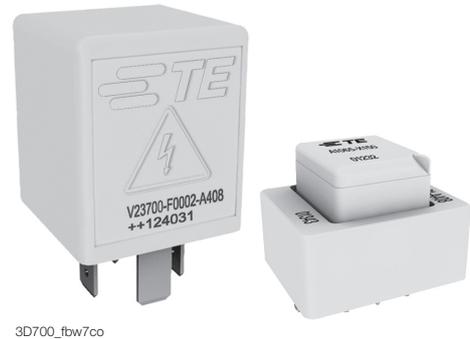


Mini K HV Precharge Relays

- Suitable for voltage levels up to 450VDC
- Precharge currents up to 20A
- Limiting break currents up to 20A
- Available with PCB and plug-in terminals

Typical applications

DC high voltage precharge applications in hybrid, full battery electric vehicles and fuel-cell cars.



Contact Data	
Contact arrangement	1 form X (NO DM)
Rated voltage	400VDC
Max. switching voltage ¹⁾ / power	450VDC / 9kW
Limiting switching current ²⁾	
normal operation	20A on/0A off: min. 10 ⁵ ops.
fault break operation ³⁾	20A on/20A off: min. 10 ops. ³⁾⁴⁾
Initial contact voltage drop at 10A	typ. 150mV, max. 300 mV
Operate time at nominal voltage	typ. 2.5ms
Release time ⁵⁾	typ. 1ms
Mechanical endurance	>10 ⁶ ops.

- 1) Consult TE Connectivity for insulation compatibility with higher voltages.
 - 2) Load circuit: L/R <14µs.
 - 3) After 10 fault break operations relay must be replaced.
 - 4) Test conditions: on-time 100ms, off-time 10s.
 - 5) Valid for recommended 250Ω suppression resistor (PCB version).
- Note: A low resistive suppression device in parallel to the relay coil increases the release time and reduces the lifetime due to increased erosion and / or higher risk of contact tack welding.

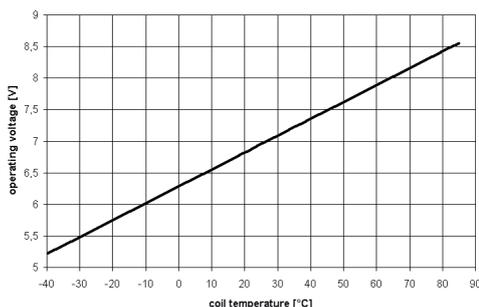
Coil Data	
Nominal voltage	12V
Min./Max. energization duration	max. 2s ⁶⁾
Max. coil temperature	155°C

- 6) Max. continuous activation time is limited and depends on operating conditions. Please contact TE Connectivity for details.

Coil versions					
Coil code	Rated voltage VDC	Operate voltage VDC ⁷⁾	Release voltage VDC ⁷⁾	Coil resistance Ω±10%	Rated coil power W
001	12	6.9	1.2	50	2.9
002 ⁸⁾	12	6.9	1.2	41.6	3.5

- 7) All values are given for coil without pre-energization, at ambient temperature +23°C.
- 8) Coil suppression resistor already included in the relay. No additional suppression component allowed.

Coil operating range



Insulation Data ¹⁾	
Initial dielectric strength	
between open contacts	2800 VDC/1mA
between contact and coil	2800 VDC/1mA
Insulation resistance after 10 fault break ops. (20A)	
between open contacts	>200MΩ
between contact and coil	>200MΩ
Max. altitude ⁹⁾	5000m
Clearance / creepage	
acc. IEC 60664-1 (2007) for	overvoltage category I, pollution degree 2

Other Data	
EU RoHS/ELV compliance	compliant
Flammability of plastic material	acc. UL94-HB
Ambient temperature range	-40°C to +85°C
Climatic cycling with condensation	
EN ISO 6988	6 cycles, storage 8/16h
Temperature cycling (shock)	
IEC 60068-2-14, Na	10 cycles, -40/+85°C (5°C per min)
Damp heat constant	
IEC 60068-2-3, Ca	56 days, upper air temperature 40°C
Degree of protection PCB version	
IEC 61810	RT III – immersion cleanable
Corrosive gas	
IEC 60068-2-42	10 days
IEC 60068-2-43	10 days
Wide-band noise	
IEC 60068-2-64	10 to 1000Hz, 30.8m/s ² 10)
Shock resistance (functional)	
IEC 60068-2-27 (half sine)	11ms, 20g ¹⁰⁾
Terminal type	PCB and plug-in/QC
Weight	
PCB version:	approx. 17g (0.6oz)
Plug-in version:	approx. 39g (1.4oz)
Solderability (aging 3: 4h/155°C) PCB version	
IEC 60068-2-20, Ta, method 1	hot dip 5s, 215°C
Resistance to soldering heat PCB version	
IEC 60068-2-20, Tb, method 1A	hot dip 10s, 260°C with thermal screen

Note: Parameters given in <http://relays.te.com/definitions> for preheating and soldering must be observed.

Sealing, IEC 60068-2-17 PCB version Qc, method 2, 1min/70°C

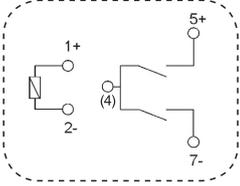
Storage conditions according IEC 60068¹¹⁾

- 9) Creepage and clearance distances fulfill the isolation coordination requirements of IEC 60664 for equipment that is particularly protected against transient overvoltage if the required impulse withstand voltage is less than 2360V.
- 10) No change in the switching state >10µs.
- 11) For general storage and processing recommendations please refer to our Application Notes and especially to Storage in the Definitions or at <http://relays.te.com/appnotes/>

Mini K HV Precharge Relays (Continued)

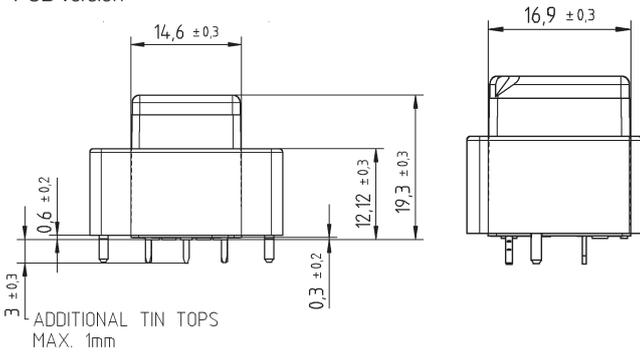
Terminal Assignment

1 form X (NO DM)
PCB version

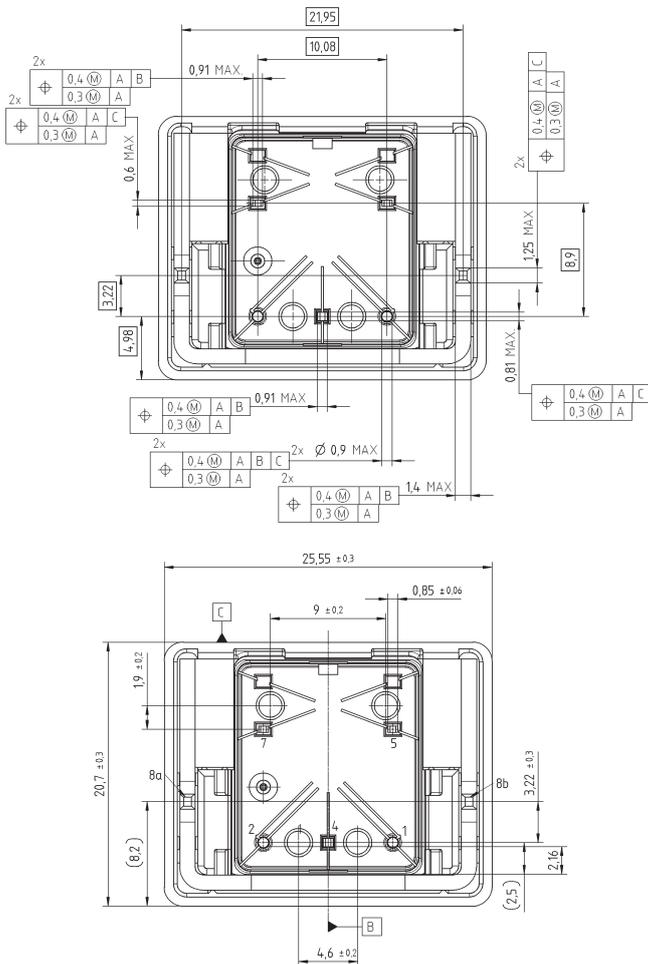


Dimensions

PCB version

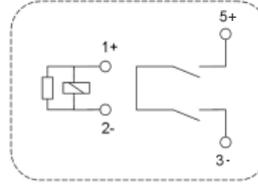


View of the Terminals (bottom view)



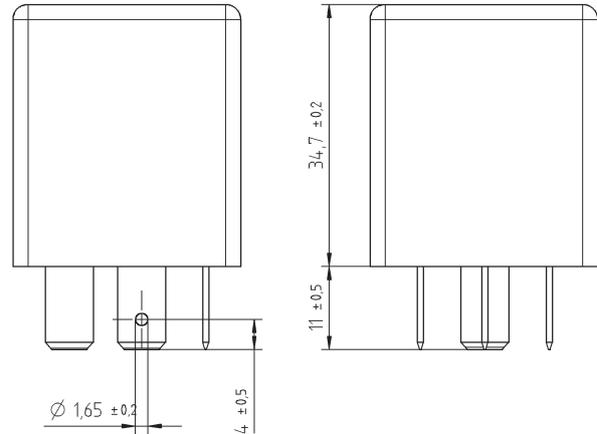
Terminal Assignment

1 form X (NO DM) with resistor
Plug-in version

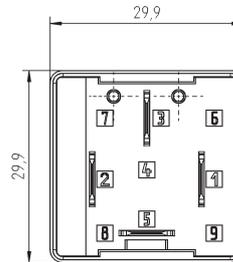


Dimensions

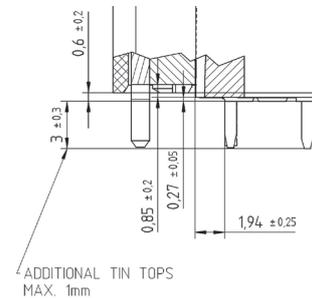
Plug-in version



View of the Terminals (bottom view)



Detail PCB version: minimum clearance requirements (see note below)



Notes regarding PCB-layout and terminal assignment:

- Pin 4 must not be electrically connected, no solder eye at that pin is allowed, only a drill-hole without via
- Potential assignment of pins:
 - pins 1; 2: low voltage (LV)
 - pins 5; 7; 4(*): high voltage (HV)
 - pin 8a; 8b: no potential but internally connected
- (*) pin 4 is on HV potential in ON-state of relay only.

Notes regarding clearance and creepage distances:

- The required clearance and creepage distances between HV and LV potential must be ensured.
- Layout of the PCB has to ensure min. clearance and creepage distances of conducting relay parts and relay terminal 1 and conducting relay parts and terminal 2 respectively. Refer to detail drawing. Minimum distance to neighboring ferruginous parts: 3mm.

Mini K HV Precharge Relays (Continued)

Product code structure	Typical product code	V23700	-C	0	001	-A	40	8
Type	V23700 Mini K HV							
Terminal and enclosure	C PCB	F Plug-in						
Design	0 Standard							
Coil	001 without parallel resistor		002 with parallel resistor					
Contact type	A Standard							
Contact material	40 Silver based							
Contact arrangement	8 1 form X (NO DM)							

Product code	Terminal/Encl.	Design	Coil	Contact type	Contact mat.	Arrangement	Part number
V23700-C0001-A408	PCB, sealed	Standard	without parallel resistor	Standard	Silver based	1 form X (NO DM)	2-1904058-5
V23700-F0002-A408	Plug-in, QC		with parallel resistor				2-1904058-7