TECNOWARE FSTESM7K5MBD Bidirectional Stabilizer Servo Assisted User Manual

Contents

TECNOWARE FSTESM7K5MBD Bidirectional Stabilizer Servo Assisted

Specifications:

- **Product Name:** TECNOWARE Stabilizer (AVR)
- **Response Time:** Short
- **Efficiency:** High
- **Reliability:** High
- **Applications:** Instruments, meters, communications, home appliances, work sites

Product Usage Instructions

Safety Warnings:

- Read and understand the manual completely before installing and using the TECNOWARE Stabilizer (AVR).
- The AVR should only be operated by trained personnel following safety standards.
- Avoid electric shock by not removing the cover as internal parts carry high voltage.
- Electric installation must be done by qualified personnel adhering to safety standards for connections and cables.
- Repairs and maintenance should only be performed by authorized technical personnel.
- Ground the AVR according to safety standards.
- Avoid electric shock risks at the output lines, during operation or when connected to the utility line.
- Ensure proper ventilation and avoid exposure to direct sunlight or corrosive substances.

Installation:

- Place the AVR indoors in a protected, clean, and dry environment.
- Use a dedicated AC power line for the AVR.
- Avoid obstructing ventilation slots or pouring liquids into the unit.

Usage:

- The AVR regulates AC voltage to ensure stable power supply to connected devices.
- Monitor the operation status of the AVR regularly for any abnormalities.
- Ensure proper airflow around the AVR for cooling.

FAQ:

- **Q: Can I perform maintenance on the AVR myself?**
  A: No, any repair or maintenance work must be done by qualified technical personnel authorized by TECNOWARE to avoid risks.
- **Q: What should I do if I encounter problems with the AVR?**
  A: Refer to the user manual for troubleshooting before contacting customer service for assistance.

Bidirectional Stabilizer Servo-Assisted with µP Electronic Control
User's manual

Safety Warnings

- Read this manual carefully and completely before installing and using the TECNOWARE Stabilizer, which, from here after, will also be referred to as AVR.
- This manual should be kept close to the AVR and read before the AVR is installed and used.
- The AVR must be used only by properly trained personnel. To ensure correct and safe operations, it is necessary that operators and maintenance personnel observe the general safety Standards as well as the specific instructions included in this manual.
- **Risk of electric shock:** do not remove the cover. The AVR contains internal parts which are at a high Voltage and are potentially dangerous, capable of causing injury or death by electric shock.
- The electric installation has to be done by qualified personnel. Follow all the Safety Standards (CEI Standards in Italy or IEEE elsewhere) for the Input/Output connections and for the right section of Input/Output cables.
- There are no internal parts in the AVR which are user serviceable. Any repair or maintenance work must be performed exclusively by qualified technical personnel authorized by TECNOWARE.
- TECNOWARE declines any responsibility if this warning is disregarded.
- It is compulsory to ground the AVR according to Safety Standards.
- Risk of electric shock at the Output lines when the AVR is ON or in Bypass Mode.
- Risk of electric shock at the Output lines while the unit is connected to the AC utility line.
- We recommend to use a dedicate AC Input/Output power line for the AVR.
- Do not obstruct ventilation slots or holes and do not rest any object on top of the AVR
- Do not insert objects or pour liquids in the ventilation holes.
- Install the AVR indoors, in a protected, clean and moisture-free environment.
- Do not expose to the direct sun light.
- Do not keep liquids, flammable gases or corrosive substances near the AVR.

Introduction

- Principle of compensated AC Voltage Regulator
- **TECNOWARE Stabilizer is an AVR (AVR means Automatic Voltage Regulator):** this product is the result of constant technological research aimed at obtaining the best performance at the lowest cost.
- This product is a compensated type AC voltage regulator.
- It consists of MCU control unit, voltage regulator unit, servo-assisted motor, and input/output protection components, etc. (see figure 1).
- When the grid voltage is not stable, MCU control unit samples the output voltage, and according to the requirement of setting accuracy, keeps the output voltage within the desired voltage range, by means of adjustment of the voltage regulator unit.
- AVR has a short response time, high efficiency, high reliability, can work continuously for a long time. It is applicable for all kinds of instruments, meters, communications, home appliances and work site.
- This manual is a guide that enables you to correctly install and use your AVR. This manual includes important SAFETY instructions for the operator, for the AVR correct installation, and gives useful advice on the product maintenance. For any type of problem, please refer to this manual before calling the customer service.
- **Stabilizer is constantly being developed and improved**: consequently, your unit may differ somewhat from the description contained in this manual.

This manual includes the following models:

SINGLE-PHASE STABILIZERS

Code	Power
FSTESM7K5MBD	7.5 KVA
FSTESM10KMBD	10 KVA

In this manual Stabilizer will simply be referred to as AVR.

General Characteristics

AVR has all the advanced features which guarantee maximum reliability and safety:

- Bidirectional Stabilizer
- Output Voltage regulation +-3%
- Protection from overload and short circuits
- Automatic restart after Blackout, once AC utility power comes back on.
- Graphic Display for visualization of the Input and Output Voltage measurements, output current value, alarms, overload and fault condition.
- Acoustic signals of various kinds indicating alarm situations

- High efficiency
- Maximum reliability
- Smart design and easy to use

Receipt and site selection

Carefully remove the AVR from its packaging, and carry out a meticulous inspection. We recommend keeping the original packaging in a secure place, in case you need to send the AVR for maintenance purposes. In case of transport damage, notify the carrier and dealer immediately.
We recommend paying attention to the below points in order to choose a correct placement for your AVR:

- The AVR is designed to operate in a protected environment (e.g. offices). We therefore recommend installing it in a place with very little or no humidity, dust or smoke.
- When the AVR is brought from a cold place to a warmer place, humidity in the air may cause condensation in the AVR. In this case, allow AVR to stand for two hours in the warmer place before beginning with the installation.
- In all circumstances, see the “Technical Characteristics” chapter for environmental specifications and check that the selected area meets these criteria.
- During normal operation the AVR discharges a minimal amount of heat. So it is necessary to leave at least 20 cm of unobstructed space all around the AVR in order to keep it properly ventilated.
- Do not obstruct ventilation holes.
- Do not insert objects or pour liquids in the ventilation holes.
- Do not rest any object on top of the AVR.
- Do not keep liquids, flammable gases or corrosive substances near the unit.
- Install the AVR on a properly tiled floor. Avoid the installation on a floor that is not tiled flat.

External Description

Front Panel

AVR informs the user about operating status, alarm conditions and measurements through a display on the front panel.

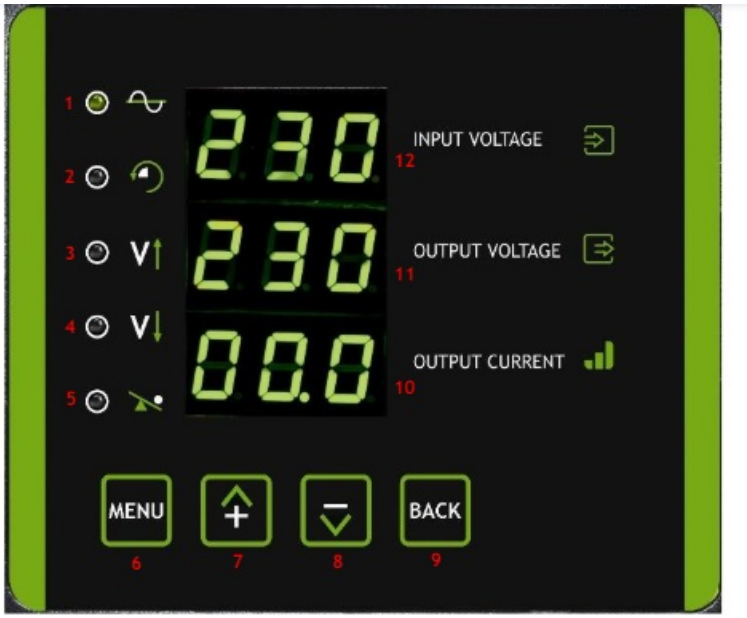

Figure 1 - Front panel display FSTESM7K5MBD and FSTESM10KMBD

1. Normal
2. Delay Time
3. Over Voltage Protection
4. Low Voltage Protection
5. Protection (fault Mode)
6. Menu Push Button
7. Up Push Button
8. Down Push Button
9. Back Push Button
10. Output Current
11. Output Voltage
12. Input Voltage

Front Side and Rear Side

Single-Phase models

Figure 2 – Front and Rear side FSTESM7K5MBD and FSTESM10KMBD (1. Display, 2. Stabilizer Breaker, 3. Bypass Breaker, 4. Terminal Block Access Panel)

Input/output Terminals

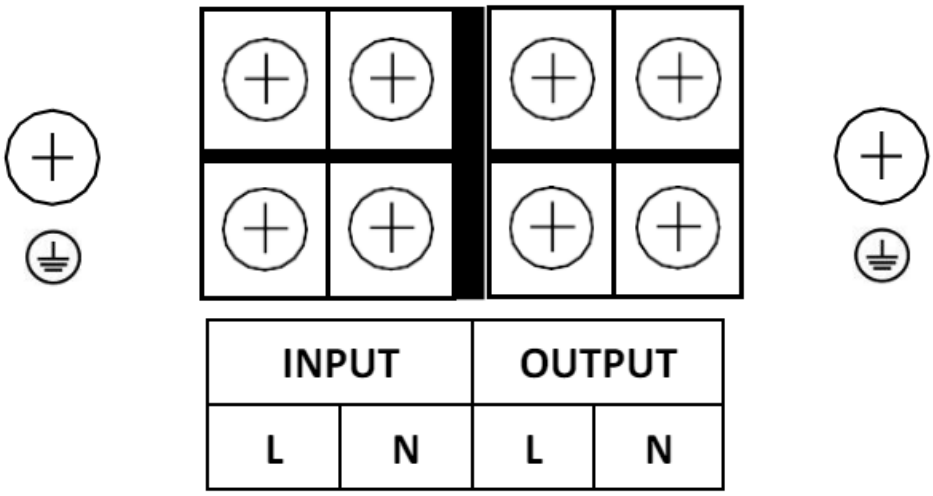

Figure 3 - INPUT/OUTPUT terminals for Single Phase Stabilizer

Electrical Installation

- The electrical installation has to be done by qualified personnel. Follow all the Safety Standards (CEI Standards in Italy or IEEE elsewhere) for the Input/Output connections and for the right selection  of Input/Output cables.
- We recommend to use dedicate AC Input/Output power lines for the AVR.
- For safety we recommend using external circuit breakers between Input mains and AVR AC Input line and between AVR Output lines and the loads. The circuit breakers should be qualified with leakage current protective function (leakage current < 30 mA).

Before starting the installation procedure, be sure that:

1. The AVR is “OFF” (check the Stabilizer Breaker is in OFF position).
2. The AC Input Voltage for the AVR has been removed.

The following table shows the recommended size (cross section) for Input, Output and Ground (GND) wires.
Single-Phase Models

Rated Power (KVA)	7,5	10
Input Cable (mm2)	4.0	6.0
Output Cable (mm2)	4.0	6.0
Ground Cable (mm2)	4.0	6.0

- We recommend using only flexible TRI-RATED cables. Otherwise if you use rigid cables, it will be difficult to move the AVR from initial positioning.
- We recommend to use dedicate AC Input/Output power Lines for the AVR.

Installation

- Connect the GROUND wire first when making wire connection. Disconnect the GROUND wire last when making wire disconnection.
- Make sure that the wires are connected tightly to the terminals.

We advise you to follow the steps below explained:

Single Phase models (see figures 2 and 3)

1. Remove the metallic panel that covers the Input/Output terminals. The terminals are shown in figure 8. All the cables have to reach the terminals from the rear side using the proper holes in the stabilizer rear side.
2. Connect the AC INPUT line (LINE, NEUTRAL and GROUND), paying attention to the right polarity, in accordance with figure 8, as explained below:
    - ▪ Connect INPUT GROUND wire to the GROUND terminal.
    - ▪ Connect INPUT LINE wire to the INPUT L terminal.
    - ▪ Connect INPUT NEUTRAL wire to the INPUT N terminal.
3. Connect the OUTPUT line (LINE, NEUTRAL and GROUND) as follow:
    - ▪ Connect OUTPUT GROUND wire to the GROUND terminal.
    - ▪ Connect OUTPUT LINE wire to the OUTPUT L terminal.
    - ▪ Connect OUTPUT NEUTRAL wire to the OUTPUT N terminal.
4. Reassemble the metallic panel that gives access to the Input/Output terminals
5. Restore the AC Input mains Voltage to the AVR.

It is compulsory to ground the AVR according to the Safety Standards.

- The case of the AVR is internally connected to the ground terminal (GND) of the IN/OUT terminals, in order to guarantee safety to the user. To guarantee safety it is necessary to be sure that the local electric plant is supplied with GROUND (in compliance with the Safety Standards), and that a valid connection is guaranteed between the GROUND of the AVR and the GROUND of the local electric plant.
- Any interruption of the GROUND conductor is absolutely prohibited.
- We recommend to use dedicate AC Input/Output power Lines for the AVR.
- Risk of electric shock at the Output lines while the unit is connected to the AC utility line.
- Risk of electric shock: do not remove the cover. The AVR contains internal parts which are at a high Voltage and are potentially dangerous, capable of causing injury or death by electric shock.
- There are no internal parts in the AVR which are user serviceable. Any repair or maintenance work must be performed exclusively by qualified technical personnel authorized by TECNOWARE.
- TECNOWARE declines any responsibility if this warning is disregarded.
- Disregard for these warnings may lead to a risk of electric shock to operators.

Functioning

Turning ON and OFF

- All models have a main breaker called Stabilizer.
- Let's see carefully the consequences of the switching of Stabilizer breaker.
- When the breaker is moved to the ON position, the AVR performs a test of about 5 seconds during which the Delay led is active.
- Then the AVR begins to work as a Stabilizer: the Output line is activated and all connected devices turn on.

Please check the following points:

1. The Normal led/indication is ON.
2. The Overload Protection led/indication must be OFF; otherwise it is necessary to remove part of the loads at the Output line.
3. The AVR gives no indication of alarm or anomaly.

When the breaker is moved to the OFF position, the AVR stops to work as a stabilizer and switches off immediately: the Output line is deactivated and all connected devices turn off.

Load Control

The AVR indicates the Output Load current value by the display on the front side.
When the Output load is higher than nominal value the AVR warns of Overload condition as follow explained:

- the Overload Protection led/indication is ON.
- a continuous acoustic alarm is ON.

The AVR has the capability to accept an Overload less than 125% for 30 seconds and then the AVR turns off. If the Overload exceeds 125%, the AVR switches off immediately.
To turn on again the AVR after an overload shutdown, follow the steps below explained:

1. Disconnect the output loads that cause the Overload condition.
2. Move the Stabilizer breaker to the OFF position.
3. Move the Stabilizer breaker to the ON position.

Make sure that the AVR never indicates Overload condition.
Do not connect a load greater than rated value to the AVR (see POWER specifications in the chapter "Technical Characteristics"), as this may damage the unit. In this case the warranty is void.

Manual Bypass
There is another breaker called Bypass on the right of the Stabilizer breaker. To enable Manual Bypass, the following steps must be taken:

1. Move the Stabilizer breaker to the OFF position.
2. Slide the metal lock on the Bypass breaker to the Stabilizer position.
3. Move the Bypass breaker to the ON position.

In Bypass mode, the AVR doesn't work as a Stabilizer, but only as a Bypass between Input and Output power lines.
To disable Manual Bypass and return to the normal operation of the AVR, follow the steps below explained:

1. Move the Bypass breaker to the OFF position.
2. Slide the metal lock on the Stabilizer breaker to the Bypass position.
3. Move the Stabilizer breaker to the ON position.

Bidirectional operation

- These bidirectional electronic voltage stabilizers are designed to work with photovoltaic systems. Its main feature is that it can work bidirectionally, i.e. it can stabilize the voltage coming from both the input network and the output on the inverter side.
- This function allows you to avoid blocking the production inverter due to anomalous voltages on the grid.
- In fact, these stabilizers can be installed downstream of the exchange/sales meter, to stabilize both the user and the photovoltaic system.
- The sizing of the stabilizer in this case must be carried out taking into account the greater power between the nominal power of the photovoltaic system and the peak power of the user.
- When the stabilizer is installed downstream of the exchange/sales meter, the current indicated on the stabilizer display can be that absorbed by the load or that fed into the network. The display does not indicate the direction of the current passing through it.

Technical Characteristics

Type	AVR Model	Input Voltage	Output Voltage	Frequency	Output Power
Single- Phase	**FSTESM7K5MBD**	**160-270 Vac**	**220/230/240 (selectable) ±3%**	**50/60 Hz**	**7,5 KVA**
	FSTESM10KMBD				**10 KVA**

Phase	**Single-Phase**
Over Temperature	If the temperature is high, the unit will shut down and alarm.
Delay Time	5 seconds
Manual Bypass	YES
Overload Capability	(100÷125) % for 30 sec with acoustic alarm; > 125% for 100 ms
Cooling	Fan Cooling
Efficiency	98%
Noise	≤65 dB
Temperature	0°C to 45°C
Humidity	20% to 90%

Technical data may change without prior notice

Maintenance

AVR Cleaning

Before starting any cleaning operation, be sure that:

1. The Stabilizer breaker is “OFF”.
2. The AC Input Voltage for the AVR has been removed.

Use only a cloth dampened with water to clean the unit.
If AVR works in an environmental unusually dusty or dirty, remove the dirty from the ventilation holes.
Before restarting the AVR be sure it is completely dry. If any liquid gets inside the AVR, do not start the unit and contact Technical Service immediately.

Operator Safety

- Whenever the AVR is not responding anymore to original characteristics, the AVR must be made non-operative and every usage not authorised must be avoided. After it will be necessary to refer to qualified technical personnel.
- Original safety characteristics might not be if, for example, the AVR has visible damage or irregular operation.

Service

For any malfunction in operation or failure please contact the Technical Service and provide the following information:

- Model and serial number of the AVR, which can be found on the nameplate on the AVR
- Description of abnormal operation and alarm displayed on display.

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TECNOWARE declines any responsibility if this warning is disregarded.

- For any malfunction in operation or failure please contact:
  - TECNOWARE SERVICE
  - **www.tecnoware.com**

Conformity to the European Directives

TECNOWARE S.r.l. confirms that the product is comply with the requirements set out in: the Low Voltage (Safety) Directive 2014/35/EU and following amendments, the EMC (Electro-Magnetic Compatibility) Directive 2014/30/EU and following amendments.

Product Disposal

- The product cannot be disposed as an urban waste, but must be treated as a separate waste. Any violation is indictable with financial sanctions as per in force regulations.
- An incorrect waste disposal or an improper use of the same or of any parts can be damaging for the environment and for human health.
- A correct waste disposal of products having the dustbin symbol marked by a cross help to avoid negative

consequences to the environment and to human health.

Documents / Resources

	**TECNOWARE FSTESM7K5MBD Bidirectional Stabilizer Servo Assisted** [pdf] User Manual FSTESM7K5MBD Bidirectional Stabilizer Servo Assisted, FSTESM7K5MBD, Bidirectional Stabilizer Servo Assisted, Stabilizer Servo Assisted, Servo Assisted, Assisted

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