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ESD Valve Control System

Functional Description

Doc No. TECH-00xxx

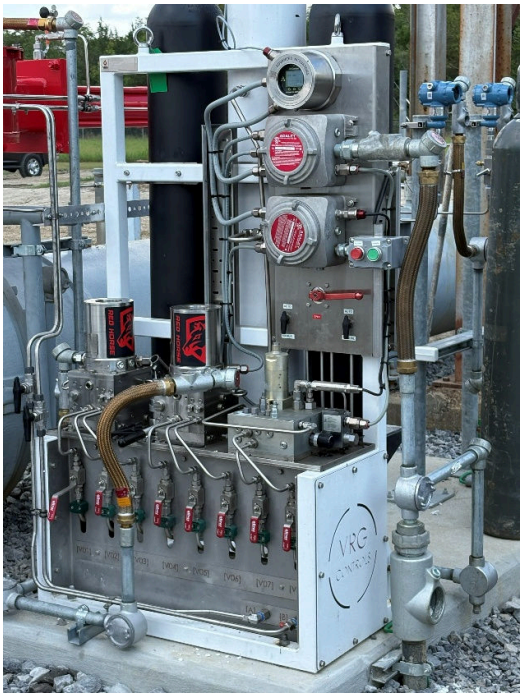
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Documents

- PID-000123
- GA

Features

- Twin Red Horse (Hyflow) hydraulic Power Units
- Twin Accumulator storage
- 30 Litre oil reservoir
- Hydraulic Pressure Booster
- ESD pulse operated solenoid
- Open/Close pump control
- Actuator independent speed control in open/close and ESD operation



Hydraulic Functional Description



Oil Storage
The central tank can store approximately 45litres (10 gallons) of hydraulic oil and has a main isolation valve mounted under the tank. It is connected to each Red Horse via isolation valves V01 and V04.

There are two level indicators on the tank, with the lower one highlighting the required level when the accumulators are fully charged – max level in Green.

ONLY when the accumulators are discharged the top indicator is used with the max level shown in Red.

A level switch in the tank monitors the oil level.

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Red Horse

The Red Horse hydraulic power unit provides 2.5lpm (0.6gpm) flow at 100Bar (1450psi). This is achieved using a reversing pump and brushless dc motor with the speed and direction controlled via the in built controller. The controller monitors the motor current and reduces the speed as the current limit (set at 20A) is reached. For added hydraulic protection there are pressure relief valve protection in both directions (RV1 and RV2).
The pressure provide by the Red Horse is maintained by the internal check valves CV4 and CV5.
The outlets of the Red Horses can be isolated using manual valves V02/3 and V05/6. This would allow a Red Horse to be isolated for maintenance whilst the single Red Horse maintains the system operation, albeit slower.

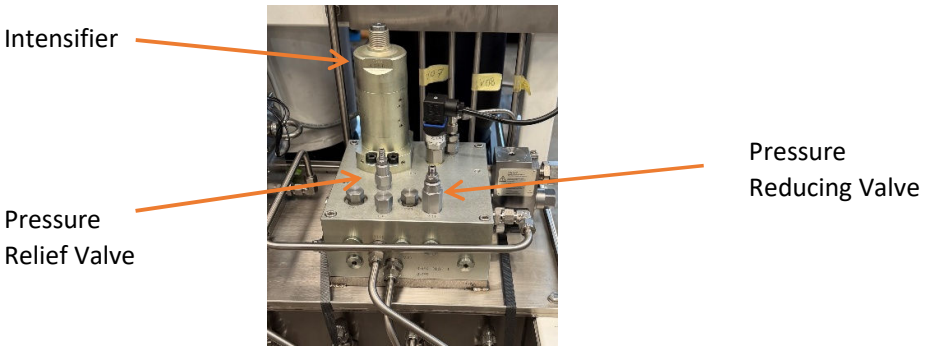


Accumulators

Bladder accumulators are pressure vessels equipped with a flexible elastomer bladder that strictly separates the gaseous nitrogen cushion and the hydraulic operating fluid. There are two pressure accumulators having a nitrogen precharge of 90Bar (1300psi). The system oil pressure is pumped to a maximum of 190Bar (3000psi), to ensure the remaining pressure in the actuator at the seated closed position is 100bar (1450psi).
A small block is mounted below each accumulator containing a safety relief valve and isolation valves. The red isolation valve isolates the accumulator line for both charging and discharging. These are normally open. The black isolation valves are in the tank line and are used to drain the accumulators to remove the pressure for maintenance operations. These are normally closed.
There are individual pressure gauges underneath each accumulator and a common pressure transmitter mounted in the intensifier manifold.

Pressure Intensifer

The system requires 190Bar in the accumulators and due to the 100Bar limit of the Red Horses a pressure intensifier (booster) is added in the hydraulic circuit, B01.
MiniBOOSTERs are oscillating pressure intensifiers that are mounted on low-pressure hydraulic systems. The miniBOOSTER will automatically intensify system pressure giving a higher outlet pressure, at a lower flow rate. This booster can be clearly heard as the mechanical cycle of the intensifying valve operates.



Solenoid SV1 and PC1
This solenoid SV1 is energised during the accumulator charging operation. This diverts flow to the pressure intensifier from the actuator feed line. This also puts a pilot pressure on PC1 to prevent inadvertent flow in/from the actuator by isolating the actuator during the charge operation.

ESD Operation – SV2
The clients control system provides a 24V dc pulse to solenoid SV2 to close the main valve in an emergency condition. When SV2 is energised the accumulator pressure is directed to pilot check valves PV1 and 3. When the pulse is removed, this pressure is locked in the pilots to close the main valve This allows the accumulator discharge flow to the actuator in the close direction. The accumulator pressure is reduced to the maximum actuator design pressure of 100Bar, 1450psi, by PV1 with additional safety provided by the relief valve RV1. These are mounted and identified on the intensifier manifold. The speed of closing is controlled by the flow control in the return line, FC1.

Once the valve is closed, to remove the pressure on the pilot check valves and enable the pushbuttons to operate the valve the manual diverter valve has to be operated – the black knob on the side of the intensifier manifold block. If this diverter valve is not operated to reset the system then the pump flow will just circulate back to tank via PV3, and the main valve will remain in the closed position.



Manual Hamp Pump
The hand pump can be used to open/close the main valve in conjunction with setting the plate mounted manual valves V09, 10 and 11 to the correct orientation. The correct orientation is identified on the plate.

