Twin coil relays TCR and TCR-F


Powertrain Systems


Chassis Systems


Safety


Security


Body


Driver Information


Convenience

Features

- Special relay for motor polarity reversal
- Optimized assembly
- High switching capacity

Typical applications

- Seat adjustment motors
- Window motors
- Sunroof motors
- Central locking mechanisms
- Mirror adjustment
- Steering column adjustment
- Retractable headlamps
- Power antenna

78A_3d01 / 78F_3d01


Car Industry


Truck Industry


Other Industry

Design

Sealed;
sealing in accordance with IEC 68;
immersion cleanable:
protection class IP 67
to IEC 529 (EN 60 529)

Weight

Approx. 0.67 oz. (19 g) PCB version
Approx. 0.88 oz. (25 g) version with quick connect terminals

Nominal voltage

12 V

Terminals

PCB terminals, for assembling in printed circuit boards
Quick connect terminals

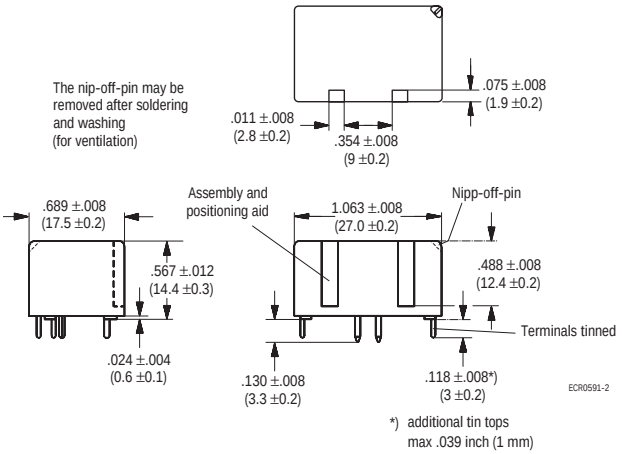
Conditions

All parametric, environmental and endurance tests are performed according to EIA Standard RS-407-A at standard test conditions unless otherwise noted:
23 °C ambient temperature,
20-50% RH, 29.5 ± 1.0" Hg
(998.9 ±33.9 hPa).

Twin coil relays TCR and TCR-F

Dimensional drawing

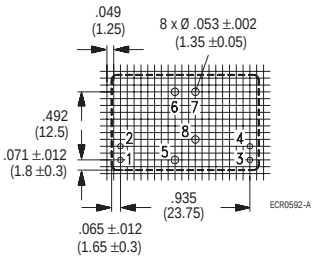
Version with PCB terminals



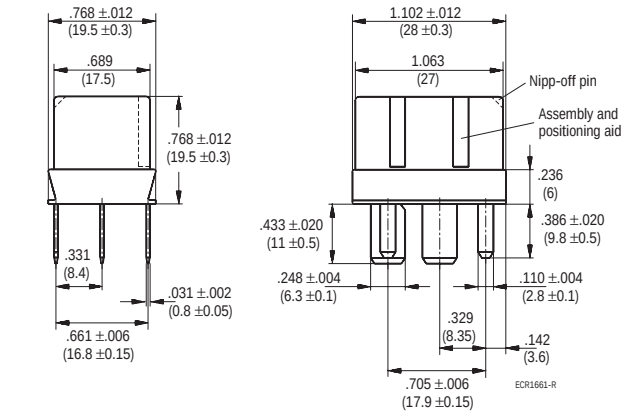
*) additional tin tops max .039 inch (1 mm)

Mounting holes

View of the terminals (Bottom view)

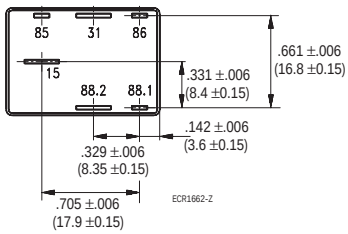


Version with quick connect terminals



Quick connect terminal similar to ISO 8092-1

View of the terminals (Bottom view)



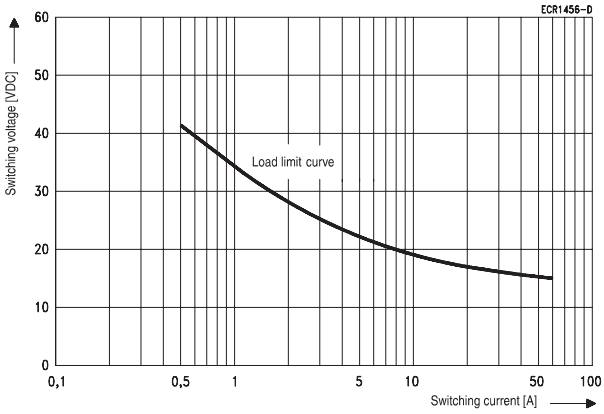
Twin coil relays TCR and TCR-F

Contact data	
Contact configuration	2 Changeover contacts/ 2 Form C
Contact material	AgNi0.15
Circuit symbol (see also Pin assignment)	
Max. switching voltage	15 VDC
Max. switching current	NC/NO
On[1]	30 A/45 A
Off	30 A/40 A
Limiting continuous current[2]	
at 23 °C	30 A
at 85 °C	30 A
Voltage drop (initial) at 10 A	Typ. 30 mV
Increase in coil temperature at 10 A load	Typ. 6 °C
Mechanical endurance (without load)	> 10^6 operations
Electrical endurance[1]	> 2 x 10^5 operations at 20 A, 12 V

[1] The values apply to a resistive load or inductive load with suitable spark suppression.
[2] At 50% ON period, max. make time 15 sec

Note: A Zener diode or a resistor is recommended for coil suppression.

Load limit curve

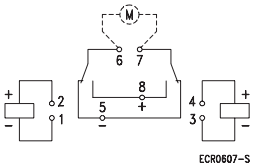


Load limit curve ≙ no stationary arc

Pin assignment

2 changeover contacts/
2 form C (H bridge)

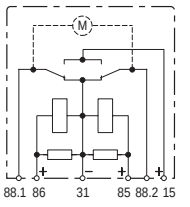
PCB Version



Important: Check polarity

The two make contacts cannot be closed simultaneously.

Quick connect version



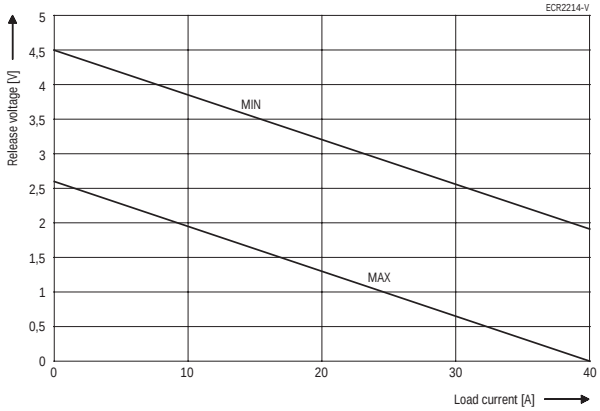
Twin coil relays TCR and TCR-F

Coil data	
Available for nominal voltages	12 VDC
Nominal power consumption of the unsuppressed coil at nominal voltage	1.3 W
Test voltage winding/contact	500 VAC_{rms}
Upper limit temperature for the coil	155 °C
Maximum ambient temperature range[1)]	– 40 to + 85 °C
Max. switching rate without contact loading	20 Hz
Operate time[2)]	Typ. 4 msec
Release time[3)]	Typ. 3 msec

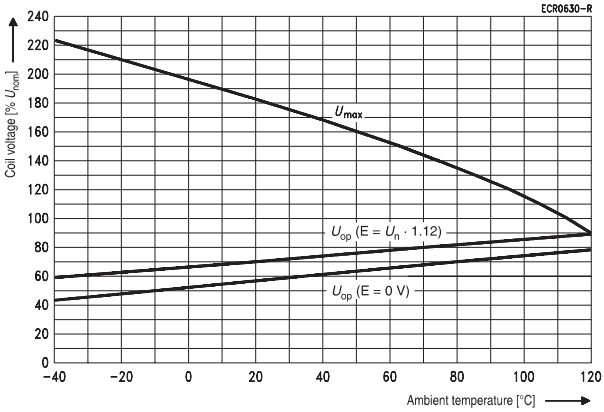
[1)] See also operating voltage diagram
[2)] Measured at nominal voltage without coil suppression unit
[3)] Measured with zero volts applied (for unsuppressed relays after having been energized at nominal coil voltage)

N.B.
A low resistive device in parallel to the relay coil slows down the armature movement
and reduces the lifetime caused by increased erosion and/or higher risk of contact tack welding.

Tolerance range of the release voltage as a function of the load current



Operating voltage range



Does not take into account
the temperature rise due to
the contact current
E = pre-energization

Twin coil relays TCR and TCR-F

Mechanical data	
Cover retention[1]	
pull	200 N (45 lbs)
push	200 N (45 lbs)
Terminals[1]	
Pull force	100 N (22.5 lbs)
Push force	100 N (22.5 lbs)
Resistance to bending, force applied to front	10 N (2.25 lbs)[2]
Resistance to bending, force applied to side	10 N (2.25 lbs)[2]
Torsion	0.3 Nm
Enclosure	
Sealed	Sealed relay is suitable for immersion cleaning of PCB assembly or conformal coating.

[1] Only version with quick connect terminals

[2] Values applied 2 mm from the end of the terminal. When the force is removed, the terminal must not have moved more than 3 mm

Operating conditions				
Temperature range, storage	-40 °C to 155 °C			
Test	Relevant standard	Testing as per	Dimension	Comments
Climatic cycling with condensation	EN ISO 6988		20 cycles	Storage 8/16 h
Temperature cycling	IEC 68-2-14	Na	20 cycles	– 40/+ 85 °C (dwell time 1 h)
Damp heat				
cyclic	IEC 68-2-30	Db, Variant 1	9 cycles	Upper air temperature 55 °C
constant	IEC 68-2-3	Ca	56 days	
Corrosive gas	IEC 68-2-42	–	10 days	
	IEC 68-2-43		10 days	
Vibration resistance	IEC 68-2-6 (sine pulse form) acceleration		up to 200 Hz > 18 g	No change in the switching state > 10 µsec
Shock resistance	IEC 68-2-27 (half-sine pulse form) acceleration, depending on position		6 msec 30 … 280 g	No change in the switching state > 10 µsec
Solderability[1]	IEC 68-2-20	Ta, Method 1		Aging 3 (4 h/155 °C) Dewetting
Resistance to soldering heat[1]	IEC 68-2-20	Tb, Method 1A		10 sec ± 1 sec with thermal screen
Sealing	IEC 68-2-17	Qc, Method 2		1 min / 70 °C

[1] Only PCB version

Ordering information

Part number (Replace * with "Coil designator") TCR	Contact arrangement	Contact material	Enclosure	Terminals
V23078-C1*-A303	2 Form C	AgNi0.15	Sealed	Printed circuit
V23078-F1*-A303	2 Form C	AgNi0.15	Sealed	Quick connect
V23078-L1*-A303	2 Form C	AgNi0.15	Sealed	Printed circuit

Coil versions

Coil designator TCR	Rated coil voltage (V)	Coil resistance +/- 10% (Ω)	Must operate voltage (VDC)	Must release voltage (VDC)[1]	Allowable overdrive (VDC) at 23 °C[2]	Allowable overdrive (VDC) at 85 °C[2]
002	12	107	6.9	2.6	21.6	15.6

[1] See also tolerance range of the release voltage as a function of the load current, page 487

[2] Allowable overdrive is stated with no load current flowing through the relay contacts and minimum coil resistance.

Standard delivery pack (orders in multiples of delivery pack)

PCB version: 500 pieces
Quick connect version: 665 pieces
Silent version: 500 pieces