

User Guide

HYDRAULIC SYSTEM ATR

04FJR02



IMPORTANT:

Any safety provisions as directed by the appropriate governing agencies must be observed when using our products.

The pictures in this document are snapshots of situations at different stages of assembly, and therefore are not complete images. For the purpose of safety, they should not be deemed as definitive.

All of the indications regarding safety and operations contained in this documents, and the data on stress and loads should be respected. ULMA's Technical Department must be consulted anytime that field changes alter our equipment installation drawings.

The loads featured in this document, related to the basic elements of the product, are approximate.

Our equipment is designed to work with accessories and items produced by our company only. Combining such equipment with other brands is not only dangerous without having made all corresponding verifications, it also voids any or all our warranties.

The company reserves the right to introduce any modifications deemed necessary for the technical development of the product.



Safety note



Control note



Warning note



Information note

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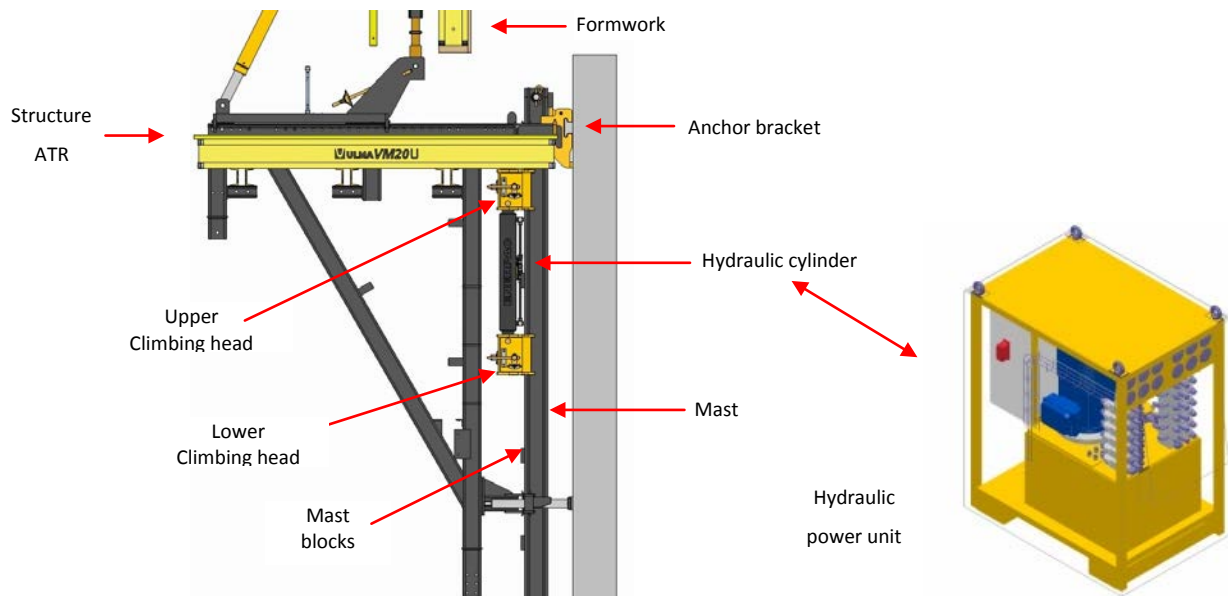
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1. PRODUCT DESCRIPTION

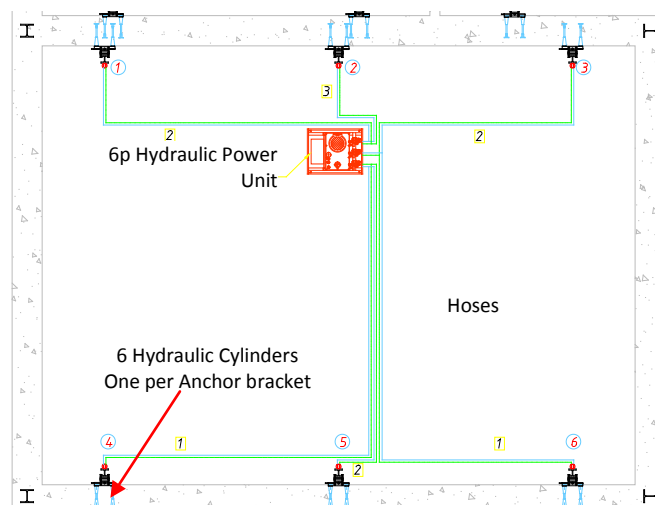
The rise of self-climbing systems (without the requirement of a crane) is done by a successive elevation of the mast and the formwork up the vertical concrete structure to be built. This elevation of first the mast and then the formwork is achieved with the help of mechanic-hydraulic, leverage equipment.



This document aims to describe the different parts of the hydraulic system as well as the different possibilities for its use.

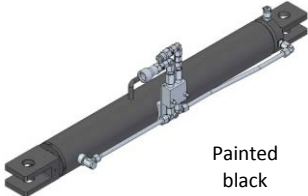
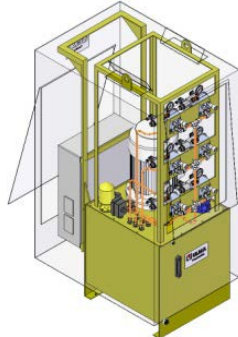
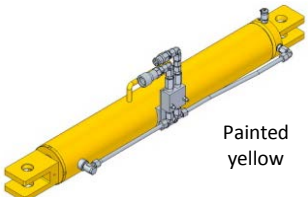
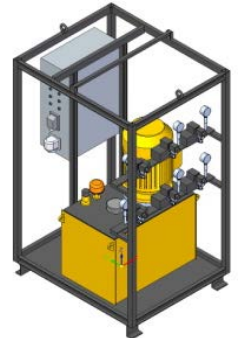

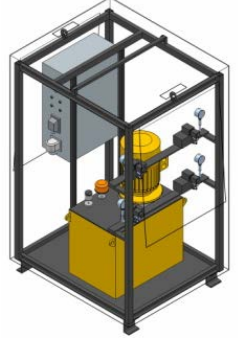
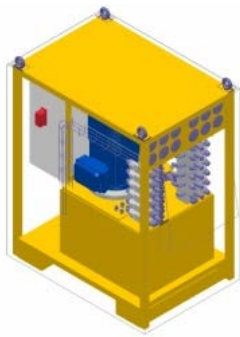

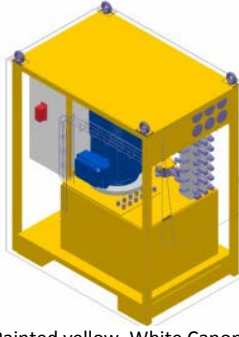
The main components of the hydraulic system used for the elevation of the self-climbing system are:


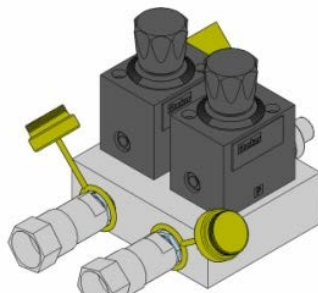

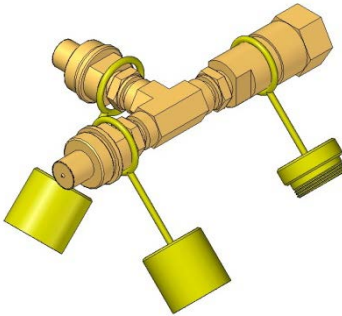
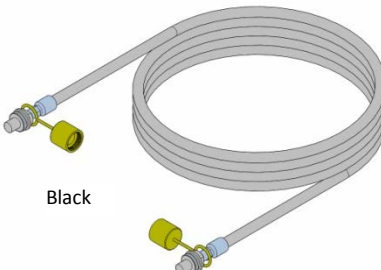
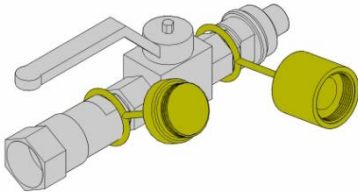
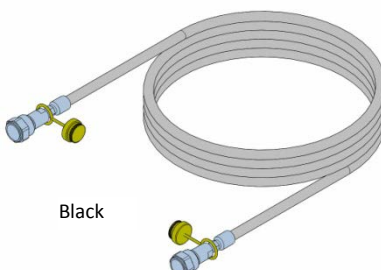
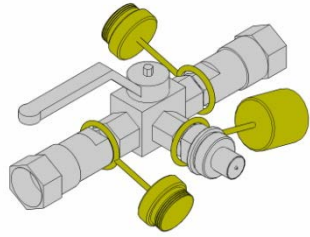
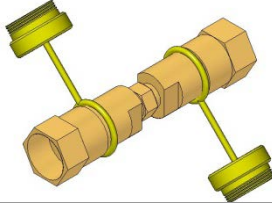

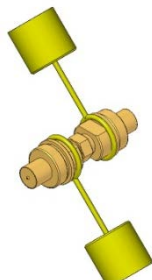
- Hydraulic power unit: Controls the hydraulic cylinders, supplying the required flow of hydraulic fluid to them.
- Hydraulic cylinder: Its purpose is to operate the climbing heads to elevate the mast and the structure.
- Flow divisors: Splitting the flow coming out of each output of the power unit into two flows which allows of operating the double number of cylinders with the same hydraulic power unit.
- Hoses: Transport the hydraulic fluid between the power unit and the hydraulic cylinders.
- Couplers: Connection parts between hoses.



2. COMPONENTS AND ACCESSORIES

2.1. GRAPHIC DESCRIPTION

Item nº	Weight kg.	Item name	Item nº	Weight kg.	Item name
0338100	45	CYLINDER ATR 100KN  Painted black	0338136	380	POWER UNIT ATR 6P BASIC  Painted yellow. White Canopy
0338142	53	CYLINDER ATR 130KN  Painted yellow	0338101 0338116	700 700	6P MASTER HYDRAULIC POWER UNIT 6P AUTO HYDRAULIC POWER UNIT  Painted black-yellow. White Canopy
0338150	53	CYLINDER ATR 130KN SIGNAL  Painted black	0338102 0338114	502 502	4P SLAVE HYDRAULIC POWER UNIT 4P AUTO HYDRAULIC POWER UNIT  Painted black-yellow. White Canopy
0338141	620	POWER UNIT ATR 12P SFP  Painted yellow. White Canopy	0338157 0338158	0,25 0,3	PLUG FEMALE 3P+N+T 380V 32A PLUG FEMALE 3P+N+T 380V 63A 
0338140	517	POWER UNIT ATR 12P SFP  Painted yellow. White Canopy			

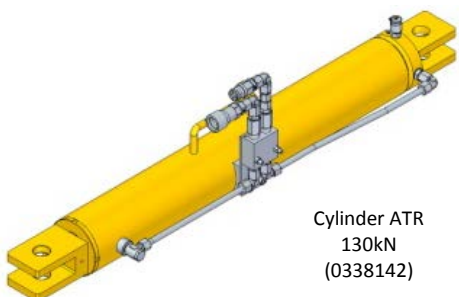
Item nº	Weight kg.	Item name	Item nº	Weight kg.	Item name
0338109	0,3	EMERGENCY STOPPER 7-10-10 ATR  Yellow-White-Red	0338143	1,7	COMPENSATED FLOW DIVIDER ATR 
0338103	1,7	MASTER/SLAVE JOINT CABLE 15M  Black	0338105	0,53	T VALVE ATR 
0338120 0338122 0338124	2,3 3,8 5,9	MALE HOSE 5 m MALE HOSE 10 m MALE HOSE 17 m  Black	0338118	0,75	BALL VALVE ATR 
0338121 0338123 0338125	2,3 3,8 5,9	FEMALE HOSE 5 m FEMALE HOSE 10 m FEMALE HOSE 17 m  Black	0338129	1	TWO WAY VALVE ATR 
0338106	0,35	MALE HOSE COUPLER 	0338144	0.4	PRESSURE GAUGE WITH TEST COUPLING 
0338107	0,2	FEMALE HOSE COUPLER 			

2.2. ELEMENTS DESCRIPTION

2.2.1. HYDRAULIC CYLINDER

Part located between the two climbing heads which moves the mast or the selfclimbing structure by extending and retracting. The system advances 600 mm in each extension-retraction cycle.

These are the 3 types of hydraulic cylinders:



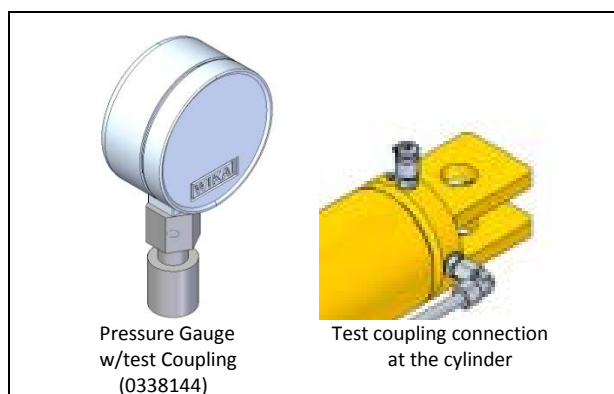
IMPORTANT:

100kN and 130kN cylinders are not possible to mix in the same elevation gang.

- **Cylinder ATR 100kN (0338100):**
 - * Load capacity: 100kN
 - * No signal elements for load measurement or limit stroke control.
 - * Test couplig connection included at the cylinder.
- **Cylinder ATR 130kN (0338142):**
 - * Load-bearing capacity: 130 kN
 - * Signal elements for load measurement and limit stroke control not available
 - * Test coupling connection included at the cylinder.
- **Cylinder ATR 130kN Signal (0338150):**
 - * Load capacity: 130kN
 - * Signal elements for load measurement and limit stroke control.
 - * This can be very useful with unbalanced loads that are very close to the limit of the cylinder (lifting auxiliary site equipment, such as concrete placing booms, etc.).
 - * Signal cable (20m long) included in the cylinder.

2.2.2. PRESSURE GAUGE W/TEST COUPLING

Item for measuring the pressure in the pushing side of the cylinder.

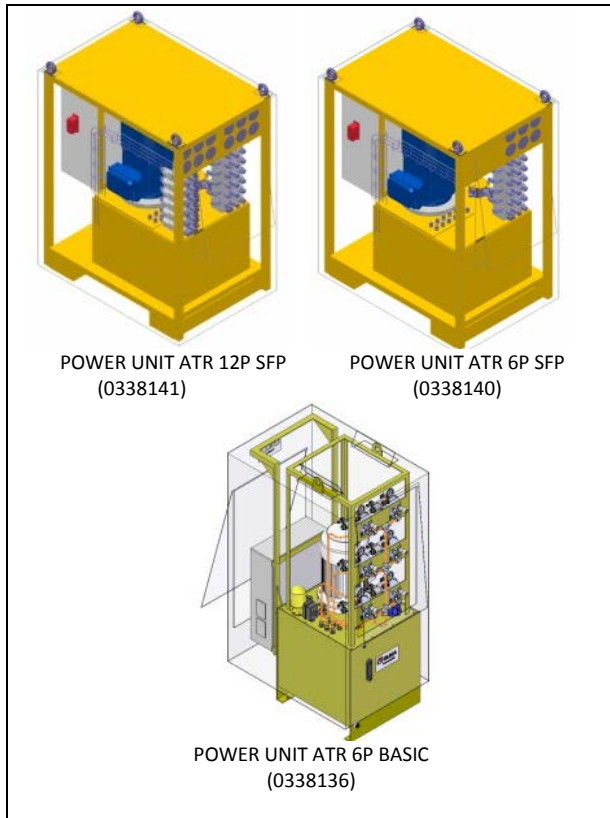


For that purpose fix it to the test coupling connection of the cylinder.

2.2.3. BASIC AND SFP HYDRAULIC POWER

UNITS

They pump the hydraulic fluid into the cylinders. The following power units are available:



The power units 6p or 12p, operate 6 or 12 cylinders, respectively.

Each power unit works independently. They cannot be connected to other power units.

The double number of cylinders can be operated by splitting the oil flow (see sub-paragraph 3.1.2).

The power unit is operated by a pendant (remote control panel) included in the power unit.



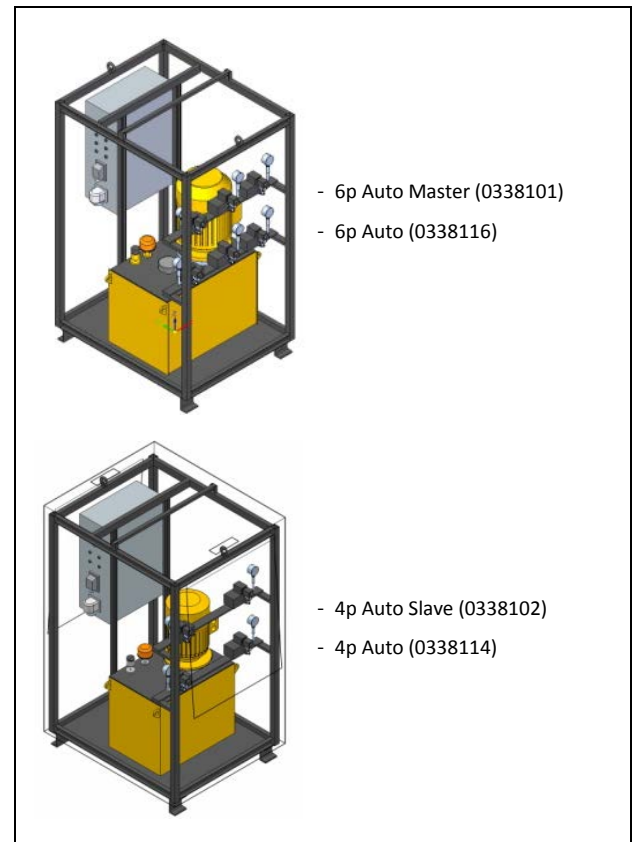
Pendants are not interchangeable between different power unit models.

The outflow of the Power unit ATR 12P SFP is half that of the Power Unit ATR SFP 6P.

2.2.4. HYDRAULIC POWER UNITS WITH SIGNAL

Likewise, they pump the hydraulic fluid into the cylinders.

The following power units are available:



The main difference to “Basic/SFP” power units is that the ones “with signal” are capable to control and monitoring the load in each cylinder, also the complete extension and retraction positions. All data are transferred to the power unit by signal cables connected to each cylinder.

Power units with signal are very useful for structures with unbalanced loads, where for reasons of load magnitude and variability, a continuous control is required. However, these power units can also be used without the signal cables.

Four power unit types with signal are available:

- Master (6p): works alone or where required with another slave power unit (4p)
- Slave (4p): works alone or under the control of a master power unit (6p).
- All other power units (6p and 4p) work alone.

4p or 6p refers to the operation of 4 or 6 cylinders. If more cylinders are required to be operated simultaneously, a Master/slave connection or a flow divisor connection can be used (refer to assembly types in section 3.1.).

The cylinders can be operated from the pendant (remote control panel) or the touch screen of the power unit. The pendants included in each power unit are:

- 6p Master Power Unit \Rightarrow 10p Pendant
- 4p Slave Power Unit \Rightarrow 4p Pendant
- 6p Power Unit \Rightarrow 6p Pendant
- 4p Power Unit \Rightarrow 4p Pendant

If the slave unit is connected to the master unit, only the 10p pendant can be used.

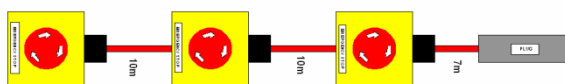


Pendants are not interchangeable among the various power unit models.

All these power units provide entries for the connection of additional emergency stoppers.

2.2.5. EMERGENCY STOPPER

The emergency stoppers arrest the hydraulic power unit in the case of emergency. Hydraulic power units have 2 regular emergency stoppers, one located on the power panel and the other on the pendant. For power units with signal, a cable with additional 3 emergency stoppers is compulsory. These emergency stoppers enable to arrest the hydraulic power unit from different points of the ATR structure.



Emergency Stopper 7-10-10 ATR (0338109)

Note: Option not available for basic power units.

2.2.6. MASTER/SLAVE JOINT CABLE 15M

15m long cable to connect master and slave power units (to enable the master unit to control the slave).



Note: For longer cables, a special order can be placed.

2.2.7. HOSES

Hoses of 5 m, 10 m and 17 m with male or female end couplers are available.

These are the male HOSES:



Male Hose 5m (0338120)
Male Hose 10m (0338122)
Male Hose 17m (0338124)

These are the FEMALE hoses:

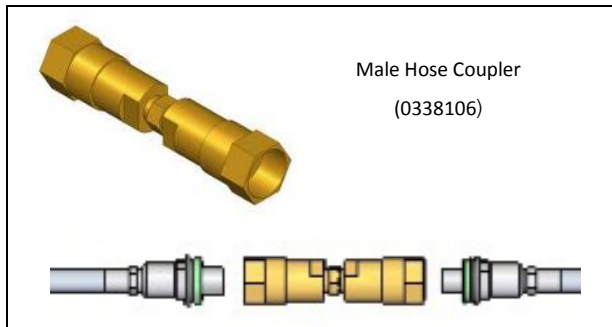


Female Hose 5m (0338121)
Female Hose 10m (0338123)
Female Hose 17m (0338125)

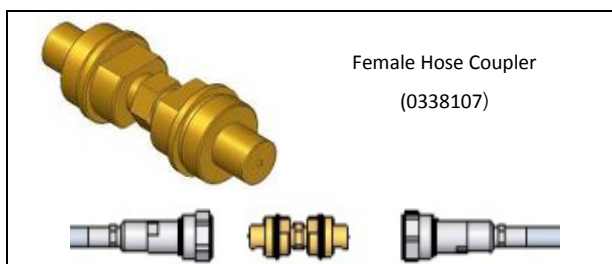
2.2.8. HOSE COUPLERS

The couplers are used between hoses to connect and extend them.

The "Male Hose Coupler " is used to connect 2 male hoses.

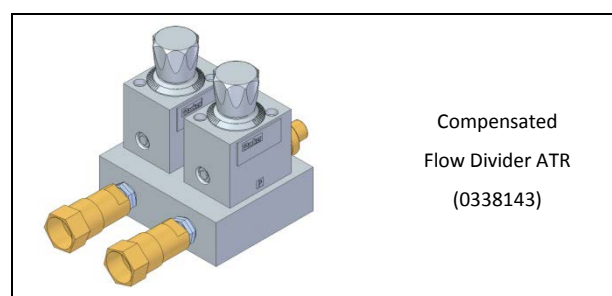


The "Female Hose coupler" is used to connect 2 female hoses.



2.2.9. COMPENSATED FLOW DIVIDER ATR

This valve splits each output flow of the power unit in two different flows.



The 2 built-in flow regulators are used to control oil flow to each cylinder regardless of its load. In that way speed of both cylinders can be synchronized.

It enables to operate the double number of cylinders with the same hydraulic power unit, simultaneously (example: 6p power unit → simultaneous control over 12 cylinders).

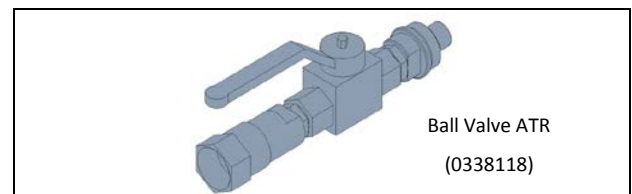
2.2.10. T VALVE ATR

When using the "Compensated Flow Divider ATR", the "T Valve ATR" becomes necessary to re-join the oil return flow from the two cylinders.



2.2.11. BALL VALVE ATR

When using the "Compensated Flow Divider ATR", the "Ball Valve ATR" is necessary in each cylinder, where the oil flows back to the tank. It is usually opened and only used in the exceptional case when the ATR system must be lowered.

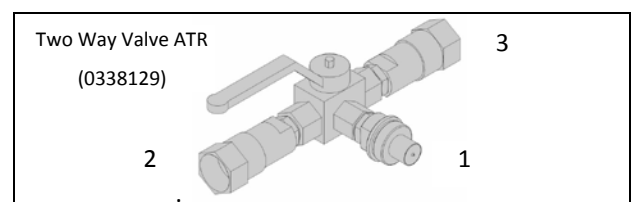


2.2.12. TWO WAY VALVE ATR

Usually used in multizone hydraulic connections to address the fluid oil. Depending on the position of the handle, the oil direction changes elevating the requested zone:

These are the different valve positions:

- Handle in position 1: closed valve.
- Handle in position 2 (according to picture): oil can only pass between 1 and 2.
- Handle in position 3 (according to picture): oil can only pass between 1 and 3.



3. ASSEMBLY, USE AND DISSASSEMBLY

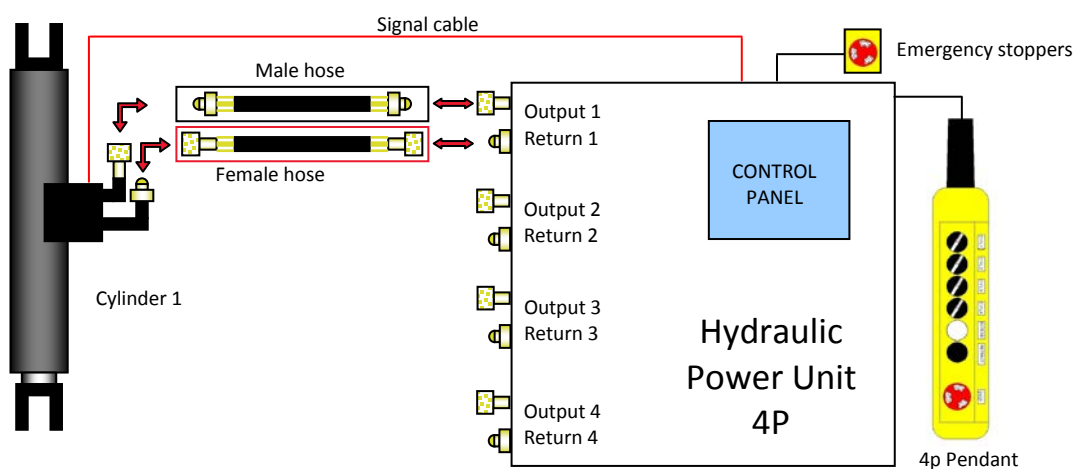
3.1. ASSEMBLY

In this section, the assembly of different hydraulic solutions of the self-climbing system ATR are described in detail.

3.1.1. DIRECT CONNECTION (POWER UNIT- CYLINDERS)

The hydraulic power unit is connected directly to the cylinders. To each output of the power unit one cylinder is connected. Therefore, a 4p power unit can be connected to 4 cylinders, a 6p to 6 cylinders and 12 to 12 cylinders.

This is an example of the connection between the outputs of a 4p power unit with signal to a cylinder with signal.



There are two direct connection types depending on the use of signal cables or not:

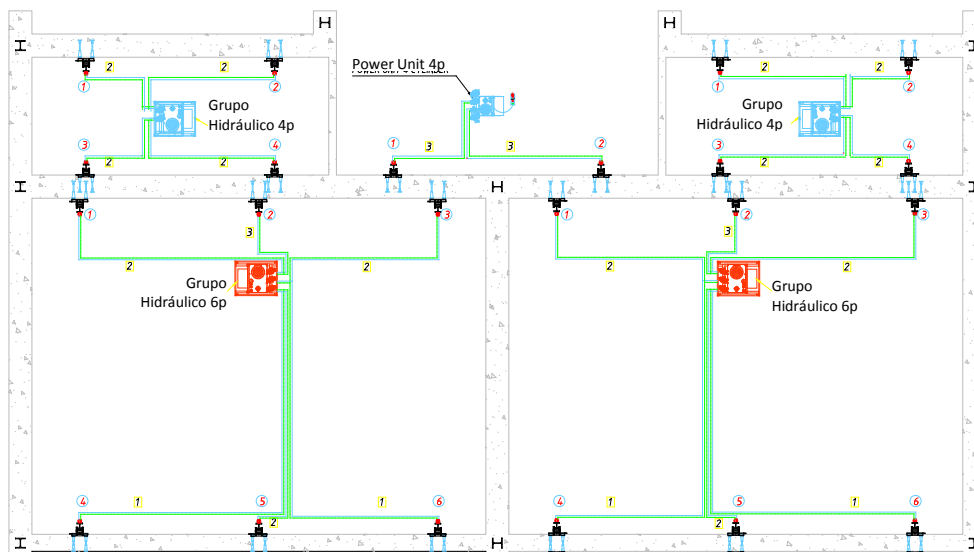
The NO-SIGNAL connection is the most common way. When there are no signal cables, the load is controlled by observing the working pressure of the equipment pressure gauges. Depending on the pressure, the load on the cylinders and whether the lifting assembly is balanced may be deduced.

Exceptionally, when each cylinder's load and the position of the platform must be displayed at all times, equipment with signal cables is used.

The control and operation of the cylinders is done with the pendant connected to the power unit. For power units "with signal", it is possible to operate the cylinders directly from the touch screen.

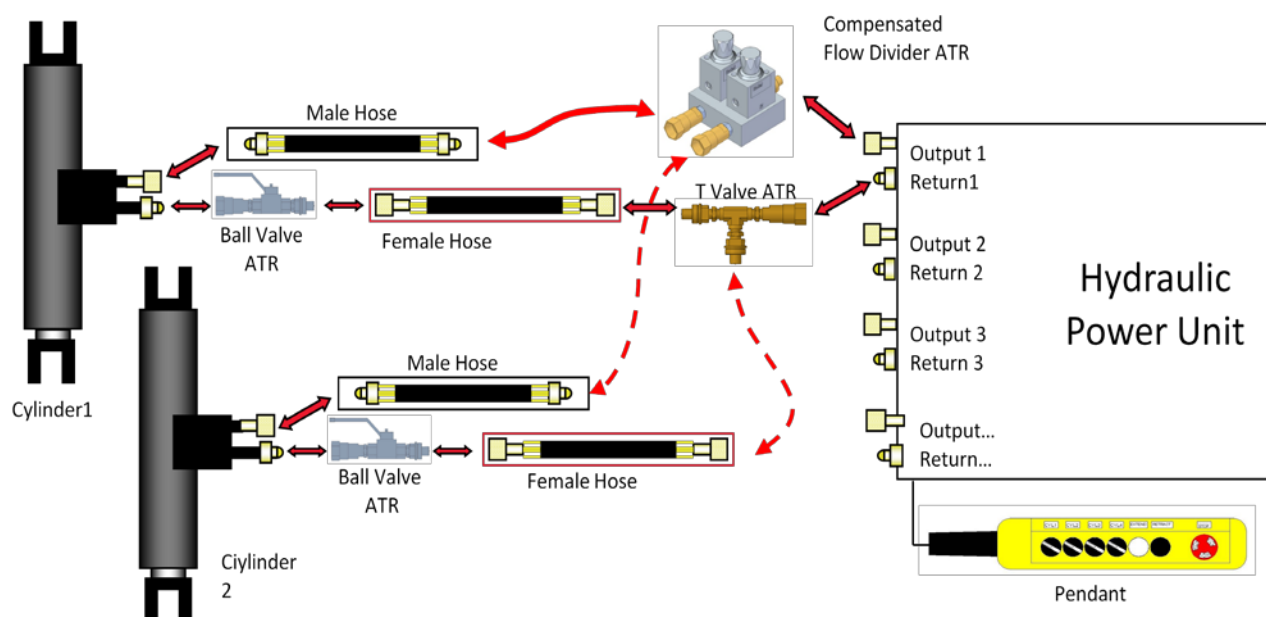
The power units "with signal" have additional emergency stoppers for shutting off from farther points of the structure ATR.

This is an example of a structure ATR elevated by various hydraulic power units where each output is directly connected to a cylinder:



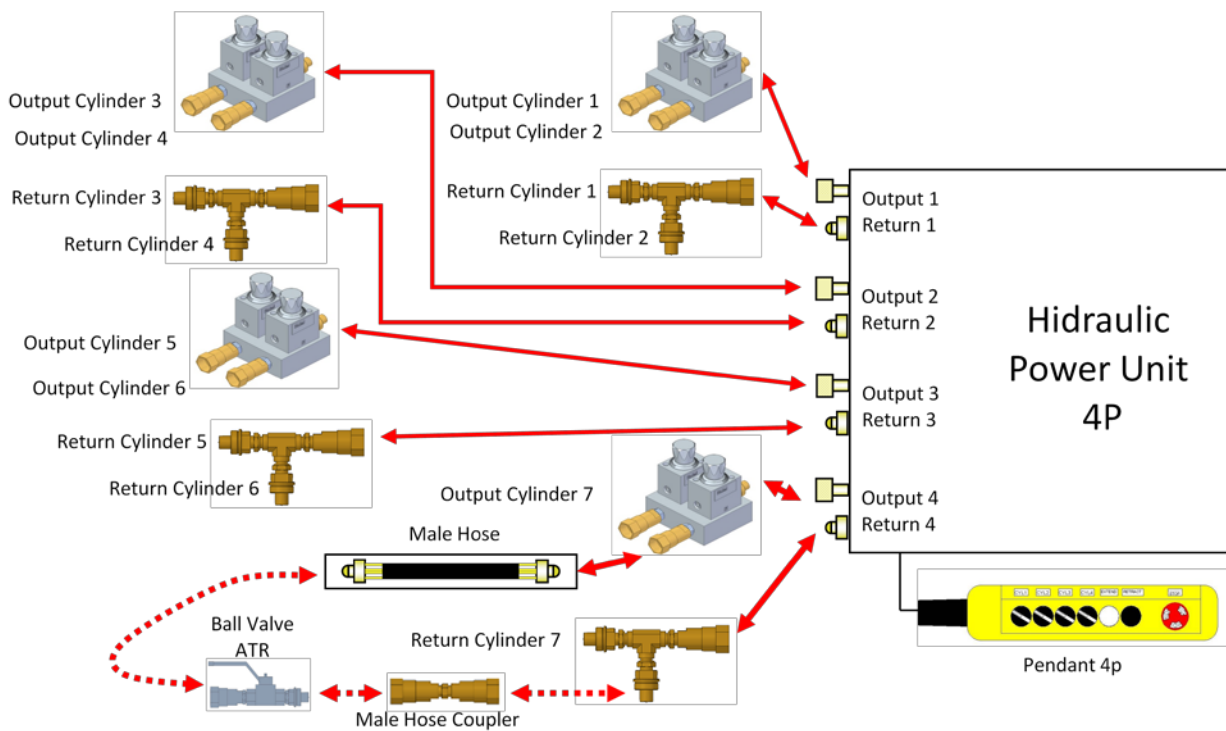
3.1.2. FLOW DIVISOR CONNECTION

There is the possibility to double the number of cylinders which can be operated with each power unit. The "Compensated Adjustable Divider ATR" splits the oil flow of each output of the power unit into two flows which can be regulated with the incorporated controls. This enables to operate two cylinders with each output of the power unit. At the return flow of each cylinder, a "Ball Valve ATR" is assembled. Finally, the "T Valve ATR" is assembled to re-join the oil of each cylinder pair into the tank.



The number of cylinders that can be connected with the split flow in accordance with the power unit employed is specified in the table in section 5 Features.

In the cases where there is an odd number of cylinders, the free output and free return flow is connected with a Male Hose Coupler. Subsequently, an example of 7 cylinders connected to a 4p power unit is given:



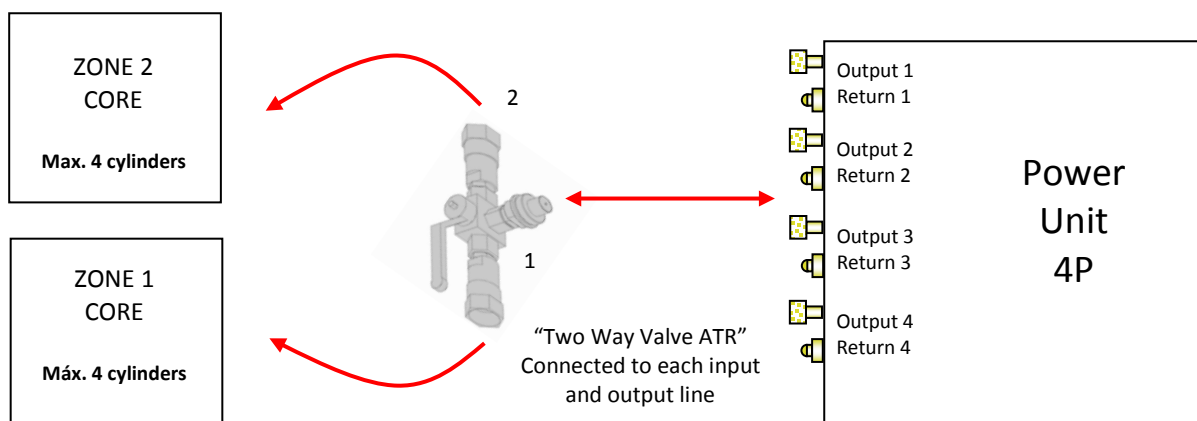
When using the Flow Divisor connection, the following must be taken into account:

- The elevation speed is reduced to the half.
- Cylinders load data cannot be visualized. **IMPORTANT:** This connection type does not allow connecting signal cables.
- The regulators of the "Compensated Adjustable Divider ATR" must be properly set-up (see section 3.3.3 Using power units with flow dividers).
- The "Ball valve ATR" must always be open, unless the ATR structure must be dismantled (see section 3.3 use).

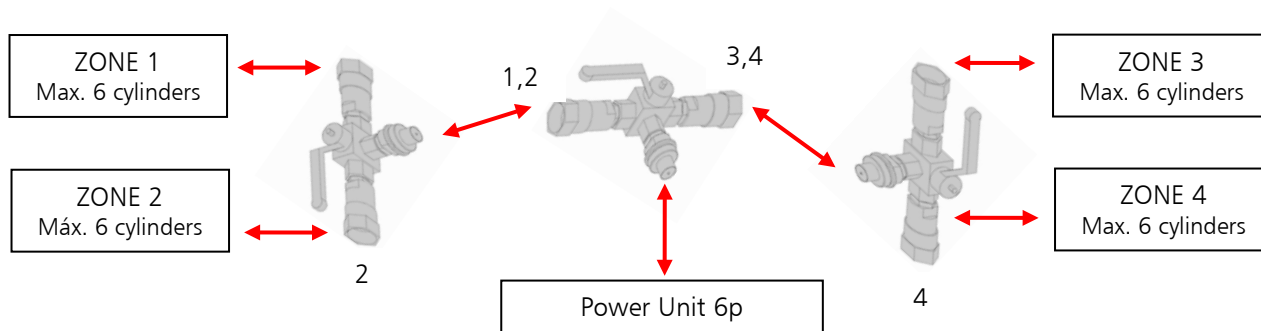
3.1.3. MULTIZONE CONNECTION

This connection type enables one single power unit to elevate different zones of a core. The core is divided in many zones, each one contains as many cylinders as outputs in the power unit. The elevation is performed per zone and not all at a time. The fluid oil is addressed to the requested zone to be lifted by beams of the “Two way valve ATR” (operating the handles).

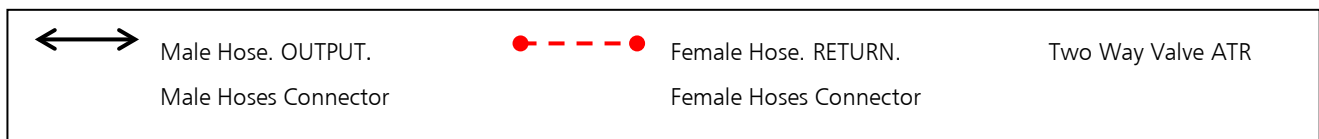
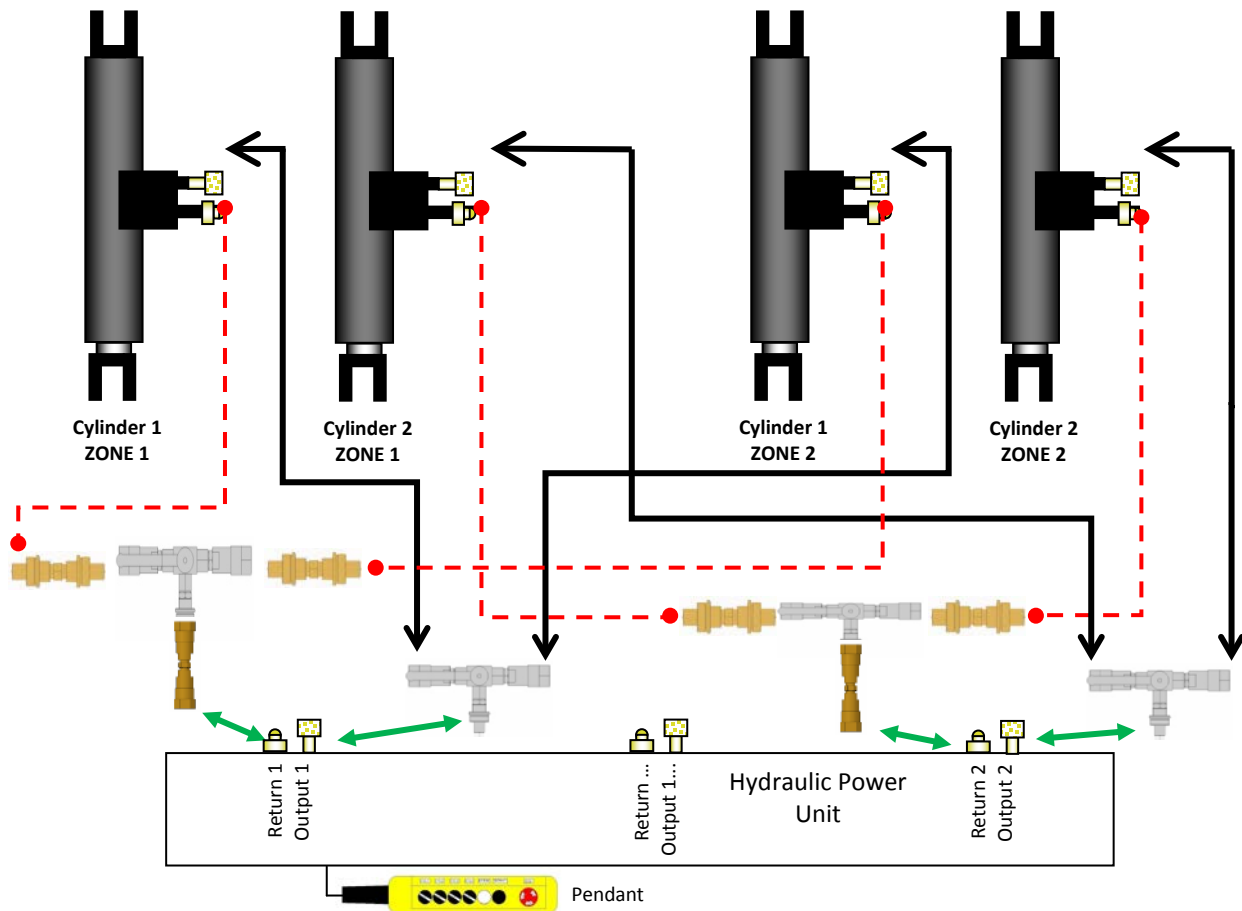
The following sketch shows in a simplified way, a 4p power unit operating 2 zones. Turning the handle to position 1, the oil flows to zone 1.



A maximum of 4 zones can be connected by means of “Two Way Valve ATR” connected in serial. This enables operating on 24 cylinders with a single 6p power unit. In each elevation, only 6 cylinders per zone can be activated.



The following connection example shows 2 ZONES with 2 CYLINDERS each.

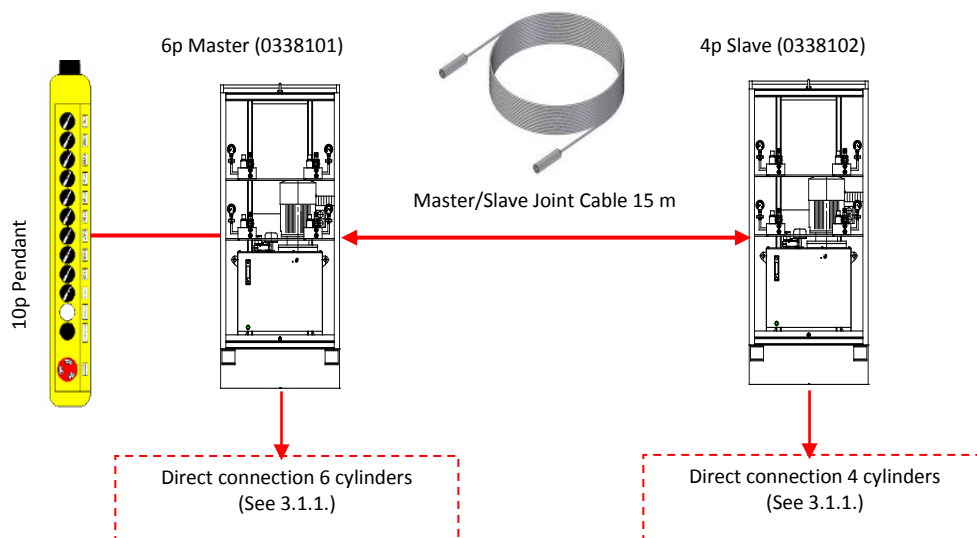


When using a “multizone connexion”, the followings must be taken into account:

- Prime the fluid oil circuit once the assembly is finished. In some cases, it is necessary to refill the tank of the power unit.
- Longer hoses are needed which permit overcoming the drop between the different zones, due that they are elevated separately from one single power unit.
- Turn ALL the handles of the “Two Way Valve ATR” addressed to the zone to be elevated.
- The load information on each cylinder cannot be visualized. **IMPORTANT:** This connection type does not allow connecting signal cables.

3.1.4. MASTER/ SLAVE CONNECTION

With the Master/Slave Joint Cable 15m, two hydraulic power units can be connected (6p Master and 4p Slave unit). This connection type creates 10 synchronized outputs which can operate 10 cylinders simultaneously.



As for the direct connection type, 1 cylinder is connected to each output of the hydraulic power units.

This connection type is normally used when simultaneous control and operating of more than 6 cylinders up to 10 with signal is required. Signal cables are connected to each cylinder and the power unit, which displays the current load in each cylinder on the screen of the 6p Master Unit.

The control and operation of all cylinders is done by the 6p Master Unit by means of the touch screen or the 10p pendant (10p pendant is included with the 4p Slave Unit. The 6p Master includes a 6p pendant that is not used).

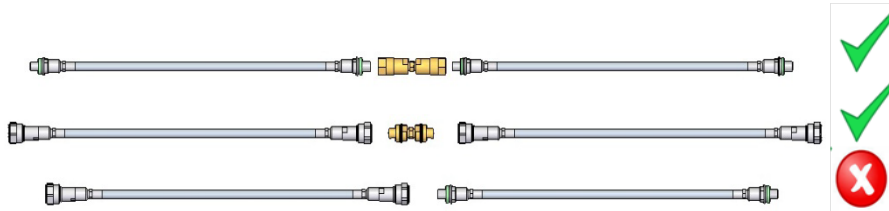
The additional emergency stoppers are connected to both hydraulic power units (6p Master and 4p Slave).

3.1.5. HOSES

To connect hydraulic power units with cylinders, male or female hoses of 5m, 10m and 17m are used. For longer hoses, male or female hose couplers are used to connect hoses.



Pay attention when joining the hoses to make longer ones. Check that the ends of the hoses are of the same type.



3.1.6. POWER SUPPLY

The hydraulic power unit requires electrical power supply. See 3.3.

3.1.7. OTHER CONSIDERATIONS



When **connecting any quick threaded** couplers (be it between hoses or other components), **do not tighten them with wrenches**, do it manually.



Once the circuit is assembled; run several cycles without load to accumulate the possible air in the cylinders. Afterwards, release the air from the cylinders with the incorporated air vent valve.



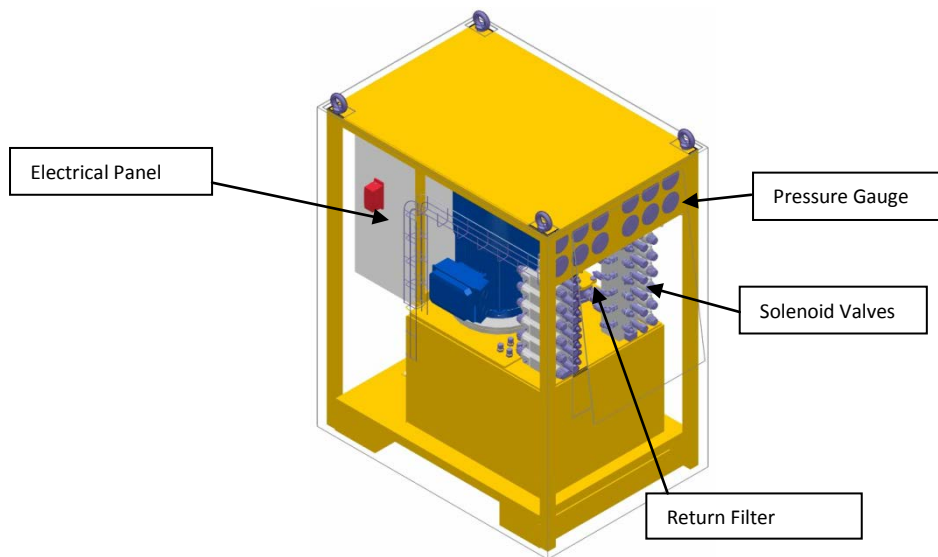
Whenever any elements with quick couplers are not being used, their protective caps should be fitted. These avoids damages to the threads and nipples. Cleaning of these threads before connecting them to the devices is recommended.

3.2. SET UP



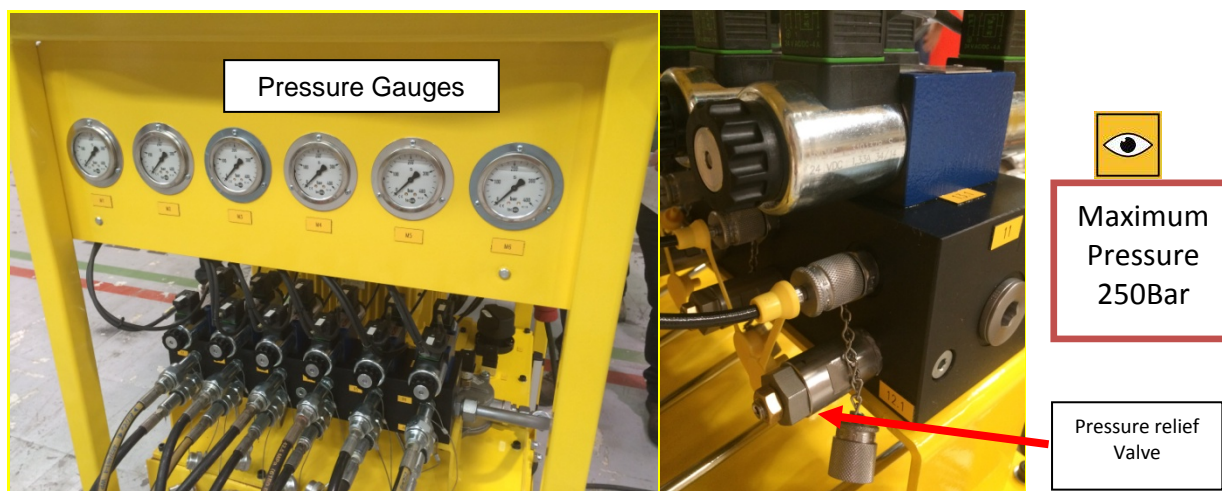
Check that the electrical connection corresponds to the site connections, especially for BASIC and AUTO equipment. The transformer must be adjusted for these devices. To see the proper regulated voltage of the transformer, consult the maintenance sheets.

The following must be checked after making all electrical and hydraulic connections and before using the PU:



- MAXIMUM WORKING PRESSURE**

Observe the pressure gauge to check that the maximum pressure of the hydraulic power unit is 180 bar.



How to check the PU pressure:

- Without connected Cylinders: With the cylinder selectors ON, press extend or retract buttons and check the pressure gauges.
- With connected Cylinders: First fully retract the cylinders (retract button). Then continue pressing the retract button while checking the pressure.



Pressures above the maximum can damage the PU and HWS Cylinder.

If there is no pressure, check that the pressure limiter is not incorrectly set.

• CHECK MOVEMENT OF CYLINDERS:

Perform various cycles on empty to check the cylinders are working properly:

- The cylinders should move in synchronized.
- Approximate speed:
 - 100kN Cylinder: 83 seconds for extension and 42 seconds for retraction.
 - 130kN Cylinder: 105 seconds for extension and 64 seconds for retraction.
- Maximum stroke: 610 mm
- Check for leaks or dripping oil.

• OIL LEVEL AND TEMPERATURE:

This equipment is supplied with oil level and temperature gauges in the tank indicator.



The equipment also comes fitted with temperature and oil level gauges whose alarms are displayed in the main panel.

The sensors for the various kinds of equipment can be seen in the next section.

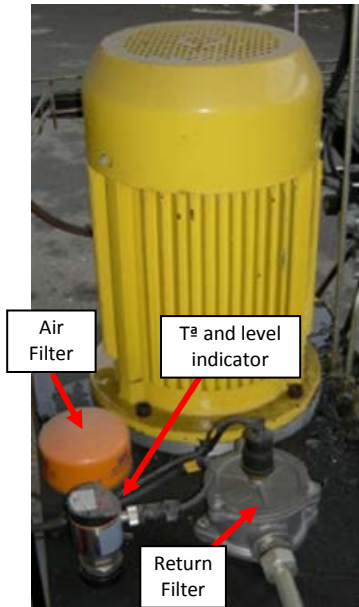
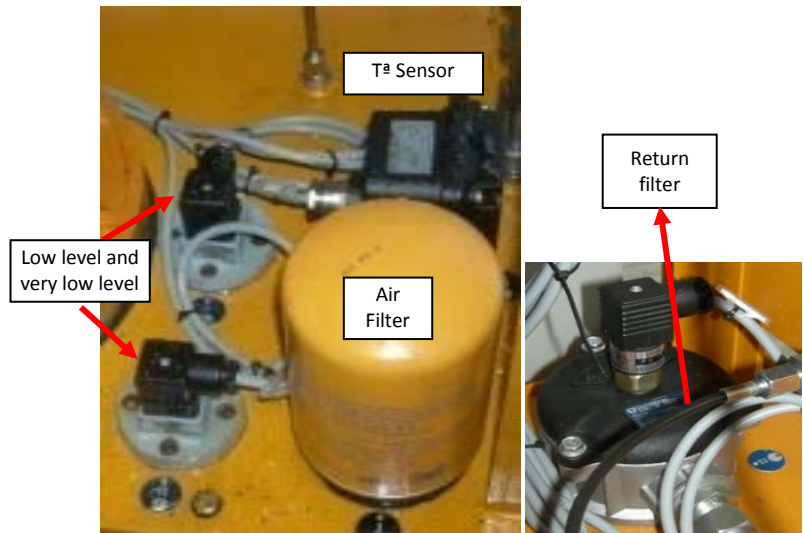
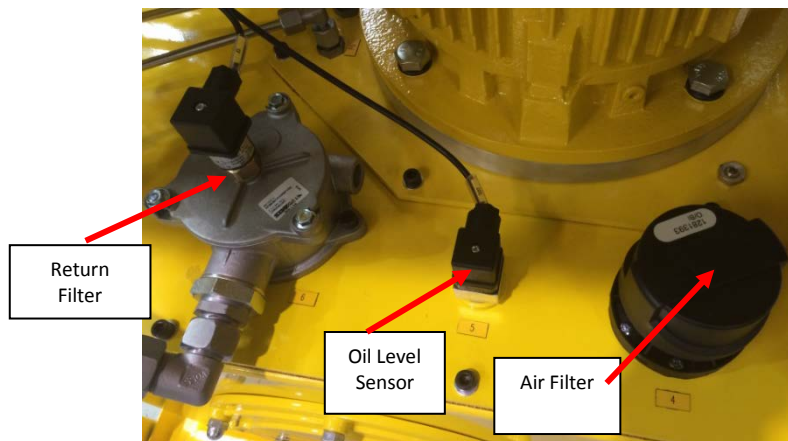


A low oil level or a temperature above 60 degrees can damage the PU.

If the oil level is low, fill the tank with oil type ISO VG32. Check maintenance sheets.

- AIR AND RETURN FILTERS.**

All equipment comes fitted with air and return filters. The return filter is equipped with a sensor whose alarm is on the main panel.

AUTO POWER UNIT**BASIC POWER UNIT****SFP POWER UNIT**

A dirty filter can cause damage to the P.U.

If the filter needs changing, check the type of cartridge in the Maintenance sheets.

3.3. USE

3.3.1. GENERAL OPERATING GUIDELINES

Technical properties of hydraulic power units:

- Electric properties:

	HYDRAULIC POWER UNIT	VOLTAGE (V)	FREQUENCY (Hz)	POWER (KW)	PLUG TYPE	SIGNAL CABLE
BASIC AND SFP	6p Basic	400V-480 3f	50-60	11	63 A 3P + N+ E	NO
	6p SFP			11	32 A 3P + N+ E	
	12P SFP			11	32 A 3P + N+ E	
WITH SIGNAL	6p Master	400V-480 3f	50-60	11	63 A 3P + N+ E	SI
	4p Slave			7.5	32 A 3P + N+ E	
	6p Auto			11	63 A 3P + N+ E	
	4p Auto			7.5	32 A 3P + N+ E	

- Maximum load capacity of the cylinder:
 - 100kN for 0338100
 - 130kN for 0338142 y 0338150.
- Maximum stroke of the cylinder: 666mm.
- Hydraulic Cylinder with signal (0338150) or without signal (0338100 and 0338142).
- Maximum working pressure 250 Bar.
- Maximum speed of cylinder stroke: 0.5/min.

The cylinders are operated by pendant connected to the hydraulic power units. These pendants enable to activate and control the different cylinders. They consist of the following components:

- Cylinder selector switch: Each push-button station has 12, 10, 6 or 4 selectors for selecting the outputs of the power units where the power units to be activated are connected.
- Extend button: Causes the selected cylinders to extend. When the button is released, extension stops.
- Retract button: Causes the selected cylinders to retract. When the button is released, retraction stops.

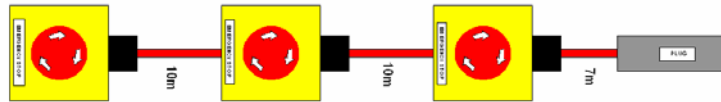
Emergency stopper: Safety switch which shuts off the system.



The pendants of the various power units are not compatible.

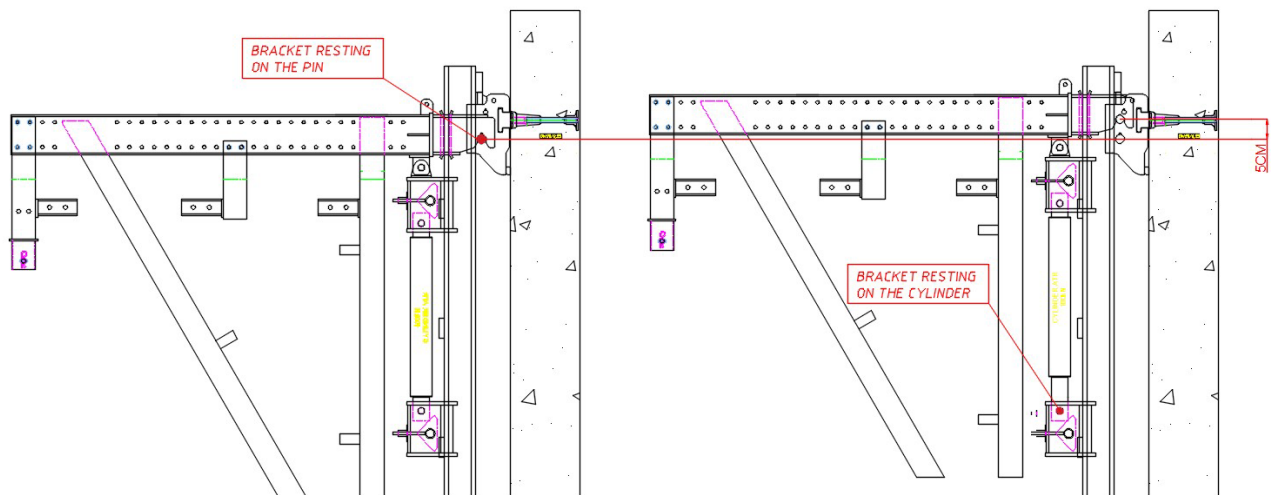
For “with signal” power units, the cylinders can also be operated from the “touch screen”.

For added safety, wherever it seems appropriate, additional emergency stoppers are placed. These emergency stoppers are connected to the hydraulic power unit (option not available for “Basic or SFP” Power Units).



IMPORTANT:

- At the first lifting check that the cylinders support the weight when the power unit is stopped. For that purpose, lift the structure 5cm, stop the power unit, wait and observe.



- In the case of any safety incident, as for example a collision, the emergency stopper of the power panel, pendant or one of the additional emergency stoppers is pressed.
- The safety guidelines for the use of hydraulic power units as well as the maintenance instructions of this guide must be strictly followed to ensure the correct working of the hydraulic equipment during construction works.



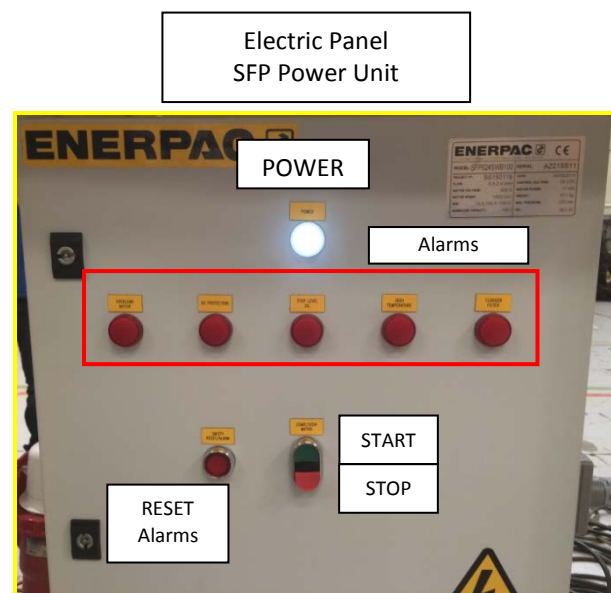
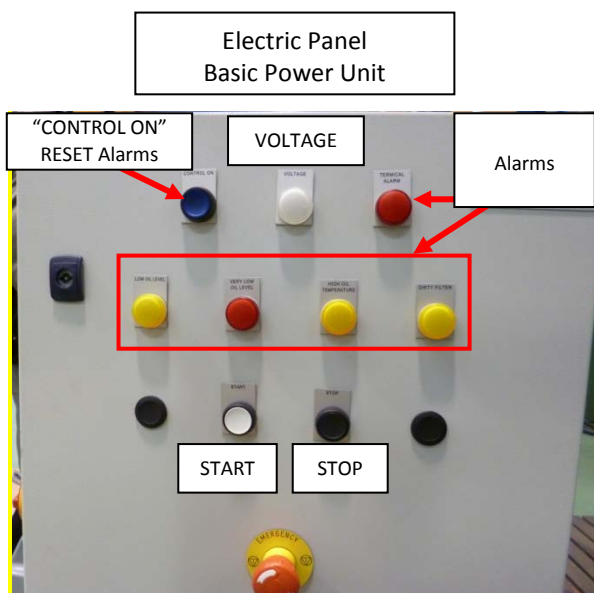
IMPORTANT:

- For the installation of the hydraulic power units as well as for the connection of the hoses, the hydraulic element assembly schemes provided by ULMA must be strictly followed.
- Periodically check that the oil temperature does not vary too much.
- In the case of “multizone connection”, before starting to elevate the system, turn all the handles of the “two Way Valve ATR” addressed to the requested zone.

3.3.2. USE OF BASIC AND SFP HYDRAULIC POWER UNITS

The steps for starting up the "Basic" and "SFP" Power Units are:

- Plug in the power panel.
- The main switch on the electrical panel is switched on, and the "POWER" or "VOLTAGE" light lights up.
- Ensure that the pendant is connected to the power panel (otherwise the power unit does not start).
- Check that there are no active alarms shown on the power panel. These are possible alarms:
 - Low or very low oil level.
 - High oil temperature.
 - Clogged filter.
 - Thermal warning.



- If there are no alarms, the "CONTROL ON" button (Basic) or "ALARM RESET" (SFP) is switched on.
- Press START to start the engine.

Once the power unit is in "ON", the cylinders are operated with the pendant:

- Active all cylinders to be operated by setting them in ON position.
- To extend or retract the cylinder, press EXTEND or RETRACT. If the button is released, the system stops.

For stopping of the hydraulic pump, press STOP.

Each exit of the power unit is provided with a pressure gauge to measure the working pressure of the exit.

3.3.3. USE OF HYDRAULIC POWER UNITS WITH FLOW DIVISOR CONNECTION

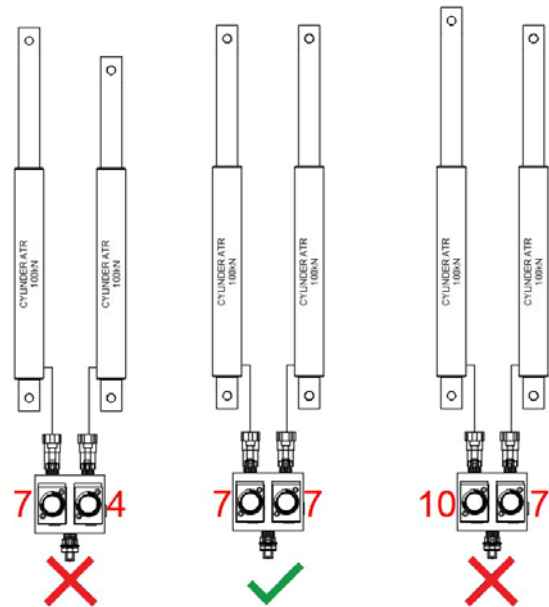
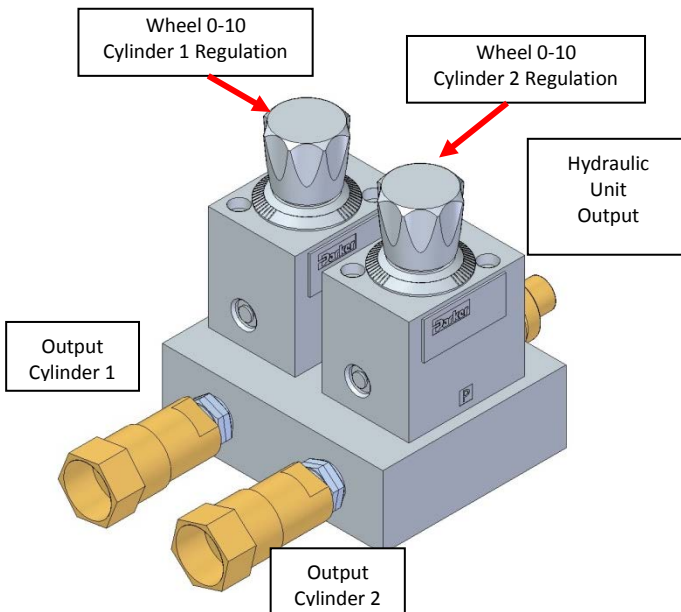


With flow divisor connections, the initial system setup and its subsequent adjustment is very important.

The procedure for adjusting the regulators is explained below. This adjustment is performed by pairs of activated cylinders.



Initially set ALL regulators to number 7.



Because the regulators may vary up to 5%, is possible to adjust one of the regulators slightly so that the pair of cylinders moves synchronized.



If a BIG speed difference is observed between pairs of cylinders, we must check the connections.

Once this adjustment has been made, the system should work correctly, regardless of load imbalance and they do not need further adjustment.



For Hydraulic Power Units with signal cable connections, a negative value (-1 kN for example) must be entered as parameter for the “Minimum load” to avoid the alarm (see sub-paragraph 3.3.4.).



The “Ball Valves ATR” are always set to open. These valves are used only if the structure is lowered. Use them with caution and always under the supervision of personnel of ULMA. The valve restricts the return flow of the oil from the cylinder to the power unit, thus slowing down the retraction of the cylinder in the case it moves faster than its partner.

3.3.4. USE OF HYDRAULIC POWER UNITS WITH SIGNAL

The steps to put Power Units with signal into operation are:

- Plug in the power panel.
- Ensure that the emergency stoppers and the pendant are connected.
- If a connection with signal cables is required, ensure that the limit stroke detectors and the pressure transducers of each cylinder are connected. It is important to connect the cylinder signal cables with their corresponding couplers to the hydraulic power unit to obtain the correct data of each cylinder.

If all steps have been carried out correctly, the voltage lamp flashes on the power panel.

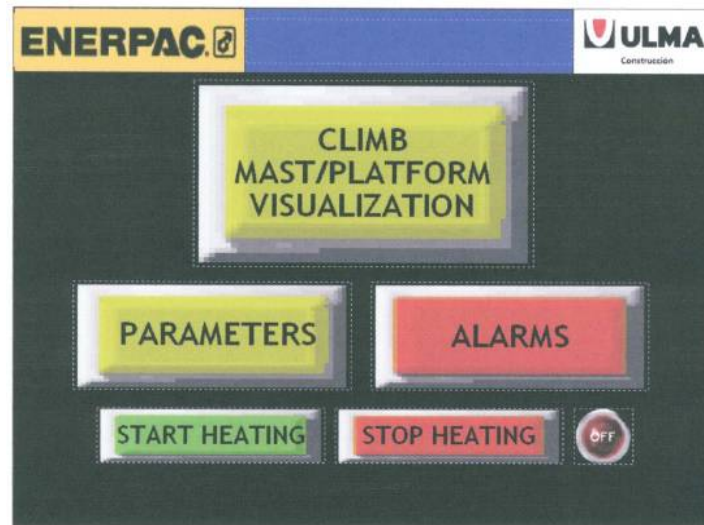
The engine starts by pressing the START button.



Ensure that the selector switch MANUAL/AUTOMATIC is set to MANUAL.

The hydraulic power units are never used in automatic mode.

The first screen displayed is the following. From this menu, the different settings of the power unit can be accessed: visualization, parameters and alarms.

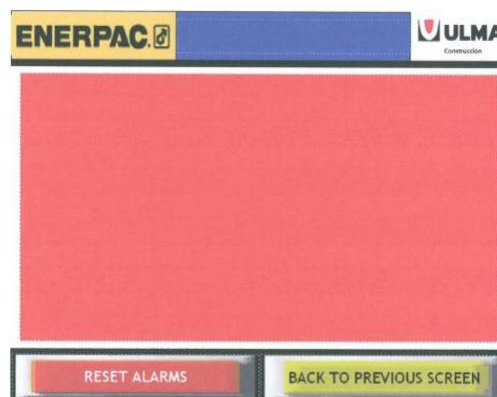


The buttons START HEATING and STOP HEATING are for the pre-heating of the hydraulic power unit. This function is used when the ambient temperature is low (lower than the minimum temperature set as alarm).

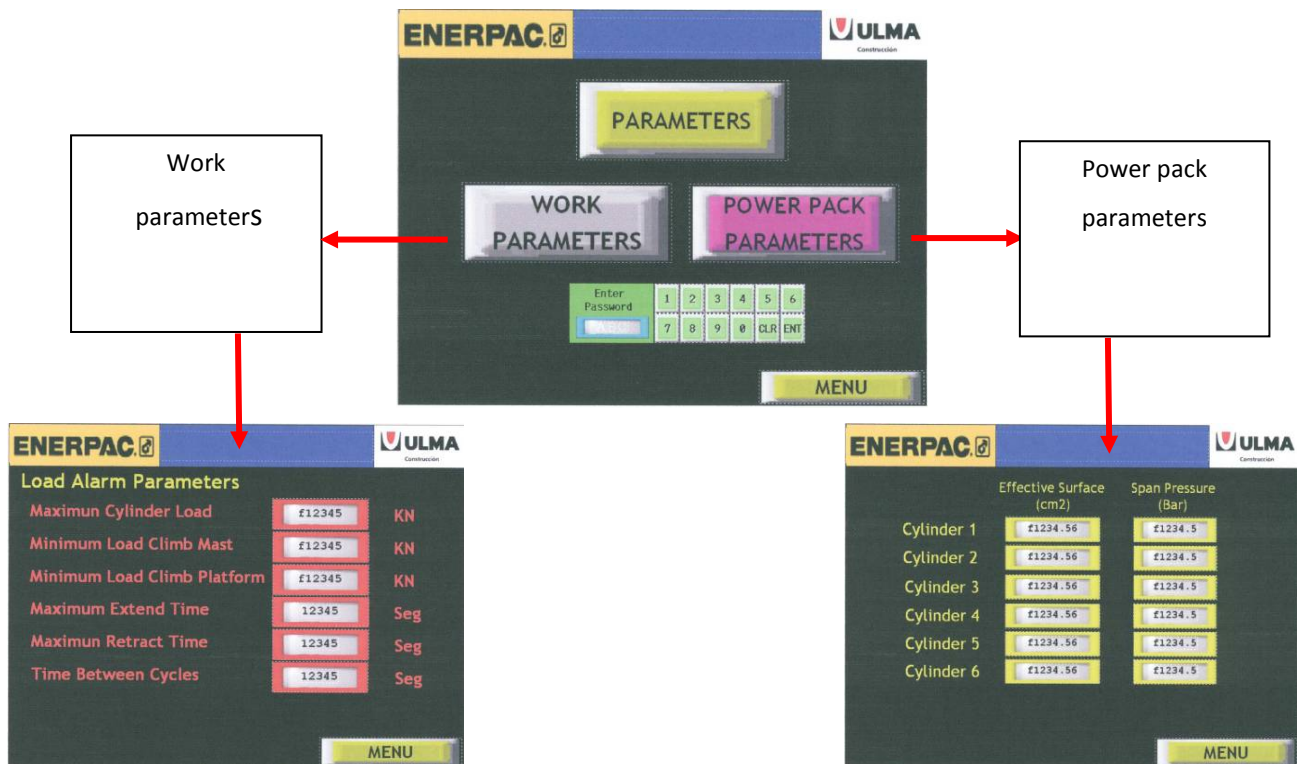
When entering the ALARMS section, all active alarms are shown. If the alarm causes have been resolved, the pressing of the RESET button deletes all detected alarms. These are possible alarms:

- Stop / Low Oil Level.
- Overload Motor.
- Maximum / Minimum Temperature.
- Power Panel / Pendant / External Emergency Stop On.
- Clogged filter.
- Maximum / Minimum load.

The system cannot be elevated until all alarms are resolved.



When entering the PARAMETERS section, the following screen is shown where the two types of parameters of the hydraulic system are managed.



These are the work parameters:

- Maximum cylinder load. It is a stopping alarm.
- Minimum load: minimum load in the cylinder at extension. During the cylinder extension, all cylinders should be loaded because the formwork or mast is lifted. If there is no load, a problem occurs such as a damaged hose.
- Maximum extend time: maximum time for the extension of the cylinder (in automatic mode only).
- Maximum retract time: maximum time for the retraction of the cylinder (in automatic mode only).
- Time between cycles: time between one back-and-forth motion of the cylinder and the next (in automatic mode only).

In the POWER PACK PARAMETERS settings, the parameters for the effective area of each cylinder and the measured pressure range of the transducer (not the one of the power unit) are defined. To enter the parameter, press on the yellow boxes, a keyboard appears with which the value can be entered.

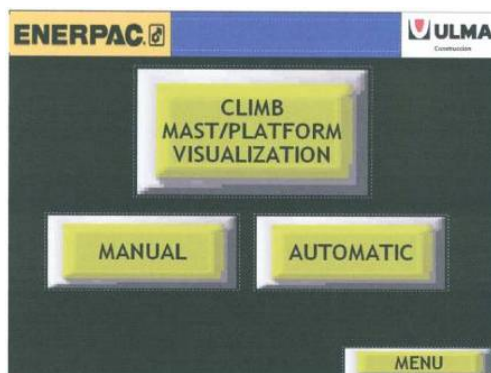


The Work Parameters are only to be changed by qualified personnel.



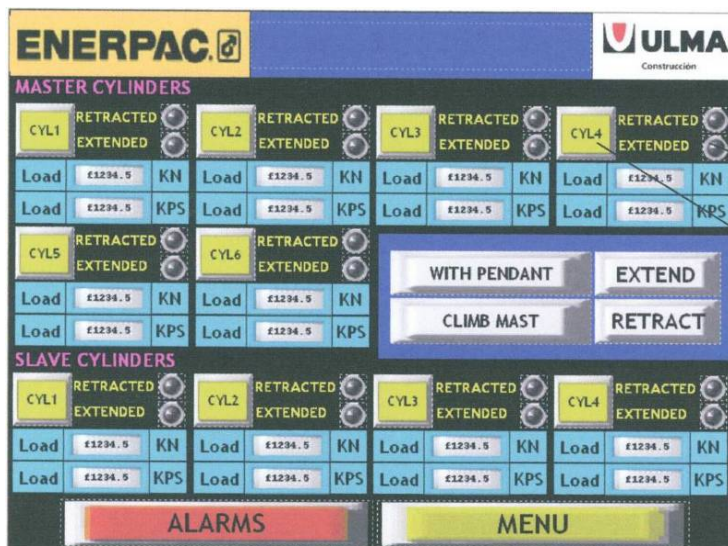
The Power Pack Parameters must not be changed at all.

To start system operation, press the button VISUALIZATION and the following screen appears:



Here it can be chosen between manual or automatic operation modes. **Always choose manual mode.**

The following screen is accessed to control and operate the cylinders:



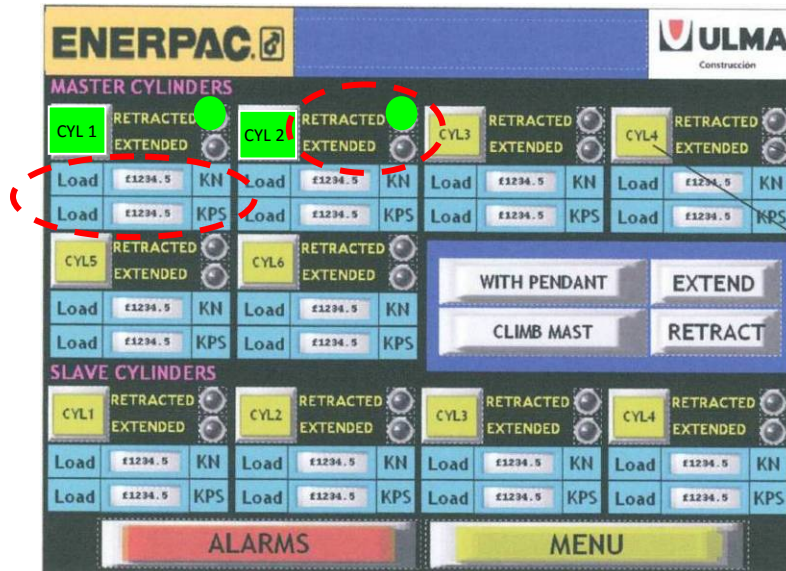
This particular screen shows a Master hydraulic power unit connected to a Slave unit. The visualisation might slightly change in the case of a simpler hydraulic power unit but the content is the same.

The first selection to be done is the following:

- With Pendant / Without Pendant: option to operate the cylinders from the pendant or from the touch screen.
- Climb Mast / Climb Platform: option to elevate the mast or the structure (platform).

The option shown on the screen is the one active at the moment. Pressing the same button changes to the other option.

The next step is to activate all required cylinders. In the option WITH PENDANT, the cylinders are activated from the pendant. If not, pressing the respective CYL directly on the touch screen activates the requested cylinders. When activating a cylinder, the colour of this cylinder changes. The following example shows a hydraulic power unit with active cylinders 1 and 2:



To extend or retract the cylinder WITH PENDANT, use the pendant. If not, use the buttons EXTEND or RETRACT of the touch screen and then press "START CYCLE" button of power panel.

In case of connection type with signal cables:

- Load data of the cylinder can be visualised continuously on the screen in kN and kPS. This data is shown in the section LOAD just below each cylinder.
- The control lamps RETRACTED and EXTENDED indicate the complete retraction or extension of the cylinder, respectively. When the power unit detects that a cylinder has reached a limit position, the oil flow is cut to prevent the overloading of the cylinder.

The screen ALARMS can be accessed at all times to check if any incidents have occurred or to see the incident history.

3.4. DISASSEMBLY

Once finished the work with the structure, it is dismantled.

All hydraulic parts are lowered to the ground, packing them the same way they have been delivered.



During the process of dismantling special care has to be taken at handling all hydraulic parts.

4. SOLUTIONS

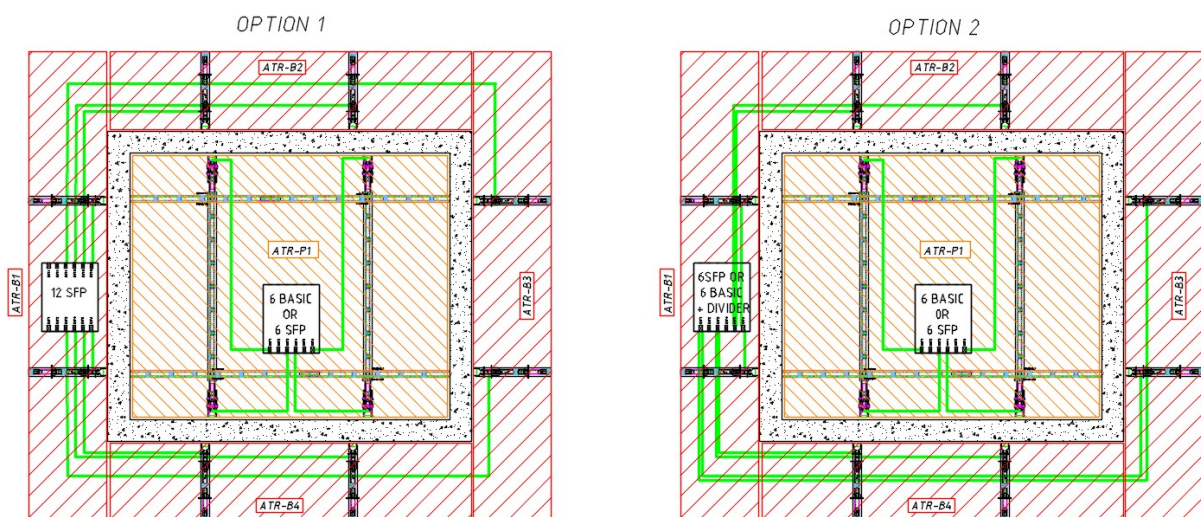
Subsequently, the most common solutions with the hydraulic system ATR are described.

4.1. CORE WITH LOAD-BALANCED ATR PLATFORM AND BRACKETS

The following solution shows a core with 8 outside self-climbing brackets ATR-B and one inside platform ATR-P.

The hydraulic solution adopted is as follows:

- Exterior brackets:
 - Option 1: Operation of 8 brackets with a 12 SFP Power Unit and direct connection (4 outputs are free).
 - Option 2: Operation of 8 brackets with a 6 SFP Power Unit (SFP or Basic) and connection with flow division (2 outputs are free).
- Internal platform powered with a Power Unit of 6 outputs (SFP or Basic):
 4 cylinders must be operated, so we choose a hydraulic power unit with of 6 outputs with direct connection to the 4 cylinders (2 outputs are free).



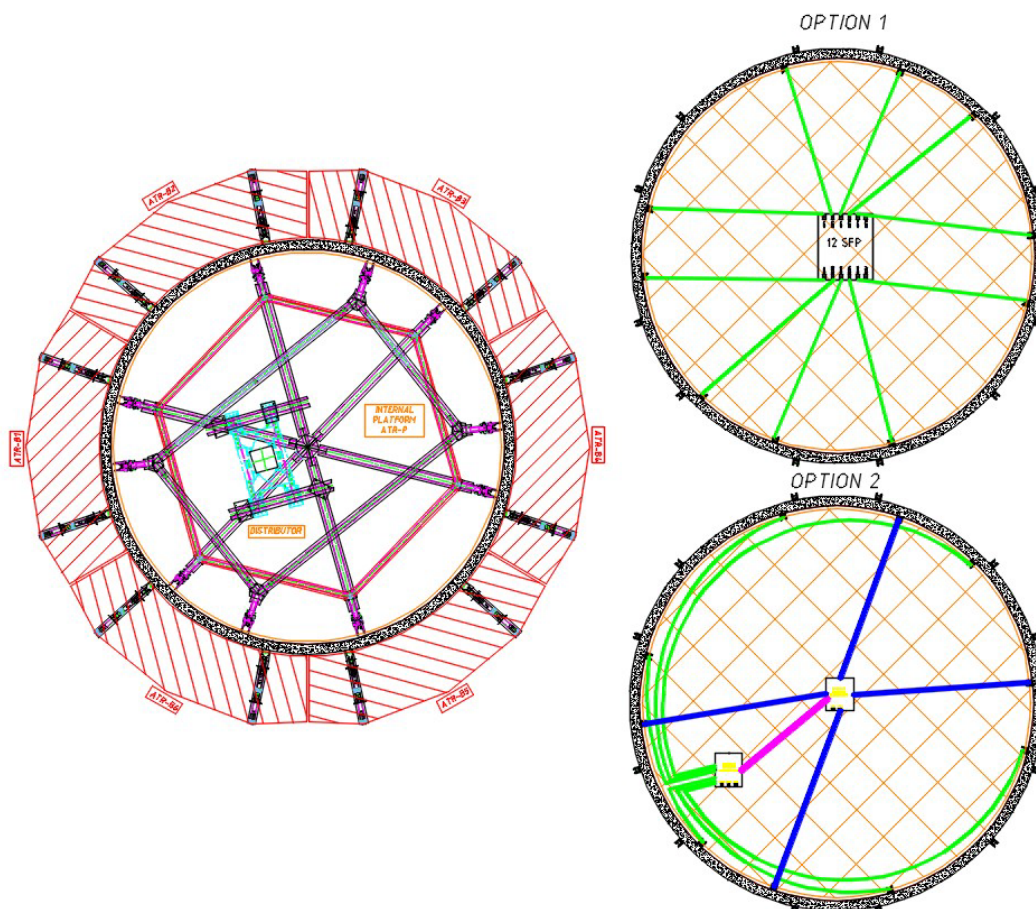
Another possible solution would be to use a single 12 SFP Power Unit, thereby driving the 12 shaft cylinders together. This solution has the problem that the hydraulic hoses would have to go over the wall and interfere with steel reinforcement and concrete placement.

4.2. CORE WITH ATR PLATFORM AND CONCRETE PLACING BOOM

The following solution shows a circular core with concrete placing boom. The inside structure consists of 6 cylinders to elevate the concrete placing boom and another 4 cylinders to elevate the platform ATR-P with the formwork. The outside formwork consists of 12 self-climbing brackets ATR-B.

The applied hydraulic solution is the following:

- Inner platform: the 10 interior cylinders must be operated simultaneously, as the platform and the distributor rise together.
 - Option 1: Direct connection to the 10 cylinders with the 12 SFP Power Unit (two free outputs). It is a connection without signal.
 - Option 2: "Master / Slave" Connection which allows the 10 cylinders to be operated, controlled entirely from the "Master". The 6 "Master" outputs are connected to the cylinders of concrete placing boom, while the 4 "Slave" outputs are connected to the cylinders of the inner platform. All is done with direct connection between power unit-cylinder and using the signal cable.
- Outside brackets: 12 cylinders must be operated and a signal is not needed.
 - Option 1: Activate the 12 cylinders directly connected by a 12 SFP Power Unit.
 - Option 2: Activate the 12 cylinders with a 6 output power unit (Basic or SFP) and flow division.



5. FEATURES

These are the two types of hydraulic cylinders of the self-climbing system and their properties:

CÓDIGO	DENOMINACIÓN	CARGA USO	CARRERA	SEÑAL
0338100	Cylinder ATR 100 kN	100 kN	666 mm	No
0338142	Cylinder ATR 130 KN	130 kN		
0338150	Cylinder ATR 130 KN Signal			Yes

Each hydraulic cylinder is capable of working with a maximum load on the “Self-Climbing Bracket ATR-B” or the “Telescopic Head ATR-P” to which it is placed. The self-weight of the structure and a possible load unbalancing have to be taken into account to avoid problems at elevation. When facing unbalanced loads, cylinders “with signal” are favoured.

There are different hydraulic power unit types available to pump the oil into the hydraulic cylinders. The following table shows the different hydraulic power unit types and the maximum number of cylinders which can be operated depending on the hydraulic connection type employed:

	ITEM NO.	HYDRAULIC POWER UNIT	DIRECT CONNECTION	FLOW DIVISOR	MULTIZONE CONNECTION	MASTER/SLAVE
BASIC	0338136	Power Unit ATR 6p Basic	6	12	24	-
	0338140	Power Unit ATR 6p SFP	6	12		
	0338141	Power Unit ATR 12p SFP	12	-		
WITH SIGNAL	0338101	6p Master Hydraulic Power Unit	6	12	24	10
	0338102	4p Slave Hydraulic Power Unit	4	8	16	
	0338114	6p Auto Hydraulic Power Unit	6	12	24	-
	0338116	4p Auto Hydraulic Power Unit	4	8	16	-

The main feature of power units “with signal” is that signal cables connect each cylinder to the power unit and thus enable the monitoring of position and load measurement by visualizing these data individually for each cylinder on the touch screen of the power unit. This feature is very helpful when handling an unbalanced load.

The cylinders are operated via a pendant. Power units with signal have two more features, a touch screen and additional emergency stoppers.

6. TERMS AND CONDITIONS OF USE

This guide only deals with the terms and conditions of use regarding the ATR Hydraulic System of ULMA. The general terms and conditions of use of the Self-climbing System ATR are defined in the respective User's Guide of Self-climbing Brackets and Platforms.

6.1. SAFE OPERATING GUIDELINES

- It is recommended to strictly follow the instructions of the project plan, the health and safety plan, as well as any further technical and/or safety rules which might apply to the project.
- Works are carried out by qualified personnel only, and under the supervision of a competent person.
- Instructions of use for the employed equipment must be followed. Consult operating manuals of the manufacturer or distributor.
- Only statutory auxiliary means and the corresponding protection equipment, preferably collective protection equipment are employed.
- Personal protective equipment (PPE) should comprise at least safety helmet, safety footwear, protective gloves and tool holder belt. Whenever necessary use further PPE, such as reflective jackets, anti-fall harness with lifeline, goggles, breathing masks, earmuffs, etc.
- If the building site is located nearby high voltage power lines, it is recommended to work without power supply. If this is not possible, the appropriate measures according to the respective reference standard should be taken.
- Under adverse weather conditions, works on the building site should stop.
- Employees and any third party accessing a structure without collective protection yet in place, must wear all indicated PPE to prevent falls from height or to be protected from falling objects.
- The purchaser or lessee of the structure shall instruct its employees on all necessary guidelines for the safe operating of the structure.
- Any alterations of the structure must be executed under the supervision of a competent person and must comply with instructions in the operating manuals of the manufacturer or distributor.
- The purchaser or lessee shall conduct periodic checks of the assembly to verify the correct installation of critical structural elements and to identify the potential withdrawal of parts or the alteration of the structure as such by employees or a third party.
- The Load capacity of cylinders: 100kN for 0338100 and 130kN for 0338142 and 0338150.
- The maximum working pressure is 250 bar.
- Once the circuit is assembled, run several cycles without load to accumulate the possible air in the cylinders and proceed to vent the air from the cylinders.
- Do not tighten quick connections with wrench.
- At the first lifting check that the cylinders support the weight when the power unit is stopped. For that purpose, lift the structure 5cm, stop the power unit, wait and observe.
- Periodically check that the oil temperature of the power unit does not vary too much.
- All persons responsible for the operation of the hydraulic system ATR must be qualified and trained and must have read the User's Guide before handling the system. The User's Guide should be constantly accessible for reference.

- In the case of doubt or lack of information, please contact ULMA.
- Travel sequences of the self-climbing system are carried out under the supervision of the person in-charge of the hydraulic installation. This person must be trained for the handling of self-climbing systems.
- During the elevation of the structure or masts, when the cylinders and climbing heads are working, the workers responsible for the handling do not touch at any time components in motion or hydraulic power units, as this can lead to crushing and bruising injuries.
- During climbing operations, there are workers at each climbing unit to ensure the correct operation of the cylinders during each travel. Watch also to prevent collisions and getting caught.
- When the climbing operations are finished, the hydraulic power units are switched off.
- The entire hydraulic system with its components must get assembled according to the instructions and schemes provided by ULMA.
- For correct handling of the self-climbing system, the customer shall ensure at all times a minimum lighting of 100 lux in working areas, and particularly in areas where the cylinder operation is supervised.
- Keep the hydraulic device free from ice and snow, even when not in use. At temperatures below 0°C, carry out checks of the hydraulic power units with special care.
- All hydraulic hoses must be attached to the structure (with clamps or other tying elements), they must never hang loose. The placing of objects on the hydraulic hoses is strictly forbidden.
- Only components supplied by ULMA are used. ULMA cannot be hold responsible for the use of material supplied by third parties.
- A fire extinguisher shall be at hand near the control panel of each hydraulic power unit.
- All electrical wiring for the power supply of the hydraulic power units is made with appropriate and hermetically closed plugs without the possibility of electrical contact to the air.
- Observe an adequate tidiness and cleanliness of the hydraulic system ATR to ensure its safe operation.
- Spread sawdust or sand on any slippery surface due to the spilling of hydraulic fluid.
- The person in-charge of the installation shall ensure the fulfilling of all points made in this User's Guide and with special emphasis on guidelines regarding workplace safety all along assembly, construction and dismantling of the system. Moreover, this person ensures the equipment is only used within its limits and the purpose it has been designed for.
- Within the responsibility of the person in-charge is also to ensure that only qualified and trained personnel works with ULMA's hydraulic system ATR.

6.2. TRANSPORT, HANDLING AND STORAGE

6.2.1. GENERAL GUIDELINES

- Get informed about hazards on the building site and preventive measures to avoid those.
- Ensure adequate communication between the employees working together.
- Use work equipment only when authorised, trained and provided with all required information to conduct it.
- Maintain minimum distances to mobile work equipment (forklifts, lorries, cranes, other construction machinery) and to areas with the risk of falling objects.

- Do not stand, walk, or work under suspended loads, nor under the trajectory or in the vicinity of these loads.
- Avoid the parts suffering blows and crushing during transport, handling and storage.
- The material is packed for transport in appropriate containers such as wood or steel pallets, boxes, or strapped in bundles with stable base.
- Strap the bundles sufficiently stable to prevent them from moving and getting damaged. If necessary, protect the items with some sort of buffer.
- Cut the metal strap, standing on the side, using gloves and goggles to prevent getting cut by the bouncing strap or caught in the strap.

6.2.2. TRANSPORT

- Ensure the stable loading of the material, complying with the instructions of the driver (equilibrated distribution on the lorry bed, fastening of auxiliary items, etc.).
- Keep your distance when opening the containers after transport to prevent injuries from falling objects.

6.2.3. HANDLING

a) Manual handling of loads:

Some ergonomic principles to be followed are listed below:

- Do not make any sudden jerky movements.
- Before lifting the load, examine it to detect any sharp corners, dirt, etc. and decide according to its shape, weight and volume for the best way to get a secure grip of the load.
- Lift, separating the feet at shoulder distance, duck, bending the knees, never the back.
- Do not attempt to lift alone, any load that is too heavy, too large, or awkward. Use a mechanical lifting device or get a helping hand from co-workers.

b) Mechanical handling of loads:

- Only statutory mechanical lifting devices, appropriate for the operation are allowed for use.
- Check the condition of the lifting gear such as slings or cables before each use and report any defects.
- Place lifting accessories and step back to a secure distance from the load and other materials which could get affected.
- Comply with all instructions given by the team chef who is specifically trained for this.
- Cause no sudden acceleration or deceleration of the moving load.
- When conducting difficult or dangerous lifting operations, or in the case that the crane operator has no obstruction free visual control of the entire trajectory of the load, the crane operations are directed by a banksman who is in constant communication with the crane operator by means of a previously agreed sign code.
- If necessary, use tag lines to control the load from distance. Keep hands clear of suspended load if hands could get caught between the load and another object. Swinging and/or unforeseen movements with the load can cause serious accidents.

6.2.4. STORAGE

- Proper storage of the parts is fundamental to keep them in good working condition.
- Wherever possible, store the material in a place protected from atmospheric impact to avoid wear.
- It is recommended to place parts of the same type and dimensions in its respective container (boxes, steel pallets, etc.).
- Ensure the stability of any piles, bearing in mind the following aspects:
 - Load-bearing capacity of the ground
 - Varying ground levels
 - Levelling of the packages
 - Package or container support
 - Package stability
 - State of the strap
 - State and capacity of the containers used
 - Do not stack full containers on top of empty or half-empty containers
 - External conditions (wind, risk of another object hitting the pile, etc.)

- For use, inspection and maintenance of the product, special attention should be paid to the following points:
 - Items aimed to ensure people's safety
 - Items made of aluminium, as they are more vulnerable to damages of the welded joints and deformation
- Before assembling any system part, check that it is in good working condition (rust, deformation, etc.).
- Before the first climbing stage and at each subsequent stage, check that all hydraulic connections are correct and that the hydraulic system works properly.
- Monthly checks: intact hydraulic hoses (without holes or brittle rubber due to ageing, etc.) and tight connections of the hoses at the power unit and the cylinders.
- Special care is taken when handling (especially at assembly and dismantling) the hydraulic cylinders, hydraulic power units and pendants.
- No alteration or change neither to the system components nor to the assembly of the self-climbing system is made without the approval and under the supervision of ULMA personnel.

6.3. INSPECTION AND MAINTENANCE

6.3.1. GENERAL GUIDELINES

- ULMA is responsible for the delivery of the products, for sale or rent, in good working condition.
- From the moment of delivery, the responsibility for correct use, inspection and product maintenance passes on to the purchaser or lessee. All damaged and broken parts, parts with missing components, i.e. all parts in no proper working condition must be removed from service.

6.3.2. MAINTENANCE OF HYDRAULIC ELEMENTS

It is advisable to perform preventive maintenance measures of all equipment and accessories connected to the hydraulic power units to foresee possible faults which might occur:

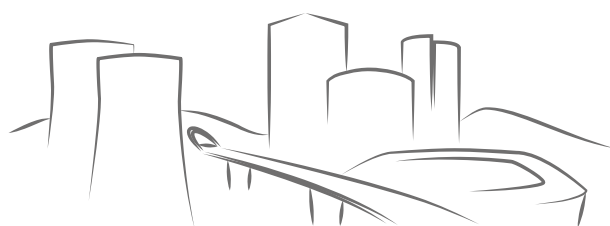
- Should you need any spare parts, consult the maintenance sheets.
- Visually check all hoses connections and piping to detect possible oil leakage. These are item numbers of the coupler's spare parts:
 - Male Coupler 1/4NPT (0338130).
 - Female Coupler 1/4NPT (0338131).
- Check if the equipment can reach the working pressure of 250 bar by observing the corresponding pressure gauge.
- Ensure that there is no leakage at the pressure gauge.
- Return filter change: change when an alarm is given or the hydraulic fluid is changed. Cartridge reference:
 - P.Unit 6P Basic: MF1001A10HB (MPFILTRI)
 - Power unit 4p With Signal (depending batch):
 - o RFM 020. Cartridge CRE025CD1 (SOFIMA).
 - o PFS 15. Cartridge CFS15CX (PLAYFLUID).
 - Power unit 6p With Signal (depending batch):
 - o RFM 030. Cartridge CRE030CD1 (SOFIMA).
 - o PFS 20. Cartridge CFS20CX (PLAYFLUID).
 - Power unit 6P and 12P SFP :
 - o RFM 030. Cartridge CRE030CD1 (SOFIMA).
 - For a current list of spare parts, refer to the maintenance sheets information.
- Oil change:
 - It is advisable to change the hydraulic fluid every 4000 to 6000 working hours depending on the type of work; or once a year.
 - The mix of different hydraulic fluids is not recommended. Thoroughly clean the tank when changing the oil.
 - After each oil change, it is necessary to re-fill the pump and drain the air from the circuit. Open the air vent valve located on the motor cover, and start and stop the electric motor twice to three times. Once finished this procedure, close the air vent valve.
 - The oil used is ISO VG-32 quality
- Aeration filter change:
 - The aeration filter should be changed with the same frequency as the hydraulic fluid, every 4000 to 6000 hours; or once a year.
 - However, ensure that the air entry is not blocked even before the change date is due.
 - Cartridge reference:
 - o Basic Power Units: CS050P10A (MPFILTRI)
 - o Power Units with signal: UC-4930 (PARKER)
 - o SFP Units: ELPF30F3W1.X/-AS(HYDAC)
 - For a current list of spare parts refer, to the maintenance sheets information.
- Maintenance of hydraulic cylinders: all connection elements must be changed every 5000 to 8000 hours, or every 2 years if the cylinder is not used during this period.

6.3.3. INSPECTION INSTRUCTIONS WITH CE MARKING OF EQUIPMENT MARKED BY ULMA CONSTRUCCIÓN

Equipment with CE marking marketed by ULMA Constucción is checked following the instructions stipulated in the User's Guide of the respective product.

7. LEGAL REFERENCES

- **Council Directive 89/391/EEC** of 12 June 1989 on the introduction of measures to encourage improvements in the safety and health of workers at work
- **Council Directive EU 89/654/EEC** of 30 November 1989 on the minimum safety and health requirements for the workplace
- **Council Directive 89/656/EEC** of 30 November 1989 on the minimum health and safety requirements for the use by workers of personal protective equipment at the workplace
- **Council Directive 90/269/EEC** of 29 May 1990 on the minimum health and safety requirements for the manual handling of loads where there is a risk particularly of back injury to workers
- **Council Directive 92/57/EEC** of 24 June 1992 on the implementation of minimum safety and health requirements at temporary or mobile construction sites
- **Directive 92/58/EEC** of 24 June 1992 on the minimum requirements for the provision of safety and/or health signs at work
- **Directive 89/655/EEC** of 30 November 1989 concerning the minimum safety and health requirements for the use of work equipment by workers at work. Council Directive 95/63/EC of 5 December 1995 and Directive 2001/45/EC of the European Parliament and of the Council of 27 June 2001 amending formerly mentioned Directive.
- **Directive 2002/44/EC** of the European Parliament and of the Council of 25 June 2002 on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (vibration)
- **Directive 2003/10/EC** of the European Parliament and of the Council of 06 February 2003 on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (noise)
- **Directive 2006/42/EC** of the European Parliament and of the Council of 17 May 2006 on machinery, and amending Directive 95/16/EC (recast)



From the beginning of your projects

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