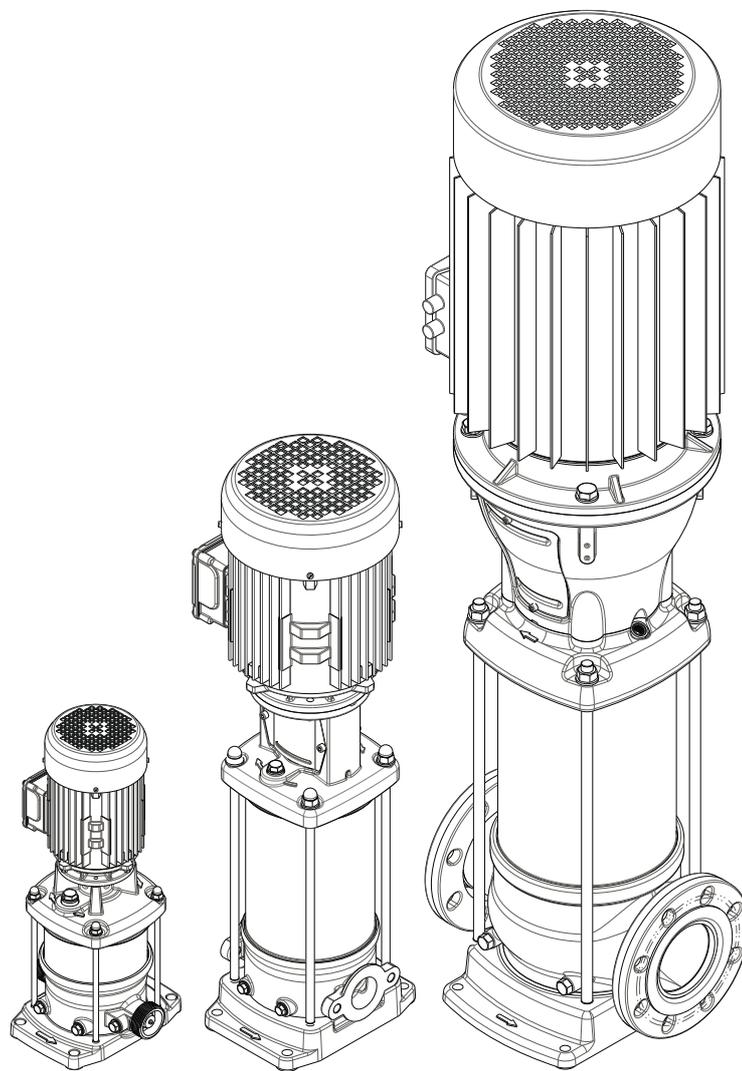


# Vertical multi-stage centrifugal pumps

Installation and operating instructions

series: DPV and DPLHS



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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.



**READ THE (SUPPLEMENTARY) DOCUMENTATION**  
Read the installation and operating instructions.

## 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 from DPV / DPLHS 6 pumps

The name plate indicates the type series / size, main operating data and identification number. Please quote this information in all queries and/or repeat orders. 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 nearest customer service centre.

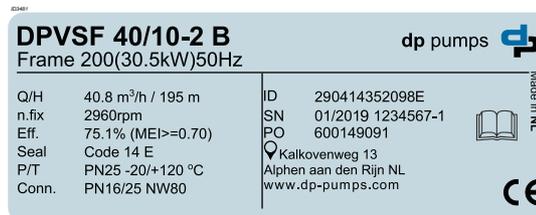


Figure 2: Example: Pump without factory mounted motor

3481



Figure 1: Example: Pump with motor

3297

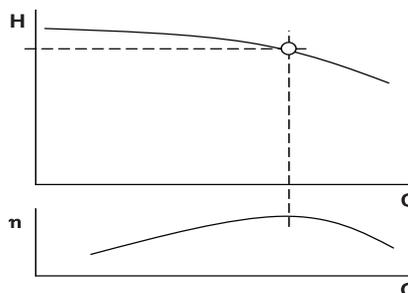


Figure 3: Duty point

3060

Table 1: Description nameplate

Indication		Meaning
DPVSF 40/10-2 B		Model key (design version B)
37 kW (30.5 kW)		Installed motor power (required power @ max. curve) <sup>1 2</sup>
Frame 200		Motor frame size
50 Hz		Nominal frequency
Q <sup>3</sup>	40 m <sup>3</sup> /h	Optimum capacity running at fixed speed (see fig. 3: Duty point)
H	195 m	Optimum head running at fixed speed (see fig. 3: Duty point)
n fix.	2960 rpm	Rotation speed indication at which Q/H are given
Eff.	75.1 % (MEI>=0.70)	Efficiency (Minimum Efficiency Index)
Seal.	Code 14 E	Mechanical Seal Surface Code, see table 8: Seal code
E	Easy access	Seal construction type: F = Fixed E = Easy Access C = Cartridge
P/T	PN25 -20/+120 °C	Maximum pressure at mentioned temperature range <sup>4</sup>
Conn.	PN16/25 NW80	Pressure Class connection and connection size
ID	290414352098V	Pump ID
SN	WW / YYYY 1234567-1	Production week/year and production serial number > as built file
PO	XXXXXXXXXX	Purchase order number

1. For pumps without a factory mounted motor: Frame size.
2. When the installed motor power is less than the required power, the pump is limited in its operating range. Consult your sales representative for details.
3. Optimum capacity of the hydraulics, restricted operating range (note 2.) not taken into account.
4. 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 <b>service department</b> 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 Material code shaft seal

Table 2: Material code shaft seal

Description	Designation	Code acc. to EN 12756	Material	Note
Spring loaded ring	Ca SiC TuC eCarb-B	B Q1 U3 B	Carbon graphite Silicon carbide Tungsten carbide Carbon graphite	Resin impregnated Pressureless sintered CrNiMo-binder Resin impregnated, porous
Seat ring	Ca Ca SiC TuC Ce eSic-Q7	A B Q1 U3 V Q7	Carbon graphite Carbon graphite Silicon carbide Tungsten carbide Al-oxide Silicon carbide	Antimony impregnated Resin impregnated Pressureless sintered CrNiMo-binder >99 % Porous
Elastomers	EPDM NBR FPM HNBR	E P V X4	Ethylene propylene rubber Nitrile-butadiene-rubber Fluor carbon rubber Hydrogenated nitrile rubber	
Spring	AISI 316 AISI 304	G F	CrNiMo steel CrNi steel	
Other metal parts	AISI 316 AISI 304	G F	CrNiMo steel CrNi steel	
Source 20110262-L				

Information about seal combinations, types, pressure and temperature see: table 8: Seal code

## 2.3 Current

### 2.3.1 Nominal current DPV

6

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.**

### 2.3.2 Maximum current DPLHS 6

The maximum allowable current of the motor is mentioned as I.max. on the motor plate. This maximum allowable current shows the maximum working range of the motor and can be used to protect the motor.



#### **WARNING**

**Be careful in using it this way, because, not only the motor, but also the pump has to be protected in its application.**

On the pump plate (sleeve sticker) this "required motor current" can be mentioned and it 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.

## 2.4 Supplementary documentation

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

*Table 3: Supplementary documentation*

Document	Code
General terms of delivery	119 / 1998
DPV	
Technical Data 50 Hz Version B	97004455
Technical Data 60 Hz Version B	97004456
DPLHS	
Technical Data 50/60 Hz	97004434
See also <a href="http://www.dp-pumps.com">www.dp-pumps.com</a>	

# 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.
- Dry running of the pump.

DP-Pumps repairs defects under warranty when:

- They are caused by flaws in the design, the material or the production.
- They are 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 and is manufactured with utmost care and is subject to continuous quality control.

DP-Pumps does not accept any liability for damage or injury caused by not following the directions and instructions in this manual or by carelessness during the installation, use or maintenance of the product.

Non-compliance with the 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.

Non-compliance can result in:

- failure of important pump/system functions,
- failure of prescribed maintenance or service,
- injury caused by electrical, mechanical and chemical effects,
- leakage to the environment of hazardous substances,
- explosions.

Depending on the application, 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.



### ATTENTION

Persons and/or children who are not qualified to do work on the product should only have access to the product under the supervision of a properly trained person.

## 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 supervisions. If the personnel in question is not in possession of the required know-how, appropriate training and instruction must be provided. The operator may require the manufacturer/supplier to provide sufficient training and/or instructions. 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

- For questions regarding the power supply contact the local electricity company.
- Isolate possible hot parts to avoid injury through direct contact.
- For your safety always assemble undeformed coupling guards (when applicable) before putting the pump into use.
- Always close the terminal box of the motor.
- Always close the control panel where applicable

#### 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**  
Before proceeding with any installation, maintenance or repair, disconnect the power supply and secure this disconnection.



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



**WARNING**  
Secure the area before starting a pump to avoid hazardous situations with rotating parts.



**WARNING**  
Take utmost care when handling dangerous liquids. Avoid danger to persons or the environment when conducting repairs, draining liquids or venting. It is strongly recommended to place a leakage tray under the pump.



**WARNING**  
Immediately after completing 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" before returning the product to service.



#### 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.

## 4.5 Environmental aspects

### 4.5.1 General

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

# 5 Pump Introduction

## 5.1 Model key

Table 4: Model key Example

	DP	VS	F	40	/10	-L	B	
Label	DP							Product Label
Material/Construction		VC						Cast Iron pump foot and top bracket hydr. 1.4301 / AISI 304
		V						All wetted parts Stainless Steel 1.4301 / AISI 304
		VM						All wetted parts Stainless Steel 1.4301 / AISI 304 with closed coupled motor
		VS						All wetted parts Stainless Steel 1.4401 / AISI 316
Connections			E					Male thread (with non-return valve insert)
								Oval flange with female thread
			F					Round flange
			V					Victaulic connections
			T					Tri-clamp connections
Size				40				Size (Capacity in m <sup>3</sup> /h at Q <sub>opt</sub> )
Stages					/10			Total number of stages
						-2		Number of stages with reduced head impeller(s)
						-L		The first stage has a "Low NPSHr" impeller
							B	Design version B
	DP	LHS		6	-200			
Label	DP							
		LHS						Vertical pump in superior grade AISI 316 (1.4401) 40 Bar
Connections								Round flanges DIN or ASME
				6				Size (Capacity in m <sup>3</sup> /h at Q <sub>opt</sub> )
					-200			Number of stages (x10)
								Design version

## 5.2 Description of the product

The vertical, single or multi stage centrifugal pump series are designed for pumping clean, or slightly aggressive, watery mediums. Suction and discharge connections of the pump are in-line, making the pump easy to install. The hydraulic assembly is driven by an electric motor. All hydraulic parts of the pump are made of stainless steel.

## 5.3 Ecodesign

Product information according to Regulation 547/2012 and Directive 2009/125/EC "Ecodesign Directive" (water pumps with maximum shaft power rating of 150 kW, applies only to water pumps marked with the Minimum Efficiency Index MEI, see pump nameplate):

- Minimum Efficiency Index: See nameplate, legend for nameplate. See table 1: Description nameplate.
- The reference value MEI of a water pump with the best efficiency is = 0.70.
- Year built: See nameplate, legend for nameplate. See table 1: Description nameplate.
- 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 table 1: Description nameplate.
- 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 Intended use

The pumps DPV are suited for the transport and increase of pressure of cold and hot water without wear to parts when used within the indicated working range. The transport of liquids with a different viscosity or density than water is possible as well. Please take into account the possible adjusted motor power which might be required for this. Ask DP-Pumps or your distributor for advice.

Any other or further use of the pump is not in conformity with its intended use. DP-Pumps does not accept any liability for any damage or injury that results from this. The pump is produced in accordance with the current standards and guidelines. Use the pump only in a perfect technical state, in conformance with the intended use described below.

The *Intended use* as laid down in ISO 12100:2010 is the use for which the technical product is intended according to the specifications of the manufacturer. The use of the product has been described in the sales brochure and in the user manual. Always observe the instructions given in the user manual. When in doubt the product must be used as becomes evident from its construction, version and function.

## 5.5 Operation

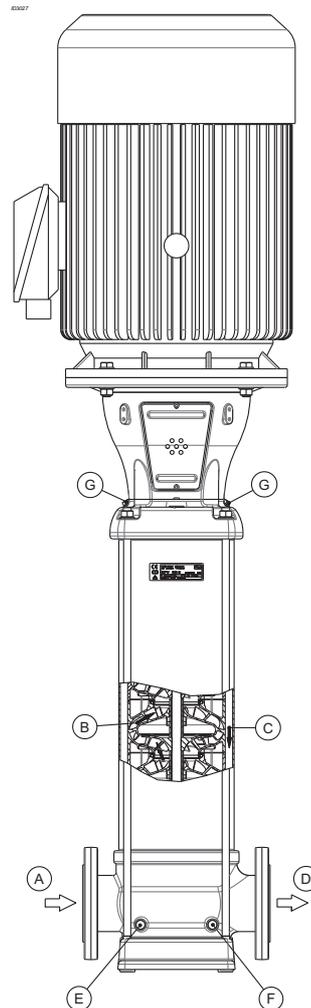


Figure 4: DPVF 40

The rotating impeller causes the pressure at the inlet of the impeller to drop. This decrease in pressure creates the flow through the suction connection (A). Every stage (B) consists of an impeller and a diffuser. The capacity of the pump is determined by the size of the passageway of the stage. The pressure of the stage is determined by the diameter of the impeller.

20080190-A/27022008

Because of the modular type of construction it is possible to choose the number of impellers most suited to the required duty point. After leaving the last impeller the medium flows between the pump stages and the outer sleeve (C) and exits the pump at the discharge connection (D)

## 5.6 Measuring, draining and venting

The pump is provided with plugs for measuring, draining and venting.

Connection (E) is meant to drain the inlet part of the pump, or to measure the inlet / suction pressure using a G ¼ connection.

Connection (F) is meant to drain the outlet part of the pump, or to measure the discharge pressure using a G ¼ connection.

Connections (G) 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 3/8 connection.

## 5.7 Modular selection

For an optimal match with the application, the pump is assembled out of modules which are selected depending on their specifications.

The basic modules are:

- **Basic pump model.** Defines the capacity and head, the basic material and allowable pressures and temperatures.
- **Connections.** Defines the connection size, pressure class and allowable temperatures.
- **Sealings.** Defines material of the elastomers, shaft seal type and allowable pressures and temperatures.
- **Electric motor.** Defines all requirements of the motor such as size, power, supply voltage, frequency and possible motor accessories.

## 5.8 Working range

The working range depends on the basic hydraulic design, the type of connection and sealings. The module in the pump with the strictest specification determines the allowable pressure and temperature of the medium in the pump. The general working specifications can be summarised as follows:

Table 5: General working range specification

Pump type	DPV	note
Ambient temperature [°C]	-20 up to 40	1, 2
Minimum inlet pressure <sup>3</sup>	NPSH <sub>req.</sub> + 1 m	
Viscosity [cSt]	1-100	4
Density [kg/m <sup>3</sup> ]	1000-2500	2
Cooling	forced motor cooling	
Minimum frequency [Hz]	30	
Maximum frequency [Hz]	60	5
Maximum number of starts	see motor data sheet	6
Noise emission	see motor data sheet	7
Allowable size of solids pumped	5 µm to 1 mm	

1. Avoid freezing the pump.
2. 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. Please contact your supplier for more detailed advice.
3. NPSH<sub>req.</sub> is given in the technical documentation.
4. Pumping liquids with a higher density and/or viscosity than water requires more mechanical power and current from the motor. If necessary, apply larger motor power accordingly. Contact your supplier for advice, if needed.
5. Pumps that are intended for 50 Hz operation, may not be connected to 60 Hz power supply.
6. Frequent start/stops, in particular in combination with higher pressure differences (Δp) may result in a shortened product lifetime. Consult your supplier for such applications.
7. Only the noise emission of the motor is documented.



### ATTENTION

**The temperature difference between the medium and the pump should never exceed 60 °C. The pump must be filled / heated-up slowly in any case where the difference between pump and medium is more than 30 °C to avoid any chance of a thermal shock.**

For minimum/maximum flow at medium temperature of 20 °C see table 6: Minimum/maximum capacity (Q<sub>min/max</sub>); for higher temperatures see figure 5: Minimum capacity vs. temperature (in % of Q optimum)

Table 6: Minimum/maximum capacity ( $Q_{min/max}$ )

size	$Q_{min/max}$ [m <sup>3</sup> /h]							
	50 Hz				60 Hz			
	2 pole		4 pole		2 pole		4 pole	
	Min.	Max.	Min.	Max.	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	10.8		
10	1.1	13.2	0.5	6.6	1.3	15.8	0.6	7.9
15	1.6	22.5	0.8	11.3	2.0	27.0	1.0	13.5
25	2.8	35.0	1.4	17.5	3.1	42.0	1.6	21.0
40	4	54	1.9	27	4.9	65	2.3	32.5
60	5.3	57	2.6	38	6.4	92	3.2	46
85	8.5	110	4.3	53.9	10.2	132	5.1	65.1
125	30	160	15	80	36	192	18	96
LHS6	0.8	8.6			0.7	8.6		

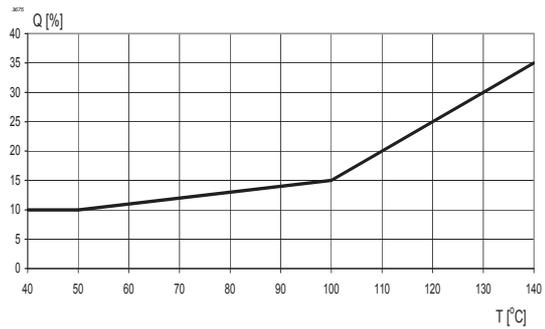


Figure 5: Minimum capacity vs. temperature (in % of  $Q$  optimum)

3675

### 5.8.1 Detailed working range DPV

For the actual working range of the pump see the name plate.

### 5.8.2 Detailed working range DPLHS 6

Table 7: Basic hydraulic design

Pump type	Pressure [bar]	Temperature [°C]
DPLHS 6	40	120

Table 8: Seal code

Seal code	Shaft seal type	Material mechanical seal	Shaft seal materials <sup>1</sup>	Pressure class shaft seal	Temperature range shaft seal	Approvals
11	MG12-G60	B Q1 E GG	Ca/SiC/EPDM	PN10	-20/+100 °C	
12	MG12-G60	B Q1 V GG	Ca/SiC/FPM	PN10	-20/+120 °C	
13	RMG12-G606	Q1 B E GG	SiC/Ca/EPDM	PN25	-20/+100 °C	WRAS
14	RMG12-G606	Q1 B V GG	SiC/Ca/FPM	PN25	-20/+120 °C	
15	RMG12-G606	U3 U3 X4 GG	TuC/TuC/HNBR	PN25(PN16)	-20/+120(140) °C	
16	RMG12-G606	U3 U3 V GG	TuC/TuC/FPM	PN25(PN16)	-20/+120(140) °C	
17	M37GN2/16-00-R	U3 B V GG	TuC/Ca/FPM <sup>2</sup>	PN40	-20/+120 °C	
18	RMG12-G606	U3 B E GG	TuC/Ca/EPDM	PN25(PN16)	-20/+120(140) °C	
19	M37GN2/16-00-R	U3 B E GG	TuC/Ca/EPDM	PN40	-20/+120 °C	
20 <sup>3</sup>	H7N	Q1 A E GG	SiC/Ca/EPDM	PN40(PN25)	-20/+120(140) °C	
21 <sup>3</sup>	H7N	Q1 A V GG	SiC/Ca/FPM	PN40(PN25)	-20/+120(140) °C	
22 <sup>3</sup>	H7N	Q1 A X4 GG	SiC/Ca/HNBR	PN40(PN25)	-20/+120(140) °C	
23	RMG12-G606	Q1 B E GG	SiC/Ca/EPDM	PN25	-20/+100 °C	
24	MG12-G60	Q1 Q1 V GG	SiC1/SiC1/FPM	PN10	-20/+120 °C	
28	MG12-G60	Q1 Q1 X4 GG	SiC1/SiC1/HNBR	PN10	-20/+120 °C	
29	MG12-G60	Q1 Q1 E GG	SiC1/SiC1/EPDM	PN10	-20/+100 °C	
30 <sup>4</sup>	MG12-G60	Q1 Q1 V GG	SiC1/SiC1/FPM	PN10	-20/+120 °C	
31	107-L60	B V P FF	Ca/Ce/NBR	PN10	-15/+100 °C	

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Seal code	Shaft seal type	Material mechanical seal	Shaft seal materials <sup>1</sup>	Pressure class shaft seal	Temperature range shaft seal	Approvals
32	107-L60	B V E FF	Ca/Ce/EPDM	PN10	-15/+100 °C	WRAS
33 <sup>5</sup>	RMG12-G606	Q1 B E GG	SiC/Ca/EPDM	PN25	-20/+100 °C	WRAS
34 <sup>6</sup>	RMG12-G606 DST	Q1 B E FF	SiC/Ca/EPDM	PN25	-20/+100 °C	
35	RMG12-G6	eCarb-B eSic-Q7 E GG	eCa/eSic/EPDM	PN25	-20/+120 °C	WRAS
36	MG12-G6	eCarb-B eSic-Q7 V GG	eCa/eSic/FPM	PN25	-20/+120 °C	
37	RMG12-G606	U3 A V GG	TuC/Ca/FPM	PN25(PN16)	-20/+120(140) °C	
38 <sup>5</sup>	RMG12-G606	U3 U3 V GG	TuC/TuC/FPM	PN25(PN16)	-20/+120(140) °C	
39 <sup>5</sup>	RMG12-G6	eCarb-B eSic-Q7 E GG	eCa/eSic/EPDM	PN25	-20/+120 °C	WRAS

Tek.: 20110262-L

1. Apart from the shaft seal other sealings might be assembled with different allowable conditions. If in doubt consult your sales supplier.
2. LHS6 only
3. Mechanical seal can withstand -30/+140 °C@PN40.
4. Only for Seal Options; with PTFE O-rings for stage casing
5. Only for Seal Options.
6. Equivalent of Seal code 13, but with AISI304 spring material.

## 5.9 Explosion safety



### ATTENTION

This sub chapter contains fundamental information which has to be taken in consideration when installing the pump with ATEX permission in a hazardous environment.



### ATTENTION

Loosening or tightening of screws or bolts could cause mechanical sparks. The pump should not be opened, closed or (dis)assembled in an explosion hazardous environment.



### ATTENTION

ATEX pumps applied in explosion hazardous atmospheres must only be used to pump medium with conductivity higher than 50 pS/m.

### 5.9.1 General

Stickers or indicators on the pump sleeve and the motor indicate whether the pump is suitable for use in an environment with risk of explosion.

It is allowed to install the pump in a zone which is classified in directive 1999/92/EC.

When in doubt it is compulsory to check the above directive.

### 5.9.2 Indication



Figure 6: Indication sticker explosion safety

2512

Table 9: ATEX marking

Indication	Meaning
II	Product group for use above ground, with the exception of mine working where there can be danger of explosion due to mine gas and/or flammable substances.
2	Category 2: Equipment in this category is intended for use in areas in which explosive atmospheres caused by mixtures of air and gases, vapours or mists or by air/dusts mixtures are likely to occur.
3	Category 3: Equipment in this category is intended for use in areas in which explosive atmospheres caused by mixtures of air and gases, vapours or mists or by air/dusts mixtures are likely to occur or, if they do occur, are likely to do so only infrequently and for a short period only.
G	Suitable for an environment that is explosive due to gas, vapour or fumes; not suitable for an environment that is explosive due to dust.
T4/T3	Temperature class: T4 for maximum surface temperature 135 °C T3 for maximum surface temperature 200 °C

### 5.9.3 Medium temperature

The medium temperature determines the pump temperature at its interfaces with the motor (at shaft coupling and flange). Practically, these can be considered to be the same. The temperatures at the motor interface need to be permitted by the motor manufacturer, while maintaining the explosion safety as indicated by the motor marking. The standard range of ATEX motors supplied by DP Pumps complies with VDMA/ZWEI 24263. These pumps meet the condition above, when the following requirements are met:

- The maximum allowed medium temperature of the pump is:

Table 10: Maximum medium temperatures

ATEX marking motor	Maximum allowable medium temperature
EX d(e) T3	100 °C
EX d(e) T4	100 °C
EX e T3	60 °C

- Converter operation is not allowed.

The maximum allowed medium temperature for pumps supplied with motors not from the DP Pumps standard range ATEX motors, is equal to the maximum allowed interface temperature as permitted by the motor manufacturer.

### 5.9.4 Commissioning (check list)

It is compulsory to check these points prior to putting the pump in operation.

- Operation of the pump at low flow does results in increased medium temperature. Make sure that the pump is only operated at the allowed flow rates. See also 5.8: Working range
- When lower flows are expected, a bypass should be installed. See 7: Installation instructions
- Make sure that the maximum medium temperatures for ATEX applications is not exceeded. If (malfunctions resulting in) higher temperatures are anticipated, a temperature monitoring and limiting system should be applied (which meets the necessary ATEX requirements).
- Make sure that the pump is de-aerated, and completely filled with the pumped medium during its operation. If (malfunction resulting in) gas in the pump is expected, a dry-running protection should be applied which stops the pump in case of malfunction (meeting the necessary ATEX requirements).
- Overloading of the pump can cause pump failure. Do not apply higher pressures/ temperatures in the pump than is allowed. See also 2.1: Obtaining data and information from DPV / DPLHS 6 pumps and 5.8: Working range.
- Cavitation at the first impeller can cause damaging of the pump. Do not operate the pump with inlet pressures lower than specified in the NPSH requirements. See 5.8: Working range and the technical documentation.
- Wrong adjustment of the coupling can cause abrasion/friction of pump parts. Assembling and adjusting of the coupling has to be performed by a certified mechanic from the supplier of the pump.
- Wrong assembling of the mechanical seal construction can cause abrasion/friction of parts. Assembly and adjustment of the cartridge or easy access seal has to be done by a certified mechanic from the supplier of the pump.
- Make sure that the pump is protected against damage from outside.
- Make sure that the coupling guard is assembled.
- Wrong assembly of the coupling guard could cause it to vibrate during operation of the pump or cause interference of external parts with the

rotating coupling. If the coupling guard has to be (re)assembled, this has to be done by a certified mechanic from the supplier of the pump.

- Make sure that only media is pumped that is compatible with the seals and elastomers that are applied in the pump (see the technical documentation).
- Regularly examine the condition of the bearings in the motor and/or thrust bearing housing in order to detect damage of the bearing raceways/roller elements (for example by vibrations measurement). Stop the application of the pump when damage in a roller element bearing is found
- When the motor has a grease nipple (motor power >7,5 kW), its axially loaded bearing can be lubricated. Proper lubrication is important to prevent high temperatures in the bearings.
- Electric installation of the pump has to be done by a trained and qualified electrician.
- Make sure the pump is electrical grounded (earthed).
- Always install an overload protection, which protects the motor against current overload.
- If the motor is suited with a PTC; connect the PTC to a monitoring and limiting system.
- Leakage of pump medium could occur by for example improper assembly of drain plugs or piping, (failing) mechanical seal or obsolete O-ring of shroud. When pumping a flammable medium, make sure that it cannot ignite in the outside atmosphere.
- At the mechanical seal, minor release of the pumped medium finds place. Shaft seal failure can cause increased leakage. In case of pumping flammable medium, proper ventilation should be ensured to maintain the zone classification as indicated by the ATEX marking of the pump.

If the pump is supplied without motor, also check these points prior to putting the pump in operation:

- Apply an ATEX certified motor.
- Make sure that the motor marking has the proper Equipment group: Group II ('explosive gas atmospheres other than mines').
- Apply a motor with a nominal power which is suited to drive the pump at the operating frequency.
- Apply a motor that has the proper frame size to connect with the motor stool.

- Apply a motor that has a special bearing which is suited to support the high axial loads of the pump shaft. If the motor bearing is not suited to support the pump shaft, a thrust bearing housing has to be applied.
- The maximum allowed medium temperature is equal to the maximum allowed temperature, as allowed by the motor manufacturer, at the interfaces between pump and motor (at shaft and flange). Please see 5.9.3: Medium temperature.

If the pump is supplied with thrust bearing housing, also check these points prior to putting the pump in operation:

- When the thrust bearing housing has a grease nipple (motor power >7,5 kW) its axially loaded bearing can be lubricated. Proper lubrication is important to prevent high temperatures in the bearings.
- Wrong adjustment of the axial play between the thrust bearing housing shaft and the motor shaft could cause too high impacts between these parts or increased loading and wear of the roller element bearings. Assembling of the electric motor on the thrust bearing housing has to be done by a certified mechanic from the supplier of the pump.

# 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**

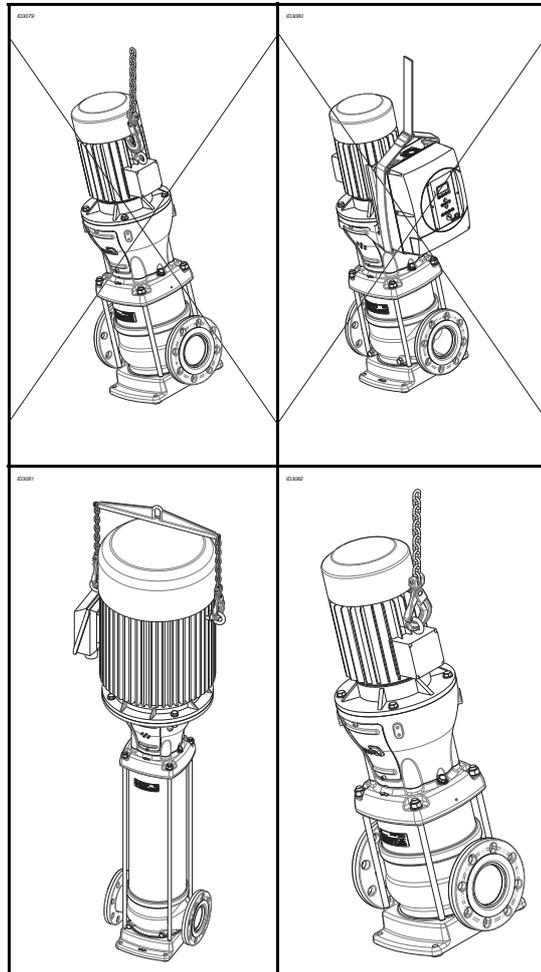
Do not lift the pump by using the frequency converter (if placed), electrical parts or the motor cover. Be sure that the pump is always in balance.



**WARNING**

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

Table 11: Transport positions



## 6.2 Storage

Fill the pump with glycol in order to protect it against the risk of frost.

Table 12: Storage

Storage	
t <sub>ambient</sub> [°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 Setting up the pump



### ATTENTION

Avoid stress in the pump casing caused by misalignment in the piping system. Please see table below.

Table 13: Allowable forces DPVCF and DPV(S)F

Type	DN [mm]	Force [N]				Type	DN [mm]	Force [N]			
		F <sub>x</sub>	F <sub>y</sub>	F <sub>z</sub>	Σ F			F <sub>x</sub>	F <sub>y</sub>	F <sub>z</sub>	Σ F
VCF 2 B	25	9400	-3200	3200	10430	V(S)F 2 B	25	3300	-2400	1700	4420
VCF 4 B	25	9400	-3200	3200	10430	V(S)F 4 B	25	3300	-2400	1700	4420
VCF 6 B	32	9400	-3200	3200	10430	V(S)F 6 B	32	3300	-2400	1700	4420
VCF 10 B	40	8000	-2000	3200	8850	V(S)F 10 B	40	4000	-3100	3100	5930
VCF 15 B	50	8000	-2000	3200	8850	V(S)F 15 B	50	4000	-3100	3100	5930
VCF 25 B	65	5000	-2000	2500	5940	V(S)F 25 B	65	3200	-3500	3500	5890
VCF 40 B	80	6000	-3000	3000	7350	V(S)F 40 B PN16/25	80	4000	-1800	2000	4820
						V(S)F 40 B PN40	80	3700	-3300	3700	6190
VCF 60 B	100	6000	-3000	3000	7350	V(S)F 60 B PN16/25	100	4000	-1800	2000	4820
						V(S)F 60 B PN40	100	3700	-3300	3700	6190
VCF 85 B	100	6200	-4100	4100	8490	V(S)F 85 B	100	3500	-2500	1000	4420
VCF 125 B PN16	125	4400	-1700	1700	5010	V(S)F 125 B PN16	125	4400	-1700	1700	5010
VCF 125 B PN25/ PN40	125	7000	-2620	2620	7920	V(S)F 125 B PN25/ PN40	125	7000	-2620	2620	7920
						DPLHS 6	32	8000	-2000	3200	8800
Type	DN [mm]	Torque [Nm]				Type	DN [mm]	Torque [Nm]			
		M <sub>x</sub>	M <sub>y</sub>	M <sub>z</sub>	Σ M			M <sub>x</sub>	M <sub>y</sub>	M <sub>z</sub>	Σ M
VCF 2 B	25	600	300	-360	760	V(S)F 2 B	25	280	95	-210	360
VCF 4 B	25	600	300	-360	760	V(S)F 4 B	25	280	95	-210	360
VCF 6 B	32	600	300	-360	760	V(S)F 6 B	32	280	95	-210	360
VCF 10 B	40	460	460	-500	820	V(S)F 10 B	40	440	180	-200	520
VCF 15 B	50	460	460	-500	820	V(S)F 15 B	50	440	180	-200	520
VCF 25 B	65	1000	300	-300	1090	V(S)F 25 B	65	1000	230	-400	1100
VCF 40 B	80	1800	1000	-1000	2290	V(S)F 40 B PN16/25	80	400	200	-300	540
						V(S)F 40 B PN40	80	975	240	-450	1100
VCF 60 B	100	1800	1000	-1000	2290	V(S)F 60 B PN16/25	100	400	200	-300	540
						V(S)F 60 B PN40	100	975	240	-450	1100
VCF 85 B	100	2000	1200	-1200	2620	V(S)F 85 B	100	750	500	-625	1100
VCF 125 B PN16	125	600	425	-425	850	V(S)F 125 B PN16	125	600	425	-425	850
VCF 125 B PN25/ PN40	125	1000	650	-650	1360	V(S)F 125 B PN25/ PN40	125	1000	655	-655	1360
						DPLHS 6	32	460	460	-500	800

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### ATTENTION

For the values mentioned in the tables above, it is assumed that they occur simultaneously.

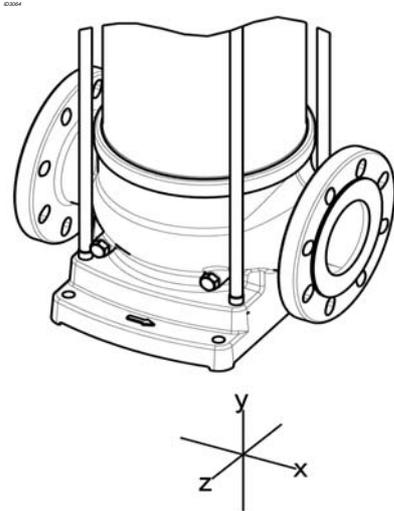


Figure 7: Allowable forces

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### 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 dry and frost-free room.
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. Install the pump with counter flanges. For pumps with non-standardised connections, counter flanges are delivered separately.
4. It is advised to install a shut off valve on the supply and on the delivery connection of the pump.
5. To avoid medium flowing back through the pump, when idle, make sure a non-return valve is installed.
6. Make sure that the inlet of the pump is never clogged.

## 7.1.1 Indicators

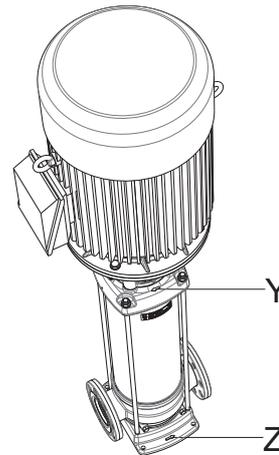


Figure 8: Pump indicators

The arrow (Z) on the pump foot indicates the flow direction of the liquid. The arrow (Y) on the top bracket indicates the rotating direction of the motor.

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## 7.1.2 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" and fig 5: Minimum capacity vs. temperature (in % of Q optimum).

## 7.2 Mounting a motor on the pump



### ATTENTION

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

The following motor specifications are required:

- Increased power output (when applicable)
- Reinforced bearing at driven end (to withstand the axial force)
- Fixed bearing at driven end (to minimize the axial play)
- Smooth shaft, no key way (to improve the coupling grip and to improve the motor balance)

The advised bearings per motor type are:

Table 14: Minimum required motor Driven-end bearing

Bearing type			
Power output [kW]	1 phase 50 Hz	3 phase 50/60 Hz	
		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	6204-2Z-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	
15		7309	
18.5		7309	
22		7311	
30		7312	
37		7312	
45		7313	

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**7.2.1 Install the motor on pumps, supplied without motor, with a standard mechanical seal.**

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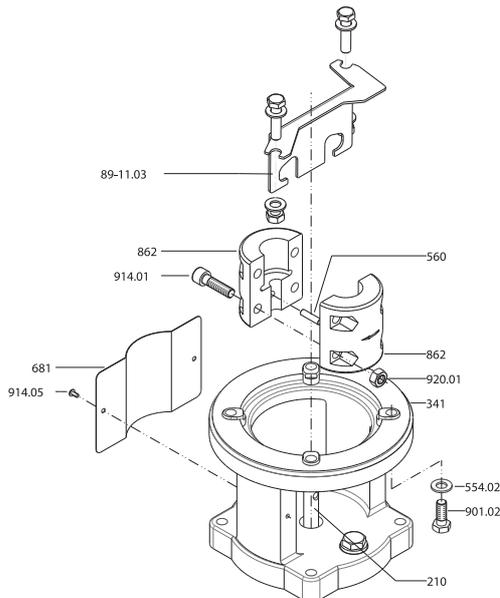


Figure 9: Without motor

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1. Remove the coupling guards (681) and the coupling shells (862).
2. Remove the seal protection bracket (89-11.03) and its mounting material. For pumps with a taper piece (722) (with motor of 5.5 kW or higher), the two bolts (914.02 or 901.02) have to be replaced to connect the taper piece to the motor stool. Thoroughly clean the motor stool (341), the shaft (210), the coupling shells (862) and the motor shaft.
3. Loosely fasten the coupling shells (862) with the coupling pin (560) in the hole in the shaft (210). Use the hexagon socket head cap screw (914.01) and the nut (920.01) for this.
4. Place the motor on the motor stool (341).
5. Tighten the lower bolts of the coupling shells (862) in such way, that the coupling slightly clamps around the motor shaft.
6. For pump series: **DPV**  
Use a sufficient tyre iron to lift the coupling (and hydraulic assembly) 1.5 mm above the lowest position. For easy and accurate adjustment of the coupling contact your supplier for the appropriate Toolkit For Adjustment Hydraulics.

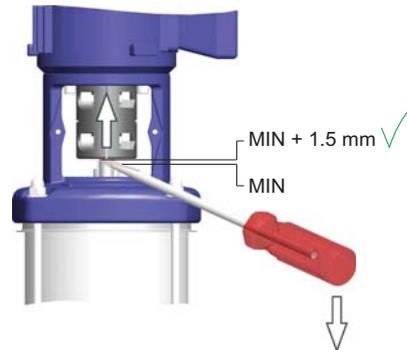


Figure 10: fixed seal

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**WARNING**  
Correct seal adjustment max. 1.5 mm above the lowest position.



**ATTENTION**  
For motors of 11 kW or higher, block the rotor when adjustments are made to the coupling. This ensures that the rotor is not lifted out of its bearings.

7. For pump series: **DPLHS 6**  
Use a sufficient tyre iron to lift the coupling (and hydraulic assembly) to the maximum upwards position and lower it 1 mm from this position.

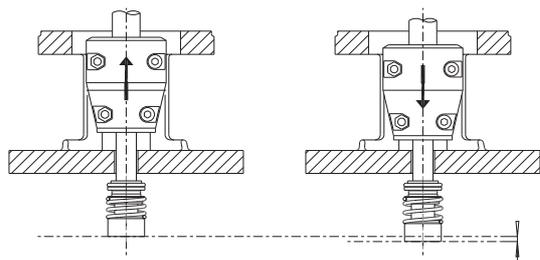


Figure 11: Positioning the seal



**WARNING**

Correct seal tension max. -1 mm lower than the maximum upwards position!



**ATTENTION**

For motors of 11 kW or higher, block the rotor when adjustments are made to the coupling. This ensures that the rotor is not lifted out of its bearings.

- Fully tighten the couplings at the specified torque (see table 16: Torques). Make sure that the gaps between the couplings are equally divided on both sides (see drawing).

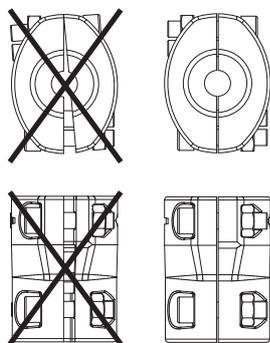


Figure 12: Position of the coupling

- Attach the coupling guards (681) with the socket head cap screws (914.05) to the motor stool (341).
- Connect the power supply. see § 7.3: Electrical installation.

**7.2.2 Installing the motor on pumps, supplied without motor, with a cartridge seal**

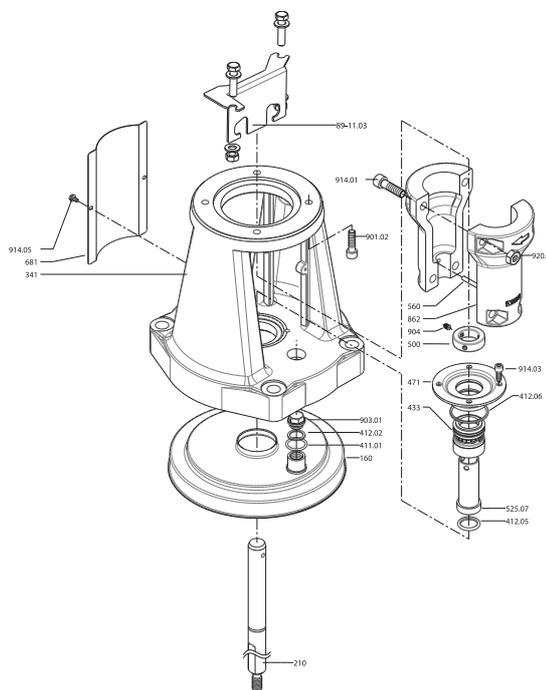


Figure 13: With motor

- Remove the coupling guards (681) and the coupling shells (862).
- Remove the seal protection bracket (89-11.03) and its mounting material. For pumps with a taper piece (722) (with motor of 5.5 kW or higher), the two bolts (914.02 or 901.02) have to be replaced to connect the taper piece to the motor stool. Thoroughly clean the motor stool (341), the shaft (210), the coupling shells (862) and the motor shaft.
- Loosely fasten the coupling shells (862) with the coupling pin (560) in the hole in the shaft (210). Use the hexagon socket head cap screw (914.01) and the nut (920.01) for this.
- Place the motor on the motor stool (341).
- Loosen the three cartridge grub screws (904) one turn.
- Push the hydraulic pump assembly in the lowest position.
- Tighten the three cartridge grub screws (904) firmly to the shaft.
- Tighten the lower bolts of the coupling shells (862) so that the coupling slightly clamps around the motor shaft.
- For pump series: **DPV**

Use a sufficient tyre iron to lift the coupling (and hydraulic assembly) 1.5 mm above the lowest position. For easy and accurate adjustment of the coupling contact your supplier for the appropriate Toolkit For Adjustment Hydraulics.

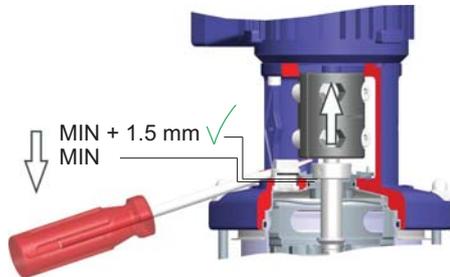


Figure 14: Cartridge seal

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**WARNING**  
Correct seal adjustment max. 1.5 mm above the lowest position.



**ATTENTION**  
For motors of 11 kW or higher, block the rotor when adjustments are made to the coupling. This ensures that the rotor is not lifted out of its bearings.

10. For pump series: **DPLHS 6**  
Use a sufficient tyre iron to lift the coupling (and hydraulic assembly) to the maximum upwards position and lower it 1 mm from this position.

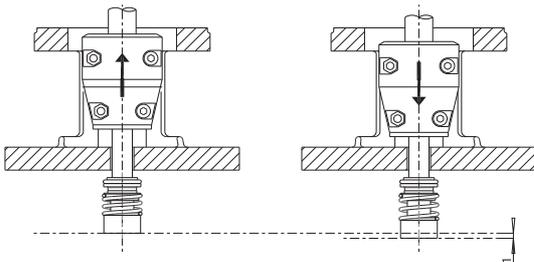


Figure 15: Positioning the seal

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**WARNING**  
Correct seal tension max. -1 mm lower than the maximum upwards position!



**ATTENTION**  
For motors of 11 kW or higher, block the rotor when adjustments are made to the coupling. This ensures that the rotor is not lifted out of its bearings.

11. Fully tighten the couplings at the specified torque (see table 16: Torques). Make sure that the gaps between the couplings are equally divided on both sides (see drawing).

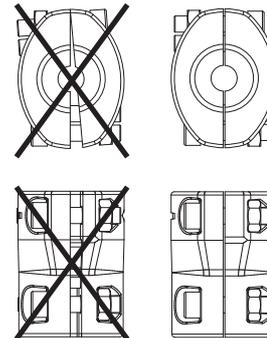


Figure 16: Position of the coupling

20030733

12. Install the coupling guards (681) with the socket head cap screws (914.05) to the motor stool (341).  
13. Connect the power supply. see § 7.3: Electrical installation.

## 7.3 Electrical installation



**WARNING**  
In accordance with the local regulations only authorised personnel is allowed to electrically connect the motor.



**ATTENTION**  
Connect the motor according to figure 17: 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 manual motor protector.

Example may differ upon chosen motor

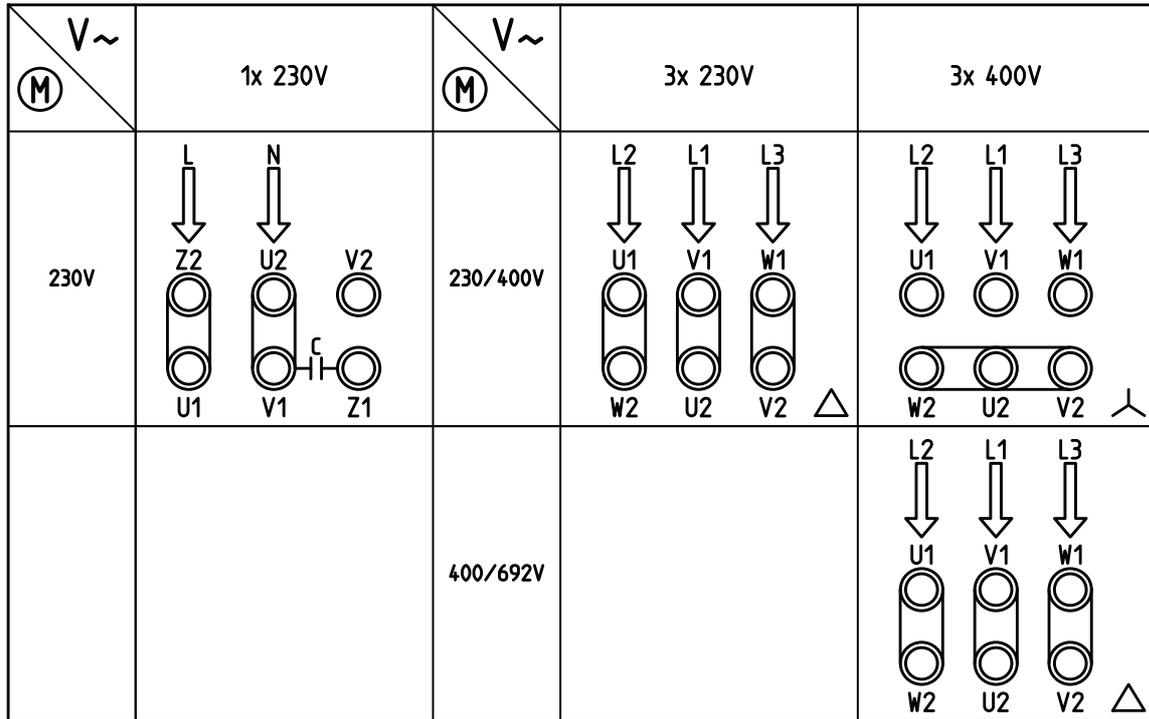


Figure 17: Motor connections

20130499-A

PTC connection STM 140 EK:

- Standard motors 3 kW and up are equipped with a PTC thermistor. Consult Table 15: Technical specifications PTC STM 140 EK.
- Connect the PTC to a thermistor relay.

Table 15: Technical specifications PTC STM 140 EK

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

## 7.4 Commissioning



### WARNING

The pump must be switched off when it is not completely filled up with the medium.



### ATTENTION

Vent the pump and suction line. Fill the pump and suction line with the medium.



### ATTENTION

Seen from the top of the motor the pump should rotate clockwise. See 17: Motor connections (Y). In case of a 3-phase motor the rotating direction can be changed by exchanging two of the three phases.

**7.4.1 In an open or closed circuit with sufficient supply pressure**

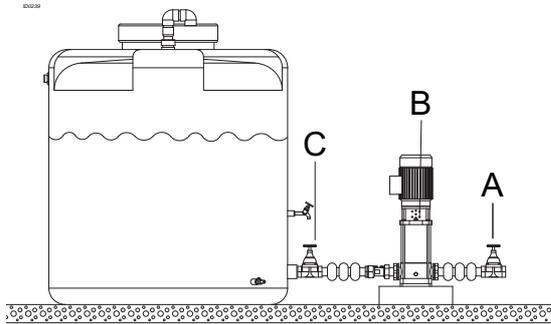


Figure 18: Example: Pump with open or closed circuit

ID239

1. Close the suction shut-off valve (C) and the outlet shut-off valve (A).
2. Open the fill plug (B).
3. Gradually open the suction shut-off valve until the liquid flows from the fill plug (B).
4. Close the fill plug.
5. Fully open the suction shut-off valve.
6. Check the rotational direction of the pump.
7. Fully open the outlet shut-off valve (A).

**7.4.2 In an open circuit with a liquid level lower than the pump**

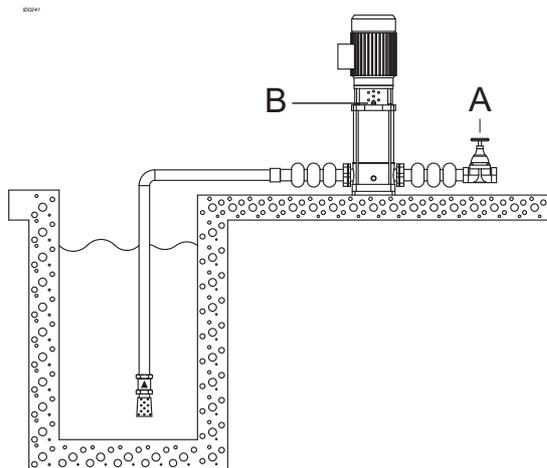


Figure 19: Example: Liquid level lower than pump

ID241

1. Remove the fill plug (B) from the top bracket.
2. Close the outlet shut-off valve (A).

3. Fill the pump housing to the maximum through the fill plug with the liquid that is to be pumped.
4. Insert the fill plug (B) in the top bracket.
5. Check the rotational direction of the pump.
6. Open the outlet shut-off valve (A).

**7.4.3 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;
2. Check if the mechanical seal is still leaking.

If the mechanical seal is still leaking:

1. Disassemble the mechanical seal.
2. Thoroughly clean and degrease the seal faces.
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 operational 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.

The bearings of 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 § 7.2: Mounting a motor on the pump.

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

Turn the shaft every three months<sup>1</sup>. This protects the seals from seizure.

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

1. period may vary per application or medium. Please consult your sales representative for application details.

1. Close all pump valves.
2. Drain each pump and/or the system.
3. Remove all plugs from the pump.
4. Open the shut-off and fill/air vent plug, if present.

## 9.4 Torques of coupling shell - pos 914.01

Table 16: Torques

Coupling shell	Pos 914.01	LHS6		Generation B	
Aluminium	Frame 71-112	M8	22	M8	22
Aluminium	Frame 56c-184TC	M8	22	M8	22
Cast iron	Frame 90-200	M10	70		
Cast iron	Frame 182TC-326TSC	M10	70		
Cast iron	Frame 132-225			M10	70
Cast iron	Frame 213TC-364TSC			M10	70
95000697-AX					

# 10 Failures

## 10.1 Failure table



**WARNING**

Observe the general safety precautions before installation, maintenance and repair.

Problem	Possible cause	Possible solution	Checkpoints
Leakage along the shaft.	Seal faces of the mechanical seal worn or damaged.	Replace the mechanical seal.	Check the pump for dirt / abrasive parts.
	New pump: seal stuck due to assembly.	Open and close the outlet shut-off valve quickly during operation.	
	Mechanical seal mounted incorrectly.	Install the mechanical seal correctly. Lubricate with water and soap.	
	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.	Replace the mechanical seal.	
Leakage along the shroud at the top bracket or at the pump casing.	O-ring worn	Replace the O-ring.	
	O-ring not resistant to the medium to be pumped	Replace O-ring by an O-ring with better resistance	
	Too much stress on the pump casing; it becomes oval.	Decrease stress on piping. Mount the pump casing without stress. Support the connections.	
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 of medium.	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).	Improve suction condition.	

Problem	Possible cause	Possible solution	Checkpoints
Pump is vibrating or noisy.	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.	
Pump does not start.	No voltage on the power terminal.	Check the power supply.	<ul style="list-style-type: none"> <li>• Circuit</li> <li>• Main switch</li> <li>• Fuses</li> </ul>
		Check the motor safety relay	<ul style="list-style-type: none"> <li>• Earth leakage switch</li> <li>• Protective relay</li> </ul>
	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 coupling between pump- and motor shaft is loose (when applicable).	Tighten the connecting screws to the required torque.	
	The pump shaft is broken.	Contact the supplier.	
Pump supplies insufficient capacity and/or pressure.	Outlet and/or inlet shut-off valve is closed.	Open both shut-off valves.	
	There is air in the pump.	Vent the pump.	
	The suction pressure is insufficient.	Increase the suction pressure.	
	Pump rotates in the wrong direction.	Interchange two of the three phases.	
	The suction line has not been vented.	Vent the suction line.	
	Air bubble in the suction line.	Install the suction line with pump end higher than the other end.	
	Pump sucks air because of leakage in the suction line.	Repair the leakage.	
	Water flow too low. Air bubbles clog up the pump.	Make sure the flow increases or use a smaller pump.	
	The diameter of the suction line is too small.	Increase the diameter of the suction line.	
	Capacity of water meter in the supply line is too small.	Increase the capacity of the water meter.	
	Foot valve blocked.	Clean the foot valve.	
	The impeller, the diffuser or stage 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 EU Declaration of conformity

**Manufacturer:** D.P. Industries B.V.  
Kalkovenweg 13  
2401 LJ Alphen aan den Rijn, The Netherlands  
Tel: (+31)(0)-172-48 83 88

**Product:** Vertical multi-stage centrifugal pumps, series: DPV and DPLHS  
Serial number: 43/2018 1000000-1 - 52/2020 9999999-9

The manufacturer declares under his sole responsibility that:

- The product above is in conformity with the relevant Community harmonization legislation in the most recent form:
  - EC Machinery Directive 2006/42/EC
  - Ecodesign Directive 2009/125/EC, Regulation 547/2012 (for water pumps with a maximum shaft power of 150 kW)
- The following harmonised standards are used:
  - EN 809
  - ISO 12100

In case the pump is delivered, ordered and marked with an ATEX classification the manufacturer additionally declares under his sole responsibility that:

- The product above is in conformity with the harmonization legislation in most recent form: 2014/34/EU. The following harmonized standards are used: EN 13463-1 and EN 13463-5. The notified body PTB (number 0102) files the technical report with registration number 11 ATEX D048-1.

The pump is subject to this declaration of conformity as a stand-alone product. Make sure that the appliance or installation, in which the pump is built in, has got a declaration of compliance with the legislation listed above.

The representative which is authorized to compile the technical file is:

Menno Schaap  
Manager Product Development  
D.P. Industries B.V.  
Kalkovenweg 13  
2401 LJ Alphen aan den Rijn  
The Netherlands





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10/2018

BE00000377-I / EN  
Can be changed without prior notice  
Original instructions

