

**PM6 LOAD BREAK SWITCH DISCONNECTOR****TYPES :****S3 up to 24kV****S4 up to 36kV****INSTRUCTIONS FOR INSTALLATION,
SETTING INTO SERVICE AND
MAINTENANCE**

Leaflet 51107194M0-E

INDEX:

1. INTRODUCTION**2. DESIGN FEATURES AND APPLICATIONS****3. HANDLING, TRANSPORT AND STORAGE****4. INSTALLATION****5. TORQUE SETTINGS****6. SETTING INTO SERVICE****7. MAINTENANCE MANUAL****1.- INTRODUCTION.**

During the functioning of any item of HV equipment, certain elements of the unit are live, others may be subject to either continuous or occasional movement, and some components may reach relatively high temperatures. As a consequence of these factors, use of the unit implies certain electrical, mechanical and/or heat-related risks.

With the aim of providing an adequate level of protection for both staff and plant equipment, the development and construction of MESA products is guided by the principle of integral safety, based on the following criteria:

- Elimination of dangers wherever possible.
- When this is not technically and/or economically viable, the fitting of adequate safety devices to the unit.
- The provision of information on possible risks for the purposes of establishing operating procedures designed to avoid dangers, facilitate operating staff safety training programs and promote the use of proper protective clothing and similar equipment.

Ensure therefore that only properly trained and/or supervised persons are allowed to work on or near the equipment described in this manual (as stipulated by EN 50110). All operating staff should be familiar with the instructions and the safety precautions contained therein, along with any applicable general precautions based on current legislation (RAT, legislation covering accident prevention and safety at work, and any safety and hygiene laws that may apply).

Please observe this point carefully, as the safe and correct functioning of this equipment depends not only on its design, but also on general circumstances beyond the control and responsibility of the manufacturer - with particular reference to:

- Observance of adequate transport and handling procedures between the factory and installation site.
- Intermediate storage in conditions that will not result in alteration to or deterioration of any of the functions of the unit or its main components.
- Installation carried out according to the instructions given in this manual and the normal rules of correct procedure.
- Operating conditions corresponding to the design capabilities of the unit.
- Operation and use carried out strictly according to the instructions contained in the manual, accompanied by a clear understanding of the operating and safety principles involved.
- Adequate maintenance, carried out as required by the actual operating conditions.

2.- DESIGN FEATURES AND APPLICATIONS.

2.1.- Description.

The aerial remote-controlled PM6 switch disconnector is designed for use on public distribution networks, at 10kV to 38 kV. Basic components are:

- Three-phase cutout switch in SF6
- Electrical control.
- Manual control.
- Control cabinet, 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 cabinet.
 - Locally, with the manual control at the support base.

Several additional functions are available as options.

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 activated from the post base and control cabinet. In addition to the base apparatus a series of options is available, as shown in figure 2.

Their use limitations are defined in the application specifications referred to in section 2.2.2.

- 1- SF6 switch.
- 2- Electrical control.
- 3- M.V links to line.
- 4- Manual control rod.
- 5- Manual control.
- 6- Control. cabinet.
- 7- Anchoring structure.
- 8- Support chassis.
- 9- Lightning conductor.
- 10- Tension transformer.
- 11- Intensity pickup.

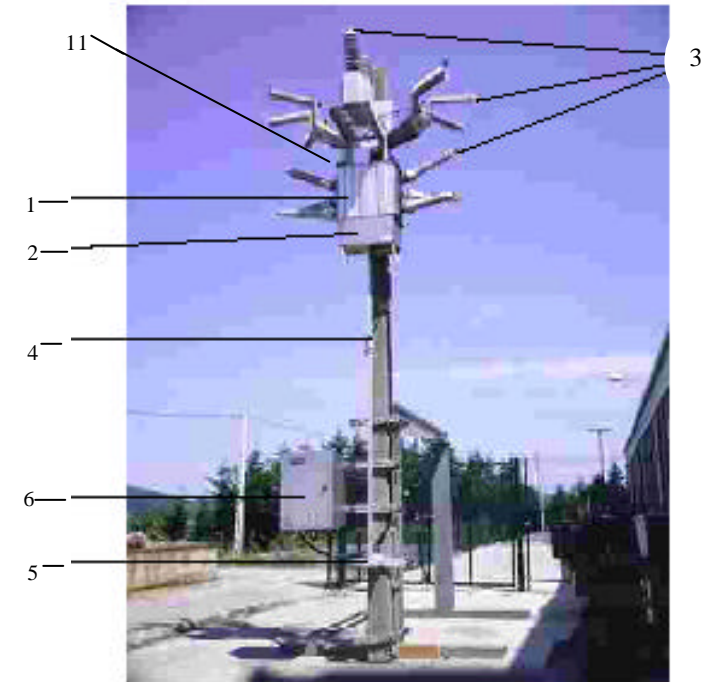
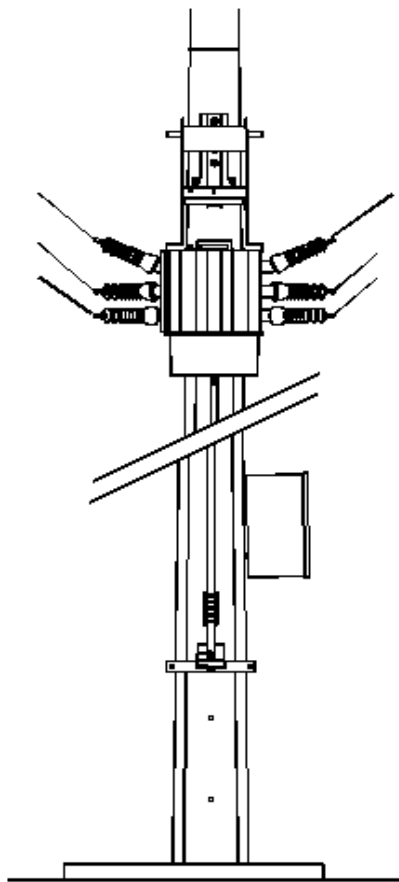
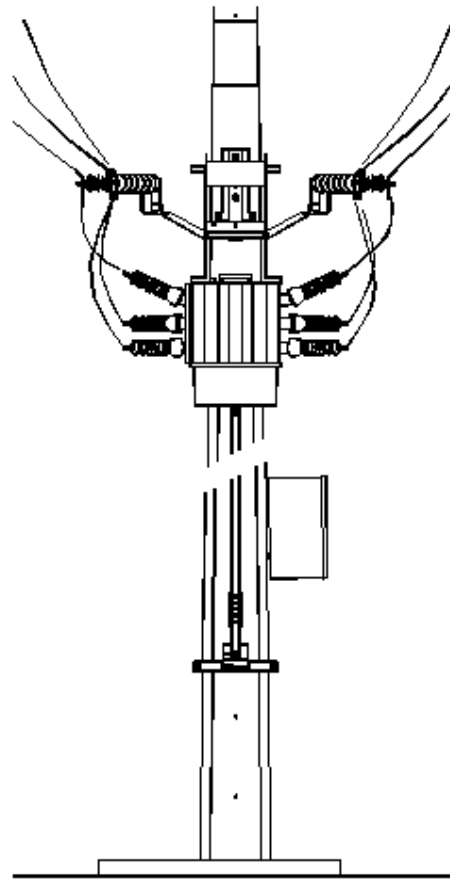


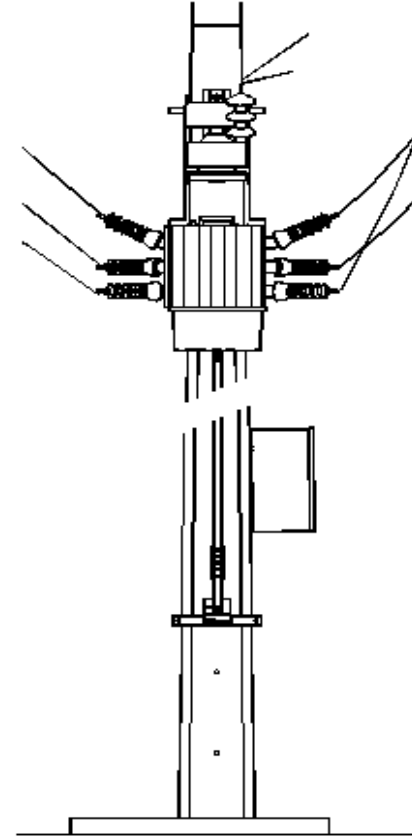
Figure 1



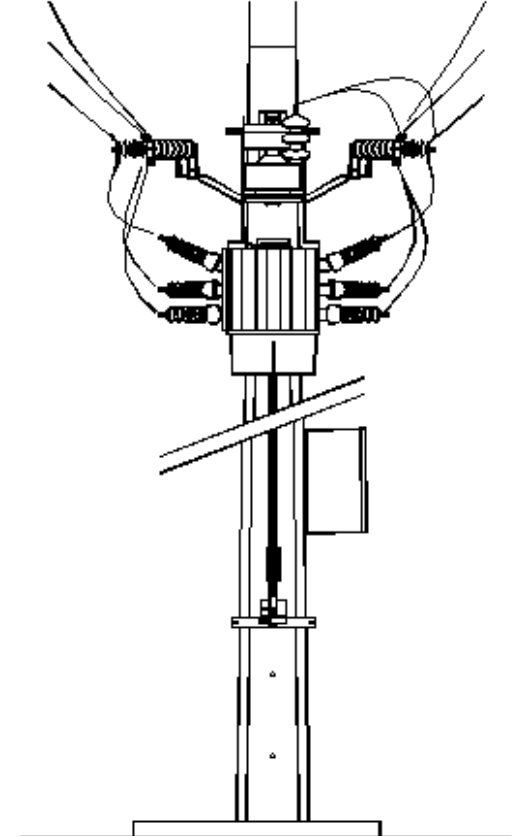
Basic option:
Direct connection to MV line.
 -- Switch and control set mounted on chassis.
 -- Manual control.
 -- Control cabinet.



Option 1:
Connection to MV line via lightning conductor.
 -- Switch and control set mounted on chassis equipped with lightning conductor.
 -- Manual control.
 -- Control box.



Option 2:
Direct connection to MV line, with power supply to box via tension transformer.
 -- Tension transformer installed on chassis.
 -- Manual control.
 -- Control box.



Option 1+2:
Connection to MV line via lightning conductor, with power supply to box via tension transformer.
 -- Switch and control set mounted on chassis equipped with lightning conductor and tension transformer.
 -- Manual control.
 -- Control box.

Figure 2



Option 3:

Fault detection. This function is carried out by the intensity pickups mounted on one side of the switch. The pickups detect the following:

Phase defect and homopolar current.

Two levels are available:

1st level

Phase intensity: 100 at 750 A , 50A passes
Homopolar intensity: 20 at 160 A , 5A passes

2nd level

Phase intensity: 100 at 750 A , 50A passes
Homopolar intensity: 3 at 25 A , 1A passes

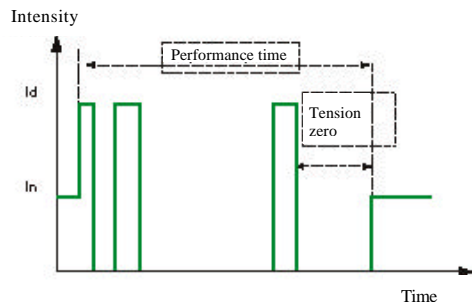
Fault information is displayed on an LED display situated inside the control cabinet, with a signalling contact.

Option 4:

Automated opening in tension zero of head disjunction recoupling cycle.

Automation is configured to open the switch after one, two, three or four defects. In order for the defect to be taken into account, it must last for a minimum of 50 ms. Two possible cases have been foreseen:

This option is only possible if associated with options 2 and 3.



2.1.1.- Description of control cabinet (TALUS 200P)

The control cabinet is composed of the following elements: (figure 3):

When cabinet is open, five items can be seen

- 1.- Rack 6U containing the set of electronic modules, including connection with MV switch.
- 2.- Location site for transmission interface (not supplied) and possibly external RTU
- 3.- Battery mounted on sliding tray.
- 4.- Supply transformer and safety cutoff.
- 5.- A mobile plate for fixing.
Optionally:
Interface terminals with the switchgear
Transformer for tension measurement.

- 6.- Lower part
Includes glands allowing cable entry.

* Consult user manual TALUS 200p.

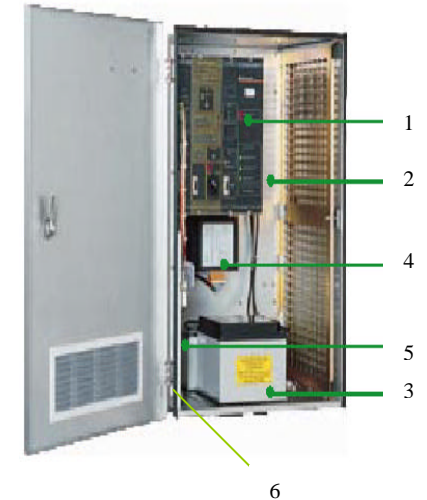


Figure 3

2.2.- Technical features.

2.2.1.- Electrical system characteristics

See table 6

2.2.2.- Applicable standards.

- ICE 60265-1/1998
- ICE 60298
- ICE 60694
- ICE 815

2.3.- Nameplate.

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

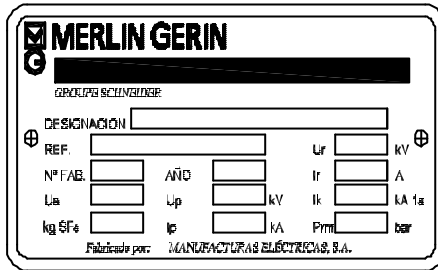


Figure 4

2.4.- Operating conditions.

PM6-S3 and PM6-S4 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 50°; min. temperature -25°C (-50 for S4)
- Altitude less than 1.000 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 unauthorised 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-S3 Y PM6-S4 switches may be delivered in seafreight 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 situation 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.

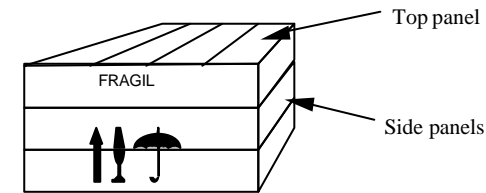


Figure 5

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 6-1) 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.



Figure 6-1

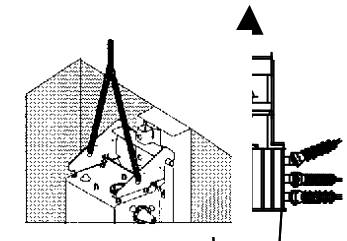
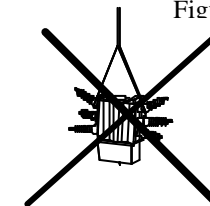
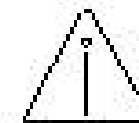


Figure 6-2

IMPORTANT NOTE

DO NOT USE THE CONNECTION-POINTS TO RAISE THE APPARATUS. FOLLOW FIGURE 6-2.



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.

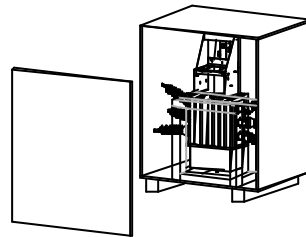


Figure 7

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.

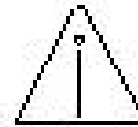
This should be carried out as follows:

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 assembly of the lightning conductor and the connectors and to allow 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 23)



When lifting the switch, special care must be taken to avoid damaging the ceramic parts, especially those of the transformer, as these are located very near to the elevation point

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 fitting to the post.

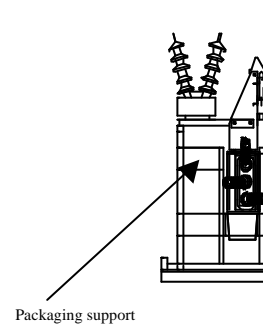
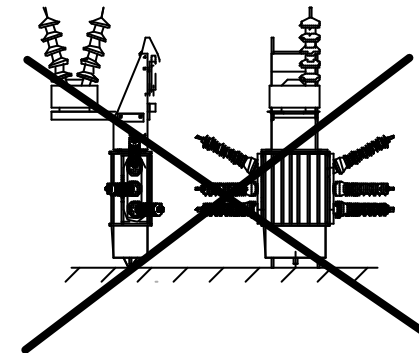


Figure 8



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)

CAUTION

- **The battery must not be stored for more than 3 years without being recharged.**
- **To help conserve the battery, do not use a car-type battery charger; use the T200P 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- Operation in Tension

- When carrying out jobs **under tension**, the transformer terminals must receive tension simultaneously in order to prevent induced tension phenomena that might damage the transformer. A proposal is outlined below for assembly procedure under tension based on a typical PM6 option. Please consult for other options.
- **Make a provisional by-pass in the line where the switch is to be installed.**

With the switch disconnecter open.

- Connect the side of the switch with no transformer to the line (Figure 9), in order to ensure that when the line is energised the transformer receives the charge simultaneously through the two primary terminals.

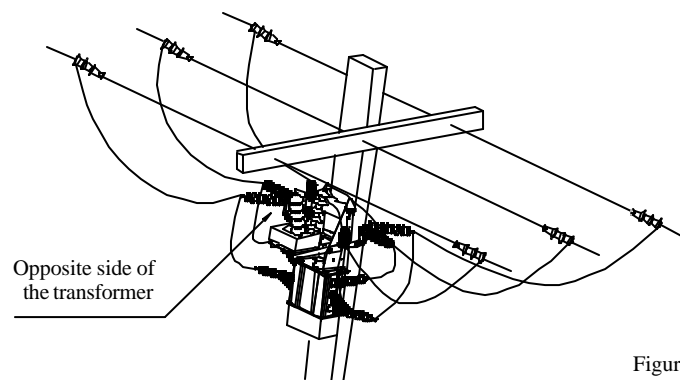


Figure 9

Once the three phases are connected switch off manually and wait for 15 minutes.

- Connect the three phases of the other side of the transformer to the line with switch in off position. (Figure 10).

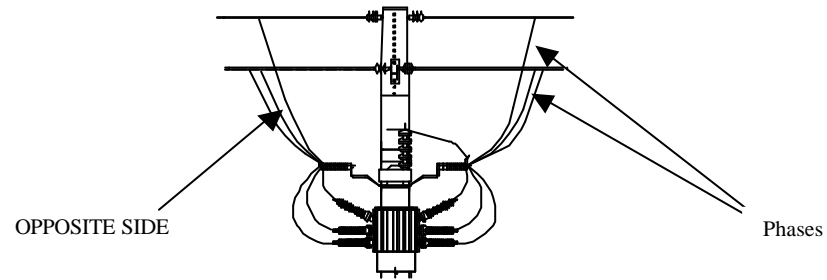


Figure 10

4.2.2.- Lightning Conductor Assembly

The lightning conductors are usually supplied dismantled and are mounted on the structure in the zone indicated in 11. For assembly, the screw set supplied has to be placed in the holes. (Screws must be tightened with a torque wrench or spanner. Torque setting 30N/m).

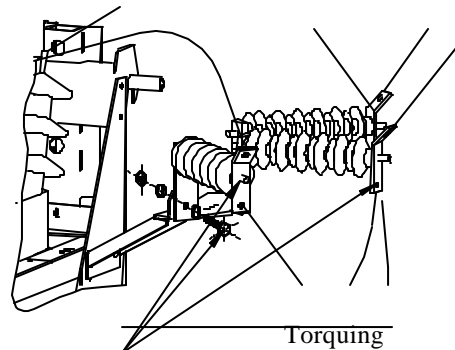


Figure 11

4.2.3.- Connector Assembly.

MESA supplies different types of connectors, TOUCHABLE connectors (figures 12 and 13) and UNTOUCHABLE connectors (figure 14).

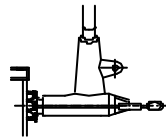


Figure 12

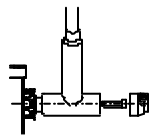


Figure 13

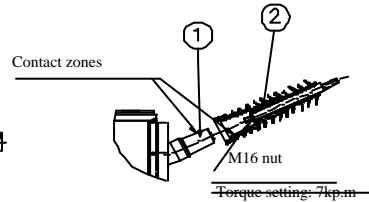


Figure 14

4.2.3.1- Unpacking the Untouchable Connectors.

The connectors must never all be unpacked at once. Unpack one at a time just before mounting in order to avoid dirt and deterioration by bumps or scratches.

4.2.3.2- Handling

To avoid dirt getting into the connectors during handling, the disposable gloves provided in the assembly Kit must always be used.

4.2.3.3- Cleaning Connectors and Sockets

Before mounting the connector on the socket the connector and socket must be cleaned as instructed in figures 15 and 16.

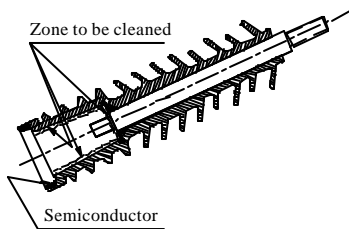


Figure 15

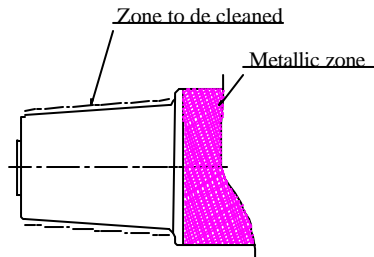


Figure 16

4.2.3.3.1 - Cleaning the Connector.

Using the gloves supplied with the KIT at all times, insert the isopropyl alcohol-soaked paper supplied in the KIT to the zones to be cleaned (figure 15) in a twisting motion inside the connector until clean. For less accessible areas, use wooden tool supplied with the KIT, twisting along with the isopropyl alcohol-impregnated paper.

CAUTION: Great care must always be taken in cleaning to avoid black rubber semiconductor residues (figure 15) in the contact zones between the connector and socket.

4.2.3.3.2 - Cleaning the Socket.

With the same paper used in the connector, proceed to clean the socket in the zone indicated in figure 16.

4.2.3.4 - Application of Grease

After cleaning, apply a thin layer of grease (supplied with the KIT). Apply 2/3 of the tube to the conical surface of the socket (Figure 17) and 1/3 to the connector zone indicated in figure 18. **Special care must be taken to avoid greasing the metallic zone in the socket indicated in figure 16.**

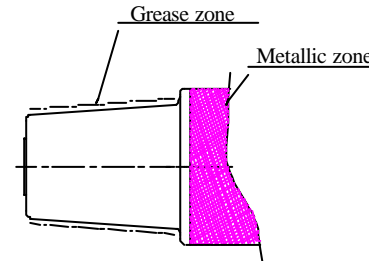


Figure 17

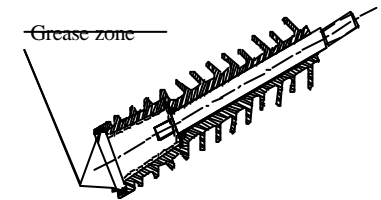


Figure 18

4.2.3.5- TOUCHABLE connectors

The touchable connectors are supplied with the cable mounted and must be fitted onto the socket in accordance with the manufacturer's instructions.

4.2.3.6- Assembly of UNTOUCHABLE Connectors onto Sockets

As indicated in section 4.2.2.1. connectors must be assembled one by one. After greasing, apply a drop of LOCTITE 480 (supplied with KIT) very carefully to the socket thread at 15 to 20 mm from the end (figure 19). Place the nylon thread in the connector as shown in figure 20 and proceed with assembly, pressing strongly in the direction of the socket shaft, turning clockwise until firmly screwed onto the socket. Once the connector is screwed onto the socket, firmly tighten the two M20 nuts and apply a torque setting of **70Nm** to the outer nut with a torque wrench (figure 21).

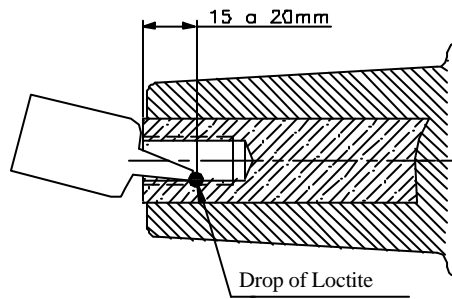


Figure19



Figure 20



Figure 21

CAUTION.

Connector and lightning conductor assembly must be carried out **WITHOUT TENSION**

After checking the torque setting of the connector, no torque pressure above 20Nm must be applied in anticlockwise direction to the connector or connections to be screwed onto this connector.



Figure 22

4.2.3.7- Extracting the nylon thread

Once the assembly has been carried out, proceed with extraction of the nylon thread. After extracting the thread, the connector must be turned gently in both directions to eliminate the marks produced in the grease during extraction.

4.2.4.- Fitting the unit

Take into account the supporting face where the apparatus is to be installed, so that the tension transformer remains supplied even although the switch is open.

4.2.5.- Location and structure.

MESA is not responsible for layout considerations
The PM6-S3 and PM6-S4 switches can be mounted in a vertical position, on a wooden, concrete or metal post.

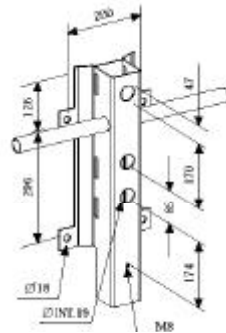


Figure 23

- * 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.

4.2.6.- 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

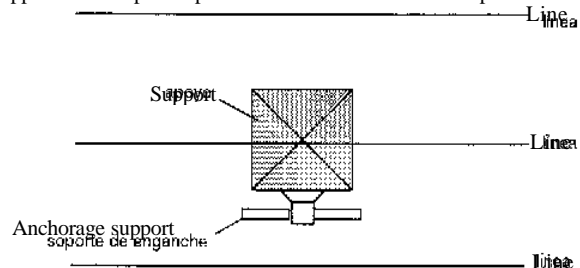


Figure 24

. Wooden or concrete support:

A.- Attachment using metal bands, regardless of the diameter of the post (figure 25).

B.- Attachment using stud bolts, of sufficient length to go through the metal clamps, regardless of diameter. (figure 26)

C.- Fixing by brackets and screw rods. The diameter must be less than mid-axis of fixation. (figure 27)

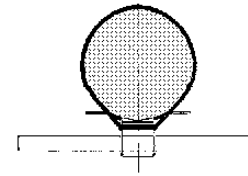


Figure 25

Metal-band attachment:
Whatever the diameter of the support.

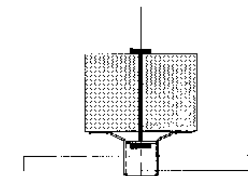


Figure 26

Screw-bolt attachment:
Support for a rectangular post.

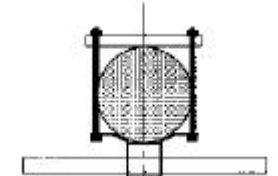


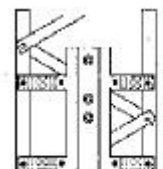
Figure 27

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 28):

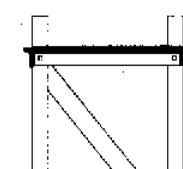
CAUTION: The minimum acceptable distance between the active parts and metallic supports must be maintained.



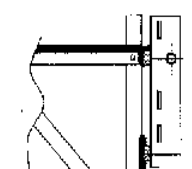
The required metal brackets must be made for use with a metal framework : for two cross-spans



...or a plate



Certain metallic supports may have L-shaped angles.



In these cases, anticipate crossbeams to compensate for projection-width

Figure 28

4.2.7.- Installation of Talus 200P control cabinet.

The cabinets have been designed for fitting to the post with either metallic bands or support grips and bolts;
The user should manufacture the plates. (figure 29)

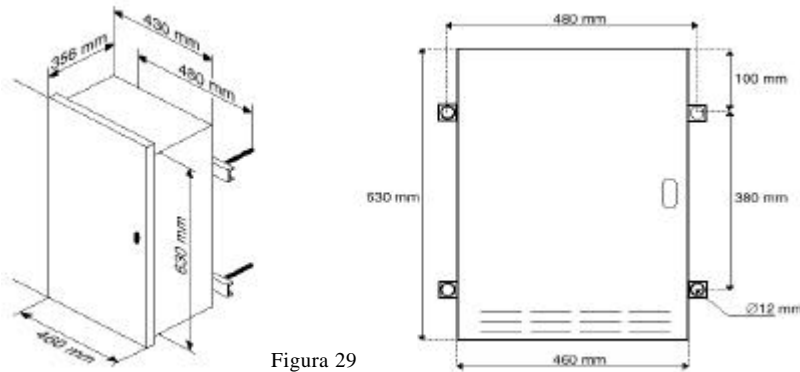


Figura 29

4.2.8.- Fixing the manual control.

The user must manufacture the metal fittings to anchor the cabinet to the post.
Dimensions of manual control support plate. (figure 30)

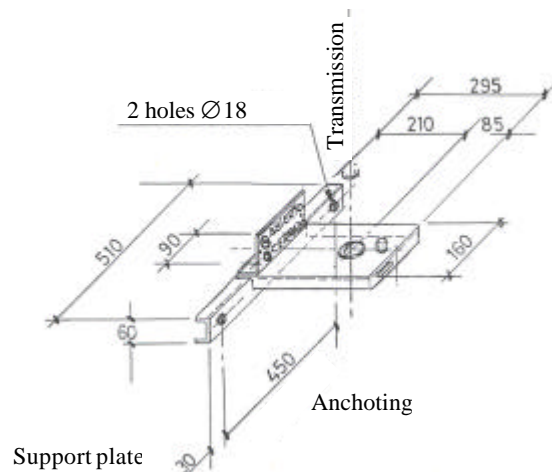


Figure 30

Take the following points into account before drilling into any part:

- a)- Make sure that the functioning of the apparatus will not be affected.
- b)- The anchoring base must provide solid support.
- c)- Clean up rough edges and burrs.
- d)- Protect the drilled holes:
 1. Apply a thick coat of zinc chromate-based cold galvanising paint (96% min. of powdered zinc.)
 2. When dry, apply a topcoat of neutral varnish designed for outdoor use.

Preliminary notes:

For alternative installations that cannot be carried out by adapting this information, 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.

4.2.9.- Space required

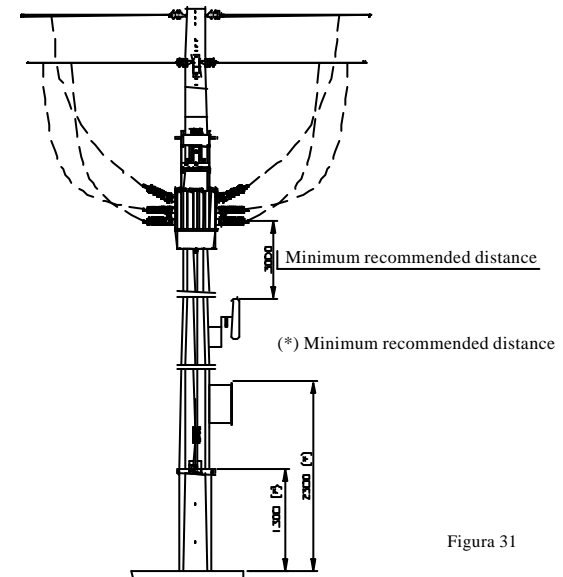


Figura 31

4.3.- Lifting, levelling 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, so that the tension transformer remains supplied even although the switch is open.

Assembly:

Follow unpacking instructions, point 3.3



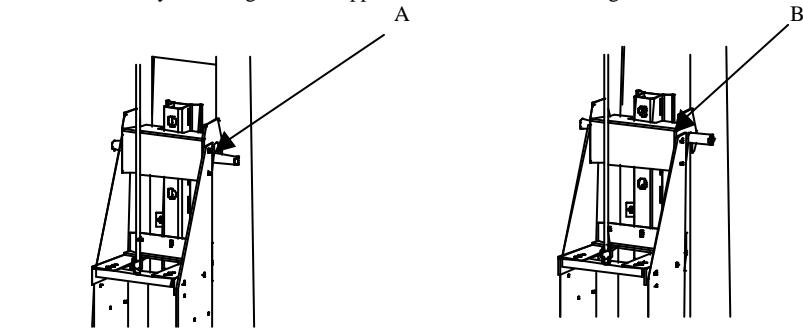
When lifting the switch, special care must be taken to avoid damaging the ceramic parts, especially those of the tension transformer, as they are located very near to the elevation point.

In addition:

Lift the switch with the aid of a hoist, introducing the cables through the suspension ring situated on the chassis. (figure 6.2)

Lift the switch, avoiding the support shaft A.

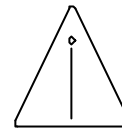
- Lower switch carefully, checking that the support is situated in the central groove of the frame, B.



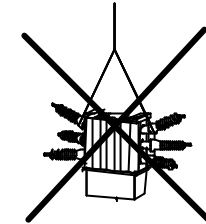
Raise the apparatus, passing support axle.

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

Figure 32



**IMPORTANT
DO NOT HOLD BY TERMINALS**



- **Fix apparatus to support by bolt M8x25** (figure 33)

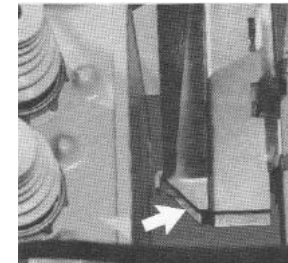


Figure 33

4.3.2.- Manual control.

- The transmission tubes are provided in separate packaging. The lower part of the control, the activating lever (figure 34) and the connecting parts of both tubes (figure 39) are to be found inside the same packaging as the switch.

The switch is delivered in the **OPEN** position indicated at the bottom of the switch (see figure 45)

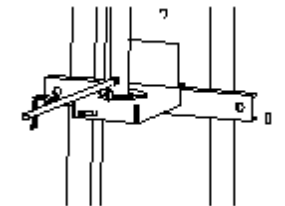


Figure 34

Proceed with Manual Control installation as follows::

1. Position the upper tube in the switch shaft, placing the anchor bolt in the upper cylindrical hole, position 1 of figure 35

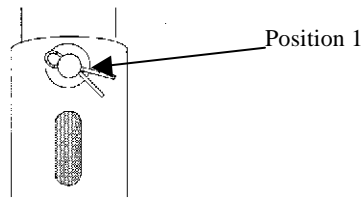


Figure 35

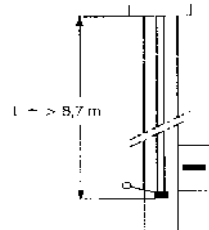


Figure 36

2. Turn the tube in the direction indicated by the arrow, open turn direction, see figure 37.

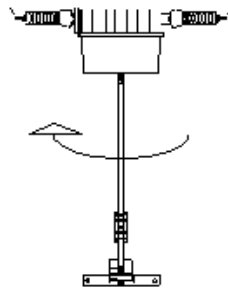


Figure 37

3. Turn the tube in the direction indicated by the arrow, open turn direction, see figure 37

4. Position the drive base so that it remains as vertically in line as possible with the down tube (Figure 38). The tube can be placed at an angle of up to $< 0.5m$. At the 8 m. height of the transmission, take into account the necessary angle, incline also the base of the control unit to an angle of 90° . Attach the OPEN/SHUT sticker.

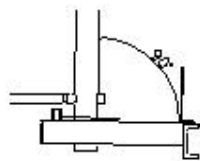


Figure 38

5. Cut the tube or tubes if required and position the connecting piece (figure 39), place the lower tube in the fully open position (Figure 40) and tighten the clips on the connecting piece.(Figure 41).

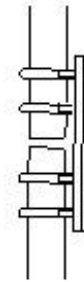


Figure 39

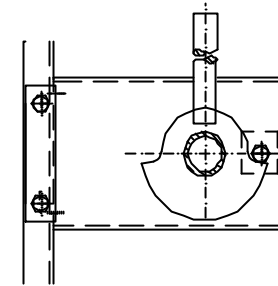


Figure 40

6. Once the apparatus has been fitted, pass the bolt from position 1 to 2 (figure 41), checking that the opening and closing operation functions correctly.

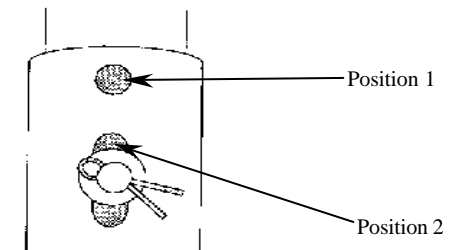


Figure 41

7. The operating lever can be set to three positions, which coincide in the grooves of the lower transmission tube. Depending upon each of these positions or grooves, operation is as follows:

- a) OPEN: remote control is blocked.
 - b) REMOTE CONTROL: open/close available by remote control.
 - c) CLOSED: remote control is blocked.
- The operating lever positioned inside the lower part of the tube is set to three positions a), b) and c) (Figure 42) and is retained in any one of them by one, two or three padlocks.

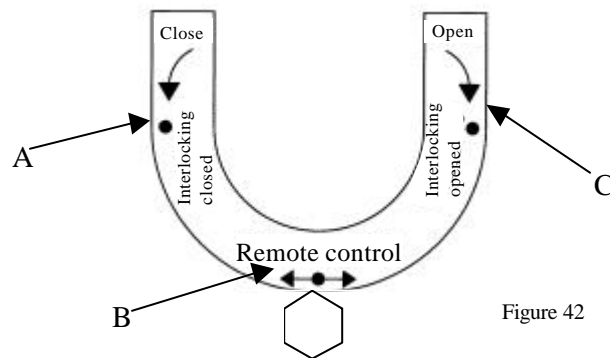


Figure 42

4.3.3.- Control cabinet.

The control cabinet should be situated at the selected height, on the anchor supports as in figure 29

4.5.- Adjustment and final check.

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

- a) 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 45) and check that the indicator turns to (I) by carrying out a closing operation.(figure 46)
- c) Operating direction for opening and closing, as well as the remote control position are both indicated on the solid front control panel (figure 42)



Figure 43

- d) Check that the apparatus closes 5° before the end of run (5 mm on front control panel). Proceed in the same way when opening. (figure 43)

- e) Check all nuts and bolts for tightness (attachment to structure, transmission units, etc.)..
- c) Do not paint the hinge points or the articulations of the different set components, as this may hinder manoeuvring.
- d) Check the control unit for correct functioning, paying special attention to correct visual signal display.
- e) Lubricate all articulations and hinge points on the controls. After checking for free movement several times, wipe off any surplus grease. (See list of lubricants in table 5, section 7).-
- f) Operate switch to check for correct functioning.
 - Perform several manual opening and closing operations and check switch signalling: - O open (figure 45)
 - I closed (figure 46)

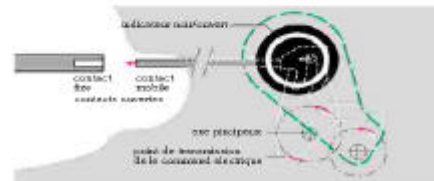


Figure 45



Figure 46

- g) 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

Torque settings

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

Table 3

CONNECTIONS

Base apparatus and options 1 + 2.

Connection plates: grease and brush before connecting. (figure 47 and 48)

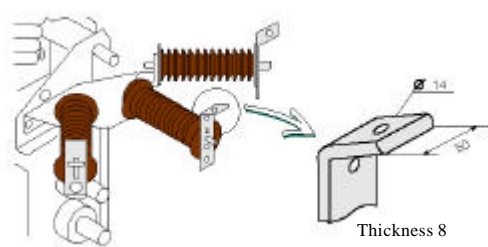


Figure 47

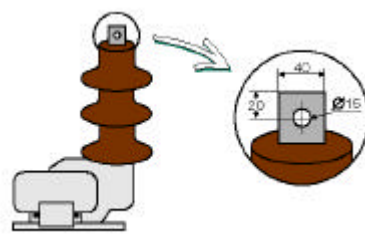


Figure 48

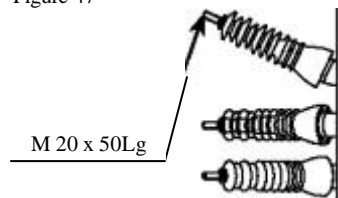
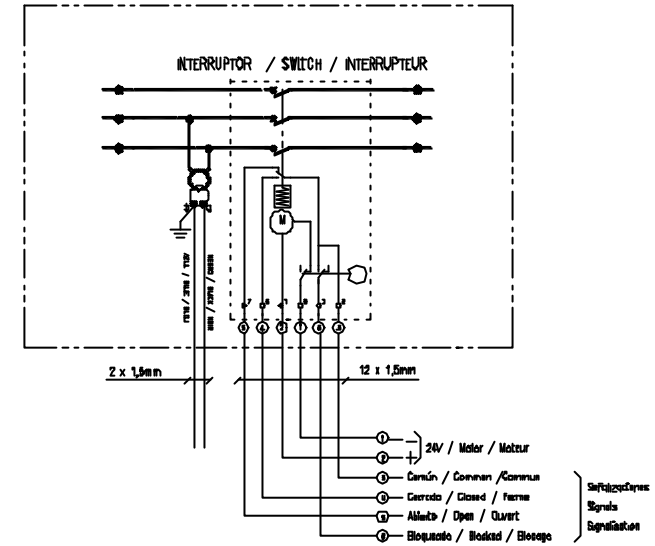


Figure 49

L.V. wiring



6.- SETTING INTO SERVICE

Do not commence the setting into service of the unit without first carrying out all the checks listed in section 4.6 and ensuring that all the different systems involved are functioning perfectly.

1.- Operating lever.

The operating lever is on the inside of the switchgear (rudders) and interlocked with the front of the emergency manual control (figure 50)



Figure 50

2.- Manual emergency operation.

To open manually: Turn the right control lever clockwise from the remote control position.
To close manually: Turn the left control lever anticlockwise from the remote control position.

3.- State of switch.

Switch open: The position indicator below the control is black. (figure 45)
Switch closed: The position indicator below the control is white. (figure 46)

4.- Operating safety.

Lock in open position (lever on the right) or in closed position (lever on the left) to block all electrical controls (local or remote control).

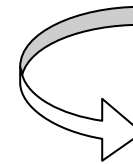
Locking is possible in the 3 positions: remote controlled, open or closed.

5 Local or remote control operations.

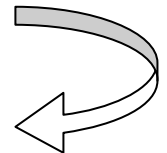
Before locking the operating lever, the electrical control of the PM6, either local or remote control, must be set to central position, (figure 52)

6.1.- Manual operation.

Opening and closing operations (figure 51)



CLOSE



OPEN

Figure 51

Position for electrical operation (figure 52)



Figure 52

6.2.- Interlocking.

Interlocking can be carried out by means of 1 or 3 padlocks in any one of three possible positions (figure 53):

- remote control
- open
- closed



Figure 53

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

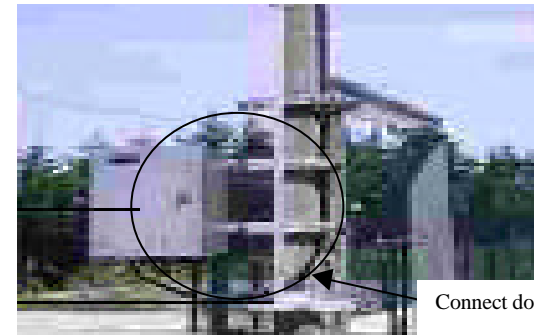


Figure 54

Connect down cables

- Check that the switch is open in O position. If not, open with manual lever. (Figure 45 and 46)

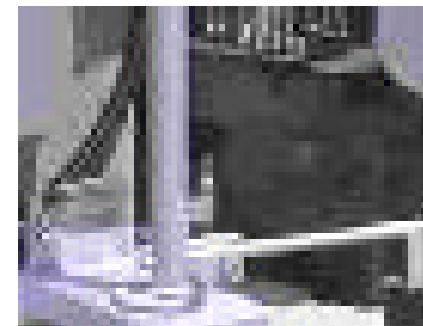


Figure 55

7.1 Procedure

Components	Action
Nuts and bolts	- Check torque settings (See table 3)
Current carrying parts and contacts	- Check connections
Drive system	Check: - Correct operation during manoeuvres
Barrel	- Clean with domestic detergent for Stainless Steel.

Table 4

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 cloth and appropriate solvents. - Apply two coats of paint using a small brush. - When the paint is dry, apply a coat of varnish.	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 same characteristics as the defective component.

The guarantee is limited to the supply, in the shortest time possible and without charge, of a part with the same characteristics as the defective component.

The main characteristics of the switches are as follows :

In accordance with I.E.C standards

Assigned tension		S3 24 kV	S4 36 kV	
Insulation level				
Effective kV , 50HZ, 1min.	In relation to mass	50	70	
	To sectioning distance	60	80	
Shock wave kV, 1,2/50 µs	In relation to mass	125	170	
	To sectioning distance	145	195	
Cutoff power (A) (Efficient value)	Main active charge (cosφ=0,7)	400/630	630	
	Charge in loop (cosφ=0.7)	400/630	630	
	Transformer empty	10	20	
	Line empty	10	10	
Shutoff power	kA.(peak value)	31.5	31.5	
Short-term intensity	kA. (effective value) – 1 second	12.5	12.5	
	kA. (peak value)	31.5	31.5	
Maximum nominal tension effective kV (type of tension assigned: 34.5 effective kV)		S4	38kV	
Assigned tension supported with flash type impulses, peak kV		150		
Test at low frequency, kV effective: 1 min in dry/10 s wet		70/60		
Intensity assigned at 60 HZ, A		600		
Instantaneous current and asymmetric excess shutoff current, effective kA		18,5		
Symmetrical current 1 s, effective kA		12.5		
Symmetrical current 10 s, effective A		3800		
Other features				
Operating temperature (C)	maximum	+50	+50	+50
	minimum	-25	-50	-50
Mechanical endurance	(cycles CA)*.	5000	5000	5000
Protection level	Safety box	IP67	IP67	IP67
	Control cabinet	IP55	IP55	IP55
Motor reducer	Maximum manoeuvring time (s)	7	8	8
Gas SF6		0.67Kg		
SF6 pressure		0.3bar		

Table 6