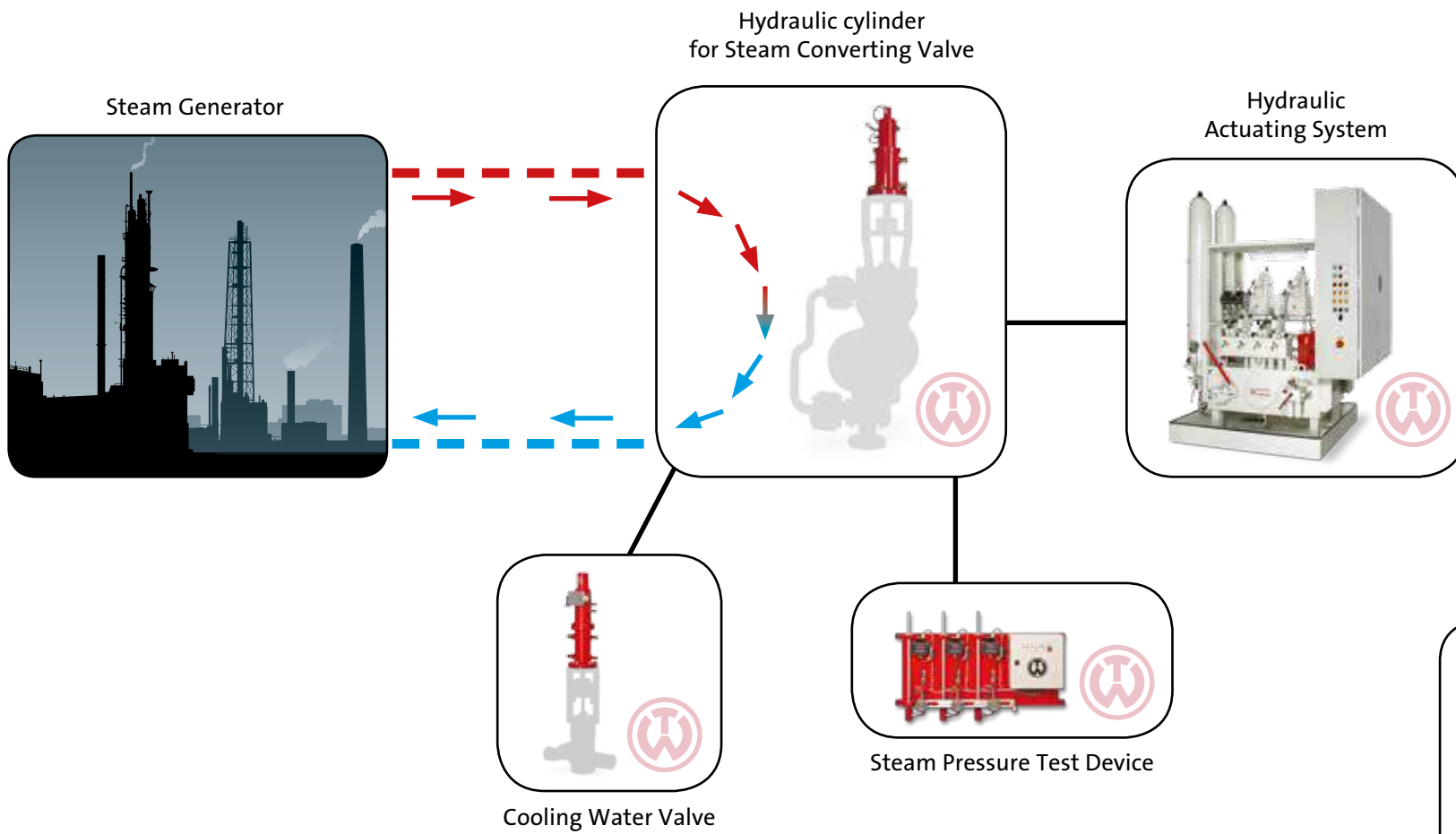


**Hydraulic Actuating Systems**  
*for bypass stations and process applications*



**WELLAND & TUXHORN AG**  
ARMATUREN- UND MASCHINENFABRIK

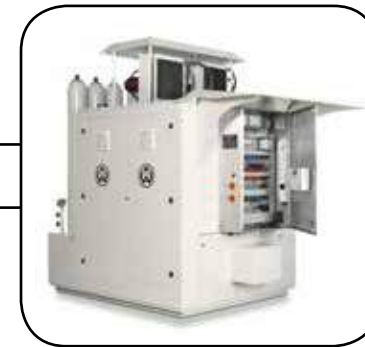




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## We Take Responsibility for the System

### *System overview*



Our system is comprised of the combination and network of valve, actuator and electrohydraulic components. The system allows predefined input values to be transformed into the required output value.

Our expertise forms the foundation for integrating and selecting subcomponents such as valves, hydraulic cylinders, hydraulic regulators, boosters, PLC, and so forth.

The integration of these subcomponents helps you, as a customer, to reduce and avoid the need for additional interfaces.

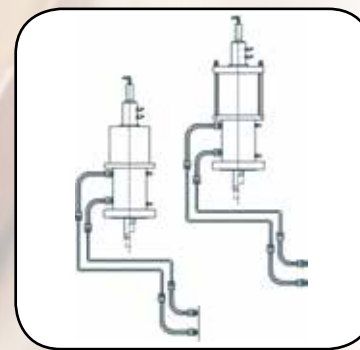
When it comes to system optimisation, our task is to select and design the subcomponents and to ensure the subcomponents are correctly combined to form an integral system.

And we take responsibility for this system! We'll shake hands on it!

Hydraulic control unit

DCS - System

Valve



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## Seamless Integration

*Everything from one single source*



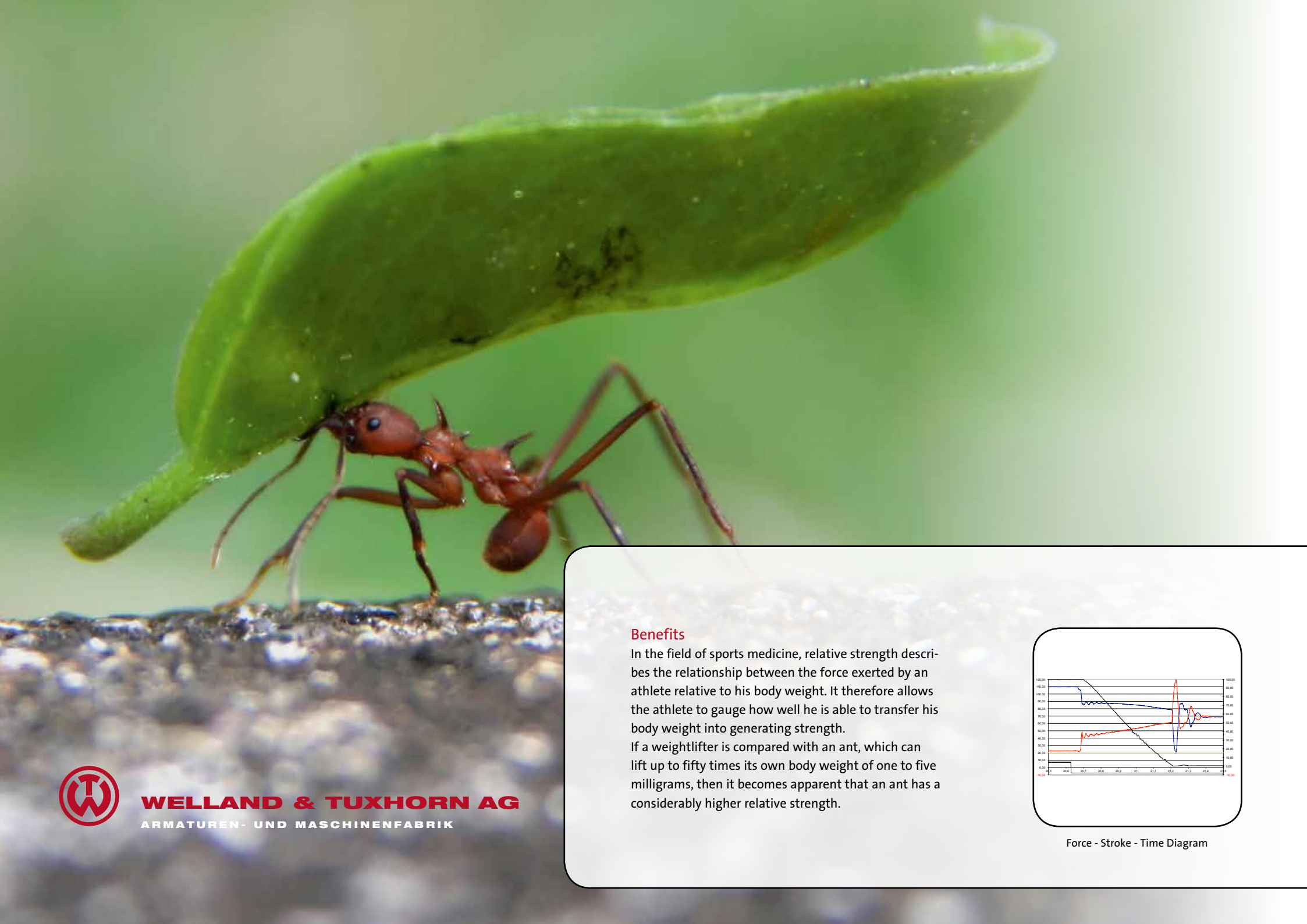
The interface is the part of the system used to enable communication.

This term has its origins in the natural sciences, where it is used to describe the property of a system figuratively as a Black Box – only the “face” is visible and communication can only take place using this face. The control technology and black boxes can only communicate with each other when their user interfaces are compatible,

meaning their interfaces are synchronised. This is exactly how we work too. When you source your system (valve, actuator, hydraulic unit including hydraulic pipes and field cabling) from us, you will benefit from a single – source solution. You only have to contact one person for all your needs and requirements for the overall system. This means less work for you, higher reliability, shorter waiting times, shorter distances and fewer misunderstandings. It is only

when the diverse subcomponents have been perfectly harmonised with each other and integrated into the system that the system can realise its optimum output properties.

Our services are rounded off by hydraulic pipe planning and installation, along with field cabling and starting up operation of the entire system, which we are happy to provide as an extra service.

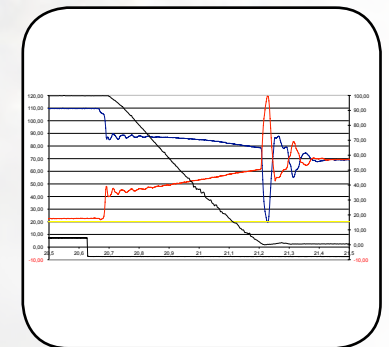


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### Benefits

In the field of sports medicine, relative strength describes the relationship between the force exerted by an athlete relative to his body weight. It therefore allows the athlete to gauge how well he is able to transfer his body weight into generating strength.

If a weightlifter is compared with an ant, which can lift up to fifty times its own body weight of one to five milligrams, then it becomes apparent that an ant has a considerably higher relative strength.



Force - Stroke - Time Diagram

## Our Hydraulics

*Powerful, precise and fast*



So too does the hydraulic cylinder, the most important element operating in the hydraulic system, provide the advantage of a high relative power, namely the ability to transfer large forces in a small space.

The energy from the hydraulic fluid, which is supplied by a hydraulic pressure accumulator or a hydraulic pump, is converted into a linear force which can be precisely controlled by elements which regulate the flow of fluid, and the force allows the valves connected to be opened or closed directly without any significant loss of efficiency. Highly uniform,

exact, and large movements (strokes) are also possible, because the compression of the hydraulic fluid is so low that it can avoid compromising the effect of technical applications. This also makes speed control under load within a large adjustment range possible and ensures no problems occur. Implementing the safety functions (Fail-Safe) or those described in DIN EN ISO 4126-5 (Controlled safety pressure relief systems, CSPRS) is made possible by using spring-loaded cylinders or by supplementing the system with our type-tested safety valve control unit.

Using largely standardised elements and sub-assemblies, as well as engineering the structural elements for flexibility, allows a very robust design to be implemented which ensures high machine availability. A long service life and low system maintenance requirements, thanks to self-lubrication of the sliding parts by the hydraulic fluid, enhances the benefits provided by our hydraulic systems.



Hydraulics	NBF 50	NBF 80/100	NBF 160	NBF 250	NBF 250S	NBF 400	NBF 630	NBF 800
<b>General</b>								
Oil volume	50l	80l/100l	160l	250l	250l	400l	630l	800l
Oil reservoir / Material	steel sheet 1.0038 / stainless steel 1.4301							
Oil tray as per Water Resources Act (WHG) / Material	steel sheet 1.0038 / stainless steel 1.4301							
Design	directly built-on	adjoining	adjoining / separate installation					
Number of valves to be controlled*	1	1-2	1-3	2-6	3-9	4-10	6-12	8-18
System control unit	black box or activation by the control system							
Oil heating	optional, version depends on the design size							
Housing	-	-	optional: W&T type 1 (protected against dust) or W&T type 2 (protected against spraying water)					
<b>Pump system</b>								
Number of oil pump units	1-2	1-2	2 x 100% redundant					
Electric motors*	2,2 / 4 kW	2,2 / 4 kW	4 kW	4 kW	7,5 kW	7,5 kW	7,5 kW / 11 kW	7,5 kW / 11 kW
Oil pump unit*	gear-type pump 4/8 cm <sup>3</sup>	gear-type pump 4/8 cm <sup>3</sup>	gear-type pump 8 cm <sup>3</sup>	gear-type pump 8 cm <sup>3</sup>	gear-type pump 8 cm <sup>3</sup>	gear-type pump 8 cm <sup>3</sup>	gear-type / radial piston pump 11/19 cm <sup>3</sup>	gear-type / radial piston pump 11/19 cm <sup>3</sup>
Oil filter	high-pressure in-line filter 10 µm		high-pressure in-line double filter 10 µm					
Oil cooler	-	-	if required, depending on the ambient conditions: oil, air or oil water cooler					
Hand pump	basic features: double stroke hand pump for emergency operation							
<b>Accumulator system</b>								
Type of accumulator	membrane / bladder accumulator 2 - 32l		Bladder accumulator volumes 32 - 50l					
Number of accumulators*	1	1 to 2	1 to 2	2	2 to 3	3 to 4	4 to 6	6 to 8
<b>Electrical operation</b>								
Supply voltage	three-phase AC 400/690 V - 50/60 Hz (other supply voltages available on request)							
Control voltage	24 V DC - direct feed-in from a UPS or by an integrated transformer							
Measuring equipment for monitoring the system	manufacturer standard or in compliance with customer specifications							
System pressure monitoring	binary: 4-channel pressure switch / analogue, via pressure transmitter							
Fill level and temperature display	binary: combined level and temperature switch / analogue: via level and temperature transmitter							
Corrosion protection	manufacturer standard or in compliance with customer specifications							
Operating media	hydraulic oil HLP 46 / Quintolubric (HFD fluid, low inflammability) / FYRQUEL EHC-N fireproof hydraulic fluid (phosphate ester)**							

\* Version varies according to actuator volume

\*\* FYRQUEL EHC-N can only be used in combination with an oil regeneration unit



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## Versions of Hydraulic Systems

*Solutions for diverse applications*

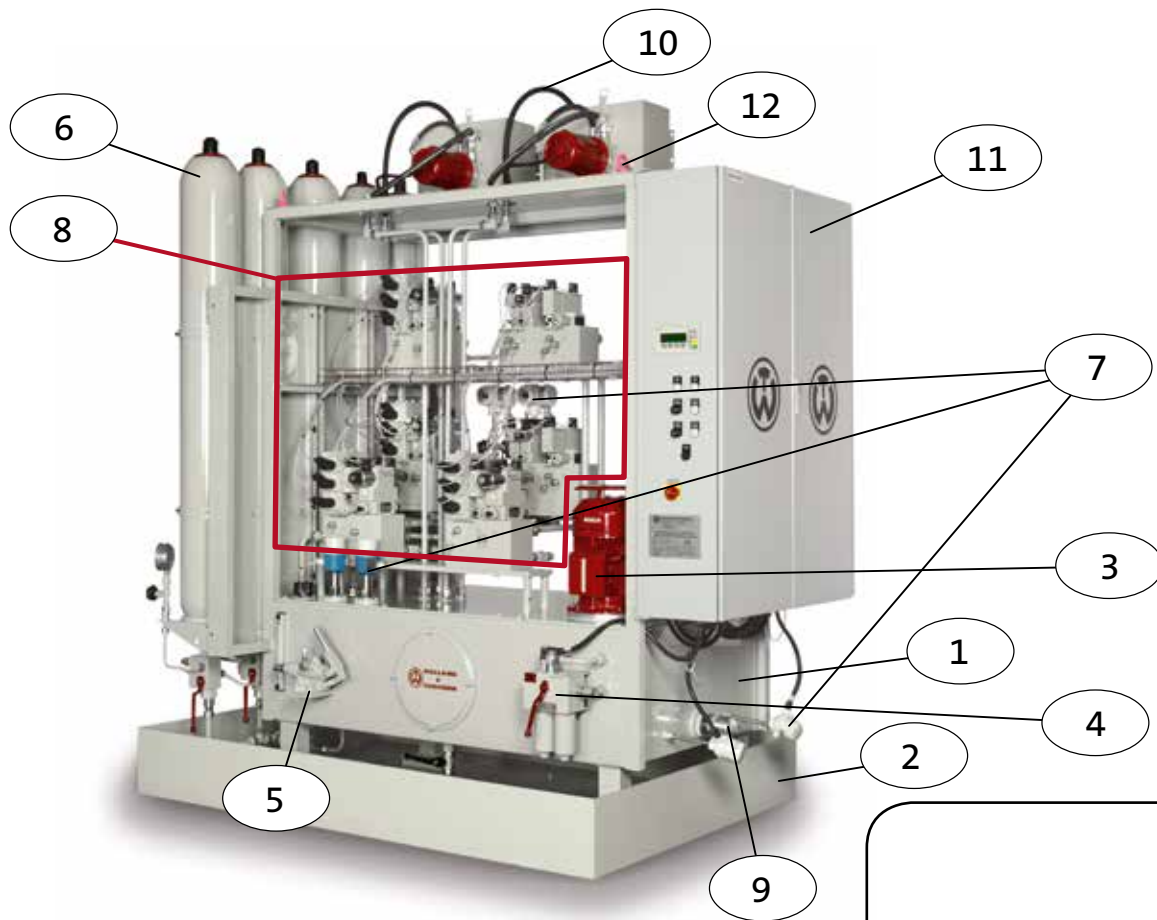


### We adapt

To ensure a system can execute its tasks optimally, the subcomponents must be perfectly harmonised with each other.

We supply our hydraulic actuating systems in a range of different versions in order to do justice to the multitude of requirements placed on the systems.

Our range of models ranges from compact actuators to fit on one individual valve, and also includes separate systems for up to 18 valves.



Even within the individual models, different components are available for different application purposes, which can be selected to suit customer specifications exactly.

Further details and more exhaustive technical information can be found in our technical information titled "Hydraulic Actuating Systems".

The following versions are available for selection for the individual components:

- 1 Oil reservoir as per DIN 24339 & Water Resources Act (WHG)
- 1.1 Filling filter / air filter
- 1.2 Optical fill level indicator
- 1.3 Discharge valve
- 1.4 Cleaning / maintenance cover



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## Available Components

*Details make the difference*



2	100% oil tray in compliance with Water Resources Act (WHG)	6.3	Pressure gauge shut-off valve (single / double shut-off)	8.2	Control function: servo, proportional or step-action control
3	High-pressure pump unit redundant			8.3	Trip function: open/closed
	• Gear-type pump / radial piston pump	7	Measuring equipment for system monitoring		All functions with mechanical throttle/check valves
4	Pressure filter		• Binary as a switch, or analogue (4 - 20 mA) as transmitter	9.	Oil heating: cartridge / immersion heating (self-regulating)
	• Switchable double filter with clogging indicator	7.1	System pressure monitor	10.	Oil cooler: air / water cooler
5	Hand pump for emergency operation	7.2	Oil level monitor	11.	Control cabinet (interface to the control technology)
6	Pressure accumulator (operating / safety accumulator)	7.3	Oil temperature monitor		Black box system or complete actuation by the control technology
	• Bladder accumulator, piston accumulator or membrane accumulator	7.4	Clogged filter monitor	11.1	Main switch for the different feeds
6.1	Accumulator safety block	7.5	Leak sensor for oil trays	11.2	Display / operating elements: operating panel / LED lamps / switch
6.2	System pressure display	8	Multifunctional control blocks	12.	Transport lugs
		8.1	Safety block: 1-fold / 3-fold		* Technical modification / variations reserved



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SIL3 Certificate



EC Prototype test

## Additional Safety

### *Electrohydraulic safety valve control system*

Our TÜV-certified electrohydraulic safety valve control system reliably protects your plant, boiler, pipelines and downstream systems against overpressure. The control system complies with the valid safety standard DIN EN ISO 4126-5 and is certified with the type test approval TÜV-SV 09-886 as well as SIL3 according to DIN IEC 61508.

The following components interact to provide the safety control system:

Steam pressure test device, safety valves (safety block) at the hydraulic station and cup spring set in the actuator.

The process pressure is monitored by the steam pressure test device using a 1oo3 safety feature. When it is triggered, the safety chain electric current is switched off, generating the pressure compensation in the hydraulic system which allows the valve to be safely moved into its end position with the aid of the cup spring set. Because the system operates according to the closed circuit current principle, safety is always guaranteed even in the event of power failures. The system is controlled without the need for software and is hard-wired. This enhances the reliability



of the entire system.

You will receive the steam pressure test device in the version suitable for you, either as a wall-mounted unit, completely enclosed or with supports for free-standing installation. These components are each comprised of a combination of 3 impulse lines, shut-off valves, pressure switches and an indicator panel as the interface to the hydraulic station. Optionally, an additional 2oo3 temperature protection is available. This allows us to guarantee the highest possible degree of safety for your system, your staff and the environment.



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### **Our service**

We accentuate service, because commissioning the system for operation and regular servicing are matters for the experts.

The technicians at Welland & Tuxhorn are constantly on call for service assignments and they travel the world in the process. They take care of any maintenance tasks required in close cooperation with the machine operators, reliably and within the agreed time.

Maintenance on Welland & Tuxhorn hydraulic systems



## Our Service for You

*Installation, maintenance and repair by the manufacturer*



must be performed by experts to ensure the valves and control system continue to function and work in sync.

### On-site maintenance – a job for the professionals

The company's own service organisation, with its trained and highly specialised staff, makes inspections and maintenance possible worldwide and thereby guarantees optimum support for the customer:

- We commission the system for operation
- We take care of the maintenance on your system

- We plan enhancements for your system in accordance with the newest technological innovations
- We react quickly and reliably when spare parts are required
- We carry out annual re-checks

### Maintenance at the plant

Our maintenance department is incorporated into the production plant. We test all parts for suitability for further use, and repair them expertly.



**WELLAND & TUXHORN AG**  
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## Cooperating to Achieve Our Goals

*Fine-tuning in all areas*

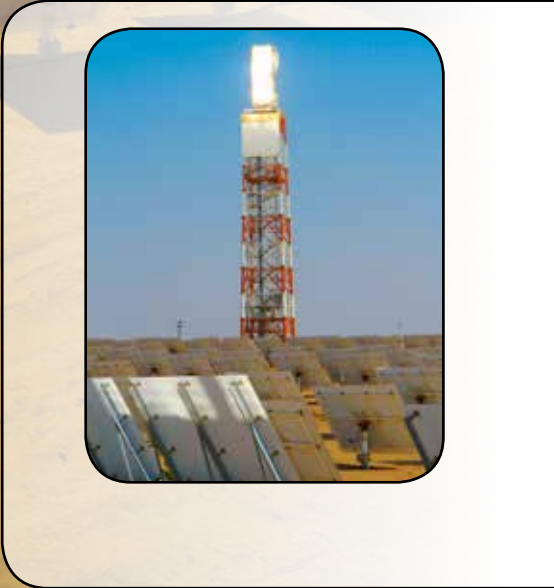
Single-unit and limited-lot production requires up-to-date technology and highly-qualified personnel.

Our customer-friendly service, consistent with theory and practice, is based on working closely together with planners and operators, and research projects at renowned technical colleges and institutes, and is the result of decades of experience worldwide. Innovative solutions are developed by our experienced employees, and in cooperation with universities and scientific institutions. Thus

the high technological standard at Welland & Tuxhorn is continually improved. Welland & Tuxhorn guarantees the best possible consultancy, expert knowledge and ideas, system-specific solutions, first-class raw materials, know-how, expertise and commitment from a highly-motivated team. An experienced team of trained and highly-specialised service personnel is continually at work all over the world, cooperating closely with the operating companies, in carrying out commissioning tasks, required inspections



and maintenance work. This ensures the best possible customer support. Our maintenance department inspects the parts and fittings to check whether they are still fit for use and maintains them expertly, thereby gathering new information that is integrated into the design and material technology areas. Individual situations require expertly tailored solutions. We provide you with expert support for complex tasks. Talk to our engineers and technicians and find the solution that is best for you!



**WELLAND & TUXHORN AG**  
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## Our Contribution to Climate Protection

*Environmentally-conscious products for the future*

### Our contribution

Using resources sparingly is our sustainable contribution to climate and environmental protection.

Our high development and quality standards also apply to protecting nature and society. Already in the design phase of our operating processes we ensure that energy and fresh water consumption is kept as low as possible. Precise planning, forward-thinking organisation and detailed fine-tuning ensure that all processes from the development to the actual product are checked and opti-

mised with regard to ecological saving potential. From products which boost efficiency for high-efficiency power plants to solar thermal systems, we are assuming responsibility for the climate. And we are investing in high-temperature research and CO<sub>2</sub> minimisation for the benefit of the coming generation. And with our products we make a contribution to meeting the increasing worldwide energy requirement in an efficient, ecological and socially acceptable way.

**Since time immemorial:** Less consumption means more for everyone.



Certificate Water Resources Law



**WELLAND & TUXHORN AG**



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## Made In Germany

*You will get a top product made by German valve engineering industry*

### Our philosophy

A high level of precision, processing quality and durability have distinguished the development and production processes at Welland & Tuxhorn for over 100 years. Continuously working together with renowned power station planners and operators and with technical and scientific institutes, we have gathered theoretical and practical experience and applied this to consistently optimise our products. The proof is in our success - special regulating valves from Welland & Tuxhorn are operating all over the world!

### Our quality

Our consistently high product quality is the result of a well-thought-out concept: we implement a range of quality assurance measures and comply with all the requirements of DIN EN, VdTÜV, AD-2000, (DIN EN ISO 6126 Part 1), ASME, ANSI, IBR and RTN as well as PED. Our quality assurance system is approved by the following regulations:  
DIN EN ISO 9001:2000, Directive 97/23 EG (PED), KTA 1401 and ASME. We have our products inspected and evaluated by recognised authorities.

### Our service

After a product is delivered, an experienced team of service technicians is available for consultation during the start-up phase, or to carry out routine inspection work. Maintenance is integrated into our production process. Inspections as to continued usability and expert maintenance in the light of the latest expertise in material technology and design, are carried out by our highly qualified personnel.

**Contact us – our engineers and technicians will provide you with individual and expert advice.**





**WELLAND & TUXHORN AG**  
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## **And Finally**

*We look forward to working with you*



### **Contact us**

Gütersloher Straße 257  
D-33649 Bielefeld  
Phone +49 (0)521 9418-0  
Fax. +49 (0)521 9418-170, -156  
[www.welland-tuxhorn.de](http://www.welland-tuxhorn.de)  
[info@welland-tuxhorn.de](mailto:info@welland-tuxhorn.de)



Contact us

Gütersloher Straße 257  
D-33649 Bielefeld  
Phone +49 (0)521 9418-0  
Fax. +49 (0)521 9418-170, -156  
[www.welland-tuxhorn.de](http://www.welland-tuxhorn.de)  
[info@welland-tuxhorn.de](mailto:info@welland-tuxhorn.de)