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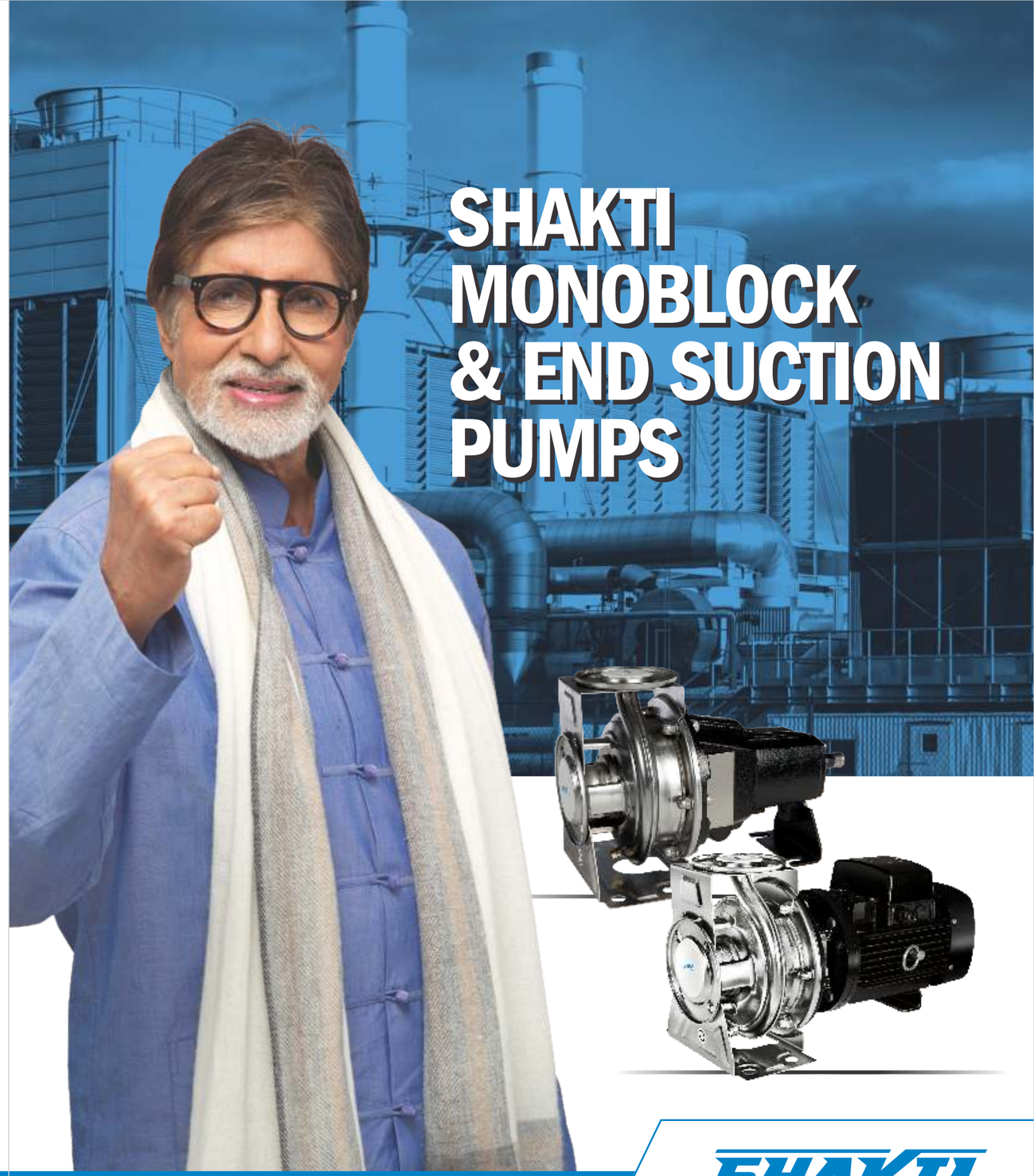

SHAKTI MONOBLOCK & END SUCTION PUMPS

SNB SNK SERIES

SHAKTI
PUMPING LIFE

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CONTENT

Introduction

SNB and SNK are multi-purpose pumps suitable for a variety of different applications demanding reliable and cost-efficient supply.

SNB and SNK pumps are used in five main fields of application:

- water supply
- industrial pressure boosting
- industrial liquid transfer
- HVAC
- irrigation.

Water supply

Besides general water supply in municipal and industrial waterworks, the SNB and SNK pumps are used for these specific applications:

- filtration and transfer at waterworks
- pressure boosting in mains
- pressure boosting in high-rise buildings, hotels, etc.
- pressure boosting in industrial buildings
- various swimming bath applications.

Industrial pressure boosting

Pressure boosting in:

- industrial washing and cleaning systems
- industrial washdown systems
- vehicle washing tunnels
- fire protection systems.

Industrial liquid transfer

Liquid transfer in:

- cooling and air-conditioning systems (refrigerants)
- boiler-feed and condensate systems
- aquafarming
- industrial heating systems
- district heating plants.

HVAC

Liquid transfer in:

- heating systems
- ventilation systems
- air-conditioning systems

Irrigation

Irrigation covers these applications:

- field irrigation (flooding)
- sprinkler irrigation
- drip-feed irrigation.

Features and benefits

SNB and SNK pumps present these features and benefits:

- The pumps are non-self-priming, single-stage, centrifugal volute pumps with axial suction port, radial discharge port and horizontal shaft.
- Suction and discharge flanges are PN 16 according to EN 1092-2.
- Dimensions and rated performance are according to EN733 (10 bar).

  However, pumps with flange dimensions up to and including DN 80 are marked PN 16 and thus suitable for 16 bar operation.
- The SNB pump is close-coupled with a totally enclosed fan-cooled standard motor with main dimensions to IEC and DIN standards.
- The SNK pump is long-coupled with a totally enclosed fan-cooled standard motor with main dimensions to IEC and DIN standards and mounting designation B3 (IM1001).
- The mechanical shaft seal has dimensions according to EN 12756.
- SNB and SNK pumps offer flow rates from 2 to 155 m^3/h and heads from 4 to 98 m. Motor sizes fall in the 1.5 to 30 HP range.
- All pumps are statically balanced according to ISO 1940 class 6.3. Impellers are hydraulically balanced.
- The SNK pump and motor are mounted on a common, steel base frame in accordance with EN 23661.
- The SNB and SNK product ranges are available in standard-range product with EFF2 class motors.
- The pumps are of the back pull-out design enabling removal of the motor, coupling, bearing bracket and impeller without disturbing the pump housing or pipework. Even the largest pumps can thus be serviced by a single person with a crane. See fig. 1 and fig. 2.

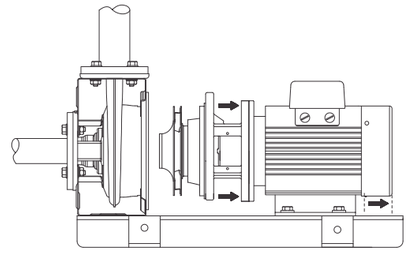


Fig. 1 SNB back pull-out design

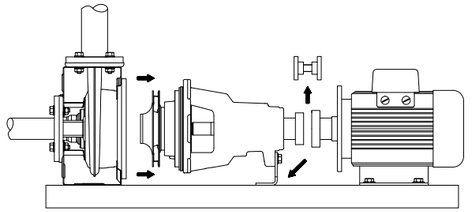


Fig. 2 SNK back pull-out design

The tables on the following pages show the complete product ranges of SNB and SNK pumps.

The standard range has been combined on the basis of the following parameters:

- Pump housings have discharge flanges from DN 32 to DN 65.
- Motors are for 50 Hz.
- SNB and SNK pumps are available with 2-pole motor.
- SNB and SNK pumps are available with standard range motors.

To a great extent, the pumps can be adapted to the requirements of the individual customer. For customized solutions, please contact Shakti.

SNB, SNK, 2-pole

Pump type 50 Hz, 2-pole	SNK model	SNB design	Pressure stage PN 16	P_2 [HP/kW]
32-125	A	A	⌘	1.5/1.1
32-160.1	A	A	⌘	2.0/1.5
		A	⌘	3.0/2.2
		A	⌘	4.0/3.0
32-160	A	A	⌘	3.0/2.2
		A	⌘	4.0/3.0
		A	⌘	5.5/4.0
		A	⌘	7.5/5.5
32-200	A	A	⌘	5.5/4.0
		A	⌘	7.5/5.5
		A	⌘	10.0/7.5
		A	⌘	15.0/11.0
32-250	A	A	⌘	10.0/7.5
		A	⌘	15.0/11.0
40-125	A	A	⌘	2.0/1.5
		A	⌘	3.0/2.2
		A	⌘	4.0/3.0
		A	⌘	5.5/4.0
		A	⌘	7.5/5.5
40-200	A	A	⌘	10.0/7.5
		A	⌘	15.0/11.0
		A	⌘	20.0/15.0
40-250	A	A	⌘	20.0/15.0
		A	⌘	25.0/18.5
		A	⌘	30.0/22.0
50-125	A	A	⌘	4.0/3.0
		A	⌘	5.5/4.0
		A	⌘	10.0/7.5
50-160	A	A	⌘	7.5/5.5
		A	⌘	10.0/7.5
		A	⌘	1 5.0 /11.0
		A	⌘	20.0/15.0
65-125	A	A	⌘	5.5/4.0
		A	⌘	7.5/5.5
		A	⌘	10.0/7.5
		A	⌘	1 5.0/11.0
65-160	A	A	⌘	10.0/7.5
		A	⌘	1 5.0/11.0
		A	⌘	20.0/15.0
		A	⌘	25.0/18.5

SNB type key

The example shows an SNB 32-160, 50 Hz, with a 163 mm impeller, made of stainless steel and with a BAQE shaft seal.

Example	SNB 32 -160 .1 /163 A -F -A -BAQE
Type range	
Nominal diameter of discharge port (DN)	
Nominal impeller diameter [mm]	
Reduced performance = .1	
Actual impeller diameter [mm]	
Code for pump version (the codes may be combined) A = Basic version B= Without motor	
Code for pipework connection: F = DIN flange (EN 1092-2)	
Code for materials: A = AISI SS 304 pump housing with AISI SS 304 impeller and NBR+PPS neckring	
Code for mechanical shaft seal and rubber pump parts	

SNK type keys

The example shows an SNK 50-160, 50 Hz, with a 177 mm impeller, made of stainless steel and with a BAQE shaft seal.

Note: For pumps without motor, the motor data are left out; for bare shaft pumps, the coupling and motor data are left out.

Example	SNK 50 -160 /177 /A /BAQE /1 /5.5 /2
Type range	
Nominal diameter of discharge port (DN)	
Nominal impeller diameter [mm]	
Actual impeller diameter [mm]	
Code for materials: A = AISI SS 304 pump housing,with AISI SS 304 impeller and NBR+PPS neckring	
Code for shaft seal	
Coupling type: 1 = Standard 2 = Spacer	
Motor power [HP]	
2-pole motor	

Shaft seals

SNB and SNK pumps are available with a BAQE shaft seal as standard. Other shaft seal variants are available on request.

Codes for shaft seals

The positions (1) - (4) cover four pieces of information about the shaft seal:

Example	(1)	(2)	(3)	(4)
Shakti type designation				
Material, rotating seal face				
Material, stationary seat				
Material, secondary seal and other rubber and composite parts, except the wear ring				

The following table explains the positions (1), (2), (3) and (4).

Pos.	Type	Short description of seal
(1)	A	O-ring seal with fixed driver
	B	Rubber bellows seal
	G	bellows seal, type B, with reduced seal faces
	D	O-ring seal, balanced
Pos.	**Type**	**Material**
(2) and (3)		Syntheticcarbons:
	A	Carbon, metal-impregnated (antimony (not approved for potable water))
	B	carbon, resin-impregnated
		Carbides:
	Q	Silicon carbide
Pos.	**Type**	**Material**
(4)	E	EPDM
	V	FKM
	F	FKM

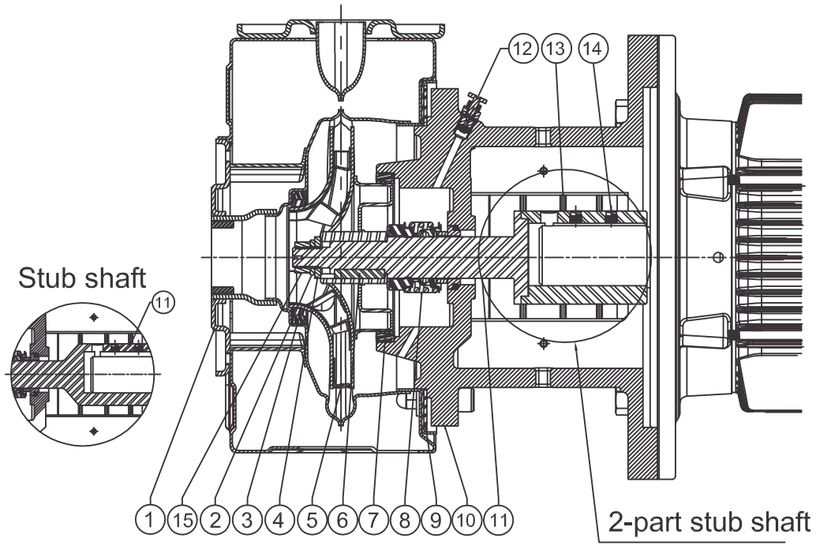


Fig. 3 Sectional view SNB

MATERIALS SNB

POS.	DESCRIPTION	MATERIAL
1	PUMP HOUSING FABRICATED	SS AISI 304
2	SPRING WASHER	SS AISI 304
3	NECKRING FOR PUMP HOUSING	PPS+NBR
4	WASHER	SS AISI 304
5	FABRICATED IMPELLER	SS AISI 304
6	IMPELLER KEY	SS AISI 304
7	NECKRING FOR MOTOR STOOL	PPS+NBR
8	MECHANICAL SEAL	N.A.
9	MOUNTING GASKET	NBR
10	MOTOR STOOL	CI FG 260
11	COUPLING WITH SHAFT	DUPLEX+EN8
12	AIR VENT PLUG ASSLY	BRONZE
13	COVER FOR STOOL	SS AISI 304
14	GRUB SCREW	(H.T.) UNBECO MAKE
15	HEX NUT	SS AISI 304

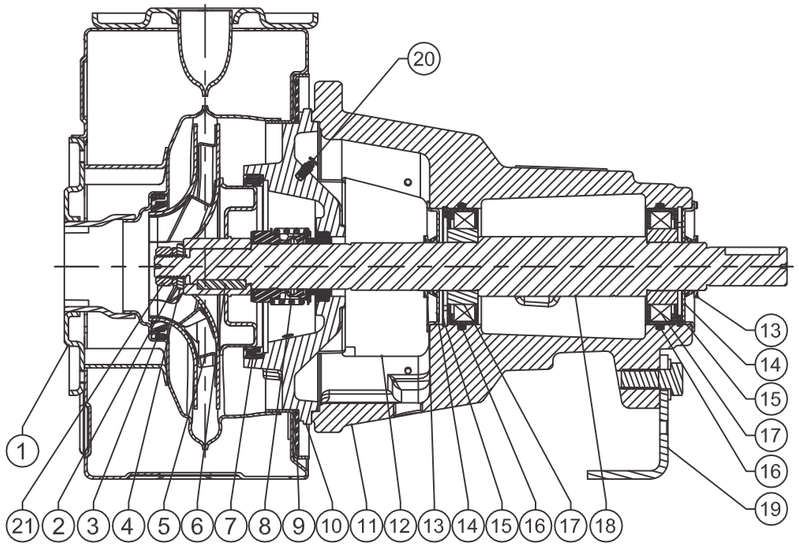


Fig. 4 Sectional view SNK

MATERIALS SNK

POS.	DESCRIPTION	MATERIAL
1	PUMP HOUSING FABRICATED	SS AISI 304
2	SPRING WASHER	SS AISI 304
3	NECKRING FOR PUMP HOUSING	PPS+NBR
4	WASHER	SS AISI 304
5	FABRICATED IMPELLER	SS AISI 304
6	IMPELLER KEY	SS AISI 304
7	NECKRING FOR MOTOR STOOL	PPS+NBR
8	MECHANICAL SEAL	N.A.
9	MOUNTING GASKET	NBR
10	BEARING BRACKET COVER	CI FG 260
11	BEARING BRACKET	CI FG 260
12	GUARD	SS AISI 304
13	SEAL RING	NBR
14	BEARING COVER	SS AISI 304
15	CIRCLIP	STD.
16	O RING	NBR
17	BALL BEARING	STD.
18	PUMP SHAFT	SS AISI 420
19	FOOT	M.S.
20	AIR VENT PLUG ASSLY	BRONZE
21	HEX NUT	SS AISI 304

Mechanical construction

Mounting (SNB)

SNB pumps design with base plate:

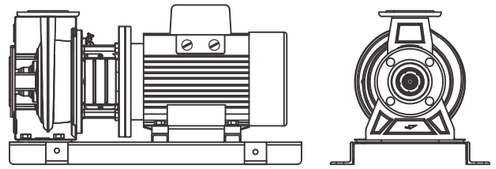


Fig. 5 SNB pump design

Pump housing

The volute pump housing has an axial suction port and a radial discharge port. Flange dimensions are in accordance with EN 1092-2.

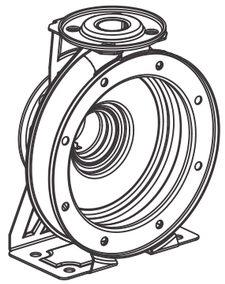


Fig. 6 SNB and SNK pump housing

Bearing bracket and shaft (SNK)

The bearing bracket has two sturdy antifriction, lubricated-for-life bearings. SNK model A pumps with shaft diameter of 24 mm, however, have open bearings with lubricating nipples.

The bearing bracket is made of cast iron CI FG 260.

The shaft is made of stainless steel. Shaft diameter d5 is either ⌀ 24.

A thrower on the shaft prevents liquid from entering the bearing bracket.

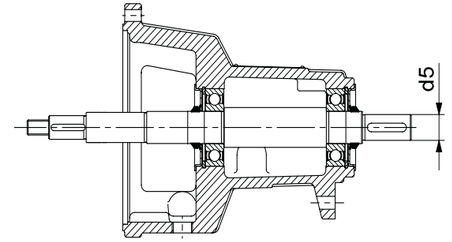


Fig. 7 Bearing bracket and shaft

All SNK pumps are fitted with one of five shaft, shaft seal and bearing sizes. As the bearings and shafts are large, the SNK pumps can be driven by a belt drive or a diesel engine, if required.

Shaft seal SNK

The shaft seal is an unbalanced, mechanical shaft seal with dimensions to EN 12 756. Seal faces are available in a variety of combinations. The code of the standard version is BAQE. See page 7.

For shaft seal variants other than those specified, please contact Shakti.

The drawings below illustrate shaft seals for SNK.

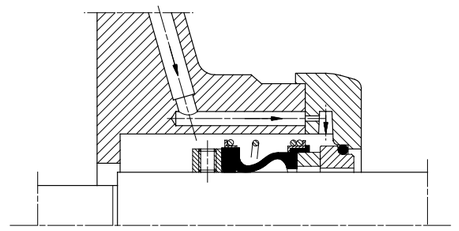


Fig. 8 Rubber bellows seal, type BAQE, counteracts deposits from the pumped liquid

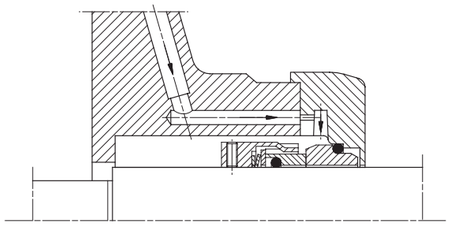


Fig. 9 Unbalanced O-ring seal, type AQAE, for high pressures

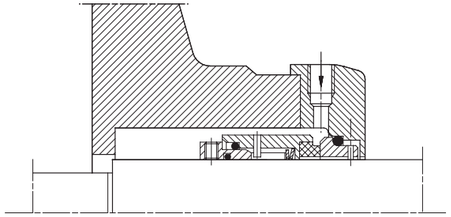


Fig. 10 Balanced O-ring seal, type DAQF, for high pressures and temperatures (120 °C to 140 °C)

Motor stool and cover (SNB)

The cover is provided with a manual air vent screw for the venting of the pump housing and the shaft seal chamber. An O-ring forms the seal between cover and pump housing.

Coupling guards are fitted to the motor stool.

The mounting designations of motors for SNB, are as follows:

- IM B5: Up to and including frame size 132.
- IM B 35: As from frame size 160 .

The flange size of the motor stool is according to IEC 60034.

Shaft (SNB)

The stainless steel shaft is Ø 28.

The coupling end of the shaft is cylindrical and has two drilled holes for the set screws of the coupling.

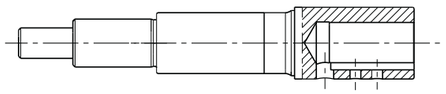


Fig. 11 Stub shaft, SNB pump

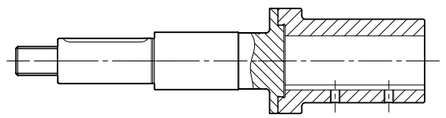


Fig. 11.1 2-part stub shaft, SNB pump

Coupling (SNK)

SNK pumps are available with two types of coupling:

- standard coupling
- spacer coupling

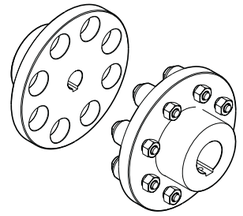


Fig. 12 Standard coupling

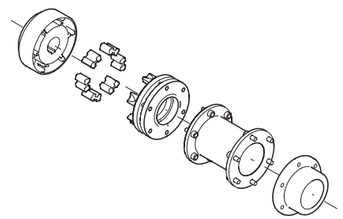


Fig. 13 Spacer coupling

Pumps fitted with a spacer coupling can be serviced without dismantling the motor from the base frame and without removing the pump housing from the pipework.

This saves realignment of pump and motor after service.

Impeller

The impeller is made from fabricated technology which is light weight which increase the pump efficiency.

The impeller is a closed impeller with double-curved blades with smooth surface. this ensure high efficiency.

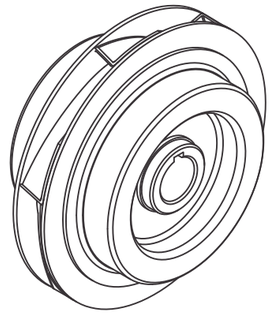


Fig. 14 Fabricated Impeller, SNB and SNK pumps

All impellers are statically and hydraulically balanced.

The hydraulic balancing compensates for axial thrust.

The direction of rotation of the impeller is clockwise when viewed from the motor.

All impellers can be adapted to the duty point as requested by the customer.

The direction of rotation of the impeller is clockwise when viewed from the motor.

All impellers can be adapted to the duty point as requested by the customer.

Base frame (SNK)

Pump and motor are mounted on a common steel base frame in accordance with EN 23661.

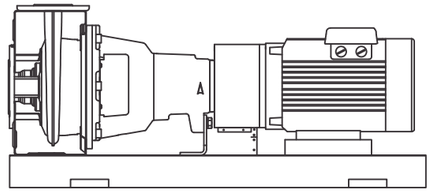


Fig. 15 Schematic view of SNK pump-motor unit mounted on a base frame

A base frame prepared for grouting is available as an option, see "Foundation (SNK)" on page 18.

Surface treatment

SNB and SNK

The cast-iron parts of SNB and SNK pumps have an epoxy-based coating made in a cathodic electro-deposition (CED) process. CED is a high-quality dip-painting process where an electrical field around the products ensures deposition of paint particles as a thin, well-controlled layer on the surface. An integral part of the process is a pretreatment. The entire process consists of these elements:

1. Alkaline-based cleaning.
2. Zinc phosphating.
3. Cathodic electro-deposition.
4. Curing to a dry film thickness 18-22 ✪m.

The colour code for the finished product is NCS 9000/RAL 9005.

For low-temperature applications at high humidity Shakti offers SNB and SNK pumps with extra surface treatment to avoid corrosion. These pumps are available on request.

Test pressure

Pressure testing was made with +20 °C water containing corrosion inhibitor.

Pressure stage	Operating pressure		Test pressure	
	bar	MPa	bar	MPa
PN 16	16	1.6	24	2.4

Motor

The motor is a totally enclosed, fan-cooled standard motor with main dimensions according to IEC and DIN standards.

The tables below show the motors available for SNB and SNK.

As appears from the tables you can choose between standard range with EFF2 (efficiency 2) motors for SNB and SNK.

Standard range EFF2 motors		
2 pole motors 50Hz		
FRAME SIZE	RATED OUTPUT	
	H.P.	kW
SMG 90	1.5	1.1
SMG 90	2.0	1.5
SMG 90	3.0	2.2
SMG 100	4.0	3.0
SMG 100	5.5	4.0
SMG 132	7.5	5.5
SMG 132	10.0	7.5
SMMG 160	15.0	11.0
SMMG 160	20.0	15.0
SMMG 160	25.0	18.5
SMMG 180	30.0	22.0

Pump location

The pump is designed for installation in a non-aggressive and non-explosive atmosphere.

The relative air humidity must not exceed 95 %.

Sound pressure level

MOTOR [HP/kW]	Maximum sound pressure level [dB(A)] - ISO 3743 Three-phase motors 2-pole	
1.5/1.1	59	
2.0/1.5	58	
3.0/2.2	60	
4.0/3.0	59	
5.5/4.0	63	
7.5/5.5	63	
10.0/7.5	68	
15.0/11.0	70	
20.0/15.0	70	
25.0/18.5	70	
30.0/22.0	70	

Ambient temperature and altitude

The ambient temperature and the installation altitude are important factors for the motor life, as they affect the life of the bearings and the insulation system.

Ambient temperature must not exceed:

- +40 °C for EFF2 motors

If the ambient temperature exceeds +40 °C (+60 °C) or if the motor is installed more than 1000 m (3500 m) above sea level, the motor must not be fully loaded due to the low density and consequently low cooling effect of the air. In such cases, it may be necessary to use a motor with a higher output.

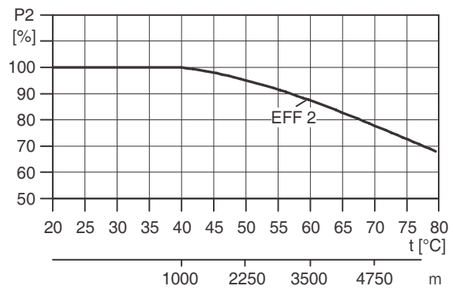


Fig. 16 Motor P2 depends on temperature/altitude

Example:

Fig. 25 shows that the load of an EFF2-motor must be reduced to 88 % when installed 3500 m above sea level.

At an ambient temperature of 70 °C the load of an EFF2-motor must be reduced to 78 % of the rated output.

In such situations an oversize motor can be used.

Pumped liquids

SNB and SNK pumps are suitable for pumping clean, thin and non-explosive liquids, not containing any solid particles.

The effect of viscosity on centrifugal pump performance

A viscous liquid affects a centrifugal pump in several ways.

- The power consumption will be increased, i.e. a larger motor is required.
- Head, flow rate and pump efficiency will be reduced.

The effect of high density on centrifugal pump performance

A high density liquid only affects the power consumption of a centrifugal pump.

- The head, flow rate and pump efficiency will remain unchanged.
- The power consumption will increase at a ratio corresponding to the increase in density. A liquid with a specific gravity of 1.2 will thus require a 20 % larger power input.
- An oversize motor will often be required.

Liquid temperatures

The SNB and SNK pump range covers the temperature range from –25 °C to +140 °C. The permissible liquid temperature depends on the mechanical shaft seal type and pump type. See also the table below.

Be aware that the maximum liquid temperature limits stated by Shakti may be overruled by local regulations and various laws.

The maximum liquid temperature is stamped on the nameplate.

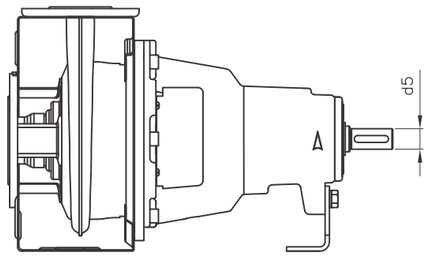


Fig. 17 Diameter of shaft end d5

Relationship between mechanical shaft seals and temperature

Shaft seal diameter [mm]	SNB/SNK		28, 38	48	55	-	60
d5 [mm]	SNK		24, 32	42	48	55	60
	Code	Temperature range	Maximum pressure [bar]				
Rubber bellows seal, metal-impregnated carbon/silicon carbide, EPDM	BAQE	0 °C to +120 °C	16	16	16	16	16
Rubber bellows seal, metal-impregnated carbon/silicon carbide, FKM	BAQV	0 °C to +90 °C	16	16	16	16	16
Rubber bellows seal, silicon carbide/silicon carbide, EPDM	BQQE	0 °C to +90 °C	16	16	16	16	16
Rubber bellows seal, silicon carbide/silicon carbide, FKM	BQQV	0 °C to +90 °C	16	16	16	16	16
Bellow seal, type B, with reduced seal faces, silicon carbide/silicon carbide, EPDM	GQQE	–25 °C to +90 °C	16	16*	16*	16*	16*
Bellow seal, type B, with reduced seal faces, silicon carbide/silicon carbide, FKM	GQQV	–20 °C to +90 °C	16	16*	16*	16*	16*
O-ring seal with fixed seal driver, silicon carbide/silicon carbide, EPDM	AQQE	0 °C to +90 °C	25	25	16	16	16
O-ring seal with fixed seal driver, silicon carbide/silicon carbide, FKM	AQQV	0 °C to +90 °C	25	25	16	16	16
O-ring seal with fixed seal driver, silicon carbide/metal-impregnated carbon, EPDM	AQAE	0 °C to +120 °C	25	25	25	25	25
O-ring seal with fixed seal driver, silicon carbide/metal-impregnated carbon, FKM	AQAV	0 °C to +90 °C	25	25	25	25	25
Rubber bellows seal, silicon carbide/resin-impregnated carbon, EPDM	BQBE	0 °C to +140 °C	16	-	-	-	-
O-ring seal, balanced, metal-impregnated carbon/silicon carbide, FXM	DAQF	0 °C to +140 °C	25	25	25	25	25
Rubber bellows seal, resin-impregnated carbon/silicon carbide, EPDM	BBQE	0 °C to +120 °C	16	16	16	16	16

*) Max. 60 °C

EPDM

Mechanical shaft seals with EPDM (xxxE) rubber are primarily suitable for water.

If the water contains oil or if chemicals or other liquids than water are pumped, you may have to replace the rubber parts of the mechanical shaft seal.

FKM

Mechanical shaft seals with FKM (xxxV) rubber have excellent resistance against oil and a number of chemicals.

Carbon/silicon carbide

Mechanical shaft seals with carbon/silicon carbide (xAQx) seal faces have a wide range of applications and are especially suitable if there is risk of dry running and/or if the temperature is high. These mechanical shaft seals are not suitable for liquids containing abrasive particles as the carbon parts will be worn. At temperatures below 0 °C, corrosion inhibitors containing abrasive particles will usually be added to the pumped liquid, and xAQx seals will thus not be suitable.

Silicon carbide/silicon carbide

Mechanical shaft seals with silicon carbide/silicon carbide (xQQx) seal faces also have a very wide range of applications. These seals are very resistant to abrasive particles and well suited at liquid temperatures up to +90 °C. At higher temperatures, the reduced lubricating properties of the pumped liquid may cause noise problems and limit the life of the seal faces.

Inlet pressure

Maximum inlet pressure

The maximum inlet pressure appears from this table:

Inlet pressure	Max. 9 bar.
	Max. 7 bar for 400 mm impellers or bigger.

Maximum inlet pressure

The actual inlet pressure + pressure when the pump is running against a closed valve must always be lower than the maximum permissible operating pressure.

Minimum inlet pressure

The minimum inlet pressure must be according to the NPSH curve + a safety margin of at least 0.5 m + correction for vapour pressure. It is, however, advisable to calculate the inlet pressure if:

- the liquid temperature is high
- the flow rate is considerably higher than the pump's rated flow rate
- the pump is operating in an open system with suction lift
- the liquid is sucked through long pipes
- the inlet conditions are poor
- the operating pressure is low.

Calculation of maximum suction lift for water in open systems

To avoid cavitation, make sure that there is a minimum pressure on the suction side of the pump. The maximum suction lift "H" in metres head can be calculated as follows:

$H = p_b \times 10.2 - NPSH - H_f - H_v - H_s$ [m]

p_b = Barometric pressure in bar. (Barometric pressure can be set to 1 bar.) In closed systems, p_b indicates the system pressure in bar.

NPSH = Net Positive Suction Head in metres head. (To be read from the NPSH curve at the highest flow the pump will be delivering.)

H_f = Friction loss in suction pipe in metres head. (At the highest flow the pump will be delivering.)

H_v = Vapour pressure in metres head. (To be read from the vapour pressure scale. "H_v" depends on the liquid temperature "T_m".)

H_s = Safety margin = minimum 0.5 metres head.

If the "H" calculated is positive, the pump can operate at a suction lift of maximum "H" metres head.

If the "H" calculated is negative, an inlet pressure of minimum "H" metres head is required.

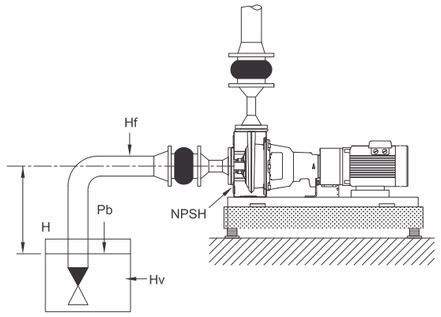


Fig. 18 Schematic view of open system with an SNK pump

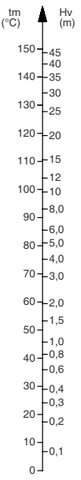


Fig. 19 Relation between liquid temperature and vapour pressure

Foundation (SNK)

We recommend that you install the pump on a plane and rigid concrete foundation which is heavy enough to provide permanent support for the entire pump. The foundation must be capable of absorbing any vibration, normal strain or shock. As a rule of thumb, the weight of the concrete foundation should be 1.5 times the pump weight. Base frame prepared for grouting is available as an option. See fig. 23.

The foundation should be 100 mm larger than the base frame on all four sides. See fig. 20.

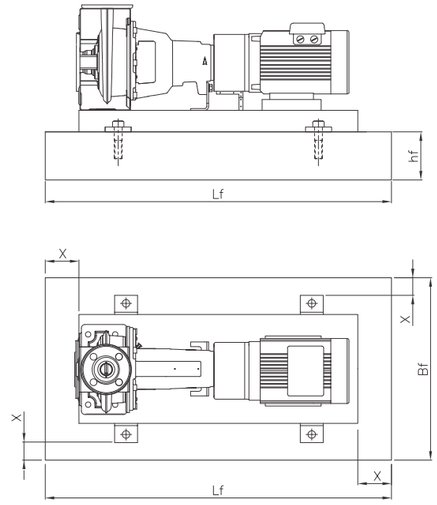


Fig. 20 Foundation, X = min. 100 mm

The minimum height of the foundation (h_f) can then be calculated:

$$h_f = \frac{m_{pump} \times 1.5}{L_f \times B_f \times \delta_{concrete}}$$

The density (δ) of concrete is usually taken as 2200 kg/m³.

Place the pump on the foundation and fasten it. The base frame must be supported under its entire area. See fig. 21.

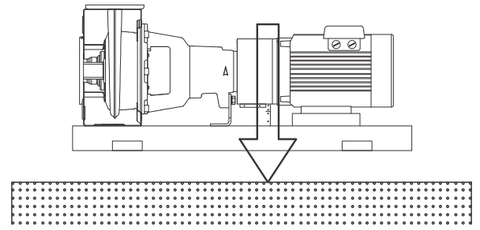


Fig. 21 Correct foundation

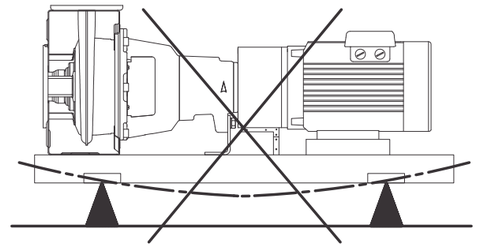


Fig. 22 Incorrect foundation

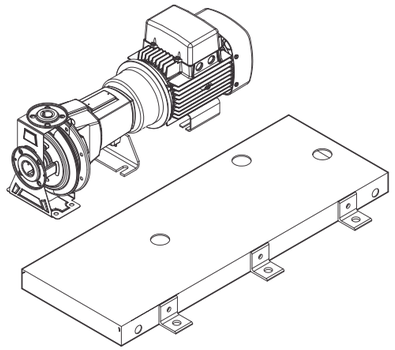


Fig. 23 Base frame prepared for grouting

Piping

When installing the pipes, make sure that the pump housing is not stressed by the pipework.

The suction and discharge pipes must be of an adequate size, taking the pump inlet pressure into account.

Install the pipes so that air locks are avoided, especially on the suction side of the pump. See fig. 24.

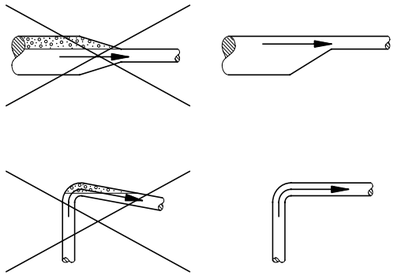


Fig. 24 Pipelines

Fit isolating valves on either side of the pump to avoid having to drain the system if the pump needs to be cleaned or repaired.

Make sure the pipes are adequately supported as close to the pump as possible, both on the suction and the discharge side. The counter flanges should lie true against the pump flanges without being stressed as this will cause damage to the pump.

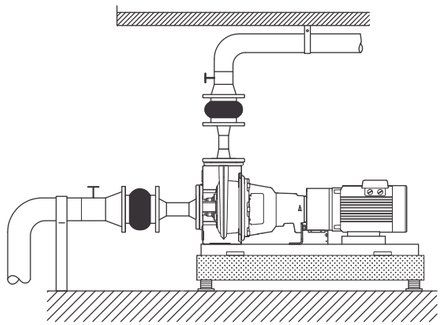


Fig. 25 Pipeline mounting

Elimination of noise and vibrations

In order to achieve optimum operation and minimum noise and vibration, consider vibration dampening of the pump. Generally, always consider this for pumps with motors above 15 HP. Smaller motor sizes, however, may also cause undesirable noise and vibration.

Noise and vibration are generated by the revolutions of the motor and pump and by the flow in pipes and fittings. The effect on the environment is subjective and depends on correct installation and the state of the remaining system.

Elimination of noise and vibrations is best achieved by means of vibration dampers and expansion joints.

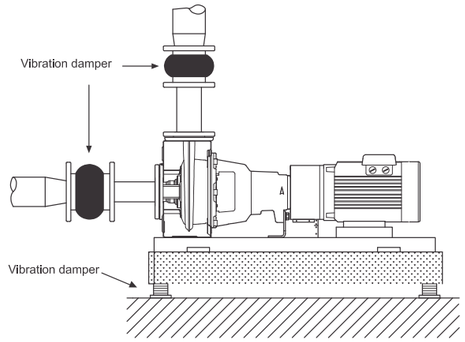


Fig. 26 SNK pump with expansion joints and vibration dampers

Vibration dampers

To prevent the transmission of vibrations to buildings, we recommend you to isolate the pump foundation from building parts by means of vibration dampers.

The selection of the right vibration damper requires the following data:

- forces transmitted through the damper
- motor speed considering speed control, if any
- required dampening in % (suggested value is 70 %).

Which is the right damper varies from installation to installation, and a wrong damper may increase the vibration level. Vibration dampers should therefore be sized by the supplier.

Expansion joints

If you install the pump on a foundation with vibration dampers, always fit expansion joints on the pump flanges. This is important to prevent the pump from "hanging" in the flanges.

Install expansion joints to

- absorb expansions/contractions in the pipework caused by changing liquid temperature
- reduce mechanical strains in connection with pressure surges in the pipework
- isolate mechanical structure-borne noise in the pipework (only rubber bellows expansion joints).

Note: Do not install expansion joints to compensate for inaccuracies in the pipework such as centre displacement of flanges.

Fit expansion joints at a distance of minimum 1 to 1½ times the nominal flange diameter away from the pump on the suction as well as on the discharge side. This will prevent the development of turbulence in the expansion joints, resulting in better suction conditions and a minimum pressure loss on the pressure side. At high water velocities (> 5 m/s) we recommend you to install larger expansion joints corresponding to the pipework.

We always recommend expansion joints with limiting rods for flanges larger than DN 100.

Alignment (SNK)

In a complete pump unit assembled and supplied from factory, the coupling halves have been accurately aligned. Alignment is made by inserting shims under the pump and motor mounting surfaces as required.

The pump/motor alignment may be affected during transport. Always check alignment after the pump has been installed.

If misalignment has occurred due to radial or angular shifting, realign by inserting/removing shims under the feet of the pump or the motor.

Take care to align carefully, as this will considerably increase the lives of the coupling, bearings and shaft seal.

Note: Check the final alignment when the pump has obtained its operating temperature under normal operating conditions.

Pump size

Selection of pump size should be based on:

- required flow rate and pressure at the draw-off point
- pressure loss as a result of height differences
- friction loss in the pipework.
  It may be necessary to account for pressure loss in connection with long pipes, bends or valves, etc.
- best efficiency at the estimated duty point.

Efficiency

If you expect the pump to always operate in the same duty point, select a pump which is operating in a duty point corresponding to the best efficiency of the pump.

In case of controlled operation or varying consumption, select a pump whose best efficiency falls within the duty range covering the greater part of the duty time.

Material

The material variant should be selected on the basis of the liquid to be pumped, see "List of pumped liquids", page 18.

Motor size

Selection of motor size should be based on the power required to achieve the duty point of the chosen pump. This information can be found in the power chart below each performance chart. See performance curves on page 58 to page 269.

Find the power curve corresponding to the required QH-value (or interpolate between curves).

To select the motor size, read the value of the P2 curve at the duty point and add a 5 % safety margin.

If the motor size must be selected according to ISO 5199.

Pumped liquids

We recommend SNB and SNK pumps for thin, clean and non-explosive liquids, not containing solid particles or fibers. The liquid must not affect the pump materials chemically or mechanically.

If you pump liquids with a density and/or viscosity higher than those of water, use motors with correspondingly higher outputs. See "List of pumped liquids".

The mechanical shaft seal must be suitable for the liquid.

Water in heating and ventilating systems often contains additives to prevent negative effects, such as system corrosion or calcareous deposits. If you want to use the pump for such liquids, use special shaft seals to avoid crystallization/precipitatio n between the seal faces.

Liquid temperature: –25 °C to +140 °C.

For heating systems, the water quality should meet VDI 2035.

List of pumped liquids

The list on the following pages gives an overview of liquids which may typically be pumped by SNB and SNK pumps.

The list states the recommended shaft seals. Other shaft seals may be applicable, but we consider those stated in the list to be the best choices.

The list is intended as a general guide only, and it cannot replace actual testing of pumped liquids and pump materials under specific working conditions.

However, use the list with some caution, as factors may affect the chemical resistance of a specific pump version.

Factors:

- operating conditions
- solids
- cleaning procedures
- contaminants
- pressure.

Legend for notes in the list

a	To minimize the risk of corrosion, the pump must run continuously, i.e. standstills must not exceed 6-8 hours.
b	May contain additives or impurities which can cause shaft seal problems.
c	The pump should run continuously to prevent discoloration of pool tiles. For intermittent use, the N version should be used.
d	Density and viscosity may differ from those of water. Consider this when calculating motor and pump performance.
e	In order to avoid corrosion, the liquid must be free of oxygen.
f	Flammable or combustible liquid.
g	Risk of crystallization/precipitation at the shaft seal.

Pumped liquids	Notes	Additional information	Material version					Shaft seal
			A	B	S	N	R	
Water								
Acidic minewater		Low pH value, high chloride content				x	x	BQQE
Boiler-feed water		<120 °C	x					BAQE
		120 °C - 140 °C	x					BQBE/DAQF [1]
Brackish water	a	30 °C, 2000 ppm chloride				x		BQQE
Condensate		<90 °C	x					BQQE
		90 °C - 120 °C	x					BAQE
		120 °C - 140 °C	x					BQBE/DAQF [1]
Cooling and cutting lubricant			x					BQQV
Demineralized water		<90 °C				x		BQQE
District heating water		<120 °C						BAQE
		120 °C - 140 °C	x					BQBE/DAQF [1]
Groundwater		<90 °C	x	x	x			BQQE
		>90 °C	x	x	x			BAQE [2]/BQBE
Oil containing water		<90 °C	x					BQQV
Softened water		<90 °C		x	x			BQQE
		90 °C - 120 °C		x	x			BAQE [2]
Seawater	a	<35 °C					x	BQQE
Swimming-pool water, chlorinated	c	40 °C, 150 ppm Cl- (< 2 ppm free chlorine)		x	x			BQQE
Coolants								
Calcium chloride	b, d, e, g	<5 °C, 30 %	x					BQQE/GQQE
Ethylene glycol	b, d	<50 °C	x					BQQE/GQQE
Glycerine (glycerol)	b, d	<50 °C	x					BQQE/GQQE
Hydrocarbon-based coolant	d, f	50 °C	x					BQQV/GQQV
Potassium acetate (inhibited)	b, d, e, g	<20 °C	x	x	x			BQQE/GQQE
Potassium formate (inhibited)	b, d, e, g	<20 °C	x	x	x			BQQE/GQQE
Propylene glycol	b, d	<50 °C	x					BQQE/GQQE
Sodium chloride	b, d, e, g	<5 °C, 30 %	x					BQQE/GQQE
Fuels								
Biodiesel	f		x					BAQV
Diesel oil	f		x					BAQV
Jet fuel	f		x					BAQV
Kerosene	f		x					BAQV
Naphta	f		x					BAQV
Petrol	f		x					BAQV
Mineral oils								
Crude oil	b, d, f	<20 °C			x			BQQV
Mineral lubricating oil	d, f		x					BAQV/BQQV
Mineral motor oil	d, f		x					BAQV/BQQV
Synthetic oils								
Synthetic lubricating oil	d, f		x					BAQV/BQQV
Synthetic motor oil	d, f		x					BAQV/BQQV
Silicone oil	d		x					BAQV/BQQV
Vegetable oils								
Corn oil	b, d		x		x			BAQV/BQQV
Olive oil	b, d		x		x			BAQV/BQQV
Peanut oil	b, d		x		x			BAQV/BQQV
Rapeseed oil	b, d		x		x			BAQV/BQQV
Soya oil	b, d		x		x			BAQV/BQQV
Cleaning								
Alkaline degreasing agent	b, h	<80 °C	x		x			BQQE/DAQF [4]
Soap (salts of fatty acids)	b	<80 °C	x	x	x			BQQV
Organic solvents								
Acetone	f	40 °C	x					BAQE [3]/BBQE
Ethyl alcohol (ethanol)	f	40 °C	x					BAQE [3]/BBQE
Hydrogen peroxide		20 °C, 5 %				x		BQQE
Isopropyl alcohol	f	40 °C	x					BAQE [3]/BBQE

SHAKTI PUMPING LIFE

Pumped liquids	Notes	Additional information	Material version					Shaft seal
			A	B	S	N	R	
Methyl alcohol (methanol)	f	40 °C	x					BAQE [3]/BBQE
Oxidants								
Sodium hypochlorite		20 °C, 0.1 %					x	BQQV
Salts								
Ammonium bicarbonate	b, d	20 °C, 15 %	x					BQQE
		60 °C, 20 %				x		BQQE
Copper sulphate	b, d, g	60 °C, 20 %				x	x	BQQE
Ferric sulphate	b, d, g	20 °C, 20 %				x	x	BQQE
Potassium bicarbonate	b, d	20 °C, 20 %	x					BQQE
		60 °C, 20 %				x		BQQE
Sodium carbonate	b, d, g	20 °C, 20 %			x			BQQE
		60 °C, 20 %				x		BQQE
Potassium permanganate	b, d	20 °C, 1 %			x			BQQE
		50 °C, 10 %				x		BQQE
Sodium nitrate	b, d	20 °C, 5 %			x			BQQE
		60 °C, 20 %				x		BQQE
Sodium nitrite	b, d	20 °C, 20 %	x					BQQE
		60 °C, 20 %				x		BQQE
Sodium phosphate (mono)	b, d	60 °C, 20 %				x		BQQE
Sodium phosphate (di)	b, d	30 °C, 20 %			x			BQQE
		60 °C, 20 %				x		BQQE
Sodium phosphate (tri)	b, d, g	20 °C, 10 %			x			BQQE
		70 °C, 20 %				x		BQQE
Sodium sulphate	b, d, g	60 °C, 20 %				x		BQQE
Sodium sulphite	b, d, g	20 °C, 1 %			x			BQQE
		60 °C, 20 %				x		BQQE
Acids								
Acetic acid		20 °C, 15 %				x		BQQE
Chromic acid		20 °C, 10 %					x	BQQE
Citric acid	d	50 °C, 20 %				x		BQQE
Formic acid	d	20 °C, 30 %				x		BQQE
Nitric acid	d	20 °C, 40 %				x		BQQE
Oxalic acid	g	20 °C, 10 %					x	BQQE
Phosphoric acid	b, d, g	70 °C, 40 %				x		BQQE
Sulphuric acid	b, d	20 °C, 20 %					x	BQQV
Sulphurous acid		20 °C, 5 %					x	BQQV
Alkalies								
Ammonium hydroxide		30 °C, 30 %	x					BQQE
Calcium hydroxide	b	30 °C, 5 %			x			BQQE
Potassium hydroxide	d, g	20 °C, 20 %			x			BQQE
		60 °C, 20 %				x		BQQE
Sodium hydroxide	d, g	20 °C, 20 %			x			BQQE
		80 °C, 20 %				x		BQQE

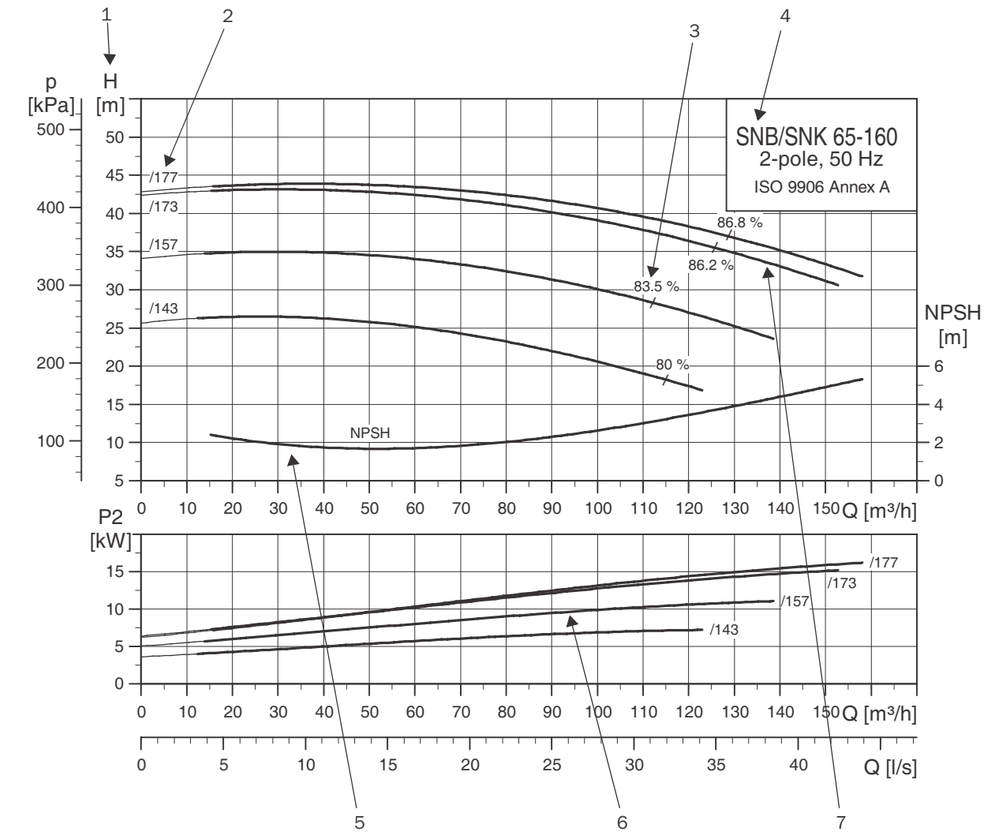
1) Shaft diameters measured at the shaft end (d5) are either 24 mm. BQBE shaft seals can be used for shaft end diameter (d5) 24 mm. DAQF shaft seals can be used for all five shaft diameters.

2) Do not use BAQE for potable water. For potable water, we recommend BBQE shaft seals.

3) If diluted with water, use BBQE.

4) If oil residuals are present, use DAQF.

How to read the curve charts



1	Total pump head, (m)
2	Impeller diameter [mm]
3	Best efficiency point of pump(%)
4	Pump type, pole number and frequency
5	The NPSH curve is shown for maximum impeller size. When sizing the pumps, add a safety margin of at least 0.5 m.
6	The power curve indicates pump input power P_2 [kW]
7	QH curve for the individual pump.

Curve conditions

The guidelines below apply to the curves shown in the performance charts.

- Tolerances according to ISO 9906, Annex A.
- The curves show pump performance with different impeller diameters at the nominal speed.
- The bold part of the curves show the recommended operating range.
- The thin parts are not recommended as the possible operating range here might suggest the selection of a smaller/larger pump type.
- Do not use the pumps at minimum flow rates below 0.1 x Q_{max} because of the danger of overheating the pump.
- The curves apply to the pumping of water at a temperature of +20 °C and a kinematic viscosity of 1 mm^2/s (1 cSt).
- NPSH: The curves show average values measured under the same conditions as the performance curves.
  When sizing the pump, add a safety margin of at least 0.5 m.
- In case of other densities than 1000 kg/m^3, the discharge pressure is proportional to the density.
- When pumping liquids with a density higher than 1000 kg/m^3, motors with correspondingly higher outputs must be used.

Calculation of total head

The total pump head consists of the height difference between the measuring points + the differential head + the dynamic head.

$$H_{total} = H_{geo} + H_{stat} + H_{dyn}$$

H_{geo}	Height difference between measuring points.
H_{stat}	Differential head between the suction and discharge side of the pump.
H_{dyn}	Calculated values based on the velocity of the pumped liquid on the suction and discharge side of the pump.

Performance tests

The requested duty point for every pump is tested according to ISO 9906, Annex A, and without certification.

If the customer requires either more points on the curve to be checked or certain minimum performances or certificates, individual measurements must be made.

Certificates

Certificates have to be confirmed for every order and are available on request as follows:

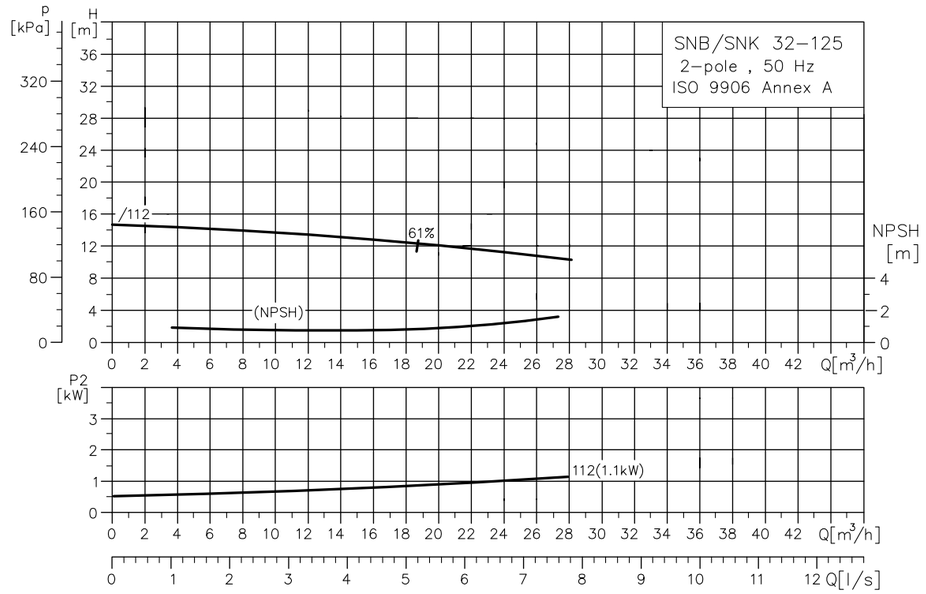
- Certificate for comp liance with the order EN 10204-2.1
- Pump certificate EN 10204-2.2
- Works certificate EN 10204-2.3
- Inspection certificate EN 10204-3.1.B
- Inspection certificate EN 10204-3.1.C.

Technical data

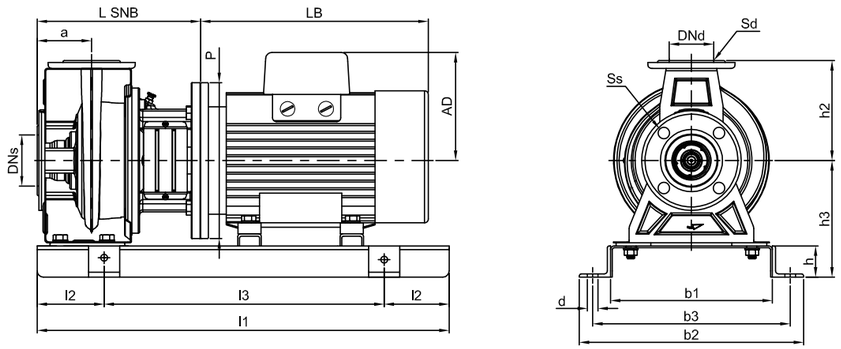
The pump dimensions on the following pages include

SNB/SNK :

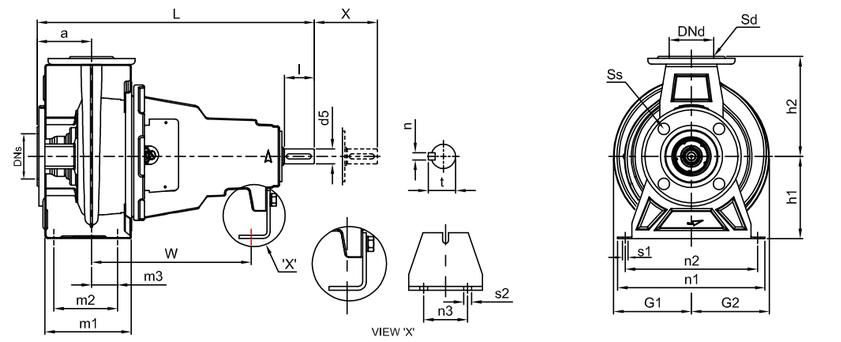
Data based on the SNB/SNK standard range. That is pumps fitted with Shakti SMG and SMMG EFF2.



SNB

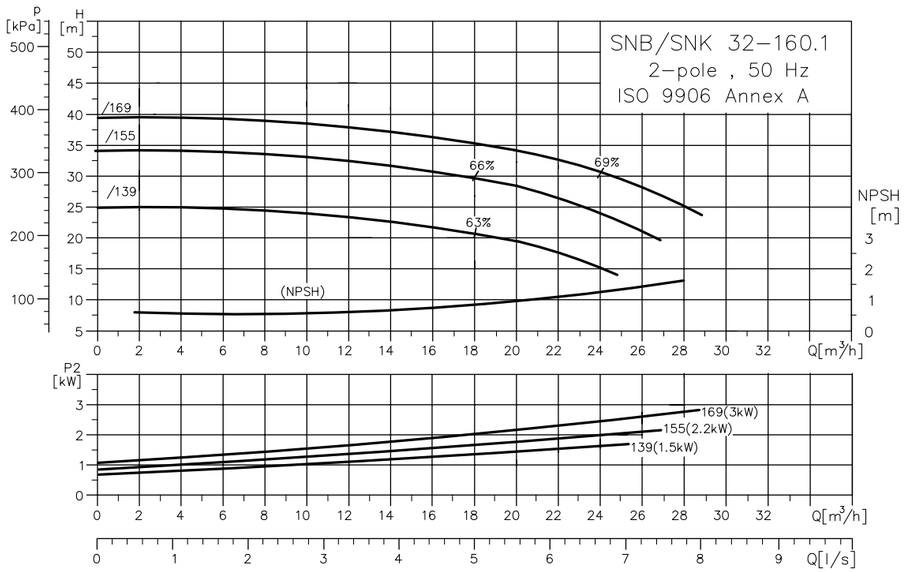


SNK



SNB, SNK 32-125 (2-pole)

Pump type			32-125/112
Motor type	STANDARD MOTOR		SMG 90
Common data SNB/SNK	P_2	[kW/HP]	1.1/1.5
	PN	[bar]	16
	DNs	[mm]	50
	DNd	[mm]	32
	a	[mm]	80
	h2	[mm]	140
	Ss		4x19
	Sd		4x19
SNK data	h1	[mm]	132
	d5	[mm]	24
	l	[mm]	50
	x	[mm]	100
	t	[mm]	27
	n	[mm]	8
	n1	[mm]	250
	n2	[mm]	195
	n3	[mm]	110
	s1	[mm]	M12
	s2	[mm]	M12
	m1	[mm]	139
	m2	[mm]	75
	m3	[mm]	35
	G1	[mm]	120
	G2	[mm]	120
	w	[mm]	260
	L	[mm]	441
	NET WT. (APX.)	[kg]	22
	GROSS WT. (APX.)	[kg]	28
SNB data	h3	[mm]	137
	h	[mm]	50
	L SNB	[mm]	227
	LB	[mm]	287
	AD	[mm]	141
	P	[mm]	200
	b1	[mm]	260
	b2	[mm]	360
	b3	[mm]	316
	d	[mm]	18
	l1	[mm]	530
	l2	[mm]	100
	l3	[mm]	330
	NET WT. (APX.)	[kg]	35
	GROSS WT. (APX.)	[kg]	45



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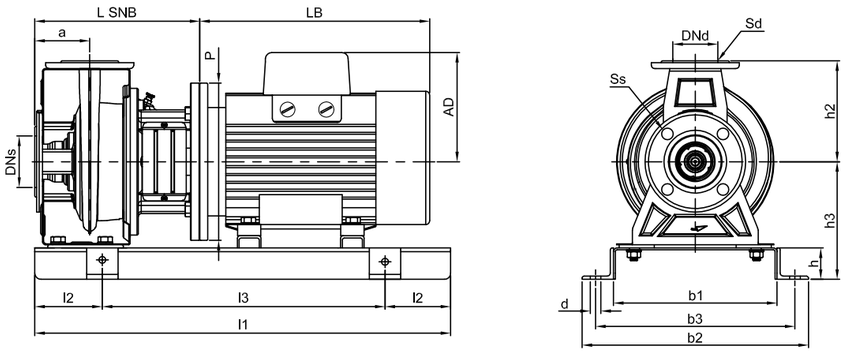
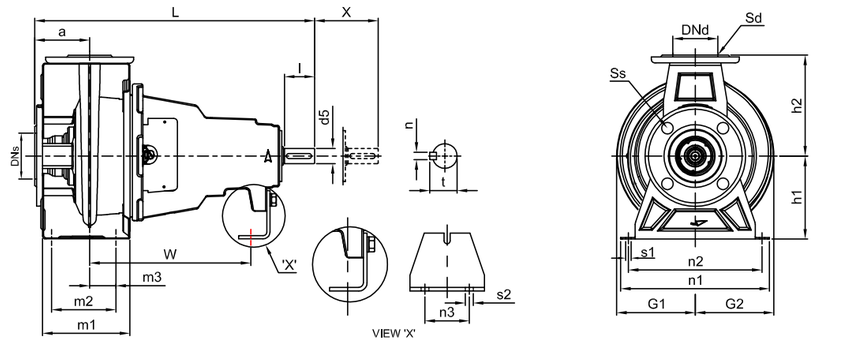
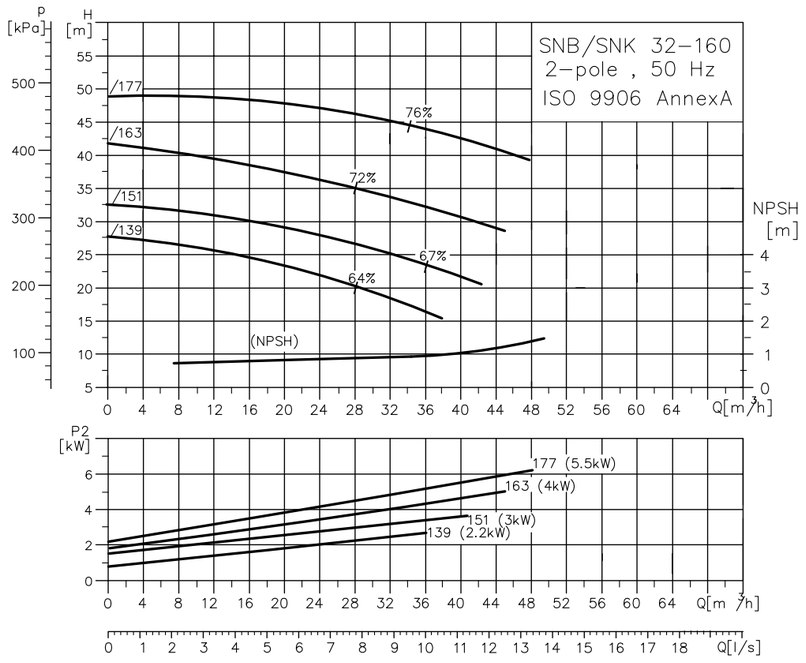


SNK



SNB, SNK 32-160.1 (2-pole)

Pump type			32-160.1/139	32-160.1/155	32-160.1/169
Motor type	STANDARD MOTOR		SMG 90	SMG 90	SMG 100
Common data SNB/SNK	P_2	[kW/HP]	1.5/2	2.2/3	3/4
	PN	[bar]	16	16	16
	DNs	[mm]	50	50	50
	DNd	[mm]	32	32	32
	a	[mm]	80	80	80
	h2	[mm]	160	160	160
	Ss		4x19	4x19	4x19
	Sd		4x19	4x19	4x19
SNK data	h1	[mm]	132	132	132
	d5	[mm]	24	24	24
	l	[mm]	50	50	50
	x	[mm]	100	100	100
	t	[mm]	27	27	27
	n	[mm]	8	8	8
	n1	[mm]	250	250	250
	n2	[mm]	195	195	195
	n3	[mm]	110	110	110
	s1	[mm]	M12	M12	M12
	s2	[mm]	M12	M12	M12
	m1	[mm]	139	139	139
	m2	[mm]	75	75	75
	m3	[mm]	35	35	35
	G1	[mm]	120	120	120
	G2	[mm]	120	120	120
	w	[mm]	260	260	260
	L	[mm]	441	441	441
	NET WT. (APX.)	[kg]	22	22	23
	GROSS WT. (APX.)	[kg]	28	28	29
SNB data	h3	[mm]	137	137	187
	h	[mm]	50	50	50
	L SNB	[mm]	227	227	255
	LB	[mm]	287	287	330
	AD	[mm]	141	141	170
	P	[mm]	200	200	250
	b1	[mm]	260	260	260
	b2	[mm]	360	360	360
	b3	[mm]	316	316	316
	d	[mm]	18	18	18
	l1	[mm]	530	530	600
	l2	[mm]	100	100	100
	l3	[mm]	330	330	400
	NET WT. (APX.)	[kg]	37	38	39
	GROSS WT. (APX.)	[kg]	42	43	49



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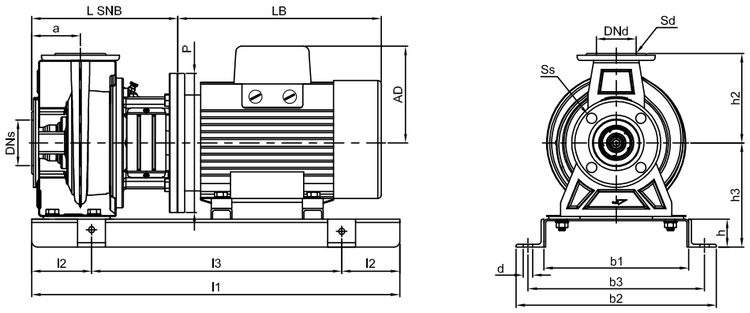

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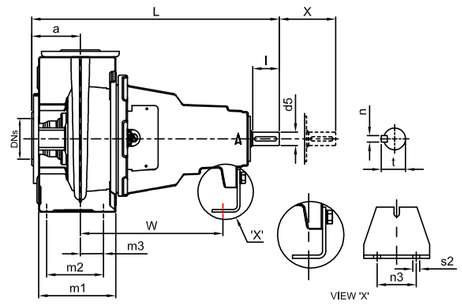
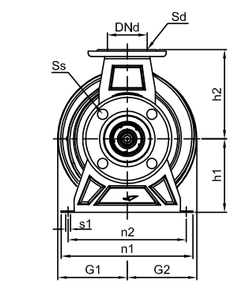
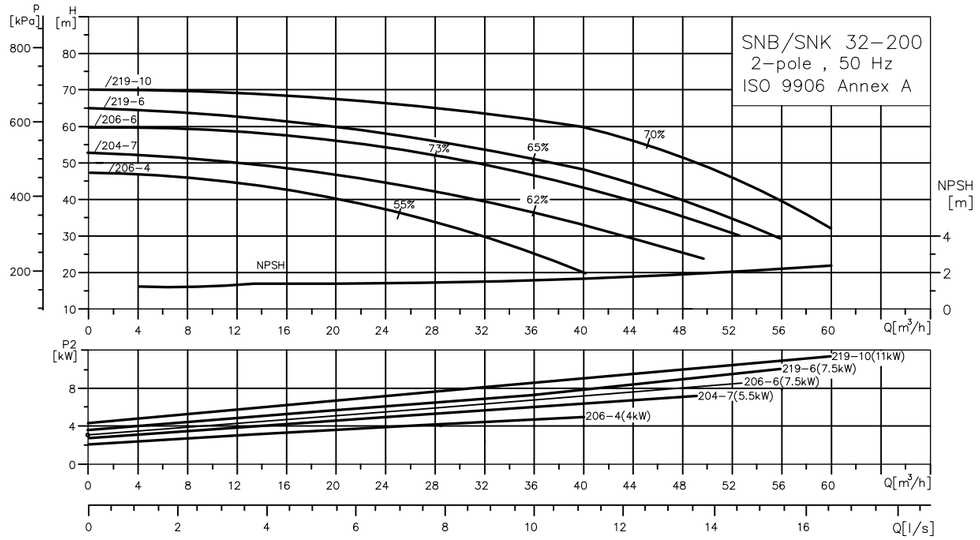




SNB, SNK 32-160 (2-pole)

Pump type			32-160/139	32-160/151	32-160/163	32-160/177
Motor type	STANDARD MOTOR		SMG 90	SMG 100	SMG 100	SMG 132
Common data SNB/SNK	P_2	[kW/HP]	2.2/3	3/4	4/5.5	5.5/7.5
	PN	[bar]	16	16	16	16
	DNs	[mm]	50	50	50	50
	DNd	[mm]	32	32	32	32
	a	[mm]	87	80	80	80
	h2	[mm]	160	160	160	160
	Ss		4x19	4x19	4x19	4x19
	Sd		4x19	4x19	4x19	4x19
SNK data	h1	[mm]	132	132	132	132
	d5	[mm]	24	24	24	24
	l	[mm]	50	50	50	50
	x	[mm]	100	100	100	100
	t	[mm]	27	27	27	27
	n	[mm]	8	8	8	8
	n1	[mm]	250	250	250	250
	n2	[mm]	195	195	195	195
	n3	[mm]	110	110	110	110
	s1	[mm]	M12	M12	M12	M12
	s2	[mm]	M12	M12	M12	M12
	m1	[mm]	139	139	139	139
	m2	[mm]	75	75	75	75
	m3	[mm]	35	35	35	35
	G1	[mm]	120	120	120	120
	G2	[mm]	120	120	120	120
	w	[mm]	260	260	260	260
	L	[mm]	441	441	441	441
	NET WT. (APX.)	[kg]	23	23	23	23
	GROSS WT. (APX.)	[kg]	28	28	28	28
SNB data	h3	[mm]	137	187	187	205
	h	[mm]	50	50	50	50
	L SNB	[mm]	227	255	255	294
	LB	[mm]	287	330	330	413
	AD	[mm]	141	170	170	134
	P	[mm]	200	250	250	300
	b1	[mm]	260	260	260	300
	b2	[mm]	360	360	360	400
	b3	[mm]	316	316	316	356
	d	[mm]	18	18	18	18
	l1	[mm]	530	600	600	740
	l2	[mm]	100	100	100	100
	l3	[mm]	330	400	400	540
	NET WT. (APX.)	[kg]	38	59	60	85
	GROSS WT. (APX.)	[kg]	43	69	70	95



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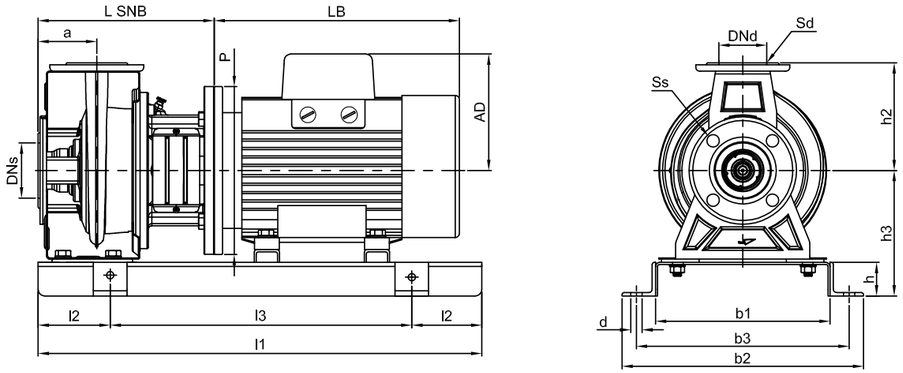

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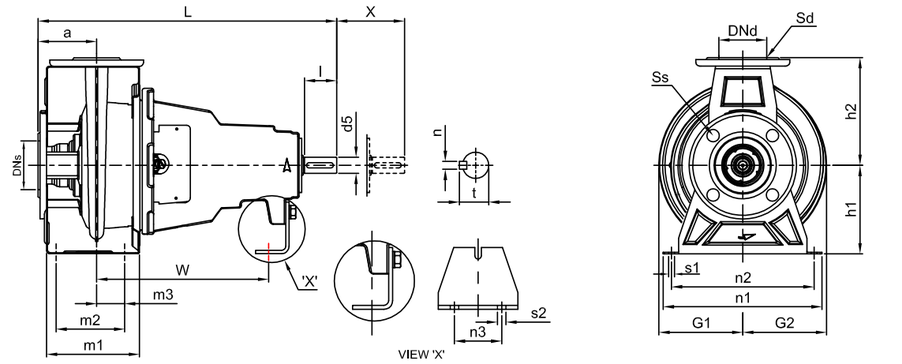
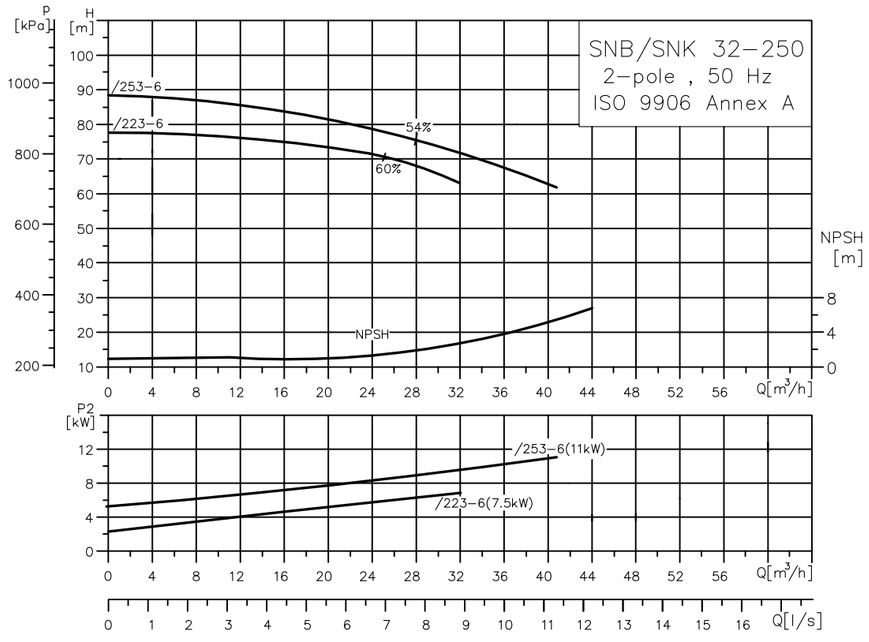


SNB, SNK 32-200 (2-pole)

Pump type			32-200/206-4	32-200/204-7	32-200/206-6	32-200/219-6	32-200/219-10
Motor type	STANDARD MOTOR		SMG 100	SMG 132	SMG 132	SMG 132	SMMG 160
Common data SNB/SNK	P_2	[kW/HP]	4/5.5	5.5/7.5	7.5/10	7.5/10	11/15
	PN	[bar]	16	16	16	16	16
	DNs	[mm]	50	50	50	50	50
	DNd	[mm]	32	32	32	32	32
	a	[mm]	80	80	80	80	80
	h2	[mm]	180	180	180	180	180
	Ss		4x19	4x19	4x19	4x19	4x19
	Sd		4x19	4x19	4x19	4x19	4x19
SNK data	h1	[mm]	160	160	160	160	160
	d5	[mm]	24	24	24	24	24
	l	[mm]	50	50	50	50	50
	x	[mm]	100	100	100	100	100
	t	[mm]	27	27	27	27	27
	n	[mm]	8	8	8	8	8
	n1	[mm]	250	250	250	250	250
	n2	[mm]	195	195	195	195	195
	n3	[mm]	110	110	110	110	110
	s1	[mm]	M12	M12	M12	M12	M12
	s2	[mm]	M12	M12	M12	M12	M12
	m1	[mm]	135	135	135	135	135
	m2	[mm]	75	75	75	75	75
	m3	[mm]	30	30	30	30	30
	G1	[mm]	151	151	151	151	151
	G2	[mm]	151	151	151	151	151
	w	[mm]	260	260	260	260	260
	L	[mm]	441	441	441	441	441
	NET WT. (APX.)	[kg]	23	23	24	24	24
	GROSS WT. (APX.)	[kg]	29	29	30	30	30
SNB data	h3	[mm]	215	215	215	215	233
	h	[mm]	50	50	50	50	50
	L SNB	[mm]	253	292	292	292	322
	LB	[mm]	330	413	413	413	505
	AD	[mm]	170	134	134	134	199
	P	[mm]	250	300	300	300	350
	b1	[mm]	260	300	300	300	380
	b2	[mm]	360	400	400	400	500
	b3	[mm]	316	356	356	356	450
	d	[mm]	18	18	18	18	22
	l1	[mm]	600	740	740	740	850
	l2	[mm]	100	100	100	100	100
	l3	[mm]	400	540	540	540	650
	NET WT. (APX.)	[kg]	87	89	90	90	130
	GROSS WT. (APX.)	[kg]	97	99	100	100	140



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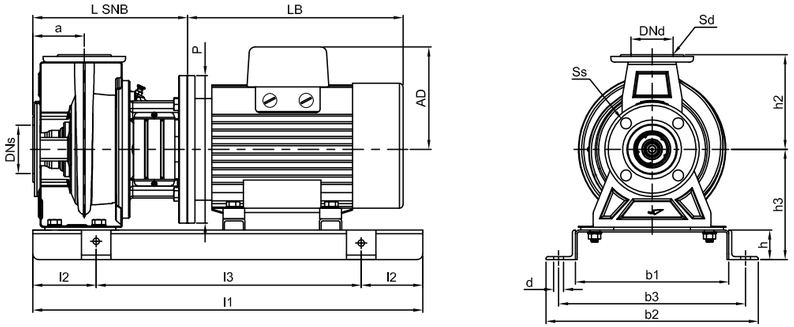

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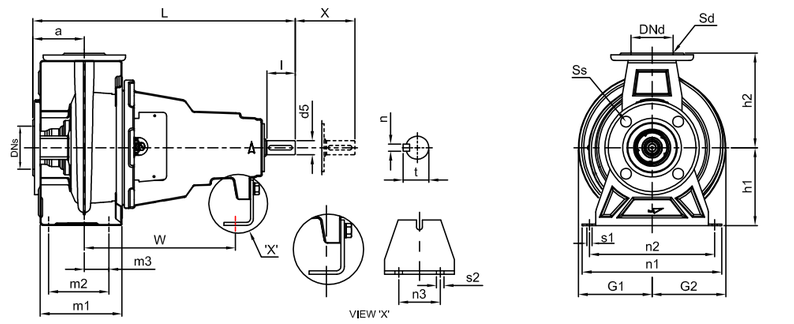
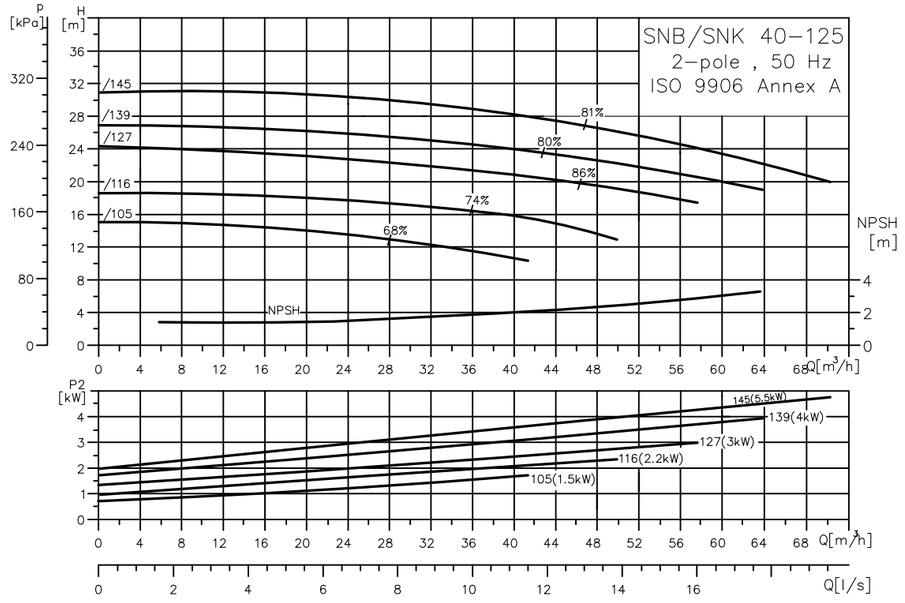


SNB, SNK 32-250 (2-pole)				
Pump type			**32-250/223-6**	**32-250/253-6**
Motor type	STANDARD MOTOR		SMG 132	SMMG 160
Common data SNB/SNK	P_2	[kW/HP]	7.5/10	11/15
	PN	[bar]	16	16
	DNs	[mm]	50	50
	DNd	[mm]	32	32
	a	[mm]	100	100
	h2	[mm]	225	225
	Ss		4x19	4x19
	Sd		4x19	4x19
SNK data	h1	[mm]	180	180
	d5	[mm]	24	24
	l	[mm]	50	50
	x	[mm]	100	100
	t	[mm]	27	27
	n	[mm]	8	8
	n1	[mm]	320	320
	n2	[mm]	250	250
	n3	[mm]	110	110
	s1	[mm]	M12	M12
	s2	[mm]	M12	M12
	m1	[mm]	140	140
	m2	[mm]	95	95
	m3	[mm]	28	28
	G1	[mm]	177	177
	G2	[mm]	177	177
	w	[mm]	270	270
	L	[mm]	466	466
	NET WT. (APX.)	[kg]	33	33
	GROSS WT. (APX.)	[kg]	40	40
SNB data	h3	[mm]	235	235
	h	[mm]	50	50
	L SNB	[mm]	318	348
	LB	[mm]	413	505
	AD	[mm]	134	199
	P	[mm]	300	350
	b1	[mm]	300	380
	b2	[mm]	400	500
	b3	[mm]	356	450
	d	[mm]	18	22
	l1	[mm]	740	850
	l2	[mm]	100	100
	l3	[mm]	540	650
	NET WEIGHT (APX.)	[kg]	103	142
	GROSS WEIGHT (APX.)	[kg]	113	152



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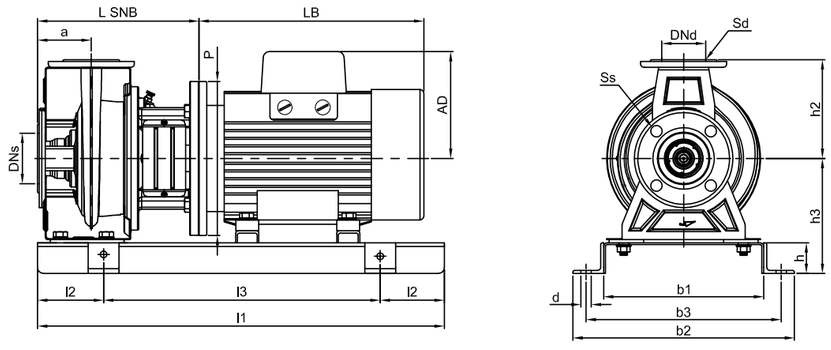

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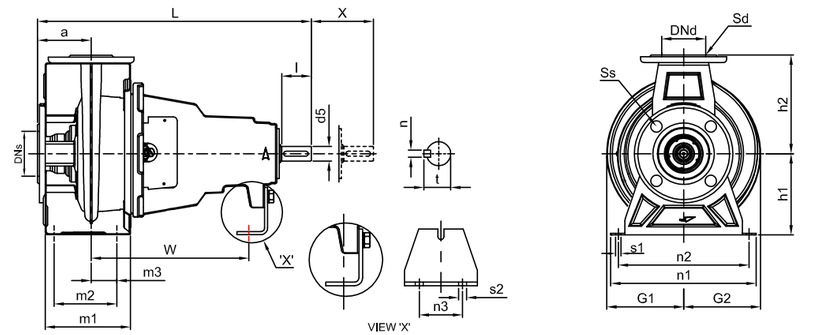
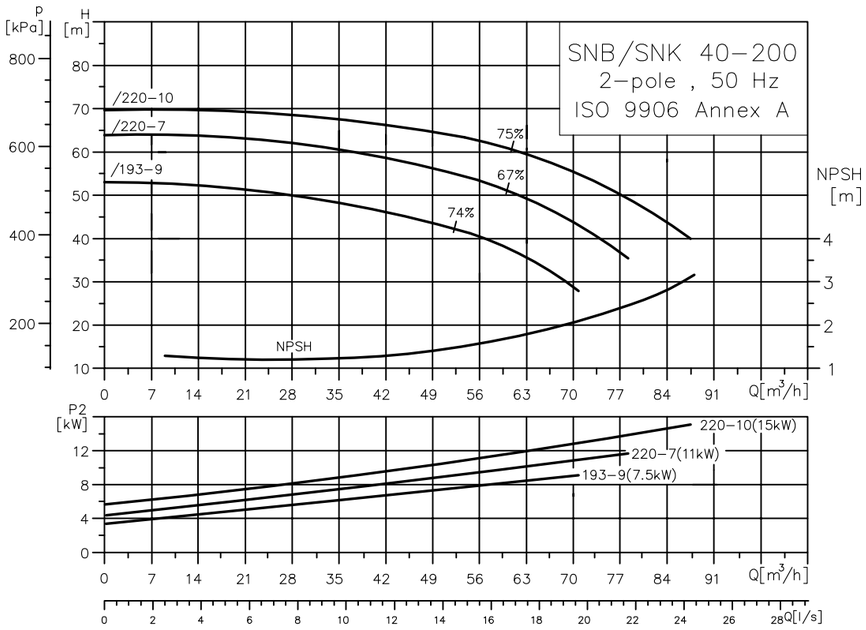


SNB, SNK 40-125 (2-pole)

Pump type			40-125/105	40-125/116	40-125/127	40-125/139	40-125/145
Motor type	STANDARD MOTOR		SMG 90	SMG 90	SMG 100	SMG 100	SMG 132
Common data SNB/SNK	P_2	[kW/HP]	1.5/2	2.2/3	3/4	4/5.5	5.5/7.5
	PN	[bar]	16	16	16	16	16
	DNs	[mm]	65	65	65	65	65
	DNd	[mm]	40	40	40	40	40
	a	[mm]	80	80	80	80	80
	h2	[mm]	140	140	140	140	142
	Ss		4x19	4x19	4x19	4x19	4x19
	Sd		4x19	4x19	4x19	4x19	4x19
SNK data	h1	[mm]	130	130	130	130	130
	d5	[mm]	24	24	24	24	24
	l	[mm]	50	50	50	50	50
	x	[mm]	100	100	100	100	100
	t	[mm]	27	27	27	27	27
	n	[mm]	8	8	8	8	8
	n1	[mm]	250	250	250	250	250
	n2	[mm]	195	195	195	195	195
	n3	[mm]	110	110	110	110	110
	s1	[mm]	M12	M12	M12	M12	M12
	s2	[mm]	M12	M12	M12	M12	M12
	m1	[mm]	132	132	132	132	132
	m2	[mm]	75	75	75	75	75
	m3	[mm]	35	35	35	35	35
	G1	[mm]	120	120	120	120	120
	G2	[mm]	120	120	120	120	120
	w	[mm]	260	260	260	260	260
	L	[mm]	440	440	440	440	440
	NET WT. (APX.)	[kg]	22	22	23	23	23
	GROSS WT. (APX.)	[kg]	28	28	29	29	29
SNB data	h3	[mm]	137	137	187	187	205
	h	[mm]	50	50	50	50	50
	L SNB	[mm]	228	228	256	256	295
	LB	[mm]	287	287	330	330	413
	AD	[mm]	141	141	170	170	134
	P	[mm]	200	200	250	250	300
	b1	[mm]	260	260	260	260	300
	b2	[mm]	360	360	360	360	400
	b3	[mm]	316	316	316	316	356
	d	[mm]	18	18	18	18	18
	l1	[mm]	530	600	600	600	740
	l2	[mm]	100	100	100	100	100
	l3	[mm]	330	400	400	400	540
	NET WT. (APX.)	[kg]	36	37	58	59	85
	GROSS WT. (APX.)	[kg]	41	42	68	69	95



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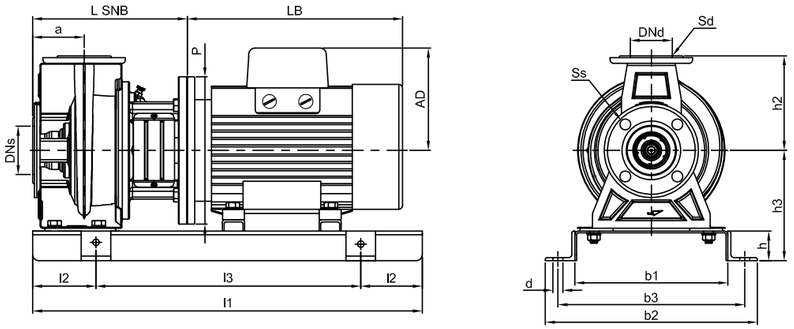
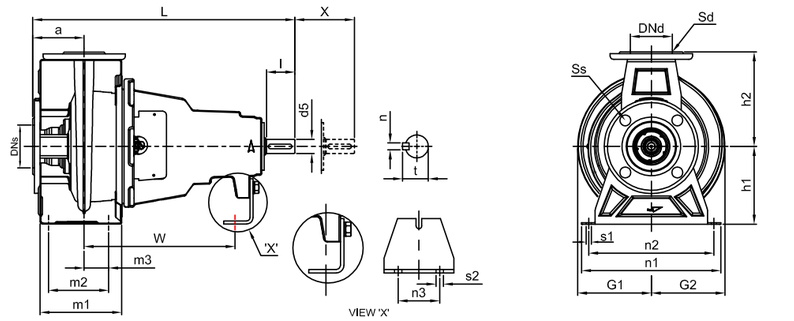
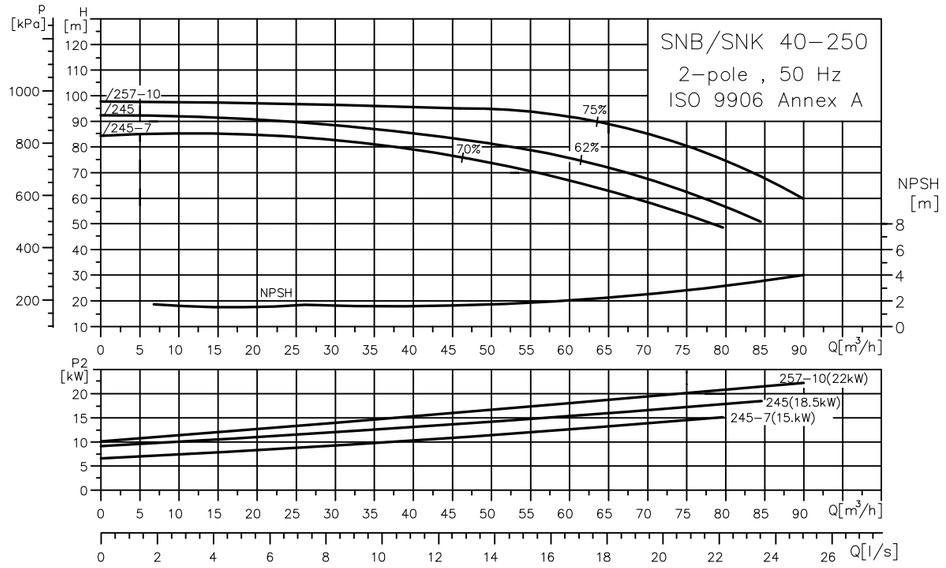


SNK

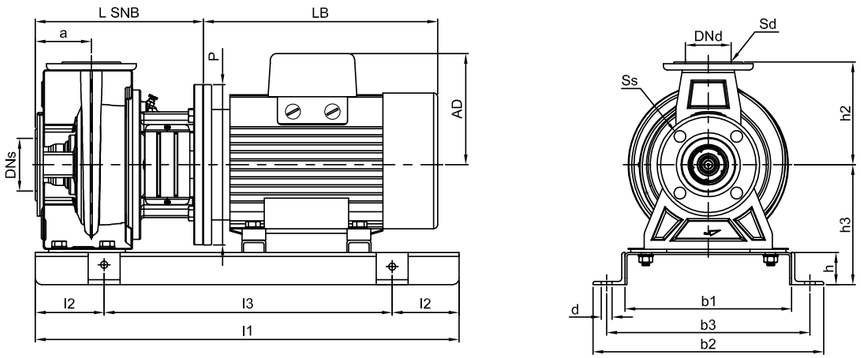


SNB, SNK 40-200 (2-pole)

Pump type			40-200/193-9	40-200/220-7	40-200/220-10
Motor type	STANDARD MOTOR		SMG 132	SMMG 160	SMMG 160
Common data SNB/SNK	P_2	[kW/HP]	7.5/10	11/15	15/20
	PN	[bar]	16	16	16
	DNs	[mm]	65	65	65
	DNd	[mm]	40	40	40
	a	[mm]	100	100	100
	h2	[mm]	180	180	180
	Ss		4x19	4x19	4x19
	Sd		4x19	4x19	4x19
SNK data	h1	[mm]	160	160	160
	d5	[mm]	24	24	24
	l	[mm]	50	50	50
	x	[mm]	100	100	100
	t	[mm]	27	27	27
	n	[mm]	8	8	8
	n1	[mm]	250	250	250
	n2	[mm]	195	195	195
	n3	[mm]	110	110	110
	s1	[mm]	15	15	15
	s2	[mm]	M12	M12	M12
	m1	[mm]	139	139	139
	m2	[mm]	75	75	75
	m3	[mm]	25	25	25
	G1	[mm]	151	151	151
	G2	[mm]	155	155	155
	w	[mm]	260	260	260
	L	[mm]	460	460	460
	NET WT. (APX.)	[kg]	25	25	25
	GROSS WT. (APX.)	[kg]	32	32	32
SNB data	h3	[mm]	215	233	233
	h	[mm]	50	50	50
	L SNB	[mm]	311	341	341
	LB	[mm]	413	505	505
	AD	[mm]	134	199	199
	P	[mm]	300	350	350
	b1	[mm]	300	380	380
	b2	[mm]	400	500	500
	b3	[mm]	356	450	450
	d	[mm]	18	22	22
	l1	[mm]	740	850	850
	l2	[mm]	100	100	100
	l3	[mm]	540	650	650
	NET WT. (APX.)	[kg]	98	139	149
	GROSS WT. (APX.)	[kg]	108	149	159



SNB



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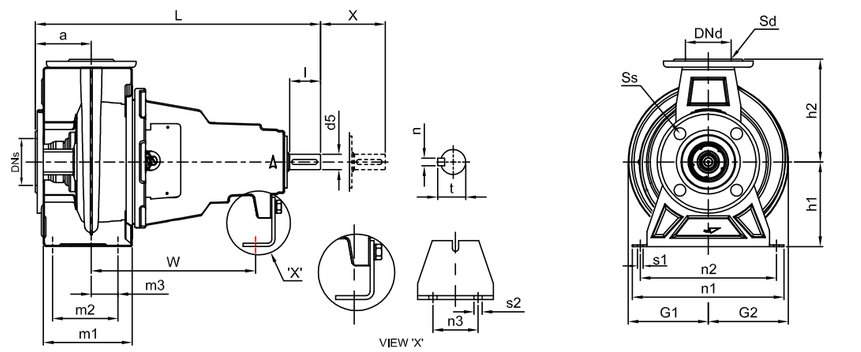
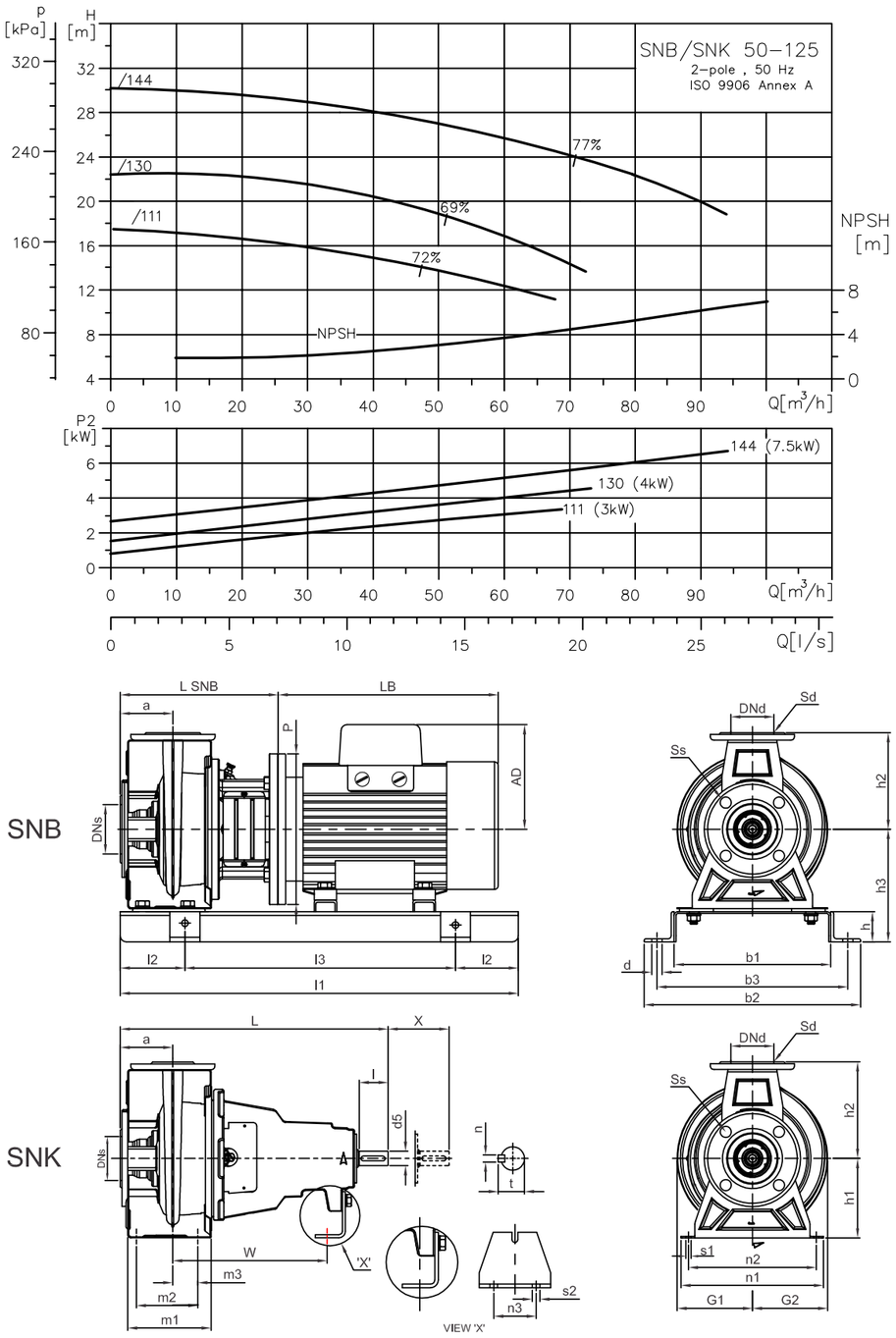


SNB, SNK 40-250 (2-pole)

Pump type			40-250/245-7	40-250/245	40-250/257-10
Motor type	STANDARD MOTOR		SMG 160	SMG 160	SMMG 180
Common data SNB/SNK	P_2	[kW/HP]	15/20	18.5/25	25/30
	PN	[bar]	16	16	16
	DNs	[mm]	65	65	65
	DNd	[mm]	40	40	40
	a	[mm]	100	100	100
	h2	[mm]	225	225	225
	Ss		4x19	4x19	4x19
	Sd		4x19	4x19	4x19
SNK data	h1	[mm]	180	180	180
	d5	[mm]	24	24	24
	l	[mm]	50	50	50
	x	[mm]	100	100	100
	t	[mm]	27	27	27
	n	[mm]	8	8	8
	n1	[mm]	320	320	320
	n2	[mm]	250	250	250
	n3	[mm]	110	110	110
	s1	[mm]	M12	M12	M12
	s2	[mm]	M12	M12	M12
	m1	[mm]	140	140	140
	m2	[mm]	95	95	95
	m3	[mm]	28	28	28
	G1	[mm]	177	177	177
	G2	[mm]	180	180	180
	w	[mm]	270	270	270
	L	[mm]	467	467	467
	NET WT. (APX.)	[kg]	34	34	34
	GROSS WT. (APX.)	[kg]	41	41	41
SNB data	h3	[mm]	235	235	240
	h	[mm]	50	50	50
	L SNB	[mm]	349	349	349
	LB	[mm]	505	505	602
	AD	[mm]	199	199	258
	P	[mm]	350	350	350
	b1	[mm]	380	380	380
	b2	[mm]	500	500	500
	b3	[mm]	450	450	450
	d	[mm]	22	22	22
	l1	[mm]	850	850	850
	l2	[mm]	100	100	100
	l3	[mm]	650	650	650
	NET WT. (APX.)	[kg]	155	170	-
	GROSS WT. (APX.)	[kg]	165	180	-

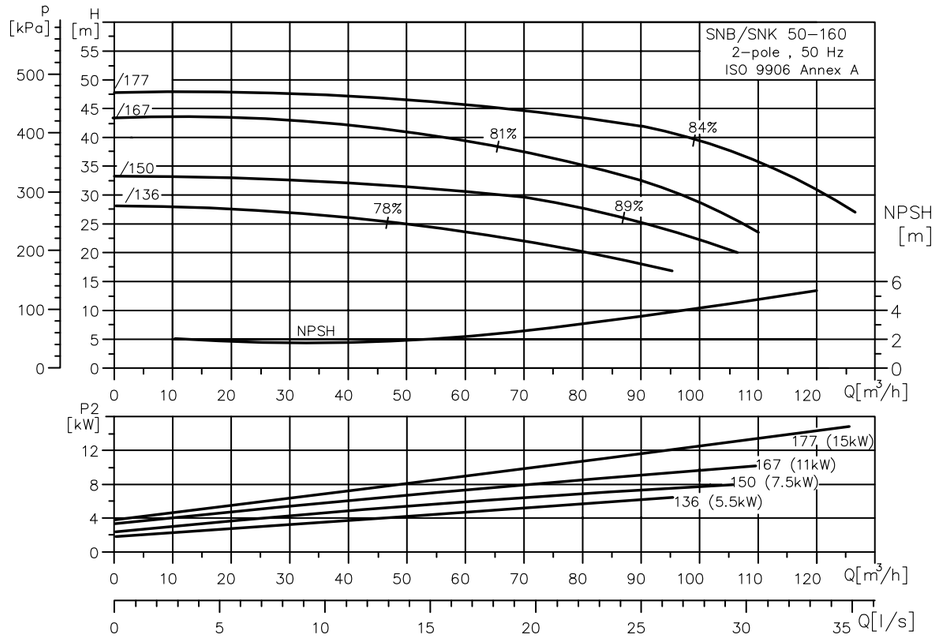


SNB

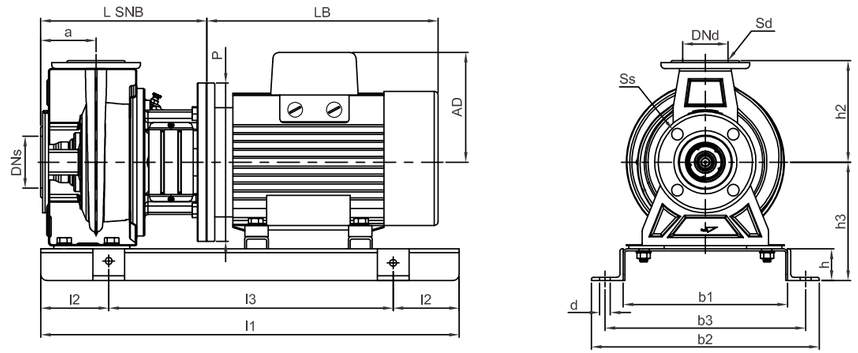
SNK

SNB, SNK 50-125 (2-pole)

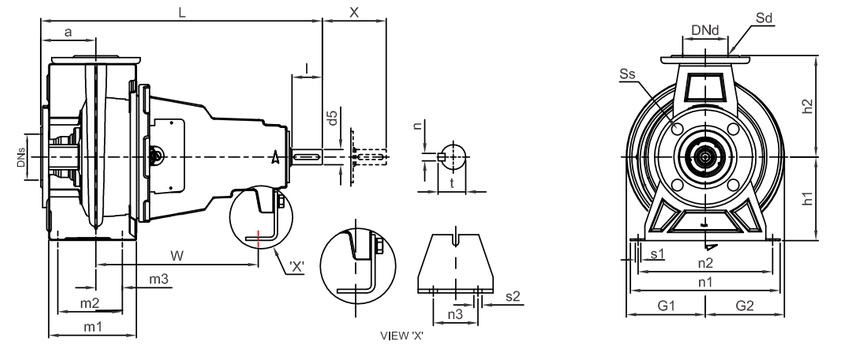
			50-125/111	50-125/130	50-125/144
Pump type					
Motor type	STANDARD MOTOR		SMG 160	SMG 160	SMMG 180
Common data SNB/SNK	P_2	[kW/HP]	15/20	18.5/25	25/30
	PN	[bar]	16	16	16
	DNs	[mm]	65	65	65
	DNd	[mm]	40	40	40
	a	[mm]	100	100	100
	h2	[mm]	225	225	225
	Ss		4x19	4x19	4x19
	Sd		4x19	4x19	4x19
SNK data	h1	[mm]	180	180	180
	d5	[mm]	24	24	24
	l	[mm]	50	50	50
	x	[mm]	100	100	100
	t	[mm]	27	27	27
	n	[mm]	8	8	8
	n1	[mm]	320	320	320
	n2	[mm]	250	250	250
	n3	[mm]	110	110	110
	s1	[mm]	M12	M12	M12
	s2	[mm]	M12	M12	M12
	m1	[mm]	140	140	140
	m2	[mm]	95	95	95
	m3	[mm]	28	28	28
	G1	[mm]	177	177	177
	G2	[mm]	180	180	180
	w	[mm]	270	270	270
	L	[mm]	467	467	467
	NET WT. (APX.)	[kg]	34	34	34
	GROSS WT. (APX.)	[kg]	41	41	41
SNB data	h3	[mm]	235	235	240
	h	[mm]	50	50	50
	L SNB	[mm]	349	349	349
	LB	[mm]	505	505	602
	AD	[mm]	199	199	258
	P	[mm]	350	350	350
	b1	[mm]	380	380	380
	b2	[mm]	500	500	500
	b3	[mm]	450	450	450
	d	[mm]	22	22	22
	l1	[mm]	850	850	850
	l2	[mm]	100	100	100
	l3	[mm]	650	650	650
	NET WT. (APX.)	[kg]	155	170	-
	GROSS WT. (APX.)	[kg]	165	180	-



SNB

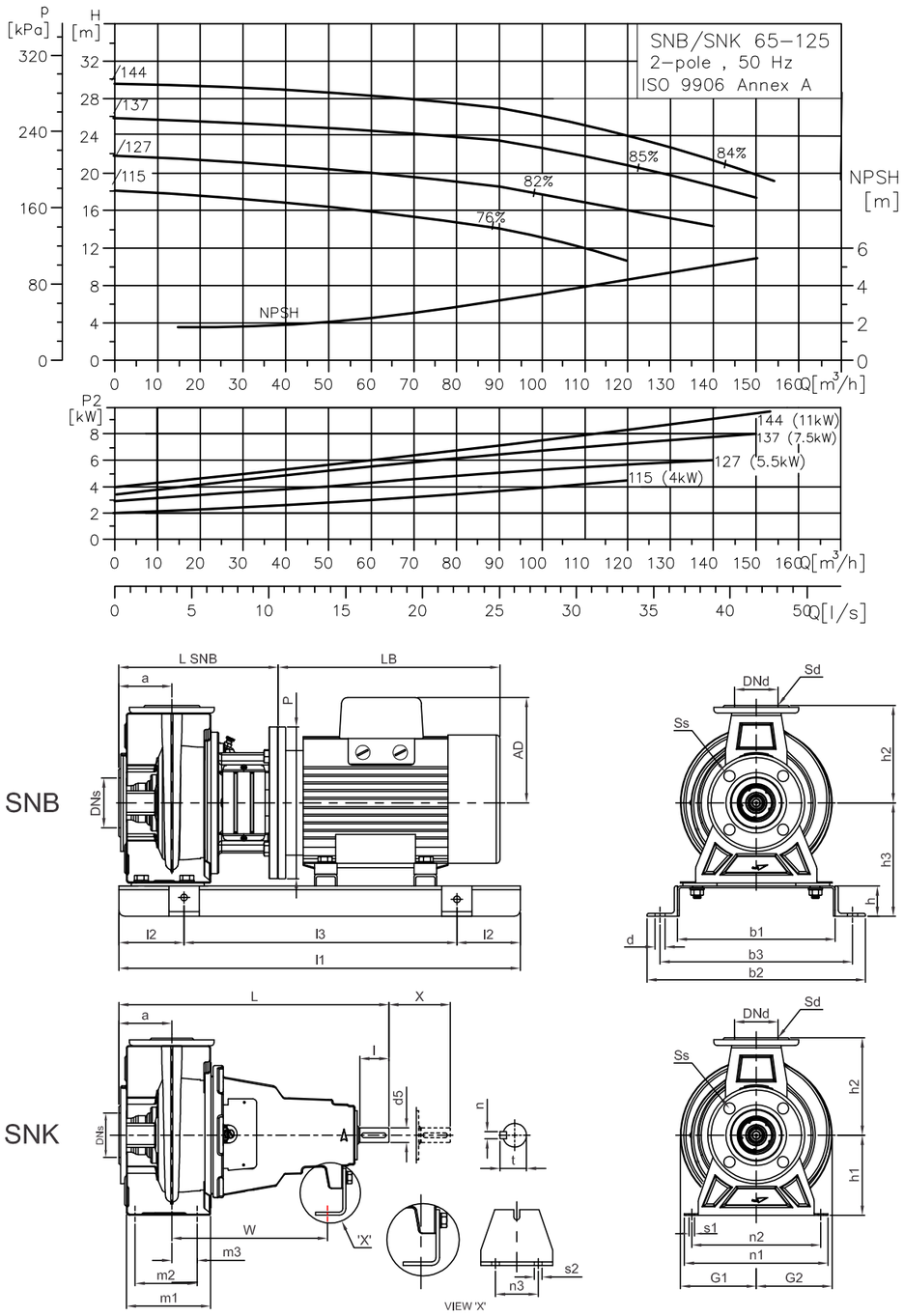


SNK



SNB, SNK 50-160 (2-pole)

Pump type			50-160/136	50-160/150	50-160/167	50-160/177
Motor type	STANDARD MOTOR		SMG 132	SMG 132	SMMG 160	SMMG 160
Common data SNB/SNK	P_2	[kW/HP]	5.5/7.5	7.5/10	11/15	15/20
	PN	[bar]	16	16	16	16
	DNs	[mm]	65	65	65	65
	DNd	[mm]	50	50	50	50
	a	[mm]	100	100	100	100
	h2	[mm]	180	180	180	180
	Ss		4x19	4x19	4x19	4x19
	Sd 4x19 4x19 4x19 4x19					
SNK data	h1	[mm]	160	160	160	160
	d5	[mm]	24	24	24	24
	l	[mm]	50	50	50	50
	x	[mm]	100	100	100	100
	t	[mm]	27	27	27	27
	n	[mm]	8	8	8	8
	n1	[mm]	240	240	240	240
	n2	[mm]	195	195	195	195
	n3	[mm]	110	110	110	110
	s1	[mm]	M12	M12	M12	M12
	s2	[mm]	M12	M12	M12	M12
	m1	[mm]	152	152	152	152
	m2	[mm]	75	75	75	75
	m3	[mm]	25	25	25	25
	G1	[mm]	122	122	122	122
	G2	[mm]	147	147	147	147
	w	[mm]	260	260	260	260
	L	[mm]	462	462	462	462
	NET WT. (APX.)	[kg]	23	23	24	24
	GROSS WT. (APX.)	[kg]	31	31	31	31
SNB data	h3	[mm]	215	215	233	233
	h	[mm]	50	50	50	50
	L SNB	[mm]	315	315	345	345
	LB	[mm]	413	413	505	505
	AD	[mm]	134	134	199	199
	P	[mm]	300	300	350	350
	b1	[mm]	300	300	380	380
	b2	[mm]	400	400	500	500
	b3	[mm]	356	356	450	450
	d	[mm]	18	18	22	22
	l1	[mm]	740	740	850	850
	l2	[mm]	100	100	100	100
	l3	[mm]	540	540	650	650
	NET WT. (APX.)	[kg]	92	94	133	145
	GROSS WT. (APX.)	[kg]	102	104	143	155

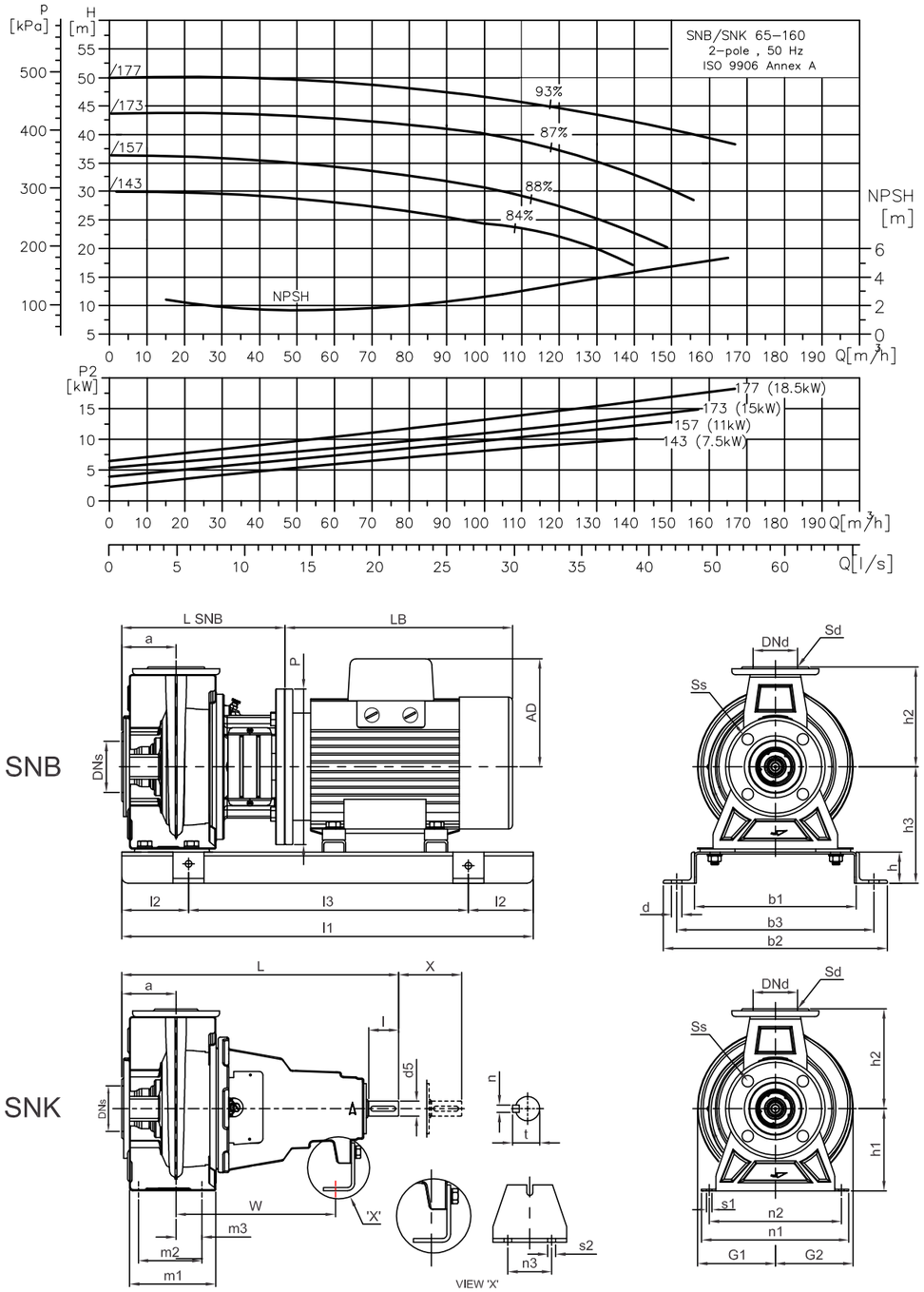


SNB

SNK

SNK, SNB 65-125 (2-pole)

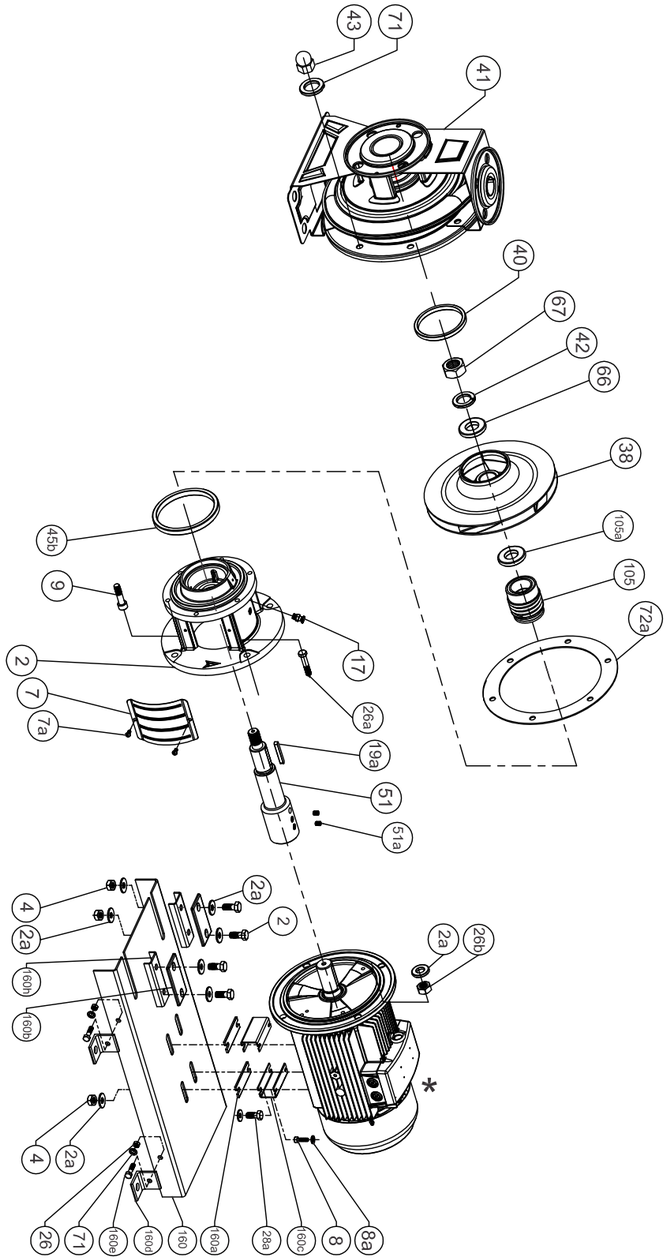
Pump type			65-125/115	65-125/127	65-125/137	65-125/144
Motor type	STANDARD MOTOR		SMG 100	SMG 132	SMG 132	SMMG 160
Common data SNB/SNK	P_2	[kW/HP]	4/5.5	5.5/7.5	7.5/10	11/15
	PN	[bar]	16	16	16	16
	DNs	[mm]	80	80	80	80
	DNd	[mm]	65	65	65	65
	a	[mm]	100	100	100	100
	h2	[mm]	180	180	180	180
	Ss		8x19	8x19	8x19	8x19
	Sd		4x19	4x19	4x19	4x19
SNK data	h1	[mm]	160	160	160	160
	d5	[mm]	24	24	24	24
	l	[mm]	50	50	50	50
	x	[mm]	100	100	100	100
	t	[mm]	27	27	27	27
	n	[mm]	8	8	8	8
	n1	[mm]	280	280	280	280
	n2	[mm]	195	195	195	195
	n3	[mm]	110	110	110	110
	s1	[mm]	M12	M12	M12	M12
	s2	[mm]	M12	M12	M12	M12
	m1	[mm]	155	155	155	155
	m2	[mm]	95	95	95	95
	m3	[mm]	37	37	37	37
	G1	[mm]	120	120	120	120
	G2	[mm]	143	143	143	143
	w	[mm]	268	268	268	268
	L	[mm]	465	465	465	465
	NET WT. (APX.)	[kg]	26	26	26	26
	GROSS WT. (APX.)	[kg]	33	33	33	33
SNB data	h3	[mm]	215	215	215	233
	h	[mm]	50	50	50	50
	L SNB	[mm]	279	318	318	348
	LB	[mm]	330	413	413	505
	AD	[mm]	170	134	134	199
	P	[mm]	250	300	300	350
	b1	[mm]	260	300	300	380
	b2	[mm]	360	400	400	500
	b3	[mm]	316	356	356	450
	d	[mm]	18	18	18	22
	l1	[mm]	600	740	740	850
	l2	[mm]	100	100	100	100
	l3	[mm]	400	540	540	650
	NET WT. (APX.)	[kg]	62	89	90	139
	GROSS WT. (APX.)	[kg]	72	99	100	149



SNB, SNK 65-160 (2-pole)

Pump type			65-160/143	65-160/157	65-160/173	65-160/177
Motor type	STANDARD MOTOR		SMG 132	SMMG 160	SMMG 160	SMMG 160
Common data SNB/SNK	P_2	[kW/HP]	7.5/10	11/15	15/20	18.5/25
	PN	[bar]	16	16	16	16
	DNs	[mm]	80	80	80	80
	DNd	[mm]	65	65	65	65
	a	[mm]	100	100	100	99
	h2	[mm]	200	200	200	200
	Ss		8x19	8x19	8x19	8x19
	Sd		4x19	4x19	4x19	4x19
SNK data	h1	[mm]	160	160	160	160
	d5	[mm]	24	24	24	24
	l	[mm]	50	50	50	50
	x	[mm]	100	100	100	100
	t	[mm]	27	27	27	27
	n	[mm]	8	8	8	8
	n1	[mm]	280	280	280	280
	n2	[mm]	195	195	195	195
	n3	[mm]	110	110	110	110
	s1	[mm]	M12	M12	M12	M12
	s2	[mm]	M12	M12	M12	M12
	m1	[mm]	149	149	149	95
	m2	[mm]	95	95	95	149
	m3	[mm]	33	33	33	33
	G1	[mm]	129	129	129	129
	G2	[mm]	166	166	166	166
	w	[mm]	260	260	260	260
	L	[mm]	459	459	459	459
	NET WT. (APX.)	[kg]	26	26	26	26
	GROSS WT. (APX.)	[kg]	34	34	34	34
SNB data	h3	[mm]	215	233	233	233
	h	[mm]	50	50	50	50
	L SNB	[mm]	312	342	342	342
	LB	[mm]	413	505	505	505
	AD	[mm]	134	199	199	199
	P	[mm]	300	350	350	350
	b1	[mm]	300	380	380	380
	b2	[mm]	400	500	500	500
	b3	[mm]	356	450	450	450
	d	[mm]	18	22	22	22
	l1	[mm]	740	850	850	850
	l2	[mm]	100	100	100	100
	l3	[mm]	540	650	650	650
	NET WT. (APX.)	[kg]	90	135	150	165
	GROSS WT. (APX.)	[kg]	100	145	160	175

Exploded view SNB

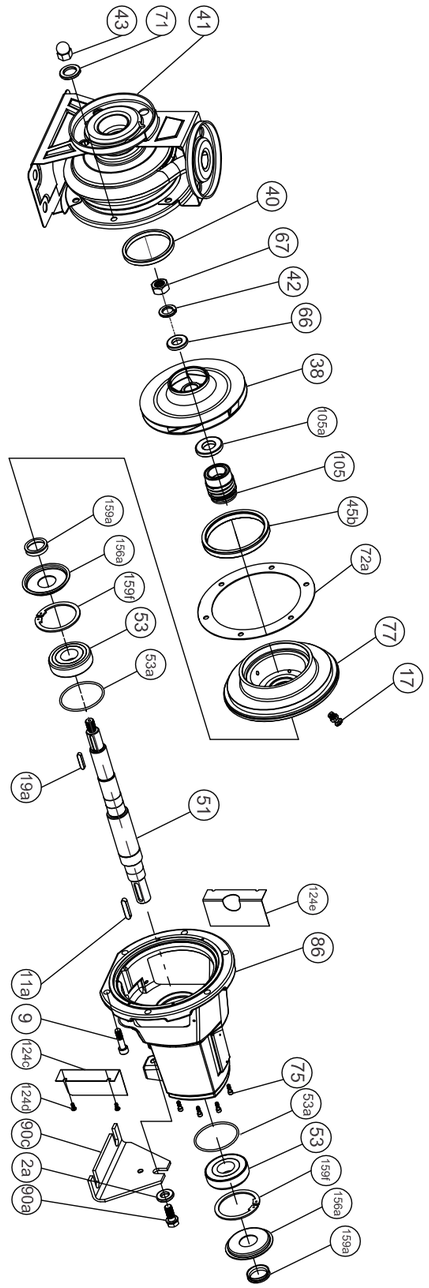


SHAKTI PUMPING LIFE

Exploded view part list SNB

POS.	PART NO.	DESCRIPTION	QTY.	MATERIAL
41	*	PUMP HOUSING FABRICATED	01	SS AISI 304
40	*	NECKRING FOR PUMP HOUSING	01	PPS+NBR
43	*	DOME NUT	*	SS AISI 304
71	*	WASHER	*	SS AISI 304
9	*	ALLEN BOLT	*	SS AISI 304
2	*	MOTOR STOOL	01	CI FG 260
72a	*	MOUNTING GASKET	01	NBR
45b	1000003852	NECKRING FOR MOTOR STOOL	01	PPS+NBR
105	1000003180	MECHANICAL SEAL	01	N.A.
105a	3000019750	WASHER FOR MECH. SEAL	01	SS AISI 304
38	*	FABRICATED IMPELLER	01	SS AISI 304
66	1000003449	WASHER	01	SS AISI 304
42	1000003343	SPRING WASHER	01	SS AISI 304
67	1000002225	HEX NUT	01	SS AISI 304
19a	1000003183	IMPELLER KEY	01	SS AISI 304
51	*	COUPLING WITH SHAFT	01	DUPLEX+EN8
51a	*	GRUB SCREW	02	(H.T.) UNBECO MAKE
7	*	COVER	02	SS AISI 304
7a	1000001852	PAN HEAD SCREW	04	SS AISI 304
17	3000015996	AIR VENT PLUG ASSLY	01	BRONZE
4	1000003870	HEX NUT	04	SS AISI 304
26a	*	HEX BOLT	04	SS AISI 304
26b	*	HEX NUT	04	SS AISI 304
2a	*	WASHER	04	SS AISI 304
160	*	BASE PLATE	01	M.S.
160b	*	PAD FOR PUMP HOUSING	02	NBR
160a	*	PAD FOR BASE PLATE	*	NBR
160c	*	FOOT FOR MOTOR	*	M.S.
160d	*	ANGLE FOR BASE PLATE	04	M.S.
160e	1000005580	HEX. BOLT	04	SS AISI 304
26	1000000387	HEX. NUT	04	SS AISI 304
71	1000005494	WASHER	04	SS AISI 304
8a	*	WASHER	*	SS AISI 304
8	*	ALLEN BOLT	*	SS AISI 304
28a	*	HEX. BOLT	*	SS AISI 304
160h	*	FOOT FOR PUMP HOUSING	*	M.S.
2a	1000004629	WASHER	*	SS AISI 304
4	1000000383	HEX. BOLT	*	SS AISI 304
2	*	HEX. BOLT	*	SS AISI 304

Exploded view SNK



SHAKTI PUMPING LIFE

Exploded view part list SNK

POS.	PART NO.	DESCRIPTION	QTY.	MATERIAL
41	*	PUMP HOUSING FABRICATED	01	SS AISI 304
40	*	NECKRING FOR PUMP HOUSING	01	PPS+NBR
43	*	DOME NUT	*	AISI SS 304
71	*	WASHER	*	AISI SS 304
9	*	ALLEN BOLT	*	SS AISI 304
86	3000017034	BEARING BRACKET	01	CI FG 260
51	3000017116	PUMP SHAFT	01	SS AISI 420
53a	1000003830	O RING	01	NBR
53	1000003761	BALL BEARING	01	STD.
159f	1000003829	CIRCLIP	01	STD.
156a	3000017036	BEARING COVER	01	SS AISI 304
75	1000002613	ALLEN BOLT	04	SS AISI 304
159a	1000003737	SEAL RING	01	NBR
19a	1000003183	KEY FOR IMPELLER	01	SS AISI 304
53a	1000003830	O RING	01	NBR
53	1000003761	BALL BEARING	01	STD.
159f	1000003829	CIRCLIP	01	STD.
156a	3000017036	BEARING COVER	01	SS AISI 304
159a	1000003737	SEAL RING	01	NBR
77	*	BEARING BRACKET COVER	01	CI FG 260
72a	*	MOUNTING GASKET	01	NBR
45b	1000003852	NECKRING FOR BRG. BKT. COVER	01	PPS+NBR
105	1000003180	MECHANICAL SEAL	01	N/A
105a	3000019750	WASHER FOR MECHANICAL SEAL	01	SS AISI 304
38	*	FABRICATED IMPELLER`	01	SS AISI 304
66	1000003449	WASHER	01	SS AISI 304
42	1000003343	SPRING WASHER	01	SS AISI 304
67	1000002225	HEX NUT	01	SS AISI 304
124c	3000017038	LEFT GUARD	01	SS AISI 304
124e	3000017039	RIGHT GUARD	01	SS AISI 304
124d	1000000059	PAN HEAD SCREW	04	SS AISI 304
17	3000015996	AIR VENT PLUG ASSLY	01	BRONZE
11a	1000003808	KEY FOR SHAFT	01	SS AISI 304
90c	*	FOOT	01	M.S.
2a	1000004629	WASHER	01	SS AISI 304
90a	1000004783	HEX BOLT	01	SS AISI 304

The tables below give all electrical data for motors for SNB and SNK.

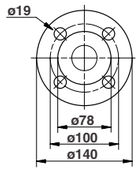
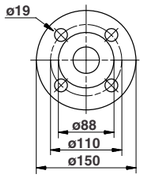
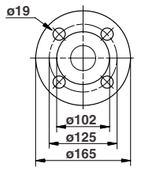
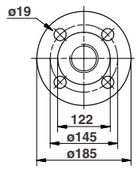
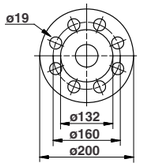
Electrical data, mains-operated motors

SNB, SNK, standard motor range, 2-pole

2 POLE MOTORS 50 Hz, 3x380x V STAR										
FRAME SIZE	RATED OUTPUT		RATED CURRENT	POWER FACTOR COSØ AT % LOAD			EFFICIENCY			RATED SPEED
	HP	kW	A	50%	75%	100%	50%	75%	100%	n
SMG 90	1.5	1.1	2.8	0.69	0.71	0.73	81	83	85	2940
SMG 90	2	1.5	3.3	0.76	0.78	0.80	81	83	85	2934
SMG 90	3	2.2	4.7	0.81	0.83	0.85	80	82	84	2880
SMG 100	4	3	6.2	0.85	0.87	0.89	82	84	86	2890
SMG 100	5.5	4	8.0	0.84	0.86	0.88	82	84	86	2930
SMG 132	7.5	5.5	10.9	0.82	0.84	0.86	85	87	89	2920
SMG 132	10	7.5	15.3	0.81	0.83	0.85	83	85	87	2917
SMMG 160	15	11	22.0	0.81	0.83	0.85	84	86	88	2929
SMMG 160	20	15	28.4	0.87	0.89	0.91	84	86	88	2911
SMMG 160	25	18.5	34.5	0.86	0.88	0.90	87	89	91	2938
SMMG 180	30	22	37.0	0.81	0.87	0.91	88	90	91	2935

Stainless steel pumps

Flanges for SNB and SNK stainless steel pumps are made of CI cast iron .
A set consists of one flange, one gasket of asbestos-free material and the requisite number of bolts, nuts and washer.

Flange	Flange size	Description	Rated pressure	Pipework connection
	DN 32	Threaded	16 bar, EN 1092-2	Rp 1¼
	DN 40	Threaded	16 bar, EN 1092-2	Rp 1½
	DN 50	Threaded	16 bar, EN 1092-2	Rp 2
	DN 65	Threaded	16 bar, EN 1092-2	Rp 2½
	DN 80	Threaded	16 bar, EN 1092-2	Rp 3