

D4-U200 relay module - 4-pole

Datasheet



Description

The D4-U200 relay module is a form, fit and function solution to replace all kind of contactors with a maximum of 4 contacts. The module consists of a 4-pole relay, spring clamp terminal connections and a housing to fasten the module.

By applying the D4-U200 relay module all specifications of the standard D-U200 relay are valid. The spring clamp connections are made on the front panel by two 5-pole connectors for the contacts and for the relay coil. There are 2 connection points per contact. Several contact combinations are possible such as 0 N/C and 4 N/O, 1 N/C and 3 N/O, 2 N/C and 2 N/O. Other contact configuration and numbering on request.

Thanks to its small dimensions the module can be fitted in most places where standard contactors are used. The relay module is standard equipped with a LED. The module is non polarity sensitive by use of a rectifier bridge.

The housing is suitable for wall mounting or rail mounting, due to its 35 mm rail connection. It is specially designed for space saving applications.

Application

A typical use of the D4-U200 relay module is in a dusty environment where the open construction of a contactor is causing contact problems (dust is gathered between the contacts of the contactor).

Features

- Ultra compact space saving 4-pole relay module
- Easy replacement of 4-pole contactors
- Module consists of 4-pole relay and housing
- Various contact combinations possible
- Many 4-pole Mors Smitt relay configurations are possible
- Non polarity sensitive
- Heavy duty, high VDC switching
- Spring clamp connections
- Terminals at front side
- Surface / wall and 35 mm rail mounting

Benefits

- Space saving
- Cost saving
- Several mounting options
- Dust proof
- No maintenance
- Low life cycle cost
- Long term availability

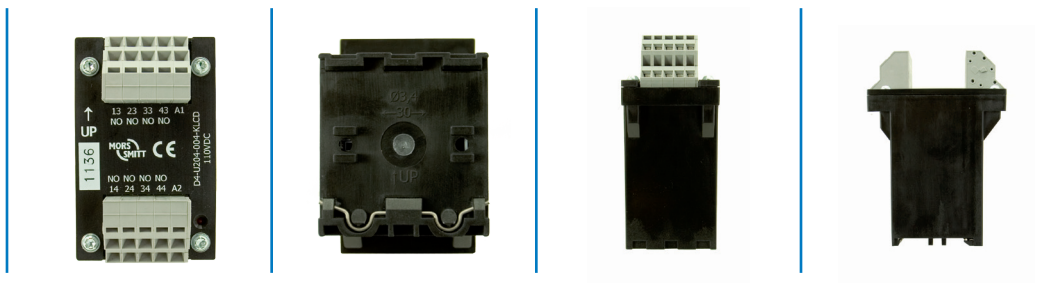
Railway compliance

- EN 50155 Railway application Electronic equipment used on rolling stock
- IEC 60077 Electronic 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
- IEC 60571 Electronic equipment used on railway vehicles
- NF F16-101/102, EN 45545-2 Fire behaviour - Railway rolling stock



D4 relay module

Technical specifications



Connection diagram spring clamp terminal

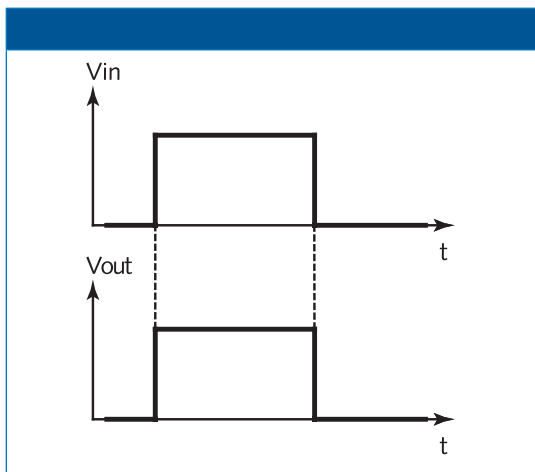
Instantaneous (4 contacts)	Topview on terminal																				
0 N/C - 4 N/O: D4-U204-004																					
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2 N/C - 2 N/O: D4-U204-022																					
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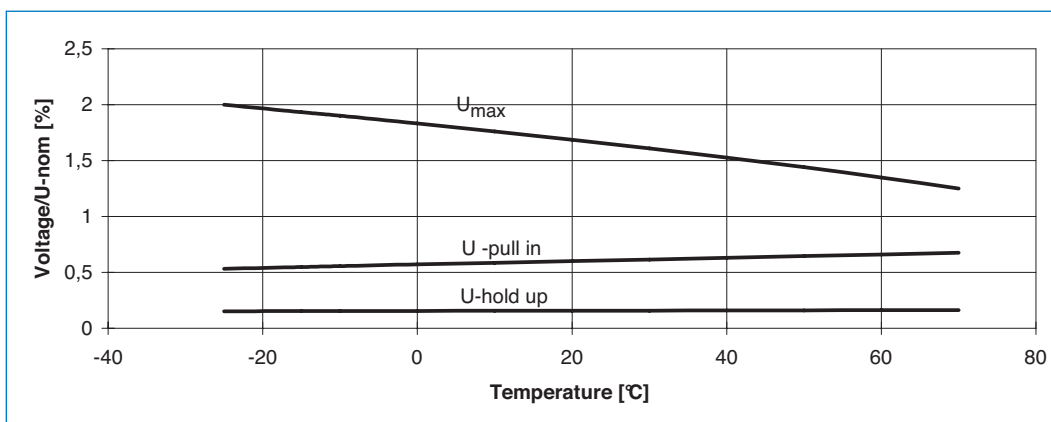
D4 relay module

Technical specifications

Timing diagram



Operating range vs. temperatures



D4 relay module

Technical specifications

Coil characteristics

Operating times at nominal voltage (typical):	
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 _{nom} (typical):	
Energized	11 ms
Released	8 ms
Nominal power consumption	2.2 W @ U _{nom}
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)
D4-U201-xxx	24	16.8	30	2.5	270	89
D4-U202-xxx	48	33.6	60	4.8	1103	44
D4-U203-xxx	72	50.4	90	7.2	2406	30
D4-U204-xxx	110	77	137.5	11	5330	21
D4-U205-xxx	96	67.2	120	9.5	4400	22
D4-U206-xxx	12	8.4	15	1.2	72	167
D4-U207-xxx	36	25.2	45	3.5	562	64
D4-U210-xxx	120	84	150	12	6160	19
D4-U212-xxx	100	70	125	10	4400	23
D4-U213-xxx	125	87.5	156.25	12.5	7634	16
D4-U215-xxx	220	154	275	22	21776	10
D4-U220-xxx	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%

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

Contact characteristics

Maximum make current	16 A
Maximum continuous current	10 A (AC1; IEC 60947) for 30 min
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



D4 relay module

Technical specifications

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	50 x 10 ⁶ operations
Maximum switching frequency	Mechanical: 3600 ops/h Electrical: 1200 ops/h
Weight	241 g

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 -50 °C)
Humidity	95% (condensation is permitted temporarily)
Damp heat	IEC 60068-2-30, Test method Db variant 1
Fire & smoke	NF F 16-101, NF F 16-102, TS 45545-2
Materials	Housing: polyamide 66, 30% glass

Technical characteristics

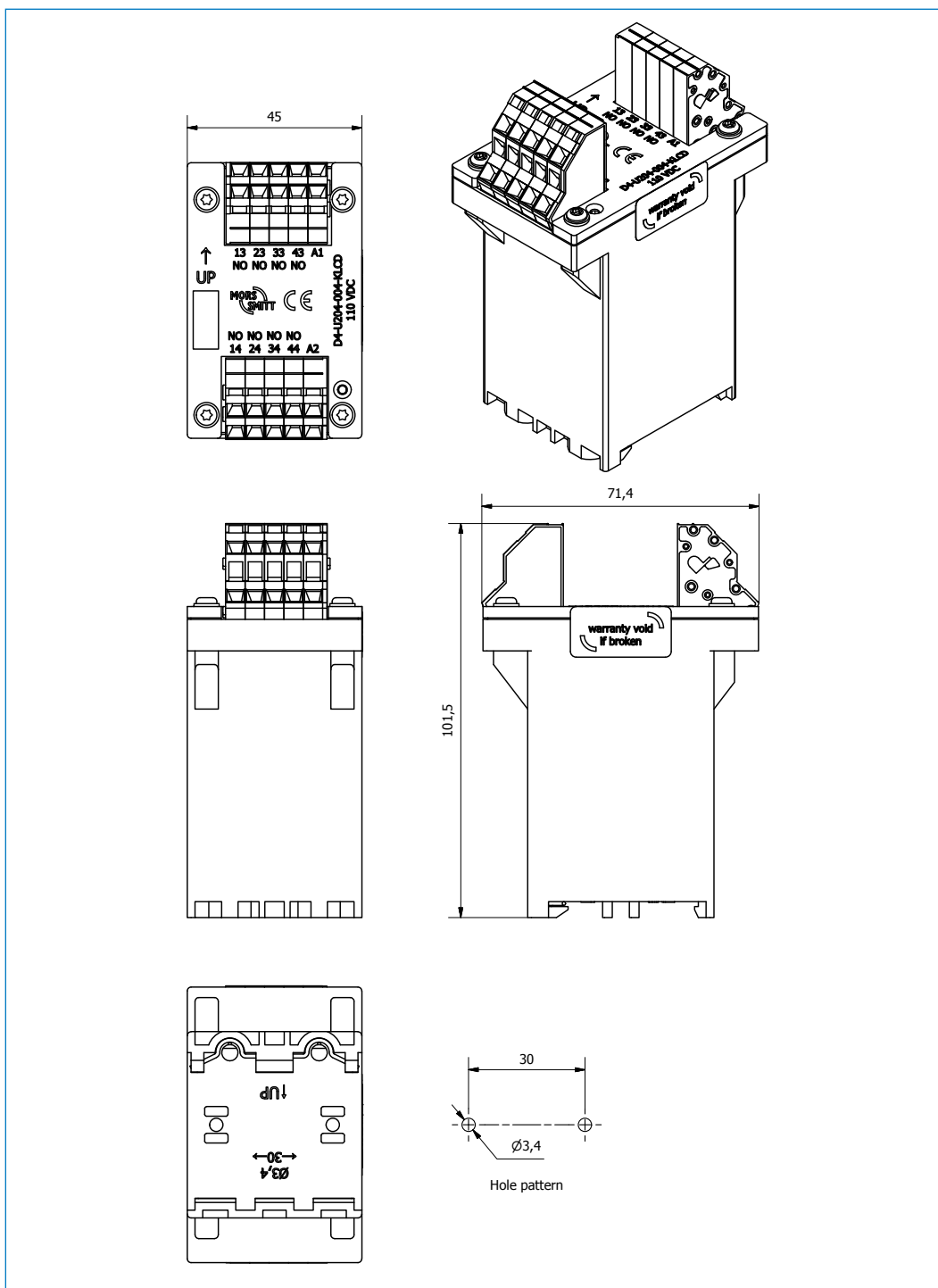
Mounting	Surface / wall and 35 mm rail
Wire size	0.08 - 2.5 mm ²
Wire stripping length	6 mm
Socket contacts	Spring clamp terminal
Max. torque value mounting screws	1.0 Nm



D4 relay module

Technical specifications

Dimensions (mm)



D4 relay module

Technical specifications

Options

Code	Description	Remark	Cannot be combined with:
C	Low temperature (-50 °C)	Icontact < 8 A	
E*	Au; Gold plated contacts (10 µm)		M
K	Extra dust protection		
M	AgSnO ₂ contacts	I contact > 100 mA	E
N	No magnetic arc blow-out		
Q	Double zener diode	Max. allowed peak voltage 180 V, higher voltage will damage the diode	

* 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



D4 relay module

Technical specifications

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

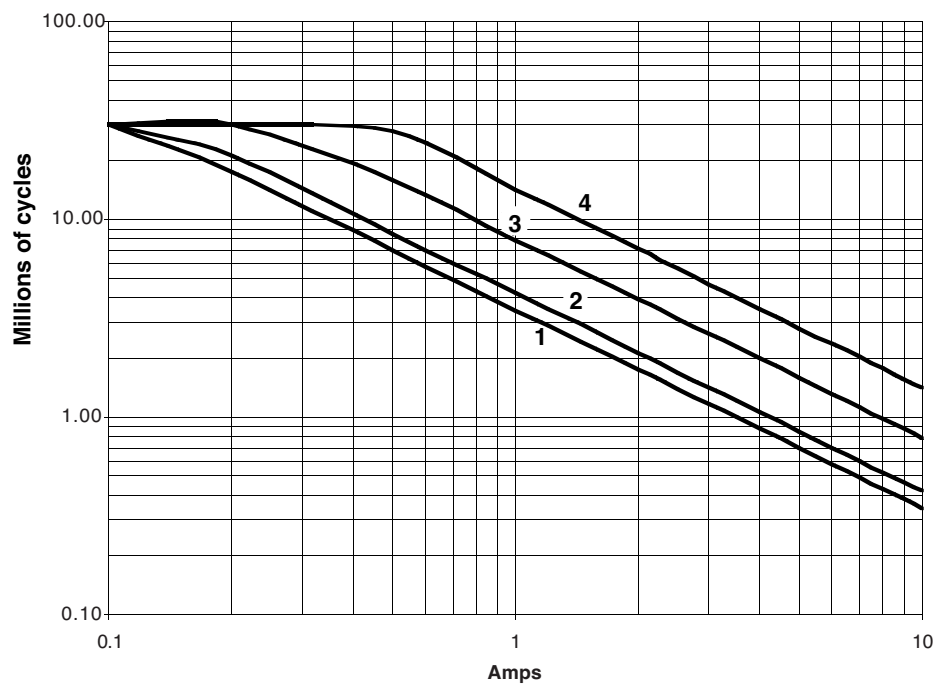
AC Current breaking capacity versus life expectancy in millions of cycles.

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



D4 relay module

Technical specifications

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 -

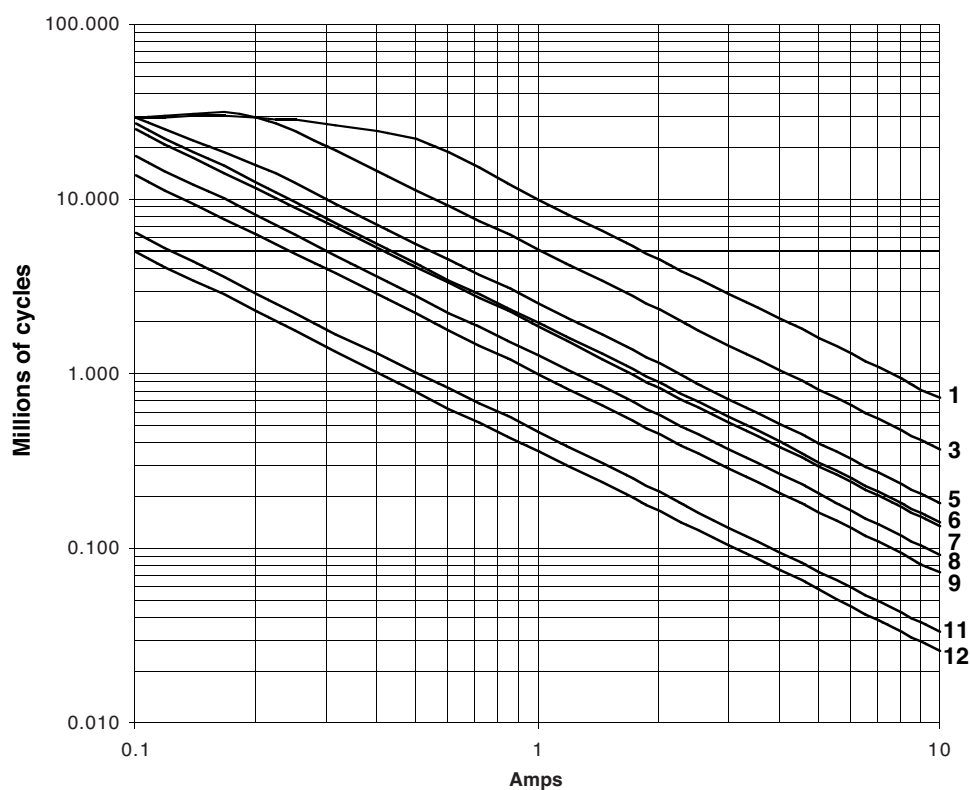
———— $\cos \phi = 0.7$

----- $\cos \phi = 0.5$

----- $\cos \phi = 0.3$

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



D4 relay module

Technical specifications

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

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

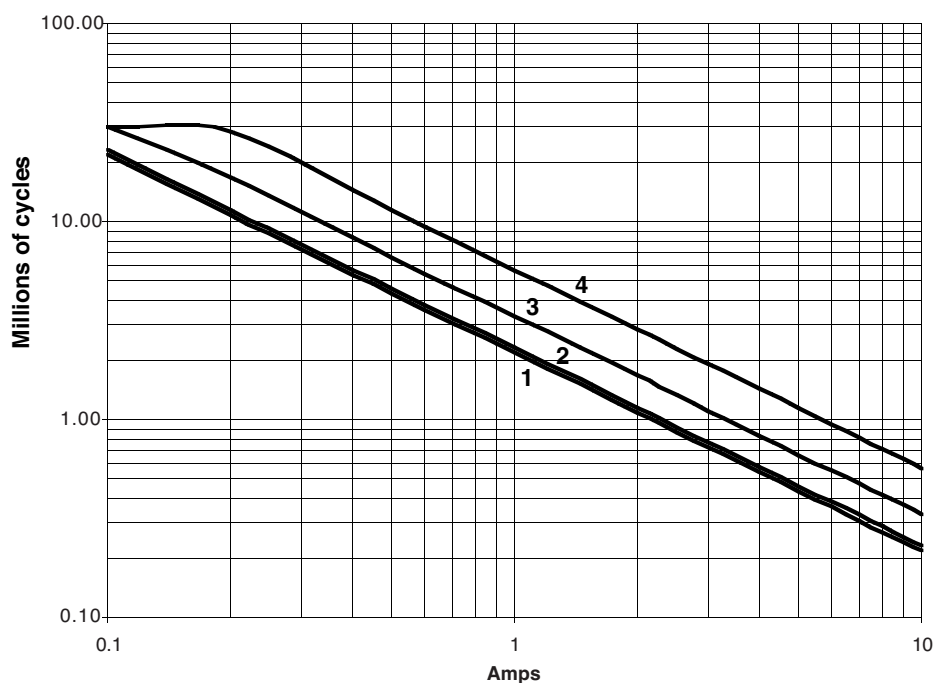
Rate of contacts opening and closing = 1200 operations per hour.

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



D4 relay module

Technical specifications

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

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 -

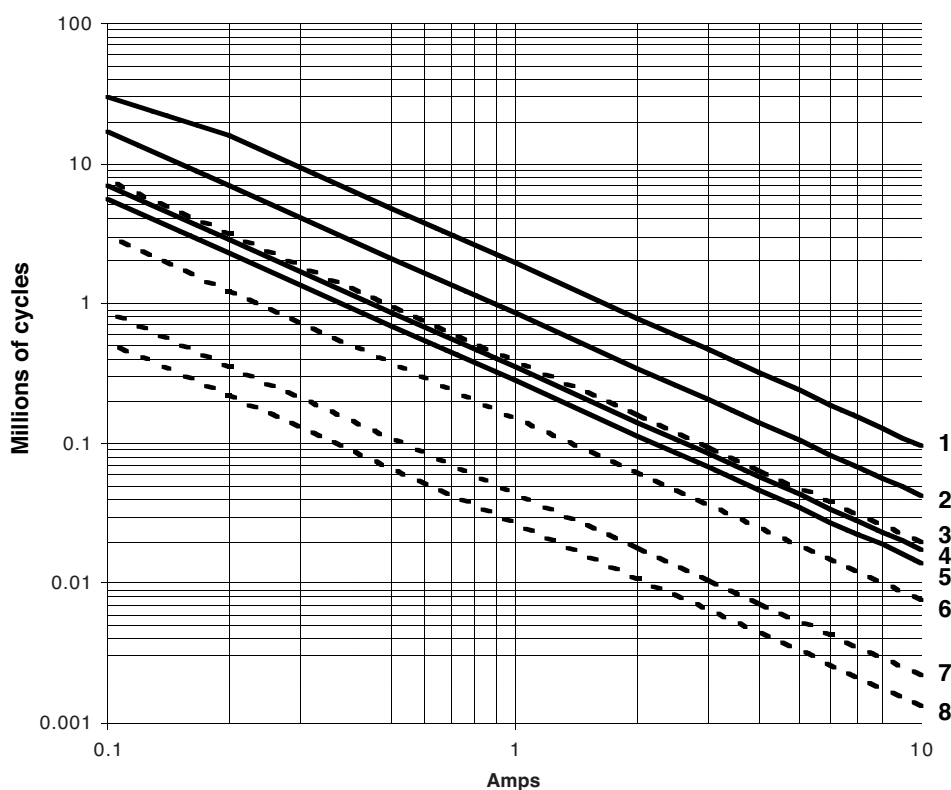
———— $L/R = 20\text{ ms}$ continuous current

- - - - $L/R = 40\text{ ms}$ 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



D4 relay module

Instructions

Installation, operation & inspection

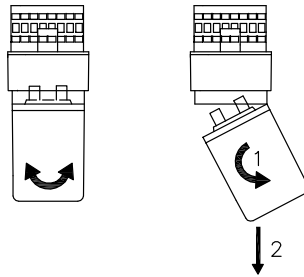
Installation

Warning!

- Before installation or working on the relay: always disconnect the power supply first!
- Never use silicon in the proximity of the relay.
- Do not use the relay in the presence of flammable gas as the arc generated from switching could cause ignition.

How to replace the relay?

Remove the four screws at the top of the housing and take out the relay-socket combination. Move the relay in the side direction as shown in the picture. Warning: Up and down movements may cause damage to the coil-wire. For installation plug the relay into the socket ensuring there is no gap between the bottom of the relay and the socket. Put the relay-socket combination in the housing and fasten the four screws.



Operation

After installation always apply the rated voltage to the coil to check correct operation.

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 $1 \text{ }\Omega$ 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

If the relay does not seem to operate correctly, check for presence of the appropriate coil voltage and polarity using a suitable multimeter. The LED 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.



D4 relay module

Ordering scheme



1. Relay model 2. Coil voltage 3. Contact data 4. Options

This example represents a D4-U201-022-LNQ

Description: D4-U200 series relay, U_{nom} : 24 VDC, instantaneous contacts 2 N/O - 2 N/C, LED, no magnetic arc blow out, double zener diode

1 Relay model

D4-U2

2 Coil data

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	110 VDC
13	125 VDC
15	220 VDC
20	250 VDC

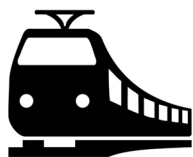
3 Contact data

004	0 N/C - 4 N/O
013	1 N/C - 3 N/O
022	2 N/C - 2 N/O

4 Options

L	LED (standard)
C	Low temp (-50 °C) - Max contact current 8 A
E	Gold plated contacts
K	Special dust protection
M	AgSnO ₂ contacts
N	No magnetic arc blow-out
Q	Double zener diode





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