



# Submersible Pumps TVS

IN STAINLESS STEEL

## Technical Data

### Performance Range:

- Capacity up to 520m<sup>3</sup>/h (2300USgpm)
- Head up to 500m (1600feet)
- Speed 2900/3500rpm
- Motor power up to 400kW (540HP)

### Pump Sizes:

8"-12" pump end for wells 8-12" depending on motor size

- |                 | 50Hz                       | 60Hz                       |
|-----------------|----------------------------|----------------------------|
| ○ TVS 8.1- 8.4  | 50 - 125m <sup>3</sup> /h  | 65 - 150m <sup>3</sup> /h  |
| ○ TVS 10.1-10.3 | 150 - 280m <sup>3</sup> /h | 180 - 320m <sup>3</sup> /h |
| ○ TVS 12.1-12.2 | 340 - 420m <sup>3</sup> /h | 410m <sup>3</sup> /h       |

### Water Temperature:

- Standard 25/35°C (77/95°F)
- Versions up to 60°C (140°F) optional available

### Pumped Fluids:

- Potable water
- Natural water
- Seawater (material code Duplex WW required)
- Thermal water
- Mineral water
- Mine water
- Sand content max. 50g/m<sup>3</sup>

### Applications:

- Water supply and distribution in cities
- Wells in water plants and agriculture
- Water supply in breweries, food and beverage industries
- Cooling water in industry
- Irrigation in agriculture and sport facilities
- Water level control and dewatering in mines and construction sites
- Fountains and water parks



### Materials:

Basic type in austenitic stainless steel (VV):

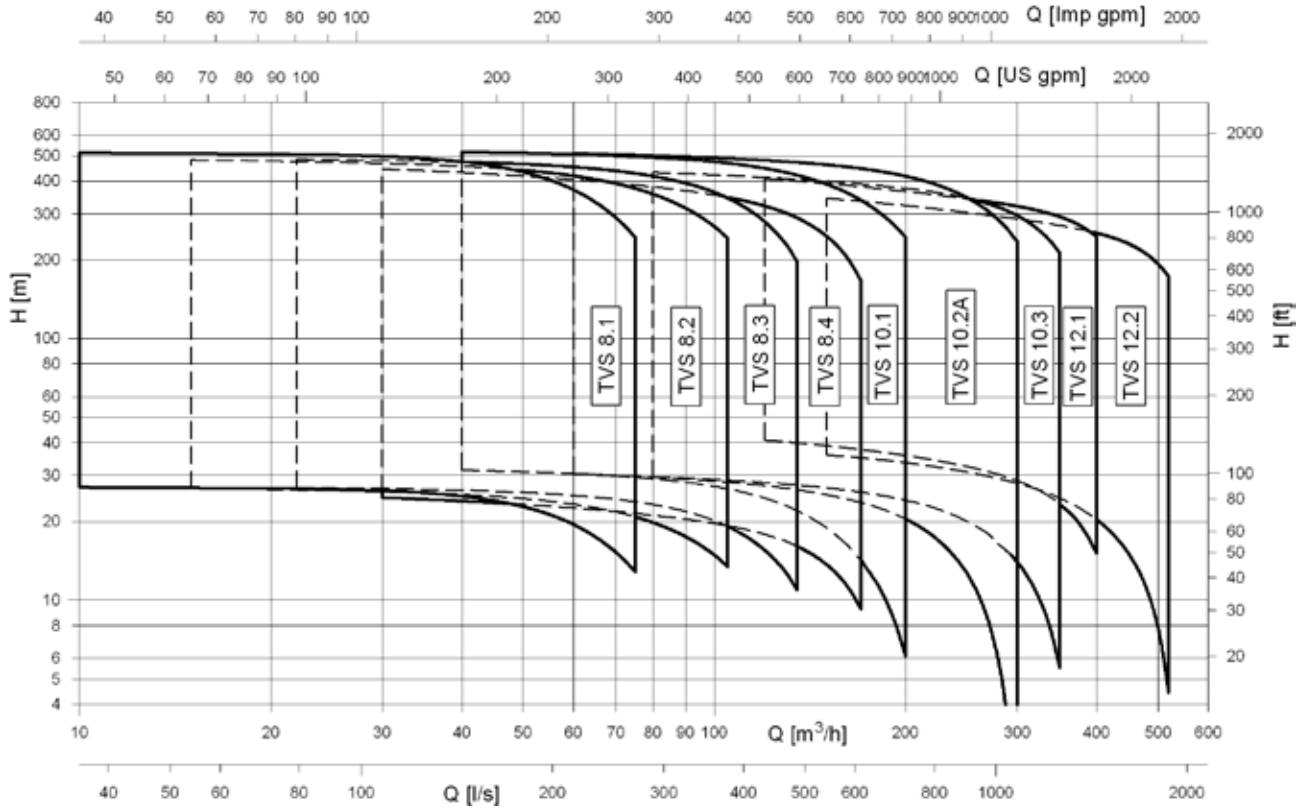
- Impellers and casings 1.4308
- Shaft 1.4057, coupling 1.4462

*Optional type Duplex (WW):*

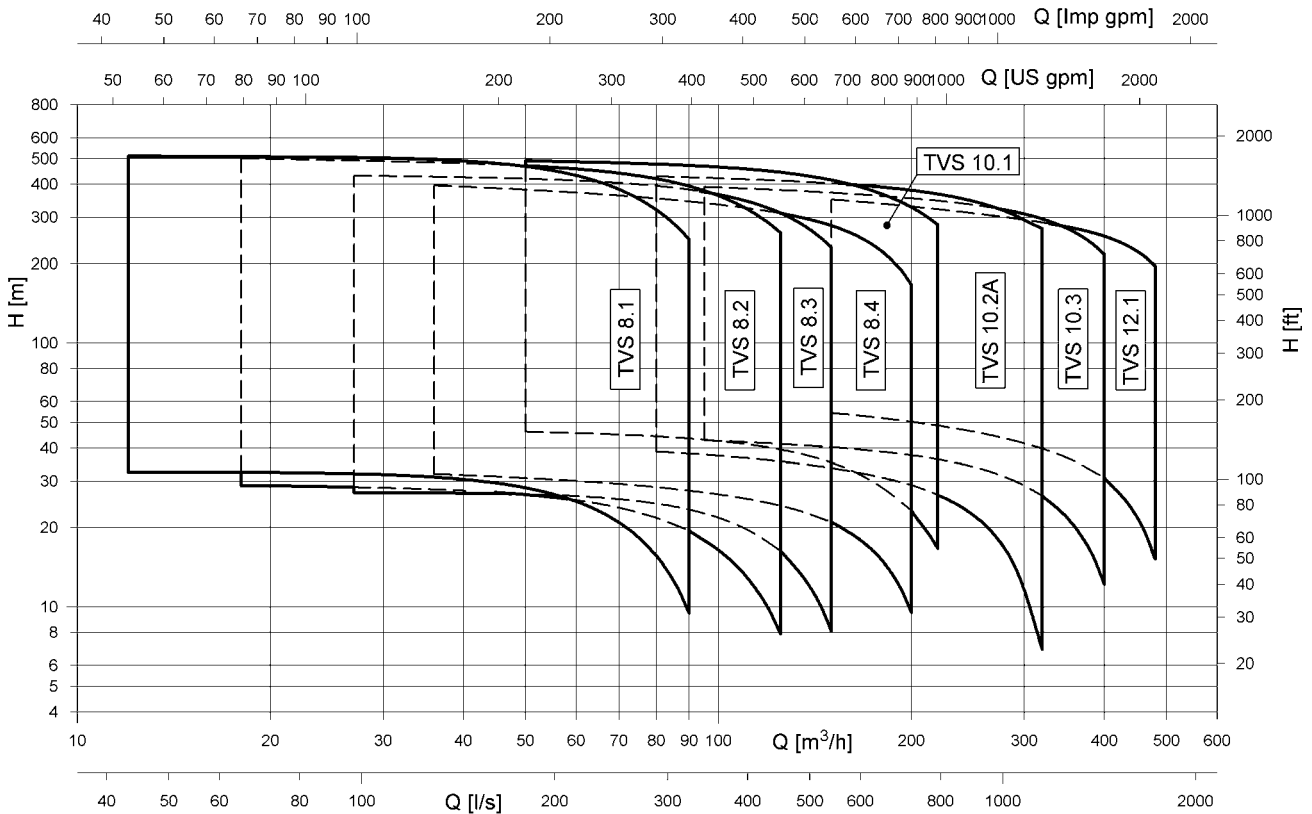
- *Impellers and casings 1.4517*
- *Shaft and coupling 1.4462*

- Bearing rubber EPDM
- Wear rings POM Polyacetal Polymere

## Performance Range 2900rpm



## Performance Range 3500rpm



# Pump Technology

Submersible borehole pumps in austenitic CrNi stainless steel, investment cast.

*Optional type  
WW Duplex 1.4517*

- New optimized hydraulics
- Improved efficiency
- Reduced life cycle costs

Enclosed impellers in CrNi stainless steel, investment cast.

*Type Duplex:  
Enclosed impellers and bowls in  
Duplex stainless steel investment cast.*

Bowls with optimized hydraulic and mechanical design with integrated diffusers in CrNi stainless steel investment cast.

Suction casing in CrNi stainless steel, investment cast, optimized low loss flow into first stage impeller. Entrance protected by strainer in stainless steel.

*Type Duplex:  
Suction casing in Duplex stainless steel,  
investment cast, suction strainer in  
Duplex.*



Discharge casing with incorporated non return valve, spring loaded, soft gasket, double guidance in rubber bushes applicable for vertical and horizontal installation.  
Optional version without valve available.

Slide bearings in each stage for optimal shaft guidance.  
Rubber (EPDM) / stainless steel 1.4057.

*Type Duplex:  
Rubber (EPDM) / Duplex 1.4462.*

Impellers fixed by conical locking sleeves made of Duplex 1.4462.

Dynamic wear ring made of POM (Polyacetal Polymer) for reduced internal losses and reduced wear.

Basic type:  
Shaft made of 1.4057, coupling made of 1.4462.

*Type Duplex:  
shaft and coupling made of 1.4462.*

Motor connection for 6" and 8" motors according to Nema with splined shaft and up thrust bearing in suction casing. For 10" and 12" motors with cylindrical shaft end with key.

## Design features for improved reliability

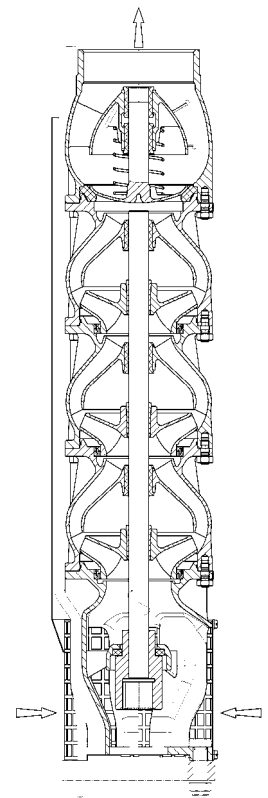
- Completely made of investment cast stainless steel for
  - increased corrosion resistance
  - improved wear resistance
  - high efficiency
- Dynamic wear rings
  - minimized internal losses
  - reduced wear in the clearance between impeller and casing
- Conical locking sleeves and pump coupling Duplex as standard
  - reduced corrosion
  - improved operational safety
  - simplifies maintenance
- Slide bearings in each stage - rubber bearing bush
  - improve smooth operation
  - lubrication grooves for improved lubrication
  - extended life time also at tough operating conditions
- Pumps with HYDROVAR (optional)
  - optimized performance
  - protect against unwanted operating conditions
  - avoid need for trimmed impellers
  - improve life time due to operating conditions according to demand at reduced speed

## Design features for reduced operating costs

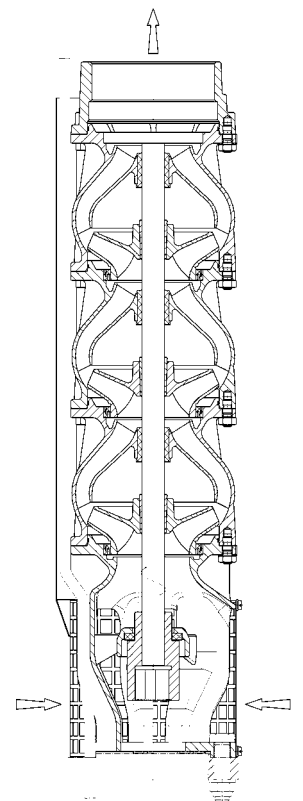
- High efficiency
  - newly developed optimized hydraulics
  - investment castings with high quality of surface finish and minimal tolerances
  - dynamic wear rings minimize internal losses
- HYDROVAR (optional)
  - optimized pump performance (adjustment according to effective demand)
  - provides high potential for energy savings

## Design features for reduced installation costs

- Pumps with integrated non-return valve
  - reduce installation costs
- Pumps for vertical and horizontal installation
  - easy adjustment to individual conditions at site
- HYDROVAR (optional)
  - eliminates expensive bypass arrangements or control valves



with  
non return valve



without  
non return valve

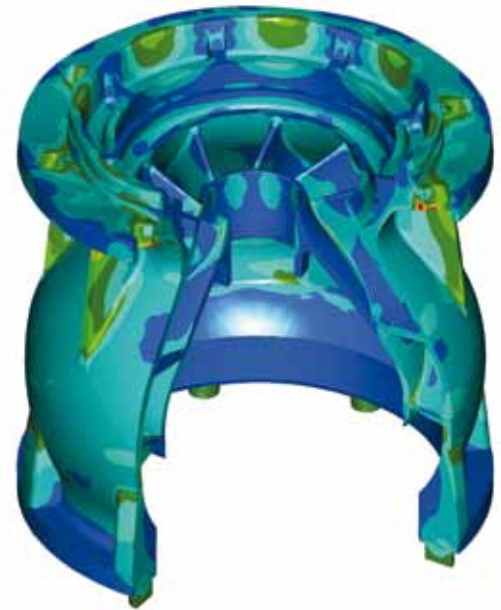
Submersible pump models TVS provide long-time value, long-time reliability and durability.

# Pump Technology

Pump components geometry by FEA analysis (Finite Element Analysis) and extensive testing strictly optimized.

Resulting in a new design concept with minimized weight and machining.

By this design concept even in case of using stainless steel material with excellent corrosion and wear resistance it is possible to provide a good price performance ratio with improved customer value.



## „Dynamic“ wear ring design

This wear ring design provides the following advantages:

### Design advantages for ease of start up

- large clearance at stand by (pressureless)
- POM (Polyacetal Polymer) avoids corrosion in the clearance area and blocking at stand by of the pump

### Design advantages for reduction of the internal losses

- wear ring clearance during operation is dynamically reduced controlled by the pressure (head) generated by each stage, resulting in reduced internal losses at operation
- minimized internal losses improve hydraulic efficiency of the pump

### Design advantages for reduction of wear

- operation with hydrodynamic lubrication
- by minimizing the internal losses (internal flow through wear ring clearance) automatically less solids (sand) contained in the fluid are carried into the wear ring area - resulting in reduced wear
- conical wear ring gap at operation (enlarged in the direction of the flow) allowing easier flush out of particles from the clearance



Wear ring pressureless



Wear ring in operation

# Submersible Motor Technology

Semi wet type motors or canned motors / encapsulated motors

## Performance Range:

### Motor power:

6" design L6C: 4-37kW (5,5- 50HP)

### Speed:

2900/3500rpm

### Voltage:

380V - 415V, 50Hz / 460V, 60Hz

Other voltages upon request

### Temperature:

35°C (95°F), up to max. 60°C (140°F)

## Product Features:

- Hermetically sealed stator, anti track, stator resin protected
- Removeable water tight lead connector
- Cable material according to drinking water regulations (KTW approved)
- Sand slinger and shaft seal for high performance in fluid containing sand
- High efficiency electrical design for low operation costs
- All motors prefilled and 100% tested
- Non contaminating water filled design

## Materials:

Motorversion	Standard
Motorshell	1.4307
Bearing casing upper	Cast iron
Bearing casing lower	Cast iron
Thrust bearing casing	Cast iron
Mechanical seal	Carbon/Ceramic/NBR
Seal cover	1.0432
Sand protection ring	NBR
Shaft end	1.4460
Diaphragm	NBR
Cable	EPR
Cable gland	1.4301
Other seals	NBR



# Submersible Motors Technology:

Wet type motors - rewindable

## Performance Range:

### Motor Power:

6" design L6W:	4 - 37kW (5,5 - 50HP)
8" design L8W:	30 - 93kW (40 - 125HP)
10" design L10W:	93 - 150kW (125 - 200HP)
12" design L12W:	185 - 300kW (250 - 400HP)
12" design PFR:	220 - 400kW (300 - 540HP)

### Speed:

2900/3500 min<sup>-1</sup> (2900/3500 rpm)

### Voltage:

380V - 415V, 50Hz / 460V, 60Hz

Other voltages upon request

### Temperature:

25°C (77°F), up to max. 60°C (140°F)

## Product Features:

- Rewindable design
- Cable material according to drinking water regulations (WRAS approved)
- Sand slinger and shaft seal for high performance in fluid containing sand
- High efficiency electrical design for low operation costs
- All motors prefilled and 100% tested
- Non contaminating water filled design

## Materials:

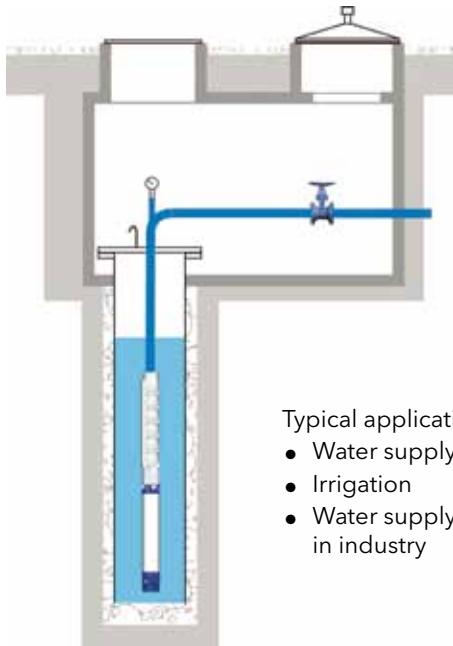
Motorversion	Standard	316 S	904 L
Motorshell	1.4306	1.4404	1.4539
Bearing casings	Cast iron	1.4408	1.4517
Thrust casing	Cast iron	1.4408	1.4517
Mechanical seal	Carbon/Ceramic/NBR	Carbon/Ceramic/NBR	Carbon/Ceramic/NBR
Seal cover	1.4308	1.4404	1.4462
Shaft end	1.4021 - 6" and 1.4462 - 8" and 12"	1.4462	1.4462
Diaphragm	EPDM	EPDM	EPDM
Cable	EPR	EPR	EPR
Other gaskets	NBR	NBR	NBR





# Applications

Vertical installation in a well (borehole) pump directly arranged on discharge pipe:



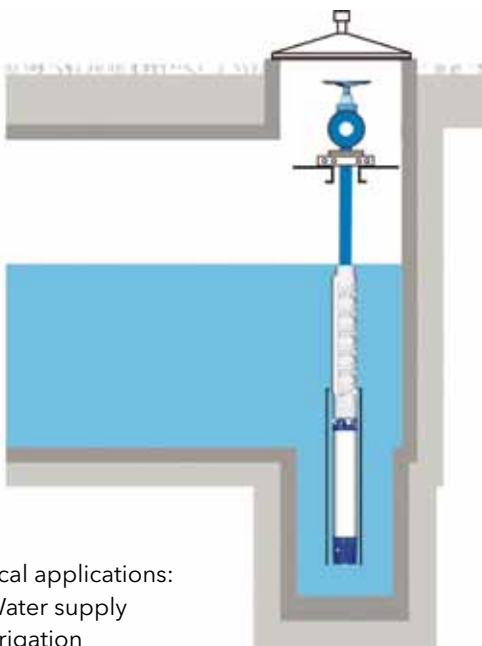
Typical applications:

- Water supply
- Irrigation
- Water supply in industry

Pumps in horizontal filter well:



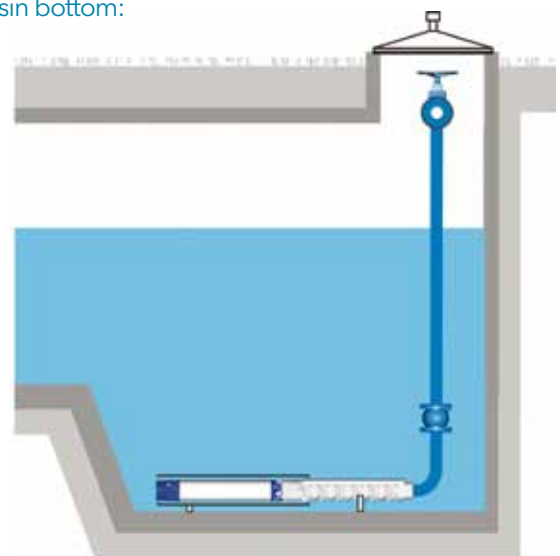
Vertical installation in water reservoir (pump sump). Pump with cooling shroud assembled on discharge pipe:



Typical applications:

- Water supply
- Irrigation
- Water supply in industry

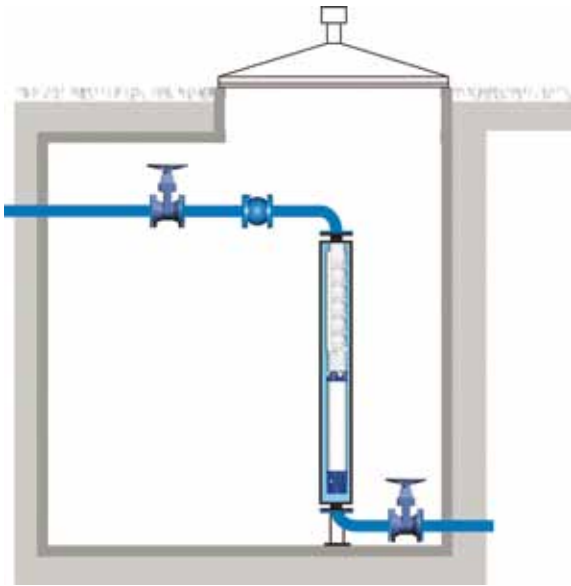
Horizontal installation in water reservoir (pump sump). Pump with cooling shroud mounted on brackets at basin bottom:



Typical applications:

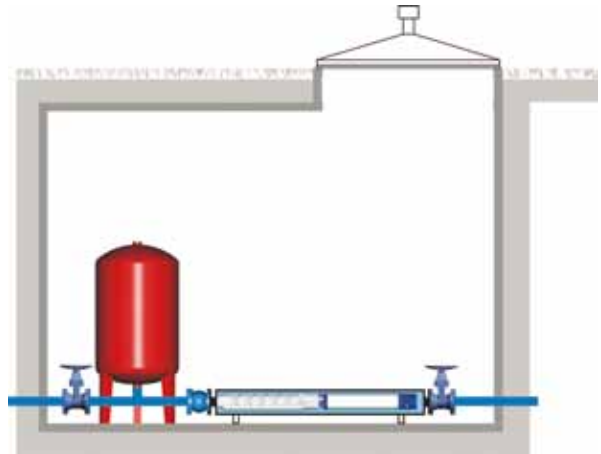
- Water supply
- Irrigation
- Water supply in industry

Vertical installation in pressure shroud as booster pump in dry mounting:



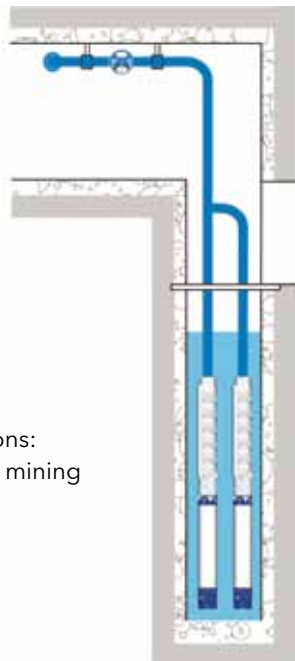
Typical applications:  
 • Water supply • Booster pumping

Horizontal installation in pressure shroud as booster pump in dry mounting:



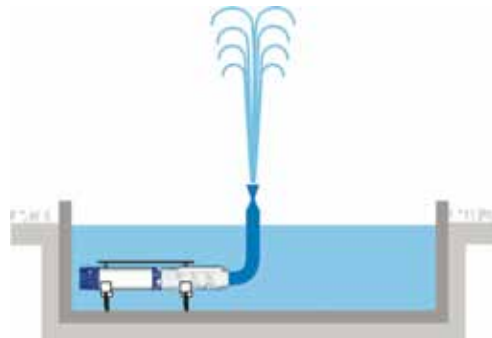
Typical applications:  
 • Water supply • Booster pumping

Vertical installation in cavern:



Typical applications:  
 • Dewatering in mining

Horizontal installation in open sumps or basins:



Typical applications:  
 • Fountains

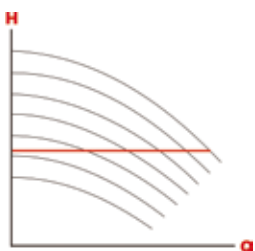
# Applications with HYDROVAR:

Hydrovar - pump control system that reduces life cycle costs and improves reliability.

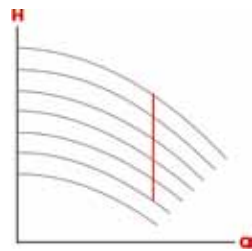
Hydrovar for mounting on the wall - the solution for varying the speed of clear water submersible pumps.

By optimising the pump performance to match the system requirements, significant advantages are gained

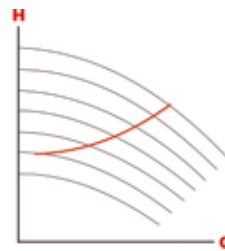
- Energy savings up to 50%
- Low installation costs, since control valves, by-pass pipework, switch and control panels can be omitted
- Soft start & stop to limit current peaks and prevent water hammers
- Built in pump protection (dry run, overvoltage, undervoltage, overload, phase loss)
- Fixed minimum speed to ensure the lubrication of the bearings
- Adjustable switching frequency between 2,5 and 8 kHz
- Multi-pump management - up to 4 units can be connected to one system
- Patented pump control to stop the pump at zero demand immediately
- Hydrovar units are available from 2,2 kW up to 45 kW for mounting directly on the wall
- Higher power ratings can be covered by using the HYDROVAR Smart controller in combination with any standard frequency converter - Hydrovar functionality without power limitation
- Wide range of applications (water supply, irrigation, filter systems)



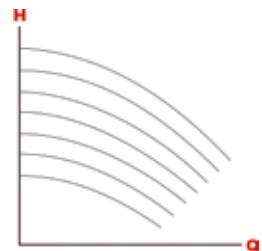
Constant Pressure



Constant Flow

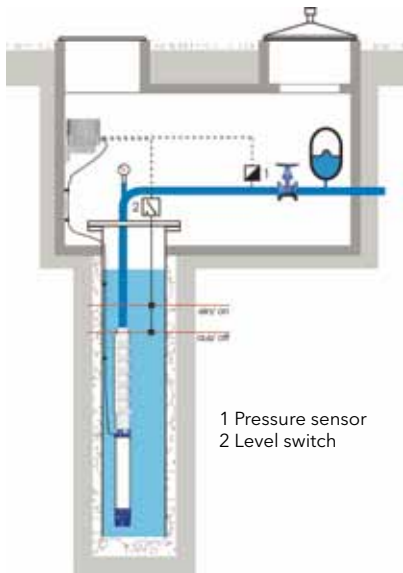


System Curve

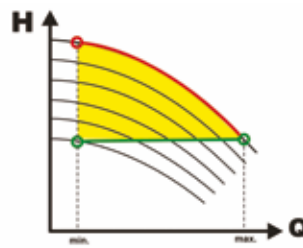


Actuator Mode

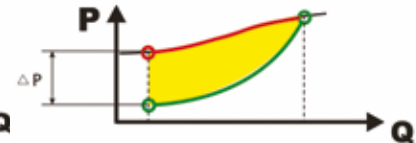
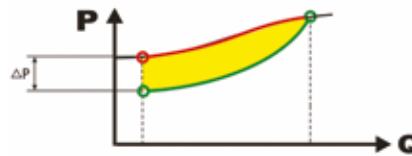
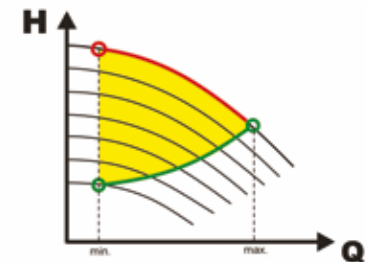
Pump regulation according to pressure with automatic switch off at zero consumption level (Vogel Patent):



Constant pressure control



Pressure control, along a system curve (automatic compensation of pipe losses)



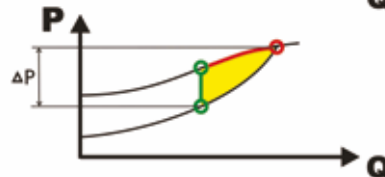
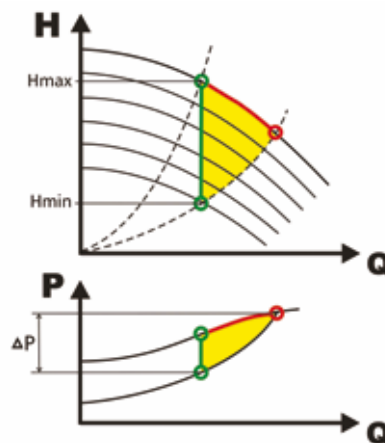
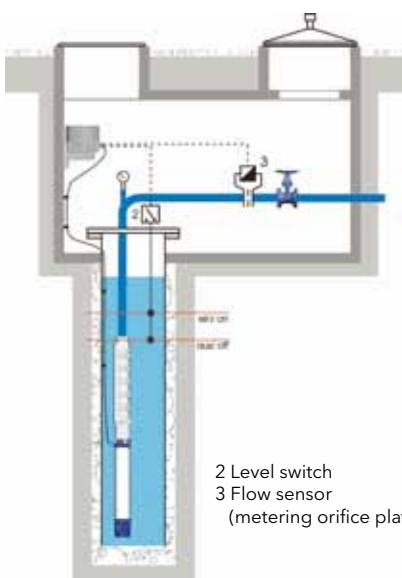
**Application:**

Drinking water- and irrigation installations, where constant system pressure is required at highly fluctuating consumption.

**Advantages:**

Energy saving compared with throttle controls or bypass regulator in part load operation up to 70%.

**Constant flow control**



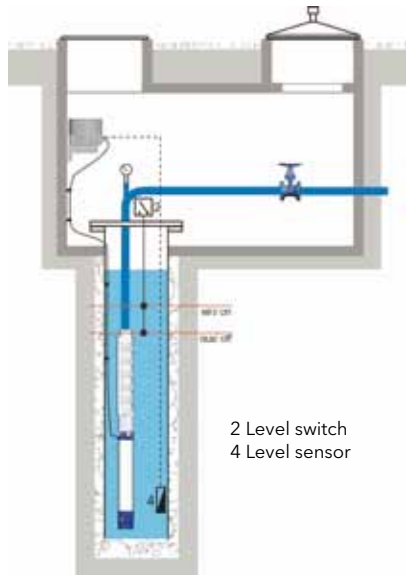
**Application:**

All filter system versions for constant filter loads, regardless for different pressure and contamination levels.

**Advantages:**

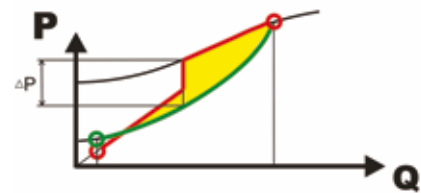
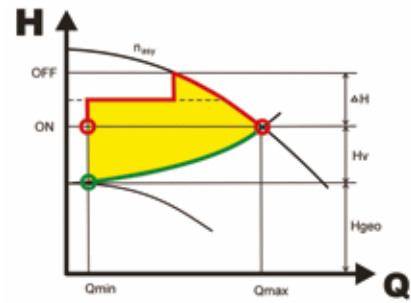
Prevention of excess flow rates and cavitation and energy savings compared with throttle controls up to 50%.

Constant level regulation in a well:



Application:

Adapting of the flow to an actual pump, productiveness of the well.

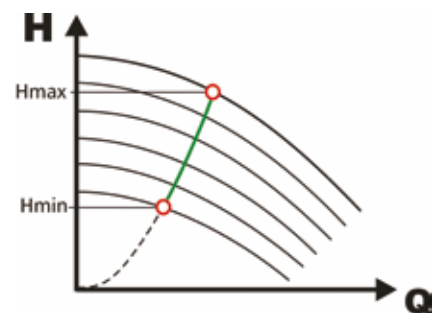
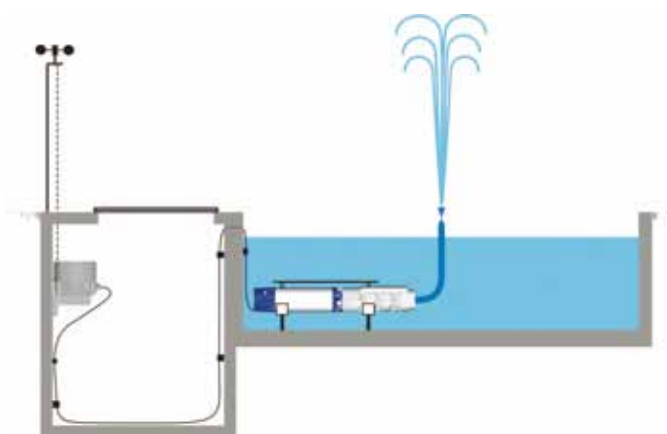


Advantages:

Continuous operation, energy saving up to 50%.

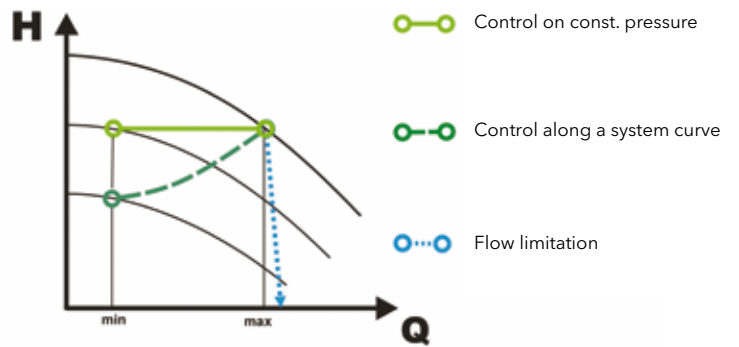
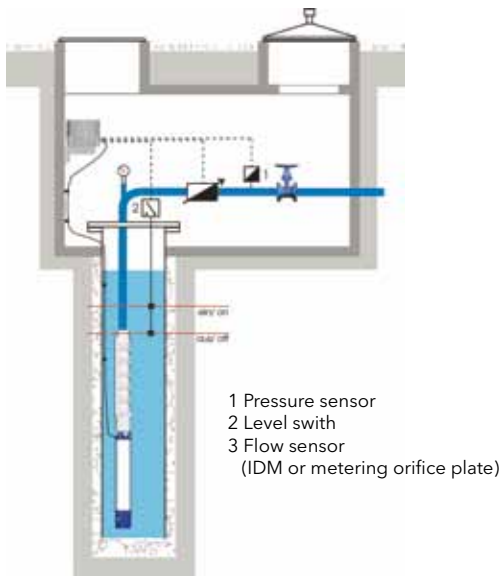
Water fountain control:

High windspeed reduces pump speed and pressure drop eliminates fountain over spray.



Control according to 2 criteria:

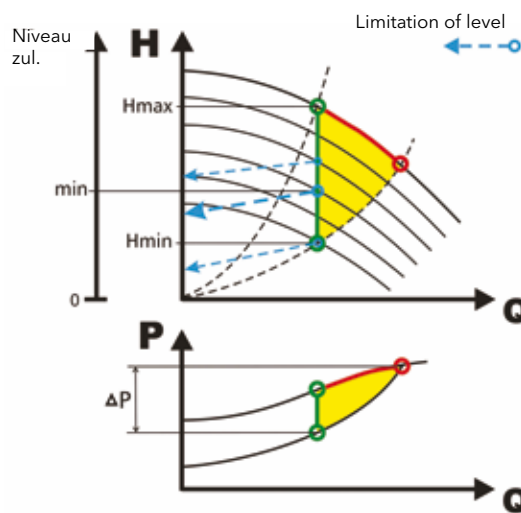
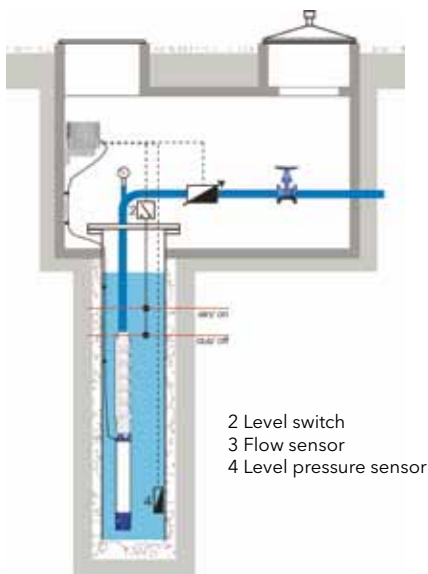
Constant pressure control or according to system curve with limitation of maximum flow rate (superimposed flow control):



**Application:**  
Water-, supply-, coolingwater and irrigation pumps at limited productiveness of the well.

**Advantages:**  
Prevention of excess quantities and cavitation at simultaneous reduction in partial load operation.

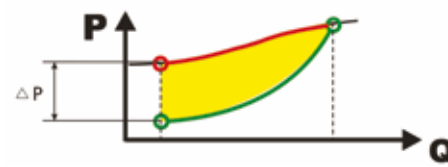
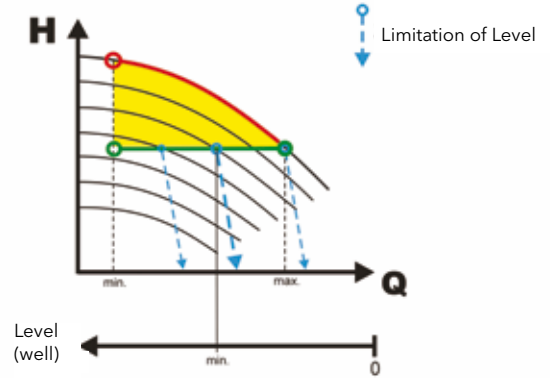
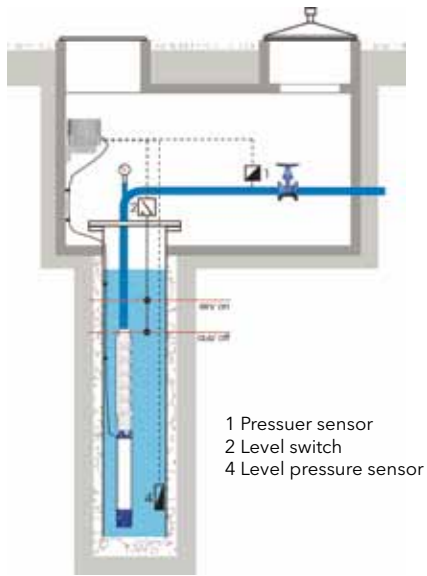
Constant flow control with limitation of a minimum level (superimposed level regulation):



**Application:**  
Systems with highly fluctuating pump delivery rates (e.g. filter systems and tank charging), where a minimum level in the extraction tank should not be undercut.

**Advantages:**  
Continuous pump operation, at varying productiveness of the well.

Pressure control with simultaneous limitation of minimum supply pressure:



**Application:**

Supply systems for service and drinking water with highly fluctuating consumption, where minimum supply pressure should not be undercut (without pump stop).

**Advantages:**

Continuous pump operation, no in-admissible sinking of the level in the well.



# Xylem |'zīləm|

- 1) The tissue in plants that brings water upward from the roots;
- 2) a leading global water technology company.

We're 12,000 people unified in a common purpose: creating innovative solutions to meet our world's water needs. Developing new technologies that will improve the way water is used, conserved, and re-used in the future is central to our work. We move, treat, analyze, and return water to the environment, and we help people use water efficiently, in their homes, buildings, factories and farms. In more than 150 countries, we have strong, long-standing relationships with customers who know us for our powerful combination of leading product brands and applications expertise, backed by a legacy of innovation.

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