



**HYDRAFORCE**

**Material Handling Solutions**



**Hydraulic Cartridge Valves  
Manifold Systems  
Electronic Controls**

[www.hydraforce.com](http://www.hydraforce.com)

Early applications of AC pump motors combined with proportional valves attempted to match the speed of the pump to the opening of the valve. This was done by either creating a lookup table in the memory of the controller or by calibrating the valve i-min and i-max points and generating a linear relationship between valve opening and pump speed. Either option required significant development time and is still inefficient due to irregularities of valves, pump efficiencies, and system wear.

By communicating with engines and pumps using a CAN networked ECU it is possible to achieve enhanced performance and efficiencies in your material handling machine. The combination of electro-proportional valves with sensors and electronics can enhance machine performance, safety, and reduce the number of components in a system. Additionally, mechanical devices that were once used to send signals to prime movers can be eliminated, further streamlining your machine.

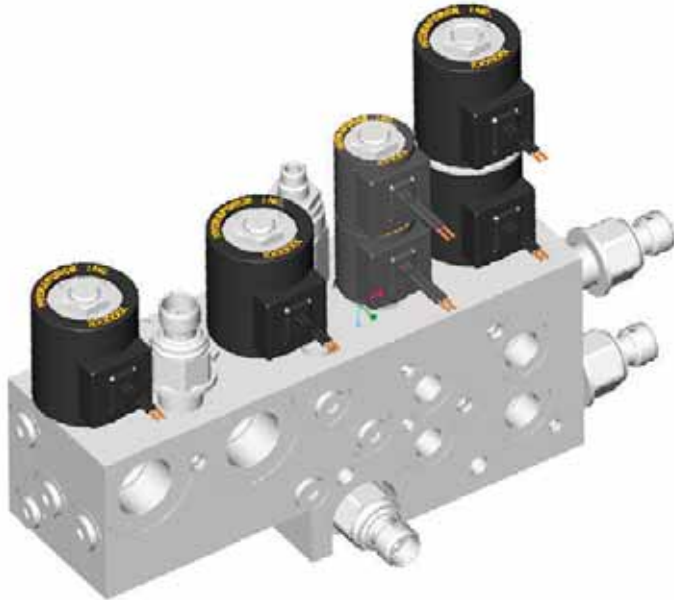
### OUR SOLUTION

In our Electronic Compensation solution, pressure transducers and an ECU are used to sense the load being applied to the various machine functions. The ECU program monitors the pressure at several points in the circuit to optimize pump flow in relation to the speed demanded by the operator.

By applying this control method to your system you will see improved load and no-load lifting and lowering performance and significant increases in machine battery life, while saving wear and tear on system components and connection points.

The reduced manifold block size gives you the flexibility to mount your manifold in a smaller envelope on these space-sensitive machines. Additional features include built-in control algorithms for pump wear, volumetric efficiency, fluid viscosity changes and automatic prioritization of system functions.

The additional control features can reduce system costs by drastically reducing the number of mechanical components in your manifold and can allow you to use conventional, inexpensive gear pumps on your machine.



### BENEFITS

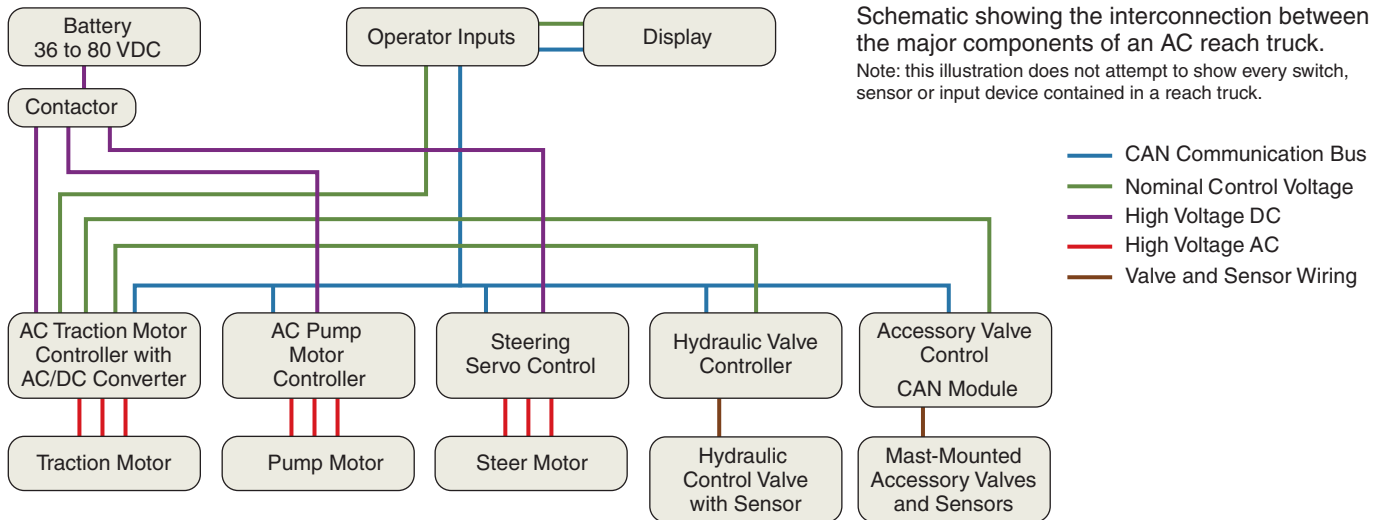
- Lower system pressure drop and improved load and no-load lowering speeds with software-optimized pressure compensation.
- Save costs by reducing mechanical components and battery power consumption.
- Increased mounting flexibility of a smaller manifold block.
- Control Algorithm monitors the pressure transducer input signals to calculate the exact flow supply to satisfy system demands.
- Additional control algorithms for pump wear, volumetric efficiency and viscosity changes.
- Options can be programmed at the dealer or out in the field.
- Programmed prioritization of system flow sharing functions.
- Removal of spring-loaded mechanical lowering compensator results in high load stability at lowering-start.
- Very low leakage, because of poppet-style seating in lowering control valve.

## SYSTEM CONCEPT

Since most AC traction control units lack sufficient I/O to do all the sensing and drive more than a few valves, an Accessory Valve Controller is used for multi-function vehicles.

In order to eliminate the number of wires running through the mast sheaves, a CAN node has been employed to operate the carriage manifold and any sensors, limit switches or position transducers that are mounted on the mast.

Because everything is electronic, limits can be established to provide overrunning load control for both directions of the reach function.



## THE PRODUCTS BEHIND THE SOLUTION



### 5-Way P Proportional Valves with Integral Load Sense Port

- A wide range of 5-way proportional valves are available for flow capacities ranging from 13 lpm/3.5 gpm to 30 lpm/8 gpm.
- SP08-58C and SP08-58D are used in this application to reduce the number of sensors required and to eliminate load shuttles.



### ERP Series Pressure Sensors

- This high accuracy pressure sensor (1% Total Error band) is used in place of mechanical compensators.
- This sensor has an overpressure rating of 150% and is tested to 50 million cycles to ensure long term stability and repeatability.
- Other benefits of using electronics in this system include the ability to incorporate a payload indicator, and a much lighter, more compact manifold.



### SPxx-20 style, Low Leakage Proportional Valves

- These proportional directional control valves provide excellent linearity, hysteresis and repeatability for lifting and lowering functions.
- 08, 10, 12 and 16-size models are available and rated up to 250 bar/3625 psi. Fine-Metering option also available.
- Flow rates range from 22 lpm/5.8 gpm up to 132 lpm/35 gpm at 18 bar/250 psi differential pressure .



### RVD50-20 Dynamic Relief Valve

- This direct-acting valve is rated to 350 bar/5075 psi with flow capabilities to 110 lpm/30 gpm.
- The RVD50-20 provides an effective pressure limiting solution for systems requiring dynamic relief, low hysteresis, low pressure rise, and low internal leakage.

# HYDRAFORCE

HydraForce is the world's leading manufacturer and supplier of cartridge valve technology, electro-hydraulic controls and integrated circuit manifolds. HydraForce products are supported around the world through international technical services offices, and through a global network of distributor partners.



Main headquarters, engineering and manufacturing facility in Lincolnshire Illinois, just north of Chicago.



Precision machining facility in Lincolnshire, Illinois.



European headquarters, engineering and manufacturing facility in Birmingham, England.



## HYDRAFORCE

High Performance Hydraulic Cartridge Valves and Electro-Hydraulic Control Systems

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HydraForce valves meet RoHS environmental requirements restricting the use of cadmium, quick silver, lead hexavalent chrome, polybrominated biphenyl (PPB) or polybrominated diphenyl Ester (PPDE) in products, components and packing materials. All HydraForce products meet requirements limiting the use of hazardous materials as identified in OSHA Standard 1910.1200(g).

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