Power relay F4 / VF4


Powertrain Systems


Chassis Systems


Safety


Security


Body


Driver Information

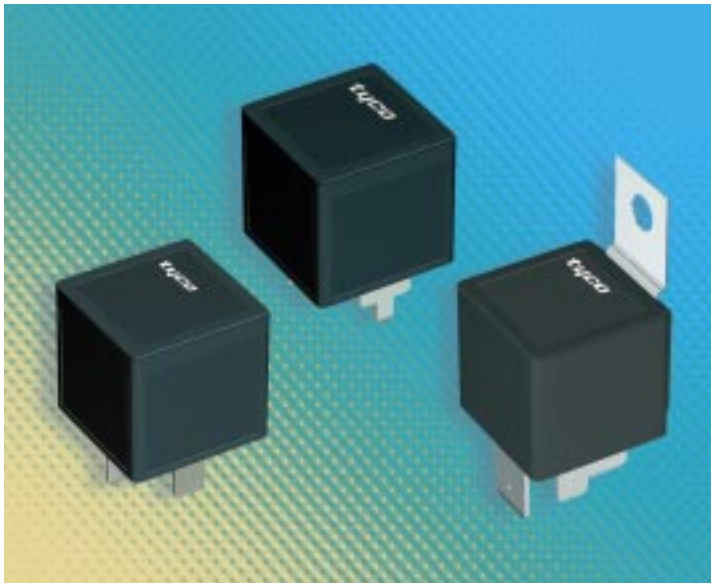

Convenience

Features

- Limiting continuous currents 60/40 A at the NO / NC contacts
- Dimensional characteristics and the functional allocations of the plug-in terminals to ISO 7588
- Standardized dimensions
- 24 V versions with contact gap > 0.8 mm on request
- Plug-in or PCB terminals

Typical applications

- Ignition lock
- Lamp load (headlights)
- Cooling fan
- ABS
- Exhaust emission control
- Cross carline up to 60 A
- Fuel pump
- Engine cooling fan
- A/C blower
- A/C compressor clatch
- Also applicable for 42 V loads (please ask our specialists)



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Car Industry


Truck Industry


Other Industry

Design

Dustproof;
protection class IP 54 to IEC 529 (EN 60 529);
with either mounting bracket or mounting clip

Options

Shrouded and weatherproof covers

Weight

Approx. 1.2 oz. (35 g)

Nominal voltage

6 V, 12 V or 24 V;
other nominal voltages available on request

Terminals

Quick connect terminals similar to ISO 8092-1
coil and load 6.3 x 0.8 mm;
surfaces tin-plated
or
PCB terminals

Accessories

Connectors see page 518

Special models on request

- Integrated components: resistor, varistor, diode
- Special labels
- Special cover shapes

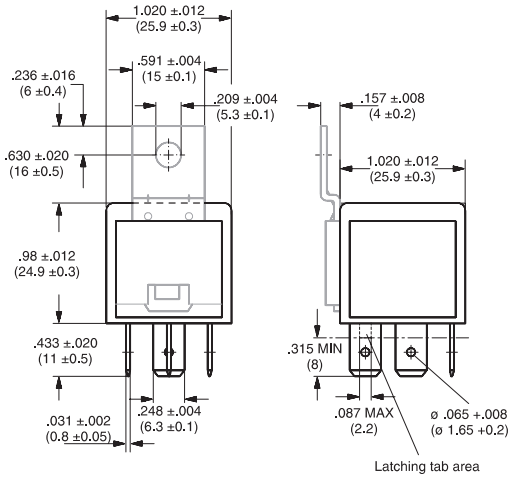
Conditions

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).

Power relay F4

Dimensional drawing

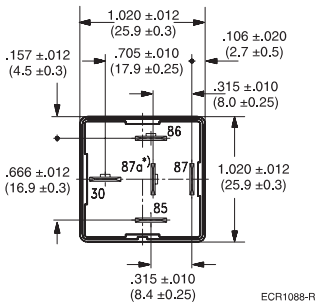
Version with quick connect terminals



Quick connect terminal similar to ISO 8092-1

ECR1093-S

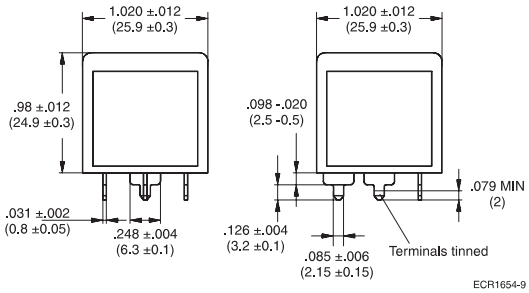
View of the terminals (bottom view)



*) For the make contact (2 x pin 87), pin 87a = 87.
For the twin make contact, pin 87a = 87b.

ECR1088-R

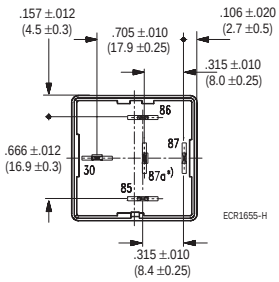
Version with PCB terminals



ECR1654-9

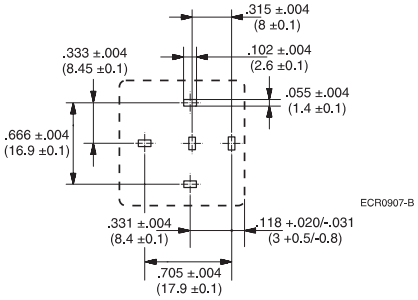
View of the terminals (bottom view)

*) For the make contact (2 x pin 87), pin 87a = 87.
For the twin make contact, pin 87a = 87b.



ECR1655-H

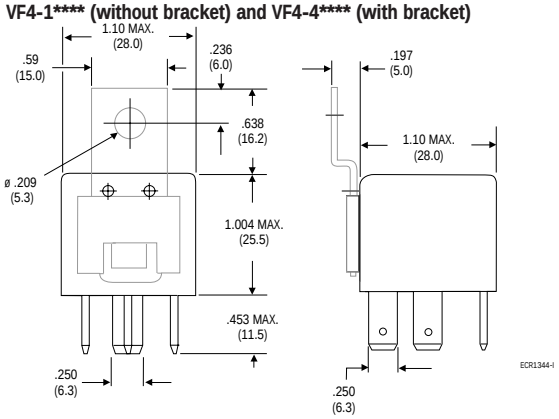
Mounting hole layout



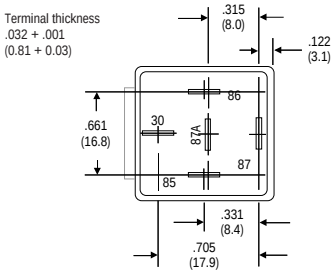
ECR0907-B

Dimensional drawing

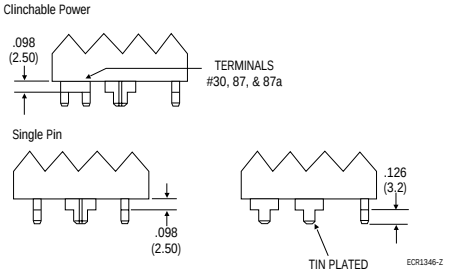
Dust cover with quick connect terminals
VF4-1**** (without bracket) and VF4-4**** (with bracket)



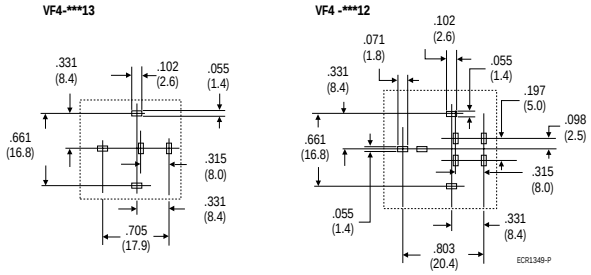
View of the terminals (bottom view)



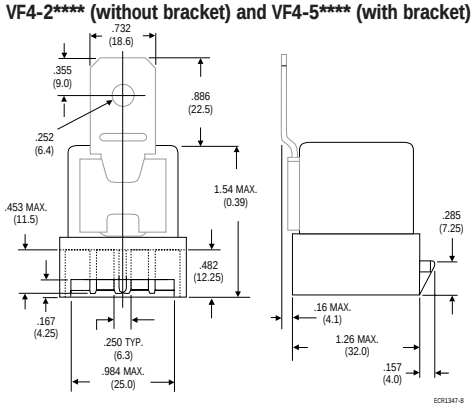
PCB terminals



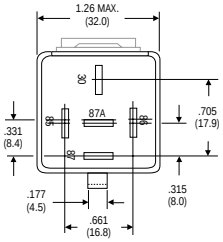
PCB terminals



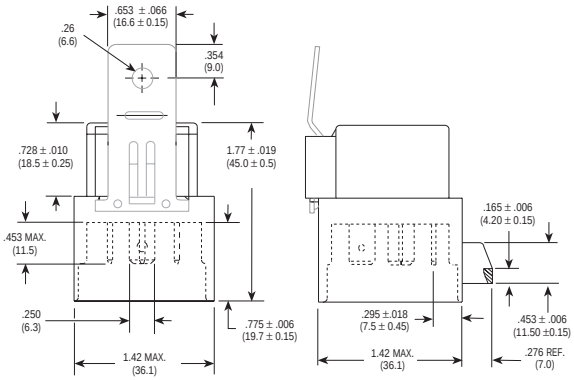
Shrouded dust cover with quick connect terminals
VF4-2** (without bracket) and VF4-5**** (with bracket)**



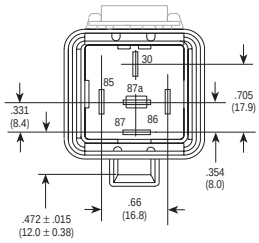
View of the terminals (bottom view)



Weatherproof cover with quick connect terminals
VF4-3** (without bracket) and VF4-6**** (with bracket)**



View of the terminals (bottom view)



Power relay F4 / VF4

Contact data

Contact configuration		Make contact/ Form A	Double make contact/ Form U	Make contact/ Form A (2 x 87)	Changeover contact/ Form C
Contact material		AgNi0.15 (further contact materials on request)			
Circuit symbol (see also Pin assignment)					
Max. switching voltage		See load limit curve			
Max. switching power		See load limit curve			
Max. switching current[1]					NC/NO
On[2]		120 A	2 x 100 A	120 A	45/120 A
Off		60 A	2 x 40 A	60 A	40/60 A
Limiting continuous current	at 23 °C	60 A	2 x 30 A	60 A	40/60 A
	at 85 °C	40 A	2 x 25 A	40 A	30/40 A
Min. recommended current		1 A at 12 VDC			
Voltage drop (initial)					
at 40 A, on NO contact		Typ. 60 mV 200 mV max.	Typ. 2 x 60 mV	Typ. 60 mV	Typ. 60 mV, 200 mV max.
at 30 A, on NC contact					Typ. 60 mV, 250 mV max.
at 2 x 30 A			Typ. 2 x 60 mV, 2 x 200 mV max.		
Increase in coil temperature at 10 A load		Typ. 3 °C			
Mechanical endurance (without load)		> 10^7 operations			
Electrical endurance		10^5 operations at 40 A, 14 VDC resistive load, NO contact			
Max. switching rate at nominal load		6 operations per minute (0.1 Hz)			

[1] The values apply to a resistive load or inductive load with suitable spark suppression at 14 VDC load voltage.
[2] Inrush current for lamp load

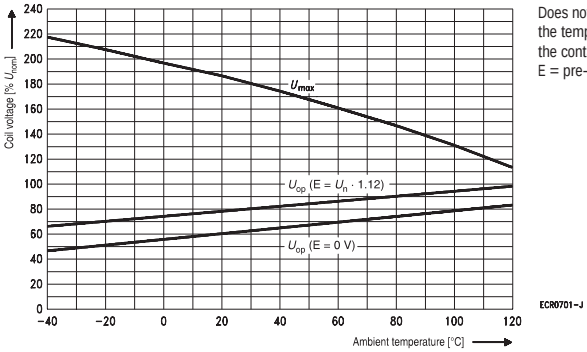
Power relay F4 / VF4

Coil data

Available for nominal voltages	6, 12, 24 VDC (other coils on request)
Nominal power consumption of the unsuppressed coil at nominal voltage	1.6 W
Nominal power consumption at nominal voltage with 680 Ω resistor	1.81 W
Test voltage winding/contact	500 VAC_{rms}
Upper limit temperature for the coil	180 °C
Maximum ambient temperature range [1]	– 40 to + 125 °C
Max. switching rate without contact loading	20 Hz
Operate time[2]	Typ. 7 msec
Release time[3]	Typ. 2 msec

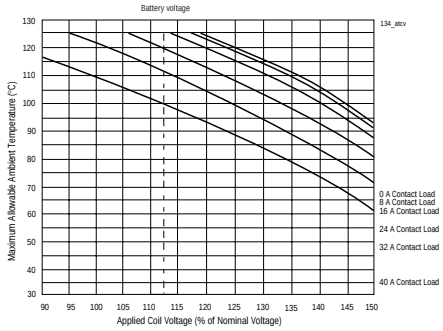
[1] See also ambient temperature vs. coil voltage for continuous duty
[2] Measured at nominal coil voltage
[3] Measured with zero V applied (for unsuppressed relays after having been energized at nominal coil voltage)
N.B.
A low resistive device in parallel to the relay coil slows the armature movement down
and reduces the lifetime caused by increased erosion and/or higher risk of contact tack welding.

Operating voltage range



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

Ambient temperature vs. coil voltage for continuous duty



Assumptions:
1. Still air
2. Nominal coil resistance
3. Maximum mean coil temperature = 180 °C
4. Coil temperature rise due to load = 1 °C at 8 A
   = 5 °C at 16 A
   = 11 °C at 24 A
   = 20 °C at 32 A
   = 32 °C at 40 A
5. Thermal resistance and power dissipation based on coil resistance at 180 °C
6. Curves are based on 1.6 W at 23 °C
7. When full lifetime is at high ambient and high load current, subtract 25 °C from maximum allowable ambient temperature.

Mechanical data

Cover retention	
Dust cover (force axially applied)	150 N (33.7 lbs)
Pull	200 N (45 lbs)
Push	200 N (45 lbs)
Terminals	
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)[1]
Resistance to bending, force applied to side	10 N (2.25 lbs)[1]
Torsion	0.3 Nm
Enclosures	
Dust cover	Protects relay from dust. For use in passenger compartment or enclosures
Shrouded dust cover	Protects relay and relay connector (order separately) from dust and splash
Weatherproof cover	Mates with a connector (order separately) to seal relay from salt spray etc. Recommended for under hood application

[1] Values apply 2 mm from the end of the terminal. When the force is removed, the terminal must not have moved by more than 0.3 mm.

Power relay F4 / VF4

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		6 cycles	Storage 8/16 h
Temperature cycling	IEC 68-2-14	Nb	10 cycles	– 40/+ 85 °C (5 °C per min.)
Damp heat cyclic constant	 IEC 68-2-30 IEC 68-2-3	 Db, Variant 1 Ca	 6 cycles 56 days	 Upper air temperature 55 °C
Corrosive gas	IEC 68-2-42 IEC 68-2-43	10 ± 2 cm^3/m^3 SO_2 1 ± 0.3 cm^3/m^3 H_2S	10 days 10 days	
Vibration resistance	1.27 mm double amplitude 5 *g* constant 0.5 mm double amplitude 5 *g* constant		10-40 Hz 40-70 Hz 70-100 Hz 100-500 Hz	Valid for NC contacts. NO contacts are significantly higher
Shock resistance	half sine wave pulse		20 g 11 msec	No change in the switching state > 1 msec
Load dump	ISO 7637	DIN 40 839 Part 1		
Jump start	5 s 16 V 15 s 28 V 10 s 16 V		3 cycles	
	24 VDC for 5 minutes conducting nominal current at 23 °C			
Drop test	Capable of meeting specifications after 1.0 m (3.28 foot) drop onto concrete			
Flammability	UL94-HB or better (meets FMVSS 302)			
Overload current[1)]	54 A, 1800 sec 80 A, 40 sec 140 A, 5 sec 240 A, 1 sec			

[1)] Current and time are compatible with circuit protection by a typical 40 A automotive fuse. Relay will make, carry and break the specified current.

Power relay F4 / VF4

Ordering information

Part number (Replace * with "Coil designator") VF4 [1]	F4 [2]	Contact arrangement	Contact material	Enclosure	Terminals
VF4-15*11	V23134-A0*-C643	1 Form C	AgNi0.15	Dust cover	Quick connect
VF4-15*13	V23134-A0*-G243	1 Form C	AgNi0.15	Dust cover	Printed circuit
VF4-45*11	V23134-A1*-C643	1 Form C	AgNi0.15	Dust cover with bracket	Quick connect
VF4-11*11	V23134-B0*-C642	1 Form A	AgNi0.15	Dust cover	Quick connect
VF4-11*13	V23134-B0*-G242	1 Form A	AgNi0.15	Dust cover	Printed circuit
VF4-41*11	V23134-B1*-C642	1 Form A	AgNi0.15	Dust cover with bracket	Quick connect
	V23134-C0*-C642	1 Form A (2 pins 87)	AgNi0.15	Dust cover	Quick connect
	V23134-C0*-G242	1 Form A (2 pins 87)	AgNi0.15	Dust cover	Printed circuit
	V23134-C1*-C642	1 Form A (2 pins 87)	AgNi0.15	Dust cover with bracket	Quick connect
	V23134-M0*-C642	1 Form U	AgNi0.15	Dust cover	Quick connect
	V23134-M0*-G242	1 Form U	AgNi0.15	Dust cover	Printed circuit
	V23134-M1*-C642	1 Form U	AgNi0.15	Dust cover with bracket	Quick connect
	V23134-A0056-X432[3]	Form C	$AgSnO_2$	Dust cover	Quick connect
	V23134-A0056-X433[4]	Form C	$AgSnO_2$	Dust cover	Quick connect
VF4-25*11		1 Form C	AgNi0.15	Shrouded dust cover	Quick connect
VF4-35*11		1 Form C	AgNi0.15	Weatherproof cover	Quick connect
VF4-45*21		1 Form C	$AgSnO_2$	Dust cover with bracket	Quick connect
VF4-51*11		1 Form A	AgNi0.15	Shrouded dust cover with bracket	Quick connect
VF4-55*11		1 Form C	AgNi0.15	Shrouded dust cover with bracket	Quick connect
VF4-61*11		1 Form A	AgNi0.15	Weatherproof cover with bracket	Quick connect
VF4-65*11		1 Form C	AgNi0.15	Weatherproof cover with bracket	Quick connect

[1] Optional coil suppression: add suffix -S07 for 180 Ω resistor (for 6 VDC),
-S01 for 680 Ω resistor (for 12 VDC),
-S08 for 2,700 Ω resistor (for 24 VDC)
Epoxy sealed construction: add suffix -C01 for epoxy sealed unit.

[2] Versions with resistor or diode in parallel to the coil on request. Versions with other contact materials on request

[3] Special high performance 24 V version with contact gap > 0.8 mm, with diode. For more information contact Tyco Electronics.

[4] Special high performance 24 V version with contact gap > 0.8 mm, with parallel resistor. For more information contact Tyco Electronics.

Coil versions

Coil designator VF4	F4	Rated coil voltage (V)	Coil resistance +/- 10% (Ω)	Must operate voltage (VDC)	Must release voltage (VDC)	Allowable overdrive (VDC) at 23 °C	at 85 °C[1]
D		6	22.5	3.6	0.6	10.1	7.9
F		12	90	7.2	1.2	20.2	15.7
H		24	360	14.4	2.4	40.5	31.5
	052	12	91	7.2	1.6	23	18
	053	24	332	14.4	3.2	44	34

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

Standard delivery packs (orders in multiples of delivery pack)

Power relay F4	Quick connect version:	315 pieces
	Quick connect with bracket:	200 pieces
	PCB version:	200 pieces
VF4-1:		300 pieces
VF4-2:		165 pieces
VF4-3:		165 pieces
VF4-4:		250 pieces
VF4-5:		110 pieces
VF4-6:		110 pieces

Remarks

VF4:	Production in USA only.
Power relay F4:	Production in Europe, Asia, South America