TVR2000 series Phase Failure Relay

(Over/under voltage,phase loss,phase reversal protector)

1. Applicable range

TVR2000 series phase failure relay is mainly used as a protector against the voltage unbalance, phase loss ,phase reversal,over voltage and under voltage of the motor with three phase,AC 50/60Hz,rated voltage 80 to 690V. 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 of the relay closes,the NC one opens,the green LED lights,when the power supply is suffering one or more abnormities,the NO contact opens,the NC one closes,and green LED turns off,the relative indicator LED lights.

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 voltage is less than 70% of another two voltage, the protection relay acts(less than 1 sec. delay), while the rate is recovering, 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. Phase reversal protection: when the L1, L2, and L3 are connected correctly, the green LED lights, the relay closes; However, if the sequence is wrong, the green LED turns off, the red LED(Reversal) lights, only need to change any two of L1, L2, L3 phases, the protection relay will cognize this phase sequence and work normally which own anti-wrong connection protection.

3. 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. Technologic data

1). The protection functions of the relay can't be affected by current intensity of circuit or what is load; the relay could work for a long time under full capability and all kinds of climate. Power consumption is lower than 9VA@380V.

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

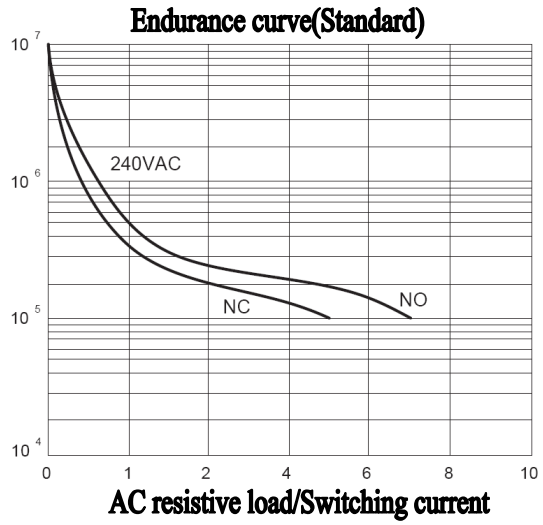
3). The EMC of the product measures up the limits of methods of measurement of radio disturbance characteristics of GB4343-1995.

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

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

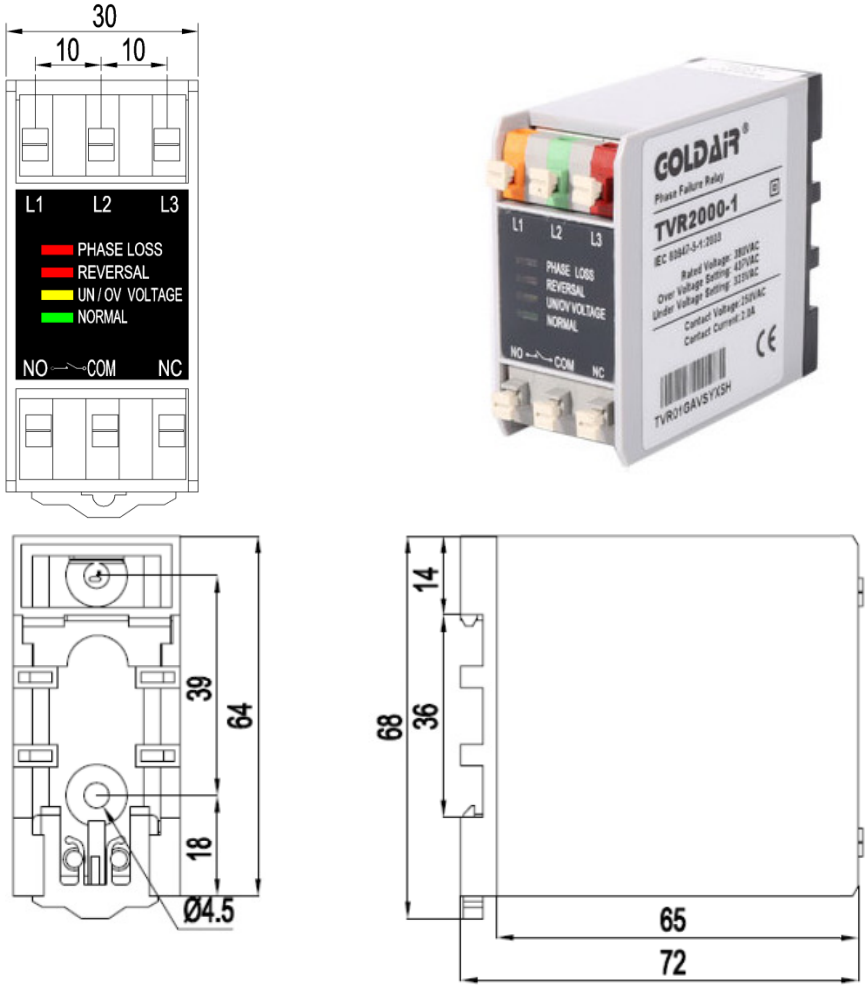
6). Auxiliary circuit (Output relay): 1SPDT

DC 12: 5A, 24VDC
AC 15: 2.5A, 250VAC
DC 13: 2.5A, 24VDC



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)	Under voltage (VAC)	Output specifications	Remarks
TVR2000-1	380	436±6	316±5	Contact voltage:250VAC Contact current:2.5A	Standard
TVR2000-2	220	251±5	183±4		
TVR2000-3	440	504±9	370±8		
TVR2000-4	415	474±8	350±7		
TVR2000-5	400	456±7	335±6		
TVR2000-6	460	525±9	385±8		
TVR2000-9	480	548±9	402±8		
TVR2000-X	Customized	Customized	Customized		
TVR2000-NQ	200~480	No over/under voltage protection, other protection functions are same as above.			
TVR2000-NQ (LL)	85~150	No over/under voltage protection, other protection functions are same as above.			
TVR2000-NQ (L)	160~260	No over/under voltage protection, other protection functions are same as above.			
TVR2000-NQ (M)	300~500	No over/under voltage protection, other protection functions are same as above.			

5. Typical applications

1. According to drawing 1, when the power supply is normal, press ON to start, and press OFF to stop, when the power supply suffering a failure, the circuit will cut off automatically to protect the motor.

2. According to drawing 2, when the power supply is normal, the circuit may start, when the power supply is suffering a failure, the circuit will cut off automatically to protect the motor. The NC contact of the connector is connected to the digital input of PLC to bring chain protection together with controller.

3. According to drawing 3, when the power supply is suffering a failure, the relay will send break signal to PLC, so that the controller can offer protection.

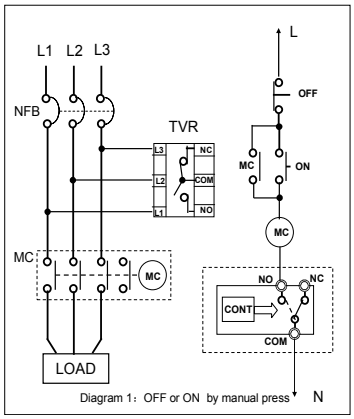


Diagram 1：OFF or ON by manual press

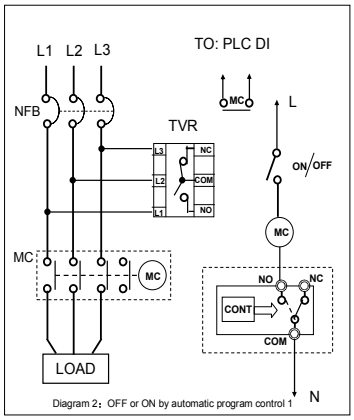


Diagram 2：OFF or ON by automatic program control 1

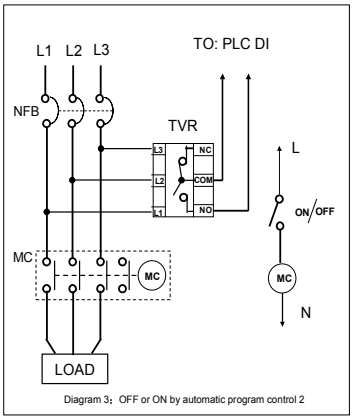
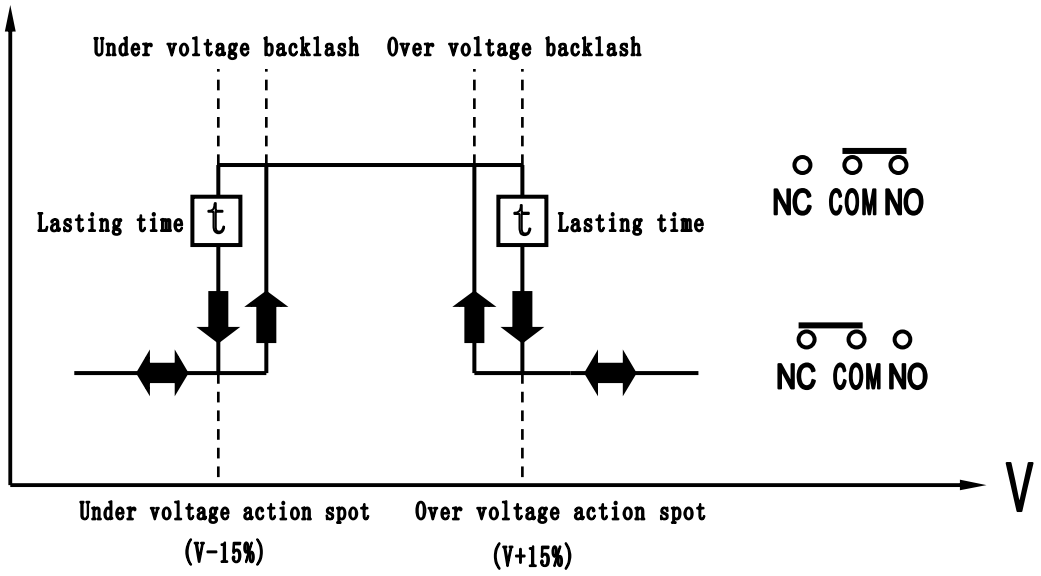


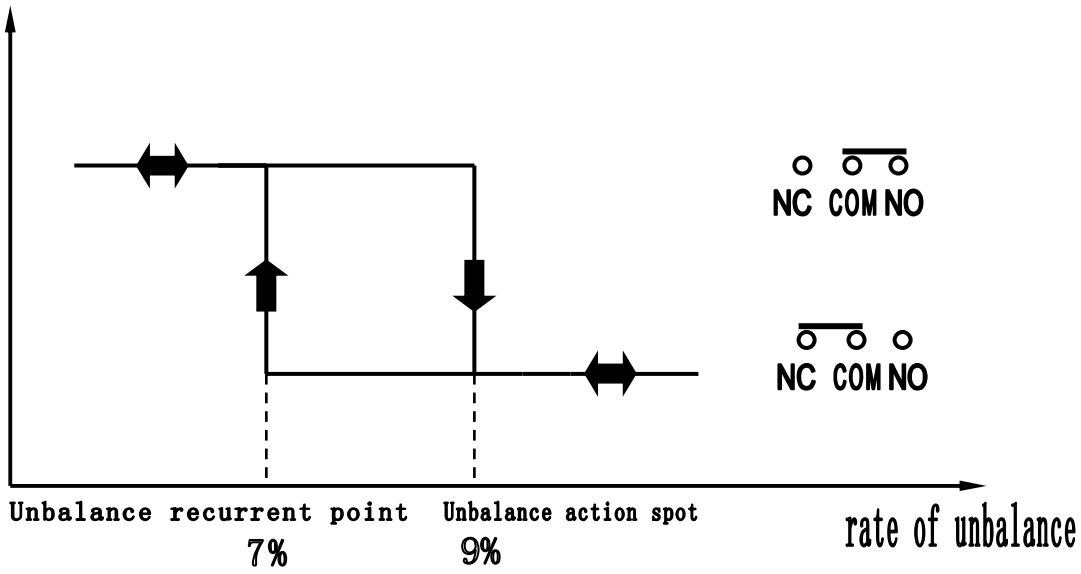
Diagram 3：OFF or ON by automatic program control 2

6. Sequence diagram (for example of TVR2000)

6.1 Over/under voltage sequence diagram



6.2. Voltage unbalance sequence diagram



7. Product certification

CE **CCC** **RoHS** (some)