

SACE FORMULA

New low voltage moulded-case
circuit-breakers up to 630 A

New SACE FORMULA. Quality For You.



[FORMULA

How simple and functional can a range of moulded-case circuit-breakers be? It was answering this question, which would appear very elementary, that the idea for a new family of circuit-breakers was conceived at ABB SACE. The result is SACE FORMULA, the perfect synthesis between ABB SACE's great quality and reliability and all-round simplicity: installation, sizing and fitting with accessories.

SACE FORMULA is the expression of all ABB SACE's long experience of several decades in all its effectiveness: SACE FORMULA was born basic, but is able to amaze with its extreme versatility of use.



The main strong points of the new moulded-case circuit-breakers are:

- just a few but essential versions of the circuit-breakers, easy to select and order;
- availability of circuit-breakers of all polarities, dedicated to the various different applications;
- possibility of using the accessories most often requested;
- circuit-breaker depths even further reduced;
- a new installation system making assembly of the circuit-breakers easier;
- suitable for use at 50°C without derating.

SACE FORMULA. Simplicity and Quality in a Single Product.

New SACE FORMULA. Simplicity for you.



The new SACE FORMULA family consists of three new A1, A2 and A3 frames which reach up to 125A, 250A and 630A respectively.

125A



A1/1p



A1/2p



A1/3p



A1/4p

250A



A2/1p



A2/2p



A2/3p



A2/4p

630A



A3/3p



A3/4p

The three frames are available in the fixed version, with front terminals.
The protection trip unit has fixed thermal and magnetic threshold values for putting the circuit-breaker into service more rapidly. This way selection becomes simple and precise.

Just a few sales codes which simplify selection and make ordering easier. Installation is also simplified, and thanks to easy and rapid fixing operations and set-up, the circuit-breaker is ready for use immediately.

SACE FORMULA. The Easy and Precise Choice.

New SACE FORMULA. Great Versatility for You.

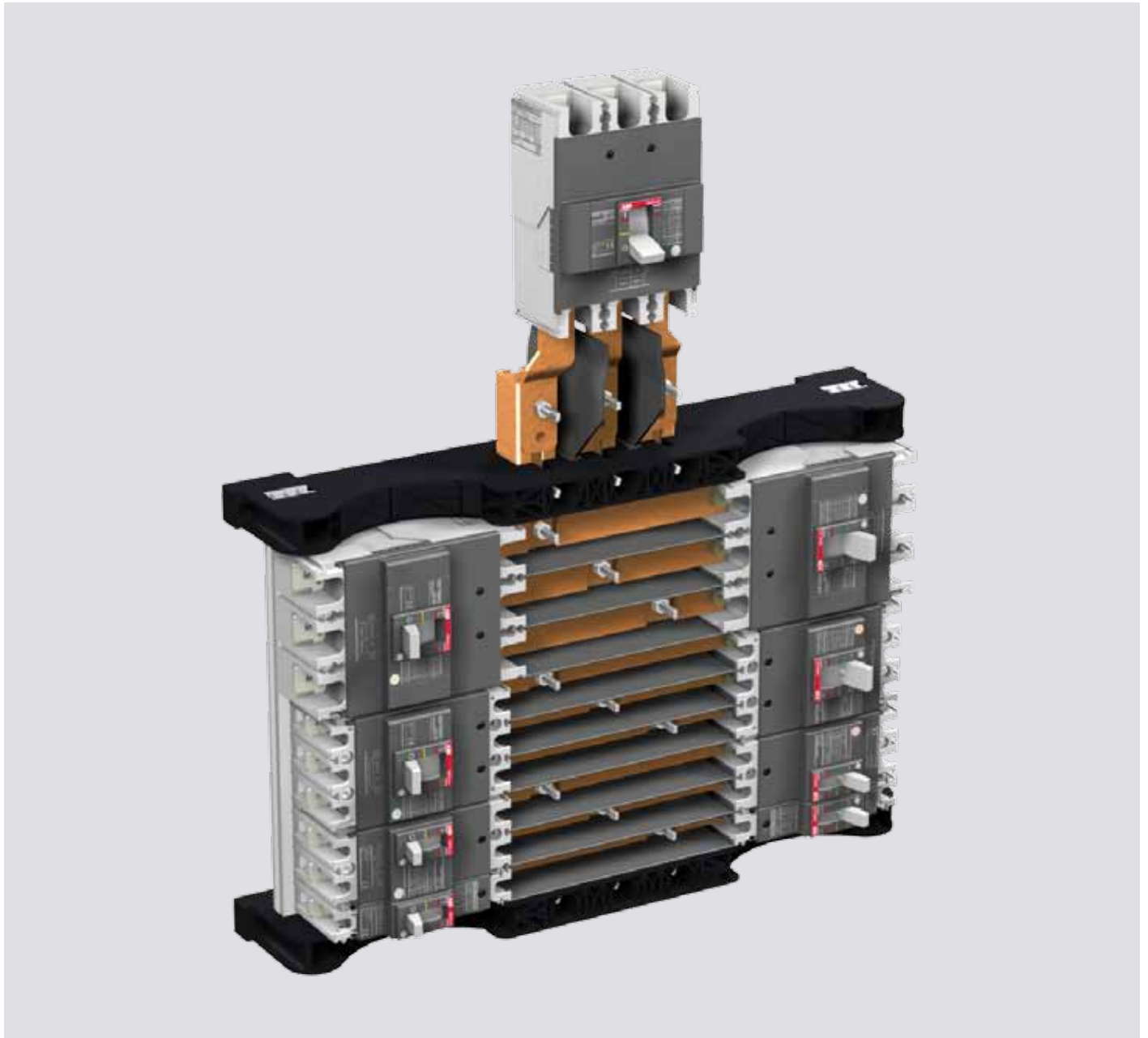


Quality is great versatility. As well as proposing all three frames in the three-pole and four-pole version, for the first time ABB SACE proposes single-pole and two-pole versions up to 250A, opening the door to the most varied application fields.

The single-pole and two-pole circuit-breakers are used in applications with single-phase loads where high currents are required, or in direct current systems where the short-circuit currents to be interrupted are particularly high, for example in the lighting, air conditioning and residential fields.

SACE FORMULA.
Winners in All Applications.

New SACE FORMULA. Easy Installation System for You.



Quality is the rapid installation system. With FORMULA Link, the simplicity of the SACE FORMULA family shows up in all its strength.

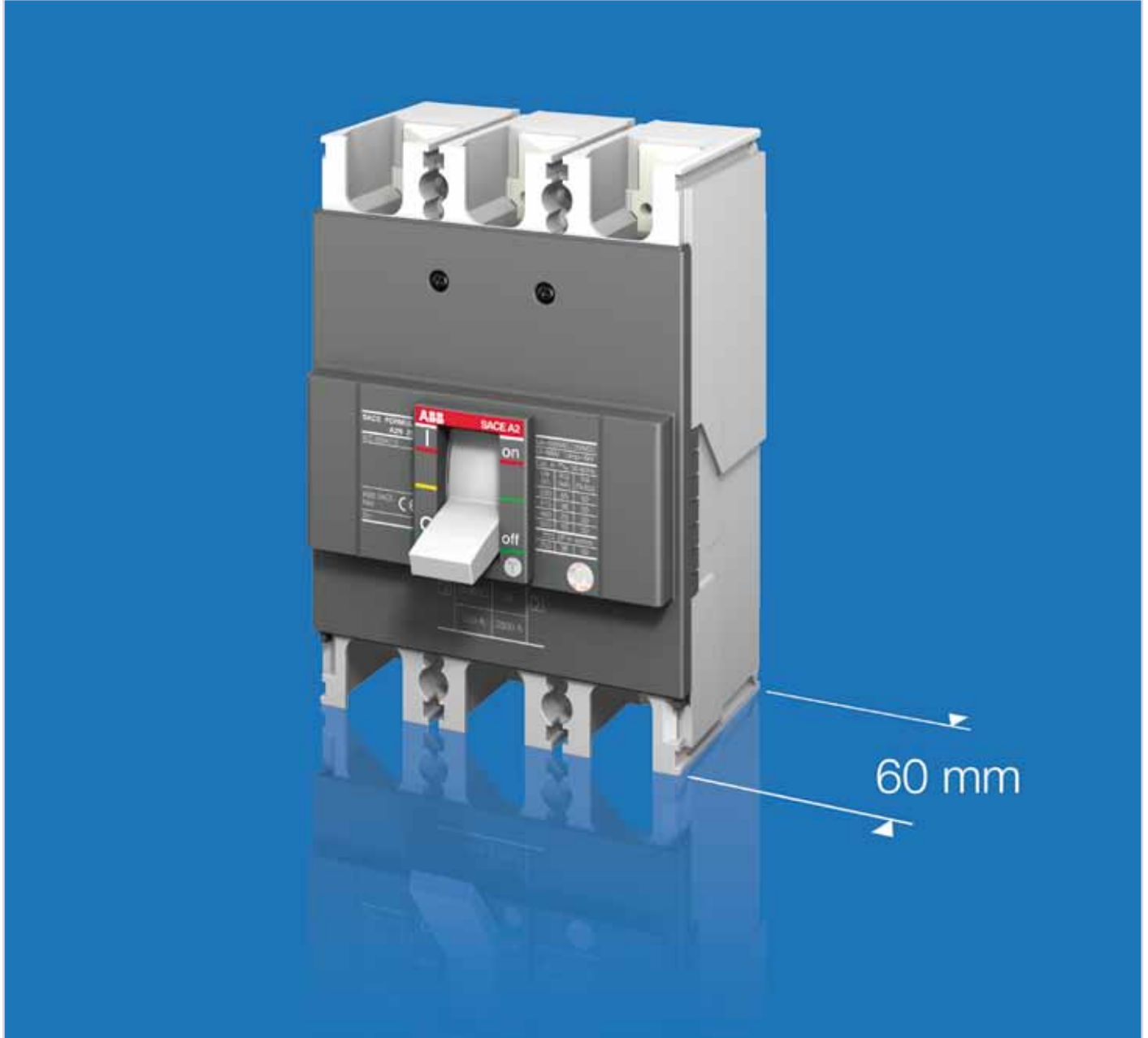
The connection between the supply side circuit-breaker and FORMULA Link is made using special incoming connections kit, whereas the connection between the load side circuit-breakers and FORMULA Link is made using the outgoing connection kits. Installation and putting into service are simple and rapid. Three different frames of FORMULA Link are available:

- 250A FORMULA Link;
- 400A FORMULA Link;
- 630/800A FORMULA Link.

All the versions of the moulded-case circuit-breakers can be installed in the FORMULA Link: SACE FORMULA A1 and A2 in the single-pole, two-pole and three-pole versions, and SACE FORMULA A3 in the three-pole version.

SACE FORMULA.
Small Space, Great Quality.

New SACE FORMULA. Lowest depth for you.

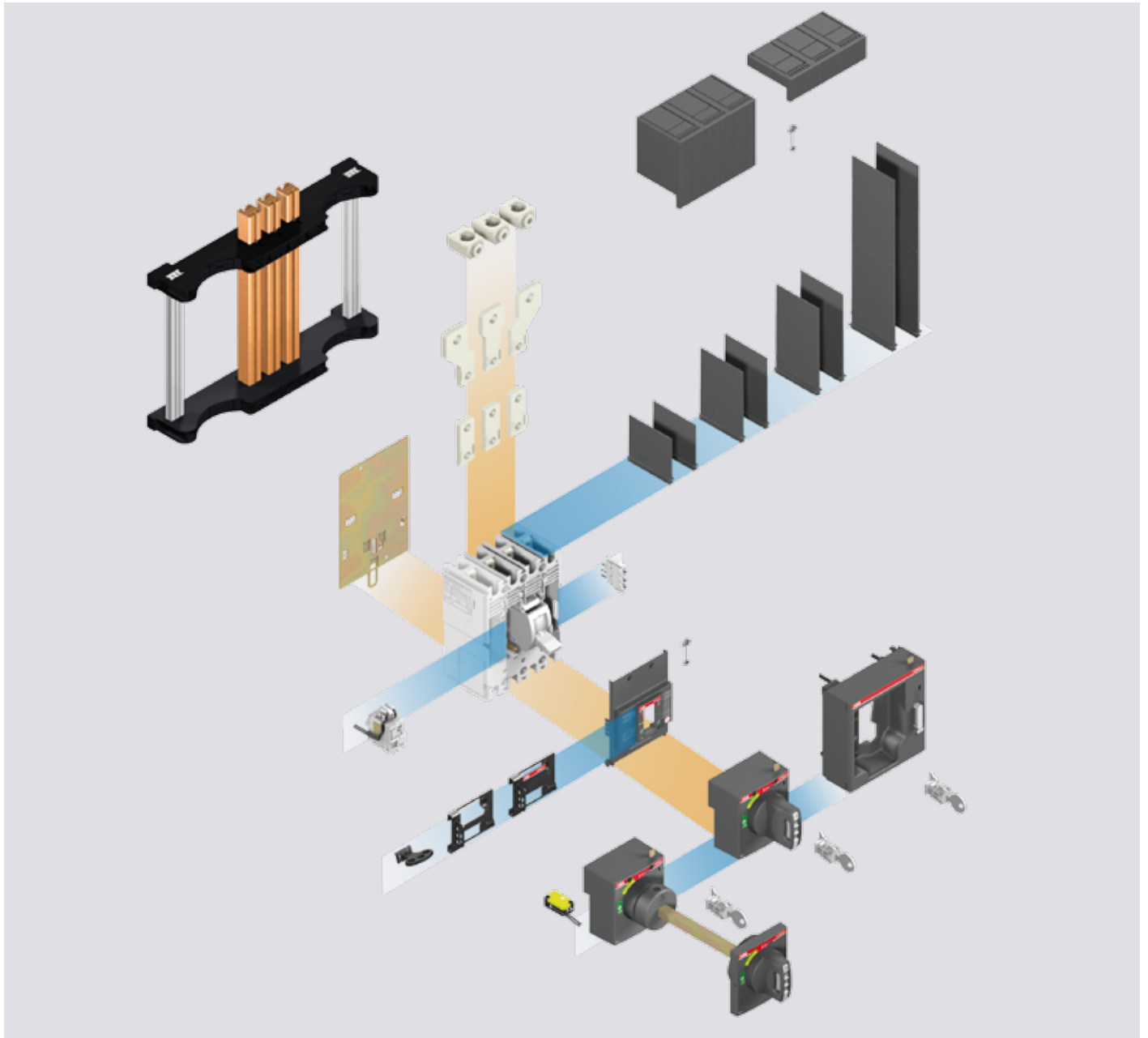


Quality is compact overall dimensions. The SACE FORMULA A1 and A2 depth of just 60 mm is the lowest on the market up to 250A. Simplicity is this, too.

Reducing the dimensions without giving up anything on performances and reliability further helps installation, increasing the work space inside the switchboards. Compactness of dimensions is a great advantage, especially for OEMs, panel builders and installers.

SACE FORMULA.
Small Space, Great Quality.

New SACE FORMULA. Standard Accessory Fitting for You.



The range of standardised accessories up to 250A is simple but complete: from the opening and undervoltage coils to the auxiliary contacts, from the different connection terminals to the rotary handles, down to the different types of key locks and padlocks.

And what to say about the snap-on fixing system for the internal accessories? It is easy and fast to carry out. The accessories are like the circuit-breakers: just a few sales codes which simplify selection and make ordering easier.

SACE FORMULA.
Easy to Select
and even Easier to Order.

New SACE FORMULA. Care of the Environment for You.



Quality is attention to the environment. ABB SACE has always taken the ecological footprint of its products into account during each single stage of their life: from production to disposal.

This is why the new SACE FORMULA moulded-case circuit-breakers have been designed, developed and produced in accordance with the International EPD system (Environmental Product Declaration). A concrete example of

ABB SACE's commitment in this direction is the reduction in the dimensions of the circuit-breakers: apart from limiting the use of raw materials during the initial construction stage, the material which will have to be recycled in future is also considerably less.

SACE FORMULA.
**The Environment First
and Foremost.**

New SACE FORMULA.

Construction characteristics.

		A1						A2						A3				
Frame size	[A]	125						250						400/630				
Rated current, I _n	[A]	15...125						125...250						320...630				
Poles	[Nr]	1, 2, 3, 4						1, 2, 3, 4						3, 4				
Rated service voltage, U _e	(AC) 50-60 Hz	550 (2p-3p-4p); 415 (1p)						550 (2p-3p-4p); 415 (1p)						550				
	(DC)	250 (2p-3p-4p); 125 (1p)						250 (2p-3p-4p); 125 (1p)						250				
Rated insulation voltage, U _i	[V]	690						690						690				
Rated impulse withstand voltage, U _{imp}	[kV]	6						6						6				
Versions		Fixed						Fixed						Fixed				
Performance Level		A		B		C		N		B		C		N		N		S
Poles	[Nr]	3/4	3/4	1	3/4	1	2	3/4	3/4	1	3/4	1	2	3/4	3/4	3/4		
Rated ultimate short-circuit breaking capacity, I_{cu}																		
I _{cu} @ 240 V 50-60 Hz (AC)	[kA]	10	25	18	30	25	50	100	25	18	50	25	50	85	85	100		
I _{cu} @ 380 V 50-60 Hz (AC)	[kA]	10	18	2.5	25	5	36 ⁽⁵⁾	36 ⁽⁵⁾	18	2.5	25	5	36	36	36	50		
I _{cu} @ 415 V 50-60 Hz (AC)	[kA]	10	18	2.5	25	5	36 ⁽⁵⁾	36 ⁽⁵⁾	18	2.5	25	5	36	36	36	50		
I _{cu} @ 440 V 50-60 Hz (AC)	[kA]	8	15	-	20	-	25	25	15	-	20	-	25	25	36	50		
I _{cu} @ 480 V 50-60 Hz (AC)	[kA]	7.5	10	-	15	-	18	18	15	-	18	-	18	25	25	35		
I _{cu} @ 500 V 50-60 Hz (AC)	[kA]	5	5	-	8	-	10	10	5	-	8	-	10	10	20	25		
I _{cu} @ 550 V 50-60 Hz (AC)	[kA]	5	5	-	8	-	10	10	5	-	8	-	10	10	15	20		
I _{cu} @ 125 V (DC) 1 pole	[kA]	-	-	5	-	10	-	-	-	5	-	10	-	-	-	-		
I _{cu} @ 250 V (DC) 2 poles in series	[kA]	5	5	-	10	-	10	10	18	-	25	-	10	36	36	50		
Rated short-circuit service breaking capacity, I_{cs}																		
I _{cs} @ 240 V 50-60 Hz (AC)	[kA]	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%		
I _{cs} @ 380 V 50-60 Hz (AC)	[kA]	50%	50%	50%	50%	50%	50%	50%	50%	100%	50%	50%	50%	50%	50%	50%		
I _{cs} @ 415 V 50-60 Hz (AC)	[kA]	50%	25% ⁽¹⁾	50%	25% ⁽²⁾	25%	25%	25%	50%	100%	50%	50%	50%	50%	50%	50%		
I _{cs} @ 440 V 50-60 Hz (AC)	[kA]	50%	25% ⁽¹⁾	-	25%	-	25%	25%	50%	-	50%	-	50%	50%	50%	50%		
I _{cs} @ 480 V 50-60 Hz (AC)	[kA]	50%	50%	-	25% ⁽¹⁾	-	25%	25% ⁽¹⁾	50%	-	50%	-	50%	50%	50%	50%		
I _{cs} @ 500 V 50-60 Hz (AC)	[kA]	50%	50%	-	25% ⁽³⁾	-	25%	25%	50%	-	50%	-	50%	50%	50%	50%		
I _{cs} @ 550 V 50-60 Hz (AC)	[kA]	50%	50%	-	25% ⁽³⁾	-	25%	25%	50%	-	50%	-	50%	50%	50%	50%		
I _{cs} @ 250 V (DC) 2 poles in series	[kA]	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%		
Rated short-circuit making capacity, I_{cm}																		
I _{cm} @ 240 V 50-60 Hz (AC)	[kA]	52.5	52.5	36	63	52.5	105	220	52.5	36	105	52.5	105	187	187	220		
I _{cm} @ 380 V 50-60 Hz (AC)	[kA]	17	36	3.8	52.5	7.5	75.6	75.6	36	3.8	52.5	7.5	75.6	75.6	75.6	105		
I _{cm} @ 415 V 50-60 Hz (AC)	[kA]	17	36	3.8	52.5	7.5	63	63	36	3.8	52.5	7.5	75.6	75.6	75.6	105		
I _{cm} @ 440 V 50-60 Hz (AC)	[kA]	13.6	30	-	40	-	52.5	52.5	30	-	40	-	52.5	52.5	75.6	105		
I _{cm} @ 480 V 50-60 Hz (AC)	[kA]	12.8	17	-	30	-	36	17	30	-	36	-	36	52.5	52.5	73.5		
I _{cm} @ 500 V 50-60 Hz (AC)	[kA]	7.5	7.5	-	13.6	-	17	17	7.5	-	13.6	-	17	17	40	52.5		
I _{cm} @ 550 V 50-60 Hz (AC)	[kA]	7.5	7.5	-	13.6	-	17	17	7.5	-	13.6	-	17	17	30	40		
Utilization category (IEC 60947-2)		A						A						A				
Hold 100% I _n at 50°C	[A]	15...100						125...250						300-400 ⁽²⁾				
Reference Standard		IEC 60947-2						IEC 60947-2						IEC 60947-2				
Isolation behaviour		■						■						■				
Fixing onto DIN rail		DIN EN 50022						DIN EN 50022						-				
Mechanical life	[No. operations]	8500						10000						5000				
Electrical life @ 415 V (AC)	[No. operations]	1500						4000						2000				
Total opening time	Shunt opening release (SOR)	15						15						15				
	Undervoltage release (UVR)	15						15						≤ 25				
Dimensions (Width x Depth x Height)	1 pole	25.4x60x130						35x60x150						-				
	2 poles	50.8x60x130						70x60x150						-				
	3 poles	76.2x60x130						105x60x150						139.5x 103.5x 205				
	4 poles	101.6x60x130						140x60x150						186x 103.5x 205				
Weight	1 pole	0.245						0.370						-				
	2 poles	0.470						0.730						-				
	3 poles	0.700						1.100						3.25				
	4 poles	0.925						1.450						4.15				
Trip Unit																		
Thermomagnetic TMF		■						■						■ (up to 500A)				
Electronic ELT LI		■						■						■ (up to 630A)				

⁽¹⁾ 5kA; ⁽²⁾ 9kA; ⁽³⁾ 2.5kA; ⁽⁴⁾ Special version; ⁽⁵⁾ I_n=15A, I_{cu}=30kA

Ordering codes for circuit-breakers (1SDA...R1)

Thermomagnetic trip unit - TMF Icu (415 V) - Hold 100% In at 50°C



		A1 125A - Fixed (F) 1pole - Front terminals (F)		A1 125A - Fixed (F) 2poles - Front terminals (F)	
In	I3	C (2,5kA)	N (5kA)	N (36kA)	
15	400	066485		068789 ⁽²⁾	
16	400	068745		068790	
20	400	066486	066686	066497	
25	400	066487	066687	066498	
30	400	066488	066688	066499	
32	400	068754	068755	068756	
40	400	066489	066689	066500	
50	500	066490	066690	066501	
60	600	066491	066691	066502	
63	630	068765	068766	068767	
70	700	066492	066692	066503	
80	800	066493	066693	066503	
90	900	066494	066694	066505	
100	1000	066495	066695	066506	
125	1250	066496 ⁽¹⁾	066696 ⁽¹⁾	066507 ⁽¹⁾	

⁽¹⁾ Derating for use at 50°C, ⁽²⁾ 30kA

Thermomagnetic trip unit - TMF Icu (415 V) - Hold 100% In at 50°C



		A1 125A - Fixed (F) 3poles - Front terminals (F)				A1 125A - Fixed (F) 4poles - Front terminals (F)			
In	I3	A (10kA)	B (18kA)	C (25kA)	N (36kA)	A (10kA)	B (18kA)	C (25kA)	N (36kA)
15	400	066510	066697	066709	066721 ⁽²⁾	066524	066733	066745	066757 ⁽²⁾
16	400	068746	068747	068748	068749	068750	068751	068752	068753
20	400	066511	066698	066710	066722	066525	066734	066746	066758
25	400	066512	066699	066711	066723	066526	066735	066747	066759
30	400	066513	066700	066712	066724	066527	066736	066748	066760
32	400	068757	068758	068759	068760	068761	068762	068763	068764
40	400	066514	066701	066713	066725	066528	066737	066749	066761
50	500	066515	066702	066714	066726	066529	066738	066750	066762
60	600	066516	066703	066715	066727	066530	066739	066751	066763
63	630	068768	068769	068770	068771	068772	068773	068774	068775
70	700	066517	066704	066716	066728	066531	066740	066752	066764
80	800	066518	066705	066717	066729	066532	066741	066753	066765
90	900	066519	066706	066718	066730	066533	066742	066754	066766
100	1000	066520	066707	066719	066731	066534	066743	066755	066767
125	1250	066521 ⁽¹⁾	066708 ⁽¹⁾	066720 ⁽¹⁾	066732 ⁽¹⁾	066535 ⁽¹⁾	066744 ⁽¹⁾	066756 ⁽¹⁾	066768 ⁽¹⁾

⁽¹⁾ Derating for use at 50°C, ⁽²⁾ 30kA

Thermomagnetic trip unit - TMF Icu (415 V) - Hold 100% In at 50°C



		A2 250A - Fixed (F) 1pole - Front terminals (F)		A2 250A - Fixed (F) 2poles - Front terminals (F)	
In	I3	C (2,5kA)	N (5kA)	N (36kA)	
125	1250	066536	066769	066542	
150	1500	068776	068777	068778	
160	1600	066537	066770	066543	
175	1750	066538	066771	066544	
200	2000	066539	066772	066545	
225	2250	066540	066773	066546	
250	2500	066541	066774	066547	

Thermomagnetic trip unit - TMF Icu (415 V) - Hold 100% In at 50°C



		A2 250A - Fixed (F) 3poles - Front terminals (F)			A2 250A - Fixed (F) 4poles - Front terminals (F)		
In	I3	B (18kA)	C (25kA)	N (36kA)	B (18kA)	C (25kA)	N (36kA)
125	1250	066548	066775	066781	066554	066787	066793
150	1500	068779	068780	068781	068782	068783	068784
160	1600	066549	066776	066782	066555	066788	066794
175	1750	066550	066777	066783	066556	066789	066795
200	2000	066551	066778	066784	066557	066790	066796
225	2250	066552	066779	066785	066558	066791	066797
250	2500	066553	066780	066786	066559	066792	066798

Thermomagnetic trip unit - TMF Icu (415 V)



		A3 400A - Fixed (F) 3poles - Front terminals (F)		A3 400A - Fixed (F) 4poles - Front terminals (F)	
In	I3	N (36kA)	S (50kA)	N (36kA)	S (50kA)
320	3200	066560	066562	066568	066570
400	4000	066561	066563	066569	066571

Thermomagnetic trip unit - TMF Icu (415 V)

		A3 630A - Fixed (F) 3poles - Front terminals (F)		A3 630A - Fixed (F) 4poles - Front terminals (F)	
In	I3	N (36kA)	S (50kA)	N (36kA)	S (50kA)
500	5000	066564	066565	066572	066573

Electronic trip unit - ELT LI Icu (415 V)

		A3 630A - Fixed (F) 3poles - Front terminals (F)		A3 630A - Fisso (F) 4poles - Front terminals (F)	
In	I3	N (36kA)	S (50kA)	N (36kA)	S (50kA)
630	6000	066566	066567	066574	066575

Ordering codes A3 special version 50°C (1SDA...R1)

Thermomagnetic trip unit - TMF Icu (415 V) - Hold 100% In at 50°C

		A3 400A - Fixed (F) 3poles - Front terminals (F)	
In	I3	N (36kA)	S (50kA)
300	3000	068809	068960
400	4000	068810	068961

Terminals						
Front terminals - F						
	1 piece	2 pieces	3 pieces	4 pieces	6 pieces	8 pieces
A1	066200	066201	066202	066203	066204	066205
A2	066206	066207	066208	066209	066210	066211
A3			055012	055013	055010	055011
Front Extended Terminals - EF						
	1 piece	2 pieces	3 pieces	4 pieces	6 pieces	8 pieces
A1	066212	066213	066214	066215	066216	066217
A2	066218	066219	066220	066221	066222	066223
A3			055036	055037	055034	055035
Front Extended Spread Terminal - ES						
		2 pieces	3 pieces	4 pieces⁽¹⁾	6 pieces	8 pieces
A1		066224	066225	066226	066227	066228
A2		066229	066230	066231	066232	066233
A3			055040	055041	055038	055039
Front Terminals for copper aluminium cables - FCCuAl						
	1 piece	2 pieces	3 pieces	4 pieces	6 pieces	8 pieces
A1 1 x 1...25 mm ²	066234	066235	066236	066237	066238	066239
A1 1 x 25...50 mm ²	066240	066241	066242	066243	066244	066245
A2 1 x 50...150 mm ²	066246	066247	066248	066249	066250	066251
A2 1 x 125...185 mm ²	066252	066253	066254	066255	066256	066257
A3 1 x 185...300 mm ²			055024	055025	055022	055023
A3 2 x 95...240 mm ²			055032	055033	055030	055031

⁽¹⁾ 4 poles circuit-breakers only.

Terminal covers						
	A1		A2		A3	
	3 poles	4 poles	3 poles	4 poles	3 poles	4 poles
HTC 60mm			066186	066189	054960	054961
HTC 50mm	066190	066185				
LTC 7.5 mm	066181	066182	066183	066184		
LTC 2 mm					054968	054969
Sealable screws for terminal cover	066673		066673		051504	
Sealable screws for front	068214		068214			

Phase separators								
	A1			A2			A3	
	2 pieces	4 pieces	6 pieces	2 pieces	4 pieces	6 pieces	4 pieces	6 pieces
Separators 50 mm	066191	066194	066197					
Separators 80 mm				066192	066195	066198		
Separators 100 mm	066193	066196	066199	066193	066196	066199	054970	054971
Separators 200 mm							054972	054973

Rotary Handle		
	A1-A2	A3
RHD - Operating mechanism direct handle	066154	066155
RHD EM - Operating mechanism emergency direct handle	066156	066157
RHE - Operating mechanism transmitted handle	066158	066159
RHE EM - Operating mechanism emergency transmitted handle	066160	066161
RHE_S - Rod transmitted handle	066164	066164
RHE_B - Base transmitted handle	066162	066163
RHE_H - Transmitted handle	066165	066167
RHE_H_EM - Emergency transmitted handle	066166	066168

Front for operating mechanism	
	A3
FLD - Front for locks	066179

Padlocks for lever operating mechanism of the circuit-breaker	
	A1-A2
PLL - Padlocks removable in open position	066259
PLL - Padlocks fixed in open position	066171
PLL - Padlocks fixed in open and closed position	066172

Key lock on Handle and front for lever operating mechanism		
	A1-A2	A3
RHL-D Lock in open position, different keys	066173	054939
RHL-S Lock in open position, same keys type A	066174	054940
RHL-S Lock in open position, same keys type B	066175	054941
RHL-S Lock in open position, same keys type C	066176	054942
RHL-S Lock in open position, same keys type D	066177	054943
RHL-D Lock in open/closed position different keys	066178	

AUE -C - Electrical characteristics		
	A1-A2	A3
AUE-C	066153	054925

Shunt opening release - SOR-C		
Cabled version		
	A1-A2	A3
SOR-C 12 VDC	066133	054869
SOR-C 24...30 VAC/DC	066134	054870
SOR-C 48...60 VAC/DC	066135	054871
SOR-C 110...127 VAC - 110...125 VDC	066136	054872
SOR-C 220...240 VAC - 220...250 VDC	066137	054873
SOR-C 380...440 VAC	066138	054874
SOR-C 480...525 VAC	066141	054875

FORMULA Link incoming kit connections	
	1SDA...R1
Incoming kit connections A2	066822
Incoming kit connections A3	066823
Incoming kit connections T6	066824
Incoming kit connections FORMULA Link 630/800 for lugs 630/800A	068744
Incoming kit connections FORMULA Link 250 for lugs 250A	068839
Incoming kit connections FORMULA Link 400 for lugs 400A	068840

Undervoltage release - UVR-C		
Cabled version		
	A1-A2	A3
UVR-C 24...30 VAC/DC	066143	054887
UVR-C 48 VAC/DC	066144	054888
UVR-C 60 VAC/DC	067114	054889
UVR-C 110...127 VAC - 110...125 VDC	066145	054890
UVR-C 220...240 VAC - 220...250 VDC	066146	054891
UVR-C 380...440 VAC	066147	054892
UVR-C 480...525 VAC	066148	054893

FORMULA Link outgoing kit connections	
	1SDA...R1
Outgoing kit connections A1	066841
Outgoing kit connections A2	066842

Auxiliary contacts - AUX-C					
Cabled version (numbered cables)					
	A1		A2		A3
	2 poles	3-4 poles	2 poles	3-4 poles	3-4 poles
AUX-C 1Q + 1SY 250 VAC/DC	066151	066149	066151	066149	054910
AUX-C 2Q + 1SY 250 VAC/DC		066150	066152	066150	
AUX-C 3Q + 1SY 250 VAC/DC					054911
AUX-C (spare parts)	066258	066258	066258	066258	

FORMULA Link frame (ready to be assembled)					
	F1	F2	F3	F4	F5
FORMULA Link 250A for A1	066825	066827	066828	066829	066830
FORMULA Link 400A for A1-A2	066831	066832	066833	066834	066835
FORMULA Link 630/800A for A1-A2	066836	066837	066838	066839	066840

Bracket for fixing on DIN rail	
	A1-A2
Bracket for 1p, 2p, 3p and 4p	066180

FORMULA Link spare parts	
	1SDA...R1
Aluminium fixing bar L=1.2m	066847
Busbar holder	066843
Busbar 250A L=1.2m	066844
Busbar 400A L=1.2m	066845
Busbar 630/800A L=1.2m	066846
Hammer Head Screws (15 pieces)	066848
Protection for compartment door (2 pieces) L=465mm	067538
Phase separators kit (2 pieces)	067539
Kit protection A1 (15 pieces)	068740
Kit protection A2 (15 pieces)	068741

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