

/// Ultra compact space saving 4-pole relay module

Rugged relay module for extreme reliability, within long endurance applications and harsh environments

D4-U200 relay module

Part of D-platform



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 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
- AC/DC coil power supply by rectifier bridge
- Standard back EMF supression function
- Heavy duty, high VDC switching
- Spring clamp connections
- Terminals at front side
- 35 mm rail mounting

Timing diagram



Options

- Low temperature (-50 °C), max. contact current 8 A
- · Gold plated contacts
- Extra dust protection (for relays)
- AgSnO₂ contacts, high resistant to welding
- No magnetic arc blow-out
- Double zener diode

Remark: Not all combinations possible

Railway compliancy

EN 50155	EN 50121
IEC 60571	EN 45545-2
IEC 60077	NF F16-101/1
IEC 60947	NF F 62-002
IEC 61373	

02 C E



Connection diagram spring clamp terminal 0 N/C - 4 N/O: D4-U204-004



1 N/C - 3 N/O: D4-U204-013



2 N/C - 2 N/O: D4-U204-022



Dimensions (mm)





Top view on terminal

13	23	33	43	A1
NO	NO	NO	NO	
NO	NO	NO	NO	
14	24	34	44	A2

13	21	33	43	A1
NO	NC	NO	NO	
NO	NC	NO	NO	
14	22	34	44	A2

13	21	31	43	A1
NO	NC	NC	NO	
NO	NC	NC	NO	
14	22	32	44	A2









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Technical specifications



Relay module D4-U200

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)	<u>≤</u> 4 ms
Bounce time N/C contacts	≤ 8 ms
Inductance L/R at Unom (typical):	
Energized	11 ms
Released	8 ms
Nominal power consumption	2.2 W @ Unom
Operating voltage range	0.7 - 1.25 Unom

Туре	Unom (VDC)	Umin (VDC)	Umax (VDC)	Udrop-out (VDC)	Rcoil * (Ω)	Icoil 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	11.0	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	15	12	6160	19
D4-U212-xxx	100	70	45	10	4400	23
D4-U213-xxx	125	87.5	150	12.5	7634	16
D4-U215-xxx	220	154	125	22	21776	10
D4-U220-xxx	250	175	156.25	25	23850	10

Other types on request * The Rcoil is measured at room temperature and has a tolerance of \pm 10%

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 versions

Remark: In June 2019 the coil tape color is changed to yellow. This change has no effect on any of the relay specifications or technical performance.



Contact characteristics

Amount and type of contacts	0 N/C - 4 N/O, 1 N/C - 3 N/O, 2 N/C - 2 N/O
Maximum make current	16 A
Peak inrush current NF F 62-0	02 200 A (withstand > 10 x 200 A @ 10 ms, 1 min)
Maximum continuous current IEC 609	47 10 A for 30 min
Maximum switching voltage	250 VDC, 440 VAC
Minimum switching voltage	12 V
Minimum switching current	10 mA
Maximum breaking capacity (> 50.000 operations)	72 VDC, 5 A (L/R ≤ 40 ms) 110 VDC, 10 A (resistive load) 110 VDC, 0.5 A (L/R ≤ 40 ms)
Maximum contact resistance	15 mΩ
Material	Ag standard (optional AgSnO ₂ , Au on Ag)
Contact gap	0.7 mm
Contact force	> 200 mN

Electrical characteristics

Dielectric strength EN50155	Pole-pole	IEC 60255-5	4 kV, 50 Hz, 1 min
	Cont-coil	IEC60077	2.5 kV, 50 Hz, 1 min
	Open contact	s	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
Mounting	Surface / wall and 35 mm rail
Socket terminals Wire size	Spring clamp terminal, 2 connection points per contact 0.08 - 2.5 mm ²

6 mm

Environmental characteristics

Wire stripping length

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)
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, IP20
Fire & smoke	NF F 16-101, NF F 16-102, EN 45545-2: HL3 for requirements R22, R23, R26
Insulation materials	Housing polyamide 66, 30% glass





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
IEC 60529	European standard describes the protection class (IP-code)



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Options

Code	Description	Remark	Cannot be	
Standard optio	20.		combined with.	
Stanuaru optio	lis.			
С	Low temperature (-50 °C)	Icontact < 8 A		
E*	Au; Gold plated contacts		М	
K	Extra dust protection	IP50 Cat 2		
N	No magnetic arc blow-out			
Q	Double zener diode over coil	Maximum allowed peak voltage 180 V, higher voltage will damage the diode.		
Special options:				
М	AgSnO ₂ ; "non-weldable" contacts	Icontact > 100 mA	E	
			,	
* Gold plated c	ontacts characteristics			
Material		Ag, gold plated		
Maximum swite	Maximum switching voltage 60 V (higher voltages may be possible, contact Mors Smitt for more information)			
Maximum swite	ching current	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 switc	hing voltage	5 V		
Minimum switc	hing current	1 mA		

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



Electrical life expectancy



By connecting 2 contacts in series the DC current breaking capacity is increased by 50 %. Electrical lifetime is tested under laboratory conditions with switching frequency 0.33 Hz.

Note: The actual electrical lifetime in the application is affected by the switching frequency, type of contact (N/O or N/C), environmental conditions, etc.

Expected electrical lifetime inductive loads:

Inductance	Voltage	% of resistive load	Remark
15 ms	24 VDC	30 %	
15 ms	72 VDC	25 %	Tested up to 8 A
15 ms	110 VDC	20 %	Tested up to 0.5 A
40 ms	24 VDC	10 %	
40 ms	72 VDC	4 %	Tested up to 5 A
40 ms	110 VDC	2 %	Tested up to 0.5 A

For other contact loads: contact Mors Smitt.





Instructions for use

Installation

Warning!

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

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 VDC & ~ 2A. 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 / 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 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).

If the relay doesn't work after inspection, replace the relay module with a similar model. Do not attempt to open the relay module 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





D4-U2 L _ Coil voltages 24 VDC 01 48 VDC 02 72 VDC 03 04 110 VDC 05 96 VDC 06 12 VDC 07 36 VDC 10 120 VDC 12 110 VDC 13 125 VDC 15 220 VDC 250 VDC 20 Contact data 004 0 N/C - 4 N/O 013 1 N/C - 3 N/O Cannot be 2 N/C - 2 N/O 022 combined with: Options С Low temperature - Max contact current 8 A (add as many options as needed) Е Gold plated contacts Μ κ Extra dust protection, IP50 (relay only) No magnetic arc blow-out Ν Q Double zener diode Special options (minimum order quantity: 20) AgSnO2 contacts, highly resistant to welding Е Μ

Example: D4-U201-022-LNQ

Ordering scheme

Description: D4-U200 relay module, Unom: 24 VDC, instantaneous contacts 2 N/O - 2 N/C, LED (standard), no magnetic arc blow out, double zener diode







Over 11 million Mors Smitt relays in use in rail transport applications worldwide!

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