Tigo TS4-A-F

Tigo TS4-A-F Fire Safety Module-Level PV Rapid Shutdown System

User Manual for Model TS4-A-F

1. Introduction

The Tigo TS4-A-F is a module-level power electronics device designed to provide rapid shutdown functionality for photovoltaic (PV) systems. This unit ensures fire safety by quickly de-energizing PV modules, complying with stringent electrical codes such as NEC 2014, 2017, and 2020 rapid shutdown requirements. It is certified by both IEC and UL, ensuring global acceptance and reliability. The TS4-A-F operates in a one-module-to-one-TS4 configuration and communicates with compatible inverters via Power Line Communication (PLC), facilitating straightforward plug-and-play installations.

This manual provides essential information for the safe and correct installation, operation, and maintenance of your Tigo TS4-A-F unit.

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2. Important Safety Information

Please read all safety instructions carefully before installing or operating the Tigo TS4-A-F. Failure to follow these instructions may result in electric shock, fire, or serious injury.

- Installation must be performed by qualified personnel in accordance with all local and national electrical codes.
- Always disconnect power from the PV array and inverter before performing any installation, maintenance, or troubleshooting.
- Do not attempt to open or repair the TS4-A-F unit. Refer all servicing to qualified service personnel.
- Ensure proper grounding of the PV system as required by local codes. The TS4-A-F itself does not require a separate ground wire.
- Wear appropriate personal protective equipment (PPE), including insulated gloves and safety glasses, when working with electrical systems.
- The TS4-A-F is designed for use with specific PV modules and inverters. Verify compatibility before installation.

3. Product Features

The Tigo TS4-A-F offers a range of features designed for enhanced safety and performance in PV installations:

- **Module-Level Rapid Shutdown:** Provides rapid shutdown capability for individual PV modules, enhancing fire safety.
- **High Power Capacity:** Supports up to 700W per channel.
- **Universal Certification:** IEC and UL certified for broad international acceptance.
- **NEC Compliance:** UL PVRSS certified, meeting US NEC 2014, 2017, and 2020 rapid shutdown requirements.
- **Integrated Communication:** Utilizes Power Line Communication (PLC) for seamless interaction with compatible inverters.
- **Standard Connectors:** Equipped with MC4 (standard) connectors for easy integration.
- **Easy Mounting:** Designed to snap directly onto the module frame.
- **Simplified Wiring:** Does not require a separate ground wire.
- **Long-Term Reliability:** Backed by a 25-year warranty.

4. Setup and Installation

The Tigo TS4-A-F is designed for straightforward installation. Follow these general steps:

Figure 4.1: Tigo TS4-A-F unit showing the main enclosure, two input cables with MC4 connectors, and two output cables with MC4 connectors. The unit is black with the Tigo logo and model number visible.

1. **Preparation:** Ensure all PV modules are de-energized. Verify that the inverter is compatible with Tigo TS4-A-F and has an integrated or external RSS transmitter for PLC communication.
2. **Mounting:** Attach one TS4-A-F unit to the frame of each PV module. The unit is designed to snap securely onto the module frame. Ensure proper ventilation and avoid direct exposure to extreme weather conditions if possible.
3. **PV Module Connection:** Connect the positive and negative output cables from the PV module to the corresponding input connectors of the TS4-A-F unit. Use the MC4 connectors provided.
4. **String Connection:** Connect the output cables of the TS4-A-F unit to the next TS4-A-F unit in the string, or directly to the inverter's input if it's the last unit in the string. Maintain correct polarity (positive to positive, negative to negative).
5. **Inverter Connection:** Connect the PV string to the compatible inverter. Ensure the inverter's rapid shutdown transmitter is active and properly configured to communicate with the TS4-A-F units via PLC.

6. **System Activation:** Once all connections are secure and verified, energize the PV array and inverter according to the manufacturer's instructions. The TS4-A-F units will communicate with the inverter to enable power production.

For detailed wiring diagrams and specific installation requirements, refer to the official Tigo installation guide available on the manufacturer's website.

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5. Operation

The Tigo TS4-A-F operates automatically in conjunction with a compatible inverter and its rapid shutdown transmitter. When the inverter is operating normally, it sends a keep-alive signal via Power Line Communication (PLC) to the TS4-A-F units. This signal allows the TS4-A-F to enable power output from the PV modules.

In the event of a rapid shutdown command (e.g., initiated by a safety switch, utility grid outage, or fire alarm), the inverter's transmitter ceases to send the keep-alive signal. Upon loss of this signal, each TS4-A-F unit automatically de-energizes its connected PV module within seconds, reducing the voltage in the PV array to a safe level as required by NEC standards. This ensures the safety of emergency responders.

To resume normal operation, the rapid shutdown condition must be cleared, and the inverter must re-establish communication with the TS4-A-F units by sending the keep-alive signal.

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6. Maintenance

The Tigo TS4-A-F is designed for minimal maintenance. Regular inspections of the PV system are recommended to ensure optimal performance and safety.

- **Visual Inspection:** Periodically inspect the TS4-A-F units and their connections for any signs of physical damage, corrosion, or loose connections.
- **Cleaning:** If necessary, gently clean the exterior of the units with a soft, damp cloth. Do not use abrasive cleaners or solvents.
- **Performance Monitoring:** Monitor the performance of your PV system through your inverter's monitoring interface. Any significant drop in module-level power output could indicate an issue with a TS4-A-F unit or the connected module.
- **Professional Check:** It is advisable to have a qualified solar technician perform a comprehensive system check periodically, especially after severe weather events.

Do not attempt to open or service the TS4-A-F unit yourself. Contact qualified service personnel for any repairs or advanced troubleshooting.

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7. Troubleshooting

If you experience issues with your Tigo TS4-A-F system, consider the following troubleshooting steps:

- **No Power Output from a Module:**
  - Check all MC4 connections for secure and correct polarity.
  - Verify that the inverter is operating and sending the PLC keep-alive signal.
  - Inspect the PV module itself for any damage.

- **System Not Shutting Down Rapidly:**
  - Ensure the inverter's rapid shutdown transmitter is functioning correctly.
  - Confirm that the rapid shutdown initiation method (e.g., external switch) is properly connected and activated.
  - Verify compatibility between the inverter and TS4-A-F units.
- **Intermittent Operation:**
  - Check for loose wiring or damaged cables.
  - Ensure there are no sources of electromagnetic interference affecting PLC communication.

For persistent issues, consult the inverter's user manual or contact Tigo support or a certified solar professional.

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8. Technical Specifications

Parameter	Value
Model Name	TS4-A-F
Max Input/Output (DC)	80V, 15A, 700W
Wattage	700 Watt-hours
Communication	Power Line Communication (PLC)
Connectors	MC4 (standard)
Certifications	IEC, UL, UL PVRSS (NEC 2014, 2017, 2020)
Item Weight	1.15 pounds (approx. 0.52 kg)
Package Dimensions	11 x 9 x 1 inches (approx. 27.9 x 22.9 x 2.5 cm)
Recommended Use	Solar Energy Rapid Shutdown and Fire Safety

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9. Warranty and Support

Warranty: The Tigo TS4-A-F comes with a 25-year warranty, covering defects in materials and workmanship under normal use and service conditions. Please retain your proof of purchase for warranty claims.

Technical Support: For technical assistance, troubleshooting beyond the scope of this manual, or warranty inquiries, please contact Tigo Energy customer support. Visit the official Tigo Energy website for contact information and additional resources.

Online Resources: For the latest documentation, FAQs, and software updates, please refer to the Tigo Energy official website.