

The British Power Conversion Company

PowerMaster Automatic Voltage Regulator User Manual

Catalogue

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1. Important Notices

- 1. Read instructions carefully before operating the AVR.
- 2. All operating instructions should be followed.
- 3. Do not overload the maximum capacity of the installation.

WARNING!

- Do not insert any object into ventilation holes or other openings.
- To reduce the risk of fire or electric shock, install in temperature and humidity controlled indoor area free of conductive contaminants.
- To reduce the risk of fire, replace fuses with the same type and rating when necessary.

CAUTION!

- Only qualified personnel should install or service AVR units.
- Risk of electric shock, do not remove cover. No user serviceable parts inside, refer servicing to qualified service personnel.

2. Product inspection

Each Automatic Voltage Regulator has passed through the most stringent quality control tests at the factory. When the Automatic Voltage Regulator arrives at the customer's site, please immediately check the following:

- 1. Do the model, capacity, voltage setting and serial number of the Automatic Voltage Regulator match with that ordered by the end user?
- Check that the Automatic Voltage Regulator has not incurred any physical damage due to transport. Any
 damage should be reported to the freight forwarding company and BPC should be connected immediately.
 Under no circumstances should you try to connect a damaged Automatic Voltage Regulator into any power
 source.

3. Operator Control Panel



- 1. **ON Supply Button:** When you push the power (ON) button, critical equipments are connected to the AVR.
- 2. **OFF Supply Button:** When you push the power (OFF) button, all power to your critical load is disconnected.
- 3. **Status Indication Lights**: "**OK**" LED indicator represents normal operation, "**Hi**" LED indicator represents that the input voltage is too high,

"Low" LED indicator represents that the input voltage is too low.

- 4. **Output Voltage Changeover Switch:** Each of the R.S.T. three phases output voltages can be measured on the output voltage meter.
- 5. Output Voltage Indicator Meter.
- 6. **Output Voltage Adjustment:** This point is used for adjusting the output voltage meter to zero (when the mains input power supply is turned off and the output voltage meter does not indicate to zero, you must then use a screw driver to adjust the indicator to zero)
- 7. **Output Current Changeover Switch:** Each of the R.S.T. three phases output currents can be measured on the output current meter.
- 8. Output Current Indicator Meter.

4. Internal Component Layout

30~75KVA



- 1. Mains input power supply switch.
- 2. Bypass switch (when changing over bypass switch, please firstly interrupt the machine equipment power supply and then interrupt the master power supply. If there are two switches needed to change over simultaneously, then the right one is through the automatic voltage regulator and the left one is not , and

after the master power supply switch is pressed on then successively to press the $\lceil ON \rfloor$ power supply switch

on the panel)

- 3. Input electrical connection terminal. (three or four points referred to connection diagram)
- 4. Output electrical connection terminal. (three or four points referred to connection diagram)





- 5. Electric control circuit board (R.S.T. three pieces)
- 6. Overload protection fuse (R.S.T. three pieces, provided only for machine model number more than 20K)
- 7. Bypass over-high voltage protection switch (provide only for machine model number than 45K)

5~15KVA



- 1. Master power supply switch.
- 2. Bypass switch (when changing over bypass switch, please firstly interrupt the machine equipment power supply and then interrupt the master power supply. If there are two switches needed to change over simultaneously, then the left one is through the automatic voltage regulator and the right one is not , and

after the master power supply switch is pressed on then successively to press the **GN**_power supply switch

on the panel)

- 3. Input electric connection place. (three or four points referred to connection diagram)
- 4. Output electric connection place. (three or four points referred to connection diagram)
- 5. Electric control circuit board (R.S.T. three pieces)

75~120KVA



- 1. Master power supply switch.
- 2. Bypass switch (when changing over bypass switch, please firstly interrupt the machine equipment power supply and then interrupt the master power supply, and directed to right through the automatic voltage regulator and left does not., and after the master power supply switch is pressed on then successively to

press the $\lceil ON \rfloor$ power supply switch on the panel)

- 3. Input electric connection place. (three or four points referred to connection diagram)
- 4. Output electric connection place. (three or four points referred to connection diagram)
- 5. Electric control circuit board (R.S.T. three pieces)
- 6. Overload protection fuse (R.S.T. three pieces, provided only for machine model number more than 20K)
- 7. Bypass over-high voltage protection switch (provide only for machine model number than 45K)

150KVA~Above



- 1 Master power supply switch.
- 2 Bypass switch (when changing over bypass switch, please firstly interrupt the machine equipment power supply and then interrupt the master power supply, and directed to upward through the automatic voltage regulator and downward does not., and after the master power supply switch is pressed on then successively

to press the $\lceil ON \rfloor$ power supply switch on the panel)

- 3 Input electric connection place. (three or four points referred to connection diagram)
- 4 Output electric connection place. (three or four points referred to connection diagram)
- 5 Electric control circuit board (R.S.T. three pieces)
- 6 Over-high & over low voltage protection bypass switch

5. Working environment requirement

The Normal function operation and use life, in particularly the safety, of the automatic voltage regulator have been directly influenced on with the working environment and distribution operation, therefore, for proceeding installation and distribution please necessarily accord the following required indication.

- 1. Working environment temperature 0°C~40°C, relative humidity 0~95%
- 2. If wetting environment, there should take an anti-wet action properly.
- 3. The regulator should be installed on the place with good ventilation and kept dryness.
- 4. To prevent form being etched by oil spray and salty article.
- 5. To prevent from being steered by dust, cotton wool, and metal powder for avoiding electric components happened to shortcut or trouble.
- 6. Do not put articles on the top of the regulator on which there is provided with ventilating holes.

6. Preparation before operation

- 1. Before operation, please check the following inputted industrial current values:
 - Is Voltage right?

Is phase number right?

- Is grounded line right?
- 2. When those values are right, still not operating the automatic voltage regulator till all output terminals of installation such as computer equipment and machine equipment have already been interrupted.

7. Operating procedure

1. Turn on:

Press the inputted non-fuse power switch located at left side or rear of the panel up to the ON position. Press the button switch with green color down then the green lamp is lighted.

When load is operated, please accord to the turn on operating procedure of computers or equipment.

2. Turn off

Press the button switch with red color down then the red lamp is lighted, and A.V.R. is not operated. If it wants to have A.V.R. totally non-operated, only press the inputted non-fuse power switch down to the OFF position.

8. Treatment for electromagnetic switch jumped

1. When industrial current is normal:

When the electromagnetic switch is jumped during normal industrial current or within allowance range for loading machine. At this time, please to interrupt the loading machine switch and then A.V.R. master power supply switch also.

After then open the left side or rear side panel to change over those simultaneously (refer to interior diagram).

To turn on A.V.R. master power supply switch again and successively to press the **FONJ** power supply switch

on the panel, so that the loading machine for the A.V.R. may be operated temporarily. If above-mentioned problem happened, please contact to our technician for maintenance. For the A.V.R. machine model less than 75K, do not continuously operate for more than 48 hours.

2. When industrial current is abnormal:

When the industrial current is altered up to more than that of allowed input range and output adjustable range. The electromagnetic switch driven by high-low voltage circuit will interrupt the output power supply. At this time, please stop making use of the automatic voltage regulator and measure the industrial current voltage to concern whether that of voltage is too high or too low, and send for a professional electrician to handle.

9. Specification

- 1. Input voltage altering range: input voltage $\pm 15\%$ (or 25% for specific order).
- 2. Output Input voltage stability: $\pm 1\%$
- 3. Output voltage adjustable range: 10% above.
- 4. Wave distortion: compare to input zero distortion.
- 5. Response time: 0.1sec response.
- 6. Efficiency : 98% above.
- 7. Working environment temperature: $0^{\circ}C \sim 40^{\circ}C$.
- 8. Humidity: 95%
- 9. Other characteristics referred to catalogue.

10. Calculation to Capacity

1. Firstly understanding the required voltage and total current of an equipment such as computer etc.; The calculation formula is:

Total Capacity (VA) = Required voltage value (V) ×Required total current (A)

2. This total capacity is practical consumption power, when A.V.R. capacity is selected.

It is necessary to consider the possibility in future to expand the installation capacity, so that A.V.R. capacity may be generally added extra 25% at least. Therefore, the A.V.R. capacity is:

A.V.R. practical capacity=Total capacity (VA)*125%

For example:

A computer is operated with voltage 115V and total current 50AMP.

A.V.R (KVA) = 115V*50A/1000*125%

= 5.75KVA*125%

= 7.18KVA

So that preferably selecting a voltage regulator with 7.5 KVA, and accordingly analogized.



11. Output Voltage and Delay Adjustment

- 1. Adjusting output voltage, counterclockwise direction for rising voltage and clockwise direction for lowering voltage.
- 2. Adjusting output voltage sensitivity, counterclockwise direction for decreasing sensitivity and clockwise direction for direction for increasing sensitivity.
- 3. Adjusting over-high voltage protection, clockwise direction for rising protection voltage and counterclockwise direction for lowering protection voltage.
- 4. Adjusting over-low voltage protection, clockwise direction for rising protection voltage and counterclockwise direction for lowering protection voltage.
- 5. and 6. Voltage regulation adjustment delay, to insert into a jump line plug for delaying 3~4 sec to start adjustment. This may extend the use life of A.V.R. in which environment usually has a –high-low voltage rapid alteration.

7. Over-high or over-low voltage protection delay, to insert a jump line plug for delaying 0.5~1 sec to start adjustment. This may avoid A.V.R. from error action then the working environment usually has a suddenly high voltage happened.

12. Line Connection Diagram



1. Input voltage line connection section.

2. Output voltage line connecting section.

Notes: 1. when input power is 3Ø3W and output power is 3Ø4W, the neutral line of input voltage is not connected.

12. Single Phase Diagram 2~10KVA



15~30KVA



2~10KVA



Item	Description		
1.	Output Voltage Meter		
2	Input &Output Changeover Switch		
۷.	(Right \rightarrow Output ; Left \rightarrow Input)		
3.	"ON" indicator		
4.	AC Input Mains Switch		
5.	Voltage Adjusting Hole(Using a screw driver for adjustment)		
6.	Input &Output Terminal		
7.	Output Outlet		

15~30KVA



14. Notes for Power Distribution

1. A.V.R. have different installing standards according to whose capacity size and various different types of voltage. Please accord the specification of A.V.R. ordered to select proper power distribution, in particular pay attention to the diameter of line whether is complied with the specification or not.

2. Please pay attention to input terminal of A.V.R. needed to avoid using the same switch other equipment.

3. Power polarity judging method please referred to the next paragraph of "Power Polarity judging Method".

4. For three-phase voltage regulator system, in particular, pay attention to the problem of connecting input and output line phase sequence.

5. For safety, when proceeding line connection, please interrupt power supply and prohibit hot line operation.

6. Please refer to electrical engineering operation rules to proceed line connection.

7. For three-phase voltage regulator system, input power is connected to one end of input power supply switch, the output power of A.V.R. is connected to output line terminal of terminal disk. Besides, neutral line N and grounding line G have already marked clear with labels, please accord specification to proceed line connection.

15. Power Polarity Judging Method

1.Hot Line: in respect to hot line(line to line) voltage, there are 190V 200V 208V 220v 230V 380V 400V 415V 440V 480V etc. for three-phase three lines or three phase four lines systems.

2. Neutral line: is also called water line, in respect to hot line voltage, there are 100V 110V 115V 120V 127V 132V 220V 227V etc., in inspect to grounding lint voltage about 0.2V~2.0V. For three-phase three lines system there is no neutral line.

3. Grounding line: earth of connection point of earth bar or distributor.

4. If the voltage of difference more than 5V in between neutral line and grounding line, or there is a special requirement for installation system, for keeping the system safety , please send for qualified electrical technician to reinstall al good earth system.

5. For three-phase four lines system the general voltage is as follows:

110V/190V 115V/200V 120V/208V 127V/220V 132V/230V 220V/380V 230V/400V 240V 415V 254V/440V 277V/480V

- 6. For three-phase three lines system the general voltage is as follows: 190V 200V 208V 220V 230V 380V 440V 480V.
- For single phase two lines systems is as follows: 100V 10V 115V 120V 127V 132V 220V 254V 227V.
- 8. Hot line marked method: for single phase system, marked as L, L1, L2, for three system , marked as R, S, T, U, V, W.
- 9. Neutral line i.e. water line mark: single phase system and three-phase system are all marked as N.
- 10. grounding line marked as "G" or used the symbol " $\frac{1}{-}$ "

16. Troubleshooting

Phenomenon	Checking Method	Troubleshooting
1.	Is power failure?	Turn on the power supply
Output power interrupted		again.
	Is NFB or electromagnetic	If NFB or electromagnetic
	switch jumped?	switch jumped is resulted from
		overload, then check whether
		the load power circuit is
		normal.
2.	Check whether the fan stops	Interrupt power and remove fan
Temperature increasing and	operation.	terminal, and renew a fan
Fan damaged.		within short-term.
3.	Is there a trouble for load?	Please check the load.
Output current much more than	Do there have new equipment	Please renew a A.V.R. with
rated current.	installed?	larger capacity.
	Is current meter troubled?	Renew a current meter.
4.	Is PCB troubled?	Renew PCB.
Output voltage higher.	Does output voltage happen to	Repair input power supply
	phase lagged?	again.
	Is voltage meter troubled?	Renew a voltage meter.
	Is VR loose?	Adjust VR to rated value.
5. Output voltage lower.	Is current overloaded?	Remove some load equipment.
	Is three-phase too unbalanced?	Redistribute load.
	Is voltage meter troubled?	Renew a voltage meter.
	Is VR loose?	Adjust VR to rated value.

To maintain A.V.R. is easier to proceed only by use of a three proposed (digital type) electric meter.

When A.V.R. is troubled and at same time the machine installation should not be stopped and user also hard to find out the trouble reason. Please change over the knife switch located within the installation to bypass for temporarily stopping operation (referred to page 4section 2), and then contact us immediately.