

M16FA655A - Mark V

User Manual

Automatic Voltage Regulator for Three-phase Synchronous Generators

SIN.NT.002.5

Instruction Manual

Installation • Operation • Maintenance

AVR M16FA655A



WARNING: It is not the intention of this manual to cover all installation or connection diagram variations, nor does this manual provide information for every possible contingency. Only the technical information provided by Technical Personnel can integrate this Manual.

Should further information be required, please contact After Sales Department (see the following reference).

WARNING: Connection drawings into this Manual are provided only for explanation purposes. They do not cover all the application cases and not substitute the connection drawings usually provided with the generator.

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APPLICATION

The voltage regulator type "MARK V", is suitable for Synchronous Generators of make, MJB series, size range 160-225 frames. The regulator is fully insulated in order to maintain high reliability also with severe ambient conditions (high level of humidity, dust, salt atmosphere), and in case of high vibrations level. The regulator is proper both for single and 3-phase generators.

TECHNICAL DATA

REGULATION ACCURACY	+/- 0.5% rated steady state conditions
VOLTAGE DRIFT:	voltage change, for 50°C T _{amb} change
RESPONSE TIME:	1 cycle
OPERATING TEMPERATURE:	-30 °C ÷ +70 °C
EXCITER FIELD RESISTANCE:	8 Ω (min) ÷ 20 Ω(max)
INPUT/OUTPUT DATA:	
-SUPPLY VOLTAGE:	170 -270 V
-POWER SUPPLY:	350 VA (max)
-POWER DISSIPATED:	15 W (max)
-VOLTAGE SENSING:	170 - 270 V
-OUTPUT VOLTAGE (DC):	30 V
-OUTPUT CURRENT (DC):	5 A (max, servizio continuo) (max, continuos)
-OUTPUT CURRENT (DC):	8 A (max, in forzamento 1 minuto) (max forcing one minute)

VOLTAGE REGULATOR
M16FA655A
MARK V

Label	Unit	Color
P1	VOLT	BLUE
P2	FREQ	RED
P3	STAB	RED
P4	AMP	VIOLET
Q		BLACK
P		YELLOW-GREEN
Hz		
60		
ORANGE		

EMI SUPPRESSOR

The Voltage Regulator is provided with an internal Electromagnetic Interference filter: this interference suppression system permits to obtain compliance with relevant EMC standards on generators.

TERMINALS

Connection terminals are performed through FAST-ON terminals. The terminals have to be connected according the applicable wiring diagram, in order to avoid any possible mistake in the wiring. The use of FAST-ON terminals makes any operation on regulator (as replacement, connection to accessories, setting up) extremely simple.

INPUT TERMINALS

“U” , “0” : terminals for power supply.

SENSING VOLTAGE TERMINALS

“S” , “0” : terminals for voltage sensing.

OUTPUT TERMINALS

“+”, “-”: output terminals (positive, DC, and negative, DC).

CONTROL TERMINALS

“Hz” , “60”: terminals for changing the low speed protection terminals.

"P", "Q": terminals for connection of external trimmer.

EXTERNAL POTENTIOMETER

At the terminals "P" and "Q" an external trimmer (minimum rating 500mW, resistance about 100kOhm) can be connected. By acting on such trimmer, it is possible to obtain a voltage regulation of about $\pm 5\%$ around the nominal voltage. By using a 200kOhm potentiometer it is possible to obtain a voltage regulation of about $\pm 10\%$. The trimmer is connected anyway (through the regulator) to the output of the generator and then it represents a live part.

USE OF POTENTIOMETERS

- **P1/VOLT** - potentiometer for adjusting the output voltage of the generator. Normally the internal potentiometer P1 allows possibility of adjusting the voltage in a wide range (i.e. between 350 and 470 V, or between 170 and 260 V); to obtain a finer possibility of voltage setting or to adjust the voltage from the control panel, or in order to limit the voltage range, an external potentiometer can be connected to the terminal "P" and "Q" (resistance about 100kOhm, 500mW, to obtain $\pm 5\%$ voltage regulation).

- **P2/FREQ** - potentiometer for changing the low speed protection.

Usually it is set at the factory in order to reduce the excitation when speed becomes lower than 90% of rated speed at 50 Hz. By removing the bridge which normally shorts the terminals "Hz" and "60", the speed protection acts properly for 60 Hz operation.

- **P3/STAB** - stability potentiometer: by rotating it clockwise stability increases, but response time becomes larger.

- **P4/AMP** - potentiometer for changing the over excitation protection, in case of over excitation due to load conditions that could cause the rotor damage. Even if correctly set, this device does not substitute external systems protections, it is only a completing device.

STABILITY SETTING

The voltage regulator is provided with internal adjustable stability circuits in order to allow operation in a wide range of applications. The operation of the regulator can be set on field to adapt it to the characteristics of the plant and of the driving engine (diesel engine, water turbine, gas turbine) in order to obtain the best voltage response. To change the stability characteristics of the regulator, it is necessary to act on the potentiometer "P3/STAB".



P3/STAB \Rightarrow increase response time, increase stability.

OVER EXCITATION PROTECTION

in case of over excitation due to load conditions that could cause the rotor damage. The protection is delayed to avoid transitory conditions and acts by decreasing excitation and holding it to a safety level. To change the over excitation threshold of the regulator, it is necessary to act on the potentiometer "P4/AMP".



P4/AMP \Rightarrow increase the over excitation threshold.

LOW SPEED PROTECTION

The regulator is provided with internal circuits in order to reduce the excitation, when running at low speed, in order to avoid damages to the excitation devices system of the generator (i.e. to the regulator, to exciter field, to rotating rectifier, main rotor). The potentiometer "P2/FREQ", fixes the corner-frequency, that is the frequency at which that protection becomes effective. Below that particular frequency the voltage of the generator reduces further with speed reduction (voltage reduction is twice the reduction in speed).



P2/FREQ \Rightarrow increase frequency of intervention.

FUSE

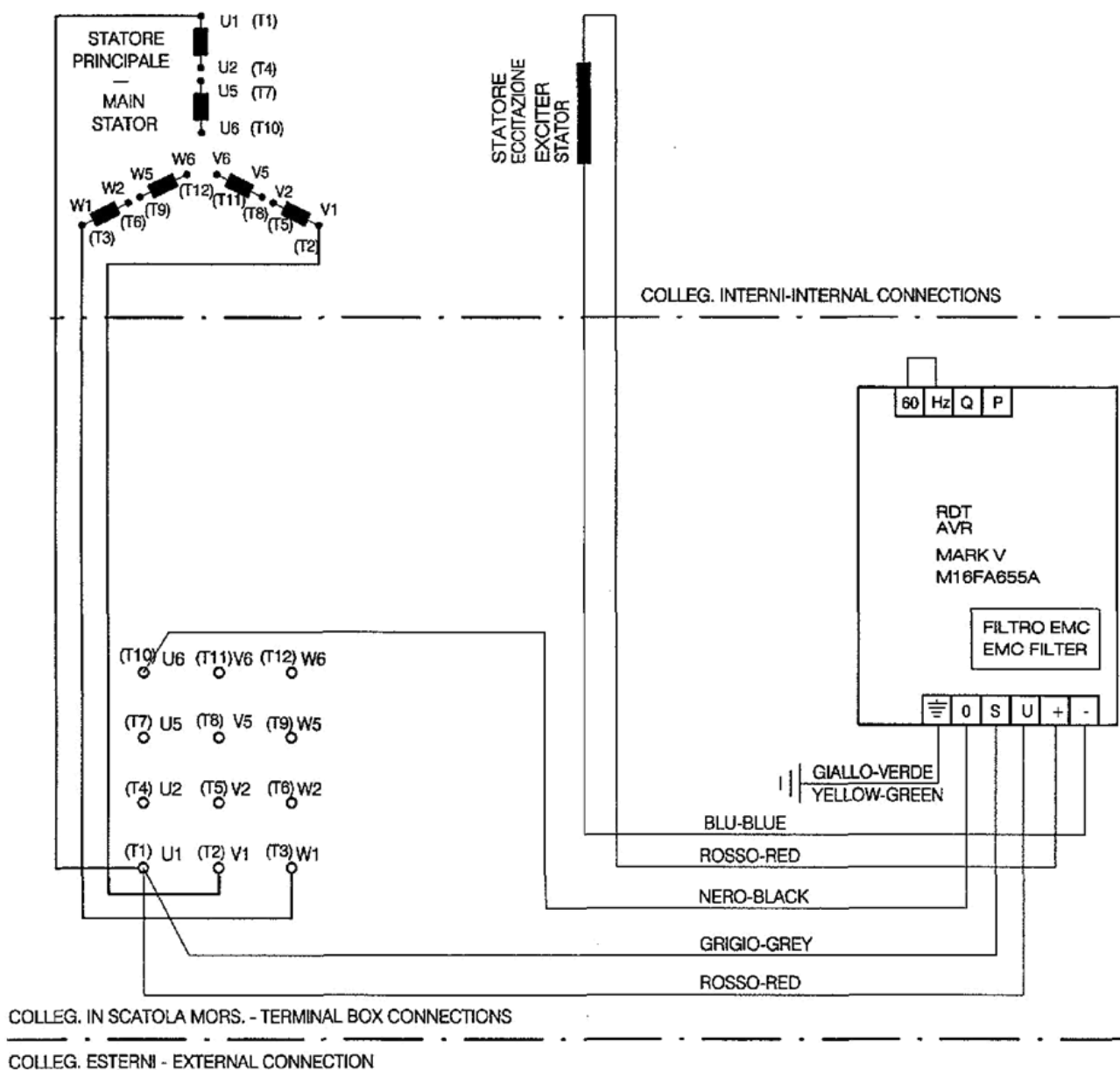
The voltage regulator is provided with an internal protecting fuse (5A 500V) (which acts in case of faults on the regulator or very large overloads on exciter circuit).

12 TERMINALS + AUX. WINDING

12 TERMINALS

PER IL FUNZIONAMENTO A 60 Hz, TOGLIERE
IL PONTICELLO ARANCIONE DEL R.D.T.

FOR 60 Hz OPERATION, THE ORANGE WIRE BRIDGE
OF A.V.R HAS TO BE REMOVED



6 TERMINALS + AUX. WINDING

PER IL FUNZIONAMENTO A 60 Hz, TOGLIERE
IL PONTE ARANCIONE DEL R.D.T.

FOR 60 Hz OPERATION, THE ORANGE WIRE BRIDGE
OF A.V.R HAVE TO BE REMOVED

