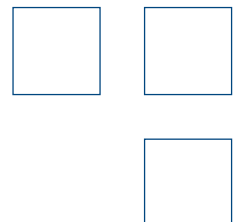
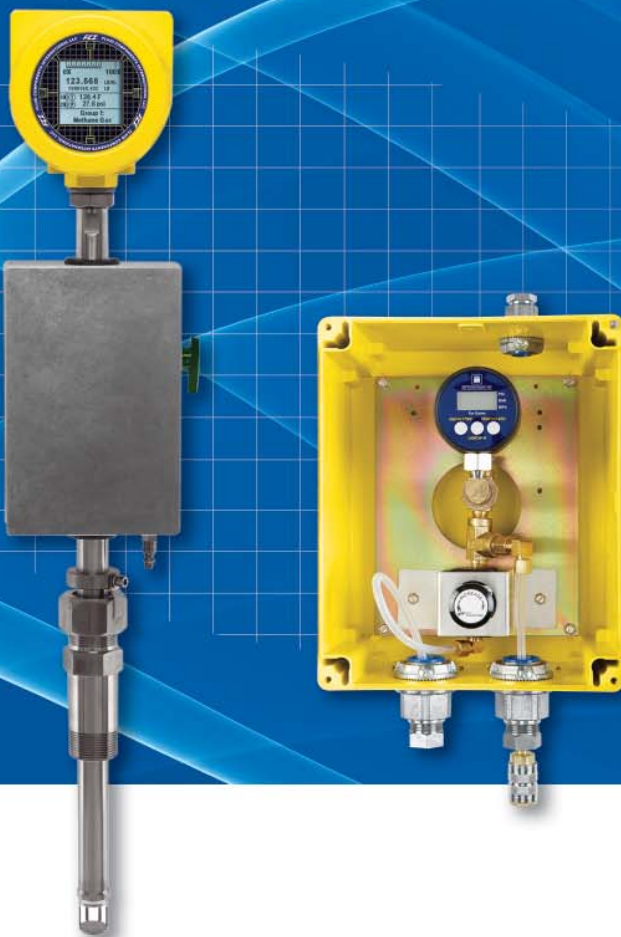


# VeriCal™ In-Situ Calibration Operation Manual

**ST110A, ST112AA, STP110A, STP112AA**  
Thermal Mass Flow Meter



**Notice of Proprietary Rights**

This document is the property of Fluid Components International LLC (FCI) and contains confidential and proprietary information including, without limitation, trade secrets, design, manufacturing, processing, form fit and function data, technical data, and/or cost and pricing information, developed exclusively at FCI's private expense. Disclosure of this information to you is expressly conditioned on your assent that its use is limited to use only within your company (and does not include manufacturing or processing uses). Any other use, including re-procurement, replication of FCI products, or other use directly or indirectly in any way detrimental to FCI's interests is strictly prohibited without prior written consent of FCI. This document is subject to the protections of 18 USC 1905 (Trade Secrets Act), 5 USC 552 (Freedom of Information Act), Executive Order 12600 of 6/23/87, 18 USC 1832 (Economic Espionage and Trade Secrets Act of 1996), and Cal. Civ. Code 3426 et seq (Uniform California Trade Secrets Act). Recipients of this document agree to maintain this legend and affix it to any duplication or reproduction, in whole or in part, of the document.

© Copyright 2022 by Fluid Components International LLC. All rights reserved. FCI is a registered trademark of Fluid Components International LLC. Information subject to change without notice.

**Table of Contents**

Introduction.....1

Theory of Operation.....1

Setup.....1

Procedure.....3

Customer Service/Technical Support.....7

INTENTIONALLY LEFT BLANK

## Introduction

This manual guides the user of the VeriCal instrumentation through an initial gathering of in-situ baseline data. This baseline line data will then be compared to data gathered during similar future verification processes to determine if the system is operating within factory specifications.

## Theory of Operation

The VeriCal system uses a sonic nozzle to consistently control the amount of compressed air (or nitrogen) injected onto the thermal flow transducer located on the end of the probe assembly. It is critical to use the same gas for subsequent VeriCal runs to ensure repeatability.

The operating principle of the sonic nozzle requires the total or absolute pressure on the high side of the nozzle to be greater than 20.0 PSIA. The pressure difference between the high side of the sonic nozzle and the process pressure (low-pressure side of the nozzle) must be greater than 2:1. When these two requirements are met, a repeatable flow is injected onto the thermal flow transducer.

## Setup

FCI Recommends that this procedure be run during the commissioning process of the instrument to determine an initial installed baseline calibration and to document any installed offset from the factory VeriCal baseline.

Frequency: Every 18 months minimum, every six months is recommended. After the process has been performed a couple times the customer should determine the required verification frequency based upon the process conditions.

This procedure makes the assumption that the instrument has been installed and is completely functional in the normal operating condition and orientation. The customer should also have access to the factory VeriCal calibration certificate.

**Note:** All standard safety procedures must be followed during the verification process. This procedure assumes the standard packing gland process connection. Your process connections may vary. It is critical to establish a field baseline upon receiving your ST100A Series flow meter. This ensures a greater likelihood of repeatability and establishes a history of the VeriCal data.

1. Apply the proper input power and allow for a 30-minute warmup. It is critical that the electronics and the sensor be fully warmed and stable prior to the VeriCal process. Failure to allow the proper warmup time can impact repeatability.
2. Loosen the packing nut on the packing gland assembly until the internal packing is loose enough to allow the probe assembly to be retracted out of the process and is recessed completely into packing gland assembly. Retract the probe assembly completely.

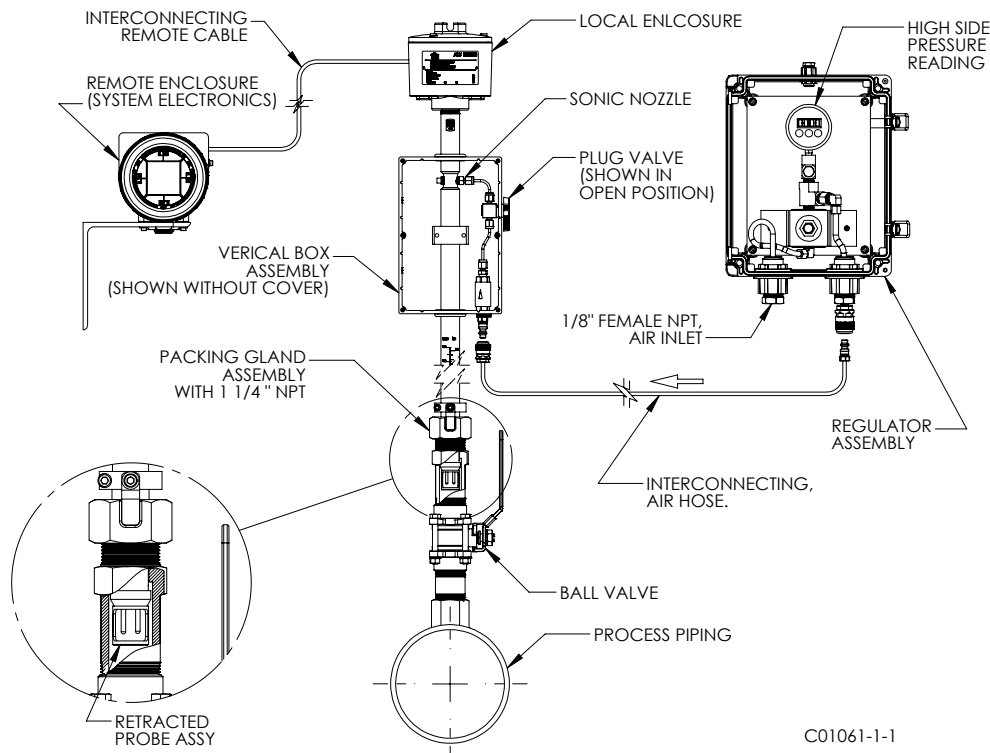


Figure 1 – Retracted VeriCal Mounting Configuration

3. Level the orientation flat on the probe assembly using a standard bubble level and tighten the packing nut to secure the assembly. To optimize the repeatability of the verification process, the position and orientation of the probe assembly should be identical every time the process is performed.
4. Attach the regulator assembly with the interconnecting hose to the inlet quick disconnect fitting on the probe assembly if it is not permanently installed.
5. Attach the calibration gas supply, typically compressed air (or Nitrogen), to the inlet side of the regulator assembly. Back out the pressure control regulator. Open the supply valve to the VeriCal pressure regulator box.
6. Slowly apply 100 PSIG to the VeriCal setup and verify that the system is leak free using a liquid leak detection fluid on all junction points. This should also ensure a steady flow across the sensors and remove any debris that might be on the thermowells or the outlet of the VeriCal tube. Reduce the pressure on the system to 25.0 PSIG. Open the ST100A Configurator application via the USB connection to the ST100A. Go to the Process Data tab for the appropriate FE (Flow Element). Be ready to record this information on the In-Situ VeriCal Data Sheet.

**Note:** An alternate method allows the user to use the HMI without the Configurator if desired:

7. Enter the ST100A HMI menu structure by covering the top light sensor on the HMI (the hot key) for three seconds.
8. Select the "Diagnostics" option.
9. Select the "Raw Signal" option.
10. Select the desired FE (the default is FE 1).
11. The HMI displays the ST100A Raw Signal. As shown in the example configurator screenshot below, the parameters include:

FE1 Raw Signal

RefR: 998.107

dR: 103.670

dTdR: 22.041

Temp: 31.1

Flow: 15.94

12. Follow the ST100A VeriCal procedure as directed to complete the process.
13. The instrument is now in the VeriCal configuration and ready to establish a set of "Field Baseline Data."

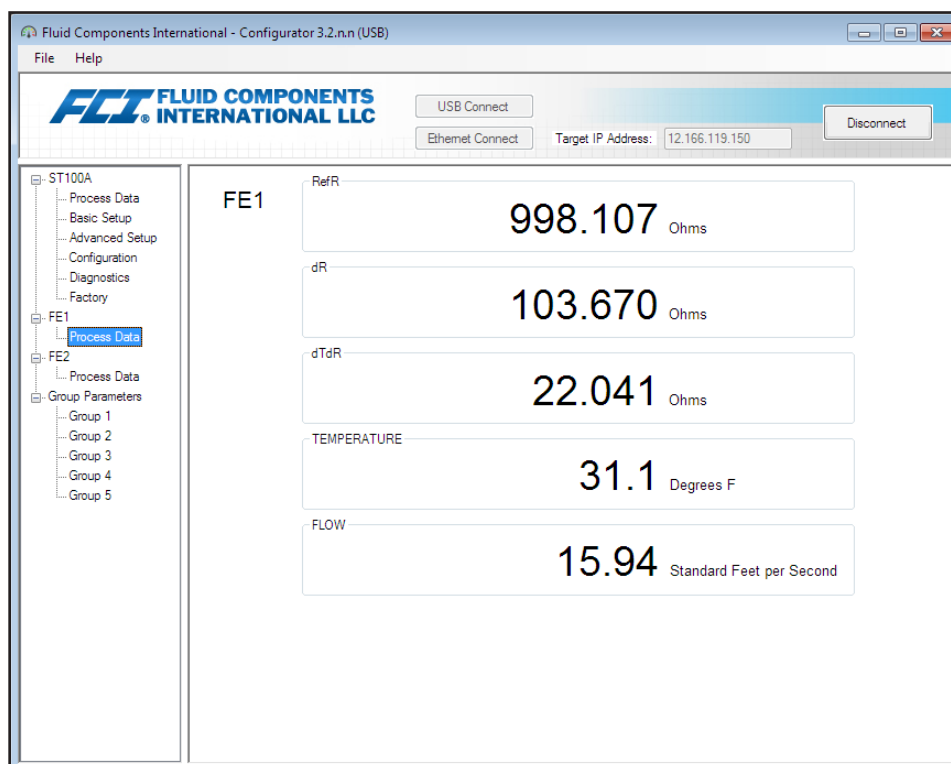


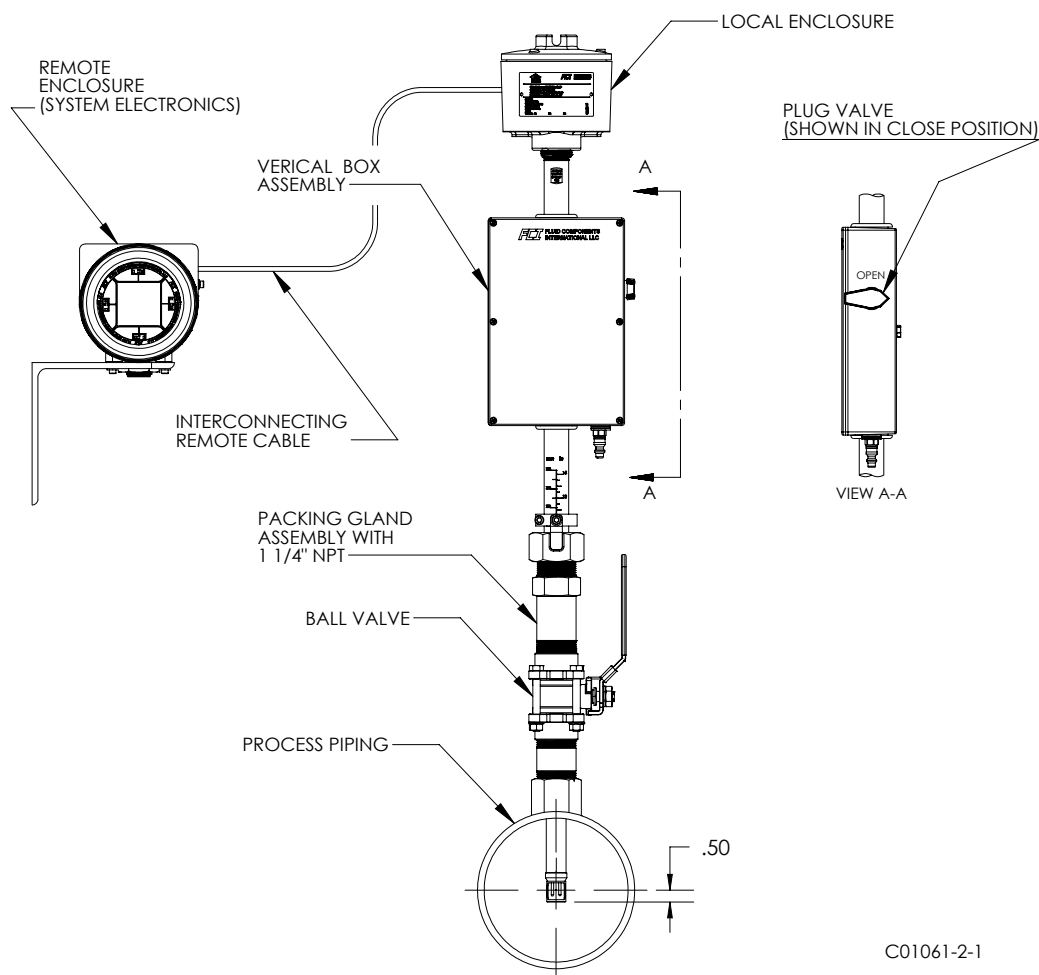
Figure 2 – ST100A Configurator Example Screenshot "FE1 Process Data"

## Procedure

1. Verify that the VeriCal pressure gauge indicates 25.0 PSIG ( $\pm 0.20$  PSIG). Note: using the exact pressure levels allows one to compare the current findings to the FCI Factory findings and any subsequent findings.
2. Allow the instrument to stabilize by sustaining the pressure for a minimum of 5 minutes. Observing the flow and temperature reading stability on the ST100A Configurator or HMI to verify that the instrument has come to equilibrium.
3. Record the VeriCal pressure as indicated on the regulator assembly pressure indicator and the ST100A data that is shown on the Configurator or HMI: RefR, dR, dTdR, Temperature, Flowrate, and optionally, the output current across a precision 250  $\Omega$  resistor.
4. Repeat this process for 50, 75 and 100 PSIG pressures.
5. The recorded values are the instrument's in-situ baseline calibration readings. All future verification readings will be compared to these baseline values and should be within 2-5% of the Field Baseline Data readings.
6. It is advisable to complete one more round of "Field Check Data" to establish a pattern of repeatability for this specific combination.

**Note:** This step is not mandatory, but it will help to understand the VeriCal system and what can be expected for future verifications.

7. The ST100A Configurator application can now be closed. Alternatively, cover the bottom light sensor on the HMI (the home key) for three seconds to return to the Home Screen.
8. Place probe assembly back into the correct location in the center of the process piping as indicated in the installation section of the operation manual.



C01061-2-1

**Figure 3 – Normal Mounting Configuration**

INTENTIONALLY LEFT BLANK





1755 La Costa Meadows Drive, San Marcos, CA 92078-5115  
 Phone: 760-744-6950 Toll Free (US): 800-854-1993 Fax: 760-736-6250  
 www.fluidcomponents.com

In-Situ VeriCal Data Sheet

|                |  |                 |  |          |
|----------------|--|-----------------|--|----------|
| Order Number:  |  | Equipment Used: |  | Due Date |
| Customer:      |  | DMM:            |  |          |
| Date:          |  | Resistor Pack:  |  |          |
| Serial Number: |  | Other:          |  |          |
| Tag Number:    |  |                 |  |          |

| Field Baseline Data |             | Date:     |             | Gas Supply: |                  |                |
|---------------------|-------------|-----------|-------------|-------------|------------------|----------------|
| Pressure PSIG       | ST100A RefR | ST100A dR | ST100A TCdR | ST100A Temp | ST100A Flow Rate | Vdc (at 250 Ω) |
|                     |             |           |             |             |                  |                |
|                     |             |           |             |             |                  |                |
|                     |             |           |             |             |                  |                |
|                     |             |           |             |             |                  |                |

| Field Check Data |             | Date:     |             | Gas Supply: |                  |                |
|------------------|-------------|-----------|-------------|-------------|------------------|----------------|
| Pressure PSIG    | ST100A RefR | ST100A dR | ST100A TCdR | ST100A Temp | ST100A Flow Rate | Vdc (at 250 Ω) |
|                  |             |           |             |             |                  |                |
|                  |             |           |             |             |                  |                |
|                  |             |           |             |             |                  |                |
|                  |             |           |             |             |                  |                |

| Field Check Data |             | Date:     |             | Gas Supply: |                  |                |
|------------------|-------------|-----------|-------------|-------------|------------------|----------------|
| Pressure PSIG    | ST100A RefR | ST100A dR | ST100A TCdR | ST100A Temp | ST100A Flow Rate | Vdc (at 250 Ω) |
|                  |             |           |             |             |                  |                |
|                  |             |           |             |             |                  |                |
|                  |             |           |             |             |                  |                |
|                  |             |           |             |             |                  |                |

INTENTIONALLY LEFT BLANK

## **Customer Service/Technical Support**

FCI provides full in-house technical support. Additional technical representation is also provided by FCI field representatives. Before contacting a field or in-house representative, make sure to follow the setup steps listed in this manual. Then perform the troubleshooting techniques outlined in the main manual.

### **By Mail**

Fluid Components International LLC  
1755 La Costa Meadows Dr.  
San Marcos, CA 92078-5115 USA  
Attn: Customer Service Department

### **By Phone**

Contact the area FCI regional representative. If a field representative is unable to be contacted or if a situation is unable to be resolved, contact the FCI Customer Service Department toll free at 1 (800) 854-1993.

### **By Fax**

To describe problems in a graphical or pictorial manner, send a fax including a phone or fax number to the regional representative. Again, FCI is available by facsimile if all possibilities have been exhausted with the authorized factory representative. Our fax number is 1 (760) 736-6250; it is available 7 days a week, 24 hours a day.

### **By Email**

FCI Customer Service can be contacted by e-mail at: [techsupport@fluidcomponents.com](mailto:techsupport@fluidcomponents.com).

Describe the problem in detail making sure a telephone number and best time to be contacted is stated in the email.

## **International Support**

For product information or product support outside the contiguous United States, Alaska, or Hawaii, contact your country's FCI International Representative or the one nearest to you.

## **After Hours Support**

For product information visit FCI at [www.fluidcomponents.com](http://www.fluidcomponents.com). For product support call 1 (800) 854-1993 and follow the prerecorded instructions.

## **Point of Contact**

The point of contact for service, or return of equipment to FCI is your authorized FCI sales/service office. To locate the office nearest you, visit the FCI website at [www.fluidcomponents.com](http://www.fluidcomponents.com).

## **Warranty Repairs or Returns**

FCI prepays ground transportation charges for return of freight to the customer's door. FCI reserves the right to return equipment by the carrier of our choice.

International freight, handling charges, duty/entry fees for return of equipment are paid by the customer.

## **Non-Warranty Repairs or Returns**

FCI returns repaired equipment to the customer either collect or prepaid and adds freight charges to the customer invoice.

## **Extended Warranty**

An extended warranty is available. Contact the factory for information.

## **Return to Stock Equipment**

The customer is responsible for all shipping and freight charges for equipment that is returned to FCI stock from the customer site. These items will not be credited to the customer's account until all freight charges are cleared, along with applicable return to stock charges, from the credit invoice. (Exceptions are made for duplicate shipments made by FCI.)

If any repair or return equipment is received at FCI, freight collect, without prior factory consent, FCI bills the sender for these charges.

**Field Service Procedures**

Contact an FCI field representative to request field service.

A field service technician is dispatched to the site from either the FCI factory or one of the FCI representative offices. After the work is complete, the technician completes a preliminary field service report at the customer site and leaves a copy with the customer.

Following the service call, the technician completes a formal, detailed service report. The formal report is mailed to the customer after the technician's return to the factory or office.

**Field Service Rates**

All field service calls are billed at the prevailing rates as listed in the FCI Price Book unless previous arrangements have been made with the FCI Customer Service Manager.

Customers are charged for all travel expenses including airfare, auto rental, meals and lodging. In addition, the customer shall pay all costs of transporting parts, tools or goods to and from the job site. Invoicing travel time, field service work and other expenses will be performed by FCI's Accounting Department.





*Flow & Level Instrumentation  
Solutions for Industrial Processes*

**FCI's Complete Customer Commitment. Worldwide  
ISO 9001 and AS9100 Certified**

Visit FCI online at [www.fluidcomponents.com](http://www.fluidcomponents.com)

**FCI World Headquarters**

1755 La Costa Meadows Drive | San Marcos, California 92078 USA | Phone: 760-744-6950 Toll Free (US): 800-854-1993 Fax: 760-736-6250

**FCI Europe**

Persephonestraat 3-01 | 5047 TT Tilburg, The Netherlands | Phone: 31-13-5159989 Fax: 31-13-5799036

**FCI Measurement and Control Technology (Beijing) Co., LTD | [www.fluidcomponents.cn](http://www.fluidcomponents.cn)**

Room 107, Xianfeng Building II, No.7 Kaituo Road, Shangdi IT Industry Base, Haidian District | Beijing 100085, P. R. China  
Phone: 86-10-82782381 Fax: 86-10-58851152

**Notice of Proprietary Rights**

This document is the property of Fluid Components International LLC (FCI) and contains confidential and proprietary information including, without limitation, trade secrets, design, manufacturing, processing, form fit and function data, technical data, and/or cost and pricing information, developed exclusively at FCI's private expense. Disclosure of this information to you is expressly conditioned on your assent that its use is limited to use only within your company (and does not include manufacturing or processing uses). Any other use, including re-procurement, replication of FCI products, or other use directly or indirectly in any way detrimental to FCI's interests is strictly prohibited without prior written consent of FCI. This document is subject to the protections of 18USC1905 (Trade Secrets Act), 5USC552 (Freedom of Information Act), Executive Order 12600 of 6/23/87, 18USC1832 (Economic Espionage and Trade Secrets Act of 1996), and Cal. Civ. Code 3426 et seq (Uniform California Trade Secrets Act). Recipients of this document agree to maintain this legend and affix it to any duplication or reproduction, in whole or in part, of the document.