QYW-3Series Poly-function Protectors for Transformers

1、Product Introduction



The QYW-3 series multi-function transformer protectors are integrated dedicated protective relays developed specifically for fully-sealed oil-immersed transformers. They integrate gas protection, overpressure protection, visual oil level monitoring with built-in output contacts, and visual oil temperature monitoring equipped with dual-channel output contacts.

Boasting a wide range of applicable scenarios, the devices can be matched with oil-immersed power transformers, oil-immersed reactors, oil-immersed power capacitors and other oil-filled electrical equipment. They serve as the standard safety protection assemblies for fully-sealed distribution transformers and box-type substations.

2、Product Model & Specifications

The naming specification for Model QYW-3 multi-function protector is defined as follows:

QYW—□/ □-□-□-□TH

- □ Over-temperature Alarm Value (℃)
- □ Temperature Alarm Value (℃)
- □ Low Oil Level Alarm Volume (mL)
- □ Pressure Relay Alarm Setting(kPa)
- □ Design Code
- TH Light Gas, Pressure (Heavy Gas), Temperature

Marking Example: The designation QYW-3/30-170-80-90TH indicates that the pressure relay alarm value (heavy gas protection) is 30 kPa. An alarm will be triggered when the gas volume of light gas exceeds 170 mL. The high oil temperature alarm threshold of the transformer is 80℃, and the over-temperature trip threshold of transformer oil is 90 ℃.

3、Technical Features

Reference Standards IEC 60076-22-1 、EN 50216-3

Item Parameter Description	Technical Index
IEC 60529/GB/T 4208-2017Protection Class	IP56
IEC 62262/GB/T 20138-2023Impact Resistance	IK10
Max. Relative Pressure	+3 Bar
Ambient Temperature Range	-40℃ < T < +70℃
Max. Oil Temperature	+120℃
Pressure Adjustment Range	100 ~ 500 mbar

Alarm Temperature Adjustment Range	+30℃ ~ 120℃
Trip Temperature Adjustment Range	+30℃ ~ 120℃
Fixed Trip Threshold for Gas & Oil Level	Trip when light gas volume exceeds
Climatic Conditions IEC60721-3-4	4K26
Special Climatic Conditions IEC60721-3-4	4Z2+4Z4+4Z14
Mechanically Active Substances IEC60721-3-4	4S13
Weathering Test ISO4892-2 Cycle 84 / D27 1389	1695 h
Salt Spray Test ISO12944-6	1440 h
Relative Humidity	Humidity not more than 95% at an air temperature of 20℃

Electrical Characteristics:

Electrical Contacts	Voltage **(V)**	Switching Current (A)	Self-reset Electrical Conditions	Max. Current (mA)	Minimum Contact Life
Temperature control switches for alarm and trip	240V 50/60Hz	6	Cosφ>0.5	2000	1000
	24-48VDC	4	L/R<40ms	2000	1000
	220VDC	0.5	L/R<40ms	2000	1000
Pressure switch	240V 50/60Hz	6	Cosφ>0.5	2000	1000
	24-48VDC	2	L/R<40ms	2000	1000
	220VDC	0.2	L/R<40ms	2000	1000
Gas / oil level switch	240V 50/60Hz	1	Cosφ>0.5	2000	1000
	24-48VDC	1	L/R<40ms	2000	1000
	220VDC	0.1	L/R<40ms	2000	1000

Dielectric Withstand Voltage:

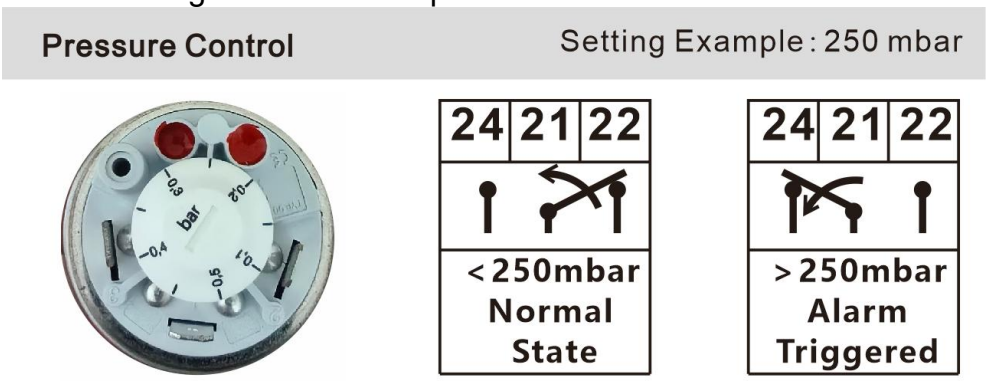
Dielectric Strength of Contacts	Rated Short-time Withstand Voltage
Between Contacts	2.5 kV
Contacts to Earth	1kV

Special Structural Design

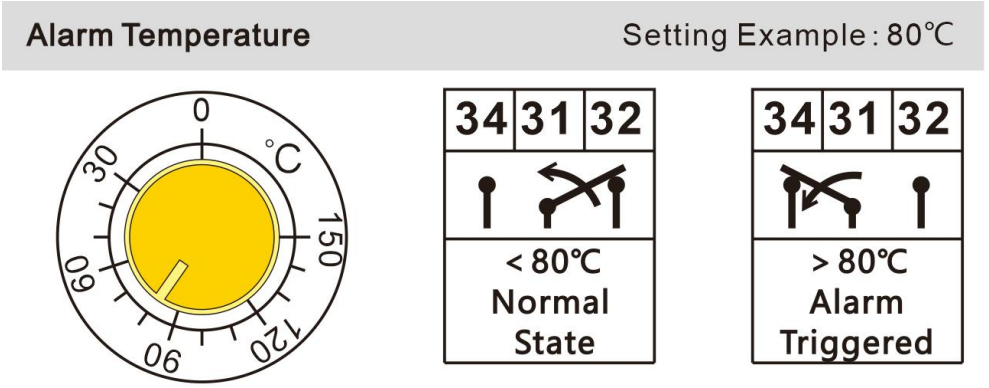
The oil level / liquid level contacts can operate without interference under an external magnetic field up to 25 mT. The oil storage chamber is equipped with three-side viewing windows and UV-resistant transparent oil filling tube, enabling full-range visibility of oil level.

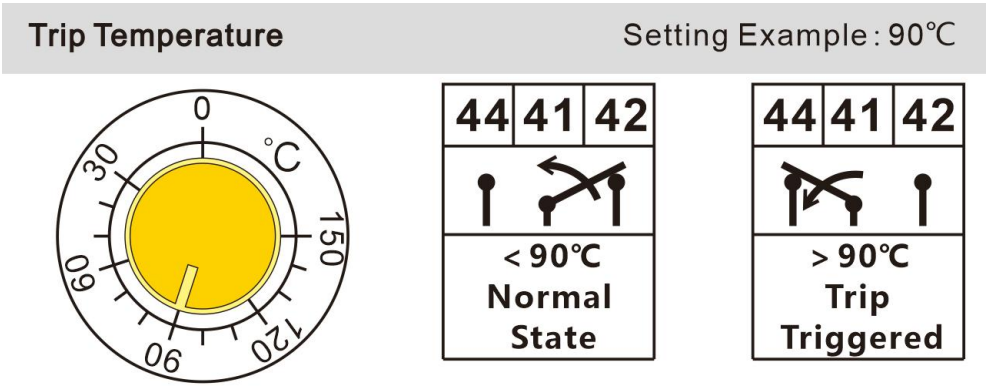
4、Applications and Features

4.1 Pressure Protection Function： A single-pole double-throw (SPDT) pressure switch is integrated internally to monitor the internal pressure of the transformer oil tank in real time, forming an electrical protection unit against excessive tank pressure. When the internal tank pressure rises to the preset alarm threshold, the pressure switch actuates rapidly and outputs an alarm signal. The factory default set pressure value is 250 mbar. The preset factory pressure parameters can be customized within the adjustment range of 100~500 mbar according to customer requirements.

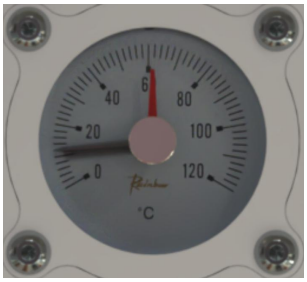


4.2 Over-temperature Protection Function： Two groups of independent adjustable single-pole double-throw (SPDT) temperature switches are built into the device, which are respectively used to set the early warning alarm threshold and over-temperature trip threshold of transformer oil temperature. The temperature probe is installed inside the temperature measuring sleeve of the protector immersed in transformer oil to realize real-time oil temperature monitoring and graded temperature control protection. The factory default preset alarm temperature is 80℃ and trip temperature is 90℃. The factory preset parameters can be customized within the range of 80–120℃ according to customer requirements.





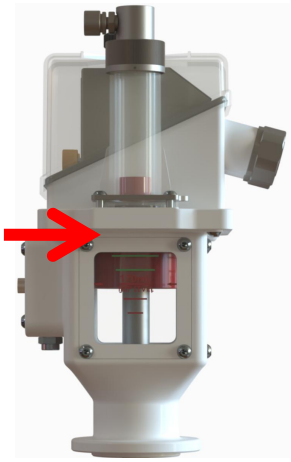
4.3 Visual Oil Temperature Gauge: A temperature gauge is installed inside the device. It adopts a bulb-type temperature sensor immersed in insulating oil to collect oil temperature data. The temperature dial is equipped with a visible graduated panel and a temperature memory pointer. It enables on-site direct reading of real-time oil temperature values and retains the maximum temperature records, facilitating operation and maintenance personnel to trace the historical maximum temperature rise conditions of the transformer.

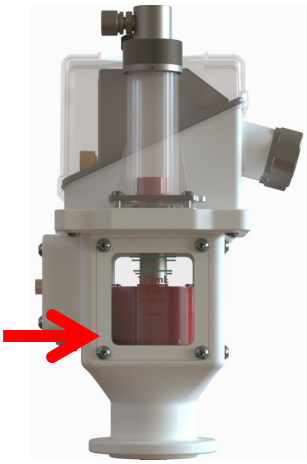


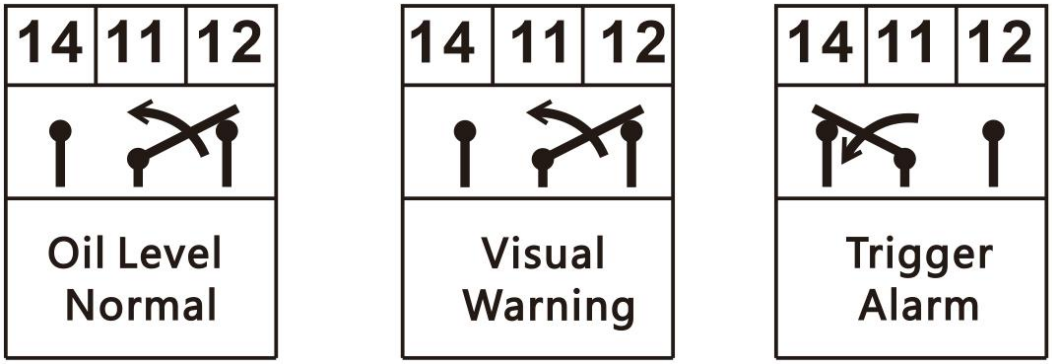
4.4 Oil Level Monitoring Function: Equipped with pipeline floats to visually observe oil level variations. Displacement of the main float can be viewed through the main oil tank sight window when the oil level drops significantly. When the oil volume reduction reaches 170 mL, the built-in magnetic ring actuates the SPDT (Single-Pole Double-Throw) reed switch contacts to output a low oil level alarm signal.

Full Oil Level Condition	Oil Level Drop / Declining Oil Level	Oil Level at Alarm Trigger Point







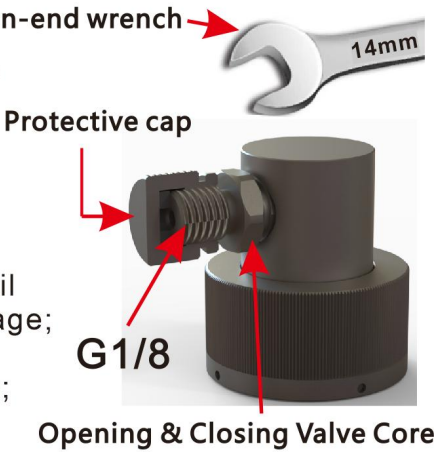


4.5 Multi-Functional Visual Oil Filling Pipe Function: The device is integrated with a multi-functional visual oil filling pipe, which can visually monitor the drop of oil level, and is integrated with interfaces for oil replenishment, pressure relief and oil sampling.

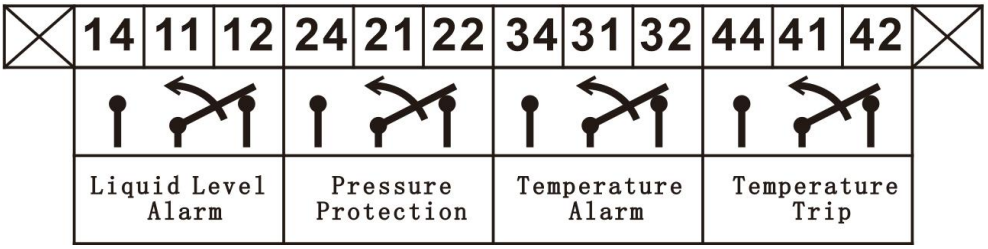
Oil and Gas Sampling

Sampling Opening Procedures
1.Unscrew and remove the protective cap counterclockwise.
2.Rotate the internal valve core two full turns counterclockwise to open the flow passage.

Sampling Closing Procedures
1. Screw the valve core clockwise until fully tightened to close the flow passage; tightening torque: 2 N·m.
2. Install the protective cap clockwise; tightening torque: 2 N·m.



5、Wiring Diagram



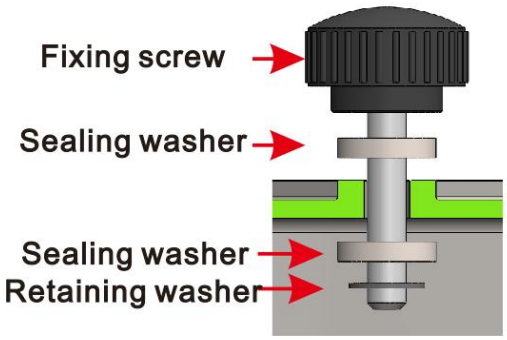
6、Open / Close Terminal Box Cover

Note: Ensure the interior of the housing is dry before closing the outer cover.

Opening Procedures
1.Loosen the fixing screws counterclockwise.
2.Pull the cover upward.
3.Remove the cover.

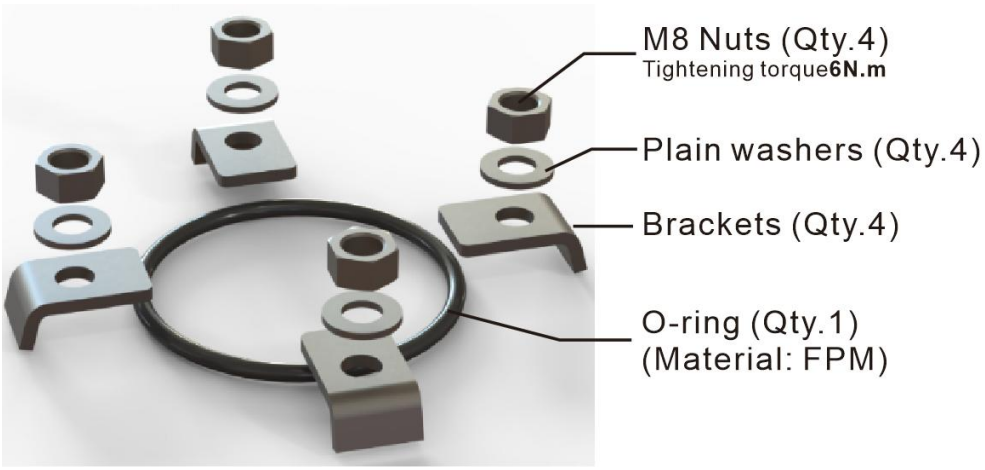
Closing Procedures
1.Fit the cover in place.
2.Press the cover to make it closely attach to the main body sealing ring.
3.Tighten the fixing screws clockwise until the sealing ring is moderately compressed under pressure.



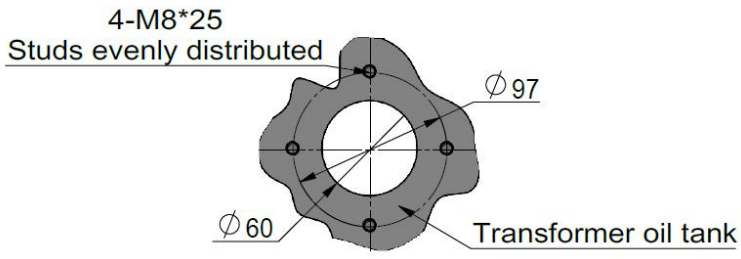


7、Installation Kit

Four fixing brackets for installation and one O-ring seal are supplied together with the protector. (**Note: M8 nuts and plain washers mentioned below shall be prepared by users and not provided by the manufacturer**. Tightening torque for M8 nuts: 6 N·m)



8、Schematic Diagram of Mounting Flange on Transformer Tank





Schematic Diagram of Flange Bolts

9、Installation and Operation

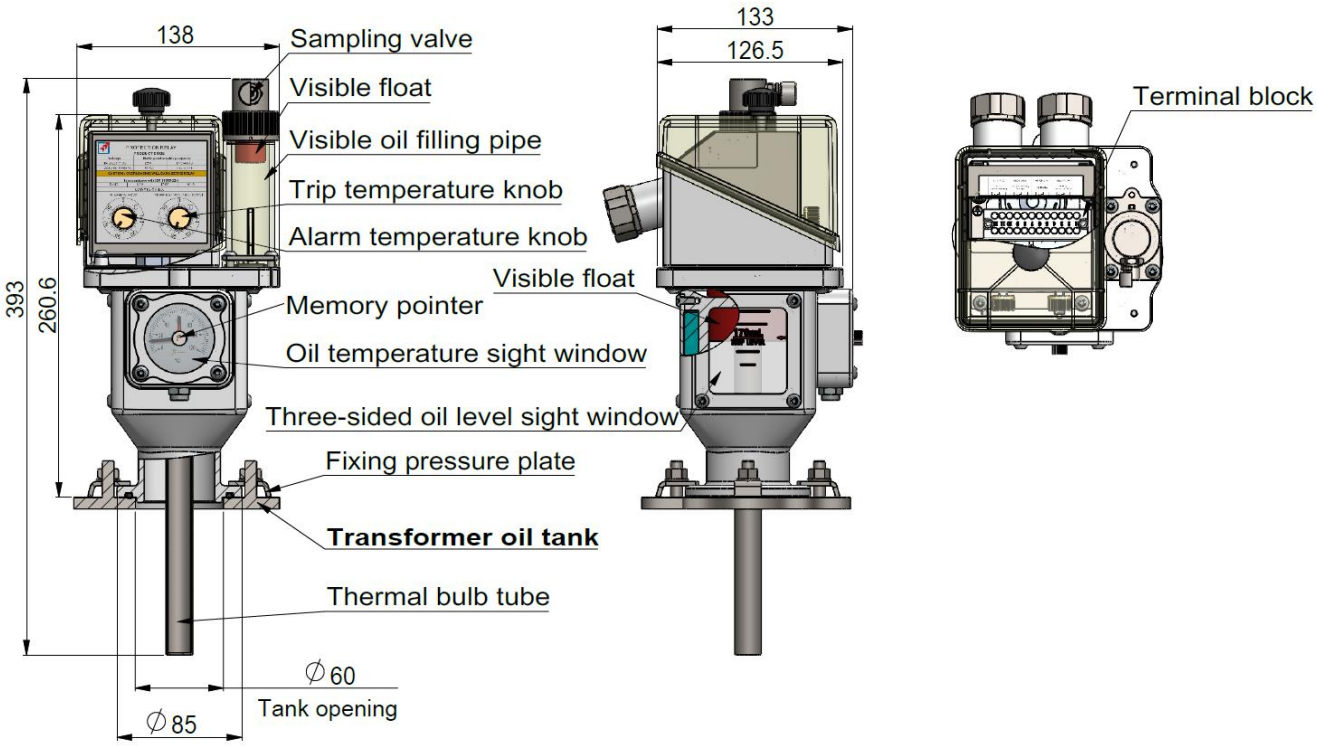
8.1 The opening size of the mounting flange on the transformer tank cover is φ60 mm.

8.2 Fill oil into the transformer via the connecting flange until the oil level approaches the tank top cover, then mount the gas relay onto the connecting flange. The upper surface of the flange shall be clean without scratches or abrasions.

8.3 Unscrew the air vent plug (or sampling valve) on the relay and take out the small float. Inject oil through the oil filling pipe until the high-low voltage bushings and the relay are fully filled with oil. Replace the float, then tighten the air vent plug (or sampling valve) on the oil filling pipe.

8.4 Our products have been calibrated and qualified before delivery. Users shall not disassemble or assemble them arbitrarily.

10、Overall Dimension Drawing



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