
WPS Stainless Steel Submersible Pumps 4" and 6"

Installation and Operation Instructions

WP/JVG/2. 1/01.01.04



ATTENTION

Before installation of the unit, the technical data quoted on the nameplates of pump and motor has to be copied onto the following table.

Nameplate of the pump	
Pump	Type: WPS _____ - _____
	Serial Nr.: _____
	Q _n : _____ m ³ /h
	H _n : _____ m
	n : _____ 1/min
Frequency: _____ Hz	
Motor	P _n : _____ kW
	T : _____ V
	I _n : _____ A
	Capacitor: _____ μF (*)

(*) only for 1~PSC motors

CONTENTS

	Page
1. General	3
2. Safety	3
3. Transport and interim storage	4
4. Description of product, accessories and installation data	4
5. Erection/Installation at site	7
6. Commissioning, start up/shutdown	10
7. Maintenance and repair	11
8. Trouble shooting	11
9. Nomenclature	13
10. Cable section	14

1. GENERAL

1.1. Applications

Submersible motor pumps are designed to pump clean or slightly contaminated water in general water supply systems, irrigation and sprinkling systems, in ground water lowering and in heat pump installations. Other applications include pressure raising, air conditioning, fountains, ... Especially suitable for installation in narrow deep wells.

1.2. Product details

The unit series and size, the most important operating data and the serial number are marked on nameplates on both pump and motor. We recommend that, before installation of the unit, the technical data quoted on the nameplates are copied onto the second page of this operating instructions.

1.3. Sound pressure level

The sound pressure level of WPS pumps with Franklin Electric motors is lower than 70 dB(A)

2. SAFETY

This operating instruction gives basic instructions, which are to be observed during installation, operation and maintenance. It is therefore imperative that these operating instructions be read and understood by both the service fitter and the responsible personnel / operator prior to erection and commissioning, and it shall at all times be available on the site of the machine.

2.1. Marking of safety instructions in the operating instructions.

Safety instructions given in these operating instructions whose non-observance may cause a hazard to persons, are specifically marked by the following symbols:



In case of **general warning**
(acc. To ISO 3864-B.3.1)



In case of warning of **electrical voltage**
(acc. To ISO 3864-B.3.6)



For safety instructions whose non-observance may cause **a danger to the machine and its function**

Non-compliance with safety instructions can jeopardise the safety of personnel, the environment and the machine itself. Non-compliance with these safety instructions will also lead to forfeiture of any and all rights to claims for damages.

In particular, non-compliance can, for example, result in:

- Failure of important machine/unit functions,
- Failure of prescribed maintenance and servicing practices,
- Hazard to persons by electrical, mechanical and chemical affects.

2.2. Personnel qualification and training

The personnel employed in operating, maintaining, inspecting and erecting the machine must be adequately qualified for this job. Responsibility, authority and supervision of the personnel must be exactly defined by the user. In the event of the personnel lacking the necessary knowledge, they should be trained and instructed. If required, this may be done by the manufacturer / supplier on behalf of the user of the machine. Moreover, the user should ensure that the intent of the operating instructions is fully understood by the personnel.

2.3. Safety instructions for maintenance, inspection and installation work

The user shall see that the above-mentioned work is performed by authorized and qualified specialists that have adequately acquainted themselves with the matter by thoroughly studying these operating instructions. As a general principle, work on the machine should be carried out only when the machine is at rest. It is imperative that the procedure for shutting down the machine as described in these operating instructions be followed.

Upon completion of the work, all safety and protection devices shall be re-installed and made operative again. Prior to re-commissioning, note the points mentioned in item «Commissioning».

2.4. Unauthorised modifications and manufacture of spare parts

Conversion work and alteration to the machine is permitted only upon consultation with the manufacturer. Using spare parts and accessories authorized by the manufacturer is in the interest of safety. Use of other parts exempts the manufacturer from any liability.

3. TRANSPORT AND INTERIM STORAGE



It is also pointed out in particular for horizontal transport (e.g. with a fork-lift), that the weight distribution of the pump and motor unit is very uneven. The heaviest point is usually in the area of the motor. If units are stored or placed vertically, secure properly against falling over.



When opening the package and when handling the unit, always ensure that the electrical connection cables are not damaged! In particular the electrical cables should never be pulled!

Any transport and handling of the unit must be carried out correctly. The motor pump WPS is supplied in packaging, which prevents flexing or other damage during transport and shelf storage. Prior to and during unpacking, please check that the packaging is not damaged or moist.

When the unit is temporarily stored it must be stored so that any flexing is avoided. In this process it must be taken measures to ensure that the cable at the outlet of cable guard are protected from folding / bending. The motor is filled with antifreeze and may therefore be stored and transported without risk at temperatures down to -30°C .



These instructions apply to WPS pump-end fitted with Franklin Electric submersible motors. If the pump is fitted with a motor of an other manufacturer, please note that the motor data may differ to the data stated in these instructions.

4. DESCRIPTION OF PRODUCT, ACCESSORIES AND INSTALLATION DATA

4.1. Assembly of the motor on the pump-end (see section 9 for the positions of the pump-end)

Check that the motor and the pump shaft turn free. Check that motor and pump mounting surfaces are clean and free of dirt for perfect alignment. Grease motor and coupling spline with water proof grease to minimize friction and to give additional protection against entry to abrasives

4.1.1 4" pumps.

4.1.1.1. Motor with lead without spliced connection.



Position the submersible motor with lead horizontally in a mechanic vice. The lead of the motor can be pushed through the suction interconnector, pos. 16, and under the cable guard, pos. 20, without slackening the nuts, pos. 22, or dismantling the

cable guard, pos. 20. Fit the motor on the suction interconnector, pos. 16, and tighten the nuts diagonally to a torque of 18 Nm.
The pump is now assembled, and it can be tested.

4.1.1.2. Motor with lead and drop cable with spliced connection.

Free the cable guard, pos. 20, by pushing it out of recess of the suction interconnector, pos. 16, by means of a screw driver and a plastic hammer. Push the cable guard, pos. 20, to the left and pull with a screw driver the right flaps of the cable guard over the left strap. Push the cable guard to the right and it will free.

ATTENTION Don't slacken the nuts, pos. 22, of the two straps near the cable guard. Fit the motor with cable on the suction interconnector, pos. 16, and tighten the nuts diagonally to a torque of 18 Nm. Align the cable in the cable guard, pos. 20, and slide it under the two straps, pos. 21, near the cable guard, pos. 20. Use if necessary a screwdriver and a plastic hammer. Push the flaps of the right side of the cable guard under the right strap near the cable guard. Push the cable guard, pos. 20, downward to the point where it's engaged in the suction interconnector, pos. 16.

ATTENTION Don't slacken the nuts, pos. 21, of the straps.
The pump is now assembled, and it can be tested.

4.1.2 6" pumps.

4.1.2.1. Motor with lead without spliced connection.

ATTENTION Position the submersible motor vertically. The lead of the motor can be pushed through the suction interconnector, pos. 12, and under the cable guard, pos. 16, without slackening the nuts, pos. 18, or dismantling the cable guard, pos. 16. Fit the motor on the suction interconnector, pos. 12, and tighten the motor screws or nuts diagonally to a torque of 100 Nm.

The pump is now assembled, and it can be tested.

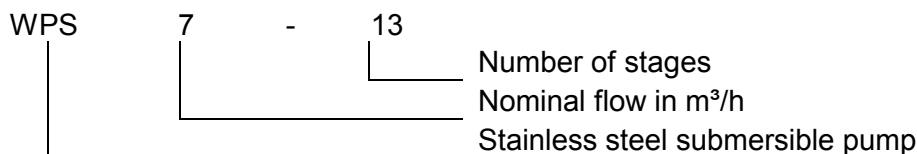
4.1.2.2. Motor with lead and drop cable with spliced connection.

Free the cable guard, pos. 16, by pushing it out of recess of the suction interconnector, pos. 12, by means of a screw driver and a plastic hammer. Push the cable guard, pos. 16, to the left and pull with a screw driver the right flaps of the cable guard over the left strap. Push the cable guard to the right and it will free.

ATTENTION Don't slacken the nuts, pos. 18, of the two straps near the cable guard. Fit the motor with cable on the suction interconnector, pos. 12, and tighten the motor nuts or screws diagonally to a torque of 100 Nm. Align the cable in the cable guard, pos. 16, and slide it under the two straps, pos. 17, near the cable guard, pos. 16. Use if necessary a screwdriver and a plastic hammer. Push the flaps of the right side of the cable guard under the right strap near the cable guard. Push the cable guard, pos. 16, downward to the point where it's engaged in the suction interconnector, pos. 12.

ATTENTION Don't slacken the nuts, pos. 18, of the straps.
The pump is now assembled, and it can be tested.

4.2. Designation (Example)



4.3. Dimensions and weights

The dimensions and weights of units are stated in the pump catalogue booklet.

4.4. Installation data

4.4.1. Location details

The WPS motor pump is ideal for vertical installation in small dimension deep wells or basins, vessels and shafts. Because it is maintenance-free and should only be operated when fully submersed, it does not require any special adaptation of buildings or rooms.

The maximum installation depth is 350 m, with respect to the stationary water level H_h and the lower edge of the motor. The water level in the well is usually determined with an electrical plumb line.

- | | |
|---------------------|--------------------------------|
| 1. submersible unit | D. I.D. of well |
| 2. riser pipe | T. depth of well |
| 3. support clamp | H_e . Installation depth |
| 4. electric cable | H_h . Stationary water level |
| 5. switching unit | H_t . Operating water level |

Note: $H_e - H_t \geq 0,5\text{m!}$

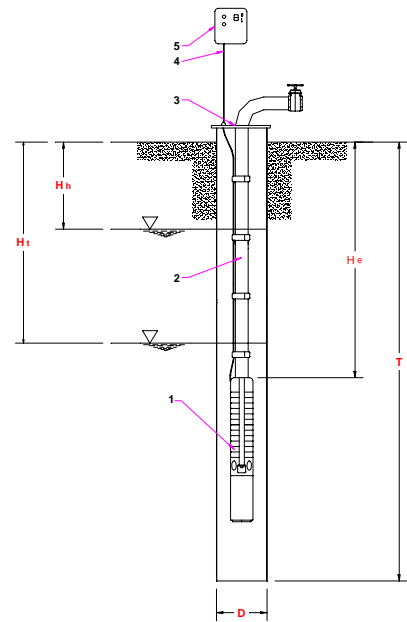


fig. 1: Vertical installation (e.g.: deep well)

This also applies to horizontal installation, mounted on pedestals, which we can also supply. Because pump and motor are delivered as a unit ready for installation, it is not necessary to align pump and motor at installation location. The foundation soil must be plane and must have a sufficient bearing capacity.

1. Submersible unit with cooling sleeve and adaptor
2. expansion joint
3. non return device
4. shut-off valve
5. drop cable
6. dry run protection
7. Switching unit

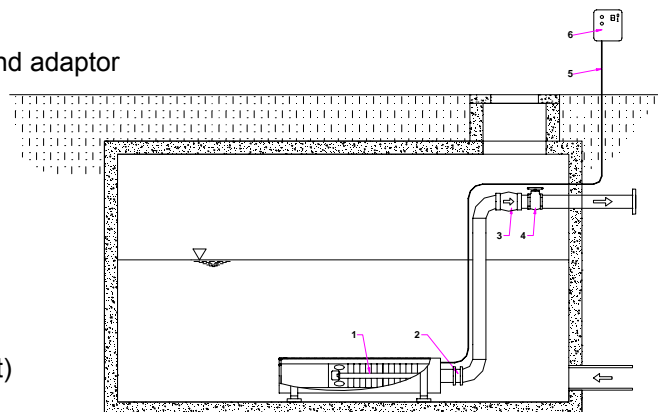


Figure 2: Horizontal installation (e.g.: tank or pit)

ATTENTION

We urgently recommend the installation of a dry-running protection unit to avoid damage in case of poor well output or where extreme water level fluctuations are possible.

ATTENTION

It is important to ensure that the unit is installed such that it doesn't sit on the base of the well and that the sanding and sludging cannot occur in the vicinity of the submersible motor. This would disrupt heat dissipation from the motor, possibly dangerously!

4.4.2. Water characteristics

The pump WPS is designed for use with water with the following characteristics:

- Temperature: up to + 30°C (for higher temperatures, please contact the producer),
- Sand content: up to maximum 50 g/m³,
- Aggressiveness: normal and slightly above.

4.4.3. Pump fluid requirements.

ATTENTION Submersible well pumps are designed for pumping clear, cold water; free of air or gasses. Decreased pump performance and life expectancy can occur if the water is not cold, clear or contains air or gasses.

Ensure that the requirement for minimum flow past the motor is met as shown in the table below.

Minimum flow required for motor cooling in water up to 30°C.		
Casing or sleeve I.D. [mm (inches)]	4" motor, cooling flow 8 cm/sec [m ³ /h]	6" motor, cooling flow 15 cm/sec [m ³ /h]
102 (4")	0,3	-
127 (5")	1,6	-
152 (6")	3,0	2,1
178 (7")	4,6	5,7
203 (8")	6,9	10,2
254 (10")	11,4	20,4
305 (12")	18,2	31,8

5. ERECTION / INSTALLATION AT SITE

ATTENTION During all installation procedures any open wells/vessels/basins/shafts must be secured to prevent falls!

5.1. Installation tools and Accessories

Proper installation of the WPS pump requires lifting gear (e.g. a derrick). The capacity of the gear must be greater than the weight of the pump unit plus pump riser pipes filled with water and the cable.

5.2. Motor filling

Motors are supplied from the factory filled with water + additive to prevent freezing. If the motor is older than 1 year (see date code), the filling level of the motor fluid has to be checked prior to installation.

5.3. Extending the electrical cables



Use of the cable connector delivered by us in swimming pools and garden ponds and their vicinity is only admissible if they are built in acc. with the current rule IEC 64 (CO) 124.

If necessary the short electrical cable lead can be extended using a waterproof cable connector, which we can supply on request. The connection must be executed in accordance with the instructions of the cable connector. When the extension cable is fitted special care must be taken to ensure that conductor colours are properly matched. Live-phase conductors are black (U), brown (V) and blue (W). The earth conductor is green / Yellow.

ATTENTION The electrician is solely responsible for choosing and dimensioning the cable. The minimum cross-section is specified according to IEC 364 (VDE 0298 part 4) or in table of section 10.

5.4. Protection against electric shock



Concerning the protection against electric shock (earthen) it must be observed the national rules if using any machines with live electric power.

The submersible motor has internal earthen as standard. The earth conductor is connected internally with the stator at the factory. A four conductor short cable with integrated earthing conductor protrudes from the motor. It is the responsibility of the user to ensure that the earthing

conductor is properly connected in the cable connector and is extended to the switching unit. IEC stipulates this type of earthing protection for accessible plant as a compulsory measure.

5.5. Installation at site

ATTENTION

During the entire installation procedure the electrical cable must be protected to prevent mechanical damage.

5.5.1. Vertical installation (e.g.: into a deep well)

5.5.1.1. Installation with threaded riser pipe

Procedure:

- the first pipe joint ($L \leq 2m$) is set into the pump end tightly and secured against loosening.
- The first pair of supporting clamps is attached to the first pipe joint immediately below the upper coupling.
- The WPS pump is then lifted by the first pair of supporting clamps with the block and tackle and lowered into the well until the pair of supporting clamps sits on the upper edge of the well.
- The second pipe joint, with the second pair of supporting clamps attached, is now made up.
- The first pair of supporting clamps on the first pipe joint are undone and the pump WPS is lowered until the second supporting clamps sit on top of the well edge.
- This step is repeated, pipe joint for pipe joint, until the unit is lowered into the well and installation depth H_e is reached.

5.5.1.2. Installation with plastic riser pipe

ATTENTION

In all cases check with the specifications of the pipe supplier.

If the pump WPS is to be installed with a plastic riser pipe an alternative is to lower the unit on two suitably dimensioned non-rusting cables attached to the discharge chamber.

5.5.2. Horizontal installation (e.g.: into a basin)

ATTENTION

It is important for pumps with high number of stages, to support the pump and motor at multiple points. If not it may result in oscillation which can damage the unit and the complete installation. To guarantee the necessary cooling of the electrical motor a cooling sleeve must be installed. (See 4.4.3.)

The pipe connected to the unit must then be laid out so that no pipe forces (weight, tension, vibrations, ...) can act on the unit. We recommend that a suitably dimensioned flexible expansion piece is installed between the unit and the pipe.

5.6. Fixing the electric cable to the riser pipe

During the installation into the well the electric cable should be fixed step by step to the riser pipe at appreciatively 3 meters intervals by a cable clip size 1, immediately before or after the flanges or couplings of the pipe. The cable clips must be tightened to ensure that the electric cable cannot slip downwards by its own weight.

5.7. Electrical connection (motor)



During the electric installation all pertinent national stipulations or IEC 64 should be observed.

5.7.1. General

- Compare existing mains voltage supply with the data on the nameplate on the motor.
- For motor protection we recommend a temperature compensated overcurrent relay.
- A fault current relay should, if provided, only be connected in the motor circuit.

5.7.2. Switching unit

Switching unit should always comprise of contactors with integrated motor protection (overcurrent relay), so that if necessary they can also be remote controlled by connecting pressure switches, float switches or similar. In this cases the overcurrent relay should be matched to the maximum operating current. An ammeter is also highly recommended.

5.7.3. Connecting of single phase

For connecting at power supply it is possible to use the switch device to be delivered by us. Additionally these motors need a starting device. Dependent on motor execution it must be distinguished as follows:

- | | |
|---------------------|----------|
| 1. motor | B: black |
| 2. starting device | Y: blue |
| 3. fuse | R: brown |
| 4. motor connection | |

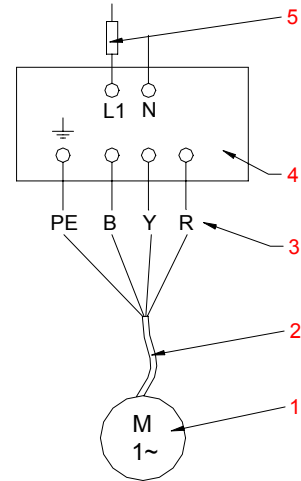


Figure 3: Cable arrangement for « 3-wire » motor for 0,37 – 3,7 kW / 50 Hz

5.7.4. Connection of three phase motors (3~)

In this case it is possible to use the motor contactor to be delivered by us. Connection is as per fig. 4.

- | |
|--------------------------------------|
| 1. motor |
| 2. power supply cable |
| 3. conductor designation |
| 4. starting device |
| 5. mains phases |
| PE. Earth conductor (yellow / green) |

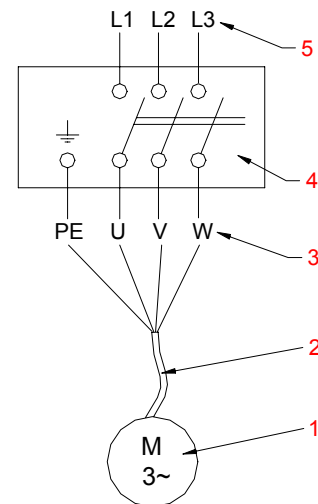


Figure 4: Cable arrangement for the 3-phase motors.

5.7.5. Current I_N

5.7.5.1. 4" motors

P_N [kW]		I_N [A]					
50 Hz	60 Hz	1 ~ (1)		3 ~			
		50 Hz 230 V	60 Hz 230 V	50 Hz 400 V	60 Hz		
					380 V	460V	
0,37	0,59	4,0	6,0	1,3	1,8	1,5	
0,55	0,81	6,0	8,0	1,7	2,3	1,9	
0,75	1,0	7,3	9,8	2,2	2,8	2,4	
1,1	1,4	8,9	11,5	3,2	3,6	3,0	
1,5	1,8	11,1	13,2	4,0	4,9	4,1	
2,2	2,5	15,9	17,0	5,9	6,5	5,4	
3	3,4	-	-	7,8	-	-	
3,7	4,2	22,7	27,5	9,5	10,7	8,9	
4	4,6	-	-	10,0	-	-	
5,5	6,4	-	-	13,7	15,7	13,0	
7,5	8,6	-	-	18,5	22,4	18,5	

(1) data for Franklin Electric 3 Wire motors

5.7.5.2. 6" motors

P _N [kW]		I _N [A] 3~		
50 Hz	60 Hz	50 Hz 400 V	60 Hz	
			380 V	460V
4,0	4,6	9,3	-	-
5,5	6,4	12,5	14,9	12,3
7,5	8,6	16,0	19,5	16,1
9,3	10,7	20,7	-	-
11	12,6	23,3	28,7	23,7
15	17,2	31,3	36,7	30,3
18,5	21,2	38,5	45,4	37,5
22	25,3	45,3	54,7	45,2
30	34,5	61,8	75,0	62,0
37	42,5	73,0	93,2	77,0
45	51,7	89,5	110,2	91,0

5.8. Protective equipment

5.8.1. *Dry-running protection*

A dry-running protection equipment is highly recommended in all situations where water level fluctuations are extreme or in wells which have often poor output levels.

5.8.2. *Lightning protection*

The lightning protection cannot offer protection against direct lightning strikes, but does screen against atmospheric overvoltage and against any near lightning strikes.

The installation and electrical connection should be carried out by the user as per instructions supplied and in accordance with any valid stipulations in each country.

6. COMMISSIONING, START UP/SHUTDOWN

6.1. Commissioning

6.1.1. *Check direction of rotation*

On single phase motors the direction of rotation is fixed and cannot be changed.

In order to check the correct direction of rotation the three phases motor is run in both directions with the gate valve closed. The direction of rotation is changed by swapping two phases of the power supply cable. In this procedure a manometer will show two different pressures. The higher pressure indicates the correct direction of rotation.

6.1.2. *Notes on initial start up (sand pumping)*

In the case of new wells, the WPS pump should be run for the first time 10 minutes with the gate valve only slightly open. This will ensure that no large amounts of sand are drawn in, which would overload the well and lead to increased wear of the pump. Then the gate valve can be opened slowly completely.

6.1.3. *Switching frequency*

In order to prevent the motor heating up too much, switching frequencies of greater than 20 cycles per hour should be avoided, or a minimum standstill period of appreciatively 3 minutes should be observed.

6.1.4. Operating with partially closed gate valves

Should it be necessary for some reason to run an submersible pump for longer periods with gate valves partially closed then in order to prevent unnecessary warming up of the motor a minimum pump capacity of 10 % of the pump output at maximum efficiency should be maintained. In the case of units with cooling jacket please contact the producer.

6.1.5. Operating with closed gate valves

The WPS pump should never be run for more than maximum 5 minutes against a closed gate valve. This would cause the water in the pump to warm up quickly and this heat would be transferred to the motor and hence to the motor winding and represents a hazard.

6.2. Operating limits

Operational safety requirements stipulate that the WPS pump may only be operated continuously within the pump output and pump head limits specified on the technical documentation.

6.3. Storage and preservation

In principle the pump WPS should be stored in vertical position, dry and protected against direct sunlight, heat and dust. If not possible, the unit must be placed to avoid flexing. The unit must be suitably supported to avoid flexing especially at centre coupling position. In this process it must be taken measures to ensure that the cable at the outlet of cable guard (pos. 22 for 4" and pos. 16 for 6") are protected from folding / bending. It is not necessary to preserve the unit specially.

6.4. Returning to service after storage

In the case of recommissioning (restarting after longer stand still times or removal) check that the pump data are still within the values quoted on the name plate.

7. MAINTENANCE AND REPAIR

The WPS pump is maintenance-free.

In order to pinpoint indications of potential damage early, we recommend that the current consumption and if possible the pump head are checked at regular intervals. It is not necessary to pull out the pump for regular inspection purposes.

8. TROUBLE SHOOTING

CAUSE

REMEDY

8.1. The pump fails to deliver or delivers insufficient liquid.

Discharge valve is closed.	Check the discharge valve
Reverse rotation (3~ only)	Change over two of the phase leads of the power supply cable
Water level in the well may be too low to supply the flow desired	Throttle pump outlet or reset the pump to lower level (never install the pump at the bottom of the well)
Selection of the wrong pump	Pull the pump and install the correct one following the well characteristics
Defective or clogged raiser pipe	Repair the raiser pipe
Clogged strainer of suction interconnector	Clean strainer of pump
Clogged pump or check valve	Pull the pump and repair it
Pump is operation at wrong speed (too low)	Check for low voltage and phase imbalance
There are leaks in the installation	Check the installation for leaks
Broken shaft or coupling	Pull the pump and inspect, replace if necessary

8.2. The pump delivers insufficient head.

Low water level in the well	Throttle the pump outlet or reset the pump at a lower level (never install the pump at the bottom of the well)
Pressure switch settings	Check settings on the pressure switch and examine for defects
Reverse rotation (3~ only)	Change over two of the phase leads of the power supply cable
There are leaks in the installation	Check the installation for leaks
Worn pump	Pull the pump and replace worn parts
Impellers are clogged	Pull the pump and inspect

8.3. The overcurrent relay responds.

The pump is silted up	Clean out the suction interconnector, the pump components and the check valve
Defective motor	Pull pump and repair motor
Wrong size of fuses	Fit a fuse of correct size
The motor is running on two phases only	Replace the defected fuse and check the cable connections

8.4. Pump starts too often.

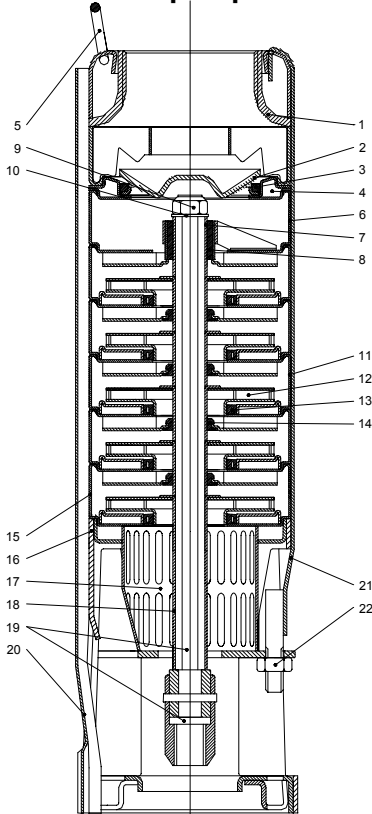
Pressure tank is too small	Replace the tank with one that has the correct size
There is insufficient air charging of the tank	Pump air into the tank or diaphragm chamber. Check the diaphragm for leaks.
Check valve	Replace if defective
Pressure switch	Check settings of the pressure switch and examine for defects

8.5. The pump runs rough and noisily.

Clogged pump	Pull the pump and repair it
Excessive amount of air or gas in the liquid pumped	Relieve air or gas from the water
Defective motor thrust bearing	Change thrust bearing
Defective radial bearing in pump	Change bearings
Vibration caused by the installation	Check and change the installation
Operation point of the pump out of the performance curve (« up-trust »)	Throttle pump outlet

9. NOMENCLATURE

9.1. 4" pumps



Part No.	Description
1	Discharge Camber
2	Valve Cone
3	Valve Seat
4	Retainer for Valve Seat
5	Hook
6	Top Diffusor
7	Spacer
8	Top Bearing
9	Nut M8
10	Washer
11	Diffusor
12	Impeller
13	Neck Ring
14	Intermediate Bearing
15	Bottom Diffusor
16	Suction Interconnector
17	Strainer
18	Spacer
19	Shaft with Nema coupling
20	Cable Guard
21	Strap
22	Nut M8

Fig 5: WPS 1,5 – WPS 2,5 – WPS 4 – WPS 7

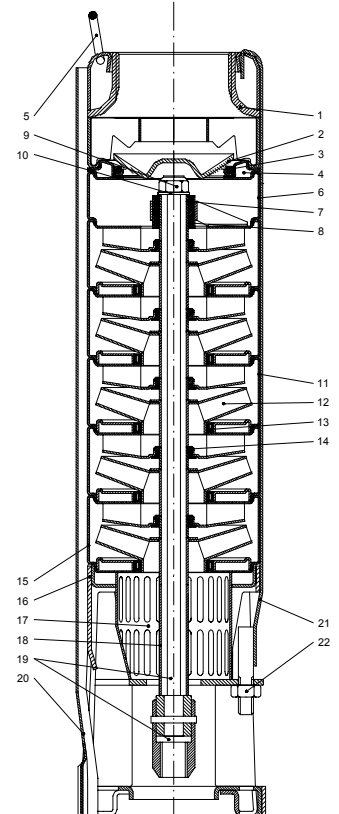


Fig 6: WPS 12

9.2. 6" pumps

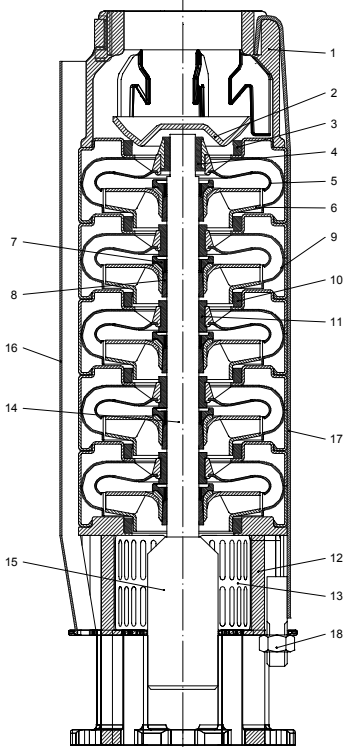


Fig 8. WPS 16

Part No.	Description
1	Discharge Camber
2	Valve Cone
3	Valve Seat
4	Top Bearing
5	Top Diffusor
6	Impeller
7	Split Cone Nut
8	Split Cone
9	Diffusor
10	Neck Ring
11	Intermediate Bearing
12	Suction Interconnector
13	Strainer
14	Shaft
15	Coupling
16	Cable Guard
17	Strap
18	Nut M12

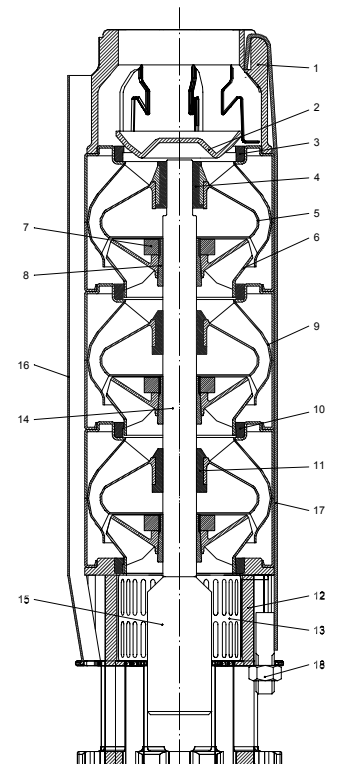


Fig 9. WPS 30 – WPS 45

10. CABLE SELECTION

Cable for submersible motors must be suitable for submerged operation, and adequate in size to operate within rated temperature and maintain adequate voltage at the motor.

10.1. 4" submersible motor

10.1.1. Single phase motor maximum cable length copper cable

Motor Rating			Cable Size [mm ²]					
Volts	kW	HP	1,5	2,5	4	6	10	16
230 Volt	0,25	1/3	170	280	450	670	1130	1750
	0,37	1/2	120	200	320	480	810	1260
	0,55	3/4	80	130	220	320	550	850
	0,75	1	60	100	170	250	430	670
50 Hz	1,1	1 1/2	40	70	120	180	300	470
	1,5	2	30	60	90	130	230	360
	2,2	3	20	40	60	90	150	230
	3,7	5	0	20	40	60	100	160

10.1.2. Three phase motor

Motor Rating			Cable Size [mm ²]						
Volts	kW	HP	1,5	2,5	4	6	10	16	
230 Volt	0,37	1/2	270	450	720	1080	1840	2860	
	0,55	3/4	180	300	490	730	1250	1940	
	0,75	1	140	230	370	550	940	1460	
	1,1	1 1/2	90	160	250	380	650	1010	
	1,5	2	70	120	190	290	500	780	
	2,2	3	50	80	130	200	340	540	
	50 Hz	3,0	4	40	60	100	150	260	410
		3,7	5	30	50	80	120	210	330
		4	5 1/2	30	50	70	110	190	300
		5,5	7 1/2	0	30	60	90	150	230
7,5	10	0	0	40	70	110	180		
380- 415 Volt	0,37	1/2	810	1350	2160	3240	5500	8530	
	0,55	3/4	550	920	1480	2230	3780	5860	
	0,75	1	410	680	1090	1640	2780	4330	
	1,1	1 1/2	300	500	810	1210	2060	3200	
	1,5	2	220	370	590	880	1500	2340	
	2,2	3	150	250	400	600	1030	1600	
	50 Hz	3,0	4	110	190	310	460	790	1230
		3,7	5	90	150	240	370	630	980
		4	5 1/2	80	140	230	340	590	920
		5,5	7 1/2	60	110	170	260	440	690
7,5		10	50	80	130	200	340	530	

10.2. 6" submersible motor

10.2.1. DOL or auto-transformer start

Motor Rating			Cable Size [mm ²]														
Volts	KW	HP	1,5	2,5	4	6	10	16	25	35	50	70	95	120	150	185	240
230 Volt 50 Hz	4	5½	20	30	40	70	120	180	280	380	530	720	900	1120	1300	1550	1870
	5,5	7½	0	20	30	50	90	140	210	290	410	550	700	860	1010	1200	1460
	7,5	10	0	0	30	40	70	110	160	220	310	430	540	670	780	940	1140
	9,3	12½	0	0	20	30	60	80	130	180	260	340	430	530	620	740	900
	11	15	0	0	0	30	50	70	110	150	210	290	360	450	530	640	770
	15	20	0	0	0	0	40	50	80	110	160	220	270	340	400	480	580
	18,5	25	0	0	0	0	30	40	70	90	130	170	220	270	320	380	460
	22	30	0	0	0	0	0	40	60	80	110	150	190	230	270	320	400
380-415 Volt 50 Hz	4	5½	50	80	140	210	350	550	840	1150	1600	2160	2710	3340	3890	4640	5590
	5,5	7½	40	60	100	160	270	450	630	870	1220	1650	2080	2560	3000	3580	4340
	7,5	10	30	50	80	120	200	320	480	670	930	1270	1610	1990	2330	2800	3400
	9,3	12½	0	40	60	90	160	250	390	530	740	1010	1270	1580	1850	2210	2680
	11	15	0	30	50	80	140	220	330	450	630	860	1090	1350	1590	1900	2310
	15	20	0	0	40	60	100	160	250	340	480	650	820	1020	1190	1430	1740
	18,5	25	0	0	0	50	80	130	200	270	380	520	650	810	950	1140	1390
	22	30	0	0	0	40	70	110	170	230	320	440	560	690	810	980	1190
	30	40	0	0	0	0	50	80	120	170	240	320	410	500	590	710	850
	37	50	0	0	0	0	0	60	100	140	190	260	330	410	480	570	690
45	60	0	0	0	0	0	0	80	110	160	220	280	340	400	480	580	

10.2.2. Star-Delta start

Motor Rating			Cable Size [mm ²]														
Volts	kW	HP	1,5	2,5	4	6	10	16	25	35	50	70	95	120	150	185	240
230 Volt 50 Hz	4	5½	30	50	70	120	200	300	450	650	900	1240	1500	1900	2200	2600	3200
	5,5	7½	20	30	50	80	130	210	320	440	610	830	1050	1290	1510	1810	2180
	7,5	10	10	20	40	60	100	160	240	340	470	640	810	1000	1170	1400	1710
	9,3	12½	0	20	30	50	80	130	190	270	370	510	640	790	930	1110	1340
	11	15	0	20	30	40	70	110	170	230	320	430	550	680	800	950	1180
	15	20	0	0	20	30	60	80	120	170	240	330	410	510	600	720	870
	18,5	25	0	0	20	30	50	60	100	140	190	260	330	410	480	570	700
	22	30	0	0	0	20	40	50	80	110	160	220	280	350	410	490	590
	30	50	0	0	0	20	30	40	60	90	120	160	200	250	300	350	430
37	60	0	0	0	0	0	30	50	70	100	130	170	200	240	290	350	
380-415 Volt 50 Hz	4	5½	80	130	240	350	600	900	1400	1900	2700	3700	4600	5500	6500	8000	9500
	5,5	7½	60	100	160	240	400	620	950	1310	1830	2470	3110	3850	4500	5380	6510
	7,5	10	40	90	120	180	310	460	730	1000	1400	1910	2410	2980	3500	4200	5100
	9,3	12½	40	80	100	140	240	380	580	800	1120	1520	1910	2370	2770	3320	4020
	11	15	30	50	80	120	210	320	490	680	950	1300	1640	2030	2380	2850	3470
	15	20	20	40	60	90	160	240	370	510	720	970	1230	1520	1790	2140	2510
	18,5	25	0	30	50	70	120	190	300	410	570	780	980	1220	1430	1710	2080
	22	30	0	30	40	60	110	170	250	350	490	680	840	1040	1230	1470	1790
	30	40	0	0	0	50	80	120	190	260	360	490	610	760	890	1060	1280
	37	50	0	0	0	0	80	100	150	210	290	490	500	610	720	850	1040
45	60	0	0	0	0	50	80	120	170	240	330	410	510	600	720	860	



WELL PUMPS S.A.
Z.I. de Fleurus
Avenue de Lambusart 18
B-6220 Fleurus
Belgium

Tel : + 32 71 46.07.83
Fax : + 32 71 46.07.71
e-mail : info@wellpumps.be
site : www.wellpumps.be
