D8-U200 relay module - 8-pole

Datasheet

Description

The D8-U200 relay module is a form, fit and function solution to replace all kind of contactors with a maximum of 8 contacts. The module consists of an 8-pole relay, screw or spring clamp terminal connections and a bracket to fasten the module.

By applying the D8-U200 relay module all specifications of the standard D8-U200 relay are valid. The screw or spring clamp connections are made on the front panel by two 8-pole connectors for the contacts and two single pole connectors for the relay coil. The spring clamp version provides 2 connection points per contact. Several contact combinations are possible such as 4 N/O and 4 N/C, 6 N/O and 2 N/C, 8 N/O or a combination of instantaneous and timed contacts. 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.

Different kind of mounting brackets are available: high for screw connection, high with 35 mm rail connection and low with 35 mm rail connection. The relay of D8-U200 module in combination with a high mounting bracket can be removed from the module without unscrewing the bracket from the module. The low 35 mm rail mounting bracket is specially designed for space saving applications.

Application

A typical use of the D8-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 8-pole relay module
- Easy replacement of contactors
- Module consists of 8-pole relay and socket
- Various contact combinations possible
- All 8-pole Mors Smitt relay configurations are possible
- Non polarity sensitive
- Heavy duty, high VDC switching
- Screw or 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 compliancy

- 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

D8 relay module
Technical specifications

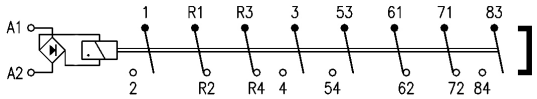


Instantaneous versions

Connection diagram screw terminal

Instantaneous (8 contacts)	Topview on terminal

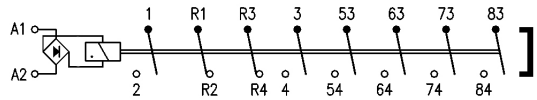
4 N/C - 4 N/O: D8-U200-044



1 NO	R1 NC	R3 NC	3 NO
53 NO	61 NC	71 NC	83 NO
54 NO	62 NC	72 NC	84 NO
2 NO	R2 NC	R4 NC	4 NO

044

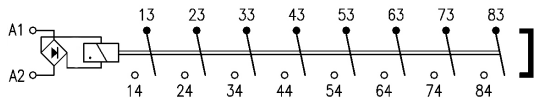
2 N/C - 6 N/O: D8-U200-026



1 NO	R1 NC	R3 NC	3 NO
53 NO	63 NO	73 NO	83 NO
54 NO	64 NO	74 NO	84 NO
2 NO	R2 NC	R4 NC	4 NO

026

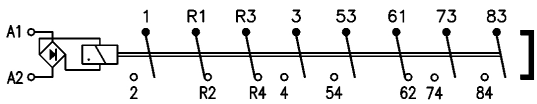
0 N/C - 8 N/O: D8-U200-008



13 NO	23 NO	33 NO	43 NO
53 NO	63 NO	73 NO	83 NO
54 NO	64 NO	74 NO	84 NO
14 NO	24 NO	34 NO	44 NO

008

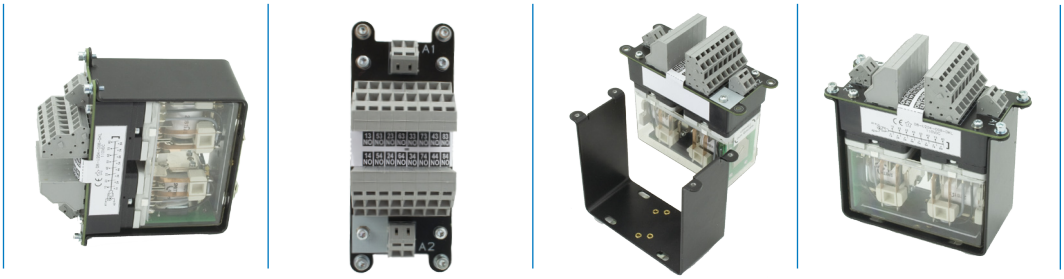
3 N/C - 5 N/O: D8-U200-035



1 NO	R1 NC	R3 NC	3 NO
53 NO	61 NC	73 NO	83 NO
54 NO	62 NC	74 NO	84 NO
2 NO	R2 NC	R4 NC	4 NO

035

D8 relay module
Technical specifications

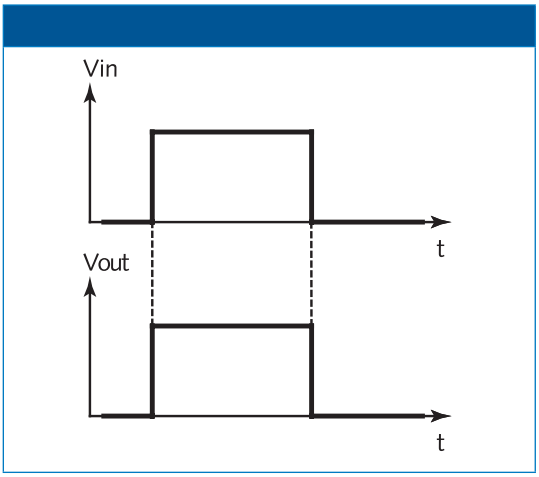


Connection diagram spring clamp terminal

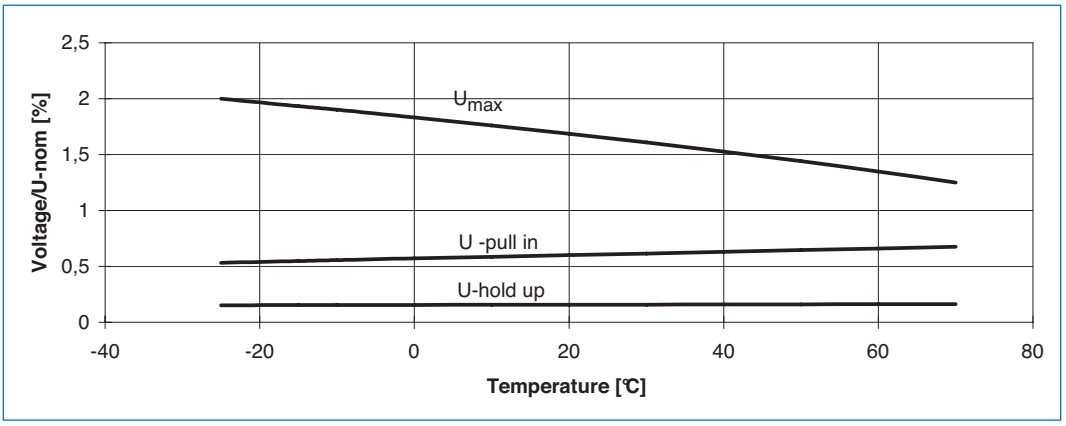
Instantaneous (8 contacts)	Topview on terminal
4 N/C - 4 N/O: D8-U200-044	13 NO 23 NO 51 NC 61 NC 81 NC 71 NC 43 NO 33 NO 044 14 NO 24 NO 52 NC 62 NC 82 NC 72 NC 44 NO 34 NO
2 N/C - 6 N/O: D8-U200-026	13 NO 53 NO 23 NO 61 NC 33 NO 71 NC 43 NO 83 NO 026 14 NO 54 NO 24 NO 62 NC 34 NO 72 NC 44 NO 84 NO
0 N/C - 8 N/O: D8-U200-008	13 NO 53 NO 23 NO 63 NO 33 NO 73 NO 43 NO 83 NO 008 14 NO 54 NO 24 NO 64 NO 34 NO 74 NO 44 NO 84 NO
3 N/C - 5 N/O: D8-U200-035	13 NO 23 NO 61 NC 71 NC 33 NO 81 NC 43 NO 53 NO 035 14 NO 24 NO 62 NC 72 NC 34 NO 82 NC 44 NO 54 NO

D8 relay module
Technical specifications

Timing diagram - instantaneous versions



Operating range vs. temperatures



Coil data - instantaneous versions

Operating times at nominal voltage (typical):	
Pull-in time	≤ 20 ms
Release time	≤ 12 ms
Inductance L/R at U_{nom} (typical):	8 ms
Operating voltage range	0.7 - 1.25 U_{nom}

D8 relay module
Technical specifications

Type	Unom (VDC)	Umin (VDC)	Umax (VDC)	Rcoil (Ω)*
D8-U201-xxx	24	16.8	30	233
D8-U202 -xxx	48	33.6	60	680
D8-U203 -xxx	72	50.4	90	1590
D8-U204 -xxx	110	77	137.5	3769
D8-U205 -xxx	96	67.2	120	3547
D8-U206 -xxx	12	8.4	15	76
D8-U207 -xxx	36	25.2	45	680

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

Contact data - instantaneous versions

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

Electrical characteristics - instantaneous versions

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)

D8 relay module
Technical specifications

Mechanical characteristics - instantaneous versions

Mechanical life	10 x 10^6 operations
Maximum switching frequency	Mechanical: 3600 ops/h Electrical: 1200 ops/h
Weight (spring clamp terminals / screw terminals)	High bracket 622 g / 652 g High 35 mm rail bracket 642 g / 672 g Low 35 mm rail bracket 627 g / 657 g

Environmental characteristics - instantaneous versions

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 and option Y: -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, EN 45545-2
Materials	Cover: polycarbonate Base: polyester Bracket: steel

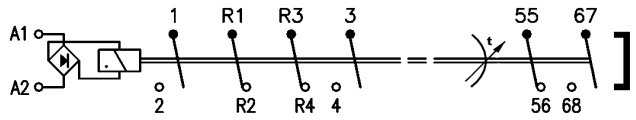
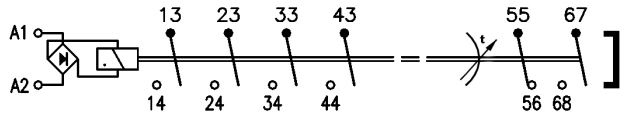
Technical characteristics - instantaneous versions

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

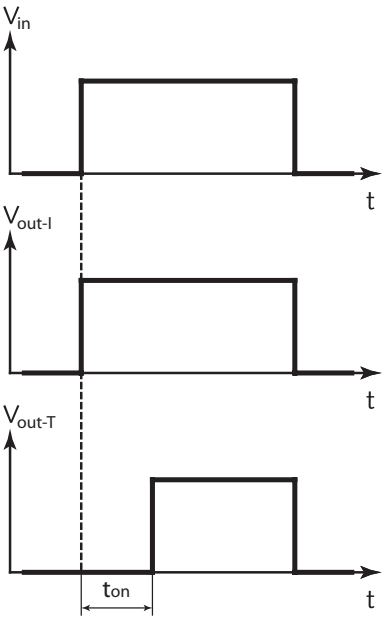
D8 relay module
Technical specifications

Instantaneous / time delayed versions

Connection diagram

Instantaneous and delay on time	Topview on terminal
I:2 N/C - 2 N/O, D: 1 N/C - 1 N/O: D8-U200-D022T011 Time 	
I: 0 N/C - 4 N/O, D: 1 N/C - 1 N/O: D8-U200-D004T011 Time 	

Timing diagram



D8 relay module
Technical specifications

Time delay specifications

Time delay function	Delay on pull-in		
Available time ranges, adjustable (xx)	0.1...1 s	0.3...3 s	0.6...6 s
	1...10 s	3...30 s	6...60 s
	0.3...3 min	0.6...6 min	1 ...10 min
	3...30 min	6...60 min	
Accuracy - adjustment	< 10 % of full scale value After adjusting / fixed time setting: no variation in setpoint		
Accuracy - repeatability	± 0.5 %		
Time variation - vs. voltage variation	± 0.05 % / % U_{nom}		
Time variation - vs. temperature variation	± 0.02 % / K		
Recovery time	Approx. 0.4 s		
Pull-in time	Depending on pull-in time setting (xx)		
Release time	< 40 ms		
Maximum permissible ripple	50 %		

Example time delay : Time range 0.3...3 s
Time delay set on 2 s : delay will be between 1.7 s...2.3 s
For example: 2.0 s. The ambient temperature is 40 degrees Celsius which is 20 degrees different compared to the standard 20 degrees Celsius. This results in 0.4 % extra time variation. The applied voltage is 30% lower than the nominal voltage. This results in 1.5 % extra time variation. The total maximum time variation is then 0.5 % (repeatability) + 0.4 % (temperature variation) + 1.5 % (voltage variation) = 2.4 %. In this case every new pulse will be between 1.95 s and 2.05 s.

Coil data - instantaneous / time delayed versions

Operating voltage range	0.7...1.25 U_{nom}
Nominal power consumption	< 2.7 W After switching on delayed contacts < 4.2 W

Type	U_{nom} (VDC)	U_{min} (VDC)	U_{max} (VDC)
D8-U201-DxxxTxxx	24	16.8	30
D8-U202-DxxxTxxx	48	33.6	60
D8-U203-DxxxTxxx	72	50.4	90
D8-U204-DxxxTxxx	110	77.0	138
D8-U205-DxxxTxxx	96	67.2	120
D8-U207-DxxxTxxx	36	25.2	45

Other types on request

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

D8 relay module
Technical specifications

Contact data - delayed contacts - instantaneous / time delayed versions

Maximum make current	10 A
Maximum continuous current	8 A (AC1; IEC 60947)
Maximum switching voltage	350 VDC, 380 VAC
Minimum switching voltage	12 V
Minimum switching current	10 mA
Maximum breaking capacity	See graph page 13
Material	Ag
Contact gap	0.1 mm
Contact force	> 200 mN

Note: contacts cannot have a different position (forced contacts, weld-no-transfer)

Contact data - instantaneous contacts - instantaneous / time delayed versions

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
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 Au on Ag)
Contact gap	0.7 mm
Contact force	> 200 mN

Electrical characteristics - instantaneous / time delayed versions

Dielectric strength	EN 50155	
Pole-pole	IEC 60255-5	Delayed contacts: 2 kV, 50 Hz, 1 min Instantaneous contacts: 4 kV, 50 Hz, 1 min
Cont-coil	IEC 60077	2 kV, 50 Hz, 1 min
Insulation between open contacts	2.5 kV; 50 Hz; 1 min	
EMC	EN 50121-3-2 compliant	

D8 relay module
Technical specifications

Mechanical characteristics
- instantaneous / time delayed versions

Mechanical life	30 x 10^6 operations
Maximum switching frequency	Mechanical: 3600 ops/h Electrical: 1200 ops/h
Maximum torque value screw to lock knob	0.15 Nm
Weight (spring clamp terminals / screw terminals)	High bracket 622 g / 652 g High 35 mm rail bracket 642 g / 672 g Low 35 mm rail bracket 627 g / 657 g

Environmental characteristics
- instantaneous / time delayed versions

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 -40 °C)
Humidity	95%
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	Cover: polycarbonate Base: polyester Bracket: steel

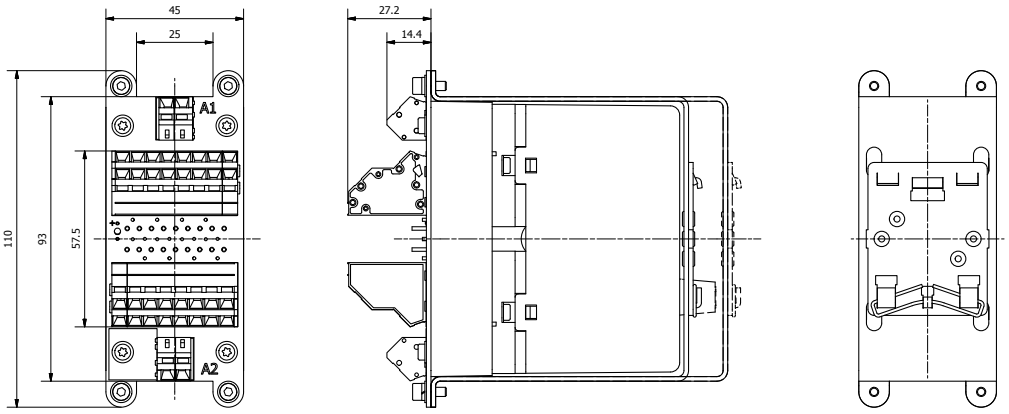
Technical characteristics
- instantaneous / time delayed versions

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

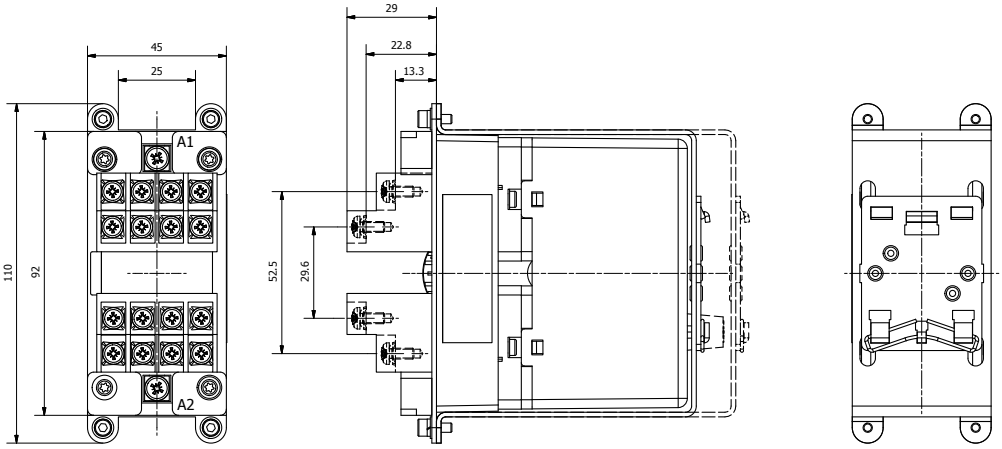
D8 relay module
Technical specifications

Dimensions (mm)

Spring clamp connection



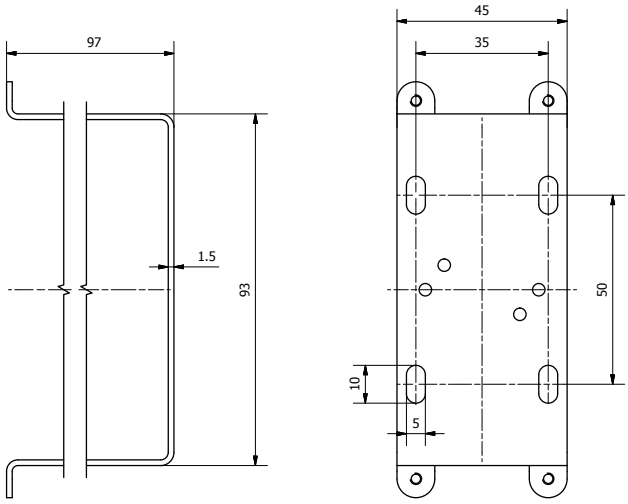
Screw connection



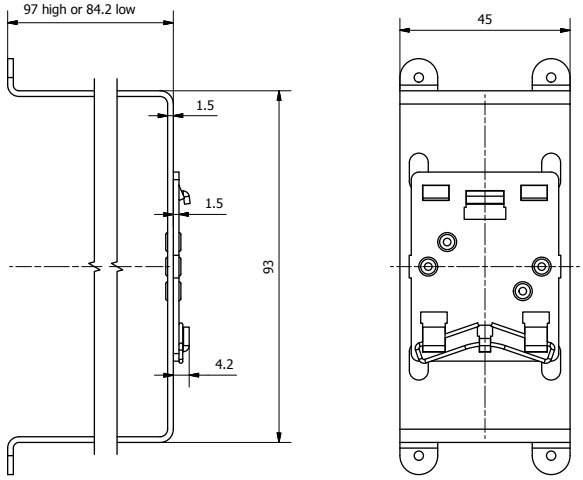
D8 relay module
Technical specifications

Dimensions mounting bracket (mm)

Screw mounting bracket



35 mm rail mounting bracket high (option Dh) or low (option D)



D8 relay module
Technical specifications

Options

Code	Description	Remark	Cannot be combined with:
C	Low temperature (-40 °C)***	Icontact < 8 A	E
E*	Au; Gold plated contacts		M
K	Extra dust protection	(only possible for instantaneous relays or in combination with fixed time delay)	
M	$AgSnO_2$ contacts (only instantaneous)	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	

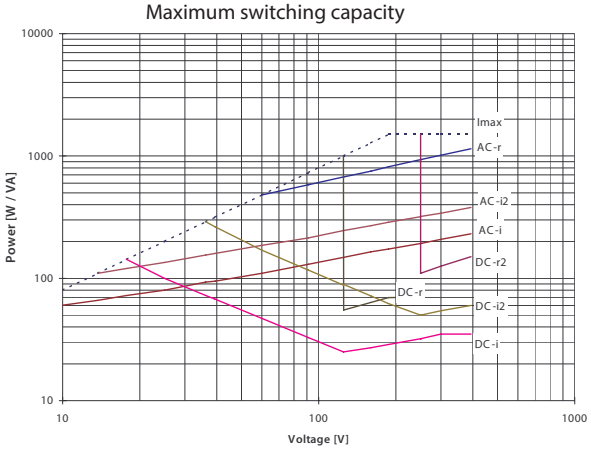
* Gold plated contacts characteristics	
Material	Ag, gold plated
Maximum switching voltage	60 V (higher voltages may be possible, contact Mors Smitt for more information)
Maximum switching current	400 mA (at higher rate gold will evaporate, then the standard silver contact rating of minimum 10 mA and 12 V is valid)
Minimum switching voltage	5 V
Minimum switching current	1 mA

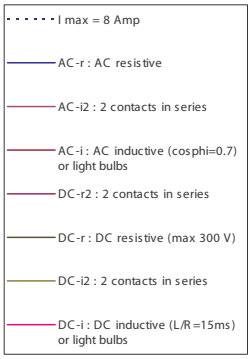
D8 relay module
Technical specifications

Delayed contacts

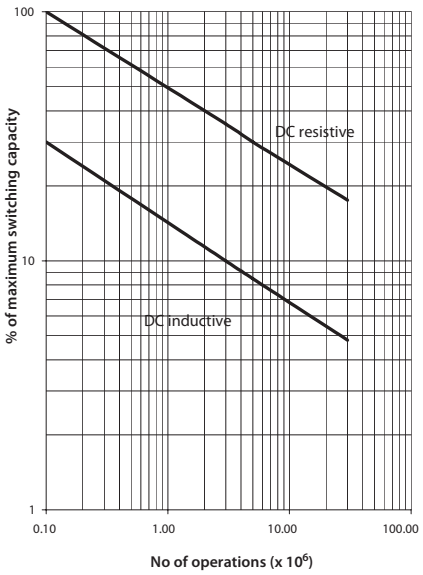
Switching capacity and contact life

Maximum switching capacity





Electrical life expectancy



Step 1: Determine switching voltage out of the application.

Step 2: Select the maximum switching capacity (in Watt) at this voltage in graph 'Maximum switching capacity'.

Step 3: Calculate the actual switched load (in Watt) out of the application.

Step 4: Calculate the % of maximum switching capacity: $\frac{\text{Actual load}}{\text{Max switching capacity}}$

Step 5: Pick the life at this load out of the graph 'Electrical life expectancy'.

D8 relay module
Technical specifications

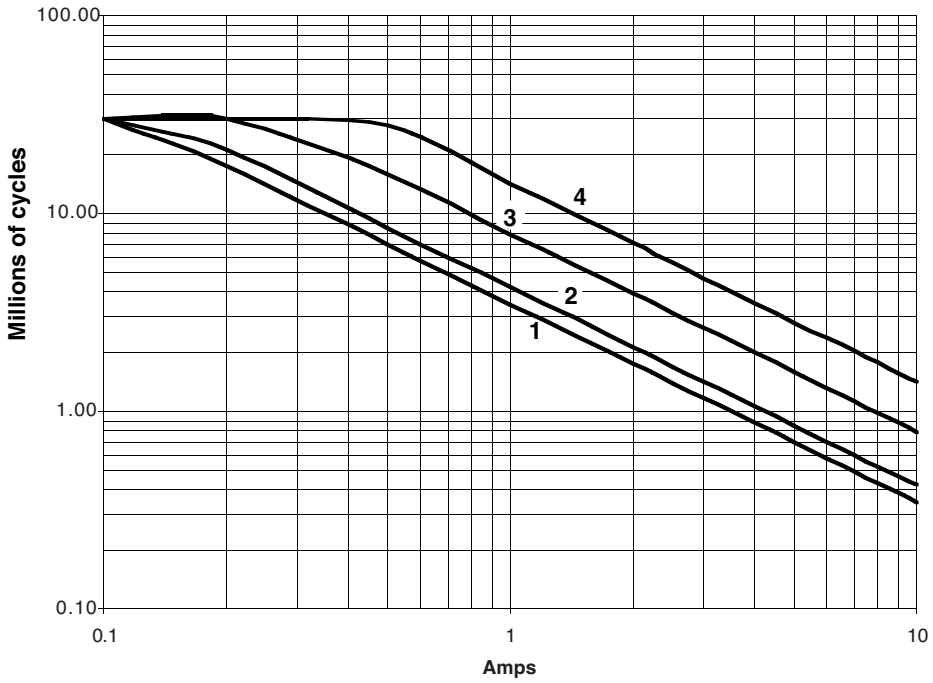
Instantaneous contacts

AC Current breaking capacity at cos φ = 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



D8 relay module
Technical specifications

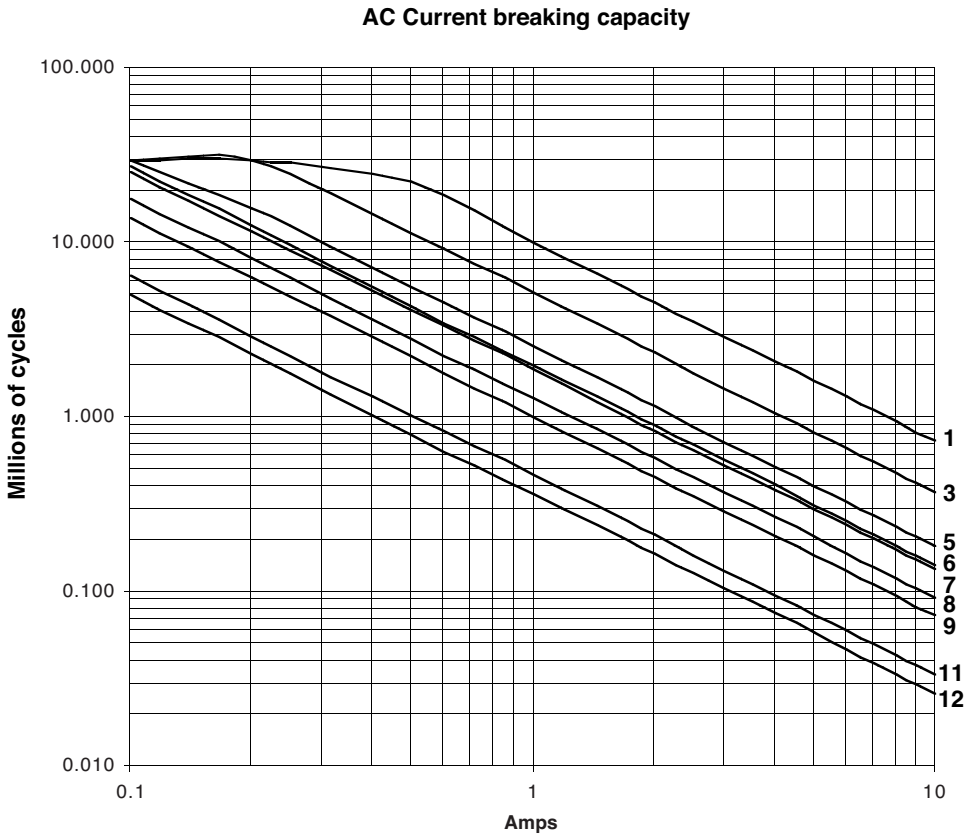
Instantaneous contacts

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



D8 relay module
Technical specifications

Instantaneous contacts

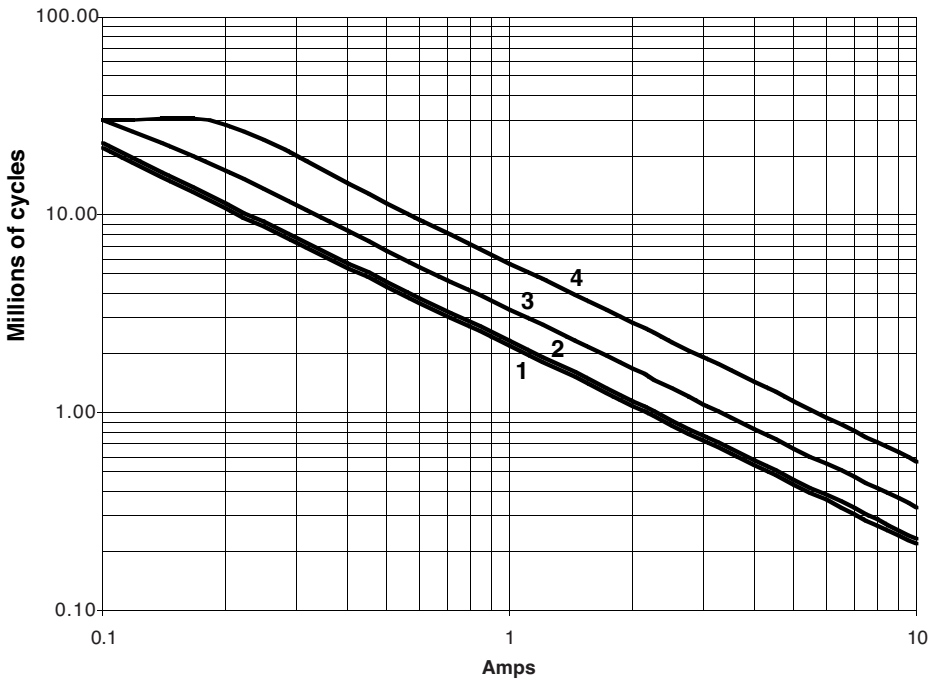
DC Current breaking capacity at L/R = 0

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



D8 relay module
Technical specifications

Instantaneous contacts

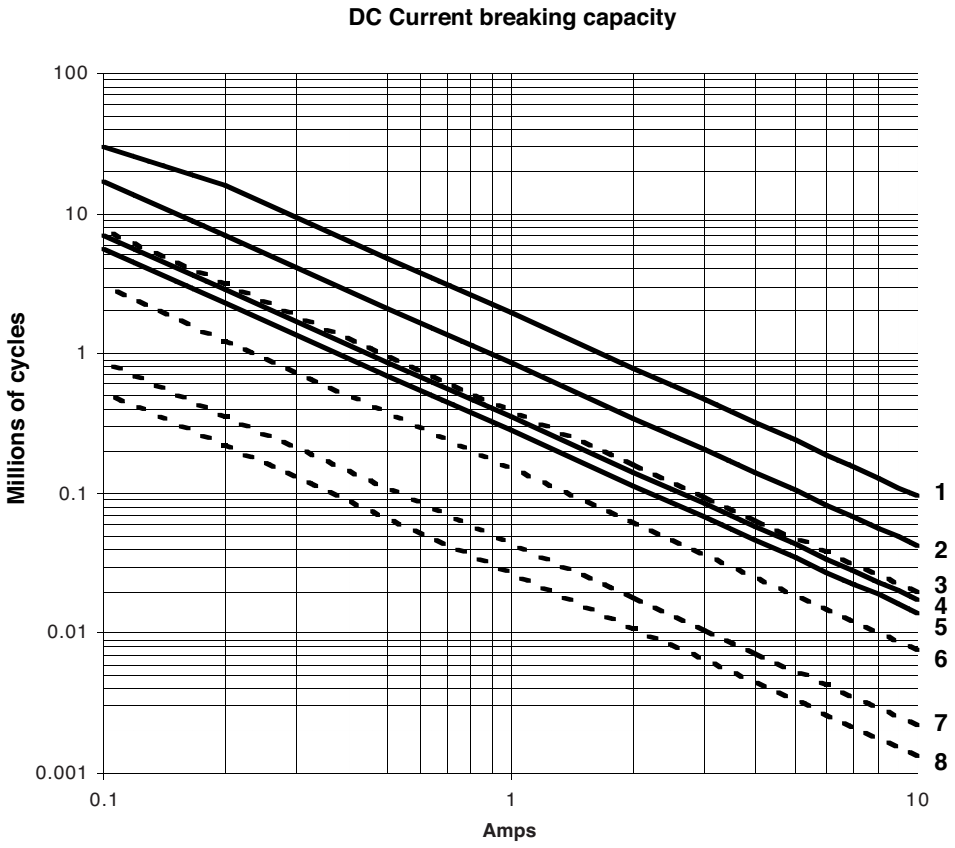
DC Current breaking capacity L/R = 20 ms ; 40 ms

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



D8 relay module
Instructions

Installation, operation & inspection

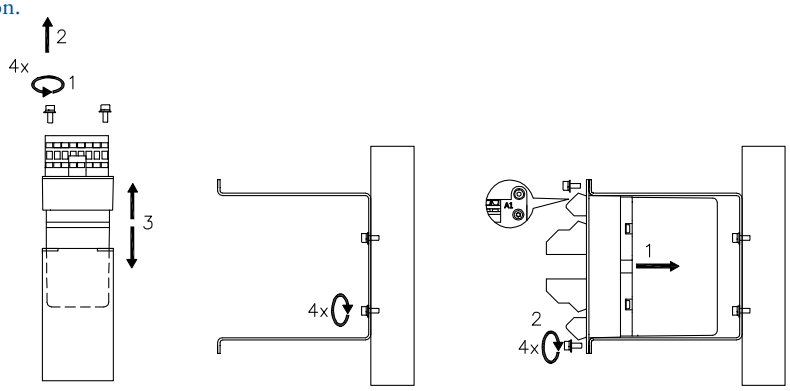
Installation

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.

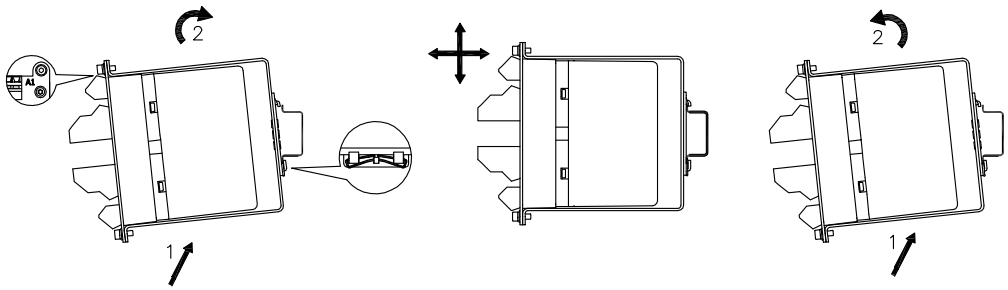
How to install a D8 relay module with a screw bracket?

A relay in the screw mounting bracket can be installed as shown in figure 1. Use a screwdriver (type hexagon socket (Allen key) 2,5 mm) to remove the four screws and remove the bracket. Screw the bracket on your panel via the four 5 x 10 mm slots. Screw the D8 relay module on the bracket. The stall torque of the four screws is 1Nm. In a vertical mounting position the text ''A1" on the module should be in top position. The modules can be mounted tightly together to save space. After installation connect the wiring according to the terminal identification.



How to install a D8 relay module with a 35 mm rail bracket (option D or Dh)?

Install or unstall the D8 relay module on a 35 mm rail according the instruction as shown.



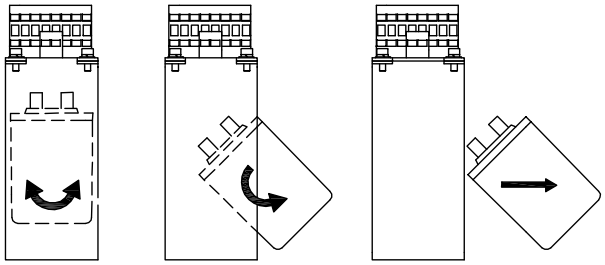
Be ensure the module is installed in the up position in a vertical mounting position with the spring at bottom and text ''A1" in top position as shown in detail. The modules can be mounted tightly together to save space. After installation connect the wiring according to the terminal identification.

D8 relay module
Instructions

Installation, operation & inspection

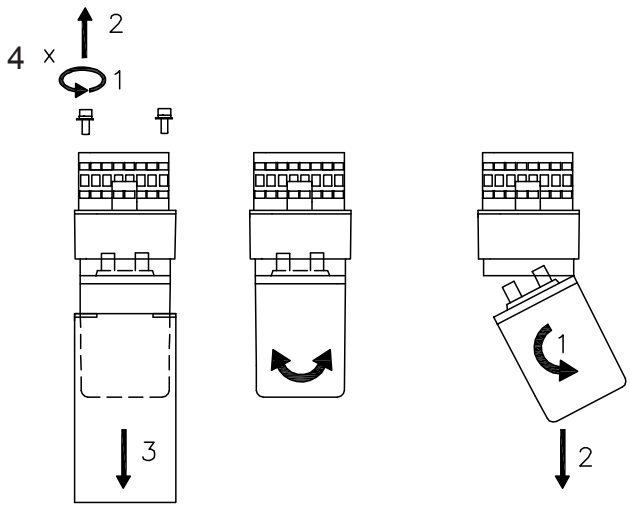
How to replace the relay of the D8 relay module with high bracket?

A relay in a high bracket can be removed as shown below. Relay installation can be done in the reverse way. Be sure there is no gap between the bottom of the relay and the socket.



How to replace the relay of the D8 relay module with a low bracket (type D)?

A relay in a low 35 mm rail bracket can be removed as shown below. Use a screwdriver type hexagon (Allen key) 2,5 mm to remove the four screws and remove the bracket. Move the relay in the side direction as shown in the second picture. Warning: Up and down movements may cause damage to the coilwire. For installation plug the relay into the socket ensuring there is no gap between the bottom of the relay and the socket. Screw the bracket on the module with the four hexagon screws (stall torque is 1 Nm).



D8 relay module
Instructions

Installation, operation & inspection

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 (≤ 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

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.

D8 relay module
Ordering scheme

D8-U2	01	-	D022T011	-	L	NQ	6 - 60 s	-

1. Relay model 2. Coil voltage 3. Contact data 4. Options 5 Time (if applicable) 6 Connection

This example represents a D8-U201-D022T011-LNQ 6-60 s
Description: D8-U200 series relay, U_{nom}: 24 V, U_{min} 16.8 V, U_{max} 30 V, instantaneous contacts 2 N/O - 2 N/C, timed contacts 1 N/O - 1 N/C, LED, no magnetic arc blow out, double zener diode, time delayed contacts adjustable from 6 to 60 s, screw connector

1 Relay model

D8-U2

2 Coil data

	U_{nom} (V)	U_{min} (V)	U_{max} (V)
01	24	16.8	30
02	48	33.6	60
03	72	50.4	90
04	110	77.0	137.5
05	96	67.2	120
06	12	8.4	15
07	36	25.2	45

3 Contact data

Instantaneous:
044 4 N/C - 4 N/O
026 2 N/C - 6 N/O
008 0 N/C - 8 N/O
035 3 N/C - 5 N/O

Instantaneous & timed contacts:
D022T011 Instantaneous: 2 N/C - 2 N/O & Timed contacts: 1 N/C - 1 N/O
D004T011 Instantaneous: 0 N/C - 4 N/O & Timed contacts: 1 N/C - 1 N/O

4 Options

L	LED (standard)
C	Low temp (-40 °C) - Max contact current 8 A
D	Low 35 mm rail bracket *
Dh	High 35 mm rail bracket
E	Gold plated contacts
K	Special dust protection**
M	$AgSnO_2$ contacts (only instantaneous contacts)
N	No magnetic arc blow-out
Q	Double zener diode

* Low 35 mm rail bracket is only possible with option fixed time relay (without knob)
** Only possible for instantaneous relays or in combination with fixed time delay
Remark: high bracket for screw connection is standard

5 Time delay

0.1 - 1 s
0.3 - 3 s
0.6 - 6 s
1 - 10 s
3 - 30 s
6 - 60 s
0.3 - 3 min
1 - 10 min
3 - 30 min

Fixed on request

6 Type of connection

-	Screw connector
Spring	Spring clamp connector