

# D-U200 relay - Plug-in, 4 pole

## Datasheet



### Description

Plug-in railway relay with 4 change-over contacts. Standard equipped with a back EMF suppression diode and magnetic arc-blowout 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 D-U200 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 D-U200 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 rolling stock applications such as door control, traction control, breaking systems etc.

#### Features

- Compact plug-in design
- Instantaneous, 4 C/O contacts
- Back EMF suppression diode
- 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

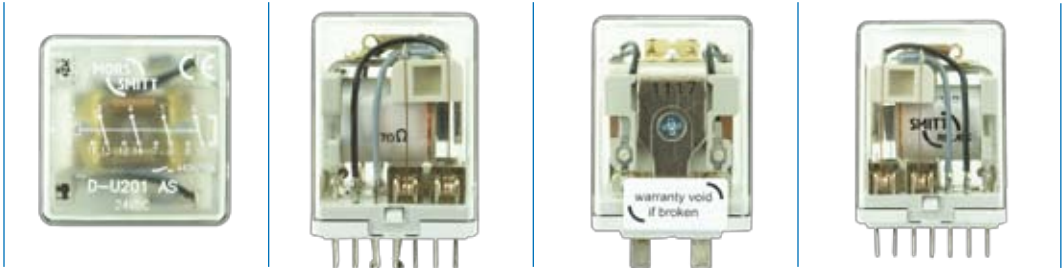
- Proven reliable
- Long term availability
- Easy to maintain
- Low life cycle cost
- No maintenance

#### Railway compliancy

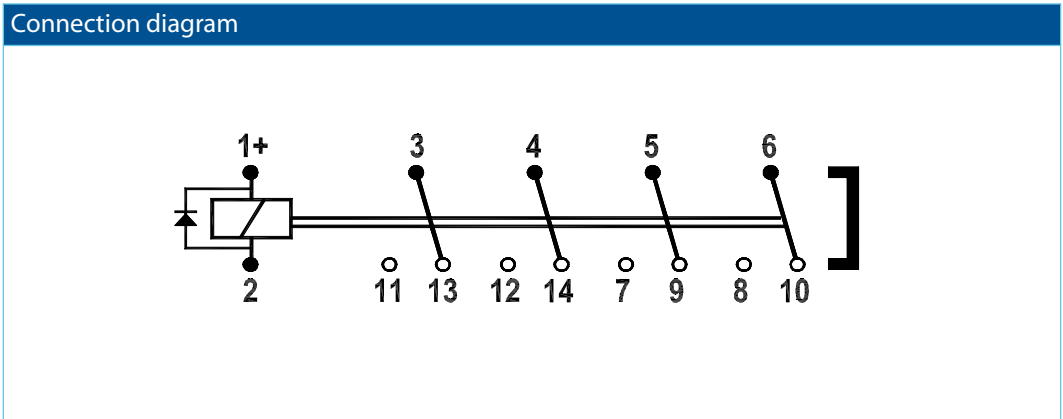
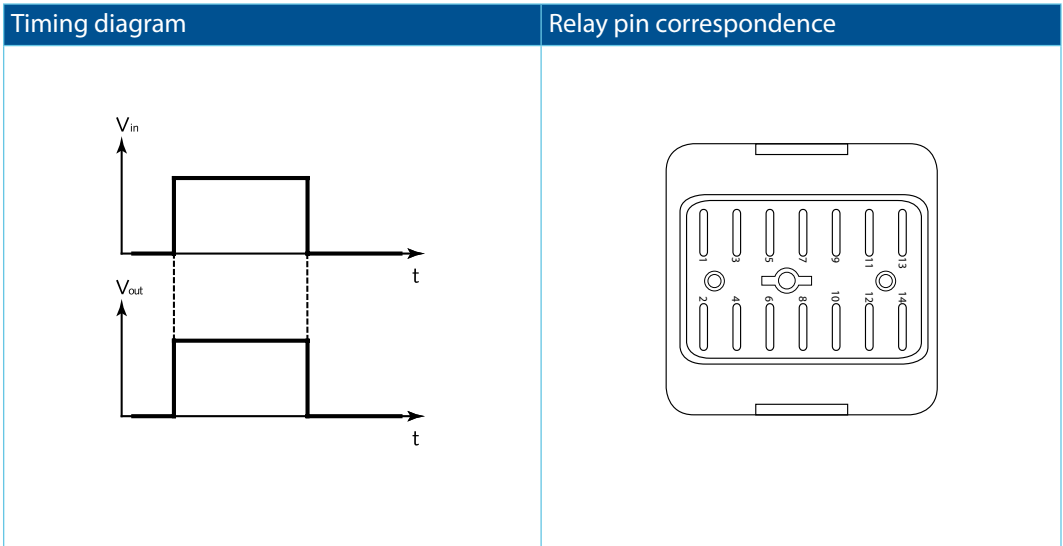
- EN 50155 Electronic equipment used on rolling stock for railway applications
- IEC 60571 Electronic equipment used on railway vehicles
- IEC 60077 Electrical equipment for rolling stock in railway applications
- IEC 60947 Low voltage switch gear and control gear
- IEC 61373 Rolling stock equipment - 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

# D-U200 relay

## Technical specifications



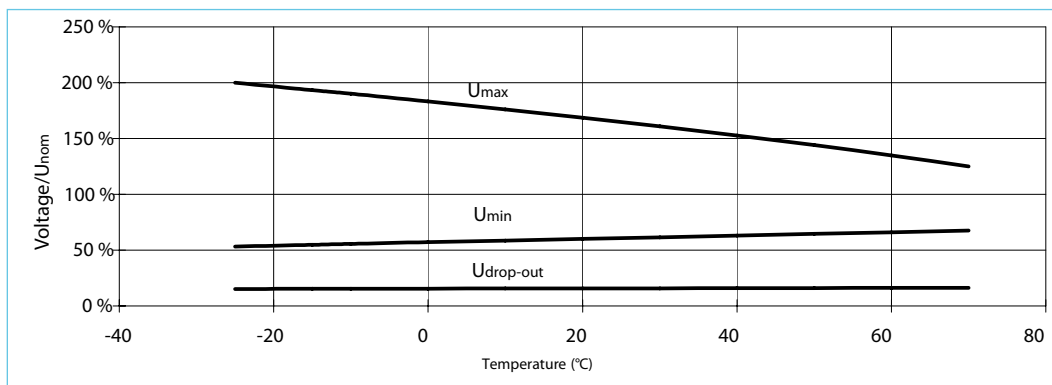
### Functional and connection diagrams



# D-U200 relay

## Technical specifications

### Operating range at various temperatures



### Coil data

Operating times at nominal voltage:	
Pull-in time	≤ 20 ms
Release time	≤ 18 ms
Bounce time N/O contacts (increased bounce time at low voltage)	≤ 4 ms
Bounce time N/C contacts	≤ 8 ms
Inductance L/R at U <sub>nom</sub> :	
Energized	11 ms
Released	8 ms
Nominal power consumption	2.2 W @ U <sub>nom</sub>
Operating voltage range	0.7 - 1.25 U <sub>nom</sub>

Type	U <sub>nom</sub> (VDC)	U <sub>min</sub> (VDC)	U <sub>max</sub> (VDC)	U <sub>drop-out</sub> (VDC)	R <sub>coil</sub> * (Ω)	I <sub>coil-nom</sub> (mA)
D-U201	24	16.8	30	2.5	270	89
D-U202	48	33.6	60	4.8	1103	44
D-U203	72	50.4	90	7.2	2406	30
D-U204	110	77	137.5	11	5330	21
D-U205	96	67.2	120	9.5	4400	22
D-U206	12	8.4	15	1.2	72	167
D-U207	36	25.2	45	3.5	562	64
D-U210	120	84	150	12	6160	19
D-U212	100	70	125	10	4400	23
D-U213	125	87.5	156.25	12.5	7634	16
D-U215	220	154	275	22	21776	10
D-U220	250	175	312.5	25	23850	10

Other types on request

\* The R<sub>coil</sub> is measured at room temperature and has a tolerance of ± 10%, with option L (LED) the value can differ

Remarks:

- U<sub>min</sub> 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
- U<sub>drop-out</sub> is the must-release voltage at which the relay has dropped-out in all circumstances (worst-case situation), in practice the relay drops out at a higher voltage

# D-U200 relay

## Technical specifications

### Contact data

Amount and type of contacts	4 C/O
Maximum make current	16 A
Peak inrush current	200 A (withstand > 10 x 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 ≤ 15 ms) 230 VAC, 10 A (cos φ ≥ 0.7)
Contact resistance	15 mΩ (initial)
Material	Ag standard (optional AgSnO <sub>2</sub> , Au on Ag)
Contact gap	0.7 mm
Contact force	> 200 mN

### Electrical characteristics

Dielectric strength	Pole-pole	EN 50155	
	Cont-coil	IEC 60255-5	4 kV, 50 Hz, 1 min
Insulation between open contacts		IEC 60077	2.5 kV, 50 Hz, 1 min
			5 kV; 50 Hz; 1 min
Pulse withstanding		IEC 60255-5	5 kV (1.2/50 μs)

### Mechanical characteristics

Mechanical life	50 x 10 <sup>6</sup> operations
Maximum switching frequency	Mechanical: 3600 ops/h Electrical: 1200 ops/h
Weight	140 g (without options)

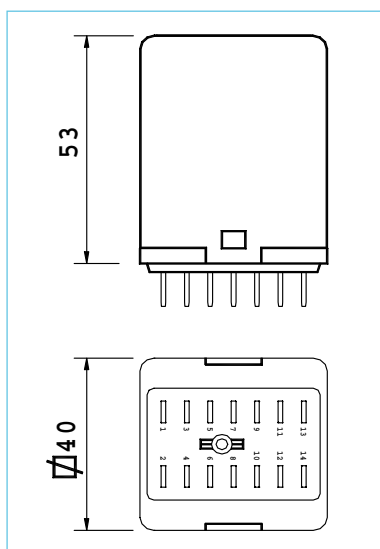
### Environmental characteristics

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 option Y: -50 °C)
Humidity	95% (condensation is permitted temporarily)
Salt mist	IEC 60068-2-52, Security level 3
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

# D-U200 relay

## Technical specifications

### Dimensions (mm)



### Options

Code	Description	Remark	Cannot be combined with:
C	Low temperature (-50 °C)	I <sub>contact</sub> < 8 A	E**
E*	Au; Gold plated contacts (10 µm)		C, M
K	Extra dust protection	I <sub>contact</sub> > 100 mA	T
L	LED integrated in coil		
M	AgSnO <sub>2</sub> ; "non-weldable" contacts		E
N	No magnetic arc blow-out		
P	Polarisation diode		
Q	Double zener diode over coil		
T	Push to test button		K
W	Weld no transfer (see datasheet D-U200-W)		
X2	AC/DC rectifier bridge		
Y	Double make/double break contacts		
Z	No diode	2 C/O DM/DB, -50°C	
11	Make before break contact	Polarity independent	
Keying	Coil coding relay and socket	2 C/O 1 N/O 1 N/C	
Colour coding	Coloured cover for coil voltage coding		

\* Gold plated contacts characteristics

Material

Maximum switching voltage

Maximum switching current

Minimum switching voltage

Minimum switching current

Ag, 10 µm gold plated

60 V (higher voltages are allowed with a maximum power per contact of 1.6 W)

400 mA (at higher rate gold will evaporate, then the standard silver contact rating of minimum 10 mA and 12 V is valid)

5 V

1 mA

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

# D-U200 relay

## Technical specifications

### Electrical life expectancy

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

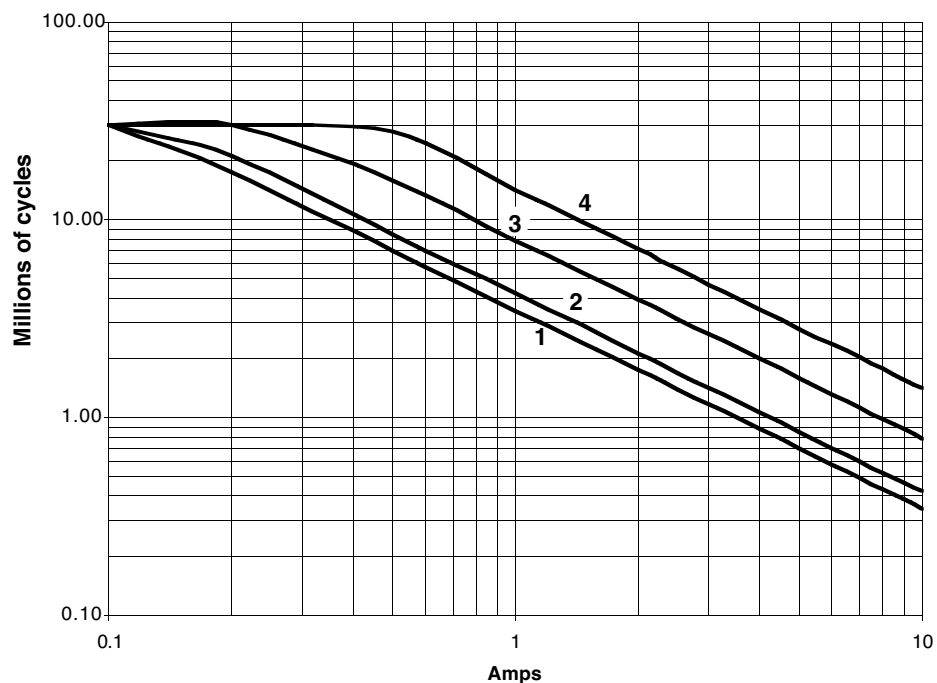
**AC Current breaking capacity versus life expectancy in millions of cycles.**

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**



# D-U200 relay

## Technical specifications

### Electrical life expectancy

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

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

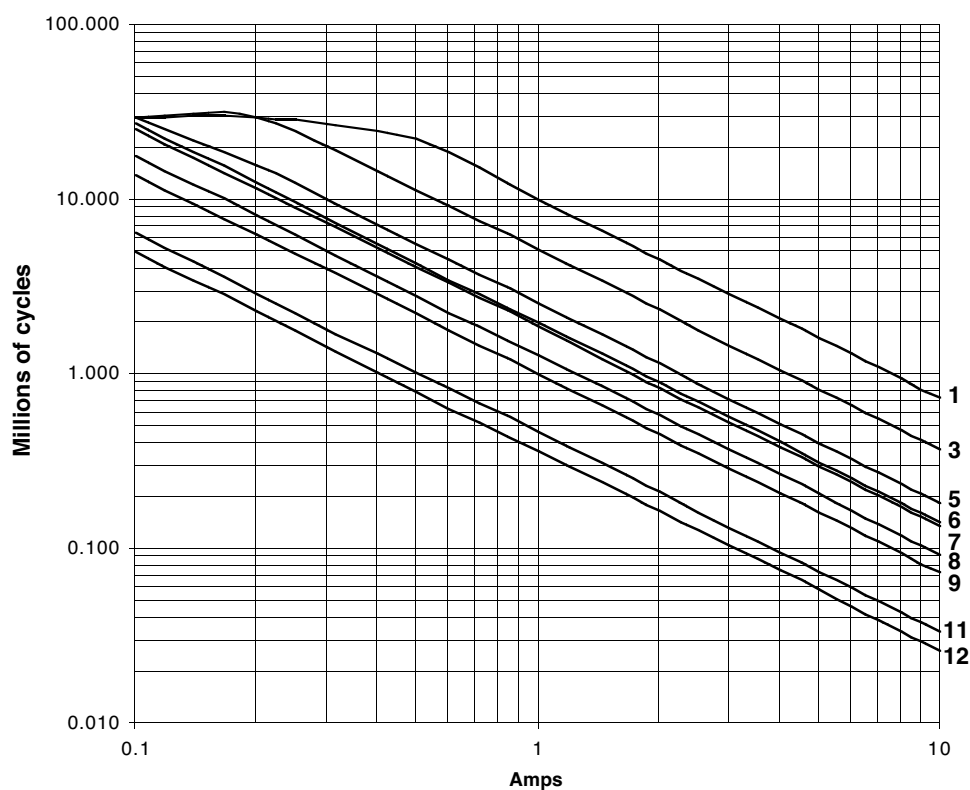
Rate of contacts opening and closing = 1200 operations per hour.

Values shown for inductive loads -

- $\cos \varnothing = 0.7$
- $\cos \varnothing = 0.5$
- -- —  $\cos \varnothing = 0.3$

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

AC Current breaking capacity



# D-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.**

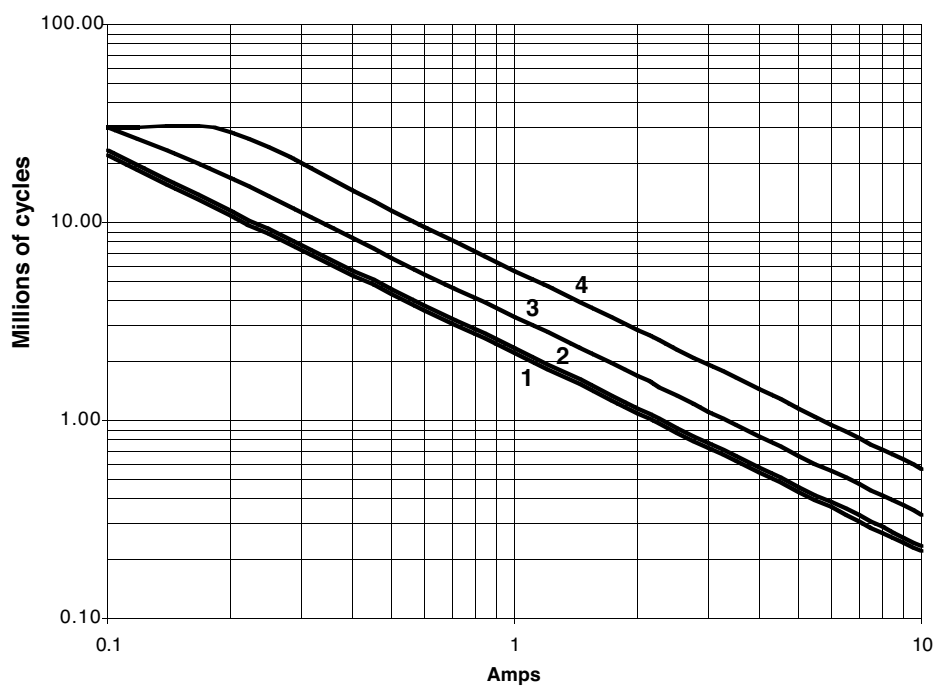
Rate of contacts opening and closing = 1200 operations per hour.

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**





# D-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 -

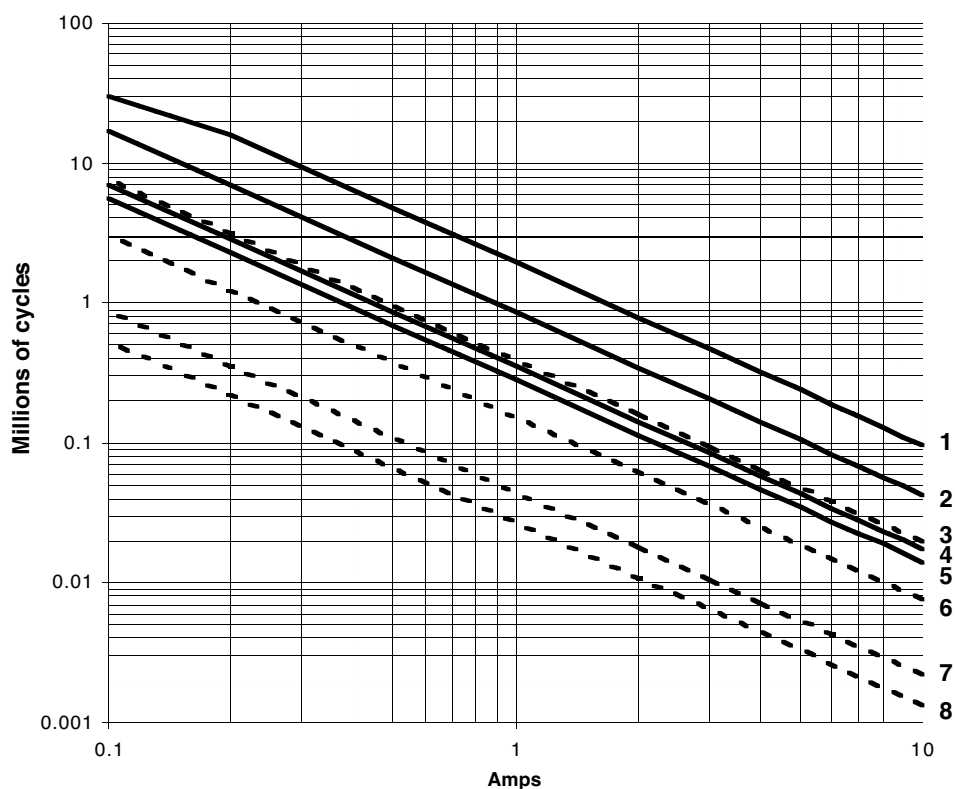
———— L/R = 20 ms continuous current

- - - - 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



# D-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)
338300100	V24	Faston connection socket, wall mount, front connection (6.3 mm or 2 x 2.8 mm)
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)
338300200	V25	Faston connection socket, rail mount, front connection (6.3 mm or 2 x 2.8 mm)
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 x 2.8 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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For more details see datasheets of the sockets

# D-U200 relay

## Keying

### Mechanical keying relay and socket (optional)



Function:

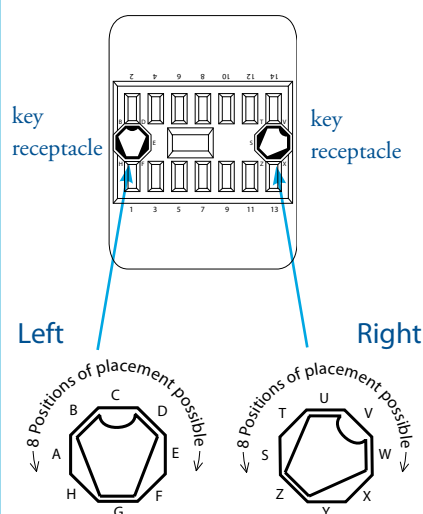
- To prevent wrong installation
- To prevent damage to equipment
- To prevent unsafe situations

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.

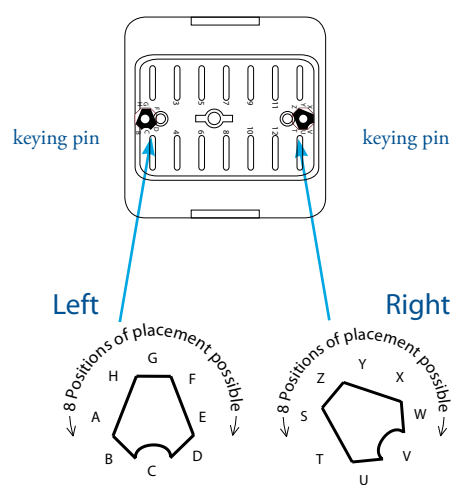
Remark: Sockets and relay shown are examples.

Top view socket



Example keying position G-Z on socket

Bottom view relay



Example keying position G-Z on relay

# D-U200 relay

## Instructions

### Installation, operation & inspection

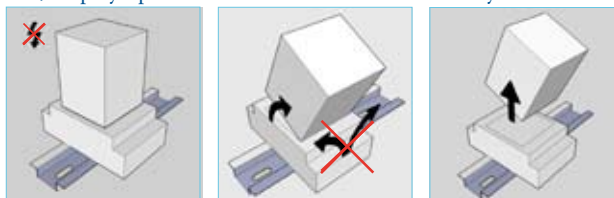
#### Installation

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.

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 resoldering 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 overvoltage, 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.

# D-U200 relay

## Ordering scheme

Configuration:

<b>D-U2</b>	<b>04</b>	-	<b>CL</b>	-	<b>code AS</b>
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1. Relay model      2. Coil voltage      3. Options      4. Keying (optional)

This example represents a **D-U204-CL-code AS**. **Description:** D-U200 series relay,  
Unom: 110 VDC, Low temp. (-50°C), LED coil indicator, keying code AS

### 1. Relay model

<b>D-U2</b>
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### 2. Coil Voltages

<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
<b>10</b>	120 VDC
<b>12</b>	100 VDC
<b>13</b>	125 VDC
<b>15</b>	220 VDC
<b>20</b>	250 VDC

### 3. Options

<b>C</b>	Low temp. (-50°C) - Max contact current 8 A
<b>E</b>	Gold plated contacts
<b>K</b>	Special dust protection
<b>L</b>	LED coil indicator
<b>M</b>	AgSnO <sub>2</sub> contacts, highly resistant to welding
<b>N</b>	No magnetic arc blow-out
<b>P</b>	Polarisation diode
<b>Q</b>	Double zener diode
<b>T</b>	Push-to-test-button
<b>W013</b>	Weld no transfer, 1 NC / 3 NO
<b>W022</b>	Weld no transfer, 2 NC / 2 NO
<b>W031</b>	Weld no transfer, 3 NC / 1 NO
	(see separate datasheet D-U200-W)
<b>X2</b>	Coil for both DC and AC
<b>Y</b>	Double make/ double break (CY=-50°C)
<b>Z</b>	No diode
<b>11</b>	Make before break contact

### 4. Keying (optional, leave blank in configuration if not required)

#### Standard, silver contacts

<b>Code AS</b>	24 VDC	D-U201 code AS
<b>Code AY</b>	36 VDC	D-U207 code AY
<b>Code AT</b>	48 VDC	D-U202 code AT
<b>Code AU</b>	72 VDC	D-U203 code AU
<b>Code AV</b>	110 VDC	D-U204 code AV

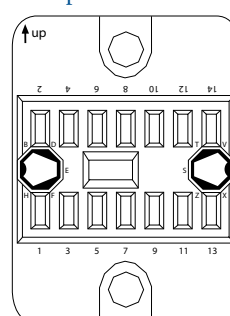
#### Option E, gold contacts

<b>Code DT</b>	24 VDC	D-U201-E code DT
<b>Code FV</b>	36 VDC	D-U207-E code FV
<b>Code HU</b>	48 VDC	D-U202-E code HU
<b>Code AZ</b>	72 VDC	D-U203-E code AZ
<b>Code HV</b>	110 VDC	D-U204-E code HV

#### Option M, silver tin oxide contacts

<b>Code GT</b>	24 VDC	D-U201-M code DG
<b>Code HT</b>	36 VDC	D-U207-M code HT
<b>Code GU</b>	48 VDC	D-U202-M code GU
<b>Code GV</b>	72 VDC	D-U203-M code GV
<b>Code GW</b>	110 VDC	D-U204-M code GW

Top view socket



Bottom view relay

