



**DICKOW  
PUMPEN**



**Vertical selfpriming  
Side-Channel Pumps  
with magnetic coupling  
Type SMV**

*our  
contribution  
for  
environmental  
protection*

## General

The side-channel pumps are selfpriming and operate more economically (better efficiency) than normal centrifugal pumps when handling low flows and high heads.

Due to these facts, the side-channel pumps are appropriate to solve many pumping problems in chemical and petrochemical industries. They can be used for almost all liquids which are free of abrasive solids and of suitable viscosity. (Application limit for selfpriming design is 115 cSt).

The vertical side-channel pumps are suitable especially for tank farms with underground storage tanks with a diameter of max. 2,5 m (8.2 ft). The design of the pumps allows an installation directly on the dome cover. That means, suction lift is only slightly above the tank diameter and the suction pipe can be kept short.

The SMV-pumps are sealless execution with permanent magnetic coupling. No shaft duct to the atmosphere and no shaft sealing is available. The static containment shell forms a closed system with hermetically sealed liquid end. This design allows the leakage free conveying of toxic, flammable and other dangerous liquids in the chemical and petrochemical industry without contamination of the environment.

The sealless maintenance free design improves the availability of the pump because 90% of pump failures are caused by leaking seals.

Maximum allowable operating pressure for standard design 16 bar at 100°C (212°F).

## Design

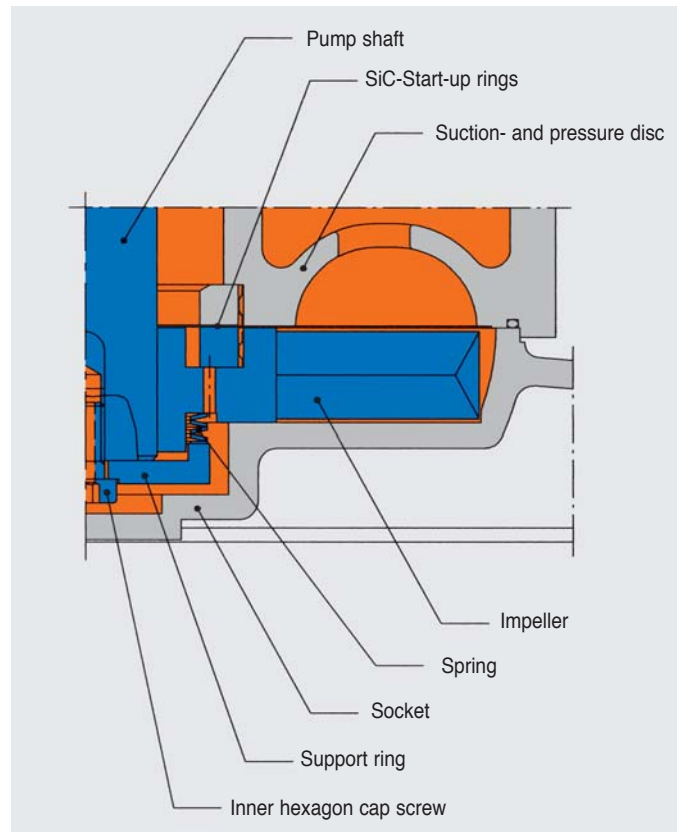
The SMV-types are single stage, single flow selfpriming Inline-pumps. The opposite located suction- and discharge flanges have identical diameters. The pump is fixed to the drive motor via the motor lantern.

The SMV-pump consists of the hydraulic parts such as socket, suction and pressure disc, bearing housing, impeller, pump shaft with sleeve bearing and of magnetic coupling with drive and driven rotor and the containment shell.

## Impeller

The hydraulic balanced side channel impeller is fitted to the pump shaft in overhung position. The torque is transmitted to the impeller by key. The impeller is located in a chamber between socket and suction and pressure disc.

The selfpriming capability, efficiency and the differential pressure require tight clearances between the rotating impeller and the stationary pump parts.



To avoid seizing of the impeller due to the tight internal clearances and therefore, decoupling of the magnets in any case, the pumps are fitted with additional wear resistant SiC-rings. The SiC-rings are placed in the suction- and pressure disc as well as in the impeller hub. The impeller is pushed concentric to the SiC-ring in the disc by the spring and the support ring. With this design, a clearance is guaranteed between impeller vanes and the stationary parts. Metallic contact between the parts and seizing is excluded.

## Pump shaft

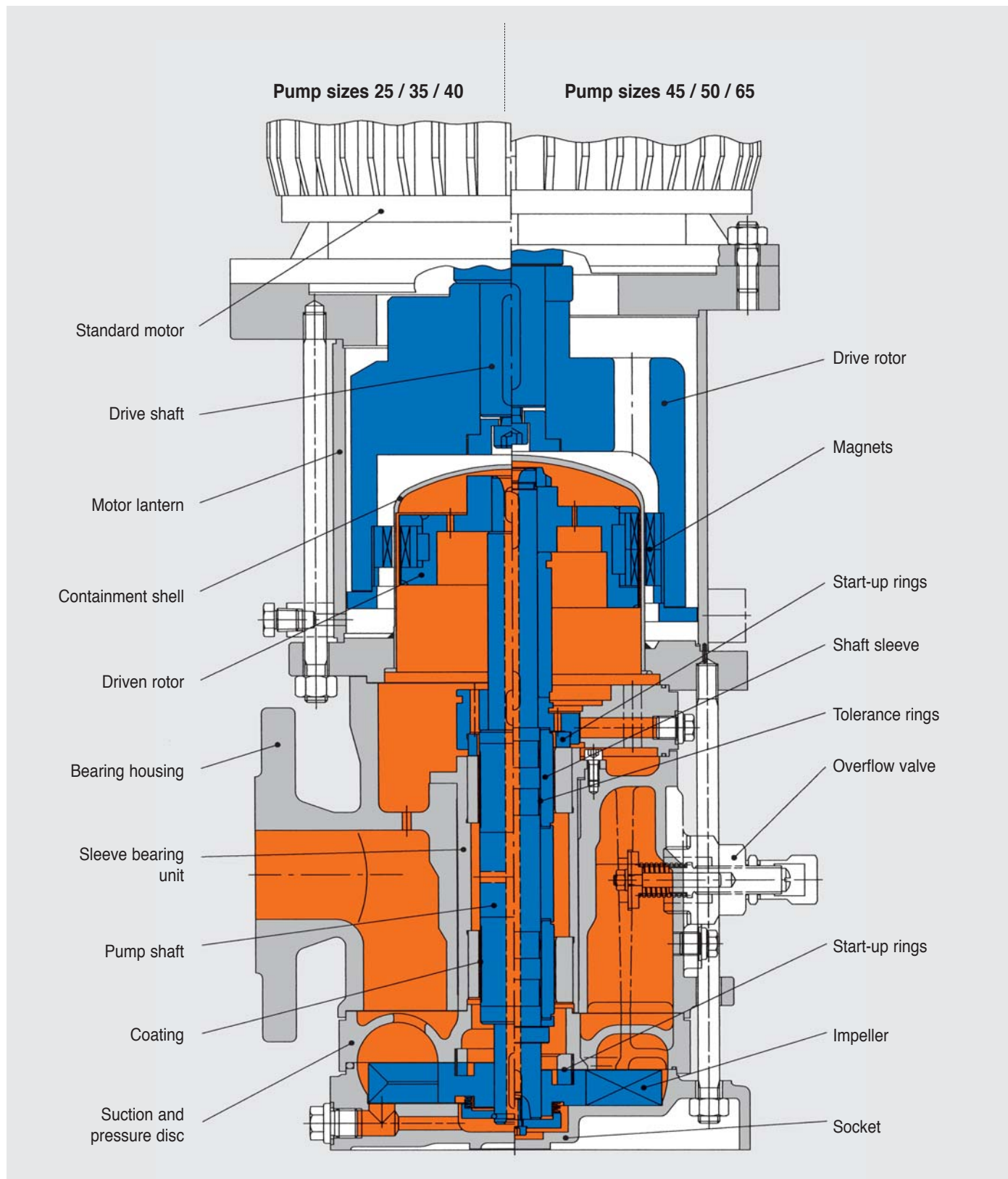
The pump shaft together with the impeller and the driven rotor is radially positioned in product lubricated sleeve bearings and axially fixed by start-up rings.

The pump shafts of pump sizes SMV 25 / 35 / 40 are coated with a special wear resistant layer under the sleeve bearings.

The sizes SMV 45 / 50 / 65 are fitted with additional interchangeable wear resistant SiC-shaft sleeves.

The shaft sleeves are fitted to the pump shaft by metallic tolerance rings to avoid thermal stress.

## Sectional drawing, design PN16



### Standard materials:

|   |   |
|---|---|
| Bearing housing, socket, suction- and pressure disc | GGG40.3, 1.4408 (G-X5 CrNiMo 18.10)                     |
| Impeller  | 1.4457 (G-X25 CrNiMo 25.9)                              |
| Pump shaft  | 1.4571 (X10 CrNiMoTi 18.10) (sizes 25/35/40 are coated) |
| Sleeve bearing unit                                 | 1.4462 / SiC  |
| Start-up rings                                      | 1.4462 / SiC  |
| Containment shell                                   | 1.4571 (X10 CrNiMoTi 18.10), 2.4610 (Hastelloy C)       |
| Overflow valve                                      | 1.4571 (X10 CrNiMoTi 18.10)                             |



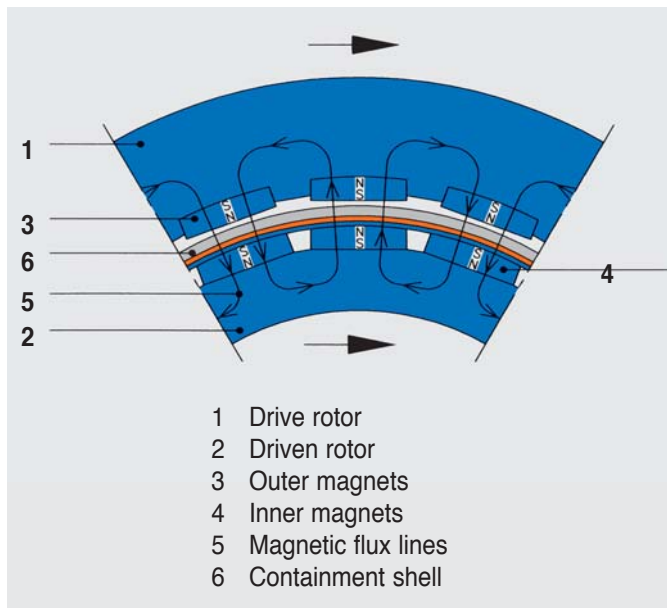
### Sleeve bearing

The stationary wear resistant SiC-sleeve bearings are shrink-fitted in the sleeve bearing housing and form with it the sleeve bearing unit.

The sleeve bearing unit is placed in the bearing housing and fastened by inner hexagon cap screws. The unit is interchangeable and easy to disassemble.

### Magnetic coupling

The magnetic coupling consists of the driven rotor and the drive rotor. The rotors are fitted with single magnet elements. Magnet material is "Cobalt Samarium Rare Earth" ( $S_{m2} CO_{17}$ ) with unlimited life time.



The drive rotor with the drive magnets is keyed to the motor shaft, the driven rotor with the driven magnets is keyed to the pump shaft.

Power is transmitted to the hermetically sealed liquid end by a bank of external magnets passing motive force through the containment shell to a bank of internal magnets. Inner and outer magnet rings are locked together by magnetic forces and work as a synchronous coupling. The inner magnet ring transmits the required torque directly to the impeller. Overload of the magnetic coupling and slipping will not lead to demagnetization. The magnetic couplings are designed for electric motors and direct on line starting with open or closed discharge valve.

The magnet elements of the driven rotor are completely encapsulated (with welded cover) and separated from the pumped liquid.

### Internal cooling flow

Pumps in operation generate eddy currents in the metallic containment shell which heat up the product in the gap between rotor and containment shell. This heat is dissipated through an internal circulation. The internal circulation flows from the suction and pressure disc through the pump shaft and the magnet area to the bearing housing.

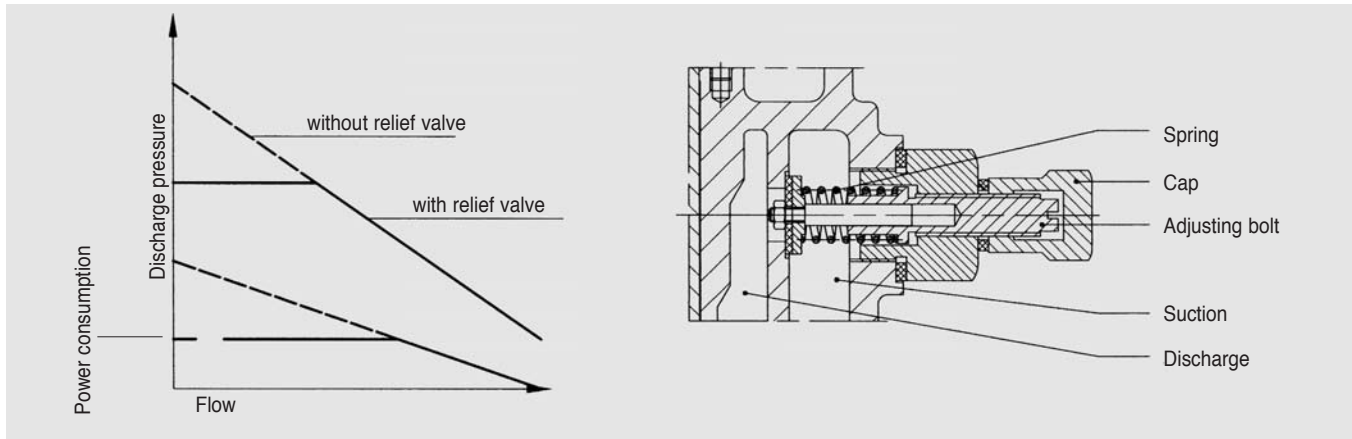
### Containment shell

The containment shell is designed as a pressurized vessel to separate the pumpage from the atmosphere. The containment shell is bolted to the socket in a manner that allows removal of the drive motor together with the drive rotor without exposing the pumpage to the atmosphere.

### Drive motors

All IEC standard motors of design V1 can be installed. Enclosure according to the plant requirements. Speed 1450 or 1750  $\text{min}^{-1}$ .

## Relief valve

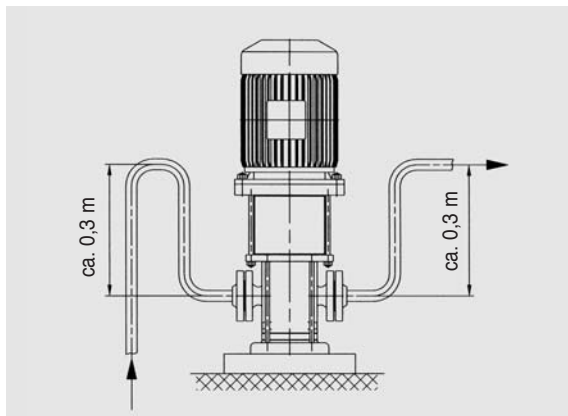


Contrary to centrifugal pumps, the side channel pumps generate a steep head rise and an increased power consumption at lower flow rates. Power consumption and discharge pressure reach the maximum at closed discharge. To protect discharge pipes and to avoid overload of the motors and unacceptable temperature rise in the pump, additional relief valves can be fitted to the SMV-pumps.

## Hazardous area

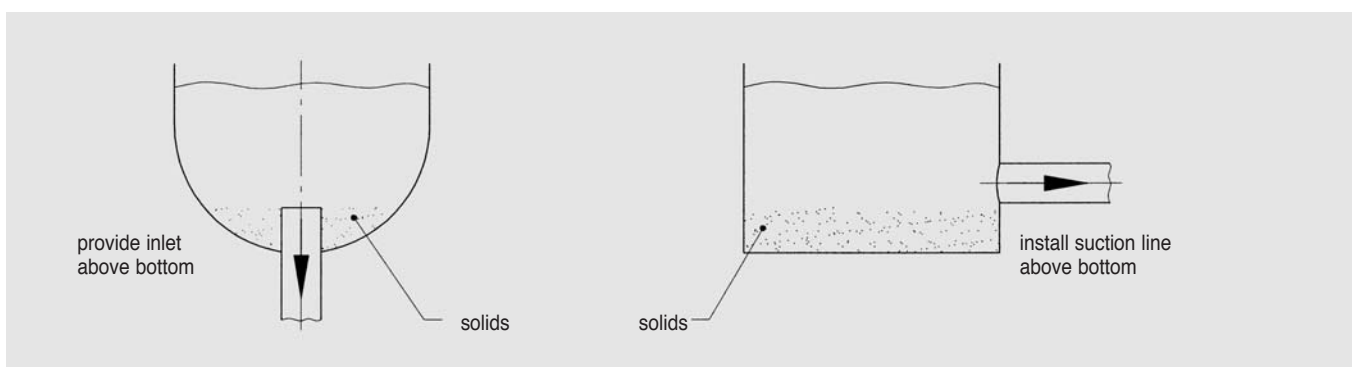
Together with the required Ex-drive motors, the SMV-pumps can be applied in hazardous area Group II, Category 2. The pumps meet the basic safety and health requirements of Explosion-proof Directive 94/9 EC and Machinery Directive 98/37 EC and are suitable for plants with increased safety requirements.

## Installation at site, suction piping

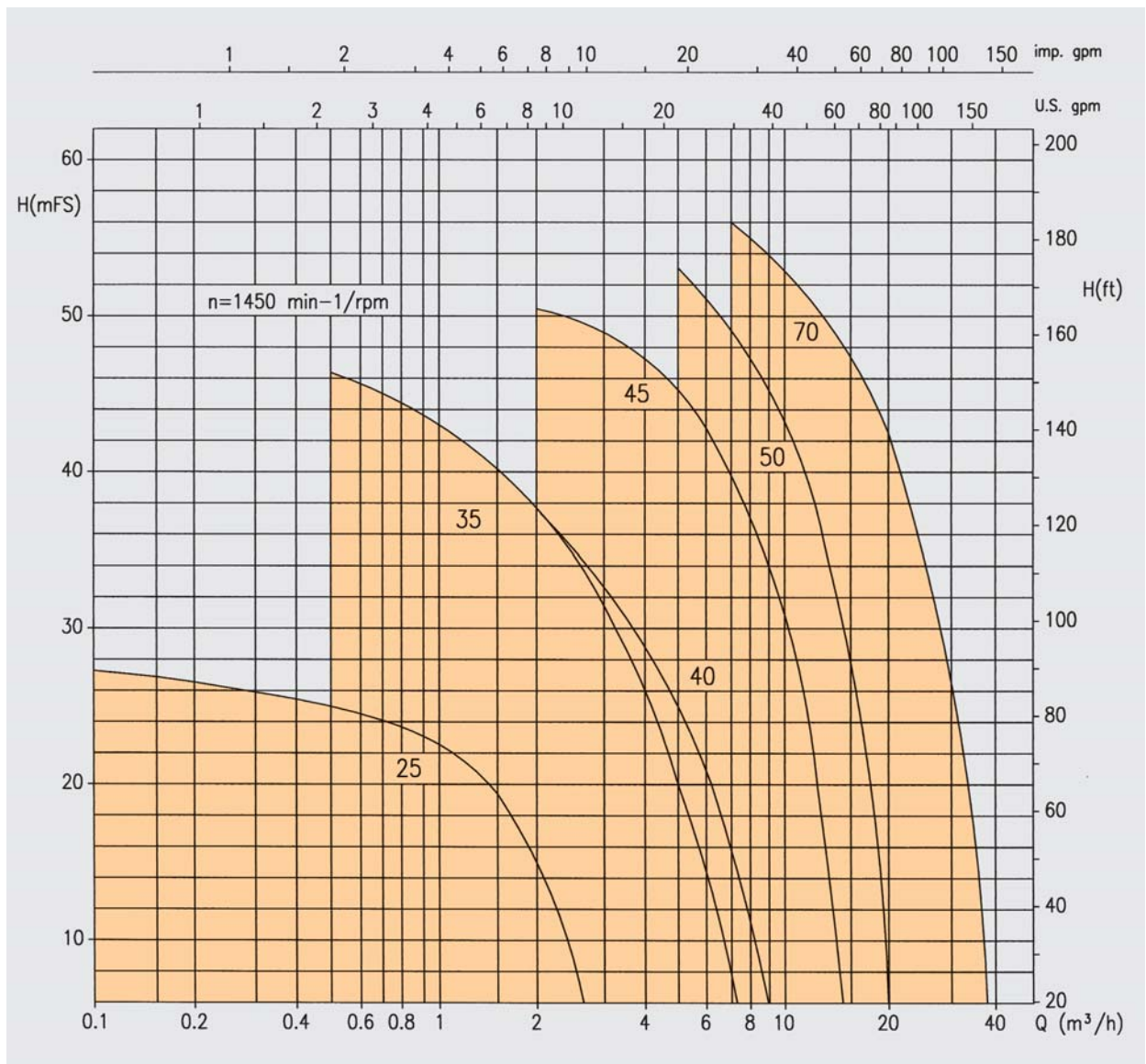


During the suction phase – when priming the empty suction line – the side-channel pumps build up a gas/liquid mixture. The gas or air will be separated and pressed into the pressure pipe while the operating liquid returns to the pump. It is therefore necessary to install the piping in a way that the operating liquid can remain in the pump.

Side-channel pumps with their tight internal clearances do not tolerate solids or abrasives in the pumped liquid. Solids, such as welding beads or forging scales, concentrate on the bottom of the suction vessel. This should be considered when connecting suction line to suction vessel.



## Performance range SMV



Performance curves of the individual pump sizes, also for 1750 rpm, with NPSH-values and power consumption are available on request.