Operation & Maintenance Manual

Submersible pumps type DWP
&
Submersible pumps type DNP

Explosion proof version

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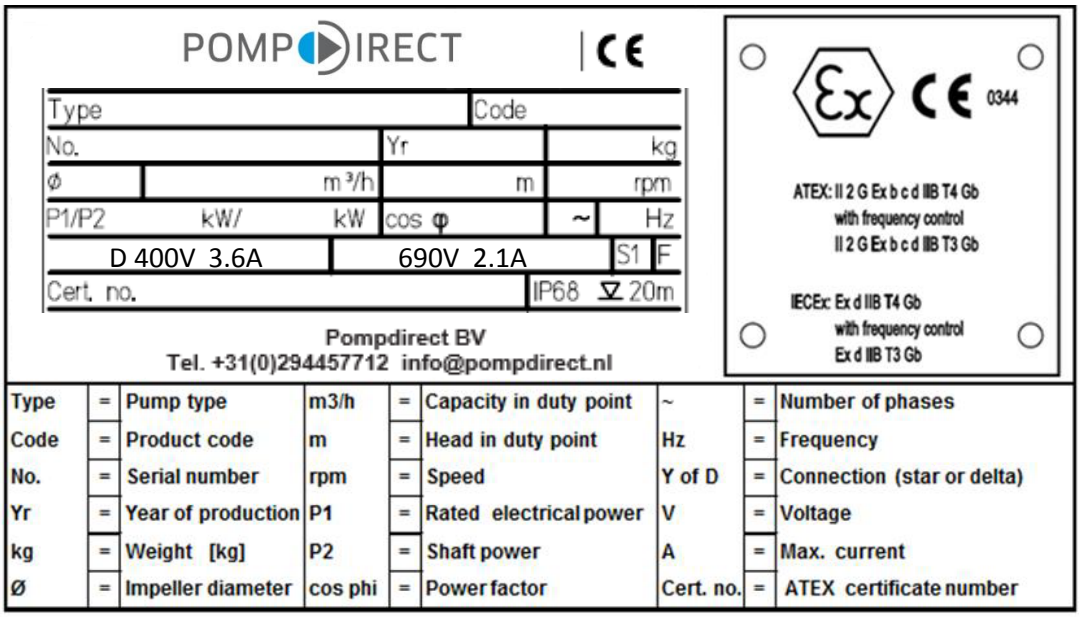
Foreword:

This manual includes several warnings, installation guidelines and safety instructions. Before installation, please read carefully to avoid dangerous situations, which can lead to severe physical injury, and which could also damage the pump.
Both the DWP and DNP pump series are typically designed to pump waste water containing long fibrous materials.
De DNP slurry pumps are typically designed for all kinds of weary media, such as sand mixtures and slurries. The pump is equipped with a heavy duty Epoxy coating for long operational use.
The pump is built in Flameproof version and might be used in a potentially explosive atmosphere, ATEX: group II category 2 IEC: (zone 1).

The DWP en DNP pumps are designed for professional use only.
Only trained and skilled personal may install, maintain and operate the pump.

Pump identification:

The main characteristics are given on the data plate, which is connected to the pump



Type	=	Pump type	m3/h	=	Capacity in duty point	~	=	Number of phases
Code	=	Product code	m	=	Head in duty point	Hz	=	Frequency
No.	=	Serial number	rpm	=	Speed	Y of D	=	Connection (star or delta)
Yr	=	Year of production	P1	=	Rated electrical power	V	=	Voltage
kg	=	Weight [kg]	P2	=	Shaft power	A	=	Max. current
Ø	=	Impeller diameter	cos phi	=	Power factor	Cert. no.	=	ATEX certificate number

Code of Notified body 0344 (DEKRA) and Ex category are on the second data plate.

Power supply:

The power supply of the pump is part of the controls of the electrical installation.
Please read carefully the specific user instructions of the electrical installation.
These instructions, including the wiring diagram, are necessary for safe installation.

Usage limitations:

De DWP & DNP pumps in Explosion proof Version may be installed in potential explosive atmospheres, group II category 2 (zone 1) gas group IIB temp. class T4.
In combination with frequency control temperature class T3 is valid.
Pay attention to the right temperature and gas group classification, see EN 60079-0.

Only use original spare parts to maintain the explosion safety !

General safety instructions before installation or maintenance:

The following safety instructions should be followed up very carefully to avoid severe injury or damage.
Before maintenance or inspection, both mechanical and electrical, always switch off the pump.

Turn off the main power supply, logout and tag out according local procedures!

Remove the fuses (if applied) and store them in a safe place.
Switch off the emergency power supply if available.

Alert other people with a clear warning to make aware this service or maintenance operation..

For servicing the pump, and replacing the oil it is standard to bring the pump in horizontal position.
This position is also needed to check the rotation of the pump.
Be aware the recoil can be very powerful, don't go near rotating parts, or stand close to the pump when testing.

Do not put hands or fingers into the pump opening if no safety measures are taken.

When it is necessary to inspect the pump outside the sump, please close the cover of the pump sump, and take care about the following:
Check carefully the power cable for bends and jamming.
To avoid cable damage put a decent spacer between pump cover and the sump

Never use the power cable to hoist the pump!
Avoid any risk, that might damage the power supply cable.

Always use safety shoes and safety gloves when handling the pump.

Make sure all safety measures are conform the legal laws and provisions, such as the specific Labor Safety Instructions for confined spaces.

Environment:

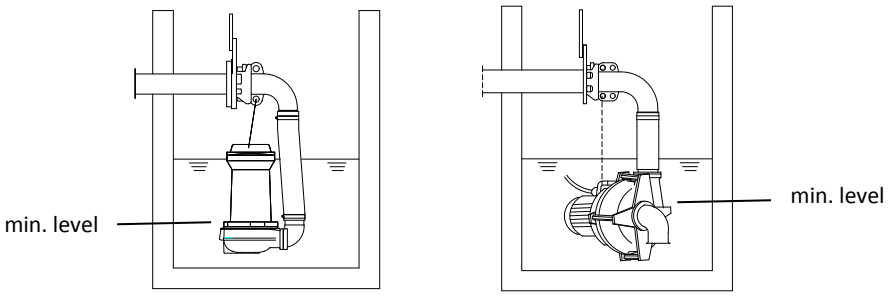
Parts which will be replaced during repair, maintenance or renewal, could contain materials which could be harmful to the environment.
Please be also aware that some of the components can be very useful for reuse.
The owner is responsible for careful disposal and processing of the materials.
Do this in according to the local environmental regulations.

Installations:

For the DWP & DNP pumps several installation options are possible.
These options will be explained, with focus on specific points of attention.

Installation “BWK”

This installation represents a permanent submerged installation using the header coupling” type “BWK”.
De smaller pumps (22 series) are suspended in vertical position to this coupling.
De bigger pumps (42 series) are suspended in horizontal position to the coupling.

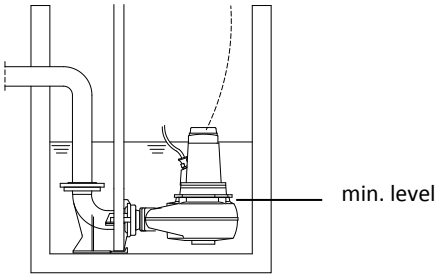


Points of attention:

- Ensure a good free passage under the pump, at least identical to the suction opening.
- Adjust start- and stop levels in such a way that the motor will not make more than 20 starts per hour **and so that the volute and seals are always submerged**!
  The level regulation should be intrinsic save with safety level of a least SIL1.
- Check that the motor is adequately cooled.
  At full load conditions, at least 2/3 of the motor housing should be submerged.

Installation “OWK”

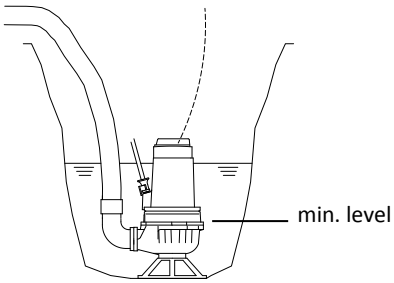
This installation represents a permanent submerged installation using the guide bar coupling” type “OWK”..



Points of attention:

- Ensure a good free passage under the pump, at least identical to the suction opening.
- Check both the vertical and parallel position of the guide bars.
  The maximum tolerance for the vertical position is ± 3º.
- The installation angle for the pump in case of installation or taking out is important.
  This angle (between pump and guide bar) is about 10º en 15º.
  This angle can be adjusted by changing the position of the hoisting cable.
- Adjust start- and stop levels in such a way that the motor will not make more than 20 starts per hour **and so that the volute and seals are always submerged**!
  The level regulation should be intrinsic save with safety level of a least SIL1.
- Check that the motor is adequately cooled.
  At full load conditions, at least 2/3 of the motor housing should be submerged.

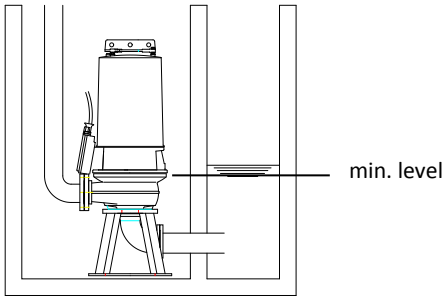
Installation "VRS"
This installation represents a permanent freestanding submerged installation.



Points of attention:

- Ensure a good free passage under the pump, at least identical to the suction opening.
- Adjust start- and stop levels in such a way that the motor will not make more than 20 starts per hour **and so that the volute and seals are always submerged**!
  The level regulation should be intrinsic save with safety level of a least SIL1.
- Check that the motor is adequately cooled.
  At full load conditions, at least 2/3 of the motor housing should be submerged.

Installation "ODO"
This installation represents a dry installation where the pump is equipped with a cooling system.



Points of attention:

- The discharge- and suction flanges should be exactly in line with the piping system.
- This installation may not create forces on the discharge- and suction flanges.
- Check the cooling system regularly for blockages.
  To do this, therefore the cooling jacket must be taken off.
  The bolts ad nuts on top of the cooling jacket, or suspension bracket must be reconnected.
  Prior to inspection, close the valves in discharge and suction pipelines!
- Adjust start- and stop levels in such a way that the motor will not make more than 20 starts per hour **and so that the volute and seals are always submerged**!
  The level regulation should be intrinsic save with safety level of a least SIL1.

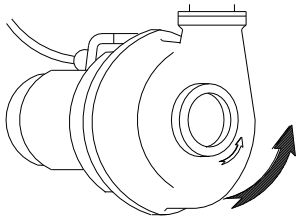
Hoisting device:

De submersible pumps can be (re-)installed in the sump by means of an adequate hoisting device.
Pompdirect is able to deliver this certified equipment.

Hoisting cable:

If applied, please replace the stainless steel hoisting cable every two years, or accordingly to local regulations.

Operation checks:



The correct direction of rotation is counter clockwise (ccw), looking at the suction opening of the pump.
Check procedure: Place the pump into horizontal position, start the pump short time, check visually the direction of rotation.
Please follow all safety measures!.
The pump should operate with sufficient cooling conditions. This means for at least ⅔ of the motor is submerged.
Without this requested cooling condition, the motor runtime is limited to maximum 15 minutes, to avoid overheating. The cooling down time is twice the running time.

Noise level:

In pump installations in sumps, with closed pump cover, the noise level will not exceed 70 dB(A). In dry installed pumps according to installation version ODO, the noise level sometimes may exceed 80 dB(A). Please use proper hearing protection!

Electrical pump connections:

The different connections for the cables are specified on page 8 and 9.
Check the cable type installed on the pump and verify the data onto the pump data plate.
The pump is equipped with extra leads for thermal protection. The thermal protection ensures that the pump under all conditions meet the needs of temperature class T4.
Standard thermo-switches (Klixons) with 125°C switching temperature are supplied.
Contact rating: max. 250V-1.6A. The contacts are normally closed.

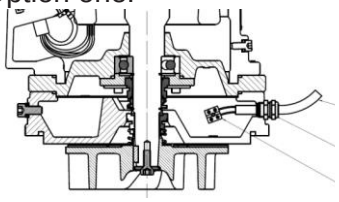
As an option thermistors (PTC) with 125°C switching temperature can be supplied.
These are resistors, not circuit breakers!
Resistance cold: 200-500 Ohm, Resistance at switching temperature: 1650-4000 Ohm
Maximum voltage is 7.5 V.

Resetting may only be done manually!
The electrical connection of the permanently connected un terminated cable shall be made in a certified enclosure in type flameproof enclosure “d” or increased safety “e”.

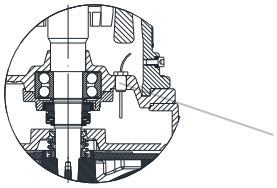
Water in oil detection:

As a safeguard against water ingress into the motor, the pump can be equipped with a water detector in the oil housing. The water detector detects water which might have entered the oil housing due to seal failure or cable damage.
The water detector causes the pump to switch off, before damage to the motor is done.

Option one:



Option two:



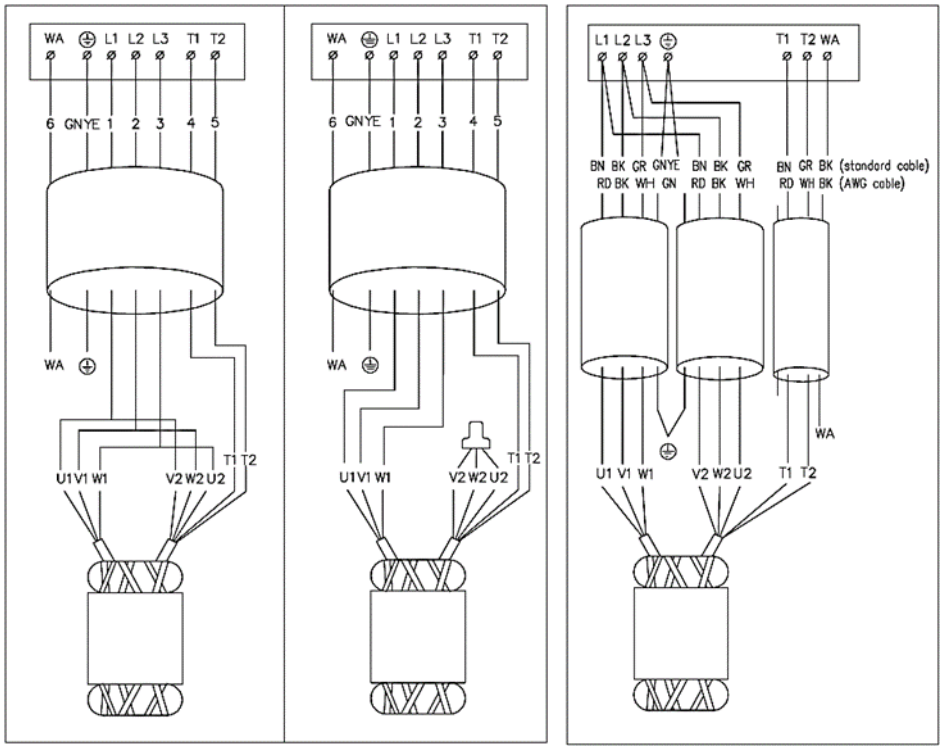
Electrodes in the oil housing are connected to an intrinsic safe amplifier by means of a shielded cable or the kabel is connected through the pump cable.
For ATEX for example the Vegator 132.AC.XXKBX and for example the IECEx Vegator 132.IC.XXKBX or equal. (See diagrams on page 8 and 9)

We do strongly recommend to connect the pump to the mains by authorized personal only.
Please ensure this is done accordingly and in compliance with local regulations.

Cable connection direct start of the pump (DOL)

1x 7 core cable

3x 4 core cable



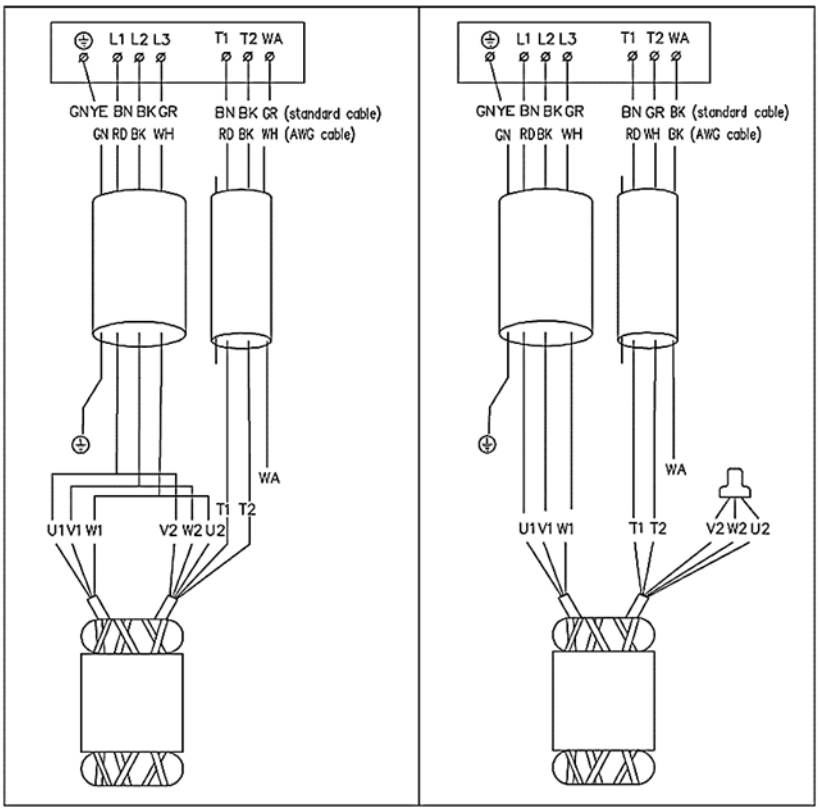
Motor in delta Motor in star

Standard cable	
BN	Brown
GR	Grey
BK	Black
GN/YE	Green/ Yellow
AWG cable	
GN	Green
RD	Red
WH	White
BK	Black
T1, T2	Klixons
L1,L2,L3	3-phase line

Optional:

WA Water detection in motor and oil housing.
Only allowed with intrinsic safe amplifier.

2x 4 core cable



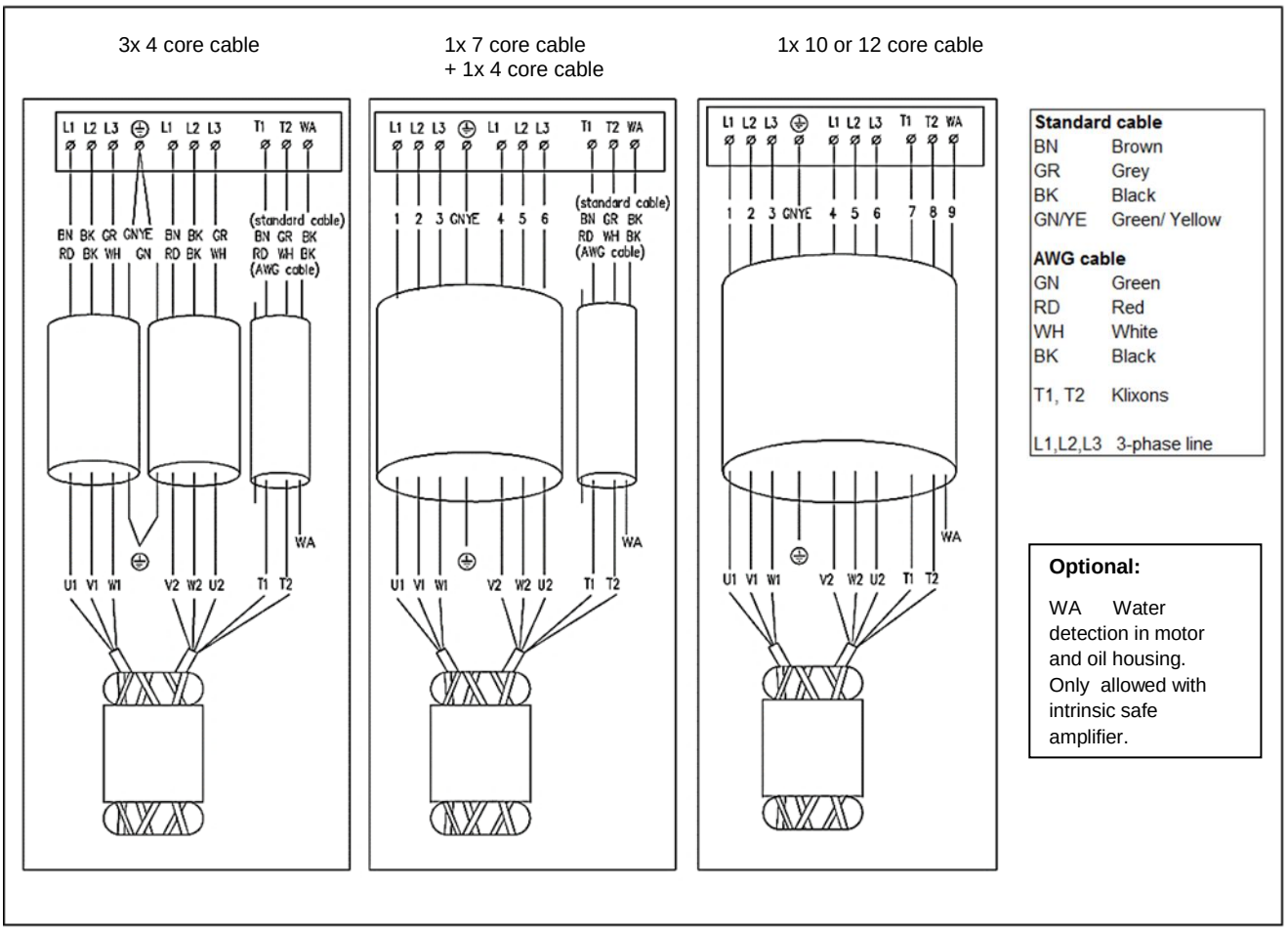
Motor in delta Motor in star

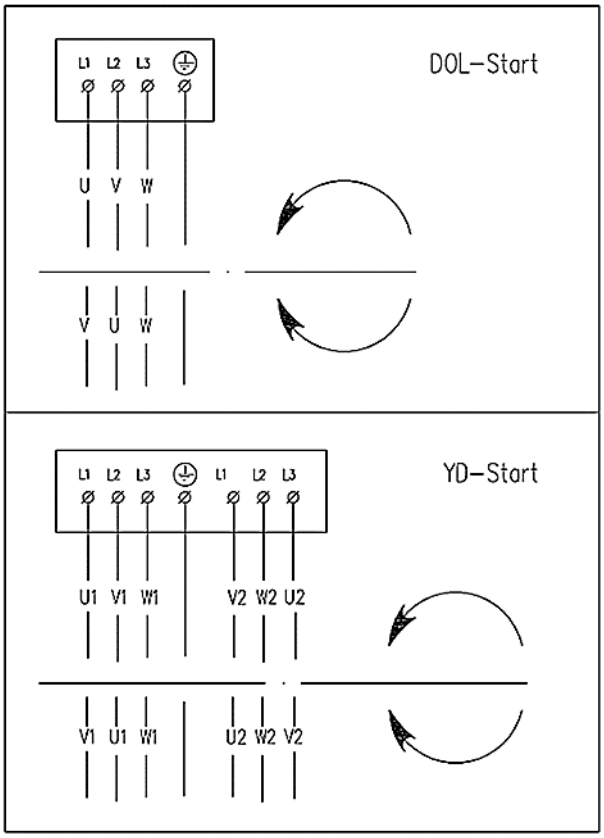
Standard cable	
BN	Brown
GR	Grey
BK	Black
GN/YE	Green/ Yellow
AWG cable	
GN	Green
RD	Red
WH	White
BK	Black
T1, T2	Klixons
L1,L2,L3	3-phase line

Optional:

WA Water detection in motor and oil housing.
Only allowed with intrinsic safe amplifier.

Cable connection star-delta start of the pump (YD).





Changing the direction of rotation

Checkpoint first pump start:

Before installing and start operating the pump following checkpoints are involved:

- Check on delivery
  Remove the pump from the packing and check for transport damage, such as material errors, cracks of bended cable.
- Check for completeness of the delivery.
  If the delivery is incomplete, or damaged, please contact your supplier immediately.
- Check oil level
  Verify the oil level in the seal housing (according to procedures on page 11)
- Check Power supply.
  Verify if voltage, frequency and starting method are according to the data as specified on the pump data plate.

Connect the pump according to the wiring diagram of the electrical cabinet.
Information about the pump cable codes can be find on page 8 or 9.

Thermal protection:

Thermo-switches (klixons), the connection values for the standard thermal protection are max. 250V-1.6A. In 'cold' condition the switch is closed.

Thermistors (PTC), as an option thermistors can be supplied.
Resistance cold: 200-500 Ohm,
Resistance at switching temperature: 1650-4000 Ohm

Cable entry:
Especially when the pump has been stored for a long time, fasten the cable entry, if necessary, to tighten the rubber gland of the cable entry, the torque should be; G7/8" = 80-100 Nm, M42 = 120-150 Nm.

Motor protection:
Verify the presence of the motor protection circuit breaker.

At direct start (DOL) the motor circuit breaker should be set at the current value given on the data plate of the pump.
At star delta start (YD) the setting of the motor circuit breaker should be 0.6 of the current value on the data plate of the pump.

Special conditions for safe use

Thermo switches or PTC thermistors in combination with a protective device shall be installed in the motor circuits in such a way that too high temperatures leads to switching-off of the motor. The resetting of the supply shall be manually.

The level sensors must have a minimum safety integrity level SIL 1

The motors are provided with fasteners of at least property class A2-70

Contact the manufacturer for information on the dimensions of the flameproof joints

Maintenance:

Before removing the pump from the installation, please switch-off the mains, according to the instructions on page 4.
Clean the pump adequately!
Take care! The surface of the pump can be hot, especially when it is just switched off.

Maintenance schedule:
* After the first 100 operating hours:
- Check the condition of the oil.
If too much water is mixed with the oil, please contact your supplier.
* Every 1000 operating hours or each year:
- Check both the condition of the oil and the oil level.
If too much water is included, please contact your supplier.
- Change the oil if not transparent.

Lubricants:
The bearings of the pump are greased for life.
Standard oil type for the mechanical seals: Shell Tellus 32, viscosity 32 cSt.
The quantity of the oil depends on the pump:
DWP/ DNP 22 series: 0,5l.
DWP/ DNP 42 series: 2,0l.
DWP/ DNP 62 series: 2,5l.

Cable entry:
If the pump is stored for long time, the rubber gland of the cable entry might be diminished.
This can lead to leakage to the motor compartment. By turning-in the cable entry clockwise, the sealing of the gland will be secured.
The torque should be: G7/8" = 80-100Nm M42 = 120-150Nm.

Check oil level:

DWP/ DNP 22 series
Bring the pump into horizontal position, and remove both the fill plug and the vent plug.
The accurate oil level is reached when the oil level is just below the fill plug.
You can check this to turn the pump a little.
Be aware that the pumps are equipped with 2 or with 3 plugs, depending on the size.
If the level is too low, please add accordingly.

DWP/ DNP 42 series
Bring the pump into horizontal position, in such position that 2 plugs are on top and one is beneath.
Remove the two plugs, using one of them as fill plug and the other as vent plug.
The accurate oil level is reached when the oil level is just below the fill plug.
You can check this to turn the pump a little.
If the level is too low, please add accordingly

DWP/ DNP 62 series
Bring the pump into vertical position and remove the M20 filling plug, at the counter side of the cable box.
The accurate oil level is reached when the oil level is just below the filling plug.
If the level is too low, please add accordingly.
Make sure the pump cannot fall over during this procedure!.

Trouble shooting:

Make sure the mains are switched off during inspection.

Only trained and authorized people may install and maintain the pump.

Make sure the pump will not start unexpectedly.

Don't go near to rotating parts of the pump

Observe the local regulations for installation, maintenance and repair!

Problem:	Possible cause:	Required action:	Checkpoints:
Pomp does not start	No voltage on the terminals	Check power supply	* main switch * installation switches * all auxiliary switches * voltage relay
		Check motor protection	* earth leakage relay * the auxiliary switches * motor protection relay * water in oil relais
		Check start- and stop signals	* too low level * obstructed level switches * engaged emergency stop * general electrical error
	Wrong pump cable connection	Measure cable wires	* check motor phases
	Blockage impeller	Check pump and/or impeller	* impeller or pump jamming
Pump does not stop	No stop signal	Check level switches	* level switches * general electrical error
	Wrong start / stop signal	Check level switches	* installation switches * level switches * settings level switches
Pump start and stops repeatedly	Fault in power supply	Check power supply	* main switch * installation switches * switch thermal protection
	Level control system not stable	Check level switches	* installation switches * level switches * settings level switches
	Motor overload	Check motor protection	* wrong direction of rotation * impeller blockage * motor protection relay
Motor current too high	Supply failure	Check power supply	* voltage monitoring relay
	Pump failure	Check pump	* impeller blockage * medium specific gravity too high
No flow or too low pump capacity	Jamming or airlock in discharge pipeline	Check discharge pipeline	* wrong direction of rotation * blockage in discharge * valves half open or closed
	Pump failure	Check pump	* pump draws air * impeller blockage * impeller loose or damage
	Fault in power supply	Check power supply	* main switch * installation switches * switch thermal protection
High level alarm	Pump failure	Check pump	* impeller blockage * impeller loose or damage * pump draws air * damaged bearings
	Supply failure	Check power supply	* switch thermal protection * fuses * level switches * settings level switches

If the pump still fails please contact:

POMPDIRECT

Annex 1: Electrical pump data:

Motor type		P1 electrical power		speed		cos phi		maximum current [A]					
		50Hz	60Hz	50Hz	60Hz	50Hz	60Hz		50Hz			60Hz	
		[kW]	[kW]	[min-1]	[min-1]			220V	400V	690V	220V	460V	575V
22 series	BB	2,1	2,4	2865	3350	0,91	0,91	6,1	3,3	1,9	7,2	3,4	2,8
	BD	2,8	3,2	2830	3396	0,89	0,89	8,2	4,5	2,6	9,4	4,5	3,6
	BE	3,5	4	2800	3360	0,91	0,9	10,1	5,6	3,3	11,6	5,6	4,4
	BH	4,9	5,6	2840	3410	0,85	0,85	15,4	8,5	4,9	17,3	8,3	6,6
	DA	0,9	1,1	1340	1700	0,79	0,78	3,1	1,7	1	3,7	1,8	1,4
	DC	2,1	2,4	1420	1700	0,85	0,85	6,6	3,6	2,1	7,5	3,6	2,9
	DD	3	3,6	1375	1650	0,8	0,89	9,1	5	2,9	10,5	5	4
	DG	4,5	5,2	1385	1660	0,85	0,85	14	7,7	4,5	16,1	7,7	6,2
42 series	BJ	6,1	7	2790	3348	0,9	0,9	17,8	9,8	5,7	20,5	9,8	7,8
	BR	10,5	12,1	2900	3480	0,89	0,89	31,2	17,2	9,4	35,9	17,2	13,8
	BZ	14,5	16,7	2965	3558	0,87	0,87	44	24,1	14	50,6	24,1	19,3
	DJ	6,3	7,2	1420	1704	0,82	0,85	20,4	11,2	6,5	23,5	11,2	9
	DL	7,7	8,9	1395	1674	0,85	0,85	24	13,1	7,6	27,6	13,1	10,5
	DO	9,2	10,6	1390	1668	0,88	0,87	27,6	15,2	8,8	31,8	15,2	12,2
	DU	12,5	14,4	1420	1704	0,85	0,88	38,6	21,2	12,3	44,4	21,2	17
	DZ	15,1	17,4	1420	1704	0,84	0,84	47,5	26,1	15,1	54,6	26,1	20,9
	FE	3,2	3,7	960	1152	0,81	0,81	10,4	5,7	3,3	11,9	5,7	4,6
	FH	5,3	6,1	930	1116	0,75	0,75	18,7	10,3	5,9	21,5	10,3	8,2
62 series	JE	22,7	25,8	2925	3510	0,89	0,89	67	36,9	21,3	76,1	36,4	29,1
	JG	32,6	37	2920	3500	0,91	0,92	92,9	51,1	29,7	106	50,7	40,5
	JL	52,7	59,1	2960	3540	0,91	0,94	149	81,9	47,4	166	79,4	63,5
	LD	18,8	21,8	1450	1740	0,78	0,78	63,3	34,9	20,2	73,2	35	28
	LF	26,2	29,8	1430	1720	0,84	0,82	83,8	46	26,7	95,2	45,6	36,4
	LI	39,5	45,4	1435	1730	0,85	0,86	121	66,3	38,4	136	66,2	52,9
	LL	54,5	62,5	1460	1750	0,86	0,91	165	91,6	53	180	86,1	68,9
	FR	10,7	12,7	940	1130	0,87	0,87	32,2	17,8	10,2	38,4	18,4	14,7
	FZ	15,1	17,9	960	1155	0,83	0,83	47,8	26,3	14,3	56,5	27	21,6
	NG	30	34,8	970	1170	0,84	0,81	92	50,4	29,2	113	54	43,2

Annex 2: Pump denomination:

Motor type		Pomp type				
22 series	BB	DWP22-10BB	DWP22-20BB	DNP22-10BB		
	BD	DWP22-10BD	DWP22-20BD			
	BE	DWP22-10BE	DWP22-20BE	DNP22-10BE		
	BH	DWP22-10BH	DWP22-20BH	DNP22-10BH		
	DA	DWP22-10DA	DWP22-20DA	DNP22-10DA		
	DC	DWP22-12DC	DWP22-30DC	DWP22-40DC		
	DD	DWP22-12DD	DWP22-30DD	DWP22-40DD		
	DG	DWP22-22DG	DWP22-30DG	DWP22-31DG	DWP22-40DG	DNP22-31DG
42 series	BJ	DWP42-21BJ	DNP42-21BJ			
	BR	DWP42-20BR	DWP42-21BR	DWP42-32BR	DNP42-21BR	
	BZ	DWP42-20BZ	DWP42-21BZ	DWP42-32BZ	DWP42-33BZ	
	DJ	DWP42-20DJ	DWP42-30DDJ	DWP42-40DJ		
	DL	DWP42-30DL	DWP42-40DL			
	DO	DWP42-30DO	DWP42-41DO	DNP42-30DO		
	DU	DWP42-41DU	DNP42-41DU	DNP42-42DU	DNP42-43DU	
	DZ	DWP42-41DZ	DNP42-41DZ	DNP42-42DZ	DNP42-43DZ	
	FE	DWP42-43FE				
	FH	DWP42-43FH				
62 series	JE	DWP62-30JE				
	JG	DWP62-11JG	DWP62-30JG	DWP62-32JG		
	JL	DWP62-11JL	DWP62-30JL	DWP62-32JL		
	LD	DWP62-11LD	DWP62-41LD			
	LF	DWP62-41LF	DNP62-40LF	DNP62-41LF	DNP62-42LF	
	LI	DWP62-41LI	DNP62-40LI	DNP62-41LI	DNP62-42LI	
	LL	DWP62-41LL	DNP62-40LL	DNP62-41LL	DNP62-42LL	
	FR	DWP62-41FR	DNP62-40FR	DNP62-41FR	DNP62-42FR	
	FZ	DWP62-41FZ	DNP62-40FZ	DNP62-41FZ	DNP62-42FZ	
	NG	DWP62-41NG	DNP62-40NG	DNP62-41NG	DNP62-42NG	

Notes: