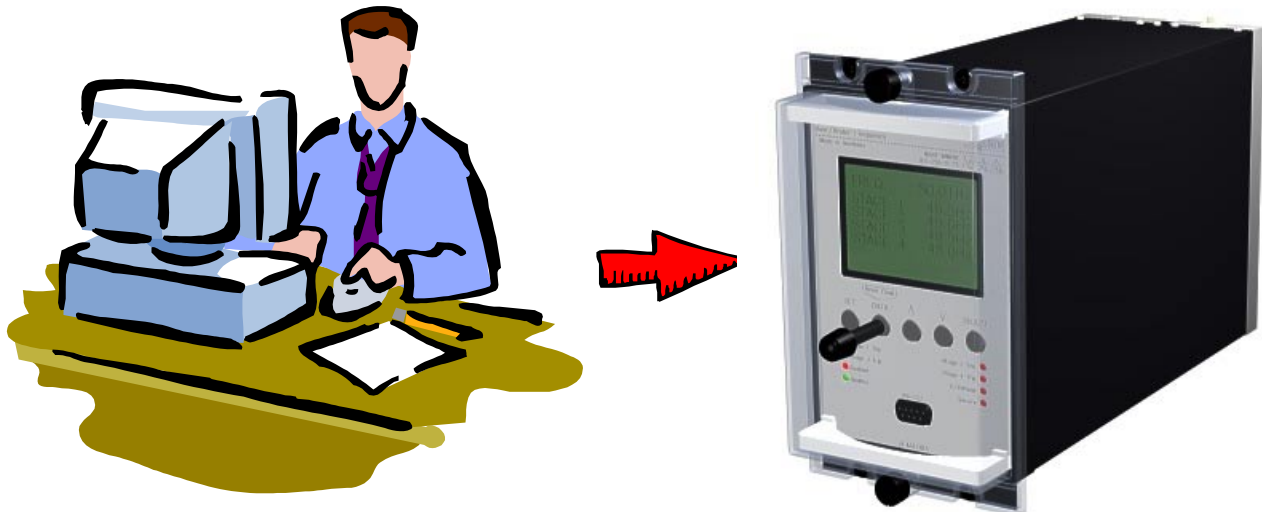


## SOFTWARE FUNCTION & VERIFICATION

# 2V164 C UMX

### VOLTAGE REGULATION & CONTROL RELAY



Issue	Date	Summary of changes
F	19/12/2002	Bios was 3.14.
G	28/01/2003	UMX Updated
H	30/04/2003	UMX Updated
D	09/09/2002	Document layout revised
E	10/10/2002	Bios was 03.11

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## 1.0 OVERVIEW

The 2V164 Voltage Regulator Relay continuously monitors the transformer output voltage & current. It provides "RAISE" & "LOWER" control commands to the on-load tap changer such that the load centre is automatically maintained within acceptable limits. Small variations in supply frequency will not affect the system performance.

The 2V164 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.

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

An RS232 programming port is provided for ease of establishing relay settings using a PC &  $\mu$ MATRIXwin.

## 2.0 SOFTWARE VERSION CONTROL REGISTER

The following table is a register of the changes for the **UMX2V164C.umx** file.

DATE	SOFTWARE	CHANGES	BIOS	FIRST HARDWARE
21/01/2002	02.02	Initial release of C UMX.	03.11+	2V164K1
18/07/2002	02.14	Over current block added	03.11+	2V164K1
28/08/2002	02.15	LDC function revised	03.11+	2V164K1
07/09/2002	02.16	uMatrixWin display Tap Rate in floating point	03.11 – 03.14+	2V164K1
12/12/2002	04.01	New hardware and Bios	04.xx	2V164K1
04/01/2003	04.10	Put elapsed time in live CDB	04.xx	2V164K1
28/04/2003	04.30	Quadrature LDC calculation bugfix	04.xx	2V164K1

### 3.0 DESCRIPTION – UMX2V164C.UMX

#### 3.1 Standard Features

The 2V164 provides a range of standard features as described in the RMS Technical Bulletin, which may be downloaded from:

[www.rmspl.com.au/handbook/2v164.pdf](http://www.rmspl.com.au/handbook/2v164.pdf)

#### 3.11 Voltage Section

Set point Voltage Range	90 - 130 in 0.25VAC Steps
Bandwidth Setting	0.5 - 5.0 in 0.25 VAC Steps
Coarse Bandwidth	1 - 20 in 1.0 VAC Steps
Over Voltage Setting Range	110 - 130 in 1.0 VAC Steps
Under Voltage Blocking Setting Range	60 - 100 in 1.0 VAC Steps
Hysteresis	50%

#### 3.12 LDC

Current	1.0 or 5.0 Amp AC
Resistance	0 - 20 VAC in 0.1 VAC Steps
Reactance	0 - 20 VAC in 0.1 VAC Steps

#### 3.13 Timer Section

Accuracy all timers	+/- 0.1 Seconds
Initial Time Delay	10 - 300 in 10second steps
Interval Time Delay	1 -100 in 1second steps
Over Voltage Setting Range	1 - 60 in 1second steps
Under Voltage Blocking Setting Range	0 - 60 in 1second steps
Coarse Bandwidth	0 - 60 in 1second steps
Tap Change Fail	10 - 300 in 10second steps
Timing Characteristic	Definite or Inverse

#### 3.14 Load Step Inputs

2 Load Step Inputs	-10% to -10% in 0.5% steps
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#### 3.15 Overcurrent Blocking

Current	50 - 150% in 5% steps
Time	0 – 60 seconds in 1s steps

### 3.2 Special Features of this Software UMX Version

TPI feedback mode.

When a tap raise or lower command is output by the 2V164 to the OLTC, the internal tap change fail timer is started. Feedback from the OLTC is required to reset this timer. One of three methods may be used depending on the requirements of the control system. This 'C' UMX utilises one method described as 'TPI Feedback Method' *For information on the two other methods, see the 2V164 data sheet or the UMX2V164A & UMX2V164B documents.*

#### UMX2V164C TPI FEEDBACK METHOD

In this method the 2V200 TPI transducer must be connected to the 2V164. The control sequence is as follows:

1. A voltage deviation starts the initial time delay.
2. The time delay expires & a tap change command is output.
3. The tap change contact will remain closed until a signal is received from the TPI transducer confirming that a tap change event has occurred.
4. The interval time delay is initiated.  
Sequence 2 to 4 will repeat at the rate determined by the Interval timer setting until the sensed voltage falls back to within pre-set bandwidth limits.

#### 4.0 USER INTERFACE

Refer to the  $\mu$ 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](http://www.rmspl.com.au/digital/uMATRIXInfo.pdf)

To download further  $\mu$ MATRIX software & documentation:  
[www.rmspl.com.au/uMATRIX.htm](http://www.rmspl.com.au/uMATRIX.htm)

#### 5.0 Loading software, Calibration & Test

This section requires at least the following:  
A PC with Windows 98 or later and at least one COM port.  
UMatrixWin software.  
The correct serial cable.  
The ability to interrogate the relay via the front panel buttons.  
A general understanding of how UMX and UMP files work with the relay.

*Settable parameters will be overwritten by loading a new UMX file. They can however, be saved to a UMP file and then returned to the relay later. To learn how to do this, refer to the uMatrix Userguide.*

#### 5.1 Loading the UMX

Before loading the UMX2V164C software, ensure that it is compatible with your hardware. Download the compatibility list from the RMS website at:

[www.rmspl.com.au/digital/compatibility.pdf](http://www.rmspl.com.au/digital/compatibility.pdf)

Now ensure that the bios version in the relay matches the table in section 2.0 of this document. (If the bios version is different, you may not be able to load this UMX. Contact RMS for support.)

Load the UMX via the front panel COM port using the 'uMatrixWin' software. Now ensure that the UMX version matches the table in section 2.0.

*To interrogate for versions, press 'SET' and 'DATA' buttons simultaneously, then select 'Version Page'. Alternatively, use uMatrixWin – Options – Utilities.*

Check versions

The relay is now ready to calibrate. *Note: calibration is a factory function. If you are simply changing or re-loading a UMX, re-calibration is not necessary. The relay is deemed to be fully operational.*

## 5.2 Calibration using 'WinCal'

Test equipment required:

As 5.0 plus

Calibrated Test Set (Volts, Amps, Timing & Phase Angle)

- a) With the test set and PC connected to the relay, start Wincal, select uMatrix – Connect.
- b) Select uMatrix – Calibrate and follow the prompts. When completed, verify the following parameters.
- c) Check Voltage display reading accuracy:

MINIMUM	MAXIMUM	NOMINAL	ACTUAL	UNITS
119.8	120.2	120.0	<input type="text"/>	VDC
MINIMUM	MAXIMUM	NOMINAL	ACTUAL	UNITS
109.8	110.2	110.0	<input type="text"/>	VDC
MINIMUM	MAXIMUM	NOMINAL	ACTUAL	UNITS
99.8	100.2	100.0	<input type="text"/>	VDC

- d) Check current display reading accuracy:

MINIMUM	MAXIMUM	NOMINAL	ACTUAL	UNITS
0.19	0.21	0.20	<input type="text"/>	Amps
MINIMUM	MAXIMUM	NOMINAL	ACTUAL	UNITS
0.49	0.51	0.50	<input type="text"/>	Amps
MINIMUM	MAXIMUM	NOMINAL	ACTUAL	UNITS
0.99	1.01	1.00	<input type="text"/>	Amps

## 5.3 Optional Analogue Output Verification

*Does not exist in all hardware variants.*

- a) With the Line voltage set to 110V there should be 16.1+/-0.1mA between terminals 49 and 51.

VERIFY

- b) With the TPI set for 1 there should be 4.7 +/-0.1mA between terminals 53 and 55 and with the TPI set to 30 there should be 20.0 +/-0.1mA between terminals 53 and 55.

VERIFY

If the relay settings in the above are correct, the relay is deemed to be fully operational.

TESTED BY : \_\_\_\_\_ DATE : \_\_\_\_\_

6.0 CONNECTION DIAGRAM

