



LNN Family Split Case Pumps

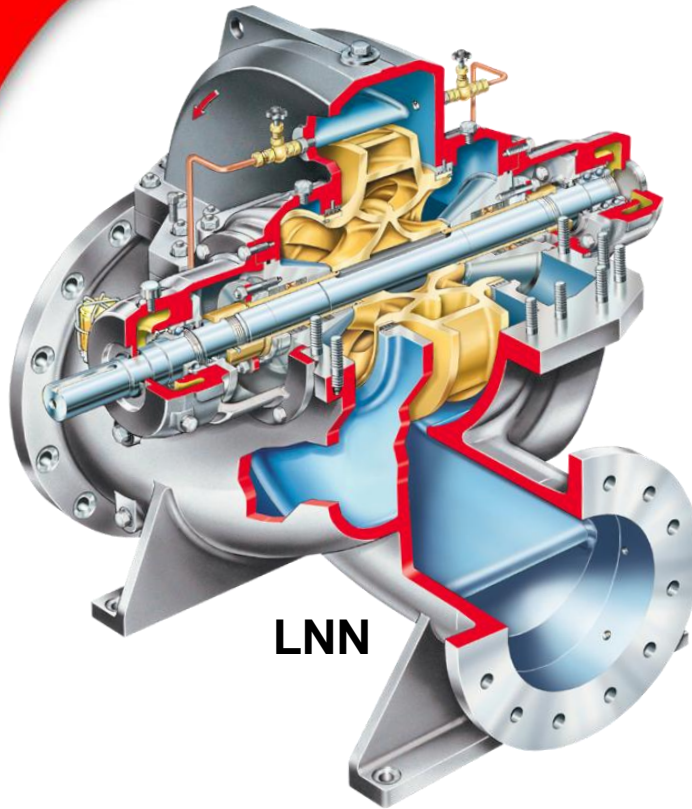
▶ *Flowserve Main Menu*



- ▶ *Introduction*
- ▶ *Overview*
- ▶ *Other Family Configurations*
- ▶ *Profile*
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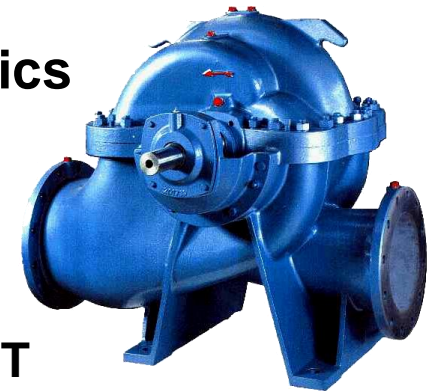
LNN Family of Pumps



LNN

LNN Family

- 100 to 20 000 m³/h (500 to 88 000 gpm)
- 125 mm (5 in) to 1000 mm (42 in) suction nozzle sizes
- 30 kW (100 hp) to 5000 kW (4500 hp) drivers
- 267+ sets of hydraulics

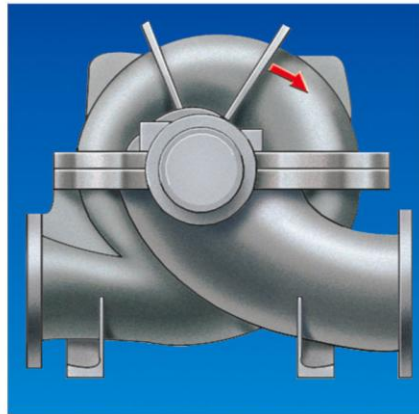


LNGT

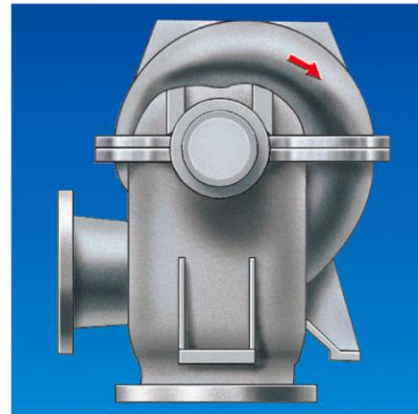
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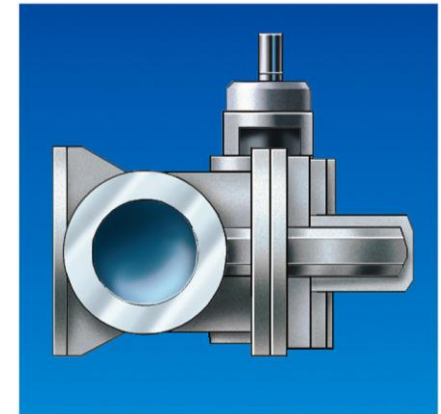
LNN Family Nomenclature



**LNN, LNE,
LNS, LNGT**
Horizontal
Side Suction



**LNNC, LNEC,
LNSC**
Horizontal
Bottom Suction



**LNNV, LNEV,
LNSV**
Vertical
Mounted Pump

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LNN – Product Overview

- Number of pumps – 49
- Number of hydraulics – 122
- Capacities:
100 to 20 000 m³/h
(500 to 88 000 gpm)
- Power range: 30 kW (40 hp)
to 5000 kW (6700 hp)
- Suction nozzle size range:
200 mm (8 in) to 1000 mm
(40 in)
- Installed population –
worldwide
- Released in early 1990s

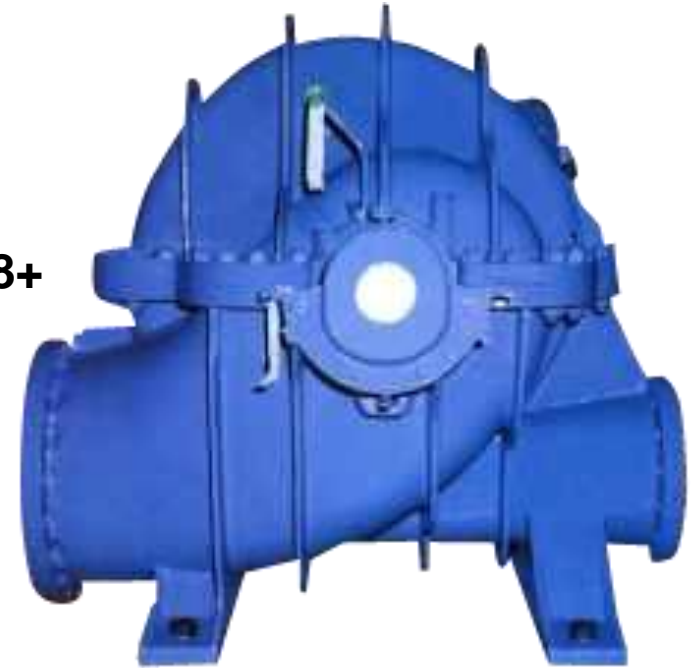


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LNE – Product Overview

- **Manufactured in multiple locations**
- **Number of pumps – 39**
- **Number of hydraulics – 78+**
- **Capacities:
100 m³/h to 13 600 m³/h
(500 to 60 000 gpm)**
- **Nozzle size range:
125 mm (5 in) to 900 mm
(36 in)**
- **Massive installed population**
- **Released in early 1950s**
- **Heritage Worthington LN**

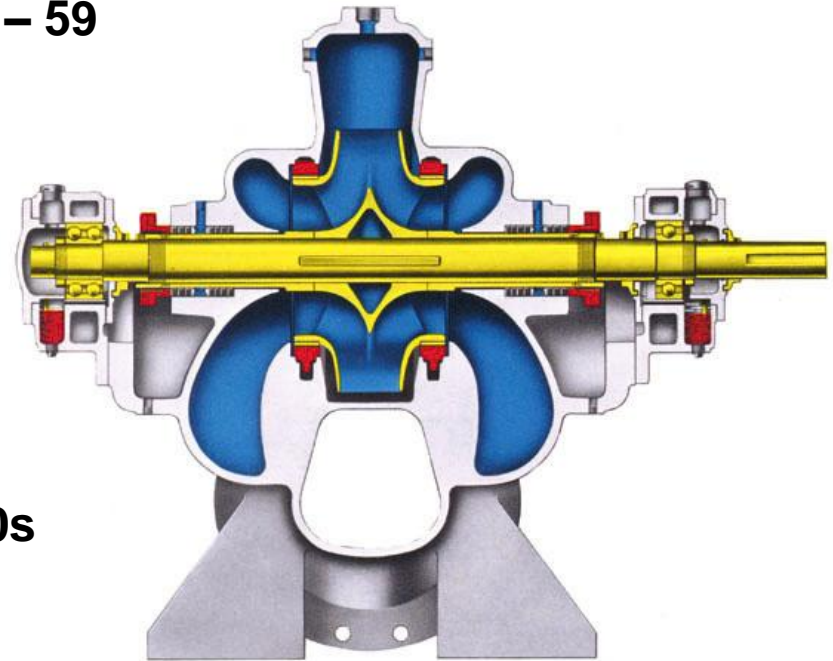


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LNS – Product Overview

- Number of pumps – 31
- Number of hydraulics – 59
- Capacities: 100 m³/h to 13 600 m³/h (500 to 60 000 gpm)
- Nozzle size range: 250 mm (10 in) to 1000 mm (42 in)
- Released in early 1940s
- Heritage I-R Model SL/SSDS Product

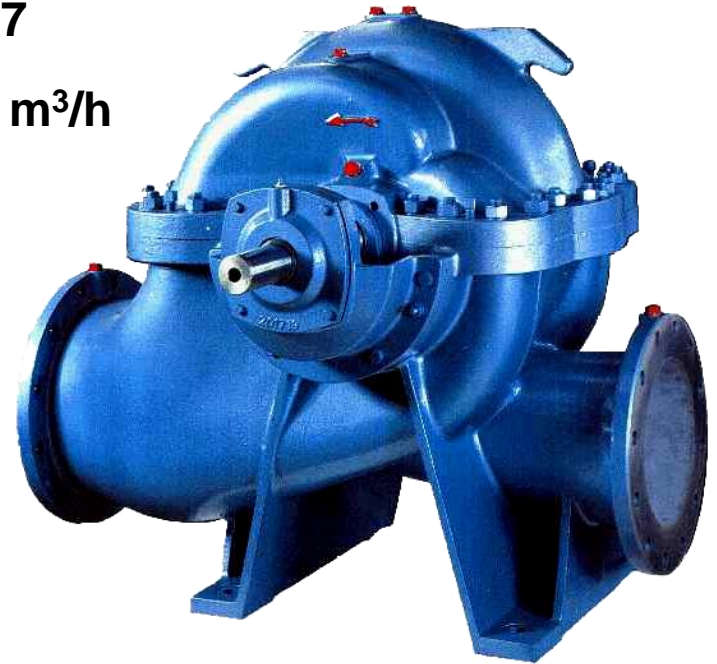


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LNGT – Product Overview

- Number of pumps – 46
- Number of hydraulics – 57
- Capacities: 100 to 20 000 m³/h (500 to 88 000 gpm)
- Nozzle size range: 150 mm (6 in) to 1400 mm (46 in)
- Installed population – mostly Europe
- Released in early 1970s
- Specialty applications
- Heritage Flowserve HGT



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LNNV – Product Overview

- Anti-friction thrust bearing
- Sleeve bottom bearing
- Lubricated by liquid pumped
- Rubber marine type
- Shorter shaft span
- Bottom bearing maintenance enhanced
- One stuffing box only

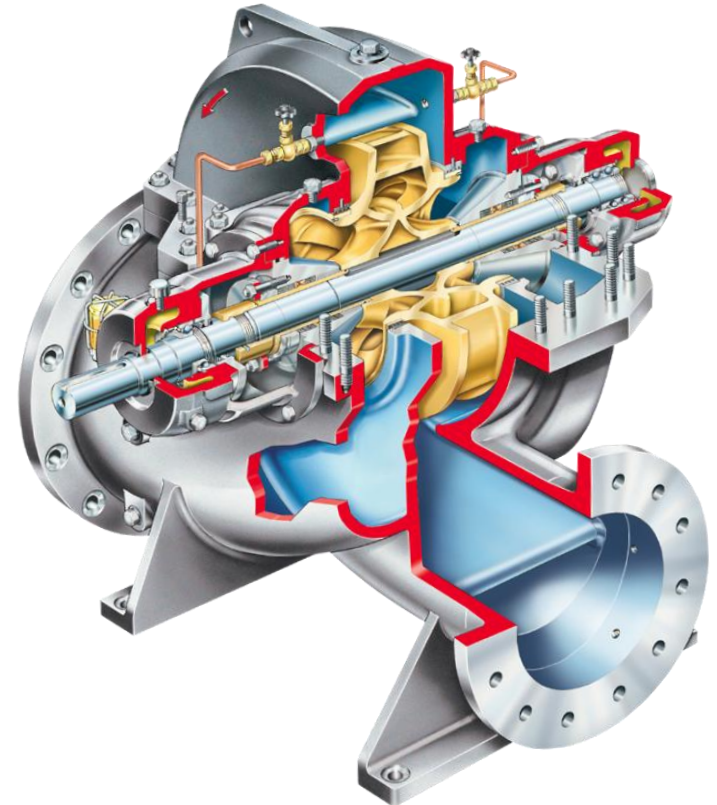


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LNN Product Profile

- Up-to-date hydraulics and features
- Utilize latest casting and machining technology
- “World” market design
- Nozzles to ANSI or ISO
- Internal dimensions and fasteners are to metric standards
- Released in 1990s



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LNN Features – Materials of Construction

Pump Component	Material Specification (PROS)					
	A1	A2	A3	B1	B2	B3
Casing and Stuffing Boxes	Cast Iron	Cast Iron	Cast Iron	Nodular Cast Iron (Ductile Iron)	Nodular Cast Iron (Ductile Iron)	Nodular Cast Iron (Ductile Iron)
Impeller	Bronze	Cast Iron	11-13% Chrome Steel	Bronze	Cast Iron	11-13% Chrome Steel
Shaft	Steel	Steel	11-13% Chrome Steel	Steel	Steel	11-13% Chrome Steel
Casing Wear Rings	Bronze > 16" Cast Iron	Cast Iron	11-13% Chrome Steel	Bronze > 16" Cast Iron	Cast Iron	11-13% Chrome Steel
Optional Impeller Wear4Rings	Bronze	Steel	11-13% Chrome Steel	Bronze	Steel	11-13% Chrome Steel
Seal	Mechanical Seal: Balanced/unbalanced/catridge/split or Gland Packing					
Bearing Housing	Cast iron (steel is optional)					
Bearings	Antifriction grease or oil bath lubricated (optional oil mist) Optional sleeve with ball thrust (or tilting pad)					

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LNN Features – Materials of Construction

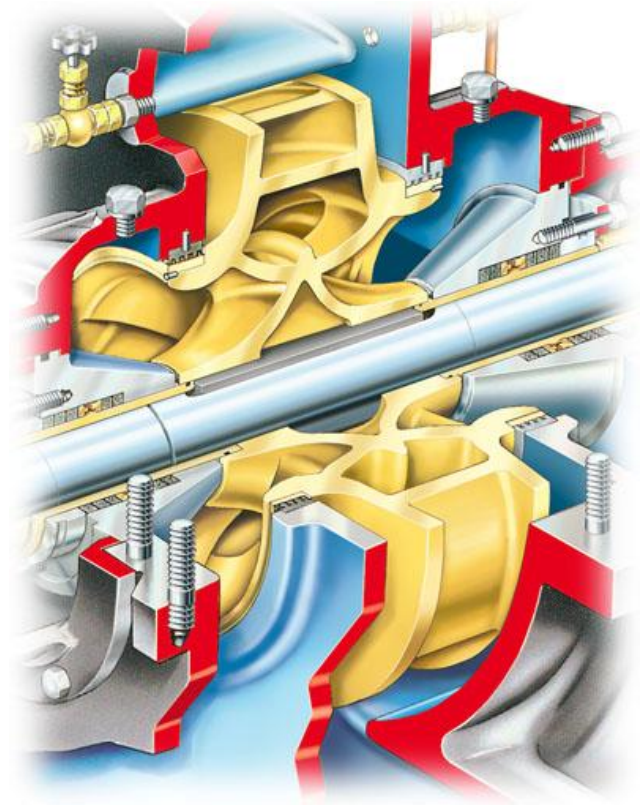
Pump Component	Material Specification (PROS)						
	C1	C2	D1	E1	E2	F1	G1
Casing and Stuffing Box	Steel	Steel	Ni-Resist	Bronze	Bronze	Nickel Aluminium Bronze	Stainless Steel
Impeller	11-13% Chrome Steel	316 Stainless Steel	Ni-Resist	Bronze	Nickel Aluminium Bronze	Nickel Aluminium Bronze	Stainless Steel
Shaft	Steel	Steel	Duplex ss	Duplex ss	Duplex ss	Duplex ss	Duplex ss
Casing Rings	Cast Iron	Cast Iron	Ni-Resist	Bronze	Bronze	Nickel Aluminium Bronze	Stainless Steel
Optional Impeller Rings	Steel	Steel	Stainless Steel	Bronze	Bronze	Nickel Aluminium Bronze	Stainless Steel
Seal	Mechanical Seal : balanced/unbalanced/cartridge/split or Gland Packing						
Bearing Housing	Cast iron (steel is optional)						
Bearings	Antifriction grease or oil bath lubricated (optional oil mist) Optional sleeve with ball thrust (or tilting pad)						

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LNN Features – Impellers

- Double suction
- Precision castings
- Key driven
- Balanced to ISO 1940 Grade 6.3 (standard)
- Available options:
 - ISO 1940 Grade 2.5 balance
 - Rotor assembly balance
 - Solid impeller hub (API)
 - Shrunk-on impeller design
 - Used for small pumps only



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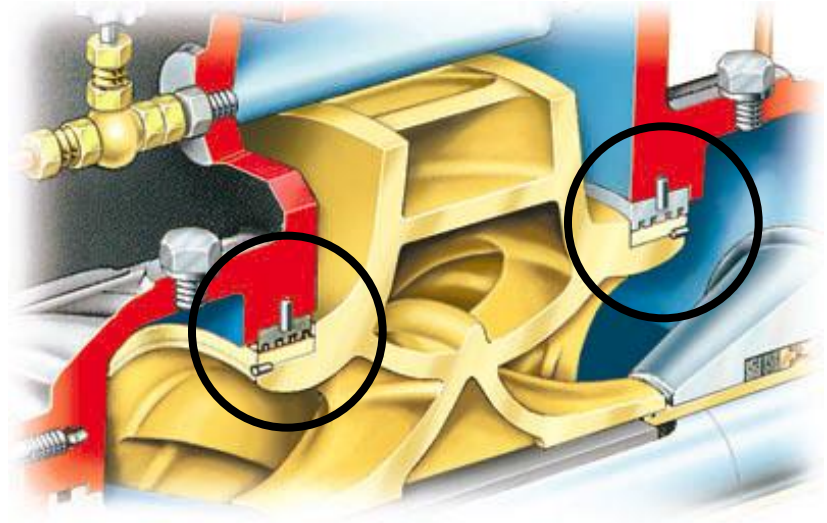
LNN Features – Wearing Rings

Casing wear rings

- Serrated for better efficiency
- Locked into casing shoulder for axial support
- Radial pins prevent rotation

Impeller wear rings

- Optional
- Pressed and pinned construction



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LNN Features – Seal Chamber

- **Separate cast part**
- **Simplified casing patterns**
 - Better quality castings
- **Seal chamber is not split in half:**
 - Better sealing
- **Can be removed from pump**
 - To repair and modify
- **Easy conversion to:**
 - Component, cartridge or split mechanical seals

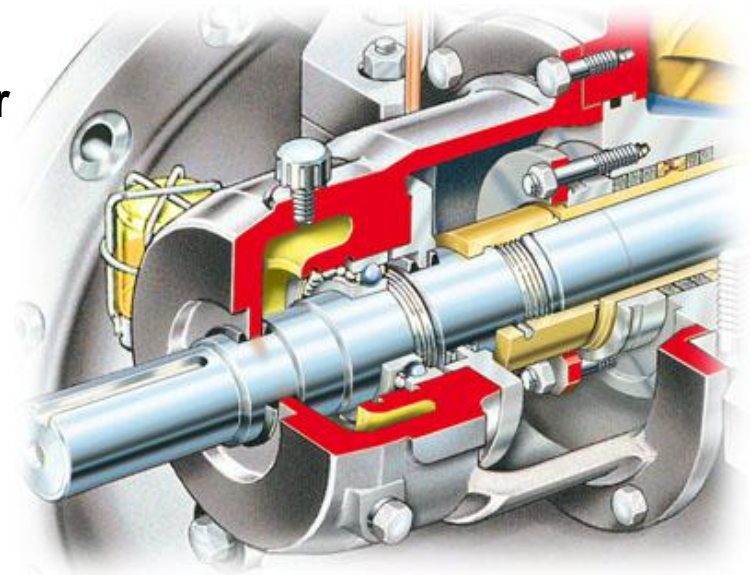


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LNN Features – Bearing Housings

- 360° attachment to pump upper and lower casing
- Alignment assured by metal-to-metal register fit with casing
 - Sealed with O-ring
 - Retains seal chamber
- Maintenance savings
 - Can be removed and allows access to bearings, mechanical seals, glands and sleeves without top casing half removal

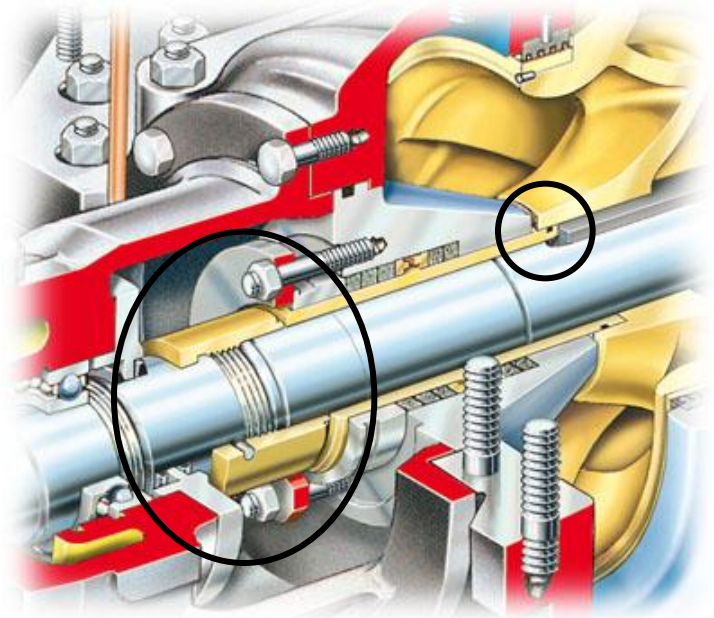


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LNN Features – Sleeves

- Shaft protected by sleeves
 - Sleeves are key-driven
 - O-ring seal at impeller hub
- Shaft nuts - outside seal chamber
 - Locked by set screws
- Shaft sleeve is shortened to accommodate mechanical seal designs mounted on pump shaft
 - Cartridge or split seals



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LNN Optional Features

Bearings

- Single row deep-groove bearings
- Thrust bearing – pair of angular contact bearings, line bearing – deep groove ball
- Sleeve bearings with ball thrust
- Sleeve bearings with “tilting pad” thrust bearing

Lubrication

- Oil bath, ring oil, pure oil mist and purge oil mist

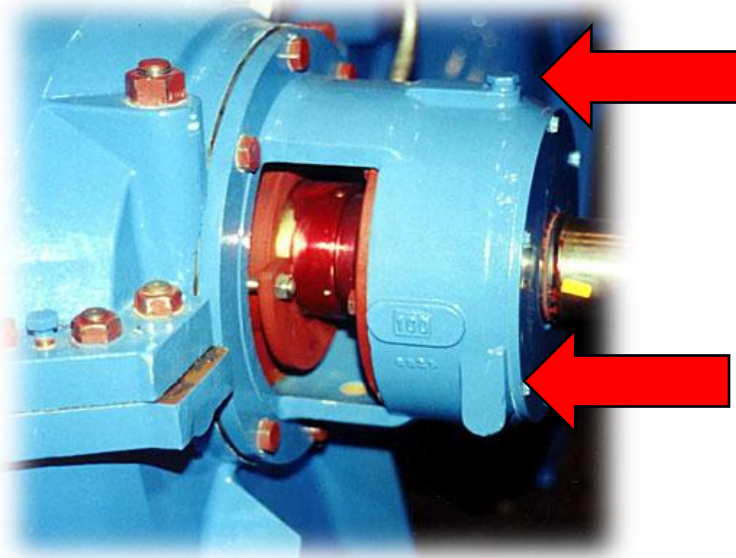
Bearing housing sealing

- Labyrinth type
 - Flowserve Bearing Guard II
 - Inpro VBX
 - Iso-Mag

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LNN Optional Features – Instrumentation



- **Bearing Housings can be modified for:**
 - Temperature probes
 - Vibration switches
 - Vibration monitors

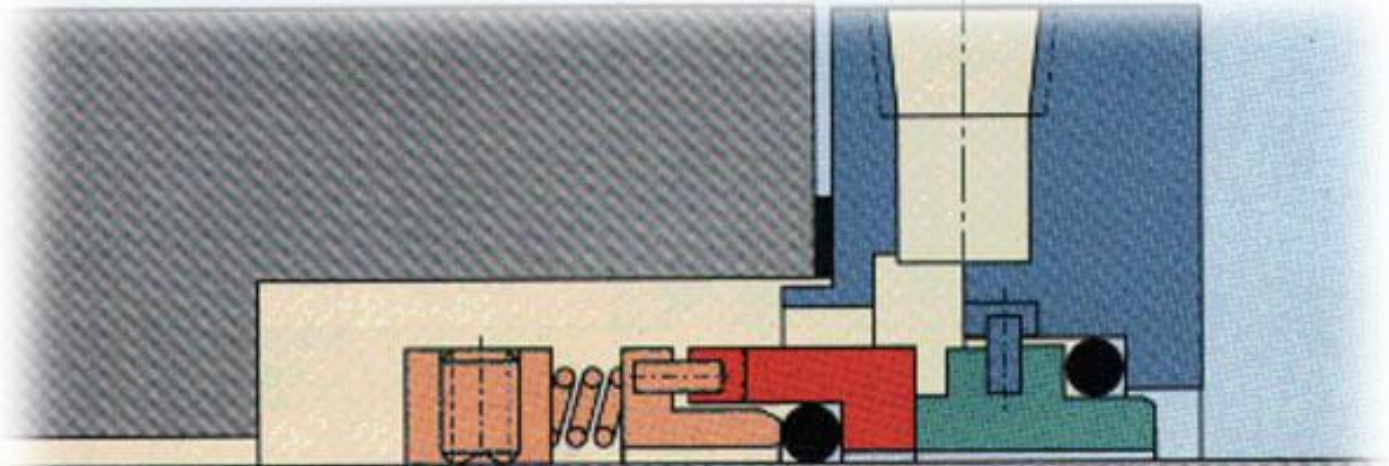
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LNN Features – Mechanical Seal Options

Component mechanical seal - Flowserve RO or equal

- **Least expensive seals**
- **Mounted on pump sleeves**



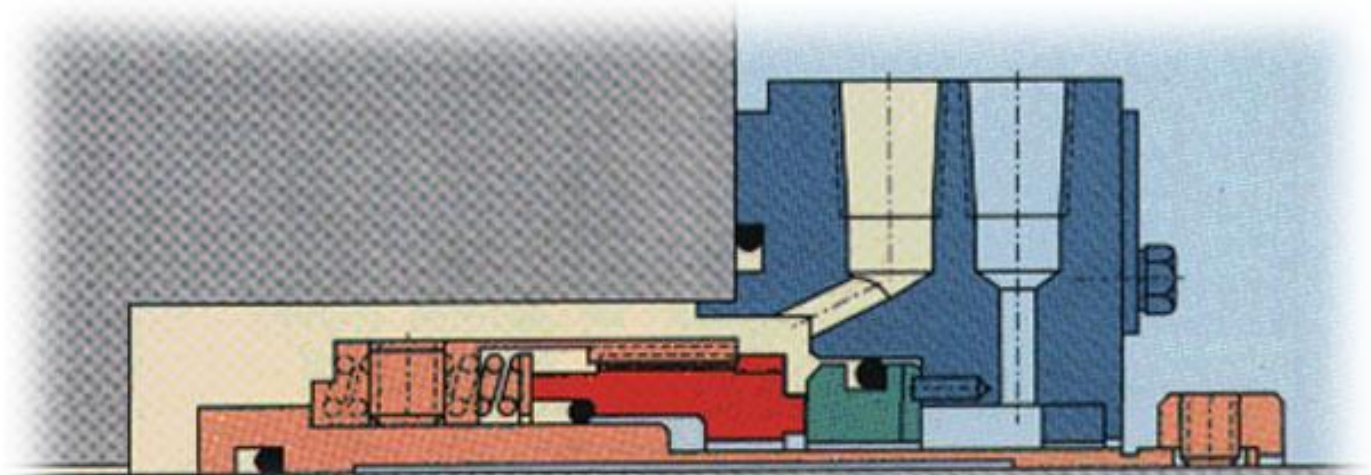
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LNN Features – Mechanical Seal Options

Cartridge mechanical seals - Flowserve QB or equal

- **Mounted on pump shaft (SS shaft can be optional)**
- **Design works well in LNN due to removable bearing housings**



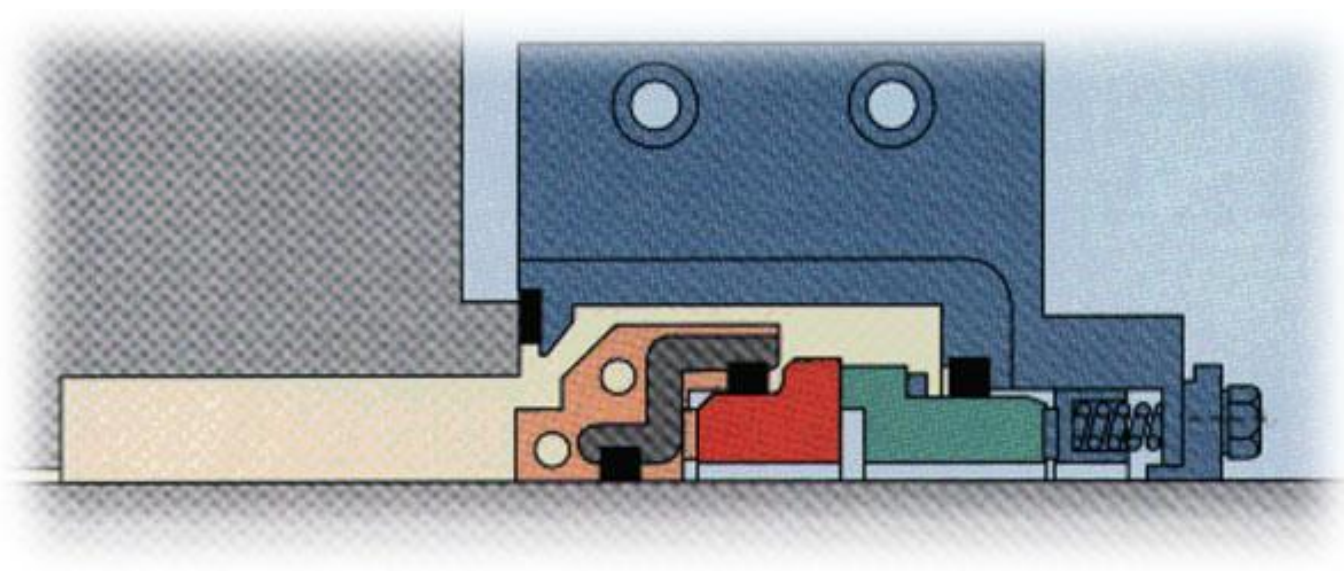
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LNN Features – Mechanical Seal Options

Split type mechanical seal - Flowserve PSS II or equal

- **Mounted on pump shaft (SS shaft can be optional)**
- **Some split seal designs require expert assembly ability**

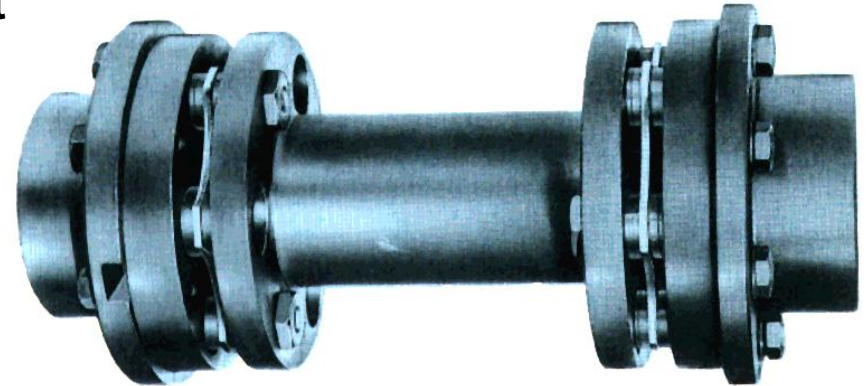


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LNN Features – Couplings

- Hubs always shrunk fit onto shaft
- Tapered hubs are optional
- Spacer design recommended
 - With mechanical seals
 - Motor not disturbed
- Standard designs
 - Gear or grid type
 - Flexible disk (non lube)



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LNN Features – Baseplates

- Fabricated steel-center drain with connection to end of base
- Fully machined mounting pads and driver adjustment screws

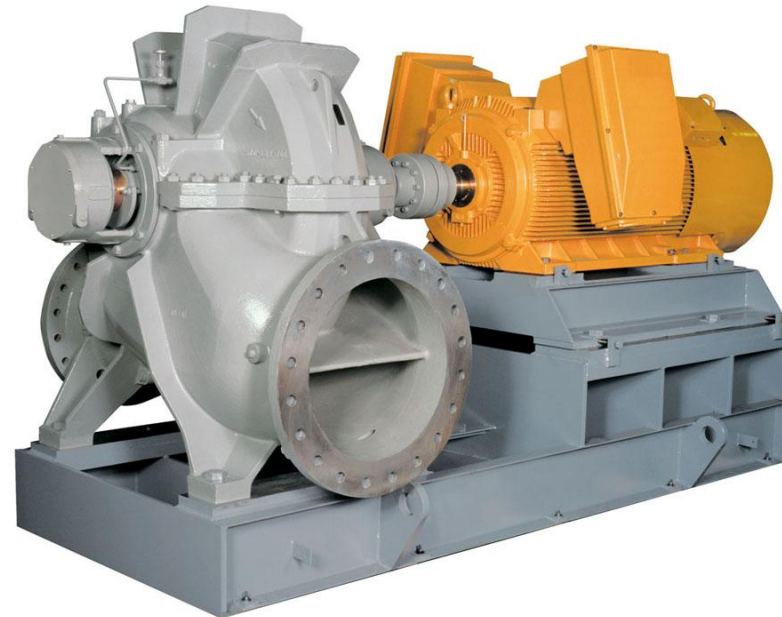


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LNN Features – Baseplate Optional

- Fabricated steel with full deck
- Machined mounting pads
- Drive alignment and leveling screws



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