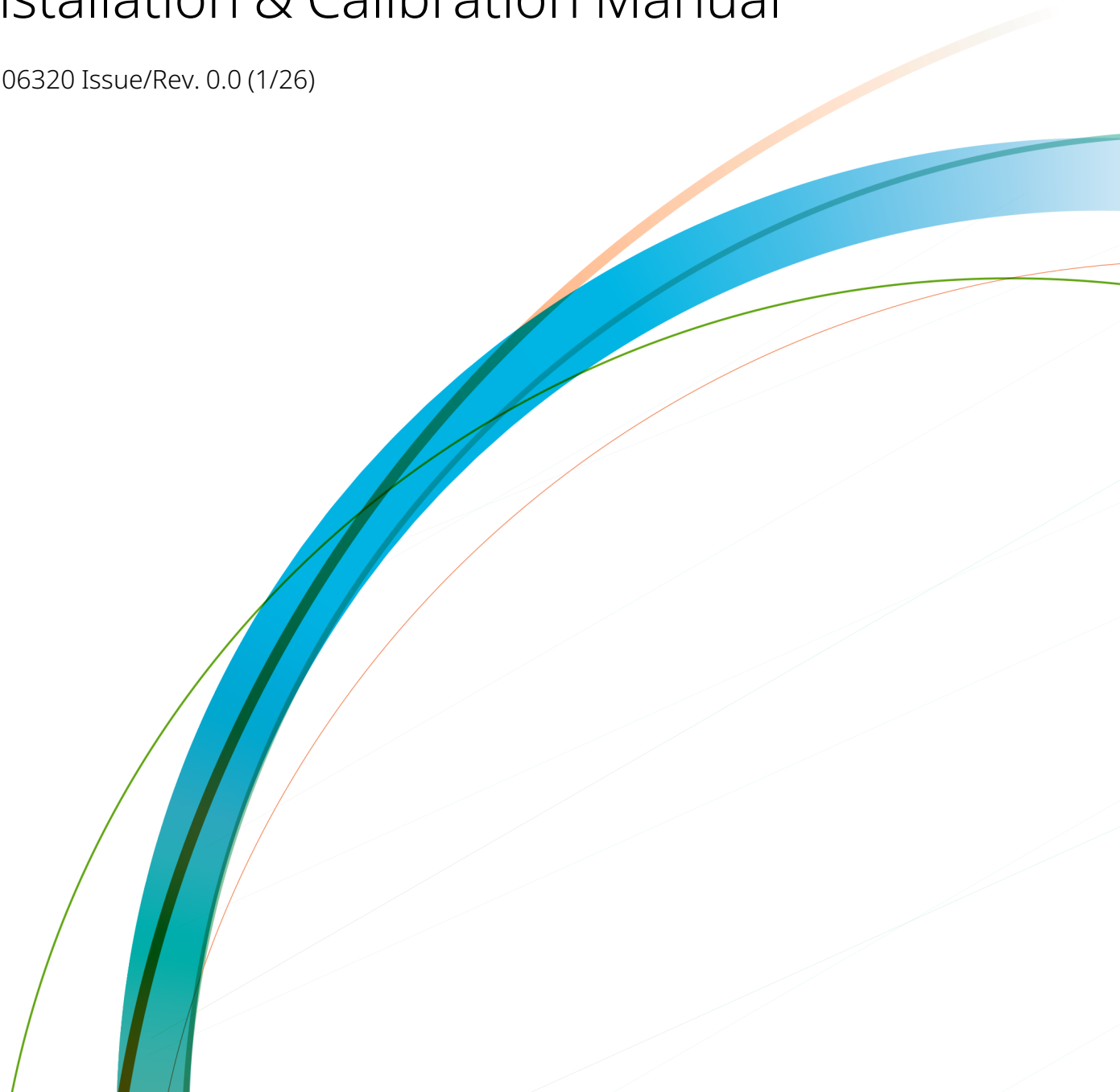
GUIDANT

Fusion4 Micro-Dose

Installation & Calibration Manual

MN06320 Issue/Rev. 0.0 (1/26)



Important

All information and technical specifications in this document have been carefully checked and compiled by the author; however, we cannot completely exclude the possibility of errors. Guidant Measurement is always grateful to be informed of any errors; contact us at TechnicalCommunications@GuidantMeasurement.com.

Caution

The default or operating values used in this document and in the configuration parameters of the product described in this document are for factory testing only and should not be construed as default or operating values for your system. Each system is unique and each configuration parameter must be reviewed and programmed for that specific system application.

Disclaimer

Guidant hereby disclaims all responsibility for damages, including but not included to consequential damages arising out of or related to the inputting of incorrect or improper program or default values entered in connection with the product described in this document.

Technical Support

Field Service Response Center

24/7 Technical Support/Schedule a Technician: +1 844.203.4014
System installation supervision, startup, and commissioning services are available.

Customer Support

Erie Customer Service

Guidant Measurement
1602 Wagner Avenue
Erie, PA 16510 USA
+1 814.898.5000
MS.ResponseCenter@GuidantMeasurement.com

Ellerbek Customer Service

Guidant Measurement
Smith Meter GmbH
Regentstrasse 1 25474 Ellerbek, Germany
P.O. Box 1164 25470 Ellerbek, Germany
+49 4101 304-0
ResponseCenter.MS@GuidantMeasurement.com

Guidant Knowledge Base

KB.GuidantMeasurement.com

Contents

1 General

The Fusion4 Micro-Dose is part of a system for complete handling of Mercaptan at propane and natural gas loading facilities. This manual details the installation and calibration of the Fusion4 Micro-Dose. For the setup and operation of the Fusion4 Micro-Dose, refer to the Fusion4 SSC-A Installation & Operation Manual.

This manual starts with a section of guidelines for a well designed Fusion4 Micro-Dose installation. Then it follows with a section for the pump start up and describes in detail the calibration procedure with references to the Fusion4 SSC-A manual.

In order to best acquaint yourself with the operation of the Fusion4 Micro-Dose we suggest that you thoroughly review this manual and the Fusion4 SSC-A manual before beginning operation of your injector system.

The Fusion4 Micro-Dose requires the following items to operate:

Table 1-1: Operating Requirements

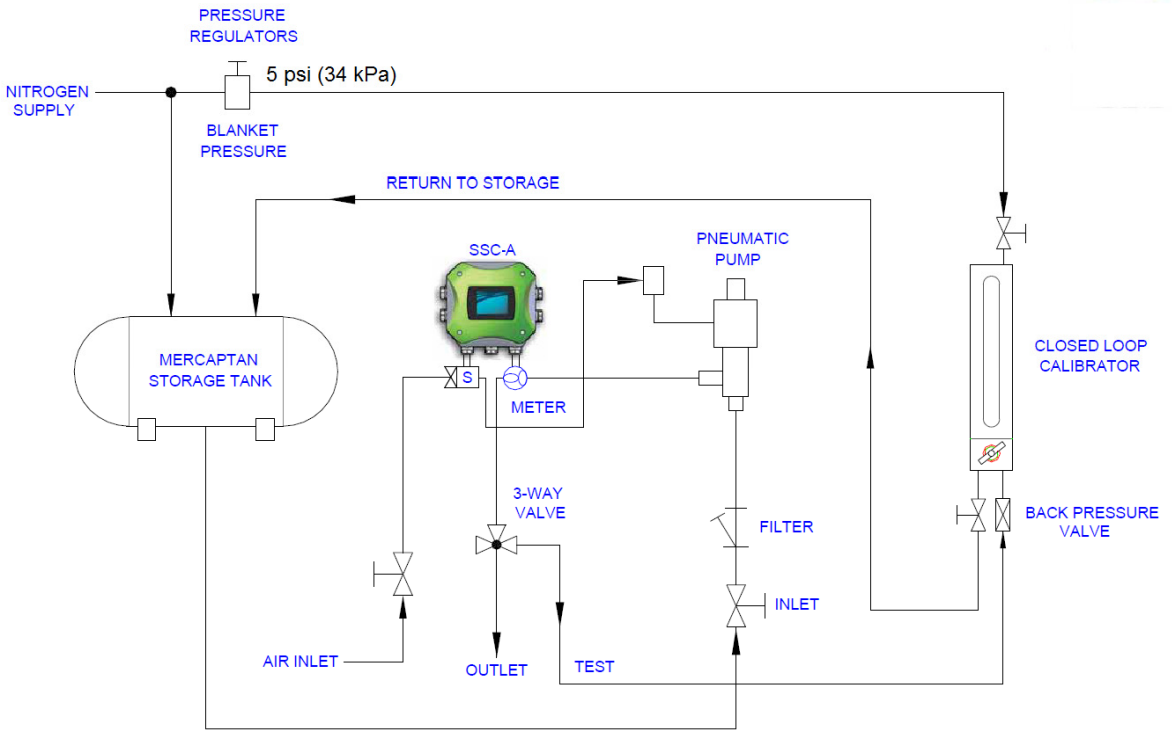
Item	Description
Permissive	Digital Input signal on DI AC or DI DC. Used to instruct the Fusion4 Micro-Dose that the loading process requires additive injection.
Wild stream pulse input	Digital Input on DI DC. Used by the Fusion4 Micro-Dose to tabulate product volumes.
Air Supply System	Compressed air, Nitrogen, or Fuel gas pressure is required as pump-driving source. This pressure must be regulated between 35 and 100 psi (240 and 690 kPa). Set pressure as required for your application.
Mercaptan Supply System	The Mercaptan supply must be a flooded suction to the injector's inlet. A return line is also required for the return of Mercaptan after the calibration process.

Each Fusion4 Micro-Dose must be set up for your application.

The Fusion4 Single Stream Controller-Additive, further in this manual referred to as SSC-A, is a hazardous area, intelligent additive injection controller, utilizing state-of-

the-art microprocessor technology for high accuracy additive injection applications. Within the Fusion4 Micro-Dose the SSC-A is used to control the Mercaptan injections and many other Fusion4 Micro-Dose applications in for instance LPG. The pump is powered by air pressure or Nitrogen. The Closed Loop Calibrator (CLC) is provided for products non-desirable for atmospheric exposure.

Figure 1-1: Example of Fusion4 Micro-Dose



All equipment (except the Mercaptan storage tank) is mounted on a panel of 24" x 22" (610 x 559 mm) for easy installation.

2 Installation

Refer to the following figure and tables for mounting details and process connections of Fusion4 Micro-Dose ATEX version.

Figure 2-1: Layout of Fusion4 Micro-Dose – ATEX version

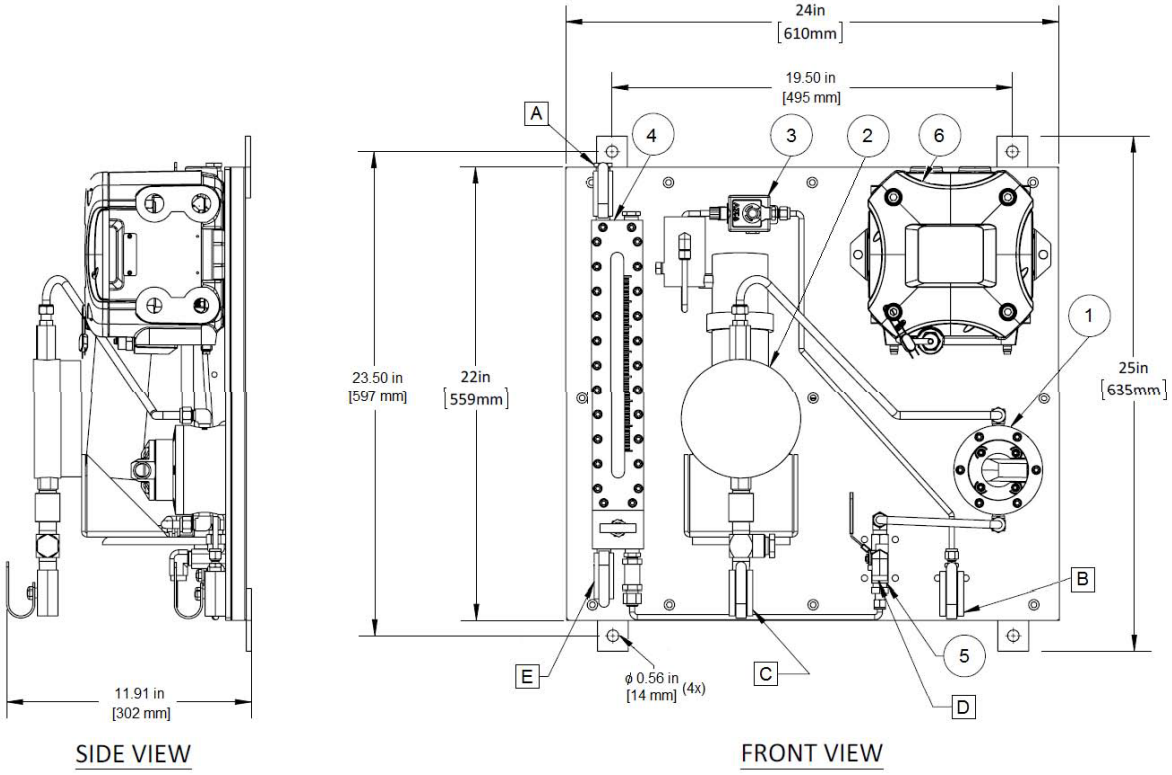


Table 2-1: ATEX Version Parts

Item No.	Description	Item No.	Description
1	Flow Meter	4	Closed Loop Calibrator (CLC)
2	Pneumatic Pump	5	3-Way Valve
3	Solenoid	6	Single Stream Controller (SSC-A)

Table 2-2: Process connections ATEX version

Item No.	Description	Process connection
A	Blanket pressure (N2 supply)	⅜" NPT female
B	Air Inlet	¼" NPT female

Item No.	Description	Process connection
C	Product Inlet (Mercaptan)	½" NPT female
D	Product Outlet (Mercaptan)	⅜" NPT female
E	Return to storage (Mercaptan)	⅜" NPT female

Refer to the following figure and tables for mounting details and process connections of Fusion4 Micro-Dose FM version.

Figure 2-2: Layout of Fusion4 Micro-Dose – FM version

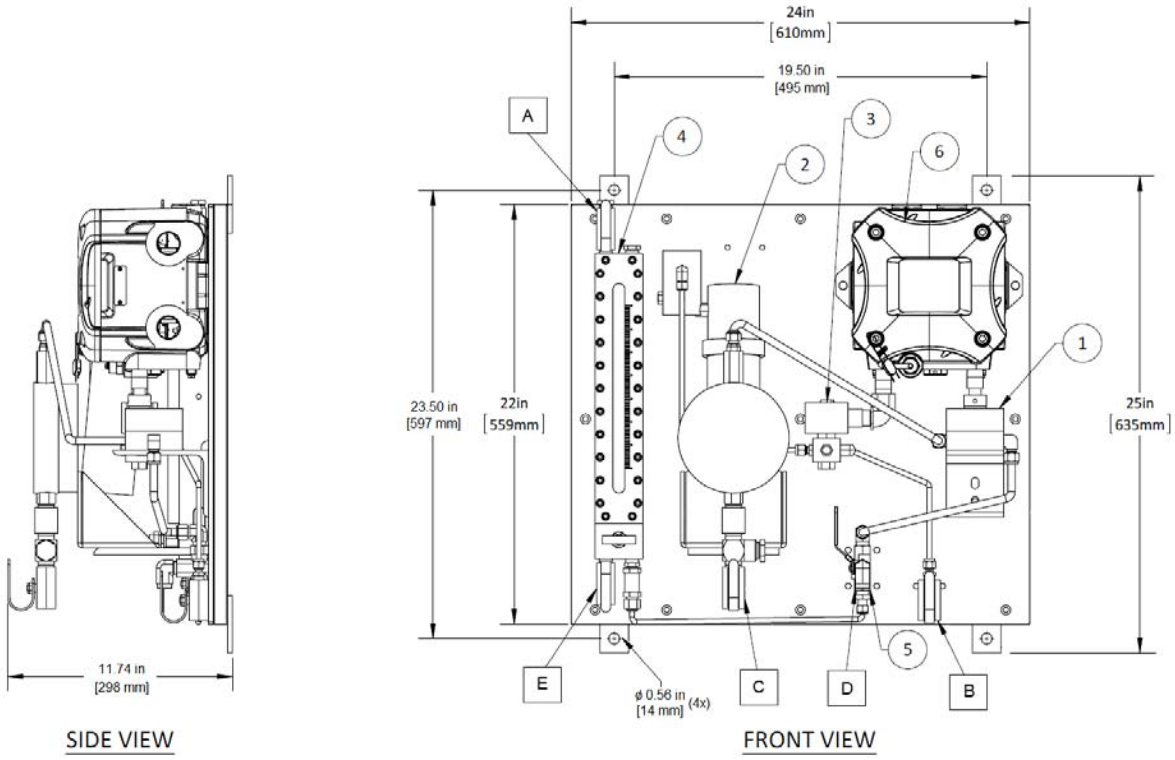


Table 2-3: FM Version Parts

Item No.	Description	Item No.	Description
1	Flow Meter	4	Closed Loop Calibrator (CLC)
2	Pneumatic Pump	5	3-Way Valve
3	Solenoid	6	Single Stream Controller (SSC-A)

Table 2-4: Process connections FM version

Item No.	Description	Process connection
A	Blanket pressure (N2 supply)	⅜" NPT female

Item No.	Description	Process connection
B	Air Inlet	¼" NPT female
C	Product Inlet (Mercaptan)	½" NPT female
D	Product Outlet (Mercaptan)	⅜" NPT female
E	Return to storage (Mercaptan)	⅜" NPT female

2.1 Additive Pump Engineering Guidelines

The Fusion4 Micro-Dose is a complete and self-contained additive handling system including electronic controller, pump, and closed loop calibrator. If you have not purchased this entire system from Guidant, consideration must be given to many design details. Some of them are included below.

- The Fusion4 Micro-Dose delivery system must have an atmospherically closed storage tank. This tank must be capable of containing a blanket pressure of inert gas (typically nitrogen) to prevent evaporation of the Mercaptan.
- A blanket gas supply system must be provided that includes a gas cylinder and regulator. The regulator MUST be a non-venting type.
- Design additive systems with a large capacity. Significant suction losses can be attributed to undersized strainers and high viscosity additive. A flooded suction must be maintained at all times.
- Design additive systems with Fusion4 Micro-Dose assembly mounted to a concrete pad to minimize vibration and strain on piping.

2.2 Piping and Tubing Engineering Guidelines

- Recommended: 300 series stainless steel continuous tubing, with a suggested maximum wall thickness of 0.035" (0.9 mm). Tubing size will vary with injector application. For applications requiring less than

0.25 GPM a 3/8" tubing should be considered as the minimum. Applications requiring a higher flow rate will require larger tubing sizes.

- Design pipe and tubing to minimize system pressure loss. Incremental cost for the larger pipe/tubing size is minimal, particularly when compared with replacing the pipe for increased requirements in the future.
- Viscosity of the liquid has a significant effect on piping pressure loss, and will change with temperature. Consider the most severe viscosity and temperature conditions anticipated for the application.
- If piping is to be installed above the elevation of the pump and injectors, a high point vent is required to allow removal of all air from the system.
- Flush all piping and tubing prior to final connection to the injector to remove all foreign materials. In addition, clean the injector strainer several times during and after start-up. Repeat this whenever the piping may be exposed to foreign matter through maintenance or new construction.
- Check valves and isolation ball valves should be installed at the injection point.
- Injection point should be located upstream of the product meter whenever possible.

2.3 Injector Engineering Guidelines

- Mount injector panels vertically and properly secure them to minimize vibration. Panels should be properly attached so that the panel is not forced to fit. Improper installation could cause meter gear drag and potential erosion of the meter, causing inaccurate additive measurement.
- Design the panel installation so the test valve outlet is accessible and free of obstacles beneath it. Calibration and testing operations require this access.
- Remove power to the unit prior to removing or installing the controller module to prevent possible damage to the module.
- Provide power voltage to the unit at 120 / 240 VAC – RMS +/- 10%, 50/60 Hz, depending on the voltage requirements.

2.4 Electrical installation

The meter and solenoid are already prewired to the Single Stream Controller (SSC-A). For other electrical wiring as mains and control and communication wiring refer to the Fusion4 SSC-A Installation & Operation Manual.

3 Startup

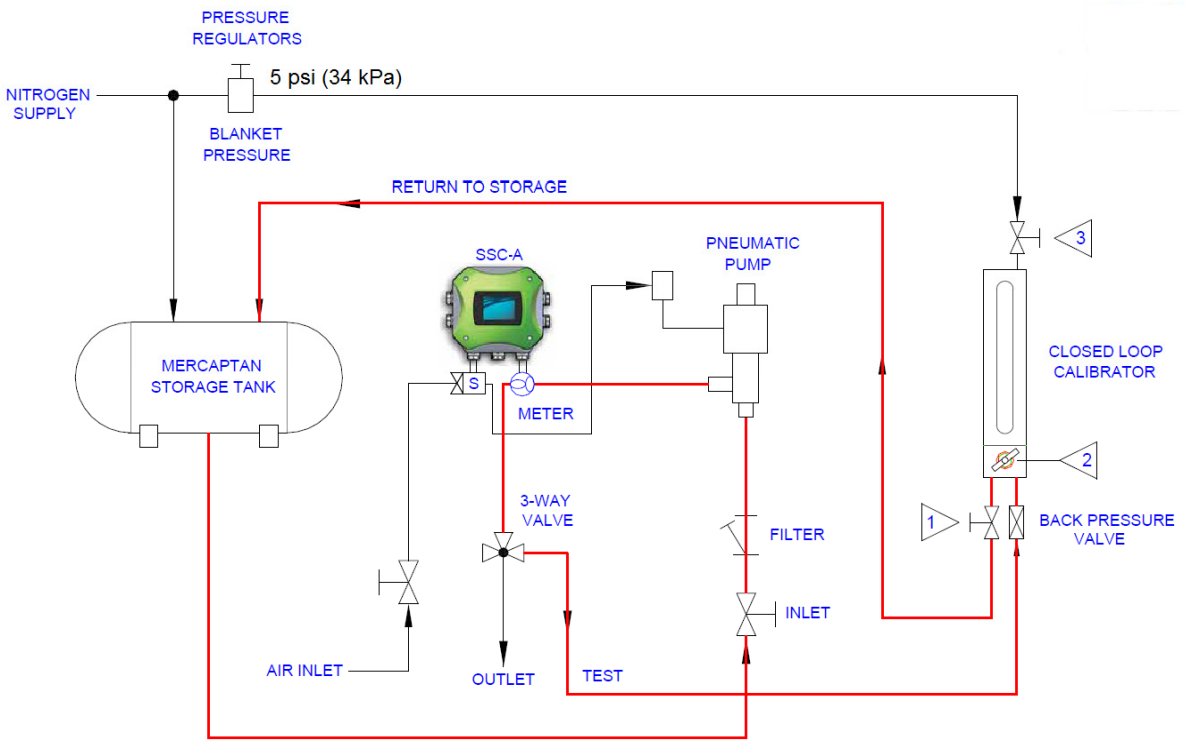
Reference is made to the WILROY™ Hydraulically Actuated Diaphragm Pump Installation, Operation and Maintenance manual (Doc.#30958; www.williamspumps.com).

Fill the pump with the supplied oil, according to section 3.2.2 of the pump manual.

Then fill the pump and pipelines with product (Mercaptan). Refer to Figure 3-1: Pump start up.

- Outlet valve closed
- Valve #3 closed (Nitrogen blanket)
- Valve #2 open (Calibrate valve)
- Valve #1 open (Return)
- Test valve open
- Inlet valve open
- Open the bleeder plug (part 460 on Figure 50 of the WILROY manual) on the front of the pump to let air escape (mind product spill).
- Pump on (see description next page)

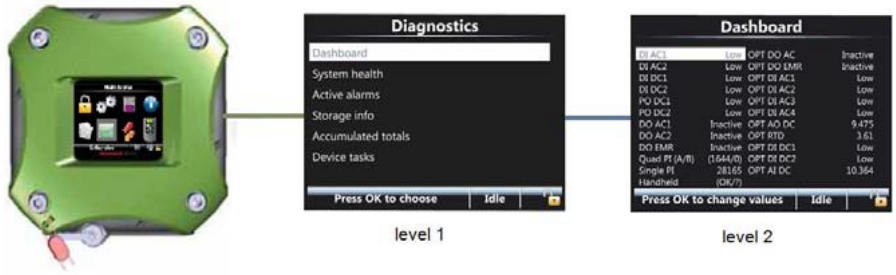
Figure 3-1: Pump start up



Reference is made to the Fusion4 SSC-A Installation & Operation Manual.

From the Dashboard menu in the Diagnostics menu, select the Digital Output for the Solenoid and activate that (refer to the following figure).

Figure 3-2: Overview Diagnostics menu



Let the pump run and close the bleeder plug once all air has escaped. Adjust the capacity setting as described in the WILROY manual.

When finished, inactivate the Solenoid in the Dashboard menu.

- Outlet valve closed
- Valve #3 open (Nitrogen blanket)

- Valve #2 close (Calibrate valve)
- Valve #1 open (Return)
- Test valve closed
- Inlet valve closed

4 Calibration

The Fusion4 Micro-Dose is provided with a Closed Loop Calibrator (CLC). The Closed Loop Calibrator is simply a way to calibrate an injector into a graduate cylinder without atmospheric exposure of the product being calibrated. The functionality of this method is quite simple.

The calibrator has two liquid external connections: Product Inlet and Product Outlet.

The inlet is referred to as the “Fill” connection and the outlet is referred to as the “Drain” connection. The drain connection has a dual purpose; that is, it also acts as a vent and pressure equalization connection depending on your step in the calibration process. A third external port is use for a blanket or purge inlet.

Two methods of application for the calibrator will determine how the calibrator will function.

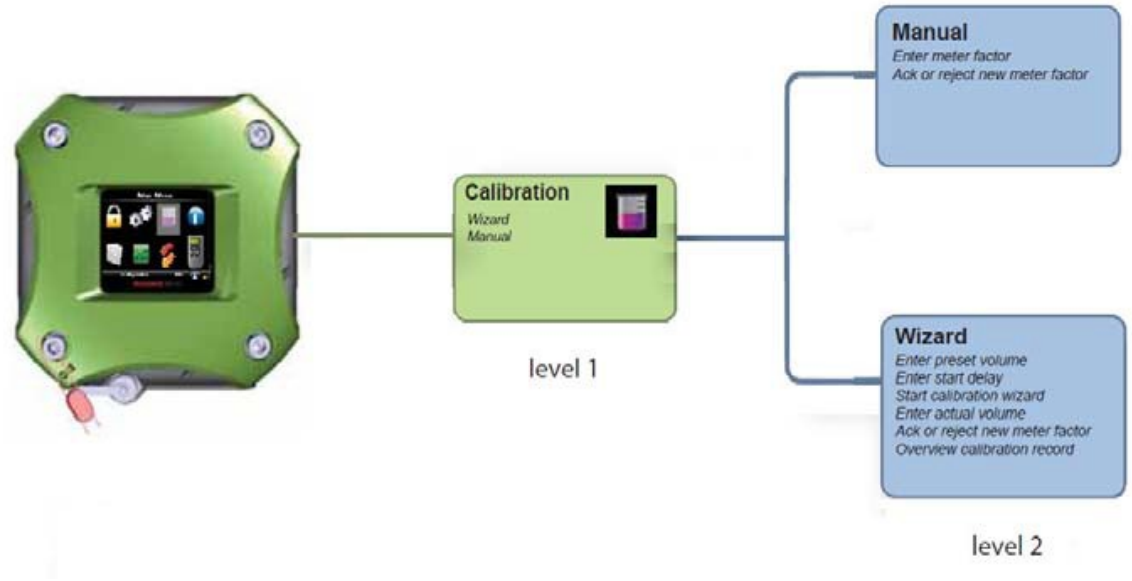
Other important aspects of the calibrator would certainly include the clear glass window in which the actual volumetric measurements are taken.

A pressure check valve (100 psi or 689 kPa) on the inlet connection used for supplementing the actual loading conditions, due to the main product line pressure, and last; but not least, a needle value used for draining the product level in the sight window to the zero mark on the graduated on the scale or to simply drain the calibrator when calibrating is completed.

The calibrator is rated for a maximum 300 psi (or 2068 kPa) working pressure. Under normal calibrating procedures the calibrator should only have blanket pressure present.

Reference is made to the Fusion4 SSC-A Installation & Operation Manual.

Figure 4-1: Overview calibration menu



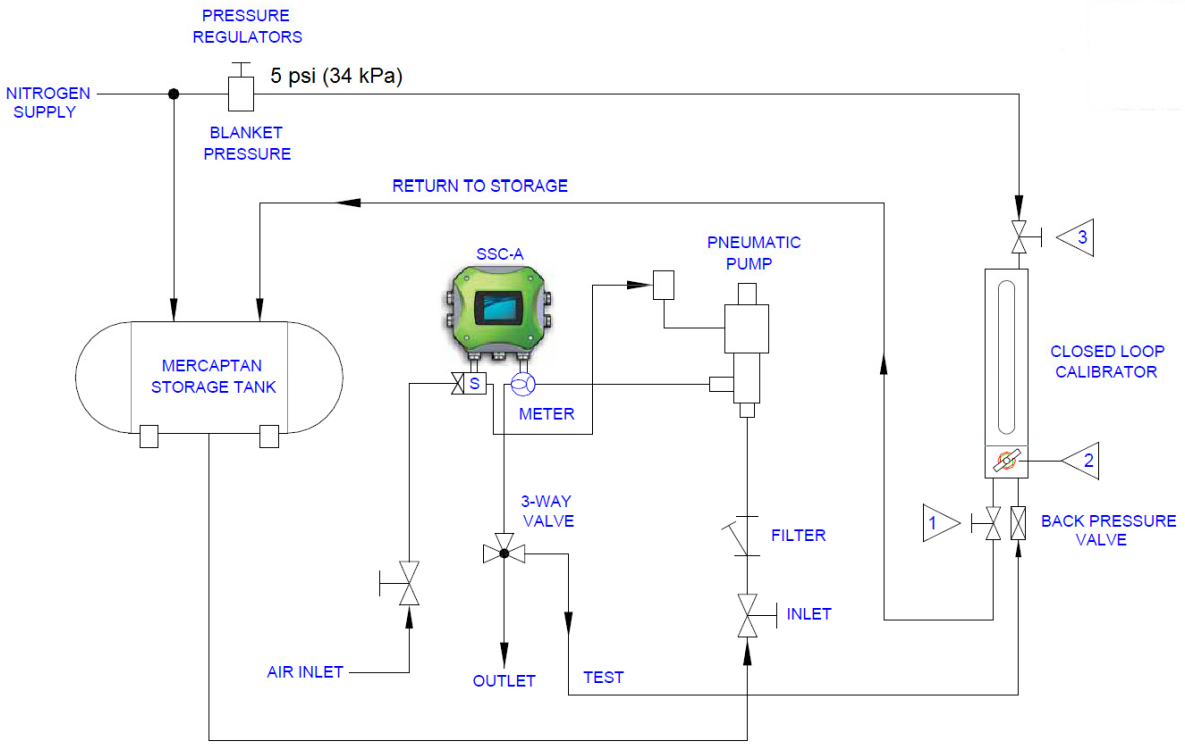
In the above figure, an overview is given of the SSC-A's calibration menu. To alter the meter factor, the SSC-A must be unlocked (refer to the Fusion4 SSC-A Installation & Operation Manual).

The built-in calibration wizard makes it easy to (re-)calibrate the flow meter, by executing the following steps via the SSC-A menu:

- Enter volume to be injected
- Measure actual volume result (by CLC)
- Enter this result
- New meter factor is displayed now.
- Accept new meter factor
- Flow meter is (re-)calibrated

4.1 Calibration procedure with CLC above storage tank

Figure 4-2: Closed Loop Calibrator above Mercaptan storage tank



1. Configure Closed Loop Calibrator for use.
    - Valve #3 open (Nitrogen blanket)
    - Valve #2 closed (Calibrate valve)
    - Valve #1 open (Return)
2. Configure Fusion4 Micro-Dose Mercaptan Injector for calibration
    - Inlet valve open
    - Pump on
    - Outlet valve closed
    - Test valve open

3. Using the Local Access Device (LAD) or Fusion4 IR Controller and observe the SSC-A display to begin test procedure.
    - Enter start volume (for the initial calibration run, completely fill the CLC)
    - Enter start delay (unit: seconds; can be zero or any suitable delay time)
    - Press <OK> (after expiration of the delay time, the injection process starts. A progress bar appears on the screen)
    - When finished, read the actual volume from the CLC and enter this value in the SSC-A. The new meter factor is displayed.
    - Reject new meter factor by selecting <ESC> (as this volume is used to 'zero' the CLC)
    - Select <OK> to exit to the Main Menu
4. Partially open Valve #2. This valve is used to zero the liquid level in the calibration.
    - With the Closed Loop Calibrator above the storage tank, level liquid from the calibrator will gravity back to the storage tank.
    - As liquid is drained from the calibrator, throttle Valve #2 to slow the flow and stop at zero liquid level.
    - With the liquid level at zero, calibration may begin. Select Wizard from the Calibration menu.
    - Enter start volume (inject up to 80cc into the CLC)
    - Enter start delay (unit: seconds; can be zero or any suitable delay time)
    - Press <OK> (after expiration of the delay time, the injection process starts. A progress bar appears on the screen)
    - When finished, read the actual volume from the CLC and enter this value in the SSC-A. The new meter factor is displayed
    - Accept new meter factor by selecting <OK>
      or
    - Reject new meter factor by selecting <ESC>

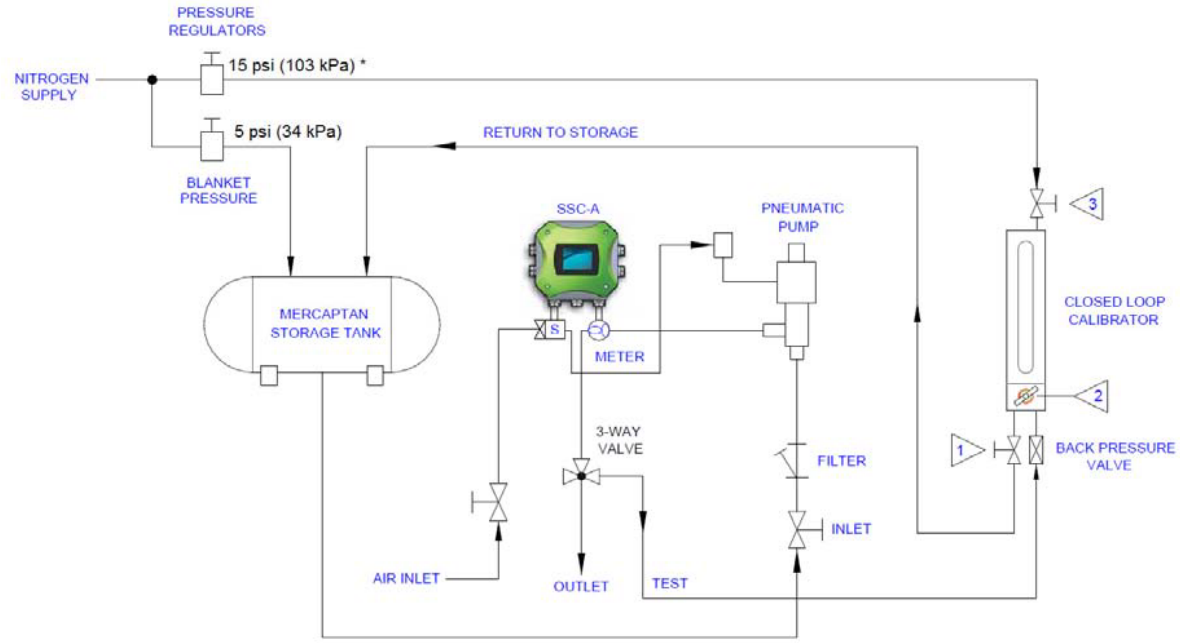
> NOTE: In case <ESC> is selected, the old meter factor is restored.

- Calibration process overview is displayed and a new calibration record is created and stored into the system.
- Select <OK> to exit to the Main Menu.
- Repeat this step until satisfactory calibration is achieved.

5. When calibration is complete, configure the SSC-A for normal injection operation and secure the Closed Loop Calibrator.
   - Fusion4 Micro-Dose Mercaptan
     - Close Test Valve
     - Open Outlet Valve
   - Closed Loop Calibrator
     - Open Valve #3 (Nitrogen blanket)
     - Close Valve #2 (Calibrate valve)
     - Open Valve #1 (Return). This will allow thermal build-up to relieve to storage tank.

4.2 Calibration procedure with CLC below storage tank

Figure 4-3: Closed Loop Calibrator below Mercaptan storage tank



1. Configure Closed Loop Calibrator for use
    - Valve #3 closed (Nitrogen purge)
    - Valve #2 closed (Calibrate valve)
    - Valve #1 open (Return)
2. Configure Fusion4 Micro-Dose Mercaptan Injector for calibration
    - Inlet valve open
    - Pump on
    - Outlet valve closed
    - Test valve open

3. Using the Local Access Device (LAD) or Fusion4 IR Controller and observe the SSC-A display to begin test procedure.
    - Enter start volume (for the initial calibration run, completely fill the CLC)
    - Enter start delay (unit: seconds; can be zero or any suitable delay time)
    - Press <OK> (after expiration of the delay time, the injection process starts. A progress bar appears on the screen)
    - When finished, read the actual volume from the CLC and enter this value in the SSC-A. The new meter factor is displayed.
    - Reject new meter factor by selecting <ESC> (as this volume is used to 'zero' the CLC)
    - Select <OK> to exit to the Main Menu
4. Partially open Valve #2. This valve is used to zero the liquid level in the calibration.
    - Slowly open Valve #3 to purge the calibrator
    - As liquid is purged from the calibrator, throttle Valve #2 to slow the flow and stop at zero liquid level
    - With the liquid level at zero, calibration may begin. Select Wizard from the Calibration menu.
    - Enter start volume (inject up to 80cc into the CLC)
    - Enter start delay (unit: seconds; can be zero or any suitable delay time)
    - Press <OK> (after expiration of the delay time, the injection process starts. A progress bar appears on the screen)
    - When finished, read the actual volume from the CLC and enter this value in the SSC-A. The new meter factor is displayed
    - Accept new meter factor by selecting <OK> or
    - Reject new meter factor by selecting <ESC>

    > NOTE: In case <ESC> is selected, the old meter factor is restored.

- Calibration process overview is displayed and a new calibration record is created and stored into the system.
- Select <OK> to exit to the Main Menu.
- Repeat this step until satisfactory calibration is achieved.

5. When calibration is complete configure the Blend-Pak for normal injection operation and secure the Closed Loop Calibrator.
   - Fusion4 Micro-Dose Mercaptan
     - Close Test Valve
     - Open Outlet Valve
   - Closed Loop Calibrator
     - Close Valve #3 (Nitrogen purge)
     - Close Valve #2 (Calibrate valve)
     - Open Valve #1 (Return). This will allow thermal build-up to relieve to storage tank.

> NOTE: *Adjust Nitrogen pressure as needed to purge the Closed Loop Calibrator. A slow purge from the Calibrator is recommended.

Notice

All procedures, data, information, drawings, specifications or other material, whether accompanying this document or separately supplied in furtherance of this document, contain confidential and proprietary information which (i) is the property of Guidant Measurement (Guidant) and its subsidiaries, (ii) is disclosed by Guidant only in confidence, and (iii) except as Guidant may otherwise permit in writing, is to be used, disclosed or copied only to the extent necessary for the evaluation and use thereof by the recipient.

The foregoing shall not apply to any such material to the extent that the contents (i) are now or subsequently become available to the public without payment, (ii) were previously known to the recipient, or (iii) subsequently become otherwise known to the recipient without restriction.

This document is based on information available at the time of its publication. While efforts have been made to be accurate, the information contained herein does not purport to cover all details or variations in hardware and software, nor to provide for every possible contingency in connection with installation, operation and maintenance.

Guidant makes no representation or warranty, either expressed or implied, with respect to, and assumes no responsibility for, the accuracy, completeness, or sufficiency of the information contained herein. No warranties of merchantability or fitness for a particular purpose shall apply.

The Guidant logo is a trademark.

This document takes precedence over and supercedes in their entirety all previous versions or revisions.

MN06320 Issue/Rev. 0.0

GuidantMeasurement.com

Corporate Headquarters
5825 North Sam Parkway West
Suite 120
Houston, TX 77086 USA

USA
1602 Wagner Avenue
Erie, PA 16510 USA
+1 814.898.5000

Germany
Regentstrasse 1
25474 Ellerbek, Germany
+49 4101 304.0