Power relay VF4


Powertrain Systems


Chassis Systems


Safety


Security


Body


Driver Information


Convenience

Description

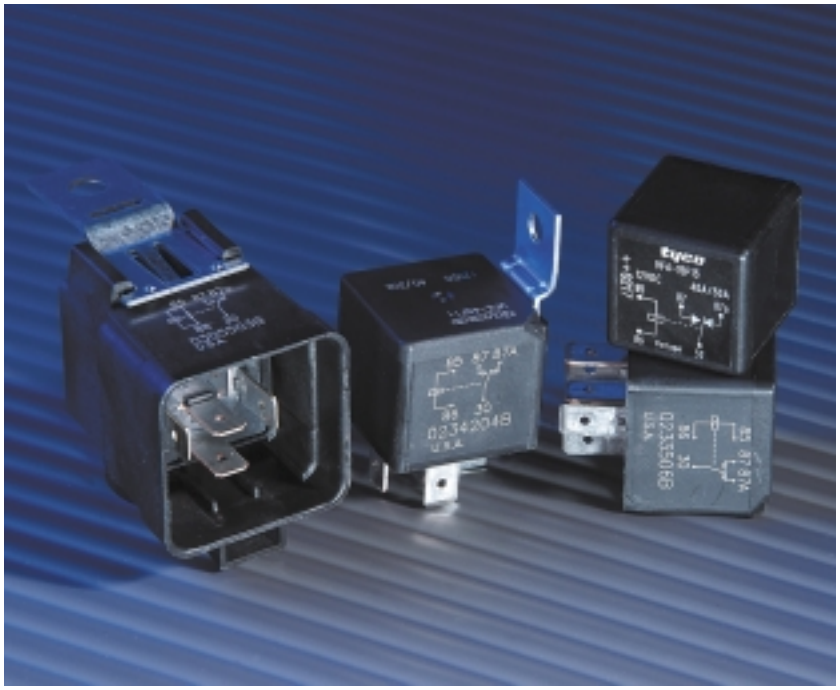
Features

- 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
- 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 clutch
- Also available for 42 V applications

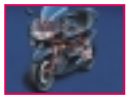
Please contact Tyco Electronics for relay application support.



VF4_3d1


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 188

Special models on request

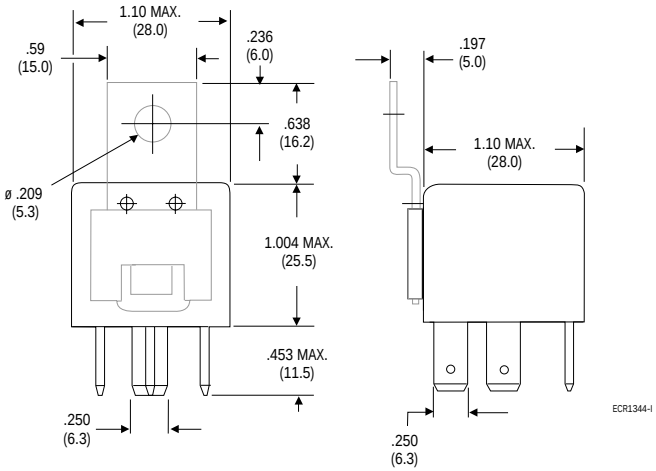
- Integrated components: resistor, varistor, diode
- Special labels
- Special cover shapes

Conditions

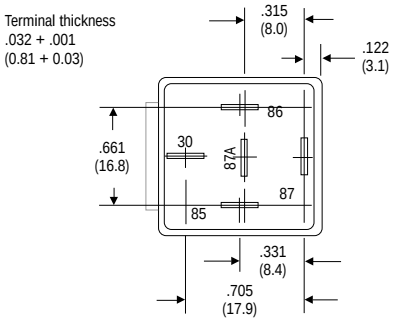
All parametric, environmental and endurance tests are performed according to EIA Standard RS-407-A at standard test conditions unless otherwise noted:
23 °C ambient temperature,
20-50% RH, 29.5 ± 1.0" Hg
(998.9 ±33.9 hPa).
Please also refer to the Application Recommendations in this catalog for general precautions.

North America production
Dimensional drawing

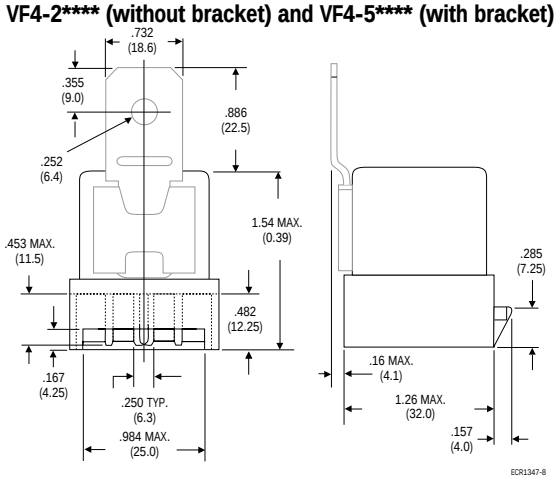
Dust cover with quick connect terminals
VF4-1** (without bracket) and VF4-4**** (with bracket)**



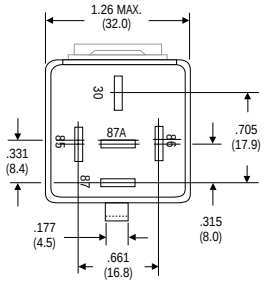
View of the terminals (bottom view)



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

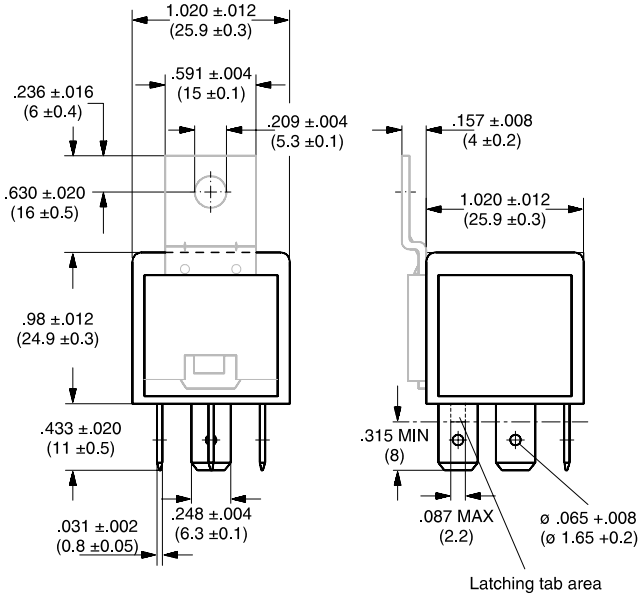


View of the terminals (bottom view)



European Production
Dimensional drawing

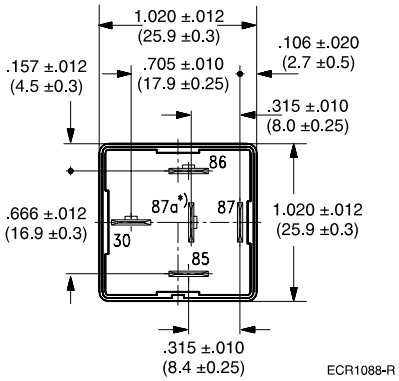
Version with quick connect terminals



Quick connect terminal similar to ISO 8092-1

ECR1093-S

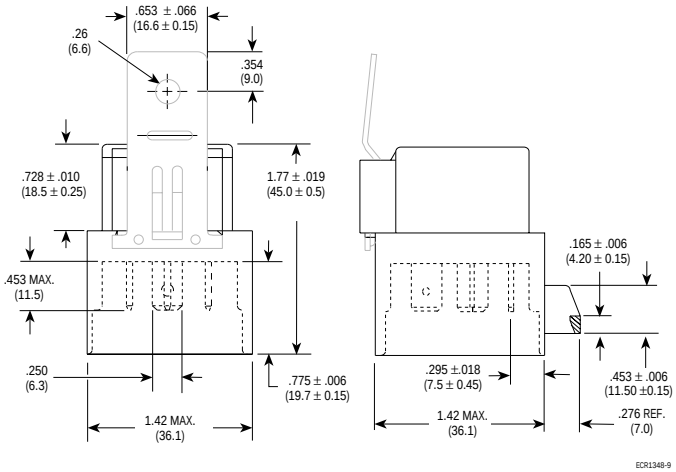
View of the terminals (bottom view)



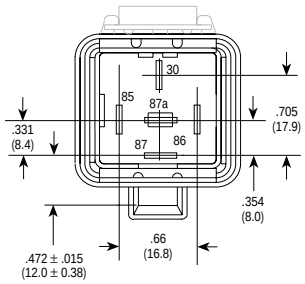
ECR1088-R

North America production

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

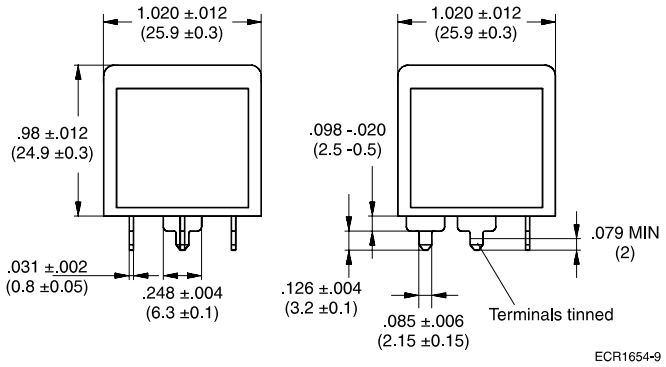


View of the terminals (bottom view)

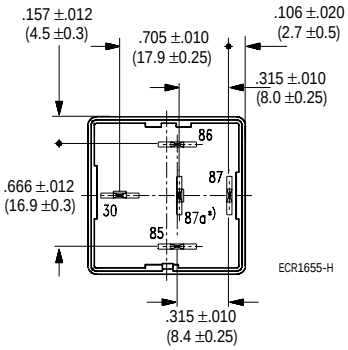


European production

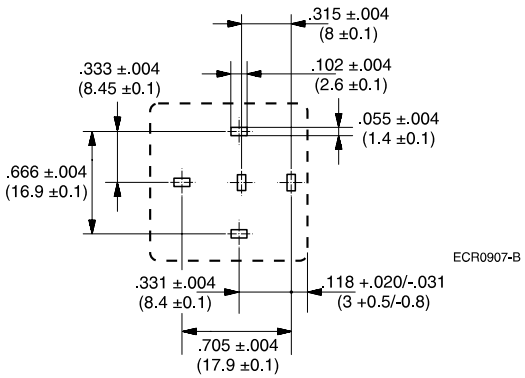
Version with PCB terminals



View of the terminals (bottom view)



Mounting hole layout



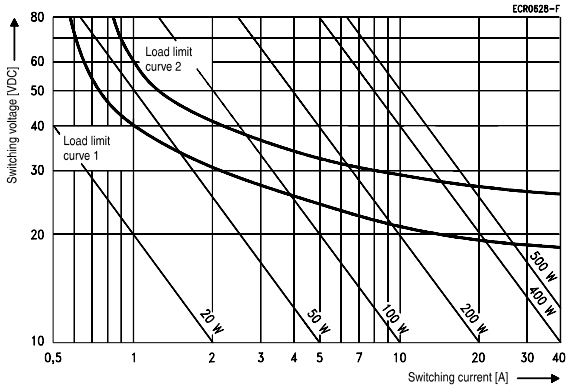
Power relay VF4

Contact data

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

[1] The values apply to a resistive or inductive load with suitable spark suppression and at maximum 13.5 V for 12 V load voltages.
[2] For a load current duration of maximum 3 s for a make/break ratio of 1:10.
[3] See chapter Diagnostics in our Application Recommendations on page 18.

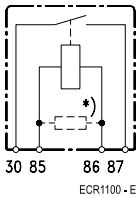
Load limit curve



Load limit curve 1 ≙ arc extinguishes during transit time (changeover contact)
Load limit curve 2 ≙ safe shutdown, no stationary arc (make contact)

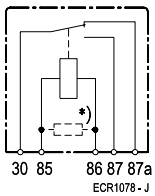
Pin assignment

1 make contact/
1 form A



*) Models with resistor or diode in parallel to the coil on request.

1 changeover contact/
1 form C



*) Models with resistor or diode in parallel to the coil on request.

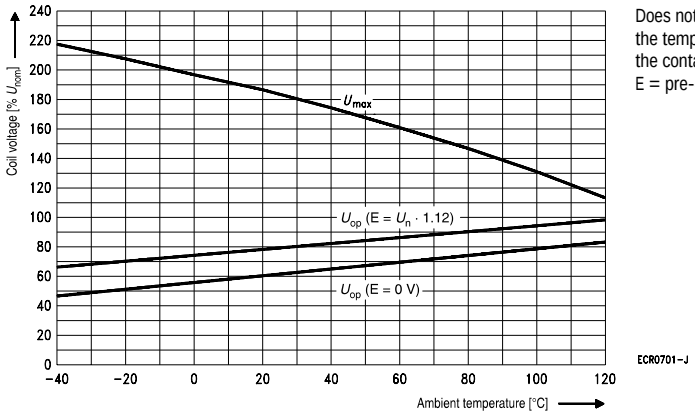
Power relay VF4

Coil data

Available for nominal voltages	6, 12, 24 V
Nominal power consumption of the unsuppressed coil at nominal voltage	1.6 W
Nominal power consumption at nominal voltage with suppression resistor	1.8 W
Test voltage winding/contact	500 VAC_{rms}
Ambient temperature range	– 40 to + 125 °C
Operate time at nominal voltage	Typ. 7 ms
Release time at nominal voltage[1)]	Typ. 2 ms

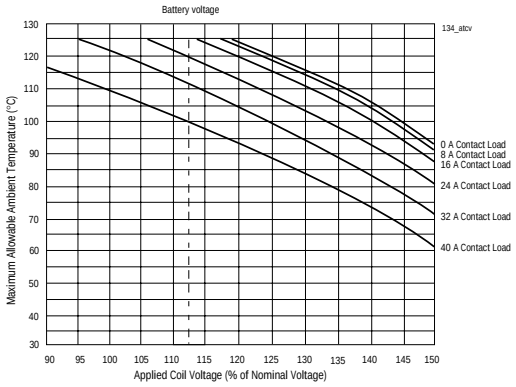
[1)] For unsuppressed relay coil
N.B.
A low resistive suppression device in parallel to the relay coil increases the release time and reduces the lifetime caused by increased erosion and/or higher risk of contact tack welding.

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	
Axial force	150 N (33.8 lbs)
Pull force	200 N (45 lbs)
Push force	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 VF4

Operating conditions				
Temperature range, storage	-40 °C to 155 °C			
Test	Relevant standard	Testing as per	Dimension	Comments
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 ms	No change in the switching state > 1 ms
Jump start	24 V 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 s 80 A, 40 s 140 A, 5 s 240 A, 1 s			

[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.

Ordering information (Production in USA unless otherwise denoted)

Part numbers for VF4[1)] (see table below for coil data)		**Contact arrangement**	**Contact material**	**Enclosure**	**Special features**
Relay part number	**Tyco order number**				
6 V plug-in relays					
VF4-45D11*	7-1393305-2	1 Form C	AgNi0.15	Dust cover	Bracket
12 V plug-in relays					
VF4-11F11	1393305-2	1 Form A	AgNi0.15	Dust cover	
VF4-11F11-S01	1-1393305-7	1 Form A	AgNi0.15	Dust cover	Resistor
VF4-15F11	6-1393298-0	1 Form C	AgNi0.15	Dust cover	
VF4-15F11-C01	6-1393298-1	1 Form C	AgNi0.15	Sealed	
VF4-15F11-C05	6-1393298-2	1 Form C	AgNi0.15	Sealed	Resistor
VF4-15F11-S01	6-1393298-4	1 Form C	AgNi0.15	Dust cover	Resistor
VF4-15F21-S01	7-1393298-3	1 Form C	AgSnO2	Dust cover	Resistor
VF4-41F11	6-1393305-5	1 Form A	AgNi0.15	Dust cover	Bracket
VF4-41F11-S01*	6-1393305-9	1 Form A	AgNi0.15	Dust cover	Bracket, resistor
VF4-45F11	8-1393298-8	1 Form C	AgNi0.15	Dust cover	Bracket
VF4-45F11-C01	7-1393305-4	1 Form C	AgNi0.15	Sealed	Bracket
VF4-45F11-C05*	7-1393305-5	1 Form C	AgNi0.15	Sealed	Bracket, resistor
VF4-45F21-S01	1432636-1	1 Form C	AgSnO2	Dust cover	Bracket, resistor
VF4-55F11	8-1393305-6	1 Form C	AgNi0.15	Shrouded Cover	
VF4-55F11-S01	8-1393305-7	1 Form C	AgNi0.15	Shrouded Cover	Resistor
VF4-61F11	9-1393305-0	1 Form A	AgNi0.15	Weatherproof Cover	
VF4-61F11-S01	9-1393305-1	1 Form A	AgNi0.15	Weatherproof Cover	Resistor
VF4-65F11	9-1393305-3	1 Form C	AgNi0.15	Weatherproof Cover	
VF4-65F11-S01	9-1393305-5	1 Form C	AgNi0.15	Weatherproof Cover	Resistor
24 V plug-in relays					
VF4-15H11	1393302-7	1 Form C	AgNi0.15	Dust cover	
VF4-15H11-C05*	5-1393305-3	1 Form C	AgNi0.15	Sealed	Resistor
VF4-15H11-S08	5-1393305-7	1 Form C	AgNi0.15	Dust cover	Resistor
VF4-41H11*	7-1393305-0	1 Form A	AgNi0.15	Dust cover	Bracket
VF4-41H11-S08*	7-1393305-1	1 Form A	AgNi0.15	Dust cover	Bracket, resistor
VF4-45H11	1-1393302-1	1 Form C	AgNi0.15	Dust cover	Bracket
VF4-45H11-C05*	1432219-1	1 Form C	AgNi0.15	Sealed	Bracket, resistor
VF4-65H11	9-1393305-7	1 Form C	AgNi0.15	Weatherproof Cover	
VF4-65H11-S08	9-1393305-9	1 Form C	AgNi0.15	Weatherproof Cover	Resistor

* Denotes Europe production.

Power relay VF4

Ordering information (Production in USA unless otherwise denoted) continued

Part numbers for VF4[1] (see table below for coil data) Relay part number	Tyco order number	Contact arrangement	Contact material	Enclosure	Special features
12 V pcb relays					
VF4-11F13*	2-1393305-1	1 Form A	AgNi0.15	Dust cover	
VF4-11F13-C01*	2-1393305-2	1 Form A	AgNi0.15	Sealed	
VF4-15F13*	0-1393302-6	1 Form C	AgNi0.15	Dust cover	
VF4-15F13-C01*	4-1393305-5	1 Form C	AgNi0.15	Sealed	
VF4-15F13-C05*	4-1393305-7	1 Form C	AgNi0.15	Sealed	Resistor
24 V pcb relays					
VF4-11H13*	2-1393305-6	1 Form A	AgNi0.15	Dust cover	
VF4-15H13*	0-1393302-8	1 Form C	AgNi0.15	Dust cover	
VF4-15H13-C01*	5-1393305-9	1 Form C	AgNi0.15	Sealed	

[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.
Epoxy sealed construction with parallel resistor: add suffix -C05 for epoxy sealed unit.

* Denotes Europe production.

Coil versions

Coil data for VF4	Rated coil voltage (V)	Coil resistance +/- 10% (Ω)	Must operate voltage (V)	Must release voltage (V)	Allowable overdrive [1] voltage (V) at 23 °C	Allowable overdrive [1] voltage (V) at 85 °C
VF4-**D**-**	6	22.5	3.6	0.6	10.1	7.9
VF4-**F**-**	12	90	7.2	1.2	20.2	15.7
VF4-**H**-**	24	360	14.4	2.4	40.5	31.5

[1] Allowable overdrive is stated with no load applied and minimum coil resistance.

Standard delivery packs (orders in multiples of delivery pack)

VF4-1:	300 pieces
VF4-2:	165 pieces
VF4-3:	165 pieces
VF4-4:	300 pieces
VF4-5:	110 pieces
VF4-6:	110 pieces