

Power Relay F4/VF4



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 part 1
- Standardized dimensions
- 24 V versions with contact gap > 0.8 mm
- Plug-in or PCB terminals
- ELV/RoHS/WEEE compliant

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.



134_kop1

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

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).

For general precautions please refer to our Application Notes and especially to *Storage* in the "Glossary" at <http://relays.tycoelectronics.com/appnotes/>

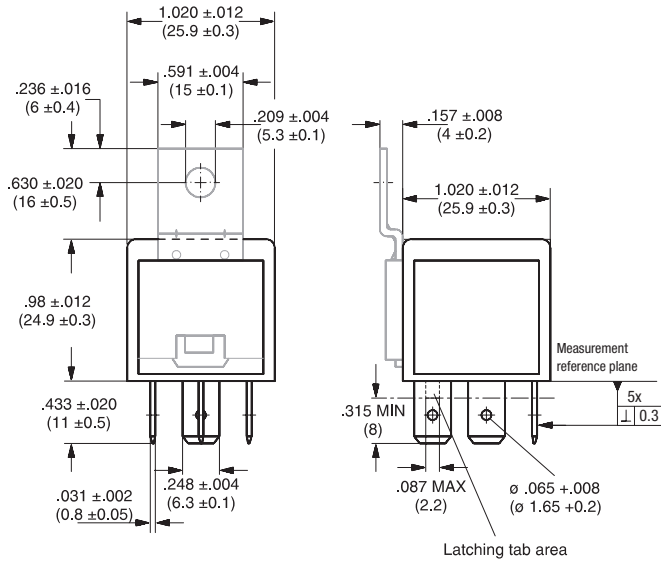
Disclaimer

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 are reserved.

Power Relay F4 / VF4

Dimensional drawing

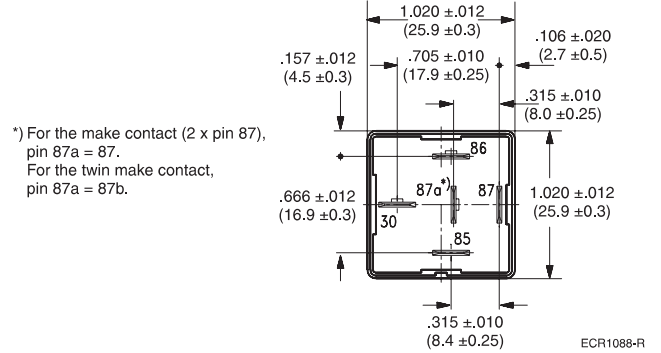
Version with quick connect terminals



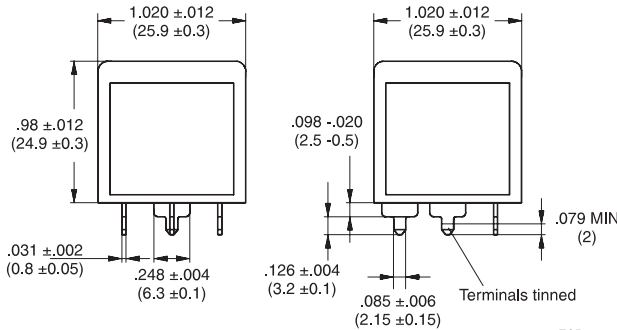
Quick connect terminal similar to ISO 8092-1

Tyco1093-S

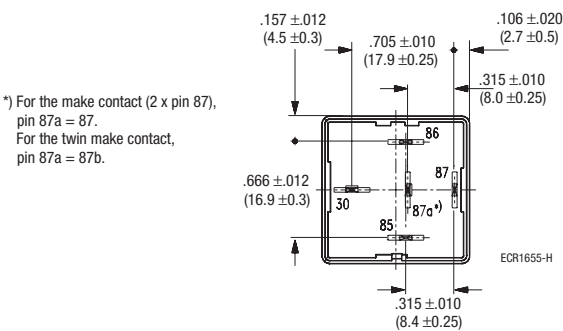
View of the terminals (bottom view)



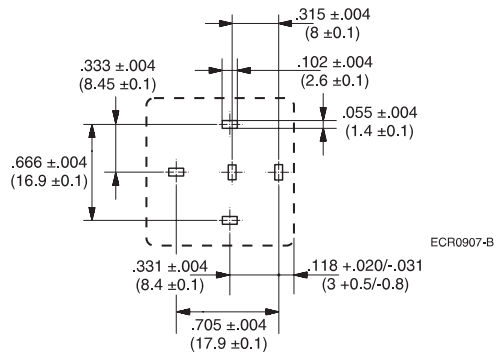
Version with PCB terminals



View of the terminals (bottom view)



Mounting hole layout



Power Relay F4 /VF4

Contact data

| Contact configuration | Make contact/ Form A or Form A (2x87) | | Double make contact/ Form U | | Changeover contact/ 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 at 85 °C | 40 A | 20 A | 2 x 25 A | 2 x 15 A | 30/40 A | 15/20 A | 20/30 A |
| Contact material | AgNi0.15 | | AgNi0.15 | | AgNi0.15 | | AgSnO ₂ |
| Max. switching voltage/power | See load limit curve | | | | | | |
| Max. switching current ¹⁾ | | | | | | | |
| On ²⁾ | 120 A | 120 A | 2 x 100 A | 2 x 100 A | NC/NO 45/120A | NC/NO 45/120A | NC/NO 45/120A |
| Off | 60 A | 20 A | 2 x 40 A | 2 x 15 A | 40/60A | 15/20A | 20/30A |
| Min. recommended load ⁴⁾ | 1 A at 5 V | | | | | | |
| Voltage drop at 10 A (initial) | NO contact NC contact | | Typ. 15 mV, 200 mV max. | | Typ. 2 x 15 mV, 200 mV max. | | Typ. 15 mV, 200 mV max. Typ. 20 mV, 250 mV max. |
| Mechanical endurance (without load) | > 10 ⁷ operations | | | | | | |
| Electrical endurance (example of resistive load without component in parallel to the coil) | > 2 x 10 ⁵ operations 40 A, 14 V | > 1 x 10 ⁵ operations 20 A, 28 V | > 2 x 10 ⁵ operations 2 x 25 A, 14 V | > 1 x 10 ⁵ operations 2 x 15 A, 28 V | > 2 x 10 ⁵ operations 40 A, 14 V (NO contact) | > 1 x 10 ⁵ operations 20 A, 28 V (NO contact) | > 1 x 10 ⁵ 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) | | | | | | |

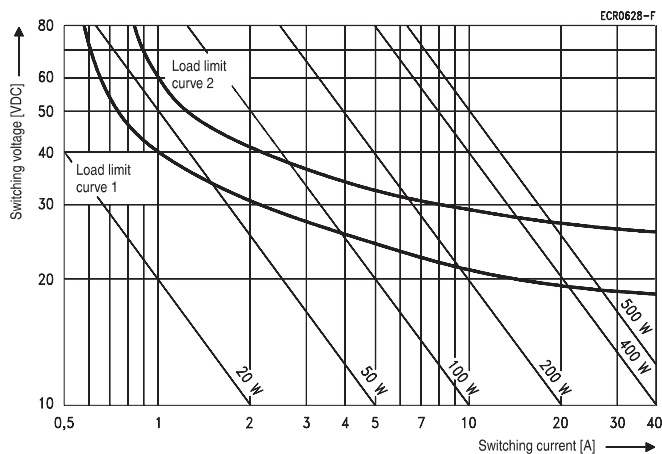
¹⁾ The values apply to a resistive or inductive load with suitable spark suppression and at maximum 14 V for 12 V or 28 V for 24 V load voltages.

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 Diagnostic Routines in our Application Notes at <http://relays.tycoelectronics.com/appnotes/>

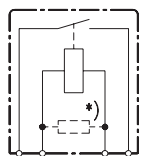
Load limit curve



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

Pin assignment

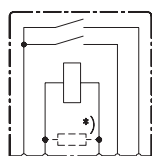
1 make contact/
1 form A



30 85 86 87
ECR1100 - E

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

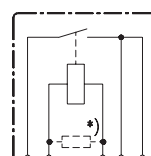
Power relay F4 only
1 double make contact/
1 form U



30 85 86 87 87b
ECR1090 - 3

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

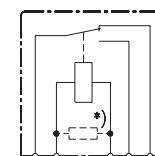
Power relay F4 only
1 make contact (2 x pin 87)/
1 form A (2 x pin 87)



30 85 86 87 87
ECR1085 - 2

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

1 changeover contact/
1 form C



30 85 86 87 87a
ECR1078 - J

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

Power Relay F4 / VF4

Coil data

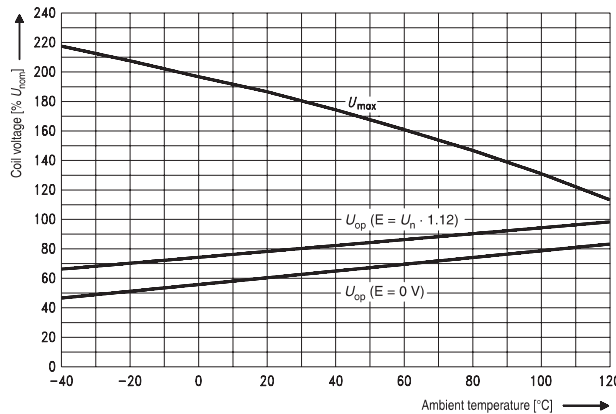
| | |
|--|--|
| Available for nominal voltages | 12, 24 V |
| Nominal power consumption of the unsuppressed coil at nominal voltage | 1.6 W |
| Nominal power consumption at nominal voltage with suppression resistor | 1.8/2.1 W (standard/high performance 24 V) |
| Test voltage winding/contact | 500 VAC _{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

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.

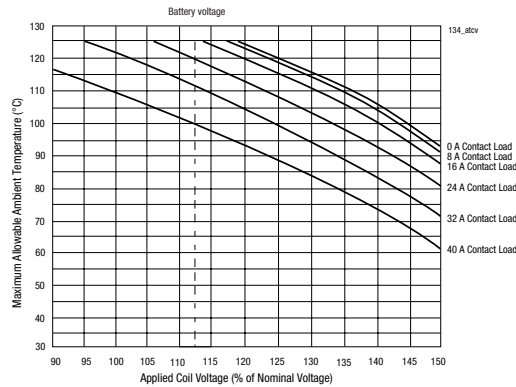
Operating voltage range



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

ECR0701-J

Ambient temperature vs. coil voltage for continuous duty



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 F4/VF4

| Environmental conditions | | | | |
|--|---|--|-----------------------------|---|
| Temperature range, storage | Refer to <i>Storage</i> in the "Glossary" | | | |
| 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 foot) 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 I _{rated} 1800 s 2.00 x I _{rated} 5 s 3.50 x I _{rated} 0.5 s 6.00 x I _{rated} 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.

Ordering information

| Part numbers for Power Relay F4/VF4 (see table below for coil data) | | Tyco order number | Contact arrangement | Contact material | Enclosure | Special features |
|---|---------------------------|--------------------------|----------------------------|-------------------------|------------------|-------------------------|
| Relay part number | Internal reference | | | | | |
| 6 V Plug-In Relays | | | | | | |
| VF4-45D11 | V23134-A1051-X826 | 7-1393305-2 | 1 Form C | AgNi0.15 | Dust cover | Bracket |
| 12 V Plug-In Relays | | | | | | |
| V23134-A0052-C643 | | 2-1393302-2 | 1 Form C | AgNi0.15 | Dust cover | |
| V23134-A0052-X205 | | 3-1393302-6 | 1 Form C | AgNi0.15 | Dust cover | Diode (cathode at 86) |
| V23134-A0052-X278 | | 4-1393302-1 | 1 Form C | AgNi0.15 | Dust cover | Resistor 560 Ω |
| V23134-A1052-C643 | | 5-1393302-8 | 1 Form C | AgNi0.15 | Dust cover | Bracket |
| VF4-45F11-C05 | V23134-A1052-X828 | 7-1393305-5 | 1 Form C | AgNi0.15 | Sealed | Bracket, resistor 680 Ω |
| V23134-B0052-C642 | | 7-1393302-5 | 1 Form A | AgNi0.15 | Dust cover | |
| V23134-B1052-C642 | | 3-1393303-4 | 1 Form A | AgNi0.15 | Dust cover | Bracket |
| VF4-41F11-S01 | V23134-B1052-X824 | 6-1393305-9 | 1 Form A | AgNi0.15 | Dust cover | Bracket, resistor 680 Ω |
| V23134-C0052-C642 | | 3-1393303-9 | 1 Form A (2 pins 87) | AgNi0.15 | Dust cover | |
| V23134-C1052-C642 | | 4-1393303-7 | 1 Form A (2 pins 87) | AgNi0.15 | Dust cover | Bracket |
| V23134-M0052-C642 | | 5-1393304-6 | 1 Form U | AgNi0.15 | Dust cover | |
| V23134-M1052-C642 | | 7-1393304-1 | 1 Form U | AgNi0.15 | Dust cover | Bracket |
| V23134-B0052-X269 | | 9-1393302-6 | 1 Form A | AgNi0.15 | Dust cover | Resistor 560 Ω |
| V23134-B0052-X270 | | 1-1414099-0 | 1 Form A | AgSnO2 | Dust cover | Resistor 680 Ω |
| 12 V PCB Relays | | | | | | |
| V23134-A0052-G243 | | 2-1393302-3 | 1 Form C | AgNi0.15 | Dust cover | |
| VF4-15F13-C01 | V23134-A0052-X812 | 4-1393305-5 | 1 Form C | AgNi0.15 | Sealed | |
| VF4-15F13-C05 | V23134-A0052-X813 | 4-1393305-7 | 1 Form C | AgNi0.15 | Sealed | Resistor 680 Ω |
| V23134-B0052-G242 | | 7-1393302-7 | 1 Form A | AgNi0.15 | Dust cover | |
| VF4-11F13-C01 | V23134-B0052-X802 | 2-1393305-2 | 1 Form A | AgNi0.15 | Sealed | |
| V23134-C0052-G242 | | 4-1393303-0 | 1 Form A (2 pins 87) | AgNi0.15 | Dust cover | |
| V23134-M0052-G242 | | 5-1393304-7 | 1 Form U | AgNi0.15 | Dust cover | |
| VF4-11F13 | V23134-B0052-X801 | 2-1393305-1 | 1 Form A | AgNi0.15 | Dust cover | |
| VF4-15F13 | V23134-A0052-X811 | 1393302-6 | 1 Form C | AgNi0.15 | Dust cover | |

Power Relay F4 / VF4

Ordering information

| Part numbers for Power Relay F4/VF4 (see table below for coil data) | | Tyco order number | Contact arrangement | Contact material | Enclosure | Special features |
|--|--------------------|-------------------|----------------------|------------------|------------|--|
| Relay part number | Internal reference | | | | | |
| 24 V Plug-In Relays | | | | | | |
| V23134-A0053-C643 | | 5-1393302-1 | 1 Form C | AgNi0.15 | Dust cover | |
| V23134-A0056-X432 | | 1-1414167-0 | 1 Form C | AgSn02 | Dust cover | Contact gap > 0.8mm, diode (cathode at 86) |
| V23134-A0056-X433 | | 1-1414168-0 | 1 Form C | AgSn02 | Dust cover | Contact gap > 0.8mm, resistor 1.2 kΩ |
| VF4-15H11-C05 | V23134-A0064-X816 | 5-1393305-3 | 1 Form C | AgNi0.15 | Sealed | Resistor 2.7 kΩ |
| V23134-A1053-C643 | | 6-1393302-3 | 1 Form C | AgNi0.15 | Dust cover | Bracket |
| VF4-45H11-C05 | V23134-A1064-X829 | 1432219-1 | 1 Form C | AgNi0.15 | Sealed | Bracket, resistor 2.7 kΩ |
| VF4-15H11-S05 | V23134-A1064-X830 | 8-1393305-4 | 1 Form C | AgNi0.15 | Dust cover | Bracket, diode (cathode at 86) |
| V23134-B0053-C642 | | 1393303-9 | 1 Form A | AgNi0.15 | Dust cover | |
| V23134-B1053-C642 | | 3-1393303-7 | 1 Form A | AgNi0.15 | Dust cover | Bracket |
| V23134-C0053-C642 | | 4-1393303-4 | 1 Form A (2 pins 87) | AgNi0.15 | Dust cover | |
| V23134-C1053-C642 | | 5-1393303-0 | 1 Form A (2 pins 87) | AgNi0.15 | Dust cover | Bracket |
| V23134-M0053-C642 | | 6-1393304-7 | 1 Form U | AgNi0.15 | Dust cover | |
| V23134-M1053-C642 | | 7-1393304-4 | 1 Form U | AgNi0.15 | Dust cover | Bracket |
| VF4-41H11 | V23134-B1064-X825 | 7-1393305-0 | 1 Form A | AgNi0.15 | Dust cover | Bracket |
| VF4-41H11-S08 | V23134-A1064-X831 | 7-1393305-1 | 1 Form A | AgNi0.15 | Dust cover | Bracket, resistor 2.7 kΩ |
| 24 V PCB Relays | | | | | | |
| V23134-A0053-G243 | | 5-1393302-2 | 1 Form C | AgNi0.15 | Dust cover | |
| VF4-15H13-C01 | V23134-A0064-X820 | 5-1393305-9 | 1 Form C | AgNi0.15 | Sealed | |
| V23134-B0053-G242 | | 1-1393303-0 | 1 Form A | AgNi0.15 | Dust cover | |
| V23134-C0053-G242 | | 4-1393303-5 | 1 Form A (2 pins 87) | AgNi0.15 | Dust cover | |
| V23134-M0053-G242 | | 6-1393304-8 | 1 Form U | AgNi0.15 | Dust cover | |
| VF4-11H13 | V23134-B0064-X804 | 2-1393305-6 | 1 Form A | AgNi0.15 | Dust cover | |
| VF4-15H13 | V23134-A0064-X819 | 0-1393302-8 | 1 Form C | AgNi0.15 | Dust cover | |

Coil versions

| Coil data for Power Relay 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 | 44 | 35 |
| 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 | 44 | 35 |

¹⁾ Allowable overdrive is stated with no load applied 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, VF4-4 | | 300 pieces |
| VF4-2, VF4-3 | | 165 pieces |
| VF4-5, VF4-6 | | 110 pieces |