

**Technical data MCB's**

Series				E90N	E90E	E90
Standards				EN/IEC 60898	EN/IEC 60898	EN/IEC 60898
Tripping characteristics				B, C	B, C	B, C, D
Nominal current				A	2-40	B 6-63, C/D 0.5-63
Calibration temperature				°C	30	30
Number of poles				1/2/3/4	1/2/3/4	1/2/3/4, 1+N, 3+N
Neutral pole protected				-	-	yes
Nominal voltage Un	AC	1P	V	240/415	240/415	240/415
		1P+N	V	-	240	240
		2P	V	415	415	415
	DC	3P/3P+N/4P	V	415	415	415
		1P <sup>(1)</sup>	VDC	-	-	48
		2P (in series) <sup>(1)</sup>	VDC	-	-	110
Frequency			Hz	50/60	50/60	50/60
			Hz	-	-	DC: magn.trip +40%
			Hz	400: magn.trip +50%	400: magn.trip +50%	400: magn.trip +50%
Maximum service voltage U <sub>max</sub> between two wires				V	250/440	250/440; 53/120 ==
Minimum service voltage U <sub>min</sub>				V	12	12; 12 ==
Selectivity class (IEC 60898)					3	3
Isolator application IEC 60947-2					yes	yes
Rated insulation voltage	Pollution degree 2		V	500	500	500
	Pollution degree 3		V	440	440	440
Impulse withstand test voltage				kV	6	6
Insulation resistance				MΩ	10.000	10.000
Dielectric rigidity				kV	2.5	2.5
Vibrations resistance (in x, y, z direction) (IEC 77/16.3)					3g	3g
Endurance	electrical at U <sub>n</sub> , I <sub>n</sub>		# op.	10.000	10.000	10.000
	mechanical		# op.	20.000	20.000	20.000
Utilisation category (IEC 60947-2)					A	A
Mounting position (for all devices): any except upside down					any	any
Incoming top or bottom					yes	yes
Protection degree (outside / inside enclosure with door)					IP20/IP40	IP20/IP40
Self-extinguish degree (according to UL94)					V2	V2
Tropicalisation (according to EN/IEC 60068-2 / DIN 40046)				°C/RH	+55°C/95% RH	+55°C/95% RH
Operating temperature				°C	-25/+55	-25/+55
Storage temperature				°C	-55/+55	-55/+55
Terminal capacity	Rigid cable min/max (top)		mm <sup>2</sup>	1/35	1/35	1/35
	Flexible cable min*/max (top)		mm <sup>2</sup>	0.75/25	0.75/25	0.75/35
	Rigid cable min/max (bottom)		mm <sup>2</sup>	1/35	1/35	1/35
	Flexible cable min*/max (bottom)		mm <sup>2</sup>	0.75/25	0.75/25	0.75/35
	(*Flexible cable 0.75/1/1.5 mm <sup>2</sup> with cable lug)					
	Torque		Nm	4.5	4.5	4.5
Add-on devices (side add-on)	Auxiliary contacts			yes	yes	yes
	Remote release NF			yes	yes	yes
	Undervoltage trip NUVR			yes	yes	yes
	Remote drive NFA			yes	yes	yes
	Panel board switch NLVS			yes	yes	yes
Busbar systems	Pin	(top/bottom)		yes/yes	yes/yes	yes
	Fork	(top/bottom)		-/yes	-/yes	-/yes
Accessories					yes	yes
Width per mod.				(mm)	18	18
Weight per mod.				(gr)	120	125
Package				# mod.	12	12
Approvals					VDE	VDE
CE-marking					yes	yes
Page					A.6	A.10

(1) Preferred values of rated control supply voltage (IEC 60947-2): 24V, 48V, 110V, 125V, 220V, 250V

E90S	E90X	E90S UC	E880/E880-S	S90
EN/IEC 60898	EN/IEC 60898	(2)	EN/IEC 60947-2	EN/IEC 60898, E DIN VDE 0645
B, C, D	3-5In/5-10In/10-20In	B, C	3-5In/5-10In/10-20In	F, Cs, E
B 6-63, C/D 0.5-63	B 6-63, C/D 0.5-63	B 6-63, C 0.5-63	80 upto 125	F, E 10/100 and Cs 20/100
30	40	30	40	E 20°C, F and Cs 30°C
1/2/3/4, 1+N, 3+N	1/2/3/4	1/2	1/2/3/4	1, 3x1, 1+N, 3, 3+N
yes	-	-	-	no
240/415	240/415	240/415	240/415	230
240	-	-	-	230
415	415	415	415	-
415	415	-	415	400
48	48	220	48	-
110	110	440	110	-
50/60	50/60	50/60 and DC	50/60	50/60
DC: magn.trip +40%	DC: magn.trip +40%	DC: magn.trip +40%	DC: magn.trip +40%	-
400: magn.trip +50%	400: magn.trip +50%	400: magn.trip +50%	400: magn.trip +50%	-
250/440; 53/120 ==	250/440; 53/120 ==	250/440; 250/440 ==	250/440; 53/120 ==	250/440 ~
12; 12 ==	12; 12 ==	12; 12 ==	12; 12 ==	207 ~
3	3	3	-	-
yes	yes	yes	yes	-
500	500	500	500	-
440	440	440	440	-
6	6	6	6	6
10.000	10.000	10.000	10.000	10.000
2.5	2.5	2.5	2.5	-
3g	3g	5g	3g	3g
10.000	10.000	1000	4000	4.000
20.000	20.000	20.000	10.000	4.000
A	A	A	A	B
any	any	any	any	any
yes	yes	follow polarity	yes	bottom only
IP20/IP40	IP20/IP40	IP20/IP40	IP20/IP40	IP20/IP40
V2	V2	V2	V2	V0
+55°C/95%RH	+55°C/95%RH	+55°C/95% RH	+55°C/95% RH	-
-25/+55	-25/+55	-25/+55	-25/+55	-25/+55
-55/+55	-55/+55	-55/+55	-55/+55	-55/+55
1/35	1/35	1/35	70	1.5/35
0.75/35	0.75/35	0.75/25	-	-
1/35	1/35	1/35	70	2.5/50
0.75/35	0.75/35	0.75/25	-	-
4.5	4.5	4.5	5	4
yes	yes	yes	yes	yes
yes	yes	yes	-	-
yes	yes	yes	yes	-
yes	yes	yes	-	-
yes	yes	yes	-	-
yes/yes	yes/yes	yes/yes	-	-
-/yes	-/yes	-/yes	-	-
yes	yes	yes	yes	-
18	18	18	27	27
120	120	125	210	350
12	12	12	8	8
VDE	-	-	-	VDE for E-char.
yes	yes	yes	yes	yes
A.12	A.14	A.16	A.18/A.20	A.22

(2) EN/IEC 60898-2 and VDE0641-2/3

### Short-circuit capacity of MCB's

Series			E90N	E90E	E90	
<b>Short-circuit capacity AC</b> (kA)						
IEC 60898	<b>Icn</b>	1P	230/400V	3	4.5	6
		1P+N	230V	3	4.5	6
		2P	230/400V	3	4.5	6
		3P/3P+N/4P	230/400V	3	4.5	6
<b>Ics (service)</b>			100% Icn	100% Icn	100% Icn	
IEC 60947-2	<b>Icu (ultimate) 1P</b>	127V	-	-	20	
		240V	5	6	10	
		415V	3	3	3	
		1P+N/2P	127V	-	15	30
			240V	10	10	20
		2P	415V	5	6	10
			240V	10	10	20
		3P, 4P	415V	5	6	10
			440V	-	-	6
		<b>Ics (service)</b>			75% Icu	75% Icu
NEMA AB1 (120/240V)			10	14	20	
<b>Short-circuit capacity DC</b> (kA)						
IEC 60947-2	<b>Icu (ultimate) 1P</b>	≤ 60V $\overline{=}$	-	-	20	
		≤ 220V $\overline{=}$	-	-	-	
		2P	≤ 125V $\overline{=}$	-	-	25
			≤ 440V $\overline{=}$	-	-	-
<b>Ics (service)</b>			-	-	100% Icu	
Page			A.6	A.8	A.10	

E90S	E90X	E90SUC	E880	E880S	S90
10	-	6 (220VDC) <sup>(2)</sup>	-	-	25
10	-	-	-	-	25
10	-	6 (440VDC) <sup>(3)</sup>	-	-	25
10	-	-	-	-	25
75% Icn	-	100% Icn	-	-	-
30	50	-	-	-	-
15	50/25/20/15 <sup>(1)</sup>	6 <sup>(5)</sup>	6	10; D7.5	-
4	-	-	6	4.5	-
40	-	-	10	-	-
30	50/50/40/30 <sup>(1)</sup>	-	10	B/C 15	-
15	50/25/20/15 <sup>(1)</sup>	6 <sup>(5)</sup>	6	B/C 10; D7.5	-
30	50/50/40/30 <sup>(1)</sup>	-	10	B/C 15	-
15	50/25/20/15 <sup>(1)</sup>	-	6	B/C 10; D7.5	-
10	50/20/15/10 <sup>(1)</sup>	-	-	-	-
50% Icu	50% Icu	-	100% Icu	100% Icu	-
30	-	-	-	-	-
25	25	-	-	-	-
-	-	-	-	-	-
30	30	10 <sup>(4)</sup>	-	-	-
-	-	-	-	-	-
100% Icu	100% Icu	10 <sup>(4)</sup>	100% Icu	100% Icu	-
A.10	A.12	A.16	A.18	A.20	A.22

(1) 0.5-4A/6-25A/32-40A/50-63A

(2) 10 (125VDC)

(3) 10 (250VDC)

(4) T=4ms

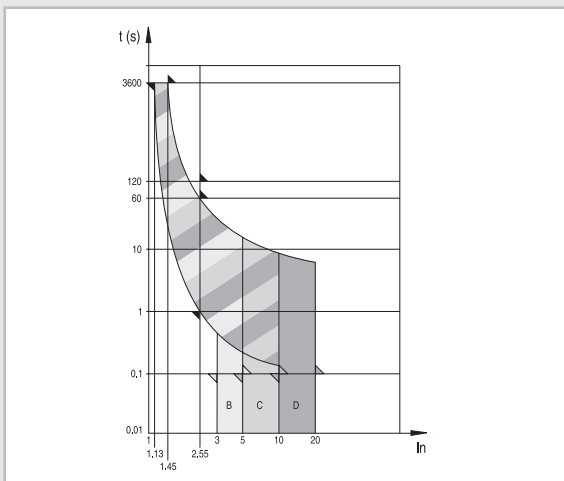
(5) 4.5kA for 50A &amp; 63A

## EN/IEC 60898 standard

Circuit breakers are intended for the protection against overcurrents of wiring installations in buildings and similar applications:

**They are designed for use by un instructed people and for not being maintained.**

### Tripping characteristic curves



## Magnetic release

An electromagnet with plunger ensures instantaneous tripping in case of short circuit. The IEC 898 distinguishes three different types, following the current for instantaneous release: type B, C, D.

	Test current	Tripping time	Applications
<b>B</b>	3 In	0.1 < t < 45s (In ≤ 32A)	Only for resistive loads such as: - electrical heating - water heater - stoves
	5 In	0.1 < t < 90s (In ≤ 32A) t < 0.1s	
<b>C</b>	5 In	0.1 < t < 15s (In ≤ 32A)	Usual loads such as: - lighting - socket outlets - small motors
	10 In	0.1 < t < 30s (In ≤ 32A) t < 0.1s	
<b>D</b>	10 In	0.1 < t < 4s <sup>(1)</sup> (In ≤ 32A)	Control and protection of circuits having important transient inrush currents (large motors)
	20 In	0.1 < t < 8s (In ≤ 32A) t < 0.1s	

<sup>(1)</sup>if In ≤ 10A, t < 8s

## Thermal release

The release is initiated by a bimetal strip in case of overload.

The standard defines the range of release for specific overload values.

Reference ambient temperature is 30°C

Test current	Tripping time
1.13 In	t ≥ 1h (In ≤ 63A) t ≥ 2h (In > 63A)
1.45 In	t < 1h (In ≤ 63A) t < 2h (In > 63A)
2.55 In	1s < t < 60s (In ≤ 32A) 1s < t < 120s (In > 32A)

## EN/IEC 60947-2 standard

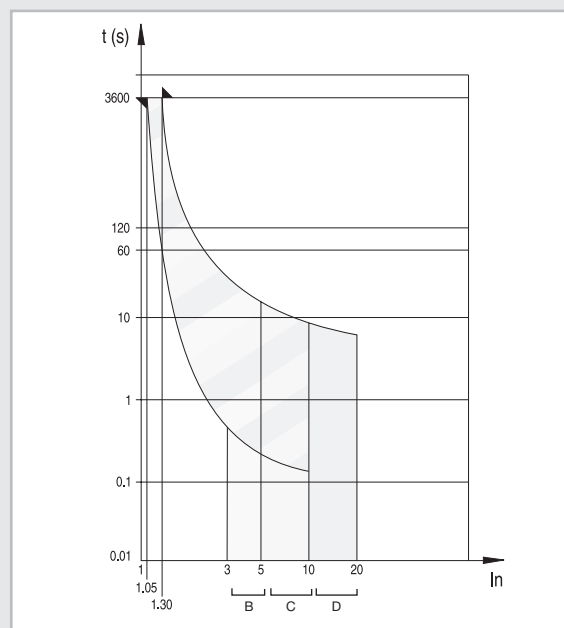
### Low voltage switchgear and controlgear

#### Part 2: circuit breakers

This standard applies to circuit breakers, the main contacts of which are intended to be connected to circuits, the rated voltage of which does not exceed 1000V ac or 1500V dc.

**Circuit breakers for use in industrial environments** (for use by instructed people).

### Tripping characteristic curves



## Magnetic release

An electromagnet with plunger ensures instantaneous tripping in case of short circuit.

The standard leaves the calibration of magnetic release to manufacturer's decision.

AEG Low Voltage offers instantaneous tripping ranges

- release B: 4 In
- release C: 8.5 In (7.5 In for 63A)
- release D: 14 In

## Thermal release

The release is initiated by a bimetal strip in case of overload.

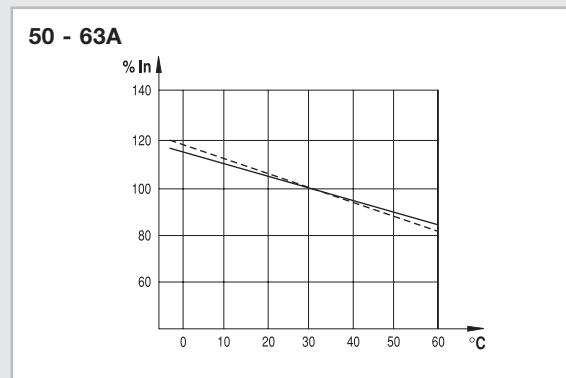
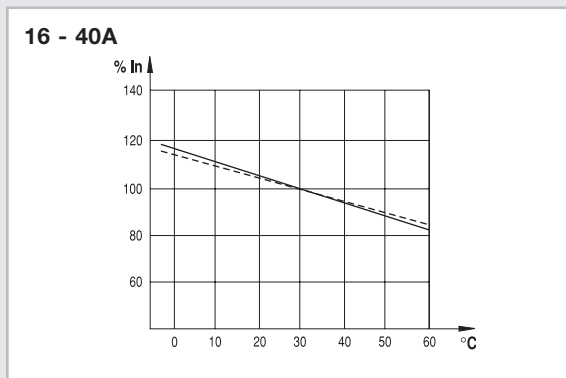
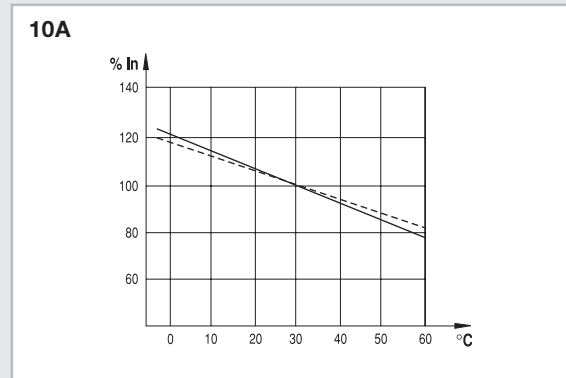
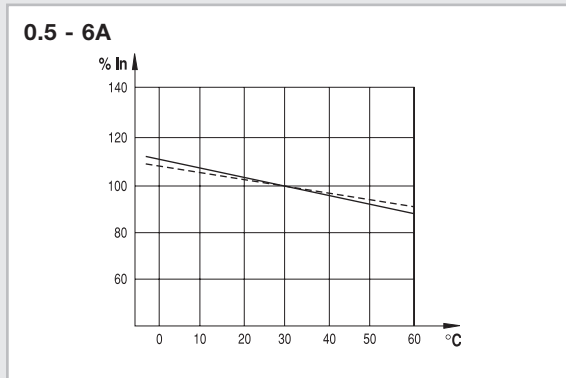
The standard defines the range of release for two special overload values. Reference ambient temperature is 40°C for E90X and 50°C for E90/E90S.

Test current	Tripping time
1.05 In	t ≥ 1h (In ≤ 63A) t ≥ 2h (In > 63A)
1.30 In	t < 1h (In ≤ 63A) t < 2h (In > 63A)

## ***Influence of ambient temperature***

The thermal calibration of the MCB's was carried out at an ambient temperature of 30°C. Ambient temperatures different from 30°C influence the bimetal and this results in earlier or later thermal tripping (see curve).

## ***Voltage drop and energy loss***



———— : 1P (single pole)  
 - - - - : mP (multipole)

In (A)	Voltage drop (V)	Energy loss (W)	Inner resistant (mΩ)
0.5	2.230	1.115	4458.0
1	1.270	1.272	1272.0
2	0.620	1.240	310.0
3	0.520	1.557	173.0
4	0.370	1.488	93.0
6	0.260	1.570	43.6
8	0.160	1.242	19.4
10	0.160	1.560	15.6
13	0.155	2.011	11.9
16	0.162	2.586	10.1
20	0.138	2.760	6.9
25	0.128	3.188	5.1
32	0.096	3.072	3.0
40	0.100	4.000	2.5
50	0.090	4.500	1.8
63	0.082	5.160	1.3
80	0.075	6.000	0.9
100	0.075	7.500	0.75
125	0.076	9.500	0.6