Auto-recloser Series with Insulation Detection

MT53SD Series

Product Manual

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1 Basic Definitions and Application Scenarios

1.1 Product Definition

The MT53SD is a motor-driven auto-reclosing module with insulation detection, designed for use with RCCBs.

After the circuit breaker trips due to a fault, the MT53SD first checks the insulation status of the downstream circuit. Automatic closing will only be performed when the circuit insulation returns to permissible conditions. If the fault persists, the device remains open and continues periodic detection to prevent closing onto a faulty circuit.

1.2 Core Functions

- Automatically distinguish manual opening and fault tripping;
- Measure insulation resistance of downstream circuit before closing;
- Auto-reclose upon insulation recovery;
- Periodic re-check during persistent fault conditions;
- Operating status confirmation after closing;
- Permanent fault lock-out;
- AUTO, MAN and mechanical LOCK modes;
- Local LED status indication;
- Support for OF and SD auxiliary contacts;

1.3 Application Scenarios

- Telecommunication base stations and unattended equipment rooms;
- Cold-chain logistics and constant-temperature warehouses;
- Municipal lighting and traffic monitoring systems;
- Outdoor power distribution for PV and charging facilities;
- Critical auxiliary production circuits;
- Residential and commercial power distribution systems.

2 Electrical Parameters

Characteristic Category	Technical Parameters	MT53SD
Electrical Characteristics	Residual current type compatibility	AC type, A type, B type and time-delay type. Subject to matching specifications.
	Rated voltage (Un)	2P: 230V AC;
	Rated current (In)	16、25、40、63、80、100
	Rated frequency	50/60Hz (±5%)
	Rated residual operating current (IΔn)	30mA, compatible with RCCB of this residual current rating
	Rated impulse withstand voltage (Uimp)	4 kV
	Auxiliary power consumption	<24 W during operation; <1.5 W in standby
Reclosing System	Maximum auto-closing cycles	1 time maximum per fault recovery sequence
	Initial insulation check	Triggered immediately after fault tripping
	Insulation re-check interval	10s
	Insulation inhibit threshold	Rd＜8 kΩ, closing prohibited
	Insulation enable threshold	Rd＞16 kΩ, closing permitted
	Transition zone	8 kΩ≤Rd≤16 kΩ: remain open and continue re- checks
	Recovery confirmation	Two consecutive valid measurements
	Post-closing observation time	60s
Mechanical Characteristics	Mechanical endurance	6000 cycles

	Electrical endurance	4000 cycles
	Number of poles	2P, depends on paired circuit breaker
	Mounting method	DIN- rail mounting
Environmental Parameters	Operating temperature	−25℃～+55℃
	Maximum altitude	2000m
	Degree of protection	IP20
Standards & Certifications	Reference standards	EN 61008- 1, EN 63024 and applicable EMC standards

3 Operation Modes and Safety Lock-out

3. 1 AUTO (Automatic Mode)

- Insulation detection and auto-reclosing are enabled;
- Auto-reclosing is inhibited after manual opening;
- Closing is prohibited if mechanical lock-out or device abnormality is detected.

3. 2 MANU (Manual Mode)

- Auto-reclosing is disabled;
- Local manual opening and closing operations are permitted;
- Switching from AUTO to MANU immediately aborts ongoing insulation detection and auto-reclosing sequences.

3. 3 LOCK (Mechanical Lock- out Mode)

- Any closing operation is prohibited when the mechanical safety lock is engaged.
- The front panel accepts Φ4 mm padlock for power-off maintenance and safety management. After releasing the mechanical lock, the device only resumes status monitoring and shall NOT perform immediate auto-closing.

4 Auto-reclosing Function

4. 1 Auto-reclosing Activation Conditions

After the RCCB changes from closed position to open position, the MT53SD shall first judge whether auto-reclosing can be activated. Insulation detection or auto-reclosing shall not be executed directly.

The auto-reclosing sequence can only be triggered when all of the following conditions are satisfied simultaneously:

- MT53SD is in AUTO mode;
- Actuator, position feedback and insulation detection circuits are normal;
- No program lockout status is active.

Auto-reclosing shall NOT be activated under the following conditions:

Condition	**Handling Logic**
Manual opening	Remain open; auto-reclosing shall not be activated.
Active Maintenance Lock	Auto-reclosing are prohibited.

Auto-reclosing shall only be used in combination with a residual current circuit-breaker (RCCB).

4. 2 Insulation Status Judgement

The MT53SD performs judgement based on the inhibit-to-reclose threshold Rd0=8 kΩ and enable-to-reclose threshold Rd=16 kΩ.

Measurement Result	Status	Action Requirement
Rmeas ≥ 16kΩ	Allowed	No fault is detected after the expected insulation detection time of 10s.
8kΩ < Rmeas < 16kΩ	Recovery Wait	Remain open and repeat checks at the defined interval.
Rmeas ≤ 8kΩ	Fault Present	Closing is prohibited; high-priority insulation fault alarm is generated.

Measurement failure	Assessment Failed	Remain open; log the cause of measurement failure.

Two consecutive "Allowed" statuses must come from two independent measurements. The same measurement reading shall not be reused.

After the RCCB trips and opens, the MT53SD continuously monitors for faults in real time, using a 10-second detection cycle. If no abnormality is detected during the 10-second cycle, the MT53SD will automatically attempt to reclose the RCCB.

When in "Recovery Wait" or "Fault Present" status, only insulation measurement is permitted. Short-time power feeding or tentative closing shall NOT be used to verify whether the fault has cleared.

4. 3 Manual Reset Operation

Condition	Operation Description
After permanent fault clearance (auto-reclosing failure)	- Manual reset (operation via the circuit- breaker main handle)

5 LED Indication Logic

A multi-color LED is integrated on the module front panel to provide real-time feedback of device operating status:

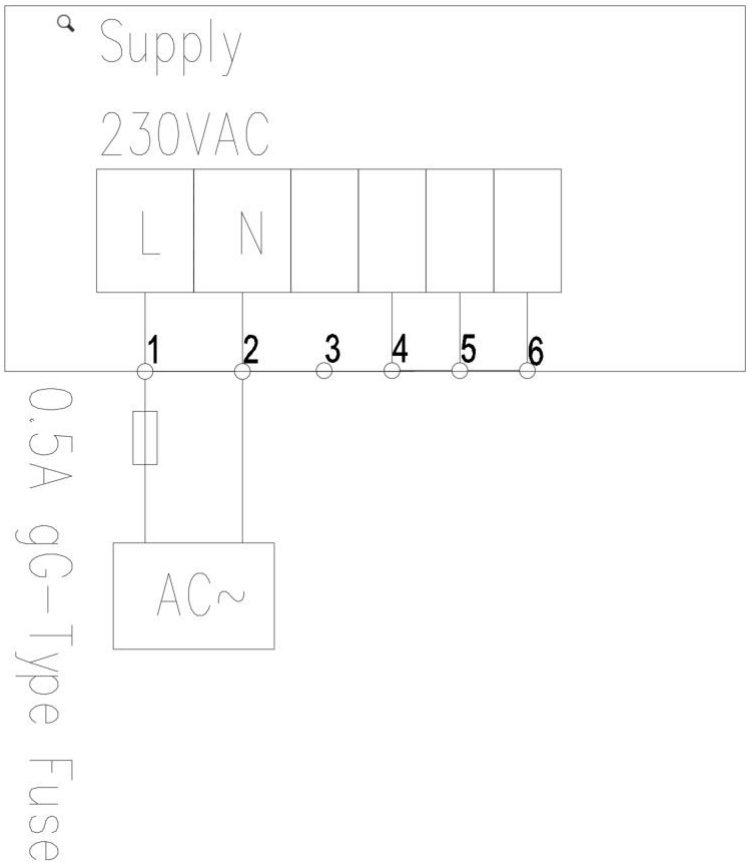
Status	Indication Meaning
Green LED steady ON	AUTO mode, device operating normally
Green LED flashing	MAN mode; opening/closing shall be controlled manually
Red LED flashing	Awaiting auto-reclosing, insulation measurement in progress

Red LED steady ON	Auto-reclosing failure, device enters program lockout status
Yellow LED flashing	During the insulation detection process before reclosing, when the measured insulation resistance (Rmeas) is less than 16 kΩ

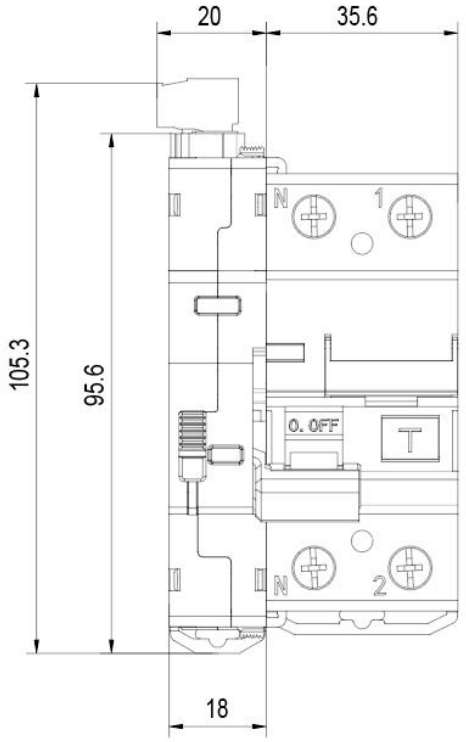
6 Terminal Definition

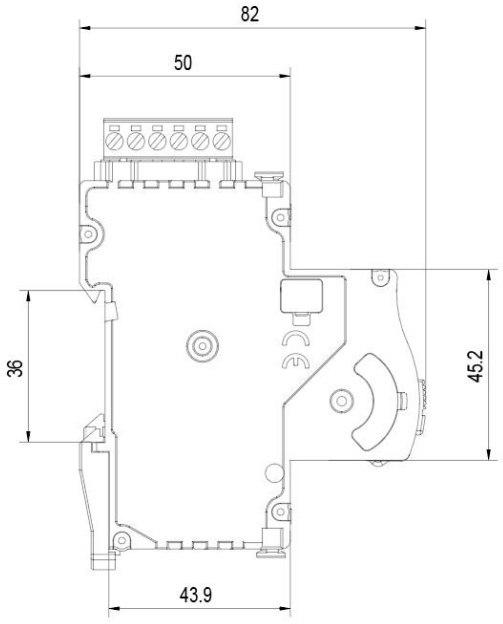
Terminal No.	Function Definition	Remarks
1、 2	Power supply input	230V AC（±15%）

6.1 Wiring Diagram



7 Dimension Drawing





8 EMC Standards

Test Item	Basic Standard	Test Level Description
Electro-static Discharge Immunity (ESD)	IEC 61000-4-2	Level 3: Air-discharge 8 kV, Contact-discharge 6 kV
Radio-frequency Electromagnetic Field Immunity (RS/RFI)	IEC 61000-4-3	Level 3: 10 V/m, 80 MHz-1000 MHz
Electrical Fast Transient / Burst (EFT)	IEC 61000-4-4	Level 2: 2 kV (power supply line), 5/50 ns
Surge Immunity	IEC 61000-4-5	Level 3: Common-mode 4 kV, Differential-mode 2 kV
Conducted Radio-frequency Immunity (CS)	IEC 61000-4-6	Level 2: 3 V, 150 Ω, 0.15-80 MHz
Power-frequency Magnetic Field Immunity	IEC 61000-4-8	Level 4: 30 A/m, continuous wave
Common-mode conducted disturbance for frequency range below 150 kHz	IEC 61000-4-16	Test level 3
Radiated Emission (EMI) RE	EN 55022 / CISPR 22	Class B
Conducted Emission (CE)	EN 55022 / CISPR 22	Class B