INSTRUCTION MANUAL
IM226R02

CP-Series Submersible Motors

INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS

CentriPro
a xylem brand

Table of Contents

Owners Information

Complete this information for your records.
Model number and serial number may be found
on the tag mounted to the pump casing.

Pump Model Number_____

Pump Serial Number_____

Control Model Number_____

Dealer_____

Dealer phone number_____

Date of purchase_____

Date of installation_____

Current Readings at Startup:

1 Ø	**3 Ø**	L1-2	L2-3	L3-1
Amps: _____	Amps: _____	_____	_____	_____
Volts: _____	Volts: _____	_____	_____	_____

I. Safety

TO AVOID SERIOUS OR FATAL PERSONAL INJURY OR MAJOR PROPERTY DAMAGE, READ AND FOLLOW ALL SAFETY INSTRUCTIONS IN MANUAL AND ON PUMP.

THIS MANUAL IS INTENDED TO ASSIST IN THE INSTALLATION AND OPERATION OF THIS UNIT AND MUST BE KEPT WITH THE PUMP.

⚠ DANGER	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
⚠ WARNING	Indicates a potentially hazardous situation which, if not avoided, will result in death or serious injury. Hazards identified by the signal word WARNING present a lesser degree of risk of injury or death than those identified by the signal word DANGER.
⚠ CAUTION	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. CAUTION may also be used to alert against unsafe practices associated with events that could lead to personal injury.
CAUTION	Used without the Safety Alert Symbol indicates a potentially hazardous situation which, if not avoided, may result in property damage.
NOTICE	Indicates a statement of company policy directly or indirectly related to the safety of personnel or protection of property.

THOROUGHLY REVIEW ALL INSTRUCTIONS AND WARNINGS PRIOR TO PERFORMING ANY WORK ON THIS PUMP.

MAINTAIN ALL SAFETY DECALS.

II. Overview

This manual gives important information concerning the installation, use and maintenance of the motors. The contents of this manual refer to the standard product, as presented in the sales documentation. Any special versions will be supplied with supplementary instruction sheets. Please refer to the sales contract for the features of variants and special versions. Always specify the exact type of motor and code when requesting our Sales and Service Department for technical information or spare parts. For any instructions, situations and events not covered in this manual or in the sales documentation, please contact the nearest Technical Assistance Center.

NOTICE Read this manual carefully before installing and using the product.

⚠ CAUTION Improper use may cause personal injury and/or damage to property, and invalidate the warranty.

III. Product Description

The CentriPro CP-Series comprises 6”, 8”, 10” and 12” submersible rewindable motors with stator and rotor immersed in a bath of lubricating liquid consisting of demineralised water and anti-freeze. 6" and 8" motors are equipped with NEMA-standard flange and shaft dimensions. For 10" and 12" motor sizes please consult this product's technical bulletin for mounting dimensional details.

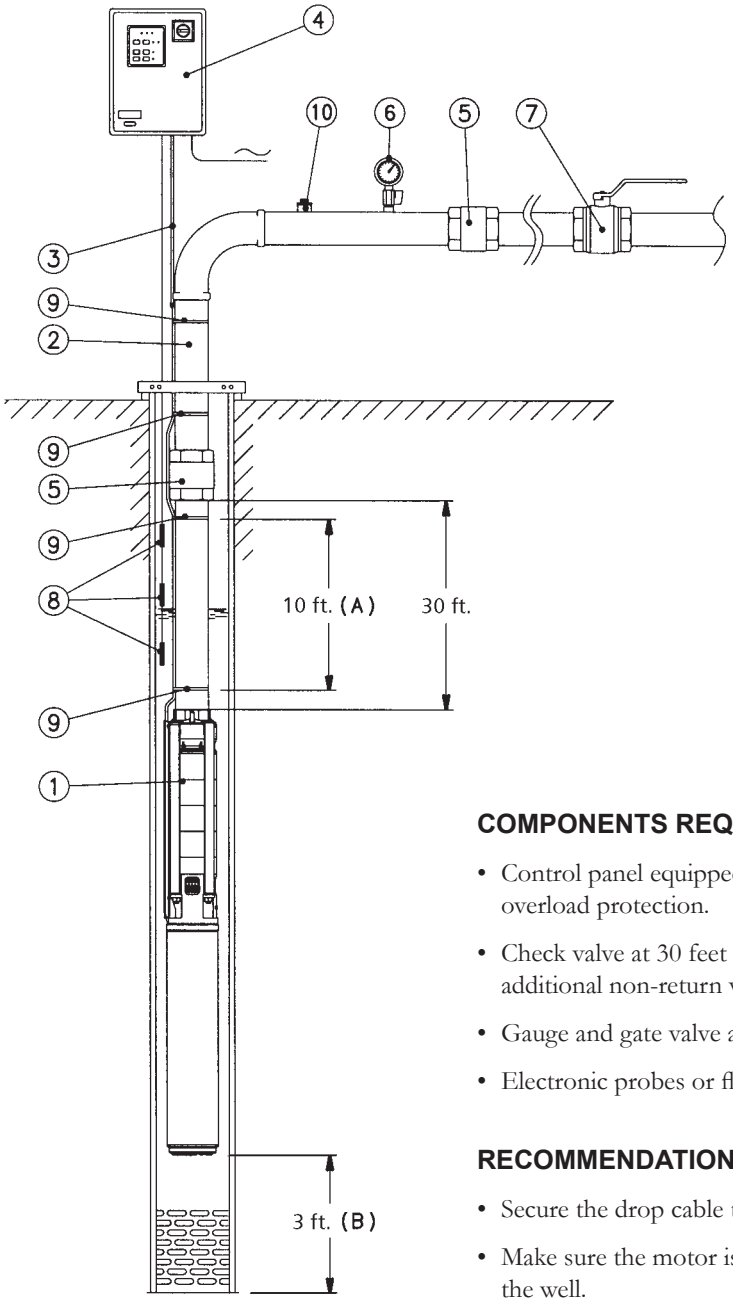
All the metal parts in contact with the water are either made from stainless steel or cast iron.

Each motor includes a Kingsbury pivoted-shoe thrust bearing and winding wire. The winding wire will be either standard or special high temperature type.

IV. Handling and Installation

1. Do not use lead wires to pull, lift or handle the motor. The lead wires should be protected during storage, handling, moving and installation of the motor.
2. Inspect the motor to determine that it is the correct HP, voltage and size for the job and that there is no shipping damage.
3. The factory-installed water in the motor is supplied with antifreeze capable of temperatures to -5° C (23° F). Do not install, transport or store below these temperatures. If storage is necessary below these temperatures, drain the water from the motor.
4. After long periods of idleness and on all new installations, check the electrical resistance and megger the motor with lead wires connected. The insulation resistance should have a value of at least 5 megohms at installation and at least 1 megohm after running.
5. Verify motor is filled with clean water before installing. The warranty is void if this is not done. Also check the tightness of all water filling and drain plugs, mounting bolts and cable connections.
6. Do not hammer the shaft, coupling or slinger since this may damage the thrust bearing. Check the rotation of the motor by hand to insure that it turns freely.
7. Do not drop the bottom end of the motor in the dirt or mud since this may plug up the diaphragm opening.
8. If motor is to be installed horizontally, make sure the relief valve is at the 12 o'clock position when facing the motor shaft (in horizontal position).
9. Check that winding coil resistance in each two phases is equal to values in Tables 1 - 4.
10. Select the proper overload relay or heaters.
11. For 50HP and 60HP models: Remove the metal sleeve attached to the midpoint of the motor and discard.

Submersible Pump Installation Diagram



1 - Submersible pump

2 - Delivery pipe

3 - Drop cable

4 - Control panel

5 - Check valve

6 - Gauge

7 - Gate valve

8 - Level sensors for protection against dry running.

9 - Cable clamp

10 - Pump bleed/priming cap

A - Distance between the clamps that secure the drop cable to the delivery pipe.

B - Distance from the bottom of the well to the electric motor.

COMPONENTS REQUIRED FOR CORRECT INSTALLATION

- Control panel equipped with a main switch and thermal relay for overload protection.
- Check valve at 30 feet distance from the delivery ports, plus an additional non-return valve every 100-165 feet of piping.
- Gauge and gate valve at well mouth.
- Electronic probes or floats for protection against dry running.

RECOMMENDATIONS

- Secure the drop cable to the pipe every 6-10 feet of piping.
- Make sure the motor is installed at a safe distance from the bottom of the well.
- Make sure there is a minimum distance of .13 inches between the diameter of the pump and the internal diameter of the well.
- During operation, make sure that the water circulation speed around the motor is per Section VI #1.
- Make sure that the minimum dynamic level of the water in the well is at least 3 feet above the pump's delivery port.

IV. Handling and Installation *(continued)*

NOTICE Before installing the motor, read this instruction manual and the one supplied with the pump or electric pump to which the motor will be coupled. Keep both manuals in a safe place for future reference.

Selecting the electrical panel

CAUTION Make sure the panel power ratings match those of the pump. Incompatible combinations may cause faults and fail to fully protect the motor.

NOTICE Before installing, carefully read the instructions supplied with the electrical panel.

Checking the motor liquid level

CAUTION Place the motor in the vertical position, with the air valve facing upwards. Unscrew the air valve from its hole. Add clean water using a syringe, until the water overflows the hole. Make sure the valve is not clogged. If necessary, clean it or replace it. Screw the valve back into the hole.

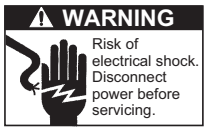
Installation in a well or tank

When installing the electric pump vertically, make sure the motor does not rest on the bottom of the well or tank.

When installing the electric pump horizontally, make sure the motor does not rest on the bottom of the tank.

Electrical connections to the electric motor

CAUTION Make sure that the supply voltage and frequency are compatible with the electrical panel. The relative information is shown on the motor rating plate and in the documents supplied with the panel. Provide suitable short circuit protection on the supply line.



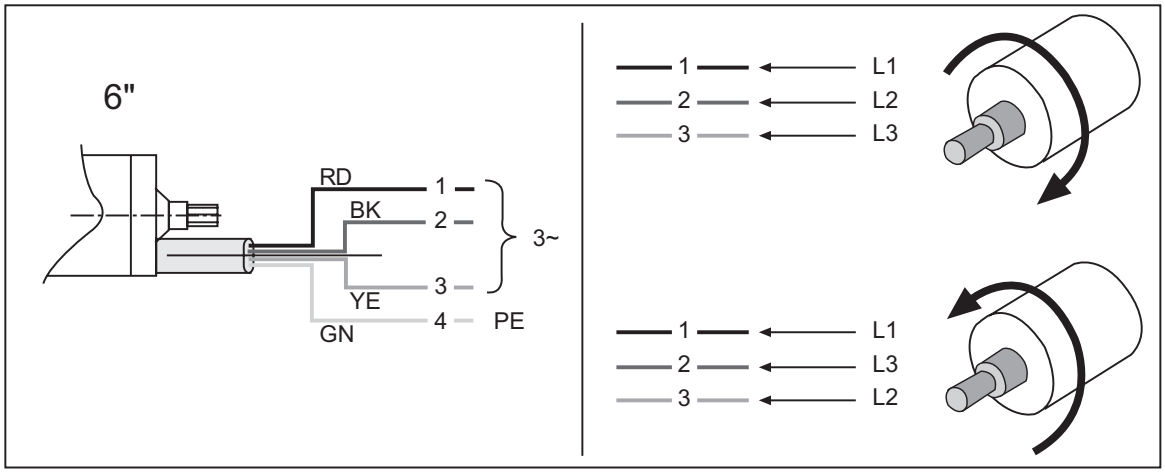
Before proceeding, make sure that all the connections (even if they are potential-free) are voltage-free. Unless otherwise specified in local bylaws, the supply line must be fitted with:

- a short circuit protection device
- a high sensitivity residual current circuit breaker (30mA) for additional protection from electrocution in case of inefficient grounding.
- a disconnect switch with a contact aperture of at least 3 mm.

Ground the system in compliance with current regulations. Attach the included lead wire to the upper endbell.

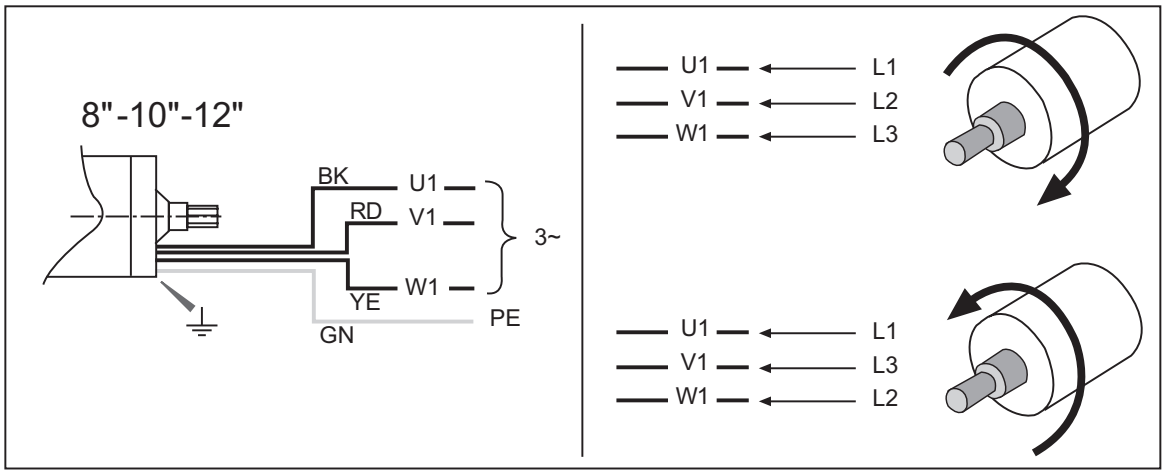
Power Cable Connection Diagrams

6" Direct Starting (1 cable)



BK - Black RD - Red YE - Yellow GN - Green

8", 10", 12" Direct Starting (1 cable)



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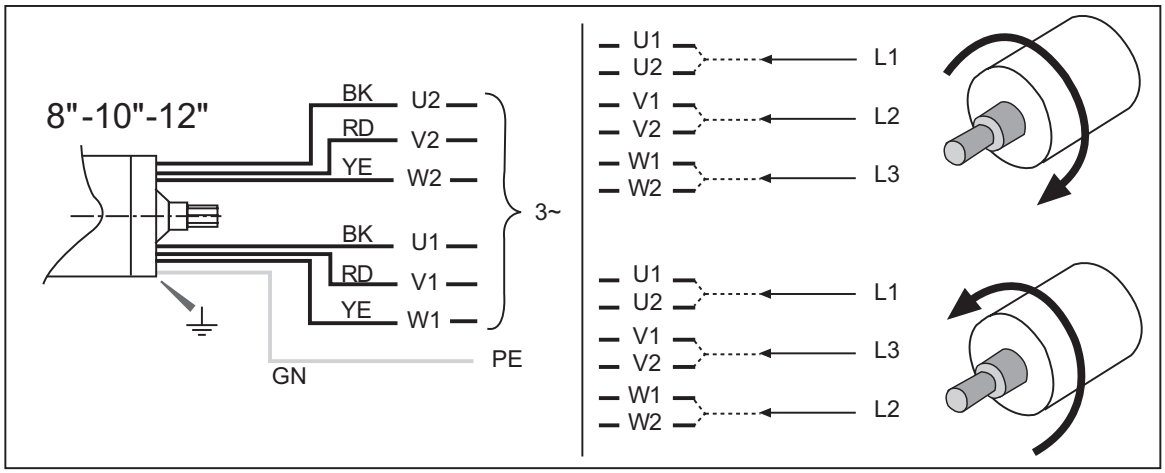
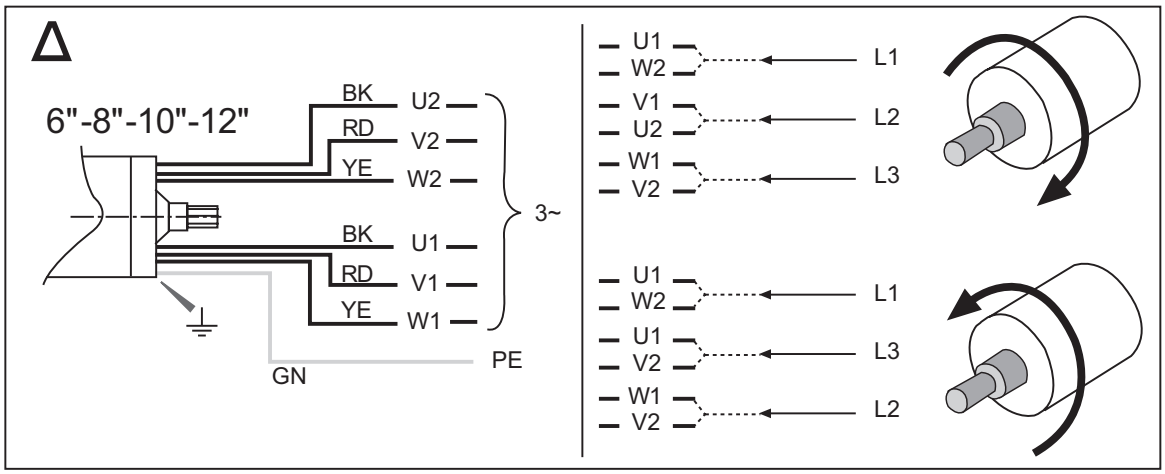
8", 10", 12" Direct Starting (2 cables)



BK - Black RD - Red YE - Yellow GN - Green

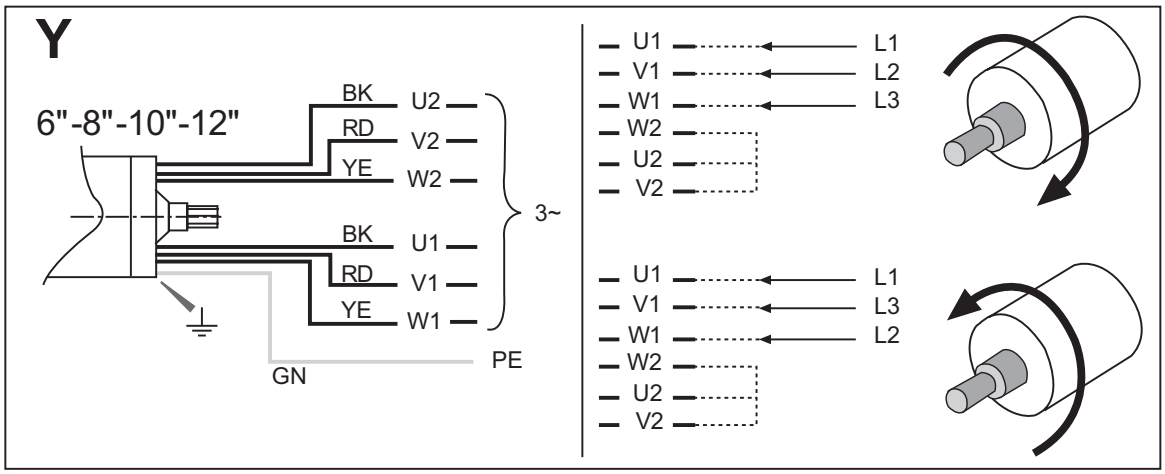
Power Cable Connection Diagrams *(continued)*

6", 8", 10", 12" Star/Delta version with direct starting at lower voltage



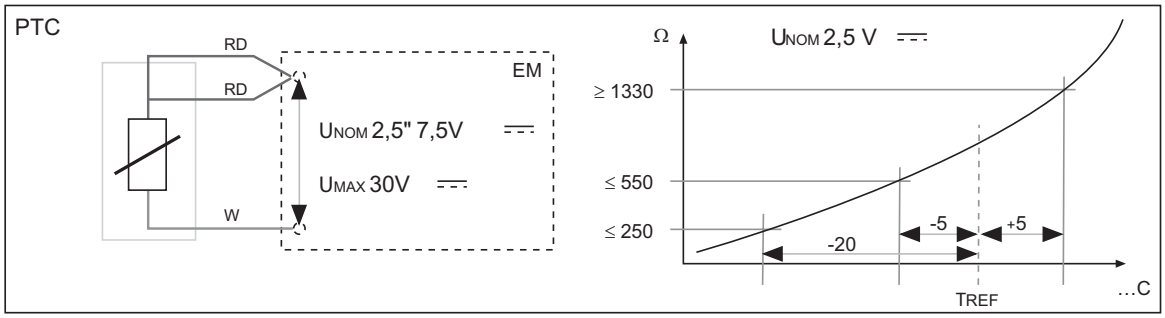
BK - Black RD - Red YE - Yellow GN - Green

6", 8", 10", 12" Star/Delta version with direct starting at higher voltage

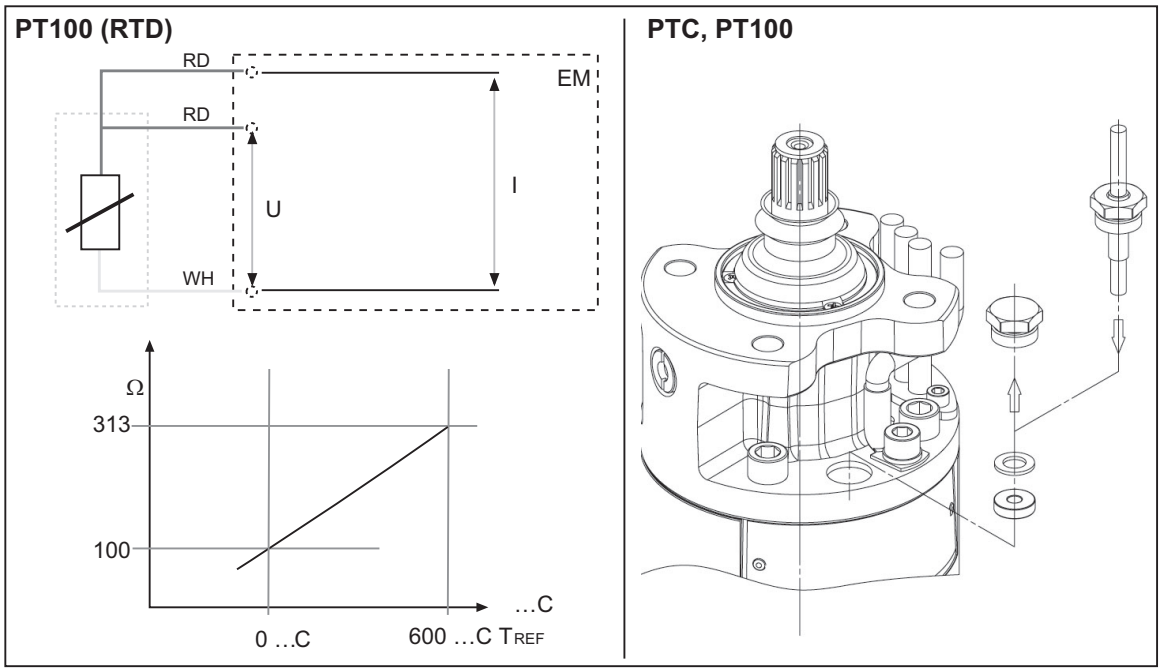


BK - Black RD - Red YE - Yellow GN - Green

PTC Temperature Probe



PT100 Temperature Probe



RD - Red WH - White

EM - Electronic Module I - Measured Variable Current U - Input Voltage
U_{nom} - Rated Input Voltage U_{max} - Maximum Input Voltage T_{ref} - Reference Temperature

V. Guidelines For VFD Control of CentriPro CP-Series Rewindable Submersible Motor

Variable Frequency Drives together with submersible pumps are today often being used when water demand varies over time. The pump will run with the VFD at a speed optimal to the actual demand, leading to possible energy savings.

There are a wide number of different frequency drives available on the market and they often have different characteristics. Therefore it is important to choose a VFD and other electric components that will work satisfactory together with the motor. VFDs generate voltage peaks and if the peaks are too high and too steep they will damage the windings in any submersible motor.

The CentriPro CP Series submersible motors can be used with Variable Frequency Drives if the following guidelines are followed.

Frequency Limitations

You should never run the motor with the VFD on a higher frequency than the data plate on the motor states. With a higher frequency than stated, overload and overheating problems could occur. Generally you are never allowed to run the pump with a frequency below 30Hz. Always make sure that the flow around the motor is enough to cool the motor at all the duty points of operation. Values for the flow can be found in the submersible motor technical catalogue.

Ramp Up and Ramp Down Time

The ramp up time to the minimum running frequency should be set as quick as possible (maximum 1s) to ensure the correct lubrication of the thrust bearing in the motor. The ramp down time (from the minimum running frequency to 0 Hz) should be set as quick as possible (maximum 1s) as well.

Filters

Filters for reducing voltage peaks and steepness generated by the VFD are recommended and should be specified by the VFD manufacturer according to the below voltage peak and rise time limits.

Voltage Drop with Long Cables

The VFD should be installed as close as possible to the motor. When this is not possible a maximum of 4% voltage drop at the motor is acceptable.

Use of VFD with CentriPro CP Series Submersible HT Motors (high temperature version)

It is always recommended the use of HT motors with VFD operation. The reason for this is that the HT version has a higher tolerance for voltage peaks. For HT motors the voltage peaks to the pump may never exceed 1000 Volts and the voltage rise time dV/dt should be lower than 500V/µs. If the VFD can not fulfil this recommendation filters between the VFD and the motor has to be used. The requirement will then be that the VFD together with the filters does not generate higher peaks than 1000V and that the voltage rise time dV/dt should be lower than 500V/µs. The following indications are also recommended: use of dV/dt filters in case of motors cable length ≤ 100 and use of sine wave filters for longer cable.

Use of VFD with CentriPro CP Series Submersible Standard Motor

Standard CentriPro CP Series motors can be used if it can be guaranteed that the VFD will not generate higher voltage peaks than 690V and if voltage rise time dV/dt is lower than 500V/µs. If the VFD can not fulfil this recommendation filters between the VFD and the motor has to be used. The requirement will then be that the VFD together with the filters does not generate higher peaks than 690V and that the voltage rise time dV/dt should be lower than 500V/µs. However it is always recommended the use of sine wave filters.

Water Temperature and VFD Use

Together with VFD we recommend the usage of the High Temperature (HT version) of the motor up to 30°C of water temperature. For higher water temperatures a derating of the motor should be made.

Derating of the motor depends on the quality of the output from the VFD. If the quality is close to the quality of the supply without VFD then there is no special restriction regarding water temperature for VFD use. Refer to the technical catalogue for submersible motors for water temperature limits.

End Notes

If the installation requires operation other than stated in the guidelines or if questions arise that are not covered in the guidelines please contact Xylem Inc. customer service for guidance. The toll free number for customer support is 1-877-833-2872.

Please note that Xylem Inc. reserves the right to disclaim the warranty in case of: a) the product is out of standard warranty period; b) the defect is a consequence of use or installation in a manner contrary to the Supplier's instructions; c) technical analysis show that the above VFD guidelines or general motor guidelines have not been followed.

VI. Pre-Installation

CAUTION 1. Maximum Water Temperature:

A) Standard Version: 30° C (86° F)

Must maintain flow rate of .75 fps (5 - 10 HP), 1.0 fps (15 - 30 HP), 1.75 fps (40 HP and greater). For temperatures above 30° C (86° F), motor output must be reduced to ensure correct cooling: maximum temperature allowed is 35° C (95° F).

B) HT Version: 45° C (113° F)

Must maintain flow rate of .75 fps (5 - 10 HP), 1.0 fps (15 - 30 HP), 1.75 fps (40 HP and greater). For temperatures above 45° C (113° F), motor output must be reduced to ensure correct cooling: maximum temperature allowed is 60° C (140° F).

2. PH content of the water between: 6.5–8
3. Maximum Chlorine Content: 500 PPM

   Maximum Sulfuric Acid Iron Content: 15 PPM

   Maximum Flourine Content: 0.8 PPM

   Maximum Electric Conductivity: 118 µMHO/INCH
4. Maximum Sand Content: 50 PPM
5. Proper approved three phase overload protection. Class 10, quick trip overloads are mandatory. See Tables 1 - 4, 9 or 10.
6. Proper fusing for motor circuit protection. See Table 5.
7. Proper Line Voltage During Running Conditions:

   460V ±10%, i.e. 506 to 414 volts

   230V ±10%, i.e. 253 to 207 volts at 60 cycle system at motor lead wire terminal. (Voltage drop of cable should be considered by user.)

   Combination of Voltage and Frequency Variation: ±10% (sum of absolute values of voltage and frequency).

   Phase Unbalance: ±5% (3 phase)
8. Proper sizing of motor (current, thrust, voltage, etc.) and a 10 feet clearance from the bottom of the well are required.
9. In the case of horizontal installation, the motor is to be rigidly aligned with the pump and firmly mounted to prevent any load on the shaft and bearings and to avoid any damaging vibrations to the motor. Also, see #8 in Section IV.
10. The maximum depth of immersion for all motors is 1,150 ft (350 m).
11. The power cables shall be sized large enough so that at rated current there will be less than a 5% voltage drop. Cables must be waterproof submersible type.
12. For 3Ø motors a balanced and properly sized transformer bank shall be provided. Improper electrical supply (for example, phase converter, V-connection transformer, etc.) or connections will void the warranty.
13. Single phase protection is recommended for protection of the installation. Any failure due to single phasing of the incoming voltage causing the motor to fail will void the warranty.
14. Lightning arrestors are recommended in the interest of protecting the control panel, as well as the insulation system of the motor. Any motor failure due to lightning or other Acts of God will void the warranty.
15. Provide waterproof insulation splices between all lead wires and well cables.
16. In the event that a reduced voltage starter is used to start the motor, the following should be verified:

    A. Correct quick trip ambient compensated overloads are incorporated.

    B. Proper short circuit protection is utilized.

    C. The torque required by the motor and pump package is attainable by this type starter.

D. The lead arrangement of the motor is acceptable with the proposed starter load connections.

E. Verify that if any time delay relays are used in switching contactors in and out, that the time settings are not too long; this could damage the motor.

F. If a manual auto transformer starter is used, don't wait too long to go into the "Run" condition and don't "tease" the contacts. Double check Tables 1 - 4 for correct protection.

17. Do not expose motor leads to air. Leads must be submerged for cooling.

VII. Maintenance

There are no bearings that need oil or grease. The motor, being inaccessible, should be monitored through its electrical connections.

1. Measure and record operating current and voltage.
2. Measure and record the motor insulation resistance. Any resistance of less than 5 megohm (5,000,000) for a new motor should be evaluated or checked further by a qualified service shop.
3. Lightning arrestors and/or surge capacitors will help prevent damage to the control box, cables and motor.
4. Single phase protection will help in preventing motor failure due to adverse incoming primary power.
5. Based on the values obtained in 1 and 2 above and the output flow rates and pressures of the pump, a complete picture of total performance can be obtained. This can be used to determine any pump and motor maintenance and overhauling which might be required.
6. If the motor is to be stored, protect the unit from freezing by storing in an area with a temperature higher than -30° C (-22° F).

VIII. Operation

1. After energizing the motor, check the flow and pressure of the pump to make sure that the motor is rotating in the correct direction. To correct a wrong rotation, switch any two of the three cable connections. (Three phase motor only.)
2. When starting the pump for the first time, inspect the water for sand. If sand appears, then continue to pump until the water clears up; otherwise, sand will accumulate in the pump stages and will bind or freeze the moving parts if water is allowed to flow back down the well.
3. During testing or checking rotation (such as "bumping" or "inching") the number of "starts" should be limited to 3, followed by a full 15 minute cooling-off period before any additional "starts" are attempted. Depending on the depth of the well and/or method of checking, these rotational checks or "starts" may actually be full-fledged starts. If this is the case, then a full cooling-off period of 15 minutes is required between this type of start.
4. For automatic (pilot device) operation, the motor should be allowed to cool for 15 minutes between starts.
5. Input voltage, current and insulation resistance values should be recorded throughout the life of the installation and should be used as a form of preventive maintenance.
6. Maximum number of starts per hour:
   - 6": 15 starts/hour
   - 8": 10 starts/hour
   - 10": 8 starts/hour
   - 12": 4 starts/hour

TABLE 1 — 6" Three Phase Motors, 200, 230, 380 and 460 volt

Motor Type	Rated Power		Rated Voltage	Operating Characteristics At Rated Power					Direct On-Line Starting			Service Factor	SF Watts	SF Amps
Three Phase	HP	kW	V	kW	A	RPM	EFF	PF	Is /In	Ts /Tn	Tmax /Tn	SF	kW	A
P6..5T206A	5.5	4	200	5.48	19.0	3490	73.0	0.83	4.72	1.29	2.02	1.15	6.34	21.3
P6..5T236A			230	5.50	17.3	3500	72.8	0.80	4.51	1.28	2.01		6.30	19.0
P6..5T386A			380	5.48	9.94	3490	73.0	0.84	4.75	1.29	2.02		6.35	11.2
P6..5T466A			460	5.48	8.09	3485	73.0	0.85	4.82	1.29	2.02		6.38	9.16
P6..7T206A	7.5	5.5	200	7.17	25.3	3490	76.7	0.82	5.54	1.60	2.55	1.15	8.26	28.1
P6..7T236A			230	7.30	24.3	3505	75.4	0.75	5.01	1.59	2.54		8.33	26.4
P6..7T386A			380	7.21	13.7	3495	76.3	0.80	5.38	1.60	2.55		8.28	15.1
P6..7T466A			460	7.17	10.9	3490	76.8	0.82	5.59	1.60	2.55		8.26	12.2
P6..10T206A	10	7.5	200	9.52	32.9	3485	78.8	0.84	5.70	1.70	2.50	1.15	11.0	36.8
P6..10T236A			230	9.60	30.6	3500	78.2	0.79	5.33	1.69	2.49		11.0	33.6
P6..10T386A			380	9.52	17.4	3490	78.8	0.83	5.67	1.70	2.50		11.0	19.4
P6..10T466A			460	9.51	14.1	3485	78.9	0.84	5.78	1.70	2.50		11.0	15.8
P6..12T206A	12.5	9.3	200	11.6	40.9	3485	79.9	0.82	5.84	1.85	2.70	1.15	13.4	45.6
P6..12T236A			230	11.7	37.6	3495	79.4	0.78	5.52	1.84	2.69		13.4	41.3
P6..12T386A			380	11.6	21.3	3485	79.9	0.83	5.90	1.85	2.70		13.4	23.8
P6..12T466A			460	11.6	17.3	3480	80.0	0.84	6.00	1.85	2.70		13.4	19.5
P6..15T206A	15	11	200	13.6	46.2	3475	80.8	0.85	5.82	1.53	2.57	1.15	15.8	52.3
P6..15T236A			230	13.7	43.5	3490	80.3	0.79	5.38	1.52	2.56		15.8	47.9
P6..15T386A			380	13.6	24.7	3480	80.7	0.84	5.73	1.53	2.57		15.8	27.8
P6..15T466A			460	13.6	20.2	3475	80.8	0.85	5.79	1.53	2.57		15.8	22.8
P6..17T206A	17.5	13	200	16.0	56.0	3485	81.2	0.83	5.74	1.67	2.55	1.15	18.5	62.5
P6..17T236A			230	16.1	52.5	3495	80.5	0.77	5.33	1.66	2.55		18.6	57.4
P6..17T386A			380	16.0	29.5	3485	81.2	0.82	5.74	1.67	2.55		18.5	32.9
P6..17T466A			460	16.0	23.3	3475	81.4	0.86	6.00	1.67	2.56		18.6	26.4
P6..20T206A	20	15	200	18.0	62.1	3470	83.3	0.84	6.49	1.94	3.03	1.15	20.9	69.8
P6..20T236A			230	18.1	56.4	3485	83.1	0.80	6.21	1.93	3.02		20.9	62.5
P6..20T386A			380	18.0	32.5	3470	83.3	0.84	6.52	1.94	3.03		20.9	36.6
P6..20T466A			460	18.0	27.2	3475	83.3	0.83	6.44	1.94	3.03		20.9	30.5
P6..25T206A	25	18.5	200	22.1	74.5	3475	83.9	0.86	6.85	2.40	3.11	1.15	25.6	84.0
P6..25T236A			230	22.2	71.1	3495	83.4	0.78	6.24	2.39	3.10		25.5	78.2
P6..25T386A			380	22.1	40.4	3485	83.8	0.83	6.65	2.40	3.11		25.5	45.1
P6..25T466A			460	22.0	32.6	3480	83.9	0.85	6.81	2.40	3.11		25.5	36.7
P6..30T206A	30	22	200	26.0	94.7	3500	84.5	0.79	5.71	0.98	2.96	1.15	30.2	106
P6..30T236A			230	26.0	83.1	3505	84.5	0.79	5.66	0.98	2.96		30.2	92.6
P6..30T386A			380	26.0	47.5	3495	84.6	0.83	5.99	0.98	2.96		30.3	53.9
P6..30T466A			460	26.0	40.0	3500	84.7	0.82	5.88	0.98	2.96		30.2	45.0
P6..35T386A	35	26	380	30.6	59.8	3500	85.0	0.78	5.90	1.18	2.82	1.15	35.4	66.5
P6..35T466A			460	30.6	47.8	3495	85.0	0.80	6.10	1.18	2.82		35.4	53.7
P6..40T386A	40	30	380	35.5	64.9	3500	84.4	0.83	6.31	2.49	2.75	1.15	41.1	72.6
P6..40T466A			460	35.5	53.9	3505	84.5	0.83	6.28	2.49	2.75		41.2	61.0
P6..50T386A	50	37	380	44.4	86.2	3495	83.4	0.78	5.40	1.32	2.63	1.15	51.4	95.9
P6..50T466A			460	44.3	68.6	3490	83.6	0.81	5.61	1.32	2.63		51.5	77.1
P6..60T386A*	60	45	380	54.0	99.4	3521	83.4	0.83	5.59	1.81	2.75	1.15	62.8	112
P6..60T466A*			460	54.0	82.1	3521	83.4	0.83	5.59	1.81	2.75		62.8	92.8

Ts/Tn = ratio between starting torque and nominal torque.

Tmax/Tn = ratio between maximum torque and nominal torque.

Is/In = ratio between starting and FL amps.

*Indicates tandem rotor design.

TABLE 2 — 8" Three Phase Motors, 380 and 460 volt

Motor Type	Rated Power		Rated Voltage	Operating Characteristics At Rated Power					Direct On-Line Starting			Service Factor	SF Watts	SF Amps
Three Phase	HP	kW	V	kW	A	RPM	EFF	PF	Is /In	Ts /Tn	Tmax /Tn	SF	kW	A
P8..40T386A	40	30	380	37.0	67.8	3470	81.5	0.83	5.50	1.04	2.22	1.15	43.0	78.0
P8..40T466A			460		56.0									64.4
P8..50T386A	50	37	380	45.6	83.5	3475	81.5	0.83	5.26	1.04	2.23	1.15	53.5	96.1
P8..50T466A			460		69.0									79.4
P8..60T386A	60	45	380	54.2	99.3	3480	83.0	0.83	4.98	0.98	2.22	1.15	62.0	114
P8..60T466A			460		82.0									94.3
P8..70T386A	70	52	380	62.7	116	3475	83.0	0.82	5.56	1.06	2.22	1.15	73.0	134
P8..70T466A			460		96.0									110
P8..75T386A	75	55	380	66.1	121	3475	83.5	0.83	5.44	1.06	2.24	1.15	77.5	139
P8..75T466A			460		100									115
P8..80T386A	80	60	380	71.6	130	3480	84.0	0.84	5.07	1.04	2.23	1.15	83.0	149
P8..80T466A			460		107									123
P8..90T386A	90	67	380	80.0	146	3480	84.0	0.83	5.13	1.03	2.23	1.15	95.0	168
P8..90T466A			460		121									139
P8..100T386A	100	75	380	89.7	162	3485	84.0	0.84	5.04	1.01	2.22	1.15	108	187
P8..100T466A			460		134									154
P8..110T386A	110	83	380	99.1	179	3485	84.0	0.84	4.79	0.97	2.28	1.15	118	206
P8..110T466A			460		148									170
P8..125T386A	125	93	380	111	201	3490	84.0	0.84	4.60	1.02	2.22	1.15	129	231
P8..125T466A			460		166									191

Ts/Tn = ratio between starting torque and nominal torque. Is/In = ratio between starting and FL amps.

Tmax/Tn = ratio between maximum torque and nominal torque.

TABLE 3 — 10" Three Phase Motors, 380 and 460 volt

Motor Type	Rated Power		Rated Voltage	Operating Characteristics At Rated Power					Direct On-Line Starting			Service Factor	SF Watts	SF Amps
Three Phase	HP	kW	V	kW	A	RPM	EFF	PF	Is /In	Ts /Tn	Tmax /Tn	SF	kW	A
P10..125T386A	125	93	380	110	199	3510	85.0	0.84	5.55	1.02	2.22	1.15	130	229
P10..125T466A			460		164									189
P10..150T386A	150	110	380	131	242	3520	85.5	0.82	6.38	1.43	2.19	1.15	149	272
P10..150T466A			460		200									225
P10..175T386A	175	130	380	152	286	3520	85.5	0.81	6.31	1.50	2.22	1.15	174	328
P10..175T466A			460		236									271
P10..200T386A	200	150	380	176	329	3525	85.5	0.81	6.24	1.56	2.22	1.15	191	379
P10..200T466A			460		272									313

Ts/Tn = ratio between starting torque and nominal torque. Is/In = ratio between starting and FL amps.

Tmax/Tn = ratio between maximum torque and nominal torque.

TABLE 4 — 12" Three Phase Motors, 380 and 460 volt

Motor Type	Rated Power		Rated Voltage	Operating Characteristics At Rated Power					Direct On-Line Starting			Service Factor	SF Watts	SF Amps
Three Phase	HP	kW	V	kW	A	RPM	EFF	PF	Is /In	Ts /Tn	Tmax /Tn	SF	kW	A
P12..250T386A	250	185	380	217	387	3515	85.5	0.85	6.59	1.50	2.22	1.15	252	445
P12..250T466A			460		320									368
P12..300T386A	300	220	380	258	466	3515	85.5	0.84	6.66	1.41	2.22	1.15	300	536
P12..300T466A			460		385									443
P12..350T386A	350	260	380	303	541	3515	86.0	0.85	6.05	1.41	2.22	1.15	342	622
P12..350T466A			460		447									514
P12..400T386A	400	300	380	347	620	3515	86.5	0.85	6.43	1.18	2.22	1.15	410	713
P12..400T466A			460		512									589

Ts/Tn = ratio between starting torque and nominal torque.

Is/In = ratio between starting and FL amps.

Tmax/Tn = ratio between maximum torque and nominal torque.

TABLE 5 — 6" Three Phase Motors, 200, 230, 380 and 460 volt

Motor Type	Rated Power		Rated Voltage	KVA Code	Line-Line Resistance	Maximum Water Temp.	Motor Lead Size		
							Sec. AWG		L
Three Phase	HP	kW	V		Ω	°F (°C)	DOL	Y/D	Ft. (m)
P6..5T206A	5.5	4	200	G	0.88	86 (30)	8	8	13.1 (4)
P6..5T236A			230		1.19				
P6..5T386A			380		3.55				
P6..5T466A			460		6.83				
P6..7T206A	7.5	5.5	200	H	0.68	86 (30)	8	8	13.1 (4)
P6..7T236A			230		0.73				
P6..7T386A			380		2.19				
P6..7T466A			460		3.91				
P6..10T206A	10	7.5	200	H	0.44	86 (30)	8	8	13.1 (4)
P6..10T236A			230		0.56				
P6..10T386A			380		1.67				
P6..10T466A			460		2.87				
P6..12T206A	12.5	9.3	200	G	0.37	86 (30)	8	8	13.1 (4)
P6..12T236A			230		0.47				
P6..12T386A			380		1.41				
P6..12T466A			460		2.35				
P6..15T206A	15	11	200	H	0.31	86 (30)	8	8	13.1 (4)
P6..15T236A			230		0.38				
P6..15T386A			380		1.15				
P6..15T466A			460		1.88				
P6..17T206A	17.5	13	200	H	0.22	86 (30)	6	8	13.1 (4)
P6..17T236A			230		0.27		8		
P6..17T386A			380		0.82				
P6..17T466A			460		1.52				
P6..20T206A	20	15	200	H	0.23	86 (30)	6	8	13.1 (4)
P6..20T236A			230		0.26				
P6..20T386A			380		0.77		8		
P6..20T466A			460		1.16				
P6..25T206A	25	18.5	200	H	0.17	86 (30)	4	8	13.1 (4)
P6..25T236A			230		0.21		6		
P6..25T386A			380		0.64		8		
P6..25T466A			460		0.82				
P6..30T206A	30	22	200	H	0.14	86 (30)	-	6	13.1 (4)
P6..30T236A			230		0.18		4	8	
P6..30T386A			380		0.55		8		
P6..30T466A			460		0.78				
P6..35T386A	35	26	380	H	0.39	86 (30)	6	8	13.1 (4)
P6..35T466A			460		0.57		8		
P6..40T386A	40	30	380	H	0.34	86 (30)	6	8	13.1 (4)
P6..40T466A			460		0.48				
P6..50T386A	50	37	380	G	0.30	86 (30)	4	8	13.1 (4)
P6..50T466A			460		0.46		6		
P6..60T386A*	60	45	380	G	0.27	86 (30)	-	6	13.1 (4)
P6..60T466A*			460		0.44		4	8	

*Indicates tandem rotor design.

TABLE 6 — 8" Three Phase Motors, 380 and 460 volt

Motor Type	Rated Power		Rated Voltage	KVA Code	Line-Line Resistance	Maximum Water Temp.	Motor Lead Size		
							Sec. AWG		L
Three Phase	HP	kW	V		Ω	°F (°C)	DOL	Y/D	Ft. (m)
P8..40T386A	40	30	380	G	0.27	86	6	8	18
P8..40T466A			460		0.46	(30)			(5.5)
P8..50T386A	50	37	380	G	0.20	86	4	8	18
P8..50T466A			460		0.36	(30)	6		(5.5)
P8..60T386A	60	45	380	F	0.15	86	2	6	18
P8..60T466A			460		0.26	(30)	4	8	(5.5)
P8..70T386A	70	52	380	G	0.18	86	2	6	18
P8..70T466A			460		0.19	(30)			(5.5)
P8..75T386A	75	55	380	G	0.12	86	2	6	18
P8..75T466A			460		0.18	(30)			(5.5)
P8..80T386A	80	60	380	F	0.10	86	1/0	4	18
P8..80T466A			460		0.16	(30)	2	6	(5.5)
P8..90T386A	90	67	380	F	0.09	86	1/0	4	18
P8..90T466A			460		0.15	(30)	2	6	(5.5)
P8..100T386A	100	75	380	F	0.07	86	1/0	2	18
P8..100T466A			460		0.12	(30)		4	(5.5)
P8..110T386A	110	83	380	F	0.08	86	2x4	2	18
P8..110T466A			460		0.12	(30)	1/0	4	(5.5)
P8..125T386A	125	93	380	E	0.07	86	2x2	2	18
P8..125T466A			460		0.11	(30)	2x4		(5.5)

TABLE 7 — 10" Three Phase Motors, 380 and 460 volt

Motor Type	Rated Power		Rated Voltage	KVA Code	Line-Line Resistance	Maximum Water Temp.	Motor Lead Size		
							Sec. AWG		L
Three Phase	HP	kW	V		Ω	°F (°C)	DOL	Y/D	Ft. (m)
P10..125T386A	125	93	380	G	0.150	86	3/0	2	16.4
P10..125T466A			460		0.077	(30)	2/0		(5)
P10..150T386A	150	110	380	H	0.108	86	4/0	2	16.4
P10..150T466A			460		0.063	(30)	3/0	1/0	(5)
P10..175T386A	175	130	380	H	0.098	86	–	2/0	16.4
P10..175T466A			460		0.054	(30)	4/0	1/0	(5)
P10..200T386A	200	150	380	H	0.097	86	–	3/0	16.4
P10..200T466A			460		0.049	(30)	2x1/0	1/0	(5)

TABLE 8 — 12" Three Phase Motors, 380 and 460 volt

Motor Type	Rated Power		Rated Voltage	KVA Code	Line-Line Resistance	Maximum Water Temp.	Motor Lead Size		
Three Phase	HP	kW	V		Ω	ºF (ºC)	Sec. AWG DOL	Sec. AWG Y/D	L Ft. (m)
P12..250T386A	250	185	380	H	–	86	2x3/0	4/0	16.4
P12..250T466A			460		0.044	(30)	2x2/0	2/0	(5)
P12..300T386A	300	220	380	H	0.059	86	2x4/0	–	16.4
P12..300T466A			460		0.034	(30)	2x3/0	4/0	(5)
P12..350T386A	350	260	380	G	0.041	86	–	–	16.4
P12..350T466A			460		0.027	(30)	2x4/0	–	(5)
P12..400T386A	400	300	380	H	0.036	86	–	–	16.4
P12..400T466A			460		0.021	(30)	–	–	(5)

IX. Three Phase 75º C Cable, 60 HZ

TABLE 9 — Three Phase 75º C Cable, 60 Hz (Service Entrance to Motor) Maximum Length in Feet

Motor Rating		75º C Insulation - AWG Copper Wire Size														
Volts	HP	14	12	10	8	6	4	2	1	1/0	2/0	3/0	4/0	250	350	500
230V 60 Hz. Three Phase 3 Lead	5.5	147	234	371	555	939	1494	2376	2997	3781	4765	6006	7574	8950	12530	
	7.5	**106**	166	264	395	669	1064	1691	2133	2691	3392	4277	5394	6371	8920	12744
	10	0	**133**	**210**	314	531	845	1342	1694	2138	2694	3397	4283	5059	7083	10120
	15	0	0	**147**	**221**	374	594	946	1192	1504	1894	2389	3013	3560	4982	7118
	20	0	0	0	**170**	**288**	458	728	918	1160	1462	1843	2323	2746	3843	5491
	25	0	0	0	0	**229**	**363**	578	730	920	1160	1461	1843	2178	3048	4355
	30	0	0	0	0	**197**	**264**	498	629	794	1000	1259	1589	1877	2627	3754
460V 60 Hz. Three Phase 3 Lead	5.5	629	1000	1589	2374	4016	6349									
	7.5	467	742	1179	1762	2982	4744	7541	9509							
	10	362	574	912	1363	2304	3667	5830	7352	9277						
	12.5	**294**	467	744	1110	1878	2970	4752	5992	7560	9530					
	15	**253**	**400**	637	950	1610	2560	4069	5131	6475	8162	10290				
	20	**187**	**298**	472	706	1195	1901	3022	3811	4810	6061	7642				
	25	0	**248**	**395**	589	997	1576	2522	3179	4013	5058	6376	8040			
	30	0	0	**322**	480	813	1285	2054	2592	3270	4122	5197	6552	7741		
	40	0	0	0	**357**	**603**	960	1525	1923	2427	3059	3856	4862	5746		
	50	0	0	0	**278**	**472**	**749**	1192	1502	1896	2389	3013	3798	4488	6283	8976
	60	0	0	0	0	**397**	**627**	1003	1264	1595	2011	2534	3197	3776	5286	7552
	75	0	0	0	0	0	**517**	**822**	1037	1309	1648	2078	2621	3096	4336	6194
	100	0	0	0	0	0	0	**613**	**773**	**976**	1230	1550	1957	2310	3235	4622
	125	0	0	0	0	0	0	**496**	**624**	**789**	**994**	**1253**	1579	1866	2611	3731
	150	0	0	0	0	0	0	0	0	**576**	**726**	**915**	**1155**	**1365**	1910	2728
	200	0	0	0	0	0	0	0	0	0	0	**765**	**963**	**1139**	**1594**	2277

Lengths NOT SHADED meet the U.S. National Electrical Code ampacity for either individual conductors or jacketed 75º C cable.

Lengths **SHADED** meet the National Electric Code ampacity only for individual conductor 75º C cable, in free air or water. If other cable is used, the National Electric Code as well as the local codes should be observed.

X. Troubleshooting of Submersible Motors

1. Motor does not start but does not blow fuses or relay.
   - No Power Supply → Replace fuses, breakers or check for loose or corroded connections and motor lead terminals.
   - Defective Connections → Correct connections.

2. Fuses or relay blow when motor starts.
   - Incorrect Voltage → Apply correct voltage.
     Voltage must be ±10% of rated (Nameplate).
   - Incorrect Fuses or Relay → Replace with proper fuses and relay.
   - Defective Capacitors → Replace with proper capacitors.
   - Wrong Connections → Correct wrong connections or short circuit.
   - Locked Rotor Conditions → Correct pump or well conditions.
   - Insulation Resistance Down → Check the line and correct.

3. Motor runs for a while and then blows fuses or relay.
   - Low Voltage or High Voltage → Apply rated voltage.
   - Defective Capacitors → Replace with proper capacitors.
   - Different Control Box for the Motor → Replace with proper control box.
   - Defective Starting Voltage Relay → Replace with proper relay.
   - Pump is Sand Clogged → Pull pump and clean well.
   - Overheated Protector → Shield the control box from heat source.

   The following conditions are stated to provide the owner with a list of criteria for maximum motor life and to assure motor warranty.

XI. Motor Cooling, Temperature Ratings

6" CP-SERIES MOTORS

Table of Power Reduction Coefficients with Increased Water Temperature

Motor Type	Rated Power kW	Temperature ºC							
		25	30	35	40	45	50	55	60
6" (1)	all models	1	0.85	0.74	–	–	–	–	–
6" (2)	all models	1	1	1	1	1	0.85	0.75	0.67

(1) Standard winding for water temperature up to 35º C. (2) Special winding for water temperature from 35º C to 60º C.

EXAMPLE:
A 15 kW 6" motor is to be used in 35º C water. Motor power at 35º C = 15 x 0.74 = 11.1 kW.

8" CP-SERIES MOTORS

Table of Power Reduction Coefficients with Increased Water Temperature

Motor Type	Rated Power kW	Temperature ºC							
		25	30	35	40	45	50	55	60
8" (1)	all models	1	0.85	0.74	–	–	–	–	–
8" (2)	all models	1	1	1	1	1	0.85	0.75	0.67

(1) Standard winding for water temperature up to 35º C. (2) Special winding for water temperature from 35º C to 60º C.

EXAMPLE:
A 55 kW 8" motor is to be used in 35º C water. Motor power at 35º C = 55 x 0.74 = 40.7 kW.

10" CP-SERIES MOTORS

Table of Power Reduction Coefficients with Increased Water Temperature

Motor Type	Rated Power kW	Temperature ºC							
		77	86	95	40	45	50	55	60
10" (1)	all models	1	0.85	0.74	–	–	–	–	–
10" (2)	all models	1	1	1	1	1	0.85	0.75	0.67

(1) Standard winding for water temperature up to 35º C. (2) Special winding for water temperature from 35º C to 60º C.

EXAMPLE:
A 110 kW 10" motor is to be used in 35º C water. Motor power at 35º C = 110 x 0.74 = 81.4 kW.

12" CP-SERIES MOTORS

Table of Power Reduction Coefficients with Increased Water Temperature

Motor Type	Rated Power kW	Temperature ºC							
		25	30	35	40	45	50	55	60
12" (1)	all models	1	0.85	0.74	–	–	–	–	–
12" (2)	all models	1	1	1	1	1	0.85	0.75	0.67

(1) Standard winding for water temperature up to 35º C. (2) Special winding for water temperature from 35º C to 60º C.

EXAMPLE:
A 220 kW 12" motor is to be used in 35º C water. Motor power at 35º C = 220 x 0.74 = 162.8 kW.

CENTRIPRO LIMITED WARRANTY

This warranty applies to CentriPro 6"-10" motors shown in this manual.

Any part or parts found to be defective within the warranty period shall be replaced at no charge to the dealer during the warranty period. The warranty period shall exist for a period of twelve (12) months from date of installation or twenty-four (24) months from date of manufacture, whichever period is shorter.

A dealer who believes that a warranty claim exists must contact the authorized CentriPro distributor from whom the motor and control was purchased and furnish complete details regarding the claim. The distributor is authorized to adjust any warranty claims utilizing the Xylem Inc. Customer Service Department.

CentriPro Warranty and Application Forms must be submitted with the warranty claim.

The warranty excludes:

(a) Labor, transportation and related costs incurred by the dealer;

(b) Reinstallation costs of repaired equipment;

(c) Reinstallation costs of replacement equipment;

(d) Consequential damages of any kind; and,

(e) Reimbursement for loss caused by interruption of service.

For purposes of this warranty, the following terms have these definitions:

(1) "Distributor" means any individual, partnership, corporation, association, or other legal relationship that stands between CentriPro and the dealer in purchases, consignments or contracts for sale of the subject motors and controls.

(2) "Dealer" means any individual, partnership, corporation, association, or other legal relationship which engages in the business of selling or leasing motors and controls to customers.

(3) "Customer" means any entity who buys or leases the subject motors and controls from a dealer. The "customer" may mean an individual, partnership, corporation, limited liability company, association or other legal entity which may engage in any type of business.

THIS WARRANTY EXTENDS TO THE DEALER ONLY.

xylem
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