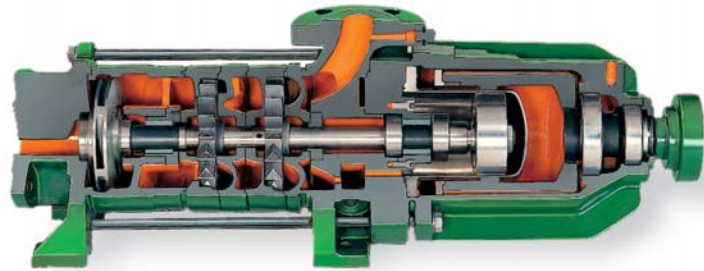




**DICKOW  
PUMPEN**



**Sealless Magnetic Coupled, Heavy Duty  
Side-Channel Pumps**

**Type SCM – PN40**

*our  
contribution  
for  
environmental  
protection*

## General

The DICKOW-pump, type SCM, is a selfpriming horizontal side-channel pump with magnetic coupling. The side-channel pump with its high differential head has the advantage of operating more economical than normal centrifugal pumps for low capacities and high heads.

Due to these facts, the side-channel pumps are appropriate to solve many pumping problems in chemical and petrochemical industries.

The SCM-pump is a heavy duty unit for handling clean liquids without solids. Sealless magnetic driven pumps are designed to improve plants and personnel safety, especially when handling toxic, explosive or other dangerous liquids which react on contact with the atmosphere. For all such services, the static containment shell replaces double acting mechanical seals with external fluid reservoirs or barrier fluid circulating systems.

Due to the fact that 90% of pump failures and required maintenance are caused by leaking mechanical seals, the sealless design will save maintenance and spare parts costs remarkably. Consider the reduction of the total costs of ownership.

The maximum allowable operating temperature is 180°C (356°F), higher temperatures on request.

## Design

The SCM-pumps are single or multistage, side-channel pumps in heavy duty design with end suction and vertical discharge flanges. Flanges and casings are designed for a working pressure of 40 bar. The containment shells are sized according to operating pressure. The pump shaft is driven via a permanent magnetic coupling. The static containment shell forms a closed system with hermetically sealed liquid end.

## Diffuser

The diffuser is designed as a retaining stage to avoid coasting of the pump at shut down. Sufficient liquid remains in the pump and enables a restart without problems also at operation with geodetic suction heights.

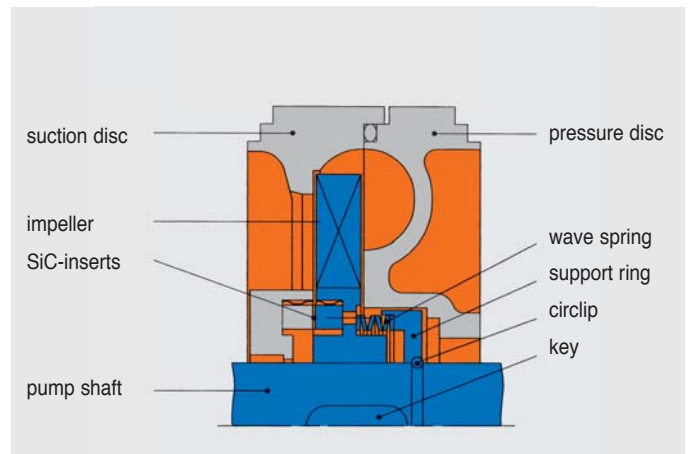
## Side-channel impellers / SiC insert rings

The rotating star-shaped side-channel impellers are fitted in a chamber between the suction and pressure discs and keyed to the pump shaft in floating position as standard. No hydraulic thrust loads exist.

To achieve selfpriming capability, best efficiency and rated differential pressure, tight clearances between the rotating impeller and the stationary discs are required.

During operation with properly filled pump, a stable fluid film between the impellers and the discs will center the impeller in the chamber and avoid metallic contact between rotating and stationary parts, seizing of the impellers and decoupling of the magnets.

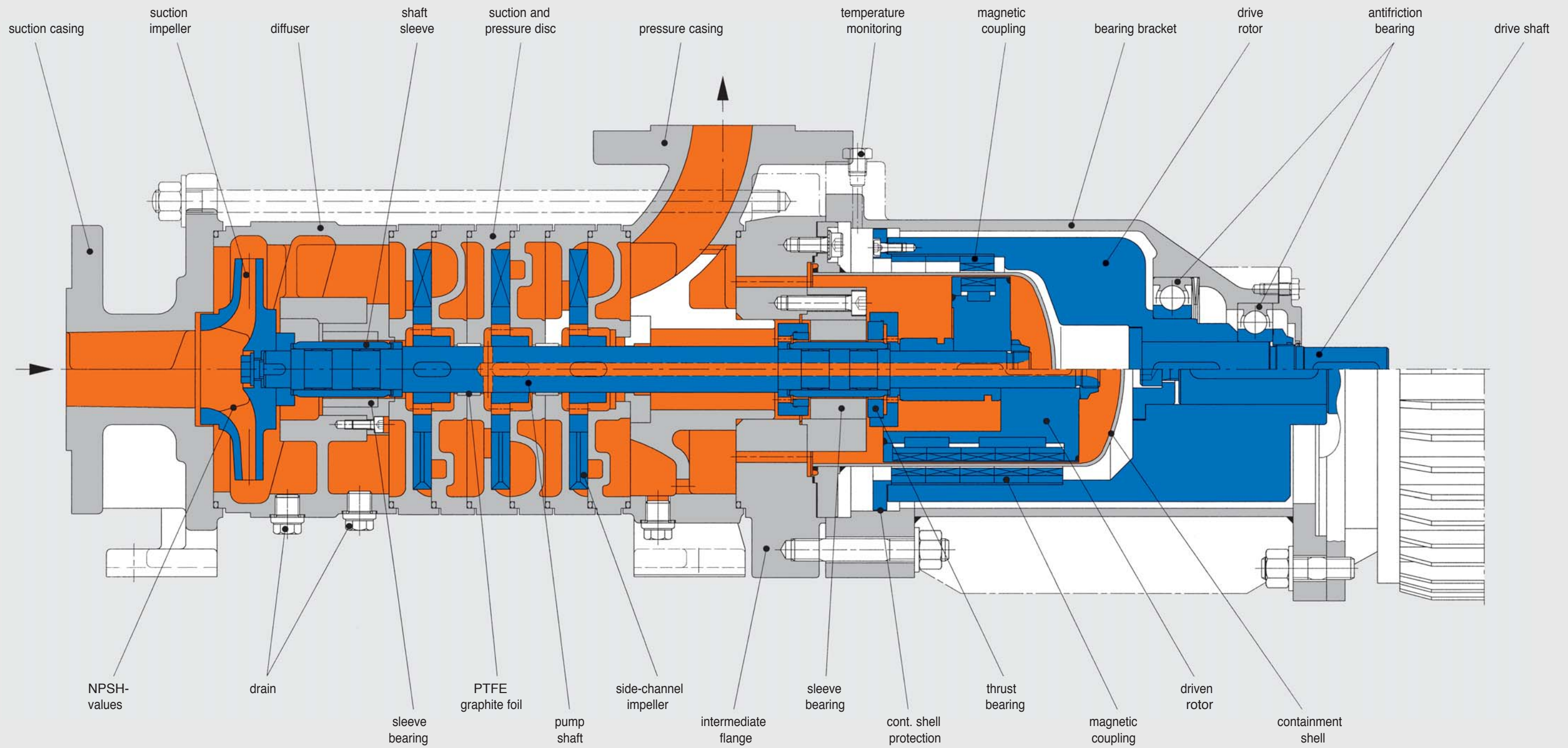
However, at dry running conditions and when handling volatile liquids with low viscosities, this fluid film will not be available or will not offer the required stability to avoid metallic contact and seizing of the impellers.



To increase availability and to avoid seizing of the impellers in any case, the pumps can be fitted with additional SiC-rings as an option.

The SiC-rings are placed in the suction and pressure disc as well as in the impeller hub. The impeller ring will be pushed concentric to the ring in the disc by the spring and the support ring. Metallic contact between the rotating and stationary parts and seizing of the impeller are excluded.

**Sectional drawing**



**Standard materials:**

Suction- and disch.casing, diffuser	GGG40.3, 1.4408
Suction- and pressure disc	GGG40.3, 1.4408 (G-X5 CrNiMo 18.10)
Suction impeller	GG25, 1.4408 (G-X5 CrNiMo 18.10)
Side-channel impellers	1.4457 (G-X25 CrNiMo 25.9)
Pump shaft	1.4021 (X20 Cr13), 1.4571 (X10 CrNiMoTi 18.10)

Sleeve bearing, shaft sleeve	SiC dry safe coated
Thrust bearing	SiC
Bearing bracket	GGG40
Containment shell	2.4610 (Hastelloy C-4)
Permanent magnet	Cobalt Samarium $S_{m2} CO_{17}$

### **Suction- and pressure discs**

The suction- and pressure discs are sealed to the atmosphere by confined O-rings with metal to metal fit, to prevent blow outs. In the shaft area, floating graphite impregnated PTFE-inserts are located in the discs to reduce shaft deflection and wear. The differential head is built up in the side-channel of the pressure disc.

### **Pump shaft**

The rigid pump shaft is carried by sleeve bearings, positioned in the pumped liquid. The generous dimensioned shaft diameter reduces deflection and ensures minimum torsional loads.

### **Outer ball bearings**

The outer rotor with the drive shaft is positioned in generously dimensioned grease lubricated ball bearings.

### **Sleeve bearings, shaft sleeve**

The stationary sleeve bearings, the rotating shaft sleeve and the thrust bearing are made of pure wear resistant SiC. The shaft sleeves are fitted to the pump shaft by metallic tolerance rings to avoid thermal stress.

### **Suction impeller / NPSH-values**

To achieve low NPSH-conditions, a centrifugal impeller with enlarged eye area is located on suction side. The NPSH-values are based on water at 20°C (65°F). When handling boiling liquids, the required liquid level on suction side can be reduced to approximately 50% of these NPSH-values.

### **Magnetic coupling**

The single elements of the multipolar magnetic coupling are manufactured of a permanent magnet material "Cobalt Samarium – Rare Earth" with unlimited lifetime. The internal magnets are completely encapsulated, no contact with liquid. Energy 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 direct to the impeller. Overload of the magnetic coupling and slipping will not affect demagnetization.

### **Internal circulation**

When the pump is in operation, it generates eddy currents which heat up the containment shell and the product in the magnet area. This heat is dissipated by an internal circulation. The circulation flow is led from discharge through the magnet area and the pump shaft to the suction disc of the last stage.

### **Temperature monitoring**

Connections for temperature monitoring of the internal circulation flow and the containment shell surface are available as standard. For critical service conditions, we recommend the mag-safe monitoring device.

### **Containment shell protection**

The clearances between the drive rotor and the bearing bracket, respectively the motor support lantern, and between the drive magnets and the containment shell are arranged such that rubbing of the magnets on the containment shell will be avoided even in the case of worn out ball bearings.

Monitoring devices for the containment shell protection are available on request.

### **Dry running protection**

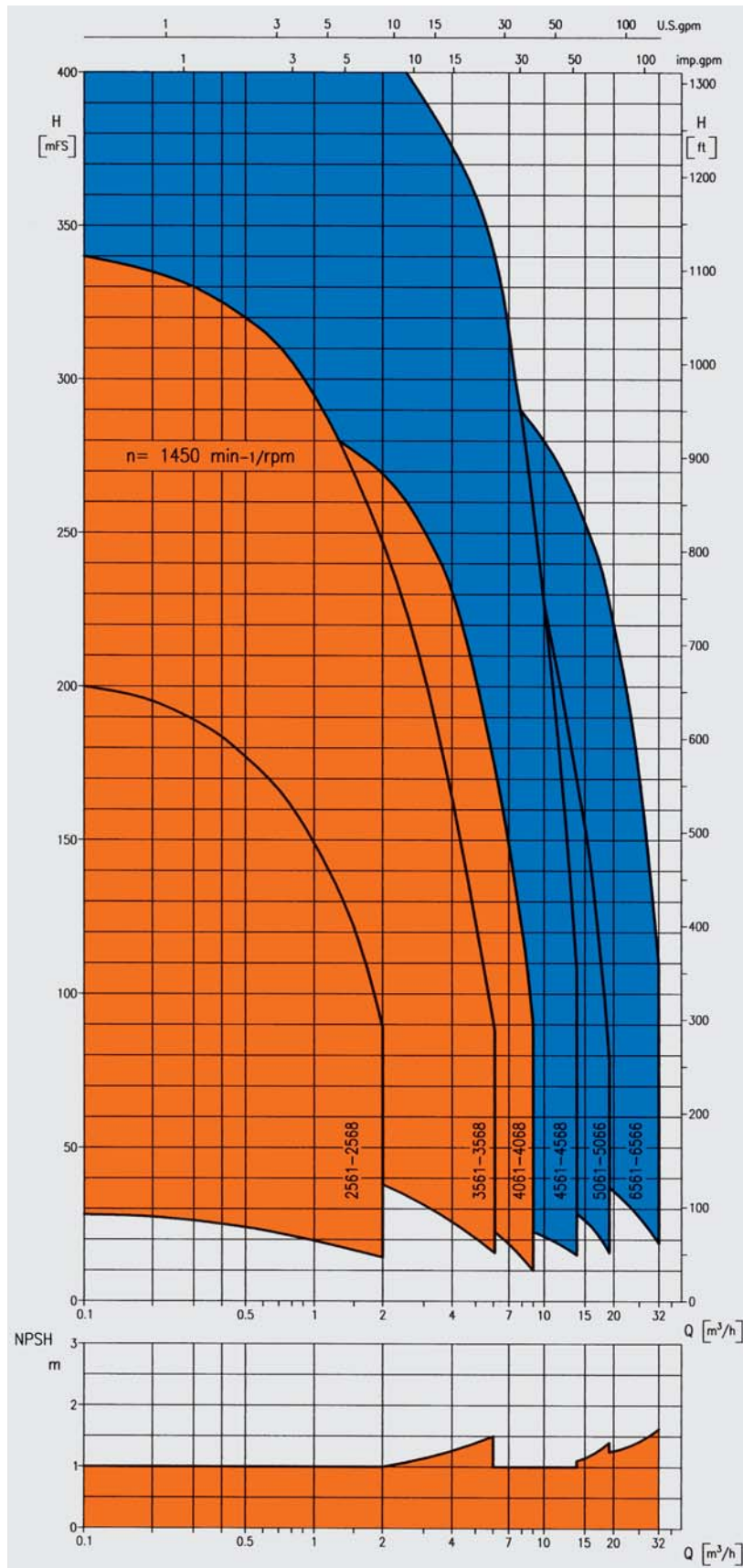
Due to the tight clearance between the side-channel impellers and the stage discs, the standard pump design will not tolerate any kind of dry running. Level monitoring in the suction line at flooded conditions is recommended. At selfpriming conditions with suction lift, an optoelectronic level detector can be fitted in the diffuser to monitor the required liquid level in the pump.

The design with additional SiC-rings can also accept dry running for limited time. Motor load monitoring can protect the pump at dry running condition.

### **Hazardous area**

Together with the required Ex-drive motors, the SCM-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 requirement.

## Performance range SCM



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