

Power Relay F4 /VF4



Features

- Limiting continuous current 40 A at 85°C
- Pin assignment similar to ISO 7588 part 1
- Plug-in or PCB terminals
- Also available for 42 V applications

Customized Versions on Request

- 24 V versions with contact gap > 0.8 mm
- Integrated components (e.g. resistor, diode)
- Customized marking/color
- Special covers (e.g. notches, release features, brackets)
- Various contact arrangements and materials
- For latching (bistable) version refer to Mini Relay Latching
- For shrouded/weatherproof dust cover versions refer to Shrouded Power Relay F4 A and VF4 A

Typical Applications

Cross carline up to 40 A for example:

- ABS control
- Blower fans
- Car alarm
- Cooling fan
- Electric Power Steering
- Energy management
- Engine control
- Fuel pump
- Heated front screen
- Ignition
- Immobilizer
- Lamps front, rear, fog light
- Main switch/supply relay
- Seatbelt pretensioner
- Trunk lock
- Valves
- Window lifter
- Wiper control

Please contact Tyco Electronics for relay application support.



134_3Dco_1

Design

- ELV/RoHS/WEEE compliant
- Dustproof: protection class IP54 to IEC 529 (EN 60 529)
- Sealed: protection class IP67 to IEC 529 (EN 60 529)

Weight

Approx. 35 g (1.2 oz.)

Nominal Voltage

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 229 ff

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, 998.9 ±33.9 hPa.

For general storage and processing recommendations please refer to our Application Notes and especially to *Storage* in the "Glossary" page 23 or at <http://relays.tycoelectronics.com/appnotes/>

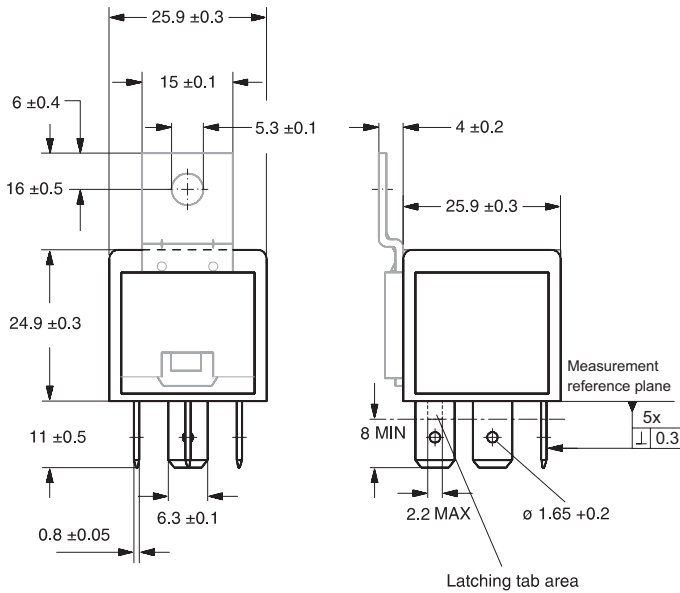
Disclaimer

All technical performance data apply to the relay as such, specific conditions of the individual application are not considered. Please always check the suitability of the relay for your intended purpose. We do not assume any responsibility or liability for not complying herewith. We recommend to complete our questionnaire and to request our technical service. Any responsibility for the application of the product remains with the customer only. All specifications are subject to change without notification. All rights of Tyco Electronics are reserved.

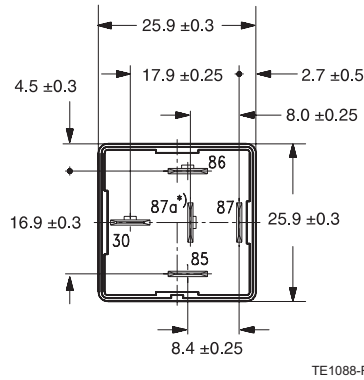
Power Relay F4/VF4

Dimensional Drawing

Power Relay F4/VF4 with Quick Connect Terminals

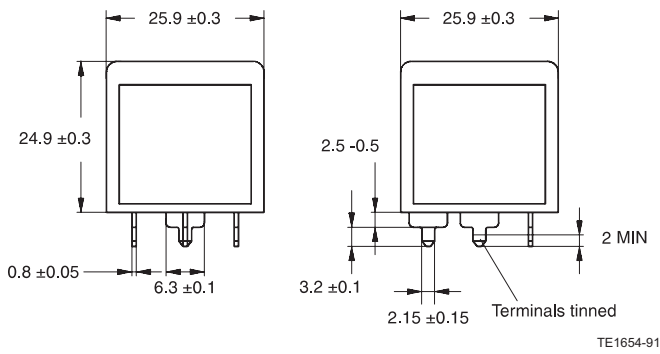


View of the Terminals (bottom view)

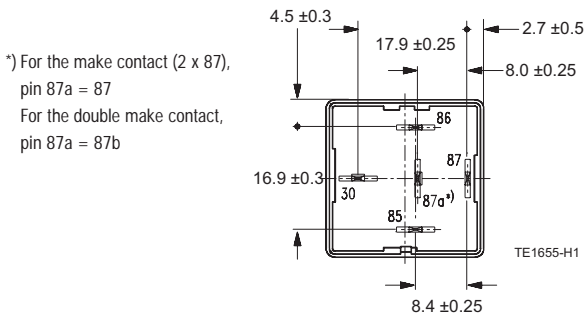


*) For the make contact (2 x 87),
pin 87a = 87
For the double make contact,
pin 87a = 87b

Power Relay F4/VF4 with PCB Terminals

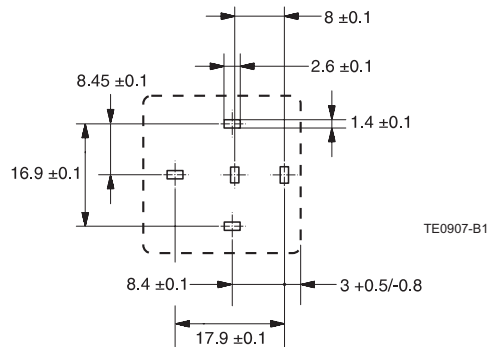


View of the Terminals (bottom view)



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

Mounting Holes (bottom view)



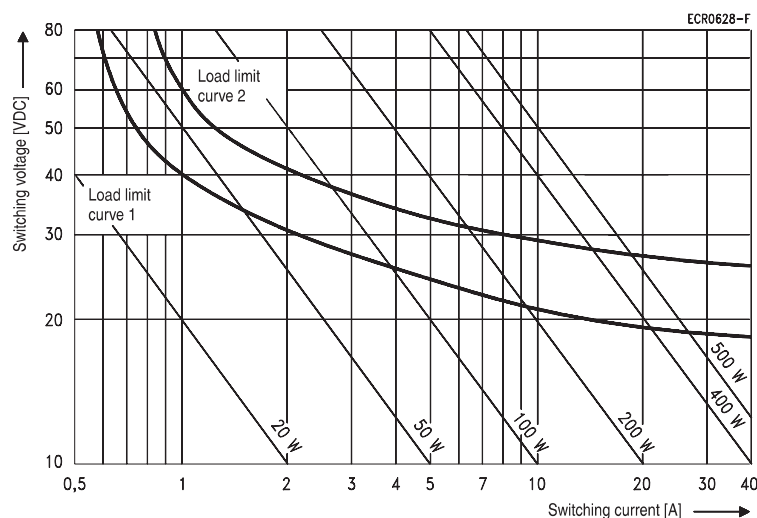
Power Relay F4/VF4

Contact Data

| Contact configuration | 1 Make contact/ 1 Form A or 1 Form A (2 x 87) | | 1 Double make contact/ 1 Form U | | 1 Changeover contact/ 1 Form C | | |
|---|--|--------------------------|------------------------------------|------------------------------|--|--|---|
| Circuit symbol (see also Pin assignment) | | | | | | | |
| Rated voltage | 12 V | 24 V | 12 V | 24 V | 12 V | 24 V | 24 V ³⁾ |
| Rated current | 40 A | 20 A | 2 x 25 A | 2 x 15 A | 30/40 A | 15/20 A | 20/30 A |
| Limiting continuous current | 60 A | | 2 x 32 A | | NC/NO | | |
| 23°C | 60 A | | 2 x 32 A | | 45/60 A | | |
| 85°C | 40 A | | 2 x 25 A | | 30/40 A | | |
| 125°C | 17 A | | 2 x 11 A | | 12/17 A | | |
| Contact material | Silver based | | | | | | |
| Max. switching voltage/power | See load limit curve | | | | | | |
| Max. switching current ¹⁾ | | | | | NC/NO | NC/NO | NC/NO |
| On ²⁾ | 120 A | 120 A | 2 x 100 A | 2 x 100 A | 45/120 A | 45/120 A | 45/120 A |
| Off | 60 A | 20 A | 2 x 40 A | 2 x 15 A | 40/60 A | 15/20 A | 20/30 A |
| Min. recommended load ⁴⁾ | 1 A at 5 V | | | | | | |
| Voltage drop at 10 A (initial) | Typ. 15 mV, 200 mV max. | | Typ. 2 x 15 mV, 200 mV max. | | Typ. 15 mV, 200 mV max. | | |
| NO contact | | | | | | | |
| NC contact | | | | | Typ. 20 mV, 250 mV max. | | |
| Mechanical endurance (without load) | > 10 ⁷ operations | | | | | | |
| Electrical endurance | > 2 x 10 ⁵ | > 1 x 10 ⁵ | > 2 x 10 ⁵ | > 1 x 10 ⁵ | > 2 x 10 ⁵ | > 1 x 10 ⁵ | > 1 x 10 ⁵ |
| (example of resistive load without component in parallel to the coil) | operations 40 A, 14 V | operations 20 A, 28 V | operations 2 x 25 A, 14 V | operations 2 x 15 A, 28 V | operations 40 A, 14 V (NO contact) | operations 20 A, 28 V (NO contact) | operations 30 A, 28 V (NO contact) |
| | | | | | | | > 5 x 10 ⁵ operations 10 A, 28 V (NC 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 14 V for 12 V or 28 V for 24 V load voltages.
- 2) For a load current duration of maximum 3 s for a make/break ratio of 1:10.
- 3) Special high performance 24 V version with contact gap > 0.8 mm, part number V23134-A0056-X432/-X433 (see ordering information).
- 4) See chapter Diagnostics of Relays in our Application Notes page 31 or consult the internet at <http://relays.tycoelectronics.com/appnotes/>

Load Limit Curve

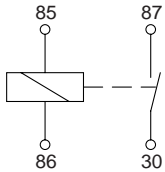


Load limit curve 1 ≙ arc extinguishes during transit time (changeover contact)
Load limit curve 2 ≙ safe shutdown, no stationary arc (make contact)

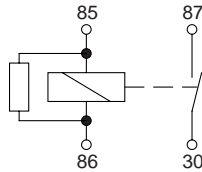
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Circuit Diagram

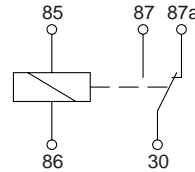
A0
1 Make contact/1 Form A



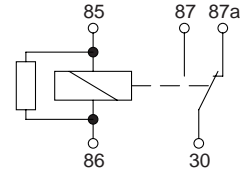
AR
1 Make contact/1 Form A
with Resistor



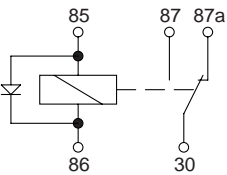
C0
1 Changeover contact/1 Form C



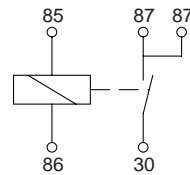
CR
1 Changeover contact/1 Form C
with Resistor



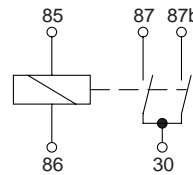
CD
1 Changeover contact/1 Form C
with Diode



D0
1 Make contact/1 Form A (2 x 87)



U0
1 Double make contact/1 Form U



Coil Data

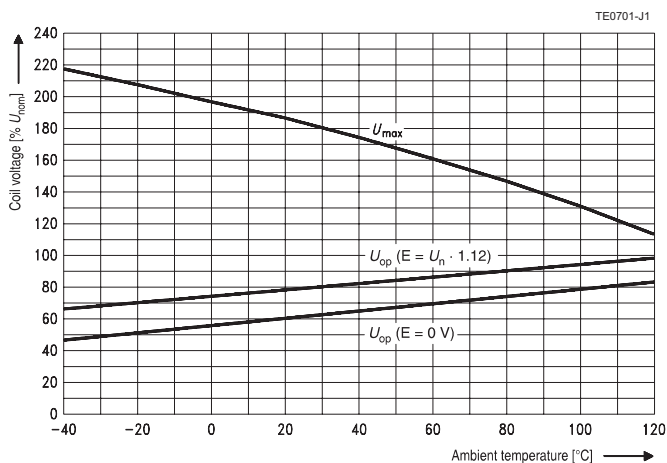
| | |
|--|--|
| Available for nominal voltages | 12 V / 24 V |
| Nominal power consumption of the unsuppressed coil at nominal voltage | 1.6 W |
| Nominal power consumption at nominal voltage with suppression resistor | 1.8 W / 2.6 W (standard/high performance 24 V) |
| Test voltage winding/contact | 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.

Note:

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

Power Relay F4 /VF4

Mechanical Data

| | |
|---|--|
| Cover retention | |
| Axial force | 150 N |
| Pull force | 150 N |
| Push force | 150 N |
| Terminals | |
| Pull force | 100 N |
| Push force | 100 N |
| Resistance to bending, force applied to front | 10 N ¹⁾ |
| Resistance to bending, force applied to side | 10 N ¹⁾ |
| Torsion | 0.3 Nm |
| Enclosures | |
| Dust cover | Protects relay from dust. For use in passenger compartment or enclosures |

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.

Environmental Conditions

| | | | | |
|--|--|---|-----------------------------|---|
| Temperature range, storage | Refer to <i>Storage</i> in the "Glossary" catalog page 23 or http://relays.tycoelectronics.com/appnotes/ | | | |
| 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 | IEC 68-2-30 | Db, Variant 1 | 6 cycles | Upper air temperature 55°C |
| constant | IEC 68-2-3 | Ca | 56 days | |
| Corrosive gas | IEC 68-2-42 | 10 ±2 cm ³ /m ³ SO ₂ | 10 days | |
| | IEC 68-2-43 | 1 ±0.3 cm ³ /m ³ H ₂ S | 10 days | |
| Vibration resistance | IEC 68-2-6 (sine sweep) | | 10 - 500 Hz min. 5 g | No change in the switching state > 10 μs Valid for NC contacts, NO contact values significantly higher |
| Shock resistance | IEC 68-2-27 (half sine form single pulses) | | min. 20 g 11 ms | |
| Load dump | ISO 7637-1 (12 V) ISO 7637-2 (24 V) | Test pulse 5 Test pulse 5 | Vs = +86.5 V Vs = +200 V | |
| 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 ft) drop onto concrete | | | |
| Flammability | UL94-HB or better (meets FMVSS 302) ¹⁾ | | | |
| Overload current for relays with rated currents as shown in contact data table ²⁾ | | 1.35 x Rated current 1800 s 2.00 x Rated current 5 s 3.50 x Rated current 0.5 s 6.00 x Rated current 0.1 s | | |

¹⁾ FMVSS: Federal Motor Vehicle Safety Standard.

²⁾ Current and time are compatible with circuit protection by a typical automotive fuse. Relay will make, carry and break the specified current.

Power Relay F4 /VF4

Ordering Information

| Part Numbers (see table below for coil data) | | Part Number | Circuit/Contact Arrangement | Contact Material | Enclosure | Coil Suppression | Bracket |
|---|--------------------|-------------|--------------------------------|---------------------|--------------------|-----------------------|---------|
| Relay Description | Internal Reference | | | | | | |
| 6 V Plug-In Relays | | | | | | | |
| VF4-45D11 | V23134-A1051-X826 | 7-1393305-2 | CO/1 Form C | Silver based | Dust cover | | Yes |
| 12 V Plug-In Relays | | | | | | | |
| V23134-A0052-C643 | | 2-1393302-2 | CO/1 Form C | Silver based | Dust cover | | |
| V23134-A0052-X205 ²⁾ | | 3-1393302-6 | CD/1 Form C | Silver based | Dust cover | Diode (cathode at 86) | |
| V23134-A0052-X278 | | 4-1393302-1 | CR/1 Form C | Silver based | Dust cover | Resistor 560 Ω | |
| V23134-A1052-C643 | | 5-1393302-8 | CO/1 Form C | Silver based | Dust cover | | Yes |
| VF4-45F11-C05 | V23134-A1052-X828 | 7-1393305-5 | CR/1 Form C | Silver based | Dust Cover, sealed | Resistor 680 Ω | Yes |
| V23134-B0052-C642 | | 7-1393302-5 | A0/1 Form A | Silver based | Dust cover | | |
| V23134-B0052-X270 | | 1-1414099-0 | AR/1 Form A | Silver based | Dust cover | Resistor 680 Ω | |
| V23134-B1052-C642 | | 3-1393303-4 | A0/1 Form A | Silver based | Dust cover | | Yes |
| VF4-41F11-S01 | V23134-B1052-X824 | 6-1393305-9 | AR/1 Form A | Silver based | Dust cover | Resistor 680 Ω | Yes |
| V23134-C0052-C642 | | 3-1393303-9 | DO/1 Form A (2 x 87) | Silver based | Dust cover | | |
| V23134-C1052-C642 | | 4-1393303-7 | DO/1 Form A (2 x 87) | Silver based | Dust cover | | Yes |
| V23134-M0052-C642 | | 5-1393304-6 | U0/1 Form U | Silver based | Dust cover | | |
| V23134-M1052-C642 | | 7-1393304-1 | U0/1 Form U | Silver based | Dust cover | | Yes |
| 12 V PCB Relays | | | | | | | |
| V23134-A0052-G243 | | 2-1393302-3 | CO/1 Form C | Silver based | Dust cover | | |
| VF4-15F13 | V23134-A0052-X811 | 1393302-6 | CO/1 Form C | Silver based | Dust cover | | |
| VF4-15F13-C01 | V23134-A0052-X812 | 4-1393305-5 | CO/1 Form C | Silver based | Dust cover, sealed | | |
| VF4-15F13-C05 | V23134-A0052-X813 | 4-1393305-7 | CR/1 Form C | Silver based | Dust cover, sealed | Resistor 680 Ω | |
| V23134-B0052-G242 | | 7-1393302-7 | A0/1 Form A | Silver based | Dust cover | | |
| VF4-11F13 | V23134-B0052-X801 | 2-1393305-1 | A0/1 Form A | Silver based | Dust cover | | |
| VF4-11F13-C01 | V23134-B0052-X802 | 2-1393305-2 | A0/1 Form A | Silver based | Dust cover, sealed | | |
| V23134-C0052-G242 | | 4-1393303-0 | DO/1 Form A (2 x 87) | Silver based | Dust cover | | |
| V23134-M0052-G242 | | 5-1393304-7 | U0/1 Form U | Silver based | Dust cover | | |
| 24 V Plug-In Relays | | | | | | | |
| V23134-A0053-C643 | | 5-1393302-1 | CO/1 Form C | Silver based | Dust cover | | |
| V23134-A0056-X432 ¹⁾ | | 1-1414167-0 | CD/1 Form C | Silver based | Dust cover | Diode (cathode at 86) | |
| V23134-A0056-X433 ¹⁾ | | 1-1414168-0 | CR/1 Form C | Silver based | Dust cover | Resistor 1200 Ω | |
| VF4-15H11-C05 | V23134-A0064-X816 | 5-1393305-3 | CR/1 Form C | Silver based | Dust cover, sealed | Resistor 2700 Ω | |
| V23134-A1053-C643 | | 6-1393302-3 | CO/1 Form C | Silver based | Dust cover | | Yes |
| VF4-45H11-C05 | V23134-A1064-X829 | 1432219-1 | CR/1 Form C | Silver based | Dust cover, sealed | Resistor 2700 Ω | Yes |
| VF4-45H11-S05 | V23134-A1064-X830 | 8-1393305-4 | CD/1 Form C | Silver based | Dust cover | Diode (cathode at 86) | Yes |
| V23134-B0053-C642 | | 1393303-9 | A0/1 Form A | Silver based | Dust cover | | |
| VF4-41H11 | V23134-B1064-X825 | 7-1393305-0 | A0/1 Form A | Silver based | Dust cover | | Yes |
| VF4-41H11-S08 | V23134-A1064-X831 | 7-1393305-1 | AR/1 Form A | Silver based | Dust cover | Resistor 2700 Ω | Yes |
| V23134-B1053-C642 | | 3-1393303-7 | A0/1 Form A | Silver based | Dust cover | | Yes |
| V23134-C0053-C642 | | 4-1393303-4 | DO/1 Form A (2 x 87) | Silver based | Dust cover | | |
| V23134-C1053-C642 | | 5-1393303-0 | DO/1 Form A (2 x 87) | Silver based | Dust cover | | Yes |
| V23134-M0053-C642 | | 6-1393304-7 | U0/1 Form U | Silver based | Dust cover | | |
| V23134-M1053-C642 | | 7-1393304-4 | U0/1 Form U | Silver based | Dust cover | | Yes |
| 24 V PCB Relays | | | | | | | |
| V23134-A0053-G243 | | 5-1393302-2 | CO/1 Form C | Silver based | Dust cover | | |
| VF4-11H13 | V23134-B0064-X804 | 2-1393305-6 | A0/1 Form A | Silver based | Dust cover | | |
| VF4-15H13 | V23134-A0064-X819 | 1393302-8 | CO/1 Form C | Silver based | Dust cover | | |
| VF4-15H13-C01 | V23134-A0064-X820 | 5-1393305-9 | CO/1 Form C | Silver based | Dust cover, sealed | | |
| V23134-B0053-G242 | | 1-1393303-0 | A0/1 Form A | Silver based | Dust cover | | |
| V23134-C0053-G242 | | 4-1393303-5 | DO/1 Form A (2 x 87) | Silver based | Dust cover | | |
| V23134-M0053-G242 | | 6-1393304-8 | U0/1 Form U | Silver based | Dust cover | | |

¹⁾ Special feature: contact gap > 0.8 mm.

²⁾ Load terminals without surface.

Power Relay F4 / VF4

Coil Versions

| Coil Data for Power F4/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 | at 85°C |
| VF4-**D**-** | 6 | 22 | 3.6 | 0.6 | 11 | 8 |
| VF4-**F**-** | 12 | 90 | 7.2 | 1.2 | 22 | 17 |
| V23134-**052-**** | 12 | 90 | 7.2 | 1.6 | 22 | 17 |
| VF4-**H**-** | 24 | 360 | 14.4 | 2.4 | 40 | 30 |
| V23134-**053-**** | 24 | 324 | 14.4 | 3.2 | 41 | 32 |
| V23134-**056-**** | 24 | 268 | 16.0 | 4.0 | 38 | 29 |
| V23134-**064-**** | 24 | 360 | 14.4 | 2.4 | 40 | 30 |

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

Standard Delivery Packs (orders in multiples of delivery pack)

| | | |
|--------------|-----------------------------|------------|
| Power F4 | Quick connect version: | 315 pieces |
| | Quick connect with bracket: | 200 pieces |
| | PCB version: | 200 pieces |
| VF4-1, VF4-4 | | 300 pieces |