KDN-U200 relay - Latching, 8 pole

Datasheet

Features

- Latching (bistable) relay
- Compact plug-in design
- 8 C/O contacts
- 2 galvanic isolated coils
- Clear position indicator
- Magnetic arc blow-out
- Flat, square and silver plated relay pins for excellent socket connection
- Wide range sockets
- 2 integrated snap locks
- 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 F 16-101/102, EN 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

Description

Plug-in bistable railway relay with eight change-over contacts. The contacts remain in the last powered position, the position is clearly shown via a position indicator. Bistable by means of two coils and a mechanical rocker mechanism. The two separate coils are galvanically isolated.

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.

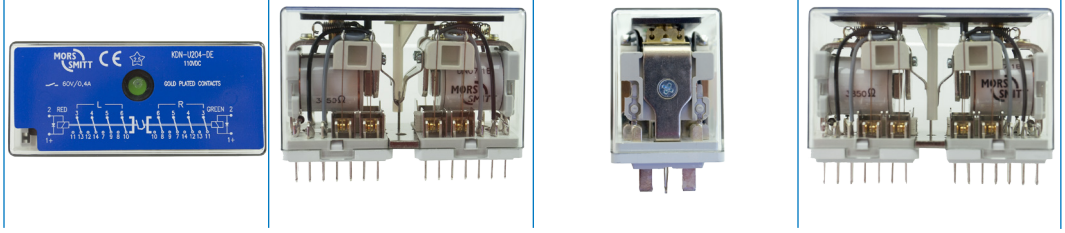
The construction of the relay and choice of materials makes the KDN-U200 relay suitable to withstand low and high temperatures, shock & vibrating and dry to very humid environments.

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

Application

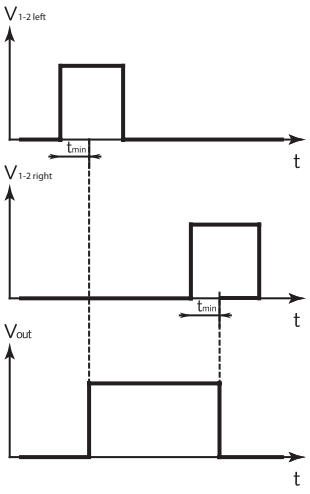
These relay series are designed for demanding rolling stock applications. The KDN-U200 is used in applications where eight contacts are used in one relay and the contacts are set and reset with permanent power or impulses.

KDN-U200 relay
Technical specifications

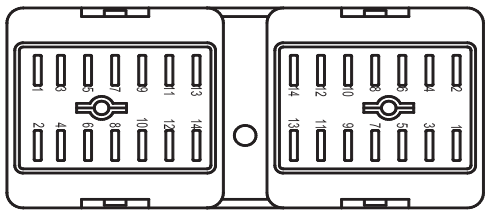


Functional and connection diagrams

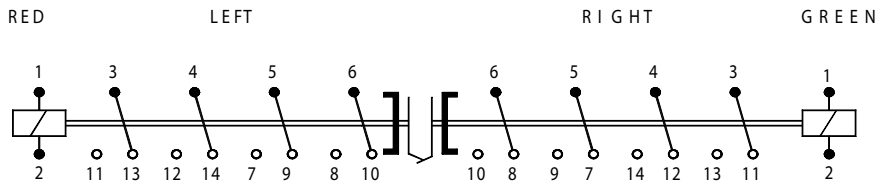
Timing diagram



Relay pin correspondence



Connection diagram



Please note the relay will leave production in open state (with open armature at the left side, flag is green) with all contacts in the position shown in the connection diagram. Due to severe shocks far exceeding maximum levels mentioned in IEC 61373 (Category I, Class B, Body mounted), it can happen the left armature closes and stay closed. Therefore after installation all relays must be checked on correct state of the contacts and activate both coils 10 times alternately for correct operation.

KDN-U200 relay
Technical specifications

Coil characteristics

Operating times at nominal voltage (typical):	
Minimum impulse time	50 ms
Bounce time N/O contacts	≤ 4 ms
Bounce time N/C contacts	≤ 8 ms
Inductance L/R at U_{nom} (typical):	
Energized	11 ms
Released	8 ms
Operating voltage range	70% - 125% U_{nom}

Type	U_{nom} (VDC)	U_{min} (VDC)	U_{max} (VDC)	$U_{drop-out}$ (VDC)	R_{coil} * (Ω)	P_{nom} (W)
KDN-U201	24	16.8	30	9.6	178	3.2
KDN-U202	48	33.6	60	19.2	666	3.3
KDN-U203	72	50.4	90	28.8	1580	3.3
KDN-U204	110	77	137.5	44	3850	3.0
KDN-U205	96	67.2	120	38.4	3600	2.6
KDN-U206	12	8.4	15	4.8	94	3.3
KDN-U207	36	25.2	45	14.4	370	3.2

Other types on request

* The Rcoil is measured at room temperature and has a tolerance of ± 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
- $U_{drop-out}$ 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
- Always select the nominal voltage as close as possible to the actual voltage in the application

KDN-U200 relay
Technical specifications

Contact characteristics

Amount and type of contacts	8 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 contact resistance	15 mΩ
Maximum breaking capacity	110 VDC, 8 A (L/R ≤ 15 ms) 230 VAC, 10 A (cos φ ≥ 0.7)
Material	Ag standard (optional $AgSnO_2$, Au on Ag)
Contact gap	0.7 mm
Contact force	> 200 mN

Electrical characteristics

Dielectric strength		EN 50155
	Pole-pole	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 µs)

Mechanical characteristics

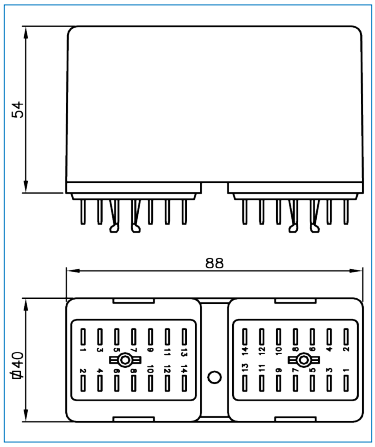
Mechanical life	2 x 10^6 operations
Maximum switching frequency	Mechanical: 3600 ops/h Electrical: 1200 ops/h
Weight	305 g (without options)

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...+85 °C (optional -40 °C)
Humidity	95% (condensation is permitted temporarily)
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
Insulation materials	Cover: polycarbonate Base: polyester

KDN-U200 relay
Technical specifications

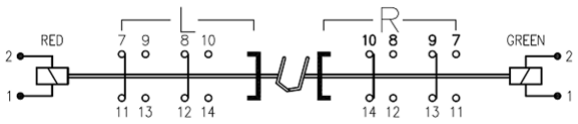
Dimensions (mm)



Options

Code	Description	Remark	Cannot be combined with
C	Low temperature (-40 °C)	Icontact < 8 A	
D	Back EMF protection diode		
E*	Au; Gold plated contacts (10 µm)		M
K	Dust protection		
M	$AgSnO_2$; "non-weldable" contacts	Icontact > 100 mA	E
N	No magnetic arc blow-out		
Q	Double zener diode over coil	Max. allowed peak voltage 180 V, higher voltage will damage the diode.	
Y	Double make/double break contacts	4 C/O DM/DB, -40 °C	
Keying	Coil coding relay and socket		
Colour coding	Coloured cover for coil voltage coding		

Option Y connection diagram



* 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

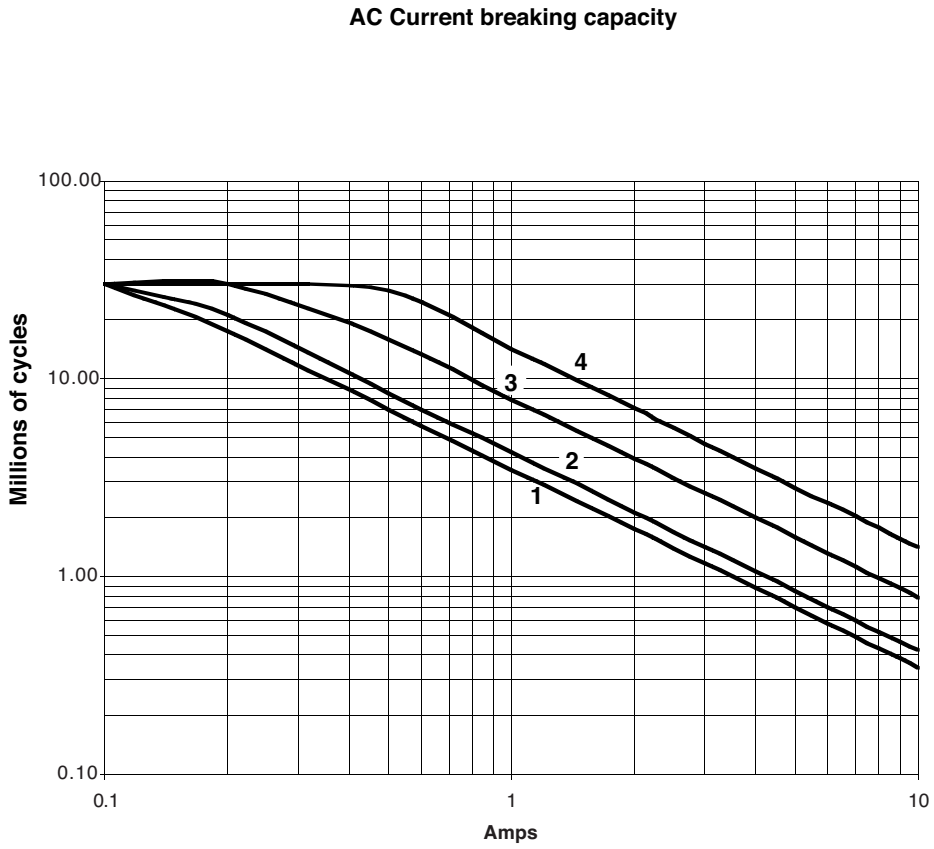
KDN-U200 relay
Technical specifications

Electrical life expectancy

AC Current breaking capacity at cosφ = 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



KDN-U200 relay
Technical specifications

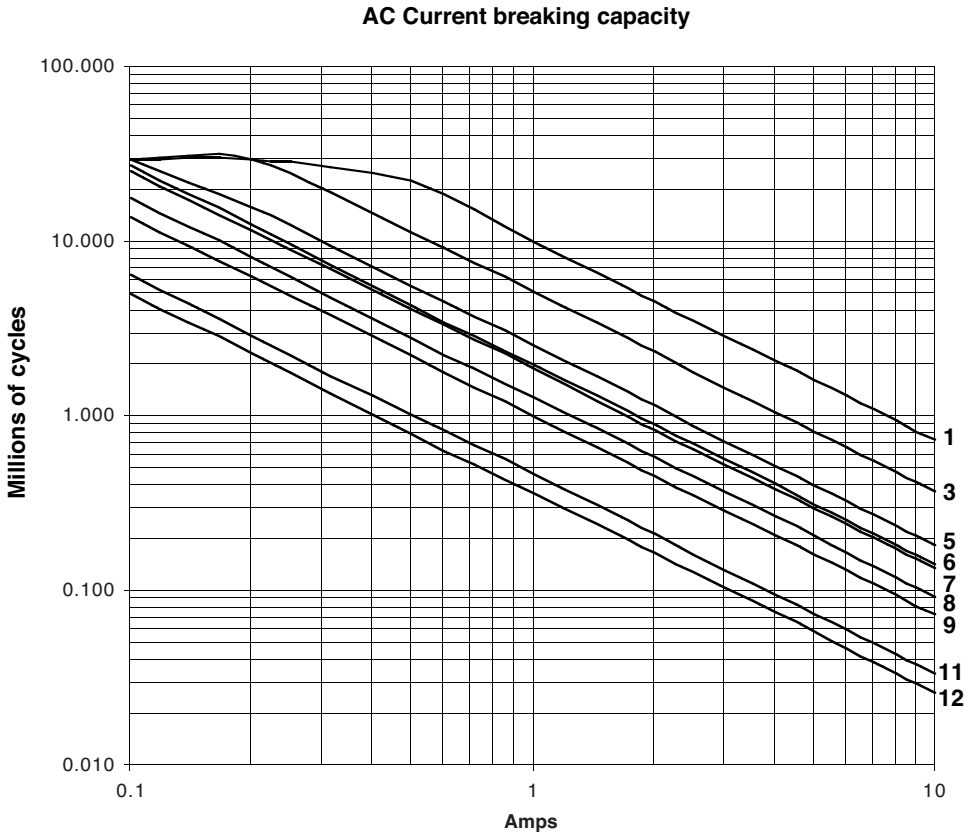
Electrical life expectancy

AC Current breaking capacity at cosφ = 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 Ø = 0.7
– – – – Cos Ø = 0.5
—·— Cos Ø = 0.3

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



KDN-U200 relay
Technical specifications

Electrical life expectancy

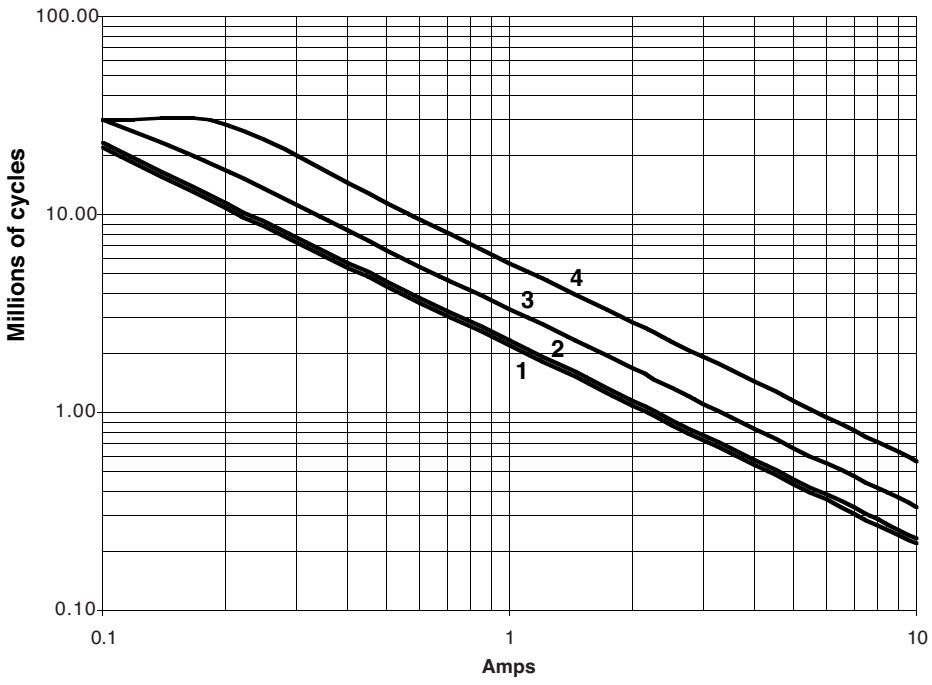
DC Current breaking capacity at L/R = 0

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



KDN-U200 relay
Technical specifications

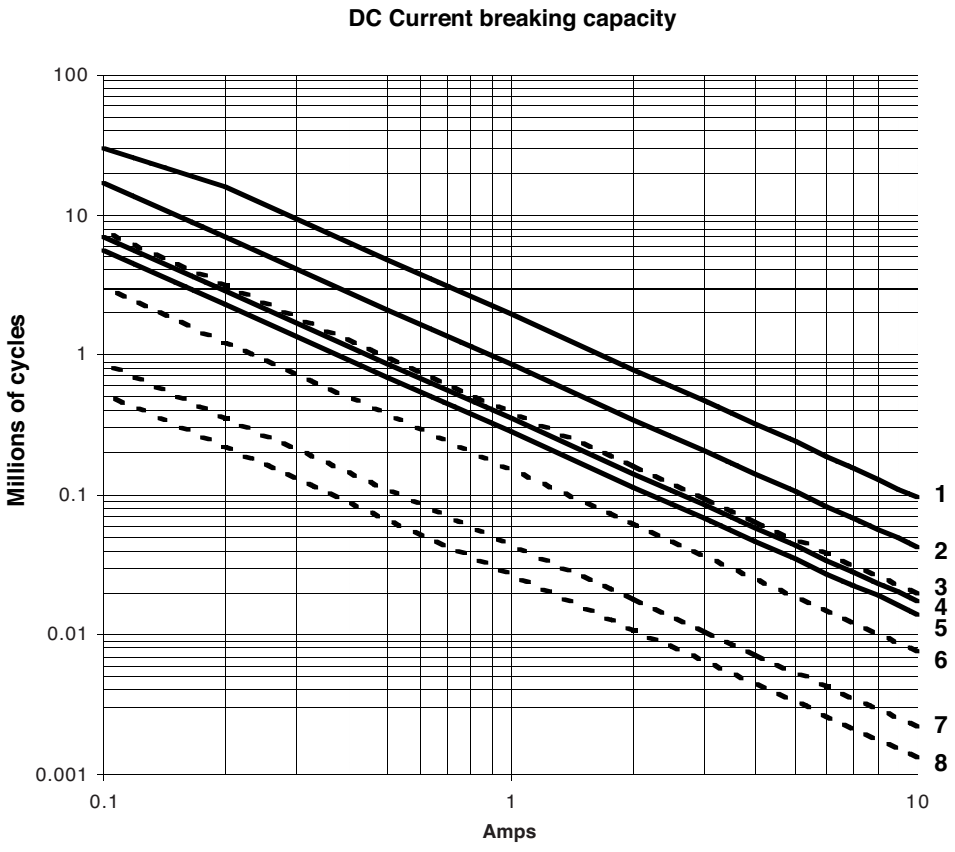
Electrical life expectancy

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

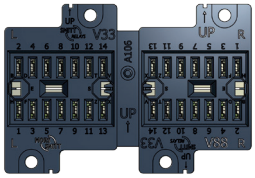
* By connecting 2 contacts in series, we increase the DC current breaking capacity by 50%

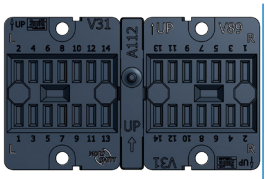
Curves	1	2	3	4	5	6	7	8
VDC	24	48	24	125	220	48	125	220
L/R (ms)	20	20	40	20	20	40	40	40

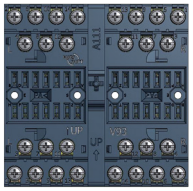


KDN-U200 relay
Sockets

Mounting possibilities/sockets


V88


V89

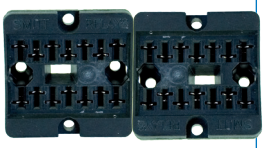

V93


V93BR


V96


V97


V99


2x V32

Surface/wall mounting

338002920	V92BR	Screw socket, wall mount, front connection (9 mm terminals)
338003900	V93	Screw socket, wall mount, front connection (7.5 mm terminals)
338003950	V99	Spring clamp socket, wall mount, front dual connection (2.5 mm²)

Rail mounting

338003900	V93	Screw socket, rail mount, front connection (7.5 mm terminals)
338003925	V93BR	Screw socket, rail mount, front connection (9 mm terminals)
338003950	V99	Spring clamp socket, rail mount, front dual connection (2.5 mm²)

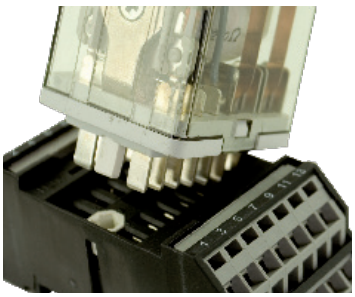
Panel/flush mounting

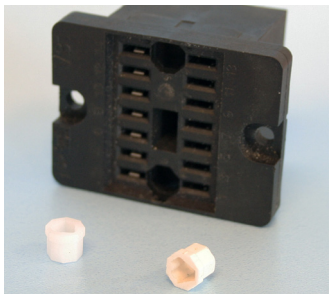
338001700	V88	Cage clamp socket, flush mount, rear dual connection (2.5 mm²)
338001850	V89	Faston connection socket, rear dual connection (4.8 x 0.8 mm)
328100200	V96	Solder tag socket, panel mount, rear connection
338400100	V97	Crimp contact socket, panel mount, rear connection, A260 crimp contact

For PCB mount: use 2x V32 according to pin layout
For more details see datasheets of the sockets

KDN-U200 relay
Keying

Mechanical keying relay and socket (optional)





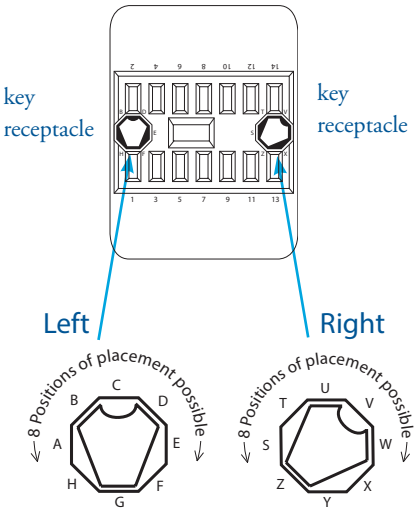
Function:
- To prevent wrong installation
- To prevent damage to equipment
- To prevent unsafe situations

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 x 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.

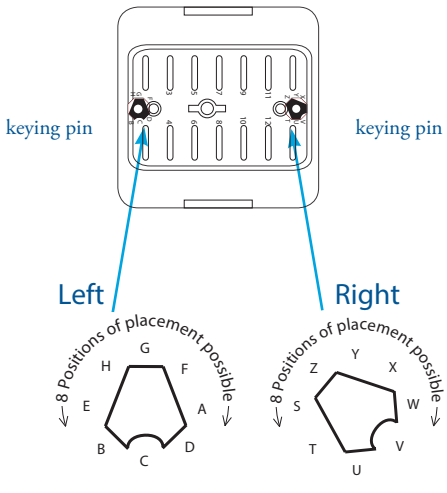
Remark: Sockets and relay shown are only examples.

Top view socket



Example keying position G-Z on socket

Bottom view relay



Example keying position G-Z on relay

KDN-U200 relay
Instructions

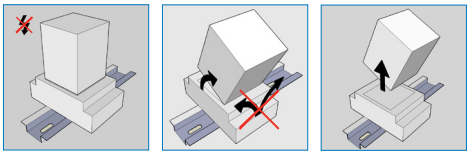
Installation, operation & inspection

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. To ensure correct working of the KDN relay, the relay should be mounted in horizontal position as the position indicator will not work correct in vertical position due to gravity. 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.



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, switch the relay 10 times. 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 mΩ 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.

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.

KDN-U200 relay
Ordering scheme

Configuration:

KDN-U2	04	-	C

1. Relay model 2. Coil voltage 3. Options

This example represents a **KDN-U204-C**
Description: KDN-U200 series relay, U_{nom}: 110 VDC, Low temperature (-40 °C)

1. Relay model

KDN-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

3. Options

C	Low temp. (-40 °C) - Max. contact current 8 A
D	Back EMF protection diode
E	Gold plated contacts
K	Dust protection
M	$AgSnO_2$ contacts, highly resistant to welding
N	No magnetic arc blow-out
Q	Double zener diode
Y	Double make / double break (Y= -40 °C)

Upon ordering indicate keying if necessary.

Mors Smitt
A Wabtec Company

SERVING SAFETY

DS-KDN-U200 V1.4 October 2016

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