N... Contactor Relays

a.c. operated

4-pole, 1-stack

			N 22 E	N 31 E	N 40 E
Main contacts	N.O. + N.C		2 2	3 1	4 0
IEC	**Rated operational current**				
	AC-15	240 V	**A**	4	
		400 V	**A**	**3**	
		690 V	**A**	2	
	DC-13	**24 V**	**A / W**	**6 / 144**	
		250 V	**A / W**	0.3 / 75	
UL/CSA		**Pilot duty**		A 600, Q 300	

Main accessories

Auxiliary contacts	front mounting	**CA 5-10** 1 N.O. **/ CA 5-01** 1 N.C. **/ CA 5-..** 4-pole
	side mounting	**CAL 5-11** 1 N.O. + 1 N.C.
Timer	front mounting	**TP 40 DA**, **TP 180 DA** Direct timing **/ TP 40 IA**, **TP 180 IA** Inverse timing
Surge suppressors		**RV 5** (Varistor) **/ RC 5-1** (RC type)

8-pole, 2-stack

			N 44 E	N 53 E	N 62 E	N 71 E	N 80 E	N 33/11	N 51/11
Main contacts	N.O. + N.C		4 4	5 3	6 2	7 1	8 0	3 3 1 1	5 1 1 1
								with overlapping of lagging / leading contacts	
IEC	**Rated operational current**								
	AC-15	240 V	**A**			4			
		400 V	**A**			**3**			
		690 V	**A**			2			
	DC-13	**24 V**	**A / W**			**6 / 144**			
		250 V	**A / W**			0.3 / 75			
UL/CSA		**Pilot duty**				A 600, Q 300			

Main accessories

Auxiliary contacts	side mounting	**CAL 5-11** 1 N.O. + 1 N.C.
Surge suppressors		**RV 5** (Varistor) **/ RC 5-1** (RC type)

N... Contactor Relays

a.c. Operated

Application

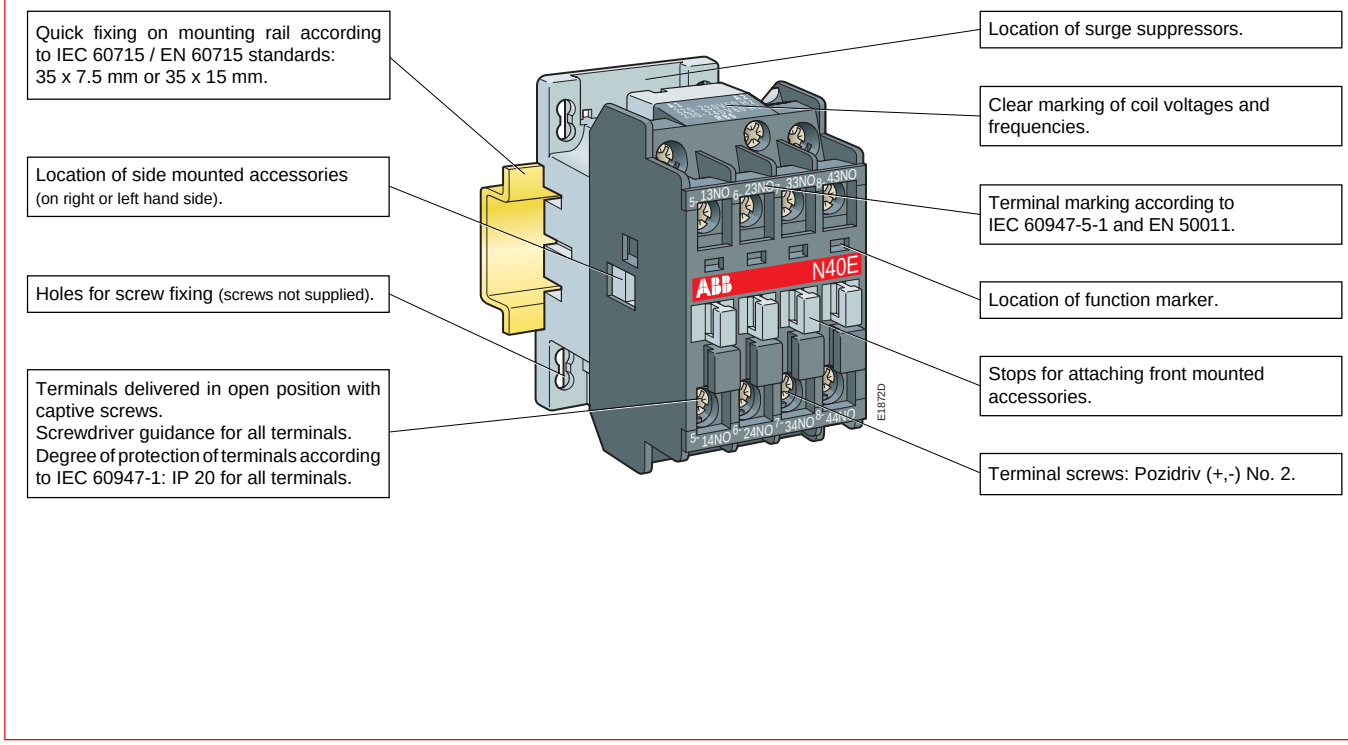
N... contactor relays are used for switching auxiliary circuits and control circuits.

Description

- Poles:
  - 1-stack contactor relays: 4-pole (mechanically linked contact elements available),
  - 2-stack contactor relays: 8-pole (mechanically linked contact elements available).
    The width of 8-pole devices is identical to that of 4-pole devices; only the depth is increased.
- Control circuit: a.c. operated with laminated magnet circuit.
- Accessories: a wide range of accessories is available.

Variants

- d.c. operated: NL..., NL Z... contactor relays with low consumption coil.
- d.c. operated: TNL... contactor relays with low consumption and large coil voltage range.



N 40 E

N 44 E

Ordering Details

Number of contacts 1st stack		2nd stack				Type	Order code	Weight kg
						state coil voltage ⌊⎓⌋ (see table below)	state coil voltage code ☐☐ (see table below)	Packing 1 piece
4-pole, 1-stack								
2	2	–	–	–	–	N 22 E ⌊⎓⌋	1SBH 141 001 R☐☐22	0.340
3	1	–	–	–	–	N 31 E ⌊⎓⌋	1SBH 141 001 R☐☐31	0.340
4	–	–	–	–	–	N 40 E ⌊⎓⌋	1SBH 141 001 R☐☐40	0.340
8-pole, 2-stack								
4	–	–	4	–	–	N 44 E ⌊⎓⌋	1SBH 141 001 R☐☐44	0.400
4	–	1	3	–	–	N 53 E ⌊⎓⌋	1SBH 141 001 R☐☐53	0.400
4	–	2	2	–	–	N 62 E ⌊⎓⌋	1SBH 141 001 R☐☐62	0.400
4	–	3	1	–	–	N 71 E ⌊⎓⌋	1SBH 141 001 R☐☐71	0.400
4	–	4	–	–	–	N 80 E ⌊⎓⌋	1SBH 141 001 R☐☐80	0.400
With overlapping of lagging / leading contacts								
3	1	–	2	1	1	N 33/11 ⌊⎓⌋	1SBH 141 001 R☐☐39	0.400
4	–	1	1	1	1	N 51/11 ⌊⎓⌋	1SBH 141 001 R☐☐59	0.400

Coil voltages and codes

Voltage ⌊⎓⌋ V - 50Hz	Voltage ⌊⎓⌋ V - 60Hz	Code ☐☐
24	24	8 1
48	48	8 3
110	110 ... 120	8 4
220 ... 230	230 ... 240	8 0
230 ... 240	240 ... 260	8 8
380 ... 400	400 ... 415	8 5
400 ... 415	415 ... 440	8 6

Other voltages: page **0**/1.

>> Accessory Fitting Details ..... page 3/8
>> Technical Data ..... page 3/10
>> Auxiliary Contacts for Safety Circuits ..... page 3/15
>> General - Approvals ..... section 7
>> Terminal Marking and Positioning ..... section 8
>> Dimensions ..... section 9

N... Contactor Relays

Accessory Fitting Details - For Ordering Details, see "Accessories"

Many configurations of accessories are possible depending on whether these are front mounted or side mounted.

Contactor types	Built-in contacts 1st stack	Built-in contacts 2nd stack	Front mounted accessories: Auxiliary contact 1-pole CA 5-... (or 1-pole CE 5-...)		Front mounted accessories: Auxiliary contact 4-pole CA 5-...		Front mounted accessories: Pneumatic timer TP .. A		Side mounted accessories: Auxiliary contact 2-pole CAL 5-11
N... Contactor Relays									
N 22 E (1)	2 2	– – – –	1 to 4 x CA 5-.. (or 1 x CE 5-..) (2)	or	1 x CA 5-... (4-pole)	or	1 x TP .. A	+	1 to 2 x CAL 5-11
N 31 E (1)	3 1	– – – –	1 to 4 x CA 5-.. (1 to 2 x CE 5-.. max.) (3)	or	1 x CA 5-... (4-pole)	or	1 x TP .. A	+	1 to 2 x CAL 5-11
N 40 E	4 0	– – – –							
N 44 E	4 0	0 4 – –							
N 53 E	4 0	1 3 – –							
N 62 E	4 0	2 2 – –	–		–		–		1 to 2 x CAL 5-11
N 71 E	4 0	3 1 – –							
N 80 E	4 0	4 0 – –							
N... Contactor Relays with overlapping of lagging / leading contacts									
N 33/11	3 1	0 2 1 1	–		–		–		1 to 2 x CAL 5-11
N 51/11	4 0	1 1 1 1							

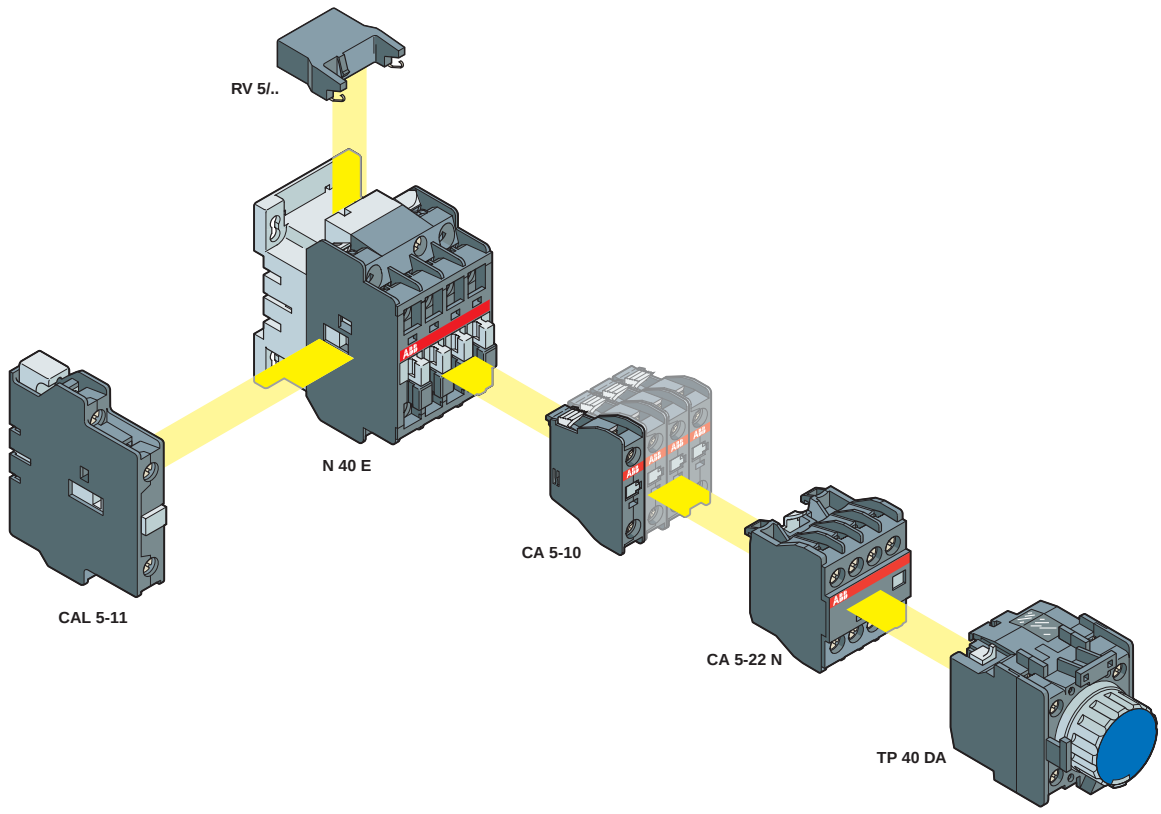
(1) 2 x N.C. front mounted auxiliary contacts maximum in mounting position 5.
N 22 E and **N 31 E** in mounting position 5, **TP..DA** not allowed.

(2) **CE5-..** auxiliary contacts **not allowed in mounting position 5.**

(3) The total number of **N.O.** or **N.C. CE 5-..** and other **additional N.C. CA 5-..** auxiliary contacts is **limited to 2.**
CE 5-.. auxiliary contacts **not allowed in mounting position 5.**

N... contactor relays and main accessories

For mounting position diagram, see "Technical Data"



Contact Utilization Characteristics

Utilization characteristics according to IEC

Contactor relay types			N...	NL...	NL Z...	TNL...
Rated operational voltage U_e max.		**V**	690			
Conventional free air thermal current I_{th} according to IEC 60947-5-1, open contactors θ ≤ 40 °C		**A**	16			
Rated frequency limits		**Hz**	25 ... 400			
Rated operational current I_e / AC-15 according to IEC 60947-5-1						
24-127 V	50/60 Hz	**A**	6			
230-240 V	50/60 Hz	**A**	4			
400-415 V	50/60 Hz	**A**	3			
500 V	50/60 Hz	**A**	2			
690 V	50/60 Hz	**A**	2			
Rated operational current I_e / DC-13 according to IEC 60947-5-1						
24 V d.c.		**A / W**	6 / 144			
48 V d.c.		**A / W**	2.8 / 134			
72 V d.c.		**A / W**	1 / 72			
110 V d.c.		**A / W**	0.55 / 60			
125 V d.c.		**A / W**	0.55 / 69			
220 V d.c.		**A / W**	0.30 / 66			
250 V d.c.		**A / W**	0.30 / 75			
Making capacity according to IEC 60947-5-1			10 x I_e / AC-15			
Breaking capacity according to IEC 60947-5-1			10 x I_e / AC-15			
Short-circuit protection U_e ≤ 500 V a.c. - gG type fuse		**A**	10			
Rated short-time withstand current I_{cw} at 40 °C ambient temp., in free air, from a cold state	1.0 s	**A**	100			
	0.1 s	**A**	140			
Minimum switching capacity		**V / mA**	17 / 5			
with failure rate acc. to IEC 60947-5-4			≤ 10^{-6}	≤ 10^{-7}		
Non-overlapping time between N.O. and N.C. contacts		**ms**	≥ 2			
Heat dissipation per pole at 6 A		**W**	0.10			
Max. electric switching frequency		**cycles/h**	1200			
Mechanical durability						
– millions of operating cycles			> 20			
– max. mechanical switching frequency		**cycles/h**	6000			

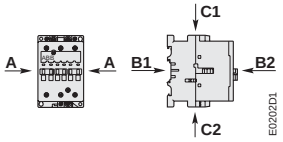
Utilization characteristics according to UL/CSA

Contactor relay types		N...	NL...	NL Z...	TNL...
Max. rated voltage	**V**	600			
Pilot duty		A 600, Q 300			

>> Electrical Durability Curves ..... section 4 >> Auxiliary Contacts for Safety Circuits ..... page 3/15 >> Terminal Marking and Positioning ..... section 8

General Technical Data

Contactor relay types		N...	NL...	NL Z...	TNL...
Rated insulation voltage U_i					
according to IEC 60947-5-1	**V**	690			
according to UL/CSA	**V**	600			
Rated impulse withstand voltage $U_{imp.}$	**kV**	8			
Standards		Devices complying with IEC 60947-5-1 and EN 60947-5-1			
Air temperature close to contactor		see "Conditions for use", for control voltage limits and authorized mounting positions			
– for operation in free air	**°C**	-40 to +70			-40 to +55
– for storage	**°C**	-60 to +80			
Climatic withstand		acc. to IEC 60068-2-30 and 60068-2-11 - UTE C 63-100 specification II			
Operating altitude	**m**	≤ 3000			
Shock withstand					
acc. IEC 60068-2-27 and EN 60068-2-27					
Mounting position 1		1/2 sinusoidal shock for 11 ms: no change in contact position			
	Shock direction	Closed or open position	Closed position	Open position	
	A	20 g	20 g	10 g	
	B1	5 g	15 g	5 g	
	B2	15 g	10 g	10 g	
	C1	20 g	20 g	8 g	
	C2	20 g	14 g	8 g	



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>> Conditions for Use ..... page 3/13
>> Mounting Positions ..... page 3/13
>> Certifications - Approvals ..... section 7
>> Dimensions ..... section 9

Magnet System Characteristics for N... Contactor Relays

Contactor relay types			**N...**
Rated control circuit voltage U_c	50/60 Hz	**V**	24 ... 690
Coil operating limits acc. to IEC 60947-5-1			0.85 ... 1.1 x **U_c** (at $\theta \leq 55$ °C) Please also refer to "Conditions for Use"
Drop-out voltage in % of **U_c**			approx. 40 ... 65 %
Coil consumption			
Average pull-in value	50 Hz	**VA**	70
	60 Hz	**VA**	80
	50/60 Hz (1)	**VA / VA**	74 / 70
Average holding value	50 Hz	**VA / W**	8 / 2
	60 Hz	**VA / W**	8 / 2
	50/60 Hz (1)	**VA / W**	8 / 2
Operating time			
between coil energization and:			
– N.O. contact closing		**ms**	10 ... 26
– N.C. contact opening		**ms**	7 ... 21
between coil de-energization and:			
– N.O. contact opening		**ms**	4 ... 11
– N.C. contact closing		**ms**	9 ... 16

(1) 50/60 Hz coils: see "Coil Voltage Code Table".

Magnet System Characteristics for NL... and NL Z... Contactor Relays

Contactor relay types			**NL...**	**NL Z...**
Rated control circuit voltage U_c		**V d.c.**	12 ... 250	24 and 48
Coil operating limits acc. to IEC 60947-5-1			0.85 ... 1.1 x **U_c** ($\theta \leq 55$ °C) Please also refer to "Conditions for Use"	
Drop-out voltage in % of **U_c**			approx. 10 ... 30 %	
Coil consumption - Average values				
– pull-in value		**W**	3.0	2.4
– holding value		**W**	3.0	2.4
Coil time constant				
– open	L/R	**ms**	28	
– closed	L/R	**ms**	74	
Operating time				
between coil energization and:				
– N.O. contact closing		**ms**	50 ... 100	
– N.C. contact opening		**ms**	20 ... 70	
between coil de-energization and:				
– N.O. contact opening		**ms**	10 ... 17 (1)	
– N.C. contact closing		**ms**	16 ... 27 (1)	

(1) The use of surge suppressors increases the opening time with a factor of 1.1 to 1.5 for a varistor suppressor and a factor of 1.5 to 3 for a transil diode suppressor.

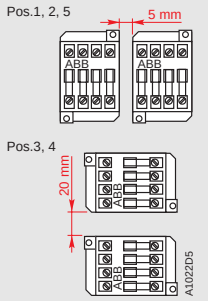
Magnet System Characteristics for TNL... Contactor Relays

Contactor relay types			**TNL...**
Rated control circuit voltage U_c		**V d.c.**	17 ... 264
Coil operating limits			**U_c** min. ... **U_c** max. ($\theta \leq 55$ °C) Please also refer to "Conditions for Use"
Drop-out voltage in % of **U_c** max.			approx. 9 ... 25 %
Coil consumption for **U_c** min. ... **U_c** max.		**W**	2.5 ... 8.5 at pull-in and holding
Coil time constant			
– open	L/R	**ms**	28
– closed	L/R	**ms**	74
Operating time			
between coil energization and:			
– N.O. contact closing		**ms**	50 ... 100
– N.C. contact opening		**ms**	20 ... 70
between coil de-energization and:			
– N.O. contact opening		**ms**	10 ... 17 (1)
– N.C. contact closing		**ms**	16 ... 27 (1)

(1) The use of surge suppressors increases the opening time with a factor of 1.1 to 1.5 for a varistor suppressor and a factor of 1.5 to 3 for a transil diode suppressor.

Mounting Characteristics

Contactor relay types	N...	NL...	NL Z...	TNL...
Mounting positions	see "Conditions for Use"			
Mounting distances	No mounting distance required between contactors			Distances for ambient temperature 20...55 °C
Fixing				
on rail	⎍ 35 x 7.5 mm			
according to IEC 60715 and EN 60715	⎍ 35 x 15 mm			
by screws (not supplied)	2 x M4			



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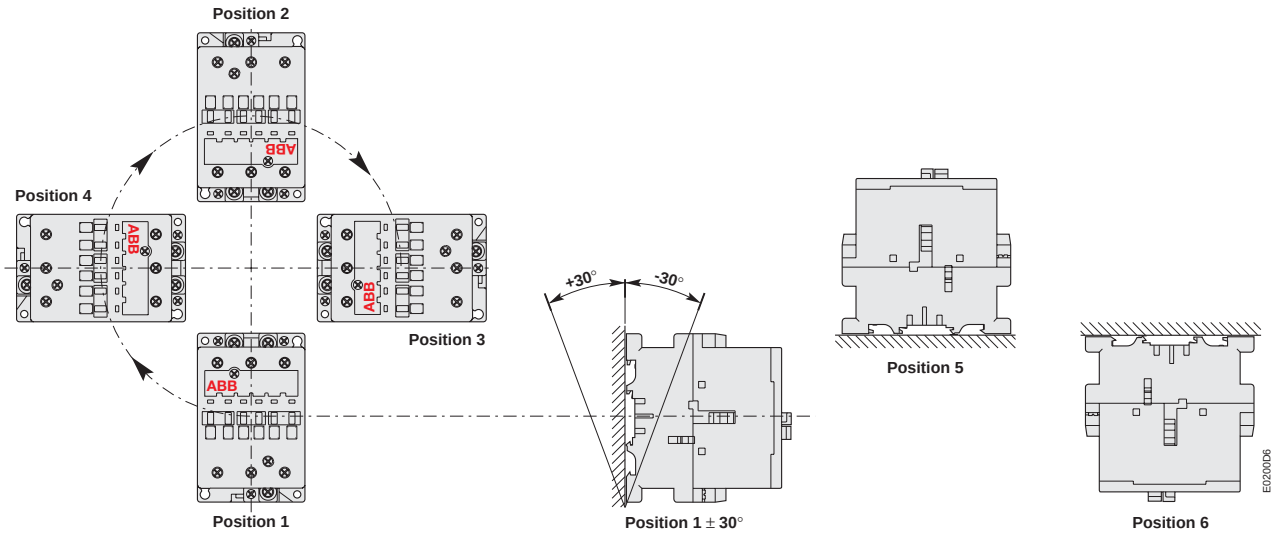
Conditions for Use

Sustainable utilization conditions for contactor relays involving at the same time the Mounting position, Ambient temperature and Control Voltage operating limits are summarized in the table below.

Contactor relay types		N...	NL...	NL Z...	TNL...
Control Voltage / Ambient temperature					
Mounting positions 1, 2, 3, 4, 5 (1)	≤ 55 °C	0.85 ... 1.1 x U_c			U_c min. ... U_c max.
	55 ... 70 °C	U_c			unauthorized
Mounting position 1 ± 30°	≤ 55 °C	0.85 ... 1.1 x U_c		unauthorized	U_c min. ... U_c max.
	55 ... 70 °C	U_c		unauthorized	
Mounting position 6	≤ 55 °C	0.95 ... 1.1 x U_c	unauthorized		
	> 55 °C	unauthorized			

(1) NL 22 E, NL Z 22 E, and TNL 22 E not allowed in position 5.

Mounting Positions (see the above table for authorized positions)



>> Coil Voltage Code Table ..... page 0/1
>> Influence of the Length of Conductors Used in Control Circuit ..... page 2/88
>> Terminal Marking and Positioning ..... section 8
>> Dimensions ..... section 9

Connecting Characteristics

Contactor relay types			N...	NL...	NL Z...	TNL...
Terminals			 with cable clamp			
Connecting capacity (min. ... max.)						
Pole and coil terminals						
Rigid solid		**1 x mm²**	1 ... 4			
		2 x mm²	1 ... 4			
Flexible with cable end		**1 x mm²**	0.75 ... 2.5			
		2 x mm²	0.75 ... 2.5			
Lugs						
– Pole terminals		L **mm** ≤	7.7			
		l **mm** >	3.7			
– Coil terminals		L **mm** ≤	8			
		l **mm** >	3.7			
Capacity according to UL/CSA		**AWG**	18 - 14			
Degree of protection			Protection against direct contact in acc. with EN 50274			
acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529						
All terminals			IP 20			
Screw terminals			(delivered in open position, screws of unused terminals must be tightened)			
All terminals			M 3.5 (+,-) pozidriv 2 screws with cable clamp			
Tightening torque						
– recommended		**Nm / lb.in**	1.00 / 9			
– max.		**Nm**	1.20			

>> Terminal Marking and Positioning ..... **section 8**