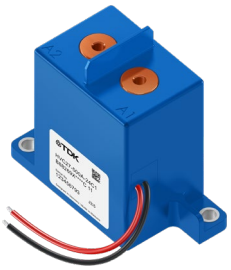
High-voltage contactor

Gas-filled contactor for high-voltage DC switching

Series/Type:	**HVC27**
Ordering code:	**B88269X***
Date:	2024-11-20
Version:	10

General

The HVC27 series has a robust design for high-voltage DC switching requirements in harsh environments. Our customers deploy the HVC27 series in a wide range of applications such as traction battery systems, electrical energy storage systems (ESS) and DC fast charging stations.



Features

- Single or dual coil
- Coil termination with varistor or diode
- Main terminals without polarity (bi-directional)
- Auxiliary contact with Hall element (optional)
- RoHS compatible

Characteristics [1]

Contact arrangement		1A		
Inner contact material		Cu alloy		
Internal contact gap (full disconnection)		3.2 (2 × 1.6)		mm
Recommended connection conductor cross section [2]				
- for I_{th} = 300 A DC		≥ 100		mm²
- for I_{th} = 400 A DC		≥ 200		mm²
- for I_{th} = 500 A DC		≥ 200		mm²
Wires			Isolator Ø max.	
Coil	AWM 3266	AWG 20	1.9	mm
Auxiliary contact	AWM 3266	AWG 20	1.9	mm
Length		300		mm
Material		Cu (tinned)		
Vibration in closed state, xyz axis				
Shock, 6 ms ½ sine, peak [3]		490		m/s^2
Vibration, sine 100 … 2000 Hz, peak [4]		98		m/s^2
Wideband random vibration, 10 ... 1000 Hz [5]		49		m/s^2_{RMS}
Operation and storage [6]				
Temperature		−40 ... +85		°C
Humidity		5 … 85		%
Air pressure		50 … 106		kPa
Utilization category	IEC 60947-4-1	DC-1		
Pollution degree	IEC 60947-1	2		
IP level	IEC 60529	IP 40		
Climatic category	IEC 60068-1	40/085/21		
Certifications		UKCA CE UL 60947-4-1 (E491412)		
Weight [7]		~ 540		g

See “Notes” on page 20

Specification [8]

Type HVC27-…		300A	400A	500A	
Contact					
Maximum operating voltage		1000			V DC
Continuous current	I_{th}	300	400	500	A DC
Temporary overcurrent (10 min)	I_{CW1}	400	520	600	A DC
Temporary overcurrent (1 min)	I_{CW2}	500	650	750	A DC
Rated operational voltage [9, 10]	U_e	1000			V DC
Rated operational current [9, 10]	I_e	100			A DC
Contact resistance at 100 A DC					
- typical		0.125			mΩ
- max.		0.30			mΩ
Insulation resistance at 1000 V DC					
- contact to contact / contact to coil		≥ 1			GΩ
Dielectric strength					
- contact to contact / contact to coil [11]		≥ 4400			V AC
Rated impulse withstand voltage [12]	U_{imp}	8			kV
Operating time [13]					
- make		≤ 35			ms
- break		≤ 20			ms

Electrical endurance [10, 14, 15]	Single coil	Dual coil (E2)	
Mechanical (make & break) [16]			
- max. 1 V DC, 1 A DC	500000	500000	operations
Capacitive (make)			
- at 20 V DC, 200 A DC for single coil	50000	80000	operations
Resistive (break) [17]			
- at 450 V DC, 300 A DC	1500	2000	operations
- at 750 V DC, 300 A DC for	150	1000	operations
Maximum cut-off (break) [18, 19]			
- at 450 V DC, 2000 A DC	1	1	operation
- at 1000 V DC, 900 A DC	1	1	operation

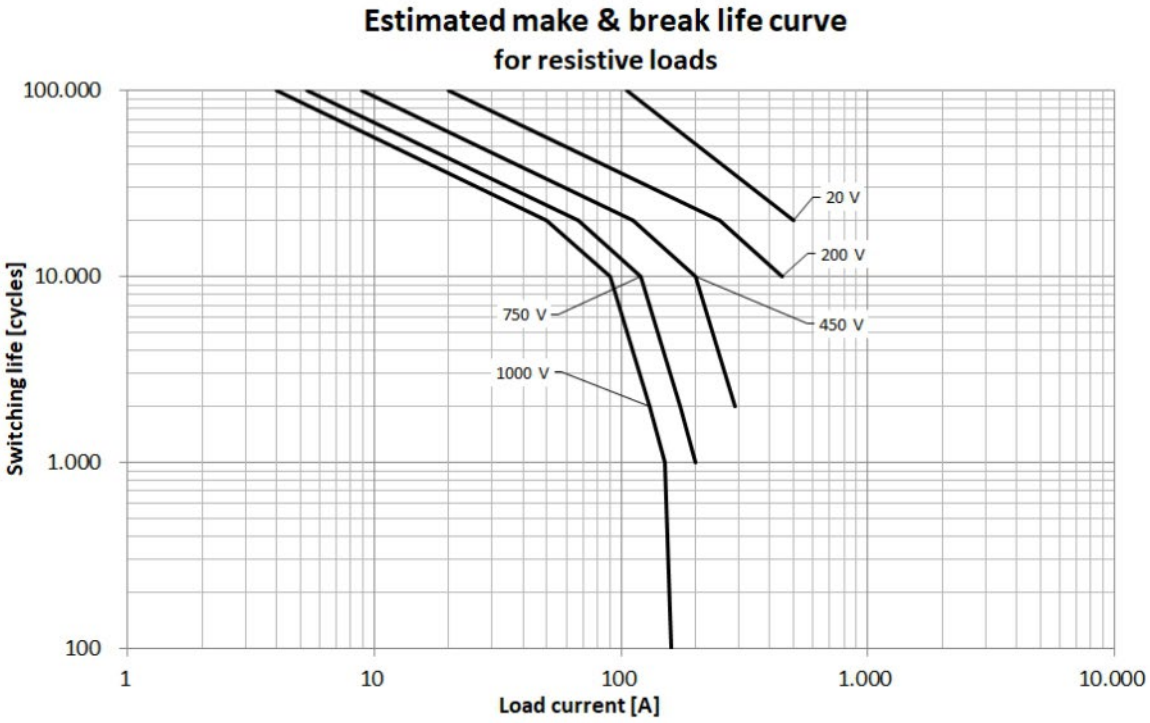
Coil type		12 V	24 V	12 V [20]	24 V [20]	
Rated control voltage (nominal)	U_c	12	24	12	24	V DC
Operating voltage range	U_1 … U_2	9 … 16	18 … 32	9 … 16	18 … 32	V DC
Pick-up voltage (max.)	U_1	9	18	9	18	V DC
Drop-out voltage (min.)		1	2	1	2	V DC
Pick-up current (inrush)		--	--	4	2	A DC
Power at nominal voltage [21]		6	6	4	4	W
Nominal resistance [14]		24	96	36	144	Ω

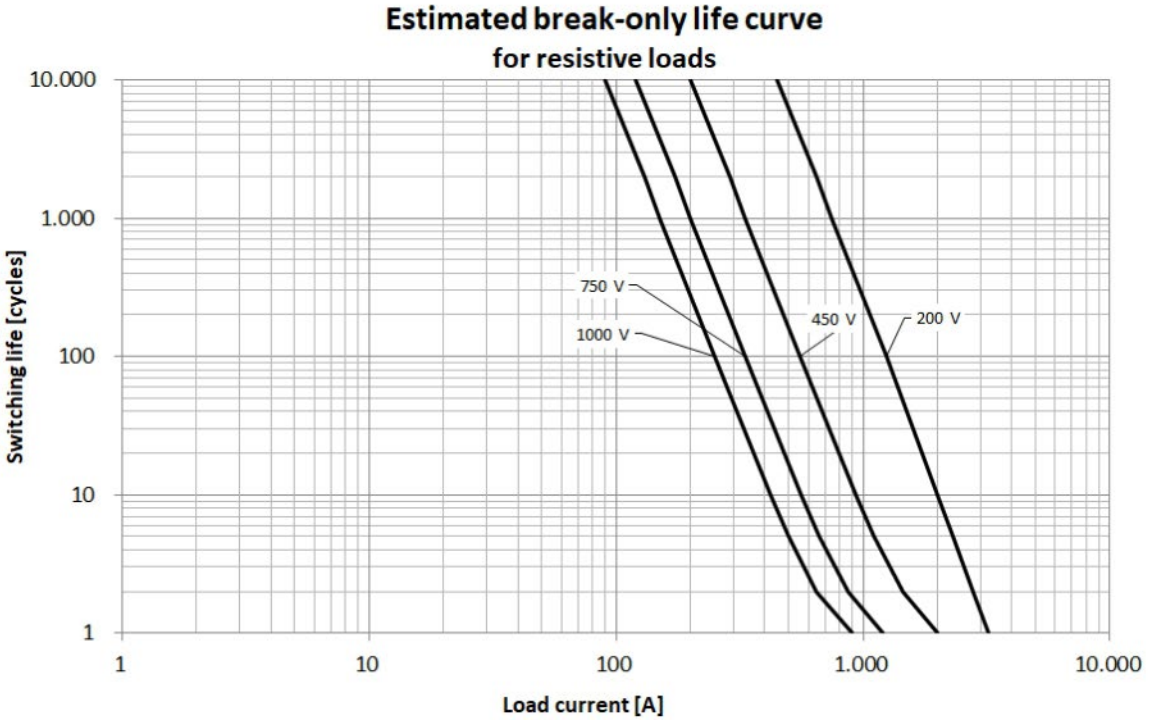
Auxiliary contact (Hall) – selectable option	
Supply voltage range, Aux V_{CC} [22]	5 … 24 V DC
Indication V_{IND} voltage range	1 … 24 V DC
Max. carry current	0.8 A DC
Max. switching current, peak (< 100 ms)	1.2 A DC
Max. current consumption	5 mA DC
ON resistance	≤ 0.5 Ω
OFF resistance	> 10 MΩ

See “Notes” on page 20

Characteristics [10, 14, 15, 23]

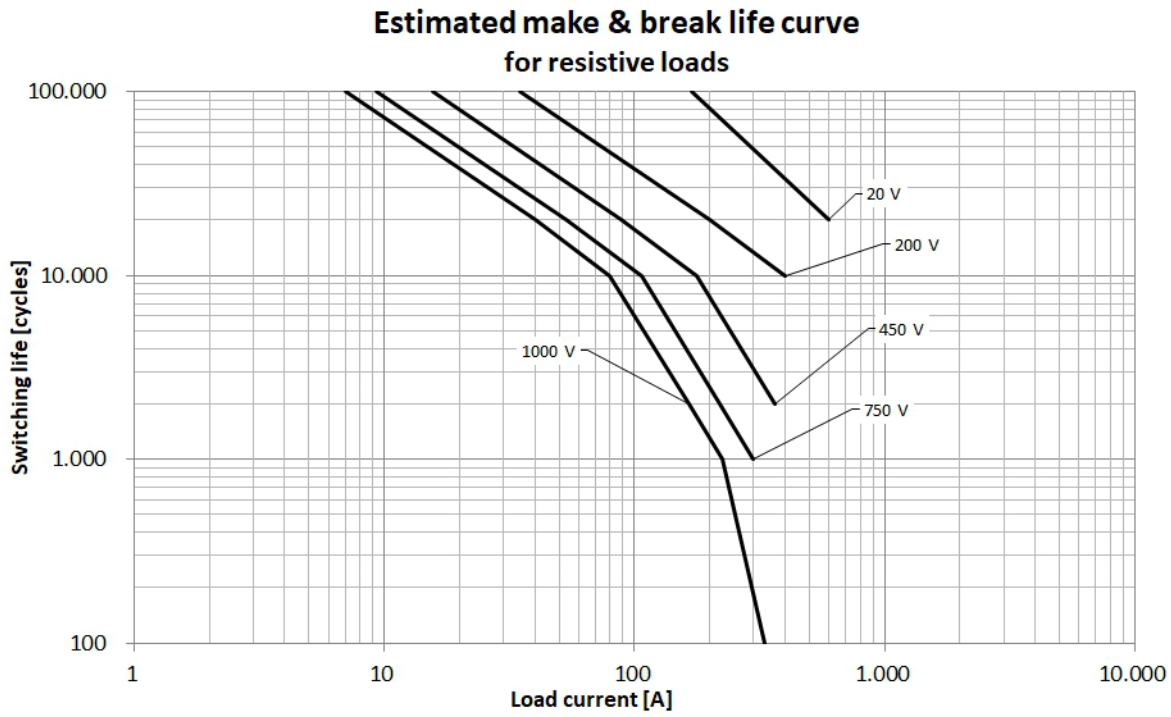
Single coil

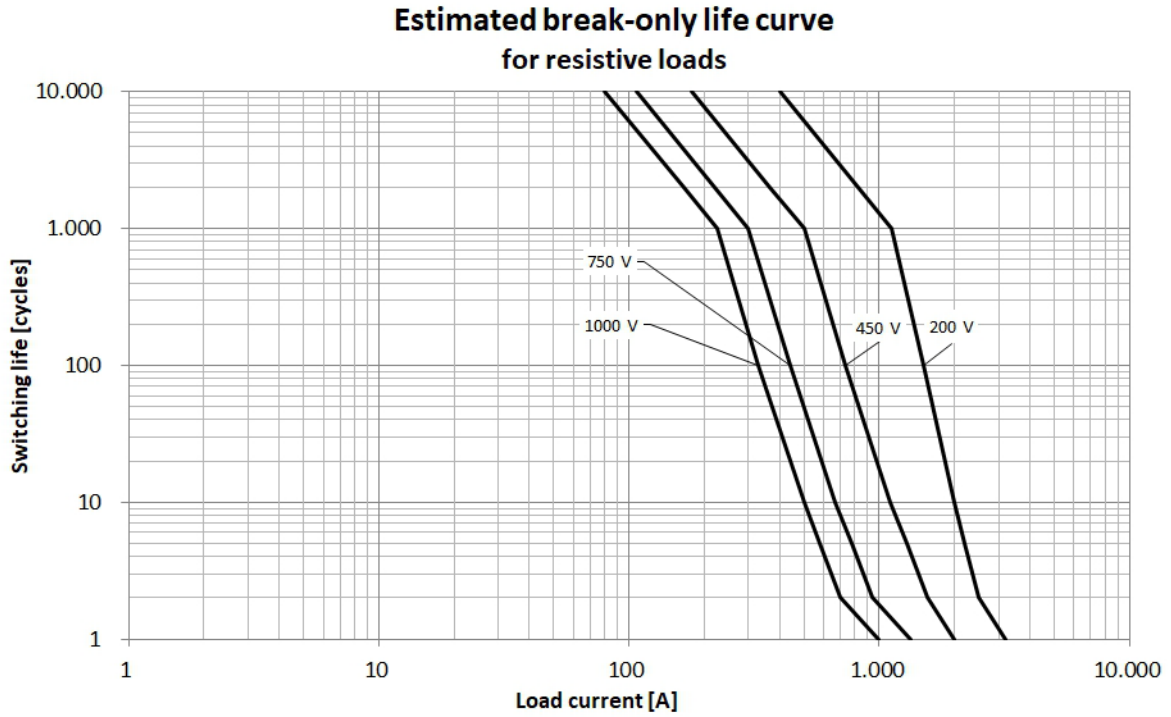




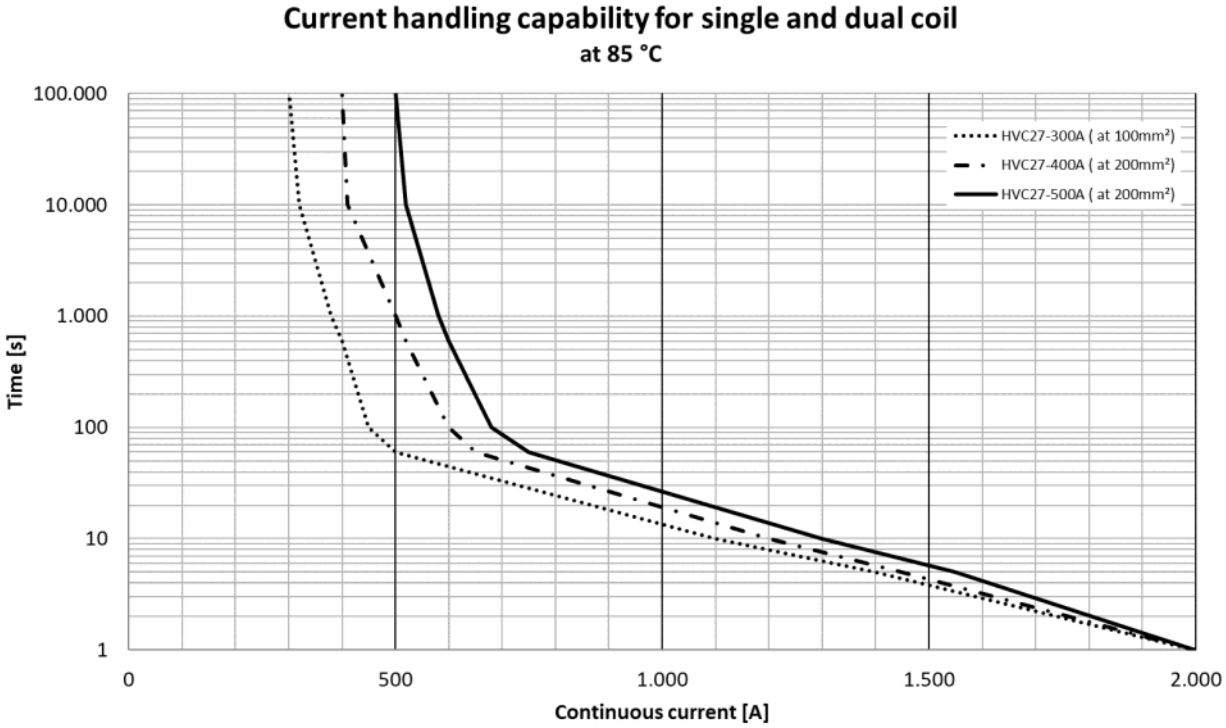
See “Notes” on page 20

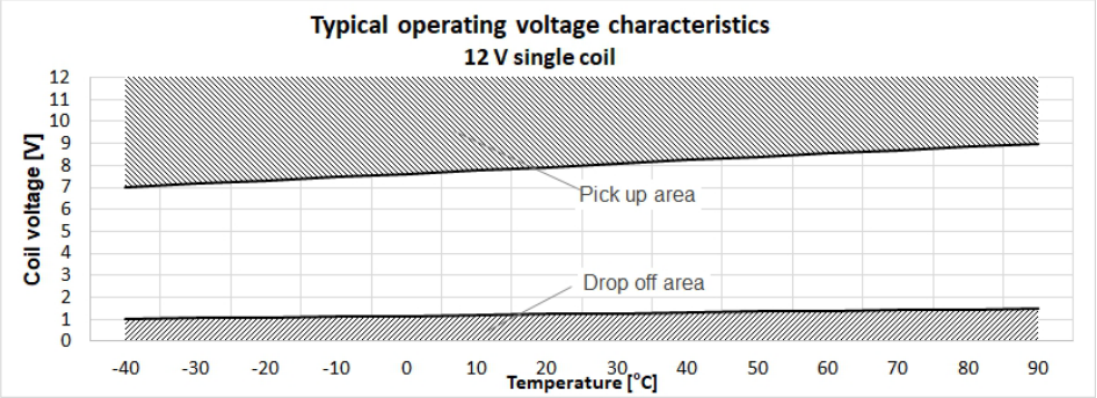
Dual coil (E2)

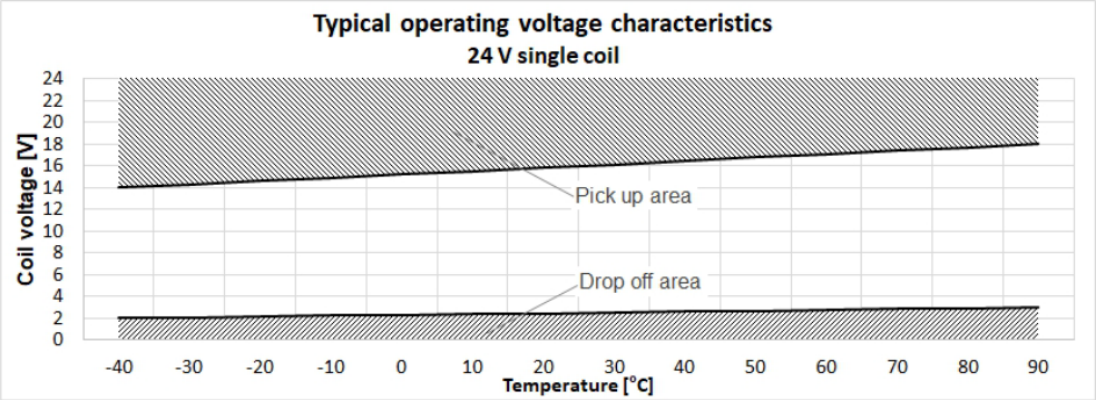


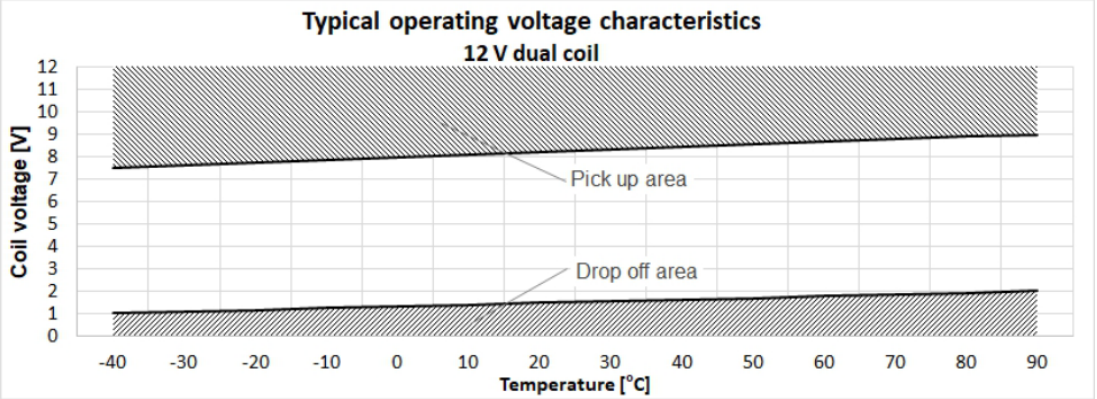


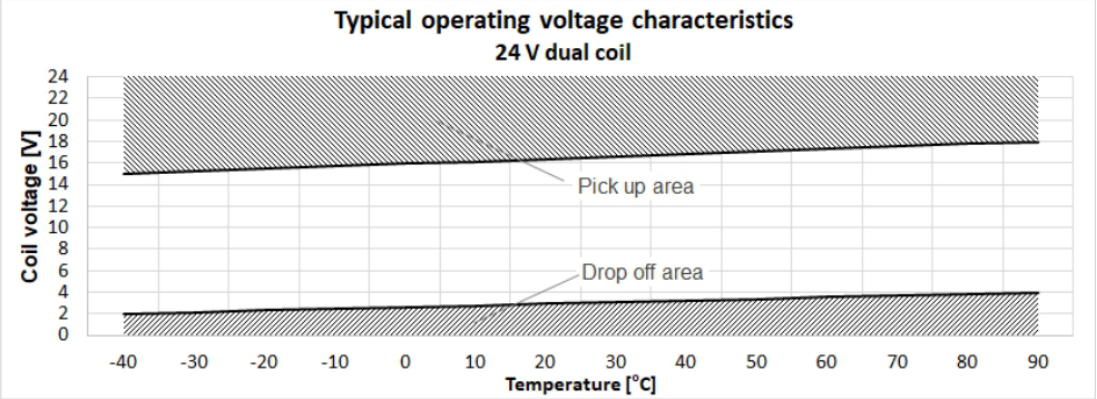
See “Notes” on page 20


Current handling capability for single and dual coil
at 85 °C
100.000
10.000
1.000
100
10
1
Time [s]
0
500
1.000
1.500
2.000
Continuous current [A]
HVC27-300A (at 100mm²)
HVC27-400A (at 200mm²)
HVC27-500A (at 200mm²)


Typical operating voltage characteristics
12 V single coil
Coil voltage [V]
Pick up area
Drop off area
Temperature [°C]


Typical operating voltage characteristics
24 V single coil
Coil voltage [V]
Pick up area
Drop off area
Temperature [°C]

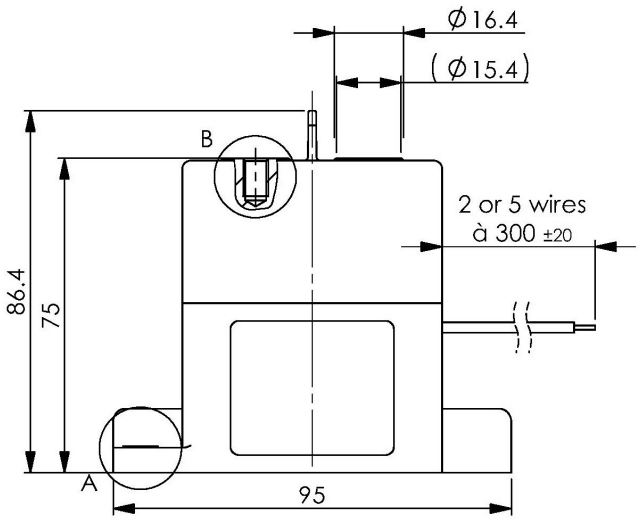

Typical operating voltage characteristics
12 V dual coil
Coil voltage [V]
Pick up area
Drop off area
Temperature [°C]


Typical operating voltage characteristics
24 V dual coil
Coil voltage [V]
Pick up area
Drop off area
Temperature [°C]

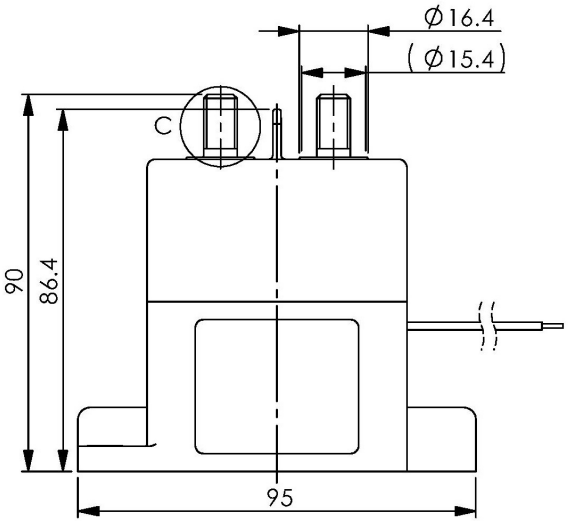
Dimensional drawings
in mm

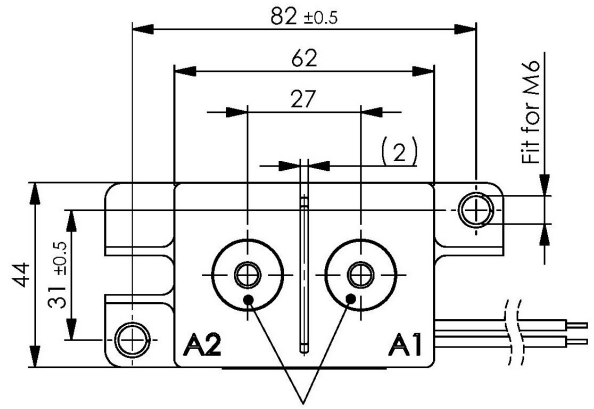
C1 housing (standard)

HVC27-_ _ _A-_ _ **C1**

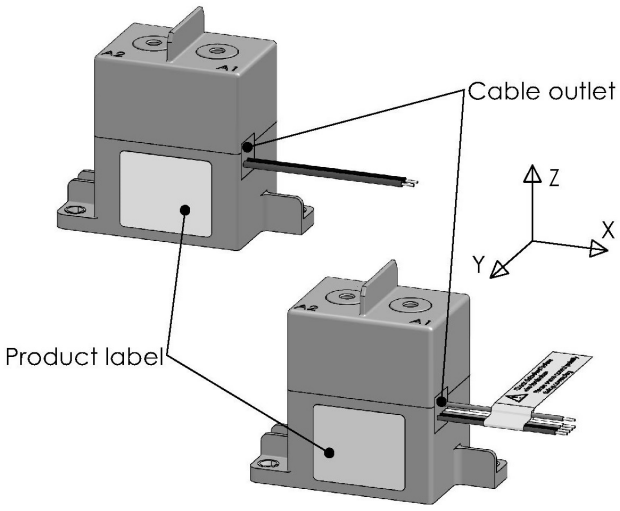


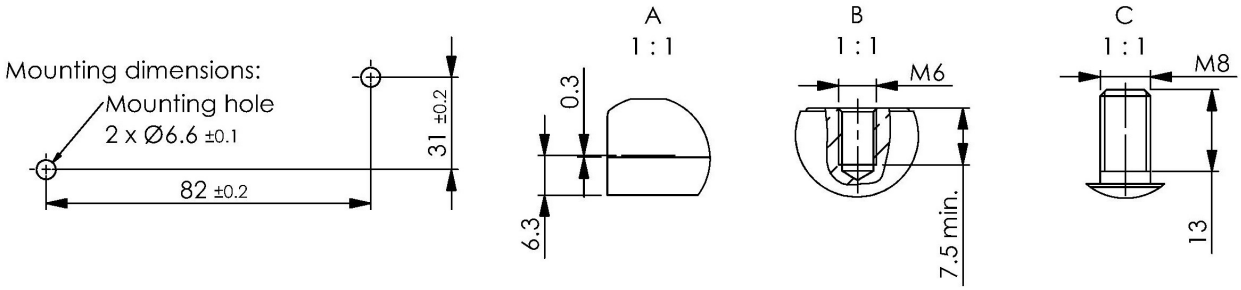
HVC27-_ _ _B-_ _ **C1**F





Load input terminals - no polarity

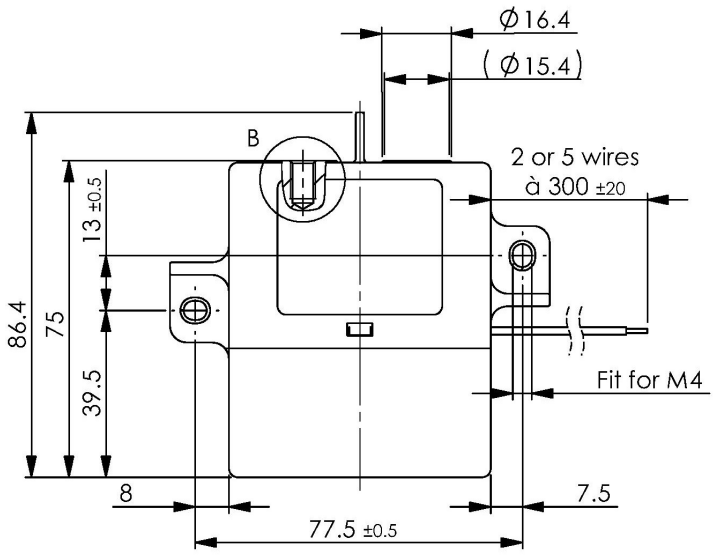




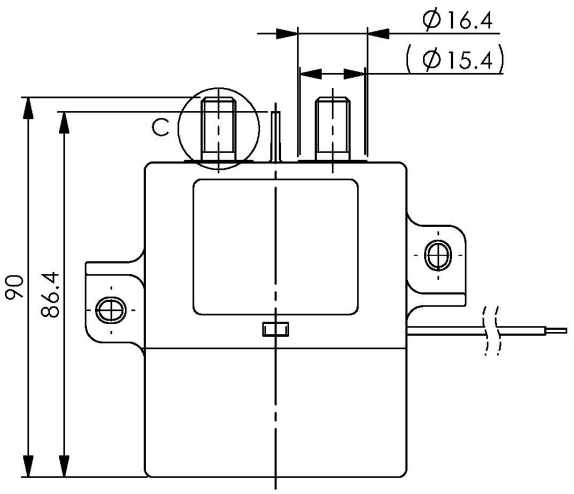
In case of no tolerance shown in dimensional drawing, general tolerances apply:
dimension ≤ 10 mm: ± 0.3 mm; dimension 10 to 50 mm: ± 0.6 mm; dimension > 50 mm: ± 1 mm

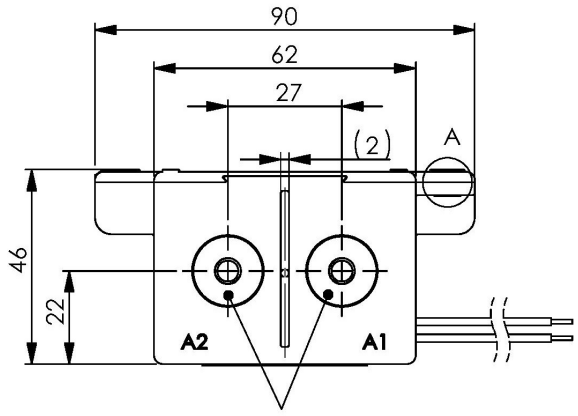
C5 housing

HVC27-_ _ _A-_ _ **C5**

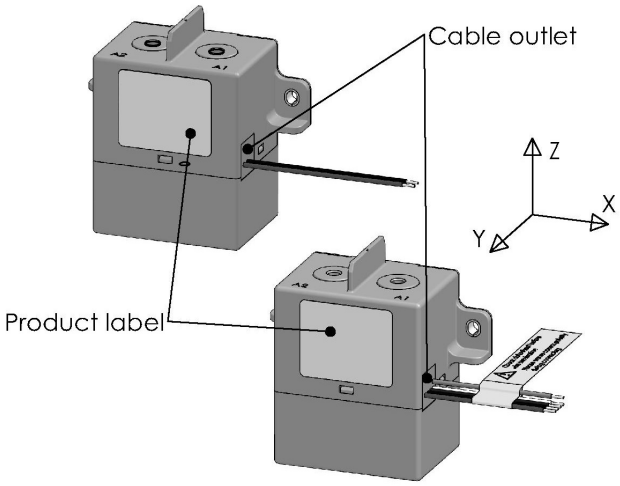


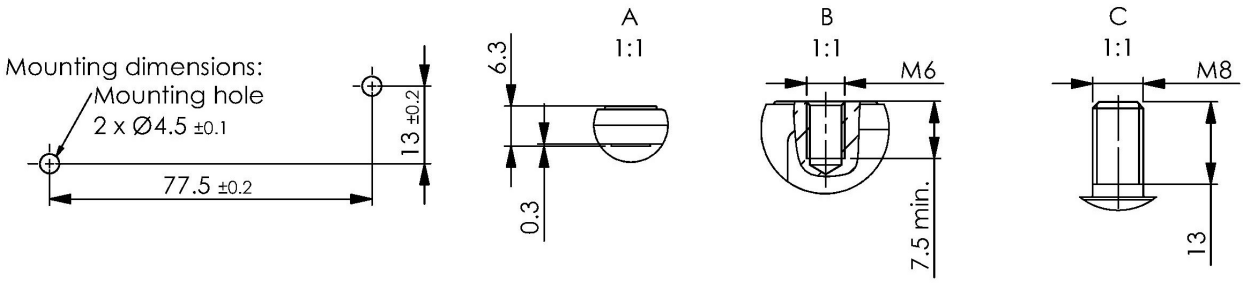
HVC27-_ _ _B-_ _ **C5**F





Load input terminals - no polarity





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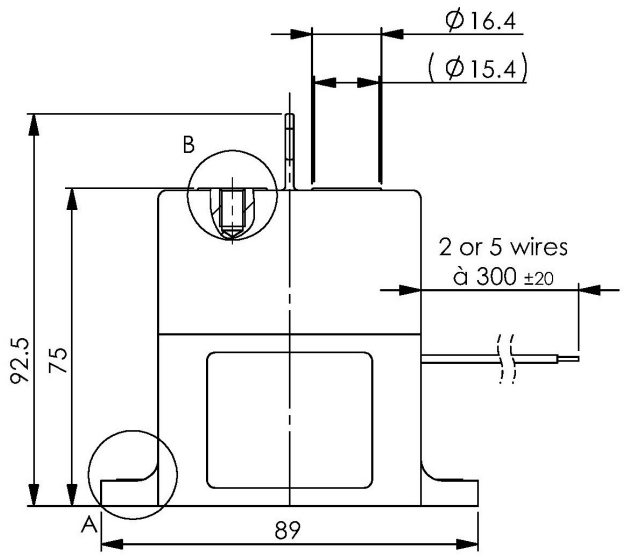
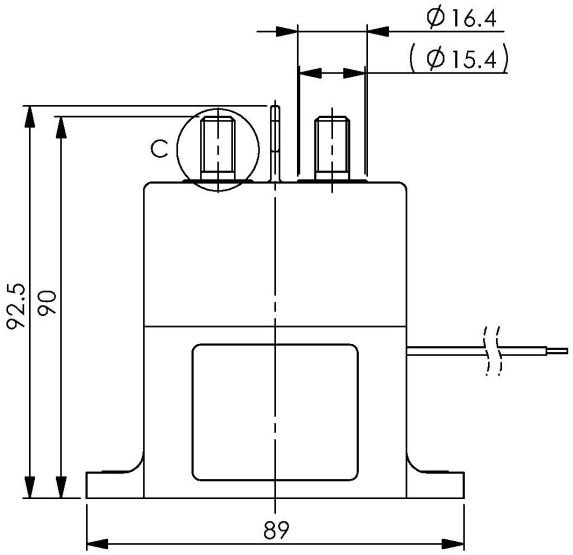
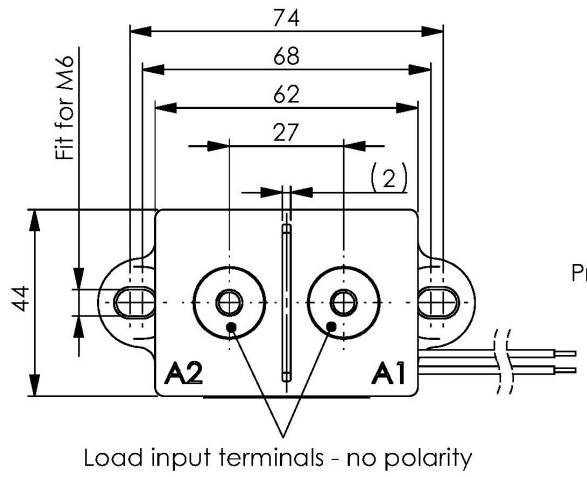
Replacement housing for HVC2.5 series

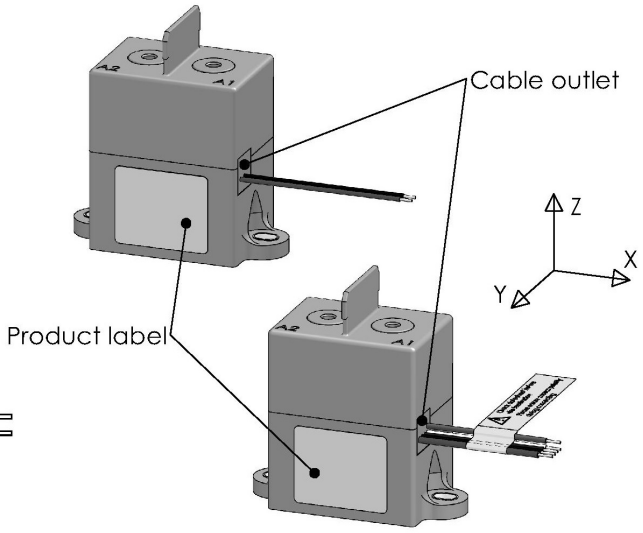
HVC27-_ _ _A-_ _

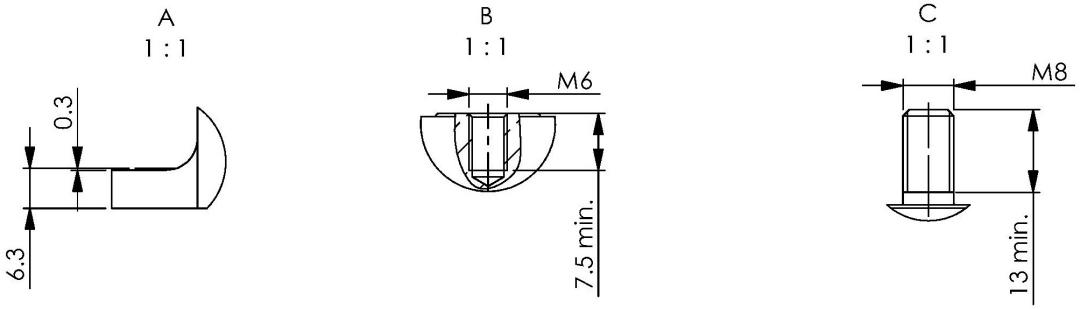


HVC27-_ _ _B-_ _F





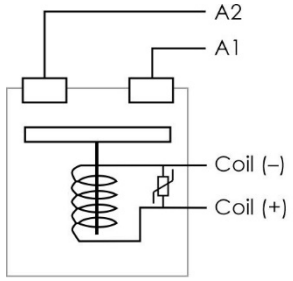
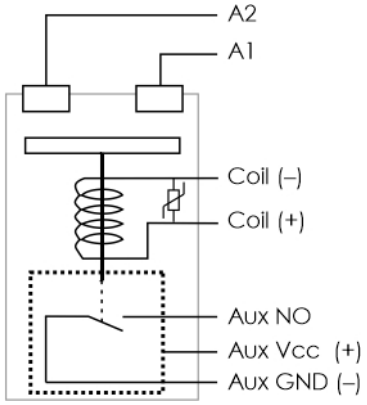
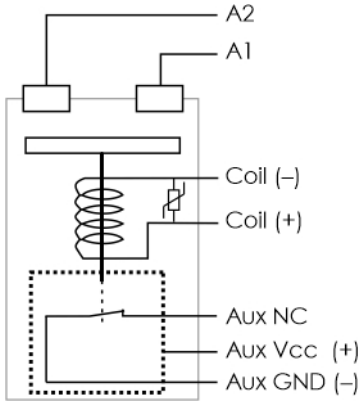




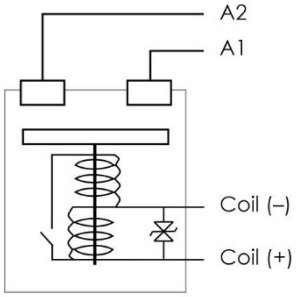
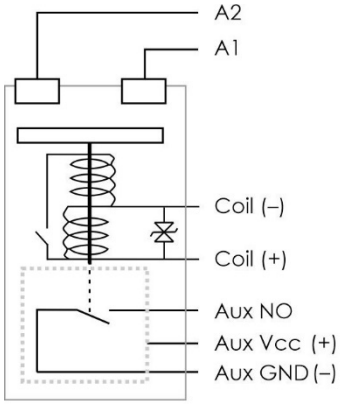
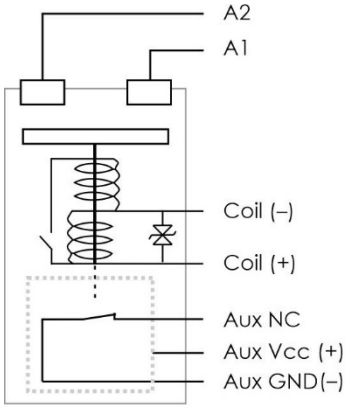
In case of no tolerance shown in dimensional drawing, general tolerances apply:
dimension ≤ 10 mm: ± 0.3 mm; dimension 10 to 50 mm: ± 0.6 mm; dimension > 50 mm: ± 1 mm

Schematics

Single coil

HVC without auxiliary contact	HVC with Hall NO (normally open)	HVC with Hall NC (normally closed)
		

Dual coil (E2)

HVC without auxiliary contact	HVC with Hall NO (normally open)	HVC with Hall NC (normally closed)
		

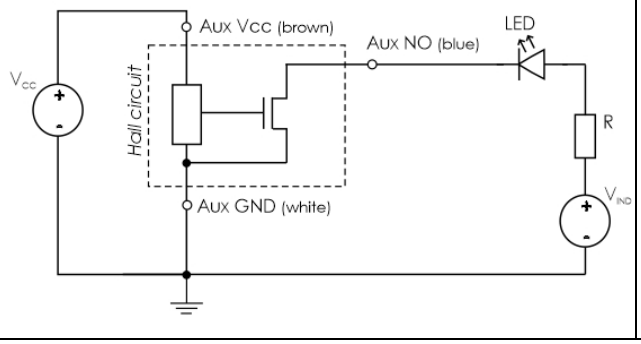
Installation information

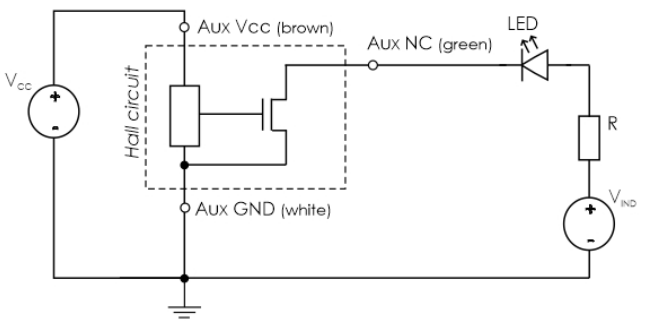
Connection name	Type	Marking	Finishing	Remarks
A1	Main terminal	A1	Copper contact surface	Tightening torque 6 … 8 Nm; max. screw ingress depth 7.5 mm for HVC27-_ _ _A versions
A2	Main terminal	A2		
Coil (+)	Coil wire	Red	Stripped and tinned	Max. allowable pull force 10 N
Coil (–)	Coil wire	Black		
Aux V_{CC} (+)	Auxiliary contact wire	Brown	Stripped and tinned	Supply voltage input; Max. allowable pull force 10 N
Aux GND (–)	Auxiliary contact wire	White		Common GND for supply voltage V_{CC} & external indication voltage; max. allowable pull force 10 N
Aux NO or Aux NC	Auxiliary contact wire	Blue or green		Indication voltage port max. allowable pull force 10 N
Case mounting	Mounting hole M6 (C1 housing)/ M4 (C5 housing)	None	Stainless steel insert	Tightening torque 4 … 6 Nm

Important:
The auxiliary contact wires are polarization sensitive and have no reverse voltage protection.
Please connect only as stated under column “Remarks”.
Coil (+) and coil (–) are suppressed with a surge protection device, see “Cautions and warnings”.

Auxiliary contact

Example circuits to realize stuck detection:





The contact Aux NO, respectively Aux NC is internally implemented as a low-side switch.

V_{IND} and R must be selected in a way that the current through Aux NO, respectively Aux NC is limited to 0.8 A.

In case the contactor is stuck, the Aux GND (white) and Aux NO (blue) wires will be short, hence the circuit is closed, and the LED will be on or the Aux GND (white) and Aux NC (green) wires will be open, hence the circuit is open, and the LED will be off.

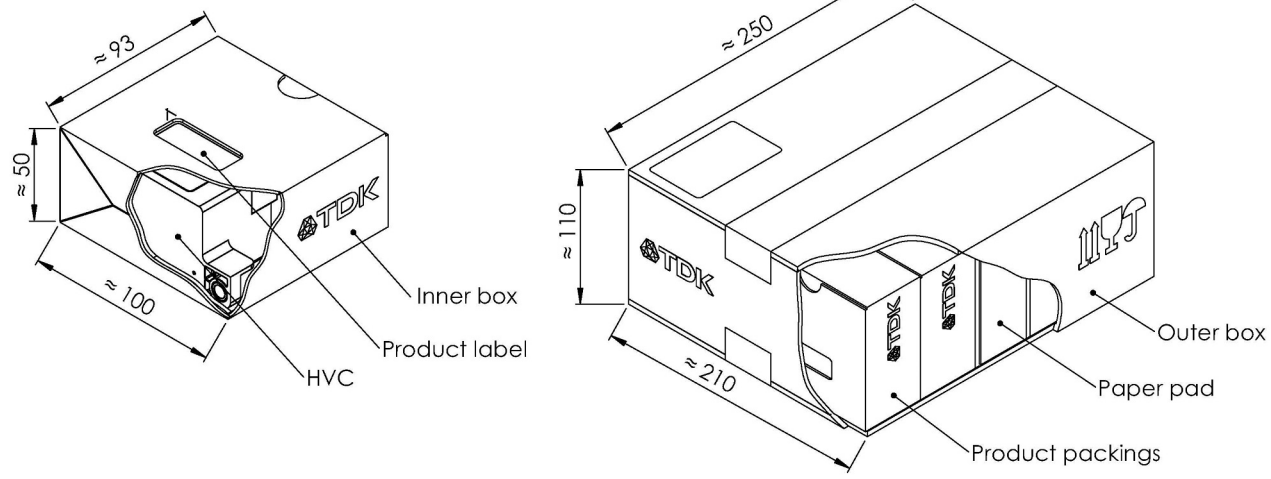
Important:
Aux V_{CC} must always be energized to enable the auxiliary contacts. If V_{CC} is not applied, Aux GND and Aux NO respectively Aux NC will be high ohmic.

The voltages V_{CC} and V_{IND} must not be supplied by the same single physical voltage source as V_{coil}.

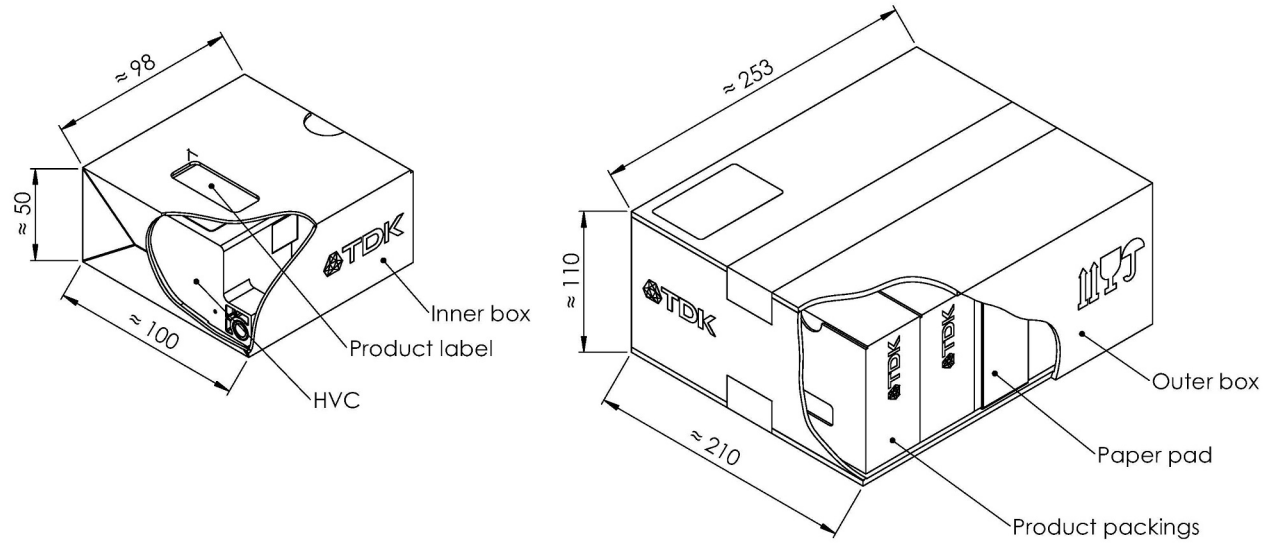
Packing unit
B88269X…**C011** = 1 pc. in cardboard box

Delivery unit
10 pcs. in cardboard box

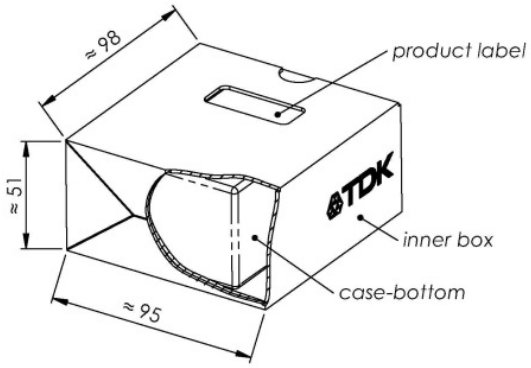
Packing for HVC w/o threads with C1 housing

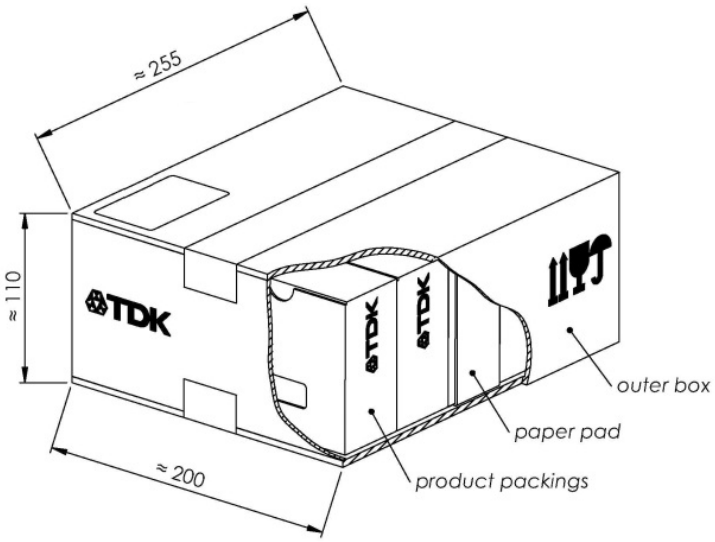


Packing for HVC with M8 threads with C1 housing

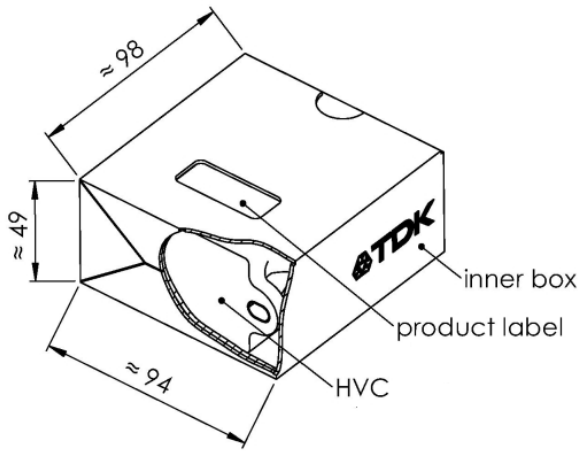


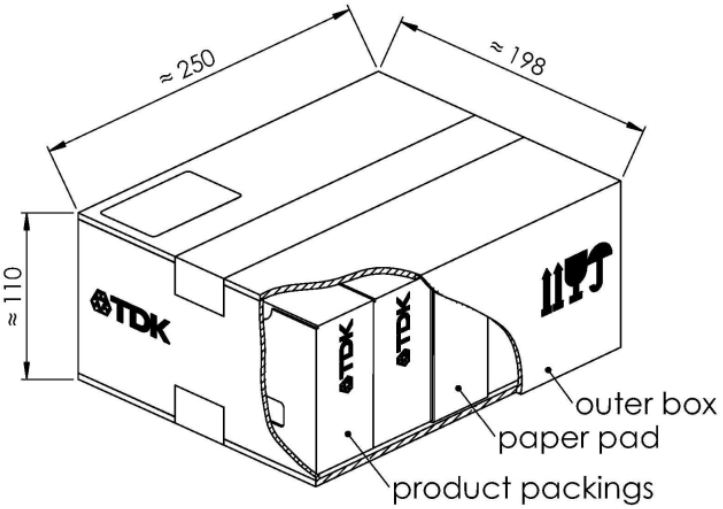
Packing for HVC with C5 housing





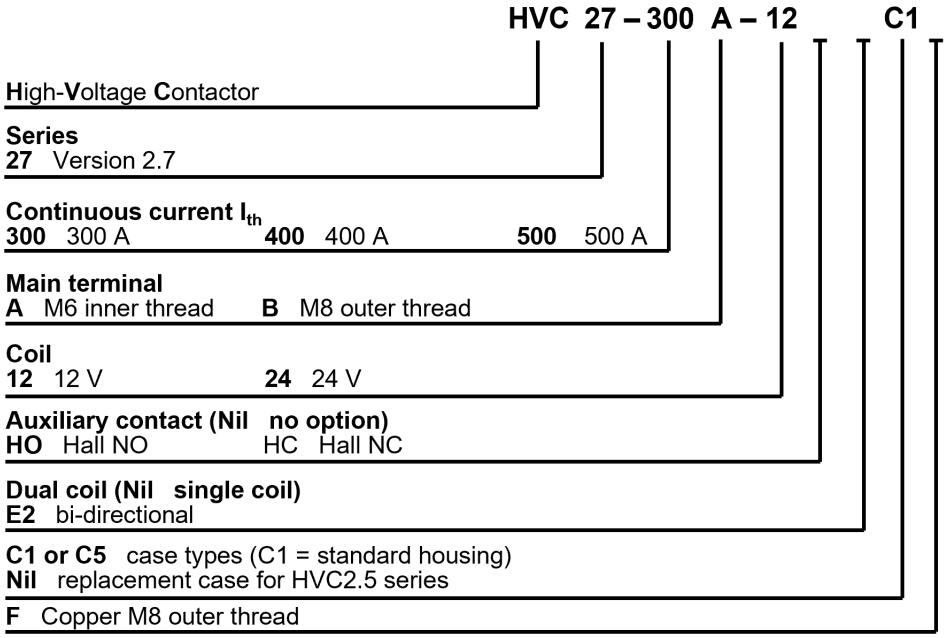
Packing for replacement for HVC2.5 series





Nomenclature of type name

Example (other digits may indicate customized version or special option)



Ordering codes

(The ordering code can be followed by a three-digit internal suffix.)

Single coil

Continuous current A DC	Coil voltage V DC	Type name	Ordering code
300 (without Hall)	12	HVC27-300A-12C1	B88269X3280C011
		HVC27-300A-12C5	B88269X6740C011
		HVC27-300A-12	B88269X3870C011
	24	HVC27-300A-24C1	B88269X3880C011
		HVC27-300A-24C5	B88269X6720C011
		HVC27-300A-24	B88269X3890C011
300 (with Hall)	12	HVC27-300A-12HOC1	B88269X3900C011
		HVC27-300A-12HCC1	B88269X3910C011
		HVC27-300A-12HOC5	B88269X6180C011
		HVC27-300A-12HCC5	B88269X6800C011
		HVC27-300A-12HO	B88269X3920C011
		HVC27-300A-12HC	B88269X3930C011
	24	HVC27-300A-24HOC1	B88269X3530C011
		HVC27-300A-24HCC1	B88269X3940C011
		HVC27-300A-24HOC5	B88269X6660C011
		HVC27-300A-24HCC5	B88269X6690C011
		HVC27-300A-24HO	B88269X3860C011
		HVC27-300A-24HC	B88269X3950C011
400 (without Hall)	12	HVC27-400A-12C1	B88269X3520C011
		HVC27-400A-12C5	B88269X6750C011
		HVC27-400A-12	B88269X6200C011
		HVC27-400B-12F	B88269X6210C011
	24	HVC27-400A-24C1	B88269X6220C011
		HVC27-400A-24C5	B88269X6730C011
		HVC27-400A-24	B88269X6230C011
		HVC27-400B-24F	B88269X6240C011
400 (with Hall)	12	HVC27-400A-12HOC1	B88269X3820C011
		HVC27-400A-12HCC1	B88269X6250C011
		HVC27-400A-12HOC5	B88269X6810C011
		HVC27-400A-12HCC5	B88269X6790C011
		HVC27-400A-12HO	B88269X6540C011
		HVC27-400A-12HC	B88269X6640C011
		HVC27-400B-12HOF	B88269X6170C011
		HVC27-400B-12HCF	B88269X6580C011
	24	HVC27-400A-24HOC1	B88269X6260C011
		HVC27-400A-24HCC1	B88269X6270C011
		HVC27-400A-24HOC5	B88269X6670C011
		HVC27-400A-24HCC5	B88269X6700C011
		HVC27-400A-24HO	B88269X6610C011
		HVC27-400A-24HC	B88269X6760C011
		HVC27-400B-24HOC1F	B88269X3830C011
		HVC27-400B-24HOF	B88269X6160C011
		HVC27-400B-24HCF	B88269X6560C011

Continuous current A DC	Coil voltage V DC	Type name	Ordering code
500 (without Hall)	12	HVC27-500A-12C1	B88269X3290C011
		HVC27-500A-12C5	B88269X6280C011
		HVC27-500A-12	B88269X3970C011
		HVC27-500B-12C1F	B88269X3390C011
		HVC27-500B-12F	B88269X6290C011
	24	HVC27-500A-24C1	B88269X6300C011
		HVC27-500A-24C5	B88269X3840C011
		HVC27-500A-24	B88269X6520C011
		HVC27-500B-24F	B88269X6310C011
500 (with Hall)	12	HVC27-500A-12HOC1	B88269X6320C011
		HVC27-500A-12HCC1	B88269X6330C011
		HVC27-500A-12HOC5	B88269X3980C011
		HVC27-500A-12HCC5	B88269X7080C011
		HVC27-500A-12HO	B88269X6550C011
		HVC27-500A-12HC	B88269X6650C011
		HVC27-500B-12HOF	B88269X6340C011
		HVC27-500B-12HCF	B88269X6590C011
	24	HVC27-500A-24HOC1	B88269X6350C011
		HVC27-500A-24HCC1	B88269X6360C011
		HVC27-500A-24HOC5	B88269X6680C011
		HVC27-500A-24HCC5	B88269X6710C011
		HVC27-500A-24HO	B88269X6620C011
		HVC27-500A-24HC	B88269X6770C011
		HVC27-500B-24HOF	B88269X3580C011
		HVC27-500B-24HCF	B88269X6570C011

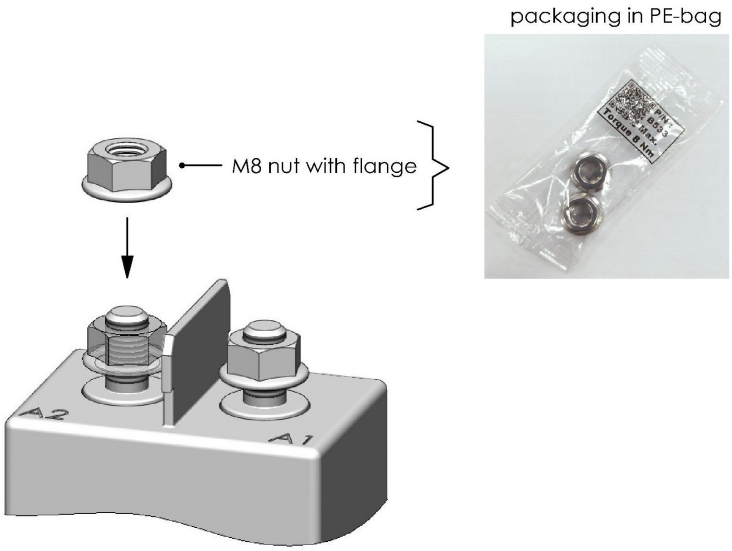
Dual coil (E2)

Continuous current A DC	Coil voltage V DC	Type name	Ordering code
300 (without Hall)	12	HVC27-300A-12E2C1	B88269X7040C011
		HVC27-300A-12E2C5	B88269X7120C011
		HVC27-300A-12E2	B88269X6930C011
	24	HVC27-300A-24E2C1	B88269X6440C011
		HVC27-300A-24E2C5	B88269X7150C011
		HVC27-300A-24E2	B88269X7180C011
300 (with Hall)	12	HVC27-300A-12HOE2C1	B88269X6890C011
		HVC27-300A-12HCE2C1	B88269X7210C011
		HVC27-300A-12HOE2C5	B88269X7570C011
		HVC27-300A-12HCE2C5	B88269X7540C011
		HVC27-300A-12HOE2	B88269X6910C011
		HVC27-300A-12HCE2	B88269X7600C011
	24	HVC27-300A-24HOE2C1	B88269X7460C011
		HVC27-300A-24HCE2C1	B88269X7510C011
		HVC27-300A-24HOE2C5	B88269X7430C011
		HVC27-300A-24HCE2C5	B88269X7480C011
		HVC27-300A-24HOE2	B88269X3780C011
		HVC27-300A-24HCE2	B88269X6630C011

Continuous current A DC	Coil voltage V DC	Type name	Ordering code
400 (without Hall)	12	HVC27-400A-12E2C1	B88269X7050C011
		HVC27-400A-12E2C5	B88269X7130C011
		HVC27-400A-12E2	B88269X6940C011
		HVC27-400B-12E2C1F	B88269X6980C011
		HVC27-400B-12E2F	B88269X6960C011
	24	HVC27-400A-24E2C1	B88269X6990C011
		HVC27-400A-24E2C5	B88269X7160C011
		HVC27-400A-24E2	B88269X7190C011
		HVC27-400B-24E2C1F	B88269X7030C011
		HVC27-400B-24E2F	B88269X7010C011
400 (with Hall)	12	HVC27-400A-12HOE2C1	B88269X6900C011
		HVC27-400A-12HCE2C1	B88269X7220C011
		HVC27-400A-12HOE2C5	B88269X7580C011
		HVC27-400A-12HCE2C5	B88269X7550C011
		HVC27-400B-12HOE2C1F	B88269X7270C011
		HVC27-400B-12HOE2F	B88269X6190C011
	24	HVC27-400A-24HOE2C1	B88269X7470C011
		HVC27-400A-24HCE2C1	B88269X7520C011
		HVC27-400A-24HOE2C5	B88269X7440C011
		HVC27-400A-24HCE2C5	B88269X7490C011
		HVC27-400B-24HOE2C1F	B88269X7420C011
		HVC27-400B-24HOE2F	B88269X7620C011
500 (without Hall)	12	HVC27-500A-12E2C1	B88269X7060C011
		HVC27-500A-12E2C5	B88269X7140C011
		HVC27-500A-12E2	B88269X6950C011
		HVC27-500B-12E2F	B88269X6970C011
	24	HVC27-500A-24E2C1	B88269X6830C011
		HVC27-500A-24E2C5	B88269X7170C011
		HVC27-500A-24E2	B88269X7200C011
		HVC27-500B-24E2F	B88269X7020C011
500 (with Hall)	12	HVC27-500A-12HOE2C1	B88269X3810C011
		HVC27-500A-12HCE2C1	B88269X3690C011
		HVC27-500A-12HOE2C5	B88269X7590C011
		HVC27-500A-12HCE2C5	B88269X7560C011
		HVC27-500A-12HOE2	B88269X6920C011
		HVC27-500A-12HCE2	B88269X7610C011
		HVC27-500B-12HOE2C5F	B88269X6870C011
		HVC27-500B-12HOE2F	B88269X7400C011
		HVC27-500B-12HCE2F	B88269X7410C011
	24	HVC27-500A-24HOE2C1	B88269X3850C011
		HVC27-500A-24HCE2C1	B88269X7530C011
		HVC27-500A-24HOE2C5	B88269X7450C011
		HVC27-500A-24HCE2C5	B88269X7500C011
		HVC27-500A-24HOE2	B88269X3960C011
		HVC27-500A-24HCE2	B88269X7110C011
		HVC27-500B-24HOE2C1F	B88269X6400C011
		HVC27-500B-24HOE2F	B88269X6860C011
		HVC27-500B-24HCE2F	B88269X6380C011

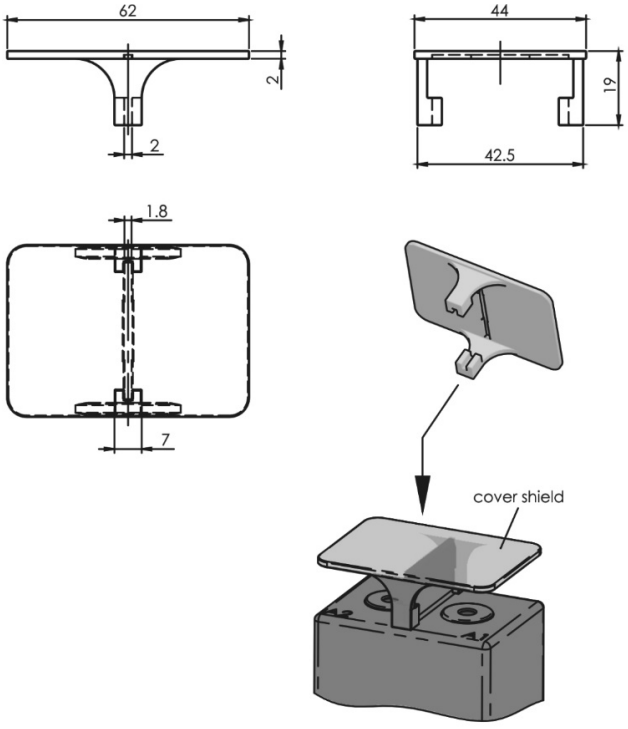
Accessories

Nuts with flange (PE bag enclosed in packing unit for types with M8 outer thread)



Cover shield (replacement for HVC2.5 series only)

To order if required:
B88269X2200**C101** = 10 pcs. cover shields in a box



Notes:

[1] All physical dimensions specified in the datasheet follow the general tolerances of the datasheet drawing.
[2] The recommended cross section refers to pure copper. In other cases it must be matched to actual current, conductor material properties, and operation temperature.
[3] Referring to IEC 60068-2-27
[4] Referring to IEC 60068-2-6
[5] Referring to IEC 60068-2-64
[6] Freezing or condensing must be avoided.
[7] Valid for base model with 300 mm wires. Other configurations will lead to deviations.
[8] The specified values apply to unused contactors acc. to IEC 61810-1.
[9] Referring to IEC 60947-4-1, 6000 operations make & break.
[10] Referring to IEC 60947-4-1, 50% of operations in positive and 50% in negative direction.
[11] Detection limit 10 mA
[12] Referring to IEC 60947-4-1
[13] Measured at rated control voltage U_C including contact bouncing time.
[14] Specified referring to JIS C 5442 (temperature 15 °C to 35 °C, humidity 25% to 85% RH).
[15] End of life is reached when insulation resistance is < 50 MΩ at 1000 V.
[16] Duty cycle 50%, cycle duration 1 s, value represents B10 lifetime acc. to Weibull analysis.
[17] Duty cycle 1%, cycle duration 600 s
[18] Tested for resistive loads with $\tau \leq 1$ ms
[19] No fire and no explosion will occur after this break
[20] 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.
[21] Tolerance ±10% at thermal equilibrium
[22] Referring to IEC 61810-10: 2019, test T2.5.4, table T3 for V_{CCmax} = 32 V
[23] For “make & break life curves” duty cycle is 10% and cycle duration is 6 s. For “break-only life curves” duty cycle is 1% and cycle duration is 600 s.

Cautions and warnings

- It is not allowed to use the contactor outside of the parameter range specified in this data sheet. This also includes temperature and humidity. Overloading may destroy the component.
- It must be ensured that during usage, storage or transportation, direct sunlight is avoided. The ambient temperature during usage must not exceed the value specified in this data sheet.
- This contactor is not waterproof.
- The manufacturer cannot be held liable for failures caused by condensation or icing. The customer must apply suitable measures to avoid these circumstances.
- 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.).
- We strongly recommend implementing redundancy, taking measures to prevent the spread of fire, taking the possibilities of malfunction into account and performing regular maintenance.
- Contactors must be handled with care and must not be dropped.
- Contactors radiate magnetic and electromagnetic fields. Please ensure that other components mounted in proximity are not affected.
- This contactor is tested and classified according to UL as an open-type device. This means that the contactor is intended to be installed in an ultimate enclosure provided by a third party. Furthermore, the contactor coil circuit is intended to be powered with a Class 2 source.
- The contactor must be mounted onto a flat surface using the designated fixation holes in addition to the cable lugs or busbars attached to the main connection terminals. It is not allowed to mount the contactor using only busbars.

- 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 of the application. Still, it must be mounted either upright standing or horizontal lying on either side. Upside down mounting must be avoided. Only the original mounting holes are allowed to be used to mount the part.
- In case two contactors are mounted in proximity, a clearance distance of 10 mm must be kept.
- It is forbidden to attach any kind of additional construction to or on the contactor.
- During installation and operation of the contactor, it must be ensured that no foreign matter adheres to the main connection terminals. Especially oils and silicones must be avoided.
- The cable lugs or busbars to the main contacts must be securely tightened. Otherwise, current stress may generate sparks and heating. Use only suitable tightening material (screws, bolts or nuts) for all mechanical connections to the contactor and verify their functionality in the application. The torque range recommended in the data sheet is suitable for multiple fixation; the maximum torque is suited for one time fixation only.
- Attached wires and plugs are not allowed to be used for lifting and handling the part (maximum allowed pull-force is 10 N).
- For parts with outer copper threads, a slight elongation of the thread is possible when doing multiple fixations. This may prevent proper fixation when changing the mechanical setup.
- It is required to always use a suitable backup fuse for the contactor.
- Contactors may become hot during extended periods of current overload (burn hazard).
- The main connections of the contactor act as a heat sink. Please ensure that the connection surface area is fully covered with a matched cable lug or busbar and that the connection hole in the cable lug or busbar is according to DIN ISO 20273 (middle clearance).
- For continuous high current operation, make sure that the temperatures of the connection terminals do not exceed 130 °C by selecting an appropriate cable or busbar cross section, or active cooling.
- Switching capacitive loads can lead to high inrush currents and can cause welding of the main connections (tack-welding). These inrush currents need to be limited as much as possible. Even short inrush currents in the microsecond range can lead to tack-welding. Please ensure with appropriate pre-charging that the differential voltage across the main terminals is as low as possible when closing the contactor. Please ensure that any connected capacitances are pre-charged to a minimum of 98% (5 time constants).
- In the event of a break under inductive load, the voltage at the connection terminals must not exceed the nominal operating voltage by more than 10%. Break of inductive loads with time constant greater than 1 ms will shorten the lifetime. Failure may also occur.
- The contactor is bi-directional (no polarity of main connections). The service life curves are estimated based on the requirements of IEC 60947-4-1 Chapter 8.2.4, where 50% of the operations are performed in positive direction and 50% in negative direction.
- 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.
- In the event of a current exceeding the maximum breaking current by more than 50% or triggering a series fuse, the contactor must be considered damaged and replaced.
- The lifetime depends on several factors like e.g. load type, driving circuit and ambient conditions. We recommend checking the performance of the part under actual conditions.

- 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.
- The contactor must not be operated without any load. This may increase the contact resistance.
- The operating life of the contactor can be affected by strong magnetic fields. Please ensure that there are no magnetic field sources in proximity and avoid nearby installed heat sources.
- We recommend separating or shielding the low voltage side (coil and auxiliary connections if available) from the high voltage side (main connection terminals).
- The coil input voltage needs to be kept stable and without disturbances. It should always remain above the minimum value of the coil voltage operation range specified in the datasheet.
- 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.
- For a successful pick-up, the coil voltage cannot be ramped up slowly. It needs to be applied instantly (within less than 1 ms) to at least the maximum pick-up voltage. For a successful breaking, the coil voltage cannot be ramped down slowly. It needs to be switched off instantly (within less than 1 ms).
- The contactor is not intended to be used with pulse width modulation (PWM) controllers. Please contact TDK for details.
- To protect the coil contacts from overvoltage when switching off, a protection device is installed in parallel to the coil. No further protection device shall be used.
- This contactor is equipped with two coils (dual coil). Both coils are active during pick-up. 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.
- The auxiliary contact (“stuck detection”) is no real parallel contact. It delivers only an indirect source of information about the actual switching status.
- For compatibility with EN 61000-4-5, we recommend using TDK S10K30 (B72210S300K101) varistors from each line to the other.
- The auxiliary circuit includes basic protection against electrostatic discharges. However, precautions must be taken to avoid occurrence of ripples, bursts, capacitive discharges, inductive over-voltages or impulses that apply a voltage higher than the specified voltage to this circuit.

Display of ordering codes for TDK Electronics products

The ordering code for one and the same product can be represented differently in data sheets, data books, other publications, on the company website, or in order-related documents such as shipping notes, order confirmations and product labels. **The varying representations of the ordering codes are due to different processes employed and do not affect the specifications of the respective products**. Detailed information can be found on the Internet at www.tdk-electronics.tdk.com/orderingcodes.

Important notes

The following applies to all products named in this publication:

1. Some parts of this publication contain **statements about the suitability of our products for certain areas of application**. These statements are based on our knowledge of typical requirements that are often placed on our products in the areas of application concerned. We nevertheless expressly point out **that such statements cannot be regarded as binding statements about the suitability of our products for a particular customer application.** As a rule we are either unfamiliar with individual customer applications or less familiar with them than the customers themselves. For these reasons, it is always ultimately incumbent on the customer to check and decide whether a product with the properties described in the product specification is suitable for use in a particular customer application.
2. We also point out that **in individual cases, a malfunction of electronic components or failure before the end of their usual service life cannot be completely ruled out in the current state of the art, even if they are operated as specified.** In customer applications requiring a very high level of operational safety and especially in customer applications in which the malfunction or failure of an electronic component could endanger human life or health (e.g. in accident prevention or life-saving systems), it must therefore be ensured by means of suitable design of the customer application or other action taken by the customer (e.g. installation of protective circuitry or redundancy) that no injury or damage is sustained by third parties in the event of malfunction or failure of an electronic component.
3. **The warnings, cautions and product-specific notes must be observed.**
4. In order to satisfy certain technical requirements, **some of the products described in this publication may contain substances subject to restrictions in certain jurisdictions (e.g. because they are classed as hazardous)**. Useful information on this will be found in our Material Data Sheets on the Internet (www.tdk-electronics.tdk.com/material). Should you have any more detailed questions, please contact our sales offices.
5. We constantly strive to improve our products. Consequently, **the products described in this publication may change from time to time**. The same is true of the corresponding product specifications. Please check therefore to what extent product descriptions and specifications contained in this publication are still applicable before or when you place an order.

   We also **reserve the right to discontinue production and delivery of products**. Consequently, we cannot guarantee that all products named in this publication will always be available. The aforementioned does not apply in the case of individual agreements deviating from the foregoing for customer-specific products.
6. Unless otherwise agreed in individual contracts, **all orders are subject to our General Terms and Conditions of Supply.**
7. **Our manufacturing sites serving the automotive business apply the IATF 16949 standard.** The IATF certifications confirm our compliance with requirements regarding the quality management system in the automotive industry. Referring to customer requirements and customer specific requirements (“CSR”) TDK always has and will continue to have the policy of respecting individual agreements. Even if IATF 16949 may appear to support the acceptance of unilateral requirements, we hereby like to emphasize that **only requirements mutually agreed upon can and will be implemented in our Quality Management System.** For clarification purposes we like to point out that obligations from IATF 16949 shall only become legally binding if individually agreed upon.

Important notes

8. The trade names EPCOS, CarXield, CeraCharge, CeraDiode, CeraLink, CeraPad, CeraPlas, CSMP, CTVS, DeltaCap, DigiSiMic, FilterCap, FormFit, InsuGate, LeaXield, MediPlas, MiniBlue, MiniCell, MKD, MKK, ModCap, MotorCap, PCC, PhaseCap, PhaseCube, PhaseMod, PhiCap, PiezoBrush, PlasmaBrush, PowerHap, PQSine, PQvar, SIFERRIT, SIFI, SIKOREL, SilverCap, SIMDAD, SiMic, SIMID, SineFormer, SIOV, SurfIND, ThermoFuse, WindCap, XieldCap are **trademarks registered or pending** in Europe and in other countries. Further information will be found on the Internet at www.tdk-electronics.tdk.com/trademarks.

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