

# BD relay - Industrial latching power relay, 4 pole

## Datasheet



### Description

Plug-in industrial bistable power relay with three change-over contacts and one normally closed contact. The contacts remain in the last powered position. Bistable by means of a permanent magnet. Optionally equipped with magnetic arc blow-out and double make/double break contacts for high breaking capacity and long contact life.

Proven reliable operation in switching high DC voltage / inductive loads and low currents. No external retaining clip needed as integrated 'snap-lock' will hold relay into socket under all circumstances and mounting directions. The construction of the relay and choice of materials makes the BD relay suitable to withstand corrosive atmospheres, low and high temperatures, shock & vibrating and dry to very humid environments.

Compact design, choice of many options and a wide range of sockets makes the BD-relay an easy and flexible solution to use.

### Application

Rugged plug-in relays for extreme reliable, long endurance applications in harsh environment. These relay series are designed for demanding industrial applications such as power utilities and petrochemical industries. The BD relay is used in applications where the contacts are set and reset with permanent power or impulses.

### Features

- Latching (bistable) relay
- Compact plug-in design
- 2 combined coils
- 3 C/O contacts and 1 N/C contact
- Flat, square silver plated relay pins for excellent socket connection
- Wide range of sockets for panel, rack or 35 mm rail
- Integrated snap-lock
- High DC breaking capacity
- Solve-All relay application concept
- Optional positive mechanical keying relay to socket
- Optional mechanical on/off position indicator
- Optional back EMF suppression diode (DC versions)
- Flexibility by many options

### Benefits

- Proven reliable
- Long term availability
- Used in safety critical applications
- Low life cycle cost
- No maintenance

### Industry compliancy

- IEC 61810 Electromechanical elementary relays
- IEC 60947 Low voltage switch gear and control gear
- IEC 60947-5-1 Electromechanical control circuit devices and switching elements
- IEC 60255 Relay design and environmental conditions
- CE

# BD-relay

## Technical specifications



Standard LED



Smitt style pinning



Magnetic arc blow-out

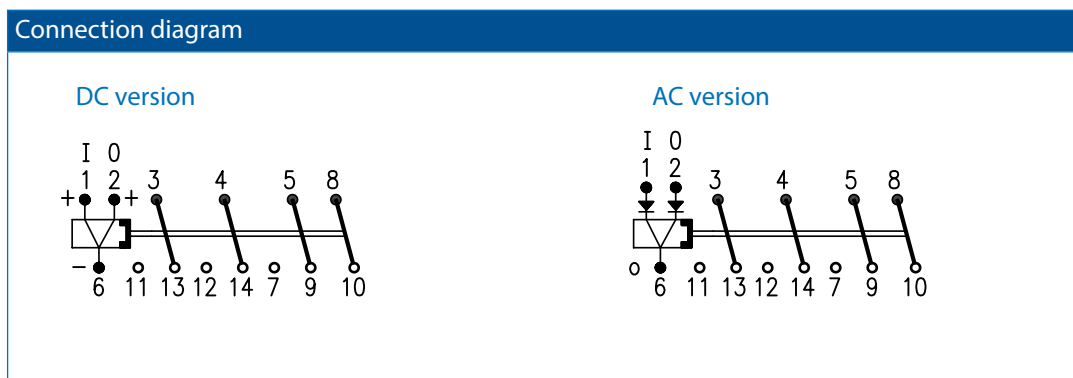
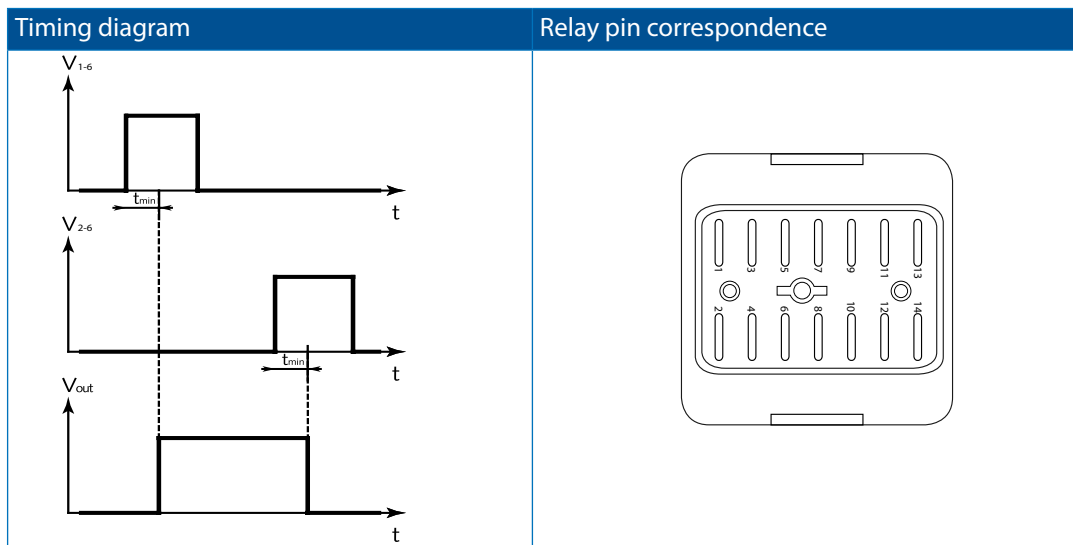


Transparent cover

### Solve-All relay application concept

The unique BD-relay with all its options has been designed in close cooperation with customers from the power utility industry. The Solve-All relay application concept offers ultimate flexibility to design and supply tailor made BD-relays.

### Functional and connection diagrams



# BD-relay

## Technical specifications

### Coil characteristics DC-versions

Operating times at nominal voltage:	
Min impulse time	25 ms
Bounce time N/O contacts	4 ms
Bounce time N/C contacts	8 ms
Nominal power consumption	1.2 W at $U_{nom}$
Operating voltage range	0.8 - 1.1 $U_{nom}$ (Option V: 0.7 - 1.25 $U_{nom}$ )

Type	$U_{nom}$ (VDC)	$U_{min}$ (VDC)	$U_{max}$ (VDC)
12 VDC	12	9.6	13.2
24 VDC	24	19.2	26.4
48 VDC	48	38.4	52.8
60 VDC	60	48.0	66.0
110 VDC	110	88.0	121.0
125 VDC	125	100.0	137.5
220 VDC	220	176.0	242.0

Other types on request

### Coil characteristics AC-versions

Operating times at nominal voltage:	
Min impulse time	50 ms
Bounce time N/O contacts	4 ms
Bounce time N/C contacts	8 ms
Nominal power consumption	4 VA at $U_{nom}$
Operating voltage range	0.8 - 1.1 $U_{nom}$ (Option V: 0.7 - 1.25 $U_{nom}$ )

Type	$U_{nom}$ (VAC)	$U_{min}$ (VAC)	$U_{max}$ (VAC)
24 V 50 Hz	24	19.2	26.4
42 V 50 Hz	42	33.6	46.2
110-115 V 50 Hz	115	92.0	121.0
220-230 V 50 Hz	230	184.0	242.0

Other types on request



# BD-relay

## Technical specifications

### Contact characteristics

Amount and type of contacts	3 C/O + 1 N/C
Peak inrush current (make and carry)	200 A for 10 ms (withstand > 10 times, 1 min) 40 A for 0.5 s 30 A for 1 s
Maximum continuous current	10 A (AC1; IEC 60947)
Maximum switching voltage	250 VDC, 440 VAC
Minimum switching voltage	12 V (5 V with option E)
Minimum switching current	10 mA (1 mA with option E)
Material	Ag standard (optional AgSnO <sub>2</sub> , Au on Ag)
Contact gap	0.7 mm (up to 1.4 mm for Y option)
Contact force	> 200 mN
Contact resistance	<15 mΩ (initial)

### Electrical characteristics

Dielectric strength	Pole-pole	IEC 61810-1	4 kV, 50 Hz, 1 min
	Cont-coil	IEC 61810-1	2.5 kV, 50 Hz, 1 min
Insulation between open contacts			2.5 kV; 50 Hz; 1 min
Pulse withstanding		IEC 60255-5	5 kV (1.2/50 μs)

### Mechanical characteristics

Mechanical life	10 x 10 <sup>6</sup> operations
Maximum switching frequency	Mechanical: 3600 ops/h Electrical: 1200 ops/h
Weight	135 g (without options)

### Environmental characteristics

Environmental	IEC 61810
Vibration	IEC 61373, Category I, Class B, Body mounted
Shock	IEC 61373, Category I, Class B, Body mounted
Operating temperature	-25 °C...+55 °C (with option C and option Y: -40 °C) -25 °C...+70 °C (with option V)
Humidity	95% (condensation is permitted temporarily)
Salt mist	IEC 60068-2-11, NaCl, 35 °C for 4 days
Damp heat	IEC 60068-2-30, Test method Db variant 1
Protection	IEC 60529, IP40 (relay on socket)
Insulation materials	Cover: polycarbonate Base: polyester



# BD-relay

## Technical specifications

### Options

Available options for BD-relay according the *Solve-All* relay application concept

Code	Description	Remark	Can not be combined with
B	Magnetic arc blow-out. Ensures a high DC breaking capacity and longer contact life.	DC: up to 125 VDC	
C	Lower temperature (-40 °C).	Max contact current 8A	E*
D	Protection against back EMF. When a coil is switched off, a large Back EMF appears across the coil. This back EMF may be several hundred volts in value, enough to destroy a transistor.		
E	Gold plated contacts. Low contact resistance and good resistance against corrosive atmospheres. Suitable for switching low level dry circuit loads.  Gold plated contacts characteristics Material Ag, 10 µm gold plated Maximum switching voltage 60 V (higher voltages may be possible, contact Mors Smitt for more information) Maximum switching current 400 mA (at higher rate gold will evaporate, then the standard silver contact rating of minimum 10 mA and 12 V is valid) Minimum switching voltage 5 V Minimum switching current 1 mA		C*, M
K	Extra dust protection. Cover sealed with sealant.		
M	AgSnO <sub>2</sub> contacts. Highly resistant to welding, for safety and vital applications.	Min. contact current 100 mA	E
Q	Double zener diode. Coil protection against transient voltage.	DC coil only	
S	Mechanical on/off position indicator (following the contacts). Indicates visual the position of the contacts.		
V	Wider operating range and ambient temperature. Operating range: 0.7 ... 1.25 U <sub>nom</sub> Ambient temperature: -25 °C...+70 °C	Power consumption 2.22 W @ U <sub>nom</sub> Operating range AC can differ	
X3	Reversed polarity of coil contacts.	+ on pin 6	
Y	Double break / double make contacts. Breaking capacity increased by 50% and longer contact life. To increase the breaking capacity and contact life more this option can be combined with option B and X5.	2 C/O DM/DB contacts -40 °C	

Coloured cover and keying of relay on socket on request

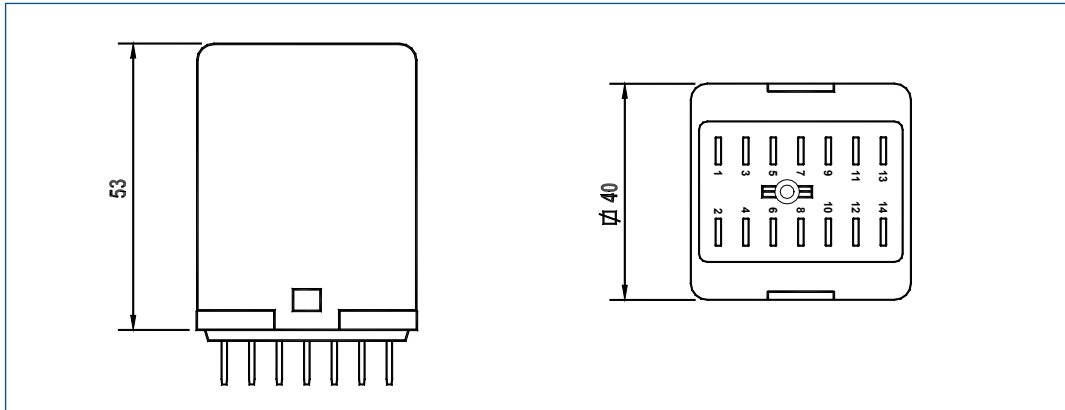
\* Options C & E combined is possible depending on the application. Contact Mors Smitt for more information.



# BD-relay

## Technical specifications

### Dimensions

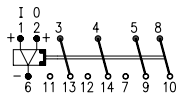


# BD-relay

## Technical specifications

In this section the most common breaking capacity for DC-voltage / inductive load possibilities are presented with the different options and contact configurations within the BD-relays.

### BD

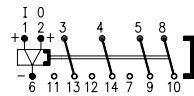


- 3 C/O + 1 N/C contacts
- Contact gap : 0.7 mm

#### Breaking capacity

DC1	110 VDC	1 A
	220 VDC	0.7 A
L/R=40 ms	110 VDC	0.3 A
	220 VDC	0.1 A
DC13	110 VDC	-
	220 VDC	-

### BD-B

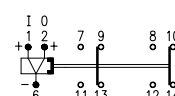


- 3 C/O + 1 N/C contacts
- Magnetic arc blow out
- Contact gap : 0.7 mm

#### Breaking capacity

DC1	110 VDC	7 A
	220 VDC	3 A
L/R=40 ms	110 VDC	3 A
	220 VDC	1 A
DC13	110 VDC	-
	220 VDC	-

### BD-Y

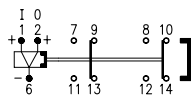


- 2 C/O contacts
- Double make double break
- Contact gap : 1.4 mm

#### Breaking capacity

DC1	110 VDC	1.5 A
	220 VDC	1 A
L/R=40 ms	110 VDC	0.5 A
	220 VDC	0.2 A
DC13	110 VDC	-
	220 VDC	-

### BD-YB



- 2 C/O contacts
- Double make double break
- Magnetic arc blow out
- Contact gap : 1.4 mm

#### Breaking capacity

DC1	110 VDC	8 A
	220 VDC	4 A
L/R=40 ms	110 VDC	5 A
	220 VDC	2 A
DC13	110 VDC	1.5 A
	220 VDC	0.5 A

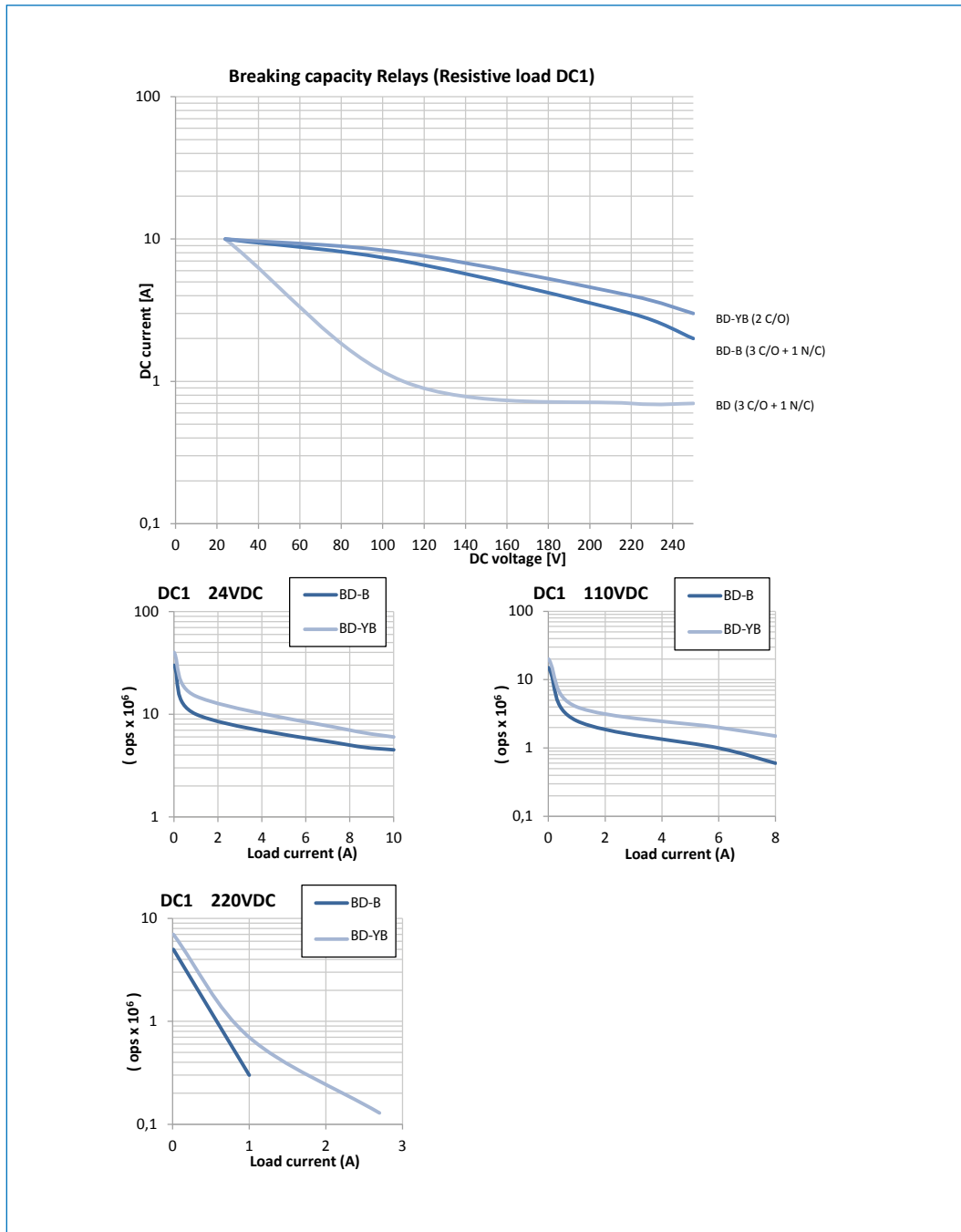


# BD-relay

## Technical specifications

### Electrical life expectancy and breaking capacity

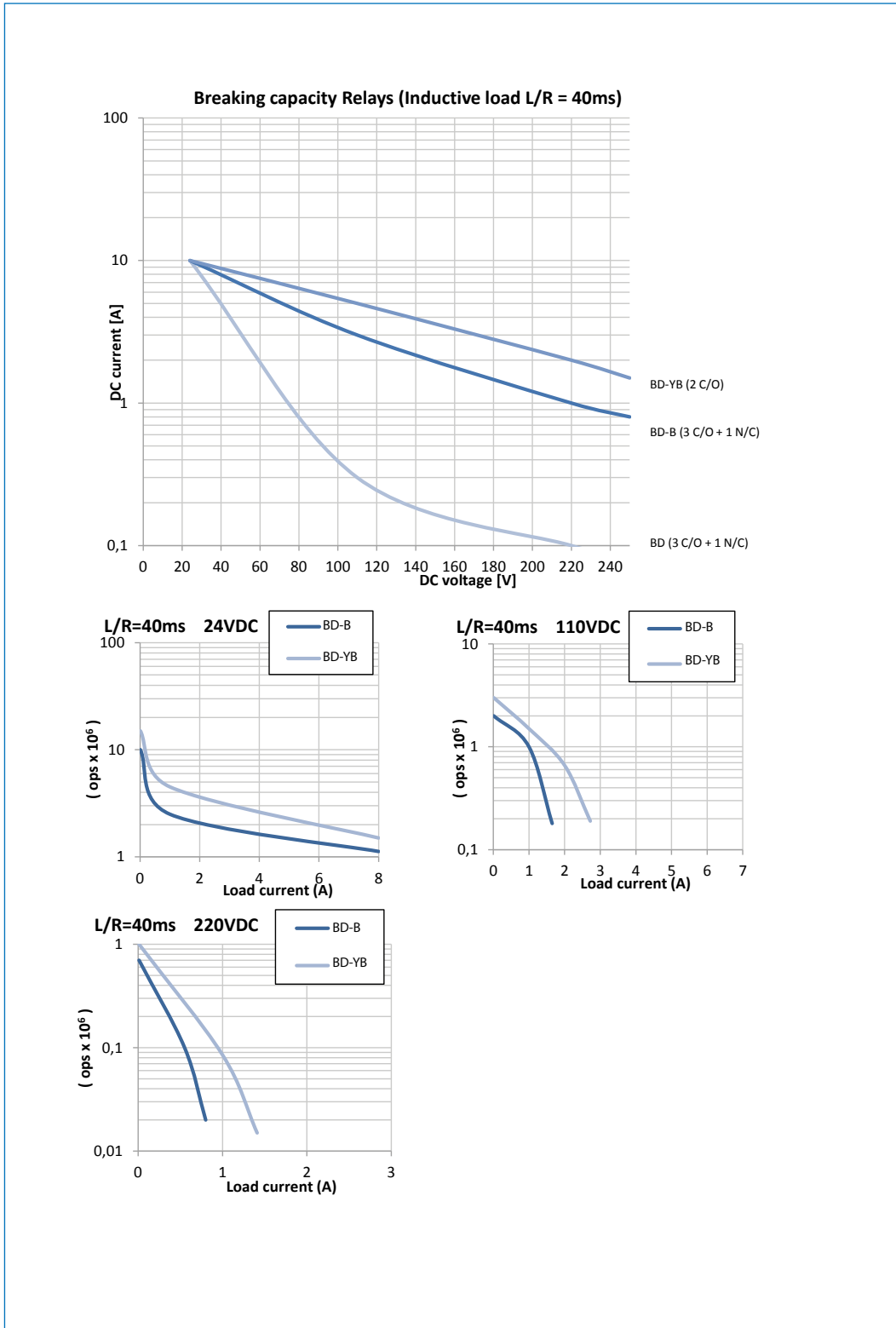
The life expectancy values shown below are based on factory tests (test frequency at 1/3 Hz). These values could be different in real life applications as environmental conditions, switching frequencies and duty cycles will influence these values. Putting more contacts in series (Y) will increase breaking capacity and life expectancy significantly.





# BD-relay

## Technical specifications



# BD-relay Sockets

## Mounting possibilities/sockets



### Surface/wall mounting

338000100	V2	Bush connection screw socket, wall mount, front connection (2.5 mm <sup>2</sup> )
338000302	V22BR	Screw socket, wall mount, front connection (9 mm terminals)
338000580	V23	Screw socket, wall mount, front connection (7.5 mm terminals)
338000610	V29	Spring clamp socket, wall mount, front dual connection (2.5 mm <sup>2</sup> )

### Rail mounting

338000200	V21	Bush connection screw socket, rail mount, front connection (2.5 mm <sup>2</sup> )
338000580	V23	Screw socket, rail mount, front connection (7.5 mm terminals)
338000402	V23BR	Screw socket, rail mount, front connection (9 mm terminals)
338000610	V29	Spring clamp socket, rail mount, front dual connection (2.5 mm <sup>2</sup> )

### Panel/flush mounting

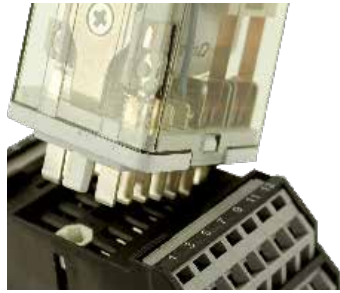
338100100	V3	Solder tag socket, panel mount, rear connection
328400100	V26	Crimp contact socket, panel mount, rear connection
338000560	V31	Faston connection socket, rear dual connection (2 x 4.8 mm)
338000570	V33	Spring clamp socket, flush mount, rear dual connection (2.5 mm <sup>2</sup> )

### PCB mounting

338000561	V32	PCB soldering socket
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# BD-relay Keying

## Mechanical keying relay and socket (optional)



Function:

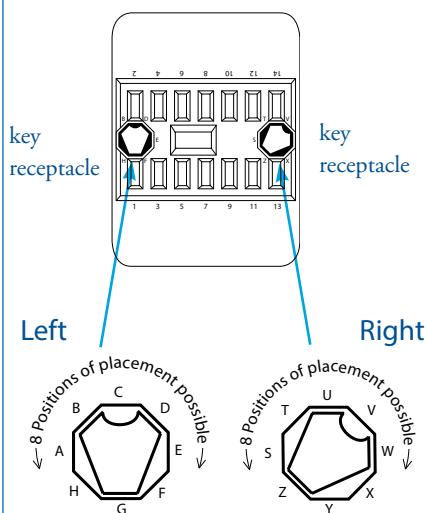
- To prevent wrong installation
- To prevent damage to equipment
- To prevent unsafe situations

Using keyed relays and sockets prevents a relay is inserted in a wrong socket. For example it prevents that a 24 VDC relay is put in a 110 VDC circuit. Positive discrimination is possible per different function, coil voltage, timing, monitoring, safety and non-safety.

The D relay socket keying option gives  $8 \times 8 = 64$  possibilities. Upon ordering the customer simply indicates the need for the optional keying. Mors Smitt will assign a code to the relay and fix the pins into the relay. The sockets are supplied with loose key receptacles. Inserting the keys into the socket is very simple and self explaining.

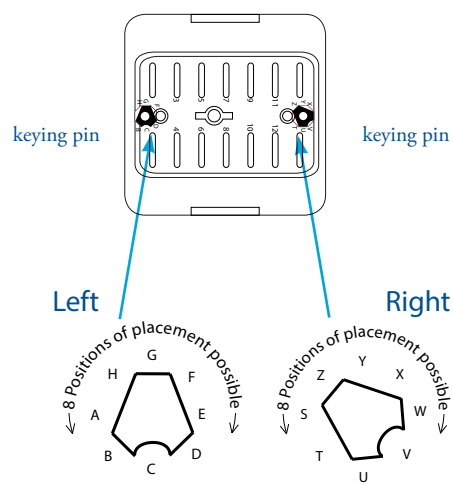
Remark: Sockets and relay shown are only examples.

Top view socket



Example keying position G-Z on socket

Bottom view relay



Example keying position G-Z on relay

# BD-relays

## Instructions

### Installation, operation & inspection

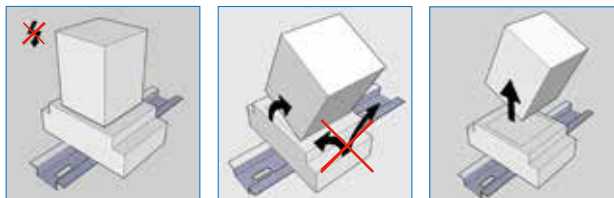
#### Installation

Before installation or working on the relay: disconnect the power supply first! Install socket and connect wiring according to the terminal identification. Plug relay into the socket ensuring there is no gap between the bottom of relay and the socket. Reverse installation into the socket is not possible due to the mechanical blocking snap-lock feature. Check to ensure that the coil connection polarity is not reversed. Relays can be mounted tightly together to save space.

When rail mounting is used, always mount the socket in the direction of the UP arrow, to have proper fixation of the socket on the rail.

#### Warning!

- Never use silicon in the proximity of the relays.
- Do not use the relay in the presence of flammable gas as the arc generated from switching could cause ignition.
- To remove relays from the socket, employ up and down lever movements. Sideway movement may cause damage to the coil wires.



#### Operation

After installation always apply the rated voltage to the coil to check correct operation.

Long term storage may corrode the silver on the relay pins. When plugging the relay into the socket, the female bifurcated or trifurcated receivers will automatically cut through the corrosion on the pins and guarantee a reliable connection.

Before actual use of relays, it is advised to switch the load several times with the contacts. The contacts will both be electrically and mechanically cleaned due to the positive wiping action. Sometimes a contact can build up increased contact resistance ( $\leq 15 \text{ m}\Omega$  when new). When using silver contacts one can clean the contact by switching a contact load a few times using  $>24 \text{ VDC}$  &  $\sim 2 \text{ A}$ . Increased contact resistance is not always problematic, as it depends on circuit conditions. In general a contact resistance of  $1 \Omega$  is no problem, consult Mors Smitt for more information.

Condensation in the relay is possible when the coil is energised (warm) and the outside, environmental temperature is cold. This is a normal phenomenon and will not affect the function of the relay. Materials in the relay have no hygroscopic properties.

#### Inspection

Correct operation of the relay can easily be checked as the transparent cover provides good visibility of the moving contacts. If the relay does not seem to operate correctly, check for presence of the appropriate coil voltage and polarity using a suitable multimeter. If a LED is fitted, it indicates voltage presence to the coil. If coil voltage is present, but the relay does not operate, a short circuit of the suppression diode is possible (This may be due to the coil connection having been reversed).

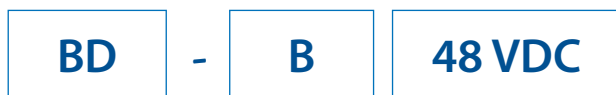
If the relay doesn't work after inspection, replace the relay unit with a similar model. Do not attempt to open the relay cover or try to repair. Contacts are calibrated and in balance, touching can affect proper operation. Also re soldering may affect correct operation. Since 2009 relays have tamper proof seals fitted and once broken, warranty is void.

Most relay defects are caused by installation faults such as over voltage, spikes/transients, high/short current far exceeding the relay specifications. When returning the relays for investigation, please provide all information on the RMA form. Send defective relays back to the manufacturer for repair or replacement. Normal wear and tear or external causes are excluded from warranty.



# BD-relays

## Ordering scheme



1. Relay model      2. Options      3. Coil voltage

This example represents a BD-B 48 VDC.

Description: BD-relay,  $U_{nom}$ : 48 VDC, 3 C/O + 1 N/C contacts, including magnetic arc blow-out.

### 1. Relay model



### 2. Options

<b>B</b>	Magnetic arc blow-out
<b>C</b>	Low temperature (-40°C)
<b>D</b>	Back EMF protection diode
<b>E</b>	Gold plated contacts
<b>K</b>	Special dust protection
<b>M</b>	AgSnO <sub>2</sub> contacts, highly resistant to welding
<b>Q</b>	Double zener diode
<b>S</b>	Mechanical position indicator
<b>V</b>	Wider operation range and ambient temperature
<b>X3</b>	Reversed polarity
<b>Y</b>	Double make double break contacts
<b>Keying</b>	Coil coding for relay and socket
<b>Colour</b>	Coloured cover for coil voltage

### 3. Coil voltage

<b>12 VDC</b>	<b>24 VAC 50 Hz</b>
<b>24 VDC</b>	<b>42 VAC 50 Hz</b>
<b>28 VDC</b>	<b>100-115 VAC 50 Hz</b>
<b>60 VDC</b>	<b>220-230 VAC 50 Hz</b>
<b>110 VDC</b>	
<b>125 VDC</b>	
<b>220 VDC</b>	Other voltages on request





Mors Smitt France SAS

Tour Rosny 2, Avenue du Général de Gaulle,  
F - 93118 Rosny-sous-Bois Cedex, FRANCE  
T +33 (0)1 4812 1440, F +33 (0)1 4855 9001  
E [sales@msrelais.com](mailto:sales@msrelais.com)

Mors Smitt Asia Ltd.

# 807, Billion Trade Centre, 31 Hung To Road  
Kwun Tong, Kowloon, HONG KONG SAR  
T +852 2343 5555, F +852 2343 6555  
E [info@morssmitt.hk](mailto:info@morssmitt.hk)

Mors Smitt B.V.

Vrieslantlaan 6, 3526 AA Utrecht,  
NETHERLANDS  
T +31 (0)30 288 1311, F +31 (0)30 289 8816  
E [sales.msbv@wabtec.com](mailto:sales.msbv@wabtec.com)

Mors Smitt Technologies Inc.

1010 Johnson Drive,  
Buffalo Grove, IL 60089-6918, USA  
T +1 847 777 6497, F +1 847 520 2222  
E [salesmst@wabtec.com](mailto:salesmst@wabtec.com)

Mors Smitt UK Ltd.

Doulton Road, Cradley Heath  
West Midlands, B64 5QB, UK  
T +44 (0)1384 567 755, F +44 (0)1384 567 710  
E [sales.msuk@wabtec.com](mailto:sales.msuk@wabtec.com)