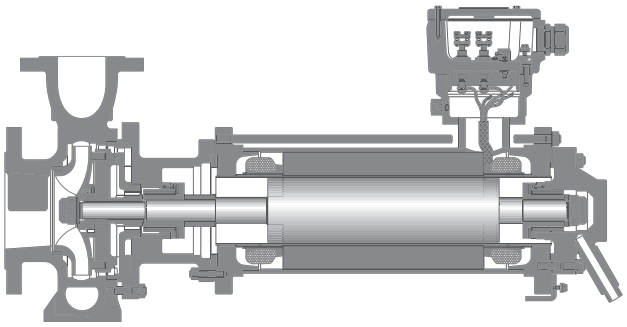
PRODUCT INFORMATION



Single-stage canned motor pumps
according to EN 22858; ISO 2858

Model series CN / CNF / CNK

LEDERLE Hermetic

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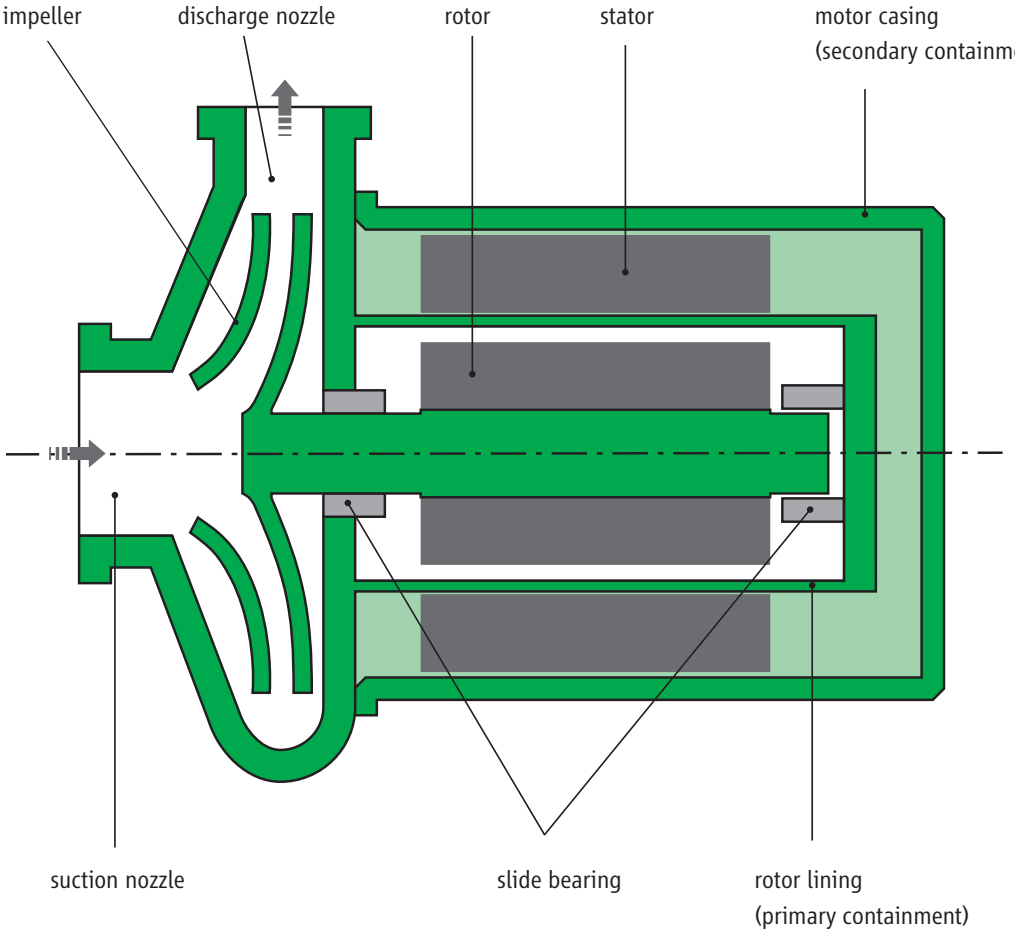
Discription

General

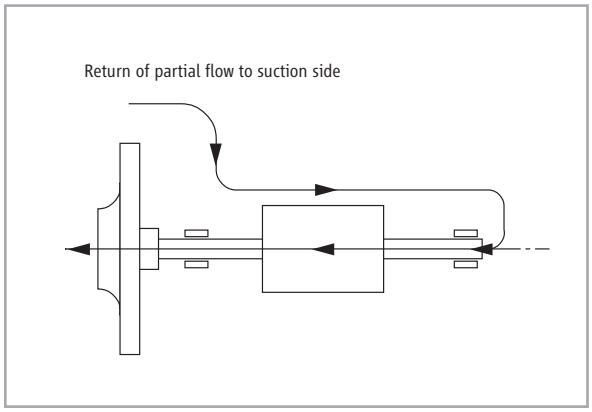
Canned motor pumps are characterised by a compact, integrated unit without mechanical seal. The motor and pump form a unit with the rotor and the impeller fitted onto a common shaft. The rotor is guided by two identical, medium-lubricated slide bearings. The stator on the drive motor is separated from the rotor space using a thin stator liner. The rotor cavity itself, along with the hydraulic section of the pump, create a combined cavity which needs to be filled with pumping medium before commissioning. The heat loss from the motor is carried off by a partial flow between the rotor and the stator. At the same time, the partial flow lubricates both slide bearings in the rotor cavity. Both the can, which is a hermetically sealed component, and the motor casing are used as a safety containment. Because of that, canned motor pumps always ensure highest safety level when conveying dangerous, toxic, explosive and valuable media.



Function

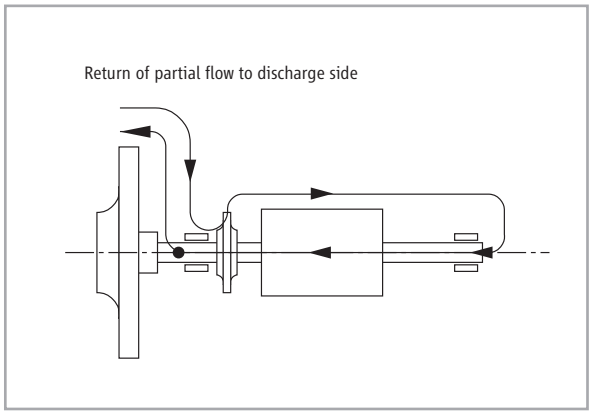
CN...B

The partial flow for cooling the motor and lubricating the slide bearings will be branched off at the periphery of the impeller and, after having passed through the motor, is carried back again through the hollow shaft to the suction side of the impeller. This design is suitable for the delivery of uncritical fluids at low vapour pressure values.



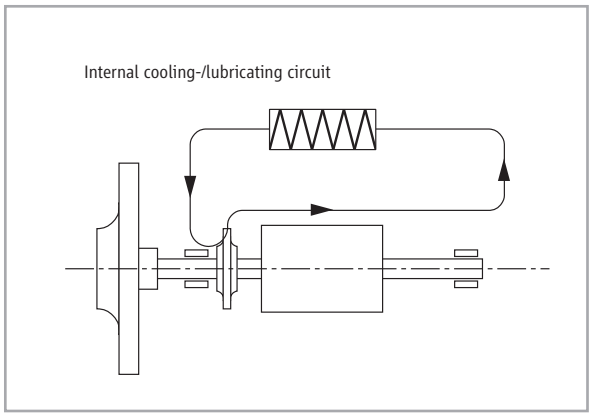
CNF...B

The partial flow for cooling the motor and lubricating the slide bearings will be branched off at the periphery of the impeller and, after having passed through the motor, is carried back again to the pressure side. An auxiliary impeller serves to overcome the hydraulic losses encountered along the way. The return of the partial flow towards discharge side ensures that the heated motor cooling flow has sufficient pressure reserves over the boiling point curve of the medium during its return to the pump. This model of pump can be used for liquefied petroleum gases with an extremely steep vapour pressure diagram.



CNK...B

The medium is delivered through the suction chamber into the impeller and then through this to the discharge nozzle. A thermal barrier avoids the direct heat transfer from the pump to the motor part. The motor heat loss is dissipated by a secondary cooling-/lubricating circuit via a separate heat exchanger. This cooling-/lubricating circuit also supplies the slide bearings. Thus the fluids at temperature up to +400 °C can be delivered on the discharge side while the secondary cooling cycle is at low temperature level. This construction is also suitable for conveying polluted liquids or liquids charged with solids, if necessary, pure process liquid needs to be dosed into the motor circuit.



Application and insertion

Application sector

CN...B

For the delivery of aggressive, toxic, explosive, precious, inflammable, radioactive and slightly volatile fluids e.g. sulphuric acid, nitric acid, hydrofluoric acid, hydrocyanic acid, ethanoic acid, formic acid, NaOH, KOH, D_2O solvent, etc.

CNF...B

Liquid gases, e.g. ammonia, freone, carbon dioxide, amines, propane, butane, vinyl chloride, ethylene oxide, chlorine, phosgene, propylene, carbon bisulphide, hydrocarbon, diphenyl (> 250 °C) etc.

CNK...B

For the delivery of hot organic heat transfer oil, as well as heat bath liquids. These models can also be used for aggressive, toxic, explosive, precious, inflammable, radioactive and slightly volatile fluids.

Application ranges

CN...B: - 120 °C to + 360 °C
CNF...B: - 120 °C to + 360 °C
CNK...B: - 120 °C to + 400 °C

Canned motors

Power:	up to 200 kW at 1450 rpm
	up to 325 kW at 2900 rpm
Operation:	S1 to S10
Voltage:	400 / 690 V
	(special tensions possible)
Heat class:	H – 180
	C – 220 / C – 400
Frequenzy:	50 or 60 Hz
	(plus frequency converter operation on request)
Protections:	motor IP 68
	terminal box IP 55
Motor protection:	thermistor e.g.
	KL 180 (for H-winding)
	PT 100 (for C-winding)

Pump and hydraulic denomination

e.g.

CN 40 – 25 – 160 B

- pump generation
- impeller diameter in mm
- discharge nozzle diameter in mm
- suction nozzle diameter in mm
- design range

Explosion protection

according to EC design test certificate in line with Directive 94/9/EC ATEX ⟨Ex⟩ II 2 G EEx dec II C T1 to T6

Documentation

Digital standard documents (CD-ROM) adapted to CE requirements include:

- sectional drawing
- dimensional drawing
- EC conformity declaration
- operating instructions

Inspections and guarantees

Standard inspections

Hydraulic inspection:

- each pump is subject to a test run and the operating point is guaranteed according to ISO 9906 – class 2 (5 measuring points)
- pressure test
- axial thrust measurement
- leak test (nitrogen filling)

Additional inspections

The following inspections can be carried out and certified against additional price (e.g. NPSH test, Helium leakage test, vibration test, ultrasonic test, PMI test). Any further inspections and tests are according to the technical specification. The guarantees are effected according to the valid conditions of supply.

Materials

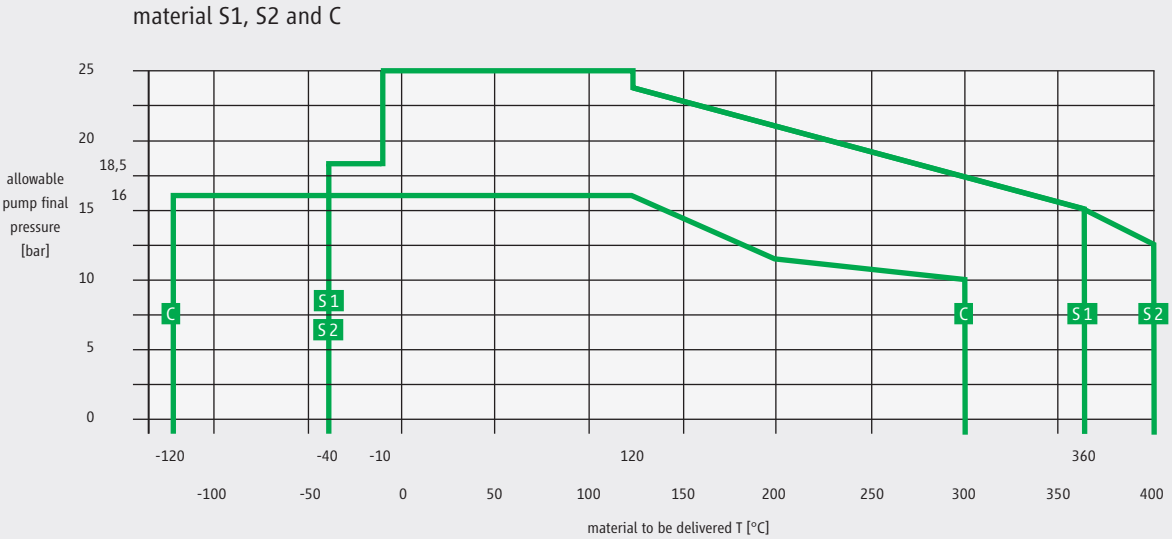
Materials and pressure ratings

VDMA-no.	description	model range CN…B / CNF…B / CNK…B		
		material S1	material S2	material C
		pressure rating PN 25	pressure rating PN 25	pressure rating PN 16
wetted parts				
102	volute casing	JS 1025	1.0619+N	1.4408
161	casing cover	1.0570 / 1.0460	1.0570 / 1.0460	1.4571
230.01	impeller	JL 1040 / JS 1025	JL 1040 / JS 1025	1.4408
230.03	auxiliary impeller(1)	JL 1030	JL 1030	1.4581
344	bearing support lantern	1.0570 / 1.0460	1.0570 / 1.0460	1.4571
360	bearing cover	1.0570 / 1.0460	1.0570 / 1.0460	1.4571
472.01/02	slide ring	PTFE/K	PTFE/K	PTFE/K
513	wear ring insert	JL 1030	JL 1030	1.4571
529.01/02	bearing sleeve	1.4571/W5 (2)	1.4571/W5 (2)	1.4571/W5 (2)
545.01/02	bearing bush	1.4571/SiC30	1.4571/SiC30	1.4571/SiC30
816	stator can	Hastelloy C4	Hastelloy C4	Hastelloy C4
817	rotor lining	1.4571	1.4571	1.4571
819	motor shaft	1.4571	1.4571	1.4571
non-wetted parts				
811	motor casing	1.0254	1.0254	1.0254

special materials / higher pressure ratings are possible on demand

(1) parts only for CNF...B and CNK...B
(2) denotes Tungsten carbide coating

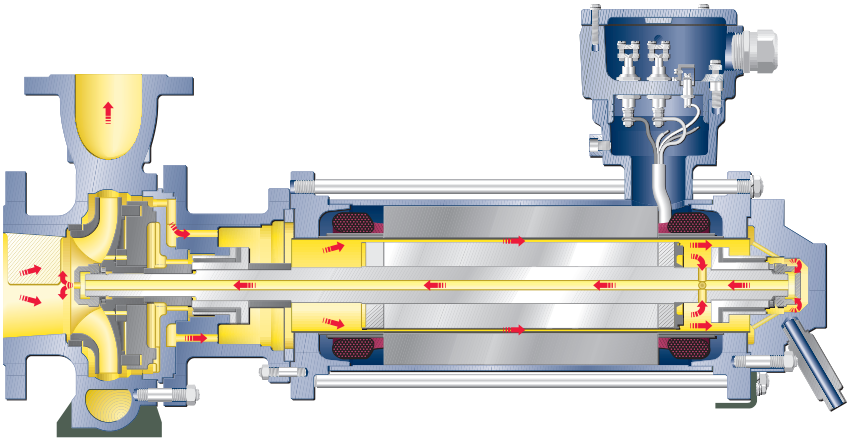
Pressure and temperature limits



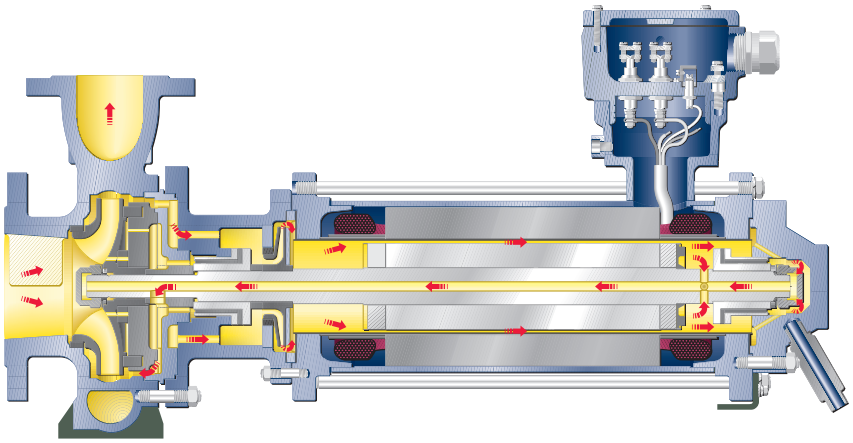
Functional principle

Modular construction principle and functional principle at motor capacity
≤ 41 kW / temperature class T6 / 50 Hz / double pole

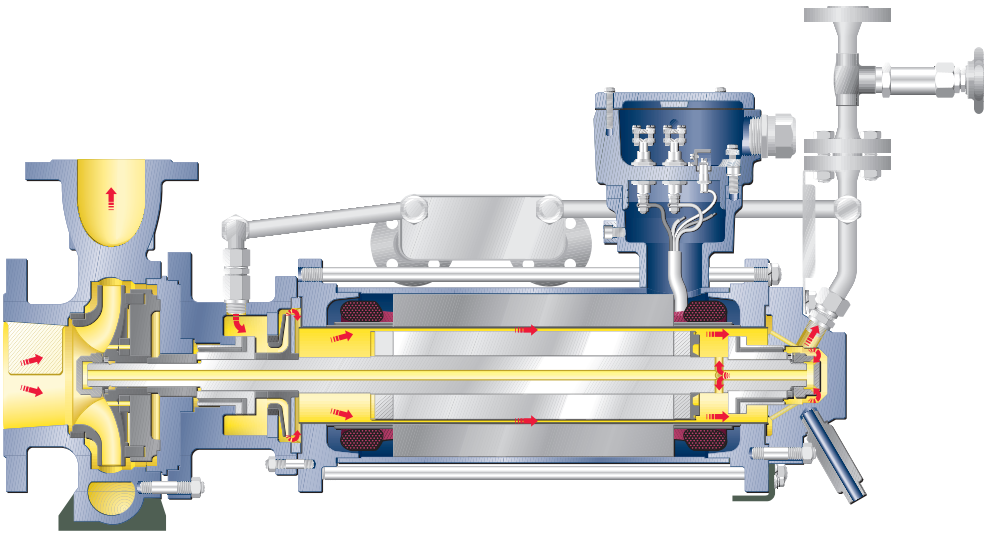
CN...B



CNF...B



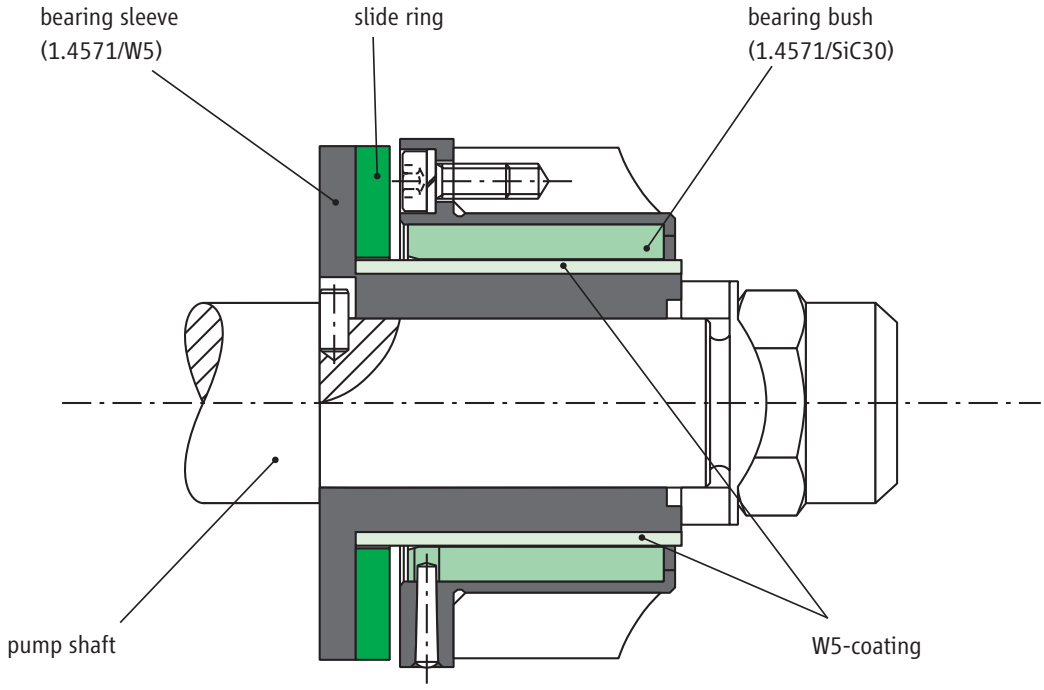
CNK...B



Bearing arrangement

The bearing in hermetically designed pumps must be located and immersed in the operating liquid. Therefore, in most cases, only the use of hydrodynamic slide bearings is required. The correct operating method ensures the advantage that no contact may be created between the bearing lining. Thus, they are constantly running free from wear and maintenance. Service life of 8 to 10 years can be easily achieved by using HERMETIC pumps.

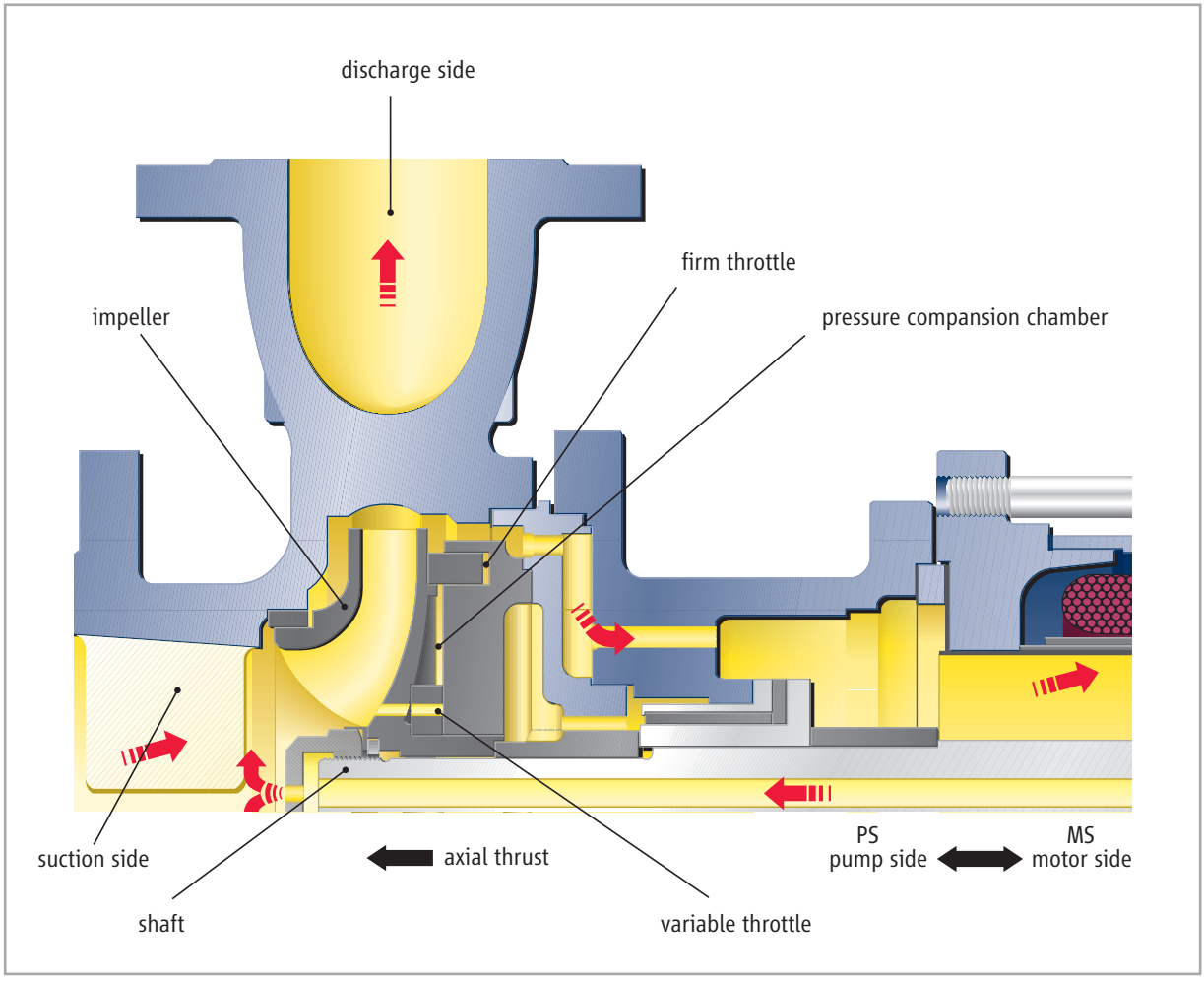
The almost universal bearing combination based on tungsten carbide (W5) and silicon carbide (SiC30) has to be proved to be the best choice. These combinations consist of metallic shaft sleeves made of stainless steel (1.4571) and coated by tungsten carbide according to the "High Velocity Oxygen Fuel Procedure". Furthermore, they consist of a firm bearing bush made of ceramic material (SiC30) that is surrounded by a sleeve made of stainless steel. SiC30 is a mixed material of silicon carbide and graphite, combining the product advantages of both materials. Conditions of mixed friction, as they may arise for example during start-up and stopping phase of pumps, can be easily handled with SiC30. Moreover, this material is deemed to be thermal shock resistant (high resistance against changes in temperature), as well as chemically stable and blister resistant (no formation of bubbles at material surface) and abrasion resistant.



Axial thrust balancing

The development of HERMETIC pump systems depended on the solution of a central problem, namely the elimination of axial thrust at the rotor equipment. The various fluid properties exclude the possibility of using mechanical axial bearings. The only generally valid solution to this problem thus lay in hydraulic balance of the rotor.

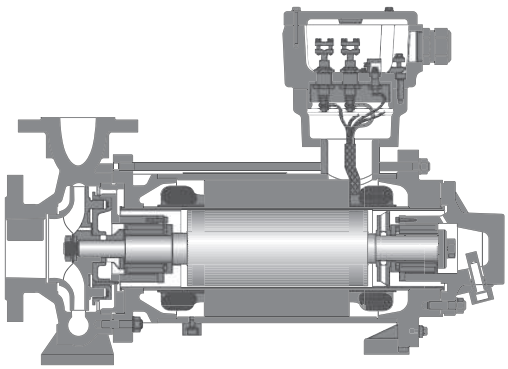
The functional principle of the hydraulic balancing device of range CN / CNF / CNK is based on the combination of a firm throttling device (labyrinth clearance) to the outer diameter of the impeller and a variable throttle in the range of the impeller hub. According to the axial position of the rotor, the pressure within the pressure compensation chamber is changed due to the valve effect of the variable throttling clearance. Therefore, it works against the axial thrust of the impeller. The pressure on backside of the impeller consequently changes due to the axial position of the rotor. The axial position of the pump shaft is automatically regulated during operation in order that a balanced condition is created by itself and thus, there are no effects by axial forces on the axial bearing collar.



Design options

Motor output > 41 kW

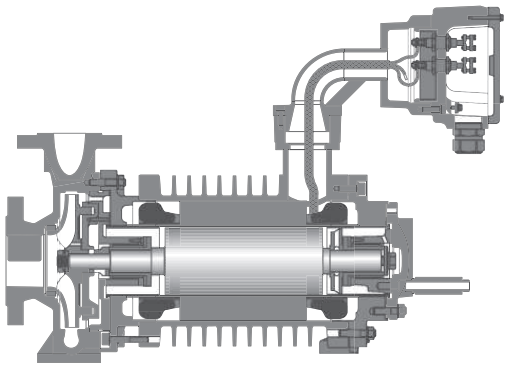
Construction of pump range CN and CNF with a motor output of more than 41 kW (from building size 80 rm) does not require the use of an intermediate lantern.



CNF

Construction without cooling

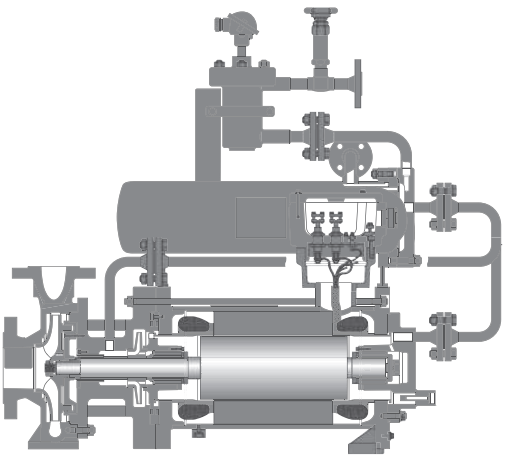
When there is lack of cooling liquid, it is allowed to use special windings of insulation class C-220 or C-400 for conveying liquids up to +360 °C. This construction is characterised by ribs used for convection cooling and by a displaced terminal box.



CNF

Cooled construction

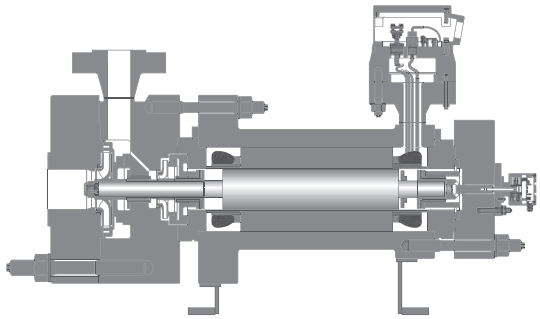
As an option to the plate heat exchanger, also tubular coolers can be used. Cleaning and maintenance can be effected more easily.



CNK

High system pressures

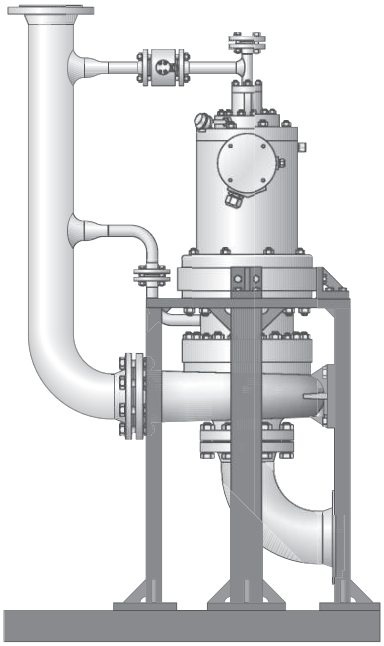
High system pressures (up to 1200 bar) can be handled by canned motor pumps in a technically simple manner. The wall thickness of the outer components corresponds to the required pressure rate.



CNFH

Pressure gases / liquefied gases

Due to the low viscosity and the resulting reduced capacity of the slide bearings, the pump can be erected vertically. In this case, the slide bearings do not have support properties, but only a leading function. The rotor weight is hydrostatically supported here.



CNFV

Monitoring systems

The most part of HERMETIC pumps are designed according to explosion protection requirements. The pumps comply with the requirements of the electrical as well as mechanical explosion protection.

Level monitoring:

On condition that the rotor cavity as part of the process system is steadily filled with liquid, no explosive atmosphere may arise. In this case, no accepted explosion protection is required for the rotor cavity. If the operator is not able to guarantee for a steady filling, it is necessary to install level monitoring devices.

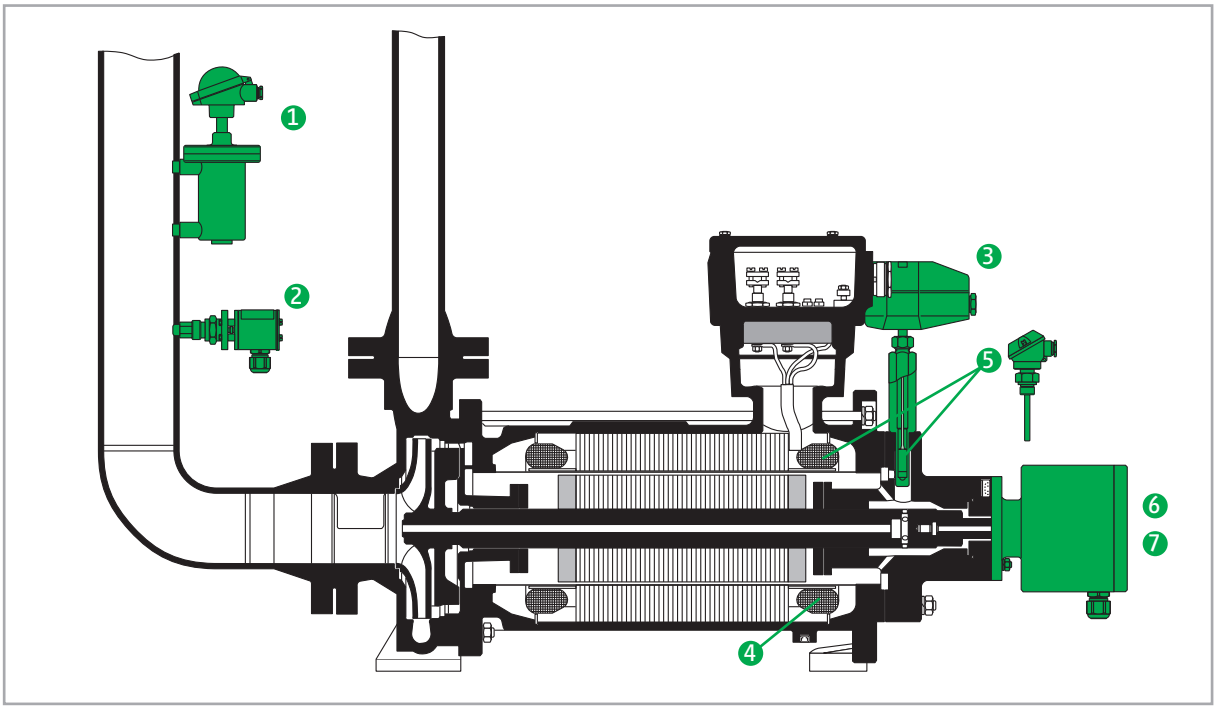
Temperature monitoring:

The observance of the temperature class and the maximum admissible surface temperature of the canned motor, respectively, is ensured via thermistor in the stator winding and/or via a measuring point on the bearing cover (liquid temperature).

Monitoring of rotor position:

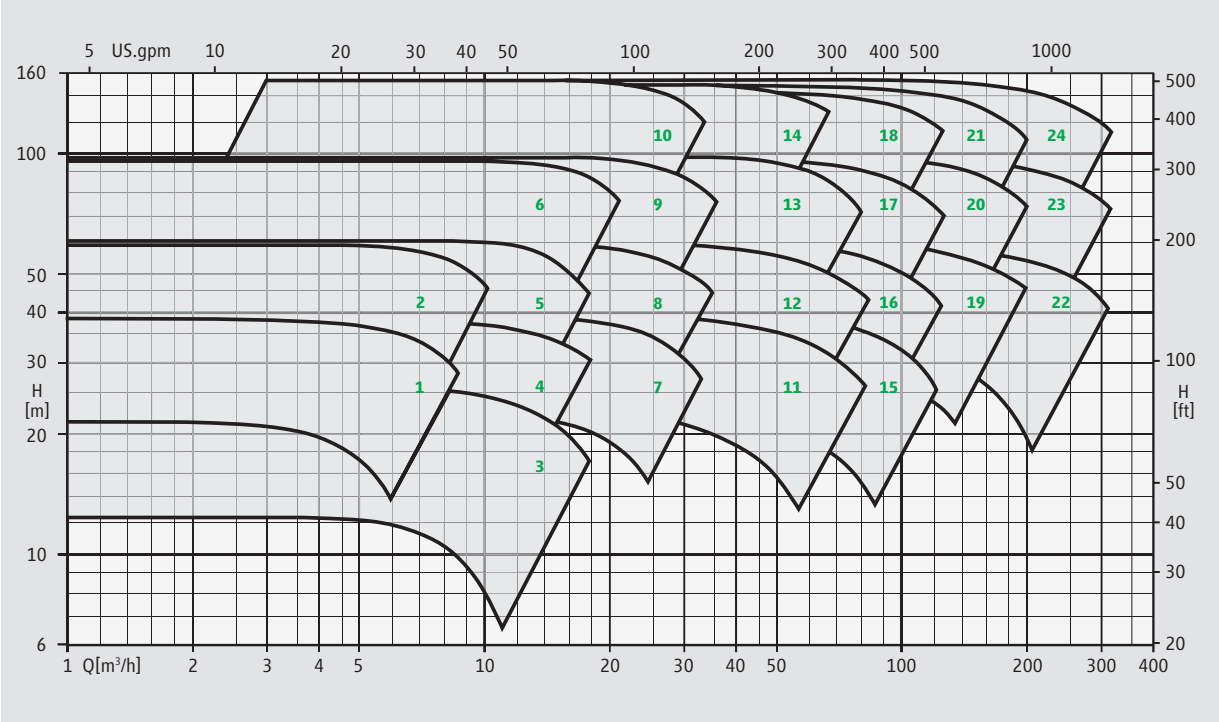
The axial thrust balancing is mainly influenced by the operating method of the pump, plant conditions and by various physical data of the liquid to be conveyed. For early detection of the source of errors, it is recommended to install a rotor-position-monitoring device. This electronic protective gear monitors the axial shaft clearance of the rotor, as well as its direction of rotation during operation in a hermetic and seal-less way. Together with the level and temperature monitoring, an effective and automatic early detection of failures may be achieved.

various monitoring devices			
1	Type N 30	LS	level
2	Type O 30	LS	
3	Type T 30	TS	temperature
4	Type KL 180	TS	
5	Type PT 100	TI	
6	Type ARM-2000 (4...20mA)	GI	rotor position/ direction of rotation
7	Type AM-2000	GI	



Characteristics diagram

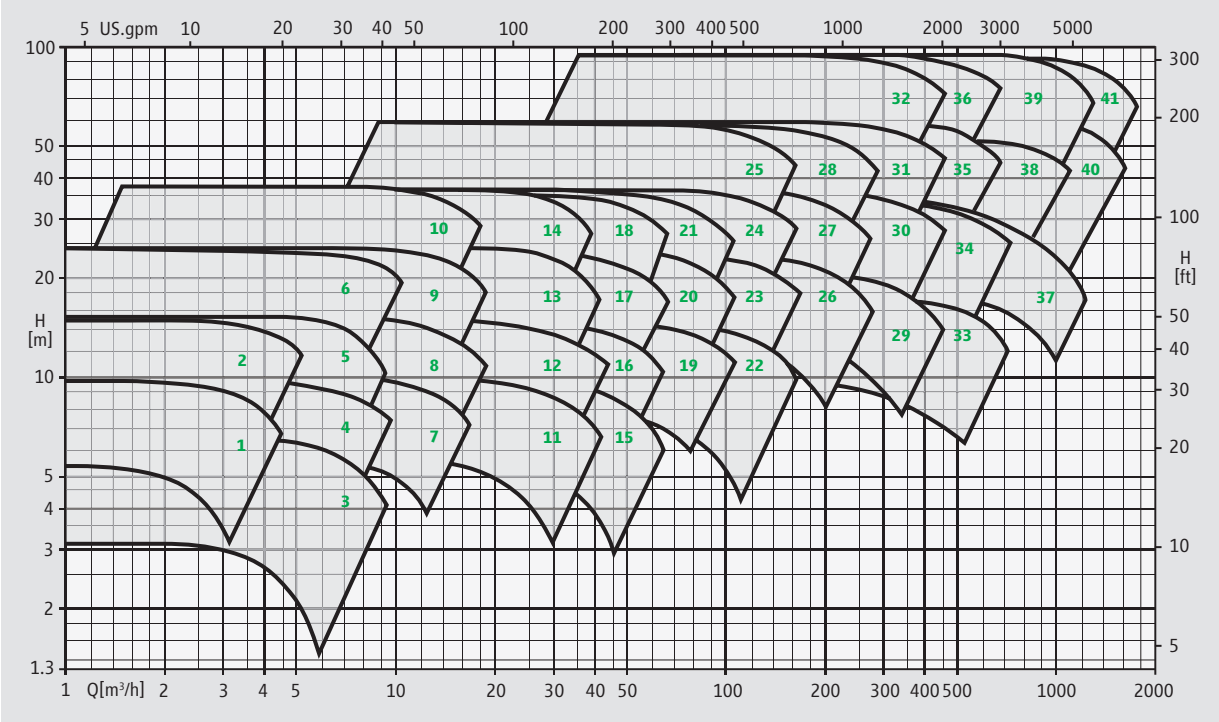
Characteristics diagram 2900 rpm 50 Hz



Denomination of hydraulics to the characteristics diagram

1	40-25-160	**10**	65-40-315	**19**	125-80-200
2	40-25-200	**11**	80-50-160	**20**	125-80-250
3	50-32-125	**12**	80-50-200	**21**	125-80-315
4	50-32-160	**13**	80-50-250	**22**	125-100-200
5	50-32-200	**14**	80-50-315	**23**	125-100-250
6	50-32-250	**15**	100-65-160	**24**	125-100-315
7	65-40-160	**16**	100-65-200		
8	65-40-200	**17**	100-65-250		
9	65-40-250	**18**	100-65-315		

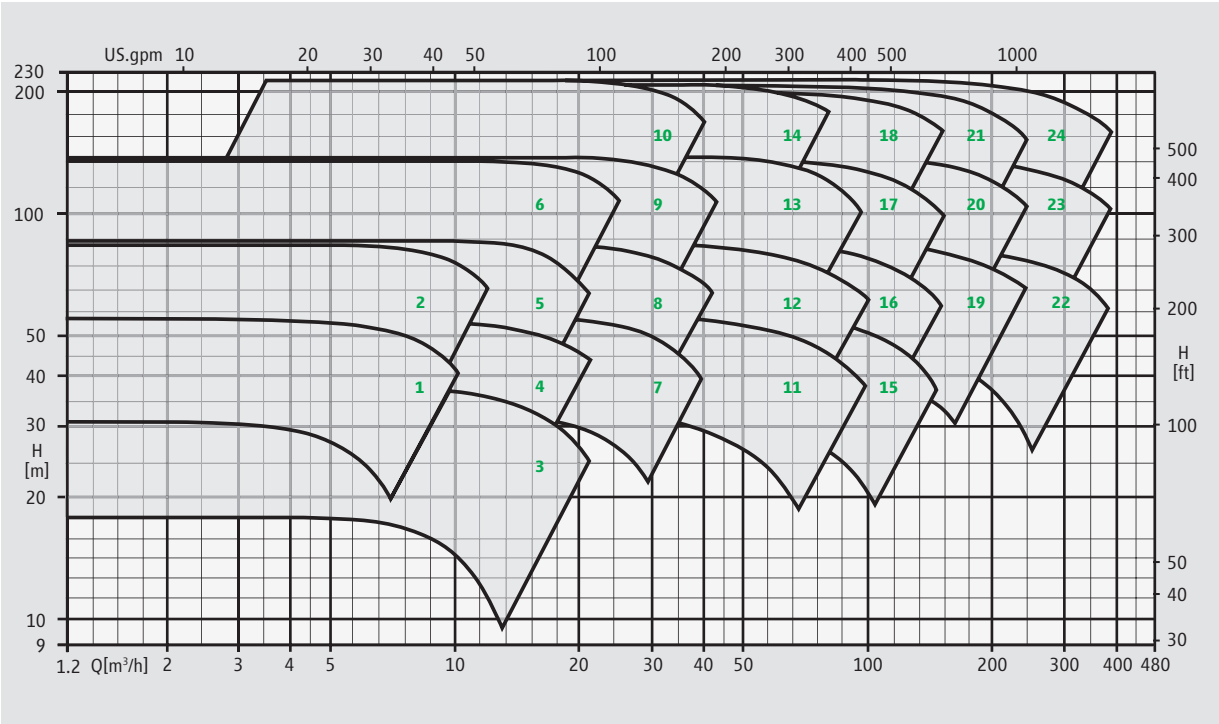
Characteristics diagram 1450 rpm 50 Hz



Denomination of hydraulics to the characteristics diagram

1 40-25-160	**10** 65-40-315	**19** 125-80-200	**28** 125-400	**37** 250-315
2 40-25-200	**11** 80-50-160	**20** 125-80-250	**29** 150-250	**38** 250-400
3 50-32-125	**12** 80-50-200	**21** 125-80-315	**30** 150-315	**39** 250-500
4 50-32-160	**13** 80-50-250	**22** 125-100-200	**31** 150-400	**40** 300-400
5 50-32-200	**14** 80-50-315	**23** 125-100-250	**32** 150-500	**41** 300-500
6 50-32-250	**15** 100-65-160	**24** 125-100-315	**33** 200-250	
7 65-40-160	**16** 100-65-200	**25** 100-400	**34** 200-315	
8 65-40-200	**17** 100-65-250	**26** 125-250	**35** 200-400	
9 65-40-250	**18** 100-65-315	**27** 125-315	**36** 200-500	

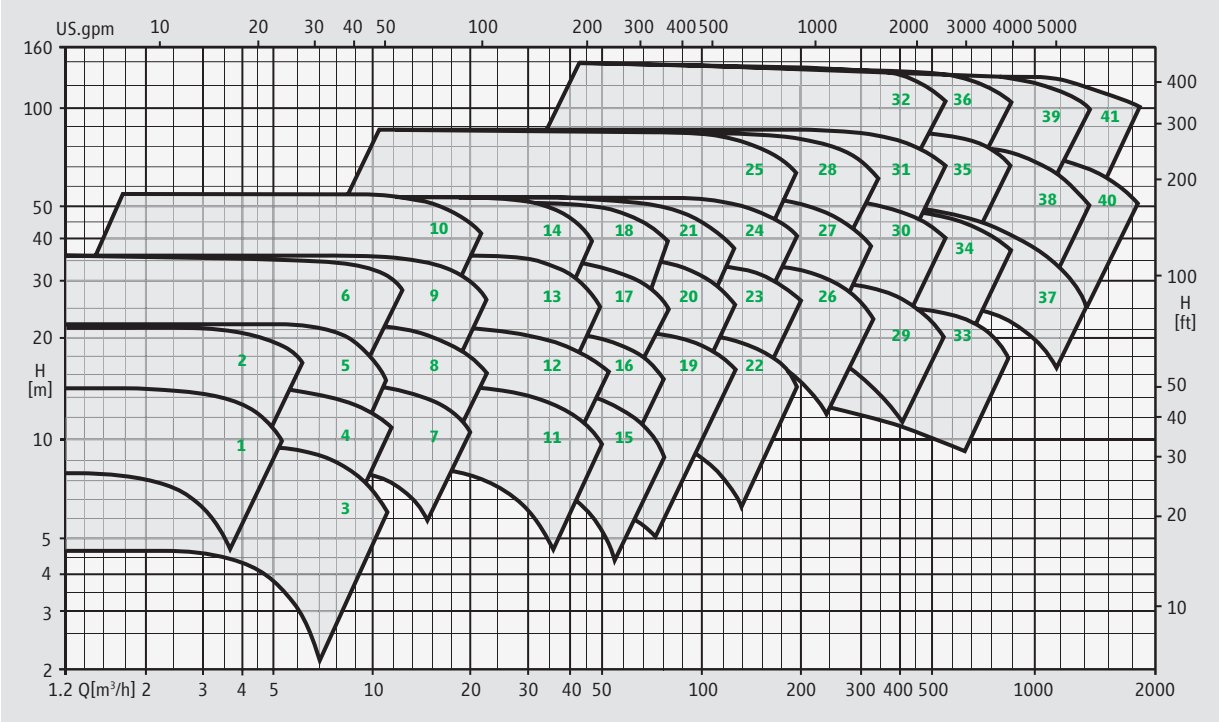
Characteristics diagram 3500 rpm 60 Hz



Denomination of hydraulics to the characteristics diagram

1	40-25-160	**10**	65-40-315	**19**	125-80-200
2	40-25-200	**11**	80-50-160	**20**	125-80-250
3	50-32-125	**12**	80-50-200	**21**	125-80-315
4	50-32-160	**13**	80-50-250	**22**	125-100-200
5	50-32-200	**14**	80-50-315	**23**	125-100-250
6	50-32-250	**15**	100-65-160	**24**	125-100-315
7	65-40-160	**16**	100-65-200		
8	65-40-200	**17**	100-65-250		
9	65-40-250	**18**	100-65-315		

Characteristics diagram 1750 rpm 60 Hz



Denomination of hydraulics to the characteristics diagram

1 40-25-160	**10** 65-40-315	**19** 125-80-200	**28** 125-400	**37** 250-315
2 40-25-200	**11** 80-50-160	**20** 125-80-250	**29** 150-250	**38** 250-400
3 50-32-125	**12** 80-50-200	**21** 125-80-315	**30** 150-315	**39** 250-500
4 50-32-160	**13** 80-50-250	**22** 125-100-200	**31** 150-400	**40** 300-400
5 50-32-200	**14** 80-50-315	**23** 125-100-250	**32** 150-500	**41** 300-500
6 50-32-250	**15** 100-65-160	**24** 125-100-315	**33** 200-250	
7 65-40-160	**16** 100-65-200	**25** 100-400	**34** 200-315	
8 65-40-200	**17** 100-65-250	**26** 125-250	**35** 200-400	
9 65-40-250	**18** 100-65-315	**27** 125-315	**36** 200-500	

Our products comply with:

- Explosion protection acc. to ATEX / UL / CQST / CSA
- VOC directive 1999/13/EC
- TA-Luft
- IPPC directive
- CE
- RCCM, level 2
- Rosgortechnazdor

HERMETIC-Pumpen GmbH is certified acc. to:

- ISO 9001:2000
- GOST „R"
- ATEX 94/9/EG
- AD HP 0 / TRD 201
- DIN EN 729-2
- KTA 1401, QSP 4a

Convincing service.

Important features are readiness, mobility, flexibility, availability and reliability. We are anxious to ensure a pump operation at best availability and efficiency to our customers.

Installation and commissioning:

- service effected on site by own service technicians

Spare part servicing:

- prompt and longstanding availability
- customized assistance in spare part stockkeeping

Repair and overhauling:

- professional repairs including test run executed by the parent factory
- or executed by one of our service stations worldwide

Maintenance and service agreement:

- concepts individually worked out to increase the availability of your production facilities

Training and workshops:

- extra qualification of your staff to ensure the course of your manufacture

LEDERLE Hermetic

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PRODUKTINFO
CN-CNF-CNK/E/06/2007