

Oswald Mutter, Head of Development and Product Management at Wandfluh Hydraulics + Electronics

## SUSTAINABLE ELECTROHYDRAULIC SOLUTIONS FOR REFUSE COLLECTING VEHICLES

**Wandfluh's innovative electrohydraulic solutions play a key role in improving the functionality and reliability of the hydraulics in refuse collecting vehicles.**

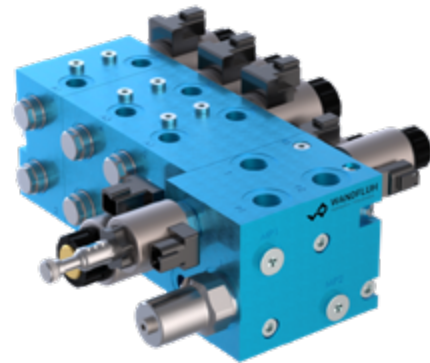
A refuse collecting vehicle, colloquially known as a waste lorry, is used to collect waste from residential buildings, commercial and industrial premises and transport it to a transfer station or a sorting or treatment plant.

Modern refuse collection vehicles consist of a special body with loading and tipping mechanisms, as well as a load compartment that is often used as a compaction chamber. This body is mounted on the chassis of a lorry, the carrier vehicle. The vehicles are fitted with suitable loading and unloading mechanisms. These are designed, on the one hand, for the collection of loose waste, particularly bulky waste, and recycling bags, and, on the other hand, for the collection of containers.



**Rear-loading** refuse collecting vehicle

Container collection is common for household and commercial waste. The containers are colloquially designated as waste bins or rubbish bins. These containers, technically designated as large waste containers (MGB), are commonly available in sizes ranging from 60 to 360 litres in a two-wheeled execution (for easier handling) and in sizes ranging from 660 to 1,100 litres in a four-wheeled execution as wheeled bins.



**CMVA monoblock and modular section solution** for a rear loader

To empty the bin, it is positioned with its tipping mechanism (comb strip, pin or DU coupling) against the loading mechanism of the refuse collecting vehicle. The loading mechanism is also designated as a tipping mechanism or lifter. The bin is emptied mechanically by hydraulically lifting and tipping it.

A hydraulically operated press plate system then conveys the load from the hopper into the compaction chamber. To make better use of the compaction chamber, the waste is hydraulically pressed within the compaction chamber. The compaction chamber is emptied mechanically by hydraulically ejecting the waste or by tipping.



**Side-loading** refuse collecting vehicle

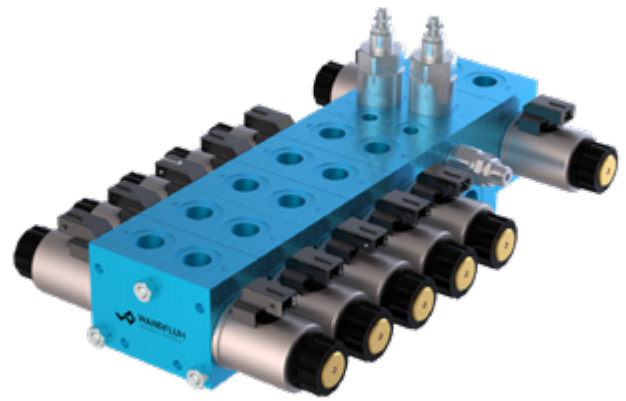
For the loose collection of bulky waste and recyclables, hoppers with a low-lying collection trough are common, which are filled by hand.

Depending on where the loading mechanism is located, a distinction is made between rear loaders, front loaders and side loaders. The rear loader is the most common construction, with a market share of approximately 70%. The crew of the rear loader consists of the driver and usually two refuse collectors who load and operate the hopper. The front-loader (with overhead emptying for large-volume containers) and the side-loader (side loading for smaller-volume bins) have the advantage that the driver can control the handling of the bins themselves; however, this requires the bins to be erected in an orderly manner.

### HYDRAULICS IN REFUSE COLLECTING VEHICLES

The movements described above for loading and unloading waste bins – namely lifting, tipping, and clamping – are powered hydraulically. This also applies to the drive system for the compaction plate in the body container and to unloading via a discharge flap or by tipping.

Well-designed hydraulic drives and control technology are indispensable for this – even in times of increasing electrification and heightened demands on the productivity and safety of refuse collecting vehicles. The hydraulics remain the heart of these superstructures. The hydraulics remain the heart of these superstructures. Modern electro-proportional technology ensures high forces, comprehensive safety, and smooth, controlled movements. These electrohydraulic control valves are grouped together in one or more control blocks.



**CMVA monoblock and modular section solution** for a side loader

With its new, sophisticated, and award-winning electrohydraulic product range 'Compact-Mobile-Valves' CMV(A), Wandfluh Hydraulics + Electronics – known worldwide for its first-class proportional technology – provides manufacturers of refuse collecting vehicles with weight-optimised, user-friendly, and future-proof solutions for hydraulics.



**Front-loading** refuse collecting vehicle



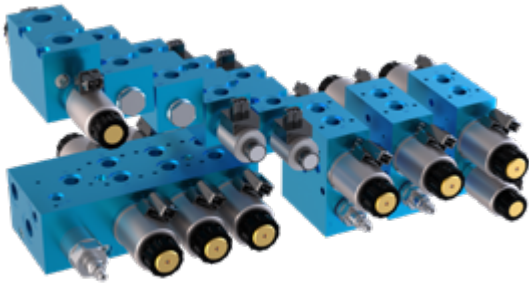
**Mini front loader,** rear-loading compact refuse collecting vehicle

In carrier vehicles, diesel engines are increasingly being replaced by battery electric drive systems (BEV). One example is the Mercedes-Benz eEconic, which has been in series production since 2022. Its battery capacity is designed to meet the daily requirements of a refuse collecting vehicle. The hydraulic pump system, which supplies the refuse collection body, is usually flanged to the diesel engine or the Electric motor via a PTO (Power Take-Off) Module.

**THE WANDFLUH CMV(A) SYSTEM – THE MOST VERSATILE AND FLEXIBLE COMPACT MOBILE VALVE SYSTEM CURRENTLY AVAILABLE ON THE MARKET.**

**DESIGN OF THE MODULES**

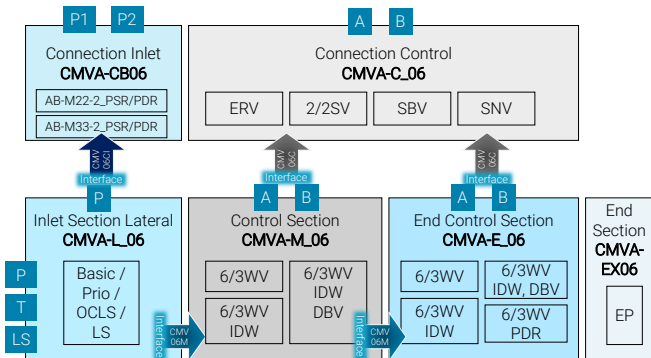
- Individual module sections
- Multiple sections / functions in a single monoblock
- Available in aluminium or steel



**FUNCTION OF THE MODULES**

- Input 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.

**CMV(A) 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 customised solution – reduces your TCD (total cost of design) – improves your machines / your end customers’ TCO (total cost of ownership)

**You can find out more about the CMV programme here:**

[wandfluh.com/en/produkte/compact-mobile-valves/](https://wandfluh.com/en/produkte/compact-mobile-valves/)



## REAR-LOADING MINI REFUSE COLLECTING VEHICLES – MINI REAR LOADERS

The design of the mini rear loaders offers a load capacity of between 5 m<sup>3</sup> and 10 m<sup>3</sup> and is mounted on chassis with a load capacity of 5 to 8 tonnes. These vehicles are very compact and manoeuvrable. They can cover confined waste collection situations, such as those found in particularly difficult old town areas, at high speed. The collected waste is transferred to a larger primary transport vehicle for final disposal (landfill, incineration, or composting). They are therefore also designated as 'satellite vehicles'.

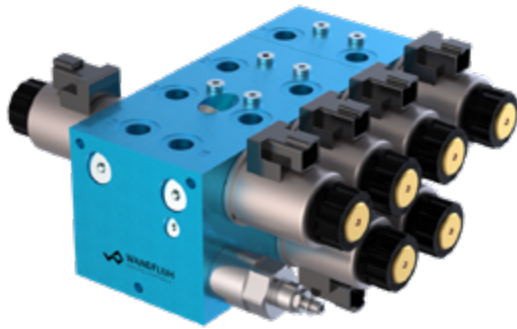
An automatic tipping system lifts and tips the bins into the container, where a compaction plate shovels the waste in and compacts it. The container is emptied by tipping.



**Mini rear-loading compact refuse collecting vehicle**  
in action

The Wandfluh solutions, developed in close collaboration with the customer, are based on the award-winning CMV(A) portfolio. They represent state-of-the-art proportional technology and ensure comprehensive safety as well as smooth and controlled movements.

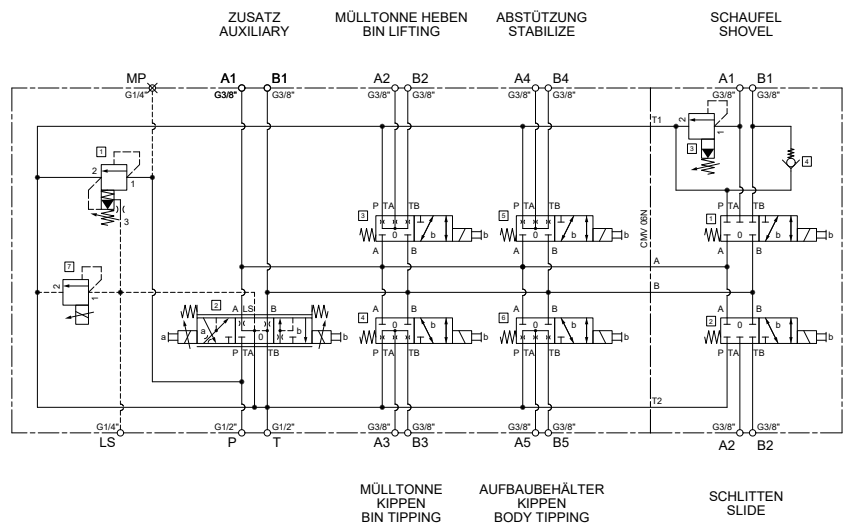
In terms of design, the system consists of one or two monoblocks, which are supplemented with individual modules as required to accommodate additional options. In solutions with two monoblocks, a control block is often provided for controlling the compaction plate (blade and carriage) and another control block for filling and emptying the body container. The movements take place sequentially or, if desired, in parallel with the filling and compaction processes.



**CMVA structural monoblock and modular sections**  
Complete solution for a mini rear loader

## ELECTROHYDRAULIC

- Clamp the bin
- Lift the bin
- Tilt the bin
- Tilt the bin back
- Lower the bin
- Release the bin clamping
- Close the bucket
- Raise the carriage
- Open the bucket
- Lower the carriage
- Extend the stabiliser cylinder
- Tilt the body
- Retract body container
- Retract support cylinder



**CMVA functional monoblock and modular section complete solution**  
for a mini rear loader based on the CMVA-06 system with p<sub>max</sub> = 250 bar,  
Q<sub>max</sub> = 60 l/min

## REAR-LOADING REFUSE COLLECTING VEHICLES – REAR-LOADERS

The rear loader is the most common type of refuse collecting vehicle, with a loading capacity of between 10 m<sup>3</sup> and 30 m<sup>3</sup>. It is mounted on carrier vehicles with a load capacity of 10 to 40 tonnes and 2 to 3 axle systems. The rear-mounted hopper is separated from the compaction chamber by a manufacturer-independent, standardised interface, meaning that systems from different manufacturers can also be combined. Loading and operating the hopper typically requires two refuse collectors, who each operate the hopper individually on the left and right with 2-wheeled refuse bins, or together with a 4-wheeled refuse bin.



**CMV integrated monoblock solution** for controlling the press plate system, in a piping-optimised execution on the left and right for the respective 2 blade and slide cylinders

The rear-loading body uses a compaction plate system consisting of a shovel, a slide, and a movable counter plate in the compaction chamber of the refuse collecting vehicle. The waste is filled into the hopper and pushed first inwards by the shovel and then upwards by the slide into the vehicle body, where it is significantly compacted. The movable counter plate inside the body generates the necessary resistance via an adjustable hydraulic back pressure. As the vehicle fills up, the counter plate is moved incrementally towards the driver's cab to free up further storage space.

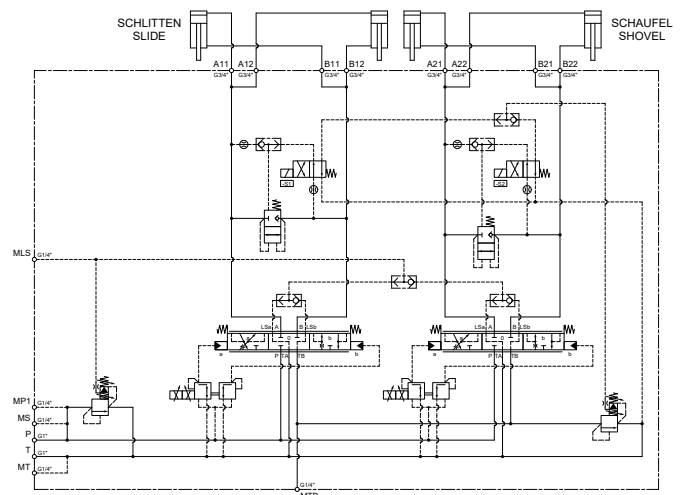
To empty the vehicle, the hopper is folded up completely so that the movable counter plate can push the collected waste out. The advantages of this system are the significant compaction of the waste and the vehicle's versatility.



**Rear-loading refuse collecting vehicle** in action

Wandfluh has extensive experience with the hopper, the press plate system, and the ejection cylinder. Depending on customer requirements, the solutions can consist of three monoblocks or be combined into one or two monoblocks.

The feeding system is based on tried-and-tested proportional technology, which is characterised by its sensitivity – regardless of whether single- or double-acting lift cylinders are used. For the back pressure adjustment of the ejection cylinder, we integrate manually operated and, optionally, proportional pressure valves into the solution. Our approach is rounded off by ingeniously designed controls for the press plate system, which allow the cycle time of the pressing process to be optimised to the full.

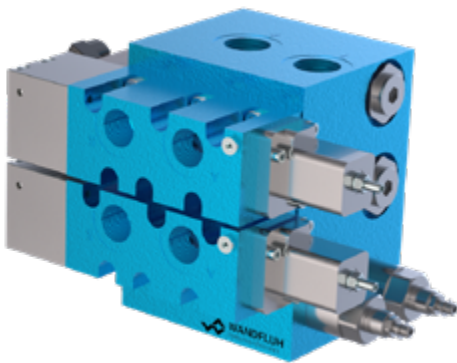


**CMVA functional monoblock solution** for a rear-loading machine, based on the CMVA-12 system with  $p_{max} = 350$  bar,  $Q_{max} = 150$  l/min. With the option of a switchable differential circuit for the bucket and/or slide to optimise the cycle time of the pressing process. In differential mode  $Q_{max} = 400$  l/min.

## FRONT-LOADING REFUSE COLLECTING VEHICLES – FRONT LOADERS

Refuse collecting vehicles with a front-loading system are primarily used in commercial waste collection for large-volume containers. The driver uses the front loader to pick up the containers, hoist them over the cab and tip them into a hopper at the rear. The basic system is similar across different manufacturers, but differs in the mounting of the lifting mechanism. The body is available in many sizes to fit different chassis (3- or 4-axle).

The waste containers have a volume of 0.7 to 15 cubic metres, meaning that during emptying, total weights of up to 3.5 tonnes are lifted over the cab. The compaction chamber is usually fitted with a compaction plate system, which compresses the loaded waste.



**CMV monoblock solution** for controlling the clamping system of a front-loading press, based on the CMVA-12 system with  $p_{max} = 350$  bar,  $Q_{max} = 150$  l/min. With a switchable differential circuit for the clamping system to optimise the cycle time of the clamping process.

To unload, the tailgate is opened upwards and the waste is pushed out of the rear of the vehicle using the compactor. To secure the load, there are two covers on the roof or a type of roller shutter that opens when the container is tipped and then closes again.

The vehicles can be fitted with weighing systems that determine either the total weight of the waste in the body or the weight of the individual containers. This enables weight-based individual billing for customers.



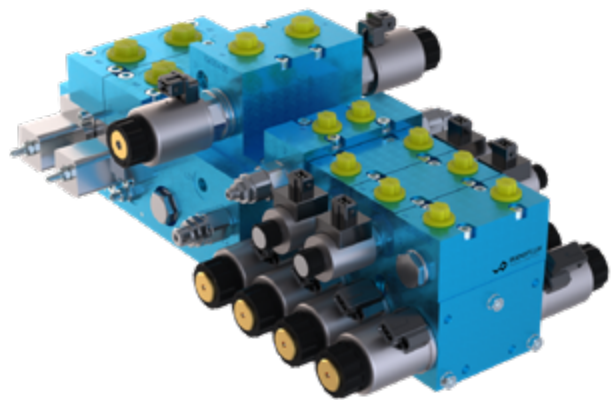
**Front-loading refuse collecting vehicle**  
in transport mode

## ELECTROHYDRAULIC FUNCTIONS

- Push, swivel and lift cylinders
- Closing cap, locking mechanism, lid cylinder
- Compaction cylinder, tipping cylinder assembly

Wandfluh solutions for the demanding loading of refuse containers implement the functions of push, swivel and lifting cylinders through sensitive, robust proportional technology based on our CMV-06, CMV-08 and CMV-12-technology with load-independent LS control at sectional flow rates of 60, 80 and 120 l/min respectively and pressures up to 250 and 350 bar.

Sophisticated, cycle-optimised solutions are also developed in collaboration with the customer for press control. These can be integrated into complete solutions in the form of a single control block or two main control blocks.



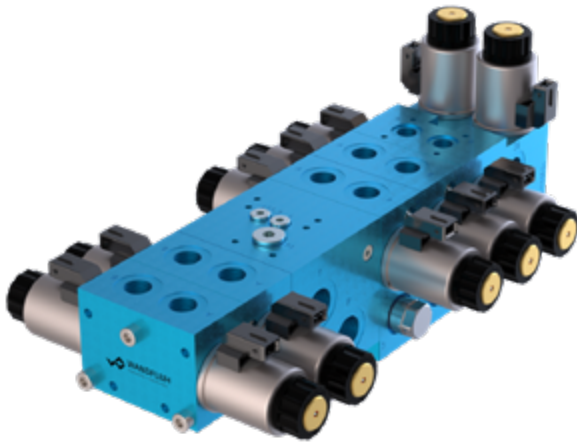
**CMV monoblock and Modular Section – Complete solution**  
for a front-loading machine. Q flow rate = 130 l/min,  $p_{max} = 350$  bar

## SIDE-LOADING REFUSE COLLECTING VEHICLES – SIDE-LOADERS

Side-loading refuse collecting vehicles have been developed for emptying smaller bins (up to 360 litres), in which the vehicle has a right-hand drive execution, like road sweepers. This allows the driver to better control the gripping of the bins. The containers are emptied into the higher-level hopper via the side loader in a short movement. None of the staff are required to empty the containers apart from the driver. However, customers must position the containers correctly and retrieve them.



**Side-loading bin**, side-loading refuse collecting vehicle in operation

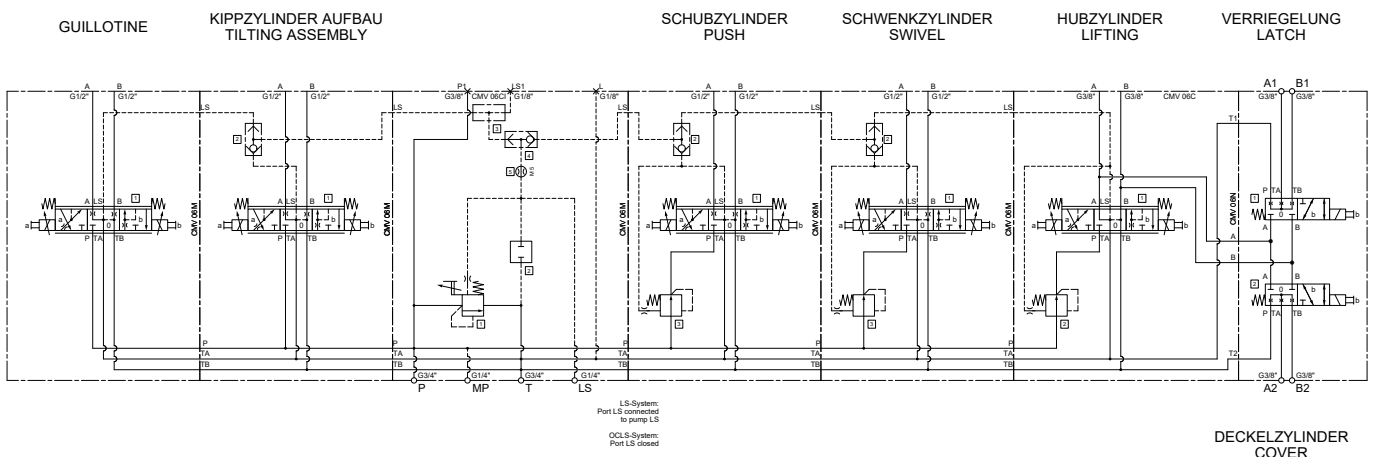


**Complete CMV and module section solution** for a side loader. Q flow rate = 120 l/min, pmax = 250 bar

## ELECTROHYDRAULIC FUNCTIONS

- Thrust, swivel and lift cylinders
- Closure cap, locking mechanism, lid cylinder
- Press, tilt cylinder assembly, guillotine

We offer complete solutions for the CMV-06, which can be supplemented with the CMV-08, CMV-12 and PMV-16 modules as required. In combination with a pressure flow-controlled pump, we build CCLS (Closed-Centre Load-Sensing) solutions. When using constant-displacement pumps – often one pump for filling and auxiliary functions and one pump for the press – our system is then designed as an OCLS (Open-Centre Load-Sensing) system.



**CMV monoblock and modular section solution** for material feeding and auxiliary functions on a side-loading machine. Q-inlet = 120 l/min, pmax 250 bar, Q-sectional = 60 l/min

## PERFECT INTERACTION BETWEEN CMV(A) SOLUTIONS AND ELECTRICAL CONTROL TECHNOLOGY

Mobile machines are extraordinary complex devices today. The use of electronic controls that support the operator and relieve them of routine tasks is therefore state of the art in these machines today. Driven by the desire for greater efficiency, ease of use and assistance systems, right through to autonomous operation, mobile machines are becoming increasingly intelligent and networked. Due to the diverse requirements that arise from this, the machines have a wide range of functions that must be mastered in the simplest feasible way. Perfect interaction between hydraulics and electronics in decentralised system architectures is necessary for powerful and innovative machines.



In this context, Wandfluh Hydraulik + Elektronik is ideally positioned to offer coherent and application-specific system solutions with high customer benefits. With its own electronics department, Wandfluh develops both hardware and software and can also respond to very specific customer requirements. The company's hydraulics and electronics specialists complement each other perfectly in this regard.

With their strong implementation skills and passion for detail, our interdisciplinary teams contribute to making our customers' machines more competitive and available more quickly. On the one hand, Wandfluh offers small, robust proportional amplifiers that can control a pressure valve or directional control valve in a functionally optimised manner. On the other hand, Wandfluh also offers mobile controllers that can control several valves proportionally. Wandfluh Electronics feature Integrated solenoid current control that minimises the influence of temperature on the magnetic coils, as well as an adjust-

table dither function which prevents the stick-slip effect and optimises the response behaviour and hysteresis of the valve. As described, the setpoint for the electronics comes from the joystick or from a higher-level control system via the standardised 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 magnetic outputs for control or regulation tasks, setpoint specification in the form of voltage, current, frequency or PWM.



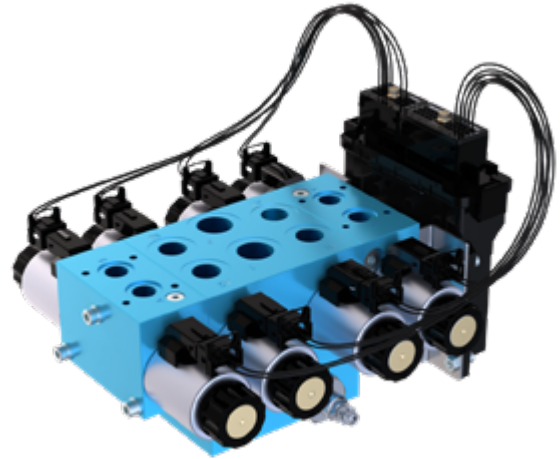
**DSV amplifier electronics** – Digital Smart Valve with digital amplifier electronics for controlling a proportional valve with one or two magnets. Plug & play solution with the valve. Robust, IP67, amplifier or controller, CANopen, J1939 or Profibus DP.



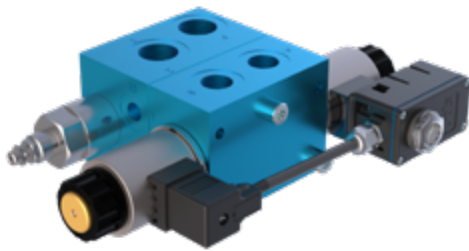
**PD2 amplifier electronics** – Digital amplifier module for controlling a proportional valve. IP67, CANopen or J1939.



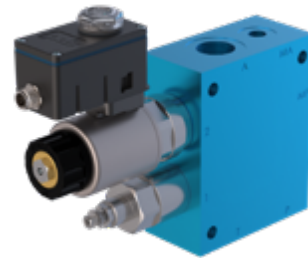
**PDS1 amplifier** – for direct mounting on proportional valves with 1 or 2 solenoids with DIN connector. Control with 0..+/-10V or 0..20mA. Simple wiring with standard M12 connector. Intuitive parameterisation via USB using the new Wandfluh PASO2.



**CMVA solution with integrated electronics (MD2 module)** – Integration of the control unit into a CAN bus-compatible system architecture for a refuse collecting vehicle



**Double-acting CMVA-06 control unit with on-board electronics (PDS1)**, for a conveyor belt drive – control block

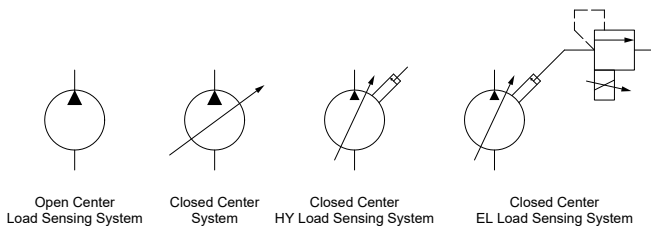


**Single-acting CMVA-06 control unit with on-board electronics (PDS1)**, for a worm drive – control block

## PUMP SYSTEMS FOR THE HYDRAULIC SYSTEMS OF REFUSE COLLECTING VEHICLES

The CMV(A) programme can be operated with all standard pump systems in the range of  $Q = 140$  l/min and  $p = 250$  bar (aluminium version) or  $p = 350$  bar (steel version).

The optimum interaction between the pump system and the hydraulics is an important aspect and is determined and adjusted in consultation with the respective manufacturer of the viticultural machine. The cost-effectiveness, efficiency and individual functional requirements of the machine play a significant role in this.



**Pump systems** that work perfectly with our CMV(A) system

With the comprehensive and compact CMV(A), Wandfluh Hydraulics + Electronics offers a solution that is precisely tailored to the requirements of modern refuse collecting vehicles. Through close collaboration and partnership between Wandfluh's specialists and customers, bespoke, innovative solutions are developed.

Wandfluh is your competent and responsive solution partner for refuse collecting vehicles.



**PERFECT TAILOR-MADE SOLUTIONS THROUGH SUCCESSFUL COOPERATION FOR THE TECHNOLOGICAL EDGE OF OUR CUSTOMERS**

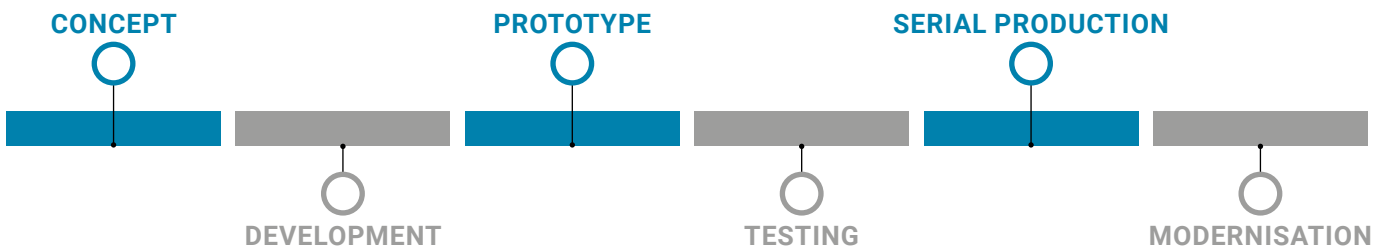
Our primary goal is to offer our customers the most suitable solution. Hydraulic control units are at the heart of modern mobile drive systems, as they precisely control pressure, volume flow, and motion sequences. As a partner with solution expertise, we understand the challenges of your markets and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

Our international network and partnership-based approach, our innovative strength, flexibility, and reliability help you to reduce unnecessary interfaces and benefit from perfectly functioning electrohydraulic solutions.



**SOLUTIONS**

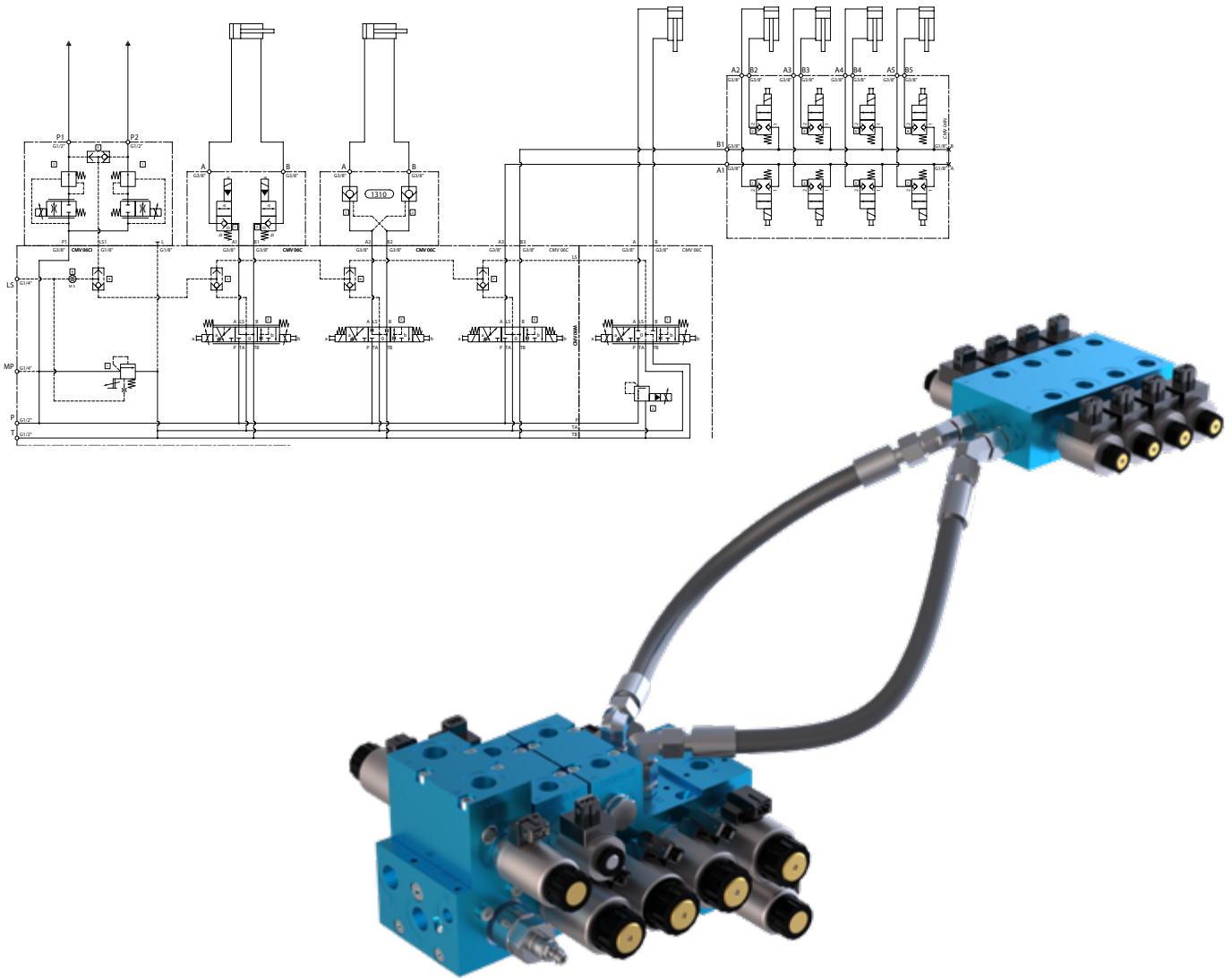
With great implementation skills and attention to detail, we help make your systems more competitive and keep them available faster. That is what drives us and is the key to our mutual success.



**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. Thus 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

TheWandfluhHydraulics+Electronicscorporatestructure 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 business, now in its third generation, we are committed to building long-term, partnership-based and dedicated relationships with our customers. We offer a high level of application and innovation expertise and are committed to continuously optimising our products and processes. In short, we strive for high-quality partnerships to achieve a remarkably high level of cooperation.



**Rear-loading lorries** in action

## TARGET APPLICATIONS MOBILE

Wandfluh Hydraulics + Electronics AG has been characterised by innovative thinking and passion since 1946 and is now a leading supplier of electrohydraulic valve and system solutions in the field of electrohydraulics. As a third-generation global family business, we inspire our customers worldwide with high-quality products. With a focus on specific application requirements and electrohydraulic functions, we develop targeted, innovative solutions – from standard components to cus-

tomers-specific components and systems – that contributes significantly to our customers' market success.

In addition to innovative solutions for refuse collecting vehicles, we have the necessary expertise and the appropriate product range to collaborate with our customers to develop user-friendly and future-proof applications for many other specific applications.

### MUNICIPAL MACHINERY

#### Refuse Collecting Vehicles

- Rear 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

### MATERIAL HANDLING MACHINERY

#### 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

### AGRICULTURAL AND FORESTRY MACHINERY

#### 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

### CONSTRUCTION MACHINERY

#### 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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