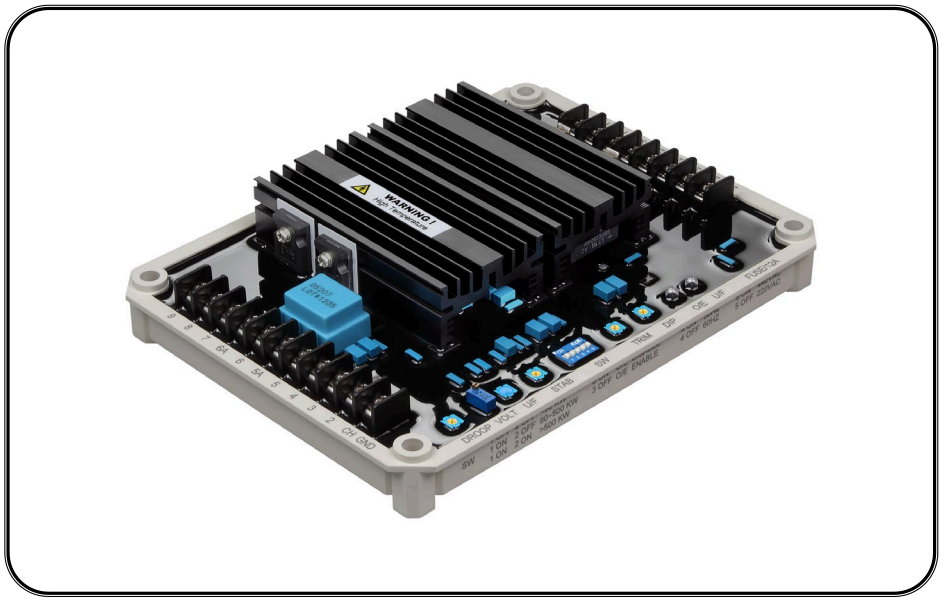
ADVR-12

Universal Hybrid Analog-Digital Voltage Regulator Operation Manual



Self Excited Automatic Voltage Regulator
For use in Brushless SHUNT, PMG and Auxiliary Winding
Compatible with Basler* AVC63-12, AVC125-10, CATERPILLAR*
VR6, Kato* K65-12B & K125-10B, Leroy Somer* 202-8634 regulators

Use with KUTAI IVT-1260 / IVT-2460 add-on module can boost generator motor starting capacity.

* All manufacturer names and numbers are used for reference purpose only and do not imply that any part is the product of these manufacturers.

KUTAI

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ISO 9001
ETC

SECTION 1 : SPECIFICATION

Sensing Input (20, 22, 24)

Voltage	220 – 520 Vac
	1- or 3- phase selectable
	180 – 260 Vac @ 220 Vac
	330 – 520 Vac @ 440 Vac
Frequency	50/60 Hz, selectable

Power Input (26, 28, 30)

Voltage	60 – 300 Vac, 1 or 3 phase
Frequency	40 – 500 Hz

Excitation Output (F1, F2)

Voltage	63 Vdc @ power input 110 Vac 1 Phase
	75 Vdc @ power input 110 Vac 3 Phase
	125 Vdc @ power input 220 Vac 1 Phase
	150 Vdc @ power input 220 Vac 3 Phase
Current	Continuous 12A
	Intermittent 20A for 10 secs.
Resistance	≧ 5 ohms @ power input 110 Vac
	≧ 11 ohms @ power input 220 Vac
Fuse Spec.	Slow blow 6.3 x 32mm 12.5A / 500V

External Voltage Adjustment

10K ohms 1 watt potentiometer

Voltage Regulation

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

Build Up Voltage

6 Vac 25 Hz residual volts at power input terminal

Soft Start Ramp Time

4 seconds +/- 10%

Typical System Response

Less than 20 milliseconds

EMI Suppression

Internal electromagnetic interference filtering

Static Power Dissipation

Max. 12 watts

Burden in SHUNT & PMG Wiring

1320 VA @ power input 110 Vac
2640 VA @ power input 220 Vac

Quadrature Droop Input (C1, C2)

CT 1A or 5A greater than 5VA (DIP switch setting)
Sensitivity +/- 7% @ PF +/- 0.5 (Droop adjustable)

Analogue Voltage Input (2, 3)

Un 0 – 10% @ 0 – 10 Vdc or +/- 5 Vdc

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 Protection

Set point 125 Vdc +/- 5 % @ power input 220 Vac
Inverse-time curve. This function can be turned off.

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

Operating Temperature	-40 to +70 ˚C
Storage Temperature	-40 to +85 ˚C
Relative Humidity	Max. 95%
Vibration	3.0 Gs @ 100 – 2K Hz

Dimensions

214.0 (L) x 163.0 (W) x 45.7 (H) mm

Weight

1130 g +/- 2%

SECTION 2 : OUTLINE / SIZE REFERENCE

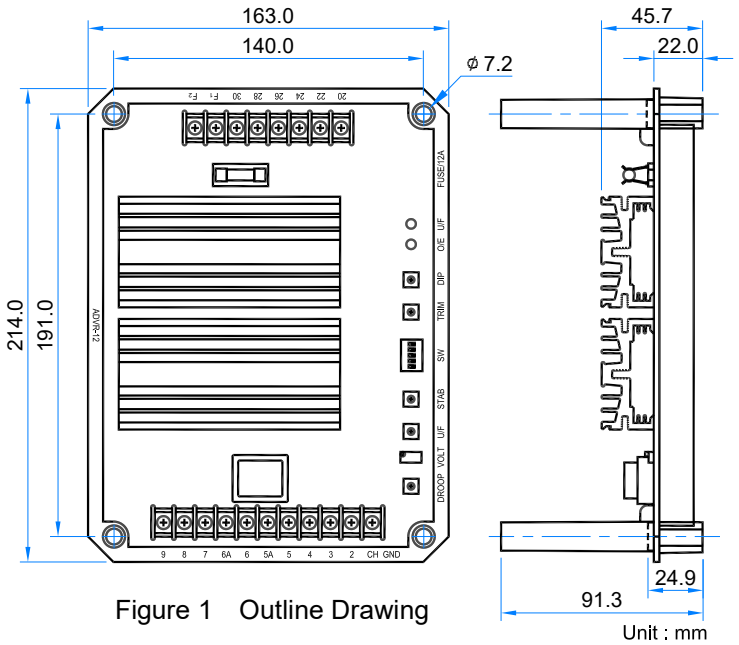

Figure 1 Outline Drawing

ATTENTION

1. **AVR can be mounted directly on the engine, genset, switchgear, control panel, or any position that will not affect operation. For dimension reference please see Figure 1.**
2. **All voltage readings are to be taken with an average-reading voltmeter Meggers and high-potential test equipment must not be used. Use of such equipment could damage the AVR.**
3. **Secure all wiring connections. Do not install AVR in a high vibration area to avoid loose connections. For safety do not touch the heat sink while in operation.**
4. **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.**
5. **Turn off O/E in AVR when paralleling.**

SECTION 3 : DIP SWITCH PROGRAMMING & ADJUSTMENTS

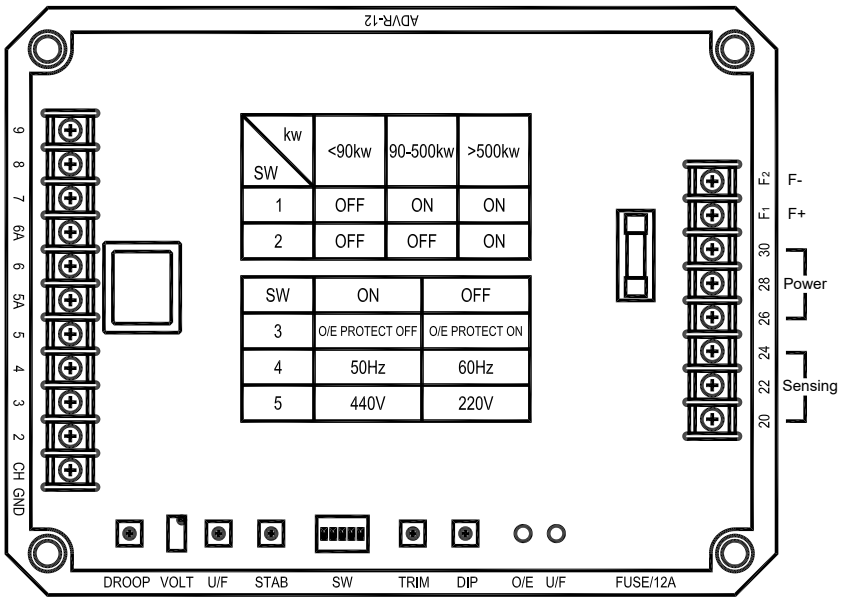

Figure 2

3.1 DROOP Adjustment (DROOP)

When operating in parallel the AVR increases or decreases its voltage output when phase current leads or lag the voltage. The range of this increase or decrease can be preset by the DROOP adjustment.

3.2 Voltage Adjustment (VOLT)

Generator rated output voltage adjustment. Must be in agreement with the DIP Switch SW5 voltage range setting.

180 – 260 Vac @ 220 Vac SW5 OFF
330 – 520 Vac @ 440 Vac SW5 ON

3.3 Under Frequency Adjustment (U/F)

When generator RPM falls below the knee point, the under frequency protection circuit will activate and the voltage and frequency begin to decrease in linear descend.

Select frequency 50 Hz or 60 Hz according to the generator in use.

3.4 Stability Adjustment (STAB)

Correct adjustment of STAB setting must be conducted while the generator is operating without load. First adjust the STAB potentiometer (POT) clockwise to the point the voltage becomes unstable, then adjust it back slightly, anti-clockwise (About 1/5 turn). This is point the voltage just reaches the critical point (Knee point) of stabilization, where the voltage is stable yet very close to becoming unstable.

3.5 TRIM Adjustment (TRIM)

When terminals 2 & 3 are biased with a DC voltage (-5 – +5V), the TRIM is used to adjust the influence this DC has on the output voltage of the AVR. If the TRIM (POT) is adjusted fully counter-clockwise the AVR DC output will not be influenced by any bias voltage. Conversely, if the TRIM is adjusted fully clockwise, then any signal will produce the maximum 10% effect.

3.6 U/F DIP Adjustment (DIP)

When U/F protection is activated-, the voltage droop ratio can be adjusted via the DIP VR. The adjustable range is 3 – 10 V/Hz.

3.7 Over Excitation LED (O/E)

Indicator illuminates when the generator is in Over-Excitation protection.

Set point 125 Vdc +/- 5% @ 220 Vac.

- DIP SW-3 switch ON, Over Excitation Protection Disabled. If over excitation occurs, the O/E LED turns on, but the AVR WILL NOT shutdown excitation.
- DIP SW-3 switch OFF. Over Excitation Protection activated. If over excitation occurs, the O/E LED turns on and the AVR will shutdown excitation.

3.8 Under Frequency Protection LED (U/F)

Indicator illuminates when the generator is in U/F Under-Frequency protection.

SECTION 4 : CONNECTION TERMINAL

TERMINAL	DESCRIPTION
CH GND	Ground
2	Analogue Voltage Input
3	
4	Connect 4 & 7 for onboard voltage adjustment. Connect 10K ohm VR to 6a & 7 for external voltage adjustment. (keep 4 & 7 Open)
5	Current Transformer (CT) 1A input
5a	Current Transformer (CT) 5A input
6	Current Transformer (CT) common
6a	Bridge selection common
7	Connect 4 & 7 for onboard voltage adjustment. Connect 10K ohm VR to 6a & 7 for external voltage adjustment. (keep 4 & 7 open)
8	No use (Null)
9	Connect 9 & 6a for 3 phase sensing connect. Keep 9 & 6a open for single phase sensing.
20	Single or Three phase sensing input
22	Single or Three phase sensing input
24	Three phase sensing input Connect 22 & 24 for Single phase sensing input.
26	Three phase power input
28	Single or Three phase power input
30	Single or Three phase power input
F1	Positive excitation output (+)
F2	Negative excitation output (-)

SECTION 5 : WIRING CONNECTIONS

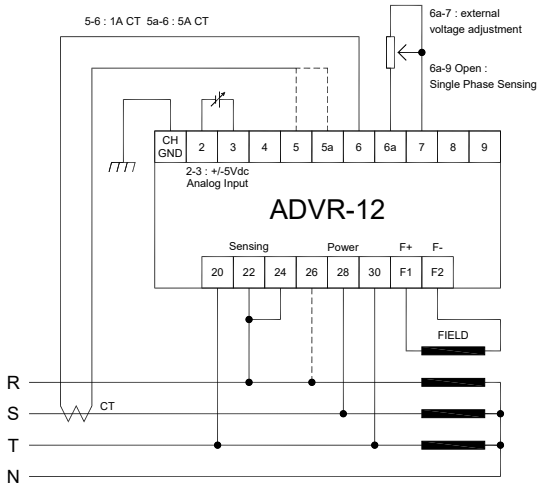

Figure 3 220V SHUNT
Single Phase Sensing

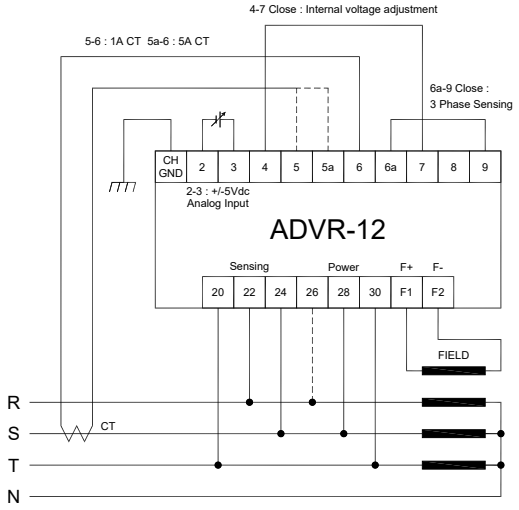

Figure 4 220V
SHUNT Three Phase Sensing

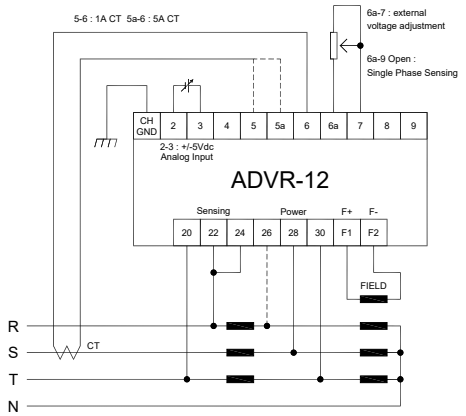

Figure 5 380/440V SHUNT
Single Phase Sensing (Option 1)

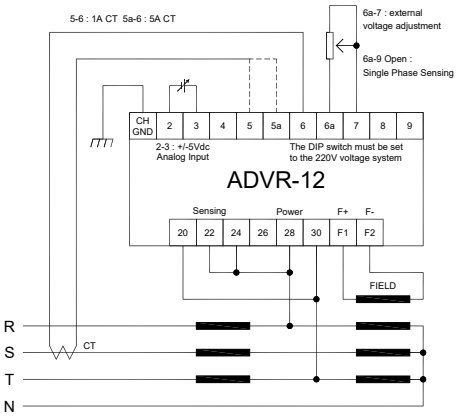

Figure 6 380/440V SHUNT
Single Phase Sensing (Option 2)

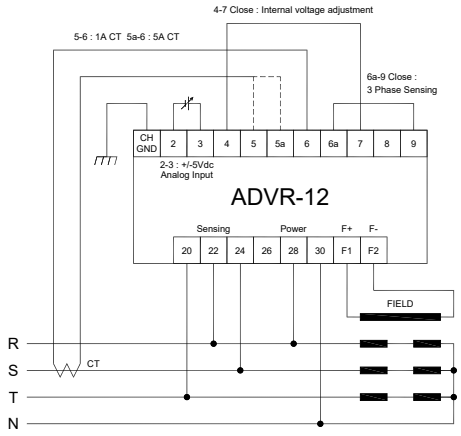

Figure 7 380/440V SHUNT
Three Phase Sensing

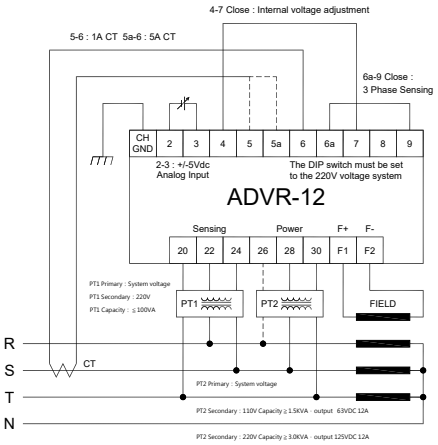

Figure 8 High Voltage System SHUNT
Three Phase Sensing

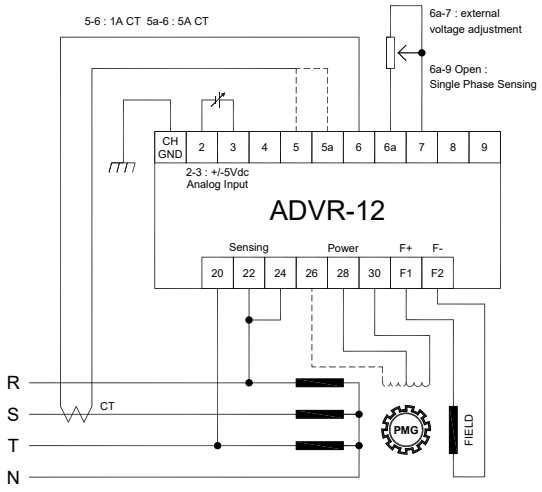

Figure 9 220/380/440V
Auxiliary / PMG Single Phase Sensing

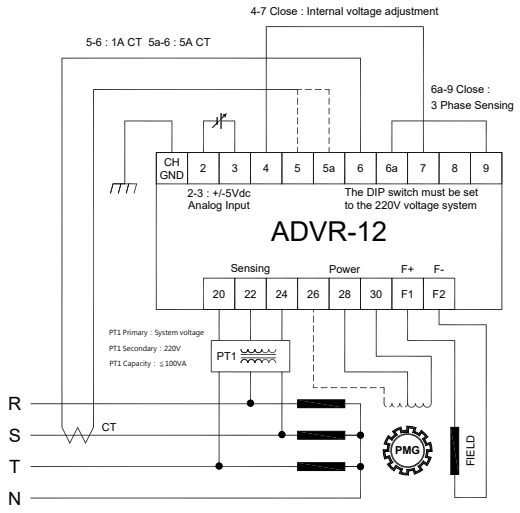

Figure 10 High Voltage System
Auxiliary / PMG Three Phase Sensing

ATTENTION

1. **The AVR reading AC voltage are all average value.**
2. **When setting external VR (open 4-7), the Internal VR will be invalid.**
3. **External voltage regulator: 10K ohms, 1 watt. Adjustable range is the same "VOLT" range.**
4. **Sensing Voltage can be set from 220 – 440 Vac Program SW5 correctly.**
5. **For single phase sensing bridge 20 & 22 and open 6a & 9.**
6. **When using PT1 of capacity > 100VA, must pay attention that the voltage and capacity of transformer PT2 has adequate excitation output.**

※ Use only replacement fuses specified in this user manual.

※ Appearance and specifications of products are subject to change for improvement without prior notice.