

## **SPECIFICATION OF 50 KVA AVR**

### **1.0 General:**

The unit shall be self-contained, compact, efficient and highly reliable for 100% duty cycle at full load, working round-the-clock, 365 days a year and based on field-proven design using modern technology. All materials used in the construction shall be of high quality and as per relevant Indian Standard Specifications. The manufacturer should have ISO 9002 certificate.

### **2.0 Salient Features:**

- 2.1 Modular construction of control circuitry for easy replace ability.
- 2.2 Control voltage device designed using solid-state electronic circuits.
- 2.3 High-speed step-less correction of output voltage using A.C synchronous motors, without hunting or overshooting.
- 2.4 Independent controls for each of the three phases to avoid unbalance in output load voltage in any phase affecting the output of AVR.
- 2.5 Built-in overload and short-circuit protection.
- 2.6 Should not introduce waveform distortion.
- 2.7 Front access for installation and servicing.
- 2.8 Compact size.(One of the base dimension be restricted to 500 mm. maximum)
- 2.9 Full complement of meters, controls, alarms and indicators.
- 2.10 All moving contacts designed to give long and trouble free service life.
- 2.11 Rugged construction and field-proven design requiring minimum maintenance. MTBF of the equipment to be specified.
- 2.12 Suitable for continuous use in tropical climatic conditions.

### 3. TECHNICAL REQUIREMENTS:

- 3.1 Capacity of AVR : 50 KVA (continuous).
- 3.2 Input/Output voltage
- 3.2.1 Input voltage : 340 V to 460 V A.C Three Phase, 50 Hz, 4 wire
- 3.2.2. Output Voltage : 400 V  $\pm$  1% A.C Three Phase 50 Hz. (230 volts Phase to neutral),voltage shall be adjustable to  $\pm$ 5% with control located on front panel.
- 3.3. Voltage Regulation :  $\pm$ 1% from no load to full load.
- 3.4. Phase Regulation : Independent Voltage Regulation for each Phase
- 3.5 Frequency : AVR should work satisfactorily with input frequency range of 50 Hz  $\pm$ 6%
- 3.6 Distortion : It should not introduce any output distortion.
- 3.7 AVR Type : Indoor, free-floor standing, servo-controlled or any other state-of-the-art technology (sensing and control details to be indicated)with individual phase sensing and control for regulating unbalanced incoming voltage and suitable for unbalanced loads. The unbalance in load can be of the order of 50% of rated load. The output voltage stability with this unbalance (up to 50%) should be within  $\pm$ 5% of the Nominal output voltage.
- 3.8 Speed of correction : 6 volts/second or better.
- 3.9 Efficiency : The efficiency of AVR should be better than 95%
- 3.10 Transformer Winding : Electrolytic prime grade copper.
- 3.11 Insulation Class : As per IS amended up to date
- 3.12 Breakdown / High voltage Test : 2.5 KV A.C for 2 minutes
- 3.13 D.C. insulation (Before & after H.V. test)  
from primary to secondary : Better than 1000 Mega Ohm at 500 Volt  
or between any winding and ground

- 3.14 Insulation Level Rated short duration power fluctuation withstand voltage. : As per IS amended up to date
- 3.15 Metering & Indications :  
i) Digital meters shall be provided with selector switches for measurement of Phase to Phase & Phase to Neutral voltage on all three phases for Input and Output,  
ii) Digital ammeter in output on all three phases.  
iii) Indications, on control panel shall be provided for input/output voltage status.  
iv) Preferably Backlit LCD display may be provided for dip count, temperature, fault log
- 3.16 Standby Manual : Facility should also be available to use AVR as a simple manually operated voltage regulator in case of failure of automatic control system. Selector switches for selection of mode Of operation (AUTO/MANUAL) and other necessary control switches for this purpose may be provided on the front panel
- 3.17 Type of Cooling : AIR COOLED ( Natural Convention)
- 3.18 Electrical Protection : AVR shall be protected against over loads, short-circuit, over and surge voltage due to system faults, switching operations, and hotspot temperature. Complete details of protections (standard as well as optional) are to be furnished with the tender. MCCB of reputed makes (Siemens/L&T/EE only) are to be provided at the INPUT/OUTPUT.
- 3.19 Main Selector Switch : A four-position heavy-duty control switch shall be provided for the following purposes.
- (A) OFF : The input supply is cut off.
- (B) TEST : Input supply is through but output is cut off.
- (C) ON : Input and output both are through.
- (D) BY-PASS : AVR gets isolated and the input gets directly connected to output.

- 3.20 Working Temperature : AVR shall work satisfactorily under ambient temperature of 0-50deg. C. and relative humidity of 95 % non- condensing at 40 deg C.
- 3.21 Time-Delay Switching : An adjustable time delay device shall be provided so that the output is connected to load about 15 to 30 seconds (adjustable) after the input is/switched on/restored after Power Supply failure or momentary interruption during which period the AVR output voltage will stabilize to the desired pre-set value.
- 3.22 Designation Labels : Suitable designation labels for all controls etc. shall be engraved on the panel and shall be distinctly visible.
- 3.22 Connections : Star with insulated neutral.
- 3.24 Terminal arrangement : Cable end boxes for input & output to be provided for up to 3 -1/2 core 50 sq.mm Al. Conductor LT Cable.
- 3.25 Temp. Rise : To be indicated
- 3.26 Component Losses
- 3.26.1 No load loss (Watts) at 400 V & 50Hz frequency. : To be indicated
- 3.26.2 Max. loss (W) at full load current at winding temp. and 400 V & also at 340 V (Phase to phase input voltage) : To be indicated
- 3.26.3 Overall Dimensions : To be indicated
- 3.27 Electronic by Pass : Preferably to be Provided .
- 3.28 Operating Altitude : 0 to 3,000 Meter

#### 4.0 MECHANICAL CONSTRUCTION:

- 4.1 Enclosure : The body of AVR shall be made of MS sheet of minimum 16 SWG thickness capable to with stand transit hazards and to provide mechanical protection to the sensitive parts
- 4.2 Facility for movement : The AVR will be provided with sturdy wheels for ease of movement.
- 4.3 Outer Finish : First quality paint after the initial primer coat shall be used to prevent rusting, corrosion etc.
- 5.0 Accessories : All the accessories like earthing terminals, lifting hook, terminal marking plate, diagram plate, rating plate as may be required for installation. Optional accessories, if any, may be quoted separately.
- 6.0 Technical Literature : Two set of manuals for Installation, operation & Maintenance are required to be sent with each AVR ordered to each consignee. One set is also to be sent at the following officers / offices / places:
- i. DE(Proj.), P&D Unit, DG:AIR, New Delhi
  - ii. Zonal Office (Project Wing)
  - iii. Zonal Office (Maintenance Wing)
  - iv. DE(Transmitter Maintenance), DG:AIR , New Delhi
  - v Technical Library, P&D Unit, DG:AIR , New Delhi
  - vi Staff Training Institute (Technical) , New Delhi
- 7.0. Inspection : At manufacture work . Full performance Test shall be carried out in accordance with mutually agreed Acceptance Test Procedure {ATP}. Full detailed measurements shall have to be undertaken at manufacturer's works as part of the acceptance tests before despatch to respective consignee.