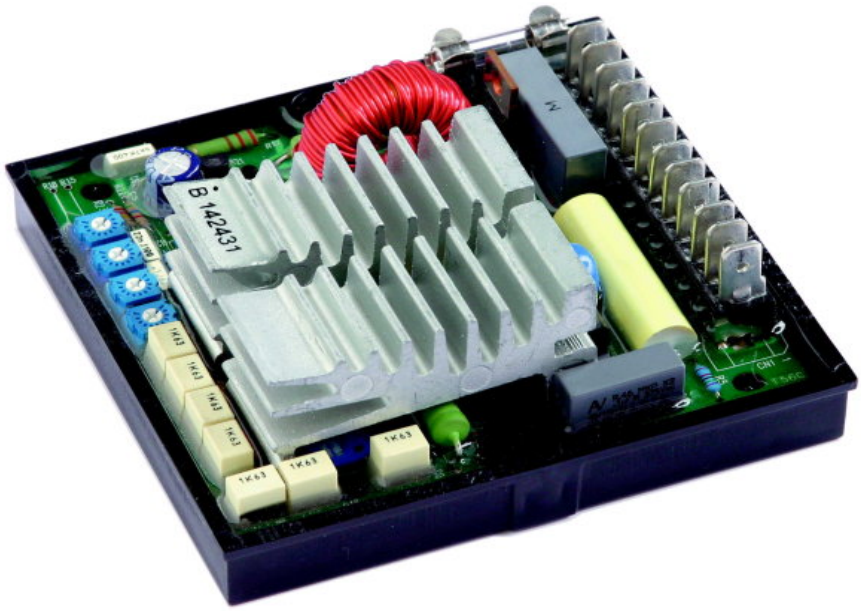
mecc alte spa

Automatic Voltage Regulator (AVR)

Mecc Alte SR7/2G



1.2.4) Terminals connection

Figure 5 shows the functions of the terminals numbered 1 to 7, as follows:

terminal 1) excitation field negative

terminal 2) connect to terminal 3 if SR7 is supplied with less than 160 Vac.

terminal 3),3A) excitation field positive and regulator supply

terminal 4), 4A) regulator sensing voltage

terminal 5), 5A), 5B), 5C) common to regulator feeding, regulator sensing and external potentiometer

terminal 6) connect to 5A for operation at 60 Hz

terminal 7) external potentiometer.

1.2.5) Possible connections

Exciter field: the exciter field negative should be connected to terminal 1 of the electronic regulator (normally dark blue or black), while the positive (normally red or yellow) should be connected to terminal 3.

Supply: There are two possibilities.

1) The supply coincides with the sensing.
   In this case the SR7 supply-sensing should be connected to terminals 4A and 5 (in the case of three-phase generators, terminal 5 is normally connected with the star point). Terminals 3A and 4 should be connected to each other in such a way that the supply is also the sensing. This connection is necessary when the generator does not have auxiliary winding for supplying the regulator.
2) The supply and sensing are separate.
   This is the case of a generator equipped with auxiliary winding for regulator supply. Supply is always connected to terminals 3A (or 3) and 5C (or 5, 5A, 5B) of the regulator.

In both these cases (1 and 2) the SR7 supply can vary from 80 to 270 Vac. But it should be noted that terminals 2 and 3 should be bridged for supply with voltage between 80 and 160 Vac, while the same terminals should be left open if the voltage is between 160 and 270 Vac.

Sensing: should be connected to terminals 4A and 5 and can vary from between 80 to 350 Vac. The sensing is single phase only and therefore normally connected to one alternator phase.

Operation at 60 Hz: When operating at 60 Hz, terminals 5A and 6 should be connected to each other in order to keep the low frequency protection correctly regulated.

External potentiometer: it is possible to get a remote voltage regulation of ± 5% inserting, in the terminals 5B and 7, a 100KΩ potentiometer (for the 6 lead units) or a 100KΩ potentiometer with a 100KΩ resistance in series (for the 12 lead units).

1.2.6) Functions of the regulator potentiometers

"VOLT"

With this potentiometer it is possible to adjust the voltage generated by the alternator in a very simple way: if the screw is turned clockwise the voltage increases, if turned anticlockwise it decreases.

"STAB"

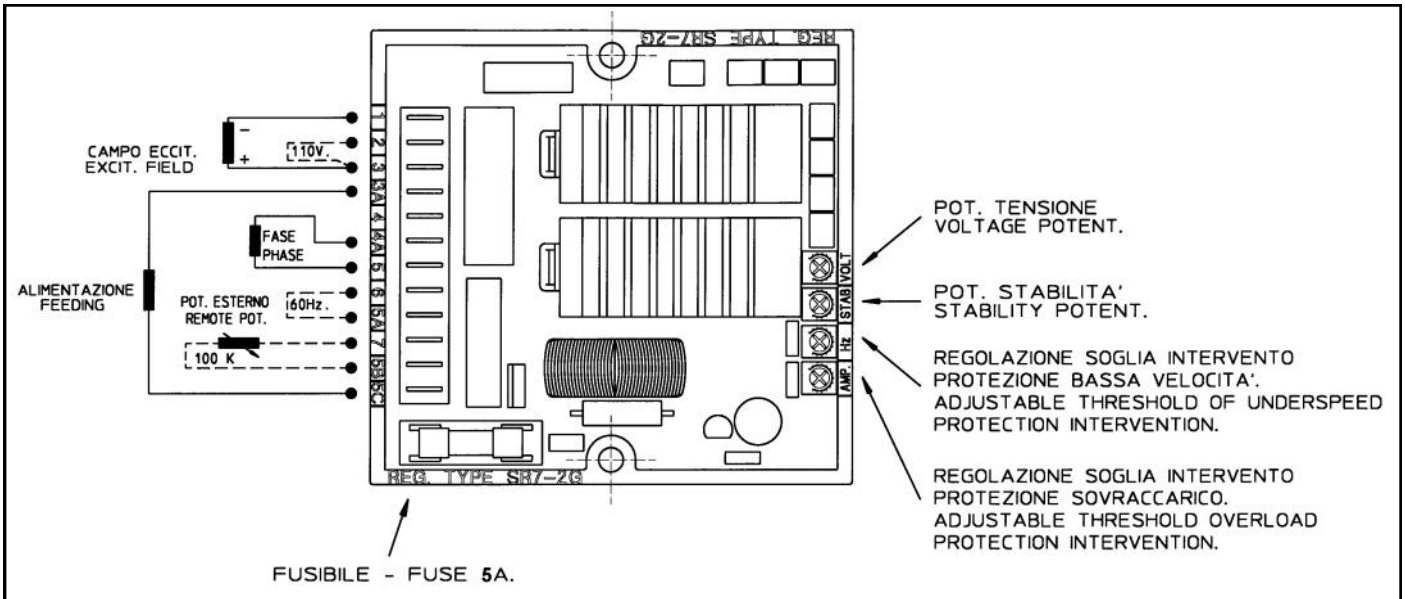
This potentiometer optimises alternator performance. If turned clockwise the stability decreases, i.e. the response time decreases but the voltage tends to be less stable. If turned anticlockwise, the response time increases and the voltage tends to be more stable.

In order to adjust this potentiometer correctly, we advise using the very simple method given below. The generator must be working, starting from zero load, and the potentiometer must be at maximum stability (turned fully anticlockwise). Slightly turn clockwise until you notice that the light generated by the filament lamp oscillates. At this point, turn the potentiometer slowly anticlockwise until the light stabilises.

"Hz"

With this potentiometer, which is normally pre-calibrated then sealed by the producer, it is possible to adjust the low frequency protection intervention.

To recalibrate this protection, you must take the generator to a normal zero load condition, turn the potentiometer clockwise until the limit position is reached, then decrease the nominal speed by 10%. After this turn the potentiometer anticlockwise and measure the voltage value until it has decreased by 5V.



Sono elettricamente connessi assieme i terminali 3 con 3A, 4 con 4A, 5 con 5A, 5B e 5C.
Following terminals are electrical connected together : 3 with 3A, 4 with 4A, 5 with 5A, 5B and 5C

fig. 5

When the speed decreases by more than 10% of the nominal value, the voltage also decreases proportionally, blocking generator overheating. Even if we advise calibrating this protection at 10% of the nominal value, it is obviously possible to calibrate the threshold at other values.

"AMP"

With this potentiometer it is possible to adjust the intervention level of the overload protection. This protection system has an intervention delay, which permits a temporary overload, necessary for example when starting motors or similar applications.

To modify this protection you must overload the generator by 15% of the nominal load, turn the potentiometer to minimum (anticlockwise) and wait about twenty seconds. During this period of time the voltage value decreases. In this condition and while turning the potentiometer clockwise, fix the generator voltage value at 10% less than the nominal one. At this point, while the initial overload is being removed, the voltage increases to the nominal value.

Fuse

The SR7 electronic regulator is equipped with a fuse, which protects the alternator from overheating in cases of regulator malfunction. The fuse can be replaced easily, but the new one must have the same characteristics as the one being replaced (250V-5A, quick acting, F type).

1.3) TEST PROCEDURES

1.3.1) Workbench test procedure (SR7)

1) Prepare the connected regulator as shown in figure 6.

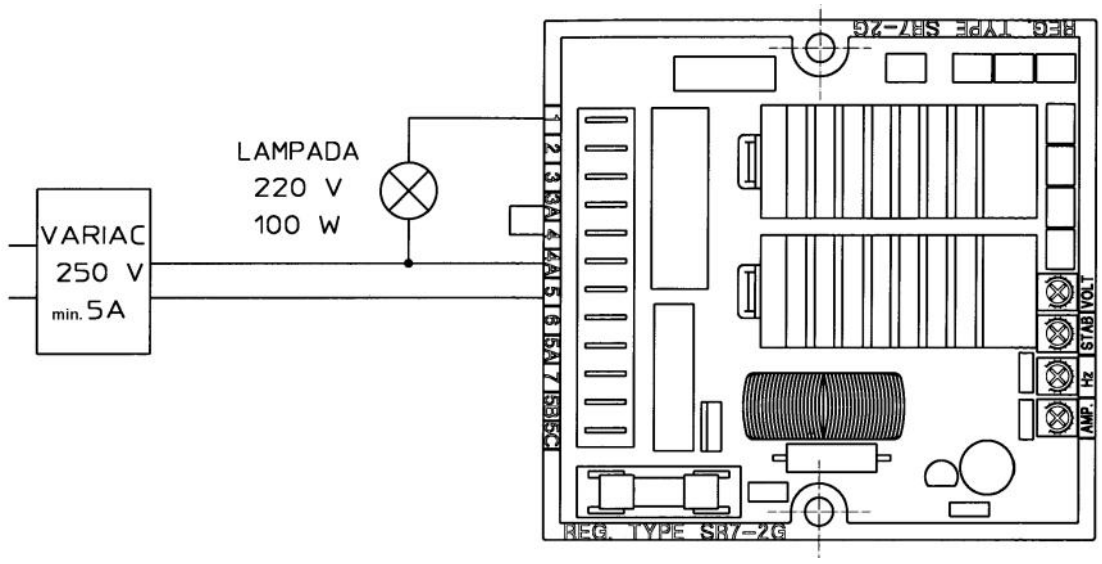


fig. 6

2) Before supplying the circuit with current, turn the "VOLT" and "STAB" potentiometers anticlockwise and the "Hz" and "Amp" potentiometers clockwise to their relevant limits. Position the variac adjustment in correspondence with the minimum value.

3) Switch on the variac and, while slowly increasing the voltage value, make sure that the light switches on and then immediately off. When a voltage of around 200 Vac is reached the light should remain off.

4) If the "VOLT" trimmer is turned slowly clockwise, you should note that the intensity of the light varies from minimum to maximum. Take the "VOLT" potentiometer back to the minimum position.

5) Take the "STAB" trimmer to maximum and repeat point 4. You should note that the light intensity variation caused by the "VOLT" trimmer adjustment is quicker. Take the "STAB" and "VOLT" trimmers to minimum.

6) If the "VOLT" potentiometer is turned to maximum (clockwise) the light shines at maximum intensity. About 20 seconds after the "AMP" trimmer is turned to minimum (anticlockwise), the overload protection intervenes and switches off the light. The light should switch on again after a short period.

7) Slowly turn the "AMP" trimmer to maximum and check that the light switches on at maximum intensity. Take the "VOLT" trimmer back to minimum.

8) Slowly turn the "VOLT" trimmer clockwise until the light is at medium intensity. Turn the "Hz" trimmer anticlockwise, checking that the light switches off. Take the "Hz" trimmer to an intermediate position and the "VOLT" trimmer to a position that gives medium light intensity. If terminals 5 and 6 are short-circuited the light should switch off, subsequently short-circuiting terminals 5 and 7 causes the light to switch on at maximum intensity.

If during all the above tests the described behaviour happens, the regulator being tested is suitable for operation.

1.3.2) Machine test procedure SR7

The regulator should be connected as shown in the relevant diagram in figure 7.

-) Before starting the system, turn the "VOLT" and "STAB" trimmers fully anticlockwise and the "AMP" and "Hz" trimmers fully clockwise.

-) Connect a light between the generator phase and neutral (select the working voltage of the light in relation to the nominal value of the generator phase-neutral voltage).

-) Voltage calibration
The output voltage may oscillate when the generator is at no load, at nominal speed and with the “VOLT” voltage trimmer at minimum. If this happens, slowly turn the “VOLT” trimmer clockwise. The generator voltage should rise and stabilise itself. Increase the voltage to the nominal value.

-) Low speed protection calibration
If the machine is to work at 60 Hz, make sure that the “60 Hz” terminals of the electronic regulator are bridged. To adjust the low frequency protection, make the generator run at a speed that is equal to 90% of the nominal one. Slowly turn the “Hz” trimmer in an anticlockwise direction until the generator voltage begins to decrease. When the speed is increased, the generator voltage should normalise. Take the speed back to the nominal value.

-) Instructions to follow for the external potentiometer connection:

CAUTION: in order to get a correct working of the machine, it is necessary to follow the following procedure, connectring the external potentiometer.

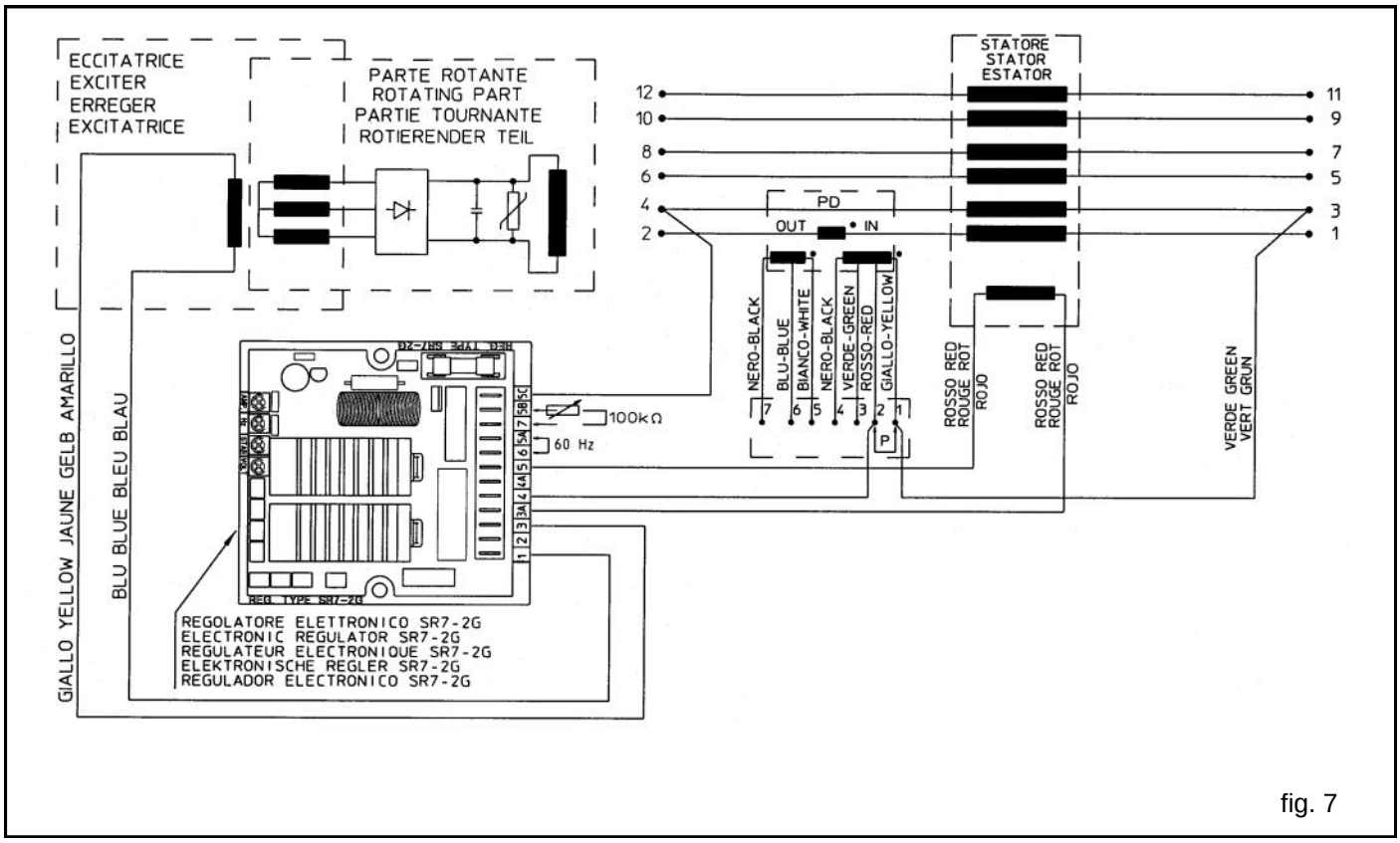


fig. 7

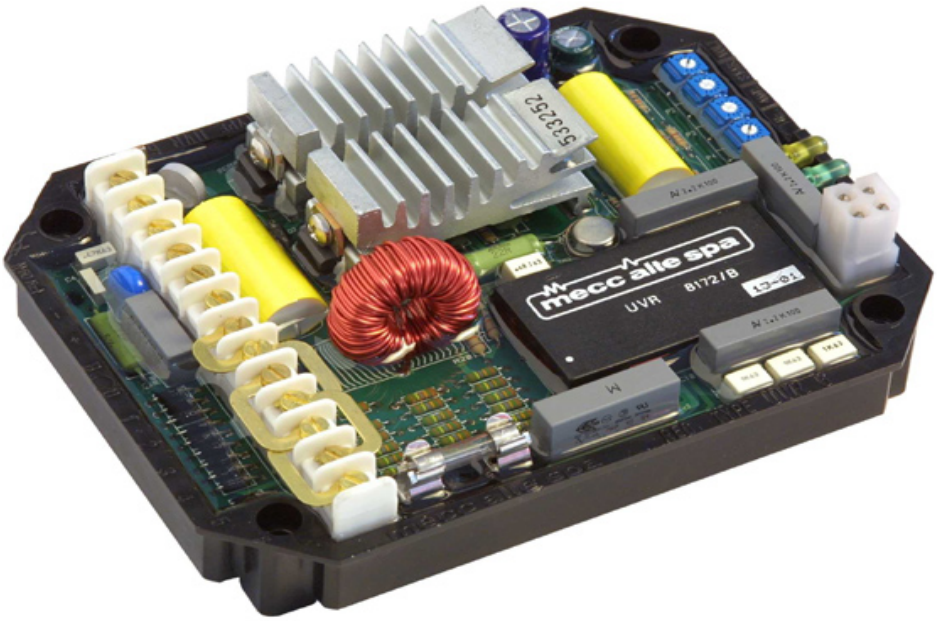
-) Stability calibration
To adjust regulator stability, slowly turn the “STAB” trimmer clockwise until the light that was previously connected between phase and neutral begins flashing slightly. Turn the “STAB” trimmer anticlockwise until the light becomes perfectly stable.

-) Overload protection calibration
To adjust the “AMP” overload protection apply a nominal load to the alternator then decrease the speed by 10% and turn the “AMP” trimmer fully anticlockwise. After a pause of 15-20 seconds, the generator voltage value should decrease. In these conditions, slowly turn the “AMP” trimmer clockwise until the output voltage value is at 97% of the nominal value. When returning to normal speed, the generator voltage return to nominal value. If this does not happen, repeat the calibration.

1) Turn the “VOLT” trimmer of the electronic regulator completely anticlockwise.
2) Set the external potentiometer at half turn and connect it to the proper terminals of the regulator.
3) Adjust the voltage at the nominal value by the “VOLT” trimmer of the regulator.
If during all the above tests the described behaviour happens, the regulator being examined is suitable for operation.

Automatic Voltage Regulator (AVR)

Mecc Alte U.V.R. 6



2) U.V.R.6 ELECTRONIC REGULATOR

2.2) Technical characteristics

2.2.1) Supply

The supply to the regulator can be from 170 to 270 Vac between terminals + and 2 of the terminal board, with + and B not connected, or from 80 to 160 Vac between terminals + and 2 but with + and B connected to each other. Supply can also be separate from the sensing and in this case should be insulated from it.

2.2.2) Sensing

The regulator is equipped with three differential sensing inputs (terminals 1-2, 3-4, 5-6), which measure up to three different machine voltages. In this way you can check the average voltage on one or three phases of your choice.

2.3.2) Voltage adjustment

The voltage can be adjusted using the potentiometer marked "VOLT".
It is possible to get a remote voltage regulation in a range of at least of ± 5% inserting a 100KΩ potentiometer (if the reference voltage is higher than 200V) or a 100KΩ potentiometer with a 100KΩ resistance in series (if the reference voltage is lower than 200V), onto the relevant terminals of the terminal board that are marked a variable resistance symbol.

2.3.3) Transitory reply time adjustment

The regulator is equipped with a “STAB” stability potentiometer with which it is possible to vary the regulator reply in a way that limits the swing and obtains from the machine a minimum voltage reset time at nominal value, after the application or release of a load. This permits optimum use of the UVR6 regulator for the whole range of Mecc Alte alternators.

OUTLINE DIMENSIONS

149,5 x 114,5 x 44 mm

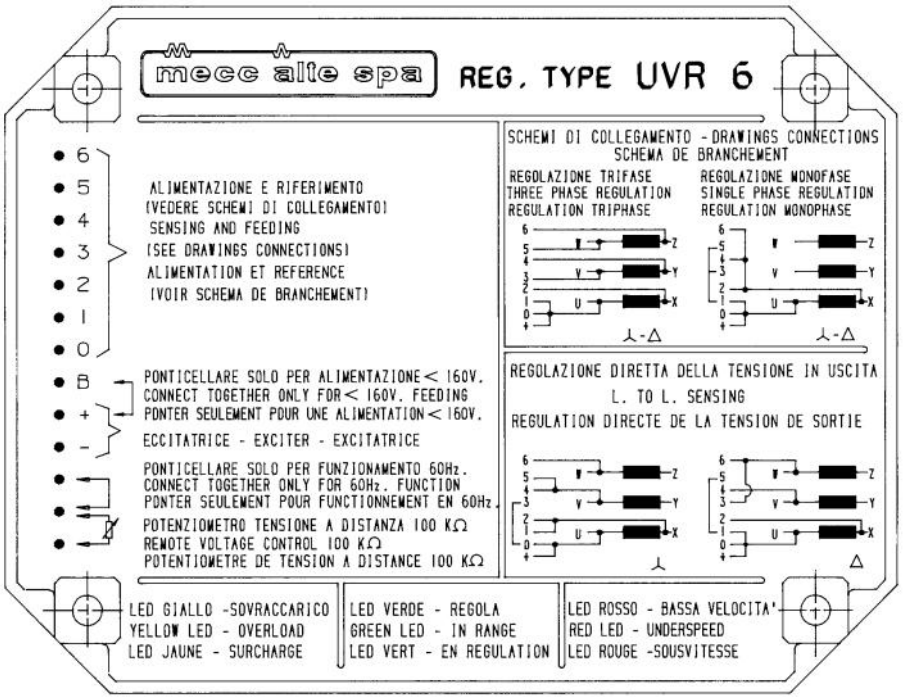


fig. 9

The most common connections are the following:

a) Direct voltage adjustment of one of the phase windings, with the machine either star or delta connected.

b) Direct adjustment of the voltage of the three phase windings (also for 12 terminal machines), with the machine either star or delta connected. In both cases (“a” and “b”), the passage of the machine connection from triangle to star does not need regulator connection modification.

c) Direct adjustment of the voltage to the terminals being used, with machine either star or delta connected.

2.3) Adjustments

2.3.1) Voltage precision

The voltage remains within ±1% of the pre-set value when passing from zero to full load, from cosφ 1 to 0.8 and with turn variations of up to -6% of the nominal value. The precision of the voltage improves if the regulator sensing inputs are connected directly to the terminals being used (see point c of the previous paragraph).

2.4) Protections

The regulator is equipped with two protection systems, and when they intervene the following LEDs light up:
a) Delayed protection for overloads (yellow LED).
b) Low speed protection (red LED).

Both protections have an intervention threshold that can be adjusted using the respective potentiometers. The protections cause an output voltage decrease that reduces the excitation current of the machine, so reducing overheating of the exciter rotor. The overload protection has a delay that let’s the machine overload briefly, for electric motor starting or other needs.
The regulator also has a third LED (green) which when lit indicates that the regulator is working correctly. All these signals can be observed remotely using the S.P.D.96/A type “REMOTE PROTECTION SIGNALLER” that is available upon request (see paragraph 3).

Fuse

The UVR6 electronic regulator is equipped with a fuse, which protects the alternator from overheating in cases of regulator malfunction. The fuse can be replaced easily, but the new one must have the same characteristics as the one being replaced (250V - 6.3A, quick acting, F type).

2.5) Usage field

The UVR6 can be used with all voltages from 80 to 480 Vac at 50 Hz.
It can also function at 60 Hz by bridging the "60 Hz" terminals of the regulator terminal board.
The UVR6-H400 can be used with all voltages from 80 to 480 Vac at 400 Hz.
The admissible calibration field corresponds to the one specified for Mecc Alte alternators.

2.6) Self-excitation

The regulator is equipped with a “starter” device that utilises the residual voltage of the machine for supply and excitation adjustment. This permits safe alternator excitation, also with very low residual voltages and in very short time, avoiding voltage swings during the starting phase. In this way, the voltage rises to the stabilised nominal value, approximately at the same moment when the speed reaches nominal value, even with prime movers with very fast starting ramps.

-) Turn the “VOLT” trimmer slowly clockwise. The lamp should switch on, starting from minimum and going to maximum brightness. Make sure that the green LED switches on then immediately off again during the brightness intensity changes.

-) Take the “VOLT” trimmer to maximum. The light switches on fully and the green LED remains unlit. Turn the ”AMP” trimmer to minimum (anticlockwise) and wait approximately 20 seconds in these conditions. You should see that the overload protection switches off the lamp and lights the yellow LED. Almost immediately after, the green LED switches on, as does the light but only slightly.

-) Slowly turn the “AMP” trimmer towards maximum. Make sure that the light illuminates with increasing intensity.
Leave the “AMP” trimmer at half range.

-) In these conditions, the light should flicker if the “STAB” trimmer is turned slowly clockwise. When the “STAB” trimmer reaches maximum, the flicker turns into intermittent light.

-) Take the “STAB” trimmer back to minimum. The green and yellow LEDs should be lit, and the light should be at medium brightness.

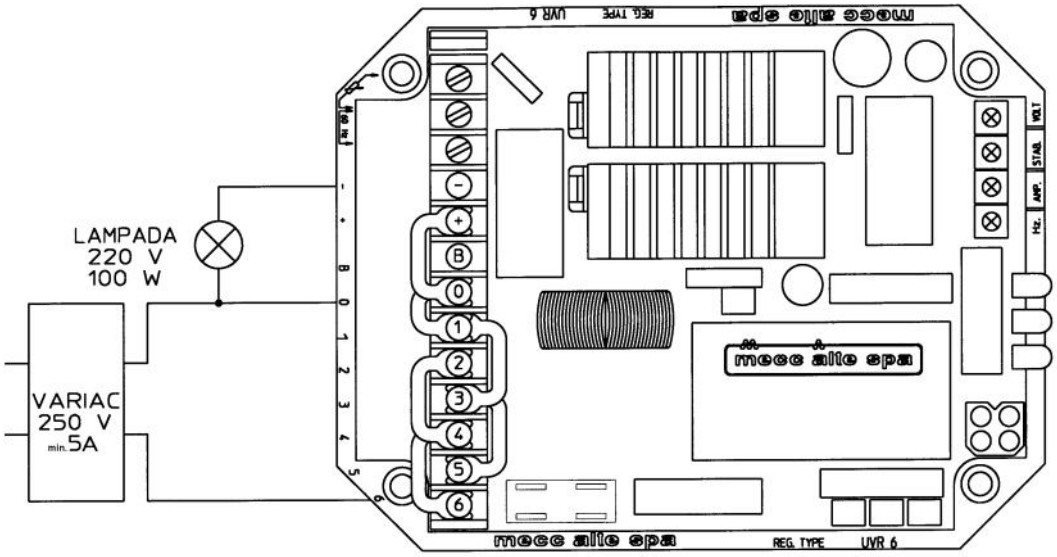


fig. 10

2.7) TEST PROCEDURES

2.7.1) Workbench test procedure (UVR6)

-) Prepare the connection diagram as shown in figure 10.

-) Before supplying the circuit with current, take the “VOLT” and “STAB” trimmers to minimum (turn anticlockwise), and the “AMP” and “Hz” trimmers to maximum (turn clockwise). The variac cursor should remain at minimum.

-) Switch on the variac and increase the voltage slowly, making sure that the light switches on and then immediately off.

-) Raise the variac voltage to approximately 200 Vac: the light should not light up.

-) Turn the “Hz” trimmer to minimum (anticlockwise). Make sure that the red LED switches on.

NOTE: If the test bench is at 50 Hz and the red LED does not illuminate, bridge the “Hz” terminals of the terminal board. If the test bench is at 60 Hz and the red LED does not light up, this does not mean that the regulator has problems. The low frequency protection should, instead, be tested in the machine.

-) Short-circuit the remote potentiometer terminals. The light should switch on with greater intensity.

If during all the above tests the described behaviour happens, the regulator being examined is suitable for operation.

2.7.2) Machine test procedure UVR6

The regulator should be connected as shown in the relevant diagram in figure 11.

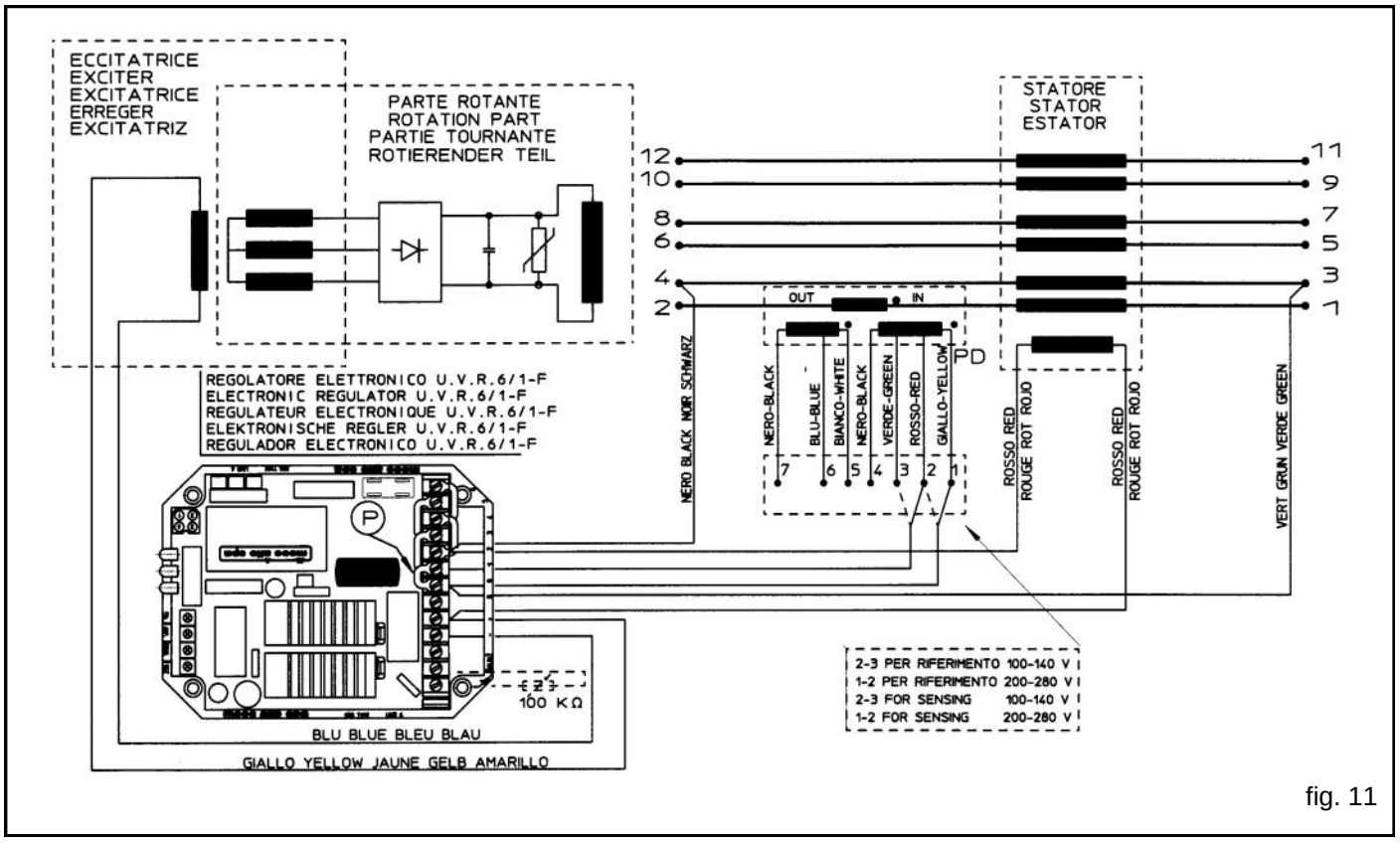


fig. 11

-) Before starting the system, turn the "VOLT" and "STAB" trimmers fully anticlockwise and the "AMP" and "Hz" trimmers fully clockwise.

-) Connect a light between the generator phase and neutral (select the working voltage of the light in relation to the nominal value of the generator phase-neutral voltage).

-) Voltage calibration

The output voltage may oscillate when the generator is at no load, at nominal speed and with the “VOLT” voltage trimmer at minimum. If this happens, slowly turn the “VOLT” trimmer clockwise. The generator voltage should rise and stabilise itself. Increase the voltage to the nominal value. In this situation only the green LED should be lit.

-) Stability calibration

To adjust regulator stability, slowly turn the “STAB” trimmer clockwise until the light that was previously connected between phase and neutral begins flashing slightly. Turn the “STAB” trimmer anticlockwise until the light becomes perfectly stable.

-) Overload protection calibration

To adjust the “AMP” overload protection apply a nominal load to the alternator then decrease the speed by 10% and turn the “AMP” trimmer fully anticlockwise. After a pause of 15-20 seconds, the generator voltage value should decrease and the yellow LED should light up. In these conditions, slowly turn the “AMP” trimmer clockwise until the output voltage value is at 97% of the nominal value – the yellow LED is still lit. When returning to normal speed, the yellow LED should switch off and the generator voltage return to nominal value. If this does not happen, repeat the calibration.

-) Low speed protection calibration

If the machine is to work at 60 Hz, make sure that the “60 Hz” terminals of the electronic regulator are bridged. To adjust the low frequency protection, make the generator run at a speed that is equal to 90% of the nominal one. Slowly turn the “Hz” trimmer in an anticlockwise direction until the generator voltage begins to decrease and at the same time make sure that the red LED lights up. When the speed is increased, the generator voltage should normalise and the red LED should switch off. Take the speed back to the nominal value.

-) Instructions to follow for the external potentiometer connection:

CAUTION: in order to get a correct working of the machine, it is necessary to follow the following procedure, connectring the external potentiometer.

1) Turn the “VOLT” trimmer of the electronic regulator completely anticlockwise.
2) Set the external potentiometer at half turn and connect it to the proper terminals of the regulator.
3) Adjust the voltage at the nominal value by the “VOLT” trimmer of the regulator.

If during all the above tests the described behaviour happens, the regulator being examined is suitable for operation.

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