SOLENOID METERING PUMP

INSTRUCTION MANUAL
MIT-S SOLENOID METERING PUMP

⚠ Carefully read and understand all precautions before installing and servicing.

CONTENT

1.Precautions

The following precautions should be taken when operating metering pumps. Please read all sections carefully prior to installation.

⚠ Protective Clothing

Wear protective clothing, face shield, safety glasses and gloves when operate or near your metering pump. Additional precautions should be taken depending on the pumped solution. Please refer to MSDS precautions from your solution supplier.

⚠ Water Test

All metering pumps are tested with water before delivered from the factory. If your solution is not compatible with water, disassemble the pump head assembly. Thoroughly dry the pump head, check valves, seal rings, valve balls and the diaphragm. Reassemble head assembly and tighten the screws. Refill the pump head with the solution before start the pump.

⚠ Tubing Connections

Inlet and outlet tubing size must not be reduced. Make certain that all tubing is securely attached to fittings before start-up. Always use the supplied tubing with your pump, as the tubing is specifically designed for use with the pump fittings. It is recommended that all tubing be shielded to prevent possible injury in case of rupture or accidental damage. If tubing is exposed to sunlight, black UV resistant tubing should be installed. Check tubing frequently for cracks and replace as necessary.

⚠ Plumbing Code

Please adhere to your local plumbing codes and requirements. Be sure installation does not constitute a cross connection. Check local plumbing codes for guidelines. Our company is not responsible for improper installations.

⚠ Back Pressure/Anti-Syphon Valve

If it is pumping downhill or into low or no system pressure, a back pressure/anti-syphon valve should be installed. Contact your local distributor for further information.

⚠ Electrical Connections

Warning: To prevent the risk of electrical shock, the metering pump must be plugged into a grounded power with ratings conforming to the data plate on the pump. All wiring must confirm to local electrical codes. If the pump power cable fails, change it by the factory, distributor or authorized repair shop, in case cause any injury.

Warning: To prevent the risk of electrical shock, install on a circuit protected by a ground-fault circuit-interrupter.

⚠ Tubing Depressure

All tubings should be depressured when disassembling or maintenance, in order to prevent solution from splashing.

⚠ Over-pressure Protect

Suggest install safety/pressure relief valve, to prevent over pressure causing the pump or system damage.

2 Product Introduction

2.1 Overview

MIT-S metering pump is a microprocessor controlled solenoid diaphragm pump with changeable frequency. It is capable for all kinds of solutions dosing, including corrosive solutions. It is widely used in petroleum, chemical, food, pharmaceutical, paper, light industry, agriculture, water conservancy and other industrial and technological sectors, in the process solution metering and dosing.

Solenoid metering pump is the use of electromagnetic push rod driven diaphragm in the pump head reciprocating movement, causing the pump head chamber volume and pressure changes. Changes in pressure caused by suction valve and discharge valve opening and closing, to achieve quantitative liquid suction and discharge.

MIT-S solenoid metering pump rated flow range is 1 ~ 20 l / h, with corresponding maximum output pressure of 10 ~ 1bar. The pump outlet displacement can be adjusted according to the pulse frequency selection switch. It is a simple structure, low energy consumption, accurate measurement, with a new screen display of electromagnetic diaphragm metering pump.

2.2 Technical Parameter

2.2.1 General Parameter

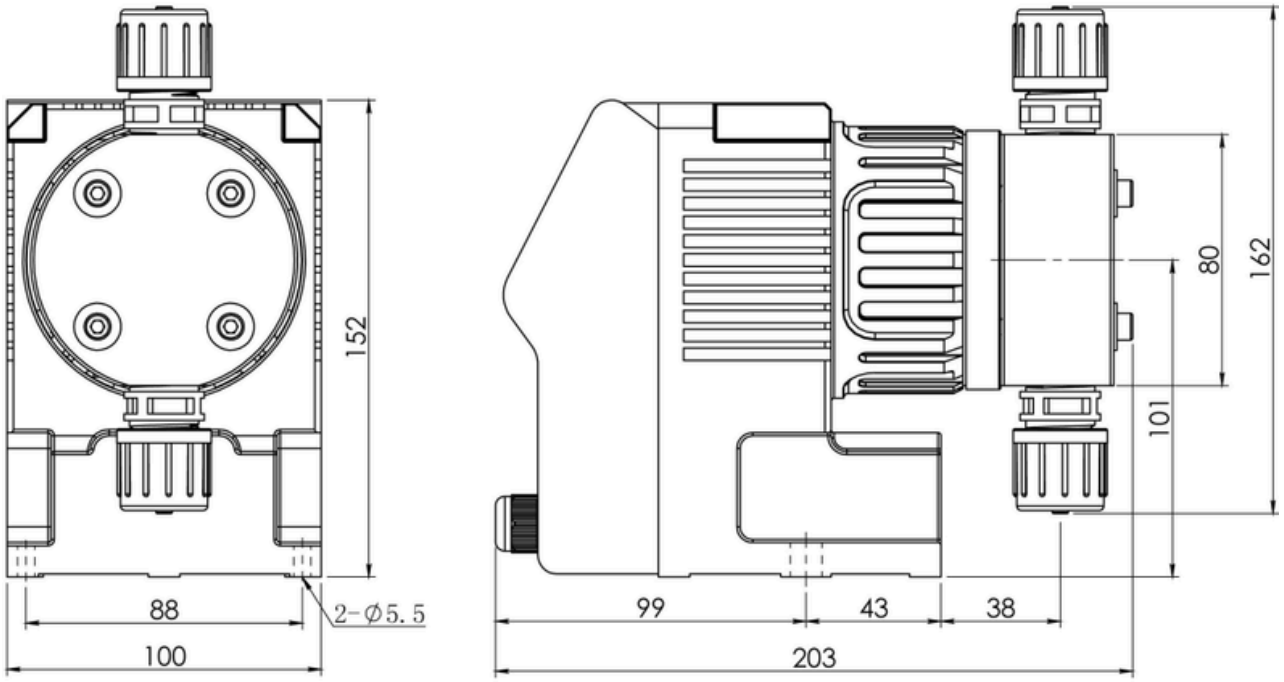
- Metering Precision: ± 2% in stable condition
- Allowable Ambient Temperature: -10℃ ~ +45℃
- Power: AC 220V or AC110V
- Frequency: 50Hz ~ 60Hz
- Input Power:
- Protection Class: IP65
- Insulation Degree: F
- Outer Connection Control: Passive Contact Pulse Signal
- Contact Load: 5V, 0.5mA

Stroke Frequency	Rated Power
90 strokes/min	16W
120 strokes/min	20W
180 strokes/min	28W

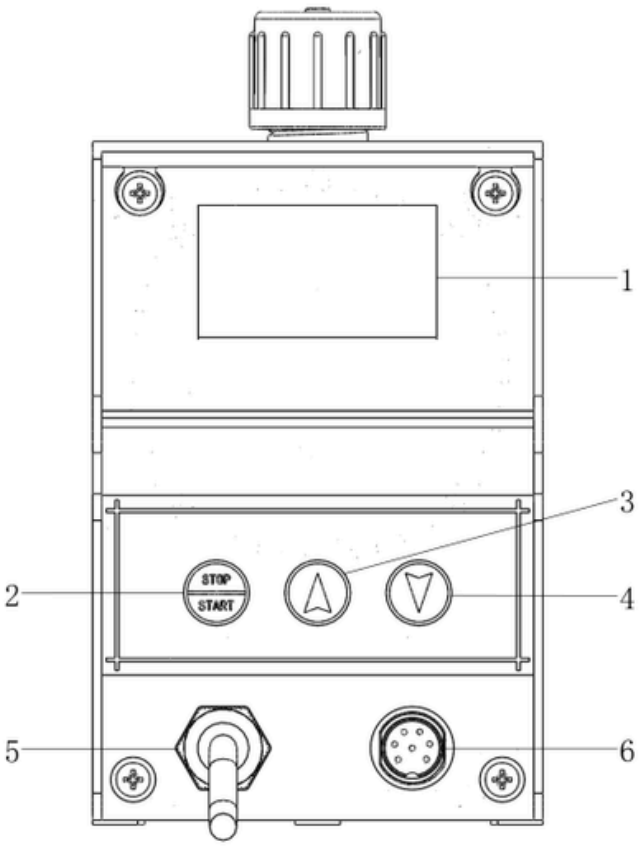
2.2.2 Performance Parameter

Model	Flow (L/H)	Pressure (Bar)	Frequency (Stroke/min)	Caliber (mm)
MIT-S0110	1.0	10	110	¢ 5
MIT-S0408	3.8	7.6	130	¢ 5
MIT-S0607	6.3	6.8	160	¢ 5
MIT-S0805	8.0	5.0	170	¢ 5
MIT-S1204	12	4.0	150	¢ 5
MIT-S1502	15	2.5	170	¢ 5
MIT-S2001	20	1.0	180	¢ 5

2.2.3 Installation Drawing



2.3 Operation Instruction



1 Display Screen

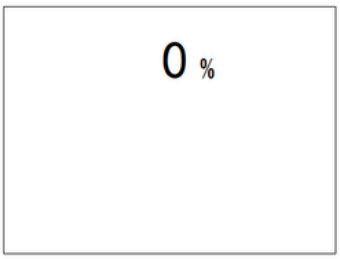
2 Stop/Start Button

3 Increase Button

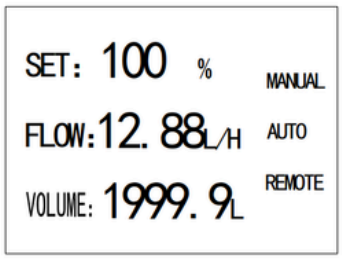
4 Decrease Button

5 Power Cable

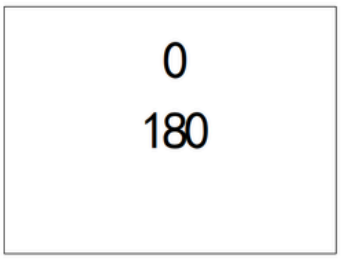
6 Signal Plug



Stop State



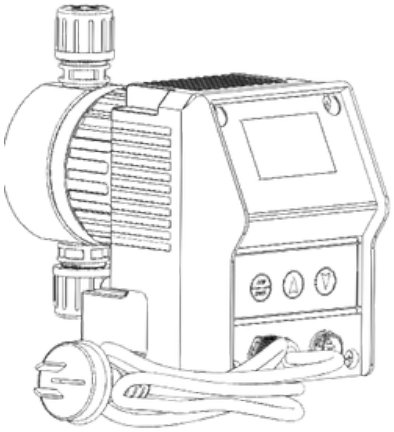
Running State



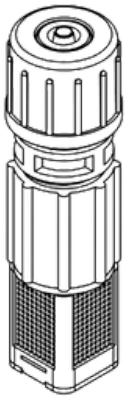
Setting State

2.4 Unpacking Check List

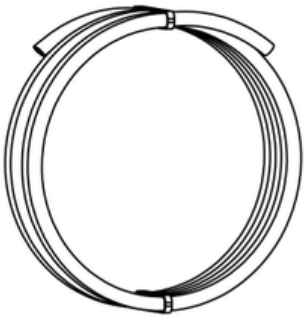
Your carton will contain all or some of the following items. Please notify the carrier immediately if there are any signs of damage to the pump or its parts.



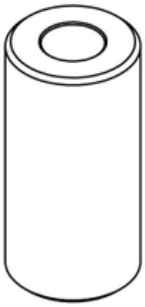
Metering Pump



Foot Valve

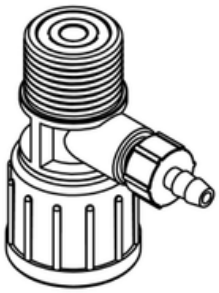


Tubing



Ceramic Weight

Injection Valve



Air Release Valve

3.Installation

- Due to the possibility of water residue at the factory test, if the metered solution can not be in contact with water, water must be removed before starting use and the inside of the pump head can be flushed through the suction side with suitable solution.
- The metering pump should be installed near the dosing tank, where the power supply is convenient. If the pump is exposed directly to the sun, a black UV shield should be installed.
- The installation location of the metering pump should be convenient for personnel to access, operate and maintain, and do not have any obstructions in the work area.
- If the shut-off valve is closed at the discharge side of the metering pump, when the shut-off valve is closed, the back pressure generated by the metering pump may be several times the maximum allowable back pressure, which may cause the discharge tube to rupture. To prevent this from happening, It is recommended to use a relief valve to limit the maximum back pressure within the allowable value.
- Only use the hose diameter corresponding to the hose, hose connector and the provisions of the specifications of the hose, or can not guarantee the connection of a solid and lasting. Do not reduce the hose specifications. Longer pipelines or medium viscous use larger cross-section pipelines and pulsating dampers.

3.1 Pump Installation

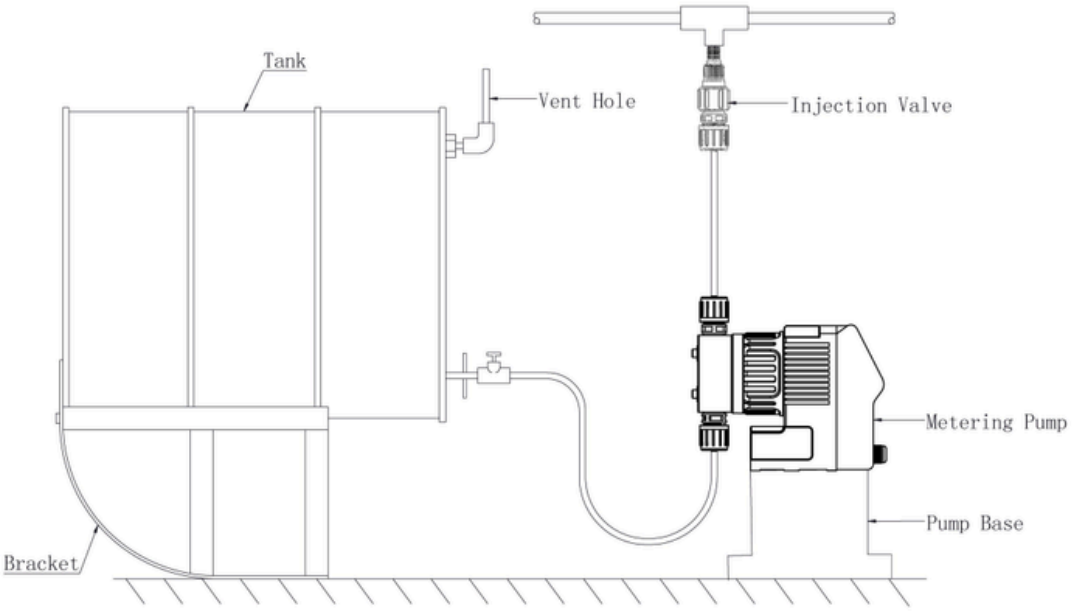
- To ensure safe operation of the metering pump, tighten with bolts.
- To ensure proper operation, the metering pump inlet and outlet must be kept vertical during installation.

The pump has the following two installation methods:

A. Flooded Suction (ideal installation)

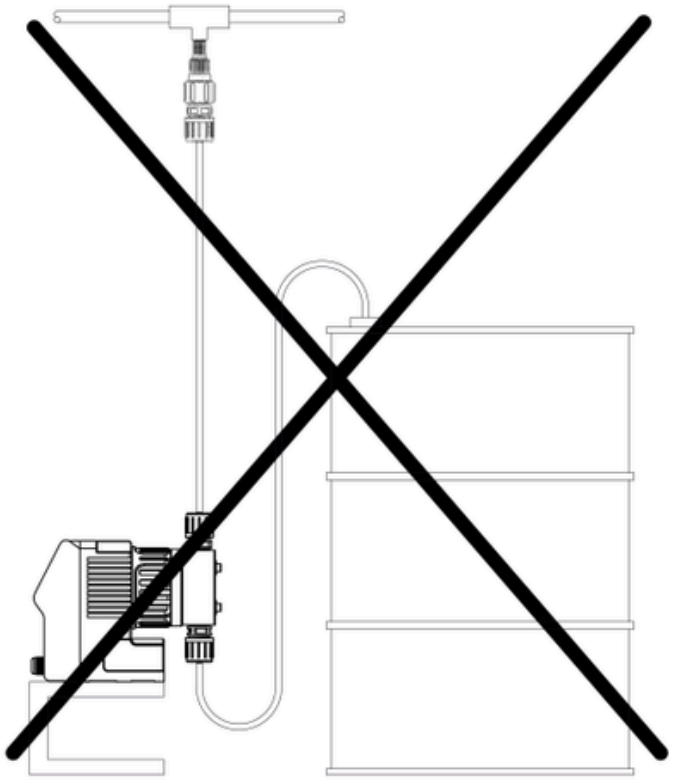
This method is installed by installing the pump on the base of the storage tank. This installation is the most easy, suitable for low flow, volatile, high viscosity solution. As the suction tube filled with the solution, the pump can quickly self-priming, and the chance of priming failure rarely occurs.

This type of installation does not require a bottom valve. If it is transported downwards or transported to a low or low pressure place, install a back pressure valve or an anti-siphon valve. All solutions can be used in this type of immersion, but this is especially recommended for high concentrations of liquids.



Correct Installation

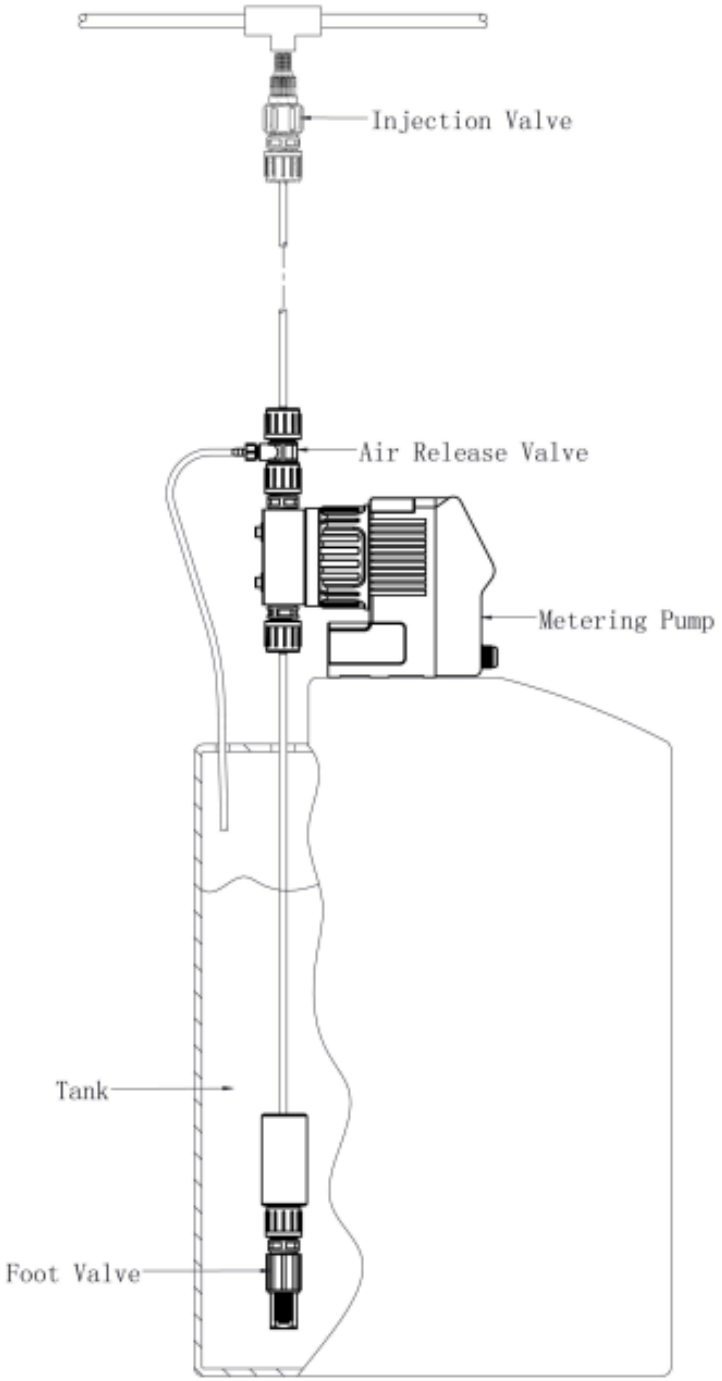
⚠ **Note:** The following figure is typical wrong installation.



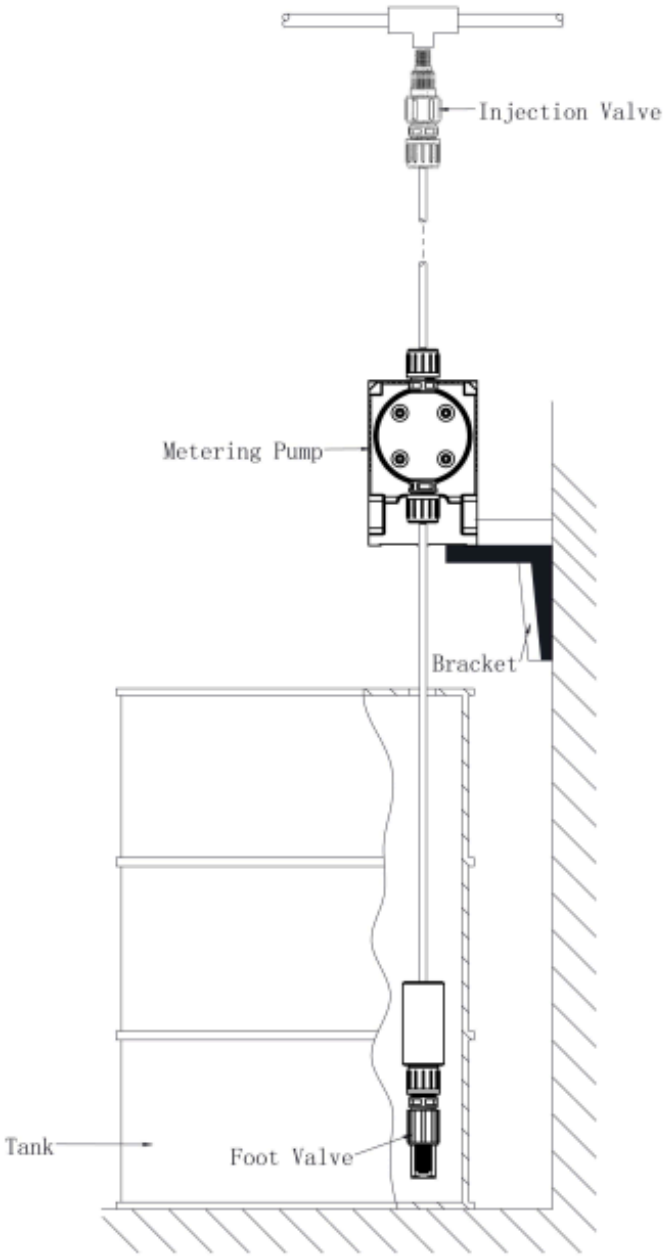
Incorrect Installation

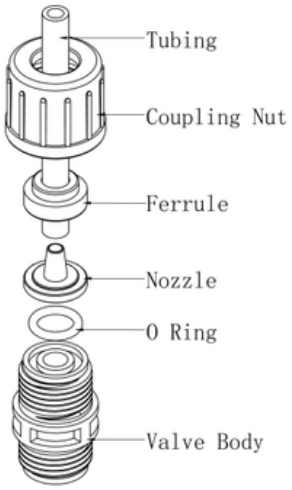
B. Suction Lift;

- Tank Mount: The pump is mounted on the top of the solution tank.



- Wall Bracket Mount: The pump is mounted on the wall with bracket above the solution tank. This method allows for easy changing of the solution tanks.





3.2 Tubing Connections

- Insert tubing through coupling nut and clamp.
- Cut the hose at suitable length, and insert the nozzle as deep as possible.
- Enlarge the diameter of the hose if needed.
- Press the clamp and tighten the coupling nut.

3.3 Food Valve and Suction Tubing Installation

The bottom valve acts as a check valve, allowing the pump to self-priming in the case of a suction installation. The bottom valve must be dipped vertically into the bottom of the dosing medium. If the medium contains a precipitate, the bottom valve should be located approximately 50 mm from the bottom of the tank.

Ceramic weight can make foot valve and suction tube in vertical position.

- Attach the foot valve to one end of the suction tubing (see section 3.2).
- Slide the ceramic weight over the tubing end until it contacts the top of the foot valve coupling nut.
- Place foot valve and suction tubing into the solution tank. Check if the foot valve is vertical and approximately 50mm from the bottom of the tank. Connect the other end of the tubing to the suction side of the pump head (see tubing connection, section 3.2).

3.4 Injection Valve and Discharge Tubing Installation

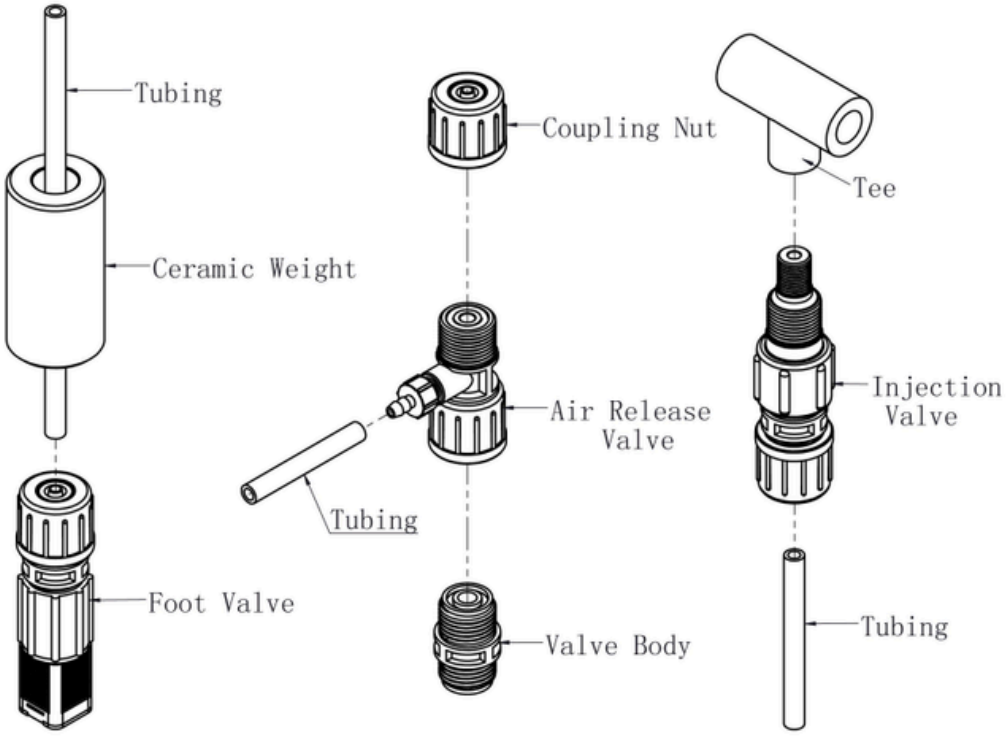
Injection valve prevents backflow. Install the injection valve at the location where chemical is being injected into the system. (see tubing connection, section 3.2)

⚠ **Warning:** When installing the injection valve, make sure that the valve is vertical to the bottom of the tube and that the left and right errors are within 80 degrees.

3.5 Air Release Valve Installation

Air release valve with exhaust sampling function. The valve is mounted on the outlet check valve and is connected to the hose to allow the medium to return to the dosing tank.

⚠ **Warning:** In order to ensure smooth self-absorption, the tube can not be immersed in the medium.



4 Operation and Setting

4.1 Start-Up and Priming

Please read the following carefully before proceeding to the next step. After all the protective measures are done, the pump is installed, the pipe is firmly connected, open all the control valves on the inlet and outlet lines, you can start priming the pump head.

- Connect the power.
- When the pump is running, slowly increase the pulse frequency.
- Suction tubing should begin to fill with solution from the tank.
- A small amount of solution will begin to discharge out the discharge valve.
- The pump is now primed.

The pump has a self-priming function (except for special conditions). If the pump does not self-prime, remove the discharge check valves, pour water or solution into the pump port until the head is filled. Install back the discharge check valve (see check valve assembly), and re-start the prime steps.

4.2 Setting

1. Stop State:

- (Screen display “0%”); Press "STOP / START" button to run the pump.
- In running state, press "STOP / START" button to stop the pump. (Note: Remote control mode does not work.)

- Setting: Long press the "STOP / START" button to enter the parameter "set status". In setting state, press "STOP / START" button for 3 seconds to exit the setting.
- If there is no operation after 10 seconds automatically exit the setting mode.

2. Button Description:

Stop/Start(Setting)

Increase Decrease

3. Parameter List:

Code	Name	Scope	Description
0	Machine Code	1-254	ID code for pump
1	Strokes/Minute	10-180	Pump working frequency
2	Flow Setting	0-999	Setting the flow rate
3	Percentage	0-100	Percentage of the flow
4	RS485 control	0-1	0: OFF 1: ON
5	Control mode	0-3	0: Manual control 1: Pulse signal multiply 2: Pulse signal division 3: 4-20mA signal
6	Pulse base	0-255	Base of pulse counts
7	Remote start/stop	0-1	0: OFF 1: ON
8	Baud rate	0-2	0: 9600 bps 1: 19200 bps 2: 38400 bps

Setting:

Long press STOP START button to enter the setting state, press STOP START button to enter the 0-8 cycle options.

0.Machine Code.

1. Set the minimum number of pulses per minute by pressing the button ▲ ▼ , range from 10-180.
2. Set the calibrated flow value. This value is 10 times of measurement flow value. For example, if the calibrated flow is 6.0 l/h, input value 60. Press ▲ ▼ button to adjust the value from 0-999.

Note: Each pump must be calibrated before use and must input the calibrated value in this setting.

3. Set a fixed flow in percentage when start the pump. After setting the value, the pump will dose at this flow rate each time turning on the pump. Change the value by button ▲ ▼ from 30-100.
4. Open or close RS485 computer control. 0 for OFF, 1 for ON.
5. Control mode, press ▲ ▼ to adjust the mode.

   0 For Manual Control

   1 For Pulse Signal Multiply

   2 For Pulse Signal Division

   3 For 4-20mA Signal Control

6.Base of pulse counts, range 0-255. This setting only works under Pulse Signal Multiply and Pulse Signal Division mode. Under Pulse Signal Multiply mode, the pump will make strokes of this value receiving each pulse signal. Under Pulse Signal Multiply model, the pump will make one stroke after receiving the pulse signals of this value.

7.Open or close the function of remote start/stop the pump.

0 for OFF, 1 for ON.

8.Baud rate. Value options as following:

0: 9600 bps

1: 19200 bps

2: 38400 bps

Modbus Communication Memory Space Setting:

Convention:

- HI ----register high byte
- LO ----register low byte

Register Area	Address (Dec)	Address (Hex)	Storage Data	Scope
Input Register (Read only)	2106	0x083A	Switch Status HI	0 OFF 1 ON
	2107	0x083B	Switch Status LO	
	2108	0x083C	Pulse per Minute HI	0x000a-0x00b4
	2109	0x083D	Pulse per Minute LO	
	2110	0x083E	Pulse Base HI	0x00-0x00ff
	2111	0x083F	Pulse Base LO	
	2112	0x0840	Flow Setting HI	0x0000-0x03e7
	2113	0x0841	Flow Setting LO	
	2114	0x0842	RS485 Control HI	0x0000 OFF 0x0001 ON
	2115	0x0843	RS485 Control LO	
	2116	0x0844	Percentage HI	0x0000-0x0064
	2117	0x0845	Percentage LO	
	2118	0x0846	Running Mode HI	0x0000-0x0005
	2119	0x0847	Running Mode LO	
	2120	0x0848	4-20mA Value HI	
	2121	0x0849	4-20mA Value LO	
	2122	0x084A	Cumulative Flow HI	Uint16 type 0-9496.7The maximum value is automatically cleared or press the ↑ and ↓ buttons at the same time
	2123	0x084B	Cumulative Flow LO	

Register Area	Address (Dec)	Address (Hex)	Storage Data	Scope
	2124	0x084C	Instant Flow HI	0x0000-0x03e7
	2125	0x084D	Instant Flow LO	
	2126	0x084E	Remote Control HI	0x0000 OFF 0x0001 ON
	2127	0x084F	Remote Control LO	
Holding Register (Write)	2129	0x0851	Switch Status HI	0x0000 OFF 0x0001 ON
	2130	0x0852	Switch Status LO	
	2131	0x0853	Pulse per Minute HI	0x000a-0x00b4
	2132	0x0854	Pulse per Minute LO	
	2133	0x0855	Instant Flow HI	0x0000-0x03e7
	2134	0x0856	Instant Flow LO	
	2135	0x0857	Running Mode HI	0x0000-0x0005
	2136	0x0858	Running Mode LO	
	2137	0x0859	Percentage HI	0x0000-0x0064
	2138	0x085A	Percentage LO	
	2139	0x085B	Machine Code HI	0x0001-0x00fe
	2140	0x085C	Machine Code LO	
	2141	0x085D	Pulse Base HI	0x0000-0x00ff
	2142	0x085E	Pulse Base LO	
	2143	0x085F	Remote Control HI	0x0000 OFF 0x0001 ON
	2144	0x0860	Remote Control LO	

Function 1: Read pump parameter function (0x04)

Read all parameter.

Host send format:

Machine Code	Function Code	Register First Address	Number of Registers	CRC Check
1-254	0x04	0x083A	0x0009	0x****
(1 Byte)	(1 Byte)	(2 Byte)	(2 Byte)	(2 Byte)

Slave return correctly:

Machine Code	Function Code	Register First Address	Number of Registers	CRC Check
1-254	0x04	0x12	*****	0x****
(1 Byte)	(1 Byte)	(1 Byte)	(0x12 Byte)	(2 Byte)

Slave error returned:

Machine Code	Function Code	Error Code	CRC Check
1-254	0x84	0x01 (Check does not pass)or 0x03 (Remote control OFF)	0x****
(1 Byte)	(1 Byte)	(1 Byte)	(2 Byte)

Read a single parameter (example: read cumulative flow):

Host send format:

Machine Code	Function Code	Register First Address	Number of Registers	CRC Check
1-254	0x04	0x084A	0x0001	0x****
(1 Byte)	(1 Byte)	(2 Byte)	(2 Byte)	(2 Byte)

Slave return correctly:

Machine Code	Function Code	Bytes	Register Value	CRC Check
1-254	0x04	0x02	Cumulative Flow HI, Cumulative Flow LO	0x****
(1 Byte)	(1 Byte)	(1 Byte)	(0x02 Byte)	(2 Byte)

Slave error returned:

Machine Code	Function Code	Error Code	CRC Check
1-254	0x84	0x01 (Check does not pass) หรือ 0x03 (Remote control OFF)	0x****
(1 Byte)	(1 Byte)	(1 Byte)	(2 Byte)

Function 2: Write a single register function (0x06)
(Example: write switch status)

Host send format:

Machine Code	Function Code	Register First Address	Register Value	CRC Check
0-254	0x06	0x0851	0x0001	0x1BBB
(1 Byte)	(1 Byte)	(2 Byte)	(2 Byte)	(2 Byte)

Slave return correctly:

Machine Code	Function Code	Register First Address	Register Value	CRC Check
0-254	0x06	0x0851	0x0001	0x1BBB
(1 Byte)	(1 Byte)	(2 Byte)	(2 Byte)	(2 Byte)

Slave error returned:

Machine Code	Function Code	Error Code	CRC Check
0-254	0x86	0x01 (Check does not pass) or 0x03 (Remote control OFF)	0x****
(1 Byte)	(1 Byte)	(1 Byte)	(2 Byte)

Function 3: Write multiple register functions (0x10)
Host send format:

Machine Code	Function Code	Register First Address	Number of Registers	Bytes	Setting Value	CRC Check
1-254	0x10	0x0851	0x0005	0x0A	****	0x****
(1 Byte)	(1 Byte)	(2 Byte)	(2 Byte)	(1 Byte)	(10 Byte)	(2 Byte)

Slave return correctly:

Machine Code	Function Code	Register First Address	Number of Registers	CRC Check
1-254	0x10	0x0851	0x0005	0x****
(1 Byte)	(1 Byte)	(2 Byte)	(2 Byte)	(2 Byte)

Slave error returned:

Machine Code	Function Code	Error Code	CRC Check
1-254	0x90	0x01 (Check does not pass) or 0x02 (Parameter setting is invalid) or 0x03 (Remote control OFF)	0x****
(1 Byte)	(1 Byte)	(1 Byte)	(2 Byte)

4.3 Signal Connector Description

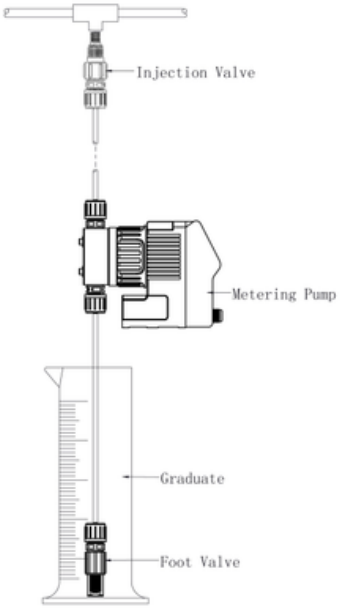
The signal plug has 7 lines,. The following is the wire color and the corresponding function.

1. Blue——485 B
2. Yellow——485 A
3. Black/Green——Zero Line
4. White——Pulse Input
5. Grey—— Remote Control Switch
6. Red——4-20mA Input

4.4 Calibration

Once the installation is complete, the approximate output of the pump is determined and the pump is calibrated to adjust the actual output flow.Make sure the pump is primed, and the discharge tubing and injection valve is installed as they would be in normal service (including factors such as working pressure, solution viscosity, and suction lift)

- Place the foot valve in a graduated container with a volume of 1000ml or more.
- Start the pump, until all the air in the exhausted from the suction line and head.
- Stop the pump. Refill the graduated container to a level starting point.
- Using a stopwatch or timer, turn the pump on for a measured amount of time(120 strokes minimum). The longer the time period, the more confident you can be of the results.
- Stop the pump. Record the time and the volume of the discharge medium, calculate the flow rate.
- If the output is too low or too great, increase or decrease the speed accordingly.



5 Maintenance and Repair

⚠ Caution

- Electrical maintenance must be carried out by qualified electricians.
- Before servicing, unplug the power plug or disconnect the power. Cut off its power if there is a relay. Make sure that the pump's power supply is not turned on during maintenance.
- The drainage pipe should be decompression before maintenance. Discharge and wash the pump head cavity. Use of corrosive liquid is prohibited .
- If the metered medium is a hazardous or unknown liquid, check the performance parameters of the metered liquid before servicing. The pump head should be emptied and cleaned.

5.1 Maintenance

Metering pump maintenance, should strictly check the

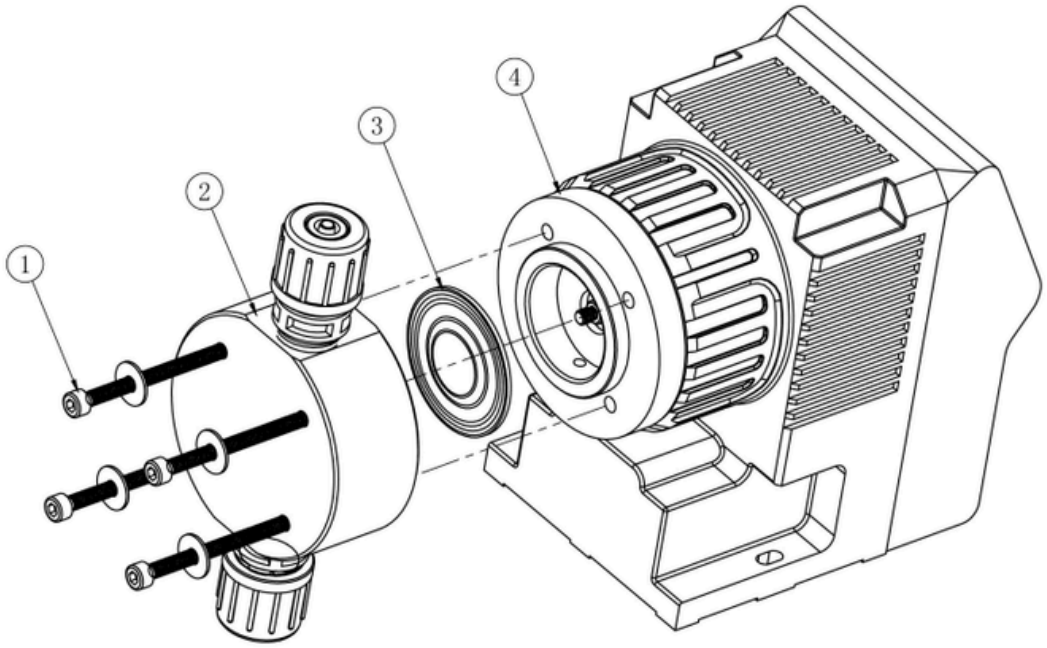
following:

- Pump head bolts (connection is firm).
- Discharge tubing(connection is firm).
- Pump head and suction check valve(connection is firm).
- The drain hole on the diaphragm base (drip indicates that the diaphragm may be damaged).

5.2 Diaphragm Replacement

⚠ Must wear protective clothing, face shield, safety glasses and gloves in the process of replacement. See also other protective measures on the Material Safety Data Sheet provided by the material supplier.

MIT-S metering pump is designed for trouble free operation, but in order to make the pump in the best working condition, the elastic parts must be maintained daily. It is recommended to replace parts such as diaphragm, check valves, sealing rings, springs every year according to the actual situation.



- Depressurize, drain, and remove the discharge tubing from pump .
- Place the bottom valve in water or other neutral solution. Start the pump and rinse the pump head. When the pump head is rinsed, remove the bottom valve from the liquid and continue running the pump to allow the air to enter until the pump head has no water or a neutral solution. (If the liquid can not be pumped due to diaphragm rupture, remove the four bolts ① on the pump head, and immerse the pump head in water or other neutral solution.
- Stop the pump and disconnect the power, unscrew the bolts①.
- Pull the pump head② and the bolts ① from the pump body.
- Turning the diaphragm③ counter-clockwise, and remove it.
- Turning a new diaphragm③ on to the driving shaft. Check the screw condition.
- Turning out the diaphragm③ again.
- Install the diaphragm base④ on the pump body(the drain hole must be down).
- Turning the diaphragm③ clockwise to the driving shaft until tightened.
- Install pump head② back to the pump body(Take care of the check valves direction).
- Diagonally tighten the bolts①.
- After 24 hours operation, recheck the screws and tighten if necessary.

5.3 Check Valves Replacement

The check valve is a cartridge design and should be replaced as a whole component. Refer to the pump head section 7 in this manual.

- Depressurize and disconnect the discharge line from the pump head.
- Place the bottom valve in water or other neutral solution. Start the pump and rinse the check valves. When the check valves are rinsed, remove the bottom valve from the liquid and continue running the pump to allow the air to enter until the discharge valve has no water or a neutral solution.
- Disassemble the discharge check valve, and place each part in correct order.
- Disconnect the suction tubing from the suction valve.
- Disassemble the suction check valve, and place each part in correct order.
- Check the ball valve, seat, seal wear, if necessary, to be replaced.
- Re-install the check valve components (reverse position of disassembly).
- Reconnect to the pump head and the piping system.

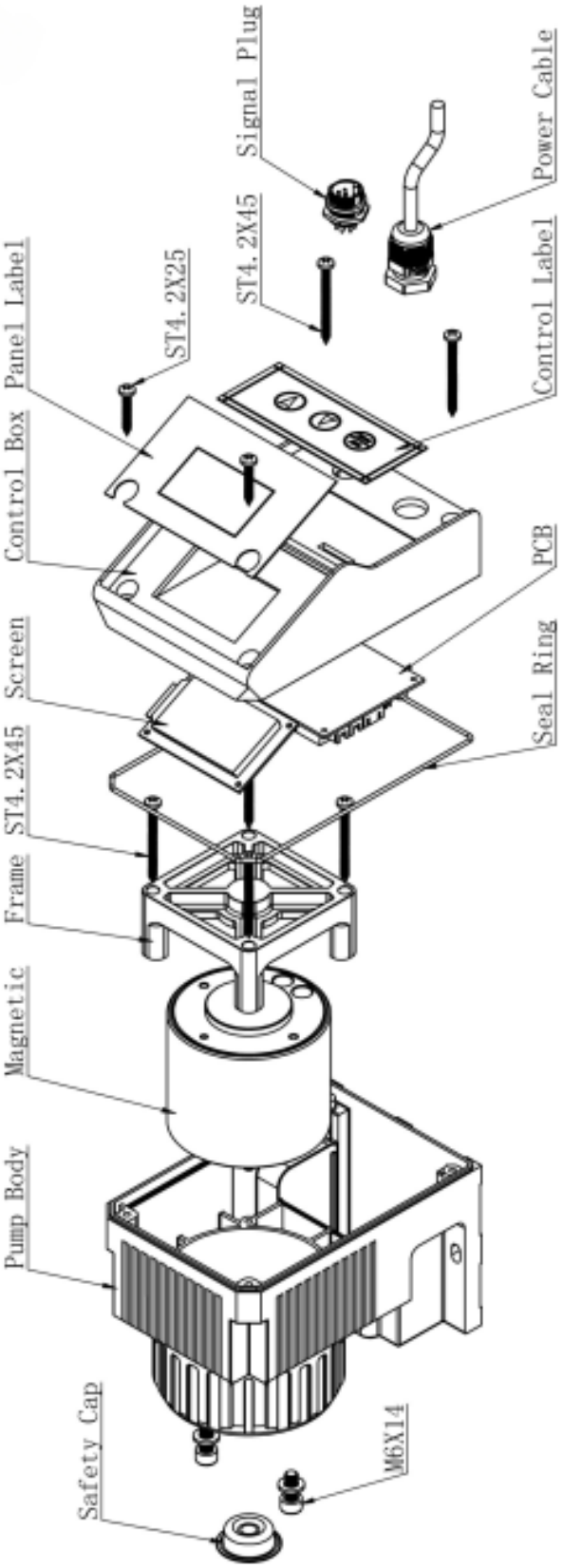
6 Troubleshooting

Problem	Possible Cause	Solution
Pump Not Start	Power supply fault.	Check the power.
	Fuse blown.	Eliminate overload, replace the fuse.
	Power circuit.	Find the location of the circuit and handle it.
	Wiring error.	Check the wiring diagram.
	Pipeline, pump cavity blockage.	Check the pipe, pump cavity, and check valves, clean the dirt.
	Wrong setting.	Check the setting.
No Output	Pump not run.	Check power and setting.
	Solution tank is empty.	Fill the solution tank.
	Pipeline block.	Clean the pipeline.
	Shut-Off valve closed.	Open the valves.

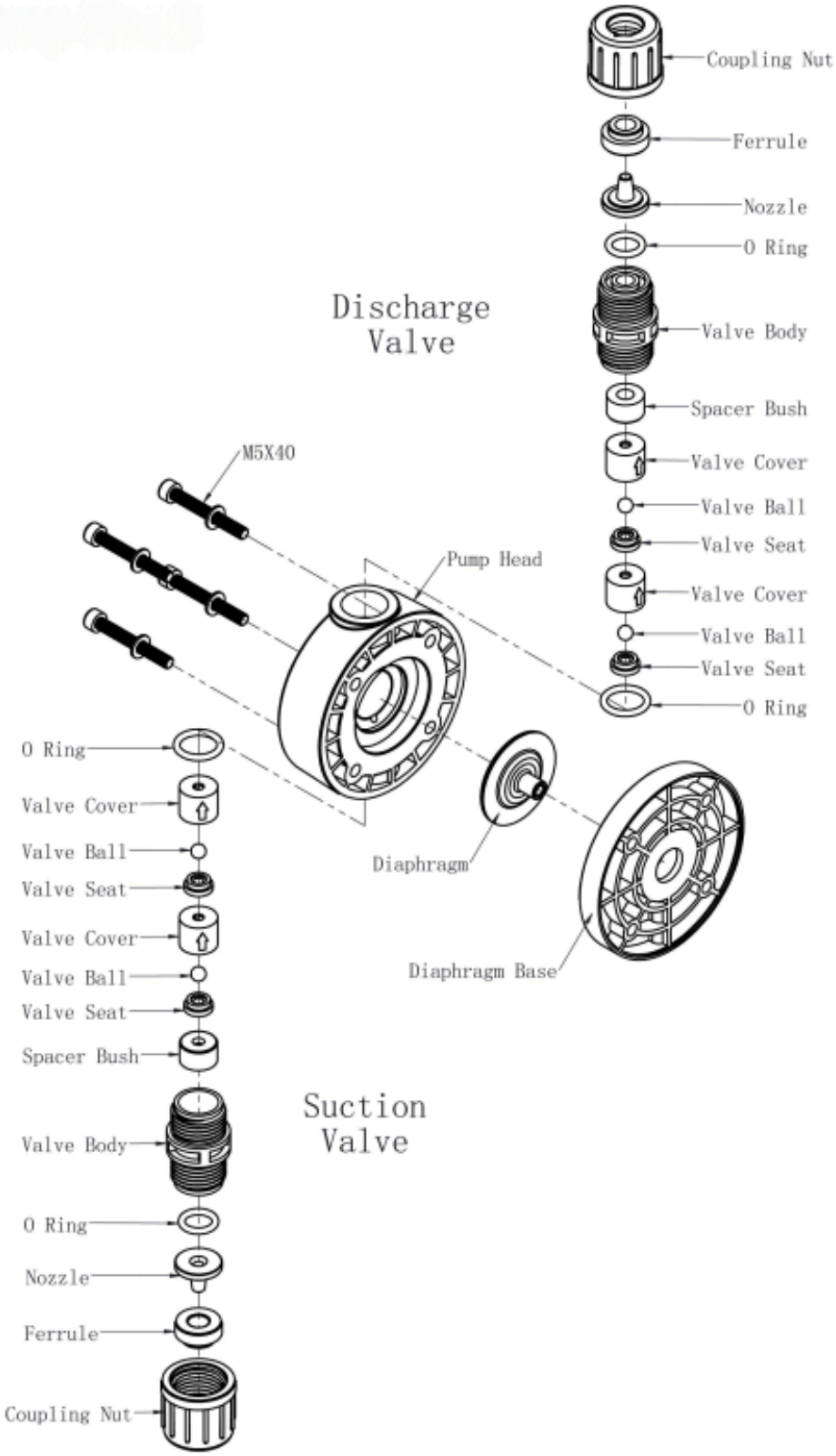
Problem	Possible Cause	Solution
	The ball check valve is blocked by particles.	Check and flush the check valves.
	Air in the pump cavity.	Release the air.
	Cavitation	Increase the suction pressure, reduce the suction lift.
	Priming problem.	Repriming and check the leakage.
	Strainer block.	Clean or change the strainer.
Low Output	Check valves wear or with particles.	Clean or change the check valves.
	Wrong calibration.	Evaluate and correct it.
	Solution viscosity too high.	Diluting the viscosity or increase the pipe size.
	Medium cavitation.	Increase the suction pressure, reduce the suction lift.
Output gradual descend	Check valve leakage	Clean or change it.
	Suction tubing leakage.	Find out the leakage point and handle it.
	Strainer block.	Clean or change the strainer.
	Medium change.	Check the viscosity
	Tank air vent hole is blocked.	Dredge vent hole.
Flow Unstable	Suction tubing leakage.	Find out the leakage point and handle it.
	Cavitation.	Increase the suction pressure, reduce the suction lift.
	Check valve block.	Clean or change it.

7 Main Parts List

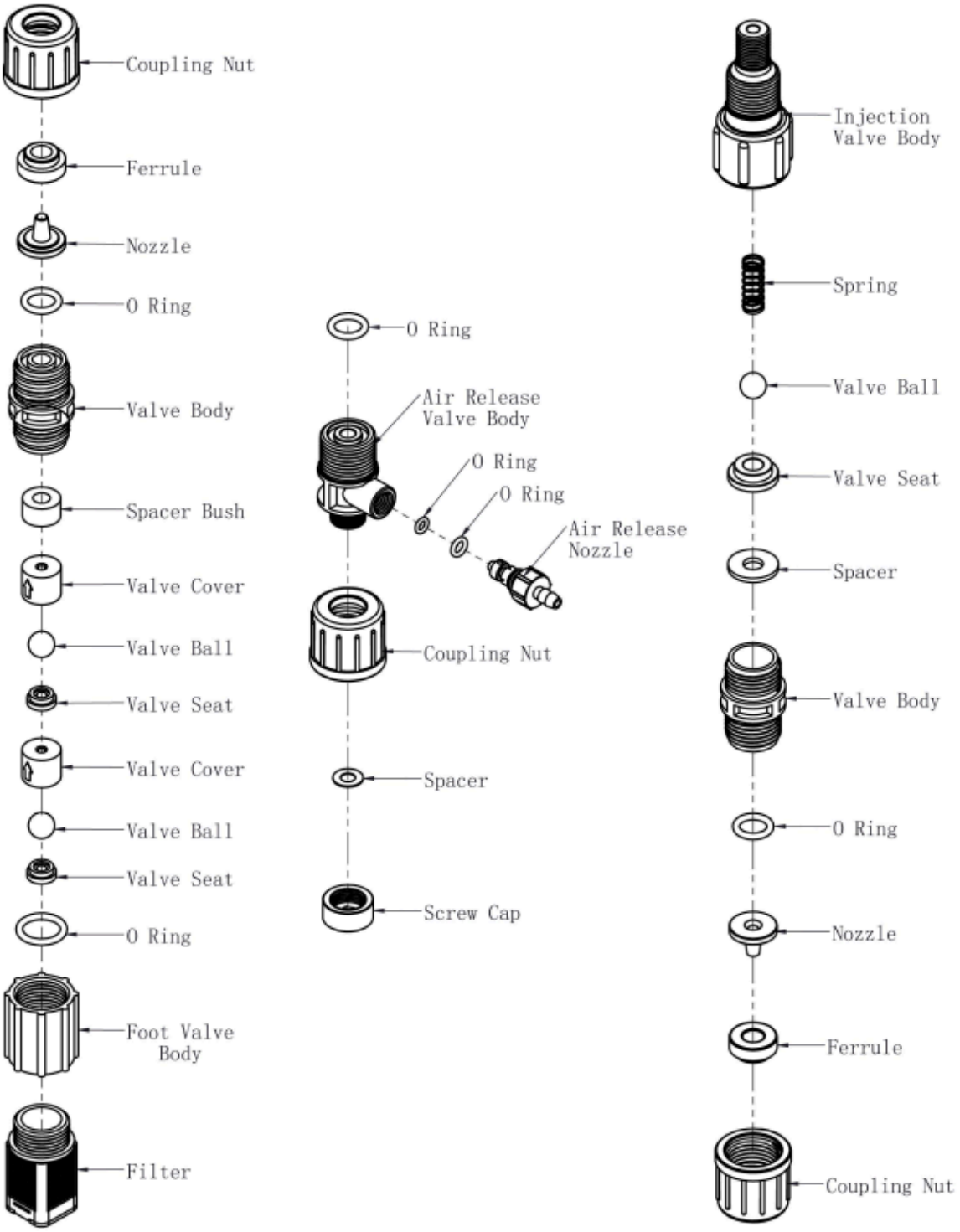
Pump Body



Pump Head


Coupling Nut
Ferrule
Nozzle
O Ring
Discharge Valve
Valve Body
Spacer Bush
Valve Cover
Valve Ball
Valve Seat
Valve Cover
Valve Ball
Valve Seat
O Ring
M5X40
Pump Head
O Ring
Valve Cover
Valve Ball
Valve Seat
Valve Cover
Valve Ball
Valve Seat
Spacer Bush
Diaphragm
Diaphragm Base
Valve Body
Suction Valve
O Ring
Nozzle
Ferrule
Coupling Nut

Valves



Foot Valve Air Release Valve Injection Valve

Appendix

Requirement on the Voltage Supply

Power supply in some areas is unstable. Excessive fluctuations in power supply affect the use of equipment, and even cause damage to the pump.

MIT-S solenoid metering pump power supply range is ± 10% of the rated voltage(for details, please refer to the relevant technical information).

For areas where the supply voltage fluctuates or the surge voltage exceeds the allowable range, please install an AC regulated power supply. Equipment loss due to over voltage of power supply, our company does not assume the responsibility of quality assurance.

Please read the manual carefully before use.

Thank you for using
MIT-S SOLENOID METERING PUMP

Website

LINE Official

Website : www.mit-trade.com
Email : info.mittrade@gmail.com
Phone : 081-123-2475