High-voltage contactor

Gas-filled contactor for high-voltage DC switching

Series/Type:	**HVC300A-12SE**
Ordering code:	**B88269X2050C011**
Date:	2019-12-04
Version:	02

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Gas-filled contactor for high-voltage DC switching HVC300A-12SE

Product description

The HVC series has been especially 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

- Energy saving with dual coil
- Gas-filled and hermetically sealed
- No EMI, low operating power
- RoHS compatible

Applications

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

Characteristics

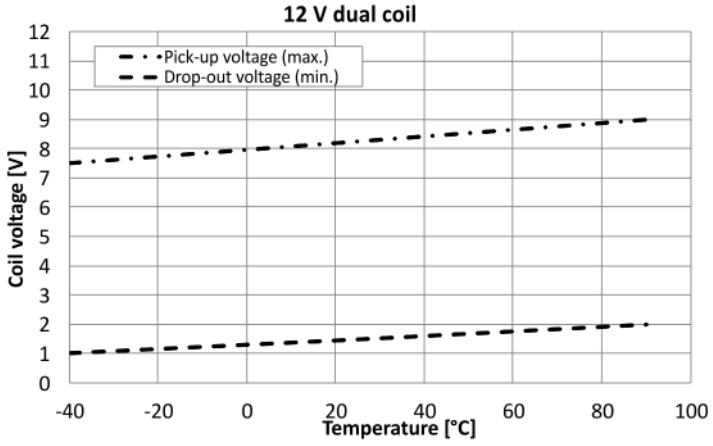
Contact arrangement Inner contact material Internal contact gap (full disconnection)	1A Cu alloy 2.8 (2 × 1.4)	 mm
Recommended connection cable cross section [1]	> 100	mm²
Coil wires - length - cross section - material	 300 AWG20 Cu	 mm
Auxiliary contact - max. voltage - max. current - max. switching power - max. resistance - wire cross section	 36 250 3 200 AWG26	 V_{DC} mA_{DC} W mΩ
Vibration in closed state, xyz-axis - shock, 11 ms ½ sine, peak - vibration, sine 100 … 2000 Hz, peak - wideband random vibration, 10 ... 1000 Hz [2]	 196 196 49	 m/s^2 m/s^2 m/s^2_{RMS}
Operation and storage [3] - temperature - humidity - air pressure	 −40 ... +85 5 … 85 69 … 106	 °C % kPA
Climatic category (IEC 60068-1)	40/085/21	
Weight	~ 500	g
Certifications	UL 60947-4-1 (E491412) CE CCC	 pending

See “Notes” on page 7

Specification [4]

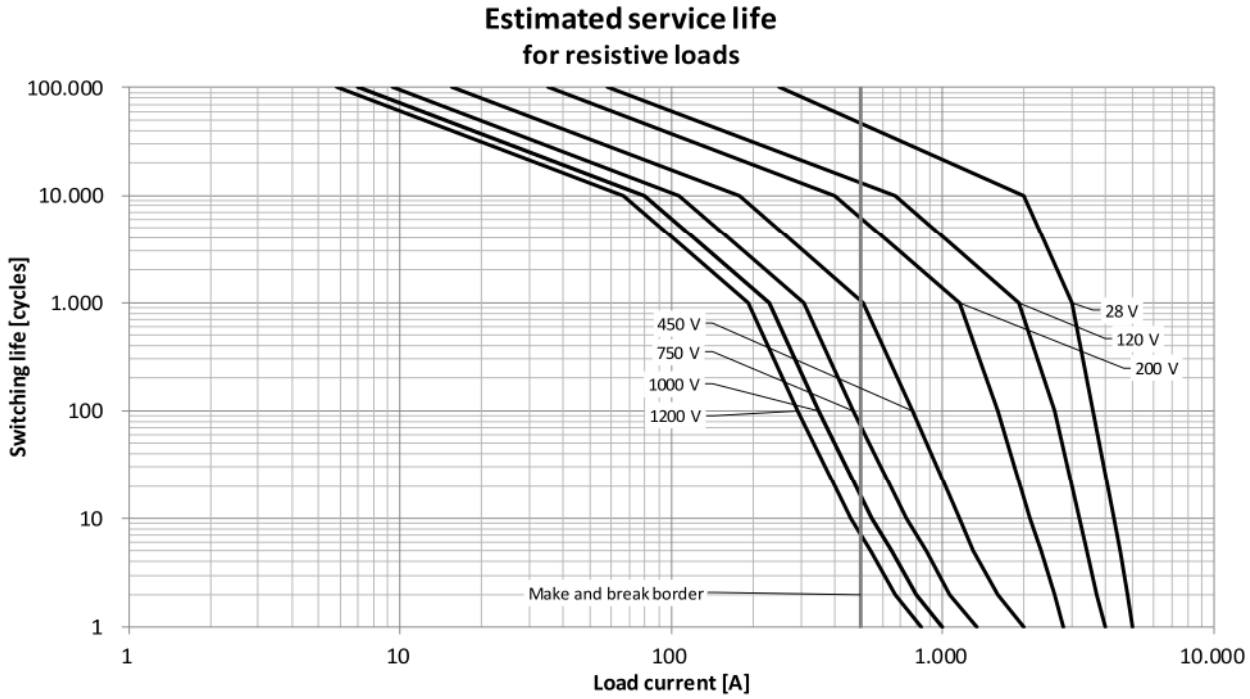
Contact			
Maximum operating voltage		1000	V_{DC}
Continuous carry current	I_{th}	300	A_{DC}
Temporary overcurrent (10 min)	I_{CW1}	400	A_{DC}
Temporary overcurrent (1 min)	I_{CW2}	500	A_{DC}
Mechanical endurance [5]		1 000 000	switchings
Maximum cut-off current (1 operation) [6, 7]		2000	A_{DC}
Electrical endurance resistive load [8, 9]			
- at 450 V_{DC}, 300 A_{DC}		3000	switchings
- at 750 V_{DC}, 300 A_{DC}		1000	switchings
Contact resistance (> 100 A_{DC})			
- typical		0.2	mΩ
- max.		0.3	mΩ
Insulation resistance at 1000 V_{DC} (initial)			
- contact to contact / contact to coil		> 1	GΩ
Dielectric strength			
- contact to contact / contact to coil [10]		> 4400	V_{AC}
Operating time			
- make		< 30	ms
- break		< 20	ms
Coil [9, 11]			
Rated operation voltage	U_c	12	V_{DC}
Operating voltage range	U_1 … U_2	9 … 16	V_{DC}
Pick-up voltage (max.)	U_1	9	V_{DC}
Drop-out voltage (min.)		1	V_{DC}
Pick-up current (Inrush)		4	A
Minimum holding current		0.14	A_{DC}
Power at nominal voltage [12]		4	W
Nominal resistance		36	Ω

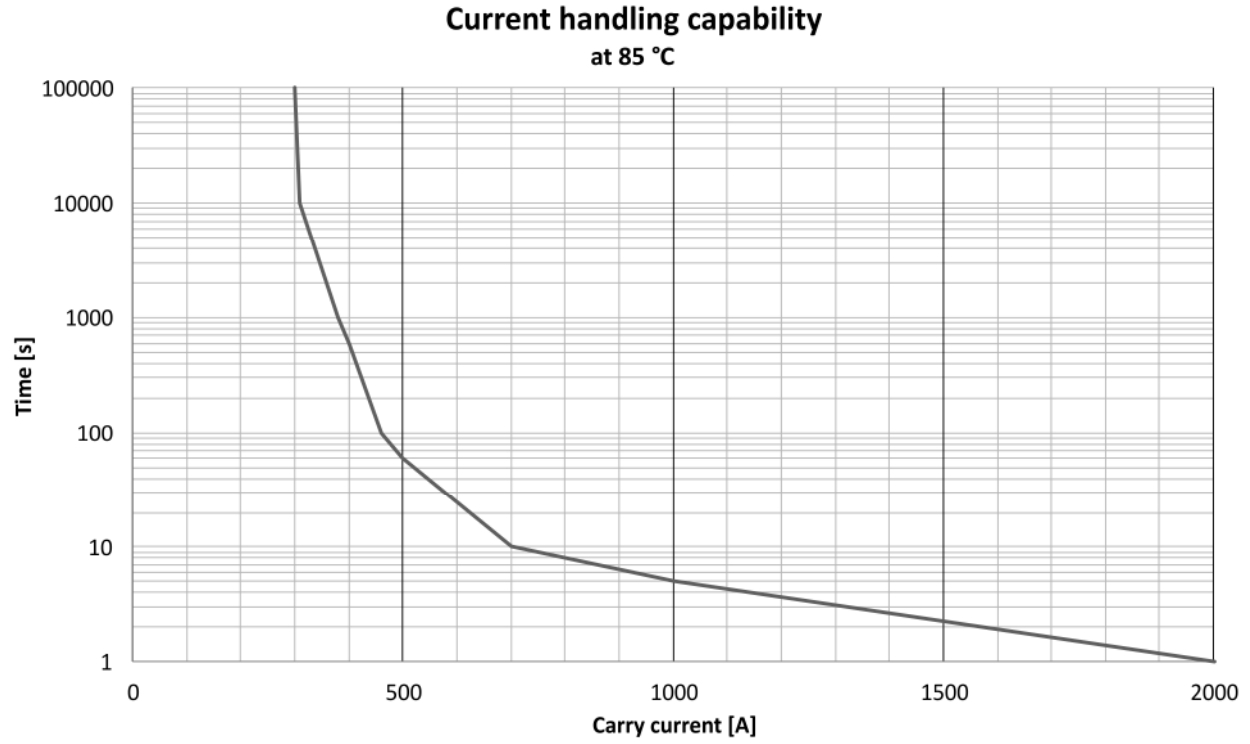
Operating voltage characteristics



See “Notes” on page 7

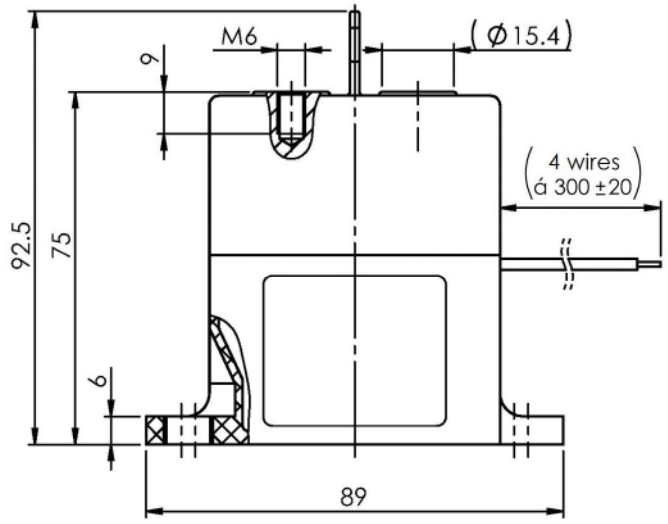
Characteristics [10, 13, 14]

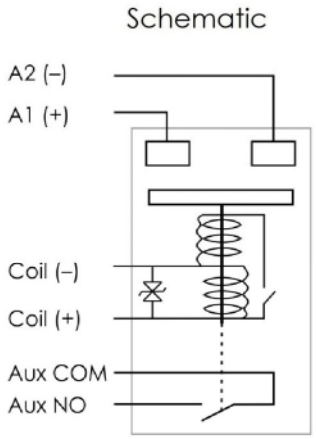


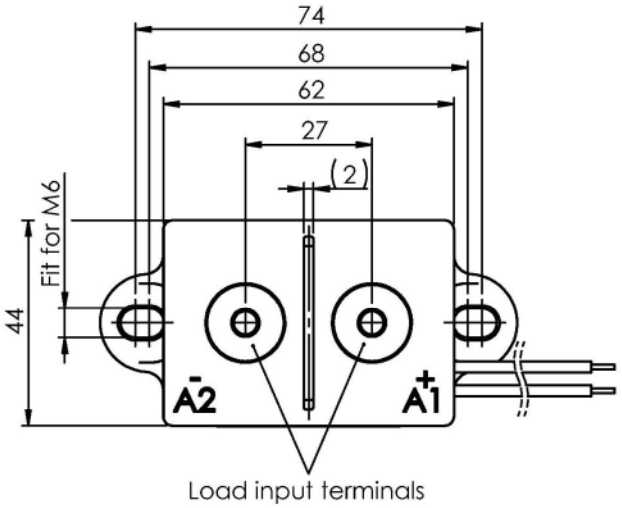


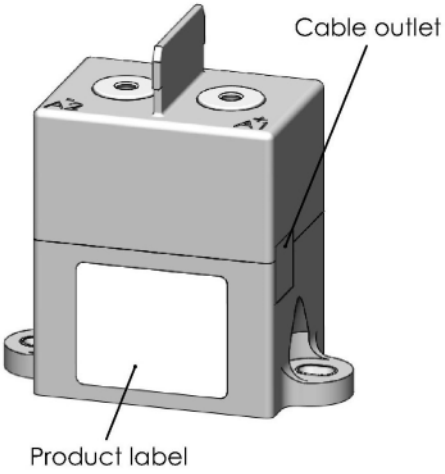
See “Notes” on page 7

Dimensional drawing in mm







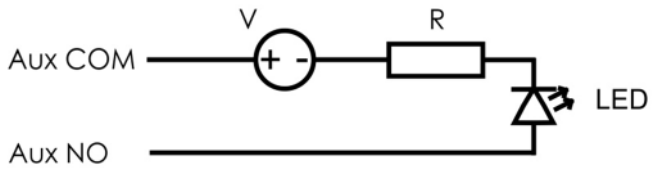


In case of no tolerance shown in dimensional drawing, general tolerances apply:
dimension ≤ 10 mm: ± 0.3 mm; dimension 10 to 50 mm: ± 0.6 mm; dimension > 50 mm: ± 1 mm

Connection name	Type	Marking	Finishing	Remarks
A1 (+)	Main terminal	A1 (+)	copper contact surface	tightening torque 6...8 Nm
A2 (–)	Main terminal	A2 (–)		
Coil (+)	Coil wire	red	stripped and tinned	max. allowable pull force 10 N
Coil (–)	Coil wire	black		
Aux COM	Auxiliary contact wire	white	stripped and tinned	
Aux NO	Auxiliary contact wire	blue		
Notes: Auxiliary contacts “blue” and “white” are normally open. When the contacts are short and the coil voltage is “0 V”, the part is stuck. Coil (+) and coil (–) are suppressed with a surge protection device, see “Cautions and warnings”.				

Auxiliary contact

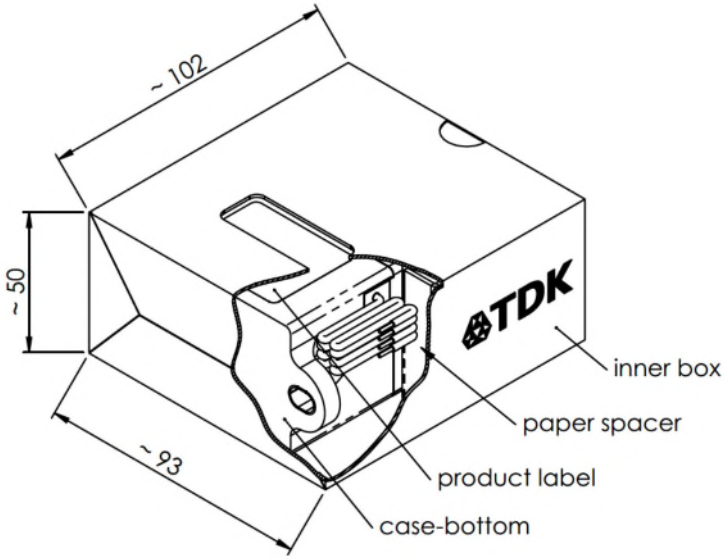
Example circuit to realize stuck detection:



In case the contactor is stuck, the Aux COM (white) and Aux NO (blue) wires will be short, hence the circuit is closed and the LED will be on.

Packing unit

*B88269X…**C 11** = 1 pc. in cardboard box*

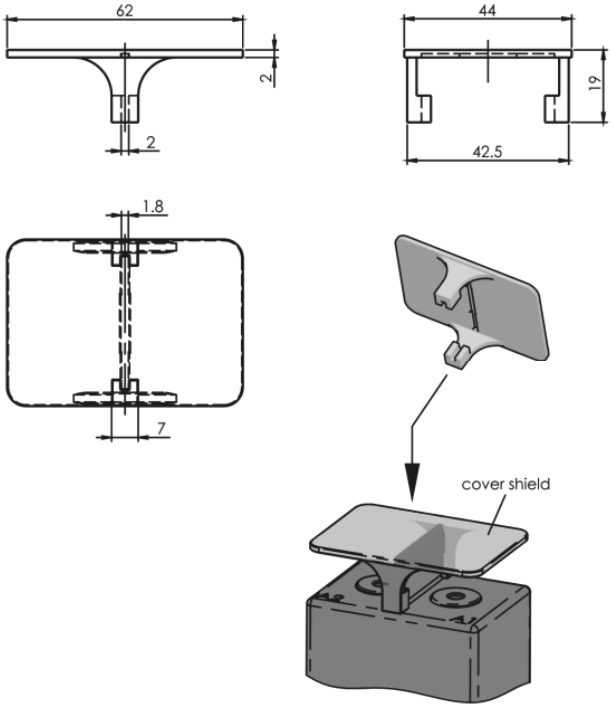


Accessory

Cover shield:

To order if required:

*B88269X2200**C101** = 10 pcs. cover shields in a box*



Notes:

1 The diameter must be matched to actual current and operation temperature (see: Cautions and warnings).
2 Referring to IEC 60068-2-64
3 Freezing or condensing must be avoided.
4 Referring to IEC/EN 61810-1
5 Duty cycle 50%, cycle duration 1 s, value represents B10 life time acc. to Weibull analysis.
6 Tested at 450 V for resistive loads with $\tau \leq 1$ ms
7 No fire and no explosion will occur after this break. Afterwards, the dielectric strength and insulation resistance may not meet initial data sheet specification.
8 Duty cycle 10%, 6 s cycle duration.
9 Specified referring to JIS C 5442 (temperature 15 °C to 35 °C, humidity 25% to 85% RH).
10 Detection limit 10 mA
11 At start up two coils are active. After ~100 ms one of the coils is switched off, leaving only a low power holding coil active.
12 Tolerance ±10% at thermal equilibrium
13 End of life is reached when insulation resistance is < 50 MΩ at 1000 V.
14 For currents > “make & break border” only break is permitted to avoid tack welding, duty cycle 1%, 600 s cycle duration. For currents < “make & break border” make and break is permitted duty cycle 10%, 6 s cycle duration.

Cautions and warnings

- To guarantee a satisfying performance of this contactor in the application we strongly recommend to implement redundancy, take measures to prevent the spread of fire, take the possibilities of malfunction into account, and perform regular maintenance.
- It is also required to always use a suitable backup fuse for the contactor.
- It is not allowed to use the contactor outside of the parameter range specified in this datasheet. This also includes temperature and humidity. Overloading may destroy the component.
- The lifetime depends on several factors: e.g. load type, driving circuit and ambient conditions. We recommend checking the performance of the part under actual conditions.
- For capacitive loads the inrush current through the contactor should not exceed the specified limit (see make and break border). Otherwise tack welding and permanent failure will occur.
- Break of inductive loads with $\tau > 1$ ms will shorten the lifetime and failure may occur.
- In the event of a break under inductive load, the voltage at the connection terminals of the contactor must not exceed the nominal operating voltage by more than 10 %.
- For continuous high current operation, make sure that the temperatures of the connection terminals do not exceed 120 °C by selecting an appropriate connection cable cross section or active cooling.
- 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. Use only suitable screws or bolts and nuts for all mechanical connections to the contactor and verify their functionality in the application. The recommended torque range is suitable for multiple fixations; the maximum torque is suited for one time fixation only.
- After long-term operation, the contactor coil resistance is increased due to the temperature rise. If the contactor is switched on immediately afterwards the coil characteristics may be deteriorated.
- The coil contacts need to be protected from overvoltage when switching off. Therefore, a protection device is installed in parallel. No further protection device shall be used parallel to coil.
- 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.
- Simultaneously applied maximum operation parameters for e.g. coil voltage, over currents, temperature, vibration etc. may lead to reduced lifetime. We recommend applying rated settings to achieve optimum life performance.
- For contactors equipped with auxiliary contacts: The auxiliary contact (“stuck detection”) is no real parallel contact and delivers only an indirect source of information about actual switching status.
- For additional safety, the contactor must be mounted in a way that the vertical axis of the part (Z-axis) is not in line with the main shock axis inside the application.
- Contactors radiate magnetic and electromagnetic fields. Please ensure that other components mounted in close proximity are not affected.
- In case two contactors are mounted in close proximity, a clearance distance of 20 mm has to be kept.
- 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 and avoid nearby installed heat sources.
- The contactor must not be operated without any load. This may increase contact resistance.
- Contactors may become hot during extended periods of current overload (burn hazard).
- Contactors must be handled with care and must not be dropped. The attached wires are not

allowed to be used for lifting and handling the part (maximum allowed pull-force is 10 N).

- Damaged contactors must not be re-used.
- The manufacturer cannot be held liable for failures caused by condensation or icing. The customer has to apply suitable measures to avoid these circumstances.
- This contactor is not waterproof.
- It is forbidden to use this contactor in atmospheres loaded with organic solvents (alcohol, petroleum, etc.) or strong alkaline substances (ammoniac, acids in general, etc.).
- It must be ensured that during installation and operation no kind of foreign matter adheres to the main contact. Especially oils and silicones must be avoided.
- It is forbidden to attach any kind of additional construction to or on the contactor.
- This contactor is tested and classified according to UL as an open-type device. This means the contactor is intended to be installed in an ultimate enclosure provided by a third party.
- This contactor is equipped with two coils. During pick-up, both coils are active. After approximately 100 ms, one coil will be removed electronically from the circuit.
- Fast and consecutive switching of the contactor is not allowed. The minimum OFF time is 5 s. If switching happens in faster cycles, the coil may become hot and fail.
- Distortions of the DC supply of the contactor may influence the electronics. Superimposed voltages at frequencies > 10 Hz and > 3 V peak to peak must be avoided. Otherwise, the coil may become hot and fail.

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Important notes

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Release 2018-10

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