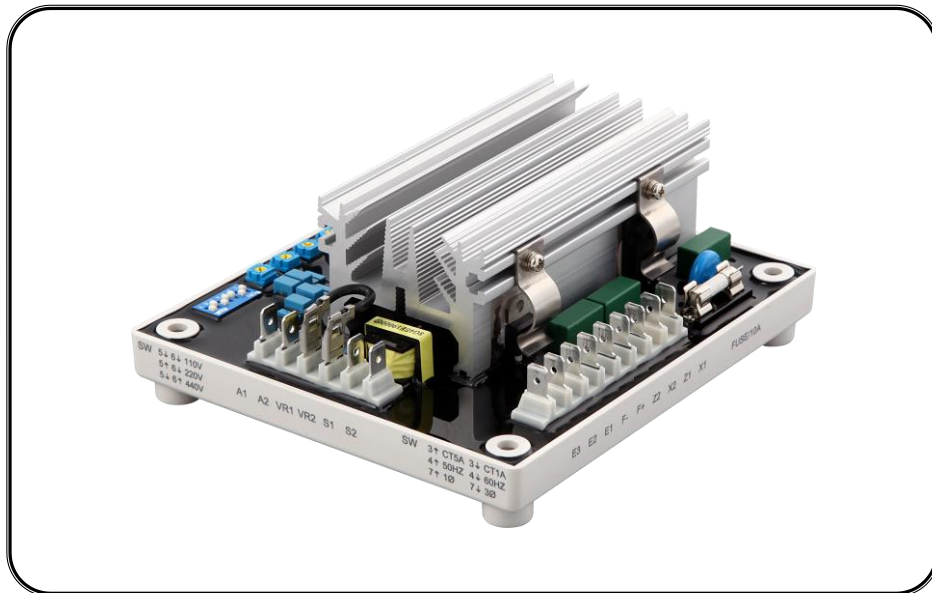# ADVR-083

Universal Hybrid Analog-Digital Voltage Regulator Operation Manual

Analog / Digital AVR, Single-phase / Three-phase Voltage detection, 8 Amp, Voltage Regulator for use with Auxiliary Winding, PMG, and self-excited (SHUNT) brushless generators.

Can be used together with KUTAI Auxiliary Excitation Booster module to increase motor starting capacity of shunt generators.

ISO 9001
ETC

SECTION 1 : SPECIFICATION

Sensing Input (E1, E2, E3) Average Reading
Voltage and Frequency DIP switch settings
1 phase **(E1, E2)** / 3 phase **(E1, E2, E3)**
$\qquad$ 90 − 130 Vac @ 110 Vac
$\qquad$ 180 − 260 Vac @ 220 Vac
$\qquad$ 340 − 520 Vac @ 440 Vac
Frequency $\quad$ 50/60 Hz

Power Input (X1, X2, Z2)
Voltage $\qquad$ 60 − 300 Vac, 1 phase / 3 phase
1 phase (X1, X2) / 3 phase (X1, X2, Z2)
Frequency $\quad$ 40 − 500 Hz

Auxiliary Input (Z1, Z2)
Voltage $\qquad$ 60 − 300 Vac, 1 phase 2 wire
Frequency $\quad$ 40 − 500 Hz

Excitation Output (F+, F-)
110V 1 phase Continuous $\quad$ 63 Vdc $\quad$ 8A
$\qquad$ Max. 90 Vdc 10A for 10 secs.
220V 1 phase Continuous $\quad$ 125 Vdc $\quad$ 8A
$\qquad$ Max. 180 Vdc 10A for 10 secs.
220V 3 phase Continuous $\quad$ 150 Vdc $\quad$ 8A
$\qquad$ Max. 215 Vdc 10A for 10 secs.
Resistance $\quad$ Min.15 ohms, Max.100 ohms @ 220V
Fuse Spec. $\quad$ 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 setting)
Burden : greater than 5VA
Sensitivity +/- 7% @ PF +/- 0.5
(Can be adjusted through Droop setting)

Analogue Voltage Input (A1, A2)
Input resistance greater than 2K ohms
Input Range +/- 5 Vdc $\quad$ or $\quad$ 0 − 10 Vdc
Sensitivity Max.1 Vdc = 5% change in output voltage
(Can be adjusted through Trim setting)

Build Up Voltage
Greater than 5 Vac, 25 Hz residual volts input power

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
Built-in Harmonic suppression

Static Power Dissipation
Max. 6 watts

Under Frequency Protection (Factory Preset)
50 Hz system preset knee point at 45 Hz
60 Hz system preset knee point at 55 Hz

Over Excitation Protection
25 − 105% of Input Power (adjust with EXC pot.)
O/E acts after 10 sec. delay. The OE function can be
turned OFF by adjusting EXC. clockwise to max.

Voltage Thermal Drift
Less than 3% from -40 to +70 ˚C

Under-Frequency Knee Point Thermal Drift
Less than +/- 0.1 Hz from -40 to +70 ˚C

Environment
Operation Temperature $\quad$ -40 to +70 ˚C
Storage Temperature $\quad$ -40 to +85 ˚C
Relative Humidity $\qquad$ Max. 95%
Vibration $\qquad$ 5.5Gs @ 60 Hz

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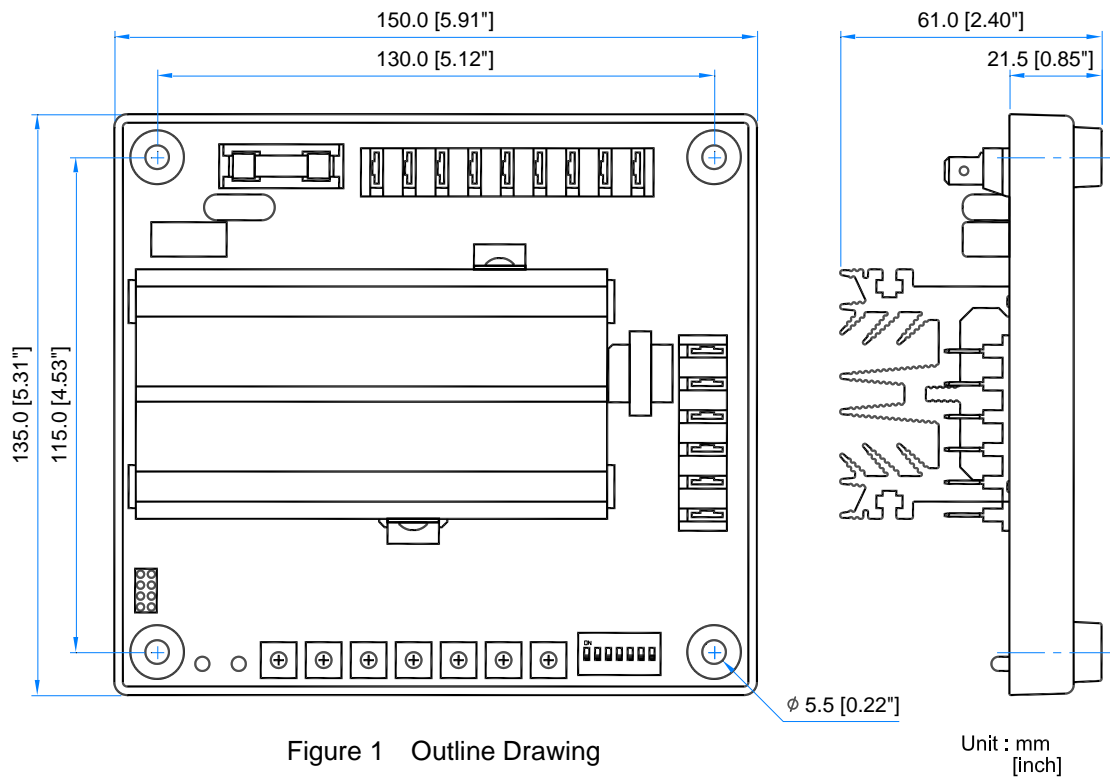5.91 (L) x 5.31 (W) x 2.40 (H) inch

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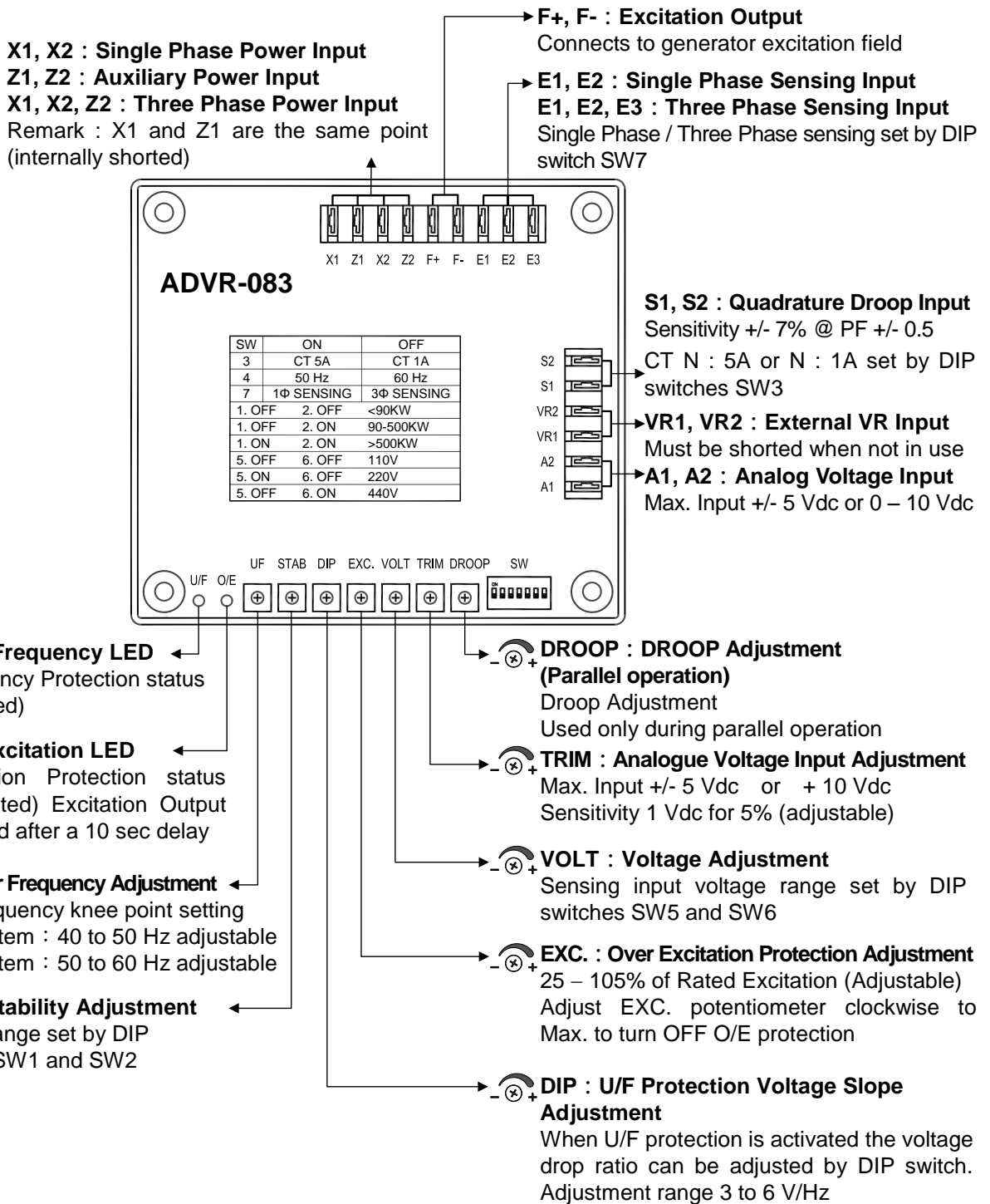

ATTENTION

In order to avoid permanent damage to the AVR confirm that the voltage sensing input setting matches the generator before use (DIP switches SW5 and SW6)

SECTION 2 : OUTLINE / SIZE / INSTALLATION REFERENCE

Figure 1   Outline Drawing

Unit : mm
[inch]

150.0 [5.91"]

130.0 [5.12"]

135.0 [5.31"]

115.0 [4.53"]

⌀ 5.5 [0.22"]

61.0 [2.40"]

21.5 [0.85"]

SECTION 3 : DIP SWITCH PROGRAMMING & VR ADJUSTMENTS

X1, X2 : Single Phase Power Input
Z1, Z2 : Auxiliary Power Input
X1, X2, Z2 : Three Phase Power Input
Remark : X1 and Z1 are the same point (internally shorted)

F+, F- : Excitation Output
Connects to generator excitation field

E1, E2 : Single Phase Sensing Input
E1, E2, E3 : Three Phase Sensing Input
Single Phase / Three Phase sensing set by DIP switch SW7

ADVR-083

X1 Z1 X2 Z2 F+ F- E1 E2 E3

SW	ON	OFF
3	CT 5A	CT 1A
4	50 Hz	60 Hz
7	1Φ SENSING	3Φ SENSING
1. OFF	2. OFF	<90KW
1. OFF	2. ON	90-500KW
1. ON	2. ON	>500KW
5. OFF	6. OFF	110V
5. ON	6. OFF	220V
5. OFF	6. ON	440V

S2
S1
VR2
VR1
A2
A1

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
Must be shorted when not in use

A1, A2 : Analog Voltage Input
Max. Input +/- 5 Vdc or 0 – 10 Vdc

UF STAB DIP EXC. VOLT TRIM DROOP SW

U/F O/E

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

O/E : Over Excitation LED
Over Excitation Protection status (ON = Activated) Excitation Output will be reduced after a 10 sec delay

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

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

DROOP : DROOP Adjustment (Parallel operation)
Droop Adjustment
Used only during parallel operation

TRIM : Analogue Voltage Input Adjustment
Max. Input +/- 5 Vdc or + 10 Vdc
Sensitivity 1 Vdc for 5% (adjustable)

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

EXC. : Over Excitation Protection Adjustment
25 – 105% of Rated Excitation (Adjustable)
Adjust EXC. potentiometer clockwise to Max. to turn OFF O/E protection

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

SECTION 4 : WIRING CONNECTIONS

Dotted lines represent a three-phase input. Do not connect if installed in single-phase system
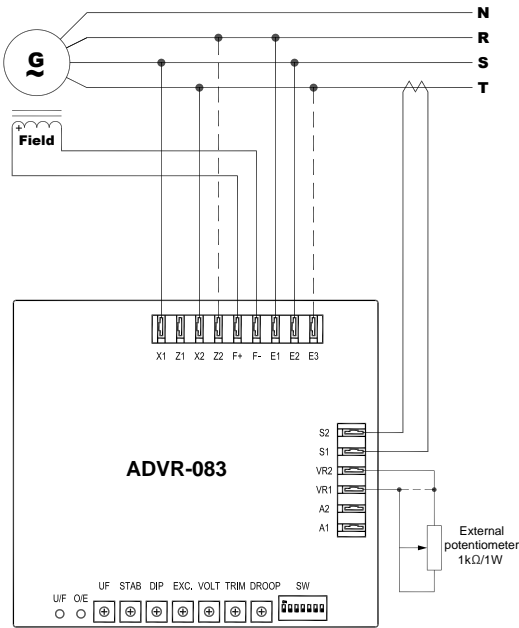

Figure 3   Self-Excited (SHUNT) 110/220 Vac
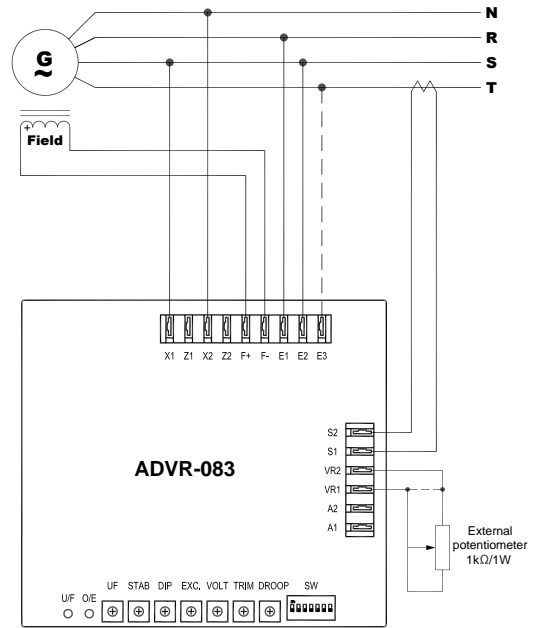Single phase / Three phase

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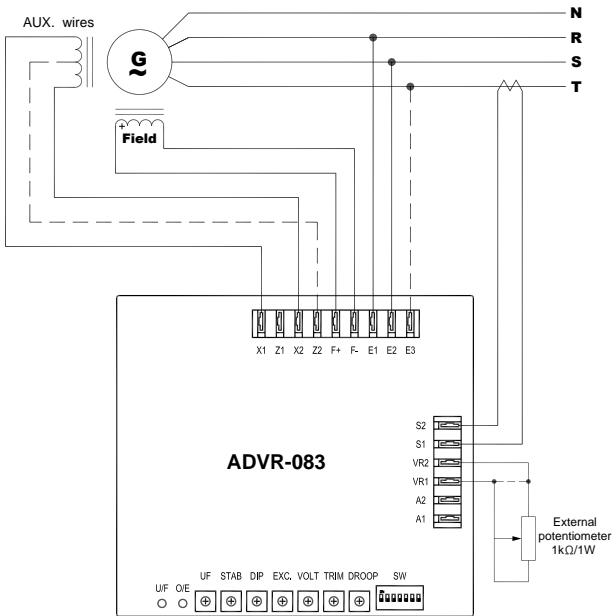Single phase / Three phase

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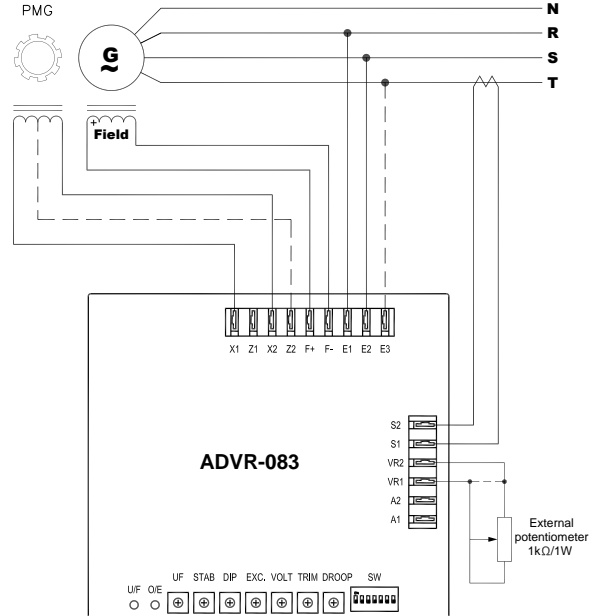Single phase / Three phase

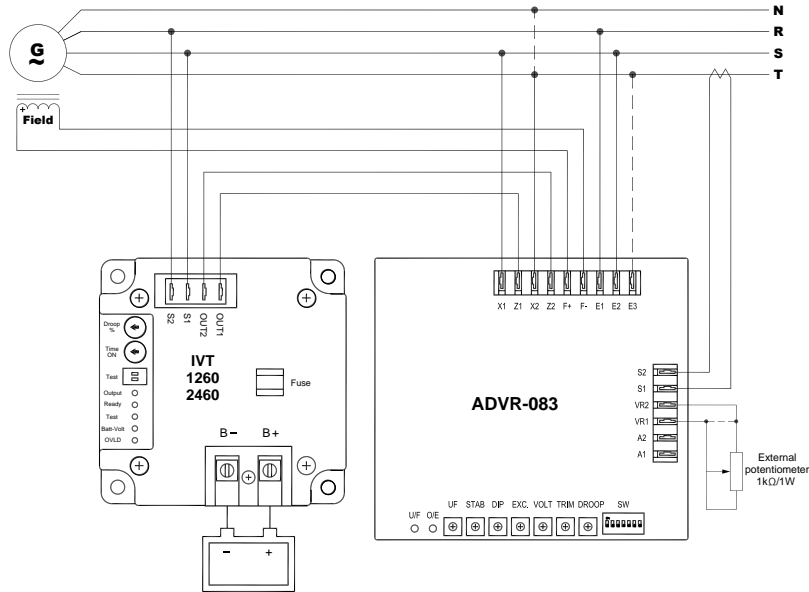Figure 6   PMG 110/220/440 Vac
Single phase / Three phase

Figure 7   ADVR-083 & IVT-1260 / IVT-2460 Wiring Connection
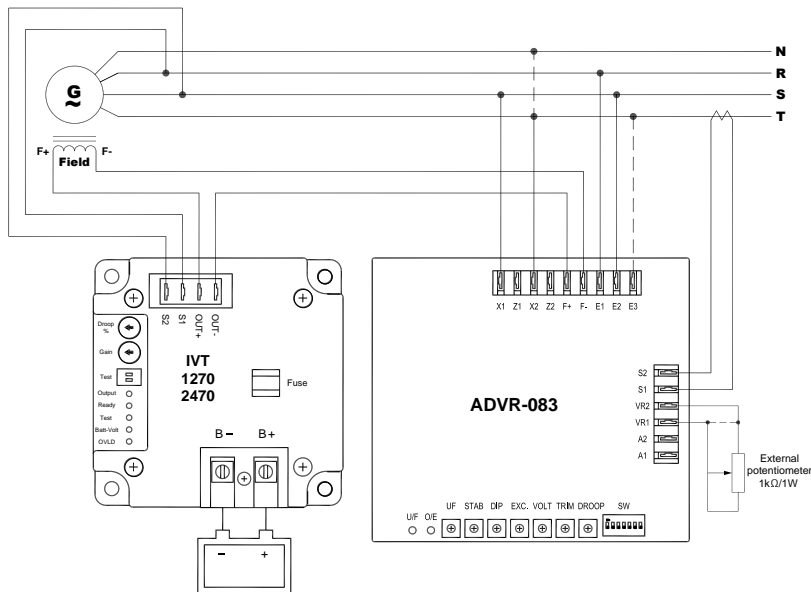Self-Excited (SHUNT) 110/220 Vac Single phase / Three phase

Figure 8   ADVR-083 & IVT-1270 / IVT-2470 Wiring Connection
Self-Excited (SHUNT) 110/220 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.