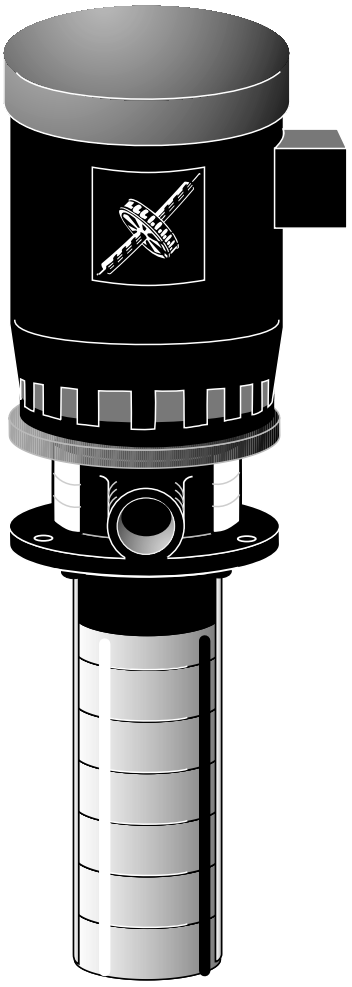
SPK/CRK/MTR
COOLANT PUMPS

Installation and Operating Instructions

CONTENTS



Please leave these instructions with the pump for future reference

GRUNDFOS®

Leaders in Pump Technology

SAFETY WARNING

Shock Hazard

A faulty motor or wiring can cause electrical shock that could be fatal, whether touched directly or conducted through standing water. For this reason, proper grounding of the motor frame to the power supply's grounding terminal is required for safe installation and operation.

In all installations, the above-ground metal plumbing should be connected to the power supply ground as described in Article 250-80 of the National Electrical Code.

Electrical Work

All electrical work should be performed by a qualified electrician in accordance with the latest edition of the National Electrical Code, local codes and regulations.

WARNING:

The safe operation of this pump requires that it be grounded in accordance with the National Electrical Code and local governing codes or regulations. Connect the ground wire to the grounding screw in the terminal box and then to the **acceptable** grounding point.

Pre-Installation Checklist

1. Confirm You Have The Right Pump

- Read the nameplate to ensure it is the one you ordered
- Compare the pump's nameplate data or its performance curve (for head, GPM, etc.) with the application in which you plan to install it. ***Will it do what you expect it to do?***

1.1 Pump Key for SPK/CRK

CRK 4 - 160 / 2 -x -x -x -xxxx

- Pump Range
- Nominal Flow Rate in m³/h
- Number of Stages x 10 (SPK x 1)
- Number of Impellers
- Code for Pump Version
- Code for Pipework Connection
- Code for Materials
- Code for Shaft Seal and Rubber Pump Parts

1.2 Pump Key for MTR

MTR 32 - 2 /1 -1 -x -x -x -xxxx

- Pump Range
- Nominal Flow Rate in m³/h
- Number of Stages
- Number of Impellers *(is only used if the pump has fewer impellers than chambers)*
- Number of impellers with reduced diameter
- Code for Pump Version
- Code for Pipework Connection
- Code for Materials
- Code for Shaft Seal

Code for Pump Version
Type of Pump
A = Standard pump
U = NEMA pump

Physical Changes
B = Oversized motor
P = Undersized motor *(1 flange size smaller)*
T = Oversized motor *(2 flange sizes larger)*
X = Special product

Code for Pipe Work Connection
F = DIN flange
G = ANSI flange
J = JIS flange
W = Internal thread

Code for Materials
A = Standard materials
I = Nonstainless parts converted to SS
K = Intermediate bearings are bronze
X = Special product
D = Graflon® bearing

U - G - A - BUBE

Type of Shaft Seal
A = O-ring seal with fixed seal driver
B = Rubber bellows seal
C = O-ring seal with a spring working as a driver
R = O-ring seal with reduced diameter stationary ring
H = Balanced seal, cartridge
E = O-ring seal, cartridge

Material of Rotating Ring
B = Carbon, plastic impregnated
C = Other types of carbon
U = Tungsten carbide
Q = Silicon carbide
V = Aluminum oxide

Materials of Secondary Seal and other Parts made of Plastic/Rubber
E = EPDM
V = FKM
K = Kalrez
X = Special product

Material of Stationary Ring
B = Carbon, plastic impregnated
C = Other types of carbon
U = Tungsten carbide
Q = Silicon carbide
V = Aluminum oxide
H = Carbon with imbedded Tungsten Carbide (Hybrid)

2. Check the Condition of The Pump

The shipping carton your pump came in is specially designed around your pump during production to prevent damage. As a precaution, it should remain in the carton until you are ready to install it. At that point, look at the pump and examine it for any damage that may have occurred during shipping. Examine any other parts of the shipment as well (electrical control boxes, etc) for any visible damage. If you find any, contact the transportation company in writing and ask to have it inspected.

3. Electrical Requirements

Supply Power

The incoming electrical supply should be verified so the voltage, phase and frequency match that of the pump motor. The proper operating voltage and other electrical information can be found on the motor nameplate. These motors are designed to run on ±10% of the nameplate-rated voltage. For dual-voltage motors, the motor should be internally connected to operate on the voltage closest to the 10% rating, i.e., a 208 voltage motor wired per the 208 volt connection diagram. Wiring connection diagrams can be found on the plates attached to the motor.

If voltage variations are larger than ±10%, do not operate the pump.

Field Wiring

Wire sizes should be based on the current carrying properties of a conductor as required by the latest edition of the National Electrical Code or local regulations. Direct on line (D.O.L.) starting is approved due to the extremely fast run-up time of the motor and the low moment of inertia of pump and motor. If D.O.L. starting is not acceptable and reduced starting current is required, an auto transformer or resistant starter should be used. It is suggested that a fused disconnect be used for each pump where service and standby pumps are installed.

Motor Protection

1. **Single-Phase Motors:**
   With the exception of 7 ½ and 10 HP motors (which require external protection) single-phase SPK/CRK pumps are equipped with multi-voltage, squirrel-cage induction motors with built-in thermal protection.

Installation Procedures

2. **Three-Phase Motors:**
   SPK/CRK/MTR Pumps with three-phase motors must be used with the proper size and type of motor-starter to ensure the motor is protected against damage from low voltage, phase failure, current imbalance and overloads. A properly sized starter with manual reset and ambient-compensated extra quick trip in all three legs should be used. The overload should be sized and adjusted to the full-load current rating of the motor. Under no circumstances should the overloads be set to a higher value than the full load current shown on the motor nameplate. This will void the warranty.

   Overloads for auto transformers and resistant starters should be sized in accordance with the recommend-ations of the manufacturer.

4. Glance Through This Guide

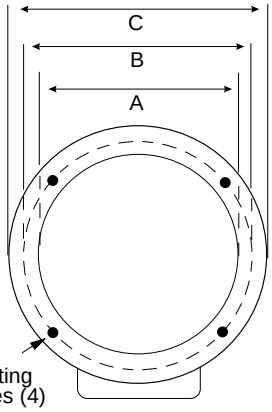
Even if you are very familiar with the installation of this pump, a quick glance through the remaining sections of this guide may help you avoid a potential problem.

Installation Procedures

Installing The Pump

Pump Location

Grundfos SPK/CRK/MTR pumps are designed for tank-mounting and may be installed in either a vertical or horizontal orientation. Where the unit is to be installed so as to position its mounting flange below the liquid level or in a pressurized tank, a gasket must be fitted between the pump's mounting flange and tank.



Pump Model	∅A	∅B	∅C	Discharge	Mounting Hole Dia.
SPK1/2/4/8 (NEMA)	5.5" (140)	6.3" (160)	7.1" (180)	1 ¼" NPT	0.28" (7)
SPK1/2/4 (IEC)	3.9" (100)	4.5" (115)	5.1" (130)	¾" BSPT	0.28" (7)
SPK8 (IEC)	5.5" (140)	6.3" (160)	7.1" (180)	1 ¼" BSPT	0.28" (7)
CRK2/4 (NEMA)	5.5" (140)	6.3" (160)	7.1" (180)	1 ¼" NPT	0.37" (9.5)
CRK2/4 (IEC)	5.5" (140)	6.3" (160)	7.1" (180)	1 ¼" BSPT	0.30" (7.5)
CRK8/16 (NEMA)	7.9" (200)	8.9" (225)	9.9" (250)	2.0" NPT	0.35" (9)
MTR32	7.5" (190)	8.7" (220)	9.9" (250)	2 ½" ANSI	0.47" (12)
MTR45/64	9.5" (240)	10.5" (265)	11.4" (290)	2 ½" ANSI	0.47" (12)

Pipework

The discharge ports of SPK/CRK pump units which are supplied for use with NEMA motors have 1¼ inch female NPT threads. Other discharge pipe sizes must be accommodated via the use of appropriate adapter bushings.

Suction Conditions

The bottom of the pump strainer must be at least 1.0 inch above the bottom of the tank. The pumps are designed to provide full performance down to a level of A mm above the bottom of the strainer.

At a liquid level between A and B mm above the bottom of the strainer, the built-in priming screw will protect the pump against dry running.

MTR32, 45 and 64 pumps have no priming screw.

Figure 1: CRK2/4•SPK1/2/4/8

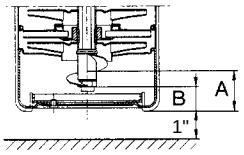


Figure 2: CRK8/16

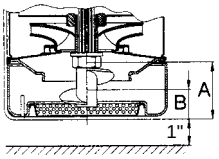
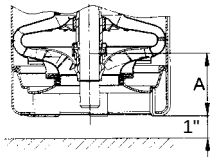


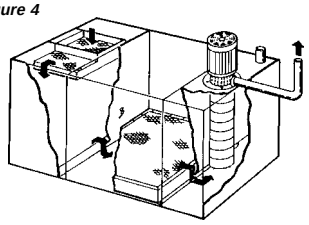
Figure 3: MTR32/45/64



PUMP TYPE	A (IN.)	B (IN.)
CRK2/4	1 ⅝"	1 ⅛"
CRK8/16	2.0"	1.0"
SPK1/2/4/8	1 ⅝"	1.0"
MTR32/45/64	2 ¾"	–

In general, it is recommended that the pump strainer be located as near as possible to the bottom of the tank. This maximizes first-stage submersion in condensate transfer applications and maintains fluid velocities in cutting lubricant applications (see Figure 4).

Figure 4



Separation of Particles

Out of consideration for the pump, the distribution system, the cutting tools and the treated materials, cooling/cutting fluids should, wherever possible, be free of particles before entering the pump unit. The system's requirements as to the purity of the pumped fluid depend on the machining methods, the treated materials and other criteria. Filtration methods should be matched to these requirements. Larger particles are unable to enter the pump with the pumped fluid due to the effect of the built-in inlet screen; particles ∅2 mm or smaller are allowed to enter the SPK and CRK pumps, and particles ∅4 mm or smaller are allowed to enter the MTR pump.

Bypass

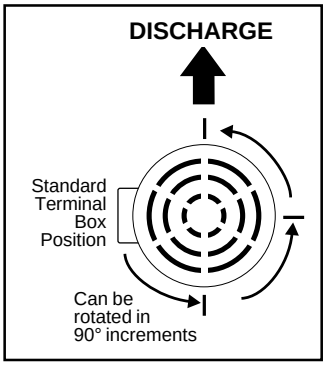
A bypass line or pressure relief valve should be installed in the discharge pipe if there is any possibility the pump may operate against a closed valve in the discharge line (or in any other no-flow condition). Flow through the pump is required to ensure adequate cooling and lubrication of the pump is maintained. The following table shows minimum flow rates:

PUMP TYPE	MINIMUM FLOW RATE
SPK1	1.0 GPM
SPK2	1.2 GPM
SPK4	3.0 GPM
SPK8	5.3 GPM
CRK2	1.2 GPM
CRK4	3.0 GPM
CRK8	5.3 GPM
CRK 16	8.5 GPM
MTR 32	15 GPM up to 176°F (80°C) 35 GPM 176° - 194°F (80-70°C)
MTR45	20 GPM up to 176°F (80°C) 44 GPM 176° - 194°F
MTR64	28 GPM up to 176°F (80°C) 66 GPM 176°F - 194°F (80°C - 80°C)

Operating The Pump

Position of Terminal Box
The motor terminal box can be turned to any of four positions in 90° steps. To rotate the terminal box, remove the four bolts securing the motor to the pump; turn the motor to the desired location; replace and securely tighten the four bolts.

Boiler Feed Installations
If the pump is being used as a boiler-feed pump, make sure the pump is capable of supplying sufficient water throughout its entire evaporation and pressure ranges. Where modulating control valves are used, a bypass around the pump must be installed to ensure pump lubrication.



Operating the Pump

Replacing The Motor

If the motor is damaged due to bearing failure, burning or electrical failure, the following instructions detail how to remove the motor for replacement. It must be emphasized that motors used on SPK/CRK/MTR pumps are specially selected to our rigid specifications. Replacement motors must be of the same frame size.

Removing the Old Motor

1. Remove the coupling guard screens.
2. Using the proper *metric* allen wrench, loosen the four cap screws in the coupling.
3. With the correct size wrench, loosen and remove the four bolts which hold the motor to the discharge section of the pump end.
4. Lift the motor straight up until the shaft is free from the coupling.

Installing the New Motor

1. Thoroughly clean the surfaces of the motor and pump end mounting flanges. Set the motor on the pump end.
2. Place the terminal box in the desired position by rotating the motor.
3. Insert the mounting bolts, then tighten diagonally and evenly.
4. Using a larger screwdriver, raise the pump shaft by placing the tip of the screwdriver under the coupling and carefully elevating the coupling to its highest point. Note: The shaft can only be raised approximately 0.20 inches (5 mm).
5. Now ***lower*** the shaft halfway back down the distance you just raised it (approximately the thickness of a dime), and retighten the *metric* cap screws in the coupling. Be sure to tighten the top and bottom screws on one side of the coupling and then the other. *Torque the coupling screws to the following specifications.*

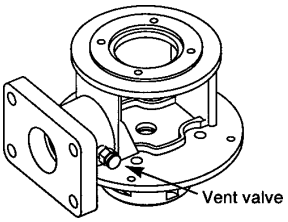
Coupling Bolt Size	Minimum Torque Specifications
M6	10 ft-lbs
M8	23 ft-lbs
M10	46 ft-lbs

6. Check to see that the gaps between the coupling halves are equal. Loosen and re-adjust if necessary.
7. Be certain the pump shaft can be rotated by hand. If the shaft cannot be rotated or it binds, disassemble and check for misalignment.
8. Replace the two coupling guard screens.

Starting The Pump The First Time

1. **Air Elimination**
   As long as the pump body is partially submerged in fluid, the pump may be started against an open or a closed discharge line. If the discharge line is open, the air will quickly escape through the discharge pipe. If the discharge line is closed, the air will be pressed down through the pump body and out into the tank so that the discharge pressure will quickly reach its maximum (shutoff) level.

   If the pump is fitted with a vent valve, this valve must be opened while running the pump against a closed valve. Once a steady stream of liquid is running out of this vent valve it can be closed.



2. **Check the Direction of Rotation**
   a. Switch the POWER OFF.
   b. Make sure the pump has been filled and vented.
   c. Remove the coupling guard and rotate the pump shaft to be certain it turns freely. Replace the coupling guard.
   d. Verify that the electrical connections are in accordance with the wiring diagram on the motor.
   e. Switch the power on and observe the direction of rotation. **When viewed from the top, the pump should rotate counter-clockwise.**
   f. To reverse the direction of rotation, first switch OFF the supply power.
   g. On three-phase motors, switch any two power leads at the load side of the starter. On single-phase motors, refer to the connection diagram on the nameplate. Change wiring as required.
   h. Switch the power ON and check for proper motor rotation.

Starting And Adjusting

Before starting the pump, make sure that:

1. The pump body is partially submerged in the fluid.
2. The direction of rotation is counter-clockwise when viewed from the top.
3. All piping connections are tight and the pipes are adequately supported.
4. The pump inlet screen is clean and unblocked.
5. Depending on the application, it may be necessary to start the pump against a closed discharge valve in order to prevent system damage due to water hammer. If so, this valve should be opened in a gradual manner after the pump is started. Unless used as a flow throttling device, make sure this valve is completely opened.
6. Check and record the voltage and amperage of the motor. Adjust the motor overloads if required.
7. Check and record operating pressures if pressure gauges have been installed.

Operating The Pump

8. Check all controls for proper operation. If pump is controlled by a pressure switch, check and adjust the cut-in and cut-out pressures. If low-water-level controls are used, be sure the low-level switch is properly adjusted so the pump cannot run if the pump should break suction.

Improper Operation

No Flow

Under no circumstances should the pump be operated for any prolonged periods of time without flow through the pump. This can result in motor and pump damage due to overheating. A properly sized relief valve should be installed to allow sufficient water to circulate through the pump to provide adequate cooling and lubrication of the pump bearings and seals.

Pump Cycling

Pump cycling should be checked to ensure the pump is not starting more than:

20 times per hour on 1/2 to 5 HP models
15 times per hour on 7 1/2 to 15 HP models
10 times per hour on 20 to 40 HP models

Rapid cycling is a major cause of premature motor failure due to increased heat buildup in the motor. If necessary, adjust controls to reduce the frequency of starts and stops.

Maintenance

Grundfos SPK/CRK/MTR multi-stage centrifugal pumps installed in accordance with these instructions and sized for correct performance will operate efficiently and provide years of service. The pumps are water-lubricated and do not require any external lubrication or inspection. The motors will require periodic lubrication as noted in the following paragraphs.

Motor Lubrication

Electric motors are pre-lubricated at the factory and do not require additional lubrication at start-up. Motors containing sealed bearings do not require additional lubrication during the first 15,000 hours of operation. Motors with grease fittings should **only** be lubricated with a lithium based grease.

Severity of Service	Ambient Temperature (Maximum)	Atmospheric Contamination	Approved Types of Grease	
Standard	104°F (40°C)	Clean, little corrosion	Shell Dolium R	Or compatible
Severe	122°F (50°C)	Moderate dirt, corrosion	Chevron SRI#2	equivalent
Extreme	>122°F (50°C) or Class H insulation	Severe dirt, abrasive dust, corrosion		type of grease

Lubrication Schedule

NEMA/(IEC) Frame Size	Standard Service Interval	Severe Service Interval	Extreme Service Interval	Weight of Grease to Add Oz./(Grams)	Volume of Grease to Add In^3/(Teaspoons)
Up through 210 (132)	5500 hrs.	2750 hrs.	550 hrs.	0.30 (8.4)	0.6 (2)
Over 210 through 280 (180)	3600 hrs.	1800 hrs.	360 hrs.	0.61 (17.4)*	1.2 (3.9)
Over 280 up through 360 (225)	2200 hrs.	1100 hrs.	220 hrs.	0.81 (23.1)*	1.5 (5.2)
Over 360 (225)	2200 hrs.	1100 hrs.	220 hrs.	2.12 (60.0)*	4.1 (13.4)

*The grease outlet plug **MUST** be removed before adding new grease.

Do not over grease the bearings. Over greasing will cause increased bearing heat and can result in bearing/motor failure.

Periodic Safety Checks

At regular intervals depending on the conditions and time of operation, the following checks should be made:

1. Pump meets required performance and is operating smoothly and quietly.
2. There are no leaks, particularly at the shaft seal.
3. The motor is not overheating.
4. Remove and clean all strainers or filters in the system.
5. Verify the tripping of the motor overload protection.
6. Check the operating of all controls. Check unit control cycling twice and adjust if necessary.
7. If the pump is not operated for unusually long periods, the unit should be maintained in accordance with these instructions. In addition, if the pump is not drained, the pump shaft should be manually rotated or run for short periods of time at monthly intervals.

If the pump fails to operate or there is a loss of performance, refer to the Troubleshooting section on page 6.

* The information below was updated March 30, 2001, but is subject to change without notice. Grundfos makes no claims or warranties regarding the accuracy of the information herein.

Motors

Totally Enclosed Fan Cooled (TEFC) Baldor Motors*
60 HZ - Two Pole (3450 RPM)

HP	PH	SERVICE FACTOR	NEMA FRAME	VOLTS	AMPS FULL LOAD	AMPS LOCKED ROTOR/ START	AMPS S.F.	EFF.	POWER FACTOR	LINE TO LINE RESISTANCE AT 25 DEG C	INS. CLASS	KVA CODE	GRUNDFOS PART NO.
1/3	1	1.35	56C	115/230	2	24.5/12.2	7.6/3.8	55.0	68	6.489/7.172	B	K	85.680001
1/3	3	1.35	56C	208-230/460	1.5-1.4/.7	11-10/5	1.7-1.6/.8	70.0	65	38.2-42.3	B	K	85.580001
1/2	1	1.6	56C	115/208-230	7.4/4.1-3.7	36/19.8-18	9.8/5.2-4.9	62.0	69	3.382/3.738	B	K	85.700002
1/2	3	1.25	56C	208-230/460	2.1-2/1	12.4-11.3/5.6	2.6-2.4/1.2	68.0	63	34.06/37.64	B	J	85.600002
3/4	1	1.25	56C	115/208-230	9.6/5-4.8	51/28-25.5	11.4/6-5.7	66.0	74	2.332/2.578	B	K	85.700003
3/4	3	1.25	56C	208-230/460	2.7-2.6/.3	33-30/15	3.1-3/1.5	74.0	73	23.4-25.88	B	K	85.600003
1	1	1.25	56C	115/230	11/5.5	77/38.5	14.4/7.2	66.0	81	2.347/2.594	B	K	85.700004
1	3	1.25	56C	208-230/460	3.7-3.6/1.8	24.3-22/11	4.1-4/2	75.5	76	15.9-17.5	B	H	85.600004
1 1/2	1	1.3	56C	115/208-230	17/9.5-8.6	79.8/43.8-39.9	20.4/11.3-10.2	71.0	79	1.178/1.302	B	K	85.700005
1 1/2	3	1.15	56C	208-230/460	5.0-4.6/2.3	35.4-32/16	3.3-3/2.5	75.5	76	11.2-12.3	B	G	85.600005
2	1	1.15	56C	115/230	23/11.5	158.4/79.2	25.4/12.7	74.0	82	0.872	F	K	85.700006
2	3	1.15	56C	208-230/460	5.7-5.4/2.7	38.7-35/17.5	6.3-6/3	78.5	93	10.7-11.8	B	H	85.600006
3	1	1.15	56C	115/208-230	30/16.5-15	172/95.1-86	32.2/16.1	77.0	87	0.593	F	H	84.6346075
3	3	1.15	56C	208-230/460	7.8-7.4/3.7	59.7-54/27	***	82.5	87	5.5-6.1	F	J	84.6326074
3	1	1.15	182TC	115/208-230	29/16-14.5	170/93.5-85	32.8/18-16.4	75.0	88	.569/.629	F	H	85.700008
3	3	1.15	182TC	208-230/460	8.2-7.8/3.9	77.4-70/35	9-8.6/.3	81.5	89	4.9-5.4	F	K	85.600008
5	1	1.15	213TC	230	22	170	25	80.0	89	0.29	F	J	85.700012
5	3	1.15	184TC	208-230/460	13.2-12/6	103.9-94/47	15-13.6/6.8	85.5	93	2.6-2.9	F	K	85.600012
7 1/2	1	1.15	213TC	208-230	34.3-31	240-217	39.3-35.5	82.0	91	.2109/.2331	H	F	85.700017
7 1/2	3	1.15	213TC	208-230/460	19-17.2/8.6	168.1-152/76	21.7-19.6/9.8	87.5	94	1.4-1.5	F	L	85.600017
10	1	1.15	213TC	230	40	233.5	46	85.5	97	***	F	F	85.700022
10	3	1.15	215TC	208-230/460	25-24/12	232.2-210/105	28.3-27.2/13.6	85.5	91	1.07-1.18	F	J	85.600022
15	3	1.15	254TC	208-230/460	38-34/17	376-340/170	43.4-38.8/19.4	86.5	94	.62-.69	H	L	85.600024
20	3	1.15	254TC	230/460	46/23	420/210	52.4/26.2	88.5	92	0.36	F	K	85.600035
25	3	1.15	284TSC	208-230/460	61-58/29	482.1-436/218	70-66/33	91.0	89	.30-.33	F	H	85.600026
30	3	1.15	286TSC	230/460	72/36	444/222	80/40	88.5	88	0.319	F	G	85.600027
40	3	1.15	286TSC	230/460	94/47	580/290	105.2/52.5	90.2	89	0.176	F	***	85.600032

*** Information unavailable at time of update.

Open Drip Proof (ODP) Baldor Motors*
60 HZ - Two Pole (3450 RPM)

HP	PH	SERVICE FACTOR	NEMA FRAME	VOLTS	AMPS FULL LOAD	AMPS LOCKED ROTOR/ START	AMPS S.F.	EFF.	POWER FACTOR	LINE TO LINE RESISTANCE AT 25 DEG C	INS. CLASS	KVA CODE	GRUNDFOS PART NO.
1/3	1	1.35	56C	115-230	6-3	28-14	7-3.5	55.0	68	7.12	B	K	84.Z00023
1/3	3	1.35	56C	208-230/460	1.5-1.4/.7	20-10/5	1.7-1.6/.8	70.0	65	38.20-42.3	B	J	85.600001
1/2	1	1.25	56C	115/208-230	7.2/4-3.6	30/16.58-15	8/4.4-4	66.0	66	4.72	B	H	84.Z00024
1/2	3	1.25	56C	208-230/460	2.1-2/1	13.27-12/6	2.6-2.4/1.2	68.0	63	35.1	B	J	84.Z00001
3/4	1	1.25	56C	115/208-230	9.6/5.3-4.8	56/30.96-28	11.4/6.3-5.7	66.0	74	2.5	B	K	84.Z00025
3/4	3	1.25	56C	208-230/460	9.6-5.3/4.8	16.81-15.2/7.6	3.1-3/1.5	74.0	73	24.6	B	K	84.Z00003
1	1	1.25	56C	115/208-230	14/7.3-7	92/50.87-46	16/8.8-8	65.0	65	1.63	B	L	84.Z00026
1	3	1.25	56C	208-230/460	3.2-3/1.5	24.33-22/11	4.2-3.8/1.9	75.5	76	16.7	B	H	84.Z00005
1 1/2	1	1.15	56C	115/208-230	18/8.7-9.0	120.8/66.8-60.4	19.6/10.8-9.8	68.0	77	1.24	B	G	84.Z00027
1 1/2	3	1.15	56C	208-230/460	4.9-4.6/2.3	40.7-36.8/18.4	5.3-5/2.5	80.0	74	8.53	B	K	84.Z00007
2	1	1.15	56C	115/208-230	24/12	160/88.5-80	26/13	70.0	75	0.844	B	G	84.Z00028
2	3	1.15	56C	208-230/460	5.9-5.6/2.8	77.4-70.4/35.2	6.5-6.2/3.1	81.5	89	10.7	B	H	84.Z00009
3	1	1.15	56C	230	13	108	14.8	82.5	93	0.614	B	K	84.6246075
3	3	1.15	56C	208-230/460	8.4-8/4	66.35-60/30	9.5-9/4.5	82.5	89	5.6	B	J	84.6226075
3	1	1.15	182TC	115/208-230	28/14.7-14	148/81.83-74	32/18.3-16	78.0	88	0.175	B	G	84.Z00029
3	3	1.15	182TC	208-230/460	8.4-8/4	66.35-60/30	9.5-9/4.5	82.5	89	5.6	B	J	84.Z00011
5	1	1.15	213TC	208-230	28-26	167.2-152	31-28.7	78.0	82	.3259/.3602	B	G	84.Z00030
5	3	1.15	184TCZ	208-230/460	13-12/6	137.8-124.6/62.3	14.7-13.6/6.8	87.5	90	2.83	B	L	84.Z00013
7 1/2	1	1.15	213TC	208-230	38-37	212.3-192	42-41	81.0	82	0.23	B	G	84.Z00031
7 1/2	3	1.15	215TC	208-230/460	19-18/9	168.1-152/76	21-20/10	85.5	91	2	B	J	84.Z00015
10	1	1.15	215TC	230	46	280	51.7	83.0	86	0.163	B	G	84.Z00032
10	3	1.15	215TC	208-230/460	27-25/13	195.5-176.8/88.4	30-28/14	85.5	91	1.47	B	H	84.Z00017
15	3	1.15	254TC	208-230/460	38-36/18	289.7-262/131	43-41/20.5	85.5	92	0.961	F	G	84.Z00019
20	3	1.15	254TC	230/460	***	***	***	***	***	***	***	***	84.Z03374
25	3	1.15	284TSC	230/460	59/29.5	372/186	67/33.5	92.4	86	0.488	B	G	84.Z00021
30	3	1.15	284TSC	230/460	73/36.5	432/216	81.2/40.6	90.2	86	.3373/.3728	F	G	84.Z00022
40	3	1.15	286TSC	230/460	100/50	540/270	114.04/57.02	90.2	83	.1919/.2121	B	F	84.Z00033

*** Information unavailable at time of update.

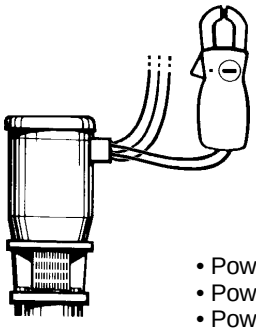
IEC IP55, IM 3611 (V18)*
60 HZ - Two Pole (3450 RPM)

Kw	HP	PH	S F	VOLTS	AMPERAGE FULL LOAD	AMPERAGE LOCKED ROTOR	FULL LOAD EFF	POWER FACTOR	LINE TO LINE RESISTANCE	INS. CLASS	GRUNDFOS PART NO
0.25	1/3	3	1.0	220-255/380-440	1.10-1.02/0.63-0.59	6.1-7.1/3.5-4.1	73/73	0.86/0.77	23.5	F	85.105501
0.37	1/2	3	1.0	220-255/380-440	1.50-1.44/0.87-0.83	8.3-9.4/4.8-5.4	78/79	0.85/0.76	21.2	F	85.805102
0.55	3/4	3	1.0	220-255/380-440	2.15-2.05/1.25-1.20	10.8-12.3/6.3-7.2	80.5/82	0.85/0.76	14.8	F	85.805103
0.75	1	3	1.0	220-255/380-440	2.85-2.70/1.65-1.55	17.1-18.9/9.9-10.9	82/84	0.85/0.78	10.4	F	85.805104
1.1	1 1/2	3	1.0	220-255/380-440	4.15-3.80/2.40-2.20	24.5-27.7/14.1-6.1	82/85	0.86/0.80	6.85	F	85.805105
1.5	2	3	1.0	220-277/380-480	5.70-5.00/3.30-2.90	33.6-42.0/19.5-24.4	80.5/82	0.89/0.78	3.8	F	85.805906
2.2	3	3	1.0	220-277/380-480	8.05-6.95/4.65-4.00	52.3-66.0/31.0-38.0	83/84.5	0.90/0.81	2.5	F	85.805908
3	4	3	1.0	220-277/380-480	10.6-9.00/6.10-5.20	78.4-99.0/45.1-57.2	86/87	0.90/0.83	1.74	F	85.805810
4	5.5	3	1.0	220-277/380-480	13.6-11.4/7.85-6.60	109-137/63-79	87/88	0.92/0.85	1.64	F	85.805413
5.5	7 1/2	3	1.0	220-277/380-480	18.8-15.6/10.8-9.00	154-193/89-112	87.5/89.5	0.92/0.85	1.12	F	85.807417
7.5	10	3	1.0	220-277/380-480	25.5-22.6/14.6-13.0	242-262/139-151	88.5/90	0.92/0.80	0.685	F	85.807422
11	15	3	1.0	220-277/380-480	37.0-30.2/21.4-17.4	244-290/141-167	89/91	0.90/0.86	.37Ω	F	85.807424

Troubleshooting

Preliminary Checks

Supply Voltage



How to Measure
Use a volt meter, (set to the proper scale) measure the voltage at the pump terminal box or starter.

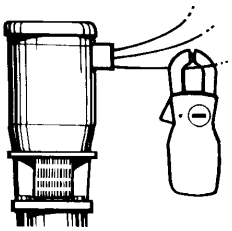
On single-phase units, measure between power leads L1 and L2 (or L1 and N for 115 volt units). On three-phase units, measure between:

- Power leads L1 and L2
- Power leads L2 and L3
- Power leads L3 and L1

What it Means
When the motor is under load, the voltage should be within ±10% of the nameplate voltage. Larger voltage variation may cause winding damage and indicate a poor electrical supply. The pump should not be operated until these variations have been corrected.

If the voltage constantly remains high or low, the motor should be changed to the correct supply voltage.

Current Measurement



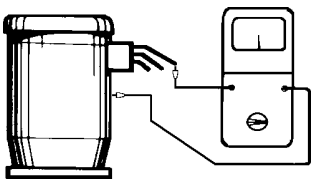
How to Measure
Use an ammeter, (set on the proper scale) to measure the current on each power lead at the terminal box or starter.

Current should be measured when the pump is operating at constant discharge pressure.

What it Means
If the amp draw exceeds the listed service factor amps (SFA) or if the current imbalance is greater than 5% between each leg on three-phase units, check the following:

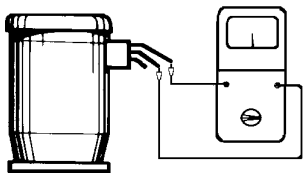
1. Burned contacts on motor starter.
2. Loose terminals in starter/terminal box or possible wire defect.
3. Too high or too low supply voltage.
4. Motor windings are shorted or grounded. Check winding and insulation resistances.
5. Pump is damaged causing a motor overload.

Lead-To-Ground Resistance



How to Measure
Turn off power and disconnect the supply power leads in the pump terminal box. Using an ohmmeter, set the scale selector to R x 100 and zero adjust the meter by touching the two ohmmeter leads together. Touch one ohmmeter lead to a motor lead and one to ground. Repeat for each lead. If measured resistance does not exceed 1,000,000 ohms, motor is bad and in need of replacement.

Winding Resistance



How to Measure — NEMA
Turn off power and disconnect the supply power leads in the pump terminal box. Using an ohmmeter, set the scale selector to R x 1 and zero adjust the meter by touching the two ohmmeter leads together.

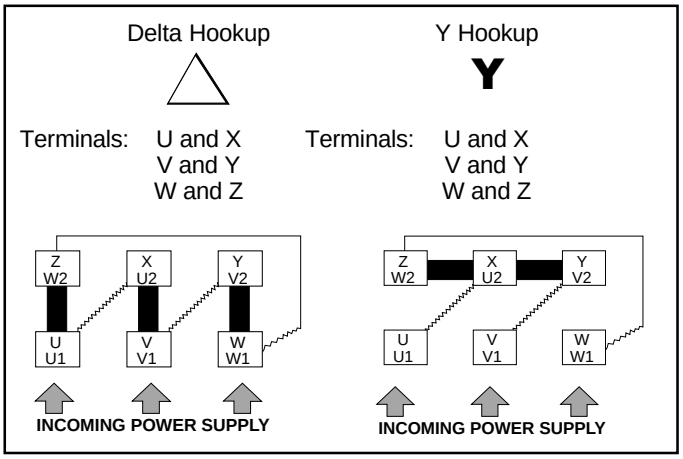
Touch the leads of the ohmmeter to two motor leads.

Single phase motors - touching the leads of the ohmmeter to the two outgoing "hot" motor leads (either a single motor lead or combination of leads joined together) will measure the main winding's resistance.

Three phase motors - touching the leads of the ohmmeter to any two hot leads will measure that winding's resistance. Repeat for all three possible lead combinations (L_1 and L_2, L_2 and L_3, L_1 and L_3)

How to Measure — IEC
Turn off power and disconnect the supply power leads in the pump terminal box. Using an ohmmeter, set the scale selector to R x 1 and zero adjust the meter by touching the two ohmmeter leads together.

Touch the leads of the ohmmeter to two motor terminals as follows:



What it Means
If all ohm values are normal, the motor windings are neither shorted nor open. If any one ohm value is less than normal (-25%), that motor winding may be starting to short. If any one ohm value is greater than normal (+25%), the winding may be starting to open. If some values are high and some are low, the leads may be connected incorrectly, or they may have a break in the insulating jacket.

Diagnosing Specific Problems

The following checklist should help you troubleshoot most of the problems you may encounter during installation.

If The Pump...	*It May Be Caused By...*	*Check This By..*	*Correct It By...*
Does Not Run	No power at pump panel	Check for voltage at panel	If no voltage at pump panel, check feeder panel for tripped circuits
	Fuses are blown or circuit breakers are tripped	Turn off power and remove fuses. Check for continuity with ohmmeter	Replace blown fuses or reset circuit breaker. If new fuses blow or circuit breaker trips, the electrical installation, motor and wires must be checked.
	Motor starter overloads are burned or have tripped out	Check for voltage on line and load side of starter	Replace burned heaters or reset. Inspect starter for other damage. If heater trips again, check the supply voltage and starter holding coil.
	Starter does not energize	Energize control circuit and check for voltage at the holding coil	If no voltage, check control circuit fuses. If voltage, check holding coil for shorts. Replace bad coil.
	Defective controls	Check all safety and pressure switches for operation. Inspect contacts in control devices	Replace worn or defective parts or controls
	Motor is defective	Turn off power and disconnect wiring. Measure the lead to lead resistances with ohmmeter (RX-1). Measure lead to ground values with ohmmeter (RX-100K). Record measured values	If an open or grounded winding is found, remove motor and repair or replace
	Defective capacitor. (Single-phase motors)	Turn off power and discharge capacitor. Check with ohmmeter (RX-100K).	When the meter is connected to the capacitor, the needle should jump towards 0 ohms and slowly drift back to infinity (∞). Replace if defective
	Pump is bound	Turn off power and manually rotate pump shaft	If shaft does not rotate easily, check coupling setting and adjust as necessary. If shaft rotation is still tight, remove pump and inspect. Disassemble and repair
			Correct wiring
Pump Runs But At Reduced Capacity or Does Not Deliver Water	Wrong rotation	Check wiring for proper connections	Provide submergence by increasing fluid level in tank or sump; alternatively by repositioning pump at lower level
	Pump body not partially submerged	Turn pump off, close isolation valve(s). Check fluid level	Clean and replace strainer, screen and/or valves
	Strainers, inlet screen or valves are clogged	Remove strainer, screen or valve and inspect	Install baffle(s) in tank. Relocate inlet pipe. Decrease pump flow rate
	Entrained air in pumpage	Check tank conditions for cascading fluid or vortexing	Decrease pump flow rate and/or fluid temperature. Increase first-stage submersion
	Fluid cavitating	Compare pump NPSH requirements to available NPSH at pump flow rate	Convert measured pressure (in PSI) to head (in feet): (Measured PSI x 2.31 ft/PSI = _____ ft.) Refer to the specific pump curve for shutoff head for that pump model. If head is close to curve, pump is probably OK. If not, remove pump and inspect
	Pump worn	Install pressure gauge, start pump, gradually close the discharge valve and read pressure at shutoff	Remove any foreign materials found
	Pump impeller or guide vane is clogged	Disassemble and inspect pump passageways	If voltage varies more than ±10%, contact power company. Check wire sizing
Fuses Blow or Circuit Breakers or Overload Relays Trip	Low voltage	Check voltage at starter panel and motor	Increase heater size or adjust trip setting to a maximum of motor nameplate (full load) current
	Motor overloads are set too low	Cycle pump and measure amperage	Must be within ±5%. If not, check motor and wiring. Rotating all leads may eliminate this problem
	Three-phase current is imbalanced	Check current draw on each lead to the motor	
	Motor is shorted or grounded	Turn off power and disconnect wiring. Measure the lead-to-lead resistance with an ohmmeter (RX-1). Measure lead-to-ground values with an ohmmeter (RX-100K) or a megaohm meter. Record values	If an open or grounded winding is found, remove the motor, repair and/or replace
	Wiring or connections are faulty	Check proper wiring and loose terminals	Tighten loose terminals. Replace damaged wire
	Pump is bound	Turn of power and manually rotate pump shaft	If shaft does not rotate eaily, check coupling setting and adjust as necessary. If shaft rotation is still tight, remove pump and inspect. Disassemble and repair
	Defective capacitor. (Single-phase motors)	Turn off power and discharge capacitor. Check with ohmmeter (RX-100K)	When the meter is connected to the capacitor, the needle should jump towards 0 ohms and slowly drift back to infinity (∞). Replace if defective.
	Motor overloads at higher ambient temperature than motor	Use a thermometer to check the ambient temperature near the overloads and motor. Record these values	If ambient temperature at motor is lower than at overloads, especially where temperature at overloads is above 104°F (40°C), ambient-compensated heaters should replace standard heaters

Notes

Notes

LIMITED WARRANTY

Products manufactured by GRUNDFOS PUMPS CORPORATION (Grundfos) are warranted to the original user only to be free of defects in material and workmanship for a period of 18 months from date of installation, but not more than 24 months from date of manufacture. Grundfos' liability under this warranty shall be limited to repairing or replacing at Grundfos' option, without charge, F.O.B. Grundfos' factory or authorized service station, any product of Grundfos manufacture. Grundfos will not be liable for any costs of removal, installation, transportation, or any other charges which may arise in connection with a warranty claim. Products which are sold but not manufactured by Grundfos are subject to the warranty provided by the manufacturer of said products and not by Grundfos' warranty. Grundfos will not be liable for damage or wear to products caused by abnormal operating conditions, accident, abuse, misuse, unauthorized alteration or repair, or if the product was not installed in accordance with Grundfos' printed installation and operating instructions.

To obtain service under this warranty, the defective product must be returned to the distributor or dealer of Grundfos products from which it was purchased together with proof of purchase and installation date, failure date, and supporting installation data. Unless otherwise provided, the distributor or dealer will contact the Grundfos factory or authorized service station for instructions. Any defective product to be returned to the factory or service station must be sent freight prepaid; documentation supporting the warranty claim and/or a Return Material Authorization must be included if so instructed.

GRUNDFOS WILL NOT BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES, LOSSES, OR EXPENSES ARISING FROM INSTALLATION, USE OR ANY OTHER CAUSES. THERE ARE NO EXPRESS OR IMPLIED WARRANTIES, INCLUDING MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, WHICH EXTEND BEYOND THOSE WARRANTIES DESCRIBED OR REFERRED TO ABOVE.

Some jurisdictions do not allow the exclusion or limitation of incidental or consequential damages and some jurisdictions do not allow limitations on how long implied warranties may last. Therefore, the above limitations or exclusions may not apply to you. This warranty gives you specific legal rights and you may also have other rights which vary from jurisdiction to jurisdiction.

GRUNDFOS®

Leaders in Pump Technology

Grundfos Pumps Corporation • 3131 N. Business Park Avenue • Fresno, CA 93727
Customer Service Centers: Allentown, PA • Fresno, CA
Phone: (559) 292-8000 • Fax: (559) 291-1357
Canada: Oakville, Ontario • Mexico: Apodaca, N.L.

Visit our website at www.us.grundfos.com

L-SPK-TL-003	Rev. 4/01
PRINTED IN USA	