# *FDV – DOKUMENTASJON*	***Nr.: 041***
	Rev.:
	Dato: 5.8.2015

Produktspesifikasjon	Styrekontaktor
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

Maximum number of contacts (MCR...)	4
Rated thermal current (Ith) θ ≤ 60°	16A
Rated operational voltage (Ue) acc. IEC 60947.1	690V
Insulation voltage (Ui) acc. IEC 60947.1	750V

Conformity to standards

IEC / EN 60947-5-1	IEC / EN 60947-1	BS 4794
EN 50002	EN 50005	EN 50011
NFC 63-110	NFC 63-140	CENELEC HD 420
CSA C22.2/14	VDE 0660	UL 508

Approvals

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

Ambient conditions

Storage temperature		-55ºC to +80ºC
Operation temperature		-40ºC to +60ºC
Altitude	up to 3000m	Nominal values
	from 3000 to 4000m	90%Ie 80%Ue
	from 4000 to 5000m	80%Ie 75%Ue

Climatic resistance (IEC 68-2)

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

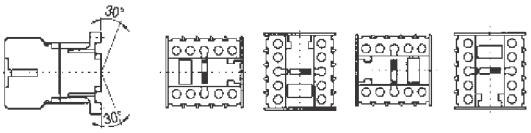
Shock resistance (IEC 68-2-27)

Continously closed (at 0,8Us)		
Admissible acceleration		25 g
Impulse duration		11 ms
Continously opened (no voltage)		
Admissible acceleration		20 g
Impulse duration		11 ms

Vibration resistance (IEC 68-2-6)

Continously closed (at 0,8Us)		
Admissible acceleration		15 g
Sweep between		10 - 200 Hz
Continously opened (no voltage)		
Admissible acceleration		5 g AC - 3.5 g DC
Sweep between		10 - 200 Hz

Mounting positions



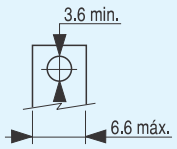
With the same pick-up and drop-out voltage
With the same rated power

-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 screw M3.5 Tightening torque		
(with pozidrive head and safety flange)		0.8 Nm - 7 Lb-in
Solid wire	mm^2	0.75 to 2x2 w.
Flexible wire without terminal	mm^2	0.75 to 2.5x2 w.
Flexible wire with terminal with cap	mm^2	0.75 to 2.5x1 w
	mm^2	0.75 to 1x2 w
Ring terminal cap		0.8 Nm - 7 Lb/in

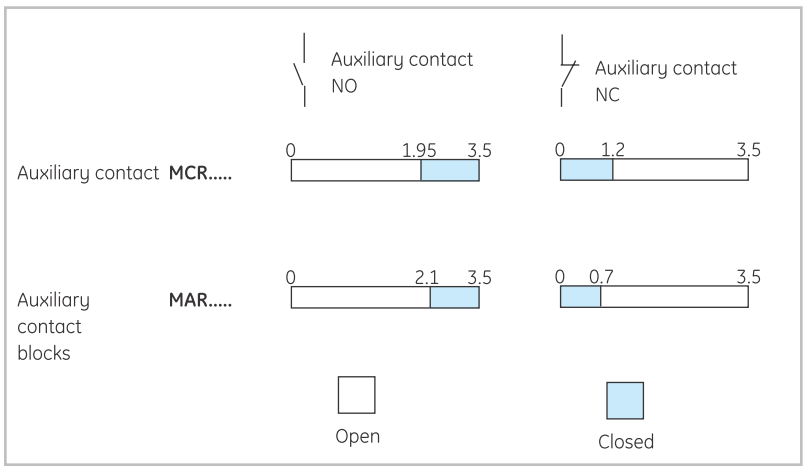


Fast-on 2.8 - 2 insulated terminals	mm^2	1 x 2 w.
Terminal for printed circuit (Ø of PCB hole)		1.8mm
Ring terminal cap		7.8mm
Fork terminal cap		6.5mm

Control circuit

		MCRA...	MCRC...	MCRC...	MCRI...	MCRK...
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	12...440	24	24
Voltage [1]						
Operating limits	xUs	0.8...1.1	0.8...1.1	0.7...1.3	0.8...1.25	0.7...1.25
Drop-out	xUs	0.35...0.55	0.15...0.3	0.15...0.3	0.15...0.3	0.13...0.35
Consumption						
Pick-up	(VA)	26	–	–	–	–
Seal	(VA)	4	–	–	–	–
DC	(W)	–	3	4	1.2	2
Power factor						
Pick-up	(cos φ)	0.8	–	–	–	–
Seal	(cos φ)	0.35	–	–	–	–
Power dissipation	(W)	1.4	3	4	1.2	2
Opening and closing times						
Values between ± %Us	%	+10...-20	+10...-20	+30...-30	+25...-20	+25...-20
Time at energisation NO	(ms)	6...13	22...36	17...28	30...70	20...50
Time at de-energisation NC	(ms)	8...16	9...12	9...12	9...16	9...16
Time at energisation NC	(ms)	5...11	18...27	12...25	20...45	18...35
Time at de-energisation NO	(ms)	6...13	5...7	5...7	5...9	5...9
Values at Us						
Time at energisation NO	(ms)	7...12	24...27	19...23	25...45	25...40
Time at de-energisation NC	(ms)	8...16	9...11	9...11	9...16	9...16
Time at energisation NC	(ms)	6...10	20...26	15...21	25...35	20...30
Time at de-energisation NO	(ms)	6...13	5...8	5...8	5...9	5...9
Maximum time without voltage	(ms)	3	3	3	3	3
(without effecting the closed magnetic circuit)						
Mechanical endurance						
Monofrequency	x10^6 ops.	15	–	–	–	–
Dual-frequency	x10^6 ops.	10	–	–	–	–
DC	x10^6 ops.	–	10	10	10	10
Maximum rate (no load)						
Monofrequency	n° ops./h	9000	–	–	–	–
Dual-frequency	n° ops./h	3600	–	–	–	–
DC	n° ops./h	–	9000	9000	9000	9000

Contact sequence (distance in mm)

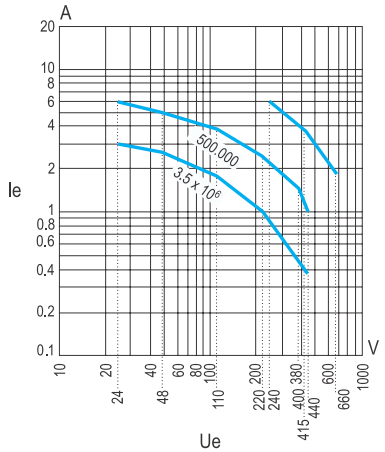


Internal auxiliary contacts

		MCR.....
Rated insulation voltage (Ui) acc. IEC 60947-1		750V
Rated thermal current (Ith) θ ≤ 60°C [1]		16A
Making capacity (r.m.s.) acc. IEC 60947-5		
AC-15	Ue ≤ 440V 50/60 Hz	160A
DC-13	Ue ≤ 220V DC	3A
Breaking capacity (r.m.s.) acc. IEC 60947-5		
AC-15	Ue ≤ 440V 50/60 Hz	106A
DC-13 (L/R = 100 ms)	Ue ≤ 220V DC	1.2A
	Ue = 110V DC	3A
	Ue = 48V DC	10A
Rated voltage and rated current Ue-Ie		
AC-15	according to IEC 947	110/120V - 6A
		220/240V - 6A
		380/400V - 4A
		415/440V - 4A
		500V - 2.5A
		660/690V - 1.5A
	according to UL, CSA	A600
DC-13	according to IEC	24V - 5A
		48V - 3.5 A
		110V - 1.2A
		220V - 0.6A
		440V - 0.25A
	according to UL, CSA	P600
Minimum operational power (operational safety)		5 mA, 17V
Short-circuit protection (max.class gl fuse without welding)		10A
Insulation resistance		
	between contacts	> 10 mΩ
	between contacts and earth	> 10 mΩ
	between input and output	> 10 mΩ
Guaranted no overlap of the contacts		
	Space	1,1 mm
	minimum time	> 2 ms
Impedance		2.3 mΩ
Terminal capacity		Same as main circuit

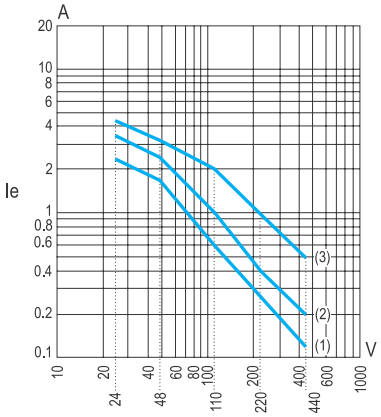
Tripping characteristics (AC)

AC AC-15
Electrical endurance



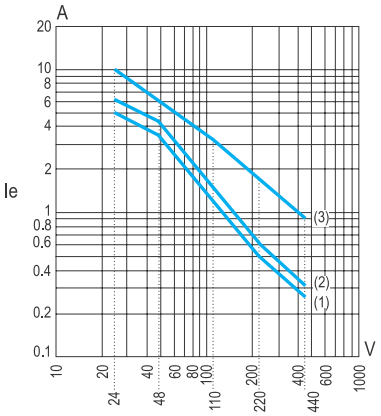
Tripping characteristics Ie/ue

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



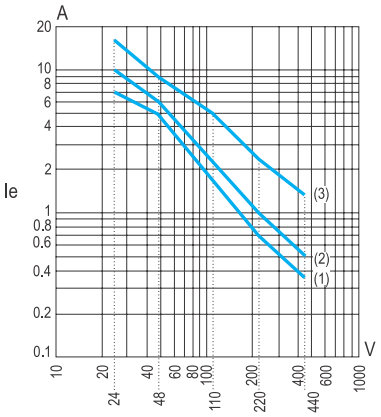
(1) 1 pole in series
(2) 2 poles in series
(3) 3 poles in series

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.



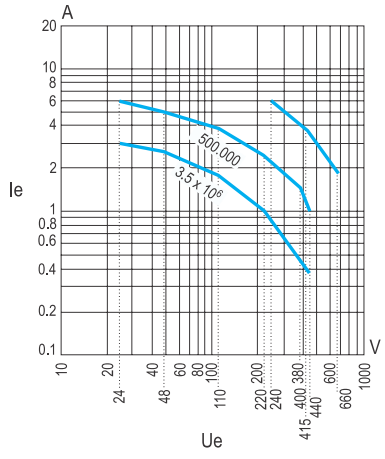
(1) 1 pole in series
(2) 2 poles in series
(3) 3 poles in series

External auxilary contact blocks

		MARN..., MARL...
Rated insulation voltage (Ui) acc. IEC 60947-1		750V
Rated thermal current (Ith) θ ≤ 60°C (1)		10A
Making capacity (r.m.s.) acc. IEC 60947-5		
AC-15	Ue ≤ 220V 50/60 Hz	73A
	Ue = 380V 50/60 Hz	38A
	Ue = 690V 50/60 Hz	22A
DC-13 L/R = 100 ms	Ue ≤ 100V DC	2.6A
	Ue = 220V DC	1A
	Ue = 440V DC	0.6A
Breaking capacity (r.m.s.) acc. IEC 60947-5		
AC-15	Ue ≤ 220V 50/60 Hz	73A
	Ue = 380V 50/60 Hz	38A
	Ue = 690V 50/60 Hz	22A
DC-13 L/R = 100 ms	Ue ≤ 100V DC	2A
	Ue = 220V DC	0.8A
	Ue = 440V DC	0.4A
Rated voltage and rated current Ue-Ie		
AC-15	according to IEC 60947	110/120V - 6A
		220/240V - 6A
		380/400V - 3A
		415/440V - 3A
		500V - 1A
		660/680V - 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 (max.class gl fuse without welding)		10A
Insulation resistance		
	between contacts	> 10 mΩ
	between contacts and earth	> 10 mΩ
	between input and output	> 10 mΩ
Guaranteed no overlap of the contacts		
	Space	0.5 mm
	minimum time	> 2 ms
Impedance		2.4 mΩ
Terminal capacity		Same as main circuit

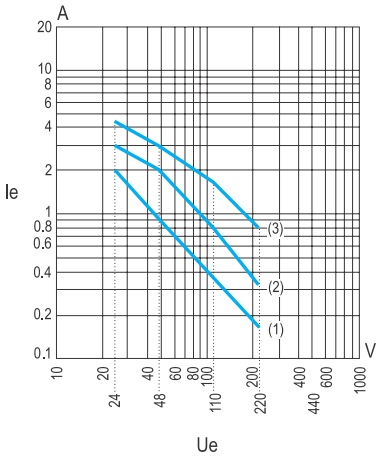
Tripping characteristics (AC)

AC AC-15
Electrical endurance



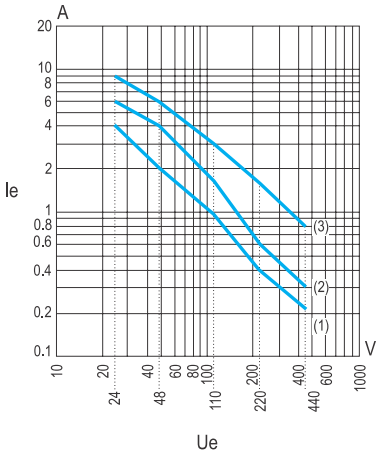
Tripping characteristics Ie/ue

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



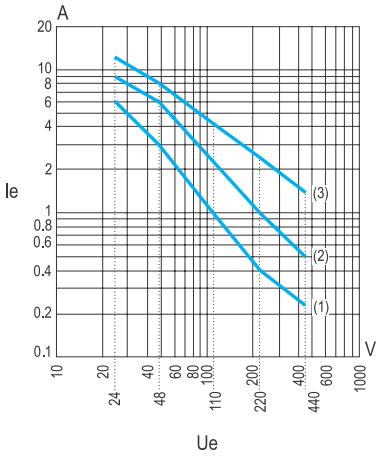
(1) 1 pole in series
(2) 2 poles in series
(3) 3 poles in series

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.

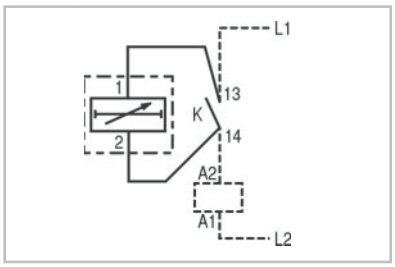


(1) 1 pole in series
(2) 2 poles in series
(3) 3 poles in series

Electronic timer block

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

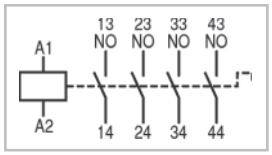
MREBC _ 0AC2



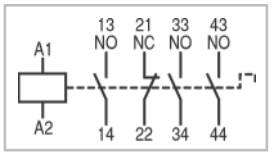
Terminal numbering

Auxiliary contactors. *According to EN 50011*

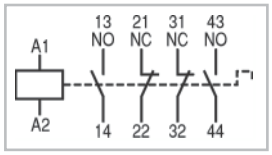
MCR_040_ _ _



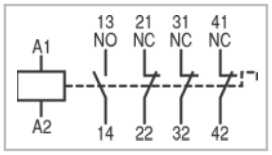
MCR_031_ _ _



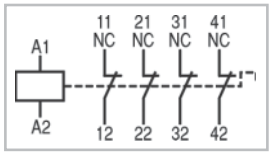
MCR_022_ _ _



MCR_013_ _ _



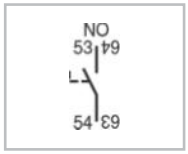
MCR_004_ _ _



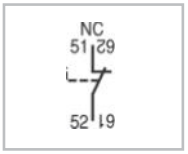
Auxiliary contact blocks

According to EN 50005 & EN 50011

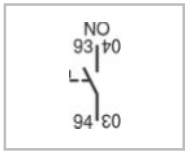
MARL110A _



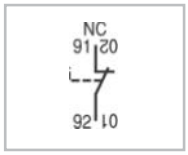
MARL101A _



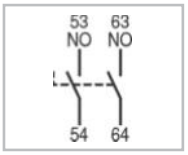
MARL110A _ S



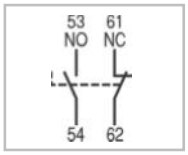
MARL101A _ S



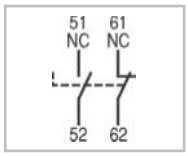
MARN220A _



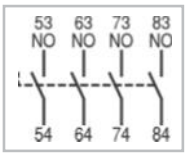
MARN211A _



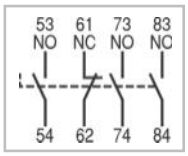
MARN202A _



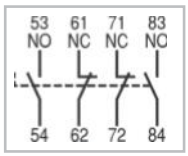
MARN440A _



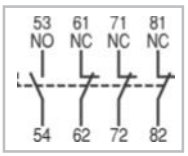
MARN431A _



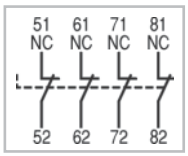
MARN422A _



MARN413A _

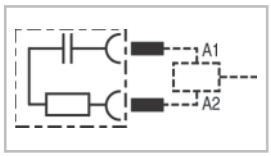


MARN404A _

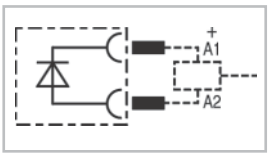


Transient voltage suppressor block

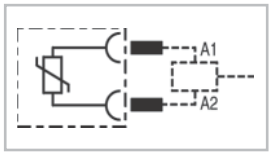
MP0AAE _



MP0CAE3



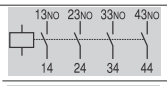
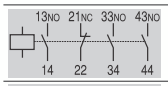
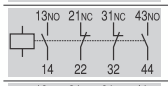
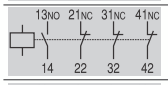
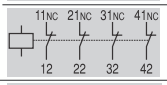
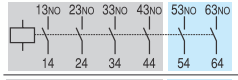
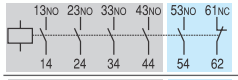
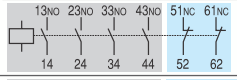
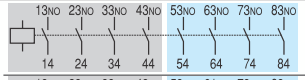
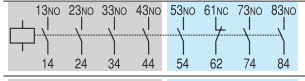
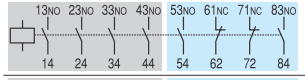
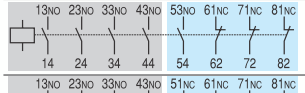
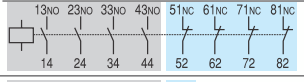
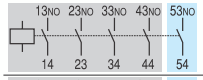
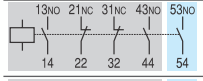
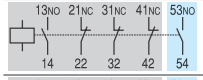
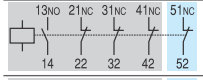
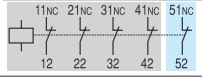
MP0DAE4



Terminal numbering in accordance with EN 50011

By combining other basic auxiliary contactors with auxiliary contact blocks MAR..., it is possible to obtain other combinations, and positions of contacts which are not covered by the table. But in all cases the maximum number of auxiliary contacts should be ten.

Type E
Standard contact combination in which the interchangeability of the devices does not affect the cabling or the diagram. Specifies a particular contact numbering and positioning.

	Final structure of the combination	Auxiliary contacts Combination / Description	NO	NC	Auxiliary contactor + Auxiliary contact blocks to be added
Type E	 	40E	4	0	MCRA040A..
		31E	3	1	MCRA031A..
		22E	2	2	MCRA022A..
		13E	1	3	MCRA013A..
		04E	0	4	MCRA004A..
	 	60E	6	0	MCRA040A.. + MARN220A..
		51E	5	1	MCRA040A.. + MARN211A..
		42E	4	2	MCRA040A.. + MARN202A..
	 	80E	8	0	MCRA040A.. + MARN440A..
		71E	7	1	MCRA040A.. + MARN431A..
		62E	6	2	MCRA040A.. + MARN422A..
		53E	5	3	MCRA040A.. + MARN413A..
		44E	4	4	MCRA040A.. + MARN404A..
	 	50E	5	0	MCRA040A.. + MARL110A..
		41E	4	1	MCRA031A.. + MARL110A..
		32E	3	2	MCRA022A.. + MARL110A..
		23E	2	3	MCRA013A.. + MARL110A..
		14E	1	4	MCRA013A.. + MARL101A..
		05E	0	5	MCRA004A.. + MARL101A..

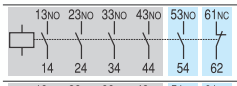
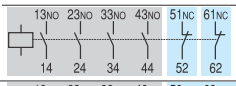
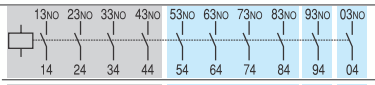
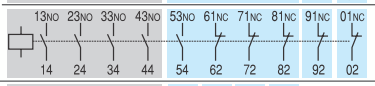
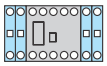
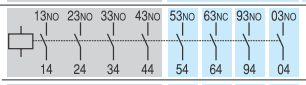
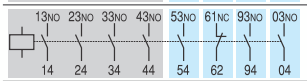
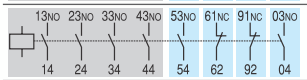
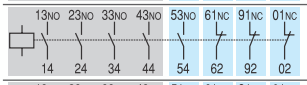
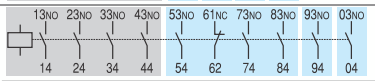
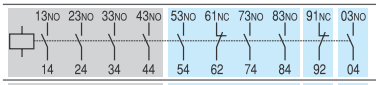
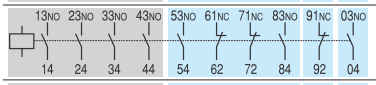
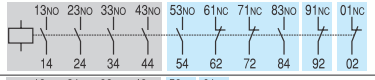
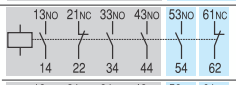
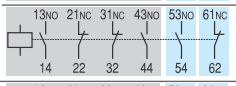
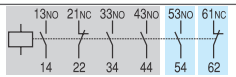
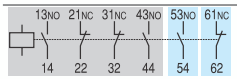
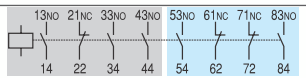
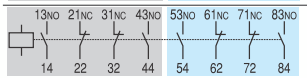
Terminal numbering in accordance with EN 50011 (continued)

By combining other basic auxiliary contactors with auxiliary contact blocks MAR..., it is possible to obtain other combinations, and positions of contacts which are not covered by the table. But in all cases the maximum number of auxiliary contacts should be ten.

Type Z
Contact combination the same as Type E. Interchangeability of the devices may affect the cabling and the diagram. Neither contact numbering nor positioning are retained.

Type X
Contact combination the same as Type E. Interchangeability of the devices may affect the cabling but not the diagram.The contact numbering is maintained but not their position.

Type Y
Contact combination which differs from Type E, although it is obtained by a combination of devices provided for this Type E.

	Final structure of the combination	Auxiliary contacts Combination Description	NO	NC	Auxiliary contactor + Auxiliary contact blocks to be added
Type Z	 	60Z	6	0	MCRA040A.. + MARL110A.. + MARL110A..
		51Z	5	1	MCRA040A.. + MARL110A.. + MARL101A..
		42Z	4	2	MCRA040A.. + MARL101A.. + MARL101A..
	 	100Z	10	0	MCRA040A.. + MARN440A.. + MARL110A..S + MARL110A..S
		55Z	5	5	MCRA040A.. + MARN413A.. + MARL101A..S + MARL101A..S
Type X	 	80X	8	0	MCRA040A.. + MARL110A.. + MARL110A.. + MARL110A..S + MARL110A..S
		71X	7	1	MCRA040A.. + MARL110A.. + MARL101A.. + MARL110A..S + MARL110A..S
		62X	6	2	MCRA040A.. + MARL110A.. + MARL101A.. + MARL101A..S + MARL110A..S
		53X	5	3	MCRA040A.. + MARL110A.. + MARL101A.. + MARL101A..S + MARL101A..S
		44X	4	4	MCRA040A.. + MARL101A.. + MARL101A.. + MARL101A..S + MARL101A..S
	 	91X	9	1	MCRA040A.. + MARN431A.. + MARL110A..S + MARL110A..S
		82X	8	2	MCRA040A.. + MARN431A.. + MARL101A..S + MARL110A..S
		73X	7	3	MCRA040A.. + MARN422A.. + MARL101A..S + MARL110A..S
		64X	6	4	MCRA040A.. + MARN422A.. + MARL101A..S + MARL101A..S
Type Y	 	42Y	4	2	MCRA031A.. + MARL110A.. + MARL101A..
		33Y	3	3	MCRA022A.. + MARL110A.. + MARL101A..
	 	42Y	4	2	MCRA031A.. + MARN211A..
		33Y	3	3	MCRA022A.. + MARN211A..
	 	53Y	5	3	MCRA031A.. + MARN422A..
		44Y	4	4	MCRA022A.. + MARN422A..

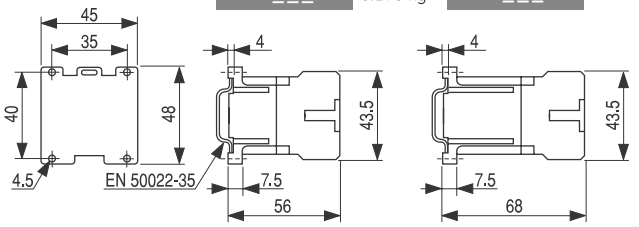
Dimensional drawings

Auxiliary minicontactors

Slotted screw

MCRA_ _ _ AT◆ 0.170 kg

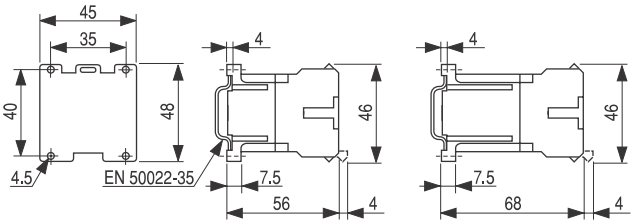
MCRC_ _ _ AT◆ 0.210 kg
MCRI_ _ _ ATD 0.225 kg
MCRK_ _ _ ATD 0.225 kg



Ring terminal

MCRA_ _ _ AR◆ 0.170 kg

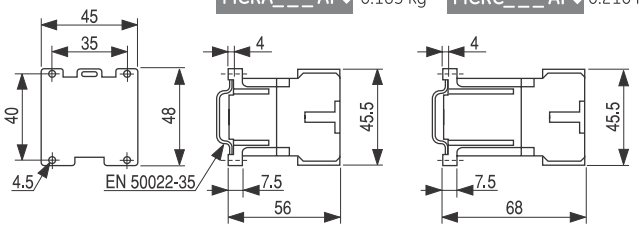
MCRC_ _ _ AR◆ 0.210 kg



Terminal: Faston 2x2.8 insulated

MCRA_ _ _ AF◆ 0.165 kg

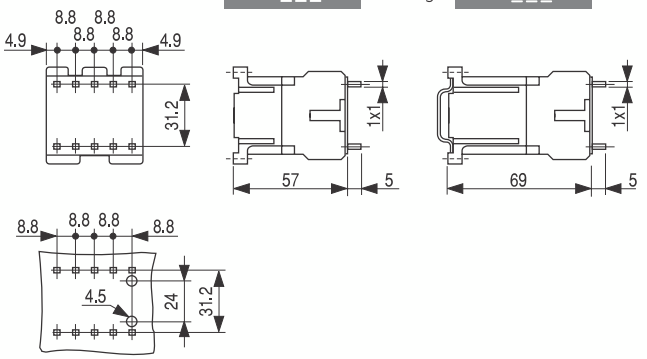
MCRC_ _ _ AF◆ 0.210 kg



Terminal: Printed circuit

MCRA_ _ _ AI◆ 0.165 kg

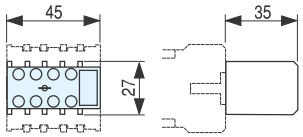
MCRC_ _ _ AI◆ 0.210 kg



Auxiliary contact blocks. *Front mounting*

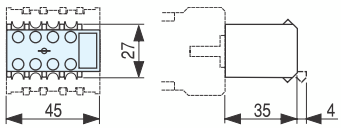
Slotted screw

MARN2 _ _AT 0.025 kg
MARN4 _ _AT 0.040 kg



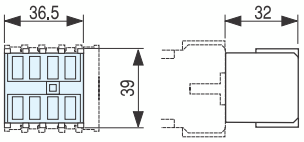
Ring terminal

MARN2 _ _AR 0.025 kg
MARN4 _ _AR 0.040 kg



Terminal: Faston 2x2.8 insulated

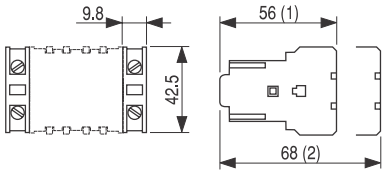
MARF4 _ _AF 0.035 kg



Auxiliary contact blocks. *Lateral mounting*

Slotted screw

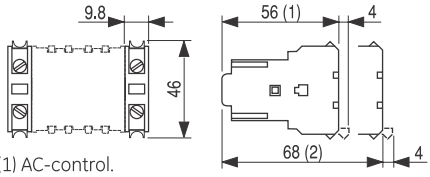
MARL_ _ _AT, ATS 0.013 kg



(1) AC-control.
(2) DC-control

Ring terminal

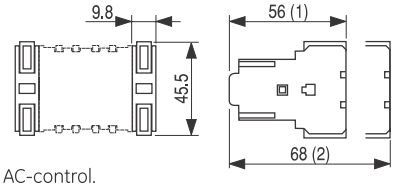
MARL_ _ _AR, ARS 0.013 kg



(1) AC-control.
(2) DC-control

Terminal: Faston 2x2.8 insulated

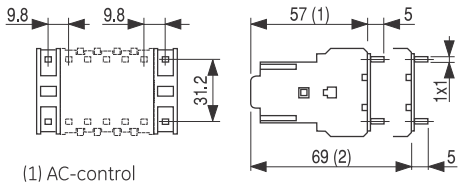
MARL _ _AF, AFS 0.009 kg



(1) AC-control.
(2) DC-control

Terminal: Printed circuit

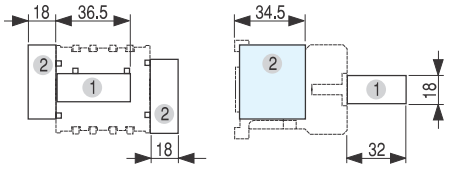
MARL _ _AI, AIS 0.009 kg



(1) AC-control
(2) DC-control

Electronic timer block

MREBC _0AC2 0.040 kg



(1) Frontal mounting
(2) Lateral mounting

Voltage suppressor block

MP0A_AE_ 0.010 kg
MP0C_AE3 0.010 kg