

Dear Client

Thank you for Purchasing our **HTYX-III Phase Shifter**. Please read the manual in detail prior to first use, which will help you use the equipment skillfully.



Our aim is to improve and perfect the company's products continually, so there may be slight differences between your purchase equipment and its instruction manual. You can find the changes in the appendix. Sorry for the inconvenience. If you have further questions, welcome to contact with our service department.



The input/output terminals and the test column may bring voltage, when you plug/draw the test wire or power outlet, they will cause electric spark. PLEASE CAUTION RISK OF ELECTRICAL SHOCK!

Company Address:

- ◆ T4, No. 41, High-tech 2 Road, East Lake High-tech Development Zone, Wuhan
- ◆ Sales Hotline: 86-27- 87457960
- ◆ After Service Hotline: 86-27- 87459656
- ◆ Fax: 86-27- 87803129
- ◆ E-mail: qiao@hvtest.cc
- ◆ Website: www.hvtest.cc

◆ **SERIOUS COMMITMENT**

All products of our company carry one year limited warranty from the date of shipment. If any such product proves defective during this warranty period we will maintain it for free. Meanwhile we implement lifetime service. Except otherwise agreed by contract.

◆ **SAFETY REQUIREMENTS**

Please read the following safety precautions carefully to avoid body injury and prevent the product or other relevant subassembly to damage. In order to avoid possible danger, this product can only be used within the prescribed scope.

Only qualified technician can carry out maintenance or repair work.

--To avoid fire and personal injury:

Use Proper Power Cord

Only use the power wire supplied by the product or meet the specification of this produce.

Connect and Disconnect Correctly

When the test wire is connected to the live terminal, please do not connect or disconnect the test wire.

Grounding

The product is grounded through the power wire; besides, the ground pole of the shell must be grounded. To prevent electric shock, the grounding conductor must be connected to the ground.

Make sure the product has been grounded correctly before connecting with the input/output port.

Pay Attention to the Ratings of All Terminals

To prevent the fire hazard or electric shock, please be care of all ratings and labels/marks of this product. Before connecting, please read the instruction manual to acquire information about the ratings.

Do Not Operate without Covers

Do not operate this product when covers or panels removed.

Use Proper Fuse

Only use the fuse with type and rating specified for the product.

Avoid Touching Bare Circuit and Charged Metal

Do not touch the bare connection points and parts of energized equipment.

Do Not Operate with Suspicious Failures

If you encounter operating failure, do not continue. Please contact with our maintenance staff.

Do Not Operate in Wet/Damp Conditions.

Do Not Operate in Explosive Atmospheres.

Ensure Product Surfaces Clean and Dry.

—Security Terms

Warning: indicates that death or severe personal injury may result if proper precautions are not taken

Caution: indicates that property damage may result if proper precautions are not taken.

Contents

I .OUTLINE.....	6
II . APPLICATION AND APPLIED SCOPE.....	6
III. MAIN TECHNOLOGY INDICATORS.....	7
IV.FUNDAMENTAL THEORY.....	8
V.HOW TO USE.....	8
VI.NOTES.....	11
VII.MAINTENANCE.....	12
VIII.TRANSPORT AND STORAGE.....	13

I .OUTLINE

Phase shifter is a new generation of portable electrical equipment which is composed by transformer phase shifter, digital phase display, digital voltage and current display, output voltage adjustment, fine-tune of phase shift and power source modules and so on, this product combine the technology of transformer phase shifter and digital measurement, with the advantages of high precision for phase adjustment ,accurate and intuitive readings, adjustable output voltage. The structure of this machine is solid and reliable, sealed, and easy to carry or to use in the field and on site.

II . APPLICATION AND APPLIED SCOPE

Phase shifter can reach any point of the lead or lag phase shift from 0 to 360 degrees.

The phase shifter transformer has three phases and three core columns,with Y0 wiring way. Each phase has four equilateral windings, which are cross-connected with different angles to form a hexagon connected to the diagonals. The hexagon has twelve files, and each file has 30 degrees. Thus we can do synchronous adjustment of three phases. The fine tune bases on three coaxial autotransformers and capacitors, and the output phase in the range of 0 to 360 can be adjusted simultaneously to ensure the balance output of three phases.

The phase shifter has the characteristics of easy operation, small size, low noise and good output waveform, which is able to meet the test and calibration for high AC power and phase of single or three phases, phase and other, and can also be used among test device of meter.

III. MAIN TECHNOLOGY INDICATORS

1. Input voltage: Three-phase four-wire $3 \times 380(220)V$ 50Hz
2. Output Voltage: Three-phase four-wire $3 \times (0 \sim 380) / (0 \sim 220)$, Three and a half figures display, accuracy: 1.0grade
Output current: AC 0-20A Three and a half figures display, accuracy: 1.0grade
3. Maximum output capacity $3 \times 300VA$
4. Rough tune of three phase: $0^\circ \sim 360^\circ$, 30° to phase shift of each step
5. fine tune for three phase: $-3^\circ \sim 18^\circ$, $12^\circ \sim 33^\circ$, four figures display, accuracy: 0.5grade
6. Voltage fluctuation: rough tune $\leq 1.5\%$, fine tune $\leq 2.0\%$
7. Waveform distortion: distortion of input waveform \leq distortion of output waveform
8. Increasing of temperature: $< 60^\circ C$
9. Insulation resistance: $\geq 22M\Omega$
10. Pressure test: 1.5kV/min
11. Environment: temperature $-10^\circ C \sim 40^\circ C$, humidity $< 80\%$

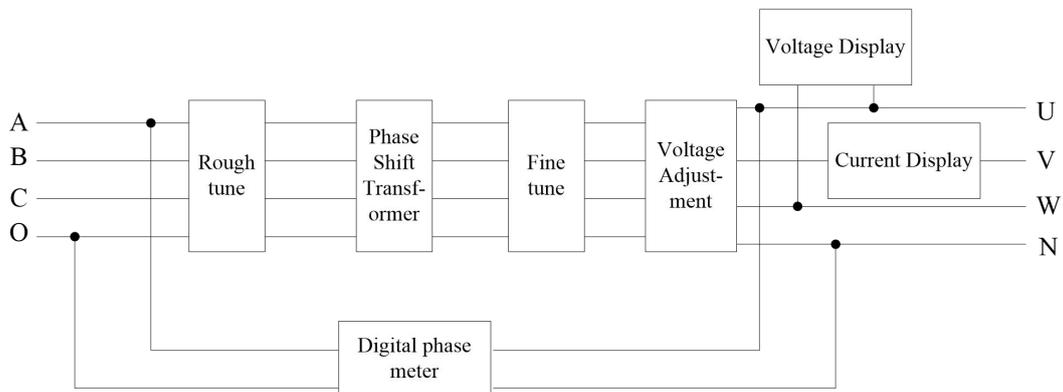
12.Size: 480×360×230mm

13.Weight: about 35kg

* When doing the rough tune adjustment clockwise to decreasing phase shift, please exchange the sequence of any input three phase.

IV.FUNDAMENTAL THEORY

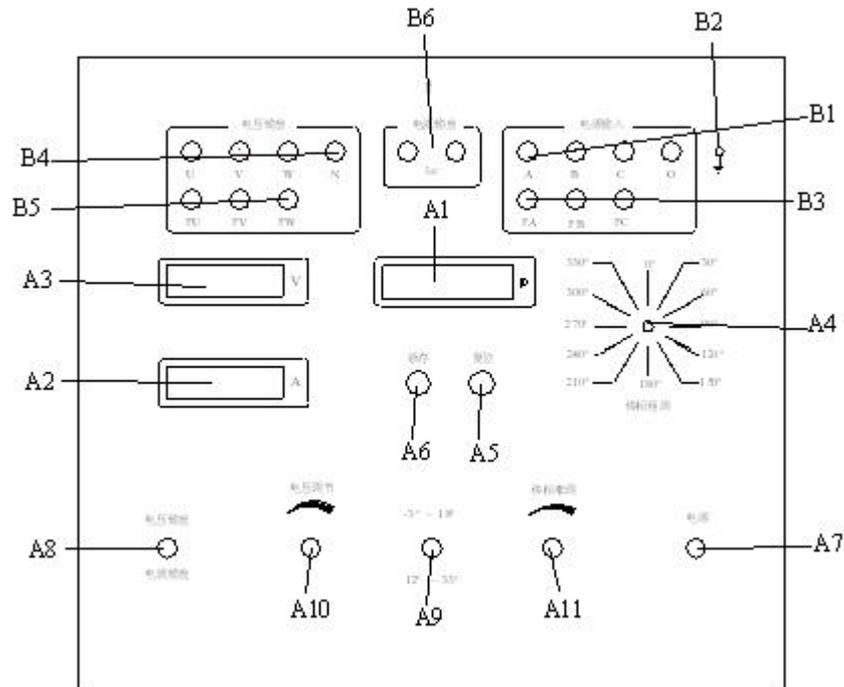
This phase shifter is designed and made by the theory of transformer phase shift, and the fundamental theory is explained in the block diagram:



V.HOW TO USE

(1)The panel diagram and description of digital three-phase phase shifter

Panel :



- A1. Phase shift display, Four figures display $0^{\circ} \sim 360^{\circ}$ phase angle.
- A2. Load current display of output V phase, three and a half figures display.
- A3. Voltage display of between output U, W phase, three and a half figures display.
- A4. Rough tune button, phase shift by the surface scale.
- A5. Reset button of phase display. Press the key to display the phase angle.
- A6. Latch button of phase display. With no change of phase, we can press the key to lock the number.
- A7. Power switch, this key can be pressed to put on or cut off the whole internal power supply.
- A8. Switch for the choice of output function. When it is turned to voltage function, the machine gives the output of voltages of U, V, W phases which are corresponding to the phase shift of input A, B, C source; and when turned to

current function, the machine gives the output of AC current range from 0~20 A, which lead to the phase shift of input B source.

A9. Fine tune selection switch, choice of two range: $-3^{\circ}\sim 18^{\circ}$, $12^{\circ}\sim 33^{\circ}$.

A10. Adjustment button of output voltage, and the outputs of U,V,W phase are adjusted simultaneously by this button. The voltage display gives the voltage of U,W phase range from 0~380V.

A11. Fine tune button, combined with A9 it can achieve the function of phase shift in 30° .

B1. Binding columns of input three phases and four wires.

B2. Ground column of the chassis.

B3. F1, F2, F3 buttons are respectively corresponding to the insurance block of C, B, A phases.

B4. Binding columns of output three phases and four wires.

B5. F4, F5, F6 buttons are respectively corresponding to the insurance block of W, V, U phases.

B6. Binding column of output current.

(2) How to use

1. Check B3, B5 of the panel to insure the fuse is intact.

2. Cut off the power button and turn the the output voltage button A10 to the lowest, then connect the input source of three phases and four wires A, B, C, O on the panel B1.

3. Connect the necessary load for output voltage of U, V, W, N phases on the

panel B3. the load power can not exceed the maximum output power of the machine.

4. Close the external blade, and turn on the machine power switch A7, the displays of A1, A2, A3 also should be light.

5. Adjust the output voltage button A10 to the designed value after power on for half a minute. Get the output voltage from U, V, M, N phases, among witch A3 dispalys the voltage of U, W phases, A2 displays the load current of V phase.

6. Adjust the rough tune button to the approximate designed phase shift angle, then adjust the fine tune button A11 with the selection switch A9 (when the switch is up, adjust A11 clockwise for one loop and the phase shift is 15° ; when the switch is down, adjust A11 Counterclockwise for one loop and the phase shift is 15°). After adjusting A4 button, turn the selection switch A9 to the top and turn the button A11 clockwise, then the display of phase shift increases. One scale of rough tune includes fine tune range from $0^\circ \sim 30^\circ$, and the A1 displays the phase shift angle with the reset button A5. After adjusted to the designed angle, press latch button A6 to lock the number of A1. Also, Press A5 again to get a new phase shift angle.

VI. NOTES

1. It is not allowed to connect the output point N to input zero line.

2. The machine is on the work with strong power, so it is necessary that ground

column of the chassis to be grounded.

3. The maximum current of the fuse is 5A and as the short circuit and overload protection it is necessary to comply the provision.
4. Minus the number of A2, A3 witch is get from the situation as output is zero to resist the environment interference.
5. After turning on the power, if without any display, Cut off the power. firstly, check the insurance and then check the external input of three phases and four wires. If still with no display, please contact us.
6. The warranty of the product is one year. Among the warranty period it is free to repair the machine because of quality and technical problems and we provide preferential services caused by careless handling.

VII.MAINTENANCE

1. Verify the availability of the equipment

Observe the appearance of the instrument before use. After turning on the power check the instrument display is showing completely or not. If the instrument is not used for long time it is should also check whether the Binding columns of output part are corroded or aging. Clear up before use timely. Refer to "How to use" chapter when using it.

2. Equipment maintenance

After test, clear the wires connected among columns, then cut off the power and disconnect the power plug , cover the chassis cover finally place

the equipment indoors in dry, clean, non-corrosive gas environment.

3. The way of replacing the fuse

The fuse and the power plug is connected so turn off the power before replacing, then set aside the fuse box with a small flathead screwdriver.

VIII. TRANSPORT AND STORAGE

■Transport

we recommend use our packing boxes and cushioning materials, in order to avoid unnecessary damage during transit, and causing unnecessary losses to you.

It is not allowed stacking emission without wooden box during transit. The maximum packing stacking layers is tow with our box.

During transit, make sure the panel is up.

■Storage

Store the equipment indoors in dry, clean, non-corrosive gas environment.

It is not allowed stacking emission without wooden box

Place pad in the bottom of the equipment in order to prevent equipment from moisture.

During transit, make sure the panel is up.