Vertical immersible multi-stage centrifugal pumps

Installation and operating instructions

Serie: VCI

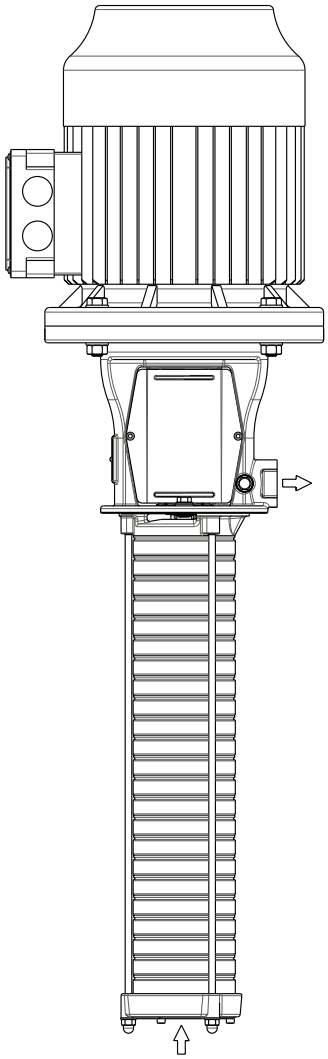


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1 Manual Introduction

1.1 Preface

This manual contains important information for reliable, proper and efficient operation. Compliance with the operating instructions is of vital importance to ensure reliability and a long service life of the product and to avoid any risks.
The first chapters contain information about this manual and safety in general. The following chapters provide information about normal use, installation, maintenance and repairs of the product. The annex contains the declaration(s) of conformity.

- Make yourself familiar with the content.
- Accurately follow the directions and instructions.
- Never change the sequence of the operations to be carried out.
- Keep this manual or a copy of it together with the logbook in a fixed place near the product which can be accessed by all personnel.

1.2 Icons and symbols

In this manual and in all accompanying documentation the following icons and symbols are used.



WARNING
Danger of electric Voltage. Safety sign according to IEC 417 - 5036



WARNING
Operations or procedures, if carried out without caution, may cause personal injury or damage to the product. General hazard sign according to ISO 7000-0434



ATTENTION
Is used to introduce safety instructions whose non-observance may lead to damage to the product and its functions.



ENVIRONMENTAL INSTRUCTION
Remarks with respect to the environment.

2 Identification, service and technical support

2.1 Obtaining data and information

The name plate indicates the type series / size, main operating data and identification number. Please quote this information in all queries, repeat orders and particularly when ordering spare parts. If you need any additional information or instructions exceeding the scope of this manual or in case of damage please contact DP-Pumps's nearest customer service centre.

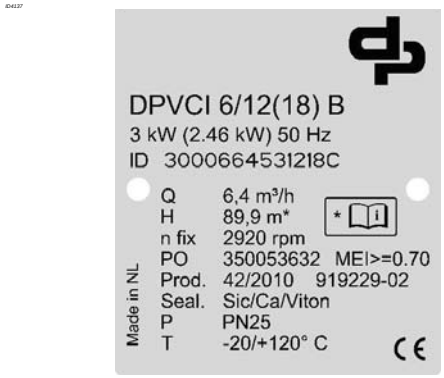


Figure 1: Pump with motor

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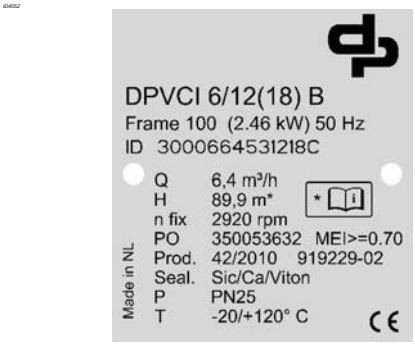
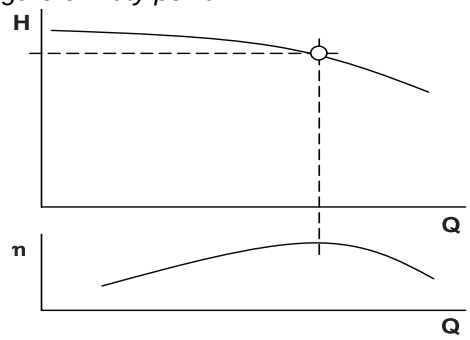


Figure 2: Pump without motor

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Figure 3: Duty point



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Table 1: Description sticker

Indication		Meaning
DPVCI 6/12(18) B		Model key (design version B)
3 kW (2.46 kW)		Nominal motor power[1] (required power)
Frame	100	Frame size
50 Hz		Nominal frequency
ID	3000664531218C	Article number
Q	6.4 m^3/h	Optimum capacity running at fixed speed (see fig. Duty point)
H	89.9 m	Optimum heads running at fixed speed (see fig. Duty point)[2]
n fix	2920 rpm	Rotation speed indication at which Q/H are given
PO	350053632	Production order number
Prod.	WW/YYYY XXXXXX-XX	Production week/year and production serial number
Seal	SiC/Ca/Viton	Mechanical Seal Surface Code, See: 2.2 Seal codes
P_{max}.	PN25	Pressure Class
T_{max}.	-20/+120°C	Maximum pressure at mentioned temperature[3]
MEI	>=0.70	Minimum Efficiency Index

1. Frame size in case without motor
2. Empty stages will reduce the pressure
3. at lower pressure a higher temperature is allowed (please consult your supplier)

The following address data are available for service and technical support:

DP-Pumps **service department** Kalkovenweg 13 2401 LJ Alphen a/d Rijn The Netherlands	Tel: +31 172 488388 Fax: +31 172 468930 Internet: www.dp-pumps.com E-mail: dp@dp-pumps.com

2.2 Seal codes

Table 2: Material code shaft seal

Code acc. to EN 12756	Description	Material		Note
B Q1 U3	Spring loaded ring	Carbon graphite Silicon carbide Tungsten carbide	Ca SiC TuC	Resin impregnated Sintered pressureless CrNiMo-binder
A B Q1 U3	Seat ring	Carbon graphite Carbon graphite Silicon carbide Tungsten carbide	Ca Ca SiC TuC	Antimony impregnated Resin impregnated Sintered pressureless CrNiMo-binder
E V X4	Elastomers	EPDM Viton HNBR	EPDM Viton HNBR	Ethylene propylene rubber Fluor carbon rubber Hydrogenated nitrile rubber
G	Spring	CrNiMo steel		
G	Other metal parts	CrNiMo steel		

Information about seal combinations, types, pressure and temperature see: table 3 Seal code

Table 3: Seal code

Shaft seal Type	Material mechanical seal	Material shaft seal	Material pump elastomer	Temperature range shaft seal[^{o}C]	Max. pressure [bar]
MG12-G60	B Q1 E GG	Ca / SiC / EPDM	EPDM	-20 - 100	10
MG12-G60	B Q1 V GG	Ca / SiC / Viton	Viton	-20 - 120	10
RMG12-G606	Q1 B E GG-WRAS	SiC / Ca / EPDM	EPDM WRAS	-20 - 100	25
RMG12-G606	Q1 B V GG	SiC / Ca / Viton	Viton	-20 - 120 (140)	25 (16)
RMG12-G606	U3 U3 X4 GG	TuC / TuC / HNBR	HNBR	-20 - 120 (140)	25 (16)
RMG12-G606	U3 U3 V GG	TuC / TuC / Viton	Viton	-20 - 120	25
RMG12-G606	U3 B E GG	TuC / Ca / EPDM	EPDM[1]	-20 - 120 (140)	25 (16)
H7N	Q1 A E GG	SiC / Ca / EPDM	EPDM 559236	-20 - 120 (140)	40 (25)
H7N	Q1 A V GG	SiC / Ca / Viton	Viton	-20 - 120 (140)	40 (25)
H7N	Q1 A X4 GG	SiC / Ca / HNBR	HNBR	-20 - 120 (140)	40 (25)
RMG12-G606	Q1 B E GG	SiC / Ca / EPDM	EPDM	-20 - 100	25

ref: teknr 20110262

1. With EPDM 559236 (Special) pump elastomers

2.3 Current

2.3.1 Nominal current DPVCI 2, 4, 6, 10 & 15

The nominal allowable current of the motor is stated on the motor plate. This shows the nominal working range of the motor and can be used to protect the motor.

Measuring the actual current of the pump during operation can be used to pre-set the motor protection switch to protect the pump/motor combination.

This current value can also be used to determine the proper electrical equipment such as variable frequency drive, main switch, wiring diameter etc.



WARNING
Not only the motor, but also the pump has to be protected in its application.

2.4 Supplementary documentation

Apart from this manual, the documentation given below is also available:

Table 4: Supplementary documentation

Document	Date/ version	Code
General terms of delivery	10-1998	119 / 1998
Motec operating instructions	09-2001	BA-8200-motec-frequency-inverters-V3-0.EM
DPVI 2, 4, 6, 10 & 15		
Technical Data 50/60 Hz Version B	03/2013	97004475

3 Warranty

3.1 Terms of warranty

The warranty period is settled by the terms of your contract or at least by the general terms and conditions of sales.



ATTENTION
Modifications or alterations of the product supplied are only permitted after consultation with the manufacturer. Original spare parts and accessories authorized by the manufacturer ensure safety. The use of other parts can invalidate any liability of the manufacturer for consequential damage.



ATTENTION
The warranty relating to the operating reliability and safety of the product supplied is only valid if the product is used in accordance with its designated use as described in the following sections of this manual. The limits stated in the data sheet must not be exceeded under any circumstances.

The warranty becomes invalid if one or more of the points below occur.

- The buyer makes modifications himself.
- The buyer carries out repairs himself or has these carried out by a third party.
- The product has been handled or maintained improperly.
- The product has non original DP-Pumps spare parts fitted.
- Caused by running dry of the pump

DP-Pumps remedies defects under warranty if the points below are observed.

- Defects are caused by flaws in the design, the materials or the production.
- The defect has been reported within the warranty period.

Other terms of warranty have been included in the general terms of delivery, which are available upon request.

4 Safety and environment

4.1 General

This DP-Pumps product has been developed using state-of-the-art technology; it is manufactured with utmost care and subject to continuous quality control. DP-Pumps does not accept any liability for damage and injury caused by not observing the directions and instructions in this manual, or in cases of carelessness during the installation procedure, use and maintenance of the product.
Non-compliance with safety instructions can jeopardize the safety of personnel, the environment and the product itself. Non-compliance with these safety instructions will also lead to forfeiture of any and all rights to claims for damages.
For example, in particular non-compliance can result in:

- failure of important pump/system functions,
- failure of prescribed maintenance and servicing practices,
- injury to persons by electrical, mechanical and chemical effects,
- hazard of the environment due to leakage of hazardous substances,
- explosions.

Depending on specific activities, extra safety measures may be required. Contact DP-Pumps if a potential danger arises during use.



ATTENTION
The owner of the product is responsible for compliance with the local safety regulations and internal company guidelines.



ATTENTION
Not only must the general safety instructions laid down in this chapter on "Safety" be complied with, but also the safety instructions outlined under specific headings.

4.2 Users

All personnel involved in the operation, maintenance, inspection and installation of the product must be fully qualified to carry out the work involved and be aware of all applicable responsibilities, authorisations and super visions. If the personnel in question is not already in possession of the required know-how, appropriate training and instruction must be provided. If required, the operator may commission the manufacturer / supplier to take care of such training. In addition, the operator is responsible for ensuring that the contents of the operating instructions are fully understood by the responsible personnel.

4.3 Safety provisions

The product has been designed with the greatest possible care. Original parts and accessories meet the safety regulations. Modifications in the construction or the use of non-original parts may lead to a safety risk.



ATTENTION
Make sure that the product operates within its working range. Only then the product performance is guaranteed.

4.3.1 Labels on the product

The icons, warnings and instructions applied to the product are part of the safety provisions. The labels may not be removed or covered. Labels must remain legible during the entire life of the product. Replace damaged labels immediately.

4.4 Safety precautions

4.4.1 During normal use

- Contact the local electricity company for questions about the power supply.
- Cover the parts that can become hot, making direct contact impossible.
- When applicable, always place undeformed coupling protection plates to protect the coupling, before putting the pump into use. Make sure that the coupling protection plates are never in contact with the rotating coupling.
- Always close the terminal box of the motor.

4.4.2 During installation, maintenance and repair

Only authorised personnel may install, maintain and inspect the product and repair electrical components. Observe the local safety regulations.



WARNING
Always disconnect the energy supply to the product first, before installation, maintenance and repairs. Secure this disconnection.



WARNING
Surfaces of a pump can be hot after continuous operation.



WARNING
Make sure that no one can be near rotating components when starting a pump.



WARNING
Handle a pump with dangerous liquids with the utmost care. Avoid danger for persons or the environment when repairing leakages, draining liquids and venting. It is strongly recommended to place a leakage tray under the pump.



WARNING
Immediately following completion of the work, all safety-relevant and protective devices must be re-installed and / or re-activated.



WARNING
Please observe all instructions set out in the chapter "Commissioning/Start-up" before returning the product to service.

4.5 Environmental aspects

4.5.1 General

The products of DP-Pumps are designed to function in an environmentally friendly way during their entire life. Therefore, when applicable, always use biodegradable lubricants for maintenance.



ENVIRONMENTAL INSTRUCTION
Always act according to the laws, by-laws regulations and instructions with respect to health, safety and the environment.

4.5.2 Dismantling

The owner is responsible for the dismantling and environmentally friendly disposal of the product.



ENVIRONMENTAL INSTRUCTION
Ask at the local government about the re-use or the environmentally friendly processing of discarded materials.

4.6 Unauthorised modes of operation

Never operate the pump (set) outside the limits stated in the data sheet and this manual (see section 5.7 Working range).

5 Pump Introduction

5.1 Model key

Table 5: Model key Example DPVCI 6/12(16)

	DP	VC	I	6	/12	(16)	B	
Label	DP							Product Label
Material/Construction		VC						Cast Iron pump foot and top bracket hydr. 1.4301 / AISI 304
Connections			I					5/4” Inner thread
				6				Size (Capacity in m^3/h at $Q._{opt}$.)
					/12			Number of impellers
						(16)		Number of total stages
							B	Design version

5.2 Description of the product

The vertical, immersible multi stage centrifugal pump series are designed for pumping liquids for machine tools, condensate transfer, liquid transfer in industrial washing machines and similar applications.
The hydraulic assembly is driven by an electric motor.

WARNING
The pump must not be used to transfer inflammable liquids such as diesel oil and petrol.

5.3 Ecodesign

Product according to Regulation 547/2012 (for water pumps with maximum shaft power rating of 150 kW) to Directive 2009/125/EC "Ecodesign Directive":

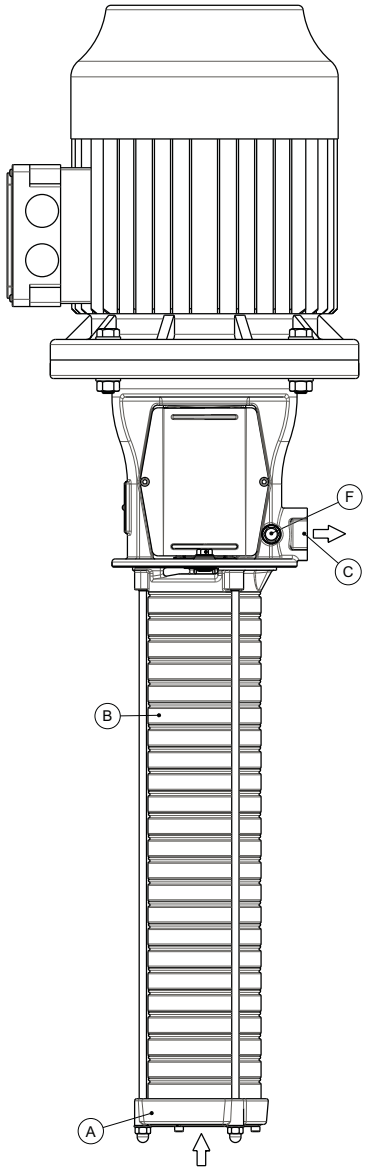
- Minimum Efficiency Index: See nameplate, legend for nameplate. See table 1 Description sticker.
- The reference value MEI of a water pump with the best efficiency is = 0.70.
- Year built: See nameplate, legend for nameplate. See table1 Description sticker.
- Manufacturer's name or trademark, official registration number and place of production: See manual or order documentation.
- Information about type and size of the item: See nameplate, Legend of the nameplate. See table 1 Description sticker.
- Performance curves of the pump, including efficiency characteristics: See documented curve.
- The efficiency of a pump with a corrected impeller is usually lower than that of a pump impeller with a full diameter. A pump with a corrected impeller is adapted to a certain duty point, thereby reducing the energy consumption. Minimum Efficiency Index (MEI) refers to the full impeller diameter.
- The operation of this water pump at different operating points can be more efficient and more economical when it is controlled, for example using a variable speed controller which adjusts the pump operation to the system.
- Information for disassembly, recycling or disposal after the final shutdown: See sub chapter 4.5.2 Dismantling.
- Information about the efficiency reference value or MEI = 0.7 (0.4) benchmark index for the pump on the basis of the pattern in the picture, please visit: http://www.europump.org/efficiencycharts.

5.4 Modular selection

To suit almost every application the pump is assembled out of modules which can be selected depending on the required working range.
Basic modules are:

- **Basic pump model,** which defines the capacity, pressure and basic material
- **Sealings,** which define the elastomers, the mechanical seal and the shaft seal type.
- **Electric motor,** which defines all requirements of the motor such as motor size, power, voltage, frequency and all possible motor accessories.

5.5 Operation



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Figure 4: DPVCI 6

During centrifugal operation of the pump an negative pressure is created at the inlet of the impeller. This underpressure enables the medium to enter the pump at the suction connection (A).
A stage (B) consists of an impeller and diffuser or an empty stage. The passage of this stage determines the capacity of the pump. The diameter of the stages is related to the centrifugal forces and its “stage pressure”: the more stages, the more pressure.
This total capacity and raised pressure will be guided to the discharge connection (C) of the pump.

ATTENTION
Check the seal. Turn the shaft every three months and just before putting into operation.

5.6 Measuring, draining and venting

The pump is provided with plugs for measuring, venting and to fill the container.
Connection (F) is meant to measure the discharge pressure using a G ¼ connection.
Connections (F) are meant to vent the pump system when the pump is not in operation. Or to measure the discharge pressure of the pump using a G 1/4 connection or to (re)fill the container.

5.7 Working range

The working range depends on the application and a combination of pressure and temperature. For specific and detailed limits advice the working ranges are described in the chapter 5.4 Modular selection. The overall working range of the pumps can be summarised as follows:

Table 6: Specification of the working range

Pump type	DPVCI	note
Medium temperature [°C]	-20 up to +120	
Ambient temperature [°C]	-20 up to 40	1
Max. operating pressure [bar]	See pump name plate	
Viscosity [cSt]	1-100	2
Density [kg/m^3]	1000-2500	2
Cooling	forced motor cooling	3
Minimum frequency [Hz]	30	
Maximum frequency [Hz]	60	4
Maximum number of starts per hours	up to 11 kW: 300 other: 200	5
Allowable size of solids pumped	5µm to 1mm	6
IPClass	See motor name plate	

1. If the ambient temperature exceeds the above value or the motor is located more than 1000 m above sea level, the motor cooling is less effective and could require an adapted motor power. See table 7: Motor load dep. sea level or amb. temp or please contact your supplier for more detailed advice.
2. Deviation in viscosity and/or density could require an adapted motor power. Please contact your supplier for more detailed advice.

3. The free space above the motor cooling fan must be at least 1/4 of the diameter of the inlet of the cooling fan in order to have a sufficient flow of (cooling) air.
4. Pumps that are intended for 50 Hz operation, may not be connected to 60 Hz power supply.
5. With a standard DM motor.
6. Not suitable for fluids containing abrasive particles.

For minimum flow at medium temperature of 20 ^{o}C see table 7 Minimum/maximum capacity (Qmin/max); for higher temperatures see figure 7 Minimum/ maximum capacity (Qmin/max)

Table 7: Minimum/maximum capacity ($Q_{min/max}$)

size	**$Q_{min/max}$ [m^3/h]**			
	50 Hz		**60 Hz**	
	2 pole		**2 pole**	
	Min.	**Max.**	**Min.**	**Max.**
2	0.2	3.3	0.2	4.0
4	0.4	6.5	0.5	7.8
6	0.6	9.0	0.8	8.6
10	1.1	13.2	1.3	15.8
15	1.6	22.5	2.0	27.0

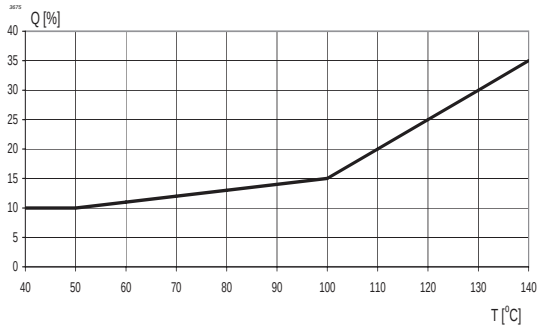


Figure 5: Minimum capacity vs. temperature (in % of Q optimum)

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ATTENTION
The pump must never operate against a closed discharge valve.

6 Transport

6.1 Transport

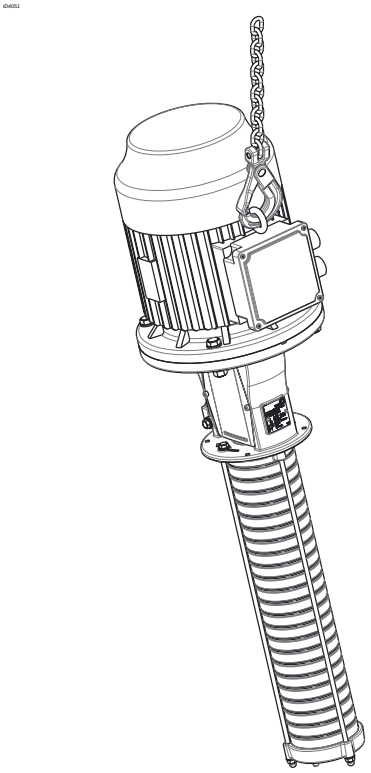
1. Transport the pump in the position as indicated on the pallet or packaging.
2. Make sure the pump is stable.
3. If present, observe the instructions on the packaging.

WARNING
Lift the pump, if necessary using a hoist and suitable slings. Attach the slings to the transport lugs on the packaging, where present.

WARNING
The pump must be lifted according to the current hoist guidelines. Only qualified personnel is allowed to lift the pump.

WARNING
Do not lift the pump by using the frequency converter (if placed), electrical parts or the motor cover. Be sure that the pump is always in balance.

WARNING
Pumps could tilt while lifting. Do not remove the lifting devices from the pump before the pump is placed and mounted correctly.



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Figure 6: Transport position

6.2 Storage

Table 8: Storage

Storage	
$t_{ambient}$ [°C]	-10/+40
Max. rel. humidity	80% at 20°C not condensing

6.2.1 Inspection during storage

1. Turn the shaft every three months and just before putting into operation.

7 Installation instructions

7.1 Pump location

WARNING
The pump must be installed so that persons cannot accidentally come into contact with hot surfaces.

The pump is designed for tank mounting in vertical position. The pump is positioned in a hole cut into the cover of the tank (upper side) and is secured to the tank by four hexagon head screws through the holes in the mounting flange. It is recommended to fit a sealing gasket between the pump flange and tank.

7.2 Installation dimensions

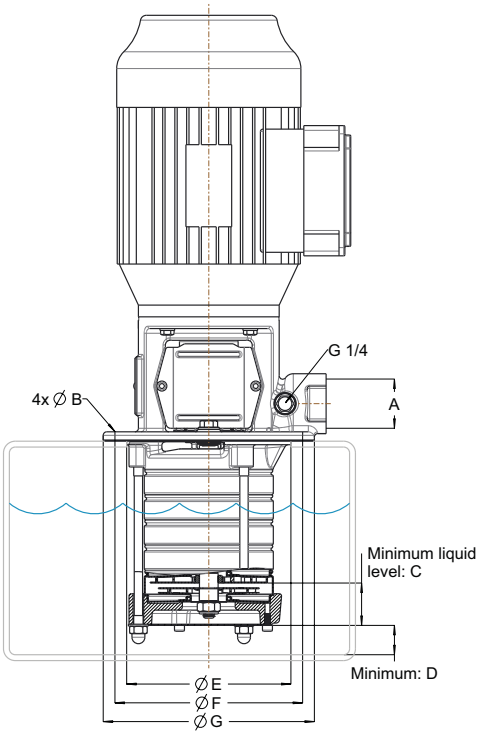


Figure 7: DPVCI 2-15 B

Table 9: DPVCI 2-15 B

Dimensions	DPVCI 2/4/6	DPVCI 10/15	
A	G 5/4	G 2	
B	7.5	9	[mm]
C	36	42	[mm]
D	25	40	[mm]
E	140	200	[mm]
F	160	225	[mm]
G	180	250	[mm]
TPG 20130303			

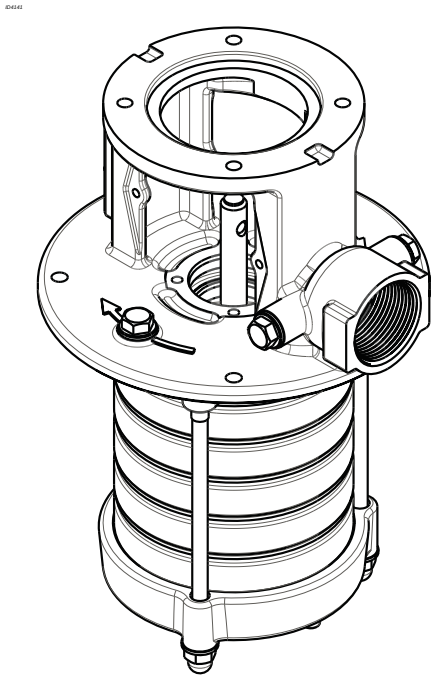
7.3 Setting up the pump

ATTENTION
Pumps which do not stand steady or stable on their own, should be mounted on a rigid and stable base.

ATTENTION
Locate the pump at the place with the lowest risk for noise nuisance.

1. Place and install the pump on a level, stable surface in a vertical position with the motor on top. Make sure the pump is always mounted with a gasket on the top of the reservoir.
2. Make sure that sufficient air can reach the cooling fan of the motor. For this purpose the free space above the cooling fan should be at least 1/4 of the diameter of the fan cover air intake.
3. It is advised to install a valve on the discharge connection of the pump.
4. To avoid medium flowing back through the pump, when idle, make sure a non-return valve is installed and the inlet is always under liquid level.
5. Make sure that the inlet of the pump is never clogged.

7.3.1 Indicators



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Figure 8: Arrow rotation mark

The arrow on the motor stool indicates the rotating direction of the motor.

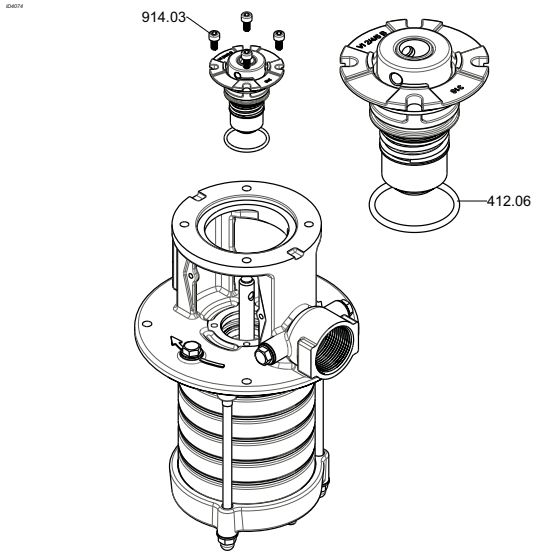
7.3.2 Install bypass

Install a bypass if the pump operates against a closed valve. The required capacity of the bypass is at least 10% of the optimum volume flow. At high operating temperatures a higher volume flow is required. Refer to the table "Minimum volume flows" in the paragraph "Working range".

7.3.3 Permissible forces and moments at the pump nozzles

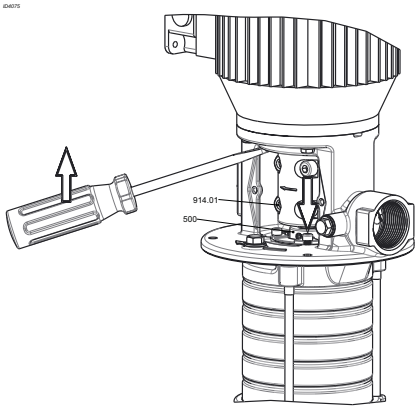
No piping-induced forces and moments (from warped pipelines or thermal expansion, for example) must act on the pump.

7.4 Check seal



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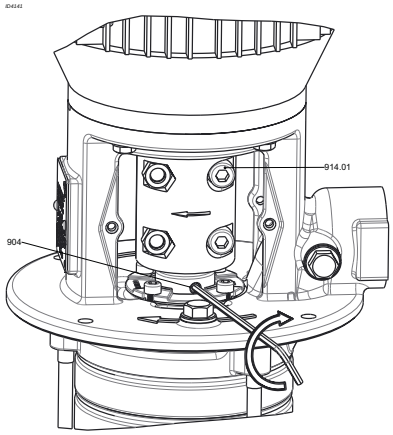
Figure 9: Seal



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Figure 10: Step 1

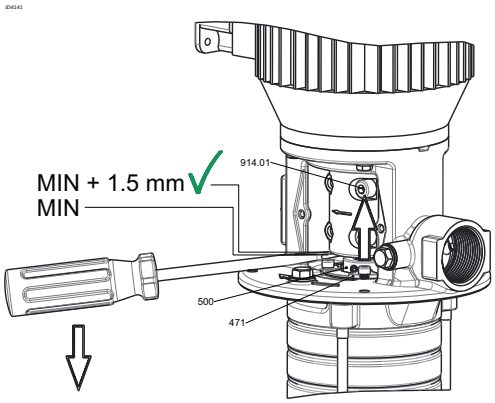
Make sure the shaft (210) and cartridge ring (500) is in the lower position. The coupling bolts (914.01) should not be tightened.



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Figure 11: Step 2

Then fasten the grub screws (904) firmly (3X).



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Figure 12: Step 3

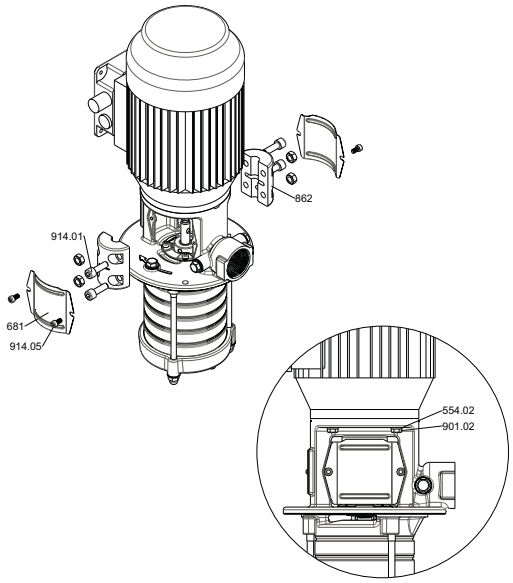
Lift the coupling, distance between seal cover (471) and cartridge ring (500) should be 1,5 mm[1]. Tighten the coupling bolts (914.01)crosswise according to table 10 Torques

7.5 Mounting a motor on the pump

ATTENTION
It is advised to use a specially designed DP-Pumps motor. Before installing an other brand/standard IEC-standard motor, DP-Pumps has to be consulted to verify the applicability.

The motor has to conform to the following conditions:

- Reinforced bearing at driven end (to withstand the axial force)
- Axially fixed rotor (to minimize the axial play of the pumps hydraulic)
- Smooth shaft, no key lock (to improve the coupling grip and to improve the motor balance)



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Figure 13: Mounting the motor

- Align the motor on the motor stool
- Fit hexagon head bolts (901.02) and washers (554.02). Tighten the bolts
- Install coupling (862)
- Fit hexagon socket head cap screws (941.01)
- Install coupling (861)
- Fit hexagon socket head cap screws (941.05)

Table 10: Torques

Part n°	Material	Thread	Model	Torque [Nm]
914.05	Stainless steel		DPVCI	hand tight
914.01	Steel	M6	DPVCI	16
914.01	Steel/Cast iron	M8	DPVCI	30
914.01	Aluminium	M8	DPVCI	22
914.01	Cast iron	M10	DPVCI	70
901.02	galvanized steel			hand tight

The advised bearings per motor type are:

1. Contact your DP dealer for special tools.

Table 11: Minimum required motor Driven-end bearing

Bearing type			
Power output	**1 phase 50 Hz**	**3 phase 50/60 Hz**	
[kW]		**2 pole**	**4 pole**
0.25			6202-2Z-C3
0.37	6202-2Z-C3	6203-2Z-C3	6202-2Z-C3
0.55	6202-2Z-C3	6203-2Z-C3	6202-2Z-C3
0.75	6204-2Z-C3	6204-2Z-C3	6202-2Z-C3
1.1	6305-2Z-C3	6204-2Z-C3	6205-2Z-C3
1.5	6305-2Z-C3	6305-2Z-C3	6205-2Z-C3
2.2	6305-2Z-C3	6305-2Z-C3	6206-2Z-C3
3		6306-2Z-C3	6206-2Z-C3
4		6306-2Z-C3	6208-2Z-C3
5.5		6308-2Z-C3	6208-2Z-C3
7.5		6308-2Z-C3	6208-2Z-C3
11		7309-BEP	
15		7309-BEP	
18.5		7209-BEP	

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Or use a thrust bearing housing.

7.6 Electrical installation

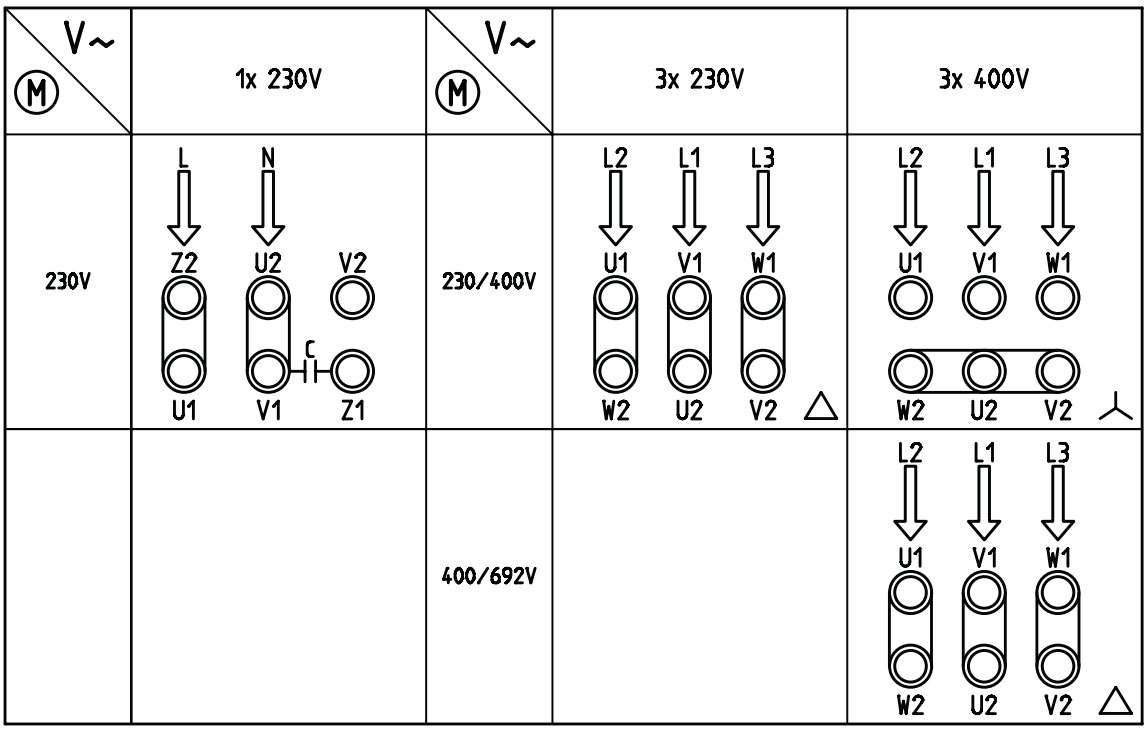
WARNING
In accordance with the local regulations only authorised personnel is allowed to make electrical connections to the motor.

ATTENTION
Connect the motor according to figure: 14 Motor connections and always check the rotation direction.

Electrical connections:

- Make sure that the motor specifications correspond with the power supply to which the pump motor is connected. Consult "Electrical diagrams" for the correct connection diagram.
- Connect the motor using a motor safety switch.

Example may differ upon chosen motor



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Figure 14: Motor connections

PTC connection STM 140 EK:

- Standard motors 3 kW and up are equipped with a PTC thermistor. Consult Table 12 Technical specifications PTC STM 140 EK.
- Connect the PTC to a thermistor relay.

Table 12: Technical specifications PTC STM 140 EK

	Value
t_n [°C]	140
$R_{20\ °C}$ [Ω]	~ 20
$R_{tn-20\ °C}$ [Ω]	~ 250
$R_{tn-5\ °C}$ [Ω]	< 550
$R_{tn+5\ °C}$ [Ω]	> 1330
$R_{tn+15\ °C}$ [Ω]	> 4000
U_n [VDC]	2.5 < U < 30

7.7 Commissioning

WARNING
Pay attention to the direction of the vent hole and take care to ensure that the escaping water does not cause injury to persons or damage to the motor or other components.

7.7.1 Before starting the pump, be sure:

- that all pipe connections are tight;
- that the pump body is partly filled with liquid (partly submerged) see figure 7 DPVCI 2-15 B;
- that the strainer is not blocked.

7.7.2 Start the pump as follows:

- Close the isolating valve on the discharge side of the pump;
- If the pump is fitted with a vent valve, this valve must be opened;
- See the correct direction of rotation of the pump on the motor fan cover or on the coupling guard;
- When seen from the top, the pump should rotate clockwise;
- Start the pump and check the direction of rotation;
- Open the discharge isolating valve a little;
- If the pump is fitted with a vent valve, closed the valve until the pump is completely vented;
- Completely open the discharge isolating valve.

The pump has now been vented and is ready for operation.

ATTENTION
The pump is not allowed to run against a closed discharge valve.

ATTENTION
Seen from the top of the motor the pump should rotate clockwise. See 7.3.1 Indicators (B). In case of a 3-phase motor the rotating direction can be changed by exchanging two of the three phases.

ATTENTION
Make sure the pump and piping are installed properly.

7.7.3 After an extended period of non-operation or storage

During first start-up, check the mechanical seals for leakage due to seizure or dehydration of the lubricating film. If so, please proceed as following:

1. Turn shaft manually.

If the mechanical seal is leaking:

1. Disassemble the mechanical seal.
2. Thoroughly clean and decrease the running surfaces.
3. Assemble the mechanical seal again and retry start-up.

If this doesn't solve the shaft leakage, replacement of the mechanical seal is necessary.

8 Operation

8.1 Operation

The pump is controlled externally and therefore does not need any operation guidance.

9 Maintenance

9.1 Introduction



WARNING
Observe the general safety precautions for installation, maintenance and repair.

Regular maintenance is necessary for the correct operation of a pump. Please contact your supplier for maintenance of the pump.

9.2 Lubrication

Standard motors, with a maximum power of 7.5 kW, are provided with maintenance free sealed bearings.

Motors with lubricating nipples must be lubricated after 2000 hours. If the pump works under extreme conditions, such as high vibrations and temperatures, the motors must be lubricated more often.

Use a lithium based -30 °C / 160 °C bearing lubricant (about 15 grams).

When the pump is delivered without a motor and fitted with an other brand or the standard motor is replaced by an other brand than DP-Pumps, please consult the maintenance instructions of the motor supplier.



ATTENTION
Also follow the instructions in § 7.5 Mounting a motor on the pump.

9.3 Maintaining the pump for an extended period of non-operation

Turn the shaft every three months. This protects the seals from seizure.

Protect the pump against if there is a risk of frost. Proceed as follows:

1. Close all pump valves.
2. Drain each pump and/or the system.
3. Remove all plugs from the pump.
4. Disassemble the cartridge seal and check the running surfaces

10 Failures

10.1 Failure table



WARNING
Observe the general safety precautions before install, maintenance and repair.

Problem	Possible cause	Possible solution	Checkpoints
Leakage along the shaft.	Running surfaces of the mechanical seal worn or damaged.	Replace the mechanical seal.	Check the pump for dirt - abrasive parts.
	Mechanical seal mounted incorrectly.	Install the mechanical seal correctly. Use water and soap as a lubricant.	
	Elastomers affected by medium.	Use the right rubber compound for the mechanical seal.	
	Pressure too high.	Use the right type of mechanical seal.	
	Shaft worn.	Replace shaft and mechanical seal.	
	Pump has been operating without water too long.	Replace the mechanical seal.	
Pump is vibrating or noisy.	Coupling mounted incorrectly.	Install the coupling in parallel.	
	Faulty setting of the hydraulic assembly.	Adjust the assembly according to the manual.	
	There is no water in the pump.	Fill and vent the pump.	
	No supply.	Make sure there is sufficient supply. Check for blockages in the supply line.	
	Bearings of pump and/or motor worn.	Have the bearings replaced by a certified company.	
	Available NPSH too low (cavitation).	Check liquid level.	
	Pump does not work in its working range.	Select another pump or adjust the system to work within its working range.	
	Pump is standing on an uneven surface.	Level the surface.	
Malfunction.	Internal blockage in the pump.	Have the pump inspected by a certified company.	

Problem	Possible cause	Possible solution	Checkpoints
Pump does not start.	No voltage on the terminal clamps.	Check the power supply.	• Circuit • Main switch • Fuses
		Check the motor safety relay	• Earth leakage switch • Protective relay
	Thermal motor safety switch triggered.	Reset the thermal motor-safety. Contact the supplier, if this problem occurs more often.	Check if the correct value is set. Find the correct value (I_{nom}) on the motor type plate.
The motor is running, but the pump does not work.	The pump shaft has broken.	Contact the supplier.	
	The coupling between pump- and motor shaft is loose.	Tighten the connecting screws to the recommended torque.	
Pump supplies insufficient capacity and/or pressure.	There is air in the pump.	Vent the pump.	
	Pump rotates in the wrong direction.	Change over L1 and L2 of the three phase supply.	
	Too little water consumption so air bubbles clog up in the pump.	Make sure the consumption increases or use a smaller pump.	
	The impeller or the diffuser is blocked.	Clean the inside of the pump.	
	O-ring between impeller and diffuser is gone.	Replace the O-rings.	
	O-ring not resistant to the medium to be pumped.	Replace O-ring by an O-ring with better resistance.	

11 Annexes

11.1 EC declaration of conformity

DP-Pumps
Kalkovenweg 13
2401 LJ Alphen aan den Rijn, The Netherlands
Tel: (+31)(0)-172-48 83 88

Declares as the manufacturer in his own responsibility, that the products:

Product: **Pump**

Type: **Vertical immersible multi-stage centrifugal pumps**

to which this declaration relates, are constructed in conformity with the following harmonized international standards:

Serial number: 18/2012 1000000-01 [...] 52/2016 9999999-99

- **ISO 12100:2010**
- **EN 809/A1**

in accordance with the provisions of:

- **Machinery directive 2006/42/EC**
- Ecodesign Directive 2009/125/EC (Regulation 547/2012)

The pump is subject to this declaration of conformity as a stand alone product. Make sure the appliance or installation in which the pump is built in, has got a declaration of compliance with the directives listed above, for its complete assembly.



Alphen aan den Rijn
06/11/2012

Authorized representative
W. Ouwehand, technical director.

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Original instructions