BK 400 relay - Safety critical, 4 contacts

Datasheet

Description

The BK 400 safety critical, heavy duty and weld resistant relay has 4 double make / double break C/O contacts (form Z). Weld no transfer and silver tin oxide safety contacts are standard. The plug-in design offers secure locking feature for maximum ease of maintenance (no wires need to be disconnected or other hardware removed for relay inspection or replacement).

The resistance to impact and vibration is conforming the standards for Railway Transported Equipment. Positive mechanical keying of relay to socket is built into relay and socket during manufacture and terminal identifications are clearly marked on identification plate that is permanently attached to the relay.

The BK 400 is pluggable in the following sockets: EA 102 B, EA 102 BF, EA 103 BF, EA 104 B, EA 104 BF, EA 105 BF, EA 112 BF.

Application

The BK relay is designed for safety critical applications where a high degree of resistance to welding is required. Stationary contacts are silver tin oxide. Mobile contacts are hard silver laminated to copper. In a power interruption situation relay armature will assure a “safe” position. This is due to the strength of the 2 compressed springs which pushes the armature back into the rest position.

Features

- Instantaneous
- Safety critical
- Weld resistant
- Weld no transfer safety contacts standard
- Plug-in design with secure locking feature
- 4 double make / double break C/O c ontacts (form Z), 12 A
- Contact life (mechanical) of 100 million cycles
- -40 ºC...+80 ºC operating temperature.

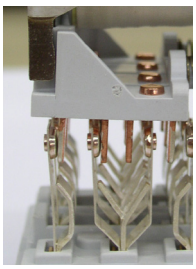
Benefits

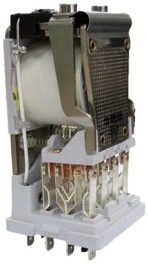
- Proven reliable in heavy duty application
- Weld no transfer
- Long life cycle
- Easy to maintain and replace
- Used in safety critical application
- Low life cycle cost
- No maintenance

Railway compliancy

- NF F 62-002 Rolling stock- Instantaneous relays contacts and sockets
- NF F 70-031 section 7.1.2. and 7.1.3 (for weld resistant contacts)
- NF F 16-101/102 Fire behaviour - Railway rolling stock

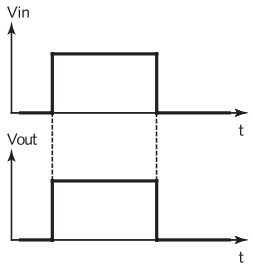
BK 400 relay
Technical specifications





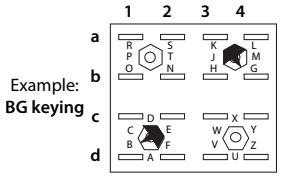
Functional and connection diagrams

Timing diagram



Relay pin correspondence

Relay pin correspondence



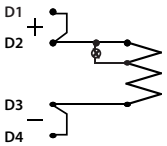
Example:
BG keying

(rear view of relay shown)

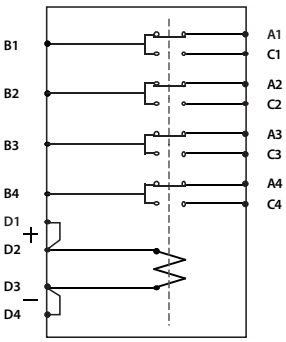
N.B.1 :
On 500VDC and 700VDC relays, coil is connected only to D1 and D4. D2 and D3 are not wired and transil or diode protections are not available.
N.B.2 :
Transil not needed on VAC coil relays

Led (V) option

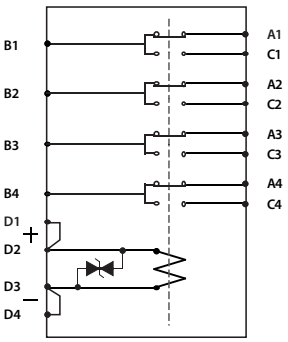
(respect polarity)



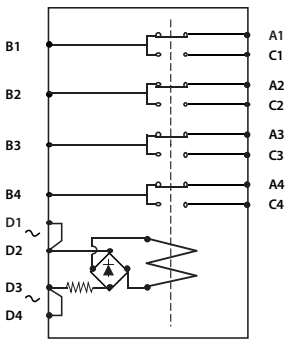
Connection diagram



VDC Models
(no Transil protection)



VDC Models
(with Transil protection)



VAC Models
N.B.: Transil not needed on VAC coil relays.

BK 400 relay
Technical specifications

Coil data - DC versions

Keying	Unom (VDC)	Uoperating (VDC)	Pnom (W)	Uhold (VDC)	Udrop-out (VDC)	R coil (Ω) (1)	L/R (ms) (2)
ME	12	8 / 16	3.5	6.25	1.25	40	40
AG	24	16 / 33	3.5	13.5	2.5	170	40
FL	36	25 / 45	3.5	21	3.5	390	40
DG	48	33 / 60	3.5	28.5	4.5	625	40
BG	72	48 / 90	3.5	40.5	6.5	1600	40
US	96	65 / 120	3.8	50	9	2400	40
EG	115	77 / 144	3.5	60	11.5	4000	40
FG	550	400 / 660	4	300	50	75500	40
UT	700	450 / 900	4.2	380	60	115000	40

(1) Coil resistance tol.: ± 8% at 20 °C
(2) Valid for closed relay.

Coil data - AC versions

Keying	Unom (VAC)	Uoperating (VAC)	Pnom (VA)	Uhold (VAC)	Udrop-out (VAC)	R coil (Ω) (1)	L/R (ms) (2)
EM	127	88 / 143	4	71.5	12	4000	40
CG	220	176 / 242	3	129	21	14350	30

(1) Coil resistance tol.: ± 8% at 20 °C
(2) Valid for closed relay.

Contact data – ($AgSnO_2$ contacts)

Nominal current	12 A resistive, 10 A resistive according to CF 62-002
Nominal breaking capacity and life	Please refer to derating curves
Contact overload withstand	At 24 VDC: 200 A at L/R = 0 for 10 ms (10 operations at the rate of 1 operation per minute)
Contact closure time	Pick-up time N/O < 55 ms Drop-out* time N/C < 25 ms
Contact opening time	Pick-up time N/C < 50 ms Drop-out* time N/O < 15 ms
Minimum contact continuity	20 mA at 110 VDC & 100 mA at 24 VDC
Number of contacts	4 double make / double break contacts (form Z)
Contact material	Silver tin oxide (10%) mobile contacts /hard silver overlay laminated to copper fixed contacts
Contact resistance – initial	30 mΩ max at 5 A
Contact resistance – end of life	60 mΩ max at 5 A

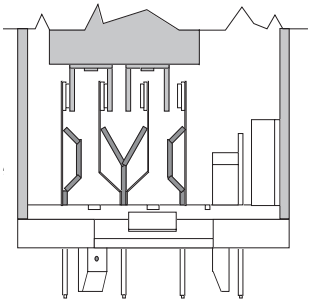
** With P option less than 95 ms*

BK 400 relay
Technical specifications

Contact design

Weld no transfer function:

If one N/O contact welds, no N/C contact can close (and vice versa) and cause an overlapping of functions. A type test is realized to insure the relays meet this important safety requirement. 150% of max. operating voltage is applied to the relay while holding 1 N/C contact closed by mechanical means. Under these conditions, it is verified that no N/O contact makes.



Double break contacts

Extend the contact life on highly inductive DC currents.

Electrical characteristics

Dielectric strength	2000 VAC, 1 min between contacts, 2600 VAC, 1 min between contacts, coil and frame
Insulation resistance	≥ 1000 MΩ at 500 VDC

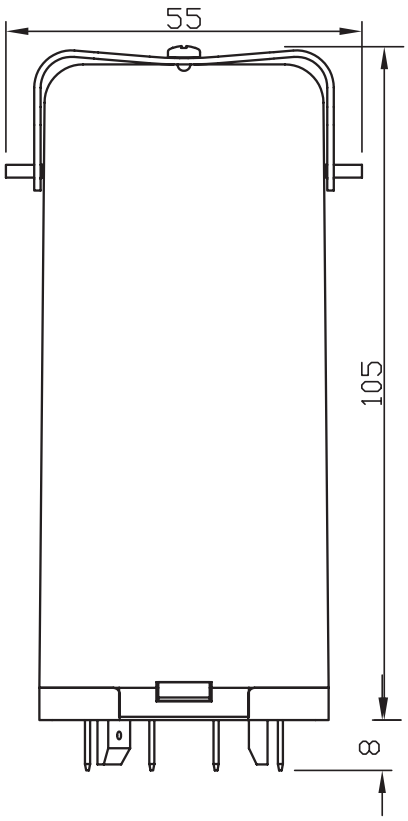
BK 400 relay
Technical specifications

Mechanical & environmental characteristics

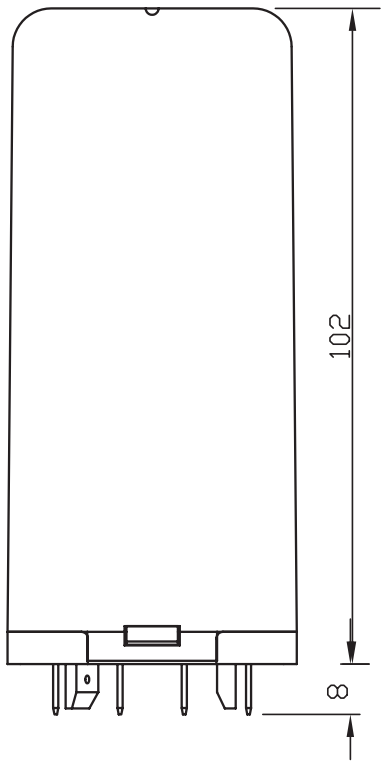
Operating temperature	- 40 °C...+ 80 °C
Mechanical life	> 100 x 10^6 operations
Weight	450 g
Vibration	NF F 62-002 tests are conducted in the X, Y , Z planes at frequency between 10 & 150 cycles (sinusoidal) at 2 g.
Shock	NF F 62-002 tests are applied in both directions in the X, Y & Z planes. Then successive shocks are administered consisting of the positive component of sinusoidal with a value of 30 g, 18 ms. Other vibration and shock tests can be performed on request
Humidity	93% RH, 40 °C for 4 days
Salt mist	5% NaCl, 35 °C for 4 days
Fire and smoke	Materials: Polycarbonate (cover) / Polyester melamine (base) Note: These materials have been tested for fire propagation and smoke emission according to standards NF F 16-101, NF F 16-102 and have been approved to be used on the English/French train channel shuttle.
Protection level	IP40 (relay on socket)

BK 400 relay
Technical specifications

Dimensions (mm)



Used
with locking brackets



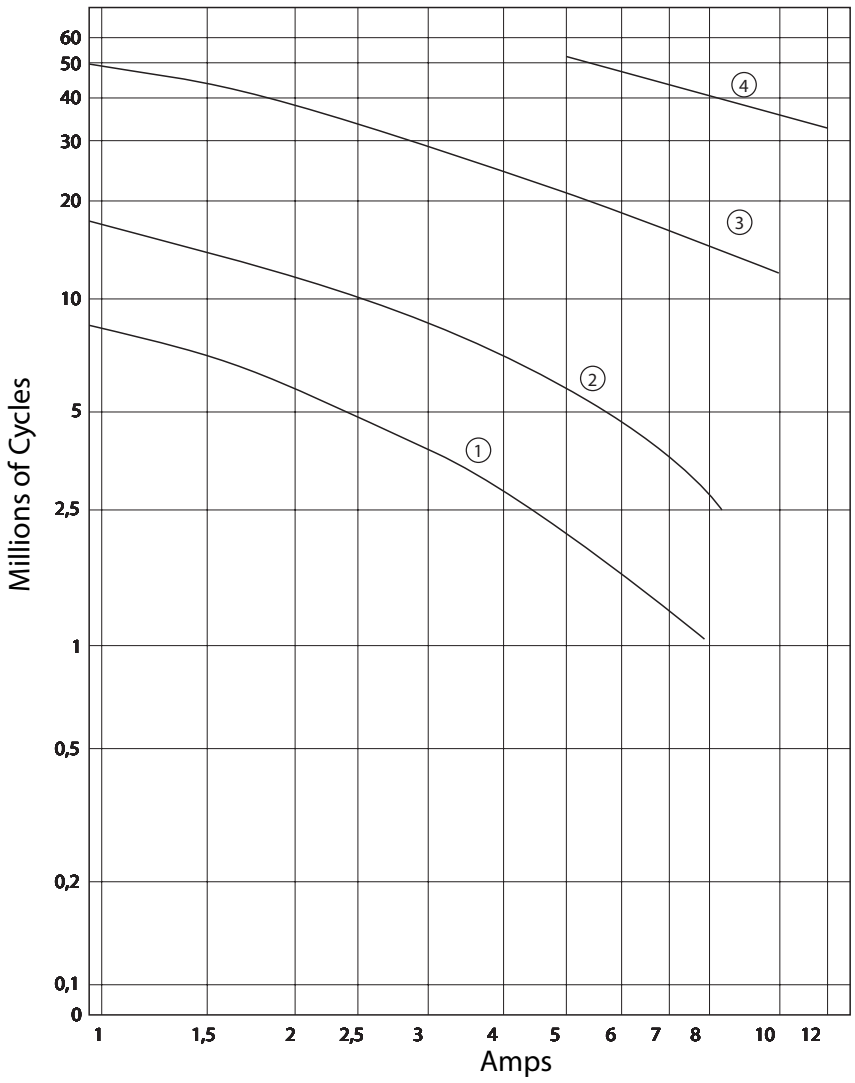
Used
with wire locking spring

BK 400 relay
Technical specifications

Dynamic relay selection curve - No. 1

AC Current breaking capacity versus life expectancy in millions of cycles.
Rate of contacts opening and closing = 1200 operations per hour.
Curves shown for resistive (Power factor = 1)

Curves	1	2	3	4
VAC	220	125	48	24



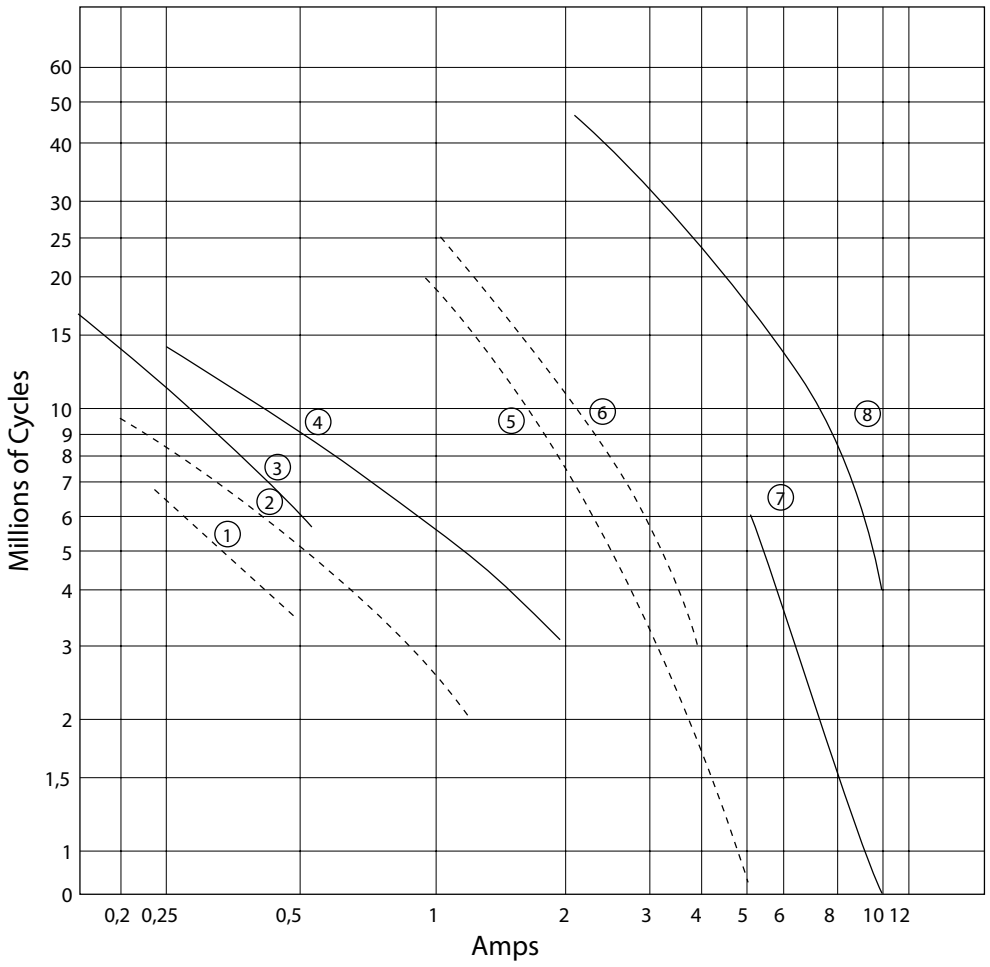
BK 400 relay
Technical specifications

Dynamic relay selection curve - No. 2

DC Current breaking capacity versus life expectancy in millions of cycles.
Rate of contacts opening and closing = 1200 operations per hour.
Curves shown for inductive load -
——— L/R = 20 ms continuous current
- - - - - L/R = 40 ms continuous current

* By connecting 2 contacts in series, DC current breaking capacity increases by 50%

Curves	1-3	2-4	5-7	6-8
VDC	220	125	48	24



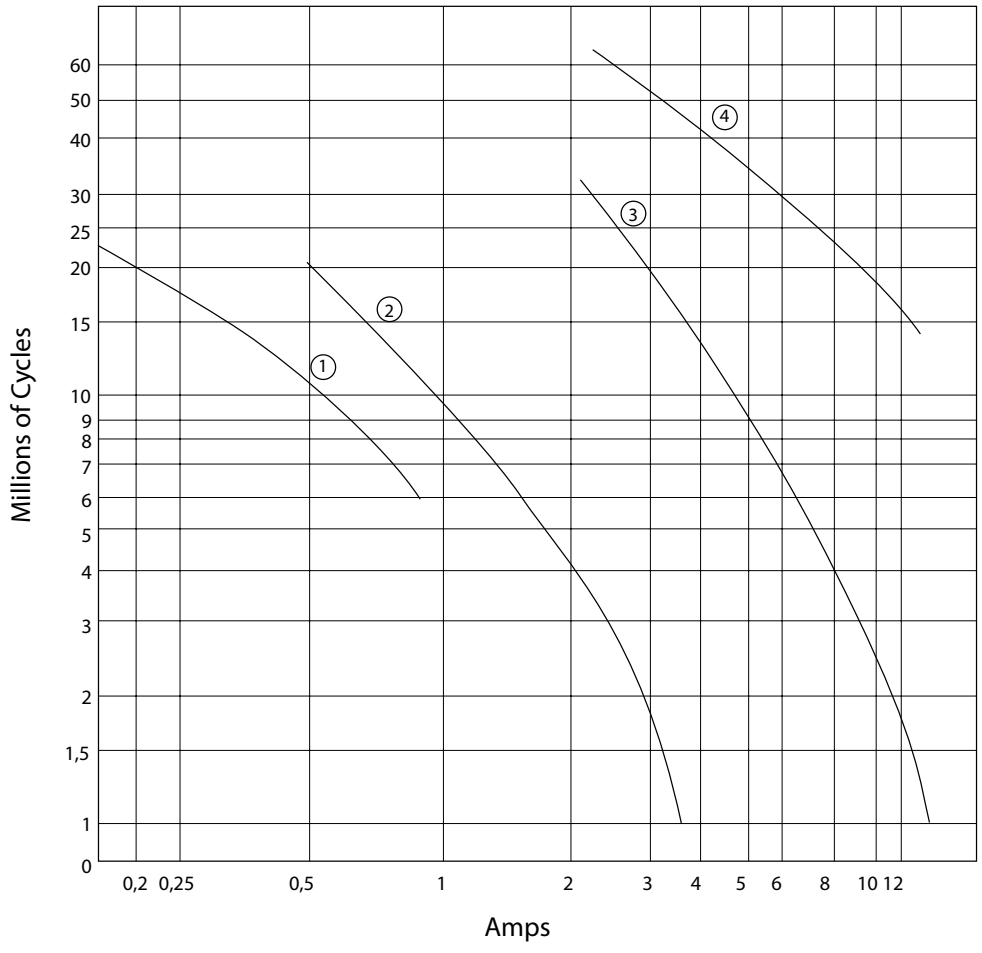
BK 400 relay
Technical specifications

Dynamic relay selection curve - No. 3

DC Current breaking capacity versus life expectancy in millions of cycles.
Rate of contacts opening and closing = 1200 operations per hour.
Curves shown for resistive load (L/R = 0). Continuous current.

* By connecting 2 contacts in series, DC current breaking capacity increases by 50%

Curves	1	2	3	4
VDC	220	125	48	24



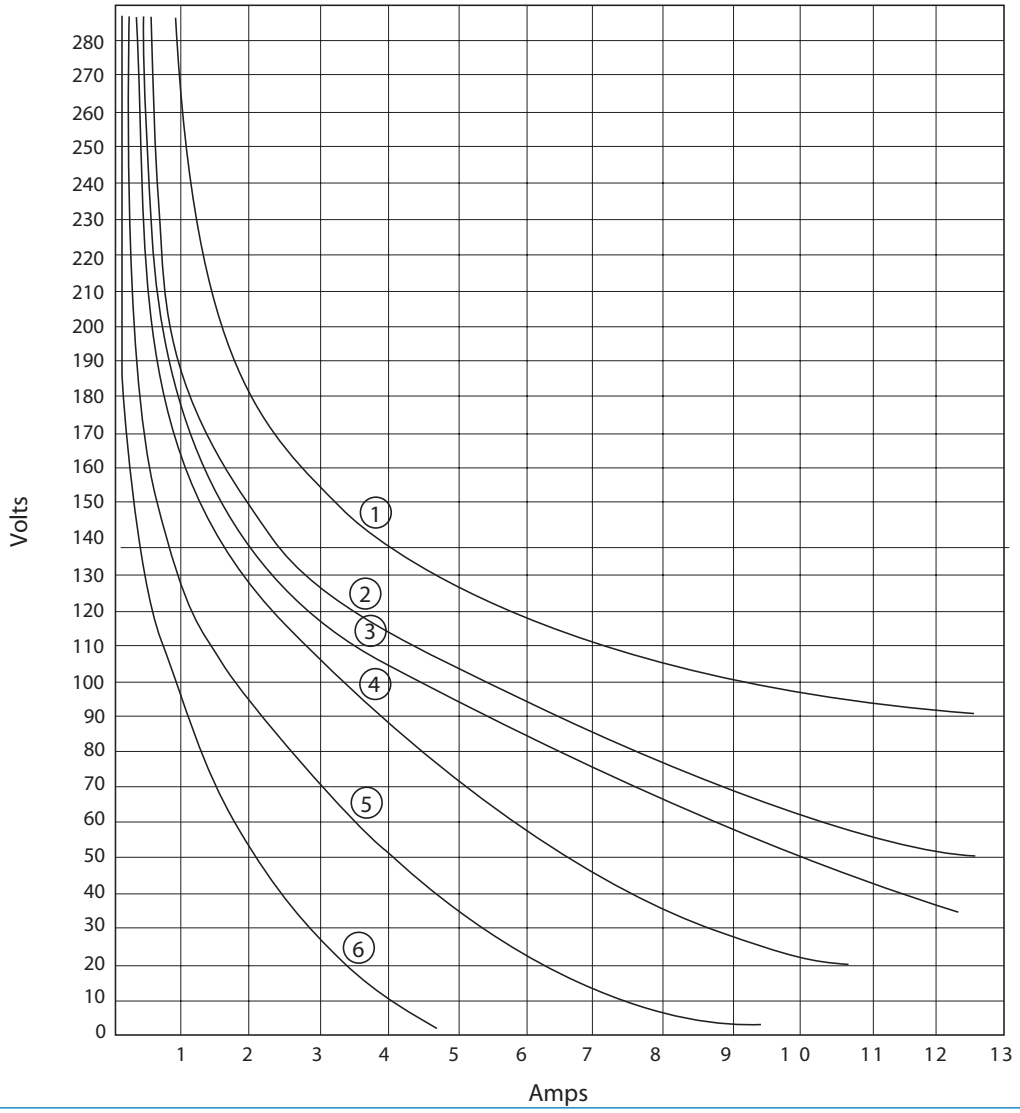
BK 400 relay
Technical specifications

Dynamic relay selection curve - No. 4

Maximum contact breaking capacity versus voltage for a given L/R
Rate of contacts opening and closing = 600 operations per hour.
Curves shown for resistive load (L/R = 0) and inductive loads. Continuous current.

Life expectancy: 800,000 cycles

Curves	1	2	3	4	5	6
L/R=	0ms	15ms	20ms	40ms	60ms	100ms

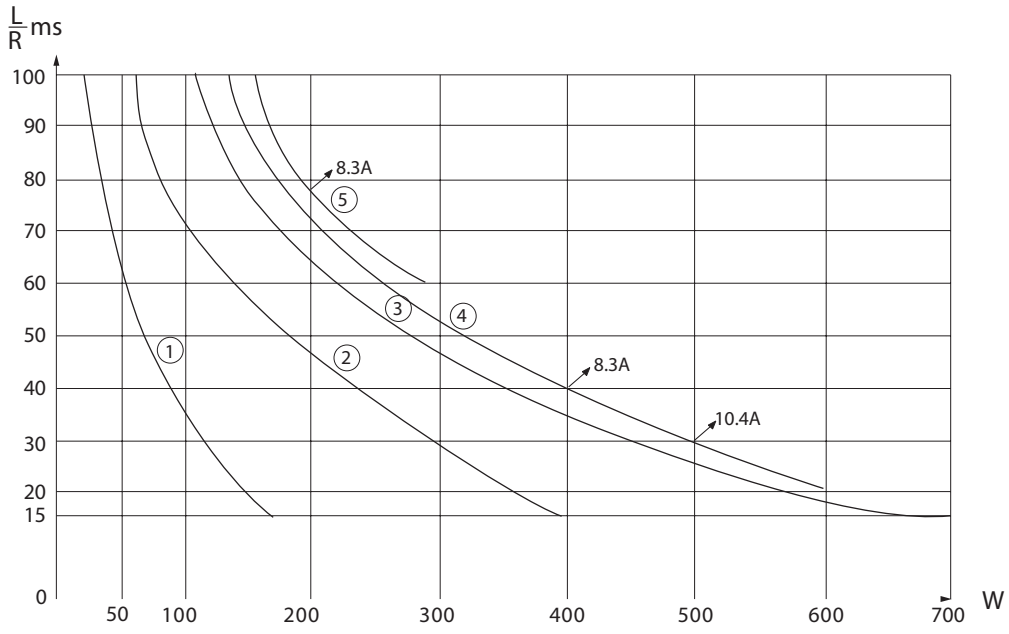


BK 400 relay
Technical specifications

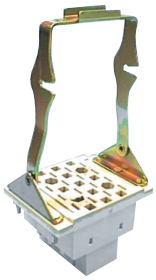
Dynamic relay selection curve - No. 5

Maximum power interuption versus load time constant (L/R) for a given voltage
Curves shown for resistive load I = P/V

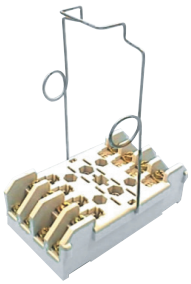
Curves	1	2	3	4	5
VDC	220	125	72	48	24



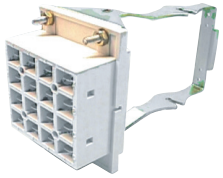
BK 400 relay
Mounting possibities / sockets



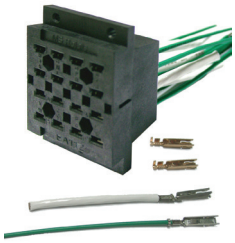
EA 102 B



EA 103 BF



EA 104 B



EA 112 BF

Mounting possibilities/sockets

Panel/flush mounting

EA 102 B	Locking bracket (905843), rear connection, double Faston 5 mm.
EA 102 BF	Wire locking spring (926853), rear connection, single Faston 5 mm.
EA 104 B	Locking bracket (905843), rear connection, single Faston 5 x 0.8 mm.
EA 104 BF	Wire locking spring (926853), rear connection, single Faston 5 x 0.8mm.
EA 112 BF	Wire locking spring (926853), rear connection, crimp contact

Surface/wall mounting

EA 103 BF*	Wire locking spring (926853), front connection, M3 screw 6,5 mm ring terminals (2,5 mm^2)
EA 105 BF*	Wire locking spring (926853), front connection, single Faston 5 mm

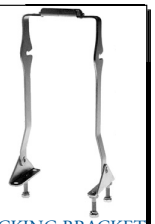
** Mounting possibility on 35 mm rail EN 50022 by adding suffix D to the part number (see socket datasheet)*

Note: Keying of relay to socket can be specified by adding the keying letters in the part number.
See all details in the related socket datasheet.

BK 400 relay
Spare parts

Spare parts - order part numbers

(1)



LOCKING BRACKET
905843

(1)

SCREW FOR BRACKET
C927210

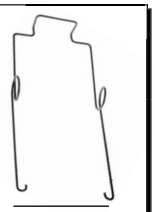
(1)

METAL STRAP (2)
P928060

(1)

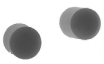
METAL STRAP (4)
P928061

(1)



WIRE LOCKING SPRING
926853

(1)



ROUND PLASTIC PLUGS
414928005

(2)

HEX. PLASTIC KEYS
414905678

(3)

LOCK PINS ASSY 2 SCREWS
906364
212903020

(1) Parts only for socket
(2) Parts for relay and socket
(3) Parts only for relay

BK 400 relay
User specifications

Installation

Install socket and connect wiring correctly according identification to terminals. Plug relay into socket. Reverse installation into socket not possible due to mechanical blocking by locking braket.
Don't reverse polarity of coil connection. Relays can be mounted (tightly) next to each other and in any attitude.
Warning! Never use silicon near by relays

Operation

Before operate always apply voltage to coil to check correct operation.
Long term storage may corrode the silver on the relay pins. Just by plugging the relay into the socket, the female bifurcated receivers will automatically clean the corrosion on the pins and guarantee a good connection.
Do not use the relay in places with flammable gas as the arc generated from switching could ignite gasses.

Maintenance

Correct operation of relay can easily be checked as transparent cover gives good visibility on the moving contacts. When the relay doesn't seem to operate correctly, please check presence of coil voltage. Use a multimeter. If LED is used, coil presence should be indicated. If coil voltage is present, but the relay doesn't work, a short circuit of suppression diode is possible (The coil connection may-be reversed). If relay doesn't work after inspection, please replace relay unit by a similar model. Send defective relay back to manufacturer. Normal wear and tear excluded.

BK 400 relay
Ordering scheme

BK 400	72	BG	S	V	-
1. Relay model	2. Nominal voltage	3. Keying	4. Coil OVP	5. LED indicator	6. Cover type

This example represents a BK 400 72 BG S V
Description: BK 400 series relay, Unom: 72 VDC, keying BG, transil coil protection, LED indicator, relay cover with lock pins

1. Relay model

BK 400

2 & 3. Nominal voltage and keying

ME	12 VDC
AG	24 VDC
FL	36 VDC
DG	48 VDC
BG	72 VDC
US	96 VDC
EG	115 VDC
FG	550 VDC
UT	700 VDC
EM	127 VAC
CG	220 VAC

4. Coil overvoltage protection

–	No coil protection
P	Avalanche diode coil protection
S	Transil coil protection

Note: no protection for AC coil versions

5. LED coil voltage indicator

–	No LED
V	LED voltage indicator

6. Relay cover type

–	Relay cover with lock pins
F	Relay cover for wire locking spring

DS-BK 400 -V2.2 July 2016

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