# VERTICAL MULTISTAGE PUMP

Multistage Series offers the advantages of a conventional motor pump along with the compact and versatile In-Line design, giving an ideal solution to restricted space applications.

MASTERFLOW

# APPLICATIONS

- Water supply and pressure boosting: Pressure boosting in buildings, hotels, residential complexes, pressure booster stations, supply of water networks, pressure boosting for industrial water supply
- Light industry: Washing and cleaning systems, car washing facilities, fire fighting systems, process water systems, machine tools (cooling lubricants)
- Heating, ventilation and air-conditioning: Boilers, induction heating, heat exchangers, refrigerators, cooling towers and systems, temperature control systems
- Irrigation and agriculture: Greenhouses, sprinkler irrigation, field irrigation (flooding)
- Water treatment: Water softeners and de-mineralization, reverse osmosis systems, distillation systems, filtration, ultra-filtration systems


# PUMP

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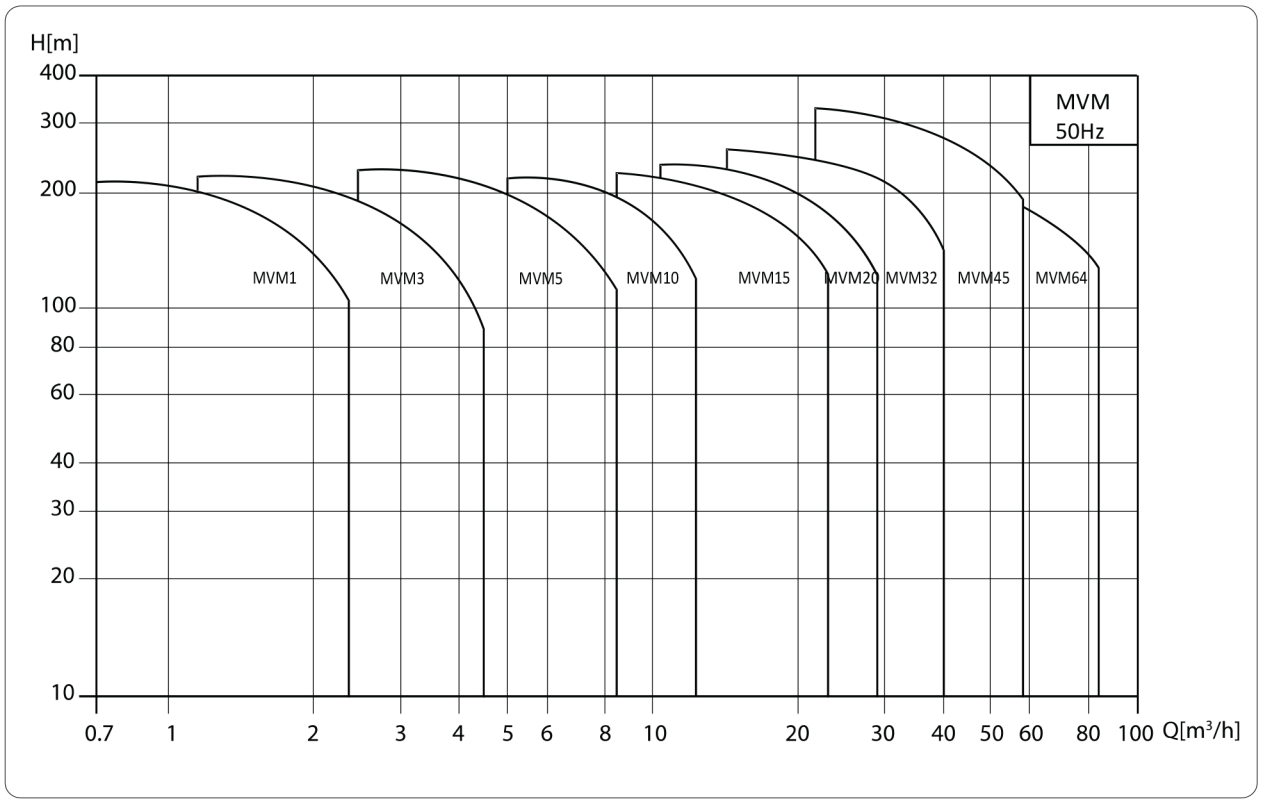
# ELECTRICAL MOTOR

- Squirrel cage in short circuit, aluminum casing up to 22 kW, totally enclosed, fan-cooled, 2-pole standard motor
- Standard supply S{CO motors
- Enclosure class: IP55
- Insulation class: F
- Standard voltages: P2: 0.37 - 7.5kW : 3 x 220 - 240/380 - 415V
- P2: From 11kW : 3 x 380 - 415V
- The motors have efficiency values that fall within the range normally referred to as EFF.1
- Ambient temperature: Max. + 50 °C

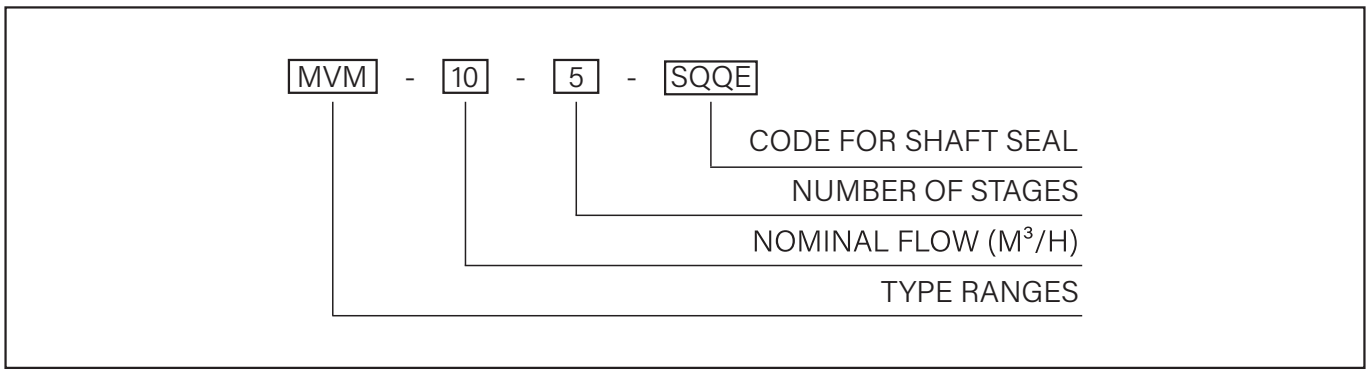
# PERFORMANCE SCOPE



# PRODUCT DATA

| RANGE | MVM, MVMI, MVMN | | | | | |
|---|---|---|---|---|---|---|
| | 1 | 3 | 5 | 10 | 15 | 20 |
| **50Hz** | | | | | | |
| Nominal flow (m3/h) | 1 | 3 | 5 | 10 | 15 | 20 |
| Flow range (m3/h) | 0.7-2.4 | 1.2-4.5 | 2.5-8.5 | 5-13 | 8.5-23.5 | 10.5-29 |
| Max pressure (bar) | 21.5 | 23 | 24 | 21.5 | 23 | 24.3 |
| Fluid temperature (°C) | -15 °C to +120 °C | | | | | |
| Motor power (kW) | 0.37-2.2 | 0.37-3 | 0.37-5.5 | 0.37-7.5 | 1.1-15 | 1.1-18.5 |
| **Version** | | | | | | |
| Cast iron and stainless steel EN 1.4301/AISI 304 | · | · | · | · | · | · |
| MVMC: Stainless steel EN 1.4301/AISI 304 | · | · | · | · | · | · |
| MVMN: Stainless steel EN 1.4401/AISI 316 | · | · | · | · | · | · |
| **Motor** | | | | | | |
| Main connection 1~ (V/Hz) (Permissible voltage tolerance ± 10%) | 220-240 V 50 Hz | | | | | |
| Main connection 3~ (V/Hz) (Permissible voltage tolerance ± 10%) | 0.37-7.5 kW 220-240/380-415 V 50 Hz From 11 kW 380-415 V 50 Hz | | | | | |
| Insulation class | F | | | | | |
| Protection class | IP 55 | | | | | |
| Ambient temperature | 50 °C | | | | | |
| **MVM Pipe Connection** | | | | | | |
| Flange | DN 25/ DN 32 | DN 25/ DN 32 | DN 25/ DN 32 | DN 40 | DN 50 | DN 50 |
| **MVMC, MVMN Pipe Connection** | | | | | | |
| Flange | DN 25/ DN 32 | DN 25/ DN 32 | DN 25/ DN 32 | DN 40 | DN 50 | DN 50 |
| Victaulic-connections | R 1 ¼ DN 32 | R 1 ¼ DN 32 | R 1 ¼ DN 32 | R 2 DN 50 | R 2 DN 50 | R 2 DN 50 |
| SiC/SiC | Standard | | | | | |
| **Seals** | | | | | | |
| EPDM | Standard | | | | | |
| Viton | Standard | | | | | |

# DEFINITION OF MODEL




# MOTOR

| MOTOR TYPE | | | | | NOMINAL CURRENT IN [A] | | | |
|---|---|---|---|---|---|---|---|---|
| HP | KW | POLE | FLANGE | FRAME | 3~220V | 3~240V | 3~380V | 3~415V |
| 0.5 | 0.37 | 2 | B14 | 71 | 1.7 | 2 | 1.1 | 1.3 |
| 0.75 | 0.55 | 2 | B14 | 71 | 2.5 | 2.8 | 1.5 | 1.7 |
| 1.0 | 0.75 | 2 | B14 | 80 | 3.5 | 3.9 | 2.1 | 2.3 |
| 1.5 | 1.1 | 2 | B14 | 90S | 4.4 | 4.7 | 2.7 | 2.9 |
| 2.0 | 1.5 | 2 | B14 | 90S | 5.9 | 5.7 | 3.4 | 3.3 |
| 3.0 | 2.2 | 2 | B14 | 90L | 8.5 | 8 | 4.9 | 4.6 |
| 4.0 | 3.0 | 2 | B14 | 100L | 11.4 | 11.4 | 6.6 | 6.6 |
| 5.5 | 4.0 | 2 | B14 | 112M | 15.4 | 16.3 | 8.9 | 9.4 |
| 7.5 | 5.5 | 2 | B5 | 132S | 20.8 | 20.8 | 12 | 12 |
| 10.0 | 7.5 | 2 | B5 | 132M | 27.4 | 26.7 | 15.8 | 15.4 |
| 15 | 11 | 2 | B5 | 160M | | | 21.2 | 20 |
| 20.0 | 15.0 | 2 | B5 | 160M | | | 27.7 | 25.5 |
| 25 | 18.5 | 2 | B5 | 160L | | | 35.2 | 32.4 |
| 30 | 22 | 2 | B5 | 180M | | | 41.3 | 38.2 |
| 40 | 30 | 2 | B5 | 180L | | | 54.2 | 50.4 |
| 50 | 37 | 2 | B5 | 200L | | | 70.8 | 65.6 |
| 60 | 45 | 2 | B5 | 200L | | | 83.1 | 79.2 |

# MECHANICAL SEALS

Standard cartridge type mechanical seal made of silicon carbide/EPDM or viton. Based on the type of application, alternative materials are available for the seal and the elastomers. The cartridge type mechanical seal can be replaced in minutes without special tools and without dismantling the pump.

# LIST OF MATERIALS

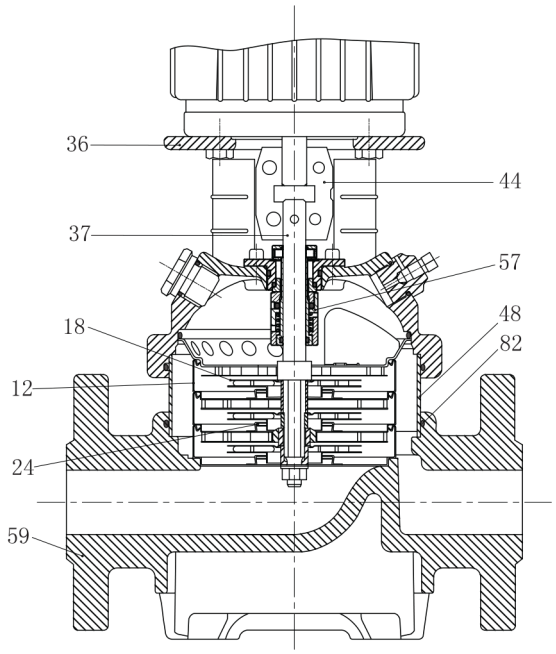
- **Q** : silicon carbide
- **U** : tugsten carbide
- **B** : carbon
- **E** : EPDM
- **V** : viton

# TYPE OF SEAL

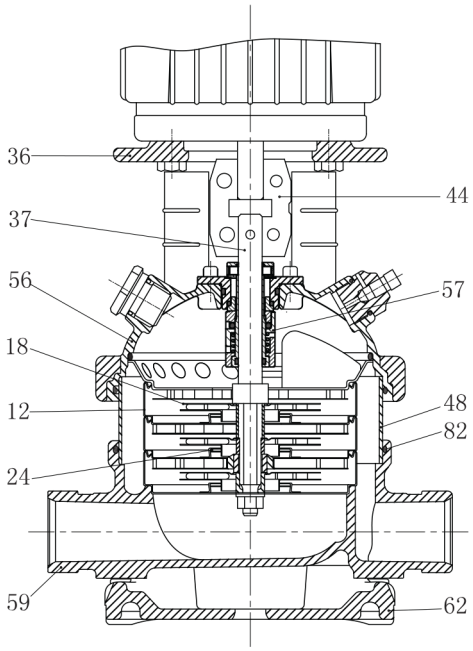
| SEAL TYPE | MVM 1/3/5/10/15/12 | MVMI 1/3/5/10/15/20 | MVMN 1/3/5/10/15/20 |
|---|---|---|---|
| **MECHANICAL SEALS** | | | |
| S : Cartridge seal | ▪ | ▪ | ▪ |
| QQ | ▪ | ▪ | ▪ |
| UU | Optional | Optional | Optional |
| UB | Optional | Optional | Optional |
| **SEALS** | | | |
| E | ▪ | ▪ | ▪ |
| V | ▪ | ▪ | ▪ |

# SECTION DRAWING

MVM - 1,3,5,10,15,20, 32, 45, 64




MVMI (N)- 1,3,5,10,15,20, 32, 45, 64



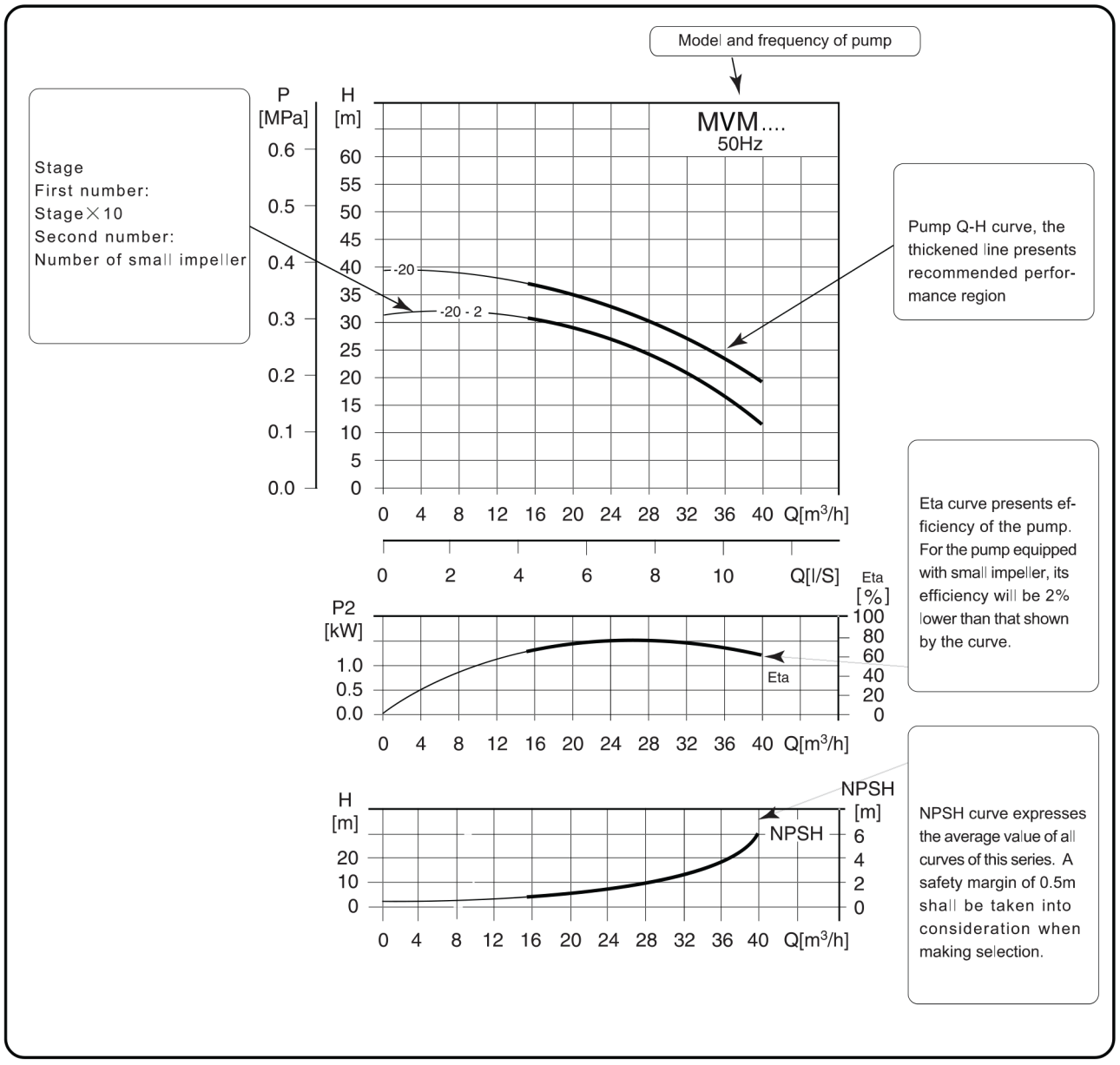

| POS. | NAME | MATERIAL | MVM 1,3,5,10,15,20,32,45,64 | | MVM 1,3,5,10,15,20,32,45,64 | | MVM 1,3,5,10,15,20,32,45,64 | |
|---|---|---|---|---|---|---|---|---|
| | | | STANDARD | | STANDARD | | STANDARD | |
| | | | EN/DIN | AISI/ASTM | EN/DIN | AISI/ASTM | EN/DIN | AISI/ASTM |
| 36 | Pump head | Cast iron | EN-GJL-200 | ASTM 25B | EN-GJS-450-10 | ASTM 70-50-05 | EN-GJS-450-10 | ASTM 70-50-05 |
| 56 | Pump head cover | Stainless steel | N/A | N/A | 1.4301 | AISI 304 | 1.4401 | AISI 316 |
| 18 | Impeller | Stainless steel | 1.4301 | AISI 304 | 1.4301 | AISI 304 | 1.4401 | AISI 316 |
| 37 | Shaft | Stainless steel | 1.4057 | AISI 431 | 1.4057 | AISI 431 | 1.4401 | AISI 316 |
| 48 | Outer sleeve | Stainless steel | 1.4301 | AISI 304 | 1.4301 | AISI 304 | 1.4401 | AISI 316 |
| 82 | O-ring for outer sleeve | EPDM | | | | | | |
| 12 | Chamber | Stainless steel | 1.4301 | AISI 304 | 1.4301 | AISI 304 | 1.4401 | AISI 316 |
| 24 | Neck ring | PTFE | | | | | | |
| 59 | Base | Cast iron | EN-GJL-200 | ASTM 25B | N/A | N/A | N/A | N/A |
| 59 | Base | Stainless steel | N/A | N/A | 1.4301 | AISI 304 | 1.4401 | AISI 316 |
| 62 | Base plate | Cast iron | N/A | N/A | EN-GJL-200 | ASTM 25B | EN-GJL-200 | ASTM 25B |
| 44 | Coupling | Fe-Cu-C | SINT C11 | MPIF FC0525 | SINT C11 | MPIF FC0525 | SINT C11 | MPIF FC0525 |
| 57 | Mechanical seal | Cartridge type | | | | | | |

# MAXIMUM OPERATING AND INLET PRESSURE

| STAGES | MAXIMUM INLET PRESSURES | STAGES | MAXIMUM OPERATING PRESSURE |
|---|---|---|---|
| **MVM, MVMI, MVMN 1** | | | |
| 2-36 | 10 BAR | 2-36 | 25 BAR |
| **MVM, MVMI, MVMN 3** | | | |
| 2-29 | 10 BAR | 2-36 | 25 BAR |
| 31-36 | 15 BAR | 2-36 | 25 BAR |
| **MVM, MVMI, MVMN 5** | | | |
| 2-16 | 10 BAR | 2-36 | 25 BAR |
| 18-36 | 15 BAR | 2-36 | 25 BAR |
| **MVM, MVMI, MVMN 10** | | | |
| 1-6 | 8 BAR | 1-16 | 16 BAR |
| 7-22 | 10 BAR | 17-22 | 25 BAR |
| **MVM, MVMI, MVMN 15** | | | |
| 1-3 | 8 BAR | 1-10 | 16 BAR |
| 4-17 | 10 BAR | 12-17 | 25 BAR |
| **MVM, MVMI, MVMN 20** | | | |
| 1-3 | 8 BAR | 1-10 | 16 BAR |
| 4-17 | 10 BAR | 12-17 | 25 BAR |

- **Rule to follow:** the inlet pressure + the pressure against a closed valve < max. operating pressure

# PERFORMANCE CURVES




**Conditions for the performance curves:**

1. All the performance curves are based on the measured values of a motor 3 x 380V - 415V at a constant speed of 2900 rpm.
2. Curve tolerance in conformity with ISO9906, appendix A.
3. Measurement is done with 20 °C air-free water, kinematic viscosity of 1mm 2/sec.
4. The operation of pump shall refer to the performance region indicated by the thickened curve to prevent overheating due to too small flow rate or overload of motor due to too large flow rate.

# MINIMUM INLET PRESSURE NPSH

In case that the pressure in pump is lower than the steam pressure used to convey liquid, the cavitations will occur. To avoid cavitations, a minimum pressure at the inlet side if the pump shall be guaranteed. That maximum suction stroke can be calculated with the following formula:

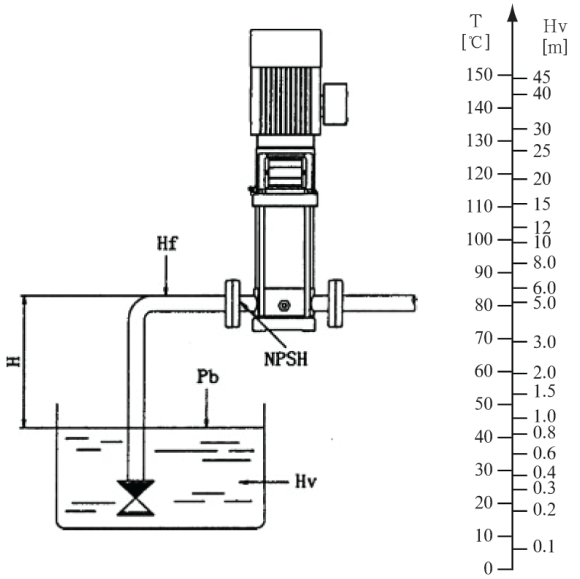
H = Pb x 10.2 - NPSH - Hf - Hv - Hs

Pb = atmosphere pressure [bar] (can be set as 1 bar)

In a closed system, Pb means system pressure [bar]

NPSH = Net positive suction head [m]. It can be read out from the point of possible max. flow rate shown on NPSH curve.

Hf = Pipeline loss at the inlet [m]
Hv = Steam pressure [m]
Hs = Safety margin minimum 0.5m delivery head

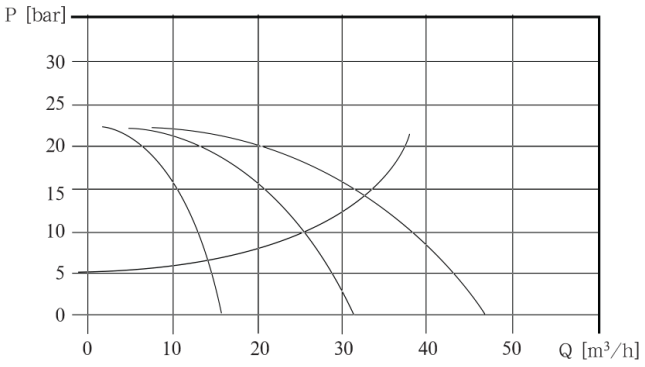



If the calculated result H is positive, the pump may run under the max. suction stroke H. In case the calculated result H is negative, a delivery head of min. inlet pressure is necessary.

Check and ensure that the pump is not at cavitation state.

# OPERATION IN PARALLEL

- Connecting several pumps in a parallel running mode will benefit the reliability of the system compared to a single pump system.
- Applicable to different working states required by a variable flow system.
- Increasing the availabilty of water supply if a pump fails: only a part of the system flow is effected




Two pumps or more can be connected in parallel running if necessary.

# PUMPED LIQUIDS

MVM, MVMI, MVMN pumps can have a wide variety of liquids, each with its own characteristic.

**MVM, MVMI**

- Non-corrosive liquids
- For fluid transfer, circulation and pressure boosting of cold or hot clean water.

**MVMN**

- Industrial liquids
- Light acids
- The fluids covered in the list are not complete. Data on the application limits of different pump materials when handling any of the listed fluids are considered to be the best choices. However, the table is intended as a general guide only, and cannot replace actual testing of the pumped fluids and pump materials under specific-working conditions.
- When choosing the pump version, sufficient attention should be given to the flow medium, such as density, solidification point, viscosity as well as ex-protection requirement. The limit of applicability of the pumps, based on pressure and temperature must also be considered.

# RECOMMENDED

| PUMPED FLUID | FLUID CONCENTRATION TEMPERATURE | MVMI | | MVMN | |
|---|---|---|---|---|---|
| | | EPDM | VITON | EPDM | VITON |
| Acetic acid anhydride | 25°C | | | ▪ | |
| Alkaline cleaner | | ▪ | | | |
| Aluminum sulphate | 10%, 25°C | | | | ▪ |
| Ammonia water (A. hydroxide) | 20%, 40°C | ▪ | | | |
| Ammonia hydrogen carbonate | 10%, 40°C | ▪ | | ▪ | |
| Benzoic acid | 10%, 90°C | | | | ▪ |
| Boric acid | Unsaturated solution, 60°C | | | | ▪ |
| Butanol | 60°C | ▪ | | | |
| Calcium acetate | 30%, 50°C | ▪ | | | |
| Calcium hydroxide | Saturated solution, 50°C | ▪ | | | |
| Chromic acid | 1%, 20°C | | | | ▪ |
| Condensate | 90°C | ▪ | | | |
| Copper sulphate | Unsaturated solution, 60°C | | | | ▪ |
| Deionic (fully desalinated water) | 50°C | | | ▪ | |
| Ethanol | 100%, 20°C | ▪ | | | |
| Ehylene glycol/Diethylene glycol | 40%, 70°C | ▪ | ▪ | ▪ | ▪ |
| Fixer | 25°C | | | | ▪ |
| Formic acid | 5%, 20°C | | | ▪ | |
| Fruit juice | 50°C | | | | ▪ |

| PUMPED FLUID | FLUID CONCENTRATION TEMPERATURE | MVMI | | MVMN | |
|---|---|---|---|---|---|
| | | EPDM | VITON | EPDM | VITON |
| Glycerine | 50%, 50°C | ▪ | | | |
| Heating oil (Light) | | ▪ | | | ▪ |
| Hydraulic oil | 100%, 100°C | | ▪ | | |
| Isopropanol | | ▪ | | | |
| Lactic acid | 10%, 20°C | | | | ▪ |
| Linoleic acid | 100%, 20°C | ▪ | | | |
| Linseed oil | 60°C | | ▪ | | |
| Liqueur | 60°C | | | | ▪ |
| Maize oil | 80°C | | ▪ | | |
| Maleic acid | 50%, 50°C | | | | ▪ |
| Methanol | 100%, 20°C | ▪ | | | |
| Motor oil | 100%, 80°C | ▪ | | | |
| Oil-water-mixture | 100°C | | ▪ | | |
| Oxalic acid | 1%, 20°C | | | ▪ | |
| Peanut oil | 100%, 80°C | | ▪ | | |
| Phosphoric acid | 20%, 20°C | | | ▪ | |
| Polyglycols | 90°C | | ▪ | | ▪ |
| Polyethylene glycols | 40%, 70°C | ▪ | | | |
| Potassium carbonte | 10%, 60°C | ▪ | | | |
| Potassium hydrogen carbonate | 10%, 60°C | ▪ | | | |
| Potassium permanganate | 5%, 20°C | | | ▪ | |
| Potassium sulphate | Unsaturated solution, 80°C | | | ▪ | |
| Rapeseed oil | 100%, 80°C | | ▪ | | |
| Silicone oil | 100% | | ▪ | | |
| Sodium carbonate | 10%, 60°C | | | ▪ | |
| Sodium hydroxide | 25%, 50°C | | | ▪ | |
| Sodium nitrate | Unsaturated solution, 80°C | | | ▪ | |
| Sodium phosphate | 5%, 100°C | | | ▪ | |
| Sodium sulphate | 10%, 60°C | | | ▪ | |
| Sulphuric acid | 5%, 25°C | | | | ▪ |
| **WATER** | | | | | |
| Swimming pool water | 35°C | ▪ MVMC | | ▪ | |
| Deionic | 50°C | | | ▪ | |
| Distilled water | 50°C | | | ▪ | |
| Decarbonated water | | | | ▪ | |
| Soft water | | | | ▪ | |
| Heating water | | | | ▪ | |
| Boiler water | | | | ▪ | |
| Pure water | | | | ▪ | |
| Rinsing water | | ▪ MVMC | | ▪ | |

MASTERFLOW

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