Industrial control relays

Pilot duty rated for control circuits
Positively guided, AC & DC controlled

Control relays

NF / NFZ control relays

- 4 & 8 pole control relays
- Pilot duty rated up to 10 A
- For AC & DC control circuit switching
- Electronic AC/DC coil input voltages
- NFZ with low power consumption coils
- Direct PLC control ≥ 24VDC, 500mA (NFZ)
- Mechanically linked contacts for safety
- Wide variety of accessories

NS / NSL control relays

- 4 & 8 pole control relays
- For high-volume applications
- Pilot duty rated up to 10 A
- Bulk packaging available
- Screw & spring termination
- Mechanically linked contacts for safety
- AC or DC coil input voltages

K / KC control & interface relays

- 4 pole miniature control relays
- Compact solutions up to 10 A
- Quick-connect & PCB mount options
- Interface relays for PLC control
- Mechanically linked contacts for safety
- AC or DC coil input voltages

Standards & approvals	NF / NFZ	NS / NSL	K / KC
UL	E252354	E252354	E48139
CSA	c UL us	c UL us	LR56745
CE	✓	✓	✓
CCC	✓	✓	✓

NOTE: K/C6 quick-connect and PCB-mount versions are UL recognized.

General information
Pilot duty ratings and overload trip classes

Pilot duty ratings for AC control circuit contacts

Contact rating designation	Continuous thermal, test current (A)	Maximum current, 50/60 Hz (A)									
		120 v ac		240 v ac		480 v ac		600 v ac		Volt-amperes	
		Make	Break	Make	Break	Make	Break	Make	Break	Make	Break
A150	10	60	6.00	-	-	-	-	-	-	7200	720
A300	10	60	6.00	30	3.00	-	-	-	-	7200	720
A600	10	60	6.00	30	3.00	15	1.50	12	1.20	7200	720
B150	5	30	3.00	-	-	-	-	-	-	3600	360
B300	5	30	3.00	15	1.50	-	-	-	-	3600	360
B600	5	30	3.00	15	1.50	7.5	0.75	6	0.60	3600	360
C150	2.5	15	1.5	-	-	-	-	-	-	1800	180
C300	2.5	15	1.5	7.5	0.75	-	-	-	-	1800	180
C600	2.5	15	1.5	7.5	0.75	3.75	0.375	3.00	0.30	1800	180
D150	1.0	3.60	0.60	-	-	-	-	-	-	432	72
D300	1.0	3.60	0.60	1.80	0.30	-	-	-	-	432	72
E150	0.5	1.80	0.30	-	-	-	-	-	-	216	36

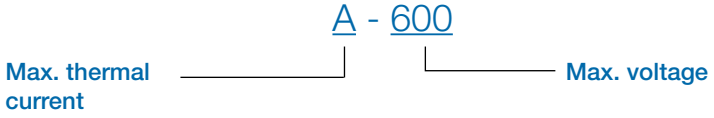
Mechanical switching ratings and test values as published in Table 1-4-1 of NEMA ICS 5-2000 (R2005, R2010)

Pilot duty ratings for DC control circuit contacts

Contact rating designation	Continuous thermal, test current (A)	Maximum current, 50/60 Hz (A)			
		120 v dc	250 v dc	301 to 600 v dc	Volt-amperes
		Make / Break	Make / Break	Make / Break	Make / Break
N150	10	2.2	-	-	275
N300	10	2.2	1.1	-	275
N600	10	2.2	1.1	0.40	275
P150	5.0	1.1	-	-	138
P300	5.0	1.1	0.55	-	138
P600	5.0	1.1	0.55	0.20	138
Q150	2.5	0.55	-	-	69
Q300	2.5	0.55	0.27	-	69
Q600	2.5	0.55	0.27	0.10	69
R150	1.0	0.22	-	-	28
R300	1.0	0.22	0.11	-	28

Mechanical switching ratings and test values as published in Table 1-4-1 of NEMA ICS 5-2000 (R2005, R2010)

Pilot duty rating explanation



General information
NF/NFZ control relays
4 & 8 pole

Description
NF / NFZ control relays are provided in either four or eight auxiliary pole configurations with a variety of accessories including additional auxiliary contacts and electronic timers.

Application
NF / NFZ control relays are pilot duty rated and primarily used for switching both AC and DC control circuits.

Control circuit types
NF / NFZ coils are designed to utilize both AC (50/60 Hz) and DC control circuit inputs ranging from 12…500V. Surge suppression is included. NFZ types offer low power consumption coils.

Control relay types
4-pole: NF(Z)22E, NF(Z)31E, NF(Z)40E

8-pole: NF(Z)44E, NF(Z)53E, NF(Z)62E
NF(Z)71E, NF(Z)80E

Quick DIN-rail mount & dismount, no tools required
- 35 x 7.5mm &
- 35 x 15mm

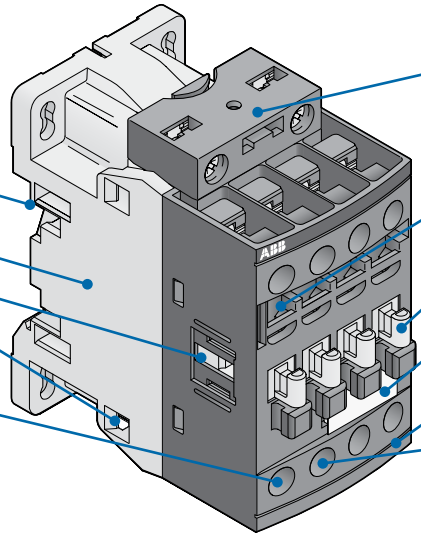
Integral surge suppression

Actuator for side-mount accessories

Contoured sides for easy access to panel mounting holes

Terminals on NF / NFZ control relays are delivered in open position with captive screws (screws of unused terminals must be tightened)

IP20 degree protection according to IEC/EN 60947-1; protection from live parts according to VDE0106 Part. 100.



Detachable coil terminals
- Can be pre-wired prior to installation
- Can easily be rotated from top (standard) to bottom

Front-mount coil termination available (4-pole only)

Stops for attaching front-mount accessories (4-pole only)

Function markers included as standard on NF / NFZ control relays

Clear indication of coil voltages and frequencies

Terminal screws:
- Posidrive (+,-) No 2

Catalog number explanation
For reference only – not all combinations will produce valid catalog numbers

NF 31 E - 13

Control relay type

Control relay type
- 22 = 2 NO / 2 NC
- 31 = 3 NO / 1 NC
- 40 = 4 NO
- 44 = 4 NO / 4 NC
- 53 = 5 NO / 3 NC
- 62 = 6 NO / 2 NC
- 71 = 7 NO / 1 NC
- 80 = 8 NO

Coil voltage code
(see product selection pages)

NF, 4 & 8 pole
For pilot duty applications up to 10 A
Electronic AC/DC operated coils

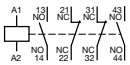
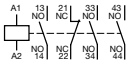
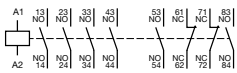
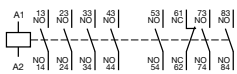
NF22E

NF44E

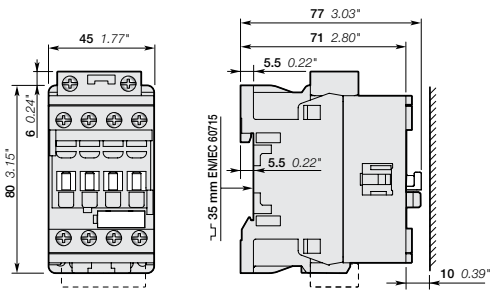
Description

- **NF** control relays include an electronic coil interface accepting a wide control voltage **U_c** min. ... **U_c** max. Only four coils cover control voltages between 24...500 V 50/60 Hz or 20...500 V DC
- **NF** control relays can manage large control voltage variations. One coil (i.e. 100...250 V 50/60 Hz - DC) can be used for different control voltages used worldwide without any coil change
- **NF** control relays have built-in surge protection and do not require additional surge suppressors
- The control relays have mechanically-linked auxiliary contacts compliant with Annex L of IEC 60947-5-1 and include the "Mechanically Linked" symbol on their side
- 8-pole control relays are mounted with a non-removable auxiliary contact block (2nd stack).

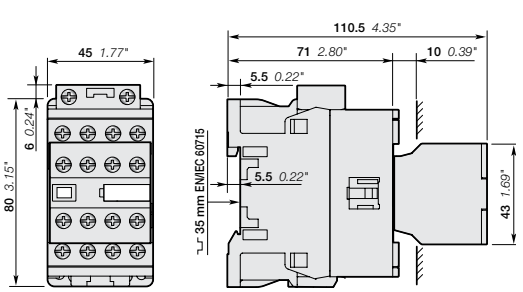
Ordering Details

Number of contacts 1st stack	2nd stack	Control voltage Range U_c min. ... U_c max. V 50/60 Hz	V DC	Catalog number
		24...60	20...60	NF22E-11
		48...130	48...130	NF22E-12
		100...250	100...250	NF22E-13
2 NO / 2 NC		250...500	250...500	NF22E-14
		24...60	20...60	NF31E-11
		48...130	48...130	NF31E-12
		100...250	100...250	NF31E-13
3 NO / 1 NC		250...500	250...500	NF31E-14
		24...60	20...60	NF40E-11
		48...130	48...130	NF40E-12
		100...250	100...250	NF40E-13
4 NO		250...500	250...500	NF40E-14
		24...60	20...60	NF44E-11
		48...130	48...130	NF44E-12
		100...250	100...250	NF44E-13
4 NO / 4 NC		250...500	250...500	NF44E-14
		24...60	20...60	NF53E-11
		48...130	48...130	NF53E-12
		100...250	100...250	NF53E-13
5 NO / 3 NC		250...500	250...500	NF53E-14
		24...60	20...60	NF62E-11
		48...130	48...130	NF62E-12
		100...250	100...250	NF62E-13
6 NO / 2 NC		250...500	250...500	NF62E-14
		24...60	20...60	NF71E-11
		48...130	48...130	NF71E-12
		100...250	100...250	NF71E-13
7 NO / 1 NC		250...500	250...500	NF71E-14
		24...60	20...60	NF80E-11
		48...130	48...130	NF80E-12
		100...250	100...250	NF80E-13
8 NO		250...500	250...500	NF80E-14

Main dimensions mm, *inches*



NF...22E, NF...31E, NF...40E



NF...44E, NF...53E, NF...62E, NF...71E, NF...80E

IEC / UL / CSA technical data
NF(Z), 4 & 8 pole
Utilization characteristics

Contact utilization characteristics according to IEC

Contactor relay types	AC / DC operated	NF(Z)
Standards		IEC 60947-1 / 60947-5-1 and EN 60947-1 / 60947-5-1
Rated operational voltage Ue max.		690 V
Rated frequency (without derating)		50 / 60 Hz
Conventional free-air thermal current Ith $\theta \leq 40$ °C		16 A
Ie / Rated operational current AC-15		
acc. to IEC 60947-5-1	24-127 V 50/60 Hz	6 A
	220-240 V 50/60 Hz	4 A
	400-440 V 50/60 Hz	3 A
	500 V 50/60 Hz	2 A
	690 V 50/60 Hz	2 A
Rated making capacity AC-15		10 x Ie AC-15 acc. to IEC 60947-5-1
Rated breaking capacity AC-15		10 x Ie AC-15 acc. to IEC 60947-5-1
Ie / Rated operational current DC-13		
acc. to IEC 60947-5-1	24 V DC	6 A / 144 W
	48 V DC	2.8 A / 134 W
	72 V DC	1 A / 72 W
	110 V DC	0.55 A / 60 W
	125 V DC	0.55 A / 69 W
	220 V DC	0.27 A / 60 W
	250 V DC	0.27 A / 68 W
	400 V DC	0.15 A / 60 W
	500 V DC	0.13 A / 65 W
	600 V DC	0.1 A / 60 W
Short-circuit protection device gG type fuse		10 A
Rated short-time withstand current Icw	for 1.0 s	100 A
	for 0.1 s	140 A
Minimum switching capacity		12 V / 3 mA
with failure rate acc. to IEC 60947-5-4		10^{-7}
Non-overlapping time between N.O. and N.C. contacts		≥ 2 ms
Power dissipation per pole at 6 A		0.1 W
Max. electrical switching frequency	AC-15	1200 cycles/h
	DC-13	900 cycles/h
Mechanically linked contacts acc. to annex L of IEC 60947-5-1		Built-in N.O. or N.C. auxiliary contacts and additional N.O. or N.C. auxiliary contacts (CA4, CAL4 aux. contact blocks) are mechanically linked contacts.

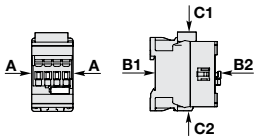
Contact utilization characteristics according to UL / CSA

Contactor relay types	AC / DC operated	NF(Z)
Standards		UL 508, CSA C22.2 N°14
Max. operational voltage		600 V AC, 600 V DC
Pilot duty		A600, Q600
AC thermal rated current		10 A
AC maximum volt-ampere making		7200 VA
AC maximum volt-ampere breaking		720 VA
DC thermal rated current		2.5 A
DC maximum volt-ampere making-breaking		69 VA

General technical data
NF(Z) 4 & 8 pole
Coil, mounting & operating characteristics

General technical data

Contactor types	AC / DC operated	NF(Z)
Rated insulation voltage Ui		
acc. to IEC 60947-5-1		690 V
acc. to UL / CSA		600 V
Rated impulse withstand voltage Uimp.		6 kV
Electromagnetic compatibility		Devices complying with IEC 60947-1 / EN 60947-1 - Environment A
Ambient air temperature close to contactor		
Operation in free air		-40...+70 °C
Storage		-60...+80 °C
Climatic withstand		Category B according to IEC 60947-1 Annex Q
Maximum operating altitude (without derating)		3000 m
Mechanical durability		
Number of operating cycles		20 millions operating cycles
Max. switching frequency		6000 cycles/h
Shock withstand		
acc. to IEC 60068-2-27 and EN 60068-2-27		
Mounting position 1		



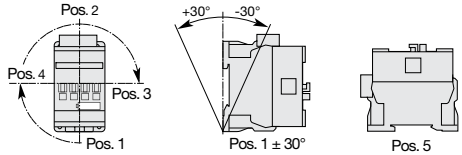
Shock direction	1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position
A	30 g
B1	25 g closed position / 5 g open position
B2	15 g
C1	25 g
C2	25 g

Vibration withstand	5...300 Hz
acc. to IEC 60068-2-6	4 g closed position / 2 g open position

Magnet system characteristics

Contactor relay types		AC / DC operated	NF(Z)
Coil operating limits		AC supply	At θ ≤ 60 °C 0.85 x Uc min...1.1 x Uc max.
acc. to IEC 60947-5-1			At θ ≤ 70 °C 0.85 x Uc min...Uc max.
		DC supply	At θ ≤ 60 °C 0.85 x Uc min...1.1 x Uc max.
			At θ ≤ 70 °C (AF) 0.85 x Uc min...Uc max. - (NFZ) 0.85 x Uc min...1.1 x Uc max.
AC control voltage	Rated control circuit voltage Uc		24...500 V AC
50/60 Hz	Coil consumption	Average pull-in value	(NF) 50 VA - (NFZ) 16 VA
		Average holding value	(NF) 2.2 VA / 2 W - (NFZ) 1.7 VA / 1.5 W
DC control voltage	Rated control circuit voltage Uc		12...500 V DC
	Coil consumption	Average pull-in value	(NF) 50 W - (NFZ) 12...16 W
		Average holding value	(NF) 2 W - (NFZ) 1.7 W
PLC-output control			(NFZ) ≥ 500 mA 24 V DC
Drop-out voltage			≤ 60 % of Uc min.
Voltage sag immunity acc. to SEMI F47-0706			(NFZ) conditions of use on request
Dips withstand			
-20 °C ≤ θ ≤ +60 °C			(NFZ) 22 ms average
Operating time			
Between coil energization and:		N.O. contact closing	40...95 ms
		N.C. contact opening	38...90 ms
Between coil de-energization and:		N.O. contact opening	11...95 ms
		N.C. contact closing	13...98 ms

Mounting characteristics

Contactor types		AC / DC operated	NF(Z)
Mounting positions			
			Max. add-on N.C. auxiliary contacts: see accessory fitting details for a NF contactor relay
Mounting distances			The contactor relays can be assembled side by side.
Fixing	On rail according to IEC 60715, EN 60715		35 x 7.5 mm or 35 x 15 mm
	By screws (not supplied)		2 x M4 screws placed diagonally

General technical data
NF(Z), 4 & 8 pole
Terminal characteristics

Connecting characteristics

Contactor types	AC / DC operated		NF(Z)
Main terminals			
			Screw terminals with cable clamp
Connection capacity (min. ... max.)			
Pole and coil terminals			
	Rigid	1 x	1...2.5 mm²
		2 x	1...2.5 mm²
	Flexible with non insulated ferrule	1 x	0.75...2.5 mm²
		2 x	0.75...2.5 mm²
	Flexible with insulated ferrule	1 x	0.75...2.5 mm²
		2 x	0.75...1.5 mm²
	Lugs	L <	8 mm
Connection capacity acc. to UL/CSA		1 or 2 x	AWG 18...14
Stripping length			10 mm
Tightening torque			
	Pole terminals		1.2 Nm / 11 lb.in
	Coil terminals		1.2 Nm / 11 lb.in
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529			
All terminals			IP20
Screw terminals			Delivered in open position, screws of unused terminals must be tightened
All terminals			M3.5
	Screwdriver type		Flat Ø 5.5 / Pozidriv 2