

*Single-stage FZ type pumps*  
*Intermediate pumping PS type stations*  
*TS type sewage pumping stations with separation of solids*



ISO 9001  
ISO 14001  
PN-N 18001



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## SINGLE-STAGE FZ TYPE PUMPS

## Intended use pumps FZ type

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. In particular, they are applied in the pumping of sewage, including sewage with solid and long-fibre content, as well as liquids containing air and gases. They will work very well in pumping of raw sludge containing active sediment, and putrid sludge.

## Basic types

Type of pump	Discharge port diameter	Connection type
FZ.1	DN 50	threaded/flange
FZ.2	DN 65	flange
FZ.3	DN 80	flange
FZ.4	DN 100	flange
FZ.5	DN 125	flange
FZ.6	DN 150	flange
FZ.7	DN 200	flange
FZ.8	DN 250	flange
FZ.9	DN 300	flange

## Versions

- FZA** - For pumping water, liquid manure solutions, 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 sludge content, without fibrous substances.
- FZC** - Double-vane (triple-vane for FZ.9) impeller pumps for pumping contaminated liquids, or raw sewage.
- FZD** - Grinding impeller pumps for pumping contaminated liquids with solid and sludge content, without fibrous substances.
- FZE** - Pumps with the Vortex Special impeller; intended for pumping of contaminated liquids and raw sewage.
- FZP** - Channel impeller pumps for pumping clean and slightly contaminated liquids.
- FZR** - Multi-vane one-side open impeller pumps equipped with a grinding device for pumping liquids contaminated with long-fibre substances.
- FZV** - Vortex impeller pumps for pumping contaminated liquids, or raw sewage.
- FZX** - Multi-vane one-side open impeller pump equipped with a grinding device for pumping liquids contaminated with long-fibre substances (explosion proof).
- FZY** - Multi-vane one-side open impeller pump equipped with a grinding device for pumping liquids contaminated with long-fibre substances.

## FZA

The FZA type pump is equipped with a multi-vane one-side open impeller for pumping water, liquid manure solutions, faeces, contaminated liquids, gassing liquids without abrasive precipitations having a diameter larger than 6 mm, and fibrous impurities. There are no internal motor safety devices in the FZA pumps. The drive motor in the FZA pump is "wet" – it is filled with white mineral oil according to the PN-60/M-96105 standard. The pump is only available as FZA.1.

## Versions

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

- small intermediate pumping stations for domestic and industrial sewage,
- in sewage treatment plants, as auxiliary pumping units,
- horticulture,
- construction industry,
- farming,
- emptying private septic tanks,
- utilisation of rainwater,
- water removal from flooded buildings,
- emptying pools and tanks.

## FZB

The FZB type pumps are equipped with a closed channel impeller. The pump is used for pumping contaminated liquids with solid and sludge content (e.g. water with sand) and without fibrous substances.

The characteristics of these systems:

- high efficiency of the hydraulic system,
- less “free” passage as compared to Vortex systems.

The pumps of this type are used in sewage pumping stations with separation of solids manufactured by Hydro-Vacuum SA, but they can also be used for pumping other liquids than preliminarily cleaned sewage.

In the standard (version 1), the impeller is made of GG25; and in version 2, the impeller and bearing housing are made of ZbCr32. At the customer’s request, the pumping housing may also be made of ZbCr32 or cast steel.

The B value (“free” passage) for FZB:

- FZB.1 –  $\varnothing 6$  mm
- FZB.2 –  $\varnothing 15$  mm
- FZB.3 –  $\varnothing 32$  mm (for FZB.3.90 -  $\varnothing 15$  mm)
- FZB.4 –  $\varnothing 45$  mm
- FZB.5 –  $\varnothing 50$  mm
- FZB.6 –  $\varnothing 55$  mm
- FZB.7 –  $\varnothing 80$  mm



## FZC

The FZC type pumps are equipped with two-vane (triple-vane for FZ.9) closed impellers and are used for pumping liquids with high solid, long-fibre, and sludge content. The main purpose of these pumps is pumping preliminarily cleaned raw sewage, active sediment, putrid sediment etc.

The characteristics of these systems:

- high “free” passage through the impeller, protecting against clogging of the rotating system,
- considerably higher efficiency as compared to the pumps with Vortex systems, which results in potentially lower motor power.

The FZC type pumps may be used interchangeably with Vortex type impellers. The face disc is not adjustable, the impeller is sealed at the entry on the roller surface and not the face surface; the wear rings are made of ZbCr32; additionally there is a notch at the impeller inlet to prevent sand getting between the impeller and the wear ring, and to protect against locking of the system.

As a standard, the impeller is made of GG25 (version 1), but may also be made of ZbCr32 (version 2).

The B value (“free” passage) for FZC:

- FZC.3 –  $\varnothing 80$  mm
- FZC.4 –  $\varnothing 80$  mm
- FZC.5 –  $\varnothing 80$  mm
- FZC.6 – 100x80 mm
- FZC.7 – 115x100 mm
- FZC.8 – 115x120 mm
- FZC.9 – 120x130 mm



## Versions

### FZD

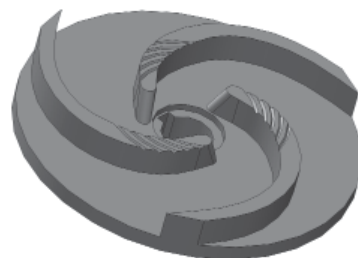
The FZD type pumps are equipped with multi-vane one-side open impellers with a grinding feature, and are used for pumping liquids with long-fibre content. Their main purpose is pumping raw sewage, preliminarily cleaned or not, active sediment, putrid sediment etc.

The characteristics of these systems:

- grinding of elements getting into the pump, between the impeller's face surface and the grinding disc,
- the pumped liquid may not contain solids (e.g. small stones), but the system is not sensitive to rags, unwoven fabric, PET bottles, and similar.

The FZD type pumps may be used in all applications where there is a risk of clogging for channel impellers with, for instance, rags; however, due to structural conditions, the pumps must be preceded by a system for separation of larger solid materials. These pumps require adjustment of the grinding disc position, which is done during assembly. The FZD pumps are predominantly used in TSA and TSB sewage pumping stations with separation of solids.

Standard impellers and grinding discs are made of GG25 (version 1) or the impeller is made of ZbCr32 and the disc of GG25 (version 2).



### FZE

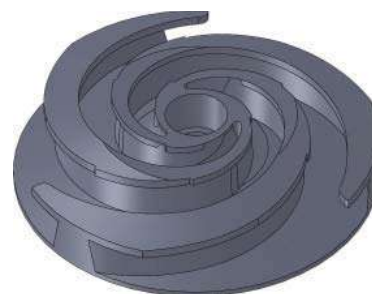
The FZE type pumps feature the Vortex Special multi-vane one-side open impellers. They are intended for pumping of liquids with high contents of solids, long fibrous substances and sludge. Their main purpose includes pumping of pre-treated and nontreated raw sewage, active sediment, septic sediment, etc.

The characteristics of these systems:

- high „free” passage under the impeller which prevents clogging of the rotating system,
- low potential for clogging of the pump rotating system.

The FZE pumps can be a replacement for the FZC pumps. The system efficiency is lower than in double-vane impeller pumps, which is compensated by a high operating efficiency of the pumps installed in wet sewage and rain water pumping stations.

The impeller is made of Zl250 (version 1) in the standard version. It is available in ZbCr32 on order in (version 2); this also applies to the oil chamber. The pumping body can also be made of ZbCr32, and a cast steel version is also available, both on custom order.



The B value („free” passage) for FZE:

- FZE.2 – ø55 mm
- FZE.3 – ø80 mm

### FZP

The FZP type pumps are equipped with a multi-vane closed channel impeller with spatial curvature blades. These pumps are used for pumping clean water, and water contaminated with sand.

The characteristics of these systems:

- high efficiency of the hydraulic system, higher than in all of the above, up to 84%,
- lower NPSH as compared to the FZB pumps by using wider inlet and a spatial blade.

The standard material for the impeller is GG25 (version 1), and in version 2 the impeller and bearing housing are made of ZbCr32. The FZP type pumps are also available in a cast steel version.



## Versions

### FZR

The FZR type pumps are equipped with a multi-vane one-side open impeller. The pump is equipped with a grinding device for pumping liquids contaminated with long-fibre content, which, if conventional hydraulics were used, would cause the pump to lock. The FZR type pump has no built-in motor safety devices. The drive motor in the FZR pumps is “wet” – it is filled with white mineral oil according to the PN-60/M-96105 standard. The pump is only available as FZR.1.

*The FZR pumps may be applied for one of the following uses:*

- small intermediate pumping stations for domestic and industrial sewage,
- in sewage treatment plants, as auxiliary pumping engines,
- horticulture,
- construction industry,
- farming,
- emptying private septic tanks,
- utilisation of rainwater,
- water removal from flooded buildings,
- emptying pools and tanks.

As a standard, in version 1, the impeller is made of GG25, and in version 2, the impeller is made of ZbCr32. In both versions, the knife and disc are made of ZbCr32.

### FZV

The FZV type pumps are equipped with multi-vane one-side open Vortex impellers, and are used for pumping liquids with high solid, long-fibre, and sludge content. Their main purpose is pumping raw sewage, either preliminarily cleaned or not, active sediment, putrid sediment etc.

*The characteristics of these systems:*

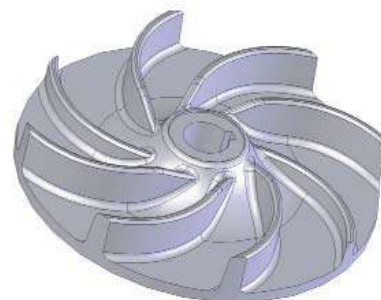
- high “free” passage under the impeller to prevent clogging of the rotating system,
- low sensitivity to rotating system clogging.

The FZV type pumps may be used interchangeably with the FZC pumps. The efficiency of the systems is lower than with double-vane impeller pumps, but it is compensated by high motion efficiency of pumps installed in wet sewage and rainwater intermediate pumping stations.

The standard impeller is made of GG25 (version 1), but it may also be made of ZbCr32 (version 2), the same as the oil housing. On request, the pumping housing may also be made of ZbCr32 or cast steel.

*The B value (“free” passage) for FZV:*

- FZV.1 – ø30 mm
- FZV.2 – ø55 mm
- FZV.3 – ø80 mm
- FZV.4 – ø90 mm
- FZV.6 – ø100 mm



### FZX

The FZX type pumps are equipped with multi-vane one-side open impeller. The pump is equipped with a grinding device to prevent pumping of liquids contaminated with long-fibre content, which, if conventional hydraulics were used, would cause the pump to lock.

The FZX pump may be used in explosion hazard areas. It is equipped with a thermal safety device for the motor winding and a safety device to protect against moistening of the motor chamber. These pumps are available only in the submersible version. The drive motor in the FZX pumps is “dry”. It is only available as FZX.1.

*FZX pumps may be applied for one of the following or other uses:*

- private intermediate pumping stations,
- intermediate pumping stations for domestic and industrial sewage,
- pumping of sewage from rooms not having sufficient ventilation.

## Versions

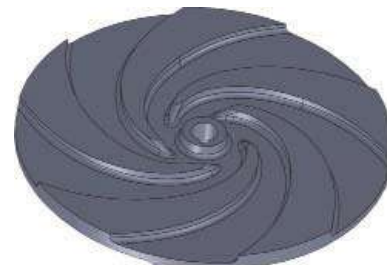
### FZY

The FZY type pumps are equipped with a multi-vane one-side open impeller. The pump is equipped with a grinding device to enable pumping of liquids contaminated with long-fibre content, which, if conventional hydraulics were used, would cause the pump to lock.

The FZY pumps are not equipped with a thermal safety device for the motor winding and a safety device to protect against moistening of the motor chamber. The FZY pump may be equipped with the same set of sensors as the FZX type, but this is non-standard equipment. These pumps are available only in the submersible version. The drive motor in the FZY pumps is "dry". The pump is only available as FZY.1

*The FZY pumps may be applied for one of the following or other uses:*

- private intermediate pumping stations,
- intermediate pumping stations for domestic and industrial sewage,
- pumping of sewage from rooms not having sufficient ventilation.



## Drives used in FZ pumps

### Motors cooled with pumped medium, with IP68

*Uses:*

- sewage pumping station (wet),
- rainwater and drainage water pumping station,
- pumping out substances from holding tanks.

*These drives are applied in the following pumps:*

- Pumps with motors filled with white mineral oil, and not equipped with sensors inside the motor chamber:
  - FZA.1 ,FZB.1 (except 60-69), FZV.1, FZR.1
- Pumps with "dry" motors, but without extra sensors inside the motor chamber:
  - FZY.1
- Pumps with „dry" motors, equipped as a standard with moisture and thermal bimetal sensors inside the motor chamber:
  - FZB.1.(60-69), FZX.1
  - FZB.2, FZD.2, FZE.2, FZV.2
  - FZB.3, FZC.3, FZD.3, FZE.3, FZV.3
  - FZB.4, FZC.4, FZE.4, FZV.4



### Air-cooled motors with IP55 – monoblock pumps

*Uses:*

- sewage pumping station (dry),
- water, rainwater and drainage water pumping station (dry),
- sewage pumping stations with separation of solids,
- private systems.

### Air-cooled motors with IP55 and standard flange-type motor

*Uses:*

- sewage pumping station (dry),
- water, rainwater and drainage water pumping station (dry),
- sewage pumping stations with separation of solids.

*These drives are applied in the following pumps:*

- FZB.5, FZB.6, FZB.7
- FZC.6, FZC.7, FZC.8, FZC.9
- FZV.6

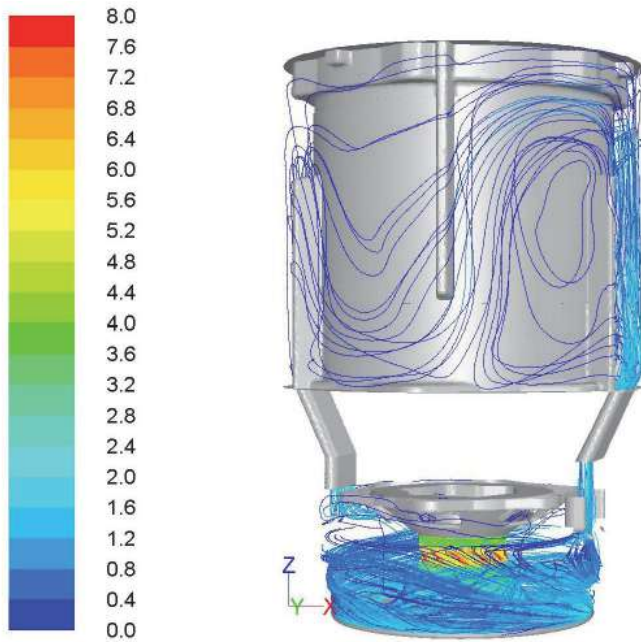


## Drives used in FZ pumps

### IP68 motors with internal cooling system and non-submersible operation capability

#### The internal cooling system operation:

- the motor is cooled through the internal cooling system which removes heat from the motor frame, and transfers it to the pumped liquid through the wall between the motor and the pump,
- the coolant used in the system is a glycol and water mixture, which enables it to work at low temperatures,
- the movement of liquid in the internal system is forced by an axial impeller with low energy consumption,
- the internal system is fully separated from the pumped liquid, which prevents bacterial fouling, as is the case in systems cooled with the pumped medium, such as municipal waste,
- the pressure in the cooling system is low, regardless of pump parameters, which reduces the risk of system unsealing.



Flow distribution in the internal motor cooling system



#### Uses:

- dry pumping stations with a risk of flooding by rainwater,
- sewage pumping stations with separation of solids with a risk of flooding by surface downflow,
- conventional intermediate pumping stations for sewage, rainwater etc.

#### These drives are applied in the following pumps:

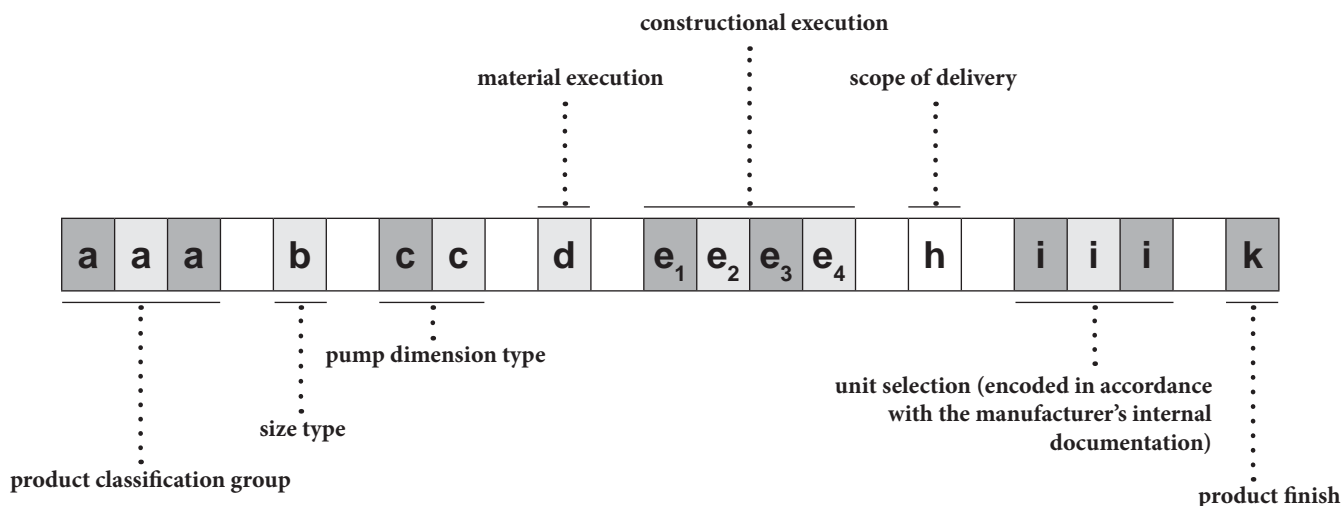
- FZ.5, FZ.6, FZ.7, FZ.8, FZ.9



Thermal view of a 55kW motor after 6 hours of continuous operation under full load and at maximum permissible operating temperature

# FZ TYPE SINGLE-STAGE PUMPS

## Product marking structure



## Pump materials

NAME	FZ.1 pumps	
	„d” Materials	
	1	2
Impeller*	grey cast iron	chromium cast iron
Bearing body	grey cast iron	chromium cast iron
Suction body	grey cast iron	chromium cast iron
Pumping body	grey cast iron	chromium cast iron
Sealing body	grey cast iron	chromium cast iron
Grinder inlet body**	chromium cast iron	
Grinder blade**	chromium cast iron	
Motor jacket	stainless steel	
Unit shaft	stainless steel	
Meshed plate	stainless steel	
Connecting parts	stainless steel	
Oil in oil chamber	white mineral oil	

NAME	FZ.2, FZ.3, FZ.4 pumps	
	„d” Materials	
	1	2
Impeller	grey cast iron	chromium cast iron
Gland body	grey cast iron	
Bearing body	grey cast iron	
Oil body	grey cast iron	chromium cast iron
Motor body	grey cast iron	
Suction body	grey cast iron	
Pumping body	grey cast iron	
Bearing cover	grey cast iron	
Unit shaft	stainless steel	
Connecting elements	stainless steel	
Oil in oil chamber	white mineral oil	

NAME	FZ.5, FZ.6, FZ.7 pumps		
	„d” Materials		
	1	2	3
Impeller	grey cast iron	chromium cast iron	cast steel
Gland body	grey cast iron		
Bearing body	grey cast iron		
Oil body	grey cast iron		
Motor body	grey cast iron		
Suction body	grey cast iron		cast steel
Pumping body	grey cast iron		cast steel
Sealing body	grey cast iron	chromium cast iron	cast steel
Bearing cover	grey cast iron		
Unit shaft	stainless steel		
Connecting elements	stainless steel		
Fluids	version 4110 – white mineral oil / version 5210 - ethylene glycol 30% aqueous solution		

\*) in FZB.1 unit, impeller is made of brass

\*\*) refers only to FZR unit

## Constructional execution

### FZ.1 type pumps

$e_1 = 1$	single-phase motor
$e_2 = 2$	three-phase motor
$e_3 = 3$	single-phase motor with a float switch

### FZ.2 type pumps

$e_1 = 1$	vertically mounted pump (flange-type liquid-cooled motor)
$e_1 = 4$	vertically mounted pump to be fixed on the pipeline (flange-type liquid-cooled motor)

$e_2 = 0$	with liquid-cooled motor (without Ex)
$e_2 = 1$	with flange-type air-cooled motor
$e_2 = 2$	with liquid-cooled motor, explosion proof version (Ex)

$e_4 = 0$	pump without accessories
$e_4 = 1$	pump with a base
$e_4 = 2$	pump with a base to be fixed on the pipeline

### FZ.4 type pumps

$e_1 = 1$	vertically mounted pump (flange-type liquid-cooled motor)
$e_1 = 4$	vertically mounted pump to be fixed on the pipeline (flange-type air-cooled motor)

$e_2 = 0$	with liquid-cooled motor (without Ex)
$e_2 = 1$	with flange-type air-cooled motor

$e_4 = 0$	pump without accessories
$e_4 = 1$	pump with a base
$e_4 = 2$	pump with a base to be fixed on the pipeline

### FZX.1 type pumps

$e_1 = 2$	single-phase motor
$e_2 = 2$	three-phase motor

### FZ.3 type pumps

$e_1 = 1$	vertically mounted pump (flange-type liquid-cooled motor)
$e_1 = 2$	vertically mounted pump to be fixed on the pipeline (flange-type liquid-cooled motor)
$e_1 = 3$	horizontally mounted pump (flange-type liquid-cooled motor)
$e_1 = 4$	vertically mounted pump to be fixed on the pipeline (flange-type air-cooled motor)

$e_2 = 0$	with liquid-cooled motor (without Ex)
$e_2 = 1$	with flange-type air-cooled motor
$e_2 = 2$	with liquid-cooled motor, explosion proof version (Ex)

$e_4 = 0$	pump without accessories
$e_4 = 1$	pump with a base
$e_4 = 2$	pump with a base to be fixed on the pipeline

### FZ.5, FZ.6, FZ.7, FZ.8, FZ.9 type pumps

$e_1 = 4$	vertically mounted pump to be fixed on the pipeline
$e_1 = 5$	pump with el. motor with internal cooling system

$e_4 = 0$	pump without accessories
$e_4 = 2$	pump with a base to be fixed on the pipeline

### Pumps are additionally equipped with the following safety devices:

- stator winding temperature limiter,
- motor chamber humidity sensor,
- oil chamber moisture sensor (option),
- sensor in motor oil chamber (option),
- electric quick-fit connector (option).

## Scope of delivery

### Scope of delivery for FZ.1 pumps:

- 3 – cable connection plus motor
- 4 – basic scope of delivery (cable connection + motor + accessories)
- 6 – basic scope of delivery + 2" female and male elbow type A4 (PN/H 74392)
- 7 – basic scope of delivery + 2" female and male elbow type A4 (PN/H 74392) and 2" hose connector end

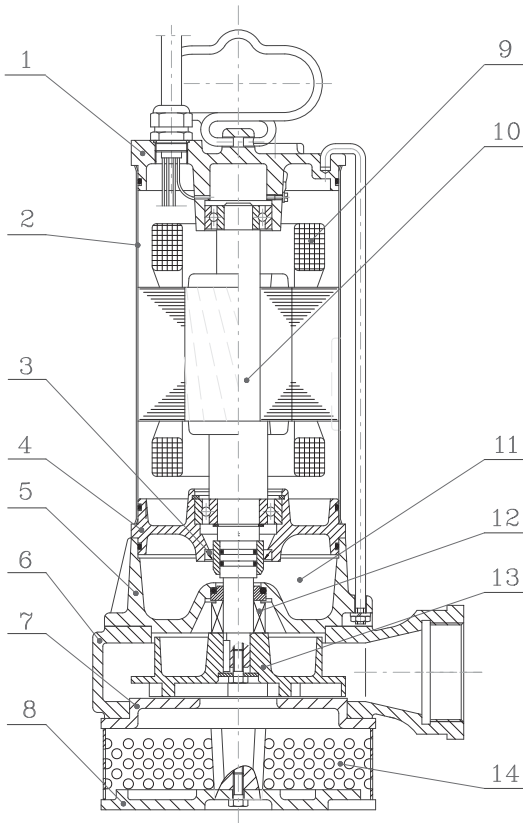
### Scope of delivery for FZ.2, 3, 4, 5, 6, 7, 8, 9 pumps:

- 4 – Pump without accessories (for  $e_4=0$ )
- 5 – Pump with accessories attached (for  $e_4=1-2$ )

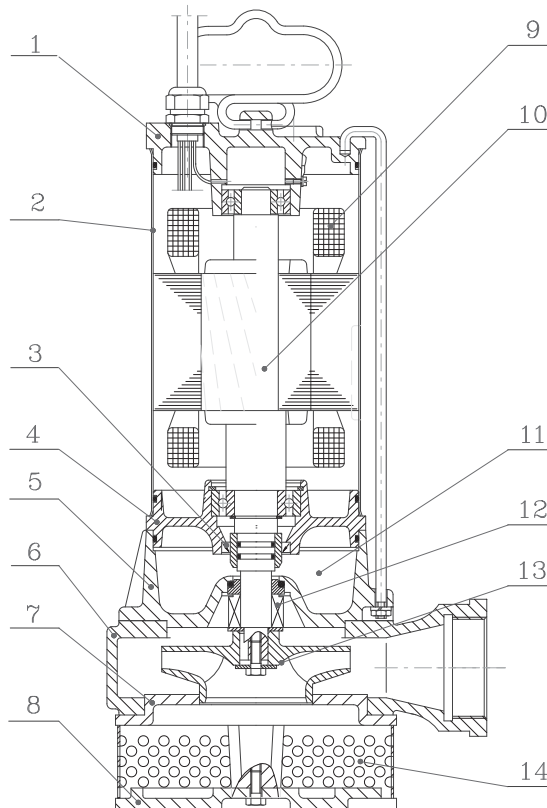
# FZ TYPE SINGLE-STAGE PUMPS

## Cross-sectional drawings of selected FZ pumps

Cross-section of FZA.1 pump

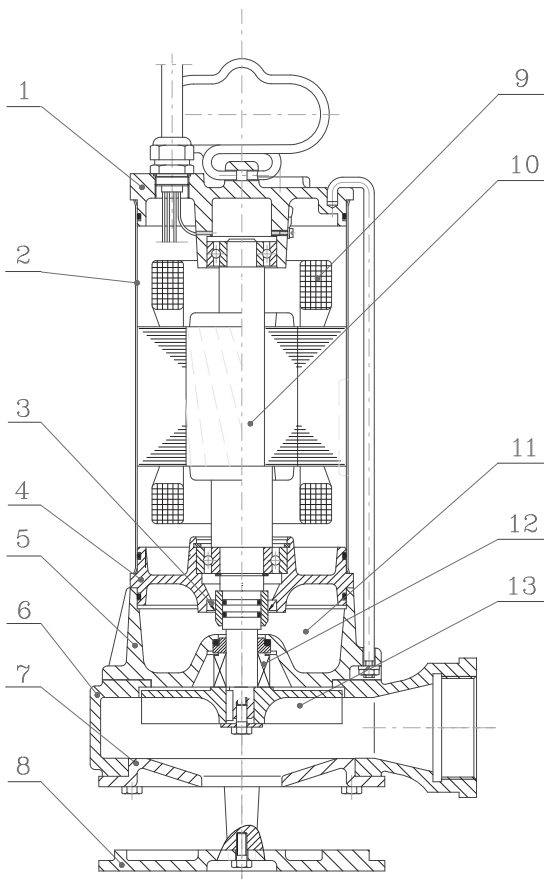


Cross-section of FZB.1 pump

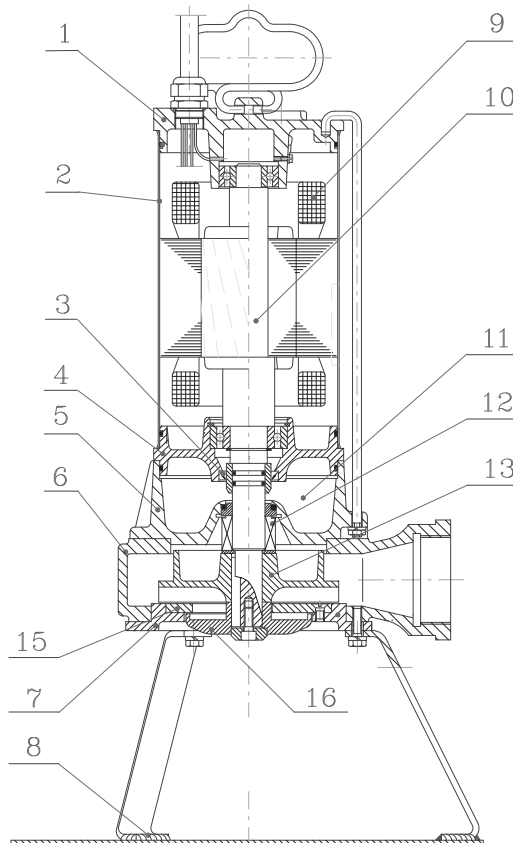


1. Upper bearing body
2. Motor jacket
3. ADT ring
4. Lower bearing body
5. Sealing body
6. Pumping body
7. Suction body
8. Base
9. Motor stator
10. Unit shaft
11. Oil chamber
12. Mechanical sealing
13. Pump impeller
14. Strainer

Cross-section of FZV.1 pump



Cross-section of FZR.1 pump

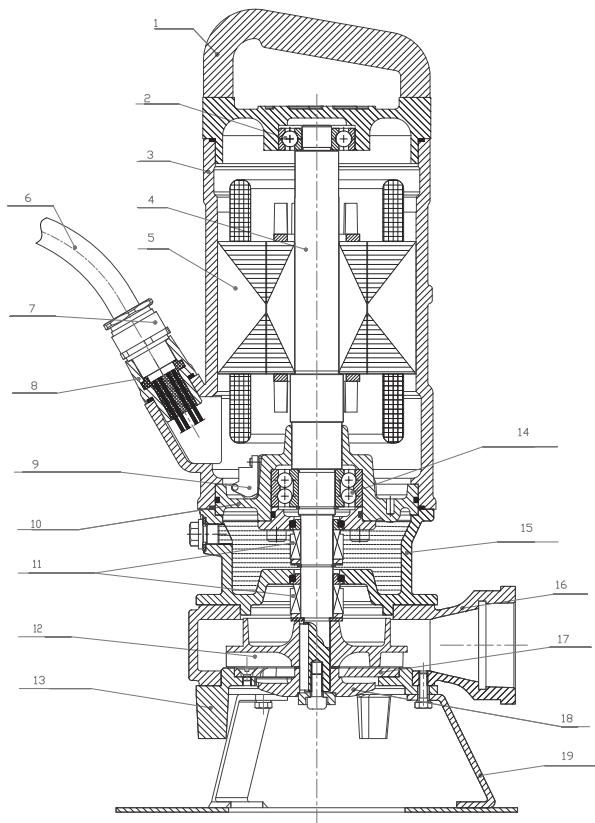


1. Upper bearing body
2. Motor jacket
3. ADT ring
4. Lower bearing body
5. Sealing body
6. Pumping body
7. Suction body
8. Base
9. Motor stator
10. Unit shaft
11. Oil chamber
12. Mechanical sealing
13. Pump impeller
15. Inlet shield
16. Blade

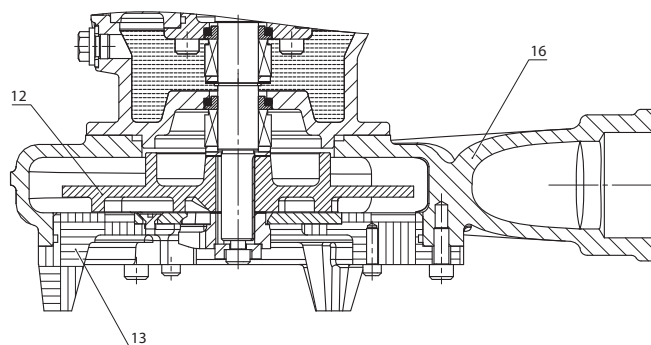
# FZ TYPE SINGLE-STAGE PUMPS

## Cross-sectional drawings of selected FZ pumps

**Cross-section of FZX.1.10 - FZX.1.22  
FZY.1.20 - FZY.1.22 pump**

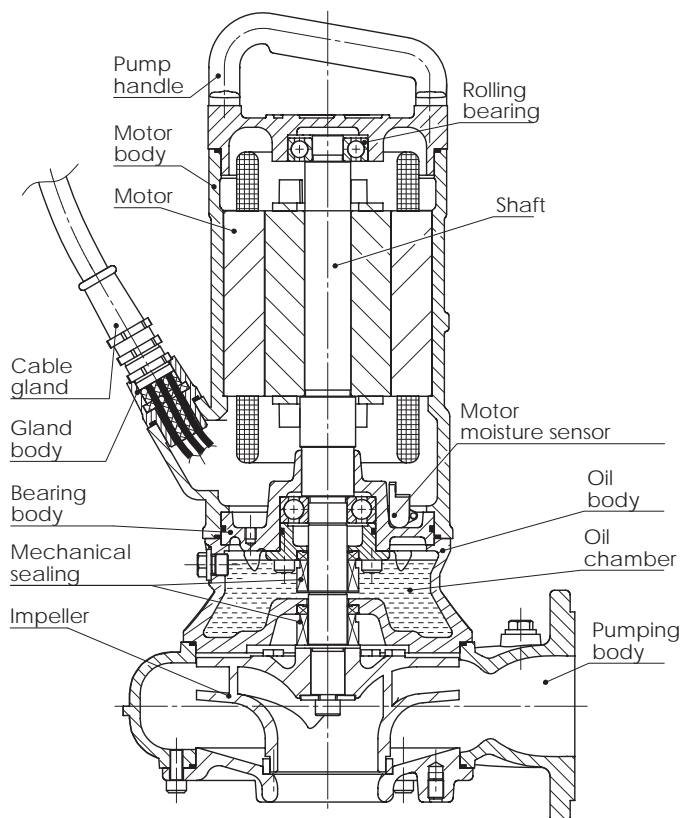


**Cross-section of FZX.1.30 - FZX.1.33  
FZY.1.30 - FZY.1.57 pump**

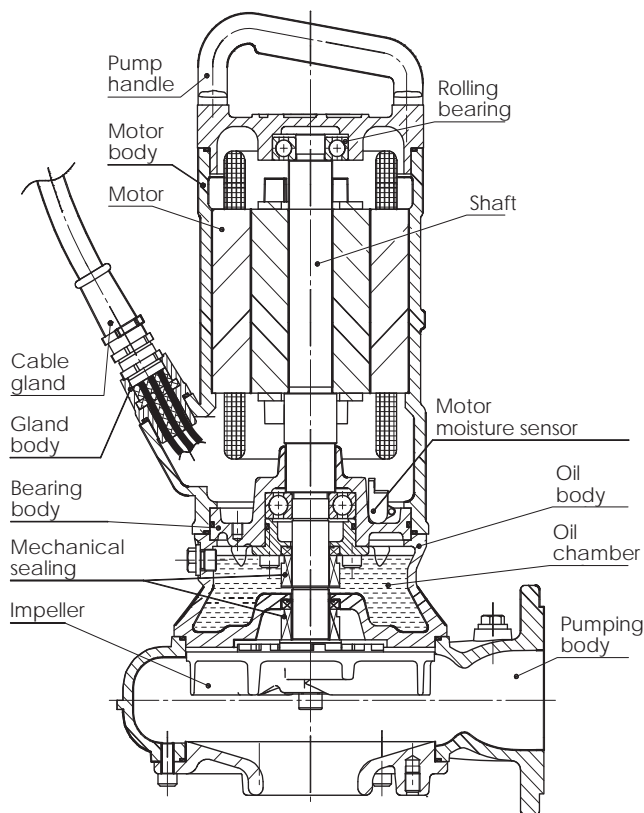


- |                          |                                |
|--------------------------|--------------------------------|
| 1. Pump handle           | 10. Bearing body               |
| 2. Rolling bearing       | 11. Mechanical sealing         |
| 3. Motor body            | 12. Impeller                   |
| 4. Shaft                 | 13. Suction body               |
| 5. Motor                 | 14. Double-row rolling bearing |
| 6. Power supply cable    | 15. Oil body                   |
| 7. Cable gland           | 16. Pumping body               |
| 8. Gland body            | 17. Inlet shield               |
| 9. Motor moisture sensor | 18. Blade                      |
|                          | 19. Base unit                  |

**Cross-section of FZB.2 pump**



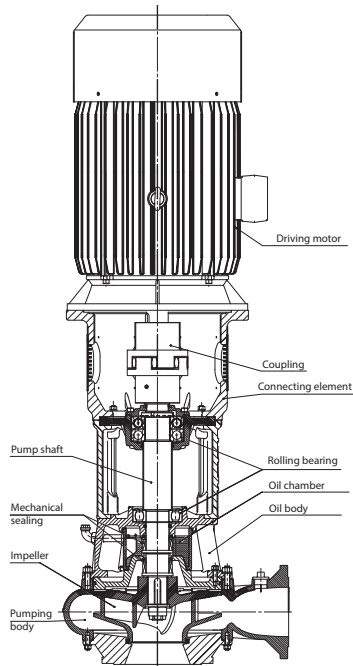
**Cross-section of FZV.2, FZE.2 pump**



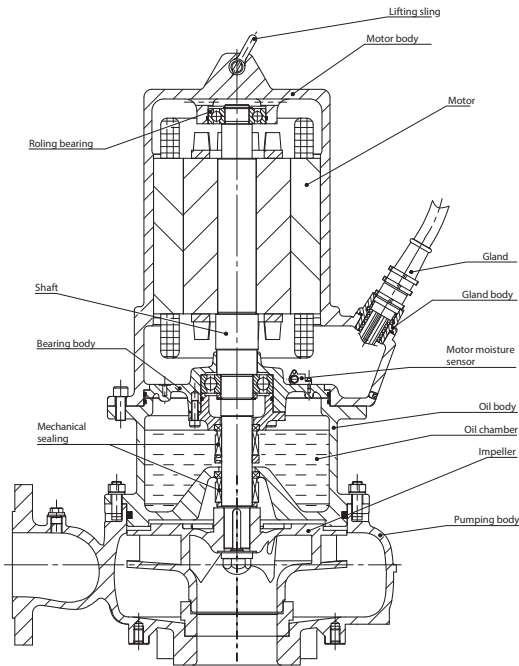
# FZ TYPE SINGLE-STAGE PUMPS

## Cross-sectional drawings of selected FZ pumps

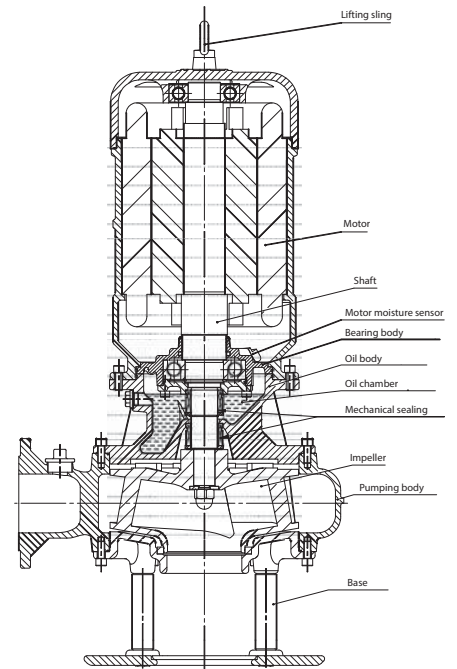
Cross-section of FZ.6 pump



Cross-section of FZB.3 pump

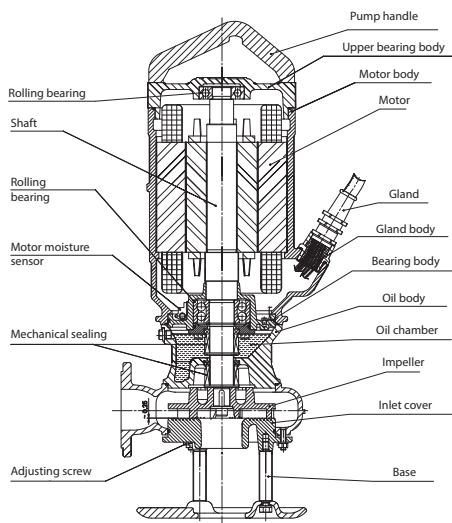


Cross-section of FZC.4 pump

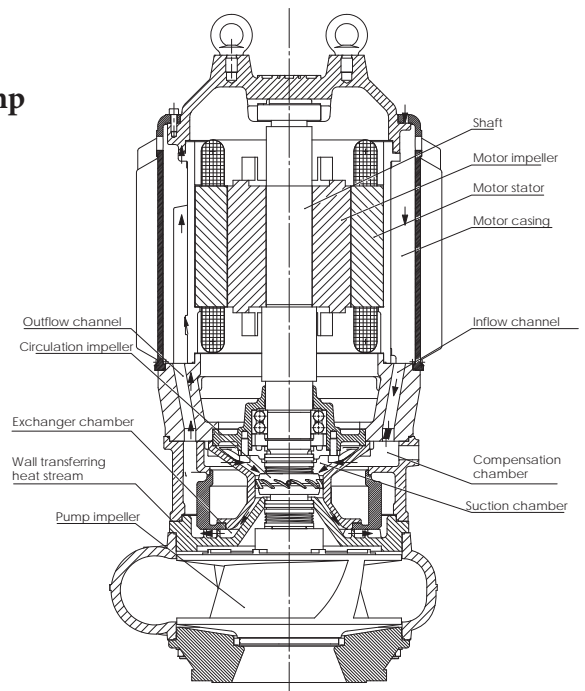
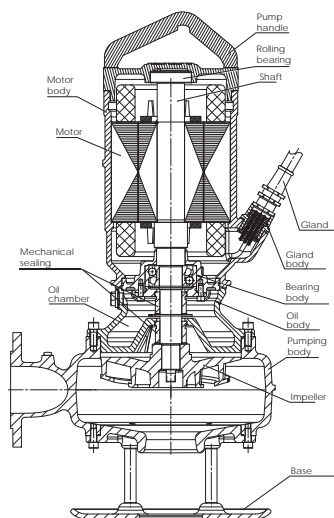


FZC.6 type pump cross-section with a motor having an internal cooling system

Cross-section of FZD.2 pump



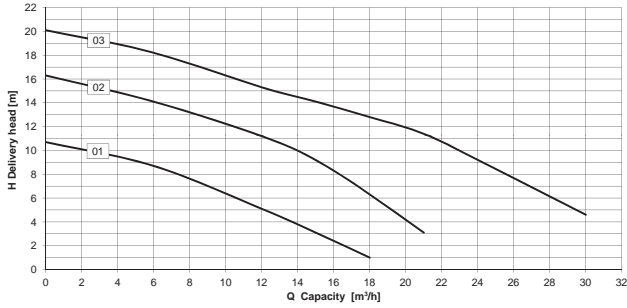
Cross-section of FZE.3 pump



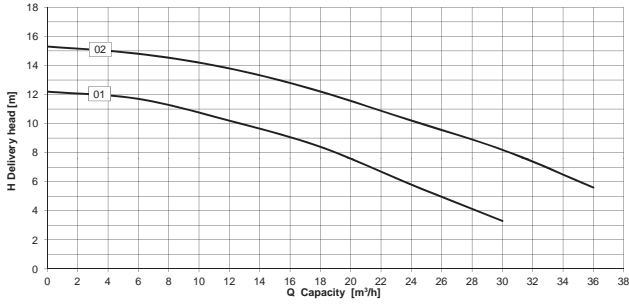
# FZ TYPE SINGLE-STAGE PUMPS

## Characteristics

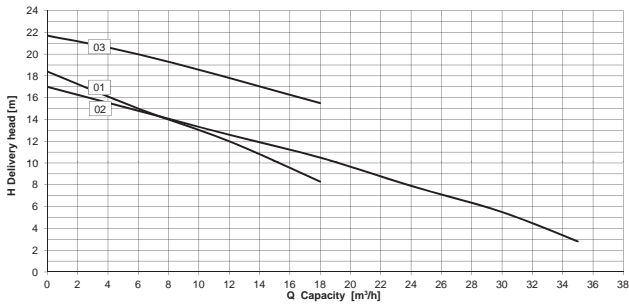
FZA.1 pump characteristics



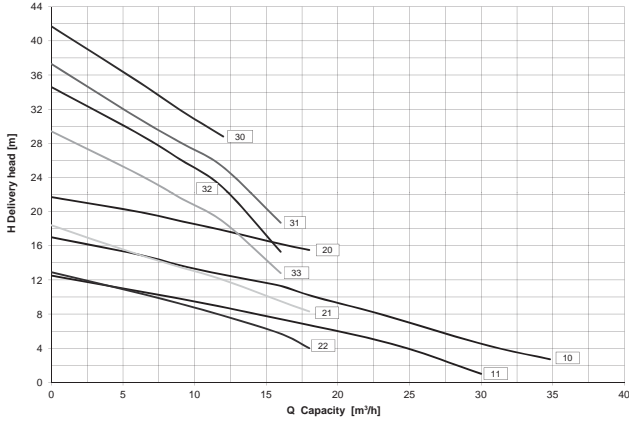
FZB.1 pump characteristics



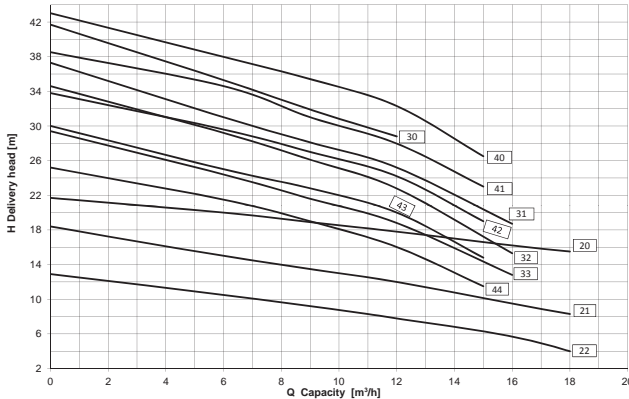
FZR.1 pump characteristics



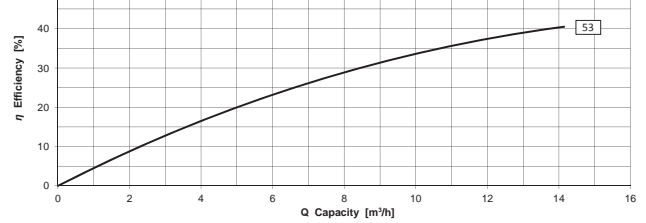
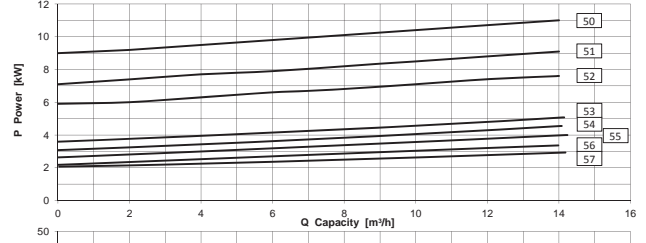
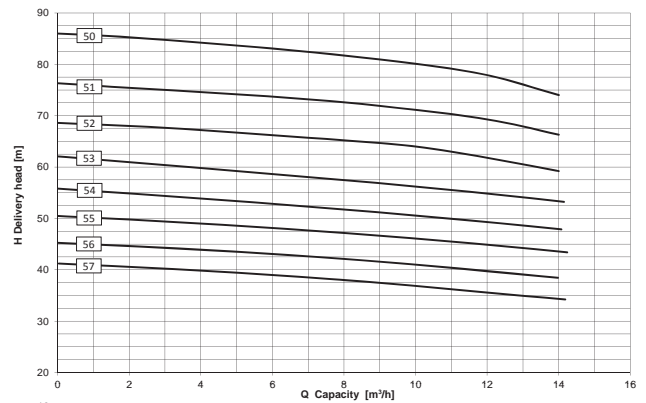
FZX.1 pump characteristics



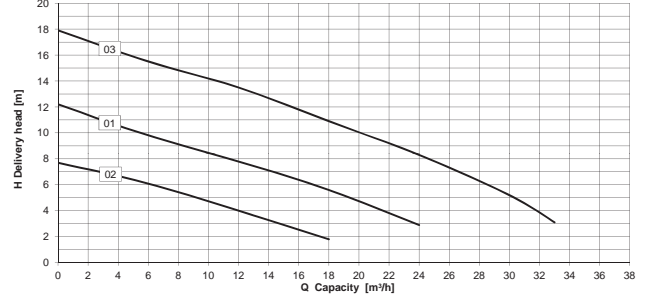
FZY.1 pump characteristics



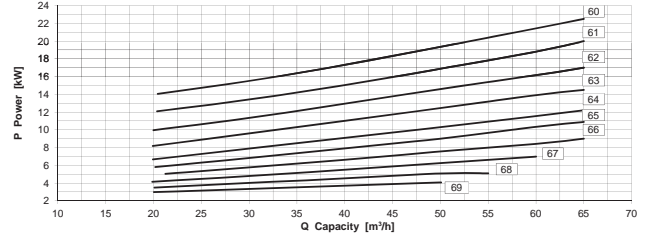
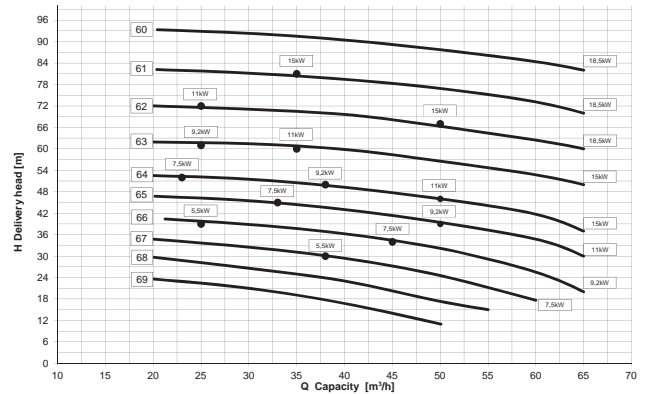
FZY.1.50-57 pump characteristics



FZV.1 pump characteristics



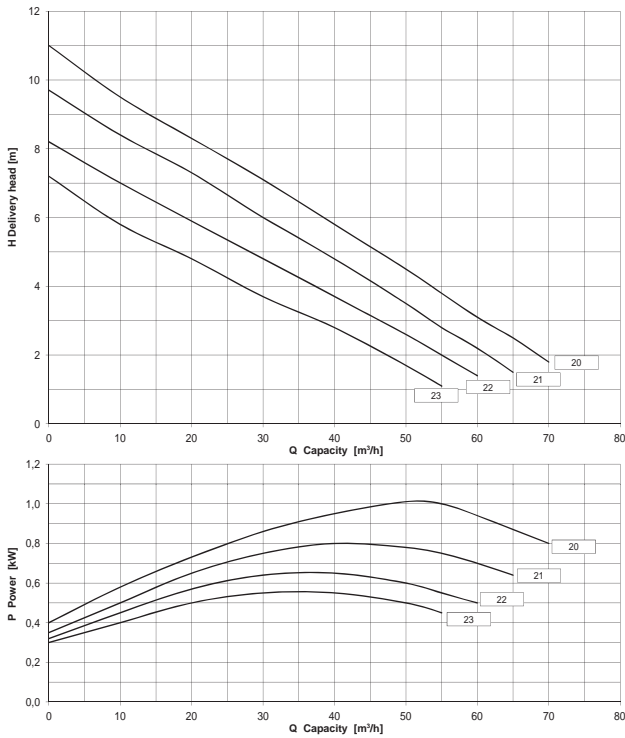
FZB.1.60-69 pump characteristics



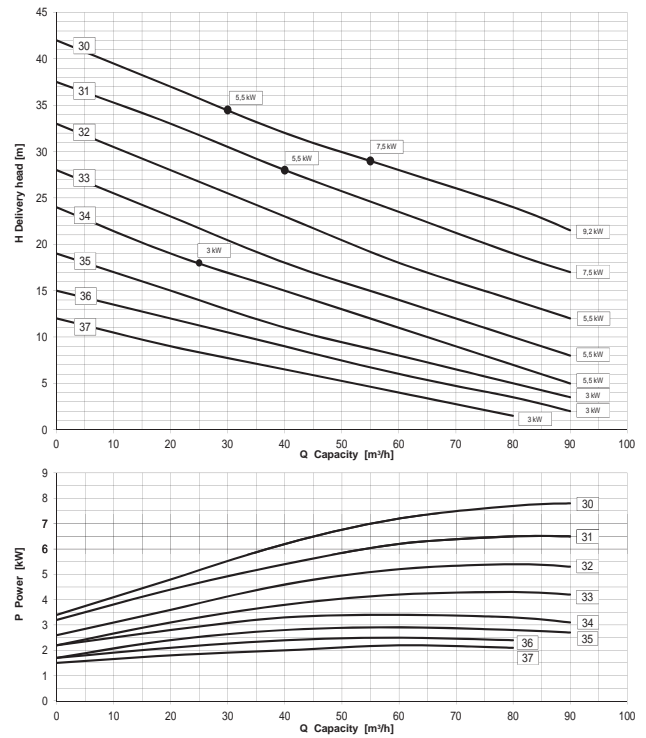
# FZ TYPE SINGLE-STAGE PUMPS

## Characteristics

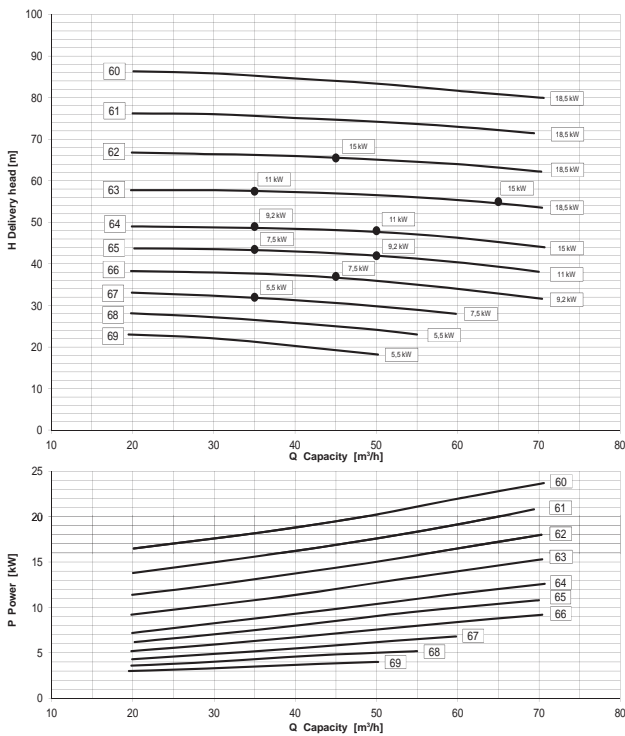
FZB.2.20-23 pump characteristics  $n = 1450[\text{rpm}]$



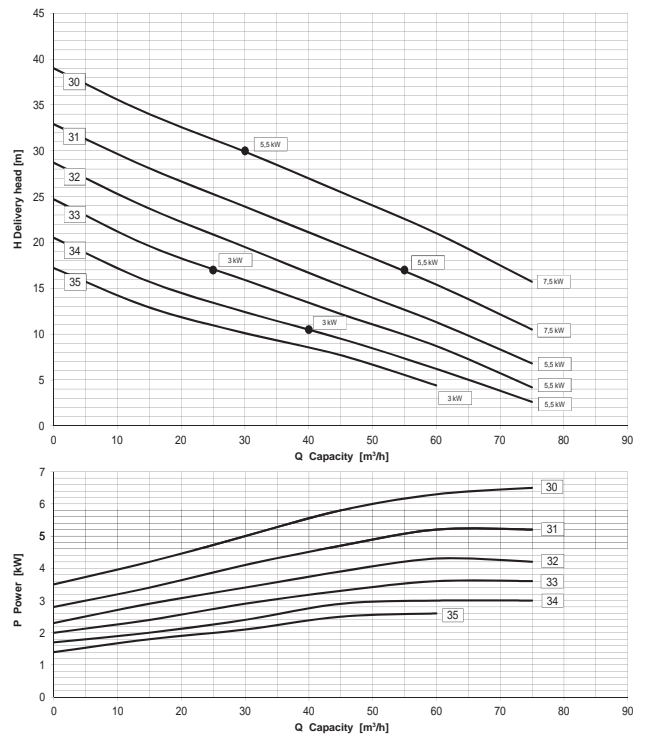
FZB.2.30-37 pump characteristics  $n = 2950[\text{rpm}]$



FZB.2.60-69 pump characteristics  $n = 3000[\text{rpm}]$



FZD.2.30-35 pump characteristics  $n = 2900[\text{rpm}]$



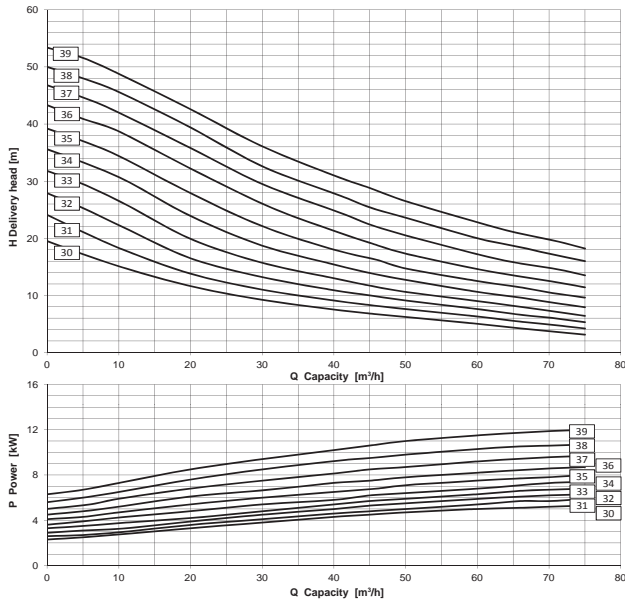


# FZ TYPE SINGLE-STAGE PUMPS

## Characteristics

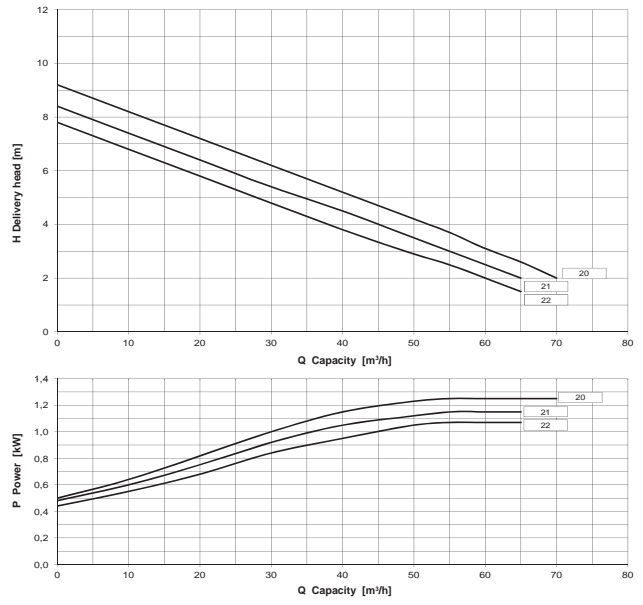
FZE.2.30-39 pump characteristics

$n = 3000$  [rpm]



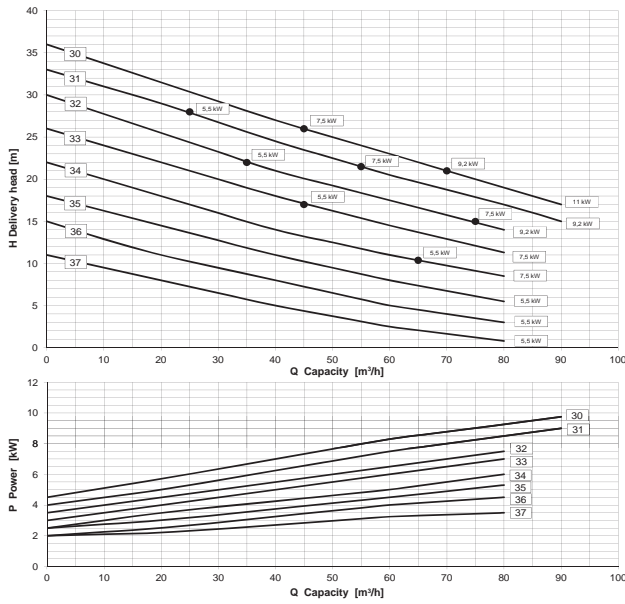
FZV.2.20-22 pump characteristics

$n = 1450$  [rpm]



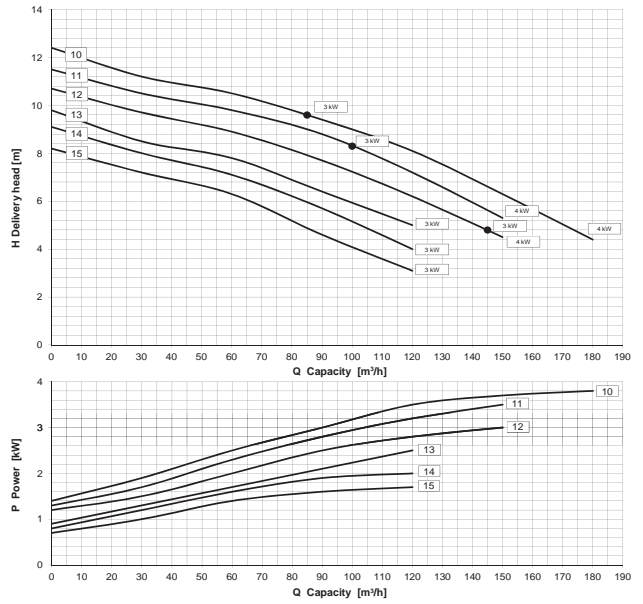
FZV.2.30-37 pump characteristics

$n = 2950$  [rpm]



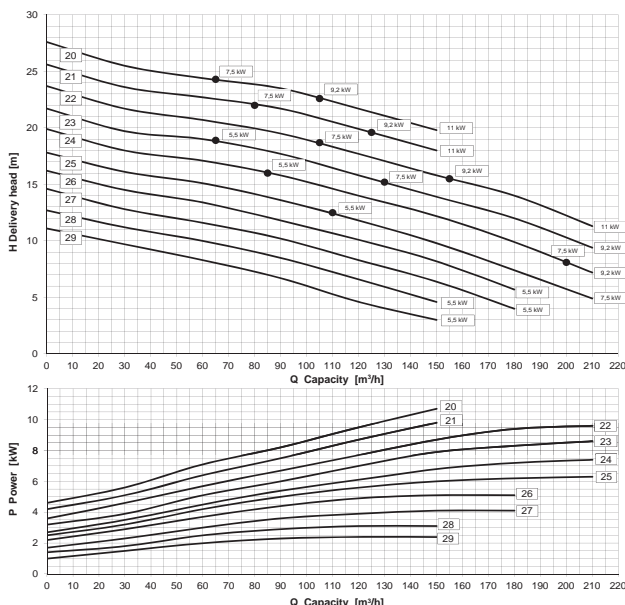
FZB.3.10-15 pump characteristics

$n = 950$  [rpm]



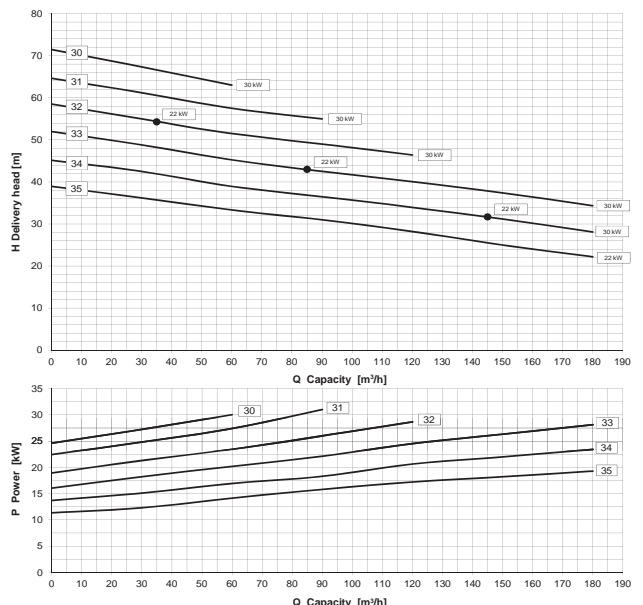
FZB.3.20-29 pump characteristics

$n = 1450$  [rpm]



FZB.3.30-35 pump characteristics

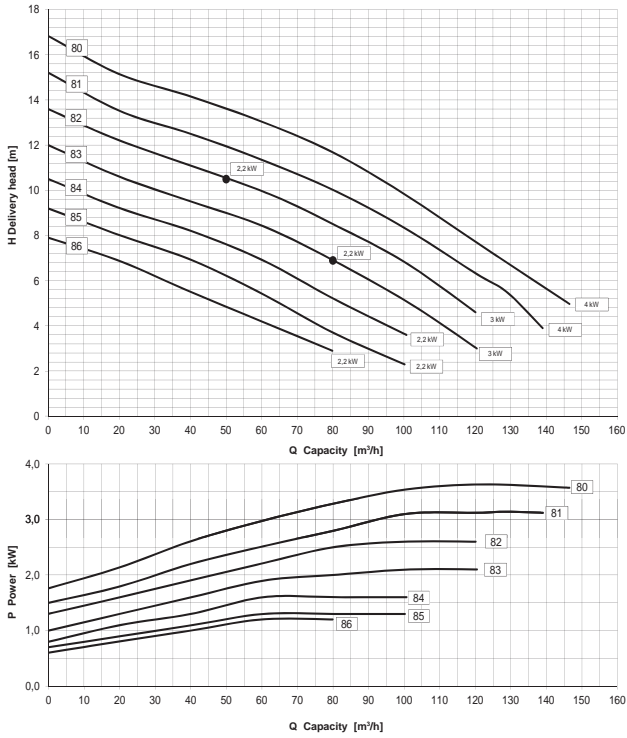
$n = 2950$  [rpm]



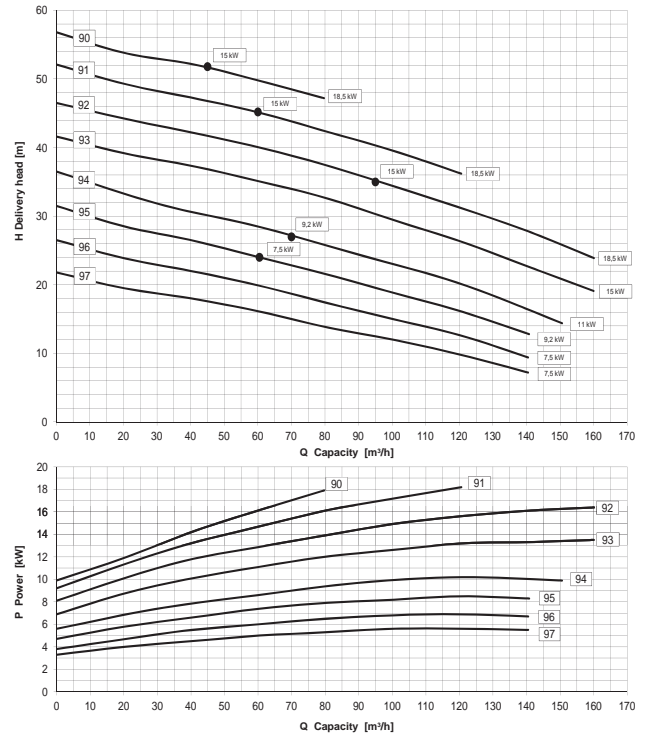
# FZ TYPE SINGLE-STAGE PUMPS

## Characteristics

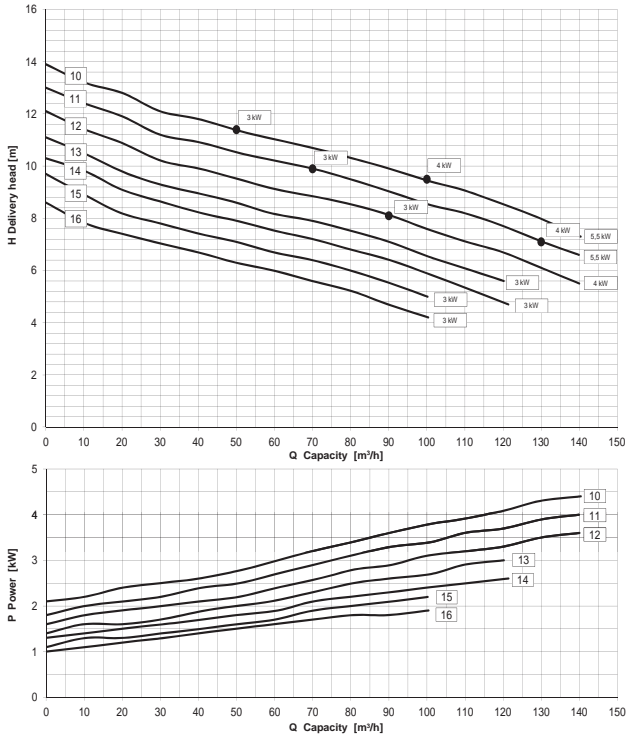
FZB.3.80-86 pump characteristics  $n = 1450[\text{rpm}]$



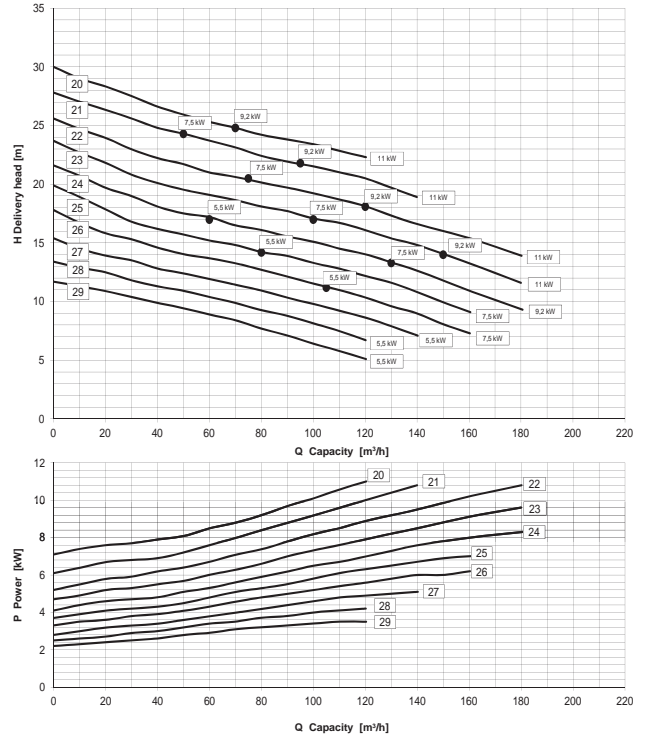
FZB.3.90-97 pump characteristics  $n = 2950[\text{rpm}]$



FZC.3.10-16 pump characteristics  $n = 2950[\text{rpm}]$



FZC.3.20-29 pump characteristics  $n = 2950[\text{rpm}]$

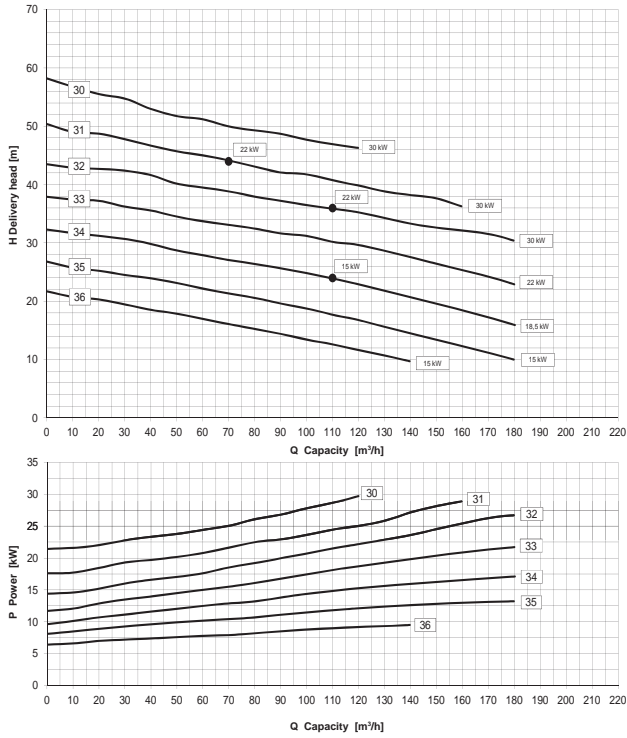


# FZ TYPE SINGLE-STAGE PUMPS

## Characteristics

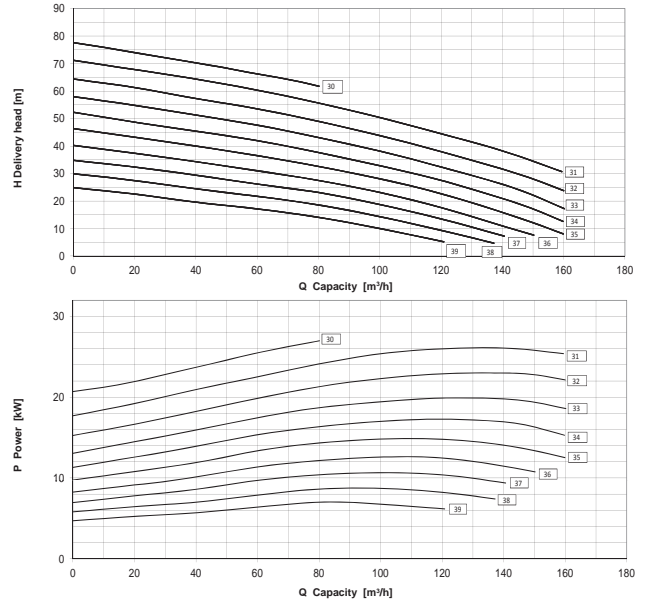
FZC.3.30-36 pump characteristics

$n = 3000[\text{rpm}]$



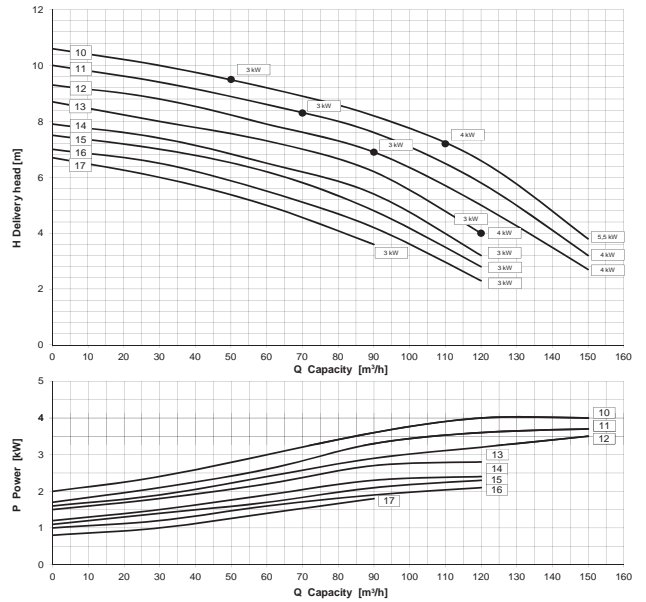
FZD.3.30-39 pump characteristics

$n = 3000[\text{rpm}]$



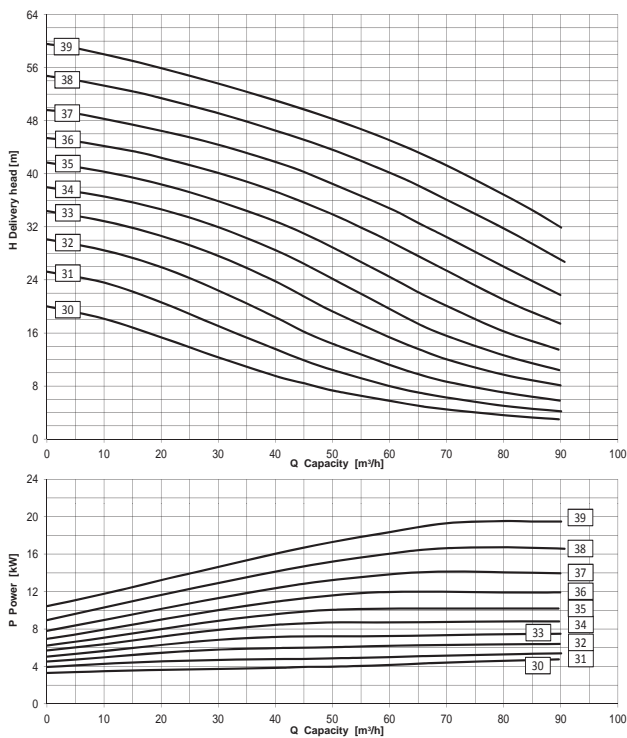
FZV.3.10-17 pump characteristics

$n = 950[\text{rpm}]$



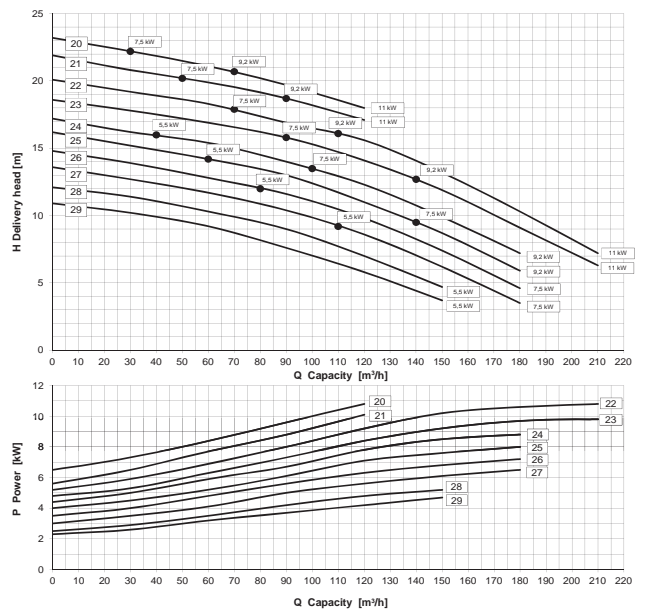
FZE.3.30-39 pump characteristics

$n = 3000[\text{rpm}]$



FZV.3.20-29 pump characteristics

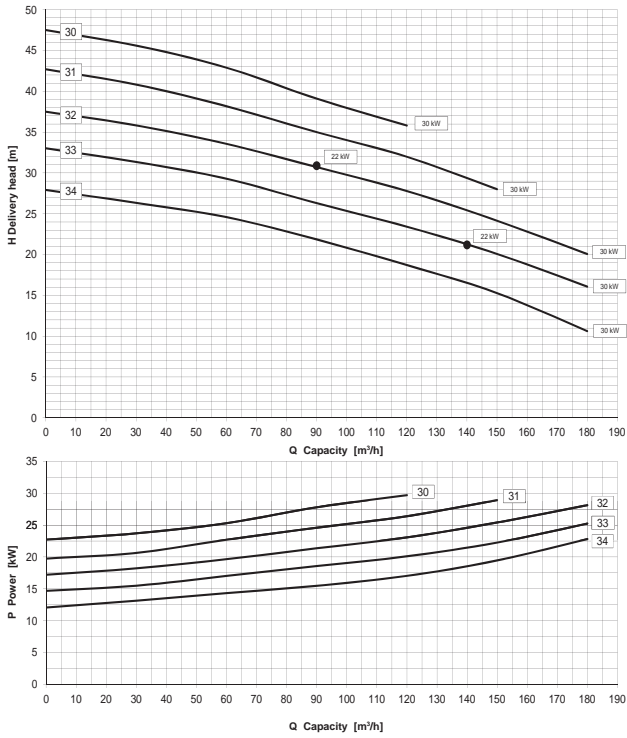
$n = 1450[\text{rpm}]$



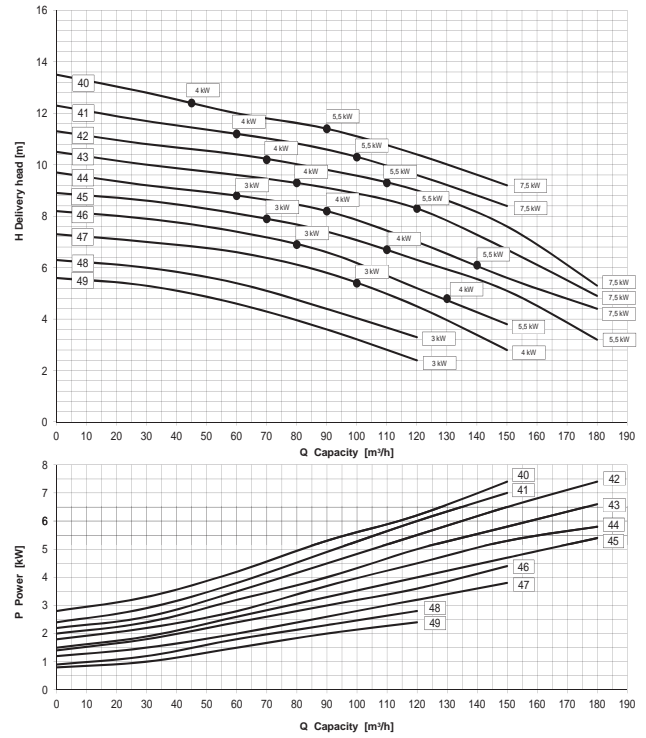
# FZ TYPE SINGLE-STAGE PUMPS

## Characteristics

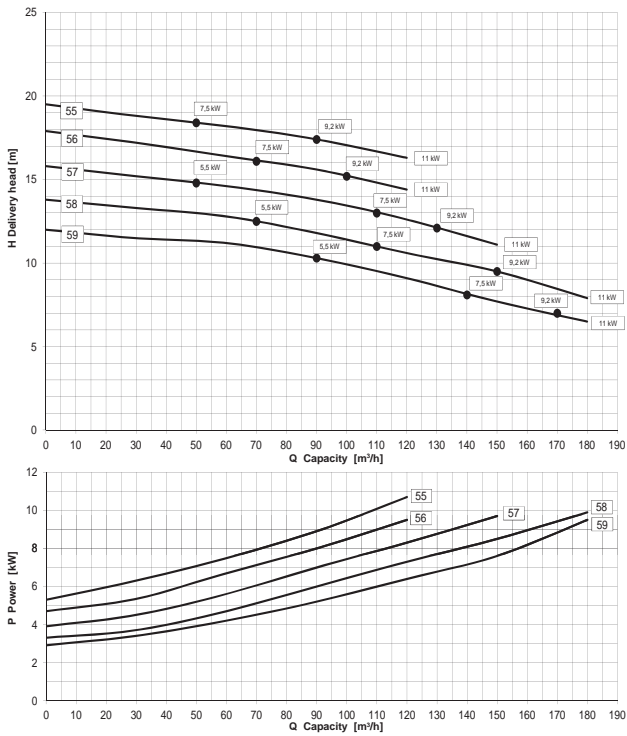
**FZV.3.30-34 pump characteristics**  $n = 2950[rpm]$



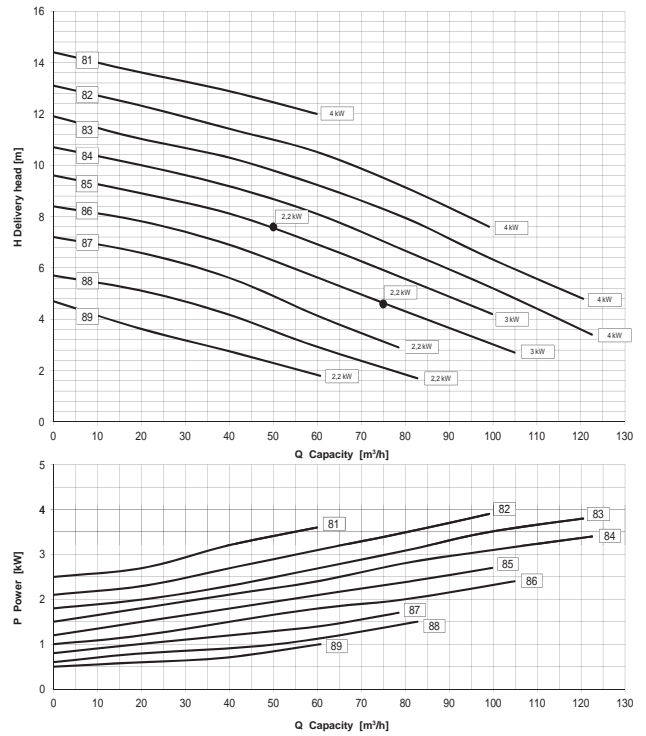
**FZV.3.40-49 pump characteristics**  $n = 950[rpm]$



**FZV.3.55-59 pump characteristics**  $n = 1450[rpm]$



**FZV.3.81-89 pump characteristics**  $n = 1450[rpm]$

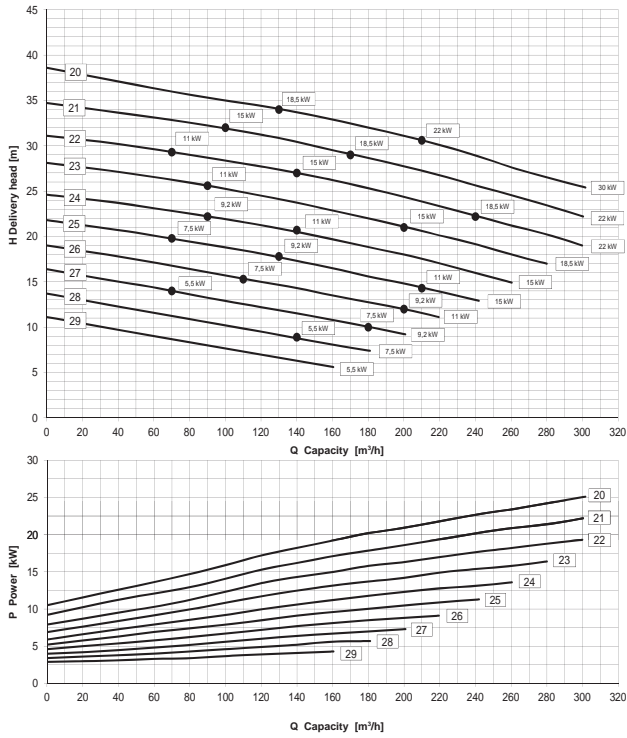


# FZ TYPE SINGLE-STAGE PUMPS

## Characteristics

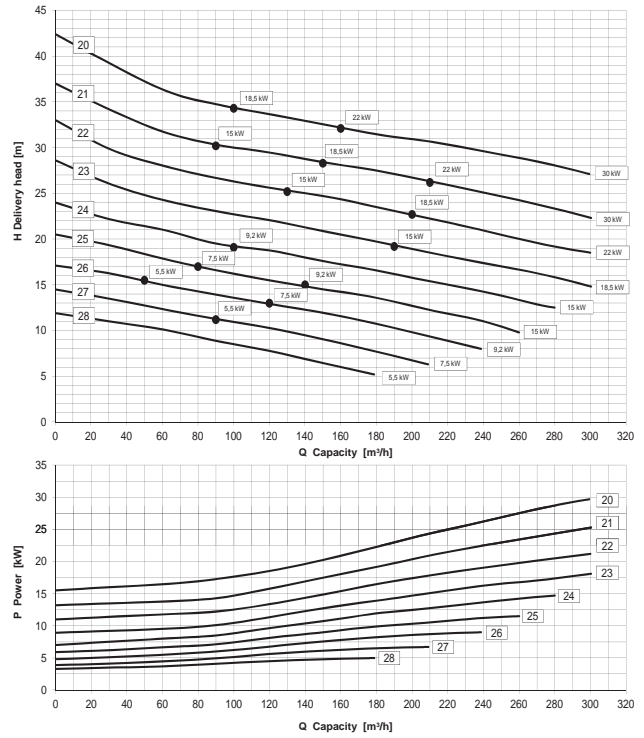
FZB.4.20-29 pump characteristics

$n = 1500[\text{rpm}]$



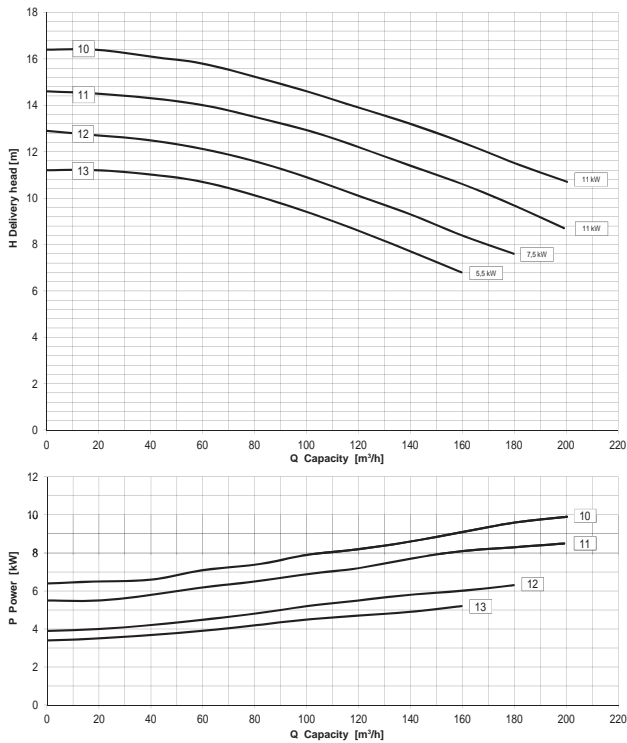
FZC.4.20-28 pump characteristics

$n = 1500[\text{rpm}]$



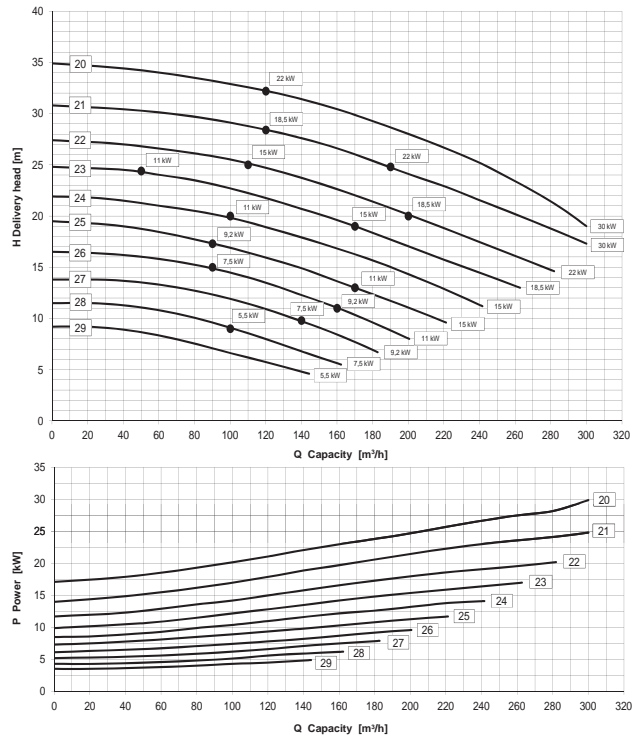
FZV.4.10-13 pump characteristics

$n = 1000[\text{rpm}]$



FZV.4.20-29 pump characteristics

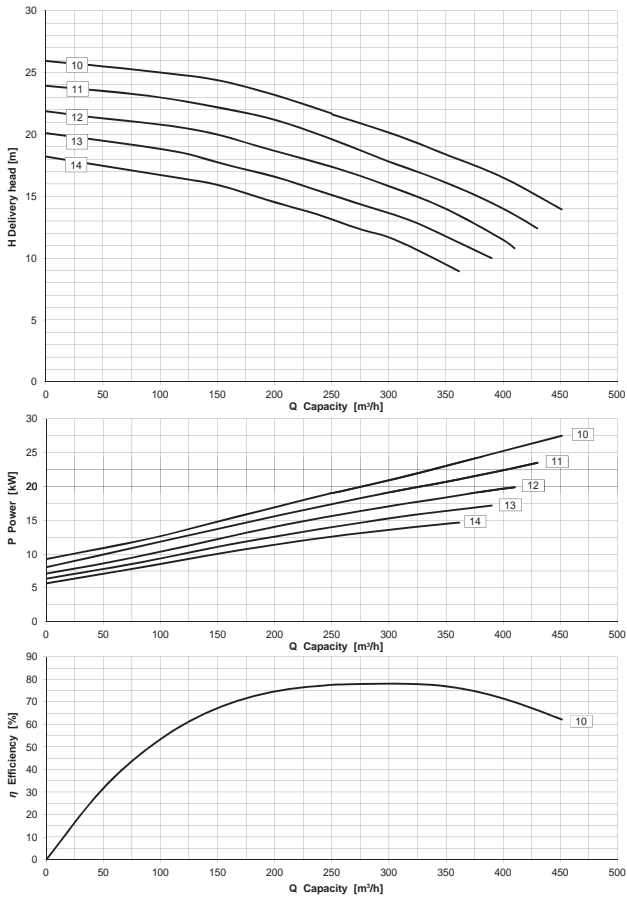
$n = 1500[\text{rpm}]$



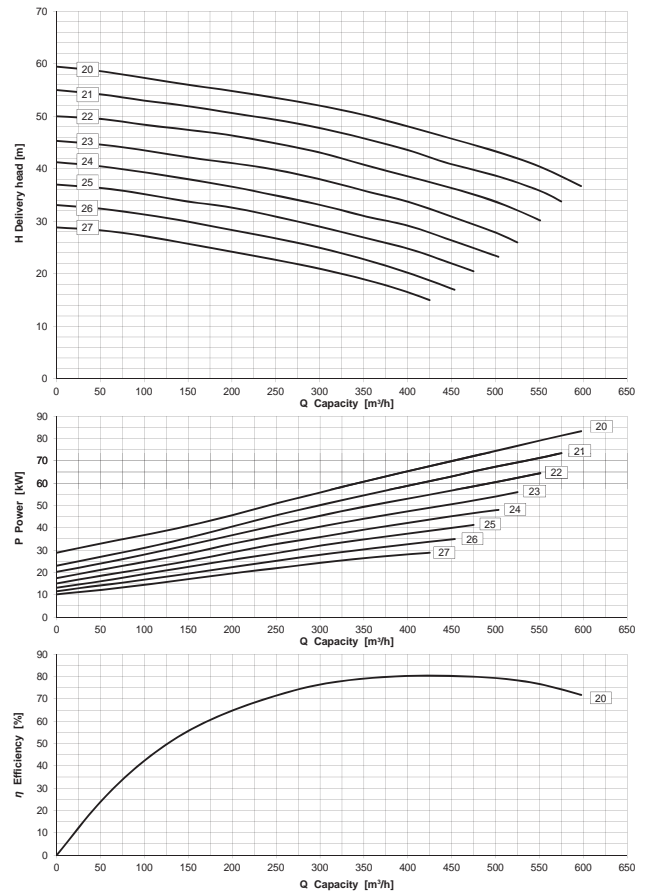
# FZ TYPE SINGLE-STAGE PUMPS

## Characteristics

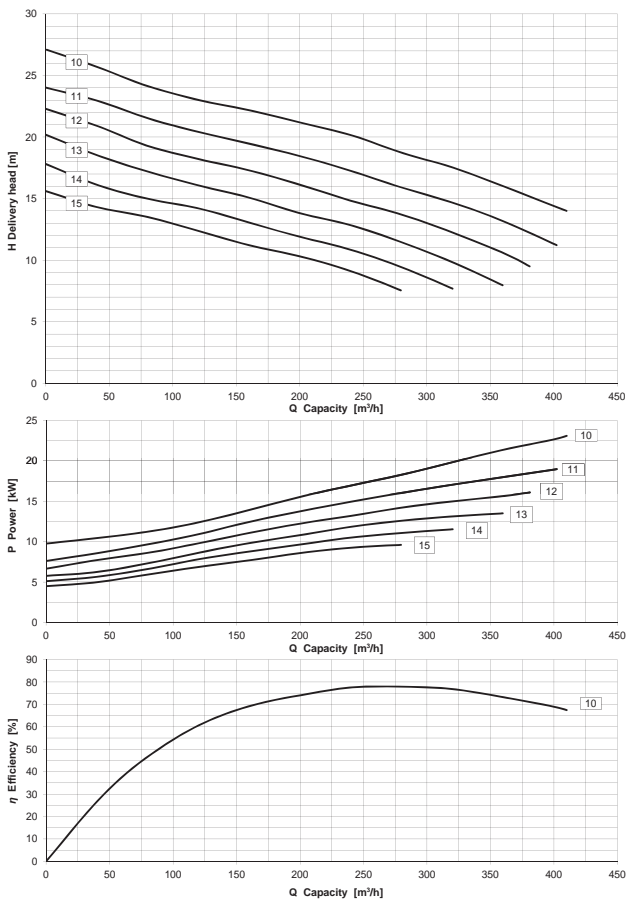
FZB.5.10-14 pump characteristics  $n = 1000[\text{rpm}]$



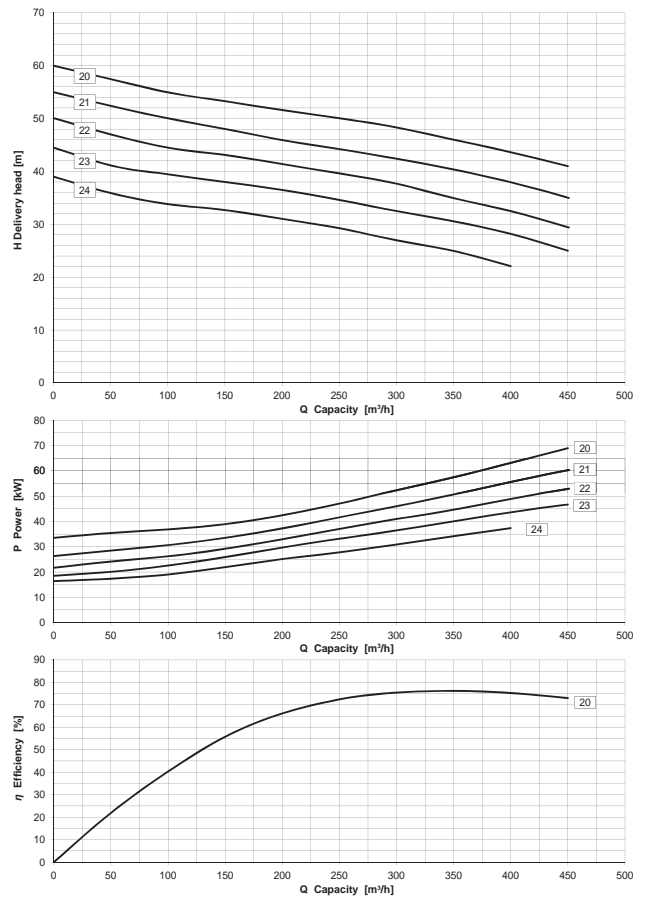
FZB.5.20-27 pump characteristics  $n = 1500[\text{rpm}]$



FZC.5.10-15 pump characteristics  $n = 1000[\text{rpm}]$



FZC.5.20-24 pump characteristics  $n = 1500[\text{rpm}]$

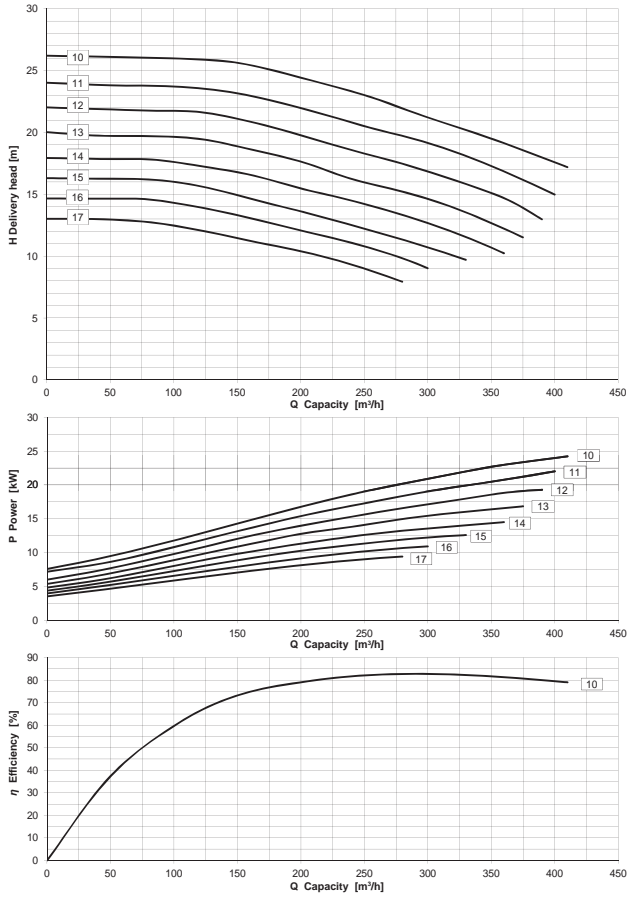


# FZ TYPE SINGLE-STAGE PUMPS

## Characteristics

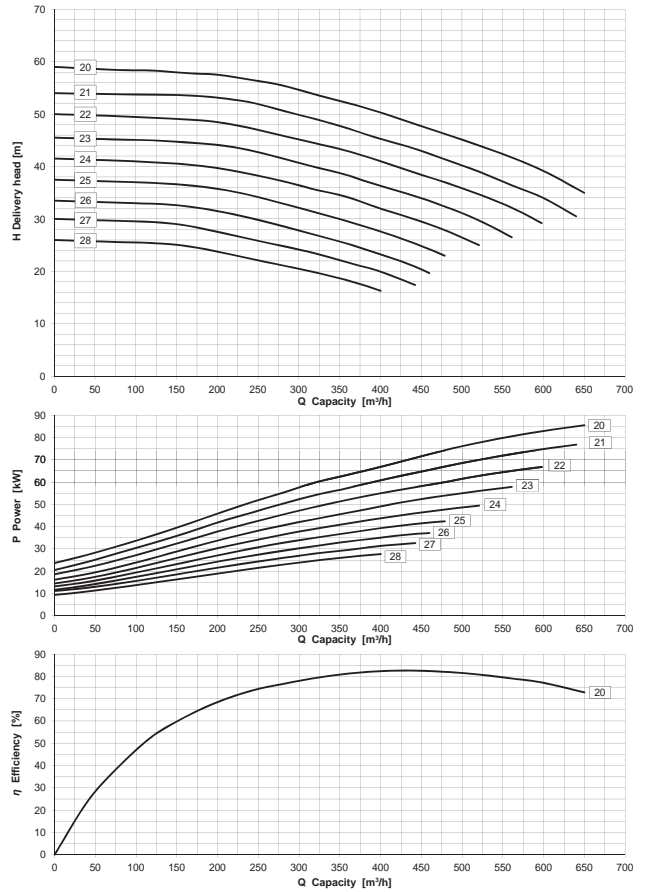
FZP.5.10-17 pump characteristics

$n = 1000$ [rpm]



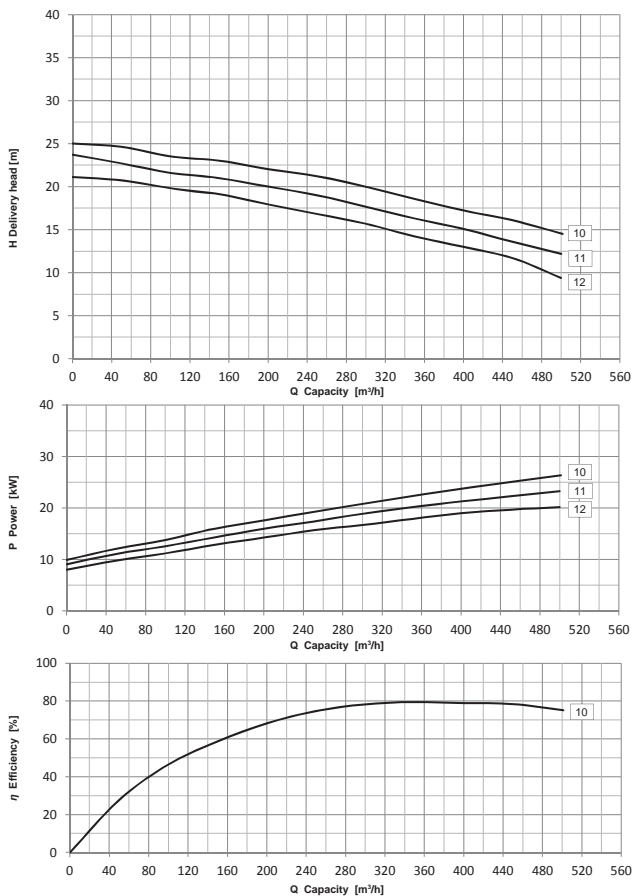
FZP.5.20-28 pump characteristics

$n = 1500$ [rpm]



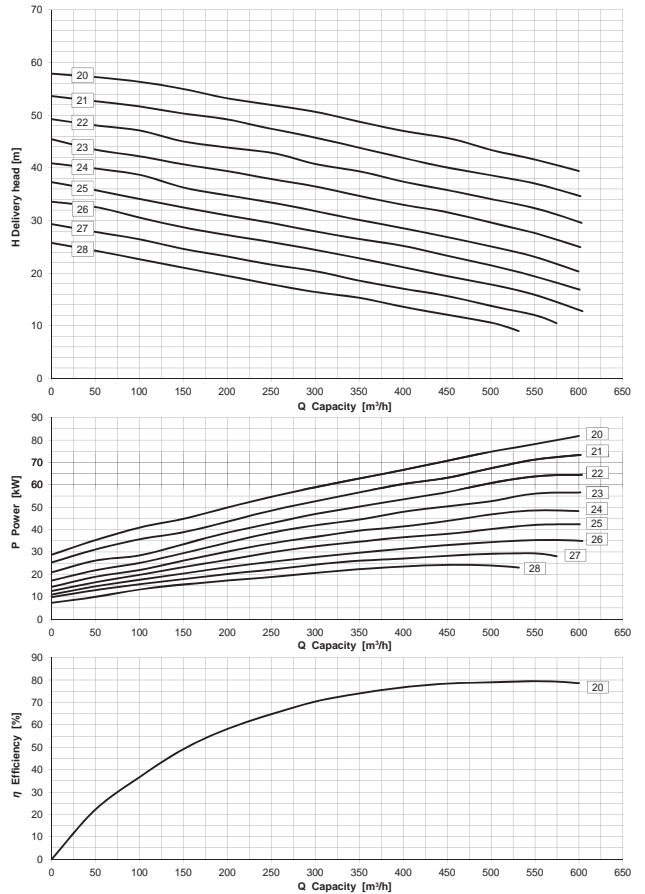
FZB.6.10-12 pump characteristics

$n = 1000$ [rpm]



FZB.6.20-28 pump characteristics

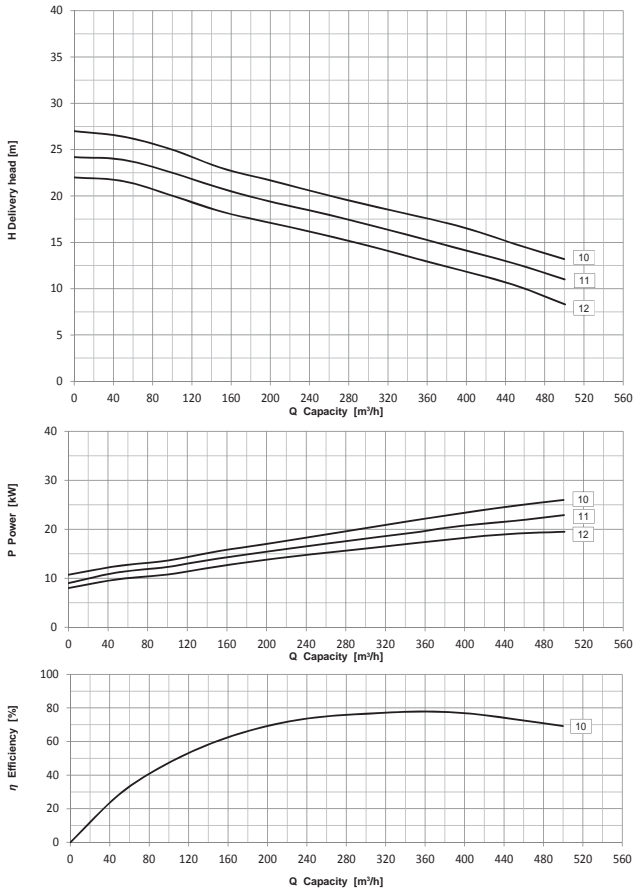
$n = 1500$ [rpm]



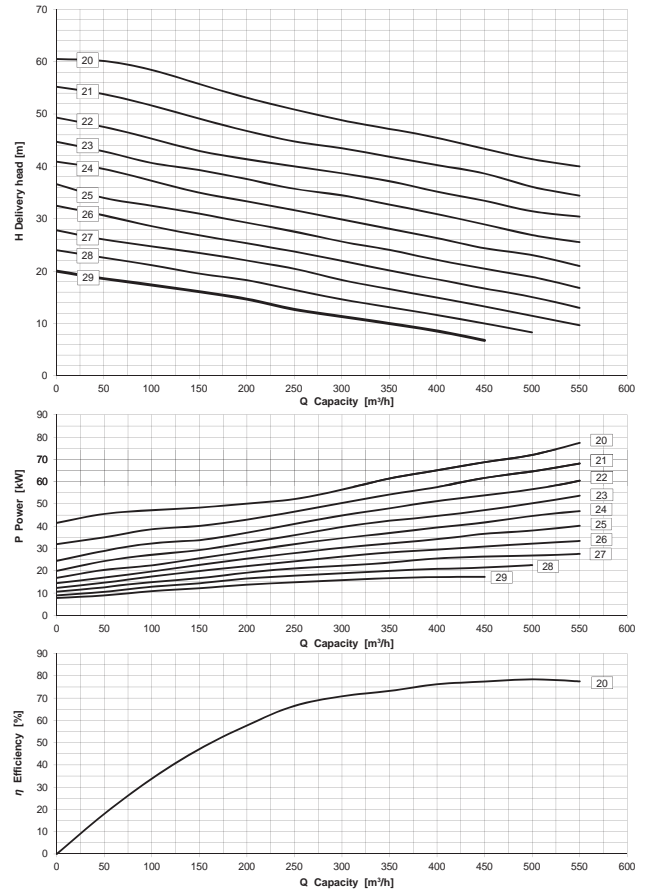
# FZ TYPE SINGLE-STAGE PUMPS

## Characteristics

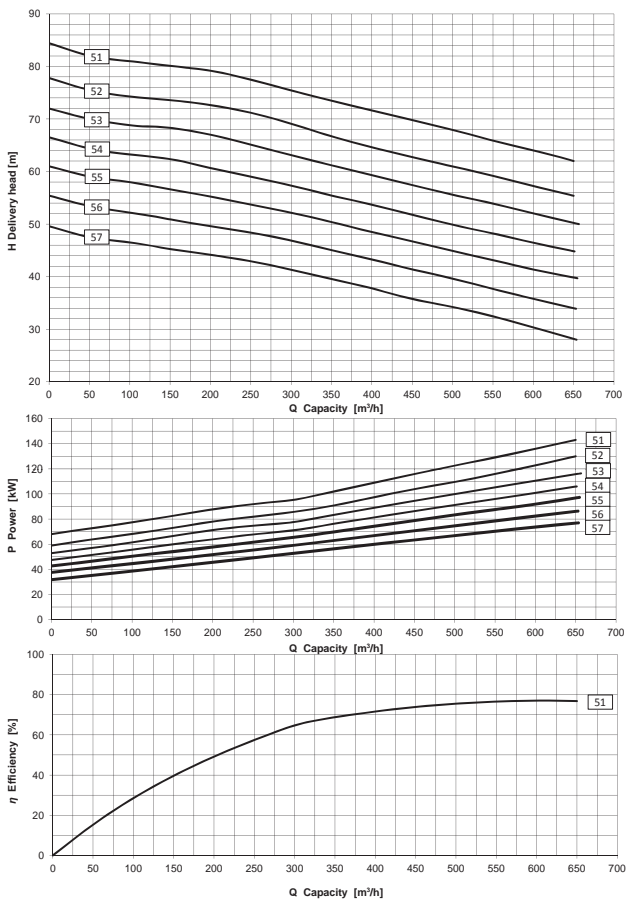
FZC.6.10-12 pump characteristics  $n = 1000[rpm]$



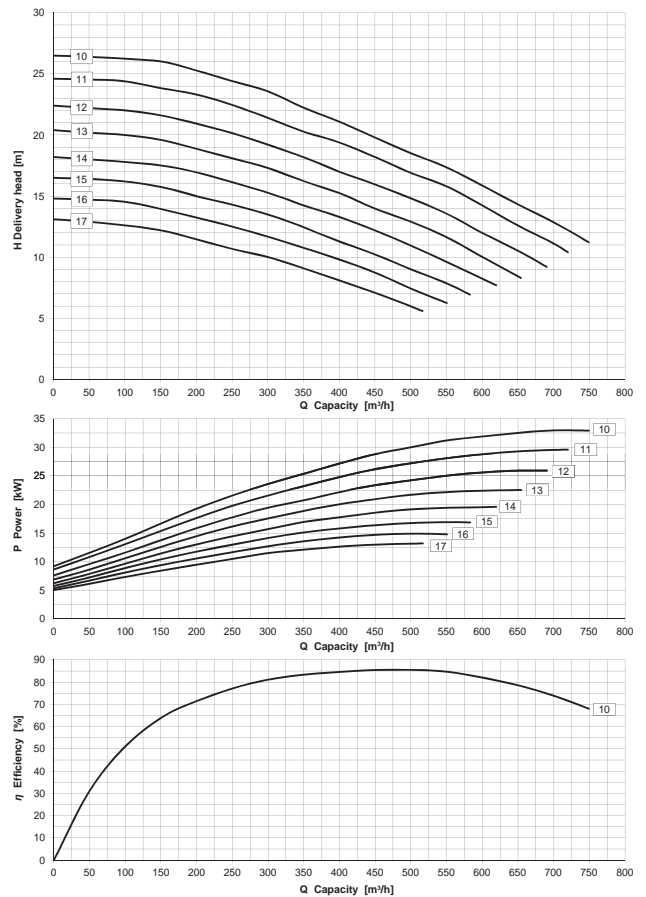
FZC.6.20-29 pump characteristics  $n = 1500[rpm]$



FZC.6.51-57 pump characteristics  $n = 1500[rpm]$



FZP.6.10-17 pump characteristics  $n = 1000[rpm]$



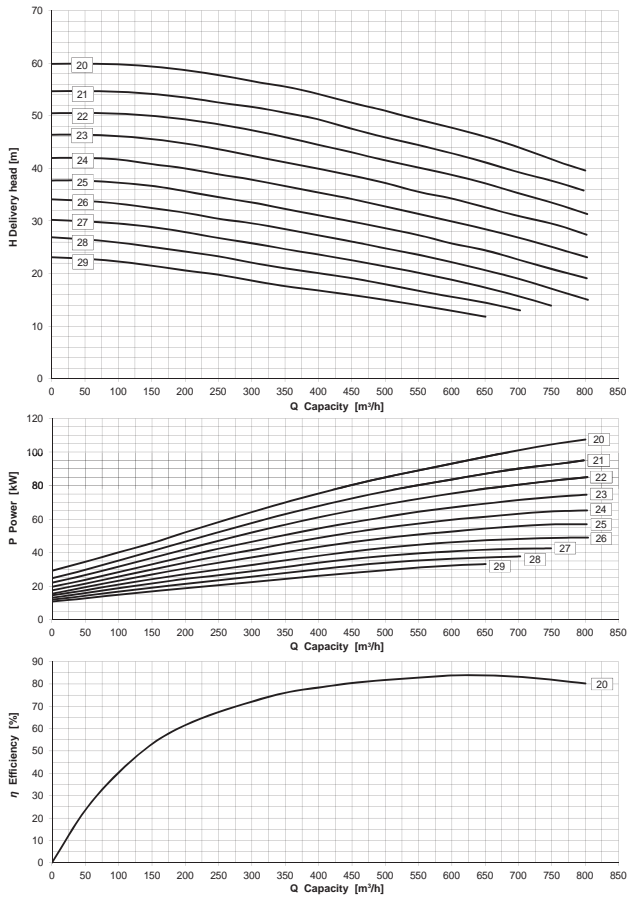


# FZ TYPE SINGLE-STAGE PUMPS

## Characteristics

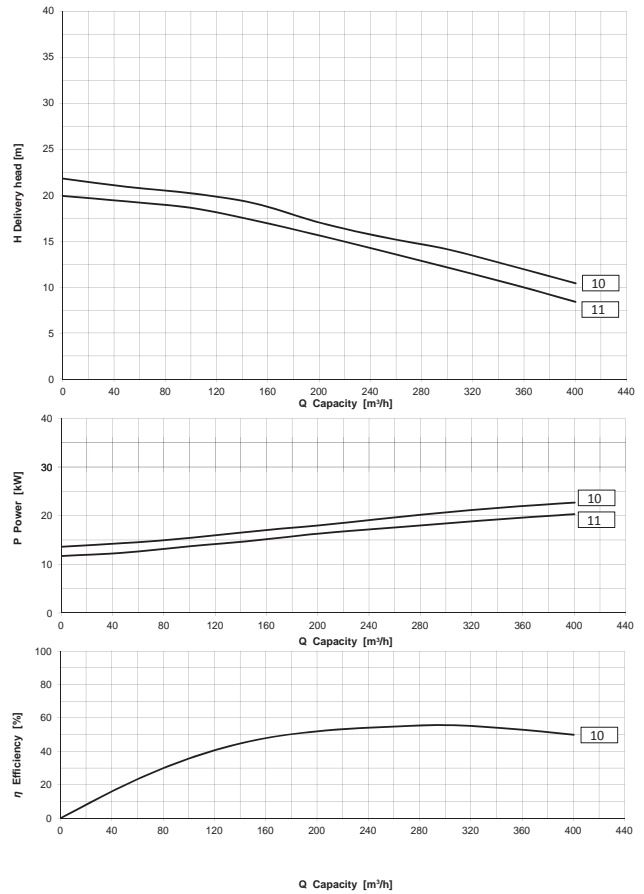
FZP.6.20-29 pump characteristics

$n = 1500 [rpm]$



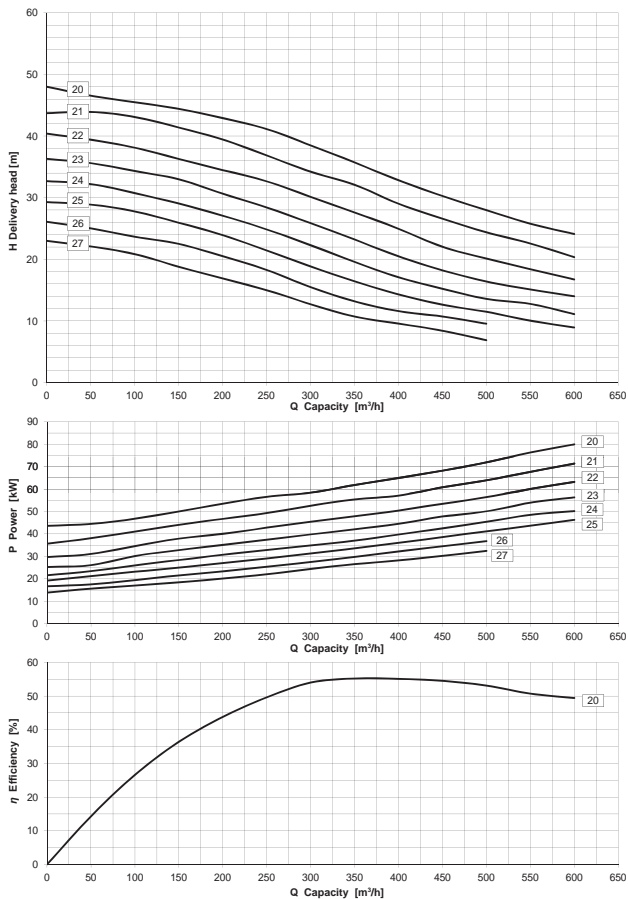
FZV.6.10-11 pump characteristics

$n = 1000 [rpm]$



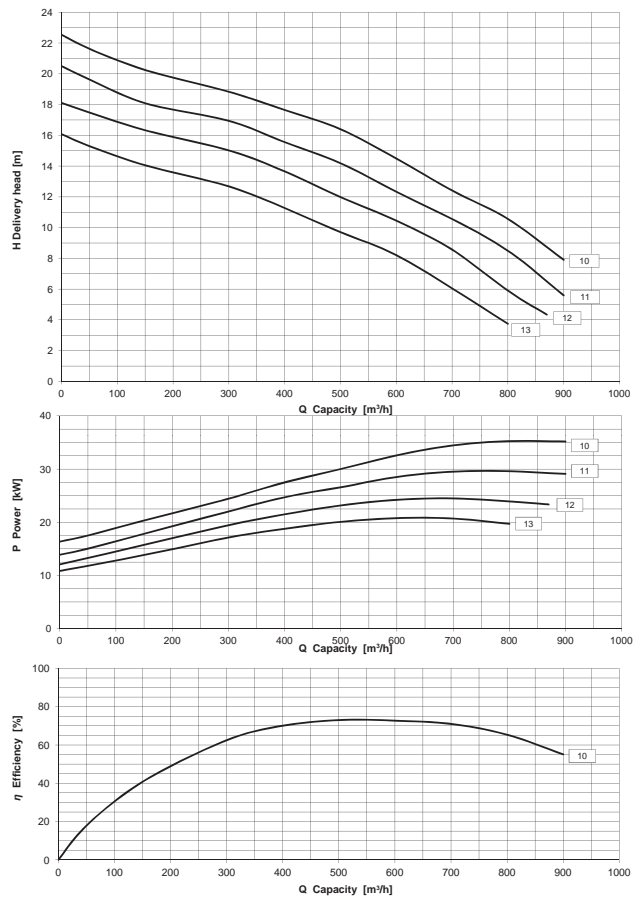
FZV.6.20-27 pump characteristics

$n = 1500 [rpm]$



FZB.7.10-13 pump characteristics

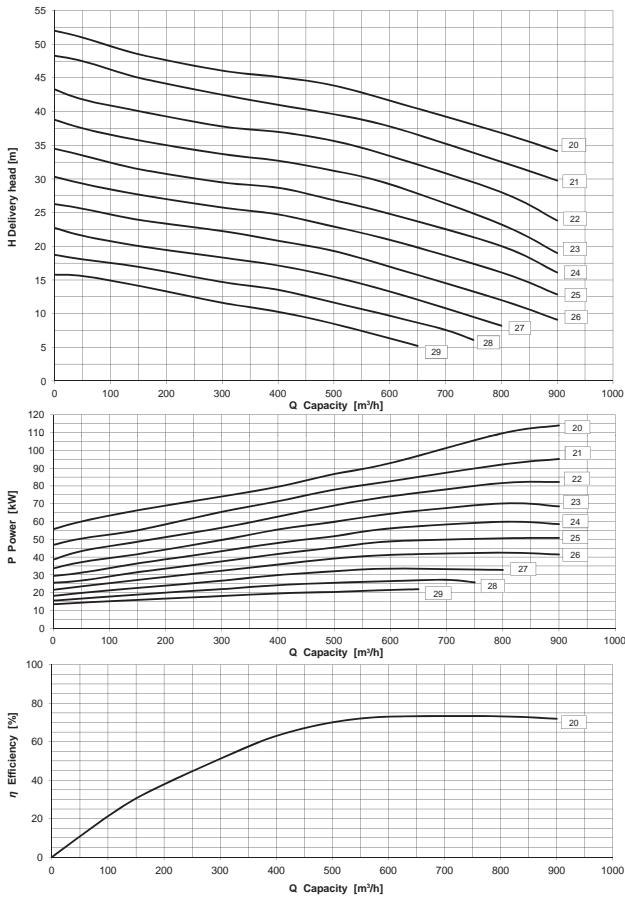
$n = 980 [rpm]$



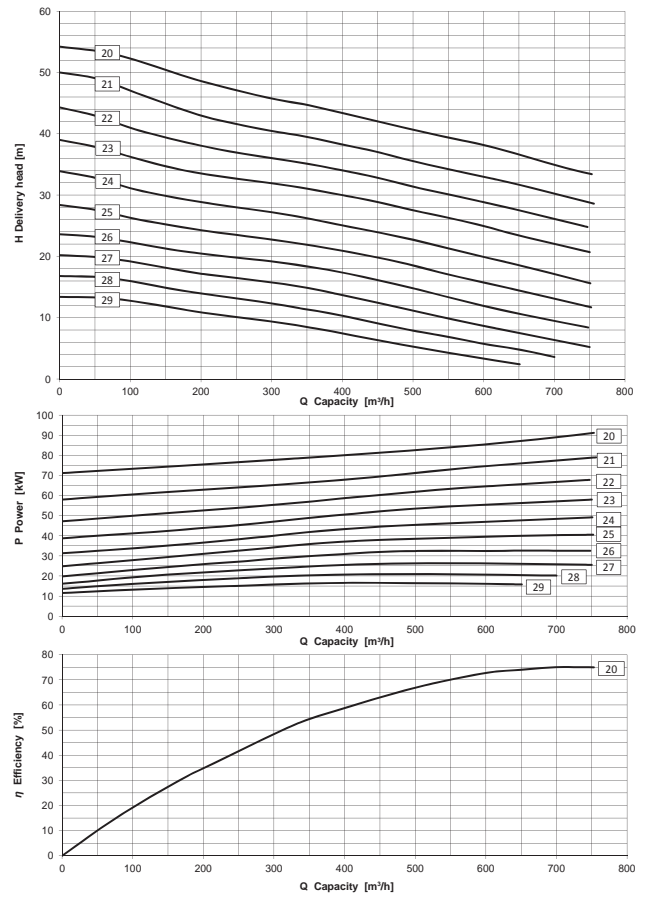
# FZ TYPE SINGLE-STAGE PUMPS

## Characteristics

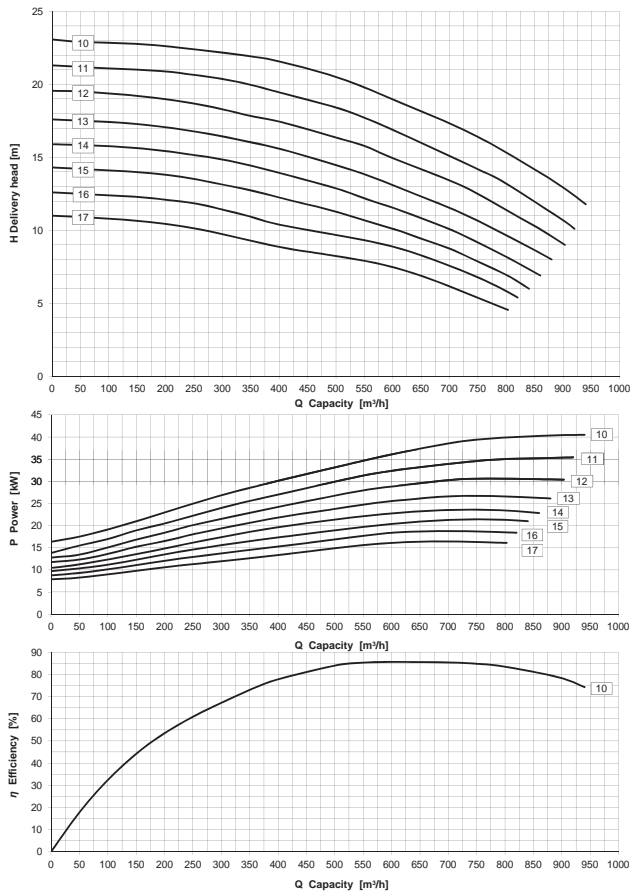
FZB.7.20-29 pump characteristics  $n = 1450[\text{rpm}]$



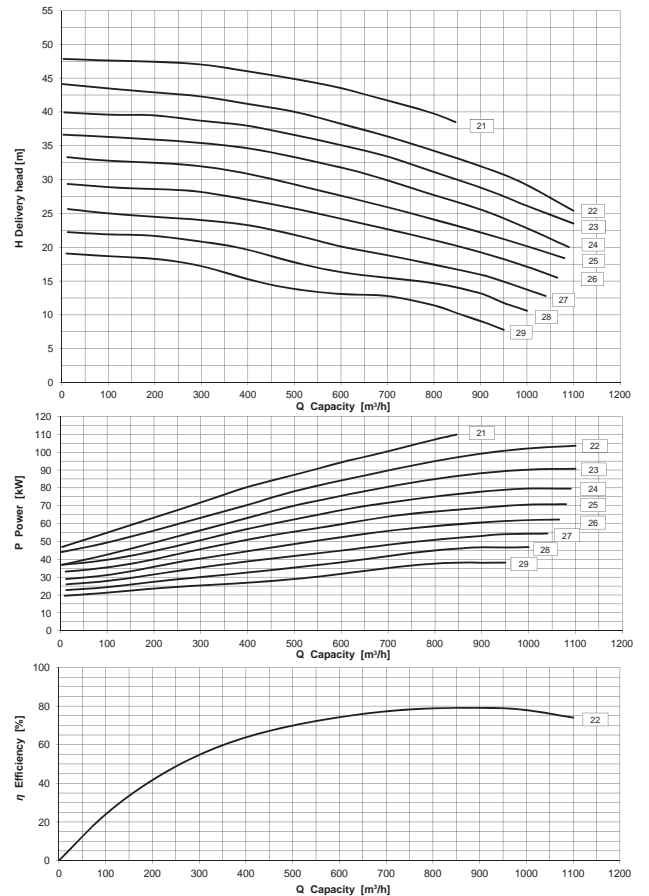
FZC.7.20-29 pump characteristics  $n = 2900[\text{rpm}]$



FZR.7.10-17 pump characteristics  $n = 1000[\text{rpm}]$



FZR.7.21-29 pump characteristics  $n = 1500[\text{rpm}]$

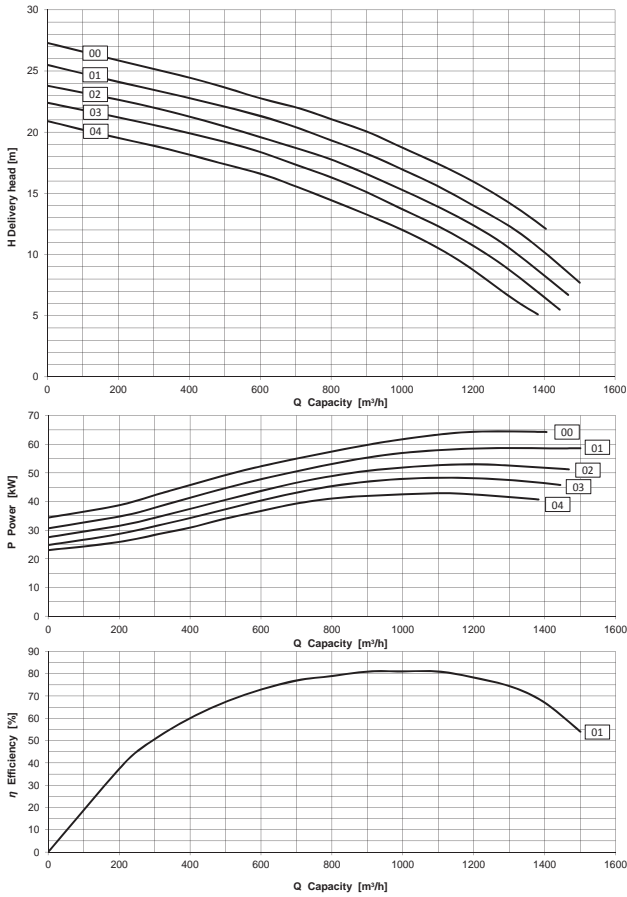


# FZ TYPE SINGLE-STAGE PUMPS

## Characteristics

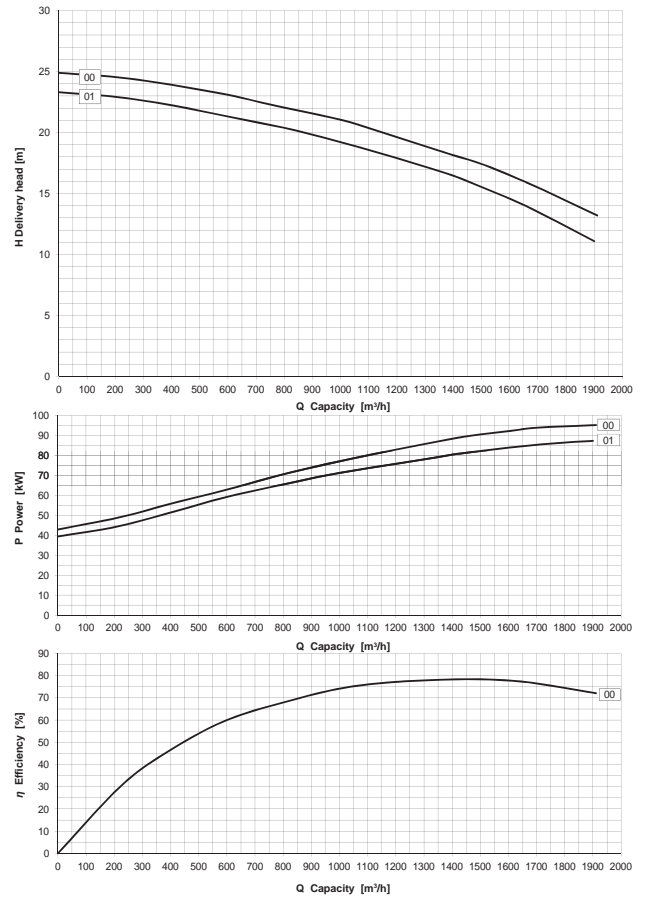
FZC.8.00-04 pump characteristics

$n = 750[\text{rpm}]$



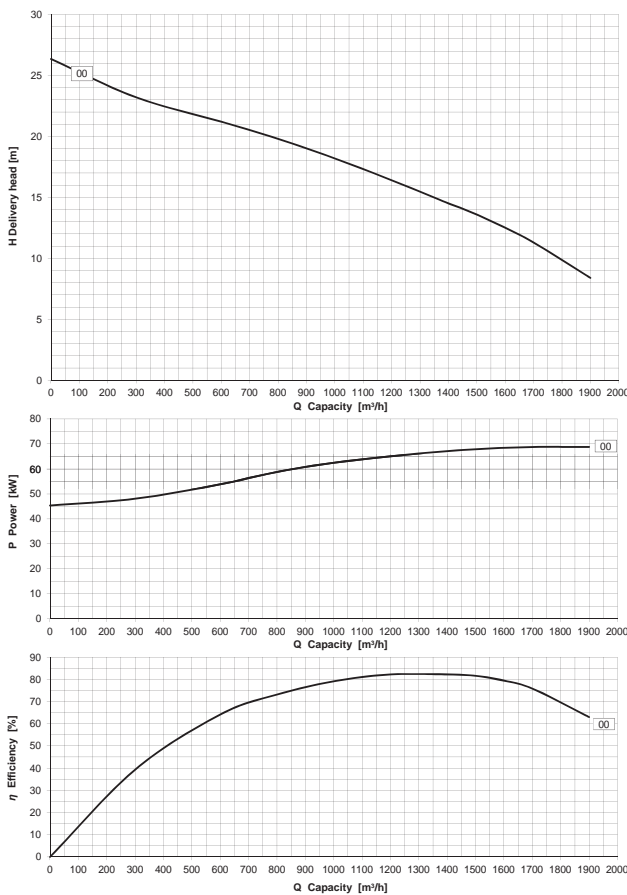
FZB.9.00-01 pump characteristics

$n = 750[\text{rpm}]$



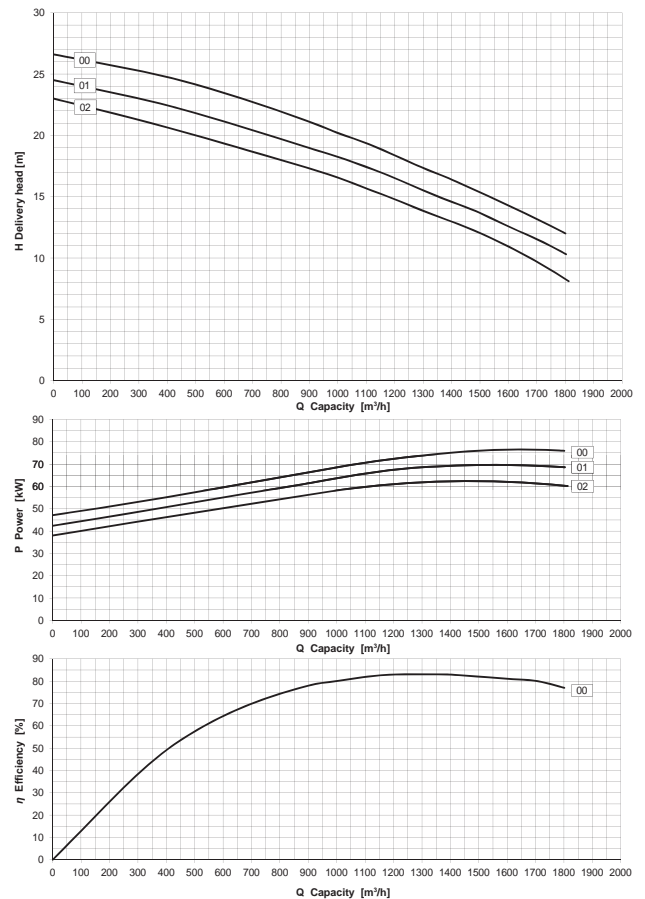
FZC.9.00 pump characteristics

$n = 750[\text{rpm}]$



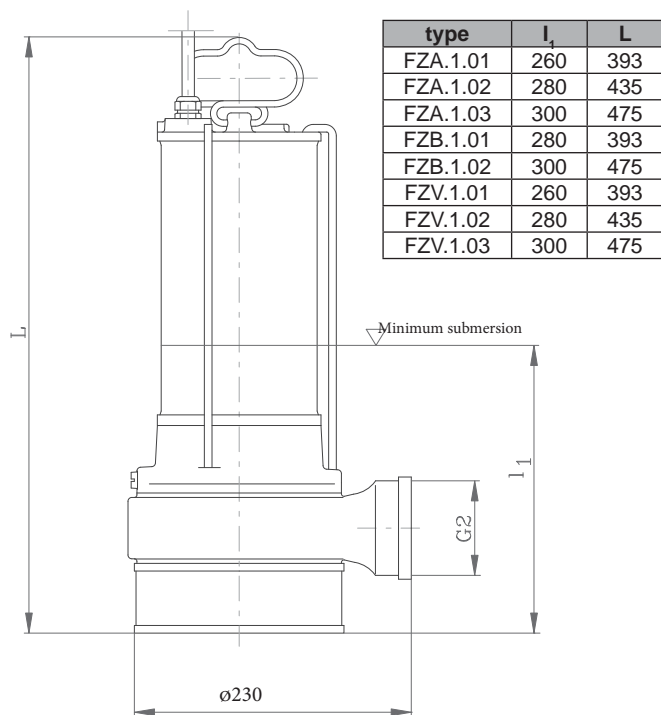
FZP.9.00-02 pump characteristics

$n = 750[\text{rpm}]$

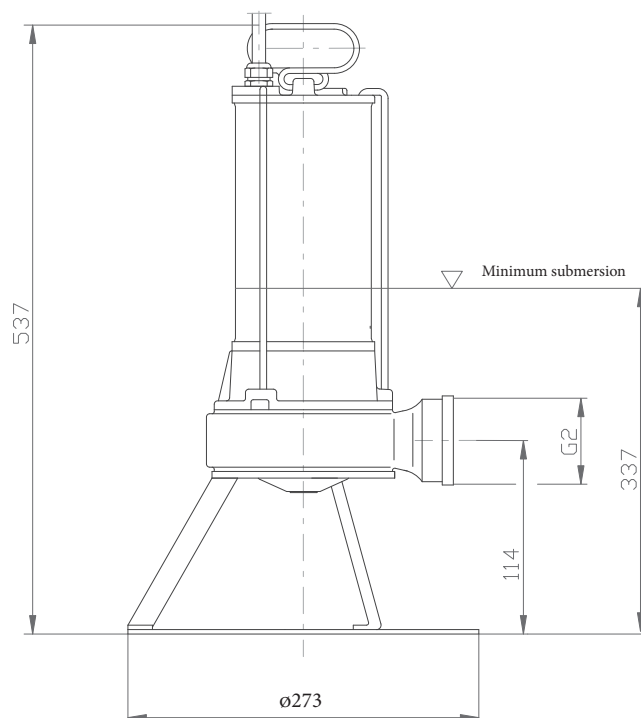


# FZ TYPE SINGLE-STAGE PUMPS

## Dimensions of FZA.1, FZB.1, FZV.1, FZR.1 pumps

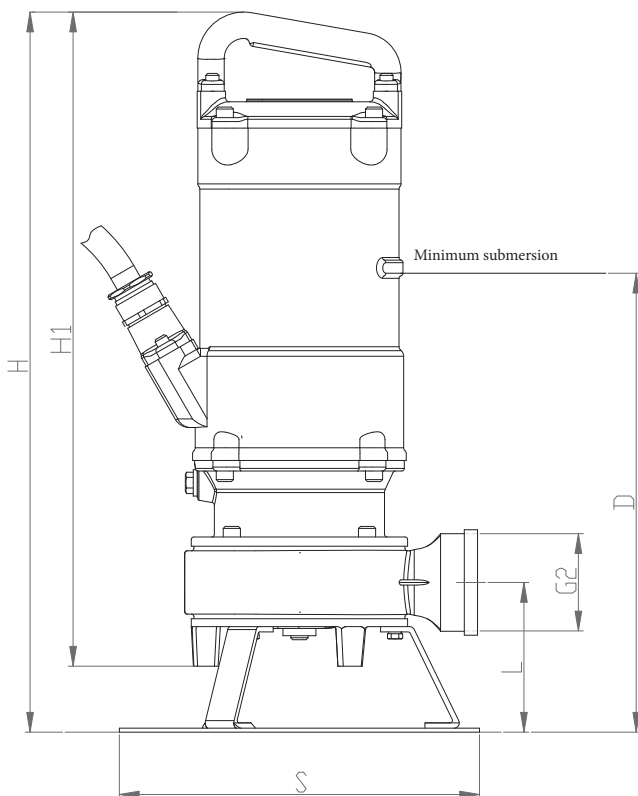


Submersible pump type FZ.1



## Dimensions of FZX.1, FZY.1 pumps

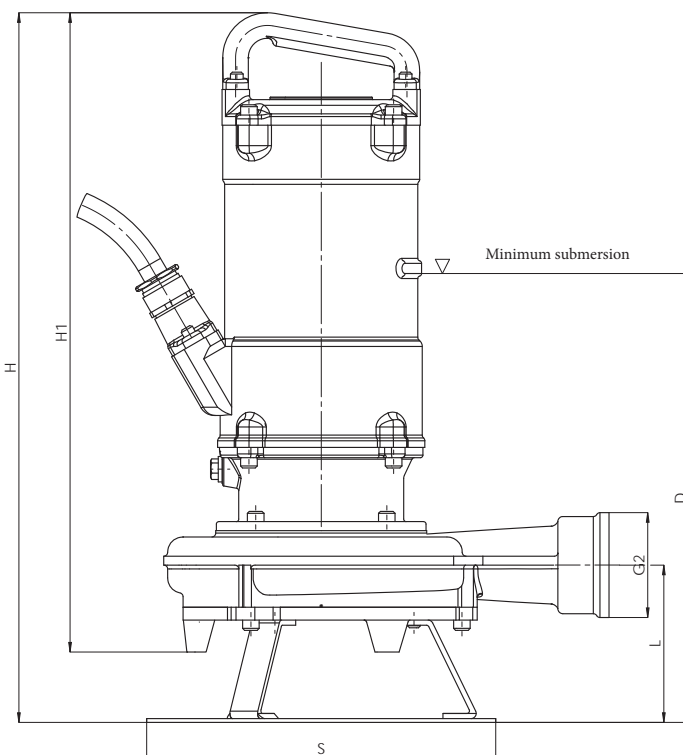
Submersible pump type FZX.1.10 to FZX.1.22



DIMENSIONS				
H1	H	L	S	D
496	546	114	273	346

H1 - height without base

Submersible pump type FZX.1.30-33, FZY.1.30-33



DIMENSIONS				
H1	H	L	S	D
500	550	165	273	350

H1 - height without base

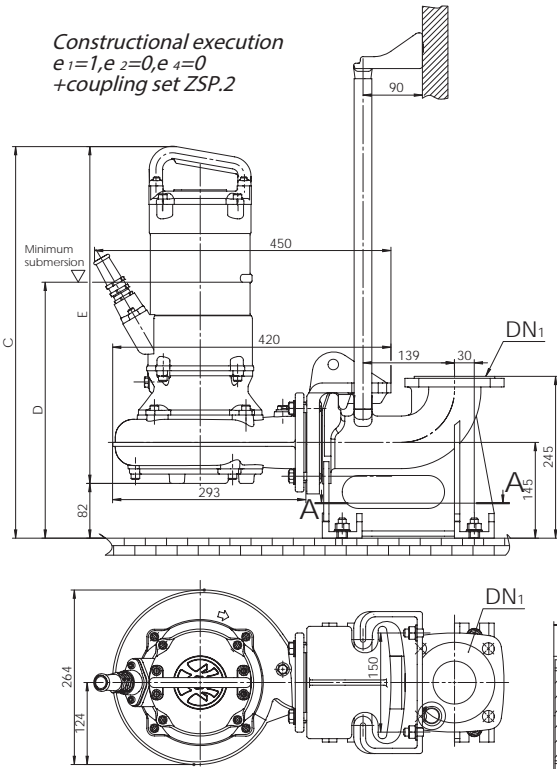
Pump with a impeller opened on one side with a cutting blade; pumping body with a 2" threaded outlet enabling pump fixing on the ZSP.0 and ZSP.1 coupling sets

# FZ TYPE SINGLE-STAGE PUMPS

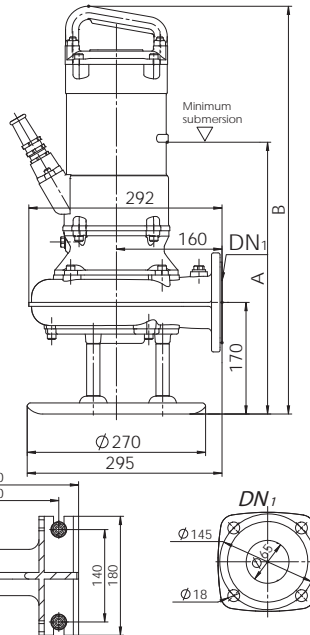
## Dimensions of FZB.2, FZD.2, FZE.2, FZV.2 pumps

(submersible liquid-cooled versions)

Constructional execution  
 $e_1=1, e_2=0, e_4=0$   
 +coupling set ZSP.2



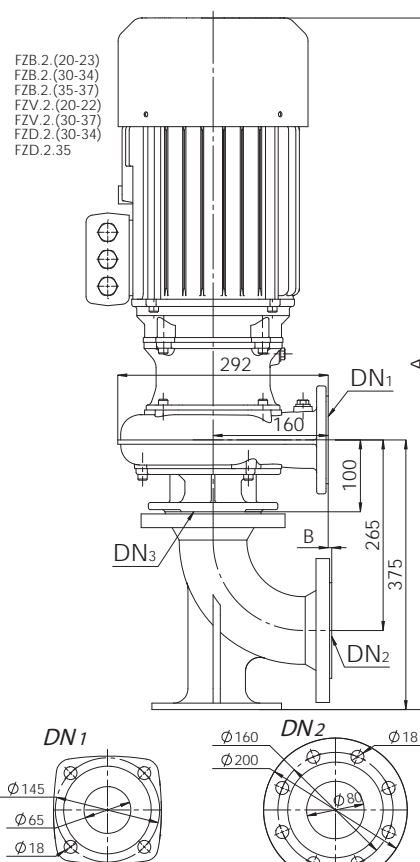
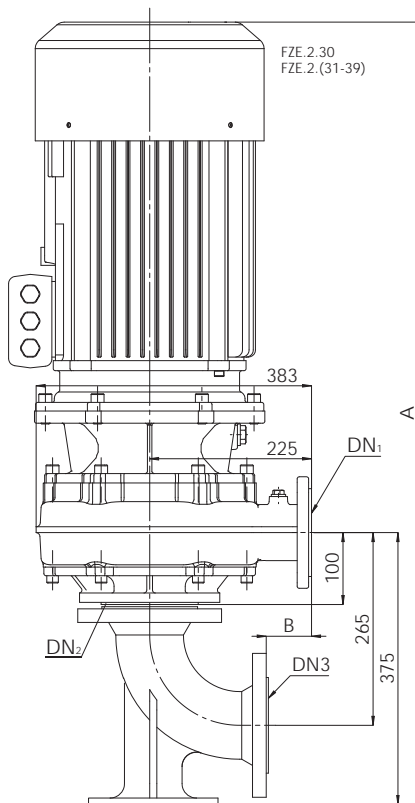
Constructional execution  
 $e_1=1, e_2=0, e_4=1$



Size	FZB.2.(20-23), FZB.2.(35-37), FZV.2.(20-22)	FZB.2.(30-34), FZV.2.(30-37)	FZE.2.(30)	FZE.2.(31-39)
A	414	518	590	561
B	618	786	898	830
C	170	170	193	193
D	270	270	350	350
E	292	292	383	383
F	180	180	225	225
G	295	295	400	400
H	592	762	850	782
I	390	490	542	513
J	510	680	784	715
K	82	82	66	67
L	293	293	386	386
M	420	420	513	513
N	450	450	588	567
O	264	264	315	315
P	124	124	158	158

(vertical operation air-cooled versions)

Constructional execution  $e_1=4, e_2=1$



size	FZB.2.(30-31) FZV.2.(30-34) FZD.2.(30-34)	FZB.2.(32-34) FZV.2.(35-37) FZD.2.35	FZB.2.(20-23) FZV.2.(35-37) FZV.2.(20-22)	FZE.2.30	FZE.2.31-39
A	962	924	792	1088	942
B	5	5	5	63	60

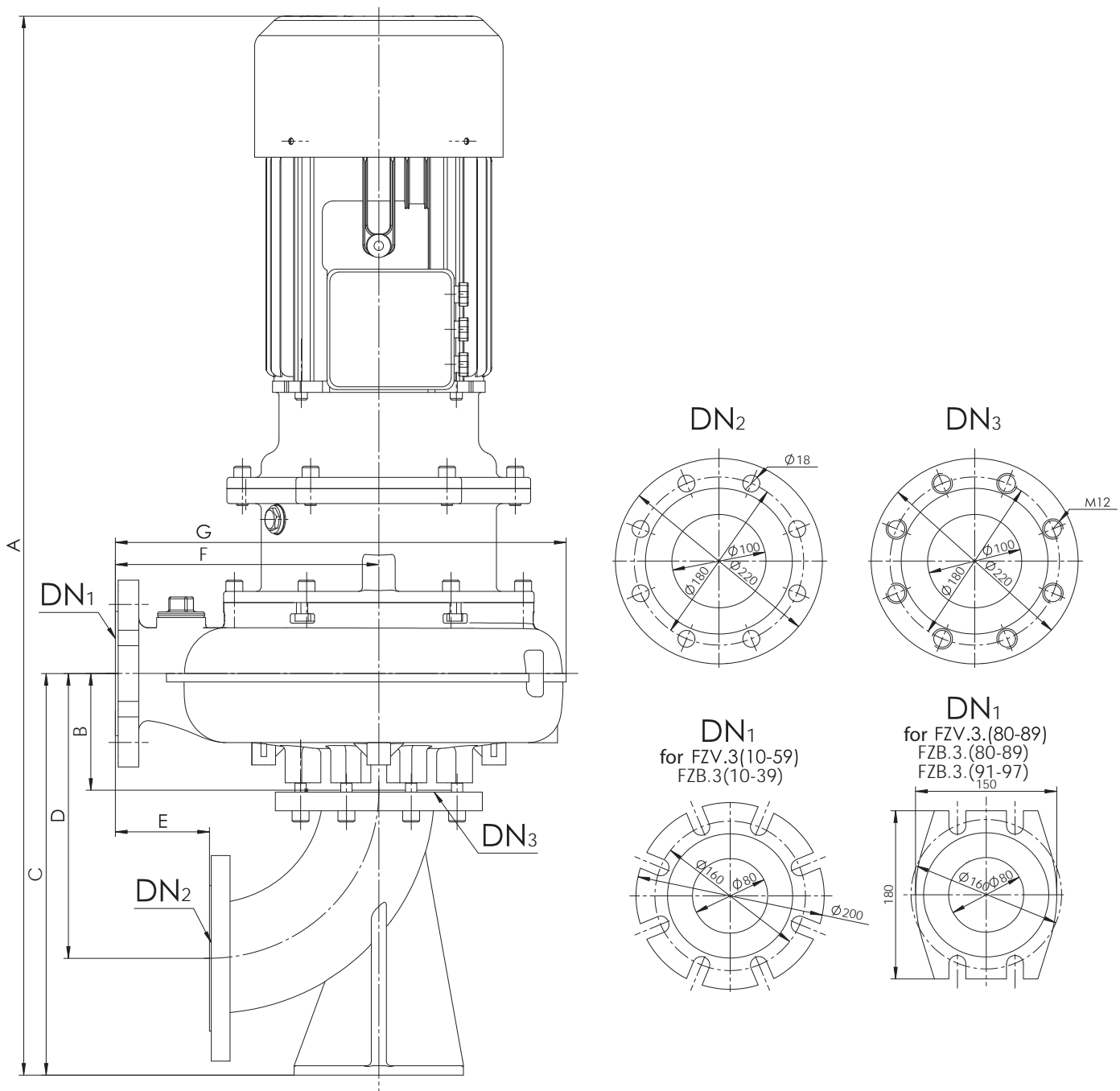
# FZ TYPE SINGLE-STAGE PUMPS

## Dimensions of FZB.3, FZE.3, FZV.3 pumps

(vertical operation air-cooled versions)

Constructional execution  $e_1=4, e_2=1$

size	FZB.3.(10-12) FZB.3.(20-25) FZC.3.(10-12) FZC.3.(20-26) FZV.3.(10-13) FZV.3.(20-27) FZV.3.(40-47) FZV.3.(55-59)	FZB.3.(13-15) FZB.3.(26-29) FZC.3.(14-17) FZC.3.(28-29) FZV.3.(14-17) FZV.3.(28-29) FZV.3.(48-49)	FZB.3.(30-34) FZC.3.(30-33) FZV.3.(30-33)	FZB.3.(35-39) FZV.3.(34-39)	FZB.3.(80-81) FZV.3.(81-84)	FZB.3.(82-86) FZV.3.(85-89)	FZB.3.(90-92)	FZB.3.93	FZB.3.(94-97)	FZC.3.(34-39)	FZE.3.(30-33)	FZE.3.(34-39)
A	1134	1096	1260	1203	1000	960	1178	1135	1144	1168	1158	1055
B	125	125	125	125	125	125	125	125	125	125	125	125
C	430	430	430	430	430	430	430	430	430	430	430	430
D	305	305	305	305	305	305	305	305	305	305	305	305
E	100	100	100	100	45	45	45	45	45	100	100	100
F	280	280	280	280	225	225	225	225	225	280	280	280
G	476	476	476	476	390	390	390	390	390	476	460	460

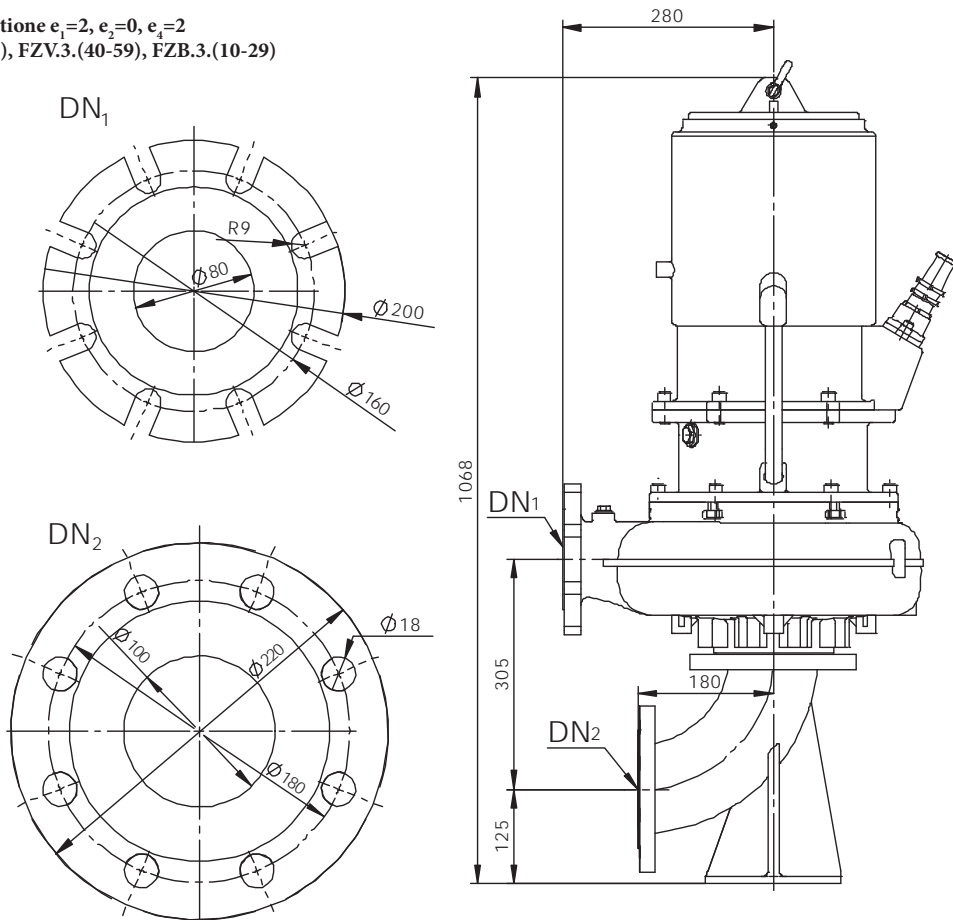


# FZ TYPE SINGLE-STAGE PUMPS

## Dimensions of FZB.3, FZV.3 pumps

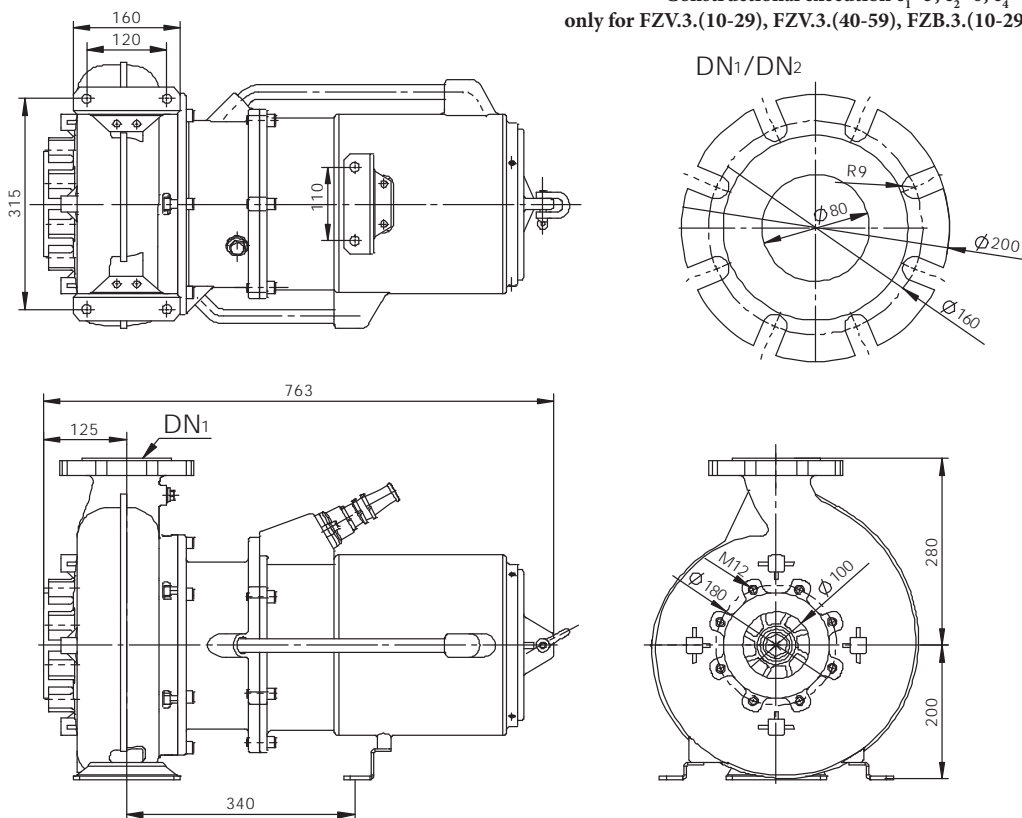
(vertical versions with internal cooling system by pumped liquid)

Constructional execution  $e_1=2, e_2=0, e_3=2$   
only for FZV.3.(10-29), FZV.3.(40-59), FZB.3.(10-29)



(vertical versions with internal cooling system by pumped liquid)

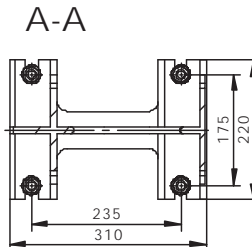
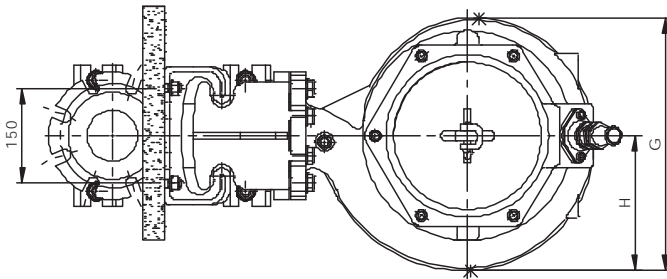
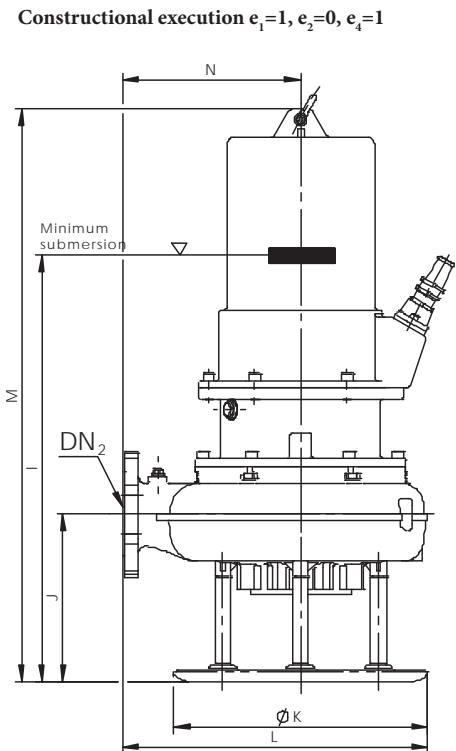
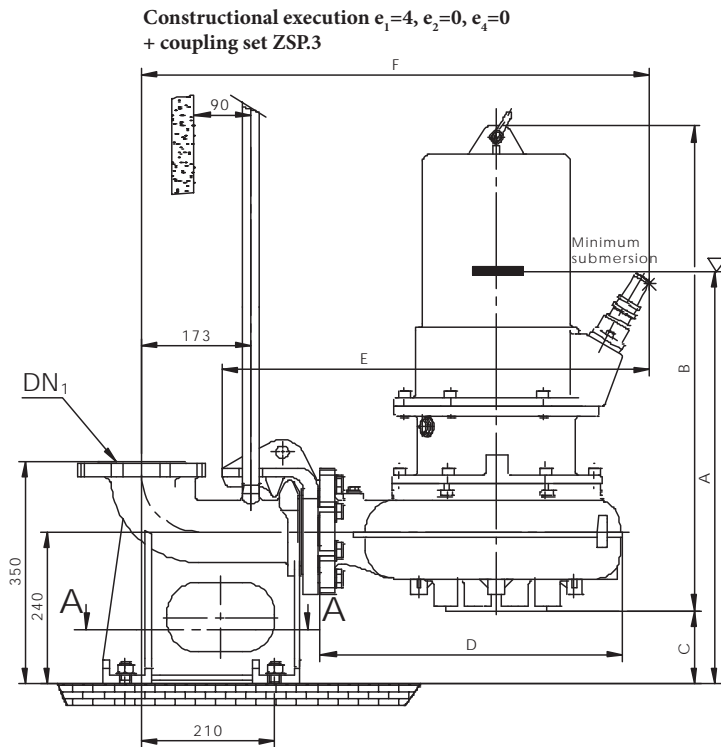
Constructional execution  $e_1=3, e_2=0, e_4=0$   
only for FZV.3.(10-29), FZV.3.(40-59), FZB.3.(10-29)



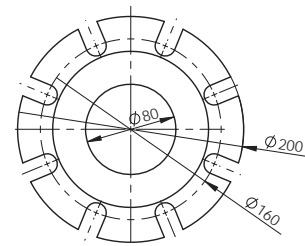
# FZ TYPE SINGLE-STAGE PUMPS

## Dimensions of FZB.3, FZC.3, FZE.3, FZV.3 pumps

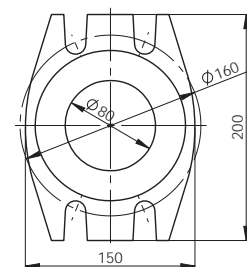
(submersible liquid-cooled versions)



size	FZV.3.(10-29) FZV.3.(40-59) FZB.3.(10-29) FZC.3.(10-29)	FZV.3.(30-39) FZB.3.(30-39) FZC.3.(30-33)	FZV.3.(80-89) FZB.3.(80-89)	FZB.3.(90-93)	FZB.3.(94-97)	FZC.3.(34-36)	FZE.3.(30-39)
A	650	698	575	680	670	665	665
B	763	852	636	835	780	820	772
C	115	115	139	139	139	115	140
D	476	476	391	391	391	476	460
E	673	680	558	558	558	673	665
F	800	807	685	685	685	800	792
G	398	398	330	330	330	398	365
H	212	212	180	180	180	212	166
I	670	721	549	650	614	689	646
J	263	263	214	214	214	263	225
K	Ø 400	Ø 400	Ø 350	Ø 350	Ø 350	Ø 400	Ø 350
L	480	480	400	400	400	480	455
M	900	988	750	948	862	916	895
N	280	280	225	225	225	280	280



DN<sub>1</sub>  
DN<sub>2</sub> for FZV.3.(10-59)  
and FZB.3.(10-39)

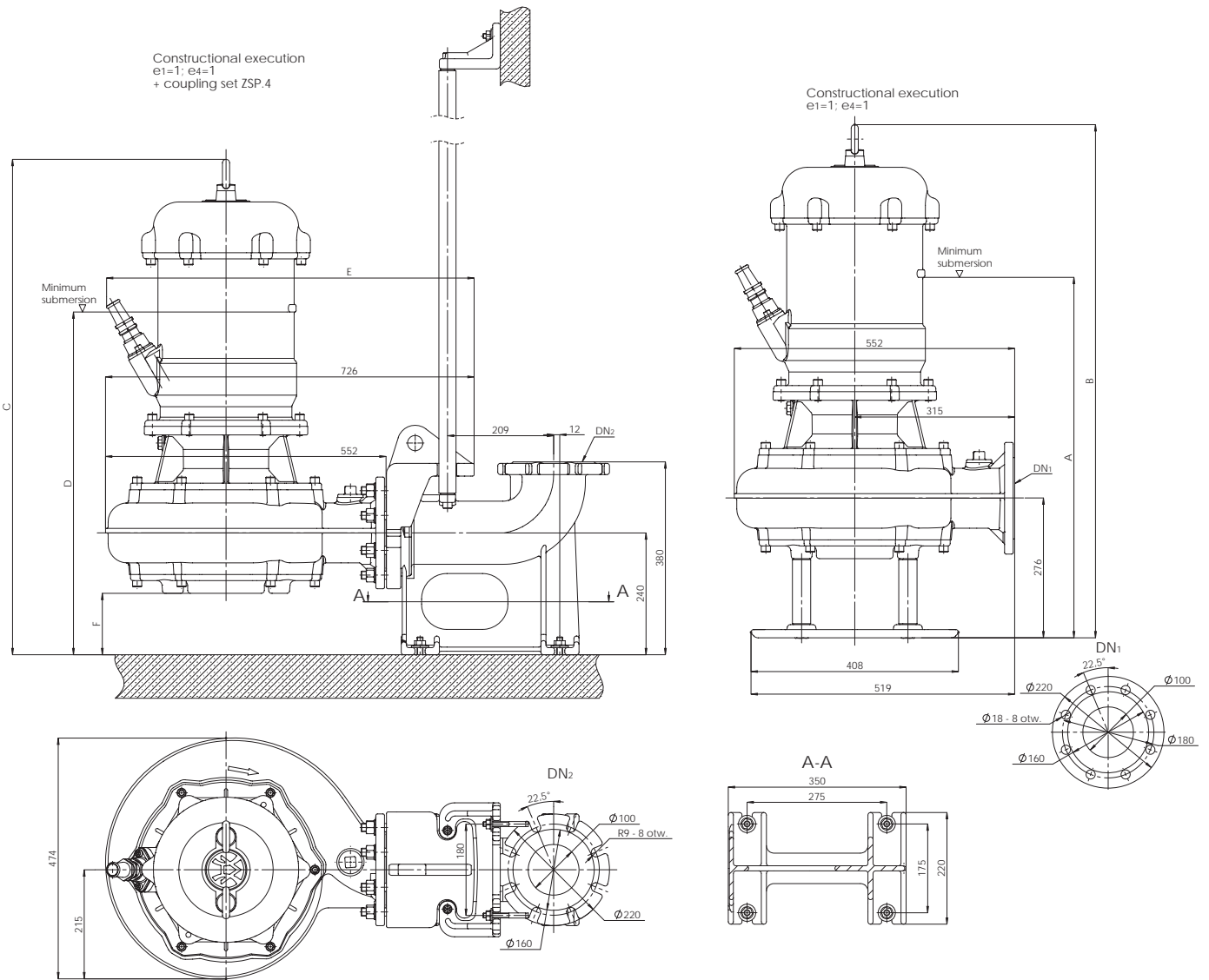


DN<sub>2</sub> for FZV.3.(80-89)  
and FZB.3.(80-89)  
and FZB.3.(91-97)



# FZ TYPE SINGLE-STAGE PUMPS

## Dimensions of FZB.4, FZC.4, FZV.4 pumps



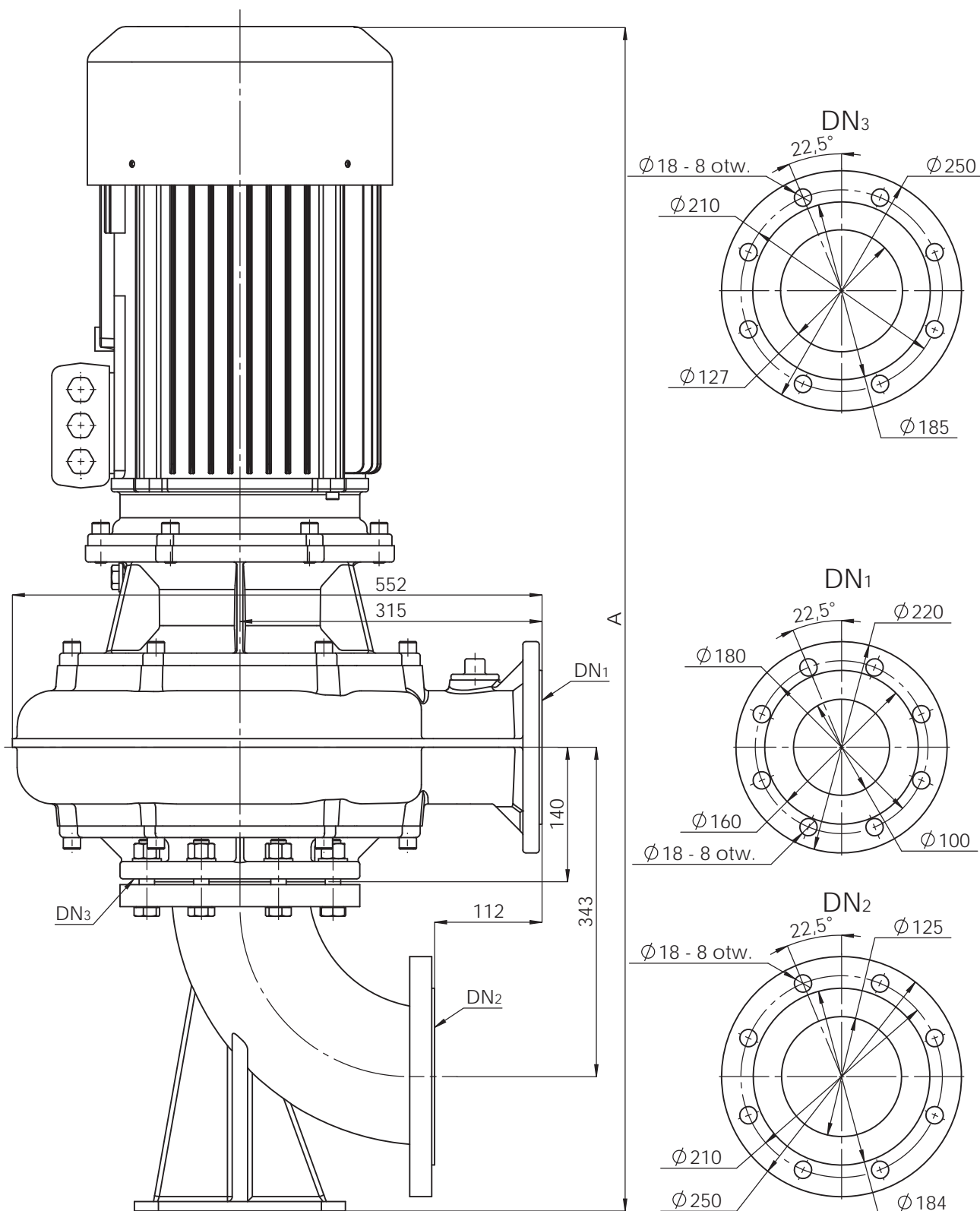
Size	FZB.4. (20-23) FZV.4. (20-23) FZC.4. (20-23)	FZB.4. (24-25) FZV.4. (24-25) FZC.4. (24-25)	FZB.4. (26-29) FZV.4. (26-29) FZC.4. (26-28)
A	742	710	695
B	1094	1011	925
C	1059	976	890
D	707	675	660
E	-	724	730

Size	FZB.4. (20-29)	FZV.4. (20-29)	FZC.4. (20-28)
F	113	113	121

# FZ TYPE SINGLE-STAGE PUMPS

## Dimensions of FZB.4, FZC.4, FZV.4 pumps

Constructional execution  
e1=4; e4=2

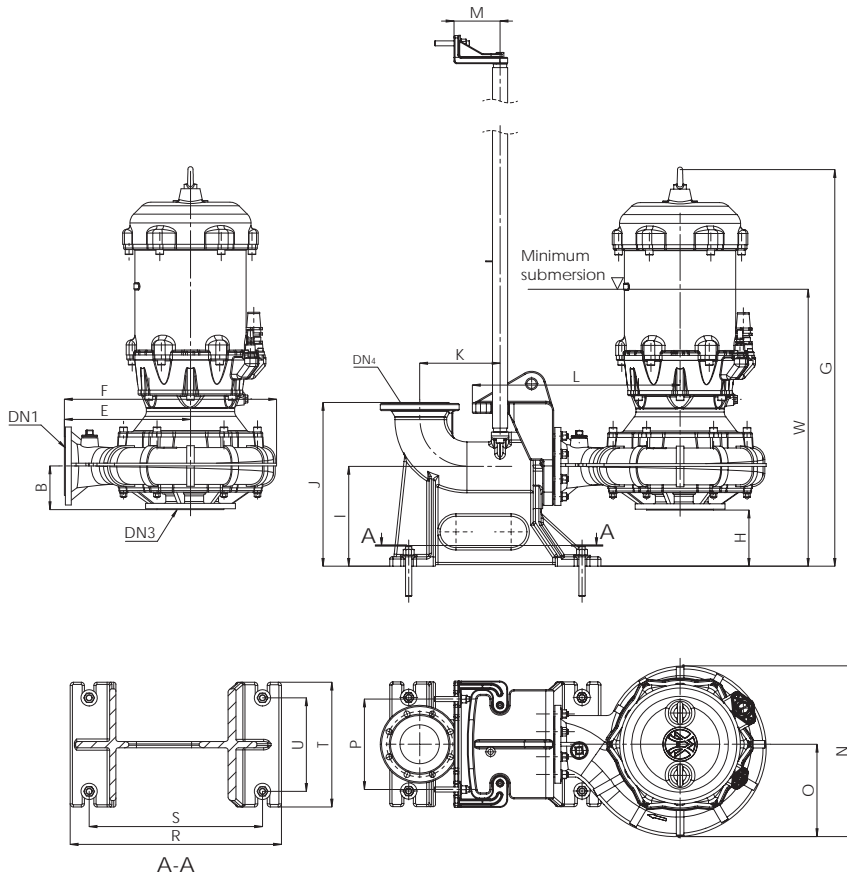


Size	FZB.4.(20-23) FZV.4.(20-23) FZC.4.(20-23)	FZB.4.(24-25) FZV.4.(24-25) FZC.4.(24-25)	FZB.4.(26-29) FZV.4.(26-29) FZC.4.(26-28)
A	1328	1235	1202

# FZ TYPE SINGLE-STAGE PUMPS

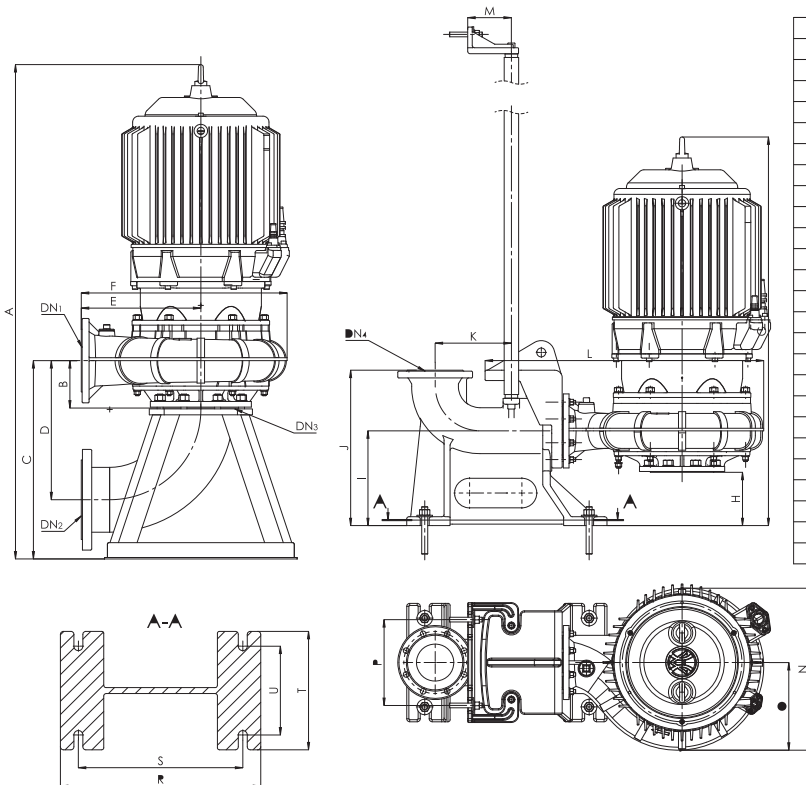
## Dimensions of FZ.5, FZ.6, FZ.7, FZ.8, FZ.9 pumps

### Constructional execution 1040



Size	Constructional execution 1040		
	FZ.5	FZ.6	FZ.7
DN <sub>1</sub>	DN125/PN10	DN150/PN10	DN200/PN10
DN <sub>2/3</sub>	DN150/PN10	DN200/PN10	DN250/PN10
A	-	-	-
B	140	160	200
C	-	-	-
D	-	-	-
E	400	400	450
F	673	688	790
DN <sub>4</sub>	DN125/PN10	DN150/PN10	DN200/PN10
G	1272	1287	1551
H	180	160	170
I	320	320	370
J	525	525	605
K	255	255	290
L	932	948	1097
M	146	146	146
N	571	586	657
O	296	311	376
P	290	290	320
R	670	670	720
S	550	550	590
T	400	400	400
U	300	300	300
W	888	895	1089

### Constructional execution 5212



Size	Constructional execution 5212				
	FZ.5	FZ.6	FZ.7	FZ.8	FZ.9
DN <sub>1</sub>	DN125/PN10	DN150/PN10	DN200/PN10	DN250/PN10	DN300/PN10
DN <sub>2/3</sub>	DN150/PN10	DN200/PN10	DN250/PN10	DN350/PN10	DN400/PN10
A	1688	1715	1860	3068	3000
B	140	160	200	370	365
C	650	670	806	1358	1373
D	415	470	586	840	905
E	400	400	450	700	700
F	673	688	790	1125	1141
DN <sub>4</sub>	DN125/PN10	DN150/PN10	DN200/PN10	DN250/PN10	DN300/PN10
G	1358	1365	1425	-	2277
H	180	160	170	-	285
I	320	320	370	-	650
J	525	525	605	-	1185
K	255	255	290	-	680
L	932	948	1097	-	1526
M	146	146	146	-	198
N	571	586	657	878	979
O	296	311	376	506	550
P	290	290	320	-	360
R	670	670	720	-	1340
S	550	550	590	-	1130
T	400	400	400	-	550
U	300	300	300	-	400
W	-	-	-	-	-



## SAFETY AND CONTROL DEVICES

## General data

**Hydro-Vacuum S.A.** recommends that contaminated liquid pumps should be provided with UZS type safety and control devices. UZS safety and control devices are recommended for protection of three-phase asynchronous electric motors of pump units.

Note!  
Safety and control devices are intended for operation in mild climate with relative humidity up to 80% (at 20°C), in an environment free of water and explosive, flammable or chemically active vapours, dusts and gases. The device should not be installed in a place located higher than 1000 m above sea level. The equipment operates at an ambient temperature specified in the table.

## Safety features and functions of UZS type devices

	UZS.4	UZS.6	UZS.7	UZS.8
Overload	x	x	x	x
Short circuits in control system		x	x	x
Phase order change			x	x
Dry run	x	x	x	x
Phase decay	x	x	x	x
Power supply asymmetry	x	x	x	x
Drop of supply voltage	x	x	x (Below 180V)	x
Excessive number of start-ups	x			
Motor winding temperature above permissible level		bimetal x	bimetal option	bimetal option
Electric shock protection	option	x	x	x
Moisture in the motor chamber		x	option	option
Keeping liquid level in the tank within specified limits	x	x	x	x
Balancing working time of individual pumping units			x	x
Pump unit manual operation option			x	x
RS485 controller enabling communication with external devices using MODBUS RTU protocol				x
Short circuit in the main circuit	x	x	x	x
Failures of contactor contacts	x	x		

## Basic technical data

	UZS.4	UZS.6	UZS.7	UZS.8
Power supply rated voltage	3 x 400V	3 x 400V, 50Hz, system TN-C-S, TN-S		
Rated current	1,2 A ÷ 20 A		1,8 A ÷ 180 A	
Power consumption	4VA		8VA	25VA
Probe electrode current	max 6 mA	max 6 mA	-	
Device operating temperature	-10°C ÷ +40°C		(-25°C OPTIONAL) -10°C ÷ +45°C	
Casing protection level	IP65	IP55	IP55 / IP66	
Weight	1,5 kg	5,5 kg	8 ÷ 10 kg	22 ÷ 26 kg

Note!  
UZS.4-7 devices are also offered in external fitting versions with light and sound signal system.

## Types of safety devices depending on motor power

NO.	Type of safety device	Approximate maximum motor power	Dimensions in mm H x W x D
1	UZS.4.01	0,55 kW	250 x 165 x 140
2	UZS.4.02	0,75 kW	
3	UZS.4.03	1,5 kW	
4	UZS.4.04	2,2 kW	
5	UZS.4.05	3,7 kW	
6	UZS.4.06	4,5 kW	
7	UZS.4.07	5,5 kW	
8	UZS.4.08	7,5 kW	
9	UZS.4.09	9,0 kW	

NO.	Type of safety device	Approximate maximum motor power	Dimensions in mm H x W x D
1	UZS.6.01	0,75 kW	400 x 300 x 180
2	UZS.6.02	1,5 kW	
3	UZS.6.03	2,2 kW	
4	UZS.6.04	3,0 kW	
5	UZS.6.05	4,0 kW	
6	UZS.6.06	5,5 kW	
7	UZS.6.07	7,5 kW	
8	UZS.6.08	9,0 kW	
9	UZS.6.09	11,0 kW	

NO.	Type of safety device	Approximate maximum motor power	Dimensions in mm H x W x D
1	UZS.7.01	0,75 kW	500 x 400 x 230
2	UZS.7.02	1,5 kW	
3	UZS.7.03	2,2 kW	
4	UZS.7.04	3,0 kW	
5	UZS.7.05	4,0 kW	
6	UZS.7.06	5,5 kW	
7	UZS.7.07	7,5 kW	
8	UZS.7.08	9,0 kW	600 x 400 x 230
9	UZS.7.09	11,0 kW	
10	UZS.7.10	13,0 kW	
11	UZS.7.11	15,0 kW	
12	UZS.7.12	18,5 kW	
13	UZS.7.13	22,0 kW	
14	UZS.7.14	26,0 kW	
15	UZS.7.15	30,0 kW	

NO.	Type of safety device	Approximate maximum motor power	Dimensions in mm H x W x D
1	UZS.8.01	0,75 kW	845 x 635 x 300
2	UZS.8.02	1,5 kW	
3	UZS.8.03	2,2 kW	
4	UZS.8.04	3,0 kW	
5	UZS.8.05	4,0 kW	
6	UZS.8.06	5,5 kW	
7	UZS.8.07	7,5 kW	
8	UZS.8.08	9,0 kW	
9	UZS.8.09	11,0 kW	
10	UZS.8.10	13,0 kW	
11	UZS.8.11	15,0 kW	
12	UZS.8.12	18,5 kW	
13	UZS.8.13	22,0 kW	
14	UZS.8.14	26,0 kW	
15	UZS.8.15	30,0 kW	



**Note!**

UZS.7, UZS.8 - for capacities higher than those specified in the table, selection of equipment and housing to individual project.

### UZS.4 safety and control device

#### Purpose

UZS.4 safety and control devices are intended for protection of three-phase asynchronous electric motors of pump units with a power from 0.55 kW to 9 kW. The UZS.4 device consists of the four modules: electronic voltage control module, electronic water surface level unit, thermal overcurrent unit and overcurrent switch.

#### Design

UZS.4 safety and control devices are made of electronic and electric automatics elements, connectors and control instrumentation, all making up a system. The safety and control device is placed within a casing made of ABS and polycarbonate with a protection degree of IP55, i.e. second class protection.

UZS.4 safety and control devices are suitable to be hung on the wall or on a carrying structure.

In the lower part of the casing there are sealing glands fitted, through which supply, receiving and control cables are provided.

### UZS.6 safety and control device

#### Purpose

UZS.6 safety and control devices are intended for protection of three-phase asynchronous electric motors of pump units equipped with internal bimetal safety device (temperature in excess of 130°C causes the bimetal contactor to disconnect) and a moisture sensor (presence of moist in the motor chamber causes the sensor contactor to disconnect), e.g. FZV-3, FZA-3, FZB-3 sewage pumps with power from 0.75 kW to 11 kW. UZS.6 device is comprised of five modules: electronic voltage control unit, electronic water surface level unit, thermal overcurrent unit, overcurrent switch and the motor bimetal sensor relay control system and motor chamber moisture control system, including failure alert feature fitted on the control cabinet casing. Sensors inside the motor are powered by a safe voltage of 12V AC.

#### Design

UZS.6 safety and control devices are made of electronic and electric automatics elements, connectors and control instruments, all making up a system. The safety and control device is placed within a casing made of ABS and polycarbonate with a protection degree of IP55, i.e. second class protection.

UZS.4 safety and control devices are suitable to be hung on the wall or on a carrying structure.

In the lower part of the casing there are sealing glands fitted, through which supply, receiving and control cables are provided.

#### Failure alert system – water in the motor and temperature in excess of permissible level

On the control cabinet casing there are failure alert features connected with sensors inside the motor.

1. water in the motor – red lamp marked “ZAW” (alert-water sensor)

When water is present in the motor chamber, the moisture sensor inside the motor will cause the contactor to be switched off resulting in pump disconnection and failure alert. The sensor is a single-use device. After water leakage into the motor chamber is removed, a new sensor must be provided.

2. exceeding motor winding temperature – red lamp marked “TEMP” (alert-temperature). When the winding temperature is in excess of 130°C, the bimetal sensor fitted in the motor winding will switch off the contractor resulting in pump disconnection and failure alert. When the temperature drops, the bimetal sensor will return to a state allowing normal operation and, unless the operation switch has been switched off, the pump will start.

## UZS.7 safety and control device

### Purpose

UZS.6 safety and control devices are intended for protection and control of two three-phase asynchronous electric motors of the intermediate pumping station units with a power from 0.75 kW to 30 kW. UZS.7 device is comprised of five modules: electronic phase loss, voltage drop and phase order control unit, electronic controller in the form of a modular intermediate pumping station automatics system, thermal overcurrent unit, overcurrent switch and differential unit – electric shock protection (option).

### Design

UZS.7 safety and control devices are made of electronic and electric automatics elements, connectors and control instruments, all making up a system. The safety and control device is placed within a casing made of ABS and polycarbonate with a protection degree of IP55, i.e. second class protection (another type of casing, e.g. metal casing or with a higher protection degree of IP-66 can be provided at the customer's request).

UZS.7 safety and control devices are suitable to be hung on the wall or on a carrying structure.

In the lower part of the casing there are sealing glands fitted, through which supply, receiving and control cables are provided. On the transparent doors there are buttons and switches provided and, in addition, a failure alert feature (exceeding the "top" and "dry run" level).

### Types and type identification

#### Failures and failure alerts

If one of the pumps is under repair or is not operational, it must be made unavailable ("O") using the W1 and W2 switch provided on the control cabinet casing and at the same time the overcurrent switch of the relevant pump inside the cabinet must be switched off. The controller screen will display the message "BRAK" (not available) next to the relevant pump number.

If the medium level is too high and the WPM upper float is activated, the message "MAXIMUM" will be displayed. In such case, medium inflow must be reduced because otherwise there is a risk of tank overflow. If the medium level is too low and the WPS lower float is activated (dry run), the pump will be switched off and the message "SUCHO" (dry) will be displayed on the controller. After failure is removed, the message will disappear and pump operation can be continued.

Each activation of the float is displayed on the controller in the form of a message: lower – "POZIOM 1" (level 1), second – "POZIOM 2" (level 2), third – "POZIOM 3" (level 3), upper – "MAXIMUM".

If the float is not activated and subsequent two floats have been activated correctly, the message "BŁĄD PŁ." (float error) will be displayed and the pump will keep running. After the float is unlocked, the unit will carry on operation..

#### Failures signalled by sensors installed inside motors (for pumps type FZA, FZB, FZV, FZD manufactured by H-V Grudziądz)

If the motor winding temperature is in excess of 130°C, the pump will switch off and the message "BIMETAL" will be displayed on the controller. Once the winding cools down, the pump will start again unless switched off using the operation type switch (R-A).

If there is moist in the pump motor chamber, the pump will switch off and the message "PTC" will be displayed on the controller. Such failure requires that the pump be repaired (sealing of the motor chamber) and moist sensor be replaced for a new one (after it has been activated, the sensor is no longer suitable for further operation).

#### Other failures

If the red LED indicator on the phase order module lights up after power is supplied, it means that the direction of phases is incorrect. In such case, the power supply phase order must be changed and correct rotations for pump motors set in a manual operation mode.

If the system is activated and the red LED on the module lights up during pump operation, it means that there has been a major voltage drop or phase loss and the failure must be removed. After the cause is removed, the system will start up depending on the positioning of the floats.

#### Note!

The controller will switch off in both cases



## Design and intended use of UZS safety and control devices

### History and alert deletion.

The controller is equipped with a feature enabling it to store in its memory all types of alerts occurring since last control. To see alert history, press “pokaż historię alarmów” (display alert history). The controller will display all alerts. If there are no alerts, the message “o.k.” is displayed. To delete alerts, press the button “kasuj historię alarmów” (delete alert history) and hold it for ca. 3 seconds.

#### *The controller can work in two alert deletion modes:*

- automatic mode – after the failure has ceased, the controller returns to normal operation; however, occurring alerts can still be viewed,
- manual mode – the controller will show alert until the button “delete alert history” is depressed and held for 3 seconds. If the alert is still on, it means that the failure has not been removed.

The controller stores alerts in memory even after power supply is switched off.

## UZS.8 safety and control device

### Purpose

UZS.8 safety and control devices are intended for protection and control of two or three three-phase asynchronous electric motors of the intermediate pumping station units with a power from 0.75 kW to 30 kW. UZS.8 device is comprised of five safety and control modules: electronic phase loss, voltage drop and phase order control unit, electronic controller, thermal overcurrent unit, overcurrent switches and, optionally, differential unit – electric shock protection.

### Design

UZS.8 safety and control devices are made of electronic and electric automatics elements, connectors and control instruments, all making up a system. The safety and control device is placed within a casing made of ABS and polycarbonate with a protection degree of IP55 (optionally – double doors with a protection degree of IP-66), i.e. second protection class.

UZS.8 safety and control devices are suitable to be hung on the wall or on a carrying structure.

In the lower part of the casing there are sealing glands fitted, through which supply, receiving and control cables are provided. On the cabinet casing (doors) there are buttons, switches and indicator lamps provided. Each casing has a main switch

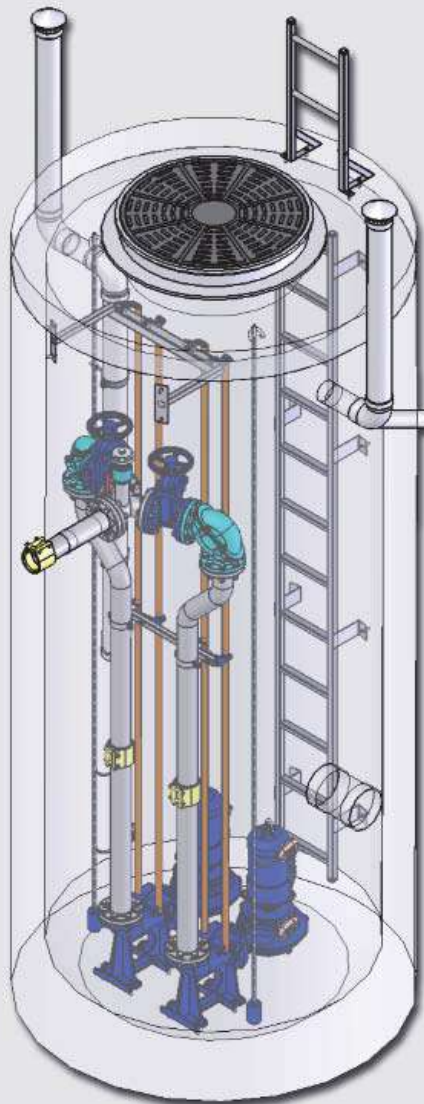
### Controller features and settings

#### 1. *Settings*

- control method setting (normal – floats, through hydrostatic probe),
- hydrostatic probe graduation (signal: 4-20 mA, various measurement ranges: 0-10 m),
- selection of pump number (1-3 but only 3 pumps for devices with a hydrostatic probe).

#### 2. *Features*

- pump with the shortest duration of operation is always switched on,
- where the sewage level is above the S2 level and pump operation time is longer than preset, second pump is switched on and operates until sewage is pumped to the S1 level,
- protection against simultaneous activation of two or three pumps,
- float failure alert (e.g. where P1 and P3 floats are on and P2 float is not),
- general counter of pumps operation time,
- local counter of specific pump operation time,
- signalling of phase decay, pump failure, operation status, amount of sewage in the tank, exceeding overflow level.



# INTERMEDIATE PUMPING STATIONS

## Application

Intermediate pumping stations manufactured by Hydro-Vacuum S.A. are used in gravitational and pressure sewage systems and are intended for the pumping of rainwater and municipal sewage, with or without faeces.

## Design

### 1.1 Introduction

Hydro-Vacuum intermediate pumping stations are comprehensive fully automated pumping solutions not requiring continuous maintenance.

*Complete intermediate pumping station consists of four basic subassemblies:*

- one or two FZ type pumping units,
- tank,
- UZS type safety and control system,
- hydraulic system.

### 1.2 Pumping units

Intermediate pumping stations are provided with one pumping unit or as multi-pump sets. In multi-pump systems, one pump is always the so-called active reserve. Depending on the discharge connection diameter, there are three types of pumps: FZ1, FZ2 and FZ3.

*Depending on the type of sewage and operating parameters (Q-H), the following types of pumps are used:*

- FZR type with grinder,
- FZV type with free flow (vortex),
- FZB type with a channel impeller.

Pumps equipped with a grinding system enable sewage to be pumped in conduits with smaller diameters (min. DN 32). Free flow pumps (vortex) lower the risk of pump clogging. Pumps with a channel impeller are used mainly for the pumping of rainwater and industrial wastewater that do not contain long and fibrous elements.



### 1.3. Tanks

Intermediate pumping stations are comprised of four basic types of tanks:

- Polyethylene PE,
- Polymer concrete,
- B 45 concrete,
- Polyester reinforced with glass fibre with a polymer concrete bottom.

Depending on the designer's requirements, diameters of the above tanks range from 600 to 2500 mm and heights up to 6000 mm. A manhole is installed in the upper part of the tank enabling descent to the intermediate pumping station or removal of pumps or hydraulic equipment elements.

Types of manholes are selected depending on the location of an intermediate pumping station: whether located within a traffic route or outside it..

### 1.4. UZS safety and control system

Pump operation is controlled by means of UZS-4, UZS-7 and UZS-8 safety and control devices. Float level indicators or hydrostatic and ultrasound level control systems are used. External versions of UZS safety and control devices are adapted for operation in mild climate at an ambient temperature of -30°C to +40°C, with relative humidity up to 80% at 20°C, in an environment free of water and explosive, flammable or chemically active vapours, dusts, and gases. The device should not be installed at a higher place than 1000 m above sea level. UZS safety and control devices are comprised of electronic and electric automatics elements, connectors and control instruments. They can be hung on the building wall or directly on the tank of an intermediate pumping station or in its vicinity.

## Design

In the lower part of the casing there are sealing glands fitted, through which supply, receiving and control cables are provided. All devices can be equipped optionally with acoustic and optical alert system. The mobile monitoring systems are intended for the monitoring of intermediate pumping stations within the operating range of mobile networks.

### 1.5 Hydraulic system

Standard internal hydraulic system consists of:

- coupling foot with or without guides, the so-called upper coupler,
- vertical discharge pipelines,
- non-return valves,
- collecting pipe (double-pump intermediate pumping station),
- system wash-up connectors.

Pipelines, collector, flanges and valves are made of acid-resistant steel. Coupling foot and valves are made of cast iron and are protected against corrosion with powder paint coating.

Intermediate pumping stations are additionally equipped with:

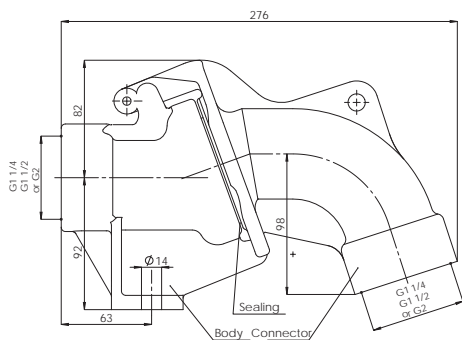
- access ladder;
- service platform (for tanks with a height above 5000 mm);
- chain for pump lowering and removal;
- chain for the fastening of level indicators;
- gravitational ventilation system.

The above elements are made of acid-resistant steel (ventilation – PVC).

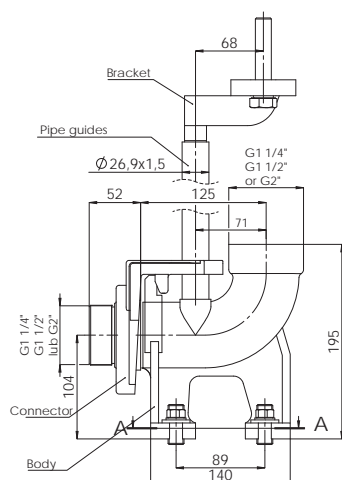


### 1.6 Coupling system

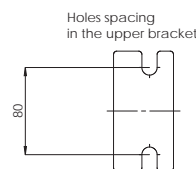
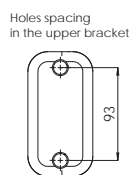
ZSP coupling systems enable, where required, simple and quick assembly and disassembly of the pump along with the attached fittings. ZSP.0 type set enables connection of fittings and pumps with diameters of discharge of 1 1/4", 1 1/2" and 2". It is used in PSA type intermediate pumping stations. The ZSP.1 pump coupling system enables connection of fittings and pumps with diameters of connections of 1 1/4", 1 1/2" and 2". ZSP.2 enables connection of fittings and pumps with diameters DN65, whereas ZSP.3 with diameters DN80



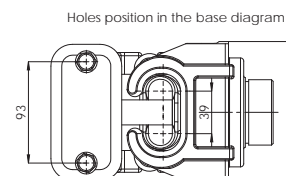
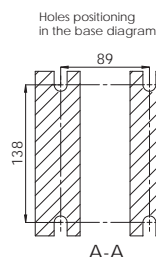
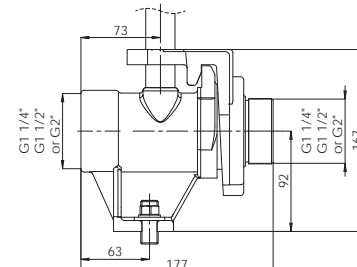
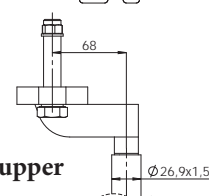
ZSP.0



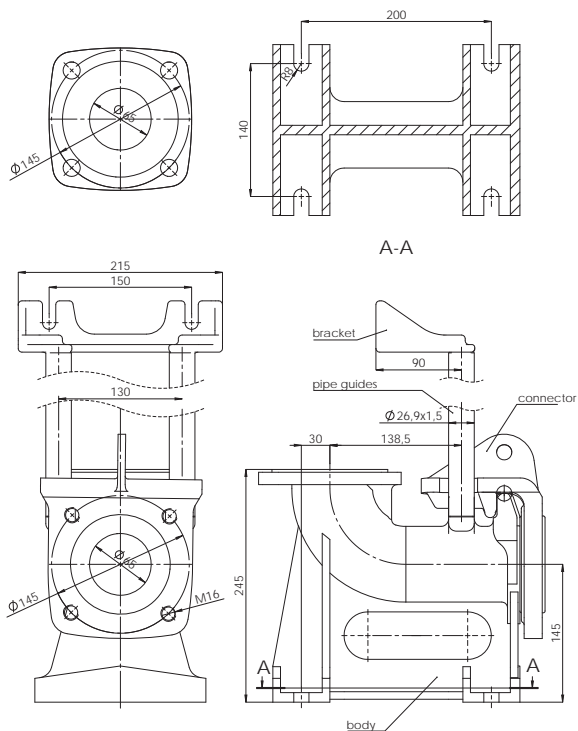
ZSP.1 lower



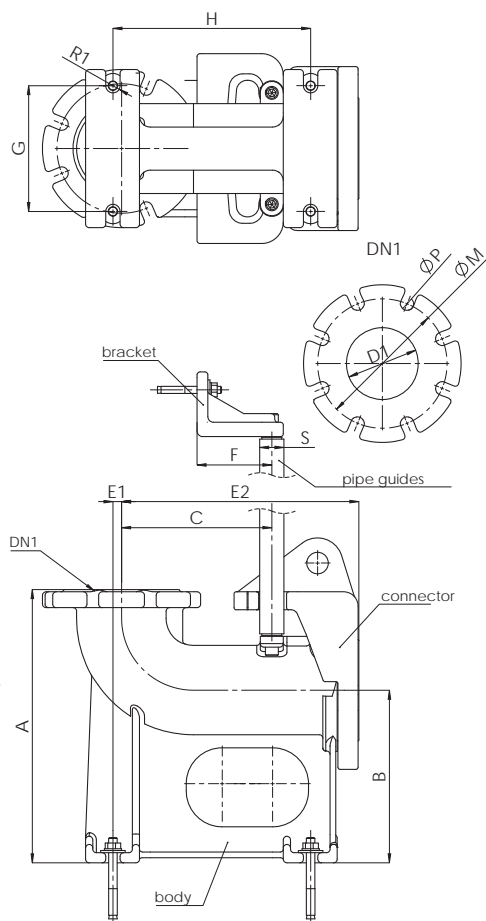
ZSP.1 upper



### ZSP.2



Holes position in the base diagram



### ZSP.3-9

Dimensions	ZSP.3	ZSP.4	ZSP.5	ZSP.6	ZSP.7	ZSP.9
A	350	380	525	605	605	1185
B	240	240	320	330	370	650
C	173	209	255	225	290	682
D1	80	100	125	150	200	300
E1	25	12	35	35	0	65
E2	279	330	426	455	506	959
F	90	104	146	143	146	199,5
G	175	175	300	300	300	400
H	235	275	550	550	590	1130
I	215	264	405	405	450	585
J	150	180	290	290	320	360
K	130	155	250	250	300	440
M	160	180	210	240	295	400
N	M16	M16	M16	M18	M18	M24
P	18	18	19	22	22	28
R	10	10	15	15	15	22
S	26,9x1,5	33,7x3,2	48,3x3,6	48,3x3,6	48,3x3,6	60,3x3,6

## Advantages

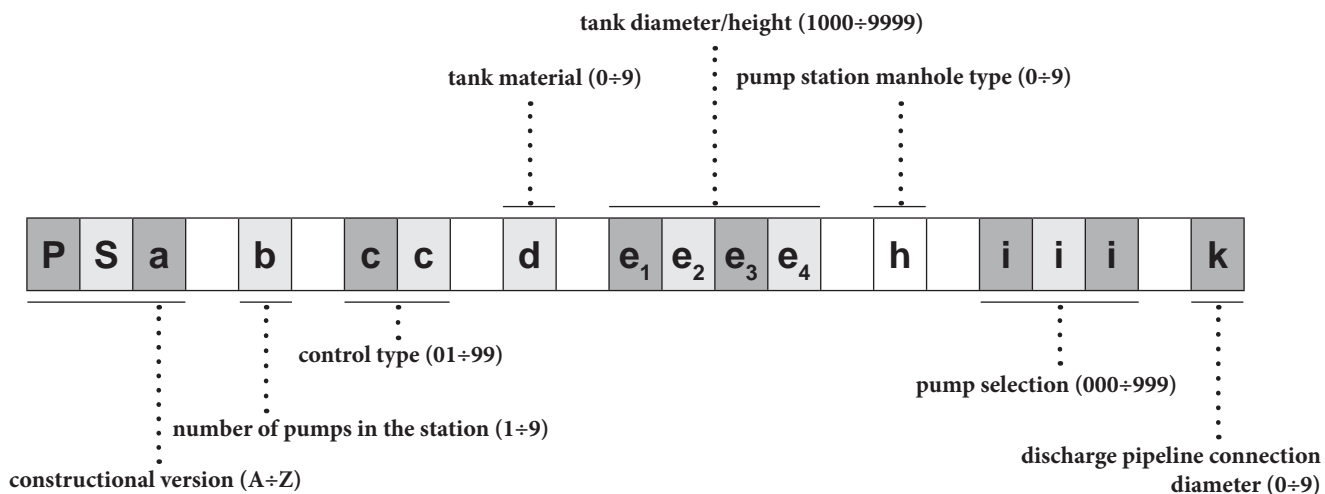
- modern structural solutions,
- complete equipment for the intermediate pumping station,
- many years of reliable operation guaranteed,
- easy and quick installation of the intermediate pumping station in any land/water conditions, with minimum earth works and assembly effort,
- automatic, hands-off operation,
- pipelines may be flushed using a fire hose connector,
- application power-saving motors, also available in the explosion-proof version,
- low cost of purchase and operation,
- constant technical supervision plus guarantee and post-guarantee service,
- easy access to spare parts,
- the system can be adapted to requirements of an individual customer,
- low price of additional accessories,
- high efficiency and longevity in extreme operating conditions,
- custom-made diameter and angle of the inlet stub pipe,
- mobile phone alerts.

# INTERMEDIATE PUMPING STATIONS

## Technical details

Design versions	Number of pumps	Types of control	Tank material	Tank diameter	Tank height	Pumps		diameter of discharge risers
				[mm]	[mm]	type	power [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-DN50

## Product marking structure



## Constructional version „a”

Constructional version „a”	Kind
A	Sewage intermediate pumping station with the use of „upper” ZSP.0 latch
B	Sewage intermediate pumping station with the use of „lower” ZSP.1 latch (with guides)
C	Sewage intermediate pumping station with the use of „lower” ZSP.2 latch (with guides)
D	Sewage intermediate pumping station with the use of „lower” ZSP.3 latch (with guides)
E	Sewage intermediate pumping station with the use of „Camlock” latch

# INTERMEDIATE PUMPING STATIONS

## Number of pumps in the station „b”

Type	Number of pumps	Pump	Power [kW]	Voltage [V]	Capacity Q [m³/h]	Delivery head H [m]	Control type
PSA.1	1	FZV.1	0,55 - 1,1	230	up to 33,0	up to 15,3	UZS.4
PSA.1	1	FZV.1	0,55 - 2,2	400	up to 33,0	up to 15,3	UZS.4
PSA.1	1	FZR.1	1,5	230	up to 34,8	up to 31,0	UZS.4
PSA.1	1	FZR.1	1,5 - 2,2	400	up to 34,8	up to 31,0	UZS.4
PSA.1	1	FZX.1	1,1 - 3,0	400	up to 34,8	up to 35,0	UZS.4, UZS.6
PSA.1	1	FZY.1	1,1 - 3,0	400	up to 18,0	up to 43,0	UZS.4, UZS.6
PSB	1 or 2	FZV.1	0,55 - 1,1	230	up to 33,0	up to 15,3	UZS.4, UZS.7, UZS.8
PSB	1 or 2	FZV.1	0,55 - 2,2	400	up to 33,0	up to 15,3	UZS.4, UZS.7, UZS.8
PSB	1 or 2	FZR.1	1,5	230	up to 34,8	up to 31,0	UZS.4, UZS.7, UZS.8
PSB	1 or 2	FZR.1	1,5 - 2,2	400	up to 34,8	up to 31,0	UZS.4, UZS.7, UZS.8
PSB	1 or 2	FZX.1	1,5 - 3,0	400	up to 34,8	up to 35,0	UZS.4, UZS.6, UZS.7, UZS.8
PSB	1 or 2	FZY.1	1,5 - 3,0	400	up to 18,0	up to 43,0	UZS.4, UZS.6, UZS.7, UZS.8
PSC	1 or 2	FZB.2	1,1 - 9,2	400	up to 90,0	up to 45,0	UZS.7, UZS.8
PSC	1 or 2	FZV.2	1,5 - 11,0	400	up to 90,0	up to 35,0	UZS.7, UZS.8
PSC	1 or 2	FZD.2	3,0-7,5	400	up to 75,0	Up to 39,0	UZS.7, UZS.8
PSC	1 or 2	FZE.2	5,5-15,0	400	up to 75,0	up to 53,0	UZS.7, UZS.8
PSD.2	2	FZB.3	2,2 - 11,0	400	up to 210,0	up to 57,0	UZS.7, UZS.8
PSD.2	2	FZV.3	2,2 - 11,0	400	up to 220,0	up to 35,0	UZS.7, UZS.8
PSD.2	2	FZC.3	3,0-11,0	400	up to 180,0	up to 58,0	UZS.7, UZS.8
PSD.2	2	FZD.3	3,0-11,0	400	up to 160,0	up to 77,0	UZS.7, UZS.8
PSD.2	2	FZE.3	5,5-22,0	400	up to 90,0	up to 59,0	UZS.7, UZS.8
PSE.1	1	FZV.1	0,55 - 1,1	230	up to 33,0	up to 15,3	UZS.4
PSE.1	1	FZV.1	0,55 - 2,2	400	up to 33,0	up to 15,3	UZS.4
PSE.1	1	FZR.1	1,5	230	up to 34,8	up to 31,0	UZS.4
PSE.1	1	FZR.1	1,5 - 2,2	400	up to 34,8	up to 31,0	UZS.4
PSE.1	1	FZX.1	1,1 - 3,0	400	up to 35,0	up to 35,0	UZS.4, UZS.6
PSE.1	1	FZY.1	1,1 - 3,0	400	up to 18,0	up to 43,0	UZS.4, UZS.6

## Tank material „d”

Tank material „d”	Type of material	Intermediate pumping station structure				
		PSA	PSB	PSC	PSD	PSE
1	Polymer concrete tank		X	X	X	
2	Concrete rings tank		X	X	X	
3	PE plastic tank	X				X

# INTERMEDIATE PUMPING STATIONS

## List of tank diameters/heights in intermediate pumping stations „e<sub>1</sub>e<sub>2</sub>e<sub>3</sub>e<sub>4</sub>”

Tank diameter e <sub>1</sub> e <sub>2</sub>	Tank height e <sub>3</sub> e <sub>4</sub>	Tank description	Types of intermediate pumping stations where used				
			PSA	PSB	PSC	PSD	PSE
06		Tank diameter Ø600	x				x
08		Tank diameter Ø800	x				x
10		Tank diameter Ø1000	x	x			x
12		Tank diameter Ø1200		x	x		
15		Tank diameter Ø1500			x	x	
20		Tank diameter Ø2000			x	x	
25		Tank diameter Ø2500			x	x	
	20	Tank height h=2000	x				x
	22	Tank height h=2200	x				x
	24	Tank height h=2400	x				x
	26	Tank height h=2600	x				x
	30	Tank height h=3000		x	x	x	
	32	Tank height h=3200		x	x	x	
	34	Tank height h=3400		x	x	x	
	36	Tank height h=3600		x	x	x	
	38	Tank height h=3800		x	x	x	
	40	Tank height h=4000		x	x	x	
	42	Tank height h=4200		x	x	x	
	44	Tank height h=4400		x	x	x	
	46	Tank height h=4600		x	x	x	
	48	Tank height h=4800		x	x	x	
	50	Tank height h=5000		x	x	x	
	52	Tank height h=5200		x	x	x	
	53	Tank height h=5300		x	x	x	
	56	Tank height h=5600		x	x	x	
	58	Tank height h=5800		x	x	x	
	60	Tank height h=6000		x	x	x	

## Discharge pipeline connection diameter „k”

Description of pumping pipe „k”	Pumping pipe	Types of intermediate pumping stations where used				
		PSA	PSB	PSC	PSD	PSE
1	Pumping pipe ø63 coupling element PE-GW 63x2”		x			
2	Pumping pipe ø75 coupling element PE-GW 75x2”		x			
3	Pumping pipe ø90 coupling element PE-GW 90x2”		x			
4	Pumping pipe ø75			x		
5	Pumping pipe ø90			x	x	
6	Pumping pipe ø110			x	x	
7	Pumping pipe ø160			x	x	
9	Unusual (arrangements with a customer)	x	x	x	x	x
0	lack of a fastener	x	x	x	x	x



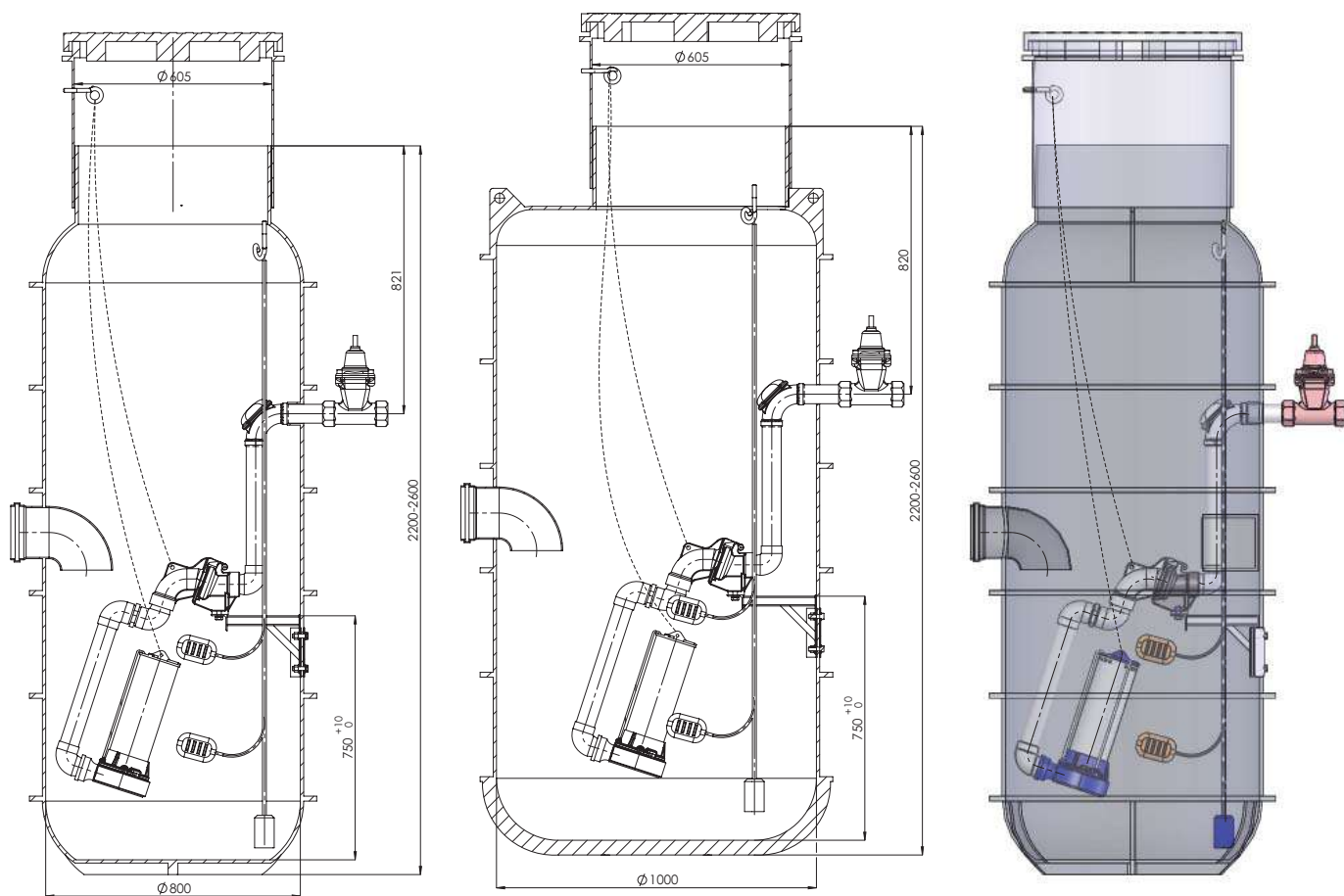
## PSA.1 intermediate pumping station

### Application:

- private residential areas,
- farms,
- single-family house estates,
- holiday complexes,
- industrial plants.

### Intermediate pumping station elements:

- pumps: FZR.1, FZV.1, FZX.1, FZY.1,
- PE polyethylene tanks,
- discharge risers,
- upper coupling latch, ZSP.0,
- pipeline flushing system with a fire hose end,
- cut-off valve,
- level control with the use of floats,
- non-return ball valve.



# INTERMEDIATE PUMPING STATIONS

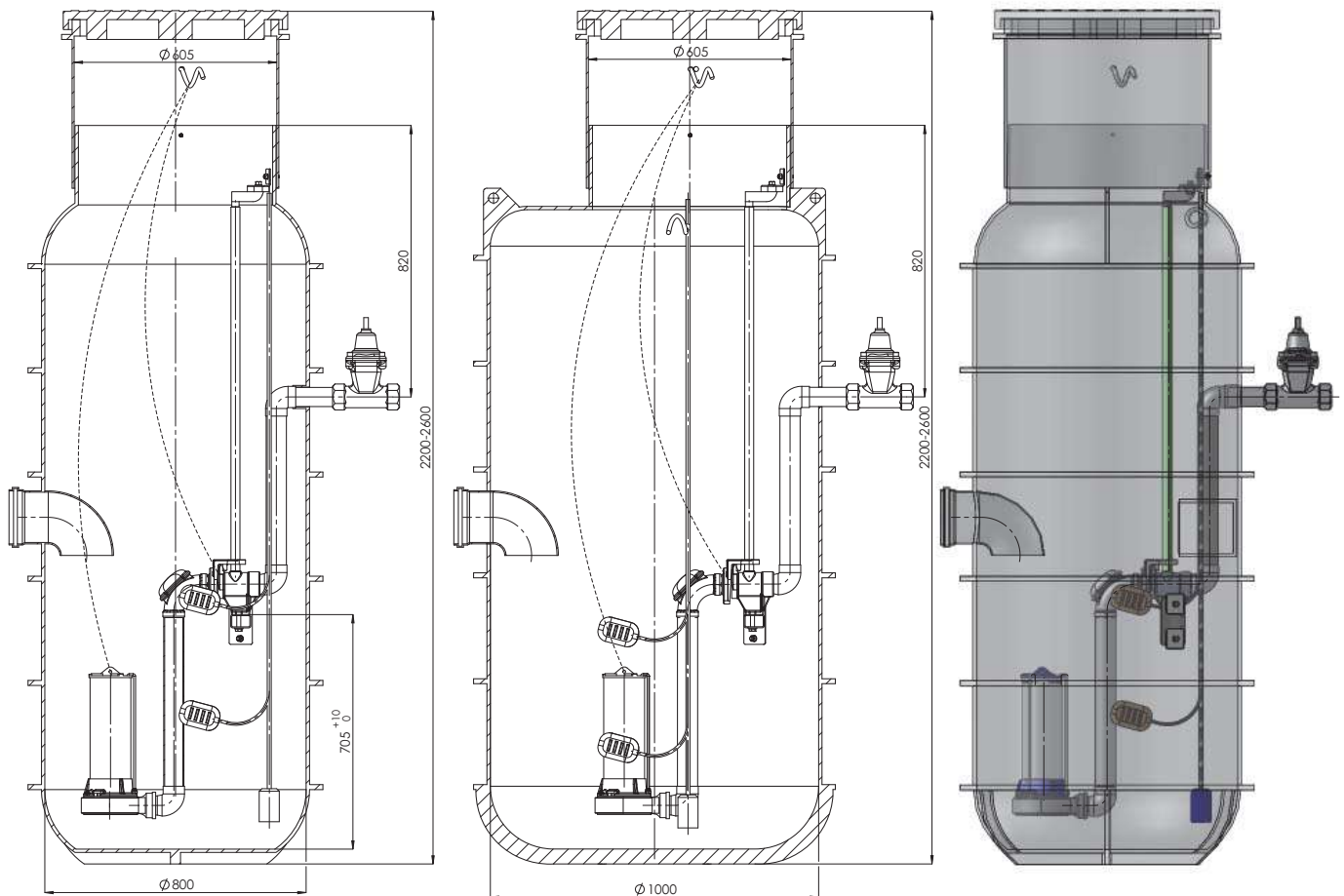
## PSE.1 intermediate pumping station

### Application:

- private residential areas,
- farms,
- single-family house estates,
- holiday complexes,
- industrial plants.

### Intermediate pumping station elements:

- pumps: FZR.1, FZV.1, FZX.1, FZY.1,
- PE polyethylene tanks,
- discharge risers,
- non-return ball valve,
- Camlock coupling latch,
- cut-off valve,
- level control with the use of floats or hydrostatic probe.



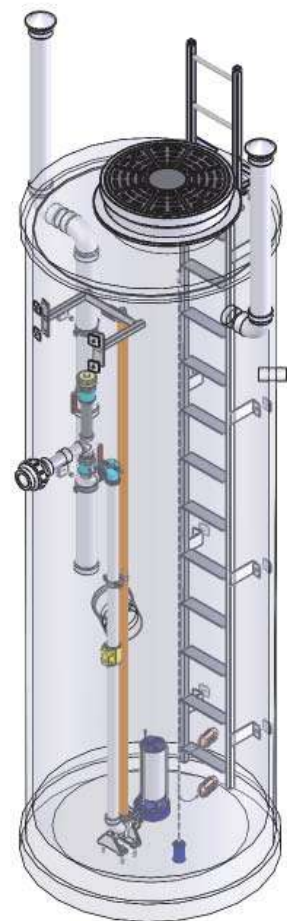
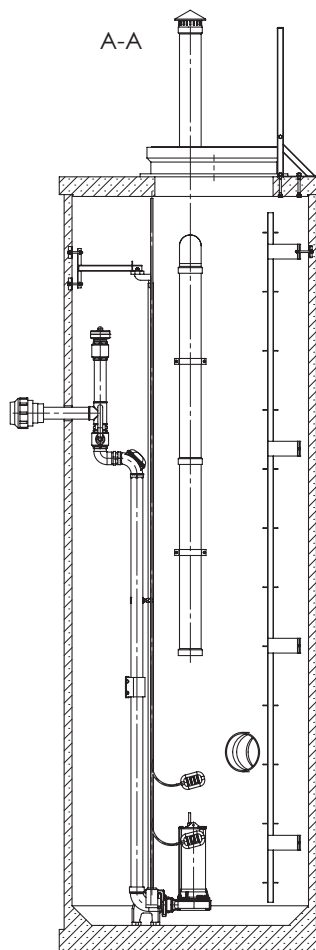
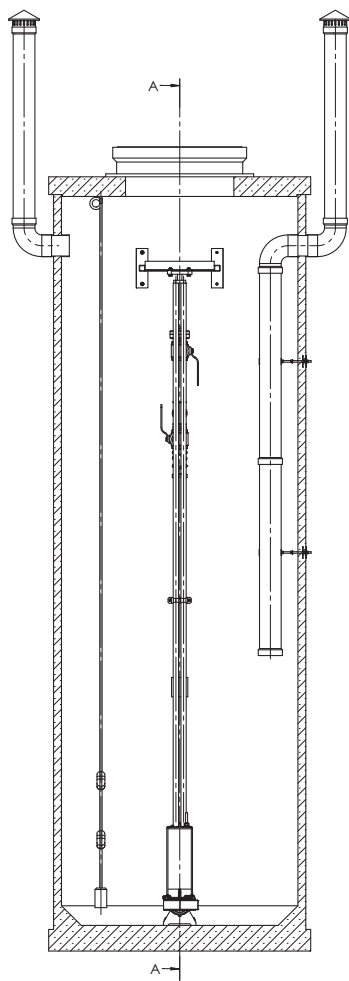
## PSB.1 intermediate pumping station

### Application:

- municipal and district sewage systems.

### Intermediate pumping station elements:

- pumps FZR.1, FZX.1, FZY.1 lub FZV.1 (re rain water drain system),
- coupling foot, ZSP.1 (with pipe guides),
- discharge risers – acid resistant steel,
- non-return ball valves of the “Szuster” system,
- cut-off valves,
- cumulative collecting pipe,
- pipeline flushing system with a fire hose end,
- pipe connector,
- sewage level control – floats or hydrostatic probe,
- access ladder,
- tank – polymer concrete, B-45 grade concrete or glass iron,
- ventilation system of the intermediate pumping station.



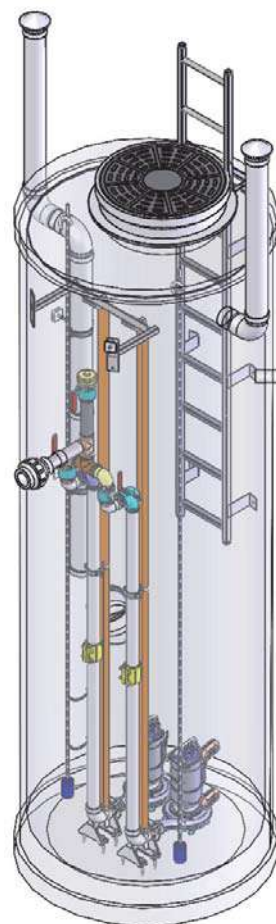
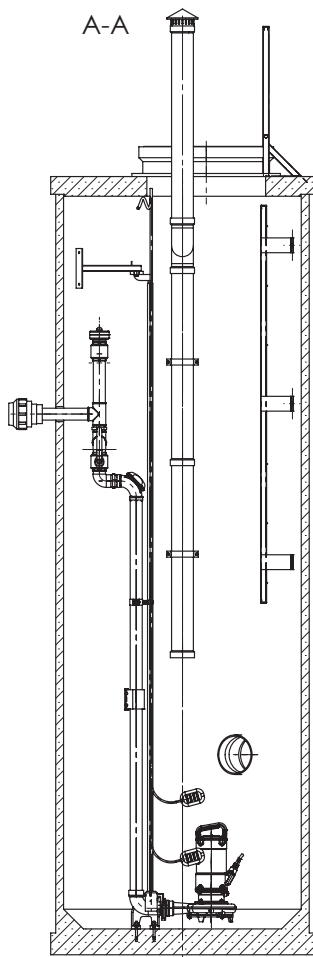
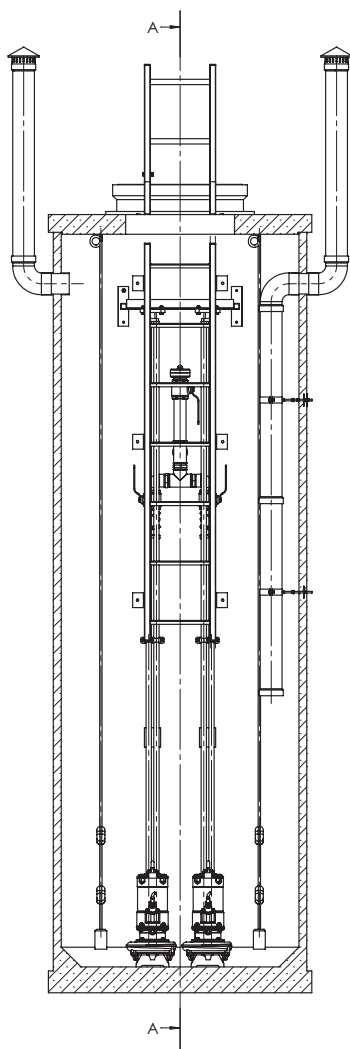
## PSB.2 intermediate pumping station

### Application:

- municipal and district sewage systems.

### Intermediate pumping station elements:

- pumps FZR.1, FZX.1, FZY.1 lub FZV.1 (re rain water drain system),
- coupling foot, ZSP.1 (with pipe guides),
- discharge risers – acid resistant steel,
- non-return ball valves of the “Szuster” system,
- cut-off valves,
- cumulative collecting pipe,
- pipeline flushing system with a fire hose end,
- pipe connector,
- sewage level control – floats or hydrostatic probe,
- access ladder,
- tank – polymer concrete, B-45 grade concrete or glass iron,
- ventilation system of the intermediate pumping station.



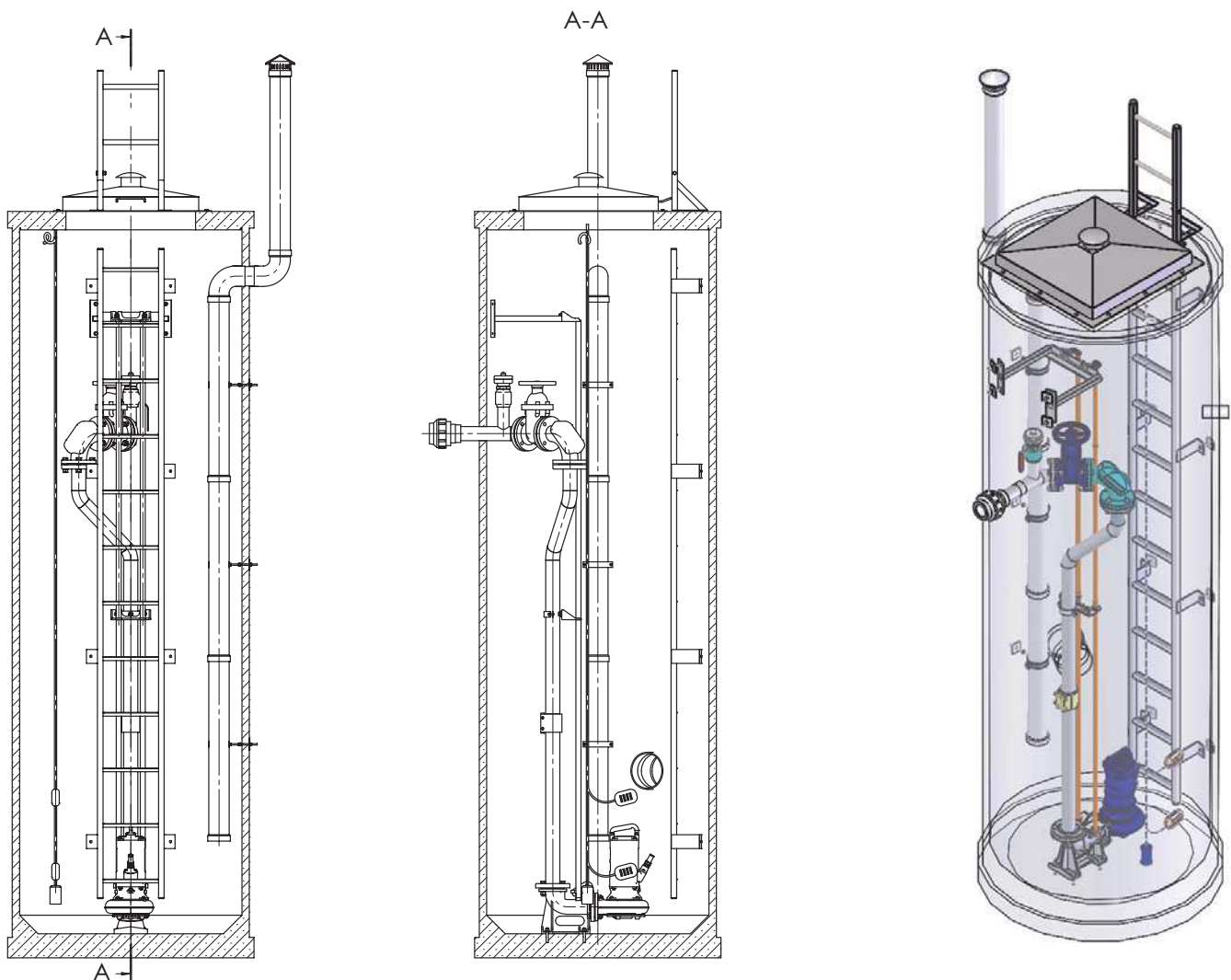
## PSC.1 intermediate pumping station

### Application:

- municipal and district sewage systems, industrial wastewater.

### Intermediate pumping station elements:

- pumps FZB.2, FZD.2, FZE.2, FZV.2,
- coupling foot, ZSP.2 (with pipe guides),
- discharge risers – acid resistant steel,
- non-return ball valves,
- cut-off valves,
- cumulative collecting pipe,
- pipeline flushing system with a fire hose end,
- pipe connector,
- sewage level control – floats or hydrostatic probe,
- access ladder and service platform (optional),
- tank – polymer concrete, B-45 grade concrete or glass iron,
- ventilation system of the intermediate pumping station.



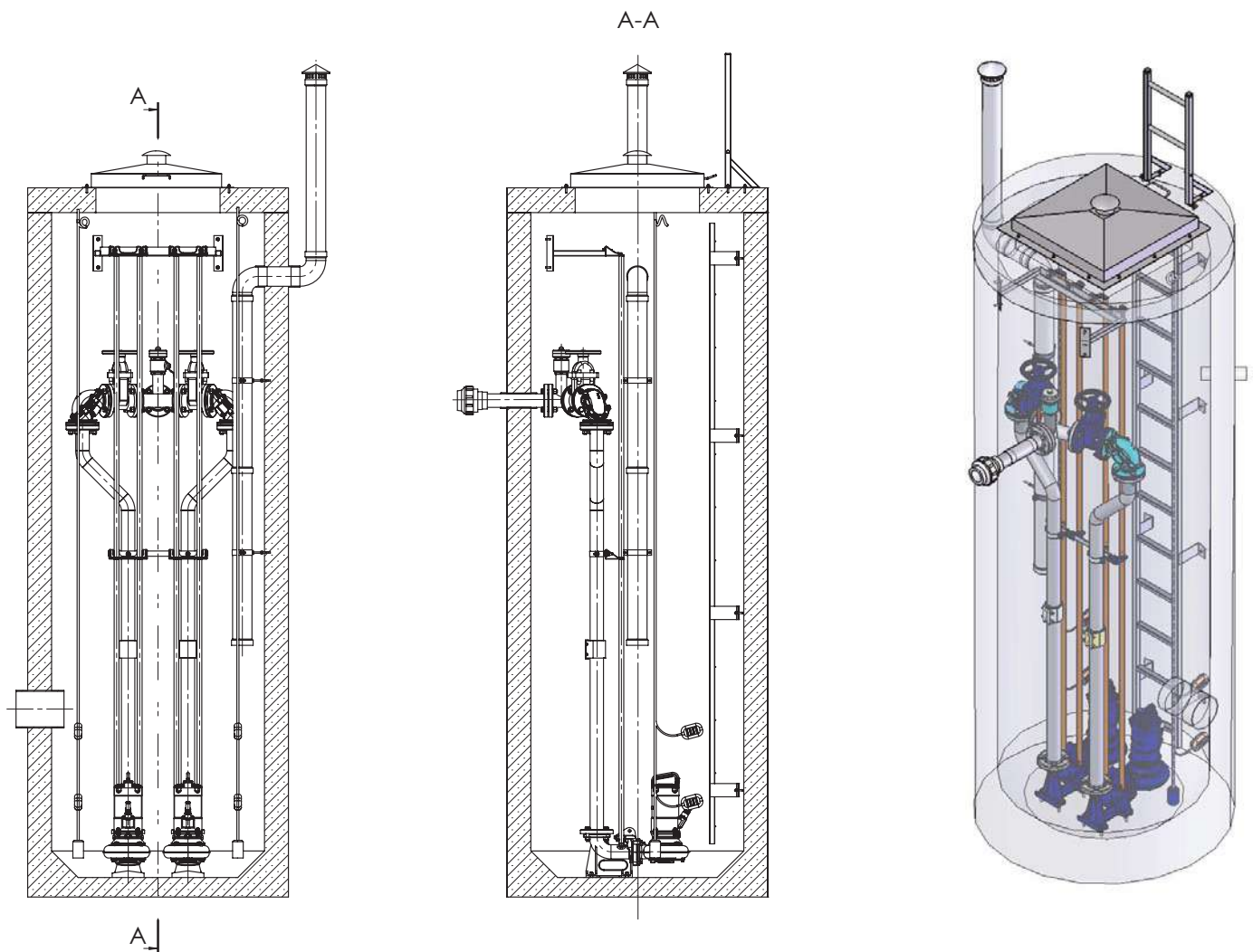
## PSC.2 intermediate pumping station

### Application:

- municipal and district sewage systems, industrial wastewater.

### Intermediate pumping station elements:

- pumps FZB.2, FZD.2, FZE.2, FZV.2,
- coupling foot, ZSP.2 (with pipe guides),
- discharge risers – acid resistant steel,
- non-return ball valves,
- cut-off valves,
- cumulative collecting pipe,
- pipeline flushing system with a fire hose end,
- pipe connector,
- sewage level control – floats or hydrostatic probe,
- access ladder and service platform (optional),
- tank – polymer concrete, B-45 grade concrete or glass iron,
- ventilation system of the intermediate pumping station.



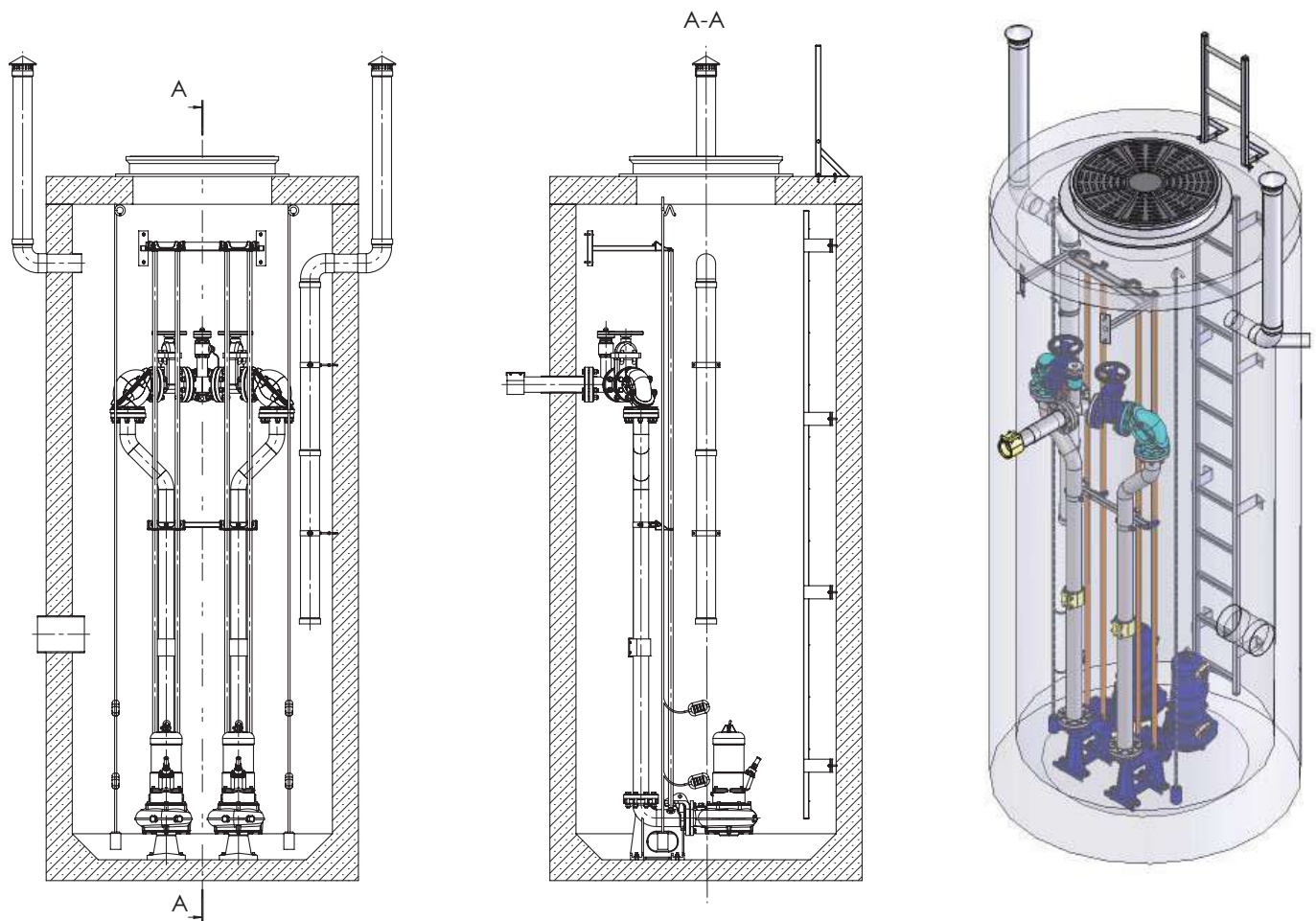
## PSD.2 intermediate pumping station

### Application:

- municipal and district sewage systems.

### Intermediate pumping station elements:

- pumps FZB.3, FZC.3, FZD.3, FZE.3, FZV.3,
- coupling foot, ZSP.3 (with pipe guides),
- discharge risers – acid resistant steel,
- non-return ball valves,
- cut-off valves,
- cumulative collecting pipe,
- pipeline flushing system with a fire hose end,
- pipe connector,
- sewage level control – floats or hydrostatic probe,
- access ladder and service platform (optional),
- tank – polymer concrete, B-45 grade concrete or glass iron,
- ventilation system of the intermediate pumping station.

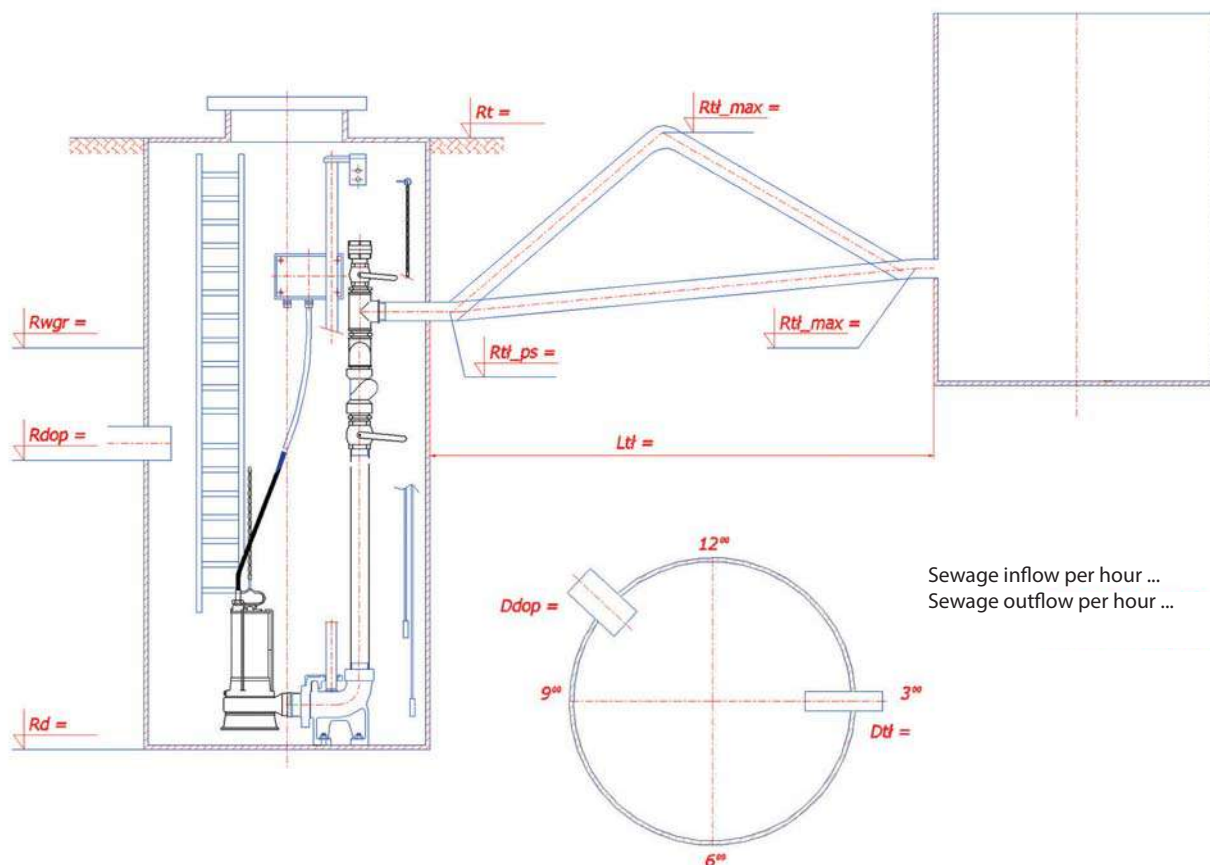


# INTERMEDIATE PUMPING STATIONS

## Intermediate Pumping Station Selection Chart Hydro-Vacuum S.A.

Company name, correspondence address		Contact person, telephone, fax, email	
Type of sewage (suspension content, granulation)			
Maximum sewage inflow	$Q_{max}$	[l/s] or [m <sup>3</sup> /h]	
Ordinate of the terrain on which the intermediate pumping station is located	$R_t$	[m n.p.m.]	
Ordinate of the channel which feeds sewage to the intermediate pumping station	$R_{dop}$	[m n.p.m.]	
Diameter and material type of the channel which feeds sewage	$D_{dop}$	[mm]	
Ordinate of the discharge pipeline axis in the intermediate pumping station	$R_{t\_ps}$	[m n.p.m.]	
Ordinate of the discharge pipeline on the inlet to collector or the highest point on the path to collector	$R_{t\_max}$	[m n.p.m.]	
Discharge pipeline length	$L_t$	[m]	
Diameter and material type of discharge pipeline	$D_t$	[mm]	
Type and number of local resistance spots on the discharge pipeline path			
Relative pressure in the sewage collector	$H_{odb}$	[m]	
Ordinate of ground water level in the location of the intermediate discharge station	$R_{wgr}$	[m n.p.m.]	
Location of the intermediate pumping station (green area, road)			
Tank internal diameter	$\emptyset$	[m]	

TYPE OF INTERMEDIATE PUMPING STATION TANK	PUMPING CONTROL TYPES	TYPE OF HATCH IN INTERMEDIATE PUMPING STATION TANK	ADDITIONAL ACCESSORIES (OPTIONAL)
<input type="checkbox"/> Polymer concrete <input type="checkbox"/> B-45 concrete <input type="checkbox"/> PE polyethylene	<input type="checkbox"/> Float level indicator <input type="checkbox"/> Hydrostatic probe	<input type="checkbox"/> Light cast iron <input type="checkbox"/> Light stainless <input type="checkbox"/> Heavy, D-400 grade	<input type="checkbox"/> Service platform <input type="checkbox"/> Access ladder



Please fax a completed chart at +48 56 45 07 346

In case of any uncertainties in completing the chart, please contact our consultants at +48 56 45 07 437 or +48 56 45 07 554







## SEWAGE PUMPING STATION WITH SOLIDS SEPARATION SYSTEM

## The advantages

Its purpose is to pump municipal sewage in pressure sewage systems. The sewage pumping stations with separation of solids are equipped with alternately operating pumps, located in a dry chamber. In front of every pump there is a solids separator, to ensure that only preliminarily cleaned sewage is pumped.

### Advantages of the sewage pumping station with solids separation system:

- because the pumps are installed in a dry chamber, their operation is easy; they are not submerged in sewage,
- preliminary cleaning of sewage protects the pumps against clogging, reduces wear of hydraulic elements, and consequently ensures lower costs of maintenance and possible repairs,
- it is possible to operate the pumps with multi-channel rotor of higher efficiencies,
- easy access to external elements because the walls of the chamber inside of which the SPS with SSS is located are not in direct contact with sewage; maintenance works are easier than in pumping stations with submersible pumps,
- thanks to relatively low volume of the tanks, sewage is steadily pumped to the discharge pipeline, the sludge does not decompose, and the released gases are not as offensive as in intermediate pumping stations (fitting a filter on the ventilation line eliminates offensive smells),
- sewage is fed more frequently, and as a consequence more steadily; it is particularly important in sewage treatment plants without equalising tanks, as it enables their steady operation,
- fully automatic operation,
- constant measurement of sewage level with the use of ultrasound or hydrostatic probe,
- mobile phone alerts and GPRS data transmission (optional).



## Design

The sewage pumping station with separation of solids is a complete and fully automated device made of the following subassemblies:

- the tank subassembly with a distribution and overflow chamber,
- separators,
- pumps with a high-efficiency channel impeller,
- hydraulic fittings, i.e. flanges, pipe tees, elbows, ball valves, and knife gate valve,
- ultrasound probe,
- safety and control device.

The sewage pumping station with separation of solids in its entirety is installed in a dry underground chamber

## Materials

- tank – depending on the size type: 0H18N9 stainless steel, or stainless steel and plastic,
- separators – precious steel,
- flanges – 0H18N9 stainless steel,
- connecting elements – 0H18N9 stainless steel,
- hydraulic fittings – cast iron with protective layer.

## Stages in the system of indirect solids separation TS sewage pumping

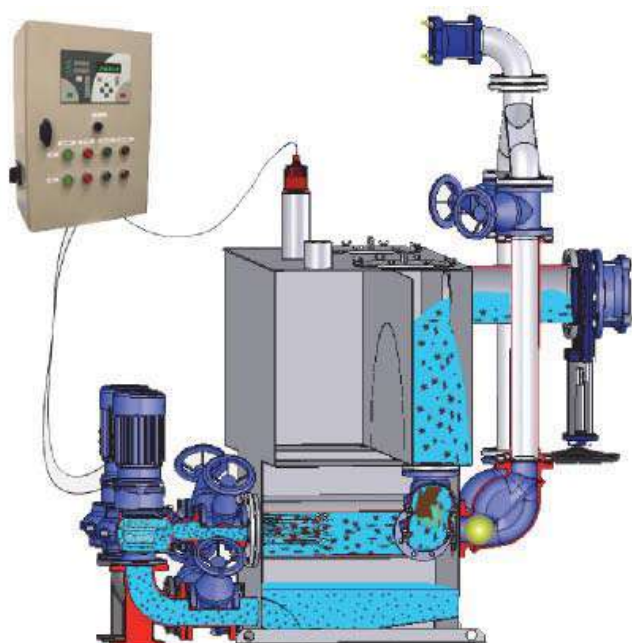
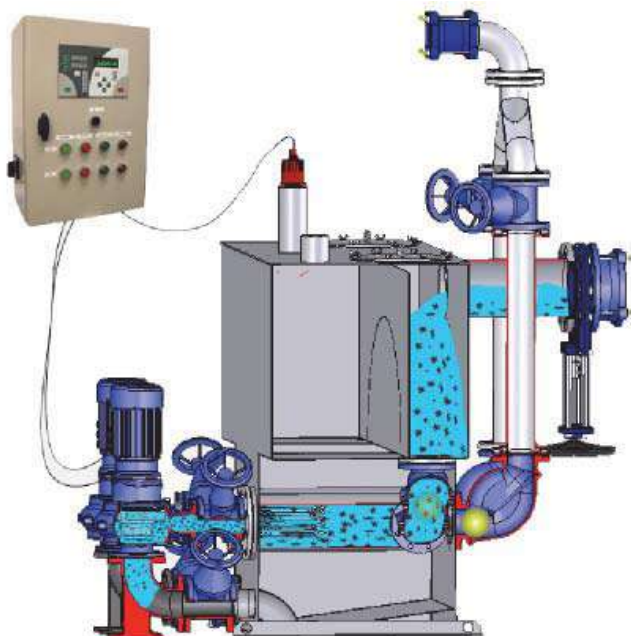
- inflow and distribution of sewage in the distribution and overflow tank,
- sewage separation in separation columns,
- pumping of sewage by pumping subassemblies based on two dry installed pumps..

## Visualization flow

### 1) Inflow of sewage to the sewage pumping station with separation of solids 2) Drainage of sewage to the storage reservoir

Distributed sewage is fed to the separator.

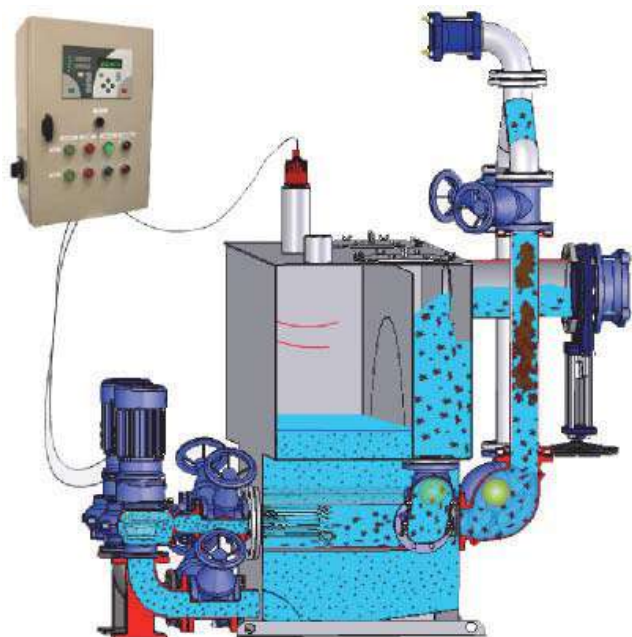
The part of sewage that is filtered drains gravitationally through the hydraulic channels of the pump and accumulates in the sewage pumping station with separation of solids's storage reservoir.



### 3) Discharge of sewage to the main drain

The process of cumulative chamber filling is controlled and triggers automatic switching on or off of the pump thanks to the use of an ultrasound probe. When the pump is switched on, the sewage collected in the tank is pumped outside. The stream of pumped sewage "flushes" the separator and carries larger impurities which had accumulated there, bypassing the pump.

The sewage pumping station with separation of solids does not require any extra equipment for removal of solid impurities.



The sewage pumping station with separation of solids is designed as a multi-pump unit, with the pumps working alternately in every cycle. The inflowing sewage passes through all separators at the same rate and into the tank. When the tank is filled, the safety and control device triggers alternating switching on of the pumps using the ultrasound probe signal. The sewage stream is cut off by the elbow type non-return ball valve which prevents the return of sewage to the distribution and overflow tank. If there is an abundant inflow of sewage, and one of the pumps is unable to pump the sewage out, another pump will be switched on for assistance. If a pump breaks down, it may be removed for repair. This is done after the gate valves have closed. It is also possible to remove the separators and ball valves. Furthermore, the storage reservoir may be cleaned, which is enabled by access covers of the sewage pumping station with separation of solids tank.

## Sewage pumping station with separation of solids parameters

Type	Sewage inflow	Volume	Number of pumps	Inlet lower edge	Recommended minimum discharge pipeline diameter	Pump type	Recommended minimum chamber diameter
	[m <sup>3</sup> /h]	[m <sup>3</sup> ]	[pcs]	[mm]	[mm]	-	[mm]
TSA.1.05	0,5	0,05	2	400	80	FZB.2 / FZD.2	2000
TSA.1.10	1	0,1	2	450	80	FZB.2 / FZD.2	2000
TSA.1.20	2	0,15	2	500	80	FZB.2 / FZD.2	2000
TSA.1.40	4	0,15	2	500	80	FZB.2 / FZD.2 FZB.3 / FZD.3	2000
TSA.1.60	6	0,2	2	550	100	FZB.2 / FZD.2 FZB.3 / FZD.3	2500
TSA.2.10	10	0,3	2	600	100	FZB.2 / FZD.2 FZB.3 / FZD.3	2500
TSA.2.15	15	0,5	2	700	100	FZB.2 / FZD.2 FZB.3 / FZD.3	2500
TSA.2.30	30	1	2-4	1200	100	FZB.2 / FZD.2 FZB.3 / FZD.3	3000
TSA.2.45	45	1,5	2-4	1200	125	FZB.3 / FZD.3	3000
TSA.2.60	60	2	2-4	1400	125	FZB.3 / FZD.3	3800
TSA.2.80	80	2,4	2-4	1600	150	FZB.3 / FZD.3	4000
TSA.3.12	120	4	2-4	1600	150	FZB.3 / FZD.3	4500
TSA.3.15	150	5	2-4	1800	200	FZB.3 / FZD.3	4500
TSA.3.20	200	6	2-4	1800	200	FZB.3 / FZD.3	4800
TSA.3.25	250	6	2-4	2000	250	FZB.6 / FZD.6	4800
TSA.3.35	350	9	2-4	2000	250	FZB.6 / FZD.6	5500
TSA.3.40	400	11	2-4	2200	250	FZB.6 / FZD.6	5500
TSB.1.05 TSB.1.10	1	0,1	2	400	80	FZB.2, FZD.2	1500
TSB.1.20 TSB.1.40	4	0,15	2	500	80	FZB.2, FZD.2	1500
TSB.1.60	6	0,2	2	550	100	FZB.2, FZB.3 FZD.2, FZD.3	2000
TSB.2.10	10	0,3	2	600	100	FZB.2, FZB.3 FZB.2, FZB.3	2000
TSB.2.15	15	0,5	2	700	100	FZB.2, FZB.3 FZB.2, FZB.3	2000
TSB.2.30	30	1	2	1200	100	FZB.2, FZB.3 FZB.2, FZB.3	2500
TSB.2.45	45	1,5	2	1200	100	FZB.3, FZD.3	2500
TSB.2.60	60	2	2	1400	100	FZB.3, FZD.3	2500
TSB.2.80	80	2,4	2	1600	150	FZB.3, FZD.3	3000
TSC.1.20	1	0,1	1-2	400	80	FZB.2, FZD.2	1500
TSC.1.40	4	0,15	2	500	80	FZB.2, FZD.2, FZE.2	1500
TSC.1.60	6	0,2	2	600	100	FZB.2, FZD.2, FZE.2, FZC.2	1500
TSC.2.15	10	0,3	2	600	100	FZB.2, FZD.2, FZE.2, FZC.2, FZB.3, FZD.3	2000
	15	0,5	2	700	100		
TSC.2.30	30	1	2-4	1200	100	FZE.2, FZC.2, FZB.3, FZC.3, FZE.3	2000
TSC.2.45	45	1,5	2-4	1000	100	FZB.3, FZC.3, FZE.3	2500
TSC.2.60	60	2	2-4	1300	100	FZB.3, FZC.3, FZE.3	2500
TSC.2.80	80	2,4	2-4	1600	150	FZB.4, FZC.4, FZV.4 (FZC.3, FZV.3, FZE.3)	2500

## Type TSC sewage pumping station with solids separation system

**NOVELTY**  
TSC

Sewage pumping stations with solids separation system TSC type are characterized by efficient work and greater freedom of operation. Cost optimization achieved thanks to the construction with modern design allows for installation of the equipment in tanks with smaller diameters suitable for "dry installation" and increases space for its maintenance.

Friendly installation and operating system of sewage pumping station with separation of solids is achieved thanks to using such elements as movable flange on the inflow side and using appropriate fittings. The elbow between the pump and the separator allows for the access to the separator without dismantling of the pump and using shut-off valves before the separator and pumps allow for conducting maintenance work without switching the sewage pumping station with solids separation system off service.

**The advantages of sewage pumping station with solids separation system TSC type:**

- direct access to the separator without dismantling of the pump,
- shut-off valves before separators and pumps allowing to conduct maintenance work without switching the sewage pumping station off service,
- increasing the space for maintenance work and easier access to separators and shut-off valves,
- additional float allowing for alternative control even in the case of probe failure.



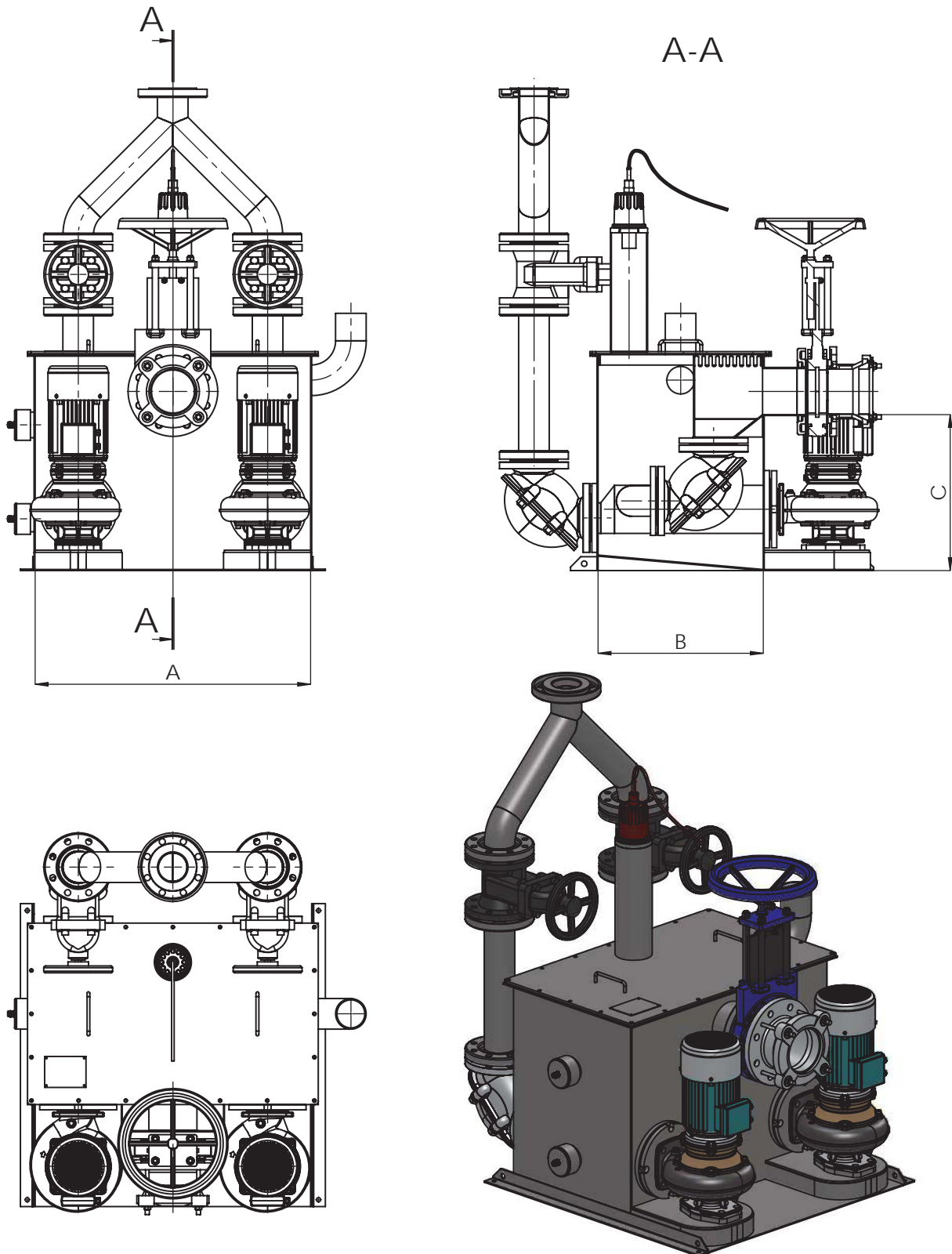
## The sewage pumping station with separation of solids meets the requirements of

- Directive 89/106/EEC relating to construction products,
- Directive 73/23/EEC relating to electrical equipment designed for use within certain voltage limits,
- Directive 89/336/EEC relating to electromagnetic compatibility,
- Directive 98/37/EC relating to machines confirmed by type test by a certified body.



## Type TSA sewage pumping station with solids separation system

Size types: TSA.1.05; TSA.1.10; TSA.1.20

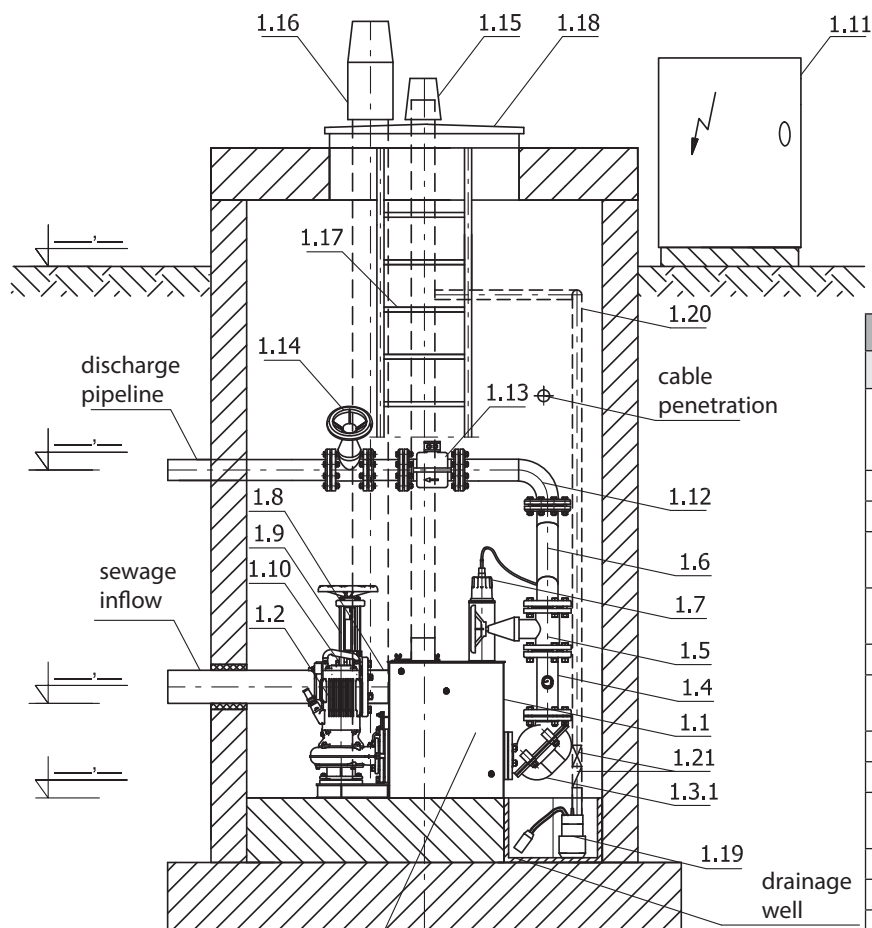


Size type	Dimensions [mm]		
	A	B	C
1.05	800	480	400
1.10	800	480	450
1.20	800	480	500

## Type TSA sewage pumping station with solids separation system

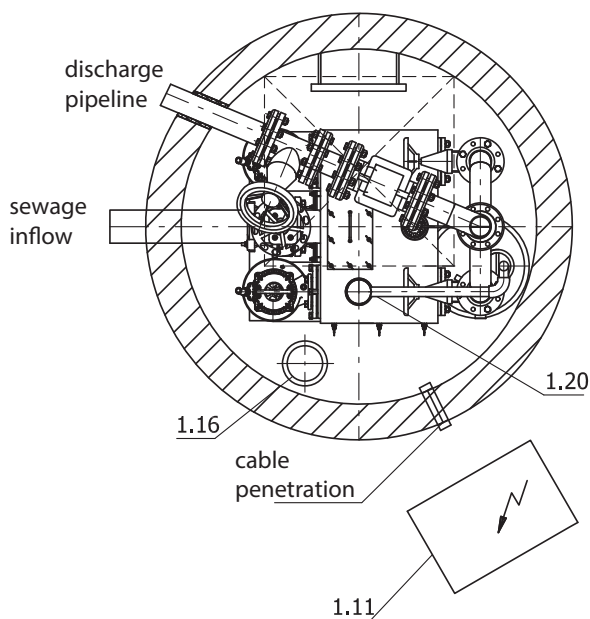
Size types: TSA.1.05, TSA.1.10, TSA.1.20

Example installation of the TSA.1.05, TSA.1.10, TSA.1.20 sewage pumping station with separation of solids in a concrete chamber-  
Minimum inner diameter of the chamber: 1500mm



1 – sewage pumping station with separation of solids

STANDARD		
NO.	NAME	PCS
1	Type TSA Size type: TSA.1.05, TSA.1.10, TSA.1.20	
1.1	Station tank	1
1.2	FZ type pump	2
1.3.1	Non-return ball valve – discharge DN80	2
1.3.2	Non-return ball valve – inflow, DN80 (inside the Station tank)	2
1.4	Discharge riser DN80	2
1.5	Flange gate valve with soft sealing DN80	2
1.6	Cumulative discharge pipeline DN80	1
1.7	Ultrasound probe	1
1.8	Gravitational channel connection DN125	1
1.9	Knife gate valve DN125	1
1.10	Pipe and flange connector DN125	1
1.11	Safety and control device UZS.8	1

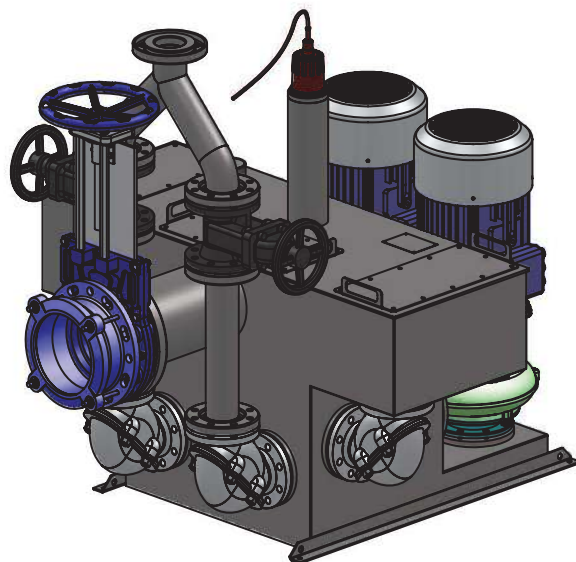
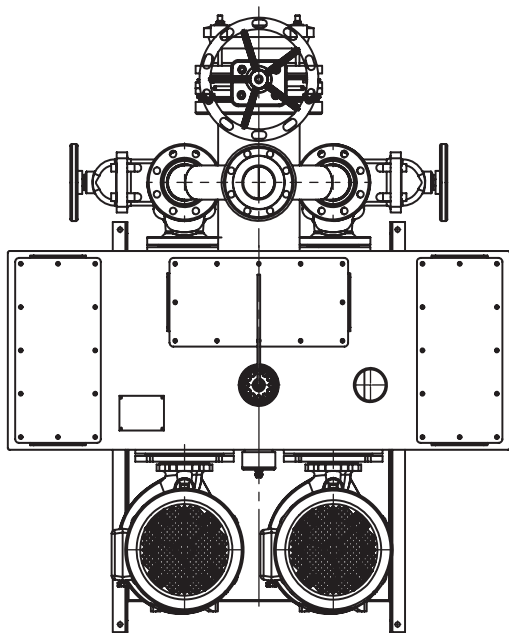
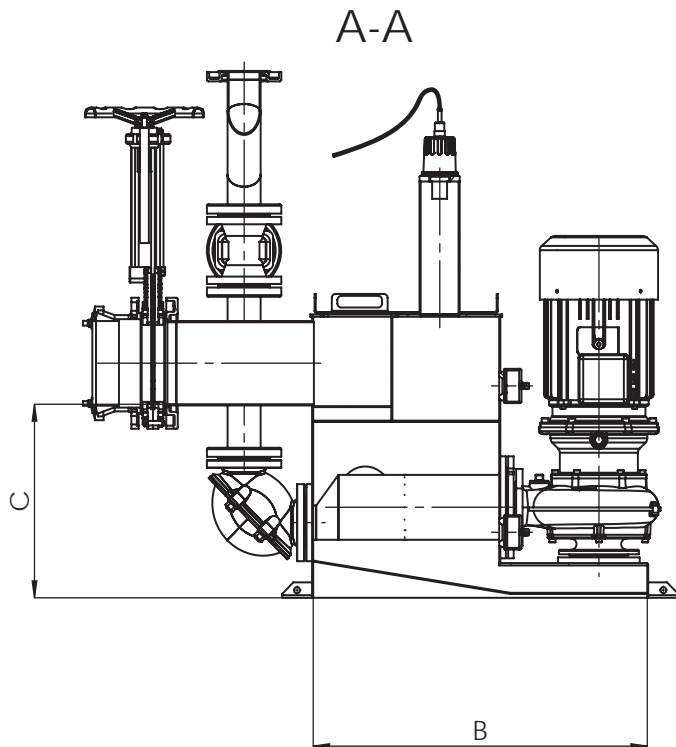
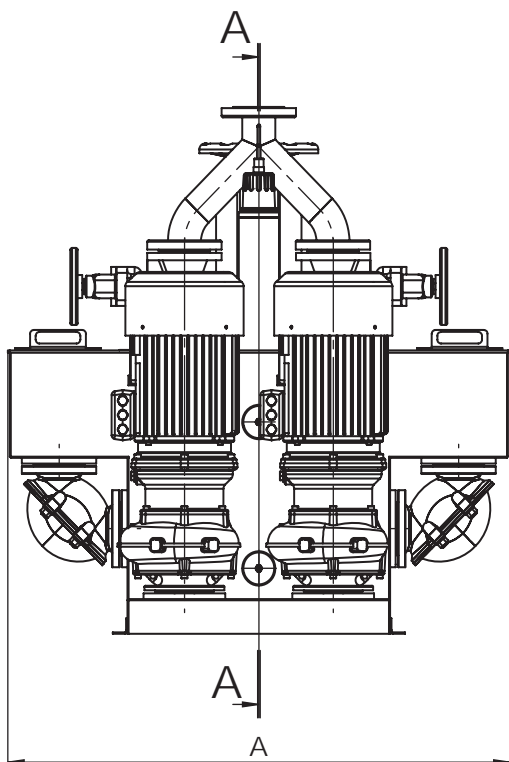


OPTIONAL		
NO.	NAME	PCS
1.12	Discharge pipeline inside the chamber DN80	1
1.13	Flow meter DN80	1
1.14	Flange gate valve, soft sealing DN80	1
1.15	Station tank ventilation DN50/DN110	1
1.16	Chamber ventilation DN160	1
1.17	Access ladder	1
1.18	Manhole cover with a vent	1
1.19	Drainage pump	1
1.20	Drainage pipe DN40	1
1.21	Gate valve and non-return valve for drainage pump 1 1/2"	1



## Type TSA sewage pumping station with solids separation system

Size types: TSA.1.40; TSA.1.60; TSA.2.10; TSA.2.15



Size type	Dimensions [mm]		
	A	B	C
1.40	1300	1000	500
1.60	1500	1000	550
2.10	1500	1000	600
2.15	1500	1000	700

## Type TSA sewage pumping station with solids separation system

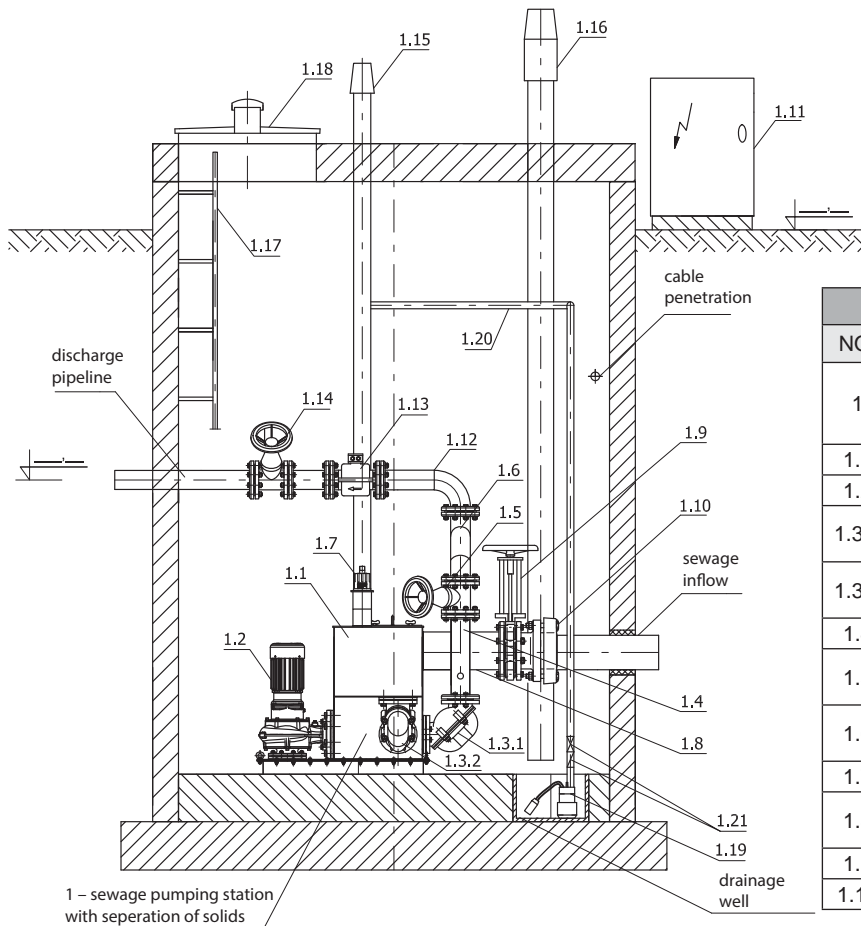
Size types: TSA.1.40; TSA.1.60; TSA.2.10; TSA.2.15

Example installation of the TSA.1.40, TSA.1.60, TSA.2.10, TSA.2.15 in a concrete chamber

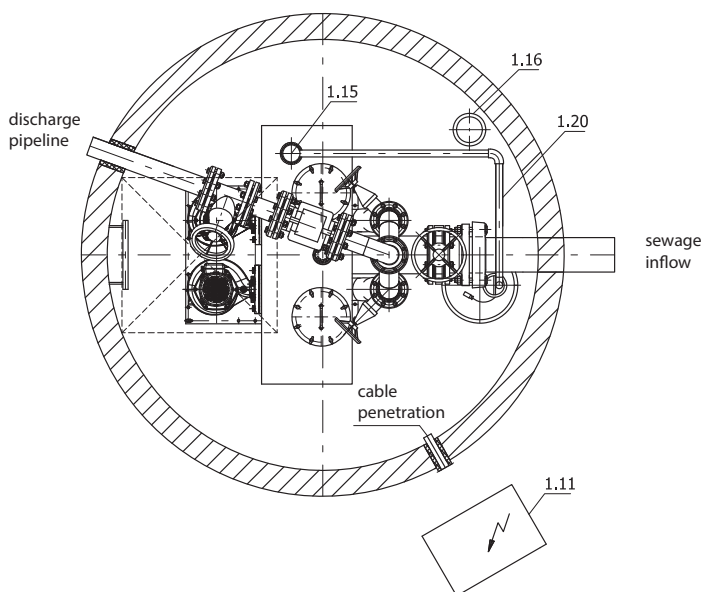
Minimum inner diameter of the chamber:

TSA.1.40 – 2000mm

TSA.1.60, TSA.2.10, TSA.2.15 – 2500mm



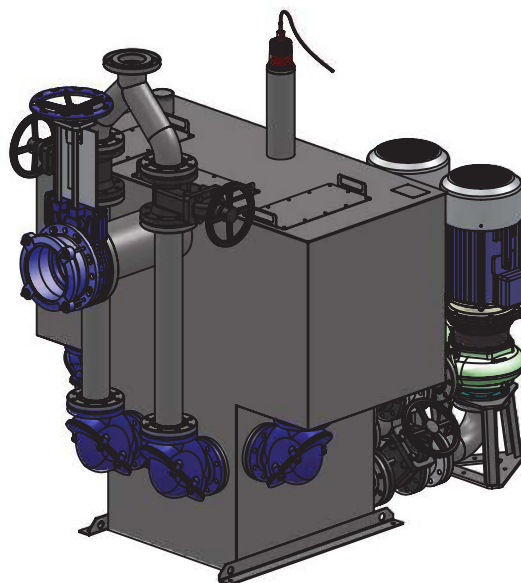
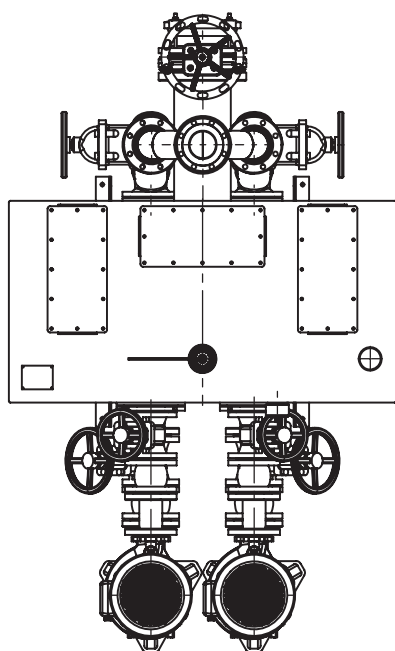
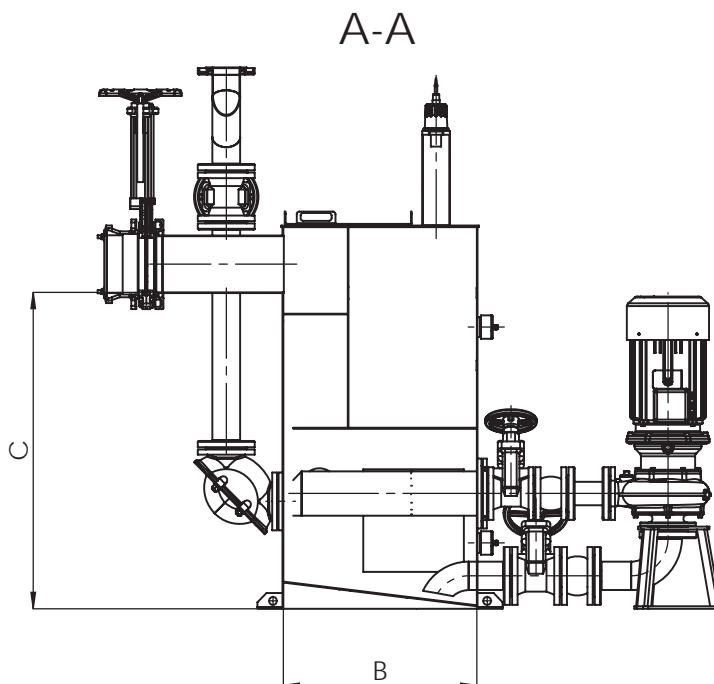
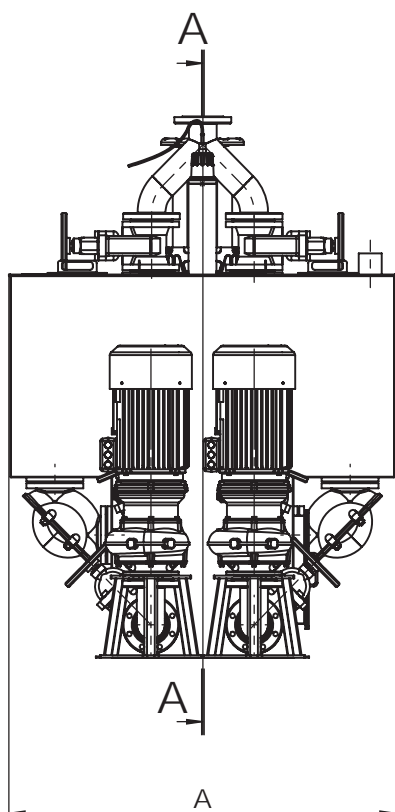
STANDARD		
NO.	NAME	PCS
1	Type TSA Size type: TSA.1.40, TSA.1.60, TSA.2.10, TSA.2.15	
1.1	Station tank	1
1.2	FZ type pump	2
1.3.1	Non-return ball valve - discharge DN80/DN100	2
1.3.2	Non-return ball valve - inflow DN80/DN100	2
1.4	Discharge riser DN80/DN100	2
1.5	Flange gate valve with soft sealing DN80/DN100	2
1.6	Cumulative discharge pipeline DN80/DN100	1
1.7	Ultrasound probe	1
1.8	Gravitational channel connection DN150/DN200	1
1.9	Knife gate valve DN150/DN200	1
1.10	Pipe and flange connector DN125	1



OPTIONAL		
NO.	NAME	PCS
1.12	Elbow subassembly DN80/DN100	1
1.13	Flow meter DN80/DN100	1
1.14	Flange gate valve, soft sealing DN80/DN100	1
1.15	Station tank ventilation DN50/DN110	1
1.16	Chamber ventilation DN160	1
1.17	Access ladder	1
1.18	Manhole cover with a vent	1
1.19	Drainage pump	1
1.20	Drainage pipe DN40	1
1.21	Gate valve and non-return valve for drainage pump 1 1/2"	1

## Type TSA sewage pumping station with solids separation system

Size types: TSA.2.30; TSA.2.45; TSA.2.60; TSA.2.80



Size type	Dimensions [mm]		
	A	B	C
2.30	1500	750	1200
2.45	1600	900	1200
2.60	1600	1000	1400
2.80	1700	1000	1600

# SEWAGE PUMPING STATION WITH SOLIDS SEPARATION SYSTEM

## Type TSA sewage pumping station with solids separation system

Size types: TSA.2.30; TSA.2.45; TSA.2.60; TSA.2.80

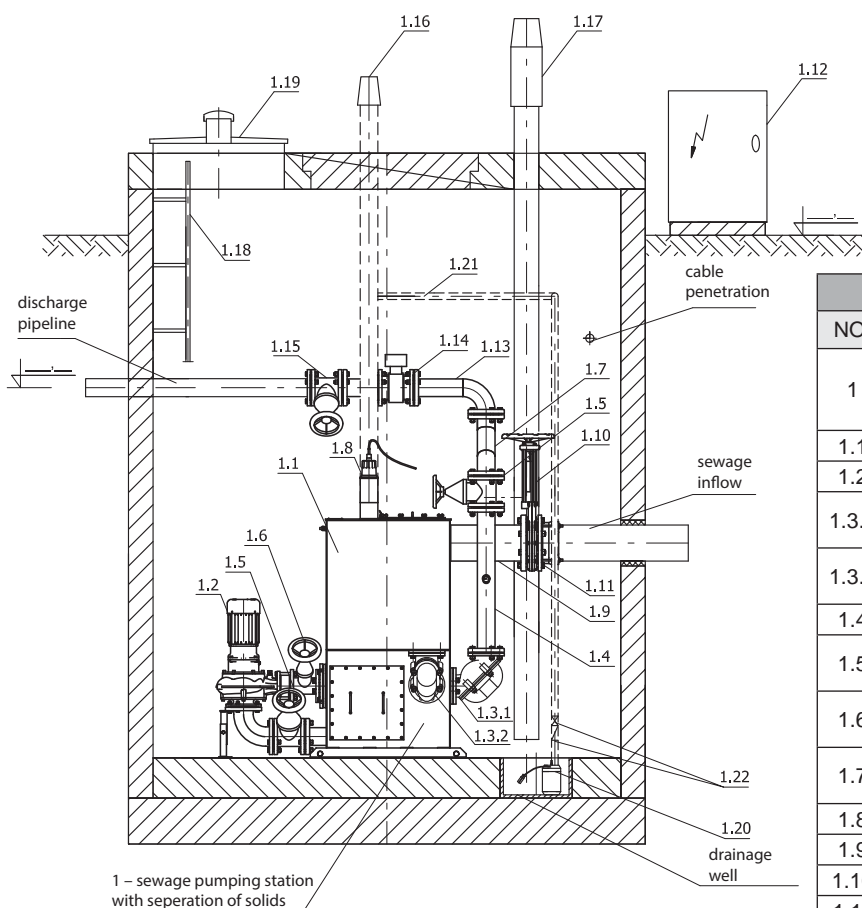
Example installation of the TSA.2.30, TSA.2.45, TSA.2.60, TSA.2.80 in a concrete chamber

Minimum inner diameter of the chamber:

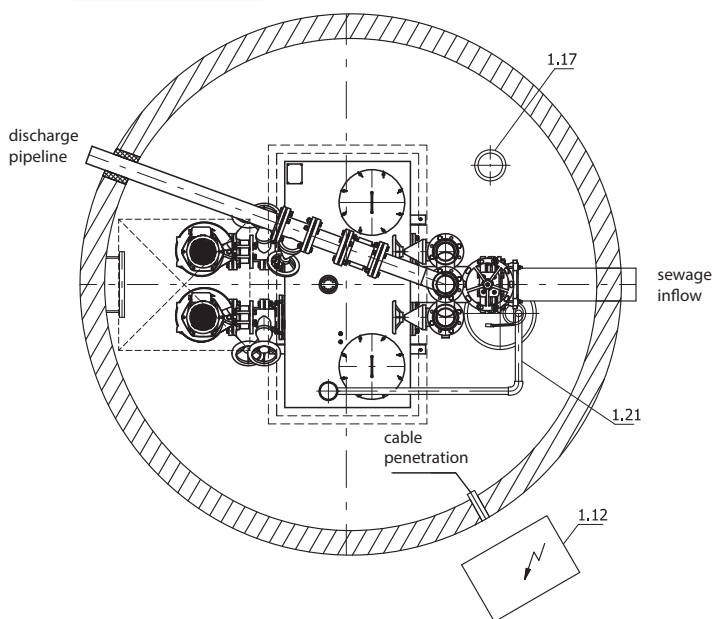
TSA.2.30, TSA.2.45 – 3000mm

TSA.2.60 – 3800mm

TSA.2.80 – 4000mm



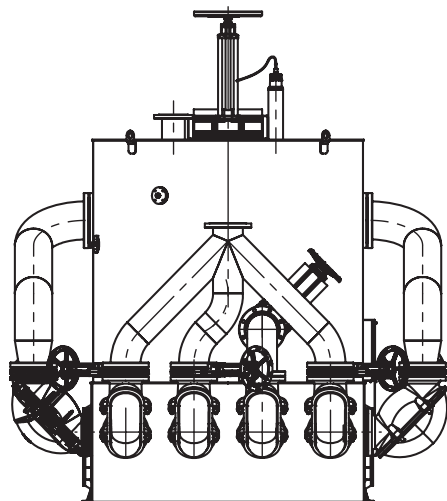
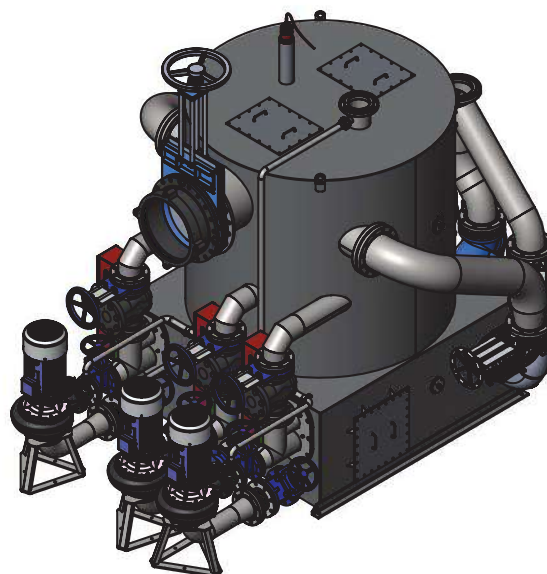
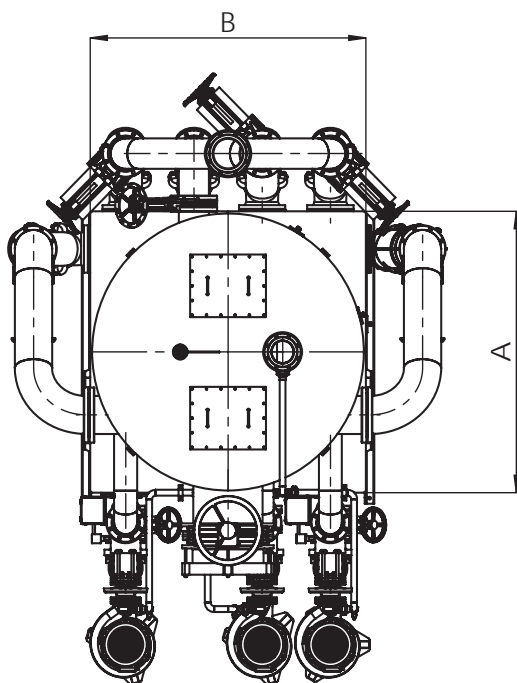
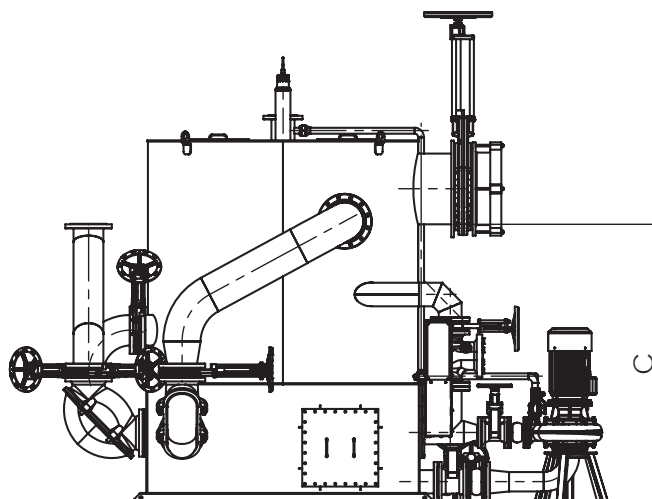
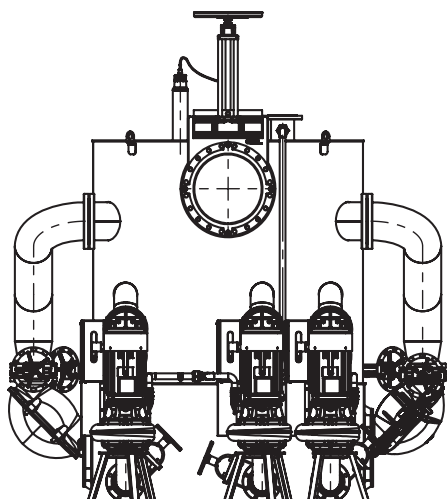
STANDARD		
NO.	NAME	PCS
1	Type TSA Size type: TSA.2.30, TSA.2.45, TSA.2.60, TSA.2.80	
1.1	Station tank	1
1.2	FZ type pump	2
1.3.1	Non-return ball valve - discharge DN100/DN125/DN150	2
1.3.2	Non-return ball valve - inflow DN100/DN125/DN150	2
1.4	Discharge riser DN100/DN125/DN150	2
1.5	Flange gate valve with soft sealing DN100/DN125/DN150	4
1.6	Flange gate valve with soft sealing DN80	2
1.7	Cumulative discharge pipeline DN100/DN125/DN150	1
1.8	Ultrasound probe	1
1.9	Gravitational channel connection DN200	1
1.10	Knife gate valve DN200	1
1.11	Pipe and flange connector DN200	1
1.12	Safety and control device UZS.8	1



OPTIONAL		
NO.	NAME	PCS
1.13	Elbow subassembly DN100/DN125/ DN150	1
1.14	Flow meter DN100	1
1.15	Flange gate valve, soft sealing DN100	1
1.16	Station tank ventilation DN110	1
1.17	Chamber ventilation DN160	1
1.18	Access ladder	1
1.19	Manhole cover with a vent	1
1.20	Drainage pump	1
1.21	Drainage pipe DN40	1
1.22	Gate valve and non-return valve for drainage pump 1 1/2"	1

## Type TSA sewage pumping station with solids separation system

Size types: TSA.3.12, TSA.3.15, TSA.3.20, TSA.3.25, TSA.3.35, TSA.3.40



Size type	Dimensions [mm]		
	A	B	C
3.12	1700	1700	1600
3.15	1700	1700	1800
3.20	2000	2000	1800
3.25	2000	2000	2000
3.35	2500	2500	2000
3.40	2500	2500	2200

## Type TSA sewage pumping station with solids separation system

Size types: TSA.3.12, TSA.3.15, TSA.3.20, TSA.3.25, TSA.3.35, TSA.3.40

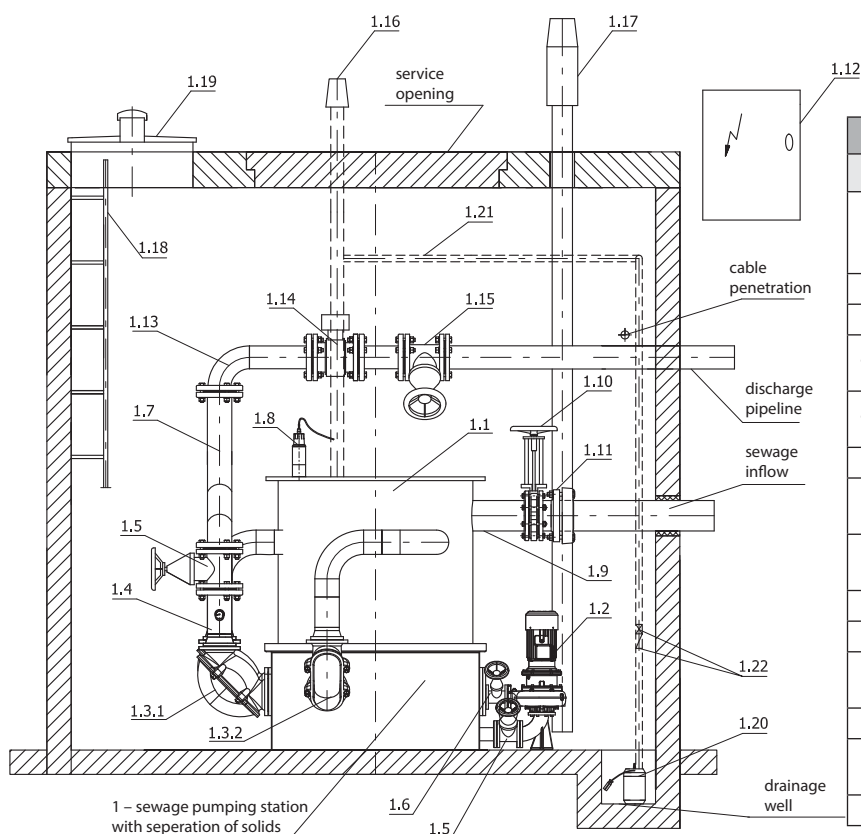
Example installation of the TSA.3.12, TSA.3.15, TSA.3.20, TSA.3.25, TSA.3.35 TSA.3.40 in a concrete chamber

Minimum inner diameter of the chamber:

TSA.3.12, TSA.3.15 – 4500mm

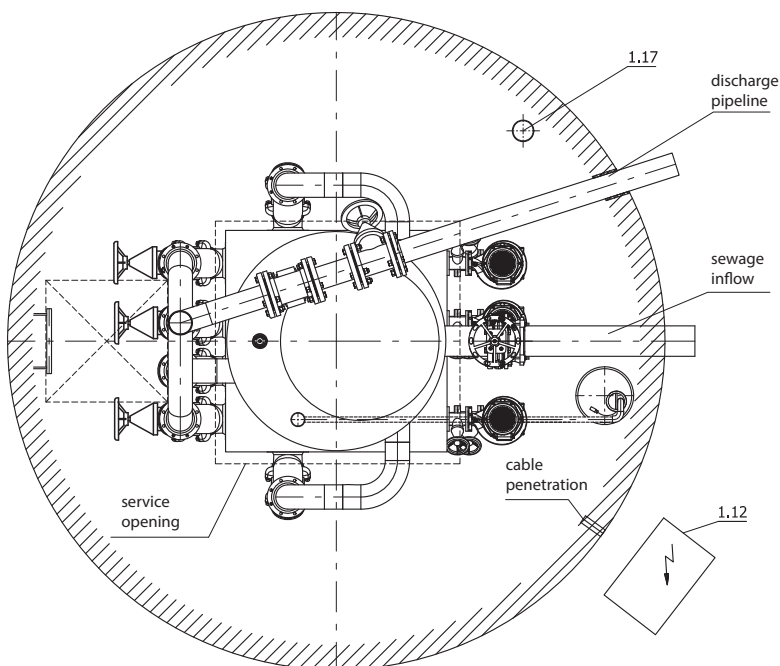
TSA.3.20, TSA.3.25 – 4800mm

TSA.3.35, TSA.3.40 – 5500mm



STANDARD		
NO.	NAME	PCS
1	Type TSA Size type: TSA.3.12, TSA.3.15, TSA.3.20, TSA.3.25, TSA.3.35 TSA.3.40	
1.1	Station tank	1
1.2	FZ type pump	2, 3*
1.3.1	Non-return valve – discharge DN150/DN200/DN250	2, 3*
1.3.2	Non-return valve – inflow DN150/DN200/DN250	2, 3*
1.4	Discharge riser DN150/DN200/DN250	2, 3*
1.5	Flange gate valve with soft sealing DN150/DN200/DN250	4, 6*
1.6	Flange gate valve with soft sealing DN80/DN100	2, 3*
1.7	Cumulative discharge pipeline	1
1.8	Ultrasound probe	1
1.9	Gravitational channel connection DN250/DN300	1
1.10	Knife gate valve DN250/DN300	1
1.11	Pipe and flange connector DN250/ DN300	1
1.12	Safety and control device UZS.8	1

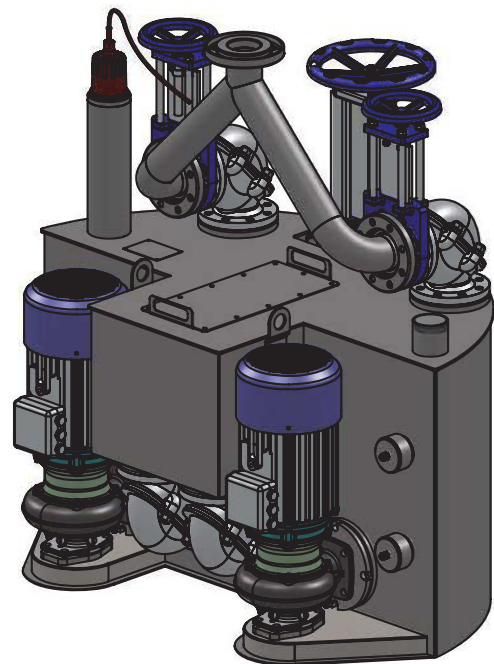
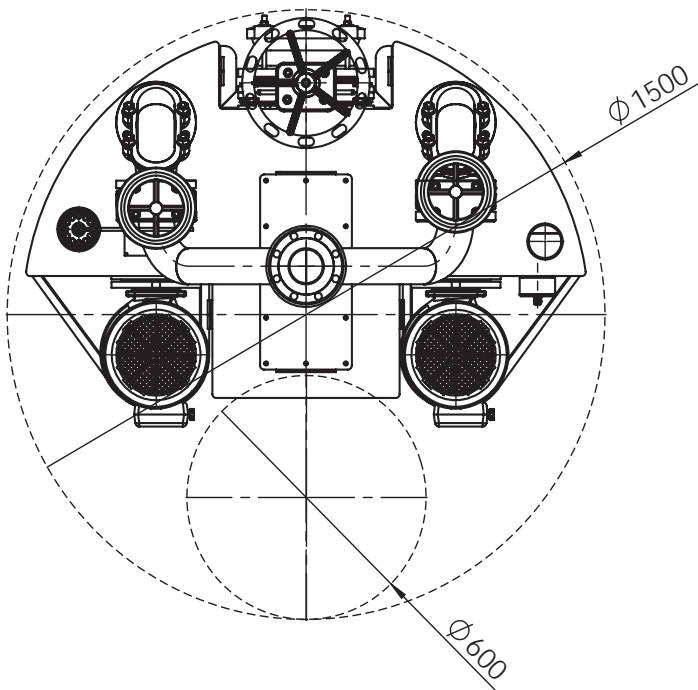
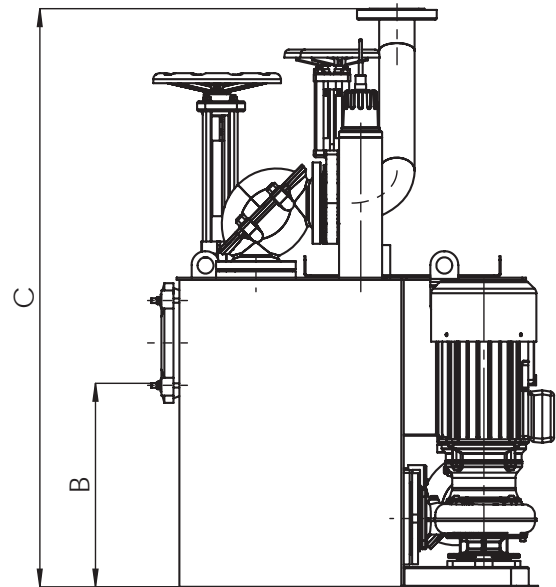
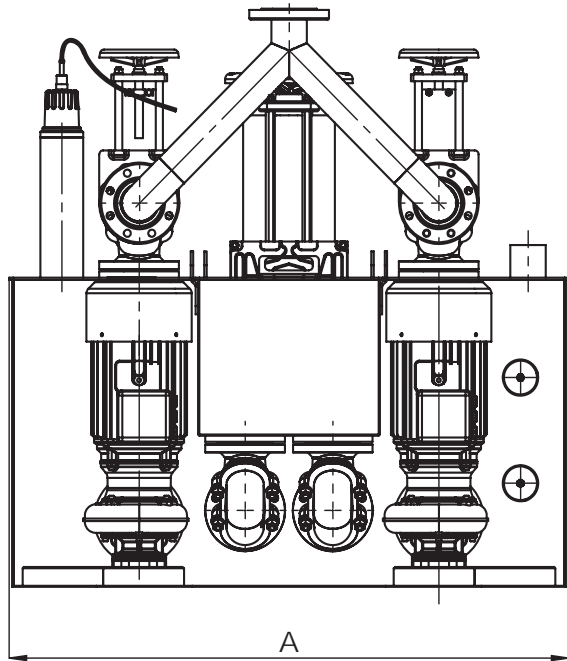
\*) - dotyczy TSA.3.15, TSA.3.20, TSA.3.35, TSA.3.40 z trzema pompami



OPTIONAL		
NO.	NAME	PCS
1.13	Elbow subassembly DN150/DN200/ DN250	1
1.14	Flow meter DN150/DN200/DN250	1
1.15	Flange gate valve, soft sealing DN150/DN200/DN250	1
1.16	Station tank ventilation DN110	1
1.17	Chamber ventilation DN160	1
1.18	Access ladder	1
1.19	Manhole cover	1
1.20	Drainage pump	1
1.21	Drainage pipe DN40	1
1.22	Gate valve and non-return valve for drainage pump 1 1/2"	1

## Type TSB sewage pumping station with solids separation system

Separation basket rod  
 Size types: TSB.1.05; TSB.1.10; TSB.1.20; TSB.1.40

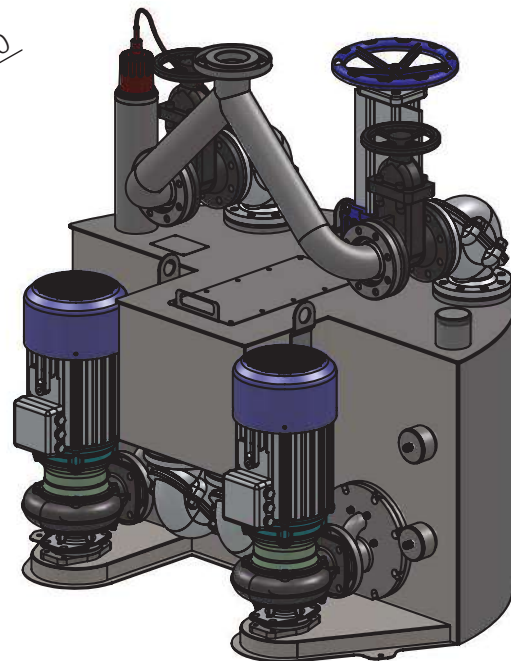
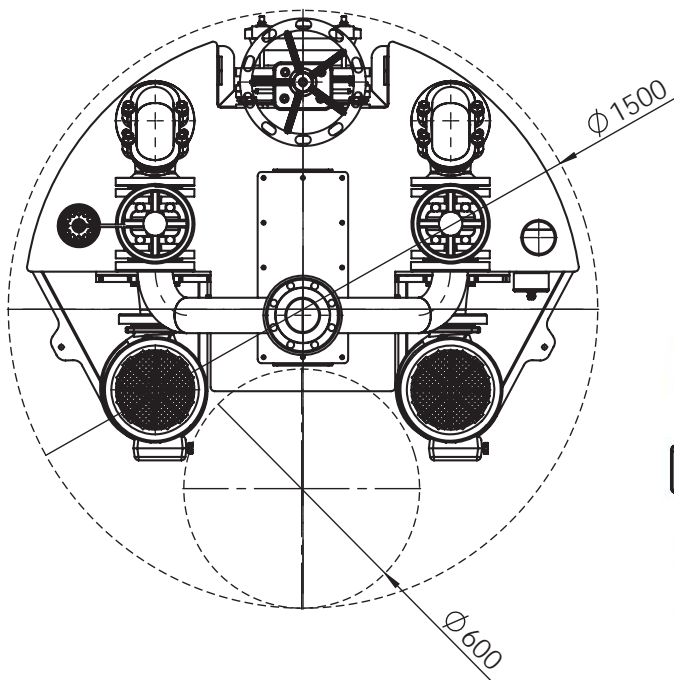
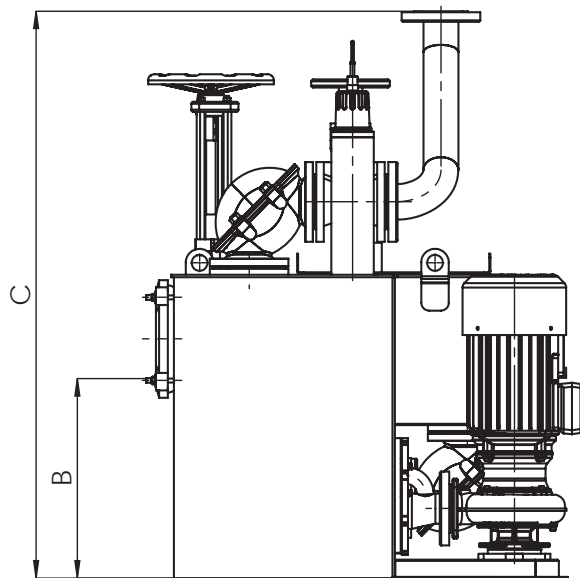
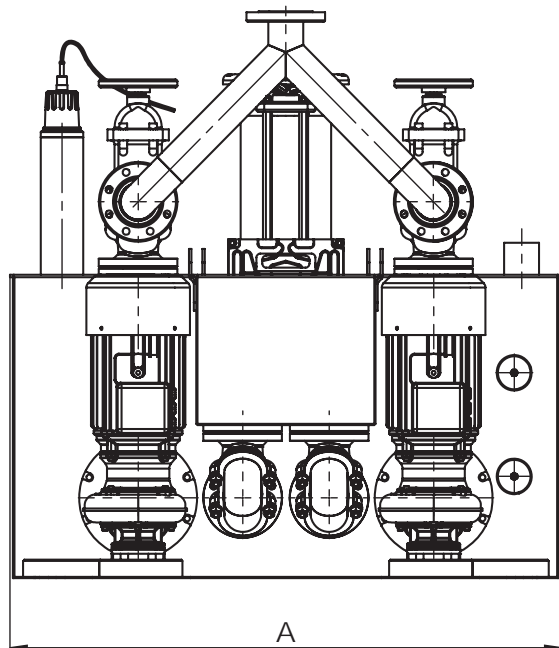


Size type	Dimensions [mm]		
	A	B	C
1.05	1410	400	1382
1.10	1410	400	1382
1.20	1410	500	1422
1.40	1410	500	1422

## Type TSB sewage pumping station with solids separation system

### Separation hinged flaps

Size types: TSB.1.05; TSB.1.10; TSB.1.20; TSB.1.40

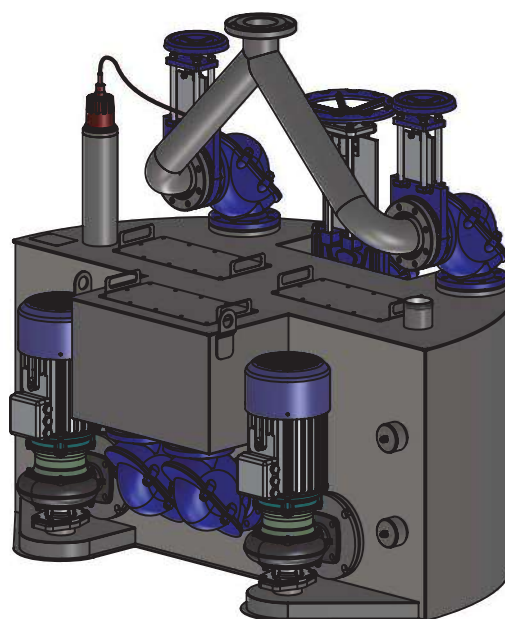
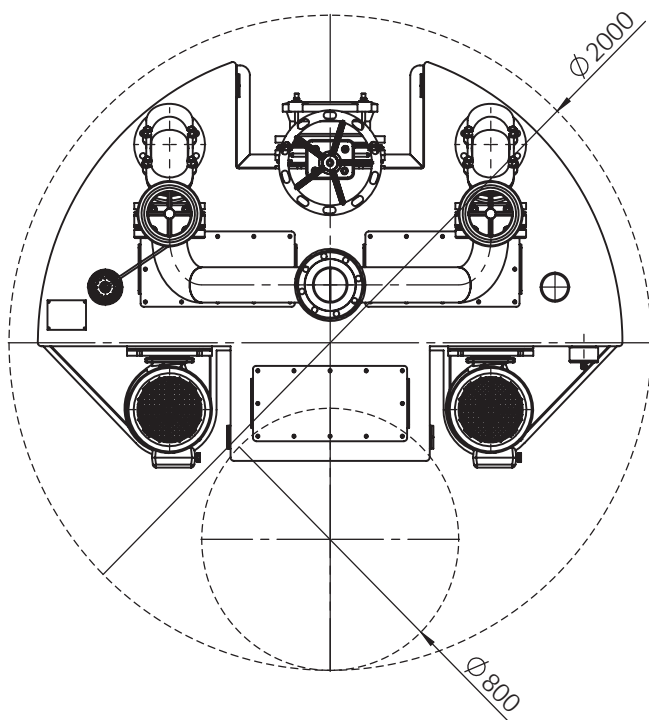
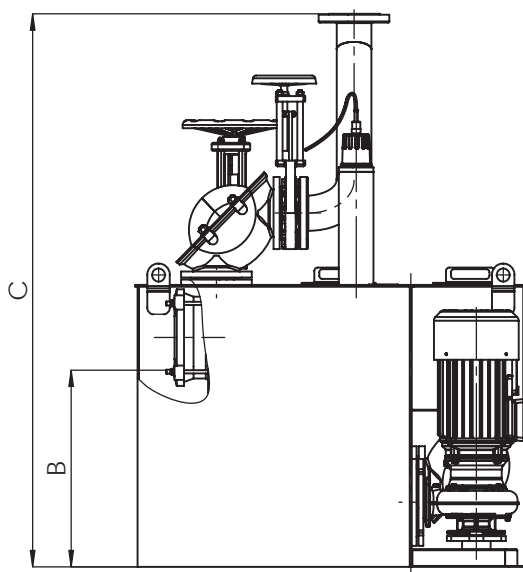
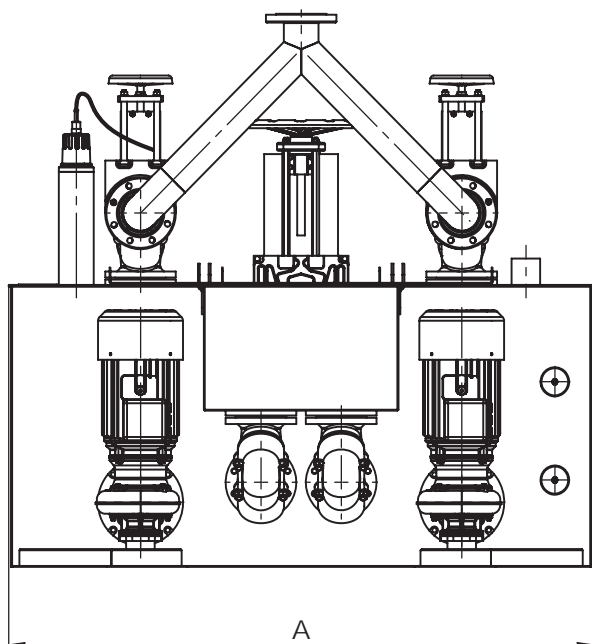


Size type	Dimensions [mm]		
	A	B	C
1.05	1410	400	1382
1.10	1410	400	1382
1.20	1410	500	1422
1.40	1410	500	1422



## Type TSB sewage pumping station with solids separation system

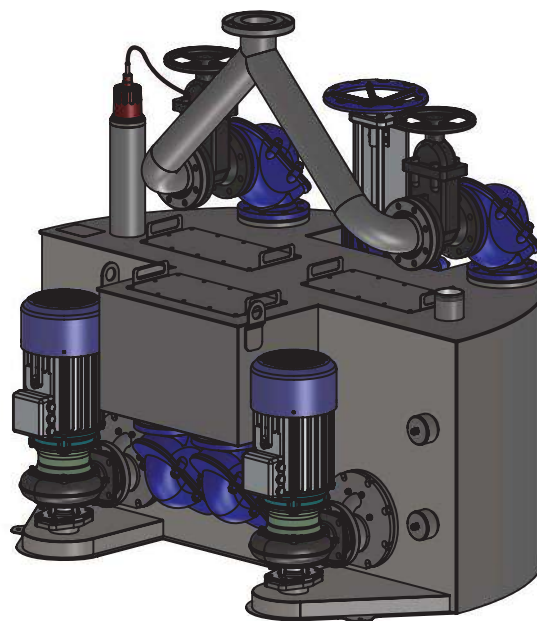
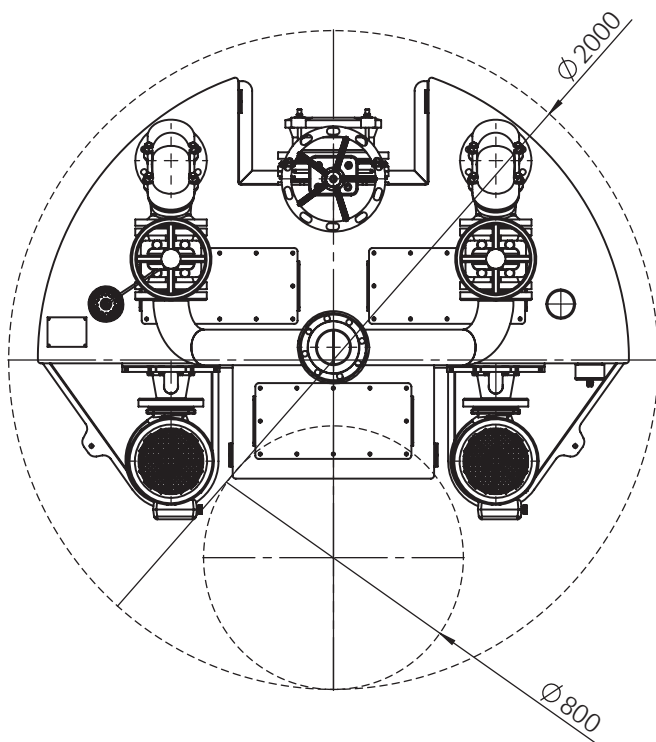
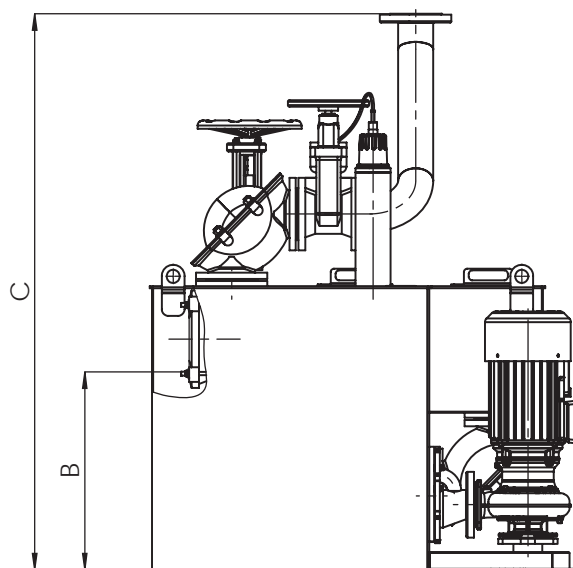
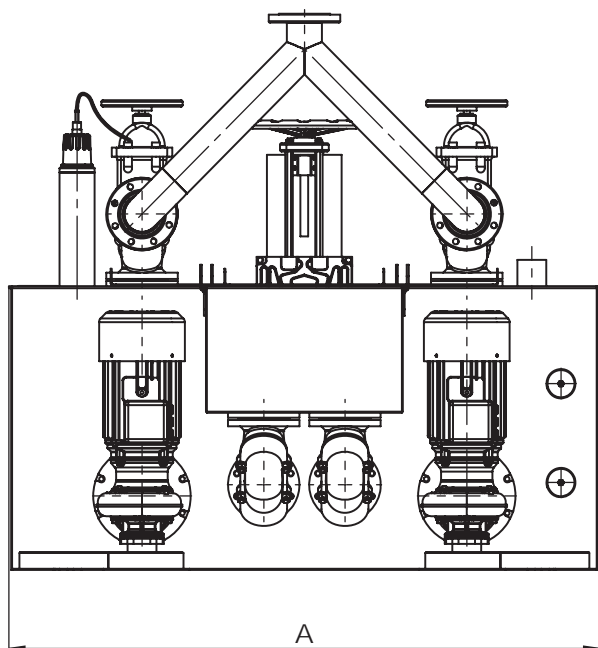
Separation basket rod  
 Size types: TSB.1.60; TSB.2.10; TSB.2.15



Size type	Dimensions [mm]		
	A	B	C
1.60	1820	550	1638
2.10	1820	600	1688
2.15	1820	700	1783

## Type TSB sewage pumping station with solids separation system

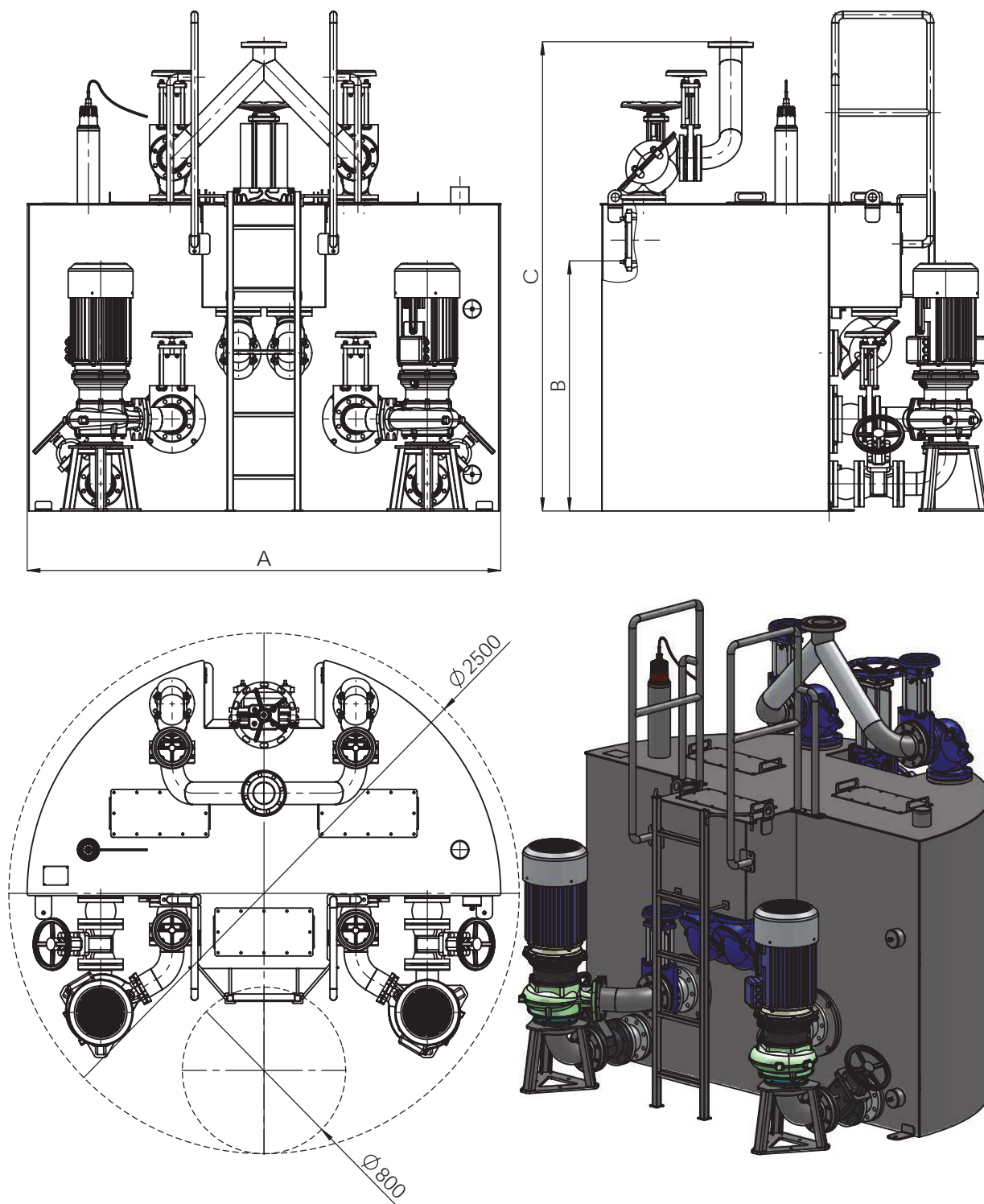
Separation hinged flaps  
 Size types: TSB.1.60; TSB.2.10; TSB.2.15



Size type	Dimensions [mm]		
	A	B	C
1.60	1820	550	1638
2.10	1820	600	1688
2.15	1820	700	1783

## Type TSB sewage pumping station with solids separation system

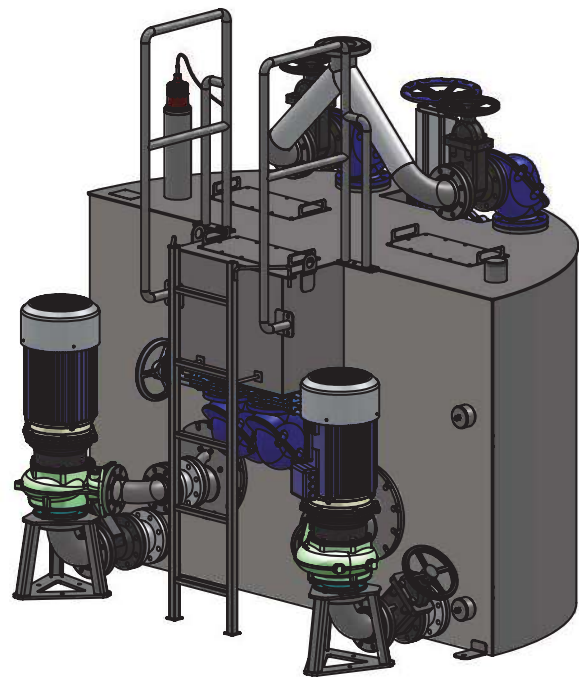
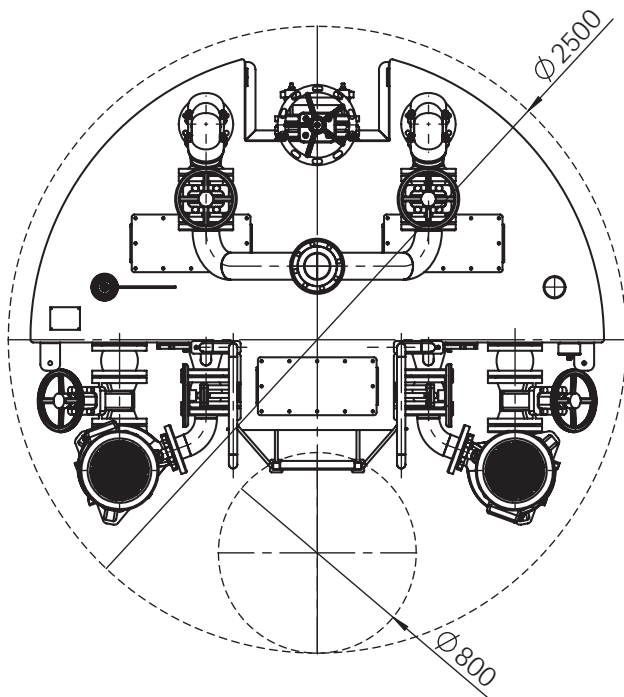
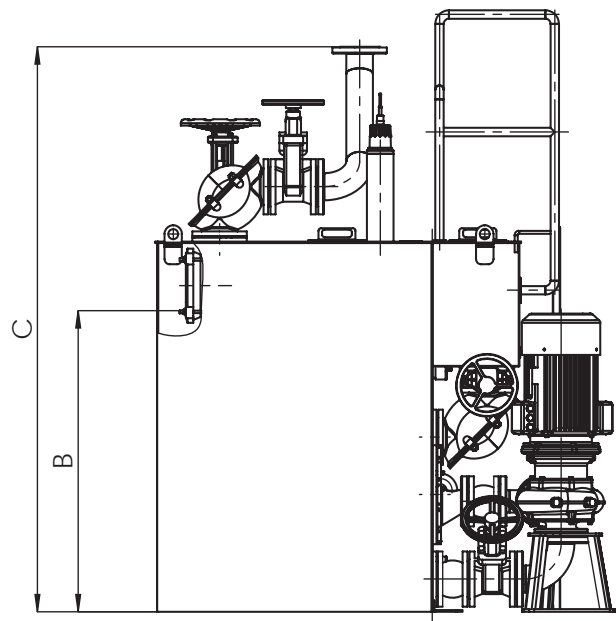
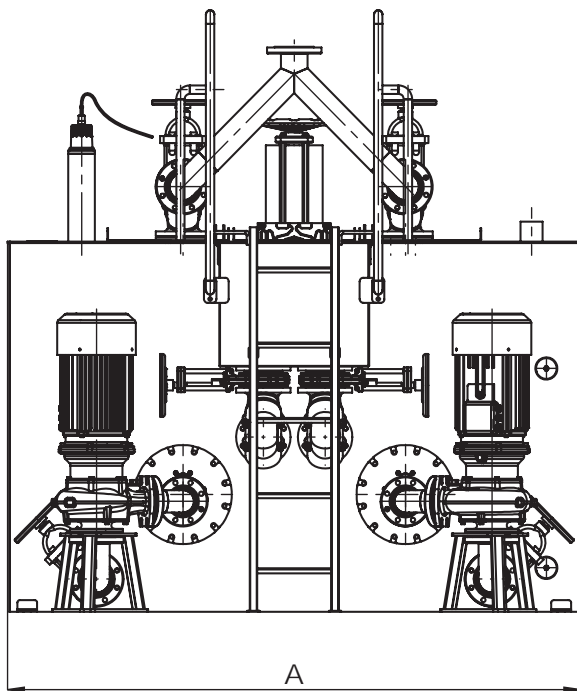
Separation basket rod  
 Size types: TSB.2.30; TSB.2.45; TSB.2.60



Size type	Dimensions [mm]		
	A	B	C
2.30	2320	1200	2253
2.45	2320	1200	2253
2.60	2320	1400	2453

## Type TSB sewage pumping station with solids separation system

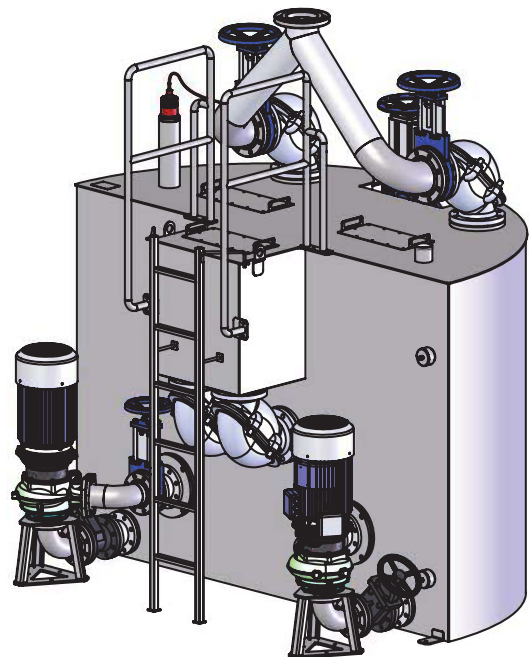
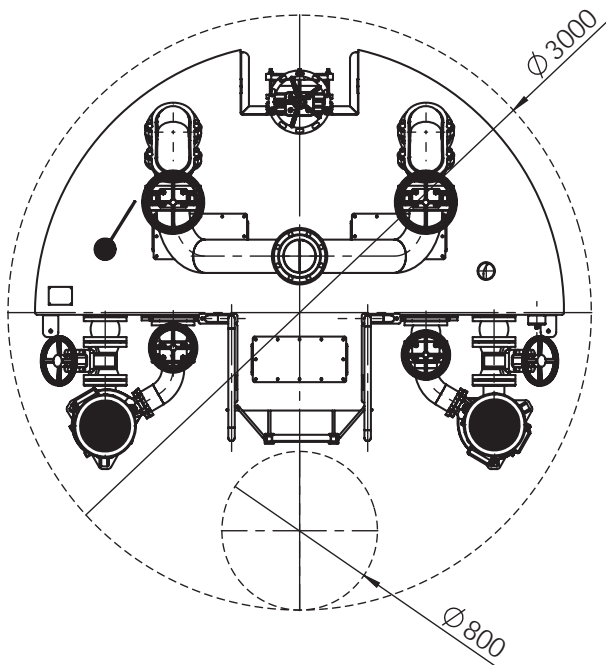
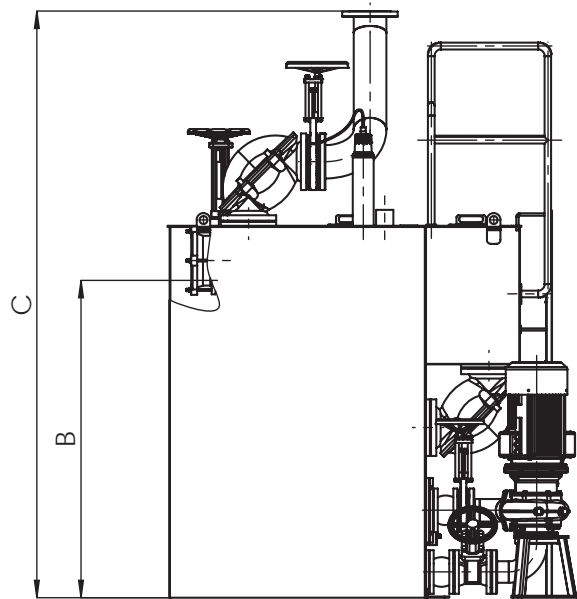
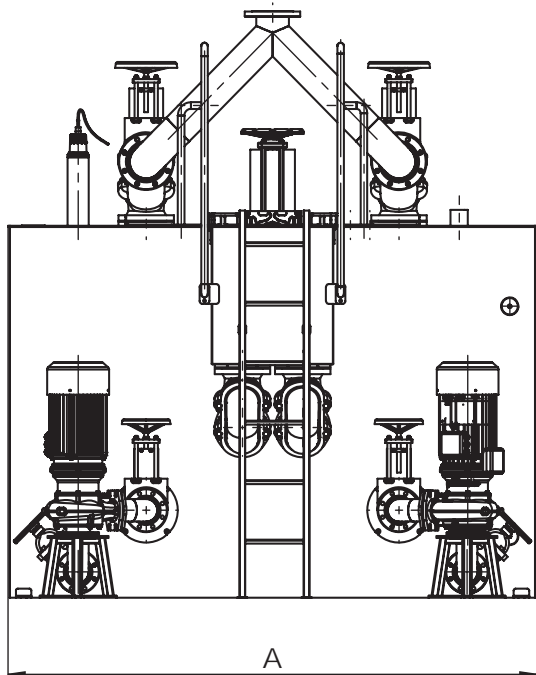
Separation hinged flaps  
 Size types: TSB.2.30; TSB.2.45; TSB.2.60



Size type	Dimensions [mm]		
	A	B	C
2.30	2320	1200	2253
2.45	2320	1200	2253
2.60	2320	1400	2453

## Type TSB sewage pumping station with solids separation system

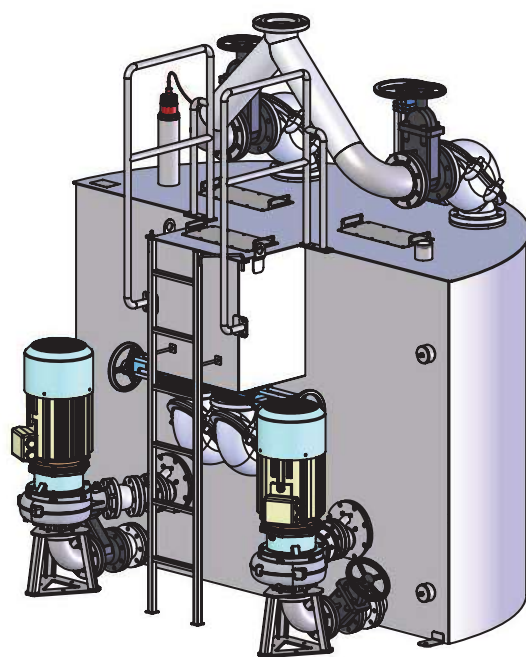
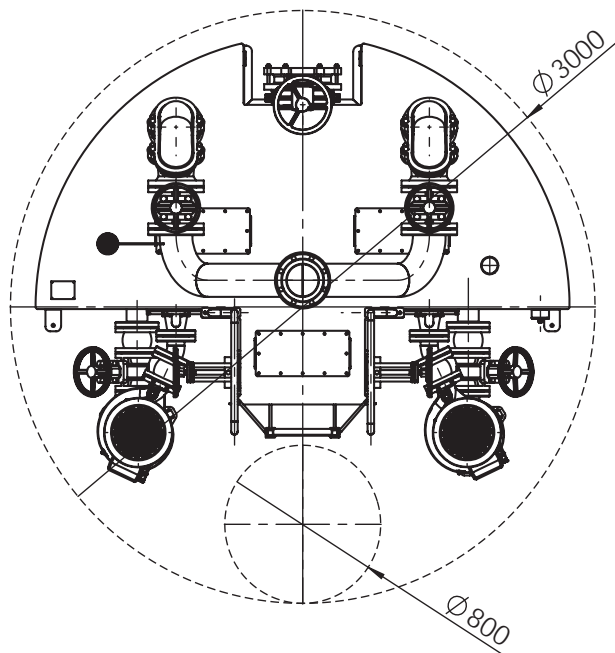
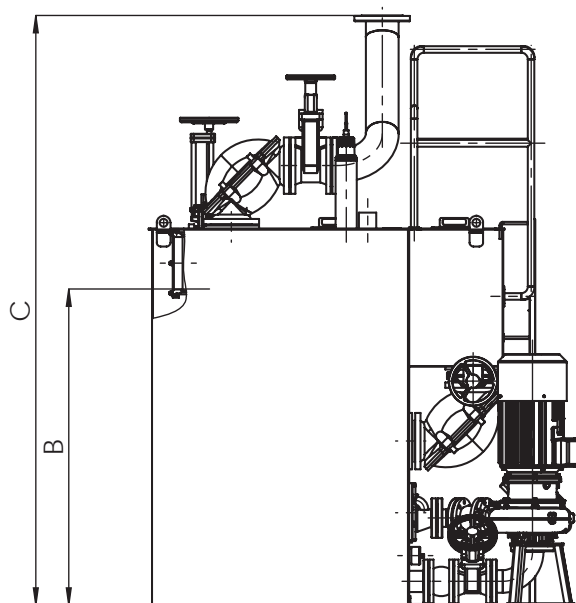
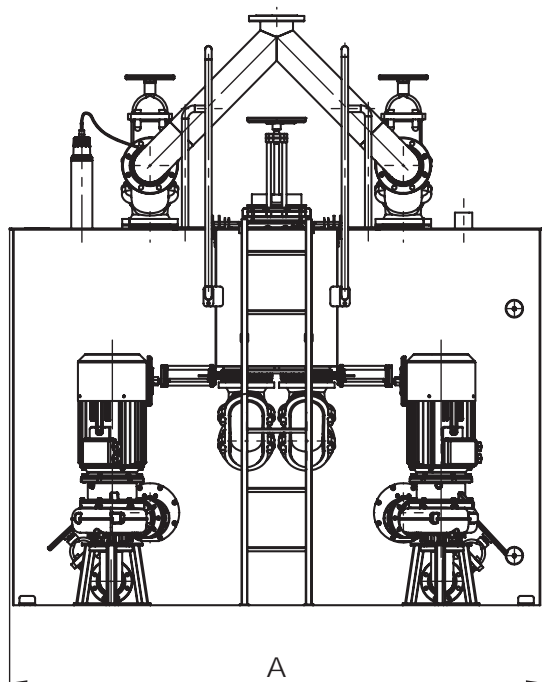
Separation basket rod  
Size types: TSB.2.80



Size type	Dimensions [mm]		
	A	B	C
2.80	2720	1600	2959

## Type TSB sewage pumping station with solids separation system

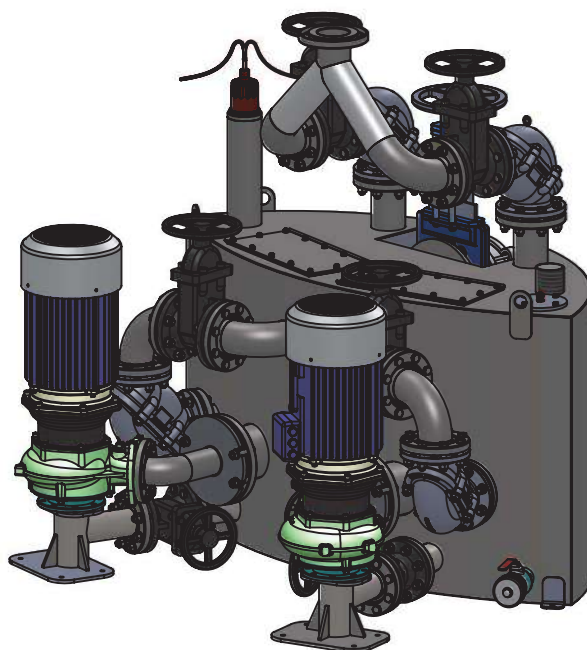
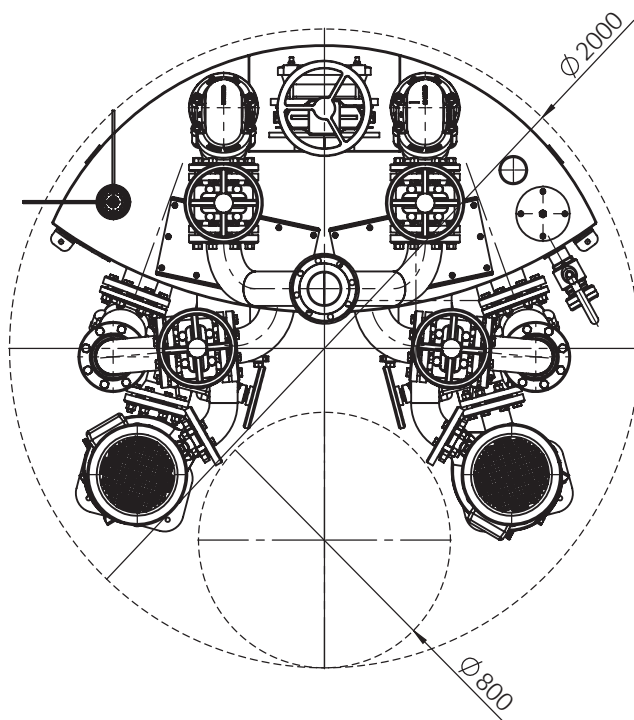
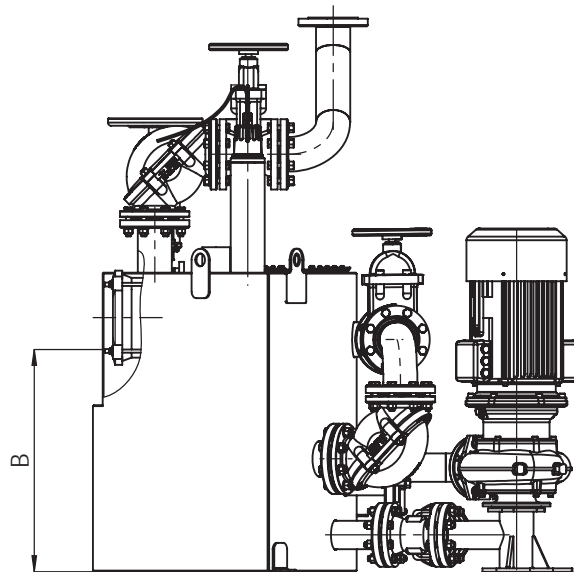
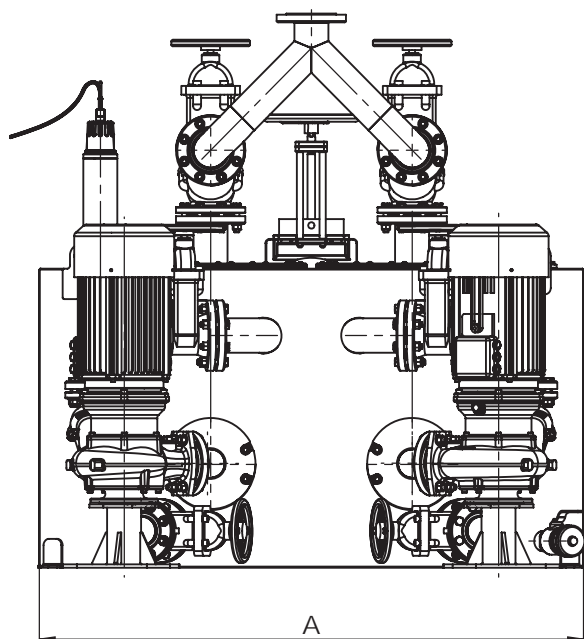
Separation hinged flaps  
Size types: TSB.2.80



Size type	Dimensions [mm]		
	A	B	C
2.80	2720	1600	2959

## Type TSC sewage pumping station with solids separation system

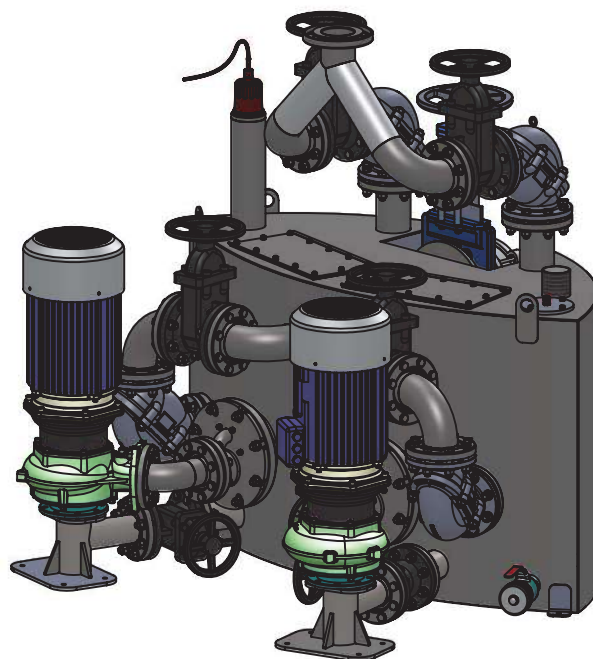
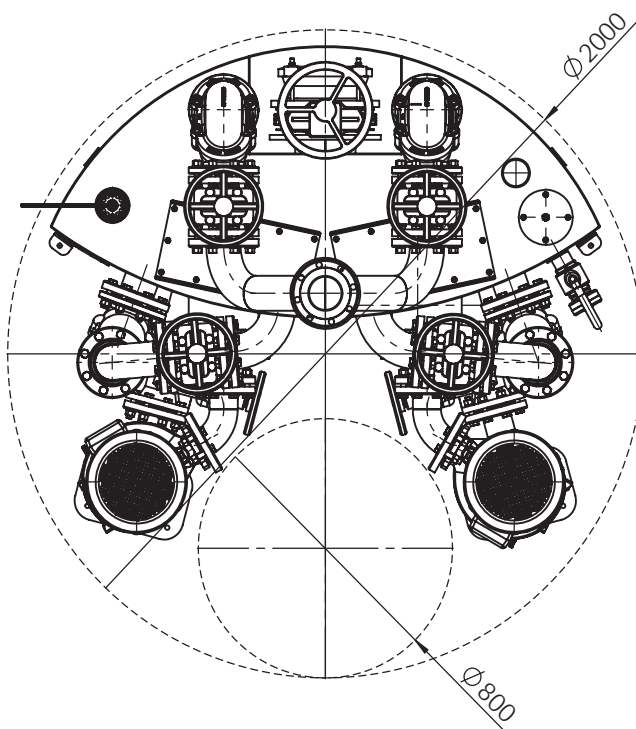
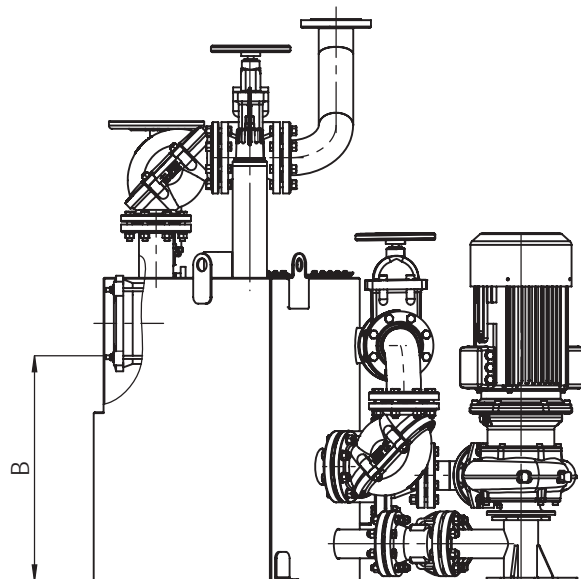
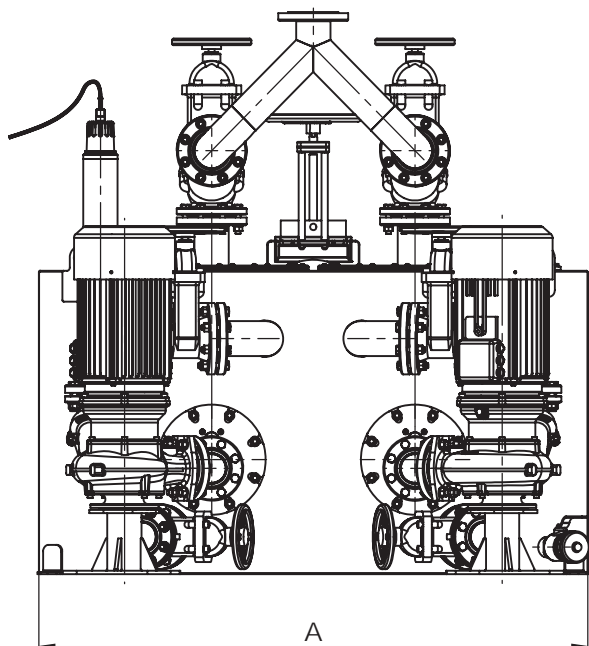
Separation basket rod  
 Size types: TSC.2.15; TSC.2.30



Size type	Dimensions [mm]	
	A	B
2.15	1730	700
2.30	1730	1200

## Type TSC sewage pumping station with solids separation system

Separation hinged flaps  
 Size types: TSC.2.15; TSC.2.30



Size type	Dimensions [mm]	
	A	B
2.15	1730	700
2.30	1730	1200







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