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Risentric

SHANGHAI RISENTRIC ELECTRIC CO .,LTD

MDmax ST Low-Voltage Switchgear Instruction Manual

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CONTENTS

ABOUT RISENTRIC

Shanghai Risentric Electric Co., Ltd. specializes in the research, development, and manufacture of high- and low-voltage complete switchgear, box-type substations, power transformers, and other power transmission and distribution equipment.。

COMPANY PROFILE

Shanghai Risentric Electric Co., Ltd., established in 2005, is a national high-tech enterprise specializing in intelligent power transmission and distribution as well as industrial electrical control. The company has been certified to ISO 9001 Quality Management System, ISO 14001 Environmental Management System, and ISO 45001 Occupational Health and Safety Management System, and has been awarded multiple qualifications including “Specialized and Innovative Enterprise.”

All products are designed and manufactured in strict accordance with IEC standards and relevant national regulations. Many products have obtained mandatory certifications such as CCC and CQC, as well as CE certification, ensuring high levels of safety, reliability, and international applicability.

Risentric possesses comprehensive capabilities covering research and development, manufacturing, system integration, and engineering implementation. Its product portfolio includes high- and low-voltage complete switchgear, European- and American-style box-type substations, power transformers, industrial automation control systems, photovoltaic equipment, and related electrical components. These products are widely applied in industries such as power generation, metallurgy, chemical processing, petroleum, transportation, construction, and municipal engineering, continuously delivering stable and reliable products and professional services to customers.

To ensure product quality and manufacturing excellence, the company has introduced advanced flexible production lines from both domestic and international sources, equipped with CNC turret punching machines, CNC bending machines, CNC shearing machines, CNC laser cutting machines, and CNC busbar processing centers, enabling lean manufacturing and full-process quality control.

While continuously strengthening its presence in the domestic market, Risentric actively expands its international business and is committed to becoming a trusted global partner for power transmission, distribution, and industrial electrical solutions.

Technological innovation, quality first, integrity-based service, and win-win cooperation are the core business philosophies of Risentric. The company sincerely welcomes customers worldwide to cooperate and achieve shared success.

HONORS AND QUALIFICATIONS

OUR PARTNERS

ZF | Schneider Electric | Defond | ABB
MOATECH | BULL公牛 公牛安全插座 | SIEMENS | EUROtronic
SUNON 台湾建准集团 | OMRON 欧姆龙 | CHINT 正泰电器 | HAVELLS
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BOLSTER SYSTEMS | LD | BERPU 贝普 | ZIPPY

Customer service

Technical Achievements

To Realize Automation World With High-advanced Technology

Risentric

MDmax ST Low-Voltage Switchgear

PRODUCT INTRODUCTION

MDmax Low Voltage Switchgear (hereinafter referred to as the “switchgear”) is divided into two series: MDmax ST and MDmax FC. It is a type-tested, modular, multi-function low-voltage power distribution assembly. Based on modular design principles and the use of standard components and modules, the switchgear provides compact, versatile, and flexible distribution solutions, and is suitable for power distribution, control, and protection in various low-voltage distribution applications.

Scope of Application and Environmental Conditions

System: three-phase four-wire, AC 400 V / 690 V, 50 Hz (extendable to 60 Hz), supporting 3P / 4P pole configurations

Environment (general): -5 to +40 ° C; relative humidity ≤ 90% (at 20 ° C, non-condensing); altitude ≤ 2000 m; indoor installation; free from conductive dust and aggressive corrosive gases

Protection: degree of protection IP40 to IP54 optional. Proper sealing consistency shall be ensured during on-site installation. For high-humidity environments, ventilation or anti-condensation heating devices can be configured

Applicable Standards

GB/T 7251.1-2005

Low-voltage switchgear and controlgear assemblies

GB/T 7251.2-2023

Low-voltage switchgear and controlgear assemblies – Part 2: Power switchgear and controlgear assemblies

IEC 60439-1

Low-voltage switchgear and controlgear assemblies

DIN VDE 0660, BS 5486, UTE 63-410, and other relevant standards

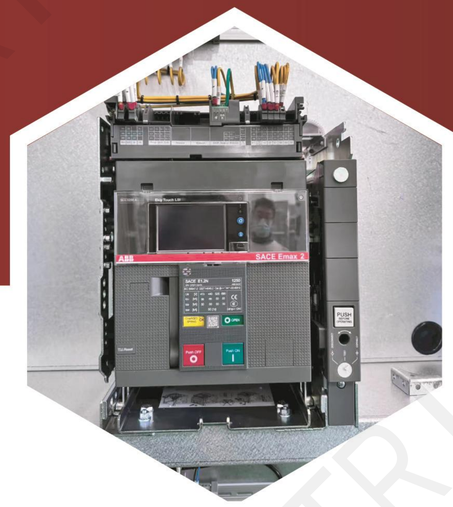
Basic Electrical Parameters

Technical data		
Standard: Type-tested modular switchgear (TTA)		GB7251.1-2005, IEC60439-1, EN60439.1, DIN_VDE0660, Part 500 BS5486, UTE63-410
Electrical characteristics		
Rated Voltage		
Rated Insulation Voltage		690V/1000V AC,3P,1500V DC
Rated Operating Voltage		400V/690V AC,3P,750V DC
Rated Pulse Withstand Voltage (Uimp)		6/8/12kV
Overvoltage level		II / III /IV
Pollution level		3
Rated operating frequency		至60Hz
Rated current		
Main bus	Rated current (Ie)	Up to 6300 A
	Rated peak withstand current(Ipk)	Up to 220 kA
	Rated short-time withstand current(Icw)	Up to 100 kA
Distribution bus	Rated current(Ie)	Up to 2000 A
	Rated peak withstand current(Ipk)	Up to 176 kA
	Rated short-time withstand current(Icw)	Up to 80 kA
Structural characteristics		
Dimensions		
Cabinet and Support Components	DIN41488	Module: E=25mm (compliant with DIN43660 standard)
Recommended Height	2200mm	
Recommended Width	400,600,800,1000,1200mm	
Recommended Depth	600,800,1000,1200mm	
Surface Protection		
Frame		Aluminum Zinc Coated
Internal Compartment Panels and Component Mounting Plates		Aluminum Zinc Coated
Outer Shell		Electric paint glossy gray RAL 7035 color code
Protection Rating		
Separation Type		
According to IEC60529 or 00PI05004NID		Up to IP54
Internal Compartment Division		Up to Form 4b
Plastic Parts		
Halogen-free, Self-extinguishing		DIN VDE0304 Part 3
CFC-free, Flame-retardant		IEC60707

PRODUCT STRUCTURE OVERVIEW

Thermal Overload Relay

Based on the thermal effect of electric current, the relay automatically disconnects the circuit when the load (such as a motor) is overloaded, providing overload protection.



Air Circuit Breaker

It is used to make and break the main circuit of the power distribution system, providing protection against overload, short circuit, and undervoltage. With high breaking capacity, it serves as the main protective switch of the distribution system.

Molded Case Circuit Breaker

It is used to make and break distribution branch circuits or equipment circuits, providing overload and short-circuit protection. Insulation protection is ensured by the molded plastic enclosure.

Contactor

By means of electromagnetic control, it frequently makes and breaks the main circuit and is commonly used for start/stop control of loads such as electric motors.

STRUCTURED DATA

Switching Devices and Enclosures

No.	Component Name	Model / Specification	Qty.	Function / Purpose
1	Universal Circuit Breaker	E1N163P1600A	1	Connects and disconnects the main circuit of the power distribution system. Protects the circuit against overload, short circuit, and undervoltage. Strong breaking capacity, used as the main protection switch of the distribution system.
		E1N083P800A	1	
2	Molded Case Circuit Breaker	T3N2503P250A	2	Connects and disconnects distribution branch circuits/equipment circuits. Provides overload and short-circuit protection. The plastic enclosure provides insulation protection.
		T2N1603P 32A	4	
		T1N1603P 80A	2	
		T1N1603P 100A	1	
		T5N4003P400A	1	
		T5N6303P630A	1	
3	Contactor	A63-30	2	Uses electromagnetic control to frequently connect/disconnect the main circuit. Commonly used for start/stop control of loads such as motors.
4	Thermal Relay	TA75	2	Uses the thermal effect of current. Automatically disconnects the circuit when the load (such as a motor) is overloaded, providing overload protection.
5	Enclosure	Steel plate, thickness 2.0mm	/	Supports and secures internal components, while providing dust protection, physical protection, and improving electrical insulation safety.

Insulating Supports and Associated Connecting Parts

No.	Component Name	Material Name	Model / Specification (mm×mm)	Function / Purpose
1	Insulator	BMC	φ40×50	Supports the busbar, while maintaining electrical insulation between the busbar and the enclosure and other components to ensure circuit safety.
2	Busbar Clamp	BMC	120×6	Secures the busbar position, prevents busbar movement, and ensures the stability of the electrical connection.
3	Busbar Frame	BMC	150×10	Supports and secures multiple busbars, maintains safe spacing between busbars, and ensures insulation performance.
4	Main Circuit Connector Plug	Connector	JZC、JTC Series	Enables fast and reliable connection of the main circuit, facilitating installation, removal, and maintenance of components.

Busbars and Insulated Conductors

No.	Component Name	Material Name	Model / Specification	Function / Purpose
1	Main Switch Incoming/Outgoing Cable	Copper Busbar TMY	3×(150mm×10mm)	As the power transmission and distribution carrier of the power distribution system, it undertakes current transmission for the main circuit and branch circuits. Through different types of busbars, it realizes centralized power distribution. It also provides neutral-line loop current return (maintaining three-phase voltage balance) and equipment grounding protection functions. Insulated wires rely on the insulation layer to achieve safe power transmission, and different specifications match different current-carrying capacity requirements.
2	Main Busbar		3×(120mm×10mm)	
3	Distribution Busbar		120mm×6mm	
4	N Busbar		2×(120mm×8mm)	
5	PE Busbar		120mm×10mm	
6	Insulated Wire	BV、BVR	6mm², 25mm², etc.	Transmits electrical power. The insulation layer provides electrical isolation to prevent leakage current/electric shock. Different cross-sectional areas match different current-carrying capacities.

TECHNICAL PARAMETERS

Mechanical Structural Parameters

Item	Parameter / Description
Rated Current of Complete Equipment (Ina)	1600A
Enclosure Protection Rating	IP40
Minimum Isolation Height of Withdrawable Unit	38.8mm
Functional Unit Separation Form	Form 3a

Thermal Stability and Short-Circuit Withstand Capability

Item	Parameter / Description
Rated Short-Time Withstand Current Icw(1s)	50kA
Rated Peak Withstand Current Icm	50kA
Main Switch Model	E1N16
Main Switch Rated Current In	1600A
Rated Short-Circuit Breaking Capacity Icu	50kA
Rated Service Short-Circuit Breaking Capacity Ics	50kA
Rated Short-Time Withstand Current Icw	50kA/1s
Relevant Standard	E1N16:Inm=1600A

Associated Electrical Systems

Item	Parameter / Description
Configuration (a)	Electrical circuits, complete equipment, motors, machinery manufacturing
Application (b)	Power equipment control, circuit protection
Control Type (c)	Motor control system, electrical protection, motor load control

Rated Current and Short-Circuit Capability of Outgoing Circuits

Circuit No.	Rated Current In (A)	Rated Short-Circuit Breaking Capacity Icu (kA)
2-1	300	30
2-2	100	30
3-1	20	30
3-2	50	50
3-3	50	50
3-4	180	35
3-5	300	30
3-6	490	30

Reliability and EMC Information

Item	Parameter / Description
Rated Diversity Factor (RDF)	1.0
EMC Level	Environment A/B
Thermal Rigidity Grade of Insulating Material	BMC: Grade A

WORKING PRINCIPLE

- Normal operation: the main power supply is fed into the main busbar through the incoming circuit breaker and distributed to each functional unit via the distribution busbars. Switching devices control the on/off status of circuits according to load requirements, while protection devices continuously monitor the circuit conditions in real time.
- Fault protection: when abnormalities such as short circuit, overload, earth leakage, or arc fault occur in a circuit, the corresponding protection devices operate rapidly to isolate the faulty circuit, preventing fault escalation and ensuring system safety.
- Functional unit operation: withdrawable / removable units are operated via a manual operating handle to achieve three positions — Disconnected, Test, and Connected. LED indication windows display the current operating status, while mechanical interlocks prevent incorrect or unsafe operations.
- Modular expansion: by means of standard modular pitch holes and standardized components, functional units can be flexibly added or removed, enabling easy expansion and retrofit of power distribution schemes.
- Main circuit power flow: incoming power → air circuit breaker (ACB) → main busbar → molded case circuit breaker (MCCB) → distribution busbar → functional unit → load; auxiliary circuits are supplied by miniature circuit breakers (MCBs) to provide control and indication functions.

MDmax switchgear is a modular, composite low-voltage switchgear assembly, mainly available in two series: ST (withdrawable type) and FC (fixed type). By adopting standardized components, it features a compact structure, high flexibility, and multifunction capability. It is widely applied in power generation, municipal infrastructure, transportation, data centers, and other fields. The switchgear can integrate digital technologies to enable remote monitoring and management, offering high safety, reliability, and ease of assembly.

INSTALLATION AND WIRING

Mechanical Installation

● Position the cabinet at the installation location according to the cabinet dimensions. Secure it using expansion bolts or chemical anchor bolts. Ensure the cabinet is level and vertically aligned, with an installation tolerance of ⩽ ±1 mm/m

● The spacing between cabinets shall meet operation and maintenance requirements. The front operating aisle shall be ⩾ 1000 mm, and the rear maintenance aisle shall be ⩾ 600 mm

● Cable trench depth shall be ⩾ 400 mm, with the width matching the cabinet cable entry requirements. The interface between the cabinet bottom and the cable trench shall be properly sealed to prevent dust ingress

● Cabinet earthing: reliably connect the PE busbar to the site earthing network. The cross-sectional area of the earthing conductor shall be ⩾ 6 mm☒, and the earthing resistance shall be ⩽ 4 Ω

Electrical Wiring (Key Points)

● Incoming cable ratings shall match the rated current. The tightening torque of main busbar connections shall comply with component requirements. Copper busbar joints shall be treated with anti-oxidation measures

● Functional unit wiring: connect according to the terminal numbers shown in the schematic diagrams. Secondary control wiring shall use BV/BVR insulated conductors, with conductor sizes selected as required within the range of 6 mm to 70 mm

● Phase sequence consistency: ensure that the phase sequence of incoming and outgoing circuits remains consistent to avoid issues such as motor reverse rotation

● Post-wiring inspection: perform insulation resistance testing and earthing continuity testing to ensure there are no short circuits or loose connections

Commissioning and Acceptance

●Pre-energization:Verify consistency between drawings and component nameplates, check the tightening torque of busbar connections and correctness of wiring, and confirm that protective sealing meets the specified requirements.

●Parameter settings:Set the circuit breaker trip current, thermal overload relay setting current, and protection device operating thresholds according to load requirements.

●Functional tests:

●Opening and closing test:Manually / electrically operate all switching devices to verify flexible and reliable opening and closing.

●Protection test:Simulate short-circuit, overload and other fault conditions to verify accurate operation of protection devices.

●Unit changeover test:Carry out three-position changeover tests for withdrawable / removable units to verify the effectiveness of interlocking functions.

●Documentation and records:Prepare and archive the “Commissioning Record”, “Terminal Schedule”, “Factory / Site Acceptance Checklist”, “Test Report”, and other relevant documents.

Operation and Handling

●Automatic / Manual mode:Automatic mode is adopted during normal operation, with protection devices performing automatic monitoring and operation; switch to manual mode during inspection or maintenance.

●Operating procedure:When operating withdrawable / removable units, strictly follow the principle of “open before close”, and proceed to the next operation only after confirming the correct position indication.

●Shutdown operation:Disconnect all functional unit switching devices first, then open the incoming circuit breaker, apply lockout and tagout (LOTO), and carry out maintenance only after voltage verification and earthing in accordance with procedures.

Maintenance (Recommendations)

●Quarterly:Clean dust from inside the cabinet and from the surfaces of components, check the status of indicator lamps and position indication windows, and perform spot checks on circuit temperature rise.

●Semi-annually:Re-tighten busbar and terminal connection bolts, check the operational flexibility of switching device mechanisms, and confirm the reliability of earthing connections.

●Annually:Carry out comprehensive functional tests and protection setting verification, inspect insulation condition and sealing performance, replace aged or damaged components, and archive maintenance records.

Risentric

The company is equipped with advanced flexible sheet metal processing production lines, busbar processing production lines, and state-of-the-art manufacturing and testing equipment. By adopting modern information technology, it has fully implemented the CIMS (Computer Integrated Manufacturing System) and PDM (Product Data Management) systems.

Common Faults and Troubleshooting

Phenomenon	Possible Causes	Recommended Actions
Switch Component Fails to Operate	No power in the control circuit; incorrect parameter settings; mechanical jamming	Check the control power supply and wiring; verify protection settings; clean and lubricate the operating mechanism
Excessive Circuit Temperature Rise	Loose busbar connections; insufficient cable cross-section; load overload	Retighten connection bolts; replace with cables of matching cross-section; check the operating status of the load
Abnormal Indication	Indicator lamp damaged; terminal loosened; control circuit fault	Replace the indicator lamp; retighten terminals; troubleshoot control circuit wiring and components
Interlock Failure	Mechanical interlock mechanism damaged; incorrect operating procedure	Repair or replace the interlock mechanism; operate again according to the standard procedure
Condensation	Ambient humidity exceeds the limit; anti-condensation device not enabled	Enable the anti-condensation heating element; improve cabinet ventilation conditions

“ Science, truth-seeking, and continuous improvement ”

Packing and Accompanying Documents

- Switchgear cabinet: 1 unit (configured according to the selected size and series)
- Supplied with the cabinet:Primary and secondary wiring diagrams, certificate of conformity, factory inspection report, terminal / circuit list, component manuals, and type test report
- Accessories:Installation fasteners, spare fuses, and tool kit (configured as required)

Ordering Information

- Rated parameters: rated voltage, rated current, number of poles, short-time withstand current, degree of protection
- Cubicle configuration: series (ST / FC), cubicle dimensions, color, form of internal separation, type and quantity of functional units
- Component selection: models and ratings of circuit breakers, contactors, thermal overload relays, SPD, etc.
- Installation and wiring: incoming and outgoing directions, cable specifications, earthing requirements, configuration of anti-condensation devices
- Expansion requirements: arc flash detection system, intelligent power distribution management unit (PMU), communication functions, etc.
- Brand preference: specified component brands or standard configuration

100+ Over 100 professionals

20+ 20 years of manufacturing experience

20000+ Factory footprint 20000 square meter

2000+ Number of satisfied customers 2000+