Order Number _____ Serial Number _____

PRODUCT/TEST MANUAL

2V48K11

OVERVOLTAGE/UNDERVOLTAGE SUPERVISION RELAY

Issue Level	Date	Summary of changes
E	14/01/1998	Initial issue.

Due to RMS continuous product improvement policy this information is subject to change without notice.

Document updated	Checked	Registered	.pdf file created	.pdf uploaded to web site

1. BROAD DESCRIPTION OF RELAY

The 2V48K11 is a 3 phase AC under and over voltage relay containing two timers - one providing an inhibit function and the other an alarm function. Solid state circuitry is employed for the measuring and timing functions and electromechanical relays are used for timer control and output signalling functions.

2. SPECIFICATIONS

DC AUXILIARY VOLTAGE	30 - 250V DC
DC AUXILIARY SUPPLY BURDEN	<15W
AC SENSING VOLTAGE	110V Ø - Ø (delta connected)
AC SENSING SUPPLY BURDEN	<1va PER PHASE @ 110v
AC OVERVOLTAGE SETTING RANGE	105% to 120%
OVERVOLTAGE REST RATIO	95 - 98%
AC UNDERVOLTAGE SETTING RANGE	80% TO 100%
UNDERVOLTAGE RESET RATIO	102 - 105%
VOLTAGE BLOCKING TIMER RANGE	1 - 10 SEC.
ALARM TIMER RANGE	.5 - 5 MIN.
AMBIENT TEMPERATURE RANGE	-5 5O 55^{O}c

3. TEST EQUIPMENT REQUIRED

Auxiliary DC Power Supply
3 x 0-150V AC Amplifiers
50Hz 3 Phase Oscillator
Digital Voltmeter
Oscilloscope Dual Trace
Frequency and Period Counter
Pickup and Dropout Time Measuring Apparatus
High Voltage Test Equipment

4. ASSOCIATED DRAWINGS

165-048-011	Descriptive Manual 2V48K11
165-048-111	Wiring Diagram 2V48K11
660-136-201	Circuit Diagram, Voltage Sensing PCB
660-136-301	Loading Diagram, Voltage Sensing PCB
660-136-202	Circuit Diagram, Voltage Sensing + 10 Sec Timer PCB
660-136-302	Loading Diagram, Voltage Sensing + 10 Sec Timer PCB
660-136-203	Circuit Diagram, Voltage Sensing + 5 Min Timer PCB

5. HIGH VOLTAGE TESTING

a) Apply 2KV RMS. between the terminal groups as listed in A & B below for 1 minute.

b) Apply three 5KV 1/50usec pulses of each polarity as listed in A & B below.

GROUP A	GROUP B
All Terminals	Frame
Inputs C1,C2,C9,C10,C19 &C20	Outputs & Frame All Other Terminals

6. CALIBRATION AND TEST PROCEDURE

6.1 Voltage Sensing Circuitry Set Up

a) Cut timer links A, B, C on 660/136-2 and links A, D, E on 660/136-3.

b) For each voltage sensing PCB connect a digital ohm meter between PCB pins 25 and 27 and pre-adjust trimpot R31 to 14.0K.

c) Repeat (b) with digital ohm meter connected between PCB pins 15 and 17 and pre-adjust R33 to 8.0K.

d) Insert PC Boards in unit.

e) Apply 30V DC Auxiliary supply.

f) Set all voltage sensing pots to maximum setting.

6.2 Over Voltage Sensing Circuitry

a) Apply 132V 50Hz between enclosure terminals C9 and C10 (CRY).
Adjust trimpot R2 on PCB 660/136-1 until pin 23 just goes low as input voltage increases above 132V.
Note that the other AC inputs should not be energised, or PCB pin 23 will not change state as VRY is varied.

b) Set VRY O/V pot to 105% and check that PCB pin 23 just goes low as input voltage increases above 115.5V. If the threshold is above 115.5V decrease trimpot R31 setting.

c) Repeat Steps a) and b) until dial is calibrated to the following accuracy:

MIN	MAX	NOM	ACTUAL	UNITS
103.9	106.1	105		%
108.9	111.1	110		%
113.9	116.1	115		%
118.9	121.1	120		%

6.2 Over Voltage Sensing Circuitry (Cont)

d) Check that pickup/dropout ratio at max. scale setting is within limits:

MIN	MAX	NOM	ACTUAL	UNITS
102	105	103		%

e) Apply 132V 50Hz between enclosure terminals C10 and C19 (VYB).
Adjust trimpot R2 on PCB 660/132-2 until pin 23 just goes low as input voltage increases above 132V.

f) Set VYB O/V pot to 105% and check that PCB pin 23 just goes low as input voltage increased above 115.5V. If the threshold is above 115.5V decrease trimpot R31 setting by adjusting anticlockwise.

g) Repeat Steps e) and f) until dial is calibrated to the following accuracy:

MIN	MAX	NOM	ACTUAL	UNITS
103.9	106.1	105		%
108.9	111.1	110		%
113.9	116.1	115		%
118.9	121.1	120		%

h) Check that dropout/pickup ratio at max. scale setting is within limits:

MIN	MAX	NOM	ACTUAL	UNITS
102	105	103		%

i) Apply 132V 50Hz between enclosure terminals C9 and C19 (VBR).
Adjust trimpot R2 on PCB 660/136-3 until pin 23 just goes low as input voltage increases above 132V.

j) Set VBR O/V pot to 105% and check that PCB pin 23 just goes low as input voltage increases above 115.5V. If the threshold is above 115.5V decrease trimpot R31 setting by adjusting anticlockwise.

k) Repeat Steps i) and j) until dial is calibrated to the following accuracy:

MIN	MAX	NOM	ACTUAL	UNITS
103.9	106.1	105		%
108.9	111.1	110		%
113.9	116.1	115		%
118.9	121.1	120		%

l) Check that pickup/dropout ratio at max scale setting is within limits:

MIN	MAX	NOM	ACTUAL	UNITS
102	105	103		%

6.3 Under Voltage Sensing Circuitry

a) Adjust trimpots R5 on 660.136-2 and 660.136-3 fully clockwise and dial pots VYB U/V and VBR U/V fully clockwise.

b) Set 3 phase input to 121V for all phases.

c) Set dial pot VRY U/V to 100% and adjust R5 on 660/136-1 until pin 12

just goes low as VRY is decreased below 110V. Note that the other input voltages will be sufficient to ensure that VRY U/V sensing circuit status may be observed at PCB pin 12.

d) Set VRY U/V pot to 80% and check that PCB pin 12 just goes low as input voltage drops below 88V. If the threshold is above 88V, decrease trimpot R33 setting by adjusting anticlockwise.

e) Repeat Steps c) and d) until dial is calibrated to the following accuracy.

MIN	MAX	NOM	ACTUAL	UNITS
78.9	81.1	80		%
83.9	86.1	85		%
88.9	91.1	90		%
93.9	96.1	95		%
98.9	101.1	100		%

f) Check that dropout/pickup ratio at max. scale setting is within limits.

MIN	MAX	NOM	ACTUAL	UNITS
95	98	97		%

g) Reset 3 phase input to 121V for all phases.

h) Set dial pot VYB U/V to 100% and VRY and VBR dial pots to 88V.
Adjust R5 on 660.136-2 until pin 12 just goes low as VYB is decreased below 110V.
Note: Adjust blue phase to neutral voltage for Steps h to j.

i) Set VYB U/V pot to 80% and check that PCB pin 12 just goes low as input voltage drops below 88V. If the threshold is above 88V decrease trimpot R33 setting by adjusting anticlockwise.

j) Repeat Steps h) and i) until dial is calibrated to the following accuracy.

MIN	MAX	NOM	ACTUAL	UNITS
78.9	81.1	80		%
83.9	86.1	85		%
88.9	91.1	90		%
93.9	96.1	95		%
98.9	101.1	100		%

k) Check that dropout/pickup ratio at max scale setting is within limits.

MIN	MAX	NOM	ACTUAL	UNITS
95	98	97		%

6.3 Under Voltage Sensing Circuitry (Cont)

l) Set 3 phase input to 120V for all phases. Increase yellow phase to neutral voltage so that VYB and VRY increase to 132V.

m) Set dial pot VBR U/V to 100% and VRY and VYB dial pots to 80%. Adjust R5 on 660/136-3 until pin 12 just goes low as VBR is decreased below 110V.
Note: Adjust blue phase to neutral voltage for Steps m to o.

n) Set VBR U/V pot to 80% and check that PCB pin 12 just goes low as input voltage drops

below 88V. If the threshold is above 88V, decrease trimpot R33 setting by adjusting anticlockwise.

o) Repeat Steps m) and n) until dial is calibrated to the following accuracy.

MIN	MAX	NOM	ACTUAL	UNITS
78.9	81.1	80		%
83.9	86.1	85		%
88.9	91.1	90		%
93.9	96.1	95		%
98.9	101.1	100		%

p) Check that dropout/pickup ratio at max. scale setting is within limits.

MIN	MAX	NOM	ACTUAL	UNITS
95	98	97		%

6.4 Timer Calibration

Note: The timers may be initiated by applying auxiliary supply to the main input [enclosure terminals C1 (+) and C2 (-)]. If no AC supply is applied, the under voltage condition will be detected and both timers will commence timing. In this instance the U/V flag will operate when the 1-10 sec. timer times out and the U/V alarm signalling relay will pick up when the .5-5 min. timer times out.

a) Connect a period counter to PCB 660/136-2 pin 8 (active) and pin 9 (0V).

b) Adjust trimpot R19 until the ratio of waveform periods at 1-10 sec. timer dial scale ends is exactly 10:1 (absolute values are unimportant).

c) Select C7, C8 and C9 (C7 nominal .01uF) such that waveform period is 2.441mS at dial scale maximum setting.

d) Check that dial is calibrated to the following accuracy:

MIN	MAX	NOM	ACTUAL	UNITS
0.8	1.2	1.0		sec
1.8	2.2	2.0		sec
3.8	4.2	4.0		sec
5.8	6.2	6.0		sec
7.8	8.2	8.0		sec
9.8	10.2	10.0		sec

6.4 Timer Calibration (Cont)

e) Connect period counter to PCB 660/136-3 pin 8 (active) and pin 9 (0V).

f) Adjust trimpot R19 until the ratio of waveform periods at .5-5 min. timer dial scale ends is exactly 10:1 (absolute values are unimportant).

g) Select C7, C8 and C9 (C7 nominal .033uF) such that waveform period is 9.155mS at dial scale maximum setting.

h) Check that dial is calibrated to the following accuracy:

MIN	MAX	NOM	ACTUAL	UNITS
0.4	0.6	0.5		min
0.9	1.1	1.0		min
1.9	2.1	2.0		min
2.9	3.1	3.0		min
3.9	4.1	4.0		min
4.9	5.1	5.0		min

7. GENERAL & FUNCTIONAL

a) Check for correct operation of magnetic disc flags.
i.e. O/V flag operates when .5-5 min timer times out and one or more AC inputs is above set threshold value and U/V flag operates when .5-5 min. timer times out and one or more AC inputs is below set threshold value.

_____ **ACTUAL**

b) Check that all relays are functional and are wired as per circuit diagram.

c) Polarise plug-in printed circuit boards as follows:

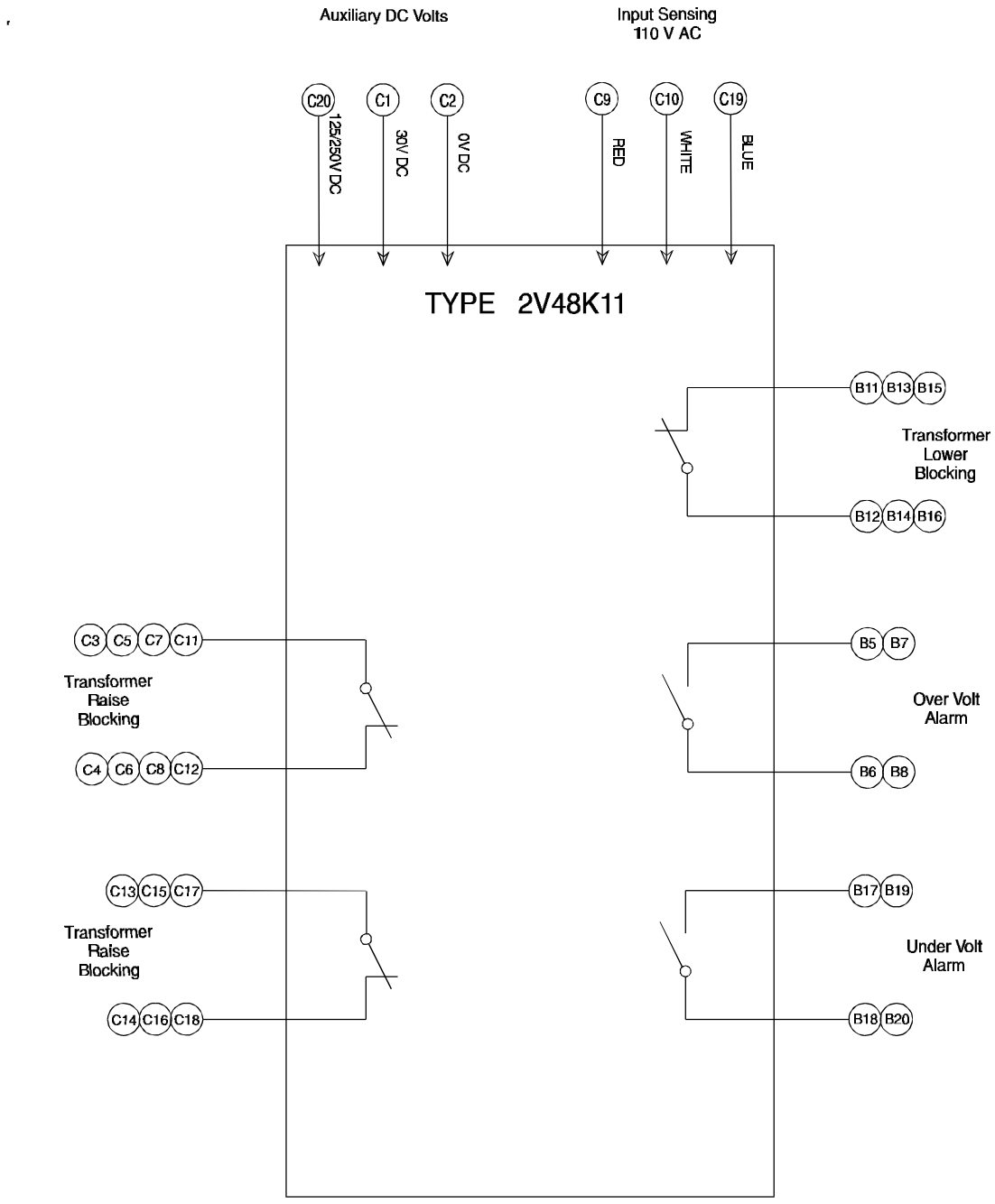
660/136-1 Pin 6
660/136-2 Pin 18
660/136-3 Pin 14 _____ **ACTUAL**

d) Check that the relay is electrically sound and mechanically robust as per Standard Inspection & Test Schedule 903-000-026

PASS ☐

TESTED BY :_____DATE :_____

8. CONNECTION DIAGRAM


Auxiliary DC Volts
Input Sensing
110 V AC
C20
C1
C2
C9
C10
C19
125/250V DC
30V DC
0V DC
RED
WHITE
BLUE
TYPE 2V48K11
B11 B13 B15
Transformer
Lower
Blocking
B12 B14 B16
C3 C5 C7 C11
Transformer
Raise
Blocking
C4 C6 C8 C12
B5 B7
Over Volt
Alarm
B6 B8
C13 C15 C17
Transformer
Raise
Blocking
C14 C16 C18
B17 B19
Under Volt
Alarm
B18 B20