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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⁽¹⁾.
Max. Load Current (@ 14VDC Load Voltage):

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

Max. Switching Power: 50-500 watts DC (voltage dependent)⁽¹⁾.
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 ⁽³⁾ 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⁽⁴⁾.
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).

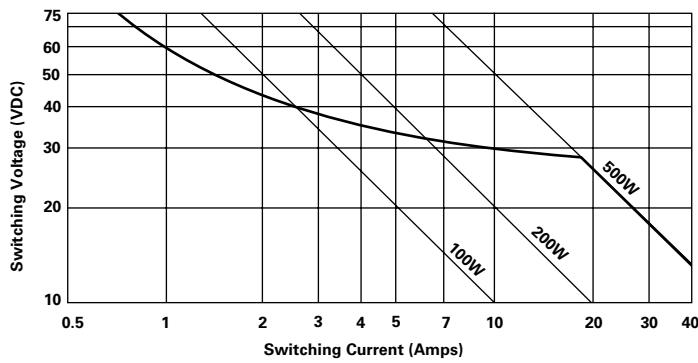
Abnormal Operation

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

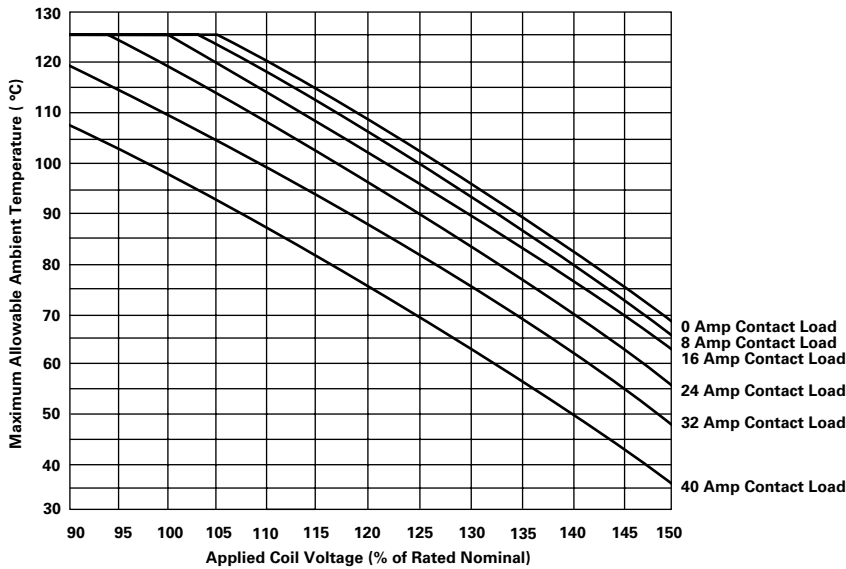
- (1) See Figure 1.
- (2) Inrush current for lamp load.
- (3) Allowable overdrive is rated at ambient temperature for 23°C or 85°C as stated with no load current flowing through the relay contacts and minimum coil resistance. Also see Figure 2 for maximum ambient temperature versus applied coil voltage.
- (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

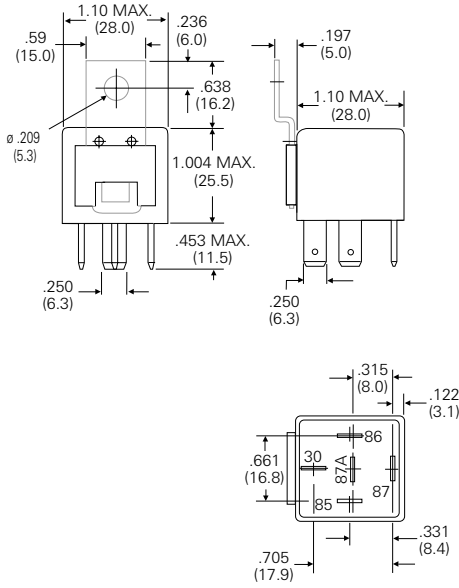
Add suffix -C01 for epoxy sealed unit.
Add suffix -C05 for epoxy sealed unit with resistor.

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

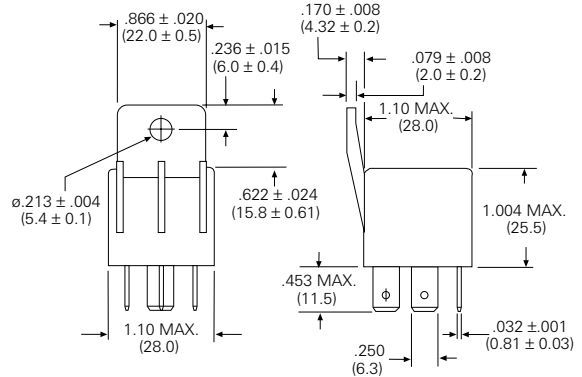
- VF4-15F11 VF4-15H11
- VF4-15F13 VF4-15H13
- VF4-45F11 VF4-65F11-S01

Outline Dimensions

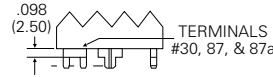
Dust Cover With Quick Connect Terminals
VF4-1_ (Without Bracket) & VF4-4_ (With Bracket)



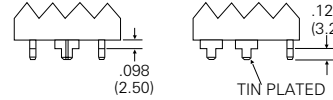
Plastic Bracket Cover With Quick Connect Terminals
VF4-8_



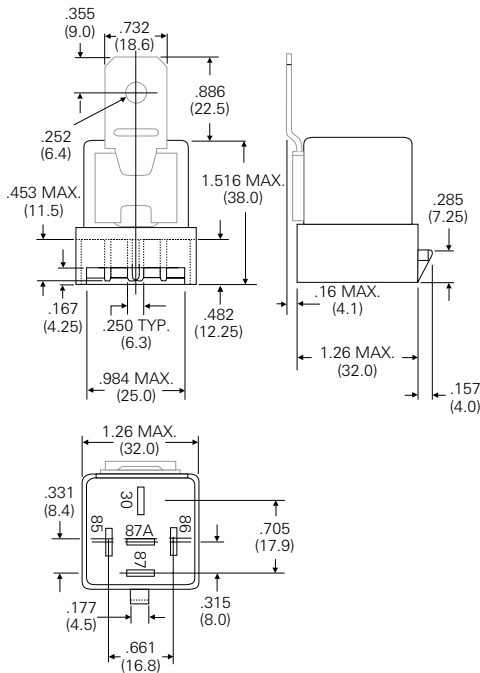
Printed Circuit Board Terminals
Clinchable Power



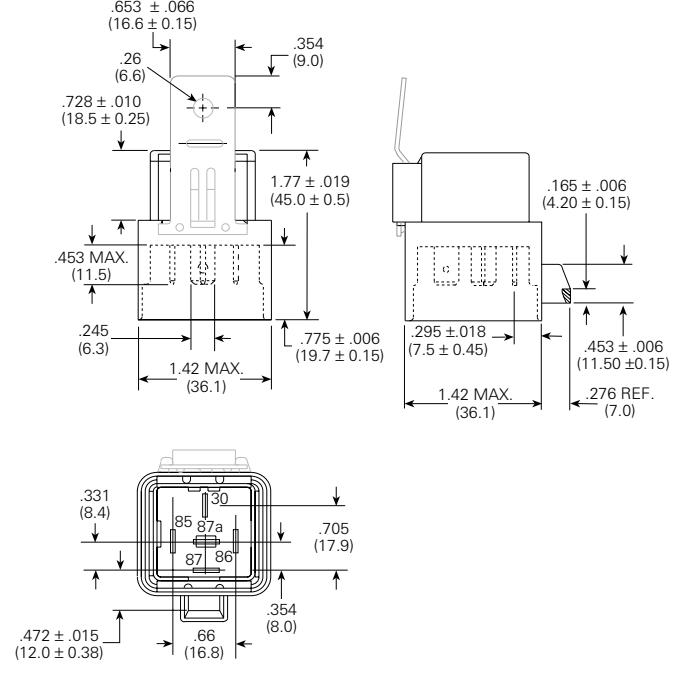
Single Pin



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

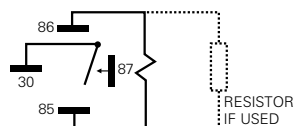


Weatherproof Cover With Quick Connect Terminals
VF4-3_ (Without Bracket) & VF4-6_ (With Bracket)

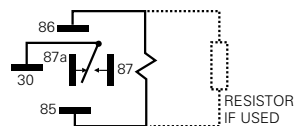


Wiring Diagrams (Bottom Views)

1 Form A

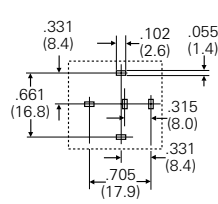


1 Form C



Suggested PC Board Layouts (Bottom Views)

VF4-XXX13



VF4-XXX12

