

Installation • Assembly • Start-Up
Use • Maintenance • Repair

HYDRAULIC POWER UNIT 1 1/4" 1 1/2"

MP sava3

SUMMARY OF MODIFICATIONS IN REGARD WITH THE PREVIOUS VERSION:

MTHDsava3_600

INDEX SECTION	DESCRIPTION OF THE MODIFICATION	MODIFICATION CONCERNING			
		Physical Product	Functions Features	Figures	Writing
8.	The "Pressure test" for commissioning as per standards EN 81-2 and EN 81-20 has been inserted	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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0 • INDIVIDUAL PROTECTION EQUIPMENT

Neither the tools nor the individual protection equipment are included in the pack.

Individual Protection Equipment

- Helmet
- Anti-cut gloves
- Reinforced boots
- Safety belt
- Goggles or shield
- Back belt

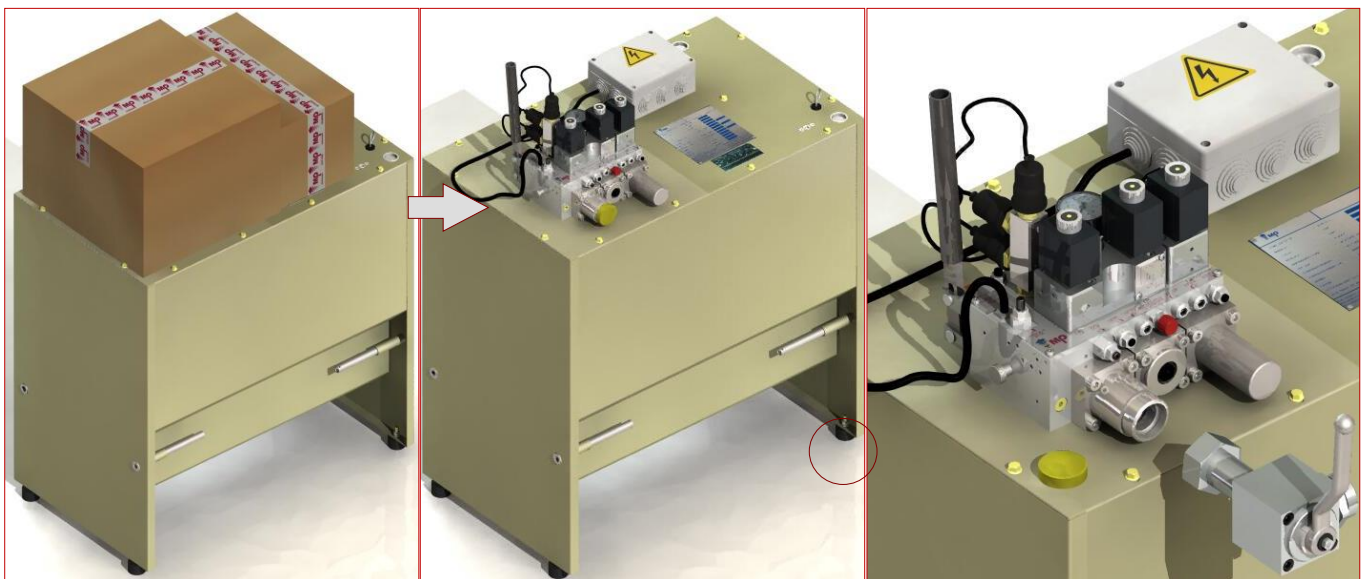


1 • HYDRAULIC POWER UNIT

1.1. Mechanical assembly

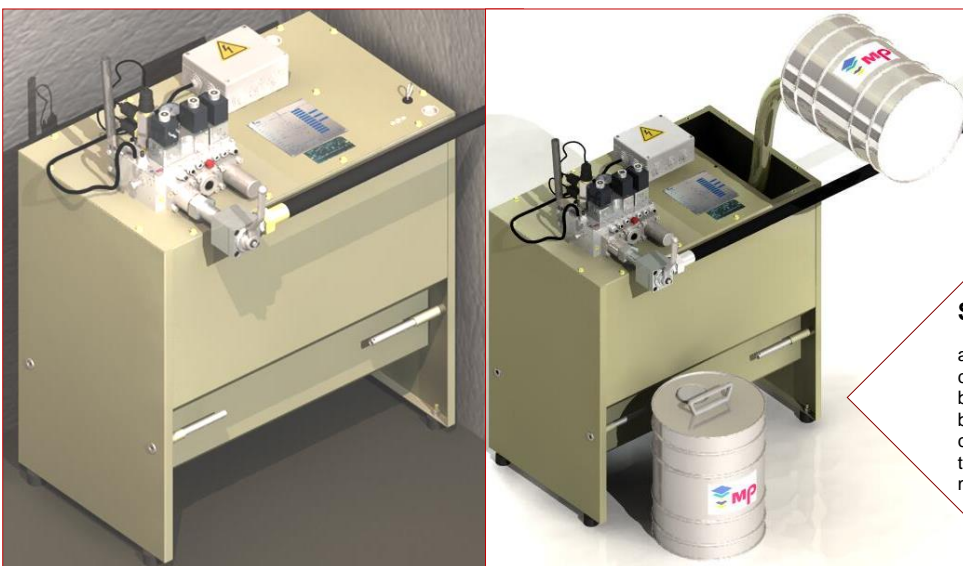
1. The power unit packaging contents the fitting box. Unpack all the assembly and place the power unit at the final position at the installation correctly supports on its four anti-vibration rubber feet.

2. Fit the lever of the hand pump and connect the shut-off valve to the input of the power unit (cylinder and power unit fitting boxes).



3. Take the hydraulic hose from the hole to connect to the power unit and to the rupture valve on the cylinder.

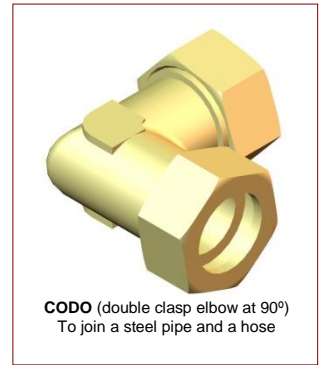
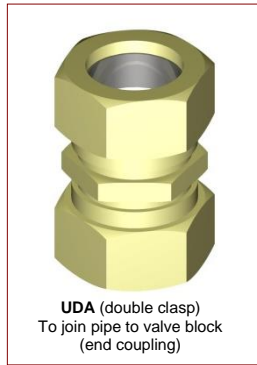
4. Fill the tank



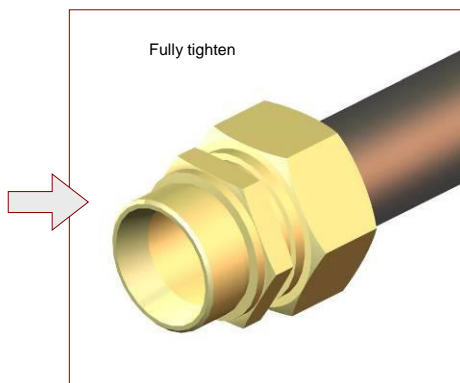
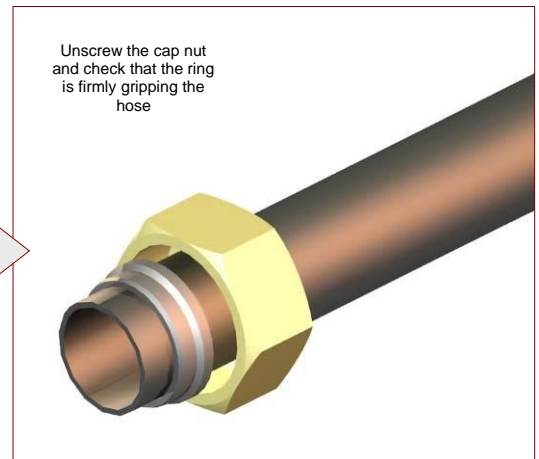
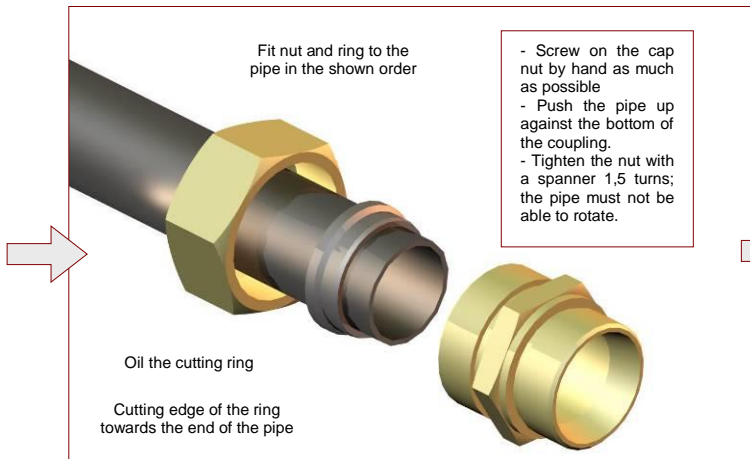
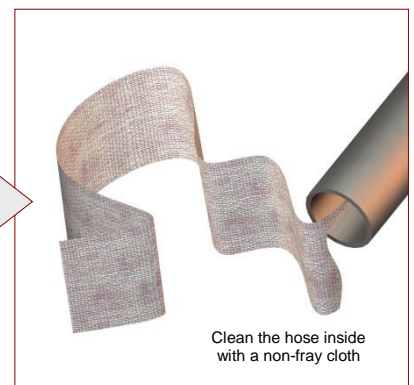
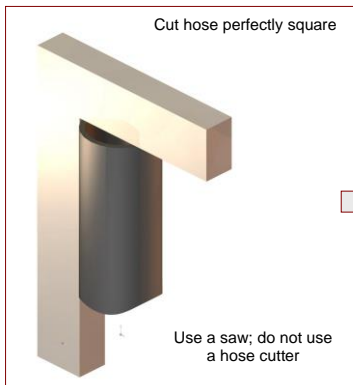
STEPS TO FOLLOW

- a) Remove the tank cover and check the cleaning of the tank (dry and no dust)
- b) Fill the tank with hydraulic oil avoiding making bubbles.
- c) The oil level must be at least 10 cm higher than the motor surface level at the moment of maximum expansion of the cylinder.

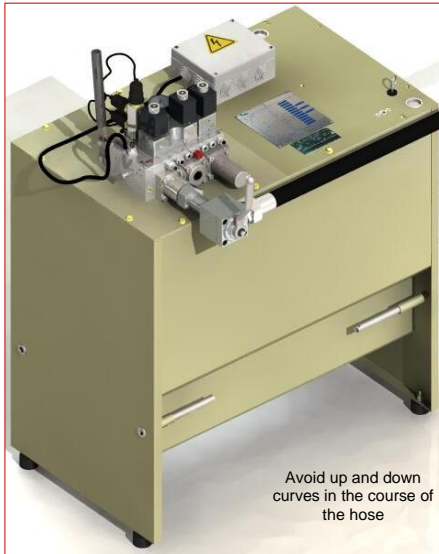
1.2. Types of pipe couplings



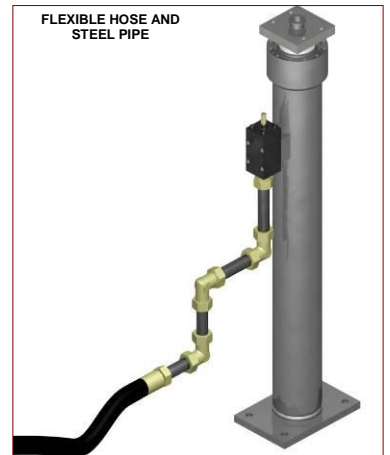
1.3. Process for joining steel pipes



1.4. Steel pipes and flexible hoses

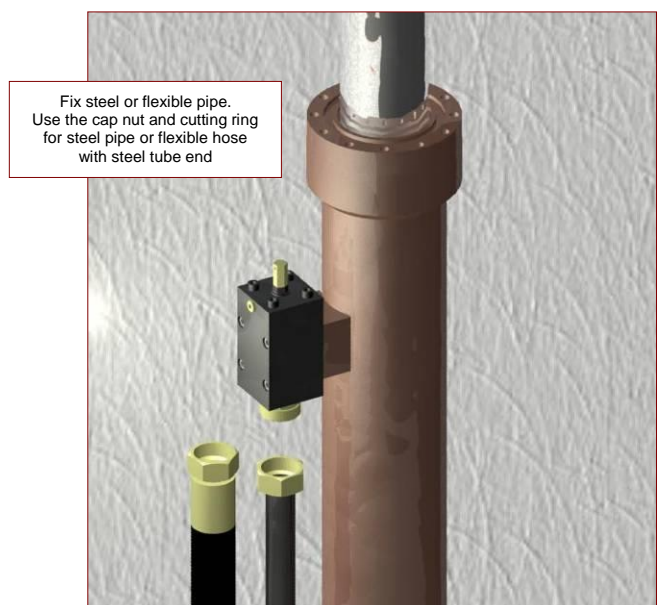
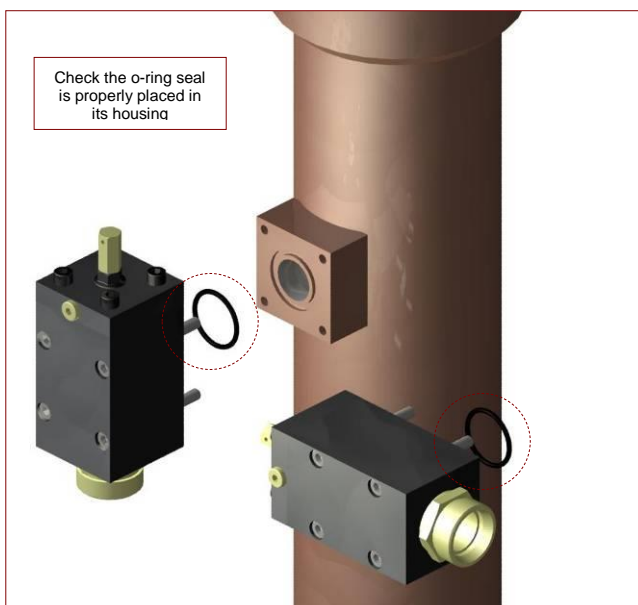
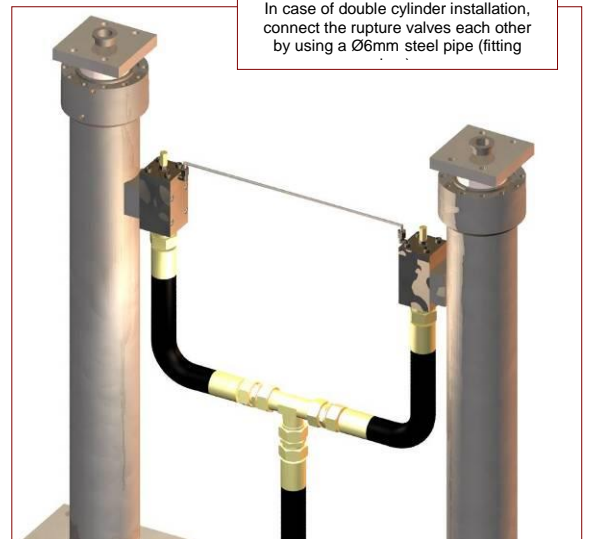
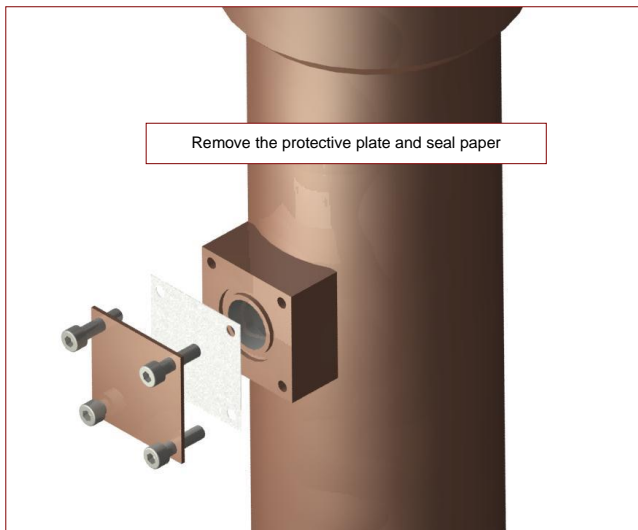


Recommended for lengths ≤ 10 m
Avoid leaving the hose completely straight

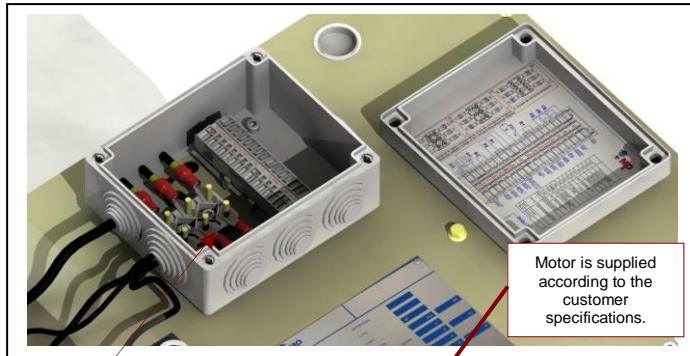


IMPORTANT:
Use for lengths > 10 m.
Assemble a piece of Flexible Pipe behind the Rupture Valve as well as between the Rigid Pipe and Power Unit.

1.5. Rupture valve

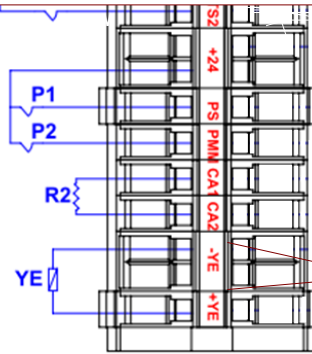


1.6. Electrical connections for 3-phase motors



Motor is supplied according to the customer specifications.

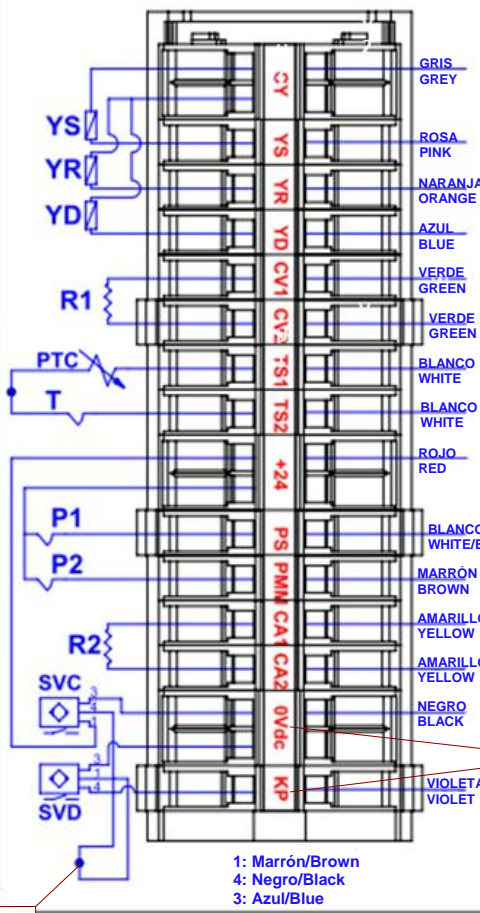
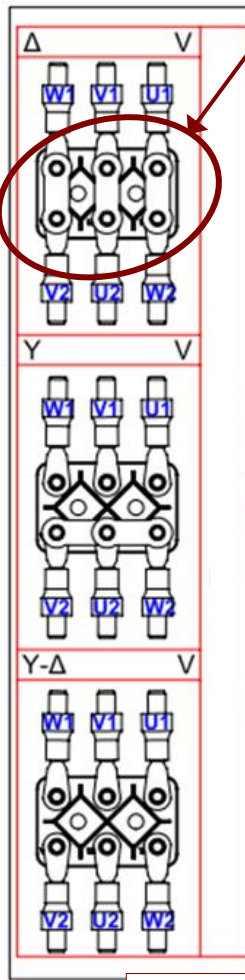
Connection considering Emergency Valve



+24	VDC	
PS	P1	Presostato P-Switch
PMM	P2	Presostato.Pmax/Pmin P.Swith. Pmax/Pmin
CA1	R2	Resistencia. Depósito Tank Oil Heater
CA2		Resistencia. Depósito Tank Oil Heater
-YE		Electroválvula YE
+YE		Electroválvula YE

THE EMERGENCY VALVE WILL NOT BE INCLUDED IN POWER UNITS THAT SHOULD BE IN ACCORDANCE WITH THE EN 81-2+A3 AND EN 81-20 STANDARD

Connection according to EN 81-2+A3 and EN 81-20/50



CY		Común electroválvula Common Electrovalve
YS		Electroválvula YS Electrovalve YS
YR		Electroválvula YR Electrovalve YR
YD		Electroválvula YD Electrovalve YD
CV1	R1	R. Calentamiento Valv. V.Block Heater
CV2		R. Calentamiento Valv. V.Block Heater
TS1		PTC
TS2	T	Termosonda T.Switch
+24	VDC	
PS	P1	Presostato P.Switch
PMM	P2	Presostato.Pmax/Pmin P.Swith. Pmax/Pmin
CA1	R2	Resistencia. Depósito Tank Oil Heater
CA2		Resistencia. Depósito Tank Oil Heater
OVdc		OVdc
KP		Salida sensores Output Sensors
SVC		SVC Sensor
SVD		SVD Sensor

Submerge the heater resistance into the oil (Optional component)

EN 81-2+A3
EN 81-20
2014/33/EU

- 1: Marrón/Brown
- 4: Negro/Black
- 3: Azul/Blue

CONNECTION

Δ Connection
Motors delta connected:
50 Hz
- 230/400 (mains 230 V)
- 400/690 (mains 400 V)
- 415/720 (mains 415 V)
60 Hz
- 220/380 (mains 220 V)
- 380/660 (mains 380 V)

Y Connection
Motors star connected:
50 Hz
- 230/400 (mains 400 V).
60 Hz
- 220/380 (mains 380 V).

Y-Δ Connection
Motors star-delta connected:
50 Hz
- 230/400 (mains 230 V).
- 400/690 (mains 400 V).
- 415/720 (mains 415 V).
60 Hz
- 220/380 (mains 220 V)
- 380/660 (mains 380 V)

Warning:
Y-Δ starting is possible only if the motors are wound for the voltages shown in these diagrams.

NOTE:
Once the installation is finished, check the motor turns to the 'right'; should it turn to the left, the pump is very noisy. In this case, reverse the polarity of the motor wiring (change two of the phases).

1.7. Sart-up

1. The oil supply line (flexible hose or steel pipe) should be as short as possible and without sharp bends.
2. Make sure the pipe is in line with the connection and the joints are made as indicated in the technical manual.
3. Before assembling the pipe line, make sure the pipes are smooth and deburred. Clean the inside of the pipes with a lint free rag.
4. Loosen the air bleeder screw in the cylinder head.
5. Rotate the pump at low speed until oil comes out of the air bleeder hole. Then close and tighten the oil bleeder screw.
6. During the installation, repeat the bleeding operation to remove any accumulated air.

NOTE:

- Before pouring oil into a tank which may have been exposed to excessive humidity or opened to the air, remove the cover and check there are no trace of moisture. Dry out the tank if necessary.
- Switch on the motor to check the turning direction. If the noise coming from the unit is excessive, the motor may be turning in the opposite direction.
- If the temperature of the machine room is very cold or very wet, the oil has to be heated.
- The manometer should be connected only when used by the installer.
- Check the rupture valve.
- After all adjustments have been made, seal the caps of all the valves.

NOTE:

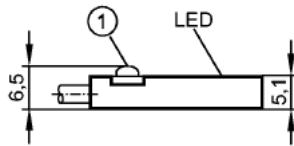
- **YS** → the name of this valve is defined by the chosen configuration equipment. Then it will be:
 - Y-Δ Electrovalve.
 - Soft-Stop Electrovalve.

VERY IMPORTANT

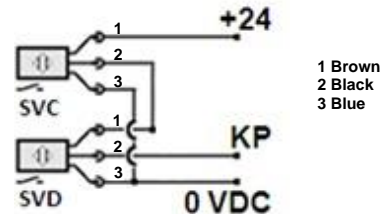
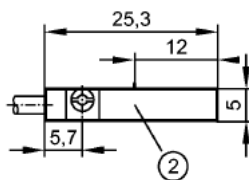
The factor service of our motors is 40%. Consequently, in inspection speed, you have to remember that, during one minute time, the lift will be working for 20 seconds and resting for 40 seconds.

In the same way, during any t time period, it will be working for 0,4 t and resting for 0,6 t.

1.8 Wiring of Magnetic Sensors.



- 1: Eccentric fixing
2: Active area



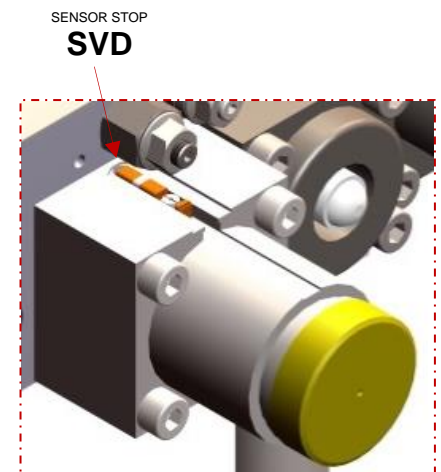
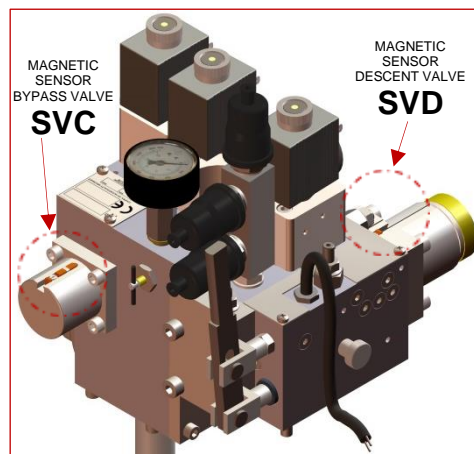
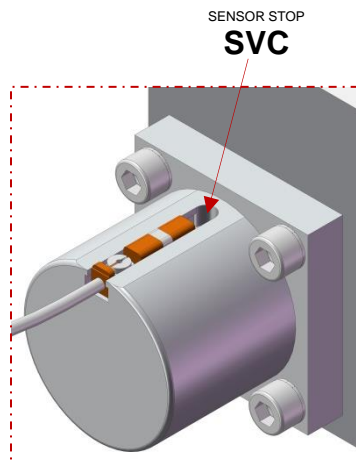
Proper position of Sensor SVC:

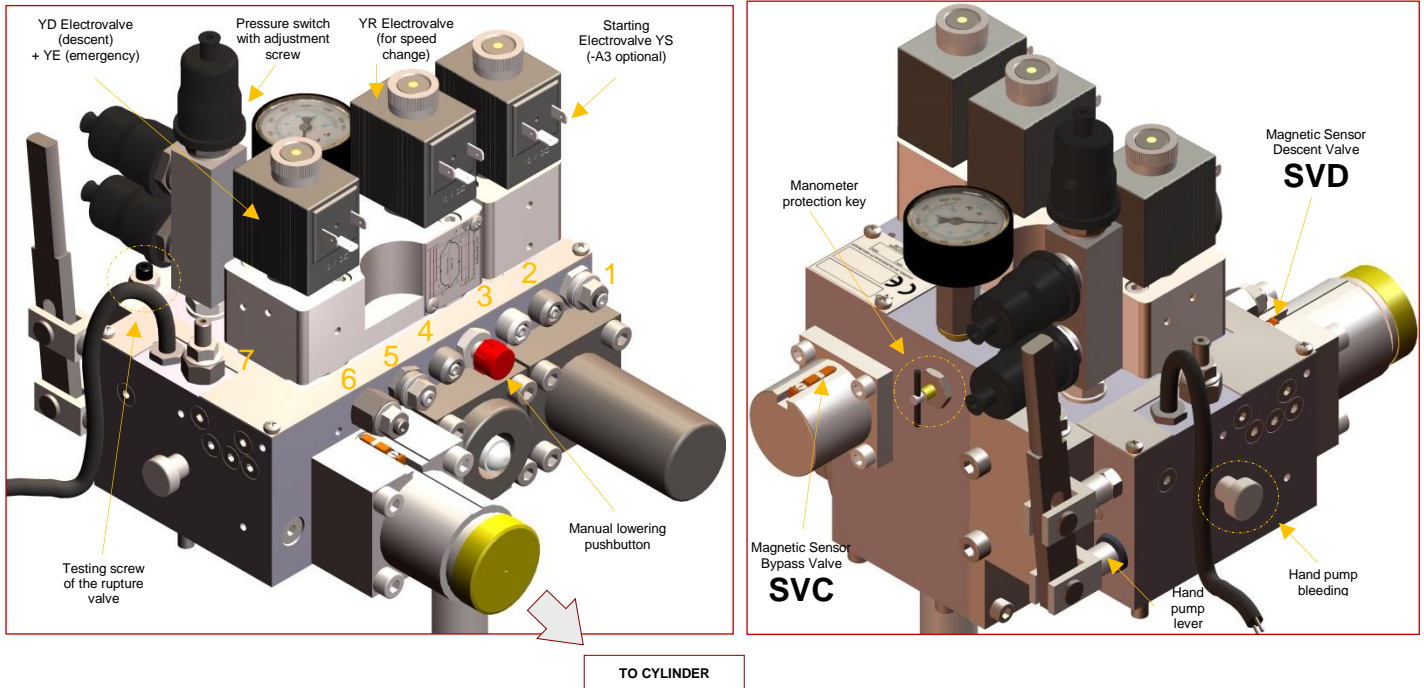
The lift being in idle state, the sensor SVC shall be located as far as possible to the limit and its led shall be lit



Proper position of Sensor SVD:

The lift being in idle state, the sensor SVC shall be located as close as possible to the limit and its led shall be lit



2 • BLOCK OF VALVES
2.1. MP sava3 Valve Block according to 2014/33/EU European Standard
2.1.1. Description of valves


Names of adjusting screws

- 1: Pressure relief valve adjustment
- 2: Upwards acceleration adjustment
- 3: Upwards/downwards acceleration adjustment
- 4: Levelling speed adjustment
- 5: Down speed adjustment
- 6: Cylinder minimum pressure adjustment.
- 7: Relief valve adjustment into hand pump.

2.1.2. Unit operation

Connected	Adjustment	FLOOR	Adjustment	Connected
YS-A3	YD	YR	FLOOR	YR MOTOR YS-A3

A Point Upwards deceleration signal.
Place at an S distance from the floor level equal to

$$S(m) = \frac{v^2}{0.7} + 0.2 = 0.77 \text{ m ; for } v = 0.63 \text{ m/s}$$

B Point Disconnected motor signal.

C Point Downwards deceleration signal.
Place at an S distance from the floor level equal to

$$S(m) = \frac{v^2}{0.7} + 0.2 = 0.77 \text{ m ; for } v = 0.63 \text{ m/s}$$

D Point YD Electrovalve disconnection signal

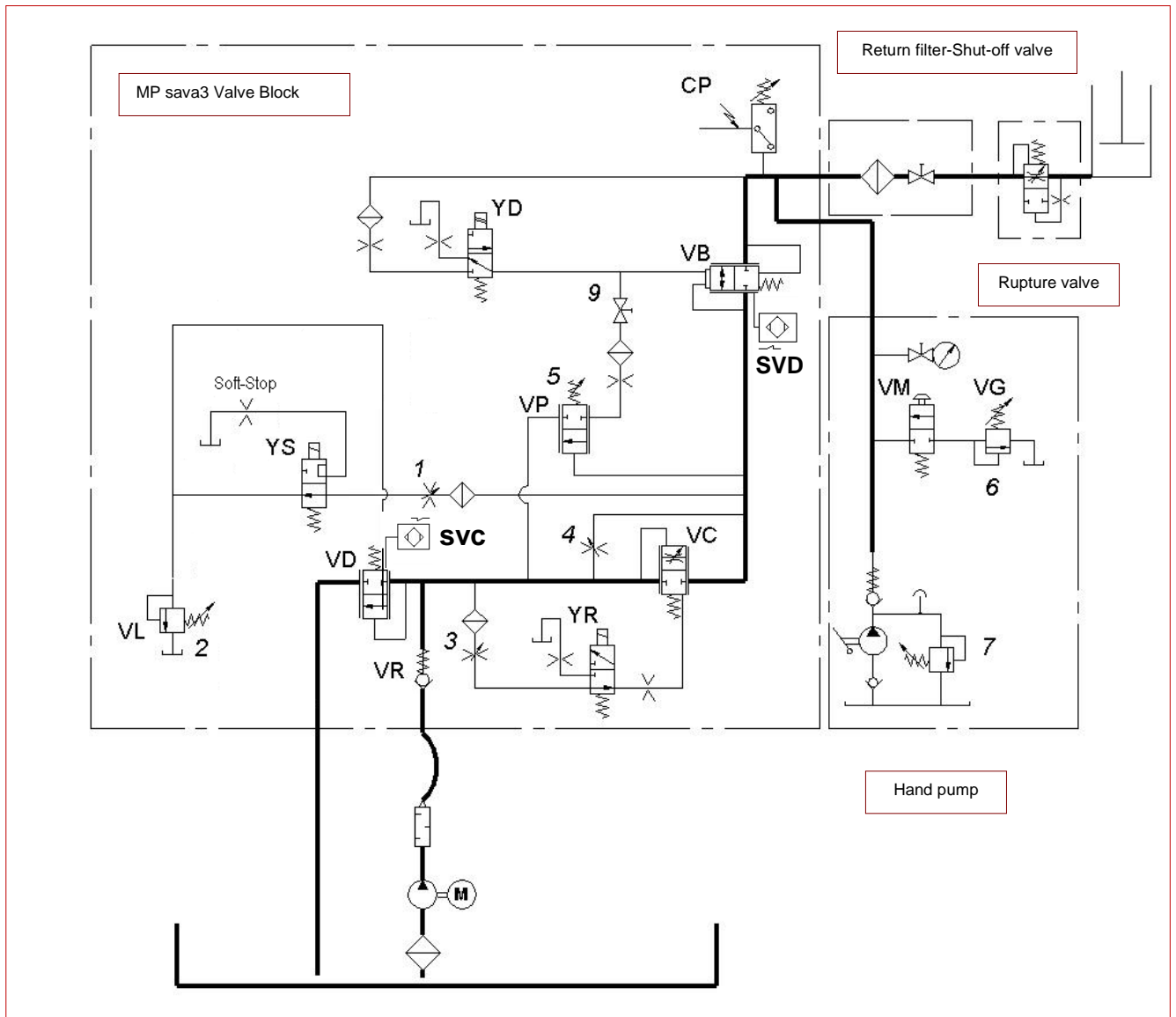
YS Electrovalve will be connected just before getting to the floor

Motor will remain connected for 2 seconds after the lift stops

For direct starting, motor idle time approx. 0.5 seconds

Change to Δ
Connect in Y for 2 seconds approx. } Y- Δ Starting

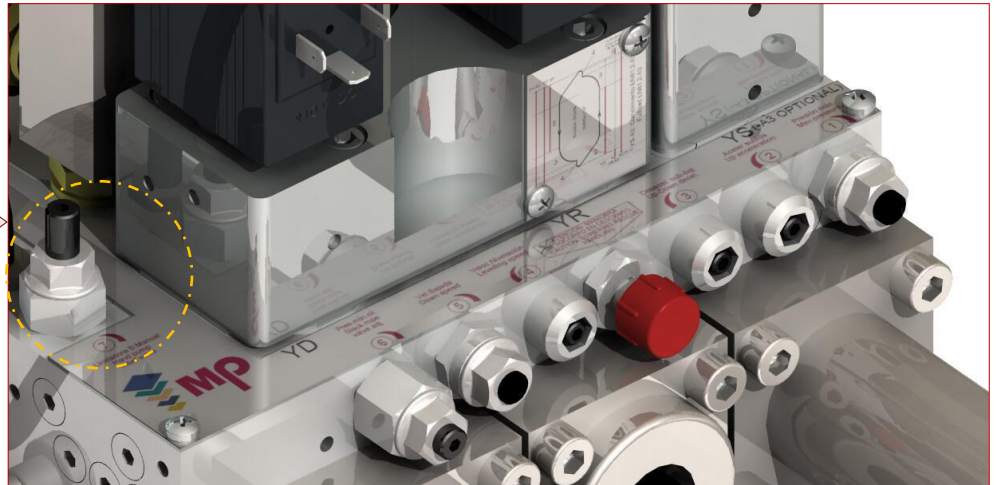
2.1.3. Hydraulic circuit MP sava3 Valve Block with Soft-Stop according to European Directive 2014/33/EU



- | | |
|---|--|
| VR. Non return valve | Screw 1: Pressure relief valve adjustment (maximum pressure) |
| VA. Starting valve | Screw 2: Upwards acceleration adjustment. |
| VD. Bypass valve | Screw 3: Upwards/downwards deceleration adjustment. |
| VC. Flow regulator valve | Screw 4: Levelling speed adjustment. |
| VB. Descent valve | Screw 5: Down speed adjustment. |
| YR. Electrovalve for changing speed | Screw 6: Hand pump relief valve adjustment. |
| YD. Descent Electrovalve | Screw 7: Cylinder minimum pressure adjustment. |
| YS. Y- Δ Starting Electrov. (YS-A3 2014/33/EU) Integrated Soft-Stop | SVC: YS-A3 Valve magnetic Sensor. |
| VP. Balancing down pressure switch | SVD: Descent Valve YD magnetic Sensor |
| VL. Pressure relief valve | |
| CP. Maximum pressure switch (optional) | |
| VM. Manual descent valve | |
| VG. Valve to control the minimum pressure in cylinder | |

2.1.4. Adjustment of Valves

NOTE: All the blocks are adjusted prior to delivery; this information must only be used if a re-adjustment of a valve block is required.



Adjustment screws with seal-locks:

- Loosen the nut before adjusting
- Tighten the nut after adjusting

NOTE: If the lift does not go up, check the pressure relief valve or the maximum pressure switch are not operating; see points 1 and 2 of section 4.5

NOTE: The power unit information plate shows, beside every adjustment screw, the quantity increase or decrease direction of the parameter that controls this adjuster and its name as well.

Hand pump pressure relief valve



1. Upwards acceleration adjustment. Screw 2

1. Load the lift car with half the rated load.
2. Tightening screw 1 makes starting gentler (- accelerated). If screw 1 is tightened fully, the lift will not start-up.
3. Loosening screw 1 makes the lift starts up more quickly and therefore abrupter (+ accelerated).

2. Down speed adjustment. Screw 5

1. Load the lift car with half the rated load. Time how long it takes the lift car to travel down.
2. If the speed is higher than required, loosen screw 5 until desired speed is obtained (- speed).
3. If the speed is lower than required, tighten screw 5 so that down speed increases (+ speed).

3. Upwards and downwards deceleration adjustment. Screw 3

1. Load the lift car with half the rated load.
2. Tightening screw 3 makes the change smoother (- accelerated); it also reduces the time at the levelling speed for a distance of the change signal.
3. Loosening screw 3 makes the change more abrupt (+ accelerated); it also increases the time at the levelling speed for a distance of the change signal.

4. Levelling speed adjustment. Screw 4

1. Load the lift car with half the rated load.
2. Tightening screw 4 reduces the speed, the lift stops smoothly (- speed). 'If the speed is too low, it could jerk'.
3. Loosening screw 4 increases the speed; the lift stops abruptly (+ speeds).
4. Time at levelling speed depends on the position of contacts in the lift shaft and the adjustment of screw 3.

5. Soft-Stop adjustment. Screw 8. Available in 1 ½" Hydraulic Equipment

1. Load the lift car with half the rated load.
2. Tightening Soft-Stop screw, the lift stops smoothly.
3. Loosening Soft-Stop screw, the lift stops abruptly.

2.1.5. Testings

1. Pressure relief valve. Screw 1

1. Load the lift car with 100% of the rated load.
2. Open the manometer protection key and take the pressure reading (full load pressure).
3. Close the shut-off valve and disconnect the maximum pressure reading switch from the circuit if any.
4. Send the lift up and make a note of the manometer reading once it is stabilized (tripping pressure).
5. This pressure should be 1,4 times the full load pressure.
6. If the pressure is not correct, tighten screw 1 to increase the tripping pressure (+ pressure) or loosen to reduce it (- pressure).

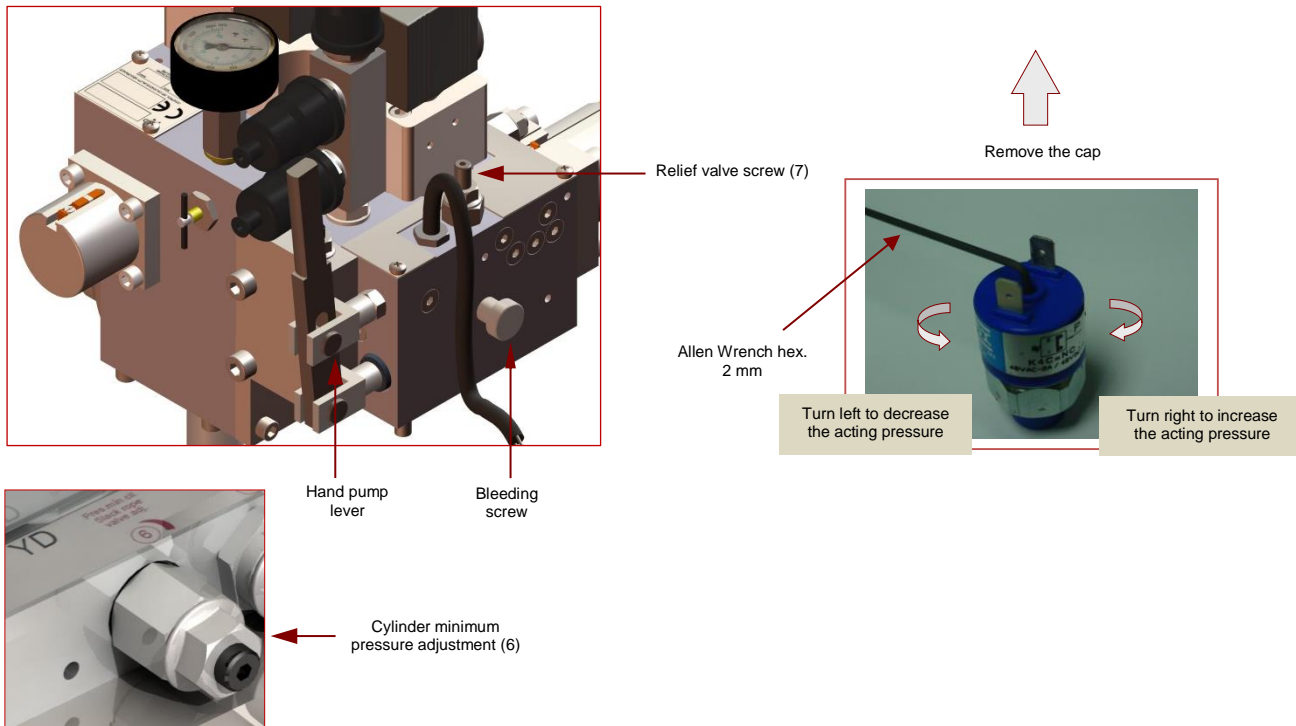
2. Maximum or minimum pressure switch (optional)

1. Close the shut-off valve and send the lift up.
2. Note the cut-off pressure; it should be between 1,1 and 1,2 times the full load pressure.
3. If it is not correct, adjust the pressure switch using an appropriate screwdriver; see figure below.

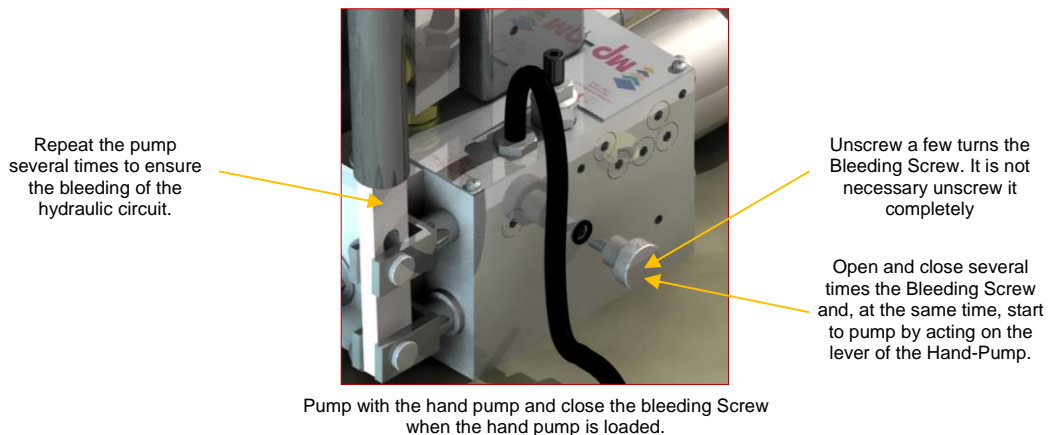
3. Hand pump. Screw 7

1. Pump the lever and check the lift goes up.
2. If not, the hand pump needs priming. To do this, pump the lever while loosening and tightening the bleeding screw several times, until an opposition in movement is observed. Then tighten the screw.
3. To check the tripping pressure of the relief valve:

- Close the shut-off valve and cut off the power.
- Pump the lever and note the manometer reading after it is stabilized.
- Pressure should be 2,3 times the full load pressure.
- Should it not be correct, tighten the relief valve screw to increase the tripping pressure, or loosen to reduce it.



Bleeding Hand Pump



4. Pipe joints and couplings (Pressure test)

1. Raise the piston up to the end of the run.
2. Work the hand pump until the pressure is stabilized.
3. Keep the pipes under pressure for 5 min. and observe the possible pressure fall because of leaks (note the pressure might decrease due to cooling of oil).
4. Check the pipe joints and couplings are correct.

5. Overload pressure switch, low hysteresis

1. Close the shut-off valve. Connect the terminals to a multimeter (if digital, in a continuity position; if analogical, in low resistance position).
2. Operating the pump would cause a pressure of 1 bar above the Maximum Static Pressure.
3. Adjust the pressure switch using a screwdriver until the contact is energized, thus receiving the appropriate signal from the multimeter.

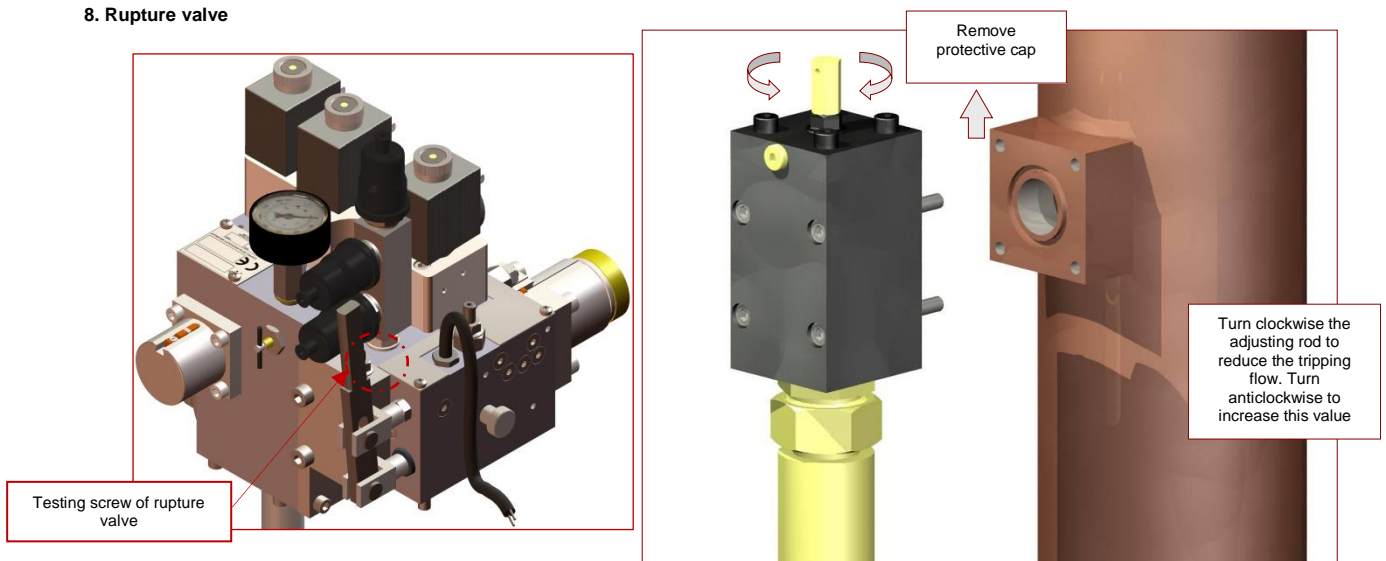
6. Minimum pressure in cylinder (for indirect acting lifts 2:1). Screw 6

1. Wedge the lift car using the safety gear.
2. Press the manual lowering pushbutton and check the piston does not go down.
3. If it does, tighten the cylinder minimum pressure screw until it does no longer go down.
4. Free the lift car using hand pump.

7. Excluding the manometer from the circuit

1. Turning the manometer protecting key anticlockwise enables working pressure to be read at any time.
2. Protecting key must remain locked (fully tightened) to ensure the correct operation of the manometer.

8. Rupture valve



DESCRIPTION

This device consists of a valve that stops the flow of oil when the downward speed of the lift exceeds a preset value.
The Rupture Valve Test must be done with the FULL LOAD in the lift according to EN 81-2 and EN 81-20 standard.

1. Testing the rupture valve at free fall speed.

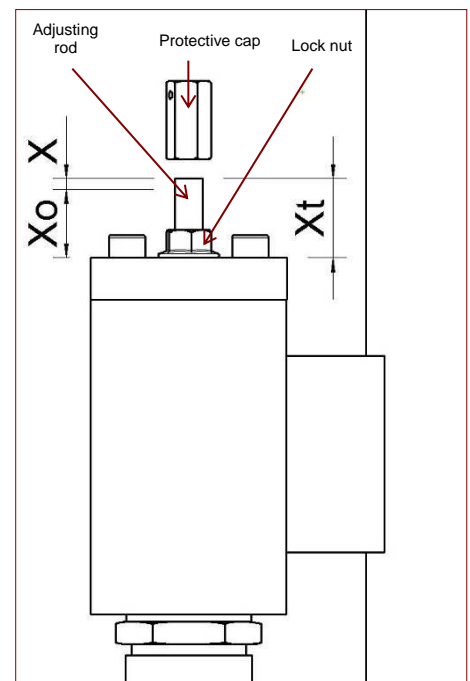
- Run the car with full load to the highest floor.
- Fully tighten the screw to test the rupture valve.
- Run the car to the lowest floor.
- The car should descend at a higher speed than the rated speed.
- The pipe rupture valve should trip at 130% of the rated speed.

When this happens, the flow of oil from the cylinder is cut off and the lift stops.

- Fully loosen the testing crew. This will allow the lift to operate normally in descent but the lift will stop if the oil line breaks.
- Move the lift up to reset the rupture valve.

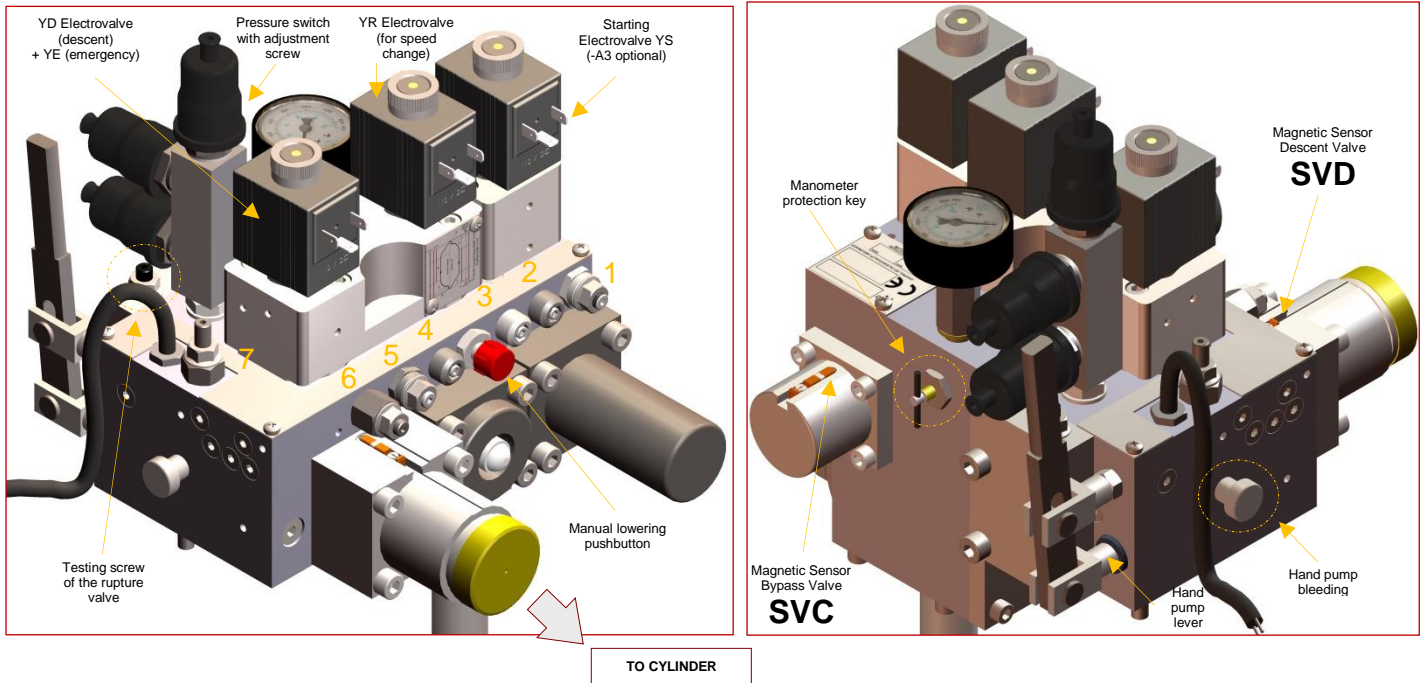
2. Valve adjustment (if the valve does not trip).

- This operation will only be done if the valve is not adjusted from the factory.
- Run the car to the highest floor.
- Unscrew the locknut.
- Move the car down.
- Tighten the adjusting screw according to the formula $X_t = X + X_0$, obtained from the curves of the rupture valve certificate of conformity.
- Screw the locknut



2.2. MP sava3 Valve Block

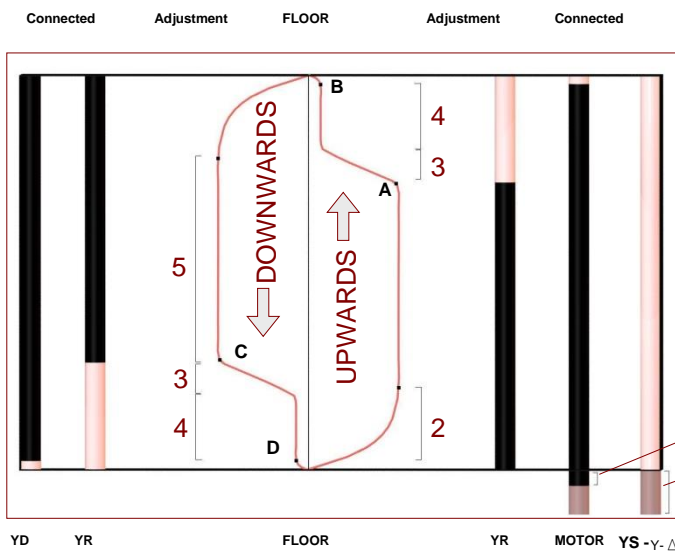
2.2.1. Description of Valves



Adjusting screws names

- 1: Pressure relief valve adjustment
- 2: Upwards acceleration adjustment
- 3: Upwards/downwards deceleration adjustment
- 4: Levelling speed adjustment
- 5: Down speed adjustment
- 6: Cylinder minimum pressure adjustment.
- 7: Hand pump relief valve adjustment.

2.2.2. Unit operation



A Point Upwards deceleration signal.
Place at an S distance from the floor level equal to

$$S(m) = \frac{v^2}{0.7} + 0.2 = 0.77 m ; \text{ for } v = 0.63 m/s$$

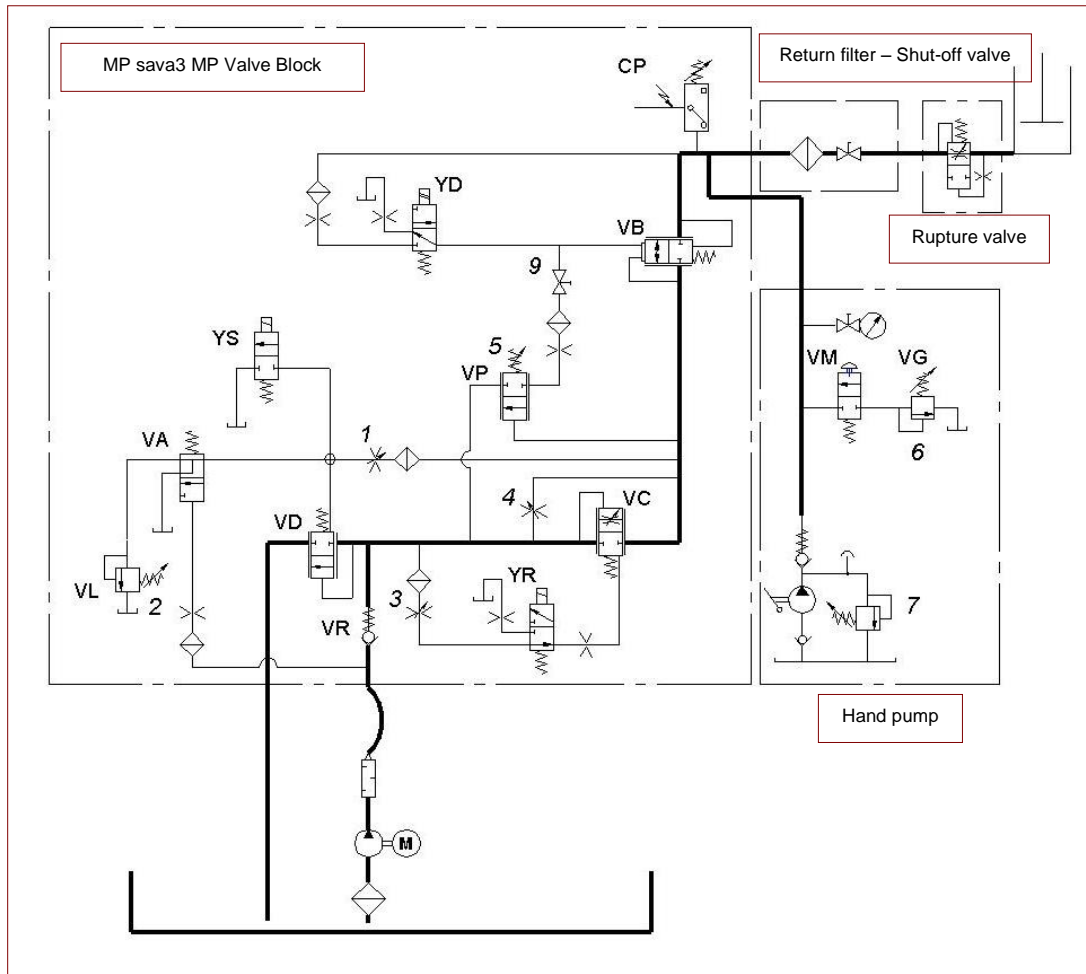
B Point Motor disconnected signal.
C Point Downwards deceleration signal.
Place at an S distance from the floor level equal to

$$S(m) = \frac{v^2}{0.7} + 0.2 = 0.77 m ; \text{ for } v = 0.63 m/s$$

D Point YD Electrovalve disconnection signal

For direct starting, motor idle time approx. 0,5 seconds

Change to Δ
Connect in Y for 2 seconds approx } Y- Δ starting

2.2.3. Hydraulic circuit (Valid for Standard and Y-Δ configurations)


VR. Non return valve

VA. Starting valve

VD. Bypass valve

VC. Flow regulator valve

VB. Descent valve

YR. Electrovalve for changing speed

YD. Descent Electrovalve

YS. Y-Δ starting Electrovalve (optional)

VP. Balancing down pressure switch

VL. Pressure relief valve

CP. Maximum pressure switch (optional)

VM. Manual descent valve

VG. Valve to control the minimum pressure in cylinder

Screw 1: Pressure relief valve adjustment (maximum pressure)

Screw 2: Upwards acceleration adjustment.

Screw 3: Upwards/downwards deceleration adjustment.

Screw 4: Levelling speed adjustment.

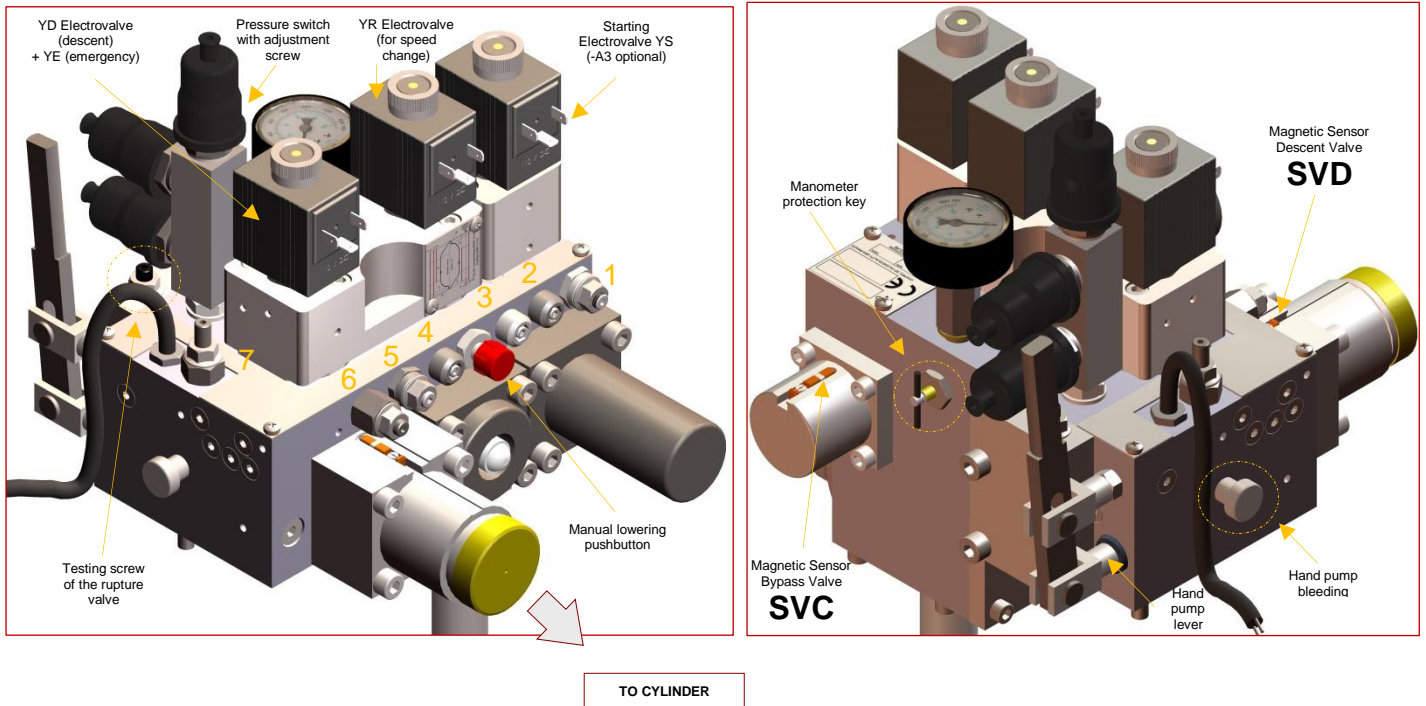
Screw 5: Down speed adjustment.

Screw 6: Hand pump relief valve adjustment.

Screw 7: Cylinder minimum pressure adjustment.

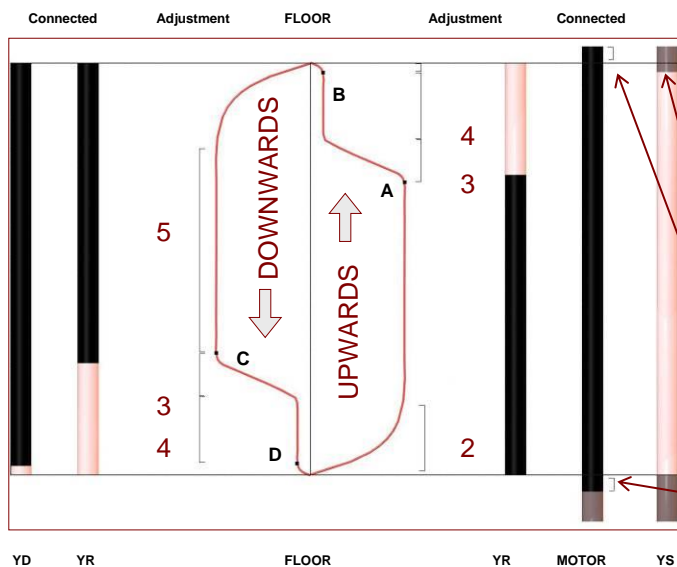
2.2.4. Valve adjustment

See pages 10-14.

2.3. MP sava3 Valve Block SOFT-STOP
2.3.1. Description of Valves


Adjusting screw names

- 1: Pressure relief valve adjustment
- 2: Upwards acceleration adjustment
- 3: Upwards/downwards acceleration adjustment
- 4: Levelling speed adjustment
- 5: Down speed adjustment
- 6: Cylinder minimum pressure adjustment.
- 7: Hand pump relief valve adjustment.

2.3.2. Unit operation


A Point Upwards deceleration signal.
 Place at an S distance from the floor level equal to

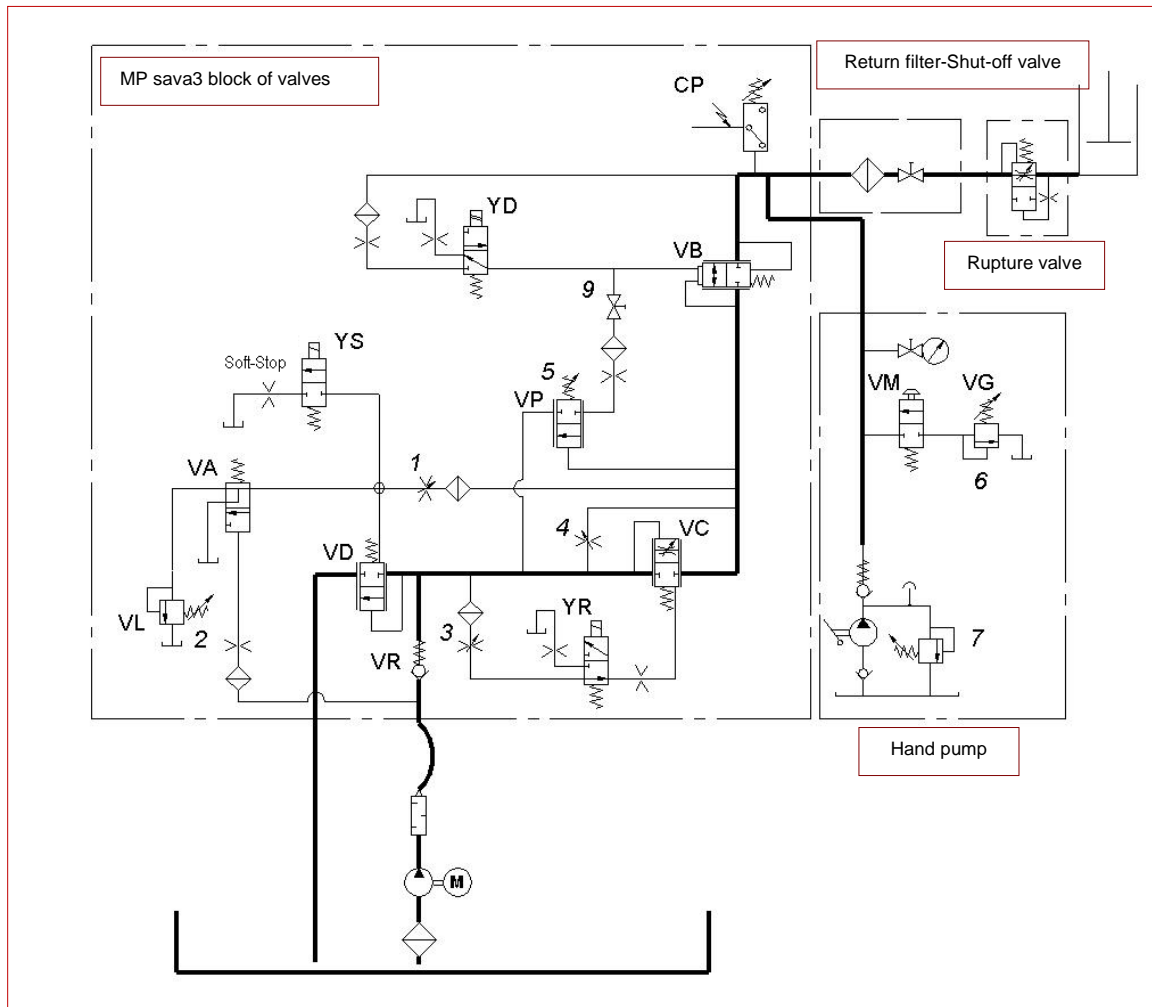
$$S(m) = \frac{v^2}{0.7} + 0.2 = 0.77 \text{ m ; for } v = 0.63 \text{ m/s}$$

B Point Disconnected motor signal.
 C Point Downwards deceleration signal.
 Place at an S distance from the floor level equal to

$$S(m) = \frac{v^2}{0.7} + 0.2 = 0.77 \text{ m ; for } v = 0.63 \text{ m/s}$$

D Point YD Electrovalve disconnection signal

YS Electrovalve will be connected just before getting to the floor
 Motor will remain connected for 2 seconds after the lift stops
 For direct starting, motor idle time approx. 0,5 seconds
 Change to Δ Connect in Y for 2 seconds approx. Y- Δ Starting

2.3.3. Hydraulic circuit MP sava3 + Soft-Stop


VR. Non return valve

VA. Starting valve

VD. Bypass valve

VC. Flow regulator valve

VB. Descent valve

YR. Electrovalve for changing speed

YD. Descent electrovalve

YS. Y- Δ starting electrovalve (optional)

VP. Balancing down pressure switch

VL. Pressure relief valve

CP. Maximum pressure switch (optional)

VM. Manual descent valve

VG. Valve to control the minimum pressure in cylinder

Screw 1: Pressure relief valve adjustment (maximum pressure)

Screw 2: Upwards acceleration adjustment.

Screw 3: Upwards/downwards deceleration adjustment.

Screw 4: Levelling speed adjustment.

Screw 5: Down speed adjustment.

Screw 6: Hand pump relief valve adjustment.

Screw 7: Cylinder minimum pressure adjustment.

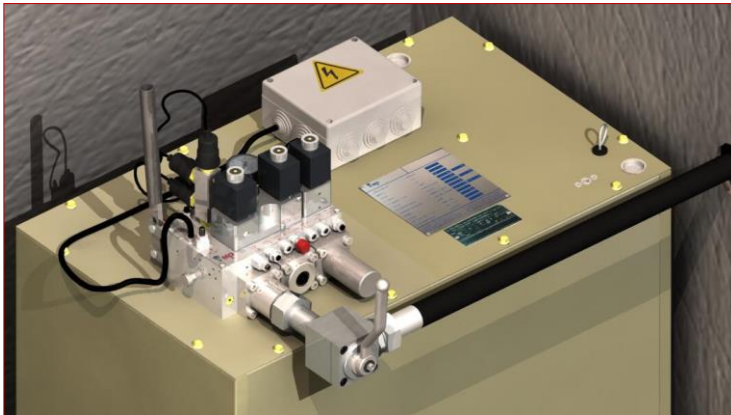
Soft-Stop integrated.

2.3.4. Valve adjustment

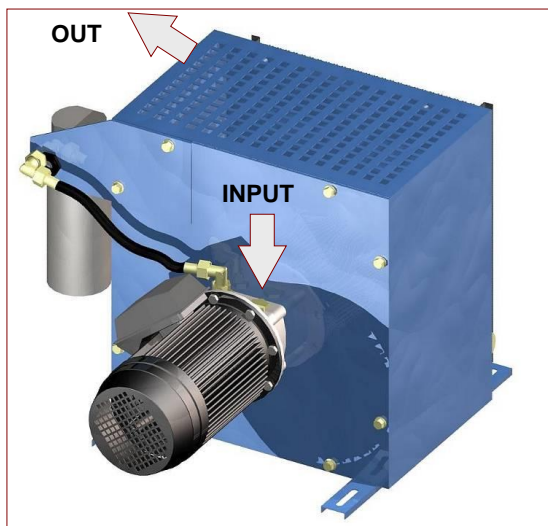
See pages 10-14.

3 • OIL COOLING DEVICE

3.1 Oil cooling device connections - Hydraulic power unit



The power unit has a dust protection on the tank identification cover. Remove this protection before installing the cooler.



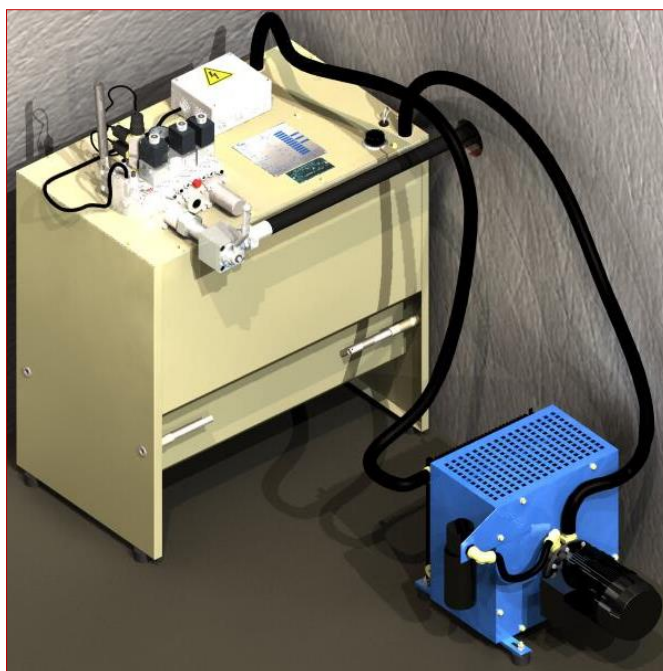
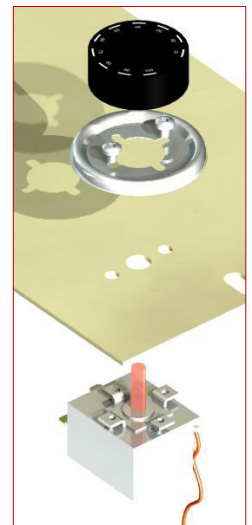
IMPORTANT:

The oil cooler must not be placed at a height of more than 1100 mm with regard to the ground where the hydraulic power unit stands.

COOLER ASSEMBLY

1. Assemble as many hoses as required to enable the oil input and output from the cooler (see attached table).
2. Insert the IN and OUT hoses of the cooler into the holes of the tank cover.
3. To assemble the thermostat, see picture here below.

THERMOSTAT ASSEMBLY DETAIL



REQUIRED ACCESSORIES NOT INCLUDED

INPUT

- SAE 100 Elbow 90° Hydraulic hose
- M G 1" – M G ¾" Connector
- 1" hydraulic joint.

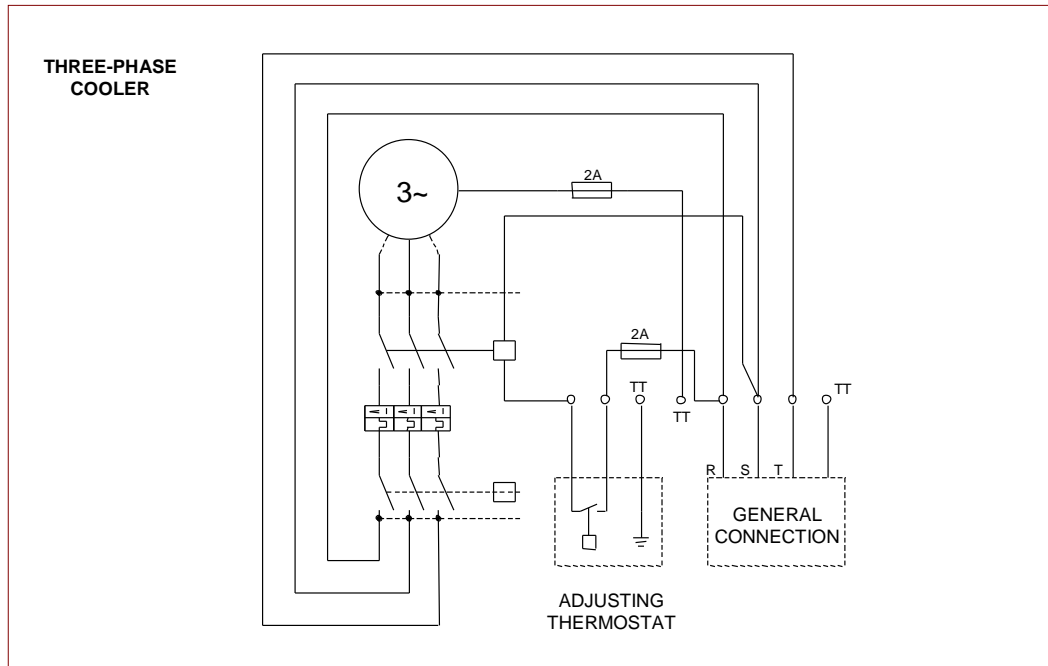
OUTPUT

- SAE 100 Elbow 90° Hydraulic hose
- M G ¾" - M G ¾" Connector
- ¾" Hydraulic joint

ASSEMBLY ON TANK COVER

- 4 T 25-30 Silent-blocks
- 4 DIN 934 M6 nuts
- 4 DIN 7980 Ø6 Grower
- 4 DIN 9021 M6 Washers

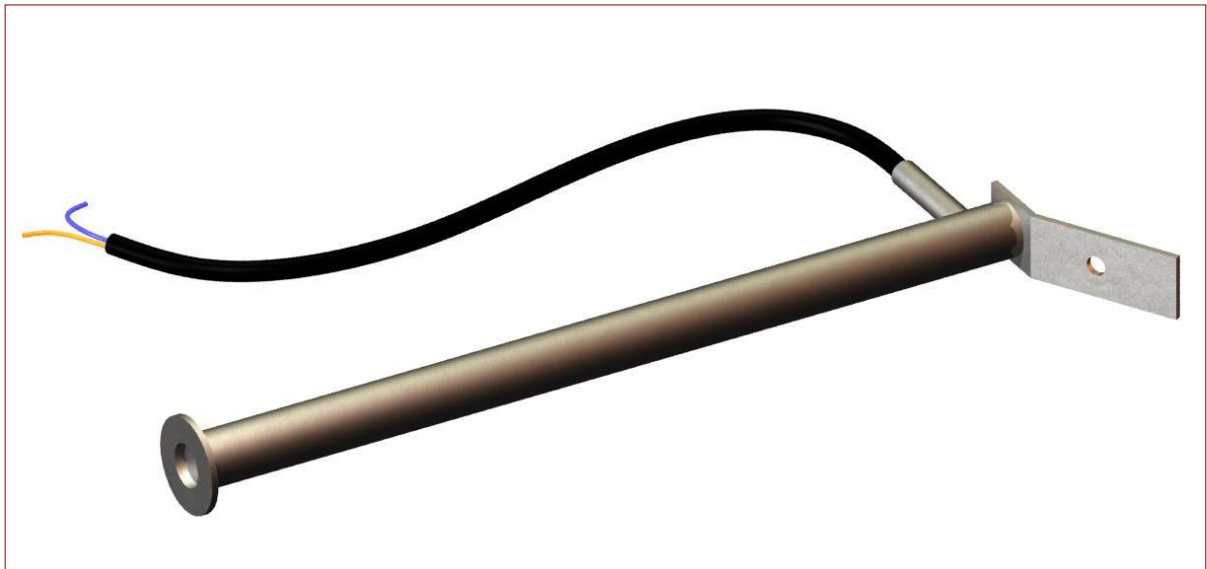
3.2. Oil cooler and thermal switch wiring



4 • TANK OIL HEATER



- To make a correct connection between the power unit and the oil heater, see page number 6 of this technical manual.



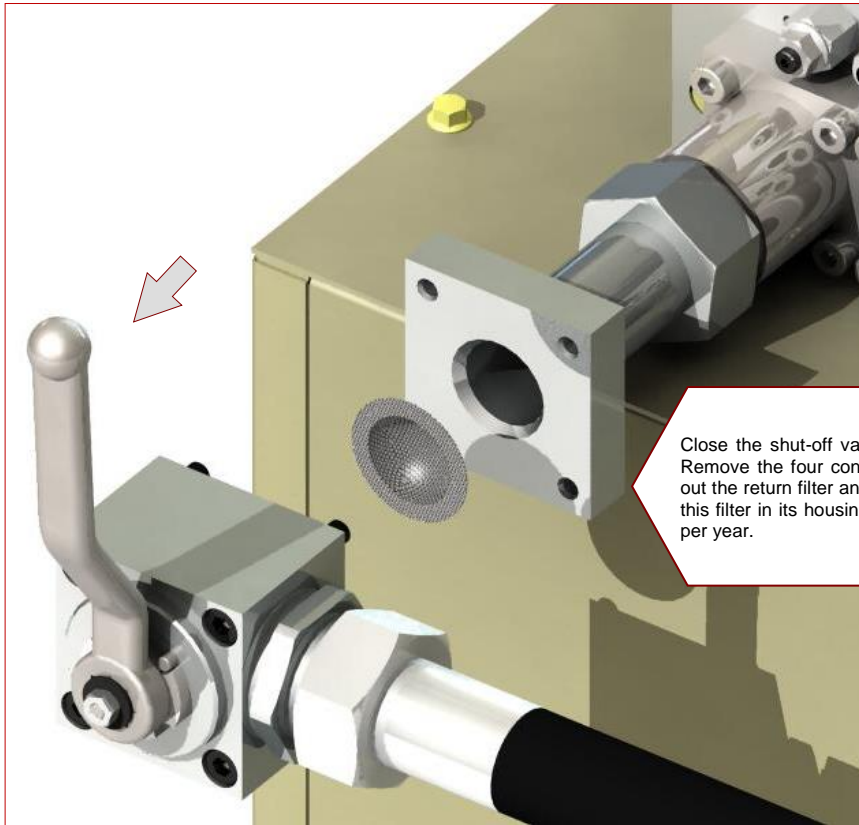
THERMOSTAT	OPENING → 30° C ± 3° C CLOSING → 20° C ± 4° C
POWER	500 W +5/-10%
HEAT FLOW SUPPLIED	2 W/cm ²
SUPPLY VOLTAGE	380 V 220 V

IMPORTANT: Do not connect the resistance without drowning it into oil

NOTE: The resistance does not work over an oil temperature of 15°C

5 • MAINTENANCE

5.1. Cleaning of the return oil filter



5.2. General checks

- Once every 5 to 10 years and depending on the lift general conditions, it is recommended to make a general inspection of all the hydraulic components. Any worn or old component must be replaced.
- We recommend to filter the oil (the filter should be between 30 and 40 μm). Clean the tank.
- Change the fitting set (seals and rings) of the cylinder.
- Once the inspection operations have been performed, check all the points as if it was a new installation.

6 • CONTROLS

CHECKS	DURING THE ASSEMBLY	THE FIRST TWO MONTHS	ONCE/YEAR	EVERY 5 TO 10 YEARS
1 Vacuum pressure (bar)	x		x	
2 Full load pressure (bar)	x		x	
3 Pressure relief valve trips at... (bar)	x		x	
4 Hand pump pressure relief valve trips at... (bar)	x		x	
5 Pressure switch trips at... (bar)	x		x	
6 Hand pump working correctly	x		x	
7 Manual lowering working correctly	x		x	
8 Releveling system correct	x	x	x	
9 Cylinder minimum pressure adjusted	x		x	
10 Lift car creeping correct (<=10mm in 10 minutes)	x	x	x	
11 Rupture valve trips correctly	x		x	
12 Emergency lowering correct	x		x	
13 Motor protections correct	x		x	
14 Oil level correct	x	x		
15 Oil condition correct	x		x	x
16 Return filter cleaning correct	x		x	x
17 No excessive leaks in the cylinder head	x	x		
18 Pressure test correct (200% of the full load pressure)	x			
19 Speed going up and down ±10% of the rated speed	x		x	
20 Descent valve	x		x	
21 Starting and stopping correct	x	x		

1. Vacuum pressure

Check that the vacuum pressure coincides with the one shown on the nameplate of the valve block.

2. Full load pressure

Check that the full load pressure coincides with the one indicated in the features plate of the valve block

3. Pressure relief valve

Check the valve trips at a pressure no higher than the pre-established value:

$$P_{\text{limit}} = 1,4 P_{\text{st. max.}}$$

4. Hand pump pressure relief valve

Check the valve trips at a pressure no higher than the pre-established value:

$$P_{\text{overpres.}} = 2.3 P_{\text{st. max.}}$$

5. Pressure switch

Check the valve trips at a pressure no higher than the pre-established value:

$$P_{\text{pres.}} = P_{\text{st. max.}} + 1$$

6. Hand pump

Trip the safety gear and check the hand pump is able to release it.

7. Manual lowering

Push the red button of manual lowering and check the lift goes down.

8. Releveling system

At each floor, push on the manual lowering valve to check the releveling of the lift is working.

9. Cylinder minimum pressure

Closing the shut-off valve, press the manual lowering button and check the manometer does not indicate a pressure lower than 5 bar.

10. Car lift creep (≤10 mm en 10 minutes)

When the lift is stopped at floor, check the car does not descent more than 10 mm in 10 minutes. Bear in mind the changes of the oil properties due to the temperature.

11. Rupture valve trips properly

To test the safety gear, check the wedging of the rupture valve by acting on the screw.

12. Emergency lowering

Switch off the power supply of the control board and check the battery is able to energize the YD electrovalve (descent).

13. Motor protections are correct

Check the protections.

14. Oil level is correct

When the car is at the highest landing, check the oil level in the tank is higher than the minimum allowed (covering motor and pump).

15. Oil condition is correct

Check the condition of the oil with just a visual inspection.

16. Return filter cleaning

Ensure that the state of the main filter located on the shut-off valve is correct and clean it frequently.

17. No excessive leaks in the cylinder head

Check the oil level in the drain bottle so that leaks do not exceed 1 to 3 litres per month.

18. Pressure test is correct (200% of the full load pressure)

Check that all the elements under pressure are working properly.

19. Speed going up and down ±10% of the rated speed

Check the speed value is included between the pre-established values.

20. Descent valve

Once the maintenance operations have been performed, check the state of the valve, according to the following procedure:

- Close the shut-off valve and check that the pressure indicated by the manometer does not exceed 4 to 6 bar in 5 minutes.

- Check that, when the lift is stopped at a landing, it does not relevel more than once every 15 minutes.

- During the inspection operations, check the state of the descent valve and its o-ring seal.

21. Startings and stoppings

Check the start and stop comfort is correct in ascent and descent trips.

7 • COMMISSIONING TEST RELATED TO UNINTENDED CAR MOVEMENT (UCM) AS PER EN 81-2 & EN 81-20



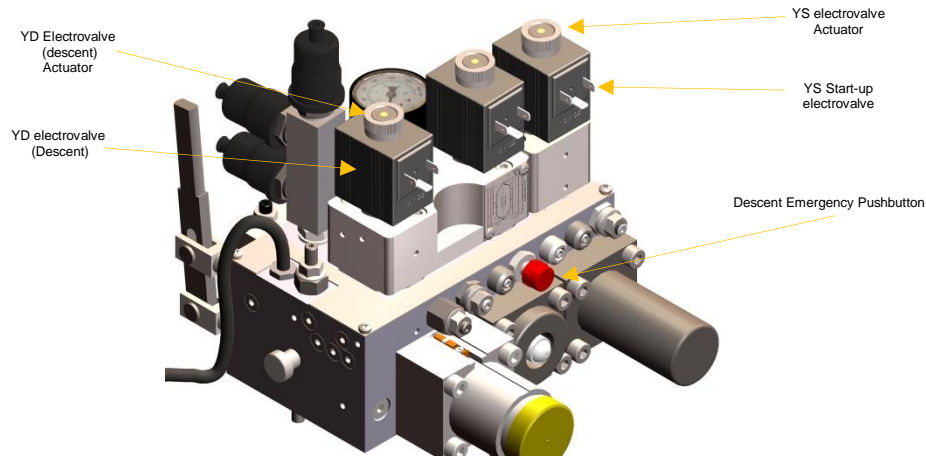
UCM tests shall be carried out by at least two technicians to prevent people entering the car with door open.

The tests detailed here below concern to the MPsava3 subsystem for locking the UCM, which is part of the full protection system against UCM and shall be integrated with the detection and activation subsystems related to the controller.

To check the proper of devices against uncontrolled movement, carry out the tests stated in clause zc of annex D of Standard EN 81-2+A3 and in clause 6.3.13 of the Standard EN 81-20.

7.1. Preliminary requirements

The controller has to comply with the standard EN 81-2 or the standard EN 81-20, it WILL NOT HAVE to send orders to the valve, neither to the motor/pump group when the car, with door open, is out of the door unlock area. The lift shall be provided with at least one device able to detect the uncontrolled car movement.

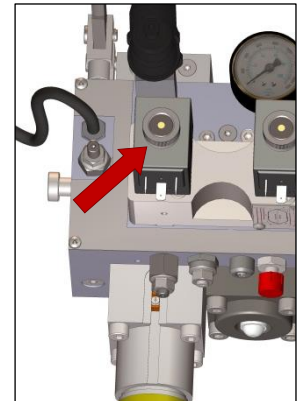
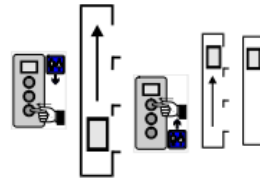


7.2. Failure simulation of the VB valve (Descent valve operated by the YD Electrovalve)

7.2.1. Failure simulation of the VB valve in ascent

The test consists of checking that the car stops in case of the VB valve failure in ascent. Proceed as described hereafter:

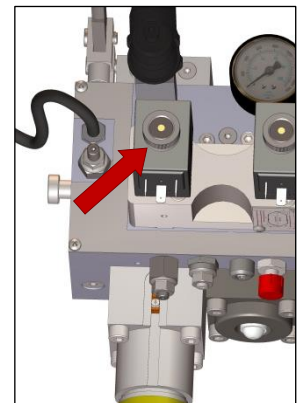
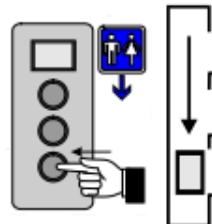
1. When the car is empty, make an ascent call to the upper floor of the run.
2. During the trip, with a punch, tight completely the actuator located in top of the YD Electrovalve (golden colour, see the previous picture): this operation opens the VB and does not allow its closing.
3. The test is completed when the LED of sensor SVC monitoring the VD valve closing is lit.
4. The test shall confirm that the distance of the uncontrolled movement at the destination landing does not exceed the value stated in clause 9.13.5 of the Standard EN 81-2+A3 or in clause 5.6.7.5 of the Standard EN 81-20.



7.2.2. Failure simulation of the VB valve in descent

The test consists of checking that the car stops at level in case of the VB valve failure. Proceed as described hereafter:

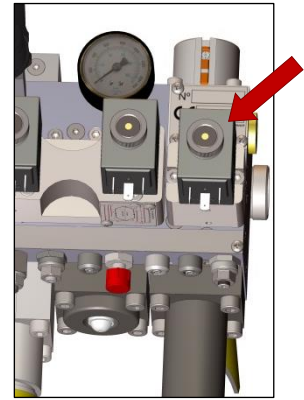
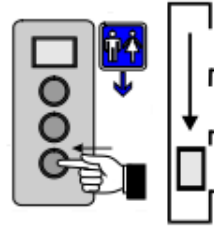
1. When the car is empty, make a descent call to any intermediate floor of the run.
2. During the trip, with a punch, tight completely the actuator located in top of the YD Electrovalve (golden colour, see the previous picture): this operation opens the VB and does not allow its closing.
3. The test is completed when the LED of sensor SVC monitoring the VD valve closing is lit.
4. The test shall confirm that the distance of the uncontrolled movement at the destination landing does not exceed the value stated in clause 9.13.5 of the Standard EN 81-2+A3 or in clause 5.6.7.5 of the Standard EN 81-20.



7.3. Failure simulation of the VD valve (Bypass valve operated by the YS Electrovalve)

The test consists of checking that the car stops at level in case of failure of the VD. Proceed as described hereafter:

1. When the car is full-loaded, make a descent call to the lowest floor of the run.
2. During the trip, with a punch, tighten completely the actuator located in top of the YS Electrovalve (golden colour, see the previous picture): this operation opens the VD and does not allow its closing.
3. The test is completed when the LED of sensor SVD monitoring the VB valve closing is lit.
4. The test shall confirm that the distance of the uncontrolled movement at the destination landing does not exceed the value stated in clause 9.13.5 of the Standard EN 81-2+A3 or in clause 5.6.7.5 of the Standard EN 81-20.



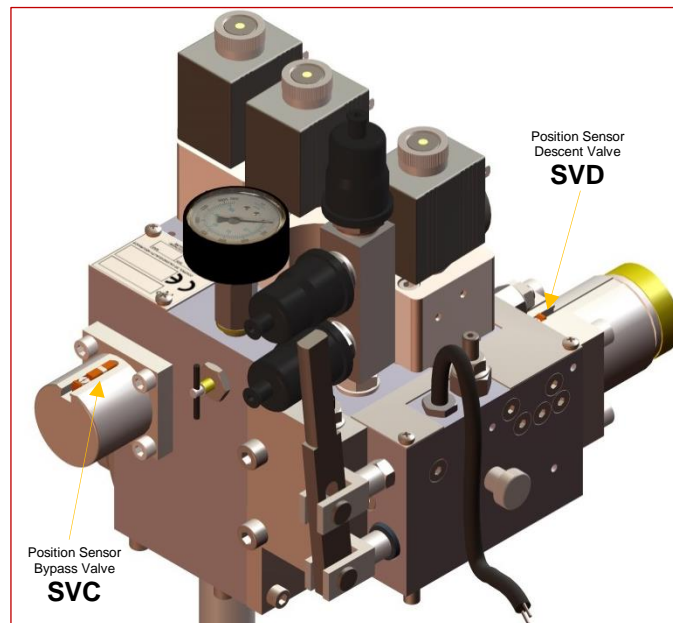
7.4. Test of the monitoring system

With the car at level and the controller switched on, unplug any SVD or SVC magnetic sensor.

1. Check that the controller displays the failure corresponding to the non-detection by the position sensor of the valve closure, after the lift reached the floor.

With the lift functioning and before it arrives at level, unplug any SVD or SVC magnetic sensor.

2. Check that the controller displays the failure corresponding to the non-detection by the position sensor of the valve closure, after the lift reached the floor.
3. Check the lift comes back to its operational status when the sensors recover the proper reading of the valve closing position after you plugged them both back on.



The test is over.

Note:

If the installation has only two stops, there is no need to achieve the point 7.2.2. because the buffer will prevent uncontrolled movements, according to the conditions described in the EN 81-2+A3 and EN 81-20 standard.

8 • COMMISSIONING WITH A PRESSURE OF 200% FULL LOAD, AS PER EN 81-2 AND EN 81-20.**➤ Pressure test as per EN 81-20, 6.3.10, and EN 81-2, Annex D, D.2, t)**

A pressure of 200 % full load pressure is applied to the hydraulic system between the non-return valve and the jack included. The system is then observed for evidence of pressure drop and leakage during a period of 5 min (taking into account the possible effects of temperature change in the hydraulic fluid). After this test, it shall be visually ascertained that the integrity of the hydraulic system is maintained. This test should be carried out after the test of the devices against free fall (5.6) and include any hydraulic elements included in the uncontrolled movement protection means.

- Car with 100 % of the rated load.
- Take the lift to the top landing and write down the pressure (100%).
- Take the jack up to the end of its travel
- Operate the hand pump up to a pressure of 200%
- Let the installation rest for 10 minutes
- After these 10 minutes, note the pressure value (p1) at this time and keep the installation under pressure for a further 5 minutes and note the pressure value (p2) in the final 5-minute period.
- For such a test to be considered successful there should be no loss of pressure greater than 10% during the final 5-minute period
- Check that there was no leakage, nor pressure drops (taking into account the possible effects of temperature change in the hydraulic fluid).
- For such a test to be considered successful there should be no loss of pressure greater than 10% during the final 5-minute period.
- Through a visual inspection, ensure that the hydraulic system integrity is maintained.
- In exceptional circumstances, the pressure loss may be greater than 10% (due to temperature effects). After the evaluation of the correct integrity of the hydraulic circuit, the valid test can be considered.

**IMPORTANT:**

As indicated in the standard EN 81-20, 6.3.10, and EN 81-2, Annex D, D.2, t), we must take into account the effects of temperature in the hydraulic fluid. Because of its thermal expansion factor, a decrease in temperature during the test, will cause a reduction in volume of the oil inside the cylinder and consequently a pressure drop occurs. It is advisable to perform the test with oil at a temperature as close as possible to the environment temperature, so this effect is minimized.

There are other factors involved in a possible pressure drop during the test without entailing there are default in the circuit integrity:

- In this regard, the proper purge of the jack air is very important.
- Oil total volume of the installation.
- Temperature gradient. The greater the difference with the ambient, the greater will be the level of affectation.
- Jack locking when it is fully deployed.
- Proper assembly of frame and guide rails (unwanted frictions)
- Expansion coefficient of flexible lines.

A. APPENDIX • ACTIONS TO FACE MALFUNCTIONS

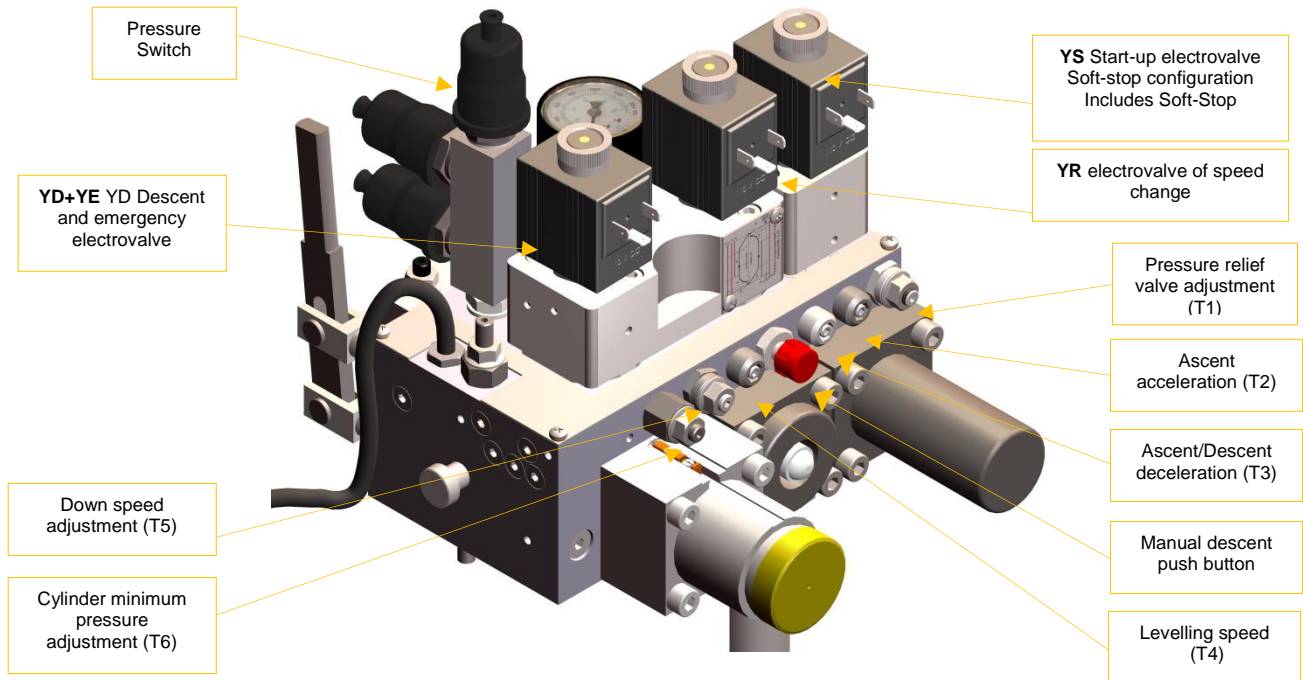
A1. Introduction

- The aim of this document is to let you know the procedures to follow in case of malfunctions that may occur in the handling during procedures such as installation, start up or maintenance of any of MP drive equipment, whatever type they are.

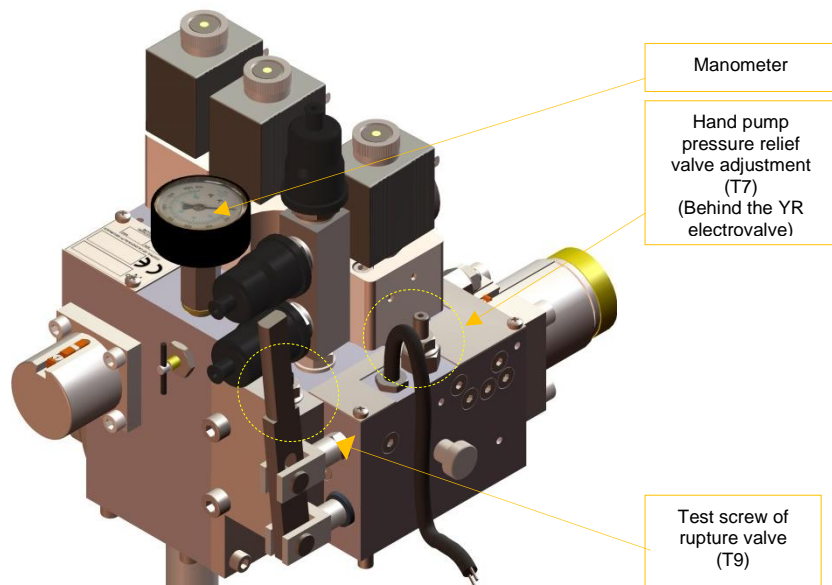
- In each point, we develop all the possible causes of the exposed malfunction. Depending on the possible origins of the event, the solution will require more or less checks.

- Hereafter, we summarize a description of each one of the valve block controls on which we will have to come into contact with in order to try to solve the incident. In order to have a greater control over the tasks of regulation and assembly of the hydraulic power unit, it is necessary to thoroughly read the Technical Manual included with the MP hydraulic product.

Disposal of the control elements in the valve block



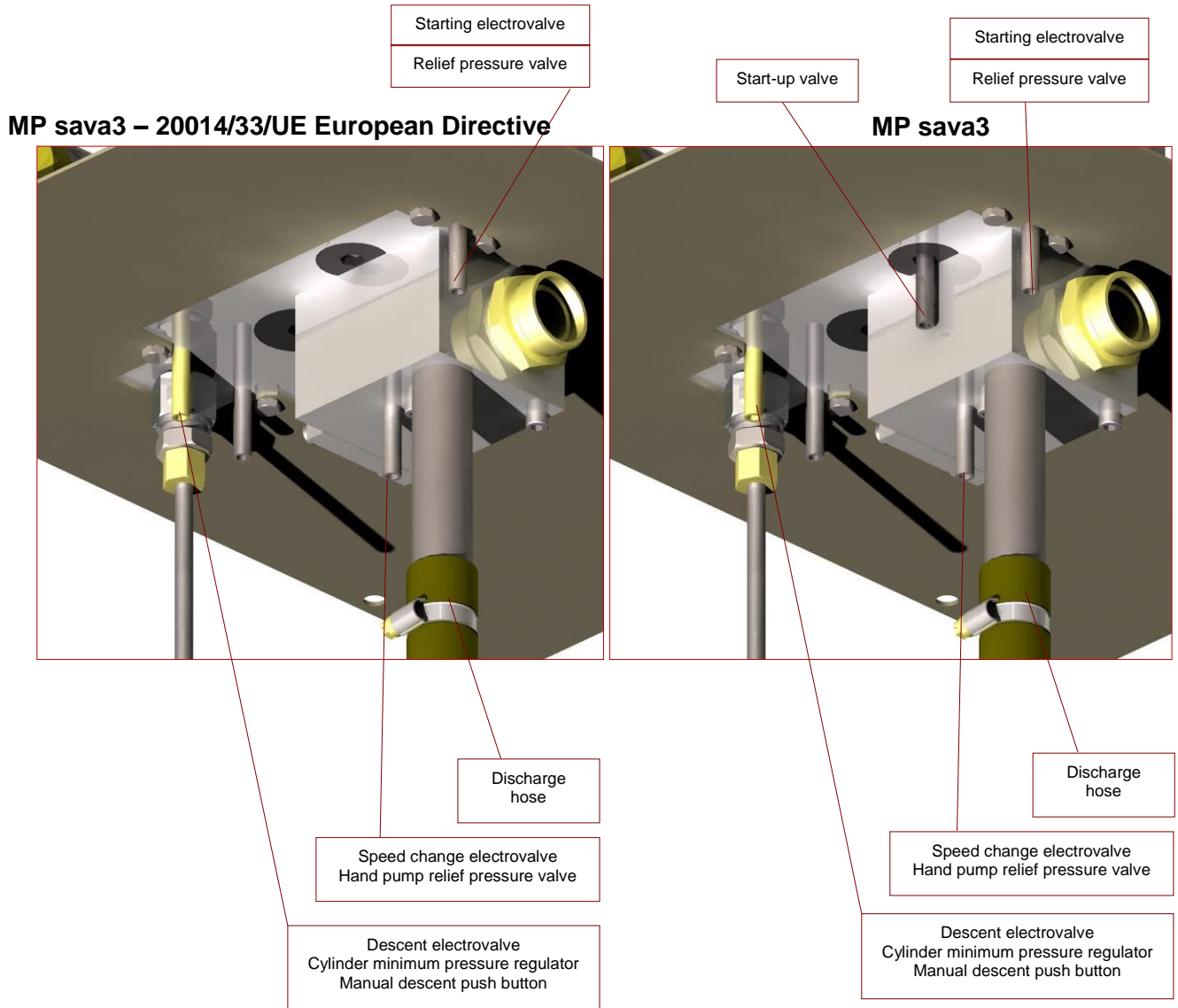
MP sava3 -FRONT VIEW-



MP sava3 -REAR VIEW-

Disposal of the return pipes in the valve block.

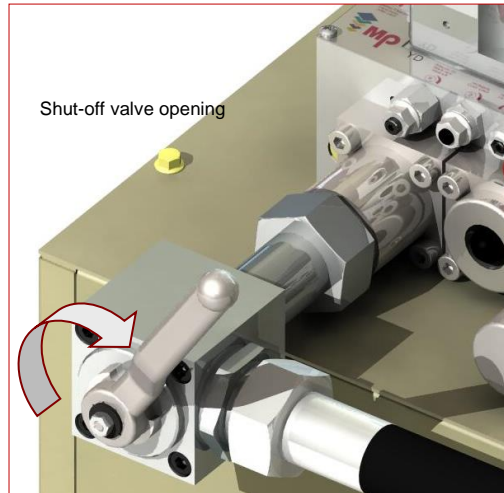
- The return pipes are small union joints on the lower side of the valve block (open the tank's level cap and have a look at the aforementioned side in order to identify them) where the hydraulic oil flows through during the different operations of this valve block. Transparent heaths will be inserted into these tubes in order to verify through which of these the oil is flowing at all times → Essential help to localize the existing problem in each different situation.



A2. Ascent

A2.1. Start-up (the lift does not start)

- **Shut-off Valve.** Check that the shut-off valve is open. Move the lever in the direction shown on the picture in order to open it.
- **Electric motor.**
 - Motor voltage and mains voltage. Delta connection, star connection.
 - If the mains voltage does not coincide with the motor voltage, the following event may occur while connecting:
 - Delta connection instead of star connection → Overcurrent, a possible short-circuit in the windings.
 - Star connection instead of delta connection → Motor turning at a slow speed.
- **Changed phases.**
 - The motor turns in the opposite direction. The absorption pump emits a low noise → Change one of the power phases.
- **Thermistors (110°C).**
 - They must not be maintained with voltages higher than 2.5 V → There may be a short circuit in the windings.

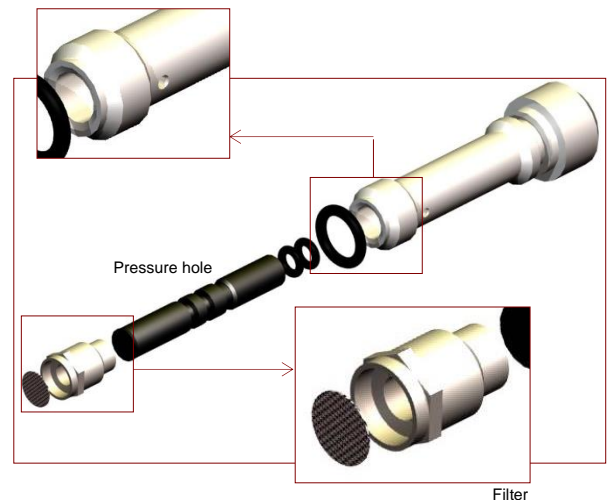
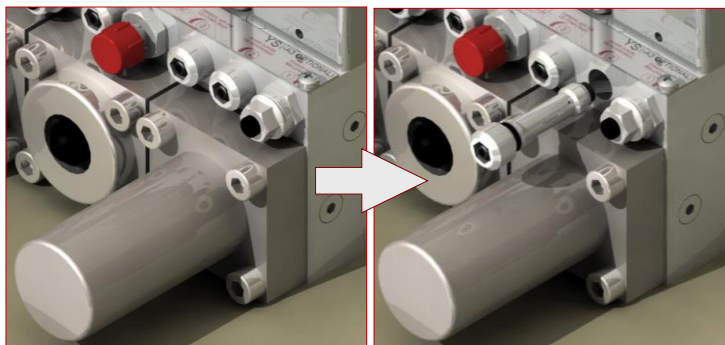


- **Overpressure valve regulator (screw n°1)**
 - Check that the lift is not carrying a load greater than the load specified. If the load is correct, check that oil is not flowing through the pressure limiter return pipe; if this is the case, it will be necessary to correctly adjust the aforementioned valve (follow that shown in MTHDEQHMP).
 - See paragraph 2.2. for an explanatory image.

- **Thermal probe.** Arranged as a support for the electric motor. If the thermal probe is open → leave the oil to cool down.

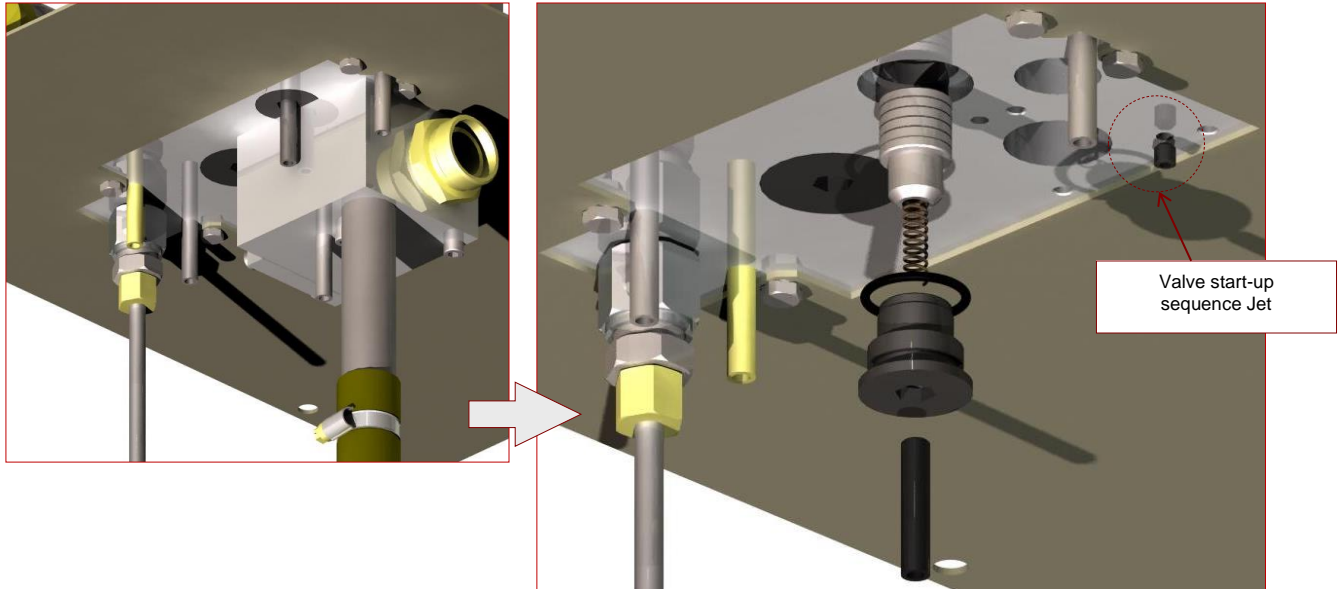
- **Star-delta start-up electrovalve (YS)**
 - The coil of this electrovalve is not connected correctly.
 - Check the connection in the connector and in the terminal of the control panel.

- **Acceleration in ascent regulator (screw n° 2)**
 - The regulator screw may be completely tightened for which reason the oil may be returned to the tank via the discharge hose.
 - Turn the screw until it is untightened and adjust according to the product technical dossier MTMECsava3.
 - Take out the regulator and check that the filter and the pressure intake port for the regulator are not blocked.



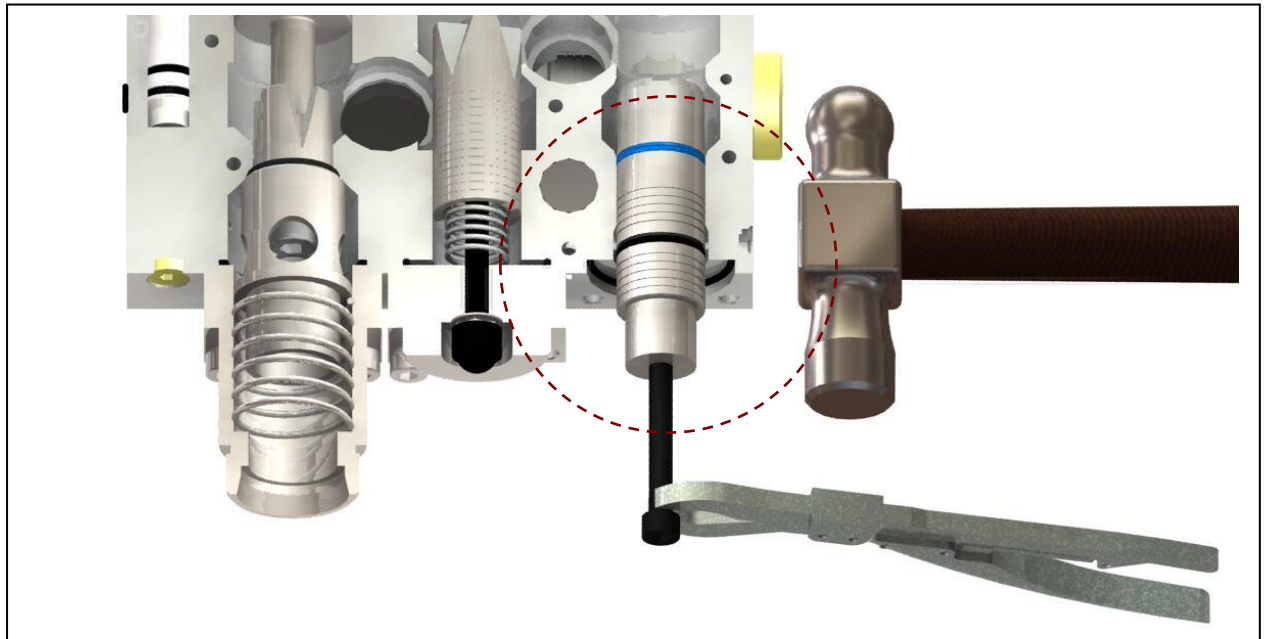
- Valve block start-up sequence.

- Check that the flow of oil through the return pipe of the start-up valve only happens for a moment and when the start-up takes place. If the flow is continuous, there is a problem at this point:
- The start-up sequence piston may be blocked.
 - Proceed to clean any possible shavings or impurities.
 - Check the appearance of the seating in the piston's locking cone into the body of the start-up sequence block. Make it if it being wrong.
- Take the start-up block apart to clean the jet and the filter acting as a connection with the main block, as they may be obstructed.



- Discharge piston.

- The discharge piston may be blocked → the oil is being returned through the main discharge pipe (yellow or black hose).
- Proceed to clean any possible shavings or impurities which may be blocking the aforementioned piston or its position.
- Make finishing sand in the piston and repair any possible scratches.

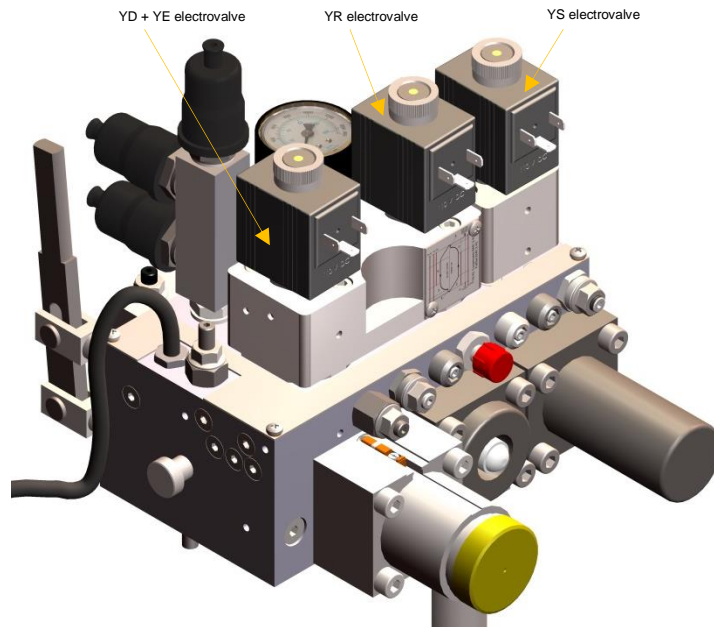


A2.2. Nominal speed (a slower speed than usual)

No load

- Electrovalve for changing speed (YR).

- The coil is not being supplied correctly → Check the connection in the connector and in the control panel terminal.
- To check the excitation of the coil, place a screwdriver on the upper part to perceive any force of attraction.
- The electrovalve actuator is blocked → the oil returns to the tank via the YR electrovalve sheath.
- Clean any possible shavings or impurities.
- Make the seating of the ball on the mechanized cone at the base of the electrovalve.



- Pulsation minimizer (Silencer)

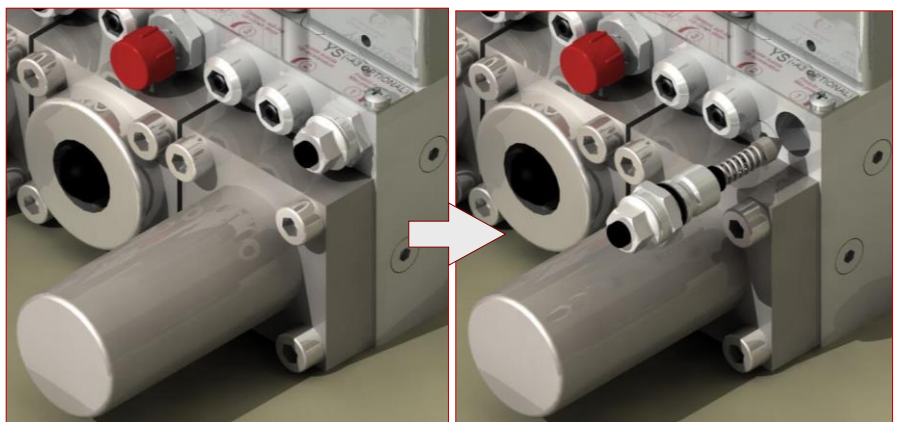
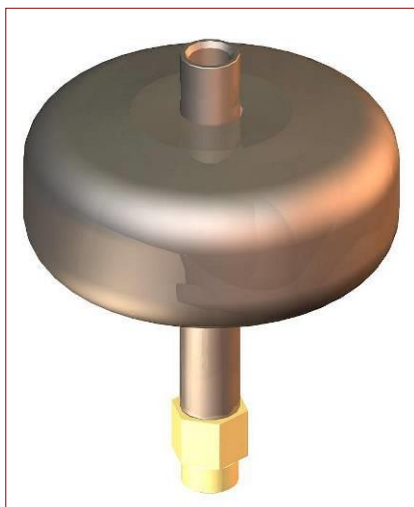
- Partial break or hole in the component → Replace minimizer (the oil is being lost through the soldered joint).

Full load

- Overpressure valve regulator (screw n° 1)

- The screw is wrongly adjusted.
 - The return of the oil to the tank with less pressure than that needed for the task.
 - Adjust the aforementioned valve to pressure = $1,4 \cdot P_{est. Max}$.

- In order to proceed to carry out the adjustment, we must completely untighten the regulator screw; close the shut-off valve and carry out a call in an ascending direction. As we begin to introduce the screw, the pressure will start to increase (pressure gauge). Continue until obtaining the appropriate pressure. In the case that this is not possible, take the regulator apart as indicated in the picture, cleaning any possible impurities which may exist between the conical piston and its frame.



A2.3. Levelling speed (does not function correctly)

- Speed change screen (Magnets on guiderails).

- The pulse magnets used for carrying out a change of speed are incorrectly positioned → Alter their distance.
 $v \leq 0,63$ m/second → between floors $X=70$ cm. Highest floors $X=90$ cm (greater than the distance between floors).
 $0,8 \leq v \leq 1$ m/second → between floors $X=100$ cm. Highest floors $X=120$ cm (greater than the distance between floors).

- Hydraulic oil.

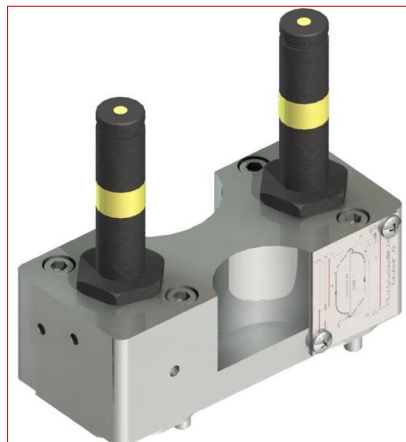
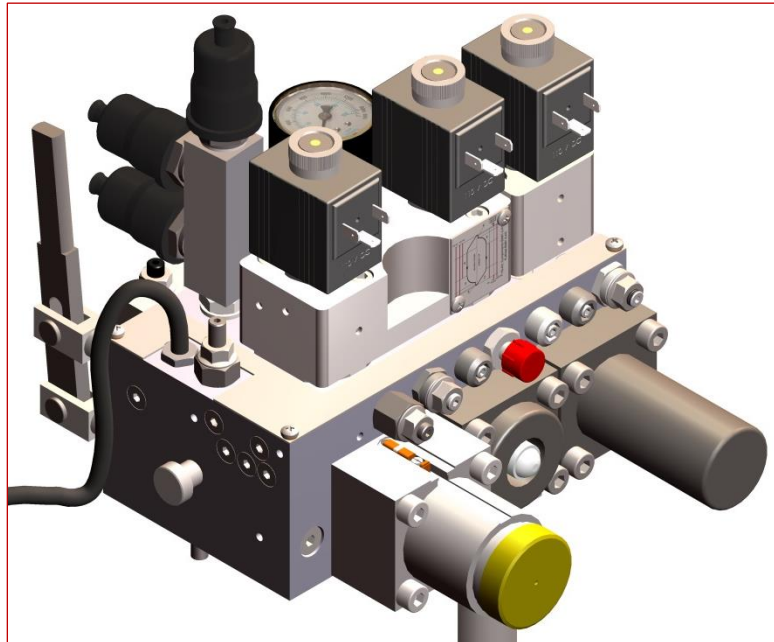
- The temperature of the oil may be too low (below 5° C) meaning that the lift may not be able to change speed.
 → It is necessary to install a tank-heating element (or check its performance if one is already installed).

- Deceleration regulator (screw n° 3).

- The screw may be excessively tightened and the lift may change speed very slowly → Turn the regulator to open it in the direction indicated by the arrow.
- The screw thread may be broken and not act as a regulator → Check.
- Check the state of the filter and the intake port for the regulator screw n° 3 → Take it out and clean it if required.

- Speed change electrovalve (YR).

- The coil does not connect → Check the connection in the connector and in the control panel terminal.
 → To check that there is no excitation in the coil, place a screwdriver on the upper part to perceive any force of attraction.
- The electrovalve actuator is blocked → the oil returns to the tank via the YR electrovalve sheath.
- The position of the ball on the base supplement or on the base of the electrovalve may be damaged.
 → Clean any possible shavings or impurities.
 → Place the ball catch on the mechanized cone at the base of the electrovalve.

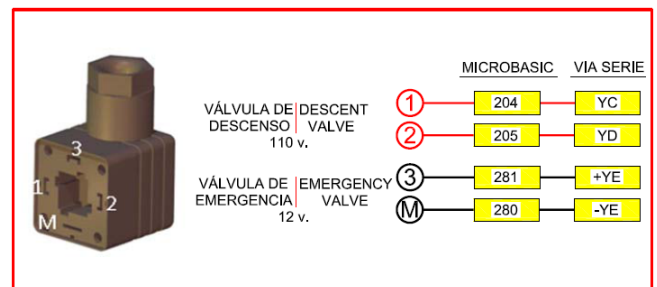
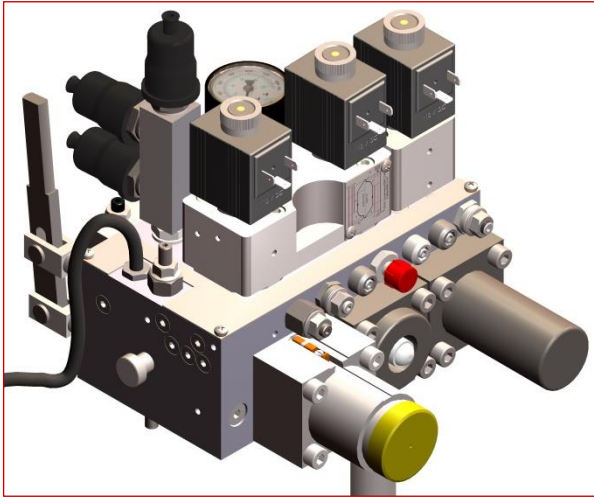


A3. Descent

A3.1. Start-up (the lift does not start)

- Descent electrovalve (YD).

- The coil is not being supplied correctly → Check the connection in the connector and in the control panel terminal.



A3.2. Nominal speed

A3.2.1. Speed slower than usual

- Speed change electrovalve (YR)

- The coil is not being supplied correctly → Check the connection in the connector and in the control panel terminal.
- The electrovalve actuator is blocked → the oil returns to the tank via the YR electrovalve sheath.
 - Clean any possible shavings or impurities.
 - Place the ball catch on the mechanized cone at the base of the electrovalve.

- Speed of descent regulator (screw nº 5)

- The screw may be excessively untightened → Turn the regulator, tightening it until achieving the desired speed.

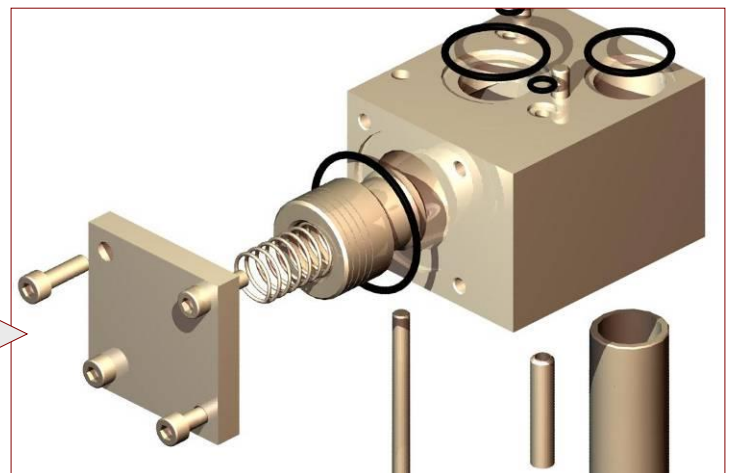
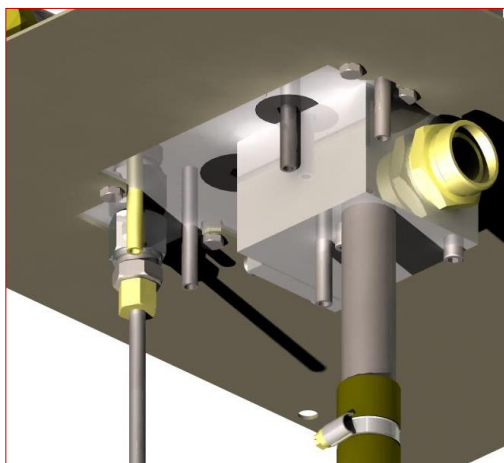
- Pressure equalizer valve (controlled by screw nº 5)

- The piston responsible for equalizing the pressure during descent may be blocked → open the screw, take out the piston positioned in the inside and clean any possible shavings or impurities both in the piston and its frame.

- Check non-return valve block

- Check the correct functioning of the non-return valve block piston. To do this, take apart the hose and the joint nut with its valve block and put pressure on the

front of the check valve piston. If the piston movement is blocked by any obstacle, take the whole block apart, clean any impurities and go over the piston with sand paper (get rid of any shavings before introducing it into the block again). Afterwards check that it slides smoothly in its frame.



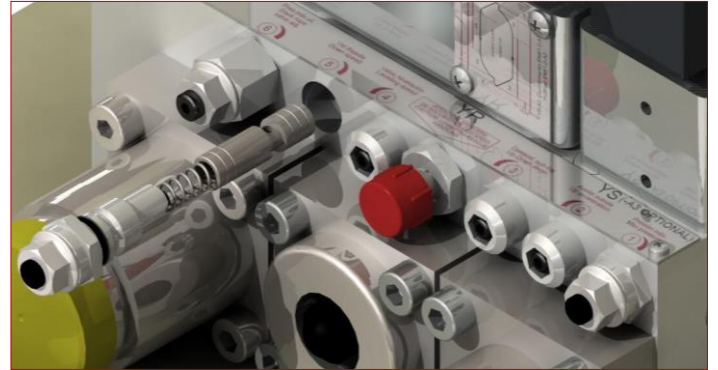
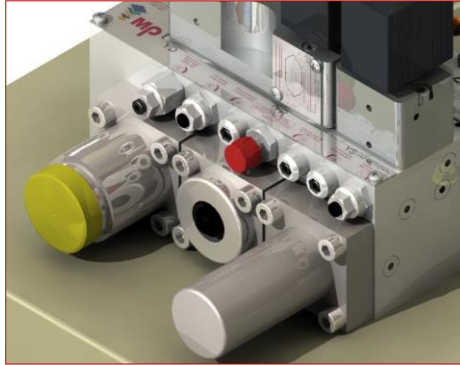
A3.2.2. Speed higher than usual

- Speed of descent regulator (screw nº 5)

The screw may be excessively tightened → Turn the regulator loosen it until achieving the desired speed.

- Safety gear valve test regulator (screw nº 9)

The screw may be tightened to the limit (if the safety gear valve operates) → Turn the regulator loosen it completely.



A3.3. Levelling speed (does not work or does not reach the correct speed)

- The reasons that cause the malfunctioning of the levelling speed in ascent are considered the same for the levelling speed in descent. On top of this there are some other reasons for not reaching the correct levelling speed in descent.

- Safety gear valve test regulator (screw nº 9)

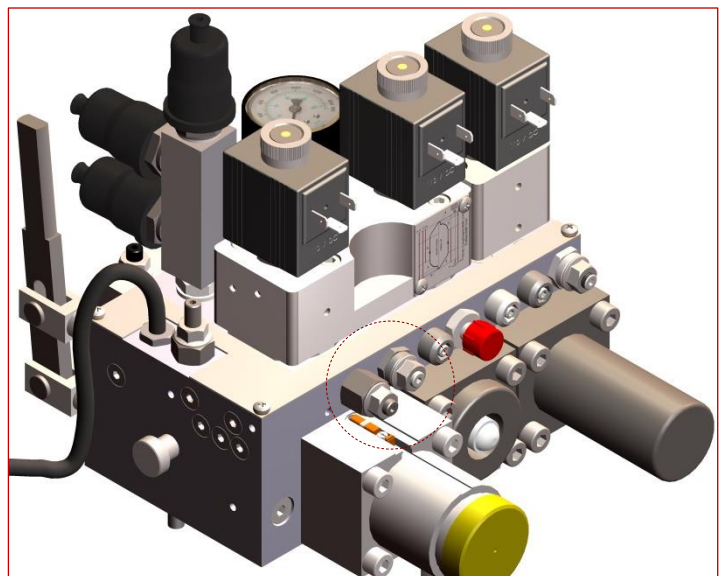
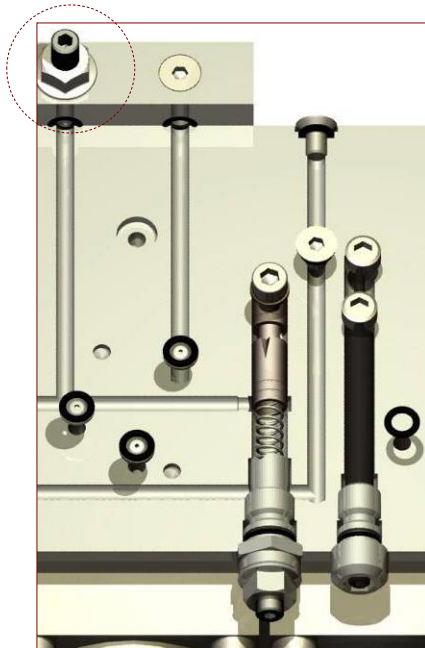
- Check that the screw is not tightened as it could cause an excessively high levelling speed.
→ From a completely tightened position, turn the screw three times to tighten it.

- Speed of descent regulator (screw nº 5)

- Check that the filter and the jet where pressure enters the equalizer (free piston cap) is not blocked.
→ Open the aforementioned cap and check it at this point.

- Levelling speed regulator (screw nº 4)

- If the levelling screw is too tight, the lift will not descend smoothly but with bumps.
→ Loosen the screw and adjust to the desired speed.
- If the levelling screw is untightened too far, there will be problems in the levelling (it will not stop at the floor).
→ Loosen the screw and adjust to the desired speed.



4. At floor

A4.1. The lift descends continuously

- **Descent valve (Locking seal)**

- The seal of the descent piston is not watertight. The problem can be clearly detected when there is rapid balancing. To assure ourselves of this, we must remove the right cap of the hydraulic power unit (level cap) and the transparent sheaths of the return pipes in the valve block. Once this has been done, we must try to localize the loss of oil. If it is being caused by the first pipe (situated beneath the start-up sequence block), we must proceed to change the descent piston seal and to clean any possible impurity existing between the piston and the block's conical lock washer.

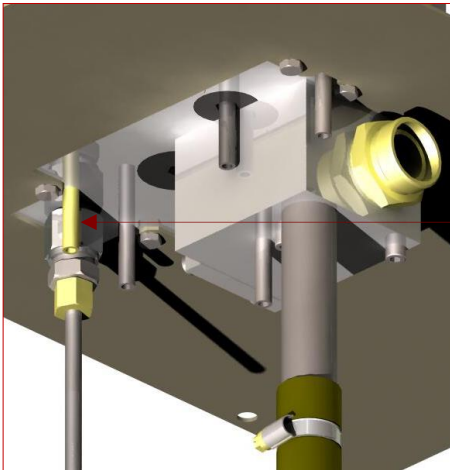
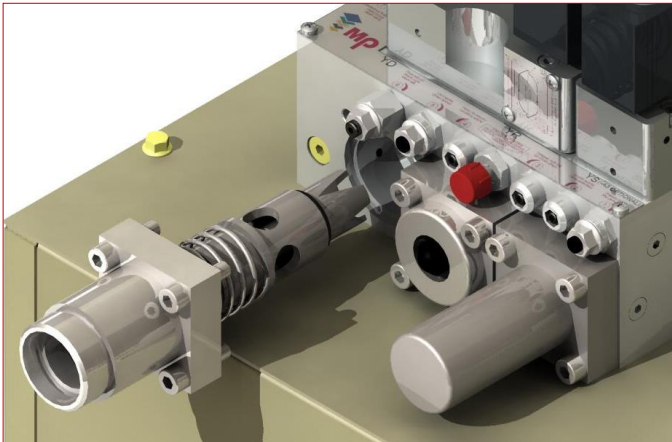
- Clean any shaving or impurity.
- Proceed to replace the seal.

- **Descent electrovalve (YD)**

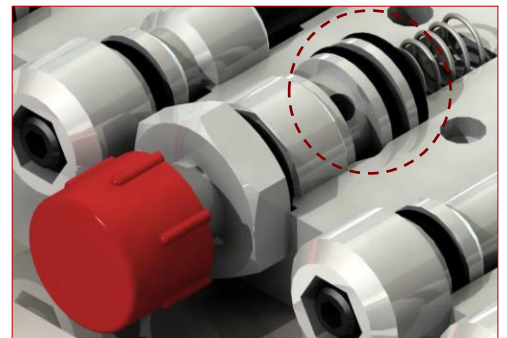
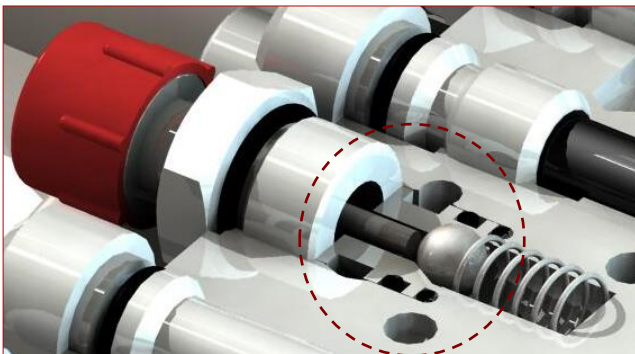
- The coil is continuously supplied.
 - The actuator ball does not tighten correctly (Watch if there are oil drops escaping through the connection of the tank to the descent electrovalve block).
 → Clean any possible shaving or impurity.

- **Manual descent valve**

- The actuator ball does not tighten correctly (Look for a possible oil leak through the connection of the tank to the manual descent valve).
 → If this is the case, it will be necessary to replace the manual pump unit.



Manual lowering pushbutton tank oil return



A4.2. The lift descends when loaded

- Presence of air in the pipes

- The existence of air inside the cylinder may cause an effect that is easy to identify. When a load is introduced, it causes a spring-like response in the system.
- Bleed the cylinder to get rid of any air inside it (see the technical manual for the MP hydraulic cylinder MTHDCMP).

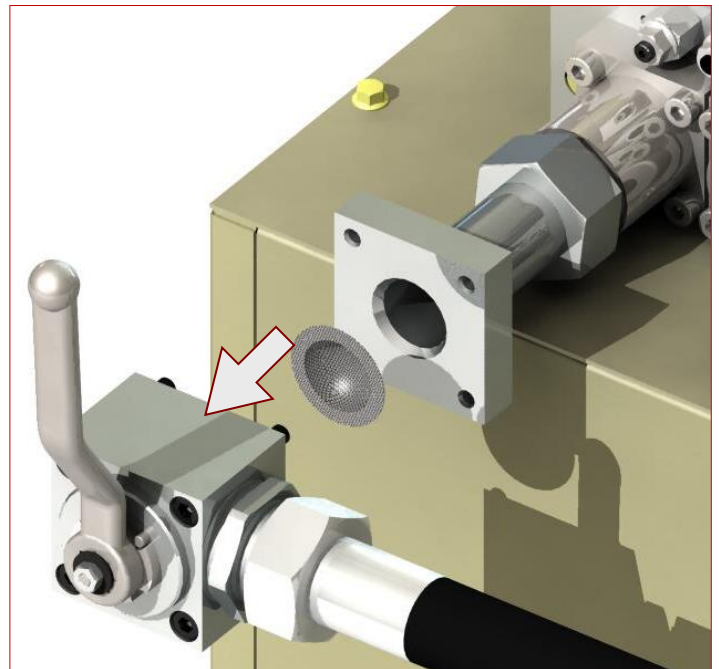
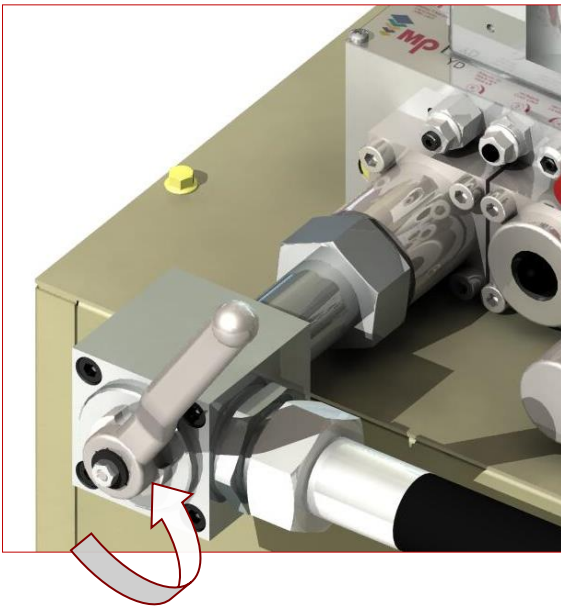
- Hydraulic oil.

- Hydraulic oil is a compressible fluid and its characteristics vary according to the temperature. If at the same time as the load is introduced into the car a considerable descent is caused, this may be due to the following reasons.
- The lift car is very high up (floor number higher than the 5th).
- The distance up to the machine room is very large.
- A flexible hydraulic hose of more than 5 m in length has been used in the installation.
- The machine room is located at the top.
- There are great differences between the temperature during the day and at night.

A5. Miscellany

- Cleaning of the return filter

- In order to clean this component, proceed according to the following steps:
- Close the shut-off valve.
- Push the manual descent button to get rid of any residual pressure in the system.
- Using an appropriate spanner, undo the hexagonal cap and extract the mesh from the filter.
- Clean with an appropriate brush, put together and open the shut-off valve following this sequence of steps (avoid sudden movements of the system).



- Bleeding of the cylinder

- Place inside the car half of the total load admissible in the installation to bleed.
- Take the car to a suitable working position that allows you to reach the bleeder screw from the roof of the car in a comfortable and simple way.
- Leave it to stand in the same position for at least 10 minutes.
- Proceed to slowly untighten the bleeder screw until the air begins to come out. This moment can be clearly detected by the noise it produces (a quiet whistle) and by the oil that comes out of the cylinder under pressure (protect the outlet with a cloth to avoid any undesirable spattering).
- Tighten the bleeder screw when you notice that the oil comes out without any air.
- Repeat the previous operation but this time whilst the car is ascending at a slow speed. Untighten the screw and begin the ascent. Air mixed with oil will start to come out up until a moment when only oil appears. This will be the point to stop the bleeding (carry out this operation whilst the bleeder screw remains accessible from your working position).
- Repeat the operation after the car has made various trips and after approximately 2 or 3 hours from the moment of changing the fittings.

- Change of fittings in the cylinder

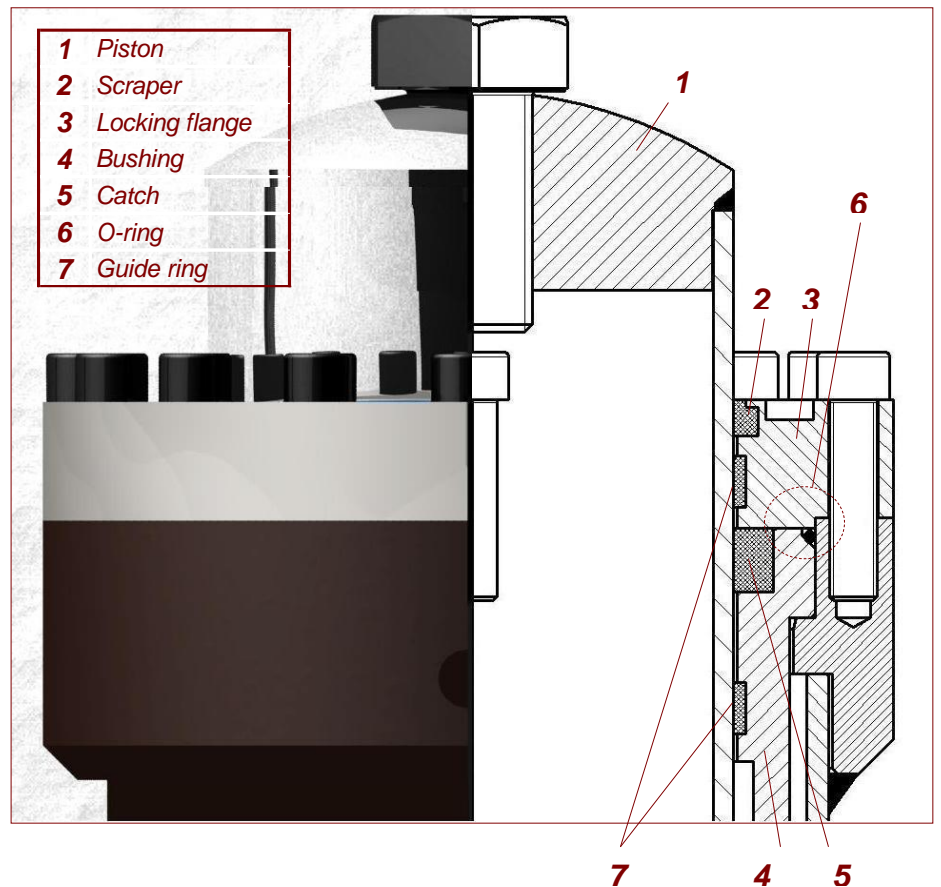
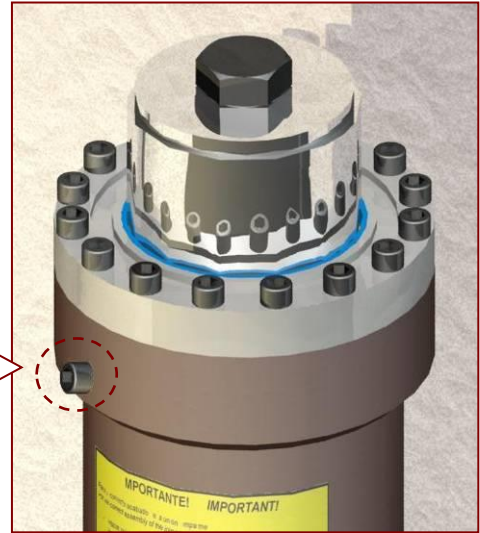
- Check that the cylinder does not have any scratches or defects which may cause oil leaks. If this is the case and some are found, try to remove them using sand paper. Sand with horizontal movements trying not to cause any greater damage.
- Secure the car, jamming it or suspending it at a distance a little bit higher than the lowest stop.
- Take apart the joint between the piston and the bolster or frame. Clean the cylinder head.
- Untighten the screws and remove the locking clamp. Place two M6 screws in the bushing in order to extract it.
- Remove the clamp saddle, the scraper and the o-ring seal. Use a small flat-tip screwdriver.
- Assemble the new spare parts in the bushing. Carry out the assembly with a nylon hammer.
- Be careful not to damage the o-ring seal.
- Place the new scraper in the locking clamp, set the clamp in its frame and tighten the locking screws.

NOTES:

- It is necessary to bleed the installation after any change of fittings.
- The usual amount of leakage through the cylinder joint is between 0,5 and 1 L per month.



Bleeding



A6. Electric Motors, Operating Instructions

The Operating Instructions of electrical motor manufacturer are shown here below.

1	Important Safety Instructions		1	Importantes instrucciones de Seguridad	
	WARNING ISO 3864	ENG ISO 639-3		ADVERTENCIA ISO 3864	SPA ISO 639-3
W1	ELMO Submersible Motors are not ready-to-use products. It is prohibited to run the electric motor before the machine on which it is fitted has been declared compliant with related directives.		W1	Los motores sumergidos ELMO no son productos listos para el uso. Está prohibido poner en servicio el motor eléctrico antes de que el conjunto, en el cual se va a incorporar, haya sido declarado conforme a las propias directivas.	
W2	The motors may only be operated when they have been installed in machines or systems, and when their safe operation is ensured, depending on use, by means of a guard, barriers or other suitable measures (see ISO 13857:2008).		W2	Los motores pueden funcionar sólo cuando han sido instalados en máquinas o sistemas y cuando está asegurado un funcionamiento en condiciones de seguridad, dependiendo del uso, mediante una protección, barreras u otras medidas de seguridad adecuadas (véase ISO 13857:2008).	
W3	ELMO motors are provided with IP00 protection degree (see 2.4).		W3	Los motores ELMO se suministran con un grado de protección IP00 (véase 2.4).	
W4	When using a motor with additional components (e.g. pumps), please observe the relevant operating instructions provided by the motor manufacturer!		W4	Cuando se utiliza un motor con componentes adicionales (por ej. bombas), le rogamos que se ajuste a las instrucciones operativas importantes proporcionadas por el fabricante del motor!	
W5	Do not modify machine unless authorized by manufacturer.		W5	No modifique la máquina sin la autorización del fabricante.	
W6	Only use the ELMO electric motor submerged in hydraulic oil (or fluid, see 3) coupled with hydraulic pumps.		W6	Utilice los motores eléctricos ELMO sólo si están sumergidos en aceite (o fluido) hidráulico (véase 3) y acoplados con bombas hidráulicas.	
W7	<p>The motors are equipped with integrated thermal protections: the temperature sensors (thermistors PTC or bimetal detectors break type NCC) which are located into the windings, they must be connected! The connection must be made and managed: -for PTCs via thermistor's control unit (motor protection relay). The operating voltage at the PTC terminals should be 2.5 V_{DC} (maximum 30 V_{DC}). -for NCCs directly via contactors, within the limits of 250 V_{ACmax} and 1.6 A_{max}.</p>		W7	<p>Los motores están equipados con protectores térmicos incorporados: los sensores de temperatura (termistores PTC o detectores bimetalicos de interrupción NCC) que han sido insertados en los devanados, ¡tienen que estar conectados! La conexión tiene que ser efectuada y gestionada: -para los PTC, mediante unidad de control de los termistores (motor protection relay). La tensión operativa en los terminales de los PTC tiene que ser de 2.5 V_{CC} (máx. 30 V_{CC}). -para los NCC, directamente mediante contactores dentro de los límites de 250 V_{ACmáx} y 1.6 A_{máx}.</p>	
	CAUTION ISO 3864	ENG ISO 639-3		ATENCIÓN ISO 3864	SPA ISO 639-3
	<p>Before operating the motor: C1) Consult this document for important safety-related information. C2) Consult the following instructions for information necessary for the proper use of the motor. C3) Ignore the safety instructions could cause injury.</p>			<p>Antes de poner en marcha el motor: C1) Consulte esta documentación para la información importante referente a la seguridad. C2) Consulte las siguientes instrucciones para la información necesaria para un uso correcto del motor. C3) Ignorar las instrucciones de seguridad puede causar accidentes.</p>	
	<p>C4) Check the data marked on nameplate fixed to motor! (See Section 5). C5) Consult the wiring diagram supplied with the motor (see 4.3).</p>			<p>C4) Compruebe los datos en la placa de datos fijada al motor! (Véase la Sección 5). C5) Consulte el esquema de conexiones proporcionado junto con el motor (véase 4.3).</p>	
	<p>C6) Installation, connection to the power supply and commissioning may only be performed by qualified service personnel! The relevant regulations must be observed! (See "maintenance M1").</p>			<p>C6) Instalación, conexión de las líneas de alimentación y puesta en servicio pueden ser efectuadas ¡sólo por personal de servicio competente! ¡Cabe ajustarse a los correspondientes reglamentos! (véase "Mantenimiento M1").</p>	
	<p>Personnel protective equipment must be worn when working near/with motors. They can cause serious injury (see "M1").</p>			<p>Quando se trabaja con los motores es necesario utilizar los equipos de protección individual (EPI), ya que los motores pueden causar daños importantes (véase "M1").</p>	
	<p>C7) The designers, installers or users are responsible for proper and safe installation and operation of the motor! (See "M1").</p>			<p>C7) Proyectistas, instaladores o usuarios ¡son responsables de una instalación y un funcionamiento adecuados y seguros del motor! (Véase "M1").</p>	
2	Transport, Storage		2	Transporte, Almacenaje	
	ISO 7000-2406 modified	ISO 7000-0629 modified		ISO 7000-2406 modified	ISO 7000-0629 modified
2.1	ELMO Submersible Motors are packed at the factory to comply with the relevant regulations, included the regulation (EC) No 300/2008.		2.1	Los motores sumergidos ELMO se emban en la fábrica conforme a los correspondientes reglamentos, incluido el reglamento (CE) N. 300/2008.	
2.2	<p>Lifting equipment must be used</p> <p>Transport the motors in the original packing or using the transport fixtures provided (attachments for lifting according to EN-81-2 see 0.2.3) in conjunction with suitable and approved lifting equipment (according to EN-81-2 see 0.3.14, 6.3.8, 15.4.5).</p>		2.2	<p>Necesario utilizar equipo de elevación</p> <p>Transporte los motores en su embalaje original o usando las fijaciones suministradas para el transporte (enganches para dispositivos de elevación conforme a EN-81-2 punto 0.2.3) con idóneos y aprobados sistemas de elevación (conforma a EN-81-2 puntos 0.3.14, 6.3.8, 15.4.5).</p>	
	<p>Lift heavy objects correctly</p> <p>Manual handling should be avoided wherever possible (according to EN-81-2 see 0.2.3), first checking whether it is necessary to move the load, and if it is, considering automation, lifting machines or any other tool that can help ease the operation. If it is essential to handle heavy objects manually, it should be done in a way to reduce the risk of injury. When handling manually comply with permissible human lifting and carrying limits.</p>			<p>Evitar correctamente los objetos pesados</p> <p>En lo posible cabe evitar el desplazamiento manual (véase EN-81-2 punto 0.2.3). Compruebe si es necesario mover la carga y si lo es, tome en consideración el uso de aparatos automáticos de elevación o de cualquier otro instrumento que pueda ayudar en las operaciones. Si el desplazamiento manual es inevitable, es necesario efectuarlo de manera que se reduzcan los riesgos de accidentes, respetando los límites humanos de elevación y de transporte de pesos.</p>	

2.3			Transport motors assembled to other component parts (e.g. pumps) in a proper manner, estimating the point of balance; detect the centre of gravity of the body transported (motor + pump + accessories) which will be handled as a single unit.	2.3			Transporte los motores ensamblados con otras partes componentes (por ej. una bomba) de la manera adecuada, evaluando el punto de equilibrio; encuentre el centro de gravedad del conjunto transportado (motor + bomba + accesorios) que será tratado como una sola unidad.
2.4			Handle with care. Heavy mechanical shocks, jolts and bumps should be avoided when handling motors. ELMO submersible motors are built with IP00 protection degree and they can be damaged if handled incorrectly.	2.4			Manejar con cuidado. Cabe evitar fuertes golpes y barquinazos mecánicos al desplazar los motores. Los motores sumergidos ELMO están contruidos con un grado di protección IP00 y se pueden dañar si se manejan de manera errónea.
2.5			Watch out for any damage to the packing of the motors. Any damage to the packing made by forwarders during transit should be reported. Damage in transit is not covered by the ELMO guarantee!	2.5			Mire si el embalaje o los motores presentan daños. Cabe manifestar cualquier daño al embalaje causado por el transportista durante el transporte. El daño durante el transporte ¡no está amparado por la garantía de ELMO!
2.6			Store the motor in the original packing (if possible) in a dry area protected from the water/humidity and dirty, in a temperature range of -20/+60 Celsius degrees, until final installation.	2.6			Almacene el motor en su embalaje original (a ser posible) en una zona seca y protegida del agua/humedad y del polvo, a una temperatura entre -20 y +60 °C, hasta la instalación final del producto.
2.7			Avoid too long storage periods. It is recommended a maximum of 6-12 months by audit date (see identification nameplate for Audit date).	2.7			Evite que los períodos de almacenaje sea demasiado largos: se recomienda un máximo de 6-12 meses desde la fecha ensayo (véase la placa de datos para conocer la fecha de ensayo).
2.8			About overseas deliveries, in order to prevent the corrosion of the materials, it is used an anti-corrosion (or anti-rust) oil (unless explicit customer prohibition) for treatment of the finished motors. ELMO employs even some Vapor phase Corrosion Inhibitor (VpCI) anti-corrosion products.	2.8			Para entregas ultramar, a fin de precaver la corrosión de los materiales, se utiliza un aceite anticorrosión (salvo manifiesta prohibición por parte del cliente) para el tratamiento de los motores acabados. ELMO utiliza también unos productos anticorrosión del tipo Vapor Phase Corrosión Inhibitor (VpCI).

3	Hydraulic Oil/Fluid Features			3	Características del Aceite/Fluido Hidráulico																																																																																																						
		ENG	ISO 639-3			SPA	ISO 639-3																																																																																																				
3.1			The oil should be free from chemical agents which may be aggressive against copper, aluminum, steel and the insulation materials. We recommend to use the oil indicated below (see 3.2).	3.1			El aceite debe estar exento de agentes químicos que pueden ser agresivos, como cobre, aluminio, acero y materiales aislantes. Recomendamos utilizar el aceite indicado a continuación (véase 3.2).																																																																																																				
3.2	The ELMO submersible motors have to work completely submerged into hydraulic paraffinic oil types HLP (according to DIN 51524-2) or HL (according to DIN 51524-1) having a viscosity class in the range ISO VG 32 + ISO VG 68 (kinematic viscosity in legal unit mm ² /s).			3.2	Los motores sumergidos ELMO tienen que funcionar completamente sumergidos en aceite hidráulico parafínico de tipo HLP (conforme a DIN 51524-2) o HL (conforme a DIN 51524-1) con una clase de viscosidad en el rango ISO VG 32 + ISO VG 68 (viscosidad cinemática en unidades legales mm ² /s).																																																																																																						
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3.3			The oil temperature should not exceed 70 °C. If it is necessary an oil chilling device should be used. Instead, when the oil temperature is lower than 10 °C and/or the oil viscosity is higher than 250 mm ² /s (cSt) an oil heating device should be used.	3.3			La temperatura del aceite no debe superar los 70 °C. A ser necesario cabe utilizar un aparato para enfriar el aceite. Por otra parte, si la temperatura del aceite es menor que 10 °C y/o la viscosidad del aceite es mayor que 250 mm ² /s (cSt) se debe utilizar un aparato para calentar el aceite.																																																																																																				
3.4			The maximum water (moisture) content into oil, expressed in part per million is 800 ppm.	3.4			El contenido máximo de agua (humedad) en el aceite, expresado en partes por millón es de 800 ppm.																																																																																																				
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4 Installation - Commission				4 Instalación - Puesta en Servicio			
			ENG ISO 639-3				SPA ISO 639-3
4.1	The motor shaft/axis must be accurately aligned with the pump one, when they are coupled each other. This is the reason why, from the ELMO side, a particular attention is paid to squareness between the flange and the axis of the motor.			4.1	El eje/árbol motor tiene que estar cuidadosamente alineado con él de la bomba, cuando motor y bomba se acoplan uno con otro. Esta es la razón por la cual ELMO presta especial atención a la ortogonalidad entre la brida y el eje del motor.		
	+ +				+ +		
4.2	Use elastic vibration absorbers (damper), between the motor feet and the tank structure, when assembling the motor on the power unit, in order to damp the propagation/amplification of the mechanical vibrations generated by the motor. Do not use excessive forces (levering, bending).			4.2	Utilice amortiguadores elásticos (<i>vibration absorbers</i>) entre las patas del motor y la estructura del tanque, cuando se ensambla el motor en la centralita hidráulica, a fin de amortiguar la propagación/amplificación de las vibraciones generadas por el motor. No hay que desarrollar fuerzas excesivas (de palanca, de flexión).		
4.3	The electric connections should be carried out by qualified service personnel, according to the wiring diagram supplied with the motor (see C5).			4.3	Las conexiones eléctricas las debe realizar personal competente, respetando el esquema de conexiones proporcionado junto con el motor (véase C5).		
4.4	Remove specific transport protection devices, and any other foreign bodies, used during transport, before use of the motor.			4.4	Antes de utilizar el motor quite los dispositivos de protección específicos y otros eventuales cuerpos extraños, utilizados para el transporte.		
4.5	When mounting the pump, the rotor of the motor should not be removed from the housing inside position, to avoid damages to the motor winding. This operation should be carried out by qualified personnel. Locate the motor on the assembly line so to have it with a vertical axis and flange up. Take the pump with the flange down for fitting its shaft into the motor rotor hole. Do not use excessive torques/forces (levering, bending).			4.5	Cuando se monta la bomba, el rotor del motor no se debe quitar de su alojamiento interno, esto para evitar que se dañe el devanado. esta operación tiene que ser efectuada por personal competente. Coloque el motor en la línea de montaje con el eje dispuesto en vertical y la brida arriba. Coloque la bomba con la brida hacia abajo y con el eje centrado con el agujero del rotor del motor. No aplique pares/fuerzas excesivos (de palanca, de flexión).		
4.6			The motor must be always submerged below the minimum oil level (elevator cabin on highest floor).	4.6			El motor tiene que estar siempre sumergido por debajo del nivel mínimo del aceite (cabina del ascensor en la planta más alta).
4.7			The motor thermal protections must be properly connected and their operativeness has to be fully checked before starting the motor (see W7).	4.7			Los protectores térmicos del motor tienen que estar correctamente conectados y su eficacia se debe comprobar a fondo antes de poner en marcha el motor (véase W7).
4.8			Check the direction of the rotation: the correct direction is counterclockwise direction watching the motor front flange. With the tank closed, pay particular attention to unusual sounds at the first starting of the motor. To change the direction, interchange two phases between the three phases.	4.8			Compruebe el sentido de giro: el sentido correcto es antihorario (contrario al de las manecillas del reloj) mirando el motor por el lado de la brida frontal. Con el tanque cerrado, preste especial atención a ruidos raros/inusuales la primera vez que se arranca el motor. Para invertir el sentido de giro, intercambie entre ellas dos de las tres fases.

5 Operating Conditions				5 Condiciones Operativas						
			ENG ISO 639-3				SPA ISO 639-3			
5.1	The motor have to operate only within the ranges defined on the nameplate! The nominal output power indicated on the nameplate is the one provided at the mechanical shaft of the motor when loaded with the nominal torque T_N (net of the hydraulic losses). The nominal parameters (current, RPM, etc.) are those tested when the motor works (without flywheel!) submerged into oil at 45 °C with the nominal output power/voltage/frequency.			5.1	El motor tiene que funcionar solamente en el rango de valores indicados en la placa! La potencia nominal indicada en la placa es aquella proporcionada al eje mecánico del motor cargado con el par nominal T_N (al neto de las pérdidas hidráulicas). Los parámetros nominales (intensidad, RPM, etc.) son los comprobados cuando el motor trabaja (sin volante!) sumergido en aceite a 45 °C con valores nominales de tensión, frecuencia y potencia en el eje.					
5.2	According to standard IEC 60034-1 standard ELMO motors (thermal Class F) are designed to be submitted to an max 40 % intermittent periodic duty with starting (duty type S4), while CSA ELMO motors (thermal Class F) are designed to be submitted to a duty type S2. The oil temperature must not exceed 70 °C! If necessary chill the oil (see point 3.3).			5.2	Conforme a IEC 60034-1 los motores ELMO-estándar (clase térmica F) están diseñados para soportar un servicio intermitente periódico con arranque con relación de intermitencia máx. 40% (servicio de tipo S4), mientras que los motores ELMO-CSA (clase térmica F) están diseñados para soportar un servicio de tipo S2. La temperatura del aceite no debe nunca superar los 70 °C! A ser necesario enfríe el aceite (punto 3.3).					
	Duty Type Ref.	Starting time, t_D	Constant Load	start/hour		Servicio de Ref.	Tiempo de arranque, t_D	Carga constante	arranques/hora	
			Load	t_p				Carga	t_p	
	S4 standard	<1 s	T_N	60		S4 estándar	<1 s	T_N	60	
	S4 max	<1 s	$1.3 \cdot T_N$	Max 45 s	60	S4 máx	<1 s	$1.3 \cdot T_N$	Máx 45 s	60
	S2 max (CSA motors)		T_N	30 min		S2 máx (motores CSA)		T_N	30 min	

5.3 For the motor supplied with **nominal** voltage/frequency, the following **occasional overload torques** are guaranteed. The oil temperature **must not exceed 70 °C!** If necessary chill the oil (see point 3.3).

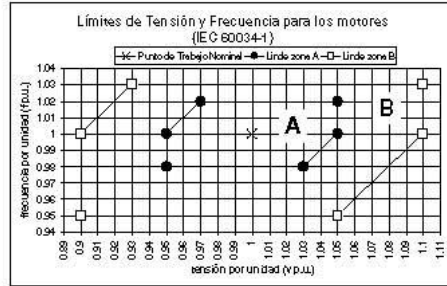
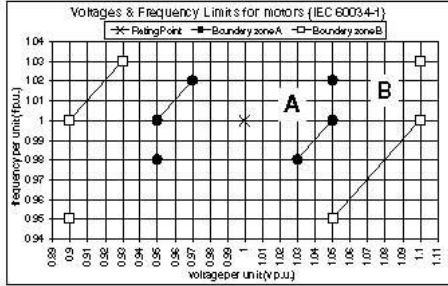
Occasional operation	Initial Temp. Oil	Overload	Test Time
Set-up over pressure valve	≤30 °C	1.45*T _N	Max 15 s
Breakdown torque test	≤45 °C	1.80*T _N	< 5 s

5.3 Para el motor alimentado con tensión y frecuencia **nominales** se garantizan los siguientes **pares de sobrecarga ocasionales**. La temperatura del aceite ¡no debe **nunca superar los 70 °C!** A ser necesario enfríe el aceite (punto 3.3).

Funcionam. ocasional	Temp. inicial aceite	Sobrecarga	Duración
Ajuste válvula de sobrepresión	≤30 °C	1.45*T _N	Máx 15 s
Test de par máximo	≤45 °C	1.80*T _N	< 5 s

5.4 According to **IEC 60034-1**, about the voltage and frequency variations during the operation, the motor must be operate at its **rating point**. However the motor is capable of performing its rated torque continuously within **zone A** and **zone B**, but it could not comply fully its performance at rated voltage and frequency, and could exhibit some deviations. In particular, the overload torques are not more guaranteed. Temperature rises may be higher than rated voltage and frequency (both the deviations and the rises are higher in zone B than in zone A). Extended operation at the boundary of zone B is not recommended!

5.4 Conforme a **IEC 60034-1**, acerca de las variaciones de tensión y frecuencia durante el funcionamiento, el motor tiene que trabajar en su **punto nominal**. De todas maneras, el motor es capaz de proporcionar su par nominal tanto en **zona A** como en **zona B**, pero podría no satisfacer plenamente sus prestaciones a tensión y frecuencia nominales, presentando algunas desviaciones. En especial, los pares de sobrecarga no están más garantizados. Los incrementos de temperatura podrían ser mayores que con tensión y frecuencia nominales (las desviaciones y los incrementos son más grandes en la zona B que en la zona A). Se recomienda ¡no superar el límite de la zona B!



6 Maintenance

ENG
ISO 639-3

ISO 7000-0717

6 Mantenimiento

SPA
ISO 639-3

ISO 7000-0717

6.1 When carrying out maintenance and service work:

IEC 60417-5188	M1) Read safety instructions (W1-W7 & C1-C7). The work protection regulations have to be observed! (See C6, C7).
IEC 60417-5110	M2) Open the tank only if all moving parts are stationary!
ISO 7000-0353	M3) The power is off and secured against undesired re-start.
ISO 7000-0025	M4) With the tank closed, pay particular attention to unusual sounds while the motor is running!
ISO 7000-1415	M5) Check oil's features! If it is necessary (see points 3.5, 4.6) clean/change the oil and/or clean the filters.

6.1 Al efectuar el mantenimiento y las operaciones de servicio:

IEC 60417-5188	M1) Lea las instrucciones de seguridad (W1-W7 & C1-C7). ¡Se deben respetar los reglamentos de protección laboral! (Véase C6, C7).
IEC 60417-5110	M2) Abra el tanque sólo si todas las partes móviles ¡están paradas!
ISO 7000-0353	M3) La alimentación está interrumpida y asegurada contra el rearme no intencional.
ISO 7000-0024	M4) Con el tanque cerrado, preste especial atención a ruidos raros/inusuales mientras el motor ¡está en rotación!
ISO 7000-1415	M5) ¡Compruebe las características del aceite! A ser necesario (véanse los puntos 3.5, 4.6) limpie/sustituya el aceite y/o limpie los filtros.

7 Customer Care

ENG
ISO 639-3

7 Servicio Clientes

SPA
ISO 639-3

7.1 For any other questions concerning the use of our products, or if you are planning a special application, please contact:

	www.info@elmoitaly.com
	www.elmoitaly.com
	+390382529564 or +390382422372
	Fax: +390382527041

7.1 Para cualquier otro tema acerca del uso de nuestros productos o para aplicaciones especiales, le rogamos que contacte con:

	www.info@elmoitaly.com
	www.elmoitaly.com
	+390382529564 o +390382422372
	Fax: +390382527041

7.2

For all motors is available the Declaration of Conformity CE.	For Canadian market we have an approval in accordance with CSA proofed CAN/CSA-C22.2 No. 100-95.

7.2

Para todos los motores está disponible la Declaración de Conformidad CE.	Para el mercado Canadiense disponemos de certificación CSA , CAN/CSA-C22.2 N. 100-95.

7.3


	The Quality System of ELMO S.r.l. is conform to the requirements of UNI EN ISO 9001:2000 .
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7.3

	El Sistema de Calidad de ELMO S.r.l. cumple los requisitos de UNI EN ISO 9001:2000 .
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