

# BD-U200 relay - Latching, plug-in 4 pole

## Datasheet



### Description

Plug-in bistable railway 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.

Standard equipped with magnetic arc blow-out for high breaking capacity and long contact life. 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 make the BD-U200 relay suitable to withstand corrosive atmospheres, low and high temperatures, shock & vibrating and dry to humid environments.

Compact design, choice of many options and a wide range of sockets makes the BD-U200 relay an easy and flexible solution to use.

### Application

This relays are designed for demanding rolling stock applications. The BD-U200 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
- Magnetic arc blow-out
- Flat, square silver plated relay pins for excellent socket connection
- Wide range of sockets
- Integrated snap lock
- Transparent cover
- High DC breaking capacity
- Optional positive mechanical keying relay to socket
- Flexibility by many options

#### Benefits

- Proven reliable
- Long term availability
- Easy to maintain
- Low life cycle cost
- No maintenance

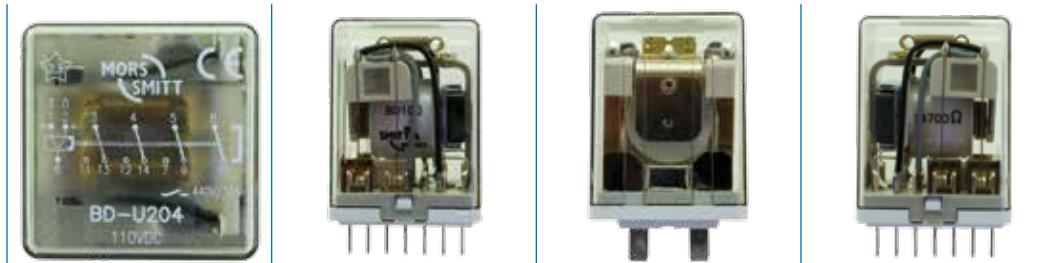
#### Railway compliancy

- EN 50155 Electronic equipment used on rolling stock for railway applications
- IEC 60571 Electronic equipment used on railway vehicles
- IEC 60077 Electrical equipment for rolling stock in railway applications
- IEC 60947 Low voltage switch gear and control gear
- IEC 61373 Rolling stock equipment - Shock and vibration test
- EN 50121 Electromagnetic compatibility for railway applications
- NF F16-101/102, TS 45545-2 Fire behaviour - Railway rolling stock
- IEC 60529 European standard describes the protection class (IP-code)
- NF F 62-002 On-off contact relays and fixed connections

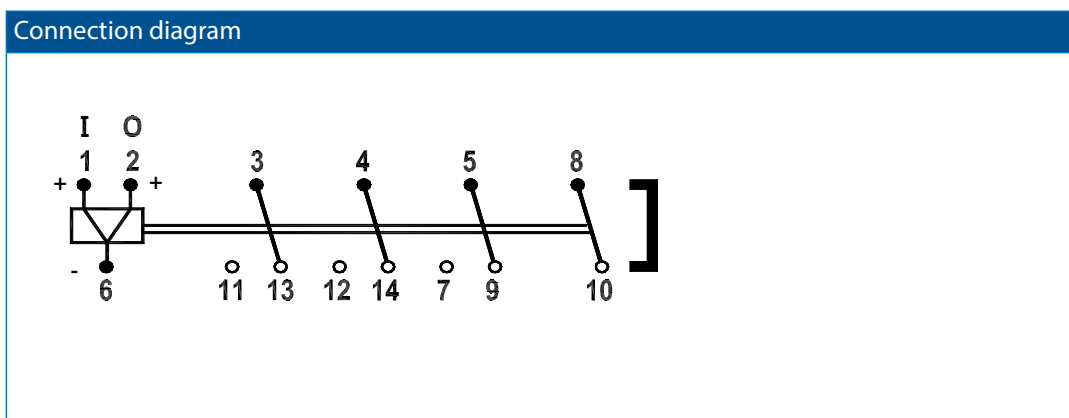
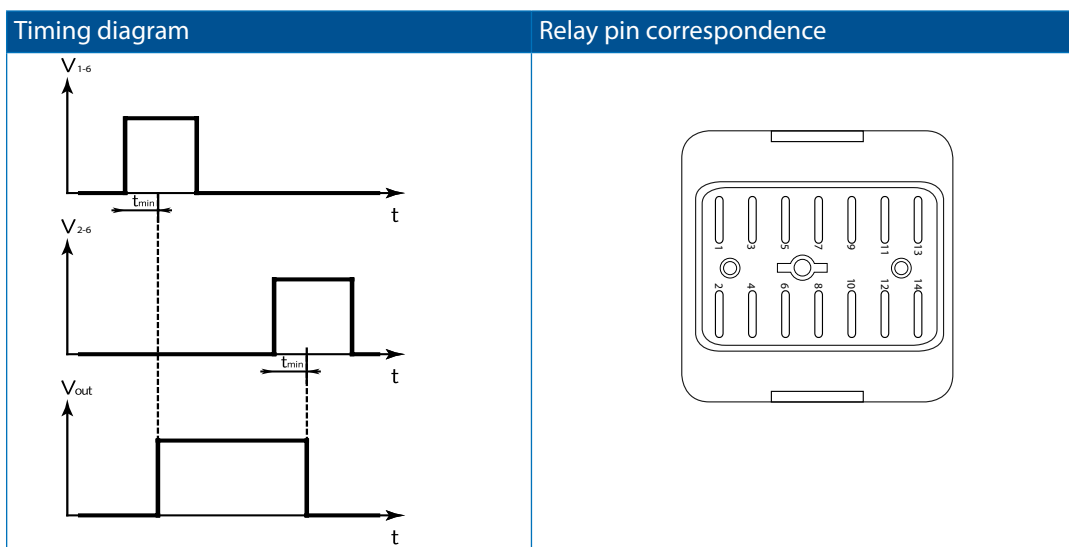


# BD-U200 relay

## Technical specifications



### Functional and connection diagrams



# BD-U200 relay

## Technical specifications

### Coil characteristics

Operating times at nominal voltage:	
Minimum impulse time $t_{min}$	25 ms
Bounce time N/O contacts	$\leq 4$ ms
Bounce time N/C contacts	$\leq 8$ ms
Operating voltage range	0.7 - 1.25 $U_{nom}$

Type	$U_{nom}$ (VDC)	$U_{min}$ (VDC)	$U_{max}$ (VDC)	$R_{coil}^*$ ( $\Omega$ )	$P_{nom}$ (W)
BD-U201	24	16.8	30	618	1.7
BD-U202	48	33.6	60	2383	1.7
BD-U203	72	50.4	90	6550	1.7
BD-U204	110	77	137.5	14700	1.7
BD-U205	96	67.2	120	14700	1.7
BD-U206	12	8.4	15	135	1.7
BD-U207	36	25.2	45	1425	1.7

Other types on request

\* The  $R_{coil}$  is measured at room temperature and has a tolerance of  $\pm 10\%$

Remarks:

- $U_{min}$  is the must-operate voltage at which the relay has picked up in all circumstances (worst-case situation), in practice the relay picks up at a lower voltage

### Contact characteristics

Amount and type of contacts	3 C/O + 1 N/C
Maximum make current	16 A
Peak inrush current	200 A (withstand $> 10 \times 200$ A @ 10 ms, 1 min)
Maximum continuous current	10 A (AC1 ; IEC 60947)
Maximum switching voltage	250 VDC, 440 VAC
Minimum switching voltage	12 V
Minimum switching current	10 mA
Maximum breaking capacity	110 VDC, 8 A ( $L/R \leq 15$ ms) 230 VAC, 10 A ( $\cos \phi \geq 0.7$ )
Contact resistance	15 m $\Omega$ (initial)
Material	Ag standard (optional AgSnO <sub>2</sub> , Au on Ag)
Contact gap	0.7 mm
Contact force	$> 200$ mN



# BD-U200 relay

## Technical specifications

### Electrical characteristics

Dielectric strength	Pole-pole	EN 50155 IEC 60255-5	4 kV, 50 Hz, 1 min
	Cont-coil	IEC 60077	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 $\mu$ s)

### Mechanical characteristics

Mechanical life	10 x 10 <sup>6</sup> operations
Maximum switching frequency	Mechanical: 3600 ops/h Electrical: 1200 ops/h
Weight	140 g (without options)

### Environmental characteristics

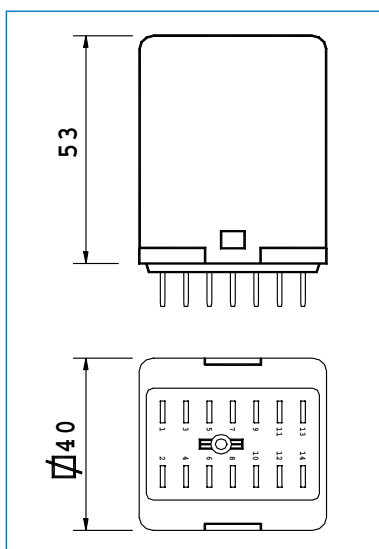
Environmental	EN 50125-1 and IEC 60077-1
Vibration	IEC 61373, Category I, Class B, Body mounted
Shock	IEC 61373, Category I, Class B, Body mounted
Operating temperature	-25 °C...+70 °C (with option C and with option Y: -40 °C)
Humidity	80%
Salt mist	IEC 60068-2-11, Class ST 4
Damp heat	IEC 60068-2-30, Test method Db variant 1
Protection	IEC 60529, IP40 (relay on socket)
Fire & smoke	NF F 16-101, NF F 16-102, TS 45545-2
Insulation materials	Cover: polycarbonate Base: polyester



# BD-U200 relay

## Technical specifications

### Dimensions (mm)



### Options

Code	Description	Remark	Cannot be combined with:
C	Low temperature (-40 °C)	I <sub>contact</sub> < 8 A	E**
D	Back EMF protection diode		
E*	Au; Gold plated contacts (10 µm)		M, C**
K	Extra dust protection		
M	AgSnO <sub>2</sub> ; “non-weldable” contacts	I <sub>contact</sub> > 100 mA	E
N	No magnetic arc blow-out		
X3	Reversed polarity	+ on pin 6	
Y	Double make/double break contacts	2 C/O DM/DB, -40 °C	
Keying	Coil coding relay and socket		
Colour coding	Coloured cover for coil voltage coding		

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



# BD-U200 relay

## Technical specifications

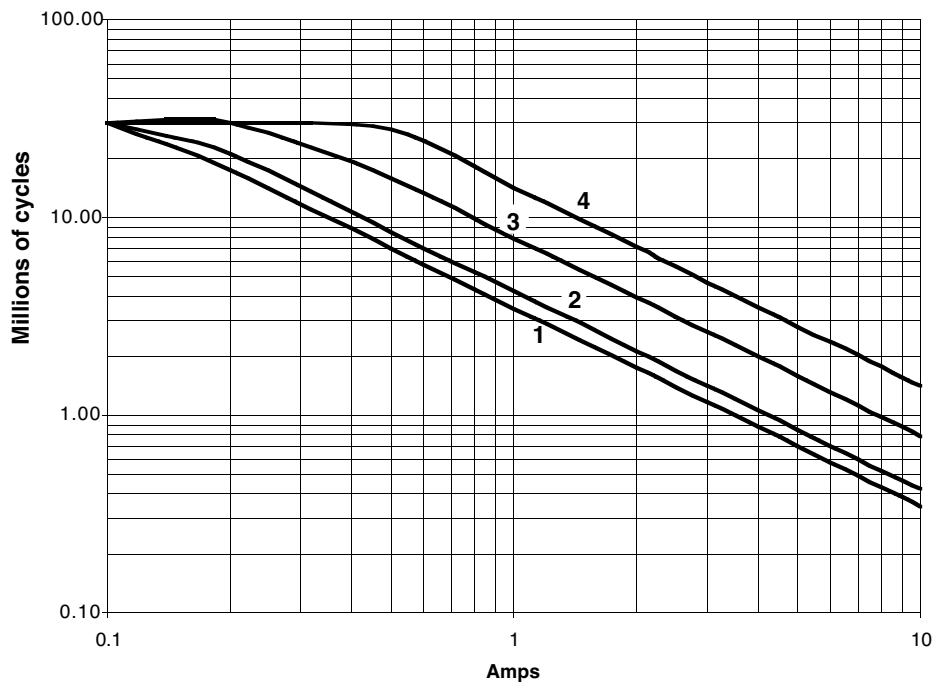
### Electrical life expectancy

*AC Current breaking capacity at  $\cos\phi = 1$*

**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 load (Power Factor = 1).

Curve	1	2	3	4
VAC	220	125	48	24

AC Current breaking capacity



# BD-U200 relay

## Technical specifications

### Electrical life expectancy

AC Current breaking capacity at  $\cos\phi = 0.7; 0.5; 0.3$

#### AC Current breaking capacity versus life expectancy in millions of cycles.

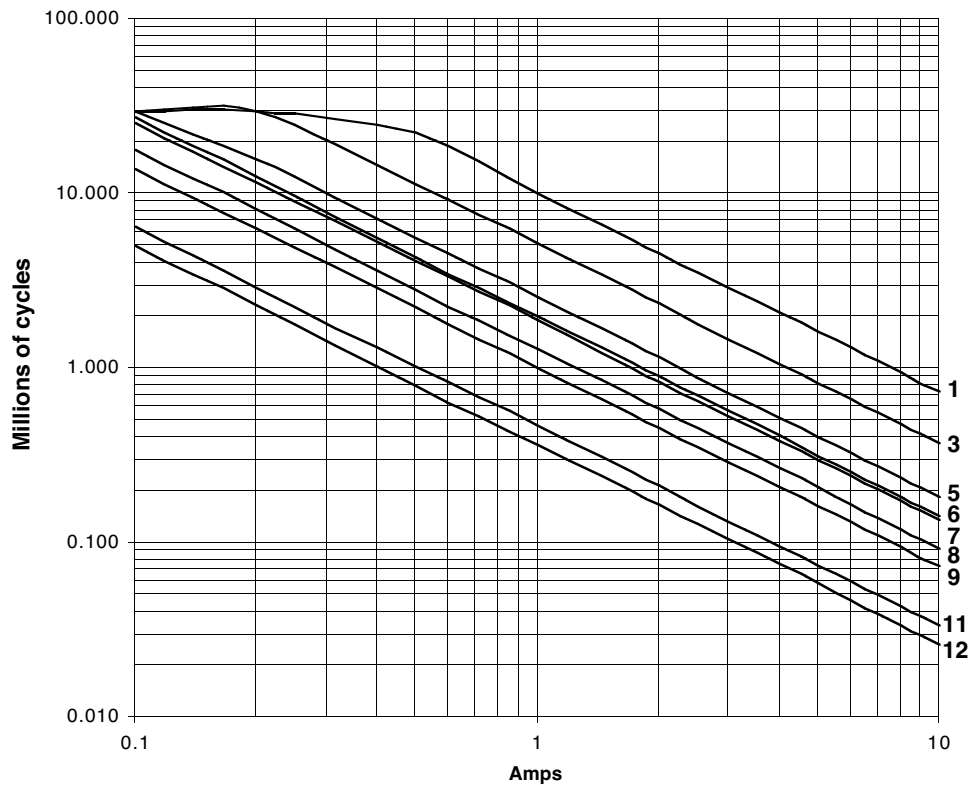
Rate of contacts opening and closing = 1200 operations per hour.

Values shown for inductive loads -

- $\cos\phi = 0.7$
- $\cos\phi = 0.5$
- - - -  $\cos\phi = 0.3$

Curves	1	3	5	6	7	8	9	11	12
VAC	24	24	125	220	24	125	220	125	220
$\cos\phi$	0.7	0.5	0.7	0.7	0.3	0.5	0.5	0.3	0.3

AC Current breaking capacity



# BD-U200 relay

## Technical specifications

### Electrical life expectancy

*DC Current breaking capacity at L/R = 0*

**DC Current breaking capacity versus life expectancy in millions of cycles.**

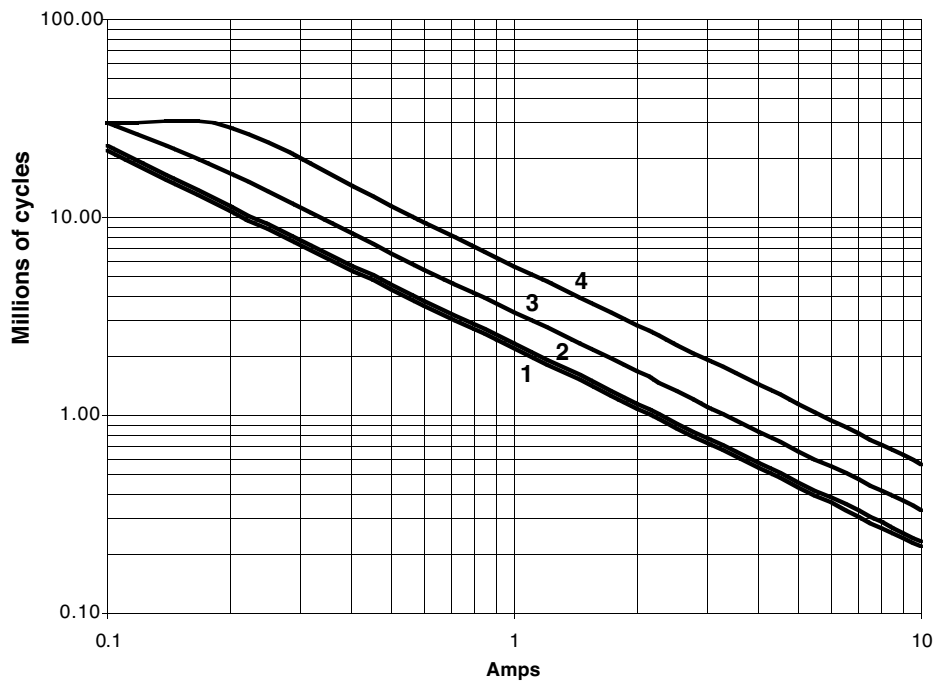
Rate of contacts opening and closing = 1200 operations per hour.

Curves shown for resistive load (L/R = 0). Continuous current.

\* By connecting 2 contacts in series, we increase the DC current breaking capacity by 50%

Curve	1	2	3	4
VDC	220	125	48	24

DC Current breaking capacity





# BD-U200 relay

## Technical specifications

### Electrical life expectancy

*DC Current breaking capacity L/R = 20 ms ; 40 ms*

#### 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 -

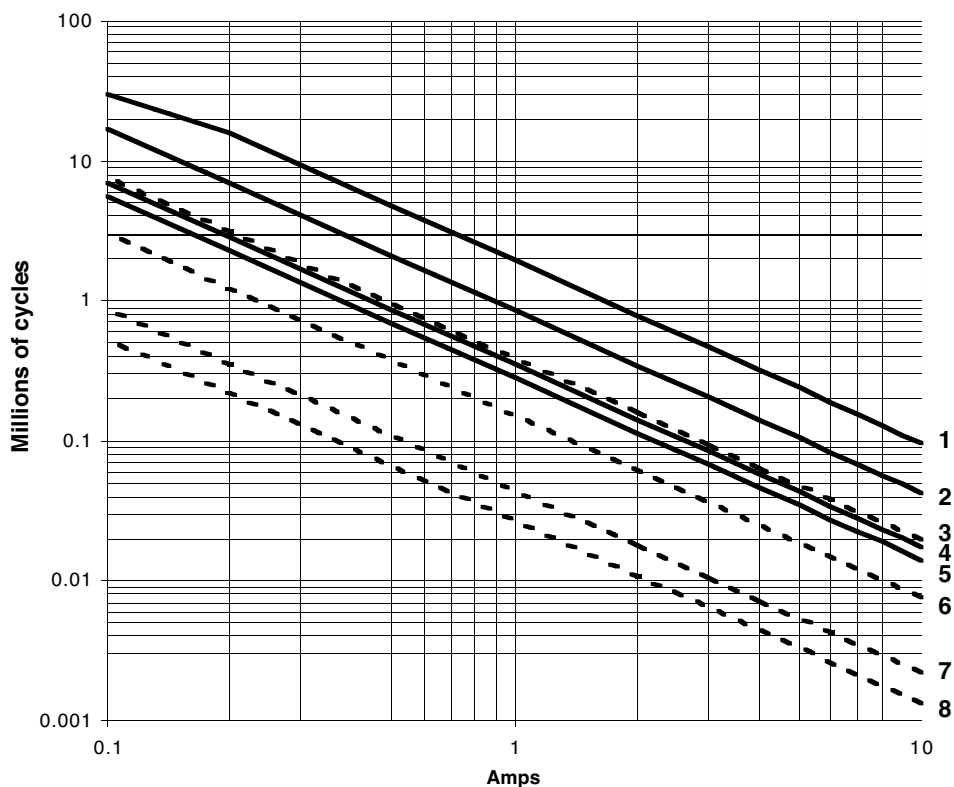
———— L/R = 20 ms continuous current

- - - - L/R = 40 ms continuous current

\* By connecting 2 contacts in series, we increase the DC current breaking capacity by 50%

Curves	1	2	3	4	5	6	7	8
VDC	24	48	24	125	220	48	125	220
L/R (ms)	20	20	40	20	20	40	40	40

DC Current breaking capacity



# BD-U200 relay Sockets

## Mounting possibilities/sockets



### Surface/wall mounting

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

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, A260 crimp contact
338000560	V31	Faston connection socket, rear dual connection (6.3 mm)
338000570	V33	Spring clamp socket, flush mount, rear dual connection (2.5 mm <sup>2</sup> )

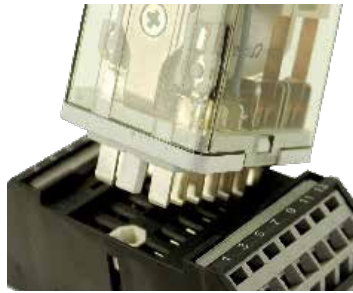
### PCB mounting

338000561	V32	PCB soldering socket
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For more details see datasheets of the sockets

# BD-U200 relay Keying

## Mechanical keying relay and socket (optional)



Function:

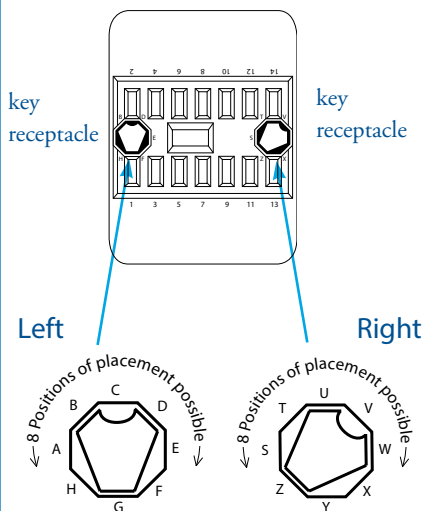
- To prevent wrong installation
- To prevent damage to equipment
- To prevent unsafe situations

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.

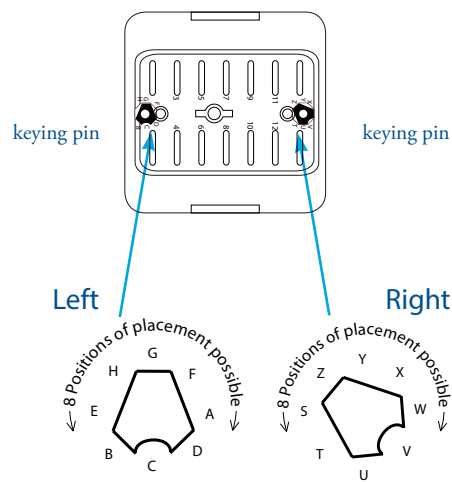
Remark: Sockets and relay shown are only examples.

Top view socket



Example keying position G-Z on socket

Bottom view relay



Example keying position G-Z on relay



# BD-U200 relay

## Instructions

### Installation, operation & inspection

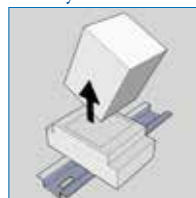
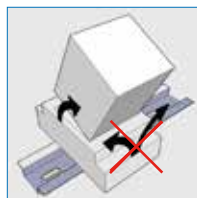
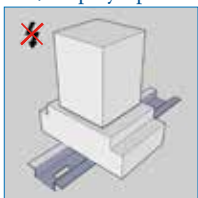
#### Installation

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-U200 relay

## Ordering scheme

Configuration:



1. Relay model

2. Coil voltage

3. Options

This example represents a **BD-U204-CE**

**Description:** BD-U200 series relay, U<sub>nom</sub>: 110 VDC, Low temperature (-40 °C), Gold plated contacts

1. Relay model

**BD-U2**

2. Coil voltage

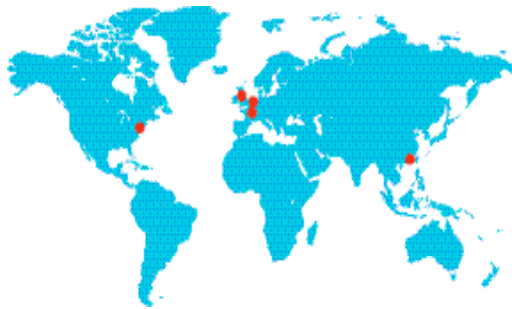
<b>01</b>	24 VDC
<b>02</b>	48 VDC
<b>03</b>	72 VDC
<b>04</b>	110 VDC
<b>05</b>	96 VDC
<b>06</b>	12 VDC
<b>07</b>	36 VDC

3. Options

<b>C</b>	Low temp. (-40 °C) - Max. contact current 8 A
<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>N</b>	No magnetic arc blow-out
<b>X3</b>	Reversed polarity (+ on pin 6)
<b>Y</b>	Double make / double break (Y=-40 °C)

Upon ordering indicate keying if necessary.





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@nieaf-smitt.nl](mailto:sales@nieaf-smitt.nl)

Mors Smitt Technologies Inc.

420 Sackett Point Road  
North Haven, CT 06473, USA  
T +1 (203) 287 8858, F +1 (888) 287 8852  
E [mstechnologies@msrelais.com](mailto:mstechnologies@msrelais.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 [info@morssmitt.co.uk](mailto:info@morssmitt.co.uk)