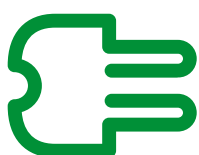


# INSTRUCTIONS MANUAL

## PM6-52

Switch-disconnector hook-stick operated  
MV Overhead distribution switchgear

07G190



Availability  
of  
electrical energy



Safety  
of  
life and property



Optimised  
Investment

**Schneider**  
Electric

**LOAD SWITCH DISCONNECTOR PM6-52**

MANUAL OF INSTRUCTIONS

07G190

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2. CHARACTERISTICS AND APPLICATIONS
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**1.-INTRODUCTION.****BEWARE**

*While high voltage systems are in operation, certain elements of the system are live, others may be moving, and other parts may reach high temperatures. This means that there are electrical, mechanical and heat-related risks in the use of these systems.*

*In order to provide an acceptable level of protection for both people and property and taking into account the applicable environmental recommendations, the manufacturers that form part of SERCOBE develop and construct their products according to the principle of integrated security, based on the following criteria:*

- Eliminate dangers whenever possible.*
- When this is technically or economically unfeasible, build effective protection devices into the systems.*
- Inform users of any remaining risks so as to help them understand the operating procedures that prevent these risks and help them with the training of the operating personnel that carry out these procedures, and the use of the correct personal protection equipment.*
- Use recyclable materials according to the state of the art and within applicable technical and economic limits and establish procedures for the processing of the equipment and its component parts so that once they have come to the end of their useful lives, they can be dealt with in a way that complies as far as possible with the environmental requirements established by the relevant bodies.*

*As a result, when working on the system covered by this manual or in the vicinity thereof the specifications of paragraph 11.2 of standard IEC-62271-1 must be taken into account. This work can only be done by personnel who are suitably trained and supervised (in accordance with the provisions of the EN50110-1 standard on safety in electrical installations and the EN50110-2 standard which applies to all kinds of activity in, with or near an electrical installation) and who are completely familiar with the instructions and warnings contained in this manual and all others of a general nature*

*that may be applicable under current legislation on the prevention of risks , and all others that in the future may replace or modify them.*

*The above instructions must be followed with great care, because the safe and correct functioning of this system depends not only on its design, but also on circumstances which in general are beyond the control of and not the responsibility of the manufacturer, in particular:*

- The correct transport and handling of the equipment from the time it leaves the factory to the place where it is to be installed.*
- Any storage on the way must be carried out under conditions that do not alter or damage the characteristics of the system as a whole or of its essential parts.*
- The operating conditions must be compatible with the specifications of the system.*
- The manoeuvres and operations carried out while using the equipment must be performed in strict accordance with the instructions in the manual, and with a clear understanding of the operating and safety principles that apply to it.*
- Maintenance work must be carried out correctly, taking into account the real operating and environmental conditions in the place where the system is installed.*
- The disposal of the equipment once it has come to the end of its useful life must be carried out according to the instructions in the manual and legislation in force at the time.*

*For this reason, the manufacturer will not be responsible for any direct or indirect damage resulting from any breach of the guarantee or of the rules set out above under any jurisdiction, including damage to people or assets, loss of profits, periods of idleness, costs of repair or replacement of materials.*

#### **Guarantee**

*The manufacturer guarantees this product against any fault in the materials or the operation of the system during the period covered by the contract. If any defect is detected, the manufacturer may choose either to repair or to replace the equipment. Incorrect handling of the equipment or the repair of the equipment by the user will be considered a breach of the guarantee.*

#### **Trademarks and Copyright**

*All the registered trademarks in this document are the property of their respective owners. The intellectual property of this manual belongs to the manufacturer.*

## 2.- DESIGN FEATURES AND APPLICATIONS

### 2.1.- Description.

The aerial remote-controlled switch-disconnector PM6 is used in public distribution network, up to 52 kV. They combine:

- Three-phase switch-disconnector in SF6
- Electrical command
- Manual command
- Control unit, integrating a power source, electrical control management and the necessary remote control interfaces.

The set is prepared to be fixed onto the M. V. line support.

It may be operated:

- Remotely, using the control system in the control box.
- Locally, with the manual command at the support base

See physical description in fig.1.

The base apparatus is composed of the switch set plus electrical control mounted on a small chassis, with manual control by hookstick and control box.

The voltage transformer, fig.2, will be installed by the client in a different en un chassis separately of the switch-disconnector.



Their use limitations are defined in the application specifications referred to in section 2.2.2.2.-

1. -Support chasis
2. -SF6 switch
3. -Electrical command
- 4 -Transmission.
- 5.- Hook-stick.
- 6.- Control unit.

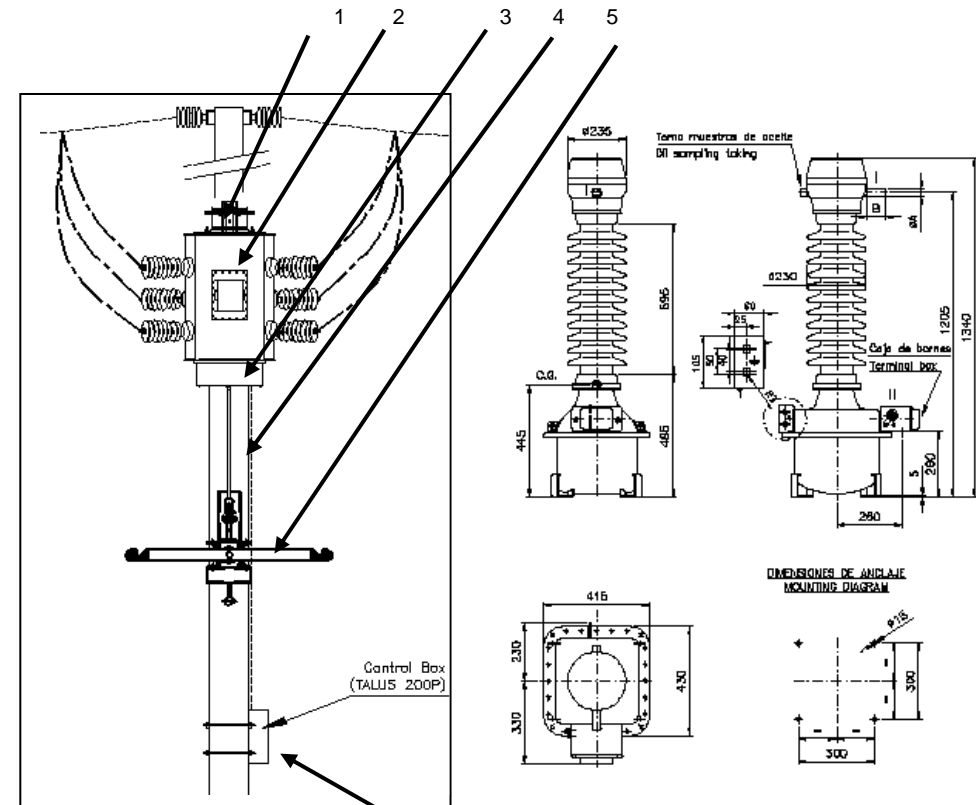


Figure 2

6

Figure 2

### 2.1.1.- Description of control unit (TALUS 200P)

\* Consult user manual TALUS 200P.

### 2.2.- Technical features.

#### 2.2.1.- Electrical system characteristics

See table 6

#### 2.2.2.- Applicable standards.

CEI 62271-103  
CEI 62271-102  
CEI 60298  
CEI 60694  
CEI 815

### 2.3.- Nameplate.

The apparatus is identified by the nameplate on the switch where the serial number appears.

Ur	Rated Voltage
Ir	Rated normal current
Ua:	Rated auxiliary voltage
Up	Rated lightning impulse withstand voltage
Ip	Rated short-circuit making current.
fr	Rated frequency
Psw	Rated gas pressure for switch
Ik	Rated short-time current.
tk	Rated duration of short-time current
TC	Temperature class.
Kg SF6	Weight SF6
m	Weight disconnecter switch

Figura 3

### 2.4.- Operating conditions.

PM6-52 switches are designed to provide long-term safe and reliable functioning, provided the instructions in this manual are strictly observed and the devices are used as stipulated and according to the conditions listed in I.E.C. 60694:

- Max. temperature 40°C and min. -25°C
- Altitude less of 1000 m.
- Other operating conditions by consultation

Any other use may affect the safe operation and correct performance of the unit, giving rise to potential hazards for persons and plant equipment. It is therefore important to read thoroughly

and understand the manual before attempting any installation work or operation of the unit. Ensure also that all staff employed to install or service the unit are properly trained.

The operations described should be carried out in accordance with current safety legislation and under the responsibility of a person qualified representing the user.

MESA accepts no liability whatsoever for any consequences that may result from failure to observe the instructions contained in this manual, or from any unauthorized use of the unit. For safety reasons, you are strongly advised to consult us before carrying out any operation not included in the manual.

As a result of improvements in materials technology, you may find that certain items on your unit do not exactly match the information provided in this document. If this is the case, or if you have any other query regarding the system, please contact us directly or via our commercial representatives or after-sales service.

### 3.- HANDLING, TRANSPORT AND STORAGE.

#### 3.1.- Delivery.

The PM6-52 switches may be delivered in sea freight or standard packaging, depending on the final destination. (packaging specifications by consultation).

Carriage is the responsibility of the customer unless otherwise specified. For this reason, the supplier accepts no liability whatsoever for any situations that may arise while the delivery is in transit. Please contact the insurer or carrier directly in the event of any problem.

Packaging instructions must be followed during handling.

Items supplied for export are covered by the international INCOTERM regulations.

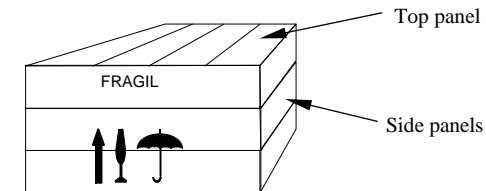


Figure 4

### 3.2.- Lifting and transporting the unit.

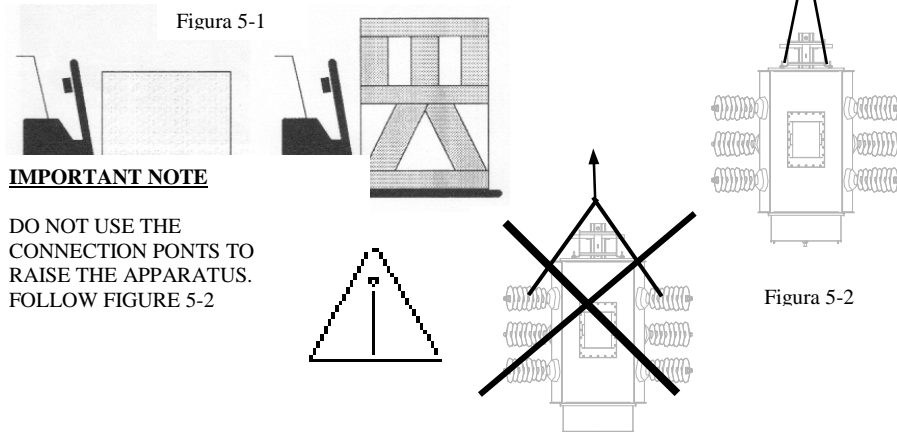
Please follow the instructions indicated on the crates:

The apparatus must be lifted in the packaging to the nearest possible point to the post.(figure 5-1)

A forklift truck or crane hoist is sufficient for moving and handling the unit.

Important:

- Avoid any impacts or sudden movements that may damage components.
- Do not leave the packing cases in any inadequate location such as on an unstable surface.
- Do not slide the units down sloping floor areas or stairways.



#### **IMPORTANT NOTE**

DO NOT USE THE CONNECTION POINTS TO RAISE THE APPARATUS. FOLLOW FIGURE 5-2

### 3.3.- Checking at the arrival.

Please carry out a check immediately after delivery to ensure that the items supplied match the items listed in the delivery note and order documentation.

You are advised to carry out a visual check to ensure that the units have not suffered any damage in transit.

If you do find any damaged items, please contact the insurer and make the corresponding claim. Before carrying out this inspection, please unpack the unit following the instructions given in section 3.4.

Now inspect the delivery to ensure that each item is correctly identified, and check the following items:

- The details shown on the nameplate should match the order specifications.
- All accessories included in the order should be present.

In the event of any anomaly, please make out a report in collaboration with the carrier. The report should indicate the order number and give details of the damage and how it was caused.

All damage reports and compensation claims MUST be submitted to MESA within the guarantee period to claim for responsibilities.

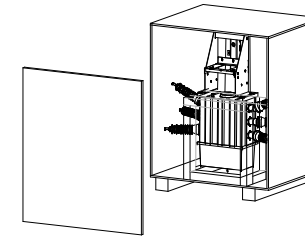


Figure 6

### 3.4.- Unpacking the unit.

The unit should be unpacked with great care in order to avoid breakage or deformation of the conducting components of the switch.

This should be carried out as follows:

1° The apparatus, with its packing, must be deposited as close as possible to the post and parallel to the line. The space between the post and the apparatus must be sufficient to allow the operation of the lifting equipment.

2° . Remove top and side panels from upper section, from transverse supports onwards. Loosen the screws fixing apparatus to packaging. Once the packaging is open as indicated, release low tension cable leaving it tight so that the centre of gravity of the apparatus is not affected. Never let the switch rest on the ground, as this could damage the switch output shaft and the connecting cables.

3° . Remove post fixing clamp from packaging and screw onto post or metallic support. Mounting position. (figure 7)

#### **NOTE.**

**It is extremely important not to damage the equipment. Do not remove the apparatus from the support supplied with the packaging. It will be sent to its destination along with this support, and must only be removed for lifting to the post.**

### 3.5- Storage.

The switch will be stored in its original packing.

- It is not advisable to store the units in sealed seaworthy packing for more than a period of six months, (standard) counted from the moment of dispatch from MESA.

- Protect from corrosive atmospheres such as chemical agents: cement dust, acid emissions, smoke, saline atmospheres, etc.
- Store all items in a dry, well-ventilated place.

- Ensure that all components are stored carefully, stacked or grouped in a way corresponding to their installed locations.

- Items stored for a long period should be cleaned and lubricated before being used, following the instructions given in the maintenance section (section 7) of this document.

- Check battery status and cable set (apparent shock, good connection and in working order)

#### ATENCION

- **The battery must not be stored for more than 3 months without being recharged.**  
 - **To help conserve the battery, do not use a car-type battery charger; use the T-200P unit itself to recharge batteries.**

### 4.- INSTALLATION.

#### 4.1.- General conditions.

The minimum conditions corresponding to the point of installation should conform to HV rules contained in ITC 15 (applicable in Spain) or to the rules applicable in the destination country.

#### 4.2.- Assembly.

##### 4.2.1.- Location and structure..

MESA is not responsible for layout considerations.

The PM6-52 switches can be mounted in a vertical position, on a wooden, concrete or metal post.

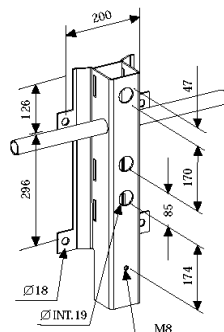


Figure 7

\* Parts for fixing to post not supplied

- switch fixing
- manual control fixing
- control box fixing

Before fitting the frame to the structure, check that:

a)- The holes drilled in the structure correspond to the control system attachment points.

b)- The attachment or supporting points are aligned and level.

**Note:** If the structure does not possess these features, you are advised to carry out the appropriate modifications.

#### 4.2.2.- Fixing the support bracket.

The different drill-holes to be made for fixing the support bracket either onto wooden post, concrete or metallic support are as follows:

The coupling support must be placed parallel to the line and in vertical position.

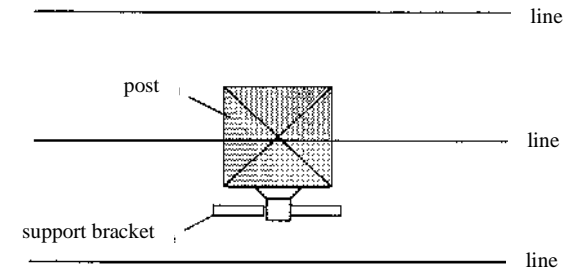


Figure 8

#### .Wooden or concrete support:

A.- Attachment using metal bands, regardless of the diameter of the post (figure 9).

B.- Attachment using stud and bolts, of sufficient length to go through the metal clamps, regardless of diameter.(figure 10)

C.- Fixing by brackets and screw rods. The diameter must be less than mid-axis of fixation.(figure 11)

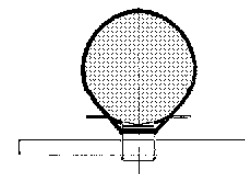


Figure 9

Figure 11

Metal band attachment :  
Whatever the diameter of the support.

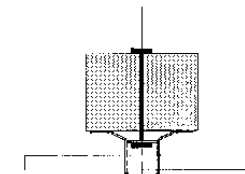
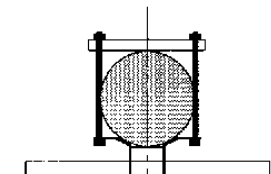


Figure 10

Screw bolt attachment:  
Support for a regular post.



Bracket and rod attachment:  
Diameter must be less than the distance between the attachment centre axes.



▪ **Metallic support:**

A.- Support elements must be made for use with a metallic support (figure 12):

**CAUTION: The minimum acceptable distance between the active parts and metallic supports must be maintained**

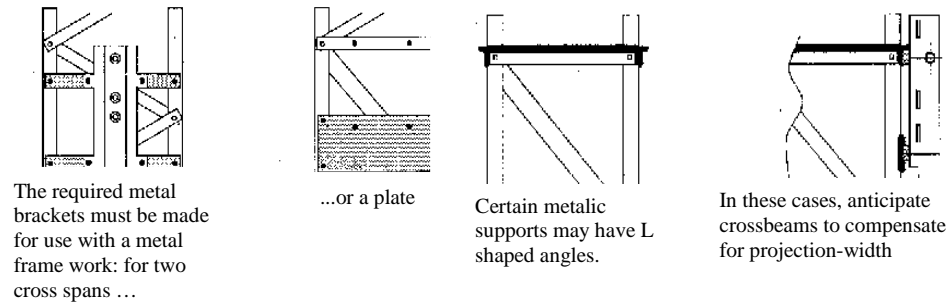


Figure 12

**4.2.3.- Installation of Talus 200P control box.**

The control boxes have been designed for fitting to the post with either metallic bands or support grips and bolts; the user should manufacture the plates. (figure 13)



- 1- Double-ceil.
- 2- Electronics card (Power, control and remote card)
- 3- Free space to remote unit interface ( radio, external modem...)
- 4 Auxiliary contact open door
- 5 Voltage transformer ( optional) and circuit-breaker LV.
- 6 Battery.
- 7
  - Terminal block to connect the control cable from PM6.
  - Terminal block to connect the current transformer from PM6.
  - Bushing to pass the power supply cable.
- 8 Antivandalism cap.

**1 The fastening will be done by means of two threaded M15 x 500 rods, perforating the post at the corresponding height**

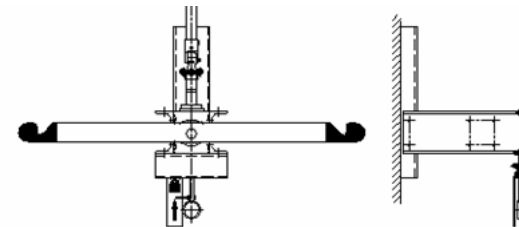
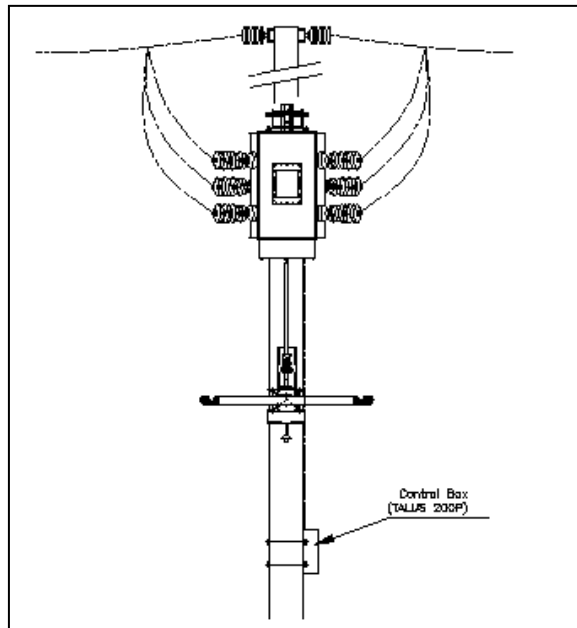


figure 14



**Preliminary notes:**

For alternative installations, please contact MESA for further details.  
It is vital for the correct adjustment and consequent functioning of the system that all bolts are tightened to the required torque. Please refer to the torque settings given in table 3.  
Carry out adjustments with bolts tightened, or these settings will not be correct.  
Never knock screws in with a hammer. Widen the hole if necessary.

**4.2.5.- Space required****4.3.- Lifting, leveling and alignment.**

Wherever possible, lift the frames directly from their delivery packaging to the point of final installation on the structure.

**4.3.1.- Lifting the Switch.**

Take into account the supporting face where the apparatus is to be installed.  
Assembly:

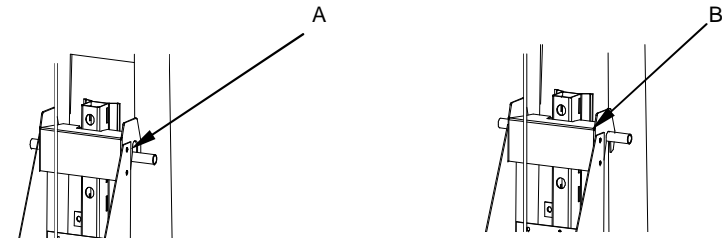
Following unpacking instructions, point 3.3

In addition:

Lift the switch with the aid of a hoist, introducing the cables through the suspension ring situated on the chassis.

Lift the switch, avoiding the support shaft A.

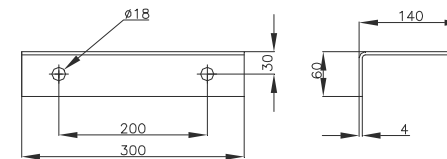
- Lower switch carefully, checking that support is situated in the central groove of the frame, B.
- 



Raise the apparatus, passing support axle.

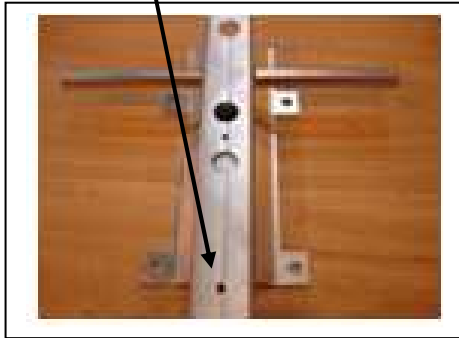
Bring down the switch again for fixing. Check that the gear is placed in the central groove of the chassis.

Figure 16



The switch must rest on this profile that is also delivered

- 
- 
- **Fix apparatus to support by bolt M8x25 (figure 18)**



#### 4.3.2.- Manual command.

The transmission pipe and the operating pole are inside the same package as the switch.

The switch is delivered in the **OPEN** position indicated at the bottom of the switch (see figure 27)

Placement of the operating pole

#### 4.3.2.1. Identification of pieces ( Fig. 19 )

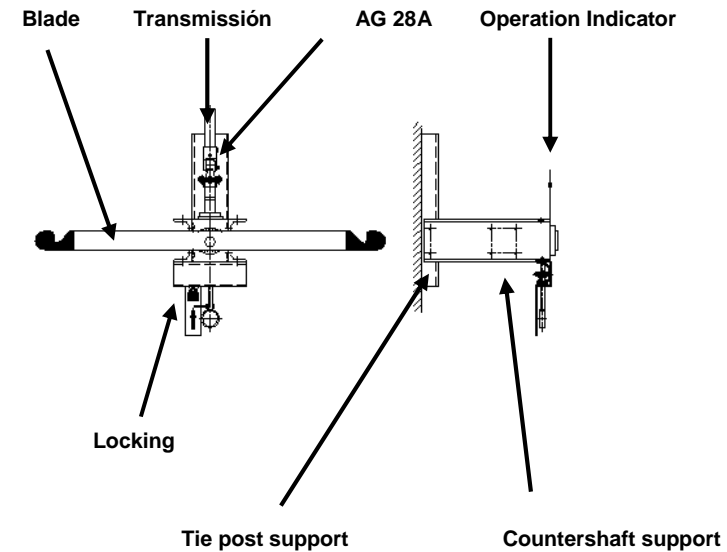
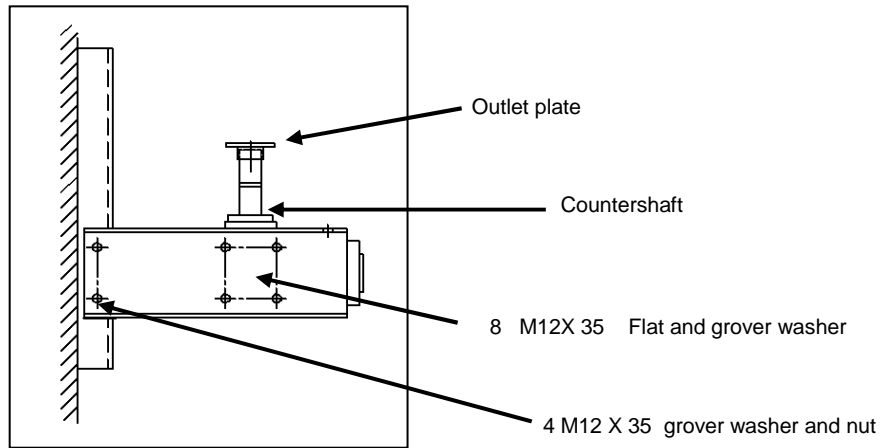


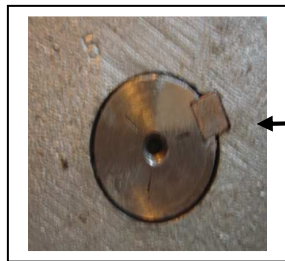
fig.19

**4.3.2.2** Fastening of the countershaft, by means of eight M12 x 35 screws with flat and grower washer M12, to both countershaft supports and these to the tie post support by means of four M12 x 35 screws with flat washer and nut. Place the outlet plate in the upper outlet shaft of the countershaft introducing a 10 x 8 x 40 spring-clip (fig. 19.2) and later fastening it with an M8x30 screw and M8 nut.

(fig.19.1)



M8x30 screw and M8 nut.



MIXED SPRING-CLIP

**4.3.2.3.** Place the locking device, by means of the two screws, in the two perforations that are under the support of the countershaft, tightening it only by hand for now. (Fig 20).

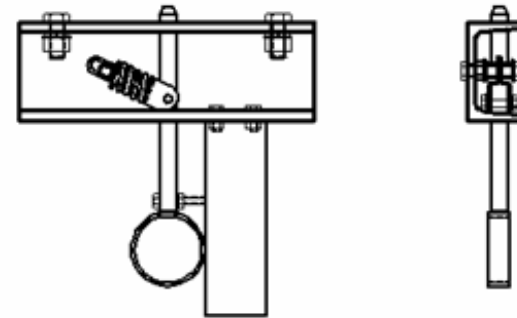


Fig 20

**4.3.2.4.** Place the blade on the outlet shaft of the countershaft by means of the two M10 x 110 screws and the two M10 self-blocking nuts. Put the blade in horizontal position (electrical mode) (fig. 21).

Place the locking device in the locked position and tighten the two fastening screws to the support (fig 20).

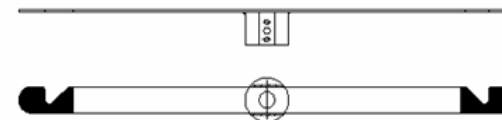


Fig.21

#### 4.3.2.5 Place the operation indicator (fig 22).

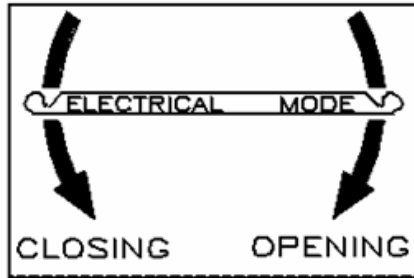


fig 22

#### 4.3.2.6. Place the transmission, by means of the bolt, in the cylindrical perforation and the upper part of the drive shaft of the PM 6 (fig 23).

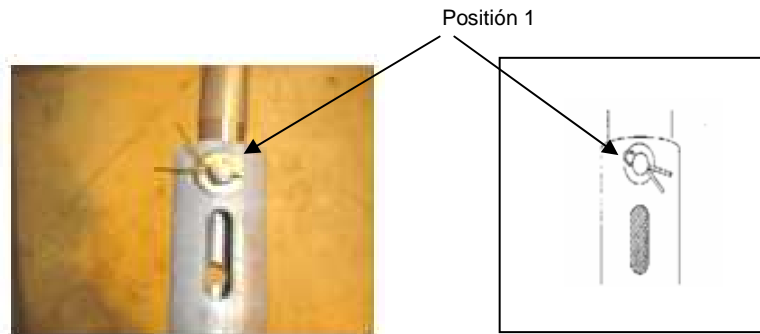


Fig 23

The AG28 A is fastened to the transmission by means of two screws that require making perforations on the transmission pipe.

In the AG28A, remove the screws that will be fastened to the transmission and those that join the plates (fig 24).

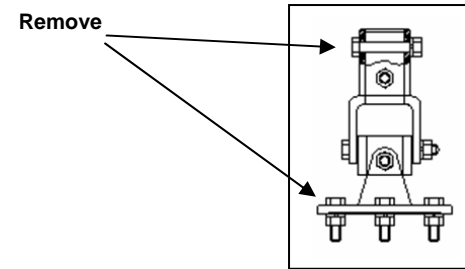


Fig.24.

Join AG-28A with the outlet plate of the countershaft, by means of screws, tightening them by hand and introducing the transmission in it. Mark the position of the perforations to be made. Release the screws of the plates tightened by hand and remove the drive shaft bolt to take out the transmission. Cut the transmission (if necessary) and make the perforations with the transmission pipe introduced in the AG28A.

Apply in these perforations a thick coat of zinc chrome based cold galvanized paint (at least 96% in zinc powder).

When this dries, apply a neutral varnish weather resistant.

#### 4.3.2.7. Verify that the operating pole assembly is in the electrical mode and in locked position. Place the screw in the lower round perforation of the outlet shaft of the switch and the slotted perforation of the transmission (position 2) (fig 25) and screw the AG-28A plate to the outlet plate of the

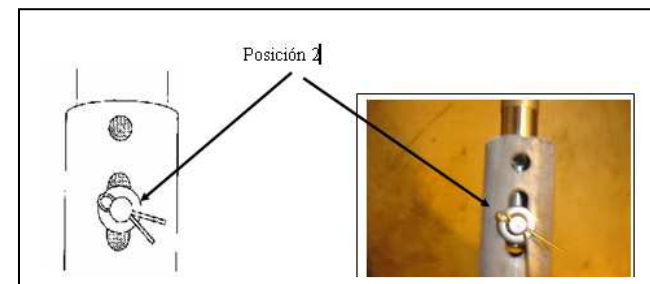


Fig 25

#### 4.3.3. - Control unit.

The control box should be situated at the selected height.

#### 4.4.- Adjustment and final check.

After installation, or servicing work of any type, carry out the following checks before connecting the power supply:

- Installation should comply with all points indicated in the manual.

- b) Check the operation of the switch. The switch is delivered in the open position (position indicated in figure 28) and check that the indicator turns to ( ON ) by carrying out a closing operation.(figure 28)
- c) Operating direction for opening and closing, as well as the electrical mode position they are indicated in the operating indicator (fig 26).

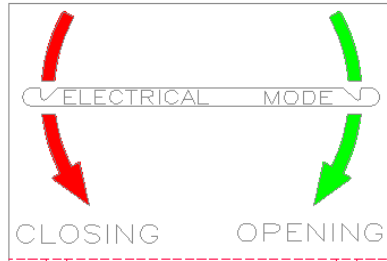


Fig 26

- d) Check all nuts and bolts for tightness (attachment to structure, transmission units, etc.)
- e) Do not paint the hinge points or the articulations of the different set components, as this may hinder manoeuvring.
- f) Check the control unit for correct functioning, paying special attention to correct visual signal display
- g) Operate switch to check for correct functioning  
- Perform several manual opening and closing operations and check switch signaling: **OFF** open (figure 27) and **ON** closed (figure 28)



Figure 27



Figure 28

- h) General cleaning of the stainless steel casing with non-abrasive cloth, applying a domestic cleaner for stainless steel in order to remove pollutants; dust; moisture; oils etc. that may have adhered to the equipment during assembly and restore passivation within the steel casing.

### 5.- TORQUE SETTINGS AND CONNECTIONS

DIMENSIONS	TORQUE SETTINGS (kp.m)	
	Bolt : grade 5.6	Bolt stainless steel :grade 8.8
M4	0.15	0.29
M5	0.3	0.6
M6	0.5	1
M8	1.25	2.5
M10	2.45	4.9
M12	4.2	8.6
M14	6.8	13.5
M16	10.5	21
M18	14.5	29
M20	20	41
M22	26.5	55
M24	34.5	71
M27	61	105
M30	68	145

Tabla 3

### CONNECTIONS

Connection plates: grease and brush before connecting. (figure 30)  
Position of terminal in the connector

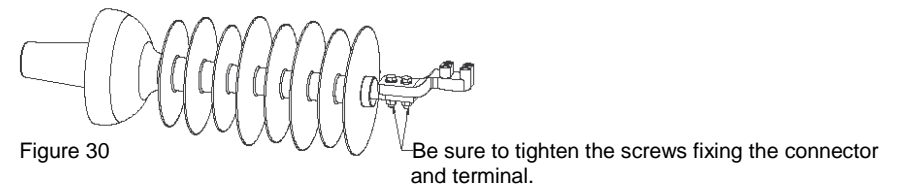
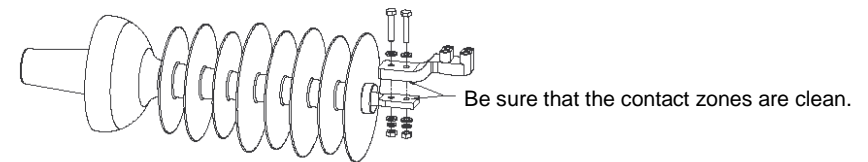


Figure 30

**L.V. wiring.**

\*See diagrams in control unit TALUS 200P.

**6.- SETTING INTO SERVICE**

Do not commence the setting into service of the unit without first carrying out all the checks listed in section 4.5 and ensuring that all the different systems involved are functioning perfectly.

1.- Operating lever.

3.- State of switch.

Switch open: The position indicator below the control is green (figure 27)

Switch closed: The position indicator below the control is red. (figure 28)

4.- Operating safety.

The blade in open position or in closed position to block all electrical controls (local or remote control).

Locking is possible in the 3 positions :electrical mode, open or closed.

5.- Local or remote control operations.

Before locking the operating lever, the electrical control of the PM6, either local or remote control, must be set to , electrical mode(figure 26)

**6.1.- Manual operation.**

Position for Electric operation (figure 29)

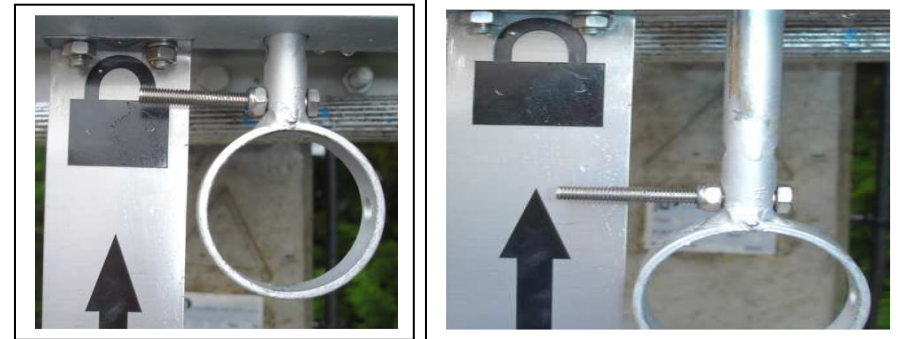


Figure29

**6.2.- Interlocking.**

The locking device can be put in the three positions

- Electrical Mode
- open
- closed

**BLOCKED****UNBLOCKED****7.- MAINTENANCE.**

Ensure that all persons engaged to carry out installation are supplied with copies of the servicing guide before starting work.

All staff involved should, by the installation handover date, be familiar with the details of the unit - particularly its operating procedures - and have a thorough knowledge of the specified safety precautions applied in -house and those established in local legislation.

Before carrying out maintenance work of any type, ensure that the affected section of the unit is shut down and disconnected from the power supply, following these five steps:

- 1) Switch off and physically unplug the unit from all power sources, by means of switchgears and disconnectors to prevent any possibility of accidental reconnection.
- 2) Secure or interlock, wherever possible, the movement of all breaking and signalling devices in their corresponding commands.
- 3) Check to ensure that no part of the electrical system is still live.
- 4) Earth and short out all possible power sources in the area where the work is to be carried out.
- 5) Attach appropriate warning signs to restrict access to the working area.

- Check that the switch is open in OFF position. If not, open with hook-stick command.(Figures 28, 29 )

### 7.1 Procedure

Componentes	Acción
Nuts and bolts	- Check torque settings (See table 3)
Current carrying parts and contacts	- Check connections
Driving system	Check: -Correct operation during manoeuvres
Stainless steel casing	- Clean with domestic detergent for Stainless Steel.

Tabla4

### Paint

Application	Required characteristics	Method of application	Example
Galvanised ferrous components: -To protect corroded areas -To protect exposed areas.	Cold galvanising Paint (96% min. Of Powdered zinc).  Neutral varnish Suitable for outdoor use	-Sand down the surface. -Clean with clean cloths and appropriate solvents. -Apply two coats of paint using a small brush -When the paint is dry, apply a coat of varnig.	Cold galvanising Paint: GALVAPACK Supplied by INELEC.

Table 5

### 7.2.- Spares

The user should decide on the number of spare parts required.  
In general, possession of spare parts is only necessary in facilities with a large number of disconnectors.

When ordering spares, please give as many details as possible:

- Nameplate
- Installation site
- Type of installation
- Any other relevant information

### Guarantee

Materials are guaranteed for a period of 12 months – counted from the date of setting into service – or 18 months from the date of delivery or handover on MESA's part, whichever of the two comes first.

The guarantee is limited to the supply, in the shortest time possible and free of charge, of a part with the some characteristics as the defective component.

### The main characteristics of the switches are as follows:

According standards C.E.I 62271-103 and 62271-102

**Rated voltage** 52 kV

**Rated current** 630 A

### Insulation level

Power frequency (kV)	To earth and between poles	95
	Across isolation distance	110
Impulse withstand (kV)	To earth and between poles	250
	A la distancia de seccionamiento	290

**Breaking capacity (A)** 630

**Poder de cierre** kA.(valor de cresta) 31.5

**Short time withstand current** kA. (RMS) – 3 s 12.5

± kA. (peak) 31.5

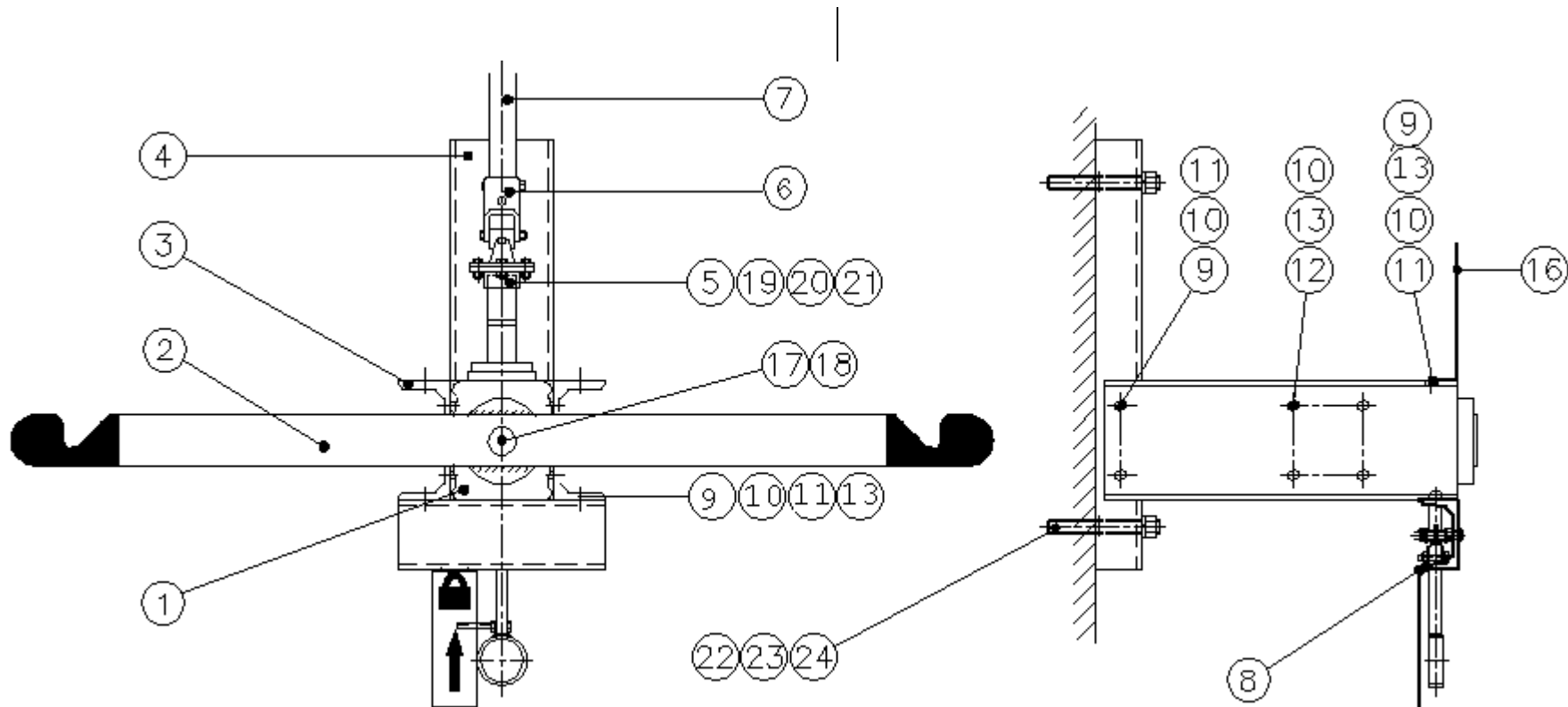
### Other features

**Temperatura ( C)** maximum +40  
minimum -25

**Mecahnical endurance** (cycles CO) 1000

Table 6





## 515990530000

## POLE-TYPE TRANSMISSION

Subject	Brief text-object	Qty	Mark
415992177007	COUNTERSHAFT	1	1
515990520001	HOOK STICK	1	2
612930395000	AG-28A	1	6
415991571028	PM6-52 UPPER PIPE	1	7
515990523004	DEVICE SUPPORT	1	8
415992179009	SIGNALLING SET	1	16
412990337001	M-16X500 THREADED ROD	5	22
1441615	M16 DIN-934 GALV. CAL 5 HEXAG. SCREW	10	23
1470162	M16 DIN 127 A4 SPRING WASHER (GROWER)	10	24
415992161002	COUNTERSHAFT SUPPORT	2	3
415992160001	TIE POST SUPPORT	1	4
415992176006	SUPPORT	1	5
390120035305	M12x35 DIN 933 Galvan.HEXAGONAL SCREW	6	9
1470129	M12 DIN 127 A4 SPRING WASHER (GROWER)	14	10
310120010420	M12 DIN 934 GALVANISED STEEL HEXAGONAL SCREW	4	11
	A2 STAINLESS STEEL M12X35 DIN-933 SCREW		
340120035300	HEXAG. HEAD	8	12
340120030090	A-4 STAINLESS STEEL M12 DIN-125 FLAT WASHER	12	13
340100110290	A-2 STAINLESS STEEL M10x110 DIN-931 SCREW	2	17
1450075	M10 DIN 985 STAINLESS STEEL HEXAGONAL SCREW	2	18
1421046	DIN-6885 DE 10X8X40 MIXED SPRING-CLIP	1	19
340080030301	W/ M8X30 DIN-933 STAINLESS STEEL HEXAG. SCREW	1	20
340080065424	M8 DIN 934 STAINLESS STEEL HEXAGONAL SCREW	1	21

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As standards, specifications and designs change from time to time, please ask for confirmation of the information given in this publication.



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