WELL PUMPS®

GB

3”WPS® Stainless Steel Submersible Pump

Installation and Operation Instructions

WP/JVG/1.0/01.06.10

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:	3"WPS -	
	Serial Nr.:		
	Q_n:		m^3/h
	H_n:		m
	Frequency:	140	Hz
Motor	P_n:		kW
	T :	1~230	V
	I_n:		A

CONTENTS

1. GENERAL

1.1. Applications

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

1.2. Product details

The pump type 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 3"WPS® pump 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)

ATTENTION

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.

To improve immunity to the possible noise radiated on other equipments, we recommend to power the 3"WPS® pump with a separate wire. In some cases an extra noise filter must be mounted.

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. 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. DECLARATION OF CONFORMITY

The company Well Pumps S.A. under its own exclusive responsibility declares that the products 3"WPS® comply with:
Directive on Electromagnetic Compatibility and subsequent modifications CE 2004/108 .
Directive on Low Voltage and subsequent modifications 2006/95 CE.
RoHS Directives 2002/95/CE
WEEE directives 2002/96/CE
Machinery Directives 2006/42 CE
Conformity to the following CE regulations :
CE EN 61000-3-2 (2002/04), CEI EN 61000-3-3 (1997/06), CE EN 60335-1 (2004/04), CE EN 60335-1 (2004/04)

4. 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.

ATTENTION 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 3"WPS® pump 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. The pump may be stored and transported without risk at temperatures down to –20°C and up to +60°C.

5. DESCRIPTION OF PRODUCT, ACCESSORIES AND INSTALLATION DATA

5.1. Introduction

The 3"WPS® pumping system is a residential water supply system that uses advanced electronics based on inverter-based technology, to enhance the performance of the pump. Moreover, depending on the conditions and usage needs of the hydraulic system, the pump is turned on or off when malfunction conditions are managed.
Key features:

- Gradual pump start and stop reduces hammering, no in-rush current
- Built-in protection features:

- Dry well conditions, with automatic reset
- Over current
- Open motor circuit, short circuit
- Internal overheating of the controller
- Low line voltage (activation at approximately 160 Volt)
- High line voltage (activation at approximately 260 Volt)
- Lightning, electrical motor cycling and sudden changes in power supply

ATTENTION In a domestic environment this product may cause radio interference in which case supplementary mitigation measures may be required

5.2. Designation (Example)

3"WPS® 3 - 80

- 80 — Nominal pressure in m
- 3 — Nominal flow in m³/h
- 3"WPS® — 3" Stainless steel submersible pump

5.3. Technical features

	3"WPS® with 600W motor	3"WPS® with 900W motor	3"WPS® with 1500W motor
Power supply voltage	200-230 V single phase toll:200-10%/230+10% 50/60Hz	200-230 V single phase toll:200-10%/230+10% 50/60Hz	200-230 V single phase toll:200-10%/230+10% 50/60Hz
Minimum voltage	160 V	160 V	160 V
Maximum voltage	260 V	260 V	260 V
Pump motor type	600W, 1x220V,140Hz	900W, 1x220V, 140Hz	1500W, 1x220V, 140Hz
Maximum current to the motor	12 A	12 A	15 A
Maximum fluid temperature	35°C		
Maximum pump diameter	78 mm		
Outlet of the pump	Rp1 ¼" female		

5.4. Installation data

5.4.1. Location details

The 3"WPS® 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 150 m, with respect to the stationary water level Hh and the lower edge of the motor. The water level in the well is usually determined with an electrical plumb wire.

1. submersible unit
2. riser pipe
3. support clamp
4. electric cable

D. I.D. of well
T. depth of well
He. Installation depth
Hh. Stationary water level
Ht. Operating water level

Note: He – Ht ≥ 0,5m!

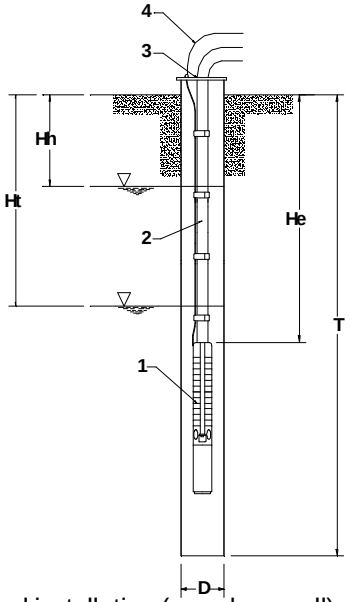


fig. 1: Vertical installation (e.g.: deep well)

ATTENTION The 3"WPS® pump should always be installed above the well screen. If a cooling sleeve is used, the pump may be installed freely in the borehole.

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!

This also applies to horizontal installation, mounted in cooling sleeve with supports, 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 supports
2. expansion joint
3. spring loaded non return valve
4. shut-off valve
5. drop cable

Note: the 3"WPS® pump has to run at least 0,5m below the dynamic water level.

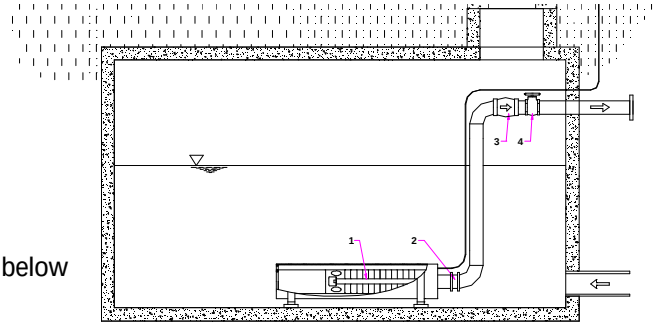


Figure 2: Horizontal installation (e.g.: tank or pit)

When the 3"WPS® pump is installed in an horizontal position, an extra spring loaded check valve must be mounted (see fig 2). In fact controller starts and stops the pump in a 'soft mode'. This way the internal check valve of the pump will not always close properly.

ATTENTION In case the pump is installed in an open tank, it's important to mount a cooling sleeve in order to assure the cooling of the submersible motor and thus prevent from burning. In case there is a risk that the pump might be covered with dirt and mud, the pump must always have a cooling sleeve with a floating screen. These sleeves are available in the Well Pumps programm.

5.4.2. Hydraulic connections

All 3"WPS® pumps have a treaded female connection, Rp 1 ¼".

5.4.3. Water characteristics

The pump 3"WPS® is designed for use with water with the following characteristics:

- Temperature: up to + 35°C (for higher temperatures, please contact the producer),
- Sand content: maximum 50 gr/m³
- Aggressiveness: normal and slightly above.

5.4.4. 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 of 8 cm/s past the motor is met. Also see the table below.

Minimum flow required for motor cooling in water up to 30°C.	
Casing or sleeve I.D. [mm (inches)]	3" motor, cooling flow 8 cm/sec [m³/h]
78 (3")	0,2
102 (4")	1,1
127 (5")	2,4
152 (6")	4,0

In case a minimum flow of 8 cm/s past the motor is not feasible, a range of cooling shrouds are available to ensure the correct cooling. Please contact Well Pumps S.A. for more information.

6. ERECTION / INSTALLATION AT SITE

ATTENTION

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

6.1. Extending the electrical cable to the pump

3"WPS® pumps can be supplied with different cable lengths without any connection (2m, 15m, 30m, 40m, 50m or 60m). In case the drop cable has to be extended, please use the Well Pumps submersible cable joint kit. For more information, please contact Well Pumps S.A..

ATTENTION Chose the correct cross-section of the drop cable in order to meet with the voltage requirements measured at the motor terminals. (+/-10% of the nominal voltage during continuous operation including variation in the supply voltage and losses in cables). The electrician is solely responsible for choosing and dimensioning the cable. The minimum cross-section is specified in table below.

Maximum cable length for specific cable section at supply 240V with 4% voltage drop in accordance with IEC 60364:2001.

Motor size	1,5 mm²	2,5 mm²	4 mm²	6 mm²
600 W	70 m	120 m	180 m	270 m
900 W	50 m	80 m	125 m	190 m
1500 W	35 m	60 m	90 m	140 m

6.2. 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 three conductor cable including integrated earthen conductor protrudes from the motor. It is the responsibility of the user to ensure that the earthen conductor is properly connected in the cable connector and is extended to the switching unit. IEC stipulates this type of earthen protection for accessible areas as a compulsory measure.

6.3. Installation at site

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

ATTENTION When the riser pipe is fitted to the pump, the pump may only be gripped at the discharge chamber.

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

6.3.1.1. 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 3"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 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 He is reached.

6.3.1.2. Installation with plastic riser pipe

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

If the pump 3"WPS® is to be installed with a plastic riser pipe an alternative is to lower the unit on a suitably dimensioned non-rusting cables attached to the discharge chamber.

ATTENTION Do not lower or lift the pump by means of the electrical wire!

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

ATTENTION To guarantee the necessary cooling of the electrical motor a cooling sleeve must be installed.

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.

6.4. 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 and 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.
Some slackness must be left between each cable clip as plastic pipes are used because plastic pipes expand when loaded.

If the motor cable is damaged, it must be replaced.

6.5. Electrical connection

DANGER! Electrical shock risk.
Before carrying out any installation or maintenance operation, the 3"WPS® pump should be disconnected from the power supply and one should wait at least 5 minutes before starting any action. During the electric installation all pertinent national stipulations or IEC 64 should be observed.

The 3"WPS® motor incorporates a thermal overload protection and requires no additional motor protection.
The motor also has an integrated starter device and can therefore be connected direct to the mains.

Start/Stop of the pump will typically be done via a pressure switch. This switch has to be rated for the maximum amps of the specific motor size.

If the pump is connected to an electric installation where an earth-leakage circuit breaker (ELCB) is used as an additional protection, this circuit breaker must trip out when earth fault currents with DC content (pulsating DC) occur.

6.6. Sizing of the diaphragm tank and setting of the precharge pressure.

ATTENTION The installation must be designed for the maximum pump pressure. In case the maximum possible pump pressure is higher than the maximum allowed operating pressure of the accessories of the installation, a safety valve must be installed protecting the accessories from overpressure.

Since the 3"WPS® pump has a built in soft starting device giving a run-up time of 2 seconds, the pressure on the installation during starting (=P_{min}) will be lower than the pump cut-in pressure (= $P_{cut\text{-}in}$, is start pressure set on the pressure switch).

In order to size the minimal volume of the diaphragm tank, you need to know the P_{min} and the maximum flow that is needed for the installation (= Q_{max}). In the table below the minimum tank size together with its pre-charge pressure (= P_{pre}) and the cut-in/cut-out pressure of the pressure switch (= $P_{cut\text{-}in}$ and $P_{cut\text{-}out}$) can be found by introducing P_{min} and Q_{max}.

Pmin	Qmax [m³/h]															Ppre	Pcut-in	Pcut-out
	0,6	0,8	1	1,2	1,5	2	2,5	3	3,5	4	4,5	5	5,5	6	6,5			
[m]	Diaphragm tank size [litres]															[m]	[m]	[m]
25	8	8	18	18	18	18	24	33	33	50	50	50	50	80	80	22	26	40
30	8	8	18	18	18	24	33	33	50	50	50	50	80	80	80	27	31	45
35	8	18	18	18	18	24	33	33	50	50	50	80	80	80	80	31	36	50
40	8	18	18	18	18	24	33	50	50	50	80	80	80	80		36	41	55
45	8	18	18	18	24	33	33	50	50	50	80	80	80			40	46	60
50	18	18	18	18	24	33	50	50	50	80	80	80				45	51	65
55	18	18	18	18	24	33	50	50	50	80	80					50	56	70
60	18	18	18	24	24	33	50	50	80	80						54	61	75

7. COMMISSIONING, START UP/SHUTDOWN

7.1. Commissioning

7.1.1. Notes on initial start up (sand pumping)

In the case of new wells, the 3"WPS® pump should be run for the first time 10 minutes without stopping 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.

7.1.2. Operating with closed gate valves

The 3"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.

7.2. Operating limits

Operational safety requirements stipulate that the 3"WPS® pump may only be operated continuously within the pump output and pump head limits specified on the technical documentation. To ensure cooling of the motor, a flow of minimum 60 l/h must be pumped.

7.3. Built-in protections

The 3"WPS® motor has an integrated electronic module which protects the motor for various situations.

- Overload: The pump has an extra feature that automatically reduces the speed of the pump when overload occurs. Lower speed means lower power and thus reduction of the absorbed amps. In the case the pump is running at 70Hz and still overloading, the pump will stop and automatically restart after one hour.
- Dry-run: The 3"WPS® motor includes a built-in controller that is factory-set with a cut-out power ($P_{cut\text{-}out}$) and which continuously tracks the absorbed power of the pump. In case of lack of water in the borehole, the absorbed power by the pump will be reduced below the $P_{cut\text{-}out}$. Consequently the pump will be stopped and thus preventing the motor from burnout. The pump will automatically restart after 20 minutes which gives time to the well to recover. In case of a second dry run, the pump will restart after 45 minutes. At the third run, the pump will wait for 6 hours and the fourth time for 24 hours before restart. If dry run still persists, the pump goes in permanent error. Resetting can be done by taking off the supply from the motor for one minute.

- Overvoltage and undervoltage: this protection cuts out the pump when the voltage at the entry of the motor falls below 160V or over 260V. The motor will automatically restart as soon as the supply voltage is re-established within the permissible voltage range.
- Lightning: a surge arrestor is built in the motor and is designed to protect from damaging effects of spikes and transients caused by lightning, electrical motor cycling or any other sudden change in electrical power flow on the supply line.
- Over temperature: the motor will reduce in speed as soon as the internal temperature in the motor reaches over 80°C. This way the absorbed power will be reduced and consequently the dissipated heat of the motor will be reduced. In case that at 70Hz the temperature is still not reduced, the pump will be shut off and automatically restarted after the temperature cooled down.

Resetting of the pump can be done by switching off the electrical supply for one minute a part of over temperature error occurs.

7.4. Storage and preservation

In principle the 3"WPS® pump should be stored in vertical or horizontal 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 is protected from folding/bending. It is not necessary to preserve the unit specially.

7.5. 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.

8. MAINTENANCE AND REPAIR

The 3"WPS® unit 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.

The motor plug must under no circumstances be removed by the user.

ATTENTION All repair has to be done by qualified persons. The service and repair manual is available on request.

9. TROUBLE SHOOTING

Before starting any work on the pump, be sure the electrical supply has been switched off.

ATTENTION Megging of the 3"WPS® motors is not allowed as the built-in electronics may be damaged.

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

Discharge valve is closed.	Check the discharge valve
Selection of the wrong pump; water too low in the well.	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
There are leaks in the installation	Check the installation for leaks
Pump is defective	Pull the pump and inspect, replace if necessary

9.2. The pump delivers insufficient head.

Low water level in the well	Pull the pump and install the correct one following the well characteristics. (never install the pump at the bottom of the well)
Pressure settings	Check settings on the pressure switch and change
There are leaks in the installation	Check the installation for leaks
Worn pump	Pull the pump and replace worn parts
Impellers are clocked	Pull the pump and inspect

9.3. Pump doesn't run.

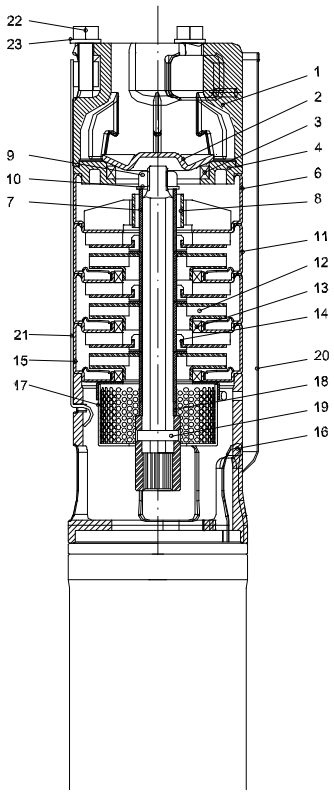
Fuses in the electric installation are blown	Replace the blown fuses.
The ELCB or the voltage-operated ELCB has triped out	Cut in the circuit breaker
No electrical supply	Contact the electricity supplier
The motor protection has cut off the supply due to overload	Check whether the pump is blocked
The pump or drop cable is defective	Repair or replace the pump or cable
Overvoltage or undervoltage has occured	Check the electricity supply

9.4. Frequent start and stop.

The differential of the pressure switch is too small	Increase the differential. The stop pressure should not exceed the operation pressure of the pressure tank, and the start pressure should be high enough to ensure sufficient water supply.
The check valve is leaking or stuck half-open	Pull the pump and clean the check valve
The supply voltage is unstable	Check the electricity supply

10. NOMENCLATURE

The pump



Part No.	Description
1	Discharge Camber
2	Valve Cone
3	Valve Seat
4	Retainer for Valve Seat
6	Top Diffusor
7	Spacer
8	Top Bearing
9	Self Locking 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 coupling
20	Cable Guard
21	Strap
22	Bolt M6
22	Washer

WELL PUMPS

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