TECHNICAL DATASHEET

Micro Contactor MA Series





- Relay-sized contactor, making it the world's smallest
- >3mm contact clearance acc. to IEC 60335-1 for Safety Applications
- Reversing contactor with mechanical interlock
- 3 Pole and 1 Aux. Contact NO or NC
- 5A AC3 @ 400VAC (2.2kW) 12A AC1 @ 400VAC
- AC coil voltages TS15 DIN rail mounting
- PCB mounting
- DC coil pending





Micro Contactor Relays

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Micro Contactors

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Micro Contactors With Solder Pins Coil Voltages Page 4



Micro Reversing Contactor

Page 5



Technical Data

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Dimensions

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Micro Contactor Relays 4-Pole

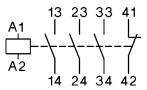
AC Operated

	Ratings	Therm.	Contacts	*2		Distinc. Number	Additional Contact	Туре	24		Coil Voltage *1 24V 50/60Hz 220-240V 50/60Hz		
	AC15 230V A	400V A	Rated- Current I _{th} A	NO	L, NC	acc. to EN50011	Blocks Type		\downarrow	Pack pcs.	Weight kg/pc.		
	4-Pole,	With Scre	w Termina	ls									
4	3	1.5	5	4	-	40E	-	MA04-S-40		10	0.07		
	3	1.5	5	3	1	31E	-	MA04-S-31		10	0.07		
	3	1.5	5	2	2	22E	-	MA04-S-22		10	0.07		

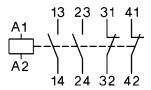
MA04-S-40

23 33 43

MA04-S-31



MA04-S-22



Other coil voltages - see page 4

^{*1} *2 Contacts suitable for electronic circuits, according to EN947-5-4 for rated voltage 24V DC (test ratings 17V DC, 5mA). Positively guided contacts.





AC Operated **Micro Contactors**

Power Ratings	Rated Current	Aux. Contacts*2 Built-in	Additional	Туре	Coil Voltage *1
AC2, AC3	AC1				24V 50/60Hz 220-240V 50/60Hz

380V 400V	660V		\	4	
415V kW	690V kW	440V A	NO	NC	Туре

Pack Weight kg/pc. pcs.

3-Pole, With Screw Terminals

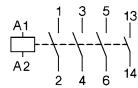


2.2	-	12	1	-	-	MA05-S-10	 10	0.07
2.2	-	12	-	1	-	MA05-S-01	 10	0.07

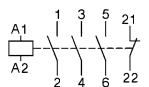
4-Pole, With Screw Terminals

2.2	-	12	-	-	-	MA05-S-0040	10	0.07

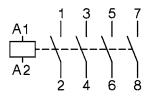
MA05-S-10



MA05-S-01



MA05-S-0040



Snap-On Adaptor



accessories on 35mm DIN-Rail acc. DIN EN 50022



Other coil voltages - see page 4

^{*1} *2 Contacts suitable for electronic circuits, according to EN947-5-4 for rated voltage 24V DC (test ratings 17V DC, 5mA). Positively guided contacts.

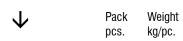




Micro Contactors AC Operated

Power Ratings	Rated Current	Aux. Contacts*2 Built-in	Additional	Туре	Coil Voltage *1
AC2, AC3	AC1	, ,			24V 50/60Hz 220-240V 50/60Hz

380V 400V	660V		\	<u>L</u>	
415V kW	690V kW	440V A	NO	NC	Туре



3-Pole, With Solder Pins Ø1.15 For Printed Circuit Applications

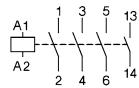


2.2	-	9	1	-	-	MA05-P-10	 10	0.07
2.2	-	9	-	1	-	MA05-P-01	 10	0.07

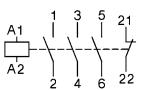
4-Pole, With Solder Pins Ø1.15 for Printed Circuit Applications

2.2	_	9	_	_	-	MA05-P-0040	10	0.07
		·				11111001 0010	. •	0.01

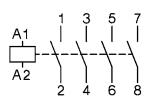
MA05-P-10



MA05-P-01



MA05-P-0040



Coil Voltages for AC operated contactors

Suffix to	Voltage Ma	rking	Rated Cont	Rated Control Voltage $\rm U_{\rm s}$					
contactor type e.g.	at the coil for	for	range for 50Hz		for 60Hz				
MA05-S-	50Hz	60Hz	min.	max.	min.	max.			
1024AC	V	V	V	V	V	V			
12	12	12	11	12	12	12			
24	24	24	22	24	24	24			
42	42	42	38.5	42	42	42			
48	48	48	48	50	48	52			
90	100	100	90	100	100	105			
95	95-100	105-110	95	100	105	110			
100	100	110-115	100	105	110	115			
105	105-110	115-120	105	110	115	120			
110	110-115	120-125	110	115	120	125			
180	200	200	185	200	200	210			

Suffix to	Voltage Ma	rking	Rated Cont	Rated Control Voltage $U_{\rm s}$					
contactor type e.g.	at the coil for	for	range for 50Hz	•					
MA05-S-	50Hz	60Hz	min.	max.	min.	max.			
10230AC	V	V	V	V	V	V			
200	200	200-220	195	205	200	220			
210	205-215	220-230	205	215	220	230			
220	210-220	220-240	210	220	220	240			
230	220-230	230-250	220	230	230	250			
240	230-240		230	240	250	260			

Standard voltages in bold type letters Operating range of magnet-coils: 0.85 x U $_{\rm s}$ (min value of rated control voltage) up to 1.1 x U $_{\rm s}$ (max value of rated control voltage)

Coil not exchangeable

^{*1} Other coil voltages - see above *2 Contacts suitable for electronic

^{*2} Contacts suitable for electronic circuits, according to EN947-5-4 for rated voltage 24V DC (test ratings 17V DC, 5mA). Positively guided contacts.





Micro Reversing Contactors, Mechanical Interlock

AC Operated

	Power Ratings		Rated Aux. Contacts*2 Current Built-in		Additional on the left hand side contactor	on right hand side contactor	Туре	24 230	Coil Voltage *1 24V 50/60Hz 220-240V 50/60Hz	60Hz	
	AC2, AC3		AC1								
1	380V 400V 415V kW 3-Pole, W	660V 690V kW /ith Scre	440V A w Termina	NO NO	L NC	K1 Type	K2 Type		\	pcs. k	Veight cg/pc.
	2.2	-	12	-	1	-	-	MA05-R-S-01		1	0.14
	2.2	-	12	1	-	-	-	MA05-R-S-10		1	0.14



2.2	-	12	-	1	-	-	MA05-R-S-01	 1	0.14
2.2	-	12	1	-	-	-	MA05-R-S-10	 1	0.14

4-Pole, With Screw Terminals

2.2 - 12 MA05-R-S-0040 1	0.14
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3-Pole, With Solder Pins Ø1.15 For Printed Circuit Applications



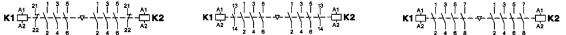
2.2	-	XXX ^{*3}	-	1	-	-	MA05-R-P-01	 1	0.14
2.2	-	XXX ^{*3}	1	-	-	-	MA05-R-P-10	 1	0.14

MA05-R-S-01

MA05-R-S-10

MA05-R-S-0040

$$\mathbf{K1} \stackrel{A_1}{\longleftarrow} \stackrel{13}{\longleftarrow} \stackrel{1}{\longleftarrow} \stackrel{1}{\longleftarrow} \stackrel{A_1}{\longleftarrow} \stackrel{A_1}{\longleftarrow} \stackrel{A_2}{\longleftarrow} \mathbf{K2}$$



Other coil voltages - see page 4

^{*1} *2 Contacts suitable for electronic circuits, according to EN947-5-4 for rated voltage 24V DC (test ratings 17V DC, 5mA). Positively guided contacts.

^{*3} Data available upon request



Data according to IEC 60947-4-1, VDE 0660, EN 60947-4-1

Main Contacts		Туре	MA05-S
Rated insulation voltage U _i		V AC	480*1
Making capacity I _{eff}	at U _e =440V AC	Α	65
Breaking capacity \textbf{I}_{eff} $cos\phi=0.65$	400V AC	Α	50
Utilization category AC1 Switching of resistive load			
Rated operational current I_e (= I_{th}) at 40°C, open		Α	12
Rated operational power of three-phase resistive loads	230V	kW	4.7
50-60Hz, cosj=1	240V	kW	4.8
	400V	kW	8.3
	415V	kW	8.6
	480V	kW	9.5
Rated operational current $I_{_{\rm e}} (= I_{_{\rm th}})$ at 60°C, enclosed		Α	8
Rated operational power of three-phase resistive loads	230V	kW	3.1
50-60Hz, cosj=1	240V	kW	3.3
	400V	kW	5.5
	415V	kW	5.7
	480V	kW	6.5
Minimum cross-section of conductor at load with I_e (= I_{th})		mm²	1.5
Utilization category AC2 and AC3 Switching of three-phase motors			
Rated operational current I _e	220V	Α	6.2
open and enclosed	230V	Α	6.2
	240V	Α	5.6
	380-400V	Α	5
	415-440V	Α	5
	480V	Α	5
Rated operational power of three-phase motors	220-240V	kW	1.5
50-60Hz	380-440V	kW	2.2
	480V	kW	2.2
Utilization category AC4 Switching of squirrel cage motors, inching			
Rated operational current I	220V	Α	4.9
open and enclosed	230V	Α	4.9
	240V	Α	4.1
	380-400V	Α	3.5
	415-440V	Α	3.5
	480V	Α	3.5
Rated operational power of three-phase motors	220-240V	kW	1.1
50-60Hz	380-440V	kW	1.5
	480V	kW	1.5

PA

^{*1} Suitable at 690V for: earthed-neutral systems, overvoltage category I to III, polution degree 3 (standard-industry): Uimp = 4kV. Data for other conditions on request



Data according to IEC 60947-4-1, VDE 0660, EN 60947-4-1

Switching of resistive load 1 pole 24V	Main Contacts			Туре	MA05-S
Standard CAR = 1 ms	Utilization category DC1				
Rated operational current 110V	•	I	•		
2200	•				12
3 poles in series 24V	Rated operational current I	ı			-
A					
110V			·		
220V A -					
### Definition category DC3 and DC5 ### Witching of shurt motors and series motors 1 pole 24V					
Switching of shunt motors and series motors			2200	Α	-
Time constant L/R ≤15ms 110V A -			1 note 24V	Δ	10
Time constant L/R ≤ 15ms	owncling or snam motors	allu series iliotors	•		-
Rated operational current	Time constant L/R <15ms				_
Spoles in series 24V A 12					
Maximum amblent temperature 2200	nated operational current i	t			12
110V			•		
Maximum ambient temperature Operation open °C -40 to +80 (+90 enclosed °C -40 to +80 (+90 enclosed °C -40 to +80 (+90 enclosed °C -40 to +40 enclosed °C -25 to +90 enclosed enclosed °C -25 to +90 enclosed enclo					
Maximum ambient temperature Operation Open or C -40 to +60 (+90 open or C -40 to +60 (+90 open open or C -25 to +60 open open or C -25 to +60 open open open or C -25 to +60 open					
Operation	Maximum ambient tempe	ratura			
Name	Operation	aluic	open	°C	-40 to +60 (+90)
Storage enclosed of C -25 to +40 -50 to +90	•		enclosed	°C	, ,
Storage enclosed of C -25 to +40 -50 to +90	with thermal overload relay		open	°C	-25 to +60
Short circuit protection or contactors without thermal overload relay Coordination-type "1" according to IEC 947-4-1 Contact welding without hazard of persons gL (gG) A	•		·	°C	-25 to +40
Coordination-type "1" according to IEC 947-4-1 Contact welding without hazard of persons ax. fuse size Condination-type "2" according to IEC 947-4-1 Light contact welding accepted axx. fuse size Contact welding accepted axx. fuse size Contact welding not accepted axx. fuse size Contact welding not accepted axx. fuse size Contact welding not accepted axx. fuse size Contact or or contactors with thermal overload relay the device with the smaller admissible backup fuse (contactor or thermal overload relay) determines the fuse size Contact or or contactors flexible with multicore cable end flexible with multicore cable end flexible with multicore cable end AWG Contactors without thermal overload relay ACC I I I/h Contactors without thermal overload relay ACC I I I I/h Contactors withou	Storage			°C	-50 to +90
Contact welding without hazard of persons nax. fuse size Coordination-type "2" according to IEC 947-4-1 light contact welding accepted nax. fuse size Contact welding accepted nax. fuse size Contact welding not accepted max. fuse size Contact welding not accepted max. fuse size Contact welding not accepted max. fuse size Contactors with thermal overload relay the device with the smaller admissible backup fuse contactor or thermal overload relay) determines the fuse size Cable cross-sections or contactors main connector flexible with multicore cable end mm² 0.5-1.5 flexible with multicore cable end mm² 0.5-1.5 Cables per clamp flexible with multicore cable end nm² 0.5-1.5 Cables per clamp contactors without load 1/h 600 AC4 I, 1/h 600 Mechanical life AC operated Sx 10°	Short circuit protection for contactors without then	mal overload relay			
Contact welding without hazard of persons nax. fuse size Coordination-type "2" according to IEC 947-4-1 light contact welding accepted nax. fuse size Contact welding accepted nax. fuse size Contact welding not accepted max. fuse size Contact welding not accepted max. fuse size Contact welding not accepted max. fuse size Contactors with thermal overload relay the device with the smaller admissible backup fuse contactor or thermal overload relay) determines the fuse size Cable cross-sections or contactors main connector flexible with multicore cable end mm² 0.5-1.5 flexible with multicore cable end mm² 0.5-1.5 Cables per clamp flexible with multicore cable end nm² 0.5-1.5 Cables per clamp contactors without load 1/h 600 AC4 I, 1/h 600 Mechanical life AC operated Sx 10°	Coordination type "1" acco	ording to IEC 0/17 // 1			
max. fuse size Coordination-type "2" according to IEC 947-4-1 Light contact welding accepted max. fuse size Contact welding not accepted max. fuse size gL (gG) A - Contact welding not accepted max. fuse size gL (gG) A - Contact welding not accepted max. fuse size gL (gG) A - Contactors with thermal overload relay the levice with the smaller admissible backup fuse (contactor or thermal overload relay) determines the fuse size Cable cross-sections for contactors main connector flexible with multicore cable end flexible with multicore cable end mm² 0.5-1.5 Cables per clamp flexible with multicore cable end mm² 0.5-1.5 Cables per clamp ACG 1			(An) In	Α	20
Light contact welding accepted max. fuse size Contact welding not accepted max. fuse size Contact welding not accepted max. fuse size gL (gG) A - For contactors with thermal overload relay the device with the smaller admissible backup fuse (contactor or thermal overload relay) determines the fuse size Cable cross-sections for contactors main connector Flexible with multicore cable end mm² Cables per clamp Frequency of operation z Contactors without thermal overload relay Mechanical life AC operated AC operated DC operated AC operated DC operated NO g 2.5 Resistance to shock according to IEC 68-2-27 Shick time 20ms sine-wave AC operated NO g Log(G) A - - - - - - - - - - - -	max. fuse size	zara or porcono	gL (ga)	/\	
Light contact welding accepted max. fuse size Contact welding not accepted max. fuse size Contact welding not accepted max. fuse size gL (gG) A - For contactors with thermal overload relay the device with the smaller admissible backup fuse (contactor or thermal overload relay) determines the fuse size Cable cross-sections for contactors main connector Flexible with multicore cable end mm² Cables per clamp Frequency of operation z Contactors without thermal overload relay Mechanical life AC operated AC operated DC operated AC operated DC operated NO g 2.5 Resistance to shock according to IEC 68-2-27 Shick time 20ms sine-wave AC operated NO g Log(G) A - - - - - - - - - - - -	Coordination tune "O" acco	ording to IEC 047 4 1			
Tax. fuse size Contact welding not accepted max. fuse size Contact welding not accepted max. fuse size Contactors with thermal overload relay the device with the smaller admissible backup fuse (contactor or thermal overload relay) determines the fuse size Cable cross-sections For contactors main connector Cable per clamp Cables per clamp Contactors without load max Contactors without thermal overload relay Contactors without toad Contactors without load Contactors without march without load Contactors without load Co			(aG) In	Δ	_
max. fuse size gL (gG) A	max. fuse size	ptod	gr (gd)	A	
max. fuse size gL (gG) A	Contact welding not accept	tad			
For contactors with thermal overload relay the device with the smaller admissible backup fuse (contactor or thermal overload relay) determines the fuse size Cable cross-sections For contactors main connector Solid or stranded mm² 0.5-1.5 flexible with multicore cable end mm² 0.5-1.5 Cables per clamp 2 solid or stranded MWG 20-14 Frequency of operation z without load 1/h 10000 Contactors without thermal overload relay AC3 I 1/h 600 Mechanical life AC operated S x 10° 3 DC operated S x 10° 5 Short time current 10s-current A 50 Power loss per pole at I //AC3 400V W 0.2 Resistance to shock according to IEC 68-2-27 Shick time 20ms sine-wave AC operated NO g 2.5		.cu	(Dp) lp	Α	_
Cable cross-sections Solid or stranded mm² 0.5-1.5 main connector Solid or stranded mm² 0.5-1.5 mm² 0.			9- (9-7)		
Solid or stranded flexible mm² (0.5-1.5) (1.5 min connector) Solid or stranded flexible mm² (0.5-1.5) (1.5 min connector) Solid or stranded flexible mm² (0.5-1.5) (1.5 min² (0.5-1.	device with the smaller adr	nissible backup fuse			
Solid or stranded flexible mm² (0.5-1.5) (1.5 min connector) Solid or stranded flexible mm² (0.5-1.5) (1.5 min connector) Solid or stranded flexible mm² (0.5-1.5) (1.5 min² (0.5-1.	Cable cross-sections				+
Flexible mm² 0.5-1.5	for contactors				0545
Sables per clamp Solid or stranded Solid or stranded AWG 20-14	main connector				
Solid or stranded AWG 20-14					
Solid or stranded AWG 20-14	Cables per clamp				
Trequency of operation z	and bot olmuly		solid or stranded	AWG	
AC3 1/h 600 AC4 1/e 1/h 120 DC3 1/h 600 Mechanical life AC operated S x 106 3 DC operated S x 106 xxxx*2 Short time current 10s-current A 50 Power loss per pole at 1/AC3 400V W 0.2 Resistance to shock according to IEC 68-2-27 Chick time 20ms sine-wave NO g 2.5 AC operated NO C 2.5	Frequency of oneration 7				<u>.</u>
AC4 1/h 120 DC3 1/h 600 Mechanical life	contactors without thermal	overload relay			
DC3 1/h 600			· ·	1/h	120
Mechanical life			· ·	1/h	600
DC operated S x 106 xxxx*2	Mechanical life	AC operated	· ·	10 ⁶	3
Power loss per pole at I _e /AC3 400V W 0.2 Resistance to shock according to IEC 68-2-27 Shick time 20ms sine-wave AC operated NO g 2.5		-	Sx	10 ⁶	XXX ^{*2}
Power loss per pole at I _e /AC3 400V W 0.2 Resistance to shock according to IEC 68-2-27 Shick time 20ms sine-wave AC operated NO g 2.5	Short time current		10s-current	Α	50
Resistance to shock according to IEC 68-2-27 Shick time 20ms sine-wave AC operated NO g 2.5	Power loss per pole			W	0.2
Shick time 20ms sine-wave AC operated NO g 2.5	Resistance to shock accor				1
	Shick time 20ms sine-way				
NC g 2.5	AC operated		NO	g	
			NC	g	2.5

^{*1} With reduced control voltage range 0.9 up to 1.0 x U_s and with reduced rated current I/AC1 according to I/AC3

^{*2} Data on request



Data according to IEC 60947-5-1, VDE 0660, EN 60947-5-1

Auxilliary Contacts		Туре	MA04-S MA05-S
Rated insulation voltage Thermal rated current I _m bis 440V	U _i	VAC	440*1
Ambient temperature	40°C	Α	5
	60°C	Α	3
Power loss per pole	I _{th}	W	0.25
Utilization category AC15	,		
Rated operational current I _e	220-240V	Α	3
	380-415V	Α	1.5
	440V	A	1
Utilization category DC13	001/		0.5
Rated operational current I _e	60V	Α	0.5
Maximum ambient temperature		_	-
Operation	open	°C	-40 bis to +60 (+90)*2
01	enclosed	°C	-40 bis to +40
Storage		°C	-40 bis to +90
Short circuit protection short circuit current 1kA, contact welding not accepted max fuse size	gL (gG)	А	10
For contactors with thermal overload relay the device with the smaller admissible control fuse (contactor or thermal overload relay) determines the fuse size			
Power consumption of coils	:ah	1//	0
AC operated	inrush	VA VA	9 4
	sealed	W	1.8
Operation range of coils in multiples of control voltage U _s			0.85 - 1.1
Switching time at control voltage $U_s \pm 10\%^{*3*4}$			
AC operated	make time	ms	13 - 18
	release time	ms	5 - 10
	arc duration	ms	10 - 15
DC operated	make time	ms	-
	release time	ms	-
	arc duration	ms	-
Cable cross-section		_	
all connectors	solid	mm²	05 - 1.5
	flexible	mm²	0.5 - 1.5
Oleman	flexible with multicore cable end	mm²	0.5 - 1.5
Clamps per pole	solid or stranded	AWG	2 20 - 14

Suitable at 690V for: earthed-neutral systems, overvoltage category I to III, polution degree 3 (standard-industry): Uimp = 4kV Data for other conditions on request

With reduced control voltage range 0.9 up to 1.0 x U_s and with reduced thermal rated current I_t to I_t /AC15 Summary switching time = release time + arc duration

Release time of NC make time of NO increase when suppressor units for voltage peak protection are used (Varistor, RC-units, Diode units)

^{*2} *3 *4 *5 Data on request



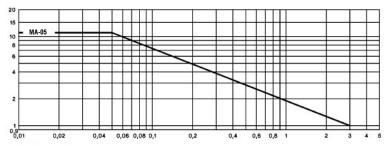
For North America - Data according UL508

Main Contacts (cULus)		Туре	MA05-S MA05-R-S	MA04-S
Rated operational current "General Use"		А	12	5
Rated operational power of three phase motors	110-120V	hp	1/2	-
at 60Hz (3ph)	200-208V	hp	1	-
	220-240V	hp	1	-
	277V	hp	1½	
Rated operational power of AC motors	110-120V	hp	1/6	-
at 60Hz (1ph)	200-208V	hp	1/2	-
	220-240V	hp	3/4	
Fuse / Short circuit current		A/kA	30/5	-
Rated voltage		VAC	300	300
Auxilliary contacts (cULus)	heavy pilot duty Standard pilot duty	AC DC	B300 R300	B300 R300

Motor P _n =AC	-	Motor Rating P _n =AC3					
400V 2	20/ 30V W	380/ 220/ 400V 230V kW kW					
- 6,6 - 4 - 3 - 2,2 - 1,5 - 1,1 - 0,75 - 0,55 - 0,37 - 0,25	- 3 - 2,2 - 1,5 - 1,1 - 0,75 - 0,55 - 0,37 - 0,25	- 37 - 22 - 30 - 16,6 - 22 - 15 - 18,5 - 11 - 15 - 7,5 - 11 - 5,5 - 7,5 - 4 - 5,5 - 3 - 4 - 2,2 - 3 - 1,5 - 2,2 - 1,1 - 1,5 - 0,76 - 1,1 - 0,55 - 0,75 - 0,37 - 0,55					

Breaking Current $I_a(=I_e=AC1)$

Α



Millions of Operations

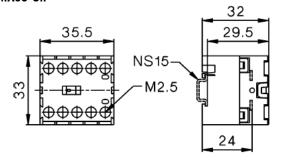


Dimensions

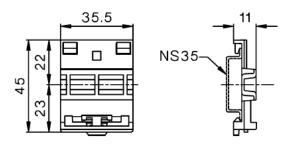
AC Operated

with screw terminals

MA04-S.. MA05-S..



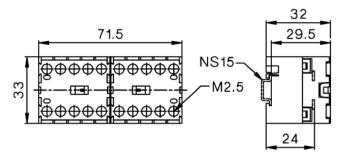
Snap-On Adaptor MA-P1039



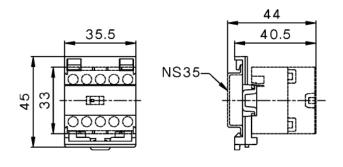
Reversing Contactors

with screw terminals

MA05-R-S..



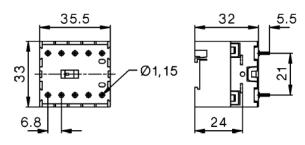
MA..-S.. with Snap-On Adaptor MA-P1039



AC Operated

with solder connections

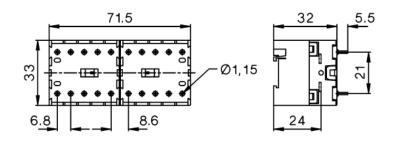
MA04-P.. MA05-P..



Reversing Contactors

with solder connections

MA05-R-S..



Mounting positions of contactors

