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High-voltage contactor

Gas-filled contactor for high-voltage DC switching

Series/Type: HVC501B-24
Ordering code: TBD1490

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Version: 01

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Preliminary data
Product description

The HVC series are specially designed to meet the requirements of high-voltage DC switching applications. The optimized hermetically sealed design exhibits excellent reliability performance against harsh environments. HVC series can be used in a wide range of applications.


Features

- Exceptional electrical and mechanical reliability
- Gas-filled and hermetically sealed
- No EMI, no inrush current phase at start-up
- No polarity of contact terminals
- RoHS compatible

Applications

- Battery charge/ discharge systems
- Renewable energy storage systems
- DC high-voltage/ high-current applications
- DC fast charging stations

Characteristics

Height × width × depth	94 × 89 × 44	mm
Weight	~ 500	g
Contact material	Cu alloy	
Contact arrangement	1A	
Internal contact gap (full disconnection)	3.0 (2 × 1.5)	mm
Recommended connection cable cross section ^{a)}	> 200	mm ²
Coil wires		
- length	300	mm
- cross section	0.5	mm ²
- material	Cu	
Vibration in xyz-axis		
- shock, 11 ms ½ sine, peak	20	g
- vibration, sine 100 ... 2000 Hz, peak	20	g
- wideband random vibration, 10 ... 1000 Hz ^{b)}	5	g _{eff}
Operation and storage ^{c)}		
- temperature	-40 ... +85	°C
- humidity	5 ... 85	%
- air pressure	47 ... 106	kPa
Climatic category (IEC 60068-1)	40/085/21	
Label, black positive	 HVC501B-24 J_ _ _ 1234567890	[type name] [internal code] [ser. no.]

Notes

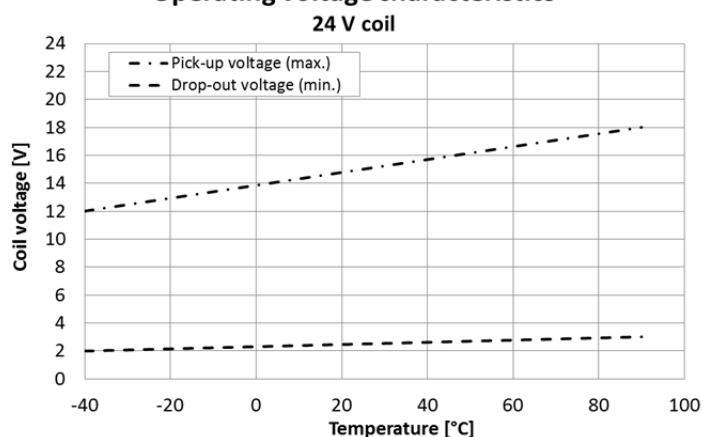
^{a)} The diameter must be matched to actual current and operation temperature (see: Cautions and warnings, page 7).

^{b)} Acc. to IEC 60068-2-64

^{c)} Freezing or condensing must be avoided.

Preliminary data
Specification

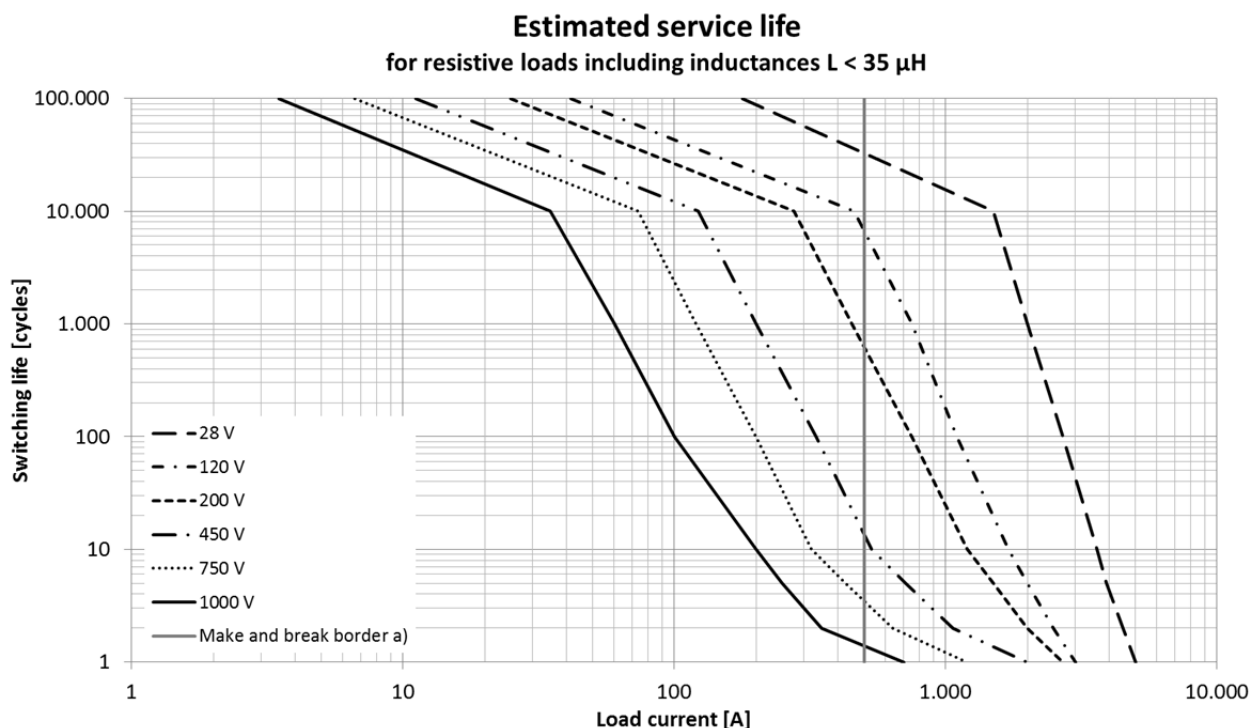
Contact		
Maximum operating voltage	1000	V_{DC}
Continuous operating current	500	A
Temporary overcurrent (10 min)	600	A
Temporary overcurrent (1 min)	750	A
Mechanical life time ¹⁾	1 000 000	switchings
Minimum make and break current	1	A
Maximum cut-off current (1 operation) ^{2) 3) 4)}	2000	A
Contact resistance typical (> 100 A)	< 0.4	m Ω
Insulation resistance at 500 V (initial) contact to contact / contact to coil	> 1	G Ω
Dielectric strength contact to contact / contact to coil ⁵⁾	> 3800	V_{AC}
Operating time		
make	< 40	ms
break	< 20	ms
Coil		
Nominal voltage	24	V_{DC}
Operating voltage range	18 ... 32	V_{DC}
Pick-up voltage (max.)	18	V_{DC}
Drop-out voltage (min.)	2	V_{DC}
Power at nominal voltage ⁶⁾	6	W
Resistance	96	Ω
Minimum holding current	80	mA

Operating voltage characteristics

Notes:

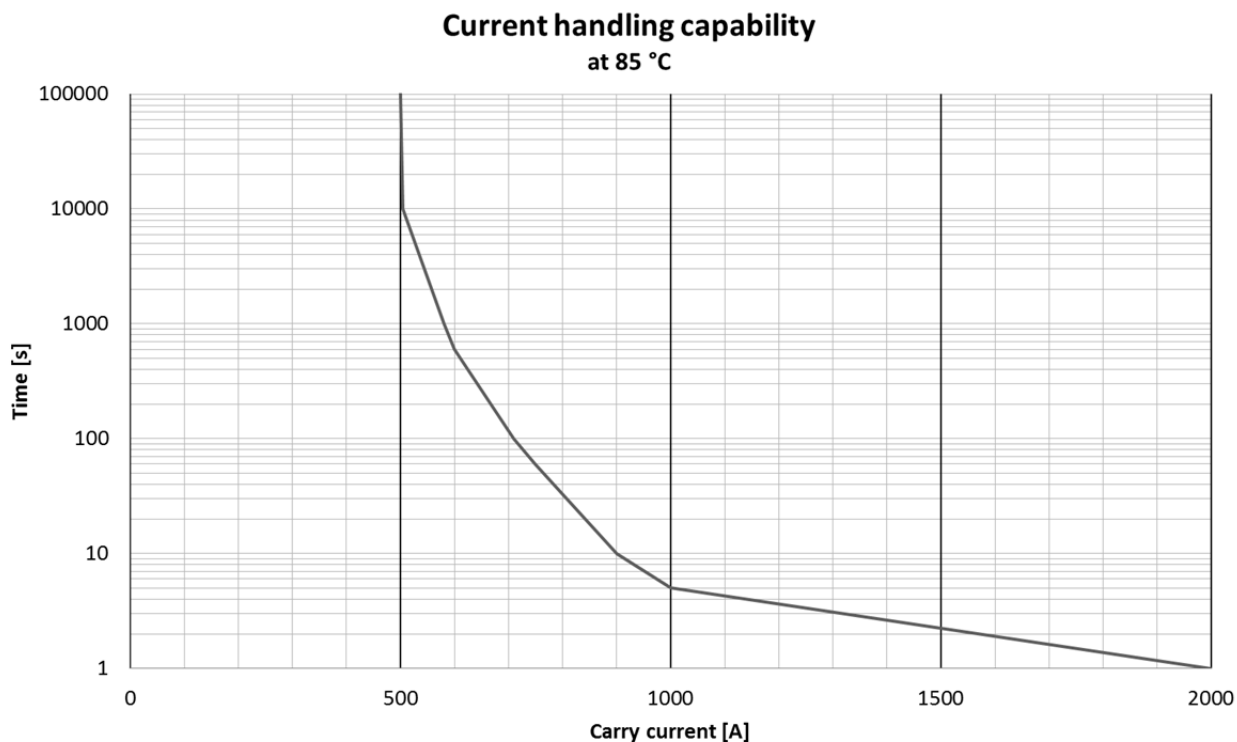
- ¹⁾ Duty cycle 50%, cycle duration 1 s, value represents B10 life time acc. to Weibull analysis.
- ²⁾ Specified according to JIS C 5442 (temperature 15 °C to 35 °C, humidity 25% to 85% RH).
- ³⁾ Tested at 450 V for resistive loads including inductance $L < 35 \mu\text{H}$.
End of life is reached when dielectric strength is $< 50 \text{ M}\Omega$ at 500 V.
- ⁴⁾ No fire and no explosion will occur after this break. Afterwards, the dielectric strength and insulation resistance may not meet initial data sheet specification.
- ⁵⁾ Detection limit 10 mA
- ⁶⁾ Tolerance $\pm 10\%$

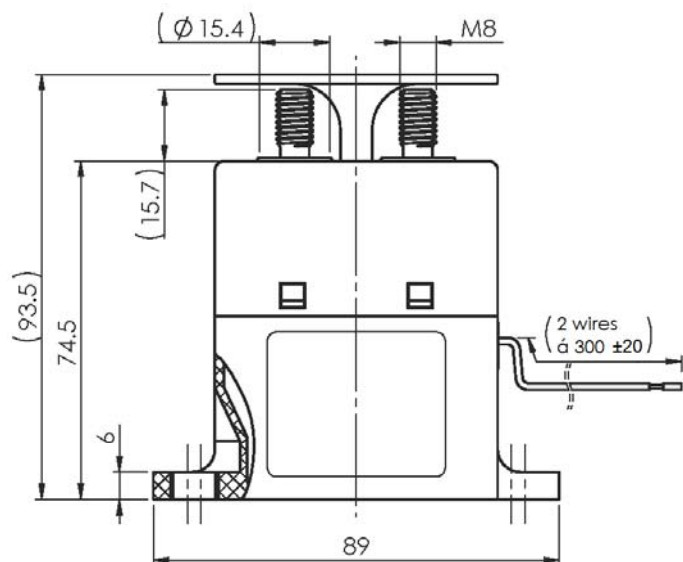
Preliminary data

Characteristics

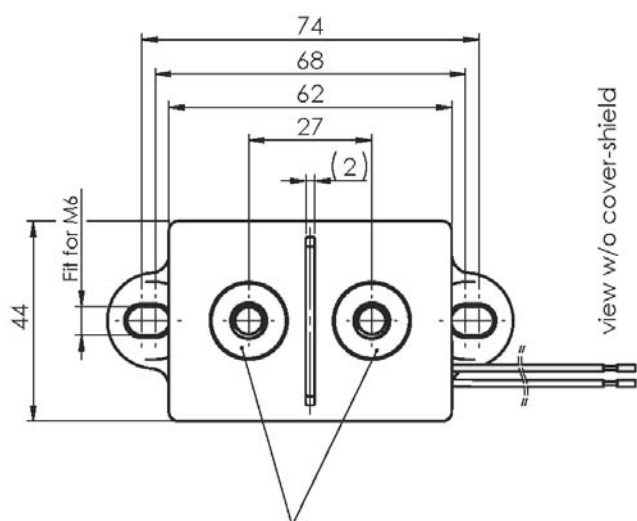
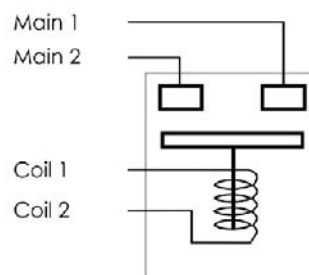


a) Below border make and break operation is permitted, duty cycle 10%, 10 s cycle duration.
Above break only is permitted, duty cycle 1%, 600 s cycle duration.



Preliminary data
Dimensional drawings in mm


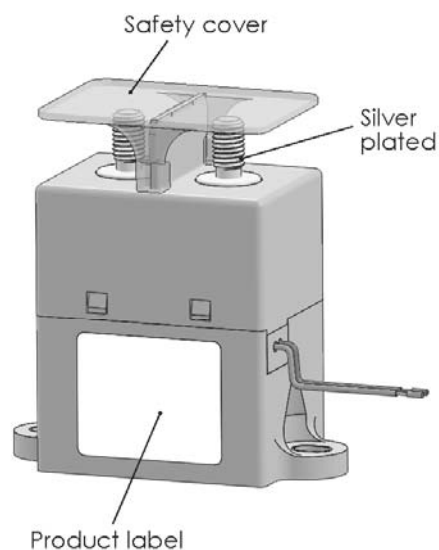
Schematic



load input terminals - no polarity

General tolerances:
 less than 10 : ± 0.3
 10 ... 50 : ± 0.6
 more than 50 : ± 1

The cover over the main contacts is optional. It can be removed and reapplied if needed.

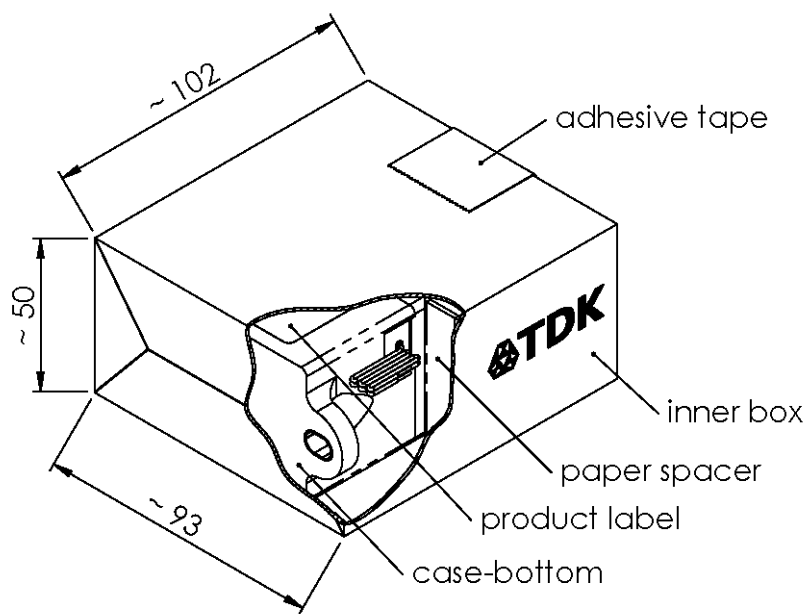


Note:
 Tightening torque of main contacts:
 6 ... 8 Nm for M8 nut

Connection name	Marking
Main 1 terminal	none
Main 2 terminal	none
Coil 1 wire (+)	red
Coil 2 wire (-)	black

Preliminary data**Packing unit**

B88269X...C011 = 1 pc. in cardboard box



Preliminary data

Cautions and warnings

- Contactors radiate magnetic and electromagnetic fields. Please ensure that other components mounted in close proximity are not affected.
- The operating life of the contactor can be affected by strong magnetic fields. Please ensure that there are no magnetic field sources in close proximity.
- The contactor must be mounted so that the contact face side is perpendicular to the direction of the main shock-axis. If this is not possible, the contactor must be mounted upright.
- In order to ensure safe operation, the voltage at the connection terminals of the contactor must not exceed the nominal operating voltage by more than 10% in the event of a break under load.
- For continuous high current operation make sure that the connection terminals will not exceed temperatures of 120 °C by selecting an appropriate connection cable cross section or active cooling.
- The coil contacts need to be protected from overvoltage when switching off. Preferably a varistor should be installed in parallel. The overvoltage protection device which is used in parallel to the coil has an influence on the break time. Use of the EPCOS S10K50 varistor (or equivalent) is recommended.
- The leads to the contactor must be securely tightened to the terminals (check torque specification in data sheet), otherwise current stress may generate sparks and heating.
- The contactor must not be operated without any load, as this may increase the contact resistance.
- Contactors may become hot during extended periods of current overload (burn hazard).
- Contactors may be used only within their specified values. Overloading the contactor may destroy the component.
- Contactors must be handled with care and must not be dropped.
- Damaged contactors must not be re-used.
- For successful pick-up, the voltage cannot be ramped up slowly. The voltage needs to be applied instantly to at least the maximum pick-up voltage.
- The cover over the main contacts is optional. It can be snapped in place after attaching wires or bus bars to the main contacts to prevent accidental touching during assembly or maintenance. The cover can be removed and reinserted.

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