SAIVS®
赛维思

Operation Instructions

SPA Series Pneumatic Torque Wrench Pump

Please read these instructions carefully before operating. And keep instructions properly for future reference.

CE

These instructions contain warnings, precautions, operation practices, and troubleshooting for special pneumatic pump station for hydraulic torque wrenches.

These operation instructions only for the reference of the end users.

I. Receiving Notice (Unpacking Inspection)

Visually inspect all components for shipping damage. Shipping damage is not covered by warranty. If shipping damage is found, notify carrier at once. The carrier is responsible for all repair and replacement costs resulting from damage in shipment.

II. Overview

The SPA series pneumatic hydraulic pump is a kind of independently integral hydraulic device assembled in integrated mode and is composed of power unit, pneumatic units, and control devices, featuring high flow, small volume, light weight, simple structure, easy operations, high operating pressure, and high energy-saving and environmental-friendliness.

1. Without the electronic control system, it's powered by pneumatic pressure, featuring higher operation safety and reliability and suitability for explosion-proof applications.
2. It's fitted with high-efficiency cooling system to adapt to extreme environments.
3. The special pressure regulator valve can guarantee the long-term continuous working and stable pressure.
4. The input air pressure is 4~8Bar.
5. It features automatic switchover among three flows and three pressure outputs.
6. Two output pressures are provided, of which the high pressure output port (port A) is fitted with high pressure relief valve adjustable within 7~70MPa and the low pressure output port (port R) is fitted with low pressure relief valve regulated at 7MPa at the time of delivery.

III. Safety Instructions

Safety First

The hydraulic torque wrench pneumatic pump station is a kind of power source. Before use, please carefully read all instructions, warnings, and precautions and abide by the safety measures to prevent personal injuries and equipment damages during operations. SAIVS will not be liable for any damage arising from unsafe or incorrect operations.

In event of abnormality during operations, please turn off the power switch, and then consult with SAVIS or SAIVS' authorized dealer.

Please ensure to abide by the following precautions and warnings.

Precautions

1. The hydraulic pump is connected by high pressure hoses, quick couplings, and wrenches. Please use the SAIVS supplied high pressure hoses, quick couplings, and hydraulic wrenches.
2. The used scrap hydraulic oil is an industrial waste. Please have it collected and disposed by an industrial waste processing company.
3. Operating environment: Please operate this pump indoors whenever possible. For outdoors applications, ensure to take the rainproof measures. Applicable for explosion-proof applications.
4. Air source: Ensure that a reliable and stable clean dry air source is provided, with the operating air pressure at ≤8Bar and the input flow at ≥1.9m^3/min. An inappropriate air source will probably damage the pneumatic motor.
5. Hydraulic oil selection: The hydraulic pump adopts 32# wear-resistant hydraulic oil and the working environment temperature is -10~60ºC. Under the temperature of <0ºC, to prevent the hydraulic oil from freezing the pump, warm up the pump for 10~30min before use. To use this product under -10~-30ºC temperature, please replace with corresponding low trademark hydraulic oil.

Warnings

1. During running of the hydraulic pump, all personnel must keep away from hydraulic oil outlet, in order to prevent the potential personal and property loss in event of leakage of hydraulic oil. Keep it away from fire source.
2. Before operating the pump station, ensure to install high pressure hoses and quick couplings to prevent the spray of high pressure oil from causing personal injuries.
3. The maximum operating pressure of this hydraulic pump station is 70Mpar. The low pressure relief valve is set as 7Mpa before delivery. It's prohibited to adjust the pressure beyond this value.
4. To operate other equipment by this pump station, it's necessary to adjust the pressure of this pump to the operating pressure of the equipment (The regulated pressure must be less than the maximum operating pressure of this hydraulic pump).

5. Cut off the power supply (air source) before repairs.
6. It's prohibited to start the hydraulic pump station without oil, otherwise it will cause equipment damage.
7. Adjust the pressure regulator valve to 0MPa before adjusting the pressure and ensure to increase gradually the pressure during the pressure test.
8. It's prohibited to refit this pump station. All refitting works without the written consent of SAIVS will not be covered by warranty scope. In event of special needs, please consult with SAIVS or SAIVS' authorized dealer.
9. Immediately stop using this pump station if the temperature of pump station exceeds 85ºC. Wait for the pump station to cool, otherwise it will impair the life of the pump station.
10. Do not fill the oil to be above the capacity of the oil tank, otherwise the hydraulic oil will overflow to pollute the environment and equipment.
11. When the pressure regulator valve is not to be used for a long time, completely loosen the relief valve to prolong the service life of valve.
12. Ensure the complete engagement (Figure 1) while connecting the quick coupling, in order to ensure that the check valve in the connector is opened to prevent oil line blockage. Otherwise, the check valve in the connector can't be opened after connection to obstruct the oil line, in which case the pump station is pressurized after the application of pressure and the wrench can't work to probably damage the quick coupling and wrench and even cause personal injuries. For quick coupling, directly insert the male connector into the female connector to the end and then tighten the sleeve.

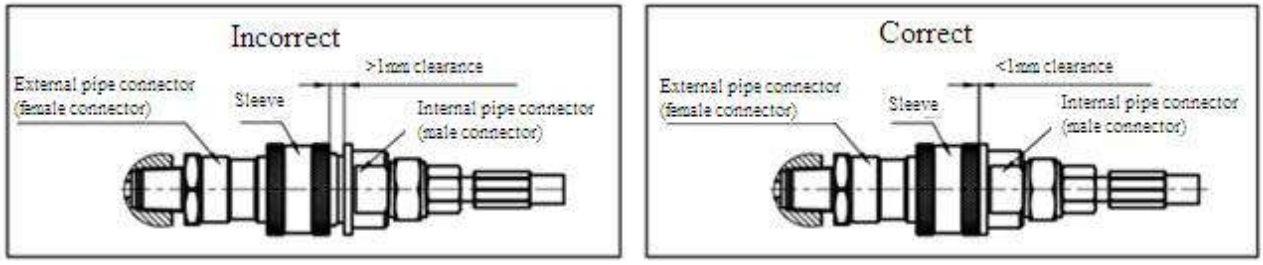


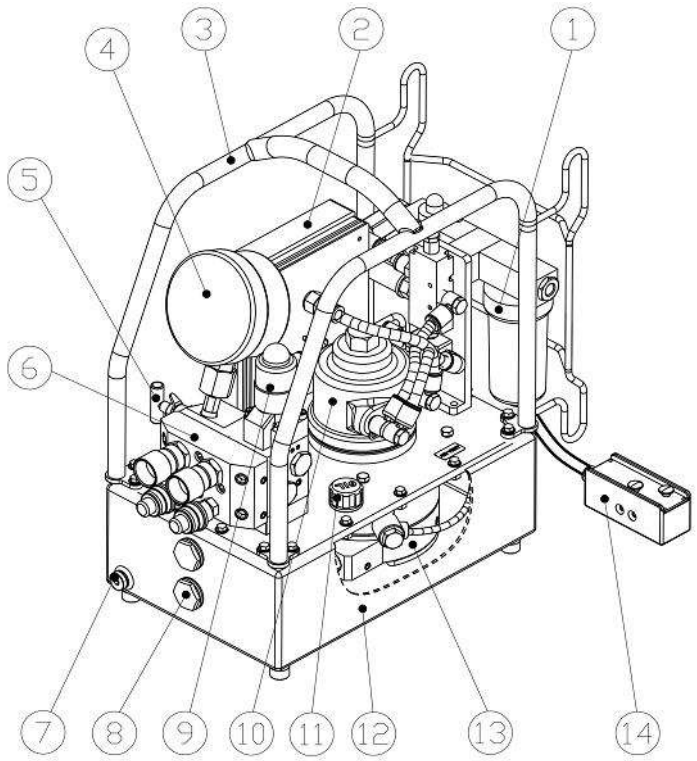
Figure (1)

13. Ensure to keep clean the hydraulic pump station, installed equipment cylinder, and internal pipeline of high pressure hoses, especially the oil outlet and the quick coupling. The dirty hydraulic oil is a main cause leading to malfunction of hydraulic pump.
14. Use 30# or 46# wear-resistant hydraulic oil for the hydraulic pump. It's prohibited to use a

hydraulic oil with oil content or corrosive to the steel or aluminum.

15. In event of splash of hydraulic oil into your eyes, flush with clean water immediately for at least 15min and then seek for medical treatment.
16. Ensure that all hoses and other connectors are correct in dimensions and securely installed. Never use any damaged, worn, or aged air hose or other connector. The hoses are of wearing part and are vulnerable to ageing and difficult to observe. Therefore, ensure to replace the hoses periodically.
17. Keep away from all positions with possible overflow of super-pressure hydraulic oil and never touch any pressurized hose. The spray of hydraulic oil will cause serious injuries.
18. Before operations, ensure to check the oil cup (Figure 3) for sufficient lubricating oil. The insufficient or no lubricating oil will accelerate the wear speed of pneumatic motor blades, impair the performance of tool, and increase the maintenance works.

IV. Exterior View of Pump Station and Overview of Main Parts



No.	Name	Quantity
14	Pneumatic control handle	1
13	Pump head	1
12	Oil tank	2
11	Oil filler and ventilator plug	1
10	Pneumatic motor (See nameplate for specification)	1
9	Directional control valve	1
8	Level gauge	1
7	Drainage port	1
6	Group valve	1
5	High pressure relief valve	1
4	Pressure gauge	1
3	Protective cage	1
2	Cooler subassembly	1
1	Pneumatic control subassembly	1

1. Pneumatic control subassembly: It's the pneumatic control part of the hydraulic pump that realizes the filtration and drying of the input air source.
2. Cooler subassembly: It's functioned to reduce the oil temperature during working of oil pump
3. Protective cage: It's installed on the oil tank for carrying and protection of hydraulic pump.
4. Pressure gauge: This pressure gauge indicates the operating pressure of hydraulic pump, with the measurement range at 100MPa and the accuracy at 1MPa.
5. High pressure relief valve: Also referred to as pressure regulator valve, this relief valve adjusts the operating pressure of hydraulic pump (The maximum operating pressure is limited at 70MPa at the time of delivery. It's prohibited to adjust the pressure above this maximum pressure).
6. Group valve: The diversified types of hydraulic control valves in the hydraulic system are connected to realize the control on the output and return of the hydraulic oil and guarantee the normal working of system under preset pressure.
7. Drainage port: It's functioned to drain the hydraulic oil from the oil tank (during replacement of hydraulic oil).
8. Level gauge: It's functioned to observe the level of hydraulic oil, in order to guarantee the

supply of the optimal oil volume.

9. Pneumatic control directional control valve: It realizes the directional control function for output and return of high and low pressure hydraulic oil and the unloading function.
10. Pneumatic motor: It's functioned as power source, with detailed parameters as below:

    Operating air source ----------4-8bar compressed air

    Top speed of pneumatic motor ---------- 2800r/min

    Air input interface ---------- PT1/2"

    Minimum specification of air hose ---------- 3/8in/10mm

11. Oil filler and ventilation plug: Oil filler port.
12. Oil tank: It's functioned for storage of hydraulic oil (The oil tank must contain sufficient oil).
4. Pump head: This radial plunger pump realizes three-stage flow output.
14. Pneumatic control handle: It controls the operating and return of the hydraulic torque wrench.

V. Operation Procedure

1. Preparations

1) Oil level: Check the pump oil level before start. If the oil level reaches the maximum level of the level gauge (8) (Figure 2), it indicates that the oil tank is full. When the oil level drops to the minimum level, it indicates that the oil refilling is required. In such case, open the oil filler and ventilation plug (11) and slowly add the oil of appropriate volume.

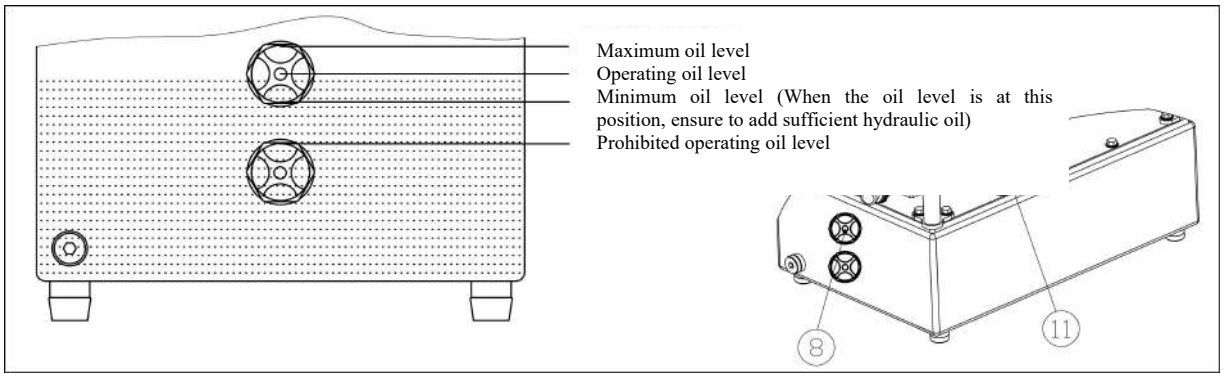


Figure (2)

2) Air source processing unit: Filter and oil feeder (Figure 3):

   Filter: It filters out the water and oil contents from the compressed air. Observe the condensate volume therein through the transparent window on the filter cup. If the water volume is excessive, drain the water.

   Water drainage of filter: This part adopts a semi-automatic drainage device. The water drips in

the filter cup can be automatically drained when the pressure is less than 0.5kgf/cm2. Alternatively, directly push upward the drainage valve stem to drain the air and water. After the water is fully drained, the drainage valve core will automatically stop the air bleeding. In case of environmental factor consideration, the PU hose can be added to direct the water to other place for drainage.

Oil feeder: After the compressed air is supplied into the pressure regulator, some air is supplied into the oil cup to compress the oil into the oil suction hose and the oil is dripped via leakage hose into the mist sprayer and is mixed into the compressed air to realize lubrication function. The oil adjustment screw on the top of the oil sightglass can adjust the oil filling volume. Adjust the oil volume based on the number of operating cycles by a flat-end screwdriver.

There are two methods to fill oil into the oil cup:

a. When the adding of lubricating oil is required for the motions of equipment but the air source can't be cut off, directly unscrew the oil filler screw by an Allen wrench. Thanks to the internally designed check valve, the air outlet hole immediately cuts off the air source once the oil filler screw is disassembled. In such case, directly add the oil by an oil pot.
b. Ensure that the air source and the internal hose pressure is completely relieved and then directly rotate counter-clockwise the oil cup and pull it down by hand to disassemble the oil cup and add the lubricating oil into the oil cup.

Warning: Before operations, ensure to check the oil cup for sufficient lubricating oil. The insufficient or no lubricating oil will accelerate the wear speed of pneumatic motor blades, impair the performance of tool, and increase the maintenance works.

Notice: Rotate counter-clockwise and then pull downward or rotate clockwise and then push upward to rapidly and easily disassemble or install the filter cup, oil cup, and protective cover. The cup is made of material with 30% plastic and 60% nylon, which can improve the durability of cup in rough environments.

Warning: The air inlet port is marked by arrow on the body. Do not input the air reversely, otherwise it will lead to occurrence of abnormality.

Warning: Ensure to use 32# lubricating oil that conforms to ISO VG32 standard. The over-thick lubricating oil will cause obstructed oil spray and even oil supply failure.

Warning: Ensure to place vertically, otherwise it will lead to abnormal motions of drainer.

Filter Oil feeder

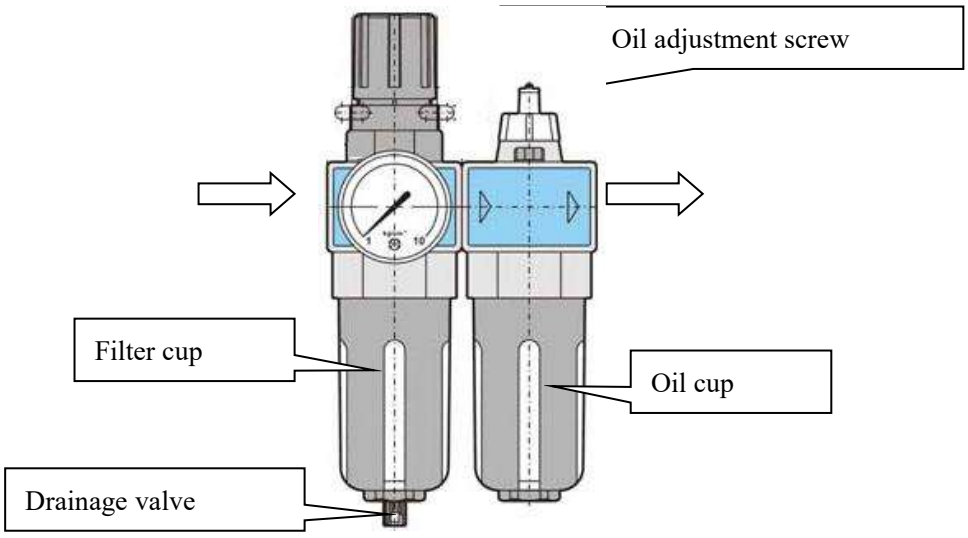


Figure (3)

3) Pneumatic motor: Please provide the air source as per the designated air pressure on the pump nameplate.

Start of motor: Connect the air hose at the air inlet to the air source (Figure 4) and press [ON] button of pneumatic control handle to run the pneumatic motor.

Stop of motor: Press the [OFF] button of handle to stop the rotation of motor.

4) Prestart: The prestart is required for the first operation, after oil replacement or long-term unused of pump station, or under cold weather. Loosen the pressure regulator valve (5) counter-clockwise to complete relief. Start the motor to idle the pump station for a while. After the air in the pump is completely bled and the oil pressure is stable without any abnormality, put the pump into operation. (Notice: Upon detection of any noise, immediately cut off the power supply and consult with SAIVS or SAIVS' authorized dealer).

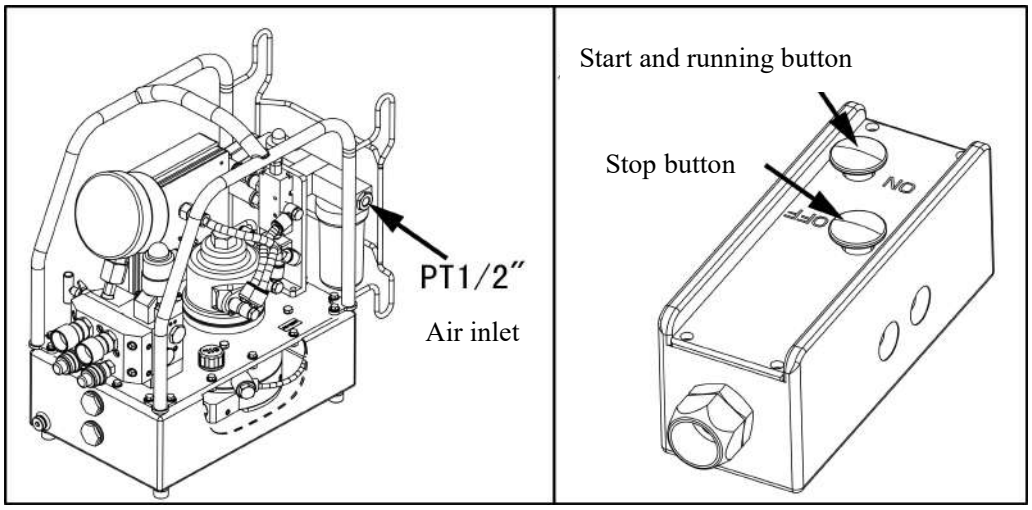


Figure (4)

5) Connections of oil lines: Connect the high pressure port (port A) of pump to the high pressure port (port A) of hydraulic torque wrench and the low pressure port (port R) of pump to low pressure port (port R) of hydraulic torque wrench respectively by 70MPa high pressure hoses (Figure 5). Ensure that the quick couplings are connected properly before operations (Figure 1).

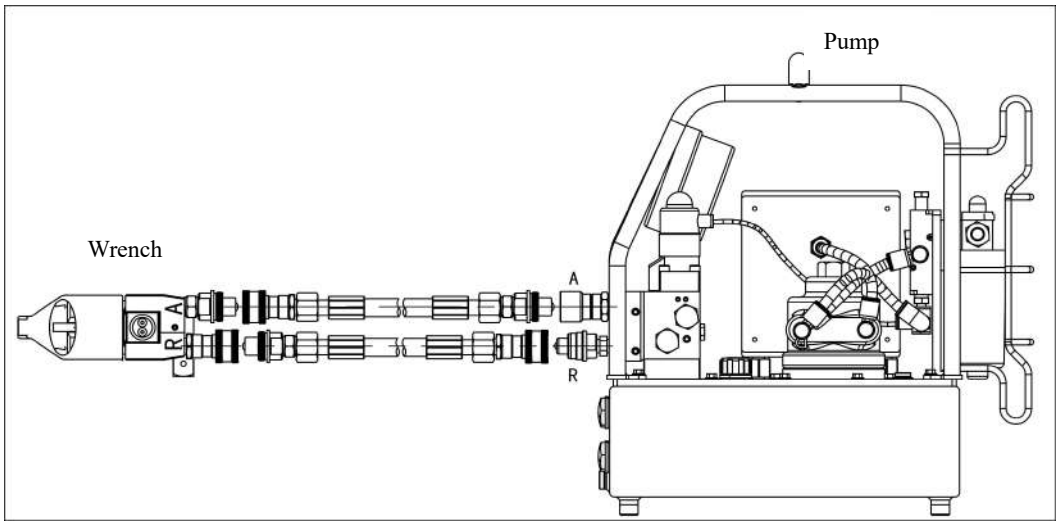


Figure (5)

Notice: Do not loosen any high pressure oil hose during working of pump.

Notice: Do not connect the oil hoses while the pneumatic motor is running.

2. Adjustment of pressure

1) Pressure regulation: After the start of motor, completely loosen counter-clockwise the handle of pressure regulator valve (5). In such case, the pressure is almost zero. Then, depress and hold the button of [ON] and at the same time rotate the handle of pressure regulator valve (5) clockwise to increase the pressure gradually to your desired value.

2) Pressure verification: After the proper adjustment of pressure, press the button of [ON] again to verify the pressure.

Notice: When the pump is not to be used for a long time, completely loosen the pressure regulator valve counter-clockwise to prolong the service life of valve.

Warning: Adjust the pressure before placing the wrench onto the head of nuts or bolts. The pressure setting of the pump shall not exceed the pressure required to meet the demanded torque. Exceeding the demanded torque will probably damage the equipment and cause serious personal injuries.

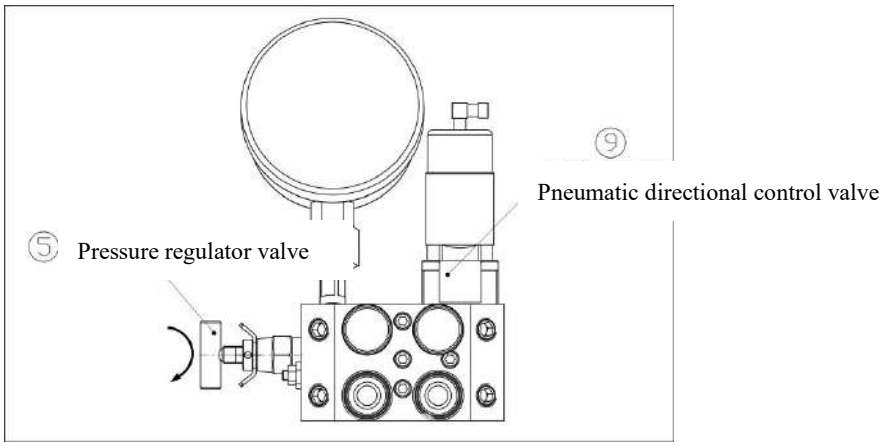


Figure (6)

3. Operations

1) Operation of wrench: After the above-mentioned preparations and pressure regulation, depress and hold the button of [ON] so that the pump station outputs high pressure oil to operate the wrench and release the button so that the pump station outputs low pressure oil to return the wrench.
2) At completion of operation: Press [OFF] button to stop the pump station. Cut off the air source, and disassemble the high pressure hoses and install the dust caps.

VI. Maintenances

1. Maintenances before operations

1) Before operations, check all electric parts for presence of looseness and poor contact. If yes, repair immediately.

2) Check and ensure that the operating air pressure in the site is 4~8bar and the air input flow is ≥1.9m3/min.

3) Check whether the water in the filter is too many. If yes, drain the water. Check the oil feeder for presence of lubricating oil. If not, ensure to add oil.

4) Check whether the hydraulic oil level reaches the specified level. If insufficient, timely add hydraulic oil.

5) Check the piping and equipment for presence of oil leakage. In event of oil leakage, determine the cause and treat accordingly.

2. Maintenances during operations: Upon detection of any abnormality in the following checking items, immediately stop the pump station for treatment.

1) Check for presence of abnormal noise, vibration, and smell and check for presence of clearly reduced speed during the working of pneumatic motor.

2) Check for presence of abnormality during the pressure rise.

3) Check the hydraulic oil for over-high temperature.

4) Check the piping and equipment for the presence of oil (or air) leakage.

5) Check for serious pressure pulsation (>5MPa).

6) Check for reduced rotation speed under high pressure.

3. Maintenances after operations

1) Ensure to cut off the air source after operations.

2) Check for presence of oil leakage. Upon detection of any abnormality, determine the cause and treat accordingly.

3) After the operations, clean the pump station and install dust caps to quick couplings.

VII. Replacement of Hydraulic Oil

1. Replace the oil after the first 100 working hours and afterwards replace the oil once every 300 working hours. Before oil replacement, fully drain the oil from the oil tank and clear up the oil tank. Under severe working environment, shorten the oil replacement interval depending on the actual conditions.

   Detailed operations: Open the oil filler and ventilator plug (6) on the hydraulic pump, unscrew the drainage plug (10) from the side drainage port of oil tank to fully drain the hydraulic oil into an appropriate container, and then clean and reinstall the drainage plug (Figure 7).

2. When necessary, disassemble the oil tank and clean the inside of oil tank and the pump head filter screen.

   Detailed operations: Unscrew 18 connecting screws between oil tank cover plate and oil tank body. In such case, the entire pump head can be taken from the oil tank. Disassemble the pump head filter screen, clean the filter screen by solvent and a soft brush, and then reinstall the cleaned filter screen.

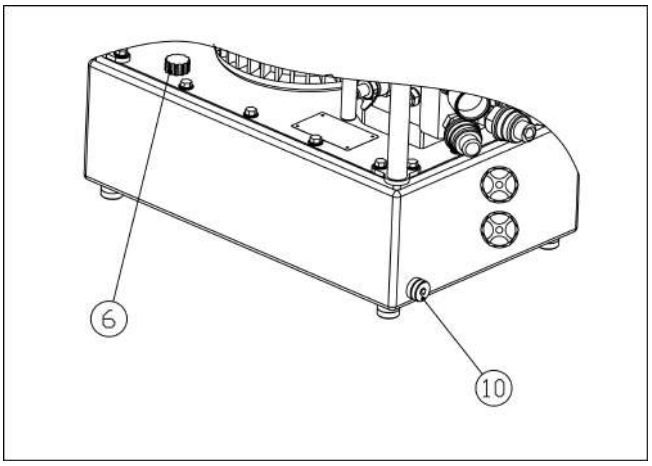


Figure (7)

VIII. Specification

Model	Name	Flow (high/medium/low) L/min	Pressure (High/medium/low) MPa	Motor power	Input air source (bar)	Length of remote control cable installed for cup (m)	Net weight (Kg)	Capacity of oil tank (L)	Oil outlet/return interface	Overall dimensions (mm)
SPA-70	Special hydraulic torque wrench pneumatic pump	0.65/1.4/7	70/30/7	1.1KW	4/8	5	22	5	NPT1/4	490*305*495

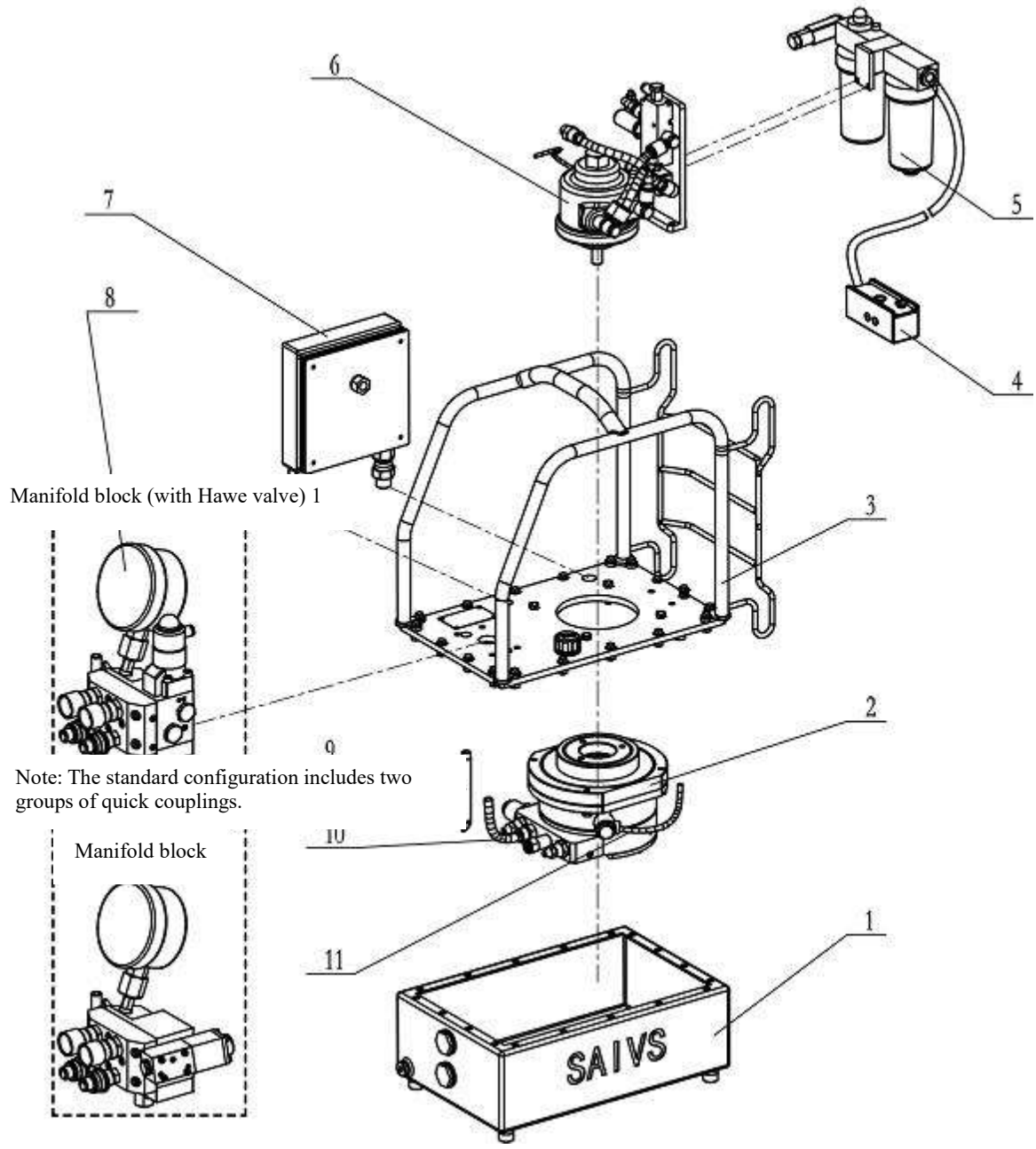
IX. Troubleshooting

Symptom	Malfunction analysis	Solution
Start failure of pump station	1. Inconsistency between voltage and specified voltage of this pump station	1. Ensure the consistent voltage
	2. No power supply for motor	2. Check all parts and ensure that the power supply is supplied.
	3. Damage of motor	3. Replace motor
No system pressure	1. No oil or insufficient oil in oil tank	1. Add hydraulic oil to specified level.
	2. Low pressure setting of relief valve	2. Adjust relief valve to required pressure.
	3. Blockage due to dirty oil	3. Replace hydraulic oil and clean hydraulic pump and filter screen.
	4. No oil suction of plunger pair	4. Open air bleeding valve (AIR VENT) to bleed air from pump head and ensure that the pump head is full of hydraulic oil (See Air Bleeding in Operation Procedure).
Failure of rated system pressure	1. Low pressure setting of relief valve	1. Adjust to rated pressure.
	2. Serious wear of plunger pair	2. Replace plunger pair.
	3. Serious wear of directional control valve core	3. Replace directional control valve.
	4. Damage of relief valve	4. Replace relief valve.
	5. Air content in system	5. Operate repeatedly to fully bleed air.
	6. Blockage of directional control valve by dirt	6. Clean directional control valve
Unstable system pressure	1. Dirty oil	1. Clean pump station and replace hydraulic oil.
	2. Damage of relief valve	2. Replace relief valve.
	3. Serious wear of plunger pair	3. Replace plunger pair.
	4. Air content in system	4. Operate repeatedly to fully bleed air.
	5. Blockage of directional control valve by dirt	5. Clean directional control valve

Note: If the above-mentioned problems can’t be solved, please timely contact SAIVS or SAIVS’ authorized dealer for troubleshooting by professionals.

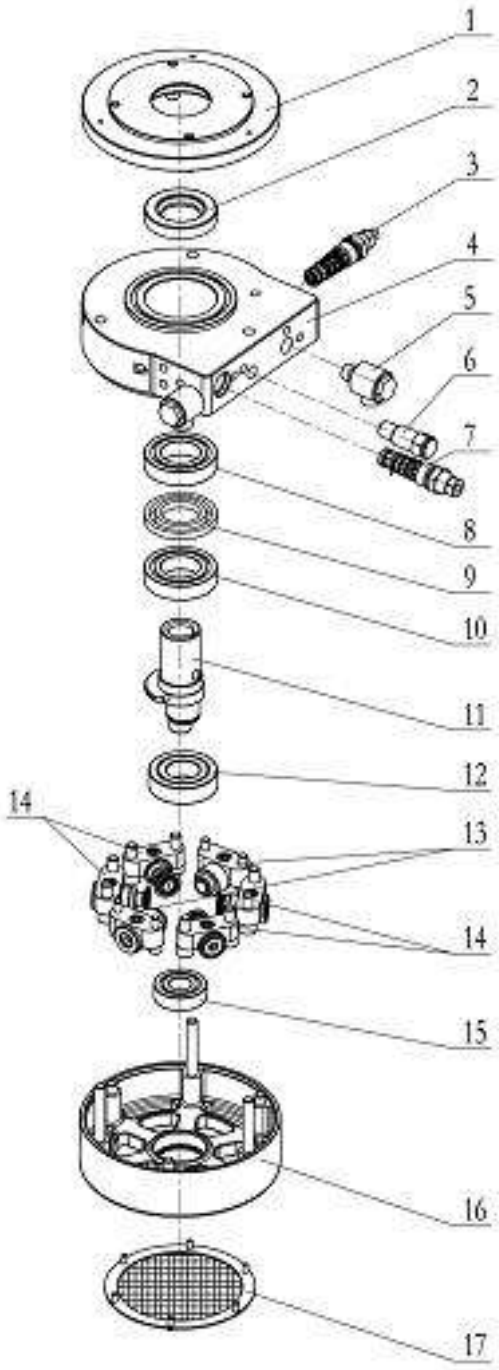
X. Explosive View of Hydraulic Pump

Assembling Explosive View of Pump



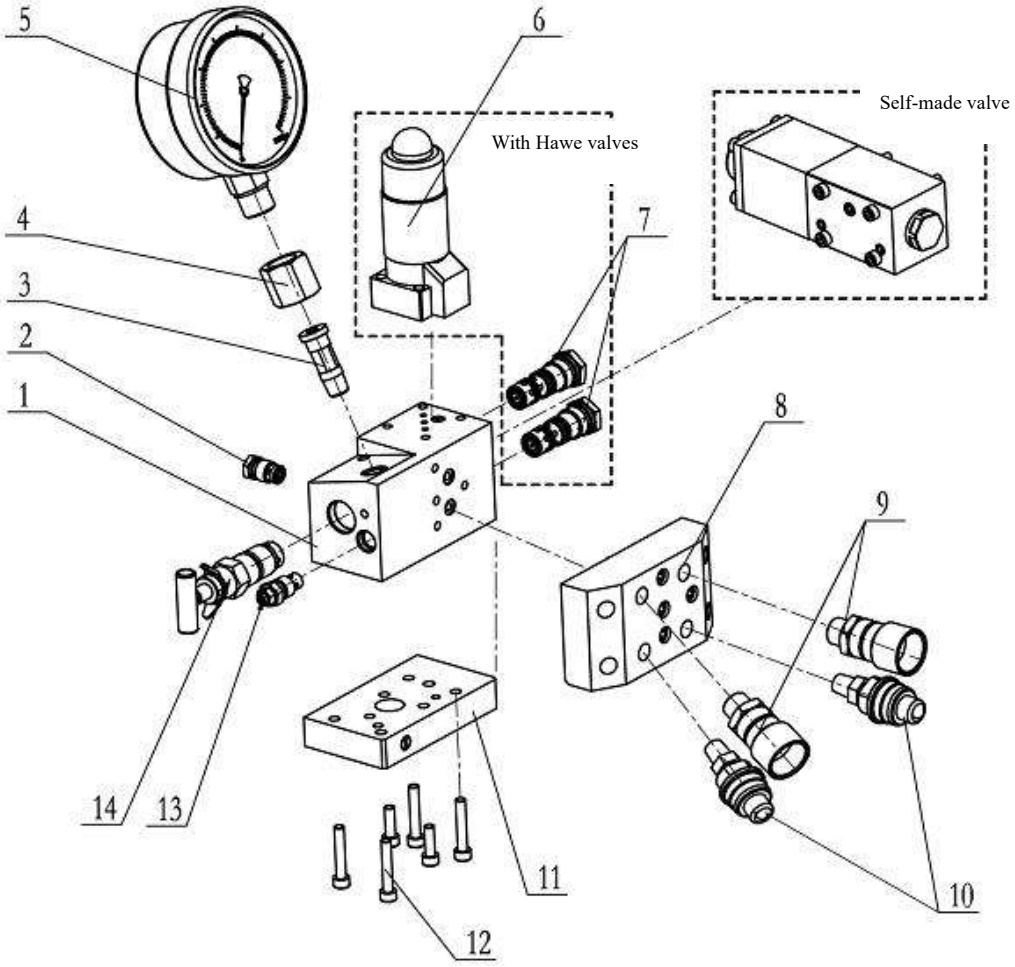
6	Pneumatic motor	12	
5	Oil-water separator (filter and oil feeder)	11	Ventilation hose
4	Pneumatic control handle	10	Oil inlet hose
3	Protective cage	9	Fuel return hose
2	Pump head	8	Manifold block
1	Oil tank subassembly	7	Cooler subassembly
No.	Name	No.	Name

Explosive View of Pump Head



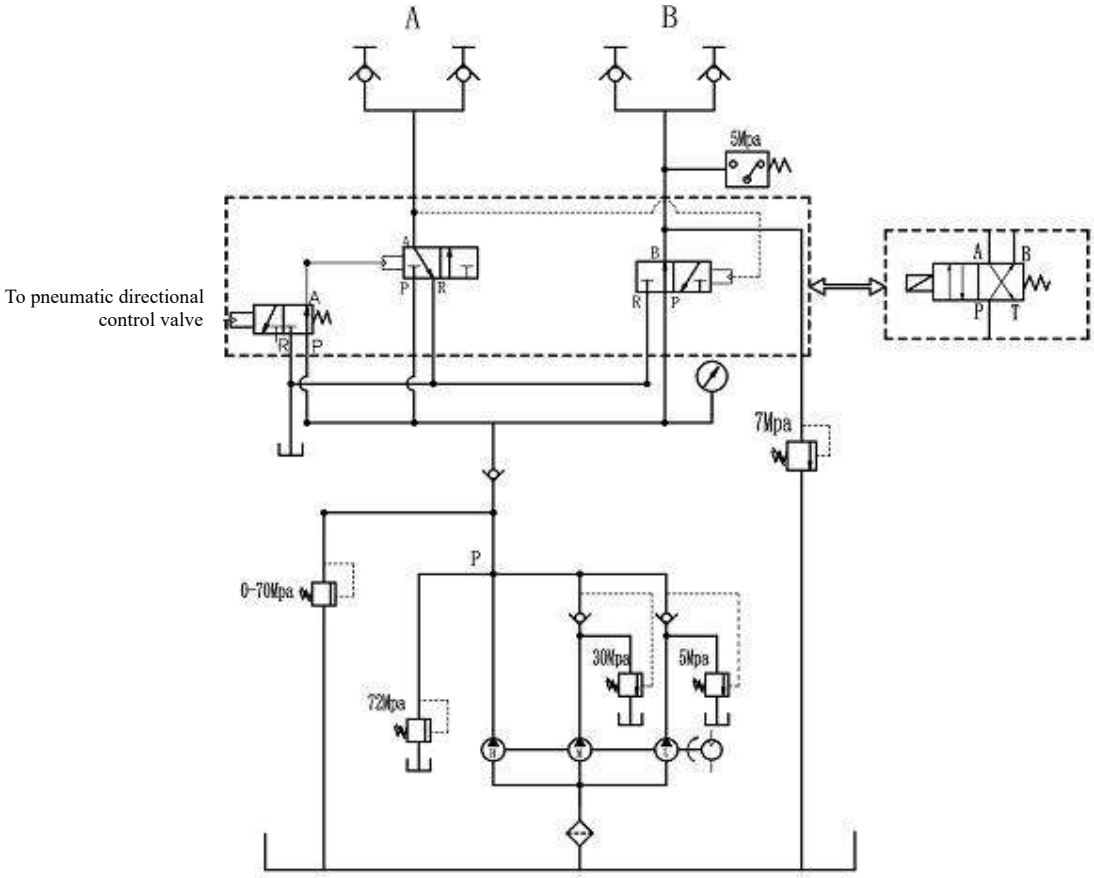
No.	Name
1	Flange
2	TC framework oil seal
3	Base
4	High/medium pressure switchover valve
5	Two-way connector
6	Safety valve
7	High/low pressure switchover valve
8	Deep groove ball bearing
9	Washer
10	Deep groove ball bearing
11	Crankshaft
12	Cylindrical roller bearing
13	Plunger pair 1
14	Plunger pair 2
15	Deep groove ball bearing
16	Bearing block
17	Filter screen

Explosive View of Manifold Block

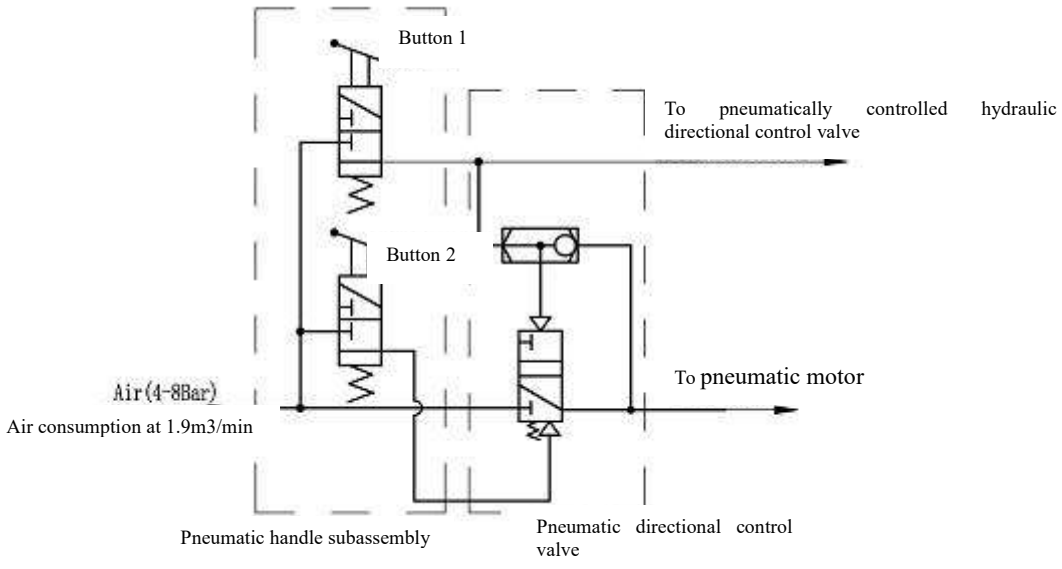


8	Quick coupling mounting plate	16	
7	Hydraulic directional control valve	15	
6	Manual directional control valve (Hawe valve)	14	High pressure relief valve
5	Pressure gauge	13	Low pressure relief valve
4	Nut	12	Hexagon socket cylindrical head screw M6*20
3	Pressure gauge connector	11	Transition plate
2	5-way check valve	10	Male connector
1	Valve block	9	Female connector
No.	Name	No.	Name

XI. Hydraulic Schematic Diagram of Pump Station



Hydraulic Schematic Diagram



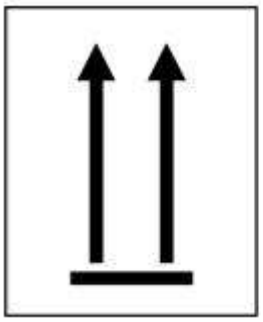
Pneumatic Schematic Diagram

Notice: The above parameters are the settings before delivery, of which the high pressure relief valve at port A can be set by the customer depending on own demands and other parameters are prohibited for adjustment.

XII. Transport

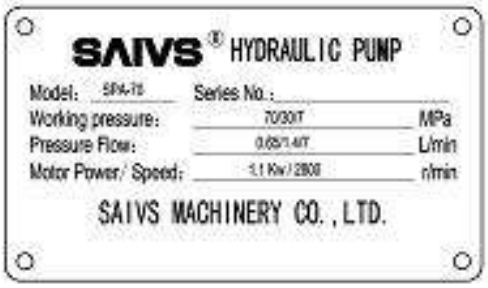
Transport precautions:

1) Handle with care during handling.
2) During loading and transport, face the product vertically upward and take the moist-proof measure, as shown in the figure:



3) Generally, handle the product by hand or trolley.

XIII. Warning Sign and Nameplate

Name	Description	Sticking location
Nameplate		On oil tank cover plate
Warning sign		Side face of oil tank

Note:

1. **Our company reserves the modification right for the operation instructions of this pneumatic pump without further notice.**
2. **For more detailed information, please contact our company.**

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