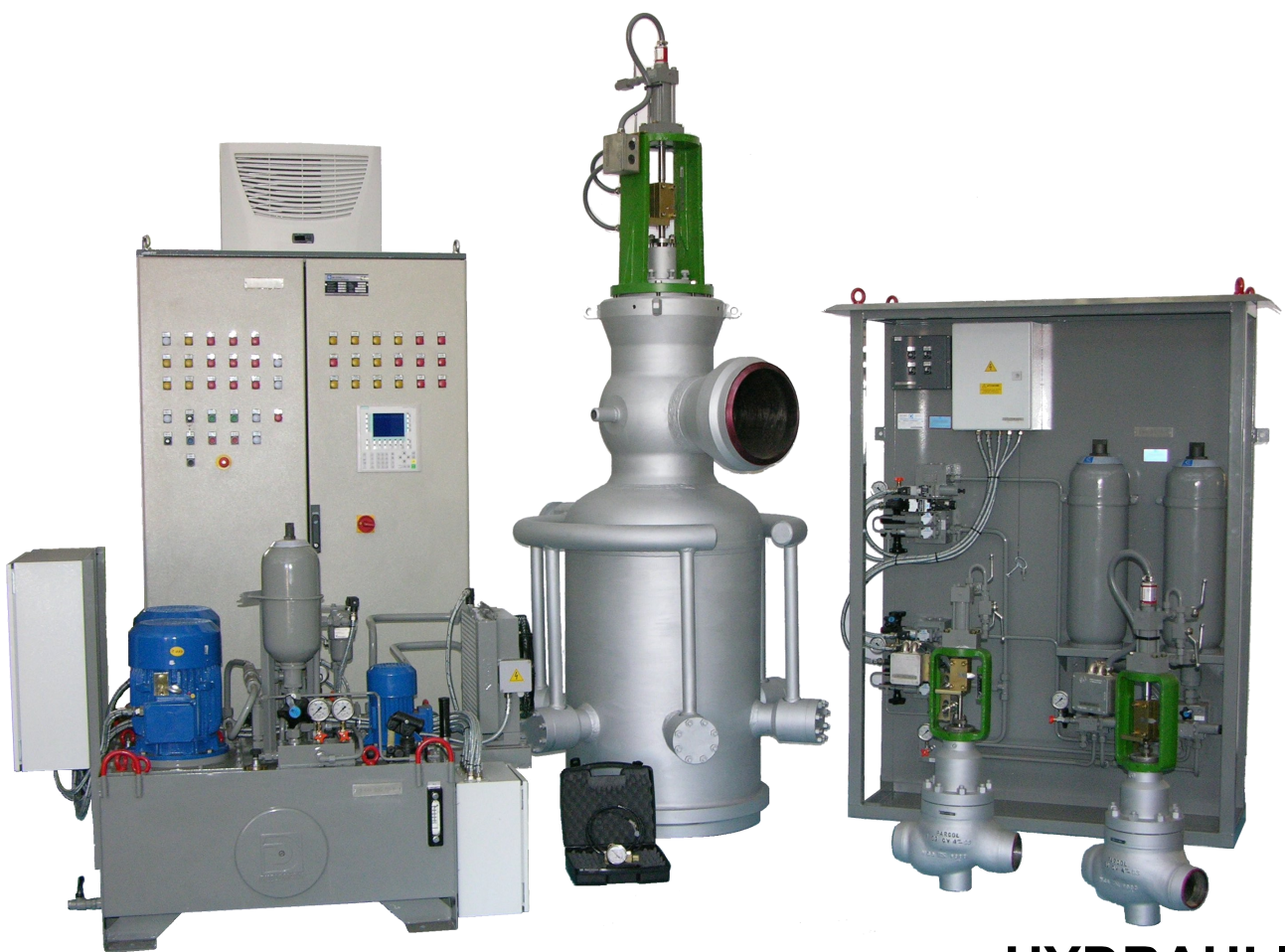


KOSO **PARCOL**



**HYDRAULIC
CONTROL
SYSTEM
Advanced**

HYDRAULIC POWER UNIT (HPU)

The hydraulic power unit is provided with a steel tank suitable for outdoor service able to collect the full volume of oil present in the circuit. The tank is equipped with inspection door, breather with filter, 2 level switches, 1 temperature switch, 1 visual level indicator and 1 electric resistance piloted by thermostat.

Two main motor-pump groups **P1** and **P2**, each one fitted with an electric motor, are provided on the tank; the fixed displacement pump is able to deliver the required flow rate at a pressure of 200 bar.

A filtering/conditioning group composed by fixed displacement pump **P3**, filter with clogging detector (**DPS3**) and exchanger (**R**) with fan piloted by internal thermostat is provided on board.

Functions of the main pumps are :

- n° 1 active pump, to maintain all control valves in closed / open position or under continuous control.
- n° 1 stand-by pump to be activated on alarm signal from low pressure switch mounted on pump common delivery manifold

The pump flow rate is enough to ensure the maximum stroke time required in control mode for each valve without involving the accumulator intervention.

Four pressure switches are installed in the common delivery manifold of the motor-pump groups, as follows:

PS1 supplies the *"low oil pressure signal"*

PS2 supplies the *"minimum oil pressure signal"* (i.e. plant out of commission).

PS3 stops the active pump

PS4 starts the active pump

One accumulator **A1**, constantly inserted on the delivery manifold, is installed on the hydraulic power unit to grant trouble-free change-over from a motor/pump group to the other one.

The overflow valve **VS3** controls the oil pressure in the primary circuit.

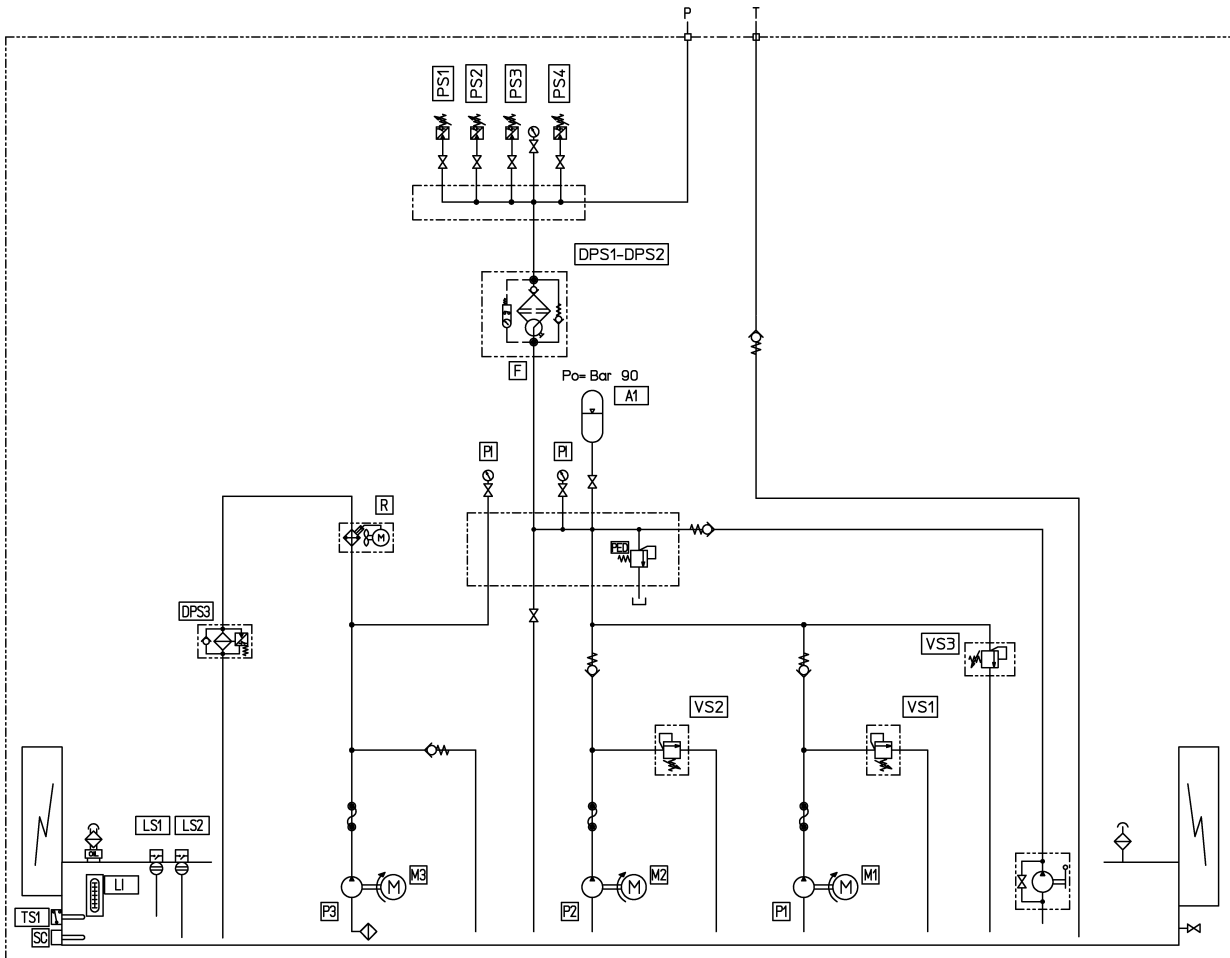
Two sealed maximum pressure safety valves **VS1** and **VS2** are mounted on pump deliveries.

A double filter **F** provided with electric clogging detectors **DPS1-DPS2** is installed at power unit outlet.

The hydraulic power unit is provided with two terminal boxes: the first one is intended for instruments cables, the second one for the electric motor control cabinet (M.C.C.).

Options:

- Inox oil tank
- Triple pressure switches configuration (2/3 logic)
- Fire resistance oil version
- First filling oil
- Charging and testing unit for accumulators



HYDRAULIC DIAGRAM



HYDRAULIC CONTROL PANEL (HCP)

The control panel for control valves consists of:

- SV proportional valves, supplied with built-in electronic circuits
- ON-OFF, two-position solenoid valves (EV), to perform emergency actions
- accumulator

The control panel for ON-OFF valve consist of:

- ON-OFF, two-position solenoid valves (EV), to perform emergency actions
- accumulator

The response time of ON-OFF valves may be separately adjusted by suitable throttling devices.

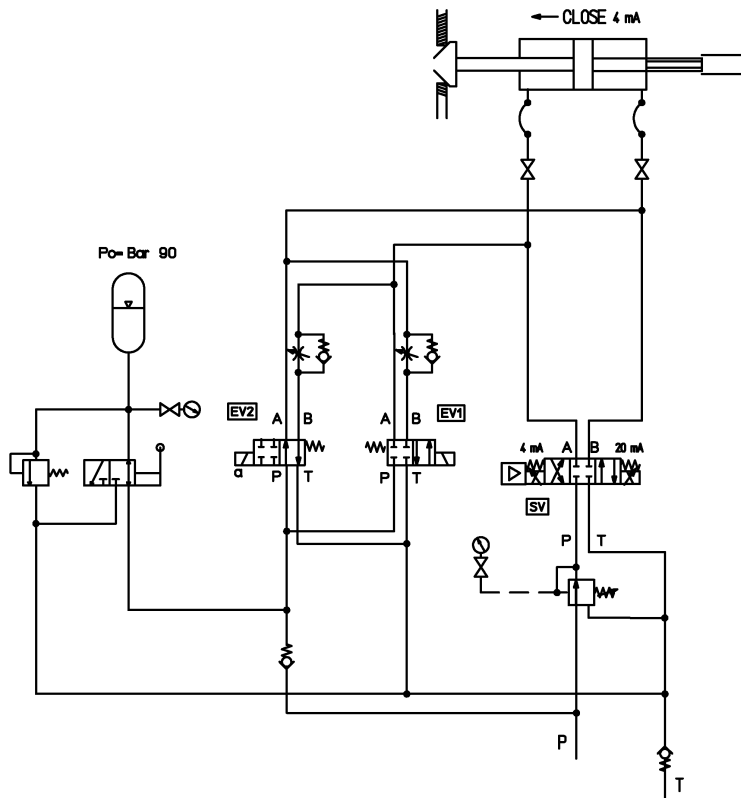
The hydraulic circuit should be provided with gate valves to allow maintenance actions.

Complete cycles are allowed, when pumps are still, within 15 minutes from pump stop, because of leakages.

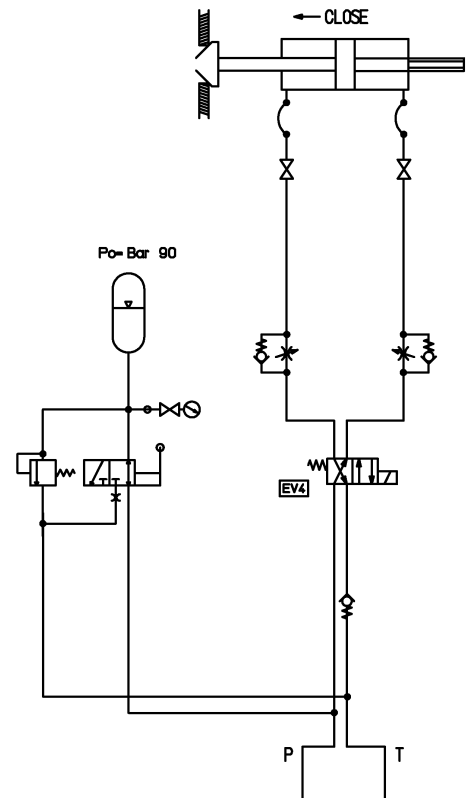
Options:

- Hand pump
- SIL 2 certification for failure actions

HYDRAULIC DIAGRAMS



CONTROL VALVES



ON-OFF VALVES



ELECTRIC CONTROL CABINET (ECC)

The electric control cabinet is supplied with a redundant feeder/transformer for auxiliary circuits (240 Vac ⇒ 24 Vdc), warning lights, lamps, contactors and any other necessary component to grant the efficiency of the whole hydraulic equipment.

The cabinet, fitted with a fan (extractor) complete with replaceable cartridge, includes an auxiliary electrical socket.

Manufactured according to the industrial standards, with minimum protection degree IP42, houses the control system for emergency solenoid valves and 1 PLC to manage the Hydraulic Power Unit, the Control Panel and the interchange signals with control room.

Auxiliary circuits are separately protected, even when redundant (pumps control, PLC power supply and proportional valves).

Cable entry	from bottom.
Max cable run from cabinet to control panel	approx. 200 m.
Max resistance of proportional valves supply cable	2 W.
Approximate sizes	1200 x 2000 (+ 100) x 600 mm.

The following warning lights and push buttons are mounted on the front:

Lights:

- Power on
- Main alarm
- Warning

Push buttons:

- Emergency
- Alarm reset
- Pumps start
- Pumps stop
- Automatic/manual operation selector.

PLC CONTROL FUNCTIONS

The cylinders are managed by one PLC, located inside the electric cabinet. The PLC controls the cylinders position according to the set points transmitted by the Control Room, and manages failure and emergency signals as well as pump change-over.

The PLC is provided with display and keyboard allowing to check the programmed parameters on site, and to modify them when required.

The access to parameter modification is protected by password.

Functions performed by PLC are listed here below:

FUNCTION	DESCRIPTION	FUNCTION	DESCRIPTION
1 - Operating mode selection	- manual mode - automatic mode	4 - Main alarm control (shutdown)	- oil pressure too low - minimum oil level - emergency shut-down
2 - Cylinder control	- PID - adjustable offset-to-close - travel time adjustable (valve under control)	5 - Secondary alarm control (monitored)	- clogged filter (3) - low oil level - low oil pressure - high oil temperature - aut/man selector
3 - Pump change-over start/stop	- temporary - failure - external commutation	6 - Actuators failure	

1 OPERATING MODE SELECTION

The operating mode may be selected by an apposite selector located on control cabinet front.

Manual Mode

Necessary in order to allow the plant start-up. The PLC does not affect the pump selection, but allows to select the pump to be started (by using the pump change-over push-buttons).
By this mode all monitoring functions towards warning lights and Control Room are implemented.

Automatic mode

By this mode the system takes over the active pump and sets to zero the change-over timer. Automatic change-over functions by time and by malfunction are set on.

2 CYLINDER OPERATION

PI

A PI control is performed per each cylinder (proportional/integral action); parameters may be modified. The PI parameter values can be modified on site by acting directly on the PLC keyboard.

Adjustable offset

Per each cylinder it is possible to set an offset-to-close value (Δ mA) to force the valve plug in closed position: the valve closes when the signal value is $4 + \Delta$ mA. The offset-to-close value is adjustable, even locally by acting on the PLC keyboard.

Adjustable travel time

The travel time is adjustable for each cylinder even locally by directly acting on the PLC keyboard. Travel time range: 5 ÷ 30 seconds (<5s available on request).

3 PUMPS CONTROL

Start-Stop

Timed change-over

Change-over due to failure

External commutation

4 MAIN ALARM CONTROL

Minimum oil level

On minimum oil level signal, the pumps are stopped.

Minimum oil pressure

Pumps are not stopped on minimum oil pressure.

Control cabinet emergency shut-down

5 SECONDARY ALARM CONTROL

Clogged oil filter

Low oil level

Low oil pressure

High oil temperature

AUT/MAN selector on MAN position

6 ACTUATORS FAILURE

Control and On/off valves

Options:

- Control axis expansion
- Redundant PLC
- Alarm signalling with lamps on cabinet door
- Cabinet conditioning equipment for indoor installation



CONTROL HYDRAULIC ACTUATORS

Double acting cylinders built in compliance with ISO 6020-2 and DIN 24554.

On board are installed the inductive limit switches (n° 1 open posit. + n° 1 close posit. – SPDT contacts) and position transducer (4 ÷ 20 mA)

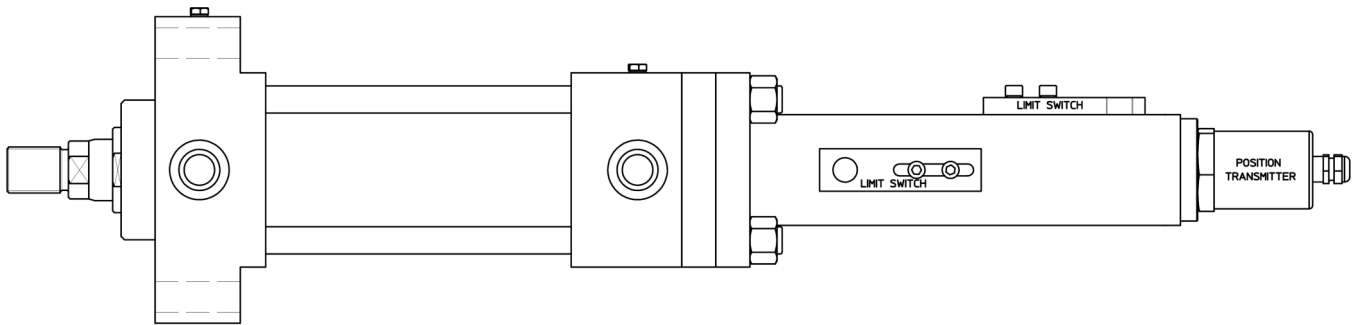
ON-OFF HYDRAULIC ACTUATORS

Double acting cylinders built in compliance with ISO 6020-2 and DIN 24554.

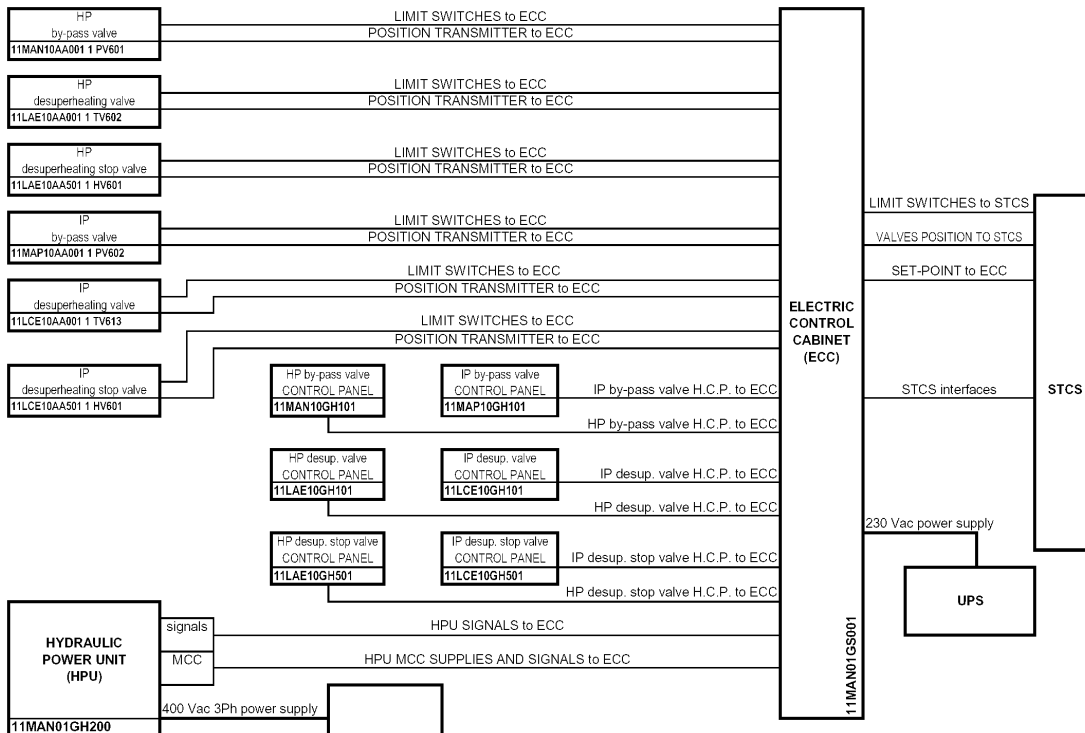
On board are installed the mechanical limit switches (n° 1 open posit. + n° 1 close posit. – SPDT contacts)

Options:

- DPDT contacts (limit switches)
- n° 4 limit switches (n°2 open posit. + n° 2 close posit.)
- spring for failure position



HYDRAULIC CYLINDER FOR CONTROL VALVES



HYDRAULIC CONTROL SYSTEM INTERCONNECTIONS DIAGRAM

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