



# INSTALLATION PROCEDURE AND OPERATION MANUAL OF EQOBRUSH FOR HEAT EXCHANGERS AND CONDENSORS

PROJECT: POLY PCE  
PROJECT No.: 7685

## Table of Content

INTRODUCTION	<b>3</b>
MATERIAL CHECK	<b>3</b>
<b>1) INSTALLATION OF SOCKETS, BASKETS &amp; BRUSHES</b>	<b>4</b>
PROCEDURE	4
FINISHING	7
<b>2) REMARKS ON INSTALLATION OF VALVE</b>	<b>8</b>
<b>3) INSTALLATION OF CONTROL PANEL</b>	<b>9</b>
<b>4) SAFETY FEATURES</b>	<b>10</b>
A. MOTOR CURRENT CONTROL	11
B. RUN TIME CONTROL	12
<b>5) START-UP / OPERATION / MAINTENANCE</b>	<b>13</b>
A. START UP	13
B. AUTOMATIC OPERATION	14
C. SERVICE AND MAINTENANCE	14
1. BRUSH AND BASKET	14
2. VALVE AND ACTUATOR	14
D. NOTES TO OPERATOR	14

Appendices:

- Wire diagram

### **INTRODUCTION:**

To start the installation of the brush-cleaning-system the heat exchanger's interior must be reachable without covers. If on height, the owner must place a safe scaffolding to reach the pipe plates.

Consider safety of installation staff by making sure:

- Working space is safely accessible
- Workers are secured when working on scaffolding or heights
- Sufficient light in the working area to ensure safety and quality of work
- Arrange for proper ventilation

### **MATERIAL CHECK:**

- Check if the BILL OF QUANTITY (BOQ) matches with the heat-exchanger.
- Confirm the Packing list details with the BOQ. The provided components basically consist of following components:
  - Baskets and brushes
  - Reversing valve
  - Actuator (geared drive for reversing valve)
  - Position switch
  - Control panel
  - Utility materials (fasteners, cement, cups)
- Check the pipe end with a socket if the sizing is correct. The socket end must go smooth in the pipe and stop at the first ring on the socket.
- Check the brush size by putting one brush in a pipe. The brush hair must be slightly oversized to the inner pipe diameter.



**NOTE – IMPORTANT**

Make sure all electrical installation works are executed by qualified electrical installation personnel only.

## SECTION 1: INSTALLATION SOCKETS, BASKETS & BRUSHES

### **NOTE:**

Instructions to be followed carefully to avoid performance loss! We actually recommend owner's verification of the quality of the socket installation. Glue residues will obstruct brushes which in turn lead to non-treated (dirty) pipes and possible unnecessary pressure losses in the operation

### **UNIT PREPARATION:**

The sockets will be glued in the pipes end with special metal cement. Therefore, the pipe-ends need to be free from burrs and grease or oil. Before starting the pipe-ends need to be extra cleaned with P-C-444 Cleaning Compound, Solvent Soluble, Grease Emulsifying or equivalent cleaning compound. The purpose of cleaning compounds is to remove oil, grease and other foreign matter from pipe ends to ensure good contact between the cement and the inner pipe wall.

### **PROCEDURE:**

The brushes, sockets and baskets cleaning cloth, cement, paper cups and application brushes are all provided with the system components. The cleaning solvent needs to be supplied by the owner.

Clean about 100 pipes starting from the bottom of the heat exchanger.

The cement will remain processable for 30 to 45 min. Prepare small portions (according to cup size) to have smooth cement available at all times throughout the installation process.



Combine 50% A adhesive and 50% B adhesive in proportion



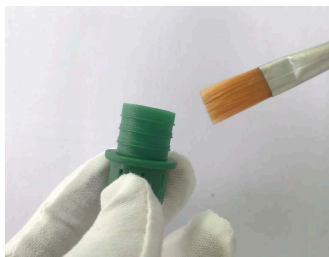
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Stir till you have a coherent mass.



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With the brush supplied put a thin layer of adhesive on the ringed end of the socket.  
Make sure all rings are covered in cement.



Cement brush and socket



Cement on brush



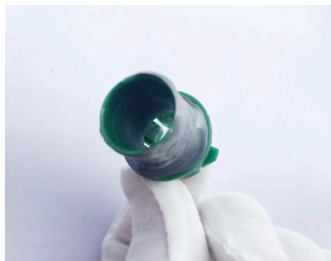
Apply cement on socket



Socket with cement layer

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Make sure that there is no adhesive inside the brush channel. Remove glue from inside of brush channel.



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Place the socket on the hand tool. Push-in the socket into the pipe plate.



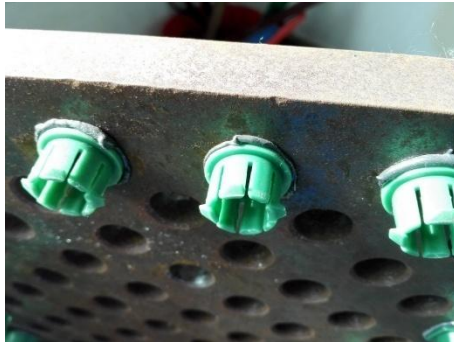
A cement ring forms around the holder.

**FINISHING:**

Once all the sockets are in place, put in the brushes at one end. ONE brush for each pipe.

Once all the brushes are in place put on the basket and check that every socket, brush and basket is placed properly.

The cement needs about 24 hours to cure before the heat-exchanger can be used.



Well glued sockets



Put on the basket

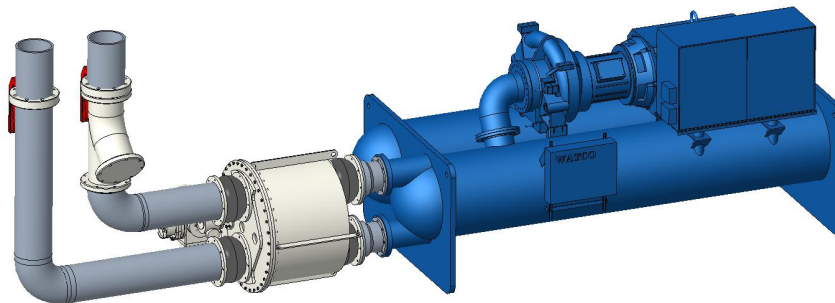
## SECTION 2: INSTALLATION OF THE FLOW REVERSAL VALVE

### INSTRUCTION AND REQUIREMENTS OF VALVE

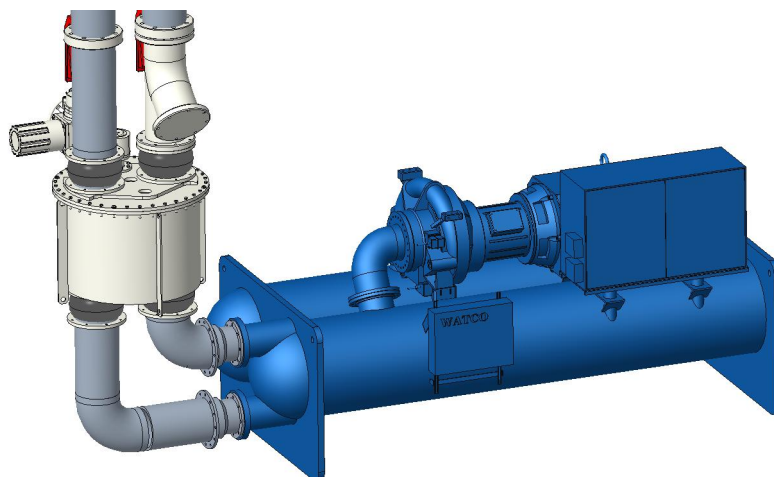
The valve should be installed in the piping system as per drawings provided. Any type of structure to support the valve body may be added.

The bottom or back side of the valve (the side that connects to heat exchanger/condenser) can be installed in the pipe work without extra precautions, while the top or front side of the valve (at the cover flange where actuator is to be installed) the piping **MUST BE INSTALLED WITHOUT STRESS OR ANY FORCES ON THE VALVE BODY**. Rubber compensators that are supplied (2) with the units should be installed in the piping to the valve (actuator side)

Demountable pipe section at the inlet and outlet from the valve-front is required.



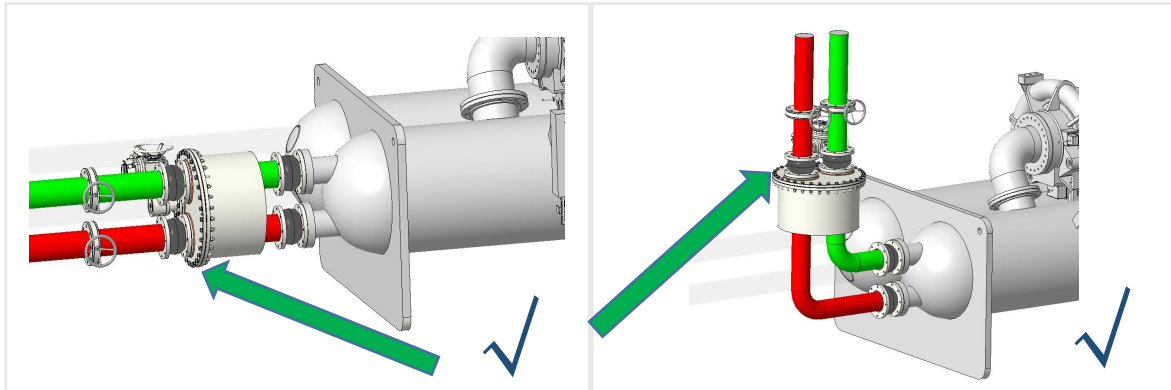
**Reversal valve installed at horizontal position**



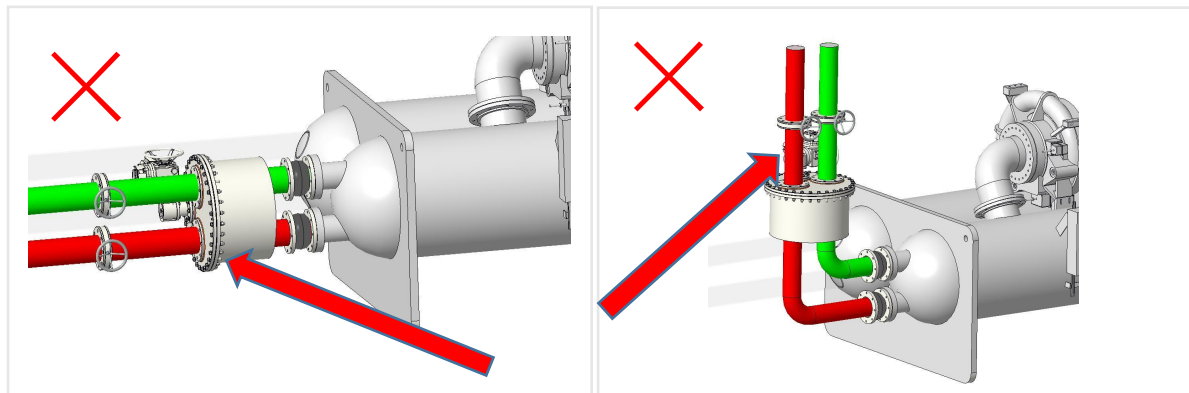
**Reversal valve installed at vertical position**



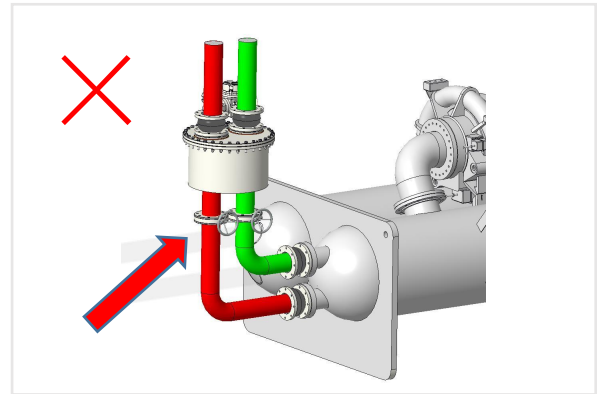
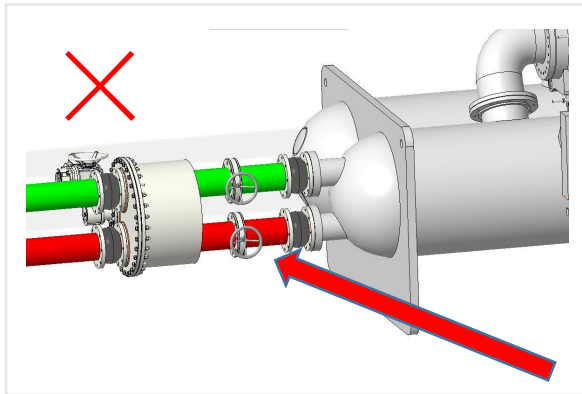
**Reversal valve installation Do's and Don't:**



**Properly installed. Compensators in and butterfly valves in the correct position. No pressure is exerted on the Flow Reversal Valve when the butterfly valves are closed.**

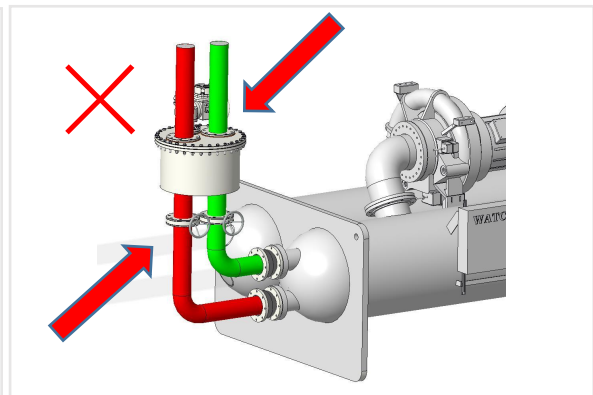
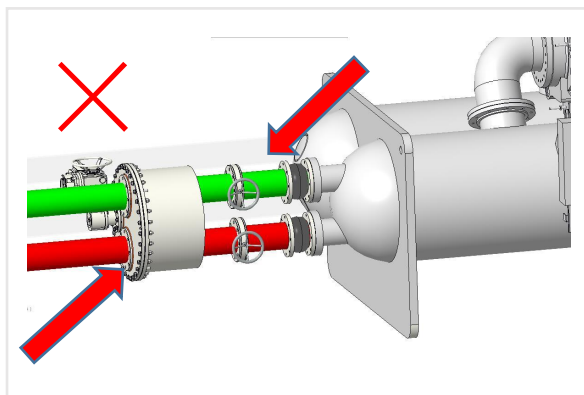


**Compensators on actuator side (front side of valve) are missing which may lead to valve cover leakage due to piping tension. Butterfly valves in the correct position.**



**Butterfly valves cannot be installed between the Flow Reversal Valve and the condenser. When the valves are closed, the pressure difference may damage the internal seal which can cause cross-over. This will impact chiller performance.**

**Compensators are installed correctly.**



**Butterfly valves are not in the correct position. Compensators on front side are missing.**

### SECTION 3: INSTALLATION PLC CONTROL PANEL

Install the panel according the given electrical details and apply the power lines as well the connection of the motor to the panel (R-S-T-0-GR) and the position indicator (8 x 0.75 mm<sup>2</sup>).

Confirm that the control panel receives power.

#### **Actuator & Position Indicator:**

Connect the cables according the diagram (appendix 1) and check if power is brought to the panel.

**WARNING:** Do not stick any body parts into the reversing valve when actuator is powered

After actuator and position indicator are properly mounted and all wirings are connected according to the diagram, follow below steps to adjust position indicator which controls the initial alignment position of valve inlet/outlet holes and swing box hole of the valve.



The PLC control panel (5 valve-set up)

## SECTION 4: SAFETY FEATURES

### A. Motor Current Control.

Each valve is equipped with a dedicated overcurrent relay on the control panel. If in stroke control, the valve encounters obstacles. The motor power needs to be increased, and the overload relay will respond. The actuator power will be cut off. Reset the alarm by releasing the overload relay. If this happens all the time, check whether the valve is blocked by external factors and cannot run smoothly.



**B. Time Control.**

The run time is the time the swing box needs to travel from start to end position. The maximum run time is set in the PLC.

Run time is different for each valve size and is pre-programmed into PLC.

If the actual run time is longer than the programmed one, the safety control function will run the swing box back to its starting position and trigger the alarm.

The system needs to be reset for it to resume operation.

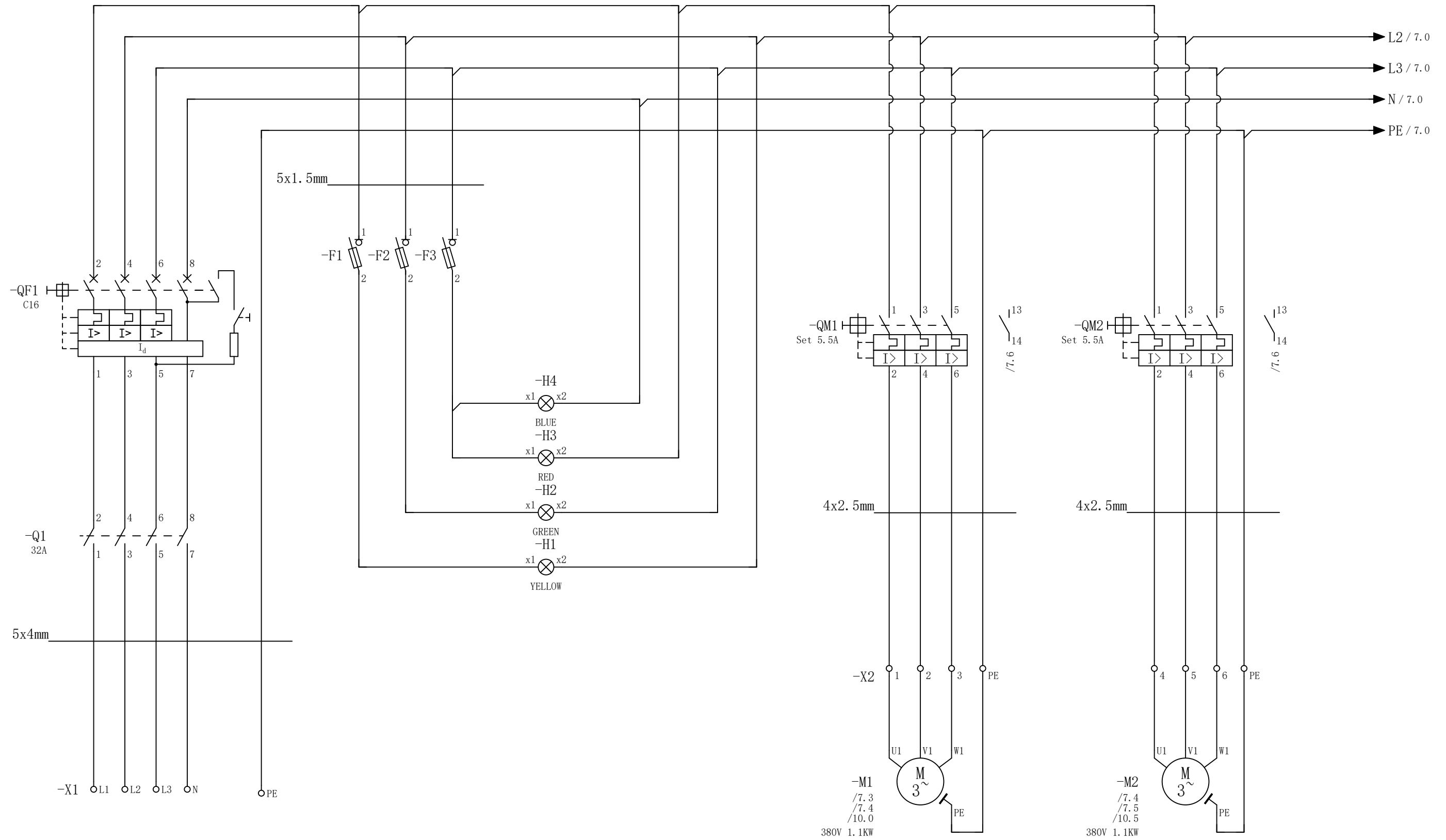
If the problem persists it may be necessary to remove the feed pipes from the front of valve and check for debris blocking the swing box.

**REMARKS:**

If EQOBRUSH is operated on chillers running at top load, it might occur that they trip on high pressure. This depends on the chiller brand and the design of the circulation system. In general, there are 3 solutions:

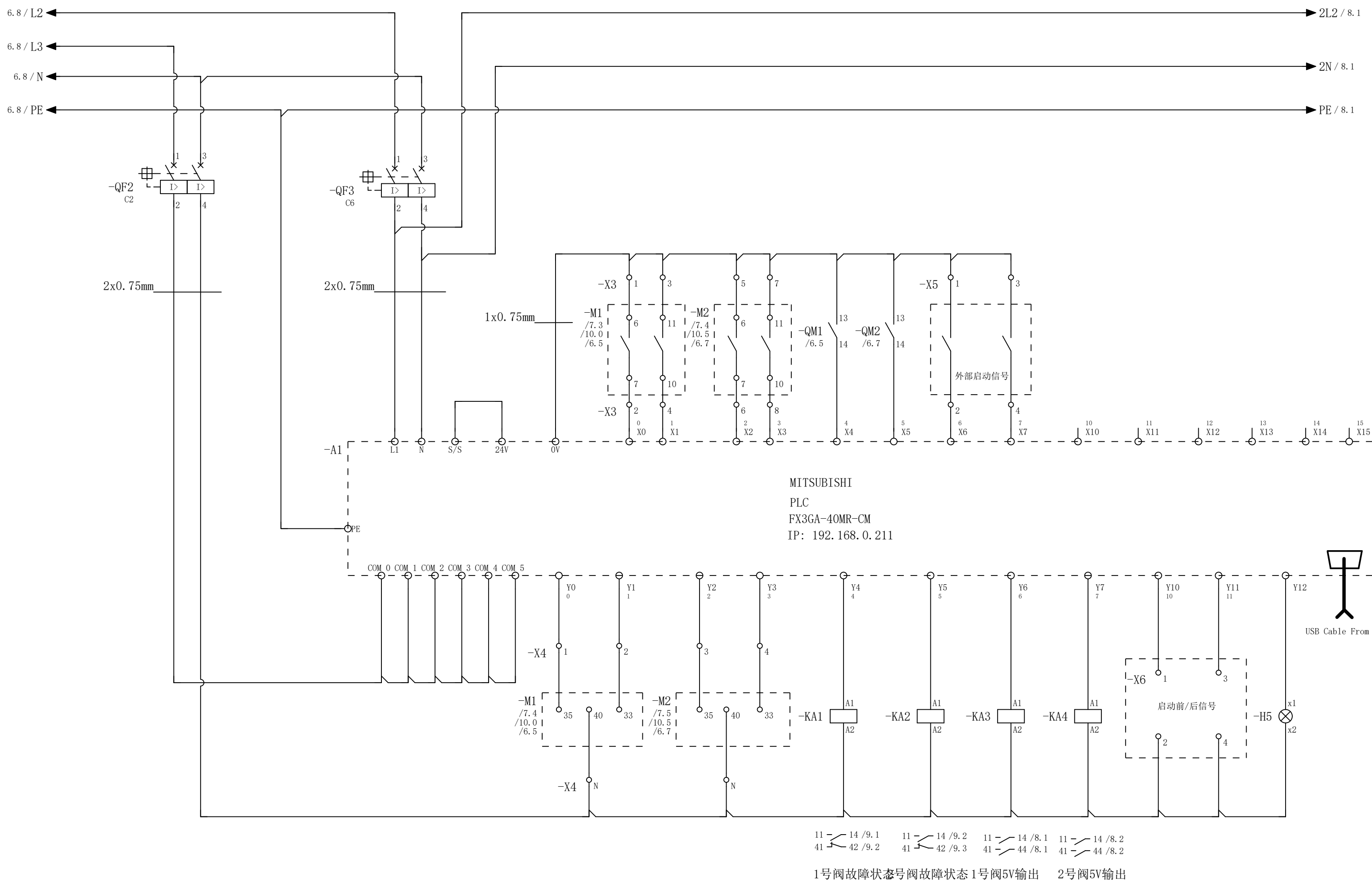
- A: The time in flush position is standard 10 to 15 seconds. This might be too short in a certain mode of operation. The flush time can then be extended to 60 or 90 seconds.
- B: The cleaning cycles to be chosen at the down time of the chiller, e.g. several cleanings in the morning before the peak load comes up, and several cleanings after the peak load is dissipating at the end of the day.
- C: Use a signal from the EQOBRUSH PLC to run down the load to <60% 5 minutes before the cleaning cycle starts. After the cleaning cycle is finished, the chiller can be operated at the required load again. This session might take up to max. 10 minutes.

All these functions are programmable in the PLC.



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Modification	Date	Name	Original	Replacement of	Replaced by	www.eqobrush.co	Eqobrush BMS control Diagram		Page 6	
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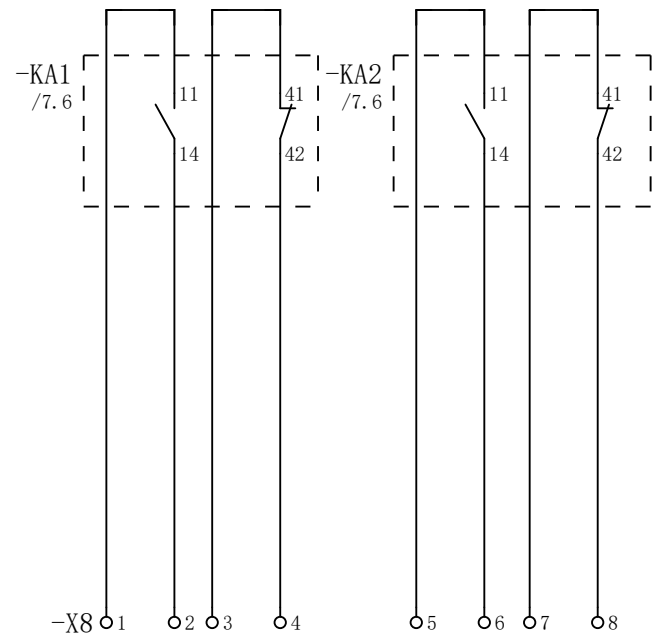




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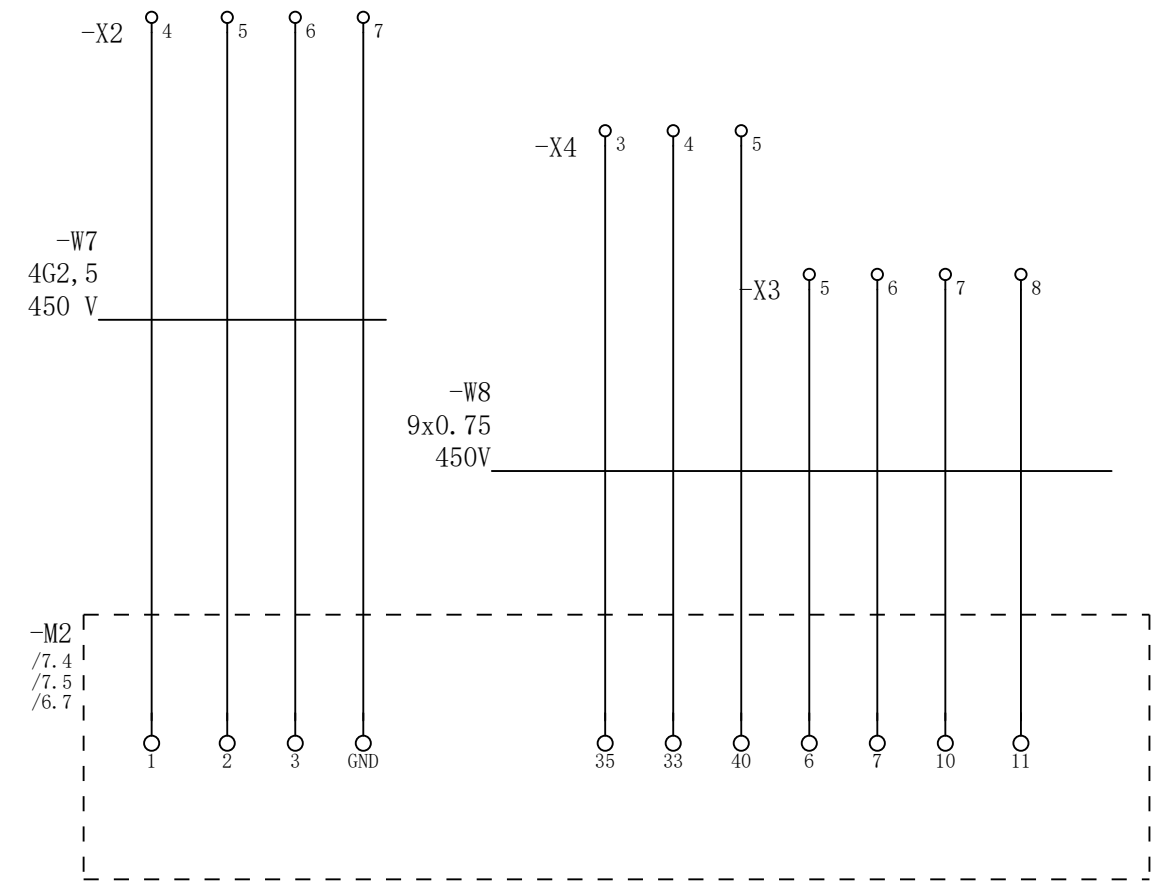
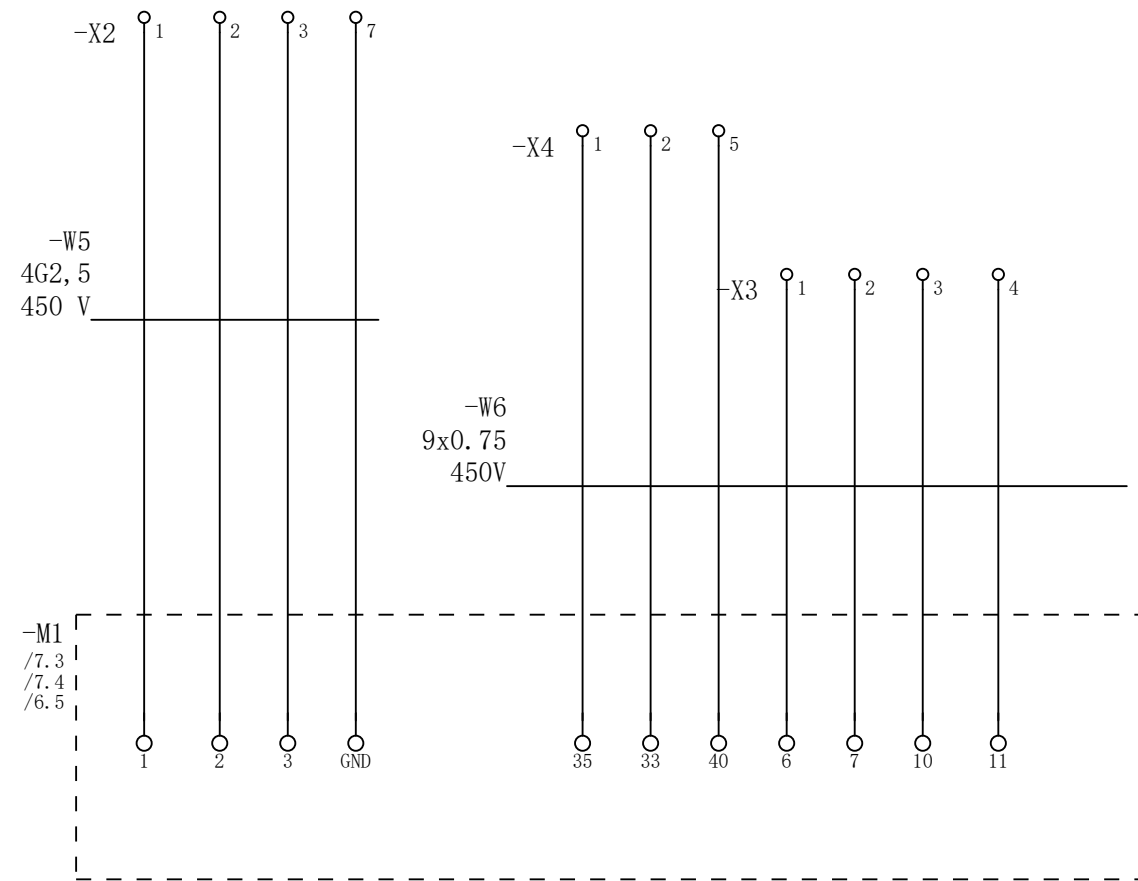






Remarks:

1. Valve 1 normality	X8 1/2 OFF ; 3/4 ON
Valve 1 fault	X8 1/2 ON ; 3/4 OFF
2. Valve 2 normality	X8 5/6 OFF ; 7/8 ON
Valve 2 fault	X8 5/6 ON ; 7/8 OFF



		Date	2021/3/24	Model: EQB 1#2		Power: 3×380V AC		=	
		Ed	ADMIN					+	
		Appr				EQB-2 Control Unit			
Modification	Date	Name	Original	Replacement of	Replaced by	www.eqobrush.co		Eqobrush BMS control Diagram	Page 10/12