

Application of ALPHA Inverter in Industrial Washing Machine

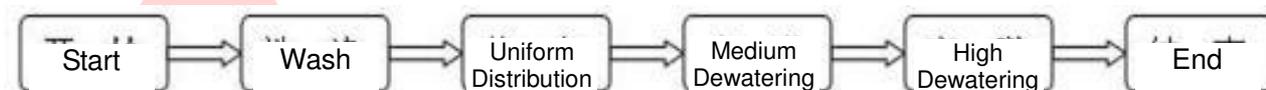
I. Introduction of Industrial Washing Machine

In recent years, industrial washing equipment focuses on water washing equipment. Inverter has been more and more widely used, which has brought brand new technological revolution to the industrial washing equipment: it has developed from the early semi-automatic washing machine whose speed cannot be regulated, to automatic washing machine in which two double speed motors are used to realize four speeds, and finally to modern washing machine in which only one motor is needed to realize different speeds at different stages.

The industrial washing machine requires the inverter be able to provide high-torque, multiple-stage speed, wide voltage range, automatic slip compensation and convenient communication; it should have stable performance and be able to adapt to high-temperature and high-humidity environment in the laundry room of various motels and hotels; the inverter supplier should be able to provide timely and complete service. In conclusion, it requires the inverter be able to adapt to the specific washing process requirement of industrial washing machine and the service requirement of specific client group.

II. Operating Process:

The washing process of the automatic washing machine is as the following:



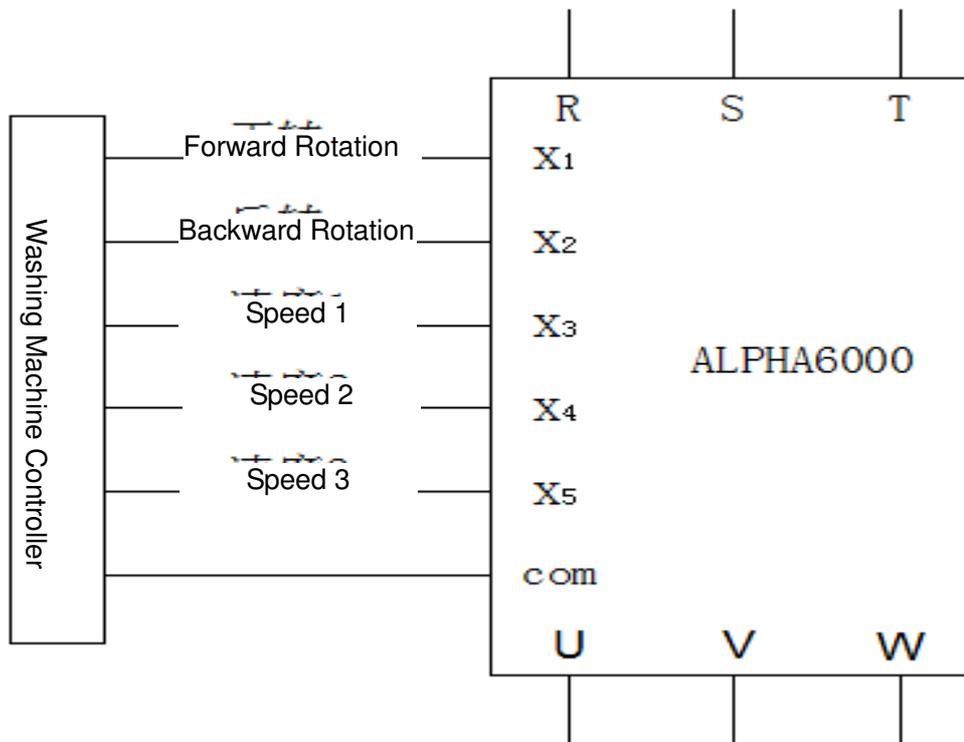
First of all, add water and wash the clothes through forward and backward rotation for 25 minutes; after washing, drain the water and enter the dewatering phase; the dewatering phase includes the three processes of uniform distribution, medium dewatering and high dewatering: during uniform distribution, no matter whether there is water or not, it will rotate forward for 1.5 minutes with a speed higher than that during the washing process, so that the clothes will be evenly adhered to the inside of the roller of the washing machine, and the subsequent dewatering process will be stable; after draining the water, the rotation speed is increased and enter the medium-speed dewatering process (2 minutes), and then enter the high-speed dewatering process (5 minutes), in this way reducing the moisture content in the clothes to the required level.

III. Control Principle:

There are two ways to set the speed:

- 1) By the means of multiple-stage speed, the operating speed in different stages can be directly set on the inverter.
- 2) Through the special control computer of the washing machine, the operating speed in different stages is set through communication.

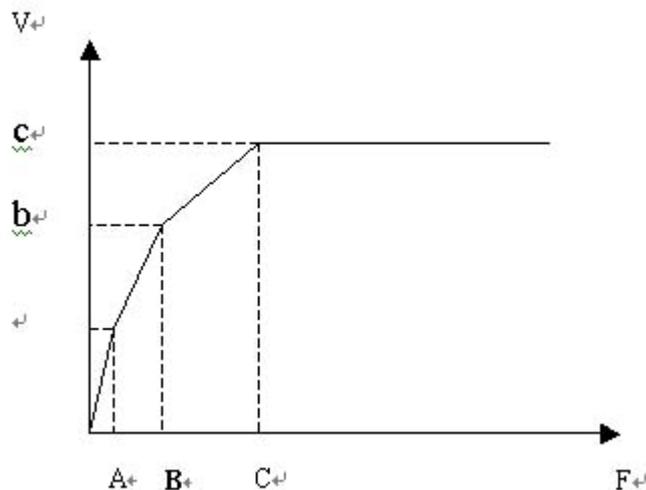
The electric wiring schematic diagram of the industrial washing machine is as the following. The ALPHLA 6000 high-performance vector inverter should be used, which has the excellent qualities of stable operation and fault protection measure.



During operation, the industrial washing machine has to rotate forward and backward repeatedly. Through adoption of the frequency-conversion system, it can satisfy the following requirements:

- ◎ Big start torque;
- ◎ Stable rotation speed during the whole process;
- ◎ No stalling during the acceleration and deceleration process;
- ◎ Wide range of speed regulation;
- ◎ During the second water-adding start, the load reaches the maximum value, and the low-frequency torque output satisfies the requirement.

ALPHA6000 inverter not only has the special V/F curve automatic lifting function, it is also able to optimize the V/F curve during each link of washing in accordance with actual requirement. It also has strong multiple-stage speed function (8-stage speed). In the industrial washing machine, general requirement for the V/F curve is as the following:



In the FIG.:

- A refers to the lowest voltage and lowest frequency;
- B refers to the medium voltage and medium frequency;
- C refers to the highest voltage and highest frequency.

Point (A, a) can be at the origin, the range of A is between 0~4HZ, and the range of a is between 0~25V; regulation of point (A, a) may affect the start torque of the equipment, and consequently affect the rotation speed of the equipment during washing. If the point (A, a) moves downward, then the equipment has low start frequency, and the start of the washing machine is slow and stable, which requires a big low-frequency torque of the inverter.

Regulation of point (B, b) will directly impact the operating current of the equipment during washing, and this is very important. If the line between point (A, a) and point (B, b) has a big slope, i.e., the V/F curve has a steep gradient, then the operating current will be very big. However, the gradient cannot be too gentle either, and this should be regulated in accordance with experience.

Take the 100kg washing machine for example:

Point (A, a): 2HZ, 24V

Point (B, b): 25HZ, 112V

Point (C, c): 50HZ, 380V

IV. Effects of Use

Through test on the 100kg washing machine, we get the following data:

	Start Current(A)	Operating Current(A)	Rotation Speed(rpm)	Frequency(HZ)
Wash	11.8	11.3	32	7.06
Uniform Distribution	13.1	7.6	50	11.66
Medium Dewatering	7.2	1.9	350	65.36
High Dewatering	6.7	2.8	653	123.6

The above data were obtained through repeated tests, during which, there was situation under which continuous four-hour operation was conducted; there was no abnormal accident, and the inverter also had small temperature rise. In addition, through tests on the 30kg, 50kg and 70kg machines, similar conclusion can be got. From this we can conclude that ALPHA6000 inverter is a high-quality inverter that applies to the washing equipment.



ALPHA