# *FDV – DOKUMENTASJON*	***Nr.: 040***
	Rev.:
	Dato: 5.8.2015

Produktspesifikasjon	Kontaktor 3 og 4 pol
Produktnavn	Serie M
Anvisning for drift	Ingen
Vedlikehold	Produktet er vedlikeholdsfritt
Henvisninger Vedlegg	Produktkatalog, dokumentasjon, brukerveiledning og tekniske data
Produsent	General Electric
Importør	**EFA Elektro AS,** Postboks 593, 1411 Kolbotn, Norway Tlf. 66812400 e-mail: post@efa.no - **www.efa.no**

EFA Elektro AS

Rune Haland

Serviceingeniør vern og startapparater

Technical data

General

		MC1...	MC2...
Rated thermal current Ith θ ≤ 60°(1)	(A)	20	20
Rated operational current Ie(2) (3 x 440V, 50/60Hz, AC-3)	(A)	9	12
Maximum number of poles		4	4
Rated insulation current Ui	(V)	750	750
Rated operational current Ue	(V)	690	690

(1) Insulated terminal type B 2.8 x 0.8 with wire 1 mm^2: Ie = 8A, design DIN 46 247
(2) Max.operational current AC3, 3 -phase≤ 440V, according to IEC 947-4-1

Conformity to standards

IEC/EN 60947-1	CSA C22.2/14	SEV 10254
IEC/EN 60947-4-1	CENELEC HD 419	JIS C8325
IEC/EN 60947-5-1	VDE 0660	JEM 1038
EN 50003	NFC 63110	NEMA ICS-1
EN 50005	BS 4794	UL 508
EN 50012		

Approvals

cULus	NEMKO	SEMKO
SETI	DEMKO	RINA
IMQ		
Lloyd's Register	Bureau Veritas	CE

Ambient conditions

Storage temperature		-55°C to +80°C
Operation temperature		-40°C to +55°C
Altitude	up to 3000m	Nominal values
	from 3000 up to 4000m	90%Ie 80%Ue
	from 4000 up to 5000m	80%Ie 75%Ue

Climatic resistance

Continuous tests 40 / 125 / 56		
Cold (72h)		
	Temperature	-40°C
Dry heat (96h)		
	Temperature	+125°C
	Relative humidity	< 50%
Humid heat (56h)		
	Temperature	+40°C
	Relative humidity	95%
Cyclic tests		
First half-cycle (12h)		
	Low temperature	+25°C
	Relative humidity	93%
Second half-cycle (12h)		
	Low temperature	+55°C
	Relative humidity	95%
Number of consecutive cycles		6

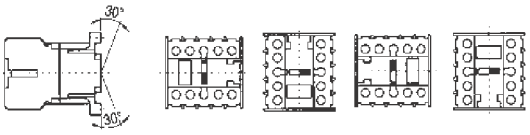
Shock resistance (IEC 68-2-27)

Continuously closed (at 0.8Us)	
Admissible acceleration	25 g
Impulse duration	11 ms
Continuously opened (no voltage)	
Admissible acceleration	20 g
Impulse duration	11 ms

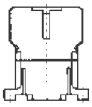
Vibration resistance (IEC 68-2-6)

Continuously closed (at 0.8Us)	
Admissible acceleration	15 g
Sweep between	10 - 200 Hz
Continuously opened (no voltage)	
Admissible acceleration	5g (AC) - 35g (DC)
Sweep between	10 - 200 Hz

Mounting positions



With the same pick-up and drop-out voltage
With the same rated power

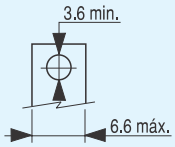


-7% of connection voltage
+4% of disconnection voltage
With the same rated power

7% of connection voltage
+4% of disconnection voltage
With the same rated power

Terminal capacity

Terminal with M3.5 screw		Tightening torque
(with pozidrive head and safety flange)		0.8 Nm - 7 Lb/in
Solid wire	mm^2	0.75 to 2 x 2 w.
Flexible wire without terminal	mm^2	0.75 to 2.5 x 2 w.
Flexible wire without terminal with cap	mm^2	0.75 to 2.5 x 1 w.
	mm^2	0.75 to 1 x 2 w.
Ring terminal		0.8 Nm - 7 Lb/in



Faston terminal 2.8 - 2 insulated terminals	mm^2	1 x 2 w.
Terminal for printed circuit (Ø of PCB hole)		1.8 mm
Ring terminal cap		7.8 mm
Fork terminal cap		6.5 mm

Control circuit

		MC _ A...	MC _ C...	MC _ I...	MC _ K...	MC _ C...W
Rated insulation voltage (Ui)	(V)	750	750	750	750	750
Standard voltages (Us)						
50Hz(V)		24 ... 690	–	–	–	–
60Hz(V)		6 ... 600	–	–	–	–
DC	(V)	–	6 ... 440	24	24	12 ... 440
Operating voltages limits						
Operating [1]	xUs	0.8 ... 1.1	0.8 ... 1.1	0.8 ... 1.25	0.7 ... 1.25	0.7 ... 1.3
Drop-out	xUs	0.35 ... 0.55	0.15 ... 0.4	0.15 ... 0.3	0.15 ... 0.35	0.15 ... 0.3
Operating voltages limits with coil 50/60 Hz						
Operating	xUs	0.8 ... 1.1	–	–	–	–
Drop-out	xUs	0.35 ... 0.55	–	–	–	–
Consumption						
50 or 60Hz - monofrequency coil						
Pick-up	(VA)	26	–	–	–	–
Seal	(VA)	4	–	–	–	–
50/60Hz - bifrequency coil						
Pick-up	(VA)	32	–	–	–	–
Seal	(VA)	6	–	–	–	–
DC	(W)	–	3	1.2	2	4
Power factor						
Magnetic circuit open	(cos φ)	0.8	–	–	–	–
Magnetic circuit closed	(cos φ)	0.35	–	–	–	–
Power dissipation	(W)	1.4	3	1.2	2	4
Opening and closing times						
Values between ± %Us	%	+10 ... -20	+10 ... -20	+25 ... -30	+25 ... -30	+30 ... -30
Time on energisation NO	(ms)	6 ... 13	22 ... 36	30 ... 70	20 ... 50	17 ... 28
Time on de-energisation NC	(ms)	8 ... 16	9 ... 12	9 ... 16	9 ... 16	9 ... 12
Time on energisation NC	(ms)	5 ... 11	18 ... 27	20 ... 45	18 ... 35	12 ... 25
Time on de-energisation NO	(ms)	6 ... 13	5 ... 7	5 ... 9	5 ... 9	5 ... 7
Values at Us						
Time on excitation NO	(ms)	7 ... 12	24 ... 27	25 ... 45	25 ... 40	11 ... 23
Time on desexcitation NC	(ms)	8 ... 16	9 ... 11	9 ... 16	9 ... 16	9 ... 11
Time on excitation NC	(ms)	6 ... 10	20 ... 26	25 ... 35	20 ... 30	15 ... 21
Time on desexcitation NO	(ms)	6 ... 13	5 ... 8	5 ... 9	5 ... 8	5 ... 8
Maximum time without voltage	(ms)	3	3	3	3	3
Mechanical endurance						
Monofrequency coil	10^6 ops.	>15	–	–	–	–
Bifrequency coil	10^6 ops.	>10	–	–	–	–
DC	10^6 ops.	–	10	10	10	10
Maximum rate						
No load Monofrequency coil	ops./h	9000	–	–	–	–
Bifrequency coil	ops./h	3600	–	–	–	–
DC	ops./h	–	9000	9000	9000	9000
AC1 and AC3 (at rated power)	ops./h	1200	1200	1200	1200	1200
AC4 (at rated power)	ops./h	300	300	300	300	300

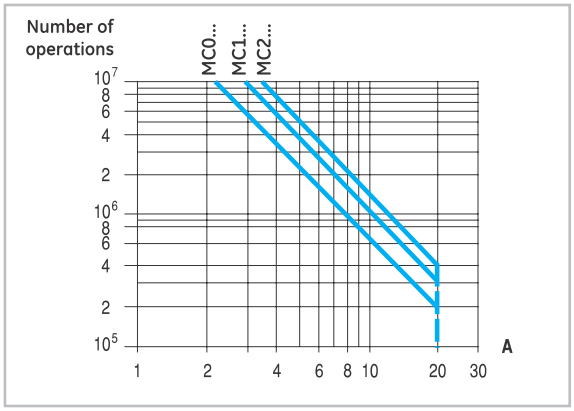
Main circuit (poles)

		MC1...	MC2...
Rated insulation voltage (Ui)	(V)	750	750
(acc. IEC 947-4)			
Rated thermal current (Ith)	(A)	20	20
θ ≤ 60° (1)			
Frequency limits	(Hz)	0...400	0...400
Making capacity (r.m.s.) Ue ≤ 690V 50/60Hz	(A)	160	160
Breaking capacity (r.m.s.) Ue ≤ 440V	(A)	106	106
Ue = 500V	(A)	90	90
Ue = 690V	(A)	80	90
Short-time current			
0.3 sec.	(A)	470	470
1 sec.	(A)	250	250
5 sec.	(A)	125	125
10 sec.	(A)	95	95
30 sec.	(A)	70	70
1 min.	(A)	50	50
3 min.	(A)	40	40
Recovery time	min.	10	10
Protec. against short-circuits (IEC 947-4). w/o TOR			
Coordination type "1" gL/gG	(A)	32	32
Coordination type "2" gL/gG	(A)	20	20
w/o welding contacts gL/gG	(A)	16	16
Circuit breaker rating (curve G CEE 19.1)		20	20
Impedance per pole	(mΩ)	1.5	1.5
Power dissipation per pole			
AC1	(W)	0.6	0.6
AC3	(W)	0.128	0.228
Insulation resistance			
Between adjacent poles	(mΩ)	> 10	> 10
Between pole and earth	(mΩ)	> 10	> 10
Between input and output	(mΩ)	> 10	> 10
Guaranteed no overlap			
between NO and NC contacts			
Space	(mm)	1	1
Time	(ms)	> 2	> 2

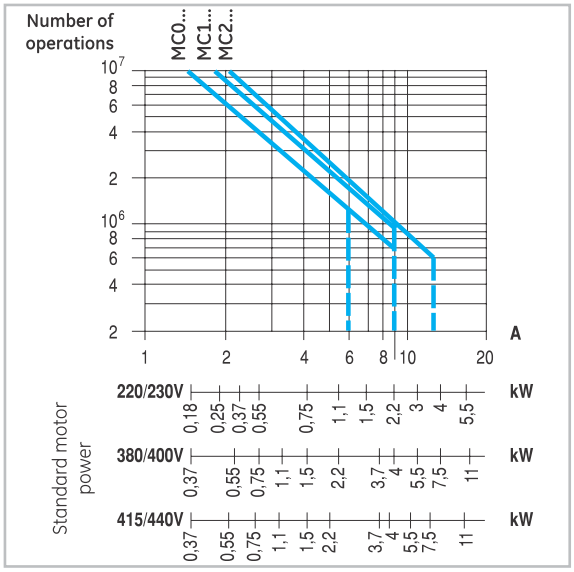
(1) Insulated terminal type B 2.8 x 0.8 with wire 1 mm² Ie = 8A acc. to DIN 46247

Electrical endurance

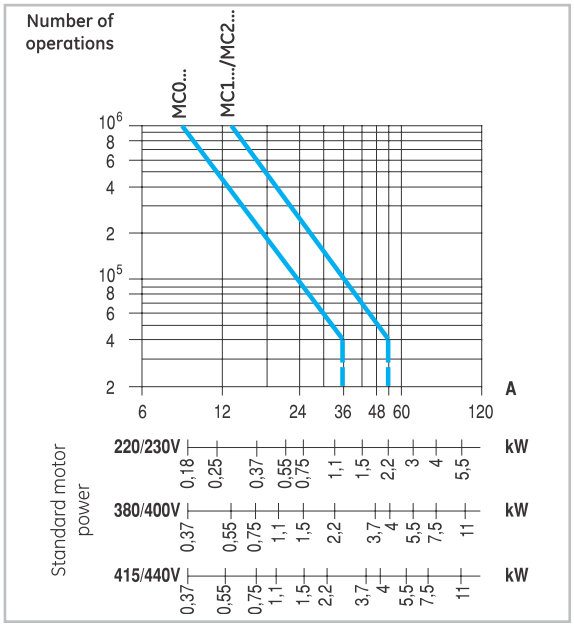
Category AC1



Category AC3



Category AC4



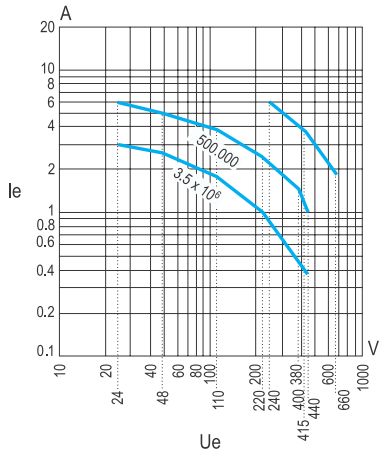
Internal auxiliary contacts

		MC1 / MC2
Rated insulation voltage (Ui) IEC 60947-5	(V)	750
Rated thermal current (Ith) θ ≤ 60°C (1)	(A)	16
Making capacity according with IEC 60947-5-1		
Ue ≤ 690 50-60 Hz	(A)	160
Ue ≤ 440V DC	(A)	160
Breaking capacity (r.m.s.) IEC 60947-5-1		
AC-15		
Ue ≤ 440V / 50-60 Hz	(A)	106
DC-13		
Ue ≤ 110V DC	(A)	3
Ue = 220V DC	(A)	1.2
Ue = 48V DC	(A)	10
Minimum operational power (operational safety.)		5mA, 17V
Short-circuit protection (max.class gl fuse) w/o welding	(A)	10
Insulation resistance		
Between adjacent contacts	(mΩ)	> 10
Between contacts and earth	(mΩ)	> 10
Between input and output	(mΩ)	> 10
Guaranteed no overlap between NO and NC contacts		
Space	(mm)	0,5
Minimal time	(ms)	> 2
Impedance	(mΩ)	2.3
Terminal capacity		Same as main circuit

(1) Insulated terminal type B 2.8 x 0.8 with wire 1 mm² Ie = 8A acc. with DIN 46247

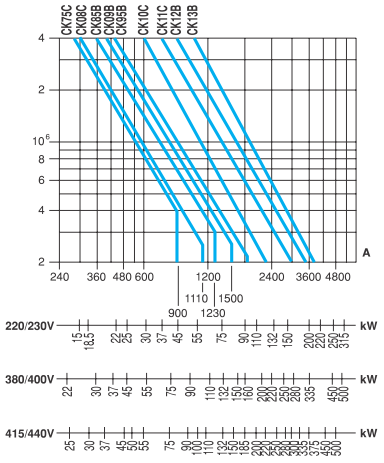
Tripping characteristics (AC)

AC Operation AC-15
Electrical endurance



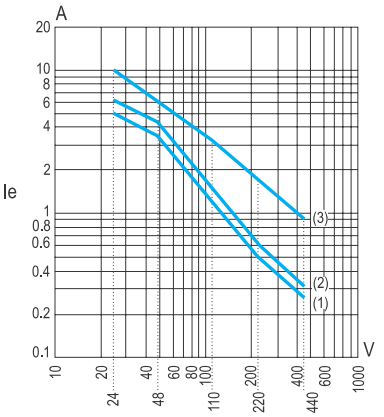
Tripping characteristics (DC)

DC Inductive circuit. DC-13 L/R ≤ 100 ms
Electrical endurance 10^6 ops.



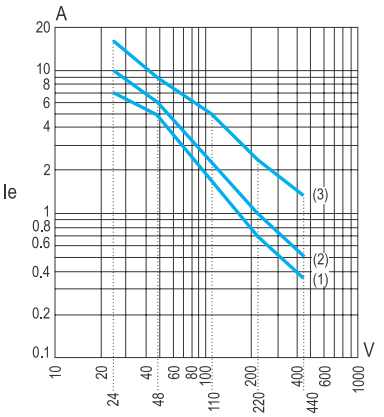
(1) 1 pole in series
(2) 2 poles in series
(3) 3 poles in series

DC Inductive circuit. DC-13 L/R ≤ 15 ms
Electrical endurance 10^6 ops.



(1) 1 pole in series
(2) 2 poles in series
(3) 3 poles in series

DC Inductive circuit. DC-13 L/R ≤ 1 ms
Electrical endurance 10^6 ops.



(1) 1 pole in series
(2) 2 poles in series
(3) 3 poles in series

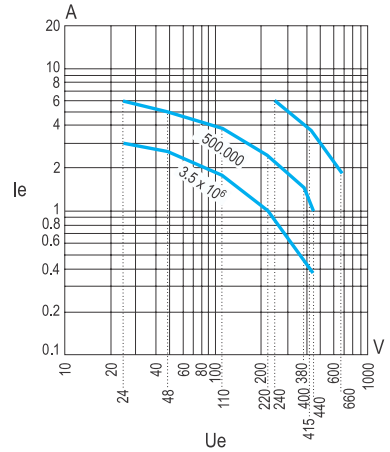
Instantaneous auxiliary contact blocks

			MACN..., MACL...
Rated insulation voltage (Ui) acc. IEC 60947-1		(V)	750
Rated thermal current (Ith) θ ≤ 60°C (1)		(A)	10
Making capacity (r.m.s.) according with IEC/EN 60947-5-1			
AC-15	Ue ≤ 220V 50/60 Hz	(A)	73
	Ue = 380V 50/60 Hz	(A)	38
	Ue = 690V 50/60 Hz	(A)	22
DC-13	Ue ≤ 100V DC	(A)	2.6
L/R=100ms	Ue = 220V DC	(A)	1
	Ue = 440V DC	(A)	0.6
Breaking capacity (r.m.s.) acc. IEC/EN 60947-5-1			
AC-15	Ue ≤ 220V 50/60 Hz	(A)	73
	Ue = 380V 50/60 Hz	(A)	38
	Ue = 690V 50/60 Hz	(A)	22
DC-13	Ue ≤ 100V DC	(A)	2
LR=100ms	Ue = 220V DC	(A)	0,8
	Ue = 440V DC	(A)	0.4
Rated voltage and rated current Ue-Ie			
AC-15	according to IEC 60947		120V - 6A 230V - 6A 400V - 4A 500V - 1A 600V - 1A
	according to UL, CSA		A600
DC-13	according to IEC 60947		24V - 4A 48V - 2A 110V - 0.7A 220V - 0.3A 440V - 0.1A
	according to UL, CSA		Q600
Minimum operational power (operational safety)			5 mA, 17V
Short-circuit protection		(A)	10
(max. class gl fuse) w/o welding			
Insulation resistance			
	Between adjacent contacts	(mΩ)	> 10
	Between contacts an earth	(mΩ)	> 10
	Between input and output	(mΩ)	> 10
Guaranteed no overlap between NO and NC contacts			
	Space	(mm)	0,5
	Minimal time	(ms)	> 2
Impedance		(mΩ)	2.4
Terminal capacity			Same as main circuit

(1) Insulated terminal type B 2.8 x 0.8 with wire 1 mm² Ie = 8A acc. with DIN 46247

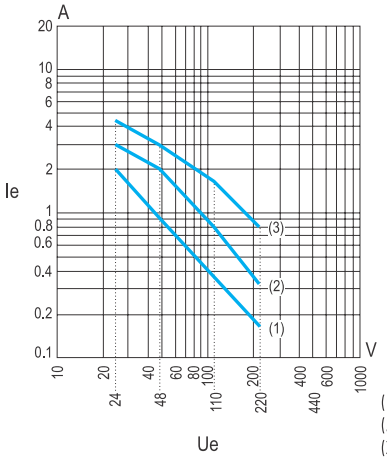
Tripping characteristics (AC)

AC Operation AC-15
Electrical endurance



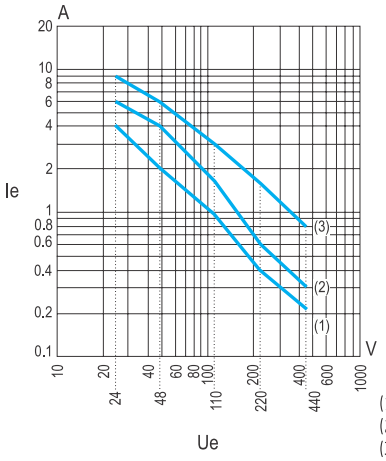
Tripping characteristics (DC)

DC Inductive circuit. DC-13 L/R ≤ 100 ms
Electrical endurance 10^6 ops.



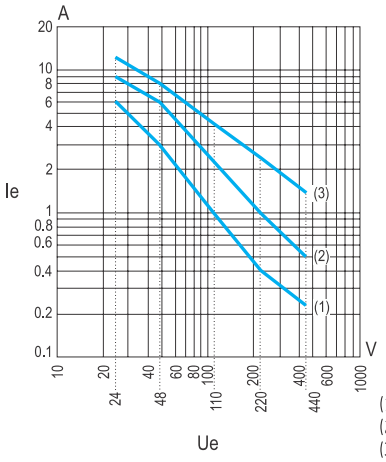
(1) 1 pole in series
(2) 2 poles in series
(3) 3 poles in series

DC Inductive circuit. DC-13 L/R ≤ 15 ms
Electrical endurance 10^6 ops.



(1) 1 pole in series
(2) 2 poles in series
(3) 3 poles in series

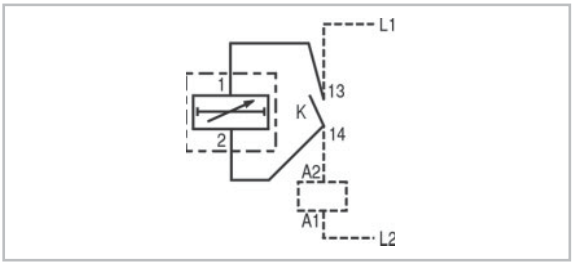
DC Inductive circuit. DC-13 L/R ≤ 1 ms
Electrical endurance 10^6 ops.



(1) 1 pole in series
(2) 2 poles in series
(3) 3 poles in series

Electronic timer block

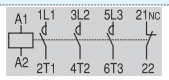
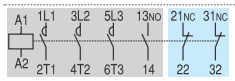
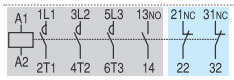
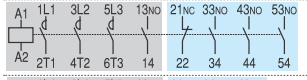
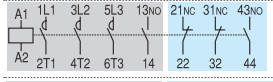
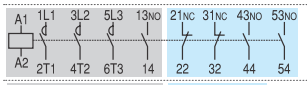
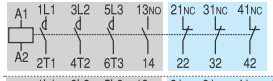
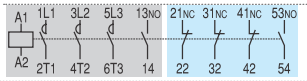
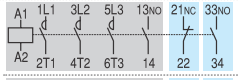
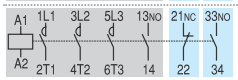
			MREBC...
Rated insulation voltage (Ui)		(V)	750
Rated thermal current (Ith) θ ≤ 60°C [1]		(V)	0.55
Supply voltage (AC and DC)		(V)	24 to 250
Operating limits			0.80 to 1.1 Us (0.85 to 1.1 Us to 12V)
Voltage drop		(V)	< 3
Maximum load current at :			
	20°C	(A)	0.9
	40°C	(A)	0.72
	60°C	(A)	0.55
Minimum load for safe operation		(A)	> 10
Maximum current		(A)	10A per 40 ms
Leakage current at 220V		(mA)	< 5
Operational current			
	AC-15	(A)	0.7
	DC-13	(A)	0.9
Timing range (delay ON)		(s)	0.5 to 60 (± 6 s)
Rearrangement time		(ms)	< 100
Repeatibility (accuracy) (%)		± 1	
Ambient temperature			
	storage	(°C)	–55 to + 80
	operation	(°C)	–5 to + 60
Degree of protection			IP20
Mounting positions			Any
Terminals : 2 free cables			1 mm² (AWG 17) 250 mm



Contact sequence

	Main contact (NO)	Main contact (NC)	Auxiliary contact (NO)	Auxiliary contact (NC)
Three-pole minicontactor				
MC...310...	0 2 3.5		0 2.3 3.5	
MC...301...	0 2 3.5			0 1.2 3.5
Four-pole minicontactor				
MC...400...	0 2 3.5			
MC...B00...	0 2 3.5	0 1.2 3.5		
MC...A00...		0 1.2 3.5		
Auxiliary contact block				
MAC...			0 2.1 3.5	0 1 3.5
MAR...			0 2.1 3.5	0 1 3.5

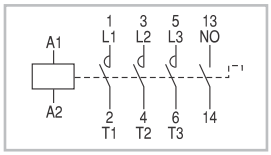
Terminal numbering in accordance with EN 50012

Final structure of the contactor	Auxiliary contactors Combination / Description	NO	NC	Possible basic contactors + Auxiliary contact blocks to be added
Without auxiliary contact blocks				
 	01E	0	1	MC_A301A...
	10E	1	0	MC_A310A...
Auxiliary contact blocks front mounted with two or four contacts				
 	11E	1	1	MC_A310A... + MACN211A
	21E	2	1	MC_A310A... + MACN211A
	12E	1	2	MC_A310A... + MACN202A
 	31E	3	1	MC_A310A... + MACN431A
	41E	4	1	MC_A310A... + MACN431A
	22E	2	2	MC_A310A... + MACN422A
	32E	3	2	MC_A310A... + MACN422A
	13E	1	3	MC_A310A... + MACN413A
	23E	2	3	MC_A310A... + MACN413A
Auxiliary contact blocks lateral mounted with one contact				
 	11E	1	1	MC_A310A... + MACL101A
 	21E	2	1	MC_A310A... + MACL101A + MACL110A
	12E	1	2	MC_A310A... + MACL101A + MACL101A

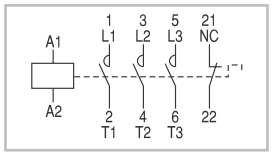
Terminal numbering

Basic three-pole contactors. *(EN 50012)*

MC _ _ 310A _

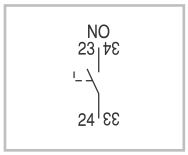


MC _ _ 301A _

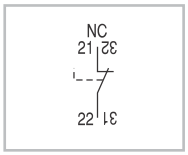


Instantaneous auxiliary contact blocks. *(EN 50012)*

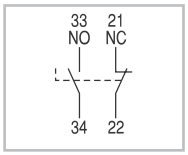
MACL110A _



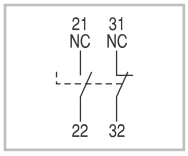
MACL101A _



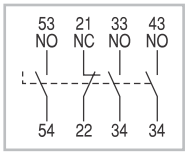
MACN211A_



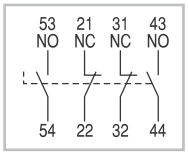
MACN202A_



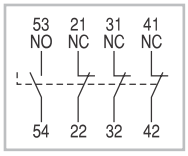
MACN431A_



MACN422A_

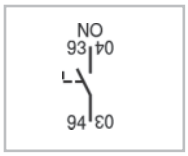


MACN413A_

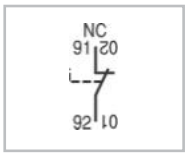


Instantaneous auxiliary contact blocks. *(EN 50005)*

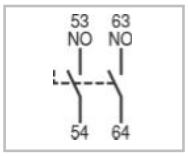
MARL110A_S



MARL101A_S



MARN220A_



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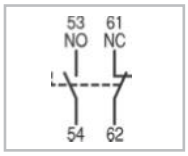

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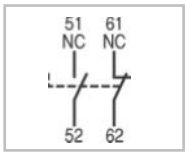
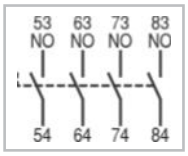


MARN440A_



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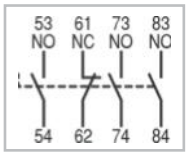
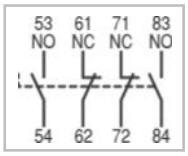


MARN422A_



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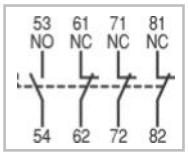
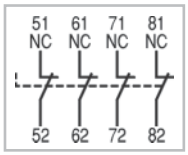
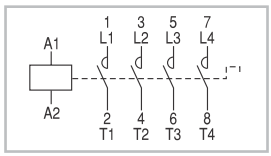


MARN404A_

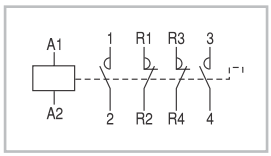


Base four-pole contactors. *(EN 50005)*

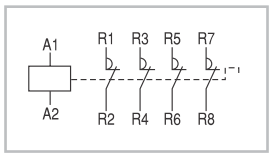
MC _ _ 400A _



MC _ _ B00A _

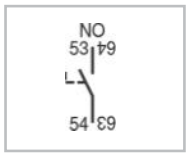


MC _ _ A00A _

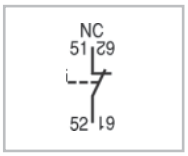


Instantaneous auxiliary contact blocks. *(EN 50005)*

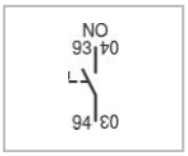
MARL110A_



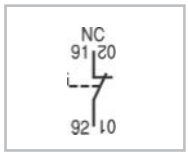
MARL101A_



MARL110A_S



MARL101A_S



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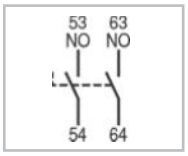

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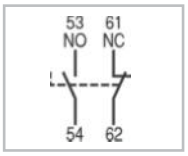

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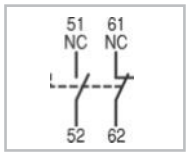
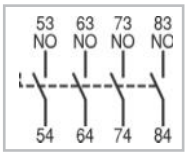
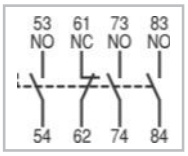


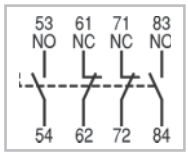
MARN440A_



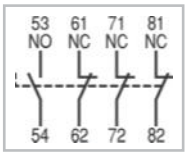
MARN431A_



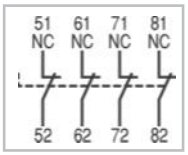
MARN422A_



MARN413A_

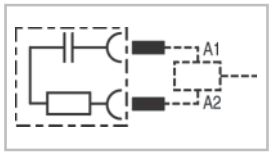


MARN404A_

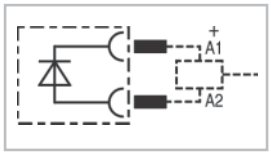


Voltage suppressor block

MP0AAE _



MP0CAE3



MP0CAE4