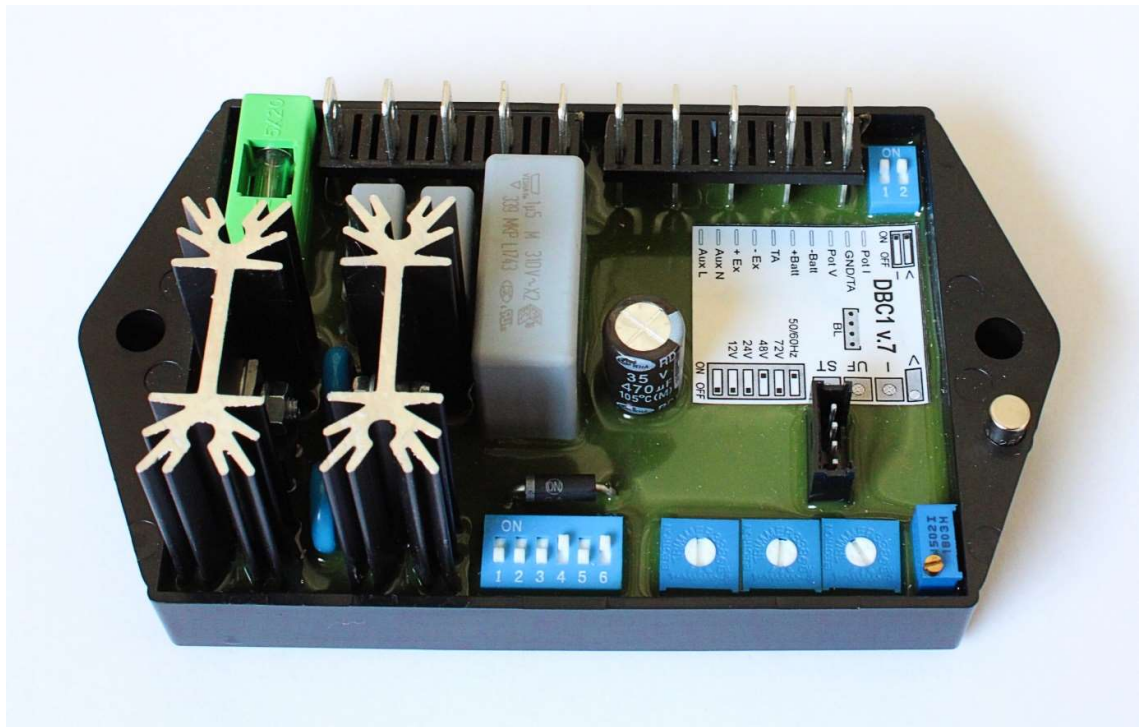


DBC1

Digital AVR

Automatic Voltage Regulator

OPERATION MANUAL



REV02 01/2021



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GENERAL FEATURES

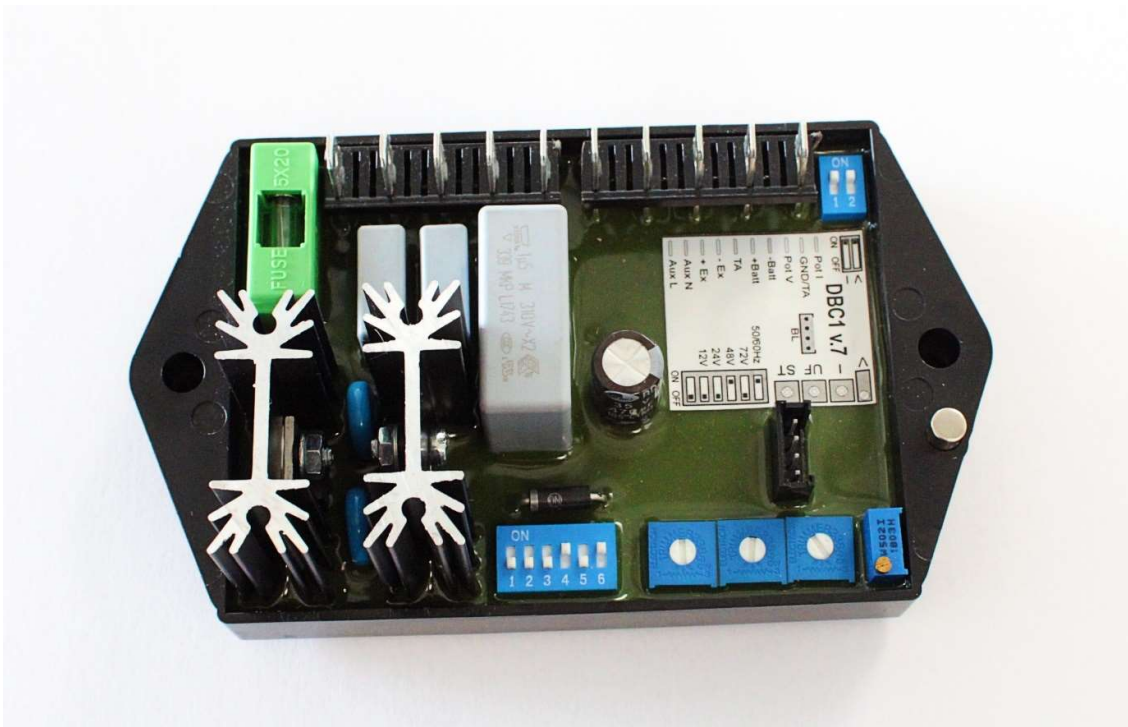
SINCRO DBC1 is a digital voltage regulator designed for brush and brushless DC alternators.

It regulates the output voltage of a generator by controlling the field current.
It has DC sensing.

The modular architecture enables optimization for different applications.

The voltage regulator controls and keeps constant the average value of the DC voltage.

A frequency measuring circuit continually monitors the alternator output and provides output under-speed protection of the excitation system, by reducing the output voltage proportionally with speed below a pre-settable threshold. A manual adjustment is provided for factory setting of the under frequency roll off point, (UF). This can easily be changed to 50 or 60 Hz with two dip switches.



ELECTRICAL SPECIFICATIONS

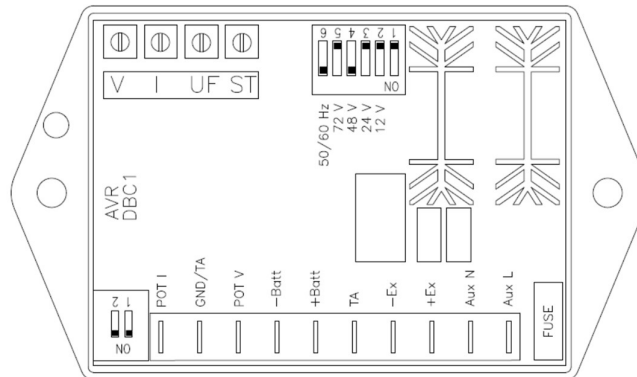
DBC1 AVR includes:

- a terminal strip (10 terminals)
- a voltage trimmer
- a current trimmer
- a stability trimmer
- an under frequency trimmer
- a range sensing selection DIP-Switch
- a frequency selection DIP-Switch
- electric protection with fuse.

The electronic is sealed with resin (it is a perfect protection against vibration and humidity).

DIP SWITCHES

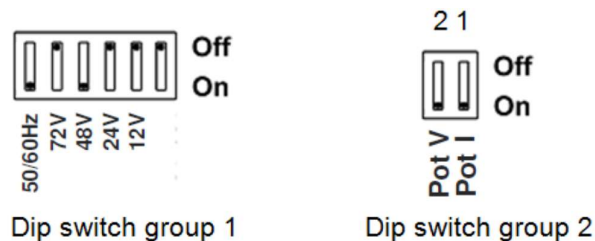
DBC1 AVR has two groups of DIP Switches.



The first group of DIP Switches selects the nominal voltage of sensing.

- 12 Vdc
- 24 Vdc
- 48 Vdc
- 72 Vdc

and 50/60 Hz under frequency protection (refers to the operation of the alternator at 50 or 60 Hz).



The second group is for configuration of External Voltage (OFF position) or External Potentiometer (ON position) for changing set point of Voltage (Pot V) and for Current limit (Pot I).

ADJUSTMENTS

VOLTAGE ADJUSTMENT

Adjusting the trimmer "V" changes the output voltage. Default position of DIP switch 2 group 2 is ON. Keep this position. Take the generating set to its nominal speed and turn clockwise if you want to increase the voltage and anticlockwise to decrease the voltage.

If a small variation in speed causes a voltage variation, then the underspeed protection trimmer "UF" should first be calibrated.

With external potentiometer is possible to adjust the set point of Voltage (Pot V): put Dip switch 2 of group 2 in position ON and connect the external potentiometer (5kOhm, 1/2W) to the free terminal "POT V" and to "Com.Ta". Otherwise it is possible to adjust the set point of Voltage with external voltage from 0 to 10 Vdc: in this case put DIP switch 2 group 2 in position OFF and connect the external voltage source (0-10 Vdc) to the free terminal "POT V" and "Com.Ta". In order to safely connect the control voltage of the PLC to the V input (contacts POT V and GND/TA) of the controller DBC1 the supply of the PLC must be galvanically isolated from the public distribution network or the PLC must be supplied with battery; or the control voltage of the plc must be galvanically isolated from its other parts.

CURRENT ADJUSTMENT

Adjusting the trimmer "I" changes the current limit. Default position of DIP switch 1 group 2 is ON. Keep this position. If you want to increase the limit of current output, turn clockwise trimmer and anticlockwise to decrease the current limit.

With external potentiometer is possible to adjust the set point of Current limit (Pot I): put Dip switch 1 of group 2 in position ON and connect the external potentiometer (5kOhm, 1/2W) to the free terminal "POT I" and to "Com.Ta". Otherwise it is possible to adjust the set point of Current limit with external voltage from 0 to 10 Vdc: in this case put DIP switch 1 group 2 in position OFF and connect the external voltage source (0-10 Vdc) to the free terminal "POT I" and "Com.Ta"

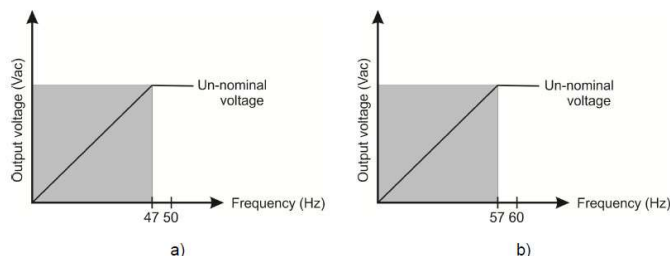
UNDER FREQUENCY KNEE ADJUSTMENT

AVR DBC1 incorporates an underspeed protection circuit (UF) which gives a volts/Hz characteristic when the alternator speed falls below a presettable threshold known as the "knee" point.

The UF knee adjustment is preset at factory at the 46-47 Hz on a 50 Hz system or 56-57 Hz on a 60 Hz system. Selection of 50 / 60 Hz can be made using the DIP-Switches.

The figures below show the curves for voltage variation as a function of frequency variation.

For nominal frequency operation, UF is disabled. When rotation decreases (e.g. when shutting down), excitation decreases, reducing the output voltage of the alternator.



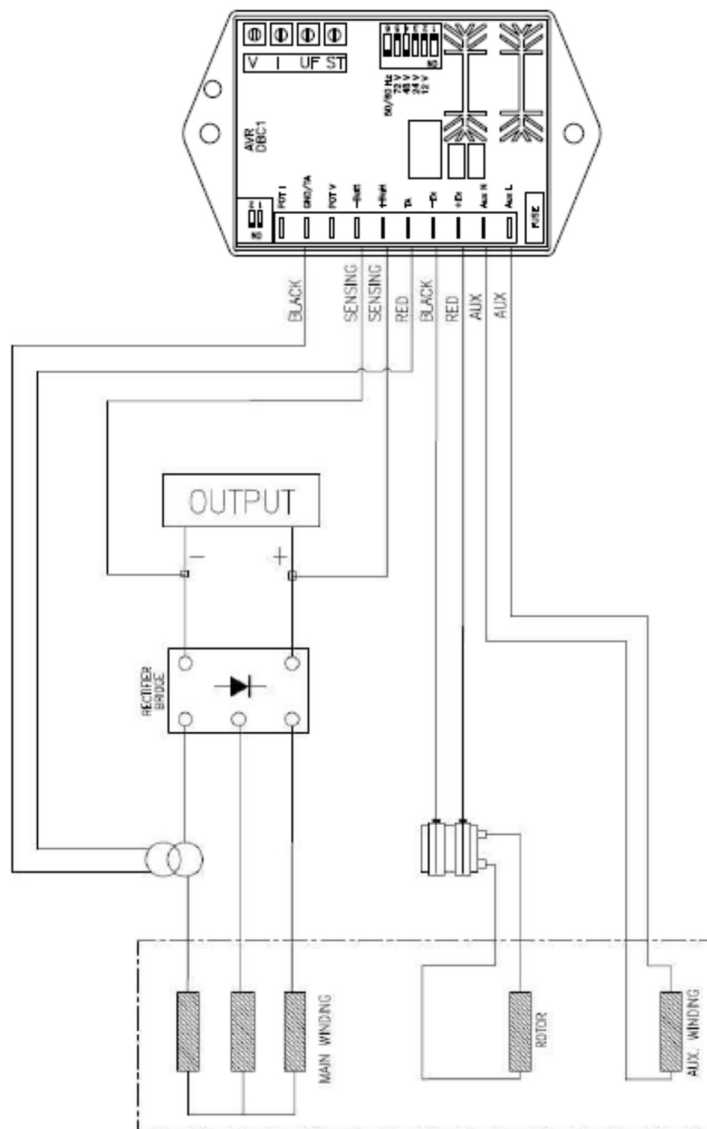
Under frequency "knee": a) 50 Hz system, b) 60 Hz system

STABILITY ADJUSTMENT

If there are voltage fluctuations, adjust the potentiometer “ST”, which modulates the reaction time of the regulator to external inputs, thereby eliminating any instability in the alternator-load system.

CONNECTION

CONNECTION DIAGRAM



CONNECTION TERMINALS

Following fast-on connections are available on the AVR:

- Power input, terminals AuxL, AuxN
- Power output, terminals –Ex, +Ex
- Voltage sensing, terminals – Batt, +Batt
- Current sensing, terminals Com\TA (black), TA (red)
- External potentiometer for adjustment output voltage, terminals Pot V, Com.Ta
- External potentiometer for adjustment current limitation, terminals Pot I, Com.Ta

STARTING UP

If a replacement AVR has been fitted, or the re-setting of the voltage adjustment is required, please proceed as follows:

1. Connect the wires coming from the alternator according to the description in the CONNECTION DIAGRAM and the type of alternator to be used.
2. Check that the DIP switches group 2 and group 1 are consistent with the characteristics of the machine (voltage, frequency, remote control)
3. Before running alternator, turn the volts trimmer "V" anti-clockwise
4. Turn stability trimmer "ST" to midway position
5. Start alternator set, and run on no load at nominal frequency e.g. 50-53 Hz or 60-63 Hz
6. Carefully turn volts trimmer "V" (or external pot, if fitted) clockwise until rated voltage is reached
7. If instability is present at rated voltage, refer to stability adjustment, and then re-adjust voltage if necessary

MAINTENANCE AND TROUBLE-SHOOTING

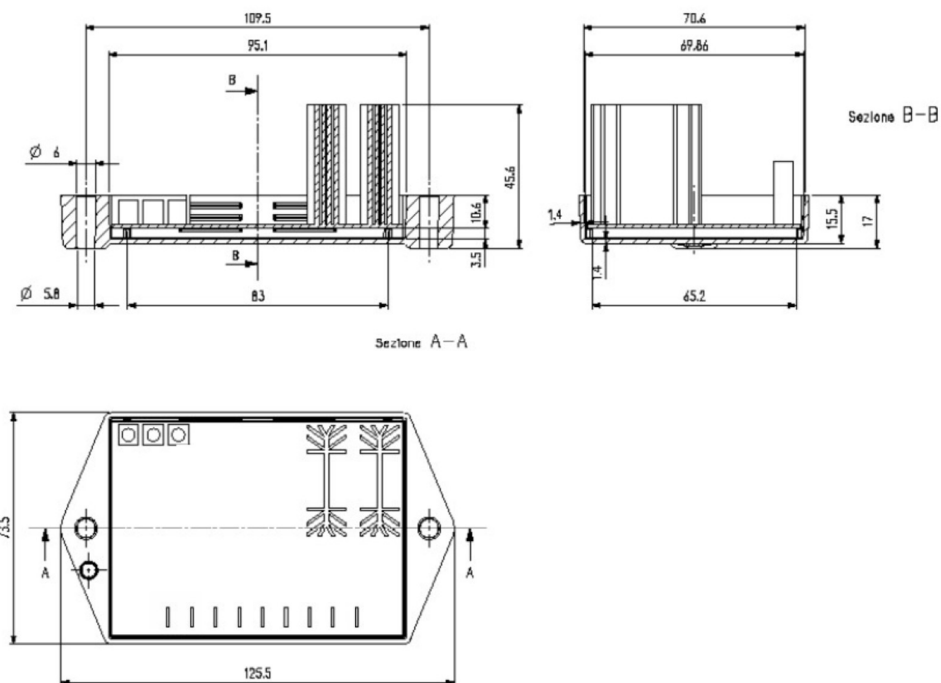
PREVENTIVE MAINTENANCE

Periodical inspections of the equipment are required to ensure they are clean, dust and moisture free. It is essential that all terminals and connections are kept free from corrosion.

TROUBLE-SHOOTING

| Trouble | Possible causes | Solutions |
|-------------------------|---|--|
| NO OUTPUT VOLTAGE | <ul style="list-style-type: none"> - Demagnetized machine - Wrong connection of the AVR - Loose terminals/connections - External potentiometer doesn't work (if present) - Burnt fuse - Faulty AVR | <ul style="list-style-type: none"> - Connect (for a while) an external battery (12Vdc) to the exciter (respecting the polarities) - Check as per wiring diagram - Check if all terminals/connections are well tightened - Change external potentiometer (if present) - Check and replace - Replace the AVR |
| LOW OUTPUT VOLTAGE | <ul style="list-style-type: none"> - Voltage potentiometer wrongly adjusted - Sensing wrongly connected - Dip-switch wrongly positioned - Low frequency (under the UF limit) - Under-Frequency protection is not properly adjusted - Faulty AVR | <ul style="list-style-type: none"> - Check and adjust - Check the sensing connections - Check and fix - Increase the engine speed - Check and adjust - Replace the AVR |
| HIGH OUTPUT VOLTAGE | <ul style="list-style-type: none"> - Voltage potentiometer wrongly adjusted - Sensing wrongly connected - Dip-switch wrongly positioned - Missing sensing - Faulty AVR | <ul style="list-style-type: none"> - Check and adjust - Check the sensing connections - Check and fix - Check if sensing is interrupted - Replace the AVR |
| UNSTABLE VOLTAGE | <ul style="list-style-type: none"> - Stability response incorrectly adjusted - Unstable engine speed - Loose terminals/connections - Faulty AVR | <ul style="list-style-type: none"> - Adjust trimmer "ST" - Check the frequency/engine speed - Check if all terminals/connections are well tightened - Replace the AVR |
| FUSE BLOWS CONTINUOUSLY | <ul style="list-style-type: none"> - UF protection adjusted for a very low frequency (so the fuse burn during the turn-off procedure) - Faulty AVR | <ul style="list-style-type: none"> - Adjust UF limit to a value close to the nominal frequency - Replace the AVR |

DIMENSIONS





SINCRO has been manufacturing trustable alternators for over 30 years.
At the core of your best energy up to 2.6 MVA. Standard and custom.
Proudly 100% Made in Europe.



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