

MINI MOTION PACKAGE(MMP)

Instruction Manual

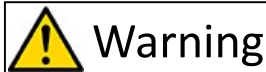
Cautions for Safe Use

- Please read this manual carefully before working with this product.
- Cautions, warnings and other notes contained in this manual are very important and must be observed at all times.
- Please keep this manual in a convenient place for quick reference.
- Safety signs are defined as follows:



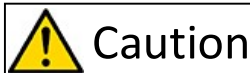
Danger

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



Warning

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



Caution

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

Definition of Warning Labels

Prohibited Actions	Hazard Identification	Mandatory Actions
Disassembly prohibited Exposure to liquid prohibited Fire prohibited	Hot surface	

KYB Corporation

Cylinder Design Sect. Gifu South Hydraulics Engineering Dept.

Contents

Contents	P. 1
1. Product Profile	P. 2
2. Model Code	P. 2
3. Specifications	P. 3
4. Hydraulic Schematic, Weight and Dimensions	P. 4
5. Characteristics	P. 4
6. Preparation for Use	P. 5
7. Operation	P. 5 ~ P. 6
8. Mounting / Adjustments	P. 7 ~ P. 9
9. Emergency Manual Operation	P. 9
10. Storage	P. 10
11. Disposal	P. 10
12. Spare Parts	P. 10
13. Troubleshooting	P. 11

WARNING - USER RESPONSIBILITY

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

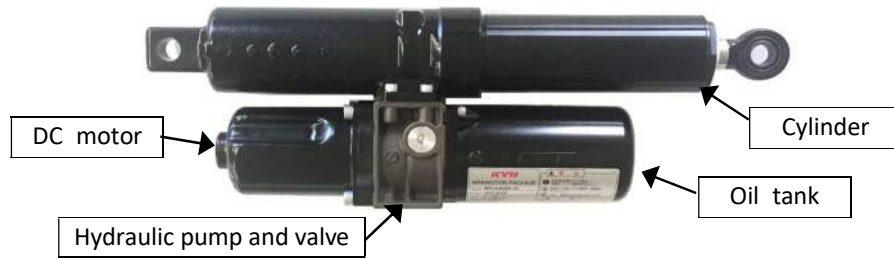
This document and other information from KYB Corporation, its subsidiaries and authorized distributors provide product or system options for further investigation by users having technical expertise. The user, through its own analysis and testing, is solely responsible for making the final selection of the system and components and assuring that all performance, endurance, maintenance, safety and warning requirements of the application are met. The user must analyze all aspects of the application, follow applicable industry standards, and follow the information concerning the product in the current product catalog and in any other materials provided from KYB or its subsidiaries or authorized distributors.

To the extent that KYB or its subsidiaries or authorized distributors provide component or system options based upon data or specifications provided by the user, the user is responsible for determining that such data and specifications are suitable and sufficient for all applications and reasonably foreseeable uses of the components or systems.

1. Product Profile

The Mini Motion Package (MMP) is an electric/hydraulic linear actuator in which a DC motor, hydraulic pump, valve and cylinder are completely integrated. By making the best use of unique features of hydraulic systems that are not available with mechanical systems this product is the best choice for labor saving and automated work environment of light duty operations.

1. The maximum rated force is 10600 N (2380 lbs) with $\phi 46-\phi 20$ cylinder and 7.1 MPa relief valve.
2. By having the motor revolve in a normal and reverse direction, the cylinder stroking of extension and retraction is controlled.
3. The power source, switches, etc. are not included.
4. The duty cycle of the product is 30 seconds operation with 90 seconds rest. It is not suitable to be used in a continuously operating application.
5. Component Diagrams



<p>① KYB</p> <p>MINI-MOTION PACKAGE</p> <p>Type MMP5-B1B350BR-QR ②</p> <p>D.No. E4250-01000 ③</p> <p>Volt DC 12 V ④</p> <p>Rating 30 sec ⑤</p> <p>P.No. *****</p> <p style="text-align: center;">MADE IN VIETNAM</p>	<p>WARNING ⑦</p> <p>⚠ READ MANUAL CAREFULLY BEFORE WORKING ON THIS PRODUCT</p> <p>⚠ DO NOT DISMANTLE, REPAIR OR MODIFY THIS PRODUCT BY ANY MEANS</p> <p>⚠ DO NOT THROW INTO FIRE NOR HEAT UP THIS PRODUCT</p> <hr/> <p>CAUTION ⑧</p> <p>⚠ CONTINUOUS OPERATION IS PROHIBITED</p> <p>⚠ THE SPECIFIED VOLTAGE LEVEL MUST BE OBSERVED</p>
---	--

- ① Product Name
- ② Product type
- ③ Product No.
- ④ Motor Voltage
- ⑤ Rating time
- ⑥ CE Mark
- ⑦ WARNING - see page.6-11
- ⑧ CAUTION - see page.6-11

2. Model Code

MMP5 - ① ② ③ ④ BB - QR

①	Motor Output and Relief Pressure	A: 250 W + 4.1 MPa B: 250 W + 7.1 MPa		
②	Power Voltage	1: 12 VDC	④	Cylinder Stroke
③	Cylinder Size	O: $\phi 34-\phi 20$ P: $\phi 34-\phi 20$ (eye 90°from std) B: $\phi 40-\phi 20$ D: $\phi 40-\phi 20$ (eye 90°from std) R: $\phi 46-\phi 20$ S: $\phi 46-\phi 20$ (eye 90°from std)		
				150: 150 mm 200: 200 mm 250: 250 mm ($\phi 40$ and $\phi 46$ Only) 300: 300 mm ($\phi 40$ and $\phi 46$ Only) 350: 350 mm ($\phi 40$ and $\phi 46$ Only)

The above model code symbols indicate standard specifications. Other non-standard symbols are not catalogued.

3. Specifications

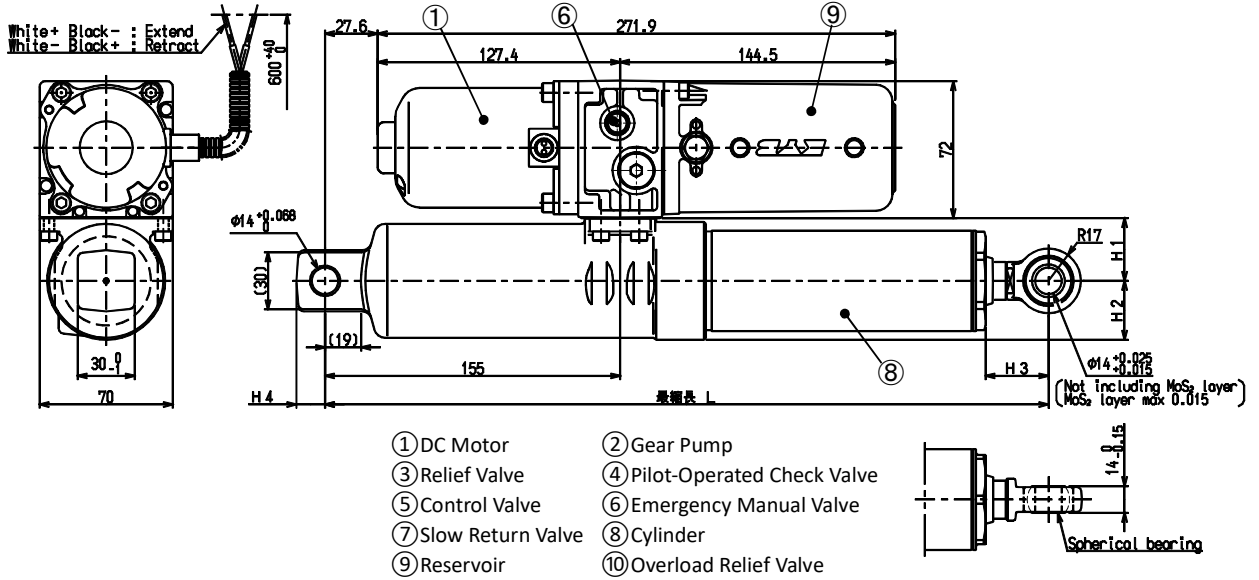
Note: Details below are at rated voltage and room temperature (approximately 20 °C / 68 °F)

		A – 4.1 MPa Relief Valve Pressure	B – 7.1 MPa Relief Valve Pressure	
Motor	Rated Output	250 W	250 W	
	Rated Voltage	12 VDC	12 VDC	
	Relief Valve Current	25.0 A	40.8 A	
	Duty Cycle	30 sec with 90 sec rest		
	Protection	Thermal Circuit Breaker		
Hydraulic Circuit	Relief Valve Pressure	4.1 MPa	7.1 MPa	
	Rated Pressure	3.4 MPa	6.4 MPa	
	Rated cylinder Force	φ34-φ20	Ext. 3.0 kN, Ret. 2.0 kN	Ext. 5.8 kN, Ret. 3.8 kN
		φ40-φ20	Ext. 4.2 kN, Ret. 3.2 kN	Ext. 8.0 kN, Ret. 6.0 kN
		φ46-φ20	Ext. 5.6 kN, Ret. 4.5 kN	Ext. 10.6 kN, Ret. 8.6 kN
	Overload Relief Valve	13.7 MPa		
	Internal leakage	Less than 0.3 cm ³ /min		
	Cylinder displacement	φ34-φ20	Compression 0.33 mm/min max, Tensile 0.51 mm/min max	
		φ40-φ20	Compression 0.24 mm/min max, Tensile 0.32 mm/min max	
		φ46-φ20	Compression 0.18 mm/min max, Tensile 0.22 mm/min max	
	Temperature Range for operation *	-32 ~ 50 °C / -25 ~ 122 °F		
Temperature Range in storage	-32 ~ 60 °C / -25 ~ 140 °F			
Hydraulic Oil	JX CSF-100K			
Vibration Resistance	JIS D1601 3 Tested			
Water Resistance (With waterproof connector)	JIS D0203 D2 Tested (IP67)			
Duty Life	10,000 cycles (1 cycle = Full extend and retract of cylinder)			

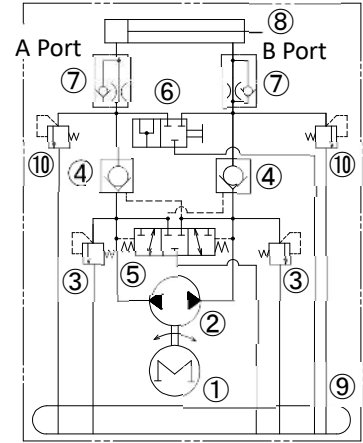
* If the motor case temperature exceeds the range it will likely operate the circuit breaker.

And if the tank temperature exceeds the range, the cylinder speed, rated force and duty life may be reduced.

4. Hydraulic Schematic, Weight and Dimensions



Model Code	Weight (kg)	Stroke (mm)	L (mm)	Bore (mm)	H1 (mm)	H2 (mm)	H3 (mm)	H4 (mm)
MMP5-**O150**	4.2	150	280	φ34	31	28.5	33	15
MMP5-**O200**	4.5	200	330					
MMP5-**B150**	4.3	150	280					
MMP5-**B200**	4.7	200	330					
MMP5-**B250**	5.1	250	380	φ40	33	31	33	15
MMP5-**B300**	5.4	300	430					
MMP5-**B350**	5.8	350	480					
MMP5-**R150**	4.7	150	280	φ46	45	34.5	32	17
MMP5-**R200**	5.1	200	330					
MMP5-**R250**	5.5	250	380					
MMP5-**R300**	5.8	300	430					
MMP5-**R350**	6.2	350	480					



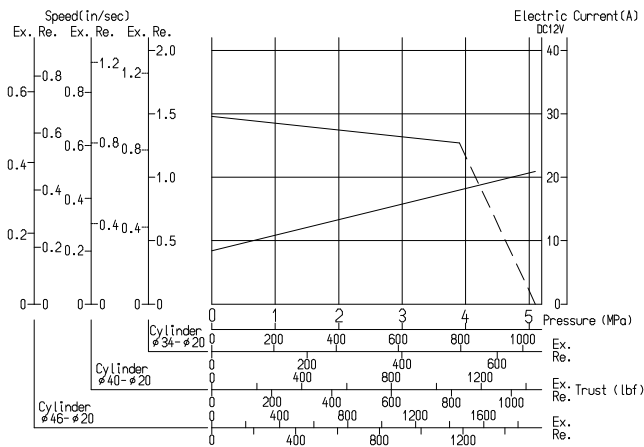
5. Characteristics

The MMP characteristics below are without the use of a slow return valve.

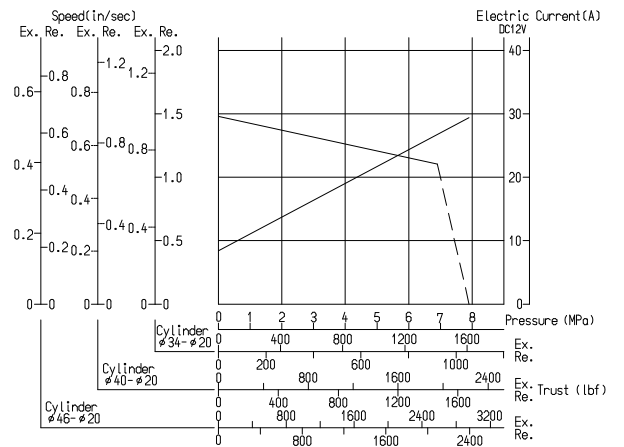
MMP Characteristics: Cylinder Force High -> Speed Low

Due to the difference in the pressure receiving area of the cylinder, the cylinder speed differs depending on whether it is extended or retracted.

4.1 MPa Relief Pressure



7.1 MPa Relief Pressure



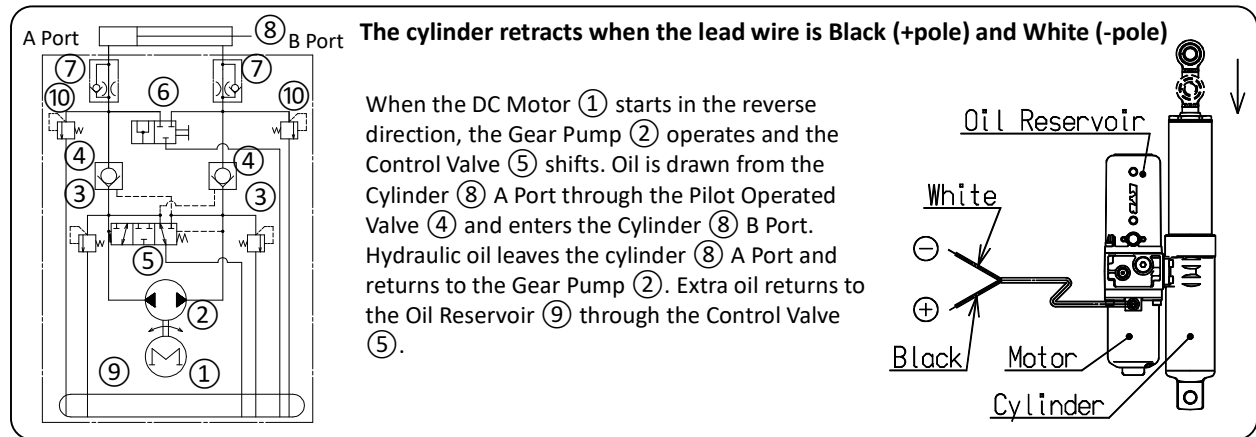
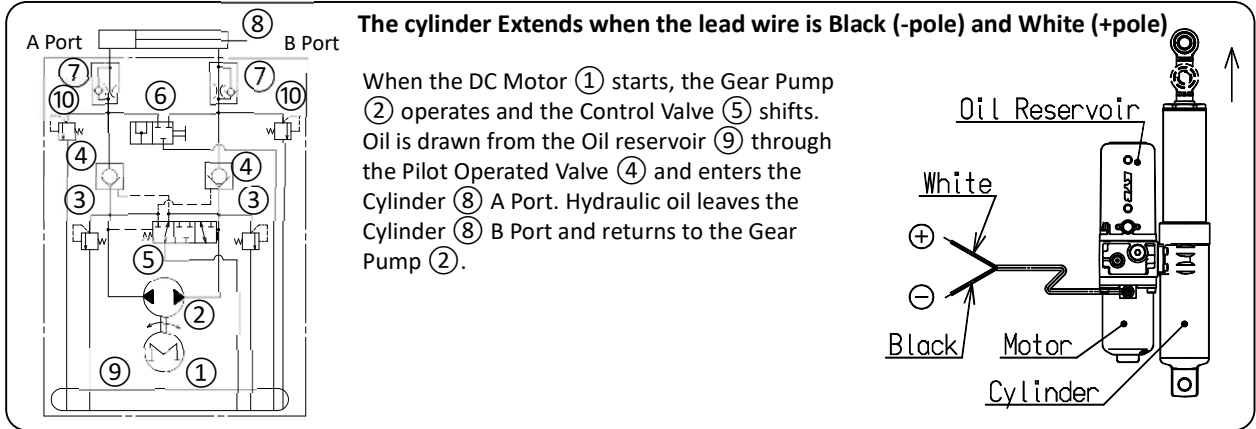
6. Preparation for Use

Unpacking and Checking

All units were carefully packed in boxes. In any case, do not remove anything from any packaging until it has been carefully checked for damage that may have occurred in transit. Report all damage immediately to the carrier and send a copy to the vendor.

7. Operation

Function	Positive	Ground
Extend	White	Black
Retract	Black	White



Load Retention

Upon removing power from the DC Motor ① the load is maintained by means of the Pilot Operated Valve ④ (Cylinder Drift: 0.3 cm³/min or less). The Overload Relief Valve ⑩ works to protect the load holding when the pressure equivalent to the retained load reaches 13.7 MPa.

Caution



Continuous use is not allowed. Relief valve must not be operated more than 2 seconds continuously.

- Due to over-heating, the circuit breaker will operate and the cylinder will stop stroking.
- Hydraulic oil becomes abnormally hot and the product life may be shortened.



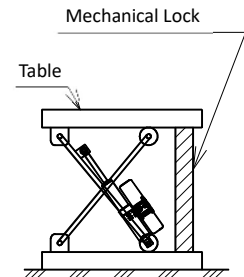
Changing between extension and retraction should be made only after the cylinder stops stroking. Wait at least 3 seconds between operation intervals.

- If the direction of the motor revolution changes while in operation the motor lifetime may be shortened and may also cause oil leakage or other malfunction.



Long term load retention is not possible

- The MMP has internal leakage less than 0.3 cm³/min.
- Long term load retention must not be made for applications such as a jack. In such a case a mechanical lock should be used.
- Without a mechanical lock the MMP could allow the weight to be lowered potentially causing injury.



Do not touch the electric motor

- The motor will become very hot and the operator could be burned.



When not operated for an extended time (1 month or more) the cylinder should be fully retracted.

- Otherwise, the piston rod could accumulate contamination or corrosion which could cause malfunction.



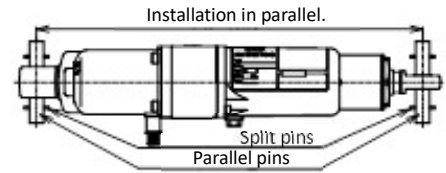
During storage with significant temperature changes, the unit should be mechanically secured to prevent extension.

- To prevent unit failure due to high pressure, overload relief valve may be activated and expand little by little. There is a risk of pushing away or crushing surrounding objects.

8. Mounting / Adjustments

-Installation

To install the MMP, simply fix both ends of the cylinder with two pins and connect the power supply. Use "parallel pins" as the fixing pins, and use cotter pins, etc. to prevent them from falling off.



-Removal

If for some reason, the MMP must be removed from service, follow these instructions:

1. Wear protective eye gear.
2. Disconnect electrical power from the motor.
3. Mechanically hold or block the load held by the actuator to prevent any movement once pressure is relieved.
4. Only after the load is mechanically held in place, remove the MMP.
5. When reinstalling the MMP, follow all the procedures and startup instructions above.



Danger

















Never disassemble or modify the unit

- There is a risk of injury due to abnormal operation such as oil ejecting at high pressure.
- At the time of shipment from the factory, the proper amount of oil is lubricated and the air inside the cylinder is removed. Since it is a completely sealed unit, internal pressure in the tank will be generated, so do not disassemble it.
- Disassembling the MMP will void any warranty.



Caution

-  **When mounting the unit, electric power should be disconnected. Also, do not operate the emergency manual valve.**
 - The cylinder could begin stroking while mounting causing injury.
-  **When mounting no excessive tensile/compressive forces or bending moments should be applied.**
 - This could cause leaks and/or malfunction.
-  **Do not bend or pull the motor rubber stopper when wiring.**
 - Water may enter the motor and cause electric shock or malfunction.
-  **Continuous use is not allowed.**
 - **The relief valve must not be operated more than 2 seconds continuously.**
 - Due to over-heating, the circuit breaker will operate and the cylinder will stop stroking.
 - Hydraulic oil becomes abnormally hot and the product life may be shortened.
-  **Electrical voltages must be within the specified levels.**
 - Other voltages could cause a fire or electrical shock.
-  **Do not pull or damage the electrical cable during mounting. Also, do not bend the lead wire below a 10 mm / 0.4 inch radius.**
 - This could cause electrical shock or malfunction.
-  **If the unit will be used around water, the electrical lead wire connection should be waterproof.**
 - This could cause electrical shock or malfunction.
-  **If the electrical wire length is too long the MMP unit the performance will be reduced.**
 - KYB recommends 14 gauge wire for length up to 3 meters / 10 ft. (In conformity with JIS C3312)
-  **If oil leakage is found, stop operation and replace the unit.**
-  **Do not paint the piston rod.**
 - This could cause oil leakage and/or malfunctions.
-  **When the product is not used for a long time (1 month or more) or for storage the cylinder should be fully retracted.**
 - This will help protect the cylinder rod and prevent contamination and corrosion.
-  **Grease the bearing as often as necessary, depending on use.**
-  **External objects could impact the MMP, so protect the unit with a cover when possible.**
 - This could cause oil leakage and/or malfunction.
-  **Perform sufficient operation validation after installation.**

Safety Devices**A. Relief Valve**


- The MMP has a built in relief valve to protect from overloading. This valve is factory set and cannot be adjusted in the field.
- The relief valve must not operate more than 2 seconds continuously. The hydraulic oil temperature becomes abnormally high, shortening the product life.

B. Overload Relief Valve

- When the load retention pressure reaches 13.7 MPa, the overload relief valve operates in order to protect the unit.
- The cylinder stroke may occur due to excessive external force.

C. Thermal Circuit Breaker

- The MMP is not designed for continuous use and a thermal circuit breaker (bi-metal type) is built into the electric motor. If the generated heat reaches the circuit breakers operating level the electric motor will not function. The unit will automatically recover when the motor temperature cools down to a normal level.


Caution


When the thermal circuit breaker activates, turn off the main switch and allow the electric motor to cool.

- When the unit returns to normal temperature the unit recovers automatically.

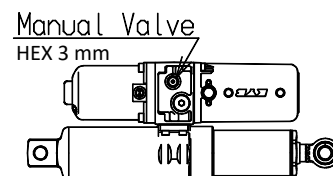


In case the thermal circuit breaker activates often, stop operation immediately.

- Heat buildup may occur and the MMP may ignite.

9. Emergency Manual Operation

In the case of an electrical failure, broken cable or system problem it is possible to stroke the MMP using the manual valve. The cylinder will stroke manually or by external force when the manual valve is loosened with a hexagonal wrench (2~3 turns counterclockwise). This operation should only be made in emergency situation.

**Danger**

Operate the manual valve slowly.

- If turned quickly, the cylinder stroke could stroke rapidly, causing severe injury or death.



When operating the manual valve confirm surroundings and operator safety.

- Sudden movement of the cylinder could cause severe injury or death.



Manual valve operation must be done with the power off.

- Otherwise the unit could malfunction causing injury.



The manual valve must not be loosened more than 4 turns.

- The manual valve may come off and hydraulic oil could spill.



After recovery make sure to tighten the manual valve.

- If the manual valve is not closed (turned clockwise) the unit may not stroke or reach the rated speed/force levels.



When closing the tightening torque is 3.4~3.6 N-m / 2.5~2.6 ft. lb..

- Improper torque could damage the valve seat.

10. Storage

- When the MMP is stored, the temperature range should be within -32~60 °C / -25~140 °F.
- To prevent deterioration of the MMP during storage, store with the MMP cylinder fully retracted.



Caution

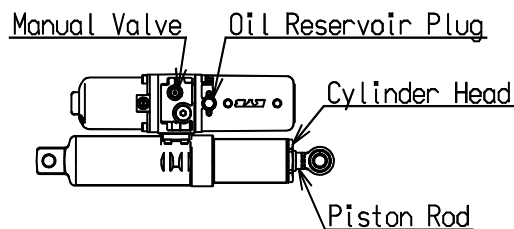


Cylinder must be fully retracted during storage.

- Piston rod could accumulate contamination or corrosion which could cause oil leakage and/or malfunction of the system.

11. Disposal

1. **Before disposal, remove the oil reservoir plug and remove the hydraulic oil.**
 - Before removing the oil reservoir plug extend the cylinder using the emergency manual valve. Once the manual valve has been opened pull out the piston rod manually. Slowly remove the plug because the hydraulic oil is always under pressure and could spill.
 - Hydraulic oil inside the cylinder can be removed by taking the cylinder head off.
2. **For disposal of the hydraulic oil please follow all regulations.**
 - Never dispose of hydraulic oil improperly or illegally.



Warning



Do not expose to fire or high temperatures.

- It could cause a fire.
- It is dangerous to expose to fire or high temperatures since the unit contains a high pressure reservoir filled with flammable oil.

12. Spare Parts

Spare parts are not available since the MMP is a factory sealed unit. Attempts to repair or modify the MMP cannot be authorized.

13. Troubleshooting

Symptom	Cause	Corrective Action
Cylinder will not stroke	<ul style="list-style-type: none"> No electric power supply 	<ul style="list-style-type: none"> Verify power supply connection Verify power supply meets voltage and amperage specifications Check wires and connectors between power supply and MMP for damage
	<ul style="list-style-type: none"> Thermal circuit breaker engaged 	<ul style="list-style-type: none"> Turn off the power and let the motor cool down Follow duty cycle specification Do not operate relief valve for more than 2 seconds
	<ul style="list-style-type: none"> Expired lifetime or electric motor broken wire 	<ul style="list-style-type: none"> Replace entire MMP
	<ul style="list-style-type: none"> Insufficient hydraulic oil 	<ul style="list-style-type: none"> Confirm cause of external oil leakage and replace entire MMP
	<ul style="list-style-type: none"> Relief valve malfunction due to external impact, etc. 	<ul style="list-style-type: none"> Replace entire MMP
Cylinder has erratic movement	<ul style="list-style-type: none"> Air absorption problem 	<ul style="list-style-type: none"> Confirm cause of external oil leakage and replace entire MMP
No load retention	<ul style="list-style-type: none"> Contamination in pilot operated check valve 	<ul style="list-style-type: none"> Replace entire MMP
Cylinder speed is too slow	<ul style="list-style-type: none"> Insufficient input voltage 	<ul style="list-style-type: none"> Check voltage of power supply Recharge battery Use correct size wire
	<ul style="list-style-type: none"> Overloading 	<ul style="list-style-type: none"> The entire system design should be reviewed to eliminate overload situation Cylinder speed varies according to load level which is not faulty performance.
	<ul style="list-style-type: none"> Faulty operation of relief valve 	<ul style="list-style-type: none"> 4.1MPa → 7.1MPa Relief Valve Pressure



Warning



Do not attempt to repair or modify the MMP.

- It is a factory sealed unit that is not serviceable.
- The unit warranty will be void.
- Failure could result in serious injury or death.