ADVR-083

Universal Hybrid IGBT Analog-Digital Voltage Regulator Operation Manual

### SECTION 1: SPECIFICATION

#### Sensing Input (E1, E2, E3) Average Reading

<table>
<thead>
<tr>
<th>Voltage</th>
<th>90 – 520 Vac 1 phase / 3 phase DIP switch setting</th>
</tr>
</thead>
</table>

1 phase (E1, E2) / 3 phase (E1, E2, E3)

- 90 – 130 Vac @ 110 Vac
- 180 – 260 Vac @ 220 Vac
- 340 – 520 Vac @ 440 Vac DIP switch setting

| Frequency | 50/60 Hz, DIP switch setting |

#### Power Input (X1, X2, Z2)

<table>
<thead>
<tr>
<th>Voltage</th>
<th>60 – 300 Vac, 1 phase / 3 phase</th>
</tr>
</thead>
</table>

1 phase (X1, X2) / 3 phase (X1, X2, Z2)

| Frequency | 60 – 500 Hz |

#### Auxiliary Input (Z1, Z2)

<table>
<thead>
<tr>
<th>Voltage</th>
<th>60 – 300 Vac, 1 phase 2 wire</th>
</tr>
</thead>
</table>

| Frequency | 40 – 500 Hz |

#### Excitation Output (F+, F-)

<table>
<thead>
<tr>
<th>Voltage</th>
<th>110V 1 phase Continuous 63 Vdc 8A Max. 90 Vdc 10A for 10 secs.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Voltage</th>
<th>220V 1 phase Continuous 125 Vdc 8A Max. 180 Vdc 10A for 10 secs.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Voltage</th>
<th>220V 3 phase Continuous 150 Vdc 8A Max. 215 Vdc 10A for 10 secs.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Resistance</th>
<th>Min. 15 ohms, Max. 100 ohms @ 220V</th>
</tr>
</thead>
</table>

| Fuse Spec. | Slow blow 5 x 20 mm 10A |

#### External Voltage Adjustment (VR1, VR2)

| Max. | +/- 10% @ 1K ohm 1 watt potentiometer |

#### Quadrature Droop Input (S1, S2)

| CT N:5A or N:1A (DIP switch selected), greater than 5VA Sensitivity +/- 7% @ PF +/- 0.5 (Droop adjustable) |

<table>
<thead>
<tr>
<th>Analogical Voltage Input (A1, A2)</th>
<th>Input resistance greater than 2K ohms Max. Input +/- 5 Vdc or + 10 Vdc Sensitivity 1 Vdc for 5% (Trim adjustable)</th>
</tr>
</thead>
</table>

### Build Up Voltage

5 Vac 25 Hz residual volts at power input terminal

### Soft Start Ramp Time

4 seconds +/- 10%

### Voltage Regulation

Less than +/- 0.5% (with 4% engine governing)

### Typical System Response

Less than 20 milliseconds

### EMI Suppression

Internal electromagnetic interference filtering

### Static Power Dissipation

Max. 6 watts

### Under Frequency Protection (Factory Presets)

- 50 Hz system presets knee point at 45 Hz
- 60 Hz system presets knee point at 55 Hz

### Over Excitation Current Limiting

Input Power 25 – 105% (EXC. Adjustable) O/E acts after a 10 sec. delay, this function can be turned OFF (EXC. set to Max clockwise)

### Voltage Thermal Drift

Less than 3% at temperature range -40 to +70 °C

### Under-Frequency Knee Point Thermal Drift

Less than +/- 0.1 Hz at -40 to +70 °C

### Environment

- Operation Temperature: -40 to +70 °C
- Storage Temperature: -40 to +85 °C
- Relative Humidity: Max. 95%
- Vibration: 5.5Gs @ 60Hz

### Dimensions

- 150.0 (L) x 135.0 (W) x 61.0 (H) mm
- 5.91 (L) x 5.31 (W) x 2.40 (H) inch

### Weight

- 750 g +/- 2%
- 1.654 lb +/- 2%

### ATTENTION

Confirm the voltage sensing input setting before use (DIP switches SW5 and SW6) in order to avoid permanently damaging the AVR.
SECTION 2 : OUTLINE / SIZE / INSTALLATION REFERENCE

Figure 1  Outline Drawing

Switch

Set Sensing  7  ON for single Phase sensing
              7  OFF for 3 phase sensing

Set Sensing Voltage  5  OFF  6  OFF  110Volts sensing
                       5  ON  6  OFF  220Volts sensing
                       5  OFF  6  ON  380/480Volts sensing

Set generator size  1  OFF  2  OFF  Less then 90KW
                   (Turbo Lag)  1  OFF  2  ON  from 90 to 500KW
                   1  ON  2  ON  more then 500KW

Set Paralleling CT size  3  ON for 5A CT  OFF for 1A CT

Set Hz  4  ON for use at 50 Hz
       4  OFF for use at 60 Hz
SECTION 3 : DIP SWITCH PROGRAMMING & VR ADJUSTMENTS

**ATTENTION**
The adjustment range of External VR and TRIM are limited by SW5, SW6 settings.

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**Z1, Z2 : Auxiliary Power Input**
**X1, X2 : Single Phase Power Input**
**X1, X2, Z2 : Three Phase Power Input**

Note: X1 and Z1 are linked internally

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**UF : Under Frequency Adjustment**
Under frequency knee point setting
- 50 Hz system: 40 to 51 Hz adjustable
- 60 Hz system: 50 to 61 Hz adjustable

**STAB : Stability Adjustment**
Stability range set by DIP switches SW1 and SW2

**DIP : U/F Protection Voltage Slope Adjustment**
When U/F protection is activated, the voltage drop ratio can be adjusted by DIP switch. Adjustment range 3 to 6 V/Hz

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<table>
<thead>
<tr>
<th>SW</th>
<th>ON</th>
<th>OFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>CT 5A</td>
<td>CT 1A</td>
</tr>
<tr>
<td>4</td>
<td>50 Hz</td>
<td>60 Hz</td>
</tr>
<tr>
<td>7</td>
<td>1Φ SENSING</td>
<td>3Φ SENSING</td>
</tr>
<tr>
<td>1. OFF</td>
<td>2. FF</td>
<td>&lt;90KW</td>
</tr>
<tr>
<td>1. OFF</td>
<td>2. ON</td>
<td>90-500KW</td>
</tr>
<tr>
<td>5. OFF</td>
<td>6. OFF</td>
<td>110V</td>
</tr>
<tr>
<td>5. ON</td>
<td>6. OFF</td>
<td>220V</td>
</tr>
<tr>
<td>5. OFF</td>
<td>6. OFF</td>
<td>440V</td>
</tr>
</tbody>
</table>

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**E1, E2, E3 : Three Phase Sensing Input**
Single or Three Phase sensing set by DIP switches SW7

**S1, S2 : Quadrature Droop Input**
Sensitivity +/- 7% @ PF +/- 0.5

CT N:5A or N:1A set by DIP switches SW3

**VR1, VR2 : External VR Input**
Shorted when not in use

**A1, A2 : Analog Voltage Input**
Max. Input +/- 5 Vdc or + 10 Vdc

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**F+, F- : Excitation Output**
Connect to generator excitation field

**E1, E2 : Single Phase Sensing Input**

**DROOP : DROOP Adjustment**
Current Compensation Droop Adjustment
Used only in parallel operation

**TRIM : Voltage Input Adjustment for terminals A1 & A2. Input +/- 5 Vdc to + 10 Vdc**
Sensitivity 1 Vdc for 5% (Trim adjustable)

**VOLT : Voltage Adjustment**
Sensing input voltage range set by DIP switches SW5 and SW6

**EXC. : Over Excitation Current Limiting Adjustment**
Input Power 25 – 105% (EXC. Adjustable)
EXC. potentiometer set clockwise to Max. to turn OFF O/E protection

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**U/F : Under-Frequency LED**
Under-Frequency Protection status (ON = Activated)

**O/E : Over Excitation LED**
Over Excitation Protection status (ON = Activated), after a 10 sec. delay will reduce Excitation Output
SECTION 4 : WIRING CONNECTIONS

Dotted lines represent a three-phase input. Do not connect it for the single phase connection.

Figure 3  Self-Excited (SHUNT) 110/220 Vac
Single phase / Three phase

Figure 4  Self-Excited (SHUNT) 440 Vac
Single phase / Three phase

Figure 5  Auxiliary Winding 110/220/440 Vac
Single phase / Three phase

Figure 6  PMG 110/220/440 Vac
Single phase / Three phase
ATTENTION

1. Before using a Megger or a Withstand Voltage Tester, remove the wires connecting to the AVR to prevent high voltage damage to the regulator.

2. Improper setting of under-frequency protection could cause the output voltage of the unit to drop or become unstable under with changes in load. Avoid making any changes to the U/F setting unless necessary.

※ Use only the replacement fuses specified in this user manual.
※ Appearance and specifications of products are subject to change for improvement without prior notice.