



MODEL: MSPG Series

**OPERATING INSTRUCTIONS, INSTALLATION & MAINTENANCE
MANUAL INCLUDING SPARE PARTS LIST**



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LIFE IS PRECIOUS - THINK SAFETY

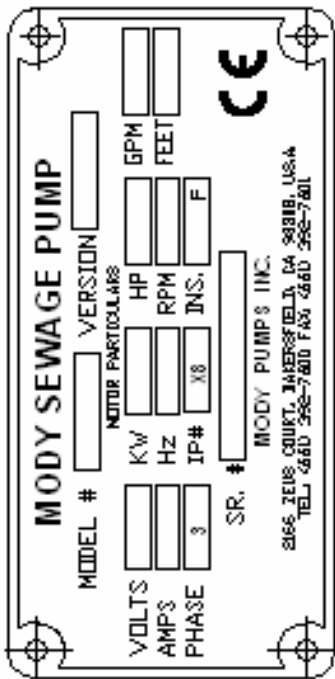
1. Most accidents can be avoided by using COMMON SENSE.
2. Please read the operation and maintenance instruction manual supplied with the pump. If you did not receive one, please call your local distributor before pump installation.
3. Do not wear loose apparel that may become entangled in the impeller or other moving parts.
4. Always use appropriate safety equipment, such as safety glasses, when working on the pump or piping.
5. Pumps build up heat and pressure during operation-allow time for pumps to cool before handling or servicing.
6. Only qualified service personnel should install, operate and repair pump.
7. Keep clear of suction and discharge openings. DO NOT insert fingers in pump with power connected.
8. Do not pump flammable or hazardous materials (gasoline, acids, alkalis, etc.)
9. Do not block or restrict discharge hose, as it may whip or burst catastrophically under pressure.
10. Make sure lifting handles/hooks are securely fastened each time before lifting.
11. Do not lift pump by the power cord under any circumstances.
12. Do not exceed manufacturer's recommendation for optimum performance, as this could cause the motor/pump to overheat and lead to premature wear or failure.
13. Secure the pump in its operating position so it does not tip over, fall or slide.
14. Keep away from impeller when power is connected.
15. 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.
16. Do not operate pump without adequate protection and safety devices in place.
17. Always replace safety devices that have been removed during service or repair.
18. To reduce risk of electrical shock, pump must be properly grounded in accordance with the National Electric Code and all applicable state and local codes and ordinances.
19. To reduce risk of electrical shock, always disconnect the pump from the power source before handling or servicing.
20. Any wiring of pumps should be performed by a qualified electrician.
21. Never operate a pump with a power cord that has frayed or brittle insulation.
22. Cable should be protected at all times to avoid punctures, cuts, and abrasions - inspect frequently.
23. Never handle connected - "hot" power cords with wet hands.
24. Never operate a pump with a plug-in type power cord without a ground fault circuit interrupter, adequate overload and short circuit protection.

IMPORTANT !!! Mody Pumps 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.

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Identification plate



General description

The MODY MSP SERIES submersible sewage pumps can be used in a variety of residential, commercial and industrial applications such as:

- Sewage System
- Flood and Pollution control
- Dewatering / Effluent
- Farms
- Hospitals
- Trailer Courts
- Hotels

MODY MSP SERIES pumps are subjected to a thorough inspection before leaving the factory and equipped with operating instructions for fitting, starting, care etc. which conform to international safety regulations. These instructions describe the procedures to

be used for fitting, operation and maintenance of standard submersible waste water pumps.

Applications

This starting & operation manual are applicable to the electric driven submersible waste water pumps specified on the front page. The pumps are designed to be used for pumping raw sewage water with solid contents. The pumps are suitable for heavy duty drainage applications and clean water too. The manufacturer guaranties that the new pump airborne noise level do not exceed 70 db(A) when submerged. For dry installation the corresponding level is 75 db(A). Be aware that under wrong operated duty points, noise level might be higher.



Caution! This range of pumps is forbidden to handle in flammable liquids nor used in explosive environment.

Do not start the pump if any parts belonging to the pump are missing.

If humans should be in contact with the pumped liquid e.g. construction sites, lifting stations etc. a grounded connection including an earth leakage detector must be used. Never install the pumps in swimming pools, special regulations apply.

Product description

Limitations

Immersion depth to max 20m (66 ft).
Media temperature up to 40 °C (115 °F).
Higher media temperature on request.

Pump models

Example: MSPG2-50.X VX3 2-200

- MSPG2 = module range
- 50 = standard outlet discharge in mm
- X = version of volute
- V = vortex impeller or
- C = channel impeller
- X = version of impeller, more than one X can appear to indicate other types.
- 3 = family pumps
- 2 = number of poles (rpm)
e.g. 2=3,500 rpm
- 200 = diameter of impeller in mm

Motor

3 phase squirrel cage induction motor for 60 Hz, degree of protection IP68, insulation class H (180°C).

Motor protection

All stators are equipped with 3 built-in thermal switches and are connected in series which opens at 135°C and closes at approx 90°C and are marked F1 & F2 control cable. To maintain warranty on the pumps, these thermal switches must be

connected in series to control circuit of control panel.

Cooling system

Models MSP2, MSP3 are standard equipped with a closed internal cooling system in all 3 types of installation, but can be ordered without this system as an option. Note that if ordered without closed internal cooling system cannot be installed as dry pit

The closed internal cooling system functions as follows:

An internal impeller, located between the two mechanical shaft seal, circulates the cooling liquid in a closed loop through channels to a cooling jacket surrounding the stator housing. Thus, the heat generated by the motor, is transferred to the cooling liquid and finally dissipated to the pumped liquid via a cooling flange (heat exchange), without any physical contact by the pumped sewage media.

Coolant: 70% water and 30% propylene glycol.

Moisture sensor

All pumps are supplied with 3 moisture sensors made of aluminum.

One sensor is placed in the seal oil chamber; another sensor is placed in the lower motor stator housing and a third sensor is placed inside the motor cable terminal board area.

The moisture detection control cable is marked D. This control cable should be connected to a relay (optional or by others) in the control panel, which is activated by a decrease in resistance to ground. Set the alarm between 20 - 100 kOhm. Voltage output applied to the moisture cable 12 - 24 VAC.

Power Cable

The pumps are standard equipped with 10m electric cable of the type H07RNF. If longer cable is required, voltage drop must be taken in consideration.

Handling

When transporting the pumps they must be properly secured. Special attention must be give to the cables; these cannot withstand rolling heavy parts. All pumps must be securely stored in vertical or horizontal positions.

Always protect cable ends from moisture and water as well, so that no moisture will penetrate into the cable.

Before lifting the pump, check to determine if the handle on the pump is properly attached. Always use the lifting handle. Do not use the cables or discharge hose. All fixing screws and bolts must be securely fastened before lifting. Human injury may result if above is not properly secured.

After a long period of storage, the pump must be inspected carefully. Rotate the impeller by hand before start-up and check carefully seals and cable entry



WARNING! Never start up the pump without impeller. This will damage (in a few seconds) the O-ring that seals between the rotor-shaft and the sleeve of the mechanical seal cartridge. Both sleeve and rotor shaft could also be damaged due to excessive friction!

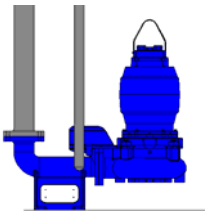
Installation

When installing the pump, reduce the risk of accidents. Be aware that the machine is extremely heavy and that it contains electrical open wires.

Before starting the installation, check and secure all screws for the lifting handle, stator and volute fixing bolts. Ensure that these are all safety tightened.

Lifting chains, cranes etc. must always be designed to fully accommodate the weight of the complete pump units. For safety reasons never walk under suspended load.

Discharge base elbow - DBE



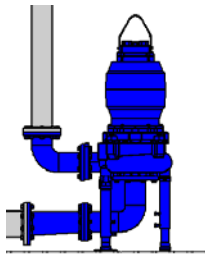
Place the discharge base elbow (DBE) at the bottom of the sump. If one pump is installed, place the pump in the center of the tank. Fit the guide rails to the upper

guide rail bracket so the rails are accurately located in vertical and parallel positions to each other.

Connect the discharge pipe to the DBE. A non return valve and gate valve sized according to the flow velocity from the pump are strongly recommended.

The lifting tackle must be installed directly at the point above the center of gravity of the pump for proper automatic coupling to and release from the DBE, which is appropriately designed for this purpose, when lifting and lowering the pump from and to the DBE.

Dry pit installation



All MSP2 and MSP3 modules can be installed dry with adjustable support legs and a separately supplied suction elbow, or a fixed suction base elbow (SBE) unit. Adjustable support consists of three legs that are

telescopic in design. The suction pipe can be connected in any direction by changing the location of the legs. After elevation

adjustment, the legs are set and fixed by two screws that lock the pump arrangement into position. The bottom leg pads can then be secure by bolting and anchoring them in the concrete foundation.

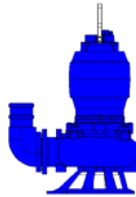
The suction pipe is connected vertically to the pump suction flange.

Note: The motor unit is easier to remove or re-install if the suction pipe is equipped with a drain valve. This can be opened when the motor is going to be or removed or reinstalled.

The discharge pipe should be equipped with a drain valve as well, in order to bleed air from the system during first start-up. Afterwards this valve can be fitted with a manometer to measure the discharge pressure.

Before starting, carefully inspect the cables for defects and check the level of coolant in the cooling jacket.

Portable version / installation



This version needs extra attention while operating. The pump can be supplied with a support ring.

Place the pump on a firm surface. Keep the cables straight and secure so that they cannot be nipped or cut in any way.



WARNING! Never remove the support ring, human contact might occur and make injury.

If there is risk of overturning, place and fit the pump on a steel plate.

When hoses are used as discharge connection, remember that friction losses are higher than in a pipe and flow may be less than expected.

Electrical connections

The electrical installation must be inspected by authorized electrician before switching-on.



CAUTION! All electrical equipment must always be earthed (grounded). This applies both to the pump and to any monitoring equipment.

Make sure that the electrical terminals and starting equipment is installed in such way that it cannot be flooded. The electrical installation must apply to national and local regulations.

All pumps are supplied with built-in thermal switches in the stator windings. These are marked F1, F2 on the control cable and must always be connected in series to the control circuit in the control panel.

The control cable marked D is connected to the moisture sensors. This cable should be connected to a conductive liquid level relay in the control panel. An alarm should be given in event of moisture intrusion. Your local MODY representative can supply you with the conductive liquid level relay as an option.

Make sure that the power supply, voltage, frequency and starting method corresponds to the nameplate data fitted on the pump.

The motor can operate by voltage tolerances at +/- 10%. The motor might be overloaded and burned out if this is exceeded.

For power supply cable, and control cable connections, refer to the motor winding connection schematics in this manual.

- Direct online starting DOL
- Star-Delta starting Y-Δ

Starting equipment in the control panel must be provided with over current protection sensitive to phase failure. A 3-phase asymmetry control relay is recommended, adjusted to 15% phase asymmetry

The power supply should be fused with low-blow fuses.

15 Starts per hour (regularly spaced) are permitted

Replacing the power cable

If the cable has been compressed or damaged it must be replaced to avoid water entry.

When changing the cable always change the rubber cable seal was well. Never change cable dimensions from the original cable or cable seal dimensions from the original seal, as water may enter the motor if these are not properly sized.

If the same cable is re-used due to any repair work, always cut away a piece at the cable entry in order to seal on a non compressed cable sheath.

For safety reasons the grounded conductor strand should always be longer than all the other conductor strands. If the motor cable is accidentally wrenched off, the grounded conductor should be the last to break away from its terminal. This applies to both ends of the cable.

Electromagnetic Compatibility, EMC

The pump does not generate any electromagnetic (EMC) that would affect other equipment. However, if the pump power is supplied by a frequency inverter, the power cables may require screening.

All MSP2 and MSP3 pump modules comply with directive EN89/336/EEC regarding EMC.

Operation

Before initial start-up after repair or in a new installation, always check direction of rotation. The pump must always rotate in an anti-clockwise direction. If the rotation is clock-wise, transpose two phases in the electric control panel so that it will change to proper rotational direction.

Be aware of the starting torque, it may be very strong depending on the size of the pump. Do not hold the pump when checking the rotation. The pump must be heavily supported and never started when hanging in a chain without proper support when performing a rotational check or in operation.



WARNING! As the pump will pump up to 70% of the nominal flow at wrong rotation, never use the visual flow rate to determine the direction of rotation. Most times, the pump creates heavy noise and vibration when operates at wrong rotation.



WARNING! Do not insert your hand or any other object into the pump volute and impeller if any power supply is connected. Remove physically the cable even if security devices is activated

Service and maintenance

Regular inspection and preventive maintenance will ensure more reliable operation. The pump should be inspected every six months or more often if the operating conditions are difficult. The cable should be checked more frequently. For a complete overhaul of the pump, please contact an authorized MODY service facility workshop or your MODY dealer.



CAUTION! When the pump or motor section has been laid on its side, always secure it with wedges from both sides to prevent it from rolling away.



CAUTION! Parts must be replaced by genuine spares, including screws, to ensure correct strength.



CAUTION! Before maintenance and repair work, motor leads must first be completely disconnected from the power supply.

Never work on electrical systems during a thunder storm.

All work on the electrical system may only be performed by qualified electricians.



CAUTION! Before undertaking any service work, make sure that the pump is thoroughly clean, and bear in mind the importance of observing good personal hygiene. Follow your local safety instructions.

NOTE! Old oil should be entrusted to an oil disposal company in accordance with local regulations.

Inspection

Pump Section	Inspection	Action in the event of a fault.
Cables	Check that the sheath is not damaged. Check that the cables are not kinked or nipped.	Fit a new cable. Correct the fault.
Cooling water	Check the cooling water level of coolant	Fill up with cooling liquid.
Visible Parts	Check that all parts are in good condition, and that bolts and nuts are securely tightened.	Replace worn parts. Tighten any loose bolts and nuts.
Impeller / Wear ring	Check that the parts are not worn to such an extent that the pump performance is affected.	Adjust the wear ring.
Shaft seal	Check that the oil is clean and is not mixed with water. See under "Changing the oil".	In the event of slight leakage, change the oil.
Hoses, pipes and valves	Check that the equipment does not leak or is otherwise damaged.	Adjust or replace defective parts.

Changing the oil

Change of oil is done in the same way on cooled and un-cooled pumps. Remove the plug marked "outlet" and let the old oil pour out through the groove under the plug.

Discard of any used oil in accordance with local regulations. Fasten the plug so that the lower but not the top O-ring gasket seals. Loosen the plug marked "inlet" and fill up with oil and then fasten both oil plugs. Use food grade oil of same quality and performance as Enerpar M002, white oil.



CAUTION! In the event of inward leakage, the oil housing may be pressurized.

When removing the oil plug, hold a piece of cloth over it to prevent oil from splashing.

3 ~ Direct on –line starting DOL Motor connection: Δ

1 Power Supply Cable + 1 Control Cable

Color Coding

Power Supply	U	Black
	V	Brawn
	W	Grey
	PE	Yellow

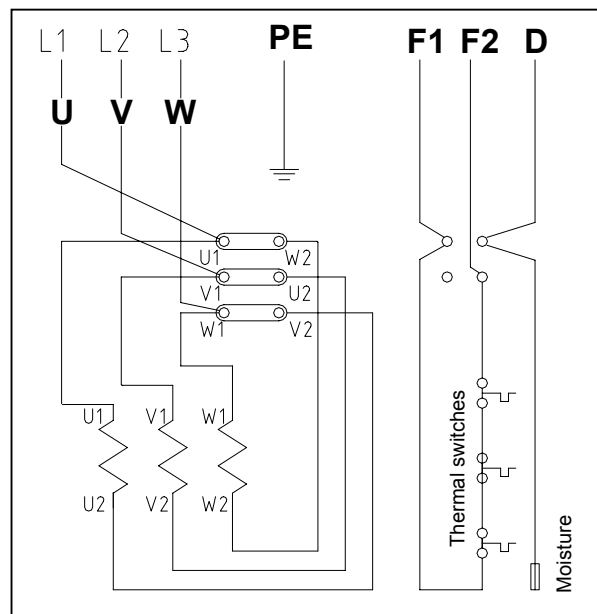
Control	F1	Black
	F2	Brawn
	D*	Grey

1 Power Supply and Control Cable

Color Coding

U	Black-1
V	Black-2
W	Black-3
PE	Yellow
F1	Black-4
F2	Black-5
D*	Black-6

3~ Direct - on - line starting DOL Motor connection : Δ



**Not available for PX1-65.0 Series*

Internal Connection on Motor's Terminal Board

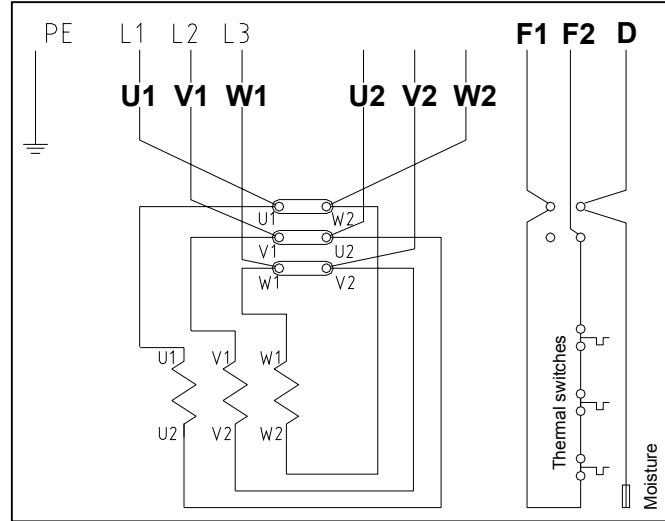
U1,	U2	:	Black
V1,	V2	:	Red
W1,	W2	:	Orange

3 ~ Star-Delta starting Y- Δ Motor connection: III Δ

2 Power Supply Cable + 1 Control Cable

		<u>Color Coding</u>	
Power Supply (cable1)	U1	Black	
	V1	Brawn	
	W1	Grey	
	PE	Yellow	
Power Supply (cable2)	U2	Black	
	V2	Brawn	
	W2	Grey	
	PE	Yellow	
Control	F1	Black	
	F2	Brawn	
	D	Grey	

3~ Star-Delta starting Y-Δ Motor connection : III Δ



1 Power Supply Cable + 1 Control Cable

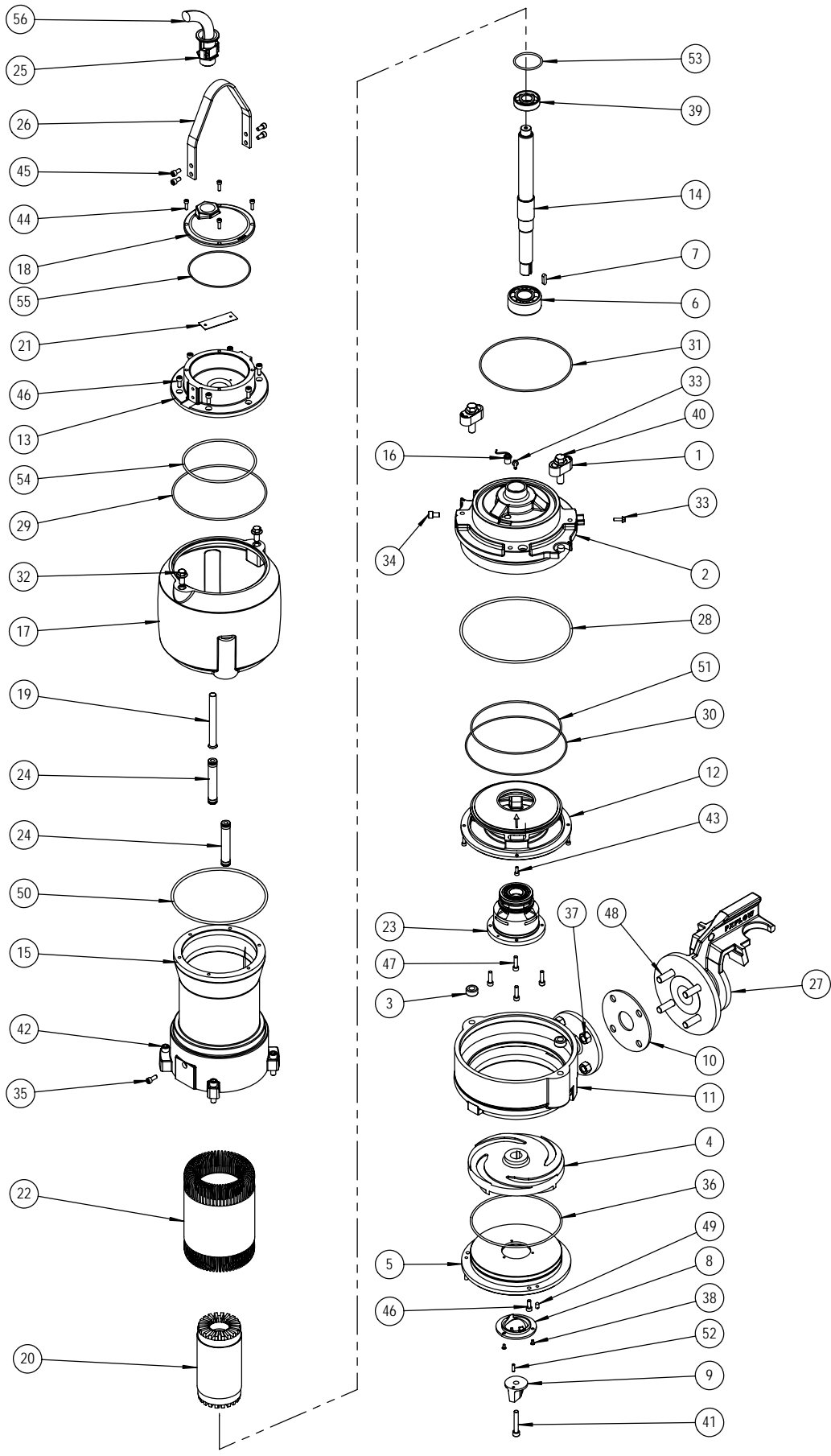
		<u>Color Coding</u>	
Power Supply	U1	Black-1	
	V1	Black-2	
	W1	Black-3	
	PE	Yellow	
	U2	Black-4	
	V2	Black-5	
Control	W2	Black-6	
	PE	Yellow	
	F1	Black	
	F2	Brawn	
	D	Grey	

1 Power Supply and Control Cable

<u>Color Coding</u>	
U1	Black-1
V1	Black-2
W1	Black-3
U2	Black-4
V2	Black-5
W2	Black-6
PE	Yellow
F1	Black-7
F2	Black-8
D	Black-9

Internal Connection on Motor's Terminal Board

U1,	U2	:	Black
V1,	V2	:	Red
W1,	W2	:	Orange



UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS SURFACE FINISH: TOLERANCES: LINEAR: ANGULAR:				FINISH:	DEBUR AND BREAK SHARP EDGES	MODY PUMPS, INC MSPG2	
DESIGN	NAME	SIGNATURE	DATE			TITLE:	
CHK'D	STELIOS					GRINDER PUMP ASSEMBLY	
APP'VD							
MFG							
Q.A				MATERIAL:	DWG NO.	002-400-495	
PRINT						A3	
					SCALE:	SHEET 1 OF 1	



PARTS LIST
MODY MSPG2 GRINDER

ITEM	DESCRIPTION	QTY	MATERIAL
1	LATCH BOLT (FAST LOCK) (SMALL)	2	stainless steel 304
2	LOWER BEARING HOUSING	1	cast iron GG25
3	WASHER SPACER	2	TEFLON
4	IMPELLER CG2	1	ductile iron GGG40
5	WEAR PLATE	1	cast iron GG25
6	BEARING LOWER	1	3307B.2ZTNG
7	KEY	1	stainless steel
8	GRINDER DISC (stationary)	1	stainless steel
9	GRINDER (rotary)	1	stainless steel
10	GASKET	1	
11	VOLUTE	1	cast iron GG25
12	LOWER COOLING FLANGE	1	cast iron GG25
13	UPPER BEARING HOUSING	1	cast iron GG25
14	SHAFT ROTOR PX2-1	1	stainless steel 304
14a	SHAFT ROTOR PX2-2	1	stainless steel 304
15	STATOR HOUSING MSP2-1	1	cast iron GG25
15a	STATOR HOUSING MSP2-2	1	cast iron GG25
16	MOISTURE SENSOR	1	aluminium/rubber
17	COOLING JACKET	1	cast iron GG25
18	MOTOR COVER	1	cast iron GG25
19	COOLAND TUBE	1	steel
20	ROTOR BODY	1	siemens
21	BASI KLEMAS	1	
22	WIRE CORE	1	siemens
23	MSP2 SEAL CATRIDGE ASSEMBLY	1	
24	COOLANT HOSE ASSEMBLY	2	rubber/stainless steel
25	CABLE SEAL compl. PG29(16) for 7x1,5mm ²	1	
25a	CABLE SEAL compl. PG29(19) for 7x2,5mm ²		
26	HANDLE	1	stainless steel 304
27	ADAPTER	1	ductile iron GGG40
28	O-RING	1	NBR
29	O-RING	1	NBR
30	O-RING	1	NBR
31	O-RING	1	NBR
32	PLUG	2	A2
33	KEY	1	stainless steel 304
33	SCREW	2	stainless steel 304
34	SCREW	1	stainless steel 304
35	SCREW	1	stainless steel 304
36	O-RING	1	stainless steel 304
37	NUT	4	stainless steel 304
39	BEARING UPPER	1	6305DDU C3
40	BOLT	2	stainless steel 304
41	SCREW	1	stainless steel 304
42	BOLT	4	stainless steel 304



**PARTS LIST
MODY MSPG2 GRINDER**

ITEM	DESCRIPTION	QTY	MATERIAL
43	SCREW	4	stainless steel 304
44	SCREW	4	stainless steel 304
45	SCREW	4	stainless steel 304
46	SCREW	6	stainless steel 304
46		9	stainless steel 304
47	SCREW	4	stainless steel 304
48	BOLT	4	stainless steel 304
49		3	stainless steel 304
50	O-RING	2	NBR
51	O-RING	1	NBR
52		1	stainless steel 304
53	O-RING	1	NBR
54	O-RING	1	NBR
55	O-RING	1	NBR
56	CABLE		

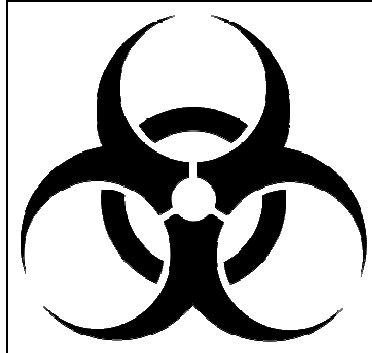


Mody MSP Series Oil and Water Qty.

Pump type	Motor series	oil	coolant construction <u>without</u> cooling jacket	coolant construction <u>with</u> cooling jacket
MSP1	M1-1	0,35 L / 0,55*L	0,4 L	3,8L
MSP2	M2-1	0,55 L / 0,90*L	1,3 L	7,3 L
	M2-2	0,55 L / 0,90*L	1,3 L	6,7 L
MSP3	M3-1	0,25 L	4,6 L	12,5 L
	M3-2	0,25 L	4,6 L	12 L
	M3-3	0,25 L	4,6 L	12 L
MSP4	M34-2	0,25 L	5,6 L	13 L
	M34-3	0,25 L	5,6 L	13 L
	M4-1	0,35 L	7 L	49,5 L
	M4-2	0,35 L	7 L	37 L
*for horizontal installation				
US Gal = 0,264 x L (liter)				

RETURNED GOODS POLICY:

RETURN OF MERCHANDISE REQUIRES A "RETURNED GOODS AUTHORIZATION" OR RGN NUMBER. CONTACT YOUR LOCAL MODY PUMPS INC. DISTRIBUTOR OR THE FACTORY DIRECTLY.



PRODUCTS THAT ARE RETURNED MUST BE PRESSURE WASHED, CLEANED, SANITIZED AND DECONTAMINATED AS NECESSARY PRIOR TO SHIPMENT. THIS ENSURES THAT EVERYONE IN CONTACT WITH RETURNED UNITS ARE NOT EXPOSED TO HEALTH HAZARDS. ALL APPLICABLE LAWS AND REGULATIONS SHALL APPLY.



LIMITED WARRANTY

We warrant to our immediate customer and to the ultimate consumer that products of our manufacture will be free of defects in material and workmanship under normal use and service for the following time periods, when installed and maintained in accordance with our instructions.

PUMPS: One (1) year from date of installation or (18) months from date of shipment, whichever occurs first. As used herein, "the ultimate consumer" is defined as the purchaser who first uses the product after its initial installation or, in the case for product designed for non-permanent installation, the first owner who uses the product. It is the purchaser's or any sub-vendor's obligation to make known to the ultimate consumer the terms and conditions of this warranty. This warranty gives you specific legal rights, and there may also be other rights which vary from state to state. In the event the product is covered by the Federal Consumer Product Warranties Law (1) the duration of any implied warranties associated with the product by virtue of said law is limited to the same duration as stated herein, (2) this warranty is a LIMITED WARRANTY, and (3) no claims of any nature whatsoever shall be made against us, until the ultimate consumer, his successor, or assigns, notifies us in writing of the defect, and delivers the product and/or defective part(s) freight prepaid to our facility or nearest authorized service station. Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply. **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, FOB 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.** Unless expressly stated otherwise, guarantees in the nature of performance specifications furnished in addition to the foregoing material and workmanship warranties on a product manufactured by *Mody Industries Pvt. Ltd.*, if any, are subject to laboratory tests corrected for field performance. Any additional guarantees, in the nature of performance specifications must be in writing and such writing must be signed by our authorized representative. Due to inaccuracies in field testing if a conflict arises between the results of field testing conducted by or for user, and laboratory tests corrected for field performance, the latter shall control. Components or accessories supplied by us but manufactured by others are warranted only to the extent of and by the terms and conditions of the original manufacturer's warranty. **RECOMMENDATIONS FOR SPECIAL APPLICATIONS OR THOSE RESULTING FROM SYSTEMS ANALYSES AND EVALUATIONS WE CONDUCT, WILL BE BASED ON OUR BEST AVAILABLE EXPERIENCE AND PUBLISHED INDUSTRY INFORMATION. SUCH RECOMMENDATIONS DO NOT CONSTITUTE A WARRANTY OF SATISFACTORY PERFORMANCE AND NO SUCH WARRANTY IS GIVEN.**

This warranty shall not apply when damage is caused by (a) improper installation, (b) improper voltage, (c) lightning, (d) sand or other abrasive materials, (e) scale or corrosion build-up due to excessive chemical content. Any modification of the equipment will also void the warranty. We will not be responsible for loss, damage or labor cost due to interruption of service caused by defective parts. Neither will we accept charges incurred by others without our prior written approval. This warranty is void if our inspection reveals the product was used in a manner inconsistent with normal industry practice and/or our specific recommendations. The purchaser is responsible for communication of all necessary information regarding the application and use of the product. **UNDER NO CIRCUMSTANCES WILL WE BE RESPONSIBLE FOR ANY OTHER DIRECT OR CONSEQUENTIAL DAMAGES, INCLUDING BUT NOT LIMITED TO 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 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.**

No rights extended under this warranty shall be assigned to any person, whether by operation or otherwise, without our prior written approval.