RDM5E

Electronic type Moulded Case Circuit Breaker

Description

RDM5E Series Electronic type MCCB is suitable for the distribution circuits of AC50Hz, rated insulation voltage of 1000V, rated operating voltage 690V and below, rated current up to 800A, which is used to distribute the electric and protect the circuits and the power equipment avoid the damages of over-load, short-circuit and under-voltage etc. faults. The circuit breaker below 630A can also be used as the protection of the motor. Under the normal situation, the circuit breaker can also be used as the circuit's infrequently switching and motor's infrequently startup. The circuit breaker has the protect function of over-load long time delay reverse time limit, short-circuit short delay reverse time limit, short circuit short delay fixed time limit, short circuit instantaneous and under-voltage. This product has the characteristics of small size, high breaking capacity, short arcing, convenient installation of accessories and anti-vibration.

Normal operating condition and installation condition

1.Installation location no more than 2000m

2.Temperature: not higher than +40℃,and no lower than -25℃, and the average temperature no higher than +35℃

3.The relative humidity: no more than 50%,when temperature is +40℃.The product can withstand the higher humidity under lower temperature, for instance, when temperature at +20℃, the product can withstand 90% relative humidity.

4.Class of pollution: 3 Class

5.Main circuit breaker installation type: III class, Auxiliary circuit and control circuit installation type: II class

Main function characteristics

Intelligent controller is the main parts of the MCCB, it is applicable for the motor protection or the distribution protection, to realize the measurement, protection, control and communication functions are integrated, so that the line and power equipment are free from overload, short circuit, grounding and other fault damages.

Using MCU micro processing controller, stable and reliable performance: this intelligent controller can supply the power, only one phase is electrified, when the current is not lower than 35% of its rated current, all can ensure the protection function is working normally.

- ☐ Selective cooperation has three-stage protection: the circuit breaker of class B and other short circuit protection devices can selectively cooperate under short circuit conditions; the setting of overload long delay reverse time limit, short circuit delay (reverse time limit, fixed time limit), short circuit instantaneous and other protection function parameters
- ☐ With three parameter sets of action current and action time, it can be adjusted from 4-10 stages: the user can adjust the controller according to the load current requirements, or choose to close the corresponding function
- ☐ High current instantaneous tripping function: when the circuit breaker is closed for operation, if has the short circuit high current (≥20Inm, the circuit breaker magnetic tripping mechanism can be directly disconnected, the double protection is more reliable and safe;
- ☐ With the tripping test (test) function: input DC DC12V voltage to test the circuit breaker action characteristics;
- ☐ Fault self-diagnosis function: to protect and detect the working state and operation situation of the intelligent controller itself;
- ☐ With the forecast warning indication, overload indication: when the load current reaches or exceeds the setting value, the light guide column exports the light source;
- ☐ Magnetic flux converter double air gap technology: work more reliable and stable, prevent misoperation, reliable tripping, low power;
- ☐ High protection accuracy: overload protectidn, short circuit, short delay protection action current accuracy of +10%; short circuit instantaneous protection value accuracy of ± 15% depends on the action current;

Optional functions

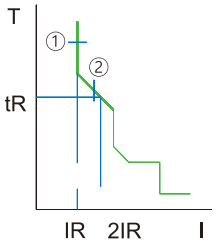
- ☐ Dual passive signal output function: signal (or alarm), AC230V3A;
- ☐ With fire protection shunt function: overload alarm does not trip (provide a pair of passive contacts) and provide shunt release function
- ☐ With communication function: standard RS485, Modbus Fieldbus Agreement

Main technical parameter

	RDM5E-125		RDM5E-250		RDM5E-400		RDM5E-800	
Rated current of frame size Inm (A)	125		250		400		800	
Rated current (A)	32, 63, 125		250		400		630, 800	
Poles	3,4		3,4		3,4		3,4	
Rated frequency (Hz)	50							
Rated insulation voltage Ui (V)	AC 1000							
Rated impulse withstand voltage Uimp (V)	12000							
Rated working voltage Ue (V)	400/690V							
Arcing distance (mm)	⩽50		⩽50		⩽100		⩽100	
Rated short circuit breaking capacity	M	H	M	H	M	H	M	H
Rated limit/Rated operation Icu/Ics (KA) at 400V	35/23	50/35	35/23	50/35	50/35	70/50	50/35	70/50
Rated limit/Rated operation Icu/Ics (KA) at 690V	15/8	20/10	15/8	20/10	15/8	20/10	15/8	20/10
Rated short-time withstand current Icw (kA/1s)	1.5		3		5		10	
Usage category	A		A		B		B	
Confirms to standard	IEC60947-2							
Using environment condition	-35~+70℃							
Electrical life (cycles)	5000		3500		1500		500	
Mechanical life (cycles)	10000		10000		5000		3000	
Front connection	■	■	■	■	■	■	■	■
Rear connection	■	■	■	■	■	■	■	■
Plug-in connection	■	■	■	■	■	■	■	■
Undervoltage release	■	■	■	■	■	■	■	■
Shunt release	■	■	■	■	■	■	■	■
Auxiliary contacts	■	■	■	■	■	■	■	■
Alarming contacts	■	■	■	■	■	■	■	■
Motor operation mechanism	■	■	■	■	■	■	■	■
Manual operation mechanism	■	■	■	■	■	■	■	■
Intelligent control module	■	■	■	■	■	■	■	■
Testing power module	■	■	■	■	■	■	■	■

Main functional configuration of the power distribution system

Overload long delay protection
Overload long delay protection is used to prevent overheating of lines and equipment under overload.



No.	Parameter	Illustration
①	I_R	Overload long delay tripping setting current
②	t_R	Overload long delay setting time

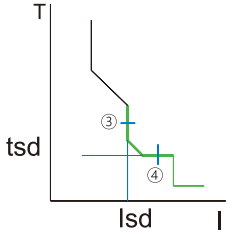
□ Overload long delay reverse time limit protection action characteristics

Items	Framse size Inm(A)	Rated current In(A)	Range（A）
Current Set Point (IR) [Encoder 1]	125	32	IR=12.5-14-16-18-20-22-25-28-30-32
		63	IR=25-32-36-40-45-50-56-63
		125	IR=50-56-63-70-75-80-90-100-112-125
	250	250	IR=100-112-125-140-150-160-180-200-225-250
	400	400	IR=160-180-200-225-250-280-315-350-375-400
	800	630	IR=250-280-315-350-375-400-450-500-560-630
		800	IR=315-350-400-450-500-560-630-700-760-800
Action characteristics			I＞1.3IR, action within 1h, I≤1.05IR, no action＞2 h, current allowable error: ±10%
Characteristics curve	Time setting value (s) [Encoder 2]		tR=12-60-80-100-OFF @2IR（Inm=125、250）；When tR=OFF, close the overload long delay protection function
			tR=12-60-100-150-OFF @2IR（Inm=400~800）；When tR=OFF, close the overload long delay protection function
	Action time		Action time confirms to $T=(\frac{2IR}{I})^2 tR$ Time allowable error：± 20%

Remark:
1. Overload long delay protection has thermal memory function, the cooling time default 30 min., the controller power-off automatically removes the thermal memory value.
2. When the overload alarming but not trip accessory is connected, the breaker automatically startup the overload alarming not trip function, action characteristics curve is the same with overload long delay protection function. When tR=OFF, close the overload long delay protection function and alarming but not trip function

Short-circuit short delay protection

Short circuit short delay protection is for medium strength short circuit faults and provides selective protection for the distribution system.



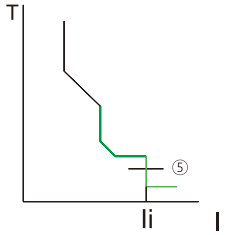
No.	Parameter	Illustration
③	Lsd	Short circuit short delay tripping setting current
④	Tsd	Short circuit short delay setting time

□ Short circuit short delay protection action characteristics

Item	Frame size Inm(A)	Rated current In(A)	Range（A）
Current setting value（IR） [Encoder 3]	125~400	32~400	Isd=（2-2.5-3-4-5-6-7-8-10-12）×IR
	800	630~800	Isd=（2-2.5-3-3.5-4-5-6-7-8-10）×IR
Action characteristics			I＞1.1Isd action，I≤0.9Isd no action current allowable error：±10%
Characteristics curve	Time setting value (s) [Encoder 4]		tsd=0.06-0.1-0.2-0.3-OFF（When tR=OFF, close the short-circuit delay protection function)
	Action time		When tsd≤I＜1.5Isd, reverse time limit action. Characteristics curve: $T=(\frac{1.5Isd}{I})^2$ tsd Time allowable error: fixed error ±20ms，±20% When 1.5Isd≤I＜Ii, fixed time limit action tsd=0.06s，±0.03s tsd=0.1s，±0.04s tsd=0.2s，±0.05s tsd=0.3s，±0.06s

Short circuit instantaneous protection

Short circuit transient protection is for severe short circuit faults and provides quick cut-off protection for the power distribution system.



No.	Parameter	Illustration
⑤	Ii	Instantaneous tripping setting current

Item	Frame size Inm(A)	Rated current In(A)	Range（A）
Current setting value （IR） [Encoder 5]	125~800	32~800	Ii=（3-4-5-6-7-8-10-12-14-OFF）×IR
Action characteristics			I＞1.15Ii Instantaneous protection action, I≤0.85Ii nstantaneous protection no action current allowable error：±15%

Overload forecast alarm [Encoder 6]

The encoder 6 may be used to set up the overload forecast alarm function parameters

Item	Frame size Inm(A)	Rated current In(A)	Range（A）
Forecast alarm current（IP）	125~800	32~800	Ip=（0.7-0.75-0.8-0.85-0.9-0.95-1-OFF）×IR
Action characteristics			I＞1.0Ip Forecast alarm indicator lights，I≤0.9Ip forecast alarm indicator do not light

Overload indication

The panel overload indicator lamp is used to monitor the load current status

Items	Frame size Inm(A)	Rated current In(A)	Range（A）
Overload indication	125~800	32~800	1.05IR
Action characteristics			I＞1.05IR Overload indicator lights，I≤1.0IR overload indicator do not light

Operation indication

Panel operation indicator is used to monitor the operation status of the controller

Items	Frame size Inm(A)	Rated current In(A)	Range
Running indication	125~800	32~800	0.4In
Action characteristics			I＞0.4In Running indication twinkle (period 1s, duty cycle 50%), I ≤0.35In running indication does not light

Prepayment function

After the product is connected to the prepaid accessories, they will receive the AC220V control signal output by the electricity meter. Action characteristics are shown in the following table:

Meter signal	Circuit breaker action characteristics
0VAC	Allow the opening and closing operation
220VAC	Delay 3 seconds automatic opening, prohibit reclosing

Communication function

The controller has a communication function, which needs to be implemented with the corresponding accessories.

Communication characteristics parameter

- □ Interface：The controller is connected with external communication accessories, which is the standard RS485 interface
- □ Baud rate (bps): the default is 38400, the remote control can set the range of 2400,4800,9600,19200,38400.

Communication format：

- □ Data bit：8；
- □ Check position: occasional；
- □ Stop position: 1；
- □ Communication protocol: ModBus RTU, slave mode;
- □ Device address: 10 (default), remote adjustment can set the range of 1~255.

Motor protection main function allocation

Overload long time delay protection

Item	Frame size Inm(A)	Rated current In(A)	Range（A）
Current setting value（IR）【Encoder 1】	125	32	IR=12.5-14-16-18-20-22-25-28-30-32
		63	IR=25-32-36-40-45-50-56-63
		125	IR=50-56-63-70-75-80-90-100-112-125
	250	250	IR=100-112-125-140-150-160-180-200-225-250
	400	400	IR=160-180-200-225-250-280-315-350-375-400
	800	630	IR=250-280-315-350-375-400-450-500-560-630
		800	IR=315-350-400-450-500-560-630-700-760-800
Action characteristics			I＞1 .2IR,action within 1h,I≤1.05IR, no action＞2 h, the current allows error：±10%
	Tripping category【Encoder 2】		tR=12-60-80-100-OFF @2IR （Inm=125、250）；
			tR=12-60-100-150-OFF @2IR （Inm=400~800）；

Characteristics curve	Category	125~250 Frame action characteristics/time										400~800 Frame action characteristics/time							
		based on I^2t action										based on I^2t action							
	1.05IR(cooling statues)	No action within 2h										No action within 2h							
	1.2IR(cooling statues)	No action within 1h										No action within 1h							
	1.5IR(cooling statues)	21.3s	107s	142s	178s	21.3s	107s	178s	267s	14.2s	21.3s	28.4s	42.7s	56.9s	85.3s	113.8s	170.7s	227s	455.1s
	2IR‡R(cooling statues)	12s	60s	80s	100s	12s	60s	100s	150s	8s	12s	16s	24s	32s	48s	64s	96s	128s	256s
	7.7IR(cooling statues)	0.93s	4.63s	6.17s	7.72s	0.93s	4.63s	7.72s	11.6s	0.62s	0.93s	1.23s	1.85s	2.47s	3.7s	4.94s	7.41s	9.88s	19.75s
	Tripping grade	—	10A	10	20	—	10	20	30	—	—	5	5	10A	10A	10	10	20	30
	Action time allowable error：±20%																		

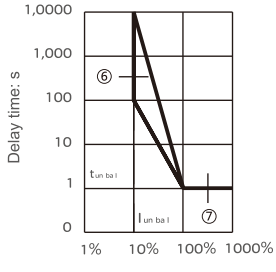
Remarks:
1. Overload long time delay protection has thermal memory function, the default cooling time is 30min, the controller automatically cleans the thermal memory value when cut off.
2. When the overload alarm without tripping is connected in, the overload alarm without tripping function will be automatically startup, the action characteristics curve is the same with the overload long time delay protection function. When tR=OFF, turning off the overload long time delay protection function and alarm without tripping function.

Overload pre-alarming

Item	Frame size Inm(A)	Rated current In(A)	Range（A）
Pre-alarm current（IP）	125~800	32~800	Ip=1.0×IR（Fixed）
Action characteristics			I＞1 .0Ip The pre-alarm indicator lights up ，I≤0.9Ip the pre-alarm indicator does not light up

Current imbalance protection【Encoder 6】

Encoder 6 can be used to do parameter setting devices for current imbalance protection. Current imbalance protection is one of the basic functions of motor protection, which can eliminate the faults of motor jitter and burning out caused by current imbalance and phase deficiency.



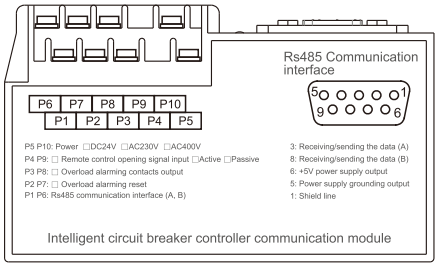
S/No.	Parameter	Illustration
⑥	L_{unbal}	Current imbalance rate setting value
⑦	T_{unbal}	Current imbalance rate protection setting time

Item	Frame size Inm(A)	Rated current In(A)	Range（A）
Current imbalance rate (%)	125~800	32~800	Iunbal=（10-20-30-40-50-60-70-80-90-OFF）%
Action characteristics			I＞1.1Iunbal action，I≤0.9Isd no action
Characteristics curve			T=max {(Iunbal) ×tunbal,tunbal} ,tunbal=1s； Time allowable error：±10%；
Method of calculating the current imbalance rate			in formula：Iavg= $\frac{\sum_{j=1}^{3} Ij}{3}$, Iavg $\varepsilon i=\frac{Max\|Ij-Iavg\|}{Iavg} \times 100\%$ Is the average of the three-phase current, and Ij is the effective value of the J phase current. Note: The current in the above formula refers to the effective value

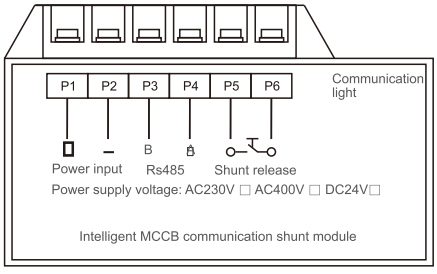
Accessory function allocation

Specification allocation

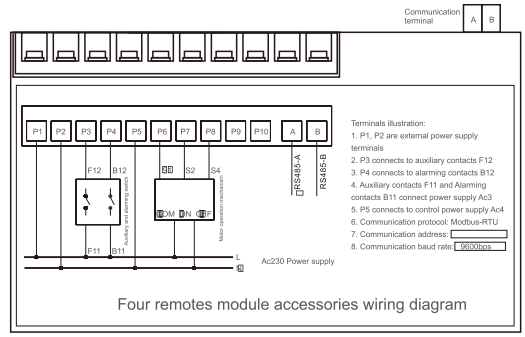
No.	Name	10p accessory function	Rated power voltage (range)	Rated control signal voltage (range)
1	Four remote accessories	Four remote communication+ Reset button+working indication	DC24V (85%~110%)	Status signal DC24V (85%~110%) Motor operation signal DC24V
			AC230V (85%~110%)	Status signal AC230V (85%~110%) Motor operation signal AC230
Remark: Reset button function, pressing and holding for 5s; Communication baud rate, communication address and other parameters are restored to factory values				

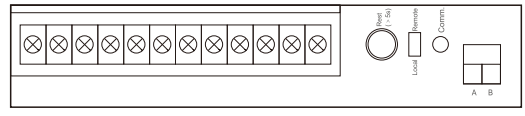


Alarming does not trip module

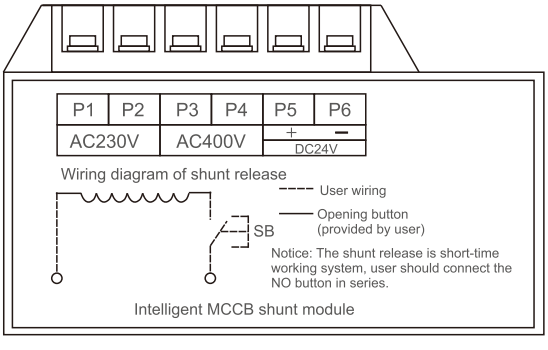


Intelligent circuit breaker communication shunt module

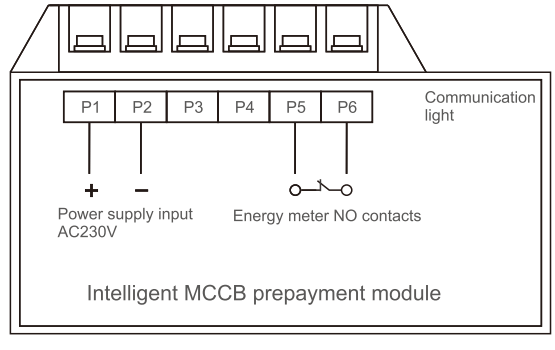




Four remotes communication module



Intelligent circuit breaker shunt module



Prepayment module

Technical parameters for the accessories devices

Rated value of auxiliary contacts and alarming contacts

Classification	Rated current of frame size Inm (A)	Setting thermal current Ith (A)	Rated working current Ie (A)	
			AC400V	DC220V
Auxiliary contacts	Inm≤400	3	0.3	0.15
	Inm≥400	3	0.4	0.15
Alarming contacts	100≤Inm≤800	3	0.3	0.15

Rated control power voltage (Us) and rated working voltage (Ue) of control circuit release and electric operation mechanism

Type			Rated voltage（V）	
			AC50Hz	DC
Release	Shunt release	Us	230、400	24
	Undervoltage release	Ue	230、400	——
Electric operation mechanism		Us	230、400	110、220

☐ External voltage of shunt release is within 70%~100% of rated control power voltage, it should reliably break the circuit breaker.

☐ When the power voltage reduces to the 70%~35% of the undervoltage release's rated voltage, the undervoltage release should reliably break the circuit breaker. When the power voltage is lower than 35% of the undervoltage release's rated voltage, the undervoltage release can prevent the circuit breaker closing. When the power voltage is higher than 85% of the undervoltage release's rated voltage, the underv -undervoltage release can ensure the circuit breaker reliably close.

☐ When the electric operation mechanism is under the rated frequency, and the power voltage between 85%~110%, it can reliably close the circuit breaker.

☐ Power consumption

Model No.	Electrified current（A）	Three-phase total power loss（VA）	
		Front and rear wiring	Plug-in type wiring
RDM5E-125	125	35	40
RDM5E-250	250	62	70
RDM5E-400	400	115	125
RDM5E-800	800	262	294

☐ Capacity reduction coefficient of ambient temperature change (all measured under the rated current of the same case frame)

Capacity reduction coefficient / Environment temperature / Model No.	+40℃	+45℃	+50℃	+55℃	+60℃	+65℃	+70℃
RDM5E-125	1In	1In	1In	0.97In	0.95In	0.92In	0.9In
RDM5E-250	1In	1In	1In	0.96In	0.93In	0.89In	0.86In
RDM5E-400	1In	1In	1In	0.97In	0.95In	0.92In	0.9In
RDM5E-800	1In	1In	1In	0.96In	0.93In	0.89In	0.86In

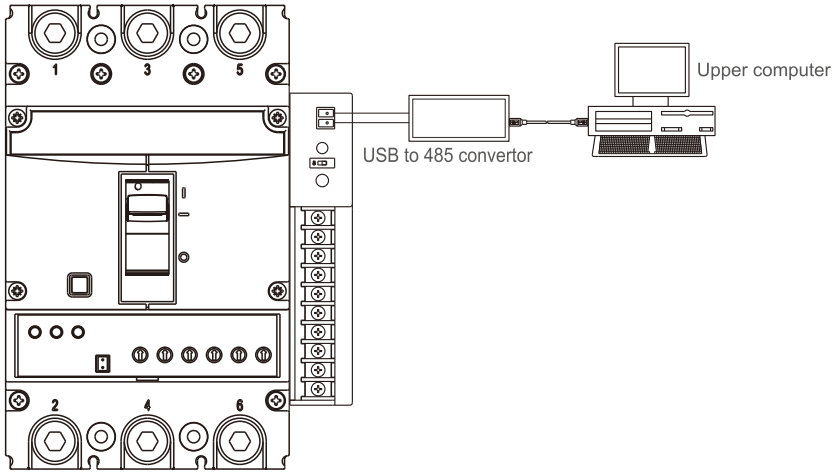
Communication function

☐ RDM5E MCCB with the electric operation mechanism is connected with the upper computer (such as computer), it can realize the remote "Four remote" function through the communication interface, RS485 interface, Modbus-RTU protocol, communication baud rate 9600K.
Additionally, adding the RDM5E MCCB controller (optional accessories) can be directly read and modify the parameters of the circuit breaker in the field.

☐ Communication interface and external module of electronic type MCCB

☐ RDM5E communication MCCB has the communication interface, MODBUS communication protocol

- ☐ When the RDM5E communication MCCB is not used for the network communication but for singly use, the handheld programmer can adjust the protection characteristics of the circuit breaker through the communication interface, the RD-CD LCD display module can also be connected to the communication interface to monitor the operating current and fault information of the circuit breaker.
- ☐ When RDM5E communication MCCB is used for the network, it can be directly connected to the responding field bus. Refer to the field bus with different protocol, can use RD-DP protocol conversion module, to converse the MODBUS protocol and connect to the responding field bus.
- ☐ The communication network of RDM5E series communicable electronic plastic case circuit breaker can be connected with reference to the scheme in the figure below



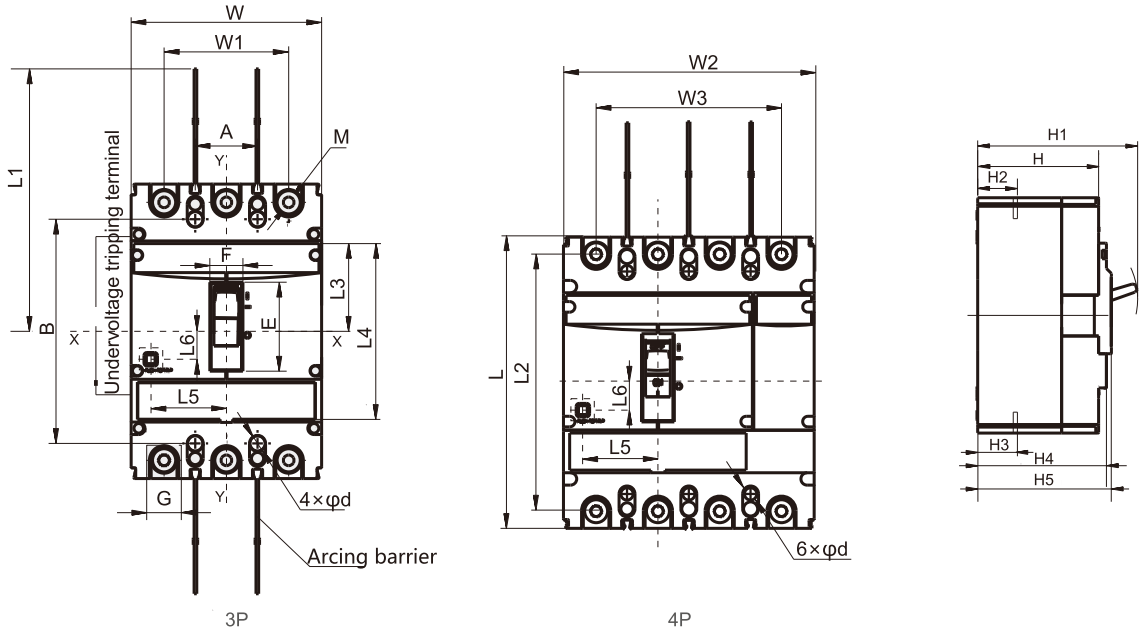
RDM5ESeries communication electronic type MCCB function configuration

●Basic function △ Optional function

Function \ Type	RDM5E Basic type	RDM5E(Z) Intelligent type	RDM5E(X) Fire-proof type	RDM5E(F) Prepaid type
Overload long delay setting	●	●	●	●
Short circuit short delay setting	●	●	●	●
Short circuit instantaneous setting	●	●	●	●
Overload, forecast alarm indication	●	●	●	●
Release testing function	●	●	●	●
Fault self-diagnosis function	●	●	●	●
Dual-channel passive signal output	-	●	△	-
Communication function module	-	●	△	-
Shunt function	-	△	△	-
intelligent control module	-	△	△	-
Fire-proof function	-	-	●	-
Prepaid function	-	-	-	●

Overall and installation dimension

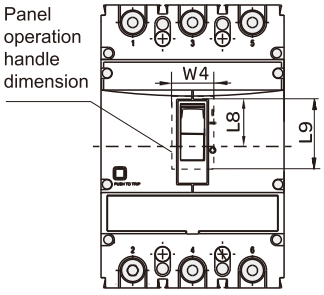
Overall dimension of front board wiring to see diagram 1（X-X、Y-Y is the center of the circuit breaker）



Fixed type front board wiring

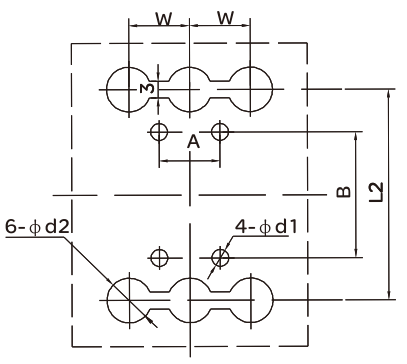
Model No.	Front board wiring																		Button position	
	W	W1	W2	W3	L	L1	L2	L3	L4	H	H1	H2	H3	H4	H5	E	F	G	L5	L6
RDM5E-125	92	60	-	-	150	125	132	43	92	82	112	29	29	93	96	43	19	18	22	16
RDM5E-250	107	70	142	105	165	136	144	52	104	85	115	23	23	90.5	94	50	19	23	42.5	15.5
RDM5E-400	150	96	198	144	257	228	224	69	159	99	152	38	38	104	115	80	42	31	57.5	30
RDM5E-800	210	140	280	210	280	240	243	80	178	103	158	41	44	112	122	82	42	44	53	24.5

Panel operation handle dimension

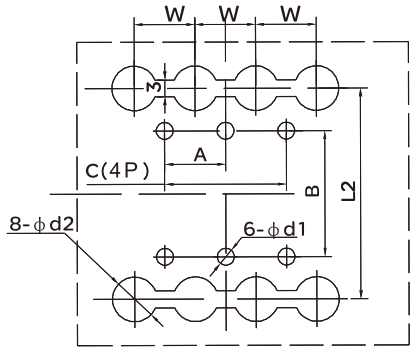


Model No.	Code		
	W4	L8	L9
RDM5E-125	23	24	40
RDM5E-250	23	30	44
RDM5E-400	47	39	66
RDM5E-800	47	42	66

RDM5E Series back board wiring installation board hole-opening dimension

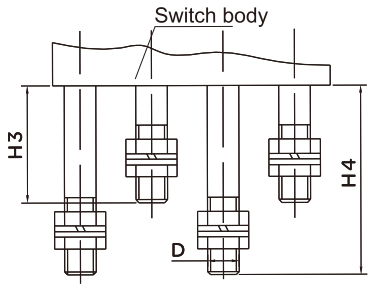


3P

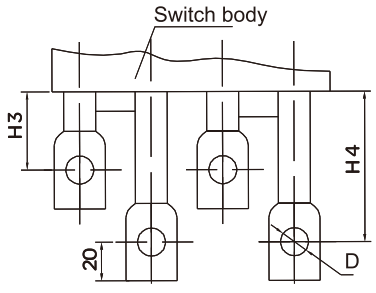


4P

RDM5E series back-board wiring overall and installation dimension



RDM5E-125, 250 Fixed type back board wiring

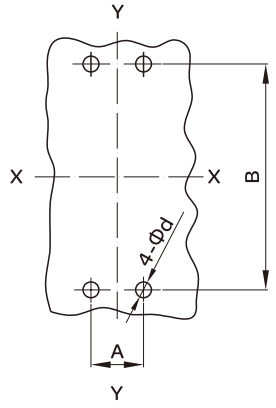


RDM5E-400、800 Fixed type back board wiring

RDM5E-125~800 Back-board wiring overall and installation board hole-opening dimension

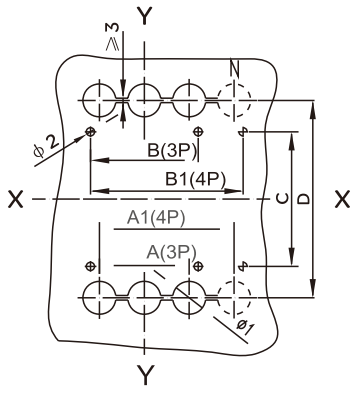
Model No.	Code									
	H3	H4	D	W	L2	d2	A	B	C	d1
RDM5E-125	40	73	M8	30	132	24	30	108	60	5.5
RDM5E-250	46	79	M10	35	145	15	35	126	70	5.5
RDM5E-400	46	83	φ12	48	224	32	44	194	94	7
RDM5E-800	47	87	φ16	70	243	48	70	243	70	7.5

Front board wiring installation board hole-opening dimension（X-X、Y-Y is the center of the circuit breaker）



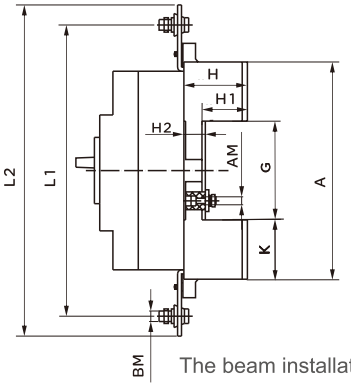
Model No.		RDM5E-125		RDM5E-250		RDM5E-400		RDM5E-800	
Pole		3	4	3	4	3	4	3	4
Installation board hole opening dimension (mm)	A	30	60	35	70	44	94	70	140
	B	129		126		194		243	
	d	4.5		4.5		7		7	

Back board wiring installation board hole-opening dimension（X-X、Y-Y is the center of the circuit breaker）

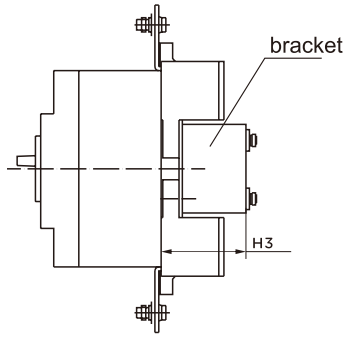


Model No.		RDM5E-125		RDM5E-250		RDM5E-400		RDM5E-800	
Pole		3	4	3	4	3	4	3	4
Installation board hole opening dimension (mm)	A	60	-	70	-	96	-	140	-
	A1	-	90	-	105	-	144	-	210
	B	30	-	35	-	44	-	70	-
	B1	-	60	-	70	-	94	-	70
	C	108		122		194		243	
	D	132		145		224		243	
	φ1	22		24		32		48	
	φ2	5.5		5.5		7		7	

RDM5E series plug-in type front board overall dimension



The beam installation

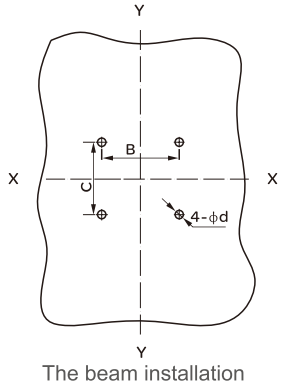


Flat surface installation

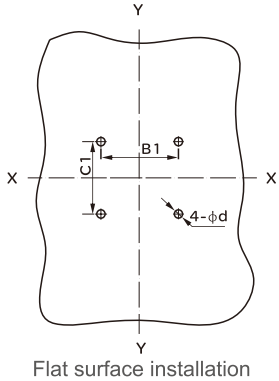
RDM5E-125～800 plug-in type front board circuit breaker overall dimension

Model No.	Code										
	A	G	K	H	H_1	H_2	H_3	L1	L2	AM	BM
RDM5E-125	172	95	38.5	50.5	35	16.5	61	185	217	M6	M8
RDM5E-250	183	95	44	52	35	18	65	230	259	M6	M10
RDM5E-400	276	170	53	79.5	67	18	-	322	352	M6	M10
RDM5E-800	303	179	62	87.5	60.5	28	118	375	405	M10	M12

Plug-in type front board wiring installation board hole-opening dimension（X-X、Y-Y is the center of the circuit breaker）



The beam installation

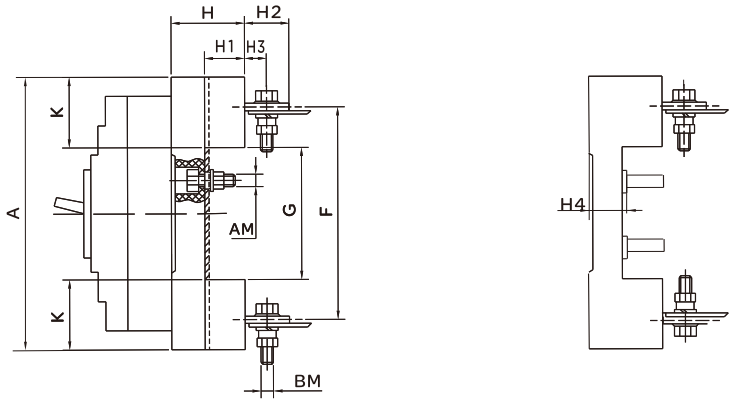


Flat surface installation

RDM5E-125~800 Plug-in type front board wiring installation board hole opening dimension

Model No.		RDM5E-125	RDM5E-250	RDM5E-400	RDM5E-800
Pole		3	3	3	3
Installation board hole opening dimension (mm)	B	66	70	115	90.5
	B1	50	60		65
	C	60	64	135	144.5
	C1	35	35	-	80
	d	6.5	6.5	6.5	11

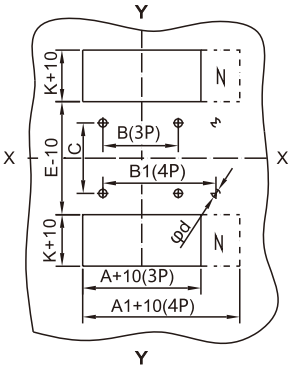
RDM5E series plug-in type back board overall dimension and installation board hole-opening dimensiona



RDM5E-125～800 Plug-in type back board circuit breaker overall dimension

Model No.	Code										
	A	G	K	L1	H	H1	H2	H3	H4	AM	BM
RDM5E-125	168	92	38	132	48	32.5	32.5	18	17	M6	M8
RDM5E-250	186	95	45.5	145	49.5	33.5	34	17	17	M6	M8
RDM5E-400	280	171	54.5	224	59.5	40	44	23.5	20	M8	M12
RDM5E-800	305	181	62	243	87	60	—	—	28	M10	M14

Plug in type back board wiring installation board hole-opening dimension（X-X、Y-Y is the center of circuit breaker）



RDM5E-125～800 Plug-in type back board wiring installation board hole-opening dimension

Model No.		RDM5E-125		RDM5E-250		RDM5E-400		RDM5E-800	
Pole		3	4	3	4	3	4	3	4
Installation board hole opening dimension (mm)	A	91	-	107	-	149	-	210	-
	A1	-	126	-	145	-	200	-	280
	B	60	-	70	-	60	-	90	-
	B1	-	90	-	105	-	108	-	162
	C	56		54		129		146	
	K	38		45.5		54.5		62	
	E	92		95		171		181	
	d	6.5		6.5		8.5		11	