Grundfos LS pumps

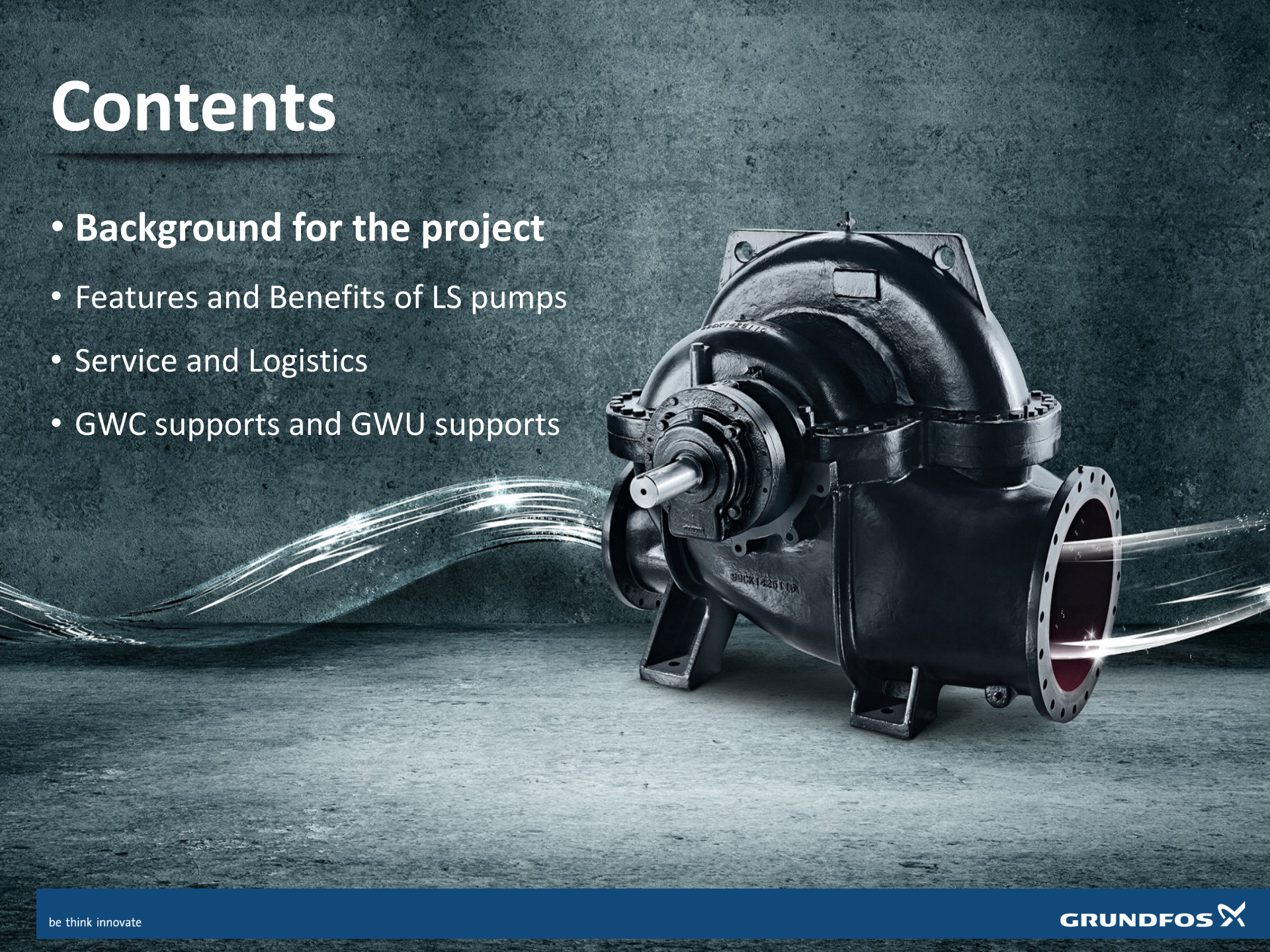
for Water Utility

be
think
innovate

GRUNDFOS

Contents

- **Background for the project**
- Features and Benefits of LS pumps
- Service and Logistics
- GWC supports and GWU supports



The Grundfos LS pumps development project

The project delivers the ideal WS complete range (from 1,000 to 12,000 m³/h) while focusing on a target NPSH and balancing the hydraulic needs for WS applications.

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Design improvement

8+ improvements from design team

- Bearing bush design
- Re-Lubricating design
- Packaging design
- Base plate drawing for sales
- Metric fastener design
- New database for ETO team
- Improved NPSH for WS app.
- Outline drawing for sales

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The applications that LS is suitable for

WATER SUPPLY:

- Water intake
- Water boosting
- Water distribution
- Backwashing

IRRIGATION:

- Field irrigation (flooding)
- Sprinkler irrigation

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The differences between LS and HS

HS	LS
Std. Material configuration	Std. Material configuration
Global brand components and motors	Local and Global brand components and motors
100% Performance testing as standard in Grundfos facilities	Performance tested as per request by customers
Inclusion in Grundfos Product Center	Not in Grundfos Product Center (but “Selector”)
Assembled and tested in Grundfos facilities in Singapore or Hungary	Assembled (and tested) in Grundfos Wuxi (GWC) (“China” on name plate)
Flow up to 3,800 m³/h	Flow up to 12,000 m³/h
Drinking Water Approvals	No Drinking Water Approvals

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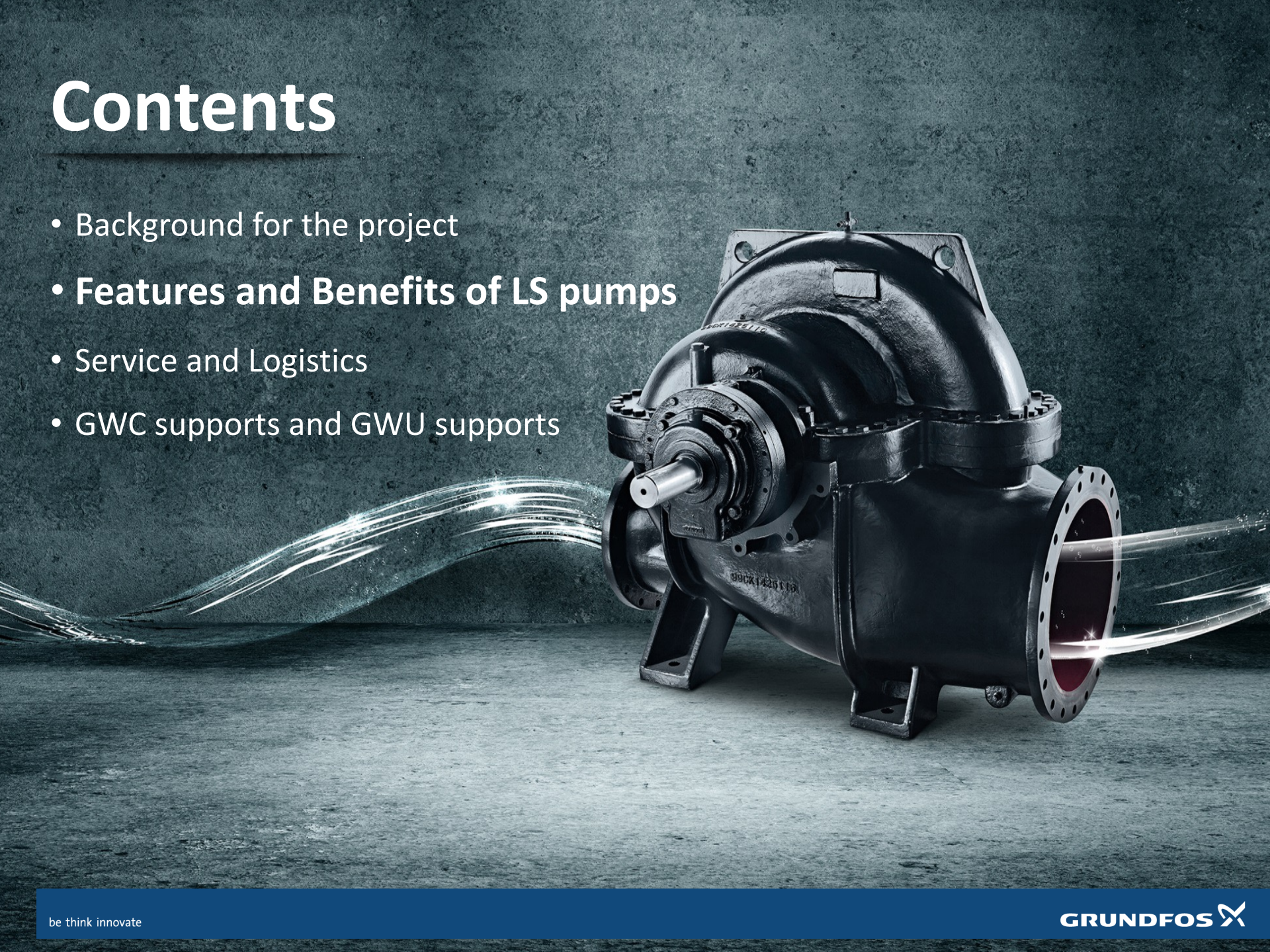
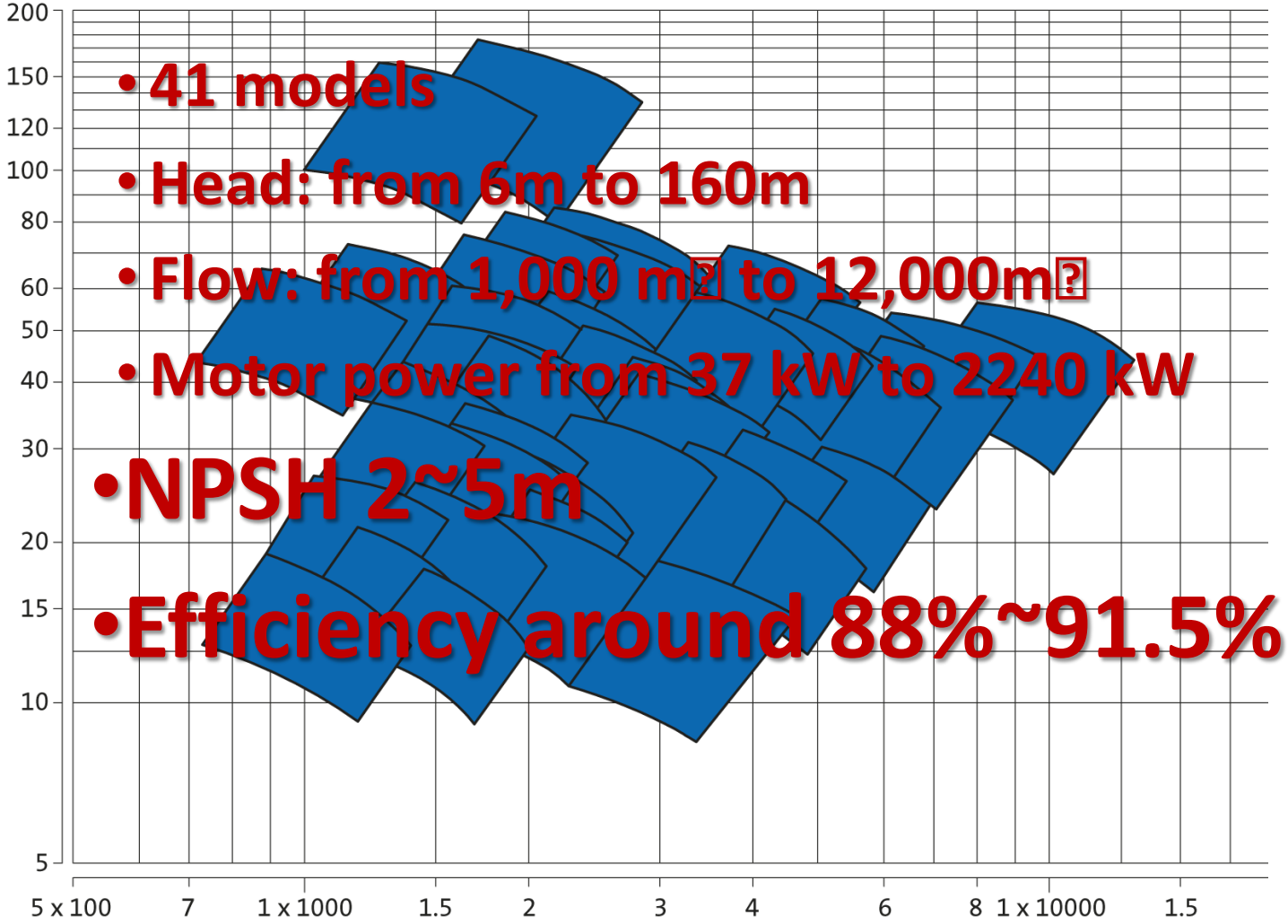


Performance range



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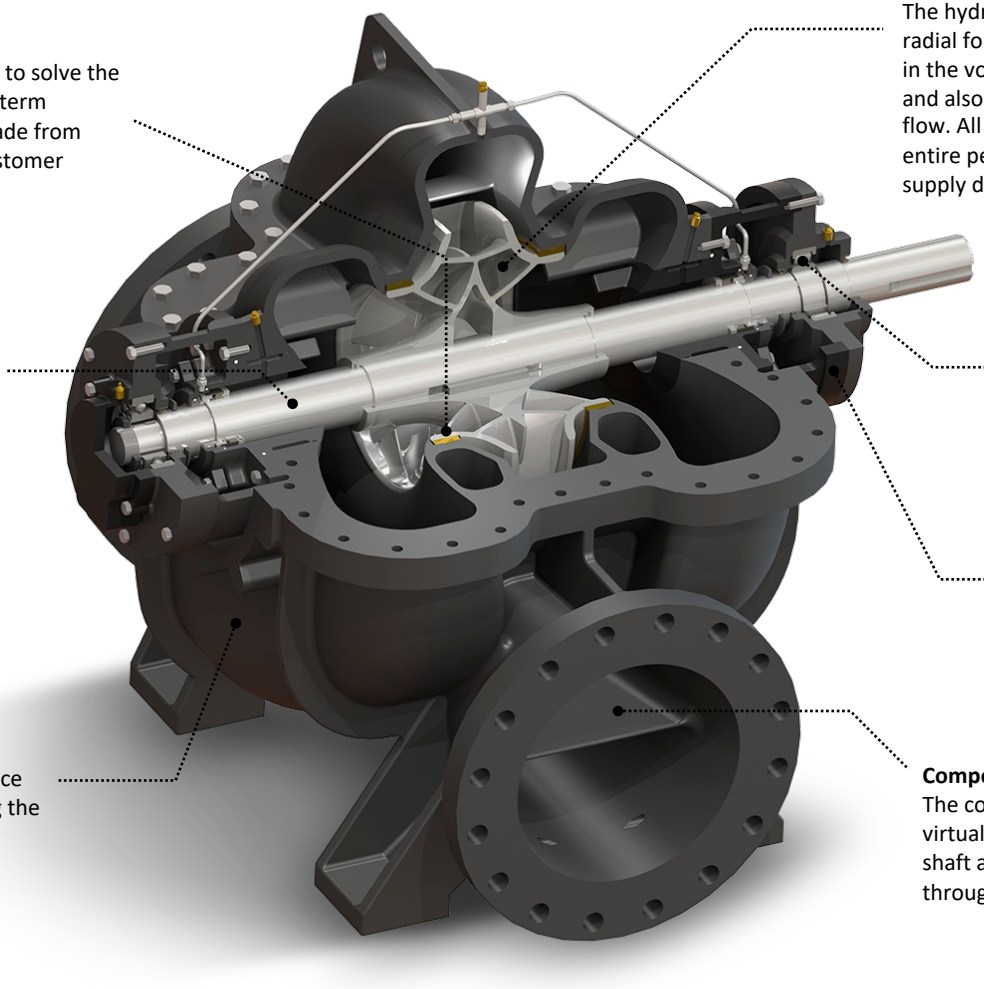
What makes the LS pump so good?

Wear ring
Replaceable wear ring design helps to solve the efficiency drop problem after long-term operation. The wear ring can be made from different materials according to customer requirements and the application.

Shaft and shaft sleeve
The strength and stiffness of the shaft are strictly calculated to withstand the stress under the harshest operating conditions. Replaceable sleeves protect the shaft from erosion and corrosion.

Pump casing
The split-casing enables maintenance of rotating parts without disturbing the pipe lines.



Impeller
The hydraulic design balances the axial force and radial force, decreases the vortex and recirculation in the volute, widening the high efficiency range, and also meets the low NPSH requirement at high flow. All this ensures reliable operation under the entire performance range, matching the water supply demands.

Bearing
Heavy duty bearing design is for the most severe environments, with the pump lasting for no less than 50,000 hours.

Bearing housing
The bearing sleeve design makes maintenance easier.

Compensated double volute design
The compensated double-volute design virtually eliminates radial forces on the shaft and ensures smooth performance throughout the entire operating range.

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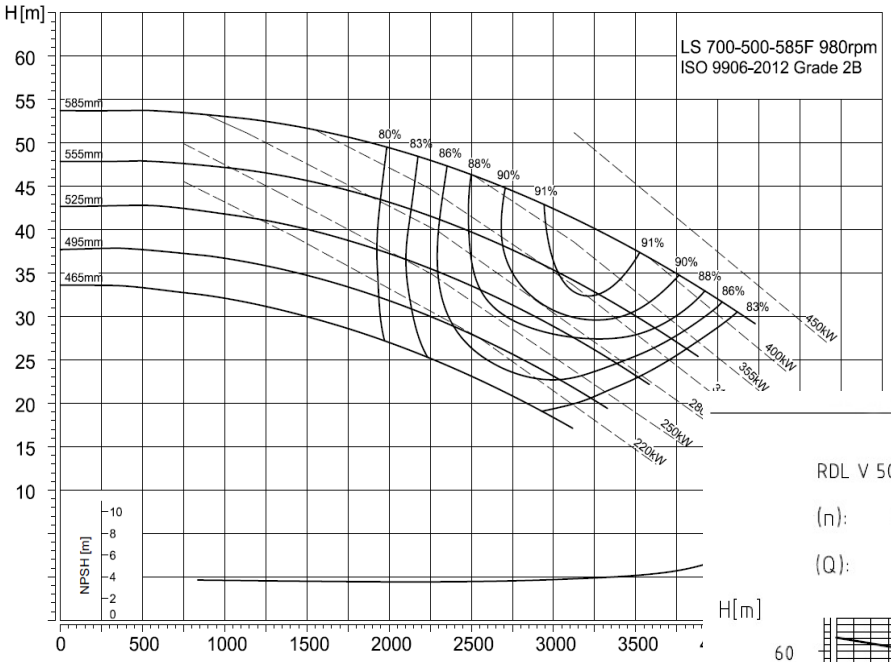
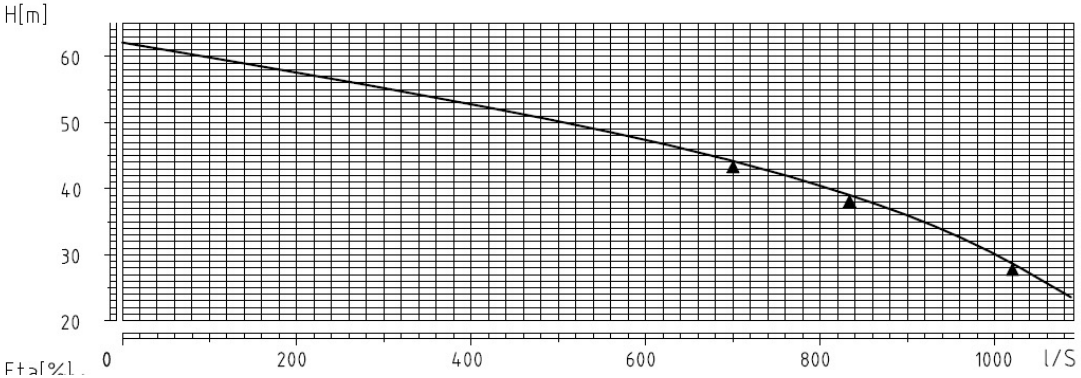
High efficiency level and low NPSHr



RDL V 500-640A1

(n):	990 rpm	(D2):	645 mm	(P):	357 kW
(Q):	3000 m^3/h	(H):	39 m	(NPSHr):	4.5 m
				(Eta):	89.5 %



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Materials for construction

	Standard	Optional
Pump casing	Cast iron	Ductile cast iron / Stainless steel
Impeller	Stainless	Bronze / Duplex stainless steel
Shaft	Stainless steel	Duplex Stainless steel
Sleeve	Stainless steel	Bronze
Wear ring	Bronze	Cast iron / Stainless steel
Shaft seal	Mechanical shaft seal	Stuffing box
Flushing line	Stainless steel	Bronze / Teflon
Low voltage motor efficiency class (up to 375 kW)	IE2	IE3
High voltage motor	6 kV, 10 kV	
Pump direction of rotation	Clockwise (CW)	Counter clockwise (CCW)

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Key selling points

- High energy efficiency
- Low NPSH
- Low life cycle costs
- Pump range up to 12,000 m^3/h
- High flexibility on custom built solutions: Material variants and ETO-capabilities
- Easy to service: Split case design
- Grundfos is a globally represented service partner
- Double suction minimises axial load, which extends the life of the wear rings, shaft seals and bearings
- Double volute reduces radial forces and minimises noise and vibration
- Removable bearing housing design allows access to the pump components without removing the top half of the casing
- Suction baffles reduce losses and improve NPSH-R by directing flow into the eye of the impeller

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Connections and flanges

Flange sizes:

Suction: 450-1200 mm

Discharge: 300-800 mm

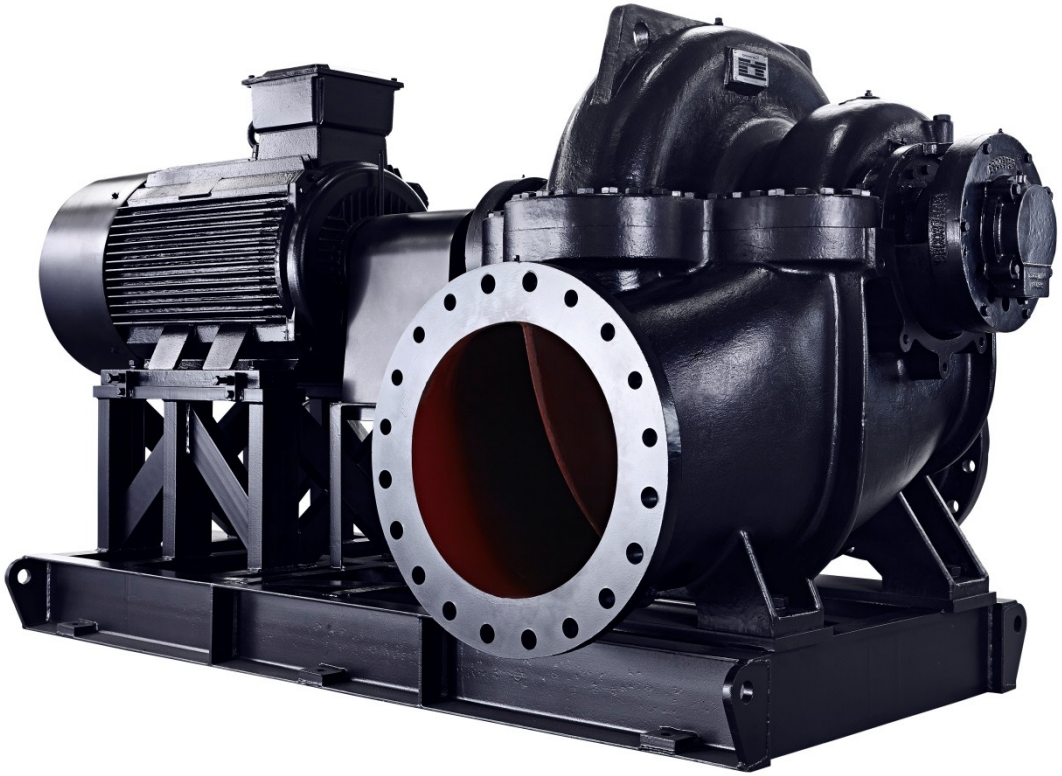
Flange standards:

DIN standard

ANSI as option

Flange Pressure rating:

PN10 / PN16 / PN25



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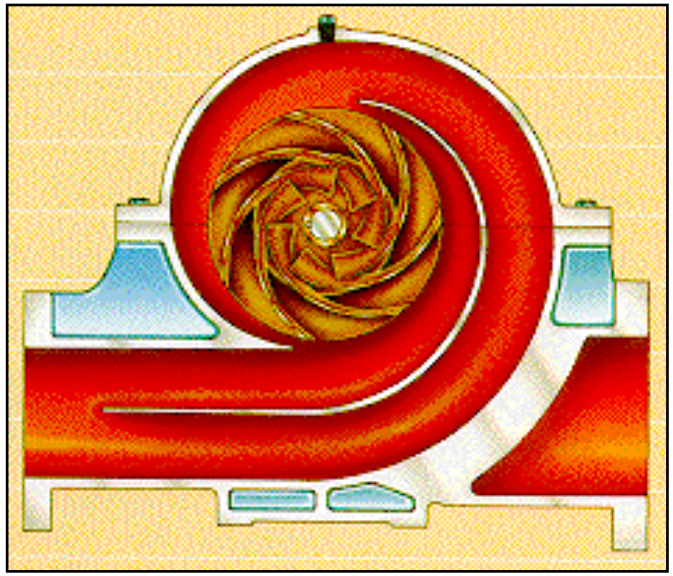
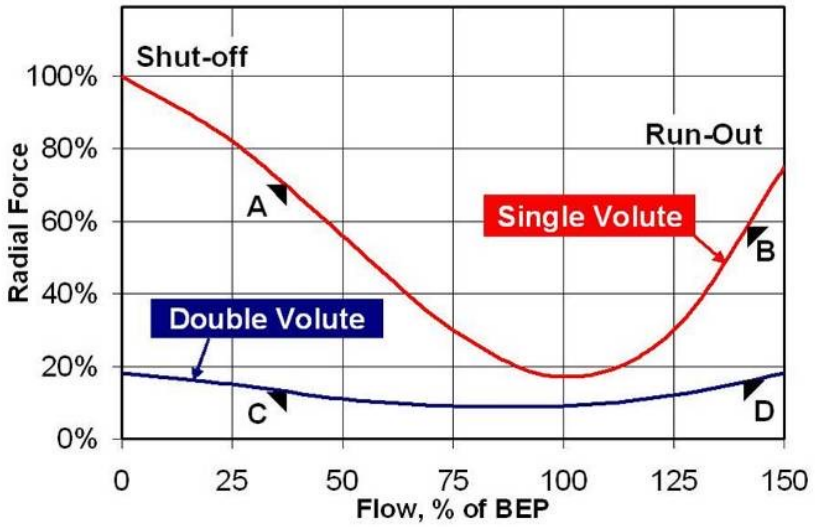
Double volute design



Compensated double volute design virtually eliminates radial loads by balancing the hydraulic forces of the liquid within the pump casing.

This balancing feature extends seal and bearing life, minimises vibration and provides quiet operation. It also reinforces the volute itself.



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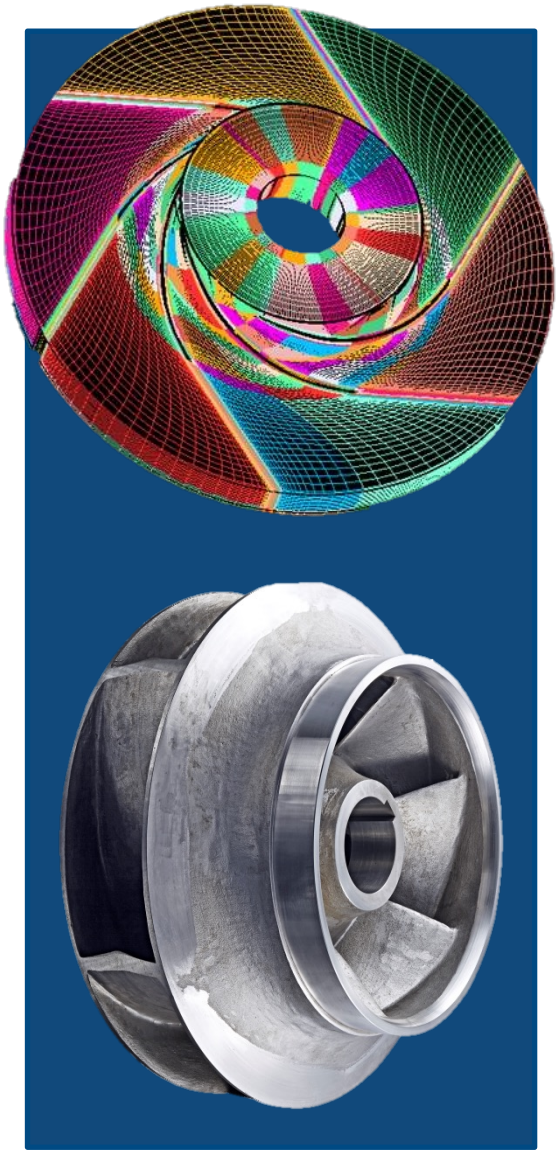
Impeller

Hydraulically and dynamically balanced double suction impellers are designed to match the casing.

The hydraulic matching of casing and impeller reduces turbulence and recirculation, ensuring high efficiency and quiet performance over the entire range of operation.

CFD (Computational Fluid Dynamics) is used to achieve a precision and highly efficient design.



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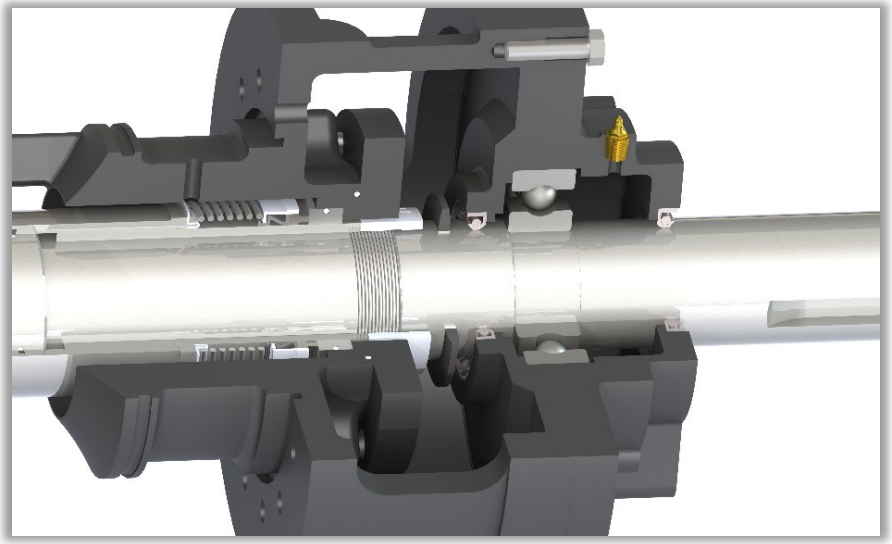
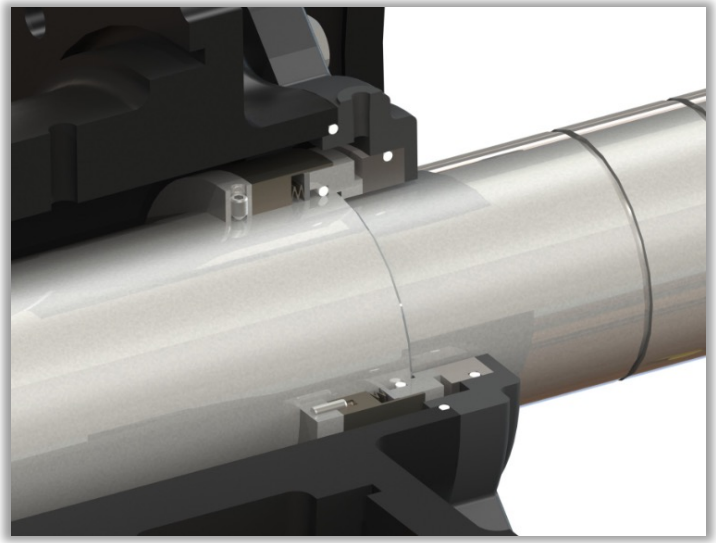
Shaft seal



Unbalanced shaft seal
- economic solution to universal applications



Balanced shaft seal
- to withstand a higher operation pressure

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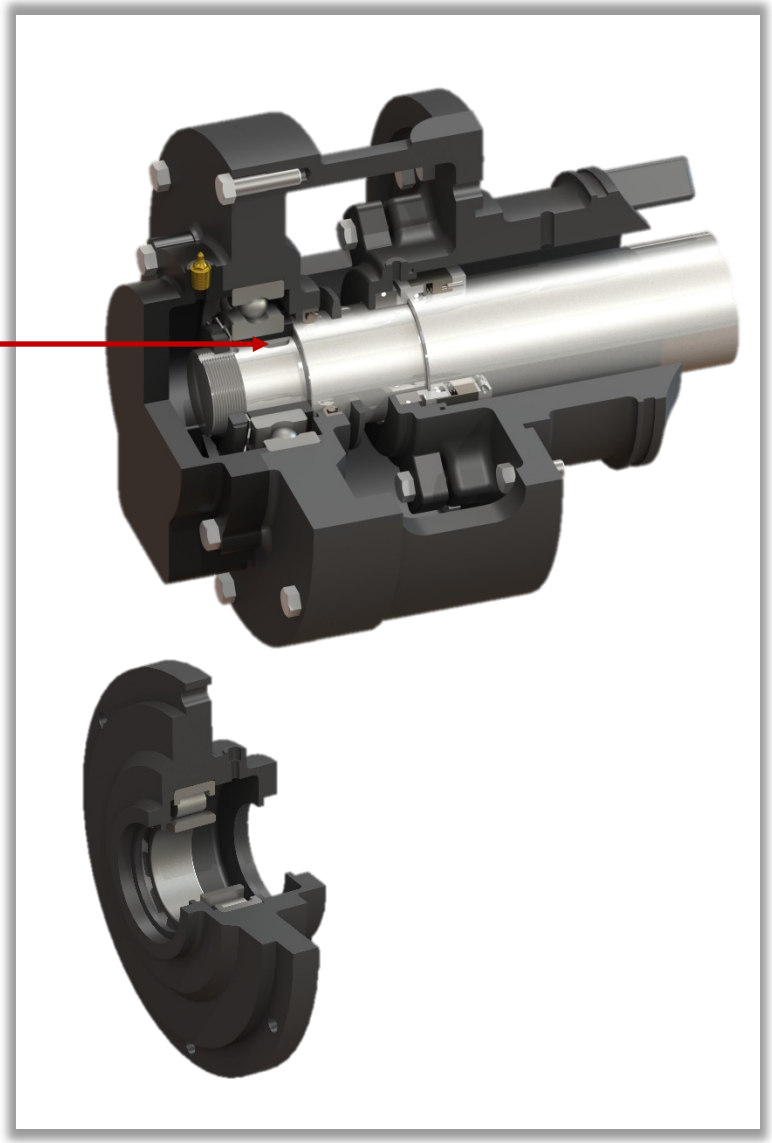
Bearing and bearing housing

Deep groove **ball bearing** or **roller bearing**

Bearing **sleeve design** makes the maintenance easier.



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Coupling

Pin and Bush coupling

- Cost effective
- Reliable and service friendly

Flexible laminated coupling

- High reliability
- Maintenance free
- Long service life
- Standard offering for separated base frame design

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Motor program of LS pumps

Low voltage 380v 660v		**High voltage** 6kv 10kv	
Marathon	Siemens	Wolong	Siemens
<=560kw		>= 200kw	

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GWC Pump Test Capability

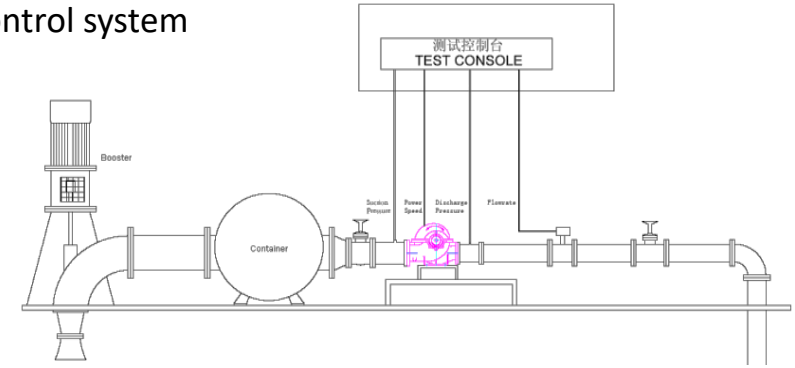
- The test bed is capable of carrying out **ISO9906-2012 Grade 1** test.
- The standard test report is according to ISO 9906 2012 Grade 2B.

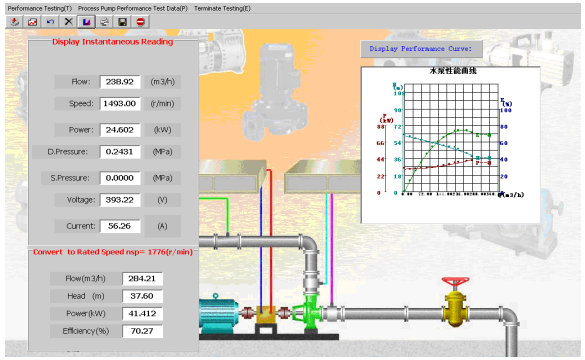
Test range:

Max. flow range	Max. test pressure	Max. test power	Max. pump suction/discharge diameter
8000 m³/h	2.5 M Pa	500KW	1200mm/800mm

Frequency conversion testing capability	
Adjustable frequency range	0 – 60Hz
Adjustable voltage	250 - 480V
Max. power	400kw

Test setup sketch and control system





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Test when volume beyond GWC capacity

Test capacity	FLOW rate	Head	P2	Power source
DN 15~1200mm	≤ 20,000 m³	≤ 4000 m	≤ 2,500 Kw	220V, 380V, 660V, 1140V, 6kV, 10kV

The test center is located in ShanDong China, about 700 km away from GWC

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Test specification overview

Test Scenarios		GWC	Shandong
Efficiency	OK	OK	OK
Full speed test Q/H	ISO9906	OK	OK
Reduced speed test	ISO9906	OK	OK
High Voltage		NO	OK
50/60 Hz		OK	OK
Hydrostatic test	ISO, API	ISO, not API	NO
NPSH	ISO9906	OK <=DN400	OK
Noise	ISO3744/3746*	OK	OK
Vibration	ISO10816*	OK	OK
Witness test		OK	OK

*The standards are only for reference

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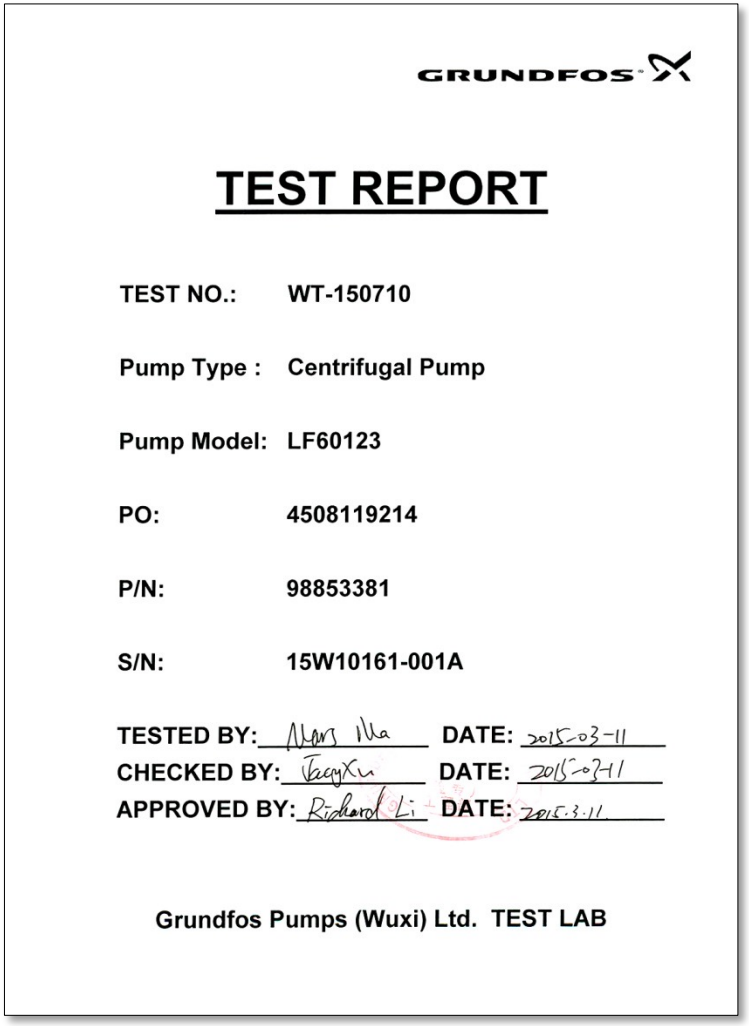
LS test report

Performance test (Q/H) done on the request of customers.



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TEST REPORT

TEST NO.: WT-150710

Pump Type : Centrifugal Pump

Pump Model: LF60123

PO: 4508119214

P/N: 98853381

S/N: 15W10161-001A

TESTED BY: DATE: 2015-03-11

CHECKED BY: DATE: 2015-03-11

APPROVED BY: Richard Li DATE: 2015.3.11

Grundfos Pumps (Wuxi) Ltd. TEST LAB

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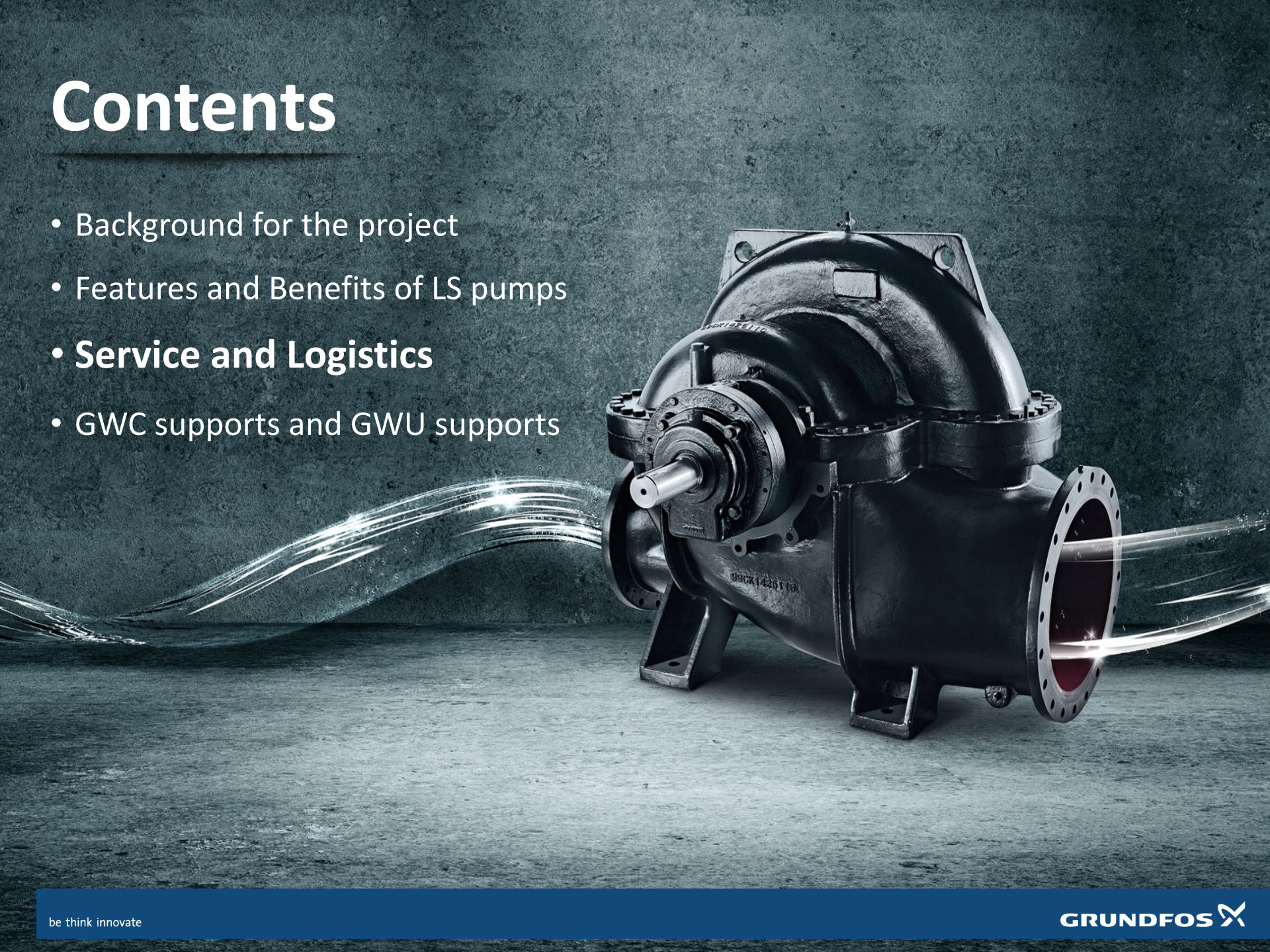
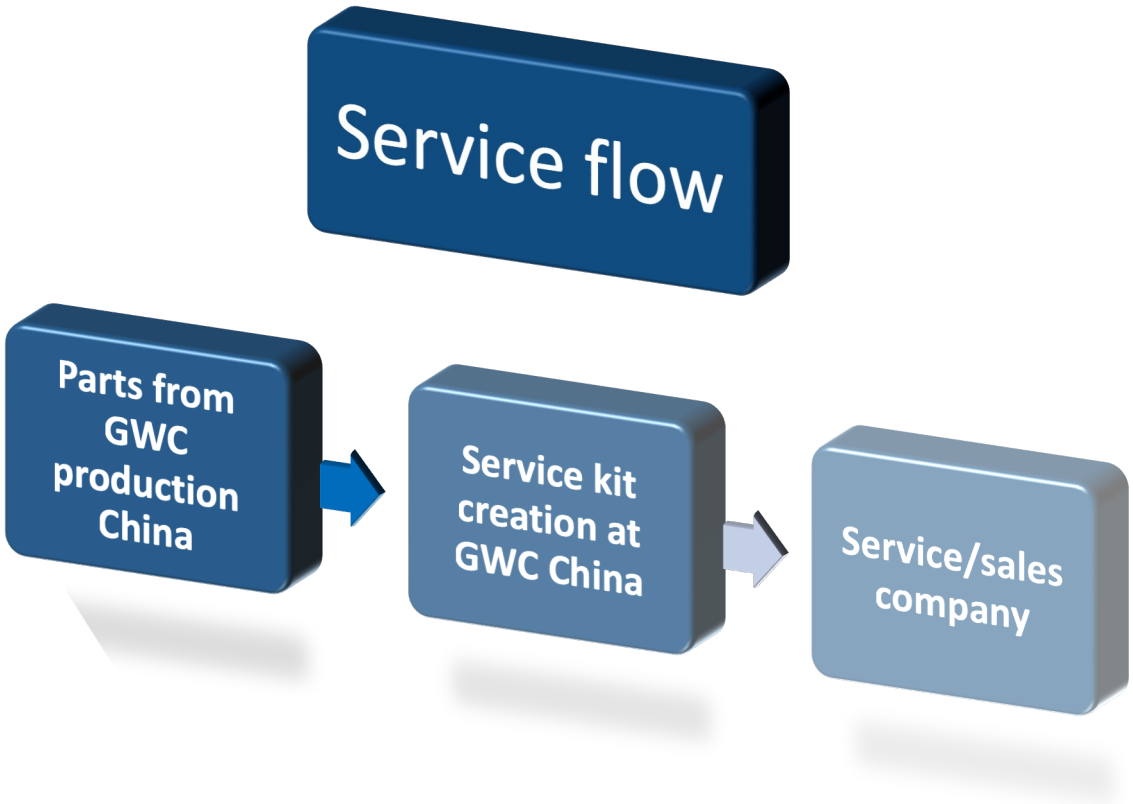


Service strategy

Recommended service parts/kits for continuous operation

For 2 years operating time:
1 x Shaft seal kit
1 x Gasket Kit
1 x Wear ring kit

For 5 years operating time:
2 x Shaft seal kit
2 x Gasket Kit
2 x Wear ring kit
1 x Hardware Kit
1 x Bearing Kit
1 x Impeller Kit
1 x Shaft Sleeve Kit
1 x Motor Bearings kit



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Expected lead time

ONLY FOR INTERNAL USE !

	Bare pump	Pump set with Motor		Test	FPV
		Siemens	Marathon/ Wolong		
Low Voltage	10 weeks	10 weeks	10 weeks	+ 0~3 weeks	On request
High Voltage	10 weeks	12 weeks	10 weeks	+ 0~3 weeks	On request

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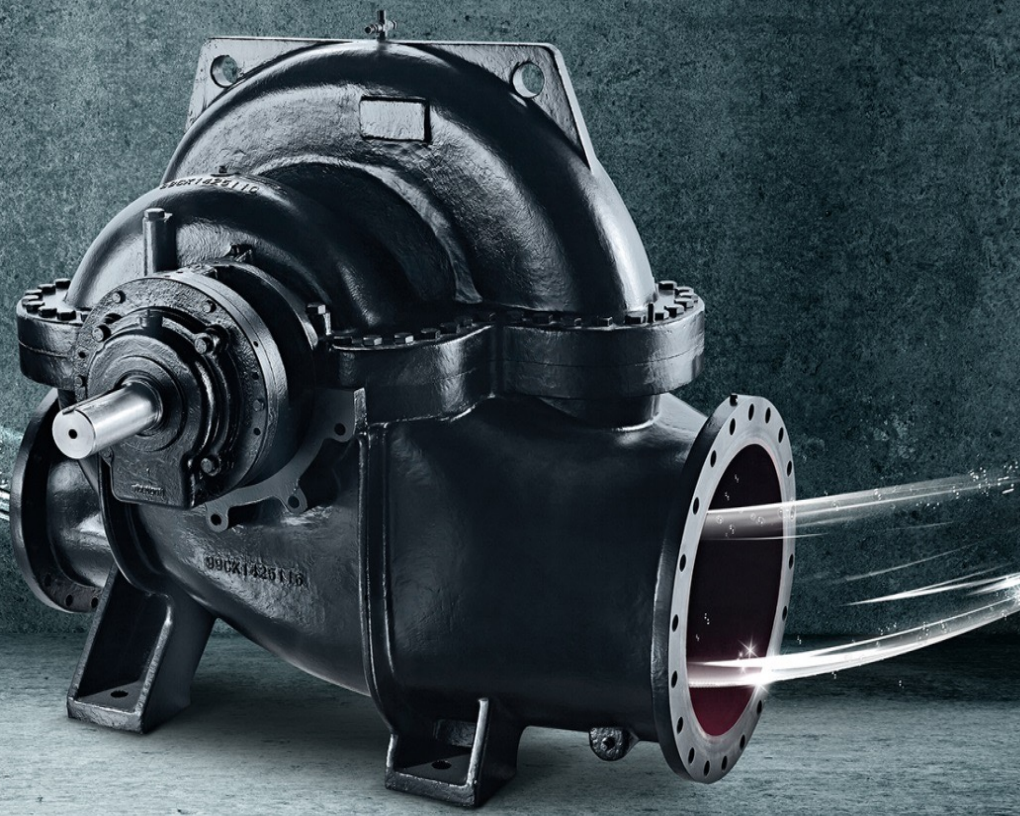
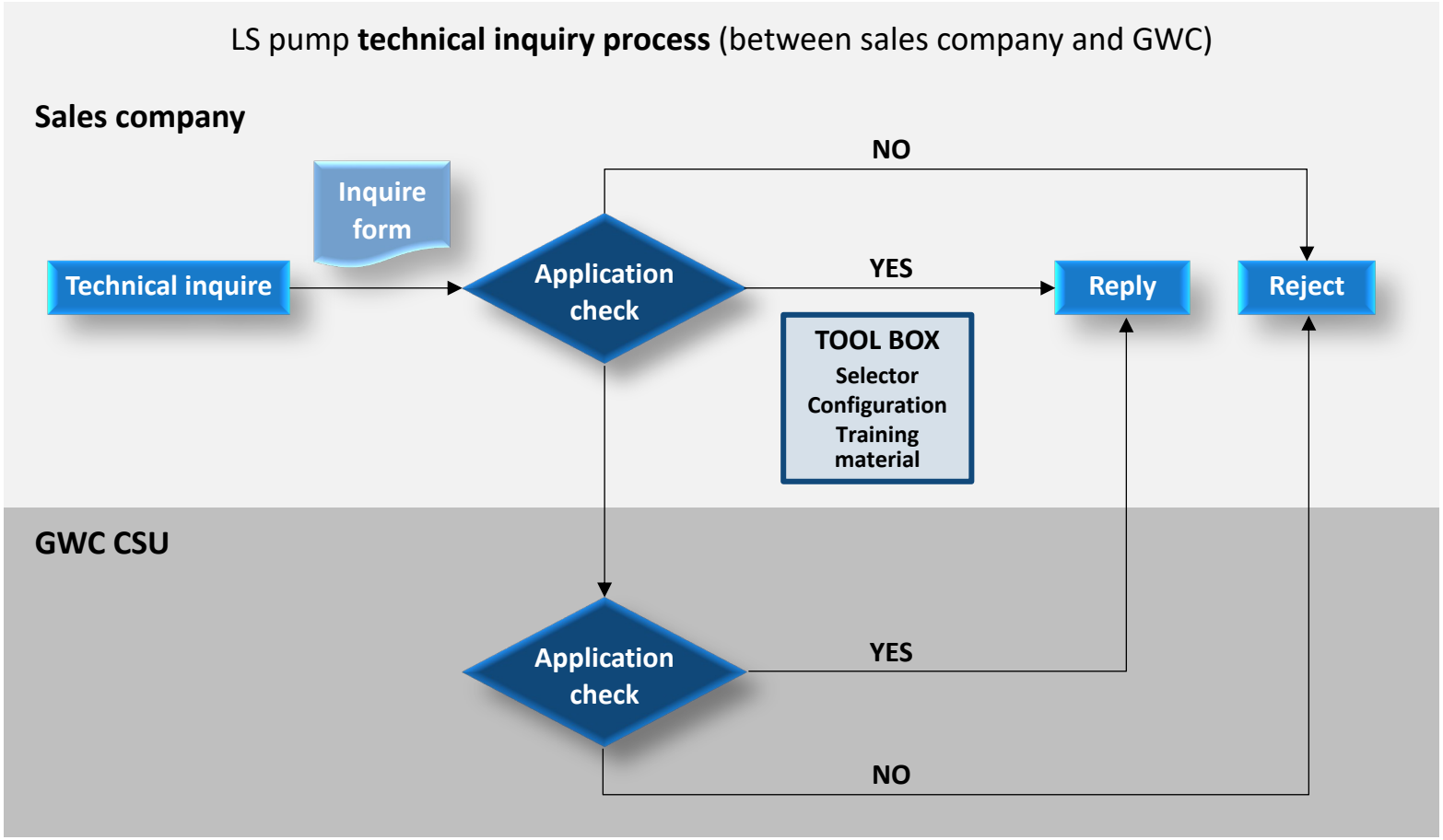


How to communicate

Communication process



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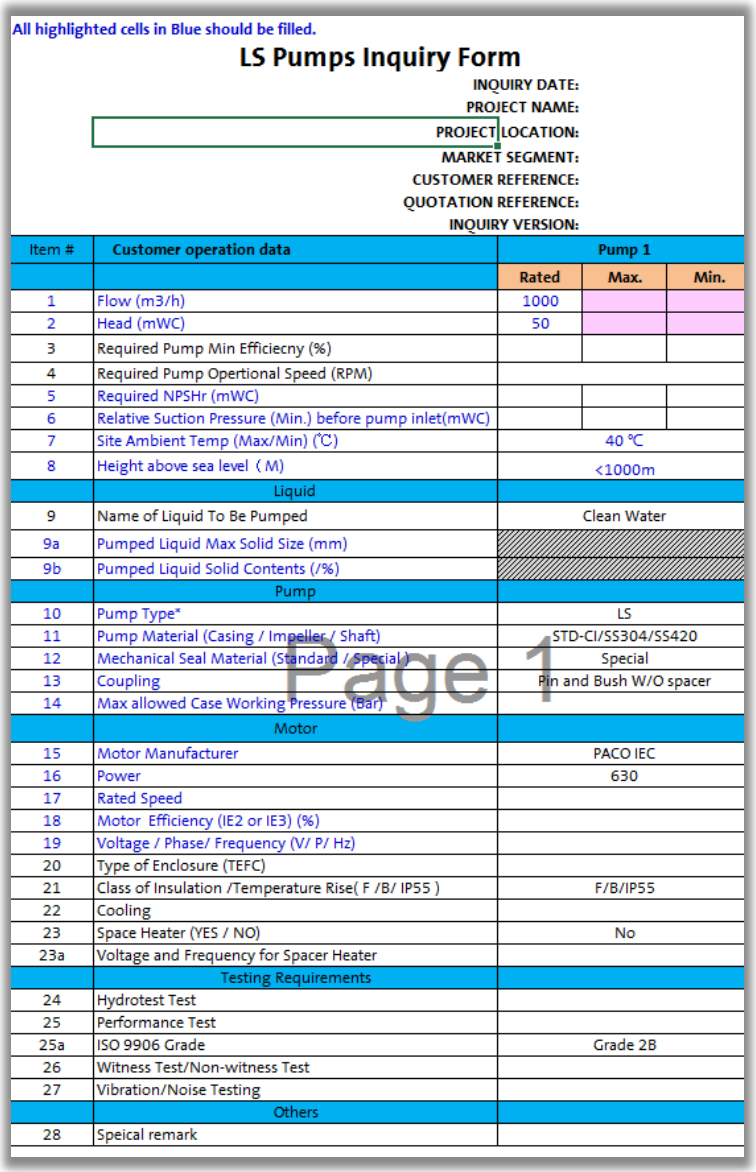
How to communicate

The order form / template



All highlighted cells in Blue should be filled.

LS Pumps Inquiry Form

INQUIRY DATE:
PROJECT NAME:
PROJECT LOCATION:
MARKET SEGMENT:
CUSTOMER REFERENCE:
QUOTATION REFERENCE:
INQUIRY VERSION:

Item #	Customer operation data	Pump 1		
		Rated	Max.	Min.
1	Flow (m3/h)	1000		
2	Head (mWC)	50		
3	Required Pump Min Efficiecny (%)			
4	Required Pump Opertional Speed (RPM)			
5	Required NPSHr (mWC)			
6	Relative Suction Pressure (Min.) before pump inlet(mWC)			
7	Site Ambient Temp (Max/Min) (℃)	40 ℃		
8	Height above sea level （M)	<1000m		
	Liquid			
9	Name of Liquid To Be Pumped	Clean Water		
9a	Pumped Liquid Max Solid Size (mm)			
9b	Pumped Liquid Solid Contents (/%)			
	Pump			
10	Pump Type*	LS		
11	Pump Material (Casing / Impeller / Shaft)	STD-CI/SS304/SS420		
12	Mechanical Seal Material (Standard / Special)	Special		
13	Coupling	Pin and Bush W/O spacer		
14	Max allowed Case Working Pressure (Bar)			
	Motor			
15	Motor Manufacturer	PACO IEC		
16	Power	630		
17	Rated Speed			
18	Motor Efficiency (IE2 or IE3) (%)			
19	Voltage / Phase/ Frequency (V/ P/ Hz)			
20	Type of Enclosure (TEFC)			
21	Class of Insulation /Temperature Rise(F /B/ IP55)	F/B/IP55		
22	Cooling			
23	Space Heater (YES / NO)	No		
23a	Voltage and Frequency for Spacer Heater			
	Testing Requirements			
24	Hydrotest Test			
25	Performance Test			
25a	ISO 9906 Grade	Grade 2B		
26	Witness Test/Non-witness Test			
27	Vibration/Noise Testing			
	Others			
28	Speical remark			

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The FPV offerings

- Material variants
- Vertical installation
- Different shaft seal brands and types.
- Motor brands other than standard
- Customised nameplate
- ISO 9906 Grade 1 test
- Witness test/third party test
- 60 Hz pumps
- CE mark

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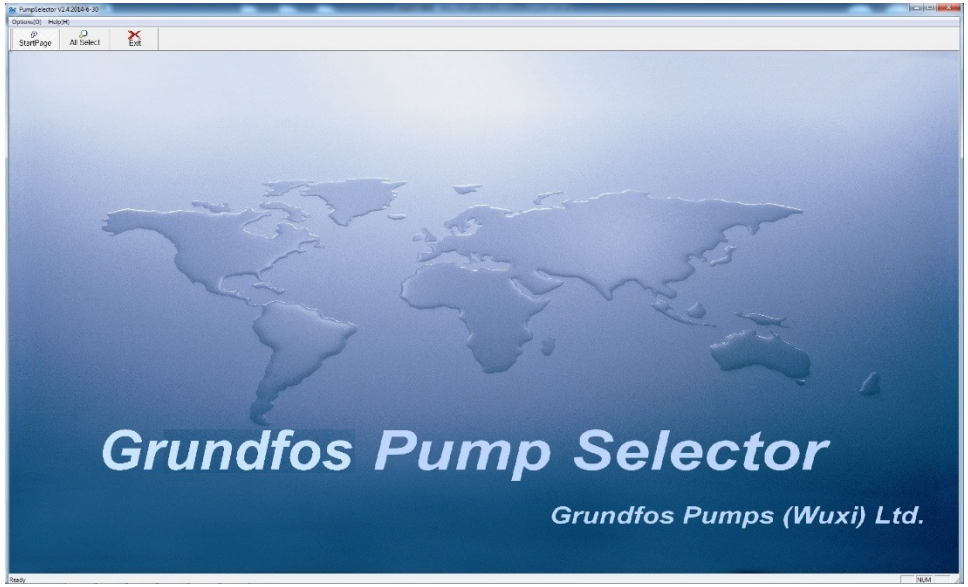
Pump selection tool

Grundfos pump selector

Grundfos Pump Selector offers a sizing program to select the most suitable pump for your application. It is available in a disk version. The software is divided into two sections:



All select

The section contains the following:

- technical data
- curves (duty point curve, multi-speed curve, parallel pump curve and system curve, etc.).

Outline

- Complete pump drawing
- Bare-shaft pump drawing

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More Info

- LS Data booklet
- LS I&O
- LS Service
- LS tender’s specifier
- Grundfos Product Selector
- SharePoint site - LINK
- Selected local web sites

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Global Water Utility Centre

GWUC can assist sales company at

- Specification stage
- Quotation stage
- Contract review
- Project management
- Technical advice and support

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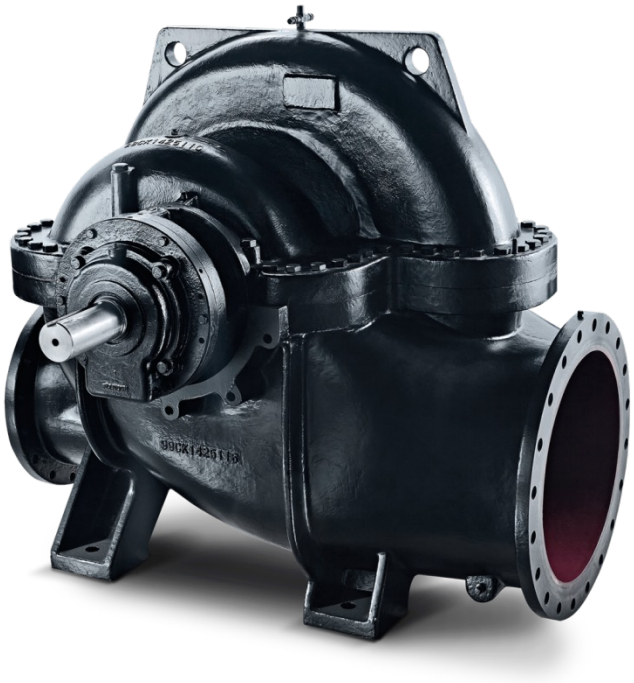
WE ARE EAGER TO HELP YOU GROW THE WATER UTILITY BUSINESS!



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