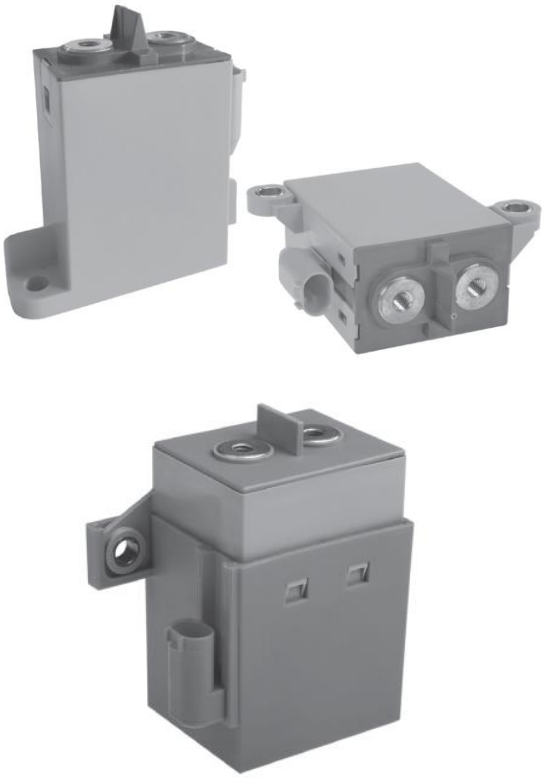
114-97881

14 AUGUST 2024 REV A

Class 1

Application Specification

High Voltage Contactors
EVC175
EVC250



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- The contactors are intended for use in high-voltage applications. Special care must be applied to ensure that the contactors function as intended.
- If you suspect that the contactor has been modified, damaged, or otherwise compromised, please discontinue its use immediately.
- The contactors should only be serviced by a trained and qualified technician.

1. SCOPE

1.1. CONTENT

This specification describes how to handle and assemble the HV contactors. It describes in detail the figures of the datasheets and customer drawings.

1.2. PROCESSING NOTE

The processor is responsible for the quality of the manufacturing process to ensure the correct function of the system over lifetime. The warranty and liability are excluded if quality deficiency or damages occur due to non-compliance to this specification.

2. APPLICABLE DOCUMENTS

2.1. DATASHEETS

Name	Product
V23717-X0000-A001	EVC175
V23720-X0000-A001	EVC250
V23720-X0000-A002	EVC250-800

2.2. CUSTOMER DRAWINGS

Name	Product
V23717-A0001-A200	EVC175 – side mount – single coil
V23717-A0002-A200	EVC175 – side mount – double coil
V23717-B0001-A200	EVC175 – bottom mount – single coil
V23717-B0002-A200	EVC175 – bottom mount – double coil
V23720-A0001-A001	EVC250 – side mount – single coil
V23720-A0002-A001	EVC250 – side mount – double coil
V23720-A0101-B001	EVC250-800 – side mount – single coil
V23720-A0102-B001	EVC250-800 – side mount – double coil
V23720-A0112-B001	EVC250-800 – side mount – double coil (24V)
V23720-B0101-B100	EVC250-800 – bottom mount – single coil

3. CONTACT DATA

Remark: All contact data in the datasheet are validated data and not necessarily limit data.

3.1. LIMITING CONTINUOUS CURRENT

The limiting continuous current depends on the cooling capability (size) of the load cables / busbar by convection. The limiting continuous current can be increased by passive cooling (additional heatsinks) or active cooling. An active cooling is most effective, if the load cables / busbars are cooled as close to the load terminals as possible. The limit temperature of the load terminals is 150°C.

The values in the datasheet are valid for convection by air.

3.2. LIMITING SHORT TIME CURRENT

The specified limiting short time currents can be carried by the EVC without damage. Exceeding the max. current limit of 5000A (EVC175) resp. 6000A (EVC250) can result in a mechanical destruction of the EVC.

3.3. SWITCHING CAPABILITY

The switch-off capability (limiting break current) depends on the load polarity, the load voltage, the load current, and the number of switch-off cycles.

The values in the datasheet are validated reference loads and tested at 0.5bar (representing an altitude of 5500m). Other data can be validated by the customer or might be available at TE Connectivity. Please contact TE Connectivity for advice.

Due to the design of the contact system the switching capability in reverse direction is lower than in forward direction. The load current direction is specified in the datasheet (Terminal Assignment).

Most of the battery systems have a positive and a negative contactor. The switch-off capability can be increased significantly, if both contactors are switch-off simultaneously (e.g. in case of an overload disconnect).

Exceeding the specified limits of the switch-off capability can result in a mechanical destruction of the EVC.

The switch-on capability is independent of the load polarity.

3.4. CONTACT RESISTANCE

The contact resistance depends on the load current. This dependency is related to the fritting effect of silver-based contacts under normal atmosphere and explained in the application note “Diagnostic of relays”. The specified values are only valid at the given load current and time.

The dependency is relevant for the design of incoming inspection processes and, if existing, onboard diagnostic routines.

Application note “diagnostics of relays”: Search for “Automotive_Relay_Applications” on te.com or look for “Datasheets & Catalog Pages” on the product pages.

3.5. SWITCHING TIMES

The switch-on time (operate time) depends on the coil voltage and the coil temperature. The higher the temperature and the lower the coil voltage, the higher the operate time.

The switch-off time (release time) depends mainly on the coil suppression. The lower the clamping voltage, the higher the release time.

The specified values are valid for rated voltage and no external voltage clamping, resp. a min. clamping voltage of 36V (EVC175) resp. 60V (EVC250) for the single coil versions.

See also application note “diagnostics of relays”: Search for “Automotive_Relay_Applications” on te.com or look for “Datasheets & Catalog Pages” on the product pages.

4. COIL DATA

4.1. SINGLE COIL VERSIONS

The single coil versions require an external economization to avoid an overheating of the coil.

For a safe operation over lifetime the coil of the contactor must be energized with the rated voltage (min. 9V acc. ISO16750-2 Code C).

After 100ms to max. 300ms the power of the coil must be reduced (economized). The range of the coil current (min and max.) is specified in the datasheet. The economization is usually realized by a PWM of the coil voltage. We recommend a PWM frequency of min. 15kHz to avoid audible noises, caused by magnetostriction.

Figure 1 shows a recommended PWM circuit.

For a safe switch-off the Enable signal must be deactivated before or simultaneously with the PWM signal to avoid a clamping by the diode D1 during switch-off. The clamping voltage Vz must be higher or equal to the value specified in the datasheets. We recommend min. 36V for the EVC175, resp. 60V for the EVC250.

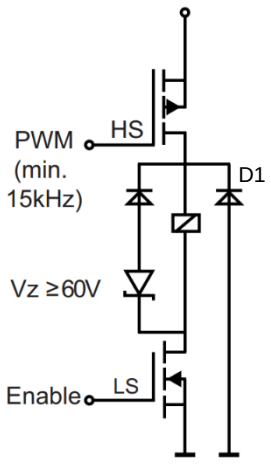

Figure 1

4.2. DOUBLE COIL VERSIONS

The double coil versions have an internal circuit, which activates the boost (pull-in) coil for appr. 100ms (max. value see datasheet). Afterwards the boost coil is switched off and only the holding coil is active.

For a safe operation over lifetime the coil of the contactor must be energized with the rated voltage (min. 9V acc. ISO16750-2 Code C, resp. 18V Code H). The rise time of the voltage must be lower than 100ms.

The switch-off voltage is clamped by the internal circuit (value acc. datasheet). An external clamping with a lower value will reduce the specified switch-off capability.

After switch-off the internal circuit requires an off-time of min. 1s to safely re-activate the boost coil.

5. ASSEMBLY INSTRUCTIONS

The degree of protection of the EVCs is IP54 (acc. IEC60259) resp. RT I (acc. IEC 61810). They are designed for an installation in a protected area (e.g. BDU or PDU).

The load connection must be mounted first without any pretension between busbar and load terminal. The gap of the terminal busbar joint must be zero. The load connection should be mounted only once in the assembly process.

The min. screw depth is 3 thread turns and must not be longer than 6mm. Longer screw depths can damage the contact system, resulting in a failure of the EVC. Regard the specified maximum torque. A too high crew torque could damage the thread. A too low screw torque would not balance thermal expansion.

In the second step the housing can be mounted. Regard the specified maximum torque.

The side mount versions of the EVC250 require the mechanical support areas which are specified in the customer drawings. Without the support areas the EVC250 could be damaged by high vibration levels.

6. SYSTEM INTEGRATION

High continuous currents and short circuit currents can affect the EVC by heat dissipation and magnetic fields, if the load cables / busbars are located close to the housing of the EVC. The specified values are valid for a single EVC with straight load cables / busbars connected to the load terminals.

Avoid potential EMI coupling from the HV side (busbar, cable) into the LV side (coil cable) of the contactor. This is valid especially for the double coil versions with internal circuit.

7. VISUAL INSPECTION

If the parts are suspected to damages by transport or mishandling a visual inspection should be performed. The plastic parts must be free of cracks and flaking, the coil pins must be straight, and the thread of the load terminals must be free of damage.

LTR	REVISION RECORD	DWN	APP	DATE
A	NEW DOCUMENT	O. LORENZ	A. SCHNEIDER	14.08.2024