

# $\star$ Electro submersible pumps



SD-SDP-SDF-SDX-SDS

OPERATING INSTRUCTIONS

made for your process

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SUMMARY

1.	GENERAL INFORMATION	8		
2.	TECHNICAL DESCRIPTION	9		
3.	TECHNICAL FEATURES	9		
4.	SAFETY	9		
5.	TRANSPORTATION AND HANDLING	10		
6.	INSTALLATION	10		
7.	STARTUP AND OPERATION	11		
8.	MAINTENANCE	12		
9.	DISPOSAL	12		
10.	SPARE PARTS	12		
11.	DESIGNATION OF PARTS	12		
12.	TROUBLESHOOTING	13		
Drawing for dismantling and assembly6				
Declaration of conformity79				

#### **GENERAL INFORMATION**

Before using the product carefully read the information contained in this instruction manual, the manual should be kept for future reference.

Italian is the original language of this instruction manual, this language is the reference language in case of discrepancies in the translations.

This manual is part of the essential safety requirement and must be retained until the product is finally decommissioned.

The customer, in case of loss, can request a copy of the manual by contacting Calpeda S.p.A. or their agent, specifying the type of product data shown on the label of the machine (see 2.3 Marking)

Any changes, alterations or modifications made to the product or part of it, not authorized by the manufacturer, will revoke the "CE declaration" and warranty.

This appliance should not be operated by children younger than 8 years, people with reduced physical, sensory or capacities, inexperienced or people who are not familiar with the product, unless they are given close supervision or instructions on how to use it safely and are made aware by a responsible person of the dangers its use might entail. Children must not play with the appliance.

It is the user's responsibility to clean and maintain the appliance. Children should never clean or maintain it unless they are given supervision.

Do not use in ponds, tanks or swimming pools or where people may enter or come into contact with the water.

Read carefully the installation section which sets forth:

- permissible - The maximum structural working pressure (chapter 3.1).
- The type and section of the power cable (chapter 6.5).

  - The type of electrical protection
- to be installed (chapter 6.5).

#### 1.1. Symbols

To improve the understanding of the manual, below are indicated the symbols used with the related meaning



Information and warnings that must be observed, otherwise there is a risk that the machine could damage or compromise personnel safety.



The failure to observe electrical information and warnings, could damage the machine or compromise personnel safety.



Notes and warnings for the correct management of the machine and its parts.



Operations that could be performed by the final user. After carefully reading of the instructions, is responsible for maintenance under normal conditions. They are authorized to affect standard maintenance operations.



Operations that must be performed by a qualified electrician. Specialized technician authorised to affect all electrical operations including maintenance. They are able to operate with in the presence of high voltages.



Operations that must be done performed by a qualified technician. Specialized technician a qualified technician, oppositions able to install the device, under normal conditions, working during "maintenance", and allowed to do electrical and mechanical interventions for maintenance. They must be capable of executing simple electrical and mechanical operations related to the maintenance of the device.



Indicates that it is mandatory to use individual protection devices.



Operations that must be done with the device switched off and disconnected from the power supply.



Operations that must be done with the device switched on.

#### 1.2. Manufacturer name and address

Manufacturer name: Calpeda S.p.A. Address: Via Roggia di Mezzo, 39 36050 Montorso Vicentino - Vicenza / Italia www.calpeda.it

#### 1.3. Authorized operators

The product is intended for use by expert operators divided into end users and specialized technicians. (see the symbols above).



It's forbidden, for the end user, carry out operations which must be done only by specialized technicians. The manufacturer declines any liability for damage related to the non-compliance of this warning.

#### 1.4. Warranty

For the product warranty refer to the general terms and conditions of sale.



The warranty covers only the replacement and the repair of the defective parts of the goods (recognized by the manufacturer).

The Warranty will not be considered in the following cases:

- Whenever the use of the device does not conform to the instructions and information described in this manual.
- In case of changes or variations made without authorization of the manufacturer.
- In case of technical interventions executed by a non-authorized personnel.
- In case of failing to carry out adequate maintenance.

#### 1.5. Technical assistance

Any further information about the documentation, technical assistance and spare parts, shall be requested from: Calpeda S.p.A. (paragraph 1.2).

#### 2. TECHNICAL DESCRIPTION

Submersible borehole pumps for 4" wells (DN 100 mm), 6" wells (DN 150 mm), 8" (DN 200 mm) and 10" (DN 250 mm).

Delivery casing with built-in non-return valve.

#### 2.1. Intended use

- For clean or slightly dirty water with maximum sand content: 150 g/m³ (50 g/m³ for SDX), (300 g/m³ for HIGH SAND versions).
- Water temperature up to 25 °C (35 °C for 4").

#### 2.2. Improper use

The device is designed and built only for the purpose described in paragraph 2.1.

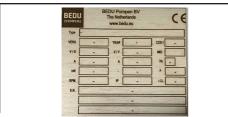


Improper use of the device is forbidden, as is use under conditions other than those indicated in these instructions.

Improper use of the product reduces the safety and the efficiency of the device, Calpeda shall not be responsible for failure or accident due to improper use.

#### 2.3. Marking

The following picture is a copy of the name-plate (see Pic.1) that is on the external case of the pump.



#### 3. TECHNICAL FEATURES

#### 3.1. Technical data

Dimensions and weight (see technical catalogue). Nominal speed 2900/3450 rpm

Protection IP X8

Supply voltage / Frequency:

- up to 240V 1~ 50/60 Hz - up to 480V 3~ 50/60 Hz

Maximum permissible working pressure:

SDP	300 m (30 bar)
SD,SDX,SDN,SDF	400 m (40 bar)
SDS	500 m (50 bar)
SDXL	700 m (70 bar)

Maximum suction pressure: PN (Pa) - Hmax (Pa). Max. starts per hour: (see instruction motor).

#### 4. SAFETY

#### 4.1. General provisions



Before using the product it is necessary to know all the safety indications.

Carefully read all operating instructions and the indications defined for the different steps: from transportation to disposal.

The specialized technicians must carefully comply with all applicable standards and laws, including local regulations of the country where the pump is sold.

The device has been built in conformity with the current safety laws. The improper use could damage people, animals and objects.

The manufacturer declines any liability in the event of damage due to improper use or use under conditions other than those indicated on the name-plate and in these instructions.



Follow the routine maintenance schedules and the promptly replace damaged parts, this will allows the device to work in the best conditions.

Use only original spare parts provided from Calpeda S.p.A or from an authorized distributor.



Don't remove or change the labels placed on the device.

Do not start the device in case of defects or damaged parts.



Maintenance operations, requiring full or partial disassembly of the device, must be done only after disconnection from the supply.



Pollution of the liquid could occur due to leakage of lubricants.

#### 4.2. Safety devices

The device has an external case that prevents any contact with internal parts.

#### 4.3. Residual risks

The appliance, designed for use, when used inline with the design and safety rules, doesn't have residual risks.

#### 4.4. Information and Safety signals

For this kind of product there will not be any signals on the product.



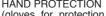
4.5. Individual protection devices

During installation, starting and maintenance it is suggested to the authorized operators to consider the use of individual protection devices suitable for described activities.

During ordinary and extraordinary maintenance interventions, where it is required to remove the filter, safety gloves are required.



individual protection device HAND PROTECTION



(gloves for protection against chemical, thermal and mechanical risks).

#### TRANSPORTATION AND HANDLING

The product is packed to maintain the content intact. During transportation avoid to stack excessive weights. Ensure that during the transportation the box cannot move.

It is not necessary to use any special vehicle to transport the packaged device.

The transport vehicles must comply, for the weight and dimensions, with the chosen product (see technical catalogue dimensions and weights).

#### 5.1. Handling

Handle with care, the packages must not receive impacts.

Avoid to impact onto the package materials that could damage the pump.

If the weight exceeds 25 Kg the package must be handled by two person at the same time.

#### INSTALLATION

#### 6.1. Dimensions

For the dimensions of the device refer to the annex "Dimensions" (paragraph 12.1 Annexes).

#### 6.2. Ambient requirements and installation site dimensions

The customer has to prepare the installation site in order to guarantee the right installation and in order to fulfill the device requirements (electrical supply,

It's Absolutely forbidden to install the machine in an environment with potentially explosive atmosphere.

#### 6.3. Unpacking



Inspect the device in order to check any damages which may have occurred during transportation.

Package material, once removed, must be discarded/ recycled according to local laws of the destination country.

#### 6.4. Installation

Along its entire length the well diameter must be wide enough to allow for passage of the pump with clearance all round.

#### 6.4.1. Pipes

When threaded connections are used, delivery pipes must be tightened to avoid any risk of the pump falling into the well owing to unscrews.

It is advisable to connect the metal pipes to the threaded joints with spot welding.

With **plastic pipes** use proper connections.

The SD, 6SDX-series pumps have two holes in the delivery casing for anchoring and for raising the pump. A safety rope or chain of non-perishable material should always be used to secure the pump.

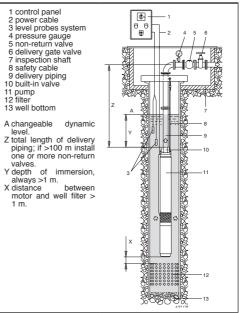
Attach the power supply cables to the delivery pipe with cable clamps placed at intervals of approx 3 m. Lower the pump into the well, making sure the feed cables are not damaged in any way during the operation.



Never use the electric power cable to suspend the pump.

When the pump is operating, the delivery connection must be submersed at least 1 m below the deepest dynamic level of the well; for this purpose, it is advisable to install an automatic control system which will stop operating of the pump when the level of the water falls below this limit.

Position the pump at a distance from the bottom of the well which will be sufficient to avoid accumulation of sand or mud around the motor and to eliminate the risk of overheating.



#### 6.4.2. Delivery pipe

The following components must be installed in the delivery pipe:

- · a pressure gauge;
- a check valve at max. 7 m from the pump outlet and more lift-type check valves (5), depending on the type of installation (at least one every 50 m in the straight vertical pipe above the pump), to provide protection against water hammering;
- · a gate valve to regulate delivery, head and absorbed power.

#### 6.4.3. Installed in the horizontal position

- if the submersible pump is to be installed in the horizontal position, the following instructions must be followed:
- install the pump with its axis placed at least 0,5 m above the bottom of the sump, tank or container;

- install a supplementary check valve, as the pump valve does not ensure a perfect seal in the horizontal position;
- the plant must allow for easy evacuation of the air when starting.

#### 6.4.4. Motor cooling

If the well (or tank) has a diameter which is considerably greater than the pump width, it is necessary to install a cooling flow shroud (a flow inducer sleeve), that is an external jacket to ensure a sufficient flow and water velocity to cool the motor (see instruction motor).

#### 6.4.5. Assembly of the pumps

The pumps are normally supplied with motor and pump disconnected (except 4SD(F)(P) already assembled).



Connect the coupling and pump-motor suction lantern. Clean the surface to be coupled. Put the suction lantern of the pump in correspondance of the motor studs. Couple the grooved joint of the

pump to the motor shaft.

Screw in the nuts to the suction lantern, then fix them crosswise starting from the one opposed to the cable as shown in the figure below. The torque recommended is 10Nm (for 4" motors).

Attach the cable to the pump with the cable guard and place the filter on the suction lantern.

Follow separate operating instructions (if available) of the motor.

#### 6.5. Electrical connection



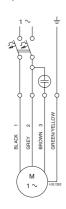




Electrical connection must be carried out only by a qualified electrician in accordance with local regulations. Follow safety standards.

The unit must be properly earthed (groun-ded), also with a non-metallic delivery pipe.

Make sure the frequency and mains voltage correspond with the name plate data.



Electrical diagram single-phase motors

The control panel must contain:

- a device for disconnection from the mains (switch) with a contact separation of at least 3 mm in all poles;
- an adequate motor protector with curve D for the current indicated on the name-plate;
- a capacitor for the SDM singlephase pumps, in accordance with the data indicated on the motors themselves.

For use in swimming pools (not when persons are in the pool), garden ponds and similar places, a residual current device with IΔN not exceeding 30 mA must be installed in the supply circuit.

For pumps with power rating above 11 kW, it is advisable to provide the control panel with Y/  $\Delta$  or impedance starting.

Install electrodes to protect the pump against dry running.

#### 6.5.1. Connection of cables

Feed cables have to be chosen on the basis of power, distance, voltage drop and temperature. For connection of cables in the well, use thermoshrinking insulation sheathes or other systems used for submerged cables.

Before lowering the motor into the well, use appropriate instruments to measure continuity between phases and perform an isolation test between each single phase and the earth conductor.

#### 6.5.2. Operation with frequency converter

Adjust the frequency converter so that the limiting values of min. 30 Hz and max. 60 Hz will not be exceeded.

The maximum running up time from 0 to 30 Hz and running down time from 30 to 0 Hz for frequency-converter operation is 1 second.

#### 7. STARTUP AND OPERATION

# 7.1. Preliminary checks before start-up of the pump

Do not start-up the device in case of damaged parts.

#### 7.2. First starting







ATTENTION: never run the pump dry, not even for a short trial run.

Start the pump with the gate valve regulated to minimum aperture and wait until the delivery pipe is completely free of air.

With a three-phase motor make sure the direction of rotation is correct.

For this purpose, with the gate valve at half-open aperture position, check the pressure (with the pressure gauge) or flow rate (sight check) after starting. Switch off power, reverse the connections of two phases on the control panel, re-start and check the pressure or flow rate capacity again.

The correct direction of rotation will provide a considerably greater and easily distinguishable pressure and delivery capacity.

Make sure the sand residue present in the water disappeares or is minimal.

Never start or run the pump when the gate valve has been opened too widely.

Make sure the pump operates within its rated limits of performance and that the rated absorbed current is not exceeded.

Otherwise, regulate the delivery gate valve or the setting of any pressure switches.

ATTENTION: avoid long periods of operation with closed discharge.

#### 7.3. Generator supply

The switching sequence is of utmost importance. If you do not apply this correctly, both motor and generator may be damaged. Therefore:

- Always switch the generator on and off without load!
   This means:
- Starting: aiways switch the generator ON first and the motor afterwards!
- Stopping: always switch the motor OFF first and the generator afterwards!

#### 7.4. Switch off of the pump







The appliance must be switch off every time there are faults. (see troubleshooting).

The product is designed for a continuous duty, the switch off is performed by disconnecting the power supply by means the expected disconnecting devices. (see paragraph "6.5 Electrical connection").

#### MAINTENANCE

Before any operations it's necessary to disconnect the power supply. Disconnect electrical power before any servicing operation.



If the supply cord is damaged, it must be replaced by the manufacturer, its service agent or similarly qualified persons in order to avoid a hazard.

Maintenance operations that are not described in this manual must be made only by special personnel authorized by Calpeda S.p.A.

For further technical information regarding the use or the maintenance of the device, contact Calpeda S.p.A.

#### 8.1. Routine maintenance





Absorbed current and head supplied by the pump must be checked at regular intervals.

This procedure should be carried out frequently when water contains considerable quantities of sand. In the case of emergency systems, it is advisable to operate the pumps once a month in order to avoid the risk of blocking and to maintain and verify perfect efficiency.

#### DISPOSAL







**European Directive** 2012/19/EU (WEEE)

The final disposal of the device must be done by specialized company.

Make sure the specialized company follows the classification of the material parts for the separation. Observe the local regulations and dispose the device accordingly with the international rules for environment protection.

#### 10. SPARE PARTS

#### Spare-parts request

When ordering spare parts, please quote their designation, position number in the cross section drawing and rated data from the pump name plate (type, date and serial number)

The spare parts request shall be sent to CALPEDA S.p.A. by phone, fax, e-mail.

#### 11. DESIGNATION OF PARTS

Nr. Part designation

10.16 Gasket

12.01 Delivery casing

12.02 Bush casing

12.03 Bearing sleeve (stationary part)

12.04 Valve ğuide 12.05 Circlip

12.06 Valve seat

12.08 Lower bush casing

12.10 Valve set

12.12 Valve joint

12.16 Plug

12.20 Screw 12.30 Stage bearing sleeve

12.31 Bearing sleeve (rotating part)

13.12 Counterflange, delivery side

13.13 Flange gasket, delivery side 13.16 Screw

14.02 External jacket

14.54 Wear ring 14.55 Adapter ring

14.96 Coupling 14.97 External jacket 15.20 Screw

15.50 Strainer

25.02 Stage casing 25.04 Gasket

25.06 Screw

26.00 Diffuser (pump)

26.02 Diffuser plate

26.08 Diffuser sleeve

26.10 Conveyor ring 26.20 Adapter ring

28.00 Impeller

28.02 Counter thrust bearing ring

28.04 Impeller nut (or screw)

28.05 Circlip 28.07 Washer

28.08 Washer

28.20 Impeller key

28.24 Locking sleeve

32.02 Suction lantern 34.02 Upper cover

46.50 Sand guard

61.02 Tie-bolt

61.04 Nut

64.00 Pump shaft

64.01 Pump shaft

64.03 Washer

64.04 Retaining ring

64.08 Shaft sleeve 64.09 Bearing sleeve

64.10 Bearing sleeve

64.13 Upper spacer sleeve

64.14 Lower spacer sleeve 64.15 Intermediate spacer sleeve

64.18 Spacer sleeve 64.19 Spacer sleeve

64.20 Key for shaft end

64.21 Coupling 64.22 Coupling, set

64.23 Washer

64.24 Shear pin 64.25 Screw

64.26 Adapter thickness

70.13 Washer

70.19 Nut

70.20 Screw

96.00 Cable

96.04 Cable guard

96.08 Clamp 96.09 Screw

99.00 Complete motor

Changes reserved.

#### 12. TROUBLESHOOTING





WARNING: Turn off the power supply before performing any operations.

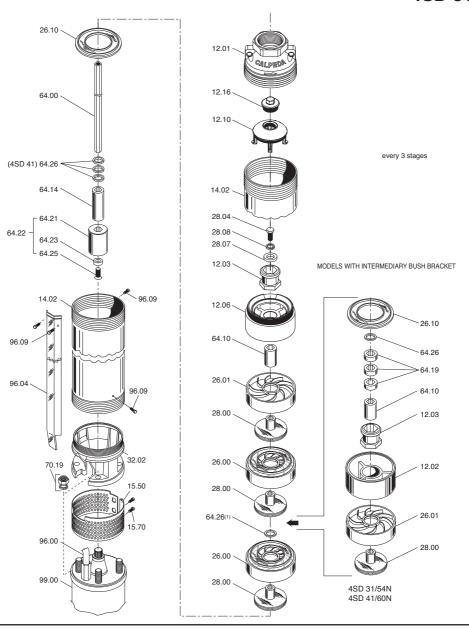
Do not allow the pump or motor to run when dry even for a short period

Strictly follow the user instructions and if necessary contact an authorised service centre

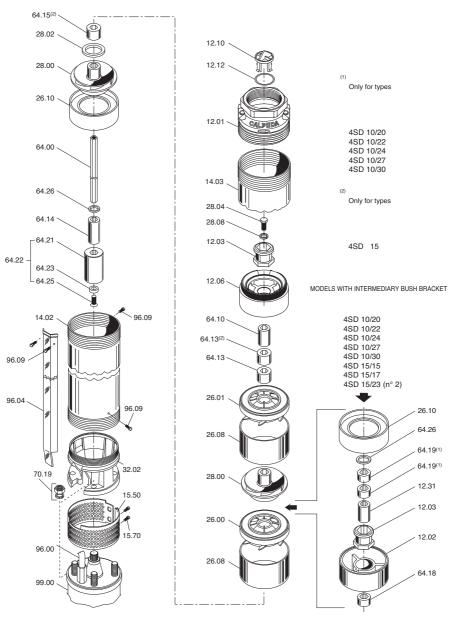
ΕN

PROBLEM	PROBABLE CAUSES	POSSIBLE REMEDIES
1) The motor does not start	1a) Unsuitable power supply     1b) Incorrect electrical connections     1c) Engine overload protective device cuts in.     1d) Blown or defective fuses     1e) Shaft blocked     1f) If the above causes have already been checked, the motor may be malfunctioning	1a) Check that the mains frequency and voltage correspond to the electrical characteristics shown on the indicator plate. Make sure that the cross section of the cable is compatible with the length of cable and with the motor power.  1b) Check that the power cable is correctly connected with the control panel.  1c) Check that the thermal overload protection is set correctly (see data on the motor name-plate) and make sure that the fuseboard upline of the motor has been properly connected. Check that the isolation of the motor with the cable is inside the values indicated in the instruction manual. See also 1a)  1d) Replace the fuses, check the electric power supply and points a) and c)  1e) Extract the pump, remove and clean the suction filter check that motor and pump turn freely. If the rotation of the pump and/or the motor is prevented, contact an authorised service centre.  1f) Repair or replace the motor by contacting an authorised service centre
2) The pump functions but no water comes out	Check that the valves are open and not blocked     Delivery casing obstructed or check-valve blocked     Suction valve closed     Pump suction filter obstructed     Pump installed above the surface of the liquid (dry functioning)     Direction of rotation incorrect	2a) Dismantle the check valve on the delivery pipe and release the valve, if necessary replace it.  2b) Extract the pump and, if necessary, contact an authorised service centre to replace the check valve.  2c) Open the suction valve  2d) Extract the pump, remove and clean the suction filter and if necessary replace it.  2e) Increase the depth of installation of the pump as far as compatible with pump performance. Do the same if the problem is due to a lowering of the water table  2f) Invert the electrical connections from the motor to the power supply terminal
3) Insufficient flow	3a) Pipes and accessories with diameter too small causing excessive loss of head 3b) Presence of deposits or solid bodies in the internal passages of the rotor and/or in the diffusers 3c) Delivery valve or check valve on the delivery pipe obstructed by solid bodies. 3d) Pump check valves obstructed by solid bodies 3e) Rotors deteriorated 3f) Worn rotors and diffusers 3g) Excessive lowering of the dynamic level of the well 3h) Incorrect direction of rotation 3i) Leaking from delivery pipe 3l) Presence of dissolved gases in the water	3a) Use pipes and accessories suitable for the specific application 3b) Extract the pump and contact an authorised service centre. 3c) Dismantle the valve and the check valve and clean them. 3d) Extract the pump and clean them. 3d) Extract the pump and clean the check valve, if necessary, contact an authorised service centre. Clean the suction filter. 3e) To replace the rotors contact an authorised service centre 3f) Contact an authorised service centre to replace the rotors and the sealing rings of the diffusers, or diffusers themselves if worn 3g) Increase the depth of immersion of the pump as far as compatible with pump characteristics, reduce the flow requested by narrowing the suction valve. Pump too big for the dynamic level of the well 3h) See 2e) 3i) Locate the points in which the delivery pipe is leaking, if located in the vertical section of the well, extract the pump and repair the pipe as needed. 3l) Contact an authorised service centre.
4) Noise and vibrations from the pump	5a) Rotating part unbalanced 5b) Impellers that slides on the diffusers 5c) Pump and pipes not firmly attached 5d) Flow too strong for the diameter of the delivery pipe 5e) Unbalanced power supply	5a) Check that no solid bodies are obstructing the rotor. Contact an authorised service centre to check the pump shaft sleeves conditions.  5b) If the thrust bearing of the motor and/or the pump shaft sleeves are worn, contact an authorised service centre.  5c) Anchor the delivery and suction piping as needed  5d) Use bigger diameters or reduce the pump flow  5e) Check that the mains voltage is correct
5) The pump starts and stops repeatedly	5a) Pump with excessive flow 5b) Repeated interventions of the thermal protection 5c) Leakages on the system	5a) Partially close the delivery valve to reduce flow. The pump may be oversized compared with the dynamic level of the well.  5b) Measure the current absorption. If necessary, properly calibrated overload protection. Remove the pump and make sure the pump shaft or the motor shaft turn freely. See also the case 1e).  5c) Check the leakage of the system and seal or replace the leaking parts.

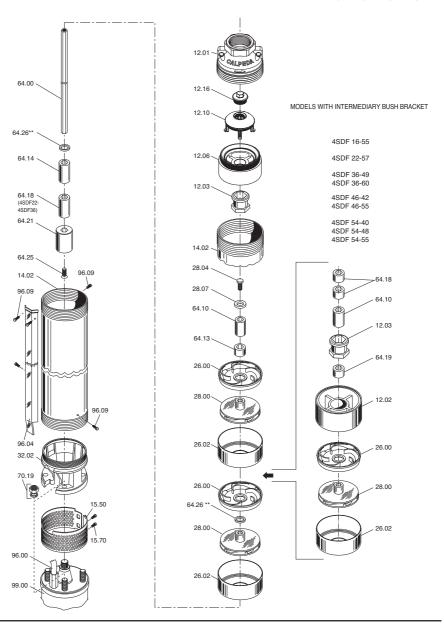
# 4SD 31



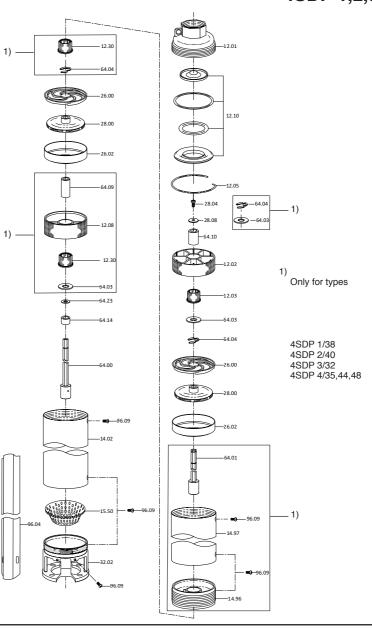
# 4SD 10,15



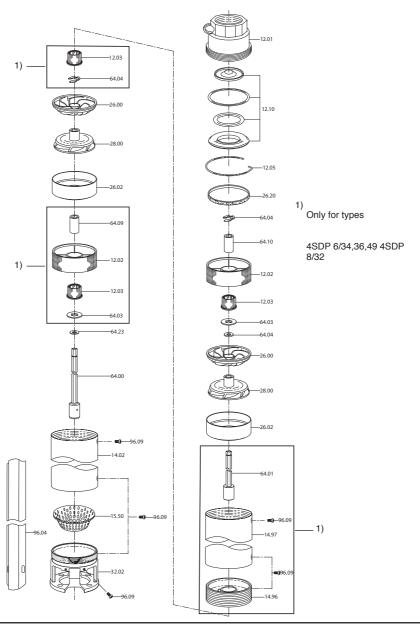
# 4SDF 16,22,36,46,54



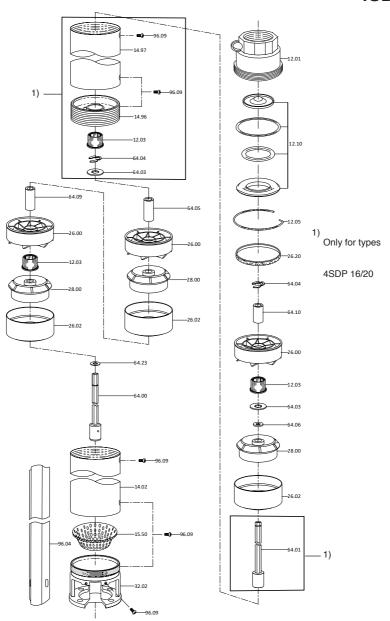
# 4SDP 1,2,3,4



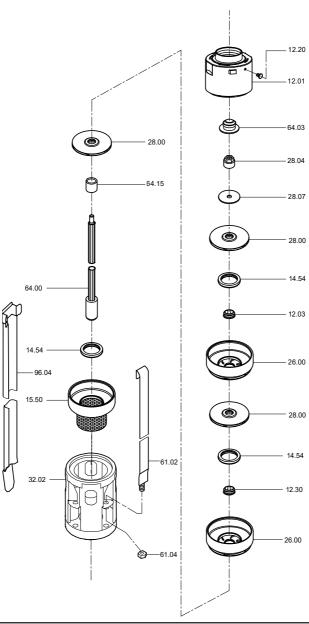
# 4SDP 6-8



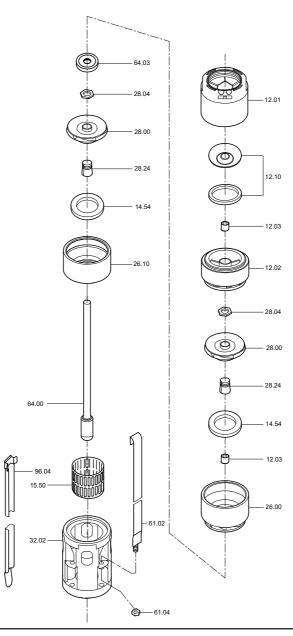
# **4SDP 16**



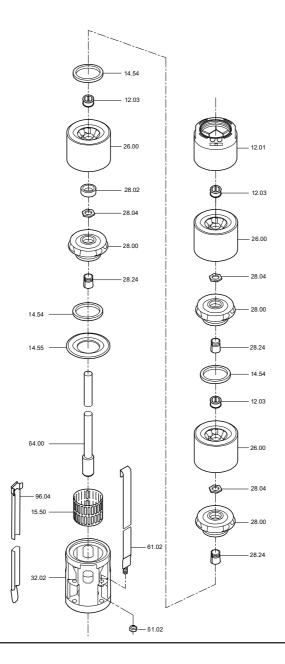
# 4SDX 1-2-3-5



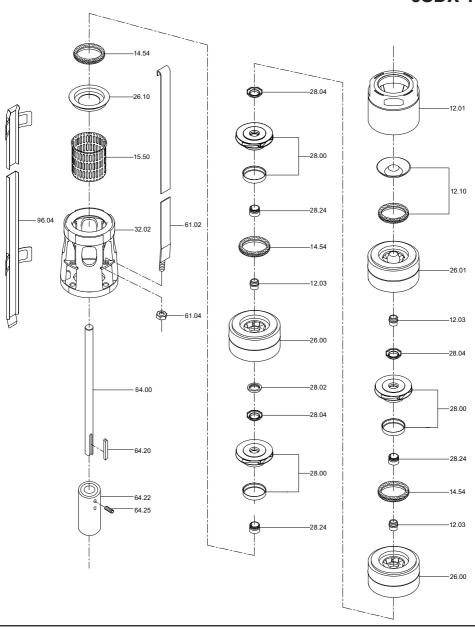
# **4SDX 8**



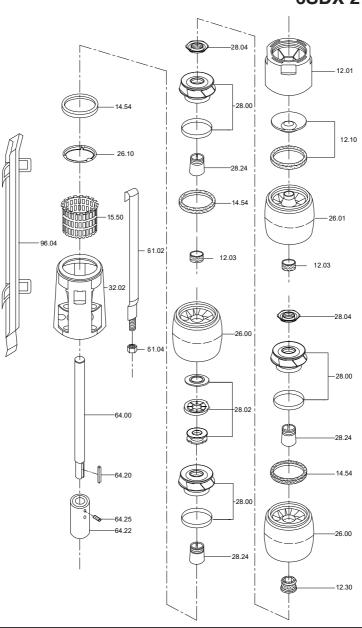
# 4SDX 12



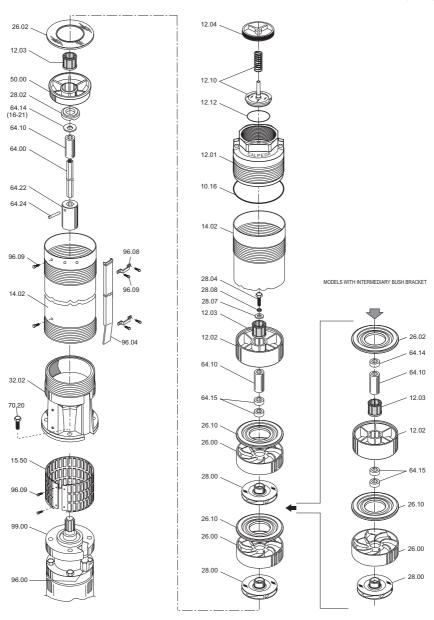
# 6SDX 16



# 6SDX 27-45-60

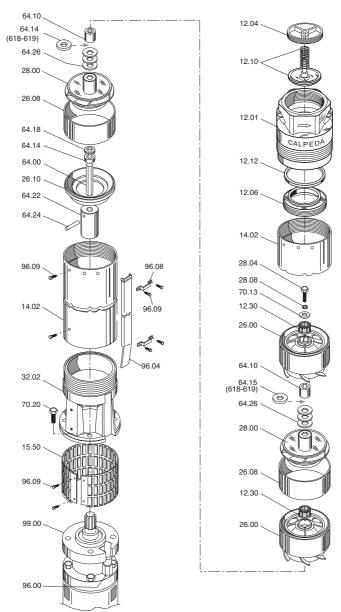


# 6SDN 12,16,21



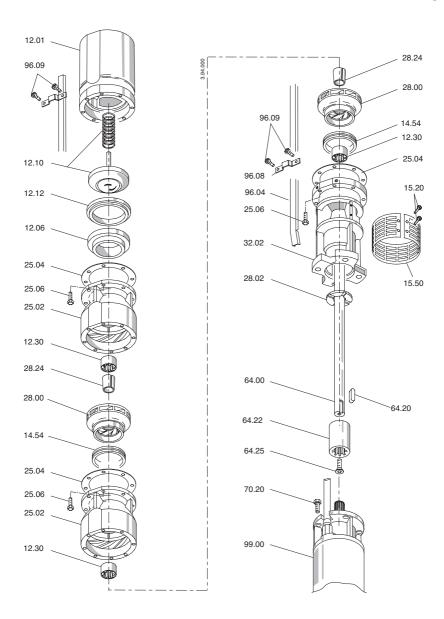
#### 13.

# 6SD 18,19,20

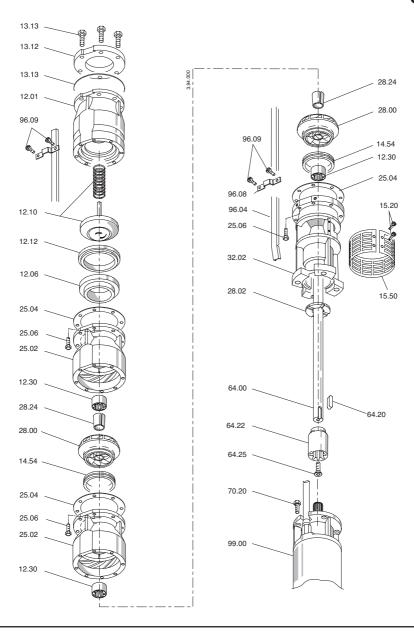


6SDX 13,18,27 6SDX 30,46,65 8SDX 78,97 12.01 12.10 25.06 12.05 12.12 12.06 12.06 28.04 25.06 34.02 64.10 28.04 64.10 34.02 25.05 64.13 12.12 64.10 64.10 28.04 12.10 28.08 64.10 28.22 28.24 28.25 28.00 14.54 26.01 14.54 64.00 12.30 14.54 26.00 26.00 26.00 28.24 12.03 26.02 64.00 28.00 64.00 12.30 28.24 28.54 28.02 14.02 28.24 28.00 28.02 25.01 -28.54 26.08 28.02 25.06 -50.00 25.06 34.00 26.01 14.03 96.09 64.22 25.01 64.14 96.04 15.50 34.00 96.09 15.50 -64.22 32.02 64.22 96.09 15.50 96.04 32.02 32.02

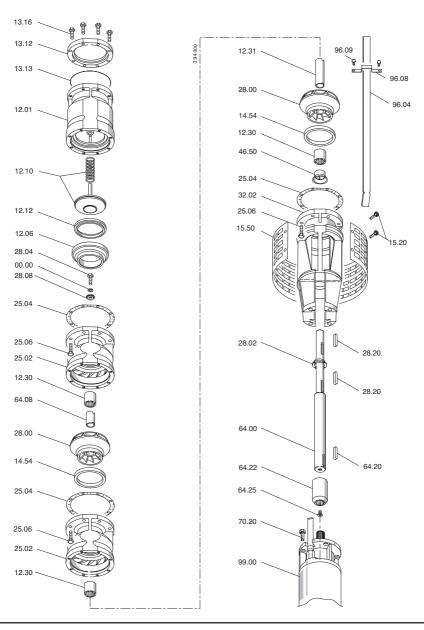
# 6SDS



# 8SDS



### **10SDS**





# EC - Declaration of Conformity

#### Manufacturer Details

Tradename

Bedu Pompen BV

Address

Poort van Midden Gelderland Rood 10, 6666 LT, Heteren, Netherlands

**Product Details** 

**Product Name** 

Deepwell pumps

Model (+series) Name SD, SDP, SDF, SDX, SDS

### **Applicable Standards Details**

Directives

2006/42/EC (Machinery Directive) 2014/35/EU (Low Voltage Directive) 2014/30/EU (Electromagnetic compatibility)

#### Additional information

No further details.

#### Declaration

We hereby declare under our sole responsibility that the product(s) mentioned above to which this declaration relates complies with the above mentioned standards and Directives.

### BEDU Pompen BV

Poort van Midden Gelderland Rood 10

6666 LT Heteren

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#### **Standards**

EN-ISO 12100:2010 EN-IEC 60204-1:2006 EN 809+A1/C1

**Business Unit Manager**: Issued Date:

**O1/10**/ 2014

Marco Breunissen

Signature of representative(s)



# made for your process

- Expert advice
- A customer-oriented organization that adapts to the requirements and wishes of your organization
- Innovative and customized solutions
- Breakdownservice, 24 hours a day, 7 days a week

- Technical service with extensive test facilities, working from our own workplace or at your location
- A fast and appropriate solution for all your issues
- Wide range of liquid pumps
- Repair, maintenance and revision

BEDU POMPEN B.V.

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