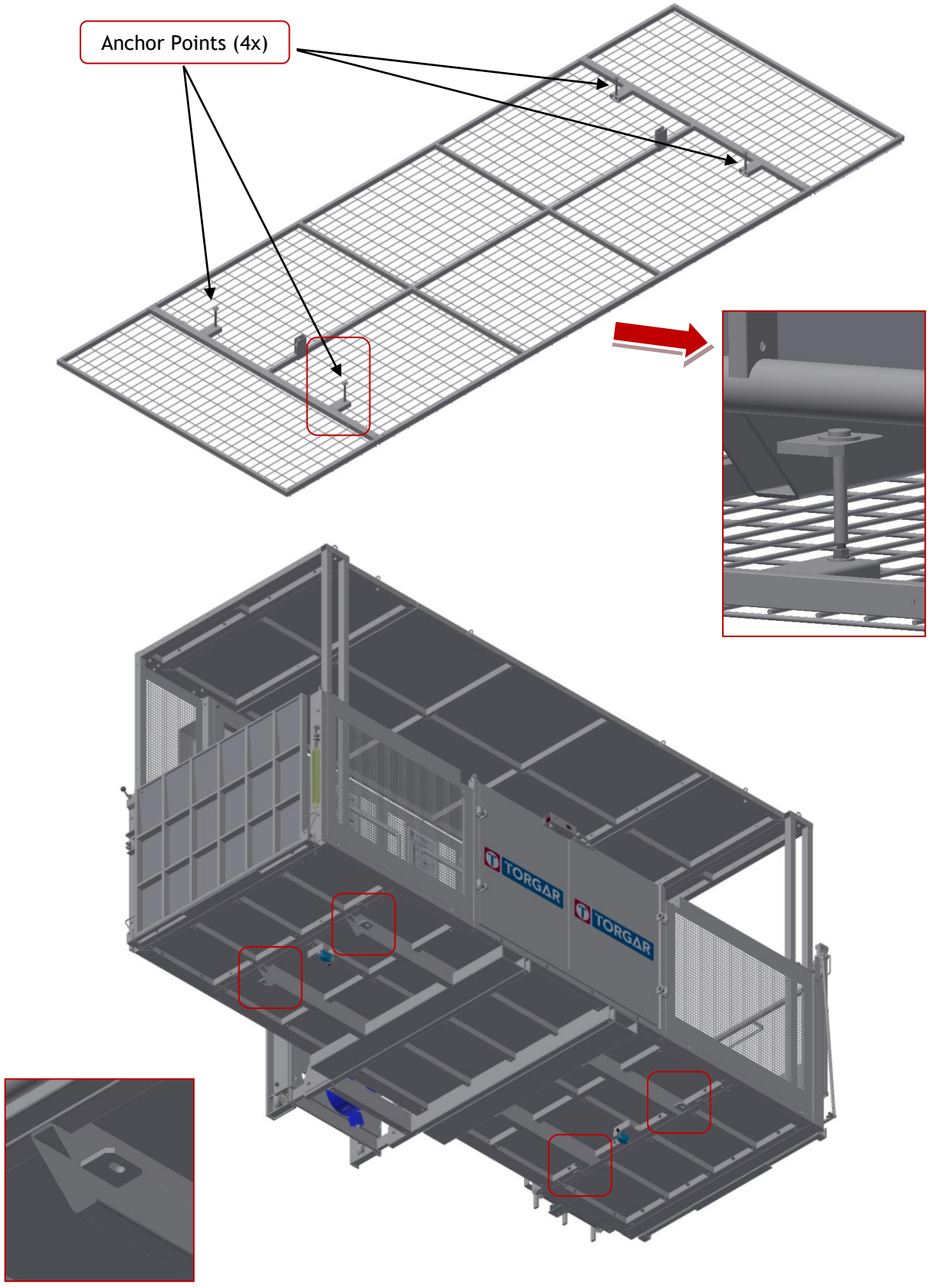
This device is a safety element, so it has to be assembled properly and do not be remove in any case.





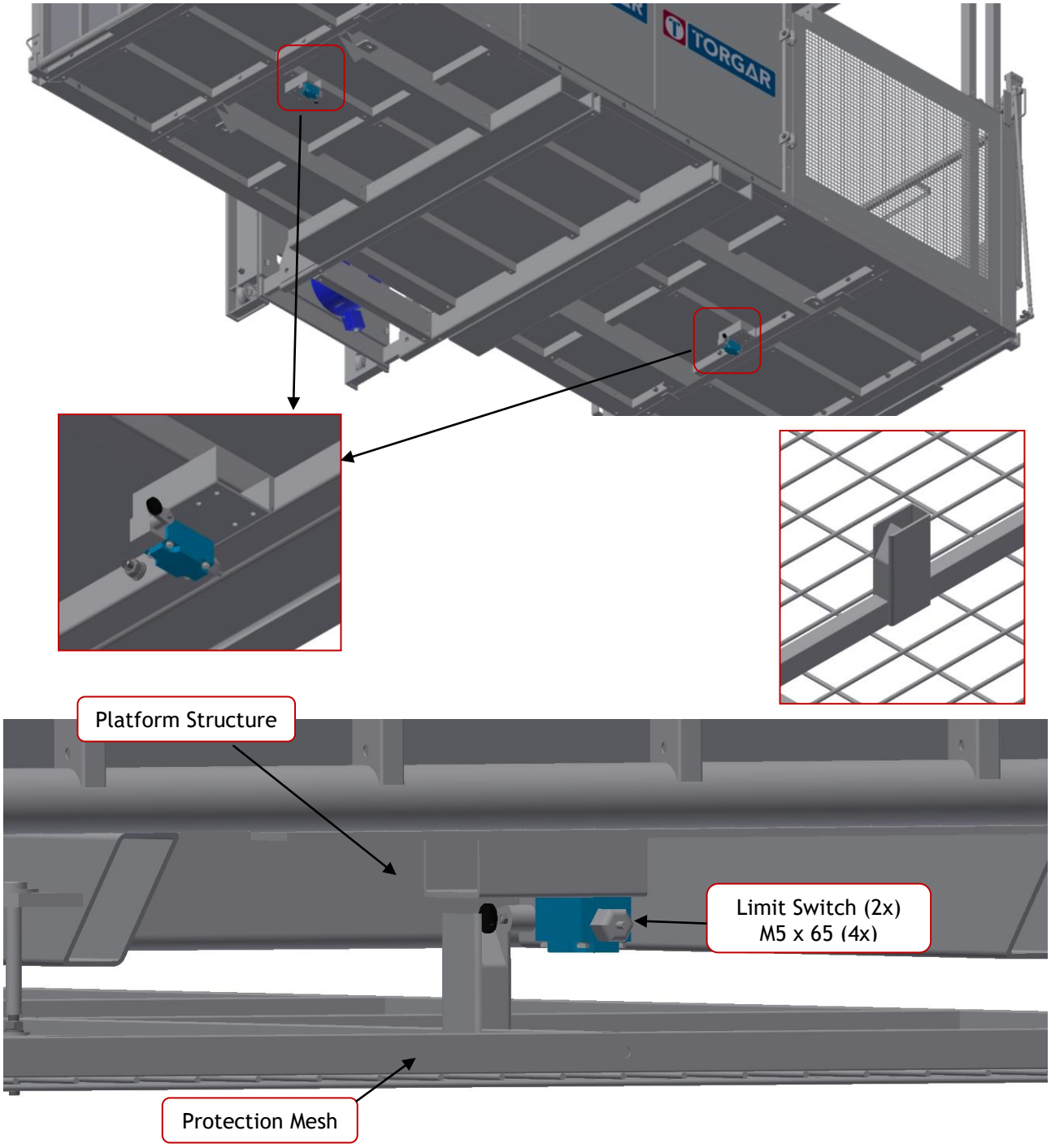
To install the protection, take into account two steps:

1. The anchorage points of the mesh:



2. The limit switches to control the mesh: Just in the middle of the mesh there is a U profile which is the road of the heads of the limit switches under the platform. The U profile must to be centered with the limit switches in any case.

Be careful with the position of the limit switches (the screwed to the structure, head position…) as it is shown:



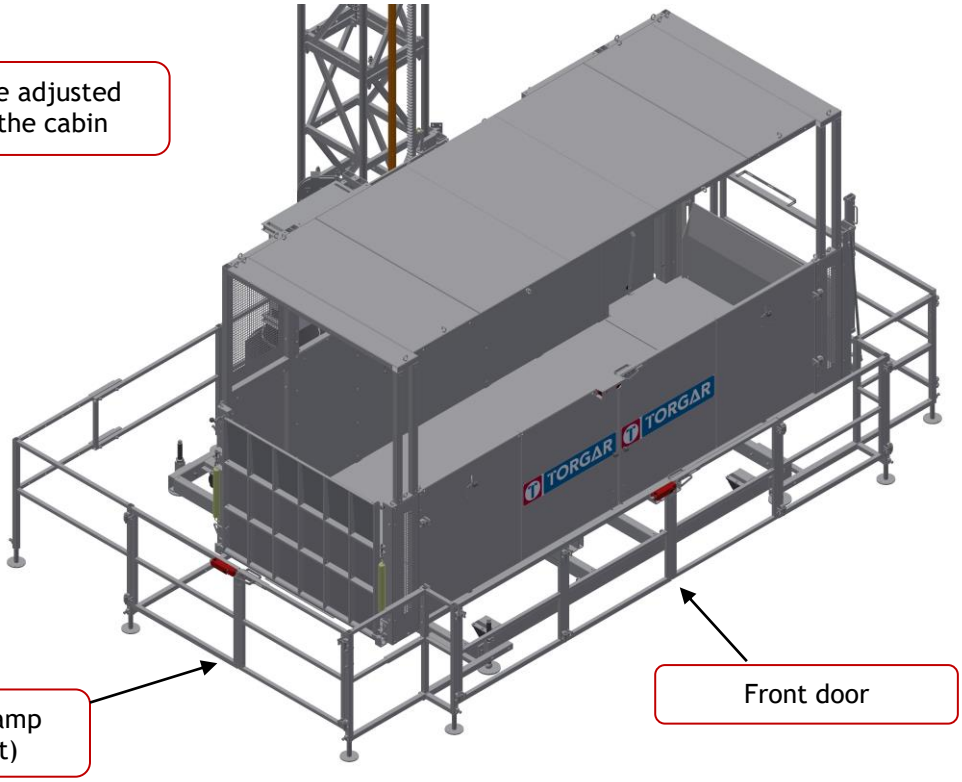
DO NOT REMOVE THE BOTTOM MESH. IT IS A MANDATORY PROTECTION DEVICE

Instead of protection mesh under the platform, we can place a base security enclosure that fulfills the same function of preventing someone from standing under the machine in its vertical path.

There are two types of base enclosures:

4.15.3 BASE ENCLOSURE 1.1 M (3,6 FT)

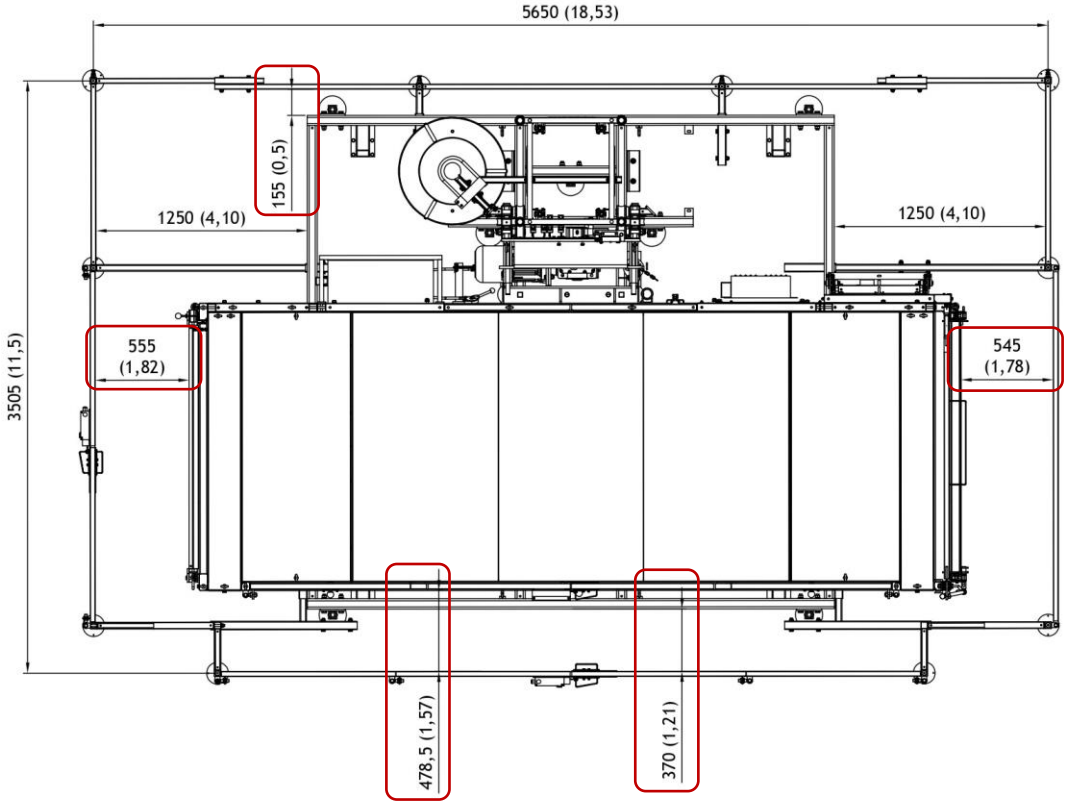
The base enclosure can be adjusted according to the size of the cabin



Front door

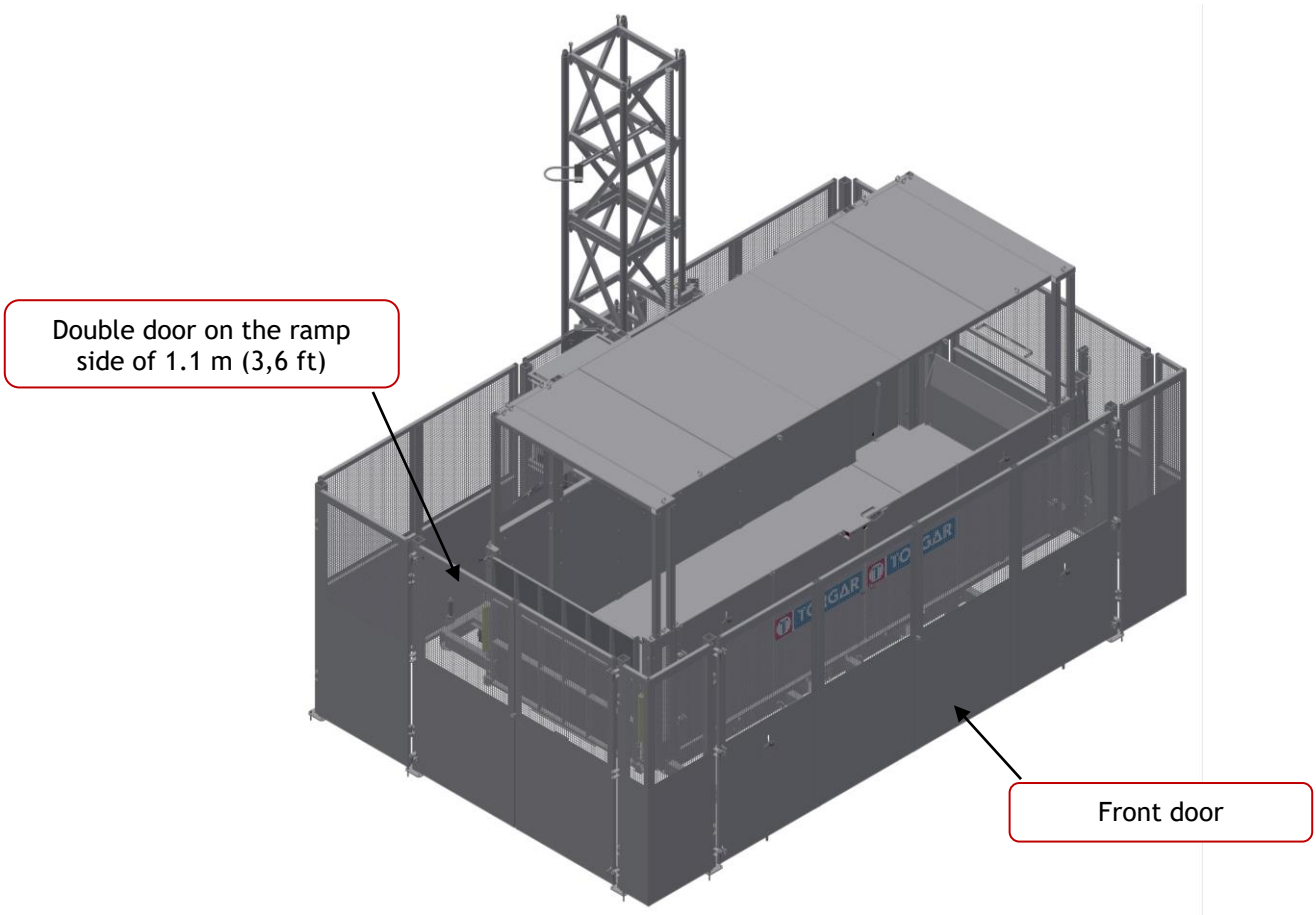
Double door on the ramp side of 1.1 m (3,6 ft)

The dimensions of the enclosure vary according to the configuration of the cabin, the measures that have to be maintained approximately regardless of the configuration of the cabin that you have are the following:

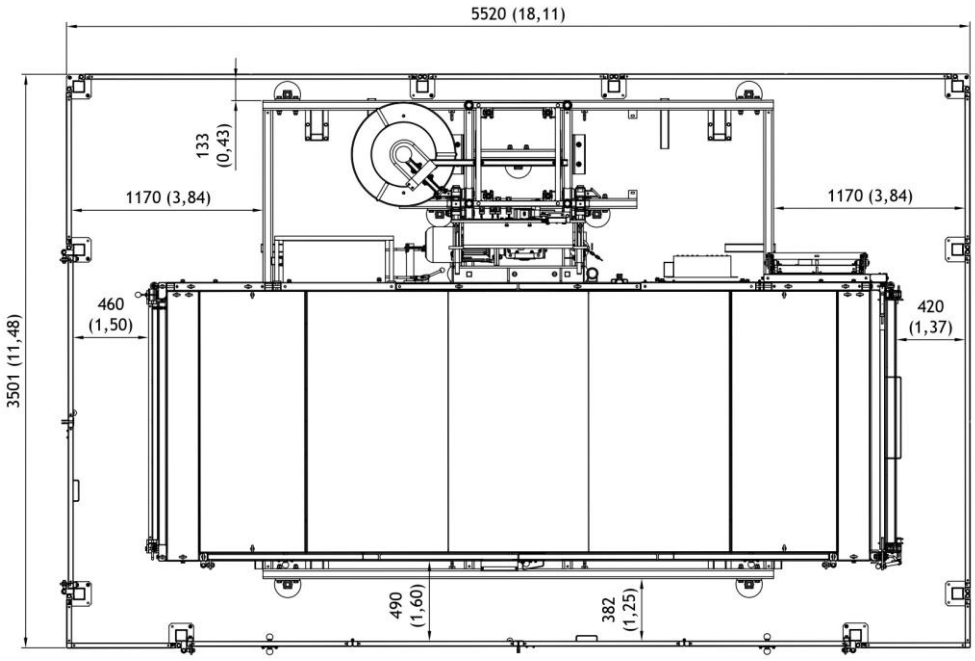


4.15.4 BASE ENCLOSURE 2M (6,56 FT)

This base enclosure can only be used with the largest cabin version 4.3m (14,10), for the rest of the cabin dimensions the base enclosure 1.1m (3,6) must be used.



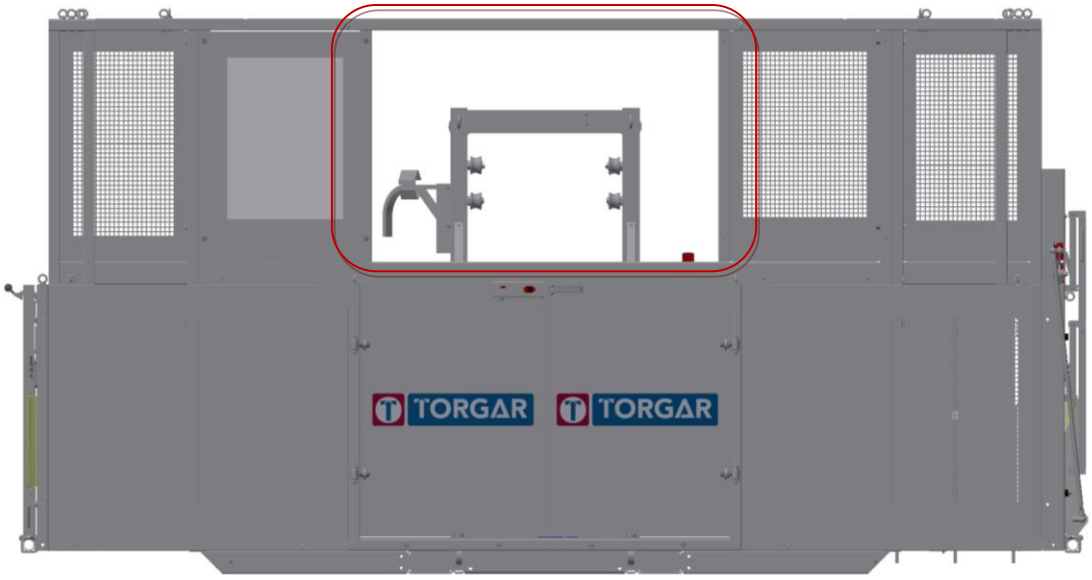
Approximate measurements:

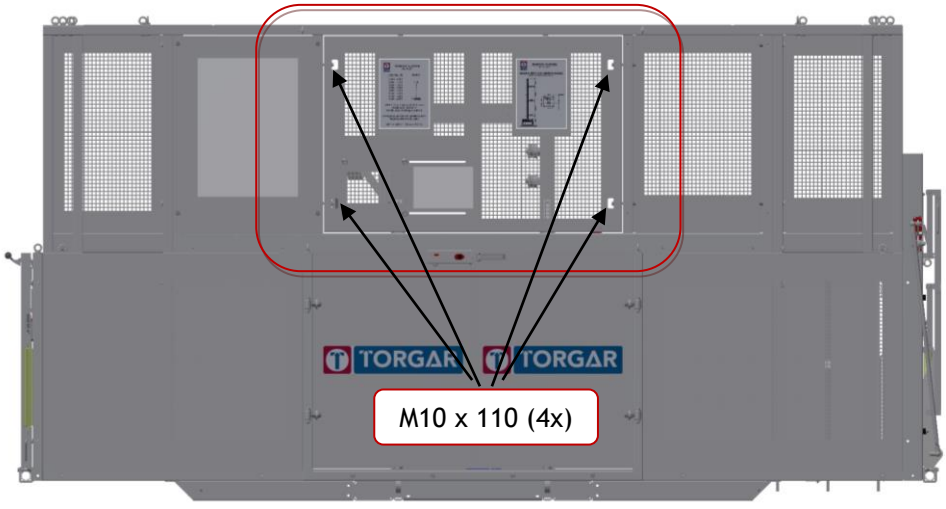


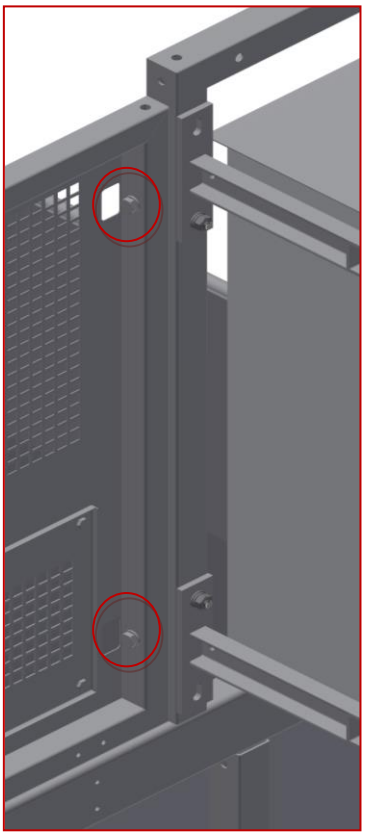
4.15.5 PROTECTION MESH FROM THE MAST SECTIONS

The protection mesh is another component that it is necessary disassembled during the process of the installation but, at the end, it is mandatory to re-assemble it.

Following you can see two pictures, with the protection mesh out of place and in place.







4.16 DISMANTLE

To dismantle the machine the operator has to follow all the assembly steps in the opposite order. Mainly:

1. Check with jobsite that platform is ready to be dismantled.
2. Check base and make sure its area is clean and free from debris.
3. Check platform is clear from any loads.
4. Change over any connections to jumper plugs in the base panels.
5. Check roof area clear.
6. Switch over any connections to enable platform to be driven from the platform.
7. Drive the transport platform up to the first tie level and check all mast tie fixings and mast bolt connections as you drive up.
8. Continue up checking all mast bolts and ties until you reach the highest point.
9. Drive to the lower level and starting from the bottom work your way up removing any landing gate skids.
10. Disconnect any landing gate wires.
11. Remove top landing gate and ensure that the appropriate barriers are in place and any fall hazards are eliminated.
12. Remove any other landing gates and wired connections and ensure that the appropriate barriers are in place and any fall hazards are eliminated.
13. Unload all landing gates and stack up neatly away from the base of the platform.
14. Fit the self erection crane and the electric winch.
15. Drive to the top and remove the skids at the top floor.
16. Remove the overrun mast section (safety mast section) and any other sections until you get to the top mast tie.
17. Drive down and unload any mast sections and ancillary parts.
18. Drive up to the top mast tie and slacken off all connecting bolts but do not remove.
19. Slacken off any turn buckles until there is no pressure on any bolts.
20. When you are sure that there is no load on the mast tie it is then safe to remove.

ANCHORAGES AND MAST SECTIONS: ONE STAGE EVERY TIME

21. Ensure that the platform is emptied and never overloaded during the dismantle process.

22. Continue this operation until you get to the last one or two mast ties (depending on transport platform type) removing cable guides as you continue down.

23. If required attach a crane to the mast section above the first or 2nd tie and then continue dismantling the platform and mast ties until you reach the lowest level.

24. Remove the base enclosure and remove the platform and any ancillary parts as required.

25. Disconnect the power supply.

*Note: You can see pictures of all of these points along this manual in opposite order

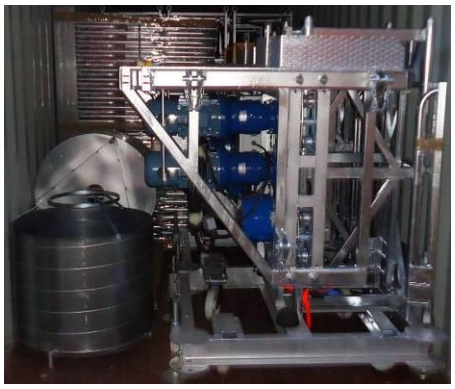
⚠	THE MACHINE SHOULD ONLY BE DISMANTLED BY PROPERLY QUALIFIED AND TRAINED PERSONNEL
⚠	MAXIMUM WIND SPEED IN DISMANTLING OPERATIONS CAN BE 45 KM/H (27.96 mph)

4.17 STORAGE AND TRANSPORT

Storage can be indoors or outdoors. Depending on the conditions, the period of storage can be longer or shorter.

4.17.1 ADVICES ABOUT STORAGE

Below are some images that can give an idea of how to properly store and transport the different components:



4.17.2 STORAGE PERIOD

Indoor storage means it is inside an industrial warehouse with walls and roof. The period of time estimated under these conditions is one year.

Any other storage is considered outdoors.

a) Favorable environment: maximum six months.

b) Unfavorable environment: maximum two months.

4.17.3 STORAGE INSPECTION

If the machine would be storage under the previous conditions for longer time than the specified, the official distributor will decide the new period of storage supported by the manufacturer.

The inspection will follow the next steps:

a) Appropriate repairs.

b) Check damages on structure. Repair if necessary.

c) Check components that can get worn.

d) Check all the recommended parts are in good conditions.

The new period of storage will be indicated in the following list:

PERSON IN CHARGE	COMPANY STAMP	DATE
		Inspection date:
		New date:

PERSON IN CHARGE	COMPANY STAMP	DATE
		Inspection date:
		New date:
		Inspection date:
		New date:
		Inspection date:
		New date:
		Inspection date:
		New date:
		Inspection date:
		New date:
		Inspection date:
		New date:
		Inspection date:
		New date:

5. GUIDELINES FOR USE

5.1 GENERAL GUIDELINES

COMPULSORY THE USE OF PERSONAL PROTECTION EQUIPMENT (PPE'S)
GLOVES – HELMET – GOOGLES – BOOTS – SAFETY ARNES – REFLECTIVE VEST

5.1.1 PERSONNEL TRAINING

The operation of the transport platform is carried out by personnel properly trained by FRACO MANUFACTURING, S. L. (or its official distributor or a competent person qualified to give transport platforms training designated by them).

To get the qualification the user needs a complete, specific and properly training. This training can be done on site or wherever FRACO MANUFACTURING, S. L. (or the official distributor or a competent person qualified designated) agrees to do it. The documentation and procedures indicated by the manufacturer will always be carried out.

This training expires every year so it has to be renewed after it.

USERS AND PERSONNEL HAVE TO BE QUALIFIED AND PROPERLY TRAINED BY FRACO MANUFACTURING, S. L., AN OFFICIAL DISTRIBUTOR OR A COMPETENT PERSON QUALIFIED TO GIVE TRANING DESIGNATED BY THEM

5.1.2 AMBIENT CONDITIONS

Maximum wind speed in freestanding work operations: 12.5 m/s (45 Km/h) - 27.96 mph.

Maximum wind speed in work operations: 20.0 m/s (56 Km/h) - 34.79 mph

Maximum wind speed in assembly - dismantle - maintenance operations: 12.5 m/s (45 Km/h) - 27.96 mph.

		SPEED OF WIND		
RANGE	**SCALE BEAUFORT**	**m/s**	**Km/h**	**mph**
0	Calm	0 – 0.2	0 – 1	0 - 0.62
2	Light breeze	1.6 – 3.0	6 – 11	3.73 - 6.83
4	Moderate breeze	5.5 – 7.7	20 – 28	12.43 - 17.39
6	Strong breeze	10.8 – 13.6	39 – 49	24.23 - 30.45
8	Gale	17.2 – 20.5	62 – 74	38.52 - 45.98
10	Storm	24.7 – 28.3	89 – 102	55.30 - 63.38
12	Hurricane	> 32.7	> 118	> 73.32

Do not use the machine if conditions (wind, rain, etc.) could mean dangerous situations for personnel.

5.2 NORMAL USE OF THE TRANSPORT PLATFORM

5.2.1 GOOD USE – BAD USE

a) Installation must be kept clean.

b) Keep it clear of objects that disturb the transport of personnel and materials.

c) Should add no materials to protrude from the confines of the carriage.

d) Check that it has not been used by any person not working on the site.

e) Do not overload the transport platform.

f) Heavy loads should be placed lengthwise in the center of the platform.

g) Load and download operation by the appropriate place.

h) Use the platform calmly and softly.

i) Do not use mast section to climb.

j) Do not enter under the travel of the platform unless it is at ground level.

k) Open and close the doors softly.

l) Access to the transport platform using the door.

m) Only the person in charge can do emergency rescue operations.

n) If the transport platform is out of service due to bad weather or failure it must be placed at ground level.

o) Bad use of the machine is doing the opposite to the previous points.

THE GUIDELINES FOR USE SET OUT IN THIS MANUAL MUST BE OBSERVED AND ALL USERS MUST BE FAMILIAR WITH THEM AND COMPLY WITH THEM

5.2.2 OUT OF ORDER SIGNS

It is mandatory not to use the transport platform with any of the safety devices disconnected or using them manually.

If failure, do a sign DIN A4 size, yellow background, black characters (capital TREBUCHET MS – black – 72 size) and protect with plastic layer: Put two signs on each access door and on the maneuver panel.

	**¡DANGER!** **OUT OF ORDER**	

	**¡TRANSPORT PLATFORM OUT OF ORDER!** **DO NOT USE**	

5.3 RESIDUAL RISKS – HUMAN MISTAKES

Risk analysis admits two situations at the same time that can lead to a dangerous situation.

1. Unconscious person + electrical fail = (evacuation) = procedure carried out by a mate.
2. Manual lower + person under the travel = (catch) = emergency + safety perimeter.
3. Lower + person under the travel = (hit) = space under the transport platform.

5.4 EVACUATION

DO NOT USE THE TRANSPORT PLATFORM IN CASE OF FIRE

5.4.1 TRAINING PEOPLE

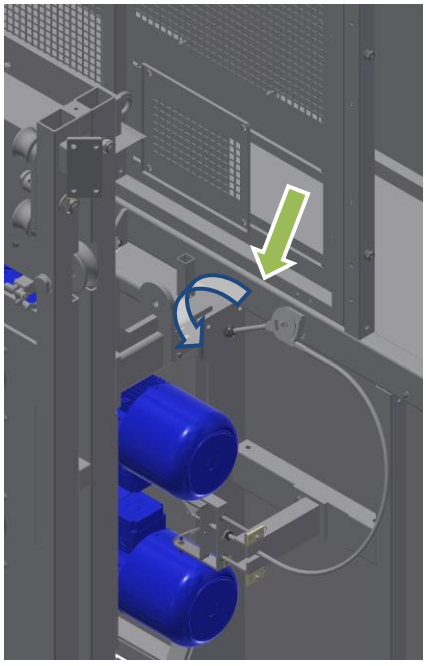
Personnel must to be trained in the following points in order to do the emergency procedures properly:

a) Emergency manual lowering

Use the manual lever that it is available in the platform.

The process must be intermittent: Descend a half mast and wait one second, in order not activate the safety device.

Only lower to first available floor exit.



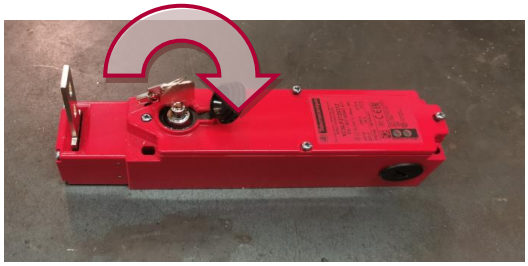
BE CAREFULL NOT TO REACH THE SAFETY DEVICE ACTIVATION SPEED
USE THE LEVER SLOWLY AND GENTLY

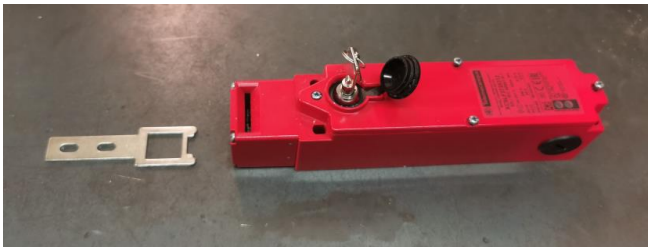
IF TRANSPORT PLATFORM STOPS BETWEEN TWO FLOORS WITH PEOPLE INSIDE ACTUATE THE LEVER OF THE MOTOR-BRAKE GENTLY UNTIL REACH NEXT FLOOR IN ORDER TO LEAVE THE PLATFORM

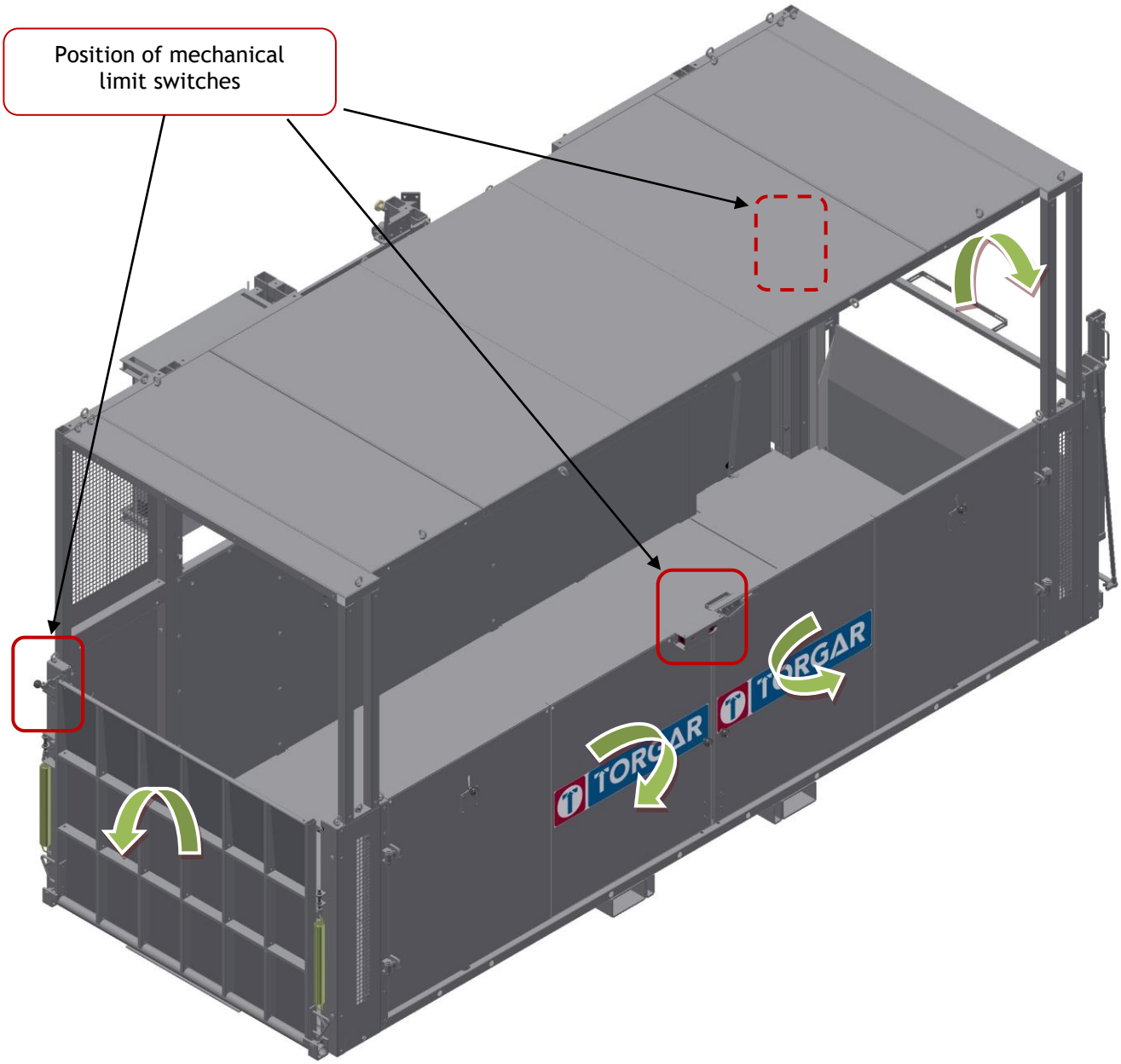
NOT IF OVERSPEED GOVERNOR DEVICE HAS WORKED

b) Opening of the platform **or floor protection doors**

A safety key is used to remove the actuator from the body of the safety lock when the solenoid is de-energized and is reason for rescue:







5.4.2 SITUATIONS OF EVACUATION

a) There is not power supply:

See the location of the transport platform.

Manual descent to the next bellower floor.

Open the platform and floor doors.

Rescue.

b) In case of injury:

A safety harness have to be available permanently in base:

Climb the tower structure until reaching the platform.

Access the platform.

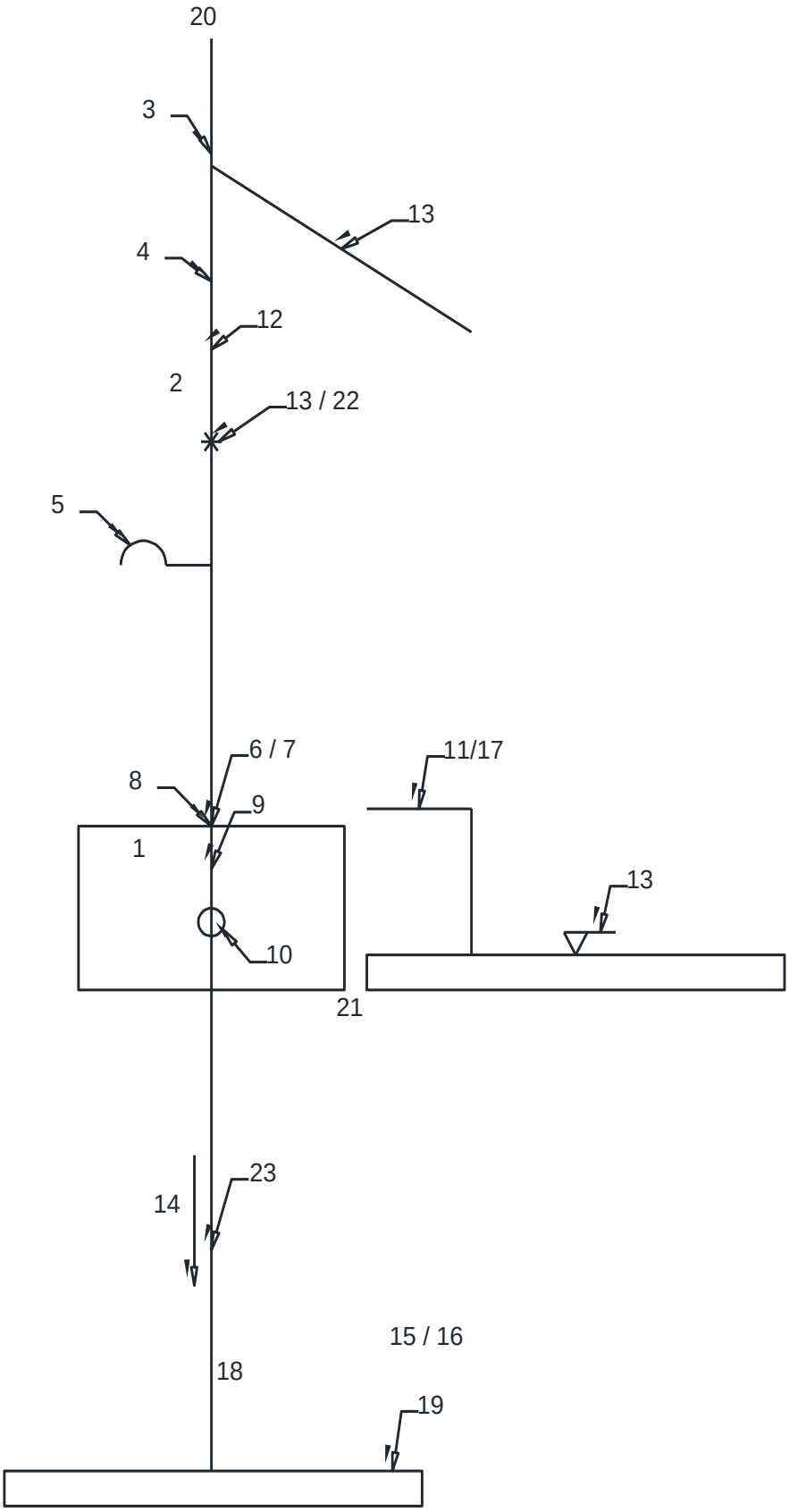
If there is electric current, reach the base with the platform transport control box.

If there is not electric current, manual descent to the next bellower floor.

Open the platform and floor doors.

Rescue.

5.5 PUT INTO SERVICE



5.5.1 CHECK-LIST

Before finishing the installation check these points:

BASIC POINTS			
No	**TASKS**	**ACTION**	**OK**
1	Information signs	Well located and visible	
2	Tightening torques (lb x ft) * Check N x m in the corresponding point of this manual	M6 (7.3-5.1) / M8 (17.7-11.8) / M10 (35.4-25.8) M12 (62.6-59) / M16 (154.8-88.5) / M18 (213.8-118)	
3	Safety mast section	Assembled	
4	Top stop limit switch	Working	
5	Cable guides	Assembled	
6	Rack detector	Working	
7	Platform limit switches	Working	
8	Overload device	Working	
9	Safety stop limit switch	Working	
10	Speed limiter safety device	Working	
11	Floor protection door	Assembled	
12	Floor stop skid	Assembled and adjusted	
13	Mast ties	Assembled and adjusted	
14	Mast verticality	1/100 - 0,5º	
15	Electrical boards	Closed and working	
16	Electrical supply	Checked	
17	Floor door interlocks	Working	
18	Bottom stop limit switch	Working	
19	Concrete foundation	Checked	
20	Height of the installation	≤ 120 m (≤ 393.70 ft)	
21	Distance between platform and structure	≥ 500 mm (≥ 1.64 ft)	
22	Distance between mast ties	≤ 6 m (≤ 19.68 ft)	
23	3 meters (9.84 ft) limit switch	Working	

5.5.2 STATIC AND DYNAMIC TESTS

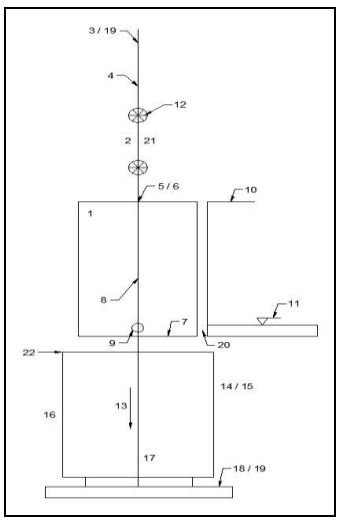
STATIC TESTS			
No	**Description**	**Remark**	**OK**
1	Constant position of the transport platform with 1,25 times the nominal load during the time indicated by the standards.	No displacements.	

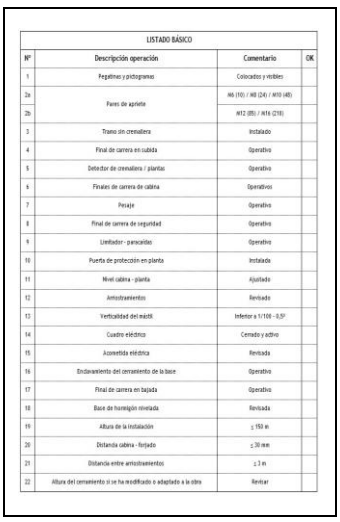
DYNAMIC TESTS			
No	**Description**	**Remark**	**OK**
1	Brake the transport platform with nominal load at nominal speed. Load has to be spread in a surface of 0,8 m^2 (2.62 ft^2).	Properly braking.	
2	Full up and down travel of the transport platform with nominal load.	No deformations.	

5.5.3 ASSEMBLY CERTIFICATION

Once the check-list and all the tests have been done, the machine is ready to get the assembly certification.

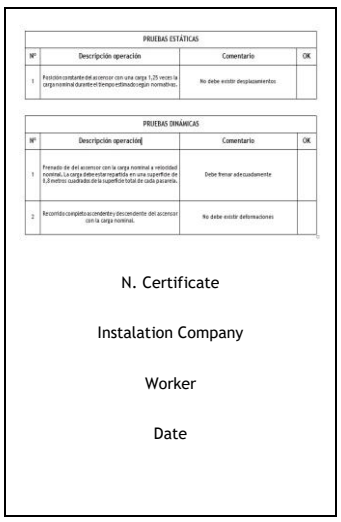
The certification refers to the points indicated in previous the check-list and tests.





LISTADO BÁSICO

Nº	Descripción operación	Comentario	OK
1	Pegatinas y pictogramas	Colocados y visibles	
2a	Pares de apriete	M6 (10) / M8 (24) / M10 (48)	
2b		M12 (85) / M16 (210)	
3	Trono sin crenallera	Instalado	
4	Final de carrera en subida	Operativo	
5	Detector de crenallera / plantas	Operativo	
6	Finales de carrera de cabina	Operativos	
7	Perajle	Operativo	
8	Final de carrera de seguridad	Operativo	
9	Limitador - paracaidas	Operativo	
10	Puerta de protección en planta	Instalada	
11	Nivel cabina - planta	Ajustado	
12	Amortiramientos	Revisado	
13	Verticalidad del mástil	Inferior a 1/100 - 0,5°	
14	Cuadro eléctrico	Cerrado y activo	
15	Acometida eléctrica	Revisada	
16	Encharcamiento del cerramiento de la base	Operativo	
17	Final de carrera en bajada	Operativo	
18	Base de hormigón nivelada	Revisada	
19	Altura de la instalación	≤ 150 m	
20	Distancia cabina - forjado	≤ 30 mm	
21	Distancia entre amortiramientos	≤ 3 m	
22	Altura del cerramiento si se ha modificado o adaptado a la obra	Revisar	



PRUEBAS ESTÁTICAS

Nº	Descripción operación	Comentario	OK
1	Posición constante del ascensor con una carga 1,25 veces la carga nominal durante el tiempo estimado según normativa.	No debe existir desplazamientos	

PRUEBAS DINÁMICAS

Nº	Descripción operación	Comentario	OK
1	Frenado de del ascensor con la carga nominal a velocidad nominal. La carga debe estar repartida en una superficie de 0,8 metros cuadrados de la superficie total de cada parante.	Debe frenar adecuadamente	
2	Recorrido completo ascendente y descendente del ascensor con la carga nominal.	No debe existir deformaciones	

N. Certificate

Instalation Company

Worker

Date

6. REPAIR AND MAINTENANCE

6.1 INTRODUCTION

REPAIR AND MAINTENANCE OPERATIONS CAN ONLY BE DONE BY TRAINED AND QUALIFIED PERSONNEL

REPAIR AND MAINTENANCE OPERATIONS WILL BE DONE WITH THE TRANSPORT PLATFORM LOCATED AT GROUND FLOOR IF IT IS POSSIBLE AND OUT OF WORK

If fail or sudden risk, the installation must be put out of operation and cannot be used until the risk had disappeared. It is mandatory to repair all failures and problems of operation before starting again. Never work with a faulty transport platform.

MAINTENANCE CHECK-LIST MUST BE DAILY SIGNED, UP-TO-DATED AND IN POSSESION OF THE MAINTENANCE COMPANY

If the transport platform suffers any drop of material, collision or accident, damaged components and safety devices must be checked.

IF THE TRANSPORT PLATFORM HAS BEEN OUT OF WORK FOR MORE THAN TWO MONTHS, IT HAS TO BE DEEPLY CHECKED BEFORE OPERATING

6.2 WORKING LIFE

TORGAR transport platforms have a working life of 10 years. This period can change depending on the use and maintenance operations on the machine.

After the end of this 10 years period, the owner must contact the manufacturer or the official distributor to do a complete inspection.

After this complete inspection, having repaired all problems and replaced all damaged parts, the distributor or manufacturer can set a new working life period.

6.2.1 INSPECTION

When the working life of the transport platform expires, the inspection will be carried out as follows:

a) Official distributor will leave the machine out of work and sealed.

b) Follow the operation and maintenance procedure.

c) Repair parts and components if necessary.

d) Check metallic structures. Repair if damaged.

e) Switch all components that have worn out or past their replace dates.

f) Check all the recommended parts are in perfect conditions.

After having checked the machine, the official distributor and the manufacturer will set the new period of working life of the machine:

PERSON IN CHARGE	COMPANY STAMP	DATE
		Inspection date:
		New date:
		Inspection date:
		New date:
		Inspection date:
		New date:

*Make copies of this sheet to be sure all relevant failures are controlled and signed

6.2.2 MISUSE OF WORKING LIFE OF THE TRANSPORT PLATFORM

THE OWNER IS RESPONSIBLE OF ANY DAMAGE, FAILURE OR MAL-FUNCTIONING IF THE TRANSPORT PLATFORM IS USED OUT OF THE WORKING LIFE PERIOD

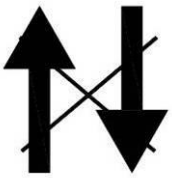
THE OWER IS RESPONSIBLE FOR ENSURING EVERY MAINTENANCE PROCEDURE

THE USER HAS THE MUST OF USING THE MACHINE PROPERLY INCLUDING NOTIFY ABOUT THE MAINTENANCE

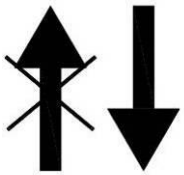
THE WORKING LIFE OF THE MACHINE HAS TO BE ACCORDING TO THE POINTS OF THIS MANUAL

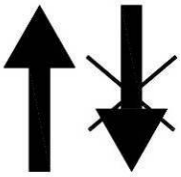
6.3 TROUBLESHOOTING

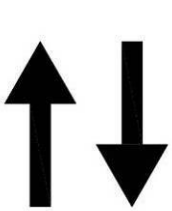
THE USE OF THE TRANSPORT PLATFORM UNDER FAULTY CONDITIONS CAN JEIPARDIZE THE SAFETY OF THE PERSONNEL

Breakdown	Cause	Solution
The transport platform cannot ascend nor descend.   ¡DANGER! Attempting to use the transport platform will jeopardize work safety.	A1 The emergency stop button is activated.	- Turn this button clockwise until it moves out to deactivate it.
	A2 Rack or pinions are damaged.	- Check the damage. - Evacuate the platform.
	A3 The service lift is stuck on an obstacle.	- Remove the obstacle. - Test the operational safety of affected tower sections. - Inform the supervisor.
	A4 Power failure. a) Main switch is set to OFF. b) Grid voltage is interrupted. c) Supply between grid connection and control is interrupted.	- Turn the main switch to ON. - Find the cause and wait for the power to return. - Test and if necessary repair the supply cable, fuses, and/or wiring from the control box.
	A5 Two phases are changed in the supply.	- Have TORGAR or qualified personnel authorized by TORGAR switch the two phases in the plug.
	A6 The hatch or door limit switches are triggered.	- Check that door and hatches are properly closed.
	A7 Motor thermal protection.	- Rearm. - If repeated, contact TORGAR.
	A8 Electromagnetic brakes do not open.	- Check voltage to the electromagnetic brakes. - Check the springs. - Check the brake disc. - Regulate the brake disc.
	A9 Magnetic thermal control.	- Rearm. - If repeated, contact TORGAR.
	A10 Control differential.	- Rearm. - If repeated, contact TORGAR.
	A11 Over voltage protection.	- Rearm. - If repeated, contact TORGAR.
	A12 Emergency top and bottom limit switch is activated.	- At top, perform manual descent until the switch is released. - At bottom, disassemble the bottom skid

		until the switch is released. - Check the position of the safety stop skid. - Check the top and bottom mechanical stop position.
	A13 Overload (overload light illuminates).	- Test and if possible reduce the load, until overload lights stops illuminating. - If repeated, contact TORGAR.
	A14 If trapped key is not present or the trapped key switch is in the OFF position.	- Insert the key and turn it to the ON position.
	A15 The guard locking switch is defective.	- Test / repair defective components.
	A16 The differential controller is tripped.	- Open the platform control box. - If any of the red lights of the differential controller is lighted up, have TORGAR or qualified personnel authorized by TORGAR adjust the differential controller.

Breakdown	Cause	Solution
The transport platform can descend but cannot ascend. 	B1 The transport platform is stuck under an obstacle.	- Carefully move the transport platform downwards and remove the obstacle. - Test the operational safety of the affected platform components. - Inform the supervisor.
	B2 Rack detector is activated.	- Check mast sections. - Check the status LED.
	B3 Top limit switch is activated.	- Test the top limit switch connection / function. Replace if necessary. - Descend the transport platform until top limit switch is released.

Breakdown	Cause	Solution
The transport platform can ascend but cannot descend. 	C1 Bottom limit switch is activated.	- Test the bottom limit switch connection / function. Replace if necessary. - Ascend the transport platform until bottom limit switch is released.
	C2 The service lift is stuck on an obstacle.	- Carefully move the transport platform upwards and remove the obstacle. - Test the operational safety of the affected platform components. - Inform the supervisor.

Breakdown	Cause	Solution
The transport platform can ascend and descend but motor hums loudly. 	D1 Motor is damaged.	- Contact TORGAR.

6.4 RECOMMENDED WELDING PRACTICE

The control of possible damages on the structure of the transport platform is one of the most important safety issues.

This point will cancel any transport platform warranty without express authorization.

DAMAGED METALLIC STRUCTURES HAVE TO BE REPLACED INMEDIATELLY WITH THE ONLY AUTHORIZATION OF THE MANUFACTURER

Screwed parts, such a rack section to the mast, should be replaced by a new one.

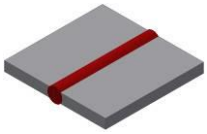
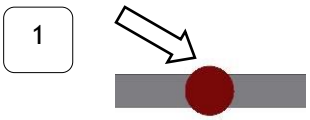
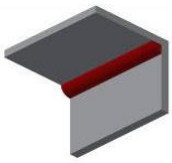
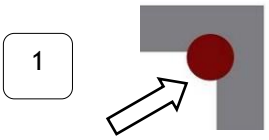
Small deformations of up to 10 mm (0.39 in) can be fixed cold if the thicknesses is less than 6 mm (0.23 in) or apply heat if the thicknesses is greater than 6 mm (0.23 in). If there are bigger deformations, damaged parts will be removed and replaced by welding a new one.

Any company which make this task will have its own welding procedures (based as follows), trained welders and will check the final results of the welded area. In any other case, the manufacturer will be exempt from liability.

Information about a welding procedure for different thicknesses, case 1:

BASE METALS	
Specification and grade: S235 JRG2 - EN 10025	Thickness angle parts (mm): 1.4 - 4 // (in): 0.055 - 0.157
Thickness flat parts (mm): 1.4 - 2.6 // (in): 0.055 - 0.102	Throat (mm): 1.5 - 3 // (in): 0.059 - 0.118

ADDED METALS	
Specification contribution metal: EN 14341 A - AWS 5.18	Commercial name of contribution metal: OK AUTROD 12.51
Classification of contribution metal : G 3 Si 1 - ER 70 S 6	Dimensions of contribution metal (mm): Ø 1.2 // (in): Ø 0.047

POSITION FLAT - ÁNGLE	WELDING PROCEDURE	THERMAL TREATMENT AFTER WELDING
		N/A
		

PRE-WARM	GAS PROTECTION
Pre-warm temperature: 5 - 20 ºC // 41 - 68 ºF	135 GMAW - Mixture: Ar 82% + CO_2 18% Volume: 16 l / min - 3.52 gpm Post-gas time (s): 1 - 2

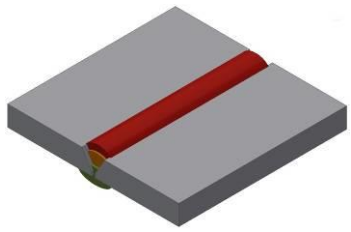
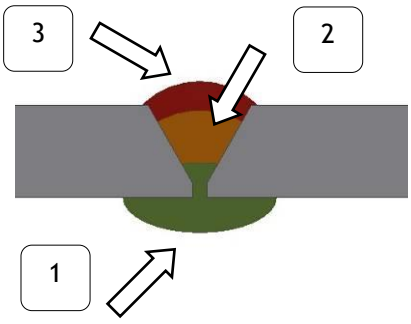
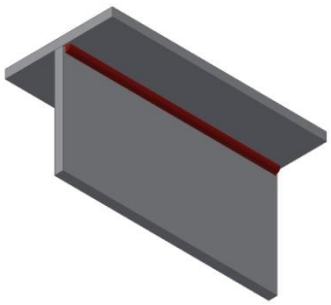
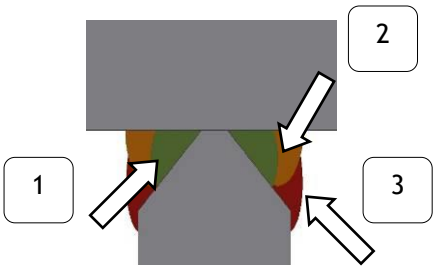
PROCEDURE	
Current: CCE+	Current intensity (A): 167 - 170
Thermal contribution (Kj/cm): 4.2 - 6.2 // (Kj/in): 10.67 - 15.78	Current voltage (V): 21 - 21,7

TECHNIQUE	
Weld bead straight or oscillating: Both Nozzle diameter (mm): 8 - 12 // (in): 0.315 - 0.472 Initial cleanliness and between pass: brushing Simple pass or multiple (by side): simple	Distance nozzle -part (mm): 4 - 8 // (in): 0.157 - 0.315 Simple electrode Transfer mode: short weld arc

Information about a welding procedure for different thicknesses, case 2:

BASE METALS	
Specification and grade: S355 J2N - EN 10025	Thickness angle parts (mm): 6 - 14.4 // (in): 0.236 - 0.567
Thickness flat parts (mm): 3 - 24 // (in): 0.118 - 0.945	Throat (mm): Without restriction

CONTRIBUTION METALS	
Specification contribution metal: EN 14341 A - AWS 5.18	Commercial name of contribution metal: OK AUTROD 12.51
Classification of contribution metal: G 3 Si 1 - ER 70 S 6	Dimensions of contribution metal (mm): Ø 1.2 mm // (in): Ø 0.047

POSITION FLAT - ANGLE	WELDING PROCEDURE	THERMAL TREATMENT AFTER WELDING
		N/A
		N/A

PRE-WARM	GAS PROTECTION
Pre-warm temperature: 5 - 20 ºC // 41 - 68 ºF	135 GMAW – Mixture: Ar 82% + CO_2 18% Volume: 16 l / min - 3.52 gpm Post-gas time (s): 1 - 2

PROCEDURE	
Current: CCE+ Thermal contribution (Kj/cm): 5.5 - 7.6 // (Kj/in): 13.99 - 19.34	Current intensity first pass (A): 167 - 170 Second – third pass (A): 237 - 242 Current voltage (V): 21 - 28,2

TECHNIQUE	
Weld bead straight or oscillating: Both Nozzle diameter (mm): 8 - 12 // (in): 0.315 - 0.472 Initial cleanliness and between pass: brushing Simple pass or multiple (by side): simple	Distance nozzle -part (mm): 4 - 8 // (in): 0.157 - 0.315 Simple electrode Transfer mode: short weld arc

6.5 REGULAR CHECKS

PERIODIC CHECKS MUST BE SIGNED IN THE FORM "MAINTENANCE CHECKING FORM"
SEE APPENDIX OF THIS MANUAL

The points listed below should be checked on a regular basis, bearing in mind that these periods have been calculated for a use of machinery in 8 – 10 hours of work per day and 80% of total work load.

Every travel of the platform:

- Check that there are no objects that may fall from the building in case of contact with the lift car.
- Any type of strange noise, vibration or malfunction should be investigated.

Every day and working shift (or 8 – 10 hours):

- General cleaning of the transport platform.
- Make sure that the support base is properly level and firmly supported on the ground.
- Make a visual check of the cross-braces on the structure and the connections to the mast.
- Check that the various parts of the transport platforms are in good working order.
- Run the platform the whole length of the mast UP and DOWN one time at the beginning of a new shift to check the adjustment and operation of end-of-travel stops, proximity detectors and skids.
- Check the grease over the rack. In case of absence, not to wait to "every week" (see next group of points).

Every week (or 40 - 50 hours):

- Check for possible oil leaks in the motor reducers.
- Clean and grease the rack and the platform rollers.

Lubricating greases for applying on opened gears must be water-repellent and adhesive to permit excellent protection of flanks of pinions and the rack. Lubricating greases must be based on mineral or synthetic oil and solid thickeners how Molybdenum Bisulfate, Graphite, Tungsten or Teflon.

Recommended lubricating grease grade 1 (NLGI) but it is possible using greases to grade 2.

The application of the lubricating grease in pinions and rack must be done by means of paintbrush, it would be better if the paintbrush had short bristles, brush or putty knife. It is very important to clean pinions and rack before of applying the grease to obtain better bond.

MARK	KLÜBER	AGIP	BP	KRAFFT
GREASE	GRAFLOSCON A-G 1 ULTRA	AGIP GR LP	TRIBOL MOLUB ALLOY 936 SF HEAVY	KRAFFT 165-X
	STRUCTOVIS HD			KGP-2/M

Every month (or 160 - 200 hours):

- Check the air gap on the electric brakes, the condition and the braking torque setting.
- Check the motor reducer is secured in place correctly.
- Check the position and the seating of the pinions.
- Check the torque of guide rollers and rack.
- Check that the bolts in the connections between the mast sections are properly tightened.
- Clean and grease the platform locks.
- Grease the shafts on the guide rollers and the rocker arms.
- Check that speed limiter is working ok and the setting of limit switch.
- Check the condition of the pinions, rack and guide rollers.
- Clean the control platform and the connections inside it.
- Check the condition of the terminal boxes for the motors and power sockets.
- Check that the electrical interlocks in the platform are working (door, hatchway, etc.).

Every three months (or 500 hours):

- Check the guide rollers and bearings for play.
- Drop Test: Follow the instructions in the corresponding point of this manual.
- Check and clean the pinion of the safety device.
- Check the plate with the serial number of the safety device.

Every six months (or 1,000 hours):

- Check the condition of the flexible motor reducer couplings.
- Dismantle and clean the reel-shaft contactor, in contactors and relays.

Every year (or 2,000 hours):

- Check the condition of the reducers (oil, bearings, etc.).
- Dismantle, clean, check and grease the motors.

3 years (6,000 hours):

- Disassemble and send the safety device to the factory for inspection and re-calibrated.

In the event of failure or imminent risk, the installation must be taken out of service and must not be used again until the cause of the risk has been identified. All malfunctions and malfunctions must be remedied before the machine can be reused. A defective machine must never be put into service.

In the event that the transport platform has been damaged in an accident or material has fallen on it, a general check should be carried out paying special attention to the affected areas and the safety systems.

If the lift is out of service for more than two months, it must be thoroughly inspected by appropriately trained personnel before being put back into service.

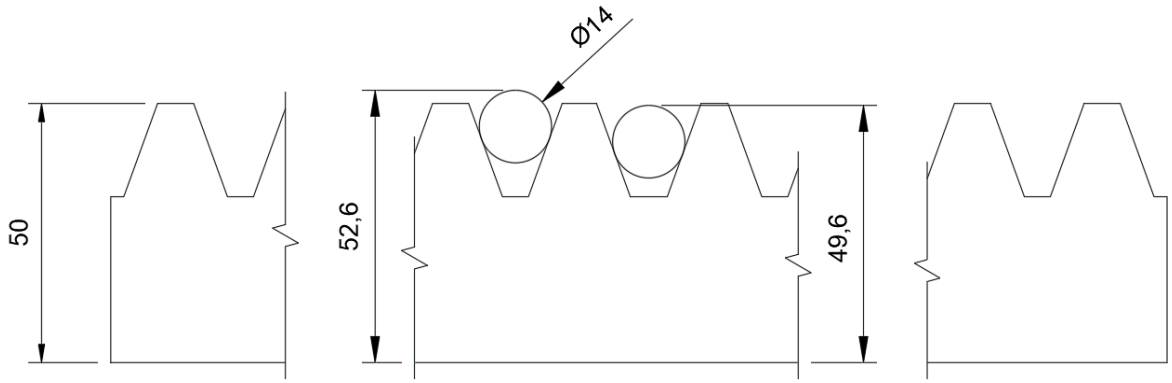
PERIODIC CHECKS MUST BE SIGNED IN THE FORM "MAINTENANCE CHECKING FORM"
SEE APPENDIX OF THIS MANUAL

6.6 WEAR OF COMPONENTS

6.6.1 RACK WEAR

The rack of the TORGAR transport platforms have a module M = 8. When the rack is new, its measurement is 50 mm (1.968 in). But as the machine is used, the rack suffers wear and the initial dimension is reduced. When the measurement reaches a certain value of wear, the corresponding stretch of elevation has to be replaced by a new one.

The following is a schematic of the procedure for measuring the wear of the rack, as well as its admissible size:



Pinion wear is determined by measuring the distance between two consecutive teeth. When this measurement exceeds the admissible value by default, the pinion will have to be changed for a new one.

New rack: Height equal to 52.6 mm (2.070 in).

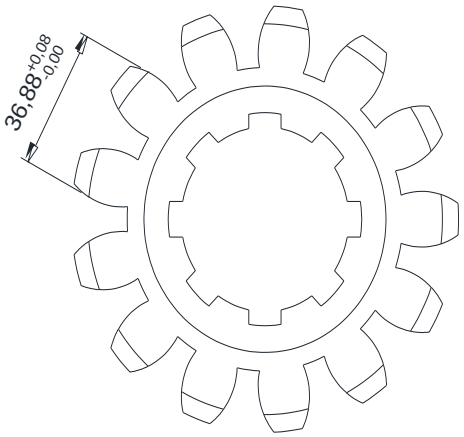
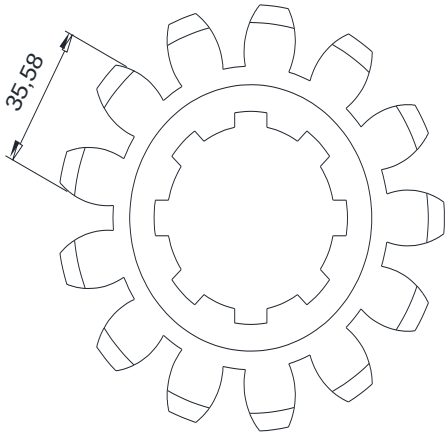
Worn rack: Height less than 49.6 mm (1.952 in).

6.6.2 PINION WEAR

The pinion of the TORGAR transport platforms (the motors and the safety device) have a module M = 8 and a number of teeth Z = 13.

The pinion wear is determined by measuring the distance between two consecutive teeth. When this measurement exceeds the admissible value by default, the pinion will have to be replaced by a new one.

The new and admissible values are outlined below:

NEW PINION [36.88 mm (1.452 in)]	WORN PINION [35.58 mm (1.400 in)]
MODULE 8 - 13 TEETH	
	

6.6.3 RACK – PINION ENGAGEMENT

The optimal rack - pinion gear happens when the primitive radius of the pinion and the primitive line of the rack are tangent.

For a correct pinion - rack adjustment, the separation between the primitive radius of the pinion and the primitive line of the rack cannot be greater than 1/3 of the module.

The diagram shows the optimal practical values and limits to consider:

Optimal gear

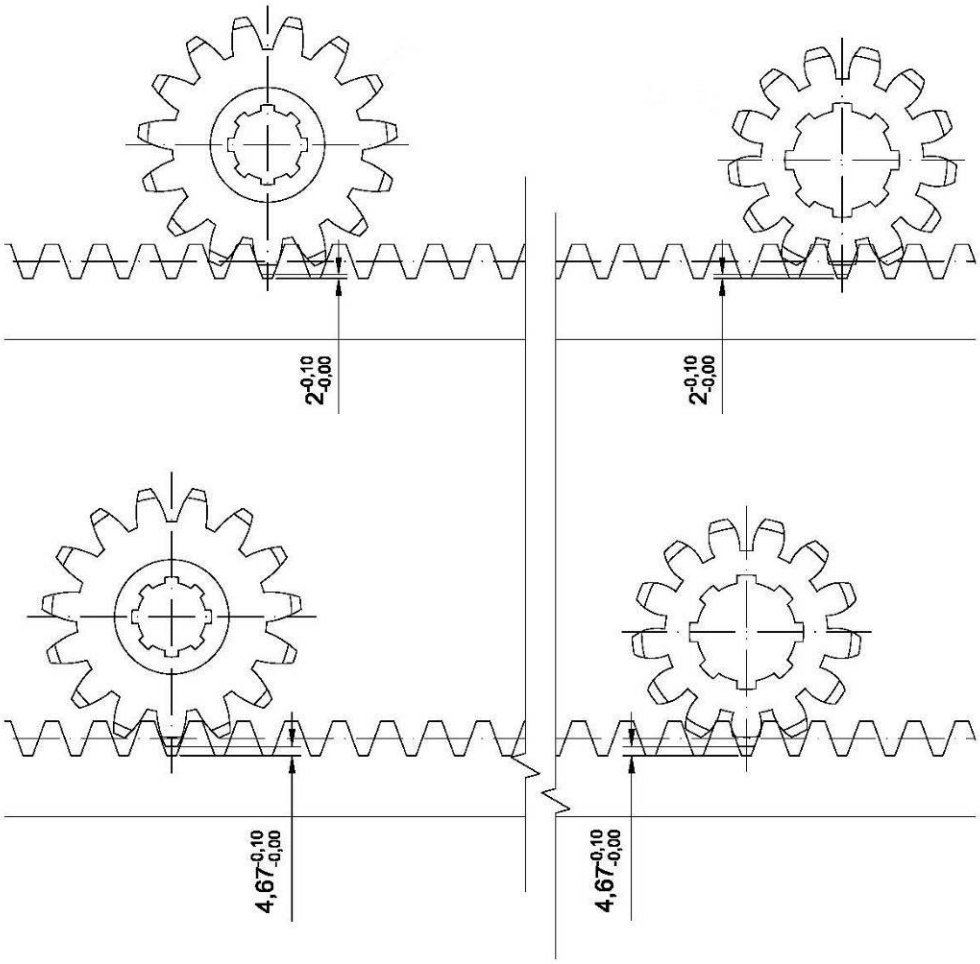
[2 mm (0.078 in)]

The primitive diameter of the pinion coincides with the primitive line of the rack.

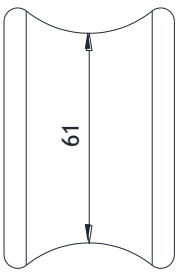
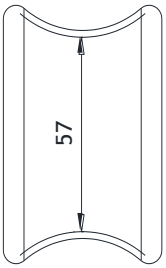
Minimum gear

[4.67 mm (0.184 in)]

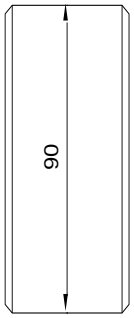
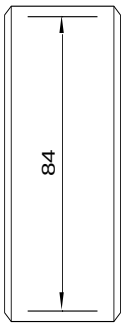
The primitive diameter of the pinion is not separated more than 1/3 of the module from the primitive line of the rack



6.6.4 GUIDE ROLLERS WEAR

NEW GUIDE ROLLER [61 mm (2.401 in)]	WORN GUIDE ROLLER [57 mm (2.244 in)]
	

6.6.5 COUNTER RACK ROLLERS WEAR

NEW COUNTER RACK ROLLER [90 mm (3.543 in)]	WORN COUNTER RACK ROLLER [84 mm (3.307 in)]
	

6.7 RECOMMENDED SPARE PARTS

1	FRONTAL GUIDE ROLLER	05638
2	LATERAL GUIDE ROLLER	05904
3	RACK LIMIT SWITCH	30286
4	STOP LIMIT SWITCH	31014
5	COUNTER RACK ROLLER	04946
6	PINION	17937
7	DRIVE SHAFT	9521A
8	BEARING SUPPORT	9520A
9	SUPPORT BEARING	45025
10	LIMIT SWITCH PIZZATO FG 60DD1D01	31366

11	MOTOR-BRAKE ROSSI	31285
12	GEAR BOX ROSSI	31286
13	SAFETY DEVICE	04389
14	OVERLOAD CELL	31122
15	ASSEMBLING RAMP LIMIT SWITCH	30282
16	CABLE GUIDES	05774
17	MANUAL EVACUATION	05940
18	FLOOR DOOR ELECTRIC LIMIT SWITCH	31014
19	ELECTRIC CABLE 8 awg - 4C Type W	-
20	SAFETY DEVICE PINION	16660

ORIGINAL SPARE PARTS FROM FACTORY

7. APPENDIX

7.1 MAINTENANCE CHECKING FORM

7.2 STRUCTURAL CHANGE FORM

7.3 ELECTRICAL CHANGE FORM

7.4 RELEVANT FAULT REPAIR FORM

7.5 SPARE PARTS

7.6 MOTOR – BRAKE & GEAR BOX: ROSSI 4 kW - 48.2

7.7 ELECTRIC DIAGRAMS AND PLATFORM INSTRUCTION USE

MAINTENANCE CHECKING FORM

NAME – SIGN	DESCRIPTION		REVISION DATE
		MONTHLY	
		TRIMESTRAL	
		SEMESTRAL	
		ANNUAL	
		MONTHLY	
		TRIMESTRAL	
		SEMESTRAL	
		ANNUAL	
		MONTHLY	
		TRIMESTRAL	
		SEMESTRAL	
		ANNUAL	
		MONTHLY	
		TRIMESTRAL	
		SEMESTRAL	
		ANNUAL	
		MONTHLY	
		TRIMESTRAL	
		SEMESTRAL	
		ANNUAL	

*Make copies of this sheet to be sure all regular checks are done and signed

STRUCTURAL CHANGE FORM

CHANGE OF STRUCTURAL COMPONENTS

Item description:.....

Reason for change: .....

Responsible and responsible company for change:.....

Member: .....

Date and location change:.....

CHANGE OF STRUCTURAL COMPONENTS

Item description:.....

Reason for change: .....

Responsible and responsible company for change:.....

Member: .....

Date and location change:.....

CHANGE OF STRUCTURAL COMPONENTS

Item description:.....

Reason for change: .....

Responsible and responsible company for change:.....

Member: .....

Date and location change:.....

*Make copies of this sheet to be sure all structural changes are controlled and signed

ELECTRICAL CHANGE FORM

CHANGE OF ELECTRICAL ELEMENTS

Item description:.....

Reason for change: .....

Responsible and responsible company for change:.....

Member: .....

Date and location change: .....

CHANGE OF ELECTRICAL ELEMENTS

Item description:.....

Reason for change: .....

Responsible and responsible company for change:.....

Member: .....

Date and location change: .....

CHANGE OF ELECTRICAL ELEMENTS

Item description:.....

Reason for change: .....

Responsible and responsible company for change:.....

Member: .....

Date and location change: .....

*Make copies of this sheet to be sure all electrical changes are controlled and signed

RELEVANT FAULT REPAIR FORM

FAILURE

Description of failure: .....

.....

Cause of failure: .....

.....

.....

FAILURE

Description of failure: .....

.....

Cause of failure: .....

.....

.....

FAILURE

Description of failure: .....

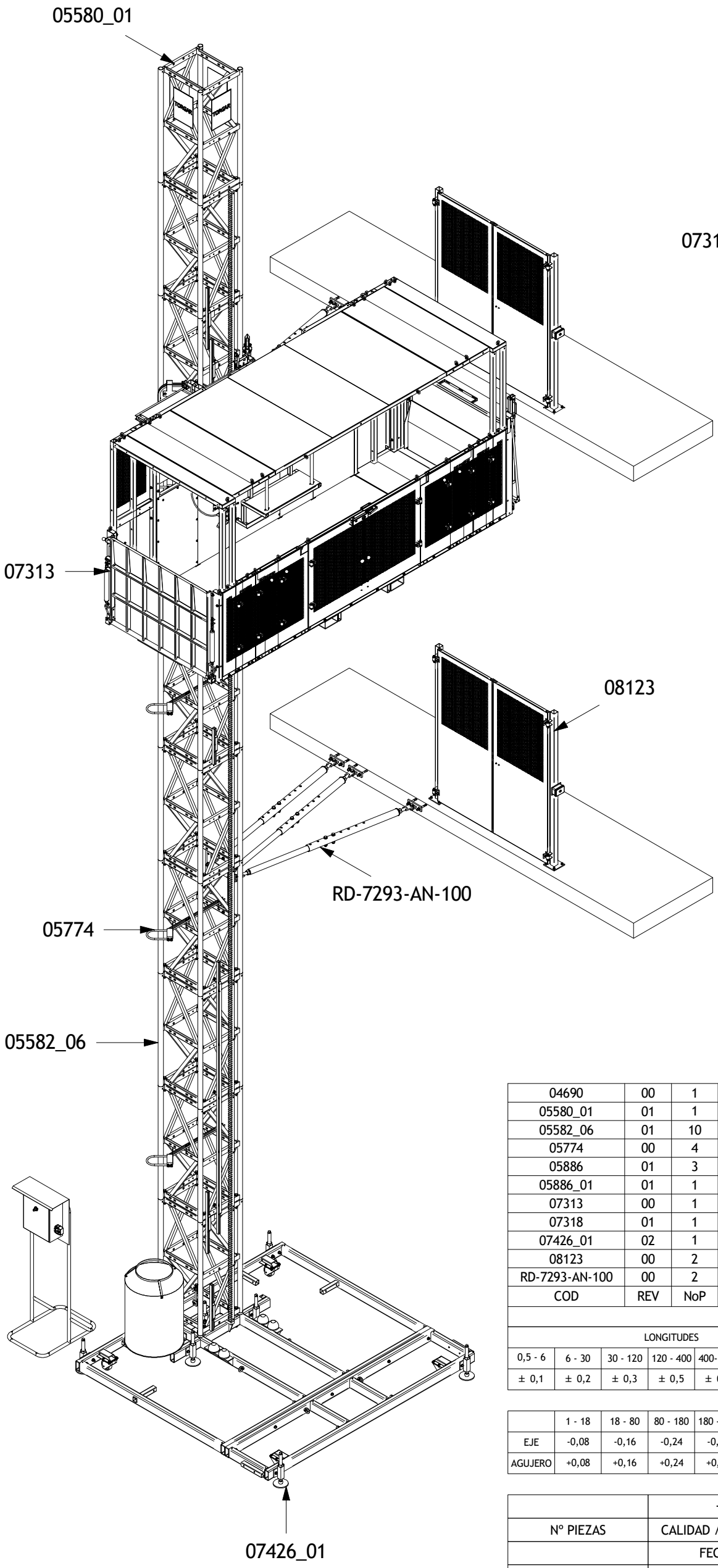
.....

Cause of failure: .....

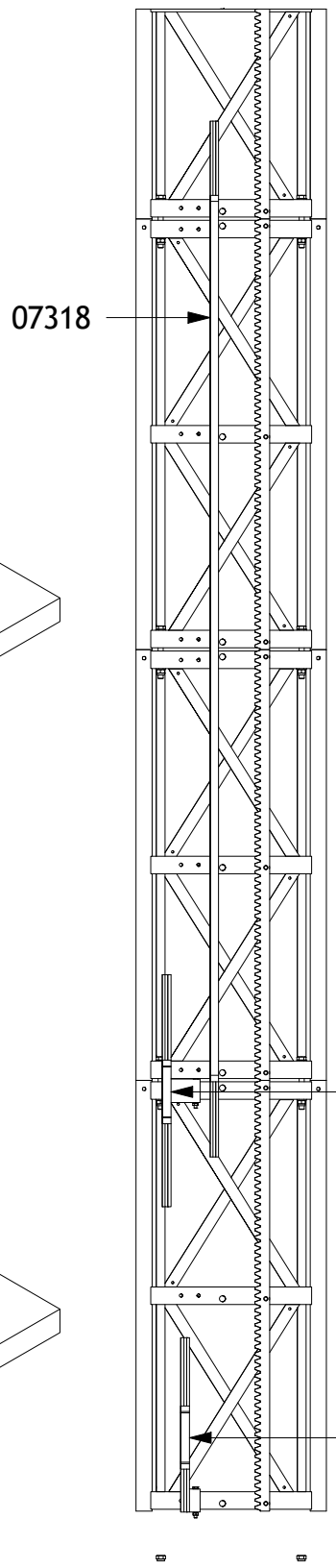
.....

.....

*Make copies of this sheet to be sure all relevant failures are controlled and signed



A (1 : 25)



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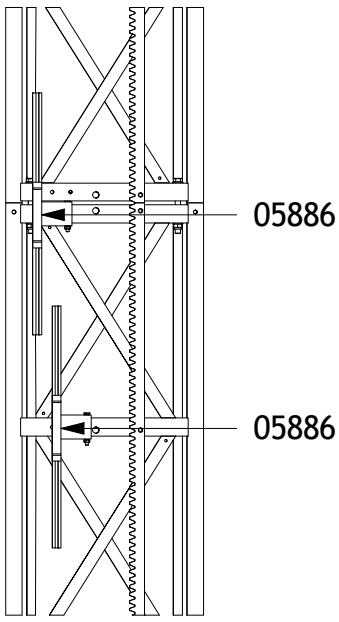
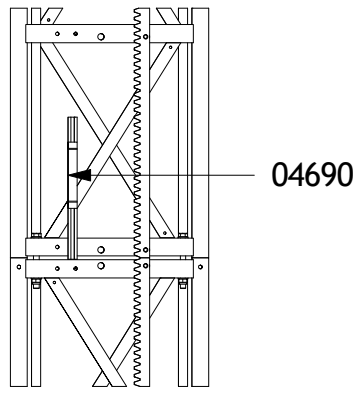


B (1 : 25)



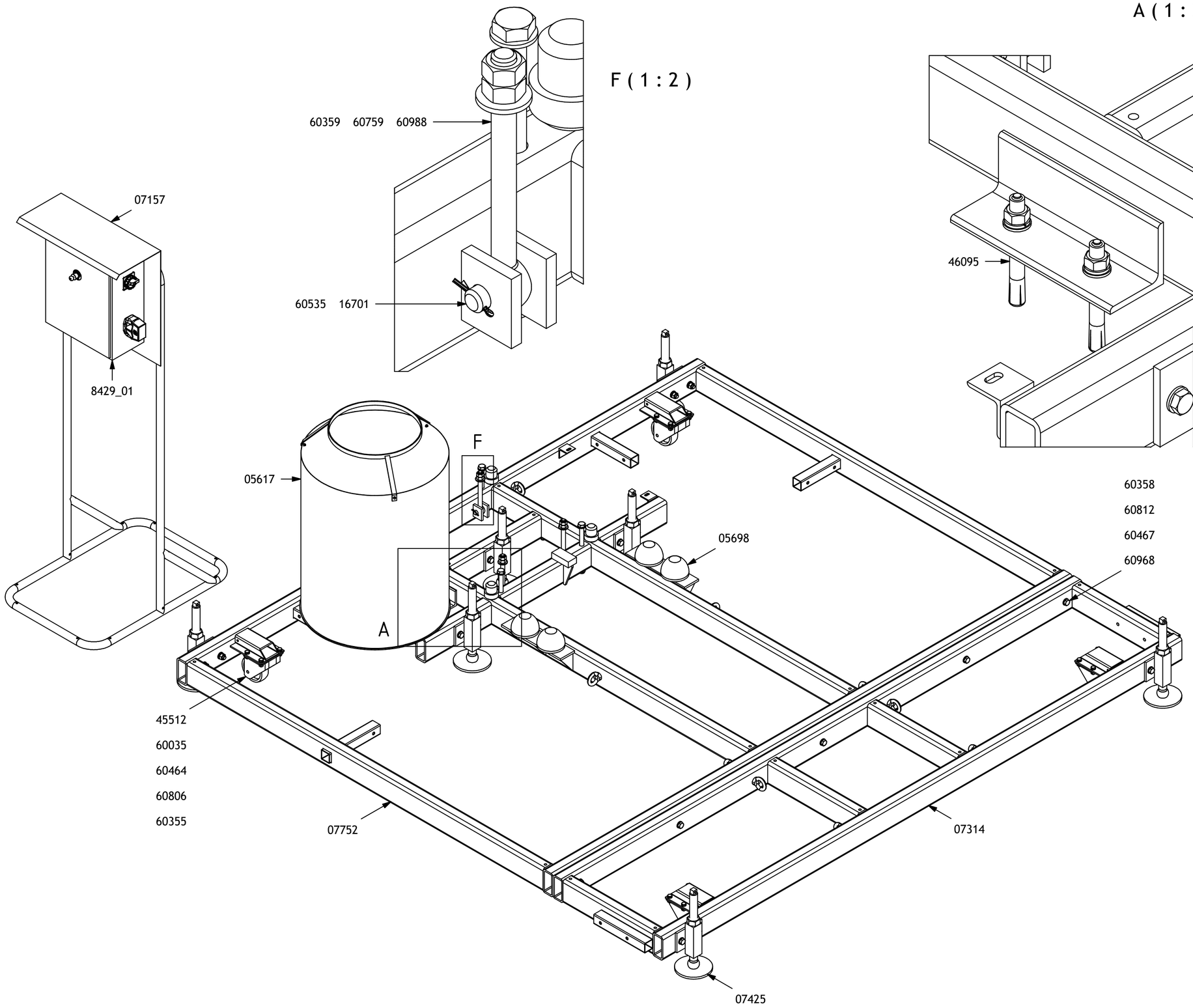
04690	00	1	PATIN EQUIPADO	470x30x105	ZN
05580_01	01	1	TRAMO SEGURIDAD EQUIPADO	1482x600x600	GALVA
05582_06	01	10	TRAMO EQUIPADO	655x708x1500	GALVA / ZN
05774	00	4	GUIA MANGUERA EQUIPADA	1084x312x20	GALVA / ZN
05886	01	3	PATIN EQUIPADO TOP-SEG	800x130x105	ZN
05886_01	01	1	PATIN EQUIPADO CBASE	600x66x105	ZN
07313	00	1	CABINA EQUIPADA	-	GALVANIZADO
07318	01	1	PATIN 3 MTS EQUIPADO	3567x106x30	ZN
07426_01	02	1	BASE EQUIPADA	-	GALVA
08123	00	2	CONJUNTO GENERAL	2010x1800	-
RD-7293-AN-100	00	2	ANCLAJE EQUIPADO		ZN / GALVA
COD	REV	NoP	DESCRIPCION	DIMENSIONES	CALIDAD / AMP

Lista de piezas

LONGITUDES							ANGULOS				FORMA Y POSICION			
0,5 - 6	6 - 30	30 - 120	120 - 400	400-1000	1000-2000	2000-4000	0º-10º	10º-50º	50º-120º	120º-360º	—	⊥	//	○
± 0,1	± 0,2	± 0,3	± 0,5	± 0,8	± 1,2	± 2	± 5 '	± 10 '	± 20 '	± 30 '	10 / 100	10 / 100	10 / 100	10 / 100

	1 - 18	18 - 80	80 - 180	180 - 400	ACABADO SUPERFICIAL			DIAMETROS TALADROS			RADIOS DE ACUERDO Y CHAFLANES			
EJE	-0,08	-0,16	-0,24	-0,35	BRUTO // DESBASTE // FINO			Ø0,5 - 6	Ø6 - 30	Ø30 - 120	0,5 - 3	3 - 6	6 - 30	30 - 120
AGUJERO	+0,08	+0,16	+0,24	+0,35	6µmm 25µmm	N8 3,2µmm	N6 0,8µmm	± 0,1	± 0,3	± 0,5	± 0,2	± 0,5	± 1	± 2

	-	GALVANIZADO	00	00
Nº PIEZAS	CALIDAD / ACAB MP	ACABADO FINAL	DIMENSION-BRUTO	REVISIÓN
	FECHA	NOMBRE	TORGAR	
DIBUJADO				
COMPROBADO				
MATERIAL / DESCRIPCIÓN: INSTALLATION DIMENSIONS			PLANO Nº 07423_150157&150160_R00.iam	
ESCALA	SUBCONJUNTO:		CLIENTE:	
	MÁQUINA:		FORMATO: A3	



05617	00	1	CUBO RECOGE MANGUERA	D640x929	GALVA
05698	00	4	SILENT BLOCK EQUIPADO	D120	GOMA
07157	00	1	SOLDADURA SOPORTE CUADRO	1917x601x864	NEGRA
07314	02	1	SOLDADURA 1/2 BASE	3220x660	GALVA
07425	00	7	SOPORTE HUSILLO EQUIPADO	-	-
07752	02	1	SOLDADURA 1/2 BASE	3120 x 2160	GALVA
8429_01	00	1	CUADRO ELÉCTRICO	500 x 400 x 200	-
16701	00	4	RED D22 (EJE TORNILLO OJO)	60	ZN
45512	00	4	RUEDA GIRATORIA 350 Kg-10TV125-TNB-0125	D118	COMERCIAL
46095	00	8	TACO HILTI M16x140	M16x140	ZN
60035	00	16	T.C.HEX M10X30 DIN 931	M10x30	DIN 931
60355	00	16	TUERCA HEX M10 DIN934	M10	DIN 934
60358	00	5	TUERCA HEX M16 DIN934	M16	DIN 934
60359	00	8	TUERCA HEX M18 DIN934	M18	DIN 934
60464	00	32	ARANDELA PLANA D10 DIN125	D10	DIN 125
60467	00	10	ARANDELA PLANA D16 DIN 125	D16	DIN 125
60468	00	8	ARANDELA PLANA D18 DIN 125	D18	DIN 125
60535	00	4	PASADOR ALETAS D3X35 DIN94	D3x35	DIN 94
60759	00	4	RED D40 (ARANDELA M18)	7	ZN
60806	00	16	ARANDELA GROWER D10 DIN127	D10	DIN 127
60812	00	5	ARANDELA GROWER D16 DIN127	D16	DIN 127
60968	00	5	TCH M16 x 150 DIN 931	M16 x 150	DIN 931
60988	00	4	TORNILLO OJO M18x200 DIN 444	M18x200	DIN 444
61025	00	4	TCH M18X240 DIN931	M18x240	DIN 931
61051	00	4	TUERCA BLOC M18 DIN 985	M18	DIN 985
COD	REV	NoP	DESCRIPCION	DIMENSIONES	CALIDAD / AMP

Lista de piezas

LONGITUDES							ANGULOS				FORMA Y POSICION			
0,5 - 6	6 - 30	30 - 120	120 - 400	400-1000	1000-2000	2000-4000	0°-10°	10°-50°	50°-120°	120°-360°	—	⊥	//	○
± 0,1	± 0,2	± 0,3	± 0,5	± 0,8	± 1,2	± 2	± 5 '	± 10 '	± 20 '	± 30 '	10 / 100	10 / 100	10 / 100	10 / 100

	1 - 18	18 - 80	80 - 180	180 - 400	ACABADO SUPERFICIAL			DIAMETROS TALADROS			RADIOS DE ACUERDO Y CHAFLANES			
EJE	-0,08	-0,16	-0,24	-0,35	BRUTO // DESBASTE // FINO			Ø0,5 - 6	Ø6 - 30	Ø30 - 120	0,5 - 3	3 - 6	6 - 30	30 - 120
AGUJERO	+0,08	+0,16	+0,24	+0,35	6µmm 25µmm	N8 3,2µmm	N6 0,8µmm	± 0,1	± 0,3	± 0,5	± 0,2	± 0,5	± 1	± 2

1	GALVA	GALVA	-	02
Nº PIEZAS	CALIDAD / ACAB MP	ACABADO FINAL	DIMENSION-BRUTO	REVISIÓN
	FECHA	NOMBRE	TORGAR	
DIBUJADO	11-11-21	JGE		
COMPROBADO				
MATERIAL / DESCRIPCIÓN:			PLANO Nº	
BASE EQUIPADA			07426_01_R02.iam	
ESCALA	SUBCONJUNTO: CONJUNTO GENERAL		CLIENTE:	
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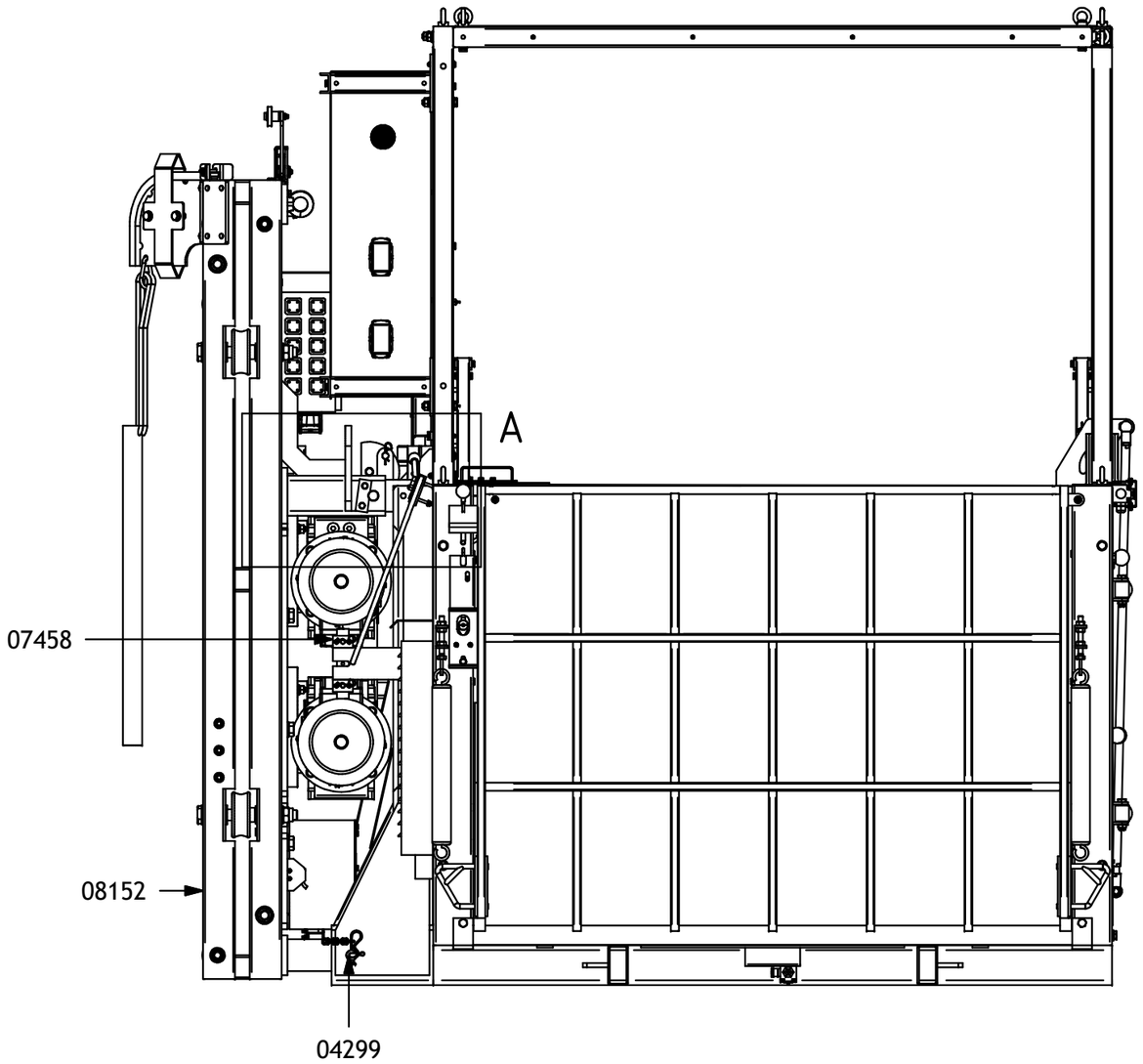
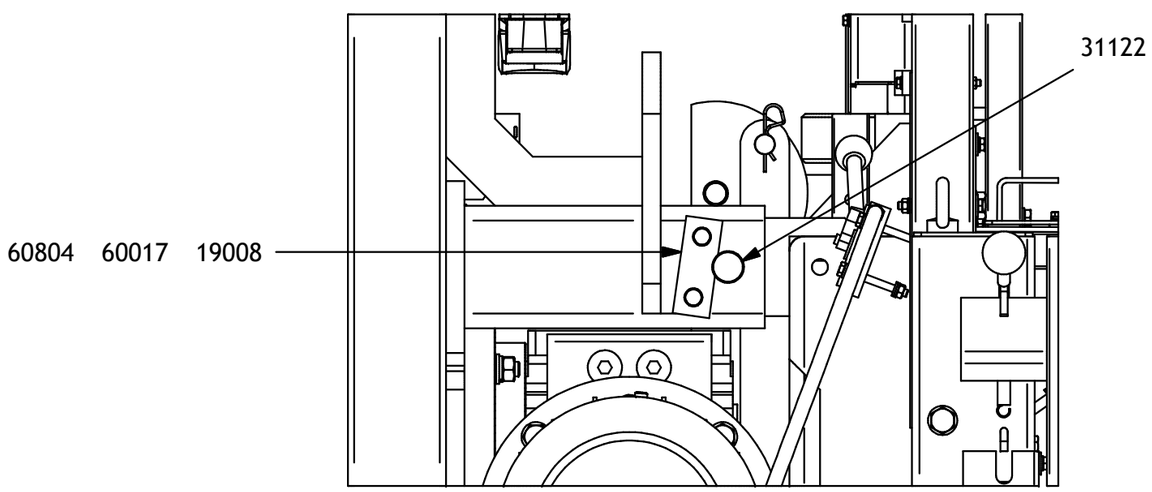
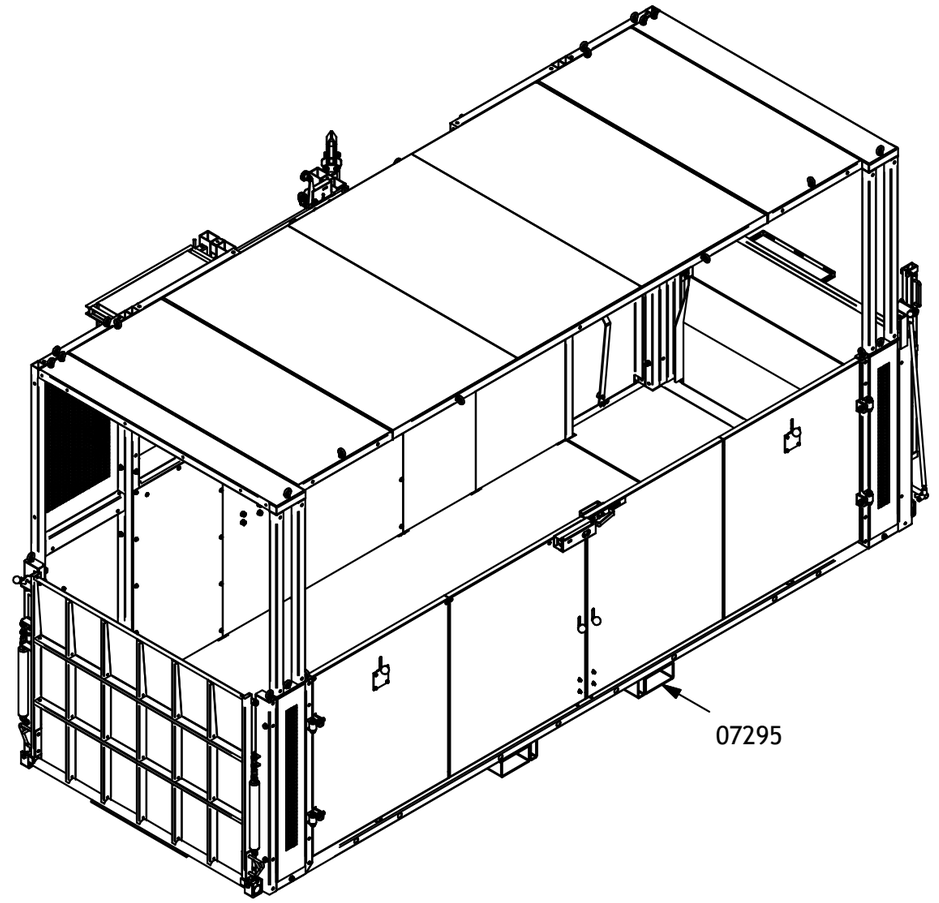


A (1 : 5)





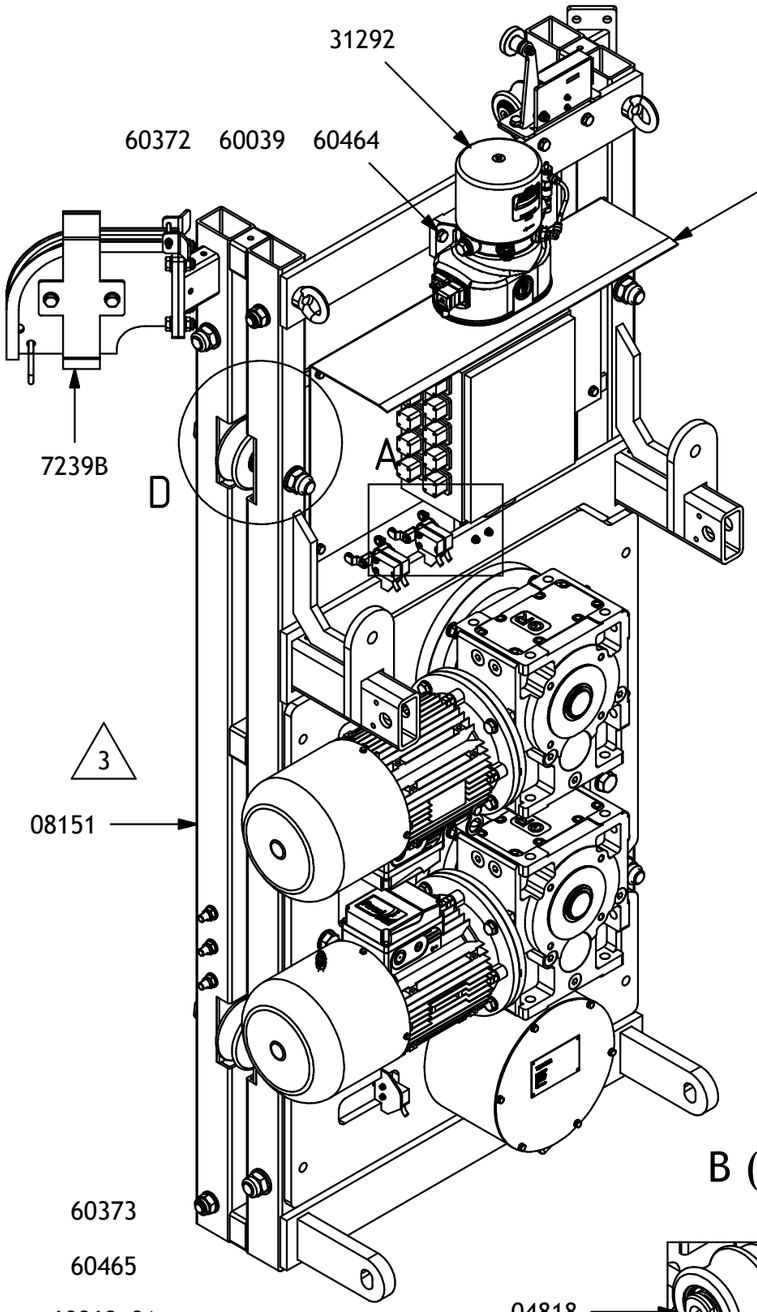
04299	00	2	BULÓN / CADENA EQUIPADO	D25x113	GALVA/ZN
07295	00	1	CABINA GRANDE EQUIPADA	-	GALVANIZADO
07458	01	1	SISTEMA DE DESBLOQUEO	-	GALVA
08152	03	1	GRUPO MOTOR EQUIPADO	-	GALVA/ZN
19008	01	3	PT 30X5 (FIJACIÓN CÉLULA)	80	F-1
31122	00	2	BULÓN PESAJE 3000 KG	S/ PLANO	DINACELL
60017	00	6	TCHEX M8X15 DIN931	M8 x 15	DIN 931
60804	00	6	ARANDELA GROWER D8 DIN127	D8	DIN 127
COD	REV	NoP	DESCRIPCION	DIMENSIONES	CALIDAD / AMP

Lista de piezas

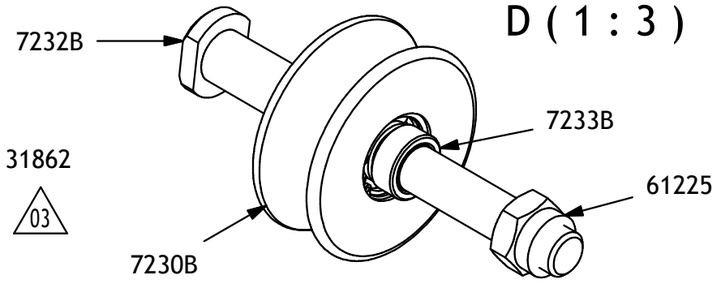
LONGITUDES							ANGULOS				FORMA Y POSICION			
0,5 - 6	6 - 30	30 - 120	120 - 400	400-1000	1000-2000	2000-4000	0º-10º	10º-50º	50º-120º	120º-360º	—	⊥	//	○
± 0,1	± 0,2	± 0,3	± 0,5	± 0,8	± 1,2	± 2	± 5 '	± 10 '	± 20 '	± 30 '	10 / 100	10 / 100	10 / 100	10 / 100

	1 - 18	18 - 80	80 - 180	180 - 400	ACABADO SUPERFICIAL			DIAMETROS TALADROS			RADIOS DE ACUERDO Y CHAFLANES			
EJE	-0,08	-0,16	-0,24	-0,35	BRUTO // DESBASTE // FINO			Ø0,5 - 6	Ø6 - 30	Ø30 - 120	0,5 - 3	3 - 6	6 - 30	30 - 120
AGUJERO	+0,08	+0,16	+0,24	+0,35	6µmm 25µmm	N8 3,2µmm	N6 0,8µmm	± 0,1	± 0,3	± 0,5	± 0,2	± 0,5	± 1	± 2

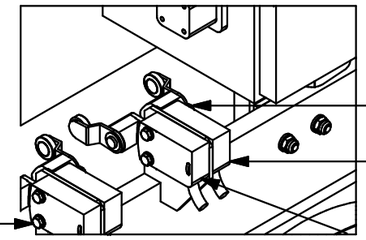
	GALVANIZADO	GALVANIZADO	-	00
Nº PIEZAS	CALIDAD / ACAB MP	ACABADO FINAL	DIMENSION-BRUTO	REVISIÓN
	FECHA	NOMBRE	TORGAR	
DIBUJADO				
COMPROBADO				
MATERIAL / DESCRIPCIÓN: CABINA EQUIPADA			PLANO Nº 07313_150143&150144_R00.iam	
ESCALA	SUBCONJUNTO:		CLIENTE:	
	MÁQUINA:		FORMATO: A3	

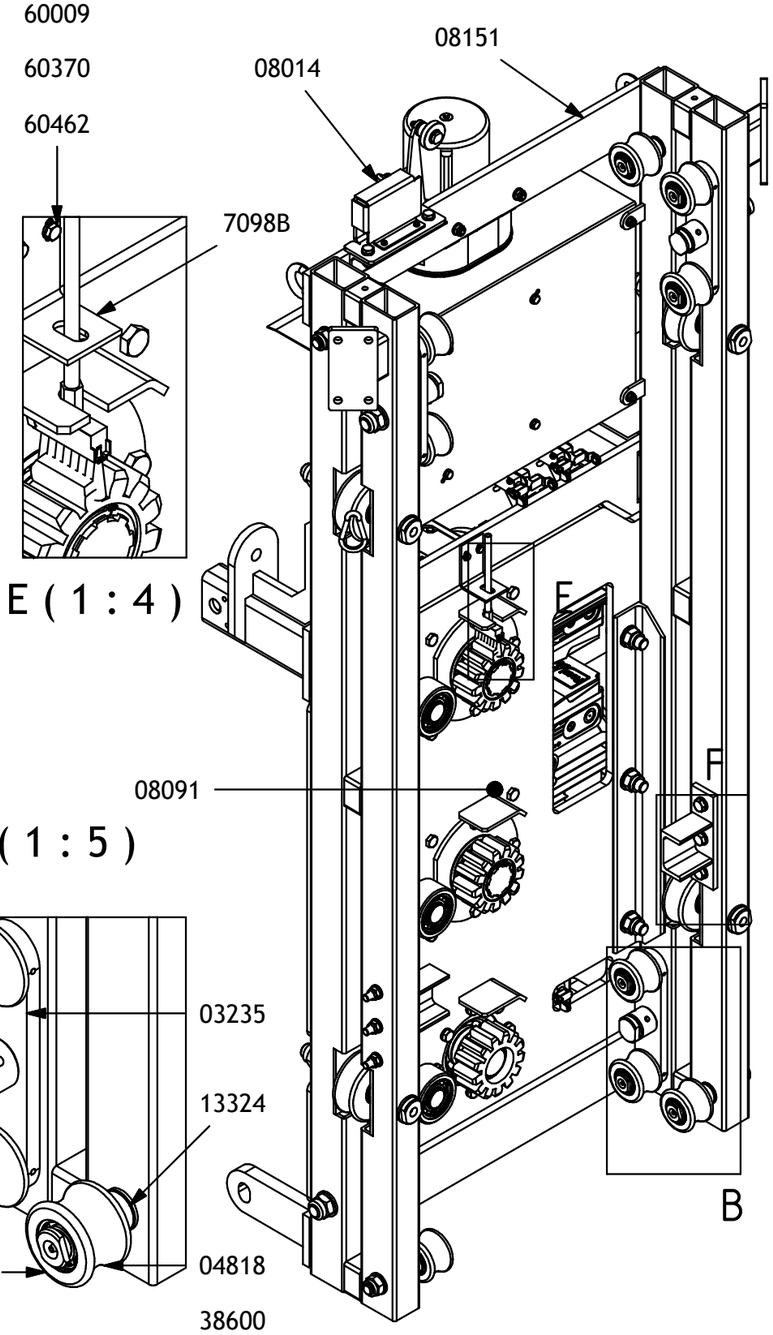


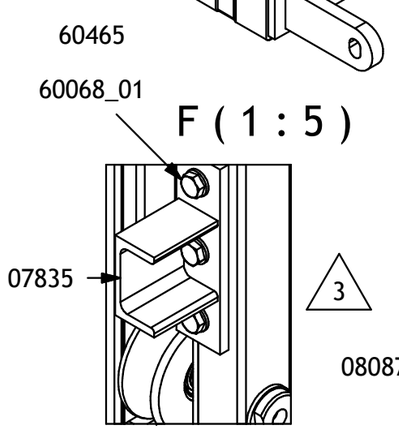
D (1 : 3)

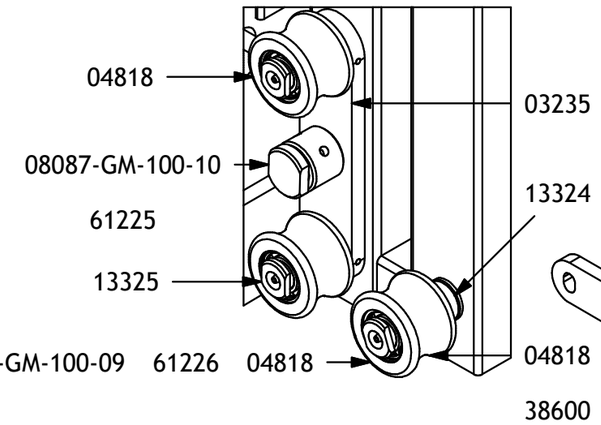


A (1 : 4)









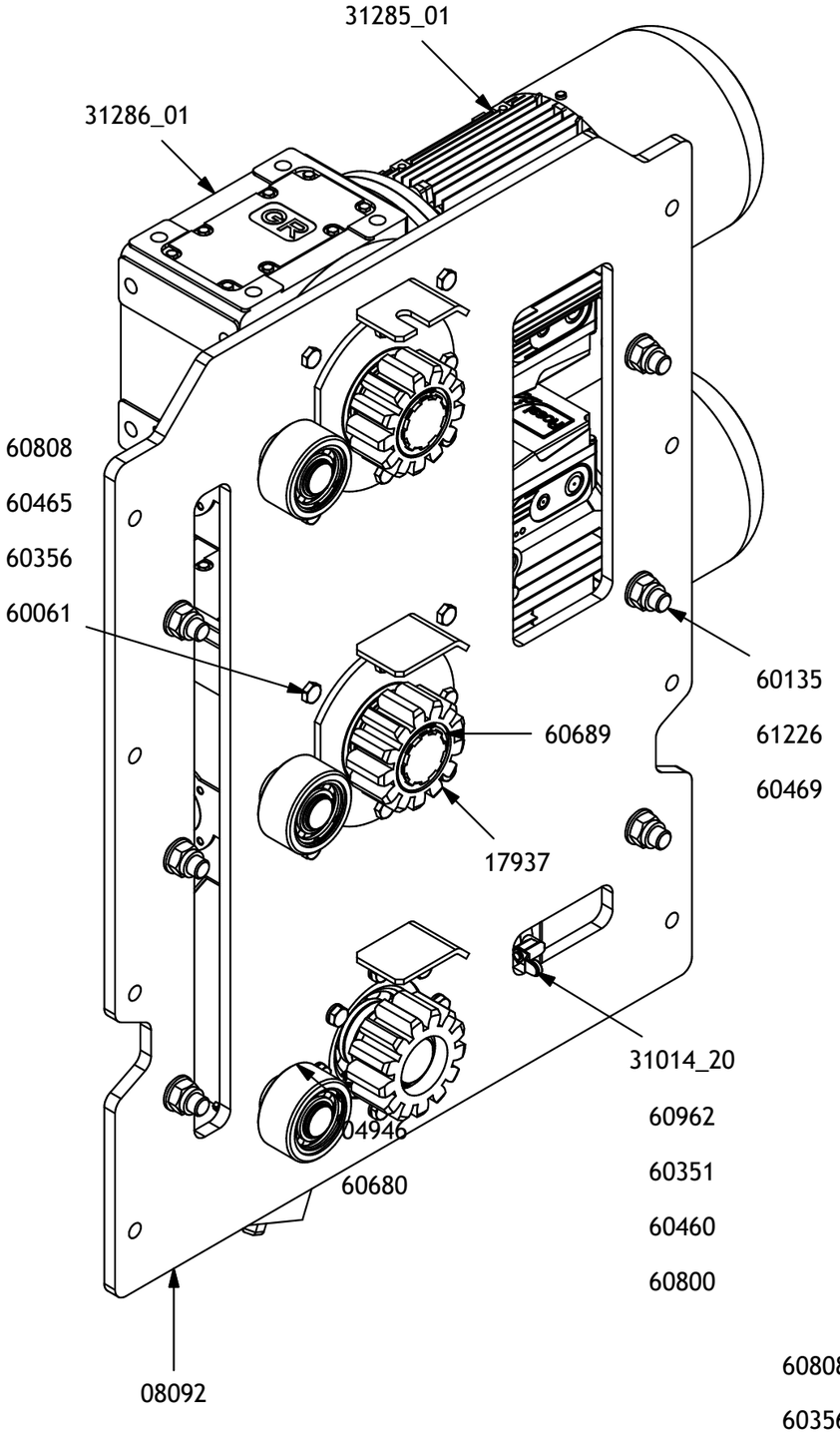
03235	01	4	BALANCIN	260x60x50	NEGRA
04818	01	12	RODILLO GUÍA EQUIPADO	D75 x 50	-
7098B	00	1	CH-4 (SOPORTE BROCHA)	138x50	GALVA
7230B	01	4	RODILLO GUÍA EQUIPADO	D110 x 45	-
7232B	02	4	RED D45 (EJE BALANCÍN)	250	F-127
7233B	00	4	RED D35	15	F-1110
7239B	00	2	BRAZO SALIDA MANGUERA	-	-
07835	00	2	TOPE SEGURIDAD	105x185x140	NEGRA
08014	00	1	DETECTOR CREMALLERA EQUIPADA	-	-
08087-GM-100-09	01	4	RED D35 (EJE FRONTAL)	170	F-127
08087-GM-100-10	01	4	RED D45 (EJE BALANCÍN)	162.5	F-127
08091	00	1	GMOTOR ROSSI 4 kW 112 - 60 Hz - MRICI100 48.2	1066x800	-
08151	04	1	SOLDADURA GRUPO MOTOR PL-EXT	-	NEGRA
13324	00	4	RED D35	22	F-1110
13325	01	8	RED D35 (EJE CORTO)	81	F-127
31014_20	01	2	SCHNEIDER XCSM4116L5 (SEG SUP-INF)	-	-
31014_21	01	2	SCHNEIDER XCSM4116L5 (SEG SUP-INF)	-	-
31292	00	1	EQUIPO DE LUBRICACION P502	263x149x214	COMERCIAL
31292_P01	00	1	CEPILLO ENGRASADOR SPF57	-	-
31862	01	1	CUADRO CONEXIONES EQUIP	-	-
38600	00	12	ENGRASADOR M8	M8	DIN 71412
60009	00	2	T.C.HEX M6X30 DIN931	M6x30	DIN 931
60039	00	2	TCH M10x45 DIN931	M10x45	DIN 931
60068_01	00	6	TCHEX M12X100 DIN 931	M12x100	DIN 931
60351	00	4	TUERCA HEX M4 DIN934	M4	DIN 934
60370	00	2	TUERCA AUTOB. M6 DIN985	M6	DIN 985
60372	00	2	TUERCA AUTOB. M10 DIN985	M10	DIN 985
60373	00	6	TUERCA AUTOB M12 DIN985	M12	DIN 985
60460	00	8	ARANDELA PLANA D4 DIN125	D4	DIN 125
60462	00	4	ARANDELA PLANA D6 DIN125	D6	DIN 125
60464	00	4	ARANDELA PLANA D10 DIN125	D10	DIN 125
60465	00	12	ARANDELA PLANA D12 DIN 125	D12	DIN 125
60949	00	4	TCH M4X40 DIN 931	M4X40	DIN 931
61225	00	8	TUERCA BLOCANTE M 24 DIN 985	M24	DIN 985
61226	00	4	TUERCA BLOCANTE M20 DIN 985	M20	DIN 985
COD	REV	NoP	DESCRIPCION	DIMENSIONES	CALIDAD / AMP

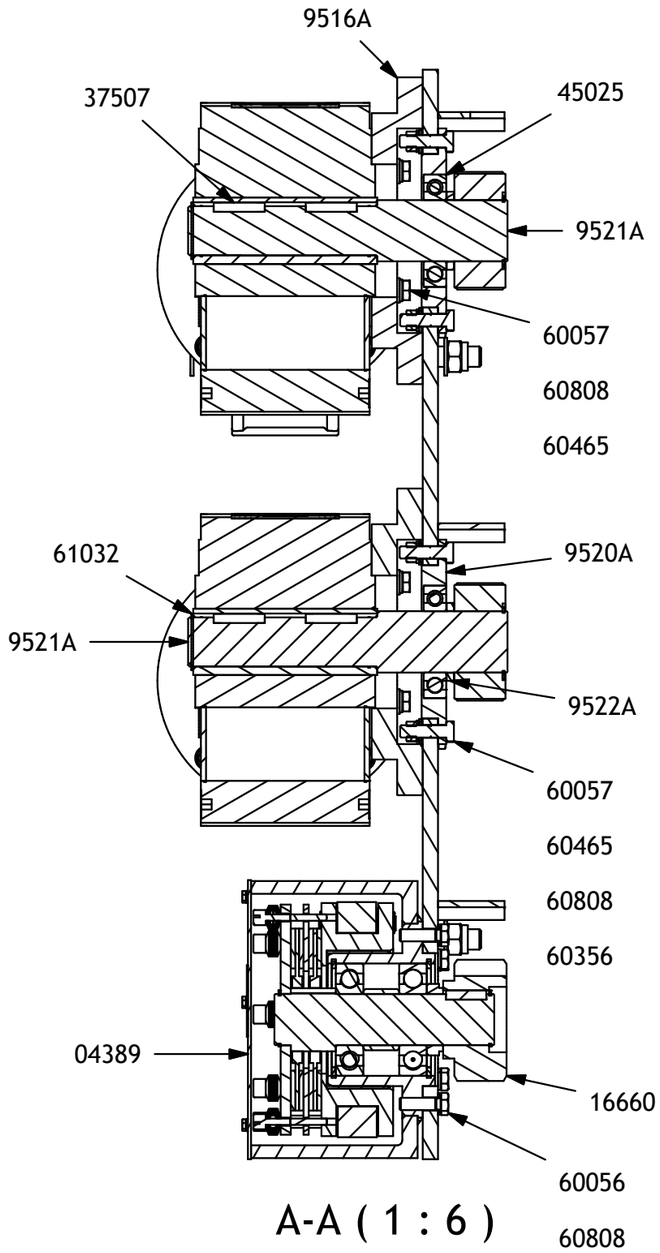
Lista de piezas

LONGITUDES							ANGULOS				FORMA Y POSICION			
0,5 - 6	6 - 30	30 - 120	120 - 400	400-1000	1000-2000	2000-4000	0°-10°	10°-50°	50°-120°	120°-360°	—	⊥	//	○
± 0,1	± 0,2	± 0,3	± 0,5	± 0,8	± 1,2	± 2	± 5 '	± 10 '	± 20 '	± 30 '	10 / 100	10 / 100	10 / 100	10 / 100

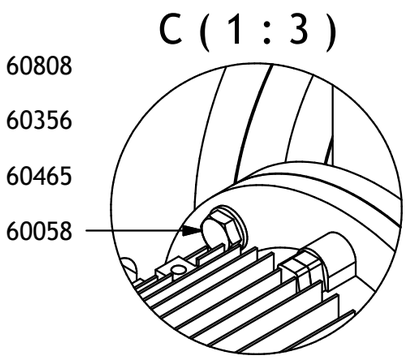
	1 - 18	18 - 80	80 - 180	180 - 400	ACABADO SUPERFICIAL			DIAMETROS TALADROS			RADIOS DE ACUERDO Y CHAFLANES			
EJE	-0,08	-0,16	-0,24	-0,35	BRUTO // DESBASTE // FINO			Ø0,5 - 6	Ø6 - 30	Ø30 - 120	0,5 - 3	3 - 6	6 - 30	30 - 120
AGUJERO	+0,08	+0,16	+0,24	+0,35	6µmm 25µmm	N8 3,2µmm	N6 0,8µmm	± 0,1	± 0,3	± 0,5	± 0,2	± 0,5	± 1	± 2

	GALVA/ZN	GALVA/ZN	-	03
Nº PIEZAS	CALIDAD / ACAB MP	ACABADO FINAL	DIMENSION-BRUTO	REVISIÓN
	FECHA	NOMBRE	TORGAR	
DIBUJADO	27-01-22	AEA		
COMPROBADO				
MATERIAL / DESCRIPCIÓN: GRUPO MOTOR EQUIPADO			PLANO Nº 08152_R03.iam	
ESCALA	SUBCONJUNTO: CABINA EQUIPADA		CLIENTE:	
1:10	MÁQUINA: PL-EXT		FORMATO: A3	





A-A (1 : 6)



C (1 : 3)

04389	03	1	PARACAÍDAS DRCH CILINDRICO PROGRESIVO	241x273 x 382	PINTADO
04946	01	3	GALE CONTRACREMALLERA EQUIPADO	-	-
08092	00	1	PLACA SOLDADURA	1066x800x122	NEGRA
9516A	00	2	RED D300 (BRIDA)	55	F-1110
9520A	00	2	RED D200 (SOPORTE RODAMIENTO)	28	F-1110
9521A	00	2	RED D70 (EJE)	315	F-1272
9522A	00	2	RED D80	9	F-1110
16660	00	1	RED D130 (PIÑÓN PARACAÍDAS)	65	F-1560
17937	00	2	RED D130 (PIÑÓN MOTRIZ)	53	F-1560
31014_20	01	1	SCHNEIDER XCSM4116L5 (SEG SUP-INF)	-	-
31285_01	00	2	ROSSI HBZ_112M_4kW_480V-60Hz_B5	4kW_480V-60Hz	ROSSI
31286_01	00	2	ROSSI MRICI100UO3A28x250-48,2	28x250-48,2	ROSSI
37507	00	4	CHAVETA 14x9x50 DIN6885	14x9x50	DIN 6885
45025	00	2	RODAMIENTO 6212 60x110x22 DIN625	60x110x22	DIN625
60056	00	8	TCH M12x40 DIN933	M12x40	DIN 933
60057	00	14	T.C.HEX. M12 L=45 DIN 931	M12x45	DIN 931
60058	00	8	TCH M12x50 DIN931	M12x50	DIN931
60061	00	8	T.C.HEX. M12 L=60 DIN 931	M12x60	DIN 931
60135	00	6	TCHEX M20X60 DIN 931	M20X60	DIN 931
60351	00	2	TUERCA HEX M4 DIN934	M4	DIN 934
60354	00	2	TUERCA HEX M8 DIN934	M8	DIN 934
60356	00	22	TUERCA HEX M12 DIN934	M12	DIN 934
60371	00	2	TUERCA AUTOBLOCANTE M8 DIN985	M8	DIN 985
60460	00	4	ARANDELA PLANA D4 DIN125	D4	DIN 125
60463	00	4	ARANDELA PLANA D8 DIN125	D8	DIN 125
60465	00	38	ARANDELA PLANA D12 DIN 125	D12	DIN 125
60469	00	12	ARANDELA PLANA D21 DIN125	D21	DIN125
60680	00	3	GRUPILLA E-35 DIN 471	E-35	DIN 471
60689	00	2	GRUPILLA E-60 DIN471	E-60	DIN 471
60800	00	2	ARANDELA GROWER D4 DIN127	D4	DIN 127
60804	00	2	ARANDELA GROWER D8 DIN127	D8	DIN 127
60808	00	38	ARANDELA GROWER D12 DIN127	D12	DIN 127
60962	00	2	TCH M4X25 DIN933	M4X25	DIN933
61032	00	2	GRUPILLA E-48 DIN 471	E-48	DIN 471
61226	00	6	TUERCA BLOCANTE M20 DIN 985	M20	DIN 985
COD	REV	NoP	DESCRIPCION	DIMENSIONES	CALIDAD / AMP

Lista de piezas

LONGITUDES							ANGULOS				FORMA Y POSICION			
0,5 - 6	6 - 30	30 - 120	120 - 400	400-1000	1000-2000	2000-4000	0º-10º	10º-50º	50º-120º	120º-360º	—	⊥	//	○
± 0,1	± 0,2	± 0,3	± 0,5	± 0,8	± 1,2	± 2	± 5 '	± 10 '	± 20 '	± 30 '	10 / 100	10 / 100	10 / 100	10 / 100

	1 - 18	18 - 80	80 - 180	180 - 400	ACABADO SUPERFICIAL			DIAMETROS TALADROS			RADIOS DE ACUERDO Y CHAFLANES			
EJE	-0,08	-0,16	-0,24	-0,35	BRUTO // DESBASTE // FINO			Ø0,5 - 6	Ø6 - 30	Ø30 - 120	0,5 - 3	3 - 6	6 - 30	30 - 120
AGUJERO	+0,08	+0,16	+0,24	+0,35	6µmm 25µmm	N8 3,2µmm	N6 0,8µmm	± 0,1	± 0,3	± 0,5	± 0,2	± 0,5	± 1	± 2

	-	GALVANIZADO	1066x800	00
Nº PIEZAS	CALIDAD / ACAB MP	ACABADO FINAL	DIMENSION-BRUTO	REVISIÓN
	FECHA	NOMBRE	TORGAR	
DIBUJADO	17-01-22	AEA		
COMPROBADO				
MATERIAL / DESCRIPCIÓN:			PLANO Nº	
GMOTOR ROSSI 4 kW 112 - 60 Hz - MRICI100 48.2			08091_R00.iam	
ESCALA	SUBCONJUNTO: GRUPO MOTOR EQUIPADO		CLIENTE:	
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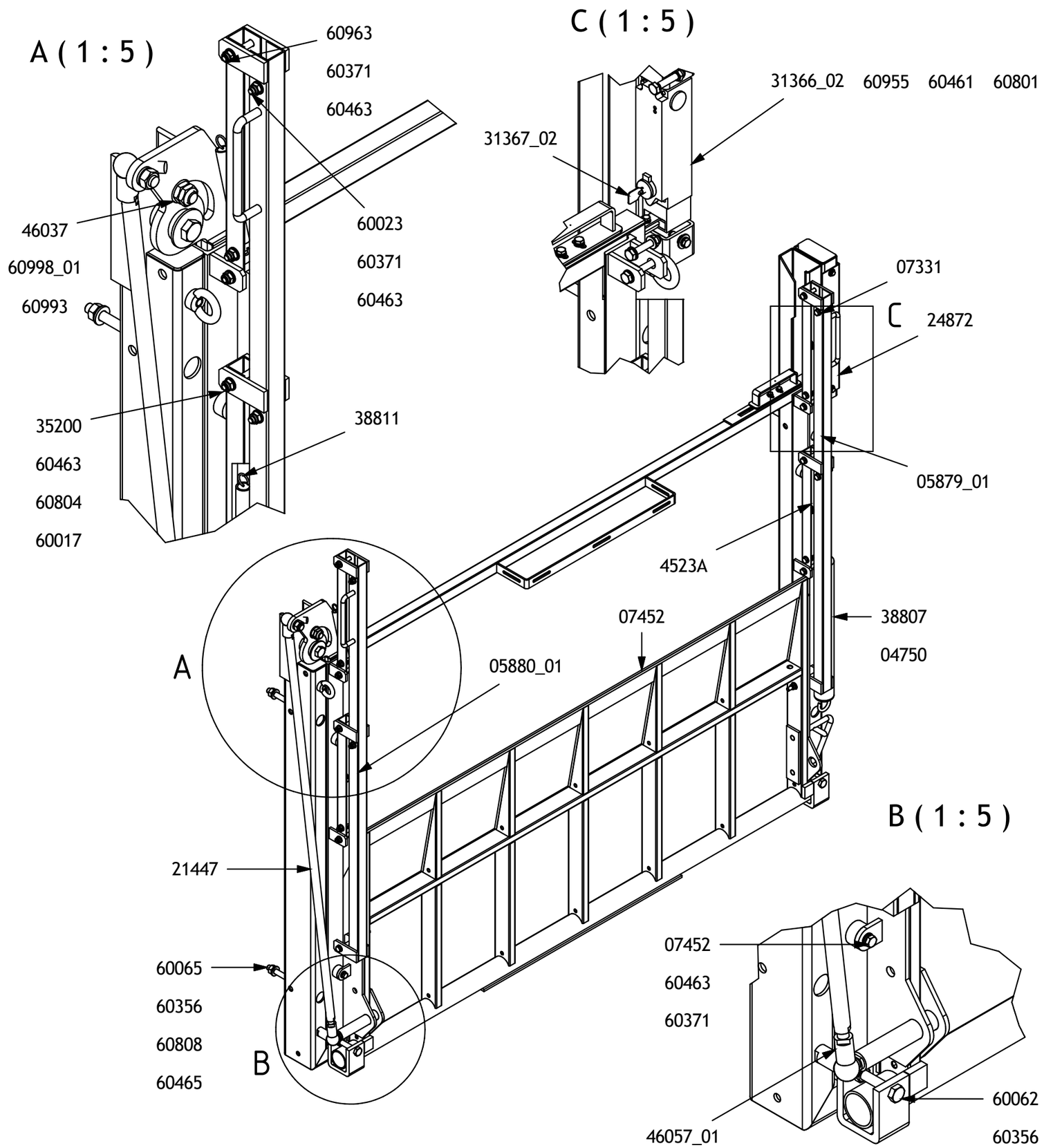

4523A	00	4	CH-2 GALVA	82x350	GALVA
04750	00	1	TENSOR	147.5	GALVA
05879_01	02	1	VERTICAL BARANDILLA DCHA (SOLDADURA)	1140x75x42	GALVA
05880_01	02	1	VERTICAL BARANDILLA IZQ (SOLDADURA)	1140x75x42	GALVA
07331	02	1	MARCO RAMPA PEQUEÑA	1660 X 1750 X 170	GALVA
07451	00	1	CIERRE 1,1 METROS EQUIPADO	-	GALVA
07452	02	1	RAMPA 0,65 M EQUIPADA	1700 X 650 X 151	GALVA
21447	00	1	RED D20 (EJE RÓTULAS)	1120	F-1110
24872	01	1	CH-2 GALVANIZADA	357 X 80	GALVA
31366_02	00	1	FDC BLOQUEO TELEMECANICA	-	-
31367_02	00	1	XCSZ25 LLAVE DE DESBLOQUEO	-	COMERCIAL
35200	00	2	TACO GOMA	REF. 212 / 15	CAUCHO
38807	00	1	MUELLE 45.5x40x34.5 5.5	480	COMERCIAL
38811	00	4	MUELLE 18x14x2	140	COMERCIAL
46037	00	2	ARANDELA ANTIFRICCIÓN WC14DU	WC14DU	COMERCIAL
46057_01	01	2	ARTICULACIÓN ANGULAR AS19M14X2	M14	ZN
60008	00	2	T.C.HEX M6X25 DIN931	M6X25	DIN 931
60017	00	2	TCHEX M8X15 DIN931	M8 x 15	DIN 931
60023	00	8	TCHEX M8X45 DIN 933	M8x45	DIN 933
60062	00	2	T.C.HEX.M12X65 DIN 931	M12X65	DIN 931
60065	00	8	TCHEX M12X80 DIN931	M12x80	DIN931
60352	00	2	TUERCA HEX M5 DIN934	M5	DIN 934
60356	00	13	TUERCA HEX M12 DIN 934	M12	DIN 934
60371	00	18	TUERCA AUTOBLOCANTE M8 DIN985	M8	DIN 985
60461	00	4	ARANDELA PLANA D5 DIN125	D5	DIN 125
60463	00	38	ARANDELA PLANA D8 DIN125	D8	DIN 125
60465	00	16	ARANDELA PLANA D12 DIN 125	D12	DIN 125
60467	00	1	ARANDELA PLANA D16 DIN 125	D16	DIN 125
60758	00	2	ARANDELA PLANA D6 DIN9021	D6	DIN 9021
60801	00	2	ARANDELA GROWER D5 DIN127	D5	DIN 127
60802	00	2	ARANDELA GROWER D6 DIN127	D6	DIN 127
60804	00	2	ARANDELA GROWER D8 DIN127	D8	DIN 127
60808	00	8	ARANDELA GROWER D12 DIN127	D12	DIN 127
60812	00	1	ARANDELA GROWER D16 DIN127	D16	DIN 127
60865_01	00	2	TCH M8X100 DIN931	M8x100	DIN931
60955	00	2	TCHEX M5X50 DIN931	M5 x 50	DIN 931
60963	00	8	TCHEX M8X55 DIN931	M8 x 55	DIN 931
60993	00	4	TUERCA M16 DIN 439	M16	DIN 439
60998_01	00	1	TCH M16X65 DIN 933	M16X65	DIN 933
61174	00	2	TUERCA REMACHABLE M6	-	-
COD	REV	NoP	DESCRIPCION	DIMENSIONES	CALIDAD / AMP

Lista de piezas

LONGITUDES							ANGULOS				FORMA Y POSICION			
0,5 - 6	6 - 30	30 - 120	120 - 400	400-1000	1000-2000	2000-4000	0º-10º	10º-50º	50º-120º	120º-360º	—	⊥	//	○
± 0,1	± 0,2	± 0,3	± 0,5	± 0,8	± 1,2	± 2	± 5 '	± 10 '	± 20 '	± 30 '	10 / 100	10 / 100	10 / 100	10 / 100

	1 - 18	18 - 80	80 - 180	180 - 400	ACABADO SUPERFICIAL			DIAMETROS TALADROS			RADIOS DE ACUERDO Y CHAFLANES			
EJE	-0,08	-0,16	-0,24	-0,35	BRUTO // DESBASTE // FINO			Ø0,5 - 6	Ø6 - 30	Ø30 - 120	0,5 - 3	3 - 6	6 - 30	30 - 120
AGUJERO	+0,08	+0,16	+0,24	+0,35	6µmm 25µmm	N8 3,2µmm	N6 0,8µmm	± 0,1	± 0,3	± 0,5	± 0,2	± 0,5	± 1	± 2

	GALVA	GALVA	1800x1650x190	02
Nº PIEZAS	CALIDAD / ACAB MP	ACABADO FINAL	DIMENSION-BRUTO	REVISIÓN
	FECHA	NOMBRE	TORGAR	
DIBUJADO	02-02-2021	IFL		
COMPROBADO				
MATERIAL / DESCRIPCIÓN: POSTIZO RAMPA 0,65 M EQUIPADO			PLANO Nº 07330_R02.iam	
ESCALA	SUBCONJUNTO: CABINA GRANDE EQUIPADA		CLIENTE:	
1:6	MÁQUINA: PL-15 EXT		FORMATO: A3	

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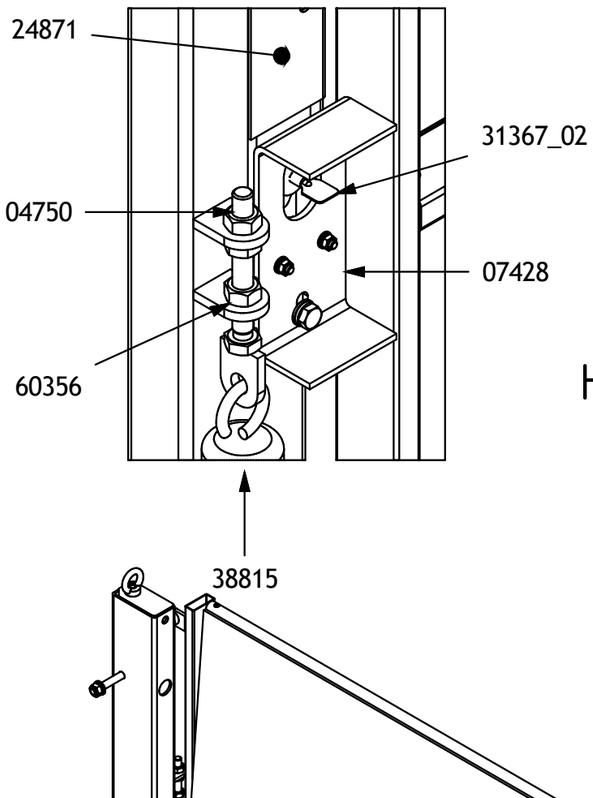
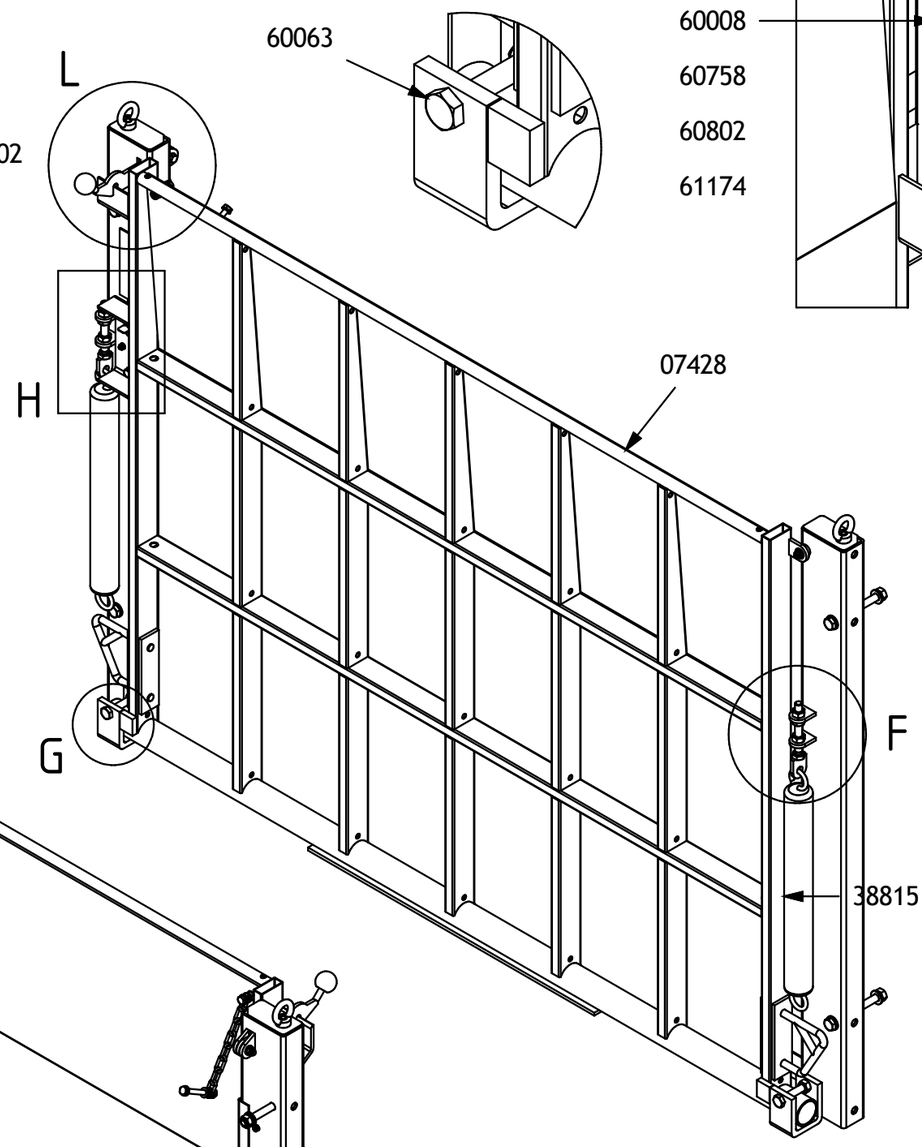
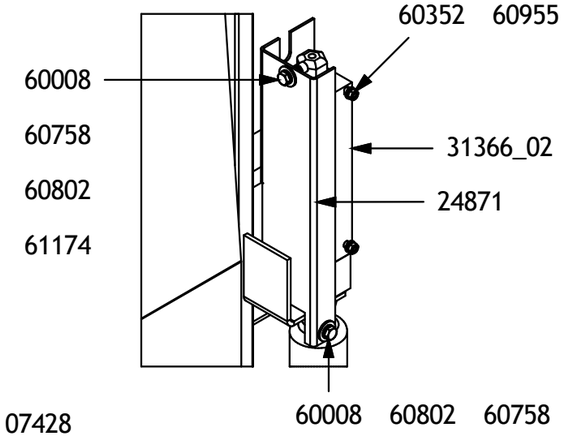


G (1 : 3)





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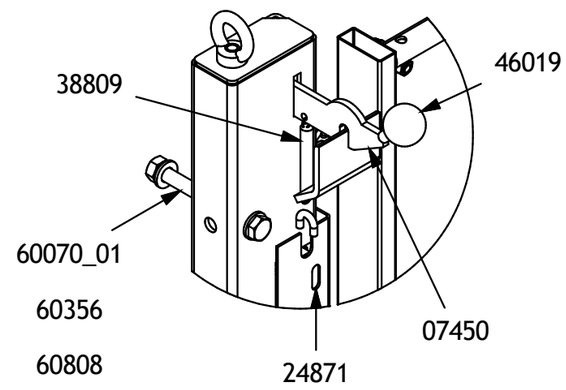

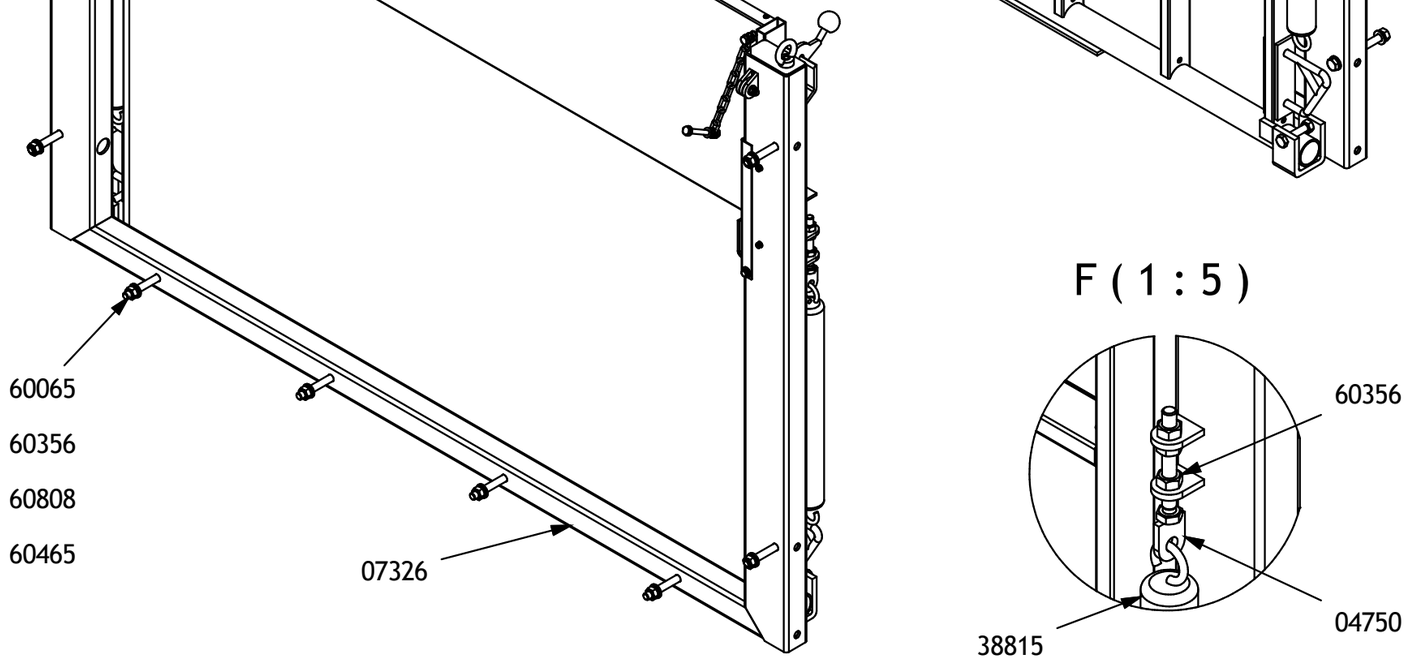

F (1 : 5)

04750	00	2	TENSOR	147.5	GALVA
07326	02	1	BASTIDOR POSTIZO RAMPA SOLDADURA	1600x1100	NEGRA
07428	02	1	RAMPA 1,1 M EQUIPADA	1600x1100	GALVA
07450	00	1	PESTILLO RAMPA	204 X 52	NEGRA
24871	02	1	CH-2 GALVANIZADA	267 X 142	NEGRA
31366_02	00	1	BOLQUEO TELEMECANICA	-	-
31367_02	00	1	XCSZ25 LLAVE DE DESBLOQUEO	-	COMERCIAL
38809	00	1	MUELLE 10,5x7,5x1,5	10,5x7,5x1,5	COMERCIAL
38815	00	2	MUELLE 40x26x7	40x26x7	COMERCIAL
46019	00	1	BOLA BAQUELITA D35 x M10	D35 x M10	BAQUELITA
60008	00	2	T.C.HEX M6X25 DIN931	M6X25	DIN 931
60021	00	1	T.C.HEX M8X35 DIN 933	M8x35	DIN 933
60063	00	2	T.C.HEX M12X70 DIN931	M12X70	DIN931
60065	00	4	TCHEX M12X80 DIN931	M12x80	DIN931
60070_01	00	4	TCH M12 X 120 DIN 931	M12 X 120	DIN 931
60352	00	2	TUERCA HEX M5 DIN934	M5	DIN 934
60356	00	16	TUERCA HEX M12 DIN934	M12	DIN 934
60371	00	1	TUERCA AUTOBLOCANTE M8 DIN985	M8	DIN 985
60461	00	4	ARANDELA PLANA D5 DIN125	D5	DIN 125
60463	00	2	ARANDELA PLANA D8 DIN125	D8	DIN 125
60465	00	16	ARANDELA PLANA D12 DIN 125	D12	DIN 125
60758	00	2	ARANDELA PLANA D6 DIN9021	D6	DIN 9021
60801	00	2	ARANDELA GROWER D5 DIN127	D5	DIN 127
60802	00	2	ARANDELA GROWER D6 DIN127	D6	DIN 127
60808	00	8	ARANDELA GROWER D12 DIN127	D12	DIN 127
60955	00	2	TCHEX M5X50 DIN931	M5 x 50	DIN 931
61174	00	2	TUERCA REMACHABLE M6	-	-
COD	REV	NoP	DESCRIPCION	DIMENSIONES	CALIDAD / AMP

Lista de piezas

LONGITUDES							ANGULOS				FORMA Y POSICION			
0,5 - 6	6 - 30	30 - 120	120 - 400	400-1000	1000-2000	2000-4000	0º-10º	10º-50º	50º-120º	120º-360º	—	⊥	//	○
± 0,1	± 0,2	± 0,3	± 0,5	± 0,8	± 1,2	± 2	± 5 '	± 10 '	± 20 '	± 30 '	10 / 100	10 / 100	10 / 100	10 / 100

	1 - 18	18 - 80	80 - 180	180 - 400	ACABADO SUPERFICIAL			DIAMETROS TALADROS			RADIOS DE ACUERDO Y CHAFLANES			
EJE	-0,08	-0,16	-0,24	-0,35	BRUTO // DESBASTE // FINO			∅0,5 - 6	∅6 - 30	∅30 - 120	0,5 - 3	3 - 6	6 - 30	30 - 120
AGUJERO	+0,08	+0,16	+0,24	+0,35	6µmm 25µmm	N8 3,2µmm	N6 0,8µmm	± 0,1	± 0,3	± 0,5	± 0,2	± 0,5	± 1	± 2

	GALVA	GALVA	1600x1165	02
Nº PIEZAS	CALIDAD / ACAB MP	ACABADO FINAL	DIMENSION-BRUTO	REVISIÓN
	FECHA	NOMBRE	TORGAR	
DIBUJADO	01-02-2021	IFL		
COMPROBADO				
MATERIAL / DESCRIPCIÓN: MODULO RAMPA 1,1 M EQUIPADO			PLANO Nº 07325_R02.iam	
ESCALA	SUBCONJUNTO: CABINA GRANDE EQUIPADA		CLIENTE:	
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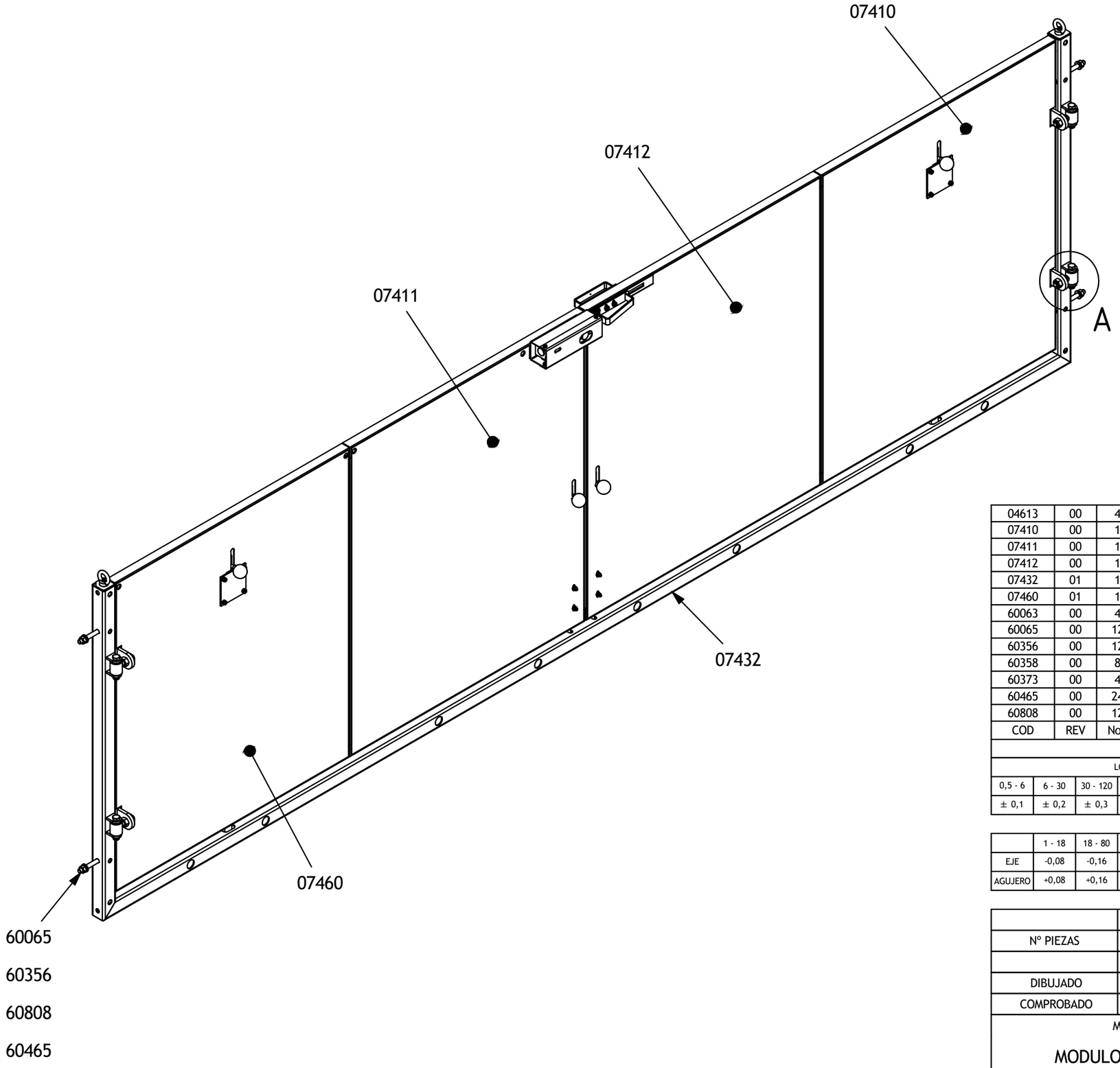

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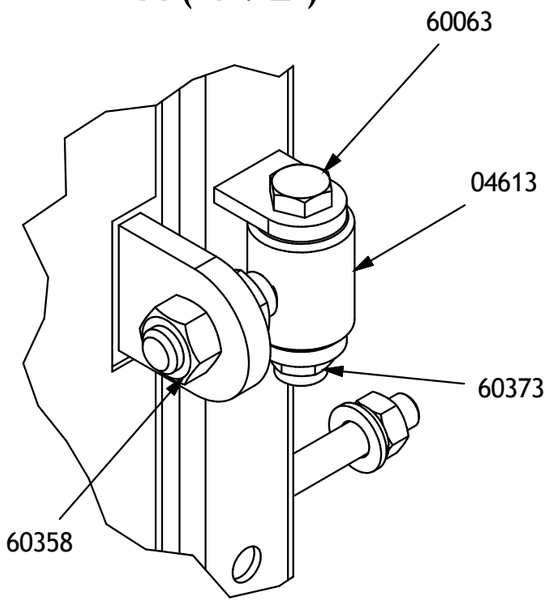

COD	REV	NoP	DESCRIPCION	DIMENSIONES	CALIDAD / AMP
04613	00	4	TORNILLO OJO PUERTAS	84.5x43	NEGRA
07410	00	1	PUERTA LATERAL EQUIPADA	1080x945	GALZANIZADO
07411	00	1	PUERTA PIZZATO EQUIPADA	1080x945	GALZANIZADO
07412	00	1	PUERTA DERECHA EQUIPADA	1080 X 945	GALVANIZADO
07432	01	1	SOLDADURA MARCO PUERTA CUADRUPLE	3900x1150	NEGRA
07460	01	1	PUERTA LATERAL EQUIPADA	1080x945	GALZANIZADO
60063	00	4	T.C.HEX M12X70 DIN931	M12X70	DIN931
60065	00	12	TCHEX M12X80 DIN931	M12x80	DIN931
60356	00	12	TUERCA HEX M12 DIN934	M12	DIN 934
60358	00	8	TUERCA HEX M16 DIN934	M16	DIN 934
60373	00	4	TUERCA HEX M12 DIN 985	M12	DIN 985
60465	00	24	ARANDELA PLANA D12 DIN 125	D12	DIN 125
60808	00	12	ARANDELA GROWER D12 DIN127	D12	DIN 127

Lista de piezas

LONGITUDES							ANGULOS				FORMA Y POSICION			
0,5 - 6	6 - 30	30 - 120	120 - 400	400-1000	1000-2000	2000-4000	0°-10°	10°-50°	50°-120°	120°-360°	—	⊥	//	○
± 0,1	± 0,2	± 0,3	± 0,5	± 0,8	± 1,2	± 2	± 5 '	± 10 '	± 20 '	± 30 '	10 / 100	10 / 100	10 / 100	10 / 100

	1 - 18	18 - 80	80 - 180	180 - 400	ACABADO SUPERFICIAL			DIAMETROS TALADROS			RADIOS DE ACUERDO Y CHAFLANES			
EJE	-0,08	-0,16	-0,24	-0,35	BRUTO // DESBASTE // FINO			∅0,5 - 6	∅6 - 30	∅30 - 120	0,5 - 3	3 - 6	6 - 30	30 - 120
AGUJERO	+0,08	+0,16	+0,24	+0,35	6µmm 25µmm	N8 3,2µmm	N6 0,8µmm	± 0,1	± 0,3	± 0,5	± 0,2	± 0,5	± 1	± 2

	GALVANIZADO	-	3900x1150	01
Nº PIEZAS	CALIDAD / ACAB MP	ACABADO FINAL	DIMENSION-BRUTO	REVISIÓN
	FECHA	NOMBRE	TORGAR	
DIBUJADO	22-01-21	AEA		
COMPROBADO				
MATERIAL / DESCRIPCIÓN:			PLANO Nº	
MODULO PUERTAS CUADRUPLES			07431_R01.iam	
ESCALA	SUBCONJUNTO: CABINA EQUIPADA		CLIENTE:	
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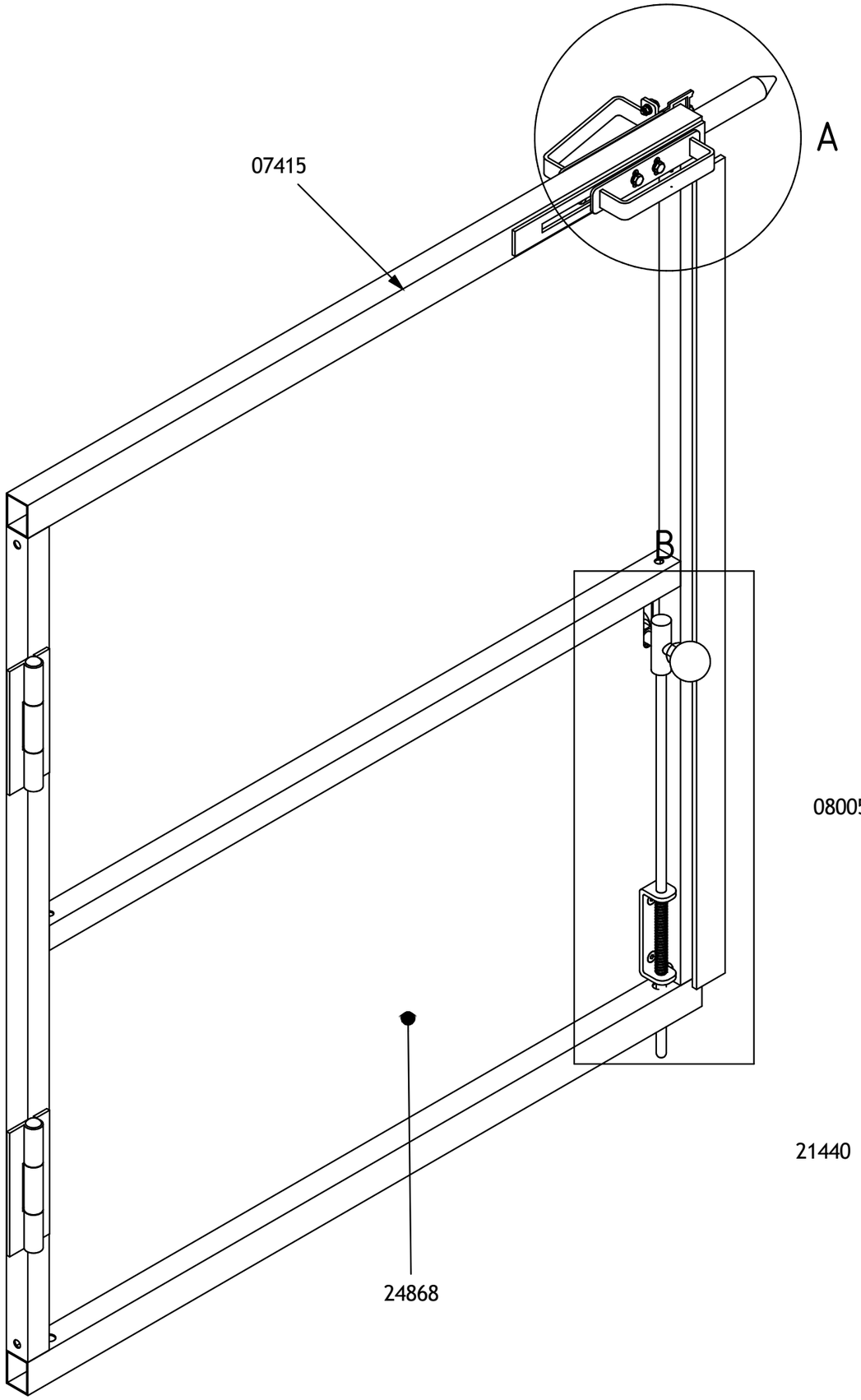

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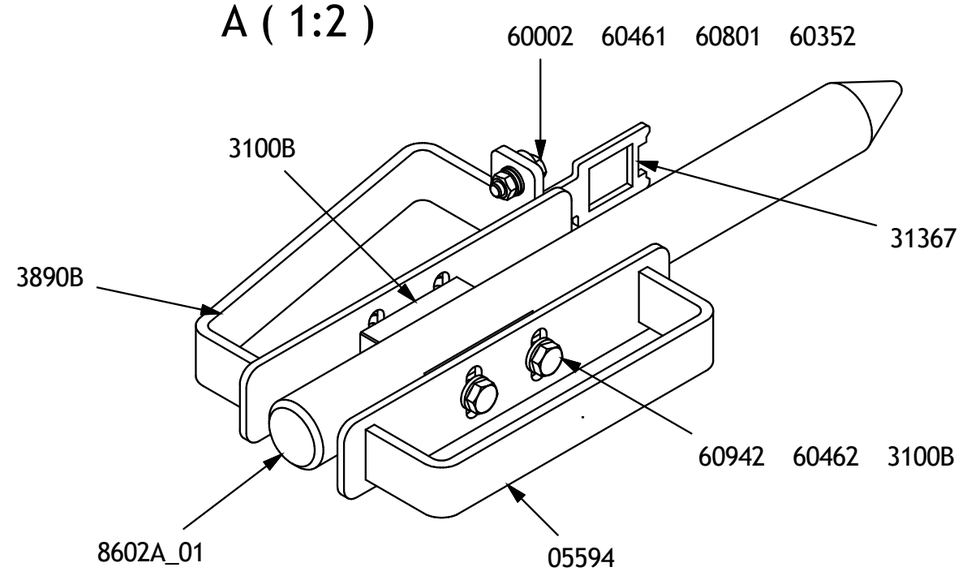

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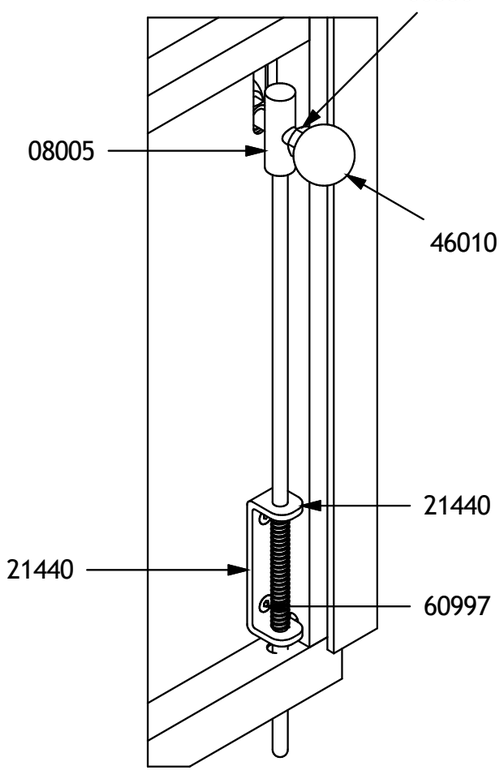

3100B	00	2	REC C10x10	45	NEGRA
3890B	00	1	MANETA (ACTUADOR BLOQUEO TELEMECÁNICA)	150 x 58 x 51	NEGRA
05594	01	1	MANETA 01	150x30x38	GALVA/ZN
07415	00	1	BASTIDOR PUERTA DERECHA SOLDADURA	945x1080	NEGRA
08005	00	1	PESTILLO SOLD	525xD20	ZN
8602A_01	00	1	REC D25	280	F-1110
21440	00	1	SOPORTE PESTILLO	105	COMERCIAL
24868	01	1	CH-2 GALVANIZADA	935 X 1070	GALVANIZADA
31367	00	1	XCSZ02 PESTILLO PERPENDICULAR 90º	-	COMERCIAL
46010	00	2	BOLA BAQUELITA M12X40	M12X40	COMERCIAL
46131	00	1	MUELLE	-	ZN
60002	00	2	TCHEX M5X16 DIN 933	M5x16	DIN 933
60352	00	2	TUERCA HEX M5 DIN934	M5	DIN 934
60353	00	4	TUERCA HEX M6 DIN934	M6	DIN 934
60356	00	2	TUERCA HEX M12 DIN934	M12	DIN 934
60461	00	4	ARANDELA PLANA D5 DIN125	D5	DIN 125
60462	00	6	ARANDELA PLANA D6 DIN125	D6	DIN 125
60801	00	2	ARANDELA GROWER D5 DIN127	D5	DIN 127
60802	00	4	ARANDELA GROWER D6 DIN127	D6	DIN 127
60942	00	2	TCH M6 x 55 DIN 931	M6x55	DIN 931
60997	00	2	TCAv ALLEN M6X20 DIN7991	M6 x 20	DIN 7991
61215	00	1	ESPÁRRAGO ALLEN M12 X 80 DIN 913	M12x80	DIN 913
COD	REV	NoP	DESCRIPCION	DIMENSIONES	CALIDAD / AMP

Lista de piezas

LONGITUDES							ANGULOS				FORMA Y POSICION			
0,5 - 6	6 - 30	30 - 120	120 - 400	400-1000	1000-2000	2000-4000	0º-10º	10º-50º	50º-120º	120º-360º	—	⊥	//	○
± 0,1	± 0,2	± 0,3	± 0,5	± 0,8	± 1,2	± 2	± 5 '	± 10 '	± 20 '	± 30 '	10 / 100	10 / 100	10 / 100	10 / 100

	1 - 18	18 - 80	80 - 180	180 - 400	ACABADO SUPERFICIAL			DIAMETROS TALADROS			RADIOS DE ACUERDO Y CHAFLANES			
EJE	-0,08	-0,16	-0,24	-0,35	BRUTO // DESBASTE // FINO			Ø0,5 - 6	Ø6 - 30	Ø30 - 120	0,5 - 3	3 - 6	6 - 30	30 - 120
AGUJERO	+0,08	+0,16	+0,24	+0,35	6µmm 25µmm	N8 3,2µmm	N6 0,8µmm	± 0,1	± 0,3	± 0,5	± 0,2	± 0,5	± 1	± 2

	GALVANIZADO	-	1080 X 945	00
Nº PIEZAS	CALIDAD / ACAB MP	ACABADO FINAL	DIMENSION-BRUTO	REVISIÓN
	FECHA	NOMBRE	TORGAR	
DIBUJADO	12-11-2020	AEA		
COMPROBADO				
MATERIAL / DESCRIPCIÓN: PUERTA DERECHA EQUIPADA			PLANO Nº 07412_R01.iam	
ESCALA	SUBCONJUNTO: MODULO PUERTA CUADRUPLE		CLIENTE:	
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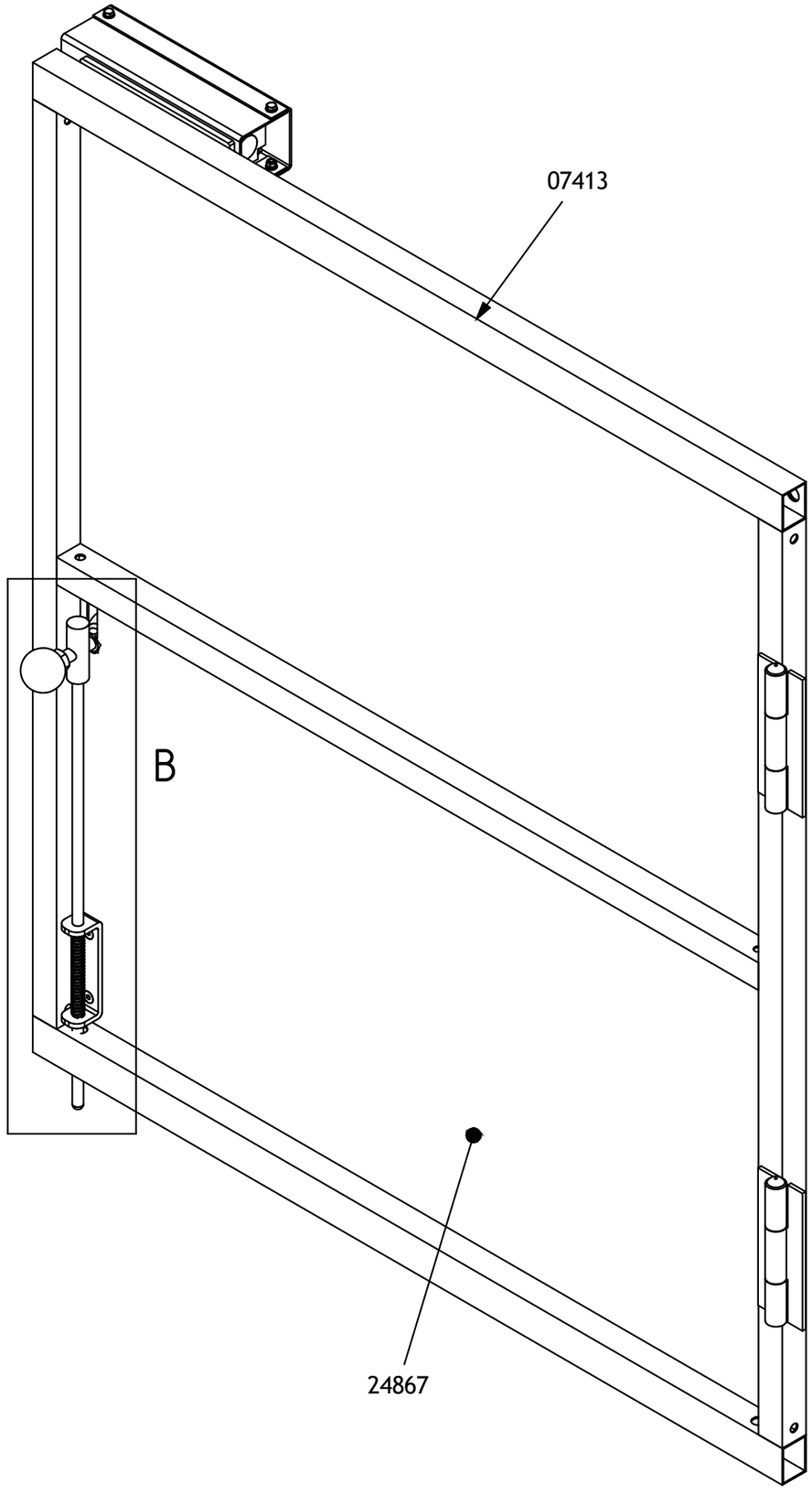

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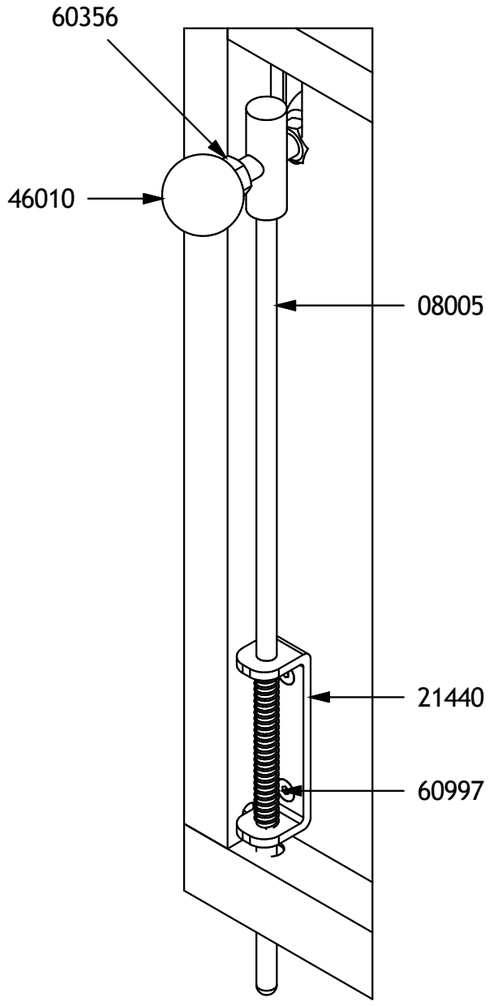

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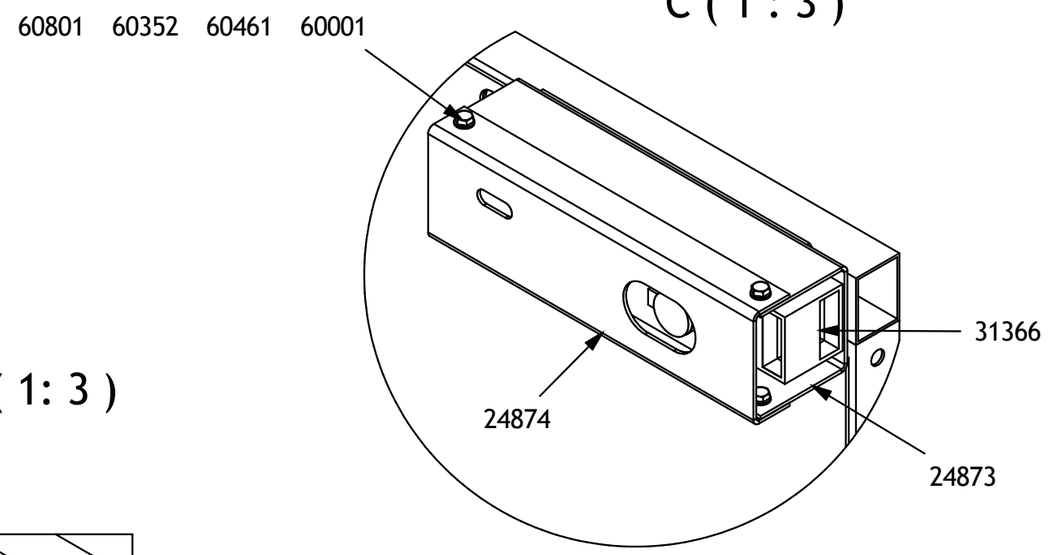

07413	01	1	BASTIDOR PUERTA IZQUIERDA SOLDADURA	945x1080	NEGRA
24867	01	1	CH-2 GALVANIZADA	1070 x 935	GALVANIZADA
24873	00	1	CH-2 GALVANIZADA	225x175	GALVANIZADO
24874	00	1	CH-2 GALVANIZADO	225X109	GALVANIZADO
31366	00	1	FDC EQUIPADO TELEMECANIQUE XCSLF2725312	-	COMERCIAL
60001	00	4	TCH M5 x 12	M5x12	DIN 931
60352	00	4	TUERCA HEX M5 DIN934	M5	DIN 934
60461	00	12	ARANDELA PLANA D5 DIN125	D5	DIN 125
60801	00	8	ARANDELA GROWER D5 DIN127	D5	DIN 127
60955	00	4	TCHEX M5X50 DIN931	M5 x 50	DIN 931
21440	00	1	SOPORTE PESTILLO	105	COMERCIAL
46131	00	1	MUELLE	-	ZN
08005	00	1	PESTILLO SOLD	525xD20	ZN
46010	00	2	BOLA BAQUELITA M12X40	M12X40	COMERCIAL
61215	00	1	ESPÁRRAGO ALLEN M12 X 80 DIN 913	M12x80	DIN 913
60356	00	2	TUERCA HEX M12 DIN934	M12	DIN 934
60997	00	2	TCAv ALLEN M6X20 DIN7991	M6 x 20	DIN 7991
60462	00	2	ARANDELA PLANA D6 DIN125	D6	DIN 125
60802	00	2	ARANDELA GROWER D6 DIN127	D6	DIN 127
60353	00	2	TUERCA HEX M6 DIN934	M6	DIN 934
COD	REV	NoP	DESCRIPCION	DIMENSIONES	CALIDAD / AMP

Lista de piezas

LONGITUDES							ANGULOS				FORMA Y POSICION			
0,5 - 6	6 - 30	30 - 120	120 - 400	400-1000	1000-2000	2000-4000	0º-10º	10º-50º	50º-120º	120º-360º	—	⊥	//	○
± 0,1	± 0,2	± 0,3	± 0,5	± 0,8	± 1,2	± 2	± 5 '	± 10 '	± 20 '	± 30 '	10 / 100	10 / 100	10 / 100	10 / 100

	1 - 18	18 - 80	80 - 180	180 - 400	ACABADO SUPERFICIAL			DIAMETROS TALADROS			RADIOS DE ACUERDO Y CHAFLANES			
EJE	-0,08	-0,16	-0,24	-0,35	BRUTO // DESBASTE // FINO			Ø0,5 - 6	Ø6 - 30	Ø30 - 120	0,5 - 3	3 - 6	6 - 30	30 - 120
AGUJERO	+0,08	+0,16	+0,24	+0,35	6µmm 25µmm	N8 3,2µmm	N6 0,8µmm	± 0,1	± 0,3	± 0,5	± 0,2	± 0,5	± 1	± 2

	GALZANIZADO	-	1080x945	00
Nº PIEZAS	CALIDAD / ACAB MP	ACABADO FINAL	DIMENSION-BRUTO	REVISIÓN
	FECHA	NOMBRE	TORGAR	
DIBUJADO	12-11-2020	AEA		
COMPROBADO				
MATERIAL / DESCRIPCIÓN: PUERTA PIZZATO EQUIPADA			PLANO Nº 07411_R01.iam	
ESCALA	SUBCONJUNTO: MODULO PUERTA CUADRUPLE EQUIPADA		CLIENTE:	
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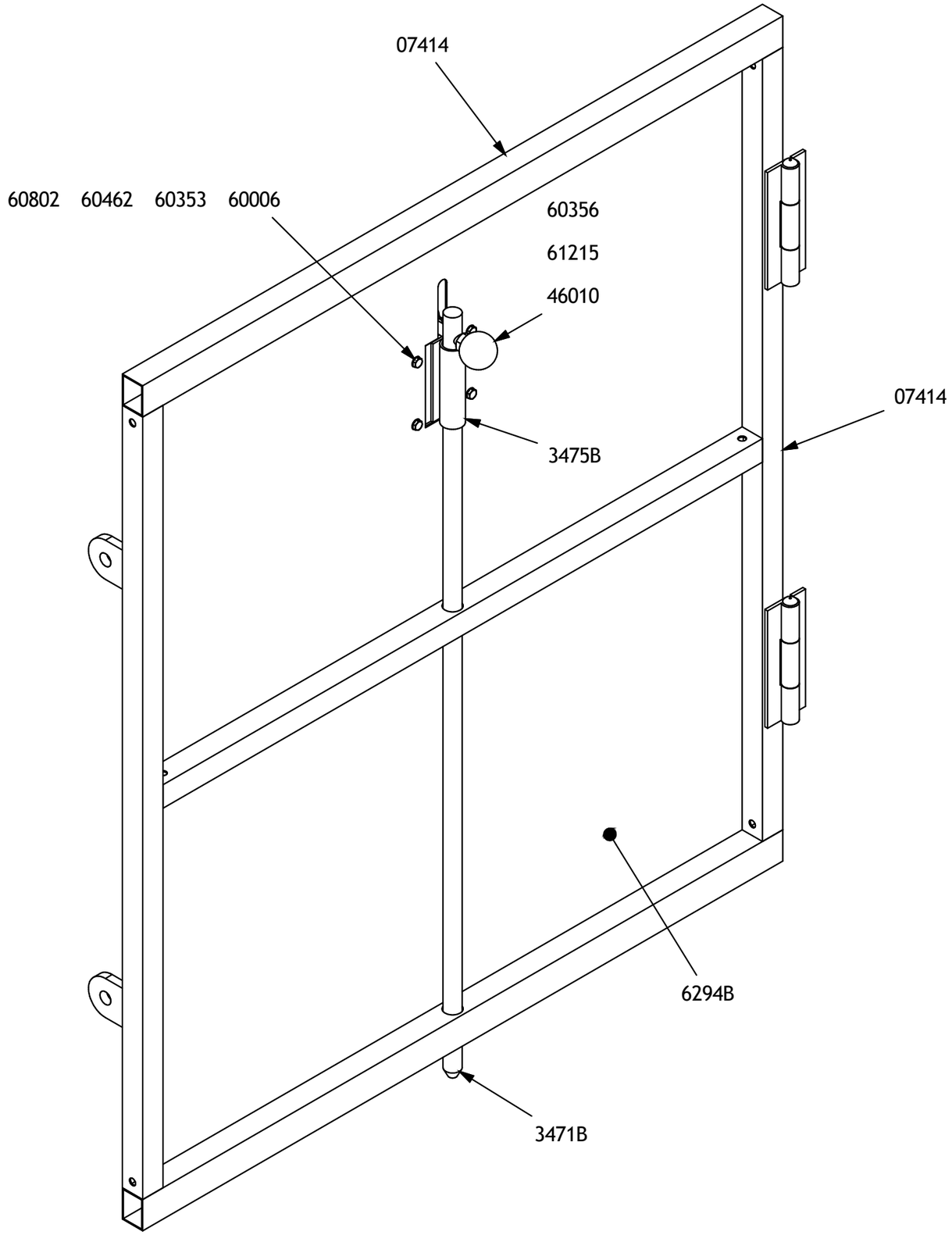

3471B	00	1	RED D20 (PESTILLO)	975	F-1110
3475B	00	1	SOPORTE PESTILLO	100x100x34	ZN
6294B	00	1	CH-2 GALVANIZADA	1070x935	GALVANIZADA
07414	00	1	SOLDADURA MARCO PUERTA AUXILIAR	945x1080	NEGRA
46010	00	2	BOLA BAQUELITA M12X40	M12X40	COMERCIAL
60006	00	4	T.C.HEX M6X16 DIN933	M6X16	DIN933
60353	00	4	TUERCA HEX M6 DIN934	M6	DIN 934
60356	00	2	TUERCA HEX M12 DIN934	M12	DIN 934
60462	00	8	ARANDELA PLANA D6 DIN125	D6	DIN 125
60802	00	4	ARANDELA GROWER D6 DIN127	D6	DIN 127
61215	00	1	ESPÁRRAGO ALLEN M12 X 80 DIN 913	M12x80	DIN 913
COD	REV	NoP	DESCRIPCION	DIMENSIONES	CALIDAD / AMP

Lista de piezas

LONGITUDES							ANGULOS				FORMA Y POSICION			
0,5 - 6	6 - 30	30 - 120	120 - 400	400-1000	1000-2000	2000-4000	0º-10º	10º-50º	50º-120º	120º-360º	—	⊥	//	○
± 0,1	± 0,2	± 0,3	± 0,5	± 0,8	± 1,2	± 2	± 5 '	± 10 '	± 20 '	± 30 '	10 / 100	10 / 100	10 / 100	10 / 100

	1 - 18	18 - 80	80 - 180	180 - 400	ACABADO SUPERFICIAL			DIAMETROS TALADROS			RADIOS DE ACUERDO Y CHAFLANES			
EJE	-0,08	-0,16	-0,24	-0,35	BRUTO // DESBASTE // FINO			Ø0,5 - 6	Ø6 - 30	Ø30 - 120	0,5 - 3	3 - 6	6 - 30	30 - 120
AGUJERO	+0,08	+0,16	+0,24	+0,35	6µmm 25µmm	N8 3,2µmm	N6 0,8µmm	± 0,1	± 0,3	± 0,5	± 0,2	± 0,5	± 1	± 2

	GALZANIZADO	-	1080x945	00
Nº PIEZAS	CALIDAD / ACAB MP	ACABADO FINAL	DIMENSION-BRUTO	REVISIÓN
	FECHA	NOMBRE	TORGAR	
DIBUJADO	11-02-21	AEA		
COMPROBADO				
MATERIAL / DESCRIPCIÓN:			PLANO Nº	
PUERTA LATERAL EQUIPADA			07410_R00.iam	
ESCALA	SUBCONJUNTO: CABINA EQUIPADA		CLIENTE:	
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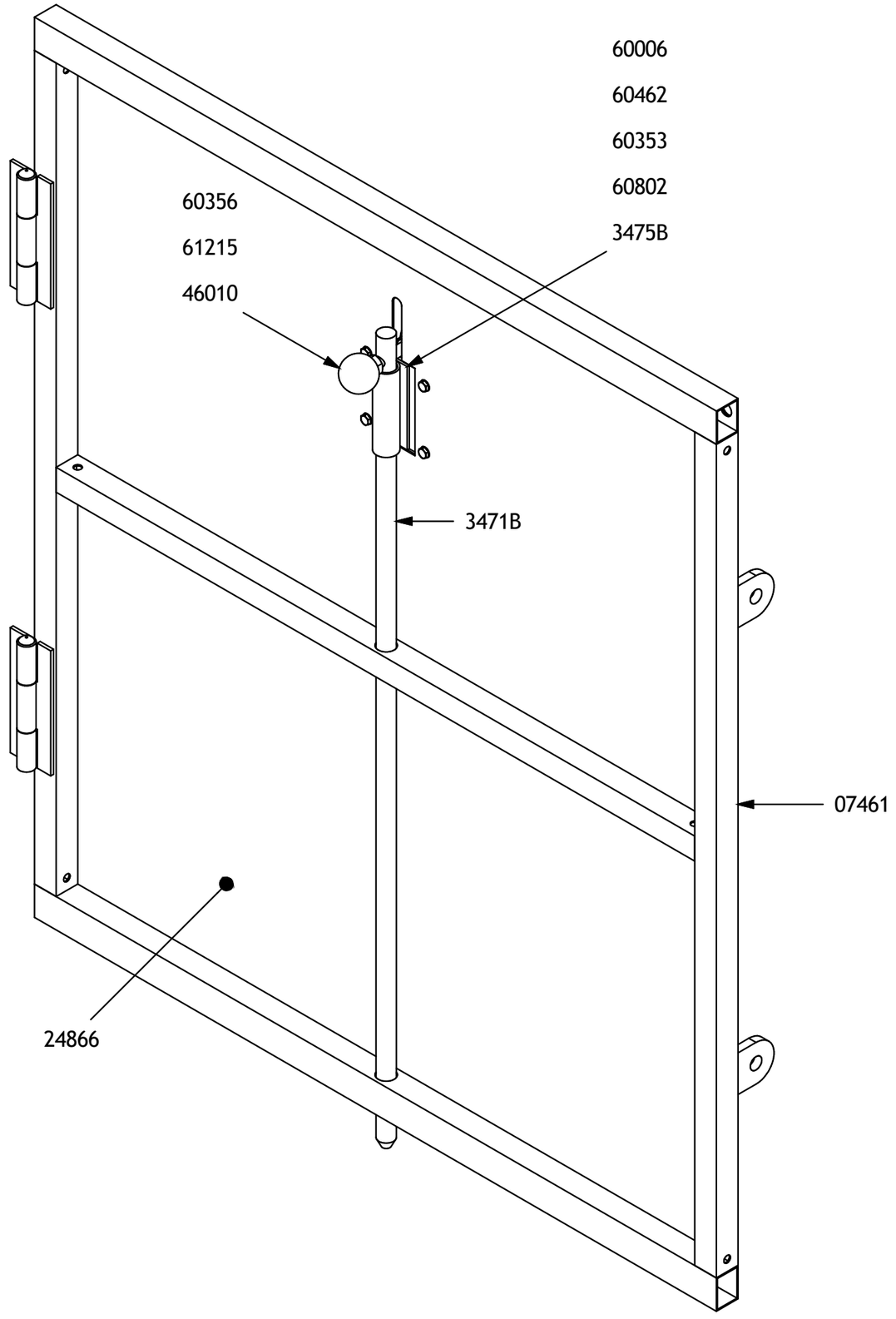

3471B	00	1	RED D20 (PESTILLO)	975	F-1110
3475B	00	1	SOPORTE PESTILLO	100x100x34	ZN
07461	00	1	SOLDADURA MARCO PUERTA AUXILIAR	945x1080	NEGRA
24866	01	1	CH-2 GALVANIZADA	1070x935	GALVANIZADA
46010	00	2	BOLA BAQUELITA M12X40	M12X40	COMERCIAL
60006	00	4	T.C.HEX M6X16 DIN933	M6X16	DIN933
60353	00	4	TUERCA HEX M6 DIN934	M6	DIN 934
60356	00	2	TUERCA HEX M12 DIN 934	M12	DIN 934
60462	00	8	ARANDELA PLANA D6 DIN125	D6	DIN 125
60802	00	4	ARANDELA GROWER D6 DIN127	D6	DIN 127
61215	00	1	ESPÁRRAGO ALLEN M12 X 80 DIN 913	M12x80	DIN 913
COD	REV	NoP	DESCRIPCION	DIMENSIONES	CALIDAD / AMP

Lista de piezas

LONGITUDES							ANGULOS				FORMA Y POSICION			
0,5 - 6	6 - 30	30 - 120	120 - 400	400-1000	1000-2000	2000-4000	0°-10°	10°-50°	50°-120°	120°-360°	—	⊥	//	○
± 0,1	± 0,2	± 0,3	± 0,5	± 0,8	± 1,2	± 2	± 5 '	± 10 '	± 20 '	± 30 '	10 / 100	10 / 100	10 / 100	10 / 100

	1 - 18	18 - 80	80 - 180	180 - 400	ACABADO SUPERFICIAL			DIAMETROS TALADROS			RADIOS DE ACUERDO Y CHAFLANES			
EJE	-0,08	-0,16	-0,24	-0,35	BRUTO // DESBASTE // FINO			Ø0,5 - 6	Ø6 - 30	Ø30 - 120	0,5 - 3	3 - 6	6 - 30	30 - 120
AGUJERO	+0,08	+0,16	+0,24	+0,35	6µmm 25µmm	N8 3,2µmm	N6 0,8µmm	± 0,1	± 0,3	± 0,5	± 0,2	± 0,5	± 1	± 2

	GALZANIZADO	-	1080x945	01
Nº PIEZAS	CALIDAD / ACAB MP	ACABADO FINAL	DIMENSION-BRUTO	REVISIÓN
	FECHA	NOMBRE	TORGAR	
DIBUJADO	11-02-21	AEA		
COMPROBADO				
MATERIAL / DESCRIPCIÓN:			PLANO Nº	
PUERTA LATERAL EQUIPADA			07460_R01.iam	
ESCALA	SUBCONJUNTO: CABINA EQUIPADA		CLIENTE:	
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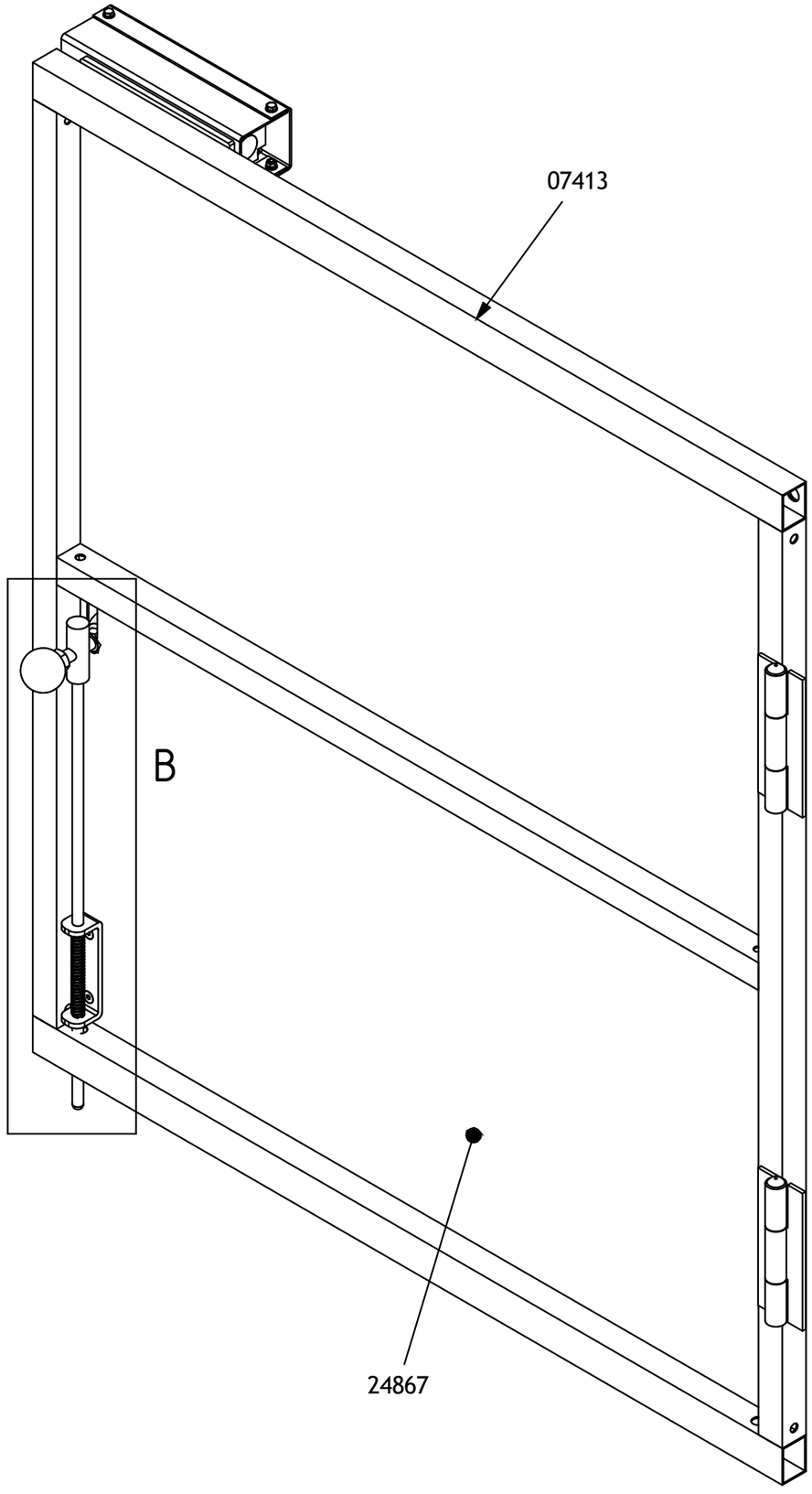

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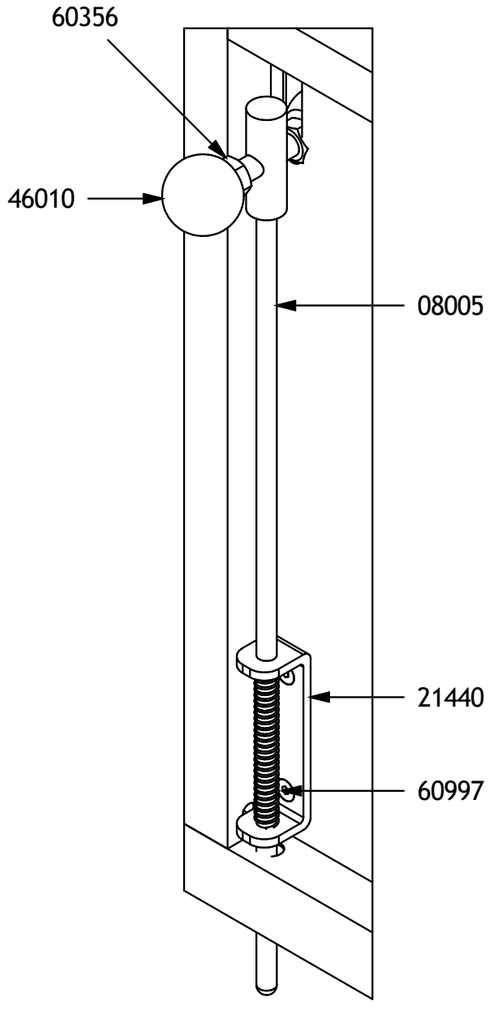

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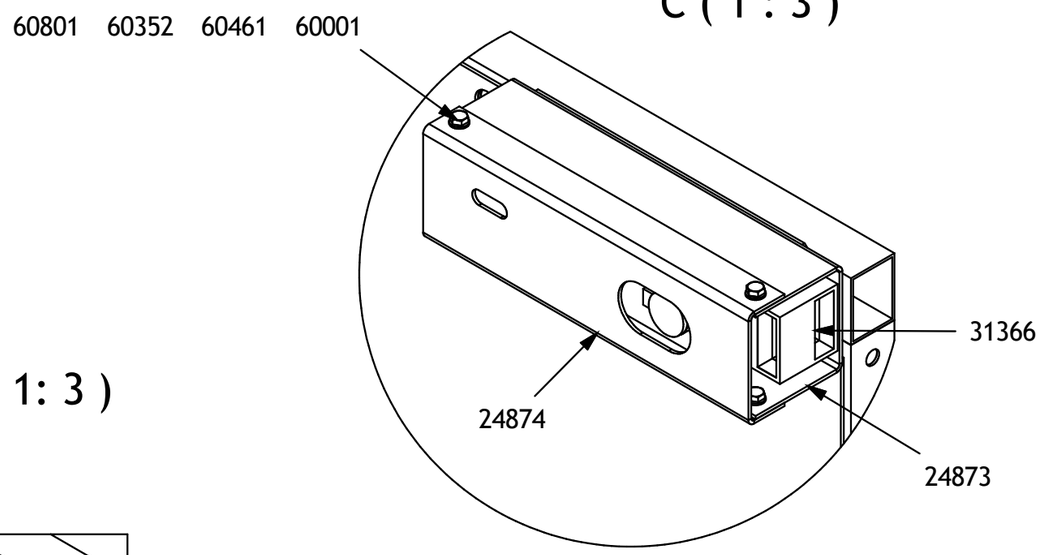

07413	01	1	BASTIDOR PUERTA IZQUIERDA SOLDADURA	945x1080	NEGRA
24867	01	1	CH-2 GALVANIZADA	1070 x 935	GALVANIZADA
24873	00	1	CH-2 GALVANIZADA	225x175	GALVANIZADO
24874	00	1	CH-2 GALVANIZADO	225X109	GALVANIZADO
31366	00	1	FDC EQUIPADO TELEMECANIQUE XCSLF2725312	-	COMERCIAL
60001	00	4	TCH M5 x 12	M5x12	DIN 931
60352	00	4	TUERCA HEX M5 DIN934	M5	DIN 934
60461	00	12	ARANDELA PLANA D5 DIN125	D5	DIN 125
60801	00	8	ARANDELA GROWER D5 DIN127	D5	DIN 127
60955	00	4	TCHEX M5X50 DIN931	M5 x 50	DIN 931
21440	00	1	SOPORTE PESTILLO	105	COMERCIAL
46131	00	1	MUELLE	-	ZN
08005	00	1	PESTILLO SOLD	525xD20	ZN
46010	00	2	BOLA BAQUELITA M12X40	M12X40	COMERCIAL
61215	00	1	ESPÁRRAGO ALLEN M12 X 80 DIN 913	M12x80	DIN 913
60356	00	2	TUERCA HEX M12 DIN 934	M12	DIN 934
60997	00	2	TCAv ALLEN M6X20 DIN7991	M6 x 20	DIN 7991
60462	00	2	ARANDELA PLANA D6 DIN125	D6	DIN 125
60802	00	2	ARANDELA GROWER D6 DIN127	D6	DIN 127
60353	00	2	TUERCA HEX M6 DIN934	M6	DIN 934
COD	REV	NoP	DESCRIPCION	DIMENSIONES	CALIDAD / AMP

Lista de piezas

LONGITUDES							ANGULOS				FORMA Y POSICION			
0,5 - 6	6 - 30	30 - 120	120 - 400	400-1000	1000-2000	2000-4000	0º-10º	10º-50º	50º-120º	120º-360º	—	⊥	//	○
± 0,1	± 0,2	± 0,3	± 0,5	± 0,8	± 1,2	± 2	± 5 '	± 10 '	± 20 '	± 30 '	10 / 100	10 / 100	10 / 100	10 / 100

	1 - 18	18 - 80	80 - 180	180 - 400	ACABADO SUPERFICIAL			DIAMETROS TALADROS			RADIOS DE ACUERDO Y CHAFLANES			
EJE	-0,08	-0,16	-0,24	-0,35	BRUTO // DESBASTE // FINO			Ø0,5 - 6	Ø6 - 30	Ø30 - 120	0,5 - 3	3 - 6	6 - 30	30 - 120
AGUJERO	+0,08	+0,16	+0,24	+0,35	6µmm 25µmm	N8 3,2µmm	N6 0,8µmm	± 0,1	± 0,3	± 0,5	± 0,2	± 0,5	± 1	± 2

	GALZANIZADO	-	1080x945	00
Nº PIEZAS	CALIDAD / ACAB MP	ACABADO FINAL	DIMENSION-BRUTO	REVISIÓN
	FECHA	NOMBRE	TORGAR	
DIBUJADO	12-11-2020	AEA		
COMPROBADO				
MATERIAL / DESCRIPCIÓN:			PLANO Nº	
PUERTA PIZZATO EQUIPADA			07411_R01.iam	
ESCALA	SUBCONJUNTO: MODULO PUERTA CUADRUPLE EQUIPADA		CLIENTE:	
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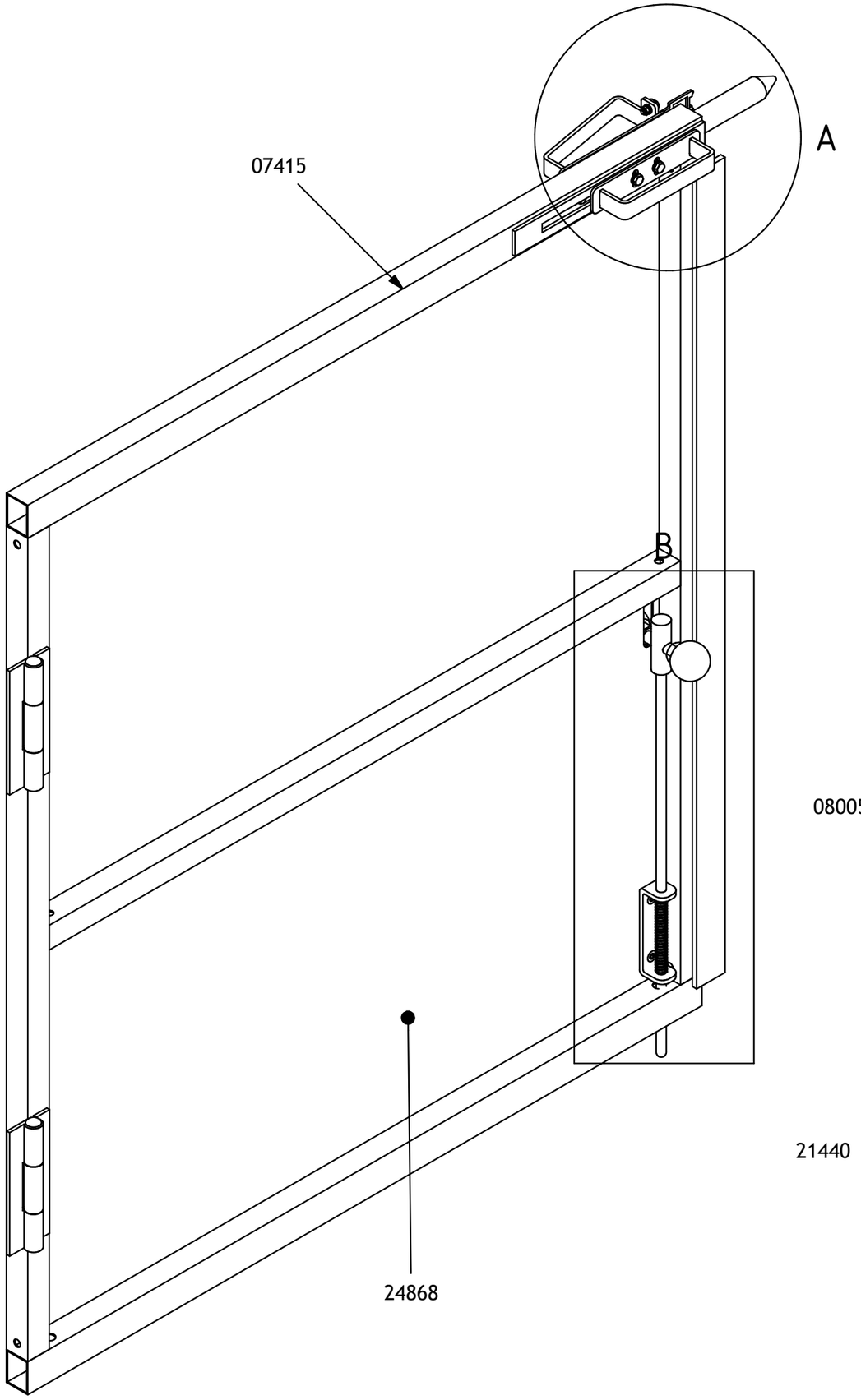

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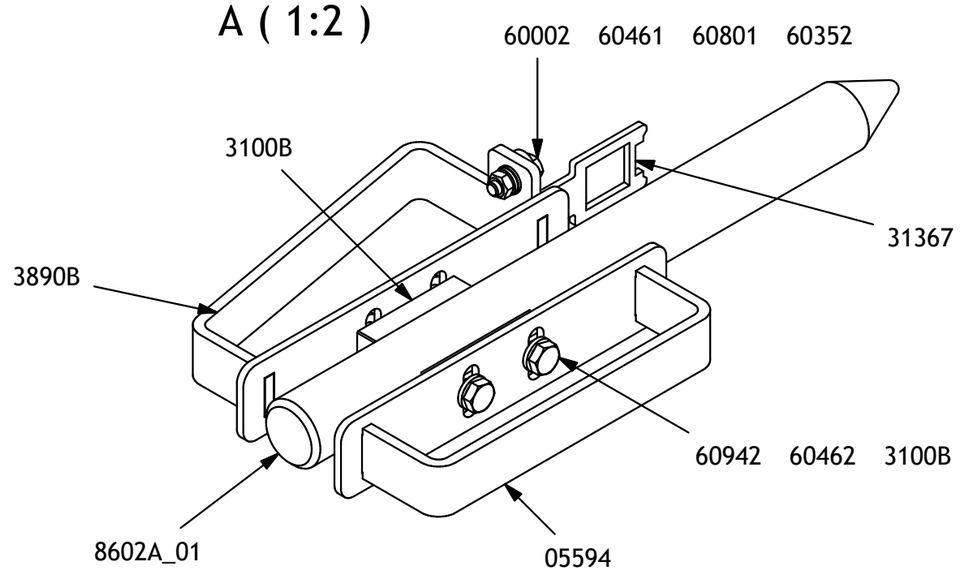

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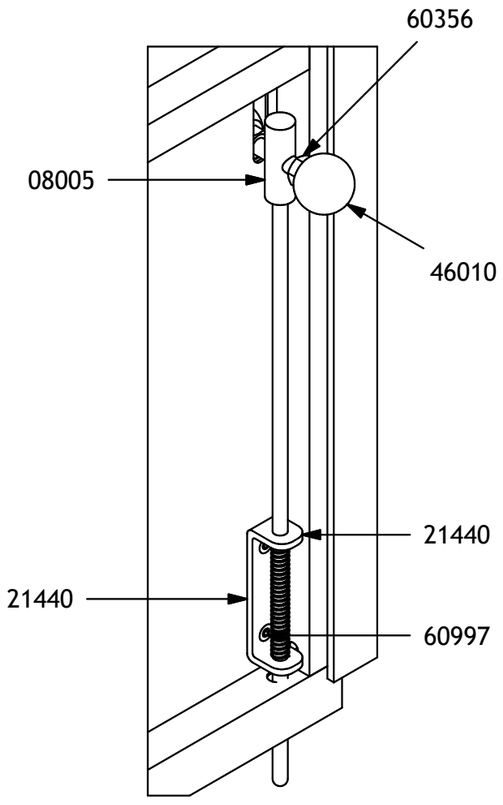

3100B	00	2	REC C10x10	45	NEGRA
3890B	00	1	MANETA (ACTUADOR BLOQUEO TELEMECÁNICA)	150 x 58 x 51	NEGRA
05594	02	1	MANETA 01	150x30x38	GALVA/ZN
07415	00	1	BASTIDOR PUERTA DERECHA SOLDADURA	945x1080	NEGRA
08005	00	1	PESTILLO SOLD	525xD20	ZN
8602A_01	00	1	REC D25	280	F-1110
21440	00	1	SOPORTE PESTILLO	105	COMERCIAL
24868	01	1	CH-2 GALVANIZADA	935 X 1070	GALVANIZADA
31367	00	1	XCSZ02 PESTILLO PERPENDICULAR 90º	-	COMERCIAL
46010	00	2	BOLA BAQUELITA M12X40	M12X40	COMERCIAL
46131	00	1	MUELLE	-	ZN
60002	00	2	TCHEX M5X16 DIN 933	M5x16	DIN 933
60352	00	2	TUERCA HEX M5 DIN934	M5	DIN 934
60353	00	4	TUERCA HEX M6 DIN934	M6	DIN 934
60356	00	2	TUERCA HEX M12 DIN934	M12	DIN 934
60461	00	4	ARANDELA PLANA D5 DIN125	D5	DIN 125
60462	00	6	ARANDELA PLANA D6 DIN125	D6	DIN 125
60801	00	2	ARANDELA GROWER D5 DIN127	D5	DIN 127
60802	00	4	ARANDELA GROWER D6 DIN127	D6	DIN 127
60942	00	2	TCH M6 x 55 DIN 931	M6x55	DIN 931
60997	00	2	TCAv ALLEN M6X20 DIN7991	M6 x 20	DIN 7991
61215	00	1	ESPÁRRAGO ALLEN M12 X 80 DIN 913	M12x80	DIN 913
COD	REV	NoP	DESCRIPCION	DIMENSIONES	CALIDAD / AMP

Lista de piezas

LONGITUDES							ANGULOS				FORMA Y POSICION			
0,5 - 6	6 - 30	30 - 120	120 - 400	400-1000	1000-2000	2000-4000	0º-10º	10º-50º	50º-120º	120º-360º	—	⊥	//	○
± 0,1	± 0,2	± 0,3	± 0,5	± 0,8	± 1,2	± 2	± 5 '	± 10 '	± 20 '	± 30 '	10 / 100	10 / 100	10 / 100	10 / 100

	1 - 18	18 - 80	80 - 180	180 - 400	ACABADO SUPERFICIAL			DIAMETROS TALADROS			RADIOS DE ACUERDO Y CHAFLANES			
EJE	-0,08	-0,16	-0,24	-0,35	BRUTO // DESBASTE // FINO			Ø0,5 - 6	Ø6 - 30	Ø30 - 120	0,5 - 3	3 - 6	6 - 30	30 - 120
AGUJERO	+0,08	+0,16	+0,24	+0,35	6µmm 25µmm	N8 3,2µmm	N6 0,8µmm	± 0,1	± 0,3	± 0,5	± 0,2	± 0,5	± 1	± 2

	GALVANIZADO	-	1080 X 945	00
Nº PIEZAS	CALIDAD / ACAB MP	ACABADO FINAL	DIMENSION-BRUTO	REVISIÓN
	FECHA	NOMBRE	TORGAR	
DIBUJADO	12-11-2020	AEA		
COMPROBADO				
MATERIAL / DESCRIPCIÓN: PUERTA DERECHA EQUIPADA			PLANO Nº 07412_R01.iam	
ESCALA	SUBCONJUNTO: MODULO PUERTA CUADRUPLE		CLIENTE:	
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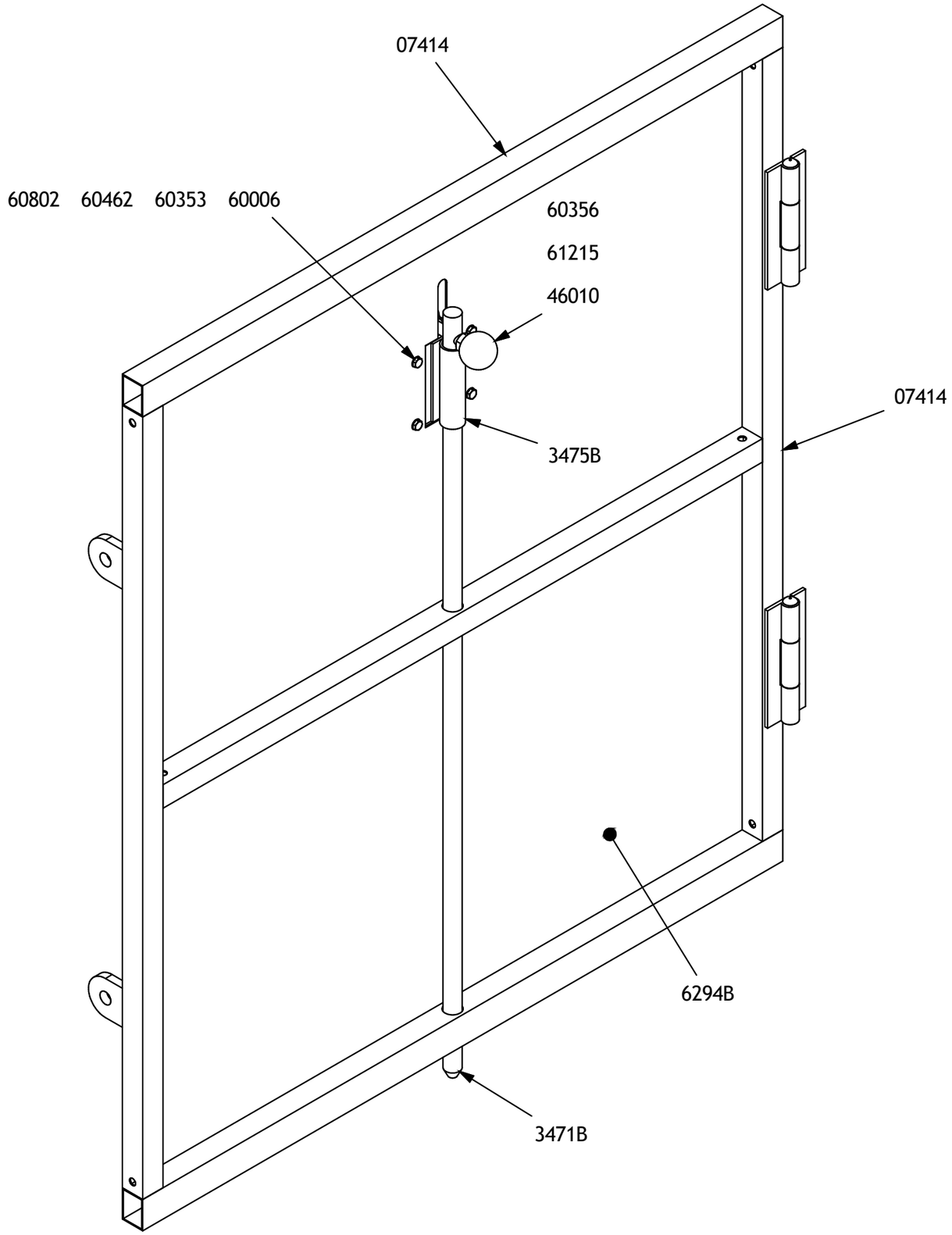


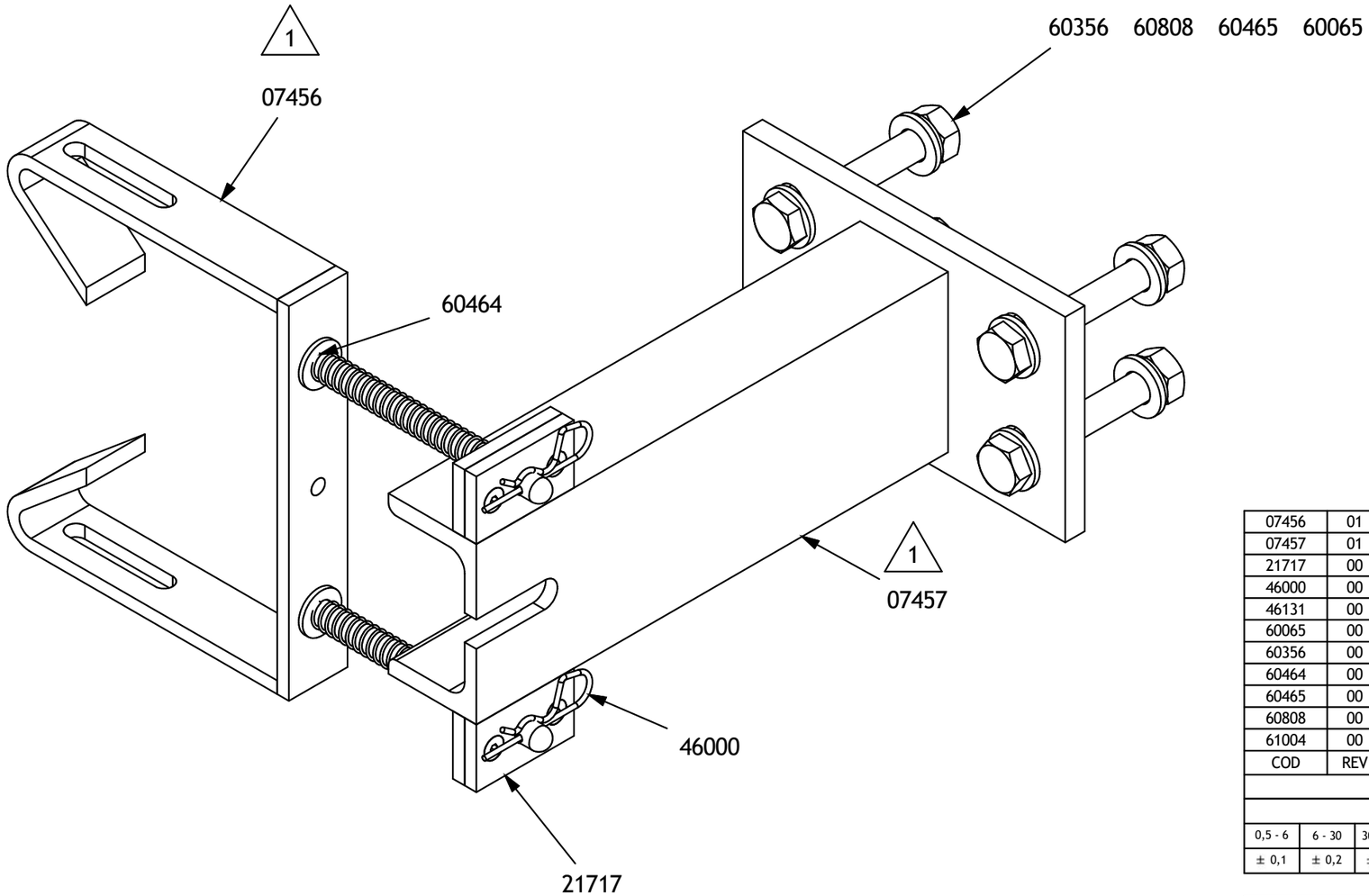
3471B	00	1	RED D20 (PESTILLO)	975	F-1110
3475B	00	1	SOPORTE PESTILLO	100x100x34	ZN
6294B	00	1	CH-2 GALVANIZADA	1070x935	GALVANIZADA
07414	00	1	SOLDADURA MARCO PUERTA AUXILIAR	945x1080	NEGRA
46010	00	2	BOLA BAQUELITA M12X40	M12X40	COMERCIAL
60006	00	4	T.C.HEX M6X16 DIN933	M6X16	DIN933
60353	00	4	TUERCA HEX M6 DIN934	M6	DIN 934
60356	00	2	TUERCA HEX M12 DIN 934	M12	DIN 934
60462	00	8	ARANDELA PLANA D6 DIN125	D6	DIN 125
60802	00	4	ARANDELA GROWER D6 DIN127	D6	DIN 127
61215	00	1	ESPÁRRAGO ALLEN M12 X 80 DIN 913	M12x80	DIN 913
COD	REV	NoP	DESCRIPCION	DIMENSIONES	CALIDAD / AMP

Lista de piezas

LONGITUDES							ANGULOS				FORMA Y POSICION			
0,5 - 6	6 - 30	30 - 120	120 - 400	400-1000	1000-2000	2000-4000	0º-10º	10º-50º	50º-120º	120º-360º	—	⊥	//	○
± 0,1	± 0,2	± 0,3	± 0,5	± 0,8	± 1,2	± 2	± 5 '	± 10 '	± 20 '	± 30 '	10 / 100	10 / 100	10 / 100	10 / 100

	1 - 18	18 - 80	80 - 180	180 - 400	ACABADO SUPERFICIAL			DIAMETROS TALADROS			RADIOS DE ACUERDO Y CHAFLANES			
EJE	-0,08	-0,16	-0,24	-0,35	BRUTO // DESBASTE // FINO			Ø0,5 - 6	Ø6 - 30	Ø30 - 120	0,5 - 3	3 - 6	6 - 30	30 - 120
AGUJERO	+0,08	+0,16	+0,24	+0,35	6µmm 25µmm	N8 3,2µmm	N6 0,8µmm	± 0,1	± 0,3	± 0,5	± 0,2	± 0,5	± 1	± 2

	GALZANIZADO	-	1080x945	00
Nº PIEZAS	CALIDAD / ACAB MP	ACABADO FINAL	DIMENSION-BRUTO	REVISIÓN
	FECHA	NOMBRE	TORGAR	
DIBUJADO	11-02-21	AEA		
COMPROBADO				
MATERIAL / DESCRIPCIÓN:			PLANO Nº	
PUERTA LATERAL EQUIPADA			07410_R00.iam	
ESCALA	SUBCONJUNTO: CABINA EQUIPADA		CLIENTE:	
1:2	MÁQUINA: PL		FORMATO: A3	



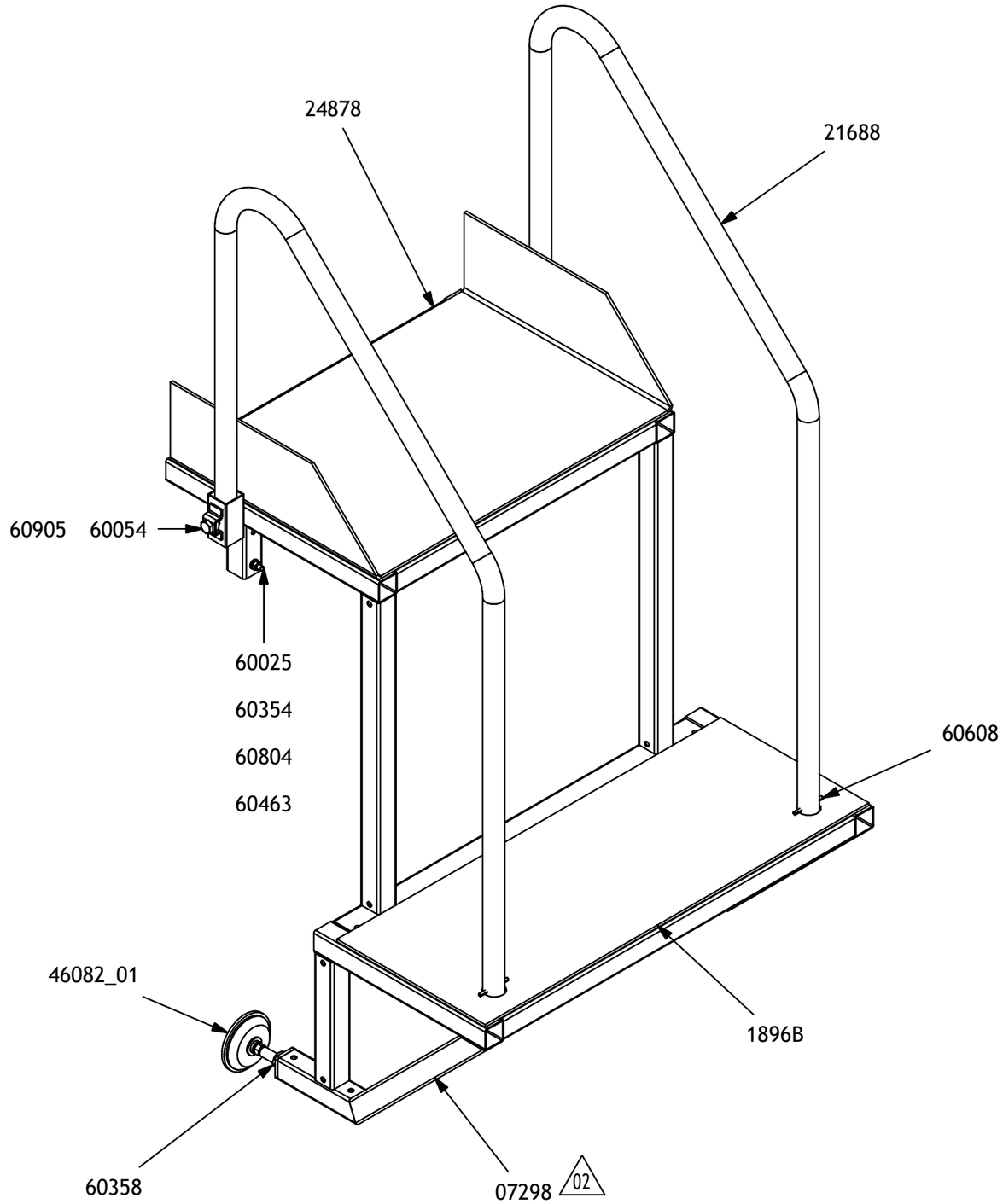
07456	01	1	ACTUADOR FRENO	-	NEGRA
07457	01	1	SOLDADURA SOPORTE ACTUADOR FRENO	-	NEGRA
21717	00	2	PT 30x6 NYLON	50	NYLON
46000	00	2	PASADOR EN "R" D2MM L=55 DIN11024	D2MM L=55	ZN
46131	00	2	MUELLE	-	ZN
60065	00	4	TCHEX M12X80 DIN931	M12x80	DIN931
60356	00	4	TUERCA HEX M12 DIN934	M12	DIN 934
60464	00	4	ARANDELA PLANA D10 DIN125	D10	DIN 125
60465	00	8	ARANDELA PLANA D12 DIN 125	D12	DIN 125
60808	00	4	ARANDELA GROWER D12 DIN127	D12	DIN 127
61004	00	4	TCA M5x16 DIN 7991	M5x16	DIN 7991
COD	REV	NoP	DESCRIPCION	DIMENSIONES	CALIDAD / AMP

Lista de piezas

LONGITUDES							ANGULOS				FORMA Y POSICION			
0,5 - 6	6 - 30	30 - 120	120 - 400	400-1000	1000-2000	2000-4000	0°-10°	10°-50°	50°-120°	120°-360°	—	⊥	//	○
± 0,1	± 0,2	± 0,3	± 0,5	± 0,8	± 1,2	± 2	± 5 '	± 10 '	± 20 '	± 30 '	10 / 100	10 / 100	10 / 100	10 / 100

	1 - 18	18 - 80	80 - 180	180 - 400	ACABADO SUPERFICIAL			DIAMETROS TALADROS			RADIOS DE ACUERDO Y CHAFLANES			
EJE	-0,08	-0,16	-0,24	-0,35	BRUTO // DESBASTE // FINO			Ø0,5 - 6	Ø6 - 30	Ø30 - 120	0,5 - 3	3 - 6	6 - 30	30 - 120
AGUJERO	+0,08	+0,16	+0,24	+0,35	6µmm 25µmm	N8 3,2µmm	N6 0,8µmm	± 0,1	± 0,3	± 0,5	± 0,2	± 0,5	± 1	± 2

	GALVA	GALVA	-	01
Nº PIEZAS	CALIDAD / ACAB MP	ACABADO FINAL	DIMENSION-BRUTO	REVISIÓN
	FECHA	NOMBRE	TORGAR	
DIBUJADO				
COMPROBADO				
MATERIAL / DESCRIPCIÓN: SISTEMA DE DESBLOQUEO			PLANO Nº 07458_R01.iam	
ESCALA	SUBCONJUNTO:		CLIENTE:	
	MÁQUINA:		FORMATO: A3	



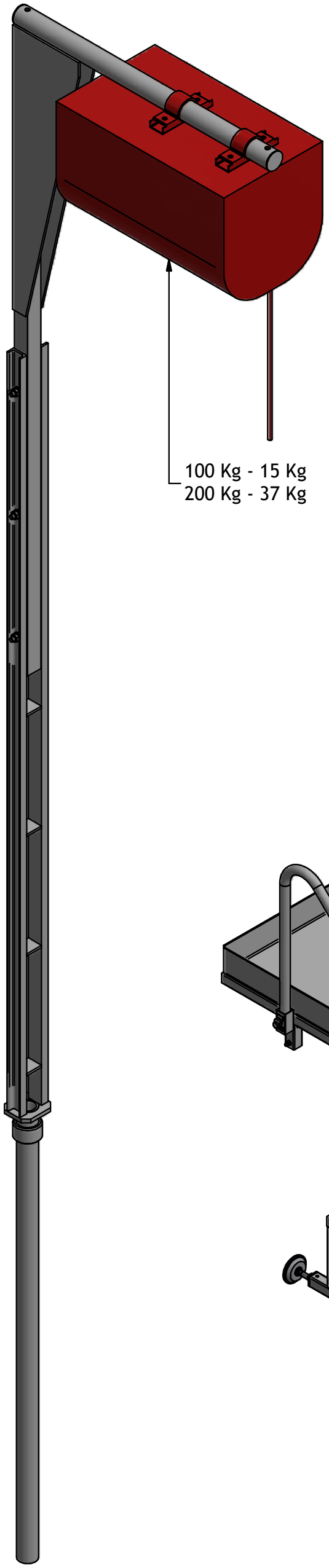
1896B	00	1	CH-3/5 DAMERO	320x830	ALUMINIO
07298	02	1	ESCALERA MONTAJE SOLD	928x840x660	NEGRA
21688	00	2	TB 1"	2204.5	S275JR
24878	01	1	CH 3/5 DAMERADA	920x445	ALUMINIO
46082_01	00	2	PATA HUSILLO M16X200	M16X200	-
60025	00	2	T.C.HEX. M8X60 DIN 931	M8X60	DIN931
60054	00	2	T.C.HEX M12X30 DIN 931	M12x30	DIN 931
60354	00	2	TUERCA HEX M8 DIN934	M8	DIN 934
60358	00	2	TUERCA HEX M16 DIN934	M16	DIN 934
60463	00	4	ARANDELA PLANA D8 DIN125	D8	DIN 125
60608	00	2	PASADOR ELASTICO D5x60 DIN 1481	D5x60	DIN 1481
60804	00	2	ARANDELA GROWER D8 DIN127	D8	DIN 127
60905	00	2	TUERCA CUADRADA M12 DIN557	M12	DIN 557
COD	REV	NoP	DESCRIPCION	DIMENSIONES	CALIDAD / AMP

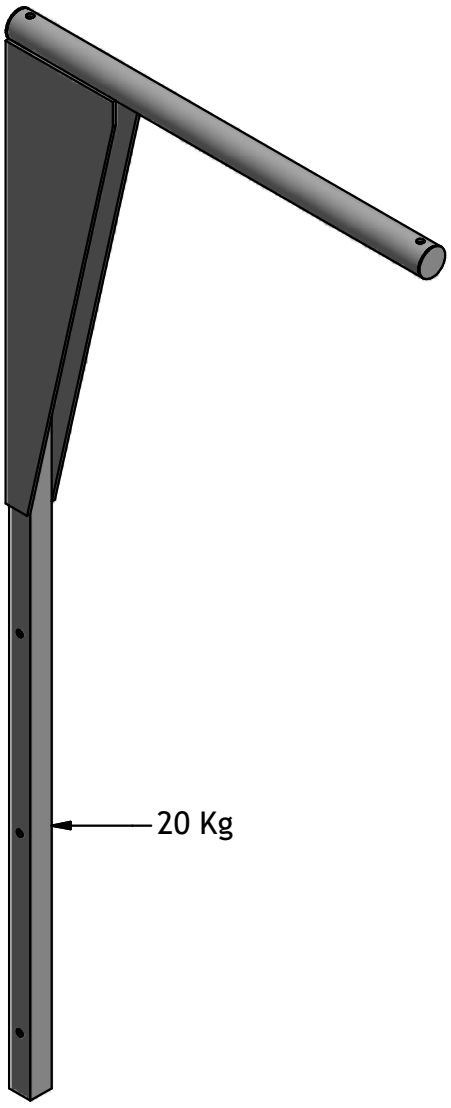
Lista de piezas

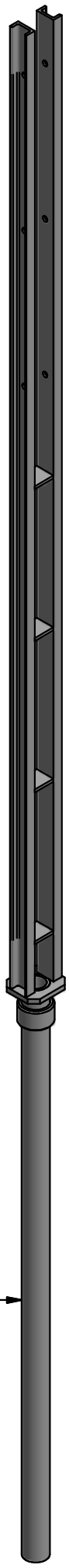
LONGITUDES							ANGULOS				FORMA Y POSICION			
0,5 - 6	6 - 30	30 - 120	120 - 400	400-1000	1000-2000	2000-4000	0º-10º	10º-50º	50º-120º	120º-360º	—	⊥	//	○
± 0,1	± 0,2	± 0,3	± 0,5	± 0,8	± 1,2	± 2	± 5 '	± 10 '	± 20 '	± 30 '	10 / 100	10 / 100	10 / 100	10 / 100

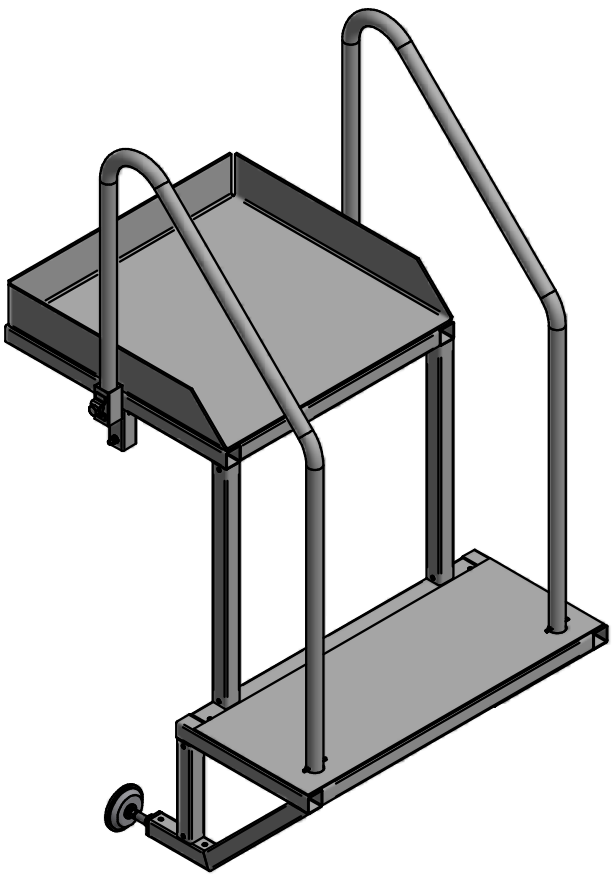
	1 - 18	18 - 80	80 - 180	180 - 400	ACABADO SUPERFICIAL			DIAMETROS TALADROS			RADIOS DE ACUERDO Y CHAFLANES			
EJE	-0,08	-0,16	-0,24	-0,35	BRUTO // DESBASTE // FINO			Ø0,5 - 6	Ø6 - 30	Ø30 - 120	0,5 - 3	3 - 6	6 - 30	30 - 120
AGUJERO	+0,08	+0,16	+0,24	+0,35	6µmm 25µmm	N8 3,2µmm	N6 0,8µmm	± 0,1	± 0,3	± 0,5	± 0,2	± 0,5	± 1	± 2

1	GALVA	-	935x660X840	02
Nº PIEZAS	CALIDAD / ACAB MP	ACABADO FINAL	DIMENSION-BRUTO	REVISIÓN
	FECHA	NOMBRE	TORGAR	
DIBUJADO	15-09-22	JGE		
COMPROBADO				
MATERIAL / DESCRIPCIÓN: PELDAÑOS			PLANO Nº 07358_R02.iam	
ESCALA	SUBCONJUNTO: CABINA EQUIPADA		CLIENTE:	
1:8	MÁQUINA: PL-EXT		FORMATO: A3	





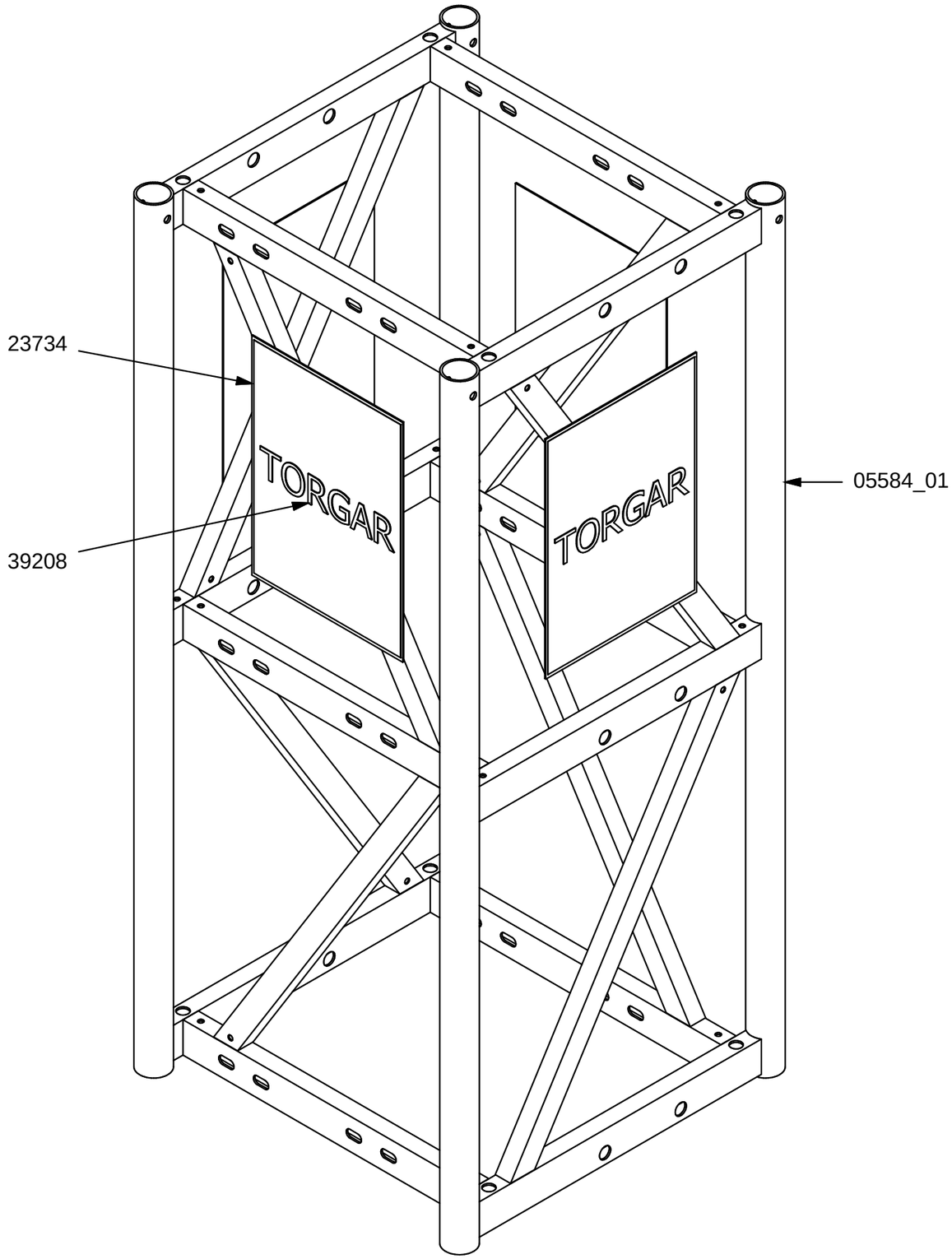




LONGITUDES							ANGULOS				FORMA Y POSICION			
0,5 - 6	6 - 30	30 - 120	120 - 400	400-1000	1000-2000	2000-4000	0º-10º	10º-50º	50º-120º	120º-360º	—	⊥	//	○
± 0,1	± 0,2	± 0,3	± 0,5	± 0,8	± 1,2	± 2	± 5 '	± 10 '	± 20 '	± 30 '	10 / 100	10 / 100	10 / 100	10 / 100

	1 - 18	18 - 80	80 - 180	180 - 400	ACABADO SUPERFICIAL			DIAMETROS TALADROS			RADIOS DE ACUERDO Y CHAFLANES			
EJE	-0,08	-0,16	-0,24	-0,35	BRUTO // DESBASTE // FINO			Ø0,5 - 6	Ø6 - 30	Ø30 - 120	0,5 - 3	3 - 6	6 - 30	30 - 120
AGUJERO	+0,08	+0,16	+0,24	+0,35	6µmm 25µmm	N8 3,2µmm	N6 0,8µmm	± 0,1	± 0,3	± 0,5	± 0,2	± 0,5	± 1	± 2

1	GALVA	GALVA	-	01
Nº PIEZAS	CALIDAD / ACAB MP	ACABADO FINAL	DIMENSION-BRUTO	REVISIÓN
	FECHA	NOMBRE	TORGAR	
DIBUJADO	02-07-21	JGE		
COMPROBADO	02-07-21	GSH		
MATERIAL / DESCRIPCIÓN: GRÚA MONTAJE PL-EXT EQUIPADA			PLANO Nº 06898_R01.iam	
ESCALA	SUBCONJUNTO: GRUPO CABINA EQUIPADA		CLIENTE: ISERMAT	
1:20	MÁQUINA: PL-EXT		FORMATO: A3	



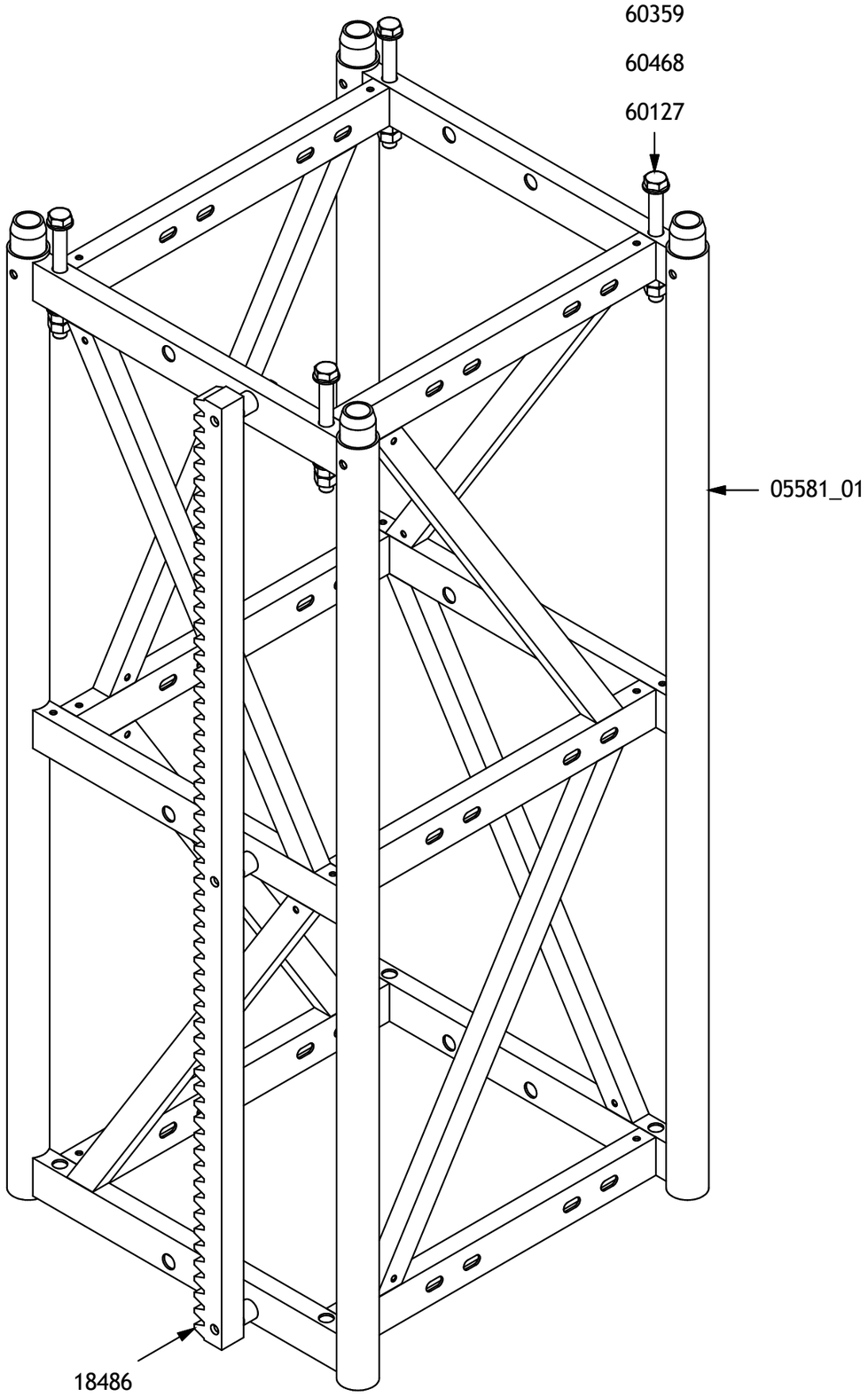
05584_01	01	1	TRAMO SEGURIDAD SOLDADURA	600X600X1500	GALVA
23734	00	4	CH-2	407 x 296	GALVA
39208	02	4	PEGATINA TORGAR VERTICAL	396 x 288	ADHESIVO
COD	REV	NoP	DESCRIPCION	DIMENSIONES	CALIDAD / AMP

Lista de piezas

LONGITUDES							ANGULOS				FORMA Y POSICION			
0,5 - 6	6 - 30	30 - 120	120 - 400	400-1000	1000-2000	2000-4000	0°-10°	10°-50°	50°-120°	120°-360°	—	⊥	//	○
± 0,1	± 0,2	± 0,3	± 0,5	± 0,8	± 1,2	± 2	± 5 '	± 10 '	± 20 '	± 30 '	10 / 100	10 / 100	10 / 100	10 / 100

	1 - 18	18 - 80	80 - 180	180 - 400	ACABADO SUPERFICIAL			DIAMETROS TALADROS			RADIOS DE ACUERDO Y CHAFLANES			
EJE	-0,08	-0,16	-0,24	-0,35	BRUTO // DESBASTE // FINO			Ø0,5 - 6	Ø6 - 30	Ø30 - 120	0,5 - 3	3 - 6	6 - 30	30 - 120
AGUJERO	+0,08	+0,16	+0,24	+0,35	6µmm 25µmm	N8 3,2µmm	N6 0,8µmm	± 0,1	± 0,3	± 0,5	± 0,2	± 0,5	± 1	± 2

1	GALVA	GALVA	1482x600x600	01
Nº PIEZAS	CALIDAD / ACAB MP	ACABADO FINAL	DIMENSION-BRUTO	REVISIÓN
	FECHA	NOMBRE	TORGAR	
DIBUJADO	09-01-20	JGE		
COMPROBADO	09-01-20	GSH		
MATERIAL / DESCRIPCIÓN: TRAMO SEGURIDAD EQUIPADO			PLANO Nº 05580_01_R01.iam	
ESCALA	SUBCONJUNTO: CONJUNTO GENERAL		CLIENTE:	
1:10	MÁQUINA: PL		FORMATO: A3	



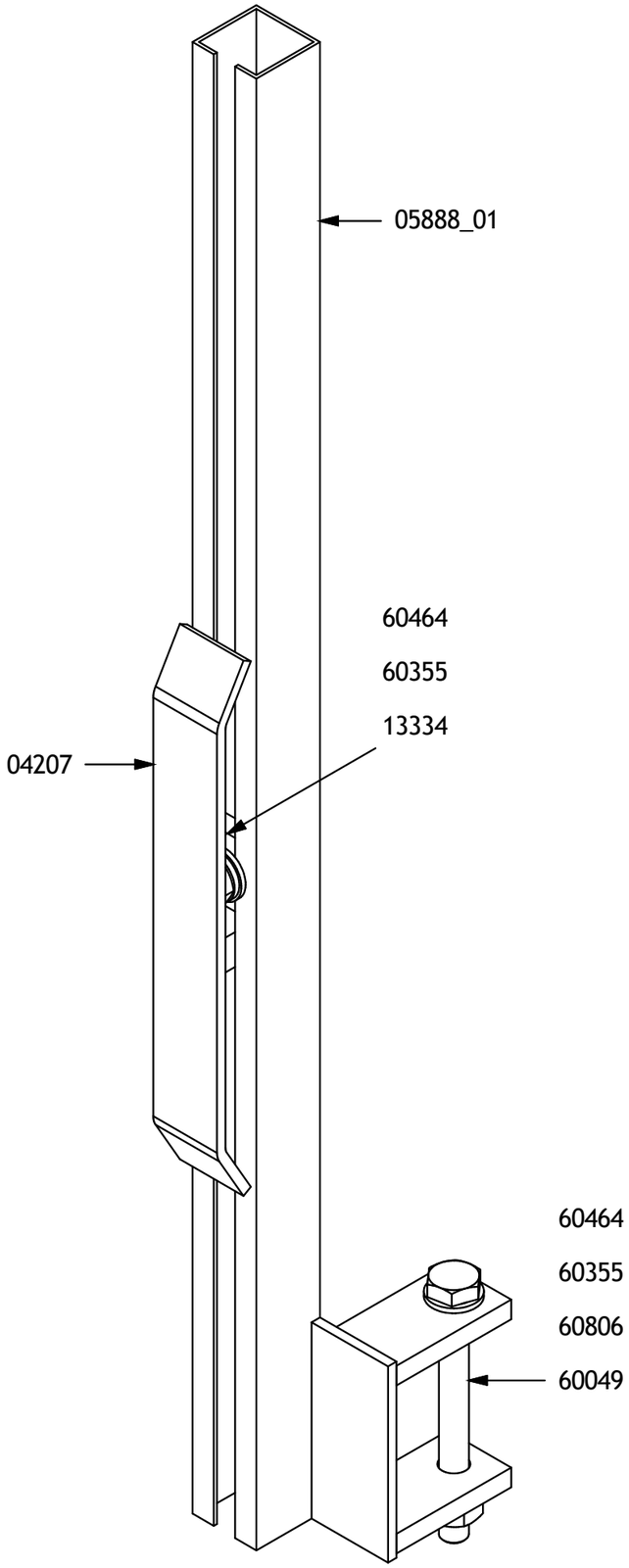
05581_01	02	1	TRAMO SOLDADURA	600x600x1500	GALVA
18486	00	1	PTC 50 x 40	1482.85	F-1110
18487	00	3	RED D30	57	F-111
60127	00	4	TCHEX M18 x 180 DIN 931	M18 x 180	DIN 931
60359	00	8	TUERCA HEX M18 DIN934	M18	DIN 934
60468	00	8	ARANDELA PLANA D18 DIN 125	D18	DIN 125
60922	00	3	TORNILLO M14 x 90 DIN 6921	M14 x 90	DIN 6921
COD	REV	NoP	DESCRIPCION	DIMENSIONES	CALIDAD / AMP

Lista de piezas

LONGITUDES							ANGULOS				FORMA Y POSICION			
0,5 - 6	6 - 30	30 - 120	120 - 400	400-1000	1000-2000	2000-4000	0°-10°	10°-50°	50°-120°	120°-360°	—	⊥	//	○
± 0,1	± 0,2	± 0,3	± 0,5	± 0,8	± 1,2	± 2	± 5 '	± 10 '	± 20 '	± 30 '	10 / 100	10 / 100	10 / 100	10 / 100

	1 - 18	18 - 80	80 - 180	180 - 400	ACABADO SUPERFICIAL			DIAMETROS TALADROS			RADIOS DE ACUERDO Y CHAFLANES			
EJE	-0,08	-0,16	-0,24	-0,35	BRUTO // DESBASTE // FINO			∅0,5 - 6	∅6 - 30	∅30 - 120	0,5 - 3	3 - 6	6 - 30	30 - 120
AGUJERO	+0,08	+0,16	+0,24	+0,35	6µmm 25µmm	N8 3,2µmm	N6 0,8µmm	± 0,1	± 0,3	± 0,5	± 0,2	± 0,5	± 1	± 2

1	GALVA / ZN	GALVA / ZN	655x708x1500	01
Nº PIEZAS	CALIDAD / ACAB MP	ACABADO FINAL	DIMENSION-BRUTO	REVISIÓN
	FECHA	NOMBRE	TORGAR	
DIBUJADO	11-03-20	JGE		
COMPROBADO	11-03-20	GSH		
MATERIAL / DESCRIPCIÓN: TRAMO EQUIPADO			PLANO Nº 05582_06_R01.iam	
ESCALA	SUBCONJUNTO: CONJUNTO GENERAL		CLIENTE:	
1:10	MÁQUINA: PL		FORMATO: A3	



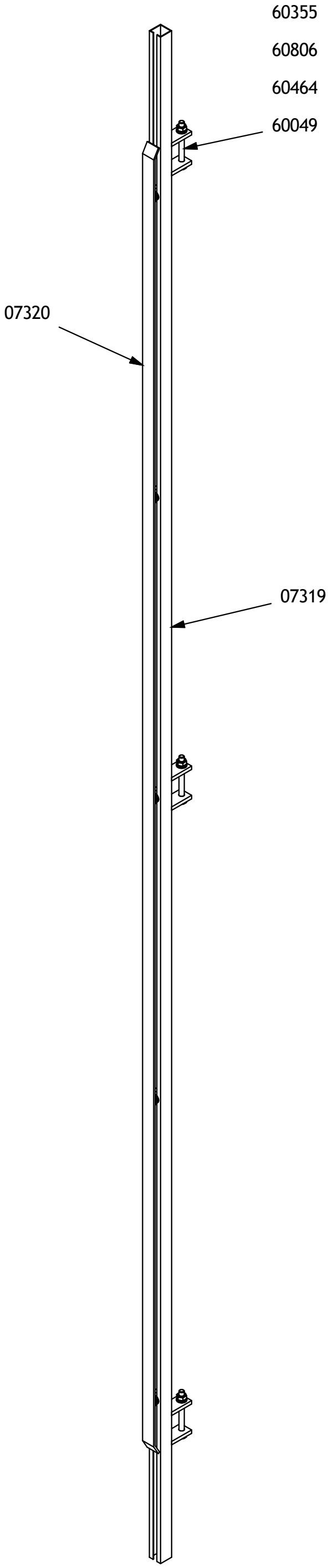
04207	00	1	PATIN SOLDADURA	175 x 30	NEGRA
05888_01	01	1	SOPORTE PATÍN (SOLDADURA)	600x130	NEGRA
13334	00	1	PT 30x8 (TUERCA CU M10)	25	F-1
60049	00	1	TCH M10x100 DIN931	M10 x 100	DIN 931
60464	00	3	ARANDELA PLANA D10 DIN125	D10	DIN 125
60806	00	2	ARANDELA GROWER D10 DIN127	D10	DIN 127
60355	00	2	TUERCA HEX M10 DIN934	M10	DIN 934
COD	REV	NoP	DESCRIPCION	DIMENSIONES	CALIDAD / AMP

Lista de piezas

LONGITUDES							ANGULOS				FORMA Y POSICION			
0,5 - 6	6 - 30	30 - 120	120 - 400	400-1000	1000-2000	2000-4000	0º-10º	10º-50º	50º-120º	120º-360º	—	⊥	//	○
± 0,1	± 0,2	± 0,3	± 0,5	± 0,8	± 1,2	± 2	± 5 '	± 10 '	± 20 '	± 30 '	10 / 100	10 / 100	10 / 100	10 / 100

	1 - 18	18 - 80	80 - 180	180 - 400	ACABADO SUPERFICIAL			DIAMETROS TALADROS			RADIOS DE ACUERDO Y CHAFLANES			
EJE	-0,08	-0,16	-0,24	-0,35	BRUTO // DESBASTE // FINO			Ø0,5 - 6	Ø6 - 30	Ø30 - 120	0,5 - 3	3 - 6	6 - 30	30 - 120
AGUJERO	+0,08	+0,16	+0,24	+0,35	6µmm 25µmm	N8 3,2µmm	N6 0,8µmm	± 0,1	± 0,3	± 0,5	± 0,2	± 0,5	± 1	± 2

	ZN	ZN	600x66x105	01
Nº PIEZAS	CALIDAD / ACAB MP	ACABADO FINAL	DIMENSION-BRUTO	REVISIÓN
	FECHA	NOMBRE	TORGAR	
DIBUJADO	18-12-18	JGE		
COMPROBADO	18-12-18	GSH		
MATERIAL / DESCRIPCIÓN: PATIN EQUIPADO CBASE			PLANO Nº 05886_01_R01.iam	
ESCALA	SUBCONJUNTO: CONJUNTO GENERAL		CLIENTE:	
1:2	MÁQUINA: PL		FORMATO: A3	



07319	01	1	SOPORTE PATIN 3.5 MTS	3567x84x30	NEGRO
07320	00	1	PATIN 3 MTS SOLDADURA	3047x44x30	ZN
13334	00	5	PT 30x8 (TUERCA CU M10)	25	F-1
60049	00	3	TCH M10x100 DIN931	M10 x 100	DIN 931
60355	00	8	TUERCA HEX M10 DIN934	M10	DIN 934
60464	00	11	ARANDELA PLANA D10 DIN125	D10	DIN 125
60806	00	8	ARANDELA GROWER D10 DIN127	D10	DIN 127
COD	REV	NoP	DESCRIPCION	DIMENSIONES	CALIDAD / AMP

Lista de piezas

LONGITUDES							ANGULOS				FORMA Y POSICION			
0,5 - 6	6 - 30	30 - 120	120 - 400	400-1000	1000-2000	2000-4000	0º-10º	10º-50º	50º-120º	120º-360º	—	⊥	//	⌭
± 0,1	± 0,2	± 0,3	± 0,5	± 0,8	± 1,2	± 2	± 5 '	± 10 '	± 20 '	± 30 '	10 / 100	10 / 100	10 / 100	10 / 100

	1 - 18	18 - 80	80 - 180	180 - 400	ACABADO SUPERFICIAL			DIAMETROS TALADROS			RADIOS DE ACUERDO Y CHAFLANES			
EJE	-0,08	-0,16	-0,24	-0,35	BRUTO // DESBASTE // FINO			Ø0,5 - 6	Ø6 - 30	Ø30 - 120	0,5 - 3	3 - 6	6 - 30	30 - 120
AGUJERO	+0,08	+0,16	+0,24	+0,35	6µmm 25µmm	N8 3,2µmm	N6 0,8µmm	± 0,1	± 0,3	± 0,5	± 0,2	± 0,5	± 1	± 2

	ZN	ZN	3567x106x30	01
Nº PIEZAS	CALIDAD / ACAB MP	ACABADO FINAL	DIMENSION-BRUTO	REVISIÓN
	FECHA	NOMBRE	TORGAR	
DIBUJADO	27-01-21	AEA		
COMPROBADO				
MATERIAL / DESCRIPCIÓN: PATIN 3 MTS EQUIPADO			PLANO Nº 07318_R01.iam	
ESCALA	SUBCONJUNTO: CONJUNTO GENERAL		CLIENTE:	
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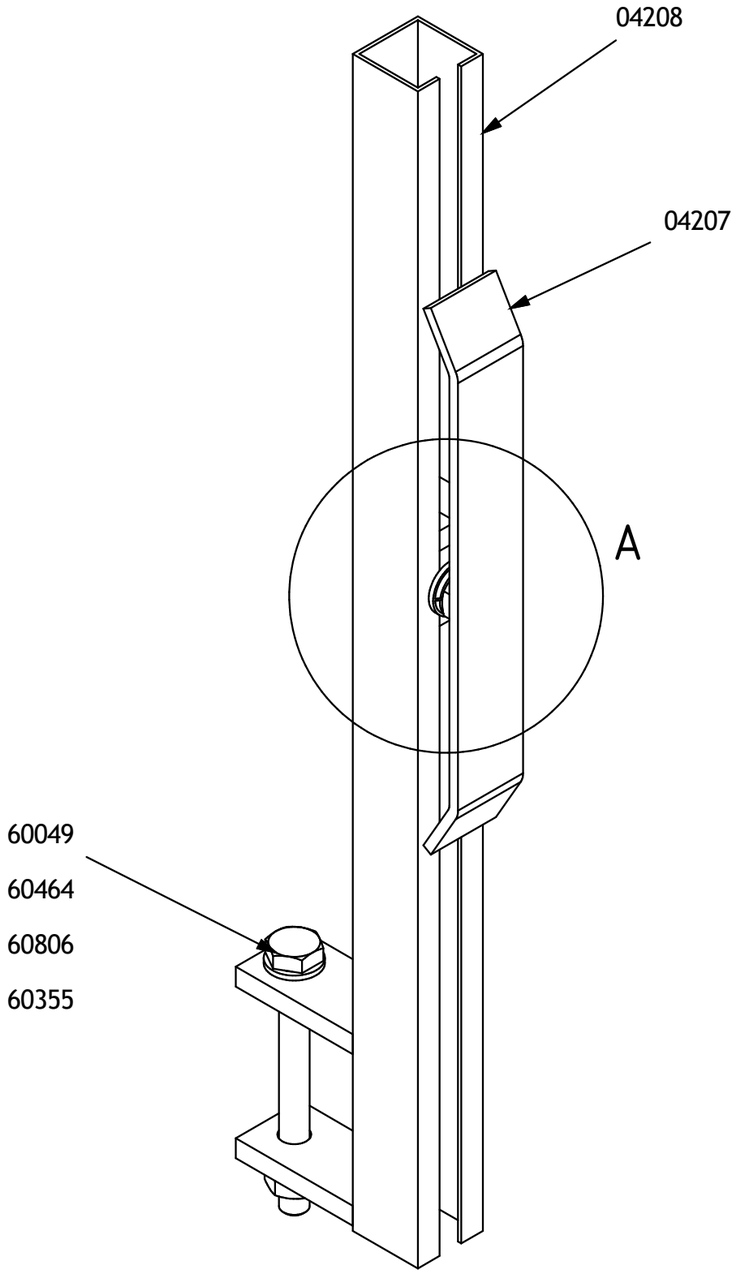

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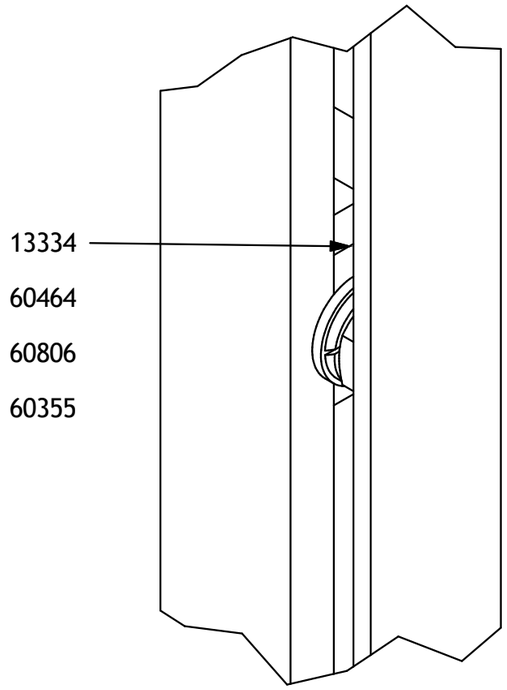


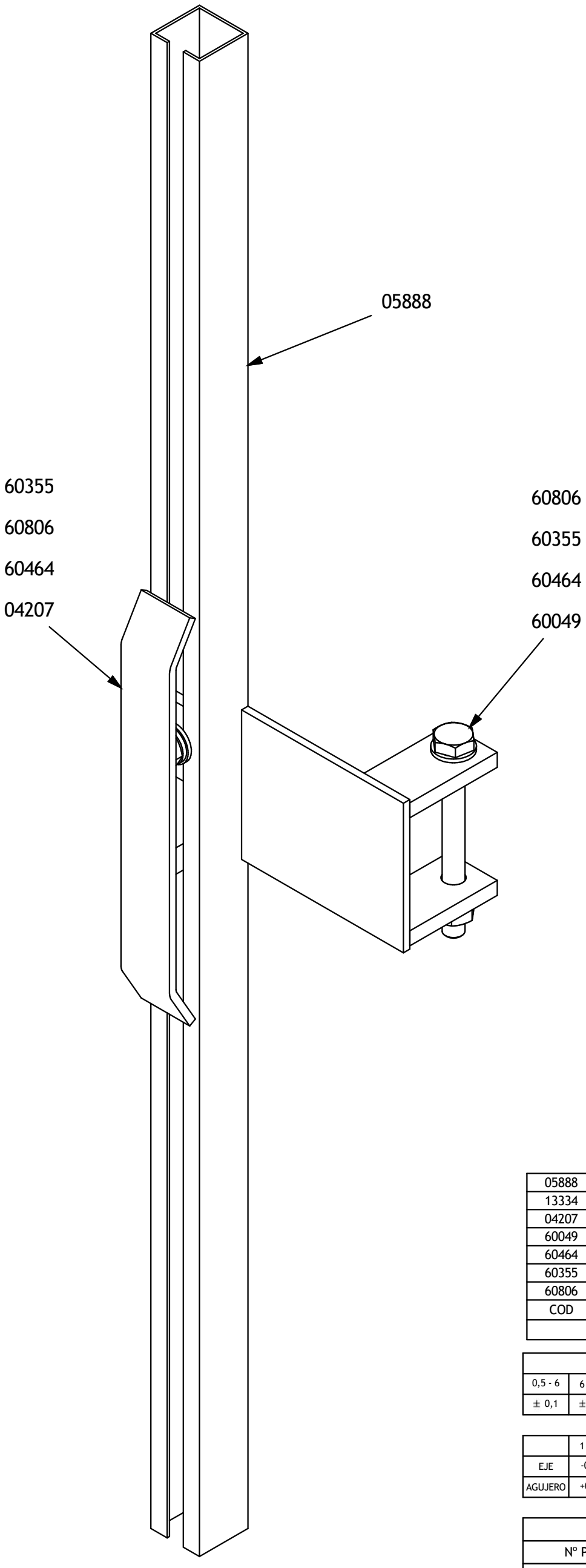
04207	00	1	PATIN SOLDADURA	175 x 30	NEGRA
04208	00	1	SOPORTE GUIA T.P. T3	470x84	NEGRA
13334	00	1	PT 30x8 (TUERCA CU M10)	25	F-1
60049	00	1	TCH M10x100 DIN931	M10 x 100	DIN 931
60355	00	2	TUERCA HEX M10 DIN934	M10	DIN 934
60464	00	3	ARANDELA PLANA D10 DIN125	D10	DIN 125
60806	00	2	ARANDELA GROWER D10 DIN127	D10	DIN 127
COD	REV	NoP	DESCRIPCION	DIMENSIONES	CALIDAD / AMP

Lista de piezas

LONGITUDES							ANGULOS				FORMA Y POSICION			
0,5 - 6	6 - 30	30 - 120	120 - 400	400-1000	1000-2000	2000-4000	0º-10º	10º-50º	50º-120º	120º-360º	—	⊥	//	○
± 0,1	± 0,2	± 0,3	± 0,5	± 0,8	± 1,2	± 2	± 5 '	± 10 '	± 20 '	± 30 '	10 / 100	10 / 100	10 / 100	10 / 100

	1 - 18	18 - 80	80 - 180	180 - 400	ACABADO SUPERFICIAL			DIAMETROS TALADROS			RADIOS DE ACUERDO Y CHAFLANES			
EJE	-0,08	-0,16	-0,24	-0,35	BRUTO // DESBASTE // FINO			Ø0,5 - 6	Ø6 - 30	Ø30 - 120	0,5 - 3	3 - 6	6 - 30	30 - 120
AGUJERO	+0,08	+0,16	+0,24	+0,35	6µmm 25µmm	N8 3,2µmm	N6 0,8µmm	± 0,1	± 0,3	± 0,5	± 0,2	± 0,5	± 1	± 2

	ZN	ZN	470x30x105	00
Nº PIEZAS	CALIDAD / ACAB MP	ACABADO FINAL	DIMENSION-BRUTO	REVISIÓN
	FECHA	NOMBRE	TORGAR	
DIBUJADO	27-01-2021	IFL		
COMPROBADO				
MATERIAL / DESCRIPCIÓN: PATIN EQUIPADO			PLANO Nº 04690_R00.iam	
ESCALA	SUBCONJUNTO: CONJUNTO GENERAL		CLIENTE:	
1:2	MÁQUINA: PL-15		FORMATO: A3	



05888	01	1	SOPORTE PATÍN (SOLDADURA)	800x130	NEGRA
13334	01	1	PT 40x6	25	F-1
04207	01	1	PATIN SOLDADURA	175 x 30	NEGRA
60049	00	1	TCH M10x100 DIN931	M10 x 100	DIN 931
60464	00	3	ARANDELA PLANA D10 DIN125	D10	DIN 125
60355	00	2	TUERCA HEX M10 DIN934	M10	DIN 934
60806	00	2	ARANDELA GROWER D10 DIN127	D10	DIN 127
COD	REV	NoP	DESCRIPCION	DIMENSIONES	CALIDAD / AMP

Lista de piezas

LONGITUDES							ANGULOS				FORMA Y POSICION			
0,5 - 6	6 - 30	30 - 120	120 - 400	400-1000	1000-2000	2000-4000	0º-10º	10º-50º	50º-120º	120º-360º	—	⊥	//	○
± 0,1	± 0,2	± 0,3	± 0,5	± 0,8	± 1,2	± 2	± 5 '	± 10 '	± 20 '	± 30 '	10 / 100	10 / 100	10 / 100	10 / 100

	1 - 18	18 - 80	80 - 180	180 - 400	ACABADO SUPERFICIAL			DIAMETROS TALADROS			RADIOS DE ACUERDO Y CHAFLANES			
EJE	-0,08	-0,16	-0,24	-0,35	BRUTO // DESBASTE // FINO			Ø0,5 - 6	Ø6 - 30	Ø30 - 120	0,5 - 3	3 - 6	6 - 30	30 - 120
AGUJERO	+0,08	+0,16	+0,24	+0,35	6µmm 25µmm	N8 3,2µmm	N6 0,8µmm	± 0,1	± 0,3	± 0,5	± 0,2	± 0,5	± 1	± 2

	ZN	ZN	800x130x105	01
Nº PIEZAS	CALIDAD / ACAB MP	ACABADO FINAL	DIMENSION-BRUTO	REVISIÓN
	FECHA	NOMBRE	TORGAR	
DIBUJADO	27-01-21	AEA		
COMPROBADO				
MATERIAL / DESCRIPCIÓN: PATIN EQUIPADO TOP-SEG			PLANO Nº 05886_R01.iam	
ESCALA	SUBCONJUNTO: CONJUNTO GENERAL		CLIENTE:	
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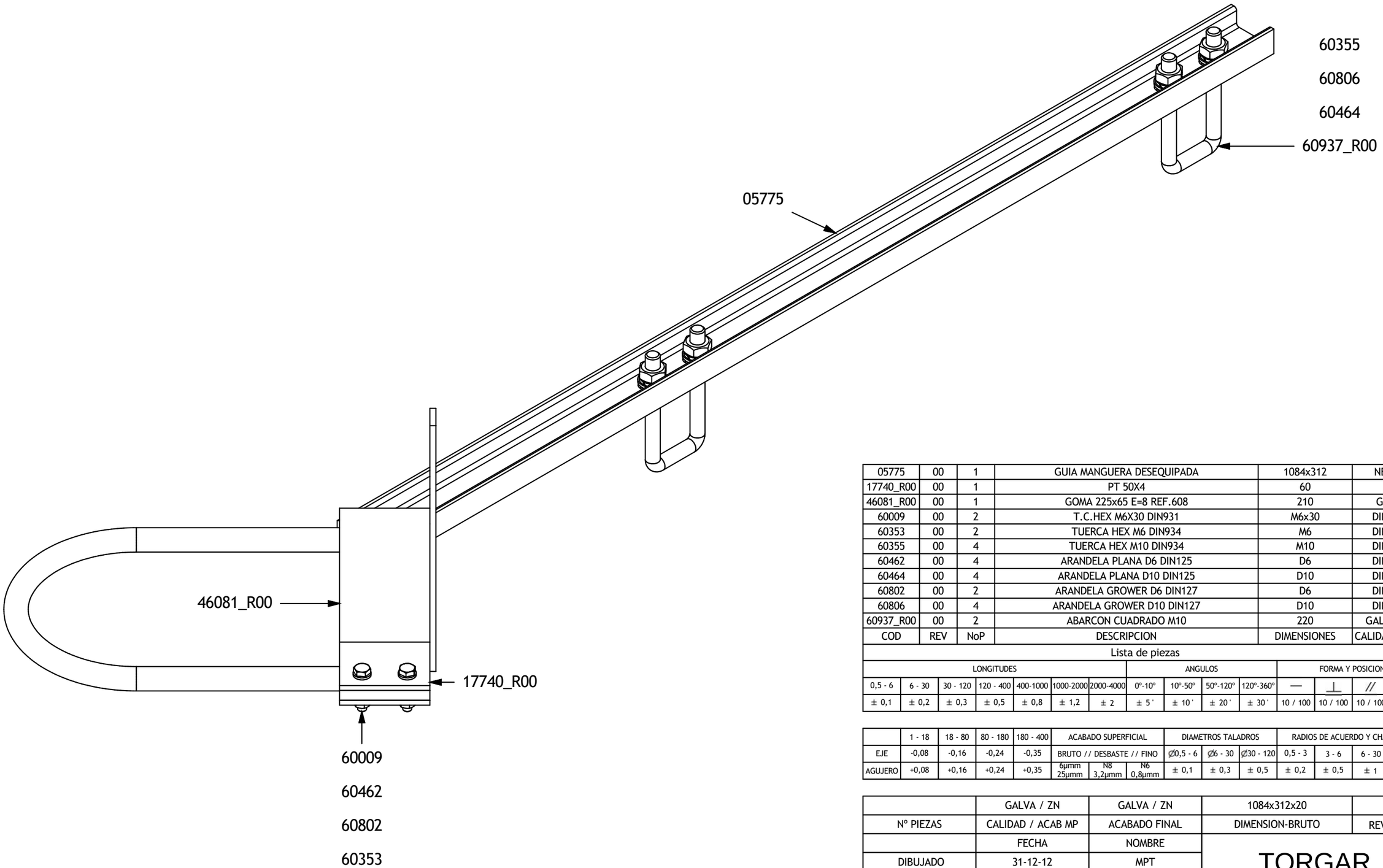


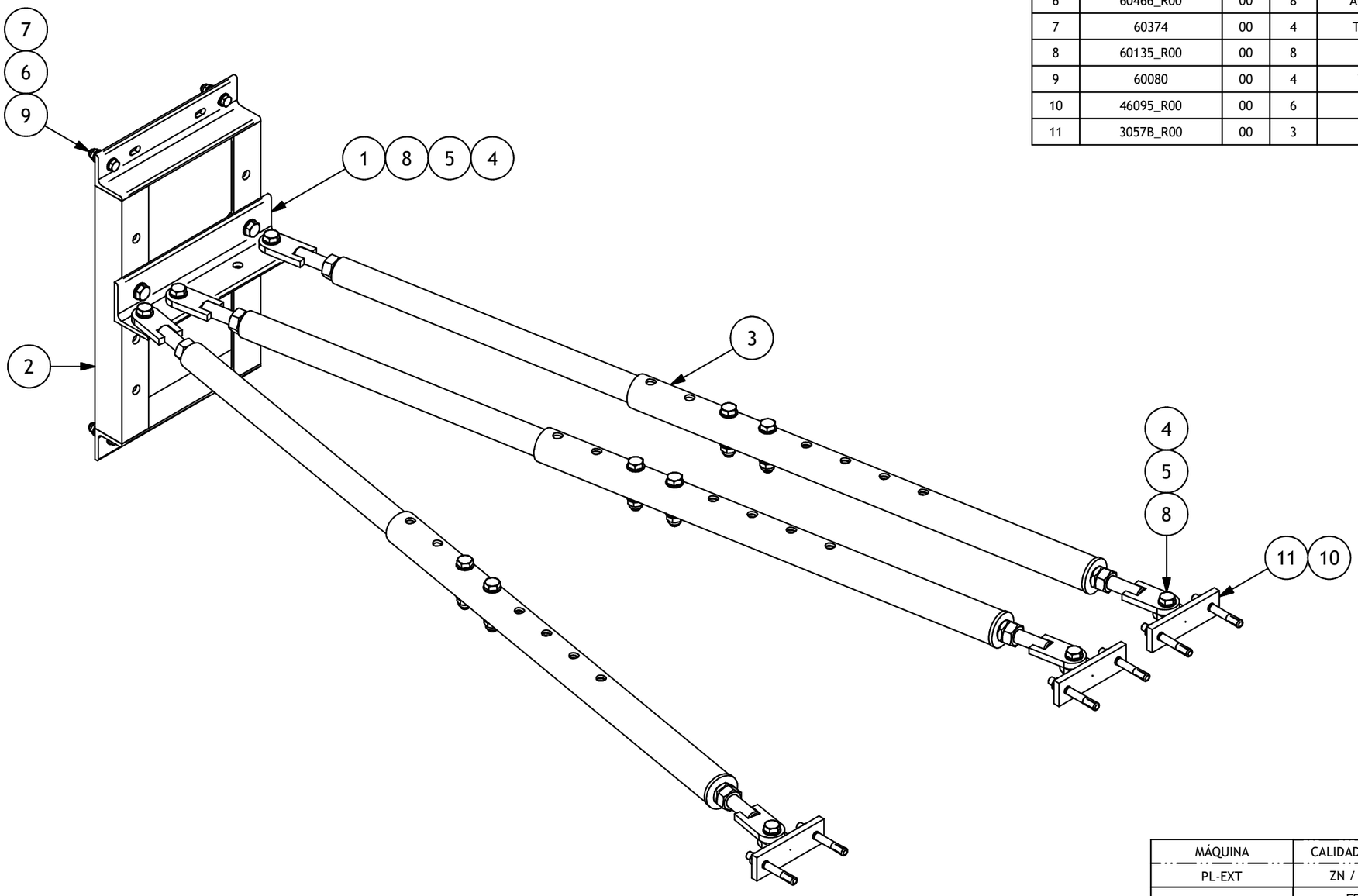
05775	00	1	GUIA MANGUERA DESEQUIPADA	1084x312	NEGRA
17740_R00	00	1	PT 50X4	60	F-1
46081_R00	00	1	GOMA 225x65 E=8 REF.608	210	GOMA
60009	00	2	T.C.HEX M6X30 DIN931	M6x30	DIN 931
60353	00	2	TUERCA HEX M6 DIN934	M6	DIN 934
60355	00	4	TUERCA HEX M10 DIN934	M10	DIN 934
60462	00	4	ARANDELA PLANA D6 DIN125	D6	DIN 125
60464	00	4	ARANDELA PLANA D10 DIN125	D10	DIN 125
60802	00	2	ARANDELA GROWER D6 DIN127	D6	DIN 127
60806	00	4	ARANDELA GROWER D10 DIN127	D10	DIN 127
60937_R00	00	2	ABARCON CUADRADO M10	220	GALVA/ZN
COD	REV	NoP	DESCRIPCION	DIMENSIONES	CALIDAD / AMP

Lista de piezas

LONGITUDES							ANGULOS				FORMA Y POSICION			
0,5 - 6	6 - 30	30 - 120	120 - 400	400-1000	1000-2000	2000-4000	0º-10º	10º-50º	50º-120º	120º-360º	—	⊥	//	○
± 0,1	± 0,2	± 0,3	± 0,5	± 0,8	± 1,2	± 2	± 5 '	± 10 '	± 20 '	± 30 '	10 / 100	10 / 100	10 / 100	10 / 100

	1 - 18	18 - 80	80 - 180	180 - 400	ACABADO SUPERFICIAL			DIAMETROS TALADROS			RADIOS DE ACUERDO Y CHAFLANES			
EJE	-0,08	-0,16	-0,24	-0,35	BRUTO // DESBASTE // FINO			Ø0,5 - 6	Ø6 - 30	Ø30 - 120	0,5 - 3	3 - 6	6 - 30	30 - 120
AGUJERO	+0,08	+0,16	+0,24	+0,35	6µmm 25µmm	N8 3,2µmm	N6 0,8µmm	± 0,1	± 0,3	± 0,5	± 0,2	± 0,5	± 1	± 2

	GALVA / ZN	GALVA / ZN	1084x312x20	00
Nº PIEZAS	CALIDAD / ACAB MP	ACABADO FINAL	DIMENSION-BRUTO	REVISIÓN
	FECHA	NOMBRE	TORGAR	
DIBUJADO	31-12-12	MPT		
COMPROBADO	31-12-12	JGE		
MATERIAL / DESCRIPCIÓN: GUIA MANGUERA EQUIPADA			PLANO Nº 05774_R00.iam	
ESCALA	SUBCONJUNTO: CONJUNOT GENERAL		CLIENTE:	
	MÁQUINA:		FORMATO: A3	



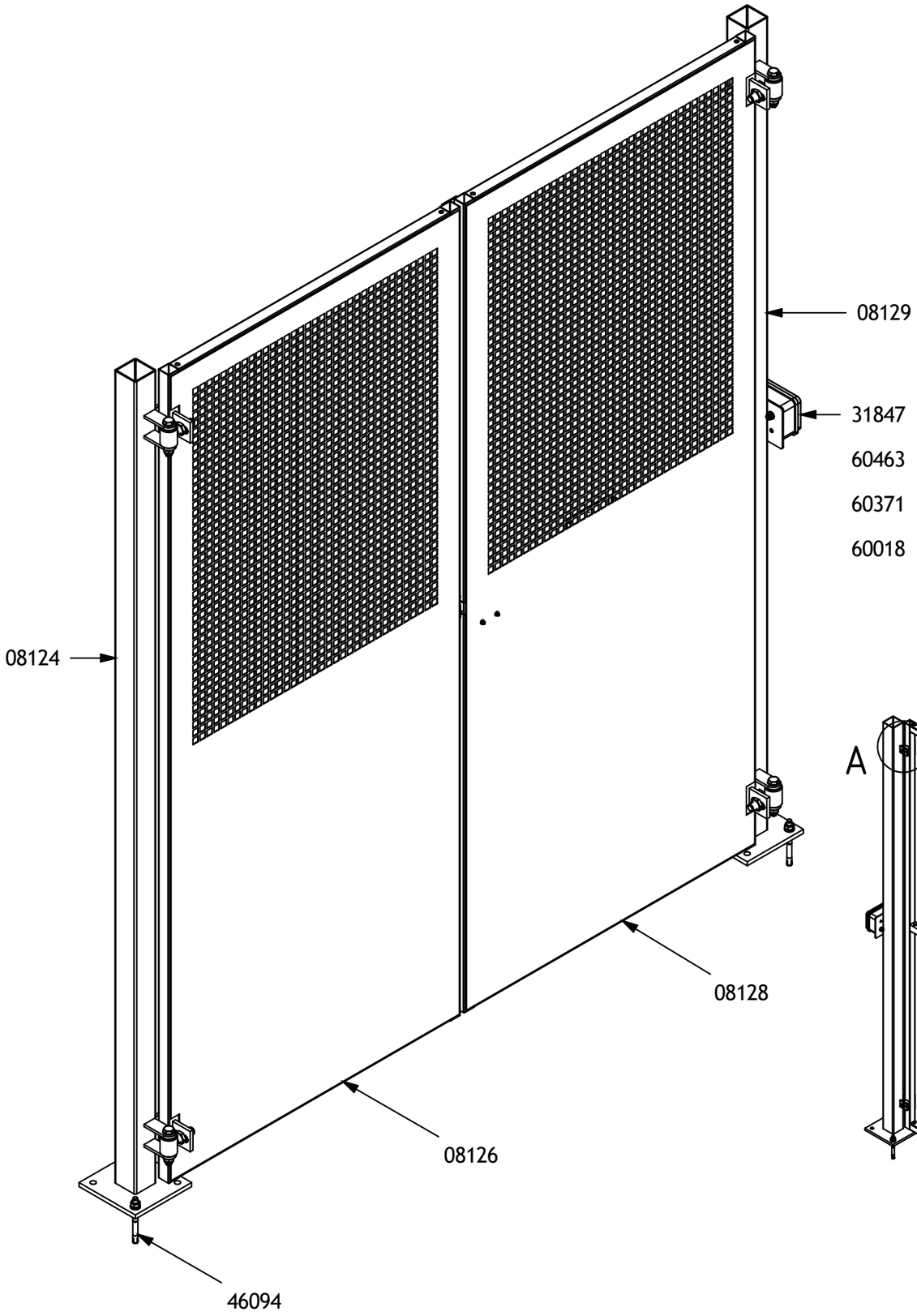
LISTADO DE PIEZAS							
#	CÓDIGO	REV	NoP	DESCRIPCION	DIMENSIONES	CALIDAD/AMP	PESO(Kg)
1	RD-7293-AN-216	00	1	L 100x100x10	457	S275JR	6.708
2	RD-7293-AN-200	00	1	SOPORTE ANCLAJES SOLD	785.5x413	GALVA	24.162
3	23080014	00	3	TIRANTE TELESCÓPICO	-	GALVA	30.916
4	61226_R00	00	8	TUERCA BLOCANTE M20 DIN 985	M20	DIN 985	0.075
5	60469_R00	00	16	ARANDELA PLANA D21 DIN125	D21	DIN125	0.017
6	60466_R00	00	8	ARANDELA PLANA D15 DIN125	D15	DIN125	0.001
7	60374	00	4	TUERCA AUTOB. M14 DIN985	M14	DIN985	0.004
8	60135_R00	00	8	TCHEX M20X60 DIN 931	M20X60	DIN 931	0.220
9	60080	00	4	T.C.HEX. M14 L=65 DIN931	M14x65	DIN931	0.107
10	46095_R00	00	6	TACO HILTI M16x140	M16x140	ZN	0.277
11	3057B_R00	00	3	PLACA AMARRE FORJADO	200x60X85	-	1.764

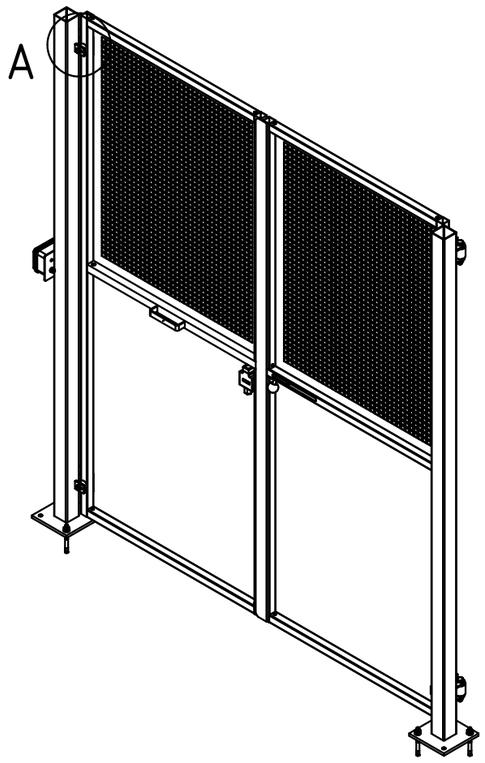
MÁQUINA	CALIDAD/ACAB MP	ACABADO FINAL	DIMENSIONES	UNIDADES
PL-EXT	ZN / GALVA	ZN / GALVA		1
	FECHA	NOMBRE		
DIBUJADO	25-07-22	JGE		
COMPROBADO				
REVISIÓN	PESO	ESCALA		
00	133.657 kg	1 : 10		

TORGAR

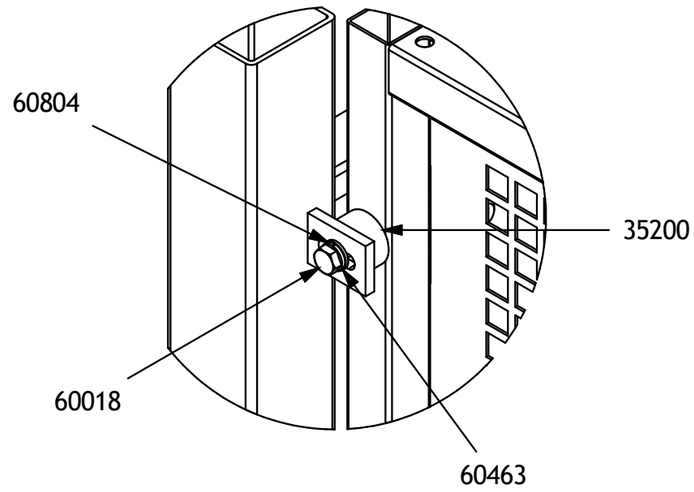
MATERIAL/DESCRIPCIÓN	PLANO Nº
ANCLAJE EQUIPADO	RD-7293-AN-100.iam

A3





A (1 : 3)



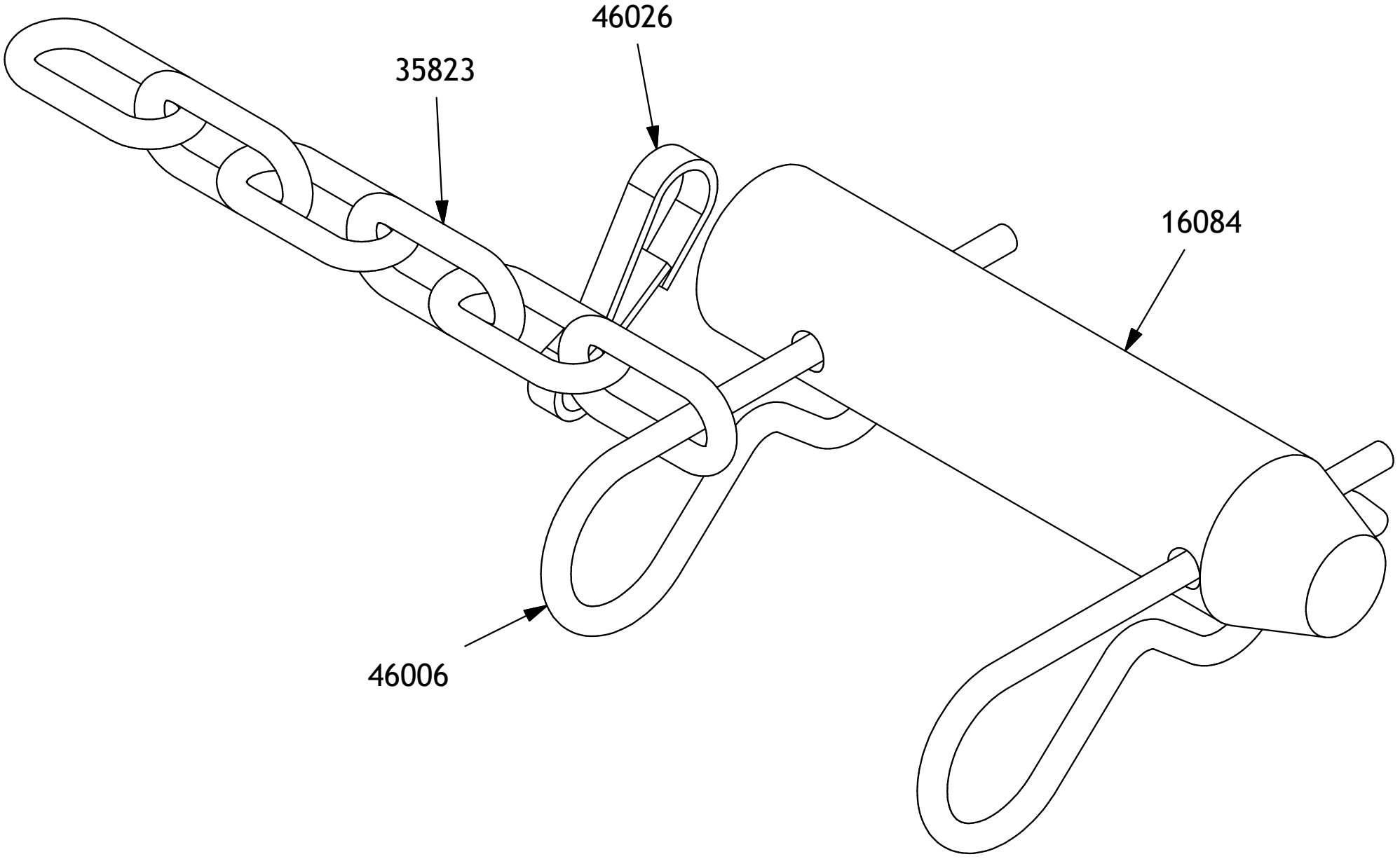
08124	00	1	SOLDADURA POSTE	2000	NEGRA
08126	00	1	HOJA CERROJO EQUIP	1990 x 860	GALVA
08128	00	1	PUERTA FDC EQUIPADA	1990x830	GALVANIZADA
08129	00	1	SOLDADURA POSTE	2000	GALVANIZADO
31847	00	1	CAJA CONEXIONES PLANTAS	122x82	-
35200	00	4	TACO GOMA	REF. 212 / 15	CAUCHO
46094	00	4	TACO HILTI M10x110	M10x110	COMERCIAL
60018	00	6	T.C.HEX M8X20 DIN931	M8x20	DIN 931
60371	00	2	TUERCA AUTOBLOCANTE M8 DIN985	M8	DIN 985
60463	00	8	ARANDELA PLANA D8 DIN125	D8	DIN 125
60804	00	4	ARANDELA GROWER D8 DIN127	D8	DIN 127
COD	REV	NoP	DESCRIPCION	DIMENSIONES	CALIDAD / AMP

Lista de piezas

LONGITUDES							ANGULOS				FORMA Y POSICION			
0,5 - 6	6 - 30	30 - 120	120 - 400	400-1000	1000-2000	2000-4000	0°-10°	10°-50°	50°-120°	120°-360°	—	⊥	//	○
± 0,1	± 0,2	± 0,3	± 0,5	± 0,8	± 1,2	± 2	± 5 '	± 10 '	± 20 '	± 30 '	10 / 100	10 / 100	10 / 100	10 / 100

	1 - 18	18 - 80	80 - 180	180 - 400	ACABADO SUPERFICIAL			DIAMETROS TALADROS			RADIOS DE ACUERDO Y CHAFLANES			
EJE	-0,08	-0,16	-0,24	-0,35	BRUTO // DESBASTE // FINO			Ø0,5 - 6	Ø6 - 30	Ø30 - 120	0,5 - 3	3 - 6	6 - 30	30 - 120
AGUJERO	+0,08	+0,16	+0,24	+0,35	6µmm 25µmm	N8 3,2µmm	N6 0,8µmm	± 0,1	± 0,3	± 0,5	± 0,2	± 0,5	± 1	± 2

	-	GALVANIZADO	2010x1800	00
Nº PIEZAS	CALIDAD / ACAB MP	ACABADO FINAL	DIMENSION-BRUTO	REVISIÓN
	FECHA	NOMBRE	TORGAR	
DIBUJADO	20-12-21	AEA		
COMPROBADO				
MATERIAL / DESCRIPCIÓN:			PLANO Nº	
CONJUNTO GENERAL			08123_R00.iam	
ESCALA	SUBCONJUNTO: CONJUNTO GENERAL		CLIENTE:	
1:8	MÁQUINA: PL-EXT		FORMATO: A3	



16084	00	1	RED CALIBRADO D25	115	F-1252 RECOCIDO
35823	00	1	CADENA 4x14x26	418	COMERCIAL
46006	00	2	PASADOR "R"	D4	ZN
46026	00	1	MOSQUETON PLANO 40 REF.12068940	REF.12068940	ZN
COD	REV	NoP	DESCRIPCION	DIMENSIONES	CALIDAD / AMP

Lista de piezas

LONGITUDES							ANGULOS				FORMA Y POSICION			
0,5 - 6	6 - 30	30 - 120	120 - 400	400-1000	1000-2000	2000-4000	0°-10°	10°-50°	50°-120°	120°-360°	—	⊥	//	○
± 0,1	± 0,2	± 0,3	± 0,5	± 0,8	± 1,2	± 2	± 5 '	± 10 '	± 20 '	± 30 '	10 / 100	10 / 100	10 / 100	10 / 100

	1 - 18	18 - 80	80 - 180	180 - 400	ACABADO SUPERFICIAL			DIAMETROS TALADROS			RADIOS DE ACUERDO Y CHAFLANES			
EJE	-0,08	-0,16	-0,24	-0,35	BRUTO // DESBASTE // FINO			Ø0,5 - 6	Ø6 - 30	Ø30 - 120	0,5 - 3	3 - 6	6 - 30	30 - 120
AGUJERO	+0,08	+0,16	+0,24	+0,35	6µmm 25µmm	N8 3,2µmm	N6 0,8µmm	± 0,1	± 0,3	± 0,5	± 0,2	± 0,5	± 1	± 2

	GALVA/ZN	-	D25x113	00
Nº PIEZAS	CALIDAD / ACAB MP	ACABADO FINAL	DIMENSION-BRUTO	REVISIÓN
	FECHA	NOMBRE	TORGAR	
DIBUJADO	20-09-19	AEA		
COMPROBADO				
MATERIAL / DESCRIPCIÓN: BULÓN / CADENA EQUIPADO			PLANO Nº 04299_R00.iam	
ESCALA	SUBCONJUNTO:		CLIENTE:	
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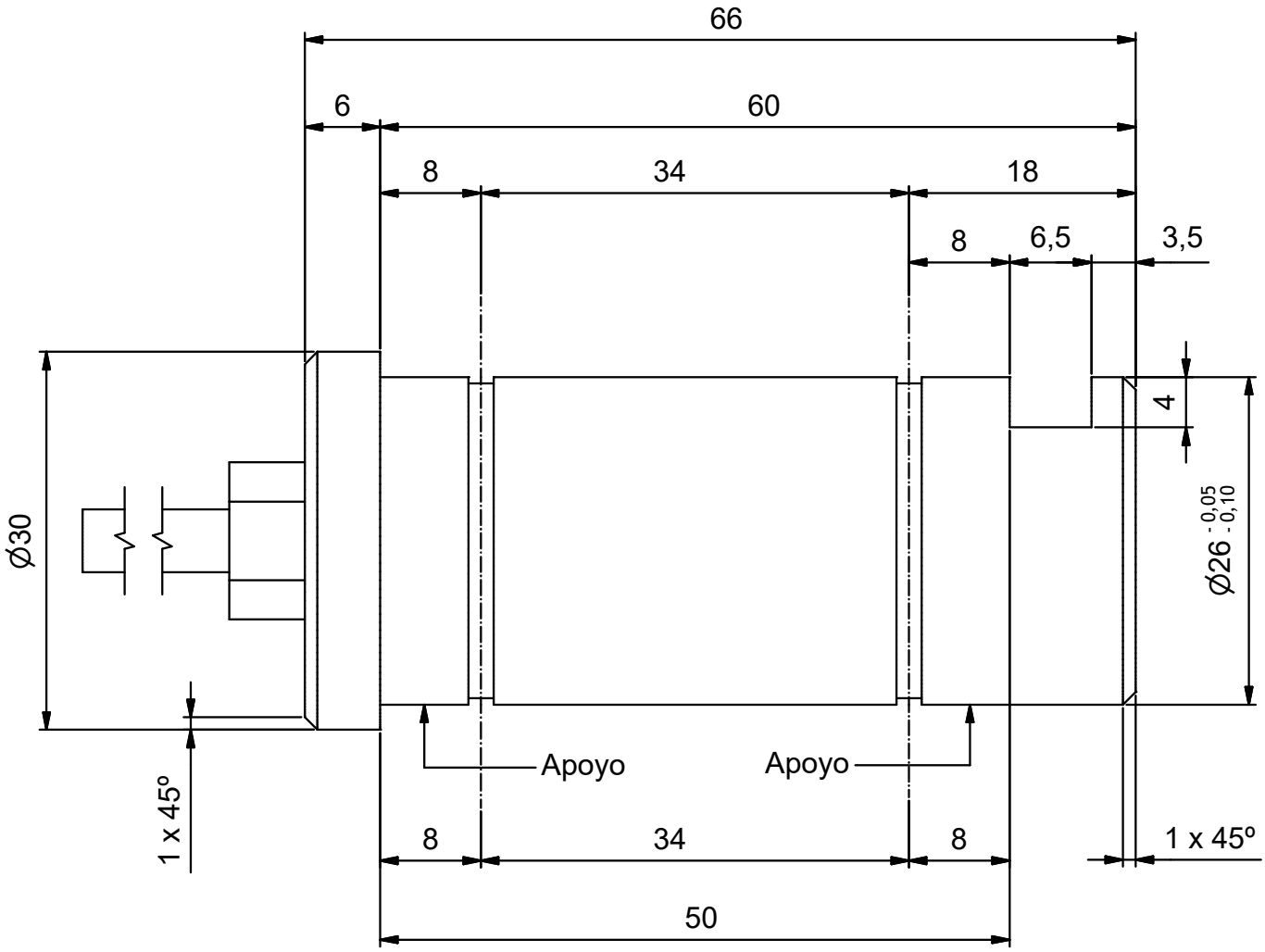
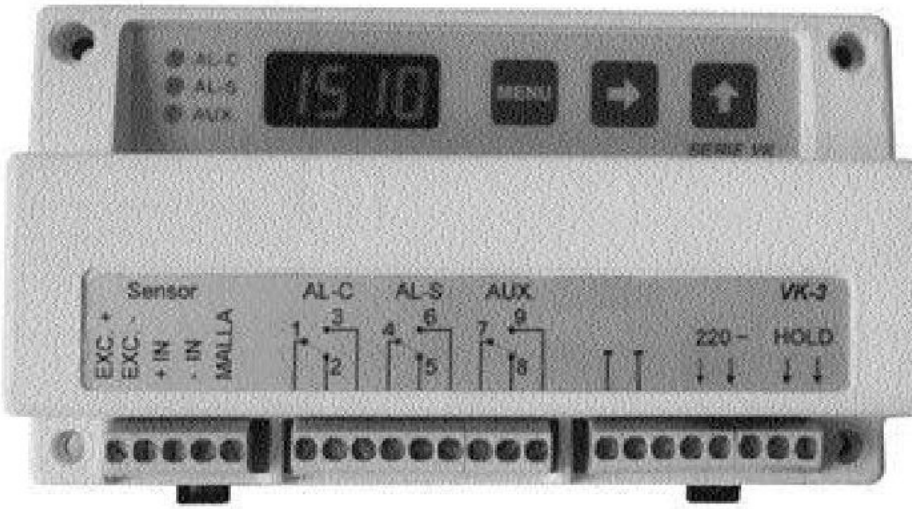


LONGITUDES							ANGULOS				FORMA Y POSICION			
0,5 - 6	6 - 30	30 - 120	120 - 400	400-1000	1000-2000	2000-4000	0º-10º	10º-50º	50º-120º	120º-360º	—	⊥	//	○
± 0,1	± 0,2	± 0,3	± 0,5	± 0,8	± 1,2	± 2	± 5 '	± 10 '	± 20 '	± 30 '	10 / 100	10 / 100	10 / 100	10 / 100

	1 - 18	18 - 80	80 - 180	180 - 400	ACABADO SUPERFICIAL			DIAMETROS TALADROS			RADIOS DE ACUERDO Y CHAFLANES			
EJE	-0,08	-0,16	-0,24	-0,35	BRUTO // DESBASTE // FINO			Ø0,5 - 6	Ø6 - 30	Ø30 - 120	0,5 - 3	3 - 6	6 - 30	30 - 120
AGUJERO	+0,08	+0,16	+0,24	+0,35	6µmm 25µmm	N8 3,2µmm	N6 0,8µmm	± 0,1	± 0,3	± 0,5	± 0,2	± 0,5	± 1	± 2

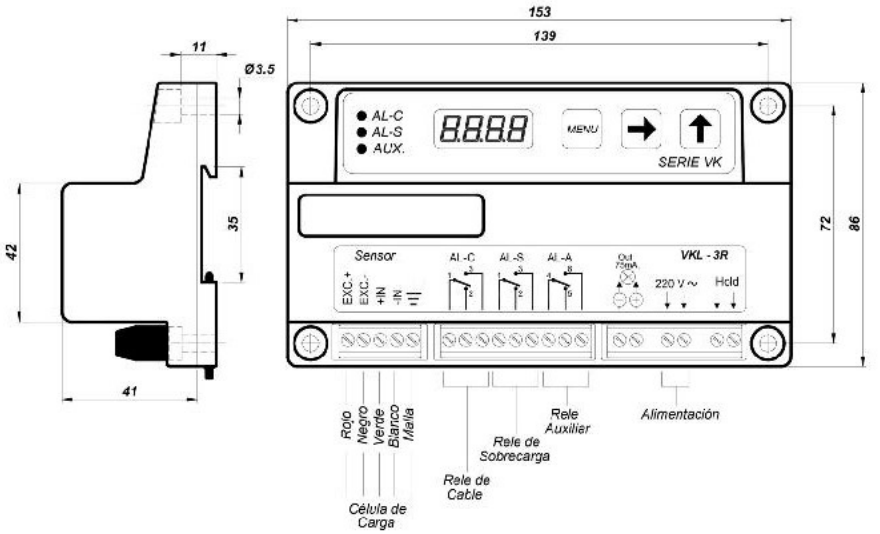
	DINACELL	-	S/ PLANO	00
Nº PIEZAS	CALIDAD / ACAB MP	ACABADO FINAL	DIMENSION-BRUTO	REVISIÓN
	FECHA	NOMBRE	TORGAR	
DIBUJADO	28-01-13	JGE		
COMPROBADO	28-01-13	GSH		
MATERIAL / DESCRIPCIÓN: BULÓN PESAJE 3000 KG			PLANO Nº 31122_R00.ipt	
ESCALA	SUBCONJUNTO: CABINA EQUIPADA		CLIENTE:	
2:1	MÁQUINA:		FORMATO: A4	



LOAD LIMITER VKL-3R

INSTRUCTIONS MANUAL

1.Installation



2. Description of the connections.

AL-C (Cable relay)

It will deactivate if the load programmed in the parameter [AL C] is overcome.
You can configure it to deactivate when the load is below the programmed value.

AL-S (Relay of the Overload)

It will deactivate if the load programmed in the parameter [AL S] is overcome .

AL-A (Auxiliary Relay)

It will deactivate if the load programmed in the parameter [AL A] is overcome .

HOLD (It activate with a tension between 24 & 220 V alternating or continuous).
Activating the entrance of **HOLD** .The weight measured is blocked,***then the display presenting in intermittent***, & the relay together with the cabin display conserves its state until this entrance is disabled.

OUTPUT OF LUMINOUS INDICATOR

a) Output that is connected when the relay AL-S is disabled . The output has polarity and it can be valid to activate a led and a buzzer (continuous current 7,5V.. máx. 75mA).

3. Keys of access to the parameters of menus

The unit has a menu to accede to the adjustment of the parameters.

MENU Pressing this key successively, will go going to all programmable parameters of the menu in a cycle way.
To return to the visual presentation of weight, press the key several time until arrive at the end of the menu, or just press it during 2 seconds.

Note: If when entering in the menu appears CLAU in intermittent, the unit has set a *key* and it is necessary to introduce your keycode in this moment in order to modify the parameters.

→ Pressing this key enters in the selected option and once inside we will be able to select the digit to modify.
Note: In the event of not being able to enter, it means that the key is protected. And it is necessary to introduce your keycode.
See section Nº.8 (Auxiliary functions CLAU *).*

↑ Pressing this key will modify the selected digit.
*Pressing this key when you are located on the parameter, the display presents its content.

.

Note: 1)The only content that you'll not see is the parameter PESO

4. Modification of a parameter

Go pressing the key MENU successively until arrived on the desired parameter.

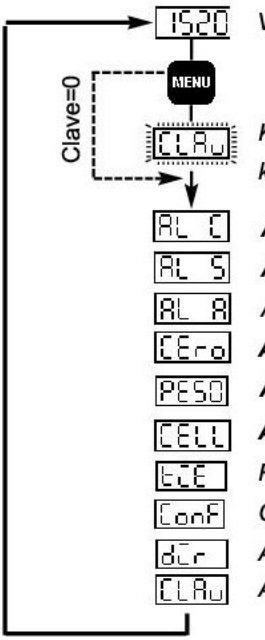
2) Press the key ↑ to enter in modification of the parameter, being the left digit in intermittent.
3) Put in the display the wanted value, using this keys → ↑.
4) Press MENU to introduce the selected value. Then the display will become intermittent during 10 seconds.
5) Press the key MENU again while it is intermittent, to confirm the operation. And the display will present the next parameter.

Notes:

a) If you haven't press the MENU for the **2nd time**, the operation will not stored,and the display presents again the parameters that you was modifying

b) To modify the parameters PESO & CERO , please consult section **Nº.6** (Calibration of the unit).

5. Programming Structure (Menu's)



Visual Weight Presentation

Keycode petition to modify parameters (Only appears if the key is different from zero).

***Alarm** of cable*

***Alarm** of overload*

*Auxiliary **Alarm***

***Adjust** of setting to zero*

***Adjust** with a well-known weight*

***Adjust** of direct load cells*

Retard for the deactivation of the relays

Configuration of the relay AL-C and way of connection

Address of communications

Access Key for the programming process

6. Calibration of the Unit

This section is necessary so that the unit knows the relationship between the signal of the cell and the weight introduced in the cabin.

There are two ways to calibrate the unit:

I) Normal Calibration (***valid for all types of load cells***).

1) *Setting of the Zero:*

a)Situate in the option of menu CEro

b)Check that the cabin is empty and press the key →, *The display menu* CEro *will become intermittent during 10seconds*

c) Press again the key M+/M- *while is in intermittent so that the operation will be confirmed starting to count backward. And when it finished, the display will present the parameter* CEro

Note:

If you don't press the MENU *before finishing the intermittence, the operation will not*

stored, and the display presents again the parameter CEro

2) *ADJUST OF THE WEIGHT(PESO):*

a) *Situate in the option of menu* PESO

b) *Introduce* ***a well-known weight*** *& press* ➔

c) *Put the value of the weight placed by using these keys* ➔ ↑

d) *To save the value press the key* MENU ***2 times*** *(The unit will start to* ***count-down*** *and the value will be save)..*

e) *Then the display will present the next parameter* CELL

Note: *If you haven't press the* MENU *for the* ***2nd time****, the operation will not stored, and the display presents again the parameter* PESO

II) CALIBRATION FOR DIRECT TRANSMISSION CELL.

* *To fulfill this operation it is not necessary to introduce a* ***well-known weight****, but it is necessary that the load cell is calibrated.*

1) *SETTING OF THE ZERO* (same as the operation of the normal calibration).

2) *ADJUST OF THE WEIGHT:*

a) *Situate in the option of menu* CELL

b) *To enter and be able to asigned a value press* ➔.

c) *Put the value of the load of the cell by using this keys* ➔ ↑

(This data comes at the end of the cables, and it belongs to the calibration value of the manufacturer.)

d) *To save the value press the key* MENU ***2 times****(The unit will start to* ***countdown*** *during 10 seconds).*

e) *Then the value will stored in the memory and the display will present the parameter* tCE .

Note: *If you haven't press the* MENU *for the* ***2nd time****, the operation will not stored, and the display presents again the parameter* CELL

7. Alarms

The alarms are the load levels in which that change the state of the relay. To adjust them it is ***not necessary any weight***, just program them with the keyboard.

AL C — When the valueof the load programmed was reach the relay **AL-C** is disabled (**ConF** is **0**). If **ConF** is **1**, the relay turns disabled when the load is lower than the value programmed in **AL-C**.(slack rope)

AL A — Value of the load starting from which is disabled AL A .

AL S — Value of the load starting from which the relay **AL-S** is disabled (Overload).

Note:

1) The disconnection of the relays is temporized in tiE .

2) For the adjustment of the alarms go to the **Nº 4** (**Modification of a parameter**).

THE VALUE OF AL C / AL A / AL S WILL BE 1650

8. Auxiliary functions

tiE — Time of retard for the deactivation of alarms. It is measured in fortieth of second. To program 1 second tie = 0040

ConF

Conf.	Function
ConF = 0	AL-C it is disabled when the load overcomes the programmed value.
ConF = 1	AL-C it is disabled when the load is under the programmed value (slack rope)

CLAu — **Key** to protect the parameters for a possible modifications. Normally the unit comes out from the factory with the key of **0000**, that allows a free access to modify the parameters.

-In the case of putting another key different from **0000**, the access to modify the parameters is **protected**.(its highly recommended to remember your key)

-If the unit is protected with a key. And once entered in the menu the display CLAu presents intermittent to request us the keycode. It is necessary to introduce the key at this time, if we wants to modify some parameter.

-To introduce the key, while CLAu is in intermittent, press the key ➔ and a number will appear that it is necessary to substitute for the correct key number.

Note: If you don't remind the key that you put on, write down the number that appears and ***call the supplier***, it will indicate you the right key.

9. Electrical Characteristics

Model: **VKL-3R.**
Nominal tension: **220V.**
Nominal current: **60mA.**
Nominal frequency:**50-60 Hz.**
Fuse: **100mA.**

10. Change of the fuse

The fuse is in the free mounting fuse holder located in the cable

ATTENTION
For security, it is indispensable to turn off the current of the unit, before acceding to change the fuse.

11. Presentation of Errors

Err1 Load cell not well connected, damaged or cut cable
- Revise the connection of the load cell.

Err2 Negative Overflow .
-The load cell is working in a contrary way or it is not well connected.

Err3 Positive Overflow. (The load cell is supporting a superior weight than the nominal value.)
-It is necessary to put a load cell that has a superior nominal value.

Err4 Polarity Error. (This error is detected when the unit adjusts the weight with the polarity of the load cell changed).
-Revise the connection of the load cell.
-Set again the adjustment of the zero and the weight.

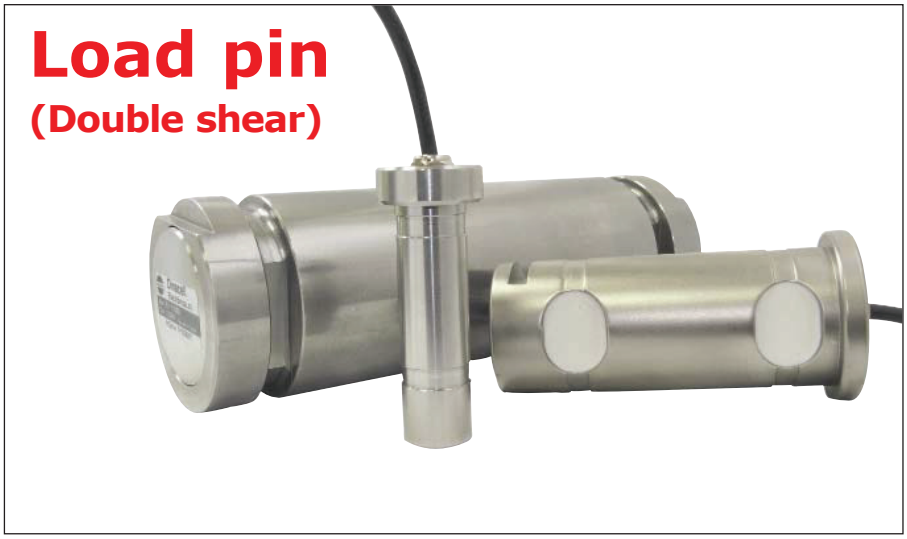
Err5 Short circuit in the output of the cabin display (MB-D).
-Locate & eliminate the short circuit.
-Turn off the unit (VK) and connect it again so that the display Err5 will disappear del display

Note: 1) When an error takes place all the relays are disabled.
2) When an error Err5 takes place, the unit is blocked and it doesn't transmit for the port of communications until eliminating the short circuit.

Dinacell Electrónica, s.l. Pol. Ind. Santa Ana
C/Torno 8 - 28529 Rivas VaciaMadrid - Tel. 913 001 435 - Fax: 913 001 645
E-mail: dinacell@dinacell.com - http://www.dinacell.com

Ref.: MI-E0003 (ESP)
Rev. 04/02

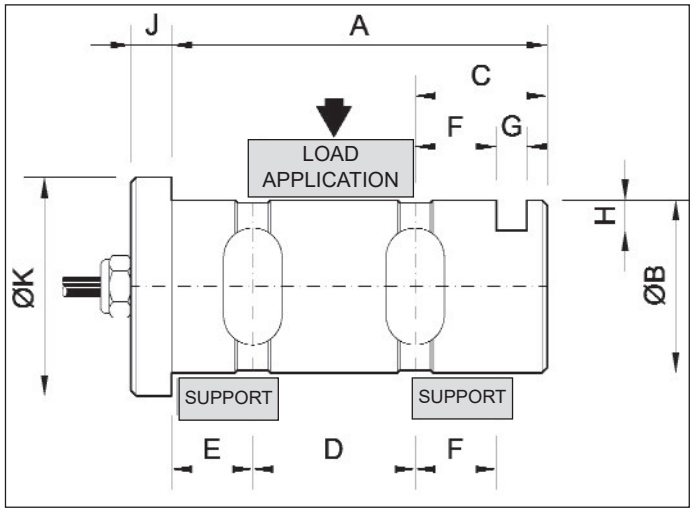
Load pin
(Double shear)



CAPACITIES

Depending on necessities

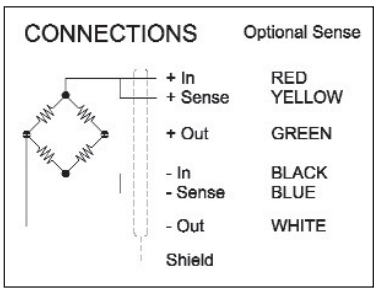
- Load pin Bulon type used in weighing system and load limitation.
- Manufactured in alloy steel or stainless steel.
- Anti-corrosion treatment of chemical nickel (Alloy steel).



TECHNICAL CHARACTERISTICS

Sensibility	1mV/V
Tolerance adjust sensibility	10%
Tolerance adjust on zero	1% F.S.
Tension of excitation	≤ 24V
Non Linearity	<0.034% F.S.
Non Repeatibility	<0.024% F.S.
Combined error	<0.045% F.S.
Hysteresis	<0.027% F.S.
Creep in 30 minutes	<0.037% F.S.
Temp. effect on sensibility	<0.034%
Temp. effect on zero	<0.024%/5ºC
Compensated margin of temperature	-10ºC/+40ºC
Input resistance	700±3Ω
Output resistance	700±3Ω
Insulation resistance (V.Test=100V)	>5000 10^6Ω
Maximum work load	150% F.S.
Load limit without loss of characteristics	200% F.S.
Break load	>500% F.S.
Cable	Flexible 4x0.25mm
Protection	IP 66 IP 68

Bench mark chart to fill up										
Dimension	A	ØB	C	D	E	F	G	H	J	ØK
mm										



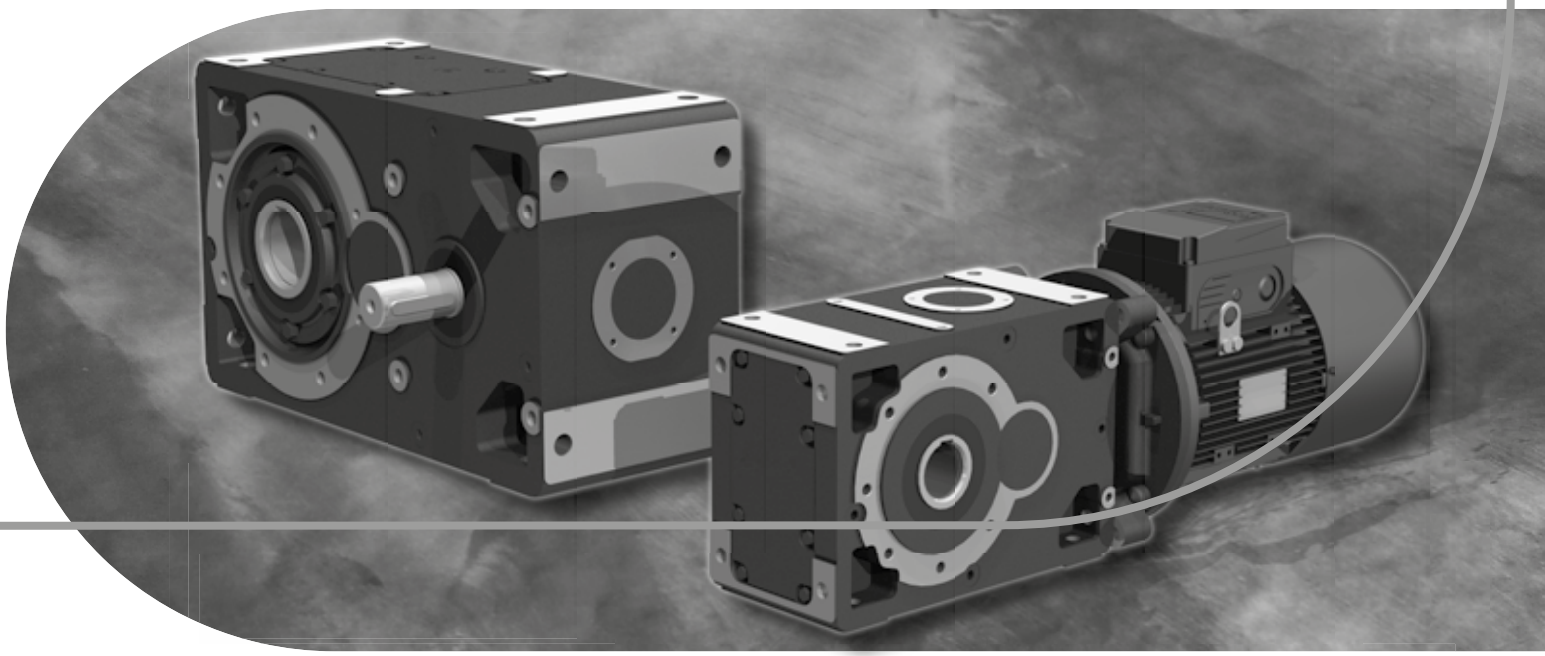
Rossi
Habasit Group

G series

Helical and bevel helical gear reducers and gearmotors

Operating instructions

UTD.187.12-2015.00_EN



Contents

1 - General safety information

This document provides information about handling, installation and maintenance of helical and bevel helical gear reducers and gearmotors (G series).

All the people involved in these activities will carefully read and follow all present instructions.

Information and data contained in this document correspond to the technical level reached at the moment the catalog is printed. Rossi reserves the right to introduce, without notice, the necessary changes to improve efficiency and safety of its products.

1.1 - Recycling

Keep in mind the instructions in force concerning exhaust disposal and recycling:

— elements of gear reducer housing, gear pairs, shafts and bearings must be transformed into steel scraps along with all other cast iron components, excluding specific cases;

– for all other non-metallic components (seal rings, caps, etc.) follow the instructions in force;

— all exhaust oils must be recycled and treated as per regulations in force.

1.2 - Safety

The paragraphs marked with symbols shown below contain dispositions to be strictly respected in order to assure personal **safety** and to avoid any heavy **damages** to the machine or to the system.

(Electric or mechanical) danger, such as:

– live parts;

– temperature higher than 50 °C;

– components rotating during operation;

– suspended loads (lifting and transport);

– eventual high sound level (> 85 dB(A)).

Lifting instructions.

IMPORTANT: gear reducers and gearmotors supplied by Rossi are **components** to be incorporated into machinery and **should not be commissioned before the machinery in which the components have been incorporated conforms to:**

- **Machinery directive 2006/42/EC and subsequent updatings; in particular, possible safety guards for shaft ends not being used for eventually accessible fan cover passages (or other) are the Buyer's responsibility;**
- **«Electromagnetic compatibility (EMC)» 2004/108/EC and subsequent updatings.**

Attention! It is recommended to pay attention to all instructions of present handbook, all standards concerning correct installation and all existing safety laws. Whenever personal injury or property damage may occur, foresee adequate supplementary protection devices against:

- **release or breakage of fastening screws;**
- **rotation or unthreading of the gear reducer from shaft end of driven machine following to accidental breakage of the reaction arrangement;**
- **accidental breakage of shaft end of driven machine.**

If deviations from normal operation occur (temperature increase, unusual noise, etc.) immediately switch off the machine.

Installation

An incorrect installation, an improper use, the removing or disconnection of protection devices, the lack of inspections and maintenance, improper connections may cause severe personal injury or property damage. Therefore the component must be moved, installed, commissioned, handled, controlled, serviced and re-paired **exclusively by responsible qualified personnel**.

The qualified personnel must be **specifically instructed** and have the experience necessary to **recognize** and prevent **dangers** connected to present products avoiding all possibile emergencies.

Gear reducers and gearmotors of present handbook are normally suitable for installations in **industrial areas**: additional protection measures, if necessary, must be adopted and assured by the personnel responsible for the installation.

Attention! Components in non-standard design or with special executions or with constructive variations may differ in the details from the ones described here following and may require additional information.

Attention! For the installation, use and maintenance of the **electric motor** (standard, brake of non-standard motor) or of the eventual motor variator and/or electric supply device (frequency converter, soft-start etc.), and/or optional electric devices (e.g.: independent cooling unit, etc.), consult the attached specific documentation. If necessary, require it.

Maintenance

When operating on gear reducer or on components connected to it the **machine** must be **at rest**: disconnect motor (including auxiliary equipments) from power supply, gear reducer from load, be sure that safety systems are on against any accidental starting and, if necessary, pre-arrange mechanical locking devices (to be removed before commissioning).

Attention! During the running the gear reducers could have **hot surfaces**; always wait that the gear reducer or the gearmotor to cool before carrying out any operations.

Please download further technical documentation (e.g.: catalogs) from our website www.rossi-group.com or contact Rossi. For any clarification and/or additional information consult Rossi and specify all name plate data.

2 – Application conditions and limits

Gear reducers are designed for industrial applications according to catalog data, ambient temperature 0 ÷ +40 °C (with peaks at -10 °C and +50 °C), maximum altitude 1 000 m.

Not allowed running conditions: application in aggressive environments having explosion danger, etc. Ambient conditions must comply with specifications stated on name plate.

3 – How supplied

3.1 - Receipt

At receipt **verify** that the unit corresponds to the one ordered and **has not been damaged during the transport**, in case of damages, report them immediately to the courier.

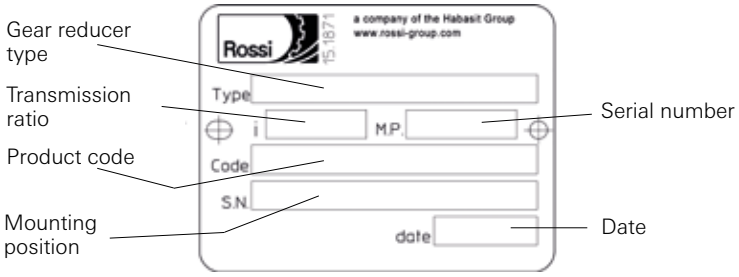
Do not commission gear reducers and gearmotors that are even slightly damaged.

Report any non-compliance to Rossi.

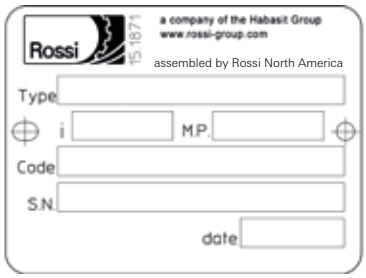
3.2 - Name plate

Every gear reducer is provided with a name plate in anodized aluminium containing main technical information relevant to identification; the name plate must not be removed and must be kept integral and readable. All name plate data must be specified on eventual spare part orders.

Product assembled by Rossi Italy



Product assembled by Rossi ACs



3.3 - Lubricant

Unless otherwise stated, the gear reducers sizes 40 ... 81 are supplied **complete** with synthetic oil whereas for sizes 100 ... 360 gear reducers are supplied **without** lubricant.

3.4 - Painting

Size gear reducer	Internal painting	External painting		Notes
		Final color blue RAL 5010	Features	
40 ... 81	Epoxy powder (pre-painted)	Epoxy powder (prepainted)	Resistant to atmospheric and aggressive agents. (corrosivity class **C3** according to ISO 12944-2) Suitable for further coats of dual-compound paints[1)]	Machined parts remain unpainted and are protected with an easily removable antitrust oil (before painting remove the protective oil).
100 ... 360	Single compound ester epoxy or phenolic resin basis primer (prepainted)	Single compound exter epoxy or phenolic resin basis primer (pre-painted) + Water-soluble polyure-than dual-compound enamel	Resistant to atmospheric and aggressive agents. (corrosivity class **C3** according to ISO 12944-2) Suitable for further coats of dual-compound paints only 1). Machined parts are painted with water-soluble polyurethan dual-compound enamel	The internal painting does not resist polyglycol synthetic oils (polyalphaolefines synthetic oils are suitable). Remove by a scraper or solvent, if present, the eventual paint of gear reducer coupling surfaces

1) Before adding further coats of paint, properly protect the seal rings and carefully degrease and sand the gear reducer surfaces (instead of sanding, it is possible to apply a coat of water-soluble primer).

3.5 - Protections and packing

Overhanging free shaft ends and hollow shafts are treated with protective anti-rust long life oil and protected with a plastic (polyethylene) cap (only up to D ⩽ 48 mm for overhanging shafts, D ⩽110 mm for hollow shafts). All internal parts are protected with protective anti-rust oil.

Unless otherwise agreed in the order, products are adequately packed: on pallet, protected with a polyethylene film, wound with adhesive tape and strap (bigger sizes); in carton pallet, wound with adhesive tape and strap (smaller sizes); in carton boxes wound with tape (for small dimensions and quantities). If necessary, gear reducers are conveniently separated by means of anti-shock foam cells or of filling cardboard.

Do not stock packed products on top of each other.

4 – Lifting, handling and storing

4.1 - Lifting and handling

Make sure that the lifting equipment (e.g.: crane, hook, eye bolt, straps, etc.) are suitable for the weight and size of the gear reducer (consult Rossi technical catalog for dimensions and weight).

For the lifting and transport of gear reducer (or gearmotor) use through holes or threads on the gear reducer housing feet as stated in the figures below.

Avoid unbalanced lifting (during the movement, inclination must not exceed max ±15° as to mounting position) and, if necessary, use additional belts to balance the weight.

Do not use any shaft ends.

Do not use motor eyebolts.

Do not use front threads of shaft ends or eventual external pipes.

Do not add supplementary loads to the gear reducer or gearmotor mass.

Attention! During the lifting and handling:

– do not stand under the suspended loads;

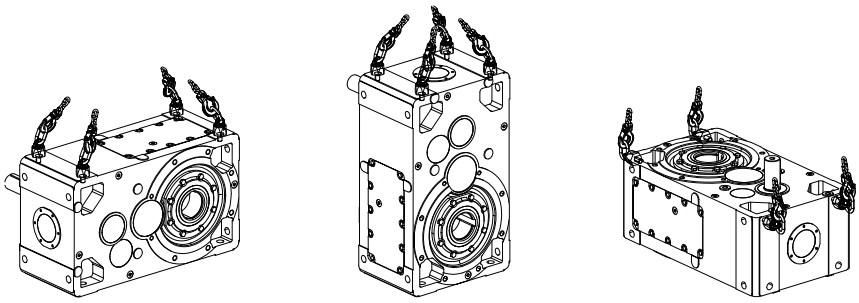
– do not damage the gear reducer with an inadequate transport;

– keep the gear reducers filled with oil in the mounting position foreseen in the order.

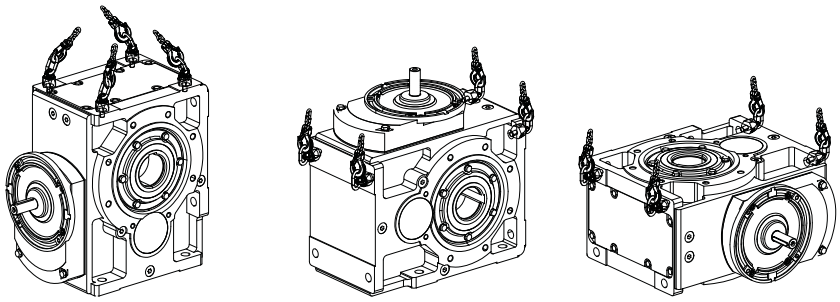
Gear reducers

R I, R 2I, R 3I

R CI, R C2I

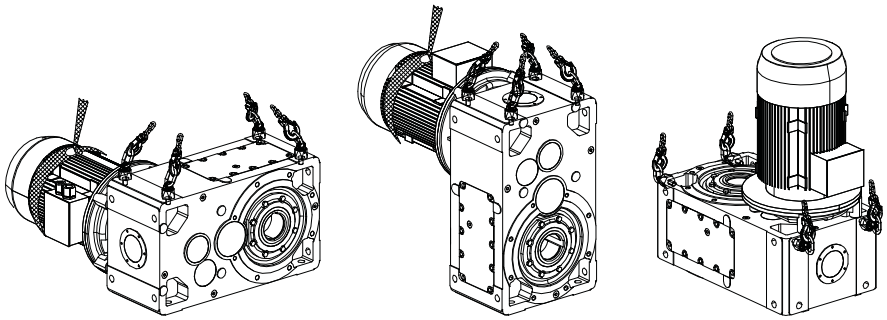


R ICI



Gearmotors

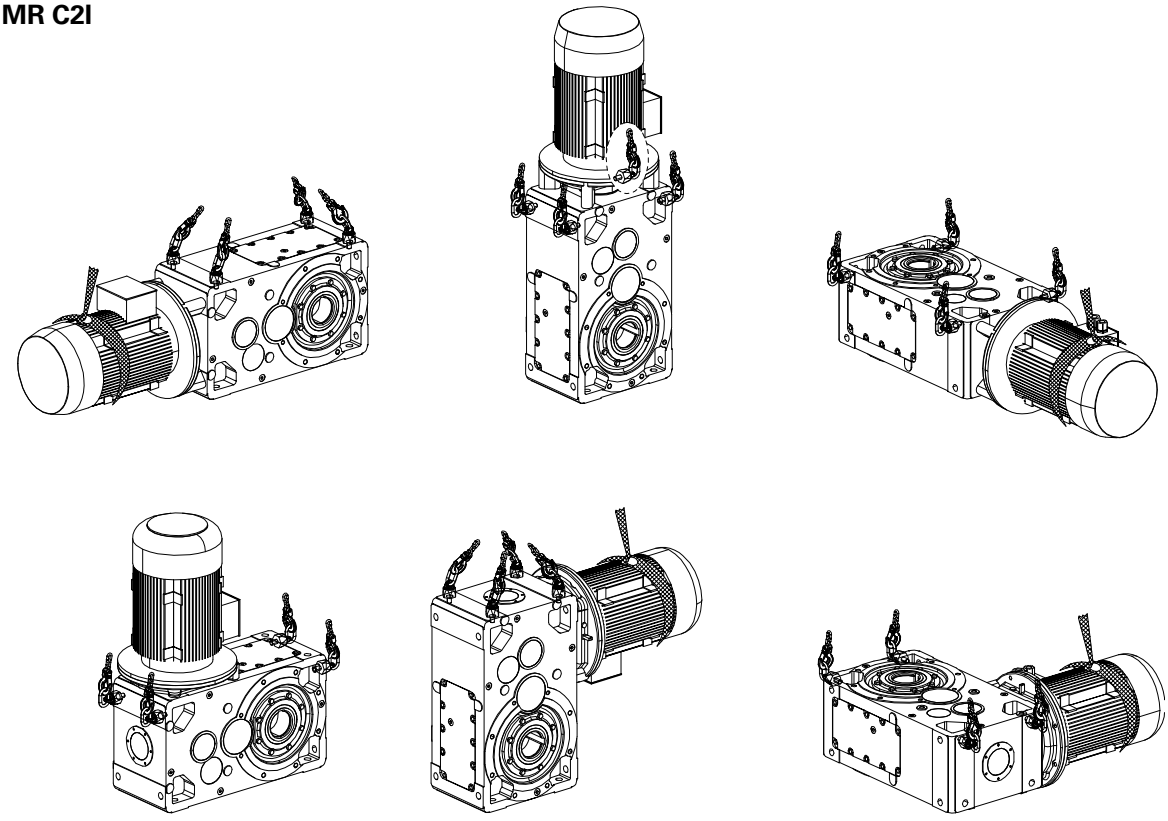
MR 2I, MR 3I, MR 4I



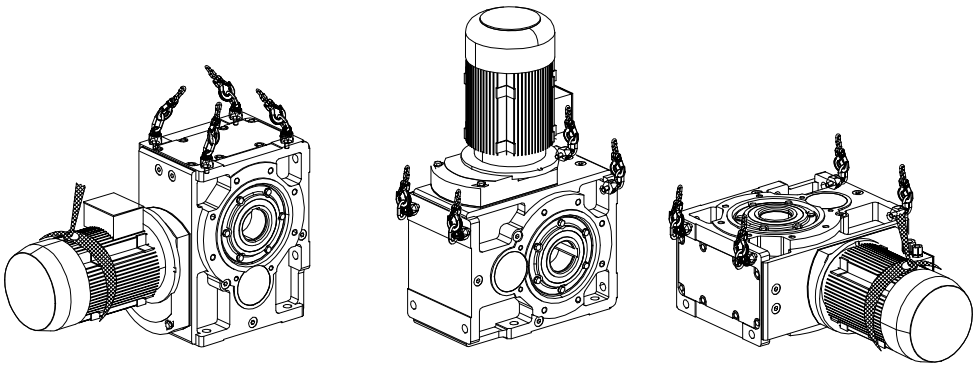
Lifting point

Belt to be used **exclusively** to ensure the motor, when directly mounted, against oscillations due to transport; **not to be used for the lifting of entire gearmotor group**.

MR CI, MR C2I



MR ICI



4.2 - Storing

Surroundings should be sufficiently clean, dry (relative humidity < 50%), free from excessive vibrations ($v_{eff} \leq 0{,}2$ mm/s) not to damage the bearings (excessive vibration should als be guarded during transit, even if within wider range) and at a temperature of 0 ÷ +40 °C: peaks of 10 °C above and belowe are acceptable.

The gear reducers filled with oil must be positioned according to the mounting position stated on name plate during transport and storage.

Every six months rotate the shafts (some revolutions are sufficient) to prevent damage to bearings and seal rings.

Assuming normal surroundings and the provision of adequate protection during transit, the unit is protected for storage up to 1 year.

For a 2 year storing period in normal surroundings it is necessary to pay attention also to following instructions:

– generously grease the seal rings, the shafts and the unpainted machined surfaces, if any, and periodically check the conservation state of the protective anti-rust oil;

– completely fill the gear reducers with lubrication oil and the specified level before commissioning.

For storages longer than 2 years or in aggressive surroundings or outdoors, consult Rossi.

5 Installation of gear reducer

5.1 - General

Before the installation, **verify that**:

– There are no damages on shafts and on mating surfaces;

– gear reducer specifications are adequate to ambient conditions (temperature, atmosphere, etc.);

– the structure on which gear reducer is fitted is plane, levelled and sufficiently dimensioned in order to assure fitting stability and vibration absence (vibration speed v_{eff} < 3,5 mm/s for P_N < 15 kW and v_{eff} < 4,5 mm/s for P_N > 15 kW are acceptable), keeping in mind all transmitted forces due to the masses, to the torque, to the radial and axial loads;

– Used mounting position corresponds to the one stated on name plate;

Attention! Bearing life, good shaft and coupling running depend on alignment precision between the shafts. Carefully align the gear reducer with the motor and the driven machine (with the aid of shims if need be).

Incorrect alignment may cause breakdown of shafts and/or bearings (which may cause overheatings) which may represent heavy danger for people.

Position the gear reducer or gearmotor so as to allow a free passage of air for cooling both gear reducer and motor (especially at motor fan sides).

– Avoid any obstruction to the air flow; heat sources near the gear reducer that might affect the temperature of cooling air and of gear reducer (for radiation); insufficient air recycle and applications hindering the steady dissipation of heat;

Verify that the gear reducer housing is dust-free in order to achieve an efficient heat dispersal.

Mating surfaces (of gear reducer and machine) must be clean and sufficiently rough to provide a good friction coefficient (indicatively *R*a 3,2 ÷ 6,3 µm). Remove by a scraper or solvent the eventual paint of gear reducer coupling surfaces

When external loads are present use pins or locking blocks, if necessary.

When fitting gear reducer and machine and/or gear reducer and eventual flange **B5** it is recommended to use **locking adhesives** such on the fastening screws (also on flange mating surfaces).

For accessories not suplied by Rossi, pay attention to their dimensioning; consult us, if need be.

Before wiring-up the gearmotor make sure that motor voltage corresponds to input voltage. If direction of rotation is not as desired, invert two phases at the terminals.

Y-Δ starting should be adopted for no-load starting (or with a very small load) and for smooth starts, low starting current or other similar devices should be fitted.

If overloads are imposed for long periods or if shocks or danger of jamming are envisaged, then motor-protection, electronic torque limiters, fluid couplings, safety couplings, control units or other similar devices should be fitted.

Usually protect the motor with a thermal cut-out however, where duty cycles involve a high number of on-load starts, it is necessari to utilise **thermal probes** for motor protection (fitted on the wiring); magnetothermic breaker is unsuitable since its threshold must be set higher than the motor nominal current of rating.

Connect thermal probes, if any, to auxiliary safety circuits.

Use varistors and/or RC filters to limit voltage peaks due to contactors.

For gear reducers equipped with **backstop device** (see ch. 5.12), foresee a protection system where a backstop device breaking could cause personal injury or property damage.

Whenever a leakage of lubricant could cause heavy damages, increase the frequency of inspections and/or envisage appropriate control devices (e.g.: remote level gauge, etc.).

In polluting surroundings, take suitable precautions against lubricant contamination through seal rings or other.

For outdoor installation or in a hostile environment (corrosivity class **C3** according to ISO 12944-2) protect the gear reducer or gearmotor with a proper anti-corrosion paint (see ch. 3.4), using water-repellent grease (especially around the rotary seating of seal rings and the accessible zones of shaft end).

Gear reducers and gearmotors should be protected whenever possibile and by appropriate means from solar radiation and extremis of weather; weather protection **becomes essential** when high or low speed shafts are vertically disposed or when the motor is installed vertical with fan uppermost.

For ambient temperature greater than +40 °C or less than 0 °C, consult Rossi.

When gear reducer or gearmotor is supplied with water cooling by coil or independent cooling unit, see ch. 8.

5.2 - Tightening torques for fastening bolts (foot, flange, accessories) and for plugs

Unless otherwise stated, usually it is sufficient to use screws in class 8.8;
- Before tightening the bolt be sure that the eventual centering of flanges are inserted properly
- The bolts are to be diagonally tightened with the maximum tightening torque (see table 5.2.1).

Before tightening, carefully degrease the screws; in the event of heavy vibrations, heavy duties, frequent drive inversions apply a thread-braking seal type Loctite or similar.

Tab. 5.2.1. Tightening torque *M*s for feet and flange fastening bolts

Screw	*M*s [N m] NI 5737-88, UNI 5931-84		
	cl. 8.8	cl. 10.9	cl. 12.9
M4	2.9	4	–
M5	6	8.5	10
M6	11	15	20
M8	25	35	40
M10	50	70	85
M12	85	120	145
M14	135	190	230
M16	205	290	350
M18	280	400	480
M20	400	560	680
M22	550	770	930
M24	710	1000	1200
M27	1000	1400	1700
M30	1380	1950	2350
M33	2000	2800	3400
M36	2500	3550	4200

Tab. 5.2.2. Tightening torques for plugs

Gear red. size	Dimension of threading	*M*s [N m]
40, 50	G 1/4''	7
63 ... 81	M16 × 1,5	14
100 ... 140	G 1/2''	14
160 ... 280	G 3/4''	14
320 ... 360	G 1''	25

5.3 - Flange mounting

Carefully select the length of fixing screws when using tapped holes (B14 flange) for gear reducer fitting, in order to assure a sufficient meshing thread length for the correct gear reducer fitting to the machine without breaking down the threading seat.

For the mounting of sizes 140, 200 and 250 including B14 flange it is necessary that the tapped holes of counterflange (driven machine) are realized with the same diameter (equal to Ø15, Ø21 and Ø25 respectively) ase the 2 tapped holes of lower diameter are not exactly in position 22° 30'.

In the fastening screws and in the flange mating surfaces use **locking adhesives**.

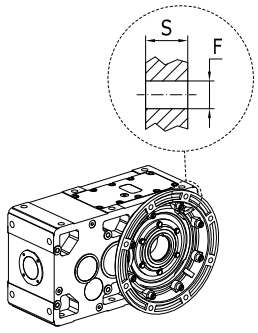


Fig. 5.3.1. **B5** Flange
B5 Flange (type B)

Tab. 5.3.1. Dimension and flange hole numbers B5 and B14

Gear red. size	Flange B14 **d**	Flange B5 **ØF**	**S**
40	M5 n. 4	9,5 n. 4 (M8)	11
50	M6 n. 4	9,5 n. 4 (M8)	12
63, 64	M8 n. 4	11,5[1)] n. 4[1)] (M10[1)])	14
80,81	M10 n. 4	14 n. 4 (M12)	16
100	M12 n. 4	14 n. 4 (M12)	18
125	M14 n. 7	18 n. 4 (M16)	20
140	M14 n. 6 + M12 n. 2	18 n. 4 (M16)	22
160, 180	M16 n. 8	18 n. 8 (M16)	22
200	M20 n. 6 + M16 n. 2	18 n. 8 (M16)	25
225	M20 n. 8	22 n. 8 (M20)	25
250	M24 n. 6 + M20 n. 2	27 n. 8 (M24)	30
280	M24 n. 8	27 n. 8 (M24)	30
320 ... 360	M30 n. 8	33 n. 8 (M30)	37

1) With **B5** flange **type B**: 14 n.4 (M12).

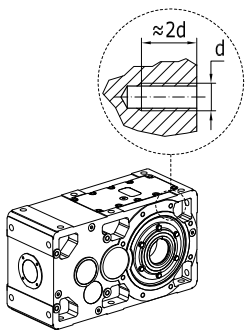
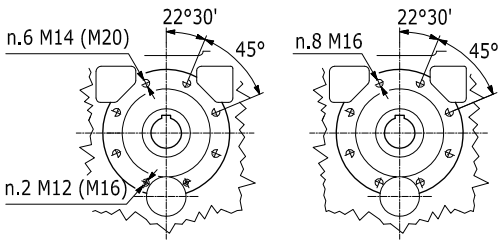


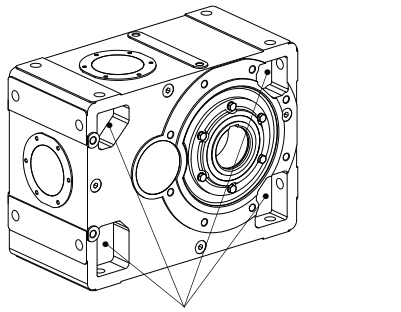
Fig. 5.3.2. **B14** Flange



Sizes 140, 200 Size 250

Fig. 5.3.3. Drilling B14 for sizes 140, 200 and 250.

5.4 - Foot mounting



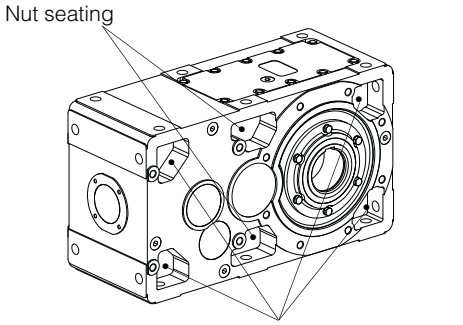
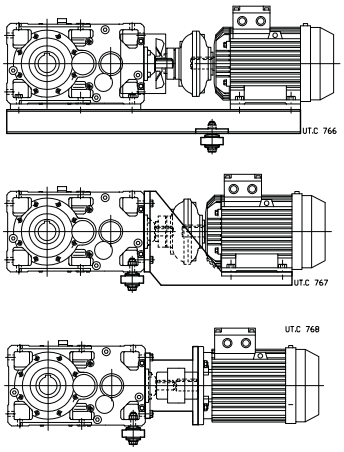
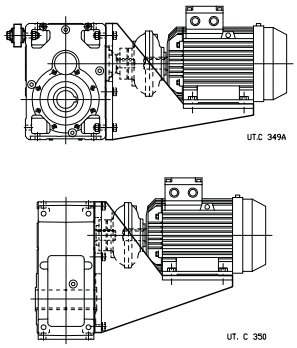


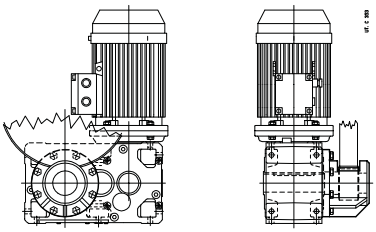
Fig. 5.4.1. Bolts for foot fastening

Gear red. size	Screw UNI 5737-88 (l max)
40	M6 × 22
50	M8 × 30
63, 64	M10 × 35
80, 81	M12 × 40
100	M14 × 50
125, 140	M16 × 55
160, 180	M20 × 70
200, 225	M24 × 90
250, 280	M30 × 110
320 ... 360	M36 × 130

5.5 - Shaft mounting







Important! When shaft mounted, the gear reducer must be supported both axially and radially (also for mounting position B3 ... B8) by the machine shaft end, as well as anchored against rotation only, by means of a reaction having **freedom of axial movement** and sufficient **clearance in its couplings** to permit minor oscillations always in evidence without provoking dangerous overloading on the gear reducer. Lubricate with proper products the hinges and the parts subject to sliding; when mounting the screws it is recommended to apply **locking adhesives**.

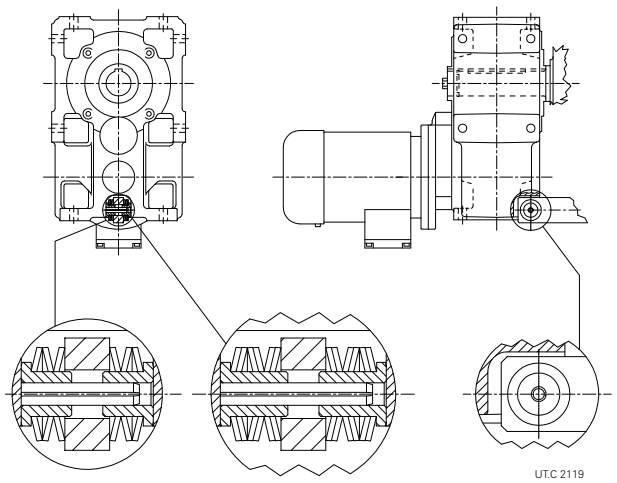
Important! Concerning the reaction system, follow the project indications stated in the technical catalogs Rossi. Whenever personal injury or property damage, due to falling or projecting parts of gear reducer or of its parts, may occur, **foresee adequate supplementary protection devices against**:

– **rotation** or **unthreading of the gear reducer from shaft end of driven machine** following to accidental breakage of the reaction arrangement;

– accidental breakage of shaft end of driven machine.

System **kit using reaction disc springs** (reaction recess).

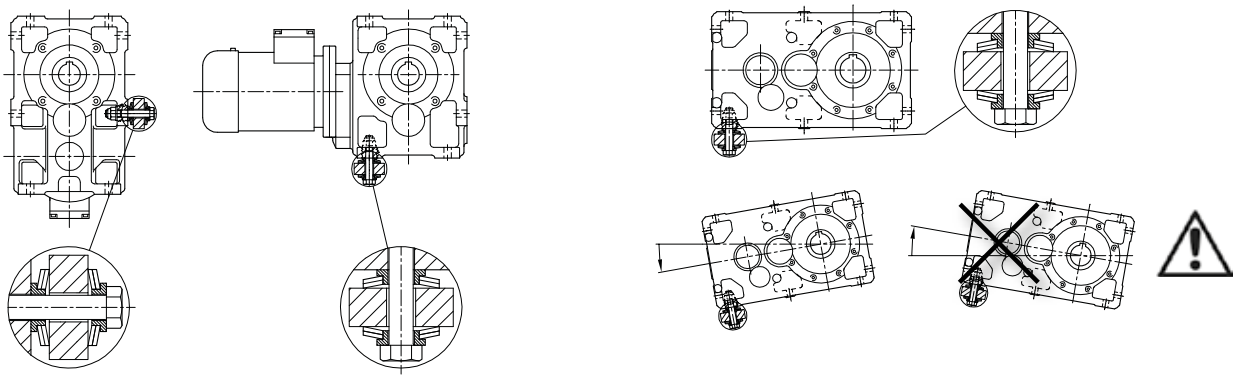
For the mounting of the kit, use the tapped butt end hole on the shaft end of the driven machine and the flat machined chamfered surface for compressine and fitting the disc springs into the reaction recess.



(50 ... 81, 125) (100)

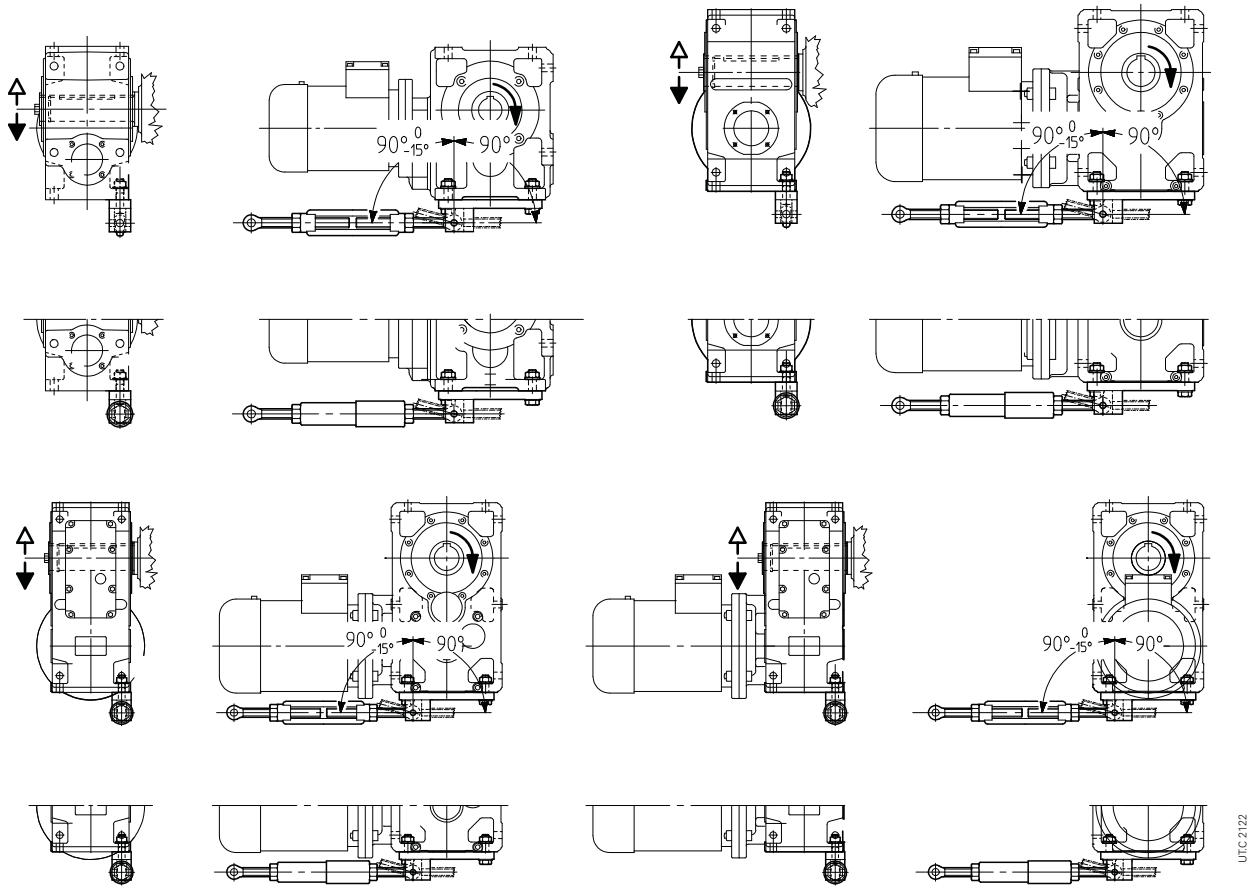
Reaction bolt using disc spring

For sizes 140 ... 360 C2I, 2I, 3I, in B3 or B8 mounting position, ensure that the **housing oscillation, during the running, does not overtake** – towards the top – **the horizontal position.**



Rigid or flexible torque arm using bracket

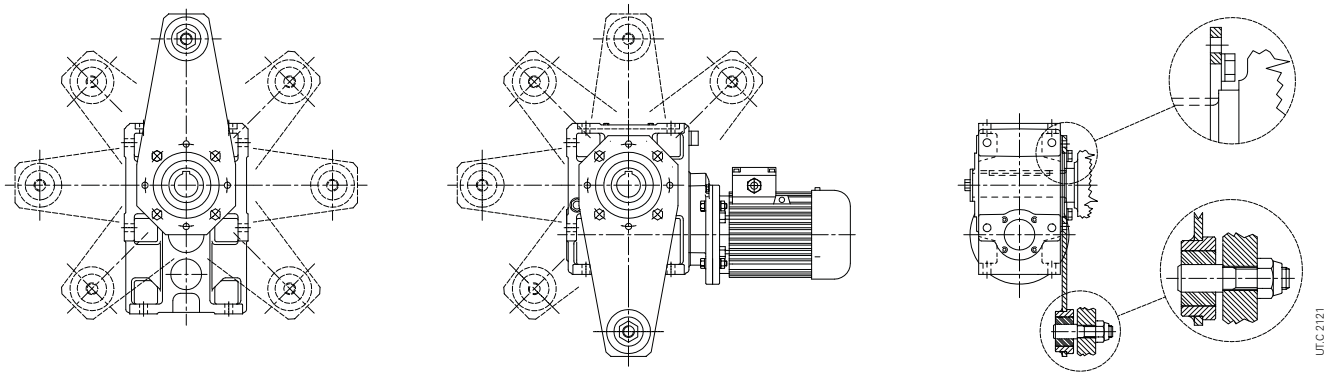
If the direction of rotation is opposite to that given in the fig. rotate the torque arm by 180° (operation not necessary in case of flexible torque arm).



System with **torque arm**

According to dimensions, some ounting positions of motor flange torque arm could not be possible.

Before mounting the torque arm, carefully clean the torque arm, all coupling surfaces and apply locking adhesives on the screws and on mating surfaces. Tighten the screws by a dynamometric wrench at values shown in the table 5.2.1 «Tightening torques».



5.6 - Mounting of hollow low speed shaft

For machine shaft ends onto which the hollow shafts of gear reducers are to be keyed, h6, j6, and k6 tolerances are recommended, according to requirements.

Important! the shoulder diameter of the driven machine shaft end abutting with the gear reducer must be at least 1,18 ÷ 1,25 time the hollow shaft internal diameter. For other data on machine shaft end (in case of standard hollow low speed shaft, stepped shaft, with locking rings or bushings) see Rossi technical catalogs.

Attention! For **vertical ceiling-type** mounting and only for gear reducers equipped with locking rings or bushing, gear reducer support is due only to friction, for this reason it is advisable to provide it with a fastening system.

Attention! Even if the hollow low speed shafts machined in tollerance H7, a check through bott could reveal two areras with a **slightly underdimensioned** diameter (see Fig. 1): this und underdimensioning is intentional and not affecting the **keying quality** – which is **improved** in terms of **duration** and **precision** – and is not hindering the assembly of machine shaft end according to usual methodes, such as the one shown at fig. a).

Attention! In order to **facilitate** the **mounting** of gear reducer onto machine shaft end, diameter D (**, see Fig. 2) is slightly overdimensioned as to nominal dimension, at hollow shaft input (standard, stepped, with shrink disc): this will not affect realiability.

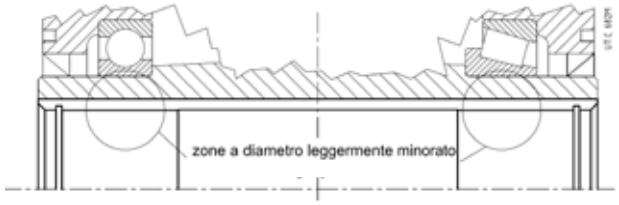


Fig. 5.6.1

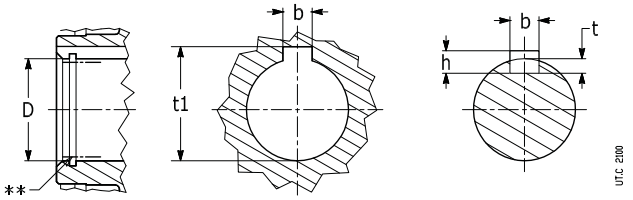


Fig. 5.6.2

Hollow low speed shaft

Hole	Parallel key						Keyway		
D Ø H7	**b** h9	×	**h** h11	×	**l***		**b** H9 hub N9 shaft	**t** shaft	**t_1** hub
19	6	×	6	×	50		6	3,5	21,8
24	8	×	7	×	63		8	4	27,3
30	8	×	7	×	63		8	4,5[1)]	32,7[1)]
32	10	×	8	×	70		10	5	35,3
38	10	×	8	×	90		10	5,5[1)]	40,7[1)]
40	12	×	8	×	90		12	5[1)]	43,3
48	14	×	9	×	110		14	5	51,8
60	18	×	11	×	140		18	7	64,4
70	20	×	12	×	180		20	8[1)]	74,3[1)]
80	22	×	14	×	200		22	9	85,4
90	25	×	14	×	200		25	9	95,4
100	28	×	16	×	250		28	10	106,4
110	28	×	16	×	250		28	10	116,4
125	32	×	18	×	320		32	11	132,4
140	36	×	20	×	320		36	12	148,4
160	40	×	22	×	400		40	14[1)]	168,3[1)]
180	45	×	25	×	400		45	15	190,4

* Recommended length.

1) Values not to standard.

5.7 - Gear reducer installing and removing

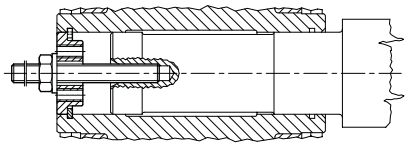


Fig. 5.7.1

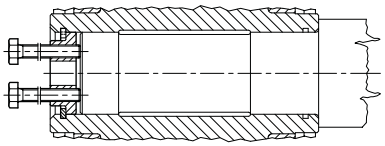
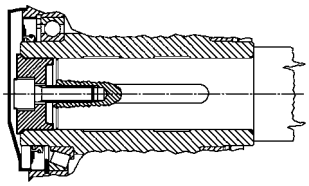


Fig. 5.7.2

In order to have an easier **installing** and **removing** of gear reducers and gearmotors with retaining ring groove (sizes 64 ... 360) – both with keyway and shrink disc – proceed as shown at fig. 5.7.1 and 5.7.2 (excluding MR 3I 100 with motor sizes 112 and 3I 125 with motor size 132; consult us).

For MR 3I 64 ... 81, first insert the washer with screw and the retaining ring into the gear reducer hollow shaft (on motor opposite side); then mount on machine shaft end.

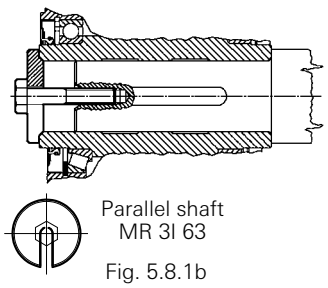
5.8 - Axial fastening of gear reducer



Helical and bevel helical size 40, 50

Helical and bevel helical size 63

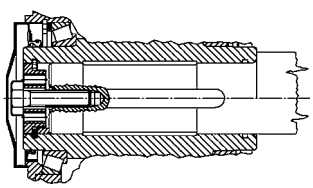
Fig. 5.8.1a



Parallel shaft MR 3I 40, 50

Parallel shaft MR 3I 63

Fig. 5.8.1b



Helical and bevel helical size 64 ... 160

Helical and bevel helical size 180 ... 360

Fig. 5.8.2

For the **axial fastening** it is possible to adopt the system as per fig. 5.8.1 and 5.8.2. For sizes 64 ... 360, when shaft end of driven machine has no shoulder, a spacer may be located between the retaining ring and the shaft end (as in the lower half on fig. 5.8.2). Parts in contact with the retaining ring must have sharp edges.

5.9 - Gear reducer fitting with key and locking rings or bushing

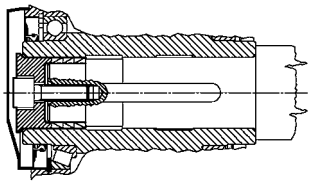


Fig. 5.9.1

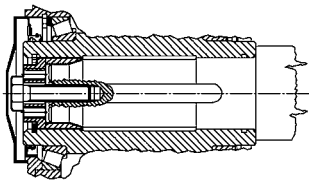


Fig 5.9.2

Using **locking rings** (sizes 40 ... 63, fig. 5.9.1) or **locking bushing** (sizes 64 ... 360, fig. 5.9.2) will allow to have easier and more accurate installing and removing and to eliminate backlash between key and keyway, friction system complying with ATEX.

The locking rings or the locking bushing are fitted after mounting (for MR 3I 64 ... 81 insert the bushing onto machine shaft end or into hollow shaft before mounting; pay attention when positioning the keyway). Do not use molybdenum bisulphide or equivalent lubricant for the lubrication of the parts in contact. When tightening the bolt, we recommend the use of **locking adhesives** type Loctite or equivalent. For vertical ceiling-type mounting, contact us.

In case of axial fastening with locking rings or bushing – especially when having heavy duty cycles, with frequent reversals – verify, after some hours of running, the bolt tightening torque and eventually apply the locking adhesive again.

Respect the tightening torques stated in table 5.9.1.

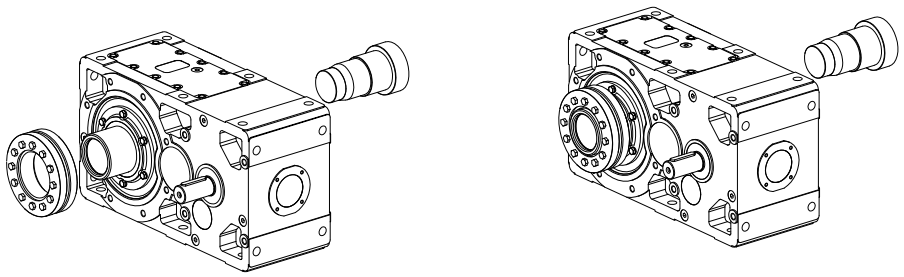
Attention! In applications with **travelling lifts**, the locking bushing is not sufficient to guarantee a stable fitting of hollow low speed shaft with the machine shaft end, also when the axial fastening bolt is fastened with locking adhesive. In these cases, it is necessary to fit with hollow shaft and shrink disc. This is valid, in general, also when there is a high frequency of starting and brakings with motion reversal and when the ratio of inertia J/J_0 is very high ($\geqslant 5$).

Tab. 5.9.1 Tightening torques for axial fastening bolts with locking rings or bushing

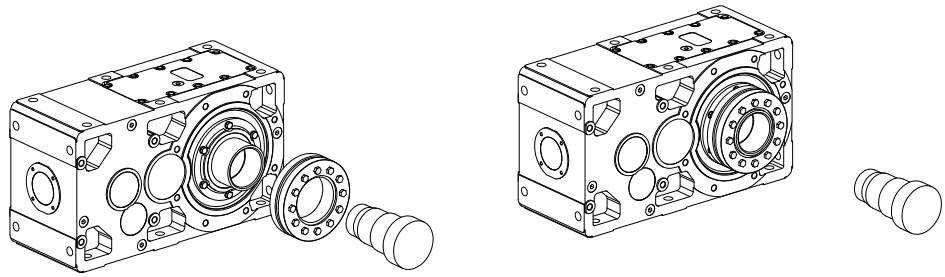
Gear red. size	**40**	**50**	**63**	**64**	**80**	**81**	**100**	**125**	**140**	**160**	**180**	**200**	**225**	**250**	**280**	**320, 321**	**360**
Bolts for axial fastening UNI 5737-88 cl 8.8	M8[1)]	M8[1)]	M10[1)]	M10	M10[2)]	M10[2)]	M12[2)]	M14[2)]	M16	M20	M20[2)]	M24	M24[2)]	M30	M30[2)]	M36	M36[3)]
*M*s [N m] for rings or bushing	29	35	43	43	51	53	92	170	210	340	430	660	830	1350	1660	2570	3150

1) UNI 5931-84 cl. 8.8 (excluding MR 3I).
2) UNI 5737-88 cl. 10.9.
3) UNI 5931-84 cl. 10.9.

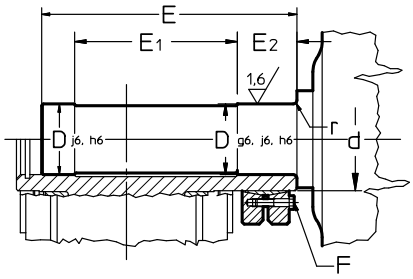
5.10 - Mounting of Hollow low speed shaft with shrink disc



Shrink disc
machine opposite side

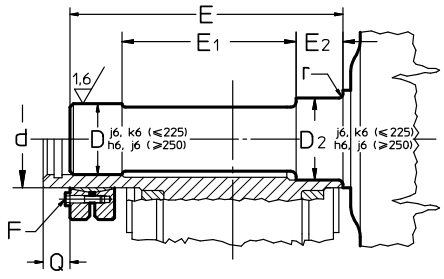


Shrink disc
machine side



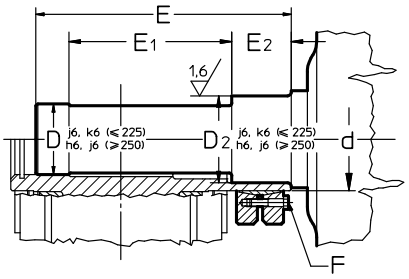
Shrink disc
machine side
(sizes 40 ... 125)

Fig. 5.10.1



Shrink disc
machine opposite side
(sizes 140 ... 360)

Fig. 5.10.2



Shrink disc
machine side
(sizes 140 ... 360)

Fig. 5.10.3

Tab. 5.10.1 - Hollow low speed shaft and machine shaft end with shrink disc [3)]

Gear reducer size	D Ø H7	D_2 H7	d Ø	E	E 1)	E_1	E_1 1)	E_2	E_2	F UNI 5737-88 cl. 10.9	M_S N m 2)	Q
40	20	–	24	99,5	–	65	–	25	–	M5 n. 6	4	–
50	25	–	30	116,5	–	77	–	30	–	M5 n. 7	4	–
63	30	–	38	135,5	–	86	–	34	–	M6 n. 5	12	–
64	35	–	44	140	–	86	–	36	–	M6 n. 7	12	–
80, 81	40	–	50	166	–	103	–	39,5	–	M6 n. 8	12	–
100	50	–	62	197	–	122	–	46,5	–	M8 n. 6	30	–
125	65	–	80	239	–	148	–	55	–	M8 n. 8	30	–
140	70	75	90	273	294,5	180	192,5	52	52	M8 n. 10	30	27,5
160	80	85	105	307	329	199	208	62	57	M10 n. 9	60	29
180	90	100	120	335	363	221	228	65	63	M10 n. 12	60	35
200	100	110	130	377	402	251	260	72	66	M12 n. 10	100	33,5
225	110	120	140	404	428	265	277	78	75	M12 n. 12	100	32,5
250	125	135	160	461	493	307	318	86	84	M16 n. 8	250	45
280	140	150	180	506	543	324	337	104	94	M16 n. 10	250	47
320, 321	160	170	200	567	607	375	388	104	107	M16 n. 12	250	50
360	180	195	230	621	668	400	414	124	116	M16 n. 15	250	57

1) Values valid for shrink disc on machine opposite side.
2) Bolt tightening torque.
3) For design with labyrinth seals at low speed shaft, the dimensions E, E1, E2 are changing: please consult us.

Attention! Verify that the machine shaft end has dimensions, tolerances and roughness as stated in fig. 5.10.1 ... 5.10.3 and tab. 5.10.1; following these instructions the correct running of shrink disc will be granted.

Pre-arrange a proper protection of the shrink disc against accidental contacts.

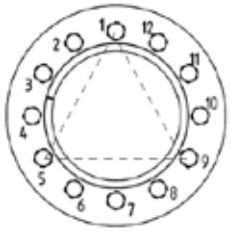


Fig. 5.10.4

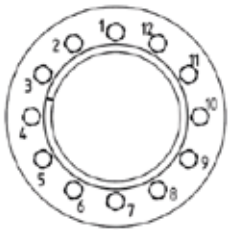


Fig. 5.10.5

Installing

Attention! Do not tighten the screws of shrink disc before mounting the gear reducer onto machine shaft in order not to deform the hollow shaft. When keying the shrink disc follow these instructions:

– carefully degrease the surfaces of hollow shaft and shaft end of driven machine to be fitted;

– mount the shrink disc on the gear reducer hollow shaft taking care to lubricate the only external surface, first; position the shrink disc axially to «Q» dimension (see tab. 5.10.1).

– slightly tighten a first group of three screws positioned at about 120° as shown for example in the figure 5.10.4;

– tighten through dynamometric wrench – balanced to a value aproximately higher than 5% compared to the one foreseen in tab. 5.10.1 – the bolts of the shrink disc, by a continuous sequence (not crossing) see fig. 5.10.5 and during several phases (approx. 1/4 turn at a time) until no 1/4 turn is possible anymore;

– do again 1 or 2 passages with dynamometric wrench verifying that the tightening torque stated in tab. 5.10.1 has been realized;

– when having heavy duty cycles, with frequent reversals, verify again after some hours of running, the bolt tightening torque.

– verify the tightening torque of screws at every maintenance interval (oil exchange) or in case of anomalous vibrations.

Removing

Before starting the disassembling operation, be sure that no torque nor load is applied to shrink disc, shaft or other connected elements.

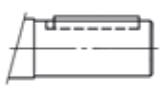
Attention! Do not completely remove fastening screws before locking rings are disengaged. Risk of serious injury!

Clean off any rusty areas.

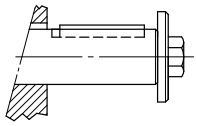
Loosen the fastening screws one after the other only by using approx. ½ turn at a time and by a continuous sequence (not crossing), until shrink disc can be moved on hollow shaft.

Remove the gear reducer from machine shaft end.

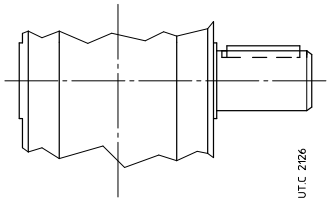
5.11 - Mounting of components on high and low speed shaft ends



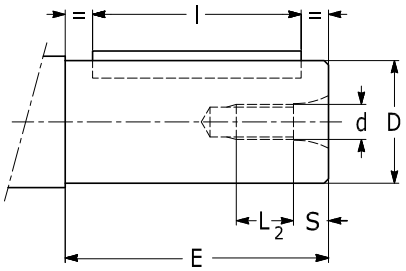
High speed shaft end



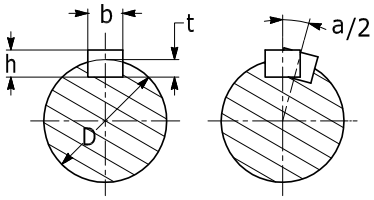
Low speed shaft end

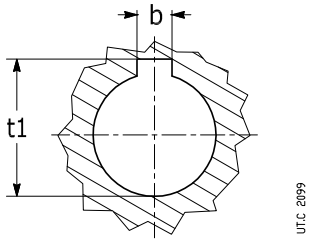


Solid low speed shaft end



Gear reducer shaft end



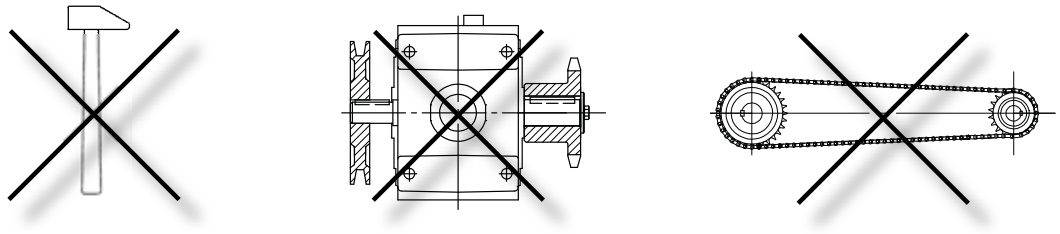


Machine shaft

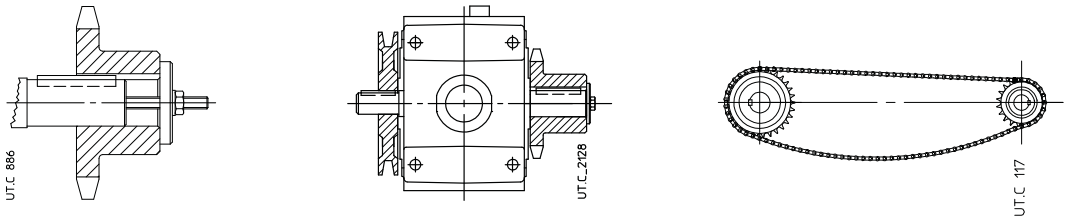
Shaft end											Parallel key			Keyway		
D Ø				**E**		**d** Ø	**S**	**L**		a/2[4] arc min	**b** h9 × **h** h11 × **l**			**b** H9 hub N9 shaft	**t** shaft	**t**1 hub
	1)	2)	3)	1)	2) 3)			1)	2) 3)				1)	2) 3)			
11	j 6	–	–	23	–	M 5	3,6	9,4	–	–	4 × 4 × 18		–	4	2,5	12,7
14	j 6	–	–	30	–	M 6	4,6	11,4	–	–	5 × 5 × 25		–	5	3	16,2
16	j 6	–	–	30	–	M 6	4,6	11,4	–	–	5 × 5 × 25		–	5	3	18,2
19	j 6	h7	–	40	30	M 6	4,6	11,4	13,4	5,43	6 × 6 × 36		25	6	3,5	21,7
24	j 6	h7	–	50	36[7]	M 8	5,9	15,1	17,1	5,16	8 × 7 × 45		25	8	4	27,2
28	j 6	–	–	60	–	M 8	5,9	15,1	–	–	8 × 7 × 45		–	8	4	31,2
30	–	h7	–	58	58[7]	M 10	7,6	–	20,4	4,13	8 × 7 × 45		45	8	4	33,2
32	k 6	h7	–	80	58[7]	M 10	7,6	18,4	20,4	3,87	10 × 8 × 70		50	10	5	35,3
38	k 6	h7	–	80	58	M 10	7,6	18,4	20,4	3,27	10 × 8 × 70		50	10	5	41,3
40	–	h7	–	–	58	M 10	7,6	–	20,4	3,7	12 × 8 × 50		50	12	5	43,3
42	k 6	–	–	110	–	M 12	9,5	22,5	–	–	12 × 8 × 90		–	12	5	45,3
45	k 6	–	–	110	–	M 12	9,5	22,5	–	–	14 × 9 × 90		–	14	5,5	48,8
48	k 6	h7	k6	110	82	M 12	9,5	22,5	26,5	3,08	14 × 9 × 90		70	14	5,5	51,8
55	m 6	–		110	–	M 12	9,5	22,5	–	–	16 × 10 × 90		–	16	6	59,3
60	m 6	h7	k6	140	105[5]	M 16	12,7	27,3	35,3	2,46	18 × 11 × 110		90	18	7	64,4
70	m 6	h7	k6	140	105	M 16	12,7	27,3	35,3	2,55	20 × 12 × 125		90	20	7,5	74,9
75	m 6	–	–	140	–	M 16	12,7	27,3	–	–	20 × 12 × 125		–	20	7,5	79,9
80	–	h7	k6	–	130	M 20	16	–	44	2,23	22 × 14 × –		110	22	9	85,4
90	m 6	h7	k6	170	130	M 20	16	34	44	1,99	25 × 14 × 140		110	25	9	95,4
95	m 6	–	–	170	–	M 20	16	34	–	–	25 × 14 × 140		–	25	9	100,4
100	–	j6	k6	–	165	M 24	19	–	41	1,79	28 × 16 × 180		140	28	10	106,4
110	m 6	j6	k6	210	165	M 24	19	41	41	1,63	28 × 16 × 180		140	28	10	116,4
125	–	j6	k6	–	200[6]	M 30	22	–	45	1,71	32 × 18 × –		180	32	11	132,4
140	–	j6	k6	–	200	M 30	22	–	45	1,52	36 × 20 × –		180	36	12	148,4
160	–	j6	k6	–	240	M 36	27	–	54	1,33	40 × 22 × –		220	40	13	169,4
180	–	j6	k6	–	240	M 36	27	–	54	1,18	45 × 25 × –		220	45	15	190,4

1) Values valid for high speed shaft end.
2) Values valid for standard low speed shaft end.
3) Values valid for solid low speed shaft end.
4) Maximum angular disalinement of keyways on double extension shafts.
5) For low speed shaft ends: E = 97 (E = 101 if double extension); value not to standanrd.
6) Value not to standard.
7) For MR 3I with low speed shaft end, E dimension increases by 1.

Incorrect



Correct



In general, it is recommended to machine the hole of the parts keyed onto shaft end to **H7** tolerance.
For high speed shaft end with D ⩾ 55 mm, provided that load is uniform and light, tolerance can be **G7**.
For low speed shaft ends, provided that load is not uniform and light, tolerance must be **K7**.
Before mounting, thoroughly clean mating surfaces and lubricate against seizure and fretting corrosion.
Attention! Assemble and disassemble with the aid of **jacking screws** and **pullers** using tapped holes at shaft butt-end, taking care to avoid impacts and shocks which may **irremediably damage** the **bearings**, the **circlips** or other parts.
For couplings H7/m6 and K7/j6 it is advisable that the part to be keyed is preheated to a temperature of 80 ÷ 100 °C.
The couplings having a tip speed on external diameter up to 20 m/s must be statically balanced; for higher tip speeds they must be dynamically balanced.
Where the transmission link between gear reducer and machine or motor generates shaft end loads, ensure that:
– loads do not rise above catalog values;
– transmission overhang is kept to a minimum;
– drive-chains should not be tensioned (if necessary – alternating loads and/or motion – foresee suitable chain tighteners);
– in the gear transmission systems there is a proper backlash (≈ 0,03 ÷ 0,04 mm) between pinion and rack;
– drive-belts should not be over-tensioned.
For splined couplings apply adequate antirust-products.

5.12 - Backstop device

The presence on gear reducer of backstop device is stated by the arrow near the low speed shaft, indicating the free rotation.
Provide a protection system where a backstop device breaking could cause personal injury or property damage.
Make sure that the **direction of rotation in machine, gear reducer and motor all correspond correctly.**

Attention! One or more startings in the false direction, even if short, could irremediably damage the backstop device, the coupling seats and/or the electric motor.

6 - Lubrication

6.1 - General

Gear reducers and gearmotors must be lubricated with **polyglycol** or **polyalphaolephines based synthetic oil** depending on the series; they are supplied **FILLED WITH OIL or WITHOUT OIL** according to type and size (see ch. 6.2 and 6.3). **When supplying WITHOUT OIL, the filling up to specified level is Buyer's responsibility and has to be carried out with gear reducer at rest**; normally stated by means of transparent level plug (see ch. 6.4 or eventual SPT sketch attached to present instructions). Every gear reducer is equipped with **lubrication name plate**.

Concerning lubricant type, how supplied status of gear reducers, plugs, filling instructions, oil-change interval, etc. see lubrication table at ch. 6.2 and 6.3.

⚠ **Be sure that, for gear reducers and gearmotors sizes ⩾ 100, the filler plug is equipped with filter and valve** (symbol ⊸◇⊸; see fig. 6.1.1). When these gear reducers are required filled with oil (non-standard design) the **filler plug** is not mounted but **sent separately**; The installer will take care of the assembly in the right position (see ch. 6.4 or eventual SPT sketch attached) replacing the fitted plug.

If gear reducer or gearmotor is supplied with **transparent oil level plug** (size ⩾ 100), the necessary lubricant quantity is the one which **reaches a.m. level at gear reducer at rest, in center line**, and not the approximate quantity given on the catalog.

When gear reducer or gearmotor is provided with a **level plug with dipstick** (see fig. 6.1.2), fill with oil up to specified level on rod.

When gear reducer or gearmotor is provided with a **plug for flowing over level** (red colour, see fig. 6.1.3) fill after unscrewing a.m. plug in order to check the obtained level by oil outlet.

Usually bearings are automatically and continuously lubricated (bathed, splashed, through pipes or by a pump) utilising the main gear reducer lubricant. The same applies for backstop devices, when fitted to gear reducers.

In certain gear reducers in vertical mounting positions V5 and V6, and bevel helical gear reducers in horizontal positions B3, B6 (though not gearmotors in this case, for which the above indications hold good) upper bearings are independently lubricated with a special grease «for life», assuming pollution-free surroundings. The same applies for motor bearings (except some cases in which relubrication device is adopted) and backstop devices when fitted to motors.

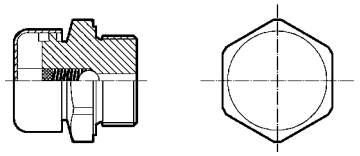


Fig. 6.1.1
Filler plug with filter and valve

2I, 3I, 4I (100, 125), m.p. **V6**
3I (125), m.p. **V5**[1)]

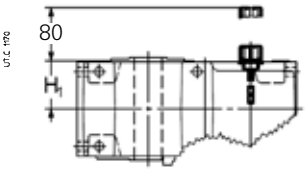
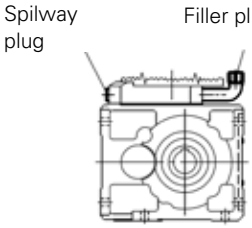


Fig. 6.1.2
Level plug with dipstick

ICI (100, 200), m.p. **B6**[1)]



C3I (100, 125), m.p. **B6**[1)]

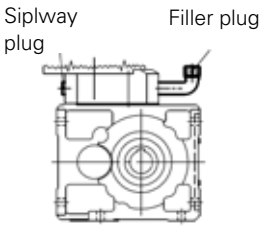


Fig. 6.1.3
Spilway plug

1) For high speed continuous duty an expansion tank is envisaged: consult us.

Always be sure that the gear reducer is located as per the mounting position ordered - including the inclined mounting positions (e.g. B3 38° V5) - which appears on the name plate (see ch. 3.2). In case of **oscillating mounting positions** the gear reducers are equipped with auxiliary name plate with statement of mounting position for the oil filling and the level check during maintenance.

For mounting positions, oil quantity and plug position see ch. 6.3 and 6.4.

Combined gear reducers. Lubrication remains independent, thus data relative to each single gear reducer hold good.

6.2 - Lubrication table

<table>
<tr><th></th><th>Size ⩽ 81</th><th>Size ⩾ 100</th></tr>
<tr><td>How supplied and plugs
(identification also through specific lubrication nameplate)</td><td>FILLED with SYNTHETIC OIL
(polyglycol based synthetic oil)
AGIP Blasia S 220
KLÜBER Klübersynth GH 6-220
MOBIL Glygoyle 220
SHELL Omala S4 WE 220
1 filler plug for size ⩽ 64
2 filler/drain plugs for sizes 80, 81</td><td>WITHOUT OIL
(except different statement on lubrication name plate)
Filler plug with filter, valve, drain and level plug</td></tr>
<tr><td>Standards for eventual first filling</td><td>–</td><td>Before commissioning, fill to specified level, with synthetic oil type and ISO viscosity grade as follows:
mineral oil:
AGIP Blasia
ARAL Degol BG
BP Energol GR XP
CASTROL Alpha SP
FUCHS Renolin CLP
KLÜBER Klüberoil GEM1
MOBIL Mobilgear 600 XP
SHELL Omala S2 G
TEXACO Meropa
TOTAL Carter EP
ISO viscosity grade [cSt]<table><tr><th>Speed n_2 min^{-1}</th><th>Ambient temperature 0 ÷ 20 °C[1)]</th><th>Ambient temperature 20 ÷ 40 °C[1)]</th></tr><tr><td>> 224</td><td>150</td><td>150</td></tr><tr><td>224 ÷ 22.4</td><td>150</td><td>220</td></tr><tr><td>22.4 ÷ 5.6</td><td>220</td><td>320</td></tr><tr><td>< 5.6</td><td>320</td><td>460</td></tr></table>1) Peaks of 10 °C below and 10 °C above the ambient temperature range are acceptable.
Polyalphaolephine based synthetic oil
AGIP Blasia SX
ARAL Degol PAS
BP Enersys EPX
CASTROL Alphasys EP
FUCHS Renolin Unisys CLP
KLÜBER Klübersynth GEM4
MOBIL SHC Gear
SHELL Omala S4 GX
TEXACO Pinnacle
TOTAL Carter SH0
ISO viscosity grade [cSt]<table><tr><th>Speed n_2 min^{-1}</th><th>Ambient temperature 0 ÷ 40 °C[1)]</th></tr><tr><td>>224</td><td>150</td></tr><tr><td>224÷22.4</td><td>220</td></tr><tr><td>22.4÷5.6</td><td>320</td></tr><tr><td>5.6</td><td>460</td></tr></table>1) Peaks of 20 °C below and 10 °C above the ambient temperature range are acceptable.</td></tr>
<tr><td>Lubrication interval and lubricant quantity</td><td>Lubrication «for life»
(assuming external pollution-free environment).</td><td><table><tr><th>Oil temperature °C</th><th>Lubrication interval h</th></tr><tr><td>⩽65</td><td>8 000</td></tr><tr><td>65 ÷ 80</td><td>4 000</td></tr><tr><td>80 ÷ 95</td><td>2 000</td></tr><tr><td>95 ÷ 110[1)]</td><td>–</td></tr></table>1) Values valid for non continuous duties.
<table><tr><th>Oil temperature °C</th><th>Lubrication interval h</th></tr><tr><td>⩽65</td><td>25 000</td></tr><tr><td>65 ÷ 80</td><td>18 000</td></tr><tr><td>80 ÷ 95</td><td>12 500</td></tr><tr><td>95 ÷ 110[1)]</td><td>9 000</td></tr></table>1) Values valid for non continuous duties.
An overall guide to oil-change interval is given in the table, and assumes pollution-free surroundings. Where heavy overloads are present, halve the values.
Apart from running hours replace or regenerate synthetic oil at least each 5 ÷ 8 years according to gear reducer size and to operating and ambient conditions.
The oil quantity is given by the level stated by the proper plug or an equivalent system (plug for flowing over level, plug with dipstick).</td></tr>
</table>

Grease-lubricated bearings:

lubrication is «**for life**» assuming uniform load and pollution-free environment. Otherwise replace the grease every year with running up to 12 h/d and every 6 months with running of 12 ÷ 24 h/d; in these occasions, re-lubricate the **backstop device** with grease SHELL Alvania RL2. Bearing should be filled with SHELL Gadus S2 V100 bearing-grease for ball bearings, KLÜBER STABURAGS NBU 8 EP for roller bearings.

In case of **labyrinth seal with greaser** apply, unless otherwise stated, KLÜBER STABURAGS NBU 8 EP (see ch. 11.4).

Attention! Refer to ch. 6.4 for bearings requiring greasing and contact Rossi in case of doubt.

6.3 - Oil level (quantity) for sizes 40 ... 81 supplied FILLED with OIL

Important! Verify mounting position keeping in mind that if gear reducer is installed in a mounting position which differs from the one indicated on the name plate, it could require the addition of the difference between the two quantities of lubricant corresponding to x dimension and stated in the following tables. Measure x dimension in fig. 6.2.1 (helical) and 6.2.2 (bevel helical), after eliminating potential residual air in the oil, inside the gear reducer.

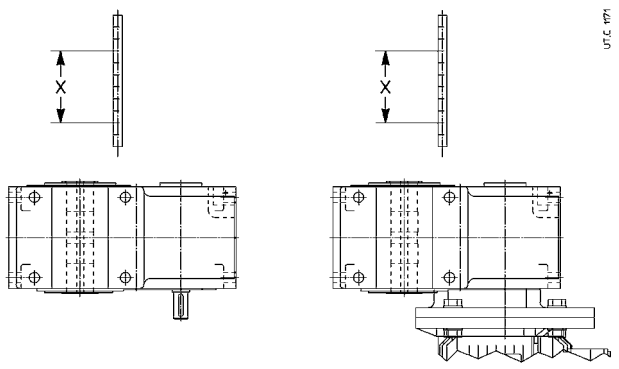


Fig. 6.2.1 - Position the helical gear reducer or gearmotor, mounting position V6 for oil level (quantity) measurement

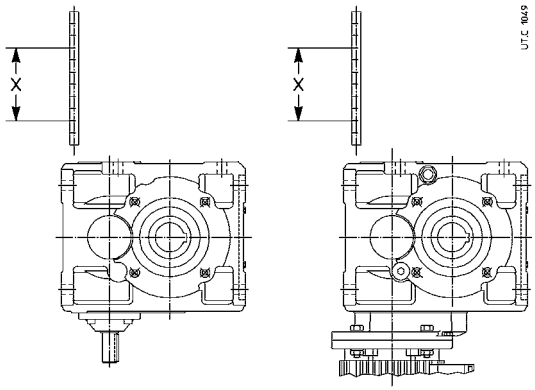


Fig. 6.2.2 - Position the bevel helical gear reducer or gearmotor, mounting position B7 for oil level (quantity) measurement

Tab. 6.1.1 - Oil level (X measurement) and quantity for HELICAL gear reducers and gearmotors sizes 40 ... 81

Size	Train of gears Mounting position Oil level (x[1] measurement) [mm] and quantity [l]																			
	I				2I							3I				4I				
	B3, B8		B7		B6, V5, V6 2)		B3, B8		B6 R		B6 MR		B7, V5, V6 2)		B3, B8		B6		B7, V5, V6 2)	
	mm	l	mm	l	mm	l	mm	l	mm	l	mm	l	mm	l	mm	l	mm	l	mm	l	mm	l
40	–	–	–	–	–	–	45	0,4	–	–	24	0,55	24	0,55	35	0,47	2	0,7	12	0,6	–	–	–	–	–	–
50	–	–	–	–	–	–	60	0,6	25	0,9	30	0,8	30	0,8	45	0,7	5	1,05	15	1	–	–	–	–	–	–
63, 64	80	0,7	65	0,8	46	1	60	0,9	42	1,4	48	1,2	48	1,2	58	1	40	1,5	B7: 50 1,3 V5: 50 1,4 V6: 50 1,3		58	1,1	40	1,8	50	1,4
80, 81	115	1,2	92	1,5	68	1,9	80	1,5	45	2,7	54	2,3	54	2,3	72	1,7	42	2,9	B7: 52 2,5 V5: 48 2,6 V6: 52 2,5		72	1,9	42	3,2	52	2,7

Tab. 6.1.2 - Oil level (X measurement) and quantity for BEVEL HELICAL gear reducers and gearmotors sizes 40 ... 81

Size	Train of gears Mounting position Oil level (x[1] measurement) [mm] and quantity [l]																			
	CI						ICI								C3I					
	B3, B6, B7 4)		B8		V5, V6 2)		B3		B6, B7 4)		B8		V5, V6 2)		B3, B7 4)		B6 5)		B8		V5, V6 2)	
	mm	l	mm	l	mm	l	mm	l	mm	l	mm	l	mm	l	mm	l	mm	l	mm	l	mm	l
40	48	0,26	30	0,35	41	0,3	31	0,31	15	0,5	30	0,4	50	0,35	–	–	–	–	–	–	–	–
50	48	0,4	30	0,6	50	0,45	50	0,45	15	0,8	30	0,65	54	0,5	50	0,5	15	0,9	30	0,7	54	0,55
63, 64	72	0,8	40	1	48	0,95	58	1	15	1,6	42	1,2	45	1,15	58	1,2	15	1,8	42	1,4	45	1,35
80, 81	90	1,3	50	2	56	1,8	90	1,6	25	2,7	48	2,2	56	2	90	1,9	25	3	48	2,5	56	2,3

1) Tolerance of dimension x: ± 5 mm for size ⩽ 50; ± 10 for size ⩾ 63.
2) For mounting positions V5 and V6 the upper bearings are greased.
3) The first reduction (the first 2 for 4I), mounting position V5, is lubricated with grease for life.
4) For design UO3D in mounting position B6 or B7 the bearings of upper bevel pinion are grease lubricated.
5) For C3I in mounting position B6, the bearing of the first gear pair (wheel side) is grease lubricated.

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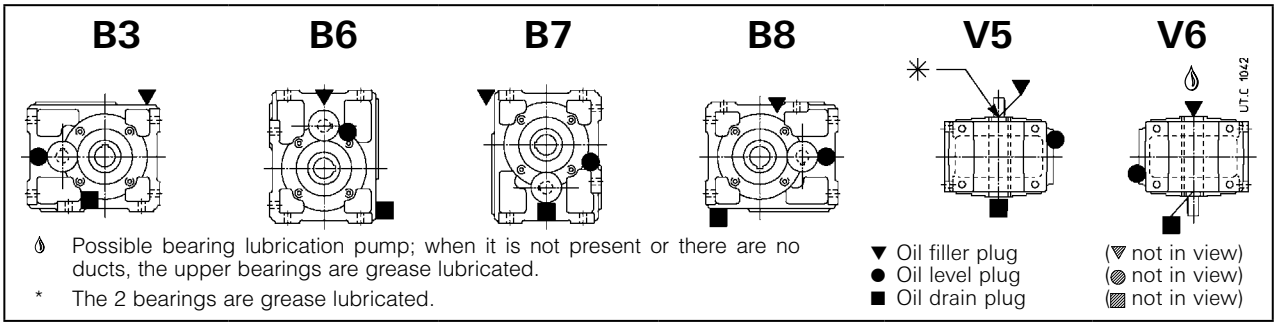
6.4 - Mounting positions and plug positions for sizes 100 ... 360 supplied WITHOUT OIL

Verify oil level through the level plug which is placed in the position indicated the following figures. For B7 mounting position the level is stated on the notched rod mounted on the filler plug.

R I 100

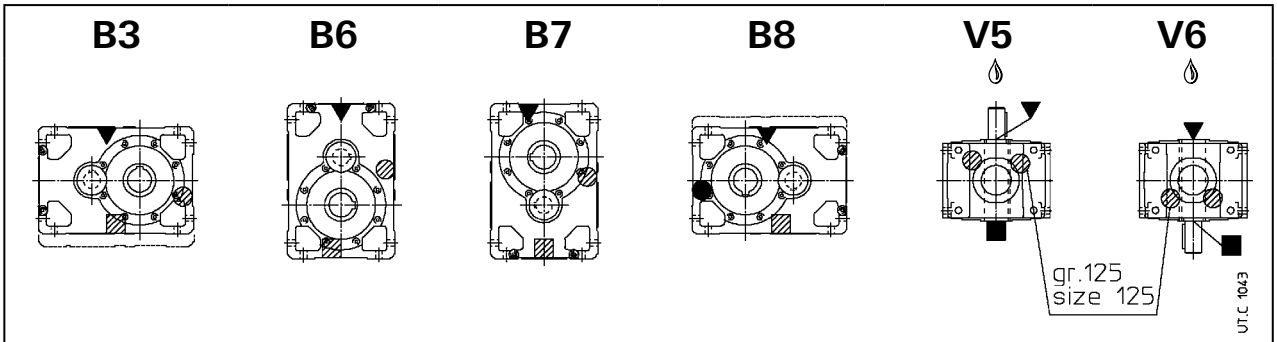


Possible bearing lubrication pump; when it is not present or there are no ducts, the upper bearings are grease lubricated.

* The 2 bearings are grease lubricated.

▼ Oil filler plug (▼ not in view)
● Oil level plug (● not in view)
■ Oil drain plug (■ not in view)

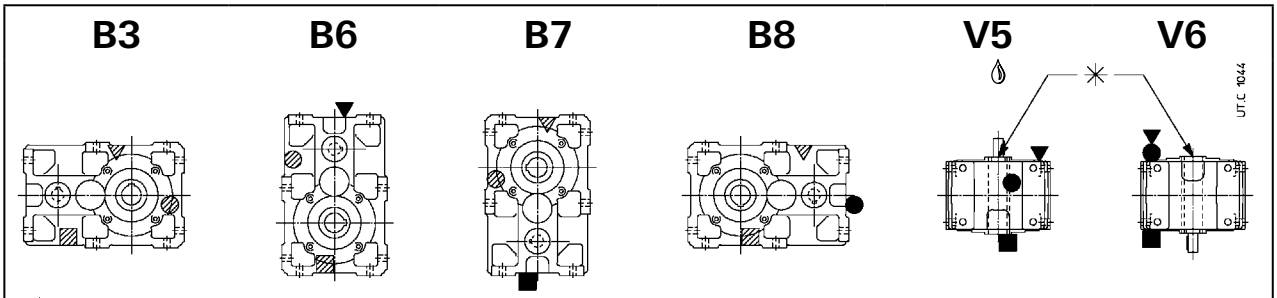
R I 125 ... 360



Possible bearing lubrication pump; when it is not present or there are no ducts, the upper bearings are grease lubricated.

▼ Oil filler plug (▼ not in view)
● Oil level plug (● not in view)
■ Oil drain plug (■ not in view)

R 2I 100, 125 (valid for long model as well)

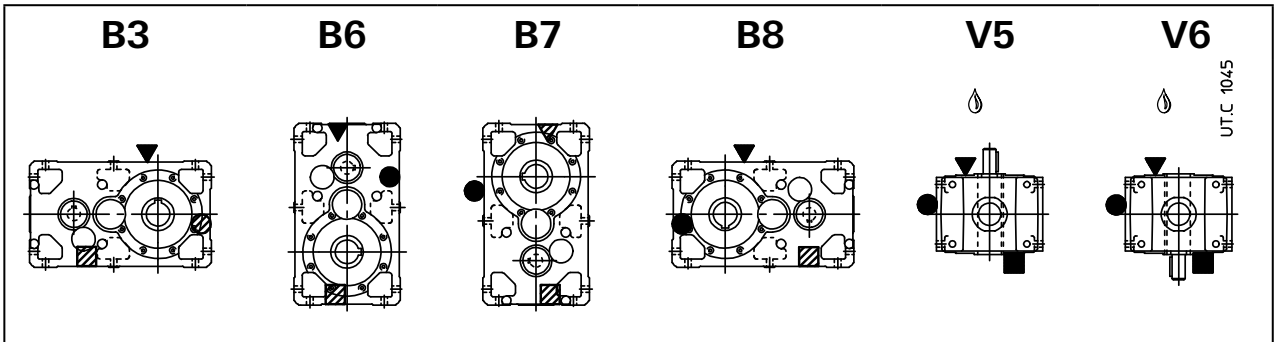


Eventual high speed shaft lubrication device; when it is not present, the bearing is grease lubricated.

* The upper bearings are grease lubricated.

▼ Oil filler plug (▼ not in view)
● Oil level plug (● not in view)
■ Oil drain plug (■ not in view)

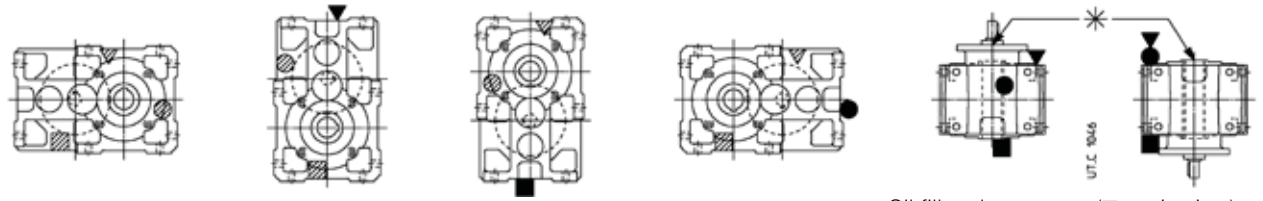
R 2I 140 ... 360 (valid for long model as well)



Eventual high speed shaft lubrication device (V5) or bearing lubrication pump (V6); when it is not present or there are not ducts, the upper bearings are grease lubricated.

▼ Oil filler plug (▼ not in view)
● Oil level plug (● not in view)
■ Oil drain plug (■ not in view)

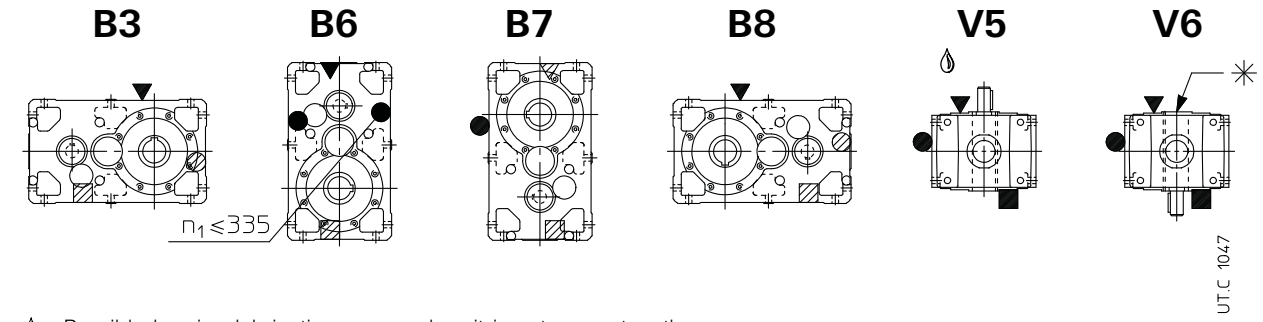
R 3I 100, 125



* Upper bearings are grease lubricated (in mounting position V5 also high speed shaft upper bearings is grease lubricated).

▼ Oil filler plug (▽ not in view)
● Oil level plug (◍ not in view)
■ Oil drain plug (▨ not in view)

R 3I 140 ... 360 (valid for long model as well)

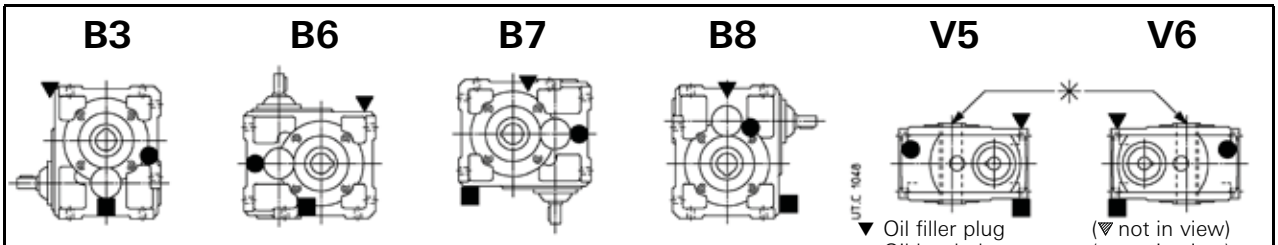


Possible bearing lubrication pump; when it is not present or there are no ducts, the upper bearings are grease lubricated.

* The 2 bearings are grease lubricated.

▼ Oil filler plug (▽ not in view)
● Oil level plug (◍ not in view)
■ Oil drain plug (▨ not in view)

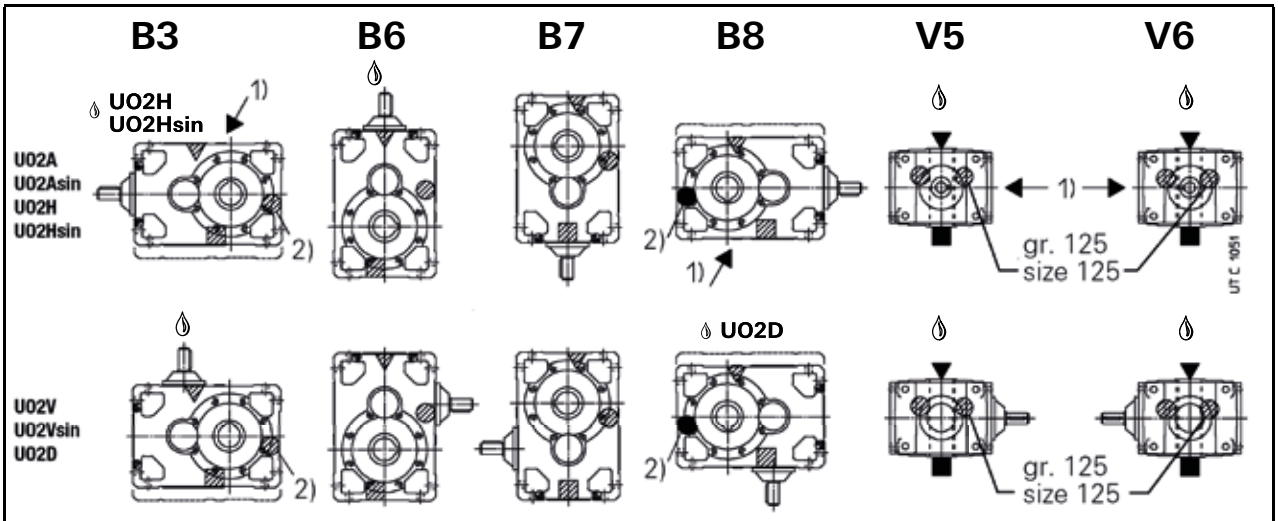
R CI 100



* The two upper bearings are grease lubricated.

▼ Oil filler plug (▽ not in view)
● Oil level plug (◍ not in view)
■ Oil drain plug (▨ not in view)

R CI 125 ... 360

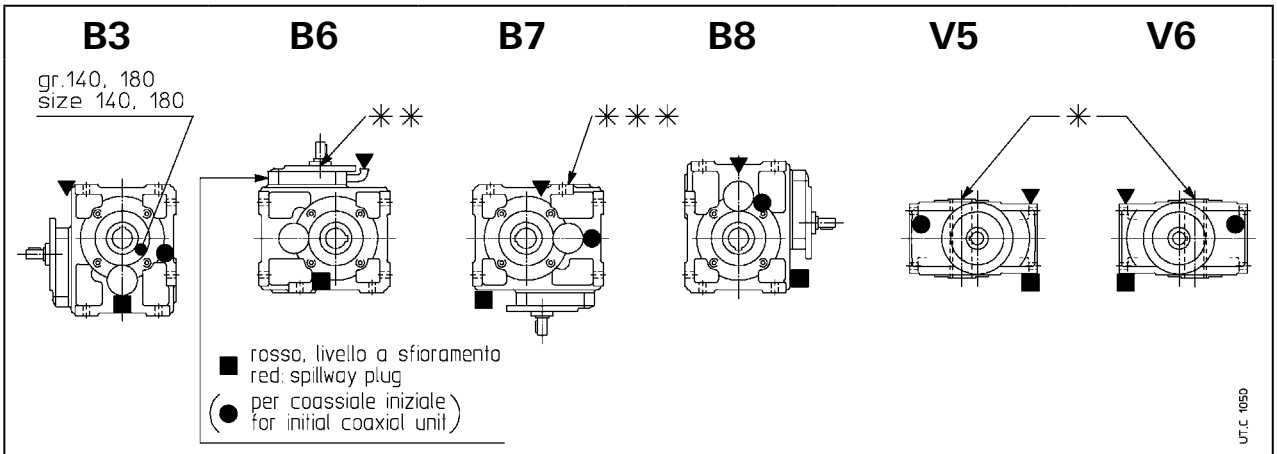


Possible bearing lubrication pump; when replacing grease of bearings (pollution, heavy duty, etc...) verify all upper bearings and fill with new grease after having removed the worn one.

1) Position of tapped holes for identification of mounting position.
2) For size ⩾ 200 the level plug could be on the opposite side.

▼ Oil filler plug (▽ not in view)
● Oil level plug (◍ not in view)
■ Oil drain plug (▨ not in view)

R ICI 100 ... 200



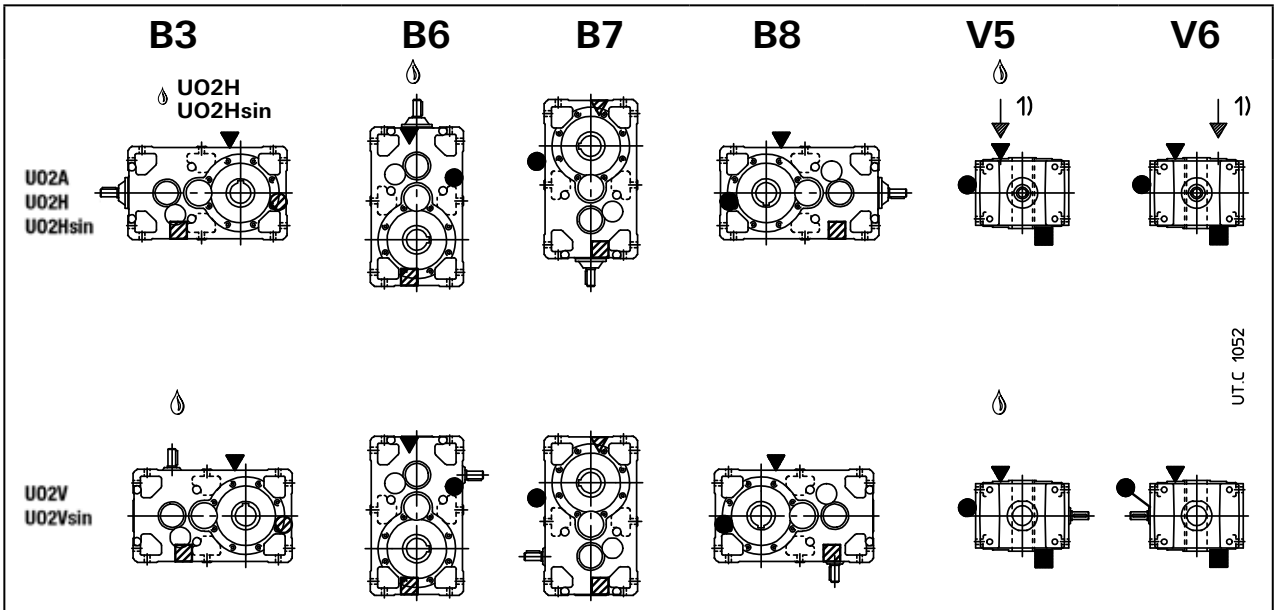
* The two upper bearings are grease lubricated.

** The high speed shaft upper bearing is grease lubricated.

*** For mounting position B7 (design **...D**) the upper bearings of bevel pinion are grease lubricated.

▼ Oil filler plug (▽ not in view)
● Oil level plug (◍ not in view)
■ Oil drain plug (▨ not in view)

R C2I 140 ... 360



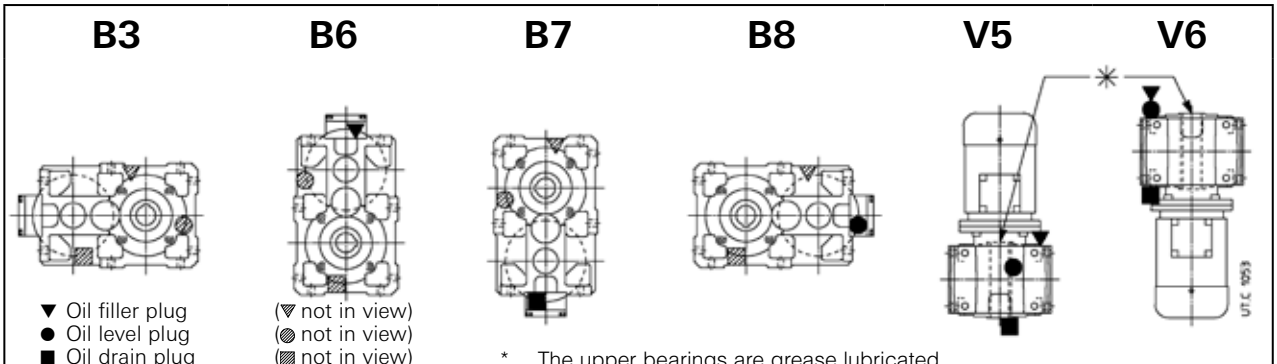
Possible bearing lubrication pump; when it is not present or there are no ducts, the upper bearings are grease lubricated.

1) Position of intermediate shaft hole for identification of mounting position.

2) For size ⩾ 250 the level plug could be on the opposite side.

▼ Oil filler plug (▽ not in view)
● Oil level plug (◍ not in view)
■ Oil drain plug (▨ not in view)

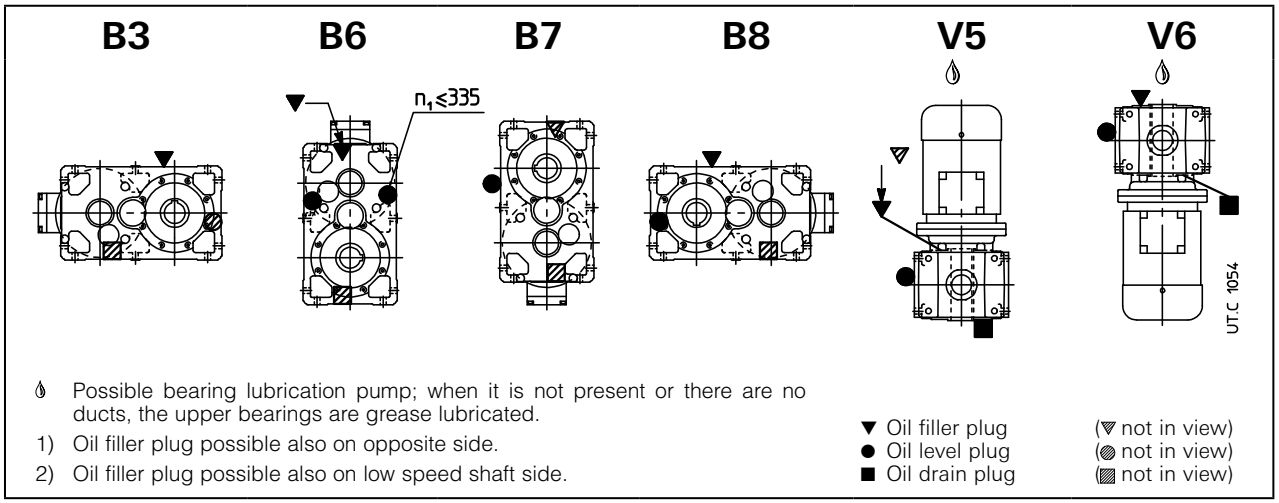
MR 2I 100, 125 (valid for long model as well)



▼ Oil filler plug (▽ not in view)
● Oil level plug (◍ not in view)
■ Oil drain plug (▨ not in view)

* The upper bearings are grease lubricated.

MR 2I 140 ... 360 (valid for long model as well)



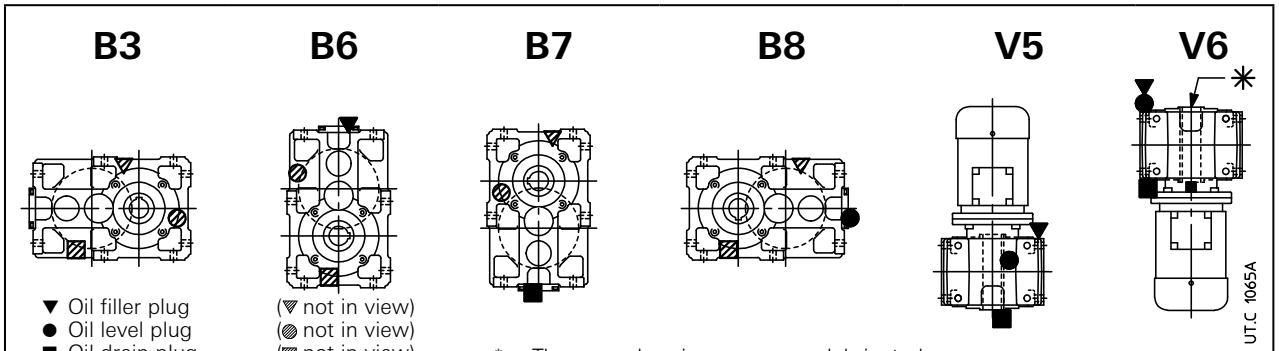
Possible bearing lubrication pump; when it is not present or there are no ducts, the upper bearings are grease lubricated.

1) Oil filler plug possible also on opposite side.

2) Oil filler plug possible also on low speed shaft side.

▼ Oil filler plug (▽ not in view)
● Oil level plug (◍ not in view)
■ Oil drain plug (▨ not in view)

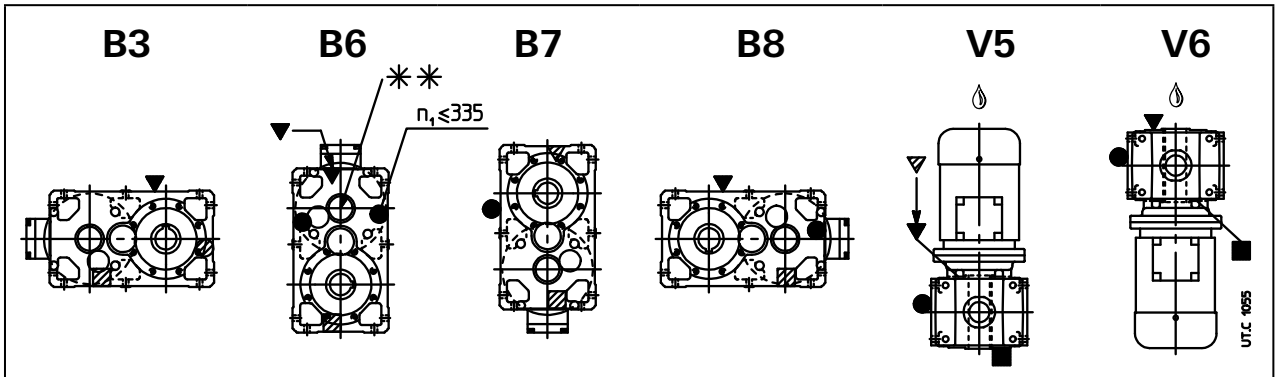
MR 3I 100, 125 (valid for long model as well)



▼ Oil filler plug (▽ not in view)
● Oil level plug (◍ not in view)
■ Oil drain plug (▨ not in view)

* The upper bearing are grease lubricated.

MR 3I 140 ... 360 (valid for long model as well)



Possible bearing lubrication pump; when it is not present or there are no ducts, the upper bearings are grease lubricated.

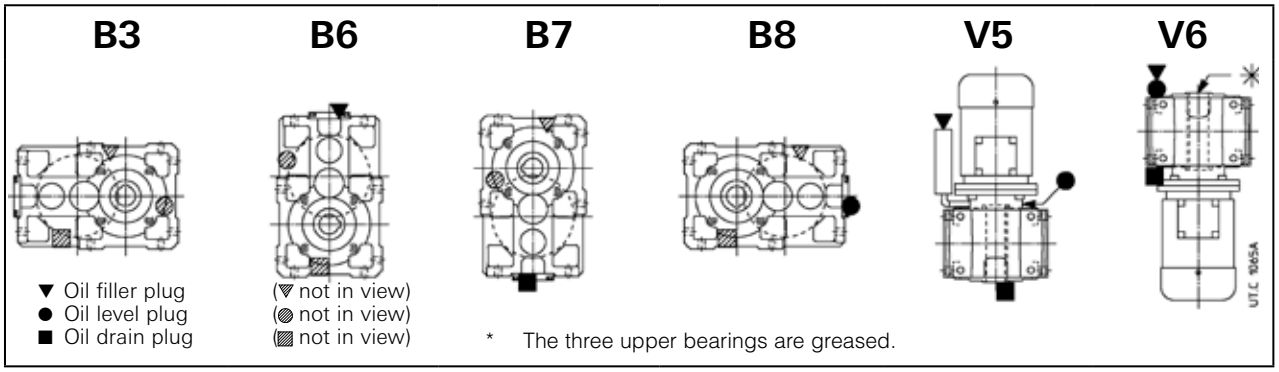
** For design **UP2D**, mounting position B6, $n_1 > 355$ min^{-1}, the bearing of double extension high speed shaft end is grease lubricated.

1) Oil filler plug possible also on opposite side.

2) Oil filler plug possible also on low speed shaft side.

▼ Oil filler plug (▽ not in view)
● Oil level plug (◍ not in view)
■ Oil drain plug (▨ not in view)

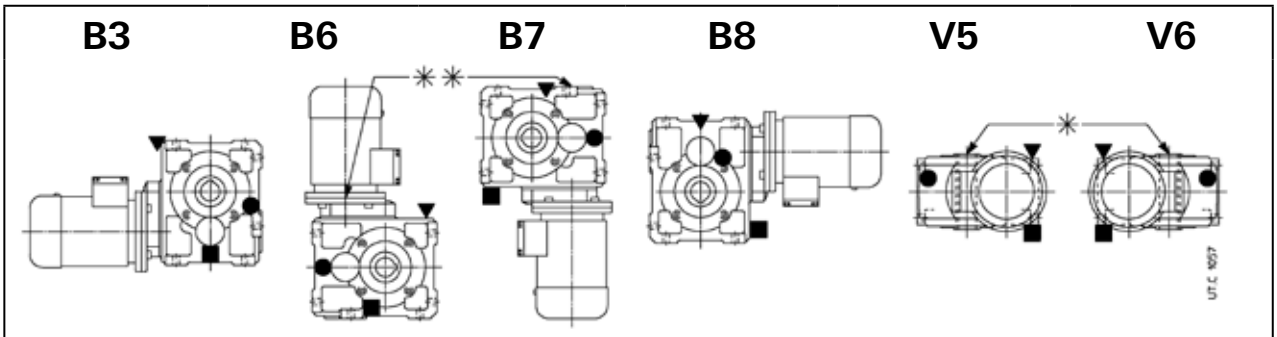
MR 4I 100, 125



▼ Oil filler plug (▽ not in view)
● Oil level plug (◍ not in view)
■ Oil drain plug (▨ not in view)

* The three upper bearings are greased.

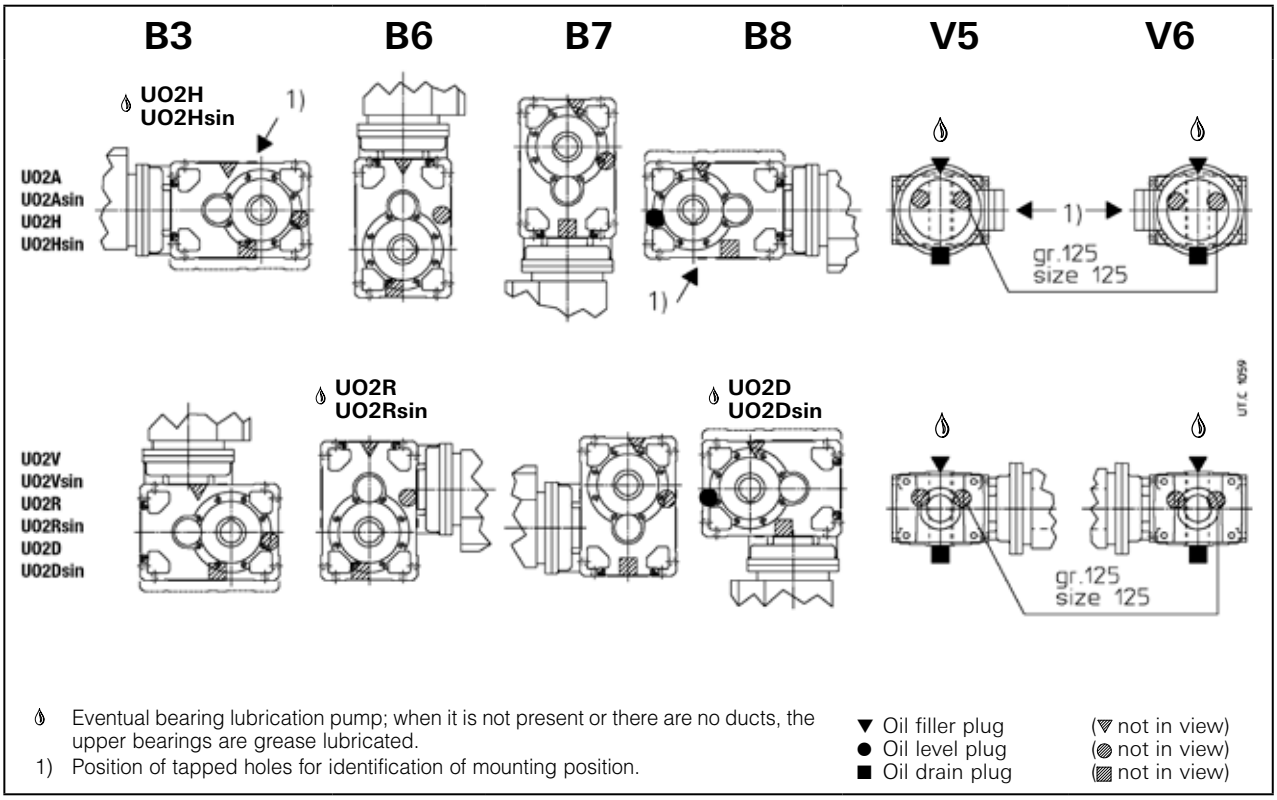
MR CI 100



* The two upper bearings are grease lubricated.
** For mounting positions B6, B7 (design **...D**) the upper bearings of bevel pinion are grease lubricated.

▼ Oil filler plug (▽ not in view)
● Oil level plug (▨ not in view)
■ Oil drain plug (▨ not in view)

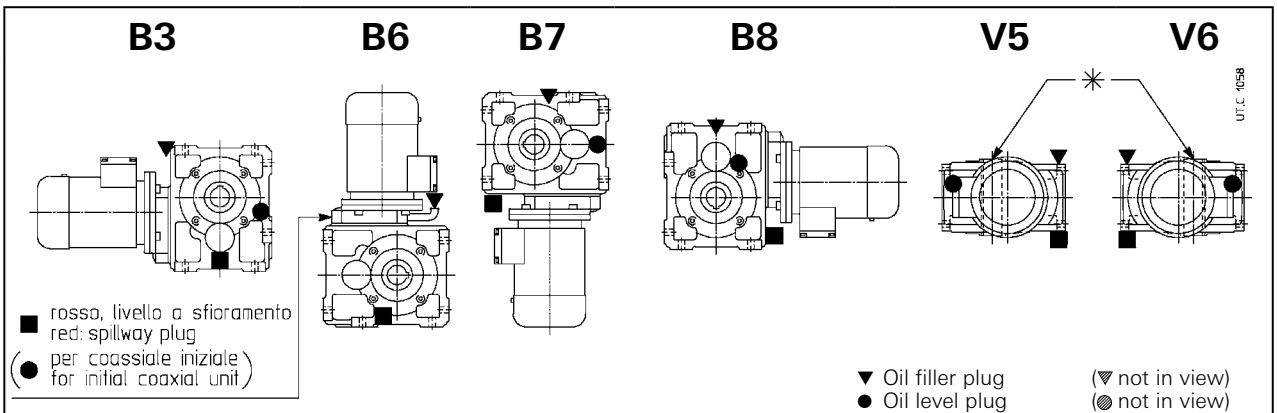
MR CI 125 ... 360



◊ Eventual bearing lubrication pump; when it is not present or there are no ducts, the upper bearings are grease lubricated.
1) Position of tapped holes for identification of mounting position.

▼ Oil filler plug (▽ not in view)
● Oil level plug (▨ not in view)
■ Oil drain plug (▨ not in view)

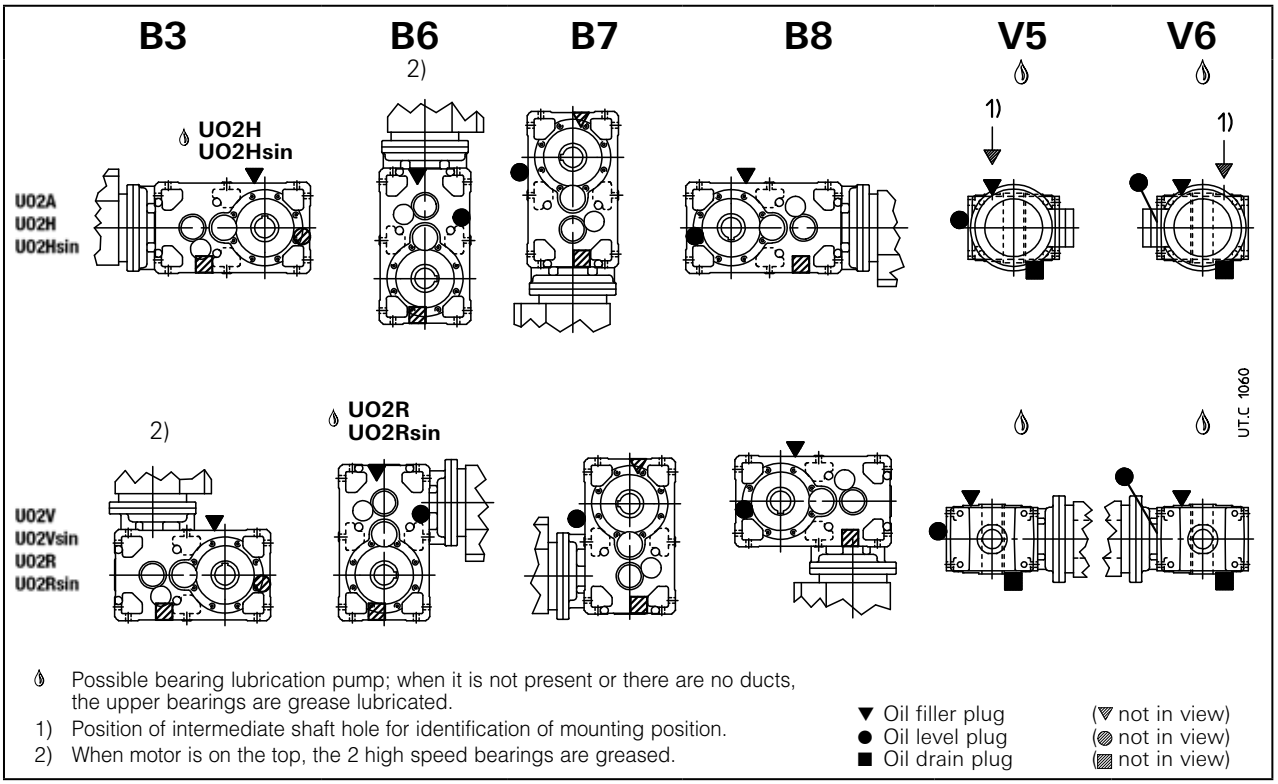
MR ICI 100 ... 200



* The two upper bearings are grease lubricated.

▼ Oil filler plug (▽ not in view)
● Oil level plug (▨ not in view)
■ Oil drain plug (▨ not in view)

MR C2I 140 ... 360



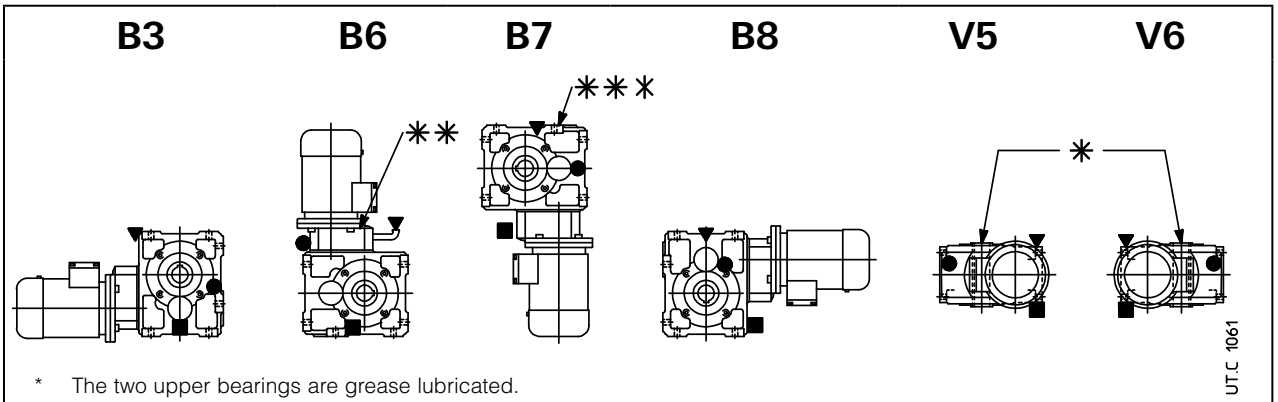
Possible bearing lubrication pump; when it is not present or there are no ducts, the upper bearings are grease lubricated.

1) Position of intermediate shaft hole for identification of mounting position.

2) When motor is on the top, the 2 high speed bearings are greased.

▼ Oil filler plug (▽ not in view)
● Oil level plug (▨ not in view)
■ Oil drain plug (▨ not in view)

MR C3I 100, 125



* The two upper bearings are grease lubricated.

** For mounting position B6, the bearing of the first gear pair (wheel side) is grease lubricated.

*** For mounting position B7 (design **...D**) the upper bearings of bevel pinion are grease lubricated.

▼ Oil filler plug (▽ not in view)
● Oil level plug (▨ not in view)
■ Oil drain plug (▨ not in view)

7 – Motor assembly and disassembly

7.1 - General

As all gearmotors are fitted with standardized motor, refer to following instructions, when mounting or replacing:

– be sure that the matin surfaces are machined under accuracy rating (IEC 60072-1);
– clean surfaces to be fitted thoroughly;
– in the event of a lowered keyway, replace the motor key with the one supplied with the gear reducer; if necessary, adjust its length to the motor shaft keyway; check the key so that between its top and the bottom of the hole keyway there is a backlash of 0,1 0,2 mm; in case of output shaft keyway, lock the key by pins;
– check that motor centering is in the relevant gear reducer flange seat;
– check that the length of the screws is enough to have 2 threads overhanging from the nut;
– tighten the motor fastening screws to gear reducer flange in order to achieve a tightening torque as per ch. 5.2.

7.2 - Gearmotors with motor keyed onto hollow high speed shaft of gear reducer

Helical gearmotors MR 2I, MR 3I 140 ... 360
Bevel helical gearmotors MR CI, MR C2I

– check that the fit-tolerance between hole and shaft end is G7/j6 for D ⩽ 28 mm, F7/k6 for D ⩾ 38 mm;
– apply a thread-braking seal type LOXEAL 23-18 the coupling surfaces in order to prevent contact oxydation;

– push the motor up to shoulder; **do not force the motor shaft inside the gear reducer**: **danger of sever injury**;
– tighten the motor fastening screws or nuts to gear reducer motor flange.

In presence of the **hub clamp** (helical gearmotors 2I, 3I with motor size ⩾ 200) for the mounting proceed as follows:

– Turn the hub clamp until the fastening screw head is aligned with one of the access holes on gear reducers flange, after having removed the relevant closure plugs;
– do not modify the axial position of the hub clamp supplied from workshop, as this position is the excellent one in order to achieve the maximum tightening effect;
– tighten the motor fastening screws or nuts to gear reducer motor flange;
– complete the tightening of hub clamp with dynamometric wrench up to the tightening torque stated in the table; during this operation pay attention not to modify the axial position of hub clamp;
– screw again the closure plugs of access holes to gear reducer flange;

For the **disassembly** proceed as follows:

– acting on motor shaft rear end, whenever possible, or disconnecting the gear reducer from machine and acting on gear reducer low speed shaft (with brake motor the brake must be released), align the wrench hole with the tightening screw of hub clamp;
– loosen the tightening screw and consequently the hub clamp (taking care not to modify the axial position of hub clamp);
– unscrew the motor fastening screws of nuts to gear reducer flange;
– disassemble the motor.

Gear reducer size		Screw	*M*s
2I	**3I**	UNI 5931	N m
160 ... 225	**200 ... 280**	M12× 45 cl. 12.9	143
250... 360	**320 ... 360**	M12× 45 cl. 12.9 Ød ⩽ 75 M14× 50 cl. 8.8 Ød = 80	143 135

7.3 - Gearmotors with helical pinion keyed directly on motor shaft end

Helical gearmotors MR 3I 40 ... 125, MR 4I

Bevel helical gearmotors MR ICI, MR C3I

Coaxial gearmotors, coupled with helical and bevel helical gear reducers (combined units).

– check that the fit-tolerance between hole and shaft end is K6/j6 for D ⩽ 28 mm, J6/k6 for D ⩾ 38 mm;

– make sure that the motors have bearing location and overhang (dimension S see fig. 7.3.1) as stated in table 7.3.1.

– assemble on motor shaft, as follows:

– the **spacer** pre-heated at **65 °C** sealing the motor shaft part with **locking adhesive type LOXEAL 58-14** and ensuring that keyway and motor shaft shoulder there is a ground helical section of at least 1,5 mm; pay attention **not to damage the external surface** of spacer;

– the **key** in the keyway, taking care that a brief segment of at least 0,9 times the pinion width;

c) the pinion pre-heated at **80** – **100 °C**;

– the **axial fastening system** where foreseen (head self-locking screw with base, spacer, or hub clamp with one or more dowels, fig. 7.3.1a; for the cases foreseen **without axial fastening** (fig. 7.3.1b), seal with **locking adhesive type LOXEAL 58-14** also the motor shaft section below the **pinion**;

– in the event of axial fastening system with hub clamp and dowels, be sure that these ones do not overhang from spacer external surface: screw the dowel and matrix the motor shaft with a tip;

– grease the pinion teeth, the sealing ring rotary seat and the seal ring (with KLÜBER Petamo GHY 133N), and assemble carefully, **paying attention not to damage the seal ring lip due to accidental shock with the pinion toothing**.

Tab. 7.3.1 - Min mech. requirements for IEC motors

Size motor	Min dynamic load capacity N		Max dimension S mm
	Front	Rear	
63	4 500	3 350	16
71	6 300	4 750	18
80	9 000	6 700	20
90	13 200	10 000	22.5
100	20 000	15 000	25
112	25 000	19 000	28
132	35 500	26 500	33.5
160	47 500	33 500	37.5
180	63 000	45 000	40
200	80 000	56 000	45
225	100 000	71 000	47.5

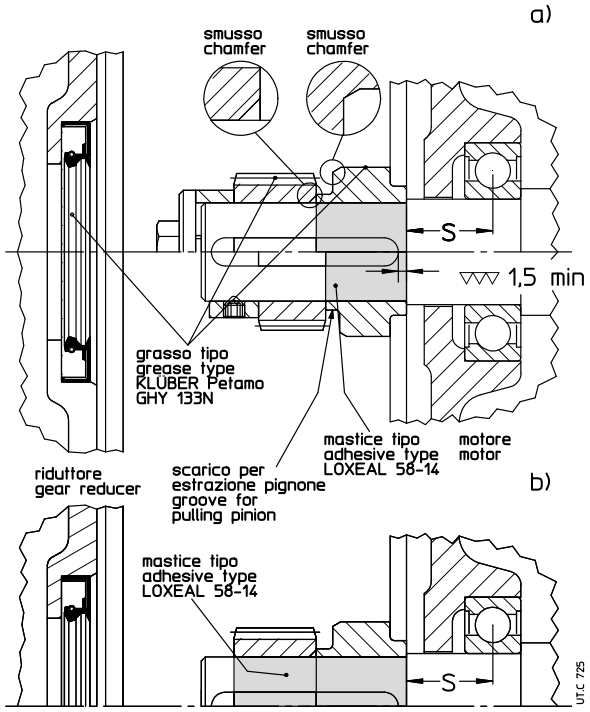


Fig. 7.3.1

7.4 - Maximum bending moment of flange MR

In case of assembly of motors supplied by the customer, verify that the static bending moment M_b generated by motor weight on the counter flange of gear reducer is lower than the value allowed M_{bmax}, stated in the table.

$$\boldsymbol{M}_b \leqslant \boldsymbol{M}_{bmax}$$

where:

M_b = G · (X + HF) / 1000 [N m]

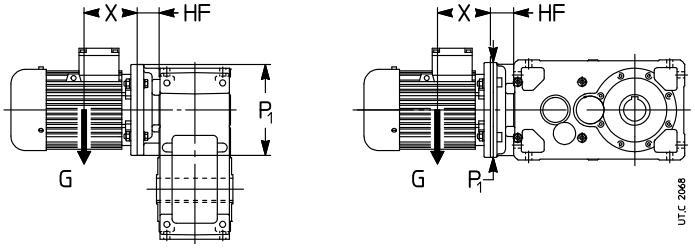
G [N] motor weight; almost equal numerically to motor mass, stated in kg, multiplied by 10.

X [mm] distance from motor center of gravity from flange surface.

HF [mm] supplied in table according to gear reducer size and flange diameter P_1.

Very long and thin motors, though with bending moments lower than prescribed limits, may generate anomalous vibrations during the operation. In these cases it is necessary to foresee a proper additional motor support (see motor specific documentation).

In the dynamic applications where the gearmotor is subject to translations, rotations or oscillations, some stresses exceeding the usuallyadmissible ones can be generated (e.g. shaft mounting): consult us for the verification of specific case.

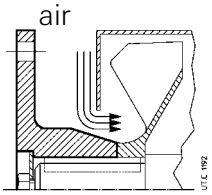


Bending torque M_{bmax} and dimension HF

Size	P_1	2I, 3I		4I		CI		ICI		C3I		C2I		
	Ø	HF mm	N m	HF mm	N m	HF mm	N m	HF mm	N m	HF mm	N m	mm		N m
40	140	28	**28**	–	**–**	31	**63**	31	**63**	–	**–**	–	–	**–**
	160	–	**–**	–	**–**	31		31	**63**	–	**–**	–	–	**–**
50	140	38	**56**	–	**–**	31	**63**	31	**63**	50	**63**	–	–	**–**
	160	30	**56**	–	**–**	31	**63**	31	**63**	50	**63**	–	–	**–**
	200	–	**–**	–	**–**	31	**63**	31	**63**	–	**–**	–	–	**–**
63, 64	140	31	**63**	51	**63**	–	**–**	–	**–**	–	**–**	–	–	–
	160	31	**63**	51	**63**	38	**112**	38	**112**	65	**112**	–	–	**–**
	200	31	**112**	–	**–**	38	**112**	38	**112**	65	**112**	–	–	**–**
80, 81	160	38	**112**	66	**112**	–	**–**	38	**112**	65	**112**	–	–	**–**
	200	38	**200**	66	**112**	38	**200**	38	**112**	65	**112**	–	–	**–**
	250	38	**200**	–	**–**	50	**200**	–	**–**	–	**–**	–	–	**–**
100	200	45	**280**	79	**280**	45	**280**	45	**280**	78	**280**	–	–	**–**
	250	45		–	**–**	45	**450**	45	**280**	–	**–**	–	–	**–**
	300	65	**450**	–	**–**	65	**450**	–	**–**	–	**–**	–	–	**–**
125	200	55	**500**	100	**500**	–	**–**	55	**500**	99	**500**	–	–	**–**
	250	55	**500**	100	**500**	–	**–**	55	**500**	99	**500**	–	–	**–**
	300	61	**1 400**	–	**–**	70	**560**	56	**900**	–	**–**	–	–	**–**
	350	75	**1 400**	–	**–**	100	**900**	–	**–**	–	**–**	–	–	**–**
140	200	–	**–**	–	**–**	–	**–**	55	**500**	–	**–**	–	–	**–**
	250	30	**560**	–	**–**	–	**–**	55	**500**	–	**–**	45	(30)	**560**
	300	55	**560**	–	**–**	70	**560**	56	**900**	–	**–**	70	(55)	
	350	75	**900**	–	**–**	100	**900**	–	**–**	–	**–**	–	–	**–**
160, 180	250	50	**1 250**	–	**–**	–	**–**	67	**710**	–	**–**	55	–	**180**
	300	50	**1 250**	–	**–**	–	**–**	67	**710**	–	**–**	70	(50)	**1 250**
	350	75	**1 250**	–	**–**	102	**1 250**	80	**1 120**	–	**–**	100	(75)	**1 250**
	400	65	**1 250**	–	**–**	102	**1 250**	–	**–**	–	**–**	–	–	**–**
	450	95	**2 000**	–	**–**	132	**1 250**	–	**–**	–	**–**	–	–	**–**
200, 225	300	67	**2 500**	–	**–**	–	**–**	80	**1 800**	–	**–**	72	–	**630**
	350	67	**2 500**	–	**–**	100	**2 500**	80	**1 800**	–	**–**	102	(67)	**2 500**
	400	67	**2 500**	–	**–**	100	**2 500**	80	**1 800**	–	**–**	102	(67)	**2 500**
	450	97	**2 500**	–	**–**	130	**2 500**	90	**1 800**	–	**–**	132	(97)	**2 500**
	550	97	**4 000**	–	**–**	130	**4 000**	–	**–**	–	**–**	–	–	**–**
250, 280	350	65	**4 500**	–	**–**	–	**–**	–	**–**	–	**–**	100	–	**1 400**
	400	65	**4 500**	–	**–**	–	**–**	–	**–**	–	**–**	100	(45)	**4 500**
	450	95	**4 500**	–	**–**	130	**4 500**	–	**–**	–	**–**	130	(75)	**4 500**
	550	95	**4 500**	–	**–**	130	**4 500**	–	**–**	–	**–**	130	(75)	**4 500**
	660	115	**4 750**	–	**–**	160	**4 750**	–	**–**	–	**–**	–	–	**–**
320 ... 360	400	85	**9 000**	–	**–**	–	**–**	–	**–**	–	**–**	100	–	**1 600**
	450	85	**9 000**	–	**–**	–	**–**	–	**–**	–	**–**	130	–	**2 800**
	550	95	**9 000**	–	**–**	–	**–**	–	**–**	–	**–**	130	(65)	**9 000**
	660	115	**9 000**	–	**–**	–	**–**	–	**–**	–	**–**	160	(85)	**9 000**

8 - Cooling system

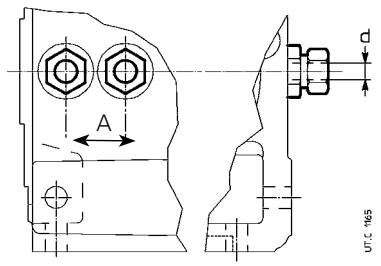
8.1 - Fan cooling



If there is fan on the gear reducer verify that there is sufficient space allowing for adequate circulation of cooling air also after fitting coupling protection. If a coupling protection is fitted (drilled case or wire netting), smooth, the coupling hub, if necessary.

8.2 - Cooling by coil or by internal heat exchanger

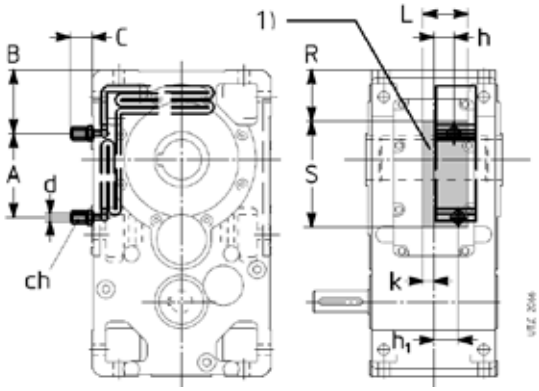
The presence of coil is given by water inlets (pipes DIN 2353) protruding from the housing or from the inspection cover as shown in the following figures.



Tab. 8.2.1 - Coil

Size gear reducer	**d** Ø	**A**[1] ≈	**B**[1] ≈	**h**[1] ≈	**O**[1] ≈	spanner
125 ... 180	12	40	40	–	–	22
200 ... 280	12	50	40	–	–	22
320 ... 360	16	60	45	–	–	30

1) Values valid for B3 mounting position; consult us.



Tab. 8.2.2 - Internal heat exchanger

Size gear reducer	ft_{1b} B3		B8	**A** ≈	**B** ≈	**C**	**ch**	**d** Ø	**h**	h_1	**K**	**L**	**R**	**S**
140	1.7	1.9	1.8	30	81.5	54	22	12	32	19	16	68	60	130
160	2.12	2.36	2.24	0	102	54	22	12	20	46	16	86	77	177
180	2	2.24	2.12	0	102	54	22	12	21	47	15	86	77	177
200	2.24	2.5	2.36	190	152	25	22	12	41	41	14	75	105	263
225	2.12	2.36	2.12	190	152	25	22	12	41	41	14	75	105	263
250	2.36	2.65	2.5	180.5	170.5	25	22	12	50.5	50.5	18	100	125	311
280	2.24	2.5	2.36	180.5	170.5	25	22	12	54	54	15	100	125	311
320, 321	2.12	2.36	2.24	60	255	34	30	16	66	66	2	129	177	302
360	2	2.24	2.12	60	255	34	30	16	66	66	2	129	177	302

1) Free area for pipe fastening and coil fastening devices.

⚠ **Attention!** Do not tamper with the eventual stop plate in order to keep the pipes locked; in particular keep the pipe locked while tightening the nut of connection pipe.

Unless specific indications given on the documentation attached to present instructions, **water** fed into the system must:

– be not too hard;

– be at max temperature +20 °C;

– capacity 10 ÷ 20 dm^3/min;

– pressure 0,2 ÷ 0,4 MPa (2 ÷ 4 bar); the load loss of the coil, according to capacity and water pressure, is of 0,6 ÷ 0,8 bar for diameter d = 16 and 0,8 ÷ 1 for diameter d = 12.

Where ambient temperature may be less than 0 °C, make provision for water drain and compressed air inlet, so as to be able to empty out the coil completely and avoid freezing up.

The direction of flow of the cooling water is discretionary.

In case of too high water input pressure, install a safety valve balanced at a proper operating threshold.

The ends of the cooling coil protruding from the gear reducer must not be damaged (bent, dented, obstructed) as this can prejudice the correct flow of water for cooling or result in leaks. Before connecting the coil to the pipe fittings used for feeding and draining of the cooling water, first rinse to clear out any possible obstructions.

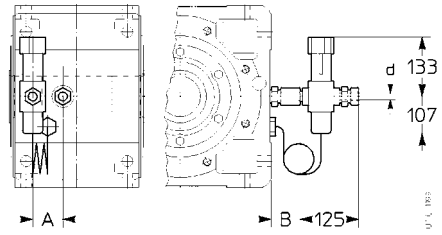
For the connection it is sufficient to use a smooth metallic tube having a *d* external diameter as per table.

The **thermostatic valve** permits to have water circulation automatically and without auxiliary supply need, when gear reducer oil reaches the set temperature. The valve sensor is equipped with immerson bulb. Mounting and setting, adjustable within +50 ÷ +90 °C, must be mounted during the assembly. For the setting use the control knob on valve head.

For ambient temperature lower than 0 °C consult us.

Setting values advised for operating temperature: +50 ÷ +65 °C.

Attention! It is necessary to protect the thermostatic valve from any shock or stroke.

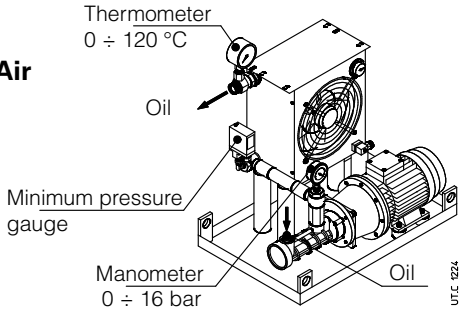


Thermostatic valve

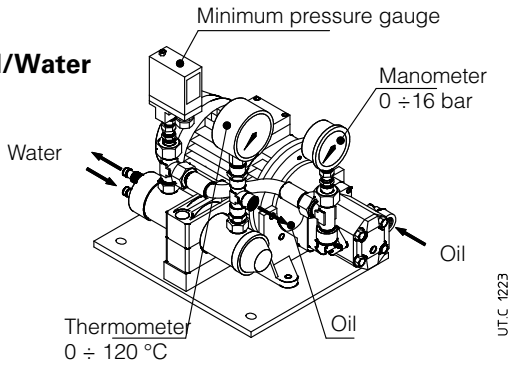
8.3 - Indepentent cooling unit

Additional cooling device in the event that the other forced cooling systems are not sufficient anymore for the dissipation of thermal power produced by gear reducer during operation.

Oil/Air



Oil/Water



Including:
- a **oil/air heat exchanger** (O/A; with thermostat and adjustable control knob 0 ÷ 90 °C) or **oil/water heat exchanger** (O/W),
- one **motor pump**: screw pump with fluoro rubber seals (gear pump for UR O/W4 ÷ UR O/W 21); 4 pole motor B3/B5 (three-phase Δ230 Y400 V 50 Hz); motor-pump connection with coupling;
- one **motor fan** (O/A) (three-phase supply Δ230 Y400 V 50 Hz or single phase supply 230 V 50, 60 Hz, see table on following page); 2 poles motor (UR O/A 5 and 7) and 4 poles motor (UR O/A 10 ... 46);
- one **analog manometer** (0 ÷ 16 bar) mounted between pump and exchanger;
- one **analog thermometer** (0 ÷ 120 °C) mounted at exchanger output;
- one **minimum pressure gauge** (with exchange contacts) mounted between pump and exchanger;
- one **supporting frame** with nameplate.

On request, several accessories are at disposal (supplied separately, assembly is Customer's responsibility) in order to satisfy all functionality and safety needs.
- **oil temperature probe Pt100**;
- **2-threshold signalling device CT03** (necessary also the oil temperature probe Pt100) for the mounting on rail to DIN EN 50022;
- **3-threshold signalling device CT10** (necessary also the oil temperature probe Pt100) for the mounting on rail to DIN EN 50022;
- **bi-metal type thermostat**;
- **flow gauge**;
- «**filter**» (with optical-eletric blockage warning and one or two filters)

Connections realized by flexible pipes (type SAE 100 R1, maximum length 2 m) between gear reducer and cooling unit and the assembly of accessories and signalling devices are Buyer's responsibility.

Operating features - UR O/A ...

Designation	*P*s	Exchanger	Oil motor pump		Motor fan		Oil connections		Exch. capacity	Mass
	kW		motor 3~ kW	load dm³/min	motor kW	load m³/h	Intake	Delivery	dm³	kg
UR O/A 5	**5**	AP 300E	1,5	30	0,12 1~	900	1" (1"1/4)[2]	1" (1"1/4)[2]	2	60
UR O/A 7	**7**	AP 300/2E	1,5	30	0,12 1~	1300			3,6	65
UR O/A 10	**10**	AP 430E	1,5	30	0,21 3~	2750			3,6	70
UR O/A 13	**13**	AP 430/2E	1,5	30	0,18 3~	2700			5,5	75
UR O/A 16	**16**	AP 580 EB	2,2	56	0,18 3~	3500			15	96
UR O/A 21	**21**	AP 680 EB	2,2	56	0,69 3~	6300			16	118
UR O/A 26	**26**	AP 730 EB	2,2	56	0,69 3~	7450	1" 1/4	1" 1/2 (1")[1]	16	127
UR O/A 30	**30**	AP 730 EB	3	80	0,69 3~	7450			16	127
UR O/A 40	**40**	AP 830 EB	2,2	56	0,81 3~	9500			20	140
UR O/A 46	**46**	AP 830 EB	3	80	0,81 3~	9500			20	140

Designation	*P*s	Exchanger	Oil motor pump		Water		Oil connections		Exch. capacity	Mass
	kW		motor 3~ kW	load dm³/min	load dm³/min	connect.	Intake	Delivery	dm³	kg
UR O/W 4	**4**	T60CB1	0,37	16	⩾ 8 (⩽ 30)	Ø 12	G 1/2"	G 1/2"	0,4	13
UR O/W 6	**6**	T60CB2	0,37	16	⩾ 10 (⩽ 30)	Ø 12	G 1/2"	G 1/2"	0,6	15
UR O/W 9	**9**	T80CB2	0,55	16	⩾ 16 (⩽ 30)	Ø 12	G 1/2"	G 1/2"	1	18
UR O/W 13	**13**	MS84P2	1,1	30	⩾ 25 (⩽ 45)	G 1/2"	G 3/4"	G 3/4"	1	31
UR O/W 21	**21**	MS134P1	1,5	30	⩾ 40 (⩽ 110)	G 1"	G 3/4"	G 3/4"	3	44
UR O/W 31	**31**	MS134P1	2,2	56	⩾ 50 (⩽ 110)	G 1"	G 1"1/4	G 1"1/4	3	55
UR O/W 50	**50**	MS134P2	3	80	⩾ 80 (⩽ 110)	G 1"	G 1"1/4	G 1"1/4	4,5	70

1) Connection for delivery of UR O/A 16.
2) Connection for the delivery in presence of filter.

Starting mode and necessary accesories

Ref.	Gear reducer lubrication system	Types of gear reducer starting	T_{amb} °C	Necessary accessories	Type of requested oil	Description and notes
A1	Oil splash lubrication	Without oil pre-heating	0 ÷ 25	Pt100 + CT10	Mineral oil or synthetic oil (preferable)	**Gear reducer starting and following hot oil motor pump starting** The motor pump is piloted by a **three threshold** oil temperature signalling system (Pt100 + CT10). Balance the three threshold device CT10 with: – switching threshold at 60 °C (motor pump starting); – reset threshold at 40 °C; – safety threshold at 90° C.
A2	Oil splash lubrication	Without oil pre-heating	> 25	–	Polyalphaolephine based synthetic oil	**Simultaneous starting of gear reducer and motor pump** Oil filter not possible[2].
B1	Forced lubrication (bearings and/or gears)	With oil pre-heating	0 ÷ 25	Pt100 + CT03 Pt100 + CT10 heater	Mineral oil or synthetic oil (preferable)	**Simultaneous starting of gear reducer and motor pump after oil pre-heating**[1] The heater is piloted by the **two threshold** oil temperature signalling system (Pt100 + CT03). The gear reducer motor pump and motor are piloted by a further **three threshold** oil temperature signalling system (Pt100 + CT10). Balance the two threshold device CT03 with: – switching threshold at 50 °C (heater power supply shut off); – reset threshold at 30 °C. Balance the three threshold device CT10 with: – switching threshold at 30 °C (motor pump and gear reducer starting); – reset threshold at 10 °C; – safety threshold at 90 °C.
B2	Forced lubrication (bearings and/or gears)	Without oil pre-heating	> 25	–	Polyalphaolephine based synthetic oil	**Simultaneous starting of gear reducer and motor pump**[1] Oil filter not possible[2].

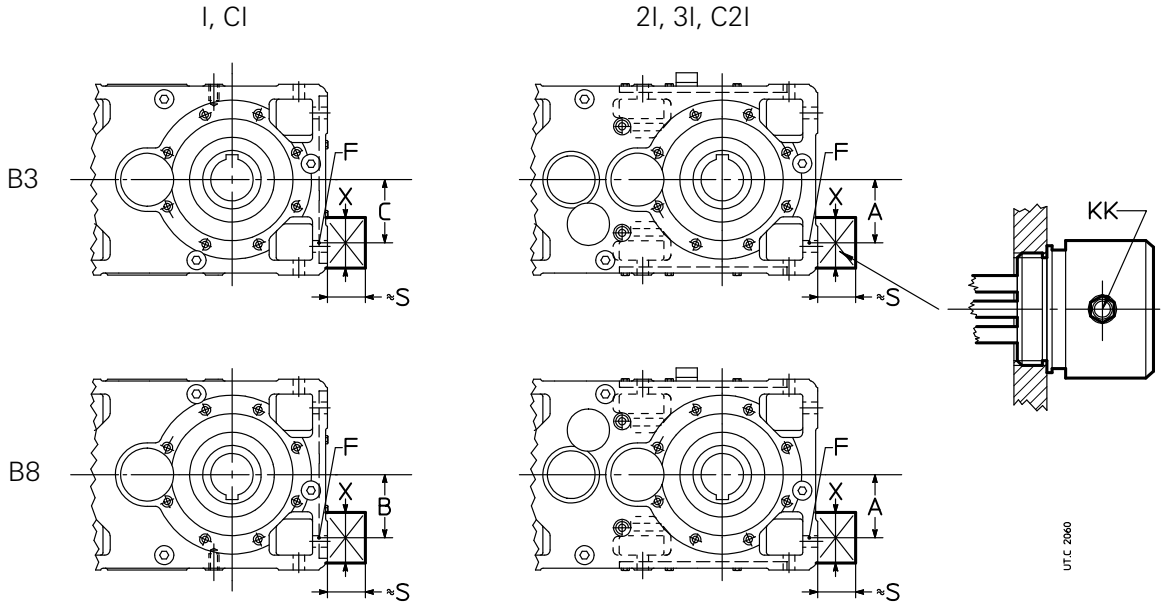
1) It is advisable to delay the starting of gear reducer compared with the motor pump starting by aprox. 1 min.
2) The presence of oil filter requires that the cooling unit starting is vigen with hot oil: refer to cases A1 or B1.

9 - Accessories

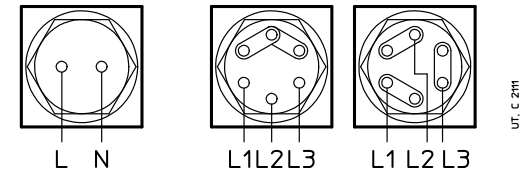
9.1 - Heater

Oil heater for gear reducer starting at low ambient temperature.
The heater is piloted through proper control device releasing when achieving the pre-set oil temperature.
IMPORTANT. The data stated in the table refer to **mounting positions B3** and **B8** only; for other mounting positions, consult us.

Features:
– specific power 2W/cm^2;
– single phase supply 230 V 50-60 Hz or three-phase Δ230 Y400 V 50-60 Hz (see table);
– stainless steel resistors AISI 321;
– metallic terminal box; cable gland protection IP 65;
– Horizontal mounting with oil bath lubrication;
– max oil temperature 90 °C;
– threaded brass joint.



Gear reducer size	**A**	**B**	**C**	**F**	**S** ≈	**X** ≈	***P*** W	**KK**	Supply
125	85	85	85	G 1"	85	85	300	Pg 11	1~ 230 V 50-60 Hz
140	100	85	100						
160	125	114	114	G 1" 1/4			600		
180		100	125						
200	150	146	146	G 1" 1/2	90		900	Pg 13	3~ Δ230 Y400 V 50-60 Hz
225		140	155						
250	200	170	170	G 2"			1500		
280		170	235						
320, 321	250	235	235				2100		
360		222	318						



Single-phase connection | Three-phase connection Y | Three-phase connection Δ

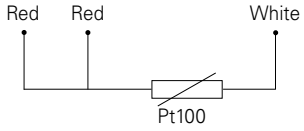
9.2 - Oil temperature probe

Remote oil temperature gauge; installation instead of drain plug, or into a hole properly pre-arranged by the Buyer. The temperature probe is realized with a thermo-resistor Pt100.

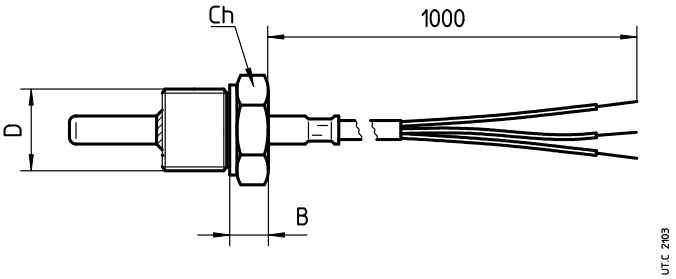
Features:

– platinum wire with 100 Ω at 0 °C according to EN 60751;
– precision class B according to EN 60751;
– operation temperature field -40 °C ÷ 200 °C;
– max current 3 mA
– 3 wire connection according to IEC 751 (see Fig. below);
– stainless steel probe AISI 316; diameter 6 mm;
– cable 1 m long with free end.

For the connection of probe to relevant controlling device use a protected section cable ⩾ 1,5 mm^2 positioned separately from power cables.



Gear reducer size	**B**	**C**h (key)	**D**
125, 140	8	22	G 1/2"
160 ... 280	10	32	G 3/4"
320 ... 360	15	36	G 1"



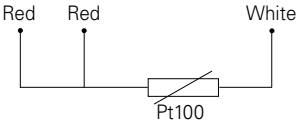
9.3 - Oil temperature probe with terminal box and amperometric transducer

Remote oil temperature gauge, with terminal box and amperometric transducer; installation in stead of drain plug, at Buyer's responsibility. The temperature gauge is realized with a thermo-resistor Pt100.

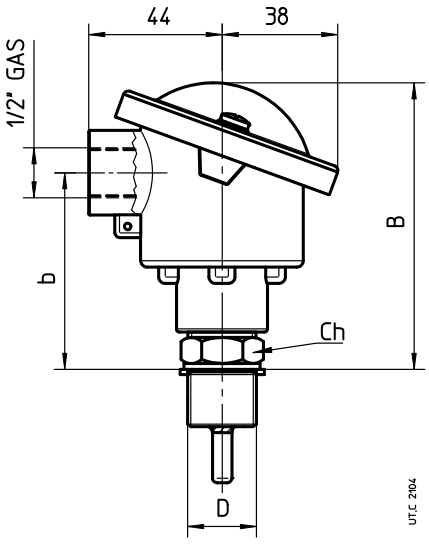
Features:

– platinum wire with 100 Ω at 0 °C according to EN 60751;
– precision class B according to EN 60751;
– operation temperature field -40 °C ÷ 200 °C;
– 3 wire connection according to IEC 751 (see fig. below);
– stainless steel probe AISI 316; diameter 6 mm;
– amperometric transducer with output signal 4 ÷ 20 mA;
– alluminium terminal block (supplied without cable gland);
– protection IP65;
– input cables G ½'';

For the connection of probe to relevant signalling device, use a protected section cable ⩾ 1,5 mm^2 positioned separately from power cables.



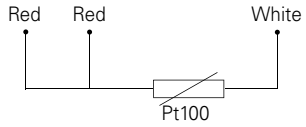
Gear reducer size	**B**	**C**h (key)	**b**	**D**
125, 140	90	24	60	G 1/2"
160 ... 280	92	32	62	G 3/4"
320 ... 360	97	36	67	G 1"

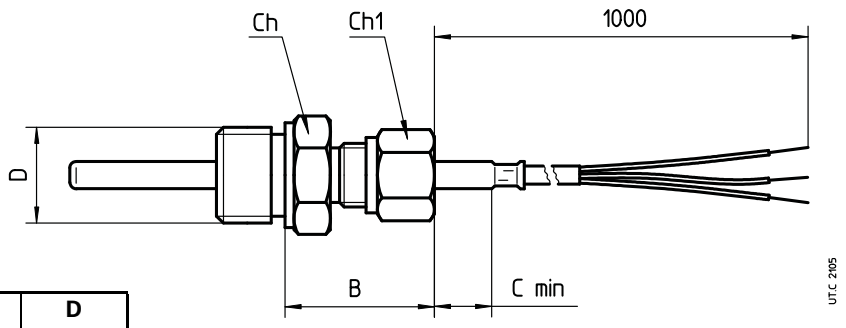


9.4 - Bearing temperature probe

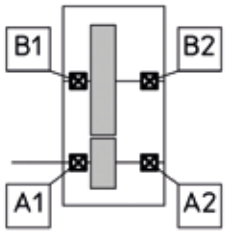
Probe for the remote bearing temperature measurement; installation into a threaded hole, properly pre-arranged by the Buyer next to a bearing to be monitored.
Using the sliding filet, set the position so that the contact between probe and bearing externa surface is guaranteed.
The temperature gauge is realized with a thermo-resistor Pt100.

Features:
– platinum wire with 100 Ω at 0 °C according to EN 60751;
– precision class B according to EN 60751;
– operation temperature field -40 °C ÷ 200 °C;
– max current 40 mA
– 3 wire connection according to IEC 751 (see Fig. below);
– stainless steel AISI 316 flat probe; diameter 6 mm;
– stainless steel **sliding** fillet.
For the connection of probe to relevant signalling device use a protected section cable ⩾ 1,5 mm^2 positioned separately from power cables.

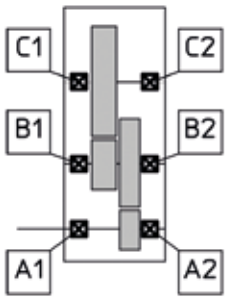




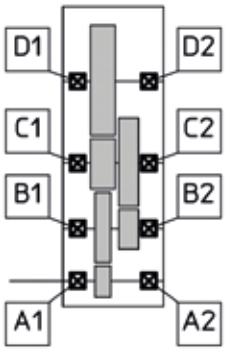
Gear reducer size	**C** $_{min}$	**B**	**C**h (key)	**C**h1 (key)	**D**
125, 140	5	32	24	17	G 1/2"
160 ... 280		36	32	27	G 3/4"
320 ... 360		40	36	27	G 1"



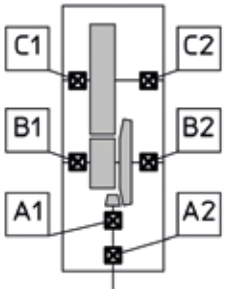
I ... UP2A



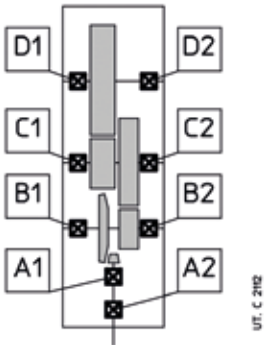
2I ... UP2A



3I ... UP2A



CI ... UO2A (UO2V)



C2I ... UO2A (UO2V)

9.5 - Bearing temperature probe with terminal box and amperometric transducer

Probe for remote bearing temperature monitoring, with terminal box and amperometric transducer, installation (at Buyer's responsibility) in a threaded hole properly pre-arranged next to a bearing to be monitored.

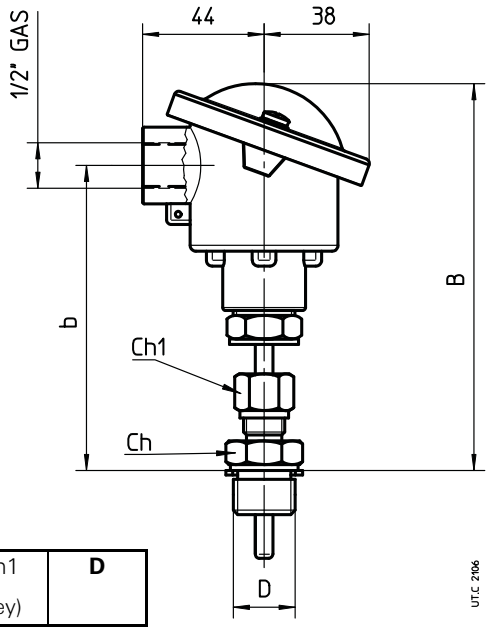
Using the sliding filet, set the position so that the contact between probe and bearing externa surface is guaranteed.

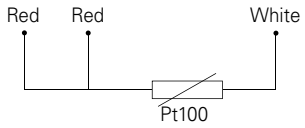
The temperature gauge is realized with a thermo-resistor Pt100.

Features:

– platinum wire with 100 Ω at 0 °C according to EN 60751;
– precision class B according to EN 60751;
– operation temeprature field -40 °C ÷ 200 °C;
– 3 wire connection according to IEC 751 (see Fig. below);
– amperometric transducer with output signal 4 ÷ 20 mA;
– alluminium terminal block (supplied without cable gland);
– IP65 protection;
– input cables G ½'';
– stainless steel AISI 316 flat probe; diameter 6 mm;
– stainless steel **sliding** steel .

For the connection of probe to relevant signalling device use a protected section cable ⩾ 1,5 mm^2 positioned separately from power cables.





Gear reducer size	**B**	**b**	**C**h (key)	**C**h1 (key)	**D**
125, 140	134	104	24	17	G 1/2"
160 ... 280	138	108	32	27	G 3/4"
320 ... 360	142	112	36	27	G 1"

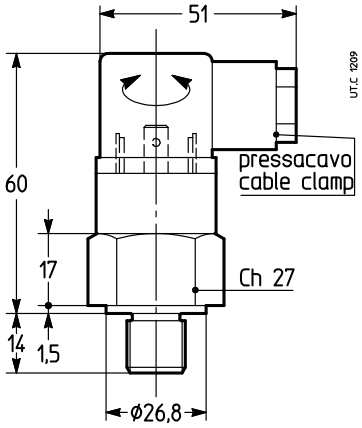
9.6 - Bi-metal type thermostat

Bi-metal type thermostat for the control of the maximum admissible oil temperature.

Features:

– NC contact with maximum alternate current 10 A 240 V a.c. (5 A - 24 V d.c.);
– G 1/2" thread connection;
– Pg 09 DIN 43650 cable gland;
– IP65 protection;
– Setting temperature 90 °C ± 5 °C (other setting temperatures are possible, on request);
– differential temperature 15 °C.

Mounting into a threaded plug with oil-bath lubrication prearranged according to mounting position and fastening, at Buyer's responsibility.



9.7 - Oil level switch with float

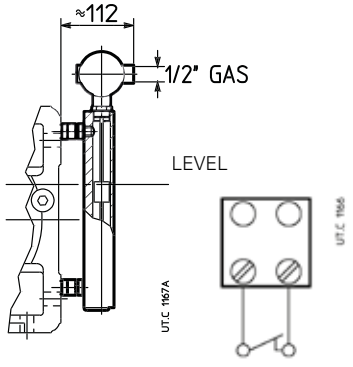
It is a level control device with reed contacts in a supporting stem moved by the magnetic field activated by the magnets included in the float.

Connecting features:

– 2 wires connection;
– maximum voltage: 350 V;
– maximum current: 1,5 A;
– 1 cable input 1/2" UNI 6125 – IP65;
– G 1" brass joint.

The switch is supplied ready for use; when level goes down approx 5 mm, the switch goes on and contact opens.

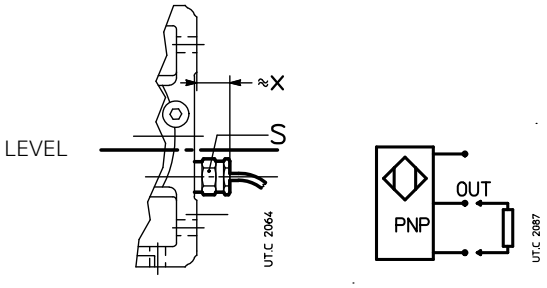
When filling oil in the gear reducer it is necessary to verify that device is properly calibrated. If any problems occur during this operation contact Rossi.



9.8 - Oil optical probe

Optical scanner, without mobile parts, for the constant control of oil level, inside the gear reducer at rest (e.g. control before starting the machine or the plant).

Features:
– Stainless steel probe.
– operation temperature field -40 °C ÷ 125 °C;
– d.c. supply 12 ÷ 28 V (other types on request; consult us);
– PNP output (other types on request, consult us), max 100 mA;
– male coupling G 3/8", G 1/2", G 3/4", G 1" according to gear reducer size.



Gear reducer size	**S**	**x**
125 ... 140	27	40
160 ... 360	36	45

10 - Commissionning

10.1 - General

Carry out an overall check, making particularly sure that the **gear reducer is filled with lubricant**.

If an external lubricating system is present (forced lubrication, cooling unit) oil is to be filled to the correct level with the external system full of oil.

Be sure that the **cooling unit with coil**, if present, **is working during the gear reducer running** (see ch. 5.5).

Where Y-Δ starting is being used, input voltage must match the motor lower voltage (Δ connection).

For asynchronous three-phase motor, if the direction of rotation is not as desired, invert two phases at the terminals.

For gear reducers equipped with **backstop device**, see ch. 5:12.

10.2 - Running-in

It is advisable to execute a running-in of approximately 200 ÷ 400 h so that it is possible to achieve the maximum functionality.

The temperature of both gear reducer and lubricant may well rise beyond normal values during running-in. After the running-in period it may be necessary to verify the gear reducer fixing bolt tightness.

11 - Maintenance

11.1 - General

At machine rest, verify at regular intervals (more or less frequently according to environment and use):
a) all external surfaces are clean and air passages to the gear reducer or gearmotor are free, in order that cooling remains fully effective;
b) oil level and deterioration degree (check with cold gear reducer at rest);
c) correct fastening screws tightening.

During the operation check:
– noise level;
– vibrations;
– sealings;
– etc.

Attention! After a running period, gear reducer is subject to a light internal overpressure which may cause burning liquid discharge.
Therefore, before loosening whichever plug (filler plug included) wait until gear reducer has become cold and open it carefully; if not possible, take the necessary protection measures against burning due to warm oil contact. In all cases, always proceed with great care.
Maximum oil temperatures indicated on lubrication table do not represent a hindrance to the gear reducer regular running.

11.2 - Oil change

Execute the operation at **machine rest** and **cold gear reducer**.
Pre-arrange a proper waste oil collection system, unscrew the drain plug and the filler plug in order to facilitate the draining; dispose the waste lubricant according to the laws in force.
Wash internally the gear reducer's housing using the same oil type applied during the running; the oil used for this washing can be re-used for further washings after filtering with 25 µm of filtration standard.
Fill the gear reducer again up to level.
During the oil change, it is necessary to replace the seal rings.
When dismounting the cap (whenever gear reducers are provided with), reset the sealing with adhesive on cleaned and degreased mating surfaces.
For lubrication intervals see table 6.2.
Apart from running hours:
— replace mineral oil at least each 3 years;
— replace or regenerate synthetic oil each 5 - 8 years according to gear reducer size, running and environmental conditions.
Never mix different makes of synthetic oil; if oil-change involves switching to a type different from that used hitherto, then give the gear reducer a through clean-out.

11.3 - Coil and internal heat exchanger

In case of long non-running periods at ambient temperatures lower than 0 °C, the coil or the internal heat exchanger on the inspection cover should be emptied out using compressed air to blast out all the coolant, so as to avoid freezing-up which would cause the coil to break.

Verify that there are no deposits inside the coil which may obstruct water circulation or affect cooling. If any, wash the coil with suitable chemical cleaning products or consult Rossi.

Check the internal heat exchanger periodically and, if necessary, clean the exchange surfaces taking care not to damage the finned surfaces.

11.4 - Seal rings

It is always recommended that the seal rings are replaced with new ones when they are removed or during periodic checks of gear reducer; in this case, the new ring should be generously greased and positioned so that the seal line does not work on the same point of sliding contact as the previous ring.

Oil seals must be protected against heat radiation, also during the shrink fitting of parts, if applicable.

Duration depends on several factors such as dragging speed, temperature, ambient conditions, etc.; as a rough guide it can vary from 3150 to4 25000 h.

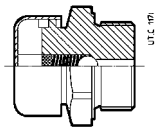
In case of designs with **labyrinth seal and greaser** («Taconite»), re-grease every 3 000 h of running or every 6 months with grease KLÜBER STABURAGS NBU 8 EP (unless otherwise stated).

11.5 - Bearings

Since there are many different types of bearings in a gear reducer (roller, tapered roller, straight roller, etc.) and each bearing works with different loads and speeds depending on the input speed, the nature of the load of the driven machine, the transmission ratio, etc., and with different lubricants (oil bath, oil splash, grease, oil circulation, etc.), it is not possible to define any periodical maintenance and replacement of bearings in advance.

If a precautionally maintenance is required, **undertake periodical checks to verify noise level and vibration with the help of appropiate diagniostic equipment and instruments**. If the measured values worsen even slightly it is necessary to stop gear reducer or gear motor and after having inspected inside the unit replace the bearings which are subject to breakdown.

11.6 - Metal filler plug with filter and valve

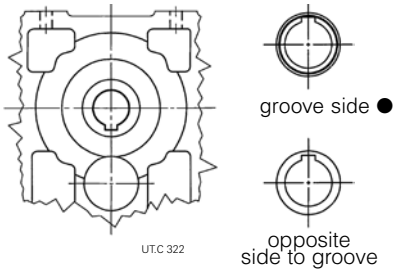


When the gear reducer or gearmotor (size ⩾ 100) is equipped with metal filler plug and valve (see fig. in order to clean it, it is necessary to unscrew it from the gear reducer (preventing any debris or other foreign items from entering the reducer, disassemble the cover, wash it with solvent, dry with compressed air and reassemble it).

This operation is to be made according to environment conditions.

11.7 - Hollow low speed shaft

In order to remove the hollow low speed shaft of the helical and bevel helical gear reducers (this is the first operation to perform when disassembling the gear reducer) turn the shaft until the keyway is facing the intermediate shaft as indicated in fig. 5 and push the shaft from the reference groove side (circumferencial keyway on shaft shoulder).



11.8 - Sound levels L_{WA} and $\bar{L}_{pA}$

Standard production sound power level L_{WA} [dB(A)][1] and mean sound pressure level $\bar{L}_{pA}$ [dB(A)][2] assuming nominal load, and input speed n_1 = 1 400[3] min^{-1}. Tolerance +3 dB(A).

Gear reducer size	I				2I				3I, 4I				CI				ICI, C2I, C3I			
	$i_N \leqslant 3{,}55$		$i_N \geqslant 4$		$i_N \leqslant 14$		$i_N \geqslant 16$		$i_N \leqslant 90$		$i_N \geqslant 100$		$i_N \leqslant 18$		$i_N \geqslant 20$		$i_N \leqslant 80$ (ICI) $i_N \leqslant 71$ (C2I)		$i_N \geqslant 100$ (ICI, C3I) $i_N \geqslant 80$ (C2I)	
	L_{WA}	$\bar{L}_{pA}$	L_{WA}	$\bar{L}_{pA}$	L_{WA}	$\bar{L}_{pA}$	L_{WA}	$\bar{L}_{pA}$	L_{WA}	$\bar{L}_{pA}$	L_{WA}	$\bar{L}_{pA}$	L_{WA}	$\bar{L}_{pA}$	L_{WA}	$\bar{L}_{pA}$	L_{WA}	$\bar{L}_{pA}$	L_{WA}	$\bar{L}_{pA}$
40, 50	–	–	–	–	**75**	66	**72**	63	**71**	64	–	–	**73**	64	**71**	62	**71**	62	**71**	62
63, 64	**83**	74	**79**	70	**78**	69	**75**	66	**74**	64	**72**	62	**76**	67	**73**	64	**73**	64	**73**	64
80, 81	**86**	77	**82**	73	**81**	72	**78**	69	**77**	67	**75**	65	**79**	70	**75**	66	**75**	66	**75**	66
100	**89**	80	**85**	76	**84**	75	**81**	72	**80**	70	**78**	68	**82**	73	**78**	69	**78**	69	**76**	67
125, 140	**92**	83	**88**	79	**87**	77	**84**	74	**83**	73	**80**	70	**85**	76	**80**	71	**82**	72	**79**	69
160, 180	**95**	86	**91**	82	**90**	79	**87**	76	**86**	75	**83**	72	**88**	79	**83**	74	**84**	74	**82**	71
200, 225	**99**[4]	89[4]	**95**[4]	85[4]	**93**	82	**90**	79	**89**	78	**86**	75	**92**	82	**87**	77	**87**	76	**84**	73
250, 280	**102**[4]	92[4]	**98**[4]	88[4]	**96**	85	**93**	82	**92**	81	**89**	78	**94**	84	**89**	79	**90**	79	**88**	76
320 ... 360	**106**[4]	96[4]	**102**[4]	92[4]	**100**	89	**97**	86	**96**	85	**93**	82	**98**	88	**93**	83	**93**	82	**91**	80

1) To ISO/CD 8579.
2) Mean value of measurement at 1 m from external profile of gear reducer standing in free field on a reflecting surface.
3) For n_1 710 ÷ 1 800 min^{-1}, modify tabulated values thus: n_1 = 710 min^{-1}, -3 dB(A); n_1 = 900 min^{-1}, -2 dB(A); n_1 = 1 120 min^{-1}, -1 dB(A); n_1 = 1 800 min^{-1}, +2 dB(A).
4) For sizes R I 225, 280 and 360, increase values of 1 dB(A).

In case of gearmotor (motor supplied by Rossi) add 1 dB(A) to the values in the table for 4 poles 50 Hz motors, and add 2 dB(A) for 4 poles 60 Hz motors.

In case of gear reducers with fan cooling, add to the values in the table 3 dB(A) for 1 fan and 5 dB(A) for 2 fans.

12 - Gear reducer troubles: causes and corrective actions

Trouble	Possible causes	Corrective actions
Excessive oil temperature	Inadequate lubrication: – excessive of insufficient oil quantity – unsuitable lubricant (different type, too viscous, exhausted, etc.)	Check – oil level (gear reducer at rest) or quantity – lubricant type and/or state (see ch. 6.2, lubrication table) and replace if necessary
	Incorrect mounting position	Change the mounting position
	Too tightened taper roller bearings	Consult Rossi
	Excessive ambient temperature	Increase the cooling or correct the ambient temperature
	Obstructed passage of air	Eliminate obstructive material
	Slow or missing air recycle	Arrange auxiliary ventilation
	Radiance	Screen gear reducer and motor properly
	Inefficiency of auxiliary bearing lubrication system	Check the pump and the pipes
	Bearings failure, defect or bad lubrication	Consult Rossi
	Inefficient or out of service oil cooling system: obstructed filter, insufficient oil (exchanger) or water (coil) flow rate, pump out of service, water temperature > 20 °C, etc.	Check the pump, the pipes, the oil filter and safety devices efficiency (manostats, thermostats, etc.)
Anomalous noise	One or more teeth with – dents or spallings – excessive flanks roughness	Consult Rossi
	Bearings failure, defect or bad lubrication	Consult Rossi
	Taper roller bearings with excessive clearance	Consult Rossi
	Vibrations	Check the fastening and the bearings
Lubricant leaking from seal ring	Seal ring with worm, bakelized, damaged or false mounted seal lip	Replace seal ring (see ch. 11.4)
	Damaged rotating seating (scoring, rust, dent, etc.)	Restore the seating
	Mounting position differs from the one stated on the name plate	Correctly position the gear reducer
Oil leaking from filler plug	Too much oil	Check oil level/quantity
	Incorrect mounting position	Check mounting position
	Inefficient vent valve	Clean/replace filler plug with vent valve
Low speed shaft not rotating even if high speed shaft or motor are running	Broken key	Consult Rossi
	Completely worn gear pair	
Lubricant leaking from joints (covers or half-housing joints)	Defective oil seals	Consult Rossi
Water in the oil	Defective cooling coil or heat exchanger	Consult Rossi

See specific motor documentation.
NOTE
When consulting Rossi state:
– all data on gear reducer or gearmotor name plate;
– failure nature and duration;
– when and under which conditions the failure occured;
– during the warranty period, in order not to loose validity, do not disassemble nor tamper the gear reducer or gearmotor without approval by Rossi.

Index of revisions

Every decision we make at Rossi impacts the world we live in. But new technologies and renewed commitment to sustainable practices have provided us with the opportunity to make environmentally friendly printing decisions. Our catalogs are printed on Forest Stewardship Council® (FSC®) certified paper [1].
This is our tangible commitment in terms of environment sustainability.

[1] The certification means that finished wood-based products in the marketplace have been handled by companies that have also been certified and that the paper has been handled in an environmentally-friendly manner.

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UTD.187.12-2015.00_EN

DROP TEST ANNEX

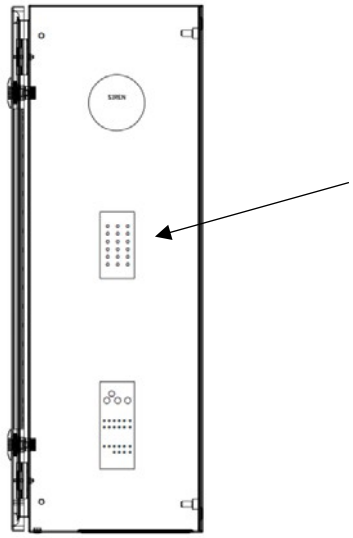
a) Load the cabin with the rated load.

b) It is necessary to go up and gown the cabin several times to increase the gearbox oil temperature. (5 minutes will be enough).

c) Stop the cabin at floor 0.

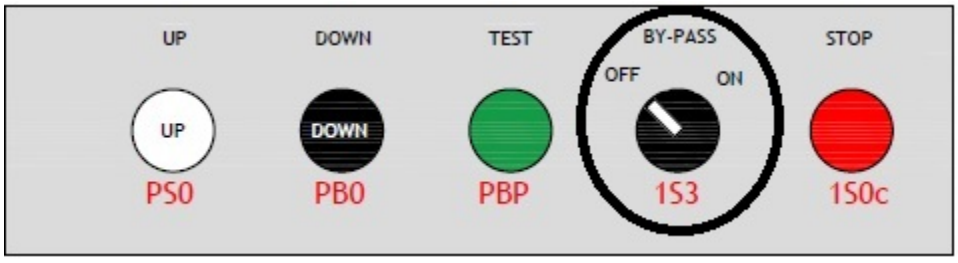
d) Connect the drop test pendant station:

HARTING female connector of the cab control panel - HARTING male connector of the drop test pendant station.

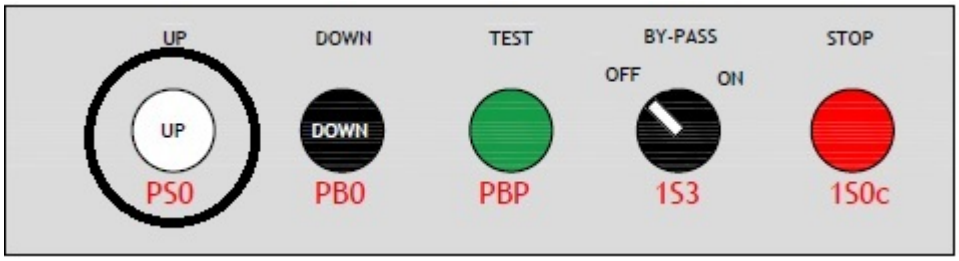


Harting female connector for drop test pushbutton (right side view).

e) The position of the selector "BY-PASS" must be set to "OFF".



f) Stand outside the cabin, press and hold the "UP" button until the cabin reaches floor 1 (or at least 3 - 4 mast sections above the base). Once it reaches floor 1, release the "UP" button.



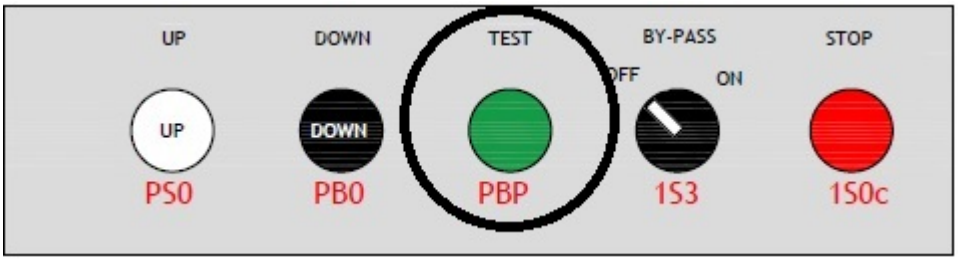
g) Ensure that everyone's position is secure.

h) Start the test. Press and hold the "TEST" button:

THE DROP TEST MUST BE DONE OUTSIDE OF THE INSTALLATION AT A SAFE DISTANCE (2 METRES AT LEAST).

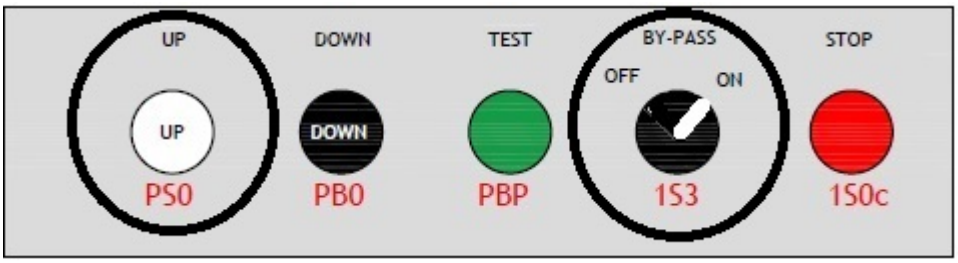
This releases the engine brakes and the transport platform will descend until it reaches the speed limit, at this moment the parachute will engage and brake the cabin.

***Note: If the parachute does not brake the fall, release the "TEST" button immediately and the cabin will brake with the engine brake.**



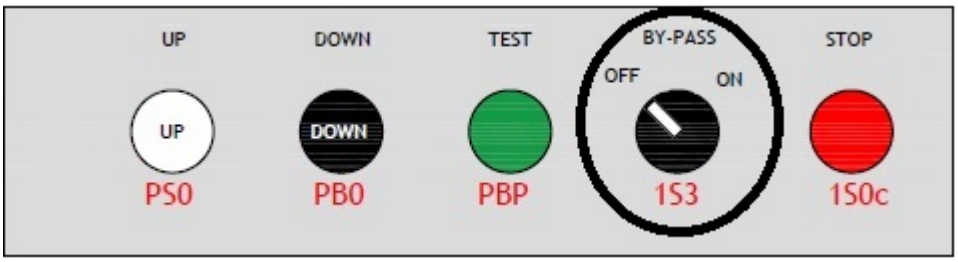
The limit switch associated to the parachute can only be released by going up the cabin. To be able to perform this rise with the limit switch actuated, the selector must be in “ON”.

I) Go up the cabin to floor 1 by pressing and holding the "UP" button, release it when the cabin reaches the floor. At this point the parachute is released.

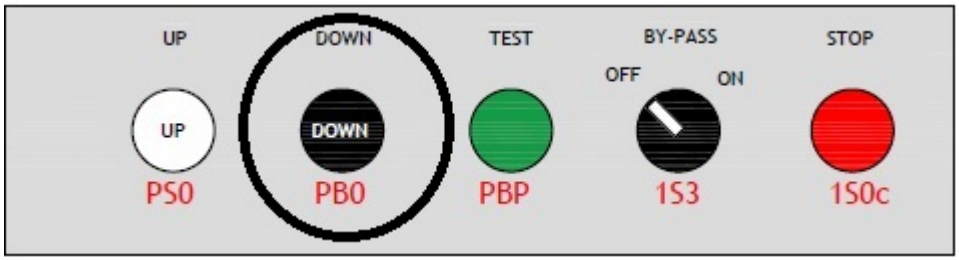


This operation of raising the cabin is possible because the "ON" selector acts as an electrical bridge of the limit switch associated with the parachute.

j) Return the selector switch to the "OFF" position (left position).



k) Go down the cabin to floor 0 by pressing and holding the "DOWN" button and release it when the cabin reaches the floor.



*Note: This operation of going down the cabin will not work with the "BY-PASS" selector in the "ON" position.

*Note: This operation of going down the cabin will not work with the "BY-PASS" selector in the "OFF" position while the parachute is actuated.

l) Disconnect the control panel to prevent misuse.

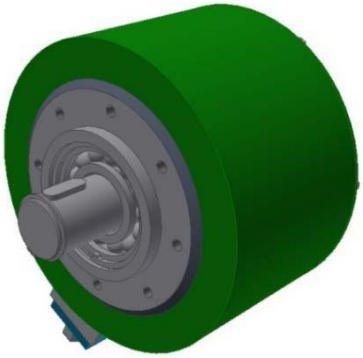
m) Check if the installation is working properly after the test.

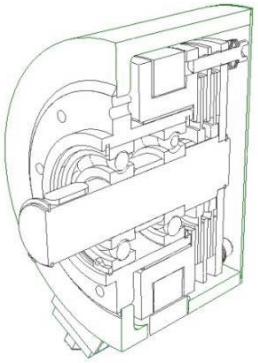
As advice, FRACO MANUFACTRING S. L. recommends to keep the drop test pushbutton out of the electrical panel and to leave it in a safe place.

After the machine have DROPED, it´s compulsory to review and adjust the Counter Rack Roller.

UNLOCK THE PARACHUTE ANNEX

If the parachute is locked, the only way to unlock the safety system is to go up the cabin.

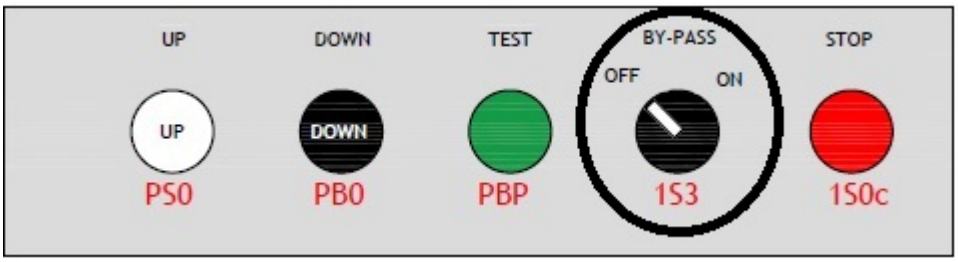




a) Connect the drop test pendant station:

   HARTING female connector of the cab control panel - HARTING male connector of the drop test pendant station.

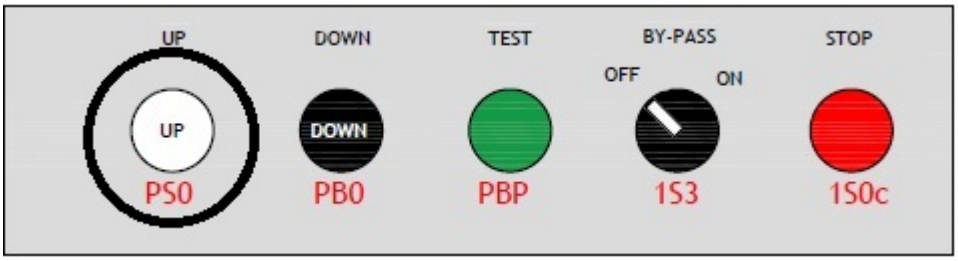
b) To be able to perform this rise with the limit switch actuated, select the "ON" position (right position) of the "BY-PASS" selector:



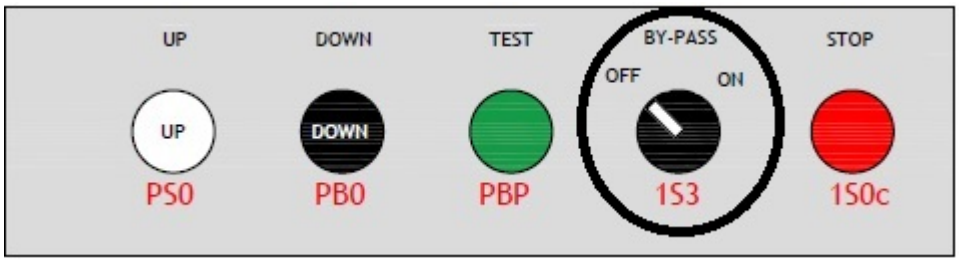
   When the parachute brakes the cabin also acts on a limit switch. This limit switch can only be released by going up the cabin.

   This operation of raising the cabin is possible because the "ON" selector acts as an electrical bridge of the limit switch associated with the parachute.

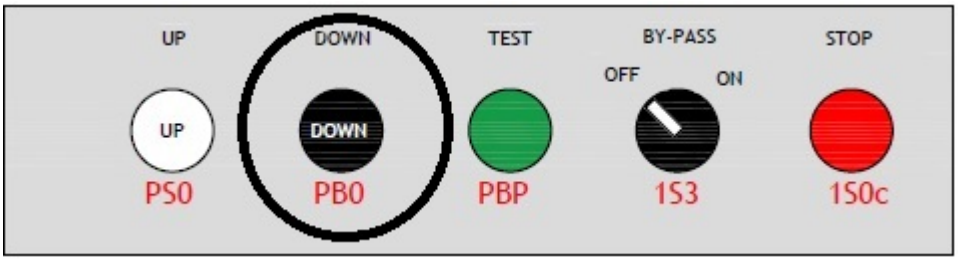
c) Go up the cabin to floor 1 by pressing and holding the "UP" button, release it when the cabin reaches the floor.



d) Return the selector switch to the "OFF" position (left position).



e) Go down the cabin to floor 0 by pressing and holding the “DOWN” button and release it when the cabin reaches the base enclosure.



*Nota: This cabin going down operation will not work with the “BY-PASS” selector in “ON” position.

*Nota: This cabin going down operation will not work with the “BY-PASS” selector in “OFF” position if the parachute is actuated.

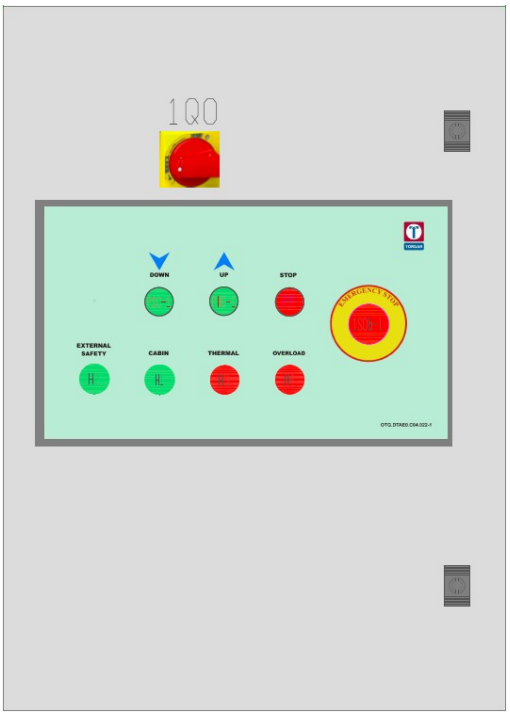
f) Disconnect the control panel to prevent misuse.

g) Check if the installation is working properly.

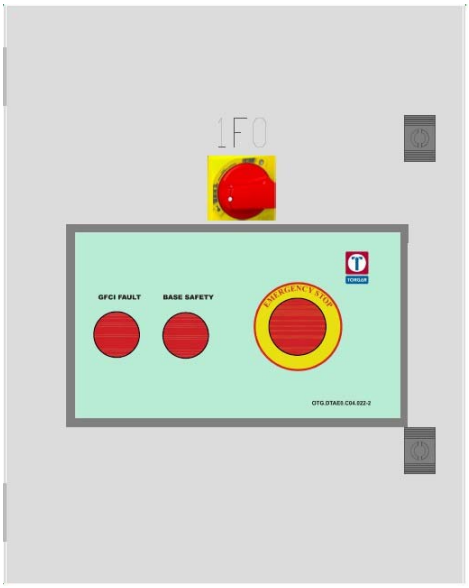
Before putting the transport platform back into operation, make a complete check of the machine and repair if necessary. Never disengage the speed limiter safety system before checking that the engine brakes are working properly.

AFTER THE OPERATION OF THE SPEED LIMITER SAFETY SYSTEM, DO NOT OPERATE THE TRANSPORT PLATFORM WITHOUT PRIOR INSPECTION, HAVING REPAIRED ALL FAULTS AND HAVING DETECTED THE CAUSES OF THE ACCIDENT.

MANEUVER



Cabin control panel



Bottom floor panel

***Note 1:** To restart the car after a stop at the plant, it is necessary to release the push button before pressing another one.

a) Go up maneuver:

- Press "UP" continuously, the cabin will start to go up.
- Whenever you want to stop the cabin on a certain floor, press "STOP" (one press will be enough) on the floor before the desired floor, this button will light and the cabin will stop on the next floor.
- Release "UP".

***Note 2:** The cabin will stop as long as "UP" is not pressed.

b) Go down maneuver:

- Press "DOWN" continuously, the cabin will start to go up.
- Whenever you want to stop the cabin on a certain floor, press "STOP" (one press will be enough) on the floor before the desired floor, this button will light and the cabin will stop on the next floor.
- Release "DOWN".

***Note 3:** The cabin will stop as long as "DOWN" is not pressed.

c) Go down to bottom floor maneuver:

- The final 3 METERS movement to the ground can only be completed after STOP and continuously pressing "DOWN". The car will start lowering after 3 seconds with this button pressed.

***Note 5:** The siren will sound as long as the machine is in final 3m, and is going down.

THREE SECONDS – THREE METERS

MAKE SURE THAT NO ONE IS UNDER THE VERTICAL OF THE CABIN.

***Examble of operation (up):**

1. The cabin is on the base and you want to go to floor 2.
2. Press and hold “UP”.
3. After passing floor 1, press “STOP”.
4. The cabin will stop at floor 2.
5. Release “UP”.

***Example of operation (down):**

1. The cabin is on the floor 6 and you want to go to floor 3.
2. Press and hold “DOWN”.
3. After passing floor 4, press “STOP”.
4. The cabin will stop at floor 3.
5. Release “DOWN”.

*** Example of special operation to descend to the bottom floor (3 meter stop):**

1. The cabin is on floor X and you want to descend to the base enclosure.
2. Press and hold “DOWN”.
3. 3 metres before reaching the base, the cabin will automatically stop.
4. Release “DOWN”.
5. Wait 3 seconds, and then press and hold “DOWN”.
6. The cabin will finish the movement to the base. The cabin siren will sound as long as the cabin go down.
7. Release “DOWN” when the cabin stops.

LED LIGHTING

- **GFCY FAULT:** Red Light. When there is a electric fault in Floor 0 Panel.

- **BASE SAFETY: Green Light.** When Emergency Stop is not Pushed and any optional door of the closing are closed.

- **EXTERNAL SAFETY:** Green Light. When there is no Fault in Floor 0.

- **CABIN SAFETY: Green Light.** When all door of the cab are closed and if there is not a safety fault in the cabin.

- **THERMAL:** Red Light. When a thermal relay has been tripped.

- **OVERLOAD**: Red Light. When the cabin is overloaded with more weight than it is designed for.

OPENING DOORS WITH SAFETY SWITCH

***Note 1:** **If one of the safety switches is manually unlocked with a key, the cab will not move until the working position of this switch is restored.**

Permission to open the doors is given with the cabin stationary as long as no movement buttons are being pressed. In addition to the previous requirements, the doors will be opened:

a) **Floor doors:** When the cabin is located on that floor. (Optional).

b) **Base enclosure doors:** When the cabin is located in the base enclosure . (Optional).

c) **Cabin doors:**

- **Lateral Cabin B door:** When the cab is on the bottom floor.

- **Central Cabin C door:** When the cab is on the bottom floor.

- **Ramp Cabin A door:** When the car is on any floor except ground floor. To allow the unloading door to be opened on ground zero, it is necessary to make a bridge between terminals 20 and 43 of the panel located in the cabin.

Customer:	FRACO MANUFACTURING, S.L.
Final user:	
Project:	LIFT (PL15 UL)
Project number:	.
Equipment of control:	
Location	CANADA

Langua

Date:	17/01/2023
Documentation:	ELECTRICAL DIAGRAMS (ELECTROMECHANIC CLOSING DOOR AND GREASE PUMP OPTION) (OPTIONAL ELECTROMECHANIC CLOSING DOOR AND GREASE PUMP)

Nº of pages: .

FRACO MANUFACTURING, S.L.
Telf: +34 976 57 17 37 Calle Isidoro de Antillon 13, 50014, Zaragoza www.torgar.com

ELECTRICAL DATA

- Nominal Power: 8kW. In case supply with Electric Generator must be 50kVA
- Voltage/frecuency: 480V/60Hz.
- Cable 4G10.
- Tensión de control: 24VAC.

Escala			Fecha dibujado	02/08/2021	Denominacion ELECTRICAL DATA	Numero de obra: V9021-0016	
			Dibujado			Cliente:	
			Fecha Comprobado			Usuario final: CANADA	siguiente:
	Fecha mod.	Firma	Comprobado		TORGAR FRACO MANUFACTURING, S. L.	Ubicacion planta:	Hoja:

PROTECTIONS

- It is necessary to connect the machine to a protective electrical panel with a 40A 3P C-curve circuit breaker. The swittching OFF capacity is subject to the characteristics of the installation.

- Differential breaker 1F00 is supplied in the power panel. In any case, the upstream installation must be adequately protected against indirect contacts.

- For a TT system the sum of the resistors of the ground electrode and the protective conductor (for each exposed conductive part) must in any case be < 30 Ω.

- Consult in case of using a TN or IT system.

- Once the machine is assembled, it is necessary to verify the continuity of the equipotential protection circuit according to the EN 60204-1 standard.

- Metallic structure of the machine must be connected to Electric Ground

Escala			Fecha dibujado	02/08/2021	Denominacion PROTECTIONS	Numero de obra: V9021-0016	
			Dibujado			Cliente:	
			Fecha Comprobado			Usuario final: CANADA	siguiente:
	Fecha mod.	Firma	Comprobado		FRACO MANUFACTURING, S.L.	Ubicacion planta:	Hoja:

TORGAR DESIGNATION SYSTEM:

F: Breaker
FC: Limit Switch
H: Signaling Horn, Lights
KA: Auxiliar Relay
KF: Security Relay
KT: Temporizator Relay
R: Auxiliar Relay for Limit Switch
E: Security Lock
Q: Motor Breaker
KM: Contactor
S: Button push
N: Other
X: Terminal
GB: Power Supply
C: Transformator
M: Motor

CX/Y-Z: Conector

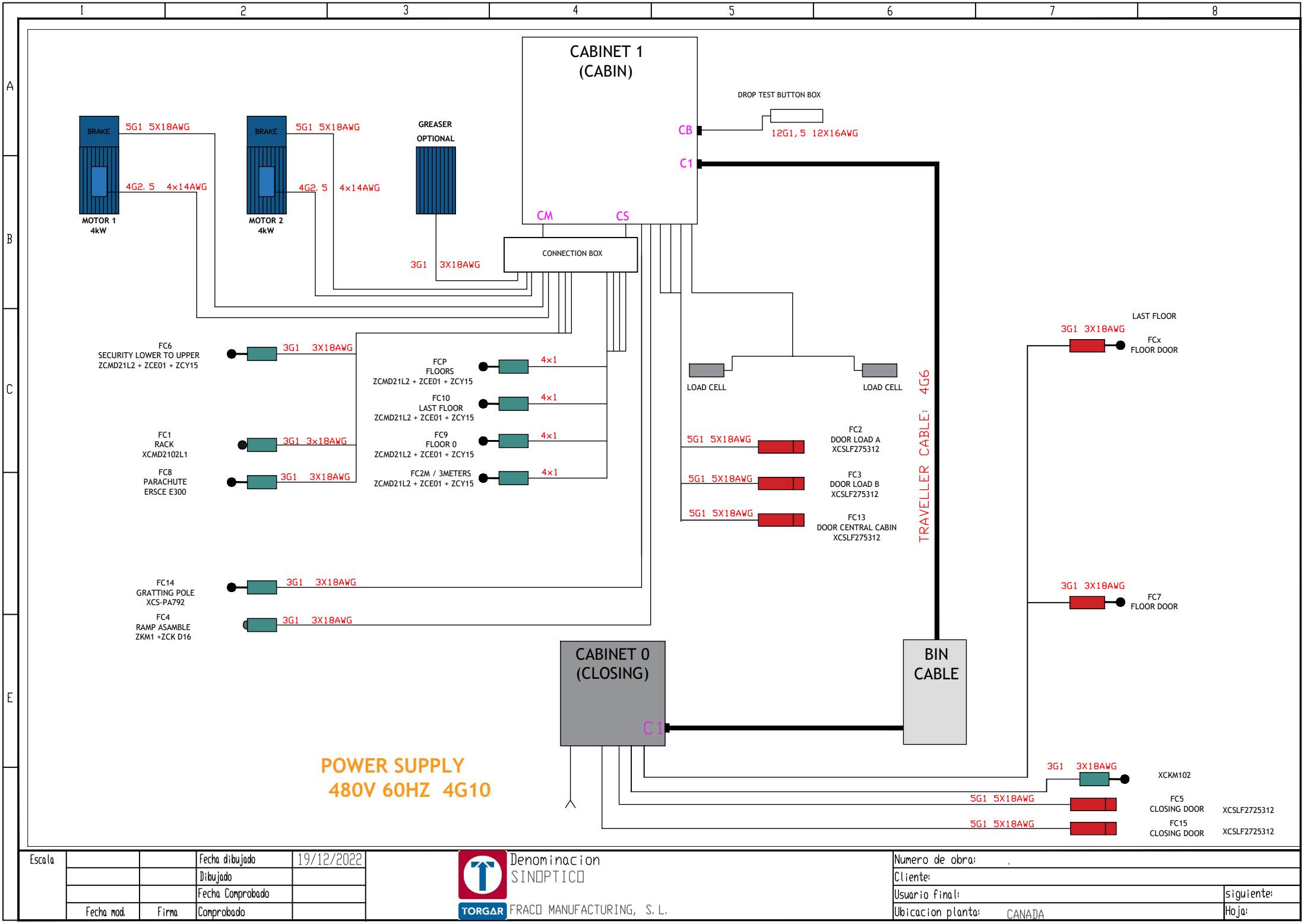
- X: Connector Number
- Y: Connector Letter
- Z: Connector PIN Number

Bridge int the inner side of the terminals

Bridge int the outter side of the terminals

The cable number does not change in terminals, except in those expressly indicated in the diagram.

Escala			Fecha dibujado	02/08/2021	Denominacion	Numero de obra:	V902-0016
			Dibujado		ELECTRICAL DESIGNATION	Cliente:	
			Fecha Comprobado			Usuario final:	siguiente:
	Fecha mod.	Firma	Comprobado		FRACO MANUFACTURING, S.L.	Ubicacion planta: CANADA	Hoja:



Escala			Fecha dibujado	19/12/2022
			Dibujado	
			Fecha Comprobado	
	Fecha mod.	Firma	Comprobado	

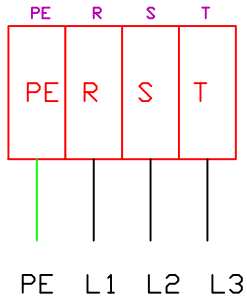
Denominacion
SINOPTICO

TORGAR FRACO MANUFACTURING, S. L.

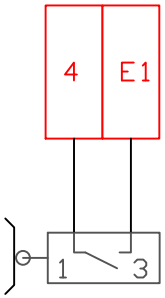
Numero de obra:	
Cliente:	
Usuario final:	siguiente:
Ubicacion planta: CANADA	Hoja:

IN CASE THAT NOT INSTALL ANY DOOR,TERMINALS 1 - 3MUST BE JUMPERED
IN CASE THAT INSTALL MORE THAN 2 DOORS IN THE CLOSING, LIMIT SWITCH DOORS MUST BE CONNECTED IN SERIAL
IN CASE THAT INSTALL MORE THAN 2 DOORS IN THE FLOORS, LIMIT SWITCH DOORS MUST BE CONNECTED IN SERIAL

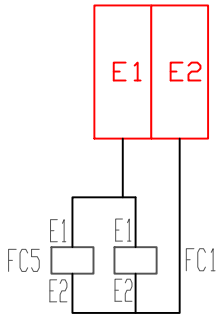
CAPO

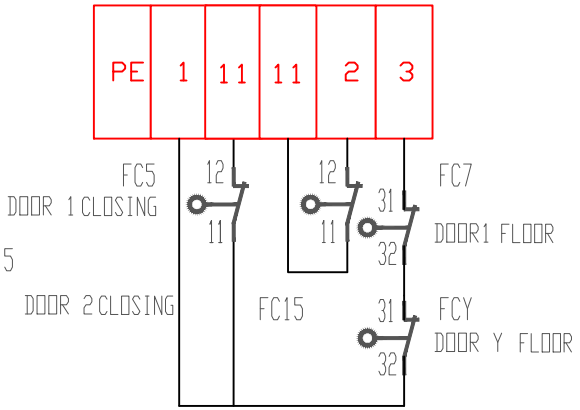


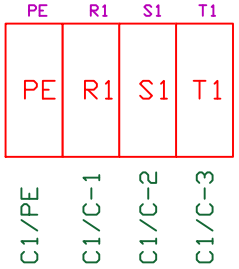
480V / 60HZ
POWER SUPPLY
10mm2



LIMIT SWITCH
FLOOR 0







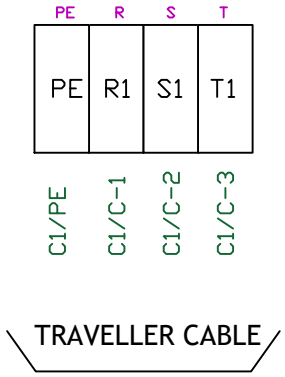
TRAVELLER CABLE

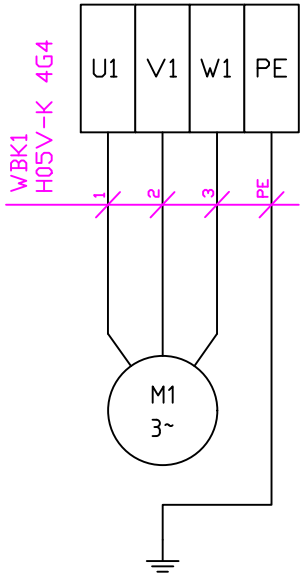
CLOSING

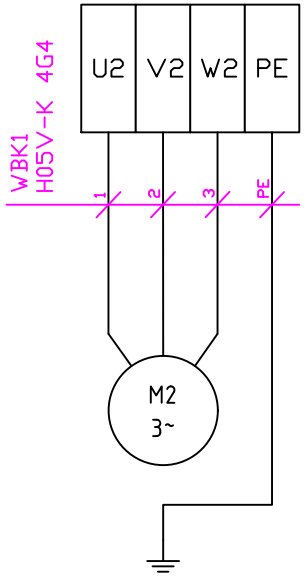
FLOORS

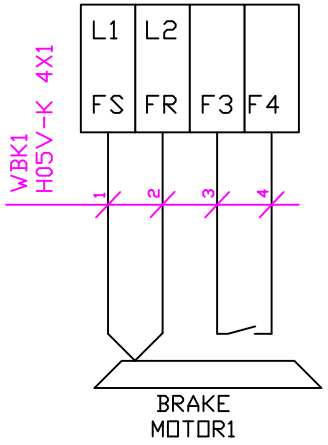
CONNECTED BY THE INSTALLER

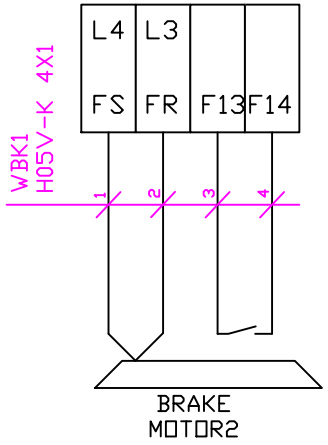
Escala			Fecha dibujado	19/12/2022	Denominacion	Numero de obra:	
			Dibujado		CONECTIONS CABINET CO INSIDE	Cliente:	
			Fecha Comprobado			Usuario final:	siguiente:
	Fecha mod.	Firma	Comprobado		TORGAR FRACO MANUFACTURING, S. L.	Ubicacion planta: CANADA	Hoja:

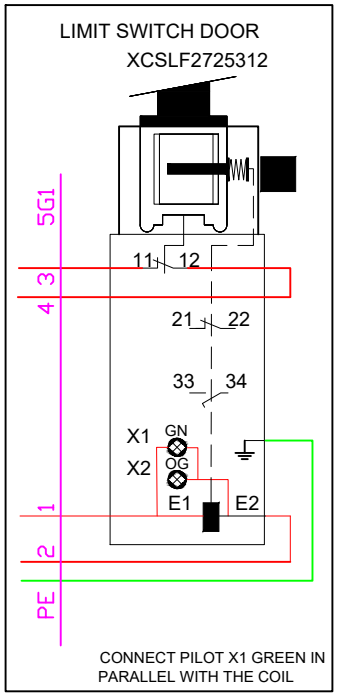












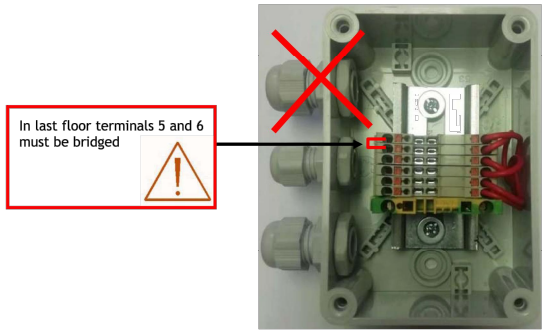
CCM2

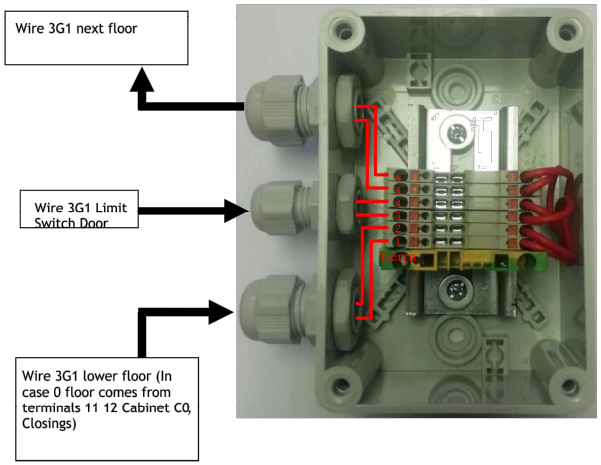
BRIDGE

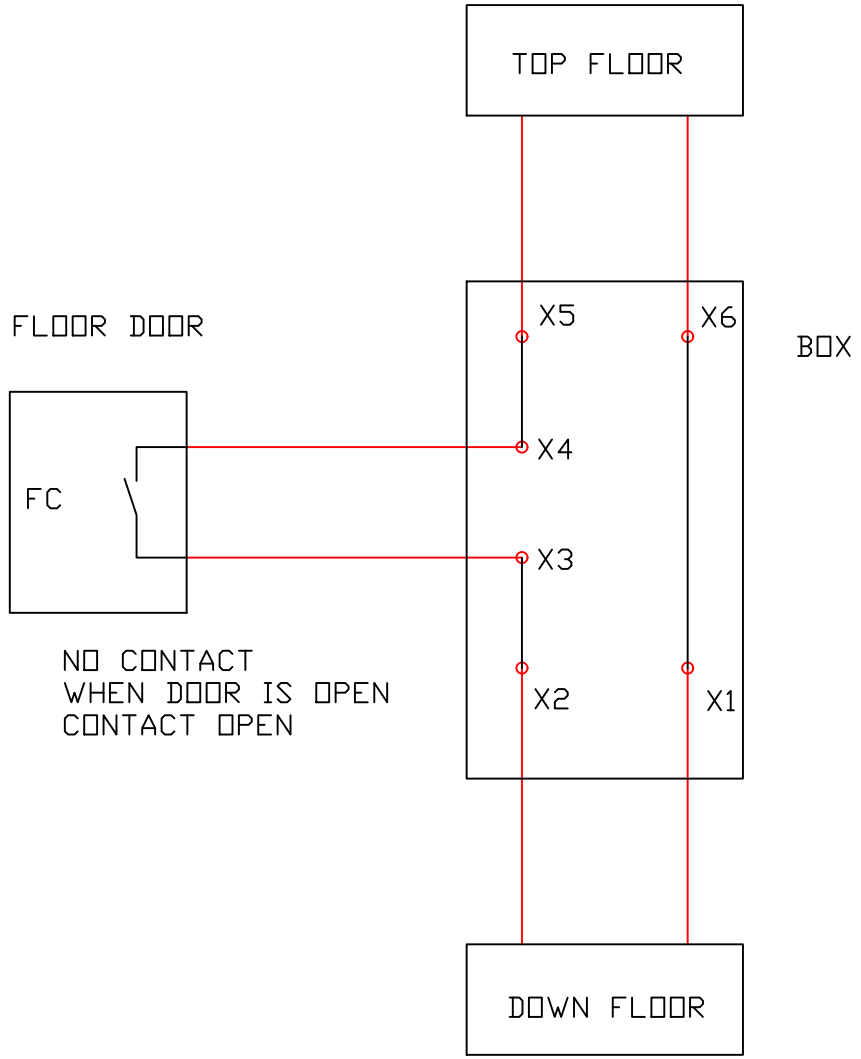
20	23	23	24	43	45	24	25	46	45	25	26	26	27	27	28	30	32	32	47	46	45	35	36	42	43	37	38	42	43	39	41	42	46	49	50	21	31	20	22	20	21	33	34
FC1 RACK 11	FC1 RACK 12	FC2 UNLOAD DOOR 31	FC2 UNLOAD DOOR 32	FC2 UNLOAD DOOR A1	FC2 UNLOAD DOOR A2	FC3 LOAD DOOR 31	FC3 LOAD DOOR 32	FC3 LOAD DOOR A1	FC3 LOAD DOOR A2	FC4 RAMP ASSEMBL 31	FC4 RAMP ASSEMBL 32	FC8 PARACHUTE 12	FC8 PARACHUTE 11	FC6 LOWER/UPPER 12	FC6 LOWER UPPER 11	FC14 GRATING POLE 11	FC14 GRATING POLE 12	FC13 DOOR CENT CABIN 11	FC13 DOOR CENT CABIN 12	FC13 DOOR CENT CABIN A1	FC13 DOOR CENT CABIN A2	FCP FLOORS 11	FCP FLOORS 12	FCP FLOORS 13	FCP FLOORS 14	FC10 LAST FLOOR 11	FC10 LAST FLOOR 12	FC10 LAST FLOOR 13	FC10 LAST FLOOR 14	FC9 FLOOR 0 11	FC9 FLOOR 0 12	FC9 FLOOR 0 13	FC9 FLOOR 0 14	FC2M 1	FC2M 2	SIREN	SIREN	1N2 OVERWEIGHT 1	1N2 OVERWEIGHT 3	1N2 OVERWEIGHT POWER	1N2 OVERWEIGHT POWER	1N2 OVERWEIGHT 4	1N2 OVERWEIGHT 6

Escala			Fecha dibujado	17/01/2023	Denominacion	Numero de obra:	V9021-0016
			Dibujado		CONNECTIONS CABINET C1	Cliente:	
			Fecha Comprobado			Usuario final:	siguiente:
	Fecha mod.	Firma	Comprobado		FRACO MANUFACTURING, S.L.	Ubicacion planta: CANADA	Hoja:

ONLY IN FLOORS DOOR WITH MECHANIC BLOCKAGE AND ELECTRIC LIMIT SWITCH



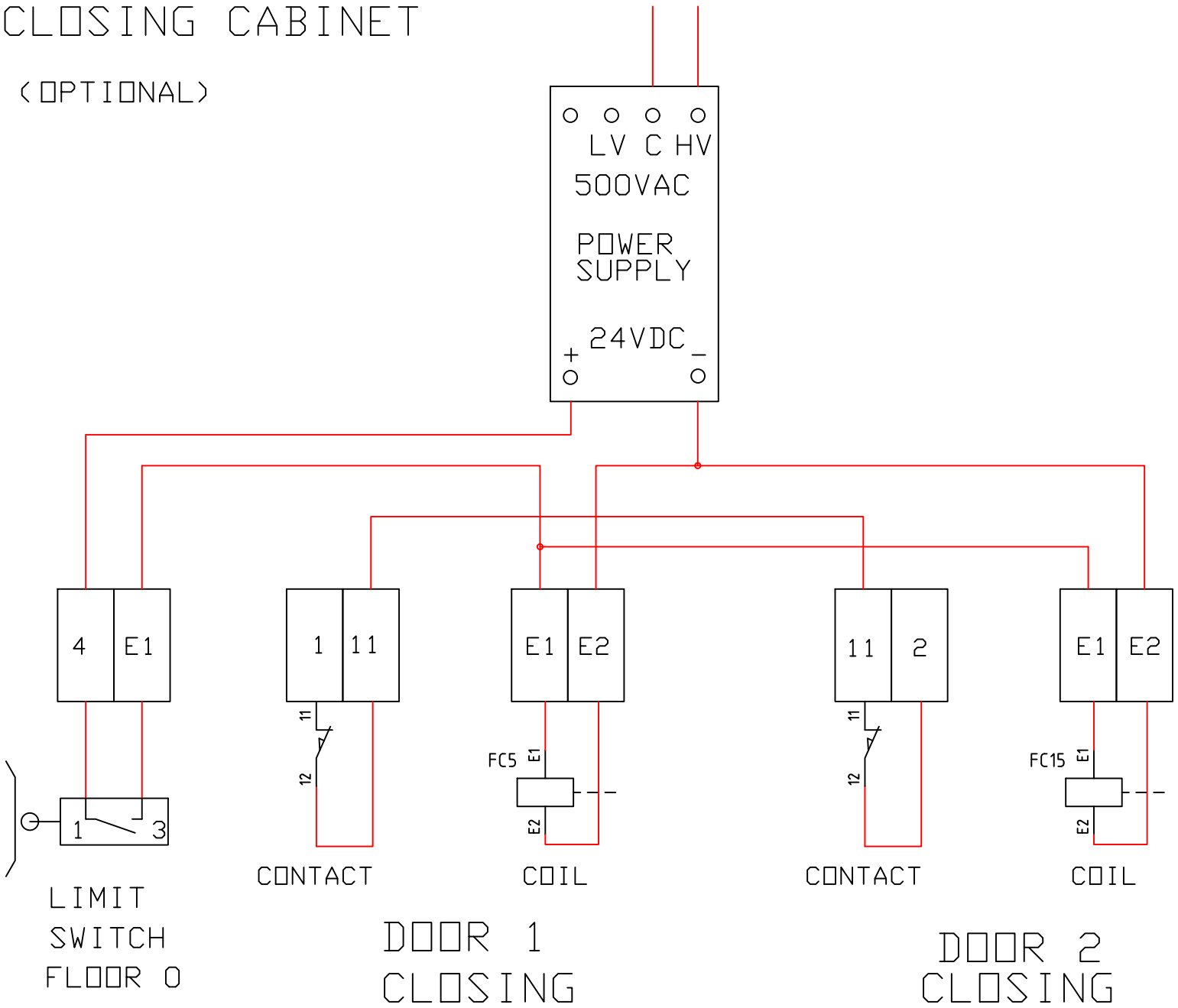


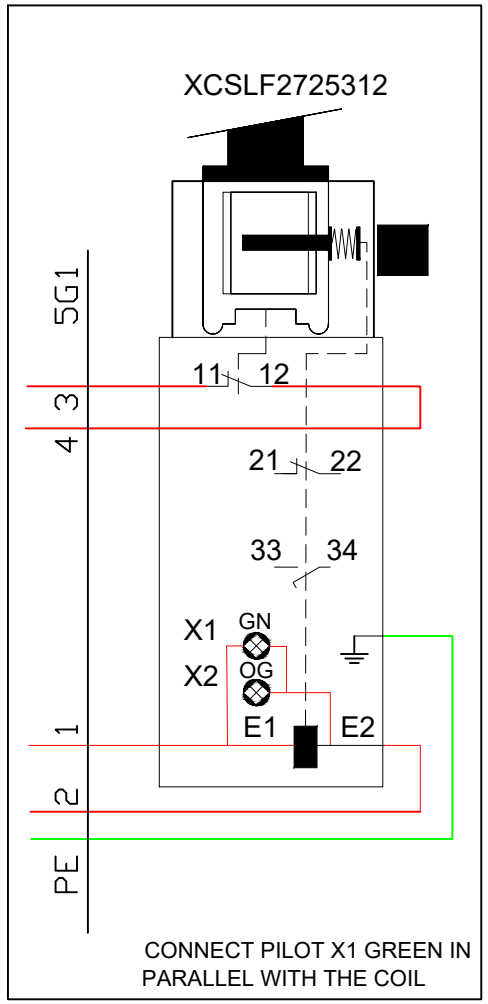


Escala			Fecha dibujado	10/01/2022	Denominacion	Numero de obra:	V9021-0019
			Dibujado		CONNECTION BOX IN FLOORS (OPTIONAL)	Cliente:	
			Fecha Comprobado			Usuario final:	siguiente:
	Fecha mod.	Firma	Comprobado		FRACO MANUFACTURING, S.L.	Ubicacion planta: CANADA	Hoja: 40

CLOSING CABINET

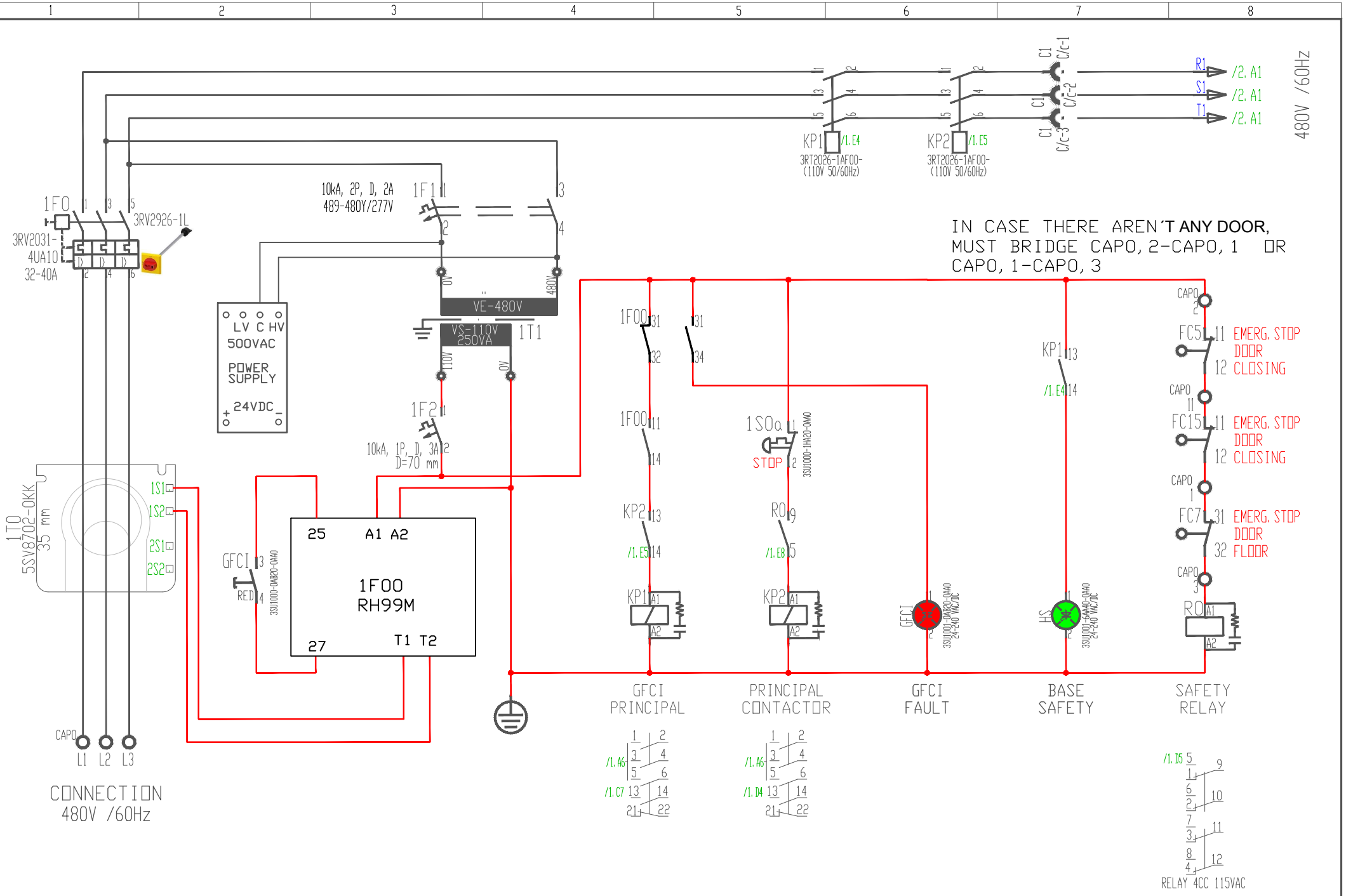
(OPTIONAL)



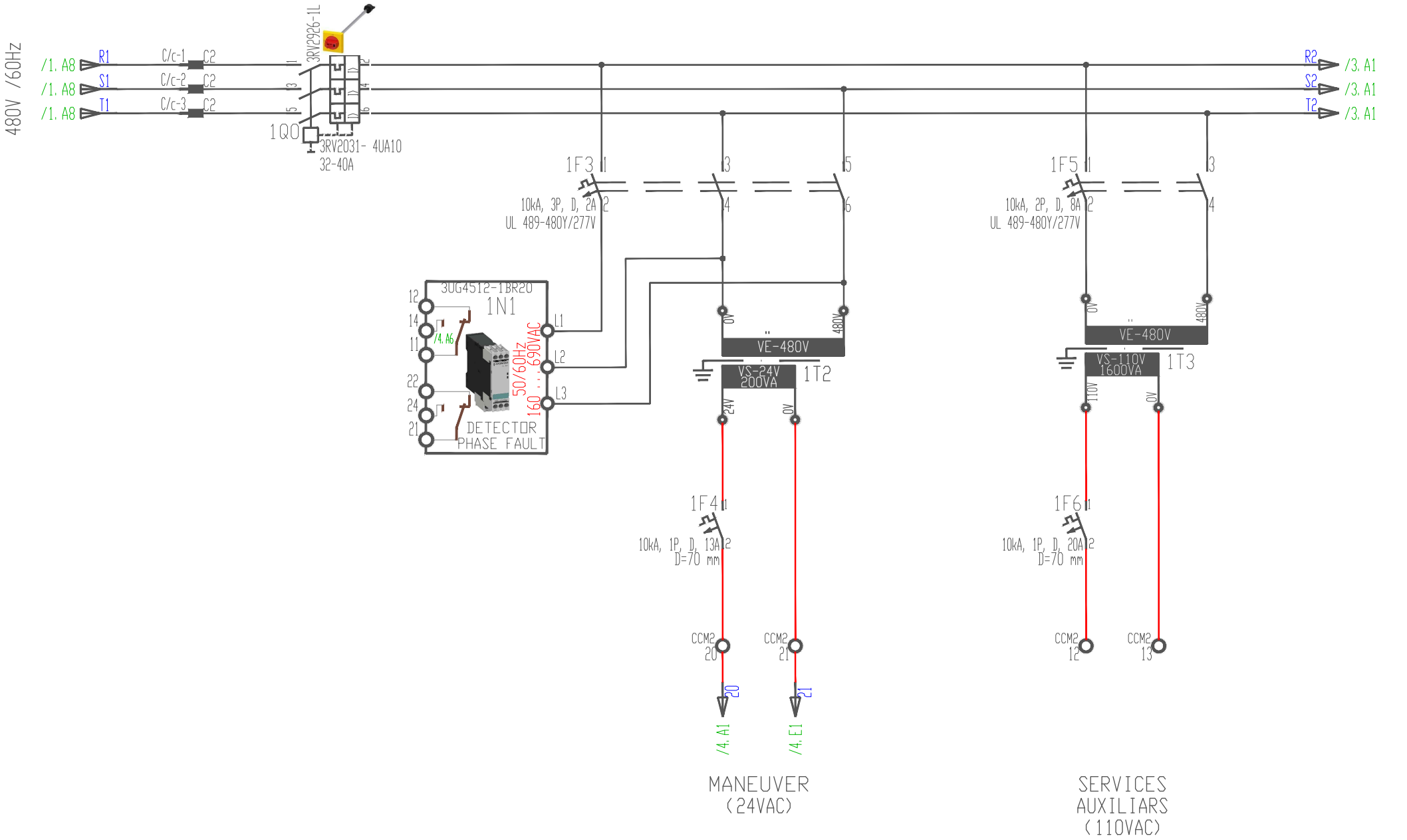


Escala			Fecha dibujado	17/01/2023	Denominacion: DOOR CLOSING WITH ELECTROMECHANIC LOCK (PL-15UL)	Numero de obra:	
			Dibujado			Cliente:	
			Fecha Comprobado			Usuario final:	siguiente:
	Fecha mod.	Firma	Comprobado			Ubicacion planta:	Hoja:

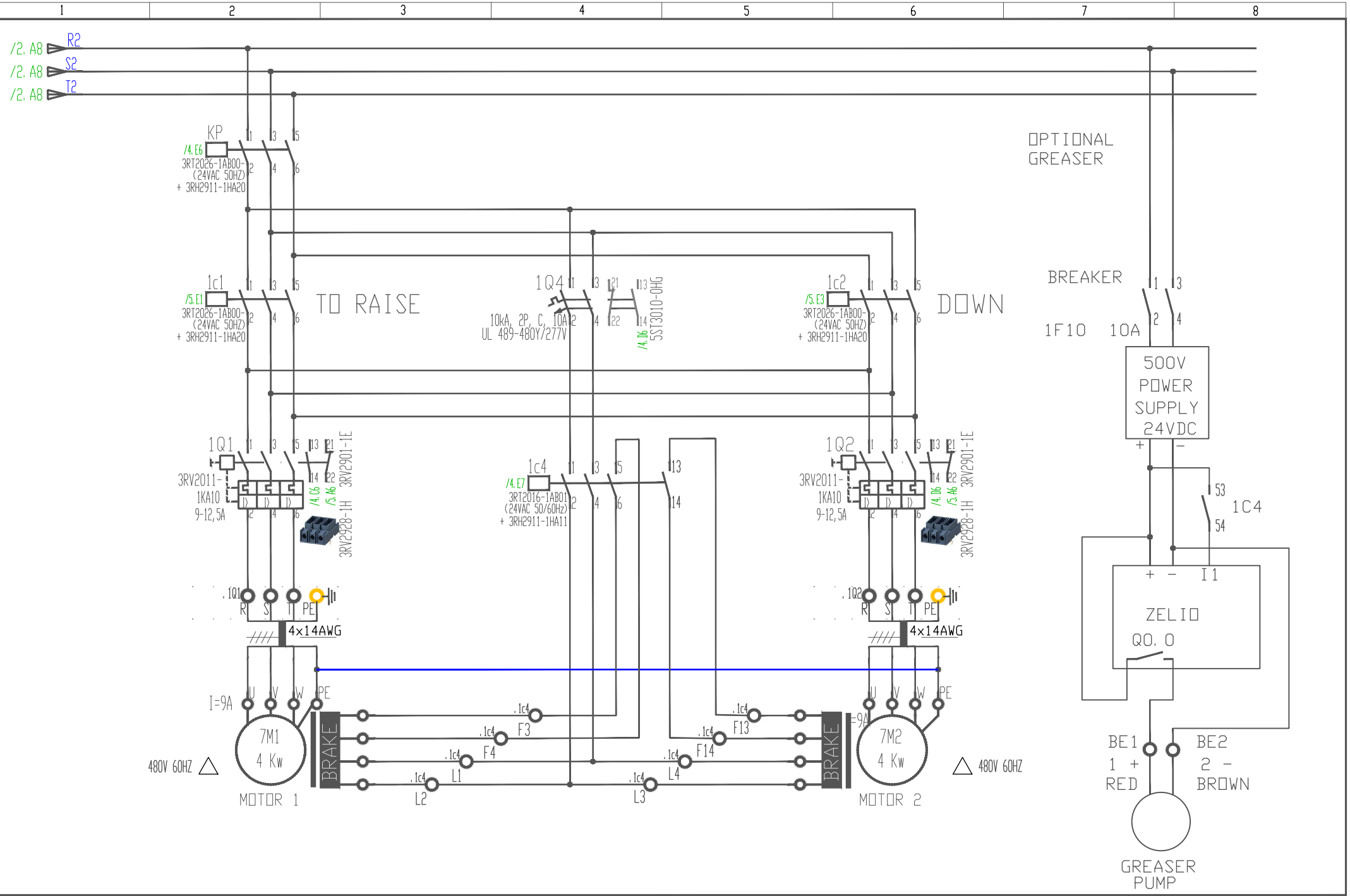
TORGAR



Scale			Drawn date	19/12/2022	Denomination	Order number:	V9021-0019
			Drawn	R. G. P. / 14	LIFT (PL15 UL)	Customer:	FRACO MANUFACTURING, S. L.
			Verified date	05/01/2022	SUPPLY TABLE (FLOOR 0)	Final user:	next: 2
	Date modif.	Signature	Verified		ENCLOSURE CO	Location: CANADA	Page: 1



Scale			Drawn date	05/08/2022	TORGAR	Denomination	Order number: .
			Drawn	R. G. P. / 14		LIFT (PL15 UL)	Customer: FRACO MANUFACTURING, S. L.
			Verified date	05/01/2022		SUPPLY	Final user: next: 3
	Date modif.	Signature	Verified			ENCLOSURE C1	Location: CANADA Page: 2



Scale			Drawn date	01/12/2022	TORGAR	Denomination	Order number:	.
			Drawn	R. G. P. / 14		LIFT (PL15 UL)	Customer:	FRACO MANUFACTURING, S. L.
			Verified date	01/12/2022		MOTORS POWER	Final user:	next: 4
	Date modif.	Signature	Verified			ENCLOSURE C1	Location: CANADA	Page: 3

CONECTOR C3,C-4 AND C3,C-5 MUST BE BRIDGED IN CASE NOT USE DROP TEST BUTTON BOX

RED AWG16 (1,3) - 24VAC

RED AWG16 (1,3) - 0VAC

/2. E5 20 — /5. A1 20

/2. E5 21 — /5. E1 21

FC1 11 RACK 12

FC2 31 DOOR 32 UNLOAD

FC3 31 32 DOOR LOAD

FC4 31 RAMPO FROM 32 ASSEMBLAGE

SELECTOR TEST DROP 1S3-1 (3, 4)

C3 A-3 / A-4 C3

FC6 11 E. STOP SAF. LOWER/ 12 UPPER

FC8 11 EMERG. STOP PARACHUTE 12

FC14 11 GRATING 12 POLE

FC13 11 DOOR 12 CENTRAL CABIN

CCM2 20, 23, 24, 24, 25, 25, 28, 27, 27, 26, 26, 30, 32, 32, 47

R2 10 /4. E5 6

KP 53 /4. F6 54

CCM2 33, 34

R2 9 /4. E5 5

AL-S 4, 6 /5. C8

OVERWEIGHT

R1 A1 A2

R2 A1 A2

TEST DROP 1SOc (1, 2) C3,C-4 C3,C-5

STOP

FASE FAULT 1N1 /2. C3 (11, 14)

R1 9 /4. E4 5

1SOb-1 (1, 2) 3SU1000-1HA20-0AA0

STOP

1Q1 13, 14 /3. D3

1Q2 13, 14 /3. D6

1Q4 13, 14 /3. C5

KP A1 A2

PBO-2 3, 4

TEST DROP

C3 A-2

3/PBO-2

1c2 53 /5. F3 54

1c1 53 /5. F1 54

1c4 A1 A2

R5 10 /6. E4 6

CCM2 31, 21

B

CABIN SAFETY

/4. B6 5, 9, 1, 6, 10, 2, 7, 11, 3, 8, 12, 4

RELAY 4CC 24VAC

WEIGHT LOCK

5, 9, 1, /4. B5 6, 10, 2, 7, 11, 3, 8, 12, 4

RELAY 4CC 24VAC

PRINCIPAL

1, 2, 3, 4, /3. A2, 5, 6, /5. A1 13, 14, 21, 22, /4. B5 53, 54, /5. C5 63, 64

BRAKE

1, 2, 3, 4, /3. D4, 5, 6, /3. D5 13, 14, /6. A5 61, 62, 53, 54

SIREN

SCHNEIDER XVBC9B+XVBC21

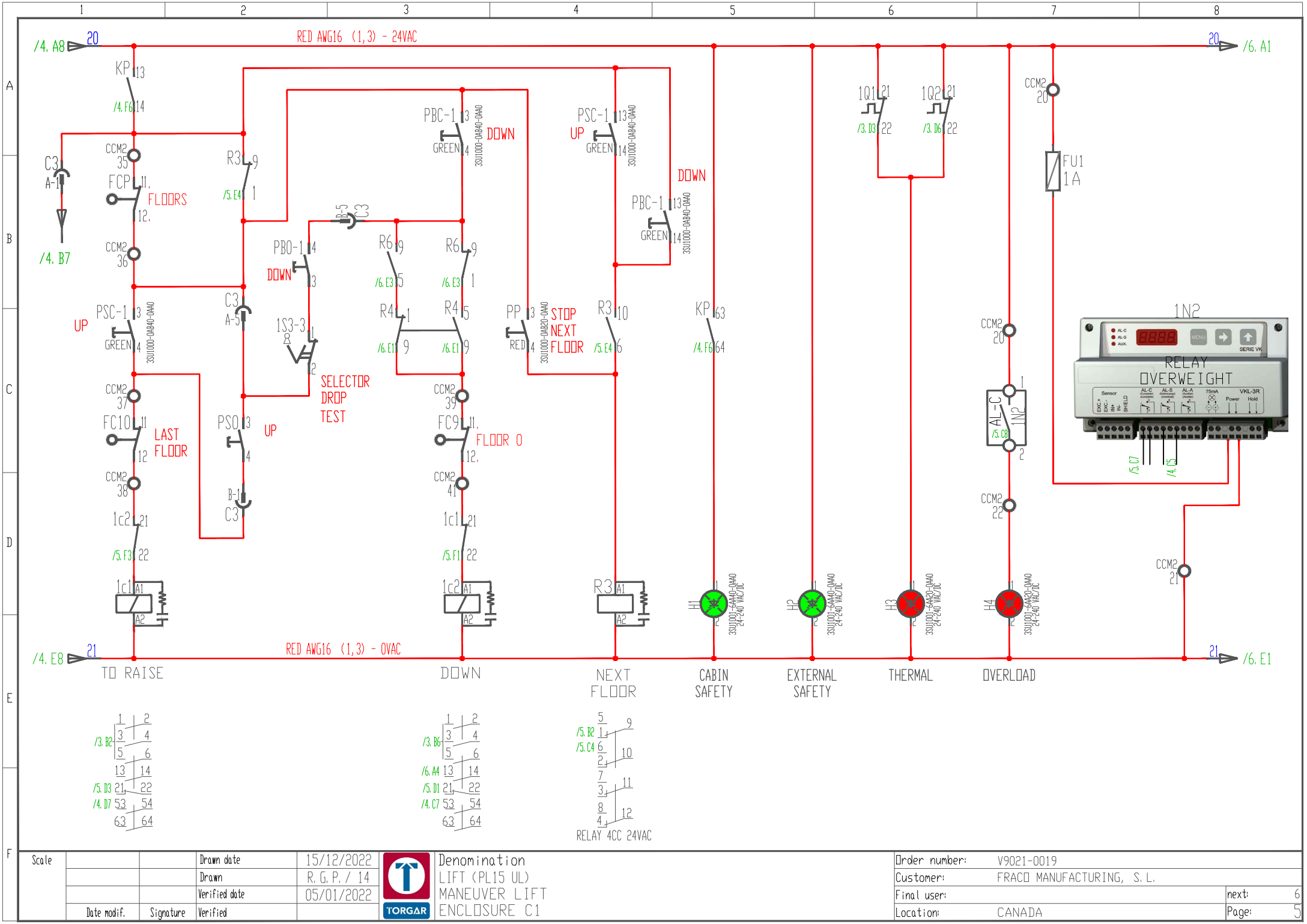
MICROSWITCH SIREN

1-2 OFF

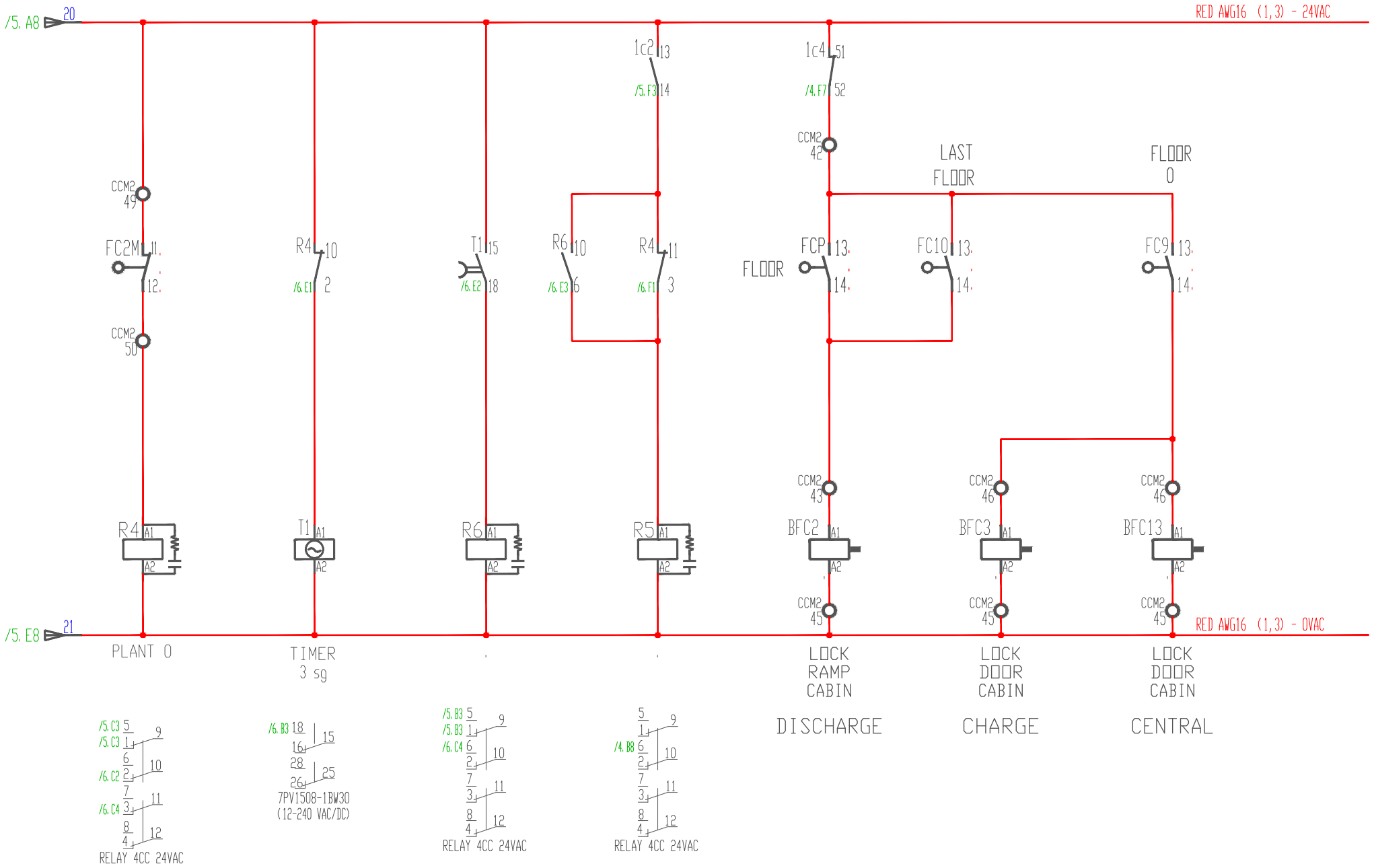
3-4 ON

Scale			Drawn date	12/12/2022	Denomination	Order number:	.
			Drawn	R. G. P. / 14	LIFT (PL15 UL)	Customer:	FRACO MANUFACTURING, S. L.
			Verified date	30/08/2022	MANEUVER LIFT	Final user:	next: 5
	Date modif.	Signature	Verified		ENCLOSURE C1	Location: CANADA	Page: 4

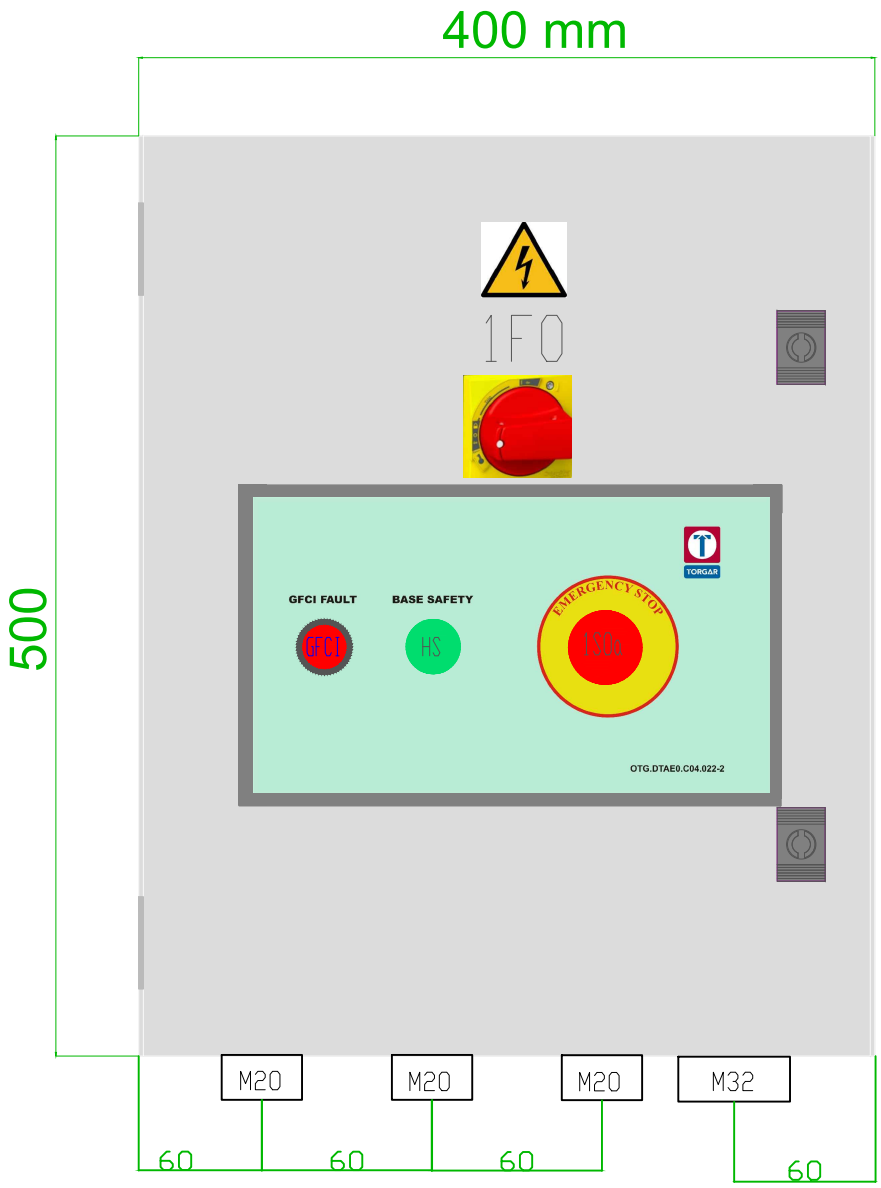
TORGAR

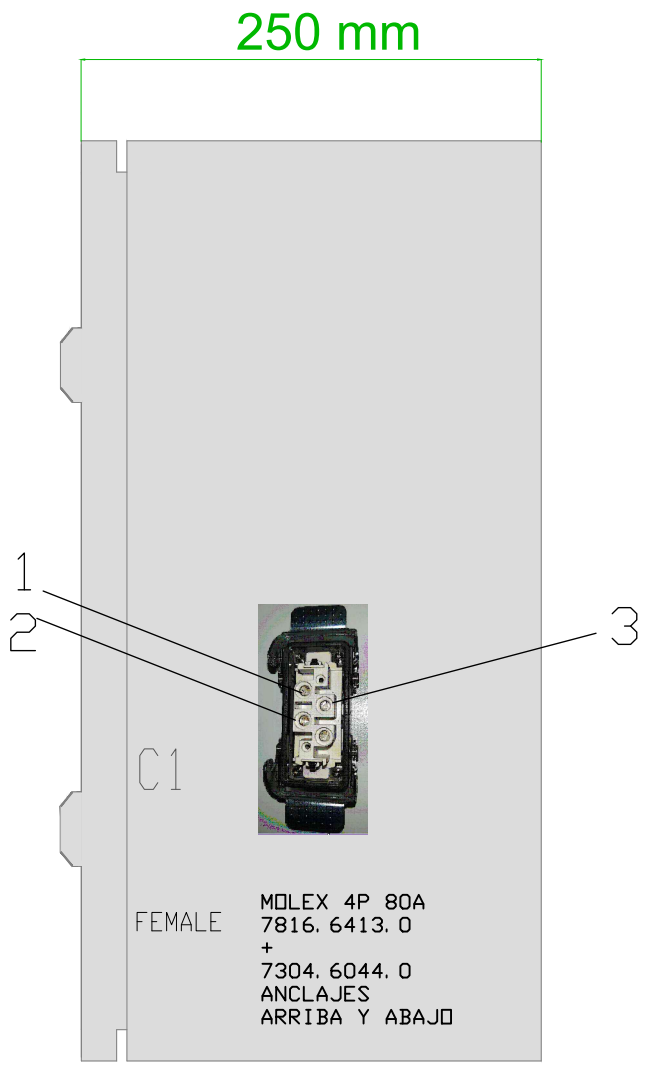


Scale			Drawn date	15/12/2022	TORGAR	Denomination	Order number: V9021-0019
			Drawn	R. G. P. / 14		LIFT (PL15 UL)	Customer: FRACO MANUFACTURING, S. L.
			Verified date	05/01/2022		MANEUVER LIFT	Final user: next: 6
	Date modif.	Signature	Verified			ENCLOSURE C1	Location: CANADA Page: 5

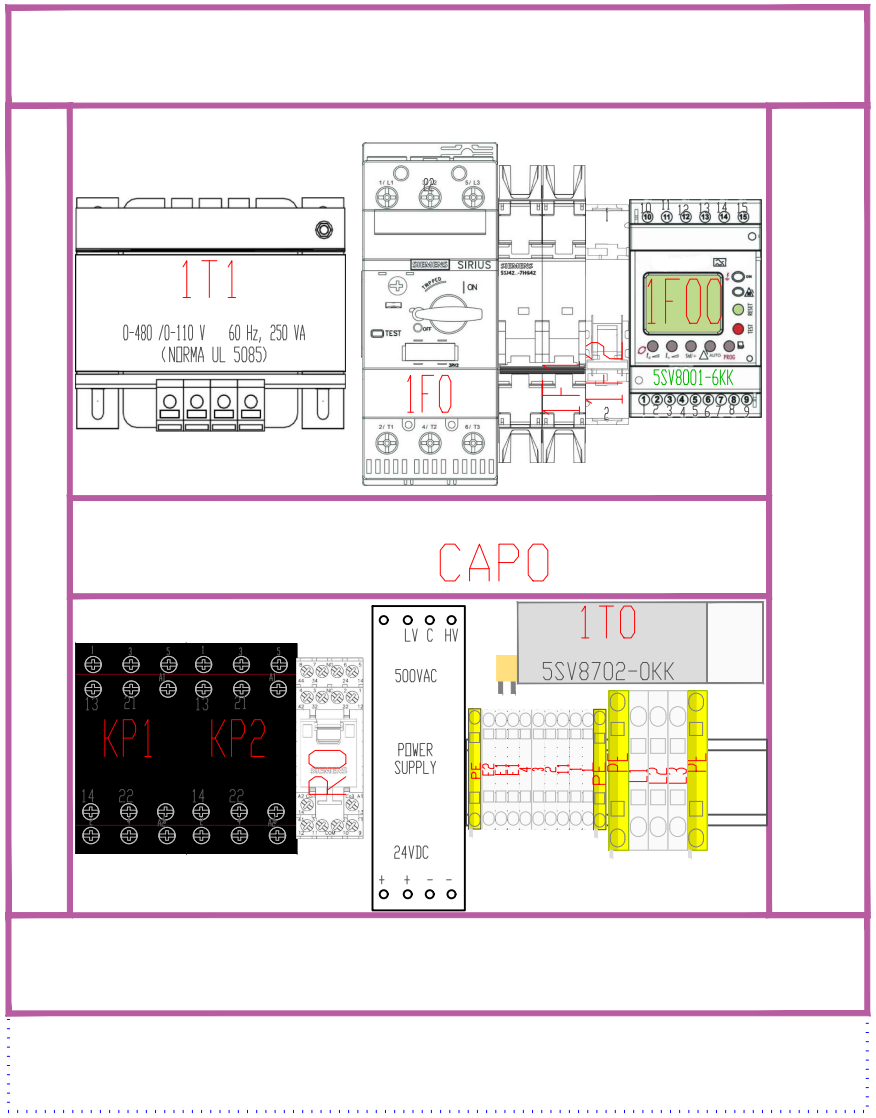


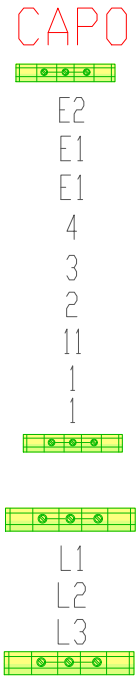
Scale			Drawn date	05/01/2022	TORGAR	Denomination	Order number: V9021-0019
			Drawn	R. G. P. / 14		LIFT (PL15 UL)	Customer: FRACO MANUFACTURING, S. L.
			Verified date	05/01/2022		MANEUVER	Final user: next: 7
	Date modif.	Signature	Verified			ENCLOSURE C1	Location: CANADA Page: 6





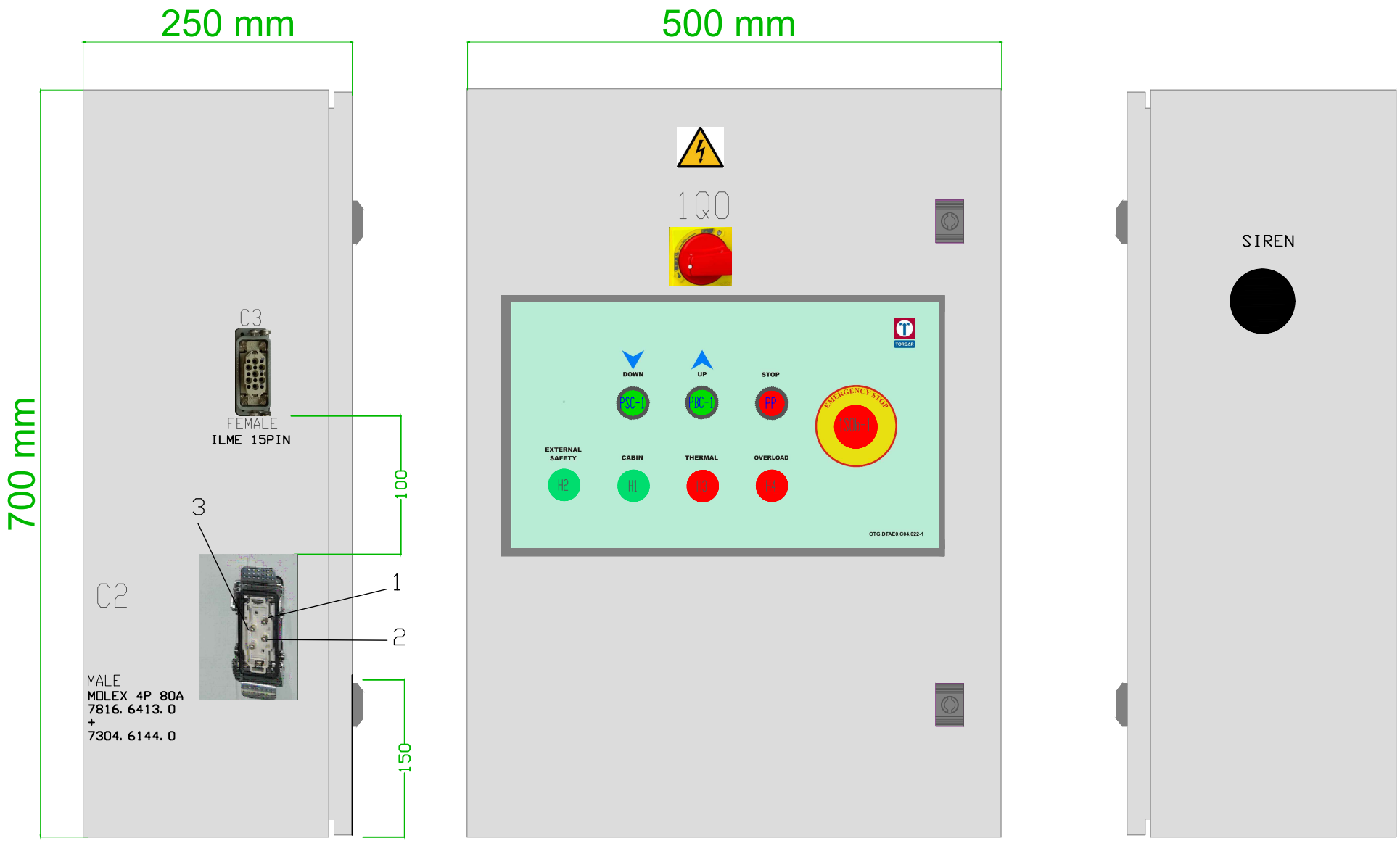
Scale			Drawn date	05/01/2022	Denomination	Order number:	.
			Drawn	R.G.P. / 14	LIFT (PL15 UL)	Customer:	FRACO MANUFACTURING, S.L.
			Verified date	29/09/2022	OUTER VIEW EXPLOTING--PLANT 0	Final user:	next: 8
	Date modif.	Signature	Verified		(CUPBOARD 500x400x250) ENCLOSURE CO	Location: CANADA	Page: 7



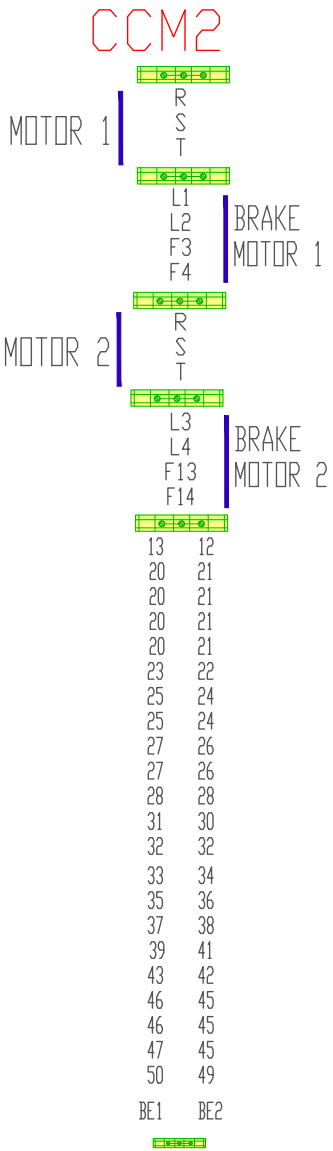


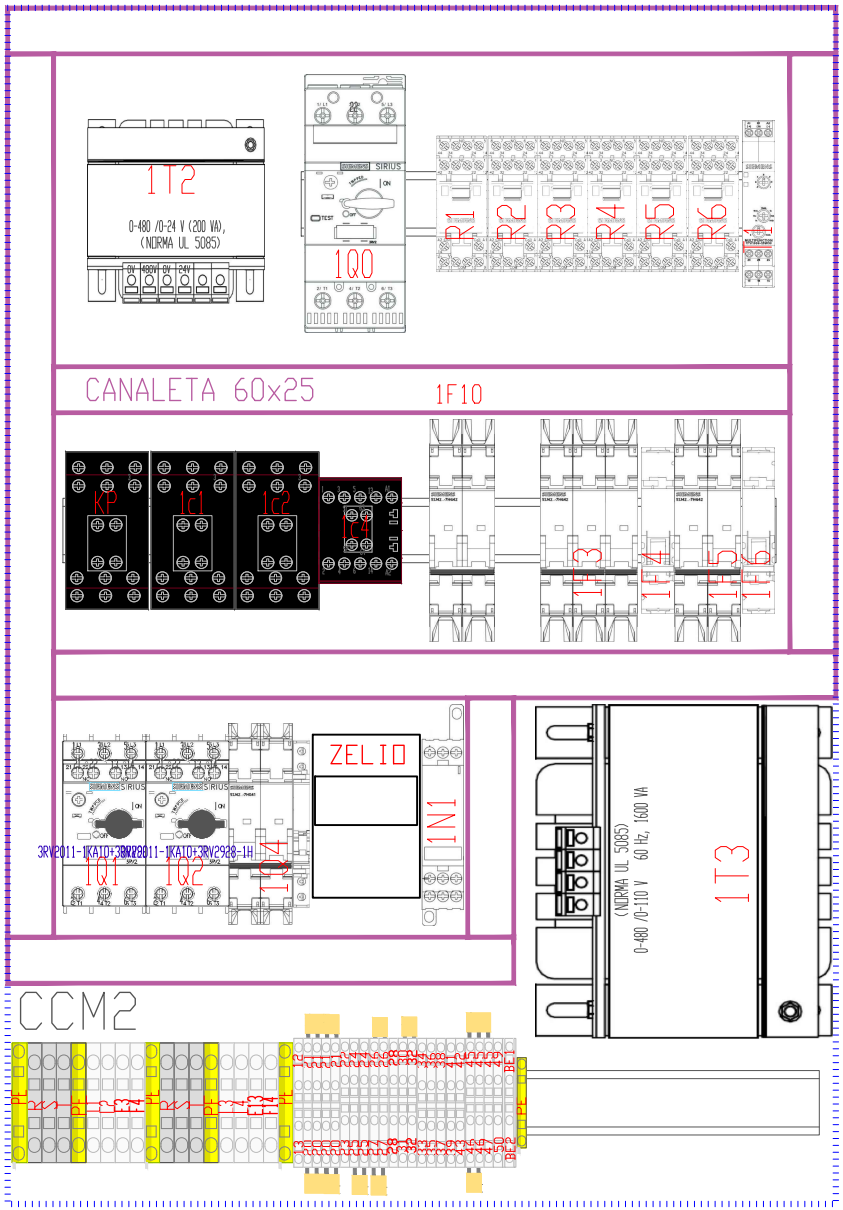
Scale			Drawn date	19/12/2022	Denomination	Order number:	
			Drawn	R. G. P. / 14	LIFT (PL15 UL)	Customer:	FRACO MANUFACTURING, S. L.
			Verified date	05/01/2022	DISTRIBUTION OF ELEMENTS-PLANT 0	Final user:	next: 9
	Date modif.	Signature	Verified		(CUPBOARD 500x400x250) ENCLOSURE CO	Location: CANADA	Page: 8

TORGAR



Scale			Drawn date	05/01/2022	Denomination	Order number:	V9021-0019
			Drawn	R.G.P. / 14	LIFT (PL15 UL)	Customer:	FRACO MANUFACTURING, S.L.
			Verified date	29/09/2022	OUTER VIEW EXPLOTING-CABIN	Final user:	next: 10
	Date modif.	Signature	Verified		(CUPBOARD 700x500x250) ENCLOSURE C1	Location:	CANADA Page: 9





GREASER
OPTIONAL
(ZELIO + BREAKER 1F10)

ALL COMPONENTS UL

CARRIL DIN
ELEVADO EN ANGULO
PARA QUE SE VEAN NUMEROS

Scale			Drawn date	01/12/2022	Denomination	Order number:	.
			Drawn	R. G. P. / 14	LIFT (PL15 UL)	Customer:	FRACO MANUFACTURING, S. L.
			Verified date	01/12/2022	DISTRIBUTION OF ELEMENTS-CABIN	Final user:	next: 11
	Date modif.	Signature	Verified		(CUPBOARD 700x500x250) ENCLOSURE C1	Location: CANADA	Page: 10

C1

CONNEC.	COMMENT
C/a-1	.
C/a-2	
C/a-3	
C/a-4	
C/a-5	
C/a-6	
C/a-7	
C/a-8	
C/a-9	
C/a-10	

CONNEC.	COMMENT
C/b-1	.
C/b-2	
C/b-3	
C/b-4	
C/b-5	
C/b-6	
C/b-7	
C/b-8	
C/b-9	
C/b-10	

CONNEC.	COMMENT
C/c-1	CONNECTION TABLE-480V /60Hz (LINEA R1)
C/c-2	CONNECTION TABLE-480V /60Hz (LINEA S1)
C/c-3	CONNECTION TABLE-480V /60Hz (LINEA T1)

C2

CONNEC.	COMMENT
C/a-1	.
C/a-2	
C/a-3	
C/a-4	
C/a-5	
C/a-6	
C/a-7	
C/a-8	
C/a-9	
C/a-10	

CONNEC.	COMMENT
C/b-1	.
C/b-2	
C/b-3	
C/b-4	
C/b-5	
C/b-6	
C/b-7	
C/b-8	
C/b-9	
C/b-10	

CONNEC.	COMMENT
C/c-1	CONNECTION TABLE-480V /60Hz (LINEA R1)
C/c-2	CONNECTION TABLE-480V /60Hz (LINEA S1)
C/c-3	CONNECTION TABLE-480V /60Hz (LINEA T1)

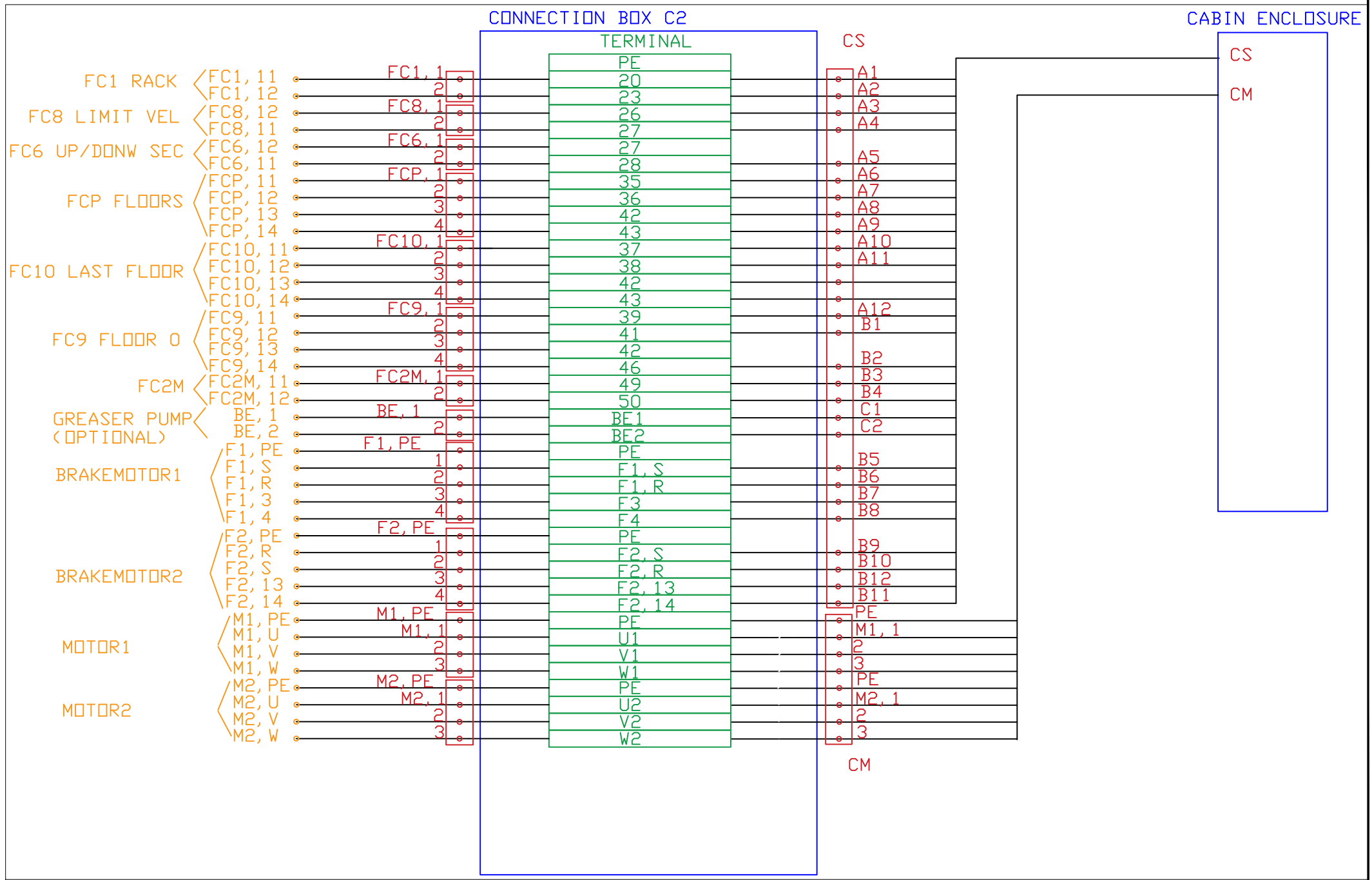
C3

CONNEC.	COMMENT
C3/A-1	TEST BRAKE BUTTON (PBP)
C3/A-2	TEST BRAKE BUTTON (PBP)
C3/A-3	PRINCIPAL SELECTOR (1S3)
C3/A-4	PRINCIPAL SELECTOR (1S3)
C3/A-5	UP BUTTON (PSO)

CONNEC.	COMMENT
C3/B-1	UP BUTTON (PSO)
C3/B-2	
C3/B-3	
C3/B-4	
C3/B-5	DOWN BUTTON (PBO)

CONNEC.	COMMENT
C3/C-1	.
C3/C-2	
C3/C-3	
C3/C-4	EMERGENCY STOP 1SO
C3/C-5	EMERGENCY STOP 1SO

Scale			Drawn date	02/12/2022	TORGAR	Denomination	Order number: .
			Drawn	R. G. P. / 14		LIFT (PL15 UL)	Customer: FRACO MANUFACTURING, S. L.
			Verified date	02/12/2022		LISTING OF CONNECTORS	Final user: next:
	Date modif.	Signature	Verified				Location: CANADA Page: 11



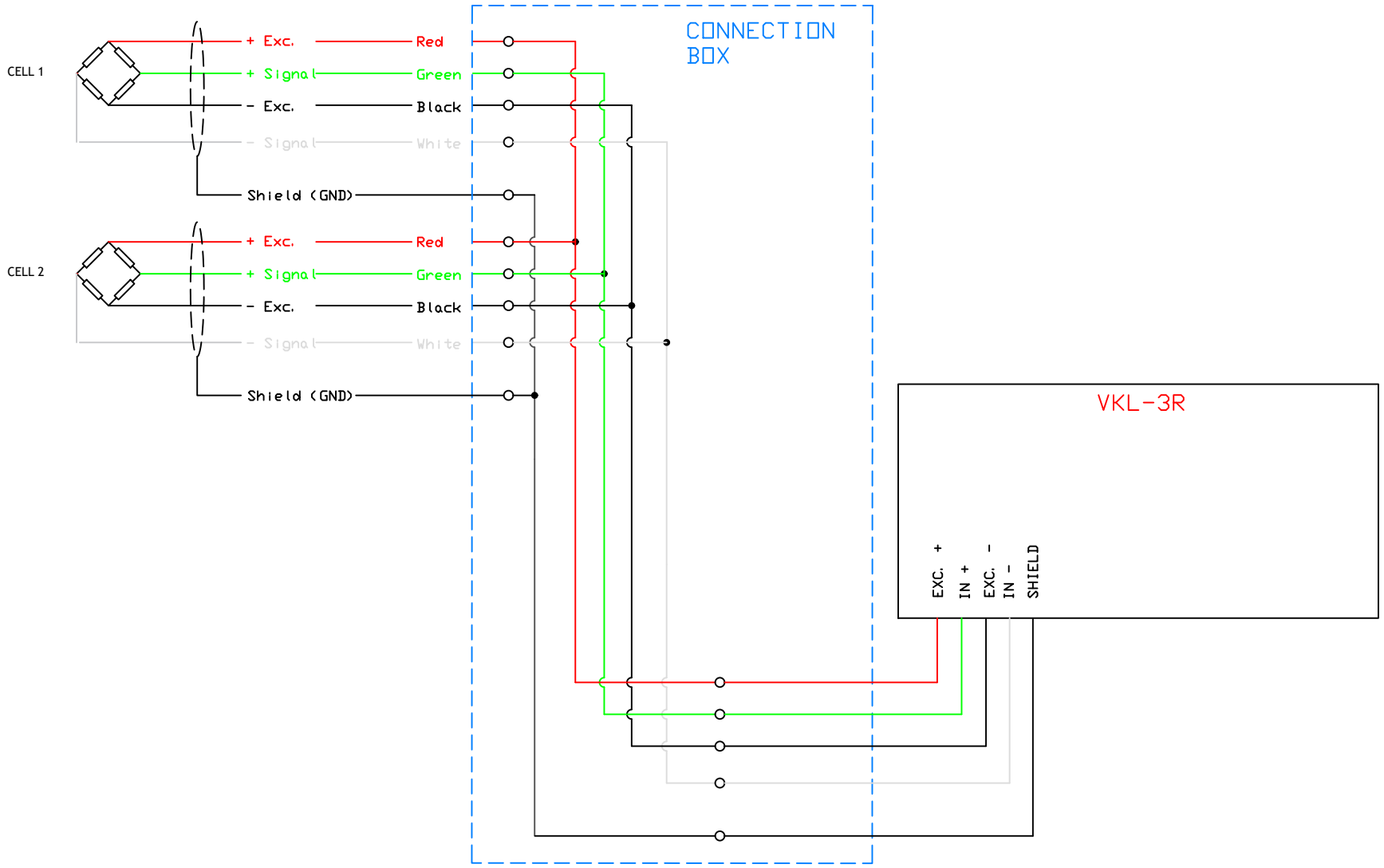
Escala			Fecha dibujado	12-12-22
			Dibujado	
			Fecha Comprobado	
	Fecha mod.	Firma	Comprobado	

TORGAR

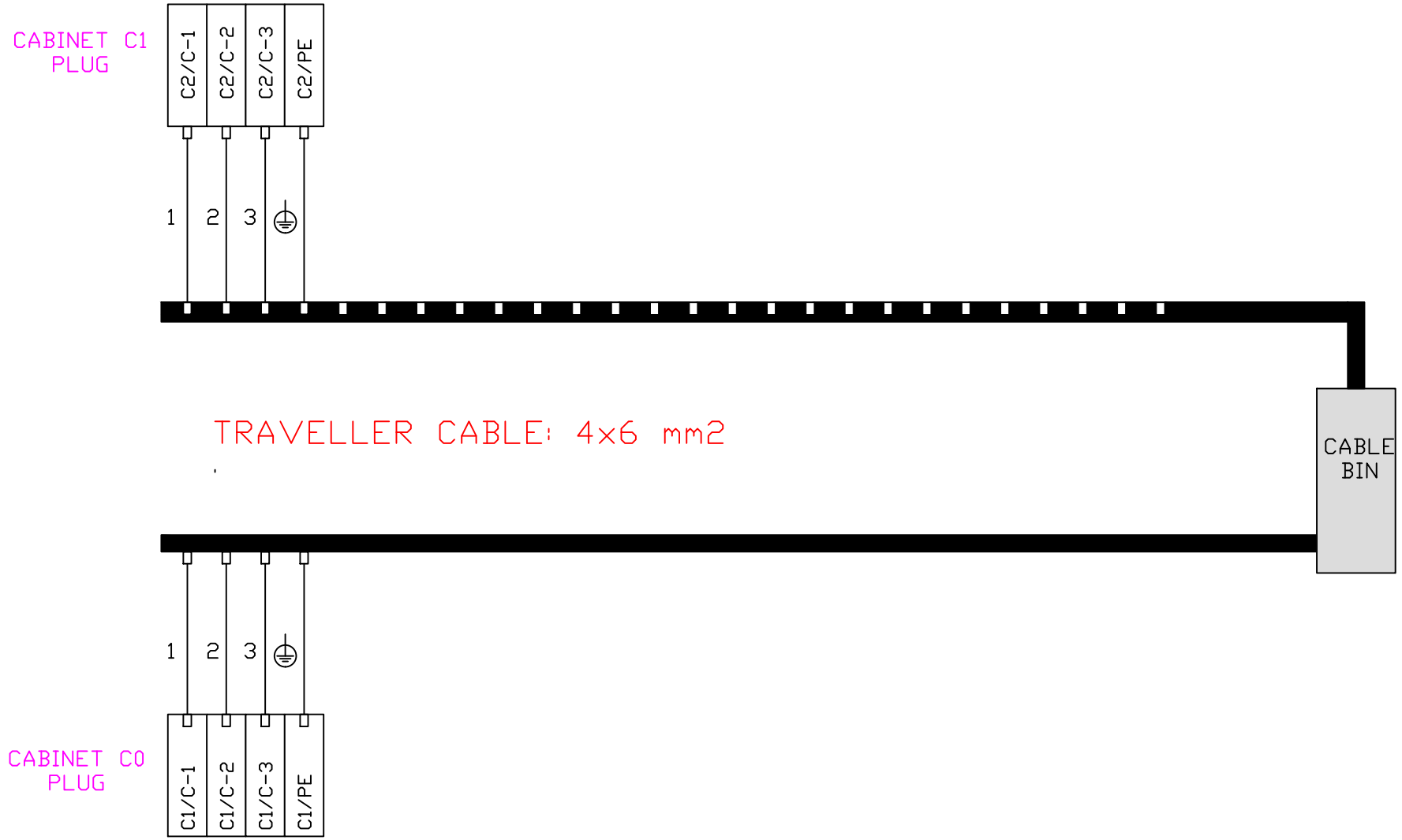
Denominacion
MOTOR GROUP CONNECTION BOX

(PL-15/20_EXT UL)

Numero de obra:	0
Cliente:	CANADA
Usuario final:	siguiente:
Ubicacion planta:	Hoja: 35

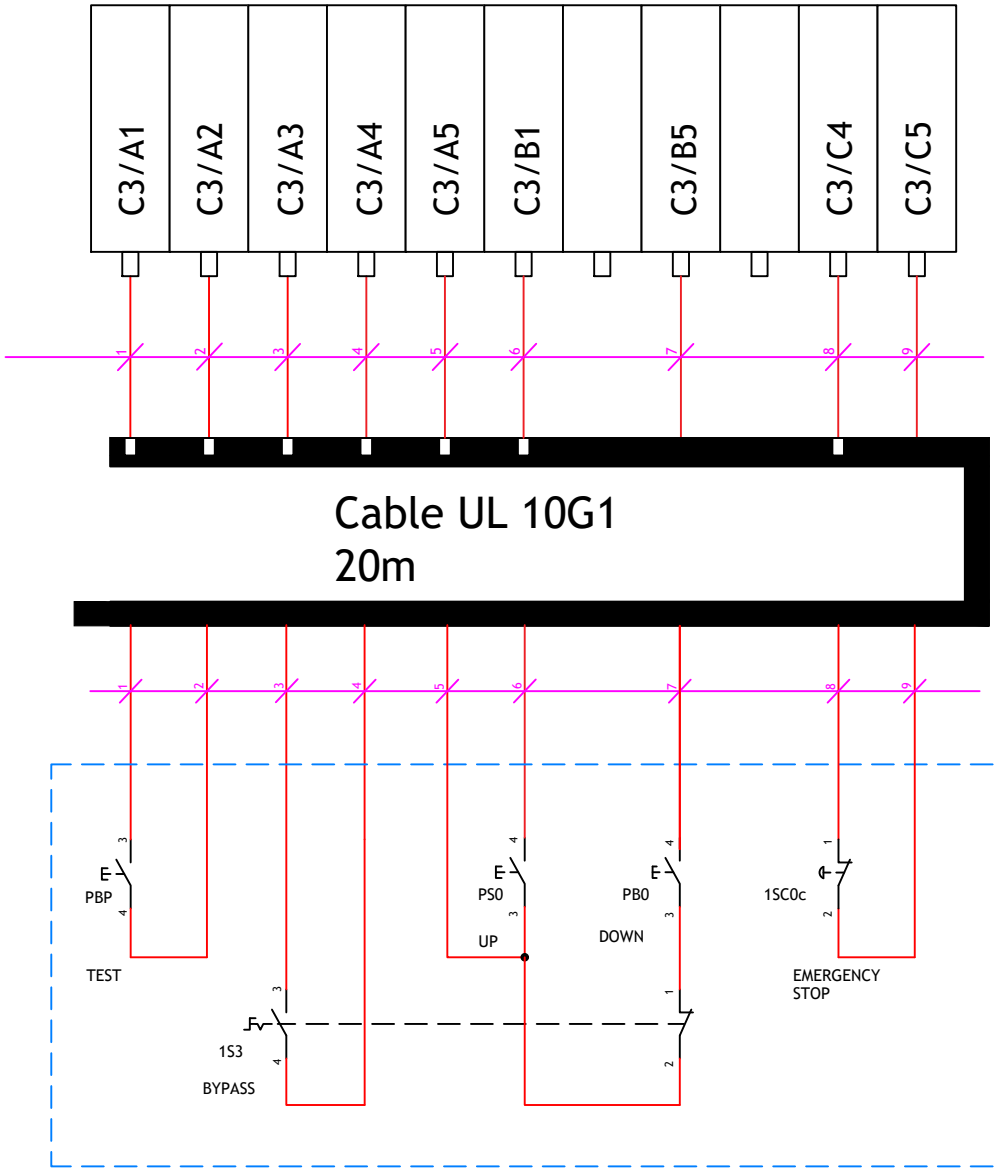


Escala			Fecha dibujado	02/08/2021	Denominacion	Numero de obra:	V9021-0016
			Dibujado		LOAD CELLS	Cliente:	
			Fecha Comprobado			Usuario final:	siguiente:
	Fecha mod.	Firma	Comprobado		TORGAR FRACO MANUFACTURING, S. L.	Ubicacion planta: CANADA	Hoja: 40



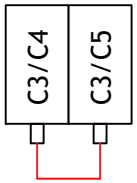
Escala			Fecha dibujado	02/08/2021	Denominacion	Numero de obra:	V9021-0016
			Dibujado		TRAVELLER CABLE	Cliente:	
			Fecha Comprobado			Usuario final:	siguiente:
	Fecha mod.	Firma	Comprobado		FRACO MANUFACTURING, S.L.	Ubicacion planta: CANADA	Hoja: 41

C3 (DROP TEST BUTTON BOX CONNECTOR)



WARNING:
Use only to make the Drop Test by authorized and skilled peolple.
Don´t use in the Assembly of the Machine.

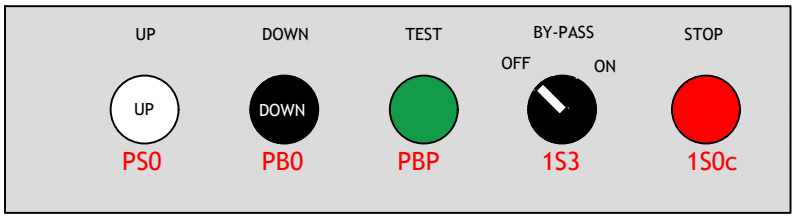
WHEN DROP TEST BUTTON BOX ARE NOT USED CONECTOR
WITH C3/C4 AND C3/C5 MUST BE CONNECTED



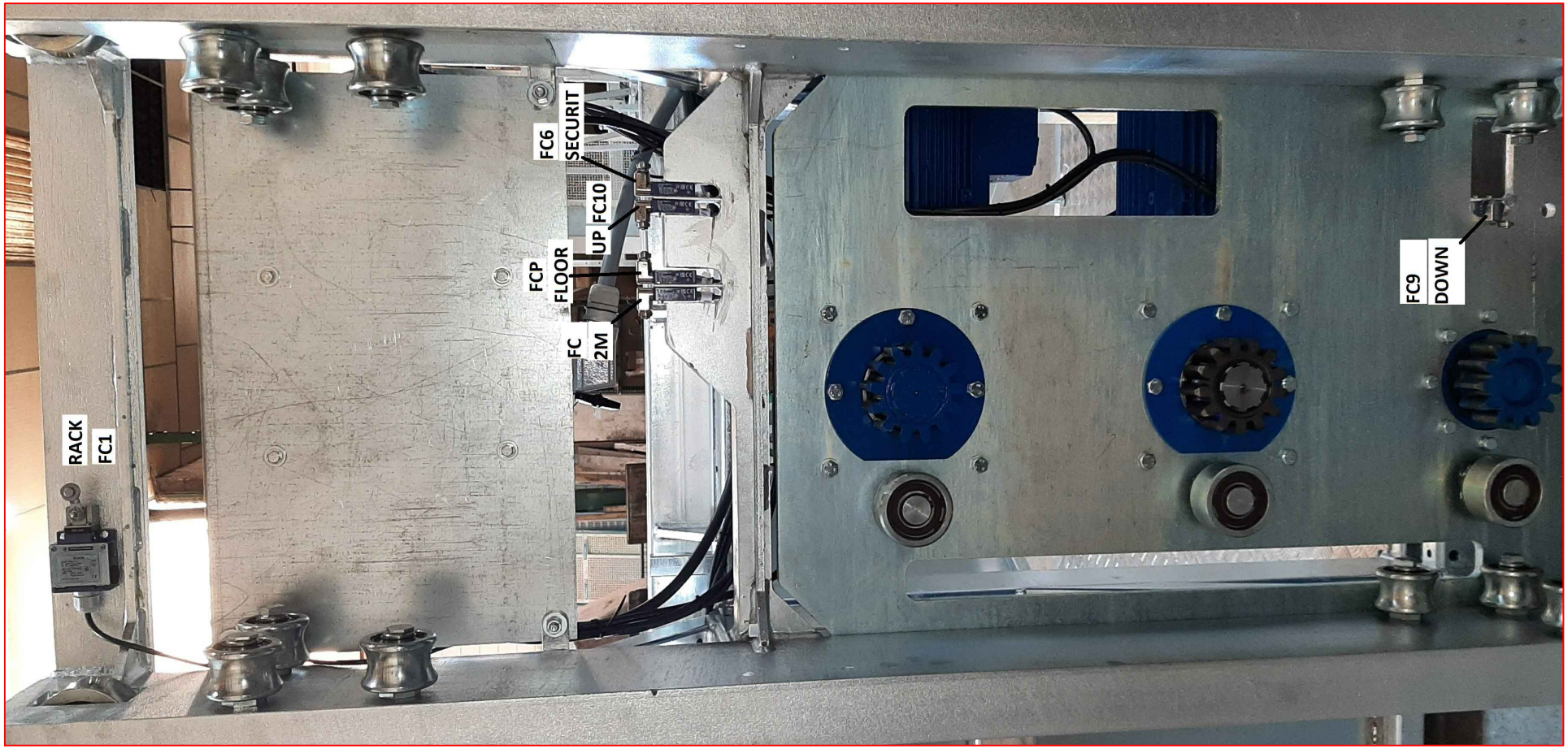
The numbers of the wire cables do not correspond to the cable numbers indicated in the diagram.

MATERIALS
1 BOX SCHNEIDER XALD05
2 NC SCHNEIDER ZEN-L1121
4 NO SCHNEIDER ZEN-L1111
1 HEAD EMERGENCY STOP ZB5 AS834
1 HEAD GREEN PUSHBUTTON SCHNEIDER ZB5 AA3
1 SELECTOR HEAD SCHNEIDER ZB5 AD2
1 HEAD BLACK PUSHBUTTON SCHNEIDER ZB5 AA2
1 HEAD WHITE PUSHBUTTON SCHNEIDER ZB5 AA1
2 MALE CONNECTOR 15 Pin + T ILME CDM15
7 PINES MALE 0.7MM2 ILME CDMA 0.7
1 GLANDS PG13,5
1 CABLE UL 10G1 20m
4 LABELS

DROP TEST BUTTON BOX

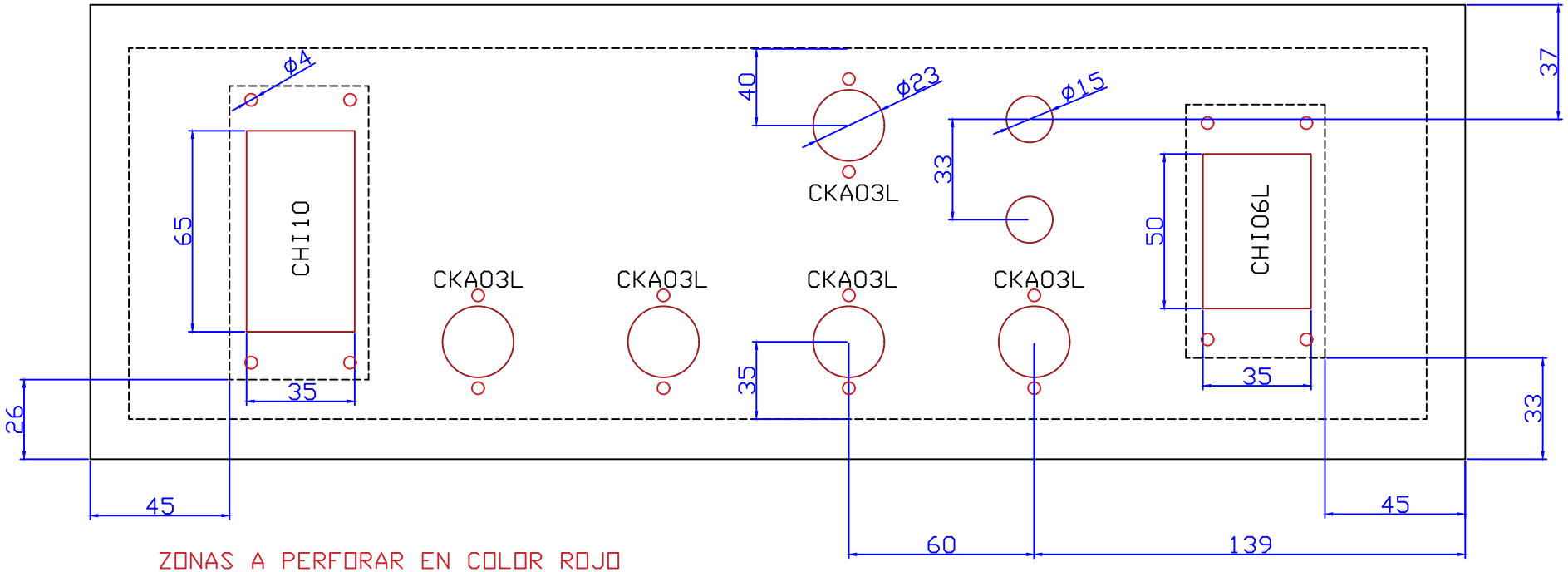


Escala			Fecha dibujado	30/08/2022	Denominacion	Numero de obra:	.
			Dibujado		DROP TEST BUTTON BOX	Cliente:	
			Fecha Comprobado			Usuario final:	siguiente:
	Fecha mod.	Firma	Comprobado		FRACO MANUFACTURING, S.L.	Ubicacion planta: CANADA	Hoja: 42



Escala			Fecha dibujado	02/08/2021	Denominacion	Numero de obra:	V9021-0016
			Dibujado		LIMIT SWITCH MOTORGROUP	Cliente:	
			Fecha Comprobado			Usuario final:	siguiente:
	Fecha mod.	Firma	Comprobado		FRACO MANUFACTURING, S.L.	Ubicacion planta: CANADA	Hoja: 43

CHAPA BASE 445X147



ZONAS A PERFORAR EN COLOR ROJO

PARA MAYOR EXACTITUD PARA MARCAR LA POSICION DE LOS TALADROS A 4MM
PRESENTAR BASE CONCTOR Y MARCAR

Escala			Fecha dibujado	19/05/2022	Denominacion	Numero de obra:	
			Dibujado		MECANIZACION BASE CUADRO CABINA	Cliente:	
			Fecha Comprobado			Usuario final:	siguiente:
	Fecha mod.	Firma	Comprobado		TORGAR FRACO MANUFACTURING, S. L.	Ubicacion planta: CANADA	Hoja: 10 1