DELIXI
ELECTRIC
德力西电气

NEW ERA Series

CDB9 Miniature Circuit Breaker

Three Highlights

- Safety and Reliability
- Innovative Manufacturing
- Technology Platform

CDB9

Functions and Features

Functions and Features

CDB9 Standard Circuit Breaker

CDB9 standard circuit breaker

CDB9 circuit breaker has the following funcitons:

Short-circuit protection
Overload protection
Control
Isolation

CDB9 standard circuit breaker is suitable for low-voltage terminal power distribution applications in industry, civil building, energy, and infrastructures.

Main parameters	
Rated current	1, 2, 4, 6, 10, 16, 20, 25, 32, 40, 50, 63A
Rated working voltage	230/400V AC
Number of poles	1/2/3/4P
Max. Working voltage	440 V AC
Breaking capacity	6 kA / 10kA
Impulse withstand voltage	4 kV
Current limiting grade	3
Isolation function	Open indication
Quick closing	To ensure normal operation of impact load, and extend the electrical life of circuit breaker
Mechanical life	20,000 times
Electrical life	10,000 times
Environment:	Ambinet temperture: -35˚C -+70˚C Heat and humidity resistance: Class 2 (the relative humidity is 95% at the temperature 55˚C)

Reference weight (g)

Type	1P	2P	3P	4P
Weight	121	242	363	484
Wiring	Tunnel-type wiring terminal Top-in and bottom-out method or bottom-in and top-out method can be sued without derating required Terminal wiring area ■ 25mm^2 and below wire			
Installation	With modular structure, easily installed on the DIN standard rail With upper and lower lock clamps, ensure more convenient installation With vertical, horizontal or back installation available, features are not affected Rated torque ■ 2.5Nm			
Accessories	OF9 auxiliary contact, SD9 alarm contact, MO9 shunt + auxiliary accesory, MVMN9 overvoltage and undervolage protection accessories, FS9 auxiliary + alarm integrated contact, FF9 dual auxiliary contacts, MV9 overvoltage proteciton accessories, MN9 udnervoltage protection accessories, MSN9 no-voltage proteciton accessory, MOWY9 passive shunt + auxiliary accessories			
Accessories	IEC/EN 60898-1, GB10963.1			
Certification	CCC, KEMA, CE, CB, RoSH			

Trip characteristic

■ B type curve
☐ Protection of load with small short-circuit current (such as power supply and long cable)
☐ Trip characteristic: Instantaneous trip range (3~5) In
■ C type curve
☐ Protection of common load and power distribution cable
☐ Trip characteristic: Instantaneous trip range (5~10) In
■ D type curve
☐ Protection of impact load with large starting current
☐ Trip characteristic: Instantaneous trip range (10~14) In

Selection

CDB9 Standard Circuit Breaker

Selection rules and order No

Product name	Breaking capacit	Frame size	Number of poles	Trip type	Rated current
CDB9	N	63A	2	C	16
	N: 6kA H: 10kA	63A	1: 1P 2: 2P 3: 3P 4: 4P	B: B型 C: C型 D: D型	1: 1A 2: 2A … 63: 63A

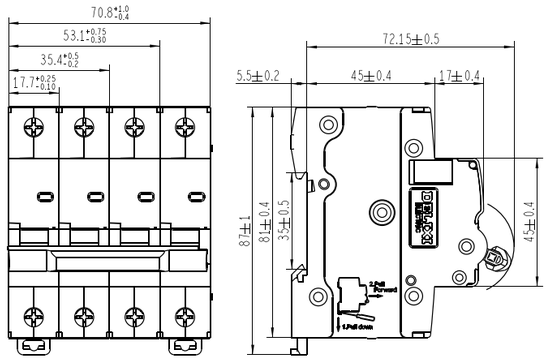
CDB9	Breaking capacity	Trip type	Rated current	Number of poles			
				1P	2P	3P	4P
	N	C	1	CDB9N63A1C1	CDB9N63A2C1	CDB9N63A3C1	CDB9N63A4C1
			2	CDB9N63A1C2	CDB9N63A2C2	CDB9N63A3C2	CDB9N63A4C2
			4	CDB9N63A1C4	CDB9N63A2C4	CDB9N63A3C4	CDB9N63A4C4
			6	CDB9N63A1C6	CDB9N63A2C6	CDB9N63A3C6	CDB9N63A4C6
			10	CDB9N63A1C10	CDB9N63A2C10	CDB9N63A3C10	CDB9N63A4C10
			16	CDB9N63A1C16	CDB9N63A2C16	CDB9N63A3C16	CDB9N63A4C16
			20	CDB9N63A1C20	CDB9N63A2C20	CDB9N63A3C20	CDB9N63A4C20
			25	CDB9N63A1C25	CDB9N63A2C25	CDB9N63A3C25	CDB9N63A4C25
			32	CDB9N63A1C32	CDB9N63A2C32	CDB9N63A3C32	CDB9N63A4C32
			40	CDB9N63A1C40	CDB9N63A2C40	CDB9N63A3C40	CDB9N63A4C40
			50	CDB9N63A1C50	CDB9N63A2C50	CDB9N63A3C50	CDB9N63A4C50
			63	CDB9N63A1C63	CDB9N63A2C63	CDB9N63A3C63	CDB9N63A4C63
		D	1	CDB9N63A1D1	CDB9N63A2D1	CDB9N63A3D1	CDB9N63A4D1
			2	CDB9N63A1D2	CDB9N63A2D2	CDB9N63A3D2	CDB9N63A4D2
			4	CDB9N63A1D4	CDB9N63A2D4	CDB9N63A3D4	CDB9N63A4D4
			6	CDB9N63A1D6	CDB9N63A2D6	CDB9N63A3D6	CDB9N63A4D6
			10	CDB9N63A1D10	CDB9N63A2D10	CDB9N63A3D10	CDB9N63A4D10
			16	CDB9N63A1D16	CDB9N63A2D16	CDB9N63A3D16	CDB9N63A4D16
			20	CDB9N63A1D20	CDB9N63A2D20	CDB9N63A3D20	CDB9N63A4D20
			25	CDB9N63A1D25	CDB9N63A2D25	CDB9N63A3D25	CDB9N63A4D25
			32	CDB9N63A1D32	CDB9N63A2D32	CDB9N63A3D32	CDB9N63A4D32
			40	CDB9N63A1D40	CDB9N63A2D40	CDB9N63A3D40	CDB9N63A4D40
			50	CDB9N63A1D50	CDB9N63A2D50	CDB9N63A3D50	CDB9N63A4D50
			63	CDB9N63A1D63	CDB9N63A2D63	CDB9N63A3D63	CDB9N63A4D63
	H	C	1	CDB9H63A1C1	CDB9H63A2C1	CDB9H63A3C1	CDB9H63A4C1
			2	CDB9H63A1C2	CDB9H63A2C2	CDB9H63A3C2	CDB9H63A4C2
			4	CDB9H63A1C4	CDB9H63A2C4	CDB9H63A3C4	CDB9H63A4C4
			6	CDB9H63A1C6	CDB9H63A2C6	CDB9H63A3C6	CDB9H63A4C6
			10	CDB9H63A1C10	CDB9H63A2C10	CDB9H63A3C10	CDB9H63A4C10
			16	CDB9H63A1C16	CDB9H63A2C16	CDB9H63A3C16	CDB9H63A4C16
			20	CDB9H63A1C20	CDB9H63A2C20	CDB9H63A3C20	CDB9H63A4C20
			25	CDB9H63A1C25	CDB9H63A2C25	CDB9H63A3C25	CDB9H63A4C25
			32	CDB9H63A1C32	CDB9H63A2C32	CDB9H63A3C32	CDB9H63A4C32
			40	CDB9H63A1C40	CDB9H63A2C40	CDB9H63A3C40	CDB9H63A4C40
			50	CDB9H63A1C50	CDB9H63A2C50	CDB9H63A3C50	CDB9H63A4C50
			63	CDB9H63A1C63	CDB9H63A2C63	CDB9H63A3C63	CDB9H63A4C63
		D	1	CDB9H63A1D1	CDB9H63A2D1	CDB9H63A3D1	CDB9H63A4D1
			2	CDB9H63A1D2	CDB9H63A2D2	CDB9H63A3D2	CDB9H63A4D2
			4	CDB9H63A1D4	CDB9H63A2D4	CDB9H63A3D4	CDB9H63A4D4
			6	CDB9H63A1D6	CDB9H63A2D6	CDB9H63A3D6	CDB9H63A4D6
			10	CDB9H63A1D10	CDB9H63A2D10	CDB9H63A3D10	CDB9H63A4D10
			16	CDB9H63A1D16	CDB9H63A2D16	CDB9H63A3D16	CDB9H63A4D16
			20	CDB9H63A1D20	CDB9H63A2D20	CDB9H63A3D20	CDB9H63A4D20
			25	CDB9H63A1D25	CDB9H63A2D25	CDB9H63A3D25	CDB9H63A4D25
			32	CDB9H63A1D32	CDB9H63A2D32	CDB9H63A3D32	CDB9H63A4D32
			40	CDB9H63A1D40	CDB9H63A2D40	CDB9H63A3D40	CDB9H63A4D40
			50	CDB9H63A1D50	CDB9H63A2D50	CDB9H63A3D50	CDB9H63A4D50
			63	CDB9H63A1D63	CDB9H63A2D63	CDB9H63A3D63	CDB9H63A4D63

Note: B type curve shall be customized.

Installation dimensions

CDB9 Standard Circuit Breaker

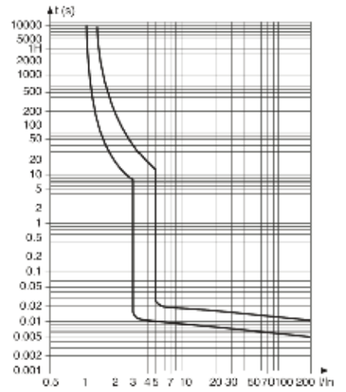
CDB9 circuit breaker



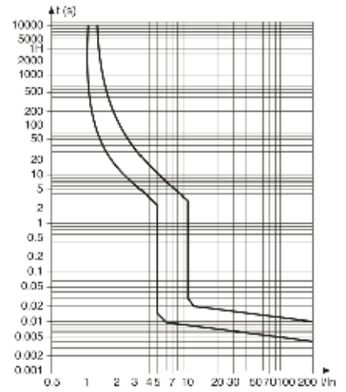
Appendix

CDB9 Standard Circuit Breaker

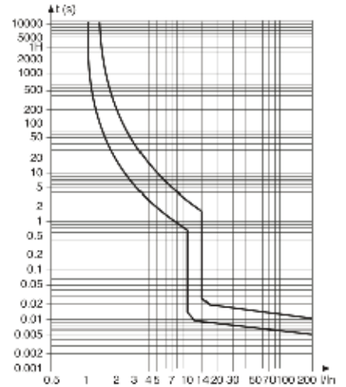
Trip curve



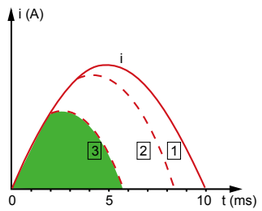
B type curve



C type curve



D type curve



Current limiting

Current limit technology was first used in the DC system in 1930, and an AC system was introduced in 1954. The core of current limit technology is the quick disconnection of the current-limit type protective device makes the actual fault current is greatly lower than the expected short-circuit current in case of short circuit.

Current-limiting principle

The protection function of miniature circuit breaker is to prevent the electric conductor and electrical equipment from damage by thermal stress and dynamic stress. The integral formula of energy passing through the circuit breaker is $E=\int_0^t I^2dt$ according to the Joule' law.

The formula shows that the energy passing through the circuit breaker depends on its current and time. The shorter the circuit breaker breaking time, the energy passing through the circuit breaker is smaller; meanwhile, the shorter the circuit breaker action time, the breaking current is smaller, and the energy will be further reduced.

Why is the circuit breaker breaking current smaller when the breaking speed is faster?

It is well known that the rated current of circuit breaker is smaller during normal operation, and the effective value of the expected maximum short-circuit current at the short-circuit point is up to thousands of amps or ten thousands of amps; however, actually, the normal working current continuously rises to the short-circuit current in case of short-circuit, which takes some time in this process, but the action speed of miniature circuit breaker is very fast, and the circuit breaker will open before the current rising to the maximum value. Therefore, the faster the circuit breaker reaction speed, the energy passing through the circuit breaker is lower, and the current limiting capacity is better.

Current-limiting grade

Level-1 current limiting: The sine half-wave energy is allowed

Level-2 current limiting: 1/3 sine half-wave energy is allowed

Level-3 current limiting: 1/10 sine half-wave energy is allowed

Temperature correction factor table

Temperature (℃) Rated current (A)	-35	-20	-10	0	10	20	30	40	50	60	70
1	1.28	1.22	1.18	1.14	1.09	1.05	1	0.95	0.9	0.84	0.78
2	2.61	2.42	2.34	2.26	2.18	2.08	2	1.92	1.84	1.74	1.59
4	5.27	5	4.82	4.63	4.43	4.22	4	3.77	3.52	3.26	2.97
6	7.75	7.35	7.1	6.84	6.57	6.29	6	5.69	5.37	5.02	4.65
10	13.9	13.09	12.54	11.95	11.34	10.69	10	9.26	8.45	7.56	6.55
16	20.77	19.77	19.07	18.35	17.6	16.82	16	15.13	14.22	13.23	12.17
20	25.7	24.49	23.66	22.8	21.91	20.98	20	18.97	17.89	16.73	15.49
25	32.25	30.72	29.67	28.57	27.43	26.24	25	23.69	22.3	20.82	19.23
32	40.48	39.19	37.86	36.49	35.05	33.56	32	30.36	28.62	26.77	24.79
40	51.69	49.24	47.54	45.77	43.93	42.01	40	37.88	35.64	33.24	30.66
50	64.23	61.89	59.7	57.43	55.06	52.59	50	47.27	44.36	41.26	37.9
63	83.52	79.22	76.26	73.17	69.94	66.56	63	59.22	55.19	50.84	46.08

Appendix
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Derating table available in high-altitude areas

■ IEC60947.2 specifies the relation between the altitude and the dielectric property. The altitude below 2,000 m has no appreciable influence on the performance of circuit breaker.

■ When the altitude is higher than 2,000, air cooling and reduction of dielectric property must be considered; therefore, the manufacturer shall contact the user for determining working conditions or special design.

■ The table below gives the corrected values for rated current when the breaking capacity is unchanged for altitude of greater than 2,000 m.

Altitude (m)	2000	3000	4000
Dielectric strenght	2500	2200	1950
Max. working voltage (V)	440	440	440
Rated curent	In	0.96In	0.93In

Influence on metal parts

Chlorine Cl_2

Nitrogen dioxide NO_2

Nitrogen dioxide H_2S

Sulfur dioxide SO_2

Copper

The thickness of copper sulfide coating layer in the Chlorine environment is two times of that in the normal working environment

This requirement is basically available for nitrogen dioxide environment.

Silver

When the silver contact or silver-plated contact is working in the SO_2 and H_2S environment, the contact surface will be darkened to form a silver sulfide coating layer making the temperature rise increase resulting in damage to the contact. In a humid environment, when there are chlorine and sulfuretted hydrogen, the coating thickness shall be increased by 7 times. In the SO_2 and H_2S environment, the silver sulfide coating layer will be increased by 20 times.

Considerations when selection

In the oil refining, steelmaking, papermaking, and artificial fiber (nylon) industries, or in the general sulfuric factories, the equipment used will be vulcanized, which is also called as oxidation in the chemical industry;

It is not guaranteed that the equipment is not oxidated even in the machine room. In order keep the pressure inside the machine room is slightly higher than the atmospheric pressure, the air inlet is generally short, which can really reduce external pollution to some extent. The equipment will be rusted unavoidably after operation for 5 to 6 years; as the equipment oxidation is unavoidable, derating is required for equipment used in the factory environment where there is corrosive gas.The derating coefficient is a product of rated value multiplied by 0.6 (up to 0.8). With this method used, the oxidation acceleration due to temperature rise can be avoided.