TVR2000T Series Phase Controller

(Over/under voltage,phase loss,imbalance protection)

1. Applicable range

TVR2000T series phase controller is mainly used as a protector against the voltage unbalance, phase loss ,over voltage and under voltage of the motor with three phase,AC 50/60Hz,rated voltage 80 to 690V. It can also correct the reversal phase automatically. The protector must be connected according to the offered drawing, generally it measures the value of the power supply.

When the power supply is normal,the NO contact (21、24) of the relay closes，the green LED lights,when the power supply is suffering one or more abnormities,the NO contact (21、24) opens, and the green LED turns off,the relative indicator LED lights.

TVR2000T series phase controller output contact (12) need connect with MC1 contactor(pick up when normal phase); Contact (14) need connect with MC2 contactor(pick up when phase reversal).

2. Protect Function

1. Voltage unbalance (phase loss) protection:voltage unbalance is to say that negative sequence component is too high,generally speaking,1% voltage unbalance will bring 3%~11% current unbalance. Because the negative sequence component is fully changed into heat by not doing work, serious voltage unbalance will lead the motor to burn out,here,over load protection relay of the common devices can't protect them in time. When the rate of voltage unbalance is higher than 9±1.5%, the protection relay acts(less than 1 sec. delay), while the rate is lower than 7±1.5%, it returns to the normal status.

Whether devices under protection is running or not, when one phase happens to loss, it is the extreme situation of three phase voltage unbalance, the rate of three-phase voltage unbalance is 100% when static phase loss, the rate is more than 5~20% when dynamic phase loss. Reverse electromotive force raised by motor running make the phase voltage not 0, it only can judge by measuring the rate of three-phase voltage unbalance to give protection. Once phase loss happen, the protector take action,normal green LED turn off,phase loss red LED lights,then relay discharges and doesn't

measure the failure of the phase loss and under voltage, the red LED(reversal) and the yellow LED(over/under voltage) may light at the same time.

2. Over/under voltage protection: The efficiency of the motor is the highest when it is working under rated voltage. When the supply voltage is too high, the free-load excitation current will increase, which will lead the descend of the efficiency and up the motor's temperature; when the supply voltage is too low, the motor's output power will descend, which will lead over load, and even stop the motor. The range of over/under voltage protection can't be too low, or it will act frequently because of the voltage fluctuating of electronic net. Yellow LED lights when 3-phase voltage is over voltage or under voltage, but relay will drop out when after 8 seconds continuous over/under voltage, at the same time Green LED turns off.

3.Correct phase automatically: when the L1, L2 and L3 are connect correctly, output contact (12) makes MC1 contactor pick up; when the L1, L2 and L3 are connect wrong, reversal LED lights, then output contact (14) makes MC2 contactor pick up.

3. Technologic data

1. TVR2000T series phase controller protection functions can't be affected by current intensity of circuit or what is load; it could work for a long time under full capability and all kinds of climate. Power consumption is lower than 1.0W.

2. This product measures up GB/T14048.1-2000, GB14048.5-2001 equivalent IEC60947-1:1999.

3. The EMC of the product measures up the limits of methods of measurement of radio disturbance characteristics of GB4343-1995.

4. The voltage of resistance to wave is 5000VAC, isolation is 4000VAC.

5. Main circuit: rated voltage (under 3Φ690VAC, 50/60Hz)

6. Auxiliary circuit:

Supply：AC15/DC13

Rated work voltage: 250VAC or 30VDC

Rated work current: 250VAC 2A, 30VDC 1.5A

Rated heat current: 5A

7. The area of insulated copper wire is 1.0~2.5mm^2 that is used together with joining of PVC in main circuit. It can connect to circuit with single copper wire, or needle-like thrum to ensure reliable connection when use soft wire.

8. Outline and installation dimensions
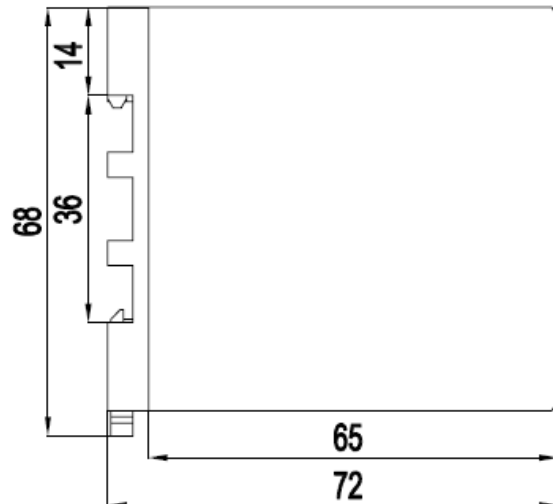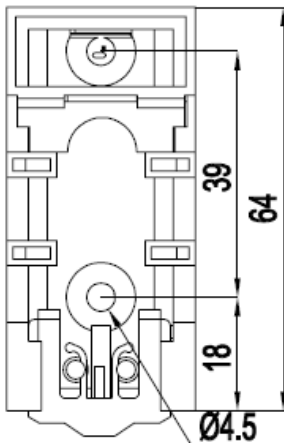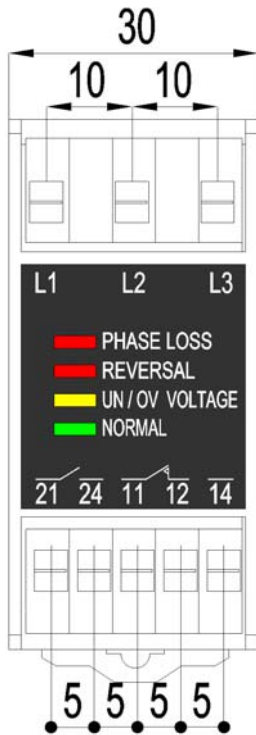
Insert the relay into 35mmTH Rail mounting directly. Under other installation, use M2-M4 type screw to fix.

4. Type selection and purchase data

Type	Rated voltage (VAC)	Over voltage (VAC)	Over voltage recovery (VAC)	Under voltage (VAC)	Under voltage recovery(VAC)
TVR2000T-1	380	436±6	426±5	316±5	323±5
TVR2000T-2	220	251±5	241±4	183±4	187±4
TVR2000T-3	440	504±9	496±8	370±8	376±8
TVR2000T-4	415	474±8	463±7	350±7	357±7
TVR2000T-5	400	456±7	446±6	335±6	340±6
TVR2000T-6	460	525±9	514±8	385±8	390±8
TVR2000T-8	690	15%		-15%	
TVR2000T-8A	690	10%		-10%	
TVR2000T-8D	660	15%		-15%	
TVR2000T-9	480	548±9	536±8	402±8	408±8
TVR2000T-X	Customized	Customized		Customized	
TVR2000T-NQ(LL)	85~150	No over/under voltage protection, other protection functions are same as above.			
TVR2000T-NQ(L)	160~260	No over/under voltage protection, other protection functions are same as above.			
TVR2000T-NQ(M)	300~500	No over/under voltage protection, other protection functions are same as above.			
TVR2000T-NQ(H)	600~700	No over/under voltage protection, other protection functions are same as above.			

When the imbalance rate of three-phase $\dfrac{|Ui-\bar{U}|\max}{\bar{U}}\times100\%$ is more than 9±1.5%, the protection relay acts, when it is

lower than 7±1.5%, the relay reverts.

5. Typical applications
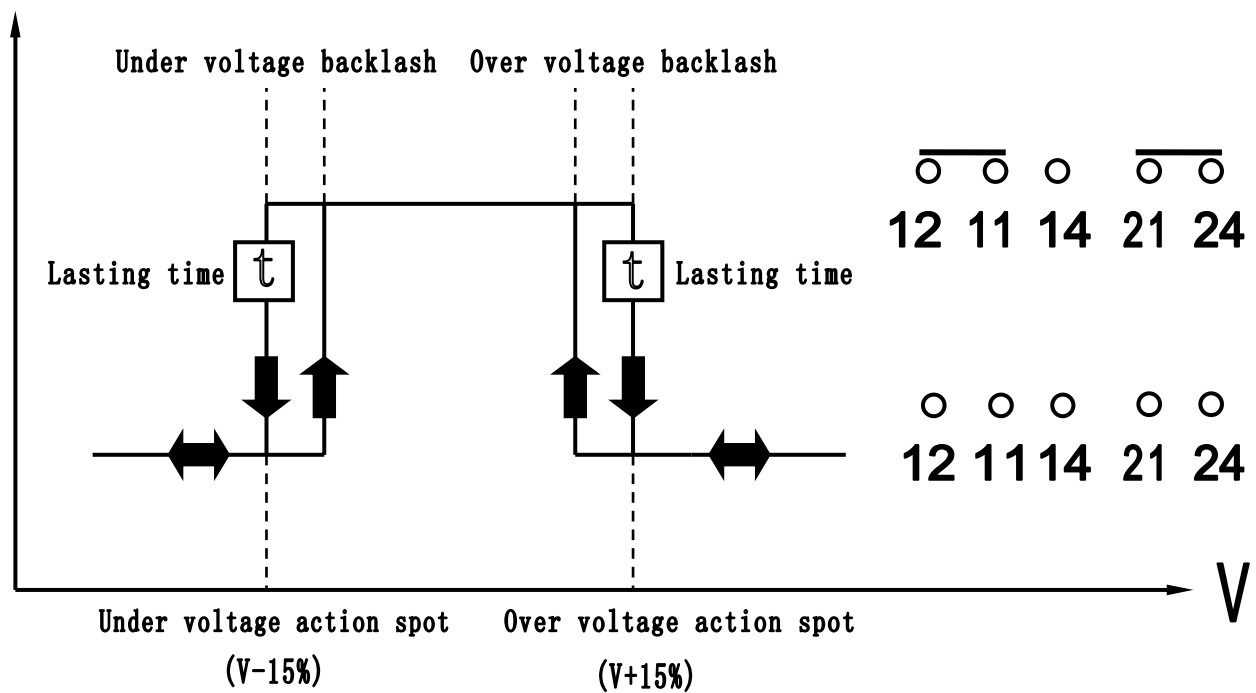
Wiring according to drawing, when something wrong with voltage, it will cut off in order to protect motor, NO contact 21,24 will output digital signal, connect with DI of PLC and controller can also give protection.
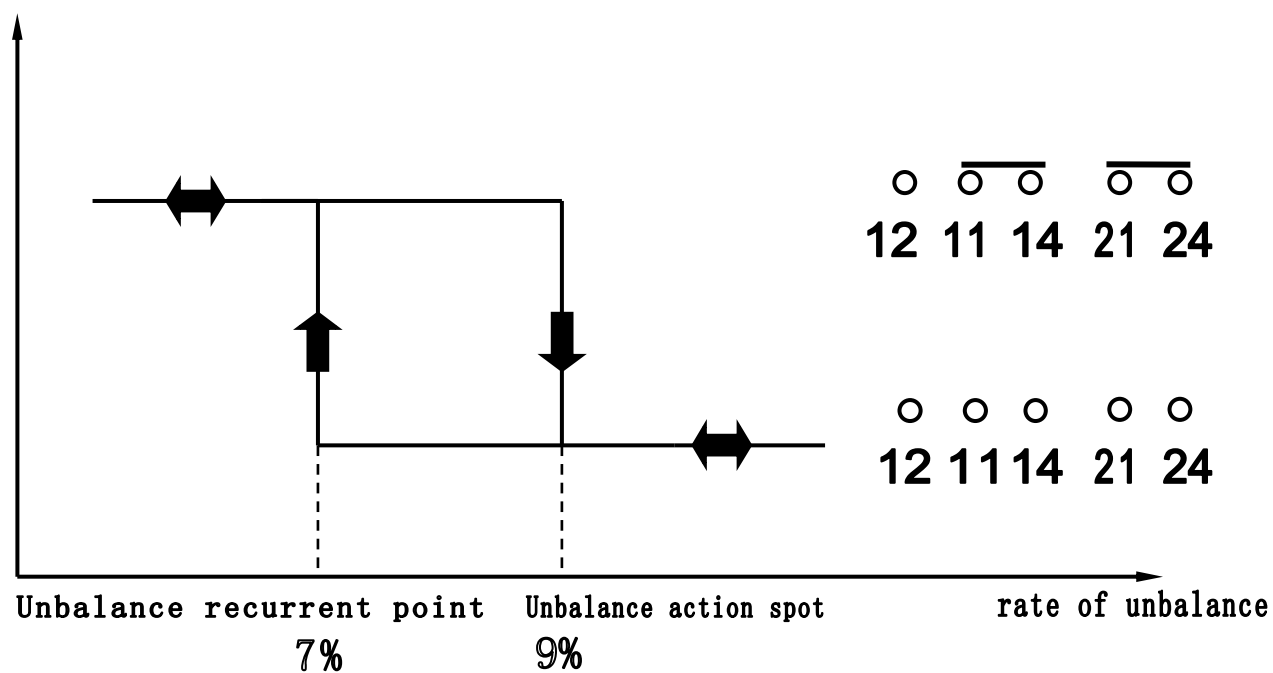
Typical Wiring Diagram
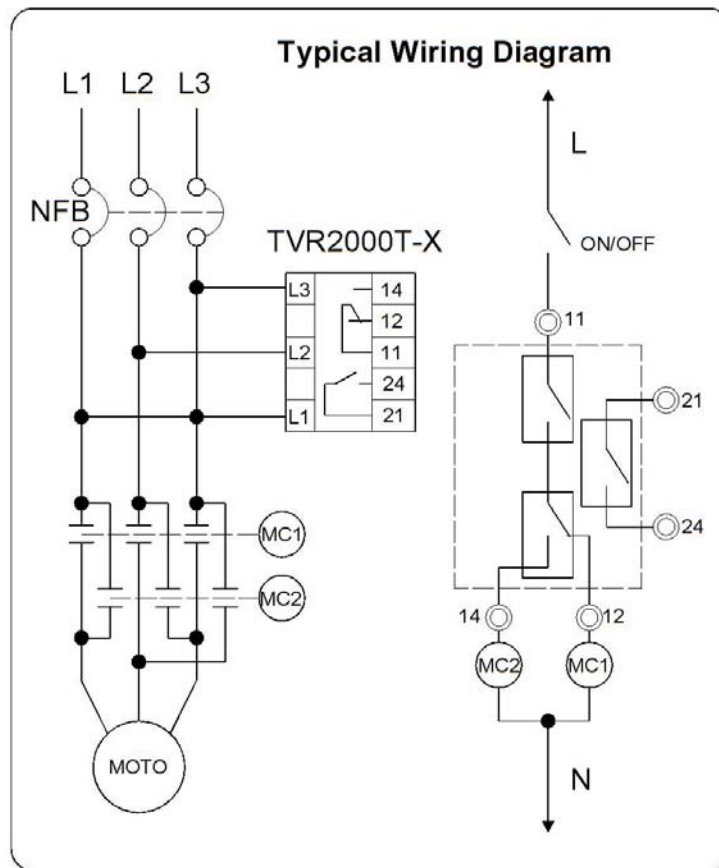
6. Sequence diagram
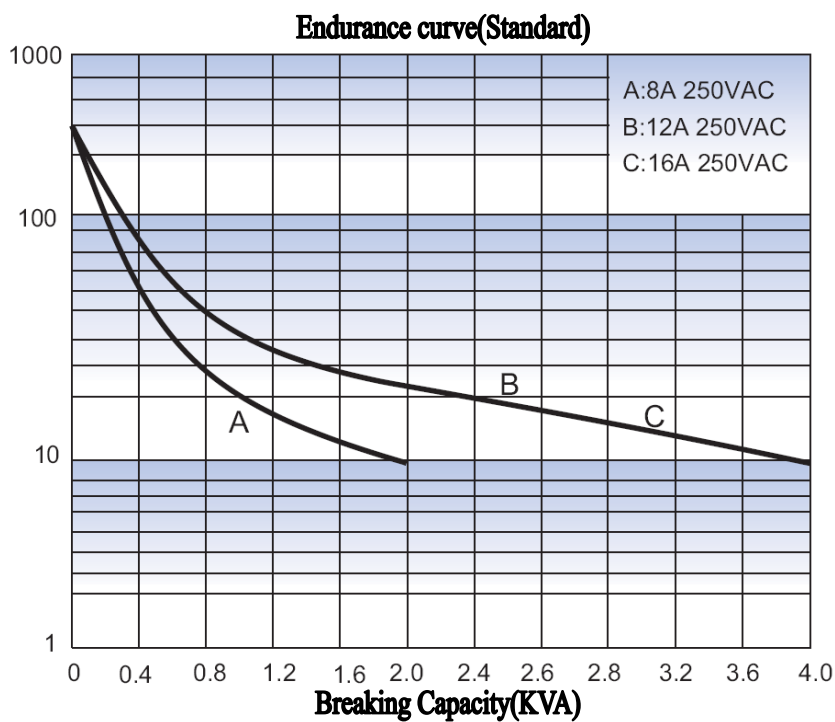
6.1 Over/under voltage sequence diagram
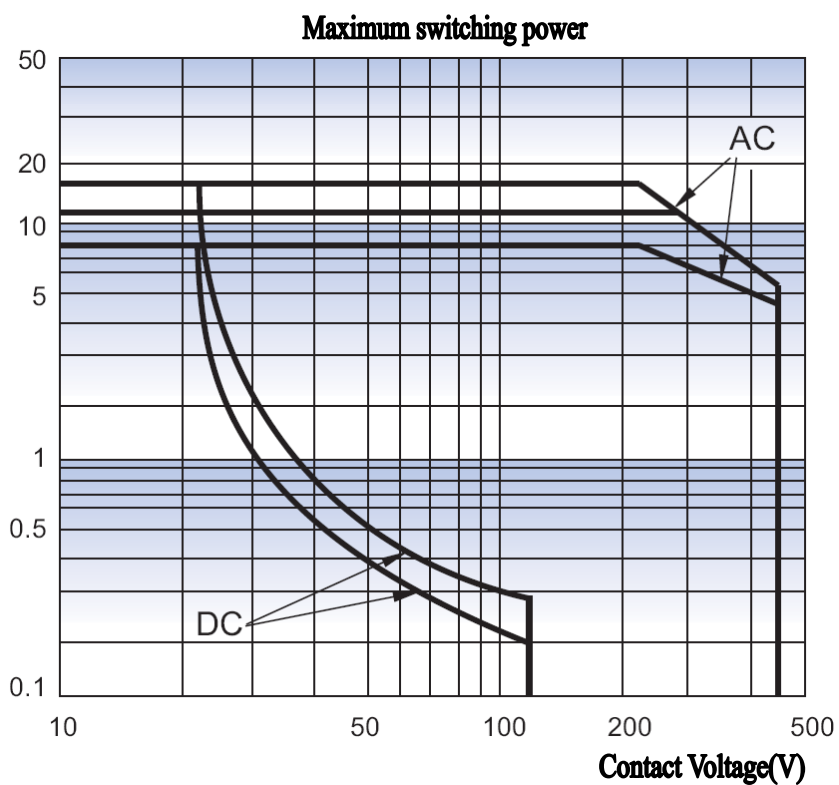
6.2. Voltage unbalance sequence diagram (Reversal)

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12 11 14 21 24

○ ○ ○   ○ ○
12 11 14 21 24

Unbalance recurrent point   Unbalance action spot   rate of unbalance

7%   9%

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7. Characteristic curves

Contact (21、24)

Endurance curve(Standard)

A:8A 250VAC
B:12A 250VAC
C:16A 250VAC

Breaking Capacity(KVA)

Maximum switching power

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Contact (11、12、14)
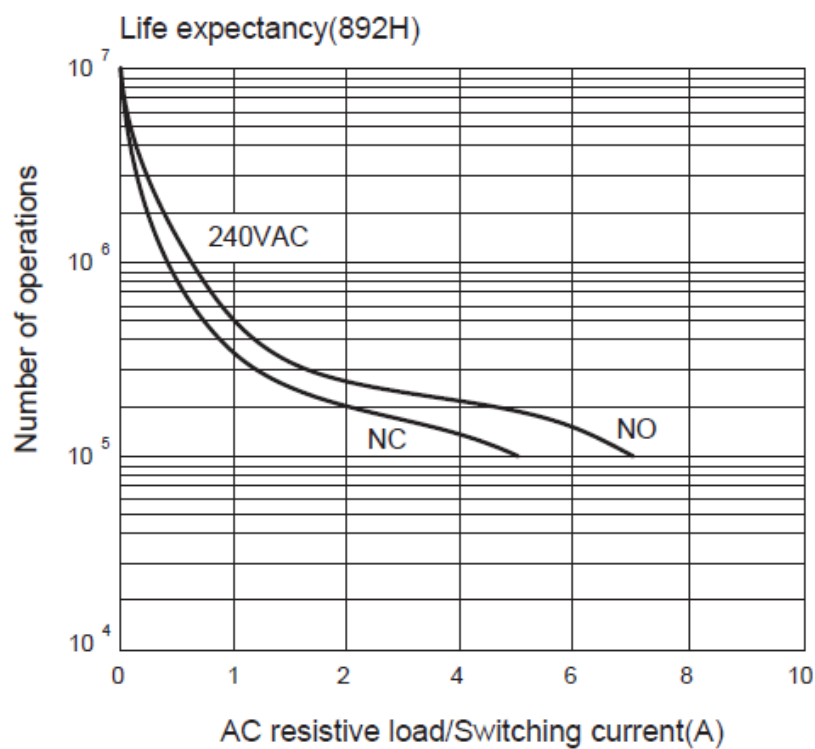
8. Product certification

CE　　CCC　　RoHS (some)