



LSIS Electric Products

MCB / MC&TOR / MMS / MCCB / ACB / FDB / SMDB / VCB

LS IS

Miniature Circuit Breakers

Page 4

- 1, 2, 3 and 4 pole series up to 125AF
- B, C and D Characteristics

Residual Current Circuit Breaker

Page 6

- 2 and 4 pole series up to 100AF
- Sensitivity up to 300mA
- Overcurrent protection type available

Surge Protective Device

Page 8



Contactors & Overload Relays

Page 12

Metasol series

- 3 and 4 pole series up to 800AF Mini-contactors available
- AC/DC common use coil from 100AF
- Thermal (Bimetallic) and electronic type overload relays are available
- CE marked and UL approved

Mini contactors

Page 20

Digital motor protection relay

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Manual Motor Starters

Page 22



Molded Case Circuit Breakers

Page 24

Susol/Metasol series

- 2, 3 and 4 pole series up to 1600AF
- Rated ambient temperature at 40°C calibrated for 50°C available
- CE marked according to IEC standard and UL approved MCCBs are also available.

Earth Leakage Circuit Breakers

Page 32

Metasol series

- 2, 3 and 4 pole series up to 800AF
- CE marked according to IEC standard



Air Circuit Breakers

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Susol/Metasol series

- 65, 85 and 150kA breaking capacity
- High functional digital trip relays
- CE marked and Marine classification

LS Final Distribution Boards

Page 42

LS SMDB Solution

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Vacuum Circuit Breakers

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Susol series

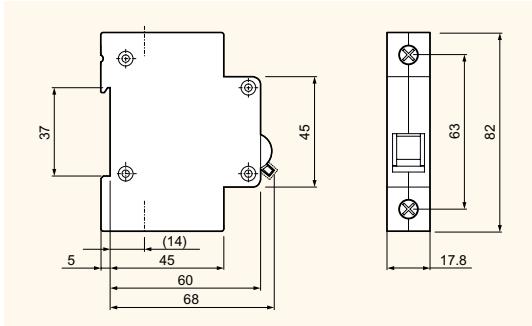


Miniature circuit breakers

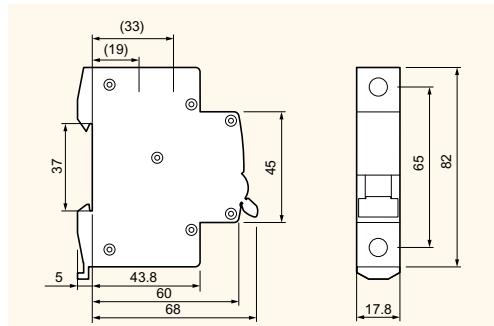
1, 2, 3 and 4 pole series up to 125AF

Type	MCB					
	BKN	BKN-c	BKN-b			
Protection	Overload and short circuit		Overload and short circuit			
Rated current	1, 2, 3, 4, 6, 10, 16, 20, 25, 32, 40, 50, 63A		1, 2, 3, 4, 6, 10, 16, 20, 25, 32, 40, 50, 63A			
Characteristic	B, C, D curve		B, C, D curve			
Poles	1p, 1p+N, 2p, 3p, 3p+N, 4p		1p, 1p+N, 2p, 3p, 3p+N, 4p			
Breaking capacity	1pole	2~4pole	1pole	2~4pole		
1A	6kA at 230/400VAC	6kA at 400VAC	10kA at 230/400VAC	10kA at 400VAC		
2A						
3A						
4A						
6A						
10A						
16A						
20A						
25A						
32A						
40A						
50A						
63A						
80A						
100A						
125A						
Standard	IEC 60898/60947-2		IEC 60898/60947-2			
Type of trip	Thermal magnetic release		Thermal magnetic release			
Electrical endurance	6000 operations		8000 operations			
Mount	On 35mm DIN rail		On 35mm DIN rail			
Width	17.8mm per pole		17.8mm per pole			
Terminal	Lug type(cable up to 25mm ²)	Dual type(Lug & Screw)	Lug type(cable up to 25mm ²)			
Auxiliary switch, AX	 1 changeover contact 6A at 240VAC, 3A at 415VAC(AX) 6A at 230VAC, 3A at 415VAC(AL) 2A at 48VDC, 1A at 125VDC Lug terminal Cable capacity 2.5mm ² 9mm wide	 1 changeover contact 6A at 240VAC, 3A at 415VAC(AX/AL) 6A at 24VDC, 2A at 48VDC, 1A at 130VDC Lug terminal cable capacity 0.75~2.5mm ² 8.8mm wide				
Optional						
Dimension	See drawing 1		See drawing 2			
Characteristic curve	See curve 1		See curve 1			

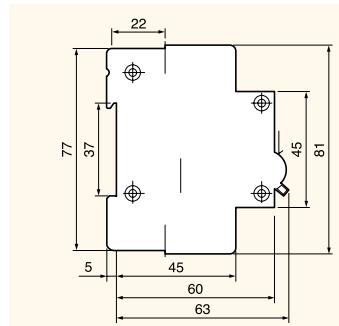
Drawing 1 : Type BKN & BKN-c



Drawing 2 : Type BKN-b



Drawing 3 : Type BKH

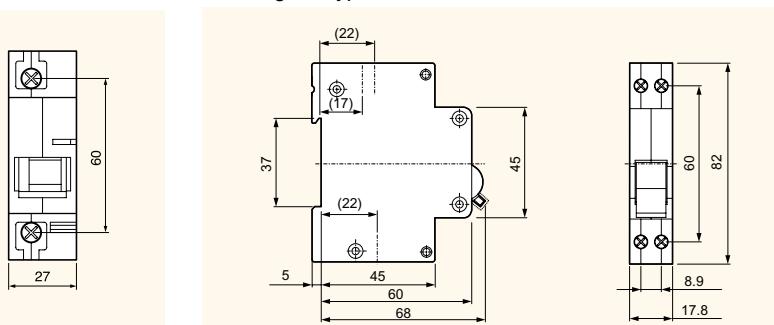




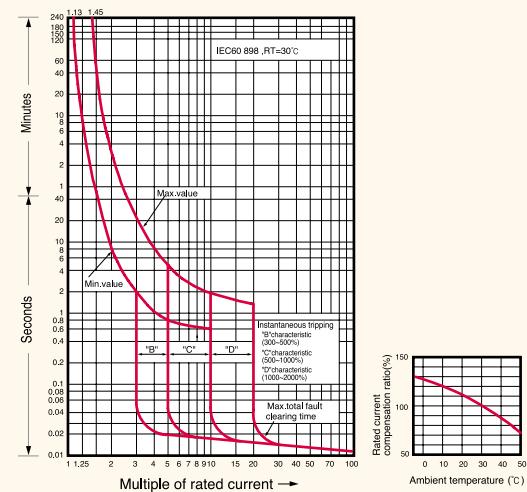
MCB

BKH		BKP	BFN
Overload and short circuit		Overload and short circuit	Overload and short circuit
63, 80, 100A, 125A		3, 6, 10, 16, 20, 25, 32A	5, 10, 15, 20, 30, 40, 50A
C, D curve		B, C, D curve	1P, 2P, 3P
1p, 2p, 3p, 3p+N, 4p		1p+N	1P, 2P, 3P
1pole	2~4pole		
		4.5kA at 230VAC	
		10kA at 220/240VAC	
10kA at 230/400VAC		10kA at 400VAC	
IEC 60947-2		IEC 60898	IEC 60947-2
Thermal magnetic release		Thermal magnetic release	Thermal magnetic release
6000 operations		20000 operations	10000 operations
On 35mm DIN rail		On 35mm DIN rail	Plug-in
27mm per pole		17.8mm per pole	25mm per pole
Lug type(cable up to 50mm ²)		Lug type(cable up to 10mm ²)	Lug type (14-6 AWG.)
See drawing 3	See drawing 4	See drawing 5	
See curve 1	See curve 1	See curve 2	

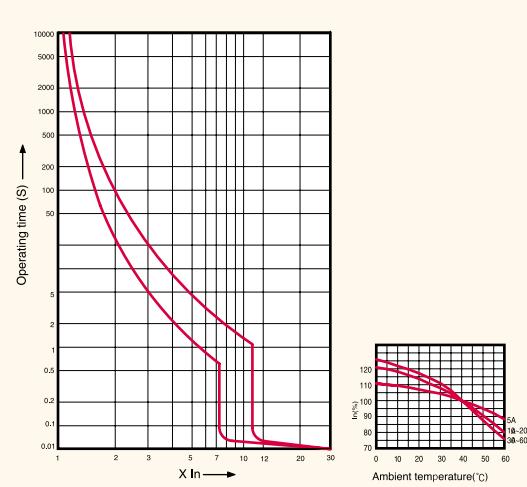
Drawing 4 : Type BKP



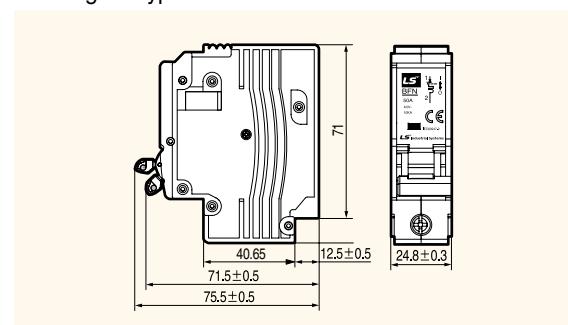
Curve 1 : Type BKN, BKN-b, BKN-c, BKP, RKS, RKS-b



Curve 2 : Type BFN



Drawing 5 : Type BFN

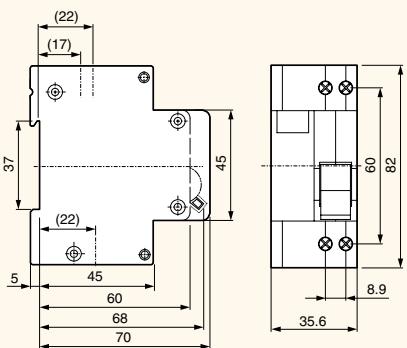


Residual current circuit breakers

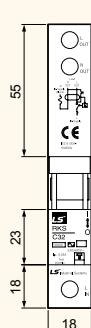
2 and 4 pole series up to 63AF

Type	RCBO						
	RKP	RKS	RKS-b	32KGRc	32KGRd	32GRhc	32GRhd
Protection	Ground fault and overcurrent	Ground fault and overcurrent	Ground fault and overcurrent	Ground fault and overcurrent		Ground fault and overcurrent	
Rated current, In	3(C,D),6,10,16,20,25,32A (B,C,D curve)	6, 10, 16, 20, 25, 32A (B, C curve)	6, 10, 16, 20, 25, 32A (B, C curve)	15, 20, 30A		15, 20, 30A	
Rated residual current							
Operating, $I_{\Delta n}$	30, 100, 300mA(non-adjustable)	30, 100mA(non-adjustable)	30, 100mA(non-adjustable)	15, 30mA(non-adjustable)	15, 30mA(non-adjustable)	15, 30mA(non-adjustable)	15, 30mA(non-adjustable)
Non-operating, $I_{\Delta no}$	0.5 $I_{\Delta n}$	0.5 $I_{\Delta n}$	0.5 $I_{\Delta n}$	0.5 $I_{\Delta n}$	0.5 $I_{\Delta n}$	0.5 $I_{\Delta n}$	0.5 $I_{\Delta n}$
Number of poles	1P+N	1P+N	2 pole				
Rated voltage	230VAC	230VAC	110/220VAC	110/220VAC	110/220VAC	110/220VAC	110/220VAC
Residual current off-time	± 0.1 sec.	± 0.3 sec.	± 0.03 sec.	± 0.03 sec.	± 0.03 sec.	± 0.03 sec.	± 0.03 sec.
Standard	IEC 61009	IEC 61009	KS	KS	KS	KS	KS
Type of trip							
Ground fault	Electronic	Electronic	Electronic	Electronic	Electronic	Electronic	Electronic
Overcurrent	Thermal-magnetic	Thermal-magnetic	Bimetallic	Bimetallic	Bimetallic	Bimetallic	Bimetallic
Breaking capacity	4.5kA	10kA	1.5kA	2.5kA	1.5kA	2.5kA	2.5kA
Conditional short circuit capacity	-	-	-	-	-	-	-
Electrical endurance	20000 operations	≤ 4000 operations	6000 operations	6000 operations	6000 operations	6000 operations	6000 operations
Mount	On 35mm DIN rail	On 35mm DIN rail	On 35mm DIN rail / Screw				
Width	35.6mm	18mm	35mm	33mm	35mm	33mm	33mm
Terminal	Lug type (cable up to 10mm ²)	Lug type (cable up to 10mm ²)	Screw clamp type (cable up to 5.5mm ²)	Screw clamp type (cable up to 5.5mm ²)	Screw clamp type (cable up to 5.5mm ²)	Screw clamp type (cable up to 5.5mm ²)	Screw clamp type (cable up to 5.5mm ²)
Dimension	See drawing 1	See drawing 2	See drawing 3	See drawing 4	See drawing 5	See drawing 5	See drawing 5
Characteristic curve	See page 5(Curve 1)	See page 5(Curve 1)	Curve 3	Curve 3	Curve 4	Curve 4	Curve 4

Drawing 1: Type RKP



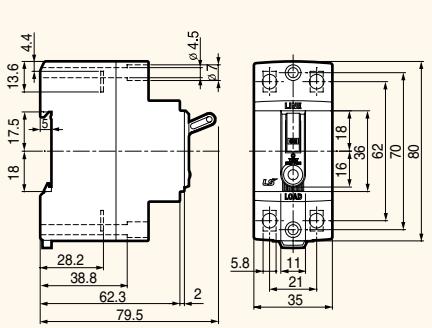
Drawing 2: Type RKS



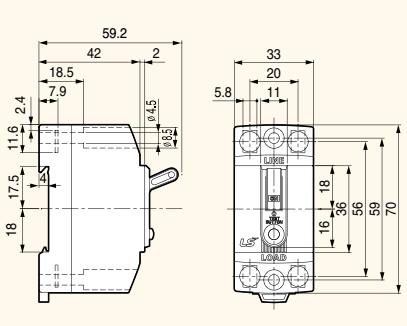
Drawing 3: Type RKS-b



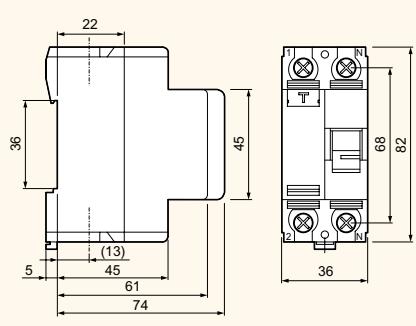
Drawing 4: Type 32KGRc & 32KGRd



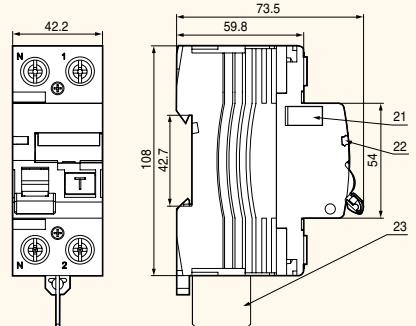
Drawing 5: Type 32GRhc & 32GRhd



Drawing 6: Type RKN



Drawing 7: Type RKN-b





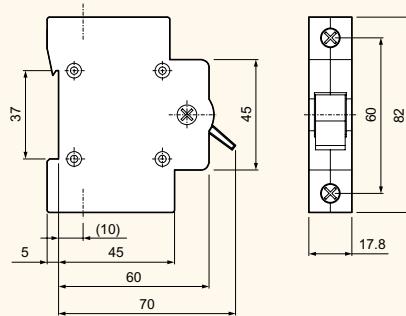
RCCB

RKN	RKN-b
Ground fault	
25, 32, 40, 63A	25, 32, 40, 63, 100A
30, 100, 300mA(non-adjustable)	
1P+N	
2, 4 pole	
230VAC(2p), 230/400VAC(4p)	
±0.1 sec.	
IEC 61008	
Electro-magnetic	
Not applicable	
-	
6kA for In=25, 32, 40, 63A	
6000 operations	
On 35mm DIN rail	
18mm	
Lug type (cable up to 35mm ²)	
See drawing 6	See drawing 7

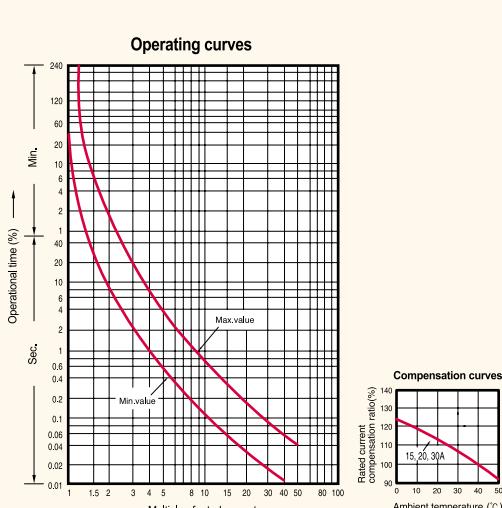
Isolator

Type	BKD
Rated current, In	40, 50, 63, 80, 100, 125A
Number of poles	1p, 2p, 3p, 4p
Rated voltage	240/415VAC
Standard	IEC 60947-3
Electrical endurance	40, 50, 63A 80, 100, 125A
Mount	On 35mm DIN rail
Width	17.8mm per pole
Terminal	Lug type(cable up to 50mm ²)
Dimension	See drawing 8

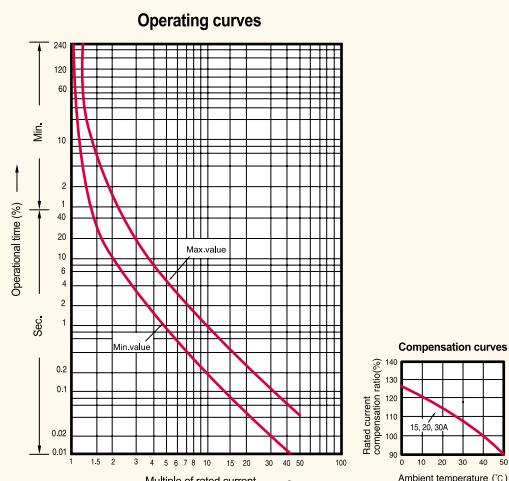
Drawing 8: Type BKD



Curve 3 : Type 32KGRc, 32KGRd



Curve 4 : Type 32GRhc, 32GRhd



Surge Protective Device

BKS Series Din-rail type

Product description

The BKS surge protective device is applied to the alternating current 50/60Hz, 220V/380V power system and provides the protection from the surge overvoltage of an electric system.

Moreover, it is the protection element (MOV) replacement type and is the product with convenience and economic efficiency.

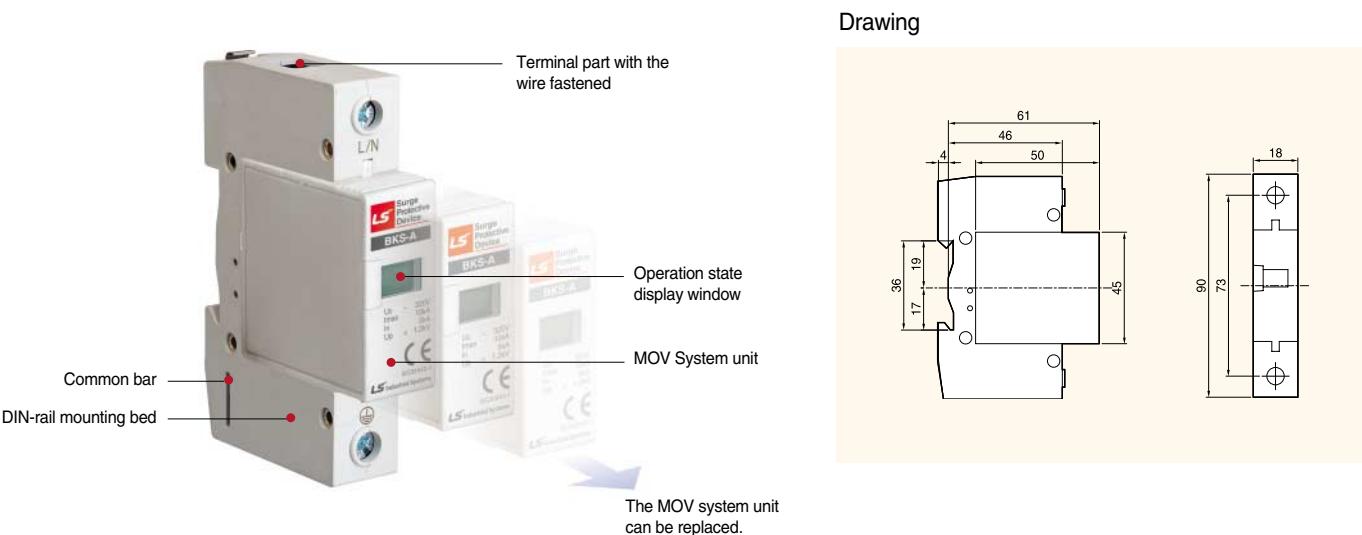
However, only the protection module is provided so that separate components have to be combined according to the site conditions.

If the protective device is normal, the display becomes green. The display becomes red after operation (abnormal or after an accident).

Product rating

Type	BKS-A	BKS-B	BKS-C	BKS-D	BKS-E	
Pole	1, 2, 3, 4 Pole					
Rated system voltage Un (Applied Voltage)	AC 220V	AC 220V	AC 220V	AC 380V	AC 380V	
Maximum continuous operating voltage Uc (MCOV, The voltage applied to the surge protective device)	AC 320	AC 320V	AC 320V	AC 420V	AC 460V	
Voltage protection level Up (The voltage level with the surge suppressed)	1.0kA	1.2kA	1.5kA	2.0kA	2.3kA	
Maximum discharge current Imax(8/20μs) kA	10kA	20kA	40kA	60kA	70kA	
Response time ns	< 25 ns					
Usable ambient temperature °C	-40 ~ +80°C					
Usable frequency Hz	50/60 Hz					
Attachment type	DIN-rail attachment type					
Operation status indication window	Normal operation: Green, Abnormal/After an accident: Red					
Product color and shape						
Min. terminal connection (mm ²)	1 Phase and Neutral 2.5, Earth 4					
Protection class	Class III		Class II			
Alarm Contact	No	No	No	No	No	

* The surge protective device starts to operate above the maximum continuous operating voltage **Uc** (MCOV).



SP Series

Box type

The SP series surge protective device is applied to the alternating current 50/60Hz, 220V/380V power system and provides the protection from the surge overvoltage of an electric system.

Moreover, the protection module, disconnectable device (fuse), and fastened power and ground wires are organized into the all-in-one steel cabinet with convenient installation and stability.

If the protective device is normal, the display becomes green. The display becomes red after operation (abnormal or after an accident).

Product rating-Single phase 2W+G (SPL)

Type	SPL-110S 20kA	SPL-220S 40kA	SPL-220S 80kA
Pole	2W+G	2W+G	2W+G
Rated system voltage U_n (Applied Voltage)	AC 110V/220V	AC 220V	AC 220V
Maximum continuous operating voltage U_c (MCOV, The voltage applied to the surge protective device)	AC 320V	AC 320V	AC 320V
Voltage protection level Up (The voltage level with the surge suppressed)	1.5kV	1.5kV	1.5kV
Maximum discharge current $I_{max}(8/20\mu s)$ kA	20kA	40kA	80kA
Response time ns	< 5 ns		
Usable ambient temperature °C	-40 ~ +70°C		
Usable frequency Hz	50/60 Hz		
Attachment type	Screw attachment type		
Operation status indication window	Normal operation: Green LED lighting, Abnormal/After an accident: Red lighting		
Dimension(W × H × D)	60 × 87 × 47	68 × 90 × 70	95 × 117 × 68
Product color and shape			
Protection class	Class III	Class II / Class III	Class II / Class III

Surge Protective Device

SP Series Box type

Product rating-Three phase 3W+G (SPT) AC 380V

Type	SPT-380S 40kA	SPT-380S 80kA	SPT-380S 120kA	SPT-380S 160kA
Pole	3W+G	3W+G	3W+G	3W+G
Rated system voltage Un (Applied Voltage)	AC 380V	AC 380V	AC 380V	AC 380V
Maximum continuous operating voltage Uc (MCOV, The voltage applied to the surge protective device)	AC 320V	AC 320V	AC 320V	AC 320V
Voltage protection level Up (The voltage level with the surge suppressed)	2.0kV	2.0kV	2.0kV	2.0kV
Maximum discharge current Imax(8/20μs) kA	40kA	80kA	120kA	160kA
Response time ns	< 5 ns			
Usable ambient temperature °C	-40 ~ +70°C			
Usable frequency Hz	50/60 Hz			
Attachment type	Screw attachment type			
Operation status indication window	Normal operation: Green LED lighting, Abnormal/After an accident: Red lighting			
Dimension(W × H × D)	113 × 160 × 80	130 × 160 × 80	160 × 190 × 86	160 × 190 × 86
Product color and shape				
Protection class	Class II / Class III		Class I / Class II / Class III	

Product rating-Three phase 3W+G (SPT) AC 440V

Type	SPT-440S 40kA	SPT-440S 80kA	SPT-440S 120kA	SPT-440S 160kA
Pole	3W+G	3W+G	3W+G	3W+G
Rated system voltage Un (Applied Voltage)	AC 440V	AC 440V	AC 440V	AC 440V
Maximum continuous operating voltage Uc (MCOV, The voltage applied to the surge protective device)	AC 320V	AC 320V	AC 320V	AC 320V
Voltage protection level Up (The voltage level with the surge suppressed)	2.0kV	2.0kV	2.0kV	2.0kV
Maximum discharge current Imax(8/20μs) kA	40kA	80kA	120kA	160kA
Response time ns	< 5 ns			
Usable ambient temperature °C	-40 ~ +70°C			
Usable frequency Hz	50/60 Hz			
Attachment type	Screw attachment type			
Operation status indication window	Normal operation: Green LED lighting, Abnormal/After an accident: Red lighting			
Dimension(W × H × D)	113 × 160 × 80	130 × 160 × 80	160 × 190 × 86	160 × 190 × 86
Product color and shape				
Protection class	Class II / Class III		Class I / Class II / Class III	

Product rating-Three phase 4W+G (SPY)

Type	SPY-220S 40kA	SPY-220S 80kA	SPY-220S 120kA	SPY-220S 160, 200, 240kA
Pole	4W+G	4W+G	4W+G	4W+G
Rated system voltage Un (Applied Voltage)	AC 220/380V	AC 220/380V	AC 220/380V	AC 220/380V
Maximum continuous operating voltage Uc (MCOV, The voltage applied to the surge protective device)	AC 320V	AC 320V	AC 320V	AC 320V
Voltage protection level Up (The voltage level with the surge suppressed)	2.0kV	2.0kV	2.0kV	2.0kV
Maximum discharge current I_{max}(8/20μs) kA	40kA	80kA	120kA	160, 200, 240kA
Response time ns	< 5 ns			
Usable ambient temperature °C	-40 ~ +70°C			
Usable frequency Hz	50/60 Hz			
Attachment type	Screw attachment type			
Operation status indication window	Normal operation: Green LED lighting, Abnormal/After an accident: Red lighting			
Dimension(W × H × D)	130 × 160 × 80	130 × 160 × 80	160 × 190 × 86	160 × 190 × 86
Product color and shape				
Protection class	Class II / Class III		Class I / Class II / Class III	



Contactors & Overload relays

Metasol MC 3P 18 to 100A

MC type Magnetic Contactors



Frame size		18AF				22AF			
Type	screws clamp terminals	MC-6a	MC-9a	MC-12a	MC-18a	MC-9b	MC-12b	MC-18b	MC-22b*
Number of poles				3pole			3pole		
Rated operational voltage, Ue				690V			690V		
Rated insulation voltage, Ui				690V			690V		
Rated frequency				50/60Hz			50/60Hz		
Rated impulse withstand voltage, Uimp				6kV			6kV		
Maximum operating rate in operating cycles per hour(AC3)				1800 operations per hour			1800 operations per hour		
Durability	Mechanical			15 mil. operations			15 mil. operations		
	Electrical			2.5 mil. operations			2.5 mil. operations		
Current and power	AC-1, Thermal current AC-3 200/240V A	25	25	25	32	25	25	32	40
	380/440V kW	2.2	2.5	3.5	4.5	2.5	3.5	4.5	5.5
	A	9	11	13	18	11	13	18	22
	500/550V kW	3	4	5.5	7.5	4	5.5	7.5	11
	A	7	9	12	18	9	12	18	22
	690V kW	3	4	7.5	7.5	4	7.5	7.5	15
	A	6	7	12	13	7	12	13	20
		3	4	7.5	7.5	4	7.5	7.5	15
		4	5	9	9	6	9	9	18
UL rating (50/60Hz)	Continuous current Single phase	25	25	25	32	25	25	40	40
	110~120V HP	0.5	0.5	0.75	1	0.5	0.75	1	2
	220~240V HP	1.5	1.5	2	3	1.5	2	3	3
	200~208V HP	2	2	3	5	2	3	5	7.5
	Three phase	3	3	5	7.5	3	5	7.5	10
	220~240V HP	5	5	7.5	10	5	7.5	10	15
	440~480V HP	7.5	7.5	10	15	7.5	10	15	20
	550~600V HP	00	00	0	0	00	00	0	1
Size and weight	AC control	Weight kg		0.33			0.34		
	DC control	Size(W × H × D) mm		45 × 73.5 × 79			45 × 73.5 × 86		
		Weight kg		0.5			0.51		
		Size(W × H × D) mm		45 × 73.5 × 113.7			45 × 73.5 × 117.7		
Auxiliary(standard)				1a or 1b			1a1b		
Auxiliary	Side mount			UA-1			UA-1		
	Front mount			UA-2, UA-4			UA-2, UA-4		

Note) Minimum conduct current of Auxiliary contactor is DC 17V 5mA.

MT type Thermal Overload Relays



Type	MT-12□	MT-32□
Screws clamp terminals	●	●
Rated operational voltage, Ue	690V	690V
Rated insulation voltage, Ui	690V	690V
Rated impulse withstand voltage, Uimp	6kV	6kV
Trip class	10A, 20	10A, 20
Setting range	0.1~18A	0.1~40A
Size and weight	Weight kg	0.1
	Size(W × H × D) mm	45 × 73.2 × 63.7
		45 × 75 × 90

* The safety cover of magnetic contactor and thermal overload relay is optional.



40AF	
MC-32a	MC-40a
●	●
3pole	
690V	
1000V	
50/60Hz	
8kV	
1800 operations per hour	
12 mil. operations	
2 mil. operations	
50	60
7.5	11
32	40
15	18.5
32	40
18.5	22
28	32
18.5	22
20	23
50	60
2	3
5	7.5
7.5	15
10	15
20	30
25	30
1	1
0.4	
45 × 83 × 90	
0.6	
45 × 83 × 117.1	
UA-1	
UA-2, UA-4	



65AF	
MC-50a	MC-65a
●	●
3pole	
690V	
1000V	
50/60Hz	
8kV	
1800 operations per hour	
12 mil. operations	
2 mil. operations	
70	100
15	18.5
55	65
22	30
50	65
30	33
43	60
30	33
28	35
70	100
3	5
10	15
20	25
25	30
40	50
50	60
2	2
0.9	
55 × 106 × 119	
1.2	
55 × 106 × 146.4	
UA-1	
UA-2, UA-4	



100AF		
MC-75a	MC-85a	MC-100a
●	●	●
3pole		
690V		
1000V		
50/60Hz		
8kV		
1800 operations per hour		
12 mil. operations		
2 mil. operations		
110	135	160
22	25	30
75	85	105
37	45	55
75	85	105
37	45	55
64	75	85
37	45	55
42	45	65
110	135	160
5	7.5	10
15	15	20
25	30	30
30	40	40
50	60	75
60	75	75
2	3	3
1.6		
70 × 140 × 135.8		
2.6		
70 × 140 × 172.3		
UA-1		
UA-2, UA-4		



MT-32/□	
●	
690V	
690V	
6kV	
10A, 20	
0.1~40A	
0.17	
45 × 75 × 90	



MT-63/□	
●	
690V	
690V	
6kV	
10A, 20	
4~65A	
0.31/0.33	
55 × 81 × 100	



MT-95/□	
●	
690V	
690V	
6kV	
10A, 20	
7~100A	
0.48/0.5	
70 × 97 × 110	

Contactors & Overload relays

Metasol MC 3P 150 to 800A

MC type Magnetic Contactors



Frame size			150AF		225AF	
Type	MC-130a	MC-150a	MC-185a	MC-225a		
screws clamp terminals	●	●	●	●		
Number of poles	3pole	3pole	3pole	3pole		
Rated operational voltage, Ue	690V	690V	690V	690V		
Rated insulation voltage, Ui	1000V	1000V	1000V	1000V		
Rated frequency	50/60Hz	50/60Hz	50/60Hz	50/60Hz		
Rated impulse withstand voltage, Uimp	8kV	8kV	8kV	8kV		
Maximum operating rate in operating cycles per hour(AC3)	1200 operations per hour		1200 operations per hour			
Durability	Mechanical	5 mil. operations	5 mil. operations	5 mil. operations		
	Electrical	1 mil. operations	1 mil. operations	1 mil. operations		
Current and power	AC-1, Thermal current A	160	210	230	275	
	AC-3 200/240V kW	37	45	55	75	
	A	130	150	185	225	
	380/440V kW	60	75	90	132	
	A	130	150	185	225	
	500/550V kW	60	70	110	132	
	A	90	100	180	200	
	690V kW	55	55	110	140	
	A	60	60	120	150	
UL rating (50/60Hz)	Continuous current A	160	210	230	275	
	Single phase 110~120V HP	10	15	15	15	
	220~240V HP	20	25	30	40	
	200~208V HP	40	40	60	60	
	Three phase 220~240V HP	40	50	60	75	
	440~480V HP	75	100	125	150	
	550~600V HP	75	75	125	150	
	NEMA size	3	4	4	4	
Size and weight	AC control	Weight kg	2.4			
		Size(W×H×D) mm	95×158×132			
	DC control	Weight kg	2.3			
		Size(W×H×D) mm	95×158×132			
Auxiliary(standard)						
Auxiliary	Side mount	UA-1		AU-100 (Max.4NO4NC)		
	Front mount	UA-2, UA-4		-		

MT type Thermal Overload Relays



Type			MT-150/□	MT-225/□
Type	Screws clamp terminals	●	●	●
Rated operational voltage, Ue		690V	690V	690V
Rated insulation voltage, Ui		690V	690V	690V
Rated impulse withstand voltage, Uimp		6kV	6kV	6kV
Trip class		10A, 20	10A, 20	10A, 20
Setting range		34~150A	65~240A	
Size and weight	Weight kg	0.67	2.5	
	Size(W×H×D) mm	95×109×113	147×141×184	

* The safety cover of magnetic contactor and thermal overload relay is optional.



400AF

MC-265a	MC-330a	MC-400a
●	●	●
3pole		
690V		
1000V		
50/60Hz		
8kV		
1200 operations per hour		
5 mil. operations	2.5 mil. operations	
1 mil. operations	0.5 mil. operations	
300	350	450
80	90	125
265	330	400
147	160	200
265	330	400
147	160	225
225	280	350
160	200	250
185	225	300
300	350	450
-	-	-
-	-	-
75	100	125
100	125	150
200	250	300
200	250	300
5	5	5

9.2
163 × 243 × 198

2a2b

AU-100 (Max.4NO4NC)



MT-400/□

●
690V
690V
6kV
10A, 20
85~400A

2.6

151 × 171 × 198



800AF

MC-500a	MC-630a	MC-800a
●	●	●
3pole		
690V		
1000V		
50/60Hz		
8kV		
1200 operations per hour		
2.5 mil. operations		
0.5 mil. operations		
580	660	900
147	190	220
500	630	800
265	330	440
500	630	800
265	330	500
400	500	720
300	400	500
380	420	630
580	660	900
-	-	-
-	-	-
150	200	200
200	250	300
400	500	600
400	500	600
6	6	7

22.4
285 × 312 × 242

2a2b

AU-100 (Max.4NO4NC)



MT-800/□

●
690V
690V
6kV
10A, 20
200~800A

11.5

360 × 530 × 212

Contactors & Overload relays

Metasol MC 4P 18 to 85A

MC type Magnetic Contactors



Frame size			
Type	Screw clamp terminal		
Number of poles			
Rated operational voltage (Ue)			
Rated insulation voltage (Ui)			
Rated frequency			
Rated impulse withstand voltage, Uimp			
Maximum operating rate in operating cycles per hour(AC1)			
Durability	Mechanical		
	Electrical		
Current	Thermal current	A	
and	AC-1 200/240V	kW	
Power		A	
	380/400V	kW	
		A	
	500/550V	kW	
		A	
	690V	kW	
		A	
UL rating	Continuous current	A	
(50/60Hz)	Single 110~120V	HP	
	Phase 220~240V	HP	
	200~208V	HP	
	Three 220~240V	HP	
	Phase 440~480V	HP	
	550~600V	HP	
	NEMA Size		
Size	AC Weight	kg	
and	Control Size(W × H × D)	mm	
weight	DC Weight	kg	
	Control Size(W × H × D)	mm	
Auxiliary(standard)			
Auxiliary	Side Mount		
	Front Mount		

18AF			
MC-6a/4	MC-9a/4	MC-12a/4	MC-18a/4
•			
4pole			
690V			
690V			
50/60Hz			
6kV			
1800 operations per hour			
15 mil. Operations			
0.5 mil. Operations			0.8 mil. Operations
25	25	25	40
9	9	9	15
25	25	25	40
17	17	17	27
25	25	25	40
21	21	21	35
25	25	25	40
27	27	27	44
25	25	25	40
25	25	25	32
0.5	0.5	0.75	1
1.5	1.5	2	3
2	2	3	5
3	3	5	7.5
5	5	7.5	10
7.5	7.5	10	15
00	00	0	0
0.33			
45 × 73.5 × 79			
0.5			
45 × 73.5 × 110.7			
-			
UA-1			
AU-2, AU-4			



22AF	
MC-22a/4	•
4pole	
690V	
690V	
50/60Hz	
6kV	
1800 operations per hour	
15 mil. Operations	
1 mil. Operations	
40	50
15	18
40	50
27	35
40	50
35	43
40	50
44	55
40	50
32	45
2	2
3	5
7.5	7.5
7.5	10
10	20
15	20
1	1
0.4	0.59
47.2 × 80 × 86.8	59 × 83.5 × 94.5
0.5	0.7
47.2 × 80 × 113.2	59 × 83.5 × 121
-	-
AU-1	AU-1
AU-2, AU-4	AU-2, AU-4

40AF	
MC-32a/4	•
4pole	
690V	
690V	
50/60Hz	
6kV	
1800 operations per hour	
15 mil. Operations	
1 mil. Operations	
50	60
18	22
50	60
35	42
50	60
43	52
50	60
55	66
50	60
45	50
2	3
5	5
7.5	10
10	10
20	25
20	25
1	1
0.59	
59 × 83.5 × 94.5	
0.7	
59 × 83.5 × 121	
-	-
AU-1	AU-1
AU-2, AU-4	AU-2, AU-4

85AF	
MC-50a/4	•
4pole	
690V	
1000V	
50/60Hz	
8kV	
1800 operations per hour	
12 mil. Operations	
1 mil. Operations	
80	100
30	37
80	100
56	70
80	100
70	88
80	100
88	110
80	100
70	80
3	5
7.5	10
10	15
15	20
30	40
30	40
2	2
0.59	1.2
59 × 83.5 × 94.5	91 × 123.5 × 117.8
0.7	1.29
59 × 83.5 × 121	91 × 123.5 × 117.8
-	-
AU-1	AU-1
AU-2, AU-4	AU-2, AU-4

Contactors & Overload relays

Metasol MC 4P 225 to 800A

MC type Magnetic Contactors



Frame size				
Type	Screw clamp terminal			
Number of poles				
Rated operational voltage (Ue)				
Rated insulation voltage (Ui)				
Rated frequency				
Rated impulse withstand voltage, Uimp				
Maximum operating rate in operating cycles per hour(AC1)				
Durability	Mechanical			
	Electrical			
Current and Power	Thermal current	A		
	AC-1	200/240V	kW	
		A		
		380/400V	kW	
		A		
		500/550V	kW	
		A		
		690V	kW	
		A		
UL rating (50/60Hz)	Continuous current	A		
	Single	110~120V	HP	
	Phase	220~240V	HP	
		200~208V	HP	
	Three Phase	220~240V	HP	
		440~480V	HP	
		550~600V	HP	
	NEMA Size			
Size and weight	AC Control	Weight	kg	
		Size(W × H × D)	mm	
	DC Control	Weight	kg	
		Size(W × H × D)	mm	
Auxiliary(standard)				
Auxiliary	Side Mount			
	Front Mount			

* - FLA = 722 A, LRA = 5618 A

** - FLA = 566 A, LRA = 4495 A

225AF				
MC-100a/4	MC-130a/4	MC-150a/4	MC-185a/4	MC-225a/4
•				
	4pole			
		690V		
			1000V	
				50/60Hz
				8kV
	1200 operations per hour			
	5 mil. Operations			
	0.8 mil. Operations			
160	165	250	300	330
57	60	76	87	100
150	155	200	230	260
106	110	142	165	185
150	155	200	230	260
132	137	180	205	230
150	155	200	230	260
165	170	225	255	290
150	155	200	230	260
160	160	210	230	275
7.5	10	15	15	15
15	20	25	30	40
30	40	40	60	60
30	40	50	60	75
60	75	100	125	150
60	75	100	125	150
3	3	4	4	4
	5.6			
	175 × 203 × 185			
	2a2b			
	AU-100			
	-			



400AF

MC-265a/4	MC-330a/4	MC-400a/4
•		
4pole		
690V		
1000V		
50/60Hz		
8kV		
1200 operations per hour		
2.5 mil. Operations		
0.5 mil. Operations		
360	420	500
115	135	160
300	350	420
215	250	300
300	350	420
265	315	375
300	350	420
335	390	470
300	350	420
300	350	450
-	-	-
-	-	-
75	100	125
100	125	150
200	250	300
200	250	300
5	5	5

9.9

206 × 243 × 205

2a2b

AU-100

-

800AF

MC-500a/4	MC-630a/4	MC-800a/4
•		
4pole		
690V		
1000V		
50/60Hz		
8kV		
1200 operations per hour		
2.5 mil. Operations		
0.5 mil. Operations		
630	750	900
245	255	310
630	660	800
450	470	570
630	660	800
560	590	710
630	660	800
710	740	900
630	660	800
580	660	900
-	-	-
-	-	-
150	200	200
200	250	300
400	500	600 *
400	500	600 **
6	6	7

26.3

346 × 310 × 244

2a2b

AU-100

-

Mini contactors

6 to 16A

Mini contactors



3NO main contacts
1 auxiliary contacts

Screw clamp type

Fast-on type

Cage clamp type

Solder pin type

Frame size	6A	9A	12A	16A																				
Screw clamp type	AC coil	GMC-6M	GMC-9M	GMC-12M																				
	DC coil	GMD-6M	GMD-9M	GMD-12M																				
Fast-on type	AC coil	GMC-6MF	GMC-9MF	GMC-12MF																				
	DC coil	GMD-6MF	GMD-9MF	GMD-12MF																				
Cage clamp type	AC coil	GMC-6MC	GMC-9MC	GMC-12MC																				
	DC coil	GMD-6MC	GMD-9MC	GMD-12MC																				
Solder pin type	AC coil	GMC-6MP	GMC-9MP	GMC-12MP																				
	DC coil	GMD-6MP	GMD-9MP	GMD-12MP																				
Ratings / IEC60947-4	kW	A	kW	A																				
AC1		20		20																				
AC3	200/240V	1.5	7	2.2																				
	380/440V	2.2	6	4																				
	500/550V	3	5	3.7																				
	690V	3	4	5																				
Ratings / UL508	hp	A	hp	A																				
continuous current	I _{th} = 20A (maximum for cage clamp type is 10A)																							
single phase	120V	1/2	1/2	1 *																				
	230V/240V	1	1.5	2 **																				
three phase	240V	1.5	3	3																				
	480V	3	5	7.5 ***																				
	600V	3	5	7.5																				
Wire Range : Copper, 75°C, Stranded, 18-12AWG																								
NEMA size	00	00	00	0																				
Additional auxiliary contacts	<table border="1"> <thead> <tr> <th></th> <th>Screw clamp type</th> <th>Fast-on type</th> <th>Cage clamp type</th> <th>Solder pin type</th> </tr> </thead> <tbody> <tr> <td>2-pole, Front mount</td> <td>AU-2M</td> <td>AU-2MF</td> <td>AU-2MC</td> <td></td> </tr> <tr> <td>4-pole, Front mount</td> <td>AU-4M</td> <td>AU-4MF</td> <td>AU-4MC</td> <td>AU-1MP</td> </tr> <tr> <td>2-pole, Side mount</td> <td>AU-1M</td> <td>AU-1MF</td> <td>AU-1MC</td> <td></td> </tr> </tbody> </table>					Screw clamp type	Fast-on type	Cage clamp type	Solder pin type	2-pole, Front mount	AU-2M	AU-2MF	AU-2MC		4-pole, Front mount	AU-4M	AU-4MF	AU-4MC	AU-1MP	2-pole, Side mount	AU-1M	AU-1MF	AU-1MC	
	Screw clamp type	Fast-on type	Cage clamp type	Solder pin type																				
2-pole, Front mount	AU-2M	AU-2MF	AU-2MC																					
4-pole, Front mount	AU-4M	AU-4MF	AU-4MC	AU-1MP																				
2-pole, Side mount	AU-1M	AU-1MF	AU-1MC																					

Note) * = 1/2 for cage clamp type, ** = 1.5hp for cage clamp type, *** = 5hp for cage clamp type

16AF : not approved from UL

Overload Relays

Bimetallic style Type GT	 GT-12M	Setting ranges (A)	0.1 - 0.16 0.16 - 0.25 0.25 - 0.4 0.4 - 0.63 0.63 - 1 1 - 1.6 1.6 - 2.5 2.5 - 4	4 - 6 5 - 8 6 - 9 7 - 10 9 - 13 12 - 16	 Base for separate mount
Differential				GTK-12M	
Non-differential (3-heater)				GTH-12M/3	
Non-differential (2-heater)				GTH-12M	

Digital motor protection relay



DMP□-S/Sa



DMP□-T/Ta

Model No.		DMP06-S/Sa	DMP60-S/Sa	DMP06-T/Ta	DMP06-T/Ta		
Wiring		Screw type		Tunnel type			
Panel mount		Unit or Extension <small>Note1)</small>					
Operation time		Select either reverse time characteristics or definite time characteristics					
Protection	Over current	According to the setting time					
	Phase failure	3 sec.					
	Reverse phase	Within 0.1 sec.					
	Asymmetry	5 sec.					
	Stall	5 sec.					
	Lock	Within 0.5 sec.					
	Under current	3 sec.					
	Ground fault	Within 0.05~1 sec. Selectable (0.05~1.0sec)					
	Short circuit <small>Note2)</small>	Within 50ms					
Alarm		Variable (60~110% of the setting current)					
Current setting range (A)		0.5~6	5~60	0.5~6	5~60		
Motor capacity (kW)	220~240V	0.09~0.75	1.1~11	0.09~0.75	1.1~11		
	380~440V	0.12~1.5	2.2~22	0.09~1.5	2.2~22		
Time setting range (sec)	Definite time	Delay in starting					
		0~60sec					
	Inverse time	Delay in operating					
		0~30sec					
Reset		0~60sec					
Tolerance		Reset					
Current		Manual reset					
Time							
Operating power		Current					
<small>Note3)</small>		±5%					
Voltage		Time					
		±5% (or ±0.5sec)					
Frequency							
Aux. contact	OL	AC 190~250V					
	AL	50Hz (50Hz)					
3A/250Vac Resistive load							
3A/250Vac Resistive load							
Insulation resistance		Over DC500V 100MΩ					
Surge impulse voltage(IEC1000-4-5)		1.2 × 50μs 6kV (Apply standard wave form)					
Fast transient burst(IEC1000-4-4)		2.5kV/5min					
Environment	Temperature	Operation	-25~70°C				
		Storage	-30~80°C				
	Humidity		30~90% RH (No freezing)				
Display	7-Segment	3 phase current, cause of a fault					
	Bar-Graph	60~110% of real load current					
Mounting type		35mm Din-rail/Panel					

Note1) In extension type, the digital EMPR is calibrated with combining the display part and main body so, please cautious not to combine the display part and main body with different part No.

Note2) Instantaneous short circuit protection is optional

Note3) Operational voltage of AC 110V and 50Hz is optional

Molded case circuit breakers

Susol MCCB 100AF to 800AF Series

		TE100	TE160	TD100	TD160
Frame size	[AF]	100	160	100	160
Rated current, In *	[A]	16~100	100,125,160	16, 20, 25, 32, 40, 50, 63, 80, 100	1P: 16, 20, 25, 32, 40, 50, 63, 80, 100, 125, 160 2, 3P: 100, 125, 160
No. of poles		3,4	3,4	2*, 3, 4	1, 2*, 3, 4
Rated operational voltage, Ue	AC [V] DC [V]	690 500	690 500	690 500	240(1P), 690 250(1P), 500
Rated impulse withstand voltage, Uimp	[kV]			8	8
Rated insulation voltage, Ui	[V]	8	8	750	750
Rated ultimate short-circuit breaking capacity, Icu		S	N	S	N H L N H L
AC 50/60Hz 220/240V	[kA]	50	85	50	85 100 200 30(1P) 85 100 200
	[kA]	37	50	37	50 50 85 150 50 85 150
	[kA]	25	37	25	37 50 70 130 50 70 130
	[kA]	18	25	18	25 30 50 65 30 50 65
	[kA]	6	8	6	8 5 8 10 5 8 10
	[kA]	37	50	37	50 42 65 100 16(1P) 42 25(1P) 65 100
DC	[kA]	37	50	37	50 42 65 100 42 65 100
	[kA]				
Rated service breaking capacity, Ics	[%Icu]	100%	100%	100%	100% 100% 100% 100% 100%
Rated short-circuit making capacity Icm		105	187	105	187 220 440 105(1P) 187 220 440
AC 50/60Hz 220/240V	[kA]	77.7	105	77.7	105 105 187 330 105 187 330
	[kA]	52.5	77.7	52.5	77.7 105 154 286 105 154 286
	[kA]	36	52.5	36	52.5 63 105 143 63 105 143
	[kA]	9.2	13.6	9.2	13.6 8 14 17 8 14 17
		A	A	A	A
Category of utilization		●	●	●	●
Isolation behavior					
Trip unit (release)					
Thermal-Magnetic					
●fixed-thermal, fixed-magnetic	FTU	●	●	●	●
●adjustable-thermal, fixed-magnetic	FMU	●	●	●	●***
●adjustable-thermal, adjustable-magnetic	ATU	-	-	-	-
●magnetic only	MTU	-	-	-	-
Electronic					
●LSI	ETS	-	-	-	-
●LSI	ETM	-	-	-	-
Option	Earth-fault protection, Ig	-	-	-	-
	Zone selective interlocking, ZSI	-	-	-	-
	Ammeter	-	-	-	-
	Communication	-	-	-	-
	Earth-leakage protection module	-	-	-	-
Connection	fixed	front-connection	●	●	●
		rear-connection	●	●	●
	plug-in	front-connection	-	-	●
		rear-connection	-	-	●
Mechanical life		[operations]	25000	25000	25000
Electrical life @ 415 V AC		[operations]	10000	10000	10000
(front connection)	Basic dimensions, W×H×D	1-pole [mm]	-	-	35×140×86
		3-pole [mm]	76×130×82	76×130×82	90×140×86
		4-pole [mm]	101×130×82	101×130×82	120×140×86
(front connection)	Weight	1-pole [kg]	-	-	0.57
		3-pole [kg]	1.05	1.05	1.5
		4-pole [kg]	1.35	1.35	1.8
Reference standard			IEC60947-2	IEC60947-2	IEC60947-2
Note) ● applicable or available			* Applicable to MCCBs equipped with FTU, FMU, ATU * 2 pole MCCB in 3pole frame size	** 700A only available for TS800FTU *** Not applicable to 1pole	

1. The breakers with electronic trip units are available only at 3-pole version. (Only for AC supply)
* The trip unit ATU is available from 125A

Molded case circuit breakers

Susol MCCB 1600AF Series

Electrical characteristics

Type			
Ampere frame			
Pole			
Rated current,(A)	In	-5~40°C	
		50°C	
		65°C	
Rated insulation voltage, (V)	Ui		
Rated impulse withstand voltage, (kV)	Uiimp		
Rated operational voltage, (V)	Ue	AC50/60Hz	
		DC	
Rated short-circuit breaking capacity			
IEC60947-2	Rated ultimate short-circuit	220/240V	
AC50/60Hz	breaking capacity, (kA) (Icu)	380/415V	
(sym)		440/460V	
		480/500V	
		660/690V	
	DC	250V 2P	
		500V 2P	
		750V 3P	
Rated service	%lcu		
breaking capacity (Ics)			
Rated short-circuit	AC50/60Hz	1s	
making capacity (kA) (lcw)	3s		
Overriding instantaneous protection		kA peak	
Isolation			
Category			
Mechanical life (operations)			
(Life cycle)	Electrical life	440V	In/2
	(operations)		In
		690V	In/2
			In
Pollution degree			
Dimension (mm)		3-pole	
(H×W×D)		4-pole	
Weight (kg)		3-pole	
		4-pole	



TS1000		TS1250		TS1600	
TS1000		TS1250		TS1600	
1000		1250		1600	
3, 4		3, 4		3, 4	
800, 1000		1250		1600	
800, 1000		1250		1560	
800, 1000		1240		1420	
1000		1000		1000	
8		8		8	
690		690		690	
-		-		-	
N	H	L	N	H	N
55	75	200	55	75	55
50	70	150	50	70	50
50	65	130	50	65	50
40	50	100	40	50	40
35	45	-	35	45	35
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
100%	75%	100%	100%	75%	100%
25		12		25	
-		-		-	
50		30		50	
○			○		○
B		A		B	
10000		4000		10000	
6000		4000		5000	
5000		3000		4000	
4000		3000		3000	
2000		2000		2000	
3			3		3
			327×210×152.5		
			327×280×152.5		
			13		
			16.8		

Overview

Classification	N type	A type	P type	S type
Externals				
Current protection	<ul style="list-style-type: none"> • L / S / I / G / Thermal 	<ul style="list-style-type: none"> • L / S / I / G / Thermal • ZSI(Protective coordination) 	<ul style="list-style-type: none"> • L / S / I / G / Thermal(Continuous) • ZSI(Protective coordination) 	• P type
Other protection	-	<ul style="list-style-type: none"> • Earth leakage (Option) 	<ul style="list-style-type: none"> • Earth leakage(Option) • Over/Under current • Over/Under frequency • Unbalance(Voltage/Current) • Reverse power 	• P type
Measurement function	-	<ul style="list-style-type: none"> • Current (R / S / T / N) 	<ul style="list-style-type: none"> • 3 Phase Voltage/Current RMS/Vector • Power(P, Q, S), PF(3-Phase) • Energy(Positive/Negative) • Frequency, Demand 	<ul style="list-style-type: none"> • 3 Phase Voltage/Current RMS/Vector • Power(P, Q, S), PF(3-Phase) • Energy(Positive/Negative) • Frequency, Demand • Voltage/Current harmonics (1st~63th) • 3 Phase Waveforms • THD, TDD, K-Factor
Fine adjustment	-	-	<ul style="list-style-type: none"> • Fine adjustment for long/short time delay/instantaneous/ ground 	• P type
Pre Trip Alarm	-	-	<ul style="list-style-type: none"> • Overload protection relays • DO (Alarm) (Ground fault is not available when using Pre trip alarm) 	• P type
Digital Output	-	<ul style="list-style-type: none"> • 3DO (Fixed) • L, S/I, G Alarm 	<ul style="list-style-type: none"> • 3DO (Programmable) • Trip, Alarm, General 	• P type
IDMTL setting	-	-	<ul style="list-style-type: none"> • Compliance with IEC60255-3 SIT, VIT, EIT, DT 	• P type
Communication	-	<ul style="list-style-type: none"> • Modbus/RS-485 • Profibus-DP 	<ul style="list-style-type: none"> • Modbus / RS-485 • Profibus-DP 	<ul style="list-style-type: none"> • Modbus / RS-485 • Profibus-DP
Power supply	<ul style="list-style-type: none"> • Self Power -Power source works over 25% of current of In (one pole) 	<ul style="list-style-type: none"> • Self Power - Power source works over 25% of current of In (one pole) - External power source are required for comm. • AC/DC 100~250V • DC 24~60V 	<ul style="list-style-type: none"> • AC/DC 100~250V • DC 24~60V <p style="background-color: #f0f0f0; padding: 5px;">Basic protection function(L / S / I / G) is still under normal operation without control power.</p>	<ul style="list-style-type: none"> • AC/DC 100~250V • DC 24~60V
RTC timer	<ul style="list-style-type: none"> • Available 	<ul style="list-style-type: none"> • Available 	<ul style="list-style-type: none"> • Available 	<ul style="list-style-type: none"> • Available
LED for trip info.	<ul style="list-style-type: none"> • Long time delay • Short time delay/Instantaneous • Ground fault 	<ul style="list-style-type: none"> • N type 	<ul style="list-style-type: none"> • N type 	<ul style="list-style-type: none"> • N type
Fault recording	-	<ul style="list-style-type: none"> • 10 records (Fault/Current/Date and Time) 	<ul style="list-style-type: none"> • 256 records (Fault/Current/Date and Time) 	<ul style="list-style-type: none"> • 256 records • Last fault wave recording (3 Phase)
Event recording	-	-	<ul style="list-style-type: none"> • 256 records(Content, Status, Date) 	<ul style="list-style-type: none"> • P type
Operating button	<ul style="list-style-type: none"> • Reset button 	<ul style="list-style-type: none"> • Reset, Menu Up/Down, Left/Right, Enter 	<ul style="list-style-type: none"> • A type 	<ul style="list-style-type: none"> • A type

Molded case circuit breakers

Metasol 30AF to 250AF Series

Frame Size(AF)		30	50		60		
Type		S-Type	N-Type	S-Type	H-Type	N-Type	S-Type
Type and Pole	2 pole	ABS32c	ABN52c	ABS52c	ABH52c	ABN62c	ABS62c
	3 pole	ABS33c	ABN53c	ABS53c	ABH53c	ABN63c	ABS63c
	4 pole	ABS34c	ABN54c	ABS54c	ABH54c	ABN64c	ABS64c
Rated current, In	A	(3, 5, 10) 15, 20, 30	15, 20, 30, 40, 50		15, 20, 30, 40, 50	15, 20, 30, 40, 50, 60	
Rated operational voltage, Ue	AC(V)	690	690	690	690	690	690
	DC(V)	500	500	500	500	500	500
Rated insulation voltage, Ui	V	750	750	750	750	750	750
Rated impulse withstand voltage, Uimp	kV	8	8	8	8	8	8
Rated short-circuit breaking capacity(lcu) kA (Sym), KSC8321, IEC 60947-2							
AC	690V	2.5	2.5	5	10	2.5	5
	480/500V	7.5	7.5	10	35	7.5	10
	415/460V	14 (10)	14	18	50	14	18
	380V	18 (14)	18	22	50	18	22
	220/250V	30 (25)	30	35	100	30	35
DC	500V(3P)	5	5	10	30	5	10
	250V(2P)	5	5	10	30	5	10
Service breaking capacity(%lcu), lcs		100	100	100	100	100	100
Category of use		A	A	A	A	A	A
Endurance (Number of operations)	Mechanical Electrical						
Type of trip unit							
Thermal-magnetic release		fixed	fixed	fixed	fixed	fixed	fixed
Hydraulic-magnetic release							
Magnetic release only without thermal trip							
Earth leakage protection	for 3 pole	▲	▲	▲	▲	▲	▲
Accessories							
Electrical auxiliaries	Auxiliary switch	●	●	●	●	●	●
	Alarm switch	●	●	●	●	●	●
	Shunt trip	●	●	●	●	●	●
	Undervoltage trip	●	●	●	●	●	●
External accessories	Direct rotary handle	●	●	●	●	●	●
	Extended rotary handle	●	●	●	●	●	●
	Terminal shield	●	●	●	●	●	●
	Insulation barrier	●	●	●	●	●	●
	Rear connection	●	●	●	●	●	●
	Pad handle lock	●	●	●	●	●	●
	Plug-in device	●	●	●	●	●	●
Dimensions (mm)	W × H × D (3P)	75 × 130 × 60	75 × 130 × 60		90 × 155 × 60	75 × 130 × 60	
Weight(kg)	2 pole	0.5	0.5	0.5	0.7	0.5	0.5
	3 pole	0.7	0.7	0.7	1	0.7	0.7
	4 pole	0.9	0.9	0.9	1.2	0.9	0.9

Note) 1. ● applicable or available

2. ▲ available as a separate breaker



100	125		250		
N-Type	S-Type	H-Type	N-Type	S-Type	H-Type
ABN102c	ABS102c	ABH102c	ABN202c	ABS202c	ABH202c
ABN103c	ABS103c	ABH103c	ABN203c	ABS203c	ABH203c
ABN104c	ABS104c	ABH104c	ABN204c	ABS204c	ABH204c
15, 20, 30, 40, 50, 60, 75, 100	15, 20, 30, 40, 50, 60, 75, 100, 125		100, 125, 150, 175, 200, 225, 250		
690	690	690	690	690	690
500	500	500	500	500	500
750	750	750	750	750	750
8	8	8	8	8	8
5	8	10	8	8	10
10	25	30	18	26	30
18	37	50	26	37	50
22	42	50	30	42	50
35	85	100	65	85	100
10	20	30	10	20	30
10	20	30	10	20	30
100	100	100	100	100	100
A	A	A	A	A	A
fixed	fixed	fixed	fixed	fixed	fixed
▲	▲	▲	▲	▲	▲
●	●	●	●	●	●
●	●	●	●	●	●
●	●	●	●	●	●
●	●	●	●	●	●
●	●	●	●	●	●
●	●	●	●	●	●
●	●	●	●	●	●
●	●	●	●	●	●
●	●	●	●	●	●
●	●	●	●	●	●
75 × 130 × 60	90 × 155 × 60		105 × 165 × 60		
0.5	0.7	0.7	1.1	1.1	1.1
0.7	1	1	1.2	1.2	1.2
0.9	1.2	1.2	1.6	1.6	1.6

	Amb. Temp.	-5°C	0°C	10°C	20°C	25°C	30°C	35°C	40°C	45°C	50°C
Calibrated for 40°C	In=15 to 30	111.9%	111.3%	110.0%	108.0%	106.6%	104.9%	102.7%	100.0%	96.8%	93.3%
	In=40 to 100	110.2%	109.8%	108.7%	107.0%	105.8%	104.3%	102.4%	100.0%	97.2%	94.0%
	In=100 to 225	114.3%	113.2%	110.6%	107.5%	105.8%	104.0%	102.0%	100.0%	97.9%	95.6%
	In=250 to 800	110.0%	109.0%	107.0%	105.0%	104.0%	103.0%	101.5%	100.0%	98.5%	97.0%

Molded case circuit breakers

Metasol 400AF to 1200AF Series

Frame Size(AF)		400			
Type		N-Type	S-Type	H-Type	L-Type
Type and Pole	2 pole	ABN402c	ABS402c	ABH402c	ABL402c
	3 pole	ABN403c	ABS403c	ABH403c	ABL403c
	4 pole	ABN404c	ABS404c	ABH404c	ABL404c
Rated current, In	A	250, 300, 350, 400			
Rated operational voltage, Ue	AC(V)	690	690	690	690
	DC(V)	500	500	500	500
Rated insulation voltage, Ui	V	750	750	750	750
Rated impulse withstand voltage, Uimp	kV	8	8	8	8
Rated short-circuit breaking capacity(lcu) kA (Sym), KSC8321, IEC 60947-2					
AC	690V	5	8	10	14
	480/500V	18	35	50	65
	415/460V	37	50	65	85
	380V	42	65	70	100
	220/250V	50	75	85	125
DC	500V(3P)	10	20	40	40
	250V(2P)	10	20	40	40
Service breaking capacity(%lcu), lcs		100	100	100	75
Category of use		A	A	A	A
Endurance (Number of operations)	Mechanical	-	-	-	-
	Electrical	-	-	-	-
Type of trip unit					
Thermal-magnetic release		fixed	fixed	fixed	fixed
Hydraulic-magnetic release		-	-	-	-
Magnetic release only without thermal trip		-	-	-	-
Earth leakage protection	for 3 pole	▲	▲	▲	▲
Accessories					
Electrical auxiliaries	Auxiliary switch	●	●	●	●
	Alarm switch	●	●	●	●
	Shunt trip	●	●	●	●
	Undervoltage trip	●	●	●	●
External accessories	Direct rotary handle	●	●	●	●
	Extended rotary handle	●	●	●	●
	Terminal shield	●	●	●	●
	Insulation barrier	●	●	●	●
	Rear connection	●	●	●	●
	Mechanical interlock	●	●	●	●
	Plug-in device	●	●	●	●
Dimensions (mm)	W × H × D (3P)	140 × 257 × 109			
Weight(kg)	2 pole	5.2	5.2	5.2	5.2
	3 pole	6.2	6.2	6.2	6.2
	4 pole	7.8	7.8	7.8	7.8

Note) 1. ● applicable or available
2. ▲ available as a separate breaker



800			1000			1200		
N-Type	S-Type	L-Type	S-Type	L-Type	S-Type		L-Type	
ABN802c	ABS802c	ABL802c	-	-	-	-	-	-
ABN803c	ABS803c	ABL803c	ABS1003b	ABL1003b	ABS1203b	ABS1203bE	ABL1203b	
ABN804c	ABS804c	ABL804c	ABS1004b	ABL1004b	ABS1204b	-	ABL1204b	
500, 630, 700, 800			1000			1200		
690	690	690	600	600	600	600	600	600
500	500	500	-	-	-	-	-	-
750	750	750	690	690	690	690	690	690
8	8	8	6	6	6	6	6	6
8	10	14	-	-	-	-	-	-
25	45	65	50	75	50	50	75	
37	65	85	65	85	65	65	85	
45	75	100	65	85	65	65	85	
50	85	125	100	125	100	100	125	
10	20	40	-	-	-	-	-	-
10	20	40	-	-	-	-	-	-
100	100	75	50	50	50	50	50	50
A	A	A	A	A	A	A	A	
-	-	-	2500	2500	2500	2500	2500	2500
-	-	-	500	500	500	500	500	500
fixed	fixed	fixed	fixed	fixed	fixed	fixed	-	fixed
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
▲	▲	▲	-	-	-	-	●	-
●	●	●	●	●	●	●	●	●
●	●	●	●	●	●	●	●	●
●	●	●	●	●	●	●	●	●
●	●	●	●	●	●	●	●	●
●	●	●	●	-	-	-	-	-
●	●	●	●	-	-	-	-	-
●	●	●	●	-	-	-	-	-
●	●	●	●	-	-	-	-	-
●	●	●	●	-	-	-	-	-
●	●	●	●	-	-	-	-	-
●	●	●	●	-	-	-	-	-
●	●	●	●	-	-	-	-	-
●	●	●	●	-	-	-	-	-
210×280×109			220×400×105			220×400×105		
11	11	11	-	-	-	-	-	-
11.5	11.5	11.5	19.6	19.6	-	-	-	-
18.2	18.2	18.2	-	-	25.7	25.7	25.7	

	Amb. Temp.	-5°C	0°C	10°C	20°C	25°C	30°C	35°C	40°C	45°C	50°C
Calibrated for 40°C	In=15 to 30	111.9%	111.3%	110.0%	108.0%	106.6%	104.9%	102.7%	100.0%	96.8%	93.3%
	In=40 to 100	110.2%	109.8%	108.7%	107.0%	105.8%	104.3%	102.4%	100.0%	97.2%	94.0%
	In=100 to 225	114.3%	113.2%	110.6%	107.5%	105.8%	104.0%	102.0%	100.0%	97.9%	95.6%
	In=250 to 800	110.0%	109.0%	107.0%	105.0%	104.0%	103.0%	101.5%	100.0%	98.5%	97.0%

Earth Leakage Circuit Breakers

Metasol 30AF to 250AF Series

Frame Size(AF)		30	50			60	
Type	<td>S-Type</td> <td>N-Type</td> <td>S-Type</td> <td>H-Type</td> <td>N-Type</td> <td>S-Type</td>	S-Type	N-Type	S-Type	H-Type	N-Type	S-Type
Type and Pole	2-pole	-	E BN52c	-	-	-	-
	3-pole	E BS33c	E BN53c	E BS53c	E BH53c	E BN63c	E BS63c
	4-pole	E BS34c	-	E BS54c	E BH54c	-	E BS64c
Protective function		Overload, Short-circuit and Ground fault	Overload, Short-circuit and Ground fault		Overload, Short-circuit and Ground fault	Overload, Short-circuit and Ground fault	
Rated current, In A		15, 20, 30	15, 20, 30, 40, 50		15, 20, 30, 40, 50	60	
Rated residual current, IΔn mA		30, 100/200/500	30, 100/200/500		30, 100/200/500	30, 100/200/500	
Rated operational voltage, Ue AC(V)		220/460	220/460		220/460	220/460	
Rated impulse withstand voltage, Uimp kV		6	6		6	6	
Residual current off-time at IΔn sec		≤0.1 sec	≤0.1 sec		≤0.1 sec	≤0.1 sec	
Rated short-circuit breaking capacity (Icu) kA (Sym), KSC8321, IEC 60947-2							
AC	460V	14	14	18	50	14	18
	415V	14	14	18	50	14	18
	220/250V	30	30	35	100	30	35
Service breaking capacity(%Icu), Ics		100	100	100	100	100	100
Category of use		A	A	A	A	A	A
Endurance (Number of operations)	Mechanical	25000	25000	25000	25000	25000	25000
(Electrical)	Electrical	10000	10000	10000	10000	10000	10000
Type of trip unit							
Thermal-magnetic release		fixed	fixed	fixed	fixed	fixed	fixed
Hydraulic-magnetic release							
Magnetic release only without thermal trip							
Earth leakage protection	for 3 pole	▲	▲	▲	▲	▲	▲
Accessories							
Electrical auxiliaries	Auxiliary switch	●	●	●	●	●	●
	Alarm switch	●	●	●	●	●	●
	Shunt trip						
	Undervoltage trip						
External accessories	Insulation barrier	●	●	●	●	●	●
	Terminal cover (Long)	●	●	●	●	●	●
	Terminal cover (Short)	●	●	●	●	●	●
	Rotary handle (Direct)	●	●	●	●	●	●
	Rotary handle (Direct, Key lock)	●	●	●	●	●	●
	Rotary handle (Extended)	●	●	●	●	●	●
	Rear terminal (Bar)				●	●	●
	Rear terminal (Round)	●	●	●	●	●	●
	Plug-in kit	●	●	●	●	●	●
	Pad handle lock	●	●	●	●	●	●
Dimensions (mm)	W × H × D (3P)	75 × 130 × 60	75 × 130 × 60		90 × 155 × 60	75 × 130 × 60	
Weight(kg)	2 pole	-	0.5	-	-	-	-
	3 pole	0.7	0.7	0.7	1	0.7	0.7
	4 pole	0.9	-	0.9	1.2	-	0.9

Note) 1. ● applicable or available

2. ▲ available as a separate breaker



100	125		250		
N-Type	S-Type	H-Type	N-Type	S-Type	H-Type
EBN102c	-	-	EBN202c	-	-
EBS103c	EBS103c	EBH103c	EBN203c	EBS203c	EBH203c
EBN104c	EBS104c	EBH104c	-	EBS204c	EBH204c
Overload, Short-circuit and Ground fault	Overload, Short-circuit and Ground fault		Overload, Short-circuit and Ground fault		
60, 75, 100	15, 20, 30, 40, 50, 60, 75, 100, 125		100, 125, 150, 175, 200, 225, 250		
30, 100/200/500	30,100/200/500		30,100/200/500		
220/460	220/460		220/460		
6	6		6		
≤ 0.1 sec	≤ 0.1 sec		≤ 0.1 sec		
18	37	50	26	37	50
18	37	50	26	37	50
35	85	100	65	85	100
100	100	100	100	100	
A	A	A	A	A	
25000	25000	25000	20000	20000	20000
10000	10000	10000	5000	5000	5000
fixed	fixed	fixed	fixed	fixed	fixed
▲	▲	▲	▲	▲	▲
●	●	●	●	●	●
●	●	●	●	●	●
●	●	●	●	●	●
●	●	●	●	●	●
●	●	●	●	●	●
●	●	●	●	●	●
●	●	●	●	●	●
●	●	●	●	●	●
●	●	●	●	●	●
●	●	●	●	●	●
75 × 130 × 60	90 × 155 × 60		105 × 165 × 60		
0.5	-	-	1.1	-	-
0.7	1	1	1.2	1.2	1.2
0.9	1.2	1.2	-	1.5	1.5

Earth Leakage Circuit Breakers

Metasol 400AF to 1200AF Series

Frame Size(AF)		400			
Type		N-Type	S-Type	H-Type	L-Type
Type and Pole	3-pole	EBN403c	EBS403c	EBH403c	EBL403c
	4-pole	EBN404c	EBS404c	EBH404c	EBL404c
Protective function	Overload, Short-circuit and Ground fault				
Rated current, In A		250, 300, 350, 400			
Rated residual current, I _{Δn} mA		30, 100/200/500mA			
Rated operational voltage, Ue AC(V)		220/460	220/460	220/460	220/460
Rated impulse withstand voltage, U _{imp} kV		6	6	6	6
Residual current off-time at I _{Δn} sec		0.1 sec	0.1 sec	0.1 sec	0.1 sec
Rated short-circuit breaking capacity (Icu) kA (Sym), KSC8321, IEC 60947-2					
AC	415/460V	37	50	65	85
	220/250V	50	75	85	125
Service breaking capacity(%Icu), Ics		100	100	100	75
Category of use		A	A	A	A
Endurance	Mechanical	40000	40000	40000	40000
(Number of operations)	Electrical	10000	10000	10000	10000
Type of trip unit					
Thermal-magnetic release		fixed	fixed	fixed	fixed
Hydraulic-magnetic release		-	-	-	-
Magnetic release only without thermal trip		-	-	-	-
Earth leakage protection for 3 pole		▲	▲	▲	▲
Accessories					
Electrical auxiliaries	Auxiliary switch	●	●	●	●
	Alarm switch	●	●	●	●
	Shunt trip	●	●	●	●
	Undervoltage trip	●	●	●	●
External accessories	Insulation barrier	●	●	●	●
	Terminal cover (Long) - 2, 3pole	●	●	●	●
	Terminal cover (Long) - 4pole	●	●	●	●
	Rotary handle (Direct)	●	●	●	●
	Rotary handle (Extended)	●	●	●	●
	Mechanical interlock - 2, 3pole	●	●	●	●
	Mechanical interlock - 4pole	●	●	●	●
	Rear terminal - 2pole	●	●	●	●
	Rear terminal - 3pole	●	●	●	●
	Rear terminal - 4pole	●	●	●	●
	Plug-in kit	●	●	●	●
Dimensions (mm)	W × H × D (3P)	140 × 257 × 109			
Weight(kg)	2 pole	-	-	-	-
	3 pole	7	7	7	7
	4 pole	8.4	8.4	7	7

Note) 1. ● applicable or available
2. ▲ available as a separate breaker



800			1200	1600
N-Type	S-Type	L-Type	S-Type	S-Type
EBN803c	EBS803c	EBL803c	EBS1003b	EBS1203b
-	-	-	-	-
Overload, Short-circuit and Ground fault			Overload, Short-circuit and Ground fault	
500, 630, 700, 800			1000	1200
30, 100/200/500mA			100/200/500mA	100/200/500mA
220/460	220/460	220/460	220/460	220/460
6	6	6	-	-
0.1 sec	0.1 sec	0.1 sec	0.1 sec	0.1 sec
37	65	85	85	85
50	85	125	125	125
100	100	75	-	-
A	A	A	-	-
2500	2500	2500	2500	2500
500	500	500	500	500
fixed	fixed	fixed	fixed	fixed
-	-	-	-	-
-	-	-	-	-
▲	▲	▲	-	-
●	●	●	●	●
●	●	●	●	●
●	●	●	-	-
●	●	●	-	-
●	●	●	-	-
●	●	●	-	-
●	●	●	-	-
●	●	●	-	-
●	●	●	-	-
●	●	●	-	-
●	●	●	-	-
●	●	●	-	-
●	●	●	-	-
●	●	●	-	-
●	●	●	-	-
●	●	●	-	-
210×280×109			220×565×105	
-	-	-	-	-
11.5	11.5	11.5	27.1	27.1
-	-	-	-	-

Air circuit breakers

Susol ACB Series



Type			
Ampere frame	(AF)		
Rated current(A)	(In max)	at 40°C	
Setting current (A) *	Control trip relay (... × In max)		
Rated current of neutral pole (A)			
Rated insulation voltage (V)	(Ui)		
Rated operating voltage (V)	(Ue)		
Rated impulse withstand voltage (kV)	(Uiimp)		
Frequency (Hz)			
Number of poles (P)			
Rated breaking capacity (kA sym)	220V/230V/380V/415V		
IEC 60947-2	(Icu)	460V/480V/500V	
AC 50/60Hz		550V/600V/690V	
Rated service breaking capacity (kA)	(Ics)	... % × Icu	
Rated making capacity (kA peak)		220V/230V/380V/415V	
IEC 60947-2	(Icm)	460V/480V/500V	
AC 50/60Hz		550V/600V/690V	
Rated short-time withstand current (kA) (Icw)		1sec 2 sec 3 sec	
Operating time (ms)		Maximum total breaking time Maximum closing time	
Life cycle (time)	Mechanical	Without maintenance With maintenance	
	Electrical	Without maintenance With maintenance	
Connections **	Draw-out / Fixed		
		Horizontal connection	
		Vertical connection	
		Front connection	
		Mixed connection	
Weight (kg) (3P/4P)	Draw-out type	Main body (With cradle)	Motor charging type Manual charging type
		Cradle only	
	Fixed type		Motor charging type
			Manual charging type
External dimensions (mm) (H × W × D)	Draw-out type	3P	430 × 334 × 375
		4P	430 × 419 × 375
	Fixed type	3P	300 × 300 × 295
		4P	300 × 385 × 295
Trip relay		N, A, P, S type	
Certificate & Approval		KS / KEMA / KERI / GOST	
Marine classification		LR, ABS, DNV, KR, BV, GL, RINA, NK	

* Refer to trip relay specification. ** ●: Standard, ○: Option

Susol					
AH-06D	AH-08D	AH-10D	AH-13D	AH-16D	AH-20D
630	800	1000	1250	1600	2000
200	400				
400	630	1000	1250	1600	2000
630	800				
(0.4 ~ 1.0) × In max					
400	400				
630	630	1000	1250	1600	2000
800	800				
1000					
690					
12					
50/60					
3, 4					
85					
85					
65					
100%					
187					
187					
143					
65					
60					
50					
40					
80					
20,000					
30,000					
5,000					
10,000					
●					
○					
○					
○					
63/74					
61/72					
29/32					
34/44					
32/42					
430 × 334 × 375					
430 × 419 × 375					
300 × 300 × 295					
300 × 385 × 295					
N, A, P, S type					
KS / KEMA / KERI / GOST					
LR, ABS, DNV, KR, BV, GL, RINA, NK					



Susol

AH-06E	AH-08E	AH-10E	AH-13E	AH-16E	AH-20E	AH-25E	AH-32E	AH-40E
630	800	1000	1250	1600	2000	2500	3200	4000
630	800	1000	1250	1600	2000	2500	3200	4000
(0.4 ~ 1.0) × In max								
630	800	1000	1250	1600	2000	2500	3200	4000
				1,000				
				690				
				12				
				50/60				
				3, 4				
				100				
				100				
				85				
				100%				
				220				
				220				
				187				
				85				
				75				
				65				
				40				
				80				
				15,000				
				20,000				
				5,000				
				10,000				
			●		○			
		○			●			
		○			-			
		○			-			
			87/103		104/147			
			85/101		102/145			
			44/55		58/70			
			44/55		63/100			
			42/53		61/98			
				430 × 412 × 375			460 × 785 × 375	
				430 × 527 × 375			460 × 1015 × 375	
				300 × 378 × 295			300 × 751 × 295	
				300 × 493 × 295			300 × 981 × 295	
				N, A, P, S type			N, A, P, S type	
				KS / KEMA / KERI / GOST			KS / KEMA / KERI / GOST	
				LR, ABS, DNV, KR, BV, GL, RINA, NK			LR, ABS, DNV, KR, BV, GL, RINA, NK	

Susol

AH-40G	AH-50G	AH-63G
4000	5000	6300
4000	5000	6300
(0.4 ~ 1.0) × In max		
4000	5000	6300
1,000		
690		
12		
50/60		
3, 4		
150		
150		
100		
100%		
330		
330		
220		
100		
100		
100		
40		
80		
10,000		
15,000		
2,000		
5,000		
○		
●		
-		
-		
181/223		186/230
179/221		184/228
97/117		102/124
98/123		103/130
96/121		101/128
460 × 785 × 375		
460 × 1015 × 375		
300 × 751 × 295		
300 × 981 × 295		
N, A, P, S type		
KS / KEMA / KERI / GOST		
LR, ABS, DNV, KR, BV, GL, RINA, NK		

Air circuit breakers

Metasol ACB Series



Type	
Ampere frame	(AF)
Rated current(A)	(In max) at 40°C
Setting current (A) *	Control trip relay (... × In max)
Rated current of neutral pole (A)	
Rated insulation voltage (V)	(Ui)
Rated operating voltage (V)	(Ue)
Rated impulse withstand voltage (kV)	(Uiimp)
Frequency (Hz)	
Number of poles (P)	
Rated breaking capacity (kA sym)	220V/230V/380V/415V
IEC 60947-2	(Icu)
AC 50/60Hz	460V/480V/500V
	550V/600V/690V
Rated service breaking capacity (kA)	(Ics) ... % × Icu
Rated making capacity (kA peak)	220V/230V/380V/415V
IEC 60947-2	(Icm)
AC 50/60Hz	460V/480V/500V
	550V/600V/690V
Rated short-time withstand current (kA)	(Icw) 1 sec
	2 sec
	3 sec
Operating time (ms)	Maximum total breaking time
	Maximum closing time
Life cycle (time)	Mechanical Without maintenance
	With maintenance
	Electrical Without maintenance
	With maintenance
Connections **	Draw-out / Fixed
	Horizontal connection
	Vertical connection
	Front connection
	Mixed connection
Weight (kg)	Draw-out type Main body Motor charging type
(3P/4P)	(With cradle) Manual charging type
	Cradle only
	Fixed type Motor charging type
	Manual charging type
External dimensions (mm)	Draw-out 3P
(H × W × D)	type 4P
	Fixed type 3P
	4P
Trip relay	
Certificate & Approval	
Marine classification	

Metasol

AN-06D	AN-08D	AN-10D	AN-13D	AN-16D	AS-20D
630	800	1000	1250	1600	2000
200	400				
400	630	1000	1250	1600	2000
630	800				
(0.4 ~ 1.0) × In max					
400	400				
630	630	1000	1250	1600	2000
630	800				
1000					
690					
12					
50/60					
3, 4					
65					
65					
50					
100%					
143					
143					
105					
50					
42					
36					
40					
80					
20,000					
30,000					
5,000					
10,000					
●					
○					
○					
○					
63/74					
61/72					
29/32					
34/44					
32/42					
430 × 334 × 375					
430 × 419 × 375					
300 × 300 × 295					
300 × 385 × 295					
N, A, P type					
KS / KEMA / KERI / GOST					
LR, ABS, DNV, KR, BV, GL, RINA, NK					

* Refer to trip relay specification. ** ●: Standard, ○: Option



Metasol			
AS-20E	AS-25E	AS-32E	AS-40E
2000	2500	3200	4000
630, 800			
1000, 1250	2500	3200	4000
1600, 2000			
(0.4 ~ 1.0) × ln max			
630, 800			
1000, 1250	2500	3200	4000
1600, 2000			
1,000			
690			
12			
50/60			
3, 4			
85			
85			
85			
100%			
187			
187			
187			
85			
75			
65			
40			
80			
15,000			
20,000			
5,000			
10,000			
●	○		
○	●		
○	-		
○	-		
87/103	104/147		
85/101	102/145		
44/50	58/70		
44/55	63/100		
42/53	61/98		
430 × 412 × 375			
430 × 527 × 375			
300 × 378 × 295			
300 × 493 × 295			
N, A, P type			
KS / KEMA / KERI / GOST			
LR, ABS, DNV, KR, BV, GL, RINA, NK			

Metasol	
AS-50F	
4000	5000
4000	5000
(0.4 ~ 1.0) × ln max	
4000	5000
1000	
690	
12	
50/60	
3, 4	
100	
100	
85	
100%	
220	
220	
187	
85	
75	
65	
40	
80	
10,000	
15,000	
2,000	
5,000	
○	
●	
-	
-	
145/173	
143/171	
78/90	
76/94	
74/92	
460 × 629 × 375	
460 × 799 × 375	
300 × 597 × 295	
300 × 767 × 295	
N, A, P type	
KS / KEMA / KERI / GOST	
LR, ABS, DNV, KR, BV, GL, RINA, NK	

Metasol		
AS-40G	AS-50G	AS-63G
4000	5000	6300
4000	5000	6300
(0.4 ~ 1.0) × ln max		
4000	5000	6300
1,000		
690		
12		
50/60		
3, 4		
120		
120		
100		
100%		
264		
264		
220		
220		
100		
90		
85		
40		
80		
10,000		
15,000		
2,000		
5,000		
○		
●		
-		
-		
181/223		186/230
179/221		184/228
97/117		102/124
98/123		103/130
96/121		101/128
460 × 785 × 375		
460 × 1015 × 375		
300 × 751 × 295		
300 × 981 × 295		
N, A, P type		
KS / KEMA / KERI / GOST		
LR, ABS, DNV, KR, BV, GL, RINA, NK		

Trip relay(OCR)

The trip relay of Susol ACB provides the additional protection functions for voltage, frequency, unbalance, and others in addition to main protection functions for over current, short-circuit, ground fault. It supports the advanced measurement functions for voltage, current, power, electric energy, harmonics, communication function, and others.

Analog trip function interlocked with mechanism enhanced a durability of devices as well as the breaking capacity of ACB.

Zone selective interlocking function makes the protective coordination more simple and thermal memory can be applied to various loads.



Trip relay types

Classification	N type	A type	P type	S type
Externals	 	 	 	
Current protection	<ul style="list-style-type: none"> • L / S / I / G / Thermal 	<ul style="list-style-type: none"> • L / S / I / G / Thermal • ZSI(Protective coordination) 	<ul style="list-style-type: none"> • L / S / I / G / Thermal(Continuous) • ZSI(Protective coordination) 	• P type
Other protection	-	<ul style="list-style-type: none"> • Earth leakage (Option) 	<ul style="list-style-type: none"> • Earth leakage(Option) • Over/Under current • Over/Under frequency • Unbalance(Voltage/Current) • Reverse power 	• P type
Measurement function	-	<ul style="list-style-type: none"> • Current (R / S / T / N) 	<ul style="list-style-type: none"> • 3 Phase Voltage/Current RMS/Vector • Power(P, Q, S), PF(3-Phase) • Energy(Positive/Negative) • Frequency, Demand 	<ul style="list-style-type: none"> • 3 Phase Voltage/Current RMS/Vector • Power(P, Q, S), PF(3-Phase) • Energy(Positive/Negative) • Frequency, Demand • Voltage/Current harmonics (1st~63th) • 3 Phase Waveforms • THD, TDD, K-Factor
Fine adjustment	-	-	<ul style="list-style-type: none"> • Fine adjustment for long/short time delay/instantaneous/ ground 	• P type
Pre Trip Alarm	-	-	<ul style="list-style-type: none"> • Overload protection relays : DO (Alarm) (Ground fault is not available when using Pre trip alarm) 	• P type
Digital Output	-	<ul style="list-style-type: none"> • 3DO (Fixed) • L, S/I, G Alarm 	<ul style="list-style-type: none"> • 3DO (Programmable) • Trip, Alarm, General 	• P type
IDMTL setting	-	-	<ul style="list-style-type: none"> • Compliance with IEC60255-3 SIT, VIT, EIT, DT 	• P type
Communication	-	<ul style="list-style-type: none"> • Modbus/RS-485 • Profibus-DP 	<ul style="list-style-type: none"> • Modbus / RS-485 • Profibus-DP 	<ul style="list-style-type: none"> • Modbus / RS-485 • Profibus-DP
Power supply	<ul style="list-style-type: none"> • Self Power -Power source works over 20% of load current. 	<ul style="list-style-type: none"> • Self Power - Power source works over 20% of load current. - External power source are required for comm. • AC/DC 100~250V • DC 24~60V 	<ul style="list-style-type: none"> • AC/DC 100~250V • DC 24~60V <p style="background-color: #f0f0f0; padding: 5px;">Basic protection function(L / S / I / G) is still under normal operation without control power.</p>	<ul style="list-style-type: none"> • AC/DC 100~250V • DC 24~60V
RTC timer	<ul style="list-style-type: none"> • Available 	<ul style="list-style-type: none"> • Available 	<ul style="list-style-type: none"> • Available 	<ul style="list-style-type: none"> • Available
LED for trip info.	<ul style="list-style-type: none"> • Long time delay • Short time delay/Instantaneous • Ground fault 	<ul style="list-style-type: none"> • N type 	<ul style="list-style-type: none"> • N type 	<ul style="list-style-type: none"> • N type
Fault recording	-	<ul style="list-style-type: none"> • 10records (Fault/Current/Date and Time) 	<ul style="list-style-type: none"> • 256records (Fault/Current/Date and Time) 	<ul style="list-style-type: none"> • 256records • Last fault wave recording (3 Phase)
Event recording	-	-	<ul style="list-style-type: none"> • 256 records(Content, Status, Date) 	• P type
Operating button	<ul style="list-style-type: none"> • Reset button 	<ul style="list-style-type: none"> • Reset, Menu Up/Down, Left/Right, Enter 	<ul style="list-style-type: none"> • A type 	<ul style="list-style-type: none"> • A type

LS Final Distribution Boards

LS Final Distribution Boards is fully type-tested by ASTA and specially designed for residential and commercial area for the protection of people and equipment.



ASTA

CERTIFICATE OF TYPE TESTS

Reference Ref. No.: RIS-2000

APPARATUS:

1600A, three-pole
Demand Asymmetrical
Final Distribution Board

MANUFACTURER:

LS Industrial Systems Co., Ltd.
100-120, Gwacheon-ro, Gwacheon-si,
Gyeonggi-do, Korea, Republic of
EAST-STEEL (Pty) Ltd., South Africa

TESTED BY:

Power Testing & Test
Assurance Corp., Korea

DATE OF TESTS:

10/10/2010 to 14/10/2010

The apparatus, mentioned in accordance with
the certificate, has been submitted for testing

RT 2000-1-Bulletin-A-C 2006-44-45 E

Classification : I & II, GDN, Class 1, L1

This result will allow the use of this equipment
in accordance with the relevant part of the
international standard for the protection of
people and equipment.

For complete information, refer to the test report.

Test Report No. : PTI-2010-10-10-14-01

Signature : [Signature]

Date : 10/10/2010

Power Testing & Test
Assurance Corp., Korea



Full range of Residential & Commercial Distribution System



Features:

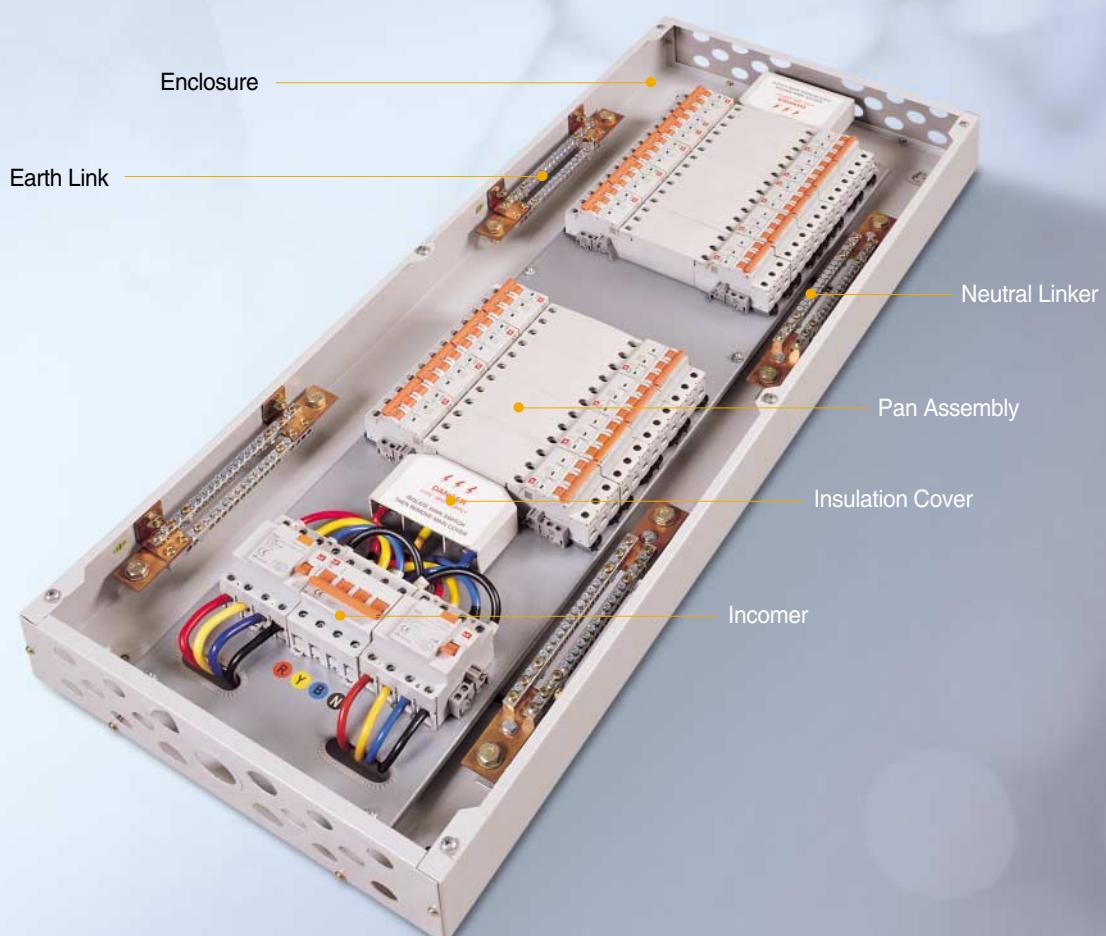
- Designed to provide higher level of safety for final distribution board
- Pan assembly type busbar systems to provide easier cabling
- Split neutral bars provide easy connection and maximum cable space
- Easy and safe mounting of LS Miniature Circuit Breaker
- Flush and surface mounted
- Tin plate and cooper busbar
- Galvanized 1.2mm steel sheet

Technical Description

- In compliance with standards : IEC 60439-3
- Short-circuit withstand: 17kA/0.2s
- Peak short time withstand: 35kA
- Index of degree: IP 4X
- Rated operational Voltage(Ue): 415V
- Rated insulation Voltage(Ui): 460V
- Rated Frequency: 50/60Hz
- Rated impuls withstand Voltage(Uimp): 4kV
- Rated Current (In): Upto 125A



Internal view



Pan Assembly System

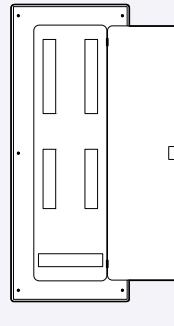
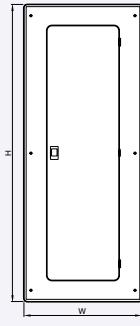
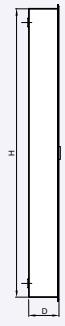


- Rigid and removable pan assembly to provide easier cabling
- Modular panel system
- Flexible connect with CB, RCCB and Disconnect switch

LS Final Distribution Boards

Specific of FDB Split busbar type

with incoming Isolator feeding two ELCBs

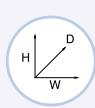
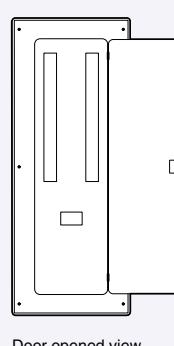
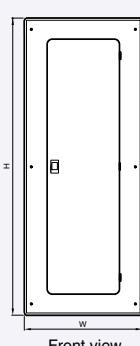


Selection of Enclosure

Code Description	Type	Dimension
02+02 Way Split DB		530H x 430W x 110D mm
04+02 Way Split DB		580H x 430W x 110D mm
04+04 Way Split DB		680H x 430W x 110D mm
06+04 Way Split DB		780H x 430W x 110D mm
06+06 Way Split DB		780H x 430W x 110D mm
08+06 Way Split DB		830H x 430W x 110D mm
08+08 Way Split DB		980H x 430W x 110D mm
10+08 Way Split DB		980H x 430W x 110D mm
12+06 Way Split DB		980H x 430W x 110D mm
02+02 Way Split DB	Flush	510H x 410W x 110D mm
04+02 Way Split DB	Flush	560H x 410W x 110D mm
04+04 Way Split DB	Flush	660H x 410W x 110D mm
06+04 Way Split DB	Surface	760H x 410W x 110D mm
06+06 Way Split DB	Surface	760H x 410W x 110D mm
08+06 Way Split DB	Surface	810H x 410W x 110D mm
08+08 Way Split DB	Surface	960H x 410W x 110D mm
10+08 Way Split DB	Surface	960H x 410W x 110D mm
12+06 Way Split DB	Surface	960H x 410W x 110D mm

Single busbar & Single Incomer type

With Incoming 4P ELCB/MCB/Isolator



Selection of Enclosure

Code Description	Type	Dimension
4 Way DB 1 INC		530H x 430W x 110D mm
6 Way DB 1 INC		580H x 430W x 110D mm
8 Way DB 1 INC		680H x 430W x 110D mm
12 Way DB 1 INC		780H x 430W x 110D mm
14 Way DB 1 INC		830H x 430W x 110D mm
18 Way DB 1 INC		980H x 430W x 110D mm
20 Way DB 1 INC		Not Common
24 Way DB 1 INC		Not Common
4 Way DB 1 INC	Flush	510H x 410W x 110 D mm
6 Way DB 1 INC	Flush	560H x 410W x 110 D mm
8 Way DB 1 INC	Flush	660H x 410W x 110 D mm
12 Way DB 1 INC	Surface	760H x 410W x 110 D mm
14 Way DB 1 INC	Surface	810H x 410W x 110 D mm
18 Way DB 1 INC	Surface	960H x 410W x 110 D mm
20 Way DB 1 INC	Surface	Not Common
24 Way DB 1 INC	Surface	Not Common

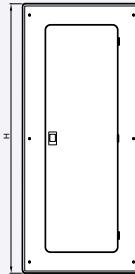
Specific of FDB

Single busbar & Dual Incomer type

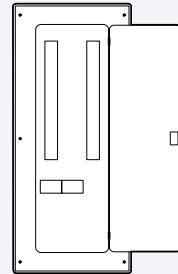
With Incoming Isolator & ELCB



Side view



Front view



Door opened view



Selection of Enclosure

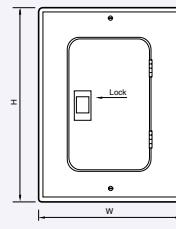
Code Description	Type	Dimension
4 Way DB 2 INC	Flush	530H x 430W x 110D mm
6 Way DB 2 INC		580H x 430W x 110D mm
8 Way DB 2 INC		680H x 430W x 110D mm
12 Way DB 2 INC		780H x 430W x 110D mm
14 Way DB 2 INC		830H x 430W x 110D mm
18 Way DB 2 INC		980H x 430W x 110D mm
20 Way DB 2 INC		Not Common
24 Way DB 2 INC		Not Common
4 Way DB 2 INC		510H x 410W x 110D mm
6 Way DB 2 INC		560H x 410W x 110D mm
8 Way DB 2 INC	Surface	660H x 410W x 110D mm
12 Way DB 2 INC		760H x 410W x 110D mm
14 Way DB 2 INC		810H x 410W x 110D mm
18 Way DB 2 INC		960H x 410W x 110D mm
20 Way DB 2 INC		Not Common
24 Way DB 2 INC		Not Common

SP&N Consumer Unit

Incoming 2P ELCB / MCB / Isolator



Side view



Front view



Selection of Enclosure

Code Description	Type	Dimension
6 Way 1P C.Unit		320H x 240W x 100D mm
9 Way 1P C.Unit		370H x 240W x 100D mm
12 Way 1P C.Unit		420H x 250W x 100D mm
15 Way 1P C.Unit		490H x 250W x 100D mm
18 Way 1P C.Unit		550H x 250W x 100D mm
22 Way 1P C.Unit		Not Common

LS SMDB Solution

- LS SMDB Solutions are arranged for 3 Phase and neutral incoming supply and specially designed easy to install MCCBs.
- These are fitted with Form 3b and 2 busbar assemblies, tested and ASTA Certified.



شركة أبوظبي للتوزيع
Abu Dhabi Distribution Co.



Rating

- A wide choice of incoming MCCBs make LS SMDB panels flexible to suit most of the requirements and represent excellent value and will appeal to consultants, contractors, end users and OEMs. These are offered in ratings of 125A, 250A, 400A, 630A.
- All incoming and outgoing MCCBs have Thermal/Magnetic fixed and adjustable tripping mechanisms incorporated with a trip-to-test button. These are available in ratings as follows : 16, 20, 25, 32, 40, 50, 63, 80, 100, 125, 160, 250, 400, 630A.

Technical Specifications

Constructional Characteristics

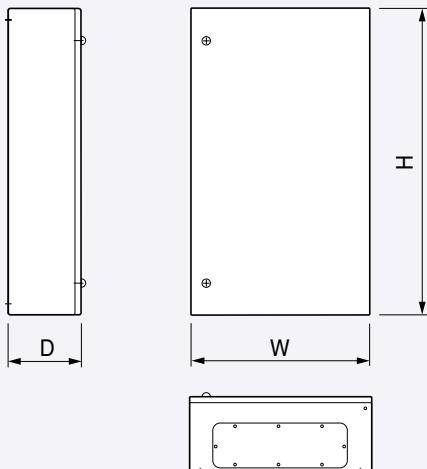
- Complied with IEC 60947-1
- Fully Type Tested, ASTA Certified
- Degree of protection : IP41 as per IEC 60529
- Form of separation: Form 3b
- Enclosure constructed from rigid folded zinc phosphate and protected both internally and externally with polyester powder coating

Electrical Characteristics

- Rated Operational Voltage Ue: upto 690V
- Rated Insulation voltage Ui: upto 750V
- Rated Frequency: 50/60Hz
- Rated Impulse withstand voltage Uimp: 8kV
- Rated Short time Icw & peak withstand IpK Current: 36kA/1S

Incoming Devices

MCCB Panelboards



Metasol Series

Incoming Breaker 250 Amps Outgoing Breaker 100 Amps				Incoming Breaker 400 Amps Outgoing Breaker 100 Amps				Incoming Breaker 630 Amps Outgoing Breaker 100 Amps			
No of Ways	Width	Height	Depth	No of Ways	Width	Height	Depth	No of Ways	Width	Height	Depth
2	700	800	180	4	700	1000	250				
4	700	800	180	6	700	1000	250	6	800	1000	250
6	700	800	180	8	700	1200	250	8	800	1200	250
8	700	1000	180	10	700	1400	250	10	800	1400	250
10	700	1200	180	12	700	1400	250	12	800	1400	250
12	700	1200	180	14	700	1600	250	14	800	1600	250

Susol TD/TS Series

Incoming Breaker 250 Amps Outgoing Breaker 100 Amps				Incoming Breaker 400 Amps Outgoing Breaker 100 Amps				Incoming Breaker 630 Amps Outgoing Breaker 100 Amps			
No of Ways	Width	Height	Depth	No of Ways	Width	Height	Depth	No of Ways	Width	Height	Depth
2	700	800	180	4	700	1000	250				
4	700	800	180	6	700	1000	250	6	800	1000	250
6	700	800	180	8	700	1200	250	8	800	1200	250
8	700	1000	180	10	700	1400	250	10	800	1400	250
10	700	1200	180	12	700	1400	250	12	800	1400	250
12	700	1200	180	14	700	1600	250	14	800	1600	250

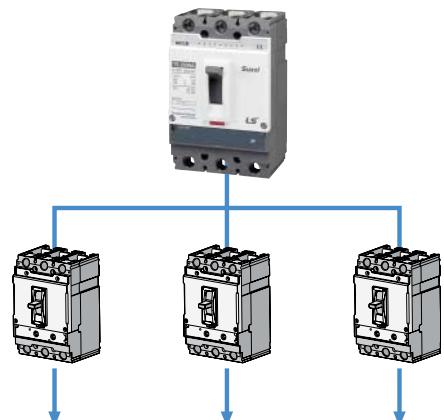
LS SMDB Solution

Incoming Devices

LSIS “Susol series” range of MCCBs

Rated current, In	250A 630A									
Rated operational voltage, Ue	750V									
MCCB breaker type	TS250		TS400			TS630				
Ultimate breaking capacity, Icu (kA rms) at 415V	N	H	L	N	H	L	N	H	L	
	50	85	150	50	85	150	50	85	150	
Service breaking capacity, Ics.....% Icu	100% Icu		100% Icu		100% Icu					
Protection trip unit	Thermal magnetic / Electronic									
Switch disconnector type TS	TS250NA		TS400NA		TS630NA					
Short-circuit making capacity Icm (kApeak) (with upstream circuit breaker)	4.9		7.1		8.5					

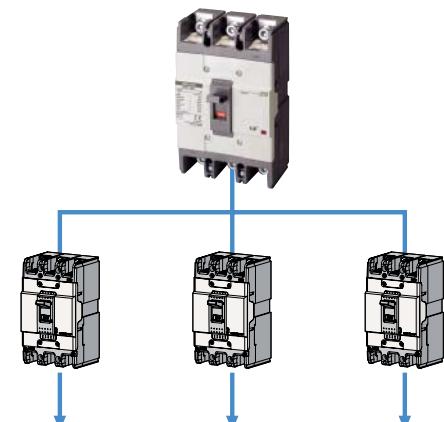
Incoming application



LSIS “Metasol series” range of MCCBs

Rated current, In	250A 630A		
Rated operational voltage, Ue	690V		
Breaker type	ABS203c	ABS403c	ABS803c
Ultimate breaking capacity, Icu (kA rms) at 415V	37	50	65
Service breaking capacity, Ics.....% Icu	100% Icu	100% Icu	100% Icu
Protection trip unit	Thermal magnetic		

Incoming application

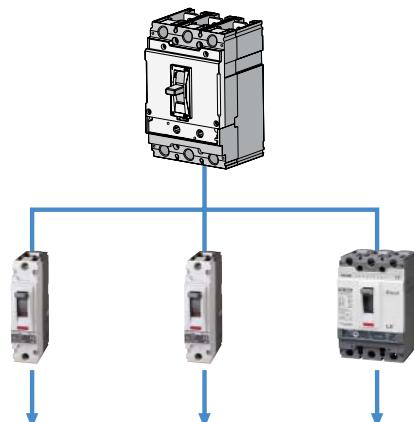


Outgoing devices

LSIS “Susol series” range of MCCBs

Rated current, In	16A 250A					
Rated operational voltage, Ue	upto 750V					
Breaker type	TD100, TD160, TS100, TS160, TS250					
	N	H	L			
No. of poles	1P	3P	1P	3P	1P	3P
Ultimate breaking capacity, Icu (kA rms) at 240V	30	100	50	120	-	200
Service breaking capacity, Ics.....% Icu	100% Icu					
Protection trip unit	Thermal magnetic / Electronic					

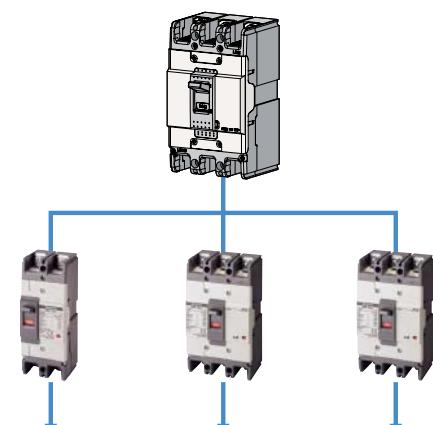
Incoming application



LSIS “Metasol series” range of MCCBs

Rated current, In	15A 100A									
Rated operational voltage, Ue	upto 415V - Single pole upto 690V - Three pole									
Breaker type	ABS103c									
	N	H	L							
No. of poles	2P	3P	2P	3P	2P	3P				
Ultimate breaking capacity, Icu (kA rms) at 240V	35		85		100					
Ultimate breaking capacity, Icu (kA rms) at 415V	18		37		50					
Service breaking capacity, Ics.....% Icu	100% Icu									
Protection trip unit	Thermal magnetic									

Incoming application



Vacuum Circuit Breakers

Susol VCB Series

VL 06

Type		VL-06□08□04	VL-06□13□06
Rated voltage	Ur (kV)	7.2	
Rated normal current	Ir (A)	400	630
Rated frequency	fr (Hz)		50/60
Rated short-circuit current	Isc (kA)	8	12.5
Rated short-time withstand current (3 sec)	Ik (kA)	8	12.5
Rated short-circuit breaking capacity	(MVA)	100	160
Rated short-circuit making current	Ip (kA)	20.8	32.5
Rated breaking time	(cycle)	3	
Rated withstand voltage	Power frequency (1 min) Impulse ($1.2 \times 50\mu\text{s}$)	Ud (kV) Up (kV)	20 60
Rated operating sequence		O-0.3s-CO-15s-CO	
Control voltage	Closing coil Trip coil	(V)	AC/DC 100~130V, AC/DC 200~250V, DC 125V, DC 24~30V, DC 48~60V, AC 48V AC/DC 100~130V, AC/DC 200~250V, DC 125V, DC 24~30V, DC 48~60V, AC 48V
Auxiliary contact			2a2b, 4a4b, 6a6b
Rated opening time	(sec)		≤ 0.04
No-load closing time	(sec)		≤ 0.06
Type test	Mechanical Electrical Capacitive current switching		M2 E2 (List1) C2
Lifetime *	Mechanical Electrical	(time)	30000 30000
Installation	Fixed Draw-out		P type E, F, G type (for MESG)
Pole centre distance	(mm)		130
Weight	CB (E, F, G type) Cradle (E, F, G type)	(kg)	37 18, 25, 32
Applied standards			IEC 62271-100, KS C 4611, JEC 2300/JIS C 4603

* With maintenance

VL 06...17

Type		VL-06□20/25□06/13/20	VL-12□20/25□06/13/20	VL-17□20/25□06/13/20
Rated voltage	Ur (kV)	7.2	12	17.5
Rated normal current	Ir (A)	630 1250 2000	630 1250 2000	630 1250 2000
Rated frequency	fr (Hz)		50/60	
Rated short-circuit current	Isc (kA)		20/25	
Rated short-time withstand current (3 sec)	Ik (kA)		20/25	
Rated short-circuit breaking capacity	(MVA)	250/310	410/520	600/750
Rated short-circuit making current	Ip (kA)		62.5/65	
Rated breaking time	(cycle)		3	
Rated withstand voltage	Power frequency (1 min) Impulse ($1.2 \times 50\mu\text{s}$)	Ud (kV) Up (kV)	20 60	28 (42) 75
Rated operating sequence			O-0.3s-CO-15s-CO	
Control voltage	Closing coil Trip coil	(V)	DC 24~30V, DC 48~60V, DC 110V, DC 125V, DC 220V, AC 48V, AC 100~130V, AC 220~250V DC 24~30V, DC 48~60V, DC 110V, DC 125V, DC 220V, AC 48V, AC 100~130V, AC 220~250V	
Auxiliary contact			4a4b, 10a10b	
Rated opening time	(sec)		≤ 0.04	
No-load closing time	(sec)		≤ 0.06	
Type test	Mechanical Electrical Capacitive current switching		M2 E2 (List3) C2	
Lifetime *	Mechanical Electrical	(time)	30000 30000	
Installation	Fixed Draw-out		P type E, F, G type (for MESG), H type (for MCSG)	P type E, F type (for MESG), H type (for MCSG)
Pole centre distance	(mm)	150	150 (210)	150 (210)
Weight	CB (H type) Cradle (H type)	(kg)	100 100 130 170 170 180	115 (120) 115 (120) 130 (140) 170 (200) 170 (200) 180 (200)
Applied standards			IEC 62271-100	115 (120) 115 (120) 130 (140) 170 (200) 170 (200) 180 (200)

* With maintenance

Vacuum Circuit Breakers

Susol VCB Series

VH 06...36

Type		VH-36□25□12/20/32			VH-36□32□12/20/32			VH-36□40□12/20/32														
Rated voltage	Ur (kV)				36																	
Rated normal current	Ir (A)	1250	2000	3150	1250	2000	3150	1250	2000	3150												
Rated frequency	fr (Hz)				50/60																	
Rated short-circuit current	Isc (kA)	25			31.5			40														
Rated short-time withstand current (3 sec)	Ik (kA)	25			31.5			40														
Rated short-circuit breaking capacity	(MVA)	1559			1964			2494														
Rated short-circuit making current	Ip (kA)	65			81.9			104														
Rated breaking time	(cycle)				3																	
Rated withstand voltage	Power frequency (1 min) Impulse ($1.2 \times 50\mu\text{s}$)	Ud (kV)				70 (95)																
		Up (kV)				170																
Rated operating sequence	O-0.3s-CO-3min-CO																					
Control voltage	Closing coil Trip coil	(V)	DC 48V, DC 110V, DC 125V, DC 220V, AC 48V, AC 110V, AC 220V			DC 48V, DC 110V, DC 125V, DC 220V, AC 48V, AC 110V, AC 220V																
Auxiliary contact	4a4b, 10a10b																					
Rated opening time	(sec)	≤ 0.04																				
No-load closing time	(sec)	≤ 0.06																				
Type test	Mechanical Electrical Capacitive current switching	M2 E2 (List3) C2																				
Lifetime *	Mechanical Electrical	(time)	20000			20000																
Installation	Fixed Draw-out	P type H type (for MCSG)																				
Pole centre distance	(mm)	300																				
Weight	CB (H type) Cradle (H type)	(kg)	400	490	400	490	400	490	400	490												
Applied standards	IEC 62271-100																					

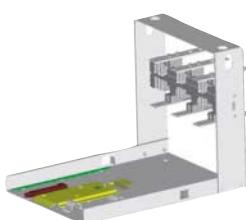
* With maintenance



Accessories

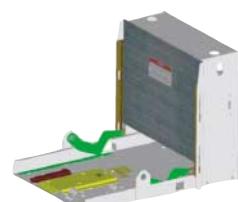
Dimensions	Main	Cradle
	<ul style="list-style-type: none"> • Secondary trip coil • Under voltage trip release • Current trip coil • Position S/W • Keylock • Button padlock • Button cover • Mechanical position indicator 	<ul style="list-style-type: none"> • Mechanical position indicator
	<ul style="list-style-type: none"> • Secondary trip coil • Under voltage trip release • Current trip coil • Position S/W • Keylock • Button padlock • Button cover • Plug interlock • Mechanical position indicator 	<ul style="list-style-type: none"> • Earthing S/W • Earthing with electromechanical interlock • Earthing S/W with position S/W • Earthing S/W with keylock • Door interlock • MOC • TOC • Shutter padlock • Emergency mechanical trip device
	<ul style="list-style-type: none"> • Secondary trip coil • Under voltage trip release • Current trip coil • Position S/W • Keylock • Button padlock • Button cover • Plug interlock • Mechanical position indicator 	<ul style="list-style-type: none"> • Earthing S/W • Earthing with electromechanical interlock • Earthing S/W with position S/W • Earthing S/W with keylock • Door interlock • MOC • TOC • Shutter padlock • Emergency mechanical trip device

Various type of Cradle



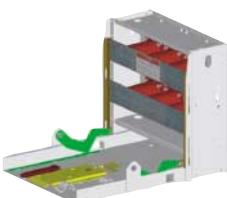
E type

- No Shutter
- For MESG



F type

- Insulation Shutter
- For MESG



G type

- Bushing
- Insulation Shutter
- For MESG



H type

- Bushing
- Metal Insulation Shutter
- Closed Compartment structure
- Earthing Switch & Interlock
- For MCSG
- Door Interlock

Memo

Green Innovators of Innovation



Safety Instructions

- For your safety, please read user's manual thoroughly before operating.
- Contact the nearest authorized service facility for examination, repair, or adjustment.
- Please contact qualified service technician when you need maintenance.
Do not disassemble or repair by yourself!
- Any maintenance and inspection shall be performed by the personnel having expertise concerned.

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