D-B relay - High DC breaking cap., 4 C/O, 10 A

Datasheet

Application

Rugged plug-in relays for extreme reliable, long endurance applications in harsh environment. Proven reliable operation in switching high DC voltage/ inductive loads. Compact design, choice of many options and a wide range of sockets makes the D-B relay concept an easy and flexible solution to use.

Description

The D relays series are designed for demanding applications such as power utilities and petrochemical industries. The construction of the relay and choice of materials makes the D relay suitable to withstand corrosive atmospheres, low and high temperatures and vibrating environments. No external retaining clip needed as integrated 'snap-lock' will hold relay into socket under all circumstances and mounting directions.

All relays are equipped with a LED and suppression diode. Magnetic arc blow out (B) and/or putting contacts in series (Y) and/or increasing contact gap (X5) will increase the performance drastically in applications were a high DC voltage/inductive load breaking capacity is required.

Features

- Compact plug-in design
- Instantaneous, 4 C/O contacts
- High DC breaking capacity
- Standard with LED & suppression diode
- Flat, square and silver relay pins for excellent connection
- Wide range sockets
- Integrated retaining clip
- Transparent cover
- Flexibility by many options
- Solve-all™ relay application concept

Benefits

- Proven reliable
- Proven technology
- Long term availability
- Low life cycle cost
- Used in safety critical applications
- No maintenance

Industry compliancy

- EN 60255 Relay design and environmental conditions.
- EN 60947 Low voltage switch gear and control gear.
- EN 60947-5-1 Electromechanical control circuit devices and switching elements.
- IEC 61810 Electromechanical elementary relays
- CE, RoHS, CB approved
- CCC approval pending

D-B relay
Technical specifications


Standard LED


Smitt style pinning

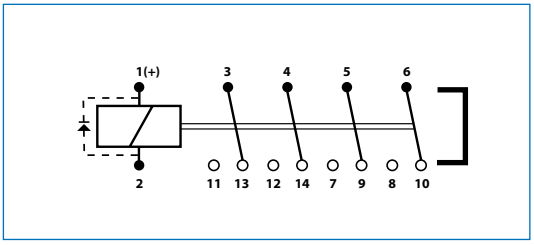

Magnetic arc blowout


Transparant cover

Solve-All™ relay application concept

From this datasheet it is obvious that the unique D-B relay with all its options has been designed in close cooperation with customers from power utility undustry.

Connection diagram



* Diode is standard in DC versions

D-B relay
Technical specifications

Coil data DC versions

Operating times at nominal voltage	
Pull-in time	≤ 20 ms
Release time	18 ms
Bounce time N/O contacts	4 ms
Bounce time N/C contacts	8 ms
Inductance L/R at U_{nom}	
Energised	11 ms
Released	8 ms
Operating voltage range	0.8...1.1 U_{nom}
Operating voltage range (option V)	0.7...1.25 U_{nom}
Nominal power consumption	2 W at U_{nom}
Min hold-up voltage	0.1 U_{nom}

Type	U_{nom} (V)	$U_{pull-in}$ (V)	$U_{hold-up}$ (V)	U_{max} (V) 40 °C	R_{coil} (Ω)
12 VDC	12	9.6	1.2	13.2	72
24 VDC	24	19.2	2.4	26.4	290
48 VDC	48	38.4	4.8	52.8	1150
60 VDC	60	48.0	6.0	66.0	1840
110 VDC	110	88.0	11.0	121.0	6500
125 VDC	125	96.0	12.0	137.5	8400
220 VDC	220	176.0	22.0	242.0	25000

* Other voltages on request

Coil data AC versions

Operating times at nominal voltage	
Pull-in time	≤ 5 ms
Release time	5 ms
Bounce time N/O contacts	4 ms
Bounce time N/C contacts	8 ms
Inductance L/R at U_{nom}	
Energised	11 ms
Released	8 ms
Operating voltage range	0.8...1.1 U_{nom}
Operating voltage range (option V)	0.7...1.25 U_{nom}
Nominal power consumption	2 W at U_{nom}
Min hold-up voltage	0.3 U_{nom}

Type	U_{nom} (V)	$U_{pull-in}$ (V)	$U_{hold-up}$ (V)	U_{max} (V) 40 °C	R_{coil} (Ω)
12 VAC 50 Hz	12	9.6	3.6	13.2	11
24 VAC 50 Hz	24	19.2	7.2	26.4	44
42 VAC 50 Hz	42	33.6	12.6	46.2	133
115 VAC 50 Hz	115	92.0	34.5	126.5	1140
220 VAC 50 Hz	220	176.0	66.0	242.0	4400
230 VAC 50 Hz	230	184.0	69.0	259.0	4800
380 VAC 50 Hz	380	304.0	114.0	420.0	12500

* Other voltages on request

* The coil resistance of the D relay is measured at room temperature and has a tolerance of ± 10 %

D-B relay
Technical specifications

Contact data

Maximum make current	16 A
Maximum continuous current	10 A (AC1; IEC 60947)
Peak inrush current	200 A (withstand ≥ 10 x 200 A @ 10 ms, 1 min)
Maximum switching voltage	350 VDC, 440 VAC
Minimum switching voltage	AG: 12 V)Au: 1µV)
Minimum switching current	AG: 10 mA (Au: 1µA)
Material	Ag standard (optional AgSnO2, Au on Ag)
Contact gap	0.7 mm (up to 4 mm for YX5 option)
Contact force	> 200 mN
Contact resistance	< 15 mΩ (initial)

Performance characteristics

Mechanical life	50 x 10^6 cycles (unpowered)
Rated switching frequency	1200 ops/hour
Dielectric strenght	IEC 61810-1, 4 kV, 50 Hz, 1 min (between contacts)
	IEC 61810-1, 2.5 kV, 50 Hz, 1 min (between coil-contact)
Pulse withstanding	IEC 60255-5, 5 kV (1.2/50 ops/hour

Mechanical data

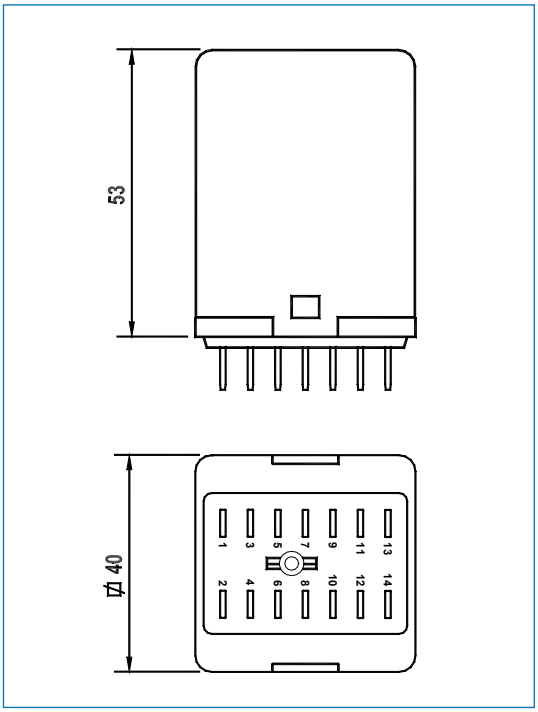
Dimensions (d, w, h)	40 x 40 x 53 mm
Weight	140 g
Materials	Polycarbonate
Non toxic. heat & fire resistant	Polyester

Environment conditions

Operating temperature	-25 °C...+55 °C (-50 °C when using option Y)
	-25 °C...+70 °C (when using option V)
Shock	IEC 60068-2-27, Shocks: 5 g, 30 ms 6 directions
Vibration	IEC 60068-2-6, Vibration: 2 g, 5...150 Hz, 6 directions
Humidity	95 % RH / +40 °C temporary condensation permitted
Salt mist	IEC 60068-2-11, 5 % NaC1, 35 °C for 4 days
Pulse withstanding	IEC 60529, IP40

D-B relay
Technical specifications

Dimensions



D-B relay
Technical specifications

Options

Available options for D-B relay according the Solve-*All*™ relay application concept

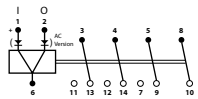
Code	Description	Remark	Can not be combined with
A	Mechanical trip indicator indicates if the relay has been energized.		K, W
B	Magnetic arc blow-out Ensures a high DC breaking capacity and longer contact life		
C	Lower temperature features (-40 °C)	Max contact current 8A (AC1;IEC 60947)	
D	Protection against back EMF. When a coil is switched off, a large Back-EMF appears across the coil. This back EMF may be several hundred volts in value, enough to destroy a transistor.	Diode standard in DC coil	
E	Gold plated contacts (Au 10 µm) Low contact resistance and good resistively against corrosive atmosphere. Suitable for switching low level dry circuit loads.		M
H	High burden protection. Provides immunity to capacitance discharge currents & power. Suitable for application in high security circuit breaker tripping circuits.	Thermistor (PTC)	T,A,R,S
K	Extra dust protection. Cover sealed with sealant		T
L	LED integrated in coil	Standard	A
M	Highly resistant to welding ($AgSnO_2$ contacts) For safety and vital applications	Min. contact current 100 mA	E
P	Protection against reversed polarity	Polarization diode	
Q	Coil protection against transient voltage	Double zener diode	
R	Faster switching contacts, pull in time < 7 ms. For reduction of total switching time in critical circuits. Suitable for energy controlling systems.	DC coil only, 3 C/O contacts	L, W
S	Mechanical on/off position indicator Indicates visual the position of the contacts.		T, W
T	'Push to Test' button, to manual operate the contact mechanically		S, K
V	Wider operating range and ambient temperature Operating range: 0.7 … 1.25 Un Ambient temperature: -25 °C…+ 70 °C	Power consumption 2.22 W	
W	Weld-no-transfer. suitable for safety critical applications. Non welding contacts		A, R, S, X4, X5, Y, 11
X	Bidirectional LED		
X2	Universal AC/DC coil because of rectifier circuit		
X3	Reversed polarity of coil contacts. Contact 1 = negative (-) and contact 2 = positive (+)		
X4	Make before break contacts. Contacts 5-7 and 6-8 will make before contacts 3-13 and 4-14 will break. During release, the contacts 3-13 and 4-14 will make before contacts 5-7 and 6-8 will break.	2 N/O and 2 N/C contacts	W
X5	Contact gap of 2 mm higher DC breaking capacity and longer contact life. To increase the breaking capacity and contact life more this option can be combined with option B and Y	2 N/O and 2 N/C contacts	W
Y	Double break double make contacts. Breaking capacity increased by 50% and longer contact life. To increase the breaking capacity and contact life more this option can be combined with option B and X5	2 C/O DMDB contacts	W
Z	Polarity independent	No diode and no LED	
11	Make before break contacts Contact 4-12 will make before contact 3-13 will break during pull-in. During release, contact 3-13 will make before contact 4-12 will break. Contact 5-7/9 is a normal change over contact.	2 C/O 1 N/O and 1 N/C	W

Colored cover en keying of relay on socket on request

D-B relay
Technical specifications

In this section the most common breaking capacity for DC-voltage / inductive load possibilities are presented with the different options and contact configurations within the D-relays series.

D-B

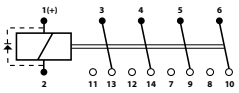


- 4 C/O contacts
- Magnetic arc blow out
- Contact gap : 0.8 mm

Breaking capacity

DC1	110 VDC	7 A
	220 VDC	3 A
L/R=40 ms	110 VDC	3 A
	220 VDC	1 A
DC13	110 VDC	-
	220 VDC	-

D

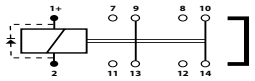


- 4 C/O contacts
- Contact gap : 0.7 mm

Breaking capacity

DC1	110 VDC	1 A
	220 VDC	0.7 A
L/R=40 ms	110 VDC	0.3 A
	220 VDC	0.1 A
DC13	110 VDC	-
	220 VDC	-

D-Y

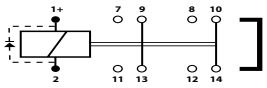


- 2 C/O contacts
- Double make double break
- Contact gap : 1.4 mm

Breaking capacity

DC1	110 VDC	1.5 A
	220 VDC	1 A
L/R=40 ms	110 VDC	0.5 A
	220 VDC	0.2 A
DC13	110 VDC	-
	220 VDC	-

D-YB

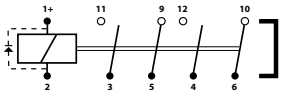


- 2 C/O contacts
- Double make double break
- Magnetic arc blow out
- Contact gap : 1.4 mm

Breaking capacity

DC1	110 VDC	8 A
	220 VDC	4 A
L/R=40 ms	110 VDC	5 A
	220 VDC	2 A
DC13	110 VDC	1.5 A
	220 VDC	0.5 A

D-BX5

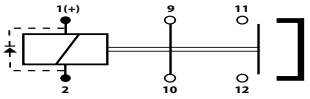


- 2 N/O + 2 N/C contacts
- Magnetic arc blow out
- Contact gap : 2 mm

Breaking capacity

DC1	110 VDC	10 A
	220 VDC	5 A
L/R=40 ms	110 VDC	6 A
	220 VDC	3 A
DC13	110 VDC	3 A
	220 VDC	1 A

D-YBX5



- 1 N/O + 1 N/C contacts
- Double make double break
- Magnetic arc blow out
- Contact gap : 4 mm

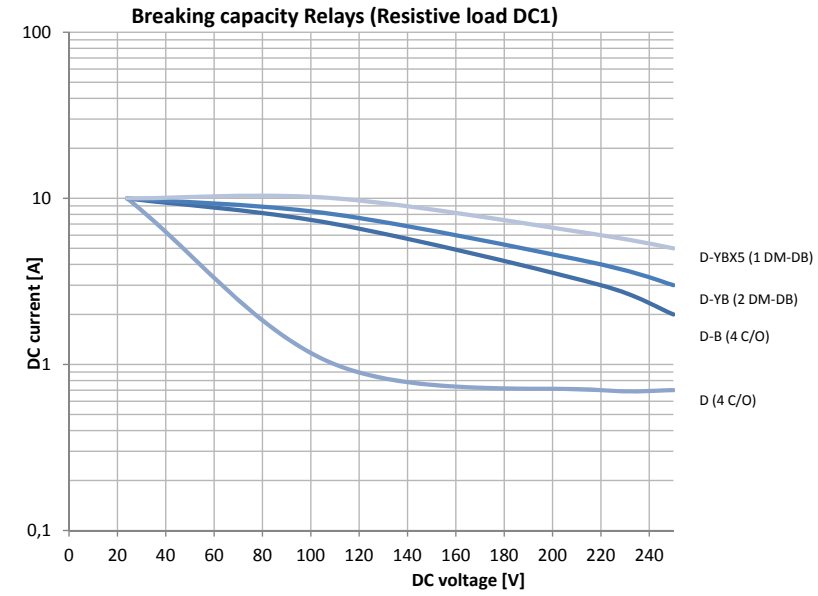
Breaking capacity

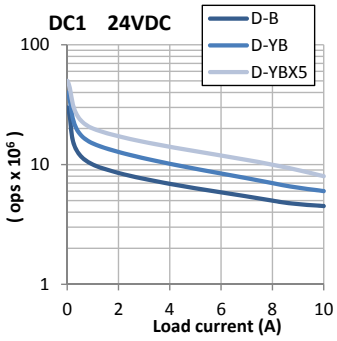
DC1	110 VDC	12 A
	220 VDC	6 A
L/R=40 ms	110 VDC	7 A
	220 VDC	4 A
DC13	110 VDC	4 A
	220 VDC	2 A

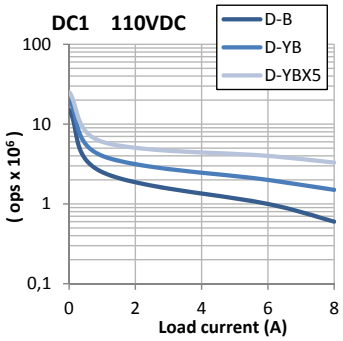
D-B relay
Technical specifications

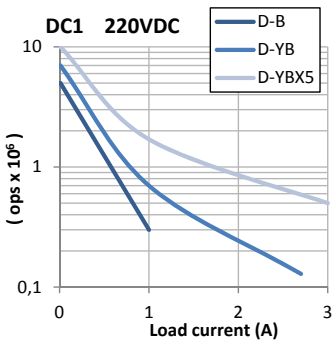
Electrical life expectancy and breaking capacity

The life expectancy values shown below are based on factory tests (test frequency at 1/3 Hz). These values could be different in real life applications as environmental conditions, switching frequencies and duty cycles will influe nce these values. Putting more contacts in series (Y) and increasing contact gap (X5) will increase breaking capacity and life expectancy significantly.

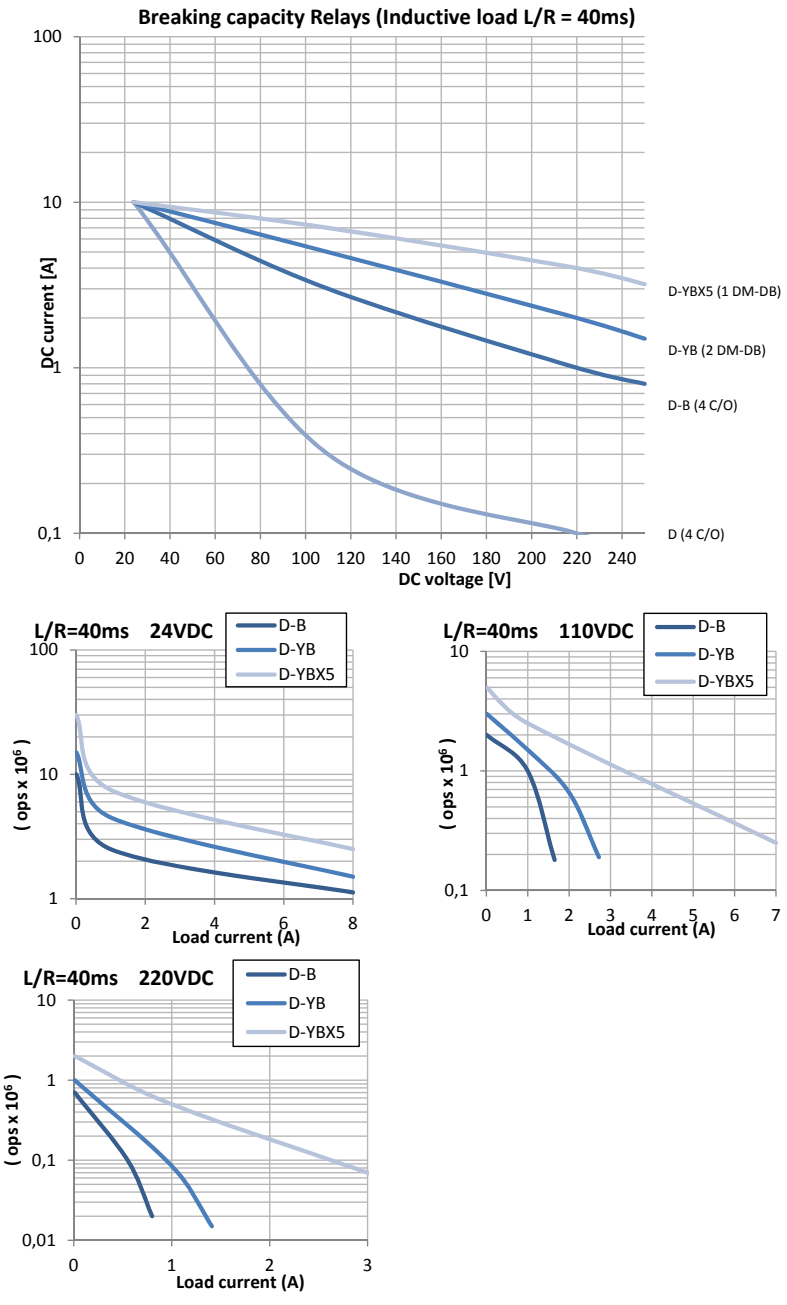








D-B relay
Technical specifications
Continuation



D-B relay
Notes

D relay
Sockets

Mounting possibilities/sockets

V21

V23

V23BR

V29

V33

Surface/wall mounting

338000100	V2	Bush connection screw socket, wall mount, front connection (2,5 mm²)
338000580	V23	Screw socket, wall mount, front connection (7,5 mm terminals)
338000302	V22BR	Screw socket, wall mount, front connection (9 mm terminals)
338300100	V24	Faston connection socket, wall mount, front connection (6,3 mm)
338000610	V29	Spring terminal socket, wall mount, front dual connection (2,5 mm²)

Rail mounting

338000200	V21	Bush connection screw socket, rail mount, front connection (2,5 mm²)
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)
338000610	V29	Spring terminal socket, rail mount, front dual connection (2,5 mm²)

Panel/flush mounting

338100100	V3	Solder tag socket, panel mount, rear connection
328400100	V26	Crimp contact socket, panel mount, rear connection
338000560	V31	Faston connection socket, rear dual connection (5 mm)
338000570	V33	Cage clamp socket, flush mount, rear dual connection (2,5 mm²)

PCB mounting

338000561	V32	PCB soldering socket

D-B relays
Instructions

Installation

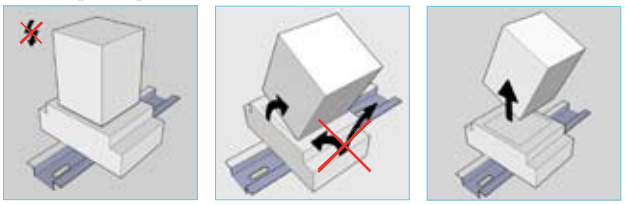
Before installation or working on the relay: disconnect the power supply first!

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 surface/rail mounting is used, always mount the socket in the direction of the UP arrow.

Warning!

- Never use silicon spray 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 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.

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.

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 a LED is fitted, voltage to the coil presence should be indicated. 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-B relay
Ordering scheme

D	-	B	220 VDC
1. Relay series		2. Options	3. Coil voltage

This example represents a D-B 220VDC. Description: D relay, U_{nom}: 220 VDC, U_{min}:174 V, U_{max}: 242 V, 4 C/O contacts, including magnetic arc blow-out.

1. Relay series

D

2. Options

B	Magnetic arc blow-out

Note: for different options we refer to the general D relays leaflet. Please note not every option is possible in combination with the D-B relay. Contact your sales representative.

3. Coil voltages

5 VDC	65 VDC	6 VAC 50Hz	230-240 VAC 50Hz
6 VDC	72 VDC	12 VAC 50Hz	350 VAC 50Hz
7 VDC	80 VDC	24 VAC 50Hz	380-400 VAC 50Hz
8 VDC	100 VDC	42 VAC 50Hz	415 VAC 50Hz
12 VDC	110 VDC	48 VAC 50Hz	
14 VDC	120 VDC	57 VAC 50Hz	24 VAC 60Hz
18 VDC	127 VDC	60 VAC 50Hz	42 VAC 60Hz
20 VDC	135 VDC	63 VAC 50Hz	110-115 VAC 60Hz
24 VDC	136 VDC	66 VAC 50Hz	215 VAC 60Hz
28 VDC	140 VDC	100 VAC 50Hz	220 VAC 60Hz
30-32 VDC	220 VDC	110-115 VAC 50Hz	230-240 VAC 60Hz
36 VDC	240 VDC	120 VAC 50Hz	380 VAC 60Hz
42 VDC	250 VDC	127 VAC 50Hz	
60 VDC		220-230 VAC 50Hz	

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