



## REVIEW OF THE PRODUCTION PROGRAM



ISO 9001  
ISO 14001  
PN-N-18001



## DEEP-WELL PUMPS

### GAB

#### Application

GAB deep well pumps are designed for pumping of drinking water, treated water, raw water and sea water as well as mineral and thermal waters not containing long, abrasive fibres elements. Maximum sand content in the pumping water is 50 g/m<sup>3</sup>. GAB pumps are designed for pumping of water from wells of 4" diameter minimum. Pumps are mainly installed in borehole wells where the dynamic water level at pumping water capacity is known. The capacity of the well should be bigger then maximum output of the pump.

#### GAB pumps are used in:

- ✘ water supply systems,
- ✘ pumping systems and liquid pressure boosting systems used in technological processes,
- ✘ systems used for lowering the ground-water level,
- ✘ irrigation systems.

#### GAB type deep-well pumps are, among others, characterized by:

- ✘ modern design solutions,
- ✘ guarantee of long-standing, reliable operation,
- ✘ low purchase and operation costs,
- ✘ 2 years guarantee expandable up to 3 years,
- ✘ entire manufacturing process of pumps takes place in the parent factory, which guarantees flexible deliveries and quickly accessible spare parts,
- ✘ coupling of the pump with the engine as per the NEMA standard allows for flexibility during engine selection.

#### Material versions:

- ✘ Shaft, coupling, spacing body, bearing body, sleeves, connection strips – stainless steel,
- ✘ Suction body, discharge body, valve body – brass,
- ✘ Stators, impellers – plastic combined with brass.



### GB, GBA, GBC

#### Application

GB deep well pumps are designed for pumping drinking water, treated water, raw water and sea water as well as mineral and thermal waters not containing long, abrasive fibres elements. Maximum sand content in the pumping water is 50 g/m<sup>3</sup> (for GB.0; GBA.1 and GBA.2) and 100 g/m<sup>3</sup> (for GBC.3; GBC.4 and GBC.5). GB pumps are designed for pumping of water from wells of 6" diameter minimum. Pumps are mainly installed in borehole wells where the dynamic water level at pumping water capacity is known. The capacity of the well should be bigger then maximum output of the pump.

#### GB pumps are used in:

- ✘ water supply systems,
- ✘ pumping systems and liquid pressure boosting systems used in technological processes,
- ✘ systems used for lowering the ground-water level,
- ✘ irrigation systems.

#### GB, GBA and GBC type deep-well pumps are, among others, characterized by:

- ✘ modern design solutions,
- ✘ guarantee of long-standing, reliable operation,
- ✘ relatively low costs of purchase comparing to quality as well as low operation costs,
- ✘ 2 years guarantee expandable up to 3 years,
- ✘ entire manufacturing process of pumps takes place in the parent factory, which guarantees flexible deliveries and quickly accessible spare parts,
- ✘ motors can be optionally equipped with temperature sensors,
- ✘ coupling of the pump with the engine as per the NEMA standard allows for flexibility during engine selection,
- ✘ wet-type rewindable engines available from 1.5 kW,
- ✘ possible selection per working point (for cast impellers),
- ✘ factory service available max 50 km from the customer's location,
- ✘ pumping sets may be delivered equipped with hermetically sealed jackets and suction jackets.

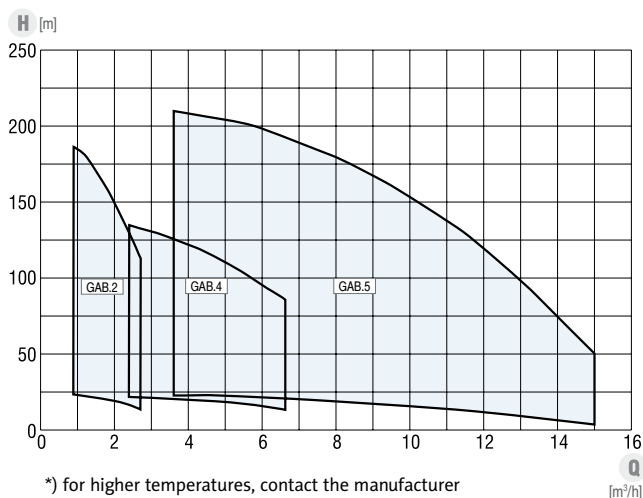
#### Material versions:

- ✘ shaft and coupling – stainless steel,
- ✘ middle casing – stainless steel or alloy cast iron,
- ✘ body – stainless steel or alloy cast iron or brass,
- ✘ diffusers, impellers – brass or plastic combined with brass.



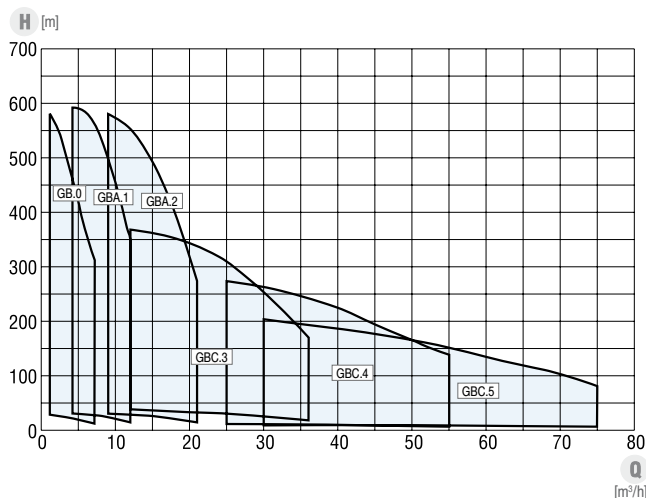
#### Technical specification

capacity [m <sup>3</sup> /h]	0,9 ÷ 15
delivery head [m]	up to 217
pumped liquid temperature [°C]	up to 30 *
weight [kg]	12,0 ÷ 52,0
motor power [kW]	0,37 ÷ 7,5
voltage [V]	230, 400



#### Technical specification

capacity [m <sup>3</sup> /h]	1,2 ÷ 75
delivery head [m]	up to 607
pumped liquid temperature [°C]	up to 30 *
weight [kg]	57,5 ÷ 222,0
motor power [kW]	3,7 ÷ 37,0



# DEEP-WELL PUMPS

## GC, GCA

### Application

GC deep well pumps are designed for pumping of drinking water, treated water, raw water and sea water as well as mineral and thermal waters not containing long, abrasive fibres elements. Maximum sand content in the pumping water is 100 g/m<sup>3</sup>. GC pumps are designed for pumping of water from wells of 8" diameter minimum. Pumps are mainly installed in borehole wells where the dynamic water level at pumping water capacity is known. The capacity of the well should be bigger then maximum output of the pump.

#### GC pumps are used in:

- \* water supply systems,
- \* pumping systems and liquid pressure boosting systems used in technological processes,
- \* systems used for lowering the ground-water level,
- \* irrigation systems.

#### GC, GCA type deep-well pumps are, among others, characterized by:

- \* modern design solutions of high efficiency,
- \* guarantee of long-standing, reliable operation in particularly hard conditions,
- \* relatively low costs of purchase comparing to quality as well as low operation costs,
- \* the complete manufacturing process of pumps takes place in the parent factory, which guarantees flexible deliveries and quickly accessible spare parts,
- \* 2 years guarantee expandable up to 3 years,
- \* wet-type, rewindable motors,
- \* coupling of the pump with the engine as per the NEMA standard allows for flexibility during engine selection,
- \* wide range of material versions enables pumping of various media,
- \* factory service available max 50 km from the customer's location,
- \* possibility to supply pumping sets equipped with hermetically sealed jackets.
- \* engines equipped with temperature sensors.

#### Material versions:

- \* shaft and coupling – stainless steel,
- \* central casing – cast iron or copper cast iron or bronze,
- \* casing – cast iron or ductile cast iron or bronze,
- \* impellers – brass or bronze or Noryl.



## GD, GF

### Application

GD, GF deep well pumps are designed for pumping of drinking water, treated water, raw water and sea water as well as mineral and thermal waters not containing long, abrasive fibres elements. Maximum sand content in the pumping water is 100 g/m<sup>3</sup>. GD, GF pumps are designed for pumping of water from wells of 10" diameter minimum (GD type pumps) and 14" diameter minimum (GF type pumps). Pumps are mainly installed in borehole wells where the dynamic water level at pumping water capacity is known. The capacity of the well should be bigger then maximum output of the pump.

#### GD, GF pumps are used in:

- \* water supply systems,
- \* pumping systems and liquid pressure boosting systems used in technological processes,
- \* systems used for lowering the ground-water level,
- \* irrigation systems.

#### GD, GF type deep-well pumps are, among others, characterized by:

- \* modern design solutions,
- \* guarantee of long-standing, reliable operation,
- \* relatively low costs of purchase comparing to quality as well as low operation costs,
- \* 2 years guarantee expandable up to 3 years,
- \* the complete manufacturing process of pumps takes place in the parent factory, which guarantees flexible deliveries and quickly accessible spare parts,
- \* wet-type, rewindable motors,
- \* motors can be optionally equipped with temperature sensors,
- \* coupling of the pump with the engine as per the NEMA standard allows for flexibility during engine selection,
- \* relatively high durability in difficult operating conditions,
- \* factory service available max 50 km from the customer's location,
- \* pumping sets may be delivered equipped with hermetically sealed jackets and suction jackets.

#### Material versions:

- \* shaft and coupling – stainless steel,
- \* central casing – cast iron or copper cast iron or bronze,
- \* casing – cast iron or ductile cast iron or bronze,
- \* impellers – brass or bronze.

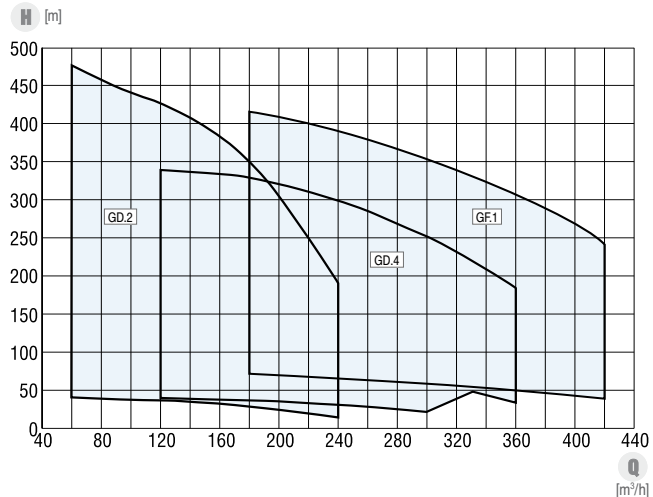
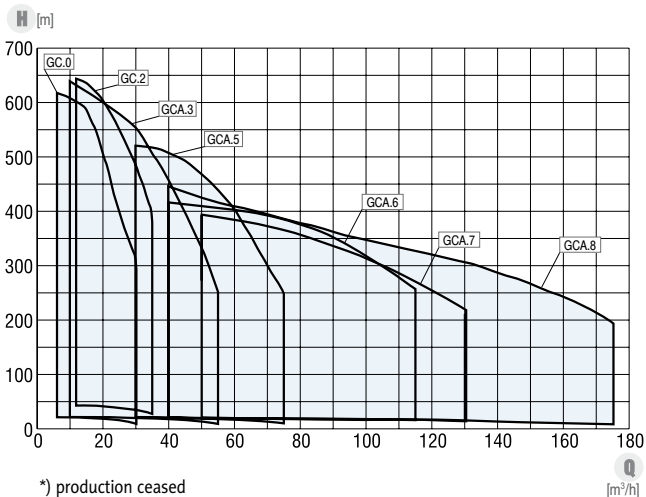


### Technical specification

capacity [m <sup>3</sup> /h]	6,0 ÷ 175
delivery head [m]	up to 669
pumped liquid temperature [°C]	up to 30 *
weight [kg]	79,0 ÷ 690,0
motor power [kW]	3,7 ÷ 150,0

### Technical specification

capacity [m <sup>3</sup> /h]	60,0 ÷ 420
delivery head [m]	up to 463
pumped liquid temperature [°C]	up to 30 *
weight [kg]	197,0 ÷ 1285,0
motor power [kW]	22,0 ÷ 300,0





## ☞ SINGLE STAGE CENTRIFUGAL PUMPS



### NHV

#### Application

NHV pumps are single stage, centrifugal, end suction pumps with axial suction connector pipe and radial discharge connector pipe with horizontal shaft axis. Pump size and parameters according to PN-EN 733 standard. NHV pumps can pump media not containing abrasive inclusions. Media physical and chemical properties should range within corrosion resistance limits for materials used for pump construction in a specific material version. There are following material versions of the pumps available: made of grey cast iron, bronze or austenitic cast steels.

#### NHV pumps are used in:

- ☒ water supply systems,
- ☒ industry (pressure increasing systems, cooling systems, process water circulation systems),
- ☒ thermal-electric power stations,
- ☒ industrial cooling systems,
- ☒ agriculture (irrigation systems),
- ☒ fire-fighting systems, hydrants,
- ☒ fuels and highly aggressive liquids pumping systems,
- ☒ chemical installations,
- ☒ environmental engineering,
- ☒ possibility to use special versions equipped with coupling with spacers (for quick disassembly).

#### Technical specification

capacity [m <sup>3</sup> /h]	up to 1700
delivery head [m]	up to 100
pumped liquid temperature [°C]	-15 ÷ 110
working pressure for ordered material version [bar]	1,2,4...16
motor power [kW]	up to 450
synchronous rotary speed [1/min]	1500 3000
shaft sealing	cord sealing or end-face seal

### MVA, MVB, MVL

#### Application

MV type single stage, centrifugal, end suction, pumps in monobloc arrangement, with the pump and engine impeller mounted on the same shaft. The pump and the engine operate on the same bearing system. The bearings are covered on both sides and filled with lubricant for the time of operation. MV pumps are suitable for pumping clean, non-flammable and non-explosive liquids, containing no solids or long-fibre components. The corrosive power of the pumped medium ought to range within the corrosion resistance limits applicable to the materials used for the given pump construction. The following material versions of the pumps are available: grey cast iron, bronze, austenitic cast steel.

Pumps MVL are single-stage, centrifugal, normally sucking, rotodynamic pumps with compact construction with closed impeller where both connection flanges (suction and discharge) has the same symmetry axis (in-line pump). Suction and discharge flanges are conformable to ISO 7005-2/PN 16 standard.

#### MV pumps are used in:

- ☒ water supply systems and water-works,
- ☒ industry (pressure boosting systems, cooling systems, process water circulation systems),
- ☒ thermal-electric power stations,
- ☒ industrial cooling systems,
- ☒ agriculture (irrigations systems),
- ☒ fire-fighting systems, hydrants,
- ☒ fuel and highly aggressive liquid pumping systems,
- ☒ chemical installations,
- ☒ environmental engineering,
- ☒ water treatment systems, air conditioning systems.

#### Technical specification

capacity [m <sup>3</sup> /h]	up to 500
delivery head [m] MVA/B	up to 100
delivery head [m] MVL	up to 95
pumped liquid temperature [°C] MVA/B	-15 ÷ 110
pumped liquid temperature [°C] MVL	-10 ÷ 110
working pressure for ordered material version [bar]	...10
motor power [kW]	up to 55
synchronous rotary speed [1/min]	1500 3000

## ☞ DOUBLE-SUCTION PUMPS



### DHV, DVV

#### Application

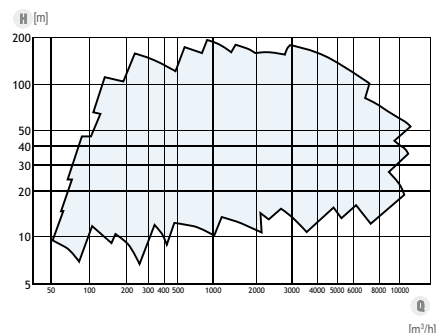
Centrifugal, single stage, double suction, axially sectioned DHV, DVV type pumps are suitable for pumping clean or slightly impure (max 20 mg/dm<sup>3</sup>) liquids of low viscosity and with a temperature of up to 140 °C. The DHV, DVV pumps are characterized by high rigidity of the hydraulic system, due to two-sided support of the shaft. Owing to the impeller mounted centrally on the shaft and water suction carried out on both sides of the impeller, the axial forces within the pump have been reduced to the minimum, allowing the application of a simple bearing system and considerably extending the life of the pump itself. These pumps are characterized by high efficiency and low maintenance costs. Vast array of type series and extensive operating range enable optimal pump selection in accordance with the preset operating parameters.

#### DHV, DVV pumps are used in:

- ☒ water supply systems and water-works,
- ☒ industry (pressure increasing systems, cooling systems, process water circulation systems),
- ☒ thermal-electric power stations,
- ☒ industrial cooling systems,
- ☒ environmental engineering,
- ☒ fire-fighting systems, most frequently assembled with combustion engines.

#### Technical specification

capacity [m <sup>3</sup> /h]	up to 12000
delivery head [m]	up to 220
pumped liquid temperature [°C]	up to 140





**SKA**

**Application**

SKA type self-priming centrifugal pumps with side ring channel and open impeller, are designed to pump liquids within the corrosion resistance limits of materials used for their construction. The biggest advantage of SKA pumps is their self-priming ability, which eliminates necessity to flood suction pipeline with liquid. SKA pumps can pump liquids of a temperature up to 110 °C, discharged liquid density up to 1300 kg/m<sup>3</sup> and viscosity up to 150 mm<sup>2</sup>/s contaminated with non-abrasive solid particles up to 0.5 mm in trace amounts. The pumps can cooperate with 50 Hz or 60 Hz motors.

**SKA pumps are used in:**

- ✦ waterworks systems,
- ✦ individual households,
- ✦ industry.

**SKB**

**Application**

SKB type self-priming centrifugal pumps with side ring channel and open impeller, are designed to pump liquids within the corrosion resistance limits of materials used for their construction. The biggest advantage of SKB pumps is their self-priming ability, which eliminates necessity to flood suction pipeline with liquid. The pump gets self-priming ability after it is flooded with liquid. The pumps can cooperate with portable devices as well as with 50 Hz or -60 Hz motors. SKB pumps are by standard equipped with mechanical seal that entirely eliminates leakage of cord sealing lubricant.

**SKB pumps are used in:**

- ✦ waterworks systems,
- ✦ individual households,
- ✦ waterworks automatic systems,
- ✦ industry.

**SM**

**Application**

SM self-priming pumps are designed for pumping non-aggressive liquids, except fuels, within the corrosion resistance limits of materials used for their construction and liquids containing trace amount of non-abrasive solid particles of up to 0.5 mm in size. The advantage of SM pumps is their ability to automatically remove air from the suction pipeline after their one-time priming with pumped liquid without the need of flooding suction pipeline. SM pumps are by standard equipped with mechanical seal that entirely eliminates leakage of cord sealing lubricant. Another advantage of SM pumps is their compact structure, which reduces space needed to install them.

**SM pumps can be used for:**

- ✦ water supply from wells or natural/artificial tanks
- ✦ rainwater handling systems:
- ✦ use in domestic hydrophores,
- ✦ industrial purposes.

**Technical specification**

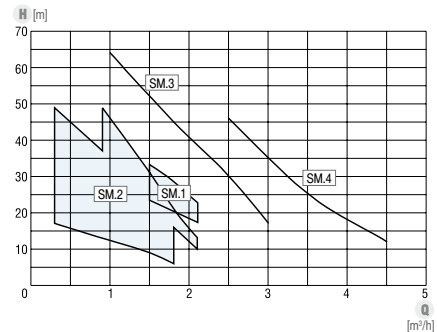
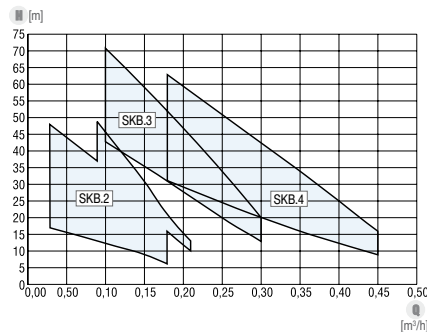
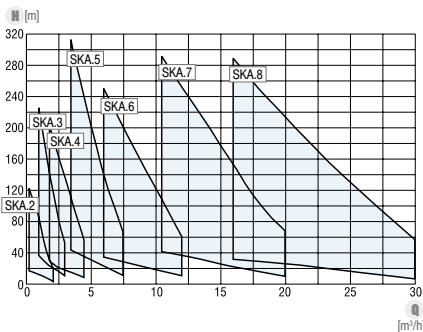
capacity [m <sup>3</sup> /h]	0,3 ÷ 30
delivery head [m]	up to 310
pumped liquid temperature [°C]	up to 110
density of the pumped liquid [kg/m <sup>3</sup> ]	up to 1300
viscosity of the pumped liquid [mm <sup>2</sup> /s]	up to 150
weight [kg]	34,0 ÷ 409,0
motor power [kW]	0,55 ÷ 30,0
rotational speed [rpm]	1450 (50 Hz) 1800 (60 Hz)
shaft sealing	cord sealing or end-face seal

**Technical specification**

capacity [m <sup>3</sup> /h]	0,3 ÷ 4,5
delivery head [m]	up to 72
pumped liquid temperature [°C]	up to 110
density of the pumped liquid [kg/m <sup>3</sup> ]	up to 1300
viscosity of the pumped liquid [mm <sup>2</sup> /s]	up to 150
weight [kg]	22,2 ÷ 47,0
motor power [kW]	0,25 ÷ 2,2
rotational speed [rpm]	1450 (50 Hz) 1800 (60 Hz)
shaft sealing	cord sealing or end-face seal

**Technical specification**

capacity [m <sup>3</sup> /h]	0,3 ÷ 4,5
delivery head [m]	up to 72
pumped liquid temperature [°C]	up to 70
density of the pumped liquid [kg/m <sup>3</sup> ]	up to 1000
viscosity of the pumped liquid [mm <sup>2</sup> /s]	up to 10
weight [kg]	6,4 ÷ 27,0
motor power [kW]	0,37 ÷ 1,5
rotational speed [rpm]	1450 (50 Hz) 1800 (60 Hz)
shaft sealing	end-face sealing type A1



## SINGLE-STAGE PUMPS



FZA, FZB, FZP

### Application

Type FZ impeller single-stage pumps are used to pump clean and dirty water, municipal and industrial waste, as well as other liquids, depending on corrosion resistance of materials of which the pump is made. They constitute a highly-unified family of submersible and dry-installed pumps. There are different versions of these pumps, depending on the characteristics of pumped liquids and the type and size of pumped impurities.

**The FZA pumping units may be applied for one of the following or other uses:**

- ✘ in industrial installations
- ✘ horticulture,
- ✘ farms,
- ✘ land use rainwater,
- ✘ in dewatering flooded objects
- ✘ emptying pools or reservoirs

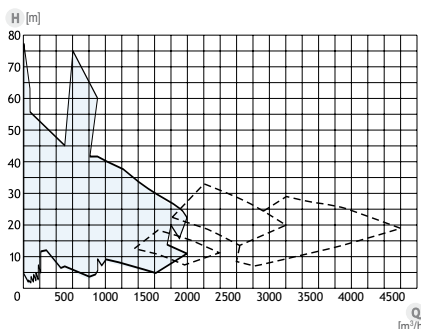
FZA	For pumping water or contaminated liquids without any inclusions, with the diameter of up to 6 mm.
FZB	Channel impeller pumps for pumping contaminated liquids with solid and sewage content, without fibrous substances.
FZP	Channel impeller pumps for pumping clean and slightly contaminated liquids.

### Drives used in FZ pumps:

- ✘ Motors cooled with pumped medium, with IP68
- ✘ Air-cooled motors with IP55 – monoblock pumps
- ✘ Air-cooled motors with IP55 and standard flange-type motor
- ✘ IP68 motors with internal cooling system and non-submersible operation capability

### Technical specification

capacity [m <sup>3</sup> /h]	up to 2000
delivery head [m]	up to 100
synchronous rotary speed [1/min]	1000, 1500, 3000



\*) on demand



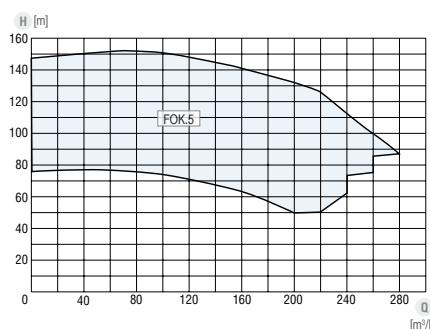
FOK

### Application

The FOK-type rotodynamic single-stage pumps are intended for pumping clean and dirty water as well as other liquids falling within the scope of the corrosion resistance of the materials used in their construction. They represent a combination of the construction of monoblock pumps with the family of reinforced drive FZ pumps, resulting in high resistance to tough working conditions. The flow system of a FOK pump is separated from the driving motor by an oil chamber with two independent mechanical seals encased inside it. Due to this, even during a malfunction of the first seal, the pumped liquid does not leak into the environment.

### Technical specification

Capacity [m <sup>3</sup> /h]	120-240
Pump head [m]	up to 140
Outlet fitting diameter [mm]	DN125
Operating pressure [MPa]	2,0
Operating temperature [°C]	0 to 120
Revolutions per minute [rpm]	2950
Engine power [kW]	75-110



## PUMPS INSTALLED IN COLUMN PIPES



FZS

### Application

Pumps FZS type are single-stage pumping units in monoblock arrangement driven by three phase electric motors assembled on the common shaft. Pumps are installed in column pipes.

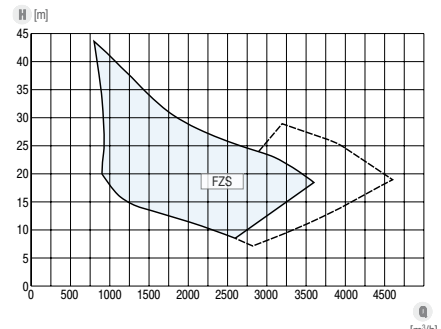
FZS pumps are designed for pumping clean, raw, river, sea, technological or slightly contaminated water with temperatures up to 40°C, in the range of the resistance of materials used for their construction.

**The FZS pumping units may be applied for one of the following or other uses:**

- ✘ boundary water intakes,
- ✘ irrigation systems,
- ✘ water cooling systems,
- ✘ flood control pumping stations,
- ✘ industrial, pressure boosting, fighting installations,
- ✘ installations for drinking and municipal water

### Technical specification

Capacity [m <sup>3</sup> /h]	up to 4500
Pump head [m]	up to 44 m
Rotational speed [rpm]	up to 1500
The maximum temperature of the pumped liquid [°C]	up to +40
The size of pipe shaft	up to DN1000



\*) on demand



## SUBMERSIBLE PUMPS



WZA

### Application

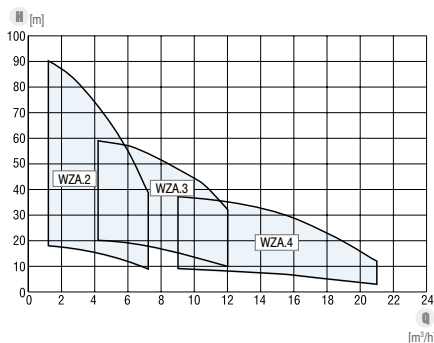
Multi-stage, submersible, impeller pumps type WZA are ideally fit for clean water pumping, including drinking and process water used in a household, with pH = 6-8. The liquid can contain non-abrasive inclusions with diameter up to 0.5 mm and their content up to 50 g/m<sup>3</sup>.

**WZA pumping units are, among others, used in:**

- ✦ water supply systems (water pumping from a well with 6" minimal diameter or from open intakes, tanks, reservoirs),
- ✦ automatic water supply systems (e.g. the AGE 5 automat),
- ✦ irrigation systems,
- ✦ washing systems,
- ✦ draining systems,
- ✦ rainwater handling systems.

### Technical specification

capacity [m <sup>3</sup> /h]	1,2-21
delivery head [m]	up to 80
submersion depth [m]	up to 10
pumped liquid temperature [°C]	up to 40
density of the pumped liquid [kg/m <sup>3</sup> ]	up to 1000
viscosity of the pumped liquid [mm <sup>2</sup> /s]	13
weight [kg]	15,5-22,5
motor power [kW]	0,55-2,2



## CIRCULATING PUMPS



CL, COK

### Application

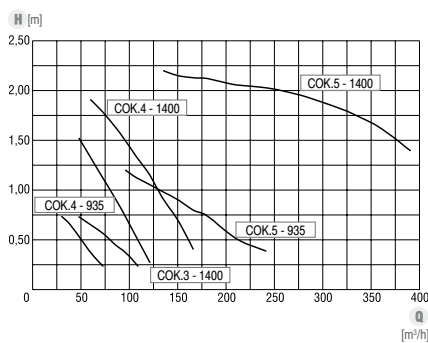
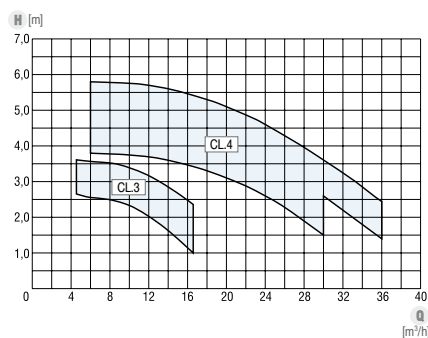
Impeller centrifugal pumps of CL type are designed to accelerate circulation of non-contaminated and chemically neutral fluids, mainly in central heating and hot water installations in process circuits.

Propeller pumps of COK type are designed to accelerate circulation of non-contaminated and chemically neutral fluids, mainly in central heating and hot water installations in process circuits.

The pumps are extremely resistant to hard working conditions and they are widely used in heating systems for farming (greenhouses).

### Technical specification

	CL	COK
capacity [m <sup>3</sup> /h]	4,5 ÷ 36	48 ÷ 390
delivery head [m]	up to 5,8	up to 2,7
pumped liquid temperature [°C]	up to 110	up to 90
weight [kg]	18 ÷ 26,7	35 ÷ 92
motor power [kW]	CL 3 - 0,25 CL 4 - 0,55	COK 125 - 0,75 COK 200 - 3



## VERTICAL PUMPS



OPA, OPB, OPF

### Application

OPA, OPB multistage, vertical pumps are designed to pump and increase the pressure of treated, drinking water that do not contain abrasive and long-fibred additions. Maximum water contamination with sand – up to 100 g/m<sup>3</sup>. OPA pumps can also be used to pump other liquids within corrosion resistance of materials applied in pump construction. Thanks to a standard flange-type motor used in this pump, it is easily available and replaceable in case of breakdown.

**Material versions:**

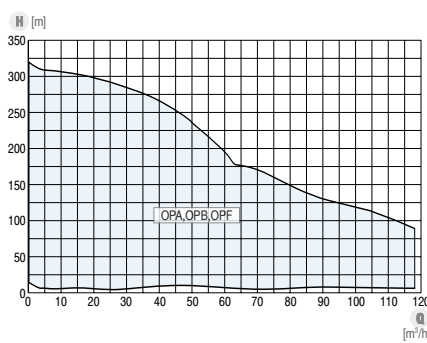
- ✦ Lower and upper casing: Grey cast iron or bronze, AISI 302, AISI 316,
- ✦ middle casing: Noryl, grey cast iron, bronze, AISI 302, AISI 316,
- ✦ impellers: polycarbonate, brass, Noryl, AISI 302, AISI 316,
- ✦ stator: Noryl, grey cast iron, bronze, AISI 302, AISI 316,
- ✦ shaft: stainless steel, AISI 302, AISI 316
- ✦ jacket: stainless steel, AISI 302, AISI 316.

**OPA, OPB pumps are used in:**

- ✦ hydrophore sets.

### Technical specification

capacity [m <sup>3</sup> /h]	0,5-118
delivery head [m]	up to 320
pumped liquid temperature [°C]	70-120
viscosity of the pumped liquid [mm <sup>2</sup> /s]	200
motor power [kW]	0,75 – 45



## ❁ PRESSURE BOOSTING SETS



ZHG

### Application

Hydrophore sets built on the basis of deep-well pumps enclosed in hermetic pressure shrouds. Due to its parameters, small size and compact structure, those pumps are designed to be installed directly in multi-family residential buildings as well as office and public buildings. Thanks to hermetic housing with wet motor, the pump can also be installed in difficult conditions of humid underground chambers or spaces that can be periodically flooded.

#### Control:

- ❁ using frequency converter,

#### Material versions of supporting structure, hermetic jackets and collectors:

- ❁ alloy austenitic steel (stainless steel).

#### The advantages include:

- ❁ possibility to use the pump in hard working conditions,
- ❁ silent operation comparing to pumping units based on other pumps.

### Technical specification

capacity Q [m <sup>3</sup> /h]	0,9 ÷ 60
delivery head ΔH [mH <sub>2</sub> O]	10 ÷ 90
pumped liquid temperature t <sub>max</sub> [°C]	25
Working pressure [bar]	up to 10
Maximum number of pumps in one set	i = 4



ZHN

### Application

Hydrophore sets based on horizontal, single-stage, centrifugal NHV pumps compliant with standard (PN-EN733). Sets of such type are used in process feeding systems, thermal-electric power plants and industrial cooling systems. Their main advantage is the possibility to achieve very high capacities and the possibility to pump aggressive liquids, where it is necessary to use such materials like cast steel or bronze.

#### Control:

- ❁ using frequency converter,
- ❁ cascade (bistable: on/off) also equipped with "soft-start" devices.

#### Material versions of supporting structure and collectors:

- ❁ hot-dip galvanized carbon steel,
- ❁ alloy austenitic steel (stainless steel).

### Technical specification

capacity Q [m <sup>3</sup> /h]	100 ÷ 2000
delivery head ΔH [mH <sub>2</sub> O]	30 ÷ 90
pumped liquid temperature t <sub>max</sub> [°C]	120
Working pressure [bar]	up to 10
Maximum number of pumps in one set	i = 6



## ❁ HYDROPHORE SETS



ZHA, ZHB, ZHF

### Application

Pressure boosting systems based on vertical, multi-stage, centrifugal OPA, OPB, OPF (hydraulics of OPF pumps made completely of stainless steel) pumps are designed to increase the pressure of:

- ❁ waterworks systems,
- ❁ irrigation systems,
- ❁ fire-fighting systems, pressure boosting systems,
- ❁ industrial systems.

ZHA pressure boosting systems are offered as complete pumping sets connected parallel using collectors and fittings, equipped with control and monitoring units.

#### Control:

- ❁ using frequency converter,
- ❁ cascade (bistable: on/off) also equipped with "soft-start" devices.

#### Material versions of supporting structure and collectors:

- ❁ hot-dip galvanized carbon steel,
- ❁ alloy austenitic steel (stainless steel).

#### Advantages of pressure boosting systems sets as compared with classic hydrophore stations

- ❁ automated, unattended unit operation,
- ❁ small size (small cubic capacity of newly designed objects),
- ❁ silent operation,
- ❁ limited number of auxiliary equipment requiring attended operation (compressors, pressure connectors, hydrophore tanks etc.),
- ❁ lack of equipment subject to Technical Supervision Board inspection (no additional costs involved),
- ❁ units do not require foundation work,
- ❁ power supply economy (unit characteristics adjusted to changeable system characteristics),
- ❁ relatively low installation costs,
- ❁ stable pressure, additionally decreasing along with distribution degree, is of paramount importance for reduction of failure frequency,
- ❁ reduced frequency of pump and unit discharge-side system failure (reduction or lack of mechanical surges in the unit and of hydraulic surges in the network).

### Technical specification

capacity Q [m <sup>3</sup> /h]	3,6 ÷ 480
delivery head ΔH [mH <sub>2</sub> O]	10 ÷ 100
pumped liquid temperature t <sub>max</sub> [°C]	70
Working pressure [bar]	up to 10
Maximum number of pumps in one set	i = 8





## TANKS

### Application

Pressure tanks are designed for:

- ✦ supplying water to individual households and farm buildings using:
  - independent water intake,
  - shallow aquifer layers at cased wells,
  - deep-wells,
  - ponds,
- ✦ hydrophore sets, a water-and-air tank.

### Features

- ✦ high quality of workmanship,
- ✦ exceptionally long life,
- ✦ safe operation and safe in contact with drinking water.

	HVP	ZBOS, ZBOL
structure	A pressure HVP tank is made of low-carbon steel sheets, fully welded. The water units with a hydrophore tank can be connected only to a non-pressure water intake. The tank can be installed only in the systems, in which max. pressure does not exceed the design pressure of a given tank type. Inside it is covered with a protective zinc coating.	Membrane hydrophore tanks ZBO type designed for storage water which is used to supply water for individual households and farm buildings from own water intakes. There is a bag membrane made of rubber inside of the tank. The tank is protected against corrosion with a paint coating both inside and outside. As the water and gas system has been separated by flexible membrane, there is no need for continuous replenishment of gas during operation. On the top of the bottom is a manometer and valve.
inside	galvanized protective coating	rubber bag membrane
capacity [l]	100, 150, 200, 300, 500, 1000, 1500	100, 150, 200, 300, 500
versions	vertical	vertical, horizontal
calculative pressure [MPa]	0,6 ÷ 0,9	0,6
test pressure [MPa]	0,75 ÷ 1,13	0,86
weight [kg]	40 ÷ 208	25 ÷ 89



### Application

Deep-well motors offered by Hydro-Vacuum S.A. are electric, rewindable, submersible, wet-type motors closed in stainless steel housing.

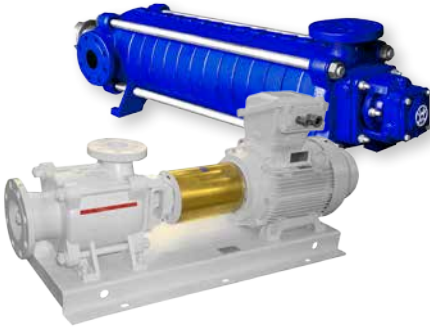
Deep-well motors are characterized by:

- ✦ wet-type, rewindable motors are available even from 1,5 kW,
- ✦ stator winding is made of wires with thermoplastic PVC insulation, which increases motor life 8 times comparing to winding insulated with PP.
- ✦ motor shaft is fixed with radial, slide bearings and one axial bearing. This is a modern segmented structure, so called: Hard bearing, where frictional couple is made of carbon-graphite and steel,
- ✦ stable and firm connection of the motor housing and casing that prevents it from breaking off in the well,
- ✦ impeller shaft is friction welded to the impeller tip and then machined, which prevents the impeller tip from breaking off,
- ✦ possibility to use temperature sensor,
- ✦ according to international standards, connection acc. to NEMA standard,
- ✦ possibility to make the stator winding of wires that are resistant to higher temperatures.

### Technical specification

rated power [kW]	1,5 - 300,0
rated voltage [V]	400
synchronous rotary speed [1/min]	3000
weight [kg]	36-765

## MULTISTAGE ROTODYNAMIC PUMPS



WHA/P, WHS, WHI, WHG

### Application

WH horizontal multistage pumps are designed for pumping water as well as liquid fuels and other liquids within the resistance of materials used for their construction.

#### WH pumps are used in:

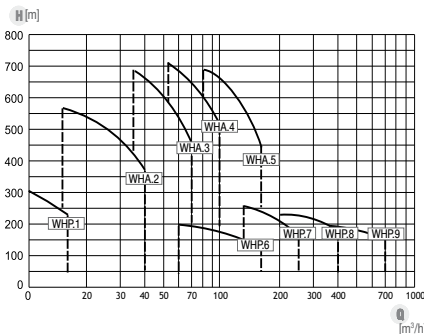
- ✘ Power industry – boiler feedwater, hot water condensate,
- ✘ Industrial, pressure boosting and extinguishing systems,
- ✘ Utility, municipal and drinking water systems,
- ✘ Distillate, solvents fuels (including LPG) pumping stations,
- ✘ Irrigation and snow making systems,
- ✘ Filtration and reverse osmosis systems,
- ✘ High pressure washing stands and washers.

#### Advantages:

- ✘ High efficiency,
- ✘ Good anti-cavitation properties,
- ✘ Simple design,
- ✘ Possibility of changing the angle of the suction port,
- ✘ Application of shaft protection sleeves and replaceable wear rings.

### Technical specification

capacity [m <sup>3</sup> /h]	up to 700
delivery head [m]	up to 700
pumped liquid temperature [°C]	up to +140
Suction flange [mm]	DN 50 ... DN 100
Discharge flange [mm]	DN 40 ... DN 80



## SELF-PRIMING PUMPS



SKC, SKD

### Application

SKC self-priming rotodynamic pumps with side channel and centrifugal impeller before the first stage serve to pump liquids within the corrosion resistance limits of materials used for their construction. Liquids can contain trace amounts of non-abrasive solid particles up to 0.5 mm in size. SKD is a self-priming pump. It is only necessary to flood the pump itself, without necessity to flood the suction pipeline with liquid. SKC/SKD pumps are manufactured in wide range of material versions, including bronze and cast steels.

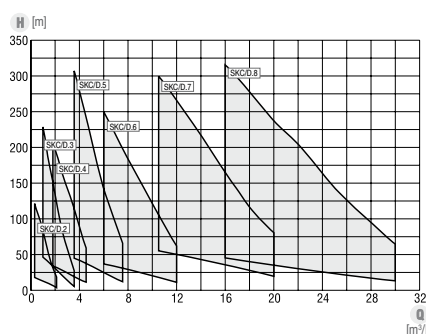
Pumps can pump liquid with a minimum excess of pressure over boiling point. Small NPSHr net positive suction head in pumping system and very good self-priming ability are of particular advantage. They are designed to pump crude-oil derivative fuels and liquid propane-butane mixture, without gaseous phase fraction.

#### SKC/SKD pumps are used in:

- ✘ LPG filling stations,
- ✘ industrial systems.

### Technical specification

capacity [m <sup>3</sup> /h]	0,2 ÷ 30
delivery head [m]	up to 310*
pumped liquid temperature [°C]	-40 ÷ 180
density of the pumped liquid [kg/m <sup>3</sup> ]	up to 1,3
viscosity of the pumped liquid [mm <sup>2</sup> /s]	up to 150
weight [kg]	37,0 ÷ 436,0
motor power [kW]	0,25 ÷ 30
rotational speed [rpm]	1450 (50 Hz) 1800 (60 Hz)



## VACUUM PUMPS BLOWERS



PW, DW

### Application

Vacuum pumps and blowers are designed for handling gases and vapours by sucking in and pumping. The temperature of handled medium cannot exceed 100 °C. They can be used to create vacuum in technological systems, to flood water siphons, transportation of loose materials, where production process requires oil free gases.

#### Main features

##### of PW, DW type pumps:

- ✘ developed on the basis of many years operation experience,
- ✘ broad range of material versions adjusted to the pumped liquid,
- ✘ possibility to complete the system with a tank designed for closed liquid systems in order to generate liquid ring (water saving),
- ✘ seals designed for pumped liquid,
- ✘ guaranteed long-term, reliable operation,
- ✘ relatively cheap spare parts,
- ✘ easily available spare parts even after several dozen years of pump work.

##### PW, DW pumps are used in:

- ✘ chemical industry,
- ✘ pharmaceutical industry,
- ✘ food processing,
- ✘ paper industry,
- ✘ textile industry,
- ✘ water supply systems – water siphons

### Technical specification

#### Vacuum pumps

capacity [m <sup>3</sup> /h]	4,5 ÷ 1600
suction pressure ps min [hPa abs]	33 (40)
weight [kg]	45,4 ÷ 1492
motor power [kW]	0,75 ÷ 45

#### Blowers

capacity [m <sup>3</sup> /h]	7,5 ÷ 1650
compression pressure (gauge) pt max [MPa]	0,15 (0,30)
weight [kg]	45,4 ÷ 1492
motor power [kW]	0,75 ÷ 45



## SINGLE STAGE CENTRIFUGAL PUMPS



**KS, KSM**

### Application

Impeller, centrifugal KS, KSM pumps have been designed to pump some acids, lyes, hydrocarbons and other chemically active fluids within corrosion resistance limits for materials used for their construction in a specific material version. Abrasive bodies content (grain size not bigger than 1 mm) should be limited to 50 g/dm<sup>3</sup>.

#### Main features

##### of KS, KSM type pumps:

- ✦ modern design solutions,
- ✦ material versions specially adjusted for highly corrosive and erosive liquids
- ✦ adjusted for chemical industry applications requirements

##### KS, KSM type pumps are used in:

- ✦ industrial installations.

## SELF-PRIMING PUMPS



**SKA**

### Application

SKA type self-priming rotodynamic, pumps with side ring channel and open impeller, are designed to pump liquids within the corrosion resistance limits of materials used for their construction. The biggest advantage of SKA pumps is their self-priming ability, which eliminates necessity to flood suction pipeline with liquid. SKA pumps can pump liquids of a temperature up to 110 °C, discharged liquid density up to 1300 kg/m<sup>3</sup> and viscosity up to 150 mm<sup>2</sup>/s contaminated with non-abrasive solid particles up to 0.5 mm in trace amounts. The pumps can cooperate with 50 Hz or 60 Hz motors.

##### SKA pumps are used in:

- ✦ waterworks systems,
- ✦ individual households,
- ✦ industry.



**SKB**

### Application

SKB type self-priming rotodynamic, pumps with side ring channel and open impeller, are designed to pump liquids within the corrosion resistance limits of materials used for their construction. The biggest advantage of SKB pumps is their self-priming ability, which eliminates necessity to flood suction pipeline with liquid. The pump gets self-priming ability after it is flooded with liquid. The pumps can cooperate with portable devices as well as with 50 Hz or -60 Hz motors. SKB pumps are by standard equipped with mechanical seal that entirely eliminates leakage of cord sealing lubricant.

##### SKB pumps are used in:

- ✦ waterworks systems,
- ✦ individual households,
- ✦ waterworks automatic systems,
- ✦ industry.

### Technical specification

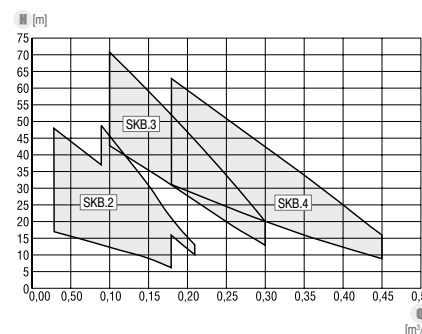
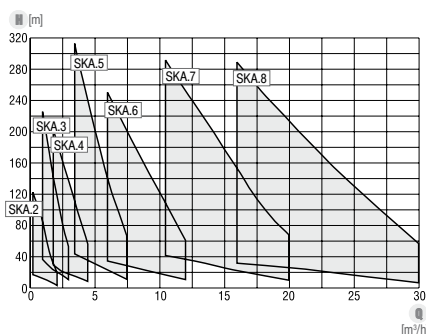
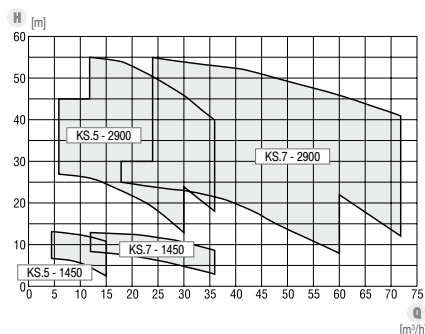
capacity [m <sup>3</sup> /h]	up to 72
delivery head [m]	up to 55
pumped liquid temperature [°C]	KS up to 120 KSM up to 70
density of the pumped liquid [kg/m <sup>3</sup> ]	up to 1900
viscosity of the pumped liquid [mm <sup>2</sup> /s]	up to 200
weight [kg]	102,0 ÷ 261,0
gauge pressure [MPa]	up to 1,0
motor power [kW]	0,75 - 22
rotational speed [rpm]	1450 (50 Hz) 1800 (60 Hz) 2900 (50 Hz) 3600 (60 Hz)
shaft sealing	KS - cord sealing or end-face seal KSM - end-face seal

### Technical specification

capacity [m <sup>3</sup> /h]	0,3 ÷ 30
delivery head [m]	up to 310
pumped liquid temperature [°C]	up to 110
density of the pumped liquid [kg/m <sup>3</sup> ]	up to 1300
viscosity of the pumped liquid [mm <sup>2</sup> /s]	up to 150
weight [kg]	34,0 ÷ 409,0
motor power [kW]	0,55 ÷ 30,0
rotational speed [rpm]	1450 (50 Hz) 1800 (60 Hz)
shaft sealing	cord sealing or end-face seal

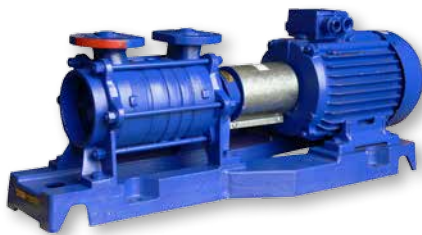
### Technical specification

capacity [m <sup>3</sup> /h]	0,3 ÷ 4,5
delivery head [m]	up to 72
pumped liquid temperature [°C]	up to 110
density of the pumped liquid [kg/m <sup>3</sup> ]	up to 1300
viscosity of the pumped liquid [mm <sup>2</sup> /s]	up to 150
weight [kg]	22,2 ÷ 47,0
motor power [kW]	0,25 ÷ 2,2
rotational speed [rpm]	1450 (50 Hz) 1800 (60 Hz)
shaft sealing	cord sealing or end-face seal





## SELF-PRIMING PUMPS



SKG

### Application

SKG type self-priming rotodynamic pumps with side ring channel and open impeller, are designed to pump liquids within the corrosion resistance limits of materials used for their construction. The pumps are also designed for pumping hydrocarbons such as petrol, fuel oils etc.

SKG pumps are manufactured in wide range of material versions: from grey cast iron, bronze alloys to carbon austenitic cast steels. The structure of the pump allows to use wide range of mechanical seals: from single end-face type to compact type, with barrier liquid etc. SKG pumps are certified with PRS certificates as well as associations of marine classification.

#### SKG pumps are used in:

- ⊗ industrial systems.



SA, SB

### Application

Self-priming, rotodynamic, pumps with open impeller are designed for pumping liquids within the corrosion resistance limits of materials used for their construction and liquids containing trace amount of non-abrasive solid particles of up to 0.5 mm in size. Together with the liquid, those pumps are able to replenish air in the tank through an aeration injection valve. SB.80 pumps are adjusted for pumping a wide range of hydrocarbons such as petrol, fuel oils etc. SA, SB pumps are manufactured in wide range of material versions, including bronze and cast steels.

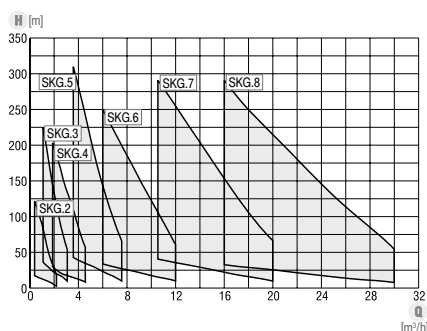
Pumps SA, SB have a wide range of material executions including bronze and chromium cast iron.

#### SA, SB pumps are used in:

- ⊗ waterworks systems,
- ⊗ industrial systems.

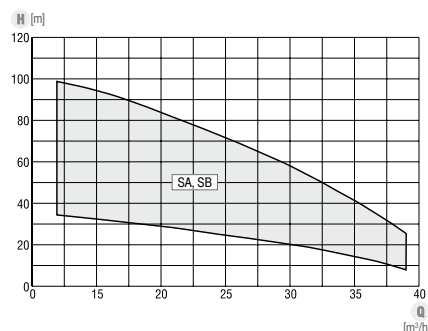
### Technical specification

capacity [m <sup>3</sup> /h]	0,3 ÷ 30
delivery head [m]	up to 310
pumped liquid temperature [°C]	up to 110
density of the pumped liquid [kg/m <sup>3</sup> ]	up to 1300
viscosity of the pumped liquid [mm <sup>2</sup> /s]	up to 150
weight [kg]	22,2 ÷ 409,0
motor power [kW]	0,25 ÷ 30
rotational speed [rpm]	1450 (50 Hz) 1800 (60 Hz)
shaft sealing	end-face sealing, single and double



### Technical specification

capacity [m <sup>3</sup> /h]	12 ÷ 39
delivery head [m]	up to 100
pumped liquid temperature [°C]	up to 110
density of the pumped liquid [kg/m <sup>3</sup> ]	up to 1300
viscosity of the pumped liquid [mm <sup>2</sup> /s]	up to 150
weight [kg]	22,2 ÷ 47,0
motor power [kW]	5,5 ÷ 22
rotational speed [rpm]	1450 (50 Hz) 1800 (60 Hz)
shaft sealing	cord sealing or end-face seal



## CONNECTORS



LCA, LPA, LCS

### Application

LCA pressure switches are used to control pressure equipment, keeping medium pressure within fixed, defined limits. They are manufactured in three type-sizes depending upon pressure range (0,4 MPa, 0,8 MPa, 1,1 MPa).

LPA float switches are used to control equipment with an open tank, keeping medium pressure within fixed, defined limits. They are manufactured in two type-sizes depending upon the location of the connector lever with regard to contacts.

Switches of LCS type are designed for protection of devices, mainly pumps, against operation with too low pressure in installation. Typical applications are hydrophore systems fed from open tanks, wells or water supply network, where protection against decreased pressure in pipeline is required.

### Technical specification

	LCA, LPA
Rated voltage of insulation [V]	380
Rated frequency [Hz]	50 i 60
Rated continuous current [A]	16
Rated test voltage of insulation [kV]	2,5
Rated frequency of operation [cycles/h]	360
Mechanical durability [cycles]	1 * 10 <sup>6</sup>
Minimum temperature of driving agent [°C]	0
Maximum temperature of driving agent [°C]	40
Cross-sections of connecting cables [mm <sup>2</sup> ]	min 1,5 max 4

	LCA
Type of driving agent	water, air machine oil, transformer oil
Maximum velocity of pressure variations	0,05 MPa/s
Minimum velocity of pressure variations	0,001 MPa/s
Connector weight [kg]	0,45 kg

	LPA
Type of driving agent	water
Maximum velocity of pressure variations	10 mm/s
Minimum velocity of pressure variations	5 mm/s
Connector weight [kg]	3,0 kg



Pump FZ with drive with internal cooling system

**FZ**

Pump FZ.9

**Application**

Impeller, single-stage, monoblock pumps serve for pumping liquids in the scope of corrosive resistance of materials used in their design. FZ units constitute a highly unified family of pumps, which individual types depend on the specificity of pumped liquid, type and size of impurities, and the installed motor.

**Types of drives used in FZ pumps:**

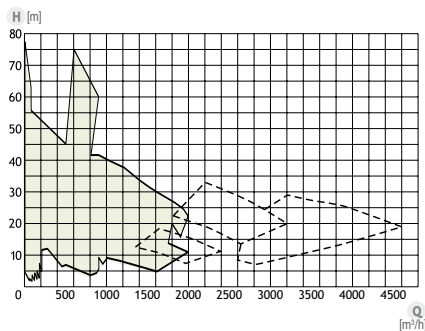
- ✦ IP 68 waterproof pumps cooled by the surrounding medium
- ✦ IP 55 fan motors
- ✦ IP 68 motors with internal cooling system with possibility of non-submersible operations

**Materials used in construction of FZ pumps:**

- ✦ GG25 cast iron
- ✦ ductile cast iron with increased mechanical resistance
- ✦ copper cast iron
- ✦ chromium cast iron
- ✦ austenitic cast steel
- ✦ stainless steel
- ✦ acid resistant steel

**Types**

Type of pumps	Diameter of discharge connector	Type of connector
FZ.1	DN 50	threaded/flanged
FZ.2	DN 65	flanged
FZ.3	DN 80	flanged
FZ.4	DN 100	flanged
FZ.5	DN 125	flanged
FZ.6	DN 150	flanged
FZ.7	DN 200	flanged
FZ.8	DN 250	flanged
FZ.9	DN 300	flanged



\*) on demand

**Varieties**

Pump variety	Characteristics
FZA/FZB	The pump with multi-channel impeller designed for pumping clean water, pretreated sewage and drainage waters containing small amounts of mineral fractions with diameter up to 6 mm, deprived of fibrous impurities. The pump is not accessorized with thermal and moisture proof protection.
FZB for sewage pumping stations with separation of solids	The pump with multi-channel impeller designed for pumping clean water, pretreated sewage and drainage waters containing small amounts of mineral fractions with diameter up to 6 mm, and small amounts of fibrous impurities. The pump is accessorized with temperature control sensor of the winding and moisture sensor of the motor chamber.
FZC	Pump with double-channel impeller, designed for pumping contaminated liquids, raw sewage. The pump is accessorized with temperature control sensor of the winding and moisture sensor of the motor chamber.
FZD	The pump with multi-channel impeller open from one side with the grinding disk, designed for pumping contaminated liquids containing solids and fibrous impurities. The pump is accessorized with temperature control sensor of the winding and moisture sensor of the motor chamber.
FZE	Vortex Special impeller pumps for pumping contaminated liquids, or raw sewage.
FZP	Pump with highly efficient channel impeller with increased suction properties, designed for pumping clean water, slightly contaminated liquids with content of solid elements (sand, for example) without any fibrous substances.
FZR	Pump with multi-channel impeller open from one side, accessorized with shredder, making possible pumping of liquids contaminated with long-fibrous impurities. The pump is not accessorized with thermal and moisture proof protection, designed mainly for household pumping stations.
FZV	Pump with multi-channel impeller open from one side, designed for pumping contaminated liquids, raw sewage. The pump is accessorized with temperature control sensor of the winding and moisture sensor of the motor chamber.
FZX	Pump with multi-channel impeller open from one side, accessorized with shredder, making possible pumping of liquids contaminated with long-fibrous impurities (made as explosion-proof units). The pump is accessorized with temperature control sensor of the winding and moisture sensor of the motor chamber.
FZY	Pump with multi-channel impeller open from one side, accessorized with shredder, making possible pumping of liquids contaminated with long-fibrous impurities. The pump is not accessorized with thermal and moisture proof protection, designed mainly for household pumping stations.

**Basic technical parameters**

		FZ.1	FZ.2	FZ.3	FZ.4	FZ.5	FZ.6	FZ.7	FZ.8	FZ.9
Capacity Qmax	m <sup>3</sup> /h	up to 65	up to 90	up to 220	up to 300	up to 600	up to 800	up to 1100	up to 1500	up to 2000
Delivery head Hmax	m	up to 95	up to 90	up to 71	up to 40	up to 60	up to 84	up to 52	up to 50	up to 30
Motor power	kW	0,55 ÷ 3	1,1 ÷ 11	2,2 ÷ 30	5,5 ÷ 11	30 ÷ 90	37 ÷ 90	37 ÷ 90	55 ÷ 110	55 ÷ 160



The range of FZ pumps is constantly expanded by new types and varieties



## SEWAGE PUMPING - stations with separation of solids



TSA, TSB, TSC

### Sewage pumping

One of the main and most persistent problems that occur in sewage pumping installations is the presence of solids. Regardless of the kind of pumps used, there is a constant risk of clogging of the pumps' hydraulic system, which causes an emergency in the pumping station. Especially troublesome are here solid elements in the form of strings, rags, bandages, etc. carried by sewage. Using 'clogless impeller', free-flow pumps will always involve a drop in hydraulic efficiency, which will result in increased cost of maintenance of the pumping station. Using a pumping station with separation of solids allows to effectively avoid above-mentioned and other problems that occur in sewage pumping systems.

### Construction

A TS sewage pumping station is a complete, fully automated device that consists of the following components:

- ✘ collector and separation tank,
- ✘ two separators - bar basket, flaps,
- ✘ pumps with a high-efficiency channel impeller,
- ✘ hydraulic equipment elements, i.e. flanges, T-connectors, elbows, system ball check valves, connectors, knife gate, etc.,
- ✘ ultrasonic level gauge,
- ✘ UZS safety and control device.

### Pumps

Sewage pumping station is equipped with alternately operating pumps of FZ type with highly efficient hydraulic system and reliable coupling system. In sewage pumping stations with separation of solids produced by Hydro-Vacuum S.A. there is a possibility of application of pumps with channel impellers with highly efficient el. motors with fan cooling or pumps in IP68 execution (motors could operate in humid conditions and submerged). Pumps of FZ type are equipped with many protections in form of built-in sensors. Multiplicity of types and sizes of FZ pumps allows for optimal selection of pumps acc. to the customer's needs.

### Tank and armature

The sewage pumping station tank is made entirely of austenite steel or austenite steel. Separators, flanges, T-connectors and connecting elements are made of austenite steel of high corrosion resistance to sewage effects. The structure and materials of other elements of hydraulic equipment (check valves, gates, pumps) make them resistant to sewage effects. In construction of sewage pumping stations were used check valves that ensure reliable and effective transport of sewage containing solids on the stretch gravitational collector - separators.

### Power supply and control

Control of operation of sewage pumping station is realized through safety-control device of UZS type. All devices are equipped with optionally acoustic-optical signaling of alarm states. On demand, we equip UZS with remote monitoring of station operation through which customer have full control over sewage pumping station through computer program.

### Advantages

- ✘ construction designed by engineers of Research & Development Department of **Hydro-Vacuum S.A.**,
  - ✘ sewage pumping station patented in Polish and European patent office,
  - ✘ stations are equipped with tested and award-winning highly efficient pumps of FZ type produced by **Hydro-Vacuum S.A.**,
  - ✘ the whole device is produced in vernacular factory **Hydro-Vacuum S.A.** in Grudziądz,
  - ✘ we ensure complexity - from delivery to station assembly and connection of remote monitoring,
  - ✘ individual selection of each sewage pumping station for the customer's needs,
  - ✘ higher, possible delivery head comparing to traditional pumping station,
  - ✘ alarm states consisting of blocking of pumps limited to minimum,
  - ✘ minimizing the risk of damaging of pump hydraulic system (separation of solids before pump),
  - ✘ installation of sewage pumping station in dry chamber considerably improves comfort of realized conservation and maintenance works, possibility of disconnection of one pump without interruption of operation of station,
  - ✘ smaller volumes of tanks prevent rotting of sewage and creation of unpleasant odours (more frequent pump starts and pumping out sewage).
- ### New sewage of TSC type
- ✘ direct access to separator without disconnection of pump,
  - ✘ cut-off valves before separators and pumps allow for realization of service activities without interruption of operation,
  - ✘ bigger area for personnel and easier access to separators and cut-off valves,
  - ✘ additional float switch that allows for an alternative control even in case of probe failure.

### Technical specification

Type	Sewage inflow [m <sup>3</sup> /h]	Discharge pipeline [mm]	Number of pumps [szt.]	Lower edge of inlet [mm]	Volume [m <sup>3</sup> ]	Pump type	Minimum diameter of chamber [mm]
TSA*	0,5 - 400	80 - 250	2 - 4	400-2200	0,05 - 11	FZB.2-7, FZC.3-6, FZD.2-3	2000-5500
TSB*	1 - 80	80 - 150	2	400-1600	0,1 - 4	FZB.2-4, FZC.2-4, FZD.2-3, FZE.2-3	1500-3000
TSC*	4 - 100	100 - 150	2 - 4	600-1650	0,1 - 2,8	FZB.2-4, FZC.2-4, FZD.2-3, FZE.2-3	1500-2500
NEW							

\* on demand, sewage pumping stations with higher capacity are also available



## Application

Sewage intermediate pumping stations manufactured by **Hydro-Vacuum S.A.** are used in gravity-and-pressurized and pressurized sewerage systems and they are designed to transfer sewage at long distances or to lift them to a high level. Hence pumping stations enable the users located away from the sewage collectors to connect to them. These users include:

- ✘ individual households,
- ✘ farms,
- ✘ estates of detached houses,
- ✘ leisure-and-holiday centres,
- ✘ industrial plants,
- ✘ municipal and rural sewerage systems

Thus they can pump sewage, draining and rain water as well as effluent to the cumulative collectors or directly to the sewage treatment plant.

Those pumping stations can be used in sewerage systems as intermediate, area or central pumping stations.

**Hydro-Vacuum S.A.** sewage intermediate pumping stations are fully automated and do not require constant supervision. A complete sewage pumping station consists of four main sub-assemblies:

- ✘ one or two FZ type pumping units.
- ✘ a tank,
- ✘ UZS type protection-and-control unit,
- ✘ hydraulic system.

Sewage intermediate pumping stations are produced with single pumping unit or as multi-pump units. In case of multi-pump units, one pump is always so called active reserve. There are three types of pumps, depending on the diameter of the pumping connector pipe: **FZ1, FZ2, FZ3**. Depending on the type of pumped sewage and parameters of operation (Q-H), the are following versions of pumps:

- ✘ with FZR type comminuter,
- ✘ with FZV type unbounded flow (vortex),
- ✘ with FZB type channel impeller,
- ✘ in FZX.1 anti-explosive version.

Pumps equipped with shredders can pump sewage through pipelines of smaller diameters (min. DN 32). Pumps with free flow (vortex) reduce the risk of pump clogging. Pumps with channel impeller are used mainly to pump rain water, industrial effluent that do not contain long-fibre particles or sewage after pre-separation of solid bodies sewage (pumping station).

Sewage intermediate pumping station are manufactured of four main types of tanks:

- ✘ polyethylene PE,
- ✘ polymer-concrete,
- ✘ concrete B 45,
- ✘ polyester reinforced with glass fibre with poured polymer-concrete bottom,

Depending on the designer's requirements, the above tanks are produced with diameters from 600 to 3000 mm and height up to 6000mm. At the top of the tank there is a manhole that allows the

personnel to go down to the intermediate pumping station or take out the pumps and hydraulic equipment items. Types of manholes are selected depending on the location of the intermediate pumping station: in or outside the communication passage.

Pump operation control is carried out with the use of UZS type protection and control units. Float level indicators or hydrostatic and ultrasound level control systems were applied. The devices are optionally equipped with acoustic and optic signalization of a relevant alarm status. The GSM monitoring systems offered are designed for monitoring the operation of intermediate sewage pumping stations active within the area of the GSM mobile communications network.

**Internal hydraulic system by standard consists of:**

- ✘ coupling foot with guides, without guides so-called top coupler or quick release couplings CAMLOCK
- ✘ vertical pumping pipes,
- ✘ check valves,
- ✘ cut-off valves,
- ✘ the collector – (dual-pump sewage intermediate pumping stations),
- ✘ system rinsing connector,

Pipelines, the collector and fittings are made of acid-resistant steel or PVC-U. Coupling feets and valves are made of cast iron and protected against corrosion using powder paints.

**Moreover, intermediate pumping stations are equipped with:**

- ✘ climb-down ladder,
- ✘ access platform (for tanks higher than 5000 mm),
- ✘ chains to lower and to lift pumps,
- ✘ a chain to mount the level indicator,
- ✘ gravity-type venting system.

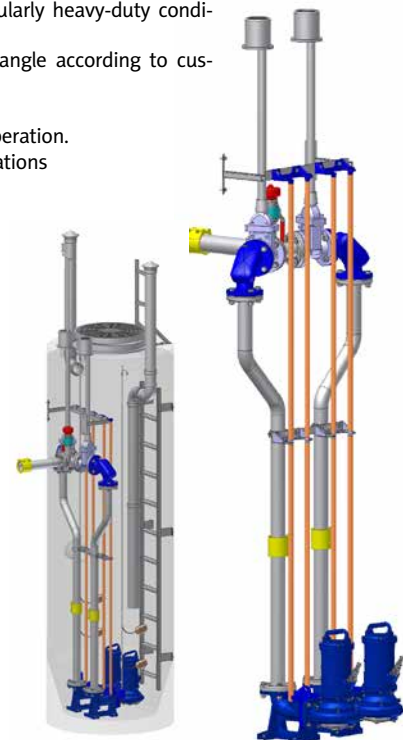
The above listed parts are made of acid-resistant steel. Venting system is made of PVC.

**Main advantages of intermediate sewage pumping station manufactured by Hydro-Vacuum S.A. include:**

- ✘ modern design solutions,
- ✘ complete intermediate pumping station equipment,
- ✘ the station can be built quickly and easily on any ground and with any water conditions, with minimum of ground works and fitting operations,
- ✘ automated, unattended unit operation,
- ✘ pipelines can be flushed through the "fireman's" tube coupling,
- ✘ energy saving, motors available also in an explosion-proof version,
- ✘ low purchase and operation costs,
- ✘ permanent technical supervision as well as guarantee and post-guarantee technical service,
- ✘ easily accessible spare parts,
- ✘ intermediate pumping stations can be executed according to individual requirements and adjusted to customer's needs,
- ✘ cheap accessories,
- ✘ high efficiency and long life in particularly heavy-duty conditions,
- ✘ inflow connector pipe diameter and angle according to customer's requirements.
- ✘ GSM communication with the system,
- ✘ guarantee of long-standing, reliable operation.
- ✘ installation of the sewage pumping stations within the factory.

## Technical specification

Design versions:	Number of pumps	Types of control	Tank material	Tank diameter	Tank height	Pumps		diameter of discharge risers
				[mm]	[mm]	typ	moc [kw]	[mm]
PSA	1	UZS.4 UZS.6	PEHD	800-1000	2200-2600	FZV.1, FZR.1 FZX.1, FZY.1	0,55-3,0	DN32-DN50
PSB	1 - 2	UZS.4 UZS.6 UZS.7 UZS.8	Concrete B-45 polymer-concrete, PEHD	1000-1200	3000-6000	FZV.1, FZR.1 FZX.1, FZY.1	0,55-3,0	DN50-DN65
PSC	1 - 2	UZS.6 UZS.7 UZS.8	Concrete B-45 polymer-concrete	1200-2500	3000-6000	FZE.2, FZV.2 FZB.2, FZD.2	1,1-11,0	DN65-DN100
PSD	2	UZS.6 UZS.7 UZS.8	Concrete B-45 polymer-concrete	1500-2500	3000-6000	FZB.3, FZC.3, FZD.3, FZE.3, FZV.3	2,2-30,0	DN80-DN150
PSE	1	UZS.4 UZS.6	PEHD	800-1000	2200-2600	FZV.1, FZB.1 FZX.1, FZY.1	0,55-3,0	DN32-DN80



## COUPLING SETS



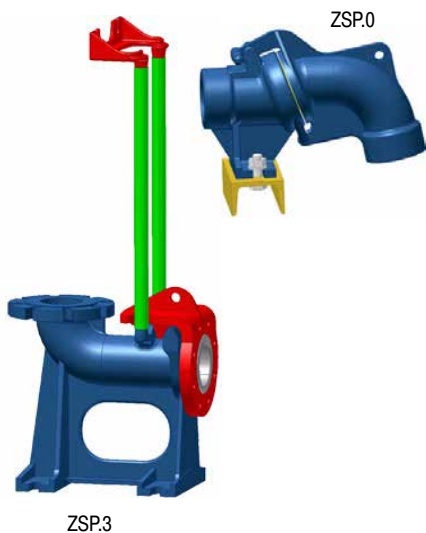
### ZSP

#### Application

The ZSP coupling set makes possible very simple assembly and disassembly of the pump. A submersible pump with a movable connector fastened to it is descended on guides to the inside of a pumping station from the ground level (without the necessity of entering the tank). The pump, after its descent to the tank interior, is automatically connected to the discharge system of the pumping station. A specially profiled seal between the body and the connector, mounted to the pump, guarantees leaktightness of the system. Lifting of the pump up with the use of a chain leads to its automatic disconnection from the discharge system, in order to clean or inspect it. Upper consoles, thanks to their shape, make possible disconnecting of the lifted pump from the guides without disassembly of any parts of the system.

#### Technical specification

Type	Diameters
ZSP.0	DN 40, DN 50
ZSP.1	DN 40, DN 50
ZSP.2	DN65
ZSP.3	DN80
ZSP.4	DN100
ZSP.6	DN150
ZSP.7	DN200



## SEWAGE PUMPS



### PFA

#### Application

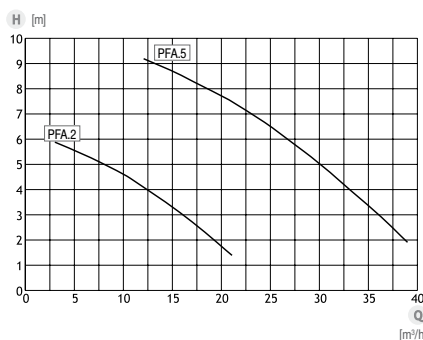
PFA pumps are immersible, single-stage roto-dynamic pumps with an one-side open centrifugal impeller. These pumps are designed to pump water, contaminated liquids, fecal matters, manure solutions and other liquids viscosity of which does not exceed 13 mm<sup>2</sup>/s and length of fibrous impurities does not exceed 20 mm. Pumped liquids may be characterised by aggressiveness within the degree of corrosion resistance of materials used to pumping unit construction. The characteristic feature of those pumps is their drive which is located outside pumped liquid.

#### PFA pumps are used in:

- ✘ sewage treatment plants - as auxiliary units,
- ✘ gardening,
- ✘ farms,
- ✘ emptying home septic tanks,
- ✘ rainwater handling systems,
- ✘ drainage of flooded buildings,
- ✘ emptying swimming pools and other reservoirs.

#### Technical specification

capacity [m <sup>3</sup> /h]	up to 39
delivery head [m]	up to 9,2
submersion depth [m]	up to 1,3
pumped liquid temperature [°C]	optionally up to 90
density of the pumped liquid [kg/m <sup>3</sup> ]	up to 1100
weight [kg]	39 ÷ 53
motor power [kW]	0,55 ÷ 1,5
rotational speed [rpm]	1420



## PROTECTION AND CONTROL SYSTEMS



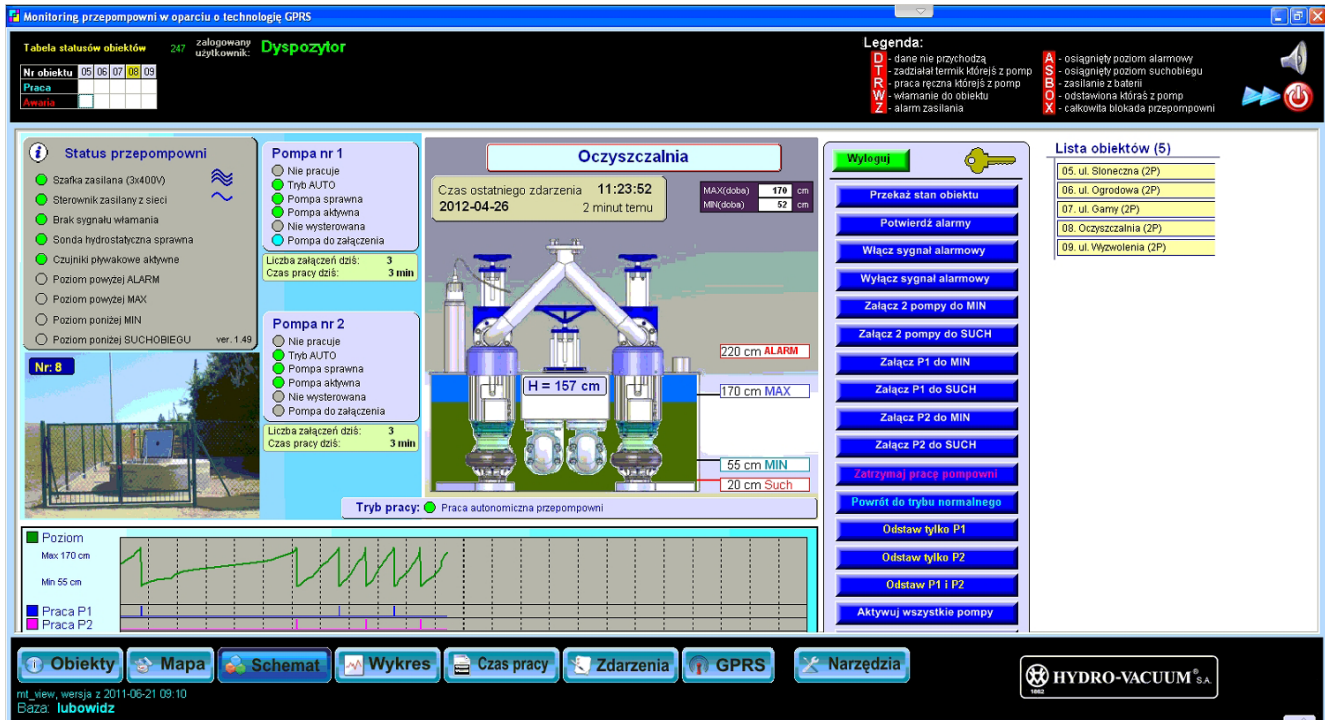
### UZS

#### Application

UZS protection and control units are designed for the protection and control of one or many three-phase asynchronous electric motors used in pumping units.

#### Range of functions offered by the protection and control unit:

- ✘ overload,
- ✘ short circuit in the control unit,
- ✘ phase order change,
- ✘ dry operation,
- ✘ phase decay,
- ✘ asymmetric power supply,
- ✘ drop of supply voltage,
- ✘ excessive number of start-ups,
- ✘ exceeding permissible temperature of motor winding,
- ✘ electric shock protection,
- ✘ moisture in the motor chamber,
- ✘ keeping liquid level in the tank within specified limits,
- ✘ balancing working time of individual pumping units,
- ✘ manual control option,
- ✘ operation of the pumping units,
- ✘ RS485 controller that makes possible communication with external devices using MODBUS RTU protocol,
- ✘ short circuit in the main circuit,
- ✘ failures of contactor contacts,
- ✘ monitoring of pump and pumping systems operation.



## Application

The pump system monitoring system by Hydro-Vacuum S.A. utilizes the potential of Internet technologies. We are able to provide our customers with a product they can use to gain full control over their own pumping systems, such as sewage pumping stations, without moving from their desks.

The Hydro-Vacuum S.A. monitoring system, apart from remote control and station monitoring, provides comprehensive graphic analysis

## The principle of operation

The general principle of operation of the Hydro-Vacuum S.A. monitoring system is based upon the use of GSM/GPRS technology. The control cabinet of a sewage pumping station is equipped with an appropriate telemeter module, which may be simultaneously a controller, SMS device and GPRS module. All relevant information concerning the condition of the station is transmitted to the telemeter module. Afterwards, the information is sent via the Internet (GPRS) to the receiving device, which is installed next to a computer serving the function of a dispatching centre. After the receipt of a data package, the receiving module saves the data, using specialist communication tools, in a database created on the user's computer. The application uses the data to present the condition of a station in its current location graphically on a screen, which relieves the customer from the necessity of performing a physical inspection of the condition of the sewage pumping station.

The operation of the Hydro-Vacuum S.A. monitoring system can be divided into two parts. The first part is visualisation of the facility's condition in its location, on the user's computer. The second part is the possibility of remote control of the station from the visualisation level on the user's computer. Remote control of the station functions in the opposite order to data collection, and the direction of data transmission changes as well.

Data collection in the monitoring system proceeds in a time and event manner. This means that if, during a set time, the station condition does not change then the receiving device sends a query to the station in order to confirm its current condition. Communication of this form facilitates early detection of communication failures between the receiving module and distant objects/stations.

of the operation of a given station. Based on real-time graphs, we can analyse the method of connecting pumps, inflow of medium to a tank, pump operation time, or number of activation times of a given pump. It allows us to initially define the extent of pump use in a given pumping system and to determine the dynamics of the system.

