



2V67 User Guide

Multi Stage Voltage Relay

relay monitoring systems Pty Ltd

Advanced Protection Devices



User Guide



Test Manual



Relay Software



μMATRIXwin



2V67 User Guide

About This Manual

This User Guide covers all 2V67 relays manufactured from May 2003. Earlier relays do not necessarily incorporate all the features described. Our policy of continuous improvement means that extra features & functionality may have been added.

The 2V67 User Guide is designed as a generic document to describe the common operating parameters for all relays built on this platform. Some relay applications are described but for specific model information the individual "K" number Product / Test manuals should be consulted.

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To download a PDF version of this guide:

http://www.rmspl.com.au/userguide/2V67_user_guide.pdf

To download the model specific Test Manual:

<http://www.rmspl.com.au/search.asp>

How this guide is organised

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Part

1

Test Manual

This User Guide covers all 2V67 relay versions & describes the generic features & attributes common across all versions.

Different relay versions are required to cater for varying customer requirements such as auxiliary voltage range, I/O configuration, case style, relay functionality etc.

The product ordering code described in the Technical Bulletin is used to generate a unique version of the relay specification & is called a type number. The type number takes the form 2V67Kxx where the Kxx is the "K" or version number.

Refer to: www.rmspl.com.au/handbook/parta3.pdf
for a complete description of the RMS "K" number system.

Each 2V67 version has a specific Test Manual which provides details on the unique attributes of the relay. Each Test Manual includes the following information:

- Test Certificate
- Specific technical variations from the standard model if applicable
- Test & calibration record

A Test Manual is provided with each relay shipped.

A CD & serial comms. cable is supplied with each relay order.

If you require a copy of the Test Manual for an RMS product the following options are available:

- Check the RMS web site at: www.rmspl.com.au/search.asp
- RMS CD catalogue select: [List all Product/Test Manuals](#) under [Technical Library](#)
- Contact RMS or a representative & request a hard copy or PDF by email.



Visit www.rmspl.com.au for the latest product information.

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Mechanical Configuration

Great care has been taken to design a rugged, cost effective & flexible mechanical solution for the *MATRIX* range of RMS protection relays. The *MATRIX* range provides a compact draw out case solution with M4 screw terminals:

- 2M28 Size 2 with 28 terminals
- 4M28 Size 4 with 28 terminals
- 4M56 Size 4 with 56 terminals

Complete details & attributes for the M (*MATRIX*) cases & accessories may be found at:

<http://www.rmspl.com.au/mseries.htm>

The 2V67 is configured in a 4M56 case & the following photographs depict the general mechanical configuration. It should be noted that re-usable screw rivets may be used to bind the draw out relay module. A 1/16" hex key is required for disassembly.



Image of generic inner relay module after removal from outer case.

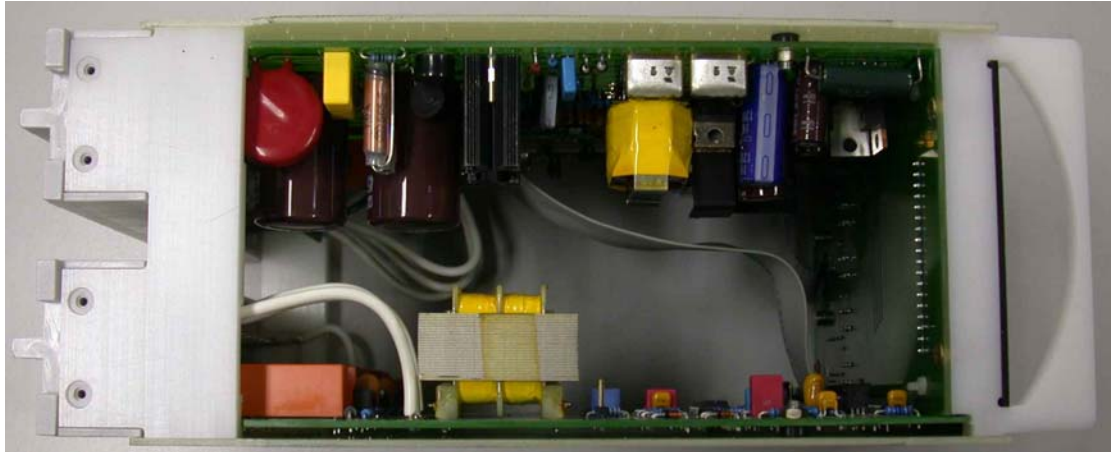
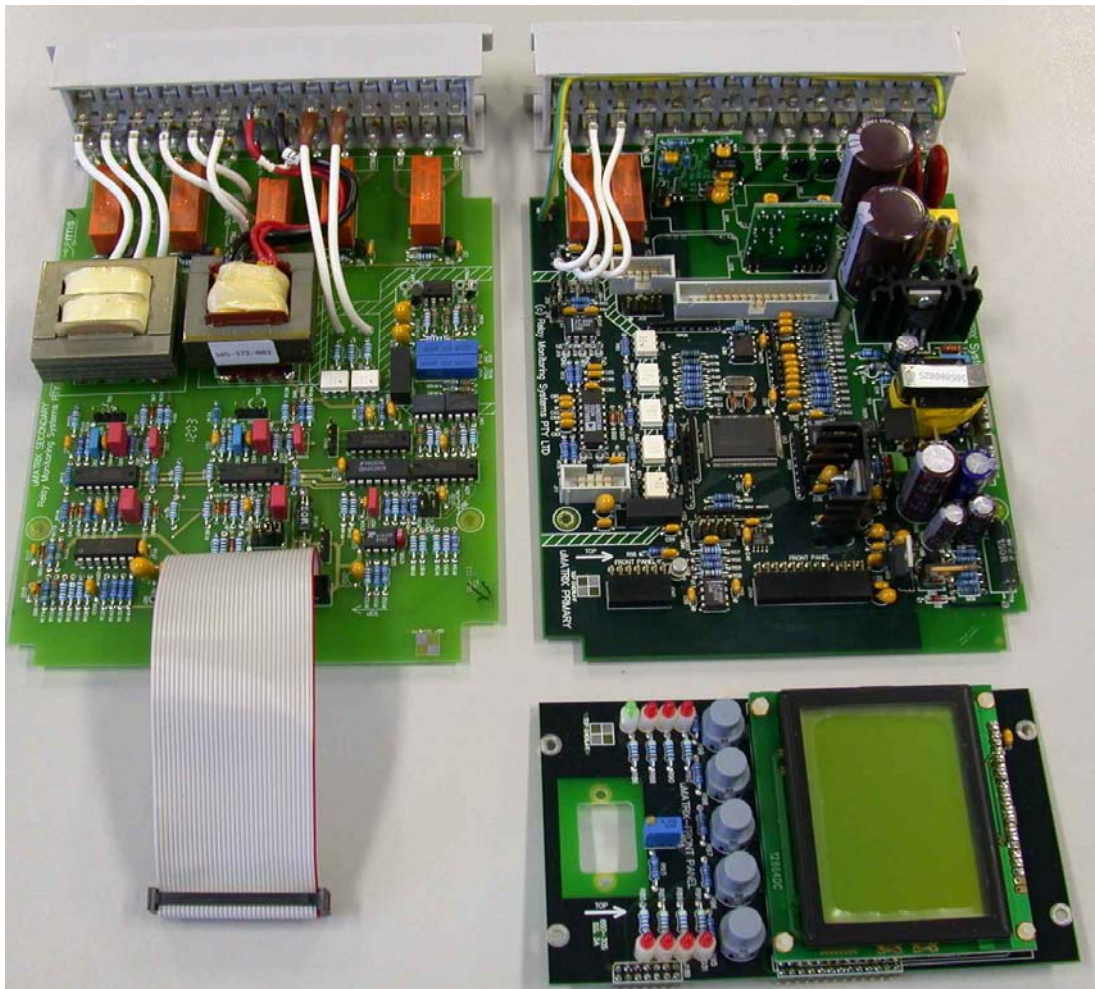


Image of the relay module showing the switch mode power supply components at the top.



Typical set of three PCB's. Note the terminal blocks fitted to the top two assemblies.



Description of Operation

The 2V67 Series relay is a three pole voltage monitoring relay with four stages of adjustable voltage pick up & drop out points. Each voltage set point can be set for under or overvoltage operation & has an independent time delay driving an output relay. An undervoltage lockout is used to disable the four voltage outputs when the voltage falls below a preset level. A single status input is used to enable the four voltage sensing stages.

The 2V67 relay is built on the Micro MATRIX digital platform. The standard Micro MATRIX human machine interface (HMI) is combined with fully solid-state voltage sensing & measuring circuitry to provide high accuracy, simple set up & flexible operation. Self-monitoring is carried out by hardware & software watchdogs. A CPU software watchdog records abnormal events & performs automatic periodic checks. High speed, high contact rating output relays are used.

The input transformer, output relays & opto isolated status input form the essential barriers against high voltage line transients while a switchmode auxiliary supply provides a wide operating range.



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Technical Bulletin

The detailed technical attributes, functional description & performance specifications for the 2V67 are described in the attached Technical Bulletin. For the most up to date version go to:

www.rmspl.com.au/handbook/2v67.htm

For any specific attributes of a particular version refer to the Test Manual for that type (K) number.

The order of precedence for technical information is as follows:

- Test Manual
- Technical Bulletin
- User Guide

Features

- Large graphics display panel
- Instantaneous voltage display
- 20 to 130V PU setting range
- 0.1V setting resolution
- Adjustable pick up & drop out
- Adjustable reset time delay
- 63.5/110V AC nominal inputs
- Four independent voltage stages & output trip contacts
- Independent definite time delay per voltage stage
- Timing & trip indication LED's
- Relay enable input
- CPU watchdog
- Undervoltage blocking function
- Wide auxiliary supply range with fail alarm contact
- Size 4 draw out case
- Made in Australia

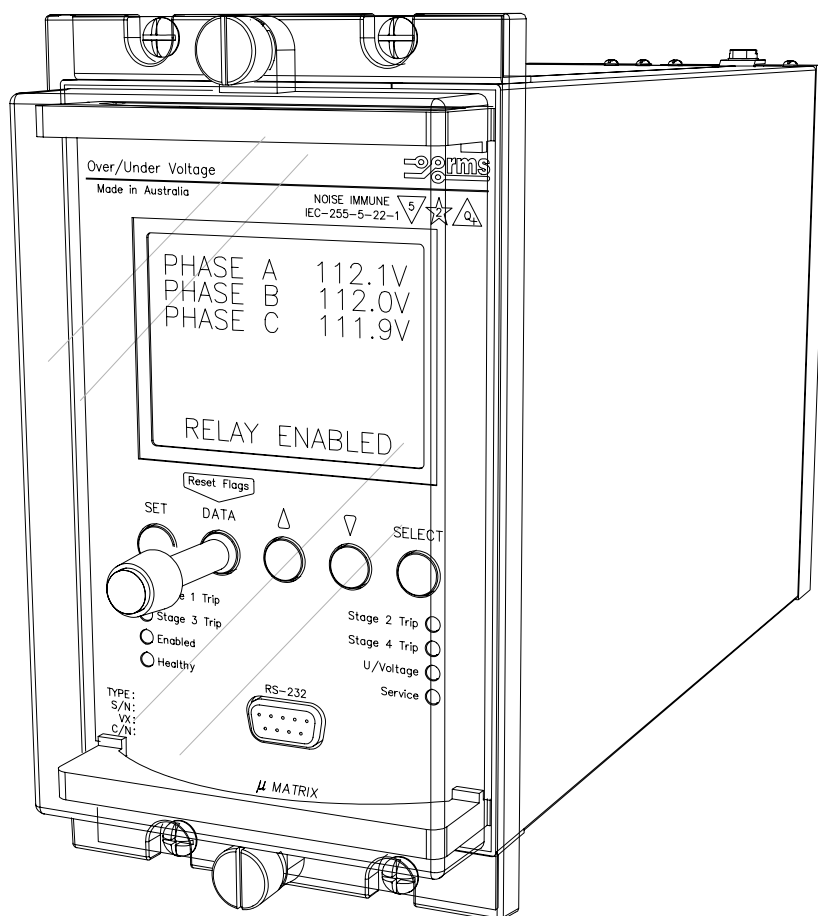
COMMUNICATION

- Non platform specific PC programming software: μ MATRIXwin
- Optically isolated communication ports
- MODBUS RTU compatible network protocol

Operation

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2V67 depicted in a 4M56 draw out case

Application

Made in Australia

UNDervOLTAGE LOAD SHEDDING

Loss of adequate system voltage can lead to plant & equipment damage if not taken off line or the voltage level restored. The 2V67 relay can be used to provide four stages of load shedding as the voltage progressively falls through the four independent setting stages.

COGENERATION SCHEMES

At the interface between the utility & the cogenerator, undervoltage relays are installed as minimum protection to provide an operating voltage window for the cogenerator. During faulted conditions when the cogenerator may become overloaded, the 2V67 relay will detect the decline in voltage & remove the cogenerator from the system.

AUTOMATIC TRANSFER

In order to restore service within a given acceptable time period, automatic transfer switching can be applied to initiate throwover from primary power to the alternate power source. The 2V67 relay can initiate switching after a given time delay to avoid transfer switching during temporary low voltage conditions.

TRANSFORMER PROTECTION

The 2V67 relay may be used to supplement the tap changer control system & to prevent equipment damage as a result of failure of the tap change undervoltage blocking mechanism or overvoltage run away.

BURDENS

Auxiliary supply: (at 110V DC nominal supply)
 Less than 7 watts during timing.
 Less than 10 watts with output relay energised.
 Sensing circuits: Less than 1VA per phase all settings.

VOLTAGE SET POINTS

Inputs: 3 phase 63.5/110V AC nominal
 Setting stages: 4 independent stages
 Setting range: 20 to 130V in 0.1V steps
 Hysteresis: 0.2 to 5V in 0.1V steps
 Overvoltage function: PU at set point
 DO at set point – hysteresis
 Undervoltage function: PU at set point
 DO at set point + hysteresis
 Undervoltage lockout: 11 to 90V in 0.1V steps

VOLTAGE MEASUREMENT ACCURACY

Precision of voltage setting: 0.1V steps
 Voltage pick up repeatability: +/-0.15V from 90 to 120V
 Voltage display: 4 digits from 10 to 145V
 Resolution of voltage display: 0.1V
 Accuracy of displayed voltage: +/-0.15V

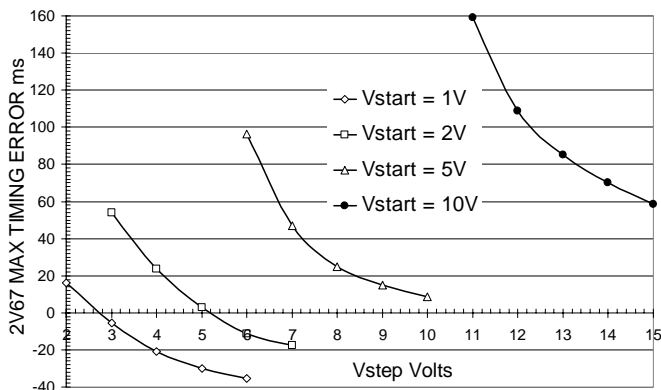
TIME SETTING RANGE

Separate time range for each of the four voltage stage set points.
 Tset from 0.2s to 320s in 0.1s steps.

PICK UP TIME ERROR

The pick up time error is caused by the delay of the voltage measuring circuit to respond to sudden voltage step changes. This error is determined from the following chart:

Vref = The nominal monitored voltage
 Vset = The voltage pick up setting
 Vstart = The difference between Vref & Vset
 Vstep = The magnitude of the actual voltage step from Vref



RESET TIME DELAY

Electronic reset time is adjustable between zero & 5s in 0.1s steps. When the voltage pick up & drop out points are set very close together it is advisable to set a longer reset delay to avoid timer resetting due to transient voltage fluctuations.

RELAY ENABLE STATUS INPUT

The status input on the 2V67 is used to enable the four voltage monitoring stages of the relay. The relay must be "enabled" in order for the time delay stages to operate. A front panel LED is illuminated red when the relay is disabled.

STATUS INPUT FUNCTION

The status input function is factory set for the relay to be enabled on the application of a control voltage. It is also possible for the status input to operate on the removal of a control voltage by simply changing a software flag in the PC setup program.

CASE

Size 4 draw out with
 56 M4 screw terminals
 Flush panel mount or 4U high 1/4 width 19 inch rack mount

AUXILIARY SUPPLY

20-70V DC switchmode supply or
 40-275V AC / 40-300V DC switchmode supply
 Burden: Less than 7 watts during timing

Inputs:

A high efficiency switchmode power supply is incorporated which provides a low burden to the auxiliary supply.

Input Transients:

Withstands multiple high-energy transients & ring waves in accordance with IEEE28 - ANSI C26.1 Cat. II, accordingly:

- 0.5us 100KHz 6KV O/C, 500A S/C, 4J
- 1.2/50us 6KV O/C
- 8/20us 3KA S/C, 80J clamped at 1,000V

Mains conducted EMI within limits specified by AS 3548 Class B.

Isolation:

The inputs are isolated from the outputs in accordance with AS3260 Class II Limited Current Circuitry, accordingly:

- Withstand voltage of 2.5Kv RMS 50Hz for one minute
- Creepage & clearance distance greater than 4mm
- Output leakage current less than 0.25A to earth

Output Protection:

Outputs will withstand continuous short circuit. Output regulators & switching control regulator are thermally protected.

RELAY FAIL ALARM

A C/O alarm contact is maintained in the energized state when all of the following conditions are met:

- The auxiliary supply is applied
- The internal 24V DC rail is within acceptable limits
- The CPU hardware watchdog maintains a pulsing output

A CPU software watchdog records "suspect" events to an assert register and if necessary performs a soft restart.

OUTPUT CONTACTS

4 C/O self reset: 1 for each time delayed voltage output stage
 1 C/O self reset: Undervoltage blocking alarm
 1 C/O self reset: Relay enabled indication
 1 C/C self reset: Power supply fail / CPU watchdog alarm

OUTPUT CONTACT RATINGS

Make & carry

30A AC or DC (Limits L/R=40ms & 300V max.) for 0.2s
 20A AC or DC (Limits L/R=40ms & 300V max.) for 0.5s
 5A AC or DC continuously

Break (Limits 5A & 300V max.)

1,250VA AC resistive
 250VA at 0.4PF AC inductive
 75W DC resistive
 30W DC inductive L/R = 40ms
 50W DC inductive L/R = 10ms

Minimum recommended load

0.5W, 10mA or 5V minimum.

INSULATION WITHSTAND

IEC60255-5 2KV RMS & 1.2/50 5KV impulse between:

- ◆ all input terminals & frame
- ◆ all output terminals & frame
- ◆ all input & output terminals
- ◆ each input group
- ◆ each output group

HIGH FREQUENCY DISTURBANCE

IEC60255-22-1 2.5KV 1MHz common mode
 1.0KV 1MHz differential mode

ELECTROSTATIC DISCHARGE

EN61000-4-2:1995 8KV Level 3

FAST TRANSIENT DISTURBANCE

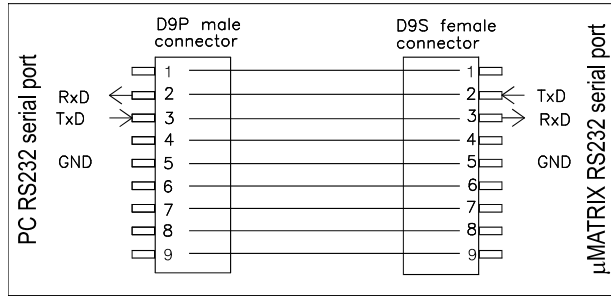
EN61000-4-4:1995 4KV Level 4

AMBIENT OPERATING TEMPERATURE RANGE

-5 to 55 degrees Celsius

PC TO μ MATRIX SERIAL CABLE

One cable supplied with each order.
P/N 290-406-151



Communications

COMMUNICATION PORTS

Two (2) communications ports are available.

Programming port

The programming port is accessible from the front panel of the relay via an RS232 physical link & PC configuration program supplied with the relay. The μ MATRIXwin configuration program is designed to operate with all relays from the Micro MATRIX range & with all installed firmware version.

Network port

The network port is intended for applications where permanent connection to a master control system is required. An optically isolated RS232 or RS485 physical layer is provided for this function.

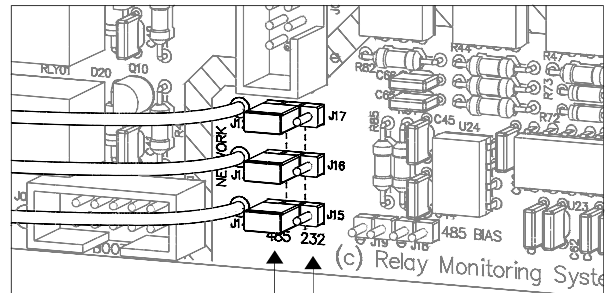
The RS485 connection is intended for applications where multiple μ MATRIX relays are to be connected on a common communications bus.

The RS232 connection is intended for interface to an RS232 to optic fiber converter in environments subject to extreme electrical interference.

The network port may be used for a permanent link to a modem, remote PC, data concentrator or SCADA system. The standard communications protocol is MODBUS RTU.

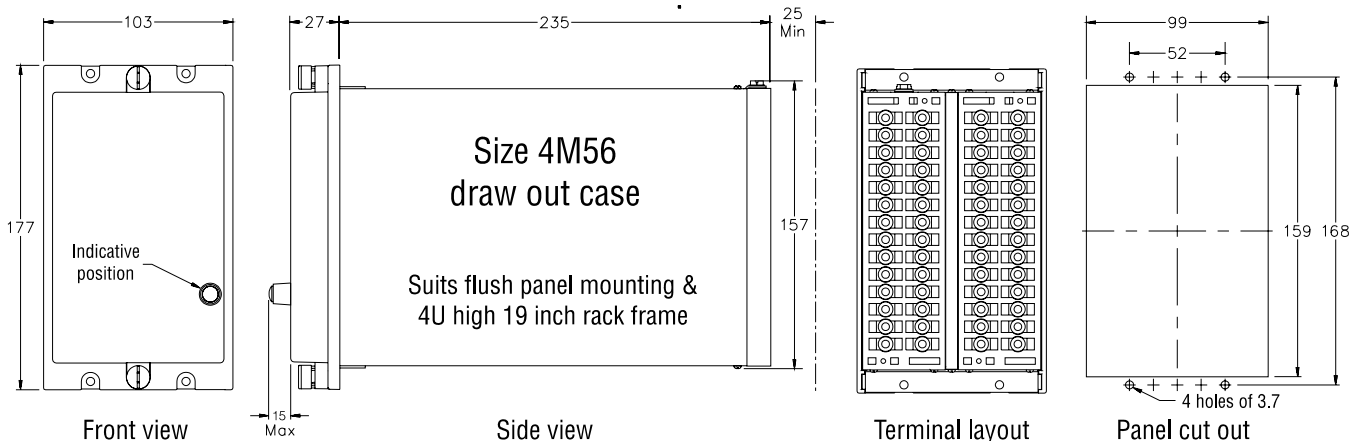
Changing the Network port from RS485 to RS232

μ MATRIX relays are shipped with the rear network port terminals configured as RS485. This configuration may be changed in the field to RS232 if required by withdrawing the relay module from the case & changing the three configuration links as depicted.



RS485 Port Header Position

RS232 Port Header Position



Ordering Information

Generate the required ordering code as follows: e.g. 2V67 BBBA

2V67

1	2	3	4
---	---	---	---

1 AUXILIARY SUPPLY RANGE

A 20-70V DC B 40-275V AC / 300V DC

2 RELAY INITIATE INPUT

Opto-isolated input

A 24-80V AC/DC B 75-150V AC/DC
C 150-300V AC/DC

3 REMOTE FLAG RESET INPUT

Opto-isolated input

A 24-80V AC/DC B 75-150V AC/DC
C 150-300V AC/DC

4 VOLTAGE INPUTS

A 3 Pole Version B 1 Pole Version

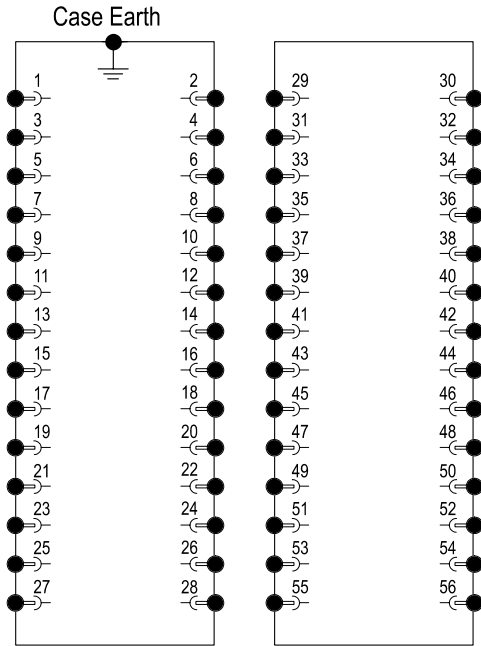
REQUEST DEFAULT APPLICATION SOFTWARE

A UMX2V067A 3 phase 4 stage under / over voltage
H UMX2V067H 1 phase 4 stage under / over voltage

All current UMX software applications may be downloaded from:

<http://www.rmssl.com.au/umatrix>

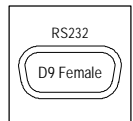
These may then be loaded into the relay using uMATRIXwin.



4M56 Case terminations (REAR VIEW)

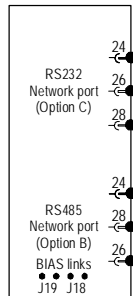
*Note: The status inputs & some relay outputs are assigned by the software (UMX) loaded on the relay. Shown here are the standard assignments of the A UMX. Other UMX versions may differ. Consult the UMX data sheets for specific I/O assignments.

FRONT PANEL PC PROGRAMMING PORT



One DE09 straight through male to female 2 metre connection cable supplied with each order of relays (P/N 997-000-042B)

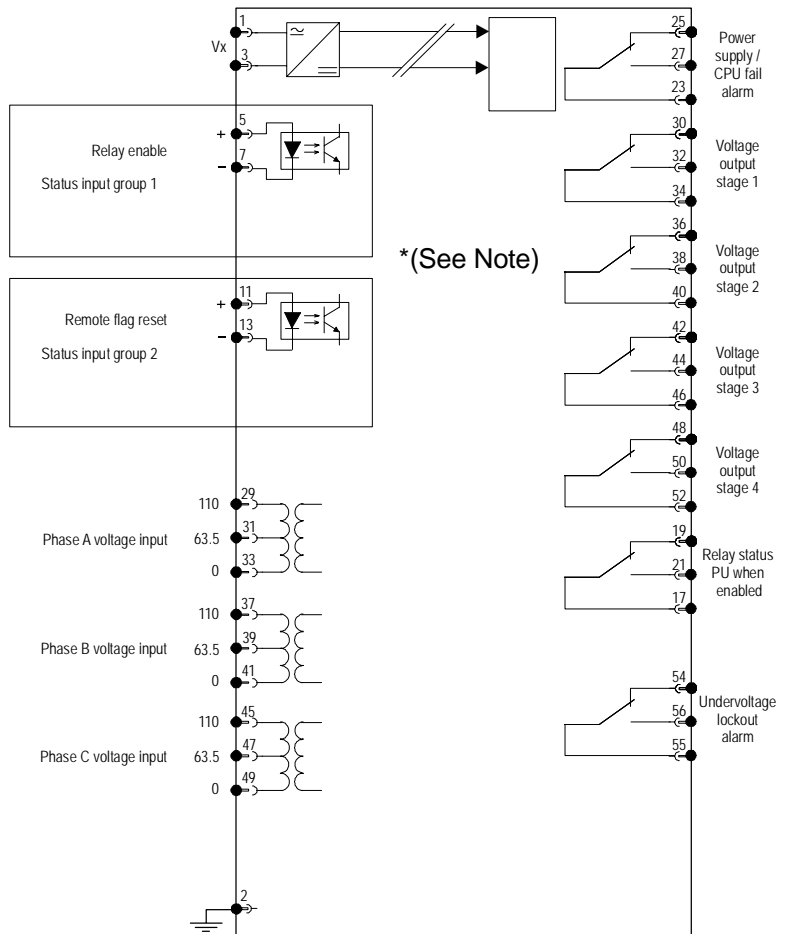
SCADA COMMUNICATIONS PORT (Use one only)



Dedicated supervisory connection

RS485 Shielded twisted pair cable (Up to 1Km)

To other uMATRIX relays (Up to 32 units)
Fit external terminating resistor to end of BUS relay only
Fit internal BIAS jumper links for single relay connection only



*(See Note)

2V67 wiring diagram - Relay shown in de-energised condition



Software Function

Compatible Software UMX

The 2V67 relay has a number of software programs called UMX available, which can be installed by the user. Each UMX provides a different functional configuration to suit specific applications. They must be however, compatible with the relay hardware.

A copy of the UMX Hardware / Software Compatibility Register is attached.

Download the most up to date UMX Hardware / Software Compatibility Register from the RMS website:

<http://www.rmspl.com.au/digital/compatibility.pdf>

Factory Default Software

The 2V67 relay is ordered with a customer specified default UMX so that it is ready for operation when received. To achieve this, an ordering code may be sought at time of quotation and specified on your order.



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Determining Software UMX

Determining which UMX is loaded onto a MATRIX relay may be done in three ways:

1. New relays received from the factory have a label located on the side of the draw out module. This label is printed with information specific to the relay and includes the UMX type that was loaded during production.
2. Press the DATA and SET page buttons on the relay simultaneously to bring up the DIAGNOSTICS page.

Now press SELECT to view the versions page and you will see:

**** VERSION PAGE ****

BIOS Version: Vxx.xx	The version of the low level BIOS code loaded by the factory.
S/W Version: Vxx.xx	The version of the software UMX.
CBD: RMS Default	The .ump parameters file saved to the relay from μ MATRIXwin.
Model: xxxxxS	The xxxxx is the relay hardware code. The "S" is the UMX code.
S/N: xxxxxx.xx	The production tracking serial number also found on the front label.
H/W Config: xx	This number is related to the PCB loading and is auto detected.
VT Cal Adj Page	Select to enter the VT calibration page menu.

3. Connect to the relay through the front panel RS232 configuration port using μ MATRIXwin and a PC. The UMX code & version is displayed at the bottom of the centre panel.

Determining UMX Functionality

Now that you have determined the UMX loaded in the relay you need to obtain the Software Functional Description Document which relates to it. It may be obtained from our web site as follows:

Document name is: UMX2V67s.pdf using the "s" code from the version page above.

The location is: www.rmspl.com.au/ptmanual/umx2v67x.pdf

User Interface

Refer to the μ MATRIX Users Guide for detailed instructions on the operation of the user interface.

To download a PDF version of the guide:

www.rmspl.com.au/digital/umatrixinfo.pdf

To download further μ MATRIX software & documentation:

www.rmspl.com.au/umatrix.htm



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Field Calibration

Small errors in voltage reading and miss match to other voltage measuring devices is a common observation during commissioning and routine testing. Adjustment of the voltage calibration is possible in the field by accessing the diagnostic menu as follows:

1. Press the DATA and SET page buttons on the relay simultaneously to bring up the DIAGNOSTICS page.
2. Now arrow down to the VT Cal Adjust Page line and press SELECT to view:

** VT ADJ MENU **

Phase A Adj: x.xV	Select to adjust Phase A calibration + or – x.x volts
Phase B Adj: x.xV	Select to adjust Phase A calibration + or – x.x volts
Phase C Adj: x.xV	Select to adjust Phase A calibration + or – x.x volts
Exit to Diagnostics	Select to return to the Diagnostics Menu

A calibration adjustment in the range -5V to +5V in 0.1V increments can be entered for each phase. This adjustment changes the voltage measured by the relay and is reflected in the voltmeter display on the Data Page.

These adjustment settings are stored in EEPROM memory and will not be overwritten when new setting (UMP) or application (UMX) files are up loaded to the relay. Changes can only be made at the relay using the VT Adj Menu under the diagnostics page.

3. Press the DATA page button to return to the DATA Page.



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Installation

Handling of Electronic Equipment

A person's normal movements can easily generate electrostatic potentials of several thousand volts. Discharge of these voltages into semiconductor devices when handling electronic circuits can cause serious damage, which often may not be immediately apparent but the reliability of the circuit will have been reduced.

The electronic circuits of Relay Monitoring Systems Pty Ltd products are immune to the relevant levels of electrostatic discharge when housed in the case. Do not expose them to the risk of damage by withdrawing modules unnecessarily.

Each module incorporates the highest practicable protection for its semiconductor devices. However, if it becomes necessary to withdraw a module, the following precautions should be taken to preserve the high reliability and long life for which the equipment has been designed and manufactured.

1. Before removing a module, ensure that you are at the same electrostatic potential as the equipment by touching the case.
2. Handle the module by its front-plate, frame, or edges of the printed circuit board.
3. Avoid touching the electronic components, printed circuit track or connectors.
4. Do not pass the module to any person without first ensuring that you are both at the same electrostatic potential. Shaking hands achieves equipotential.
5. Place the module on an antistatic surface, or on a conducting surface which is at the same potential as yourself.
6. Store or transport the module in a conductive bag.

If you are making measurements on the internal electronic circuitry of an equipment in service, it is preferable that you are earthed to the case with a conductive wrist strap.

Wrist straps should have a resistance to ground between 500k – 10M ohms. If a wrist strap is not available, you should maintain regular contact with the case to prevent the build up of static.

Instrumentation which may be used for making measurements should be earthed to the case whenever possible.



Safety Section

This Safety Section should be read before commencing any work on the equipment.

The information in the Safety Section of the product documentation is intended to ensure that products are properly installed and handled in order to maintain them in a safe condition. It is assumed that everyone who will be associated with the equipment will be familiar with the contents of the Safety Section.

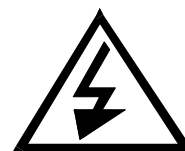
Explanation of Symbols & Labels

The meaning of symbols and labels which may be used on the equipment or in the product documentation, is given below.

Caution: refer to product information

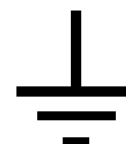


Caution: risk of electric shock



Functional earth terminal

Note: this symbol may also be used for a protective/safety earth terminal if that terminal is part of a terminal block or sub-assembly eg. power supply.





Unpacking

Upon receipt inspect the outer shipping carton or pallet for obvious damage.

Remove the individually packaged relays and inspect the cartons for obvious damage.

To prevent the possible ingress of dirt the carton should not be opened until the relay is to be used. Refer to the following images for unpacking the relay:



Outer packing carton showing shipping documentation pouch.
Address label on top of carton.



Inner packing carton showing front label detailing the customer name, order number, relay part number & description, the relay job number & packing date.
(Size 2 inner packing carton depicted)



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Unpacking (Continued)



Inner packing carton with lid open showing protective foam insert.

CD depicted supplied with digital relay models or upon request at time of order.



Inner packing carton with protective foam insert removed showing relay location.



Where mechanical flags are fitted the yellow transit wedge must be removed before operation using a gentle twisting action. The wedge should be stored with the original packaging material.



Visit www.rmspl.com.au for the latest product information.

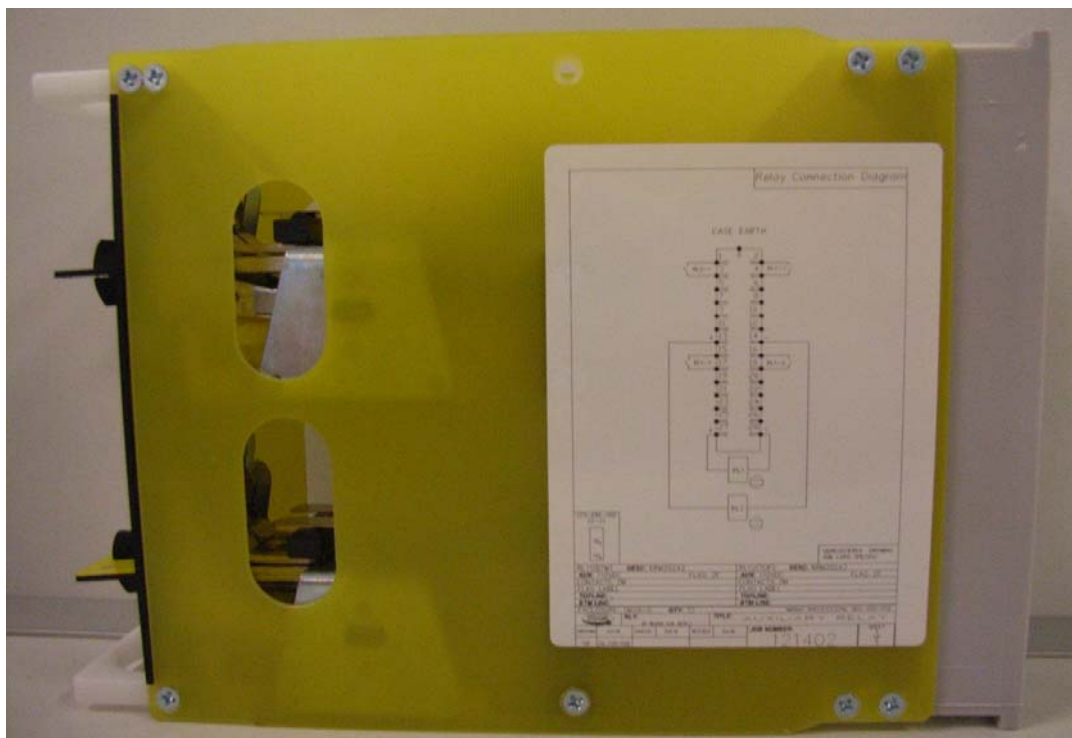
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Relay Module Side Label Depicting Product Details



Relay Module Side Label Depicting Wiring Diagram (6R MATRIX relays only)



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Accessories Supplied With Each Relay



Self threading M4 mounting screws



M4 terminal screws with captured lock washers

Storage & Handling

If damage has been sustained a claim should immediately be made against the carrier, also inform Relay Monitoring Systems Pty Ltd and the nearest RMS agent

When not required for immediate use, the relay should be returned to its original carton and stored in a clean, dry place.

Relays which have been removed from their cases should not be left in situations where they are exposed to dust or damp. This particularly applies to installations which are being carried out at the same time as constructional work.

If relays are not installed immediately upon receipt they should be stored in a place free from dust and moisture in their original cartons.

Dust which collects on a carton may, on subsequent unpacking, find its way into the relay; in damp conditions the carton and packing may become impregnated with moisture and the de-humidifying agent will lose its efficiency.



Equipment Operating Conditions

The equipment should be operated within the specified electrical and environmental limits.

Protective relays, although generally of robust construction, require careful treatment prior to installation and a wise selection of site. By observing a few simple rules the possibility of premature failure is eliminated and a high degree of performance can be expected.

Care must be taken when unpacking and installing the relays so that none of the parts are damaged or their settings altered and must at all times be handled by skilled persons only.

Relays should be examined for any wedges, clamps, or rubber bands necessary to secure moving parts to prevent damage during transit and these should be removed after installation and before commissioning.

The relay should be mounted on the circuit breaker or panel to allow the operator the best access to the relay functions.

Relay Dimensions & Other Mounting Accessories

Refer drawing in Technical Bulletin. Relevant Auto Cad files & details on other accessories such as 19 inch sub rack frames, semi projection mount kits & stud terminal kits may be down loaded from:

<http://www.rmspl.com.au/mseries.htm>



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Equipment Connections

Personnel undertaking installation, commissioning or servicing work on this equipment should be aware of the correct working procedures to ensure safety. The product documentation should be consulted before installing, commissioning or servicing the equipment.

Terminals exposed during installation, commissioning and maintenance may present hazardous voltage unless the equipment is electrically isolated.

If there is unlocked access to the rear of the equipment, care should be taken by all personnel to avoid electric shock or energy hazards.

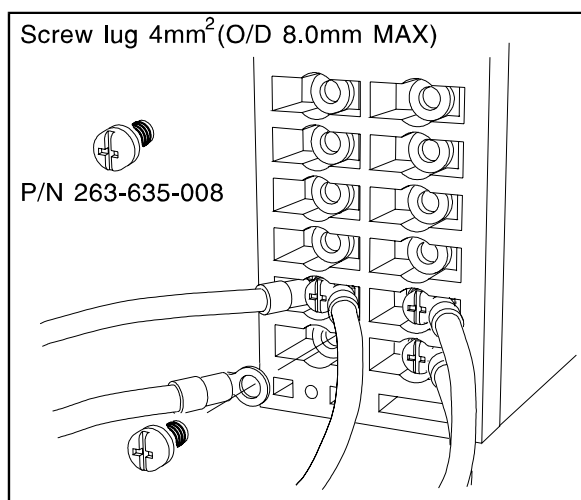
Voltage and current connections should be made using insulated crimp terminations to ensure that terminal block insulation requirements are maintained for safety. To ensure that wires are correctly terminated, the correct crimp terminal and tool for the wire size should be used.

Before energising the equipment it must be earthed using the protective earth terminal, or the appropriate termination of the supply plug in the case of plug connected equipment. Omitting or disconnecting the equipment earth may cause a safety hazard.

The recommended minimum earth wire size is 2.5mm², unless otherwise stated in the technical data section of the product documentation.

Before energising the equipment, the following should be checked:

1. Voltage rating and polarity;
2. CT circuit rating and integrity of connections;
3. Protective fuse rating;
4. Integrity of earth connection (where applicable)





Current Transformer Circuits

Do not open the secondary circuit of a live CT since the high voltage produced may be lethal to personnel and could damage insulation.

External Resistors

Where external resistors are fitted to relays, these may present a risk of electric shock or burns, if touched.

Insulation & Dielectric Strength Testing

Insulation testing may leave capacitors charged up to a hazardous voltage. At the end of each part of the test, the voltage should be gradually reduced to zero, to discharge capacitors, before the test leads are disconnected.

Insertion of Modules

These must not be inserted into or withdrawn from equipment whilst it is energised, since this may result in damage.

Electrical Adjustments

Pieces of equipment which require direct physical adjustments to their operating mechanism to change current or voltage settings, should have the electrical power removed before making the change, to avoid any risk of electric shock.

Mechanical Adjustments

The electrical power to the relay contacts should be removed before checking any mechanical settings, to avoid any risk of electric shock.

Draw Out Case Relays

Removal of the cover on equipment incorporating electromechanical operating elements, may expose hazardous live parts such as relay contacts.

Insertion & Withdrawal of Heavy Current Test Plugs

When using a heavy current test plug, CT shorting links must be in place before insertion or removal, to avoid potentially lethal voltages.



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Commissioning Preliminaries

Carefully examine the module and case to see that no damage has occurred during transit. Check that the relay serial number on the module, case and cover are identical, and that the model number and rating information are correct.

Carefully remove any elastic bands/packing fitting for transportation purposes.

Check that the external wiring is correct to the relevant relay diagram or scheme diagram. The relay diagram number appears inside the case.

Particular attention should be paid to the correct wiring and value of any external resistors indicated on the wiring diagram/relay rating information.

Note that shorting switches shown on the relay diagram are fitted internally across the relevant case terminals and close when the module is withdrawn. It is essential that such switches are fitted across all CT circuits.

If a test block system is to be employed, the connections should be checked to the scheme diagram, particularly that the supply connections are to the 'live' side of the test block.

Earthing

Ensure that the case earthing connection above the rear terminal block, is used to connect the relay to a local earth bar.

Insulation

The relay, and its associated wiring, may be insulation tested between:

- all electrically isolated circuits
- all circuits and earth

An electronic or brushless insulation tester should be used, having a dc voltage not exceeding 1000V. Accessible terminals of the same circuit should first be strapped together. Deliberate circuit earthing links, removed for the tests, subsequently must be replaced.



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Commissioning Tests

If the relay is wired through a test block it is recommended that all secondary injection tests should be carried out using this block.

Ensure that the main system current transformers are shorted before isolating the relay from the current transformers in preparation for secondary injection tests.

DANGER

DO NOT OPEN CIRCUIT THE SECONDARY CIRCUIT OF A CURRENT TRANSFORMER SINCE THE HIGH VOLTAGE PRODUCED MAY BE LETHAL AND COULD DAMAGE INSULATION.

It is assumed that the initial preliminary checks have been carried out.

Relay CT shorting switches

With the relay removed from its case, check electrically that the CT shorting switch is closed.

Primary injection testings

It is essential that primary injection testing is carried out to prove the correct polarity of current transformers.

Before commencing any primary injection testing it is essential to ensure that the circuit is dead, isolated from the remainder of the system and that only those earth connections associated with the primary test equipment are in position.

Decommissioning & Disposal

Decommissioning: The auxiliary supply circuit in the relay may include capacitors across the supply or to earth. To avoid electric shock or energy hazards, after completely isolating the supplies to the relay (both poles of any dc supply), the capacitors should be safely discharged via the external terminals prior to decommissioning.

Disposal: It is recommended that incineration and disposal to water courses is avoided. The product should be disposed of in a safe manner.

Maintenance

Mechanical Inspection

Relay Assembly

Inspect the relay for obvious signs of damage or ingress of moisture or other contamination.

Relay Module

Isolate the relay, remove the front cover & carefully withdraw the relay module from the case.

Care must be taken to avoid subjecting the relay element to static discharge which may damage or degrade sensitive electronic components.

Inspect the relay module for signs of any overheating or burn marks which may have been caused by overvoltage surge or transient conditions on the power supply or digital status inputs.

Inspect the VT & CT stages for degradation of insulation on the terminal wiring & transformer windings.



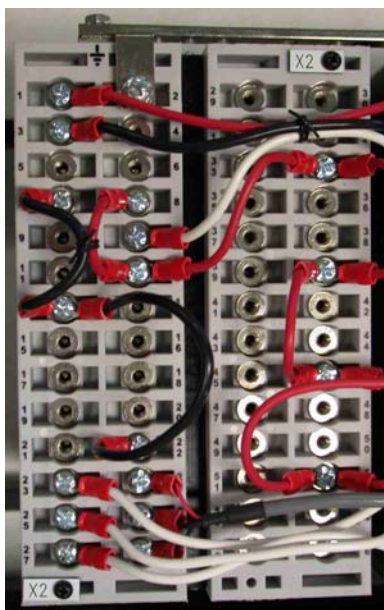
Remove cover by unscrewing black thumb screws & withdraw the relay module from the case.

Relay Case

Inspect the outer terminals checking insulation integrity & tightness.

Inspect inside the case and use a blower to remove dust.

Inspect the inner terminals for worn, distorted or tarnished contacts and if necessary clean the contacts using a brush dipped in a suitable substance.



Case outer terminals



Case inner terminals



Module plug in terminals

Test Intervals

The maintenance tests required will largely depend upon experience and site conditions, but as a general rule it is recommended that the following inspection and tests are performed every twelve months.

- ◆ Mechanical Inspection
- ◆ Check of Connections
- ◆ Insulation Resistance Test
- ◆ Fault Setting Tests by Secondary Injection
- ◆ Tests using Load Current
- ◆ Check the continuity of the neutral CT loop with a bell test set or an ohmmeter



Defect Report Form

Please copy this sheet and use it to report any defect which may occur.

Customers Name & Address:	Contact Name:
	Telephone No:
	Fax No:
Supplied by:	Date when installed:
Site:	Circuit:

When Defect Found

Date:	Commissioning?	Maintenance?	Systems Fault?	Other, Please State:
Product Part No:			Serial Number:	
Copy any message displayed by the relay:				
Describe Defect:				
Describe any other action taken:				
Signature:		Please Print Name:		Date:

For RMS use only

Date Received:	Contact Name:	Reference No:	Date Acknowledged:	Date of Reply:	Date Cleared:
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Australian Content

Unless otherwise stated the product(s) quoted are manufactured by RMS at our production facility in Melbourne Australia. Approximately 60% of our sales volume is derived from equipment manufactured in house with a local content close to 90%. Imported components such as semi-conductors are sourced from local suppliers & preference is given for reasonable stock holding to support our build requirements.

Quality Assurance

RMS holds NCSI (NATA Certification Services International), registration number 6869 for the certification of a quality assurance system to AS/NZS ISO9001-2008. Quality plans for all products involve 100% inspection and testing carried out before despatch. Further details on specific test plans, quality policy & procedures may be found in section A4 of the RMS product catalogue.

Product Packaging

Protection relays are supplied in secure individual packing cardboard boxes with moulded styrene inserts suitable for recycling. Each product & packing box is labeled with the product part number, customer name & order details.

Design References

The products & components produced by RMS are based on many years of field experience since Relays Pty Ltd was formed in 1955. A large population of equipment is in service throughout Australia, New Zealand, South Africa & South East Asia attesting to this fact. Specific product & customer reference sites may be provided on application.

Product Warranty

All utility grade protection & auxiliary relay products, unless otherwise stated, are warranted for a period of 24 months from shipment for materials & labour on a return to factory basis. Repair of products damaged through poor application or circumstances outside the product ratings will be carried out at the customer's expense.

Standard Conditions of Sale

Unless otherwise agreed RMS Standard Terms & Conditions (QF 907) shall apply to all sales. These are available on request or from our web site.



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