Quality products for demanding applications

WANDFLUH MARINE

SOLUTIONS SINCE 1946
We want to provide our clients around the world with high-quality products and get engaged as a valued partner in the development of technically demanding hydraulic systems.

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**FOCUS**
The harsh conditions at sea require robust and proven technology that works reliably within a relatively high temperature range. In the marine sector, the Wandfluh portfolio focuses on corrosion and explosion protection valve technology with low leakage. The range of marine products additionally includes valves constructed specially for the underwater world which, thanks to their pressure compensation, are designed for underwater robots with diving depths of 6,000 m. These valves are often powered by biodegradable water glycol. On numerous projects, Wandfluh has collaborated closely with its customers to develop partial or complete solutions that meet the high demands of the sector and the customers.

**CHARACTERISTICS**
• Corrosion protection valves (up to stainless steel)
• Explosion protection valves including electronics
• Valve technology for high external pressure
• Valves for water glycol
• Valves with reduced leakage
• Anti-cavitation protection
• Smart control with electronics developed in-house via a bus system or directly on the valve
• Miniature valves
• Redundant systems
• Individual customer-specific adaptations
• Worldwide customer service

**APPLICATION EXAMPLES**
• Ballast water management (actuation of ball valves and butterfly valves)
• Ship’s hatch control
• Brake systems for winches
• Control of the manipulator arms of ROVs
• Thruster control in underwater robots
• Precise positioning with port cranes

Wandfluh valves are increasingly being used in the marine sector. By using stainless materials or equivalent surface treatments, corrosion protection is guaranteed even in wet and salty conditions. When using water glycol as a hydraulic fluid, the inner workings of the valves are adapted accordingly.
APPLICATION ACTUATORS

All over the world, goods are transported by ship or pipeline from the producer to the consumer. To ensure safe loading and unloading, for example, ball valves are opened, throttled or closed via a hydraulic rotary actuator. When used in explosion-hazard areas such as on oil tankers, explosion-protected valves with corresponding certificates are used.

FUNCTION
The rotary actuators of the ball valves are usually controlled directly from the ship bridge or the command centre. In the event of a power failure, the industry standard stipulates that all ball valves must be completely closed via the accumulator operation. So-called 3/2-way poppet valves are used for a leakage-free hydraulic circuit, while 4/2- and 4/3-way spool valves allow only an almost leakage-free hydraulic circuit. On platforms that draw their energy from power generators, valves with reduced power are mostly used. Especially with valves in continuous operation, the power requirement can be significantly reduced.

COMPONENTS
Screw-in cartridges or flange valves from the standard range can often be used to control the rotary actuators. These are available as leakage-free poppet valves or as low-leakage directional spool valves in explosion-protected execution. In order to meet special requirements or constructions, more and more customer-specific valves are being developed and adapted to the various rotary actuators.

SPECIALTIES
• Standard valves with customer-specific adaptations possible
• Available as standard or Ex-protection execution
• Valves with power reduction
• Valves in various corrosion protection classes up to K10
APPLICATION STRADDLE CARRIER

In a globalised world where container ships with several thousand containers call at the world’s largest ports, the loading and unloading of ships is supported by fully automated systems. The containers are stacked by self-propelled lifting cranes, so-called straddle carriers, in an intermediate storage facility in the port area. The hydraulics and electronics installed in straddle carriers are often in use 24 hours a day, with any system failure leading to delays and high costs.

FUNCTION
Several straddle carriers are controlled from one control room. The dispatcher only indicates the desired end position of the container to the vehicle, everything else is managed independently by the vehicle. Due to its high payload, a straddle carrier has six to eight axes that are individually controlled, regulated and monitored hydraulically via proportional valves. For safety reasons, the entire hydraulics, including control electronics and axes control, is kept redundant, similar to aircraft construction. In addition to increased security, the system also gains significantly in availability. System failures and the associated time delays in 24-hour port operation are thus practically eliminated.

COMPONENTS
The heart of the system is the SIL2-capable steering controller. The steering unit transmits the values via a redundant CAN bus system to the controller, which compares and regulates the positions with robust angle sensors. The proportional amplifier electronics then controls the proportional spool valves and regulates the steering angle of the axes. All components are aligned with each other, allowing easy commissioning and controlled operation.

SPECIALTIES
- Manual vehicle steering and various driving modes selectable
- Flexible safety functions can be extended at any time
- Intuitive parameterisation software for commissioning and maintenance
- Aligned hydraulics and electronics from a single source
APPLICATION WINCHES

Hydraulic winches are used in various fields all over the world. One of the most demanding applications is surely on board ships, where salt water and high temperature differences affect the construction. Outstanding reliability and availability are certainly among the most important features of all systems used on the high seas.

FUNCTION

Winch systems on ships are used for lifting and lowering anchor chains, for installing underwater cables or for setting down and hauling nets and fish traps for fishing. In many applications, precise control of the rope tension in every operating phase is of the highest importance. Whether it is to avoid damage or to ensure the safety of the workers on the ship. The winch control is usually integrated into an overall system and interacts with a crane boom control or a linear cable engine, for example. Especially on large ships in rough seas, extreme forces act on the individual systems. These must be able to absorb the forces and have a high reliability so that the loads can be quickly hauled in the event of an impending storm.

COMPONENTS

Valves with increased corrosion protection and stainless external parts are mostly used for controlling the winches. When proportional valves are used, the associated control devices are pre-parameterised on the basis of the system reference values, so that the customer only has to readjust them slightly in the overall system using the intuitive PASO software.

SPECIALTIES

• Explosion protected valves
• Corrosion protected valves
• Valves with integrated electronics and controllable via CAN bus
• Customer-specific adaptations possible
Remotely Operated Vehicles (ROV) are most modern and precisely controllable underwater robots that are often controlled by an operator from a ship in shift operation. They descend to great depths, where they carry out repairs and manipulations on oil platforms, pipelines, etc. Pressure-compensated valves are used for positioning the ROV and for the complex motion sequences of the manipulation arms.

**FUNCTION**

The ROV is controlled from the mother ship via connecting cables. The entire hydraulics is located on the ROV and is designed for high pressures at great depths. It is equipped with special, pressure-compensated valves for this purpose. The operator's control commands are transmitted as electrical signals from the water surface to the ROV at a depth of over 3000 m and converted by NG3-MINI valves into a precise movement of the manipulation arms in real time. The manoeuvring and positioning of the robot is performed by thrusters, whose hydraulic motors are driven and controlled by large pressure valves with high volume flows.

**COMPONENTS**

The partly high volume flows for the thruster control are controlled by large and powerful proportional pressure reducing valves with a nominal volume flow of up to 250 l/min (nominal size M42). For the control of the manipulation arms, however, the small spool valves of the NG3-MINI series are sufficient. These miniature hydraulic valves were developed as pilot valves as well as for special applications such as ROVs or sewer robot cameras and cover a niche in many areas of modern mechanical engineering. The advantage of these miniature valves is on the one hand their size and weight and on the other hand their low electrical power consumption, which is particularly important for remote-controlled or autonomous systems.

**SPECIALTIES**

- Valves with pressure compensation
- Integrated on-board electronics
- Various connector variants or potted cables for easy installation
- Execution for water glycol as hydraulic fluid
Valves adapted to the various applications ensure that the different requirements such as small leakage, freely adjustable volume flows or pressures as well as seat tight closing of control lines can be readily realised. Perfect coordination of valve and electronics leads to simple drive solutions for precise movements and sensitive valve actuation.

**SPOOL VALVES LOW-LEAK WDMF**

**CHARACTERISTICS**
Actuators that are supplied in conjunction with an energy-saving pressure accumulator supply are dependent on minimal losses.

**FEATURES**
- Direct operated
- Very low leakage
- Detented, spring-centred or with spring-reset
- Precise spool adjustment
- Nominal sizes NG4 and NG6

**SPOOL VALVES FLANGE WDPFA**

**FEATURES**
The volume flow is controlled proportionally to the solenoid current. A cylinder can thus be moved forward and backward at variable speed.

**CHARACTERISTICS**
- Progressive characteristic
- Good repeatability
- Direct or pilot operated
- Pressure max. 350 bar
- Flow max. 200 l/min
- Nominal sizes NG3, NG4, NG6, NG10

**PRESSURE REDUCING VALVES MDPP, MVPP**

**FEATURES**
Reduces the input pressure to the desired starting point. The pressure in A is continuously adjusted via the solenoid current.

**CHARACTERISTICS**
- Linear characteristic and good repeatability
- Direct or pilot operated
- Pressure max. 350 bar
- Flow max. 250 l/min
- Nominal sizes M16, M18, M22, M33, M42, U10
POPPET VALVES SVSPM, SDSP

**FEATURES**
For tight closing functions, to hold loads in position or to close lines tightly.

**CHARACTERISTICS**
- Cartridge, flange and sandwich construction
- Solenoid actuation
- Direct or pilot operated
- Metallically sealing seat
- Detented or with spring reset
- Pressure max. 420 bar
- Flow max. 300 l/min
- All constructions and nominal sizes

SPOOL VALVES WITH INTEGRATED ELECTRONICS WDRFA06

**FEATURES**
The volume flow is controlled proportionally to the command value signal. The Valve is adjusted ex works.

**CHARACTERISTICS**
- Linear characteristics
- High dynamics (35Hz)
- Very good repeatability and very low hysteresis
- Direct operated
- Integrated amplifier electronics with spool position control
- Optionally with controller function
- Pressure max. 350 bar
- Flow up to 40 l/min
- Nominal sizes NG4 and NG6

ROV CONTROL VALVES FOR WATER DEPTH UP TO 6000 M

**FEATURES**
The valve utilisation in ROVs (Remotely Operated Vehicle) in the underwater area requires a resistance to a high external pressure.

**FEATURES**
- Different solenoids with pressure compensation bore
- With screw terminal connections
- Potted loose cables without connectors
- Status display by means of LED

ELECTRONICS SD7

**CHARACTERISTICS**
Digital controller module for regulating position, pressure or volume flow including integrated amplifier.

**FEATURES**
- Controller mode selectable: pressure, position, speed
- Solenoid current regulated, with superimposed dither
- Command and feedback values as voltage or current
- Up to 7 digital inputs and up to 4 outputs
- Optionally with fieldbus (CANopen, Profinet, HART)
- Housing for dome rail mounting
- SSI interface
- Analog output
Flammable gases, vapours and dust can form an explosive atmosphere when mixed with oxygen. In order to ensure a high level of safety, appropriate protective regulations exist for the various operating equipment to avoid the risk of explosion hazards. The solenoid as an electrical actuation in the valve technology must therefore demonstrate a type of protection that is in line with the explosion protection standard. Valves that are exposed to continuous contact with salty water and atmospheres that contain salt or to harsh weather conditions demand enhanced corrosion protection in order to prolong their service life.

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### EXPLOSION PROTECTION

**Description**
- Electrical operating equipment for all explosion hazard zones
- Solutions for valves and systems
- Optionally enhanced corrosion protection up to stainless steel executions

**Functions**
- Solenoid spool valves
- Solenoid poppet valves
- Proportional spool valves
- Proportional pressure valves (relief and reducing)
- Proportional flow valves (throttle and flow control)
- Electronics integrated into the valve for proportional functions

**Features**
- Type of protection flameproof enclosure (Ex d) for zone 1 and 2
- Type of protection intrinsic safety (Ex i) for zone 0
- Certified solenoids for surface and mining areas
- Certificates for ATEX, IECEX, EAC, UL/CSA, Australia, MA

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### CORROSION PROTECTION

**K8: 500 - 1000 h salt spray test**
- Zinc-nickel coating, or made of stainless materials.

**K9: > 1000 h salt spray test**
- Mainly made of stainless and acid-resistant steel AISI 316L. The solenoids are zinc-nickel coated.

**K10: > 1000 h salt spray test**
- All elements made of stainless materials (AISI 316L) or coated with stainless materials.

### LOW TEMPERATURES

**Z604: -40 °C**
- Adapted sealing, adjustment tolerances partly adapted

**Z591: -60 °C**
- Special materials, special sealings, adjustment tolerances enhanced
SPECIAL VALVES

Wandfluh valves are constructed in a modular way and are thus very flexible in their composition. This allows different standard functional elements to be combined, so that individual solutions can be easily realised.

POPPET VALVES WITH DETENT FUNCTION

CHARACTERISTICS
The valve holds the closed position without having to be permanently energised. One electrical impulse is sufficient for it to be subsequently held mechanically in position.

FEATURES
- 2-way or 3-way function
- Electrical actuation with standard or Ex d solenoid
- Combination of an electrical actuation with a mechanical actuation possible
- Valve state can be displayed with position sensor
- Pressure max. 350 bar
- Flow up to 80 l/min
- Nominal size NG6

VALVES WITH SWITCHING POSITION MONITORING

CHARACTERISTICS
An electronic sensor detects the switching position of the valve. By detecting and evaluating a switching error, the safety and availability of the overall system can be increased.

FEATURES
- For various spool and poppet valves
- In combination with standard and Ex d solenoids
- Inductive switching sensor
- Pressure max. 350 bar
- Flow up to 160 l/min
- Nominal sizes NG6, NG10

SEAT TIGHT PRESSURE CONTROLLERS

CHARACTERISTICS
Controls the adjusted output pressure independent of the volume flow and closes seat tight. This reduces losses in the system.

FEATURES
- Manual adjustment of the output pressure
- Good pressure control in case of volume flow fluctuations
- Seat tight
- Pressure max. 350 bar
- Flow up to 20 l/min
- Cartridge with cavity M22x1,5