

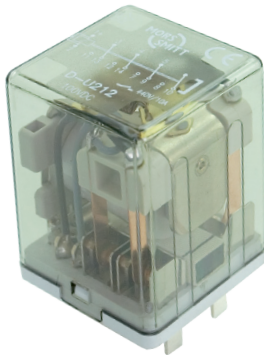
/// Plug-in railway relay with 4 C/O contacts

Rugged plug-in relays for extreme reliability, within long endurance applications and harsh environments

D-U200

Instantaneous relay

Part of D-platform



Description

Plug-in railway relay with 4 change-over contacts. Standard equipped with a back EMF suppression diode and magnetic arc blow-out 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.

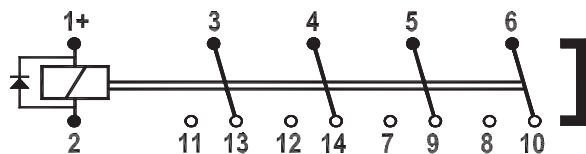
Application

Demanding rolling stock applications such as door control, traction control, braking systems etc. Designed for extreme reliability, within long endurance applications and harsh environments.

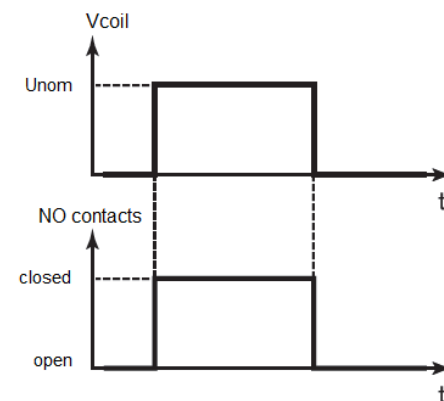
Features

- Instantaneous compact plug-in relay, 4 C/O contacts
- Integrated back EMF suppression diode
- Magnetic arc blow-out for high breaking capacity and long contact life
- Coil voltages 12 to 250 VDC
- Maximum continuous current 10 A
- Maximum switching voltage 250 VDC, 440 VAC
- Maximum breaking capacity 110 VDC, 8 A (L/R < 15 ms), 230 VAC, 10 A ($\cos \varphi > 0.7$)
- Minimum switching current 10 mA (optional 1 mA)
- Mechanical life 50 million operations
- Electrical life 10 million operations at 24 VDC, 0.5 A resistive load
- Integrated snaplock, no external retaining clip needed
- Transparent cover for easy visual inspection
- Flexibility with many options and wide range of sockets
- Optional positive mechanical keying relay to socket
- Fully railway compliant

Connection diagram



Timing diagram



Railway compliancy

EN 50155	EN 50121
IEC 60571	EN 45545-2
IEC 60077	NF F16-101/102
IEC 60947	NF F 62-002
IEC 61373	



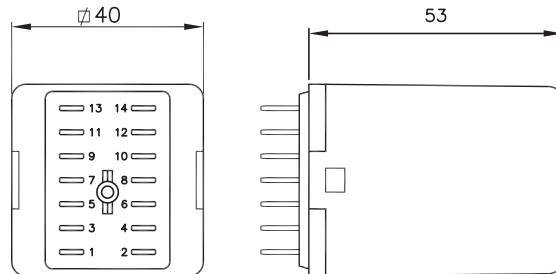
Instantaneous relay D-U200

Options

- Weld-no-transfer contacts
- Low temperature (-50 °C), max. contact current 8 A
- Gold plated contacts
- Extra dust protection
- LED coil indicator
- Bipolar LED indicator
- AgSnO₂ contacts, high resistant to welding
- No magnetic arc blow-out
- Polarisation diode
- Double zener diode
- Push-to-test button
- Coil for both AC and DC
- Double make / double break contacts (-50 °C)
- No diode
- Make before break contact
- Reversed polarity
- Keying

Remark: Not all combinations possible

Dimensions (mm)



Sockets

		Mounting			
		Surface / Wall	35 mm rail	Panel / Flush	PCB
Terminal connection	Screw	V23	V23	-	-
	Screw - wide terminals	V22 BR	V23 BR	-	-
	Spring clamp	V29	V29	V33	-
	Faston	-	-	V31	-
	Crimp	-	-	V26	-
	Solder tag	-	-	V3	-
	PCB	-	-	-	V32

For more information see the respective datasheets

For more detailed technical specifications, drawings and ordering information, go to the product page on www.morssmitt.com

 Over 10 million Mors Smitt relays in use in rail transport applications worldwide!

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Technical specifications

Instantaneous relay D-U200

Coil characteristics

Inductance L/R at Unom (typical value):	
Energized	11 ms
Released	8 ms
Nominal power consumption	2.2 W @ Unom
Operating voltage range	0.7 - 1.25 Unom

Type	Unom (VDC)	Umin (VDC)	Umax (VDC)	Udrop-out (VDC)	Rcoil * (Ω)	Icoil-nom (mA)
D-U201	24	16.8	30	2.4	270	89
D-U202	48	33.6	60	4.8	1044	46
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	9.6	4400	22
D-U206	12	8.4	15	1.2	72	167
D-U207	36	25.2	45	3.6	562	64
D-U208	55	38.5	69	5.5	1300	42
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

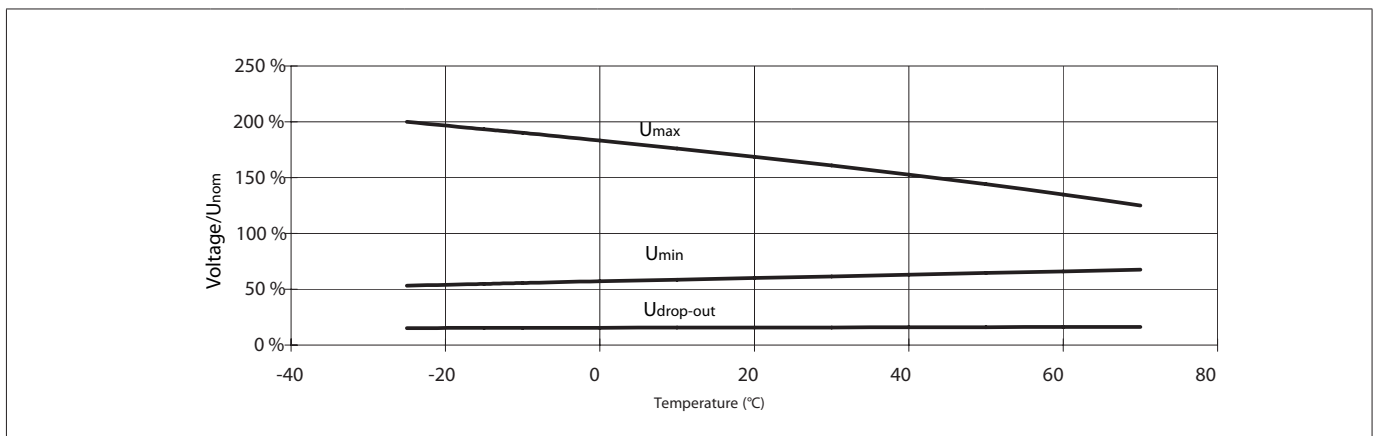
Other types on request

* The Rcoil is measured at room temperature and has a tolerance of $\pm 10\%$, with option L (LED) the value can differ

Remarks:

- Umin 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
- Udrop-out 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
- Always select the nominal voltage as close as possible to the actual voltage in the application

Operating range at various temperatures

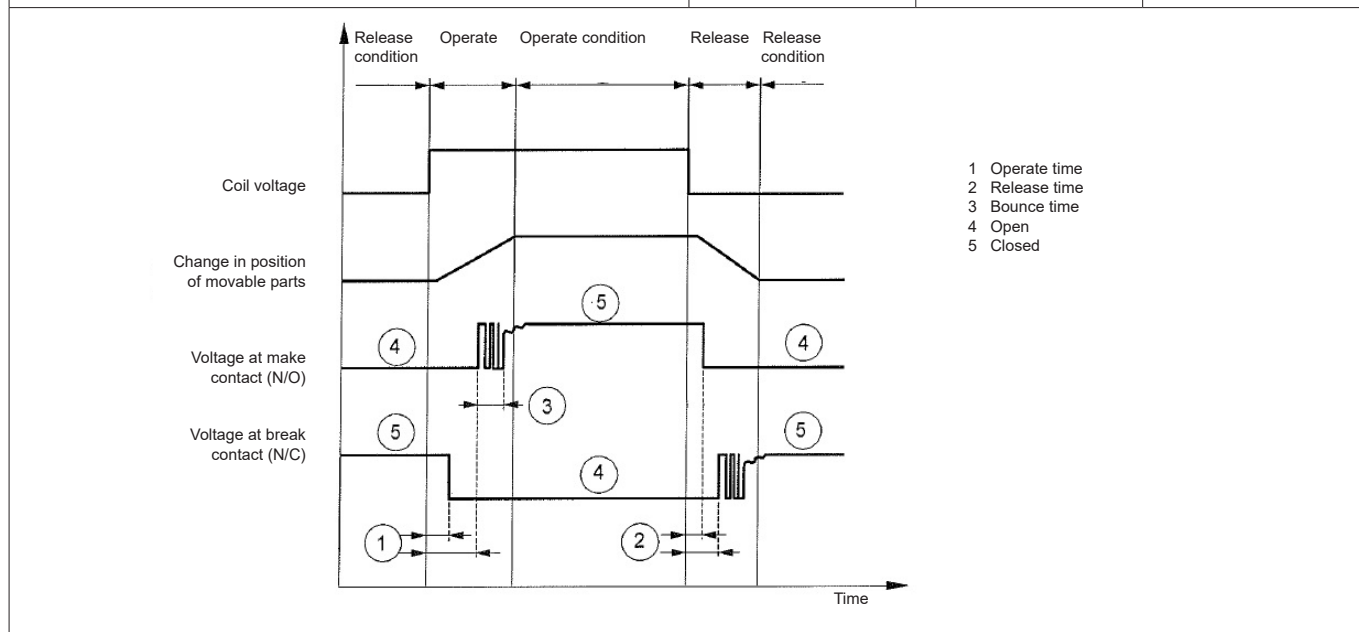


Instantaneous relay D-U200

Contact characteristics

Amount and type of contacts	4 C/O
Maximum make current	16 A
Peak inrush current	NF F 62-002 200 A (withstand > 10 x 200 A @ 10 ms, 1 min)
Maximum continuous current	10 A
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 ($\cos \varphi \geq 0.7$)
Contact resistance	15 m Ω (initial)
Material	Ag standard (optional AgSnO ₂ , Au on Ag)
Contact gap	0.7 mm
Contact force	> 200 mN

Operating times (ms) at nominal voltage (typical value):	Standard relay	With double zener diode (option Q)	Without diode (Option Z)
Operate time	18	17	19
Release time	21	8	6
Bounce time N/O contacts	7	6	6
Bounce time N/C contacts	8	11	12



Electrical characteristics

Dielectric strength	Pole-pole	4 kV, 50 Hz, 1 min
	Cont-coil	2.5 kV, 50 Hz, 1 min
	Open contacts	2.5 kV; 50 Hz; 1 min
Pulse withstanding	IEC 60255-5	5 kV (1.2/50 μ s)

Instantaneous relay D-U200

Mechanical characteristics

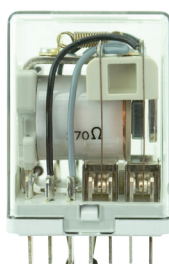
Mechanical life	50 x 10 ⁶ operations
Maximum switching frequency	Mechanical: 3600 ops/h Electrical: 1200 ops/h
Weight	140 g (without options)

Environmental characteristics

Environmental	EN 50125-1
Vibration	IEC 61373, Category I, Class B, Body mounted
Shock	IEC 61373, Category I, Class B, Body mounted
Operating temperature	-25 °C...+85 °C (optional: -50 °C)
Humidity	95% (condensation is permitted temporarily)
Maximum altitude	2000 meter. Higher altitudes are possible but have consequences mentioned in IEC 60664 (for example 5000 meter with bigger clearance distance)
Salt mist	IEC 60068-2-11, class ST4
Damp heat	IEC 60068-2-30, Test method Db variant 1
Protection	IEC 60529, IP40 (relay on socket) (with option K: IP50)
Fire & smoke	NF F 16-101, NF F 16-102, EN 45545-2: HL3 for requirements R22, R23, R26
Insulation materials	Cover: polycarbonate Base: polyester

Railway compliancy

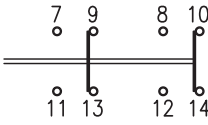
EN 50155	Railway applications - Rolling stock - Electronic equipment
IEC 60571	Railway applications - Electronic equipment used on rolling stock
IEC 60077	Railway applications - Electric equipment for rolling stock
IEC 60947	Low-voltage switchgear and controlgear
IEC 61373	Railway applications - Rolling stock equipment - Shock and vibration tests
EN 50121	Railway applications - Electromagnetic compatibility
NF F16-101/102	Railway rolling stock - Fire behavior
EN 45545-2	Railway applications - Fire protection on railway vehicles Part 2: Requirements for fire behavior of materials and components
NF F 62-002	Railway rolling stock - On-off contact relays and fixed connections



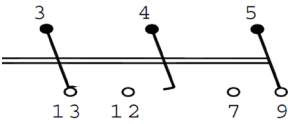
Instantaneous relay

D-U200

Options

Code	Description	Remark	Cannot be combined with:
Standard options:			
C	Low temperature (-50 °C)	Icontact < 8 A	
E*	Au; Gold plated contacts (10 µm)	Yellow tape around relay for identification (option X6)	M
K	Extra dust protection	IP50 Cat 2 for the relays mounted in a Mors Smitt socket. Application PD1/PD2 and contact load > 0.5 A.	T
L	LED integrated in coil		X, X2
N	No magnetic arc blow-out		
Q	Double zener diode over coil	Maximum allowed peak voltage 180 V, higher voltage will damage the diode. Replaces back EMF diode.	Z
W	Weld no transfer (see datasheet D-U200-W)		T, 11
Y	Double make/double break contacts	2 C/O DM/DB, -50 °C 	
Z	No diode	Polarity independent	
Keying	Coil coding relay and socket		

Special options:

E1M3	1 Gold plated signaling contact (terminals 8-10) and 3 AgSnO ₂ contacts		E, M
M	AgSnO ₂ ; "non-weldable" contacts	Icontact > 100 mA	E
P	Polarisation diode		X, Z
T	Push to test button		K, W
X	Bipolar LED	Only in combination with Q or Z	L, P, X2
X2	AC/DC rectifier bridge		L, X
X6	Yellow tape around relay for identification		
11	Make before break contact	1 C/O 1 N/O 1 N/C  Contact 4-12 will make before contact 3-13 will break during pull-in. No make before break during drop-out.	W

* 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

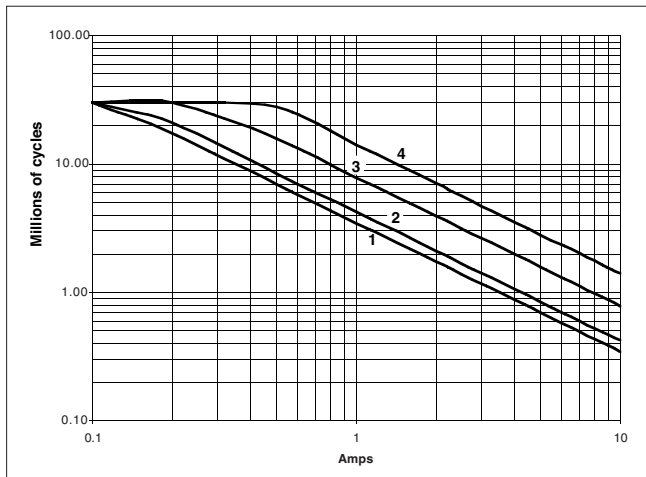
Remark: For application support or technical product support, contact your local Mors Smitt sales office (see contact details on last page).

Instantaneous relay D-U200

Electrical life expectancy

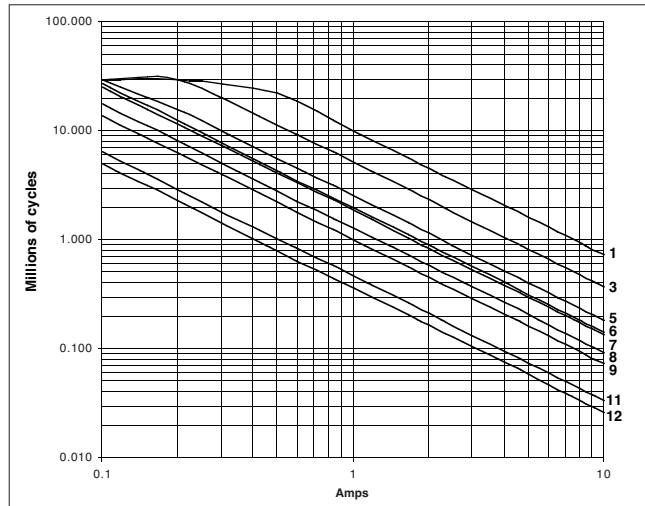
AC Current breaking capacity at $\cos\phi = 1$

Curve	1	2	3	4
VAC	220	125	48	24



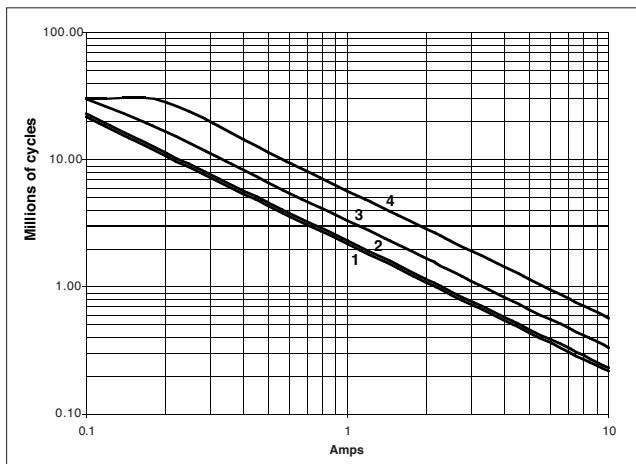
AC Current breaking capacity at $\cos\phi = 0.7 ; 0.5 ; 0.3$

Curve	1	3	5	6	7	8	9	11	12
VAC	24	24	125	220	24	125	220	125	220
Cos ϕ	0.7	0.5	0.7	0.7	0.3	0.5	0.5	0.3	0.3



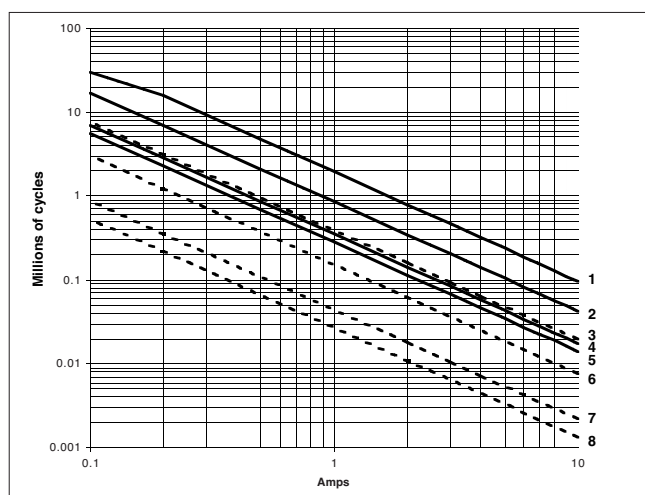
DC Current breaking capacity at $L/R = 0$

Curve	1	2	3	4
VDC	220	125	48	24



DC Current breaking capacity $L/R = 20 \text{ ms} ; 40 \text{ ms}$

Curve	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



By connecting 2 contacts in series, the DC current breaking capacity is increased by 50%.

Instantaneous relay D-U200

Mounting possibilities/sockets

				
V3	V22BR	V23	V23BR	V26
				
V29	V31	V32	V33	

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 ²)

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 ²)

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 (4.8 x 0.8 mm)
338000570	V33	Spring clamp socket, flush mount, rear dual connection (2.5 mm ²)

PCB mounting

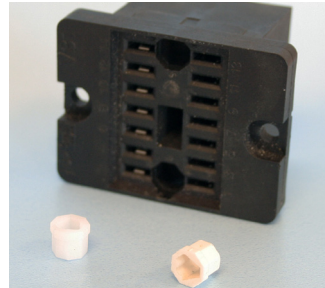
338000561	V32	PCB soldering socket
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No external retaining clip needed as the 'snap-lock' will hold the relay into the socket under all circumstances and mounting directions (according shock & vibration requirements IEC 61373, Category I, Class B, Body mounted). If regulations require external retaining clips, these are available as well.

For more details see datasheets of the sockets on www.morssmitt.com

Instantaneous relay D-U200

Mechanical keying relay and socket (optional)



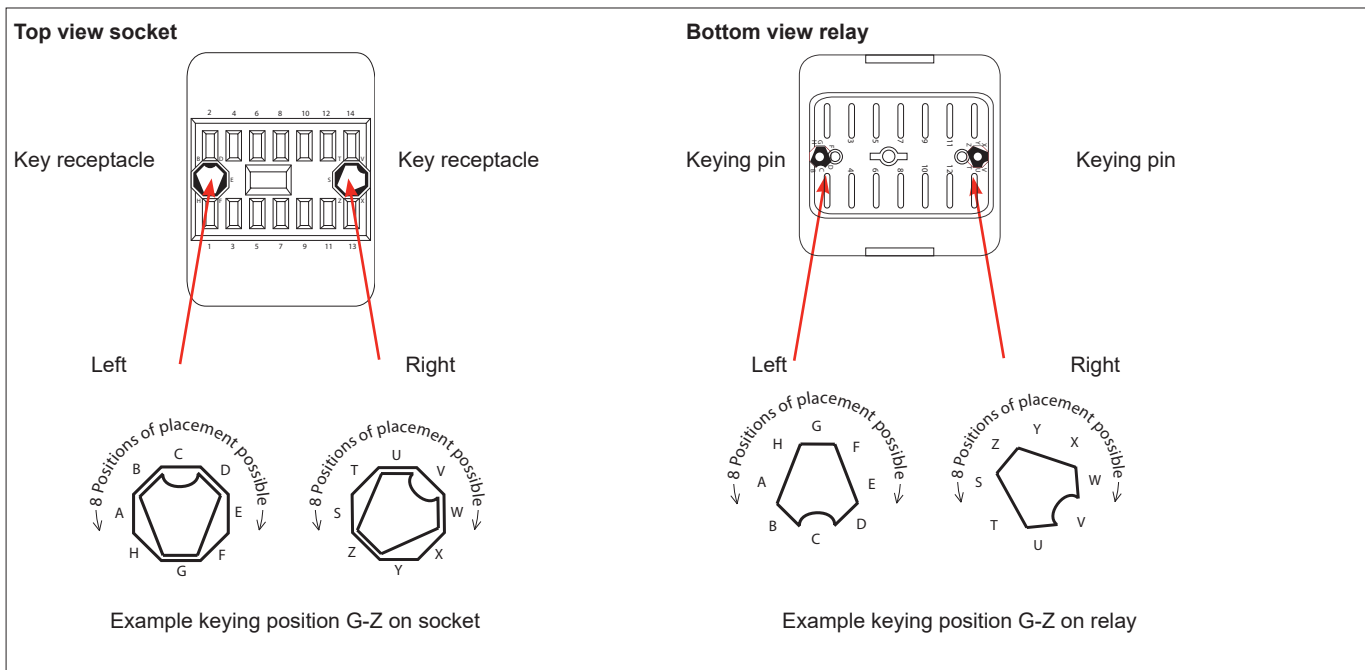
Function:

- 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.



Instantaneous relay D-U200

Important for relay selection and operation

Make sure the relay is suitable for the application. For critical applications (for example: green loop applications) relays should be checked on correct working during periodic inspection.

Recommendations for long time contact reliability

For relays to enable failure free performance over a very long operational time, it is important to create the right circumstances. In any relay, contact usage and atmospheric conditions influence the contact surface. To counter this effect it is common practice to use a safety factor of > 2 to ensure long time contact reliability.

Therefore for long time contact reliability we recommend:

- Silver contacts: a minimum contact current of 20 mA per contact
- Gold contacts: a minimum contact current of 10 mA per contact
- Double Make Double Break contacts: a minimum contact current of 40 mA per contact
- When low currents are switched and not frequently, e.g. 10 mA once a day, it is advised next to gold plated contacts to put similar contacts within the same relay in parallel
- With higher load switching, e.g. 110 VDC and > 1 A, put relay contacts in series
- Rule of thumb: any relay works best with switching currents > 20 mA in DC environment when frequently switched. When not switched frequently a higher switching current like 50 mA is better for a long reliable operational time
- Check relays regularly, for example with the Mors Smitt Portable Relay Tester and visually through the transparent cover

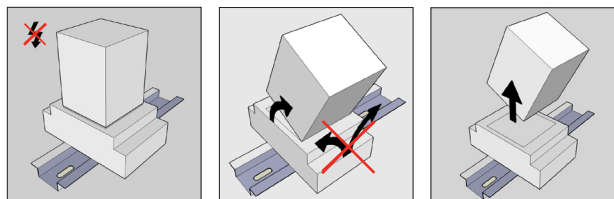
Instructions for use

Installation

Before installation or working on the relay: disconnect the power supply first (no hot swapping)! 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 presense 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



- Relays should never be swapped to other circuit positions when taken out of its socket for inspection or fault finding, always place it back into the original position to prevent contact resistance problems. Contact resistance problems can be created when swapping relays between different circuit loads due the contact wear/condition having changed during its operational life.

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 (≤ 15 m Ω when new). When using silver contacts one can clean the contact by switching a contact load a few times using > 24 VDC & ~ 2 A. Increased contact resistance is not always problematic, as it depends on circuit conditions. In general a contact resistance of 1 Ω 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.

Instantaneous relay **D-U200**

Inspection / maintenance

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 have been reversed due to the coil connection).

Relays can easily be tested with the Mors Smitt Relay Tester. More information on: www.morssmitt.com.

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.

RMA procedure see www.morssmitt.com

Instantaneous relay D-U200

Ordering scheme

D-U2		-	Code	
Coil voltages	01			24 VDC
	02			48 VDC
	03			72 VDC
	04			110 VDC
	05			96 VDC
	06			12 VDC
	07			36 VDC
	08			55 VDC
	10			120 VDC
	13			125 VDC
	15			220 VDC
	20			250 VDC
				Cannot be combined with:
Options (add as many options as needed)	C			Low temperature (-50 °C) - Max contact current 8 A
	E			Gold plated contacts
	K			Extra dust protection, IP50
	L			LED coil indicator
	N			No magnetic arc blow-out
	Q			Double zener diode
	W013			Weld no transfer, 1 NC / 3 NO (see separate datasheet D-U200-W)
	W022			Weld no transfer, 2 NC / 2 NO (see separate datasheet D-U200-W)
	W031			Weld no transfer, 3 NC / 1 NO (see separate datasheet D-U200-W)
	Y			Double make/ double break (-50 °C)
	Z			No diode
Special options (minimum order quantity: 20)	E1M3			1 Gold, 3 AgSnO ₂ contacts
	M			AgSnO ₂ contacts, highly resistant to welding
	P			Polarisation diode
	T			Push-to-test-button
	X			Bipolar LED
	X2			Coil for both DC and AC
	X6			Yellow tape around relay for identification
	11			Make before break contact
Keying code (optional, leave blank if not required)				Standard, silver contacts
Remark: keying codes are available for all possible coil voltages.		AS	24 VDC	D-U201 code AS
		AY	36 VDC	D-U207 code AY
		AT	48 VDC	D-U202 code AT
		AU	72 VDC	D-U203 code AU
		AV	110 VDC	D-U204 code AV
				Option E, gold contacts
		DT	24 VDC	D-U201-E code DT
		FV	36 VDC	D-U207-E code FV
		HU	48 VDC	D-U202-E code HU
		AZ	72 VDC	D-U203-E code AZ
		HV	110 VDC	D-U204-E code HV
				Option M, silver tin oxide contacts
		GT	24 VDC	D-U201-M code GT
		HT	36 VDC	D-U207-M code HT
		GU	48 VDC	D-U202-M code GU
		GV	72 VDC	D-U203-M code GV
		GW	110 VDC	D-U204-M code GW

Example: D-U204-CL code AV

Description: D-U200 relay, Unom: 110 VDC, low temperature (-50 °C), LED coil indicator, keying code AV

Instantaneous relay
D-U200

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