# LVS/LVR

## Stainless Steel Vertical Multistage Pump

## Application

- Suitable for transferring liquids of low viscosity, non-inflammable and non-explosive, not containing solid particles or fibers
- Water supply & drainage for high-rise buildings, filtration and transfer at waterworks, pressure boosting in main pipe
- Washing and cleaning systems, boiler feeding, cooling water circulation, water treatment systems, auxiliary system, support equipment
- Ultra-filtration systems, reverse-osmosis systems, distillation systems, separators, swimming pools
- Agricultural irrigation: sprinkler irrigation, drip-feed irrigation
- Food & beverage industry
- Fire-fighting system

## Operating Conditions

- Low viscosity, non-inflammable and non-explosive liquids not containing solid particles or fibers. The liquids must not chemically attack the pump materials. When pumping liquids with a density or viscosity is higher than that of water, a motor with a higher output power rating shall be used.
- Liquid temperature: -20℃~+120℃
- Flow ranges: 0.7-240 $m^3/h$
- Liquid pH value: 4 - 10
- Max. ambient temperature: +40℃
- Max. operation pressure: 33 bar
- Altitude: up to 1000 m

## Motor

- IE 2 motor (IE 3 motor optional)
- Totally enclosed & fan-cooled
- Protection class: IP55
- Standard voltage: 50Hz 1 × 220V/3 × 380V

## Ambient Temperature

Max. ambient temperature: + 40℃. Ambient temperature above 40℃ or installation at altitude of more than 1000 meters above sea level require the use of an oversize motor. Because of low air density and poor cooling effects, the motor output power $P_2$ will be decreased. See the picture.

In such cases, it may be necessary to use a motor with a higher output power rating.

For example, when the pump is installed at altitude of more than 3500 meters above sea level, $P_2$ will be decreased to 88%. When the ambient temperature is 70℃, $P_2$ will be decreased to 78%.

## Identification Codes

LVS 45 - 10 - 2 - B - K

- K: Pipeline Port Code (Omitted for DIN flange)
- B: AISI316 Stainless Steel Material (Omitted for AISI304)
- 2: Small Impeller Stages
- 10: Impeller Stages
- 45: Rated Flow ($m^3/h$)
- LVS: LVS,LVR Vertical Multistage Pump Series

LVS 200 - 3 - C - D

- D: One small impeller D
- C: One small impeller C
- 3: Impeller Stages
- 200: Rated Flow($m^3/h$)
- LVS: LVS,LVR Vertical Multistage Pump Series

LVS: Stainless steel wetted parts
LVR: Cast iron base & pump cover

**Identifications codes of flange structure**
A: Oval flange; K: Clamp connector ;
G: Threaded connector



## Minimum Inlet Pressure–Npsh

Calculation of the inlet pressure "H" is recommended in these situations:
The liquid temperature is high.
The flow is significantly higher than the rated flow.
Water is drawn from depths.
Water is drawn through long pipes.
Inlet conditions are poor.

To avoid cavitation, make sure that there is a minimum pressure on the suction side of the pump. The maximum suction lift "H" in meters head can be calculated as follows:

| | |
|---|---|
| H | = $P_b$ × 10.2-NPSH-$H_f$-$H_v$-$H_s$ |
| $P_b$ | = Barometric pressure in bar. (Barometric pressure can be set to 1 bar). In closed systems, $P_b$ indicates the system pressure in bar. |
| NPSH | = Net Positive Suction Head in meters head. (To be read from the NPSH curve at the highest flow the pump will be delivering.) |
| $H_f$ | = Friction loss in suction pipe in meters head. (At the highest flow the pump will be delivering.) |
| $H_v$ | = Vapor pressure in meters head. (To be read from the vapor pressure scale. "$H_v$" depends on the liquid temperature "tm") |
| $H_s$ | = Safety margin=minimum 0.5 meters head. |

If the "H" calculated is positive, the pump can operate at a suction lift of maximum "H" meters head.
If the "H" calculated is negative, an inlet pressure of minimum "H" meters head is required.

**Note**: To avoid cavitation, never select a pump with a duty point too far to the right on the NPSH curve. Always check the NPSH value of the pump at the highest possible flow.

## Maximum Inlet Pressure

The following table shows the maximum permissible inlet pressure. However, the current inlet pressure + the pressure against a closed valve must always be lower than the Max. permissible operating pressure.
If the maximum permissible operating pressure is exceeded, the bearing in the motor may be damaged and the life of the shaft seal reduced.

| Pump Type | Maximum Inlet Pressure [bar] |
|---|---|
| LVR1,LVS1 | |
| 1-2 — 1-36 | 10 |
| LVR2,LVS2 | |
| 2-2 | 6 |
| 2-3 — 2-12 | 10 |
| 2-13 — 2-26 | 15 |
| LVR3,LVS3 | |
| 3-2 — 3-29 | 10 |
| 3-31 — 3-26 | 15 |
| LVR4,LVS4 | |
| 4-2 | 6 |
| 4-3 — 4-11 | 10 |
| 4-12 — 4-22 | 15 |
| LVR5,LVS5 | |
| 5-2 — 5-16 | 10 |
| 5-18 — 5-29 | 15 |
| LVR10,LVS10 | |
| 10-1 — 10-6 | 8 |
| 10-7 — 10-22 | 10 |
| LVR15,LVS15 | |
| 15-1 — 15-3 | 8 |
| 15-4 — 15-17 | 10 |
| LVR20,LVS20 | |
| 20-1 — 20-3 | 8 |
| 20-4 — 20-17 | 10 |
| LVR32,LVS32 | |
| 32-1-1 — 32-4 | 4 |
| 32-5-2 — 32-10 | 10 |
| 32-11 — 32-14 | 15 |
| LVR45,LVS45 | |
| 45-1-1 — 45-2 | 4 |
| 45-3-2 — 45-5 | 10 |
| 45-6-2 — 45-13-2 | 15 |
| LVR64,LVS64 | |
| 64-1-1 — 64-2-2 | 4 |
| 64-2-1 — 64-4-2 | 10 |
| 64-4-1 — 64-8-1 | 15 |
| LVR90,LVS90 | |
| 90-1-1 — 90-1 | 4 |
| 90-2-2 — 90-3-2 | 10 |
| 90-3 — 90-6 | 15 |
| LVR90,LVS90 | |
| 120-1 — 120-2-1 | 10 |
| 120-2 — 120-5-1 | 15 |
| 120-5 — 120-7 | 20 |
| LVR150,LVS150 | |
| 150-1-1 — 150-2-2 | 10 |
| 150-2-1 — 150-4-1 | 15 |
| 150-4 — 150-6 | 20 |
| LVR200,LVS200 | |
| 200-1-D | 10 |
| 200-1-C — 200-2-2C | 15 |
| 200-2-C — 200-4 | 20 |

## How To Read The Curve Charts

The thin curves indicate the duty range where long-time operation is not allowed

Number of Stages

Pump type, frequency and ISO standard.

The bold curves indicate the duty range where long-time operation is permitted for best efficiency

The efficiency curve

The output power curves of single impeller

The Q-H curve of single impeller

The NPSH curve

### GUIDELINES TO PERFORMANCE CURVES

Tolerances to ISO 9906, Annex A.
Measurements have been made with airless water at a temperature of 20℃ and kinematic viscosity of 1mm²/s.
To avoid overheating of the motor, the pump should not be use against a high head for a long time.

## Minimum Flow Rate

Due to the risk of overheating, the pump should not be used at a flow below the minimum flow rate. The curve below shows the minimum flow rate as a percentage of the nominal flow rate in relation to the liquid temperature.

Air cooling apparatus

**Note**: The outlet valve must be opened when the pump is in operation.

## Terminal Box Positions

**(Note: set to position 1 before delivery)**

Position 1 Position 2 Position 3 Position 4

## Product Range

| MODEL / DESCRIPTION | LVR(S)1 | LVR(S)2 | LVR(S)3 | LVR(S)4 | LVR(S)5 | LVR(S)10 | LVR(S)15 | LVR(S)20 | LVR(S)32 | LVR(S)45 | LVR(S)64 | LVR(S)90 | LVR(S)120 | LVR(S)150 | LVR(S)200 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rated flow [m³/h] | 1 | 2 | 3 | 4 | 5 | 10 | 15 | 20 | 32 | 45 | 64 | 90 | 120 | 150 | 200 |
| Flow range [m³/h] | 0.7–2.4 | 1.0–3.5 | 1.2–4.5 | 1.5–8 | 2.5–8.5 | 5–13 | 8–23 | 10.5–29 | 15–40 | 22–58 | 30–85 | 45–120 | 60–150 | 80–180 | 100–240 |
| Max. pressure [bar] | 22 | 23 | 24 | 21 | 24 | 22 | 23 | 25 | 28 | 33 | 22 | 20 | 16 | 16 | 16 |
| Motor power [kW] | 0.37–2.2 | 0.37–3 | 0.37–3 | 0.37–4 | 0.37–4 | 1.1–7.5 | 1.1–15 | 1.1–18.5 | 1.5–30 | 3–45 | 4–45 | 5.5–45 | 11–75 | 11–75 | 18.5–110 |
| Temperature Range [℃] | –20℃~+120℃ ( Note: Both the Max. permissible pressure and liquid temperature range refer to the pump capacity.) | | | | | | | | | | | | | | |
| Max. pump efficiency [%] | 45 | 46 | 55 | 59 | 60 | 65 | 70 | 72 | 78 | 79 | 80 | 81 | 74 | 73 | 79 |
| Pipe connection-LVR | | | | | | | | | | | | | | | |
| Oval flange | G1 | G1 | G1 | G1 1/4 | G1 1/4 | – | – | – | – | – | – | – | – | – | – |
| DIN flange | DN25 | DN25 | DN25 | DN32 | DN32 | DN40 | DN50 | DN50 | DN65 | DN80 | DN100 | DN100 | DN125 | DN125 | DN150 |
| Pipe connection-LVS | | | | | | | | | | | | | | | |
| Oval flange | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – |
| DIN flange | DN32 | DN32 | DN32 | DN32 | DN32 | DN40 | DN50 | DN50 | DN65 | DN80 | DN100 | DN100 | DN125 | DN125 | DN150 |
| Clamp connector | ϕ42 | ϕ42 | ϕ42 | ϕ42 | ϕ42 | – | – | – | – | – | – | – | – | – | – |
| Threaded connector | G1 1/4 | G1 1/4 | G1 1/4 | G1 1/4 | G1 1/4 | – | – | – | – | – | – | – | – | – | – |

## Scope Of Performance–LVR,LVS

## Cross Section

**MODEL:LVR1(2,3,4,5)**

| | Part | Material |
|---|---|---|
| 1 | Base | HT200 |
| 2 | Drainage plug assembly | AISI304 |
| 3 | Primary diffuser | AISI304 |
| 4 | Diffuser with bearing | AISI304 |
| 5 | Medium diffuser | AISI304 |
| 6 | Impeller | AISI304 |
| 7 | Final volute | AISI304 |
| 8 | Motor base | HT200 |
| 9 | Filling plug | AISI304 |
| 10 | Coupling | Iron based powder metallurgy |
| 11 | Motor | |
| 12 | Guarding plate | AISI304 |
| 13 | Cartridge seal | |
| 14 | Vent plug assembly | AISI304 |
| 15 | Pump shaft | AISI304 |
| 16 | Pump barrel | AISI304 |
| 17 | Oval flange | HT200 |

**MODEL:LVS1(2,3,4,5)**

| | Part | Material | Optional Material |
|---|---|---|---|
| 1 | Base plate | HT200 | |
| 2 | Drainage plug assembly | AISI304 | AISI316 |
| 3 | Chasis | ZG304 | ZG316 |
| 4 | Primary diffuser | AISI304 | AISI316 |
| 5 | Diffuser with bearing | AISI304 | AISI316 |
| 6 | Medium diffuser | AISI304 | AISI316 |
| 7 | Impeller | AISI304 | AISI316 |
| 8 | Final volute | AISI304 | AISI316 |
| 9 | Motor base | HT200 | |
| 10 | Filling plug | AISI304 | AISI316 |
| 11 | Coupling | Iron based powder metallurgy | |
| 12 | Motor | | |
| 13 | Guarding plate | AISI304 | |
| 14 | Cartridge seal | | |
| 15 | Pump cover | ZG304 | ZG316 |
| 16 | Vent plug assembly | AISI304 | AISI316 |
| 17 | Pump shaft | AISI304 | AISI316 |
| 18 | Pump barrel | AISI304 | AISI316 |
| 19 | Flange | ZG35 | |

**MODEL:LVR32(46,64,90)**

| | Part | Material |
|---|---|---|
| 1 | Base plate | HT200 |
| 2 | Flange | ZG35 |
| 3 | Primary diffuser | AISI304 |
| 4 | Medium diffuser | AISI304 |
| 5 | Diffuser with bearing | AISI304 |
| 6 | Impeller | AISI304 |
| 7 | Shaft sleeve assembly | |
| 8 | Final diffuser | AISI304 |
| 9 | Vent plug assembly | AISI304 |
| 10 | Motor base | HT200 |
| 11 | Motor | |
| 12 | Guarding plate | AISI304 |
| 13 | Coupling | QT400 |
| 14 | Cartridge seal | |
| 15 | HT200 Pump head | HT200 |
| 16 | Filling plug | AISI304 |
| 17 | Tension plate | AISI304 |
| 18 | Pump barrel | AISI304 |
| 19 | Pump shaft | AISI304 |

**MODEL:LVS32(46,64,90)**

| | Part | Material | Optional Material |
|---|---|---|---|
| 1 | Base plate | HT200 | |
| 2 | Flange | ZG35 | |
| 3 | Chasis | ZG304 | ZG316 |
| 4 | Primary diffuser | AISI304 | AISI316 |
| 5 | Medium diffuser | AISI304 | AISI316 |
| 6 | Diffuser with bearing | AISI304 | AISI316 |
| 7 | Impeller | AISI304 | AISI316 |
| 8 | Shaft sleeve assembly | | |
| 9 | Final diffuser | AISI304 | AISI316 |
| 10 | Vent plug assembly | AISI304 | AISI316 |
| 11 | Motor base | HT200 | |
| 12 | Motor | | |
| 13 | Guarding plate | AISI304 | |
| 14 | Coupling | QT400 | |
| 15 | Cartridge seal | | |
| 16 | Pump head | ZG304 | ZG316 |
| 17 | Filling plug | AISI304 | AISI316 |
| 18 | Tension plate | AISI304 | AISI316 |
| 19 | Pump barrel | AISI304 | AISI316 |
| 20 | Pump shaft | AISI304 | AISI316 |

**MODEL:LVR10(15,20)**

| | Part | Material |
|---|---|---|
| 1 | Base | HT200 |
| 2 | Drainage plug assembly | AISI304 |
| 3 | Primary diffuser | AISI304 |
| 4 | Diffuser with bearing | AISI304 |
| 5 | Medium diffuser | AISI304 |
| 6 | Impeller | AISI304 |
| 7 | Final volute | AISI304 |
| 8 | Filling plug | AISI304 |
| 9 | Motor base | HT200 |
| 10 | Coupling | Iron based powder metallurgy |
| 11 | Motor | |
| 12 | Guarding plate | AISI304 |
| 13 | Cartridge seal | |
| 14 | Vent plug assembly | AISI304 |
| 15 | Pump shaft | AISI304 |
| 16 | Pump barrel | AISI304 |

**MODEL:LVS10(15,20)**

| | Part | Material | Optional Material |
|---|---|---|---|
| 1 | Base plate | HT200 | |
| 2 | Drainage plug assembly | AISI304 | AISI316 |
| 3 | Chasis | ZG304 | ZG316 |
| 4 | Primary diffuser | AISI304 | AISI316 |
| 5 | Diffuser with bearing | AISI304 | AISI316 |
| 6 | Medium diffuser | AISI304 | AISI316 |
| 7 | Impeller | AISI304 | AISI316 |
| 8 | Final volute | AISI304 | AISI316 |
| 9 | Filling plug | AISI304 | AISI316 |
| 10 | Motor base | HT200 | |
| 11 | Coupling | Iron based powder metallurgy | |
| 12 | Motor | | |
| 13 | Guarding plate | AISI304 | |
| 14 | Cartridge seal | | |
| 15 | Vent plug assembly | AISI304 | AISI316 |
| 16 | Pump cover | ZG304 | AISI316 |
| 17 | Pump shaft | AISI304 | AISI316 |
| 18 | Pump barrel | AISI304 | AISI316 |
| 19 | Flange | ZG35 | |

**MODEL:LVR120(150,200)**

| | Part | Material |
|---|---|---|
| 1 | Base plate | HT200 |
| 2 | Flange | ZG35 |
| 3 | Base | HT200 |
| 4 | Primary diffuser | AISI304 |
| 5 | Medium diffuser | AISI304 |
| 6 | Diffuser with bearing | AISI304 |
| 7 | Impeller | AISI304 |
| 8 | Final diffuser | AISI304 |
| 9 | Pump head | HT200 |
| 10 | Motor base | HT200 |
| 11 | Motor | |
| 12 | Coupling | QT400 |
| 13 | Guarding plate | AISI304 |
| 14 | Cartridge seal | |
| 15 | Filling plug | AISI304 |
| 16 | Tension plate | AISI304 |
| 17 | Pump barrel | AISI304 |
| 18 | Pump shaft | AISI304 |

**MODEL:LVS120(150,200)**

| | Part | Material | Optional Material |
|---|---|---|---|
| 1 | Base plate | HT200 | |
| 2 | Flange | ZG35 | |
| 3 | Chasis | ZG304 | ZG316 |
| 4 | Primary diffuser | AISI304 | AISI316 |
| 5 | Medium diffuser | AISI304 | AISI316 |
| 6 | Diffuser with bearing | AISI304 | AISI316 |
| 7 | Impeller | AISI304 | AISI316 |
| 8 | Final diffuser | AISI304 | AISI316 |
| 9 | Pump head | ZG304 | ZG316 |
| 10 | Motor base | HT200 | |
| 11 | Motor | | |
| 12 | Coupling | QT400 | |
| 13 | Guarding plate | AISI304 | |
| 14 | Cartridge seal | | |
| 15 | Filling plug | AISI304 | AISI316 |
| 16 | Tension plate | AISI304 | AISI316 |
| 17 | Pump barrel | AISI304 | AISI316 |
| 18 | Pump shaft | AISI304 | AISI316 |

## Hydraulic Performance Curves

## Dimension Drawing

| MODEL | OVAL FLANGE(LVR) | | DIN FLANGE(LVS) | | D1 | D2 |
|---|---|---|---|---|---|---|
| | B1 | B1+B2 | B1 | B1+B2 | | |
| 5–2 | 256 | 486 | 282 | 512 | 136 | 109 |
| 5–3 | 283 | 513 | 309 | 539 | 136 | 109 |
| 5–4 | 310 | 540 | 336 | 566 | 136 | 109 |
| 5–5 | 341 | 591 | 367 | 617 | 155 | 124 |
| 5–6 | 368 | 618 | 394 | 644 | 155 | 124 |
| 5–7 | 395 | 645 | 421 | 671 | 155 | 124 |
| 5–8 | 422 | 672 | 448 | 698 | 155 | 124 |
| 5–9 | 465 | 775 | 491 | 801 | 175 | 137 |
| 5–10 | 492 | 802 | 518 | 828 | 175 | 137 |
| 5–11 | 519 | 829 | 545 | 855 | 175 | 137 |
| 5–12 | 546 | 856 | 572 | 882 | 175 | 137 |
| 5–13 | 573 | 883 | 599 | 909 | 175 | 137 |
| 5–14 | 600 | 910 | 626 | 936 | 175 | 137 |
| 5–15 | 627 | 937 | 653 | 963 | 175 | 137 |
| 5–16 | 654 | 964 | 680 | 990 | 175 | 137 |
| 5–18 | 712 | 1042 | 738 | 1068 | 195 | 151 |
| 5–20 | 766 | 1096 | 792 | 1122 | 195 | 151 |
| 5–22 | 820 | 1177 | 846 | 1203 | 219 | 169 |
| 5–24 | 874 | 1231 | 900 | 1257 | 219 | 169 |
| 5–26 | 928 | 1285 | 954 | 1311 | 219 | 169 |
| 5–29 | 1009 | 1366 | 1035 | 1392 | 219 | 169 |

Note: B1 and B1+B2 of clamp connector and threaded connector are in compliance with that of DIN flange.

| MODEL | POWER[kW] | Q[m³/h] | 1.0 | 2.0 | 3.0 | 4.0 | 5.0 | 6.0 | 7.0 |
|---|---|---|---|---|---|---|---|---|---|
| 5–2 | 0.37 | | 13 | 12 | 12 | 10 | 9 | 7 | 6 |
| 5–3 | 0.55 | | 19 | 19 | 18 | 16 | 15 | 12 | 10 |
| 5–4 | 0.55 | | 26 | 25 | 24 | 22 | 19 | 16 | 14 |
| 5–5 | 0.75 | | 33 | 32 | 30 | 28 | 24 | 22 | 18 |
| 5–6 | 1.1 | | 40 | 38 | 37 | 34 | 28 | 27 | 23 |
| 5–7 | 1.1 | | 46 | 45 | 42 | 40 | 32 | 32 | 27 |
| 5–8 | 1.1 | | 53 | 51 | 48 | 45 | 40 | 36 | 31 |
| 5–9 | 1.5 | | 60 | 59 | 56 | 53 | 47 | 44 | 37 |
| 5–10 | 1.5 | | 67 | 65 | 62 | 59 | 53 | 48 | 41 |
| 5–11 | 2.2 | | 74 | 73 | 70 | 66 | 59 | 54 | 47 |
| 5–12 | 2.2 | H(m) | 81 | 79 | 76 | 72 | 63 | 59 | 51 |
| 5–13 | 2.2 | | 88 | 85 | 82 | 78 | 68 | 64 | 55 |
| 5–14 | 2.2 | | 95 | 92 | 89 | 83 | 74 | 69 | 60 |
| 5–15 | 2.2 | | 101 | 99 | 95 | 89 | 79 | 74 | 63 |
| 5–16 | 2.2 | | 108 | 105 | 101 | 95 | 85 | 78 | 68 |
| 5–18 | 3.0 | | 122 | 119 | 115 | 109 | 98 | 90 | 78 |
| 5–20 | 3.0 | | 135 | 132 | 127 | 120 | 108 | 100 | 87 |
| 5–22 | 4.0 | | 150 | 147 | 142 | 134 | 120 | 112 | 97 |
| 5–24 | 4.0 | | 163 | 160 | 154 | 146 | 132 | 122 | 106 |
| 5–26 | 4.0 | | 176 | 173 | 166 | 157 | 145 | 132 | 115 |
| 5–29 | 4.0 | | 198 | 194 | 188 | 178 | 155 | 149 | 131 |