

D-U200-W relay - Weld-no-transfer, 4 pole Datasheet



Description

Plug-in safety critical railway relay with 4 change-over contacts. Weld-no-transfer contacts are standard. Also 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-W 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-W relay an easy and flexible solution to use.

Application

Rugged plug-in relays for safety critical, extreme reliable and 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 N/O - N/C contacts
- Weld-no-transfer (WNT) contacts
- Standard back EMF suppression diode
- Magnetic arc blow-out
- Flat, square silver plated relay pins for excellent socket connection
- Wide range sockets
- Integrated snap lock
- Transparent cover
- High DC breaking capacity
- Flexibility by many options
- Positive mechanical keying relay to socket

Benefits

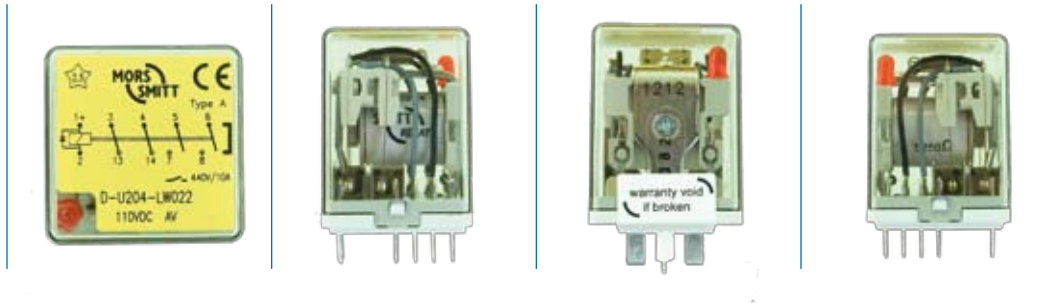
- Proven reliable
- Long term availability
- Easy to maintain
- Suitable for safety critical applications
- Low life cycle cost
- No maintenance

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)
- EN 50205 Relays with forcibly guided (mechanically linked) contacts
- NF F 62-002 On-off contact relays and fixed connectors

D-U200-W relay

Technical specifications



Functional and connection diagrams

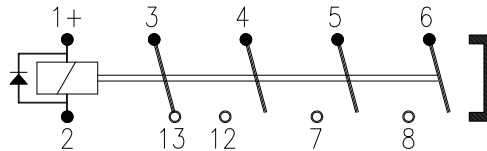
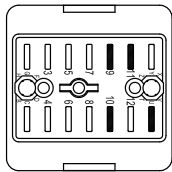
Timing diagram	Relay pin correspondence

D-U200-W relay

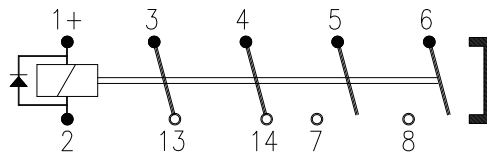
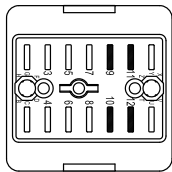
Technical specifications

Connection diagram

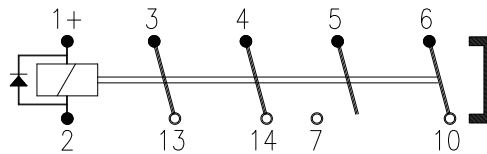
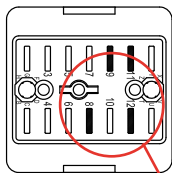
Bottom view relay



D-U200-W013
relay contact
combination
1 N/C 3 N/O

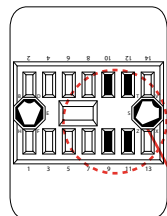


D-U200-W022
relay contact
combination
2 N/C 2 N/O



D-U200-W031
relay contact
combination
3 N/C 1 N/O

No relay pins are placed at the black marked pin positions.



Top view socket

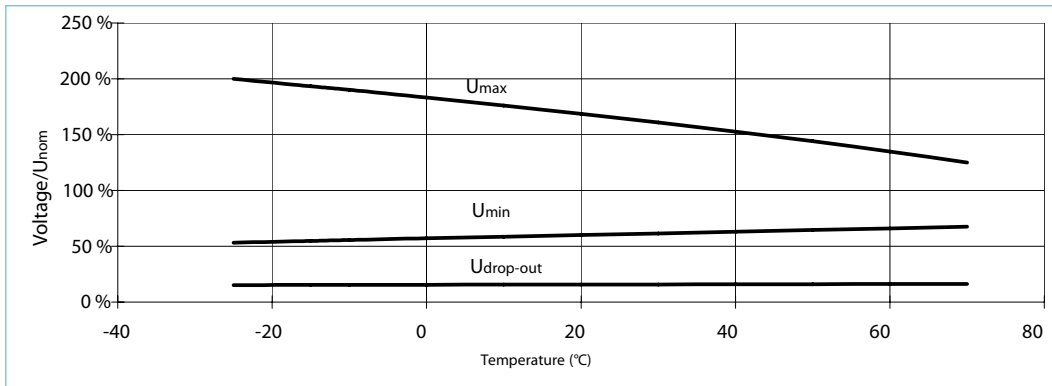
At the black marked positions the holes in the socket are blocked, so no relay pin can enter. Only correct contact configuration of the D-U200-W0XX model will fit.

Note: For applications in France the relay and correct socket form an obligatory combination.
Additional standard keying see page 13

D-U200-W relay

Technical specifications

Operating range at various temperatures



Coil data

Operating times at nominal voltage:	
Pull-in time	≤ 25 ms
Release time	≤ 55 ms
Bounce time N/O contacts	≤ 5 ms
Bounce time N/C contacts	≤ 16 ms
Inductance L/R at U _{nom} :	
Energized	11 ms (typical)
Released	8 ms (typical)
Nominal power consumption	2.2 W @ U _{nom} (typical)
Operating voltage range	0.7 - 1.25 U _{nom}

Type	U _{nom} (VDC)	U _{min} (VDC)	U _{max} (VDC)	U _{drop-out} (VDC)	R _{coil} * (Ω)	I _{coil-nom} (mA)
D-U201-W	24	16.8	30	2.4	270	89
D-U202-W	48	33.6	60	4.8	1103	44
D-U203-W	72	50.4	90	7.2	2406	30
D-U204-W	110	77	137.5	11	5330	21
D-U205-W	96	67.2	120	9.6	4400	22
D-U206-W	12	8.4	15	1.2	72	167
D-U207-W	36	25.2	45	3.6	562	64
D-U210-W	120	84	150	12	6160	19
D-U212-W	100	70	125	10	4400	23
D-U213-W	125	87.5	156.25	12.5	7634	16
D-U215-W	220	154	275	22	21776	10
D-U220-W	250	175	312.5	25	23850	10

Other types on request

* The R_{coil} is measured at room temperature and has a tolerance of ± 10%, with option L (LED) the value can differ

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
- U_{drop-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

D-U200-W relay

Technical specifications

Contact data

Amount and type of contacts	4 N/O - N/C
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 ₂ , Au on Ag)
Contact gap	≥ 1.5 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
			2.5 kV; 50 Hz; 1 min
Pulse withstanding		IEC 60255-5	5 kV (1.2/50 μs)

Mechanical characteristics

Mechanical life	50 x 10 ⁶ operations
Maximum switching frequency	Mechanical: 3600 ops/h Electrical: 1200 ops/h
Weight	145 g

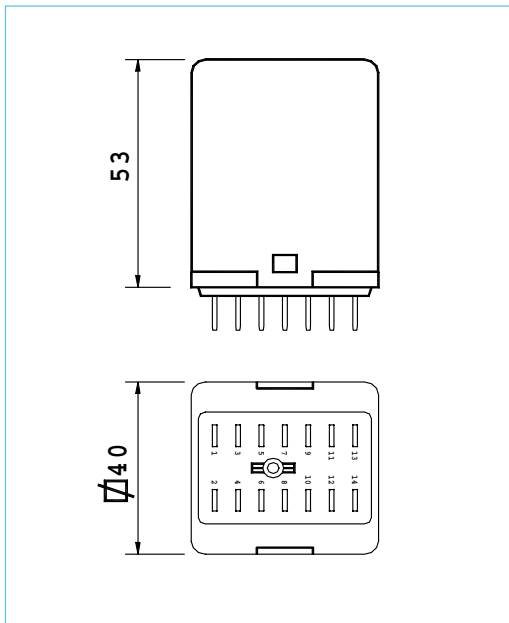
D-U200-W relay

Technical specifications

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 -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 material	Cover: polycarbonate Base: polyester

Dimensions (mm)



D-U200-W relay

Technical specifications

Options

Code	Description	Remark	Cannot be combined with:
C	Low temperature (-50 °C)	Icontact < 8 A	E**
E*	Au; Gold plated contacts (10 µm)		C**, M, Y
K	Extra dust protection		T
L	LED integrated in coil		
M	AgSnO ₂ ; highly resistant to welding	Icontact > 100 mA	E
N	No magnetic arc blow-out		
P	Polarisation diode		
Q	Double zener diode parallel to coil		
X2	AC/DC rectifier bridge		
Y	Double make/double break contacts	1 N/C, 1 N/O, 1 N/O DM/DB 1 N/C DM/DB, 1 N/O DM/DB 1 N/C, 1 N/C DM/DB, 1 N/O	
Z	No diode	Polarity independent	
Keying	Coding relay and socket		

* 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.	

D-U200-W relay

Technical specifications

Electrical life expectancy

Due to the safety nature of the D-U200-W relays, please contact Mors Smitt with detailed contact load data. With this information, Mors Smitt can provide a correct advice in line with your specific application.

Required contact data:

- Voltage
- Current
- Inductance of load
- Kind of suppression used on load
- Required number of operations
- Switching frequency

Weld-no-transfer

The D-U200-Wxxx relay with weld-no-transfer contacts complies to the standards NF F62-002 (§12.3.10) and EN50205 Type A. With the option weld-no-transfer a normally open contact will not close if a normally closed contact fails to open and the relay is energized. Also, a normally closed contact will not close if a normally open contact fails to open and the relay is de-energized.

Testing according to NF F62002 §12.3.10:

- With one N/C contact kept closed, none of the N/O contacts may close a test circuit of 10 mA @ 220 V 50 Hz when the coil is energized with 150 % of the maximum specified coil voltage ($= 150 \% * 125 \% U_{nom} = 188 \% U_{nom}$). The other N/C contacts may open
- With one N/O contact kept closed, none of the N/C contacts may close a test circuit of 10 mA @ 220 V 50 Hz when the coil is de-energized. The other N/O-contacts may open

Testing according to EN50205:

- If one N/C contact fails to open, all N/O contacts must maintain a contact gap ≥ 0.5 mm when the coil is energized with the maximum energizing quantity which can occur under worst case conditions:
 - maximum coil voltage
 - minimum ambient temperature
 - minimum coil resistance
- If one N/O contact fails to open, all N/C contacts must maintain a contact gap ≥ 0.5 mm when the coil is de-energized
- All tests must be performed under worst case conditions
- Above requirements apply throughout the specified endurance and under reasonable foreseeable single failure conditions
- Failure mode and effect analysis (FMEA) has been performed to verify the design.

D-U200-W 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 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)
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 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)

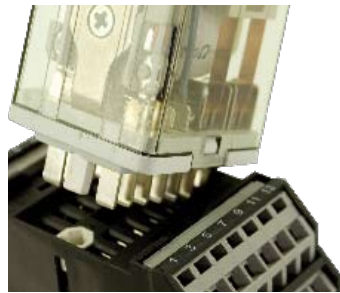
PCB mounting

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

D-U200-W relay Keying

Mechanical keying relay and socket (optional)



Function:

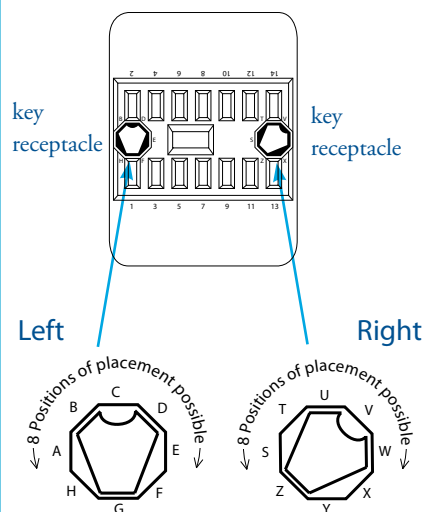
- To prevent wrong installation
- To prevent damage to equipment
- To prevent unsafe situations

Keyed relays and sockets prevent the relay to be 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.

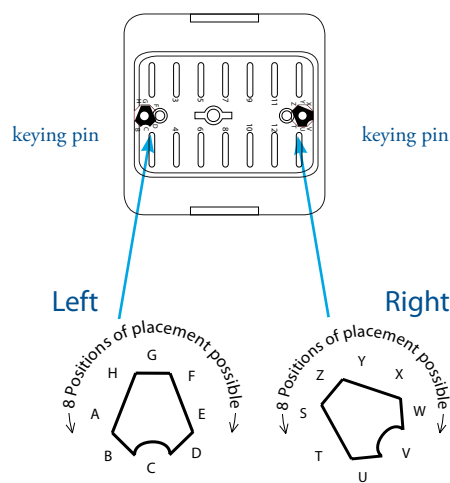
Remark: Sockets and relay shown are examples.

Top view socket



Example keying position G-Z on socket

Bottom view relay



Example keying position G-Z on relay

D-U200-W relay

Instructions

Installation, operation & inspection

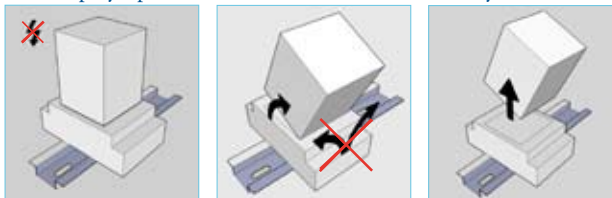
Installation

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 the contacts can be cleaned 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 may occur 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-W

Ordering scheme



1. Relay model 2. Coil voltage 3. Options 4. Contact config. 5. Keying

This example represents a **D-U201-W013 code AS**.

Description: D-U200 series relay, Unom: 24 VDC, low temperature (-50 °C), weld-no-transfer, 1 N/C - 3 N/O, keying AS.

1. Relay model

D-U2

2. Coil voltages

01	24 VDC
02	48 VDC
03	72 VDC
04	110 VDC
05	96 VDC
06	12 VDC
07	36 VDC
10	120 VDC
12	100 VDC
13	125 VDC
15	220 VDC
20	250 VDC

3. Options

C	Low temp. (-50°C) - Max contact current 8 A
E	Gold plated contacts
K	Special dust protection
L	LED coil indicator
M	AgSnO ₂ contacts, highly resistant to welding
N	No magnetic arc blow-out
P	Polarisation diode
Q	Double zener diode
X2	AC/DC rectifier bridge
Y	Double make / double break
Z	No diode

D-U200-W relay

Ordering scheme

4. Contact configuration

W013	Weld no transfer, 1 N/C - 3 N/O	(option Y: YW012: N/C 3-13, N/O 5-7, N/O* 8-12)
W022	Weld no transfer, 2 N/C - 2 N/O	(option Y: YW011: N/C* 13-14, N/O* 7-8)
W031	Weld no transfer, 3 N/C - 1 N/O	(option Y: YW021: N/C 3-13, N/O 5-7, N/C* 10-14)

*double make /double break

5. Keying (optional)*

Standard, silver contacts			
Code AS	24 VDC	D-U201 code AS	<p>Top view socket</p>
Code AY	36 VDC	D-U207 code AY	
Code AT	48 VDC	D-U202 code AT	
Code AU	72 VDC	D-U203 code AU	
Code AV	110 VDC	D-U204 code AV	
Option E, gold contacts			
Code DT	24 VDC	D-U201-E code DT	<p>Bottom view relay</p>
Code FV	36 VDC	D-U207-E code FV	
Code HU	48 VDC	D-U202-E code HU	
Code AZ	72 VDC	D-U203-E code AZ	
Code HV	110 VDC	D-U204-E code HV	
Option M, silver tin oxide contacts			
Code GT	24 VDC	D-U201-M code GT	
Code HT	36 VDC	D-U207-M code HT	
Code GU	48 VDC	D-U202-M code GU	
Code GV	72 VDC	D-U203-M code GV	
Code GW	110 VDC	D-U204-M code GW	

* Obligatory for applications in France



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