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SUSTAINABLE ELECTROHYDRAULIC SOLUTIONS FOR MUNICIPAL MACHINERY

Innovative electro-hydraulic CMVA system solutions from Wandfluh play a key role in enhancing the functionality and reliability of the working hydraulics in municipal machinery.

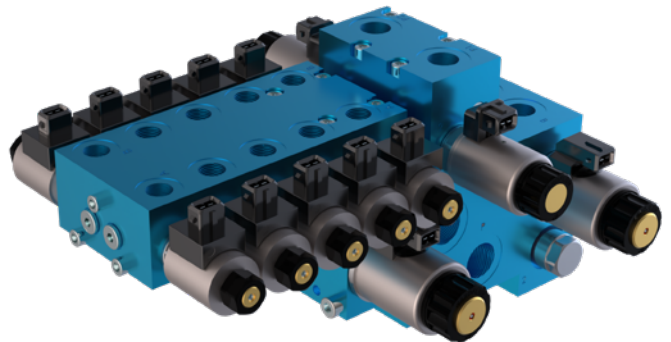
Municipal machinery refers to machines used by cities, municipalities, or municipal utilities for public services. Along with waste collection vehicles, street sweepers and utility vehicles are among the most important specialized vehicles for municipal services. These vehicles help cities and municipalities keep public spaces clean, safe, and functional. They can be used year-round, are designed for use in public spaces, and must operate reliably and economically. Modern models often feature low-emission or electric powertrains to reduce noise and harmful pollution.



Compact Sweeper

Street sweepers are divided into compact sweepers and truck-mounted sweepers. A compact sweeper is a specially designed vehicle in which the chassis and sweeping mechanism form a single unit. They are particularly well-suited for use in city centers, pedestrian zones, parks, on sidewalks and bike paths, and in residential areas. They are highly maneuverable and easy to handle, allowing them to operate even on very narrow streets. Due to their relatively small debris bins, they have a short-

ter operating time before needing to be emptied and are less economical for large streets than larger vehicles.



CMVA System Solution for a Compact Sweeper

In a truck-mounted sweeper, the sweeping equipment is mounted on a Normal truck chassis. This allows it to collect large amounts of debris and perform longer operations. It is frequently used on federal and state highways, major city streets, industrial areas, airports, and large parking lots. With its large debris collection bin, it can operate for extended periods, is suitable for large areas, and can travel at high



Truck-Mounted Sweeper

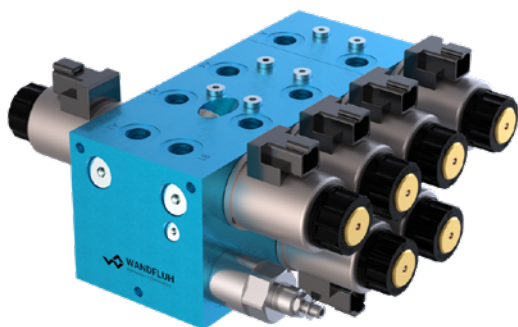
speeds between job sites. Due to its large turning radius and overall size, it is not suitable for narrow areas. The most important components of a sweeper are rotating side and/or main brushes, a debris collection bin, and a vacuum system. The rotating side brushes sweep the debris together, collecting leaves, sand, gravel, cigarette butts, and other debris along the roadside. They convey the material to the center of the vehicle, where



Implement carrier vehicle with a mounted front loader

a powerful blower draws the debris through a suction chute into a collection bin. At the same time, water is sprayed in front of the brushes or into the suction channel via orifices. This prevents fine dust from being stirred up. When the container is full, the machine drives to a disposal site. The container is hydraulically lifted or tilted so that the collected debris can be unloaded.

Utility vehicles are versatile work vehicles that can be equipped with various attachments for different municipal tasks. For example, they can be used in the spring and summer to mow green spaces or perform Cleaning on streets, while in the fall they are used to remove leaves and in the winter to clear snow and spread salt or grit. This means that municipalities do not have to purchase a separate vehicle for each task.



CMVA System Solution for an implement carrier vehicle



Implement carrier vehicle with a mounted sweeping roller

The vehicle consists of two main components: the base vehicle, which includes the engine, cab, chassis, and drivetrain, and the attachments or superstructures, which are mounted as needed for the specific application. To enable the attachments to operate, the vehicle has hydraulic and electrical connections which provide power and control functionalities for the equipment.

All the movements described – for both sweepers and utility vehicles – are driven by hydraulic cylinders or hydraulic motors, which are controlled by sensitive electric proportional valves or on-off valves. These are often accompanied by poppet, lowering brake, or pressure valves. These valves are grouped together in one or more control blocks.

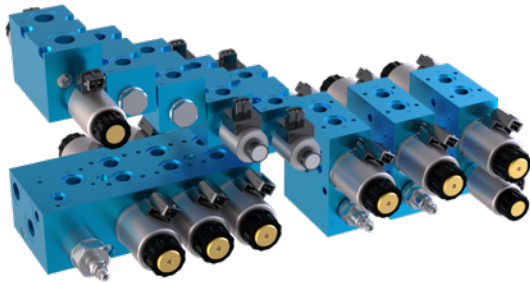
Even in times of increasing electrification and heightened demands on the productivity and safety of waste collection vehicles, working hydraulics remain the heart of these machines.

With its new, well-designed, and award-winning “Compact Mobile Valves” (CMV) product line, Wandfluh Hydraulics + Electronics – known worldwide for its first-class proportional technology – provides manufacturers of municipal vehicles with weight-optimized, user-friendly, and future-proof solutions.

THE AWARD-WINNING WANDFLUH CMVA SYSTEM IS CURRENTLY THE MOST VERSATILE AND FLEXIBLE COMPACT MOBILE VALVE SYSTEM ON THE MARKET.

DESIGN OF THE MODULES

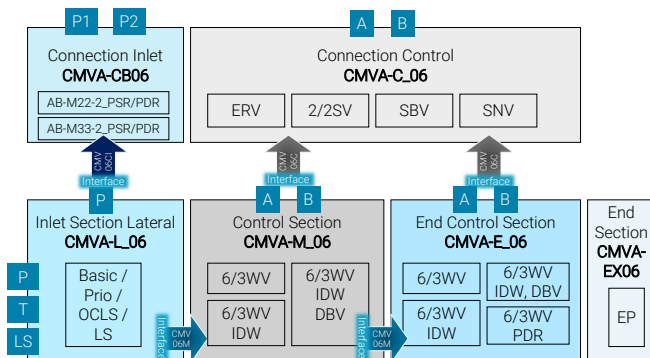
- Individual module sections
- Multiple sections / functions in a single monoblock
- Available in aluminium or steel



FUNCTION OF THE MODULES

- Inlet modules
- Control modules
- End control modules
- Connection modules
- End module
- Individual modules

CONCEPT



CUSTOMISED HYDRAULIC SOLUTIONS

- With pure standard section modules
- With monoblocks and additional section modules
- With individual customer-specific monoblocks

Solutions based on pure section modules have the advantage of being readily available and particularly suitable for small quantities. They also represent a simple and efficient option for functional proof-of-concept approaches.



CMVA Award: In 2024, our CMVA system was recognised by OEM Magazine as the most innovative and best product in the field of fluid technology/ hydraulics.

Monoblock solutions, on the other hand, offer compact and cost-optimised concepts for series machines with high quantities. Combinations of monoblocks and section modules are the most frequently chosen solutions. Many mobile applications have basic equipment that needs to be supplemented with various options. These options require clearly defined interfaces and modular functional assemblies.

DESCRIPTION

With a focus on defined electrohydraulic functions and specific application requirements in target applications, we have developed new products and further refined existing ones. Based on the extensive functionalities of the CMV(A), we offer solutions that meet the individual requirements and wishes of mobile machine manufacturers.

CMVA ADVANTAGES => YOUR BENEFITS

- Smart modular design => increased flexibility to respond to changing customer requirements
- High performance and reliability => ensures precise control and efficiency
- Compact and easily adaptable size => perfect for mobile devices with limited space
- Lightweight and flexible design => reduces weight without compromising strength
- Product availability and support => accelerates your time to market
- Best customized solution => reduction of your TCD (Total Cost of Design) => improvement of your machines' / your end customers' TCO (Total Cost of Ownership)

Here you can find more information about the CMV program:

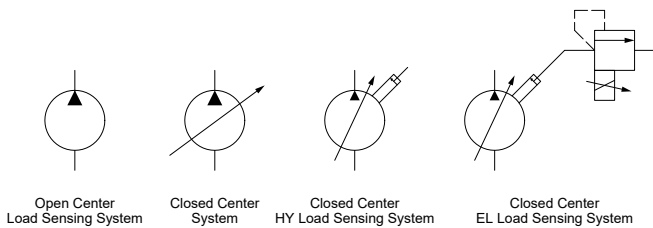
www.wandfluh.com/en/products/compact-mobile-valves/



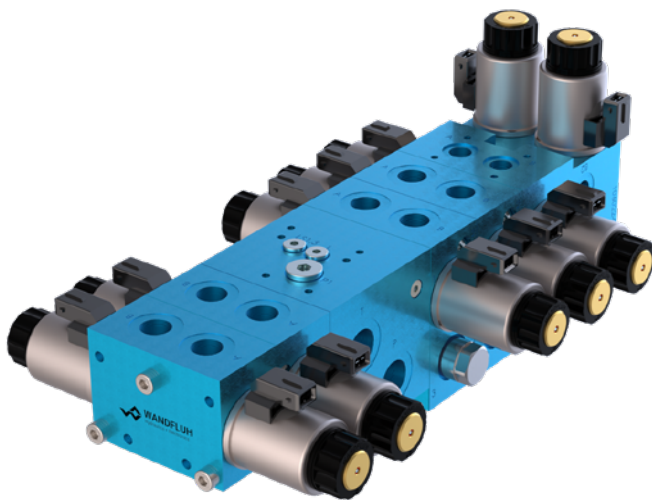
PUMP SYSTEMS FOR THE HYDRAULIC POWER SYSTEMS OF SELF-PROPELLED VEHICLES

The CMVA program can be operated with all Standard pump systems in the range up to $Q=140$ l/min and $p=250$ bar (aluminum version) or $p=350$ bar (steel version).

Optimal coordination between the pump system and the working hydraulics is a key consideration and is determined and adjusted in consultation with the respective manufacturer of the municipal machine. The machine's cost-effectiveness, efficiency, and specific functional requirements play a significant role in this process.



Pump systems that work perfectly with our CMVA system



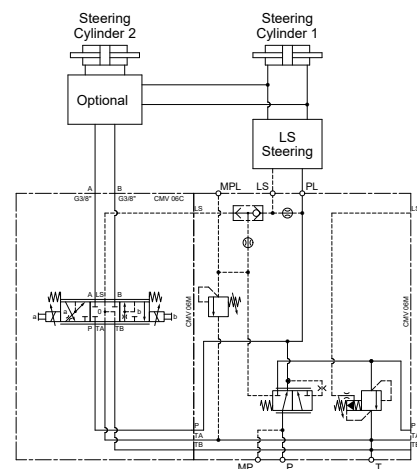
CMVA system solution for a street sweeper. Q flow rate = 120 l/min, $p_{max} = 250$ bar, based on a monoblock solution supplemented with control modules



PRIORITY OIL SUPPLY FOR STEERING OR ELECTRONIC PROPORTIONAL AUXILIARY STEERING

With the CMVA system, we secure priority oil supply for the hydraulic steering system in both compact sweepers and utility vehicles. The proven and reliable Priority valves can supply both open-center (OC) and load-sensing (LS) steering systems—the latter optionally in either static or dynamic mode.

In addition, the direct operated proportional valves offer an ideal solution for additional electro-proportional steering control (steer-by-wire). This makes it relatively easy to implement, for example, joystick- or GPS-assisted steering of the self-propelled vehicle in addition to the hydraulically operated Orbitrol steering system. Furthermore, it is possible to control the front and rear axles individually.



Priority power supply for the steering system, as well as optional GPS steering

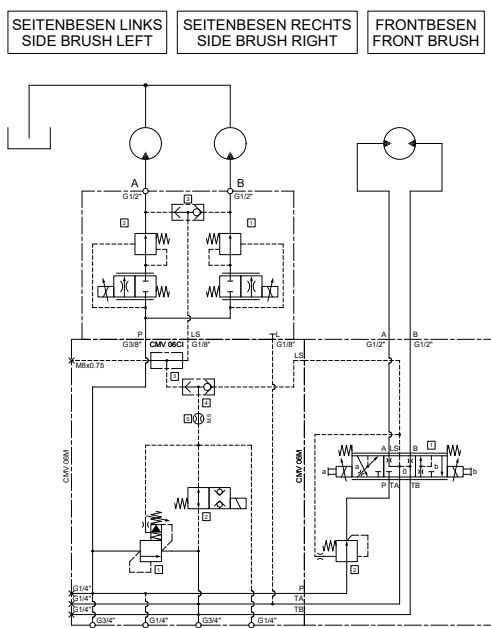
PRECISE, SENSITIVE CONTROL OF ROTARY DRIVES

Brush drives, blower drives, and water pump drives are key drive components in modern sweepers. These functions are powered by hydraulic motors, which operate either as single-acting – rotating in only one direction – or double-acting – meaning they can rotate in both directions.



Compact sweeper side brushes in sweeping operations

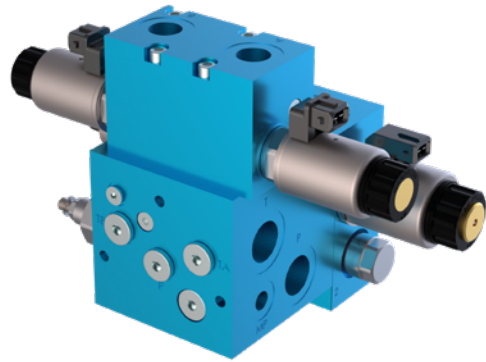
The speed of hydraulic motors can cover a wide range. Start-up (breakaway torque) must be smooth, and jerk-free rotation must be ensured across the entire speed range. Proportional flow control valves are used to control these motors.



CMVA-06 Control unit for a sweeper, schematic

The CMVA valve series includes a wide range of flow control modules, which – like the entire CMV series – are available as sectional elements and can also be executed as monoblocks according to customer specifications. A single module can be used to precisely control either two single-acting rotary actuators independently of one another or a reversible actuator.

The Proportional flow control modules used demonstrate smooth and responsive control as well as stable performance across the entire operating range.



CMVA-06 Control unit for the brush drives of a compact sweeper, control block



Compact sweeper in action



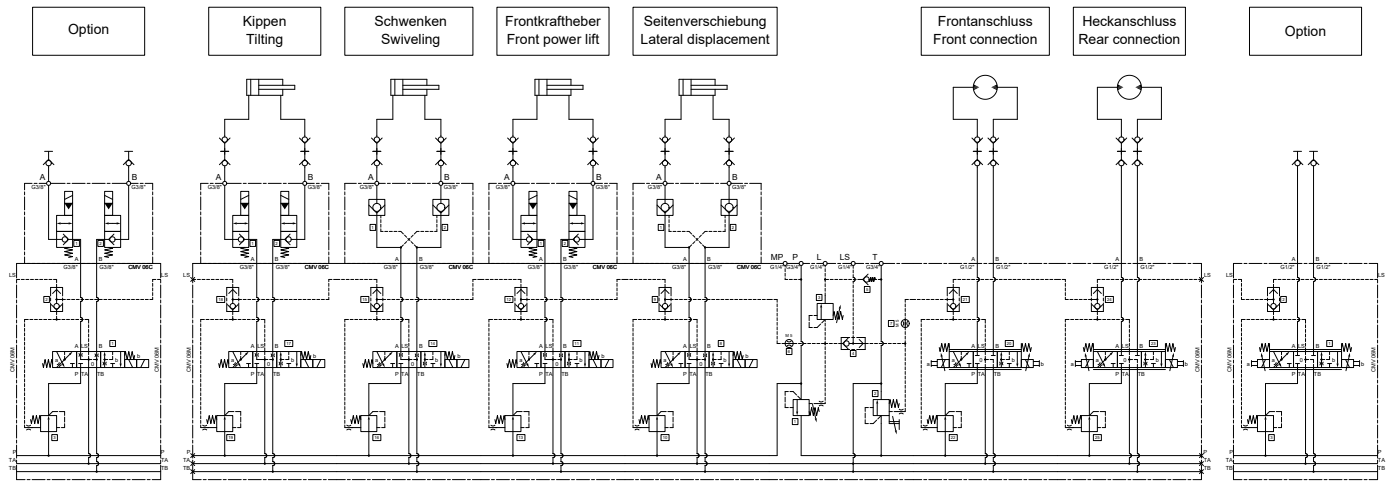
Truck-mounted sweeper in action

PRESSURE COMPENSATED POSITIONING AND CONTROL OF WORKING IMPLEMENTS

The productivity of a sweeper or an equipment-carrying vehicle is significantly influenced by the efficient and precise positioning of the working implements around the sidewalk and their adjustment to the road. This requires linear movements in which a load must be moved sensitively and precisely. In hydraulic control technology,

double-acting load-sensing valves (LS valves) or, in simpler systems, OC (open-center) 4/3-way valves are used for this purpose. These valves can be operated simultaneously (in parallel) or one after another (sequentially).

The load being controlled must be held securely in position. In addition, pulling forces must be controlled. Such movements are an essential component of all modern municipal machinery. To achieve these functiona-



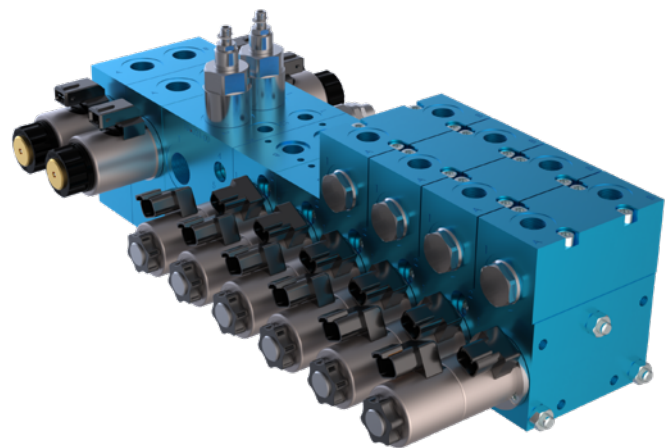
CMVA System Solution for an implement carrier, diagram

lities, the CMVA developed double-acting load-sensing directional control valves in Proportional and on-off executions as the core element of this product line.

This allows hydraulic actuators, such as Cylinders or Motors, to be accelerated smoothly, moved in an energy-efficient manner, and positioned precisely. The LS modules are also available with an upstream in-line pressure balancer. This allows multiple actuators to be controlled in parallel, independent of load.

To hold work cylinders securely in position, there are optional secondary-side unlockable Non-return valves or, for leading loads, lowering brake valves. Versions with electrically actuated 2/2-way on-off valves for implementing an additional neutral position, or with shock-absorbing valves for controlling/braking Motors, round out the range of secondary-side options.

A unique feature of the CMVA load-sensing valves is their Aluminium construction. This allows manufacturers of municipal machinery to be offered solutions optimized for weight.



CMVA System Solution for an implement carrier, control unit



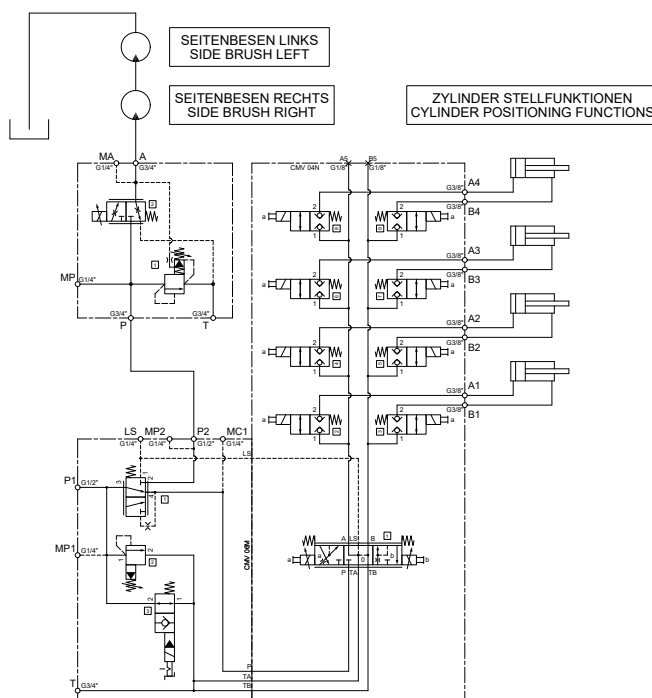
Compact sweeper in action

The essential operating movements of a sweeper include holding the brushes in position, independently raising and lowering the side brushes and the front brush, and setting them to the so-called “floating position.” These movements are performed by relatively small hydraulic cylinders and therefore do not require high flow rates. In addition, the movements are usually performed sequentially.

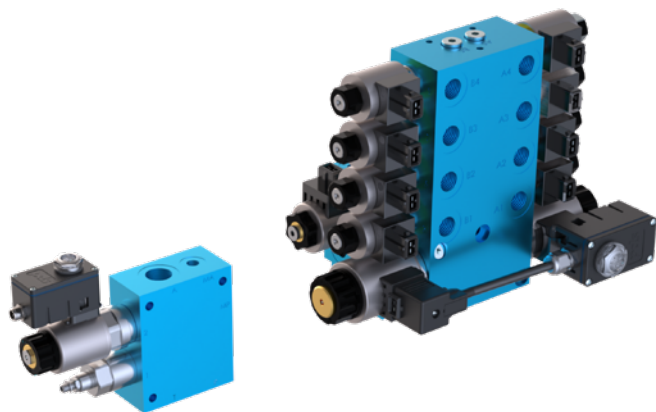
In this context, the design advantages of the Wandfluh CMVA program—particularly its flexibility—are fully realized. Standard sectional elements, combinations of individual monoblocks including standard sections, and custom-designed monoblocks are available for developing solutions. At the same time, we can equip the solutions with integrated CAN-bus-compatible electronics, which enables plug-and-play solutions for the electronics as well.

Since the control blocks are made of Aluminium, they are very lightweight. Upon customer request, they can also be manufactured from steel. The maximum opera-

ting pressure for Aluminium is 250 bar. The inlet flow, which can be diverted via the bypass Pressure compensator, is approximately 120 l/min. The custom 6/3-LS valve handles a volume flow of up to approximately 65 l/min. The operating temperature range is between -25 and +70°C. The operating voltage of the solenoid valves is designed for 12- or 24-VDC onboard power systems. The following plug connections are available for the electrical connection of the solenoid coils: DIN EN 175301-803, German DT04-2P, and Junior Timer plugs (axial or radial arrangement).



Decentralized CMVA-06 Control unit for a sweeper, schematic



Decentralized CMVA-06 Control Unit for a sweeper, control blocks

Building on the extensive functionality of the CMVA-06, the existing portfolio of NG4 and NG6 on-off and proportional valves, and the detailed line of screw-in valves, Wandfluh’s hydraulic and electronics specialists have the expertise and commitment to address the highly customized requirements and requests of municipal equipment manufacturers. Together, we design clever, innovative solutions to tailor hydraulic systems to specific needs while also optimizing them for weight and space, ensuring energy efficiency, and offering enhanced functionality. All of this, of course, is based on Wandfluh’s proven reliability and quality.

SEAMLESS INTEGRATION OF CMVA'S HYDRAULIC SOLUTIONS WITH ELECTRIC CONTROL SYSTEMS

Today's mobile machinery is highly complex. The use of electric control systems – which assist the operator and relieve them of routine tasks – is therefore state-of-the-art in these machines. Driven by the desire for greater efficiency, ease of use, and assistance systems – all the way to autonomous operation—mobile work machines are becoming increasingly intelligent and connected. Due to the diverse requirements this entails, the machines feature a wide range of functions that must be controlled in the simplest possible way. Seamless interaction between hydraulics and electronics in decentralized system architectures is essential for high-performance and innovative machines.



In this context, Wandfluh Hydraulics + Electronics is ideally positioned to offer integrated, application-specific system solutions that deliver significant customer value. With its own electronics department, Wandfluh develops both hardware and software and can also accommodate very specific customer requests. Here, the company's hydraulics and electronics specialists complement each other perfectly. With strong execution capabilities and a passion for detail, we contribute to making our customers' machinery more competitive and available more quickly. On the one hand, Wandfluh offers small, robust proportional amplifiers that can control a Pressure valve or a directional control valve in a functionally optimized manner. On the other hand, Wandfluh also offers mobile controllers capable of proportionally controlling multiple valves. The integrated solenoid current regulation in Wandfluh's electronics minimizes the effect of temperature on the Solenoid coils, and the adjustable dither function minimizes the stick-slip effect, thereby optimizing

the valve's response characteristics and Hysteresis. The setpoint for the electronics is supplied by the joystick or by a higher-level control system via the standardized CANopen protocol. In addition to pure control, this interface also enables integrated monitoring and diagnostic functionality.



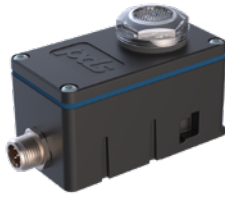
MD2 Mobile Electronics, digital amplifier and controller Module for use in harsh environments. IP67, CANopen – fieldbus, up to 8 solenoid outputs for control or regulation tasks, setpoint specification in the form of voltage, current, frequency, or PWM.



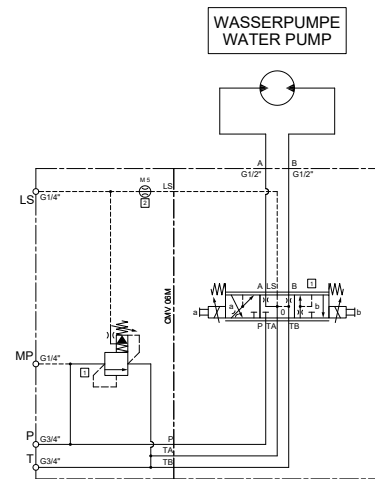
DSV Amplifier Electronics, Digital Smart Valve with digital Amplifier electronics for controlling a proportional valve with one or two Solenoids. Plug-and-play solution with the valve. Rugged, IP67, Amplifier or Controller, CANopen, J1939, or Profibus DP.



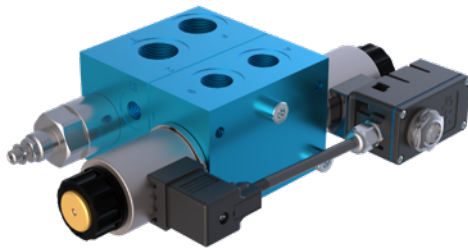
PD2 Amplifier Electronics – Digital amplifier module for controlling a proportional valve. IP67, CANopen or J1939.



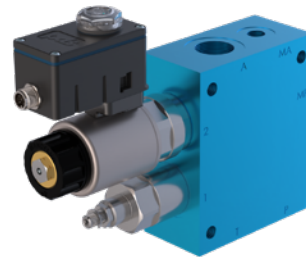
PDS1 amplifier, for direct mounting on proportional valves with 1 or 2 Solenoids and a DIN plug. Control via 0..+/-10V or 0..20mA. Extremely simple wiring with Standard M12 plugs. Intuitive parameterisation via USB using the new Wandfluh PASO2.



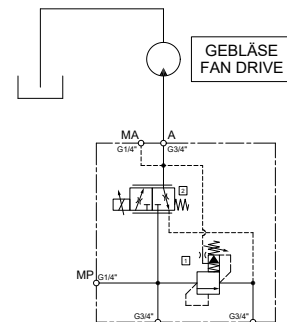
Double-acting CMVA-06 control unit with on-board electronics (PDS1), for water pump drive
Q = 0–60 l/min, p = 250 bar, diagram



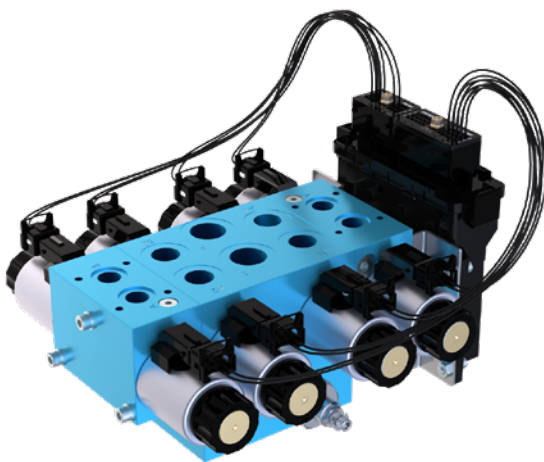
Double-acting CMVA-06 control unit with on-board electronics (PDS1), for water pump drive, control block



Single-acting CMVA-06 control unit with on-board electronics (PDS1), for fan drive, control block



Single-acting CMVA-06 control unit with on-board electronics (PDS1), for fan drive
Q = 0–70 l/min, p = 250 bar – Schematic



CMVA solution with integrated electronics (MD2 module), integration of the control unit into a CAN-bus-compatible system architecture for a sweeper.

With the comprehensive and compact CMVA, Wandfluh Hydraulics + Electronics offers a solution tailored precisely to the requirements of modern mobile machinery. Through close, collaborative partnerships between Wandfluh's specialists and customers, customized, innovative solutions are developed. Wandfluh is a competent and responsive solution partner.

PERFECT, TAILOR-MADE SOLUTIONS THROUGH SUCCESSFUL COLLABORATION FOR THE TECHNOLOGICAL EDGE OF OUR CUSTOMERS

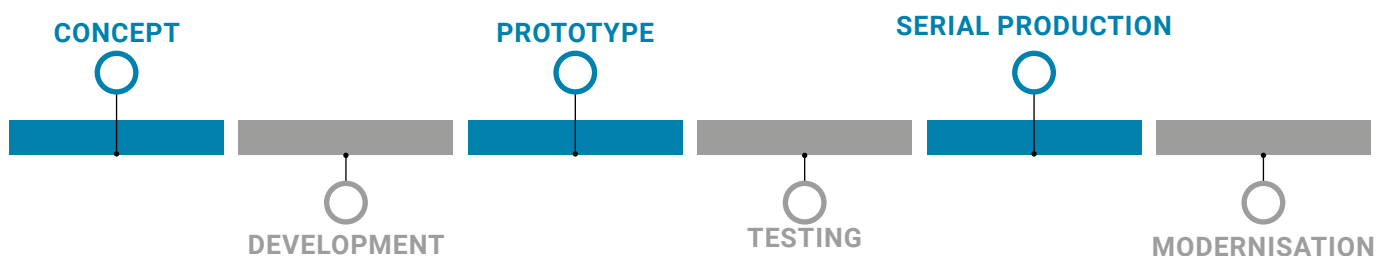
Our primary goal is to offer our customers the most suitable solution. Hydraulic control units are at the heart of modern mobile drive systems, as they precisely control pressure, flow rate, and motion sequences. As a partner with solution expertise, we understand the challenges of your markets and have the capabilities to meet your specific requirements.

Our international network and collaborative approach, along with our innovative strength, flexibility, and reliability, help you reduce unnecessary interfaces and benefit from flawlessly functioning electrohydraulic solutions.



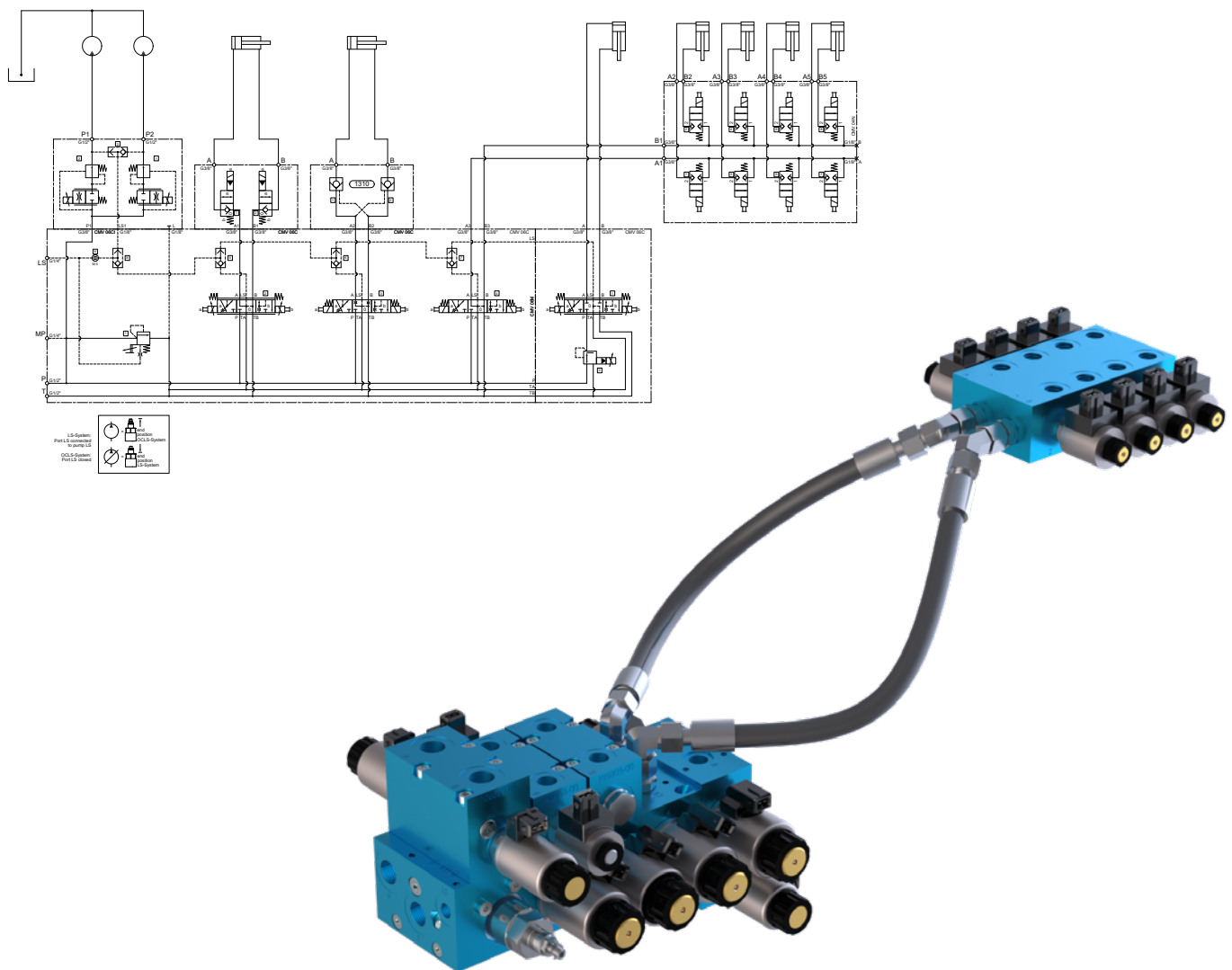
SOLUTIONS

With great implementation skills and attention to detail, we help make your systems more competitive and keep them available faster. That is what drives us and is the key to our mutual success.



REQUIREMENTS

The search for the optimal solution for you begins right from the very first joint discussions. We critically examine existing solutions, draw inspiration from your individual ideas and wishes, discuss innovative approaches and decide together on the best individual solution for you. In this way, we maintain close partnerships at all hierarchical levels and throughout the entire engineering process.



FROM THE POTENTIAL BENEFITS OF OUR PRODUCTS TO THE PERFECT SOLUTION FOR YOU

Wandfluh Hydraulics + Electronics' corporate structure allows us to adapt flexibly to your needs – throughout the entire life cycle of your machine. Thanks to our many years of experience, we develop flexible, compact, modular, reliable, and future-oriented solutions.

As a global family-owned company now in its third generation of leadership, we are committed to building long-term, collaborative, and dedicated relationships with our customers. We bring a high level of application and innovation expertise to the table and are committed to continuously optimizing our products and processes. In short: We strive for a high-quality partnership to achieve a very high level of collaboration together.



Compact sweeper with raised side brushes

TARGET APPLICATIONS: MOBILE MACHINERY

Since 1946, Wandfluh Hydraulics + Electronics has been driven by passion and innovative thinking, and today it is a leading provider of electrohydraulic valve and system solutions in the field of electrohydraulics. As a third-generation global family-owned company, we delight our customers worldwide with high-quality products. With a focus on specific application needs and electrohydraulic Functions, we develop targeted, innovative solutions – ranging from standard components to custom

components and custom systems—that make a decisive contribution to our customers' market success.

In addition to innovative solutions for municipal vehicles, we possess the necessary application expertise and the corresponding product portfolio to work with our customers to develop user-friendly and future-proof solutions for many other specific applications.

MUNICIPAL MACHINERY	MATERIAL HANDLING MACHINERY	AGRICULTURAL AND FORESTRY MACHINERY	CONSTRUCTION MACHINERY
Refuse Collecting Vehicles • Rear End Loaders • Side Loaders • Front Loaders Sweepers • Truck-Mounted • Compact Airport Cleaners Sewage Vehicles Tool Carriers Small Tractors Slope Mowers Winter Road Services • Salt spreaders • Snow ploughs	Fork Lift Trucks • Electric • Combustion Side Loaders Order pickers Truck Mounted Work Platforms • Scissor Lifts • Telescopic or articulated boom lifts Telehandler Mobile Cranes Truck-Mounted Cranes Container Handling Reach Stackers Tail Lifts Terminal Tractors	Tractors Farm Loaders Harvesters • Combine • Forage • Beet • Potato • Grape Self Propelled Sprayers Self Propelled Fodder Mixers Agricultural Attachments and Towed Equipment Forestry Tractors Auxiliary Forestry Equipment • Harvester Head	Excavators • Mini Excavators • Wheel Excavators • Crawler Excavators Crawler Dozers Skid Steer Loaders Backhoe Loaders Wheel Loaders Graders Concrete Machines • Mixers • Pumps Drilling Rigs Dumper Road Rollers Road Compaction Road Pavers Recycling Auxiliary devices • Tilt Rotators • Quick Couplers



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