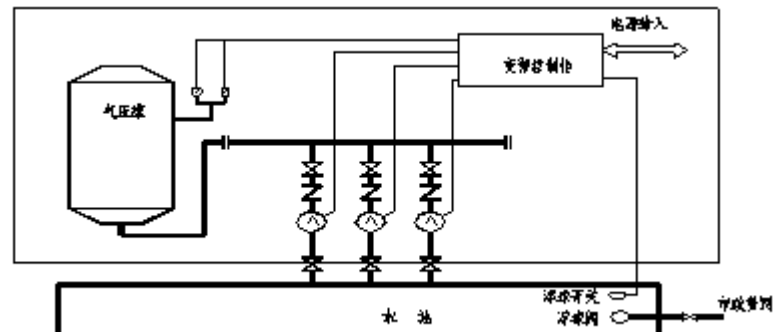


1. Equipment instruction

In order to suit various demand from all kinds of customers, Kaiquan automatic waterworks department has designed four series equipment, including over four thousand specifications. Being a product of N series combined equipment, it is able to stop automatically due to pneumatic tank provided, therefore, it is applicable to intermittent water supply situation. That is to say, it not only bears advantage of supplying water in proper time, but also could save energy in the utmost extent.

2. Equipment constitution

This equipment consists of pump unit, control cabinet, diaphragm tank and pressure sensor. The system structural drawing is as follows. The charging pressure is 60% of pump rated head as diaphragm tank is leaving factory.



3. Equipment working principle

(1) Operation manner: when manual operation is set, pump is started or stopped by panel switch. As automatic operation is set, pump is controlled by pressure (flow), increasing or decreasing pump according to practical requirement.

(2). Electric principle instruction:

Refer to schematic drawing for KQK303BG electric principle and wiring, explanation provided below:

A. Manual status: when SA1 is set at manual position, open SA2 and SA3 separately, then each pump is started into operation depending on line frequency. This position is used for inspection and test running.

B. Remote status: as SA1 is set at remote position, switch on (or cut off) the corresponding passive terminals separately, each pump is started into operation (or stopped) by line frequency. This position is for remote detecting and debugging purposes.

C. **Automatic status:** as SA1 is set at automatic position, PLC control each pump automatically in variable-frequency stationary working mode. Firstly, variable frequency pump start into operation as pressure is lower than lower low limit. However, if pressure is still lower than lower limit, PLC start pump 2 into parallel operation after delayed confirmation. If pipe network pressure is less than lower limit,

PLC drive pump 3 into parallel operation after delayed confirmation. As pipeline frequency reach the set lower limit due decreased flow quantity, PLC decrease pump automatically after delayed confirmation, then pump 2 stops operating. As pipeline frequency reach the set lower limit due decreased flow quantity, PLC send out signal of decreasing pump automatically after delayed confirmation, then pump 3 stops operating. In the case of only variable frequency pump operating, pipe network frequency reaches the set lower limit value due to decreased flow quantity, it would automatically throw over to frequency converter for high-speed operation after PLC delayed confirmation, until pipe network pressure get at the set upper up limit and equipment come into pressure maintaining status. In all, in order to ensure customers' pressure at constant value, PLC will automatically switch and conduct parallel operation for the two pumps. If frequency converter is found trouble during operation, PLC will automatically stop variable-frequency pump from operating, and then switch to another line-frequency pump for operation. At this time, equipment comes into pneumatic pressure working status and pipe network pressure is less than lower low limit, PLC would start one line frequency pump for parallel operation after delayed confirmation. As pipe network is higher than upper up limit, PLC stop one line-frequency pump after delayed confirmation. Frequency converter can only be put into operation if manually reset.

4. Debugging procedure

(1) Open box to check

Pay special attention to possible loosen installation of electric component due to long-time transportation, moreover check and screw up all wiring terminal. Also pay attention to check whether all the electric components are firmly installed, change them if any component is damaged.

(2) Check and adjust component parameter

Mainly check time relay and thermal relay parameter are properly set.

(3) Electrify to conduct no-load test

First perform manual working test after it is electrified, also ensure that electric device motion is correct, then conduct automatic working test. As it is difficult to simulate pressure feedback closed-loop control, thus, this step is provided to check whether startup and stop of frequency converter, increasing pump function of line frequency pump, as well as operating mode are correct and reliable. (Right choice can only be made after perusing the above instruction and fully knowing about working principle of whole equipment.)

(4) Load (whole set) test

As motion is ensured reliable after no-load test, it is all right to connect motor to conduct test for the whole set. Firstly, open inlet valve of each pump, then open air-relief plug screw to let water fully fill into pump chamber. Set working switch at manual position: manually start and stop each pump to check whether rotating direction is correct and operation is normal. If all is OK, please start pump unit to pre-charge pressure to pipe network, until it reach the required pressure of customers,

then stop equipment. Set the required 1st constant pressure, the 2nd constant pressure, constant pressure deviation, lower low limit, lower limit and upper up limit for regulator, so as to make preparation for the next automatic test running. Set working switch at automatic position: firstly variable frequency pump put into operation, check whether its rotating direction is right. Then gradually open valve to discharge water, variable-frequency speed-regulating constant-pressure performance can be debugged as flow quantity change within small range; increasing pump function can be debugged as flow quantity change greatly.

5. Caution

- (1) It is forbidden to go near to water tank or pool when control cabinet power is not cut off.
- (2) The equipment and control cabinet must be safely connected to earth.