

Drive and Control Systems for Truck Mounted Equipment



From Gear Pump to Electronic Crane Control



Unique Variety Permits Customised Systems

Rexroth supplies a unique variety of components and systems designed to provide custom solutions for the drive and control systems of commercial vehicles. Rexroth has exactly the right system for the particular requirements of these machines. With our product range, we are able to cover the full spectrum of applications. In the “Commercial Vehicle” application center, where specialists from the different product divisions work together as a team, we provide comprehensive assistance, in selecting the best suited components to the drafting of complete system solutions.

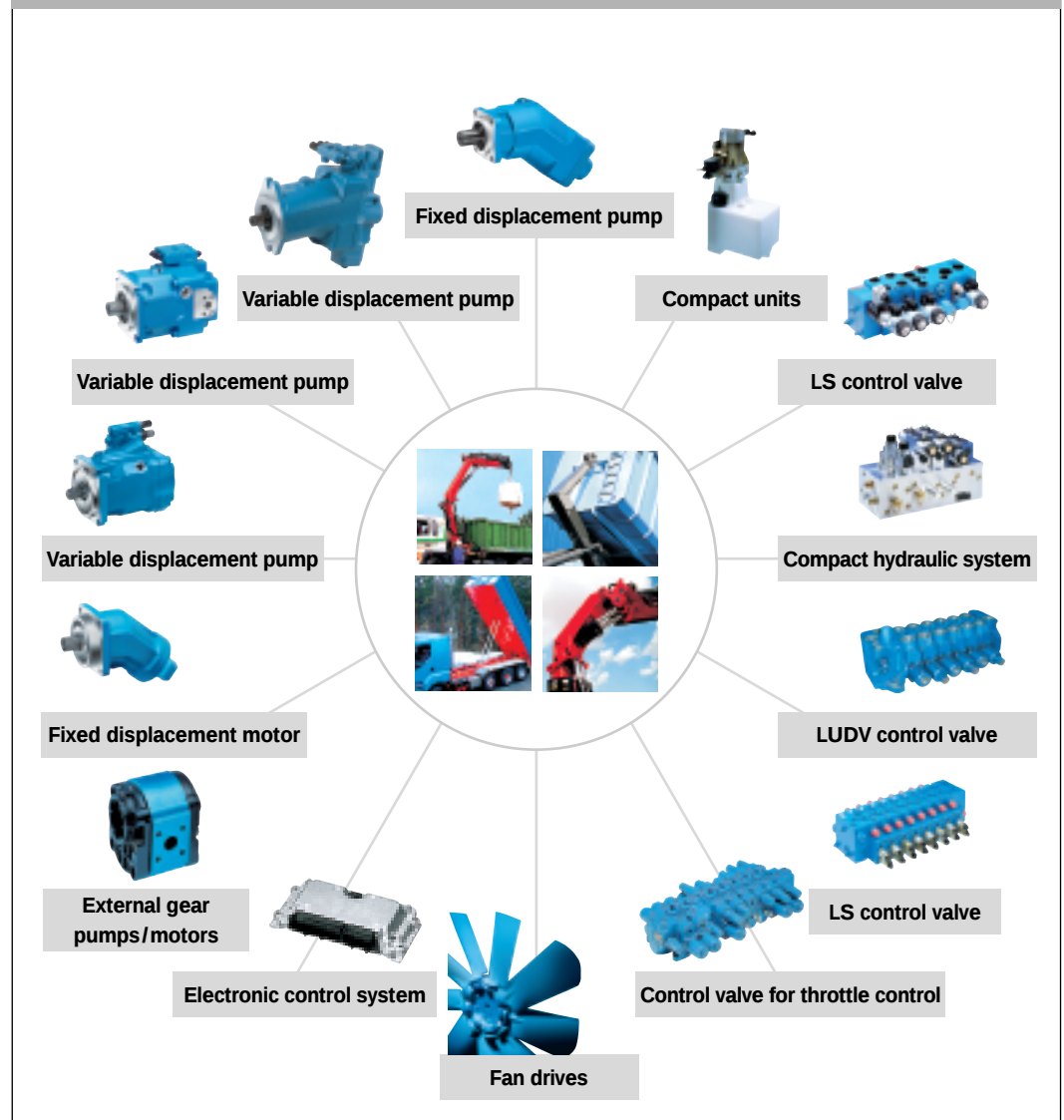
Products:

- Implement hydraulics, from the simple throttle control to the technically sophisticated LUDV control.
- Complete control systems for optimal handling.

Everything From a Single Source

At Rexroth you will find the complete range of commercial vehicle drive and control systems from a single source: the Mobile Hydraulics technology division of Bosch Rexroth is able to join forces with other product divisions, namely Axial Piston Units, External Gear Units, Radial Piston Motors, Mobile Controls, Gears and Mobile Electronics, in order to provide each system with all the equipment required.

Components for Drive and Control Systems





Contents

- Dump trucks / roll-off tipper
- Crane drives
- Energy balance
- Components
- Prospects

Basic Requirements for Optimum Operation

Our powerful drive and control systems are essential parts and therefore form the basic frame for optimum operation of truck mounted equipment. They are characterised by reliability, economy, high productivity and ease of use. For the implement hydraulics, qualities such as economy, handling capacity and ease of use are the main criteria. In addition to conventional throttle control, increasing use is now being made of user-friendly and energy-saving load-sensing or LUDV systems.

On-site all Over the World

The Rexroth sales network spans 80 countries. This network gives us a global presence of production sites, trading subsidiaries, distributors and service centers. So, wherever you may be in the world, you and your customers will enjoy the support of expert partners in drive and control systems.

Application Center: System Consulting, Project Planning and Optimization

The Rexroth Application Centers have the function of analysing current and future customer requirements in the field of drive and control technology and working out appropriate solutions – from individual components to complete systems. The future belongs to vehicles and machines that simultaneously can be made more powerful, more rapidly available and more competitively priced. Drive systems that can be specifically optimized for individual applications are therefore necessary. With our Commercial Vehicle Application Center we provide the requisite application-oriented know-how, the latest modern simulations and powerful test systems. In close co-operation with our customers and partners, we devise complete turnkey systems with a minimum of interfaces and with perfectly matched components. In addition, in our Application Centers, we make use of the effects of synergy between the various Rexroth divisions specializing in different technologies.

Hydraulics for Drump Trucks, Skid Handlers and and Roll-off Tippers

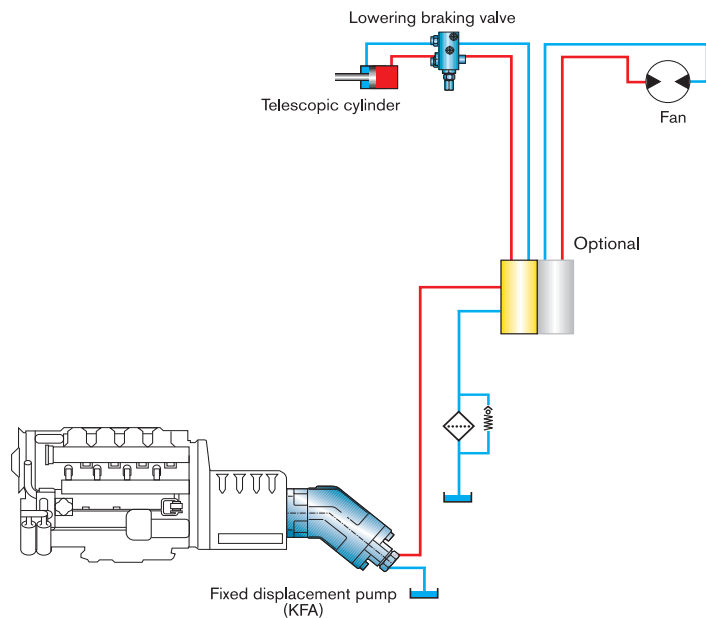
To load and unload commercial vehicles, the vehicles are often equipped with special devices and attachments, such as tipper cylinders. The hydraulic pumps are generally mounted on the side of the vehicle's gearbox integrated power take-off units (PTOs). The PTOs are engaged and disengaged by means of the truck's pneumatic system.

Hydrostatic Transmission

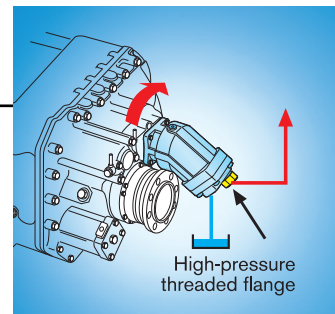
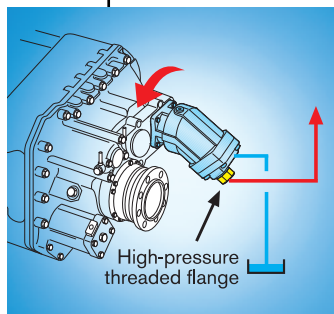
Rexroth KFA-type fixed displacement pumps are axial piston pumps based on the proven bent-axis principle. They are available in the nominal sizes 23, 32, 45, 63, 80, 107 and 125 cc/rev., with working pressures up to 5000 psi (350 bar), except the size 125 which is suitable for peak pressure of 4350 psi (300 bar). KFA pumps are of fixed displacement design and used in open circuits. This range of pumps features low noise levels, a heavy duty rotary group and space saving dimensions.

One special feature compared to other pumps is the patented system for easily changing the direction of rotation from outside, without having to dismantle the pump. The threaded insert in the pressure port is screwed into the opposite port. This insert also acts as an adjustment tool to reduce the noise level and pressure pulsations.

Dump Truck Drives Based on the Throttle Control Principle

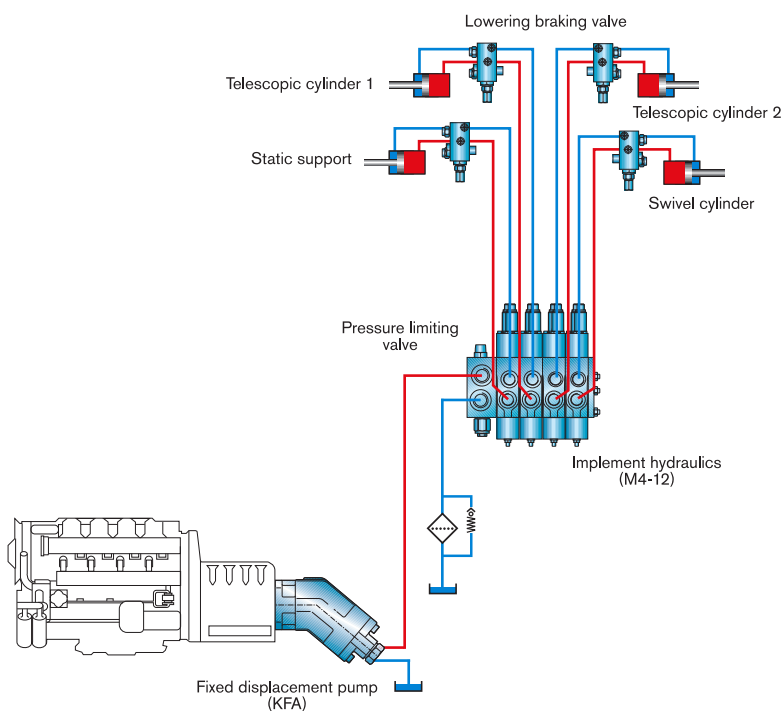


Patented system
for changing the
direction of rotation





Implement Hydraulics for Dump Trucks, Skid Handlers or Roll-off Tippers Based on the Load-sensing Open Center Principle



Sophisticated Hydraulic Systems

Loading and unloading systems are designed as load-sensing systems with open-center inlet unit. The Rexroth M4-12 valve block permits highly sensitive proportional control of the individual users. The actuating system can be mechanical, hydraulic or electro-hydraulic. The static support and three valve axis are actuated electro-hydraulically by proportional or on-off control. An emergency cut-off valve can also be integrated in the inlet unit. In addition, an internal pilot oil supply is provided. Finally, for modern actuating systems, a built-in electronic unit for analogue and digital signals (CAN system) is available.

The M4-12 valve block can handle pump pressure up to 5000 psi (350 bar) and work port pressure up to 6100 psi (420 bar).

Hydraulics for Loading Cranes, Cargo Cranes and Timber Loading Cranes

Efficient variable displacement pumps based on the axial piston principle are used for the hydraulic systems of truck loading cranes, cargo cranes and timber loading cranes. Wherever dynamic performance, economic operation and fast working speeds are the main priorities, variable displacement pumps, with different control systems depending on the specific requirements, provide the ideal solution. Rexroth systems are optimally tuned to the particular application and are customised to meet individual user requirements. They are characterised by high reliability, safety and ease of use, even under difficult operating conditions.

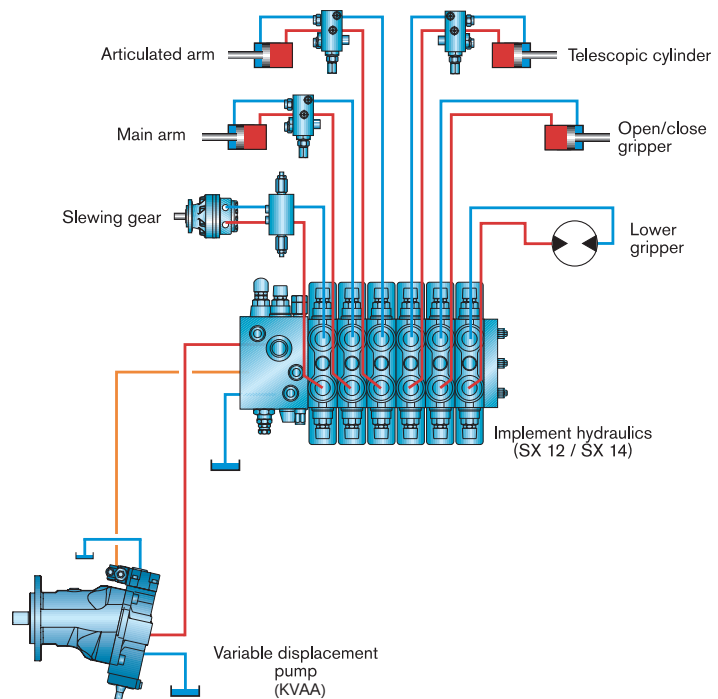
Construction and Loading Cranes for Loads up to 10 mt with LUDV Control

In this application range, the main requirements are good mobility and high load capacity of the crane. Rexroth systems are ideal for rapid and powerful material handling. SX control blocks are based on the LUDV system, which distributes the oil flow independently of the actual load. LUDV control systems enable a number of operating movements to be performed simultaneously and independently of one another. In addition, the SX control block provides two speed stages, for sensitive and aggressive operation of the loads. An emergency stop switch and power beyond line are already built into the inlet unit. The SX control block replaces the old dual-circuit systems.

Construction and Loading Cranes with Load-sensing Control

In these systems, there is constant interaction between the pump and control block in order to supply each individual crane function with only the quantity of oil actually required for the current operating function. Several functions can be operated at the same time, because the variable displacement pump always delivers exactly the quantity of oil that the combined loads require. When none of the loads are in operation, the pump automatically switches to “standby” mode. In this mode it delivers about 3 litres/min against a set pressure of lower than 360 psi (25 bar), corresponding to a power input of less than 1 kilowatt.

Loading Crane Control Based on the LUDV Principle (Load-independent Flow Distribution)





Load-sensing Control Block for Loading Cranes

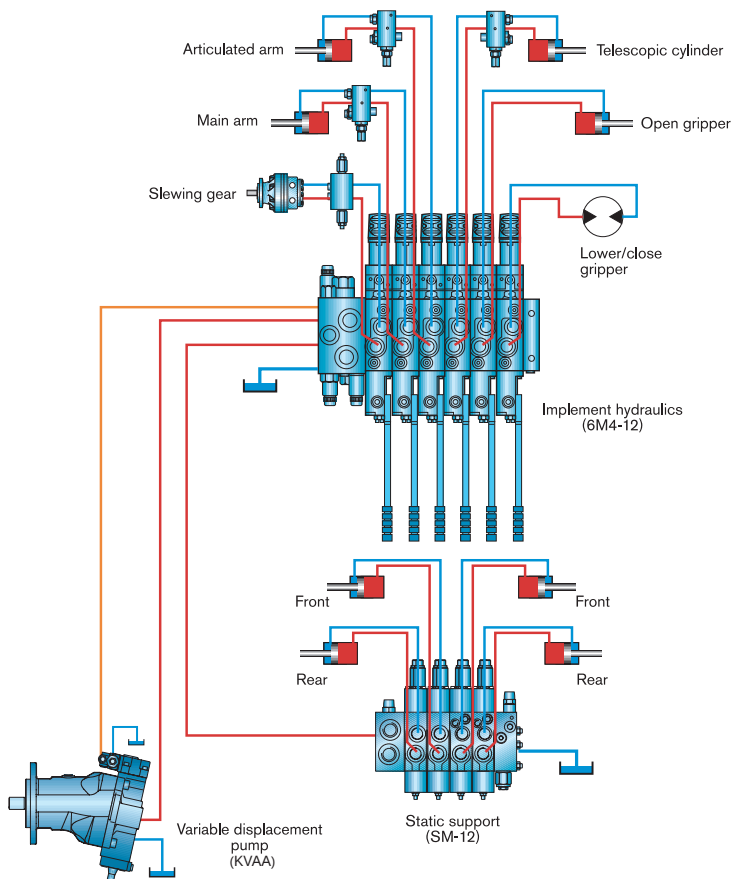


Load-sensing Control Block

The Rexroth M4 load-sensing control block provides a reliable basis also for high-pressure applications with maximum pressures of 5000/6100 psi (350/420 bar). The M4 is able to control all the functions of a construction crane. The central inlet unit can distribute high flows to up to ten valve functions. Overall, the pressure drop of the LS-valve is very low, potentially reducing the cooler size.

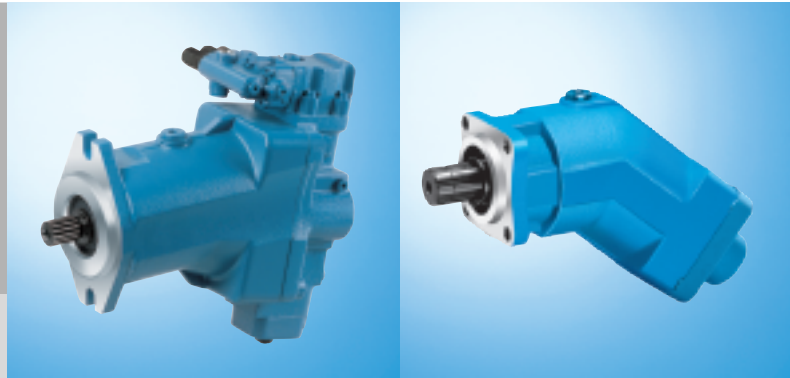
Rexroth M4-12 (LS system)

- Inlet unit with change-over axis for emergency stop, static support and crane operating functions.
- Primary pressure relief system
- Integral pilot oil supply
- Cut-off for pilot oil supply (secondary cut-off system)
- Simple conversion from open-center to closed-center variants
- Electro-hydraulic actuation with manual override lever
- Built-in CAN electronic system with positional sensor for safety cut-off
- Stroke limit for maximum flow setting
- LS pressure limiting valves for supply pressure control
- Secondary pressure relief and anti-cavitation valves for protection of dynamic loads
- Electronic flow management possible for highest flexibility



Innovative and Competitive Hydraulics for Commercial Vehicle Equipment

Rexroth KVAA variable displacement pump (left)
Rexroth KFA fixed displacement pump (right)



Rotary Group and General Features

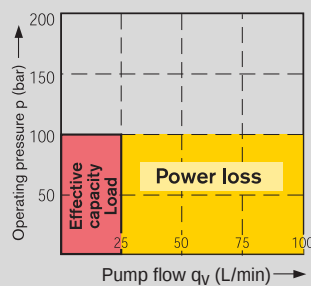
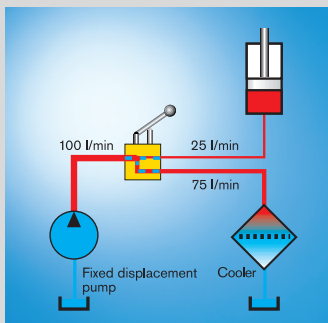
- Rotary group proven millions of times
- Low weight
- Space saving design enables installation in tight mounting space
- Bent-axis axial piston design
- Self-priming for open circuit
- Spherical, self-centring control area
- Cylinder transmission without universal joint
- Tapered pistons sealed with piston rings
- Forced lubrication of all moving parts
- Reduced pressure pulsations due to the noise-optimised pump technology
- No drain line required: internal drain to the pump inlet side
- Two shaft sealing rings, sealing to the inside and outside. A relief hole between the two seals prevents any build up of pressure

Operating Principle and Features

- The flow is proportional to the drive speed and the displacement, which, in the case of the variable displacement pump, is infinitely variable between 0 and $V_{g \max}$
- Suitable for simple throttle control (KFA) or energy saving load-sensing systems (KVAA)
- The favourable dimensions and lightweight construction (aluminium housing) provide advantages of easy installation and reduced weight
- The drive shaft and mounting flange are suitable for direct mounting on the PTO of all common truck transmissions conforming to the European DIN and US-SAE standards
- The pumps have robust tapered roller bearings, making them also suitable for mounting on drive shafts with universal joints
- High overall efficiency
- Patented simple system for changing the direction of rotation

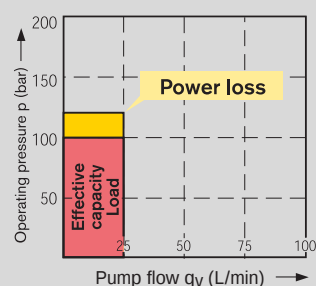
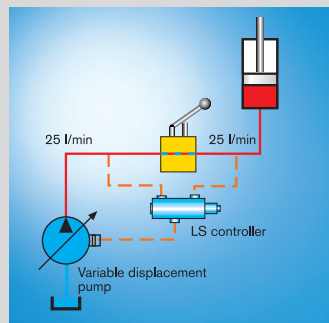


Comparison between drive systems with throttle control and load-sensing control clearly shows the energy-saving possibilities of the LS control system. In addition to improved ease of use and sensitivity of control, energy costs are reduced.



Throttle Control with Fixed Displacement Pump

The fixed displacement pump is designed for the maximum required power and therefore delivers 100% of the drive power. When the power requirement is less, the excess oil flow is throttled, converted to waste heat and cooled down by large heat exchangers.



Load-sensing Control with Variable Displacement Pump

The drive power of the variable displacement pump is adjusted to the actual requirements by the LS controller. In this system, no excess oil flow is produced by the variable displacement pump, so that no power is lost in the form of waste heat.

Fields of Application

Tipper Vehicles

- Rear tippers, 3-sided tippers
- Roll-off dumpers, dump trucks
- Hook tippers

Truck Mounted Cranes

- Loading cranes, timber loading cranes
- Lift platforms
- Service cranes (mobile cranes)

Local Authority Vehicles

- Refuse disposal trucks
- Road-sweeping vehicles
- Fire trucks

Tankers

- Tankers for liquids, granulates and flour
- Drives for feed pumps and compressors

Special Vehicles

- Refrigeration vehicles
- Glass transporters, brick transporters
- Flushing and vacuuming vehicles
- Drives for generators
- Additional traction drives

Fan Drives

Overview of Components

Axial piston units, external gear units, radial piston motors, mobile controls, gears and mobile electronics.
Rexroth offers you the complete range of equipment from a single source.



KFA Fixed Displacement Pump

Open circuit operation
Nominal pressure 300 bar
Peak pressure 350 bar

Data sheet RE 91 501



KVAA Variable Displacement Pump

Open circuit operation
Nominal pressure 300 bar
Peak pressure 350 bar

Data sheet RA 92 250



Axial Piston Pump A10VO

Open circuit operation
Nominal pressure 250 bar
Peak pressure 315 bar

Data sheet RA 92 703



Axial Piston Pump A11VO

Open circuit operation
Nominal pressure 350 bar
Peak pressure 400 bar

Data sheet RA 92 500



Fixed Displacement Motor A2FM

Open and closed circuit operation
Nominal pressure 400 bar
Peak pressure 450 bar

Data sheet RA 91 001



External Gear Pump/Motor

Fixed displacement pumps in
standard and silence versions
Nominal pressure 250 bar
Peak pressure 280 bar

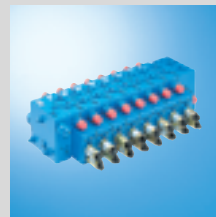
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LS Control Block M4-12

Hydraulically or electro hydraulically
operated
Nominal flow 100 l/min
Operating pressure up to 420 bar

Data sheet RA 64 278



LS Control Block M4-15

Hydraulically or electro hydraulically
operated
Nominal flow 150 l/min
Operating pressure up to 420 bar

Data sheet RE 64 282



LUDV Control Block SX14

Mechanically, hydraulically or
electro hydraulically operated
Nominal flow 120 l/min
Operating pressure up to 300 bar

Data sheet RE 64 125



RC Control Unit

For closed-loop and open-loop
control of hydrostatic drives and
implement hydraulic functions.

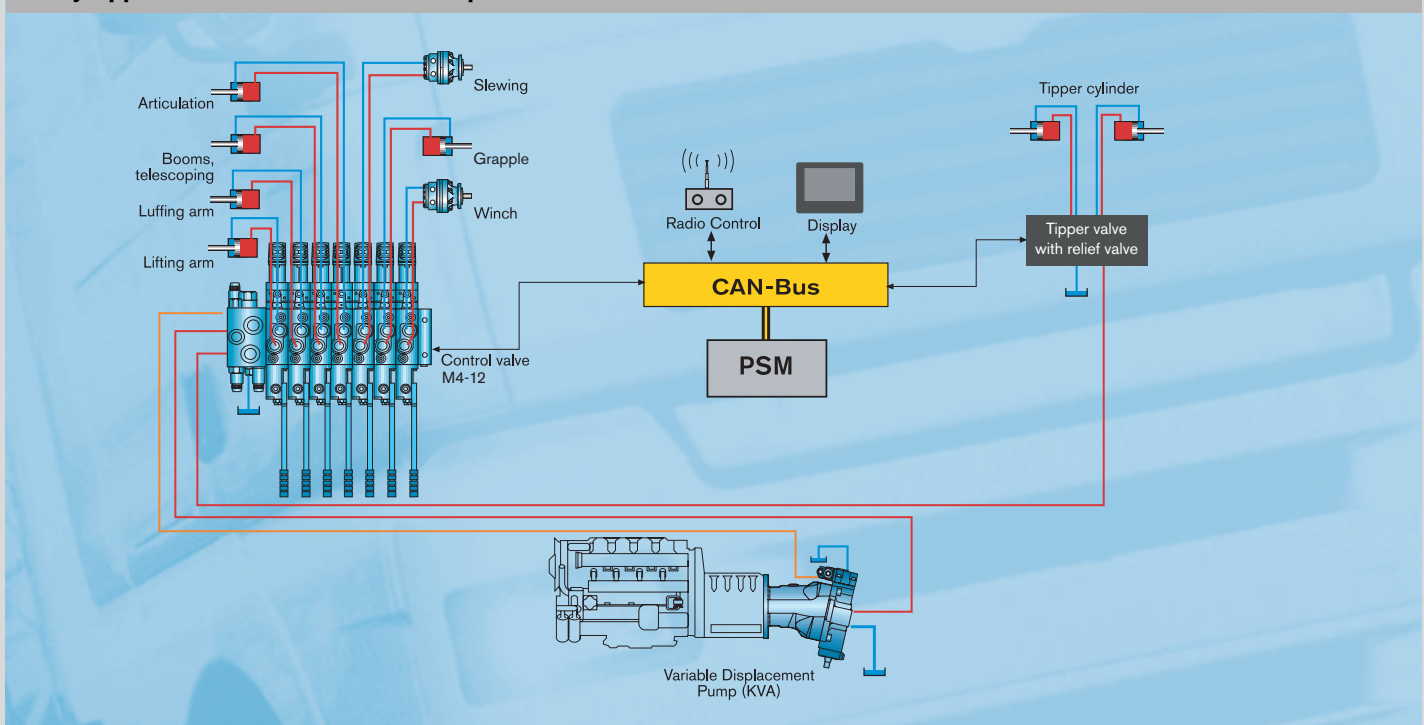
Data sheet RE 95 200

Prospects for Commercial Vehicle Technology



Technical systems for commercial vehicles are being constantly improved and advanced. In this process of development, Rexroth lays particular emphasis on the possibility of operating equipment at higher pressures and speeds. At the same time, Rexroth developers are constantly working to reduce the weight and installation space of the components. A trend towards bus systems can also be discerned. The aim is to develop hydraulic systems that are more economical, ecological and user-friendly. Rexroth meets this challenge through intensive collaboration and constant dialogue with its customers. These steps form the foundations for success in the future.

Key Applications and Lines of Development



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