

**Reliable products for demanding fluids:
KSB heat transfer engineering.**



**Innovation is part of our tradition.
So are all-in solutions
for heat transfer applications.**



One of the principles of our success, especially in heat transfer engineering, is to identify market requirements at an early stage and meet them by developing appropriate technical solutions. Where heat transfer systems are concerned, our complete know-how flows into providing 100 % reliable, leakage-free thermal oil handling and preventing costly downtimes. Innovative, seal-less mag-drive and canned motor pumps, conventional pump sets with extended cooling distance and high temperature resistant valve type series from KSB surpass the requirements laid down in standards.

The understandable demand to save energy, in particular, has greatly influenced our recent development work. From our pumps' optimised combination of motor and hydraulic system to the standard use of IE2 motors, speed control and the optimised flow paths developed for our valves, we enable our customers to plan their heat transfer systems with energy efficiency in mind.





From lightweight concrete to heavy oil: thermal oils offer the solution

Whether warming up sand and gravel to produce concrete in winter or frost-proof heating in heavy oil transfer and mineral oil processing: no other method is as well-suited to a wide range of high-temperature applications as thermal oil technology. Mixer tanks, storage tanks and reactors for paint and coatings production are gently warmed with thermal oils, while bitumen products can be treated and transported at the precise temperature specified. And heat transfer systems deliver both the heat required by a timber drying system or particle board press and the precisely controlled temperature necessary for an industrial baking oven.

Worldwide, thermal oils play a vital role in diverse processes integral to numerous industries from chemicals and pharmaceuticals to textiles, plastics and electronics. In a field this demanding, no other pumps, valves and systems supplier can offer you KSB's level of experience, product quality and service.

Thermal oils supply:

Air emission control systems, agitator tanks, baking ovens, bitumen tanks, boilers and cookers, building heaters, calenders, concrete mixing plants, continuous-flow dryers, cooling/heating systems, deep fryers, dishwashers, distillers, foil systems, galvanic baths, grease liquefiers, impregnators, ironing presses, laundries, particle board presses, pasteurisers, powder coating systems, printed board lines, reactors, roller presses, sausage boilers, sludge dryers, smokers, steam peelers, storage tanks, veneering presses, etc.

KSB's pumps and valves: strength at the heart of heat transfer circuits.

More than 1 million pumps and countless valves sold: that's the proud track record after 130 years of KSB. Our products provide the "beating heart" of heat transfer circuits in a remarkably varied range of sectors. Mag-drive pumps such as the Etamagno SY are built to a design that itself rules out any possibility of fluid leakage. On the HPK and Etanorm pumps, special mechanical seals are separated from the hot pump chamber by a cooling distance. This means that the HPK, for example, can pump thermal fluids up to 400°C without a cooling water supply. Canned motor pumps such as the Secochem Ex K with external cooler or the HT range from Nikkiso-KSB can also handle temperatures of up to 400°C. These pumps can still be used at temperature ranges where conventionally sealed pumps are prohibited by law.

Where KSB heat transfer pumps benefit from improved, cavitation-reducing flow paths ensuring a markedly increased lifespan, the optimised flow paths of KSB heat transfer valves reduce pressure losses and facilitate the system's economical operation. When used in thermal oil circuits, pumps and valves are especially crucial: it is a challenge we endeavour to handle responsibly. As a manufacturer of innovative products and trusted, competent partner to heat transfer system designers and operators, we set global standards in heat transfer engineering.

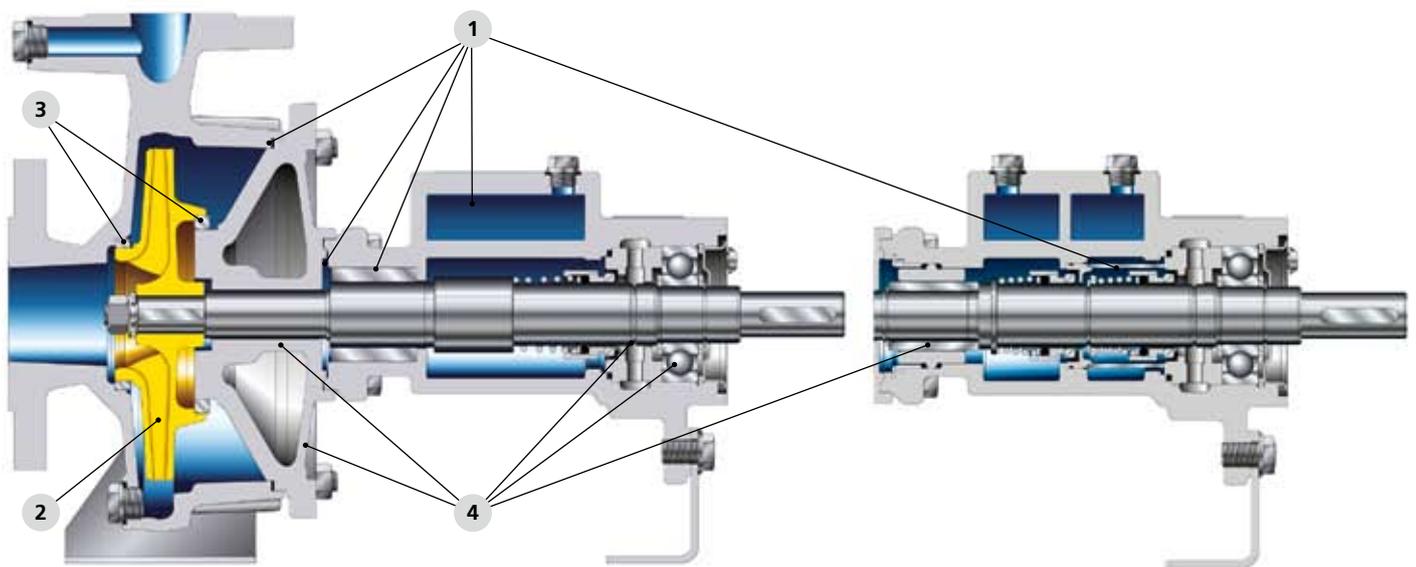
Heat transfer systems have some obvious benefits:

- High boiling point at atmospheric pressure – "non-pressurised" systems possible up to 400°C.
- High thermal stability and very long service life of thermal oils.
- No tendency to corrode materials or build up deposits.
- No treatment of thermal oil required.
- Gentle, even operation extends systems' service lives.
- Thermal oils can be used for heating and maintaining exact temperatures but also, for example, for cooling strongly exothermal processes.
- They also offer the economical option of recycling dissipated heat by feeding it to suitable consumers within the system.

Etanorm – a proven concept can always adapt to the market’s latest demands.

Rapid growth in the use of synthetic thermal oils can be put down to the fact that they allow high fluid temperatures and significantly extend service life. At the same time, the synthetic thermal oils’ high proportion of low-boiling fractions, high vapour pressures and tendency to creep place serious demands on and require state-of-the-art pumping technology. KSB's Etanorm SYT is the optimum solution. It ensures maximum operating reliability by means of a highly effective venting contour and is also available with a double-acting mechanical seal for safe operation with all heat transfer media.

The sturdy discharge cover is designed so that less heat is transferred to the bearing bracket – good news for both the bearings and the mechanical seal. What is more, variable-speed operation and IE2 motors as standard make for energy efficient operation while the Etanorm SYT’s easily dismantled bearing bracket ensures straightforward servicing.



Etanorm SYT with single-acting mechanical seal

With double-acting mechanical seal and SiC/SiC bearing

1 Maximum operating reliability

Optimum venting, confined gaskets, and a design variant with double-acting mechanical seal.

2 High energy efficiency

Optimised hydraulic system, impeller trimmed to duty point, and variable-speed operation.

3 Easy to service

Replaceable wear rings and straightforward dismantling of bearing bracket.

4 Robust design

Sturdy discharge cover, optimised heat barrier, reinforced deep-groove ball bearings, and a SiC/SiC bearing variant.



Etanorm SYT Thermal oil/Hot water pump, explosion-proof

▪ To EN 733

Technical data *

DN: 32 to 105
Q max: 660 m³/h
H max: 102 m
t: -30°C to +350°C
p₂ max: 16 bar



* All technical data for 50 Hz operation

Successful and versatile: the Eta from KSB.

Having been the focus of continuous improvement over decades, the Etanorm model provided the basis for developing new pump sets for handling mineral oil or synthetic base heat transfer media in heat transfer systems (DIN 4754) and for hot water circulation (EN 12953-6, previously DIN 4752). Our customers have come to appreciate the benefits of high operating reliability, low operating costs, the ability to handle heat transfer media up to 350°C

without a separate external cooler, and low energy consumption thanks to the optimised hydraulic system. With Etanorm RSY, these advantages are now also available for pump sizes up to DN 300. And that is a lot more than the EN 733 standard requires! We also offer space-saving installation variants such as the compact close-coupled model Etabloc SYT and in-line model Etaline SYT.

Etanorm RSY Thermal oil/Hot water pump, explosion-proof



- Nominal diameters up to DN 300 – far beyond the requirements of EN 733
- Also available with wear-resistant SiC/SiC bearing



Technical data*

DN:	200 to 300
Q max:	1,900 m ³ /h
H max:	92 m
t:	-30°C to +350°C
p ₂ max:	16 bar

Etabloc SYT Close-coupled thermal oil/hot water pump, explosion-proof



- Sturdy discharge cover and drive lantern designed for high stiffness
- Optimised heat barrier, little wear



Technical data*

DN:	32 to 80
Q max:	280 m ³ /h
H max:	67 m
t:	-30°C to +350°C
p ₂ max:	16 bar

Etaline SYT Close-coupled thermal oil/hot water pump in in-line design, explosion-proof



- Sturdy discharge cover and drive lantern designed for high stiffness
- Optimised heat barrier, little wear



Technical data*

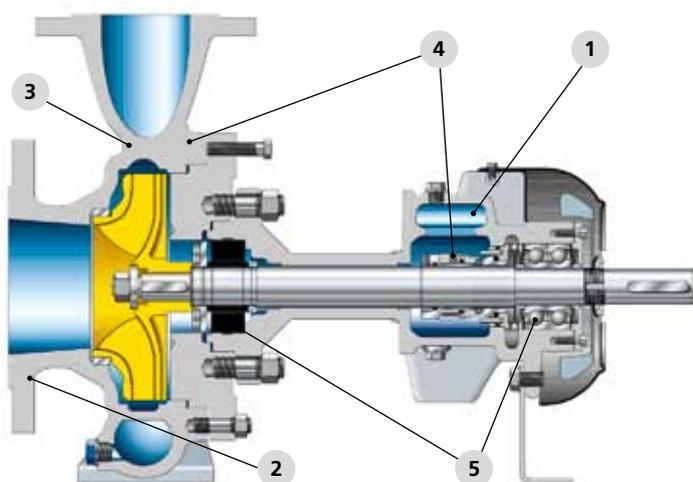
DN:	40 to 100
Q max:	280 m ³ /h
H max:	67 m
t:	-30°C to +350°C
p ₂ max:	16 bar

* All technical data for 50 Hz operation

HPK and HPK-L: the marathon-runners of the pump world.

HPK pumps handle thermal oils at extremely high temperatures. Cooled by air alone, the HPK-L still gets the job done at up to 350°C. Temperature is rapidly reduced along a heat barrier between the fluid pumped and the mechanical seal. A mechanical seal specially selected for this pump – for example one equipped

with metal bellows – ensures reliable sealing. A quench supply of nitrogen, steam or white oil prevents the formation of cracked products on the seal faces. Moreover, the cartridge design makes the mechanical seal quick and easy to replace.



- 1 HPK-L: no cooling water needed up to 350°C**
Due to heat barrier, large cooling fins and integrated fan impeller.
- 2 Reliable**
Well-proven design used in over 200,000 units manufactured to date.
- 3 Low operating costs**
High efficiency combined with long service life.
- 4 Service-friendly**
Easy maintenance due to back pull-out design. Standardised parts, e.g. mechanical seal, for reduced spare parts inventory.
- 5 Long service life**
Robust rolling element bearings and ceramic plain bearing.

HPK-L Thermal oil/Hot water recirculation pump without external cooling, explosion-proof

▪ To EN 22858/ISO 2858/ISO 5199

Technical data*

DN: 25 to 250
Q max: 1,330 m³/h
H max: 155 m
t: up to +350°C
p₂ max: 25/40 bar



HPK Thermal oil/Hot water recirculation pump, explosion-proof

▪ To EN 22858/ISO 2858/ISO 5199

Technical data*

DN: 150 to 400
Q max: 4,150 m³/h
H max: 190 m
t: up to +400°C
p₂ max: 25/40 bar

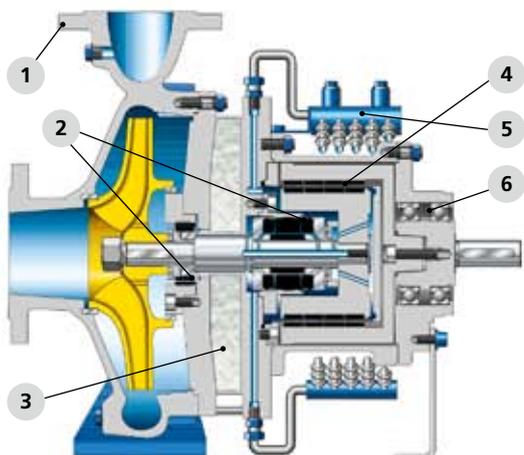


*All technical data for 50 Hz operation

Etamagno SY – mag-drive design guarantees zero leakage.

The magnetic coupling eliminates the need for a shaft seal, often the most critical component. Thanks to an efficient heat barrier between the pump's drive and the hydraulic system, Etamagno SY neither requires cooling water. Another major advantage is the

separate cooling/lubricating circuit. This keeps solids present in the fluid handled – including ferromagnetic particles – away from the containment shroud and the plain bearings, avoiding damage to the shroud and wear on the bearings.

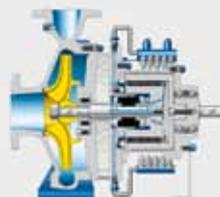


- 1 **Maximum safety** Pressure boundary made of ductile material (JS 1025), designed for 16 bar.
- 2 **Long service life** thanks to product-lubricated plain bearings.
- 3 **High operating reliability** Efficient heat barrier ensures low temperature in the drive section.
- 4 **Optimum environmental protection** Mag-drive design guarantees zero leakage.
- 5 **No costs for external cooling system** Heat dissipated via air cooler.
- 6 **Long service intervals** thanks to low-load, permanently grease-packed rolling element bearings.

Etamagno SY Thermal oil pump with magnetic drive, explosion-proof



- To EN 733
- With patented SICADUR® plain bearing



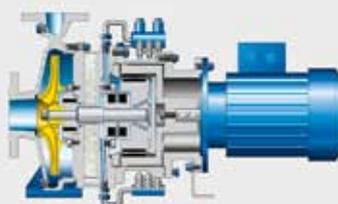
Technical data*

DN:	32 to 150
Q max:	660 m ³ /h
H max:	102 m
t:	-30°C to +350°C
p ₂ max:	16 bar

Etamagno-Bloc SY Close-coupled thermal oil pump with magnetic drive, explosion-proof



- With patented SICADUR® plain bearing
- Space-saving
- Easy to install



Technical data*

DN:	32 to 80
Q max:	260 m ³ /h
H max:	70 m
t:	-30°C to +350°C
p ₂ max:	16 bar

Etamagno SYI Close-coupled thermal oil pump with magnetic drive in in-line design, explosion-proof



- With patented SICADUR® plain bearing
- Easy to install
- Simple piping layout



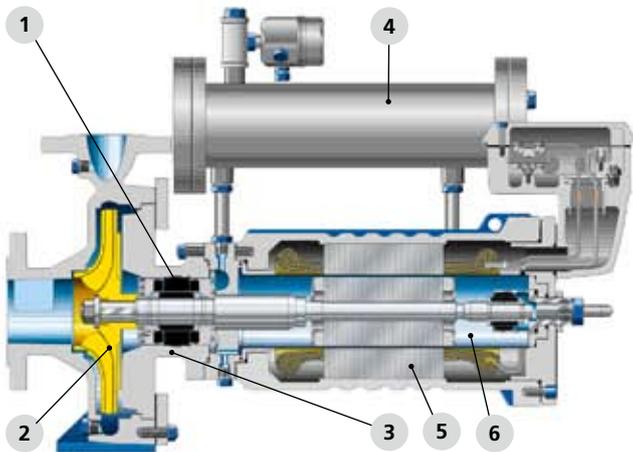
Technical data*

DN:	40 to 100
Q max:	315 m ³ /h
H max:	70 m
t:	-30°C to +350°C
p ₂ max:	16 bar

Secochem Ex K – canned motor technology delivers the utmost in reliability.

Tried and tested canned motor technology: Secochem Ex K – a firmly established feature of the chemicals sector – has undergone a double revolution for use in heat transfer applications. Its external cooler increases the application range to 400°C. Moreover, an in-

novative barrier ensures that the hydraulic system and motor are separated. This prevents heat propagation into the rotor space and keeps solid particles in the fluid handled away from the drive.



- 1 **Adaptable** Flexible, temperature-independent SICADUR® bearings with innovative fastenings.
- 2 **Easy to service** The rotor unit is located outside the potentially explosive atmosphere.
- 3 **The “smart neck”** Intelligent separation of hydraulic system and drive.
- 4 **The “cool head”** Ideal operating conditions for the drive thanks to external cooler; suitable for temperatures up to 400°C.
- 5 **Energy-efficient** Hydraulic system and motor perfectly matched for maximum cost savings.
- 6 **Reliable** Direct monitoring of fluid temperature.

Secochem Ex K Canned motor pump, explosion-proof

- To EN 22858/ISO 2858
- Low-noise
- Low life cycle costs
- Long service life

Technical data*

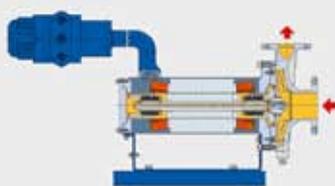
DN:	25 to 100
Q max:	300 m³/h
H max:	156 m
t:	-40°C to +400°C
p ₂ max:	25 bar



Canned motor pumps from Nikkiso-KSB GmbH

HX/HY (Nikkiso-KSB) Canned motor pump, explosion-proof

- Uncooled, coolable or heatable
- With ceramic winding (HX) up to 350 °C for drive ratings up to 55 kW



Technical data* HX/HY

DN:	32 to 100	32 to 80
Q max:	220 m³/h	150 m³/h
H max:	100 m	100 m
t:	Up to +350°C	Up to +250°C
p ₂ max:	40 bar	40 bar



HT (Nikkiso-KSB) Canned motor pump, explosion-proof

- Cooled
- Separation of motor space and hydraulic system
- Available to API 685



Technical data*

DN:	32 to 300
Q max:	800 m³/h
H max:	200 m
t:	Up to +400°C
p ₂ max:	40 bar



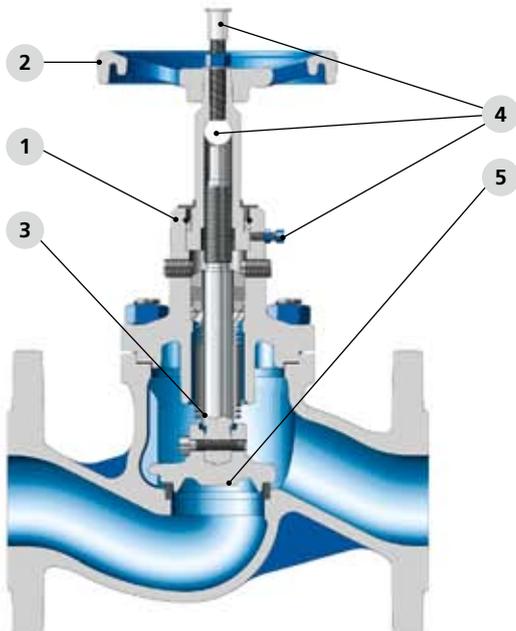
* All technical data for 50 Hz operation

BOA[®]-H – a tried-and-tested classic combined with the latest technology.

BOA[®]-H shut-off valves have been designed and further developed to offer uncompromising safety and reliability in continuous operation. For example, when the valve is fully open, the bellows is confined within the valve body, protected from pressure surges. This means that even if extreme pressure surges occur, maximum reliability is maintained. Alongside the well-established throttling valve plug, which combines excellent flow coefficients with effective throttling, a new, seat-guided V-port plug has been developed. This is very well-suited to extremely demanding applications and benefits from a spring steel design which minimises vibrations.

The BOA[®] valve series, with BOA[®]-H shut-off valve, BOA[®]-S strainer and BOA[®]-R non-return valve, spells state-of-the-art technology in a tried-and-tested design.

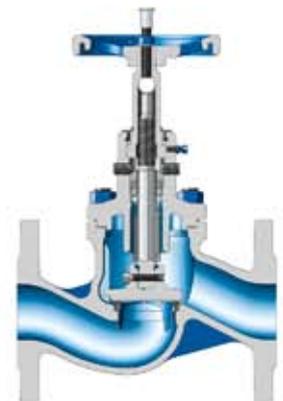
- 1 **Improved energy efficiency of the system** Short, easy-to-insulate bonnet minimises heat losses.
- 2 **Optimised model made of nodular cast iron for high-temperature applications** Made of optimally combined materials without plastic components, the valve provides excellent handling even at very high temperatures.
- 3 **Increased safety and longer service life of bellows** When the valve is fully open, the bellows is confined within the valve body, protected from pressure surges. The bellows is welded to the stem, so no vibrations are transmitted from the valve plug to the bellows.
- 4 **High operating comfort at no extra charge**
 - Position indicator with travel stop and locking device as a standard feature on all valve sizes.
 - Easy identification of valve designs thanks to colour coding. Valve model and seat/plug seal type can be verified from outside the insulation.
- 5 **One globe valve – two functions, excellent value for money** Shut-off and throttling function from the same valve thanks to standard throttling plug up to DN 100. Excellent flow coefficients with good throttling function.



BOA[®]-H
EN-GJS-400-18-LT

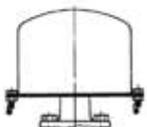


BOA[®]-H
EN-GJL-250

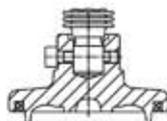


BOA[®]-H
V-port plug

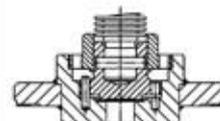
Variants



Lead-sealable cap
(assembly set)



Valve plug with
PTFE ring
DN 15 to 200



Pilot plug
DN 200 and above

BOA®-H Maintenance-free metal-seated bellows shut-off valve

To EN 22858/ISO 2858/ISO 5199

- Straight-way or angle pattern with horizontal seat
- Maintenance-free bellows-type stem seal with back-up gland



Technical data

DN: 15 to 350
 t: -10°C to +350°C
 p max: 25 bar
 Materials: nodular or grey cast iron



BOA®-S Strainer

- Straight-way Y-valve
- Strainer insert accurately guided in cover and body
- Additional supporting basket for size DN 150 and above
- Drain plug as standard



Technical data

DN: 15 to 300
 t: -10°C to +350°C
 p max: 25 bar
 Materials: nodular or grey cast iron



BOA®-R Maintenance-free metal-seated non-return valve

- Straight-way or angle pattern with horizontal seat
- Spring-loaded check plug



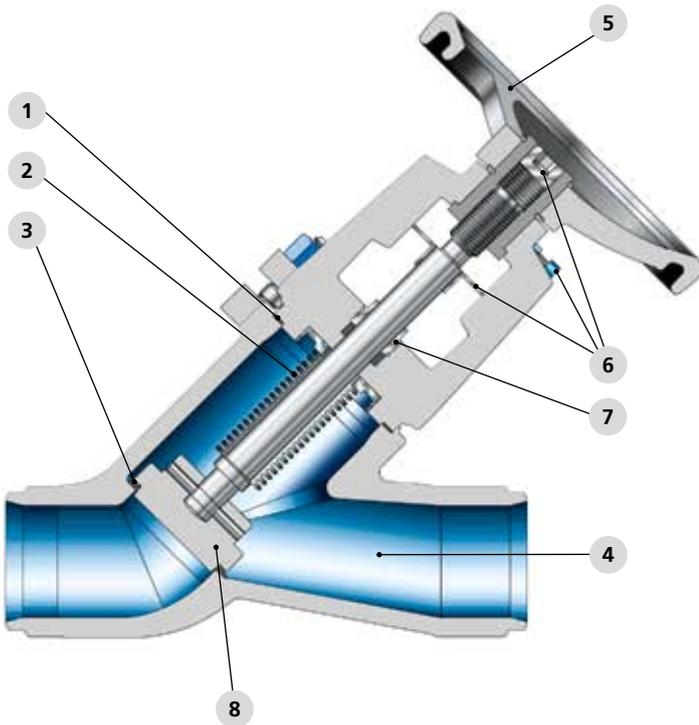
Technical data

DN: 15 to 350
 t: -10°C to +350°C
 p max: 25 bar
 Materials: nodular or grey cast iron



NORI® 40 – greater safety and optimum flow for critical temperature ranges.

The NORI® 40 bellows globe valve with double-walled stainless steel bellows, pure graphite back-up gland, fully confined bonnet gasket and hard-faced valve seat is specially designed for high temperature applications. Position indicator, locking device and travel stop are all standard features alongside the throttling plug up to DN 100. NORI® 40 strainers (types FSL/FSS) and non-return valves (types RXL/RXS) complement this carefully planned series.



- 1 **Reliable sealing** No gasket creep due to fully confined bonnet gasket.
- 2 **Leak-proof and easy to service** The double-walled bellows is welded to the stem at the lower end, and to the yoke at the upper end. No vibrations transmitted from valve plug to bellows. The valve plug is easy to replace.
- 3 **Long service life and high functional reliability** Valve seat materials resist wear and corrosion.
- 4 **Economical** Cast body with optimised flow path. Very good zeta values and little pressure loss.
- 5 **Space-saving design** with non-rising handwheel.
- 6 **Easy to operate** Adjustable travel stop, position indicator and locking device supplied as standard. No risk of injuries thanks to travel stop with internal screw.
- 7 **Added safety** and easy re-adjustment due to pure graphite back-up gland, e.g. for heat transfer installations to DIN 4754.
- 8 **Single model for shut-off and throttling** Standard throttling plug up to DN 100, which reduces spare parts stocks.

NORI® 40 ZYLB/ZYSB Maintenance-free metal-seated bellows shut-off valve

- Straight-way Y-valve
- Maintenance-free bellows-type stem seal with back-up gland
- Flanged and weld end designs



Technical data

DN: 15 to 300
 t: -10°C to +450°C
 p max: 40 bar
 Material: cast steel



NORI® 40 FSL/FSS Strainer

- Straight-way Y-valve
- Strainer insert accurately guided in cover and body
- Additional supporting basket for size DN 125 and above
- Drain plug as standard
- Magnetic inserts (optional)
- Flanged and weld end designs



Technical data

DN: 15 to 300
 t: -10°C to +450°C
 p max: 40 bar
 Material: cast steel



NORI® 40 RXL/RXS Maintenance-free metal-seated non-return valve

- Straight-way pattern with vertical bonnet
- Seat/plug interface made of wear and corrosion resistant Cr steel or CrNi steel
- Spring-loaded check plug
- Flanged and weld end designs



Technical data

DN: 10 to 200
 t: -10°C to +450°C
 p max: 40 bar
 Material: forged/cast steel



It pays to make use of energy-saving potential.

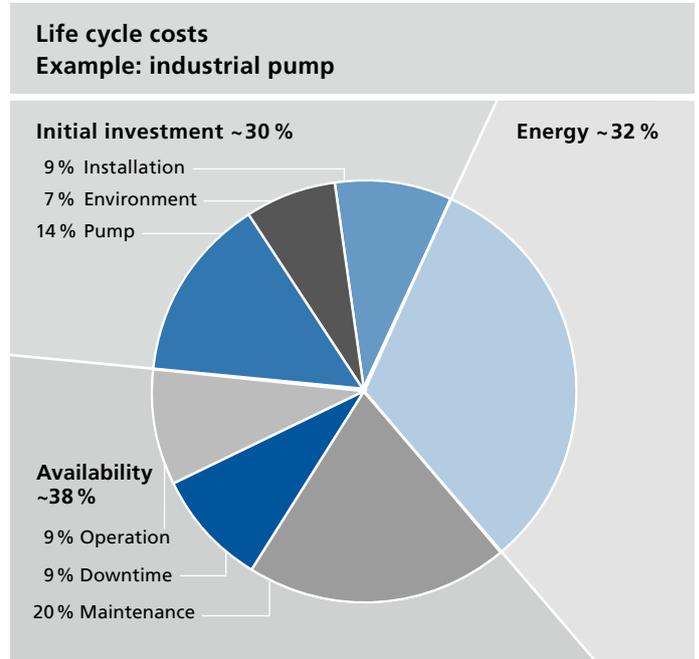
KSB's energy efficiency programme: Efficiency from the word go.

Pumping systems account for 20 % of energy costs in industrial plants. And at 32 %, energy costs make up the highest proportion of the life cycle costs of a medium-sized industrial pump.

KSB can help you remain competitive.

To be successful in the market, operators should not only keep the initial investment costs of their plant at a minimum: they must also keep down the cost of operation. Maintenance and energy costs in particular need to be reduced. By choosing the right material for the application and ensuring a diversity of solutions down to the last detail, such as wear rings, the availability of the pump can be improved – and maintenance costs remain low.

But ultimately, it is mainly an increase in energy efficiency through system optimisation that is crucial to competitiveness.



KSB optimises not just individual components but entire hydraulic systems.

System Efficiency Services
Potential savings are identified and solutions proposed on the basis of a precisely analysed pump load profile.



Speed control

PumpDrive adjusts the speed of the motor to match current demand.
Energy saved: up to 60 %



Pump selection

The most important step towards cutting energy costs: hydraulic optimisation of the system and selection of the best pump for the job.



Impeller trimming

The impeller is adapted to match the specified duty point without any added expenses.
Energy saved: over 10 % on average



High-efficiency motor (EFF1/IE2)

Standard at KSB. Efficiency gain:
up to 3.5 %

Everything under control – with automation solutions from KSB.

Current developments on the industrial market are calling for important decisions from plant operators: to keep quality and manufacturing costs under control they must ensure that the processes within the system are efficient.

One of the most important components of KSB's energy efficiency concept is speed control using PumpDrive. The energy savings possible with PumpDrive mean that investment pays back extremely swiftly.

PumpDrive The intelligent speed control system

PumpDrive flexibly matches pump output to actual demand and allows energy savings of up to 60 %.

- Increased operating reliability through perfect matching with the pump and monitoring of operating limits based on the H/Q curve (PumpDrive Advanced).
- Enhanced functionality for improved process control.
- Motor mounted – possible for temperatures from -10°C to +140°C at an ambient temperature of 20°C.
- Wall and control cabinet mounting.
- Installation outside of potentially explosive atmospheres.

Technical data

Supply voltage:	3 ~ 380 V -10 % Up to 480 V +10 %
Enclosure:	IP 55
Efficiency:	97 % (at a carrier frequency of 2 kHz)
Ambient temperature:	0°C to +40°C
Output frequency:	0 to 70 Hz



Hyamaster® The intelligent control system

Developed for open and closed loop control and monitoring of hydraulic systems, the Hyamaster multiple pump control system ensures reliable supply in open and closed cycles.

- An all-in solution comprising pump, hydraulic system, valve, open and closed loop control system, frequency inverter, motor and sensor – all from a single source.
- Operating and maintenance costs are reduced as operation in the optimum control range is ensured.
- System is automatically adjusted to match changes in plant conditions.
- Early detection of malfunctions is enabled by characteristic curve control function.

Technical data

Number of pumps:	1 to 6
Motor rating:	For all pump outputs
Number of frequency inverters:	1 to 6
Amb. temp.:	0°C to 40°C
Mains voltage:	3x 400 V ± 10 % 3x 500 V ± 10 % 3x 690 V ± 10 %
Mains frequency:	50 Hz/60 Hz



PumpExpert – The intelligent diagnostic system saves costs and provides additional reliability.

Careful consideration of a pumping system's overall operating costs pays dividends, particularly in the waste water treatment sector, as purchase costs make up only about 14 % of life cycle costs. Maintenance and downtime account for a far higher proportion. And this is where PumpExpert comes into its own.

PumpExpert is the first smart diagnostic system for centrifugal pumps that provides straightforward information on the current pump, system and process status. It prevents costly equipment failures and the resulting damage and enables substantial savings through condition-oriented maintenance.

PumpExpert is the first pump diagnostic system that – based on pump-specific condition monitoring – recommends suitable courses of action. The information provided by PumpExpert increases plant availability and safety. This is particularly important for operation in critical applications and explosive atmospheres.

In heat transfer systems, PumpExpert is installed outside the potentially explosive atmosphere.



PumpExpert constantly keeps an eye on all relevant variables: fill level, motor and bearing temperature, suction and discharge pressure, vibrations, etc.

- Local output via “traffic light” signals
- Data storage on SD card: operating and status data, maintenance history, parameterisation
- Permanent data transfer to control room by field bus or modem

Monitoring

PumpExpert scans, collates and summarises all pump signals to present a clear overview of operational status information.

Diagnosis

PumpExpert's preventive diagnosis detects impending damage well before it occurs.

Recommendation for action

PumpExpert clearly “tells” you what to do to remedy faults.

Fast and efficient – service that does the job.

As one of the global market leaders, KSB offers more than a broad range of pumps and valves. KSB Service GmbH – a fully owned subsidiary of KSB AG – has a global network of service centres. With a complete service spectrum ranging from new

installations and commissioning through inspections and repairs to technical consulting and bespoke service solutions. And this includes products of other manufacturers as well.

Facts and figures at a glance:

- A complete service spectrum for valves, pumps, motors and other "rotating equipment"
- Over 2,500 qualified and experienced service specialists in more than 120 service centres worldwide
- Safety and reliability through comprehensive certification such as SCC** and also through state accreditation of service personnel with regard to testing and repair of explosion-proof units
- Service throughout the life cycle
- Use of special techniques on site, e.g. electric-discharge machining and bolt handling
- Total Pump Management for bespoke service solutions
- System Efficiency Service – increase in the profitability of pumping systems through comprehensive systems analysis (comparison of actual performance with rated performance)
- More than 350,000 assignments worldwide every year

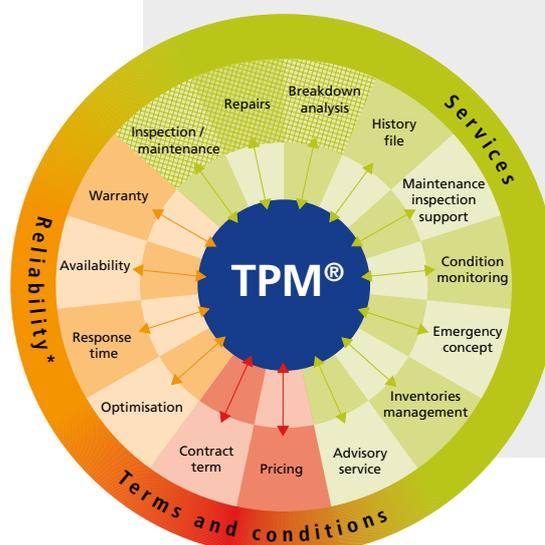
** Safety Certificate Contractors

Total Pump Management – for your individual requirements.

Total Pump Management is our approach to offering you service solutions for pumps, valves and other rotating systems. The modular nature of the service concepts enables us to put together individual service packages – tailored to your needs and your system.

Your benefits:

- System optimisation through improved system availability
- Reduction in energy input
- Maintenance cost reduction



* Only in conjunction with inspection/maintenance, commissioning and damage analysis

Your local KSB representative:

Placeholder for local KSB representative information, indicated by four corner brackets.

More space for solutions.



KSB Aktiengesellschaft
Johann-Klein-Straße 9
67227 Frankenthal (Germany)
www.ksb.com