Technical Bulletin

# 2V67

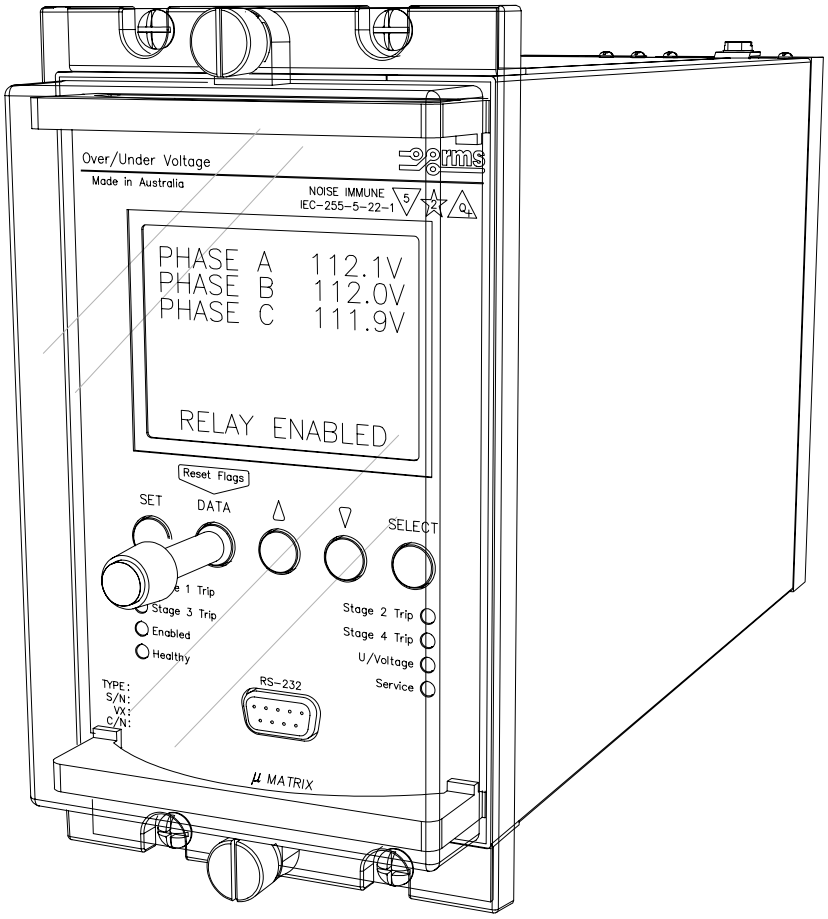
## Four Stage Over / Under Voltage Relay

## 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: $\mu$MATRIXwin
- Optically isolated communication ports
- MODBUS RTU compatible network protocol




2V67 depicted in a 4M56 draw out case

## 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.

## 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 |

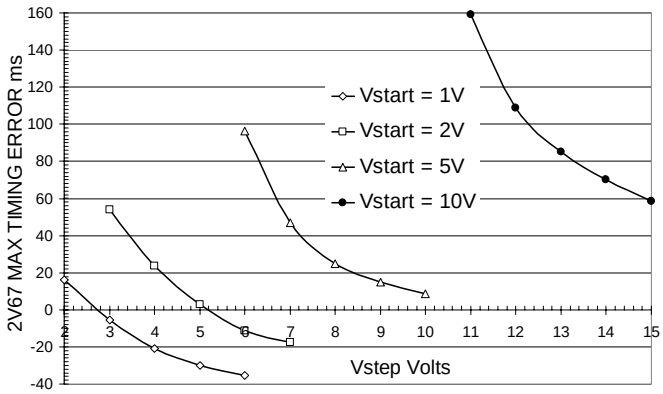
## TIME SETTING RANGE

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

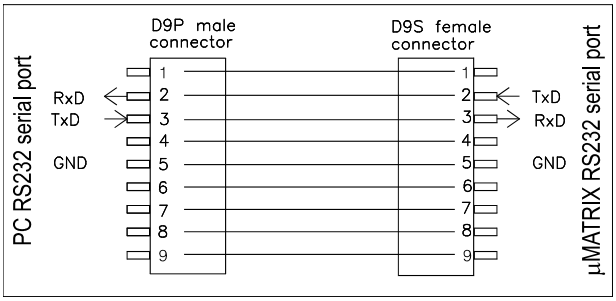
## FAST TRANSIENT DISTURBANCE

EN61000-4-4:1995 4KV Level 4

## AMBIENT OPERATING TEMPERATURE RANGE

-5 to 55 degrees Celsius

**PC TO μMATRIX SERIAL CABLE**
One cable supplied with each order.
P/N 290-406-151




**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 μMATRIXwin configuration program is designed to operate with all relays from the Micro MATRIX range & with all installed firmware version.

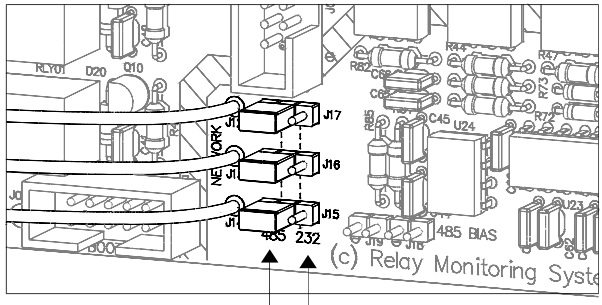
Network port
The network port is intended for applications where permanent connection to a master control system is required. An optically isolated RS232 or RS485 physical layer is provided for this function.

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

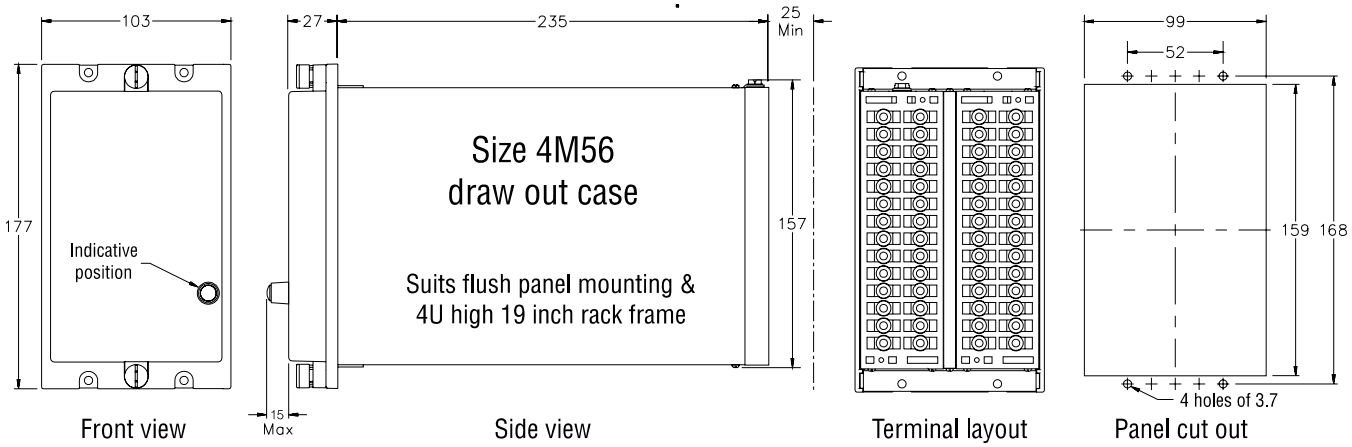
The RS232 connection is intended for interface to an RS232 to optic fiber converter in environments subject to extreme electrical interference.

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.

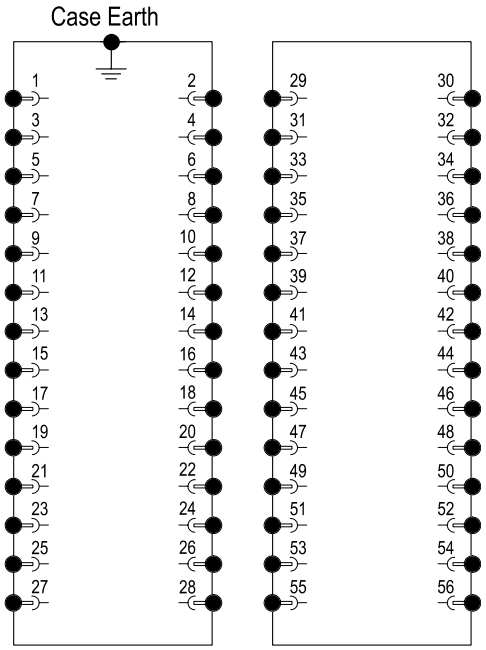
Changing the Network port from RS485 to RS232
μMATRIX relays are shipped with the rear network port terminals configured as RS485. This configuration may be changed in the field to RS232 if required by withdrawing the relay module from the case & changing the three configuration links as depicted.




RS485 Port Header Position | RS232 Port Header Position




Front view | Side view | Terminal layout | Panel cut out




4M56 Case terminations (REAR VIEW)

# 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

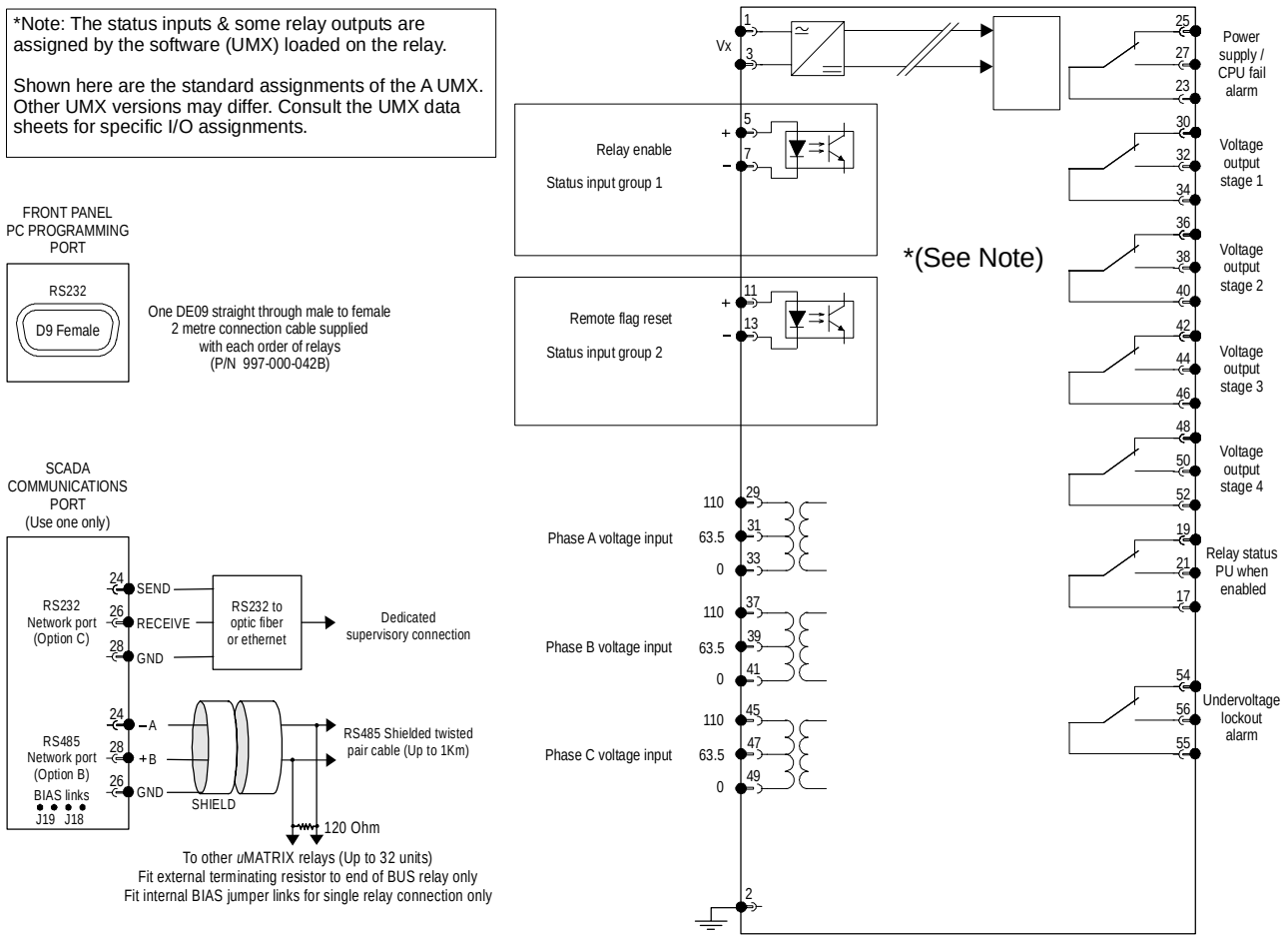
All current UMX software applications may be downloaded from:

http://www.rmspl.com.au/umatrix

These may then be loaded into the relay using uMATRIXwin.

*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.




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

## 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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