



FoamDDI™

Foam Digital Detection Imaging





User Manual

June, 2024

Software Version 1.14 – Document Version 1.8

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VISAYA





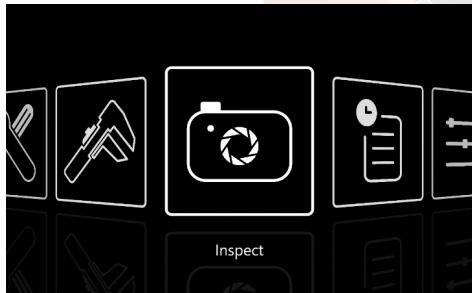
About Your FoamDDI

The Foam Digital Detection Imaging (FoamDDI) is the fourth addition to the high-tech optical device under Ayalytical's suite of visual testing instruments powered by VISAYA sophisticated optics. FoamDDI is designed to determine the height of foam and its stability with greater degree of accuracy to improve on the classical empirical visual rating of ASTM D892 Standard Test Method.

Foam testing is a critical indicator of rating the lubricating oils quality by determining the foaming tendency and the stability of the foaming characteristics. FoamDDI is a new standard of analysis for the petroleum industry using a high-resolution camera with optical intelligence. FoamDDI identifies foaming characteristics of lubricating oils in a 3-Step method. Results are then digitally recorded, displayed in a variety of formats and seamlessly integrate with LIMS software.

FoamDDI's higher precision, patent pending design eliminates guesswork and operator bias from oil foaming detection. The digital detection imaging is achieved through a unique vision algorithm and optics that records, calculates and displays accurate foaming tendencies and stability over standardized testing times. This standardized measurement of oil quality improves on current rating, method and sample handling procedures performed in current lab tests.

FoamDDI's improvements over current test rating output and analysis include:



- Easy-to-use touchscreen driven software.
- 1-2-3 Wizard operation.
- Innovative Stopper for Leak Free Operation.
- High precision and accuracy.
- USB, HDMI, Ethernet for enhanced connectivity.
- Digital image logging complete with operator notes and calculated results for easy sharing of findings.
- Integrated industrial computer for easy interface with network.



EC Declaration of Conformity



Ayalytical Instruments, Inc.
2787 W Fulton St.
Chicago, Illinois 60612
United States

The **VISAYA FoamDDI** is conformal to the following directives and standards:

Directives:

- 2001/95/EC (General Product Safety Directive) Self-declared
- 2004/108/EC (EMC Directive)

Standards to which conformity is declared:

- EN55024: 1998 + Amendment A1: 2001 + Amendment A2: 2003
- EN55022: 1998 + Amendment A1: 2000 + Amendment A2: 2003 (ClassB)
- EN61000-3-2: 2001
- EN61000-3-3: 1995 + Amendment A1: 2001

EN 61326-1: 2021 Electrical equipment for measurement, control and laboratory use. EMC requirements is classified in these ICS categories:

- 17.220.20 Measurement of electrical and magnetic quantities
- 33.100.20 Immunity
- 25.040.40 Industrial process measurement and control
- 33.100.01 Electromagnetic compatibility in general

FCC CFR 47: Part 15: B: 2015 Equipment authorization of unintentional radiators.

Important information:

VISAYA, Inc. bases its knowledge and belief of FCC and CE compliance on information provided by third parties, and makes no representation or warranty as to the accuracy of such information beyond that implied or expressed in (1) various legal and technical opinions on the likely interpretation of EU legislation, and (2) supplier material declarations.

VISAYA INC

AYALYTICAL
Instruments Inc.

JUAN J AYALA
MANAGING DIRECTOR



Safety

Read this section carefully before installing and operating the instrument.

For safe and correct use of the instrument, it is essential that both operating, and service personnel follow generally accepted safety procedures as well as the safety instructions given in this document, the FoamDDI Handlers User's Guide.

The instruments described in this document are for testing fluids and should be used for automatic Lubricating Oil Foaming operations only. They should only be used in the laboratory or similar indoor environments for analytical purposes by qualified personnel. If an instrument is used in a manner not specified by VISAYA, the protection provided by the instrument may be impaired.

When the FoamDDI is functioning, it is necessary to check that nothing hinders the instrument parts in any way. Nothing should be placed in or around the IPC Logic Box Controller and the Testing Modules.

Voltages present inside the instrument are potentially dangerous. If there is a problem with the instrument, the power cable should be removed until qualified service personnel have repaired it. This is to prevent anyone from inadvertently using the instrument, thus causing possible harm to themselves, or damage to the instrument itself.

The leakage current of this instrument is within the limits allowed by international safety standards for laboratory equipment. An efficient ground connection is imperative for the physical protection of the user.

Power supply cord reference 7080316106 is for use in France and Germany. Power supply cord reference 7080316105 is for use in USA and Canada. For other countries, contact your local VISAYA distributor. You must only use the type of fuse described in this document: 4.0 Amp type "T" slow blow.

Adequate protection including clothing and ventilation must be provided if dangerous liquids are used in the analytical work. In case of incidental spillage, carefully wipe with a dry cloth, considering the nature of the spilled liquid and the necessary safety precautions.

Cleaning, dismantling, maintenance, adjustment and repair should only be performed by personnel trained in such work, and who are aware of the possible dangers involved. These instruments must not be sterilized, using an autoclave, or any other mechanical device. When you need to clean an instrument, use one of the three following methods:

1. a clean dry cloth,
2. a cloth dampened with water, or
3. a cloth dampened with soapy water.

If a cloth dampened with soapy water is used to clean the instrument, only domestic soap may be used. No other form of detergent or chemical may be used.



USB Cable

The FoamDDI is supplied with a USB cable, which is specific to FoamDDI. The length is specific at 3', and this cable does not have a +5v line. This cable should be used for proper operation and to conform to EMC and FCC directives and standards.

Red Light/ Infrared Safety

The FoamDDI utilizes an IR Lamp to heat and maintain sample temperature. This IR source is located inside the base of the instrument, and shielded from direct line of sight - but some of this light is still visible while the instrument is actively heating. Exposure to this light is perfectly safe, even during long durations, while the instrument is assembled and operated correctly.

WARNING: Running the instrument without the IR Lamp Shield in place could allow the IR Lamp to become visible at some angles, in which direct eye contact could be harmful. Be sure to only run the instrument with the IR Lamp Shield in place.

In addition to the IR Lamp, there are RED colored LEDs located at the base and the top of the instrument. This light source is completely safe, even for long durations, and even during direct eye contact.

Lighting Info:

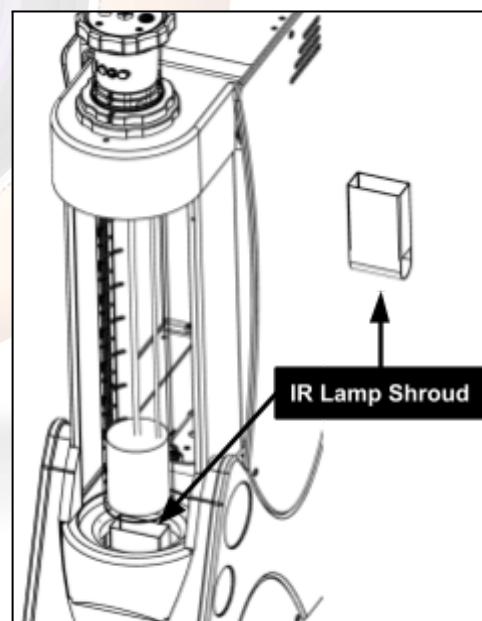
IR Lamp (Heat Source)

110VAC Wavelength 620nm to 3800nm (1120nm peak)

220VAC Wavelength 620nm to 3800nm (1160nm peak)

RED LED (Foam Visibility)

Wavelength 630nm





Warranty

Warranties: VISAYA, Inc. expressly warrants the products manufactured by it (i) to be free from defects in material and workmanship, (ii) to be of good title, (iii) not to infringe any patent in effect in the country of its manufacture, (iv) to meet the applicable VISAYA specifications for that product.

VISAYA makes no other warranties either expressed or implied (including without limitation warranties as to fitness for a particular purpose). Purchaser retains responsibility for the application of VISAYA's products to its particular function. In addition, the following should constitute the exclusive remedies for any breach by VISAYA of its warranties. VISAYA, Inc. shall either replace or repair (at its discretion) free of charge: (i) any VISAYA manufactured product (or component or part thereof) which shall be returned to VISAYA within (1) one year from date of delivery, (ii) any VISAYA manufactured product (or component or part thereof) previously repaired or replaced under VISAYA warranty, which shall be returned to VISAYA prior to the later of the balance of the original one year warranty period or (3) three months after the date of repair or replacement, and (iii) any part (sold as such) manufactured by VISAYA which shall be returned to VISAYA within (3) three months from date of delivery, but only if such product, component or part does not comply with one of the expressed warranties stated above. All shipping or transportation charges to the factory shall be paid for by the Purchaser; return shipping will be paid for by VISAYA. Any and all such replacements or repairs necessitated by: (i) inadequate preventative maintenance, (ii) the fault of the Purchaser due to abnormal use or abuse, (iii) attack and deterioration under unsuitable environmental conditions, shall be paid for by the Purchaser. Resale Products: Shall carry the warranty offered by VISAYA to the original purchaser, unless specified otherwise in the offering or separately and specifically agreed upon in writing by VISAYA.

**To obtain warranty service, please contact VISAYA at
service@visayainc.com**

Return the instrument in its original packaging, enclosed in a new box.



Package Contents

If any of these items are missing or damaged, please contact your distributor or VISAYA Inc. right away.

Please save shipping boxes and custom foam inserts as they may serve for future transportation and securing of contents!!!

1. Place the box facing up
2. Open the box and remove top protective layer as shown in **FIGURE 1**
3. Remove second protective layer and take out the lightest side (accessories) of the package as shown in **FIGURE 2**
4. Remove middle layer of foam exposing main unit and IPC Logic Box (if purchased) as shown in **FIGURE 3**
5. Take out main unit from the foam inserts (2 people required) and place it standing up as shown in **FIGURE 4**
6. Lay out all units and accessories as shown in **FIGURE 5**



FIGURE 1



FIGURE 2



FIGURE 3



FIGURE 4



FIGURE 5



IPC Logic Box

If you also purchased an IPC Logic Box with your FoamDDI you will find it boxed with your unit **FIGURE 6**. Remove it as you did the FoamDDI in the previous steps **FIGURE 7**.



FIGURE 6



FIGURE 7



Identify Accessories

Double check all accessories are given as requested by the following list:

Item	Part Number
Graduated Sample Cylinder 1000mL	AYA-13-88696
Stopper & Temperature Sensor Assembly	AYA-13-88942
Outer Glass V2	AYA-13-88745
Adjustable Sample Tube Ring Part A	AYA-13-88647
Adjustable Sample Tube Ring Part B	AYA-13-88844
USB Cable	AYA-13-88650
Power Chord	N/A
Allen Wrench for FoamDDI - 3x25x127mm	AYA-13-89200
USB Drive with FoamDDI Manual	AYA-13-88764
IPC Logic Box	AYA-10-88605
IPC Logic Box Power Supply	AYA-13-89027
Power Chord	N/A

If any of these items are missing or damaged, please contact your distributor or VISAYA Inc. right away. See next page for a full size picture of all parts included in this list.



Once all items are unpacked and ready to set up, proceed to the next steps. (Note: Wrench in picture not included).



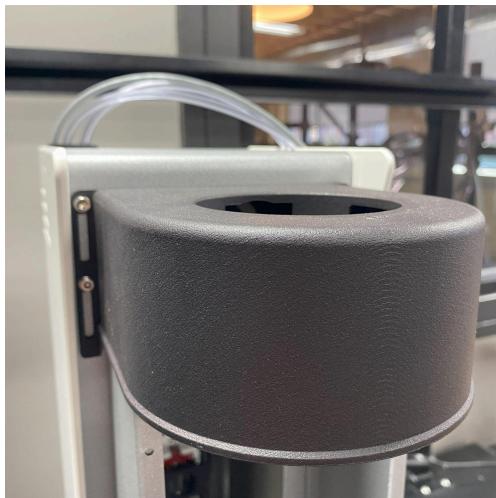
Install Outer Vacuum Cylinder

- 1) Unwrap Outer Cylinder and stand upright (Note: We ship this part with a protective film over the polarizing film. Remove this prior to installation)





- 2) Locate Top Housing (Figure 1) and Wrench included in FoamDDI Box (Figure 2)
- 3) Loosen bolts half way until top housing can move up and down (Figure 3). (Note: DO NOT remove fully)
- 4) Place Vacuum Cylinder with rubber nipple up and facing inward (Figure 4) (Note: Installing cylinder upside down will cause an obstruction of the camera and thus bad or no results)



(Figure 1)



(Figure 2)



(Figure 3)



(Figure 4)



Foam Tube Alignment

1. Locate the Foam Tube Alignment parts A and B as FIGURE 8.1
2. Insert and align Part A into Part B (Large or Small depending on Grad Sample Cylinder size) as FIGURE 8.2
3. Place the Foam Tube Alignment with the longer side facing down on top of the Cap aligned with the white mark as FIGURE 8.3



FIGURE 8.1 (Part A & B)



FIGURE 8.2



FIGURE 8.3



Identifying Parts and Controls

FoamDDI consists of two main components, an IPC Logic Box Controller and FoamDDI modules. Each IPC box can control up to 4 FoamDDI modules and an additional optional calibration module.

The IPC Logic Box Controller features an embedded grade computer with easy-to-use software. Interface to the software is achieved using an industrial grade large 10.5 LCD display with integrated touch controller. The computer, which runs an embedded version of Windows 10 Professional, allows for easy integration to network and modern LIMS systems. On the front view of the FoamDDI's IPC LogicBox is an auxiliary a USB port. The USB port can be used to download data, software updates or external peripheral devices. This port is USB 2.0 compatible only.

Each FoamDDI module is a self-contained single position testing apparatus for Foam Testing. Each module is capable of heating and cooling within the same module. Internally there is automated temperature control, air flow control and sequencing as per ASTM D892.





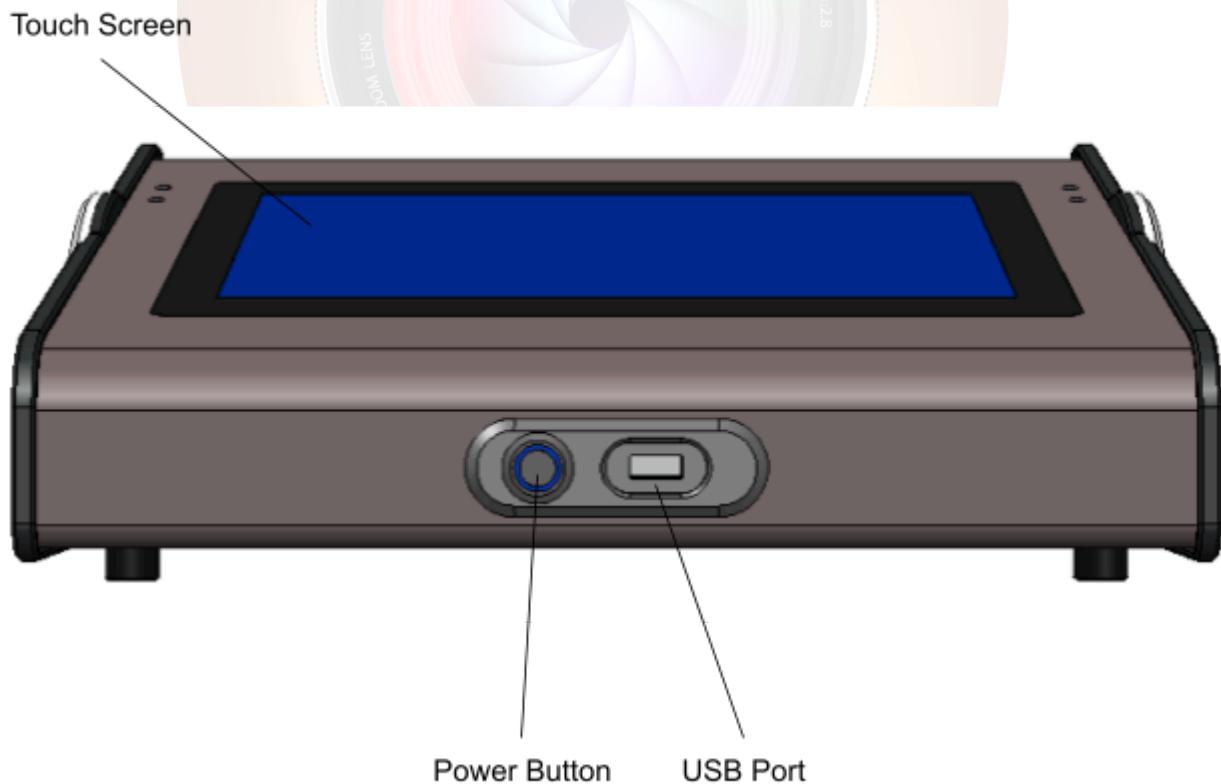
PLC LogicBox

IPC LogicBox features two Ethernet (RJ-45) ports, HDMI display ports, On/Off Button, Front USB Port, and four Rear USB 3.0 ports. Dual Ethernet ports allow simultaneous dedicated LIMS network connectivity, while allowing the second port to be used for traditional network or internet access. Display ports can be used to output displays for external presentations, or for dual monitor support. A FrontUSB Port can be used to connect external keyboards, printers, Wi-Fi adapter, memory sticks and other USB devices supported by Windows 10 Pro. The Rear USB 3.0 ports are reserved for connecting Visaya Modules (e.g. FoamDD).

Power supply to your IPC Box is achieved using an external voltage converter. This converter features universal switching power supply, which can accept power from 90 - 264 VAC and frequencies ranging from 47 - 63 Hertz.

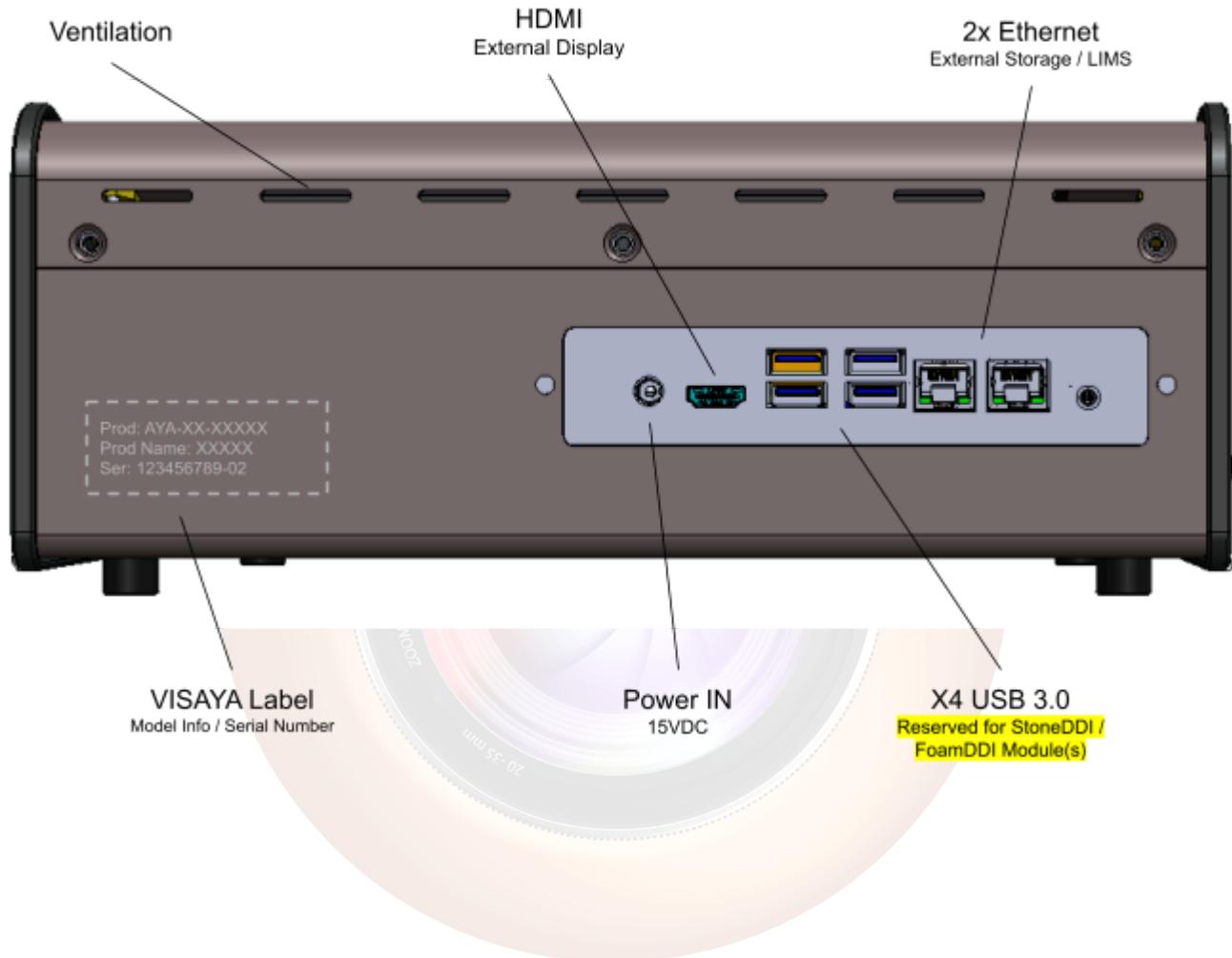
Ventilation for the IPC Box is achieved using multiple vents placed on the top rear panel as pictured below, and on the bottom (not shown). Please allow a minimum clearance of 6" (15cm) for proper ventilation. The IPC Box uses this passive cooling system to maintain 24/7 operation.

Front View





Rear View

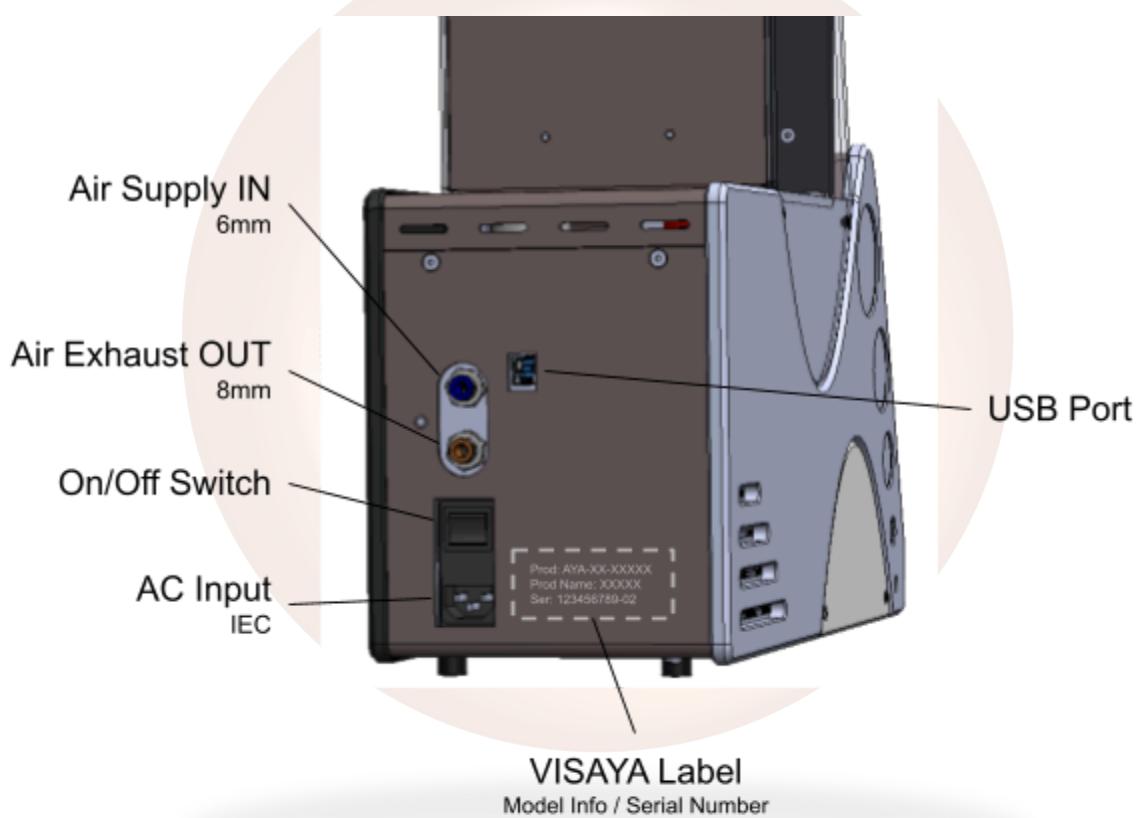




FoamDDI Module

FoamDDI Modules are powered using 110/120VAC, or 220/230VAC (50/60 Hz) main power supply. Proper fusing must be selected depending on voltage, please consult image below for fuse selection based on voltage input. Air supply must be connected to the rear of the FoamDDI. Clean, dry instrument grade air in the range of 20-25 PSI must be connected to the rear using 6mm OD Tubing. Optionally exhaust can be connected to the rear using 8mm tubing. Communications with IPC Logic Box is achieved using the supplied USB cable.

Rear View



Note: Changing voltage must be done by a trained VISAYA personnel. Damage may be caused by connecting the wrong voltage.



FoamDDI Connections

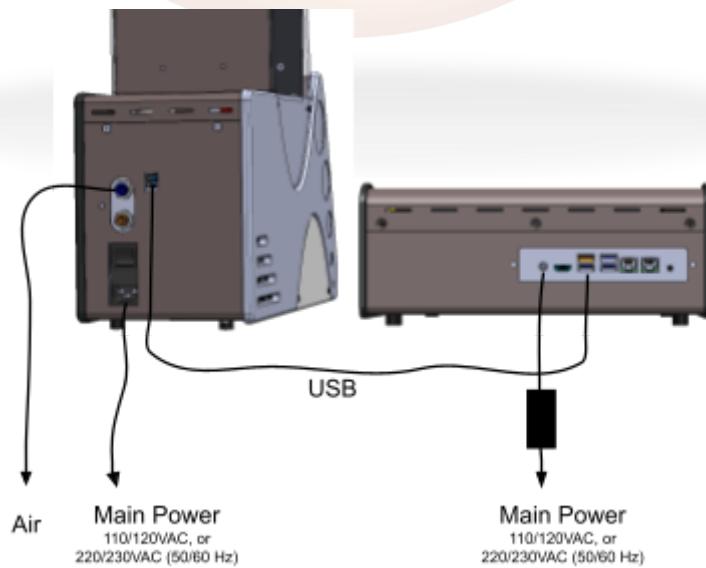
When setting up your new FoamDDI, select a location away from heat, smoke, electrical interference and avoid any electrostatic discharges (ESD) to the analyzer unit. The bench top should be a level surface and free of vibration.

Ensure that the vent holes of the analyzer are not obstructed. The analyzer requires an environment with ambient room temperature in the range of 15°C to 25°C with 30-80% RH non-condensing.

CAUTION! Before making any connections, make sure that the power cable at the back of the analyzer is not plugged into an electrical outlet. Only one set-up utility is required: an A.C. electrical outlet. It is recommended that the analyzer is plugged into its own circuit to avoid power line interference and voltage surges or drops, which may occur if the circuit is shared with devices with high electrical draw.

1. Connect the FoamDDI to AC Power using the IEC Cordset provided.
2. Connect the IPC LogicBox to AC Power using the IEC/DC Power Supply provided.
3. Connect the FoamDDI to the IPC LogicBox using the provided USB Cable.
4. Connect 25-30 PSI of dry, clean, instrument grade air to the rear of the FoamDDI module using 6mm OD rigid tubing. Optionally, exit air can be routed to fume hood or extraction using 8mm OD connection.
5. On Rear of FoamDDI, move ON/OFF toggle switch to the ON Position. Power to the IPC LogicBox can be confirmed via the front Blue Pushbutton.

Additional connections such as Ethernet or printers can be done at this point. NOTE: certain printers may require drivers, which can be loaded by an administrator. Please contact your distributor or VISAYA for more instructions.





Caring For Your FoamDDI

Your FoamDDI is designed to operate worry-free for years. In the event your FoamDDI needs to be replaced, a replacement can be done quickly in the field with a software-driven calibration procedure:

- Ensure proper handling, and refrain from dropping FoamDDI on the laboratory floor. In the event the machine is dropped, ensure there are no cracks, or breaks, and that machine is fully operational. One can also check operation in Diagnostic menu of software to ensure mechanicals and electronics are responding correctly.
- Thorough cleansing of the test cylinder and gas diffuser and air-inlet tube are essential after each use to remove any additive remaining from previous tests which can seriously interfere with results of subsequent tests.
- Interior walls of the cylinder should drain water cleanly, without drops forming.
- Gas diffuser and air-inlet tube should have no visual evidence of residual material remains from a prior analysis prior to conducting a subsequent analysis.
- One suitable technique for cleaning the cylinder is to rinse the cylinder with heptane. Wash the cylinder with a suitable detergent. Rinse the cylinder, in turn, with distilled water, then acetone and dry in a current of the compressed air or in a drying oven
- One suitable technique for cleaning the gas diffuser and air tube is to first clean the inside of the air tube (disassembled for the gas diffuser) with toluene and heptane. Next, connect the air tube and gas diffuser and immerse the gas diffuser in about 300 mL of toluene. Flush a portion of the toluene back and forth through the gas diffuser at least fix time with vacuum and air pressure. Repeat the process with heptane. After the final washing, dry both the air tube and the gas diffuser thoroughly by forcing clean air through them. Wipe the outside of the air inlet tube, first with a cloth moistened with heptane, then a dry cloth. **DO NOT WIPE THE GAS DIFFUSER.**



Running a Test

This section will guide you on how to correctly run a test on your FoamDDI

Loading The Sample

1. Add your liquid sample to the 1000ml Sample Cylinder and fill it as the test method sequence you are trying to run.

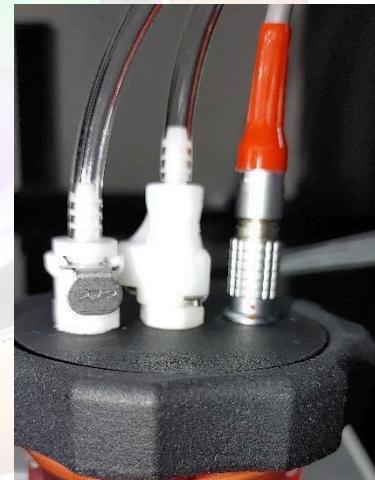
Seq I	Seq II	Seq III	Seq IV
190mL (+/- 5mL)		180mL (+/- 5mL)	200mL (+/- 5mL)



2. Screw the Diffuser to the end of the Stopper and insert stopper to the Sample Cylinder. Ensure Stopper is well pressed (airtight) to the Sample Cylinder.

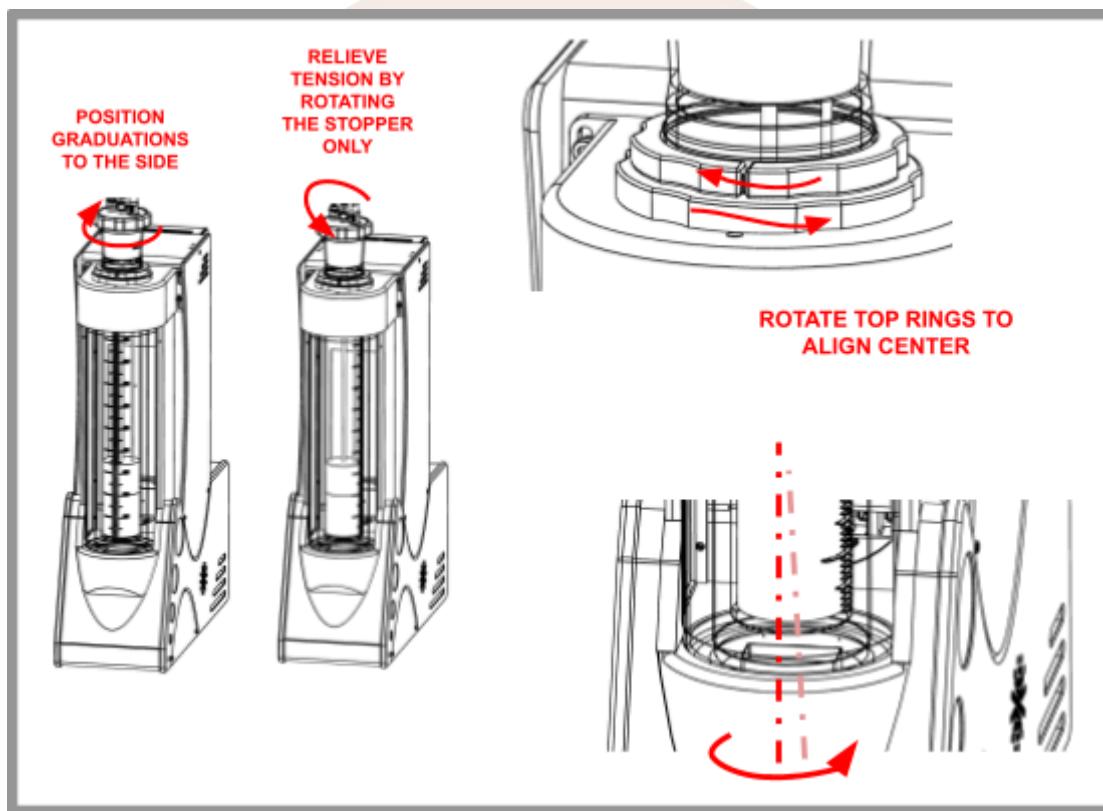


3. Insert the Sample Cylinder into the unit with white markings aligned. Make sure to connect the Probe and Air Tubes.





4. Adjust the cylinder such that the graduations are to the side. This is critical for the automatic foam analysis (vision system) to work properly. While doing so, you may have issues with the weight of the air and electrical - as they will tend to drop down and maybe rotate the cylinder back. To work around this - correct the glass rotation first, then rotate only the stopper until the weight of the connection is no longer working against you. Review the bottom of the cylinder inside the FoamDDI. The cylinder should be as close to center as possible, and you can use the two stopper rings to correct it.



Once the sample is ready, proceed to section Software Navigation – Inspect Screen – Running an Analysis (Page 27)



Software Navigation

Your new FoamDDI was designed with an internal high-end industrial PC, which allows for the latest advancements in graphical user interfaces. Using a P-Cap screen, interfacing with the software and data entry is easily achieved. The intuitive software typically only requires a few minutes of training for routine operation. Using a unique Wizard-driven sample set-up, FoamDDI guides you through many of the routine tasks for rating foaming tendencies. Please consult the following sections for a detailed explanation of all elements of the software.

Main Screen

After proper installation of your FoamDDI, software will automatically boot onto the main screen. The software is divided into six main sections, with each section represented by an icon. Each icon visually describes the sub-menu, which is labeled accordingly below. Navigating within these icons is done by a simple swipe left to right against the icons. One can also use the drag and drop function of an external mouse if preferred. To enter one of these sub-menus, simply use a single touch or single click. To return to the main menu, use the arrow placed conveniently at the top right portion of the screen.

Main screen navigation is briefly described below and described in detail in subsequent sections:

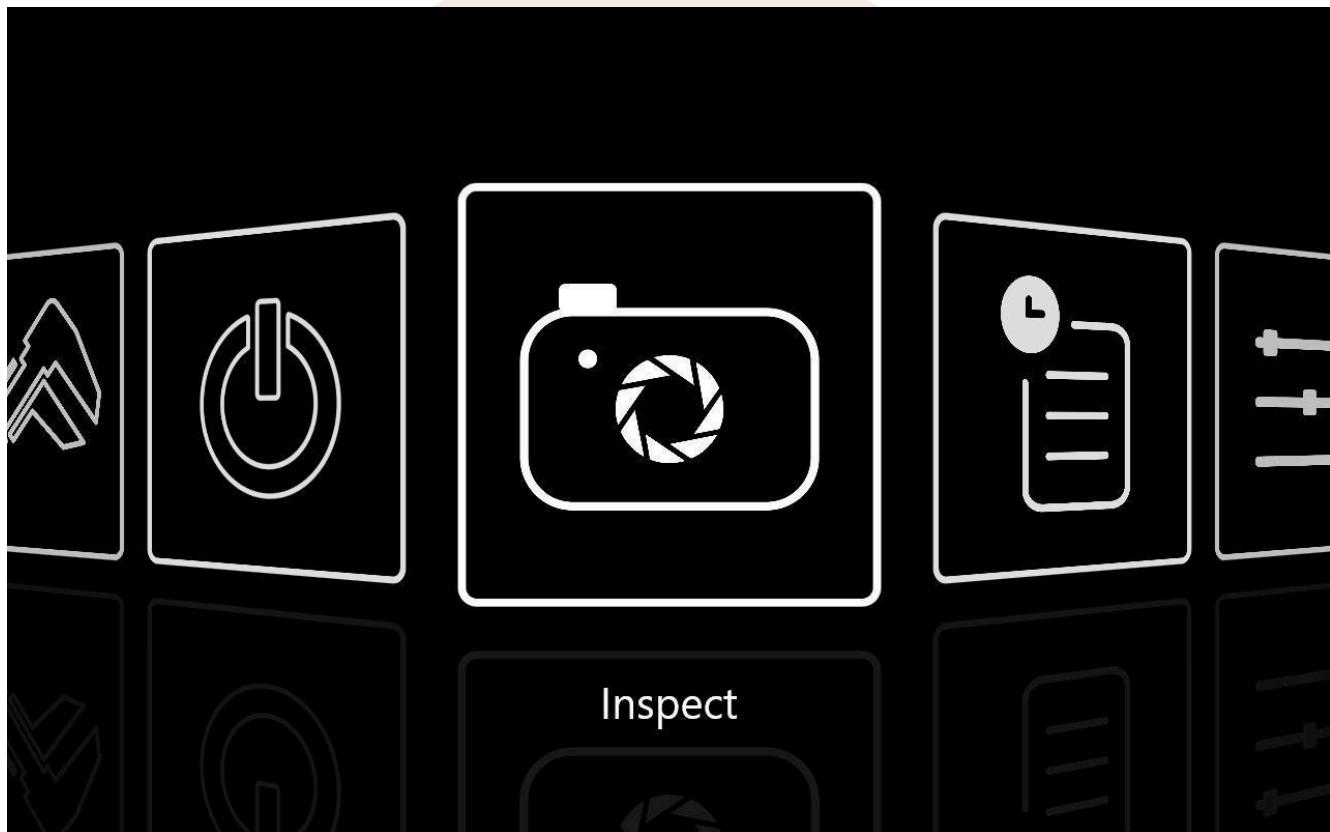


- **Inspect:** Screen to begin inspection and rating of lubricant oil sample.
- **History:** Archive and database of previous results
- **Settings:** General settings such as date, time, language, LIMS, network, printing, etc.
- **Diagnostic:** Screen to check mechanical, electrical and I/O of FoamDDI
- **Calibration:** Menu to recalibrate the Flow Control, Temperature and Camera of the FoamDDI
- **Power:** Allows you to shut off or restart FoamDDI's IPC Logic Box



Inspect Screen

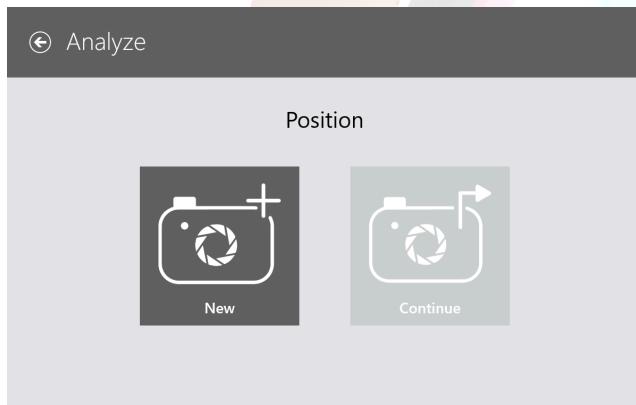
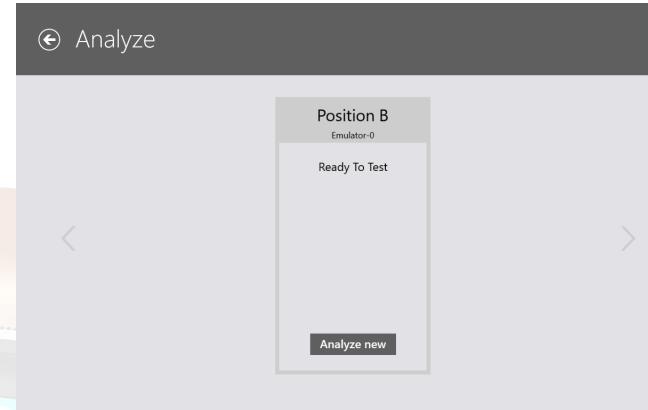
The inspect screen is where an operator would perform the automated inspection of an oil sample. To start an inspection, simply tap on the Inspect icon from the main menu. There will be two options for an operator to choose new or continue, depending on whether the operator would like to start a new test or continue an old one. If clicking new, create a name for sample then click continue. The operator will then have the option to choose their test method and sequence they would like to perform.





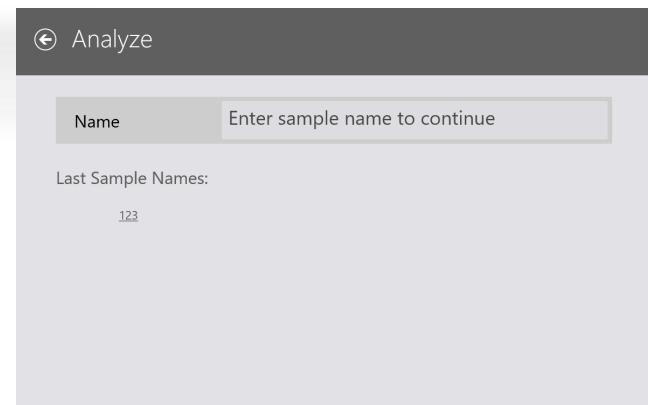
Running an Analysis

Running an inspection is achieved using a simple Wizard-driven menu. Upon entering the Inspect menu, the user is presented with a box showing the connected FaomDDI unit, when starting a New sample, you will be asked to enter a sample name. Alternatively, the user can click or tap in the sample name section to display an onscreen keyboard for entry of a new sample ID. The keyboard allows the entry of up to 255 characters and accepts standard ASCII characters. Changes and deletion of text can also be made using the keyboard.



The **Continue** option allows you to append to an existing sample ID: if one has started within the past 3 hours.

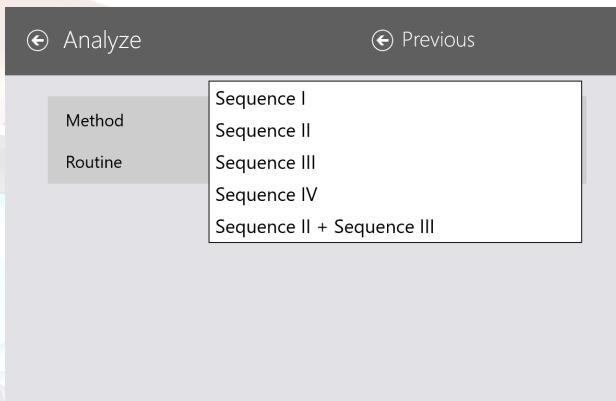
After successful entry of a valid sample ID, the Next button will become activated. Confirmation of the sample ID is confirmed using the Next button located at the top-right hand corner.





After pressing the Next button, the operator is presented with options to enter a Test Method and Routine.

Methods and Routines are fixed and selected using a dropdown box.



Select the type of sequence you want to run from the ASTM D892 test Method options

Type of Sequence	Test Duration	Description
Sequence I	40 minutes	Room temperature test
Sequence II	30 minutes	Hot temperature test
Sequence III	60 minutes	Room temperature test
Sequence II + Sequence III	90 minutes	Room and hot temperature test
Sequence IV	90 minutes at 10 min heating	Highest temperature maintained for specific intervals (5 sec, 15 sec, 1 min, 5 min, 10 min).



Operator names are fixed and selected using a dropdown box. To add new operator names, please consult the Settings section of this manual.

The next option presented is the optional Description or comments of a sample inspection. This field is used to enter other information such as notes, batch ID, etc. To enter a description/comments, simply tap or click on the white entry box to display an onscreen keyboard.

Once complete, press the Next button to proceed with your inspection.

After completing all the necessary sample identifiers (sample ID, operator name, test method and optional description), the automated visual analysis is started and you are returned to the Module Select screen. A 2nd test can be executed on another module (if one is present).



Once the Test starts to run, the Testing Screen will appear. The underlying line, shown below, will change throughout time, depending on what the unit is performing as follows:

- Venting - Venting the inlet tube for 5 minutes while heating/cooling
- Heating or Cooling - Waiting until the target temperature is reached. May take between 20 - 30 minutes
- Flow - Air is released to the diffuser / sample at a controlled rate.
- Measuring Foam Stability - Vision is monitoring foam until volume is either zero or a total of 10 minutes elapsed
- Finalizing - Disabling modules temperature control, and preparing test results (storing data)





Viewing Results

After successful completion of an inspection, FoamDDI will display the following data:

- Images of foam level
- Sequence I, II, and III Data
- Foam Tendency/Stability, mL for each sequence
- Foam collapse speed for Sequence II, and III
- Target temperature for Sequences
- Graph view of Sequences
- Still images of Foam Tendency and Foam Stability
- Totalizer Flow
- Errors

>Analyze Results



Seq	Date	Serial#	Target	Foam Tendency/ Stability, mL	Foam Collapse, s	Totalizer
I	4/11/2024, 2:59 PM	230710699-02	50 °C 100 ml/m	235.0 (O) / 0.0	92.7	Pass
II	4/11/2024, 2:31 PM	230710699-02	50 °C 300 ml/m	59.0 / 0.0	37.2	Pass
III	4/11/2024, 2:59 PM	230710699-02	50 °C 500 ml/m	214.5 / 0.0	92.7	Pass
IV						

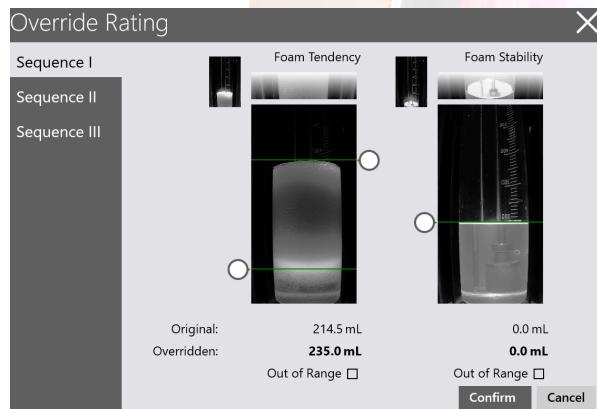
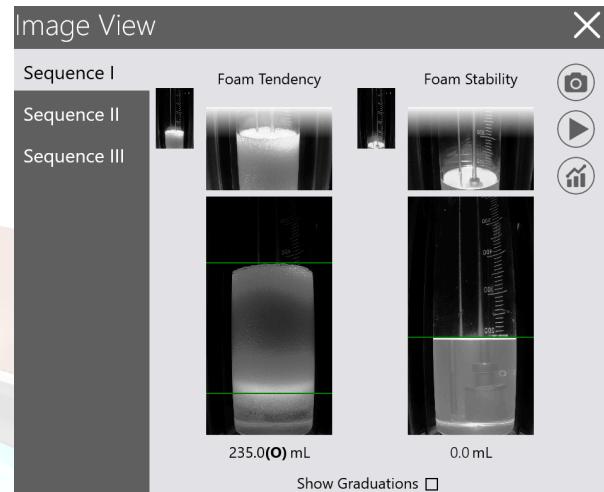
Override rating ...

Name	FinalLeft 4 2
Method	Amine Method PS
Operator	Operator

 Print
 Export
 Delete
 Done

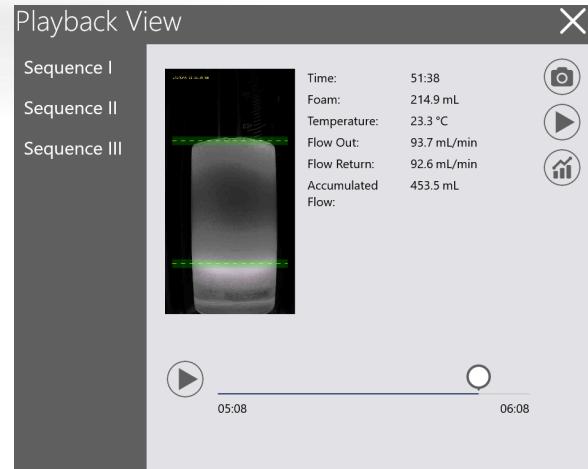


For each Sequence Foam Tendency and Foam Stability, a user can tap on an image to show an image within a pop-out window. This view will also display a red line to indicate the foam's height for the given sequence. This still image allows the operator to get a clear view of the Foam's Tendency and Foam's Stability for the given sequence.



FoamDDI uses a sophisticated algorithm for determining the Foam Tendency and Foam Stability. In the rare occasion that the user does not agree with the rating, the user is able to click on the “Override rating...” button to bring up the still images of the Foam Tendency and Foam Stability, which can be used to manually select the Foam Tendency and Foam Stability. FoamDDI will then store this data together with the original automated rating.

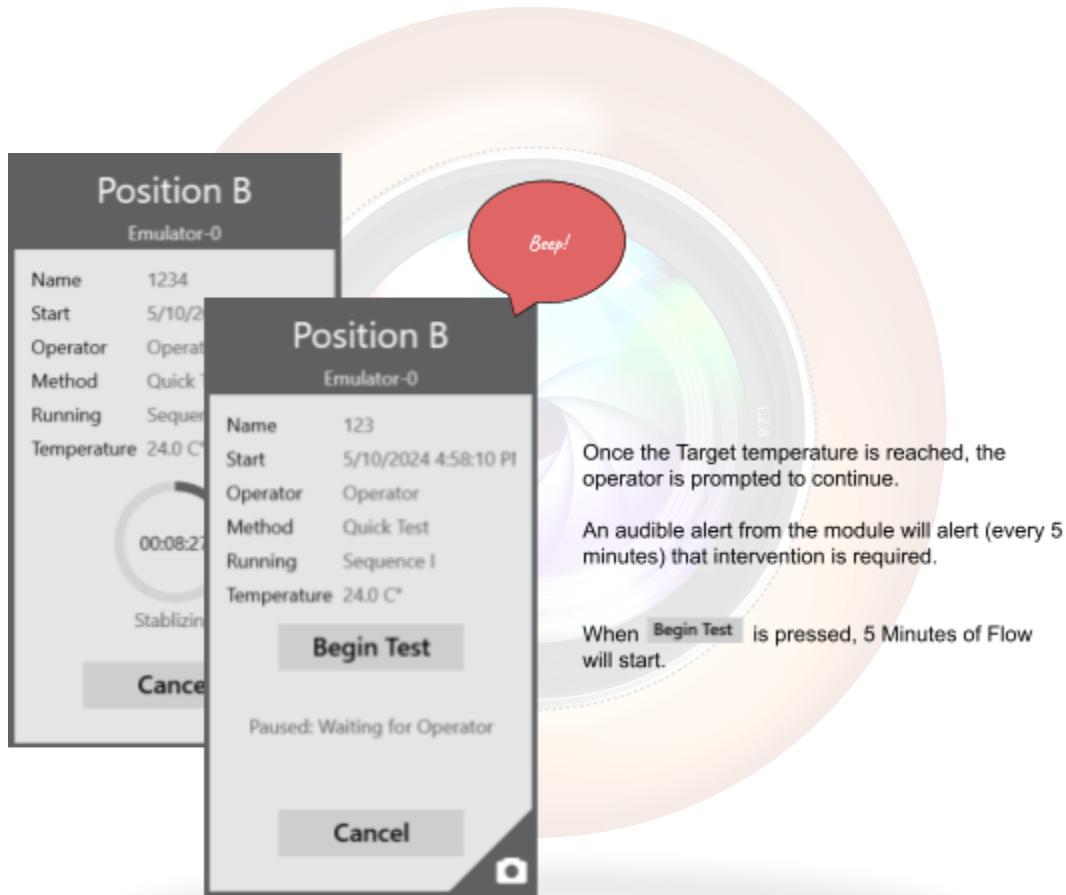
FoamDDI also gives the operator the ability to use Playback View. Playback view plays the recording from the installed camera allowing the operator to replay the sequence over again. The Playback View features gives the operator the ability to see at what exact time and at what exact temperature foaming occurs.





Optional: Wait for Operator

When enabled, an operator is prompted to initiate (or continue) the test before the 5 Minutes of Flow begins. The FoamDDI will automatically prepare the sample temperature (24°C or 93.5°C) and then prompt the operator before continuing. This mode ensures an operator will be nearby to capture the Foam Tendency. An audible alert is used to signal that the test is ready, while the temperature is maintained.

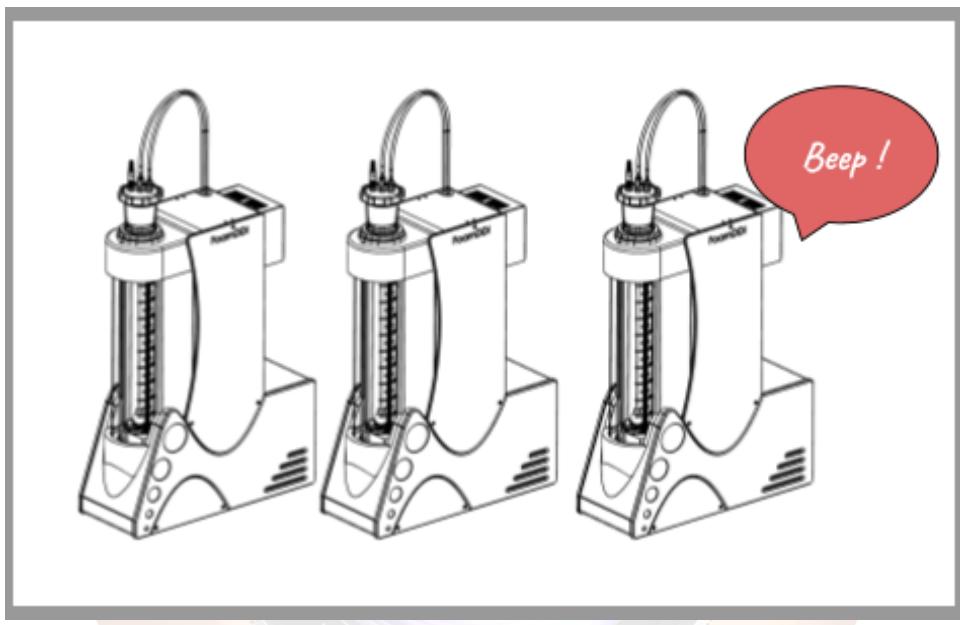


Once pressed, the automation will continue with the test, using audible alerts to signal critical points along the way that can not be stopped: such as a 1 Minute Warning for the Flow, and another alert to notify exactly when the Tendency sample should be taken. This allows a user to observe the Foam Tendency in real time, in cases where the stored video playback is not enough.



Optional: Audible Alert

An audible alert can be enabled to alert the laboratory of certain stages during the Foam Analysis. The buzzers are located on each FoamDDI Module, to help identify which position in cases where more than one module is present and running.



The alert is helpful for users who wish to either audit the FoamDDI, or rate the Foram Tendency and Stability manually. The alerts are helpful in either case - to allow the user to visually watch the Foaming without having to look away at a display. The following conditions are used to trigger the buzzer:

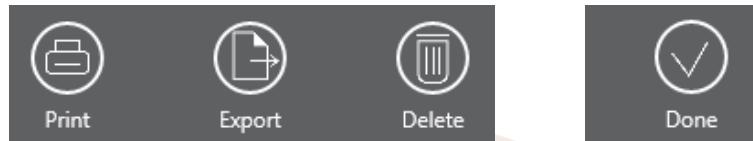
- **Waiting to Start** - when the new feature called "Prompt before Test" is enabled (see next section), the module will sound 4 quick beeps, every 5 minutes until the user responds and starts the test.
- **1 Minute Flow Remaining Warning** - 3 quick beeps will sound.
- **15 Second Flow Remaining Warning** - 2 quick beeps will sound.
- **Tendency Mark** - when flow is completed, and the Tendency is captured, 1 beep will sound.

Operator has the option to select either the Manual or Auto rating as the final rating.



Saving, Printing, and Other Options

After analysis, the user is presented with the following options at the bottom bar:

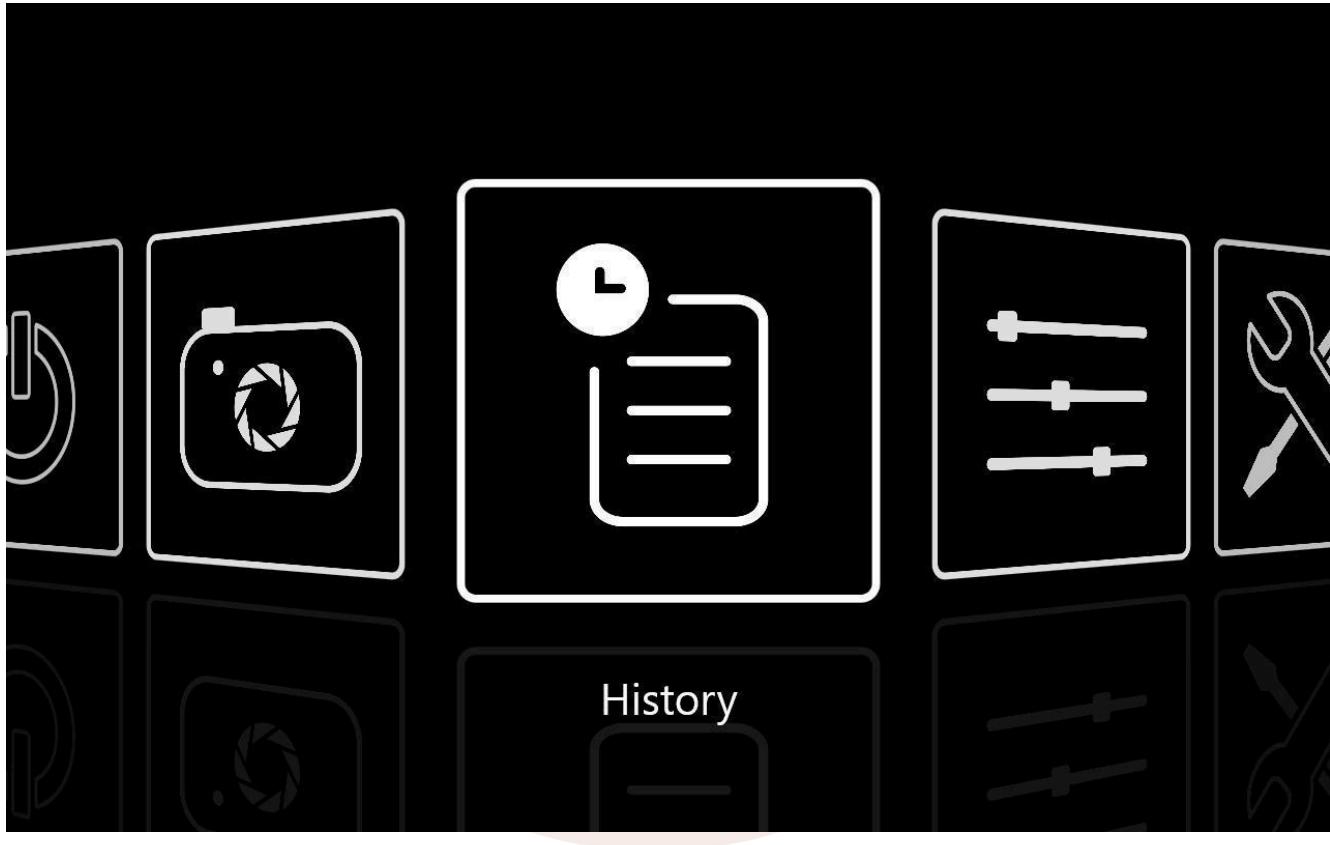


- Done: Saves results to database and returns to Analyze screen for next analysis
- Delete: Deletes results and does not store them in the database.
- Export:
 - To LIMS - Manual export to LIMS
 - To USB - Manual write to an external USB memory or location on hard disc for easy sharing of results.
 - To Email - Send results as a PDF output to an email address. Users will be prompted to enter an email address. **Note: See Email Settings**
- Print: Sends results page and images to predefined printers. Results will be printed in a similar format as PDF output. **Note: See Printer Settings**



History

The History screen is where an operator can view stored results in the database. Operators also have the option to filter results, export, print, and delete results from the database. FoamDDI's intuitive software allows the capability to export multiple results.





View Database Results

Entering the History database, you will be presented with a list view of all the saved results. Using the summary list view, the operator has the option to quickly see the sample ID, date, operator, method and overall rating.

History

Sample	Date	Operator	Method	mL	mL at Rest
FinalLeft	4/12/2024, 3:12 PM	Operator	ASTM D892 / D6082	-,-,-,0.0	-,-,-,0.0
FinalLeft	4/12/2024, 9:37 AM	Operator	ASTM D892 / D6082	170.8,-,-,-	0.0,-,-,-
FinalLeft 4 2	4/11/2024, 2:31 PM	Operator	Amine Method PS	235.0, 59.0, 214.5, -	0.0, 0.0, 0.0, -

Action Buttons: Print, Export, Delete, View, Clear filters, Clear selection, Select all

Results shown under rating column with a represent abnormal foam detected and manual override is suggested. Click on the icon to go into the override section and manually place the baseline for foam tendency, and foam stability and once confirmed values will display.

To view more information:

Simply click to highlight a row and tap the View button at the bottom action bar. Note that the View button is only available when a **single** sample row is selected. Selecting more than one row at a time will remove the ability to use the View option.

Clicking the View button will display results similar to the results page displayed after a test analysis. Operator can perform print, export and delete functions, as well as playback view. To ensure data integrity, the following options are not available:

- Change sample identifiers



- Change method

Note: See Saving and Options

Setting Filters

Within the History screen, the operator can also filter data shown in the columns. This function allows the operator to:

- Quick search and find results
- Sort by a particular method or mL
- Sort and display results from a specific date range
- Filter a specific data set for export and analysis

The following filter options are available:

- Filter by sample ID: Open as a search box that allows you to enter values to search by
- Date: Displays data by a specific date or range of dates
- Operator: Displays list of stored operators to filter results from a specific operator
- Method: Displays list of methods by which to filter

Sample	Date	Operator	Method	mL	mL at Rest
FinalLeft	4/12/2024, 3:12 PM	Opera	Sequence I From 0.0 to 240.0	███████████	-, -, -, 0.0
FinalLeft	4/12/2024, 9:37 AM	Opera	Sequence II From 0.0 to 240.0	███████████	0.0, -, -, -
FinalLeft 4 2	4/11/2024, 2:31 PM	Opera	Sequence III From 0.0 to 240.0	███████████	0.0, 0.0, 0.0, -
			Sequence IV From 0.0 to 240.0	███████████	

Note: Activating any of the filters will change the color of the Filter icon for each column from white to blue

Activating any of the filters will display only relevant data if available. Otherwise, FoamDDI will display a blank screen. Multiple rows or a single row can be selected to export, print or further filter.



Export & Data Options

Filtered results as well as unfiltered results displayed on the History screen can be exported, printed, emailed and deleted, among some of the available functions. The operator, upon selection of a result either from default or filtered results, can perform the following:

- Manual export to LIMS
- Save to USB or hard disk space
- Email to user

Note: see Saving and Options sections for more details

History						
Sample Id	Date	Operator	Method	mL	mL at Rest	
factoryTest J	09-Nov-17, 9:23 AM	Operator	ASTM D 852	- 26.5 -	- 1.6 -	
factoryTest 2	09-Nov-17, 3:07 PM	Operator	ASTM D 852	- 60.11.7	- 7.8.16.9	
factoryTest	09-Nov-17, 10:52 AM	Operator	ASTM D 852	- 24.14.6	- 8.0.0.0	
TG2250 2	09-Nov-17, 11:32 AM	Operator	ASTM D 852	- 0.8 -	- 0.2 -	
TG250	11-Dec-17, 9:28 AM	Operator	ASTM D 852	- 11.8.11.7	- 4.8.0.0	
TG322 2	02-Dec-17, 4:11 PM	Operator	ASTM D 852	- 0.8 -	- 0.2 -	
TG322 1	02-Dec-17, 7:45 AM	Operator	ASTM D 852	125.1 -	128.4 -	
TG322	02-Dec-17, 8:58 AM	Operator	ASTM D 852	0.0 -	0.0 -	

History						
Sample Id	Date	Operator	Method	Rating		
Do you want to delete selected item(s)?						
		Yes		No		
x1	12/02/2015, 2:09 PM	Rig 2	ASTM D130	3b		
x10	12/02/2015, 1:54 PM	Rig 2	ASTM D130	3b		
...	12/02/2015, 1:59 PM	Rig 2	ASTM D130	3b		

The operator, upon selection of a result either from default or filtered results, can delete entries from the database. To delete an entry, simply select single or multiple results from listview and tap the delete button. The operator will then need to verify the deletion of results on a confirmation screen.

*Note: Deletion is permanent and cannot be un-done.
Please turn on administrator mode for restrictions.*

The operator, upon selection of a result either from default or filtered results, can print entries from the database. To print, simply select single or multiple results from listview and tap the print button. FoamDDI offers the convenient ability to print simple or multiple results at the same time.

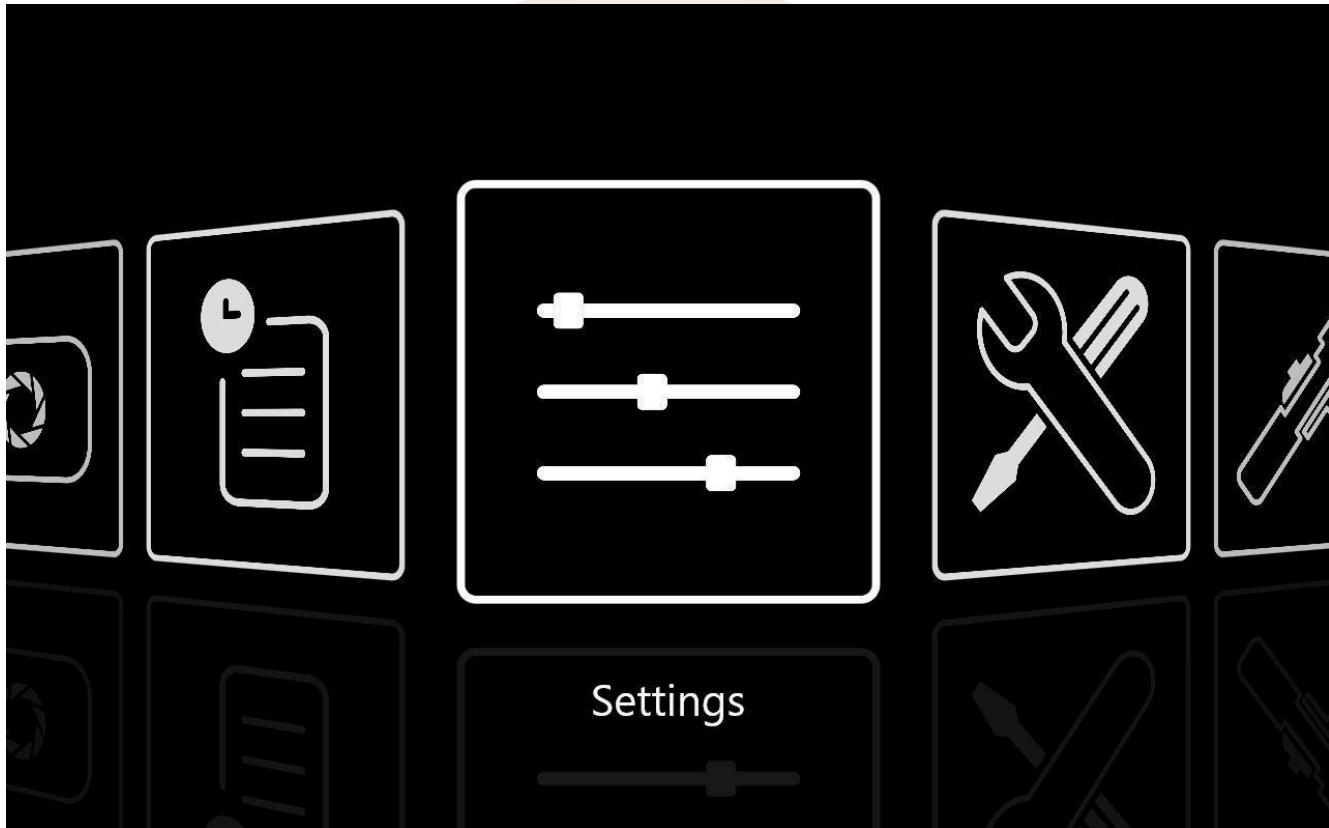
Note: see Setting - Printing sections for details on defining printers

History						
Sample Id	Date	Operator	Method	Rating		
Printing ...						
x1	12/02/2015, 2:09 PM	Rig 2	ASTM D130	3b		
x10	12/02/2015, 1:54 PM	Rig 2	ASTM D130	3b		
...	12/02/2015, 1:59 PM	Rig 2	ASTM D130	3b		



Settings

The Settings screen is FoamDDI's central location for defining system-wide parameters such as users, date, e-mail, LIMS, printing, modules, log, etc. Changes, additions and navigation are easily performed using the integrated touchscreen and onscreen keyboard. Protection against critical functions of the software are defined within the Settings, using an Admin password.

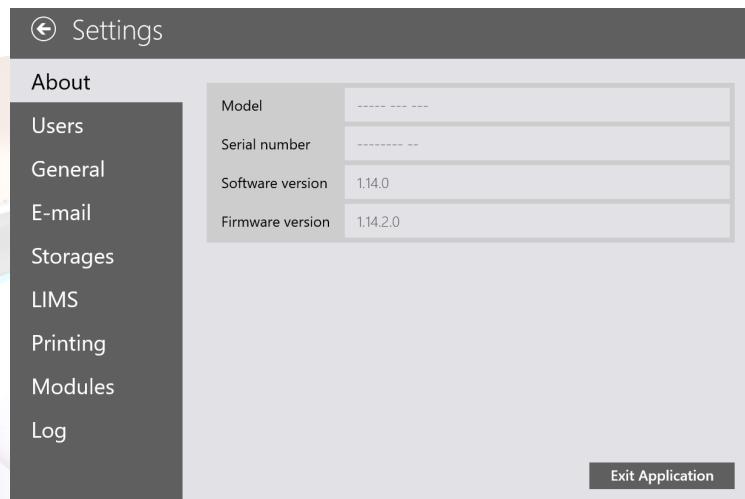




About

The About screen displays basic information about your FoamDDI analyzer:

- Model Number: Displays model number and hardware version of your analyzer
- Serial Number: Displays serial number, which also appears on back of analyzer
- Software Version
- Firmware Version



FoamDDI is operated in a protected mode called KIOSK or Assigned Access mode. This mode is critical to protect against changes to the software and operating system, as well as to prevent the ability to run malicious programs on FoamDDI. This operating mode allows only the approved FoamDDI software to run.

It may be necessary to exit this mode to allow access to the administrator account to perform functions such as Adding to Domain, Defining Network Printers, and IP Address functions. To exit FoamDDI's operating mode, press the Exit Application button and allow the administrator to access a FoamDDI Admin account. Please contact VISAYA for more information on making changes and the password of VISAYA Admin account.

Note: The Exit Application Mode button is only available when operating when no Admin Password is activated.



Users

Operators, for use within the Inspect analysis screen and filtering options detailed in History, are defined in this section. To create a new operator:

- Click the + next to New Operator
- User will be prompted to enter a new Name
- *Note: Name must be unique from other operators and can be alpha-numeric*
- Click Confirm to confirm a new entry and the New User will be displayed in Operators List

The screenshot shows a software application window titled 'Settings'. On the left is a sidebar with the following menu items: About, Users (which is selected), General, E-mail, Storages, LIMS, Printing, Modules, and Log. The main content area has three sections: 'Operators list', 'Change admin password', and a footer with 'Confirm' and 'Cancel' buttons.

Operator	Action
New operator	(+)
Operator	(Edit) (Delete)
John Smith	(Edit) (Delete)
Jane Smith	(Edit) (Delete)
Adam Smith	(Edit) (Delete)
Eve Smith	(Edit) (Delete)

Change admin password

New Password
Confirm Password

Confirm Cancel

Once created, an Operator Name can be edited and deleted. To edit and delete a user use the Edit and Delete icons located next to the user name. It is not necessary to confirm these changes using the Confirm button. All edits are permanent.

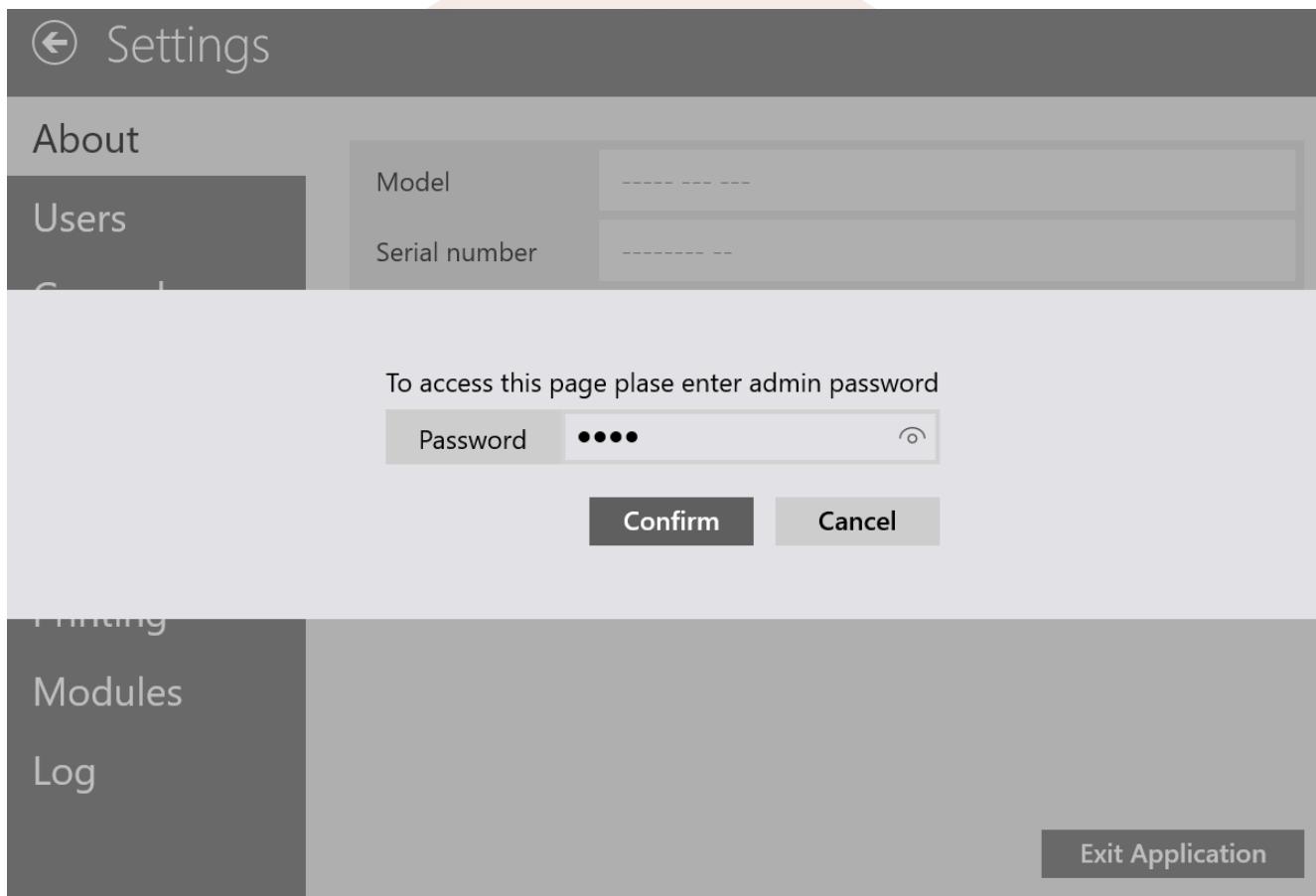
Admin Mode

FoamDDI's software provides an easy-to-use Admin mode to prevent access to critical parts of the software. Any critical functions can be locked with a prompt for password to allow access and/or changes. To activate this function, simply type a password in the Change Admin fields. Password must be entered a second time to confirm entry. To activate this function, it is necessary to confirm using the Confirm button at the bottom of the screen. Alternatively, you can press cancel to start all over with a new password.



Once this feature is activated, any attempt to enter critical parts of the software will be prompted with a request to enter a password. Operators can enter Admin password to enter or cancel to exit screen. Admin Mode prevents changes to the following screens:

- Enter Settings screen
- Calibration Advance screen
- User will still have ability to perform a Calibration Verification



Admin Mode provides an easy-to-use protection mode without the need for complex usernames and passwords with various user rights and access levels.

To remove Admin Mode, simply:

- Enter Settings Page (using the previously defined password).
- Enter Users section and erase password from both “New Password” & “Confirm Password” fields
- Press the “Confirm” button to accept removal of admin mode

**Note: If Admin password is lost, please contact VISAYA Service for master password to regain access to your system.*



General

The General section of the Settings page is used to view current system time, change date format and select language. Other Options include settings and switches to turn on and off certain features which impact testing characteristics. The settings are saved only when the user Confirms the change. Only future testing is impacted by these changes - previously run tests found in History are not changed

The screenshot shows the 'Settings' page with the 'General' tab selected. On the left is a sidebar with links: About, Users, General (selected), E-mail, Storages, LIMS, Printing, Modules, and Log. The main area displays system information and configuration options:

- Date/Time: 4:45:25 PM, Friday, May 31, 2024 (with a 'Change' button)
- Short date format: M/d/yyyy
- Long date format: dddd, MMMM d, yyyy
- Short time format: h:mm tt
- Long time format: h:mm:ss tt
- Current language: English (United States)
- Test Options:
 - Prompt Before Test: On (switched on)
 - Audible Alert: On (switched on)
 - Stop Test after Foam Collapse: On (switched on)
 - Extended Logging: Off (switched off)
 - Air Jet: Off (switched off)
 - 49°C Precondition (D892 Seq I): Off (switched off)
 - Resolution (mL): 1.0
- Action buttons: Confirm and Cancel

Date/Time Options

- Short Date/Time Format: Displays data in reports and list views used in History
- Long Date/Time Format: Displays data in LIMS and database

Prompt Before Test

The FoamDDI will automatically prepare the sample temperature (24°C or 93.5°C) and then prompt the operator before continuing. This mode ensures an operator will be near to capture the Foam Tendency. An audible alert is used to signal that the test is ready, while the temperature is maintained. *See the section Running a Test for more information.*



Audible Alert

Alerts the laboratory of certain stages during the Foam Analysis by beeping from the module itself. *See the section Running a Test for more information.*

Stop Test after Foam Collapse

Will stop executing the test if foam is collapsed before the normal 10 min limit.

Enable Extended Logging

Used to produce extended information in the logging tool option, and it is typically something asked for by Visaya Engineering for troubleshooting purposes.

Air Jet

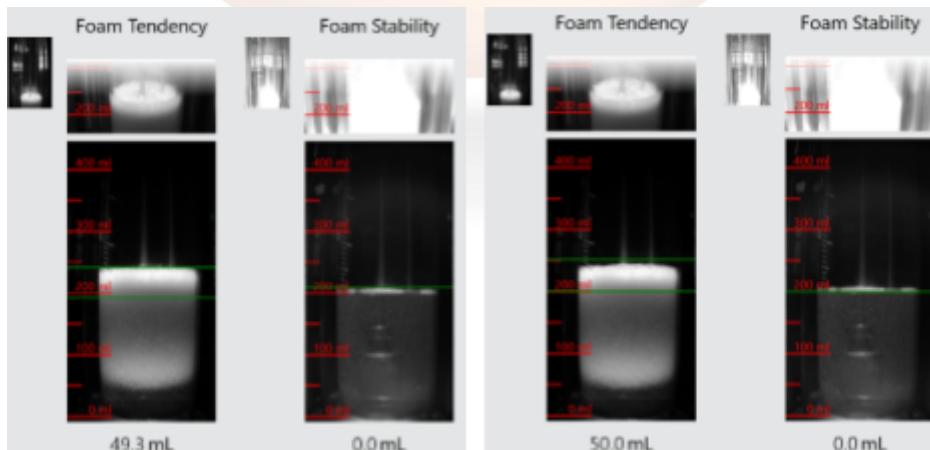
When enabled, compressed air is jetted onto the hot sample (during Seq 3) in order to speed up the cooling from the 93.5C test. Warning: this option can consume more air than normal. Consult Sales or Service for help identifying if your installation has the capacity to support this.

49°C Precondition (D892 Seq 1)

When enabled, the sample will first be heated to 49°C - then cooled to 24°C when running Sequence I. This is an optional step defined in D892 and it is used to remove thermal memory from a sample. Consult ASTM D891 section 10.1 for more information on this optional step.

Foam Resolution (mL)

The resolution of the Foam Level can be changed according to the laboratory's preference. Options include: 0.1 mL, 1.0 mL, 5.0 mL, and 10.0 mL. The resolution preference is used for the Automatic Foam Analysis, as well as the Override / Semi-Automatic Mode. Here is an example of the default 0.1mL compared to a 10.0mL settings:



Resolution: 0.1mL

Resolution: 10 mL



Current Language

FoamDDI's software features the ability to display in a growing number of languages. To change language files, simply select the desired language from the dropdown box. Upon selection of a new language, the software will reset within seconds, displaying the software in the new language.

Settings

About 5:54:55 PM, Friday, May 31, 2024 Change

Users Short date format Audible Alert
General M/d/yyyy On

E-mail Long date format Stop Test after Foam Collapse
Storages dddd, MMMM d, yyyy On

LIMS Short time format Extended Logging Air Jet
Printing h:mm tt Off Off

Modules Long time format 49°C Precondition (D892 Seq I)
Log h:mm:ss tt Off

Current language Resolution (mL)
English (United States) 5.0

Español (España)

Português (Brasil)

Русский

Confirm Cancel



Email

FoamDDI has the ability to send an email upon request via the Results view screen, history and log files. Configuration of the email server settings must be defined before using this service.

- Email: Unique Address
- Host: SMTP or IMAP Email Server
- Server Port: Server Software Port
- Login: User Name
- Password: Password for User
- SSL: SSL – Turn On/Off

Email Subject and Body text defaults to the following when left blank:

Subject:

"FoamDDI Test Results / SN #XXXXXXXXXX-XX"

Body Text:

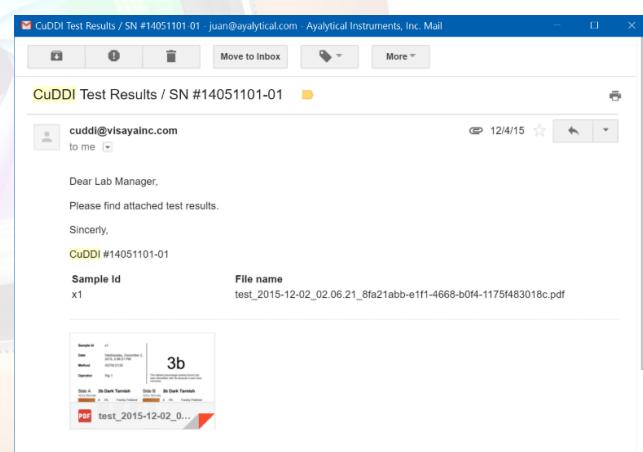
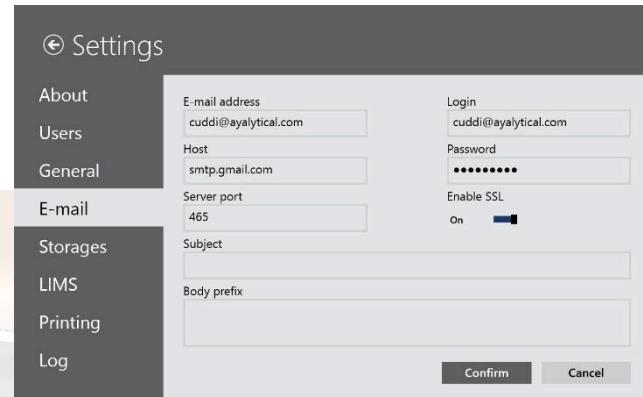
"Dear Lab Manager, please find attached..."

Sincerely, FoamDDI Test Results / SN #XXXXXXXXXX-XX

Sample ID - Filename ID"

If you prefer to use a unique subject line and body text, simply fill in the corresponding fields with custom content. Within the email, FoamDDI will embed a PDF document containing all the test results along with images. Final rating and messages are also included.

- Sample ID
- Date
- Method
- Operator
- Foam Tendency

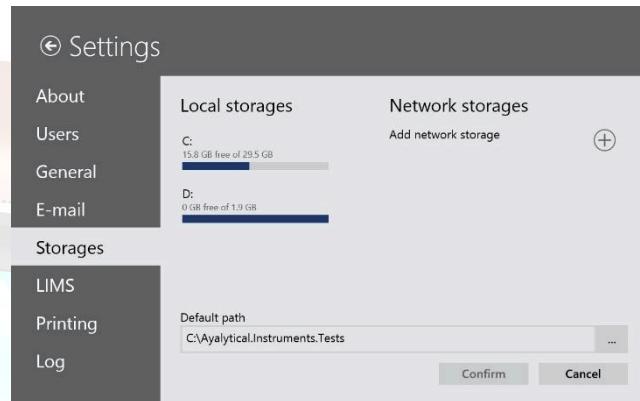




Storages

FoamDDI works within a specialized industrial application in a Windows-embedded OS, which uses a solid-state hard drive for the storage of test results.

- The blue progress bars show the storage space remaining on the SS hard drive, always designated by location: C
- Any additional external hard drives or USB memory devices will also be shown here
- The Default Path displays the default storage location for test results. If needed, the location can be changed by clicking the button at the end of the file path field
- Normally the integrated hard drive is sufficient. In the event the administrator needs to change the storage location, the ability to add a network storage location, such as a network share, is allowed. Clicking on the Add Network Storage button opens a dialogue page to allow this function. If needed, Default Path for storage results can be changed to this new location.





LIMS

FoamDDI features full LIMS integration with a variety of options to fit virtually every LIMS system and allows for flexibility in the connections options:

- **Network Share:** Network storage or share
- **USB Save:** Using a USB as a share
- **USB COM:** USB port communication
- **COM 1:** Serial communications

Using the dropdown selection box, simply select the desired mode of communications to access more options pertaining to that mode.

The screenshot shows the 'Settings' screen with a sidebar containing links: About, Users, General, E-mail, Storages, LIMS, Printing, and Log. The 'LIMS' link is highlighted. A dropdown menu titled 'Port settings' is open, listing four options: None, Network Share, USB Save, USB COM, and COM 1. The 'None' option is selected. At the bottom right of the screen are 'Confirm' and 'Test' buttons.

The screenshot shows the 'Settings' screen with the 'LIMS' link in the sidebar highlighted. Under the 'LIMS' section, the 'Port settings' dropdown is set to 'COM 1'. Below it, there are five configuration fields: Baud rate, Data bit, Stop bit, Parity bit, and Handshake control, each with dropdown menus. At the bottom right are 'Confirm' and 'Test' buttons.

USB COM and COM 1 LIMS communications work in a similar fashion. COM Communications allows a serial output of the data in a fixed format using a standard 9 PIN RS-232 connection, and USB COM uses a standard USB connection to communicate in a serial fashion. The following parameters need to be defined:

- Baud rate
- Data bit
- Stop bit
- Parity bit
- Handshake control

Note: Serial port has to be installed for COM 1. Contact VISAYA service for more details.

LIMS communication via Network Share and USB Save allows FoamDDI to write results to Network Share or location to a remote server. Prior to communication with a Network Share, the following parameters must be default:

- **Server:** Address location of server
- **User:** User name credentials
- **Password:** Password of user
- **Share:** File path or share location

The screenshot shows the 'Settings' screen with the 'LIMS' link in the sidebar highlighted. Under the 'LIMS' section, the 'Port settings' dropdown is set to 'Network Share'. Below it, there are several configuration fields: Server (\\VAYALYTICAL-SERV), Share (\lims), File name (Instrument-SN), File extension (Comma-Separated Values (*.csv)), Append (Yes), and Include images (Yes). At the bottom right are 'Confirm' and 'Test' buttons.



Settings

- About
- Users
- General
- E-mail
- Storages
- LIMS**
- Printing
- Log

Port settings: Network Share

Server: \\AYALYTICAL-SERV	User: Administrator
Share: \lims	Password: *****
File name: Method Name	
File extension: Comma Separated Values (*.csv)	
Include images: Yes	

Confirm Test

The File Name can be changed to suit the needs of various LIMS systems:

Method Name: Test method name (i.e. ASTM_D130.csv)

Instrument-SN: Uses serial number of the analyzer

LIMS: Automatically assigns LIMS as file name

Select Append to **Yes** for FoamDDI to write a new data line to the existing file.

Select Append to **No** for FoamDDI to erase and write a new file for each sample test result.

Select Include Images to **Yes** to send images to an images folder with a serialized ID.

Settings

- About
- Users
- General
- E-mail
- Storages
- LIMS**
- Printing
- Log

Port settings: Network Share

Server: \\AYALYTICAL-SERV	User: Administrator
Share: \lims	Password: *****
File name: Method Name	
File extension: Comma Separated Values (*.csv)	
Append: Yes	

Confirm Test

A file format is selectable for best compatibility with various LIMS systems. FoamDDI has the ability to export and select from a variety of formats using dropdown menu:

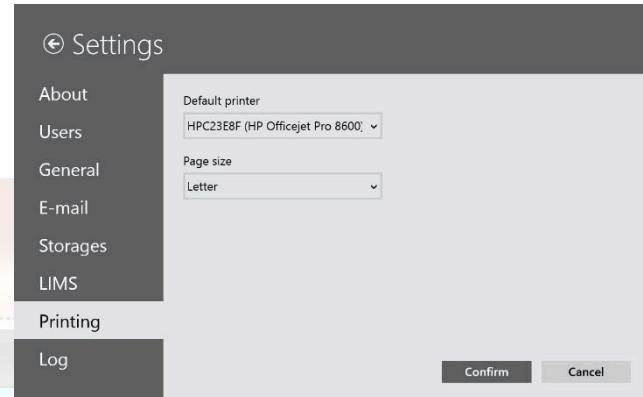
- Text Document: Simple plain text format with file delimited with a comma
- CSV Format: Comma separated values with file delimited with a comma
- XML Format: XML output with full markup and identifiers of each field. Best option to use for building custom PDF with images.



Printing

After an analysis or via the History view, an operator has the ability to print to any network or USB printer. Some settings may require administration assistance, such as driver or network installation.

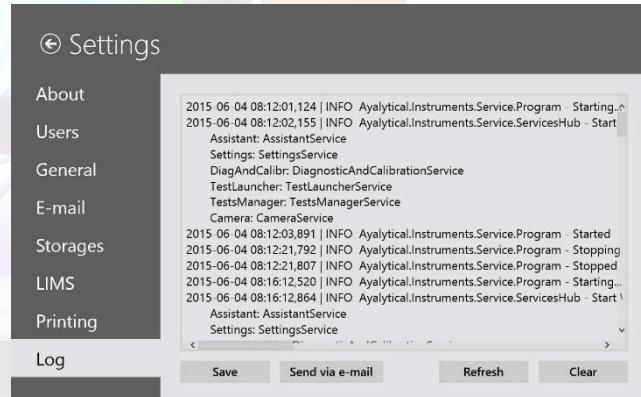
- **Default Printer:** User selectable printer. Displays all available printers either shareable via network or installed.
- **Page size:** Letter and A4 selectable file formats for both PDF and printer pages.



Log

FoamDDI features a Log file which stores all the communications between the hardware firmware and software. This log can be viewed, saved and sent via email.

- **Save:** Saves Results to hard drive or external USB memory
- **Send via email:** Opens dialogue box to enter email address to send log file
- **Refresh:** Updates display with the latest log entries
- **Clear:** Clears screen and log to display only the latest entries



Note: To send via email, Email Settings must be defined. See Email Settings.



Modules

The modules tab is used to view the FoamDDI that is currently connected to the logic box.

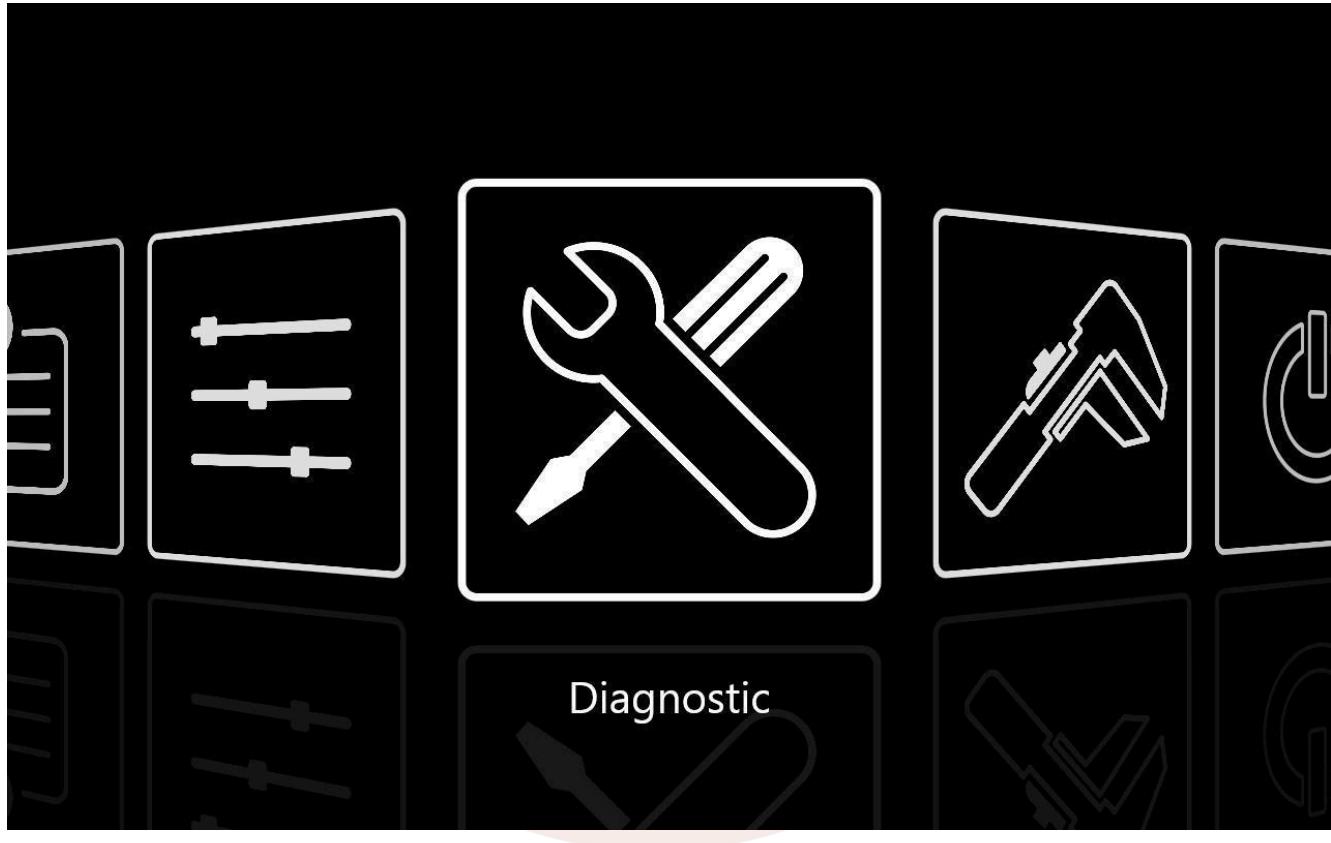
- **Serial#:** Displays the serial# of the installed FoamDDI.
- **Position:** The position is defined after establishing connection with the operating system. Position can be changed using the ↑ keys.
- **Alias:** Used to indicate a specific module. Clicking on the box will allow you to change the alias name.
- **Status:** The status box allows to turn on/off each individual FoamDDI.
- **Refresh:** Clicking this box will search for active modules.

Serial#	Position	Alias	Status
180323158-01	A	158	<input checked="" type="checkbox"/> On
180323157-01	B	157	<input checked="" type="checkbox"/> On



Diagnostics

FoamDDI's software includes an easy-to-use diagnostics screen for troubleshooting and manual operation/verification of FoamDDI's electro-mechanical devices. This screen is useful for both identifying the source of a fault and for manually demonstrating the functions of your FoamDDI.





Vision

Vision portion displays a live view as seen by FoamDDI and advises if the cameras are communicating with the FoamDDI software. This image is updated a few times per second and can be used for manual visual verifications and to ensure the image is displaying correctly.

On the right side of the screen, both cameras' live view should display once the module was selected

The top and bottom light button allows you to manually turn the light On/Off. If the image appears dark, try turning the light(s) on.

Located at the bottom right of the image is an export button. This button will export the current view to a select folder/share for sharing or troubleshooting.

Located on top of the export button is the Auto Exposure button that will automatically make the image brighter or darker. *Note: automatic exposure is enabled by default.*

Diagnostic

Instrument

Reset All Devices

Total Test Cycle Count: 0

Vision

Foam Level: 0.0 ml Top Light: On Bottom Light: On

Air Flow

Out: 0.0 mL/min In: 0.5 mL/min Vent: Off

Two camera preview windows show a dark vessel and a vessel with liquid. Each preview has an 'AUTO Ex' button and an 'Export' button.



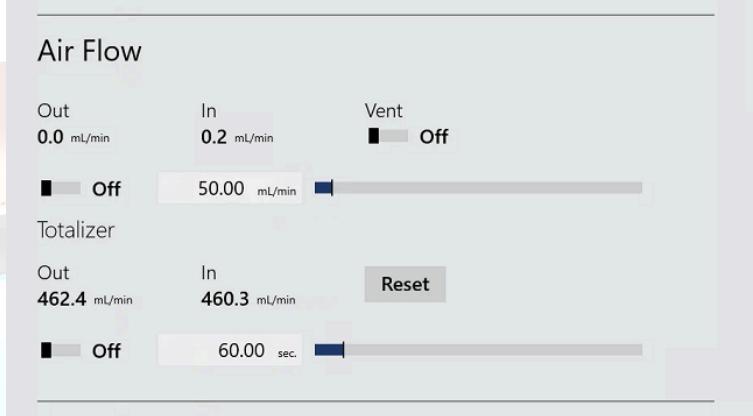
Air Flow

The Air Flow section displays the status of the Diffuser depending on the adjustment of the mass flow. Enable flow by adjusting the slider or entering a value for the mL/min set-point and then press the On/Off button.

Out: The “live” value from the Mass Flow Controller which also would indicate the air moving out the Diffuser.

In: The “live” value from a Mass Flow Monitor used to measure the return air from the stopper (aka Totalizer).

Vent: A valve used to vent the air circuit (between the Mass Flow Controller and Diffuser) to atmosphere is opened/closed using this On/Off button.



Totalizer

A totalizer is *kept* of both Flow Out and Flow In (see above) and can be diagnosed here. Enable the totalizer(s) by adjusting the slider or entering a value for the seconds set-point and then press the On/Off button to begin totalizing the flow.

Reset: Resets each totalizer.

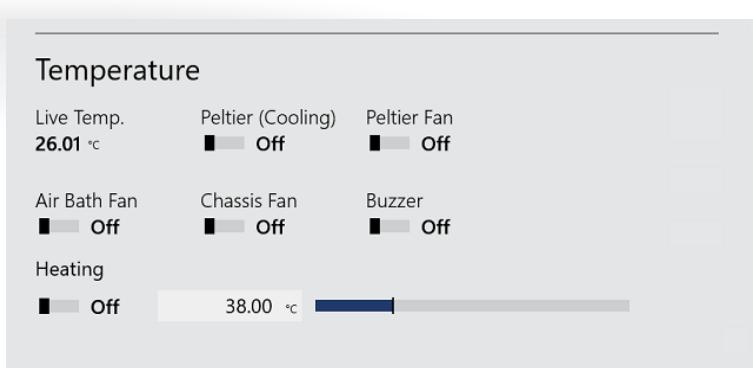
Temperature

The Temperature section displays the status of the Temperature Probe submersed into the sample. Enable heating control by adjusting the slider or entering a value for the °C set-point and then press the On/Off button. To enable cooling, enable the Peltier.

Peltier Fan: The fan located on the rear of the instrument used to cool the Peltier’s hot side.

Air Bath Fan: Used to circulate air across the sample cylinder.

Chassis Fan: Used to prevent the chassis from overheating while the heater is enabled.

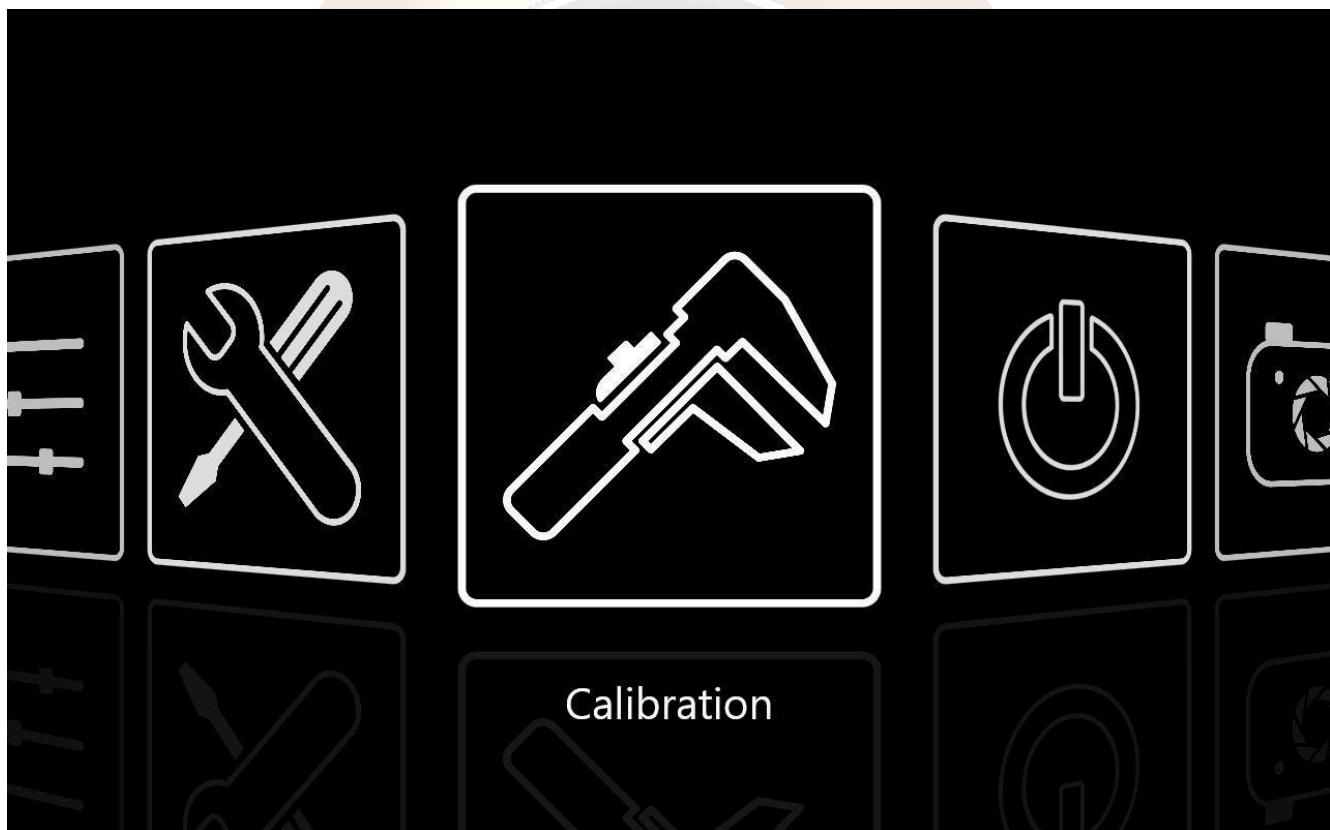




Calibration

Calibration of your FoamDDI is easily achieved via the Calibration screen of the software. In this section the Temperature, Flow, and Camera can be calibrated.

Each FoamDDI Module has its own stored calibration data. Each component on a module can be calibrated individually, or all at the same time. For example, the user may create one temperature data point and while waiting for a bath to reach a temperature for a 2nd point, the user may complete the calibration for the Flow Control. However, only a single module can be calibrated at a time. Once the user leaves the calibration area, any calibration points that were not already saved will be lost.





Temperature Calibration

The FoamDDI temperature is calibrated to a standard value of $\pm 0.2^\circ$ prior to shipping. A dated calibration certificate is included. We recommend annual calibration be performed by a certified Ayalytical Service Engineer. Following are the steps to verify temperature calibration.

Verification

1. Using an *ICE BATH place the FoamDDI temperature probe and reference probe in the bath together and let settle until temperature is stable.
2. Verify that the temperature probe matches the reference probe.
3. Create a **WARM BATH with a set point of 93.5°C and insert both probes in the bath and let settle until temperature is stable.
4. Verify that the temperature probe matches the reference probe.

Permissible

- 0 Data Points
- 1 Data Point
- 2 Data Points (recommended)

Calibration Process

1. Click NEW Calibration to clear the existing calibration data.
2. Using an *ICE BATH place the FoamDDI temperature probe and reference probe in the bath together and let settle until temperature is stable.
3. Input your value from your reference temperature probe on the ACTUAL box and click the "+" button.
4. Create a **WARM BATH with a set point of 93.5°C and insert both probes in the bath and let settle until temperature is stable.
5. Input your value from your reference temperature probe on the ACTUAL box and click the "+" button.
6. Click the APPLY box to save. Temperature calibration has been completed.



_calibration

Flow Control	Set Point: 20.0 °C	Actual	TEMP.
Temperature	I	27.933	(+)
Camera	Cooling: Off	26.35	(X)
	Fans: Off	100.1	(X)

Refresh

Current calibration must be cleared before you can continue.

New **Apply** **Cancel**

* An ICE BATH may be substituted with an AMBIENT data point by leaving both probes exposed to ambient temperature.

** A WARM BATH may be substituted with a BOILING WATER bath if no control mechanism is available to create a stable 93.5C bath.

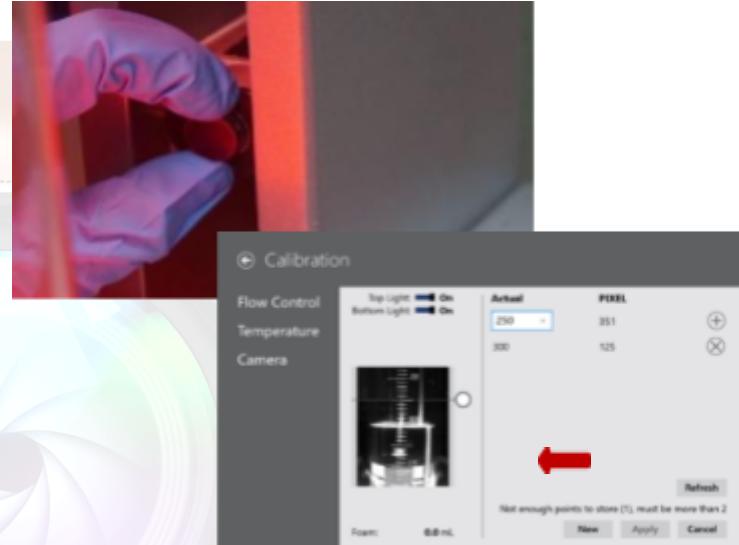


Camera Calibration

The FoamDDI camera is calibrated to a standard value of $\pm 5\text{mL}$ prior to shipping. A dated calibration certificate is included. We recommend an annual calibration be performed by a certified Ayalytical Service Engineer. Following are the steps to verify camera calibration.

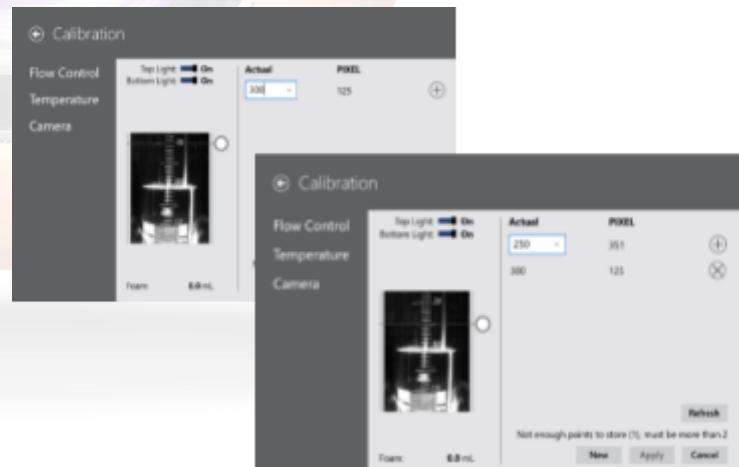
Verification

1. Turn the cylinder so the mL lines are facing the camera.
2. Verify that numbers on the cylinder are readable on the camera live view box.*
3. Verify that the purple reference line matches the volume reading below.
4. Return cylinder to normal run position.
5. Verify that sample volume matches foam volume reading on the live view box.
6. Exit screen.



Permissible

1. 2 thru 10 Data Points (> 4 is recommended)
2. Calibration Process
3. Click NEW calibration to clear the existing calibration data.
4. Turn the cylinder so the mL lines are facing the camera.
5. Adjust the line in the camera live view box to the 300mL line on the cylinder.
6. Input 300 in the ACTUAL box and click the + button.
7. Continue to do the same for 250mL, 200mL, 150mL, and 100mL.
8. Click the APPLY box to save.
9. Exit calibration function back to the menu.



*Please see section Maintenance – Camera Focus



Flow calibration

The FoamDDI flow is calibrated to a standard value of $\pm 2.5\text{mL/min}$. prior to shipping. A dated calibration certificate is included. We recommend annual calibration be performed by a certified Ayalytical Service Engineer. Following are the steps to verify flow calibration.

Verification

1. Disconnect both quick connectors located on the top of the FoamDDI stopper and connect both to your flow meter, such that a closed loop is created with your reference meter.
2. On the FLOW CONTROL screen, change your SET POINT from 0.0 mL/min to 94.0 mL/min.
3. Click FLOW CONTROL to ON.
4. Observe the FLOW value; they should be close to your set-point.
5. Exit screen

Permissible

- 0 Data Points
- 1 Data Point (recommended)

Calibration Process

1. Click NEW calibration to clear the existing calibration data.
2. Disconnect both quick connectors located on the top of the FoamDDI stopper and connect both to your flow meter, such that a closed loop is created with your reference meter.
3. On the FLOW CONTROL screen, change your SET POINT from 0.0 mL/min to 94.0 mL/min.
4. Click FLOW CONTROL to ON.
5. Observe the FLOW values; they should be close to your set-point.
6. Input your value from your reference meter on the ACTUAL box and click the “+” button.
7. Click the APPLY box to save.
8. Click flow control to OFF and back ON to see changes on

	Actual	FLOW	TOTALIZER
Flow Control	0.0 mL/min	1.6	3.3
Temperature			
Camera	Closed	1.6	3.3

Refresh
Current calibration must be cleared before you can continue.
New Apply Cancel



Power Options

FoamDDI can be easily powered down and restarted using the Power Options screen. Due to an embedded OS controlling your FoamDDI, it is important that FoamDDI is properly shut down and restarted.





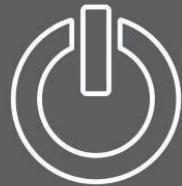
Shut Down

To shut down your FoamDDI, press the Shutdown button. You will be alerted with a screen to confirm you would like to shut down the unit. Press the OK button to proceed. This process takes approximately 10 seconds to complete. To restart your FoamDDI, press the Power Reset button on the front panel.

Restart

To restart the OS and software, simply press the Restart button. You will be prompted to confirm restart. Press OK to proceed. This will restart FoamDDI software.

⟲ Power Options



Shut down



Restart



Maintenance

Camera focus

FoamDDI modules use two cameras to detect foam. The cameras are fitted with a small M12 lens. The Adapter threads into the camera where a typical lens would go, and it is threaded all the way. The M12 lens uses a jam nut on the front to define its stop position. This is used to focus the camera.

Please follow the instructions to Focus the cameras on your FoamDDI once the side panels are removed

1. Unscrew the nuts (**FIGURE 1.1**) to remove the screen protectors shown as **FIGURE 1.2**

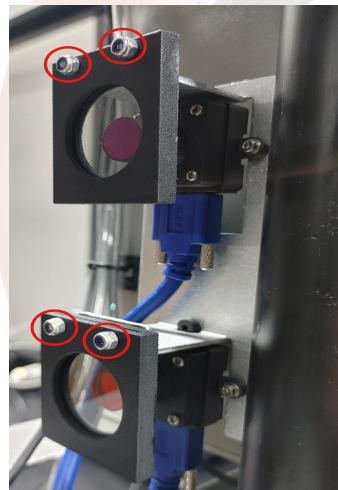


FIGURE 1.1

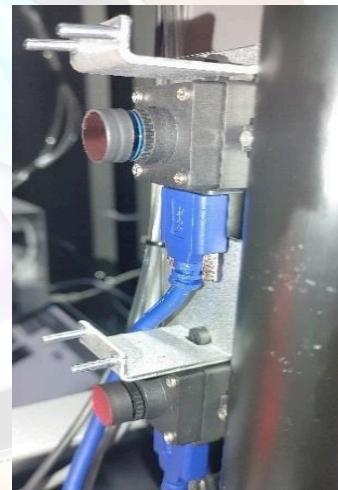


FIGURE 1.2

2. On the IPC Logic box, proceed to Diagnosis center (**FIGURE 2.1**) and choose the Module you want to focus the cameras on as **FIGURE 2.2**

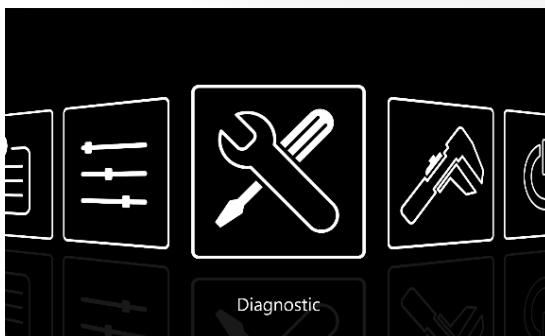


FIGURE 2.1

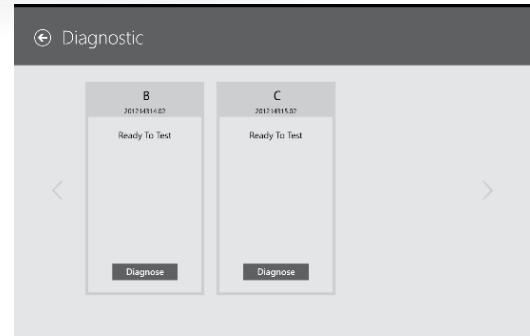


FIGURE 2.2



Turn Bottom Light ON

3. **FIGURE 3** shows clear examples when cameras need get focused

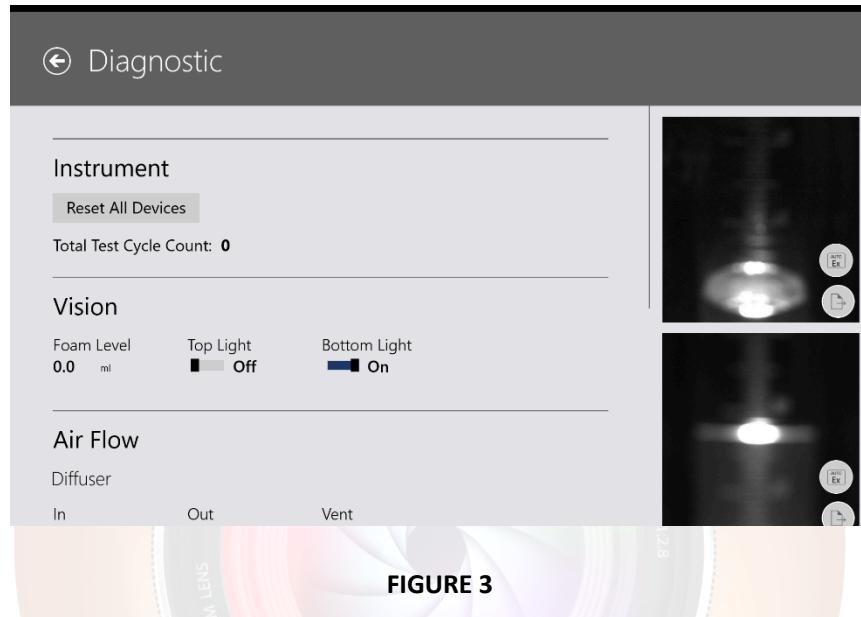


FIGURE 3

4. Carefully start twisting the camera In and Out to focus the camera without removing the red camera filter.
5. Once the image is clear gently tie the Jam Nut from the lens to make sure the lens is firm as **FIGURE 5**

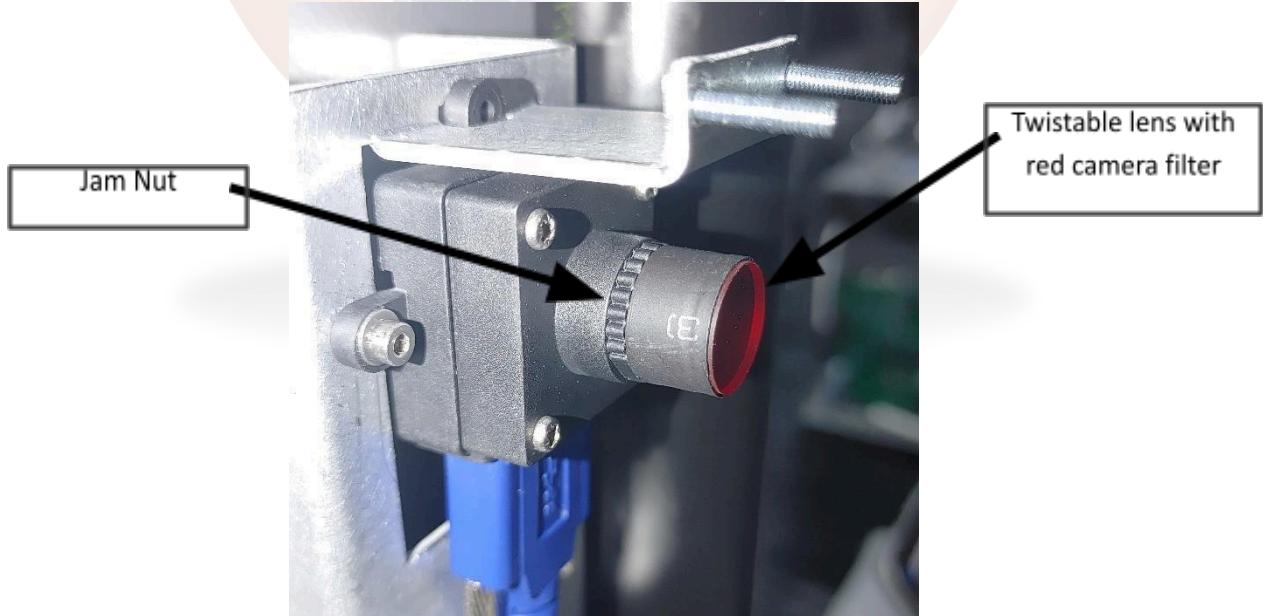


FIGURE 5

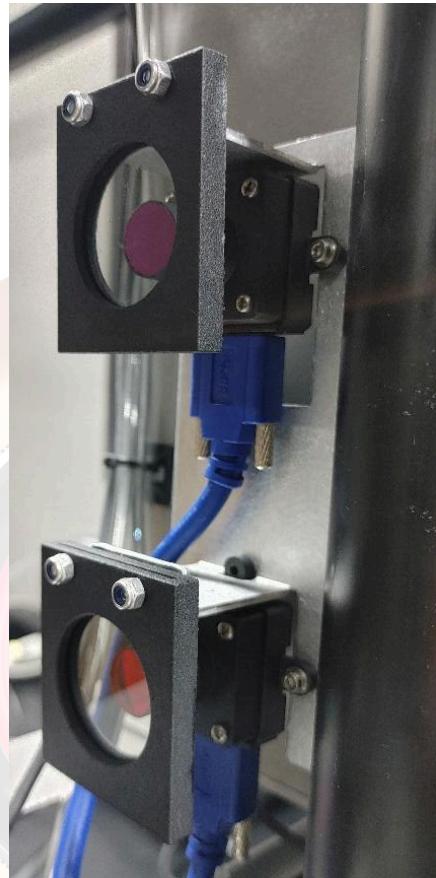
6. For better results, gesture pinch the screen to zoom in and out as **FIGURE 6.1** and **FIGURE 6.2**



FIGURE 6.1 (Zoom In)

FIGURE 6.2 (Zoom Out)

7. Tighten the nuts with the camera protectors on as **FIGURE 7 (DO NOT over tighten)**



Troubleshooting

FIGURE 7

The troubleshooting chapter has been subdivided in the following sections: Calibration, Diagnostics, Email, General, NetDrive, Printer, Settings, Tests and Results. Although most of the errors messages are related to improper connections and alignments the following guide provides the most elemental steps to correct for the failures.

Section	Error Message	Correction
Calibration	The Camera Motor failed to go home	Check connections
Calibration	Canceled	Reinitiate calibration
Calibration	Failed to calibrate the Camera Motor	Check connections and alignment
Calibration	The motor failed to calibrate	Check all cable connections
Calibration	Failed Light Intensity {0} level 0-255 Valid range is {1} to {2}	Check connections and recalibrate
Calibration	Failed to locate the calibration due to an unknown error	Contact VISAYA Service



Calibration	Failed Motor Calibration {0} deg per pulse Valid range is {1} to {2}	Contact VISAYA Service
Calibration	Failed Pixel Scale {0} mm per pixel Valid range is {1} to {2}	Contact VISAYA Service
Calibration	Failed to scan	Check electrical installation
Calibration	Failed to Verify Light Intensity due to an unknown error	Contact VISAYA Service
Calibration	The motor failed to go to position	Restart the system
Calibration	The Motor failed to go home	Restart the system
Calibration	Calibration is already running	Wait for ready condition and restart again
Calibration	Verification is already running.	Wait for ready signal and restart verification
Diagnostics	Scan Canceled	Check home position and alignments
Diagnostics	Failed to start recording	Check connections and restart
Diagnostics	Camera not found	Check cables and connection to the main unit
Diagnostics	Camera's snapshot is unavailable	Check camera connections
Email	Failed to create an attachment with PDF document	Check for proper path
Email	Failed to send email	Check for proper path
General Error	An error has occurred. Contact your system administrator.	Contact VISAYA Service
NetDrive	Access is denied	Check accessibility and try again
NetDrive	The local device name is already in use	Restart device
NetDrive	The network name cannot be found	Check network name
NetDrive	The network path was not found	Verify network path
NetDrive	The specified username is invalid	Introduce a valid username
NetDrive	The device is in use by an active process and cannot be disconnected.	Power cycle the system and restart again
NetDrive	Fail to get access to a network resource	Restart the system
NetDrive	Fail to mount/unmount a network drive	Restart computer
NetDrive	Fail to retrieve a list of mounted network drives	Restart the system
NetDrive	The specified network password is not correct	Check Network settings and restart



NetDrive	The user name or password is incorrect	Reenter login information
NetDrive	The network path was either typed incorrectly, does not exist, or the network provider is not currently available.	Try to retype the path and availability of network
NetDrive	The network is not present or not started	Restart the Network
Printer	Print operation is timed out	Check Printer's driver
Printer	Fail to set default printer	Redefine printer
Printer	Printer is not installed	Check Printer installation
Settings Date/Time	All date format strings must be non-empty	Check Date and Time are properly defined
Settings Email	E-mail address is invalid	Address must be non-empty strings
Settings Email	Port number is invalid	Host, must be non-empty strings
Settings Email	Address, host, login and password must be non-empty strings	Check proper names
Settings Language	Unknown language	Select the language
Settings Lims	Baud rate must be set	Check that the proper rate has been set
Settings Lims	Data bit must be set	Check Data Bit and retry
Settings Lims	Stop bit must be set	Set Stop bit
Settings Lims	Files transfer failed	Server and share must be non-empty strings
Settings Lims	Files transfer failed	Folder location must be non-empty string
Settings Operators	Operator's name cannot be empty	Define Operator's name
Settings Operators	Operator with the same name already exists	Change Operator's name
Settings Storage	Directory not found	Check path and availability of Directory
Settings Storage	You do not have access to write to this directory	Check access permission
Settings Storage	Drive letter and network path must be non-empty strings	Verify network path
Settings Storage	Path must be non-empty string	Verify network path
Test	Camera Motor failed to go home	Check mechanical alignment
Test	Failed to analyze	Restart test



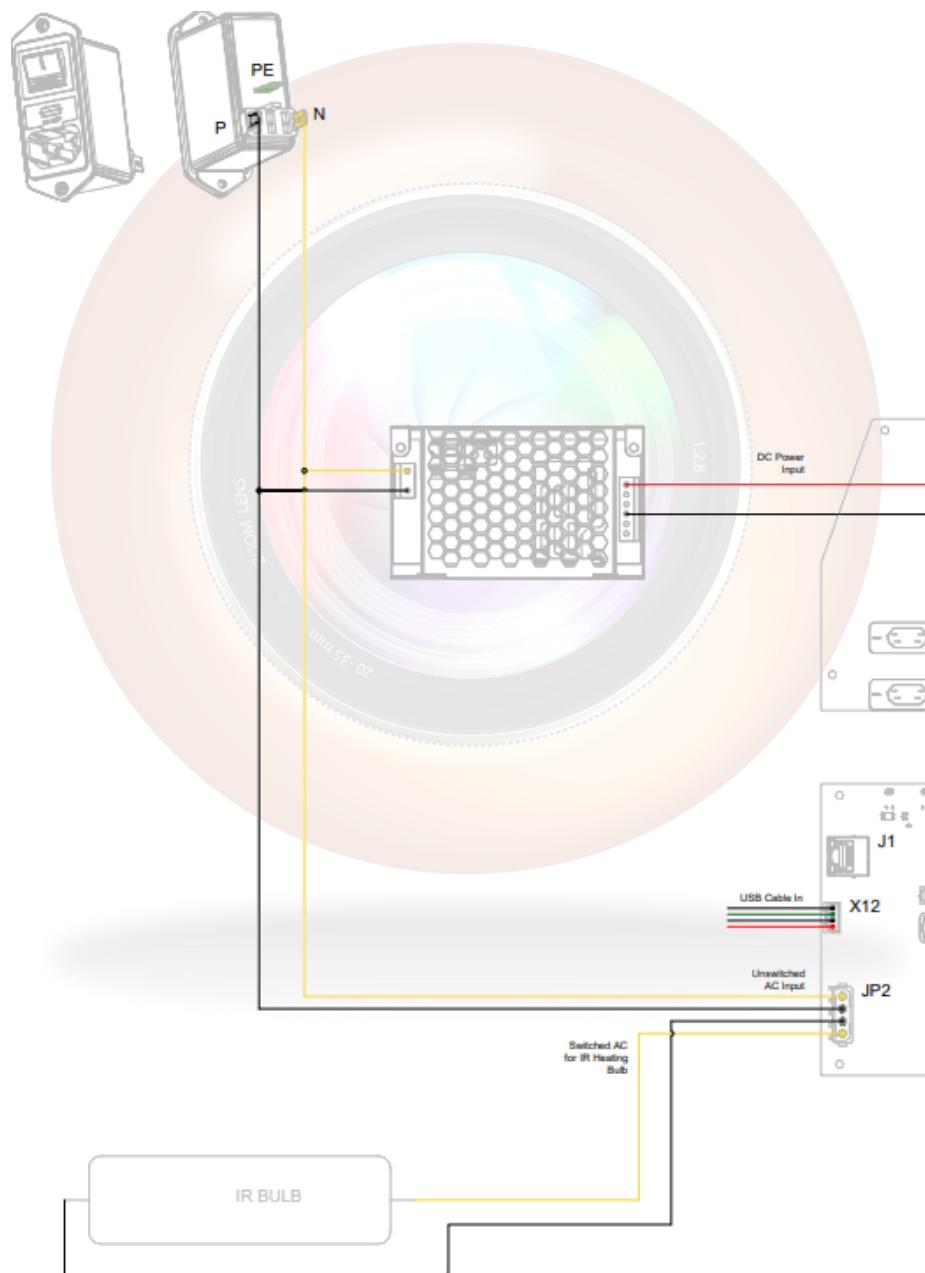
Test	Failed to scan	Restart test
Test	is not present.	Redefine test
Test	Motor failed to go home.	Check alignment and connections
Test	Motor failed to go to position.	Check alignment and connections
Test	Test canceled	Review method and restart
Test	Test failed.	Check all connections system status and restart
Test	Test failed: {0}	Contact VISAYA Service
Test	Canceled	Abort experiment and reinitiate
Test	Error	Check method and test settings and restart experiment
Test	Failed to locate the sample	Power cycle the system at restart test
Test	There is no test to report progress	Check for availability of test results
Test	Test is already running	Wait for ready and start again
Test Results Screen	Export target is not supported	Check target and restart
Test Results Screen	You must load test data to change its rating	Verify that you are at the correct data test
Test Results Screen	Access to the directory '{0}' is denied	Contact VISAYA Service
Test Results Screen	Could not find test data	Contact VISAYA Service
Test Results Screen	Test's save directory not found	Contact VISAYA Service
Test Results Screen	Test's save directory is not specified	Contact VISAYA Service

In case of unsuccessful attempt to correct for the malfunction of the instrument please contact VISAYA by
Ayalytical Instruments Technical Service



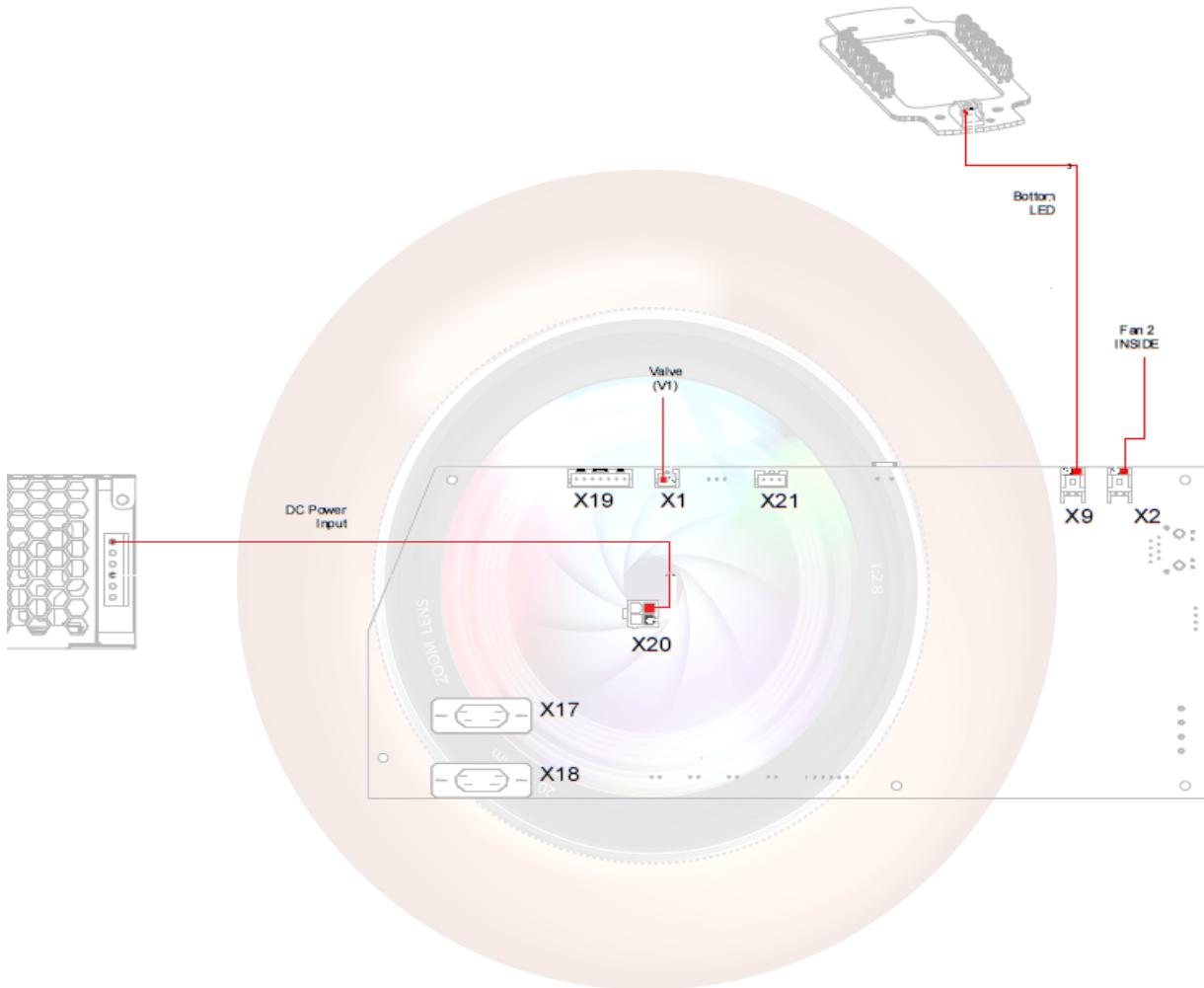
Electrical & Pneumatic Circuit

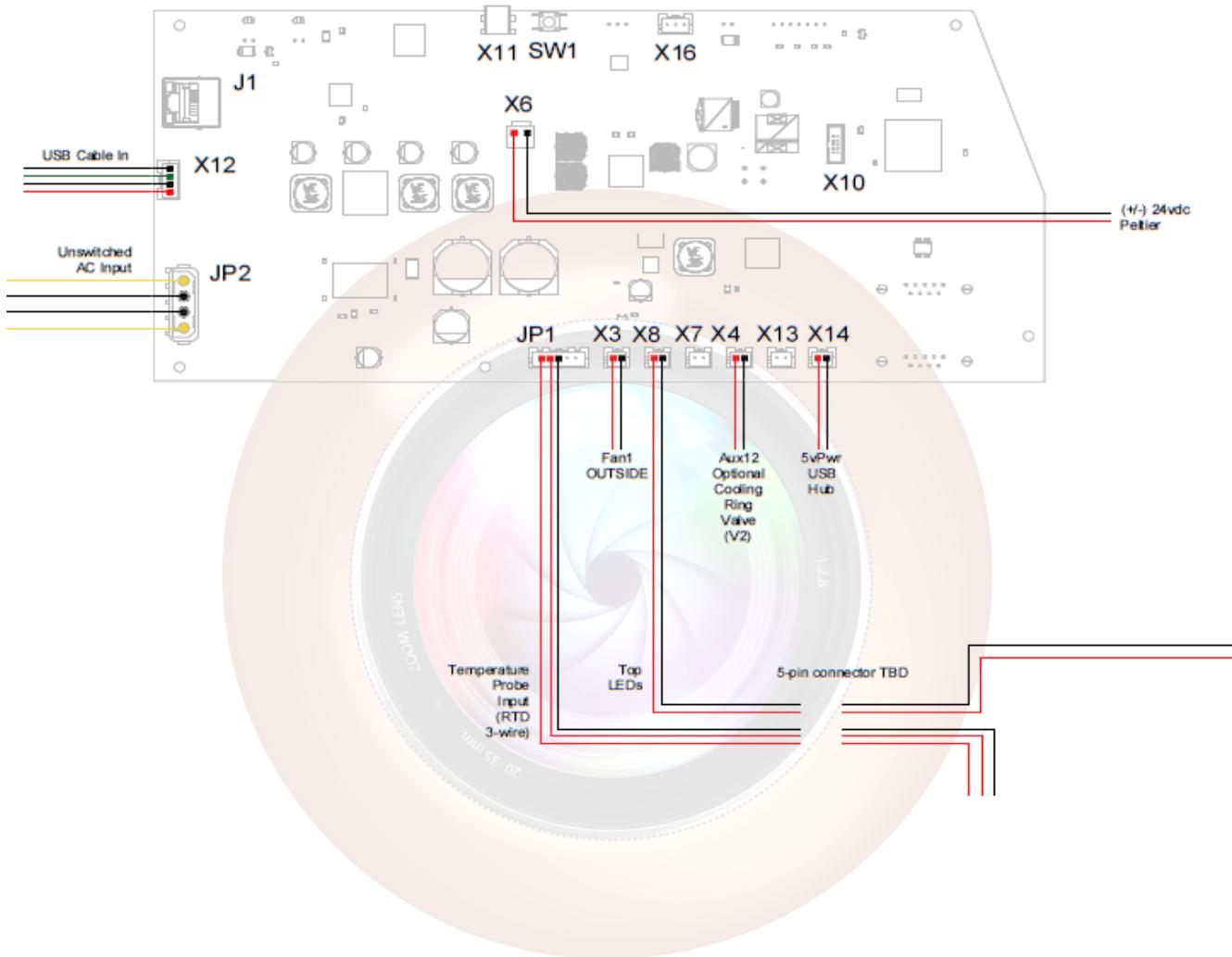
FoamDDI Module Internal AC Wiring Diagram





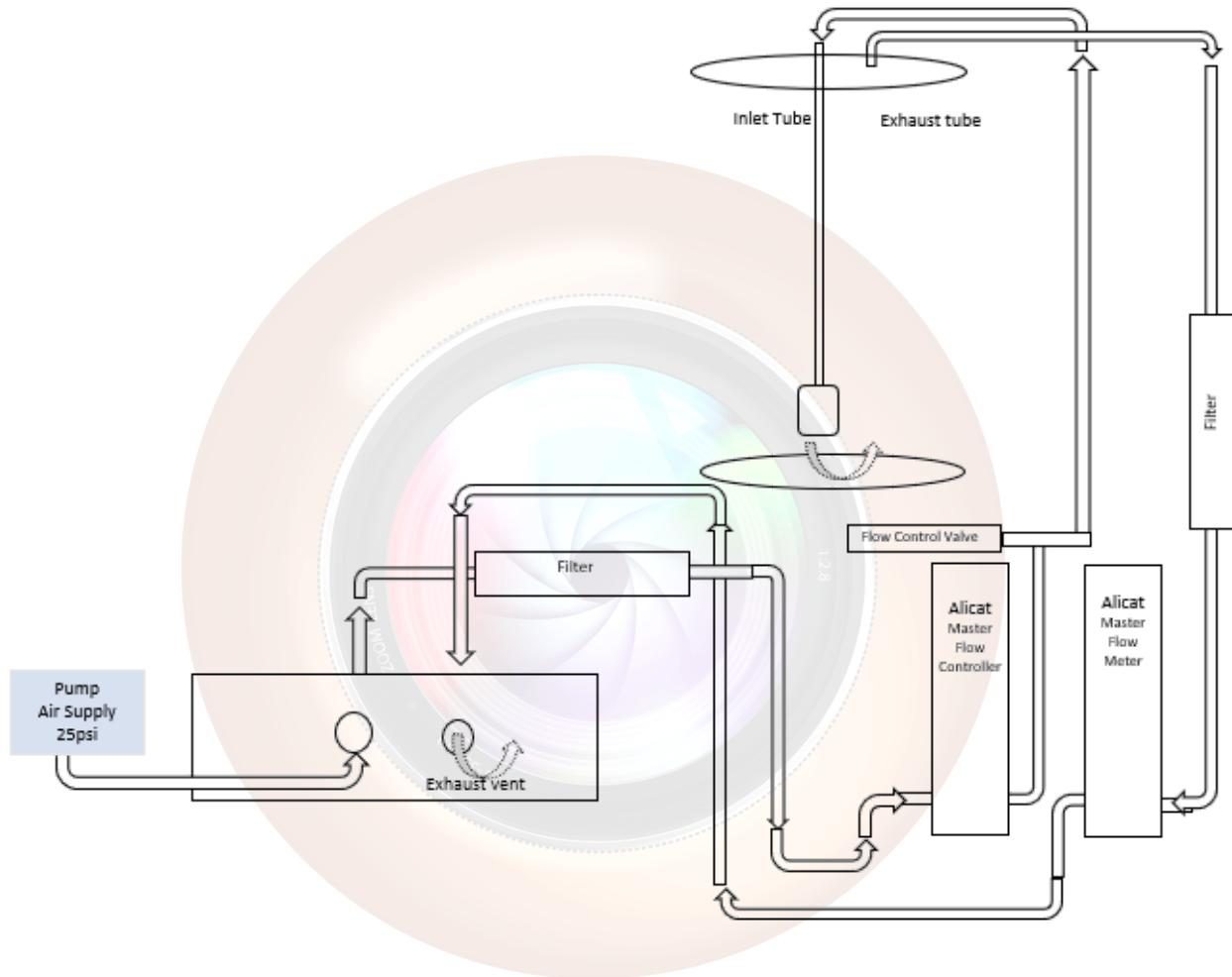
FoamDDI Module Internal DC Wiring Diagram







FoamDDI Module Internal Pneumatics





Consumables & Spare Parts:

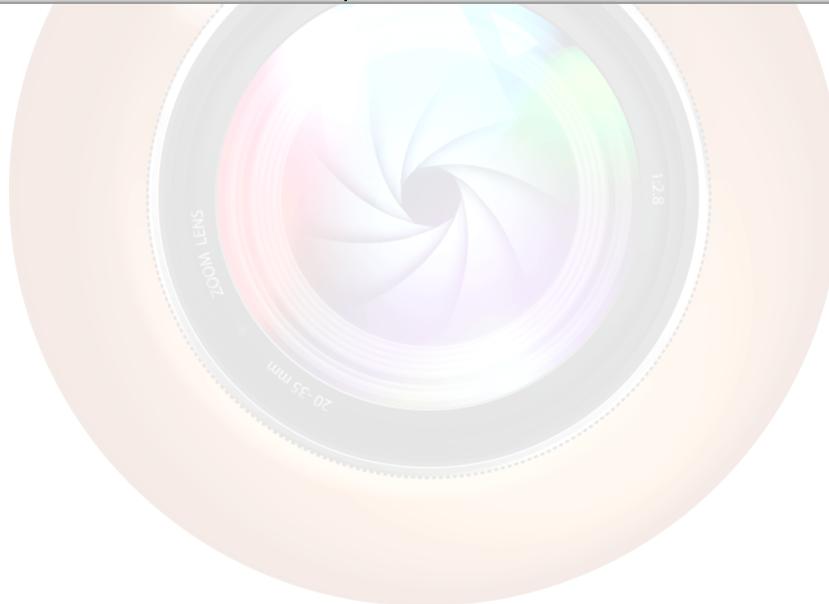
Part Number	Description
AYA-13-88696	FoamDDI Graduated Cylinder with Glass Joint. (1000mL) VISAYA Only.
AYA-13-88942	FoamDDI RDX Stopper & Temperature Sensor Assembly
AYA-13-88683	FoamDDI 1881 Graduated Cylinder with Glass Joint. (500mL) for Coolant Testing VISAYA Only.
AYA-13-88944	FoamDDI 1881 Stopper & Temperature Sensor Assembly for Coolant Testing
AYA-52-50230	Certified Cylindrical Gas Diffuser - Includes Certificate
AYA-52-50231	Certified Norton Spherical Gas Diffuser - Includes Certificate
AYA-13-88902	Replacement Oring for RDX Stopper, Upper
AYA-13-88903	Replacement Oring for RDX Stopper, Lower
AYA-12-22016	Sealing Washer for Air Stem - D892
AYA-15-00045	Air Inlet Tube for FoamDDI.
AYA-52-50233	4 Position Test Cylinder Rack
AYA-15-00050	Air Supply Pump for FoamDDI, 110VAC, 60Hz.
AYA-15-00052	Air Supply Pump for FoamDDI, 220VAC, 50Hz.
AYA-15-00055	Filter, Regulator and Dryer System for FoamDDI
AYA-13-88706	Replacement 3/16" Teflon Ferrule for RDX Stopper, Front
AYA-13-88710	Replacement 3/16" Teflon Ferrule for RDX Stopper, Back
AYA-13-88719	Replacement QD Fitting FoamDDI to RDX Stopper, Air Supply
AYA-13-88720	Replacement QD Fitting FoamDDI to RDX Stopper, Air Return (Totalizer)
AYA-13-88728	Replacement QD Fitting RDX Stopper, Air Input
AYA-13-88727	Replacement QD Fitting RDX Stopper, Air Output (Totalizer)
AYA-13-88730	Replacement FoamDDI Module Inline Oil Filter
AYA-13-88901	FoamDDI Gen 1 Centering Disc for Cylindrical Diffuser Stone, PTFE - (Append. X2.3)



AYA-13-88900	FoamDDI Gen 1 Stopper & Temperature Sensor Assembly
AYA-13-88629	Mass Flow Meter
AYA-13-88628	Mass Flow Controller
AYA-13-88833	Valve(s) Vent and Air Jets
AYA-13-88730	FoamDDI Inline Air Filter
AYA-13-88719	FoamDDI Fitting for Supply to Stopper
AYA-13-88749	FoamDDI Fitting for Return from Stopper
AYA-13-88610	Peltier Assembly
AYA-13-88809	Camera (Allied Version) RED
AYA-13-88667	Camera Cable
AYA-13-88644	Camera Lens (Top Camera)
AYA-13-88618	Camera Lens (Bottom Camera)
AYA-13-88650	FoamDDI Ver 2 USB 3.0 SuperSpeed A/B Cable Rev B
AYA-13-88671	USB Hub
AYA-13-88656	vBoard
AYA-13-88648	FoamDDI Ver 2, IR Lamp, 120
AYA-13-88649	FoamDDI Ver 2, IR Lamp, 240
AYA-13-88646	Bottom LED
AYA-13-88745	2018 Outer Glass V2
AYA-13-88830	IR Lamp Guide Mirror
AYA-13-88647	Adjustable Sample Tube Ring Part A
AYA-13-88844	Adjustable Sample Tube Ring Part B
AYA-13-88870	Lens & Filter Holder
AYA-13-88871	Lens & Filter Cover
AYA-13-88734	Power Entry Fuse
AYA-13-88831	DC Power Supply
AYA-13-88832	Fan(s) Chassis and Air Circulation
AYA-13-88936	Temp Probe Cable Connector
Stopper	
AYA-13-88728	Air and Water Quick-Connect Tube Coupling
AYA-13-88727	Air and Water Quick-Connect Tube Coupling



AYA-12-22016	Sealing Washer
AYA-13-88902	Upper O-ring
AYA-13-88903	Lower O-ring
AYA-13-88828	PTFE Probe Tip
AYA-13-89100	O-Ring For Quick Connect Tube Coupling Pack of 5
LogicBox	
AYA-13-88608-1	-1 SBC
AYA-13-88608-2	-2 Display w/touch controller and cable(s)
AYA-13-89027	Power Supply





Specifications:

Applicable Test Methods	ASTM D892
Operational Mode	Sequences I, II and III
Display Units	mL Foam, Temperature °C, Time min., Foam collapse rate seconds. Flow mL/min
Detection Method	Patent Pending CCD Digital Detection
Precision	+/- 0.27mL Foam, +/- 0.1 °C
Optical Design	Patent Pending Optical Arrangement
Light Source	LED Red (600nm)
Measuring Time	Method and Sequence dependent
Calibration	Temperature and Flow calibrations with probes and flowmeters
Display	10.5" Projective Capacitance Touch (Multi Touch)
Operating System	Modern Embedded Windows 10
Interface	Ethernet x2, USB 3.0 x1, USB 2.0 x2, HDMI
Memory / Storage	64 GB SSD Storage
Temperature Range	Capability 20° to 165° C (+/-0.1°) - Requires ambient temperature 15° to 25° C for proper operation
Heating Element	200 Watt Infrared Basking Heat Lamp
Cooling	35 Watt TEC
Humidity	Up to 85% Non-Condensing
Power Requirements	FoamDDI: 110/120VAC, 50/60Hz 3.2A or 220/230 VAC 50/60 Hz 1.6A, IPC Logic Control Box: Auto-switching 90 ~ 264VAC, 47 ~ 63Hz, 280 Watt Power Supply
Materials Requirements	40 psi Instrumental Grade air
Space Requirements	80 mm (3") on Sides and Back. Sides 1", Back 6"
Dimensions (W x D x H) mm (inches)	FoamDDI: 508x228x635 (20x9x25") IPC Logic Control Box: 304x254x152 (12x10x6")
Gross Dimensions & Weight	FoamDDI: Weight 10 Kg. (22 lbs.) 470x180x725 (18.5x7x28.5) IPC Logic Control Box: Weight 3 Kg. (7lbs.)



304x254x152 (12x10x6)

Document Revisions

Date	Version Number	Document Changes
12/7/2020	0.1	Initial Draft from FoamDDI Gen 1 – DS
1/28/2021	0.2	Gen 2 updates - DS
7/23/2021	0.3	Added Standard Package Contents, page 8
02/08/2024	1.6	Added spares and consumables to end of manual - ja
05/31/2024	1.7	Added Seq IV and revised Unpacking - kb
6/3/2024	1.8	Updated software sections. - db