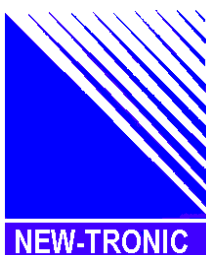


OLEOMAX

WORKBENCH COMPLETE WITH MEASURING INSTRUMENTS FOR EXERCISES OF HYDRAULICS



EXERCISE MANUAL

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WORKBENCH COMPLETE WITH MEASURING INSTRUMENTS FOR EXERCISES OF HYDRAULICS “EXERCISES”

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EXERCISE NR 1
“VERIFICATION OF FUNCTIONALITY AND CHARACTERISTICS
OF THE PRESSURE-LIMITING VALVE
WITH ELECTRIC PROPORTIONAL CONTROL”

● **PREMISE**

In order to ensure the success of the exercises described below, the bench must be in the following conditions:

- Presence of 400VAC three-phase power supply + neutral + earth.
- Presence of oil inside the tank of the Hydraulic Unit. 25 litres at least
- “**QF3**” general power supply door lock selector in ON position

● **TARGET**

- The purpose of this exercise is to demonstrate **the functionality of the proportional electrically controlled pressure relief valve and its proportionality characteristics.**

● **WARNINGS**

- Before carrying out the exercises it is necessary to wear the gloves and goggles provided with the bench
- All the hydraulic connections must be made on the back of the bench where all the quick fit couplings are present
- All hydraulic connections must be made with a non-pressurized system
- All the electrical connections of the instruments present must foresee the use of the cables supplied (**see the User Manual**)

● **PROCEDURE**

- Be sure that the system is not under pressure
- Make all the hydraulic connections according to the diagram shown below. It should be noted that the connections must be made on the back of the bench using the flexible hoses, complete with quick-fit couplings, supplied with the bench
- Make all the necessary connections as shown in the diagram. **NOTE:** the connections must be made using the special cables, complete with dedicated connectors, supplied on the bench.

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- Move the door-locking knob of the main magneto thermal-differential “**QF3**” switch to the “ON” position
- Make sure that the two lamps “**HL-1**” and “**HL-2**” indicating voltage presence on the bench are lit

● Oil recycling

- Press the luminous button “**SB-2/HL4**”
- Make sure that the integrated green light is on
- The electric motor of the Hydraulic Unit and the related hydraulic gear pump are operating in the “recycling” mode. The oil recirculates inside the tank but the plant is not under pressure. Any attempt to set the pressure value via the potentiometer “**RP-1**” has no effect.
- Any immediate stops can be made by pressing the stop button “**SB-3**” or the general emergency button “**SB-1**”
- To restart the oil recycling, repeat the initial steps .

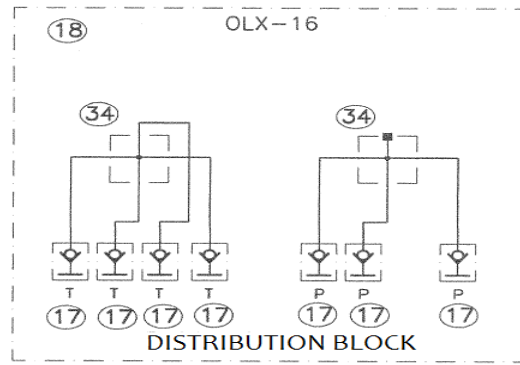
● System pressure

- After the oil recycling maneuver has been performed successfully, the system can be put under pressure by following the next steps:
 - a) Turn selector “**SA-1**” to the right.
 - b) Make sure that lamp “**HL-5**” lights up
 - c) Turn potentiometer “**RP-1**”, which regulates the proportional valve, until reaching the required pressure value .
 - d) Pressure is now available on the distribution unit present on the panel “**OLX-16**”
 - e) To remove pressure from the system, return the selector “**SA-1**” to the left.

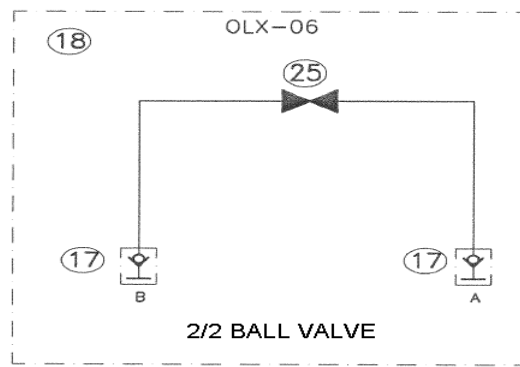
Any immediate stops can be made by pressing the stop button “SB-3” or the general emergency button “SB-1”

- COMPONENTS TO BE USED

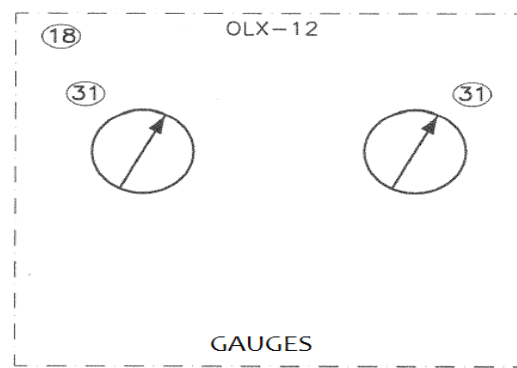
- Nr.1 distribution block (panel OLX-16)



- Nr.1 2/2 Ball valve (panel OLX-06)



- Nr.1 Gauges (panel OLX-12)



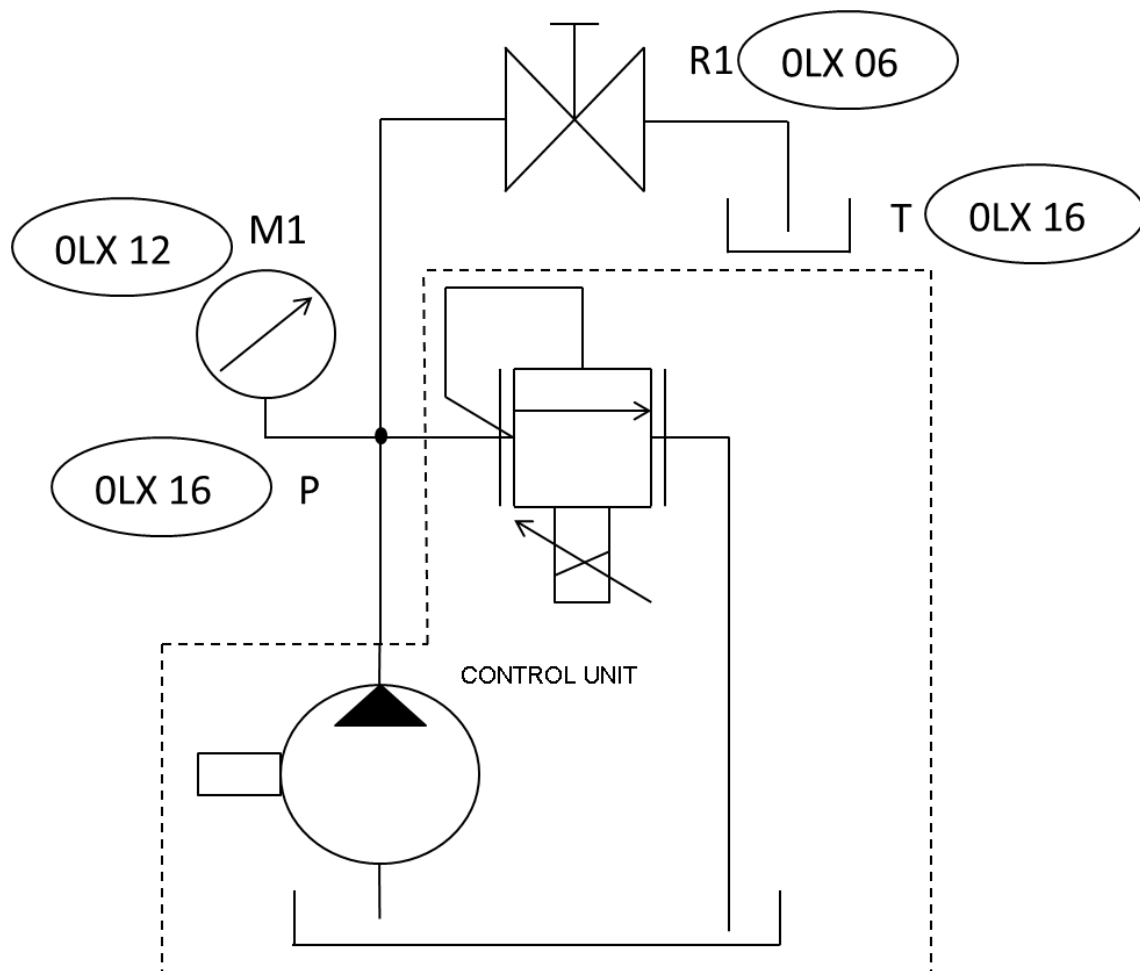
- **EXERCISE PHASES**

- 1) Open “**R1**” and read the relevant pressure on gauge “**M1**”
- 2) Close faucet “**R1**”, calibrate potentiometer “**RP-1**” to its maximum value and read the relevant pressure on “**M1**”
- 3) Open faucet “**R1**” and read the relevant pressure on gauge “**M1**”
- 4) Close faucet “**R1**”
- 5) Complete the here following table checking on gauge “**M1**” the pressure values in relation to the increments and decrements of the reference
- 6) Open faucet “**R1**”

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REFEFENCE RP1	PRESSURE M1
0	
10%	
20%	
30%	
40%	
50%	
60%	
70%	
80%	
90%	
100%	
90%	
80%	
70%	
60%	
50%	
40%	
30%	
20%	
10%	
0	

- DIAGRAM



EXERCISE NR 2
“FUNCTIONALITY OF THE 4/3
CLOSED CENTER DIRECTIONAL VALVE
MANUAL SPRING-LOADED MECHANICAL CENTERING CONTROL”

● **PREMISE**

In order to ensure the success of the exercises described below, the bench must be in the following conditions:

- Presence of 400VAC three-phase power supply + neutral + earth.
- Presence of oil inside the tank of the Hydraulic Unit. 25 litres at least
- “**QF3**” general power supply door lock selector in ON position

● **TARGET**

- The purpose of this exercise is to demonstrate the **functionality of the 4/3 closed center directional valve manual spring-loaded mechanical centering control**

● **WARNINGS**

Before carrying out the exercises it is necessary to wear the gloves and goggles provided with the bench

- All the hydraulic connections must be made on the back of the bench where all the quick fit couplings are present
- All hydraulic connections must be made with a non-pressurized system
- All the electrical connections of the instruments present must foresee the use of the cables supplied (**see the User Manual**)

● **PROCEDURE**

- Be sure that the system is not under pressure
- Make all the hydraulic connections according to the diagram shown below. It should be noted that the connections must be made on the back of the bench using the flexible hoses, complete with quick-fit couplings, supplied with the bench.

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- Make all the necessary electrical connections as shown in the diagram.
NOTE: the connections must be made using the special cables, complete with dedicated connectors, supplied on the bench.
- Move the door-locking knob of the main magneto thermal-differential “**QF3**” switch to the “ON” position
- Make sure that the two lamps “**HL-1**” and “**HL-2**” indicating voltage presence on the bench are lit

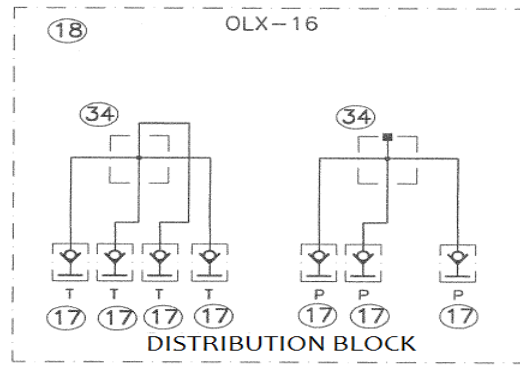
- **Oil recycling**
- Press the luminous button “**SB-2/HL4**”
- Make sure that the integrated green light is on
- The electric motor of the Hydraulic Unit and the related hydraulic gear pump are operating in the “recycling” mode. The oil recirculates inside the tank but the plant is not under pressure. Any attempt to set the pressure value via the potentiometer “**RP-1**” has no effect.
- Any immediate stops can be made by pressing the stop button “**SB-3**” or the general emergency button “**SB-1**”
- To restart the oil recycling, repeat the initial steps .

- **System pressure**
- After the oil recycling maneuver has been performed successfully, the system can be put under pressure by following the next steps:
 - a) Turn selector “**SA-1**” to the right.
 - b) Make sure that lamp “**HL-5**” lights up
 - c) Turn potentiometer “**RP-1**”, which regulates the proportional valve, till reaching a pressure of **50 BAR**.
 - d) Pressure is now available on the distribution unit present on the panel “**OLX-16**”
 - e) To remove pressure from the system, return the selector “**SA-1**” to the left.

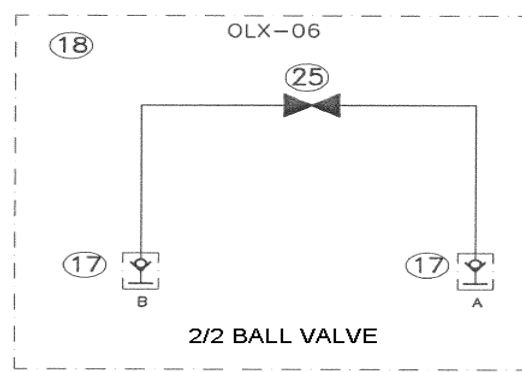
**Any immediate stops can be made by pressing the stop button
“SB-3” or the general emergency button “SB-1”**

- **COMPONENTS TO BE USED**

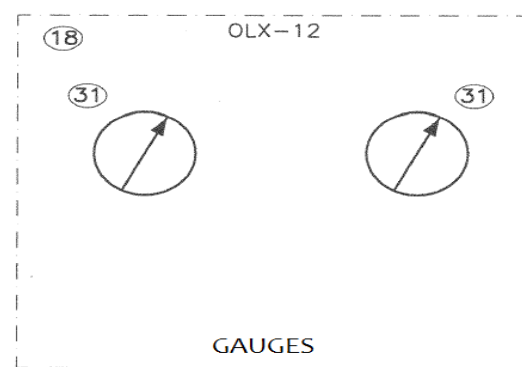
- Nr.1 distribution block (panel OLX-16)



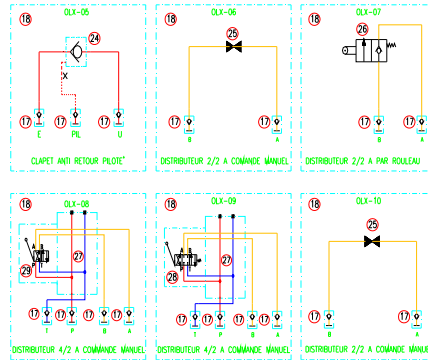
- Nr.1 2/2 manual faucet (panels OLX-06 & OLX-10)



- Nr.1 Gauges (panel OLX-12)



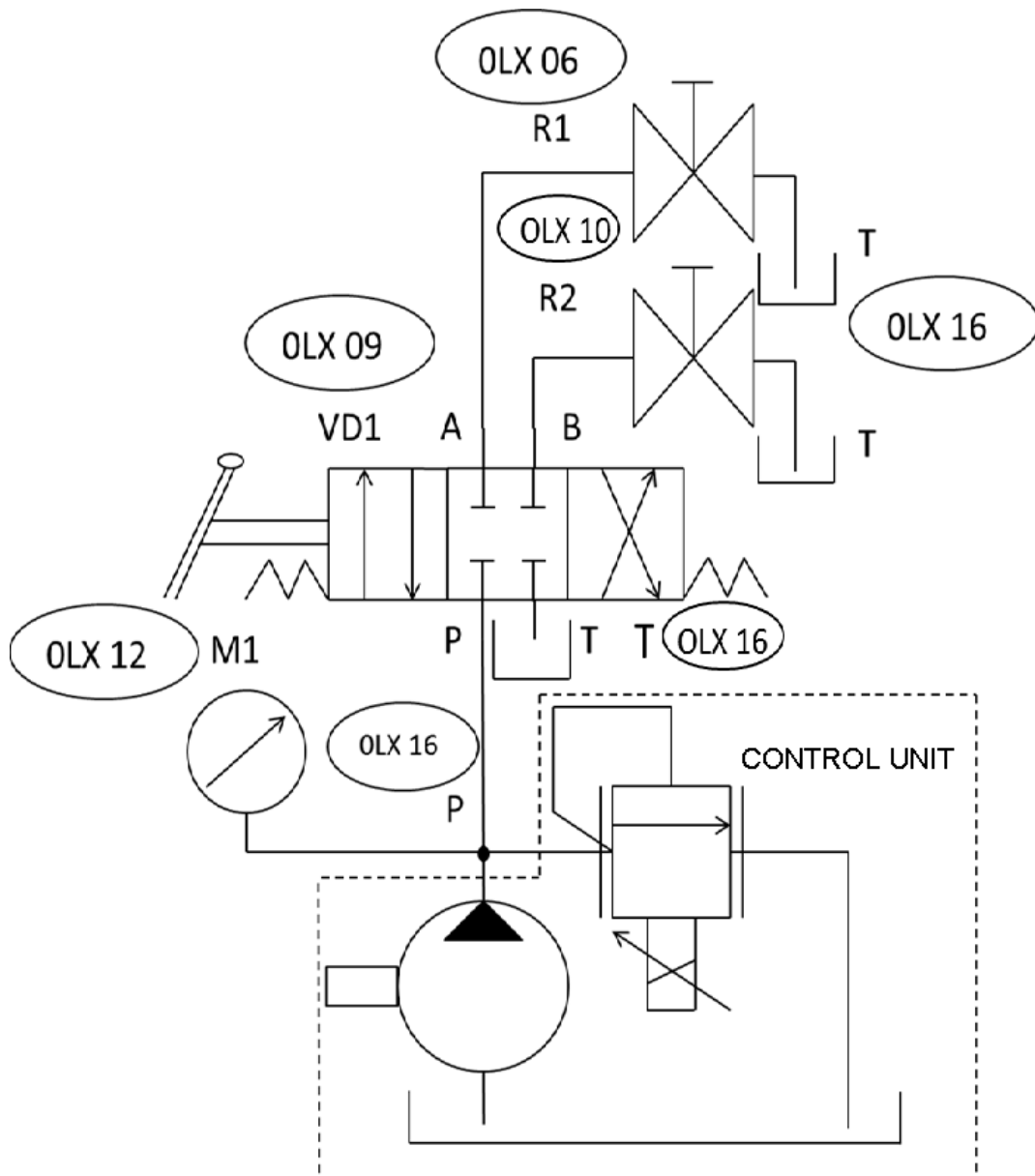
- Nr.1 4/3 closed center directional valve manual spring-loaded mechanical centering control (panel OLX-09)



- **EXERCISE PHASES**

- 1) Manually set the “**VD1**” valve in the central position
- 2) Close faucets “**R1**” and “**R2**”
- 3) Read the pressure value on gauge “**M1**”:
- 4) Manually set the “**VD1**” valve in the parallel arrows position and keep it positioned, read the pressure value on pressure gauge “**M1**”:
- 5) Open faucet “**R1**”
- 6) Read the pressure value on gauge “**M1**”:
- 7) Manually set the “**VD1**” valve in the crossed arrows position and keep it positioned, read the pressure value on pressure gauge “**M1**”:
- 8) Open faucet “**R2**”
- 9) Read the pressure value on gauge “**M1**”:
- 10) Manually set the “**VD1**” valve in the central position
- 11) Open faucets “**R1**” and “**R2**”

• **DIAGRAM**



EXERCISE NR 3

“FUNCTIONALITY TEST OF THE ONE-WAY VALVE (CHECK VALVE)”

- **PREMISE**

In order to ensure the success of the exercises described below, the bench must be in the following conditions:

- Presence of 400VAC three-phase power supply + neutral + earth.
- Presence of oil inside the tank of the Hydraulic Unit. 25 litres at least
- “**QF3**” general power supply door lock selector in **ON position**

- **TARGET**

- The purpose of this exercise is to demonstrate the **functionality of the one-way valve (check valve)**

- **WARNINGS**

- Before carrying out the exercises it is necessary to wear the gloves and goggles provided with the bench
- All the hydraulic connections must be made on the back of the bench where all the quick fit couplings are present
- All hydraulic connections must be made with a non-pressurized system
- **All the electrical connections of the instruments present must foresee the use of the cables supplied (see the User Manual)**

- **PROCEDURE**

- Be sure that the system is not under pressure
- Make all the hydraulic connections according to the diagram shown below. It should be noted that the connections must be made on the back of the bench using the flexible hoses, complete with quick-fit couplings, supplied with the bench
- Make all the necessary electrical connections as shown in the diagram.
NOTE: the connections must be made using the special cables, complete with dedicated connectors, supplied on the bench.

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- Move the door-locking knob of the main magneto thermal-differential “**QF3**” switch to the “ON” position
- Make sure that the two lamps “**HL-1**” and “**HL-2**” indicating voltage presence on the bench are lit

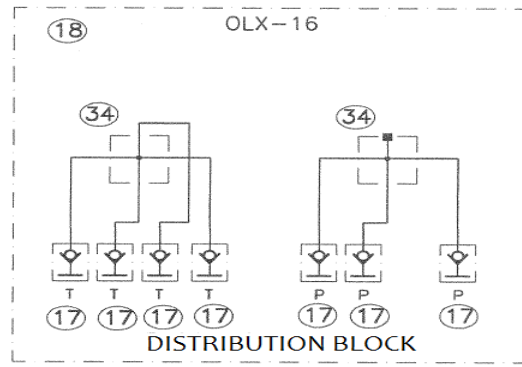
- **Oil recycling**
- Press the luminous button “**SB-2/HL4**”
- Make sure that the integrated green light is on
- The electric motor of the Hydraulic Unit and the related hydraulic gear pump are operating in the “recycling” mode. The oil recirculates inside the tank but the plant is not under pressure. Any attempt to set the pressure value via the potentiometer “**RP-1**” has no effect.
- Any immediate stops can be made by pressing the stop button “**SB-3**” or the general emergency button “**SB-1**”
- To restart the oil recycling, repeat the initial steps .

- **System pressure**
- After the oil recycling maneuver has been performed successfully, the system can be put under pressure by following the next steps:
 - a) Turn selector “**SA-1**” to the right.
 - b) Make sure that lamp “**HL-5**” lights up
 - c) Turn potentiometer “**RP-1**”, which regulates the proportional valve, until reaching a pressure of **50 BAR**.
 - d) Pressure is now available on the distribution unit present on the panel “**OLX-16**”
 - e) To remove pressure from the system, return the selector “**SA-1**” to the left.

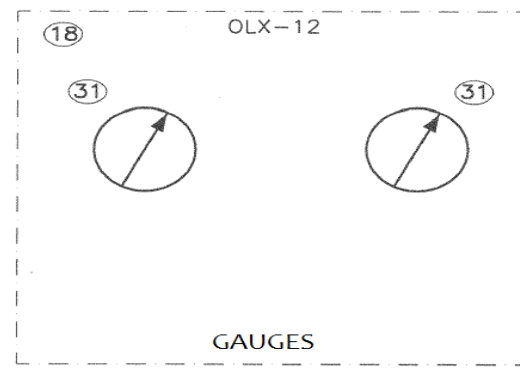
Any immediate stops can be made by pressing the stop button “SB-3**” or the general emergency button “**SB-1**”**

• COMPONENTS TO BE USED

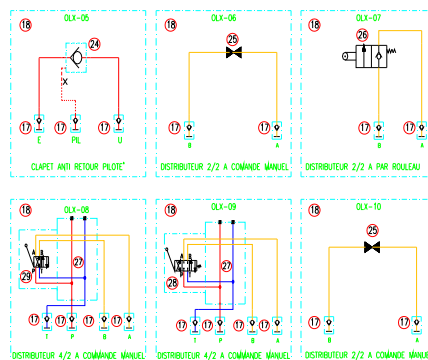
- Nr.1 distribution block (panel OLX-16)



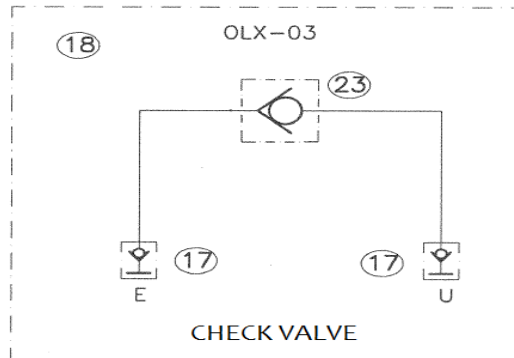
- Nr.1 Gauges (panel OLX-12)



- Nr.1 4/3 closed center directional valve manual spring-loaded mechanical centering control (panel OLX-09)



- Nr.1 check valve (panel OLX-03)

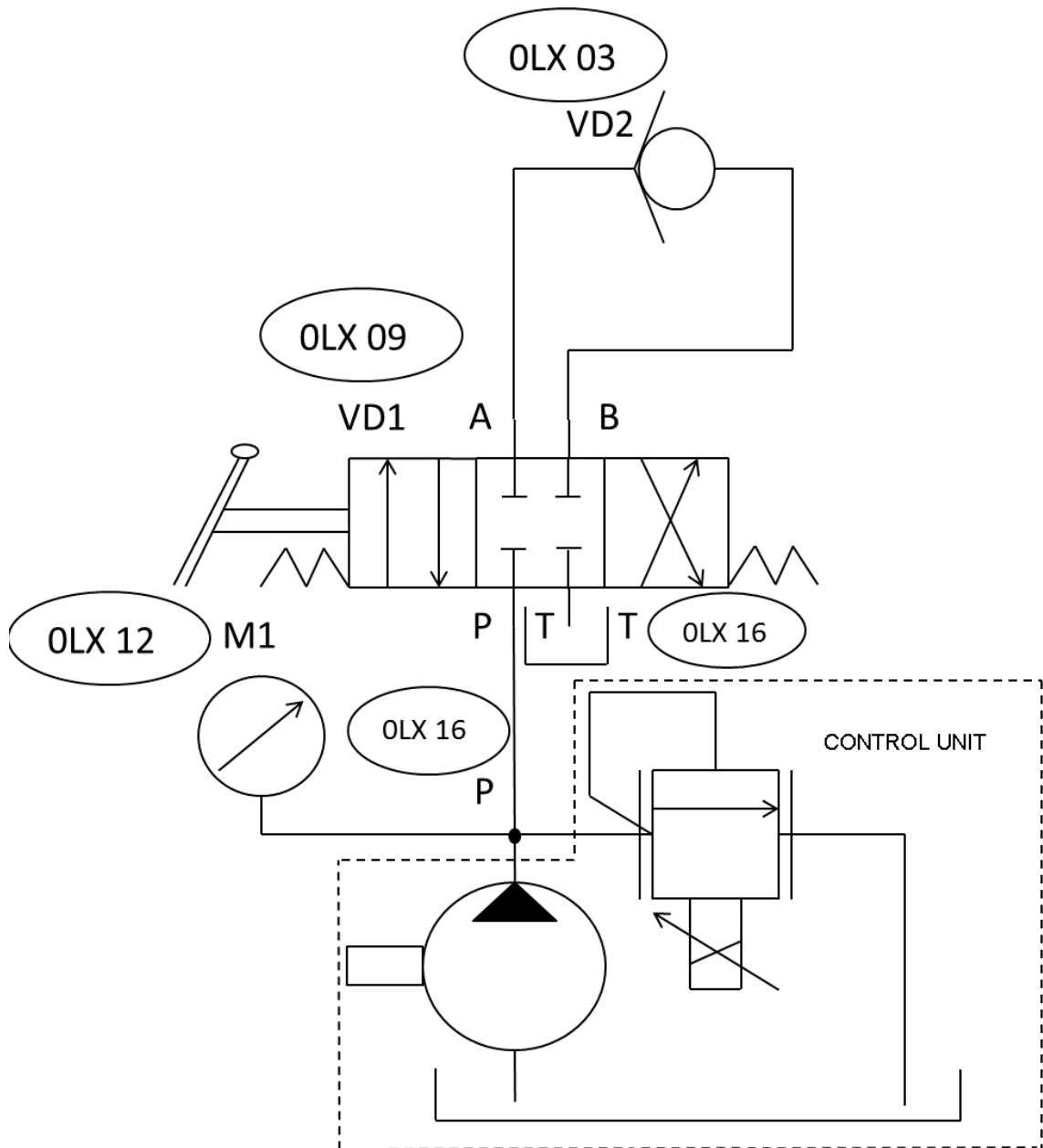


- **EXERCISE PHASES**

1. Manually set the “**VD1**” valve in the central position and read the pressure value on the pressure gauge “**M1**”:
2. Manually set the “**VD1**” valve in the parallel arrows position and keep it positioned, read the pressure value on pressure gauge “**M1**”:
3. Manually set the “**VD1**” valve in the crossed arrows position and keep it positioned, read the pressure value on pressure gauge “**M1**”:
4. Manually set the “**VD1**” valve in the central position

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- **DIAGRAM**



EXERCISE NR 4

“FUNCTIONALITY TEST OF THE PILOTED CHECK VALVE”

● PREMISE

In order to ensure the success of the exercises described below, the bench must be in the following conditions:

- Presence of 400VAC three-phase power supply + neutral + earth.
- Presence of oil inside the tank of the Hydraulic Unit. 25 litres at least
- “**QF3**” general power supply door lock selector in **ON position**

● TARGET

- The purpose of this exercise is to demonstrate the **functionality of the piloted check valve**

● WARNINGS

- Before carrying out the exercises it is necessary to wear the gloves and goggles provided with the bench
- All the hydraulic connections must be made on the back of the bench where all the quick fit couplings are present
- All hydraulic connections must be made with a non-pressurized system
- All the electrical connections of the instruments present must foresee the use of the cables supplied (**see the User Manual**)

● PROCEDURE

- Be sure that the system is not under pressure
- Make all the hydraulic connections according to the diagram shown below. It should be noted that the connections must be made on the back of the bench using the flexible hoses, complete with quick-fit couplings, supplied with the bench
- Make all the necessary electrical connections as shown in the diagram.
NOTE: the connections must be made using the special cables, complete with dedicated connectors, supplied on the bench.
- Move the door-locking knob of the main magneto thermal-differential “**QF3**” switch to the “**ON**” position

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- Make sure that the two lamps “HL-1” and “HL-2” indicating voltage presence on the bench are lit

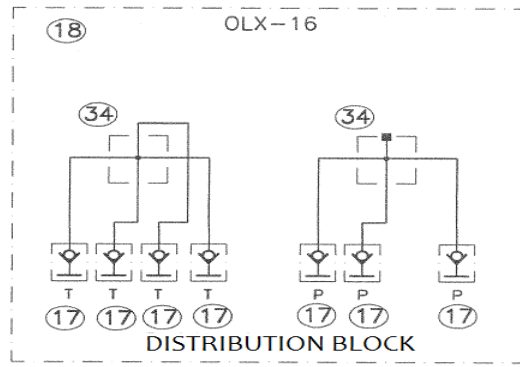
- **Oil recycling**
 - Press the luminous button “SB-2/HL4”
 - Make sure that the integrated green light is on
 - The electric motor of the Hydraulic Unit and the related hydraulic gear pump are operating in the “recycling” mode. The oil recirculates inside the tank but the plant is not under pressure. Any attempt to set the pressure value via the potentiometer “RP-1” has no effect.
 - Any immediate stops can be made by pressing the stop button “SB-3” or the general emergency button “SB-1”
 - To restart the oil recycling, repeat the initial steps .

- **System pressure**
 - After the oil recycling maneuver has been performed successfully, the system can be put under pressure by following the next steps:
 - a) Turn selector “SA-1” to the right.
 - b) Make sure that lamp “HL-5” lights up
 - c) Turn potentiometer “RP-1”, which regulates the proportional valve, until reaching the pressure value of **50 BAR**.
 - d) Pressure is now available on the distribution unit present on the panel “OLX-16”
 - e) o remove pressure from the system, return the selector “SA-1” to the left

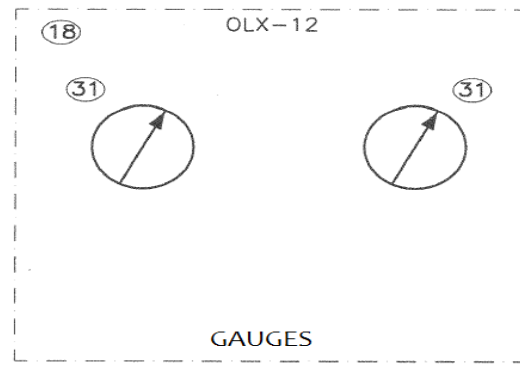
**Any immediate stops can be made by pressing the stop button
“SB-3” or the general emergency button “SB-1”**

• COMPONENTS TO BE USED

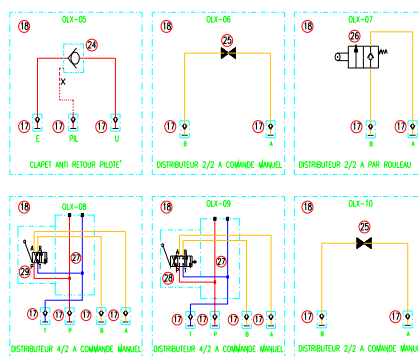
- Nr.1 distribution block (panel OLX-16)



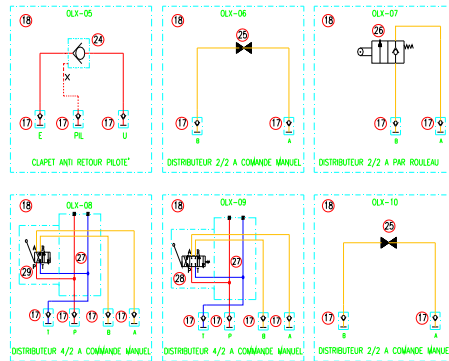
- Nr.1 Gauges (panel OLX-12)



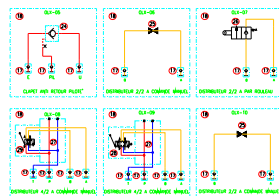
- Nr.1 4/3 closed center directional valve manual spring-loaded mechanical centering control (panel OLX-09)



- Nr.1 4/2 manually controlled directional valve (panel OLX-08)



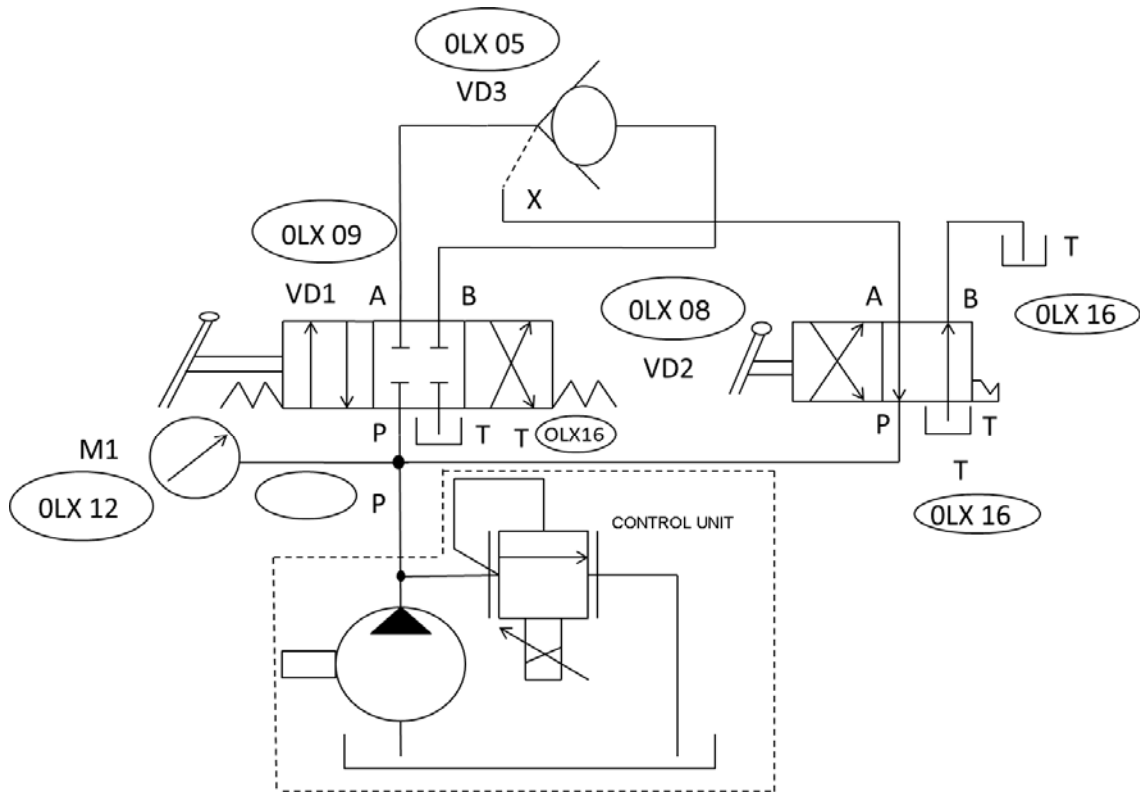
- Nr.1 pilot-operated block valve (panel OLX-05)



- **EXERCISE PHASES**

- 1) Manually set the “**VD1**” valve in the central position and the directional valve “**VD2**” in the parallel arrows position. Read the pressure value on gauge “**M1**”:
- 2) Manually set the “**VD1**” valve in the parallel arrows position and keep it positioned; manually set the “**VD2**” in the crossed arrows position and read the pressure value on gauge “**M1**”:
- 3) Manually set the “**VD1**” valve in the crossed arrows position and keep it positioned; manually set the “**VD2**” in the crossed arrows position and read the pressure value on gauge “**M1**”:
- 4) Manually set the “**VD2**” valve in the parallel arrows position; keep the “**VD1**” valve in the crossed arrows position and read the pressure value on gauge “**M1**”:

- **DIAGRAM**



EXERCISE NR 5

“VERIFICATION OF THE FUNCTIONALITY OF THE UNIDIRECTIONAL FLOW CONTROL VALVE”

● PREMISE

In order to ensure the success of the exercises described below, the bench must be in the following conditions:

- Presence of 400VAC three-phase power supply + neutral + earth.
- Presence of oil inside the tank of the Hydraulic Unit. 25 litres at least
- “**QF3**” general power supply door lock selector in **ON position**

▪ TARGET

- The purpose of this exercise is to demonstrate **the functionality of a unidirectional flow control valve**

● WARNINGS

- Before carrying out the exercises it is necessary to wear the gloves and goggles provided with the bench
- All the hydraulic connections must be made on the back of the bench where all the quick fit couplings are present
- All hydraulic connections must be made with a non-pressurized system
- All the electrical connections of the instruments present must foresee the use of the cables supplied (**see the User Manual**)

▪ PROCEDURE

- Be sure that the system is not under pressure
- Make all the hydraulic connections according to the diagram shown below. It should be noted that the connections must be made on the back of the bench using the flexible hoses, complete with quick-fit couplings, supplied with the bench
- Make all the necessary electrical connections as shown in the diagram.
NOTE: the connections must be made using the special cables, complete with dedicated connectors, supplied on the bench.

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- Move the door-locking knob of the main magneto thermal-differential “**QF3**” switch to the “ON” position
- Make sure that the two lamps “**HL-1**” and “**HL-2**” indicating voltage presence on the bench are lit

- **Oil recycling**
 - Press the luminous button “**SB-2/HL4**”
 - Make sure that the integrated green light is on
 - The electric motor of the Hydraulic Unit and the related hydraulic gear pump are operating in the “recycling” mode. The oil recirculates inside the tank but the plant is not under pressure. Any attempt to set the pressure value via the potentiometer “**RP-1**” has no effect.
 - Any immediate stops can be made by pressing the stop button “**SB-3**” or the general emergency button “**SB-1**”
 - To restart the oil recycling, repeat the initial steps .

- **System pressure**

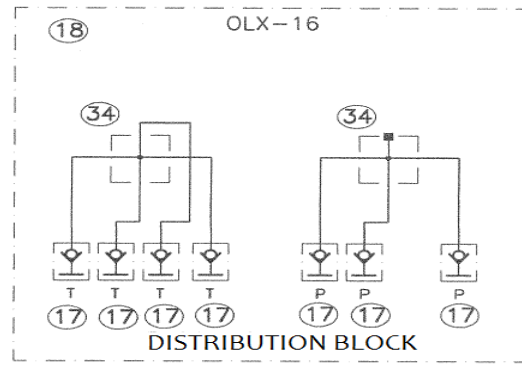
After the oil recycling maneuver has been performed successfully, the system can be put under pressure by following the next steps:

- a) Turn selector “**SA-1**” to the right..
- b) Make sure that lamp “**HL-5**” lights up
- c) Turn potentiometer “**RP-1**”, which regulates the proportional valve, until reaching the pressure value of **50 BAR**.
- d) Pressure is now available on the distribution unit present on the panel “**OLX-16**”
- e) To remove pressure from the system, return the selector “**SA-1**” to the left.

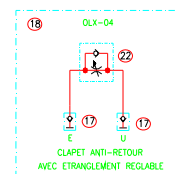
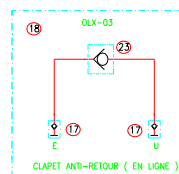
Any immediate stops can be made by pressing the stop button “SB-3” or the general emergency button “SB-1”

● COMPONENTS TO BE USED

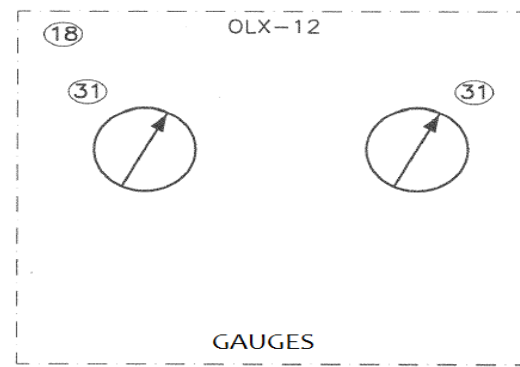
- Nr.1 distribution block (panel OLX-16)



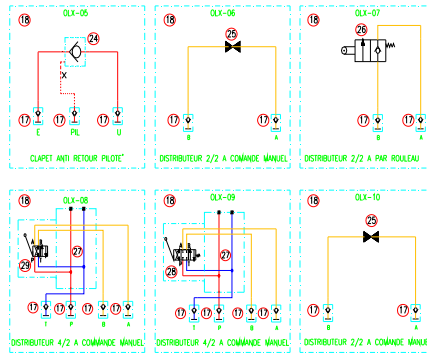
- Nr.1 flow regulator (panel OLX-04)



- Nr.1 Gauges (panel OLX-12)



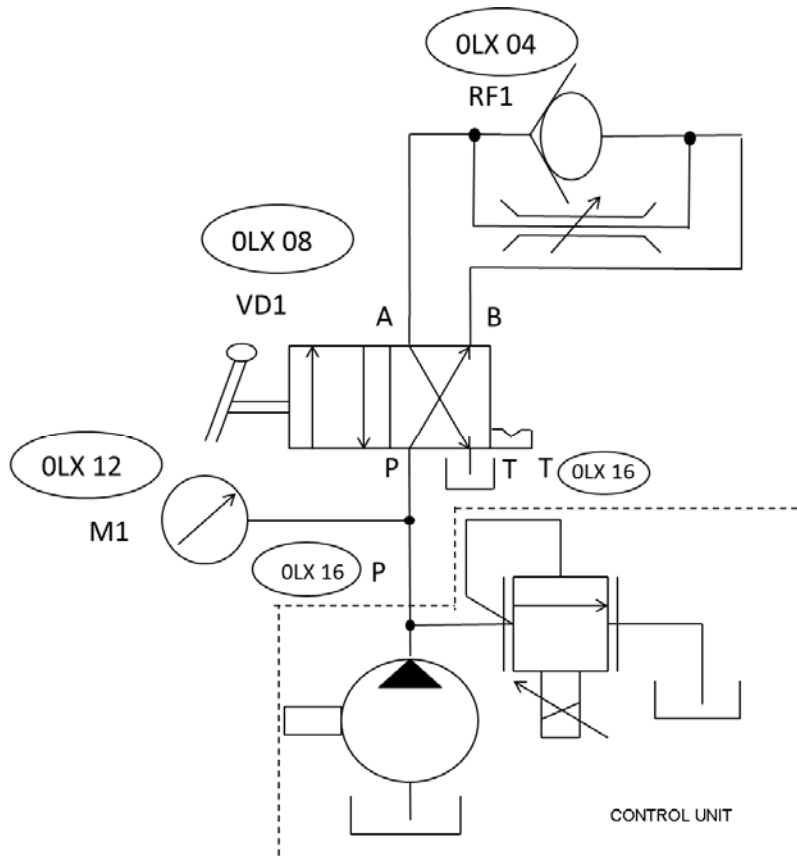
- Nr.1 4/2 manually controlled directional valve (panel OLX-08)



- **EXERCISE PHASES**

- 1) Open the flow control valve “**RF1**” completely, then manually set the “**VD1**” valve in the parallel arrows position and read the pressure value on pressure gauge “**M1**”:
- 2) Set the “**VD1**” valve in the crossed arrows position and read the pressure value on pressure gauge “**M1**”:
- 3) Manually set the “**VD1**” valve in the parallel arrows position; close the “**RF1**” flow control valve by 25% of its range and read the pressure value on gauge “**M1**”:
- 4) Manually set the “**VD1**” valve in the crossed arrows position and read the pressure value on pressure gauge “**M1**”:
- 5) Manually set the “**VD1**” valve in the parallel arrows position; close the “**RF1**” flow control valve by 50% of its range and read the pressure value on gauge “**M1**”:
- 6) Manually set the “**VD1**” valve in the crossed arrows position and read the pressure value on pressure gauge “**M1**”:
- 7) Manually set the “**VD1**” valve in the parallel arrows position; close the “**RF1**” flow control valve by 75% of its range and read the pressure value on gauge “**M1**”:
- 8) Manually set the “**VD1**” valve in the crossed arrows position and read the pressure value on pressure gauge “**M1**”:
- 9) Manually set the “**VD1**” valve in the parallel arrows position; close the “**RF1**” flow control valve by 100% of its range and read the pressure value on gauge “**M1**”:
- 10) Manually set the “**VD1**” valve in the crossed arrows position and read the pressure value on pressure gauge “**M1**”:

• DIAGRAM



EXERCISE NR 6

“MOVEMENT OF A DOUBLE-DIRECTION ROTATION MOTOR”

- **PREMISE**

In order to ensure the success of the exercises described below, the bench must be in the following conditions:

- Presence of 400VAC three-phase power supply + neutral + earth.
- Presence of oil inside the tank of the Hydraulic Unit. 25 litres at least
- “QF3” general power supply door lock selector in **ON position**

- **TARGET**

- The purpose of this exercise is to demonstrate the **movement of an hydraulic, double-direction rotation motor**

and

the use of a 4/2 directional valve with manual control for the movement of an actuator

- **WARNINGS**

- Before carrying out the exercises it is necessary to wear the gloves and goggles provided with the bench
- All the hydraulic connections must be made on the back of the bench where all the quick fit couplings are present
- All hydraulic connections must be made with a non-pressurized system
- All the electrical connections of the instruments present must foresee the use of the cables supplied (**see the User Manual**)

- **PROCEDURE**

- Be sure that the system is not under pressure
- Make all the hydraulic connections according to the diagram shown below. It should be noted that the connections must be made on the back of the bench using the flexible hoses, complete with quick-fit couplings, supplied with the bench

OLEOMAX

- Make all the necessary electrical connections as shown in the diagram.
NOTE: the connections must be made using the special cables, complete with dedicated connectors, supplied on the bench.
- Move the door-locking knob of the main magneto thermal-differential “**QF3**” switch to the “ON” position
- Make sure that the two lamps “**HL-1**” and “**HL-2**” indicating voltage presence on the bench are lit

- **Oil recycling**
 - Press the luminous button “**SB-2/HL4**”
 - Make sure that the integrated green light is on
 - The electric motor of the Hydraulic Unit and the related hydraulic gear pump are operating in the “recycling” mode. The oil recirculates inside the tank but the plant is not under pressure. Any attempt to set the pressure value via the potentiometer “**RP-1**” has no effect.
 - Any immediate stops can be made by pressing the stop button “**SB-3**” or the general emergency button “**SB-1**”
 - To restart the oil recycling, repeat the initial steps.

- **System pressure**

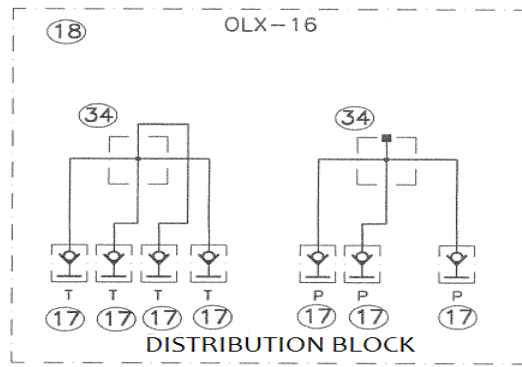
After the oil recycling maneuver has been performed successfully, the system can be put under pressure by following the next steps:

- a) Turn selector “**SA-1**” to the right.
- b) Make sure that lamp “**HL-5**” lights up
- c) Turn potentiometer “**RP-1**”, which regulates the proportional valve, until reaching the required pressure value .
- d) Pressure is now available on the distribution unit present on the panel “**OLX-16**”
- e) To remove pressure from the system, return the selector “**SA-1**” to the left.

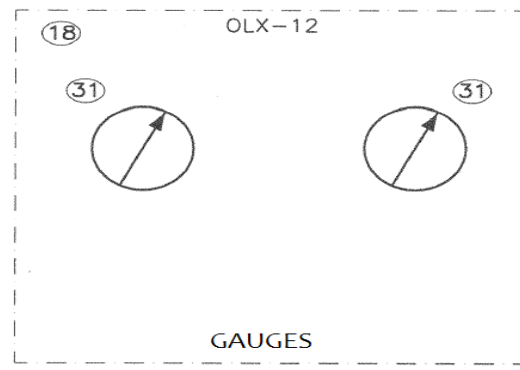
Any immediate stops can be made by pressing the stop button “SB-3” or the general emergency button “SB-1”

- COMPONENTS TO BE USED

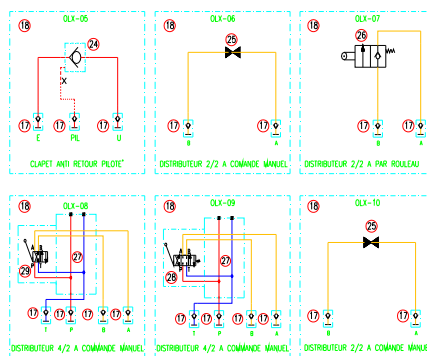
- Nr.1 distribution block (panel OLX-16)



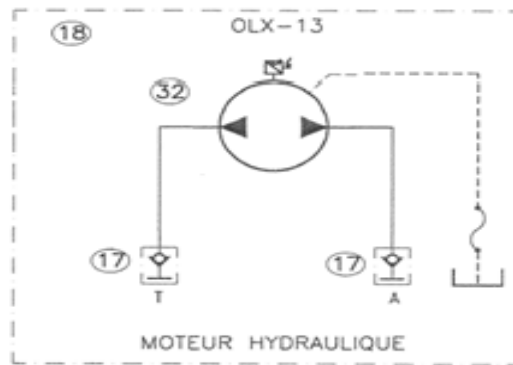
- Nr.1 Gauges (panel OLX-12)



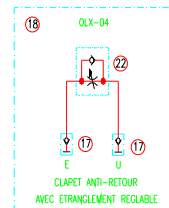
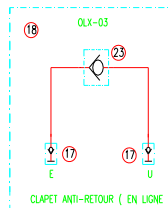
- Nr.1 4/2 manually controlled directional valve (panel OLX-08)



- Nr.1 Hydraulic motor (panel OLX-13)



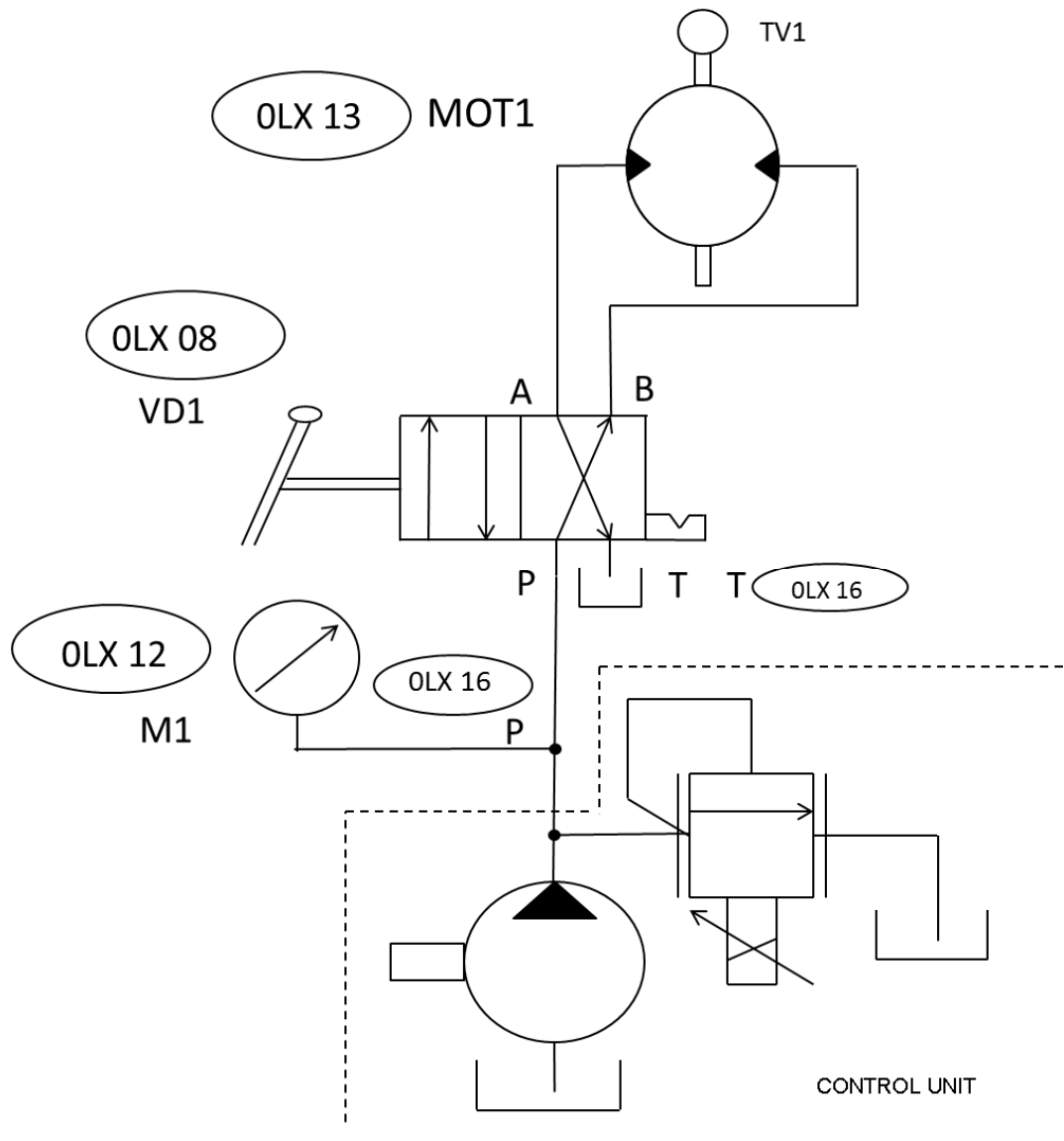
- Nr.1 unidirectional flow regulator (panel OLX-04)



- **EXERCISE PHASES**

- 1) Manually set the “**VD1**” valve in the parallel arrows position and read the pressure value on pressure gauge “**M1**”: **during the counterclockwise rotation of the motor**
- 2) Manually set the “**VD1**” valve in the crossed arrows position and read the pressure value on pressure gauge “**M1**”: **during the clockwise rotation of the motor**

• DIAGRAM



EXERCISE NR 7

“MOVEMENT OF A DOUBLE-ROD DOUBLE-ACTING CYLINDER”

● PREMISE

In order to ensure the success of the exercises described below, the bench must be in the following conditions:

- Presence of 400VAC three-phase power supply + neutral + earth.
- Presence of oil inside the tank of the Hydraulic Unit. 25 litres at least
- “QF3” general power supply door lock selector in **ON** position

● TARGET

- The purpose of this exercise is to demonstrate **the movement of a double-rod double-acting cylinder**
and
the use of a 4/2 directional valve with manual control for the movement of an actuator

● WARNINGS

- Before carrying out the exercises it is necessary to wear the gloves and goggles provided with the bench
- All the hydraulic connections must be made on the back of the bench where all the quick fit couplings are present
- All hydraulic connections must be made with a non-pressurized system
- All the electrical connections of the instruments present must foresee the use of the cables supplied (**see the User Manual**)

● PROCEDURE

- Be sure that the system is not under pressure
- Make all the hydraulic connections according to the diagram shown below. It should be noted that the connections must be made on the back of the bench using the flexible hoses, complete with quick-fit couplings, supplied with the bench.

OLEOMAX

- Make all the necessary electrical connections as shown in the diagram.
NOTE: the connections must be made using the special cables, complete with dedicated connectors, supplied on the bench.
- Move the door-locking knob of the main magneto thermal-differential “**QF3**” switch to the “ON” position
- Make sure that the two lamps “**HL-1**” and “**HL-2**” indicating voltage presence on the bench are lit

● Oil recycling

- Press the luminous button “**SB-2/HL4**”
- Make sure that the integrated green light is on
- The electric motor of the Hydraulic Unit and the related hydraulic gear pump are operating in the “recycling” mode. The oil recirculates inside the tank but the plant is not under pressure. Any attempt to set the pressure value via the potentiometer “**RP-1**” has no effect.
- Any immediate stops can be made by pressing the stop button “**SB-3**” or the general emergency button “**SB-1**”
- To restart the oil recycling, repeat the initial steps

● System pressure

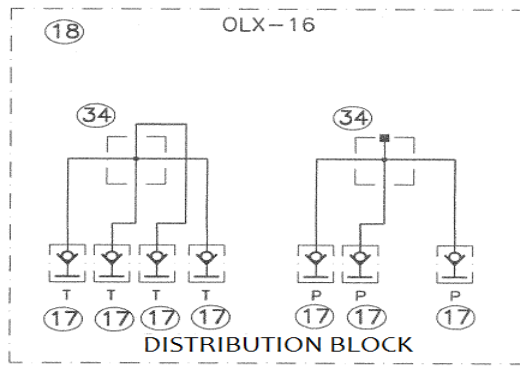
After the oil recycling maneuver has been performed successfully, the system can be put under pressure by following the next steps:

- a) Turn selector “**SA-1**” to the right.
- b) Make sure that lamp “**HL-5**” lights up
- c) Turn potentiometer “**RP-1**”, which regulates the proportional valve, until reaching the required pressure value .
- d) Pressure is now available on the distribution unit present on the panel “**OLX-16**”
- e) To remove pressure from the system, return the selector “**SA-1**” to the left.

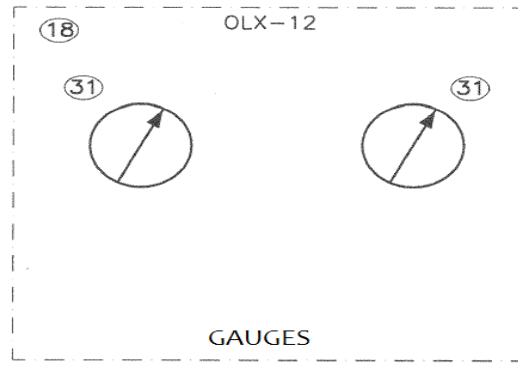
Any immediate stops can be made by pressing the stop button “SB-3” or the general emergency button “SB-1”

● COMPONENTS TO BE USED

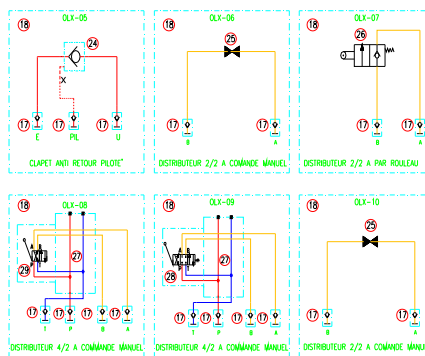
- Nr.1 distribution block (panel OLX-16)



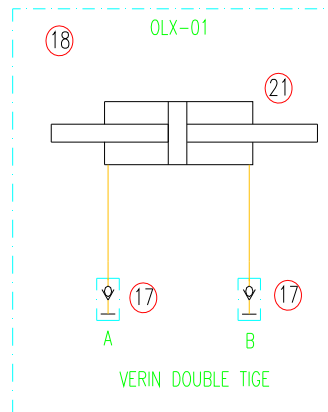
- Nr.1 Gauges (panel OLX-12)



- Nr.1 4/2 manually controlled directional valve (panel OLX-08)



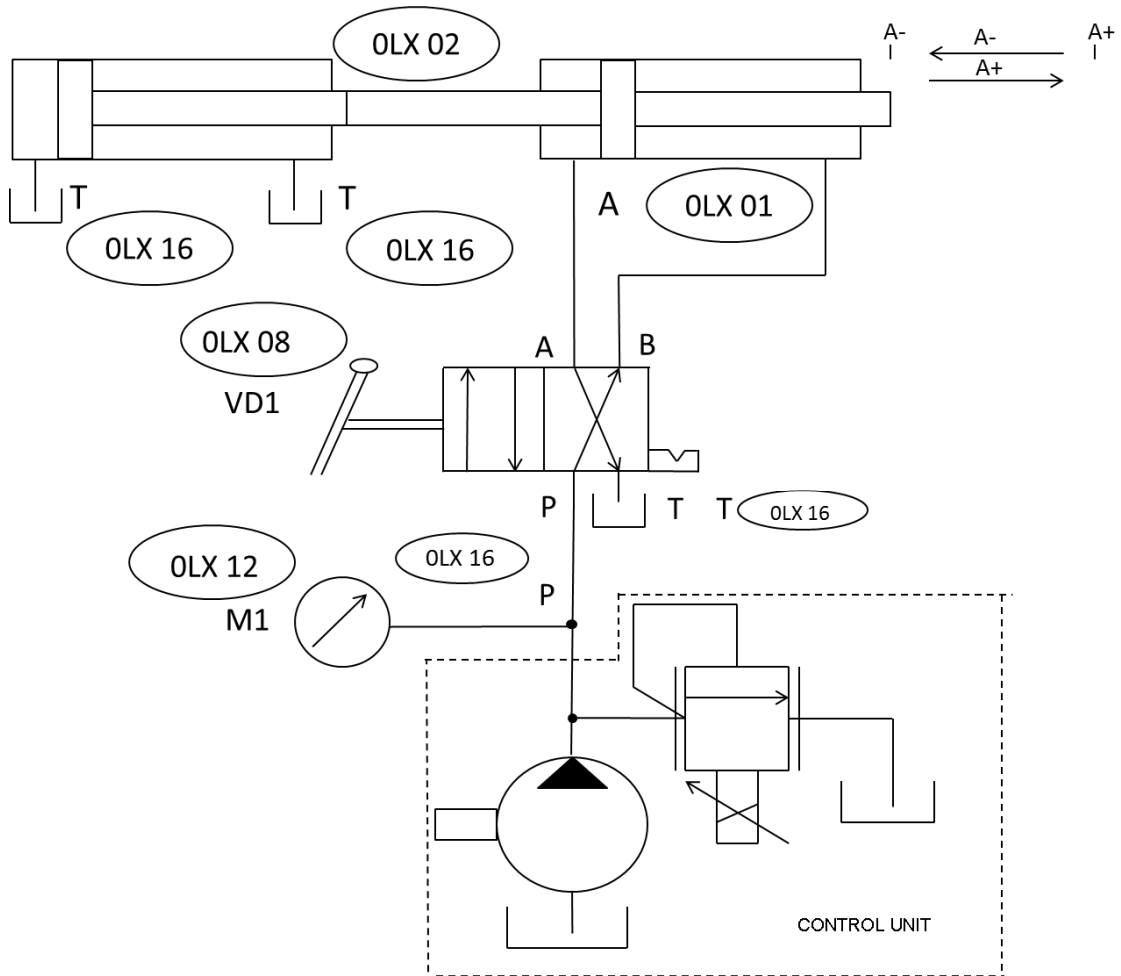
- Nr.1 double-rod double-acting hydraulic cylinder (panel OLX-01)



- **EXERCISE PHASES**

1. Manually set the “**VD1**” valve in the parallel arrows position and read the pressure value on pressure gauge “**M1**”: **during the exit stroke of the front stem “A” of the cylinder (positive stroke A+)**
2. Manually set the “**VD1**” valve in the crossed arrows position and read the pressure value on pressure gauge “**M1**”: **during the return stroke of the front stem “A” of the cylinder (negative stroke A-)**

● DIAGRAM



EXERCISE NR 8

“SPEED REGULATION (IN ONE DIRECTION ONLY) OF A TWO-WAY ROTATION MOTOR”

● PREMISE

In order to ensure the success of the exercises described below, the bench must be in the following conditions:

- Presence of 400VAC three-phase power supply + neutral + earth.
- Presence of oil inside the tank of the Hydraulic Unit. 25 litres at least
- “QF3” general power supply door lock selector in **ON** position

● TARGET

- The purpose of this exercise is to demonstrate **the speed regulation (in one direction only) of a two-way rotation hydraulic motor**
and
the use of the flow regulator as a speed regulator of a hydraulic motor

● WARNINGS

- Before carrying out the exercises it is necessary to wear the gloves and goggles provided with the bench
- All the hydraulic connections must be made on the back of the bench where all the quick fit couplings are present
- All hydraulic connections must be made with a non-pressurized system
- All the electrical connections of the instruments present must foresee the use of the cables supplied (**see the User Manual**)

● PROCEDURE

- Be sure that the system is not under pressure
- Make all the hydraulic connections according to the diagram shown below. It should be noted that the connections must be made on the back of the bench using the flexible hoses, complete with quick-fit couplings, supplied with the bench.

OLEOMAX

- Make all the necessary electrical connections as shown in the diagram.
NOTE: the connections must be made using the special cables, complete with dedicated connectors, supplied on the bench.
- Move the door-locking knob of the main magneto thermal-differential “**QF3**” switch to the “ON” position
- Make sure that the two lamps “**HL-1**” and “**HL-2**” indicating voltage presence on the bench are lit

● Oil recycling

- Press the luminous button “**SB-2/HL4**”
- Make sure that the integrated green light is on
- The electric motor of the Hydraulic Unit and the related hydraulic gear pump are operating in the “recycling” mode. The oil recirculates inside the tank but the plant is not under pressure. Any attempt to set the pressure value via the potentiometer “**RP-1**” has no effect.
- Any immediate stops can be made by pressing the stop button “**SB-3**” or the general emergency button “**SB-1**”
- To restart the oil recycling, repeat the initial steps

● System pressure

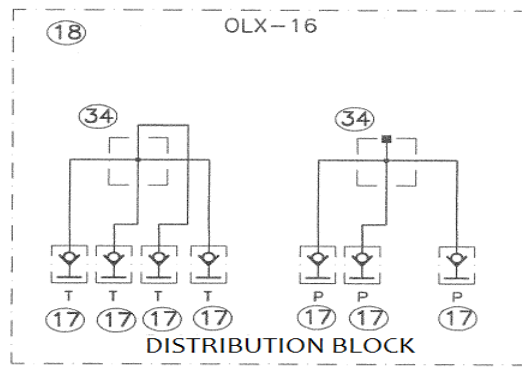
After the oil recycling maneuver has been performed successfully, the system can be put under pressure by following the next steps:

- a) Turn selector “**SA-1**” to the right.
- b) Make sure that lamp “**HL-5**” lights up
- c) Turn potentiometer “**RP-1**”, which regulates the proportional valve, until reaching the required pressure value of **50 BAR**.
- d) Pressure is now available on the distribution unit present on the panel “**OLX-16**”
- e) To remove pressure from the system, return the selector “**SA-1**” to the left.

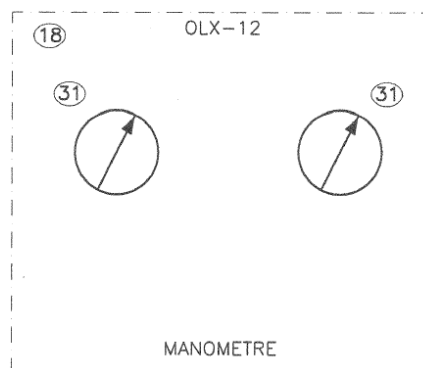
Any immediate stops can be made by pressing the stop button “SB-3” or the general emergency button “SB-1”

● **COMPONENTS TO BE USED**

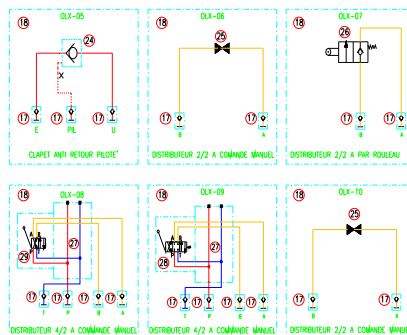
- Nr.1 distribution block (panel OLX-16)



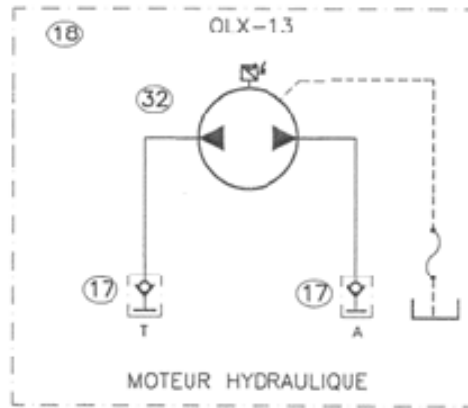
- Nr.1 Gauges (panel OLX-12)



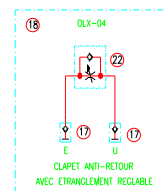
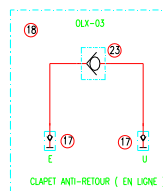
- Nr.1 4/2 manually controlled directional valve (panel OLX-08)



- Nr.1 Hydraulic motor (panel OLX-13)

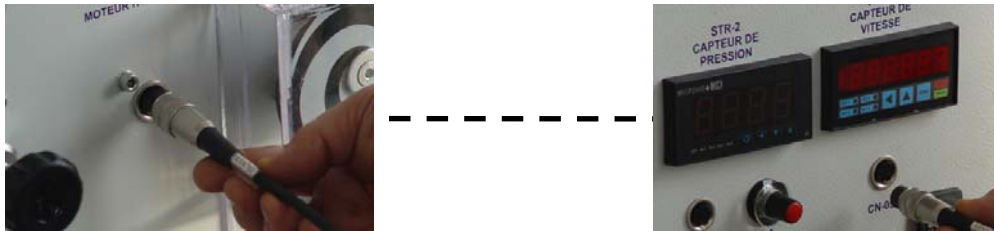


- Nr.1 unidirectional flow regulator (panel OLX-04)













- **EXERCISE PHASES**

- 1) Electrically connect the speed sensor of the panel “**OLX-13**”
- To read the speed of the hydraulic motor it is necessary to use the connection cable supplied with the bench and identified with the following code
“**OLX-13**” -----“**CN-05**”
 - a) Connect the male connector “**CN-05**” to the electrical panel and to the correspondingly identified female connector.
 - b) Connect the “**OLX-13**” connector to the connector located on the panel of the hydraulic motor.
 - c) The reading of the speed of the hydraulic motor will be displayed on the digital instrument “**STR-3**”, located on the electric panel.

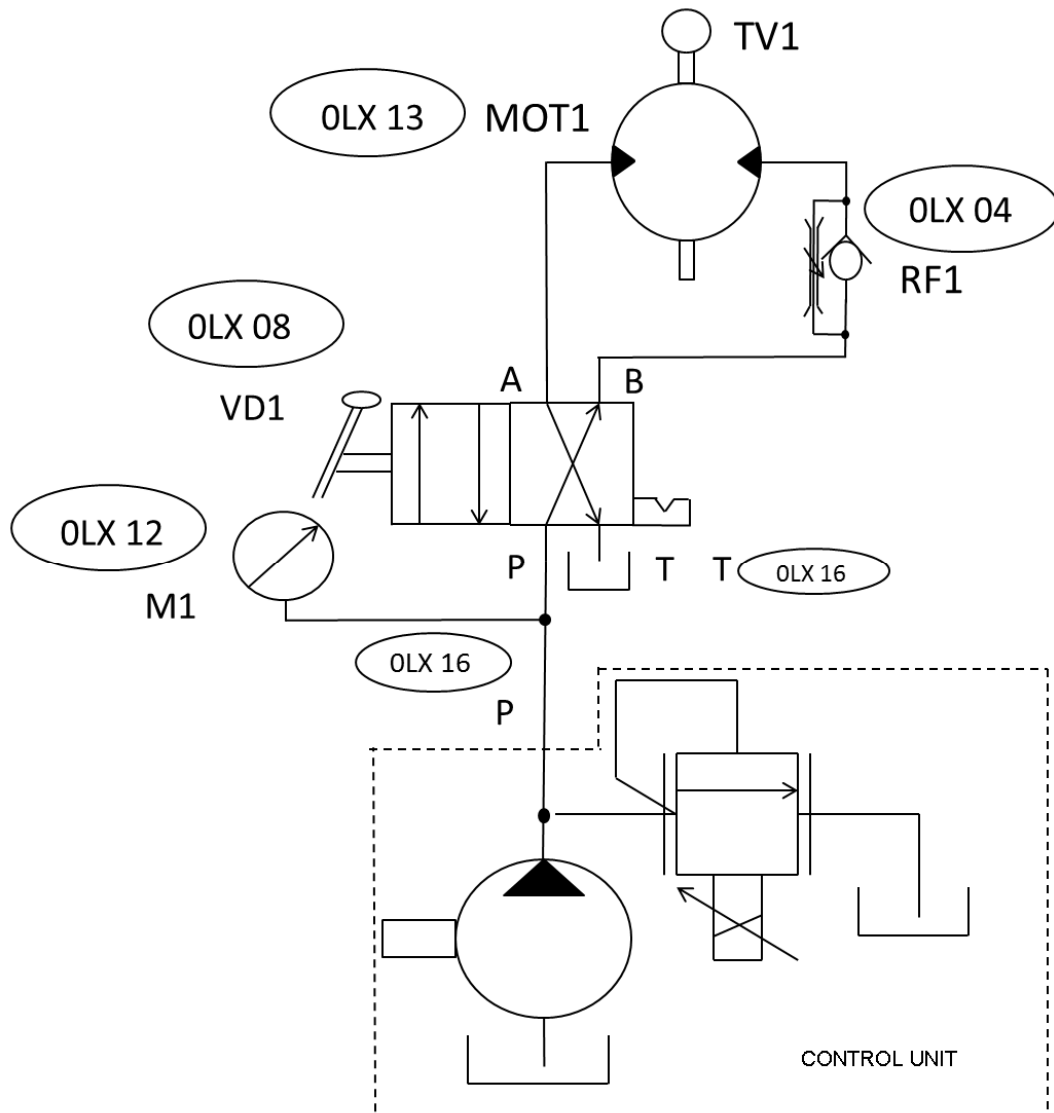


- 2) Manually set the “**VD1**” valve in the parallel arrows position and read the pressure value on pressure gauge “**M1**”: **during the counterclockwise rotation of the motor “MOT1”** and report the data in the table below
- 3) Read the speed of the motor “**MOT1**” on the digital display “**STR-3**” and report the data in the table below
- 4) Adjust the “**RF1**” flow regulator **to 25% of its range**; read the pressure value on pressure gauge “**M1**” and report the data in the table below
- 5) Read the speed of the motor “**MOT1**” on the digital display “**STR-3**” and report the data in the table below
- 6) Adjust the “**RF1**” flow regulator **to 50% of its range**; read the pressure value on pressure gauge “**M1**” and report the data in the table below
- 7) Read the speed of the motor “**MOT1**” on the digital display “**STR-3**” and report the data in the table below

- 8) Adjust the "RF1" flow regulator **to 75% of its range**; read the pressure value on pressure gauge "M1" and report the data in the table below
- 9) Read the speed of the motor "MOT1" on the digital display "STR-3" and report the data in the table below
- 10) Adjust the "RF1" flow regulator **to 100% of its range**; read the pressure value on pressure gauge "M1" and report the data in the table below
- 11) Read the speed of the motor "MOT1" on the digital display "STR-3" and report the data in the table below
- 12) Manually set the "VD1" valve in the crossed arrows position and read the pressure value on pressure gauge "M1": **during the clockwise rotation of the motor "MOT1"** and report the data in the table below
- 13) Read the speed of the motor "MOT1" on the digital display "STR-3" and report the data in the table below
- 14) Adjust the "RF1" flow regulator **to 25% of its range**; read the pressure value on pressure gauge "M1" and report the data in the table below
- 15) Read the speed of the motor "MOT1" on the digital display "STR-3" and report the data in the table below
- 16) Adjust the "RF1" flow regulator **to 50% of its range**; read the pressure value on pressure gauge "M1" and report the data in the table below
- 17) Read the speed of the motor "MOT1" on the digital display "STR-3" and report the data in the table below
- 18) Adjust the "RF1" flow regulator **to 75% of its range**; read the pressure value on pressure gauge "M1" and report the data in the table below
- 19) Read the speed of the motor "MOT1" on the digital display "STR-3" and report the data in the table below
- 20) Adjust the "RF1" flow regulator **to 100% of its range**; read the pressure value on pressure gauge "M1" and report the data in the table below
- 21) Read the speed of the motor "MOT1" on the digital display "STR-3" and report the data in the table below

RF1	VD1	M1	ng
0%			
			
25%			
			
50%			
			
75%			
			
100%			
			

- DIAGRAM



EXERCISE NR 9

“ADJUSTING THE STROKE SPEED OF A CYLINDER”

- **PREMISE**

In order to ensure the success of the exercises described below, the bench must be in the following conditions:

- Presence of 400VAC three-phase power supply + neutral + earth.
- Presence of oil inside the tank of the Hydraulic Unit. 25 litres at least
- “**QF3**” general power supply door lock selector in **ON** position

- **TARGET**

- The purpose of this exercise is to demonstrate **how to adjust the stroke speed of a double-stem double acting cylinder**
and
how to use a flow regulator as a speed controller for the stroke of a hydraulic cylinder rod

- **WARNINGS**

- Before carrying out the exercises it is necessary to wear the gloves and goggles provided with the bench
- All the hydraulic connections must be made on the back of the bench where all the quick fit couplings are present
- All hydraulic connections must be made with a non-pressurized system
- All the electrical connections of the instruments present must foresee the use of the cables supplied (**see the User Manual**)

- **PROCEDURE**

- Be sure that the system is not under pressure
- Make all the hydraulic connections according to the diagram shown below. It should be noted that the connections must be made on the back of the bench using the flexible hoses, complete with quick-fit couplings, supplied with the bench.

OLEOMAX

- Make all the necessary electrical connections as shown in the diagram.
NOTE: the connections must be made using the special cables, complete with dedicated connectors, supplied on the bench.
- Move the door-locking knob of the main magneto thermal-differential “**QF3**” switch to the “ON” position
- Make sure that the two lamps “**HL-1**” and “**HL-2**” indicating voltage presence on the bench are lit

● Oil recycling

- Press the luminous button “**SB-2/HL4**”
- Make sure that the integrated green light is on
- The electric motor of the Hydraulic Unit and the related hydraulic gear pump are operating in the “recycling” mode. The oil recirculates inside the tank but the plant is not under pressure. Any attempt to set the pressure value via the potentiometer “**RP-1**” has no effect.
- Any immediate stops can be made by pressing the stop button “**SB-3**” or the general emergency button “**SB-1**”
- To restart the oil recycling, repeat the initial steps

● System pressure

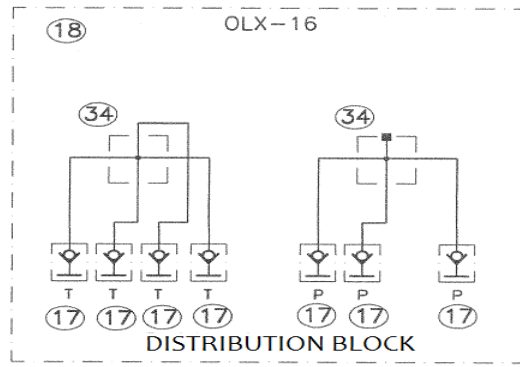
After the oil recycling maneuver has been performed successfully, the system can be put under pressure by following the next steps:

- a) Turn selector “**SA-1**” to the right.
- b) Make sure that lamp “**HL-5**” lights up
- c) Turn potentiometer “**RP-1**”, which regulates the proportional valve, until reaching the required pressure value of **50 BAR**.
- d) Pressure is now available on the distribution unit present on the panel “**OLX-16**”
- e) To remove pressure from the system, return the selector “**SA-1**” to the left.

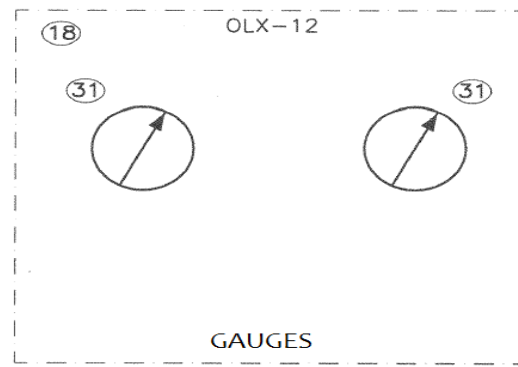
Any immediate stops can be made by pressing the stop button “SB-3**” or the general emergency button “**SB-1**”**

● COMPONENTS TO BE USED

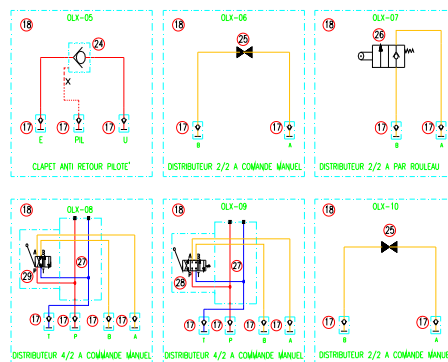
- Nr.1 distribution block (panel OLX-16)



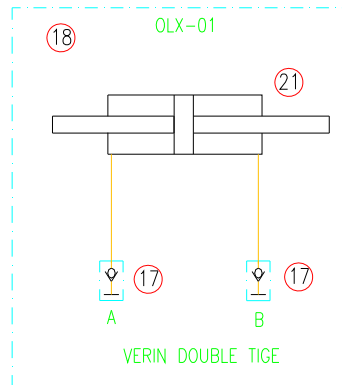
- Nr.1 Gauges (panel OLX-12)



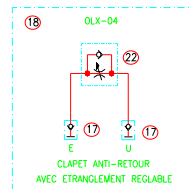
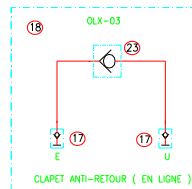
- Nr.1 4/2 manually controlled directional valve (panel OLX-08)



- Nr.1 double-rod double-acting hydraulic cylinder (panel OLX-01)



- Nr.1 unidirectional flow regulator (panel OLX-04)



- **EXERCISE PHASES**

- 1) Manually set the “VD1” valve in the parallel arrows position and read the pressure value on pressure gauge “M1” **during the exit stroke of the front rod “A” of the cylinder and at the end of the stroke**; report the data in the table below
- 2) Manually set the “VD1” valve in the crossed arrows position and read the pressure value on pressure gauge “M1”: **during the return stroke of the front rod “A” of the cylinder and at the end of the stroke**; report the data in the table below
- 3) Adjust the flow regulator “RF1” to **25% of its range**
- 4) Manually set the “VD1” valve in the parallel arrows position and read the pressure value on pressure gauge “M1” **during the exit stroke of the front rod “A” of the cylinder and at the end of the stroke**; report the data in the table below

and

Observe carefully the stroke speed of the rod

- 5) Manually set the “VD1” valve in the crossed arrows position and read the pressure value on pressure gauge “M1”: **during the return stroke of the front rod “A” of the cylinder and at the end of the stroke**; report the data in the table below

and

Observe carefully the stroke speed of the rod

- 6) Adjust the flow regulator “RF1” to **50% of its range**
- 7) Manually set the “VD1” valve in the parallel arrows position and read the pressure value on pressure gauge “M1”: **during the exit stroke of the front rod “A” of the cylinder and at the end of the stroke**; report the data in the table below

and

Observe carefully the stroke speed of the rod

- 8) Manually set the “VD1” valve in the crossed arrows position and read the pressure value on pressure gauge “M1”: **during the return stroke of the front rod “A” of the cylinder and at the end of the stroke**; report the data in the table below

and

Observe carefully the stroke speed of the rod

- 9) Adjust the flow regulator “RF1” to **75% of its range**
- 10) Manually set the “VD1” valve in the parallel arrows position and read the pressure value on pressure gauge “M1”: **during the exit stroke of the front rod “A” of the cylinder and at the end of the stroke**; report the data in the table below

and

Observe carefully the stroke speed of the rod

- 11) Manually set the “VD1” valve in the crossed arrows position and read the pressure value on pressure gauge “M1”: **during the return stroke of the front rod “A” of the cylinder and at the end of the stroke**; report the data in the table below

and

Observe carefully the stroke speed of the rod

- 12) Adjust the flow regulator “RF1” to **100% of its range**
- 13) Manually set the “VD1” valve in the parallel arrows position and read the pressure value on pressure gauge “M1”: **during the exit stroke of the front rod “A” of the cylinder and at the end of the stroke**; report the data in the table below











and

Observe carefully the stroke speed of the rod

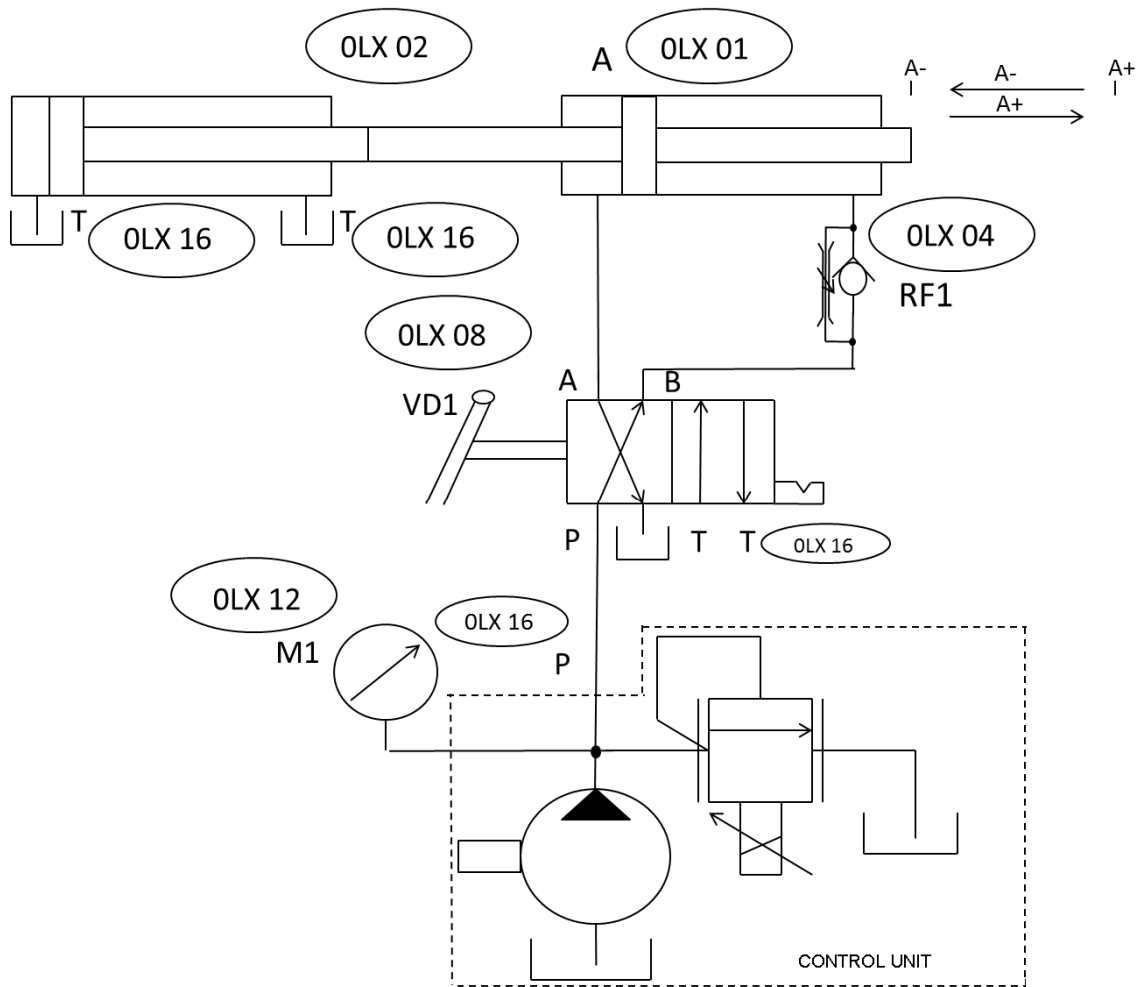
- 14) Manually set the “VD1” valve in the crossed arrows position and read the pressure value on pressure gauge “M1”: **during the return stroke of the front rod “A” of the cylinder and at the end of the stroke**; report the data in the table below

and

Observe carefully the stroke speed of the rod

RF1	VD1	M1	M1	Speed
		DURING THE STROKE	END OF STROKE	CYLINDER
0%				
				
25%				
				
50%				
				
75%				
				
100%				
				

• DIAGRAM



EXERCISE NR 10
“MOVEMENT OF A DOUBLE-ACTING CYLINDER
WITH LOCKING IN POSITION”

● **PREMISE**

In order to ensure the success of the exercises described below, the bench must be in the following conditions:

- Presence of 400VAC three-phase power supply + neutral + earth.
- Presence of oil inside the tank of the Hydraulic Unit. 25 litres at least
- “**QF3**” general power supply door lock selector in **ON position**

● **TARGET**

- The purpose of this exercise is to demonstrate **the movement of a double-acting double-stem cylinder**
and
the locking in position by means of a 4/3 directional valve closed center manually controlled e mechanical spring centering

● **WARNINGS**

- Before carrying out the exercises it is necessary to wear the gloves and goggles provided with the bench
- All the hydraulic connections must be made on the back of the bench where all the quick fit couplings are present
- All hydraulic connections must be made with a non-pressurized system
- All the electrical connections of the instruments present must foresee the use of the cables supplied (**see the User Manual**)

● **PROCEDURE**

- Be sure that the system is not under pressure
- Make all the hydraulic connections according to the diagram shown below. It should be noted that the connections must be made on the back of the bench using the flexible hoses, complete with quick-fit couplings, supplied with the bench.

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- Make all the necessary electrical connections as shown in the diagram.
NOTE: the connections must be made using the special cables, complete with dedicated connectors, supplied on the bench.
- Move the door-locking knob of the main magneto thermal-differential “**QF3**” switch to the “ON” position
- Make sure that the two lamps “**HL-1**” and “**HL-2**” indicating voltage presence on the bench are lit

● Oil recycling

- Press the luminous button “**SB-2/HL4**”
- Make sure that the integrated green light is on
- The electric motor of the Hydraulic Unit and the related hydraulic gear pump are operating in the “recycling” mode. The oil recirculates inside the tank but the plant is not under pressure. Any attempt to set the pressure value via the potentiometer “**RP-1**” has no effect.
- Any immediate stops can be made by pressing the stop button “**SB-3**” or the general emergency button “**SB-1**”
- To restart the oil recycling, repeat the initial steps

● System pressure

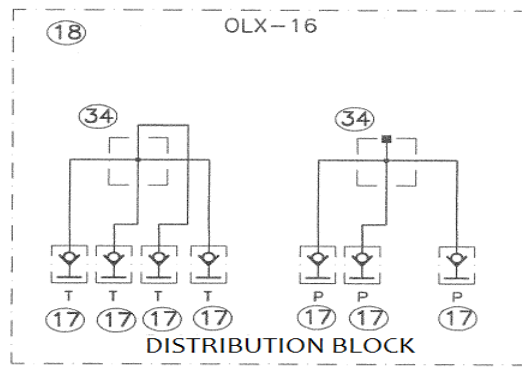
After the oil recycling maneuver has been performed successfully, the system can be put under pressure by following the next steps:

- a) Turn selector “**SA-1**” to the right.
- b) Make sure that lamp “**HL-5**” lights up
- c) Turn potentiometer “**RP-1**”, which regulates the proportional valve, until reaching the required pressure value of **50 BAR**.
- d) Pressure is now available on the distribution unit present on the panel “**OLX-16**”
- e) To remove pressure from the system, return the selector “**SA-1**” to the left..

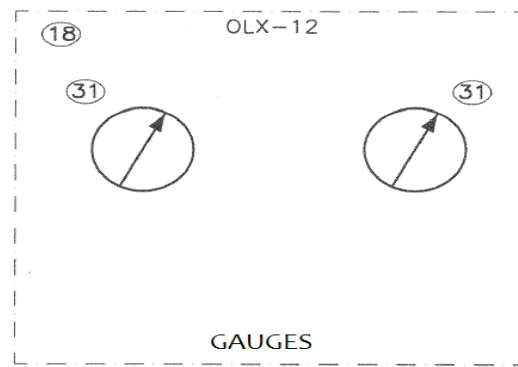
Any immediate stops can be made by pressing the stop button “SB-3” or the general emergency button “SB-1”

● **COMPONENTS TO BE USED**

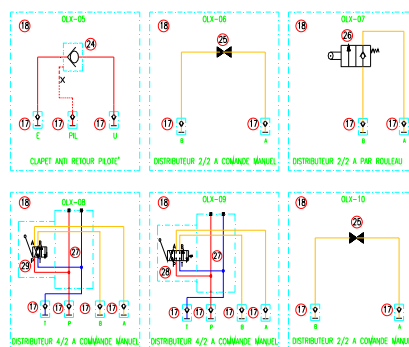
- Nr.1 distribution block (panel OLX-16)



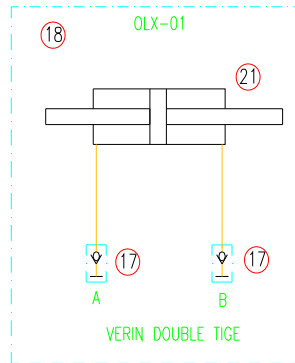
- Nr.1 Gauges (pannello OLX-12)



- Nr.1 4/3 closed center directional valve manual spring-loaded mechanical centering control (panel OLX-09)



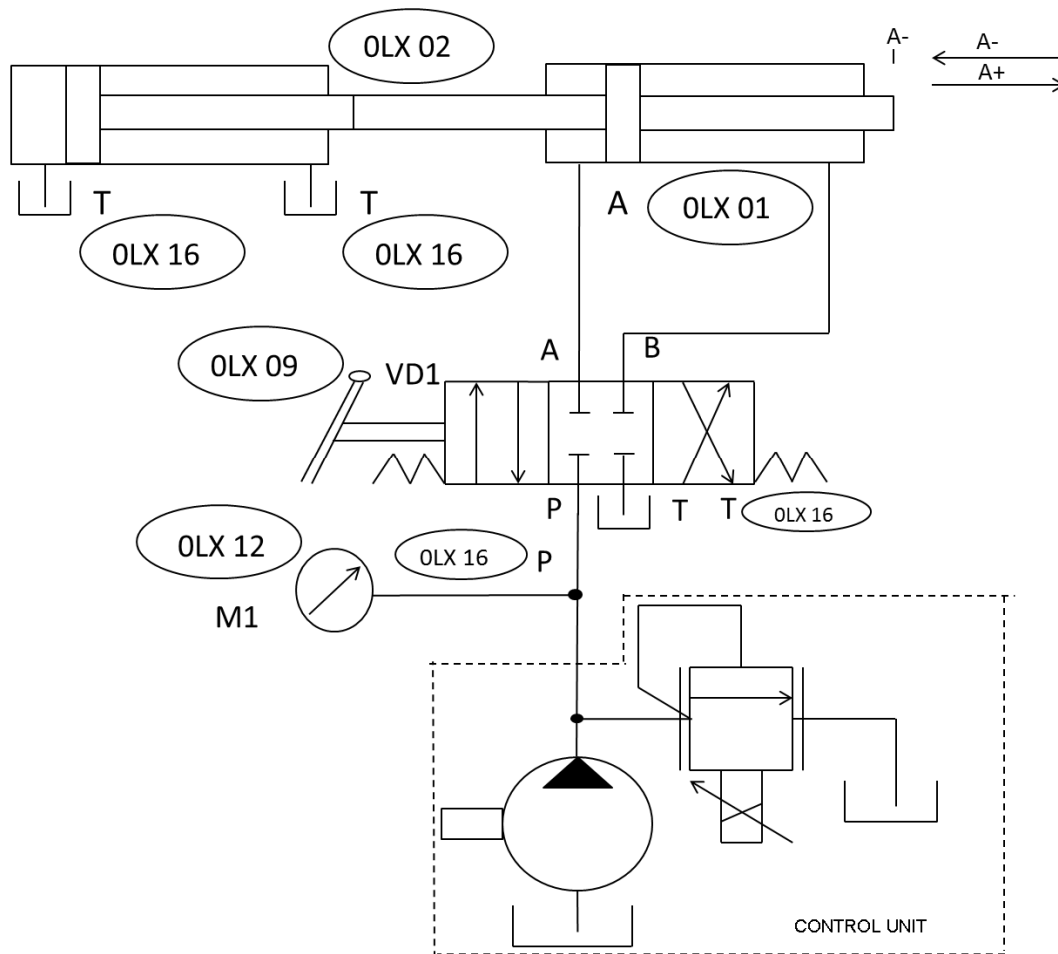
- Nr.1 double-stem double-acting hydraulic cylinder (panel OLX-01)



1) **EXERCISE PHASES**

- 2) Manually set the “VD1” valve in the central position and read the pressure value on the pressure gauge “M1”:
- 3) Manually set the “VD1” valve in the parallel arrows position and keep it positioned; read the pressure value on pressure gauge “M1”: **during the exit stroke of the front rod “A” of the cylinder and at the end of the stroke;**
- 4) Manually set the “VD1” valve in the crossed arrows position and keep it positioned; read the pressure value on pressure gauge “M1” **during the return stroke of the front rod “A” of the cylinder and at the end of the stroke**
- 5) Manually set the “VD1” valve in the parallel arrows position and keep it positioned; read the pressure value on pressure gauge “M1”: **during the exit stroke of the front rod “A” of the cylinder**
- 6) **When the stem is about half way of its stroke, release valve “VD1”** (which returns in central position): **cylinder “A” will stop in its current position**
- 7) Read the pressure value on pressure gauge “M1”:
- 8) Manually set the “VD1” valve in the crossed arrows position and keep it positioned; complete the **exit stroke of the front stem of the cylinder “A”**
- 9) Manually set the “VD1” valve in the crossed arrows position and keep it positioned; read the pressure value on pressure gauge “M1”:
- 10) **When the stem is about half way of its stroke, release valve “VD1”** (which returns in central position): **cylinder “A” will stop in its current position**
- 11) Read the pressure value on pressure gauge “M1”:
- 12) Manually set the “VD1” valve in the crossed arrows position and keep it positioned; complete the **stroke of the stem**

• DIAGRAM



ESERCITAZIONE NR 11
“MOVEMENT OF A TWO-WAY ROTATION MOTOR
WITH LOCKING IN POSITION”

● **PREMISE**

In order to ensure the success of the exercises described below, the bench must be in the following conditions:

- Presence of 400VAC three-phase power supply + neutral + earth.
- Presence of oil inside the tank of the Hydraulic Unit. 25 litres at least
- “QF3” general power supply door lock selector in **ON** position

● **TARGET**

- The purpose of this exercise is to demonstrate **the movement of a two-way rotation motor**

and

Its locking in position by means of a 4/3 directional valve closed center manually controlled e mechanical spring centering

● **WARNINGS**

- Before carrying out the exercises it is necessary to wear the gloves and goggles provided with the bench
- All the hydraulic connections must be made on the back of the bench where all the quick fit couplings are present
- All hydraulic connections must be made with a non-pressurized system
- All the electrical connections of the instruments present must foresee the use of the cables supplied (**see the User Manual**)

- **PROCEDURE**

- Be sure that the system is not under pressure
- Make all the hydraulic connections according to the diagram shown below. It should be noted that the connections must be made on the back of the bench using the flexible hoses, complete with quick-fit couplings, supplied with the bench
- Make all the necessary electrical connections as shown in the diagram.
NOTE: the connections must be made using the special cables, complete with dedicated connectors, supplied on the bench.
- Move the door-locking knob of the main magneto thermal-differential “**QF3**” switch to the “ON” position
- Make sure that the two lamps “**HL-1**” and “**HL-2**” indicating voltage presence on the bench are lit

- **Oil recycling**

- Press the luminous button “**SB-2/HL4**”
- Make sure that the integrated green light is on
- The electric motor of the Hydraulic Unit and the related hydraulic gear pump are operating in the “recycling” mode. The oil recirculates inside the tank but the plant is not under pressure. Any attempt to set the pressure value via the potentiometer “**RP-1**” has no effect.
- Any immediate stops can be made by pressing the stop button “**SB-3**” or the general emergency button “**SB-1**”
- To restart the oil recycling, repeat the initial steps

- **System pressure**

After the oil recycling maneuver has been performed successfully, the system can be put under pressure by following the next steps:

- a) Turn selector “**SA-1**” to the right.
- b) Make sure that lamp “**HL-5**” lights up
- c) Turn potentiometer “**RP-1**”, which regulates the proportional valve, until reaching the required pressure value of **50 BAR**.
- d) Pressure is now available on the distribution unit present on the panel “**OLX-16**”



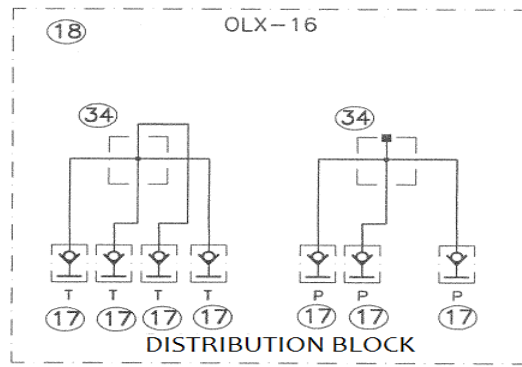
OLEOMAX

- e) To remove pressure from the system, return the selector “**SA-1**” to the left.

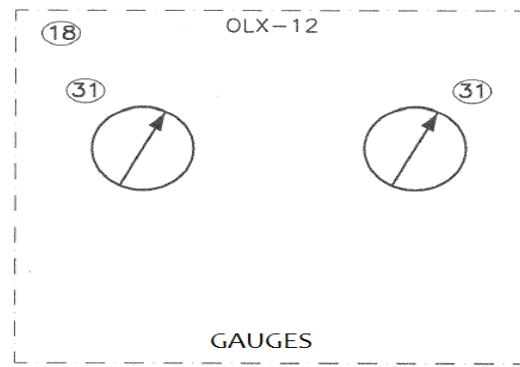
Any immediate stops can be made by pressing the stop button “SB-3” or the general emergency button “SB-1”

- COMPONENTS TO BE USED

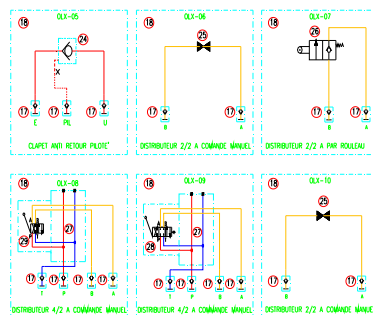
- Nr.1 distribution block (panel OLX-16)



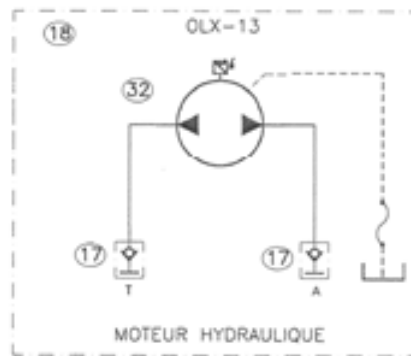
- Nr.1 Gauges (pannelo OLX-12)



- Nr.1 4/3 closed center directional valve manual spring-loaded mechanical centering control (panel OLX-09)



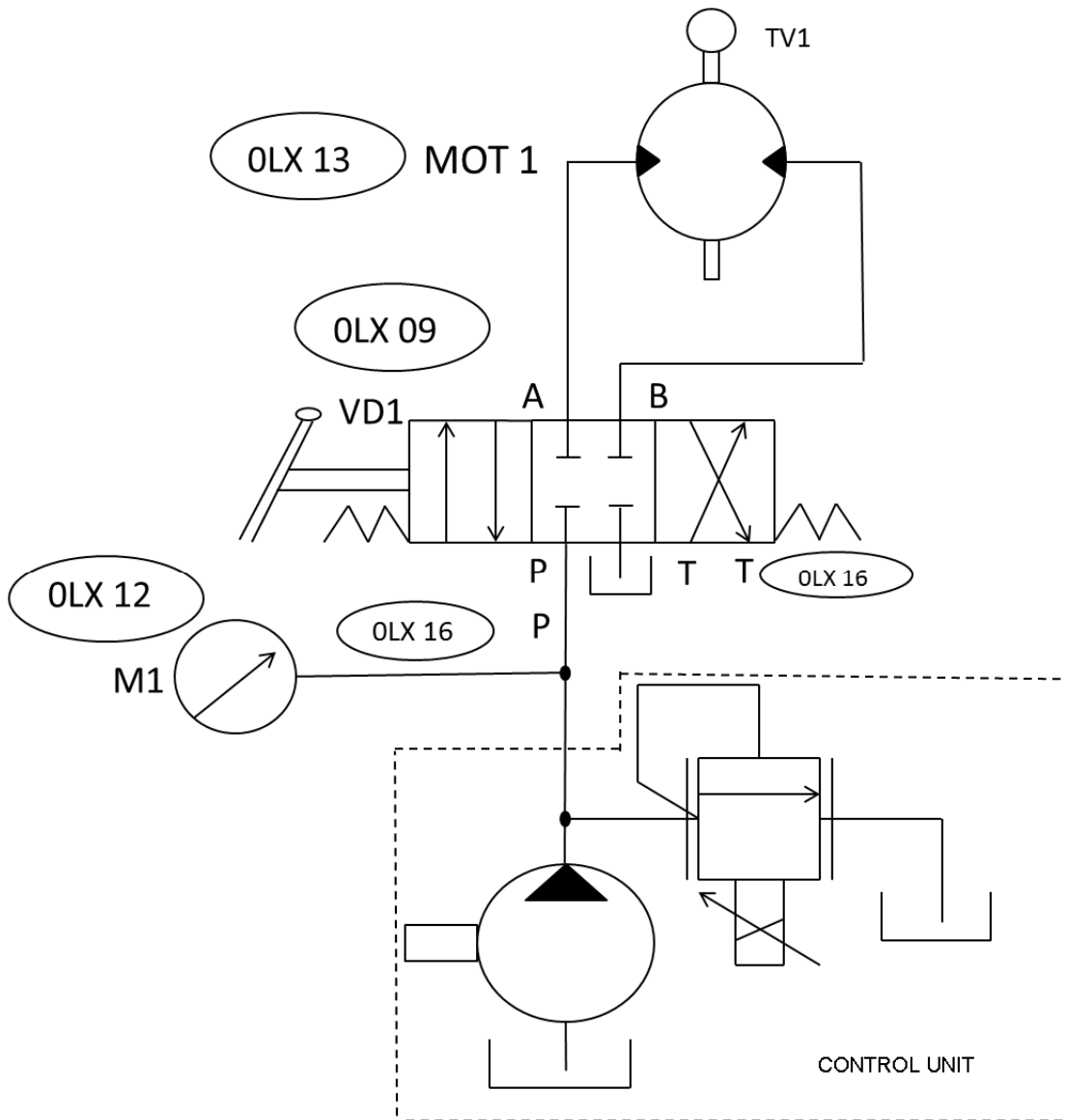
- Nr.1 two-way rotation hydraulic motor (panel OLX-13)



● **EXERCISE PHASES**

- 1) Manually set the “**VD1**” valve in the central position and read the pressure value on the pressure gauge “**M1**”:
- 2) Manually set the “**VD1**” valve in the parallel arrows position and keep it positioned; read the pressure value on pressure gauge “**M1**”: during the clockwise rotation of motor “**MOT1**”
- 3) **Release valve “VD1”** (which returns in central position): **motor “MOT1” stops its rotation**
- 4) Manually set the “**VD1**” valve in the crossed arrows position and keep it positioned; read the pressure value on pressure gauge “**M1**”: during the counterclockwise rotation of motor “**MOT1**”
- 5) **Release valve “VD1”** (which returns in central position): **motor “MOT1” stops its rotation**

• DIAGRAM



EXERCISE NR 12**“MOVEMENT OF A DOUBLE-ACTING CYLINDER WITH
LOCKING IN POSITION BY MEANS OF A SOLENOID VALVE”****● PREMISE**

- In order to ensure the success of the exercises described below, the bench must be in the following conditions:
- Presence of 400VAC three-phase power supply + neutral + earth.
- Presence of oil inside the tank of the Hydraulic Unit. 25 litres at least
- “**QF3**” general power supply door lock selector in **ON** position

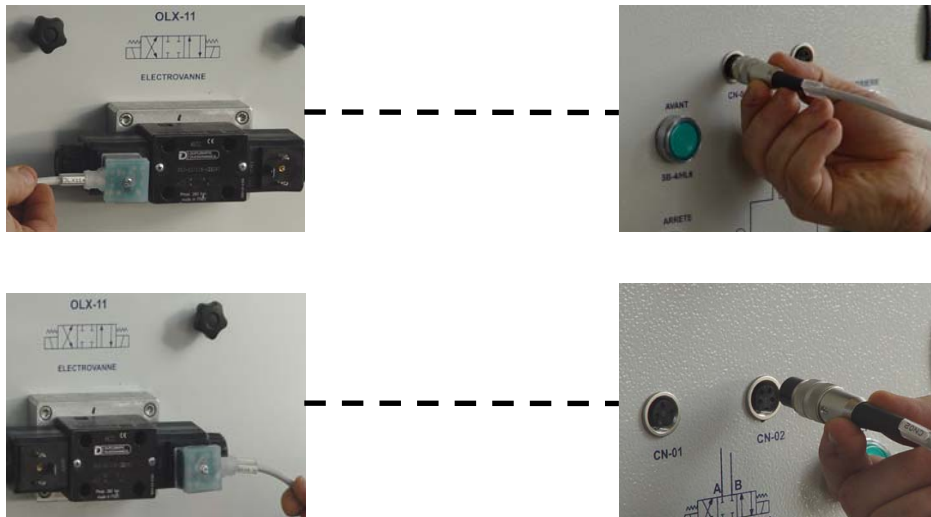
▪ TARGET

- The purpose of this exercise is to demonstrate **the movement of a double-stem double-acting cylinder**
and
its locking in position by means of a 4/3 closed center directional solenoid valve manual spring-loaded mechanical centering control

● WARNINGS

- Before carrying out the exercises it is necessary to wear the gloves and goggles provided with the bench
- All the hydraulic connections must be made on the back of the bench where all the quick fit couplings are present
- All hydraulic connections must be made with a non-pressurized system
- All the electrical connections of the instruments present must foresee the use of the cables supplied (**see the User Manual**)
- **Give power supply to solenoid valve on panel “OLX-11”**
 - To supply the coils on the solenoid valve it is necessary to use the cables supplied with the bench and identified with the following codes
 - a) “**OLX-11A**” -----“**CN-01**”
 - b) “**OLX-11B**” -----“**CN-02**”

- c) Connect the male connector "**CN-01**" or "**CN-02**" to the electrical panel and to the correspondingly identified female connectors
- d) Connect the "**OLX-11A**" or "**OLX-11B**" female connector to the male connector on the solenoid valve



● PROCEDURA

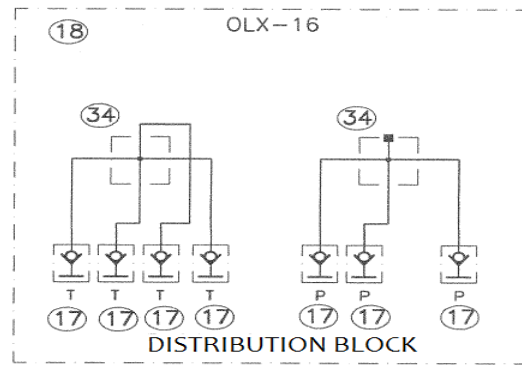
- **PROCEDURE**
- Be sure that the system is not under pressure
- Make all the hydraulic connections according to the diagram shown below. It should be noted that the connections must be made on the back of the bench using the flexible hoses, complete with quick-fit couplings, supplied with the bench
- Make all the necessary electrical connections as shown in the diagram. **NOTE:** the connections must be made using the special cables, complete with dedicated connectors, supplied on the bench.
- Move the door-locking knob of the main magneto thermal-differential "**QF3**" switch to the "ON" position
- Make sure that the two lamps "**HL-1**" and "**HL-2**" indicating voltage presence on the bench are lit
- **Oil recycling**
-
- Press the luminous button "**SB-2/HL4**"
- Make sure that the integrated green light is on

- The electric motor of the Hydraulic Unit and the related hydraulic gear pump are operating in the “recycling” mode. The oil recirculates inside the tank but the plant is not under pressure. Any attempt to set the pressure value via the potentiometer “**RP-1**” has no effect.
 - Any immediate stops can be made by pressing the stop button “**SB-3**” or the general emergency button “**SB-1**”
 - To restart the oil recycling, repeat the initial steps
-
- **System pressure**
 - After the oil recycling maneuver has been performed successfully, the system can be put under pressure by following the next steps:
 - a) Turn selector “**SA-1**” to the right.
 - b) Make sure that lamp “**HL-5**” lights up
 - c) Turn potentiometer “**RP-1**”, which regulates the proportional valve, until reaching the required pressure value of **50 BAR**.
 - d) Pressure is now available on the distribution unit present on the panel “**OLX-16**”
 - e) o remove pressure from the system, return the selector “**SA-1**” to the left.

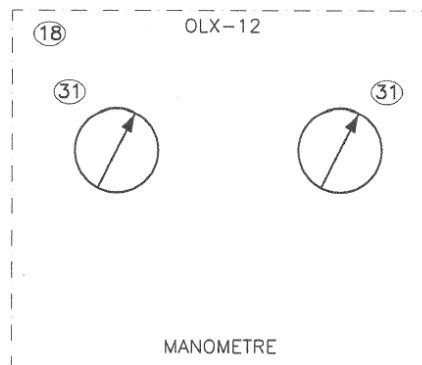
Any immediate stops can be made by pressing the stop button “SB-3” or the general emergency button “SB-1”

● **COMPONENTS TO BE USED**

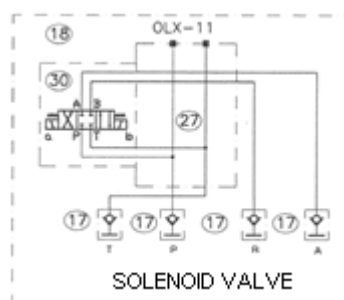
- Nr.1 distribution block (panel OLX-16)



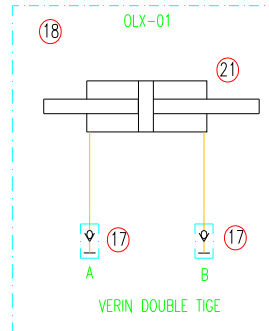
- Nr.1 Gauges (panel OLX-12)



- Nr.1 4/3 closed center directional solenoid valve manual spring-loaded mechanical centering control (panel OLX-11)



- Nr.1 double-stem double-acting hydraulic cylinder (panel OLX-01)

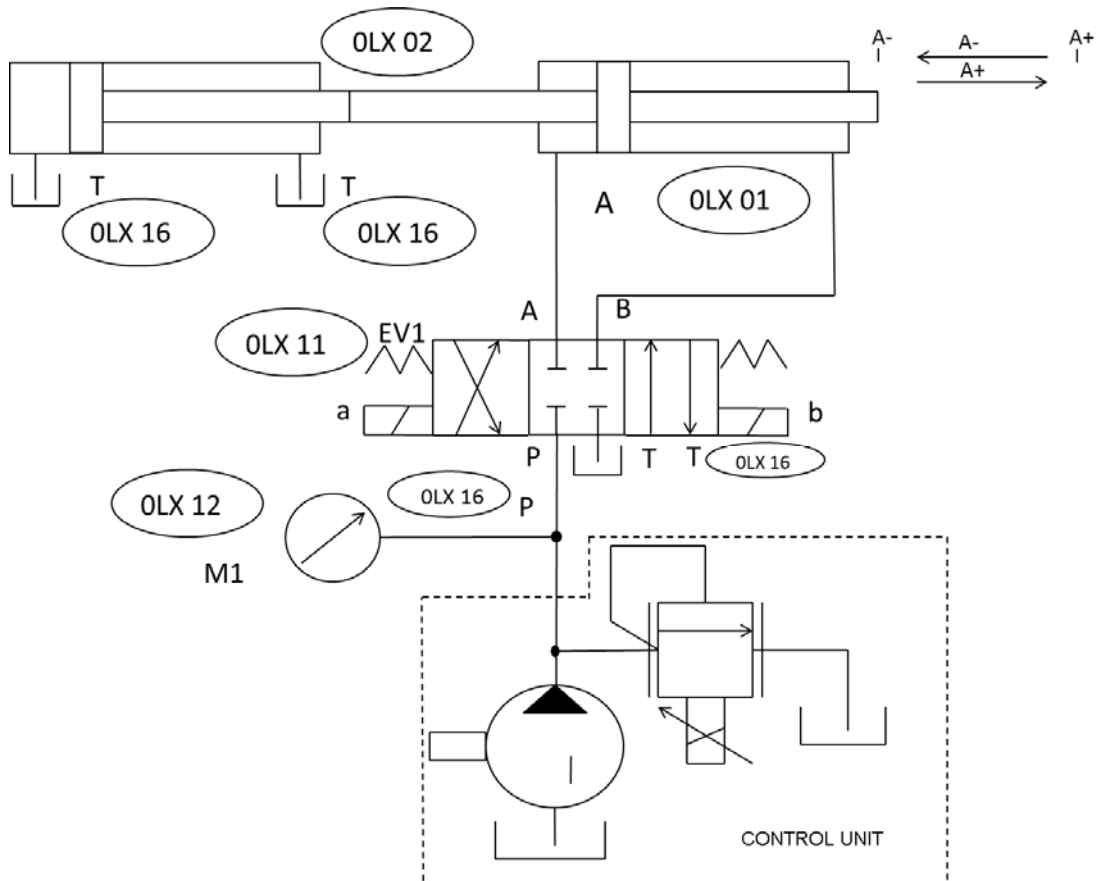


- **EXERCISE PHASES**

- 1) Electrically set the solenoid valve “EV1” in the central position (no electrical command given to its coil). Do not activate the “SB-4/HL6” and “SB-5/HL7” buttons and read the pressure value on the “M1” gauge
- 2) Electrically set the solenoid valve “EV1” in the parallel arrows position by energizing the coil “b” (press and hold the “SB-4/HL6” button). Read the pressure value on the “M1” gauge: **during the exit stroke of the front stem of the cylinder “A” and at the end of the stroke**
- 3) Electrically set the solenoid valve “EV1” in the crossed arrows position by energizing the coil “a” (press and hold the “SB-5/HL7” button). Read the pressure value on the “M1” gauge: **during the return stroke of the front stem of the cylinder “A” and at the end of the stroke**
- 4) Electrically set the solenoid valve “EV1” in the parallel arrows position (and keep it energized); read the pressure value on the “M1” gauge **during the exit stroke of the front stem of the cylinder “A”**
- 5) **When the stem is about half way of its stroke, de-energize the “EV1” valve** (by removing the electric control) **which returns in central position: cylinder “A” will stop in its current position**
- 6) Read the pressure value on the pressure gauge “M1”:
- 7) Electrically set the solenoid valve “EV1” in the parallel arrows position (and keep it energized) to complete **the exit stroke of the front stem of cylinder “A”**
- 8) Electrically set the solenoid valve “EV1” in the crossed arrows position (and keep it energized); read the pressure value on the “M1” gauge
- 9) **When the stem is about half way of its stroke, de-energize the “EV1” valve** (by removing the electric control) **which returns in central position: cylinder “A” will stop in its current position**
- 10) Read the pressure value on the pressure gauge “M1”:
- 11) Electrically set the solenoid valve “EV1” in the crossed arrows position (and keep it energized) **to complete the stroke of the front stem of cylinder “A”**

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- DIAGRAM



EXERCISE NR 13
**“MOVEMENT OF A TWO-WAY ROTATION MOTOR WITH
LOCKING IN POSITION BY MEANS OF A SOLENOID VALVE”**

- **PREMISE**

- In order to ensure the success of the exercises described below, the bench must be in the following conditions:
- Presence of 400VAC three-phase power supply + neutral + earth.
- Presence of oil inside the tank of the Hydraulic Unit. 25 litres at least
- “**QF3**” general power supply door lock selector in **ON** position

- **TARGET**

- The purpose of this exercise is to demonstrate **the movement of a two-way rotation hydraulic motor**

and

the locking in position by means of a 4/3 closed center directional solenoid valve manual spring-loaded mechanical centering control

- **AVVERTENZE**

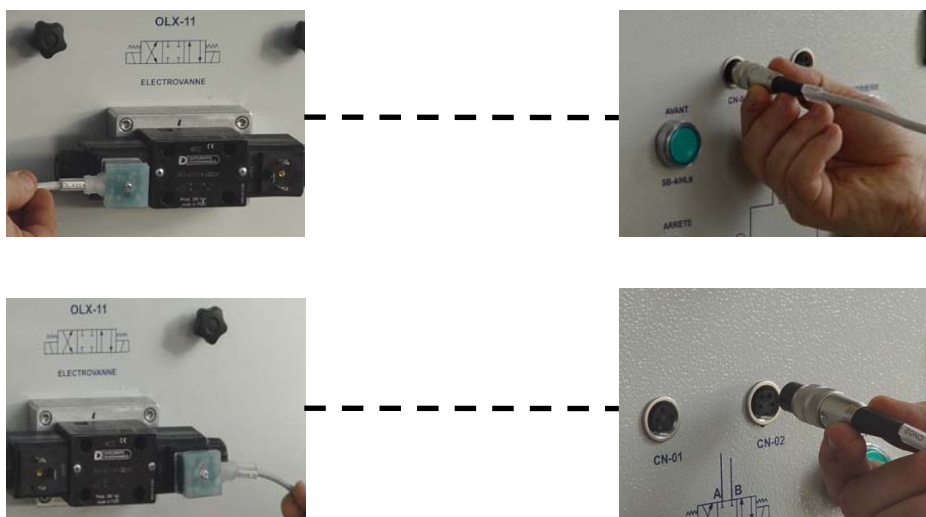
- **WARNINGS**

- Before carrying out the exercises it is necessary to wear the gloves and goggles provided with the bench
- All the hydraulic connections must be made on the back of the bench where all the quick fit couplings are present
- All hydraulic connections must be made with a non-pressurized system
- All the electrical connections of the instruments present must foresee the use of the cables supplied (**see the User Manual**)

**Power supply of the solenoid valve on panel “OLX-11”
(see the User Manual)**

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- To supply the coils on the solenoid valve it is necessary to use the cables supplied with the bench and identified with the following codes
 - a) **"OLX-11A"** -----**"CN-01"**
 - b) **"OLX-11B"** -----**"CN-02"**
 - c) Connect the male connector **"CN-01"** or **"CN-02"** to the electrical panel and to the correspondingly identified female connectors
 - d) Connect the **"OLX-11A"** or **"OLX-11B"** female connector to the male connector on the solenoid valve



- **PROCEDURE**
- Be sure that the system is not under pressure
- Make all the hydraulic connections according to the diagram shown below. It should be noted that the connections must be made on the back of the bench using the flexible hoses, complete with quick-fit couplings, supplied with the bench
- Make all the necessary electrical connections as shown in the diagram. **NOTE:** the connections must be made using the special cables, complete with dedicated connectors, supplied on the bench.
- Move the door-locking knob of the main magneto thermal-differential “**QF3**” switch to the “ON” position
- Make sure that the two lamps “**HL-1**” and “**HL-2**” indicating voltage presence on the bench are lit

Oil recycling

-
- Press the luminous button “**SB-2/HL4**”
- Make sure that the integrated green light is on
- The electric motor of the Hydraulic Unit and the related hydraulic gear pump are operating in the “recycling” mode. The oil recirculates inside the tank but the plant is not under pressure. Any attempt to set the pressure value via the potentiometer “**RP-1**” has no effect.
- Any immediate stops can be made by pressing the stop button “**SB-3**” or the general emergency button “**SB-1**”
 - To restart the oil recycling, repeat the initial steps
- **System pressure**
 - After the oil recycling maneuver has been performed successfully, the system can be put under pressure by following the next steps:
 - a) Turn selector “**SA-1**” to the right.
 - b) Make sure that lamp “**HL-5**” lights up
 - c) Turn potentiometer “**RP-1**”, which regulates the proportional valve, until reaching the required pressure value .



OLEOMAX

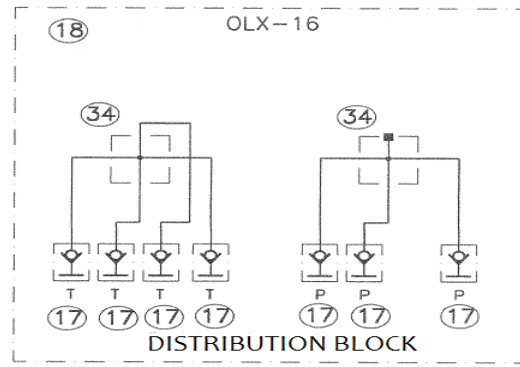
- d) Pressure is now available on the distribution unit present on the panel "OLX-16"
- e) To remove pressure from the system, return the selector "SA-1" to the left

Any immediate stops can be made by pressing the stop button "SB-3" or the general emergency button "SB-1"

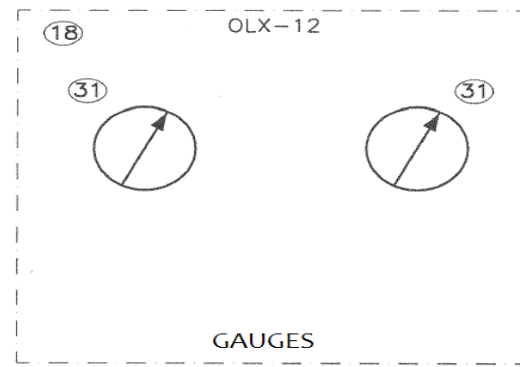
OLEOMAX

- **COMPONENTS TO BE USED**

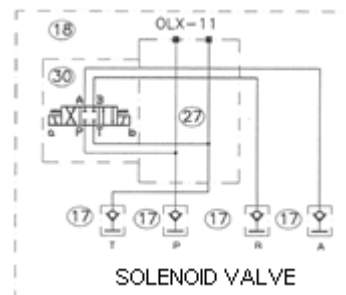
- Nr.1 distribution block (panel OLX-16)



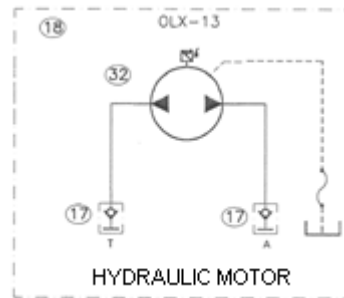
- Nr.1 Gauges (panel OLX-12)



- 4/3 closed center directional solenoid valve manual spring-loaded mechanical centering control (panel OLX-11)



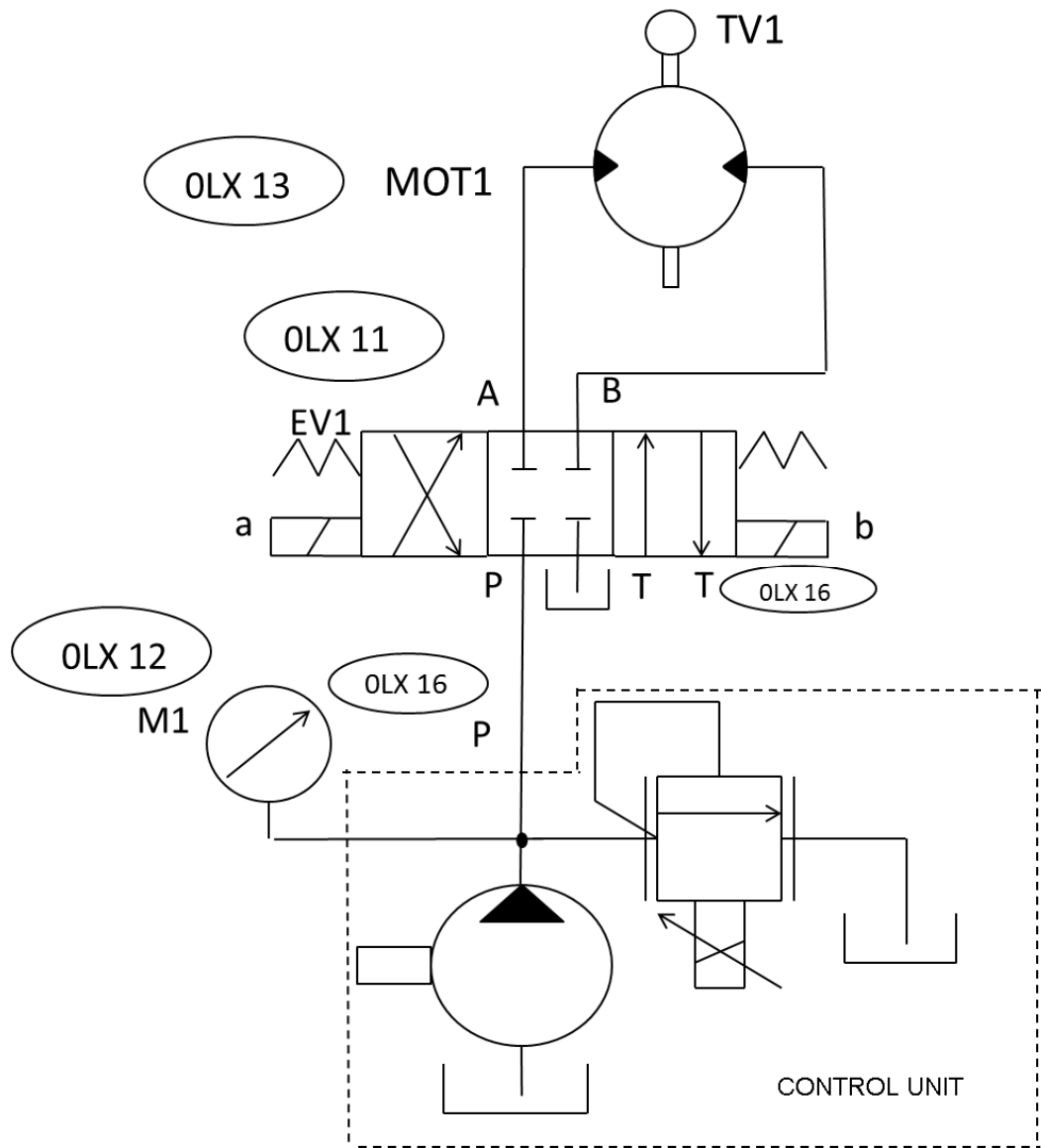
- Nr.1 two-way rotation hydraulic motor (panel OLX-13)



- **EXERCISE PHASES**

- Electrically set the solenoid valve “EV1” in the central position (no electrical command given to its coil). Do not activate the “SB-4/HL6” and “SB-5/HL7” buttons and read the pressure value on the “M1” gauge
- Electrically set the solenoid valve “EV1” in the parallel arrows position by energizing the coil “b” (press and hold the “SB-4/HL6” button). Read the pressure value on the “M1” gauge: **during the clockwise rotation of the hydraulic motor “MOT1”**
- **De-energize the “EV1” valve** (by removing the electric control) **which returns in central position: the motor “MOT1” stops turning**
- Electrically set the solenoid valve “EV1” in the crossed arrows position by energizing the coil “a” (press and hold the “SB-5/HL7” button). Read the pressure value on the “M1” gauge: **during the counterclockwise rotation of the hydraulic motor “MOT1”**
- **De-energize the “EV1” valve** (by removing the electric control) **which returns in central position: the motor “MOT1” stops turning**

• DIAGRAM



EXERCISE NR 14

“CALIBRATION OF A PRESSURE REDUCING VALVE”

- **PREMISE**

- In order to ensure the success of the exercises described below, the bench must be in the following conditions:
- Presence of 400VAC three-phase power supply + neutral + earth.
- Presence of oil inside the tank of the Hydraulic Unit. 25 litres at least
- “**QF3**” general power supply door lock selector in **ON** position

- **TARGET**

- The purpose of this exercise is to demonstrate **how a pressure reducing valve works**

- **WARNINGS**

- Before carrying out the exercises it is necessary to wear the gloves and goggles provided with the bench
- All the hydraulic connections must be made on the back of the bench where all the quick fit couplings are present
- All hydraulic connections must be made with a non-pressurized system
- All the electrical connections of the instruments present must foresee the use of the cables supplied (**see the User Manual**)

- **PROCEDURE**

- Be sure that the system is not under pressure
- Make all the hydraulic connections according to the diagram shown below. It should be noted that the connections must be made on the back of the bench using the flexible hoses, complete with quick-fit couplings, supplied with the bench
- Make all the necessary electrical connections as shown in the diagram.
NOTE: the connections must be made using the special cables, complete with dedicated connectors, supplied on the bench.
- Move the door-locking knob of the main magneto thermal-differential “**QF3**” switch to the “**ON**” position

OLEOMAX

- Make sure that the two lamps “HL-1” and “HL-2” indicating voltage presence on the bench are lit.

Oil recycling

-
- Press the luminous button “SB-2/HL4”
- Make sure that the integrated green light is on
- The electric motor of the Hydraulic Unit and the related hydraulic gear pump are operating in the “recycling” mode. The oil recirculates inside the tank but the plant is not under pressure. Any attempt to set the pressure value via the potentiometer “RP-1” has no effect.
- Any immediate stops can be made by pressing the stop button “SB-3” or the general emergency button “SB-1”
 - To restart the oil recycling, repeat the initial steps

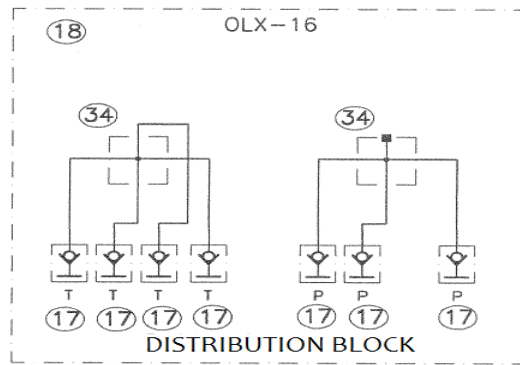
- **System pressure**

- After the oil recycling maneuver has been performed successfully, the system can be put under pressure by following the next steps:
 - a) Turn selector “SA-1” to the right.
 - b) Make sure that lamp “HL-5” lights up
 - c) Turn potentiometer “RP-1”, which regulates the proportional valve, until reaching the required pressure value .
 - d) Pressure is now available on the distribution unit present on the panel “OLX-16”
 - e) To remove pressure from the system, return the selector “SA-1” to the left.

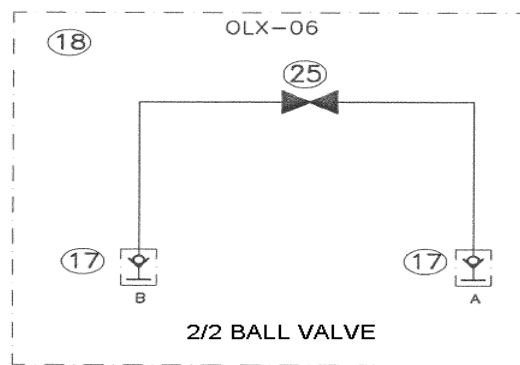
Any immediate stops can be made by pressing the stop button “SB-3” or the general emergency button “SB-1”

● **COMPONENTS TO BE USED**

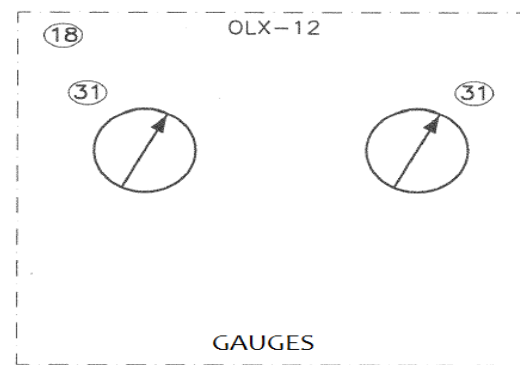
- Nr.1 distribution block (panel OLX-16)



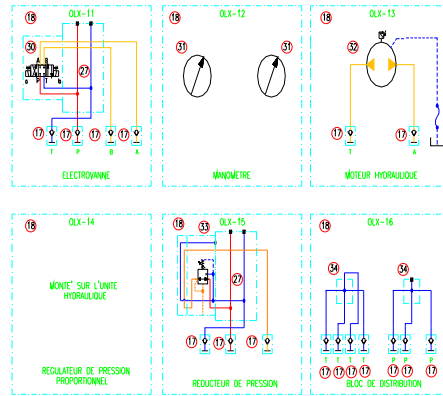
- Nr.1 2/2 Ball valve (panel OLX-06)



- Nr.2 Gauges (panel OLX-12)



Nr.1 pressure reducing valve (panel OLX-15)

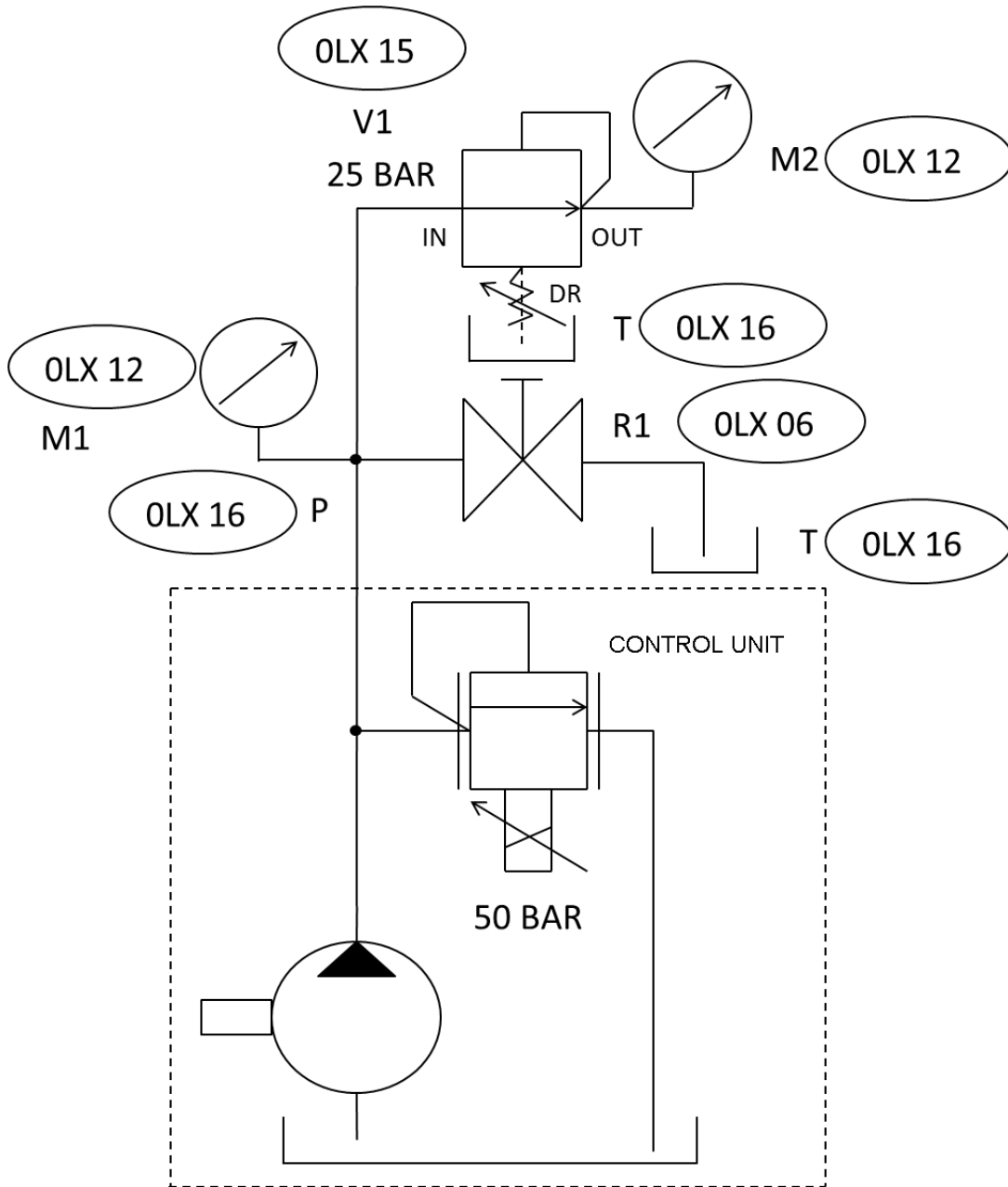


- **EXERCISE PHASES**

- 1) Open faucet “**R1**”
- 2) set the pressure reducing valve “**V1**” out of calibration, by turning it fully open
- 3) Close the faucet “**R1**”
- 4) Calibrate the pressure reducing valve “**V1**” by acting on the calibrating knob until reaching a pressure reading of **25 BAR** on the “**M2**” pressure gauge
- 5) Read the pressure values on gauges “**M1**” e “**M2**” and report the readings in the table below
- 6) Open faucet “**R1**”
- 7) Read the pressure values on gauges “**M1**” e “**M2**” and report the readings in the table below

R1	M1	M2
OPEN		
CLOSED		

• DIAGRAM



EXERCISE NR 15

“CHECKING THE FUNCTIONALITY OF A PRESSURE REDUCING VALVE”

- **PREMISE**

- In order to ensure the success of the exercises described below, the bench must be in the following conditions:
- Presence of 400VAC three-phase power supply + neutral + earth.
- Presence of oil inside the tank of the Hydraulic Unit. 25 litres at least
- “**QF3**” general power supply door lock selector in **ON** position

- **TARGET**

- The purpose of this exercise is to demonstrate **the functionality of a pressure reducing valve**

- **WARNINGS**

- Before carrying out the exercises it is necessary to wear the gloves and goggles provided with the bench
- All the hydraulic connections must be made on the back of the bench where all the quick fit couplings are present
- All hydraulic connections must be made with a non-pressurized system
- All the electrical connections of the instruments present must foresee the use of the cables supplied (**see the User Manual**)

- **PROCEDURE**

- Be sure that the system is not under pressure
- Make all the hydraulic connections according to the diagram shown below. It should be noted that the connections must be made on the back of the bench using the flexible hoses, complete with quick-fit couplings, supplied with the bench.
 - Make all the necessary electrical connections as shown in the diagram. **NOTE:** the connections must be made using the special cables, complete with dedicated connectors, supplied on the bench.

OLEOMAX

- Move the door-locking knob of the main magneto thermal-differential “**QF3**” switch to the “ON” position
- Make sure that the two lamps “**HL-1**” and “**HL-2**” indicating voltage presence on the bench are lit

Oil recycling

-
- Press the luminous button “**SB-2/HL4**”
- Make sure that the integrated green light is on
- The electric motor of the Hydraulic Unit and the related hydraulic gear pump are operating in the “recycling” mode. The oil recirculates inside the tank but the plant is not under pressure. Any attempt to set the pressure value via the potentiometer “**RP-1**” has no effect.
- Any immediate stops can be made by pressing the stop button “**SB-3**” or the general emergency button “**SB-1**”
 - To restart the oil recycling, repeat the initial steps
- **System pressure**

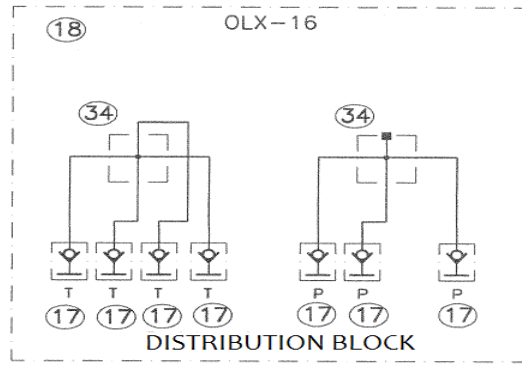
After the oil recycling maneuver has been performed successfully, the system can be put under pressure by following the next steps:

- a) Turn selector “**SA-1**” to the right.
- b) Make sure that lamp “**HL-5**” lights up
- c) Turn potentiometer “**RP-1**”, which regulates the proportional valve, until reaching the required pressure value .
- d) Pressure is now available on the distribution unit present on the panel “**OLX-16**”
- e) To remove pressure from the system, return the selector “SA-1” to the left.

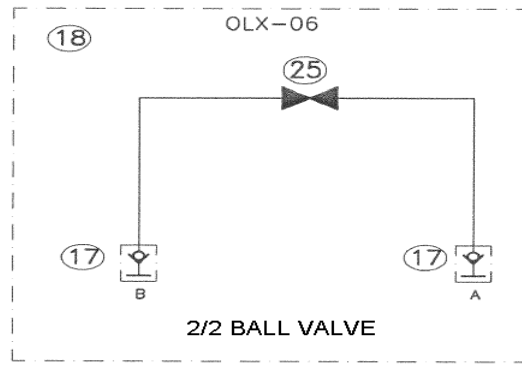
Any immediate stops can be made by pressing the stop button “SB-3” or the general emergency button “SB-1”

- **COMPONENTS TO BE USED**

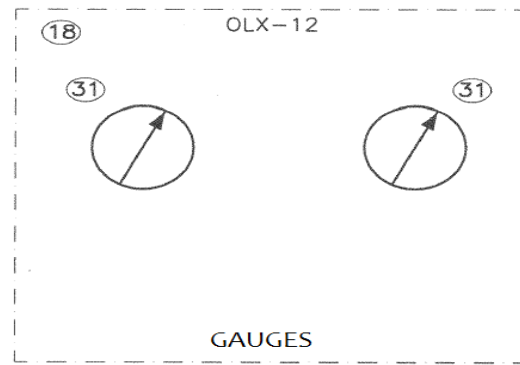
- distribution block (panel OLX-16)



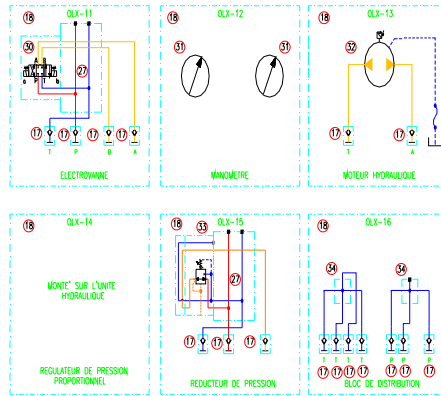
- Nr.2 2/2 Ball valve (panels OLX-06 - OLX-10)



- Nr.2 Gauges (panel OLX-12)



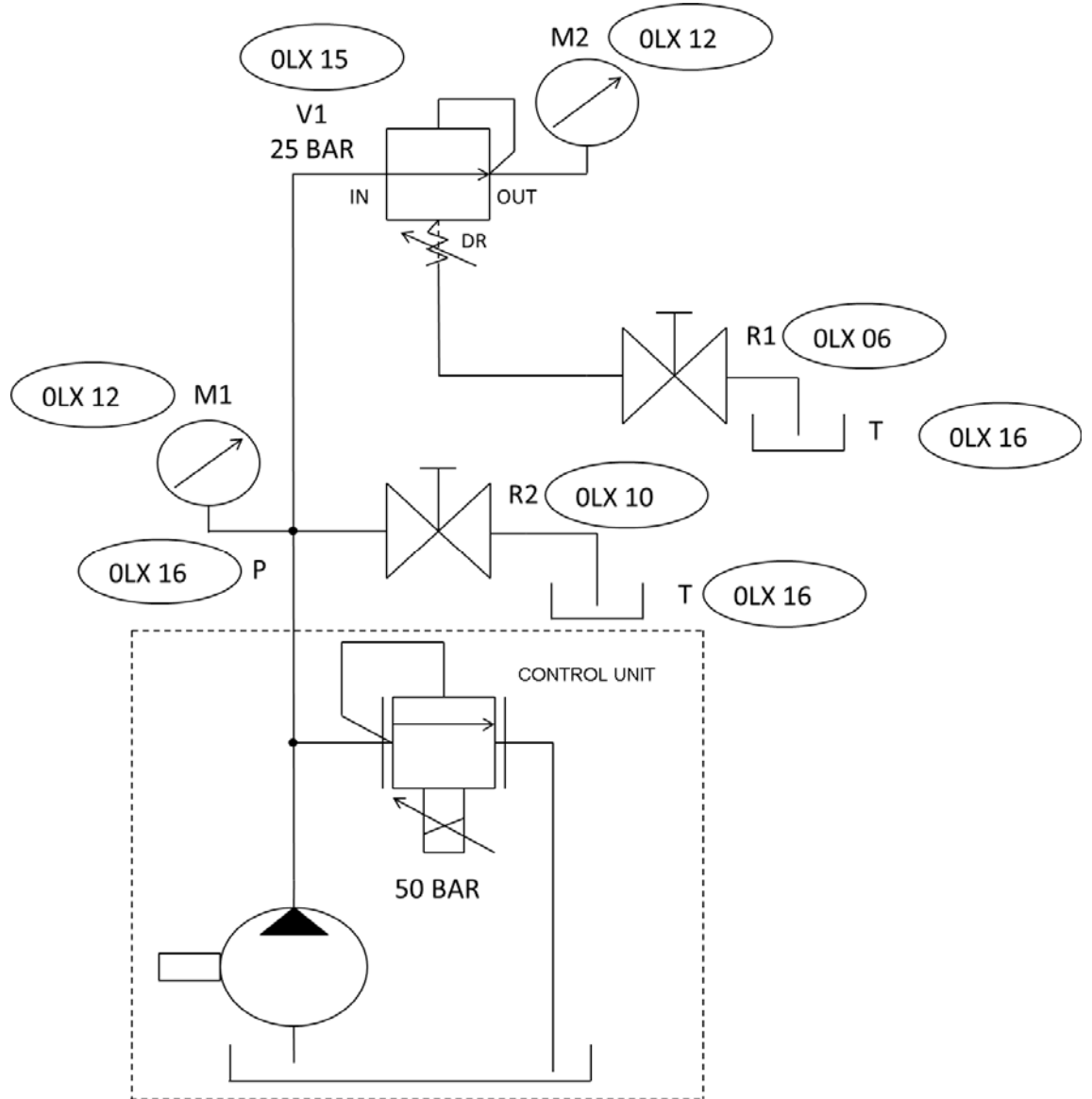
- Nr.1 pressure reducing valve (panel OLX-15)



- **EXERCISE PHASES**

- 1) Open faucet "R1" and faucet "R2"
- 2) set the pressure reducing valve "V1" out of calibration, by turning it fully open
- 3) Close the faucet "R1"
- 4) Calibrate the pressure reducing valve "V1" by acting on the calibrating knob until reaching a pressure reading of **25 BAR** on the "M2" pressure gauge
- 5) **Read the pressure values on gauges "M1" e "M2"** and report the readings in the table below
- 6) Close the faucet "R2" (obstruction of drainage of the pressure reducing valve and its exclusion)
- 7) Wait a few seconds and read the pressure values indicated on the pressure gauges "M1" e "M2"; report the data on the following table
- 8) Open faucet "R1"
- 9) Read the pressure values indicated on the pressure gauges "M1" e "M2"; report the data on the following table
- 10) Open faucet "R2"
- 11) Read the pressure values indicated on the pressure gauges "M1" e "M2"; report the data on the following table

	R1	R2	M1	M2
● D				
I	CLOSED	OPEN		
A				
G	CLOSED	CLOSED		
R				
A	OPEN	CLOSED		
M				
	OPEN	OPEN		



EXERCISE NR 16
“ VERIFICATION OF THE REPOSITIONING
OF A DOUBLE-ACTING CYLINDER ”

- **PREMISE**

- In order to ensure the success of the exercises described below, the bench must be in the following conditions:
- Presence of 400VAC three-phase power supply + neutral + earth.
- Presence of oil inside the tank of the Hydraulic Unit. 25 litres at least
- “**QF3**” general power supply door lock selector in **ON** position

- **TARGET**

- The purpose of this exercise is to demonstrate **how to verify the repositioning of a double-acting cylinder**

- **WARNINGS**

- Before carrying out the exercises it is necessary to wear the gloves and goggles provided with the bench
- All the hydraulic connections must be made on the back of the bench where all the quick fit couplings are present
- All hydraulic connections must be made with a non-pressurized system
- All the electrical connections of the instruments present must foresee the use of the cables supplied (**see the User Manual**)

Connecting the position sensor on panel “OLX-02”
(see the User Manual)

- To be able to read the position of the cylinder it is necessary to use the connection cable supplied with the bench and identified with the following code
- a) “**OLX-2**” -----“**CN-03**”
 - b) Connect the male connector “**CN-03**” to the electrical panel and to the correspondingly identified female connector.

- c) Connect the female connector “**OLX-2**” to the male connector on the position sensor.
 - The reading of the cylinder position will be displayed on the digital instrument “**STR-1**”, located on the electric panel.
 - **PROCEDURE**
 - Be sure that the system is not under pressure
 - Make all the hydraulic connections according to the diagram shown below. It should be noted that the connections must be made on the back of the bench using the flexible hoses, complete with quick-fit couplings, supplied with the bench
 - Make all the necessary electrical connections as shown in the diagram. **NOTE:** the connections must be made using the special cables, complete with dedicated connectors, supplied on the bench.
 - Move the door-locking knob of the main magneto thermal-differential “**QF3**” switch to the “ON” position
 - Make sure that the two lamps “**HL-1**” and “**HL-2**” indicating voltage presence on the bench are lit

Oil recycling

-
- Press the luminous button “**SB-2/HL4**”
- Make sure that the integrated green light is on
- The electric motor of the Hydraulic Unit and the related hydraulic gear pump are operating in the “recycling” mode. The oil recirculates inside the tank but the plant is not under pressure. Any attempt to set the pressure value via the potentiometer “**RP-1**” has no effect.
- Any immediate stops can be made by pressing the stop button “**SB-3**” or the general emergency button “**SB-1**”
 - To restart the oil recycling, repeat the initial steps
- **System pressure**

After the oil recycling maneuver has been performed successfully, the system can be put under pressure by following the next steps:

- α) Turn selector “**SA-1**” to the right.
- β) Make sure that lamp “**HL-5**” lights up



OLEOMAX

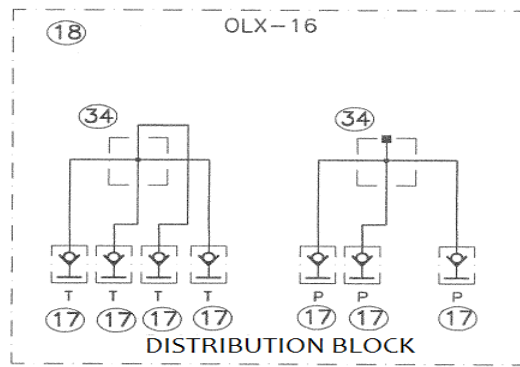
- χ) Turn potentiometer “**RP-1**”, which regulates the proportional valve, until reaching the required pressure value .
- δ) Pressure is now available on the distribution unit present on the panel “**OLX-16**”
- ε) To remove pressure from the system, return the selector “**SA-1**” to the left.

Any immediate stops can be made by pressing the stop button “SB-3” or the general emergency button “SB-1”

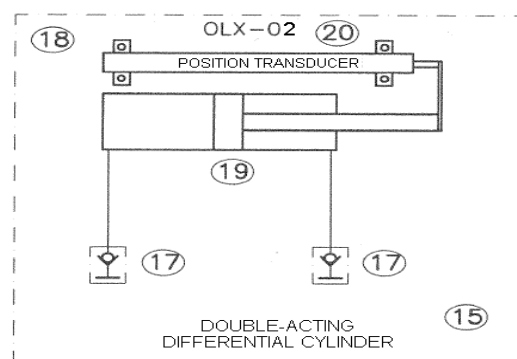
OLEOMAX

- **COMPONENTS TO BE USED**

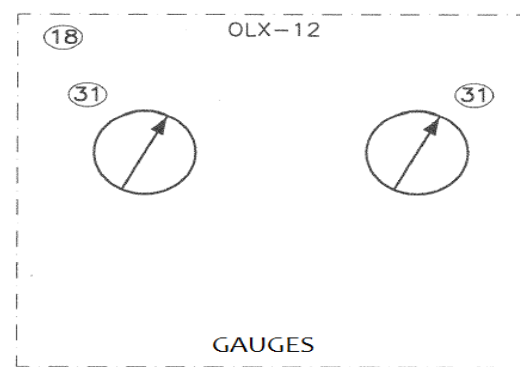
- Nr.1 distribution block (panel OLX-16)



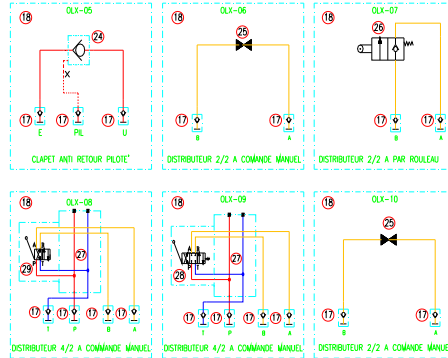
- Nr.1 Double-acting cylinder with counter cylinder function (panel OLX-02)



Nr.1 Gauges (panel OLX-12)



Nr.1 4/2 manually controlled directional valve (panel OLX-08



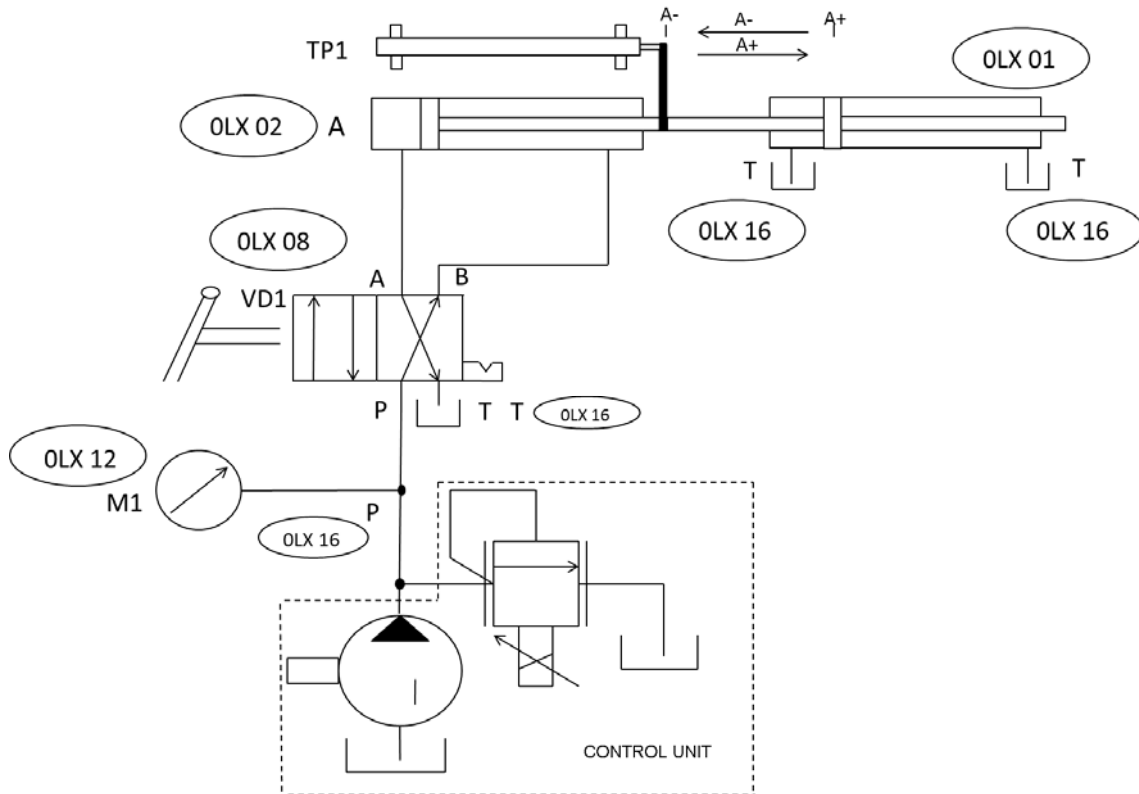
- **EXERCISE PHASES**

- 1) Manually set the “**VD1**” valve in the crossed arrows position and verify the complete exit stroke (**A+**) of the stem of cylinder “**A**”
- 2) Read this value on the digital position meter “**STR-1**” and report the data to **line “1”** in **column “A+”** of the table below
- 3) Manually set the “**VD1**” valve in the parallel arrows position and verify the complete return stroke (**A-**) of the stem of cylinder “**A**”
- 4) Read this value on the digital position meter “**STR-1**” and report the data to **line “1”** in **column “A-”** of the table below
- 5) Repeat steps from 1 to 4 for other 9 times, completing the table below

OLEOMAX

NR	A+	A-
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

● DIAGRAM



EXERCISE NR 17

“DETERMINATION OF THE PRESSURE REQUIRED TO MOVE A CYLINDER WITH A VERTICALLY POSITIONED LOAD”

- **PREMISE**

- In order to ensure the success of the exercises described below, the bench must be in the following conditions:
- Presence of 400VAC three-phase power supply + neutral + earth.
- Presence of oil inside the tank of the Hydraulic Unit. 25 litres at least
- “QF3” general power supply door lock selector in **ON** position

- **TARGET**

- The purpose of this exercise is to demonstrate **how to determine the pressure required to overcome a vertically positioned load in order to obtain the ascent stroke of a double acting cylinder**
and
how to use a maximum pressure limiting valve with electric proportional control

- **WARNINGS**

- Before carrying out the exercises it is necessary to wear the gloves and goggles provided with the bench
- All the hydraulic connections must be made on the back of the bench where all the quick fit couplings are present
- All hydraulic connections must be made with a non-pressurized system
- All the electrical connections of the instruments present must foresee the use of the cables supplied (**see the User Manual**)

- **PROCEDURE**

- Be sure that the system is not under pressure
- Make all the hydraulic connections according to the diagram shown below. It should be noted that the connections must be made on the back of the bench using the flexible hoses, complete with quick-fit couplings, supplied with the bench

- Make all the necessary electrical connections as shown in the diagram. **NOTE:** the connections must be made using the special cables, complete with dedicated connectors, supplied on the bench.
- Move the door-locking knob of the main magneto thermal-differential “**QF3**” switch to the “ON” position
- Make sure that the two lamps “**HL-1**” and “**HL-2**” indicating voltage presence on the bench are lit

- **Oil recycling**

-

- Press the luminous button “**SB-2/HL4**”
- Make sure that the integrated green light is on
- The electric motor of the Hydraulic Unit and the related hydraulic gear pump are operating in the “recycling” mode. The oil recirculates inside the tank but the plant is not under pressure. Any attempt to set the pressure value via the potentiometer “**RP-1**” has no effect.
- Any immediate stops can be made by pressing the stop button “**SB-3**” or the general emergency button “**SB-1**”
- To restart the oil recycling, repeat the initial steps

- **System pressure**

- After the oil recycling maneuver has been performed successfully, the system can be put under pressure by following the next steps:

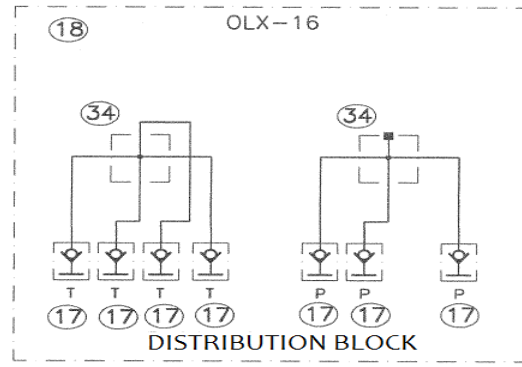
- a) Turn selector “**SA-1**” to the right.
- b) Make sure that lamp “**HL-5**” lights up
- c) Turn potentiometer “**RP-1**”, which regulates the proportional valve, until reaching the required pressure value .
- d) Pressure is now available on the distribution unit present on the panel “**OLX-16**”
- e) To remove pressure from the system, return the selector “**SA-1**” to the left.

Any immediate stops can be made by pressing the stop button “SB-3” or the general emergency button “SB-1”

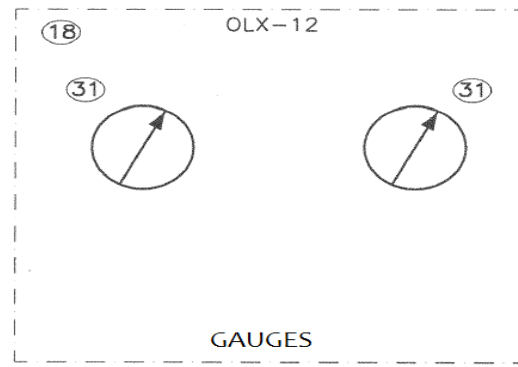
OLEOMAX

- **COMPONENTS TO BE USED**

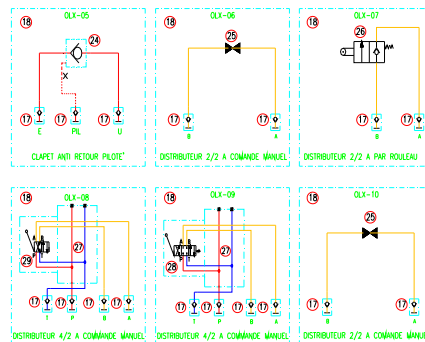
- Nr.1 distribution block (panel OLX-16)



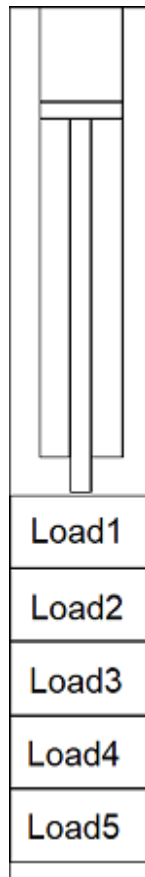
- Nr.1 Gauges (panel OLX-12)



- Nr.1 4/2 manually controlled directional valve (panel OLX-08)



- Nr.1 Double-stem double-acting hydraulic cylinder with load

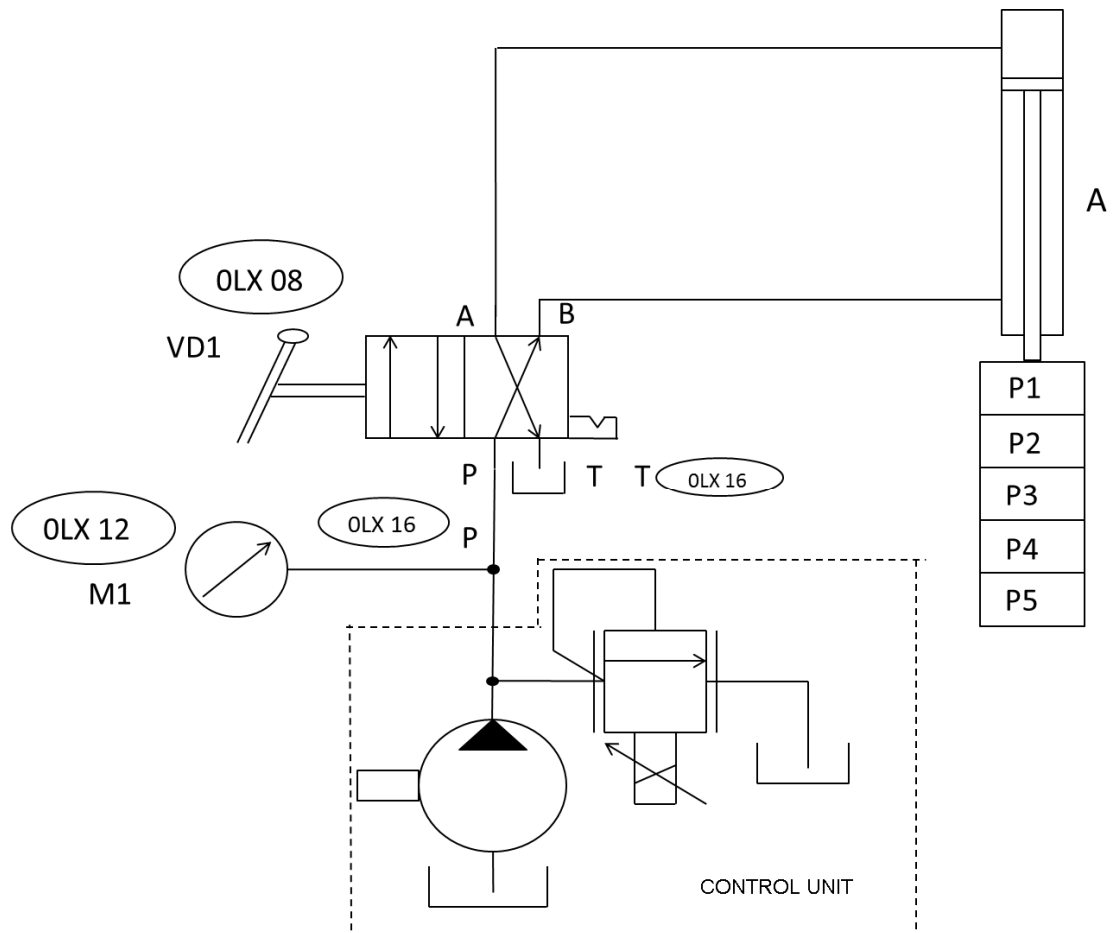


- **EXERCISE PHASES**

- 1) Manually set the “VD1” valve in the parallel arrows position, so as to obtain the **total exit** of the stem
- 2) Operate on the "RP-1" pressure adjustment potentiometer until to read the pressure value of **0 BAR** on the "M1" pressure gauge
- 3) Stop the simulation.
- 4) Load the minimum weight “L1” on the stem of cylinder “A” (**see the User Manual**)
- 5) Repeat step 1 of the procedure
- 6) Start adjusting the “RP-1” pressure regulator **very slowly; in the meantime observe cylinder “A” and stop the increase in pressure as soon as the stem begins to move upwards. Let the ascending stroke end**
- 7) Read the pressure value on the "M1" pressure gauge and report the data in the table below
- 8) Manually set the “VD1” valve in the crossed arrows position, so as to obtain the descent of the stem of the cylinder “A”
- 9) Repeat steps from 3) to 8) for all the load weight from “L2” to “L5”
- 10) Complete the table below.

LOAD	M1
L1	
L2	
L3	
L4	
L5	

- DIAGRAM



EXERCISE NR 18

“MOVEMENT AND LOCKING IN POSITION OF A CYLINDER WITH A VERTICALLY POSITIONED LOAD”

- **PREMISE**

- In order to ensure the success of the exercises described below, the bench must be in the following conditions:
- Presence of 400VAC three-phase power supply + neutral + earth.
- Presence of oil inside the tank of the Hydraulic Unit. 25 litres at least
- “**QF3**” general power supply door lock selector in **ON** position

- **TARGET**

- The purpose of this exercise is to demonstrate **the movement of a cylinder with a vertically positioned load and the locking in position by means of a controlled one-way valve**

- **WARNINGS**

- Before carrying out the exercises it is necessary to wear the gloves and goggles provided with the bench
- All the hydraulic connections must be made on the back of the bench where all the quick fit couplings are present
- All hydraulic connections must be made with a non-pressurized system
- All the electrical connections of the instruments present must foresee the use of the cables supplied (**see the User Manual**)

- **PROCEDURE**

- Be sure that the system is not under pressure
- Make all the hydraulic connections according to the diagram shown below. It should be noted that the connections must be made on the back of the bench using the flexible hoses, complete with quick-fit couplings, supplied with the bench.
 - Make all the necessary electrical connections as shown in the diagram. **NOTE:** the connections must be made using the special

cables, complete with dedicated connectors, supplied on the bench.

- Move the door-locking knob of the main magneto thermal-differential “**QF3**” switch to the “ON” position
- Make sure that the two lamps “**HL-1**” and “**HL-2**” indicating voltage presence on the bench are lit.

Oil recycling

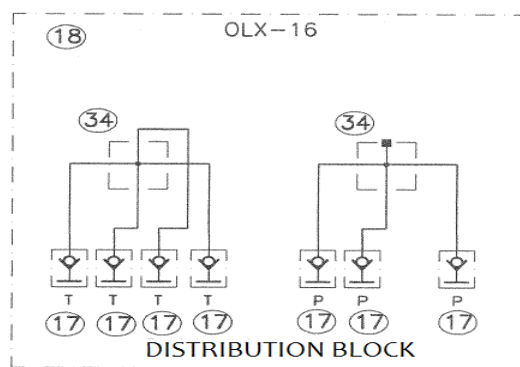
-
- Press the luminous button “**SB-2/HL4**”
- Make sure that the integrated green light is on
- The electric motor of the Hydraulic Unit and the related hydraulic gear pump are operating in the “recycling” mode. The oil recirculates inside the tank but the plant is not under pressure. Any attempt to set the pressure value via the potentiometer “**RP-1**” has no effect.
- Any immediate stops can be made by pressing the stop button “**SB-3**” or the general emergency button “**SB-1**”
 - To restart the oil recycling, repeat the initial steps
- **System pressure**
 - After the oil recycling maneuver has been performed successfully, the system can be put under pressure by following the next steps:
 - a) Turn selector “**SA-1**” to the right.
 - b) Make sure that lamp “**HL-5**” lights up
 - c) Turn potentiometer “**RP-1**”, which regulates the proportional valve, until reaching the required pressure value .
 - d) Pressure is now available on the distribution unit present on the panel “**OLX-16**”
 - e) To remove pressure from the system, return the selector “**SA-1**” to the left

Any immediate stops can be made by pressing the stop button “SB-3” or the general emergency button “SB-1”

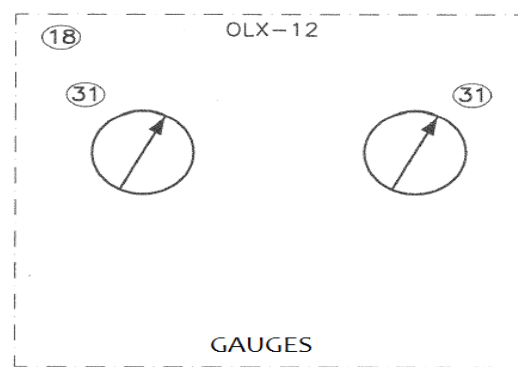
OLEOMAX

- **COMPONENTS TO BE USED**

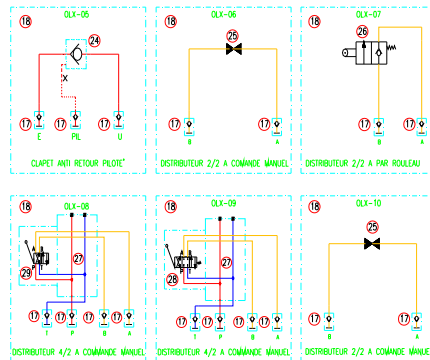
- Nr.1 distribution block (panel OLX-16)



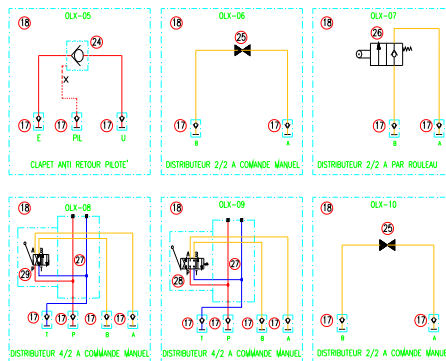
- Nr.1 Gauges (panel OLX-12)



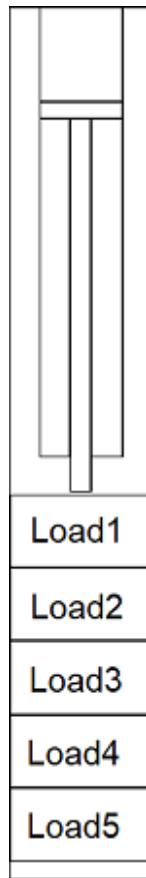
- Nr.1 4/3 closed center directional valve manual spring-loaded mechanical centering control (panel OLX-09)



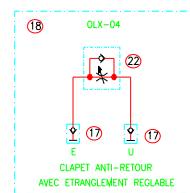
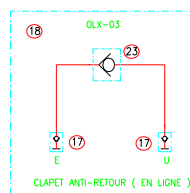
- Nr.1 4/2 manually controlled directional valve (panel OLX-08)



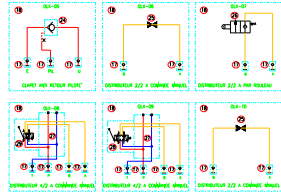
- Nr.1 Double-stem double-acting hydraulic cylinder with load



- Nr.1 unidirectional flow regulator (panel OLX-04)



- Nr.1 pilot-operated one-way check valve (panel OLX-05)



- **EXERCISE PHASES**

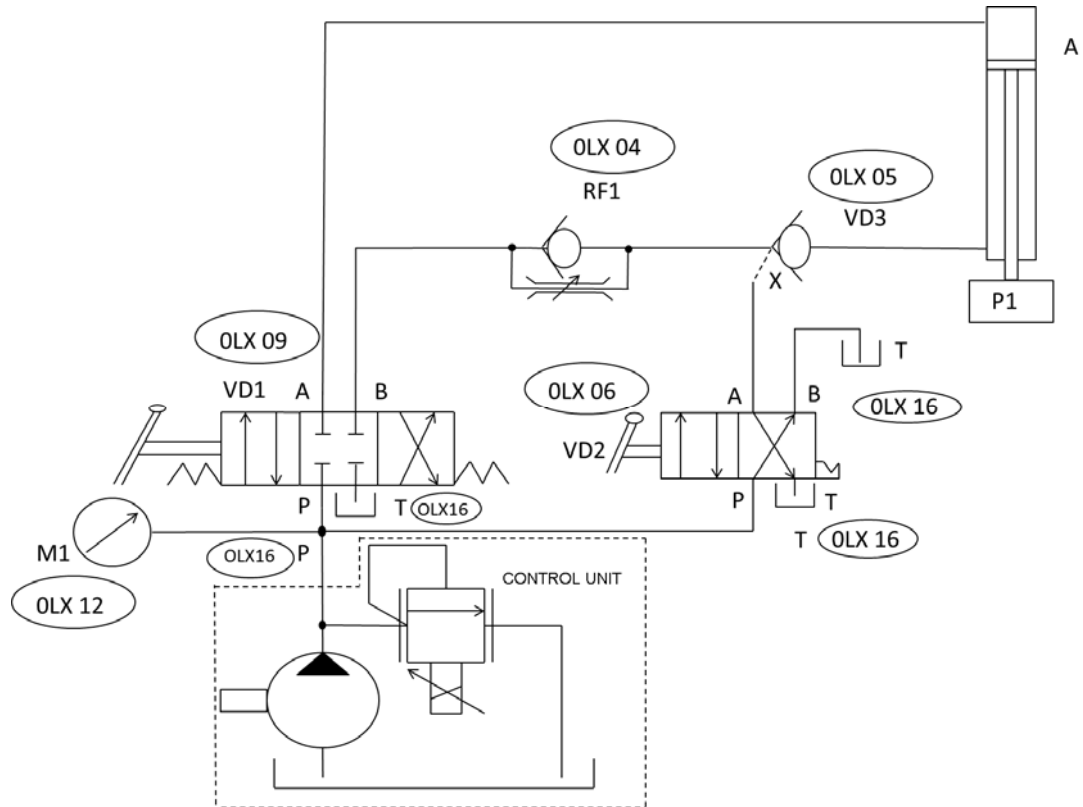
- 1) **Manually set the “VD1” valve (and keep it positioned) and the “VD2” valve in the parallel arrows position, in order to make the stem of cylinder “A” running downward**
- 2) Once the stem is **completely out**, operate the “RP-1” pressure controlling potentiometer so as to read a pressure value of **0 BAR** on the gauge “M1”
- 3) Stop the simulation.
- 4) Load the minimum weight “L1” on the stem of cylinder “A” (**see the User Manual**)
- 5) Manually set and hold the “VD1” valve in the crossed arrows position
- 6) Start adjusting the “RP-1” pressure regulator **very slowly; in the meantime observe cylinder “A” and stop the increase in pressure as soon as the stem begins to move upwards. Let the ascending stroke end**
- 7) Read the pressure value on the “M1” pressure gauge
- 8) Increase by a 15% the pressure value operating on potentiometer “RP1” and reading on the “M1” pressure gauge
- 9) Manually set the “VD1” valve in the parallel arrows position to obtain the downward movement of cylinder “A” and, at the same time, adjust **the flow regulator “RF1” to 25% in closing, in order to adequately control the speed**
- 10) Manually set and hold the “VD1” valve in the crossed arrows position: cylinder “A” performs the ascent run
- 11) Manually set the “VD1” and “VD2” valves in the parallel arrows position, in order **to make the stem of cylinder “A” perform a descent run**
- 12) Once the stem is about halfway down its descent, set the “VD2” valve in the crossed arrows position; this causes the run to stop: **the stem of the cylinder remains stationary in the current position**
- 13) Manually set the “VD2” valve again in the parallel arrows position; the stem resumes its descent run until the end of the stroke
- 14) Manually set and hold the “VD1” valve in the crossed arrows position. Cylinder “A” **will perform its ascent run. Once the stem is about halfway up, release the “VD1” valve, which returns to its central**

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position: the stem movement stops and the rod remains steady in the current position

- 15) Set and hold the “**VD1**” valve again in the crossed arrows position **to make the stem complete its upward run**
- 16) Set the “**VD1**” valve in the central position and the valve “**VD2**” in the crossed arrows position

● DIAGRAM



EXERCISE NR 19

“SIMULATION OF THE PLANT CIRCUIT OF A MARKING DEVICE”

● **PREMISE**

- In order to ensure the success of the exercises described below, the bench must be in the following conditions:
- Presence of 400VAC three-phase power supply + neutral + earth.
- Presence of oil inside the tank of the Hydraulic Unit. 25 litres at least
- “**QF3**” general power supply door lock selector in **ON** position

● **TARGET**

- The purpose of this exercise is to **simulate the work sequence of a marking device and its operating cycle:**

phase 1) Piece Locking A+

phase 2) Piece Marking B+

phase 3) Marking repositioning B-

phase 4) Piece Unlocking A-

▪ **WARNINGS**

- Before carrying out the exercises it is necessary to wear the gloves and goggles provided with the bench
- All the hydraulic connections must be made on the back of the bench where all the quick fit couplings are present
- All hydraulic connections must be made with a non-pressurized system
- All the electrical connections of the instruments present must foresee the use of the cables supplied (**see the User Manual**)

- **PROCEDURE**
- Be sure that the system is not under pressure
- Make all the hydraulic connections according to the diagram shown below. It should be noted that the connections must be made on the back of the bench using the flexible hoses, complete with quick-fit couplings, supplied with the bench
- Make all the necessary electrical connections as shown in the diagram. **NOTE:** the connections must be made using the special cables, complete with dedicated connectors, supplied on the bench.
- Move the door-locking knob of the main magneto thermal-differential “**QF3**” switch to the “ON” position
- Make sure that the two lamps “**HL-1**” and “**HL-2**” indicating voltage presence on the bench are lit.

Oil recycling

-
- Press the luminous button “**SB-2/HL4**”
- Make sure that the integrated green light is on
- The electric motor of the Hydraulic Unit and the related hydraulic gear pump are operating in the “recycling” mode. The oil recirculates inside the tank but the plant is not under pressure. Any attempt to set the pressure value via the potentiometer “**RP-1**” has no effect.
- Any immediate stops can be made by pressing the stop button “**SB-3**” or the general emergency button “**SB-1**”
 - To restart the oil recycling, repeat the initial steps
- **System pressure**
 - After the oil recycling maneuver has been performed successfully, the system can be put under pressure by following the next steps:
 - a) Turn selector “**SA-1**” to the right.
 - b) Make sure that lamp “**HL-5**” lights up
 - c) Turn potentiometer “**RP-1**”, which regulates the proportional valve, until reaching the required pressure value .
 - d) Pressure is now available on the distribution unit present on the panel “**OLX-16**”



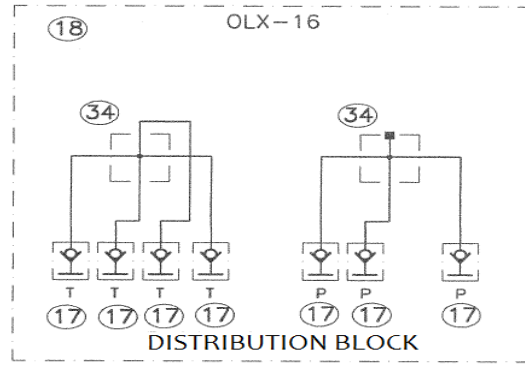
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- e) To remove pressure from the system, return the selector “**SA-1**” to the left

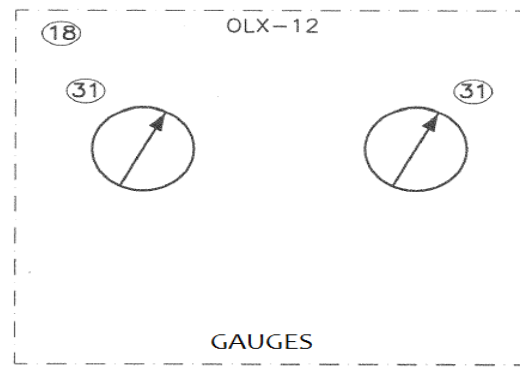
Any immediate stops can be made by pressing the stop button “SB-3” or the general emergency button “SB-1”

▪ **COMPONENTI DA UTILIZZARE**

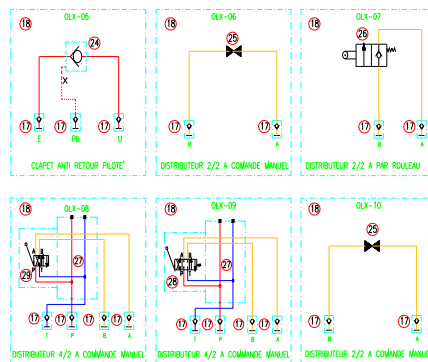
- Nr.1 distribution block (panel OLX-16)



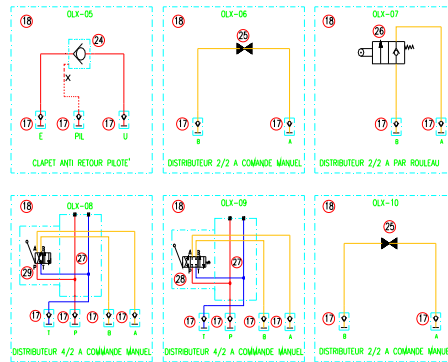
- Nr.1 Gauges (panel OLX-12)



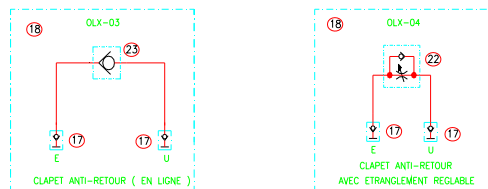
- Nr.1 4/3 closed center directional valve manual spring-loaded mechanical centering control (panel OLX-09)



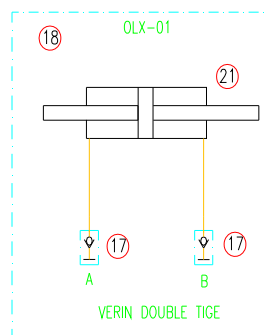
- Nr.1 4/2 manually controlled directional valve (panel OLX-08)



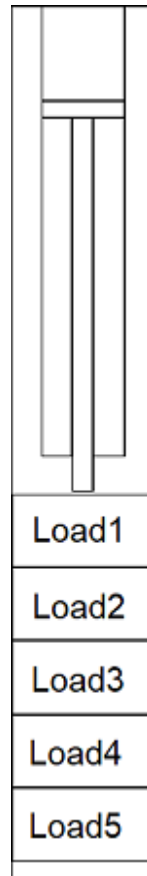
- Nr.1 unidirectional flow regulator (panel OLX-04)



- Nr.1 double-stem double-acting hydraulic cylinder (panel OLX-01)



- Nr.1 vertical cylinder with load



▪ EXERCISE PHASES

- 1) Manually set **and hold** the “VD2” valve in the parallel arrows position so that cylinder “B” **makes a descent run**
- 2) **Once the stem is completely out, operate the “RP-1” pressure controlling potentiometer so as to read a pressure value of 0 BAR on the gauge “M1”**
- 3) Shut down the bench.
- 4) Load on the stem of cylinder “B” the minimum weight “L1” (**see the User Manual**).
- 5) Repeat the start procedure of the bench
- 6) Manually set **and hold** the “VD2” valve in the crossed arrows position
- 7) **Start adjusting the “RP-1” pressure regulator very slowly; in the meantime observe cylinder “B” and stop the increase in pressure as soon as the stem begins to move upwards. Let the ascending stroke end**
- 8) Read the pressure value on gauge “M1” :
- 9) Increase by a 15% the pressure value operating on potentiometer “RP1” and reading on the “M1” pressure gauge
- 10) Manually set the “VD2” valve in the parallel arrows position to obtain the downward movement of cylinder “B” and, at the same time, adjust **the flow regulator “RF1” to 25% in closing, in order to adequately control the speed**
- 11) Manually set and hold the “VD2” valve in the crossed arrows position: cylinder “B” **performs the ascent run**
- 12) Manually set and hold the “VD2” valve in the parallel arrows position to obtain the downward movement of cylinder “B”,
- 13) Once the stem is about halfway down, set the “VD2” valve in the central position; this causes the run to stop: **the stem of the cylinder “B” remains stationary in the current position**
- 14) Manually set the “VD2” valve again in the parallel arrows position; the stem resumes its descent run until the end of the stroke.
- 15) Manually set and hold the “VD2” valve in the crossed arrows position. Cylinder “B” **will perform its ascent run. Once the stem is about halfway up, release the “VD2” valve, which returns to its central**

position: the stem movement stops and the rod remains steady in the current position.

- 16) Set and hold the “VD2” valve again in the crossed arrows position to make the stem complete its upward run**

Cycle Simulation:

Blocking piece A+:

- 17) Set the “VD1” valve in the crossed arrows position and the “VD2” valve in the central position**

Marking piece B+:

- 18) Set and hold valve “VD2” in the parallel arrows position and valve “VD1” in the crossed arrows position**

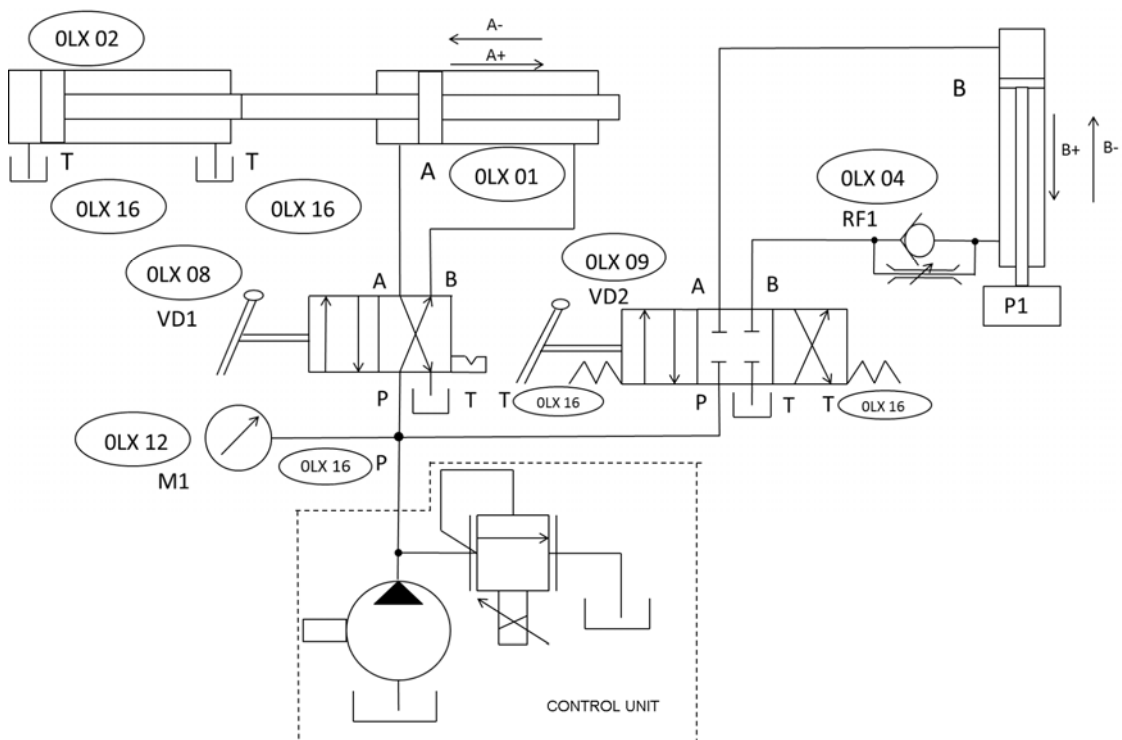
Marking repositioning B-:

- 19) Set and hold valve “VD2” in the crossed arrows position and valve “VD1” in the crossed arrows position**
- 20) Set the “VD2” valve in the central position**

Unlocking piece A-:

- 21) Set the “VD1” valve in the parallel arrows position and the “VD2” valve in the central position**

▪ **DIAGRAM**



EXERCISE NR 20

“SIMULATION OF THE PLANT CIRCUIT OF A DRILLING DEVICE”

- **PREMISE**

- In order to ensure the success of the exercises described below, the bench must be in the following conditions:
- Presence of 400VAC three-phase power supply + neutral + earth.
- Presence of oil inside the tank of the Hydraulic Unit. 25 litres at least
- “QF3” general power supply door lock selector in **ON** position

- **TARGET**

- The purpose of this exercise is to **simulate the work sequence of a drilling device and its operating cycle:**

phase 1) Piece Locking A+

phase 2) Piece drilling MOT+

phase 3) Drilling repositioning MOT-

phase 4) Piece Unlocking A-

- **WARNINGS**

- Before carrying out the exercises it is necessary to wear the gloves and goggles provided with the bench
- All the hydraulic connections must be made on the back of the bench where all the quick fit couplings are present
- All hydraulic connections must be made with a non-pressurized system
- All the electrical connections of the instruments present must foresee the use of the cables supplied (**see the User Manual**)

- **PROCEDURE**

- Be sure that the system is not under pressure
- Make all the hydraulic connections according to the diagram shown below. It should be noted that the connections must be made on the back of the bench using the flexible hoses, complete with quick-fit couplings, supplied with the bench

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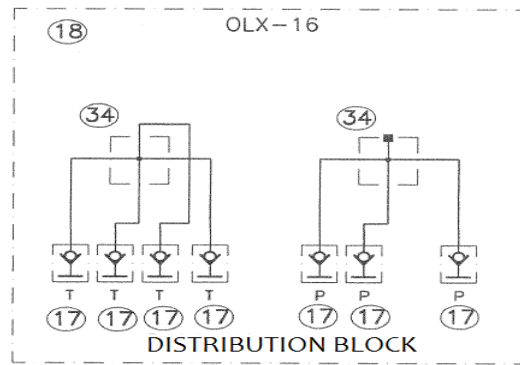
- Make all the necessary electrical connections as shown in the diagram.
NOTE: the connections must be made using the special cables, complete with dedicated connectors, supplied on the bench.
- Move the door-locking knob of the main magneto thermal-differential “QF3” switch to the “ON” position
- Make sure that the two lamps “HL-1” and “HL-2” indicating voltage presence on the bench are lit
 - **Oil recycling**
 - Press the luminous button “SB-2/HL4”
 - Make sure that the integrated green light is on
 - The electric motor of the Hydraulic Unit and the related hydraulic gear pump are operating in the “recycling” mode. The oil recirculates inside the tank but the plant is not under pressure. Any attempt to set the pressure value via the potentiometer “RP-1” has no effect.
 - Any immediate stops can be made by pressing the stop button “SB-3” or the general emergency button “SB-1”
 - To restart the oil recycling, repeat the initial steps
 - **System pressure**
 - Turn selector “SA-1” to the right.
 - Make sure that lamp “HL-5” lights up
 - Turn potentiometer “RP-1”, which regulates the proportional valve, until reaching the required pressure value .
 - Pressure is now available on the distribution unit present on the panel “OLX-16”
 - To remove pressure from the system, return the selector “SA-1” to the left

Any immediate stops can be made by pressing the stop button “SB-3” or the general emergency button “SB-1”

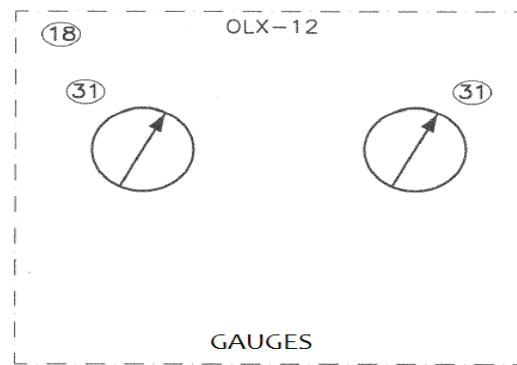
OLEOMAX

- **COMPONENTS TO BE USED**

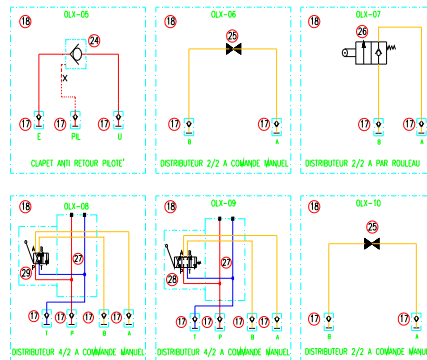
- Nr.1 distribution block (panel OLX-16)



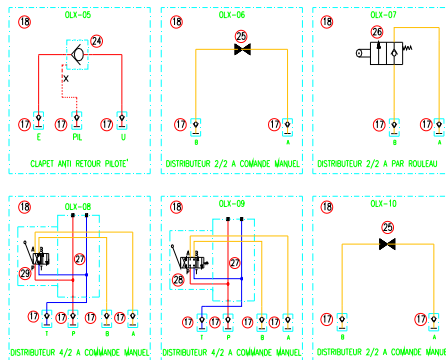
- Nr.1 Gauges (panel OLX-12)



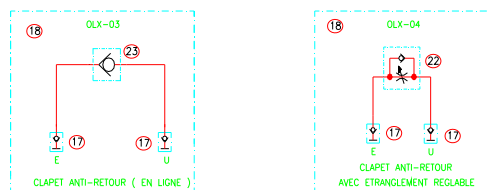
- Nr.1 4/3 closed center directional valve manual spring-loaded mechanical centering control (panel OLX-09)



- Nr.1 4/2 manually controlled directional valve (panel OLX-08)

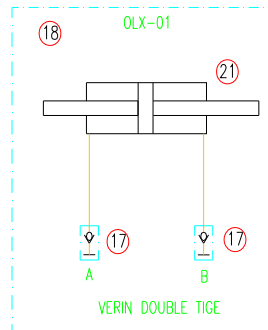


- Nr.1 unidirectional flow regulator (panel OLX-04)

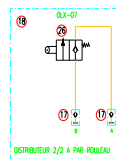


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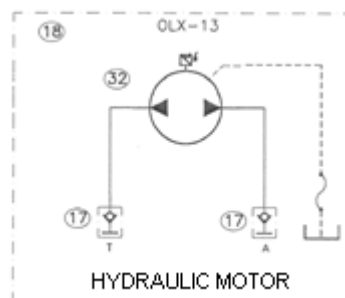
- Nr.1 double-stem double-acting hydraulic cylinder (panel OLX-01)



- Nr.1 2/2 End stroke valve (panel OLX-7)



- Nr.1 hydraulic motor (panel OLX-13)



- **EXERCISE PHASES**

Cycle Simulation:

Piece Locking A+:

- 1) Manually set the “VD1” valve in the crossed arrows position and the “VD2” valve in the central position

Piece Drilling MOT+:

- 2) Set and hold valve “VD2” in the crossed arrows position with the “VD1” valve in the crossed arrows position

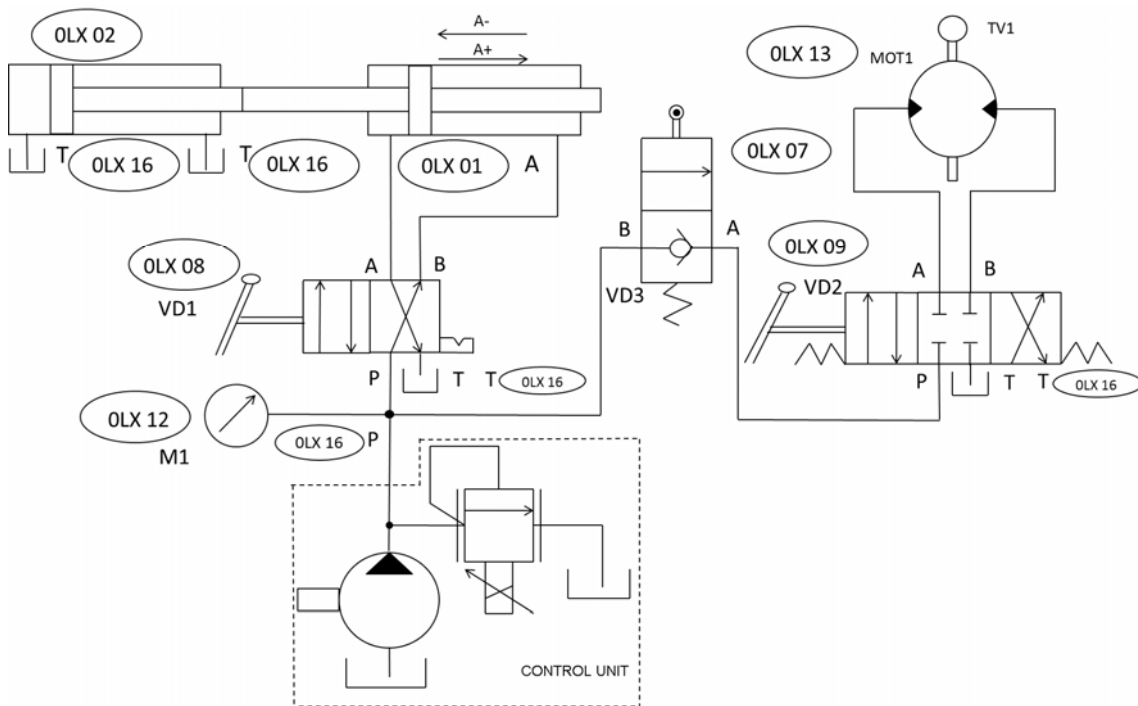
Drilling Repositioning MOT-:

- 3) Set and hold valve “VD2” in the crossed arrows position with the “VD1” valve in the crossed arrows position
- 4) Release valve “VD2” in the central position

Piece Unlocking A-:

- 5) Manually set the “VD1” valve in the parallel arrows position and the “VD2” valve in the central position

● DIAGRAM



EXERCISE NR 21
“SIMULATION OF A MECHANICAL LOAD OF A
TWO-WAY ROTATION HYDRAULIC MOTOR ”

- **PREMISE**

- In order to ensure the success of the exercises described below, the bench must be in the following conditions:
- Presence of 400VAC three-phase power supply + neutral + earth.
- Presence of oil inside the tank of the Hydraulic Unit. 25 litres at least
- “**QF3**” general power supply door lock selector in **ON** position

- **TARGET**

- The purpose of this exercise is to demonstrate **the simulation of a mechanical load of a two-way rotation hydraulic motor**
and
the use of the maximum pressure valve to simulate a mechanical load of a hydraulic motor

- **WARNINGS**

- Before carrying out the exercises it is necessary to wear the gloves and goggles provided with the bench
- All the hydraulic connections must be made on the back of the bench where all the quick fit couplings are present
- All hydraulic connections must be made with a non-pressurized system
- All the electrical connections of the instruments present must foresee the use of the cables supplied (**see the User Manual**)

- **PROCEDURE**

- Be sure that the system is not under pressure
- Make all the hydraulic connections according to the diagram shown below. It should be noted that the connections must be made on the back of the bench using the flexible hoses, complete with quick-fit couplings, supplied with the bench

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- Make all the necessary electrical connections as shown in the diagram.
NOTE: the connections must be made using the special cables, complete with dedicated connectors, supplied on the bench.
- Move the door-locking knob of the main magneto thermal-differential “QF3” switch to the “ON” position
- Make sure that the two lamps “HL-1” and “HL-2” indicating voltage presence on the bench are lit .

- **Oil recycling**

- Press the luminous button “SB-2/HL4”
- Make sure that the integrated green light is on
- The electric motor of the Hydraulic Unit and the related hydraulic gear pump are operating in the “recycling” mode. The oil recirculates inside the tank but the plant is not under pressure. Any attempt to set the pressure value via the potentiometer “RP-1” has no effect.
- Any immediate stops can be made by pressing the stop button “SB-3” or the general emergency button “SB-1”
- To restart the oil recycling, repeat the initial steps

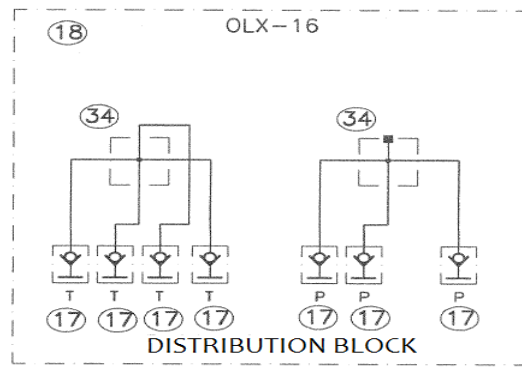
- **System pressure**

- After the oil recycling maneuver has been performed successfully, the system can be put under pressure by following the next steps:
 - a) Turn selector “SA-1” to the right.
 - b) Make sure that lamp “HL-5” lights up
 - c) Turn potentiometer “RP-1”, which regulates the proportional valve, until reaching the required pressure value .
 - d) Pressure is now available on the distribution unit present on the panel “OLX-16”
 - e) To remove pressure from the system, return the selector “SA-1” to the left.

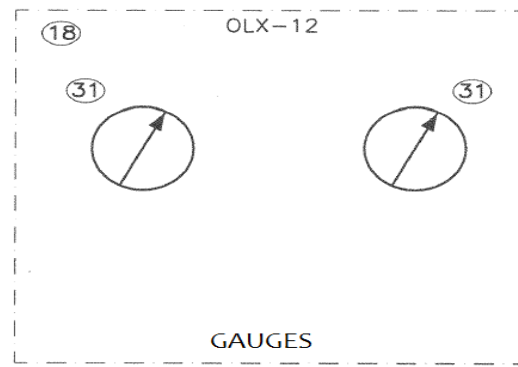
Any immediate stops can be made by pressing the stop button “SB-3” or the general emergency button “SB-1”

- COMPONENTS TO BE USED

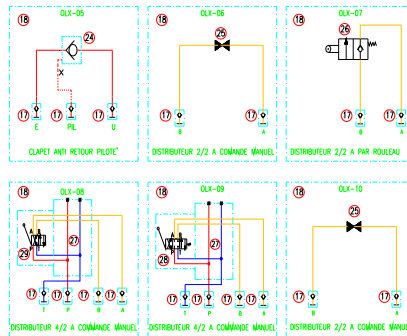
- Nr.1 distribution block (panel OLX-16)



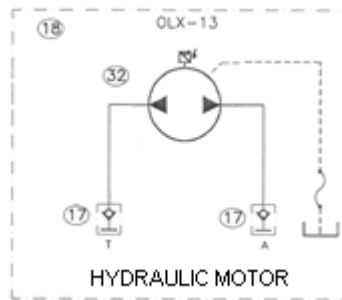
- Nr.1 Gauges (panel OLX-12)



- Nr.1 4/2 manually controlled directional valve (panel OLX-08)



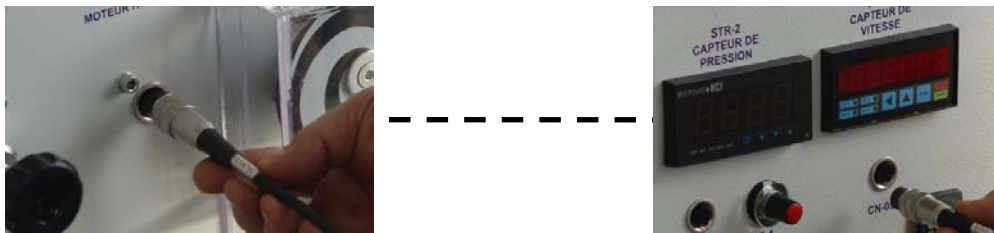
- Nr.1 Hydraulic Motor (panel OLX-13)



- Nr.1 Pressure reducing valve V1 (pannello OLX-15)











- **EXERCISE PHASES**

- 1) Electrical connection of the speed sensor on panel “**OLX-13**”
 - To be able to read the speed of the hydraulic motor it is necessary to use the connection cable supplied with the bench and identified with the following code
- a) “**OLX-13**” -----“**CN-05**”
- b) Connect the male connector “**CN-05**” to the electrical panel and to the correspondingly identified female connector.
- c) Connect the “**OLX-13**” connector to the connector located on the panel of the hydraulic motor.
- d) The reading of the speed of the hydraulic motor will be displayed on the digital instrument “**STR-3**”, located on the electric panel.



- 2) Manually set the “**VD1**” valve in the parallel arrows position and read the pressure value on “**M1**” pressure gauge **during the counterclockwise rotation of the “MOT1” motor**. Report the data in the table here below
- 3) Read the speed of motor “**MOT1**” on the digital display “**STR-3**”. Report the data in the table here below
- 4) Adjust the flow regulating valve “**V1**” **to the 25% in closing**. Read the pressure value on the “**M1**” pressure gauge and report the data on the table here below.
- 5) Read the speed of motor “**MOT1**” on the digital display “**STR-3**”. Report the data in the table here below
- 6) Adjust the flow regulating valve “**V1**” **to the 50% of its range**. Read the pressure value on the “**M1**” pressure gauge and report the data on the table here below
- 7) Read the speed of motor “**MOT1**” on the digital display “**STR-3**”. Report the data in the table here below.

- 8) Adjust the flow regulating valve “**V1**” to the **75% of its range**. Read the pressure value on the “**M1**” pressure gauge and report the data on the table here below
- 9) Read the speed of motor “**MOT1**” on the digital display “**STR-3**”. Report the data in the table here below.
- 10) Adjust the flow regulating valve “**V1**” to the **100% of its range**. Read the pressure value on the “**M1**” pressure gauge and report the data on the table here below
- 11) Read the speed of motor “**MOT1**” on the digital display “**STR-3**”. Report the data in the table here below
- 12) Manually set the “**VD1**” valve in the crossed arrows position and read the pressure value on “**M1**” pressure gauge **during the clockwise rotation of the “MOT1” motor**. Report the data in the table here below
- 13) Read the speed of motor “**MOT1**” on the digital display “**STR-3**”. Report the data in the table here below
- 14) Adjust the flow regulating valve “**V1**” to the **25% in closing**. Read the pressure value on the “**M1**” pressure gauge and report the data on the table here below.
- 15) Read the speed of motor “**MOT1**” on the digital display “**STR-3**”. Report the data in the table here below
- 16) Adjust the flow regulating valve “**V1**” to the **50% of its range**. Read the pressure value on the “**M1**” pressure gauge and report the data on the table here below
- 17) Read the speed of motor “**MOT1**” on the digital display “**STR-3**”. Report the data in the table here below.
- 18) Adjust the flow regulating valve “**V1**” to the **75% of its range**. Read the pressure value on the “**M1**” pressure gauge and report the data on the table here below
- 19) Read the speed of motor “**MOT1**” on the digital display “**STR-3**”. Report the data in the table here below.
- 20) Adjust the flow regulating valve “**V1**” to the **100% of its range**. Read the pressure value on the “**M1**” pressure gauge and report the data on the table here below
- 21) Read the speed of motor “**MOT1**” on the digital display “**STR-3**”. Report the data in the table here below

V1	VD1	M1	RPM
0%			
			
25%			
			
50%			
			
75%			
			
100%			
			

• DIAGRAM

