ACE4U TUF-2000M-TM-1

ACE4U TUF-2000M-TM-1 Digital Ultrasonic Flowmeter Flow Module User Manual

Model: TUF-2000M-TM-1

1. Introduction

This manual provides comprehensive instructions for the installation, operation, and maintenance of the ACE4U TUF-2000M-TM-1 Digital Ultrasonic Flowmeter Flow Module. Please read this manual thoroughly before using the device to ensure proper function and safety.

2. Product Overview

The ACE4U TUF-2000M-TM-1 is a digital ultrasonic flowmeter flow module designed for precise measurement and analysis in industrial automation and process control applications. Its compact size, high performance, and local display capabilities make it suitable for various flow metering tasks, including multi-channel and high-accuracy systems.
This module is particularly effective for measuring flow and can also be configured for heat measurement if specified at the time of order.



Figure 1: Front view of the ACE4U TUF-2000M-TM-1 Flow Module, displaying current flow status and control buttons.

3. Key Features

- **High Accuracy:** Linearity better than 0.5%, repeatability better than 0.2%, and overall accuracy better than ±1%.
- **Wide Measuring Range:** Compatible with various transducer types, supporting pipe sizes from DN15mm to DN6000mm.
- **Far Transmission Distance:** Connects to secondary meters via RS-485 interface, allowing transmission distances up to 1000m.
- **Powerful Functions:**
  - Current input: 4-20mA, three channels, suitable for data collectors.
  - Tri-wire resistance signal input (PT100): two channels, suitable for calorimeters.
  - Current output: 4-20mA, one channel, for flow/heat transmitters.
  - OCT output: two channels, for flow/heat switches.
- **Communication Protocols:** Compatible with MODBUS, METER-BUS, Fuji extended protocol, and general water meter protocols.

4. Technical Specifications

General Specifications:

Parameter	Value
Manufacturer	ACE4U
Part Number	262041723
Item Model Number	TUF-2000M-TM-1
Item Weight	2.65 pounds
Package Dimensions	0.39 x 0.39 x 0.39 inches
Item Package Quantity	1
Number Of Pieces	1

Optional Transducers:

Model	Measuring Range	Liquid Temperature	Accuracy
Clamp-on Transducers			
TS-2 (small size) TUF-2000MNB1	DN15-100mm	-30°C to 90°C	Flow ±1%, Heat ±2%
TM-1 (medium size) TUF-2000MNB2	DN50-700mm	-30°C to 90°C	Flow ±1%, Heat ±2%
TL-1 (large size) TUF-2000MNB3	DN300-6000mm	-30°C to 90°C	Flow ±1%, Heat ±2%
High-Temperature Clamp-on Transducers			
THS-1 (small size) TUF-2000MNB4	DN15-100mm	-30°C to 160°C	Flow ±1%, Heat ±2%
THM-1 (medium size) TUF-2000MNB5	DN50-700mm	-30°C to 160°C	Flow ±1%, Heat ±2%
Insertion Transducers			
TC-1 (standard) TUF-2000MNC1	DN80-6000mm	-40°C to 160°C	Flow ±1%, Heat ±2%
TLC-2 (lengthen) TUF-2000MNC2	DN80-6000mm	-40°C to 160°C	Flow ±1%, Heat ±2%
Prover Section			
TUF-2000MNG	DN15-1000mm	-40°C to 160°C	Flow ±0.5%

Input/Output and Communication:

- **Input:** 3 channels 4-20mA analog input, 2 channels Tri-wire resistance signal input (PT100).
- **Output:** Isolation RS-232/RS-485 output, 2 channels isolation OCT output, 1 channel isolation 4-20mA output (two-wire system).
- **Communication Protocols:** Compatible with MODBUS, METER-BUS protocol, Fuji extended protocol, and general water meter protocol.

5. Setup and Installation

Proper installation is crucial for accurate measurements. This section provides general guidelines. For detailed, specific installation instructions, refer to the dedicated installation guide provided with your transducer type.

5.1 Component Identification



Figure 2: Unpacked components of the flowmeter kit.



Figure 3: Terminal layout of the flow module, showing connections for TX, GND, T1, T2, A13-A15, OCT, Relay, DN, UP, AO, RS485, and 24V.

5.2 Electrical Connections

The module features various input and output terminals for integration into your system:

- **Power Supply:** Connect 24V DC to the designated 24V+ and 24V- terminals.
- **Transducer Connection:** Connect the ultrasonic transducers to the TX1, TX2, T1, T2, and GND terminals as per your transducer's wiring diagram.
- **Analog Inputs:** Utilize the 4-20mA input channels for data collection.
- **Resistance Inputs:** Connect PT100 sensors to the Tri-wire resistance signal input channels for calorimeter applications.
- **Communication:** Use the RS-232/RS-485 terminals for connecting to secondary meters or control systems. Ensure proper polarity for RS-485 (RS485+ and RS485-).
- **Outputs:** Connect external devices to the OCT output channels for flow/heat switches and the 4-20mA output for transmitters.

Ensure all connections are secure and correctly wired to prevent damage to the module or inaccurate readings. Refer to the wiring diagram specific to your application.



Figure 4: Flow module connected to a transducer.

6. Operating Instructions

Once the module is correctly installed and powered, it will begin to measure flow. The integrated display provides real-time information.

6.1 Display and Controls

The front panel features an LCD display and four control buttons: MENU, Up Arrow, Down Arrow, and ENT (Enter).

- **Display:** Shows current flow rate, accumulated flow, signal status, and other operational parameters.
- **MENU Button:** Accesses the main menu for configuration and settings.
- **Up/Down Arrow Buttons:** Navigate through menu options and adjust parameter values.
- **ENT Button:** Confirms selections and saves changes.

6.2 Basic Operation

1. **Power On:** Ensure all connections are secure, then apply power to the module. The display should illuminate.
2. **Initial Check:** Observe the display for flow readings. If "No Signal Detected" appears, refer to the Troubleshooting section.
3. **Configuration:** Use the MENU button to access settings such as pipe diameter, fluid type, and transducer type. Adjust these parameters using the arrow buttons and confirm with ENT to match your specific application. Incorrect settings will lead to inaccurate readings.
4. **Monitoring:** The module continuously measures and displays flow. Connect to a secondary meter or data collector via RS-485 for remote monitoring or data logging.

7. Maintenance

The ACE4U TUF-2000M-TM-1 Flow Module is designed for reliable operation with minimal maintenance. Regular checks can help ensure continued accuracy and longevity.

- **Cleaning:** Keep the module's exterior and display clean using a soft, dry cloth. Avoid abrasive cleaners or solvents.
- **Connection Checks:** Periodically inspect all electrical and transducer connections to ensure they are secure and free from corrosion or damage.
- **Environmental Conditions:** Ensure the module operates within its specified environmental limits (temperature, humidity) to prevent damage.
- **Transducer Inspection:** For clamp-on transducers, ensure good acoustic coupling with the pipe. For insertion transducers, check for fouling or damage.

8. Troubleshooting

This section addresses common issues you might encounter. For problems not listed here, contact technical support.

Problem	Possible Cause	Solution

Problem	Possible Cause	Solution
"No Signal Detected" on display	◦ Incorrect transducer connection. ◦ Poor acoustic coupling between transducer and pipe. ◦ Air bubbles or debris in the pipe. ◦ Incorrect configuration settings (e.g., pipe diameter, fluid type). ◦ Damaged transducer or cable.	◦ Verify all transducer wiring according to the diagram. ◦ Ensure sufficient coupling gel is applied and transducers are securely clamped. ◦ Check for and remove any air bubbles or significant debris in the measurement section of the pipe. ◦ Review and correct configuration parameters in the module's menu. ◦ Inspect transducers and cables for visible damage. Replace if necessary.
Inaccurate flow readings	◦ Incorrect configuration settings. ◦ Improper transducer placement. ◦ Flow profile disturbances. ◦ Calibration required.	◦ Double-check all configured parameters (pipe material, diameter, fluid velocity, etc.). ◦ Ensure transducers are placed on a straight section of pipe, away from bends or valves. ◦ Consult the installation guide for optimal transducer placement. ◦ If discrepancies persist, professional calibration may be necessary.
Module does not power on	◦ No power supply. ◦ Incorrect wiring of power supply. ◦ Faulty power supply.	◦ Verify power source is active and providing the correct voltage (24V DC). ◦ Check power supply wiring for correct polarity and secure connections. ◦ Test the power supply with another device or replace it if suspected faulty.

9. Warranty and Support

For warranty information, please refer to the documentation provided at the time of purchase or contact your vendor directly. ACE4U stands behind its products, and support is available for technical inquiries and assistance.
For technical support or service, please contact the seller or manufacturer with your product model number (TUF-2000M-TM-1) and part number (262041723).

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