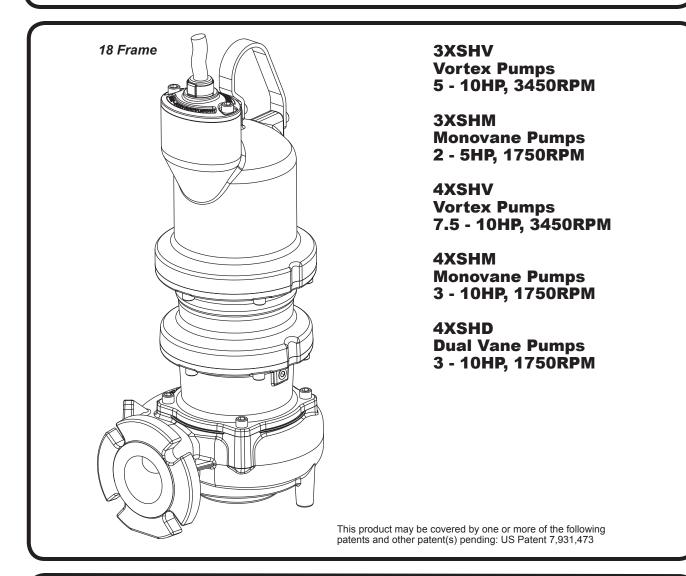
BARNES®

INSTALLATION and OPERATION MANUAL Solids Handling Submersible Pump



IMPORTANT!

Read all instructions in this manual before operating pump. As a result of Crane Pumps & Systems, Inc., constant product improvement program, product changes may occur. As such Crane Pumps & Systems reserves the right to change product without prior written notification.



PUMPS & SYSTEMS

420 Third Street Piqua, Ohio 45356 Phone: (937) 778-8947 Fax: (937) 773-7157 www.cranepumps.com 83 West Drive, Bramton Ontario, Canada L6T 2J6 Phone: (905) 457-6223 Fax: (905) 457-2650



Form No. 133030XP-Rev. C

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SAFETY FIRST!

Please Read This Before Installing Or Operating Pump. This information is provided for SAFETY and to PREVENT EQUIPMENT PROBLEMS. To help recognize this information, observe the following symbols:



IMPORTANT! Warns about hazards that can result in personal injury or Indicates factors concerned with assembly, installation, operation, or maintenance which could result in damage to the machine or equipment if ignored.

CAUTION ! Warns about hazards that can or will cause minor personal injury or property damage if ignored. Used with symbols below

WARNING ! Warns about hazards that can or will cause serious personal injury, death, or major property damage if ignored. Used with symbols below.



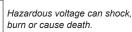
Hazardous fluids can cause fire or explosions, burns or death could result.



Biohazard can cause serious personal injury.



Rotating machinery Amputation or severe laceration can result.



property damage.

\$\$\$

Extremely hot -

Severe burnes can

occur on contact.

Hazardous fluids can Hazardous

pressure, eruptions or explosions

could cause personal injury or

Only qualified personnel should install, operate and repair pump. Any wiring of pumps should be performed by a qualified electrician.



WARNING ! - To reduce risk of electrical shock, pumps and control panels must be properly grounded in accordance with the National Electric Code (NEC) or the Canadian Electrical Code (CEC) and all applicable state, province, local codes and ordinances.

WARNING! - To reduce risk of electrical shock, always disconnect the pump from the power source before handling or servicing. Lock out power and tag.



WARNING! Operation against a closed discharge valve will cause premature bearing and seal failure on any pump, and on end suction and

self priming pump the heat build may cause the generation of steam with resulting dangerous pressures. It is recommended that a high case temperature switch or pressure relief valve be installed on the pump body.



CAUTION ! Never operate a pump with a plug-in type power cord without a ground fault circuit interrupter.



CAUTION! Pumps build up heat and pressure during operation-allow time for pumps to cool before handling or servicing.



WARNING! - DO NOT pump hazardous materials (flammable, caustic, etc.) unless the pump is specifically designed and designated to handle them.



Do not block or restrict discharge hose, as discharge hose may whip under pressure.



WARNING! - DO NOT wear loose clothing that may become entangled in the impeller or other moving parts.

WARNING! - Keep clear of suction and discharge openings. DO NOT insert fingers in pump with power connected.



.

Always wear eye protection when working on pumps.

Make sure lifting handles are securely fastened each time before lifting. DO NOT operate pump without safety devices in place. Always replace safety devices that have been removed during service or repair. Secure the pump in its operating position so it can not tip over, fall or slide.

DO NOT exceed manufacturers recommendation for maximum performance, as this could cause the motor to overheat

DO NOT remove cord and strain relief. Do not connect conduit to pump.

WARNING! Cable should be protected at all times to avoid punctures, cut, bruises and abrasions - inspect frequently. Never handle connected power cords with wet hands.



WARNING! To reduce risk of electrical shock, all wiring and junction connections should be made per the NEC or CEC and applicable state or province and local codes. Requirements may vary depending on usage and location.

WARNING! Submersible Pumps are not approved for use in swimming pools, recreational water installations, decorative fountains or any installation where human contact with the pumped fluid is common.



WARNING! Products Returned Must Be Cleaned, Sanitized, Or Decontaminated As Necessary Prior To Shipment, To Insure That Employees Will Not Be Exposed To Health Hazards In Handling Said Material. All Applicable Laws And Regulations Shall Apply.

Bronze/brass and bronze/brass fitted pumps may contain lead levels higher than considered safe for potable water systems. Lead is known to cause cancer and birth defects or other reproductive harm. Various government agencies have determined that leaded copper alloys should not be used in potable water applications. For non-leaded copper alloy materials of construction, please contact factory.



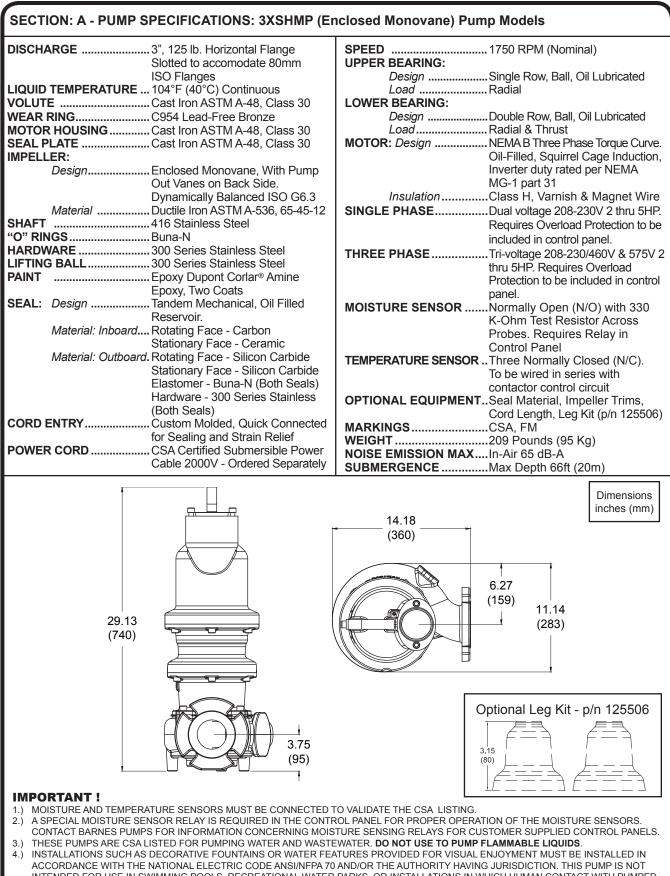
IMPORTANT! - Crane Pumps & Systems, Inc. is not responsible for losses, injury, or death resulting from a failure to observe these safety precautions, misuse or abuse of pumps or equipment.

SECTION: A - PUMP SPECIFICATIONS: 3XSHVR (Vortex) Pump Models

SLOT		FECHICATIONS: SASTIVE (VC			
DISCH	ARGE	. 3", 125 lb. Horizontal Flange Slotted to accomodate 80mm	UPPER BEARING:		
		ISO Flanges		Single Row, Ball, O	il Lubricated
		. 104°F (40°C) Continuous	Load	Radial	
VOLUT	Е	. Cast Iron ASTM A-48, Class 30	LOWER BEARING:		
WEAR	RING	. C954 Lead-Free Bronze	Design	Double Row, Ball, C	JII Lubricated
		. Cast Iron ASTM A-48, Class 30		Radial & Thrust	T O
		. Cast Iron ASTM A-48, Class 30	MOTOR: Design	NEMA B Three Pha	
IMPELL				Oil-Filled, Squirrel	
	Design	. Vortex, With Pump Out		Inverter duty rated	per NEMA
		Vanes on Back Side. Dynamically	laculation	MG-1 part 31	Q Magazat Mina
	Matarial	Balanced ISO G6.3		Class H, Varnish &	
QUAET		. Ductile Iron ASTM A-536, 65-45-12 . 416 Stainless Steel	SINGLE PHASE	Dual Voltage 208-2	
	NGS			Requires Overload	
	NGS	. 300 Series Stainless Steel		included in control	
	2 RALI	. 300 Series Stainless Steel	THREE PHASE	Tri-voltage 208-230)/460V & 575V,
		. Epoxy Dupont Corlar® Amine		5 thru 10HP. Requi	res Overload
1.750111	•••••	Epoxy Two Coats		Protection to be inc	ciuaea in control
SFAI ·	Desian	. Tandem Mechanical, Oil Filled		panel.	
	200igii	Reservoir.	WUISTURE SENSOR	Normally Open (N	
	Material: Inboard	. Rotating Face - Carbon		K-Ohm Test Resis	
		Stationary Face - Ceramic		Probes. Requires Control Panel	Relay III
	Material: Outboard	Rotating Face - Silicon Carbide	TEMPERATURE SENS	OR Three Normally Cl	losed (N/C)
		Stationary Face - Silicon Carbide	TEMPERATORE SENS	To be wired in seri	
		Elastomer - Buna-N (Both Seals)		contactor control c	
		Hardware - 300 Series Stainless	OPTIONAL FOUIPME	ENTSeal Material, Imp	
		(Both Seals)		Cord Length, Leg I	
CORD	ENTRY	. Custom Molded, Quick Connected	MARKINGS		
		for Sealing and Strain Relief	WEIGHT		(a)
POWEF	R CORD	. CSA Certified Submersible Power	NOISE EMISSION MA	XIn-Air 65 dB-A	57
		Cable 2000V - Ordered Separately		Max Depth 66ft (2	:0m)
	-		•		
					Dimensions
					inches (mm)
			13.33		
			(339)		
				L	
				i	
				4.84	
				(123) 9.74	
		.05			
	(76	53)		(247)	
]
				Optional Leg Kit -	p/n 125506
					= 1
		3.76		3.15	
	,	(96)			
		· •			<u>} </u>
IMPO	RTANT !				
		ATURE SENSORS MUST BE CONNECTED 1	TO VALIDATE THE CSA LISTI	NG.	
		NSOR RELAY IS REQUIRED IN THE CONTR			RE SENSORS.

 A SPECIAL MOISTURE SENSOR RELAY IS REQUIRED IN THE CONTROL PANEL FOR PROPER OPERATION OF THE MOISTURE SENSORS. CONTACT BARNES PUMPS FOR INFORMATION CONCERNING MOISTURE SENSING RELAYS FOR CUSTOMER SUPPLIED CONTROL PANELS.
 THESE PUMPS ARE CSA LISTED FOR PUMPING WATER AND WASTEWATER. DO NOT USE TO PUMP FLAMMABLE LIQUIDS.

- 4.) INSTALLATIONS SUCH AS DECORATIVE FOUNTAINS OR WATER FEATURES PROVIDED FOR VISUAL ENJOYMENT MUST BE INSTALLED IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE ANSI/NFPA 70 AND/OR THE AUTHORITY HAVING JURISDICTION. THIS PUMP IS NOT INTENDED FOR USE IN SWIMMING POOLS, RECREATIONAL WATER PARKS, OR INSTALLATIONS IN WHICH HUMAN CONTACT WITH PUMPED MEDIA IS A COMMON OCCURRENCE.
- 5.) THIS PUMP IS NOT APPROPRIATE FOR THOSE APPLICATIONS SPECIFIED AS CLASS 1 DIVISION 1 HAZARDOUS LOCATIONS.



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SECTION: A - PUMP SPECIFICATIONS: 4XSHVA & 4XSHVB (Vortex) Pump Models

DISCHARGE 4", 125 lb. Horizontal Flange Slotted to accomodate 100mm ISO Flanges LIQUID TEMPERATURE 104°F (40°C) Continuous VOLUTE Cast Iron ASTM A-48, Class 30 WEAR RING C954 Lead-Free Bronze MOTOR HOUSING Cast Iron ASTM A-48, Class 30 SEAL PLATE Cast Iron ASTM A-48, Class 30 IMPELLER: Design Ductile Iron ASTM A-48, Class 30 IMPELLER: Ductile Iron ASTM A-536, 65-45-12 SHAFT 416 Stainless Steel "O" RINGS Buna-N HARDWARE 300 Series Stainless Steel LIFTING BALL 300 Series Stainless Steel PAINT Epoxy Dupont Corlar® Amine Epoxy, Two Coats SEAL: Design Tandem Mechanical, Oil Filled Reservoir. Material: Inboard Material: Outboard. Rotating Face - Carbon Stationary Face - Silicon Carbide Stationary Face - Silicon Carbide Blastomer - Buna-N (Both Seals) Hardware - 300 Series Stainless Goth Seals) Custom Molded, Quick Connected for Sealing and Strain Relief POWER CORD	SPEED
Cable 2000V - Ordered Separately	Dimensions inches (mm)

IMPORTANT !

1.) MOISTURE AND TEMPERATURE SENSORS MUST BE CONNECTED TO VALIDATE THE CSA LISTING.

 A SPECIAL MOISTURE SENSOR RELAY IS REQUIRED IN THE CONTROL PANEL FOR PROPER OPERATION OF THE MOISTURE SENSORS. CONTACT BARNES PUMPS FOR INFORMATION CONCERNING MOISTURE SENSING RELAYS FOR CUSTOMER SUPPLIED CONTROL PANELS.
 THESE PUMPS ARE CSA LISTED FOR PUMPING WATER AND WASTEWATER. DO NOT USE TO PUMP FLAMMABLE LIQUIDS.

3.15

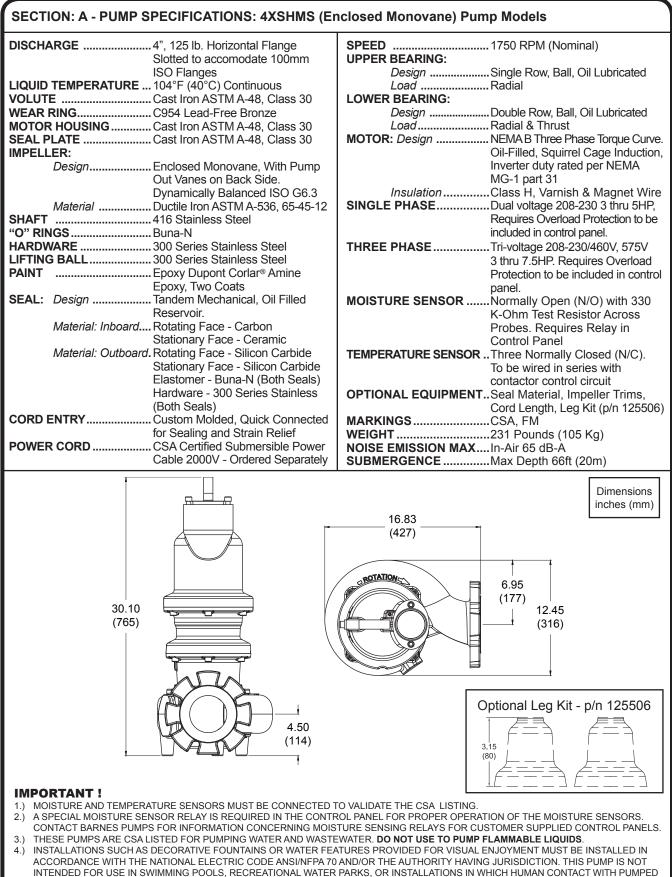
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- 4.) INSTALLATIONS SUCH AS DECORATIVE FOUNTAINS OR WATER FEATURES PROVIDED FOR VISUAL ENJOYMENT MUST BE INSTALLED IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE ANSI/NFPA 70 AND/OR THE AUTHORITY HAVING JURISDICTION. THIS PUMP IS NOT INTENDED FOR USE IN SWIMMING POOLS, RECREATIONAL WATER PARKS, OR INSTALLATIONS IN WHICH HUMAN CONTACT WITH PUMPED MEDIA IS A COMMON OCCURRENCE.
- 5.) THIS PUMP IS NOT APPROPRIATE FOR THOSE APPLICATIONS SPECIFIED AS CLASS 1 DIVISION 1 HAZARDOUS LOCATIONS.

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MEDIA IS A COMMON OCCURRENCE.

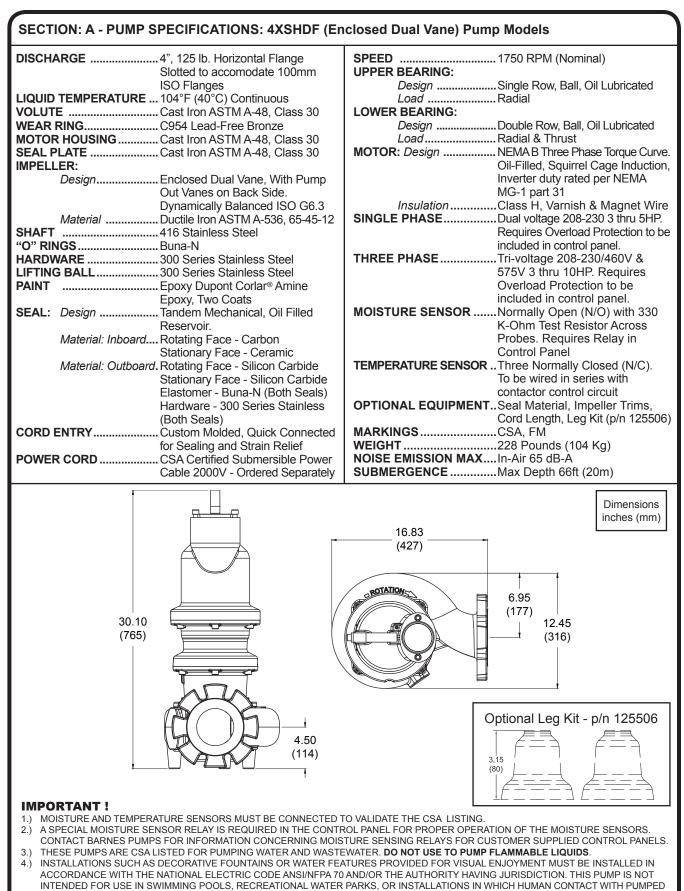
^{5.)} THIS PUMP IS NOT APPROPRIATE FOR THOSE APPLICATIONS SPECIFIED AS CLASS 1 DIVISION 1 HAZARDOUS LOCATIONS.

SECTION: A - PUMP SPECIFICATIONS: 4XSHMC (Enclosed Monovane) Pump Models

DISCHARGE	. 4", 125 lb. Horizontal Flange	SPEED	1750 RPM (Nomina	al)
	Slotted to accomodate 100mm	UPPER BEARING:	, , , , , , , , , , , , , , , , , , ,	,
	ISO Flanges		Single Row, Ball, Oil	I Lubricated
LIQUID TEMPERATURE		Load	Radial	
	Cast Iron ASTM A-48, Class 30	LOWER BEARING:		
WEAR RING		Design	Double Row, Ball, Oi	il Lubricated
MOTOR HOUSING	Cast Iron ASTM A-48, Class 30		Radial & Thrust	- T
SEAL PLATE	Cast Iron ASTM A-48, Class 30		NEMA B Three Phase	
	Enclosed Monovane, With Pump		Oil-Filled, Squirrel C Inverter duty rated p	
Design	Out Vanes on Back Side.		MG-1 part 31	
	Dynamically Balanced ISO G6.3	Insulation	Class H, Varnish &	Magnet Wire
Material	Ductile Iron ASTM A-536, 65-45-12		Dual voltage 208-23	
SHAFT	416 Stainless Steel		Requires Overload P	
"O" RINGS	Buna-N		included in control pa	
HARDWARE	300 Series Stainless Steel	THREE PHASE	Tri-voltage 208-230/	/460V, 575V
LIFTING BALL	300 Series Stainless Steel		5 thru 10HP. Require	
PAINT	Epoxy Dupont Corlar® Amine		Protection to be inclu	uded in control
	Epoxy, Two Coats		panel.	
SEAL: Design	Tandem Mechanical, Oil Filled	MOISTURE SENSOR	Normally Open (N/	O) with 330
	Reservoir.		K-Ohm Test Resist	
Material: Inboard	Rotating Face - Carbon		Probes. Requires F	Relay in
Material: Outboard	Stationary Face - Ceramic 		Control Panel	
Material. Outboard	Stationary Face - Silicon Carbide	I EWIPERATURE SENSU	DR Three Normally Clo To be wired in serie	
	Elastomer - Buna-N (Both Seals)		contactor control ci	
	Hardware - 300 Series Stainless	OPTIONAL FOUIPME	NTSeal Material, Impe	
	(Both Seals)		Cord Length, Leg K	
CORD ENTRY	Custom Molded, Quick Connected	MARKINGS	CSA, FM	(
	for Sealing and Strain Relief	WEIGHT	231 Pounds (105 k	<g)< th=""></g)<>
POWER CORD	CSA Certified Submersible Power	NOISE EMISSION MA	XIn-Air 65 dB-A	
	Cable 2000V - Ordered Separately	SUBMERGENCE	Max Depth 66ft (20	Dm)
t t				
				Dimensions
		18.78	- 1	inches (mm)
		(477)		
			4 4	
		$\langle \rightarrow \rangle$		
			7.68	
			(195)	
30.08			13.85	
(764)			(352)	
E E				
			Optional Leg Kit - p	125506
	4.40			
	(112)		3.15	
			(80)	
IMPORTANT !				
_	ATURE SENSORS MUST BE CONNECTED T	O VALIDATE THE C.SA LISTIN	IG.	
2.) A SPECIAL MOISTURE SE	NSOR RELAY IS REQUIRED IN THE CONTR	ROL PANEL FOR PROPER OPE	ERATION OF THE MOISTURE	
	S FOR INFORMATION CONCERNING MOIS			

CONTACT BARNES PUMPS FOR INFORMATION CONCERNING MOISTURE SENSING RELAYS FOR CUSTOMER SUPPLIED CONTROL PANELS. 3.) THESE PUMPS ARE CSA LISTED FOR PUMPING WATER AND WASTEWATER. **DO NOT USE TO PUMP FLAMMABLE LIQUIDS**.

- 4.) INSTALLATIONS SUCH AS DECORATIVE FOUNTAINS OR WATER FEATURES PROVIDED FOR VISUAL ENJOYMENT MUST BE INSTALLED IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE ANSI/NFPA 70 AND/OR THE AUTHORITY HAVING JURISDICTION. THIS PUMP IS NOT INTENDED FOR USE IN SWIMMING POOLS, RECREATIONAL WATER PARKS, OR INSTALLATIONS IN WHICH HUMAN CONTACT WITH PUMPED MEDIA IS A COMMON OCCURRENCE.
- 5.) THIS PUMP IS NOT APPROPRIATE FOR THOSE APPLICATIONS SPECIFIED AS CLASS 1 DIVISION 1 HAZARDOUS LOCATIONS.



- MEDIA IS A COMMON OCCURRENCE.
- 5.) THIS PUMP IS NOT APPROPRIATE FOR THOSE APPLICATIONS SPECIFIED AS CLASS 1 DIVISION 1 HAZARDOUS LOCATIONS.

SECTION: A - PUMP SPECIFICATIONS: 4XSHDG (Enclosed Dual Vane) Pump Models

DISCHARGE	4", 125 lb. Horizontal Flange	SPEED	
	Slotted to accomodate 100mm	UPPER BEARING:	
	ISO Flanges	DesignSingle Row, Ball, Oil Lubricate	d
LIQUID TEMPERATURE .	104°F (40°C) Continuous	LoadRadial	
VOLUTE	Cast Iron ASTM A-48, Class 30	LOWER BEARING:	
WEAR RING		DesignDouble Row, Ball, Oil Lubricate	d
	Cast Iron ASTM A-48, Class 30	LoadRadial & Thrust	
	Cast Iron ASTM A-48, Class 30	MOTOR: Design NEMA B Three Phase Torque C	
IMPELLER:		Oil-Filled, Squirrel Cage Induc	
Design	Enclosed Dual Vane, With Pump	Inverter duty rated per NEMA	
	Out Vanes on Back Side.	MG-1 part 31	A./:
	Dynamically Balanced ISO G6.3	InsulationClass H, Varnish & Magnet V	vire
Material	Ductile Iron ASTM A-536, 65-45-12	SINGLE PHASEDual voltage 208-230 5HP. Requires Overload Protection 1	to ho
			lo pe
"O" RINGS	Buna-N 300 Series Stainless Steel	included in control panel. Tri-voltage 208-230/460V	
	300 Series Stainless Steel	& 575V 5 thru 10HP. Require	20
	Epoxy Dupont Corlar® Amine	Overload Protection to be	.5
	Epoxy Two Coats	included in control panel.	
SEAL: Design	Tandem Mechanical, Oil Filled	MOISTURE SENSOR Normally Open (N/O) with 33	30
	Reservoir.	K-Ohm Test Resistor Across	
Material [.] Inboard	Rotating Face - Carbon	Probes. Requires Relay in	
	Stationary Face - Ceramic	Control Panel	
Material: Outboard	Rotating Face - Silicon Carbide	TEMPERATURE SENSOR Three Normally Closed (N/C)).
	Stationary Face - Silicon Carbide	To be wired in series with	,
	Elastomer - Buna-N (Both Seals)	contactor control circuit	
	Hardware - 300 Series Stainless	OPTIONAL EQUIPMENT Seal Material, Impeller Trims	
	(Both Seals)	Cord Length, Leg Kit (p/n 125	
CORD ENTRY	Custom Molded, Quick Connected	MARKINGSCSA, FM	
	for Sealing and Strain Relief	WEIGHT	
POWER CORD	CSA Certified Submersible Power	NOISE EMISSION MAXIn-Air 65 dB-A	
	Cable 2000V - Ordered Separately	SUBMERGENCEMax Depth 66ft (20m)	
•			
		Dimensio	
		18.78 inches (m	חm)
		(477)	
		7.68	
30.08			
(764)			
	$h \Pi \lambda$		
	K X X		
		Optional Leg Kit - p/n 12550)6
	4.40		~
	4.40		
		3.15	
IMPORTANT !	ATURE SENSORS MUST BE CONNECTED T		
		O VALIDATE THE CSA LISTING. OL PANEL FOR PROPER OPERATION OF THE MOISTURE SENSORS	5.
		TURE SENSING RELAYS FOR CUSTOMER SUPPLIED CONTROL PAN	

- CONTACT BARNES PUMPS FOR INFORMATION CONCERNING MOISTURE SENSING RELAYS FOR CUSTOMER SUPPLIED CONTROL PANELS. 3.) THESE PUMPS ARE CSA LISTED FOR PUMPING WATER AND WASTEWATER. **DO NOT USE TO PUMP FLAMMABLE LIQUIDS**.
- 4.) INSTALLATIONS SUCH AS DECORATIVE FOUNTAINS OR WATER FEATURES PROVIDED FOR VISUAL ENJOYMENT MUST BE INSTALLED IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE ANSI/NFPA 70 AND/OR THE AUTHORITY HAVING JURISDICTION. THIS PUMP IS NOT INTENDED FOR USE IN SWIMMING POOLS, RECREATIONAL WATER PARKS, OR INSTALLATIONS IN WHICH HUMAN CONTACT WITH PUMPED MEDIA IS A COMMON OCCURRENCE.
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SECTION B: GENERAL INFORMATION

B-1) To the Purchaser:

Congratulations! You are the owner of one of the finest pumps on the market today. CP&S pumps are products engineered and manufactured of high quality components. Over one hundred years of pump building experience along with a continuing quality assurance program combine to produce a pump which will stand up to the toughest applications. This manual will provide helpful information concerning installation, maintenance, and proper service guidelines.

B-2) Receiving:

Upon receiving the pump, it should be inspected for damage or shortages. If damage has occurred, file a claim immediately with the company that delivered the pump. MAKE CERTAIN TO RETAIN THIS MANUAL!

B-3) Storage:

Short Term- CP&S Pumps are manufactured for efficient performance following short inoperative periods in storage. For best results, pumps can be retained in storage, as factory assembled, in a dry atmosphere with constant temperatures for up to six (6) months.

Long Term - Any length of time exceeding six (6) months, but not more than twenty-four (24) months. The unit should be stored in a temperature controlled area, a roofed over walled enclosure that provides protection from the elements (rain, snow, wind-blown dust, etc.), and whose temperature can be maintained between +40 deg. F and +120 deg. F. (4.4 - 49°C). Pump should be stored in its original shipping container. On initial start up, rotate impeller by hand to assure seal and impeller rotate freely. If it is required that the pump be installed and tested before the long term storage begins, such installation will be allowed provided:

- 1.) The pump is not installed under water for more than one (1) month.
- 2.) Immediately upon satisfactory completion of the test, the pump is removed, thoroughly dried, repacked in the original shipping container, and placed in a temperature controlled storage area.

B-4) Service Centers:

For the location of the nearest Barnes Service Center, check your Barnes representative or Crane Pumps & Systems, Inc., Service Department in Piqua, Ohio, telephone (937) 778-8947 or Crane Pumps & Systems Canada, in Brampton, Ontario, (905) 457-6223.

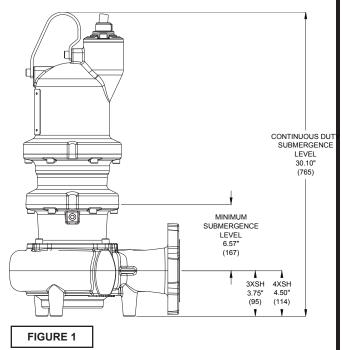
SECTION C: INSTALLATION

C-1) Location:

These self-contained pumping units are recommended for use in a sump, lift station or basin. This pump is designed for submerged continuous duty (15 minutes duty in air at nameplate horsepower), pumping sewage, effluent, wastewater or other nonexplosive or noncorrosive liquids not above 104°F (40°C). Never install the pump in a trench, ditch or hole with a dirt bottom; the legs will sink into the dirt and the suction will become plugged.

C-1.1) Submergence:

It is recommended that the pump be operated in the Continuous Duty Submergence condition and the sump liquid level should never be less than the Minimum Submergence Level (See Fig. 1). The time required to draw the well down from top of motor to the minimum submergence level should not be greater than 15 minutes. **NOTE:** Outer shaft seal must be in liquid when motor is operated, whether motor is submerged or in air.



C-2) Discharge:

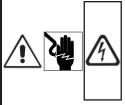
Discharge piping should be as short as possible. Both a check valve and a shut-off valve are recommended for each pump being used. The check valve is used to prevent backflow into the sump. Excessive backflow can cause flooding and/or damage to the pump. The shut-off valve is used to stop system flow during pump or check valve servicing.

Barnes Pumps manufactures a break away fitting discharge system designed to allow the submersible wastewater pump to be installed or removed without requiring personnel to enter the wet well. Place the Break Away Fitting (BAF) in position. Temporarily secure the guide rails in the upper mounting brackets and locate the base elbow on the bottom of the wet well. Level the base elbow with grout and/or shims. Install the intermediate support brackets, if required. Make sure the rails are in a true vertical position so the pump will clear the access opening and will slide freely down the rails into place on the discharge base elbow. Once the rails are in proper alignment, bolt the base elbow into the floor of the station and connect the discharge pipe to the elbow. Connect the movable portion and other supplied fittings of the BAF onto the pump and lower into wet well. See the Break Away Fitting manual for more information.

C-3) Liquid Level Controls:

It is recommended to use a liquid level control system that allows the on and off point to be separated by at least twelve inches. An additional set point (lag point) should be incorporated with an alternator switching system for a duplex (two pump) station. A high level alarm may be required to alert maintenance personnel that there is a high water situation in the wet well should the output of the pump station drop below the inflow rate. A low level cut off may be installed to provide system shutdown if the main level control system malfunctions. The off point should be positioned so that the liquid level never drops below the minimum continuous duty point for the pump shown in figure 1.

C-4.1) Electrical Connections:

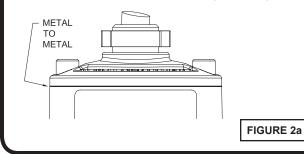


WARNING! - All model pumps and control panels must be properly grounded per the NATIONAL ELECTRIC CODE or CANADIAN ELECTRIC CODE, State, Province and local codes. Improper grounding voids warranty.

C-4) Power/Control Cord:

The power/control cord used with pump has a patent pending "quick disconnect" feature that allows the cord to be easily attached and disconnected at the pump. The maximum amperage rating for the cord is cast in the top of the cast stainless mounting plate. The voltage connection for the motor is determined by the cord assembly used. Low voltage cords (208 & 230 Volt) utilize a molded quick connect plug that is colored black. High voltage cords (460 & 575 Volt) utilize a molded guick connect cord that is colored orange. It is important to verify that the cord being used is rated for the nameplate voltage and amperage rating shown on the pump nameplate. Refer to Chart on page 7. No internal wiring adjustments are necessary for dual and tri-voltage pumps. All jumper connections to set the proper voltage are made by the cord plug itself.

A flat alignment mark is molded into the plug and mating socket on the pump. These should be used as a visual indication as to the correct orientation of the plug. Insert the plug into the pump and install the two 12 mm socket head cap screws into the clamping plate. Slowly tighten the two screws alternating back and forth until the clamping plate is drawn down flush to the top of the cord boss on the pump. The two screws should be torqued until the plate is down to a point where **metal to metal** contact is made between the stainless steel plate and pump housing. (See Fig. 2)



The cord assembly mounted to the pump must not be modified in any way except for shortening to a specific application. Any splice between the pump and the control panel must be made in accordance with all applicable electric codes. It is recommended that a junction box (if used) be mounted outside the sump or be of at least Nema 6 or 6P construction with NEMA 6 or 6P watertight cord grips if located within the wet well. A water and vapor tight seal fitting **MUST** be used in conduit leaving the wet well to prevent moisture and gasses from reaching the control panel. Prior to installation, the pump power cable should be inspected for nicks or damage. If damaged, the cord should be replaced before installation.

DO NOT USE THE POWER CORD TO LIFT PUMP.

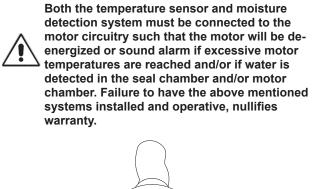
C-4.1) Electrical Connections:

When the electrical connections are made, the lead wires from the power cable should be stripped so that the ground wire is at least two inches longer than the power leads. This will ensure that if the cable is inadvertently pulled out of the connection point, the ground wire will be the last lead to break the circuit.

C-4.2) Wire Size:

If additional cable is required consult a qualified electrician for proper wire size. Voltage drop due to wire resistance between the pump and power connection point should be limited to 3% when additional cable is added.

WARRANTY NOTE:



$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	$ \left(\begin{array}{cccccccccccccccccccccccccccccccccccc$	 MODEL NO	PART NO	dH	VOLT	Н) Hz	RPM (Nom)	NEMA START CODE	FULL LOAD AMPS	1.2 SERVICE FACTOR AMPS	LOCKED Rotor Amps	CORD P/N *	CORD SIZE	CORD 0.D.	WINDING RESISTANCE MAIN START
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	10 G 25.4 29.9 131.2 1.2440 $0.4 - 10.4$ $1.12 \pm .02$ 150 1 14.9 17.8 $85.4 / 95.2$ 125496 $12/4 - 18/4$ $86 \pm .02$ 2 150 J 13.7 16.0 8.0 47.6 125496 $12/4 - 18/4$ $86 \pm .02$ 2 150 J 5.5 6.4 38.1 125497 $12/4 - 18/4$ $86 \pm .02$ 2 150 M 5.5 6.4 38.1 125497 $12/4 - 18/4$ $86 \pm .02$ 2 150 M 25.4 28.2 $173.9 / 201.0$ 125496 $12/4 - 18/4$ $86 \pm .02$ 2 150 M 10.2 11.3 100.5 125497 $12/4 - 18/4$ $86 \pm .02$ 2 150 M 10.2 $173.9 / 201.0$ 125497 $12/4 - 18/4$ $86 \pm .02$ 2 150 M 100.5 125497 $12/4 - 18/4$ $11/2 \pm .02$ <td< td=""><td>3VPH//16072</td><td>000001</td><td>с ц</td><td>208</td><td>-</td><td>6</td><td>0.4 EO</td><td>ш</td><td>27.8</td><td>34.1</td><td>113.2</td><td>105400</td><td>014 4014</td><td>1.12 ± .02</td><td>0.38 1.66</td></td<>	3VPH//16072	000001	с ц	208	-	6	0.4 EO	ш	27.8	34.1	113.2	105400	014 4014	1.12 ± .02	0.38 1.66
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$			133020		230	-	No	24:00	IJ	25.4	29.9	131.2	120490	0/4 - 10/4	1.12 ± .02	0.38 1.66
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$					208					14.9	17.8	0F 4 / 0F 0	125496	12/4 - 18/4	.86 ± .02	0.75
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		3XSHVR50N2	133829	5.0	230	ო	60	3450		13.7	16.0	7.08 / 4.00	125496	12/4 - 18/4	.86 ± .02	0.75
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$				460				I	6.9	8.0	47.6	125497	12/4 - 18/4	.86 ± .02	3.00
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	3XSHVR5052	133830	5.0	575	ო		3450	- -	5.5	6.4	38.1	125497	12/4 - 18/4	.86 ± .02	4.34
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$					208					24.2	28.0	0 100 / 0 021	Ľ	12/4 - 18/4	.86 ± .02	0.40
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		3XSHVR75N2	133832	7.5	230	ო	60	3450	Σ	25.4	28.2	0.102/8.0/1		12/4 - 18/4	.86 ± .02	0.40
133833 7.5 575 3 60 3450 M 10.2 11.3 80.4 125497 12/4 - 18/4 133833 10.0 208 3 30.6 3450 K 30.8 37.0 173.9 / 201.0 125498 8/4 - 18/4 133834 10.0 230 3 60 3450 K 30.1 34.8 173.9 / 201.0 125498 8/4 - 18/4 133834 10.0 230 3 15.1 17.4 100.5 125498 8/4 - 18/4 100.5 10.0 230 15.1 17.4 100.5 126427 12/4 - 18/4	10 10.2 11.3 80.4 125497 10 30.8 37.0 173.9 / 201.0 125498 150 X 30.1 34.8 175491 150 X 30.1 17.4 125498 150 X 17.4 100.5 125497 150 X 13.9 80.4 125498				460				I	12.7	14.1	100.5	125497	12/4 - 18/4	.86 ± .02	1.58
208 208 34 - 18/4 133834 10.0 230 3 60 3450 K 30.1 34.8 173.9 / 201.0 125498 8/4 - 18/4 133834 10.0 230 3 60 3450 K 30.1 34.8 173.9 / 201.0 125498 8/4 - 18/4 460 460 15.1 17.4 100.5 125497 12/4 - 18/4	30.8 37.0 125498 150 K 30.1 34.8 173.9 / 201.0 125498 15.1 17.4 100.5 125497 150 K 12.1 13.9 80.4 125497	3XSHVR7552	133833	7.5	575	e	-	3450	Σ	10.2	11.3	80.4	125497	12/4 - 18/4	.86 ± .02	2.47
133834 10.0 230 3 60 3450 K 30.1 34.8 1/3.97 201.0 125498 460 460 15.1 17.4 100.5 125497 125497	K 30.1 34.8 10.3 / 201.0 125498 15.1 17.4 100.5 125497 K 12.1 13.9 80.4 125497				208					30.8	37.0	0 100 / 0 021		8/4 - 18/4	1.12 ± .02	0.40
460 15.1 17.4 100.5 125497 10005 100 100 100 100 100 100	15.1 17.4 100.5 125497 K0 K 12.1 13.9 80.4 125497	3XSHVR100N2		10.0	230	ო	60	3450	~	30.1	34.8	0.102/8.0/1		8/4 - 18/4	1.12 ± .02	0.40
	150 K 12.1 13.9 80.4 125497				460				I	15.1	17.4	100.5	125497	12/4 - 18/4	.86 ± .02	1.58
		3XSHVR10052	133835	10.0	575	ო	-	3450	×	12.1	13.9	80.4	125497	12/4 - 18/4	.86 ± .02	2.47

Moisture and Temperature sensor leads are integral to power cord. Winding Resistance ± 7.5% Winding resistance measured in OHMS @ 25°C (Between Lines) at motor leads. Pump rated for operation at ± 10% voltage at motor. Cord Suffix: XF - XC - 30 Feet, 50 Feet, XJ - 75 Feet, or XL - 100 Feet

3XSHMP2074 133819 2.0 208 1 60 1750 0 10.7 11.9 66.3 124.96 124.184 86.6.02 0.88-2.14 3XSHMP2074 133819 2.0 200 1 750 7 8.3 56.3 125496 124-1814 86.6.02 0.88-2.14 3XSHMP2074 133820 2.0 575 3 60 7750 7.4 8.3 56.56.8 1244-1814 86.6.02 0.88-2.14 3XSHMP2074 133821 2.0 575 3 60 1750 7 4.0 329 1244-1814 86.6.02 0.88-2.14 3XSHMP3074 133822 3.0 1750 7 3.9 4.2 37.0 125496 124-1814 86.6.02 0.88-2.14 3XSHMP3074 133822 3.0 1750 7 14.9 16.5 66.3 12494 86.6.02 0.88-2.14 3XSHMP3074 133822 3.0 1750 16.5 66.3		MODEL	PART NO	dH	логт	Hd	, ∎	RPM (Nom)	NEMA Start Code	FULL LOAD AMPS	1.2 SERVICE FACTOR AMPS	LOCKED Rotor Amps	CORD P/N *	CORD SIZE	CORD 0.D.	WINDING RESISTANCE MAIN START
AXSTMIN_EOU4 13301 2.0 230 1 00 1730 0 1730 0 1730 10.7 10.7 1139 66.3 1244-164 86.4.02 8.0 1244-164 86.4.02 1244-164 86.4.02 1244-164 86.4.02 1244-184 86.4.02			010001	6	208	-	6	1	G	10.4	12.1	59.1	105100		.86 ± .02	0.88 - 2.14
X3XHMP20N4 208 208 1750 7.4 8.3 58.2 / 65.8 125496 124-18/4 86.1.02 2 X3XHMP20N4 133820 230 30 1750 7.4 8.0 3.7 125496 124-18/4 86.1.02 2 X3XHMP2054 133821 2.0 575 3 60 1750 7 3.9 125497 124-18/4 86.1.02 2		37371MIP2014	1330 8	D.7	230	_	00		_ _	10.7	11.9	66.3	064071	12/4 - 10/4	.86 ± .02	0.88 - 2.14
XXHMP20N4 133820 2.0 230 3.0 1750 7.4 8.0 7.4 8.0 7.4 8.1 8.4 8.4 0.2 3XSHMP2054 133821 2.0 575 3 60 1750 7 3.0 125497 124.18/4 86.4.02 86.4.02 3XSHMP2054 133821 2.0 575 3 60 1750 7 3.9 125497 124.18/4 86.02 2					208					7.4	8.3	ED / EE O	125496	12/4 - 18/4	.86 ± .02	1.08
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $		3XSHMP20N4	133820	2.0	230	ო	60	1750	ـــــ	7.4	8.0	0.00 / 2.00	125496	12/4 - 18/4	.86 ± .02	1.08
XXHMP2054 133821 2.0 575 3 60 1750 T 333 125496 124-18/4 86±.02 202 XXHMP3074 133822 3.0 208 1 1750 D 14.9 18.5 59.1 124-18/4 86±.02 202 XXHMP3074 133822 3.0 208 1 50 1 1750 11.4 16.5 66.3 124-18/4 86±.02 202 XXHMP3074 133824 3.0 575 3 60 1750 N 4.6 5.3 10.6 125496 124-18/4 86±.02 203 203 203 203 204 24.18/4 86±.02 204 24.18/4 86±.02 24.18/4 86±.02 27 26.9 25.0 25.0 25.0 25.0 25.4 25.49 124-18/4 86±.02 26 26.0 26.0 26.0 26.0 26.0 26.0 26.0 26.0 26.0 26.0 26.0 26.0<					460				I	3.7	4.0	32.9	125497	12/4 - 18/4	.86 ± .02	4.32
3X5HMP30741338223.0 208 2301 60 1750 D 14.1 16.5 59.1 125496 $124 \cdot 18/4$ $86 \pm .02$ $86 \pm .02$ 3X5HMP30741338233.0 208 0 1750 F 0.7 0.7 0.7 11.4 16.5 66.3 126496 $124 \cdot 18/4$ $86 \pm .02$ 266.3 3X5HMP3074133823 3.0 230 3 60 1750 Y 4.6 9.2 10.6 $58.2/65.8$ $1244 \cdot 18/4$ $86 \pm .02$ 266.3 3X5HMP3054 133824 3.0 575 3 60 1750 Y 4.6 5.2 32.9 125497 $124 \cdot 18/4$ $86 \pm .02$ 266.3 3X5HMP3054 133824 3.0 208 1750 Y Y 4.6 5.3 32.9 $1244 \cdot 18/4$ $86 \pm .02$ 266.3 $3X5HMP3054$ 133825 5.0 208 1750 Y 27.2 35.6 99.9 126497 $124 \cdot 18/4$ $86 \pm .02$ $3X5HMP3074$ 133826 5.0 208 1750 Y 27.2 35.6 99.9 126496 $12/4 \cdot 18/4$ $86 \pm .02$ $3X5HMP3074$ 133826 5.0 208 1750 Y 15.6 126496 $12/4 \cdot 18/4$ $12/4 \cdot 18/4$ $12/4 \cdot 18/4$ $3X5HMP3074$ 133827 5.0 208 1760 17.0 15.6 1760 17.2 126496 $12/4 \cdot 18/4$ 16.2 $12/4 \cdot 18/4$ <th></th> <td>3XSHMP2054</td> <td>133821</td> <td>2.0</td> <td>575</td> <td>ო</td> <td>60</td> <td>1750</td> <td>μ</td> <td>3.9</td> <td>4.2</td> <td>37.0</td> <td>125497</td> <td>12/4 - 18/4</td> <td>.86 ± .02</td> <td>4.32</td>		3XSHMP2054	133821	2.0	575	ო	60	1750	μ	3.9	4.2	37.0	125497	12/4 - 18/4	.86 ± .02	4.32
335HMF30/4 13362 3.0 230 1 00 1/30 F 14.1 16.5 66.3 124-10/4 86±.02 8 2 6 3 125496 124-18/4 86±.02 2 2 2 2 6 125496 124-18/4 86±.02 2 2 3 2 3 6 1750 X 9.2 10.6 5 3 2 6 124-18/4 86±.02 2 2 3 3 3 6 1750 X 3 6 1750 X 3 3 3 3 6 1750 X 4 6 3 3 3 3 4 3 <t< th=""><th>d</th><td></td><td></td><td>, ,</td><td>208</td><td>-</td><td>ç</td><td>1 1 1</td><td>Δ</td><td>14.9</td><td>18.5</td><td>59.1</td><td>101100</td><td>101</td><td>.86 ± .02</td><td>0.88 - 2.14</td></t<>	d			, ,	208	-	ç	1 1 1	Δ	14.9	18.5	59.1	101100	101	.86 ± .02	0.88 - 2.14
XSHMP30N4 208 208 30 208 31 208 31 203 30 230 31 60 1750 K 9.2 10.6 58.2/658 125496 124-18/4 86 ± .02 22 3XSHMP30N4 133824 3.0 230 375 230 7 460 7 460 7 465 125497 124-18/4 86 ± .02 2	un		133822	0.0	230	_	00		ш	14.1	16.5	66.3	064021	12/4 - 10/4	.86 ± .02	0.88 - 2.14
3X5HMP30N4 133823 3.0 230 3 60 1750 K 9.2 10.6 30.4 ¹ 0.0 ⁵ 125496 12/4 - 18/4 86 ± .02 2 3X5HMP3054 133824 3.0 575 3 60 1750 N 4.6 5.3 32.9 125497 12/4 - 18/4 86 ± .02 3X5HMP3054 133824 3.0 575 3 60 1750 N 4.5 4.9 37.0 125497 12/4 - 18/4 86 ± .02 3X5HMP5074 133825 5.0 208 1 750 27.2 35.6 99.9 12/4 - 18/4 86 ± .02 3X5HMP5014 133826 5.0 230 1 16.0 17.5 33.2 18.7 125496 12/4 - 18/4 86 ± .02 3X5HMP5014 133826 5.0 230 9 1 15.0 17.2 ± .02 17.2 ± .02 3X5HMP5014 133827 5.0 230 99.9 112.4 - 18/4 86 ± .02 17.2 ± .0	d c				208					9.7	11.4		125496	12/4 - 18/4	.86 ± .02	1.08
(1) (1) <th>IMF</th> <td></td> <td>133823</td> <td>3.0</td> <td>230</td> <td>ო</td> <td>60</td> <td>1750</td> <td>¥</td> <td>9.2</td> <td>10.6</td> <td>0.00 / 2.00</td> <td>125496</td> <td>12/4 - 18/4</td> <td>.86 ± .02</td> <td>1.08</td>	IMF		133823	3.0	230	ო	60	1750	¥	9.2	10.6	0.00 / 2.00	125496	12/4 - 18/4	.86 ± .02	1.08
3X5HMP3054 133824 3.0 575 3 60 1750 N 4.5 4.9 37.0 125497 12/4 - 18/4 86 ± .02 2 2 2 2 37.0 125497 12/4 - 18/4 86 ± .02 2 2 2 37.0 125497 12/4 - 18/4 86 ± .02 2 2 3 1 </th <th>ISX</th> <td></td> <td></td> <td></td> <td>460</td> <td></td> <td></td> <td></td> <td>I</td> <td>4.6</td> <td>5.3</td> <td>32.9</td> <td>125497</td> <td>12/4 - 18/4</td> <td>.86 ± .02</td> <td>4.32</td>	ISX				460				I	4.6	5.3	32.9	125497	12/4 - 18/4	.86 ± .02	4.32
	33		133824	3.0	575	с	60	1750	z	4.5	4.9	37.0	125497	12/4 - 18/4	.86 ± .02	4.32
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$			10000	4	208	-	0	1750	۵	27.2	35.6	6.99	105100	014 1014	1.12 ± .02	0.50 2.66
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			070001	D.C	230	-	no		ш	25.4	30.2	112.4	120490	0/4 - 10/4	1.12 ± .02	0.50 2.66
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$					208					15.8	18.7		125496	12/4 - 18/4	.86 ± .02	0.72
133827 5.0 575 3 60 1750 1 7.5 8.6 46.2 125497 12/4 - 18/4 86 ± .02 133827 5.0 575 3 60 1750 J 6.0 6.9 37.0 125497 12/4 - 18/4 .86 ± .02		3XSHMP50N4	133826	5.0	230	ო	60	1750		15.0	17.2	02.4/ 32.4	125496	12/4 - 18/4	.86 ± .02	0.72
133827 5.0 57.0 57.0 125497 12/4 - 18/4 .86 ± .02					460	_			I	7.5	8.6	46.2	125497	12/4 - 18/4	.86 ± .02	2.88
		3XSHMP5054	133827	5.0	575	с	60	1750	_ _	6.0	6.9	37.0	125497	12/4 - 18/4	+1	4.32

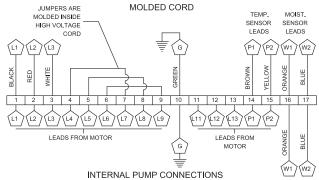
Moisture and Temperature sensor leads are integral to power cord. Winding Resistance ± 7.5% Winding resistance measured in OHMS @ 25°C (Between Lines) at motor leads. Pump rated for operation at ± 10% voltage at motor. Cord Suffix: XF - XC - 30 Feet, 50 Feet, XJ - 75 Feet, or XL - 100 Feet

	MODEL	PART NO	ЧH	логт	Hd	E E E E E E E E E E E E E E E E E E E	RPM (Nom)	NEMA Start Code	FULL LOAD AMPS	1.2 SERVICE FACTOR AMPS	LOCKED ROTOR AMPS	CORD P/N	CORD SIZE	CORD 0.D.	WINDING RESISTANCE MAIN START
				208					24.2	28.0	0 100 / 0 221	125496	12/4 - 18/4	.86 ± .02	0.40
d	4XSHVA75N2	133691	7.5	230	ო	60	3450	Σ	25.4	28.2	0.102/8.011	125496	12/4 - 18/4	.86 ± .02	0.40
աn				460					12.7	14.1	100.5	125497	12/4 - 18/4	.86 ± .02	1.58
J P	4XSHVA7552	133692	7.5	575	e	60	3450	Þ	10.2	11.3	80.4	125497	12/4 - 18/4	.86 ± .02	2.47
//H				208					30.8	37.0	0 100 / 0 021	125498	8/4 - 18/4	1.12 ± .02	0.40
ISX	4XSHVA100N2	133693	10.0	230	ო	60	3450	×	30.1	34.8	11.02/8.011	125498	8/4 - 18/4	1.12 ± .02	0.40
7				460					15.1	17.4	100.5	125497	12/4 - 18/4	.86 ± .02	1.58
1	4XSHVA10052	133694	10.0	575	e	60	3450	×	12.1	13.9	80.4	125497	12/4 - 18/4	.86 ± .02	2.47
				208					24.2	28.0	0 100 / 0 221	125496	12/4 - 18/4	.86 ± .02	0.40
d	4XSHVB75N2	133696	7.5	230	ო	60	3450	Σ	25.4	28.2	0.102/8.011	125496	12/4 - 18/4	.86 ± .02	0.40
աո				460					12.7	14.1	100.5	125497	12/4 - 18/4	.86 ± .02	1.58
9 8	4XSHVB7552	133697	7.5	575	e	60	3450	Μ	10.2	11.3	80.4	125497	12/4 - 18/4	.86 ± .02	2.47
ΙΛH				208					30.8	37.0	0 100 / 0 221	125498	8/4 - 18/4	1.12 ± .02	0.40
ISX	4XSHVB100N2	133698	10.0	230	ო	60	3450	×	30.1	34.8	0.102/8.011	125498	8/4 - 18/4	1.12 ± .02	0.40
4				460					15.1	17.4	100.5	125497	12/4 - 18/4	.86 ± .02	1.58
	4XSHVB10052	133699	10.0	575	ę	60	3450	¥	12.1	13.9	80.4	125497	12/4 - 18/4	.86 ± .02	2.47
O UI NO	Moisture and Temperature sensor leads are integral to power cord. Winding Resistance ± 7.5% Winding resistance measured Pump rated for operation at ± 10% voltage at motor. Cord Suffix: XF - XC - 30 Feet, 50 Feet, XJ - 75 Feet, or XL - 100 Feet	ature sensoi 7.5% ion at ± 10% 30 Feet, 50	r leads á M 6 voltag 1 Feet, >	s are integral to power co Winding resistance mea age at motor. XJ - 75 Feet, or XL - 10	al to pov sistanc∈ r. et, or X	ver co e meas L - 10(rd. sured in) Feet	© SMHO	25°C (Betwee	ord. isured in OHMS @ 25°C (Between Lines) at motor leads. 00 Feet	eads.		*** CORD OI	RDERED SE	*** CORD ORDERED SEPARATELY ***

Oute Amno Amno </th <th></th> <th>MODEL</th> <th>PART NO</th> <th>đ</th> <th>ΛΟΓΤ</th> <th>H</th> <th>Hz (</th> <th>(Nom)</th> <th>NEMA START</th> <th>FULL LOAD AMPS</th> <th>1.2 SERVICE FACTOR</th> <th>LOCKED ROTOR</th> <th>CORD P/N</th> <th>CORD SIZE</th> <th>CORD O.D.</th> <th>WINDING RESISTANCE</th>		MODEL	PART NO	đ	ΛΟΓΤ	H	Hz ((Nom)	NEMA START	FULL LOAD AMPS	1.2 SERVICE FACTOR	LOCKED ROTOR	CORD P/N	CORD SIZE	CORD O.D.	WINDING RESISTANCE
66.3 125496 124 -18/4 86 ± .02 0.383 58.2 / 65.8 125496 12/4 - 18/4 86 ± .02 1.0 58.2 / 65.8 125497 12/4 - 18/4 86 ± .02 4.3 37.0 125497 12/4 - 18/4 86 ± .02 4.3 99.9 125497 12/4 - 18/4 86 ± .02 4.3 99.9 125497 12/4 - 18/4 86 ± .02 0.50 - 1.0 99.9 125496 12/4 - 18/4 86 ± .02 0.50 - 0.7 91.1 112.4 125496 12/4 - 18/4 86 ± .02 0.7 82.4 / 92.4 125496 12/4 - 18/4 86 ± .02 0.7 0.7 82.4 / 92.4 125497 12/4 - 18/4 86 ± .02 0.7 0.7 99.9 125496 12/4 - 18/4 86 ± .02 0.4 0.7 0.4 105.9 / 123.6 125496 12/4 - 18/4 86 ± .02 0.7 0.7 105.9 / 123.6 125496 12/4 - 18/4 86 ± .02 0.4 0.7					208					14.9	18.5	59.1			.86 ± .02	0.88 2.14
58.2 / 65.8 125496 12/4 - 18/4 86 ± 02 32.9 125497 12/4 - 18/4 86 ± 02 37.0 125497 12/4 - 18/4 86 ± 02 37.0 125497 12/4 - 18/4 86 ± 02 99.9 125496 12/4 - 18/4 86 ± 02 99.9 125496 12/4 - 18/4 86 ± 02 82.4 / 92.4 125496 12/4 - 18/4 86 ± 02 82.4 / 92.4 125496 12/4 - 18/4 86 ± 02 37.0 125496 12/4 - 18/4 86 ± 02 99.9 125496 12/4 - 18/4 86 ± 02 99.9 125496 12/4 - 18/4 86 ± 02 91.4 125496 12/4 - 18/4 86 ± 02 91.9 125496 12/4 - 18/4 86 ± 02 91.9 125496 12/4 - 18/4 86 ± 02 91.9 125496 12/4 - 18/4 86 ± 02 91.9 125496 12/4 - 18/4 86 ± 02 91.9 125496 12/4 - 18/4 86 ± 02	_	4XSHMS3074	133799	0.0 	230	.	09	1750		14.1	16.5	66.3	125496	12/4 - 18/4	.86 ± .02	11
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$					208					9.7	11.4	ED / CE 0	125496	12/4 - 18/4	.86 ± .02	1.08
32.9 125497 12/4 - 18/4 86 ± .02 37.0 125497 12/4 - 18/4 86 ± .02 99.9 112.4 1.154.02 86 ± .02 99.9 125496 12/4 - 18/4 86 ± .02 82.4 / 92.4 125496 12/4 - 18/4 86 ± .02 82.4 / 92.4 125496 12/4 - 18/4 86 ± .02 105.9 / 123.6 125496 12/4 - 18/4 86 ± .02 105.9 / 123.6 125496 12/4 - 18/4 86 ± .02 99.9 125496 12/4 - 18/4 86 ± .02 105.9 / 123.6 125496 12/4 - 18/4 86 ± .02 112.4 125496 12/4 - 18/4 86 ± .02 99.9 12/4 - 18/4 86 ± .02 2 112.4 125496 12/4 - 18/4 86 ± .02 82.4/92.4 125496 12/4 - 18/4 86 ± .02 37.0 125496 12/4 - 18/4 86 ± .02 112.4 125496 12/4 - 18/4 86 ± .02 82.4/92.4 12/4 - 18/4 86 ± .		4XSHMS30N4	133800	3.0	230	ო	60	1750		9.2	10.6	0.00 / 2.00	125496	12/4 - 18/4	.86 ± .02	1.08
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$					460					4.6	5.3	32.9	125497	12/4 - 18/4	.86 ± .02	4.32
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	u		133801	3.0	575	e		1750	z	4.5	4.9	37.0	125497	12/4 - 18/4	.86 ± .02	4.32
112.4 125496 $0.4 - 10/4$ 1.12 ± .02 82.4 / 92.4 125496 12/4 - 18/4 $86 \pm .02$ 46.2 125496 12/4 - 18/4 $86 \pm .02$ 7.0 125497 12/4 - 18/4 $86 \pm .02$ 7.1 125497 12/4 - 18/4 $86 \pm .02$ 7.0 125496 12/4 - 18/4 $86 \pm .02$ 90.9 125496 12/4 - 18/4 $86 \pm .02$ 105.9 / 123.6 125496 12/4 - 18/4 $86 \pm .02$ 99.9 125497 12/4 - 18/4 $86 \pm .02$ 112.4 125496 12/4 - 18/4 $86 \pm .02$ 82.4/92.4 125496 12/4 - 18/4 $86 \pm .02$ 37.0 125496 12/4 - 18/4 $86 \pm .02$ 82.4/92.4 125496 12/4 - 18/4 $86 \pm .02$ 105.9 / 123.6 12/4 - 18/4 $86 \pm .02$ 12/4 - 18/4 105.9 / 123.6 12/4 - 18/4 $86 \pm .02$ 12/4 - 18/4 86 \pm .02 12/4 - 18/4 $86 \pm .02$ 12/4 - 18/4 105.9 /	un		000001	4	208	-	0	1 7 6 0	۵	27.2	35.6	6.66	105400	014 1014	1.12 ± .02	0.50 2.66
$82.4/92.4$ 125496 $12/4 - 18/4$ $86 \pm .02$ 002 46.2 125497 $12/4 - 18/4$ $86 \pm .02$ 002 37.0 125497 $12/4 - 18/4$ $86 \pm .02$ 002 37.0 125497 $12/4 - 18/4$ $86 \pm .02$ 002 $105.9/123.6$ 125496 $12/4 - 18/4$ $86 \pm .02$ 002 61.8 125496 $12/4 - 18/4$ $86 \pm .02$ 0050 $105.9/123.6$ 125496 $12/4 - 18/4$ $86 \pm .02$ 0050 99.9 112.4 125496 $12/4 - 18/4$ $86 \pm .02$ 0050 912.4 $1274 - 18/4$ $86 \pm .02$ 0050 0050 0050 112.4 $1274 - 18/4$ $86 \pm .02$ 0050 0050 0050 37.0 125496 $12/4 - 18/4$ $86 \pm .02$ 0050 0050 $8/2.4/92.4$ $12/4 - 18/4$ $86 \pm .02$ 0050 0050 0050 $8/2.4/92.4$ $12/4 - 18/4$	d 9	_	133002		230	_	00		Ŀ	25.4	30.2	112.4	064071	0/4 - 10/4	1.12 ± .02	0.50 2.66
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	SMI-				208					15.8	18.7	1 0 1 0	125496	12/4 - 18/4	.86 ± .02	0.72
46.2 125497 12/4 - 18/4 .86 ± .02 2 37.0 125496 12/4 - 18/4 .86 ± .02 2 105.9 / 123.6 125496 12/4 - 18/4 .86 ± .02 4 61.8 125496 12/4 - 18/4 .86 ± .02 4 70 125496 12/4 - 18/4 .86 ± .02 4 8/3 125497 12/4 - 18/4 .86 ± .02 6 99.9 125496 12/4 - 18/4 .86 ± .02 6 99.9 125496 12/4 - 18/4 .86 ± .02 0.50 112.4 125496 12/4 - 18/4 .86 ± .02 0.50 82.4/92.4 125496 12/4 - 18/4 .86 ± .02 0.50 37.0 125496 12/4 - 18/4 .86 ± .02 0.50 37.0 125496 12/4 - 18/4 .86 ± .02 0.50 105.9 / 1236 125496 12/4 - 18/4 .86 ± .02 0.50 105.9 / 1236 125497 12/4 - 18/4 .86 ± .02 0.50 105.9 / 1236 125497 12/4 - 18/4 .86 ± .02 0.50 105.9	HS)		133803	5.0	230	ო	60	1750		15.0	17.2	02.4/92.4	125496	12/4 - 18/4	.86 ± .02	0.72
37.0 125497 12/4 - 18/4 .86 ± .02 - 105.9 / 123.6 125496 12/4 - 18/4 .86 ± .02 - 61.8 125496 12/4 - 18/4 .86 ± .02 - 61.8 125497 12/4 - 18/4 .86 ± .02 - 61.8 125497 12/4 - 18/4 .86 ± .02 - 99.9 125496 12/4 - 18/4 .86 ± .02 - 112.4 125496 12/4 - 18/4 .86 ± .02 0.50 99.9 125496 12/4 - 18/4 .86 ± .02 0.50 82.4/92.4 125496 12/4 - 18/4 .86 ± .02 0.50 37.0 125496 12/4 - 18/4 .86 ± .02 0.50 37.0 125496 12/4 - 18/4 .86 ± .02 0.50 105.9 / 123.6 125497 12/4 - 18/4 .86 ± .02 0 105.9 / 123.6 125496 12/4 - 18/4 .86 ± .02 0 105.9 / 123.6 125497 12/4 - 18/4 .86 ± .02 0 105.9 / 123.6 125497 12/4 - 18/4 .86 ± .02 0 <td< td=""><td>XÞ</td><td>V+-</td><td></td><td></td><td>460</td><td></td><td></td><td></td><td></td><td>7.5</td><td>8.6</td><td>46.2</td><td>125497</td><td></td><td>.86 ± .02</td><td>2.88</td></td<>	XÞ	V+-			460					7.5	8.6	46.2	125497		.86 ± .02	2.88
105.9 / 123.6 125496 124 - 18/4 .86 ± .02 0 61.8 125497 12/4 - 18/4 .86 ± .02 0 61.8 125497 12/4 - 18/4 .86 ± .02 0 49.4 125497 12/4 - 18/4 .86 ± .02 0 99.9 125496 12/4 - 18/4 .86 ± .02 0 99.9 125496 12/4 - 18/4 .86 ± .02 0 99.9 125496 12/4 - 18/4 .86 ± .02 0 82.4/92.4 125496 12/4 - 18/4 .86 ± .02 0 37.0 125496 12/4 - 18/4 .86 ± .02 0 37.0 125496 12/4 - 18/4 .86 ± .02 0 105.9 / 123.6 125496 12/4 - 18/4 .86 ± .02 0 105.9 / 123.6 125497 12/4 - 18/4 .86 ± .02 0 105.9 / 123.6 125497 12/4 - 18/4 .86 ± .02 0 105.9 / 123.6 125497 12/4 - 18/4 .86 ± .02 0 105.9 / 123.6 125497 12/4 - 18/4 .86 ± .02 0 105.9 / 123.6 125497 12/4 - 18/4 .86 ± .02 0 105.9 / 123.6 125497 12/4 - 18/4 .86 ± .02 0 </td <td></td> <td>4XSHMS5054</td> <td>133804</td> <td>5.0</td> <td>575</td> <td>ო</td> <td>├</td> <td>1750</td> <td>-</td> <td>6.0</td> <td>6.9</td> <td>37.0</td> <td>125497</td> <td></td> <td>.86 ± .02</td> <td>4.32</td>		4XSHMS5054	133804	5.0	575	ო	├	1750	-	6.0	6.9	37.0	125497		.86 ± .02	4.32
105.97 125.496 12/1.4. 18.6 ± .02 0 61.8 125497 12/4 - 18/4 .86 ± .02 0 49.4 125497 12/4 - 18/4 .86 ± .02 0 99.9 125496 12/4 - 18/4 .86 ± .02 0 99.9 125496 12/4 - 18/4 .86 ± .02 0 112.4 125496 12/4 - 18/4 .86 ± .02 0 82.4/92.4 125496 12/4 - 18/4 .86 ± .02 0 37.0 125496 12/4 - 18/4 .86 ± .02 0 37.0 125496 12/4 - 18/4 .86 ± .02 0 105.9 / 123.6 125496 12/4 - 18/4 .86 ± .02 0 105.9 / 123.6 125496 12/4 - 18/4 .86 ± .02 0 61.8 125496 12/4 - 18/4 .86 ± .02 0 105.9 / 123.6 125497 12/4 - 18/4 .86 ± .02 0 105.9 / 123.6 125497 12/4 - 18/4 .86 ± .02 0 105.9 / 123.6 125497 12/4 - 18/4 .86 ± .02 0 105.9 / 123.6 125497 12/4 - 18/4 .86 ± .02 0 105.9 / 123.6 125497 12/4 - 18/4 .86 ± .02 0 <					208					23.8	28.5	101 0 1100 0	125496	L + -	.86 ± .02	0.43
61.8 125497 12/4 - 18/4 .86 ± .02 7 49.4 125497 12/4 - 18/4 .86 ± .02 2 99.9 125496 8/4 - 18/4 .86 ± .02 0.50 112.4 125496 12/4 - 18/4 .86 ± .02 0.50 82.4/92.4 125496 12/4 - 18/4 .86 ± .02 0.50 82.4/92.4 125496 12/4 - 18/4 .86 ± .02 0.50 37.0 125497 12/4 - 18/4 .86 ± .02 0.50 37.0 125496 12/4 - 18/4 .86 ± .02 0.50 105.9 / 123.6 125496 12/4 - 18/4 .86 ± .02 0.50 105.9 / 123.6 125497 12/4 - 18/4 .86 ± .02 0.50 61.8 125496 12/4 - 18/4 .86 ± .02 0.50 105.9 / 123.6 125497 12/4 - 18/4 .86 ± .02 0.50 105.9 / 123.6 125497 12/4 - 18/4 .86 ± .02 0.50 105.9 / 123.6 125497 12/4 - 18/4 .86 ± .02 0.50 105.9 / 123.6 125497 12/4 - 18/4 .86 ± .02 0		4XSHMS75N4	133806	7.5	230	ო	60	1750	T	23.7	27.2	0.521 / 8.001	125496	· ·	.86 ± .02	0.43
49.4 125497 12/4 - 18/4 .86 ± .02 250 99.9 125498 8/4 - 18/4 11.12 ± .02 0.50 92.4/92.4 125496 12/4 - 18/4 11.12 ± .02 0.50 82.4/92.4 125496 12/4 - 18/4 .86 ± .02 0.50 82.4/92.4 125496 12/4 - 18/4 .86 ± .02 0.50 70 125496 12/4 - 18/4 .86 ± .02 0.50 105.9 / 123.6 125496 12/4 - 18/4 .86 ± .02 0.50 105.9 / 123.6 125496 12/4 - 18/4 .86 ± .02 0.50 61.8 125497 12/4 - 18/4 .86 ± .02 0 105.9 / 123.6 125497 12/4 - 18/4 .86 ± .02 0 105.9 / 123.6 125497 12/4 - 18/4 .86 ± .02 0 105.9 / 123.6 125497 12/4 - 18/4 .86 ± .02 0 105.9 / 123.6 125497 12/4 - 18/4 .86 ± .02 0 105.9 / 123.6 125497 12/4 - 18/4 .86 ± .02 0 105.9 / 123.6 125497 12/4 - 18/4 .86 ± .02 0 105.9 / 123.6 125497 12/4 - 18/4 .86 ± .02 0 105.9 / 123.6 125497 12/4 -					460					11.9	13.6	61.8	125497		.86 ± .02	1.72
99.9 125498 8/4 - 18/4 1.12 ± .02 0.50 112.4 125496 12/4 - 18/4 1.12 ± .02 0.50 82.4/92.4 125496 12/4 - 18/4 86 ± .02 0.50 82.4/92.4 125496 12/4 - 18/4 86 ± .02 0.50 70.0 125496 12/4 - 18/4 86 ± .02 0.50 70.0 125496 12/4 - 18/4 86 ± .02 0.50 705.9 / 123.6 125496 12/4 - 18/4 86 ± .02 0.50 61.8 125496 12/4 - 18/4 86 ± .02 0.50 61.8 125497 12/4 - 18/4 86 ± .02 0.50 61.8 125497 12/4 - 18/4 86 ± .02 0.50 49.4 125497 12/4 - 18/4 86 ± .02 0.50 105.9 / 123.6 125497 12/4 - 18/4 86 ± .02 0.50 105.9 / 123.6 125497 12/4 - 18/4 86 ± .02 0.50 105.9 / 123.6 125497 12/4 - 18/4 86 ± .02 0.50 <t< td=""><td></td><td>4XSHMS7554</td><td>133807</td><td>7.5</td><td>575</td><td>ო</td><td>60</td><td>1750</td><td>т</td><td>9.5</td><td>10.9</td><td>49.4</td><td>125497</td><td>- L</td><td>.86 ± .02</td><td>2.69</td></t<>		4XSHMS7554	133807	7.5	575	ო	60	1750	т	9.5	10.9	49.4	125497	- L	.86 ± .02	2.69
112.4 123496 $6/4 - 16/4$ $1.12 \pm .02$ 82.4/92.4 125496 $12/4 - 18/4$ $86 \pm .02$ 46.2 125496 $12/4 - 18/4$ $86 \pm .02$ 37.0 125496 $12/4 - 18/4$ $86 \pm .02$ $105.9 / 123.6$ 125496 $12/4 - 18/4$ $86 \pm .02$ $105.9 / 123.6$ 125496 $12/4 - 18/4$ $86 \pm .02$ 61.8 125496 $12/4 - 18/4$ $86 \pm .02$ 49.4 125496 $12/4 - 18/4$ $86 \pm .02$ 49.4 125498 $8/4 - 18/4$ $86 \pm .02$ $105.9 / 123.6$ $122/4 - 18/4$ $86 \pm .02$ $105.9 / 123.6$ 125498 $8/4 - 18/4$ $86 \pm .02$ $105.9 / 123.6$ 125498 $8/4 - 18/4$ $86 \pm .02$ 49.4 125497 $12/4 - 18/4$ $86 \pm .02$		1XOLINICE074	004007	C L	208	,	-		۵	27.2	35.6	99.9	101100	10,1	1.12 ± .02	22
82.4/92.4 125496 82.4/92.4 125496 46.2 125497 37.0 125496 105.9/123.6 125496 61.8 125496 49.4 125498 105.9/123.6 125496 61.8 125496 61.8 125496 105.9/123.6 125496 49.4 125497 61.8 125498 61.8 125497 49.4 125497 49.4 125498		4XSHINC5U/4	133/09	0.0	230	<u> </u>			ш	25.4	30.2	112.4	125498	8/4 - 18/4	1.12 ± .02	0.50 2.66
64.4492.4 125496 46.2 125497 37.0 125497 105.9 / 123.6 125496 61.8 125497 49.4 125498 105.9 / 123.6 125497 49.4 125498 61.8 125498 61.8 125497 49.4 125498 61.8 125498 49.4 125497					208					15.8	18.7	1001	125496	12/4 - 18/4	.86 ± .02	0.72
46.2 125497 37.0 125497 37.0 125496 105.9 / 123.6 125496 61.8 125497 49.4 125498 105.9 / 123.6 125498 105.9 / 123.6 125497 49.4 125497 49.4 125497		4XSHMC50N4	133710	5.0	230	с	60	1750		15.0	17.2	02.4/92.4	125496	12/4 - 18/4	.86 ± .02	0.72
37.0 125497 105.9 / 123.6 125496 105.9 / 123.6 125496 61.8 125497 49.4 125498 105.9 / 123.6 125498 105.9 / 123.6 125498 61.8 125497 49.4 125497 49.4 125497	al	dı			460				•	7.5	8.6	46.2	125497	12/4 - 18/4	.86 ± .02	2.88
105.9 / 123.6 125496 61.8 125496 61.8 125497 49.4 125498 105.9 / 123.6 125498 61.8 125498 61.8 125497 49.4 125498 49.4 125497	un		133711	5.0	575	ო	60	1750	~	6.0	6.9	37.0	125497	12/4 - 18/4	.86 ± .02	4.32
100.97 125496 61.8 125497 49.4 125497 105.97 125498 61.8 125498 105.97 125498 61.8 125497 49.4 125497 49.4 125497	сь —				208					23.8	28.5	10E 0 / 102 6	125496	12/4 - 18/4	.86 ± .02	0.43
61.8 125497 49.4 125497 105.9 / 123.6 125498 61.8 125498 61.8 125498 49.4 125497		-	133712	7.5	230	ო	60	1750	т	23.7	27.2	0.621 / 8.601	125496	12/4 - 18/4	.86 ± .02	0.43
49.4 125497 105.9 / 123.6 125498 61.8 125498 49.4 125497	15)				460					11.9	13.6	61.8	125497	12/4 - 18/4	.86 ± .02	1.72
105.9 / 123.6 125498 61.8 125497 49.4 125497	X7		133713	7.5	575	ო	-	1750	т	9.5	10.9	49.4	125497	12/4 - 18/4	.86 ± .02	2.69
61.8 125498 61.8 125497 49.4 125497					208					32.2	41.4	10E 0 / 103 6	125498	014 4014	1.12 ± .02	0.43
61.8 125497 49.4 125497		4XSHMC100N4	133714	10.0	230	ო	60	1750	ш	29.8	35.6	0.621 / 8.601	125498	0/4 - 10/4	+	0.43
49.4 125497					460					14.9	17.8	61.8	125497	L 1	.86 ± .02	1.72
-		4XSHMC10054	133715	10.0	575	с	-	1750	ш	11.9	14.2	49.4	125497	12/4 - 18/4	.86 ± .02	2.69
Winding Resistance ± 7.5% Winding resistance measured in OHMS @ 25°C (Between Lines) at motor leads. Pump rated for operation at ± 10% voltage at motor. Cord Suffix: XF - XC - 30 Feet. 50 Feet. XJ - 75 Feet. or XL - 100 Feet	Σ	loisture and Temperat	ture sensor	leads a	are integra	I to pov	wer coi	rd.						*** CORD OI	RDERED SE	PARATELY ***
Pump rated for operation at ± 10% voltage at motor. Cord Suffix: XF - XC - 30 Feet. 50 Feet. XJ - 75 Feet. or XL - 100 Feet	3	/inding Resistance ± 7	7.5% Wind	ding res	istance m	easure	io ui pi	HMS @	25°C (Bei	tween Lines) at	motor leads.					
t. or XL - 1	Ę	ump rated for operatic	on at ± 10%	6 voltag	e at motor)								
	ŏ	ord Suffix: XF - XC - 3	30 Feet. 50	Feet. >	(J - 75 Fet	et, or X	(L - 10(0 Feet								

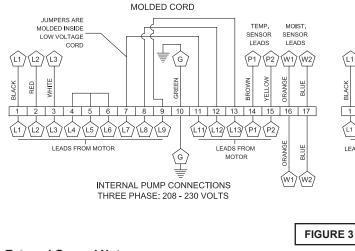
	ODD AMPS AMPS <th< th=""><th>Originary Ames Ames</th><th>$\begin{array}{ c c c c c c c c c c c c c c c c c c c$</th><th>MODEL</th><th>PART</th><th>1</th><th>F IOV</th><th></th><th>÷</th><th></th><th>NEMA</th><th></th><th>1.2 SERVICE</th><th>LOCKED</th><th>CORD</th><th>CORD</th><th>CORD</th><th>WINDING</th></th<>	Originary Ames	$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	MODEL	PART	1	F IOV		÷		NEMA		1.2 SERVICE	LOCKED	CORD	CORD	CORD	WINDING
Diagram Diagram 14.9 18.5 59.1 155.46 12.4 18.6 0.2 0.882 0.882 750 7 11.4 16.5 66.3 125.496 12.4<-18.4 86.4.02 0.882 0.882 750 N 4.5 3.3 37.9 125.495 12.4-18.4 86.4.02 0.502 3.882 750 N 4.5 3.3 37.9 125.495 12.4-18.4 86.4.02 0.502 3.882 750 N 4.5 3.02 99.9/112.4 125.493 81.4 11.12±.02 0.502 750 N 4.62 7.24 3.02 105.9/123.6 12.4-18.4 86.4.02 0.72 750 N 16.0 17.2 12.4-18.4 86.4.02 0.72 750 N 16.0 17.2 12.4-18.4 86.4.02 0.72 750 N 16.0 17.2 12.4-18.4 86.4.02 0.72 750	Diagram Diagram 143 185 59.1 125496 124-18/4 86.02 0.8802 0.43 750 10 2 2.54 30.2 8802 10.8 3.37 0 10.72<	Diagram Diagram 143 165 66.3 125.496 12.4-16.4 66.3 0.08 0.05	P0 149 185 69.1 125496 124 184 86±.02 0.882 750 7 11.4 56.3 125496 124 184 86±.02 0.882 750 N 4.5 5.3 32.9 125496 124 184 86±.02 0.882 750 N 4.5 5.3 32.9 125496 124 184 86±.02 0.882 750 D 27.2 35.6 99.9/112.4 125496 124<-184 86±.02 0.502 0.502 750 150 17.2 82.4/92.4 125496 124-184 86±.02 0.502 0.502 750 150 172 82.4/92.4 125496 124-184 86±.02 0.43 0.202 750 150 150 125496 124-184 86±.02 0.43 0.43 0.43 0.43 0.43 0.43 0.43 0.43 0.502 0.50 0.23 0.43		N			5		(MoM)	CODE	AMPS	AMPS	AMPS	P/N *	SIZE	0.D.	MAIN START
70 F 14,1 16,5 66,3 12,4430 12,4-104 86 ± .02 0.88 ± .02 108 750 8,7 11,4 58,2 / 65,8 125449 124 + 184 86 ± .02 108 -3 750 N 4,5 5,3 32,9 125449 124 + 184 86 ± .02 108 750 N 4,5 4,9 37,0 125449 124 + 184 86 ± .02 0,502 750 15,0 17,2 82,4/32,4 125449 124 + 184 86 ± .02 0,502 750 15,0 17,2 82,4/32,4 125449 124 + 184 86 ± .02 0,502 750 9,6 9 37,0 125496 124 + 184 86 ± .02 0,43 751 8,6 10,9 49,4 1254 + 184 86 ± .02 0,43 751 19,9 10,9 125496 124 + 184 86 ± .02 0,43 750 11,9 135 125496 124 + 184 <td>700 F 14.1 16.5 66.3 125495 124-18/4 86±.02 0.88±.02 108 -2 750 N 4.6 5.3 32.9 125495 124-18/4 86±.02 108 -3.3 750 N 4.5 5.3 32.9 125495 124-18/4 86±.02 10.80 -3.3 750 J 27.2 30.5 99.9/112 125495 124-18/4 86±.02 0.502 0.73 750 J 75 86 46.2 125495 124-18/4 86±.02 0.72 750 J 75 86 37.0 125495 124-18/4 86±.02 0.72 750 H 23.8 23.6 99.9/112.4 125495 124-18/4 86±.02 0.72 750 H 46.2 126497 124-18/4 86±.02 0.72 751 H 105.9/12.36 125496 124-18/4 86±.02 0.72 750</td> <td>700 F 14.1 16.5 66.3 123490 12.4 16.4 66.02 0.88 -0.2 10.88 -0.2 10.88 -0.2 10.88 -0.2 10.88 -0.2 10.88 -0.2 10.88 -0.2 10.88 -0.2 10.88 -0.2 10.88 -0.2 10.88 -0.2 10.88 -0.2 10.88 -0.2 0.88 -0.2 0.88 -0.2 0.88 -0.2 0.88 -0.2 0.88 -0.2 0.88 -0.2 0.38 -0.2 0.39 -0.2 0.38 -0.2 0.38 -0.2 0.39 -0.2 0.38 -0.2 0.36 -0.2 0.38 -0.2 0.36 -0.2 0.38 -0.2 0.36 -0.2 -0.32 -0.2 -0.25</td> <td>700 F 14.1 16.5 66.3 125495 124-161 66.402 0.08802 10.08 -2.2 750 N 4.6 5.3 32.9 125495 124-1614 86.4.02 10.08 -3.2 750 N 4.5 5.3 32.9 125495 124-1614 86.4.02 10.05022 10.05022 750 J 27.2 30.2 99.9/112.4 125496 124-1614 86.4.02 0.5022 0.5022 750 J 75 8.6 30.2 105.9/12.36 12641614 16.4.6.02 0.5022 0.50 0.5022 0.50 0.5022 0.50 0.5022 0.50 0.5022 0.50 0.5022 0.50 0.50 0.50 0.5022 0.50</td> <td></td> <td></td> <td>, ,</td> <td>208</td> <td>,</td> <td>0</td> <td>1</td> <td>Ω</td> <td>14.9</td> <td>18.5</td> <td>59.1</td> <td>105400</td> <td>101 101</td> <td>.86 ± .02</td> <td>0.88 2.14</td>	700 F 14.1 16.5 66.3 125495 124-18/4 86±.02 0.88±.02 108 -2 750 N 4.6 5.3 32.9 125495 124-18/4 86±.02 108 -3.3 750 N 4.5 5.3 32.9 125495 124-18/4 86±.02 10.80 -3.3 750 J 27.2 30.5 99.9/112 125495 124-18/4 86±.02 0.502 0.73 750 J 75 86 46.2 125495 124-18/4 86±.02 0.72 750 J 75 86 37.0 125495 124-18/4 86±.02 0.72 750 H 23.8 23.6 99.9/112.4 125495 124-18/4 86±.02 0.72 750 H 46.2 126497 124-18/4 86±.02 0.72 751 H 105.9/12.36 125496 124-18/4 86±.02 0.72 750	700 F 14.1 16.5 66.3 123490 12.4 16.4 66.02 0.88 -0.2 10.88 -0.2 10.88 -0.2 10.88 -0.2 10.88 -0.2 10.88 -0.2 10.88 -0.2 10.88 -0.2 10.88 -0.2 10.88 -0.2 10.88 -0.2 10.88 -0.2 10.88 -0.2 0.88 -0.2 0.88 -0.2 0.88 -0.2 0.88 -0.2 0.88 -0.2 0.88 -0.2 0.38 -0.2 0.39 -0.2 0.38 -0.2 0.38 -0.2 0.39 -0.2 0.38 -0.2 0.36 -0.2 0.38 -0.2 0.36 -0.2 0.38 -0.2 0.36 -0.2 -0.32 -0.2 -0.25	700 F 14.1 16.5 66.3 125495 124-161 66.402 0.08802 10.08 -2.2 750 N 4.6 5.3 32.9 125495 124-1614 86.4.02 10.08 -3.2 750 N 4.5 5.3 32.9 125495 124-1614 86.4.02 10.05022 10.05022 750 J 27.2 30.2 99.9/112.4 125496 124-1614 86.4.02 0.5022 0.5022 750 J 75 8.6 30.2 105.9/12.36 12641614 16.4.6.02 0.5022 0.50 0.5022 0.50 0.5022 0.50 0.5022 0.50 0.5022 0.50 0.5022 0.50 0.50 0.50 0.5022 0.50			, ,	208	,	0	1	Ω	14.9	18.5	59.1	105400	101 101	.86 ± .02	0.88 2.14
0.7 11.4 $58.2/65.8$ 125496 $124 + 1844$ $86 \pm .02$ 1.08 70 1.5 3.70 125497 $124 + 1844$ $86 \pm .02$ 4.32 70 1.5 3.70 125497 $124 + 1844$ $86 \pm .02$ 4.32 70 272 356 $99.9/112.4$ 125497 $124 + 1844$ $86 \pm .02$ $0.50 - 2$ 70 15.6 118.7 $82.4/92.4$ 125497 $124 + 1844$ $86 \pm .02$ 0.72 75 8.6 37.0 175496 $124 + 1844$ $86 \pm .02$ 0.72 70 11.9 11.9 17.6 8.6 12.6 0.72 70 11.9 17.6 8.6 $12.4 + 1844$ $8.6 \pm .02$ 0.72 70 11.9 12.6497 $124 + 1844$ $8.6 \pm .02$ 0.72 70 11.9 12.6496 $12.4 + 1844$ $8.6 \pm .02$ 0.72 70 23.2 <t< td=""><td>No 9.7 11.4 58.2 / 65.8 125.4 184 86.5 .02 108 750 N 4.5 5.3 32.9 125496 124.1 84 86.5 .02 108 750 N 4.5 5.3 32.9 125497 124.1 84 86.5 .02 4.32 750 D 27.2 35.6 99.9 / 112.4 125496 124.1 84 86.5 .02 0.50 - 2 750 15.0 17.2 27.2 35.6 99.9 / 112.4 125496 124.1 84 86.5 .02 0.50 - 2 75 8.6 0.6 9.9 / 112.4 125496 124.1 84 86.5 .02 0.50 - 2 75 8.6 0.6 9.7 / 123 125496 124.1 84 86.5 .02 0.72 750 H 9.5 105.9 / 123.6 125496 124.1 84 86.5 .02 0.72 750 H 9.9 124.1 84 86.5 .02 0.72 0.72 750 H 105.9 / 123.6 1254.96 124</td><td>750 K 9.7 11.4 56.2 / 65.8 125.456 124.154 56.4.02 1.06 750 N 4.5 5.3 32.9 125.457 124.154 56.4.02 1.08 750 D 27.2 35.6 99.9 / 112.4 155.43 124.154 86.4.02 -1.08 750 D 27.2 35.6 99.9 / 112.4 155.49 124.154 86.4.02 0.5022 750 15.8 16.1 17.2 25.496 124.154 86.4.02 0.502 750 6.9 37.0 125.496 124.154 86.4.02 0.73 750 19 17.2 82.4 / 92.4 125.496 124.154 86.4.02 0.43 750 19 105.9 / 123.6 125.496 124.154 86.4.02 0.43 750 11 112.4 184.7 124.154 86.4.02 0.43 750 11 124.154 86.4.02 124.154 86.4.02 0.43</td><td>750 8 7 11.4 56.2 / 65.8 125.495 124.18/4 56.4.02 106 750 N 4.5 5.3 32.9 125.497 124.18/4 56.4.02 106 750 N 4.5 3.3 32.9 125.497 124.18/4 56.4.02 1.06 750 N 4.5 30.2 99.9/112.4 125.496 124.18/4 56.4.02 0.502 750 B 6.6 17.2 30.2 124.18/4 56.4.02 0.502 750 B 6.6 17.2 124.18/4 56.6.02 0.72 750 B 6.6 17.2 124.18/4 56.6.02 0.43 750 B 6.6 17.2 124.18/4 56.6.02 0.43 750 B 105.9/12.36 125.496 124.18/4 56.6.02 0.43 750 B 105.9/12.36 125.496 124.18/4 56.6.02 0.43 750 B</td><td>+</td><td></td><td>с. С.С</td><td>230</td><td>-</td><td>00</td><td></td><td><u>ш</u></td><td>14.1</td><td>16.5</td><td>66.3</td><td>064071</td><td>12/4 - 18/4</td><td>.86 ± .02</td><td>0.88 2.14</td></t<>	No 9.7 11.4 58.2 / 65.8 125.4 184 86.5 .02 108 750 N 4.5 5.3 32.9 125496 124.1 84 86.5 .02 108 750 N 4.5 5.3 32.9 125497 124.1 84 86.5 .02 4.32 750 D 27.2 35.6 99.9 / 112.4 125496 124.1 84 86.5 .02 0.50 - 2 750 15.0 17.2 27.2 35.6 99.9 / 112.4 125496 124.1 84 86.5 .02 0.50 - 2 75 8.6 0.6 9.9 / 112.4 125496 124.1 84 86.5 .02 0.50 - 2 75 8.6 0.6 9.7 / 123 125496 124.1 84 86.5 .02 0.72 750 H 9.5 105.9 / 123.6 125496 124.1 84 86.5 .02 0.72 750 H 9.9 124.1 84 86.5 .02 0.72 0.72 750 H 105.9 / 123.6 1254.96 124	750 K 9.7 11.4 56.2 / 65.8 125.456 124.154 56.4.02 1.06 750 N 4.5 5.3 32.9 125.457 124.154 56.4.02 1.08 750 D 27.2 35.6 99.9 / 112.4 155.43 124.154 86.4.02 -1.08 750 D 27.2 35.6 99.9 / 112.4 155.49 124.154 86.4.02 0.5022 750 15.8 16.1 17.2 25.496 124.154 86.4.02 0.502 750 6.9 37.0 125.496 124.154 86.4.02 0.73 750 19 17.2 82.4 / 92.4 125.496 124.154 86.4.02 0.43 750 19 105.9 / 123.6 125.496 124.154 86.4.02 0.43 750 11 112.4 184.7 124.154 86.4.02 0.43 750 11 124.154 86.4.02 124.154 86.4.02 0.43	750 8 7 11.4 56.2 / 65.8 125.495 124.18/4 56.4.02 106 750 N 4.5 5.3 32.9 125.497 124.18/4 56.4.02 106 750 N 4.5 3.3 32.9 125.497 124.18/4 56.4.02 1.06 750 N 4.5 30.2 99.9/112.4 125.496 124.18/4 56.4.02 0.502 750 B 6.6 17.2 30.2 124.18/4 56.4.02 0.502 750 B 6.6 17.2 124.18/4 56.6.02 0.72 750 B 6.6 17.2 124.18/4 56.6.02 0.43 750 B 6.6 17.2 124.18/4 56.6.02 0.43 750 B 105.9/12.36 125.496 124.18/4 56.6.02 0.43 750 B 105.9/12.36 125.496 124.18/4 56.6.02 0.43 750 B	+		с. С.С	230	-	00		<u>ш</u>	14.1	16.5	66.3	064071	12/4 - 18/4	.86 ± .02	0.88 2.14
750 K 9.2 10.6 36.2 32.3 125496 $124 + 184$ $86 \pm .02$ 108 750 N A 5.3 37.0 125497 $124 + 184$ $86 \pm .02$ 4.32 750 D 27.2 35.6 99.9 1124 18.7 82.02 $0.50 - 2$ 750 J $75.$ 36.6 99.9 1124 18.4 $86 \pm .02$ $0.50 - 2$ 750 J $75.$ 8.6 30.2 1244 184 $86 \pm .02$ $0.50 - 2$ 750 H 27.5 8.6 37.0 125497 $124 - 18/4$ $86 \pm .02$ 0.43 750 H 37.0 125497 $124 - 18/4$ $86 \pm .02$ 0.43 750 H 95.7 $106.9/1236$ $1244 - 18/4$ $86 \pm .02$ 0.43 750 H 125497 $124 - 18/4$ $86 \pm .02$ 0.43 750 H 125497	Fo K 9.2 10.6 32.7 125496 124 - 1844 86.6 0.2 1.03 750 N 4.6 5.3 32.9 175497 124 - 1844 86.6 0.2 4.32 750 D 27.2 35.6 99.9 / 112.4 125497 124 - 184 86.6 0.2 0.50 - 2 750 J 15.0 17.2 36.6 99.9 / 112.4 125497 124 - 184 86.6 0.50 -2.50 - 2 750 J 6.0 6.9 37.0 125497 124 - 184 86.6 0.7 0.43 75 8.6 46.2 125497 124 - 184 86.6.02 0.43 75 8.6 46.2 125497 124 - 184 86.6.02 0.43 75 8.6 105.9 / 12.6 125497 124 - 184 86.6.02 0.43 75 8.6 105.9 / 12.6 125497 124 - 184 86.6.02 0.50 - 2 75 8.6	750 K 9.2 10.6 36.4 0.5 125496 124 - 1844 86.5 0.2 4.32 750 N 4.6 5.3 32.9 125496 124 - 184 86.5 0.2 4.32 750 N 4.6 5.3 32.9 125498 8/4 - 18/4 1.12 ± 0.2 0.50 - 2 750 J 150 18.7 82.4 / 92.4 125496 124 - 18/4 86.5 0.2 0.72 750 J 150 17.2 82.4 / 92.4 125496 124 - 18/4 86.5 0.2 0.72 750 H 23.7 27.2 8.6 46.2 125497 124 - 18/4 86.5 0.2 0.43 750 H 23.7 27.2 105.9 124 - 18/4 86.5 0.2 0.43 750 H 23.7 27.2 105.9 124 - 18/4 86.5 0.2 0.43 750 H 23.7 27.2 105.9 124 - 18/4 86.5 0.2 0.43 750 H	750 K 9.2 10.6 30.2./ 10.3.1 125.495 12.4.13/4 36.6.02 1.0.6 750 N 4.6 5.3 32.9 125.447 124.13/4 36.6.02 4.32 750 D 27.2 35.6 99.9/112.4 125.493 124.13/4 36.6.02 0.502 750 J 75.6 8.6 5.3 37.0 125.497 124.13/4 86.4.02 0.502 750 J 7.5 8.6 9.9/112.4 125.496 124.13/4 86.4.02 0.502 750 J 16.0 19.7 16.9 124.13/4 86.4.02 0.72 750 B.6 J 172.6 105.9/1236 124.18/4 86.4.02 0.73 750 B.6 J 105.9/1236 125.496 124.18/4 86.4.02 0.73 750 B.6 J 105.9/1236 125.496 124.18/4 86.4.02 0.73 750 B.7 J	1			208		╞			9.7	11.4		125496	1 .	.86 ± .02	1.08
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0 27.2 36.6 $99.9/112.4$ 125496 $124 - 184$ $112 \pm .02$ 0.502 75 25.4 30.2 8.6 12.4 184.4 $86 \pm .02$ 0.72 75 15.0 117.2 8.7 125496 $124 - 184$ $86 \pm .02$ 0.72 75 8.6 46.2 125496 $124 - 184$ $86 \pm .02$ 0.43 750 1.2 8.6 46.2 125496 $124 - 184$ $86 \pm .02$ 0.43 750 1.3 0.50 125497 $124 - 184$ $86 \pm .02$ 0.43 750 11.9 13.6 0.9 37.0 125497 $124 - 184$ $86 \pm .02$ 0.43 750 11.9 12.5497 $124 - 184$ $86 \pm .02$ 0.43 750 11.9 12.4 $186 + .02$ 0.43 0.43 750 12.4 184 $86 \pm .02$ 0.50 0.23 <t< td=""><td>0 27.2 35.6 $99.9/112.4$ 125436 1.12 ± 0.2 $0.50 - 2$ $0.50 - 2$ 75 16.6 17.2 $82.4/92.4$ 125496 $124 - 18/4$ 86 ± 0.2 0.72 75 8.6 17.2 $82.4/92.4$ 125497 $124 - 18/4$ 86 ± 0.2 0.72 75 8.6 37.0 125497 $124 - 18/4$ 86 ± 0.2 0.72 75 8.6 37.0 125497 $124 - 18/4$ 86 ± 0.2 0.73 75 8.6 37.0 125497 $124 - 18/4$ 86 ± 0.2 0.73 75 11.9 13.6 61.8 125497 $124 - 18/4$ 86 ± 0.2 0.43 75 11.9 13.6 01.9 $124 - 18/4$ 86 ± 0.2 0.69 75 10.9 125497 $124 - 18/4$ 86 ± 0.2 0.73 750 1250 $124 - 18/4$ 86 ± 0.2 0.73 750</td><td>Diagram Diagram <t< td=""><td>70 D 27.2 35.6 99.9 / 112.4 125.4 30.2 95.9 / 12.4 184 11.12 ± 0.2 0.50 - 2</td><td>14</td><td>-</td><td>3.0</td><td>575</td><td>m</td><td>┢</td><td>1750</td><td>z</td><td>4.5</td><td>4.9</td><td>37.0</td><td>125497</td><td>12/4 - 18/4</td><td>.86 ± .02</td><td>4.32</td></t<></td></t<>	0 27.2 35.6 $99.9/112.4$ 125436 1.12 ± 0.2 $0.50 - 2$ $0.50 - 2$ 75 16.6 17.2 $82.4/92.4$ 125496 $124 - 18/4$ 86 ± 0.2 0.72 75 8.6 17.2 $82.4/92.4$ 125497 $124 - 18/4$ 86 ± 0.2 0.72 75 8.6 37.0 125497 $124 - 18/4$ 86 ± 0.2 0.72 75 8.6 37.0 125497 $124 - 18/4$ 86 ± 0.2 0.73 75 8.6 37.0 125497 $124 - 18/4$ 86 ± 0.2 0.73 75 11.9 13.6 61.8 125497 $124 - 18/4$ 86 ± 0.2 0.43 75 11.9 13.6 01.9 $124 - 18/4$ 86 ± 0.2 0.69 75 10.9 125497 $124 - 18/4$ 86 ± 0.2 0.73 750 1250 $124 - 18/4$ 86 ± 0.2 0.73 750	Diagram Diagram <t< td=""><td>70 D 27.2 35.6 99.9 / 112.4 125.4 30.2 95.9 / 12.4 184 11.12 ± 0.2 0.50 - 2</td><td>14</td><td>-</td><td>3.0</td><td>575</td><td>m</td><td>┢</td><td>1750</td><td>z</td><td>4.5</td><td>4.9</td><td>37.0</td><td>125497</td><td>12/4 - 18/4</td><td>.86 ± .02</td><td>4.32</td></t<>	70 D 27.2 35.6 99.9 / 112.4 125.4 30.2 95.9 / 12.4 184 11.12 ± 0.2 0.50 - 2	14	-	3.0	575	m	┢	1750	z	4.5	4.9	37.0	125497	12/4 - 18/4	.86 ± .02	4.32
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$ \left(\begin{array}{cccccccccccccccccccccccccccccccccccc$	750 H 9.5 10.9 49.4 125497 124 - 18/4 86 ± .02 2 750 E 29.8 35.6 105.9 / 123.6 125498 8/4 - 18/4 11.12 ± .02 0 750 E 14.9 17.8 61.8 125497 12/4 - 18/4 86 ± .02 1 0 750 E 11.9 14.2 49.4 125497 12/4 - 18/4 86 ± .02 0 0 750 D 27.2 35.6 99.9 125496 12/4 - 18/4 86 ± .02 0	750 H 9.5 10.9 49.4 125497 124 - 18/4 86 ± .02 2 750 E 29.8 35.6 105.9 / 123.6 125498 8/4 - 18/4 112 ± .02 0 750 E 14.9 17.8 61.8 125497 124 - 18/4 86 ± .02 1 750 E 11.9 14.2 49.4 125497 124 - 18/4 86 ± .02 0 750 D 27.2 35.6 99.9 125496 124 - 18/4 86 ± .02 0 0 750 J 15.8 18.7 82.4 / 92.4 125496 12/4 - 18/4 86 ± .02 0 0 750 J 15.0 172.4 18/4 18.7 125496 12/4 - 18/4 86 ± .02 0	750 H 9.5 10.9 49.4 125497 12/4 - 18/4 86 ± .02 2 750 E 29.8 35.6 10.5.9 / 123.6 125498 8/4 - 18/4 112 ± .02 0 750 E 14.9 17.8 61.8 125497 12/4 - 18/4 8.6 ± .02 7 750 E 11.9 14.2 99.9 125497 12/4 - 18/4 8.6 ± .02 0 0 750 E 11.9 14.2 30.5.0 112.4 18/4 112 ± .02 0				460				I	11.9	13.6	61.8	125497	12/4 - 18/4	.86 ± .02	1.72
750 32.2 41.4 $105.9/123.6$ 125498 $8/4 - 18/4$ 1.12 ± 0.2 0.2 750 E 14.9 17.8 61.8 125497 $124 - 18/4$ 86 ± 0.2 0.50 750 E 11.9 14.2 49.4 125497 $124 - 18/4$ 86 ± 0.2 0.50 750 D 27.2 35.6 99.9 125496 $8/4 - 18/4$ 16.2 ± 0.2 0.50 750 D 27.2 30.2 112.4 125496 $12/4 - 18/4$ 86 ± 0.2 0.50 750 J 15.0 17.2 $82.4/92.4$ 125496 $12/4 - 18/4$ 86 ± 0.2 0.50 750 J 7.5 8.6 46.2 125497 $12/4 - 18/4$ 86 ± 0.2 0.50 750 J 125497 $1274 - 18/4$ 86 ± 0.2 0.50 0.50 750 H 233.6 $1059/123.6$ 125496 $12/4 - 18/4$ 86 ± 0	750 E 32.2 41.4 $105.9/123.6$ 125498 $8/4 - 18/4$ $1.12 \pm .02$ 0.2 750 E 11.9 17.8 61.8 125497 12/4 - 18/4 $86 \pm .02$ $1.12 \pm .02$ 0.50 750 E 11.9 14.2 49.4 125497 12/4 - 18/4 $86 \pm .02$ 0.50 750 D 27.2 35.6 99.9 125496 12/4 - 18/4 $86 \pm .02$ 0.50 750 D 27.2 30.2 112.4 125496 12/4 - 18/4 $86 \pm .02$ 0.50 750 J 15.0 17.2 82.4 / 92.4 125496 12/4 - 18/4 $86 \pm .02$ 0.50 750 J 7.5 8.6 46.2 12/4 - 18/4 $86 \pm .02$ 0.50 750 H 15.6 12/4 - 18/4 $86 \pm .02$ 0.50 0.50 750 H 15.6496 12/4 - 18/4 $86 \pm .02$ 0.50 0.50 750	750 32.2 41.4 $105.9/123.6$ 125498 $8/4 - 18/4$ 1.12 ± 0.2 0.2 750 E 14.9 17.8 61.8 125497 $124 - 18/4$ 86 ± 0.2 1 750 E 11.9 14.2 49.4 125497 $124 - 18/4$ 86 ± 0.2 1 750 D 27.2 35.6 99.9 125497 $124 - 18/4$ 86 ± 0.2 1 750 D 27.2 35.6 99.9 125497 $124 - 18/4$ 86 ± 0.2 050 750 J 15.0 17.2 30.2 112.4 $18/4$ 86 ± 0.2 050 750 J 16.0 6.9 37.0 125497 $12/4 - 18/4$ 86 ± 0.2 050 750 H 25.4 30.2 125497 $12/4 - 18/4$ 86 ± 0.2 050 750 H 257496 $12/4 - 18/4$ 86 ± 0.2 050 <t< td=""><td>750 32.2 41.4 $105.9/123.6$ 125498 $8/4 - 18/4$ 1.12 ± 0.2 002 750 E 11.9 17.8 61.8 125497 124.4 18.6 ± 0.2 11.2 ± 0.2 050 750 E 11.9 14.2 49.4 125497 124.4 18.4 ± 0.2 050 750 D 27.2 35.6 99.9 125497 $124.4 \pm 18/4$ 86 ± 0.2 050 750 J 17.2 30.2 112.4 $18/4$ 86 ± 0.2 050 750 J 15.0 17.2 30.2 112.4 $18/4$ 86 ± 0.2 050 750 J 15.0 17.2 $82.4 / 92.4$ 125496 $12/4 - 18/4$ 86 ± 0.2 050 750 H 23.7 125496 $12/4 - 18/4$ 86 ± 0.2 050 750 H 23.7 125496 $12/4 - 18/4$ 86 ± 0.2 050</td><td>12</td><td>-</td><td>7.5</td><td>575</td><td>ო</td><td></td><td>1750</td><td>Ξ</td><td>9.5</td><td>10.9</td><td>49.4</td><td>125497</td><td>12/4 - 18/4</td><td>.86 ± .02</td><td>2.69</td></t<>	750 32.2 41.4 $105.9/123.6$ 125498 $8/4 - 18/4$ 1.12 ± 0.2 002 750 E 11.9 17.8 61.8 125497 124.4 18.6 ± 0.2 11.2 ± 0.2 050 750 E 11.9 14.2 49.4 125497 124.4 18.4 ± 0.2 050 750 D 27.2 35.6 99.9 125497 $124.4 \pm 18/4$ 86 ± 0.2 050 750 J 17.2 30.2 112.4 $18/4$ 86 ± 0.2 050 750 J 15.0 17.2 30.2 112.4 $18/4$ 86 ± 0.2 050 750 J 15.0 17.2 $82.4 / 92.4$ 125496 $12/4 - 18/4$ 86 ± 0.2 050 750 H 23.7 125496 $12/4 - 18/4$ 86 ± 0.2 050 750 H 23.7 125496 $12/4 - 18/4$ 86 ± 0.2 050	12	-	7.5	575	ო		1750	Ξ	9.5	10.9	49.4	125497	12/4 - 18/4	.86 ± .02	2.69
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750 E 11.9 14.2 49.4 125497 124 - 18/4 86 ± .02 20.50 750 D 27.2 35.6 99.9 125498 8/4 - 18/4 1.12 ± .02 0.50 750 D 15.6 18.7 82.4 / 92.4 125496 12/4 - 18/4 86 ± .02 0.50 750 J 15.0 17.2 82.4 / 92.4 125496 12/4 - 18/4 86 ± .02 0.50 750 J 15.0 17.2 82.4 / 92.4 125496 12/4 - 18/4 86 ± .02 0.50 750 J 6.0 6.9 37.0 125496 12/4 - 18/4 86 ± .02 0.50 750 H 23.8 28.5 105.9 / 123.6 12/4 - 18/4 86 ± .02 0.50 750 H 23.7 27.2 49.4 16.4 - 18/4 86 ± .02 0.50 750 H 23.7 27.2 125496 12/4 - 18/4 86 ± .02 0.50 750 H	750 E 11.9 14.2 49.4 125497 124 - 18/4 86 ± .02 20 750 D 27.2 35.6 99.9 125498 8/4 - 18/4 1.12 ± .02 0.50 750 D 27.2 30.2 112.4 1.25496 12/4 - 18/4 1.12 ± .02 0.50 750 J 15.0 17.2 82.4 / 92.4 125496 12/4 - 18/4 86 ± .02 0.50 750 J 15.0 17.2 8.6 46.2 125496 12/4 - 18/4 86 ± .02 0.50 750 J 6.0 6.9 37.0 125496 12/4 - 18/4 86 ± .02 0.50 750 H 23.8 28.5 105.9 / 123.6 12/4 - 18/4 86 ± .02 0.50 750 H 23.2 105.9 / 123.6 12/4 - 18/4 86 ± .02 0.50 750 H 23.2 105.9 / 123.6 12/4 - 18/4 86 ± .02 0.50 750 H 23.2	750 E 11.9 14.2 49.4 125497 124 - 18/4 86 ± .02 20 750 D 27.2 35.6 99.9 125498 8/4 - 18/4 1.12 ± .02 0.50 750 D 27.2 30.2 112.4 1.5498 8/4 - 18/4 1.12 ± .02 0.50 750 J 15.0 17.2 82.4 / 92.4 125496 12/4 - 18/4 86 ± .02 0.50 750 J 15.0 17.2 82.4 / 92.4 125496 12/4 - 18/4 86 ± .02 0.50 750 H 23.8 8.6 46.2 125496 12/4 - 18/4 86 ± .02 0.50 750 H 23.8 28.5 105.9 / 123.6 12/4 - 18/4 86 ± .02 0.50 750 H 23.3 27.2 125496 12/4 - 18/4 86 ± .02 0.50 750 H 23.5 105.9 / 123.6 12/4 - 18/4 86 ± .02 0.50 750 B 12.4 - 18/	750 E 11.9 14.2 49.4 125497 124 - 18/4 86 ± .02 2050 750 D 27.2 35.6 99.9 125498 8/4 - 18/4 16.12 ± .02 0.50 750 D 15.8 18.7 82.4 / 92.4 125496 12/4 - 18/4 86 ± .02 0.50 750 J 15.0 17.2 82.4 / 92.4 125496 12/4 - 18/4 86 ± .02 0.50 750 J 15.0 17.2 82.4 / 92.4 125496 12/4 - 18/4 86 ± .02 0.50 750 H 23.8 28.5 105.9 / 123.6 125496 12/4 - 18/4 86 ± .02 0.50 750 H 23.7 27.2 105.9 / 123.6 126497 12/4 - 18/4 86 ± .02 0.50 750 H 13.6 61.8 125496 12/4 - 18/4 86 ± .02 0.50 750 H 23.7 27/2 105.9 / 123.6 12/4 - 18/4 86 ± .02 0.50 <t< td=""><td></td><td></td><td></td><td>460</td><td></td><td></td><td></td><td></td><td>14.9</td><td>17.8</td><td>61.8</td><td>125497</td><td>12/4 - 18/4</td><td>.86 ± .02</td><td>1.72</td></t<>				460					14.9	17.8	61.8	125497	12/4 - 18/4	.86 ± .02	1.72
10 27.2 35.6 99.9 125498 $84-18/4$ 1.12 ± 02 0.50 75 25.4 30.2 112.4 125496 $12/4$ $18/4$ 1.12 ± 02 0.50 75 18.7 $82.4/92.4$ 125496 $12/4$ 18.6 ± 02 0.50 75 8.6 46.2 125496 $12/4$ 18.4 86 ± 02 0.50 750 J 6.0 6.9 37.0 125496 $12/4$ 18.4 86 ± 02 0.50 750 H 23.8 28.5 $105.9/123.6$ 125496 $12/4$ 18.4 86 ± 02 0.50 750 H 23.3 27.2 49.4 $12/4$ 18.4 86 ± 02 0.50 750 H 11.9 13.6 $12/4$ 18.6 ± 02 0.50 0.50 750 H 12.6 $12/4$ $18/4$ 86 ± 02 0.50 0.50 0.50 </td <td>50 D 27.2 35.6 99.9 125498 8/4 - 18/4 1.12 ± .02 0.50 750 1 15.8 18.7 82.4 / 92.4 125496 12/4 - 18/4 86 ± .02 0.50 750 1 15.0 17.2 82.4 / 92.4 125496 12/4 - 18/4 86 ± .02 0.50 750 1 7.5 8.6 46.2 125496 12/4 - 18/4 86 ± .02 0.50 750 1 6.0 6.9 37.0 125496 12/4 - 18/4 86 ± .02 0.50 750 1 0.50 125496 12/4 - 18/4 86 ± .02 0.50 750 1 0.50 125496 12/4 - 18/4 86 ± .02 0.50 750 1 105.9 / 123.6 125496 12/4 - 18/4 86 ± .02 0.50 750 1 105.9 / 123.6 12/4 - 18/4 86 ± .02 0.50 0.50 750 1 125496 12/4 - 18/4 86 ± .02 0.50 <t< td=""><td>50 D 27.2 35.6 99.9 125498 84-18/4 1.12±.02 0.50 750 7 25.4 30.2 112.4 1.25496 1214-18/4 86±.02 0.50 750 1 15.0 17.2 82.4 / 92.4 125496 1214-18/4 86±.02 0.50 750 1 7.5 8.6 46.2 125496 1214-18/4 86±.02 0.50 750 1 6.0 6.9 37.0 125496 1214-18/4 86±.02 0.50 750 1 6.0 6.9 37.0 125496 1214-18/4 86±.02 0.50 750 1 0.5.9 105.9 / 123.6 125496 1214-18/4 86±.02 0.50 750 1 32.2 49.4 125496 1214-18/4 86±.02 0.50 750 1 1.5 126496 1214-18/4 86±.02 0.50 750 1 1.5 1.5 1.5 <td< td=""><td>50 D 27.2 35.6 99.9 125498 $84 - 18/4$ $1.12 \pm .02$ 0.50 <t< td=""><td>12</td><td></td><td>10.0</td><td>575</td><td>ო</td><td>-</td><td>1750</td><td>ш</td><td>11.9</td><td>14.2</td><td>49.4</td><td>125497</td><td>12/4 - 18/4</td><td>.86 ± .02</td><td>2.69</td></t<></td></td<></td></t<></td>	50 D 27.2 35.6 99.9 125498 8/4 - 18/4 1.12 ± .02 0.50 750 1 15.8 18.7 82.4 / 92.4 125496 12/4 - 18/4 86 ± .02 0.50 750 1 15.0 17.2 82.4 / 92.4 125496 12/4 - 18/4 86 ± .02 0.50 750 1 7.5 8.6 46.2 125496 12/4 - 18/4 86 ± .02 0.50 750 1 6.0 6.9 37.0 125496 12/4 - 18/4 86 ± .02 0.50 750 1 0.50 125496 12/4 - 18/4 86 ± .02 0.50 750 1 0.50 125496 12/4 - 18/4 86 ± .02 0.50 750 1 105.9 / 123.6 125496 12/4 - 18/4 86 ± .02 0.50 750 1 105.9 / 123.6 12/4 - 18/4 86 ± .02 0.50 0.50 750 1 125496 12/4 - 18/4 86 ± .02 0.50 <t< td=""><td>50 D 27.2 35.6 99.9 125498 84-18/4 1.12±.02 0.50 750 7 25.4 30.2 112.4 1.25496 1214-18/4 86±.02 0.50 750 1 15.0 17.2 82.4 / 92.4 125496 1214-18/4 86±.02 0.50 750 1 7.5 8.6 46.2 125496 1214-18/4 86±.02 0.50 750 1 6.0 6.9 37.0 125496 1214-18/4 86±.02 0.50 750 1 6.0 6.9 37.0 125496 1214-18/4 86±.02 0.50 750 1 0.5.9 105.9 / 123.6 125496 1214-18/4 86±.02 0.50 750 1 32.2 49.4 125496 1214-18/4 86±.02 0.50 750 1 1.5 126496 1214-18/4 86±.02 0.50 750 1 1.5 1.5 1.5 <td< td=""><td>50 D 27.2 35.6 99.9 125498 $84 - 18/4$ $1.12 \pm .02$ 0.50 <t< td=""><td>12</td><td></td><td>10.0</td><td>575</td><td>ო</td><td>-</td><td>1750</td><td>ш</td><td>11.9</td><td>14.2</td><td>49.4</td><td>125497</td><td>12/4 - 18/4</td><td>.86 ± .02</td><td>2.69</td></t<></td></td<></td></t<>	50 D 27.2 35.6 99.9 125498 84-18/4 1.12±.02 0.50 750 7 25.4 30.2 112.4 1.25496 1214-18/4 86±.02 0.50 750 1 15.0 17.2 82.4 / 92.4 125496 1214-18/4 86±.02 0.50 750 1 7.5 8.6 46.2 125496 1214-18/4 86±.02 0.50 750 1 6.0 6.9 37.0 125496 1214-18/4 86±.02 0.50 750 1 6.0 6.9 37.0 125496 1214-18/4 86±.02 0.50 750 1 0.5.9 105.9 / 123.6 125496 1214-18/4 86±.02 0.50 750 1 32.2 49.4 125496 1214-18/4 86±.02 0.50 750 1 1.5 126496 1214-18/4 86±.02 0.50 750 1 1.5 1.5 1.5 <td< td=""><td>50 D 27.2 35.6 99.9 125498 $84 - 18/4$ $1.12 \pm .02$ 0.50 <t< td=""><td>12</td><td></td><td>10.0</td><td>575</td><td>ო</td><td>-</td><td>1750</td><td>ш</td><td>11.9</td><td>14.2</td><td>49.4</td><td>125497</td><td>12/4 - 18/4</td><td>.86 ± .02</td><td>2.69</td></t<></td></td<>	50 D 27.2 35.6 99.9 125498 $84 - 18/4$ $1.12 \pm .02$ 0.50 <t< td=""><td>12</td><td></td><td>10.0</td><td>575</td><td>ო</td><td>-</td><td>1750</td><td>ш</td><td>11.9</td><td>14.2</td><td>49.4</td><td>125497</td><td>12/4 - 18/4</td><td>.86 ± .02</td><td>2.69</td></t<>	12		10.0	575	ო	-	1750	ш	11.9	14.2	49.4	125497	12/4 - 18/4	.86 ± .02	2.69
0.0 F 25.4 30.2 112.4 $124+30$ $0.4+10.4$ 112 ± 0.2 112 ± 0.2 750 1 15.0 18.7 $82.4/92.4$ 125496 $124+18/4$ 86 ± 0.2 86 ± 0.2 750 1 7.5 8.6 46.2 $124+18/4$ 86 ± 0.2 86 ± 0.2 750 1 6.0 6.9 37.0 $124+18/4$ 86 ± 0.2 86 ± 0.2 750 1 6.0 6.9 37.0 125496 $12/4-18/4$ 86 ± 0.2 86 ± 0.2 750 1 23.8 28.5 $105.9/123.6$ $1274-18/4$ 86 ± 0.2 86 ± 0.2 750 11.9 13.6 61.8 125496 $12/4-18/4$ 86 ± 0.2 86 ± 0.2 750 11.9 13.6 126497 $12/4-18/4$ 86 ± 0.2 <td>70 F 25.4 30.2 112.4 12.4-50 04+ 104 112±02</td> <td>70 F 25.4 30.2 112.4 12.4-50 04+ 104 112±02</td> <td>70 F 25.4 30.2 112.4 124-104 112±.02 750 1 15.8 18.7 82.4 / 92.4 1254.96 124 - 18/4 86±.02 750 1 7.5 8.6 46.2 1254.96 12/4 - 18/4 86±.02 750 1 6.0 6.9 37.0 1254.97 12/4 - 18/4 86±.02 750 1 6.0 6.9 37.0 1254.97 12/4 - 18/4 86±.02 750 H 23.8 28.5 105.9 / 123.6 12/4 - 18/4 86±.02 2 750 H 23.7 27.2 105.9 / 123.6 12/4 - 18/4 86±.02 2 750 H 23.7 27.2 105.9 / 123.6 12/4 - 18/4 86±.02 2 750 H 32.2 41.4 105.9 / 123.6 12/4 - 18/4 86±.02 2 750 E 10.3 12/54.96 12/4 - 18/4 86±.02 2 750 E</td> <td></td> <td>_</td> <td>C L</td> <td>208</td> <td><i>.</i></td> <td>00</td> <td>1750</td> <td>D</td> <td>27.2</td> <td>35.6</td> <td>6.66</td> <td>105400</td> <td>010 1010</td> <td>1.12 ± .02</td> <td>0.50 2.66</td>	70 F 25.4 30.2 112.4 12.4-50 04+ 104 112±02	70 F 25.4 30.2 112.4 12.4-50 04+ 104 112±02	70 F 25.4 30.2 112.4 124-104 112±.02 750 1 15.8 18.7 82.4 / 92.4 1254.96 124 - 18/4 86±.02 750 1 7.5 8.6 46.2 1254.96 12/4 - 18/4 86±.02 750 1 6.0 6.9 37.0 1254.97 12/4 - 18/4 86±.02 750 1 6.0 6.9 37.0 1254.97 12/4 - 18/4 86±.02 750 H 23.8 28.5 105.9 / 123.6 12/4 - 18/4 86±.02 2 750 H 23.7 27.2 105.9 / 123.6 12/4 - 18/4 86±.02 2 750 H 23.7 27.2 105.9 / 123.6 12/4 - 18/4 86±.02 2 750 H 32.2 41.4 105.9 / 123.6 12/4 - 18/4 86±.02 2 750 E 10.3 12/54.96 12/4 - 18/4 86±.02 2 750 E		_	C L	208	<i>.</i>	00	1750	D	27.2	35.6	6.66	105400	010 1010	1.12 ± .02	0.50 2.66
750 1 15.0 18.7 82.4/92.4 125496 7.5 8.6 46.2 125496 750 J 6.0 6.9 37.0 125496 750 J 6.0 6.9 37.0 125497 750 J 6.0 6.9 37.0 125496 750 H 23.8 28.5 105.9/123.6 125496 750 H 23.7 27.2 125496 125496 750 H 23.7 27.2 105.9/123.6 125496 750 H 9.5 10.9 49.4 125497 750 B.5.6 10.9 49.4 125497 750 E 29.8 35.6 105.9/123.6 125498 750 E 14.9 17.8 61.8 125497 750 E 14.9 14.2 49.4 125497	750 15.8 18.7 82.4 / 92.4 125496 7.5 8.6 46.2 125497 750 J 6.0 6.9 37.0 125497 750 J 6.0 6.9 37.0 125497 750 J 6.0 6.9 37.0 125497 750 H 23.8 28.5 105.9 / 123.6 125496 750 H 9.5 10.9 49.4 125496 750 H 9.5 10.9 49.4 125497 750 E 29.8 35.6 61.8 125497 750 E 29.8 35.6 10.5 / 123.6 125497 750 E 29.8 35.6 105.9 / 123.6 125497 750 E 14.9 17.8 61.8 125497 750 E 11.9 14.2 49.4 125497 750 E 11.9 14.2 49.4 125497	750 15.8 18.7 82.4 / 92.4 125496 75 8.6 46.2 125497 75 8.6 46.2 125497 75 8.6 46.2 125497 75 8.6 46.2 125497 75 8.6 46.2 125497 750 J 6.9 37.0 125496 750 H 23.7 27.2 105.9 / 123.6 125496 750 H 9.5 10.9 49.4 125497 750 E 29.8 35.6 61.8 125497 750 E 29.8 35.6 105.9 / 123.6 125497 750 E 29.8 35.6 105.9 / 123.6 125497 750 E 14.4 105.9 / 123.6 125497 750 E 11.9 14.2 49.4 125497 750 E 11.9 14.2 49.4 125497 7 E	750 15.8 18.7 82.4 / 92.4 125496 750 J 7.5 8.6 46.2 125497 750 J 6.0 6.9 37.0 125497 750 J 6.0 6.9 37.0 125497 750 J 6.0 6.9 37.0 125496 750 H 23.8 28.5 105.9 / 123.6 125496 750 H 23.7 27.2 125496 125496 750 H 9.5 10.9 49.4 125497 750 E 29.8 35.6 61.8 125497 750 F 10.9 13.6 61.8 125497 750 F 29.8 35.6 61.8 125497 750 F 105.9 / 123.6 125498 125497 750 F 14.9 17.8 61.8 125497 750 F 14.2 49.4 125497 <	4		0.0	230	-	00		ш	25.4	30.2	112.4	02420	0/4 - 10/4	1.12 ± .02	0.50 2.66
750 J 15.0 17.2 0.4.4 / 9.4 / 9.4 / 125496 7.5 8.6 46.2 125497 750 J 6.0 6.9 37.0 125497 750 J 6.0 6.9 37.0 125497 750 H 23.8 28.5 105.9 / 123.6 125496 750 H 23.7 27.2 105.9 / 123.6 125496 750 H 9.5 10.9 49.4 125497 750 H 9.5 10.9 49.4 125497 750 F 32.2 41.4 125497 125497 750 E 29.8 35.6 105.9 / 123.6 125497 750 E 29.8 35.6 40.4 125497 750 E 11.9 14.2 49.4 125497	750 J 15.0 17.2 $0.4.4.73.4.7$ 125496 750 J 7.5 8.6 46.2 125497 750 J 6.0 6.9 37.0 125497 750 J 6.0 6.9 37.0 125497 750 H 23.8 28.5 $105.9/123.6$ 125496 750 H 23.7 27.2 49.4 125496 750 H 9.5 10.9 49.4 125497 750 E 29.8 35.6 49.4 125497 750 E 29.8 35.6 49.4 125497 750 E 11.9 17.8 61.8 125497 750 E 11.9 14.2 49.4 125497 750 E 11.9 14.2 49.4 125497 750 E 11.9 14.2 49.4 125497 <t< td=""><td>750 J 15.0 17.2 $0.4.4.73.4.7$ 125496 750 J 7.5 8.6 46.2 125497 750 J 6.0 6.9 37.0 125497 750 J 6.0 6.9 37.0 125496 750 H 23.8 28.5 $105.9/123.6$ 125496 750 H 23.7 27.2 49.4 125496 750 H 9.5 10.9 49.4 125497 750 E 29.8 35.6 40.4 125497 750 E 29.8 35.6 49.4 125497 750 E 11.9 17.8 61.8 125497 750 E 11.9 14.2 49.4 125497 750 E 11.9 14.2 49.4 125497 750 E 11.9 14.2 49.4 125497 <t< td=""><td>750 J 15.0 17.2 04.4 / 34.4 125496 750 J 6.0 8.6 46.2 125497 750 J 6.0 6.9 37.0 125497 750 J 6.0 6.9 37.0 125497 750 H 23.8 28.5 105.9 / 123.6 125496 750 H 23.7 27.2 105.9 / 123.6 125496 750 H 9.5 10.9 49.4 125497 750 E 29.8 35.6 61.8 125497 750 E 29.8 35.6 105.9 / 123.6 125497 750 E 11.9 17.8 61.8 125497 750 E 11.9 14.2 49.4 125497 750 E 11.9 14.2 49.4 125497 750 E 11.9 14.2 49.4 125497 750 E 11.9 <</td><td></td><td></td><td></td><td>208</td><td></td><td></td><td></td><td></td><td>15.8</td><td>18.7</td><td>0 / 7</td><td>125496</td><td>12/4 - 18/4</td><td>.86 ± .02</td><td>0.72</td></t<></td></t<>	750 J 15.0 17.2 $0.4.4.73.4.7$ 125496 750 J 7.5 8.6 46.2 125497 750 J 6.0 6.9 37.0 125497 750 J 6.0 6.9 37.0 125496 750 H 23.8 28.5 $105.9/123.6$ 125496 750 H 23.7 27.2 49.4 125496 750 H 9.5 10.9 49.4 125497 750 E 29.8 35.6 40.4 125497 750 E 29.8 35.6 49.4 125497 750 E 11.9 17.8 61.8 125497 750 E 11.9 14.2 49.4 125497 750 E 11.9 14.2 49.4 125497 750 E 11.9 14.2 49.4 125497 <t< td=""><td>750 J 15.0 17.2 04.4 / 34.4 125496 750 J 6.0 8.6 46.2 125497 750 J 6.0 6.9 37.0 125497 750 J 6.0 6.9 37.0 125497 750 H 23.8 28.5 105.9 / 123.6 125496 750 H 23.7 27.2 105.9 / 123.6 125496 750 H 9.5 10.9 49.4 125497 750 E 29.8 35.6 61.8 125497 750 E 29.8 35.6 105.9 / 123.6 125497 750 E 11.9 17.8 61.8 125497 750 E 11.9 14.2 49.4 125497 750 E 11.9 14.2 49.4 125497 750 E 11.9 14.2 49.4 125497 750 E 11.9 <</td><td></td><td></td><td></td><td>208</td><td></td><td></td><td></td><td></td><td>15.8</td><td>18.7</td><td>0 / 7</td><td>125496</td><td>12/4 - 18/4</td><td>.86 ± .02</td><td>0.72</td></t<>	750 J 15.0 17.2 04.4 / 34.4 125496 750 J 6.0 8.6 46.2 125497 750 J 6.0 6.9 37.0 125497 750 J 6.0 6.9 37.0 125497 750 H 23.8 28.5 105.9 / 123.6 125496 750 H 23.7 27.2 105.9 / 123.6 125496 750 H 9.5 10.9 49.4 125497 750 E 29.8 35.6 61.8 125497 750 E 29.8 35.6 105.9 / 123.6 125497 750 E 11.9 17.8 61.8 125497 750 E 11.9 14.2 49.4 125497 750 E 11.9 14.2 49.4 125497 750 E 11.9 14.2 49.4 125497 750 E 11.9 <				208					15.8	18.7	0 / 7	125496	12/4 - 18/4	.86 ± .02	0.72
7.5 8.6 46.2 125497 750 J 6.0 6.9 37.0 125497 750 J 6.0 6.9 37.0 125497 750 H 23.8 28.5 105.9 / 123.6 125496 750 H 23.7 27.2 105.9 / 123.6 125496 750 H 9.5 10.9 49.4 125497 750 H 9.5 10.9 49.4 125497 750 E 29.8 10.9 49.4 125497 750 F 32.2 41.4 105.9 / 123.6 125498 750 E 14.9 17.8 61.8 125497 750 E 14.9 14.2 49.4 125497	7.5 8.6 46.2 125497 750 J 6.0 6.9 37.0 125497 750 J 6.0 6.9 37.0 125497 750 H 23.8 28.5 105.9 / 123.6 125496 750 H 23.7 27.2 105.9 / 123.6 125496 750 H 9.5 10.9 49.4 125497 750 E 29.8 35.6 10.5 / 123.6 125498 750 E 29.8 35.6 105.9 / 123.6 125498 750 E 11.9 17.8 61.8 125497 750 E 11.9 14.2 49.4 125497	7:5 8:6 46:2 125497 750 J 6:0 6:9 37.0 125497 750 J 6:0 6:9 37.0 125497 750 H 23.8 28.5 105.9 / 123.6 125496 750 H 23.7 27.2 105.9 / 123.6 125496 750 H 9.5 10.9 49.4 125497 750 E 29.5 41.4 105.9 / 123.6 125498 750 E 29.8 35.6 10.5 / 123.6 125498 750 E 14.9 17.8 61.8 125497 750 E 11.9 14.2 49.4 125497	7.5 8.6 46.2 125497 750 J 6.0 6.9 37.0 125497 750 J 6.0 6.9 37.0 125497 750 H 23.8 28.5 105.9 / 123.6 125496 750 H 23.7 27.2 105.9 / 123.6 125496 750 H 9.5 10.9 49.4 125497 750 E 29.8 35.6 61.8 125497 750 E 29.8 35.6 61.8 125497 750 E 11.9 17.8 61.8 125497 750 E 11.9 17.8 61.8 125497 750 E 11.9 14.2 49.4 125497 750 E 11.9 14.2 49.4 125497 750 E 11.9 14.2 49.4 125497	4		5.0	230	ო	60	1750	ـــــــــــــــــــــــــــــــــــــ	15.0	17.2	4 / 34	125496	12/4 - 18/4	.86 ± .02	0.72
750 J 6.0 6.9 37.0 125497 750 H 23.8 28.5 105.9 / 123.6 125496 750 H 23.7 27.2 105.9 / 123.6 125496 750 H 9.5 10.9 49.4 125496 750 H 9.5 10.9 49.4 125497 750 H 9.5 10.9 49.4 125497 750 E 29.8 35.6 105.9 / 123.6 125498 750 E 11.9 17.8 61.8 125498 750 E 11.9 17.8 61.8 125498 750 E 11.9 17.8 61.8 125498	750 J 6.0 6.9 37.0 125497 750 H 23.8 28.5 105.9 / 123.6 125496 750 H 23.7 27.2 105.9 / 123.6 125496 750 H 9.5 10.9 49.4 125497 750 H 9.5 10.9 49.4 125497 750 E 29.8 35.6 10.5 / 123.6 125498 750 E 29.8 35.6 105.9 / 123.6 125498 750 E 11.9 17.8 61.8 125498 750 E 11.9 14.2 49.4 125497 750 E 11.9 14.2 49.4 125497 750 E 11.9 14.2 49.4 125497	750 J 6.0 6.9 37.0 125497 750 H 23.8 28.5 105.9 / 123.6 125496 750 H 23.7 27.2 105.9 / 123.6 125496 750 H 23.7 27.2 105.9 / 123.6 125497 750 H 9.5 10.9 49.4 125497 750 E 29.8 35.6 10.9 / 123.6 125498 750 E 29.8 35.6 105.9 / 123.6 125498 750 E 11.9 17.8 61.8 125498 750 E 11.9 14.2 49.4 125498 750 E 11.9 14.2 49.4 125497	750 J 6.0 6.9 37.0 125497 750 23.8 28.5 105.9 / 123.6 125496 750 H 23.7 27.2 105.9 / 123.6 125496 750 H 23.7 27.2 105.9 / 123.6 125496 750 H 9.5 10.9 49.4 125497 750 E 29.8 35.6 10.5 / 123.6 125498 750 E 29.8 35.6 105.9 / 123.6 125498 750 E 29.8 35.6 105.9 / 123.6 125498 750 E 11.9 17.8 61.8 125497 750 E 11.9 14.2 49.4 125497				460					7.5	8.6	46.2	125497		.86 ± .02	2.88
750 750 23.8 H 28.5 27.2 105.9 / 123.6 105.9 / 123.6 125496 750 H 23.7 27.2 105.9 / 123.6 125496 750 H 9.5 10.9 49.4 125497 750 H 9.5 10.9 49.4 125497 750 E 29.8 35.6 105.9 / 123.6 125498 750 E 14.9 17.8 61.8 125497 750 E 11.9 14.2 49.4 125497	750 H 23.8 28.5 105.9 / 123.6 125496 750 H 23.7 27.2 105.9 / 123.6 125496 750 H 9.5 10.9 49.4 125497 750 H 9.5 10.9 49.4 125497 750 E 29.8 35.6 49.4 125498 750 E 29.8 35.6 105.9 / 123.6 125498 750 E 14.9 17.8 61.8 125498 750 E 11.9 14.2 49.4 125497 750 E 11.9 14.2 49.4 125497 750 E 11.9 14.2 49.4 125497	750 H 23.8 28.5 105.9 / 123.6 125496 750 H 23.7 27.2 61.8 125496 750 H 9.5 10.9 49.4 125497 750 H 9.5 10.9 49.4 125497 750 E 32.2 41.4 105.9 / 123.6 125498 750 E 29.8 35.6 105.9 / 123.6 125498 750 E 14.9 17.8 61.8 125498 750 E 11.9 14.2 49.4 125497 750 E 11.9 14.2 49.4 125497 7 X6 25°C (Between Lines) at motor leads. 125497 125497	750 H 23.8 28.5 105.9 / 123.6 125496 750 H 23.7 27.2 105.9 / 123.6 125496 750 H 9.5 10.9 49.4 125497 750 H 9.5 10.9 49.4 125497 750 E 29.8 35.6 10.9 / 123.6 125498 750 E 29.8 35.6 105.9 / 123.6 125498 750 E 11.9 17.8 61.8 125498 750 E 11.9 14.2 49.4 125497 750 E 11.9 14.2 49.4 125497 750 E 11.9 14.2 49.4 125497 A 25°C (Between Lines) at motor leads. 12.5 125497 125497	54		5.0	575	3		1750	ſ	6.0	6.9	37.0	125497	1	.86 ± .02	4.32
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	750 H 23.7 27.2 100.37 125496 750 H 9.5 10.9 49.4 125497 750 H 9.5 10.9 49.4 125497 750 E 32.2 41.4 105.9 / 123.6 125498 750 E 29.8 35.6 105.9 / 123.6 125498 750 E 114.9 17.8 61.8 125498 750 E 11.9 14.2 49.4 125498 750 E 11.9 14.2 49.4 125497 750 E 11.9 14.2 49.4 125497	750 H 23.7 27.2 100.37 125496 750 H 11.9 13.6 61.8 125497 750 H 9.5 10.9 49.4 125497 750 H 9.5 10.9 49.4 125497 750 E 29.8 35.6 105.9 / 123.6 125498 750 E 14.9 17.8 61.8 125498 750 E 11.9 14.2 49.4 125498 750 E 11.9 14.2 49.4 125497 750 E 11.9 14.2 49.4 125497 750 E 11.9 14.2 49.4 125497	750 H 23.7 27.2 100.37 125496 750 H 9.5 13.6 61.8 125497 750 H 9.5 10.9 49.4 125497 750 H 9.5 10.9 49.4 125497 750 E 29.8 35.6 105.9 / 123.6 125498 750 E 14.9 17.8 61.8 125498 750 E 11.9 14.2 49.4 125497 61.8 25°C (Between Lines) at motor leads. 12.55497 12.55497 12.55497				208					23.8	28.5	10E 0 / 123 E	125496	12/4 - 18/4	.86 ± .02	0.43
11.9 13.6 61.8 125497 750 H 9.5 10.9 49.4 125497 750 H 9.5 10.9 49.4 125497 750 E 32.2 41.4 105.9 / 123.6 125498 750 E 29.8 35.6 10.5.9 / 123.6 125498 750 E 14.9 17.8 61.8 125498 750 E 11.9 14.2 49.4 125497	750 H 9.5 13.6 61.8 125497 750 H 9.5 10.9 49.4 125497 750 E 32.2 41.4 105.9 125498 750 E 29.8 35.6 105.9 125498 750 E 14.9 17.8 61.8 125498 750 E 11.9 14.2 49.4 125497	11.9 13.6 61.8 125497 750 H 9.5 10.9 49.4 125497 750 H 9.5 10.9 49.4 125497 750 E 32.2 41.4 105.9 / 123.6 125498 750 E 14.9 17.8 61.8 125498 750 E 11.9 14.2 49.4 125497 750 E 11.9 14.2 49.4 125497 750 E 11.9 14.2 49.4 125497 7 25°C (Between Lines) at motor leads. 49.4 125497 1	11.9 13.6 61.8 125497 750 H 9.5 10.9 49.4 125497 750 H 9.5 10.9 49.4 125497 750 E 32.2 41.4 105.9 / 123.6 125498 750 E 14.9 17.8 61.8 125498 750 E 11.9 14.2 49.4 125497 750 E 11.9 14.2 49.4 125497 750 E 11.9 14.2 49.4 125497 7 25°C (Between Lines) at motor leads. 12.5497 12.5497	SN4		7.5	230	ო	60	1750	Ξ	23.7	27.2	0.021 / 8.001	125496	12/4 - 18/4	.86 ± .02	0.43
750 H 9.5 10.9 49.4 125497 750 32.2 41.4 105.9 / 123.6 125498 750 E 29.8 35.6 125498 750 E 14.9 17.8 61.8 125498 750 E 11.9 17.2 49.4 125497	750 H 9.5 10.9 49.4 125497 750 E 32.2 41.4 105.9 / 123.6 125498 750 E 29.8 35.6 105.9 / 123.6 125498 750 E 11.9 17.8 61.8 125497 750 E 11.9 14.2 49.4 125497 750 E 11.9 14.2 49.4 125497 750 E 11.9 14.2 49.4 125497	750 H 9.5 10.9 49.4 125497 750 23.2 41.4 105.9 / 123.6 125498 750 E 29.8 35.6 105.9 / 123.6 125498 750 E 14.9 17.8 61.8 125498 750 E 11.9 14.2 49.4 125497 750 E 11.9 14.2 49.4 125497 750 E 11.9 14.2 49.4 125497	750 H 9.5 10.9 49.4 125497 750 E 32.2 41.4 105.9 / 123.6 125498 750 E 29.8 35.6 105.9 / 123.6 125498 750 E 14.9 17.8 61.8 125497 750 E 11.9 14.2 49.4 125497 7 25°C (Between Lines) at motor leads. 25°C (Between Lines) at motor leads. 1 1				460			_		11.9	13.6	61.8	125497		.86 ± .02	1.72
32.2 41.4 105.9 / 123.6 125498 750 E 29.8 35.6 105.9 / 123.6 125498 750 E 11.9 17.2 49.4 125497	32.2 41.4 105.9 / 123.6 125498 750 E 29.8 35.6 105.9 / 123.6 125498 750 E 11.9 17.8 61.8 125497 750 E 11.9 14.2 49.4 125497 750 E 11.9 14.2 49.4 125497 7 35.6 14.2 49.4 125497	32.2 41.4 105.9 / 123.6 125498 750 E 29.8 35.6 105.9 / 123.6 125498 750 E 14.9 17.8 61.8 125497 750 E 11.9 14.2 49.4 125497 750 E 11.9 14.2 49.4 125497 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1	32.2 41.4 105.9 / 123.6 125498 750 E 29.8 35.6 105.9 / 123.6 125498 750 E 14.9 17.8 61.8 125497 750 E 11.9 14.2 49.4 125497 750 E 11.9 14.2 49.4 125497 750 E 11.9 14.2 49.4 125497 7 Ø 25°C (Between Lines) at motor leads. 125497 1	554	-	7.5	575	ო	-	1750	т	9.5	10.9	49.4	125497	12/4 - 18/4	.86 ± .02	2.69
750 E 29.8 35.6 103.97 125498 14.9 17.8 61.8 125497 750 E 11.9 14.2 49.4 125497	750 E 29.8 35.6 103.97 125498 750 E 14.9 17.8 61.8 125497 750 E 11.9 14.2 49.4 125497 750 E 11.9 14.2 49.4 125497 750 E 11.9 14.2 49.4 125497 7 @ 25°C (Between Lines) at motor leads. 14.2 125497 125497	750 E 29.8 35.6 103.97 125498 750 E 14.9 17.8 61.8 125497 750 E 11.9 14.2 49.4 125497 750 E 11.9 14.2 49.4 125497 750 E 11.9 14.2 49.4 125497 .1 .1 .1 14.2 49.4 125497 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1	750 E 29.8 35.6 103.97 125498 750 E 14.9 17.8 61.8 125497 750 E 11.9 14.2 49.4 125497 750 E 11.9 14.2 49.4 125497 7 3 25°C (Between Lines) at motor leads. - - -				208					32.2	41.4	10E 0 / 103 6	125498	0/1 10/1	+1	0.43
14.9 17.8 61.8 125497 750 E 11.9 14.2 49.4 125497	14.9 17.8 61.8 125497 750 E 11.9 14.2 49.4 125497 .13.@ 25°C (Between Lines) at motor leads. .11.9 .11.9 .11.9 .11.9	14.9 17.8 61.8 125497 750 E 11.9 14.2 49.4 125497 .13.@ 25°C (Between Lines) at motor leads.	14.9 17.8 61.8 125497 750 E 11.9 14.2 49.4 125497 <t< td=""><td>ON4</td><td></td><td>10.0</td><td>230</td><td>ო</td><td>60</td><td>1750</td><td>ш</td><td>29.8</td><td>35.6</td><td>0.621 / 8.601</td><td>125498</td><td>0/4 - 10/4</td><td>+</td><td>0.43</td></t<>	ON4		10.0	230	ო	60	1750	ш	29.8	35.6	0.621 / 8.601	125498	0/4 - 10/4	+	0.43
750 E 11.9 14.2 49.4 125497	750 E 11.9 14.2 49.4 125497	750 E 11.9 14.2 49.4 125497	750 E 11.9 14.2 49.4 125497				460					14.9	17.8	61.8	125497	12/4 - 18/4	.86 ± .02	1.72
	∕IS @ 25°C (Between Lines) at motor leads.	AS @ 25°C (Between Lines) at motor leads.	∕AS @ 25°C (Between Lines) at motor leads. ∹eet	054		10.0		в	-	1750	ш	11.9	14.2	49.4	125497	12/4 - 18/4	.86 ± .02	2.69
	AS @ 25°C (Between Lines) at motor leads.	AS @ 25°C (Between Lines) at motor leads.	AS @ 25°C (Between Lines) at motor leads. ⁻eet	npe	rature senso.	r leads	are integra	al to pov	wer co	rd.						*** CORD OI	RDERED SE	PARATELY ***

THREE PHASE 460-575 VOLT	
Power Cable	Motor Lead ID
Green (Ground)	Green
Black	1
Red	2
White	3
Jumpered Inside Cord	T4 & T7 Together
Automatically (No user jump-	T5 & T8 Together
ering required)	T6 & T9 Together



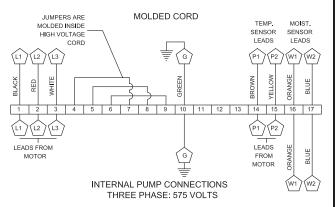
NTERNAL PUMP CONNECTIONS THREE PHASE: 460 VOLTS

THREE PHASE 208-230 VOL	T AC (black molded plug)
Power Cable	Motor Lead ID
Green (Ground)	Green
Black	1
Red	2
White	3
Jumpered Inside Cord Automatically (No user jumpering required)	T4, T5 & T6 Together T11 & T7 Together T13 & T9 Together T12 & T8 Together



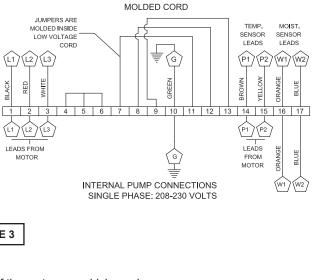
MOISTURE AND TEMPERATURE SENSORS

Power Cable	Lead ID
Brown	P1 (Temperature Sensor)
Yellow	P2 (Temperature Sensor)
Orange	W1 (Moisture Sensor)
Blue	W2 (Moisture Sensor)



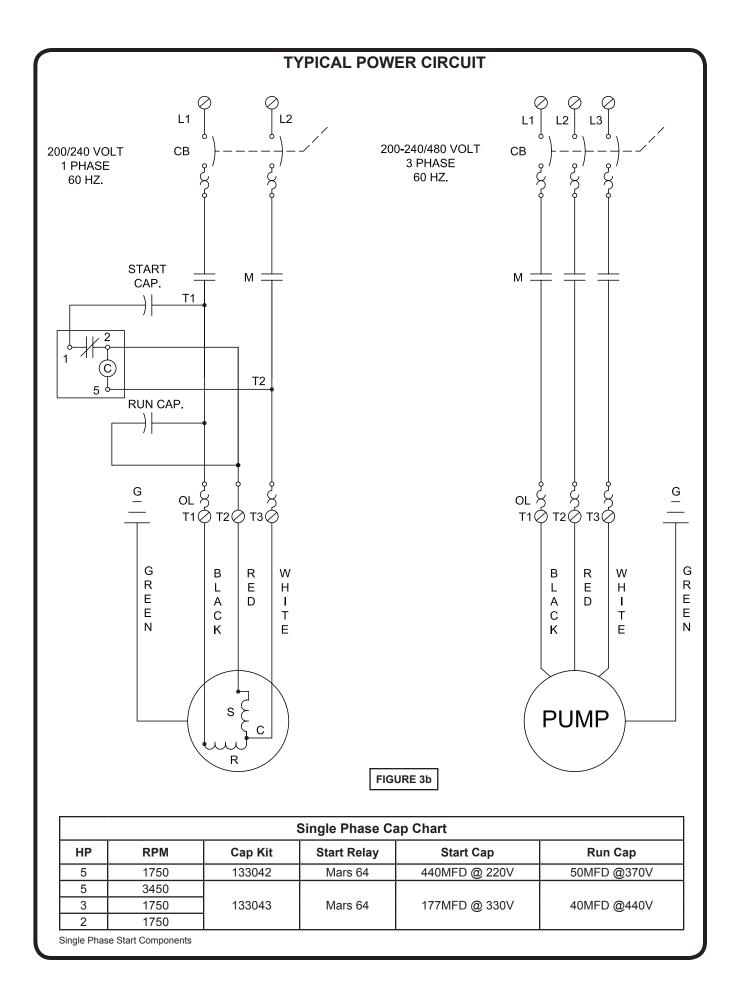
SINGLE PHASE 208-230 VOLT AC (black molded plug)		
Power Cable	Motor Lead ID	
Green (Ground) Green		
Black	1 (Run)	
Red	2 (Start)	
White	3 (Common)	
Write3 (contributy)Jumpered Inside CordT4, T5 & T6 TogetherAutomatically (No user jumpering required)T11 & T7 TogetherT13 & T9 TogetherT12 & T8 Together		

* Requires Start/Run Caps and Start Relay in panel *

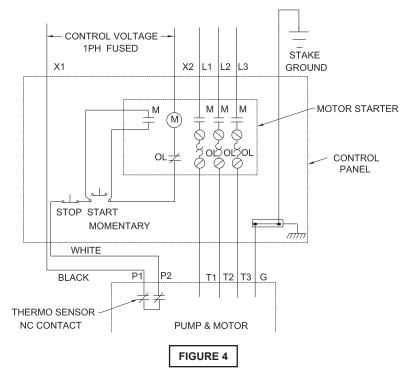


External Ground Note:

(Grd symbol) An external ground screw is provided on the side of the motor cap which can be used for supplemental bonding connection where local codes permit or require such connection.



TYPICAL THERMAL PROTECTION WIRING DIAGRAM



C-4.3) Overload Protection:

Current sensing overloads must be provided in the pump control panel and should be properly sized for the full load current of the pump. Three normally closed (N/C) thermal sensors wired in series (one per phase) are embedded in the motor windings and will detect excessive heat in the event an overload condition occurs which will then trip and stop the pump when wired in series with the pump contactor control circuit. The thermal sensor leads marked P1 and P2 MUST be connected in series with the stop button of the pilot circuit of the magnetic motor controller located in the control panel so that the thermostat will open the circuit before dangerous temperatures are reached. A manual momentary start switch is required to prevent the automatic restarting of the motor when the thermostat resets. For a typical wiring diagram, refer to Figure 4.

In the event of an over temperature condition, the source of this condition should be determined and rectified before the pump is put back into normal operation. DO NOT LET THE PUMP CYCLE OR RUN IF AN OVER TEMPERATURE CONDITION OCCURS!

If current through the temperature sensor exceeds the values listed, an intermediate control circuit relay must be used to reduce the current or the sensor will not work properly.

TEMPERATURE SENSOR ELECTRICAL RATINGS		
Volts	Continuous Amperes	Inrush Amperes
110-120	3.00	20.0
220-240	2.00	18.0

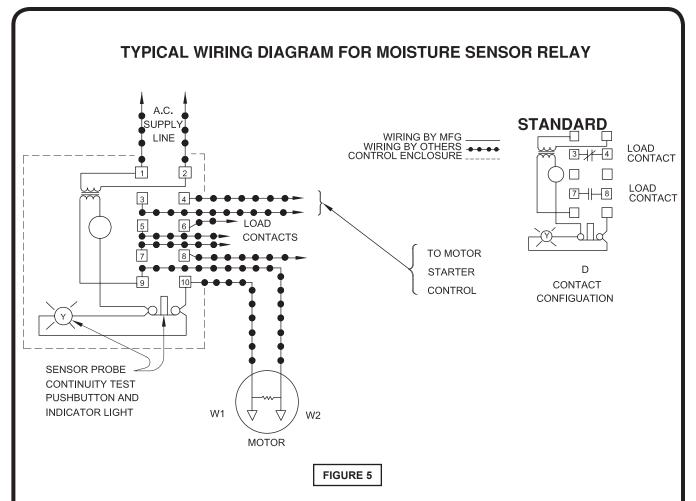
C-4.4) Moisture Sensors:

A normally open (N/O) detector is installed in the pump seal chamber, which will detect any moisture present, and a continuity test resistor built into the motor. The test resistor is rated 1 watt at 330K ohms. The moisture sensors MUST be connected to moisture detector control in the control panel which includes a continuity test circuit, see Figure 4 for typical wiring diagram. The normally closed (N/C) contact of the moisture detector MUST be connected in series with the stop button of the pilot circuit of the magnetic motor controller. Wiring must be provided from the moisture detector sensor probe leads of the motor designated W1 and W2 to terminals 9 and 10 of the 2800-XXX control. Terminal pair 1-2 must be continuously energized from an A-C supply line of electrical characteristics shown on the data table. In the event of moisture detection, the pump should be pulled and the source of the failure located and repaired. IF MOISTURE DETECTION HAS OCCURRED, SCHEDULE MAINTENANCE AS SOON AS POSSIBLE !

C-4.5) Control Panel and Electrical System:

The control panel and the electrical system **MUST** be properly designed and wired to include at least, but not limited to the following;

- a. Proper grounding per NEC.
- b. A temperature sensing circuit (See Fig. 4)
- c. A moisture detection circuit with continuity test circuit (See Fig. 5)
- d. A level control system.
- e. A main power manual disconnect and lock out.
- f. A motor starter and overload system.
- g. Start Capacitor, Run Capacitor & Start Relay (single phase only).



It is advisable that all three phase control panels be purchased from the factory.

SECTION: D START-UP OPERATION

D-1) Check Voltage and Phase:

Before operating pump, compare the voltage and phase information stamped on the pump's identification plate to the available power.

D-2) Check Pump Rotation:

Before putting pump into service for the first time, the motor rotation must be checked. Improper motor rotation can result in poor pump performance and can damage the motor and/ or pump. To check the rotation, suspend the pump freely, momentarily apply power and observe the "kickback". "Kickback" should always be in a counter-clockwise direction as viewed from the top of the pump motor housing and will always be in the opposite direction of the rotation arrows cast in the pump volute.

D-2.1) Incorrect Rotation for Three-Phase Pumps:

In the event that the rotation is incorrect for a three-phase installation, interchange any two power cable leads at the control box. Recheck the "kickback" rotation again by momentarily applying power.

D-2.2) Test Procedure For Moisture Sensor Control:

With a moisture detection control, a normally closed push button and neon indicating lamp is typically provided as a means of checking the moisture sensing components. When the push button is depressed, the indicating lamp will be illuminated to indicate (A) power is supplied to the control, (B) the control is operative, and (C) wiring to the moisture sensing probes in the motor is intact. This procedure should be performed periodically to confirm integrity of the circuit.

D-3) Start-Up Report:

Included at the end of this manual is one start-up report sheet, this sheet is to be completed as applicable. Return a copy to Barnes and store the second in the control panel or with the pump manual. It is important to record this data at initial start-up since it will be useful to refer to should servicing the pump be required in the future.

D-3.1) Identification Plate:

Record the numbers from the pump's identification plate on the START-UP REPORT provided at the end of the manual for future reference.

D-3.2) Insulation Test:

Before the pump is put into service, an insulation (megger) test should be performed on the motor. The resistance values (ohms) as well as the voltage (volts) and current (amps) should be recorded on the start-up report. Pumps/systems with an insulation value of less than 5 M-Ohms should be investigated for moisture or damaged cables before proceeding.

D-3.3) Pump-Down Test:

After the pump has been properly wired and lowered into the basin, sump or lift station, it is advisable to check the system by filling with liquid and allowing the pump to operate through it's pumping cycle. The time needed to empty the system, or pump-down time along with the volume of water, should be recorded on the start-up report.

SECTION E: PREVENTATIVE MAINTENANCE

As the motor and seal chamber are oil-filled, no lubrication or other maintenance is required, and generally Barnes Pumps will give very reliable service and can be expected to operate for years of normal sewage pumping without failing. However, as with any mechanical piece of equipment a preventive maintenance program is recommended and suggested to include the following checks:

- Test moisture detector control "Test Switch" for continuity of circuit. Water in the seal chamber will energize a seal leak warning light at the control panel. This is a warning light only and does not stop the motor. It indicates the seal has leaked and must be repaired. This should be done within 2 or 3 weeks to prevent further damage. See section D-2.2.
- 2) Inspect impeller and body for excessive build-up or clogging and repair as required per section F-2.
- Inspect outer shaft seal and replace as required per section F-3.
- 4) Check motor for ground leakage and proper amp draw.

SECTION F: SERVICE AND REPAIR

NOTE: All item numbers in () refer to Figures 9 & 10.



WARNING ! - Electrical power to the pump motors must be disconnected and locked out to prevent any dangerous electrical hazards or personnel danger before any service work is done to the pump.



CAUTION ! - Operating pump builds up heat and pressure; allow time for pump to cool to room temperature before handling or servicing.

F-1) Lubrication

F-1.1) Checking Oil

- 1. Place pump on it's side, and drain oil into a clean, dry container.
- Check oil for contamination using an oil tester with a range to 30Kilovolts breakdown.

- 3. If oil is found to be clean and uncontaminated (measure above 15 KV. breakdown), refill the seal chamber as per section F-1.2.
- 4. If oil is found to be dirty or contaminated (or measures below 15 KV. breakdown), the pump must be carefully inspected for leaks at the shaft seal (4), before refilling with oil. To locate the leak, perform a pressure test as per section F-1.3. After leak is repaired, refill with new oil as per section F-1.2.

F-1.2) Replacing Oil:

Seal Chamber - Drain all oil from seal chamber and dispose of properly. Refill with (see parts list for amount) new cooling oil as per Table 1. An air space must remain to compensate for oil expansion (See Fig. 9). Set unit on side and fill.



IMPORANT! - Do not overfill oil. Overfilling of seal chamber with oil can create excessive and dangerous hydraulic pressure which can destroy the pump and create a hazard. Overfilling oil voids warranty.

F-1.3) Pressure Test:

Seal Chamber - Before checking the pump for leaks around the shaft seal, the oil level should be full. Remove pipe plug. Apply pipe sealant to pressure gauge assembly and tighten into pipe plug hole. Pressurize motor housing to 10 P.S.I. Use a soap solution around the sealed area and inspect joints for "air bubbles". If, after five minutes, the pressure is still holding constant, and no "bubbles" are observed, slowly bleed the pressure and remove the gauge assembly. Replace the pipe plug using a sealant. If the pressure does not hold, then the leak must be located.



CAUTION! - Pressure builds up extremely fast, increase pressure by "tapping" air nozzle. Too much pressure will damage seal. Do Not exceed 10 P.S.I. in seal chamber.

TABLE 1 - COOLING OIL - Dielectric		
SUPPLIER	GRADE	
BP	Enerpar SE100	
Conoco	Pale Paraffin 22	
Mobil	D.T.E. Oil Light	
G & G Oil	Circulating 22	
Imperial Oil Voltesso-35		
Shell Canada Transformer-10		
Texaco	Diala-Oil-AX	
Woco	Premium 100	

F-2) Impeller and Volute Service:

F-2.1) Disassembly and Inspection:

To clean out the volute (10), or clean out or replace impeller (6), disconnect power, remove cap screws (8) then vertically lift motor assembly from the pump body (10). Clean out the volute, if necessary, clean and examine impeller (6) for pitting or wear, replace if required. To remove Impeller (6), remove cap screw (8). The impeller is keyed onto the shaft with a square key (7) and to remove, pull impeller straight off the shaft using a wheel puller if required. Inspect o-ring (9) and replace if cut or damaged. Before reinstallation, check the motor shaft and impeller bore for damage.

F-2.2) Reassembly:

To install impeller (6), apply a thin film of oil to motor shaft and slide impeller straight onto shaft, keeping keyways lined up. Drive key (7) into keyway. Thread cap screw (8) into shaft and torque to 35 ft. lbs. Rotate impeller to check for binding. Place o-ring (9) on seal plate pilot diameter lining up holes and install impeller and motor assembly onto volute (10). Loctite cap screws (2), insert into volute and motor assembly and torque to 35 ft. lbs. Check for free rotation of motor and impeller.

F-3) Outer Shaft Seal Service:

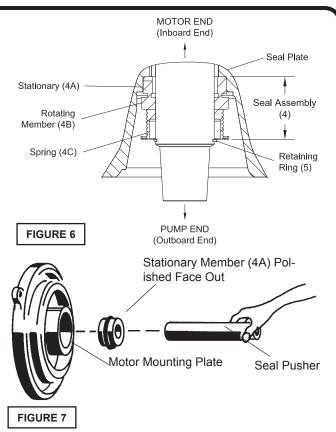
CAUTION ! - Handle seal parts with extreme care. DO NOT scratch or mar lapped surfaces.

F-3.1) Disassembly and Inspection:

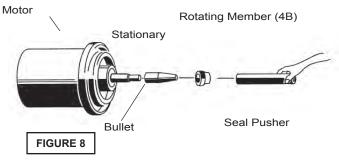
To expose outer shaft seal (4) for examination, remove Impeller and Volute per Section F-1.1. Set motor assembly (1) in the inverted position to prevent loss of oil. Remove snap ring from motor shaft, then retaining ring (5), spring (4C) and rotating member (4B) from shaft, See Figure 5 Examine all seal parts and especially contact faces. Inspect seal for signs of wear such as uneven wear pattern on stationary members, chips and scratches on either seal face. **DO NOT** interchange seal components, replace the entire shaft seal (4). If replacing seal, remove stationary (4A) from mounting plate by prying out with flat screw driver.

F-3.2) Reassembly:

Lightly oil **(DO NOT use grease)** outer surface of stationary member (4A). Press stationary member (4A) firmly into mounting plate using a seal pusher but the seal pusher is to come in contact with seal face (See Fig. 7).



Make sure the stationary member is in straight and that the rubber ring is not out of it's groove. Lightly oil **(DO NOT use grease)** shaft and inner surface of bellows on rotating member (4B) see Figure 8. With lapped surface of rotating member (4B) facing inward toward stationary member (4A), slide rotating member (4B) onto shaft using a seal pusher, until lapped faces of (4A) and (4B) are together. (See Fig. 8).





IMPORTANT ! - It is extremely important to keep seal faces clean during assembly. dirt particles lodged between these faces will cause the seal to leak.

Place spring (4C) over shaft and in place on rotating member (4B), making sure it is seated on retainer and not cocked or resting on bellows tail. Slide retaining ring (5) over shaft and let rest on spring (4C). Replace snap ring onto motor shaft. Inspect gasket (9) and replace if cut or damaged. Assemble impeller and volute as outlined in paragraph F-1.2.

SECTION: G REPLACEMENT PARTS

G-1 ORDERING REPLACEMENT PARTS:

When ordering replacement parts, ALWAYS furnish the following information:

- 1. Pump serial number and date code. (Paragraph G-4)
- 2. Pump model number. (Paragraph G-3)
- 3. Pump part number. (Paragraph G-2)
- 4. Part description.
- 5. Item part number.
- 6. Quantity required.
- 7. Shipping instructions.
- 8. Billing Instructions.

Power	Ph. RF	PM Volts	
Hz. FLA.	SFA		SF
Ambient Duty 0-40°C CONT.	Weight	Part No.	
Model No.	Serial No.		Imp. Dia.
- CLASS I DIV.1 GROUP C AI	WARNING	LOCATIONS	- TEMP CODE: T4
- CLASS I DIV.1 GROUP C AI A.) SEE INSTRUCTION MANUAL FOR: P SENSOR AND THERMAL CUTOFF WIRI IN ACCORDANCE WITH THE NATIONAL PUMP FROM THE POMPER SOURCE JAUALIFIE SHALL BE CONDUCTED BY A QUALIFIE	ND D HAZARDOUS WARNING ROPER INSTALLATION, NG REQUIREMENTS. B.). ELECTRICAL CODE ANI FORE HANDLING OR SE D PERSON.	CORD REPLACEME PUMP MUST BE PR D ALL LOCAL CODE ERVICING. D.) INSTA	- TEMP CODE: T4 NT, MOISTURE KOPERLY GROUNDED S. C.) DISCONNECT THE ALLATION AND SERVICE
- CLASS I DIV.1 GROUP C AI A.) SEE INSTRUCTION MANUAL FOR: P SENSOR AND THERMAL CUTOFF WIRI IN ACCORDANCE WITH THE NATIONAL PUMP FROM THE POWER SOURCE BE SHALL BE CONDUCTED BY A QUALIFIE USE WITH APPROVED MOTOR CONTR OVERLCAD ELEMENT(S) SELECTED OI (UTLISER ON DEMARREUR APPROVED DONT LES ELEMENTS THERMIQUES SI QUI L'ACCOMPAGNENT).	ND D HAZARDOUS WARNING ROPER INSTALLATION, OR EQUIREMENTS. B, ELECTRICAL CODE AN FORE HANDLING OR SE D PERSON. OL THAT MATCHES MOT OL THAT MATCHES MOT OL THAT MATCHES MOT ONT REGLES OU CHOIS	BLOCATIONS CORD REPLACEME PUMP MUST BE PP DAIL LOCAL CODE ERVICING, D.) INST/ TOR INPUT IN FULL DANCE/WITH CONTI RANT A PLEIMECHA IS CONFORMEMEN	- TEMP CODE: T4 NT, MOISTURE (OPFRLY GROUNDED S, C;) DISCONNECT THE KILATION AND SERVICE LOAD AMPERES WITH AUX INSTRUCTION INGE DU MOTEUR ET T AUX INSTRUCTION
- CLASS I DIV.1 GROUP C AI A) SEE INSTRUCTION MANUAL FOR: P SENSOR AND THERMAL CUTOFF WIRI IN ACCORDANCE WITH THE NATIONAL PUMP FROM THE POWER SOURCE BE SHALL BE CONDUCTED BY A QUALIFIE USE WITH APPROVED MOTOR CONTR OVERLOAD ELEMENTS THERMIQUES 3	ND D HAZARDOUS WARNING ROPER INSTALLATION, REQUIREMENTS, B, ELECTRICAL CODE AN IFORE HANDLING OR SE DI PERSON. DL THAT MATCHES MOT COMENANT AU COU ONT REGLES OU CHOIS ARGE OPENING AT ALL OIL UNDER PRESSURE, IN SWIMMING POOLS,	B LOCATIONS CORD REPLACEME PUMP MUST BE PR D ALL LOCAL CODE ERVICING, D.) INST/ TOR INPUT IN FULL BANCE WITH CONTI RANT A PLEINECHA IS CONFORMEMEN TIMES WHEN POWE ALLOW MOTOR TO DECORATIVE FOUR DECORATIVE FOUR	- TEMP CODE: T4 NT, MOISTURE (OPERLY GROUNDED S. C.) DISCONNECT THE LLATION AND SERVICE LOAD AMPERES WITH ROL INSTRUCTIONS. ROE DU MOTEUR ET T AUX INSTRUCTION ER IS CONNECTED. COOL BEFORE OPENINI VIANIS OR

G-2 PART NUMBER:

This number is used for ordering and obtaining information.

G-3 MODEL NUMBER:

This designation consists of numbers and letters which represent the discharge size, series, horsepower, motor phase and voltage, speed and pump design. This number is used for ordering and obtaining information.

G-4 SERIAL NUMBER:

The serial number block will consist of a six digit number, which is specific to each pump and may be preceded by an alpha character, which indicates the plant location. This number will also be suffixed with a four digit number, which indicates the date the unit was built (Date Code). **EXAMPLE: A012345 0490**.

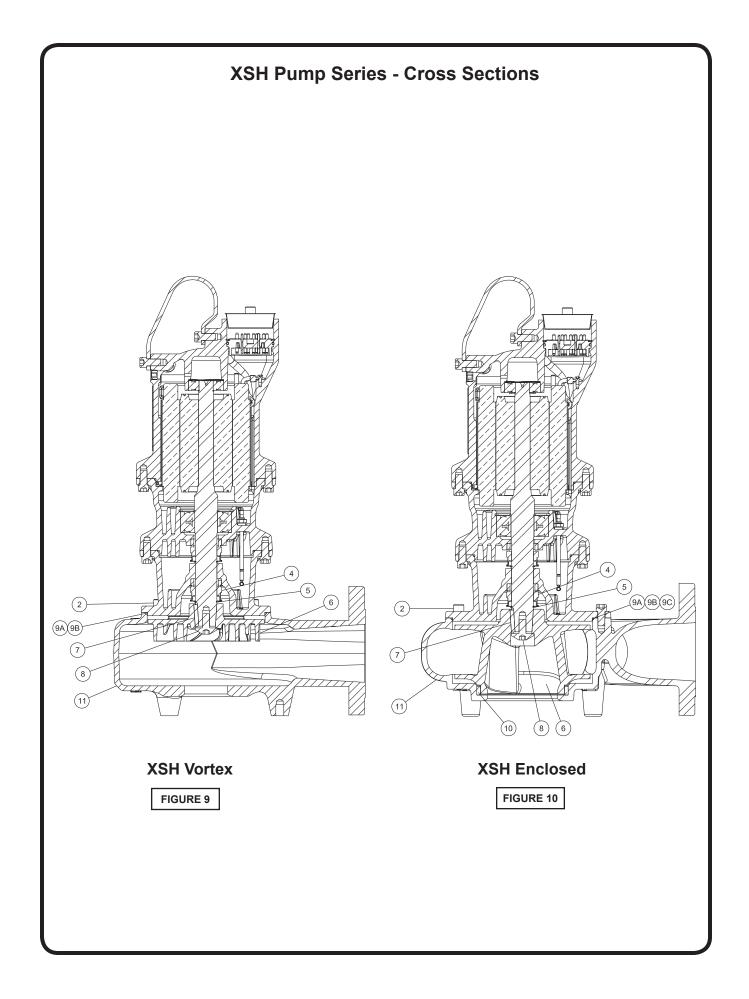
Reference the six digit portion (Serial Number) of this number when referring to the product.

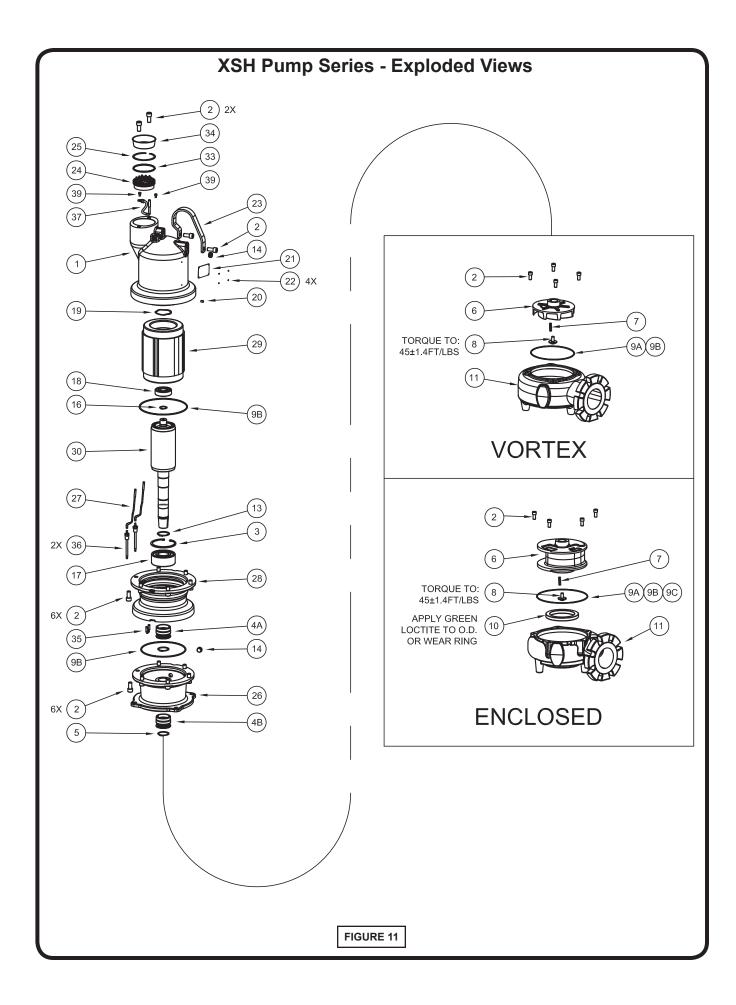
TROUBLE SHOOTING

CAUTION ! Always disconnect the pump from the electrical power source before handling. If the system fails to operate properly, carefully read instructions and perform maintenance recommendations. If operating problems persist, the following chart may be of assistance in identifying and correcting them: **MATCH "CAUSE" NUMBER WITH CORRELATING "CORRECTION" NUMBER**.

NOTE: Not all problems and corrections will apply to each pump model.

PROBLEM	CAUSE	CORRECTION		
Pump will not run	 Poor electrical connection, blown fuse, tripped breaker or other interruption of power, improper power supply. Motor or switch inoperative (to isolate cause, go to manual operation of pump). Float movement restricted. Switch will not activate pump or is defective. Defective motor Insufficient liquid level. 	 Check all electrical connections for security. Have electrician measure current in motor leads, if current is within ±20% of locked rotor Amps, impeller is probably locked. If current is 0, overload may be tripped. Remove power, allow pump to cool, then recheck current. Reposition pump or clean basin as required to provide adequate clearance for 		
Pump will not turn off	 2a. Float movement restricted. 2b. Switch will not activate pump or is defective. 4. Excessive inflow or pump not properly sized for application. 9. Pump may be airlocked 14. H-O-A switch on panel is in "HAND" position 	float. 2b. Disconnect level control. Set ohmmeter for a low range, such as 100 ohms full scale and connect to level control leads. Actuate level control manually and check to see that ohmmeter shows zero ohms for closed switch and full scale for open switch. (Float Switch).		
Pump hums but does not run	 Incorrect voltage Impeller jammed or loose on shaft, worn or damaged, impeller cavity or inlet plugged. 	and full scale for open switch. (Float Switch 2c. Check winding insulation (Megger Test) and winding resistance. If check is outside of range, dry and recheck. If still defective,		
Pump delivers insufficient capacity	 Incorrect voltage. Excessive inflow or pump not properly sized for application. Discharge restricted. Check valve stuck closed or installed backwards. Shut-off valve closed. Impeller jammed or loose on shaft, worn or damaged, impeller cavity or inlet plugged. Pump may be airlocked. Pump running backwards 	 or range, dry and recheck. If still defective, replace per service instructions. 3. Make sure liquid level is at least equal to suggested turn-on point. 4. Recheck all sizing calculations to determine proper pump size. 5. Check discharge line for restrictions, including ice if line passes through or into cold areas. 6. Remove and examine check valve for proper installation and freedom of operation 7. Open valve. 8. Check impeller for freedom of operation, security and condition. Clean impeller and inlet of any obstruction. 9. Loosen union slightly to allow trapped air to escape. Verify that turn-off level of switch is set so that the suction is always flooded. Clean vent hole. 10. Check rotation. If power supply is three phase, reverse any two of three power supleads to ensure proper impeller rotation 11. Repair fixtures as required to eliminate leakage. 		
Pump cycles too frequently or runs periodically when fixtures are not in use	 Check valve stuck closed or installed backwards. 11. Fixtures are leaking. 15. Ground water entering basin. 			
Pump shuts off and turns on indepen- dent of switch, (trips thermal overload protector). CAUTION! Pump may start unexpectedly. Disconnect power supply.	 Incorrect voltage. Excessive inflow or pump not properly sized for application. Impeller jammed, loose on shaft, worn or damaged, impeller cavity or inlet plugged. Excessive water temperature. (internal protection only) 			
Pump operates noisily or vibrates excessively	2c. Worn bearings, motor shaft bent.5. Debris in impeller cavity or broken impeller10. Pump running backwards13. Piping attachments to buiding structure too rigid or too loose.	 12. Check pump temperature limits & fluid temperature. 13. Replace portion of discharge pipe with flexible connector. 14. Turn to automatic position. 15. Check for leaks around basin inlet and outlets. 		





XSH 18 Frame - PARTS LIST

Bearing Ki Overhaul F	sket Kit p/n 1 tp/n 1 Kitp/n 1 p/n 1 PART NO.	33046(•) 2, 3, 5, 9, 13, 14, 17, 18, 1933054(◊) 2, 7, 8, 9, 10	
ITEMQTY1123314A14B1526171819A19B29C11011121131142161171181191201211224231241251261272281301315325331341351	PART NO. 133023 127223 0033607 133029 133029 133029 133029 133029 133029 133029 133029 133029 133029 133029 133029 133029 133029 133048 \circ $021-20-J8$ $125857-200$ $125857-235$ 0 029034 121305 $014270-SS$ 0038377 0016456 0038378 133031 133032 133021 133021 133022 <	DESCRIPTION Housing, Motor Screw, SHCS, M12 x 1.75 x 25 Ring, Snap, Tru-Arc Seal, Mechanical Type 21, 1.5", C/CE/B Seal, Mechanical Type 21, 1.5", SC/SC/B Ring, Retaining, EXT, 5100 Impeller Key, ¼ x ¼ x 1½" Bolt, THSCS, 12mm x 1.75 x 25 O-Ring, M3 x 200, 70 Duro O-Ring, M3 x 235, 70 Duro O-Ring, M3 x 235, 70 Duro Wear Ring Volute, Vortex Seal Chamber Oil Fill Ring, Snap, Tru-Arc Plug, Pipe, 0.375-18NPT, Ring, Snap, Tru-Arc Bearing, Ball, 3308 Bearing, Ball, 6306 Washer, Springer, Wavy, 72mm Screw, Set Nameplate, Main Rivet, Nameplate Handle, Lifting Block, Term, 17 pin, 180, Quick Ring, Retaining Plate, Seal Wire, Jumper, Orange, 18", Bar/Bar Bracket, Bearing Stator Assy, Rotor/Shaft Paint, Epoxy, Part "A", Blue Paint, Epox, Part "A", Blue	Class 30 CI 18-8 SS Steel 420 SS Ductile Iron 303 SS 18-8 SS Buna-N Buna-N Buna-N Bronze Cast Iron Oil Steel SS Steel Steel SS Steel Steel SS Steel Class Steel 304 Stainless Steel 304 Stainless Steel 304 Stainless Steel Class 30 CI Class 30 CI Buna-N PE
36 2 37 1 38 1 39 2	125856 127249 039462 125855	Sensor, Moisture, ¼-18NPT, AMP Wire, Jumper, Green, 6", Bar/O-Ring, 8G Tie, Cable Screw, SHCS, M5 x 0.8 x 8	PP / SS Stainless Steel

XSH Pump Series Power Cable Chart					
Part No.	Length (feet)	Volt	Max. Amps	Cord Size	Cord O.D. +/- .02in (.5mm)
125496XC	30	208-240	31.7	12/4 - 18/4	0.86in (22.0mm
125496XF	50	208-240	31.7	12/4 - 18/4	0.86in (22.0mm
125496XJ	75	208-240	31.7	12/4 - 18/4	0.86in (22.0mm
125496XL	100	208-240	31.7	12/4 - 18/4	0.86in (22.0mm
125497XC	30	400-600	31.7	12/4 - 18/4	0.86in (22.0mm
125497XF	50	400-600	31.7	12/4 - 18/4	0.86in (22.0mm
125497XJ	75	400-600	31.7	12/4 - 18/4	0.86in (22.0mm
125497XL	100	400-600	31.7	12/4 - 18/4	0.86in (22.0mm
125498XC	30	208-240	59.0	8/4 - 18/4	1.12in (28.4mm
125498XF	50	208-240	59.0	8/4 - 18/4	1.12in (28.4mm
125498XJ	75	208-240	59.0	8/4 - 18/4	1.12in (28.4mm
125498XL	100	208-240	59.0	8/4 - 18/4	1.12in (28.4mm
125499XC	30	400-600	59.0	8/4 - 18/4	1.12in (28.4mm
125499XF	50	400-600	59.0	8/4 - 18/4	1.12in (28.4mn
125499XJ	75	400-600	59.0	8/4 - 18/4	1.12in (28.4mm
125499XL	100	400-600	59.0	8/4 - 18/4	1.12in (28.4mm

Note: 1 - Standard Motor includes, Moisture & Temperature Sensors

and Carbon/Ceramic/Buna-N Inner & Silicon Carbide/Silicon Carbide/ Buna-N Outer Shift Seals.

Note: 2 - Item 4 is for Outer seal replacement ONLY.

Seals		
Part No. Material		
133029	Carbon / Ceramic	
133029SB	Tungsten Carbide / Tungsten Carbide	
133029SD +	Silicon Carbide / Silicon Carbide	

	Volute Pilot Diameter				
Model	Volute Size	Seal Plate P/N	Volute P/N	Wear Ring P/N	O-Ring P/N
3XSHVR	180mm	133026	133035	N/A	125857-163
3XSHMP	180mm	133026	133034	133047	125857-163
4XSHVA	208mm	133025	125453	N/A	125857-200
4XSHVB	208mm	133025	125453	N/A	125857-200
4XSHMS	208mm	133025	133033	133045	125857-200
4XSHMC	240mm	133024	129994	129996	125857-235
4XSHDF	208mm	133025	133033	133045	125857-200
4XSHDG	240mm	133024	129994	129997	125857-235

125454B 2 125454BTA 2 125454BTA 2 125454TA 2 125454TB 1 125454TB 1 125454TC 1 125454TD 1 125454TC 1 125454TD 1 125454TE 1 125454TF 1 125454TG 1 125454TK 1 125454TK 1 125454TN 1 125454TN 1 125454TR 1 125454TR 1 125454TR 1 125454TR 1 125454TR 1 125454TR 1 125454TS 1 133052 1 133052TA 1 133052TA 1 133052TB 1 133052TF 1 133052TF 1 133052TF 1 133052TH 1 133052TK 1 133052TK 1 <	Im Dia. mm (in) 205mm (8.07in) 200mm (7.87in) 200mm (7.87in) 200mm (7.87in) 200mm (7.87in) 200mm (7.87in) 200mm (7.87in) 195mm (7.68in) 195mm (7.68in) 195mm (7.28in) 185mm (7.28in) 185mm (6.69in) 165mm (6.69in) 165mm (6.50in) 165mm (5.91in) 155mm (6.10in) 155mm (5.31in) 135mm (5.31in) 135mm (5.31in) 135mm (5.12in) 125mm (4.92in) 8 Impeller Im Dia. mm (in) 90mm (7.48in) 85mm (7.28in) 80mm (7.09in) 75mm (6.89in) 70mm (6.69in) 65mm (6.50in) 60mm (6.30in) 55mm (6.10in)
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125454TC 125454TD 125454TE 125454TF 125454TG 125454TG 125454TG 125454TH 125454TK 125454TK 125454TK 125454TN 125454TR 125454TR 125454TR 125454TR 125454TR 125454TS *F" Hydraulic Part No. 133052TA 133052TB 133052TC 133052TF 133052TF 133052TF 133052TG 133052TH 133052TH 133052TH 133052TH 133052TA	900mm (7.48in) 185mm (7.28in) 185mm (7.28in) 175mm (6.89in) 175mm (6.69in) 165mm (6.50in) 165mm (6.30in) 155mm (6.10in) 155mm (5.91in) 145mm (5.91in) 145mm (5.91in) 145mm (5.91in) 145mm (5.91in) 135mm (5.91in) 135mm (5.91in) 135mm (5.12in) 135mm (5.12in) 135mm (4.92in) 5 Impeller im Dia. mm (in) 90mm (7.48in) 85mm (7.28in) 80mm (7.09in) 75mm (6.89in) 70mm (6.69in) 65mm (6.30in) 55mm (6.10in)
125454TD 125454TE 125454TF 125454TG 125454TG 125454TH 125454TJ 125454TK 125454TK 125454TN 125454TR 125454TR 125454TR 125454TR 125454TR 125454TR 125454TR 125454TS "F" Hydraulic Part No. 133052TA 133052TB 133052TC 133052TF 133052TF 133052TF 133052TG 133052TJ 133052TJ 133052TK 133052TM 133052TM 133052TA	85mm (7.28in) 185mm (7.29in) 175mm (6.89in) 175mm (6.69in) 165mm (6.50in) 155mm (6.10in) 155mm (5.91in) 145mm (5.71in) 145mm (5.71in) 135mm (5.31in) 135mm (5.12in) 135mm (5.12in) 135mm (5.12in) 135mm (5.12in) 135mm (7.28in) 85mm (7.28in) 80mm (7.09in) 75mm (6.89in) 70mm (6.69in) 65mm (6.50in) 60mm (6.30in) 55mm (6.10in)
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125454TL 1 125454TM 1 125454TN 1 125454TP 1 125454TR 1 125454TR 1 125454TS 1 125454TS 1 125454TS 1 125454TS 1 125454TS 1 133052 1 133052TA 1 133052TD 1 133052TD 1 133052TF 1 133052TF 1 133052TG 1 133052TF 1 133052TF 1 133052TG 1 133052TH 1 133052TK 1 133052TL 1 133052TM 1 133050TM 1 133050TA 1 133050TA 1 133050TA 1 133050TB 1	50mm (5.91in) 45mm (5.71in) 440mm (5.71in) 135mm (5.31in) 130mm (5.12in) 130mm (5.12in) 125mm (4.92in) 5 Impeller im Dia. mm (in) 90mm (7.48in) 85mm (7.28in) 80mm (7.09in) 75mm (6.89in) 70mm (6.69in) 65mm (6.50in) 60mm (6.30in) 55mm (6.10in)
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125454TR 1 125454TS 1 "F" Hydraulic 1 Part No. Tr 133052 1 133052TA 1 133052TB 1 133052TB 1 133052TB 1 133052TB 1 133052TC 1 133052TD 1 133052TF 1 133052TG 1 133052TH 1 133052TL 1 133052TL 1 133052TM 1 133050TA 1 133050TA 1 133050TA 1 133050TB 1	30mm (5.12in) 125mm (4.92in) s Impeller im Dia. mm (in) 90mm (7.48in) 85mm (7.28in) 80mm (7.09in) 75mm (6.89in) 70mm (6.69in) 65mm (6.50in) 60mm (6.30in) 55mm (6.10in)
125454TS 1 "F" Hydraulic Part No. Tr 133052 1 133052TA 1 133052TB 1 133052TB 1 133052TB 1 133052TC 1 133052TC 1 133052TC 1 133052TD 1 133052TF 1 133052TG 1 133052TG 1 133052TG 1 133052TG 1 133052TG 1 133052TG 1 133052TH 1 133052TL 1 133052TL 1 133052TM 1 133052TM 1 133052TM 1 133052TM 1 133050TM 1 133050TA 1 133050TA 1 133050TB 1	255mm (4.92in) s Impeller im Dia. mm (in) 90mm (7.48in) 85mm (7.28in) 80mm (7.09in) 75mm (6.89in) 70mm (6.69in) 65mm (6.50in) 60mm (6.30in) 55mm (6.10in)
"F" Hydraulic Part No. Tr 133052 1 133052TA 1 133052TB 1 133052TB 1 133052TB 1 133052TC 1 133052TC 1 133052TC 1 133052TC 1 133052TF 1 133052TG 1 133052TG 1 133052TG 1 133052TG 1 133052TG 1 133052TH 1 133052TK 1 133052TL 1 133052TM 1 133052TM 1 133052TM 1 133052TM 1 133050TM 1 133050TA 1 133050TA 1 133050TB 1	s Impeller im Dia. mm (in) 90mm (7.48in) 85mm (7.28in) 80mm (7.09in) 75mm (6.89in) 70mm (6.69in) 65mm (6.50in) 60mm (6.30in) 55mm (6.10in)
Part No. Tr 133052 1 133052TA 1 133052TB 1 133052TB 1 133052TB 1 133052TC 1 133052TC 1 133052TD 1 133052TF 1 133052TG 1 133052TH 1 133052TK 1 133052TL 1 133052TM 1 133052TM 1 133050TM 1 133050TA 1 133050TA 1 133050TB 1	im Dia. mm (in) 90mm (7.48in) 85mm (7.28in) 85mm (7.09in) 75mm (6.89in) 70mm (6.69in) 65mm (6.50in) 60mm (6.30in) 55mm (6.10in)
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133052 1 133052TA 1 133052TB 1 133052TC 1 133052TC 1 133052TC 1 133052TC 1 133052TC 1 133052TF 1 133052TG 1 133052TG 1 133052TG 1 133052TG 1 133052TH 1 133052TK 1 133052TL 1 133052TM 1 133052TM 1 133052TM 1 133052TM 1 133052TM 1 133050TA 1 133050TA 1 133050TB 1	90mm (7.48in) 85mm (7.28in) 80mm (7.09in) 75mm (6.89in) 70mm (6.69in) 65mm (6.50in) 60mm (6.30in) 55mm (6.10in)
133052TA 1 133052TB 1 133052TC 1 133052TD 1 133052TD 1 133052TF 1 133052TF 1 133052TG 1 133052TF 1 133052TG 1 133052TH 1 133052TK 1 133052TK 1 133052TK 1 133052TM 1 133050TA 1 133050TA 1 133050TB 1	85mm (7.28in) 80mm (7.09in) 75mm (6.89in) 70mm (6.69in) 65mm (6.50in) 60mm (6.30in) 55mm (6.10in)
133052TB 1 133052TC 1 133052TD 1 133052TF 1 133052TF 1 133052TG 1 133052TG 1 133052TG 1 133052TH 1 133052TJ 1 133052TK 1 133050 1 133050 1 133050TA 1 133050TB 1	80mm (7.09in) 75mm (6.89in) 70mm (6.69in) 65mm (6.50in) 60mm (6.30in) 55mm (6.10in)
133052TC 1 133052TD 1 133052TF 1 133052TF 1 133052TG 1 133052TG 1 133052TG 1 133052TG 1 133052TJ 1 133052TK 1 133050 1 133050 1 133050TA 1 133050TB 1	75mm (6.89in) 70mm (6.69in) 65mm (6.50in) 60mm (6.30in) 55mm (6.10in)
133052TD 1 133052TE 1 133052TF 1 133052TG 1 133052TG 1 133052TH 1 133052TJ 1 133052TK 1 133052TK 1 133052TK 1 133052TK 1 133052TM 1 133050 1 133050 1 133050TA 1 133050TB 1	70mm (6.69in) 65mm (6.50in) 60mm (6.30in) 55mm (6.10in)
133052TE 1 133052TF 1 133052TG 1 133052TH 1 133052TJ 1 133052TK 1 133052TK 1 133052TK 1 133052TK 1 133052TK 1 133052TM 1 133052TM 1 133052TM 1 133052TM 1 133052TM 1 133050 1 133050TA 1 133050TB 1	65mm (6.50in) 60mm (6.30in) 55mm (6.10in)
133052TF 1 133052TG 1 133052TH 1 133052TJ 1 133052TK 1 133052TK 1 133052TK 1 133052TK 1 133052TK 1 133052TM 1 133052TM 1 133052TM 1 133052TM 1 133050TM 1 133050TA 1 133050TB 1	60mm (6.30in) 55mm (6.10in)
133052TG 1 133052TH 1 133052TJ 1 133052TK 1 133052TL 1 133052TM 1 133052TM 1 133052TM 1 133052TM 1 133052TM 1 133050 1 133050 1 133050TA 1 133050TB 1	55mm (6.10in)
133052TH 1 133052TJ 1 133052TK 1 133052TL 1 133052TM 1 133052TM 1 133052TM 1 133052TM 1 133052TM 1 133050TM 1 133050 1 133050TA 1 133050TB 1	, ,
133052TJ 1 133052TK 1 133052TL 1 133052TM 1 133052TM 1 "R" Hydraulic Part No. Tr 133050 1 133050TA 1 133050TB 1	
133052TK 1 133052TL 1 133052TM 1 133052TM 1 133052TM 1 133050 1 133050TA 1 133050TB 1	50mm (5.91in)
133052TL 1 133052TM 1 "R" Hydraulic Part No. Tr 133050 1 133050TA 1 133050TB 1	45mm (5.71in)
133052TM 1 "R" Hydraulic Part No. Tr 133050 1 133050TA 1 133050TB 1	40mm (5.51in)
"R" Hydraulic Part No. Tr 133050 1 133050TA 1 133050TB 1	35mm (5.31in) 30mm (5.12in)
Part No. Tr 133050 1 133050TA 1 133050TB 1	30mm (3.12m)
133050 1 133050TA 1 133050TB 1	s Impeller
133050TA 1 133050TB 1	im Dia. mm (in)
133050TB 1	75mm (6.89in)
	70mm (6.69in)
133050TC 1	65mm (6.50in)
	60mm (6.30in)
133050TD 1	55mm (6.10in)
	50mm (5.91in)
	45mm (5.71in)
	40mm (5.51in)
	35mm (5.31in)
	30mm (5.12in)
	25mm (4.92in)
	20mm (4.72in)
	15mm (4.53in)
	15mm (4.53in) 10mm (4.33in)
	15mm (4.53in) 10mm (4.33in) 05mm (4.13in)
	15mm (4.53in) 10mm (4.33in) 05mm (4.13in) 00mm (3.94in)
133050TT	15mm (4.53in) 10mm (4.33in) 05mm (4.13in)

"C" Hydraulics Impeller		
Part No.	Trim Dia. mm (in)	
127263	235mm (9.25in)	
127263TA	230mm (9.06in)	
127263TB	225mm (8.86in)	
127263TC	220mm (8.66in)	
127263TD	215mm (8.46in)	
127263TE	210mm (8.27in)	
127263TF	205mm (8.07in)	
127263TG	200mm (7.87in)	
127263TH	195mm (7.68in)	
127263TJ	190mm (7.48in)	
127263TK	185mm (7.28in)	

"G" Hydraulics Impeller		
Part No.	Trim Dia. mm (in)	
129991	235mm (9.25in)	
129991TA	230mm (9.06in)	
129991TB	225mm (8.86in)	
129991TC	220mm (8.66in)	
129991TD	215mm (8.46in)	
129991TE	210mm (8.27in)	
129991TF	205mm (8.07in)	
129991TG	200mm (7.87in)	
129991TH	195mm (7.68in)	
129991TJ	190mm (7.48in)	
129991TK	185mm (7.28in)	
129991TL	180mm (7.09in)	
129991TM	175mm (6.89in)	
129991TN	170mm (6.69in)	
129991TP	165mm (6.50in)	

170mm (6.69in)		
165mm (6.50in)		
"S" Hydraulics Impeller		
Trim Dia. mm (in)		
200mm (7.87in)		
195mm (7.68in)		
190mm (7.48in)		
185mm (7.28in)		
180mm (7.09in)		
175mm (6.89in)		
170mm (6.69in)		
165mm (6.50in)		
160mm (6.30in)		
155mm (6.10in)		

"P" Hydraulics Impeller		
Part No.	Trim Dia. mm (in)	
133051	175mm (6.89in)	
133051TA	170mm (6.69in)	
133051TB	165mm (6.50in)	
133051TC	160mm (6.30in)	
133051TD	155mm (6.10in)	
133051TE	150mm (5.91in)	
133051TF	145mm (5.71in)	
133051TG	140mm (5.51in)	

3450 RPM		
Model No.	Rotor Kit Part No.	Stator / Motor Housing Kit Part No.
— XSH — — 5072	133927	133928
- XSH 50N2	133929	133930
— XSH — — 5052	133931	133932
— XSH — — 75N2	133933	133934
— XSH — — 7552	133935	133936
- XSH 100N2	133937	133938
- XSH 10052	133939	133940

1750 RPM		
Model No.	Rotor Kit Part No.	Stator / Motor Housing Kit Part No.
- XSH 2074	133941	133942
- XSH 20N4	133943	133944
- XSH 2054	133945	133946
- XSH 3074	133947	133948
- XSH 30N4	133949	133950
-XSH3054	133951	133952
— XSH — — 5074	133953	133954
- XSH 50N4	133955	133956
— XSH — — 5054	133957	133958
— XSH — — 75N4	133959	133960
— XSH — — 7554	133961	133962
- XSH 100N4	133963	133964
- XSH 10054	133965	133966

Example		
Model No.	Rotor Kit Part No.	Stator / Motor Housing Kit Part No.
4XSHMS75N4	133959	133960

Rotor Kit includes:

- Rotor/Shaft Assembly
- Ball Bearing, 2x
- Washer, Springer, WavyRetaining Ring, EXT, 2x
- O-Ring
- Screws, SHCS
- Washer, Wavy
- Ring, Snap

Stator/Motor Housing Kit includes:

- Motor Housing
- Stator
- Pipe Plug
- O-Ring
- Screws, SHCS
- Set Screw

Notes



BARNES

Limited 5 Year Warranty

Municipal Wastewater

Crane Pumps & Systems offers a Commercial Warranty covering parts and labor on its pumps to this original end purchaser, when used in permanent installations in compliance with requirements of the Barnes Catalog and Technical Manual specifications for pumping municipal wasterwater or similar abrasive free, non corrosive liquids against defects in workmanship and material for the period as defined below.

In the event that the pump is provided with moisture and/or temperature sensors, these must be in use in order to validate this warranty. Barnes SH series Non-Clogs, SE series Non-Clogs, Wet End of XSE series Non-Clogs (Motor has a one (1) year warranty and is the sole responsibility of Reliance Electric). Effluent and Sump pump models are Warranted for sixty (60) months (or 10.000 hours of operation) from the date of manufacture from Crane Pumps & Systems to the End Purchaser as follows: Crane Pumps & Systems will pay the following share of the cost of replacement parts and labor provided the pump, with cable attached, is returned prepaid to an Authorized Service Station as decided by Crane Pumps & Systems and its Municipal Market Distributor.

Warranty Period *			
Time After Manufacture (months):	0 - 18	19 -39	40 -60
Run Time (hours):	0 - 3,000	3,001 - 6,500	6,501 - 10,000
Warranty:	100%	50%	25%

* Time After Manufacture (months) or Run Time (hours) shall be determined by an Authorized Service Station and/or current copy of maintenance. If run time documentation cannot be produced then date of manufacture prevails.

Start-up reports and electrical system schematics (including Bills-of-Material) may be required to support any Warranty claims. This Warranty shall not apply to any product or part of product which has been subject to misuses, negligence, accident, operation outside of our published hydraulic curve parameters, used in a manner contrary to printed Instructions, or damaged due to a defective power supply, improper electrical protection, excessive abrasive wear or faulty installation or repair. THE SOLE AND EXCLUSIVE REMEDY FOR BREACH OF ANY AND ALL WARRANTIES WITH RESPECT TO ANY PRODUCT SHALL BE TO REPLACE OR REPAIR AT OUR ELECTION, F.O.B. POINT OF MANUFACTURE OR AUTHORIZED REPAIR STATION, SUCH PRODUCTS AND/OR PARTS AS PROVEN DEFECTIVE. THERE SHALL BE NO FURTHER LIABILITY, WHETHER BASED ON WARRANTY, NEGLIGENCE OR OTHERWISE.

Crane Pumps & Systems neither assumes nor authorizes any person or company to assume for it, any other obligation in correction with the sale of its equipment. Any enlargement or modification of this Warranty by a Representative or other Selling Agent shall become HIS or HER exclusive responsiblity.

UNDER NO CIRCUMSTANCES WILL WE BE RESPONSIBLE FOR ANY OTHER DIRECT OR CONSEQUENTIAL DAMAGES. INCLUDING BUT NOT LIMITED TO TRAVEL EXPENSES, RENTED EQUIPMENT, OUTSIDE CONTRACTOR FEES, UNAUTHORIZED REPAIR SHOP EXPENSES, LOST PROFITS, LOST INCOME, LABOR CHARGES, DELAYS IN PRODUCTION, IDLE PRODUCTION, WHICH DAMAGES ARE CAUSED BY ANY DEFECTS IN MATERIAL AND/OR WORKMANSHIP AND/OR DAMAGE OR DELAYS IN SHIPMENT. THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY OTHER EXPRESS OR IMPLIED WARRANTY, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

The following information must be completed to validate warranty. (Certain data will be provided before order placement and additional data following shipment).

 Pump Model/Serial #:

 Sales Order #:

Date:

Factory Authorized Signature: ______ Title: _____

CRANE

A Crane Co. Company

PUMPS & SYSTEMS

420 Third Street Pigua, Ohio 45356 Phone: (937) 778-8947 Fax: (937) 773-7157 www.cranepumps.com

83 West Drive, Bramton Ontario, Canada L6T 2J6 Phone: (905) 457-6223 Fax: (905) 457-2650

IMPORTANT! WARRANTY REGISTRATION

Your product is covered by the enclosed Warranty. To complete the Warranty Registration Form go to:

http://www.cranepumps.com/ProductRegistration/

If you have a claim under the provision of the warranty, contact your local Crane Pumps & Systems, Inc. Distributor.

RETURNED GOODS

RETURN OF MERCHANDISE REQUIRES A "RETURNED GOODS AUTHORIZATION". CONTACT YOUR LOCAL CRANE PUMPS & SYSTEMS, INC. DISTRIBUTOR.



Products Returned <u>Must</u> Be Cleaned, Sanitized, Or Decontaminated As Necessary Prior To Shipment, To Insure That Employees Will Not Be Exposed To Health Hazards In Handling Said Material. All Applicable Laws And Regulations Shall Apply.



PUMPS & SYSTEMS

<u>START-UP REPORT</u>

General Information

Pump Owner's Name:
Address:
Location of Installation:
Location of Installation: Contact Person: Phone:
Purchased From:
Nameplate Data
Pump Model #: Serial #:
Part #: Impeller Diameter: Voltage: Phase: Ø Hertz: Horsepower:
Voltage: Phase: Ø Hertz: Horsepower:
Full Load Amps:
Motor Manufacturer:
Controls
Control panel manufacturer:
Model/Part number:
Number of pumps operated by control panel:
Short circuit protection? YES NO Type:
Number and size of short circuit device(s): Amp rating:
Overload Type: Size: Amp rating:
Do protection devices comply with pump and motor Amp rating? YES NO
Are all electrical and panel entry connections tight? YES NO
Is the interior of the panel dry? YES NO
Liquid level Control Brand and Model:
Pre-Startup
Type of equipment: NEW REBUILT USED
Condition of equipment at Start-Up: DRY WET MUDDY
Was Equipment Stored? YES NO Length of Storage: Linuid Linuid Terms and the store of the
Liquid being pumped: Liquid Temperature:
Supply Voltage/Phase/Frequency matches nameplate? YES NO
Shaft turns freely? YESNO
Direction of rotation verified for 3Ø motors? YES NO
Debris in piping or wet well? YESNO
Debris removed in your presence? YESNO
Pump case/wet well filled with liquid before startup? YES NO
Is piping properly supported? YES NO
Non Submaraible Dumna
Non-Submersible Pumps
Is base plate properly installed / grouted? YES NO N/A
Coupling Alignment Verified per I&O Manual? YESNON/A
Grease Cup/Oil Reservoir Level checked? YES NO N/A

Submersible Pumps

		for (measured at pump control):
		ed-White: Ohms(Ω) White-Black: Ohms(Ω) een Control Panel and outside of pump: Ohms(Ω)
	hms check of insulation:	
Red to	Ground: White	e to Ground: Black to Ground:
ls thore	noise or vibration present?	Operational Checks YES NO Source of noise/vibration:
	-	? YES NO N/A
ls syste	em free of leaks? YES	NO Leaks at:
Does s	ystem appear to operate at o	design flow rate? YES NO
Nomina	al Voltage:	Phase: 1Ø 3Ø (select one)
		on, Pump OFF: L1, L2 L2, L3 L1, L3
		on, Pump ON: L1, L2 L2, L3 L1, L3 L2 L3 L3
Апрен		
Subme	ersible Pumps	
	F and guide rails level / plum	
	p seated on discharge prope	
		om turbulence? YES NO
	control operating properly? p fully submerged during ope	
is pull	p runy submerged during ope	
	Follow	up/Corrective Action Required
		YES NO
Additio	onal Comments:	
Startup	performed by:	Date:
Preser	nt at Start-Up	
() Eng	jineer:	() Operator:
() Cor	ntactor:	() Other:
All	parties should retain a co	py of this report for future trouble shooting/reference
CRANE	PUMPS & SYSTE	MS
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	Piqua, Ohio 45356	Ontario, Canada L6T 2J6
	Phone: (937) 778-8947 Fax: (937) 773-7157	Phone: (905) 457-6223 Fax: (905) 457-2650
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