

# VF4 series

## 40 Amp Relay With PC Board or Quick Connect Terminals for Automotive Applications

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

### Features

- 40A continuous contact rating @ 85°C.
- 1 Form A and 1 Form C arrangements.
- Plug-in or PC board terminals.
- Optional mounting bracket.
- Various enclosure options.

### Conditions

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

### Contact Data

**Arrangements:** 1 Form A (SPST-NO) and 1 Form C (SPDT).  
**Material:** AgNi 0.15 (consult factory for other contact materials).  
**Max. Switching Rate:** 20 operations per second with no contact load.  
 6 operations per minute for rated life at rated load.  
**Max. Switching Voltage:** 75VDC<sup>(1)</sup>.  
**Max. Load Current (@ 14VDC Load Voltage):**

Load	Form A (NO)	Form C	
		NO	NC
Max. Continuous Current	60A	60A	40A
Max. Make Current <sup>(2)</sup>	120A	120A	45A
Max. Break Current <sup>(1)</sup>	60A	60A	40A

**Max. Switching Power:** 50-500 watts DC (voltage dependent)<sup>(1)</sup>.  
**Min. Recommended Current:** 1 amp @ 12VDC.  
**Initial Voltage Drop:** 200 millivolts, maximum, for normally open contacts @ 40 amp contact load.  
 250 millivolts, maximum, for normally closed contacts @ 30 amp contact load.  
**Expected Life:** 10 million operations, mechanical; 100,000 operations at 40 amps, 14VDC, resistive load on normally open contact.

### Initial Dielectric Strength

Between Contacts and Coil: 500V rms.

### Coil Data

**Voltage:** 6, 12 and 24VDC.  
**Resistance:** See Coil Data table.  
**Nom. Power:** (@ 23°C coil temp. and rated coil voltage.):  
 1.6W, un-suppressed.  
 1.81W, with 680 ohm resistor.  
**Thermal Resistance:** 50°C per actual coil watt in still air with no contact load current.

### Coil Data

Coil Designator	Rated Coil Voltage (VDC)	Coil Resistance ±10% (Ohms)	Coil Inductance (H) (Ref.)	Must-Operate Voltage (VDC)	Must-Release Voltage (VDC)	Allowable <sup>(3)</sup> Overdrive (VDC)	
						@ 23°C	@ 85°C
D	6	22.5	0.2	3.6	0.6	10.1	7.9
F	12	90	0.8	7.2	1.2	20.2	15.7
H	24	360	2.7	14.4	2.4	40.5	31.5

### Operate Data

**Must Operate and Must Release Voltage:** See Coil Data table.  
**Initial Operate Time:** 7 milliseconds, typical, with rated coil voltage applied.  
**Initial Release Time:** 2 milliseconds, typical, with zero volts applied (for un-suppressed relays after having been energized at rated coil voltage.)

### Environmental Data

**Temperature Range:** **Storage:** -40°C to +155°C.  
**Operating:** -40°C to +125°C<sup>(4)</sup>.  
**Shock:** 20g, 11 milliseconds, half sine wave pulse.  
**Vibration:** (For NC contacts, NO contacts are significantly higher.)  
 10-40 Hz., 1.27mm double amplitude.  
 40-70 Hz., 5 g's constant.  
 70-100 Hz., 0.5mm double amplitude.  
 100-500 Hz., 10 g's constant.

### Mechanical Data

**Termination:** 0.250" quick connect and printed circuit terminals.  
**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.  
**Cover Retention:** Dust cover will withstand a 33.7 pound (150 Newton) force (axially applied) without detachment. Ultrasonic cover: 50 pound (220 Newton).  
**Weight:** 31g (1.1 oz.) approximately (dust cover model).

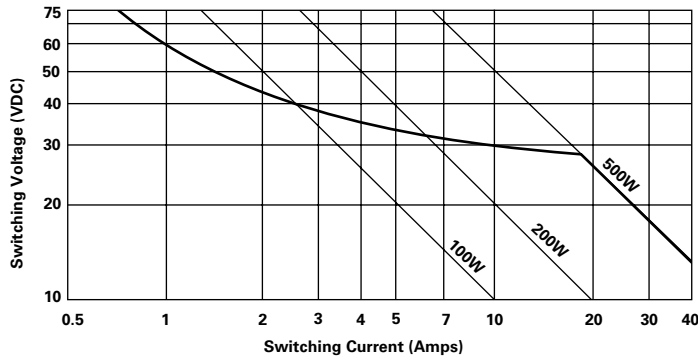
### Abnormal Operation

**Overload Current:** Consult factory.  
**24V Jump Start:** 24VDC for 5 minutes conducting rated contact current @ 23°C.  
**Drop Test:** Capable of meeting specifications after a 3.28 foot (1.0 meter) drop onto concrete.  
**Flammability:** UL94V-0 external; UL94-HB or better, internal parts (meets FMVSS 302).

### Notes

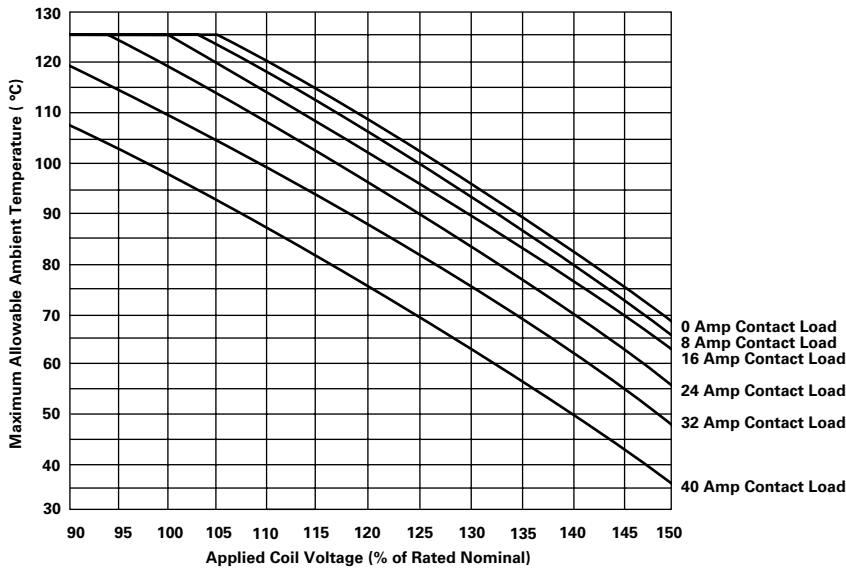
- (1) See Figure 1.
- (2) Inrush current for lamp load.
- (3) Allowable overdrive is rated at ambient temperature for 23°C or 85°C as stated with no load current flowing through the relay contacts and minimum coil resistance. Also see Figure 2 for maximum ambient temperature versus applied coil voltage.
- (4) See Figure 2.
- (5) Current and times are compatible with circuit protection by a typical automotive circuit breaker. Relay will make, carry and break the specified current.

**Figure 1 – Limiting Curve for Power Load**



Safe breaking, arc extinguished (normally open contact) for resistive loads.

**Figure 2 – Ambient Temperature vs. Coil Voltage for Continuous Duty**



**Assumptions:**

1. Thermal resistance = 50°C per watt
2. Still air
3. Nominal coil resistance
4. Maximum mean coil temperature = 180°C
5. Coil temperature rise due to load
  - = 2°C @ 8 amps
  - = 5°C @ 16 amps
  - = 11°C @ 24 amps
  - = 20°C @ 32 amps
  - = 32°C @ 40 amps
6. Thermal resistance and power dissipation based on coil resistance at 180°C
7. Curves are based on 1.6 watts at 23°C
8. When full lifetime is at high ambient and high load current, subtract 25°C from maximum allowable ambient temperature.

**Ordering Information**

Part Number	Contact Arrangement	Contact Material	Enclosure	Terminals
VF4-11 * 11	1 Form A	AgNi0.15	Dust cover	Quick connect
VF4-11 * 13	1 Form A	AgNi0.15	Dust cover	Printed circuit
VF4-15 * 11	1 Form C	AgNi0.15	Dust cover	Quick connect
VF4-15 * 13	1 Form C	AgNi0.15	Dust cover	Printed circuit
VF4-25 * 11	1 Form C	AgNi0.15	Shrouded dust cover	Quick connect
VF435 * 11	1 Form C	AgNi0.15	Weatherproof cover	Quick connect
VF4-41 * 11	1 Form A	AgNi0.15	Dust cover with bracket	Quick connect
VF4-45 * 11	1 Form C	AgNi0.15	Dust cover with bracket	Quick connect
VF4-45 * 21	1 Form C	AgSnO	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
VF4-81 * 11	1 Form A	AgNi0.15	Dust cover with molded bracket	Quick connect
VF4-85 * 11	1 Form C	AgNi0.15	Dust cover with molded bracket	Quick connect

\*Standard Coil Voltages: D = 6VDC (Consult factory for availability).  
F = 12VDC  
H = 24VDC (Consult factory for availability).

**Optional Coil Suppression**

Add suffix -S07 for 180 ohm resistor in parallel with 6VDC coil.  
Add suffix -S01 for 680 ohm resistor in parallel with 12VDC coil.  
Add suffix -S08 for 2,700 ohm resistor in parallel with 24VDC coil.

**Epoxy Sealed Construction**

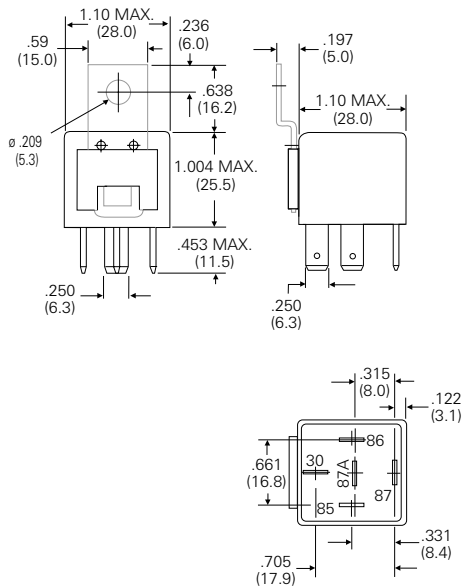
Add suffix -C01 for epoxy sealed unit.  
Add suffix -C05 for epoxy sealed unit with resistor.

**Our authorized distributors are more likely to maintain the following items in stock for immediate delivery.**

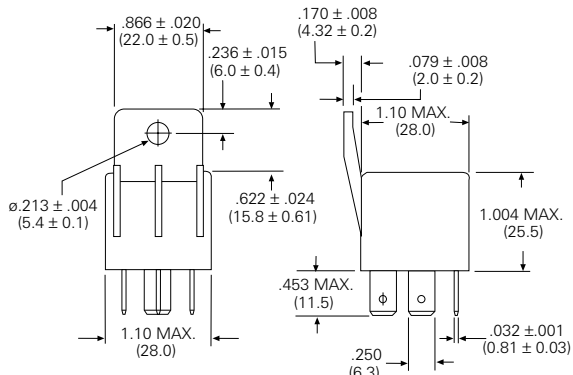
- VF4-15F11      VF4-15H11
- VF4-15F13      VF4-15H13
- VF4-45F11      VF4-65F11-S01

**Outline Dimensions**

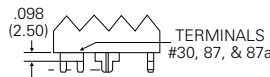
**Dust Cover With Quick Connect Terminals**  
VF4-1\_ (Without Bracket) & VF4-4\_ (With Bracket)



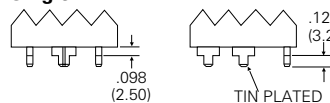
**Plastic Bracket Cover With Quick Connect Terminals**  
VF4-8\_



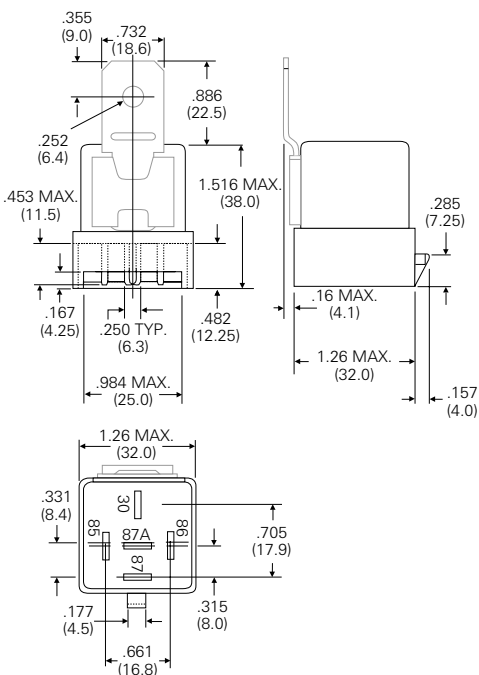
**Printed Circuit Board Terminals**  
Clinchable Power



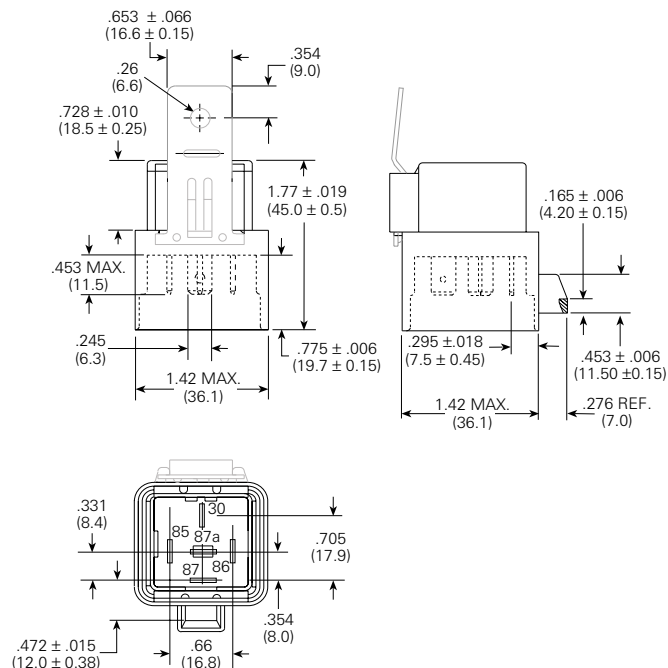
**Single Pin**



**Shrouded Dust Cover With Quick Connect Terminals**  
VF4-2\_ (Without Bracket) & VF4-5\_ (With Bracket)

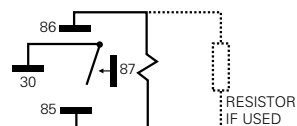


**Weatherproof Cover With Quick Connect Terminals**  
VF4-3\_ (Without Bracket) & VF4-6\_ (With Bracket)

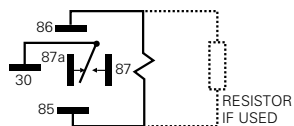


**Wiring Diagrams (Bottom Views)**

**1 Form A**

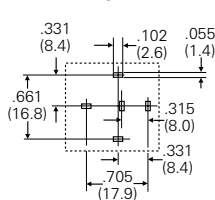


**1 Form C**

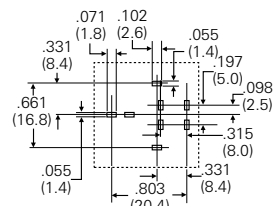


**Suggested PC Board Layouts (Bottom Views)**

**VF4-XXX13**



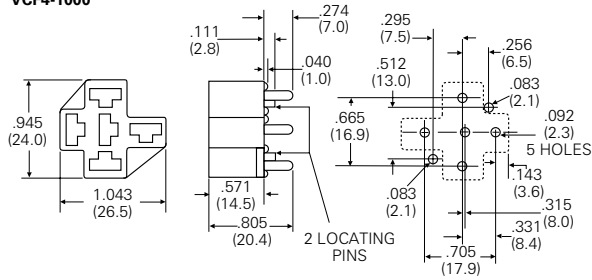
**VF4-XXX12**



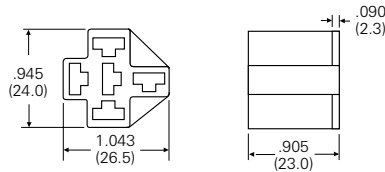
**Connectors**

**Connectors For Use With Quick Connect Terminal VF4-1, VF4-4 And VF4-8 Relays**

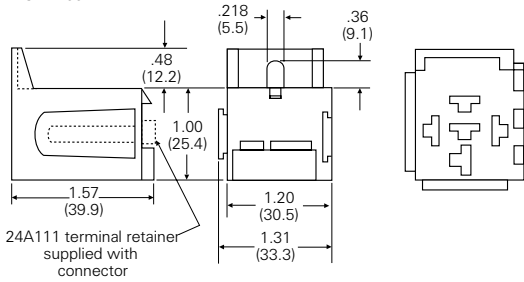
**PC Board Socket  
VCF4-1000**



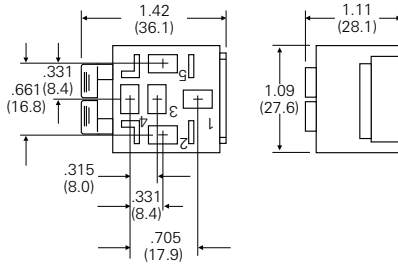
**Wiring Harness Style Connector (order terminals separately)  
VCF4-1001**



**Wiring Harness Style, Bracket Mount Socket (order terminals separately)  
(Mount individually or can be interlocked)  
VCF4-1002**



**Connector For Use With VF4-2 or VF4-5 Relays With Shrouded Dust Cover (order terminals separately)  
VCF4-1003**



**Connector For Use With VF4-3 or VF4-6 Relays With Weatherproof Cover**

Connectors to mate with the weatherproof cover relays are available from Delphi Packard (1-800-PACKARD). (Typical Delphi Packard part number: 12065685).

**Connector/Terminal Usage Chart - Our authorized distributors are more likely to stock boldface items.**

Connector	Terminal P/N	Required Crimp Terminals (Order Separately)			
		Alternate P/N	Wire AWG	Qty. Required	
				Form A	Form C
VCF4-1000	None	None	N/A	0	0
VCF4-1001	<b>26A1349A</b>	AMP 60249-1	12-16	4	5
	<b>26A1349B</b>	AMP 42281-1	14-18		
VCF4-1002 VCF4-1003	<b>26A1348A</b>	Packard 12015864	18-20	4	5
	<b>26A1348B</b>	Packard 12015865	14-16		
	<b>26A1348C</b>	Packard 12084588	10-12		