

MYOGRAPH SYSTEM – 110P-XL

USER MANUAL, VOL. 3.7



TRADEMARKS

DMT reserves the right to alter specifications as required.

This document was, as far as possible, accurate at the time of printing.

Changes may have been made to the software and hardware it describes since then.

New information may be supplied separately.

This documentation is provided with the DMT Pressure Myograph System – Model 110P-XL

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SAFETY

The Pressure Myograph System has been designed for use only in teaching and research applications. It is not intended for clinical or critical life-care use and should never be used for these purposes. Nor for the prevention, diagnosis, curing, treatment, or alleviation of disease, injury, or handicap.



CAUTION:

- *DO NOT USE THIS APPARATUS NEAR WATER. THE ELECTRONICS POSE A RISK OF ELECTRICAL SHOCK.*
- *TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THIS APPARATUS TO RAIN OR MOISTURE. OBJECTS FILLED WITH LIQUIDS SHOULD BE PLACED ON THE APPARATUS.*
- *DO NOT BLOCK ANY VENTILATION OPENINGS. INSTALL IN ACCORDANCE WITH THEM MANUFACTURER'S INSTRUCTIONS.*
- *ONLY USE SECURE INDUSTRY STANDARD CONNECTORS AND TUBING FOR PRESSURE CONNECTIONS. FAULTS, DEFECTS, AND MISTAKES DUE TO WRONG CONNECTIONS VOID WARRANTY. WE ARE NOT ACCOUNTABLE FOR RESULTS AND MISTAKES DUE TO INAPPOSITE PRESSURE HOOKUP.*
- *DO NOT INSTALL NEAR ANY HEAT SOURCE SUCH AS RADIATORS, HEAT REGISTERS, STOVES, OR OTHER APPARATUS THAT PRODUCE HEAT.*

The Pressure Myograph System is delivered with an external 100-240VAC to 24VDC adapter.

Protect the power adapter and cord from being walked on or pinched. Particularly at power plugs and the point where they connect to the apparatus.

Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as, the power-supply cord or plug is damaged, liquid has spilled onto or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

EC DECLARATION OF CONFORMITY

DMT A/S

Certify and declare that the following apparatus:

Pressure Myograph System - DMT110P-XL

Restrictive use: Only for laboratory use.

Manufactured by:

DMT A/S

Rho 14

8382Hinnerup

Denmark

Conforms with the essential requirements of the EMC Directive 2004/108/EC.

Based on the following specifications applied by:

EN 61326-1:2006

EN 61326-2-6:2006 EN

61326-2-6/Corr.:2007

And with the LVD Directive 2006/95/EC.

Based on the following specifications applied by:

EN 61010-1:2010

EN 61010-2-030:2010

General warnings regarding EMC:

Do not use this device in close proximity to sources of strong electromagnetic radiation (e.g. unshielded intentional RF sources), as these may interfere with the proper operation.

CHAPTER 1 - SYSTEM OVERVIEW

1.1 INTERFACE

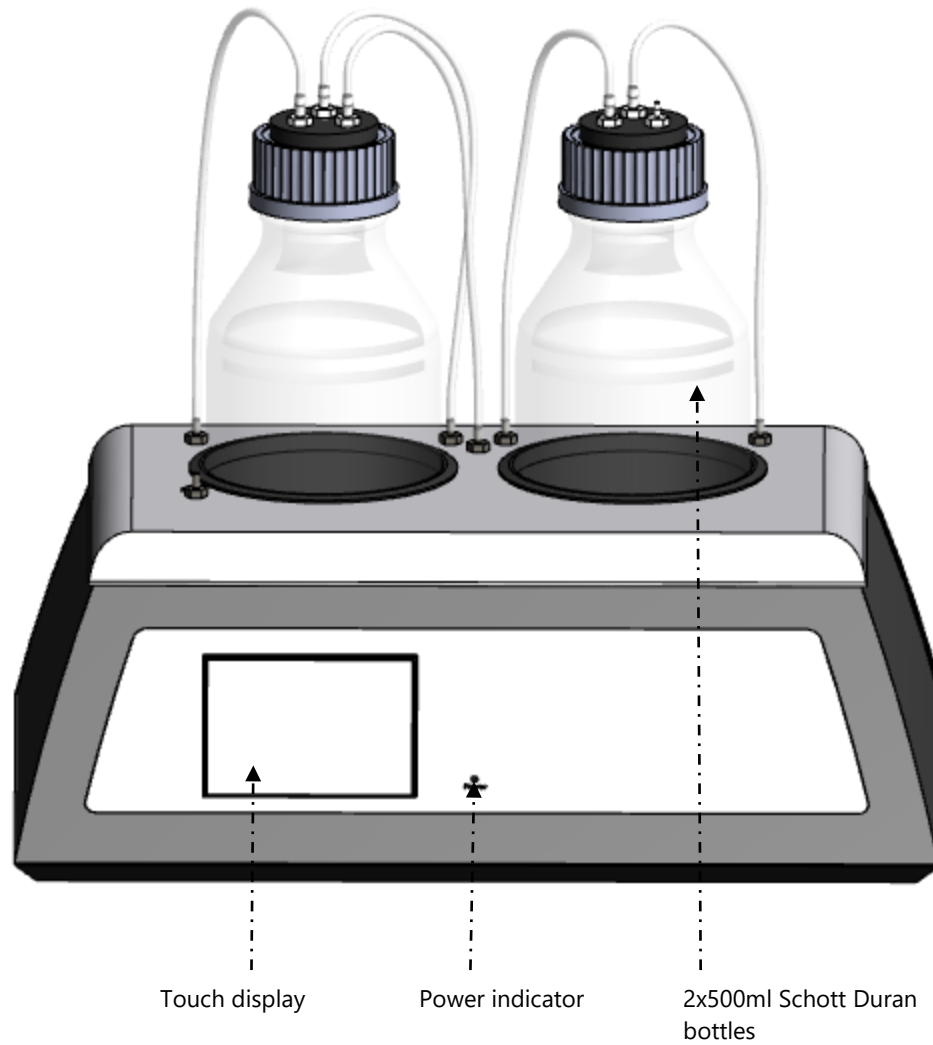


Figure 1.1 Pressure Interface - front

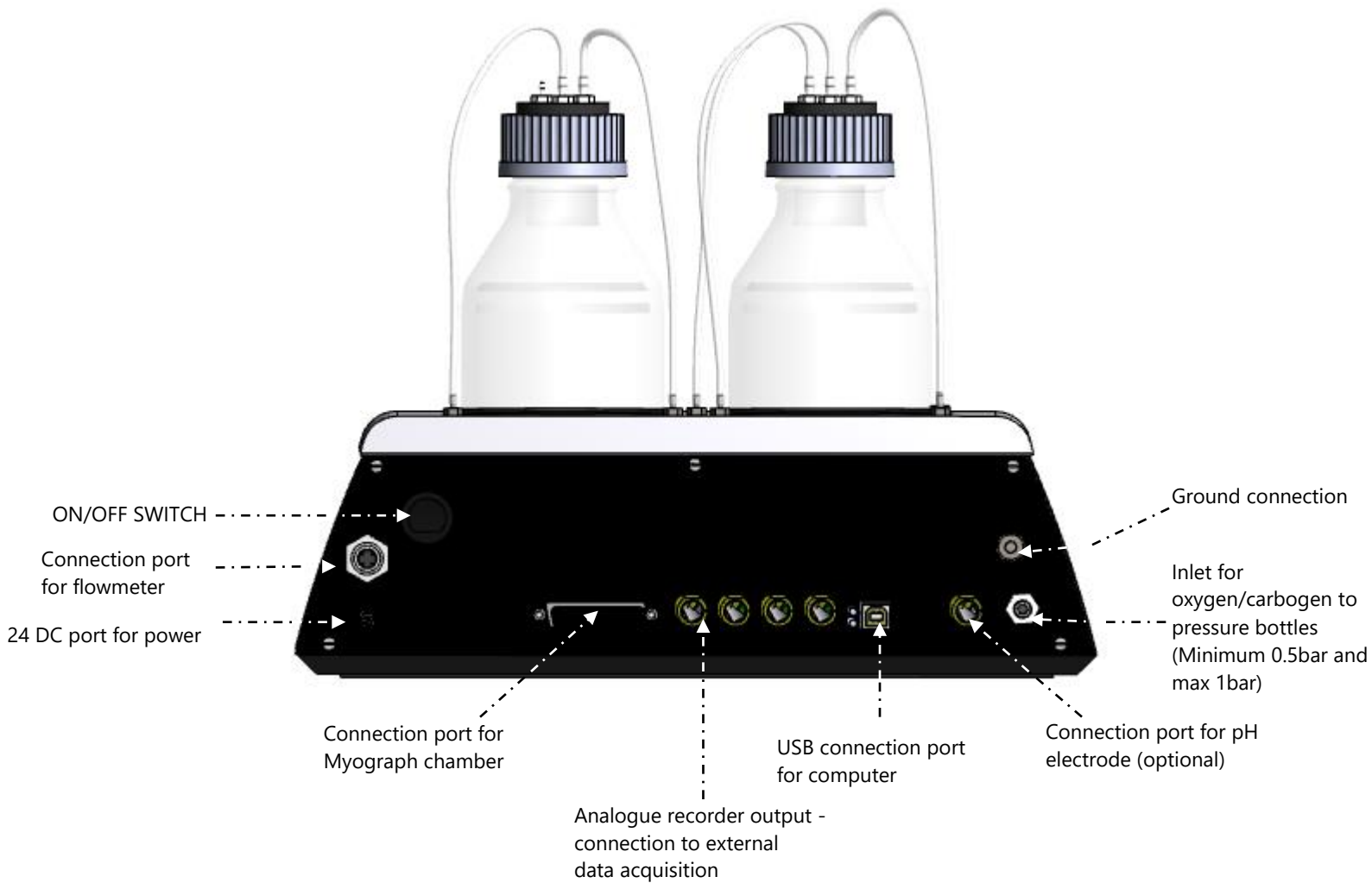
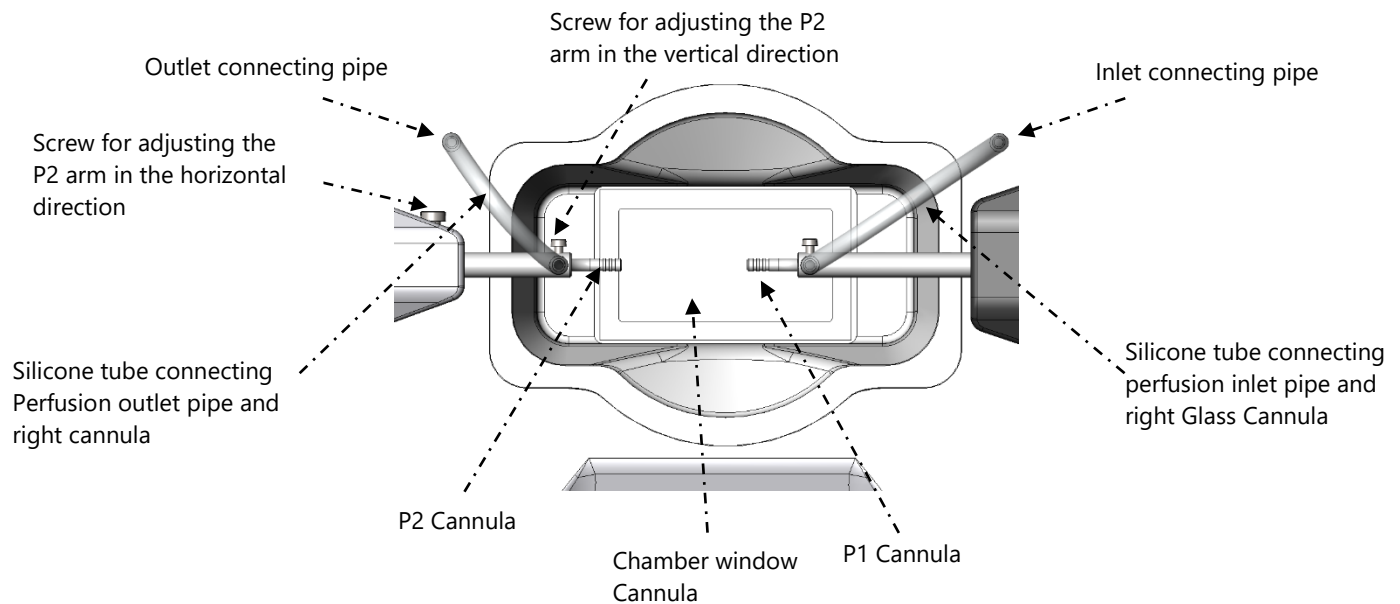
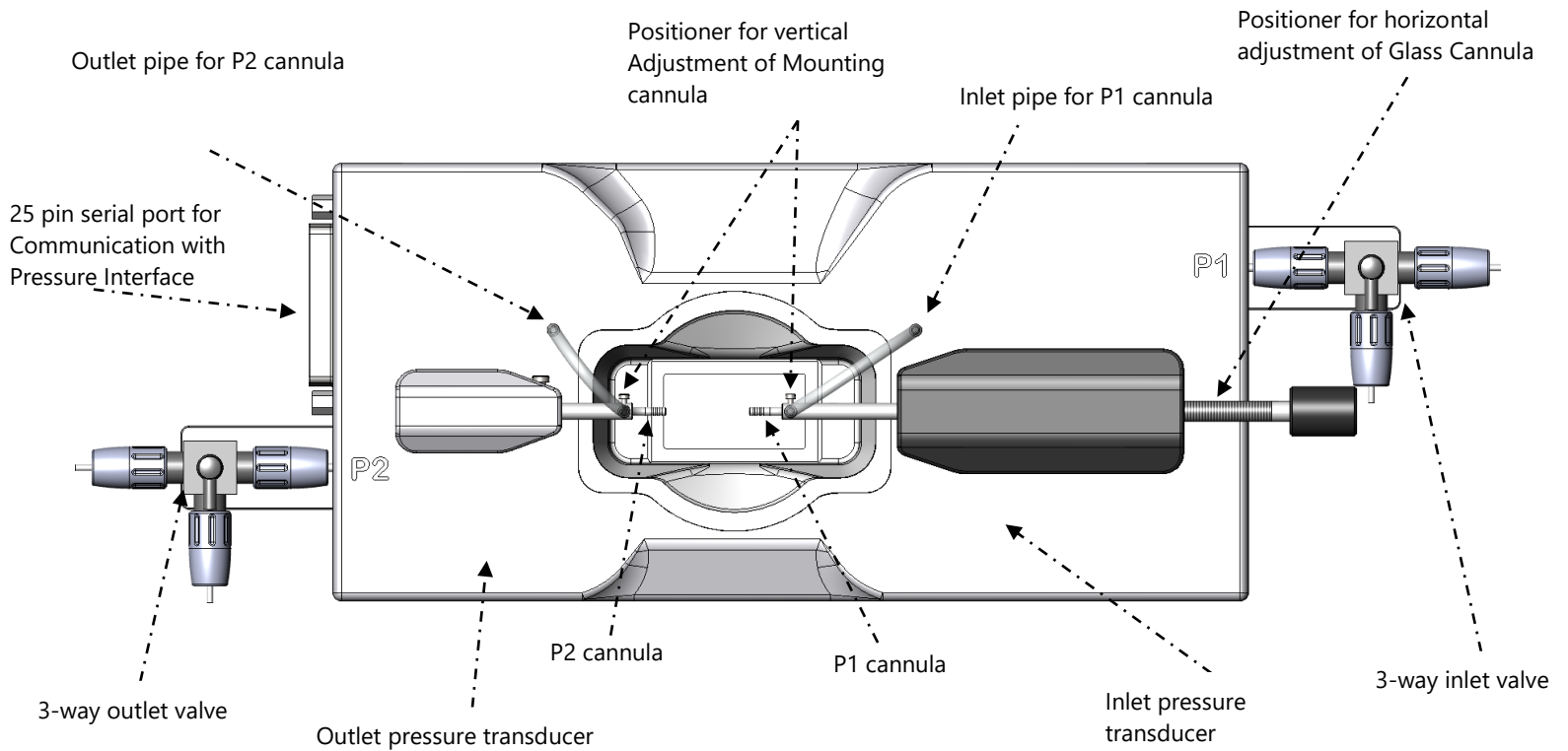


Figure 1.2 Pressure Interface - rear

1.2 110P-XL PRESSURE MYOGRAPH CHAMBER



CHAPTER 2 - SETTING UP THE 110P-XL SYSTEM

2.1 SETTING UP THE COMPLETE PRESSURE MYOGRAPH SYSTEM

Figure 2.1 is an example of a complete set-up for the Pressure Myograph System. A detailed step-by-step description is provided in the remaining sections of chapter 2.

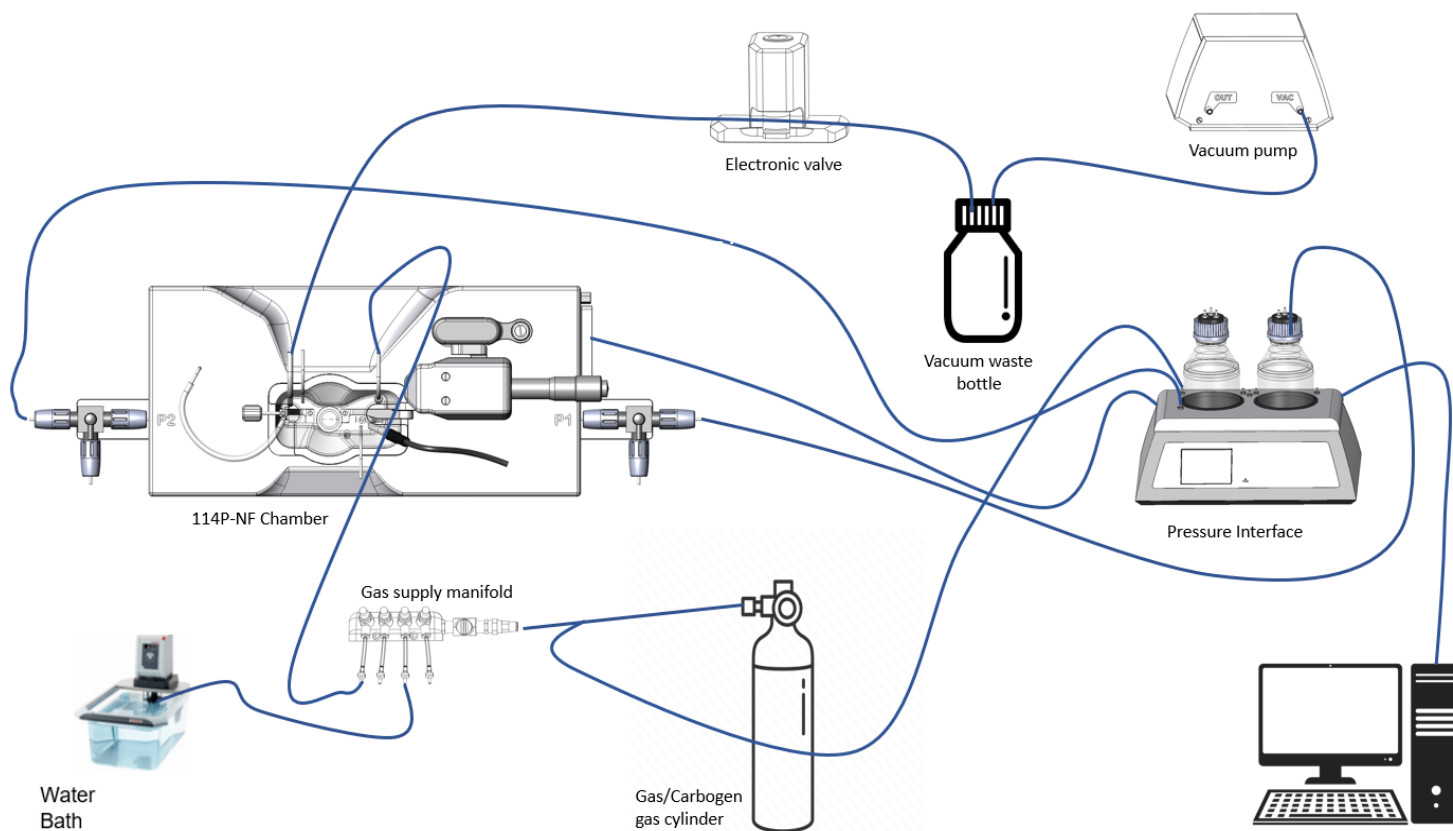


Figure 2.1 Pressure Myograph – 110P-XL Set up outline

The Pressure Myograph System will work with a range of different microscopes: the DMT Microscope, the Zeiss Axio vert A1, the Nikon TS-100F and Motic AE 2000 and others.

NOTE: THE MICROSCOPE IS ESSENTIAL FOR THE DIMENSIONAL ANALYSIS OF THE MOUNTED VESSELS.

The DMT Microscope is a standard inverted microscope with a built-in digital CCD USB camera. The DMT Microscope is very effective and recommended in setups requiring standard image analysis.

The Zeiss Axio vert A1 is an inverted microscope that provides the highest degree of flexibility in image analysis. The Zeiss Axio vert A1, a Nikon TS-100F and Motic AE 2000 enable the use of a wide range of objectives and facilitate sophisticated fluorescence techniques. Objectives for the 110P-XL chamber will typically be 1.25x and up to max 5x objectives. A camera c-mount is needed for the DMT USB camera.

Contact the DMT Sales Department for further product information and price on any optional equipment, including microscopes.

2.2 SETTING UP STEP-BY-STEP

This section describes how to connect the cables in the Pressure Myograph System as illustrated in figure 2.1.

NOTE: BEFORE PROCEEDING SETTING UP STEP-BY STEP MAKE SURE THAT THE PRESSURE INTERFACE, THE MICROSCOPE AND THE COMPUTER ARE SWITCHED OFF.

1. Pressure Myograph chamber to Pressure Interface connection: Connect the Pressure Myograph cable to the Pressure Interface by using the grey 25/44-pin connection cable. Then connect the cable to the Pressure Myograph Chamber.
2. Pressure Interface to computer connection: Connect the Pressure Interface to the computer with the USB cable, from the back panel of the Pressure Interface to the USB port on the computer.

3. Pressure Interface and oxygen supply connection: Connect the “Oxygen” inlet on the back of the Pressure Interface to an adjustable oxygen supply using the “Atlas Copco Cablair hose” delivered with the Pressure Myograph System.

IMPORTANT: MAKE SURE THAT THE HOSE IS SECURELY FASTENED TO THE “OXYGEN” INLET USING THE HOSE CLIP. THE PRESSURE FROM THE OXYGEN SUPPLY MUST BE BETWEEN 0.5 BAR and 1.0 BAR.

4. Microscope/camera to computer connection:
 - A. DMT Inverted Microscope: Inside the DMT Microscope there is a USB camera wired to a USB cable and one USB cable to power the microscope light. Connect the two USB cables from the DMT Microscope to the computer USB ports.
 - B. Another microscope: Zeiss Axio vert A1, Nikon TS-100F, Motic AE 2000 etc. Connect the USB cable from the USB camera mounted on the microscope to the computer USB port.

NOTE: IF YOU HAVE NOT PURCHASED A COMPUTER FROM DMT FOLLOW THE MYOVIEW QUICK INSTALLATION GUIDE TO INSTALL MYOVIEW ON YOUR OWN COMPUTER. PLEASE MAKE SURE THE COMPUTER HAS THE REQUIRED SPECIFICATIONS.

NOTE: IF YOU HAVE PURCHASED A COMPUTER FROM DMT WITH YOUR PRESSURE MYOGRAPH SYSTEM THEN MYOVIEW DATA ACQUISITION SOFTWARE HAS ALREADY BEEN INSTALLED WITH DRIVERS FOR THE DIGITAL USB CAMERA. FOLLOW THE NEXT PROCEDURE TO SETUP THE PRESSURE MYOGRAPH SYSTEM.

5. OPTIONAL: Pressure Interface to external Data Acquisition System connection (optional): If you have not obtained the MyoVIEW software the four BNC ports on the rear of the Pressure Interface enables connection of an external data acquisition system for recording inlet pressure P1, outlet pressure P2, longitudinal force, probe temperature, chamber temperature, flow ON/OFF, pressure ON/OFF, pH1 value.
6. Turn on the power: Turn on the main power to the Pressure Interface by using the power switch. Then turn on the computer. The Pressure Myograph System is now ready for use with MyoVIEW Data Acquisition Software.

2.3 THE FIRST PRESSURE CALIBRATION

Prior to shipping the Pressure Myograph System has gone through two days of continuous testing, including final pressure calibration. However, in order to ensure that the Pressure Myograph System is working at the highest performance, DMT recommends that a new pressure calibration is performed before the first use. The pressure calibration procedure is described in detail in chapter 3.7.1.

2.4 EXTERNAL PRESSURE MYOGRAPH CONNECTIONS

This section illustrates how to connect the pressure circuit, the oxygen supply, the pressure supply, and the suction device to the Pressure Myograph.

2.4.1 CONNECTING PERFUSION FLOW AND PURGING THE SYSTEM WITH BUFFER

The Pressure Interface controls the pressure and temperature. Instructions on how to control the pressure are provided in Chapter 3.4. To connect the Pressure Interface to the Pressure Myograph, use the silicone tube (internal diameter 1mm) delivered with the Pressure Myograph System.

- Connect the “perfusion/pressure inlet” at P1 on the Pressure Myograph (see Figure 2.2) to the P1 outlet on the cap of the Pressure Interface bottle (see Figure 2.3).
- Connect the “perfusion/pressure outlet” at P2 on the Pressure Myograph (see Figure 2.2) to the P2 inlet on the Pressure Interface (see Figure 2.3).

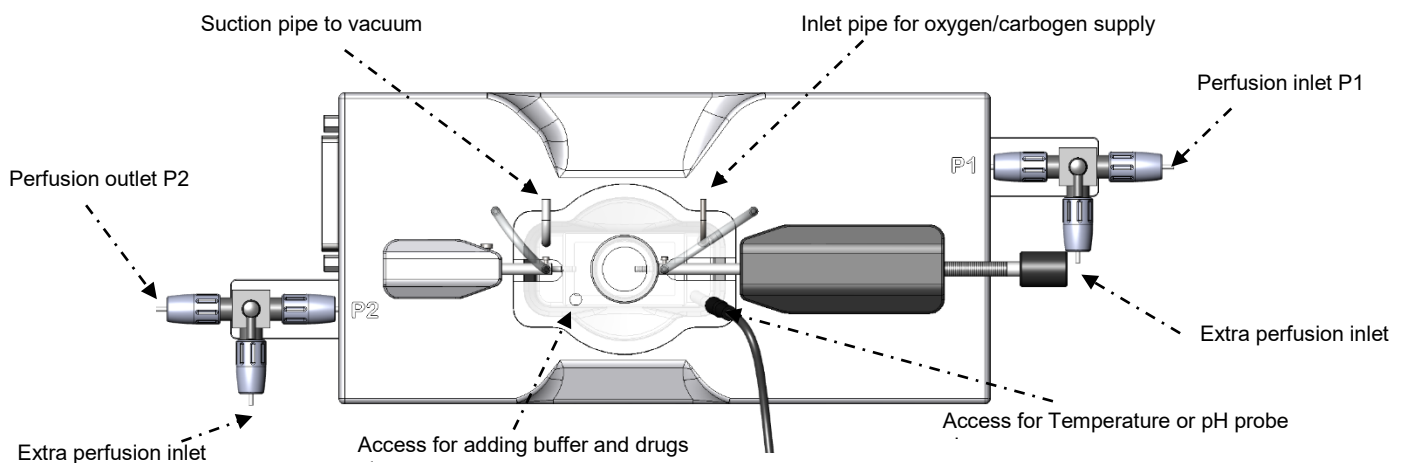


Figure 2.2 External connections for Pressure Myograph 110P-XL

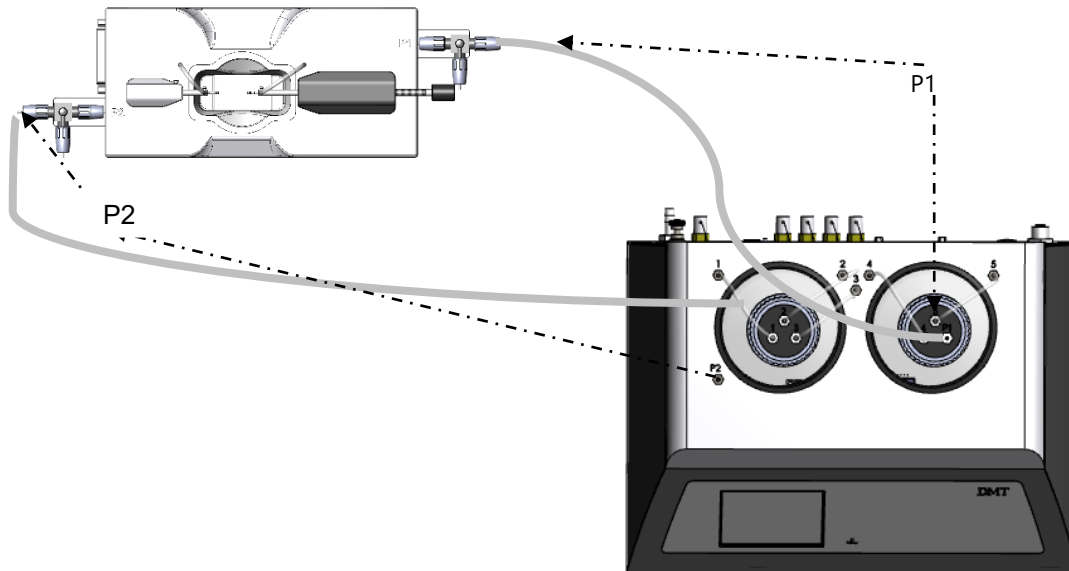
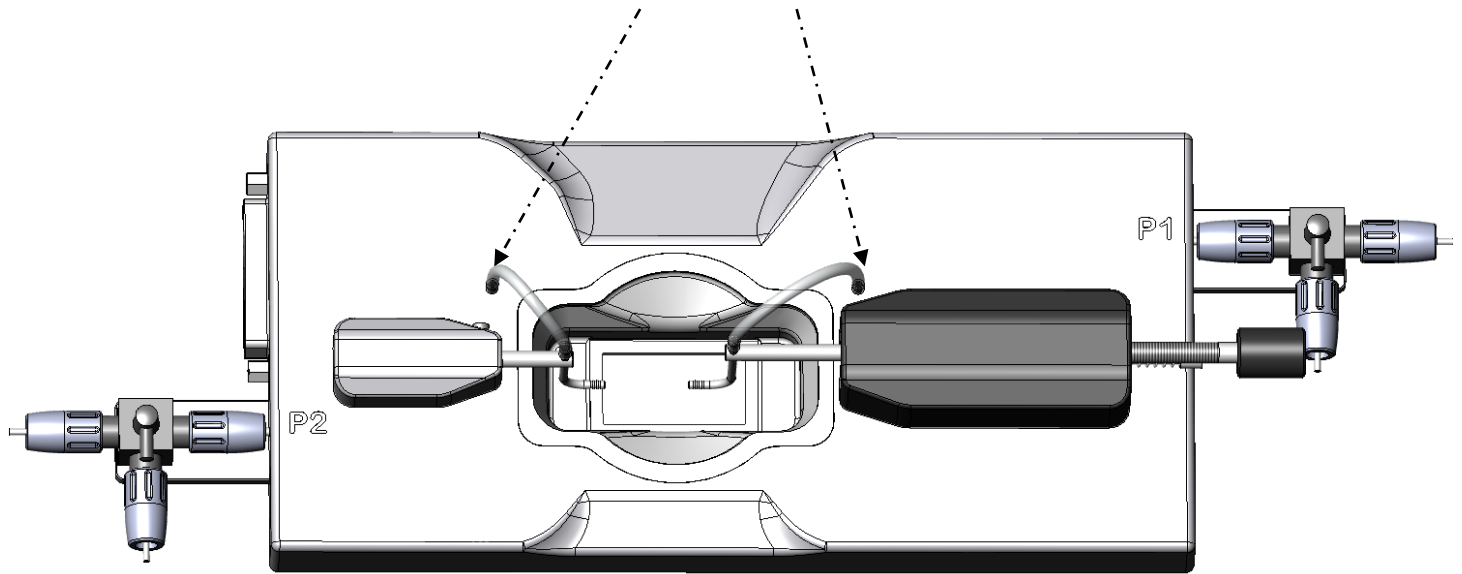


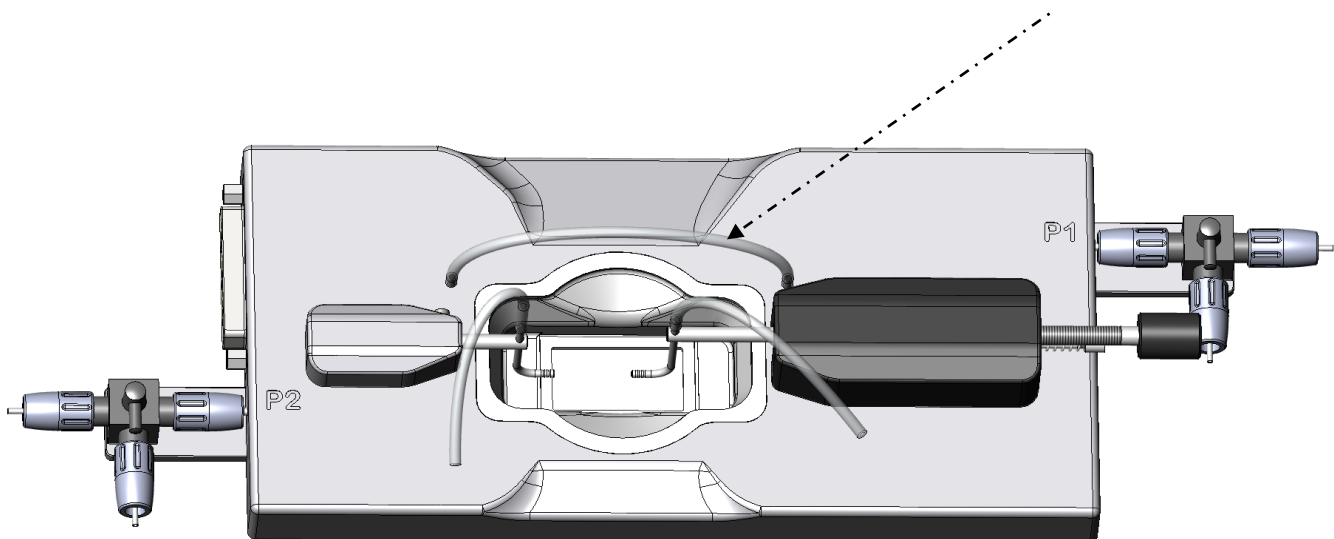
Figure 2.3 External connections for Pressure Myograph – 110P-XL

NOTE: TO FILL THE TUBING AND AVOID AIR BUBBLES, MOUNT THE CALIBRATION SHUNT (RESISTANCE TUBE) AS SHOWN BELOW

Calibration shunt tubes delivered in a small box with the system is attached to the two steel pipes



Calibration shunt tube connected



Fill the P1 Schott bottle with a maximum of 300 ml pre-warmed buffer aerated with carbogen.

NOTE: It is very important that the buffer is prewarmed to 37°C and aerated with carbogen to avoid air bubbles in the silicone tubing during an experiment.

In the pressure interface menu set the pressure P1 and P2 as follow:

P1 = 150 mmHg

P2 = 70 mmHg

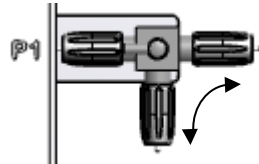
Set the Pressure ON

Set Flow ON

IMPORTANT:

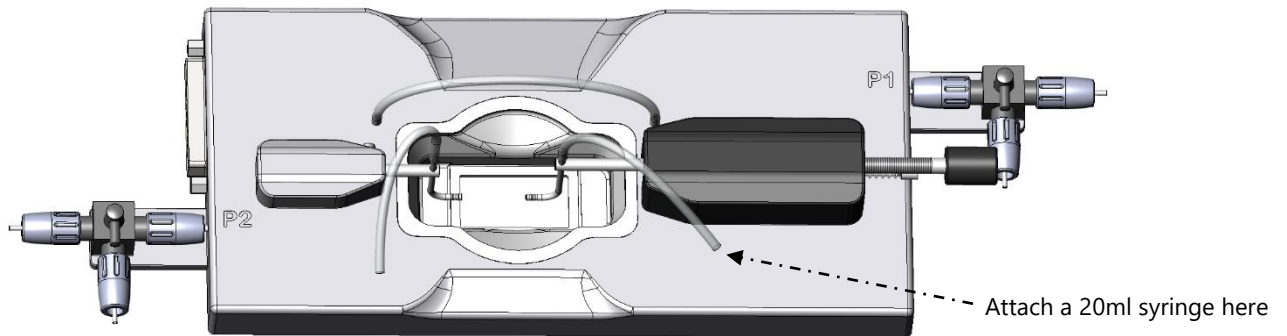
- *LET THE PRESSURE REGULATOR RUN UNTIL NO AIR BUBBLES ARE VISIBLE IN THE PERFUSION CIRCUIT.*
- *NEVER RUN AIR BUBBLES THROUGH A VESSEL AS THIS MAY DAMAGE IT.*
- *NEVER FILL THE BUFFER BOTTLE WITH MORE THAN 300 ML AS HIGHER VOLUMES. IT MAKES PRECISE CONTROL OF THE PRESSURE MORE DIFFICULT.*

1. When no air is seen in the tubing turn off the flow and pressure. Close the P1 3-way valve to the chamber as shown below.

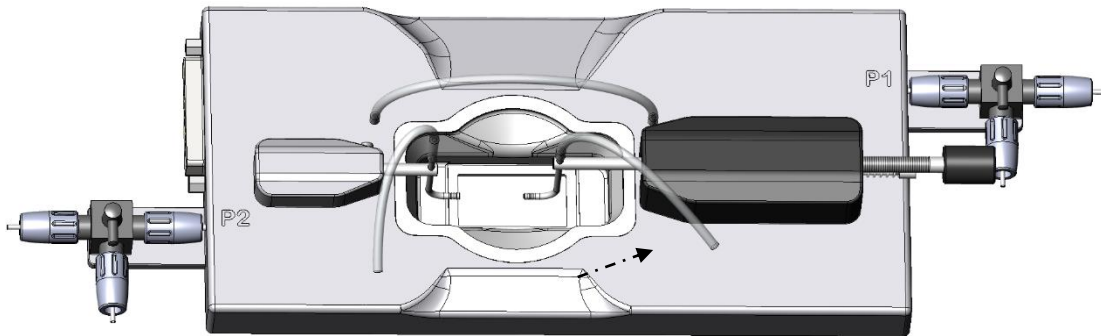


Attach a 20ml syringe here

2. Fill the 110P-XL chamber with 12 ml pre-heated buffer.

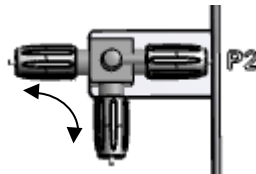


3. Attach a 20ml syringe to the silicone tubing on the P1 cannula and use the syringe to drag buffer backwards into the P1 cannula and silicone tube. When all air is removed, re-connect the silicone tube from the cannula to the Inlet connecting pipe again replacing the Calibration shunt tube as shown below.

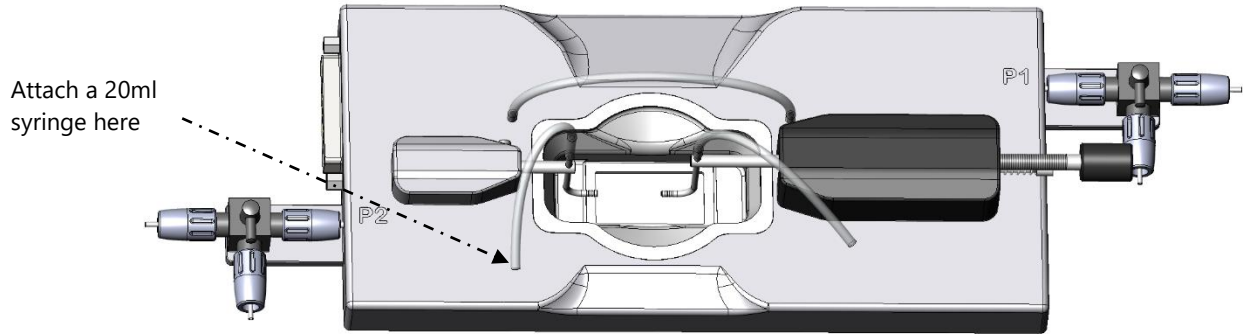


4. Close the P2 3-valve towards the chamber as shown below

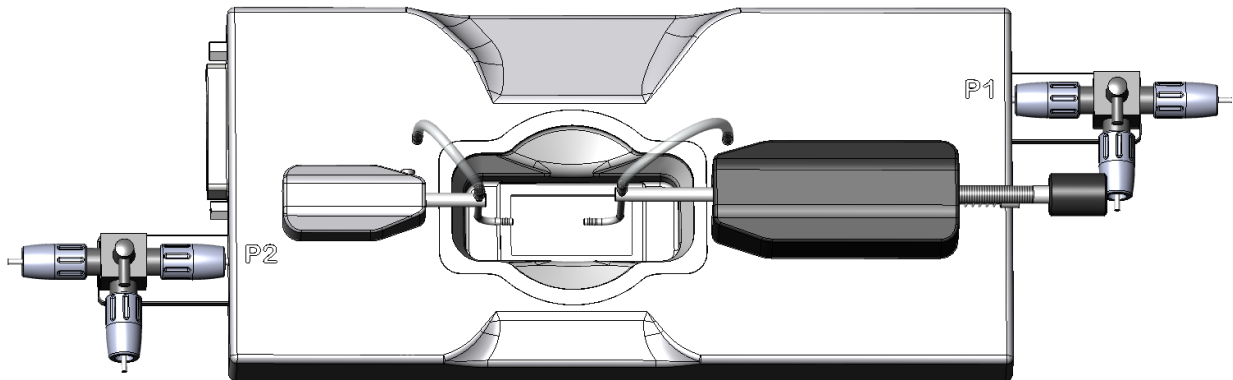
Connected port to marked P2
on the pressure interface



- Attach a 20ml syringe to the silicone tube (Shown in the figure below) on the P2 side and use the syringe to drag buffer into the P2 cannula and silicone tube.

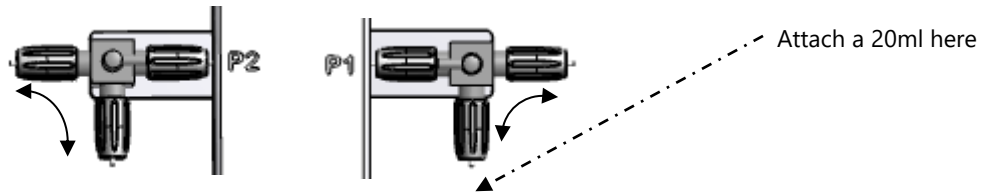


- When all air is removed, re-connect the silicone tube to the Outlet connecting pipe on the 110P-XL chamber, see figure below.

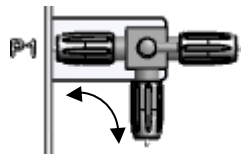


- If no air bubbles are visible, then continue with the mounting of the artery (See USER GUIDE) and skip step 8-11. If air bubbles are present, then try to repeat the above until all are removed. If an air bubble is located on the P1 side, then try to remove it as described in step 8-10, otherwise skip these steps.

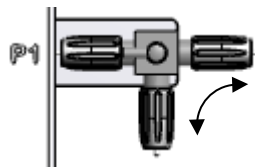
8. Close the 3-way valves toward the chamber at the P1 and P2 sides.



9. Attach a 20ml syringe at the extra P1 perfusion Inlet and drag a small volume of buffer through the 3-way valve to remove air in the valve. Then close the 3-way valve toward the P1 buffer flask on the interface as shown below.



10. Now very gently with the syringe, push buffer into the chamber (MONITOR the P1 Pressure on the Pressure Interface screen and DO NOT exceed 200mmHg). Make sure the chamber is connected to the interface with the myograph cable. Push minimum 5ml into the chamber and P1 cannula to remove air. Close the 3-way valve toward the chamber as shown below.



11. The 110P-XL chamber can now be moved to a dissection microscope for mounting of the vessel in the chamber by detaching the silicone tubes connected to the P1 and P2 3-way valves and the myograph cable.

NOTE: ARTERY MOUNTING PROCEDURE SEE "PRESSURE MYOGRAPH -110P-XL USER GUIDE PAGE".

2.4.2 EXTRA PERFUSION INLET/OUTLET

The extra perfusion inlet/outlet 3-way valves on the Pressure Myograph allow the introduction of special agents or reagents to the perfusion circuit during an experiment. They are placed at P1 and P2 on the Pressure Myograph and the small handle on top of the valves controls the flow direction. See figure 2.4.

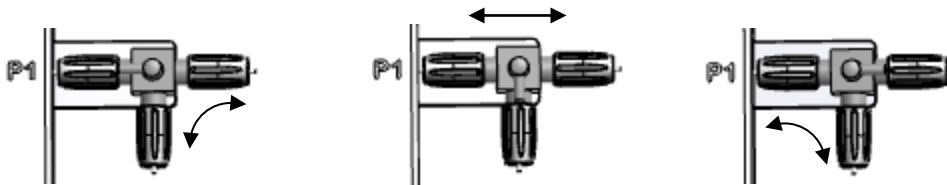


Figure 2.4 3-way valve flow settings at P1.
The arrow indicates the flow directions.

2.4.3 CONNECTING A SUCTION DEVICE

Connect the “large” pipe on the Pressure Myograph chamber cover (see figure 2.5) to a vacuum pump via a suction bottle and a vacuum valve as illustrated in figure 2.1. The internal diameter of the silicone tube used for this connection must be 2 mm. (2 mm tubing is not included with the Pressure Myograph System).

The Vacuum Package (#101018/#101052) contains the electronic valve, waste bottle, vacuum pump and all the tubing and fittings.

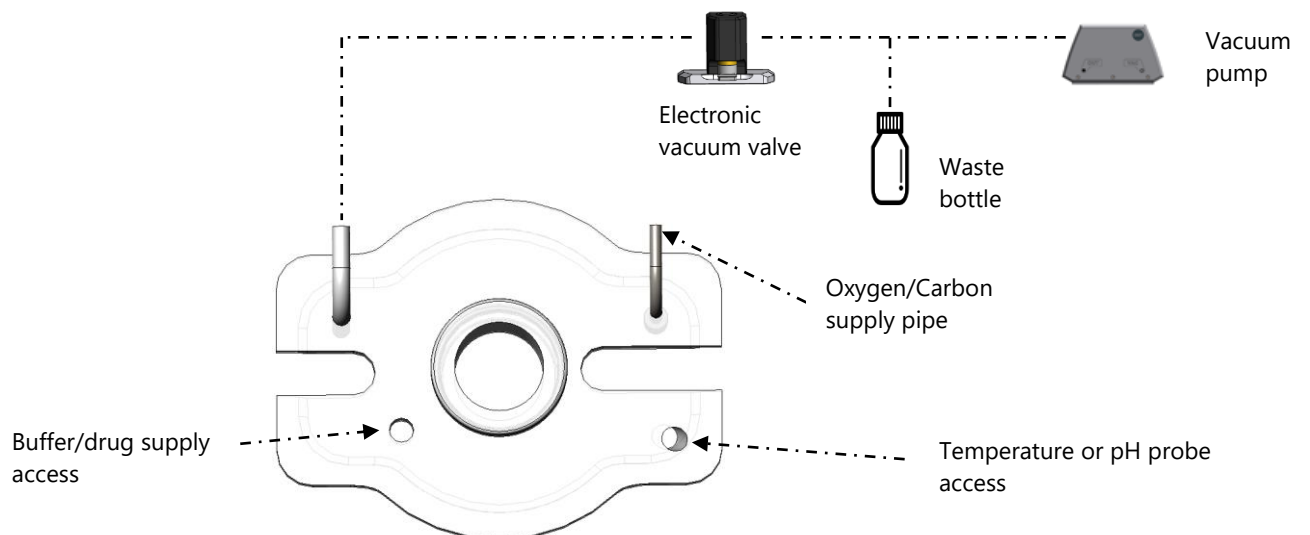


Figure 2.5 Description of coverlid functions for the 110P-XL chamber

CHAPTER 3 - PRESSURE INTERFACE MENUS

This chapter contains a detailed description of how to navigate the touch screen menus and how to use the special features of the Pressure Interface.

3.1 GENERAL DESCRIPTION OF HOW TO NAVIGATE THE TOUCH SCREEN

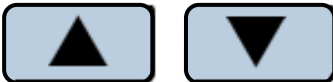
Menus on the Pressure Interface are all accessible by a touch screen. To access a menu, simply touch the screen. When a setting needs to be changed, press SELECT beside the line to be changed.



The line selected will turn blue, indicating that the Pressure Interface is in edit mode and waiting for input. When DEFAULT is chosen, a default value will be displayed.




To change the numeric value for the selected parameter, touch the UP or DOWN arrows.



Once the desired setting has been chosen, pressing ENTER will save the selection, and the new value will be stored in memory. The selected line will turn black.

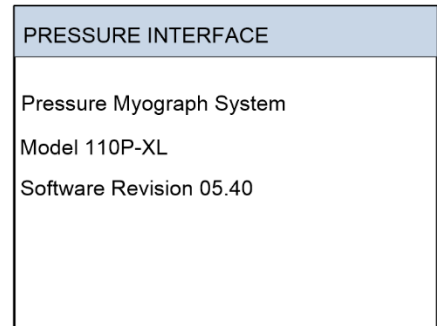


Pressing the white X in the red box will exit the menu and take you automatically to the Main Menu. 

P1 Inlet setpoint:	+120.0mmHg	SELECT
P2 Outlet setpoint:	+85.0mmHg	SELECT
Pressure gradient:	5.0mmHg/sec.	SELECT
Pressure:	ON OFF	
Flow:	ON OFF	
		ENTER
		DEFAULT

3.2 POWER-UP SCREEN

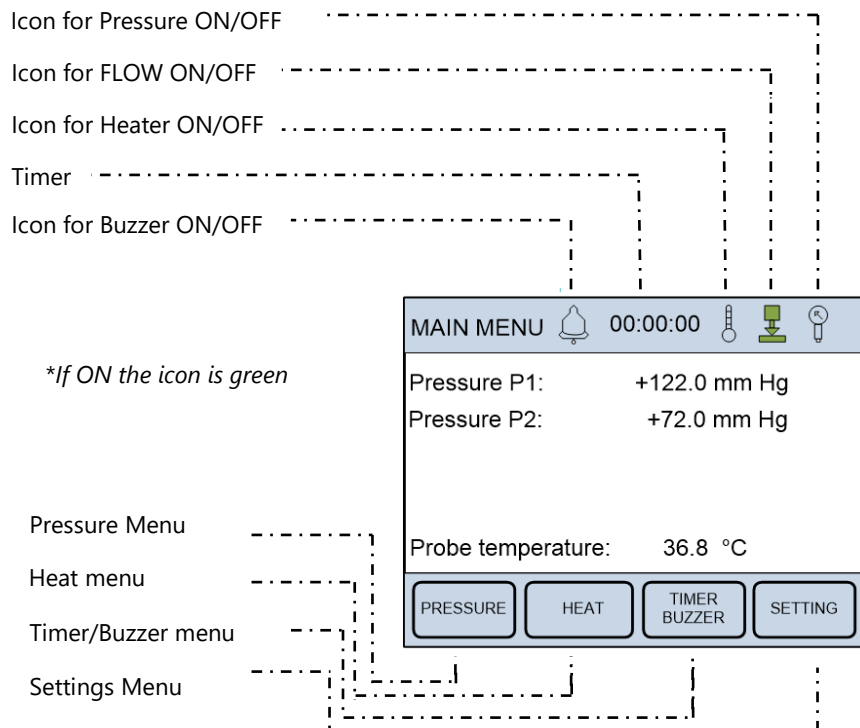
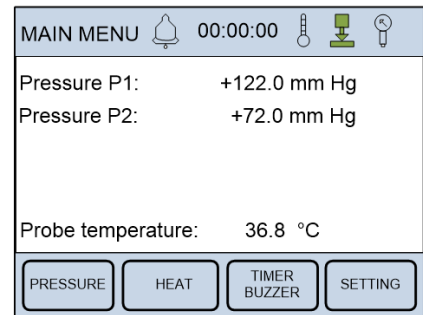
After turning on the Pressure Interface, an introduction screen appears. It displays the software version number. While this screen is displayed the system is auto-initializing. After a few seconds, the Main Menu display will appear, showing the firmware version of the system.



3.3 MAIN MENU

The Main Menu gives a good overall picture of how the Pressure Interface is working. It displays values for the input pressure, output pressure, pH (Optional), probe temperature and time, and the status of systems including the time, heat, flow and pressure.

Four sub-menus are accessible from the Main Menu screen: Pressure Menu, Heat Menu, Timer Buzzer Menu and Setting Menu.



Buzzer icon:

This icon indicates the status on the buzzer. If the icon is grey the buzzer is OFF.

If the icon is green the buzzer is ON (active) and will make a sound when the timer reaches zero.

OFF ON

Timer:

The Timer is a countdown timer that can be set to maximum 24 hours. If the Buzzer is activated, it will buzz when the timer reaches zero.

00:00:00

Heat icon:

This icon indicates the status of the chamber heat. If the icon is grey the heat is OFF.

If the icon is green the heat is ON (active).

OFF ON

Flow valve icon:

This icon indicates the status on the flow valve.

If the icon is grey the flow valve is OFF (NO flow). If the icon is green the flow valve is ON (active).

OFF ON

Pressure icon:

This icon indicates the status of the pressure regulation. If the icon is grey the pressure regulation is OFF.

If the icon is green the pressure regulation is ON (active).

 
OFF ON

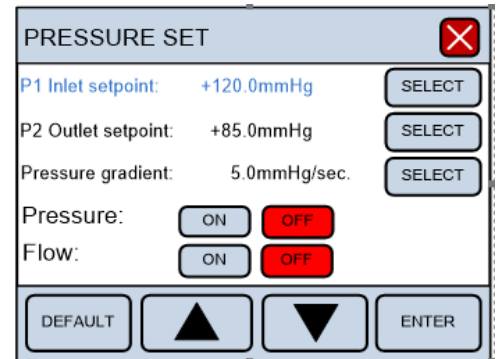
Zero:

Is used to zero the output from the force transducer. Pressing ZERO will reset the baseline of the chart traces without affecting the calibrations.



3.4 PRESSURE MENU

The pressure is controlled from this menu. Use SELECT to select the line to be changed. When selected the line changes to blue (edit mode). Use DEFAULT or UP and DOWN arrows to change the setpoint value. Pressing ENTER will save the new setpoint.

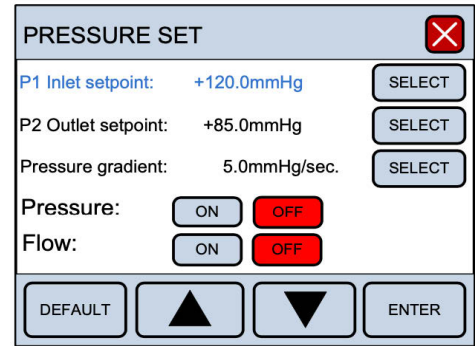


*NOTE: IT IS NOT POSSIBLE TO CREATE FLOW IN THE 110P-XL SYSTEM THAT WILL CORRELATED WITH THE P1 AND P2 PRESSURE DIFFERENCE. DMT RECOMMENDS THAT **NO FLOW** IS ALWAYS SELECTED DURING AN EXPERIMENT. IN **NO FLOW** THE MOUNTED ARTERY WILL BE EXPOSED TO THE P1 PRESSURE ONLY.*

P1 Inlet setpoint is the pressure value that the regulator is setting on the inlet side of the Pressure Myograph. The pressure range is 0-250mmHg. If FLOW is set to OFF the mounted artery will only be exposed to the P1 pressure

P2 Outlet setpoint is the pressure value that the regulator is setting on the outlet side of the Pressure Myograph. The pressure range is 0-250mmHg. If FLOW is set to OFF the mounted artery will not be exposed to the P2 pressure but only the P1 pressure

Pressure gradient sets the speed at which the regulator modifies the pressure. The pressure change range is 1-10mmHg/sec.



IMPORTANT:

- P1 INLET SET POINT CANNOT BE LOWER THAN P2 OUTLET SET POINT. THIS IS TO PREVENT BACKFLOW IN THE SYSTEM.
- IF FLOW IS ON, P1 INLET SET POINT HAS TO BE HIGHER THAN P2 OUTLET SET POINT. THE SYSTEM WILL AUTOMATICALLY MAKE THE CORRECTION IF A SMALLER DIFFERENCE IS ENTERED.
- IF NO-FLOW IS WANTED, TURN FLOW OFF. WITH FLOW OFF THE MOUNTED ARTERY IS EXPOSED TO THE P1 PRESSURE ONLY.

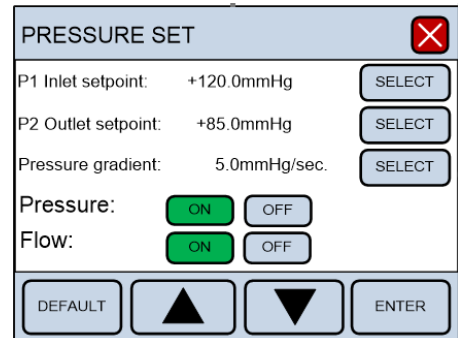
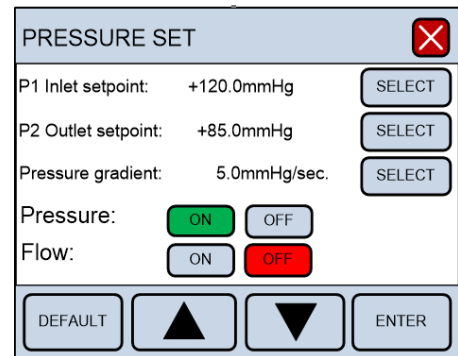
The pressure regulator and the flow icons are also controlled from this menu. To turn the pressure regulator on press ON outside the line for Pressure. When activated it turns green.

In Main Menu the pressure icon also turns green when pressure regulation is on.



ON

To turn the flow on press ON outside the line for Flow. When activated it changes green.



In Main Menu the flow icon also turns green when flow is on.

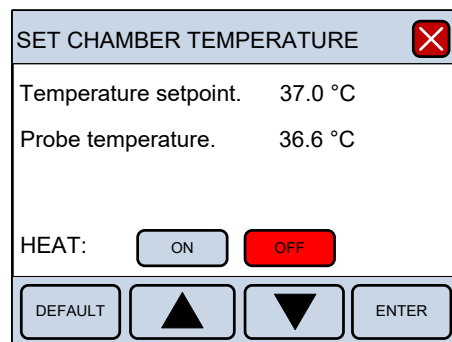
Turning flow on will demand that the P1 is equal or higher than P2 pressure set point. The pressure interface will automatically make the correction of P1 set to the same value as P2 if P1 is lower than P2. Turn flow OFF to simulate a “blind sac” experiment. Do not set P1 equal P2 because risk of backflow.



ON

3.5 HEAT MENU

The chamber and bottle heating temperature are controlled from this menu. To turn the heat on, or to change the temperature for the system, press the HEAT in the Main Menu. The display will enter the Heat Menu and allow the user to change the system temperature, as well as turn heat on or off. Pressing DEFAULT will automatically reset the temperature setpoint to 37°C. Manually change the temperature by pressing the UP or DOWN arrows. Pressing ENTER will save the new temperature setpoint.

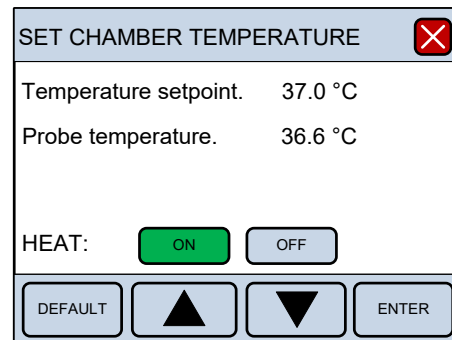


To turn the heat on, press ON and it will turn green. The system will heat to the desired temperature setpoint.

In Main Menu the thermometer icon turns green when the heat is on.



ON



3.6 TIMER AND BUZZER MENU

The timer and buzzer are controlled from this menu.

Use SELECT to program the timer. The timer can be programmed in intervals from 0 to 23:59:59 (Hours: minutes: seconds). When Set Timer is selected press the UP and DOWN arrows to program the timer. The hours are programmed first, and then use the RIGHT arrow to get to the minutes and then the seconds.

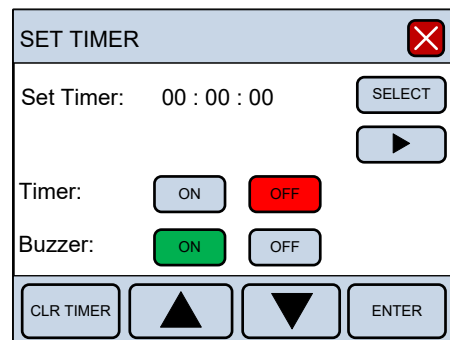
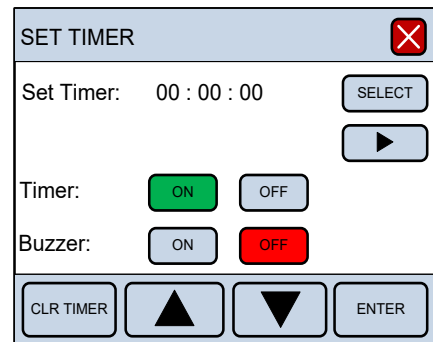
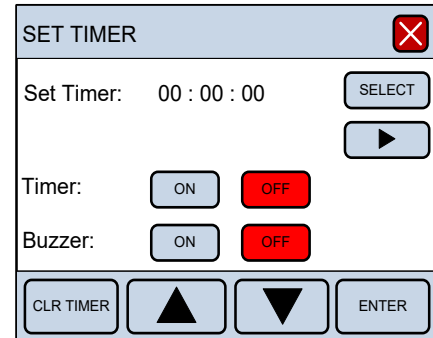
Pressing ENTER will save the programmed time.

To start the timer, press the Timer ON and it will turn green. When the timer reaches zero it automatically switches to OFF. If the buzzer is set ON it will make a tone when the timer reaches zero

To activate the buzzer, press ON and it will turn green. In Main Menu the bell icon also turns green.



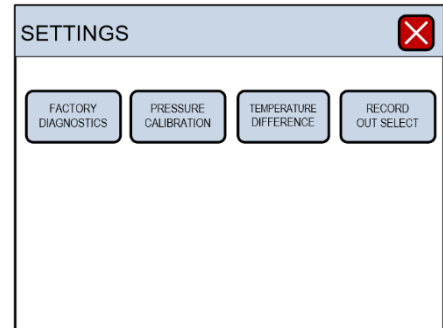
ON



3.7 SETTING MENU

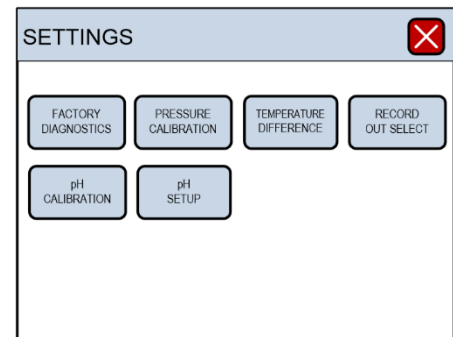
The Settings Menu for the 114P system contains several sub-menus. These sub- menus include:

- Pressure Calibration
- Temperature difference
- Record Out Select
- Factory diagnostics



The Settings Menu for the 110P-XL with pH electrode module

- Pressure Calibration
- Temperature difference
- Record Out Select
- pH calibration
- pH setup
- Factory diagnostics



3.7.1 PRESSURE CALIBRATION MENU

3.7.1.1 Set-up the pressure calibration procedure

Press Settings in the Main Menu and then press Pressure Calibration. The set-up to perform the pressure transducer calibration procedure is illustrated in figure 3.3 Carefully follow the procedure described below to calibrate the Pressure Myograph System. The calibration procedure is listed in 5 individual steps and needs to be performed one at a time to calibrate the system.

PRESSURE CALIBRATION PROCEDURE FOR PRESSURE MYOGRAPH 110P-XL

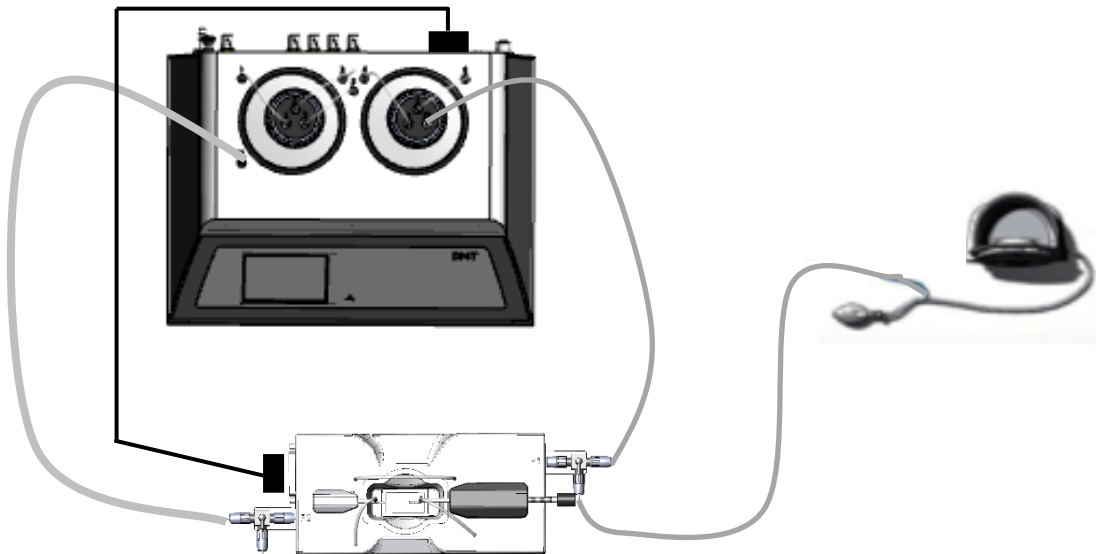
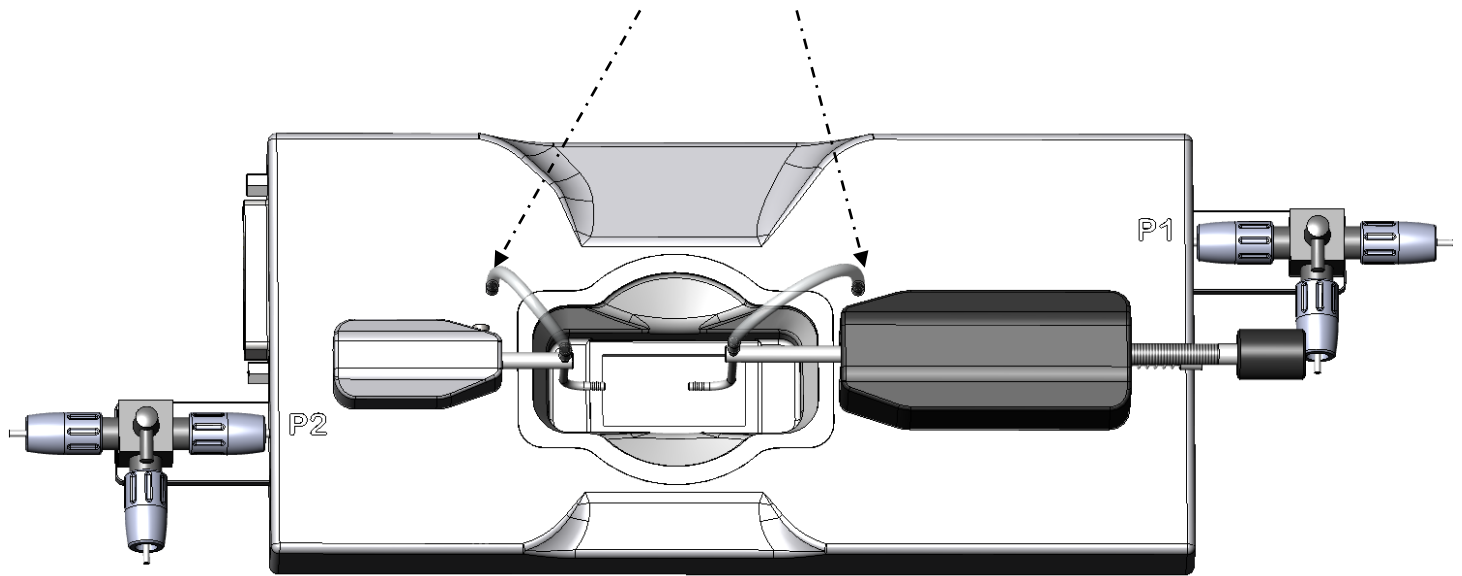


Figure 3.3 Illustration of proper set up for pressure calibration.

1. Connect the Pressure Interface with the Pressure Myograph chamber.
2. Connect the Big Ben Pressure Manometer to the 3-way valve at P1 on the Pressure Myograph as illustrated in figure 3.3.
3. On the right-hand side of Pressure Myograph chamber is a stainless steel pipe, which is connected to the right cannula (P1) via a small silicone tube (see figure 3.4). Carefully disconnect the silicone tube from the stainless steel pipe.
4. On the left-hand side of Pressure Myograph chamber is a stainless steel pipe, which is connected to the left cannula (P2) via a small silicone tube (see figure 3.4). Carefully disconnect the silicone tube from the stainless steel pipe.
5. Mount the enclosed calibration shunt (resistance tube) to the inlet and outlet connecting pipe as illustrated in figure 3.4.

Calibration shunt tubes delivered in a small box with the system is attached to the two steel pipes



Calibration shunt tube connected

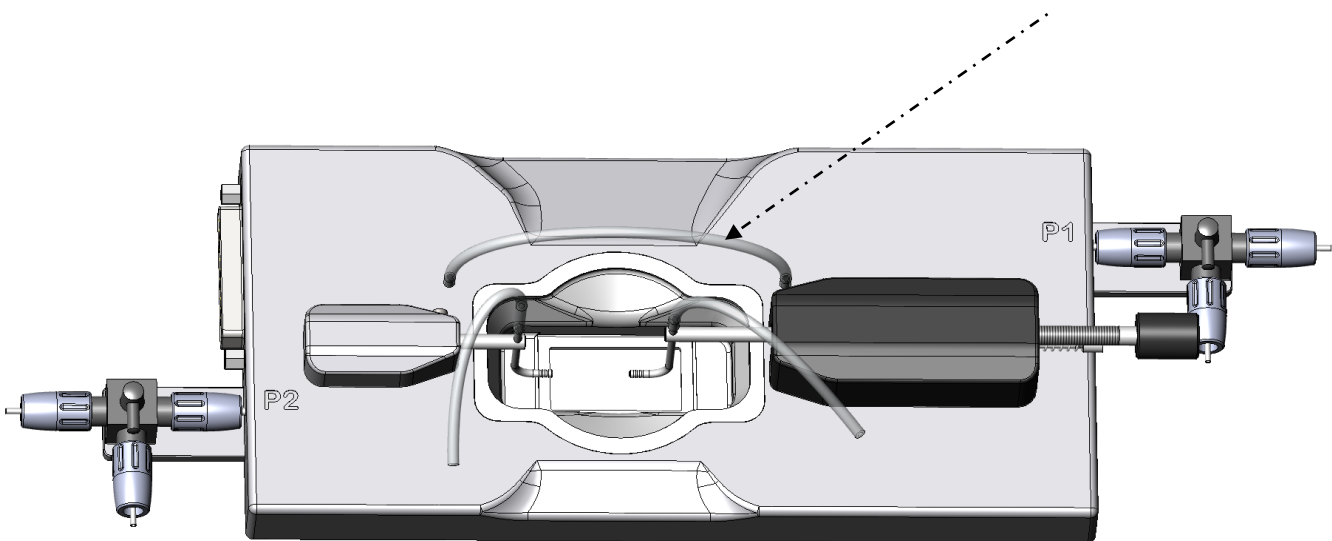


Figure 3.4 Mounting of calibration shunt (resistance tube) in the 110P-XL chamber

- Close the P1 3-way valve towards the P1 bottle on the Pressure Interface, see figure 3.5 normal inlet way, see figure 3.5. The inlet to P1 now comes from the pressure manometer and the Pressure Myograph system is now ready for a calibration procedure.

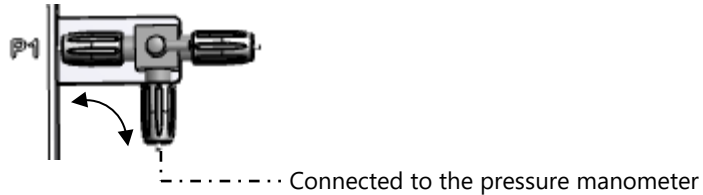
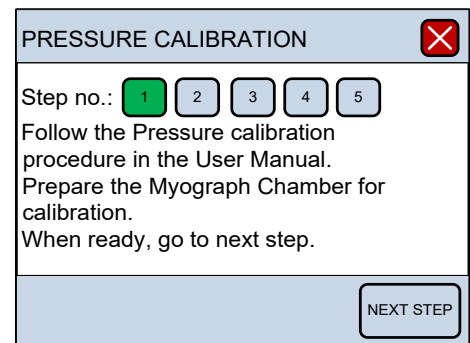


Figure 3.5 Three-way valve flow setting at P1

3.7.1.2 Set-up the pressure calibration on the Pressure Interface for the 110P-XL System

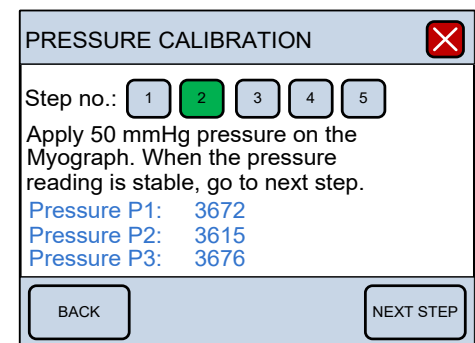
Press Settings in the Main Menu and then press Pressure Calibration. Carefully follow the procedure described below to calibrate the Pressure Myograph System. The calibration procedure is listed in 5 individual steps and needs to be performed one at a time to calibrate the system.

Step 1 - Press NEXT STEP when the system is ready.



Step 2 - Apply a pressure of 50mmHg on the Pressure Myograph using the Big Ben Pressure Manometer. When the 3 blue lines of relative values stabilize, go to NEXT STEP.

The relative values should be between 3300 to 3900



Step 3 - Apply a pressure of 125mmHg to the Pressure Myograph using the Big Ben Pressure Manometer. When the 3 blue lines of relative values stabilize, go to NEXT STEP.

The relative values should be between 3900 to 4500.

PRESSURE CALIBRATION

Step no.: 1 2 3 4 5

Apply 125 mmHg pressure on the Myograph. When the pressure reading is stable, go to next step.

Pressure P1: 4293
Pressure P2: 4203
Pressure P3: 4211

BACK NEXT STEP

Step 4 - Apply a pressure of 200mmHg to the Pressure Myograph using the Big Ben Pressure Manometer. When the 3 blue lines of relative values stabilize, go to NEXT STEP.

The relative values should be between 4600 to 5200.

PRESSURE CALIBRATION

Step no.: 1 2 3 4 5

Apply 200 mmHg pressure on the Myograph. When the pressure reading is stable, go to next step.

Pressure P1: 4905
Pressure P2: 4788
Pressure P3: 4784

BACK NEXT STEP

Step 5 - The calibration is now finished. The readings in the three bottom lines are the actual pressure on all three pressure sensors. The values must be 200.0 +/-1.0mmHg.

Press NEXT STEP. Carefully remove the calibration shunt tube and reconnect the tubing to the glass cannulas.

PRESSURE CALIBRATION

Step no.: 1 2 3 4 5

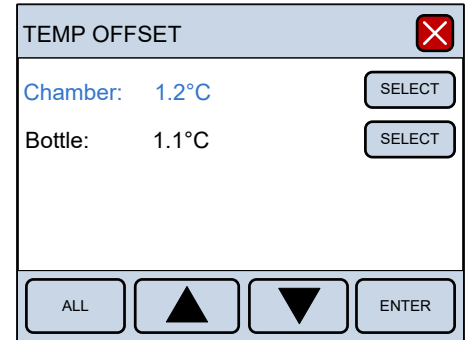
If the readout is 200.0 +/-1.0 mm Hg the calibration is OK. Otherwise repeat the calibration.

Pressure P1: 200.0 mm Hg
Pressure P2: 200.0 mm Hg
Pressure P3: 200.0 mm Hg

BACK NEXT STEP

3.7.5.1 Temperature Difference (offset)

The temperature difference function allows the user to fine-tune the temperature setpoint of the system. Although the temperature setpoint for the system can be set in the Heat Menu, the actual temperature for the system may not heat to the exact setpoint. This function allows the user to adjust the temperature of the chamber and bottle individually, so the exact temperatures can be reached. This is referred to as a temperature offset (“TEMP OFFSET” on chamber). Pressing SELECT or ALL have the same function in this menu as previously described. Pressing ENTER will save the values for future experiments.



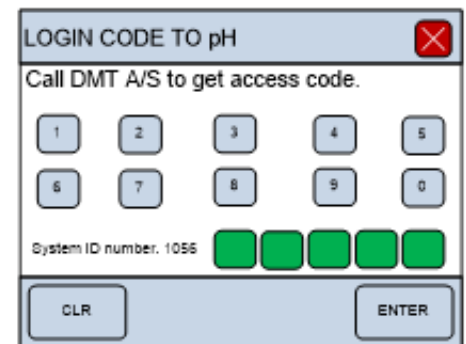
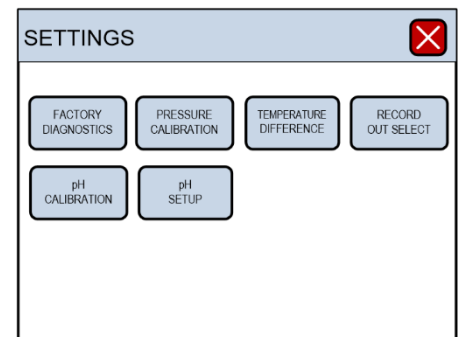
3.7.3 PH CALIBRATION PROCEDURE (OPTIONAL)

The pH Module menu in the 110P-XL is only visible for users that have bought a pH electrode and pH module at DMT.

By ordering the pH sensor from DMT the pH sensor is delivered with the unlocking code and a quick guide how to do it. Entering the code will the pH Calibration menu visible and usable.

The 110P-XL system has a built-in pH meter and a pH-meter electrode plug-in port marked PH on the back side of the 110P-XL interface.

The pH electrode can be ordered at DMT by contacting your sales representative or emailing sales@dmtdk.



The pH calibration procedure is listed in 4 individual steps and needs to be performed one at a time.

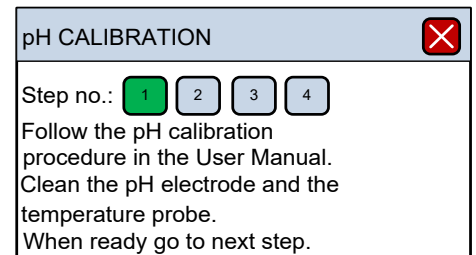
NOTE: BEFORE THE PH CALIBRATION IS PERFORMED BE SURE TO SELECT THE WAY THE PH ELECTRODE IS TO BE USED. GO TO THE PH SET-UP MENU UNDER INTERFACE SETTINGS

The pH calibration procedure is listed in 4 individual steps and needs to be performed one at a time.

Step 1 - Step 1 involves cleaning the pH electrode and the temperature probe with double distilled water. When ready Press NEXT STEP.

Step 2 - Place the pH electrode and temperature probe in the high buffer solution (here pH 7) and turn on stirring of the high buffer solution. When the relative pH output in the blue line is stable, go to NEXT STEP.

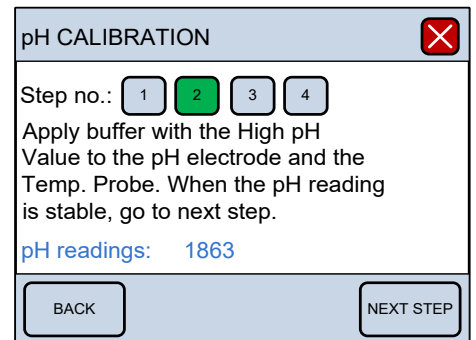
Step 3 - Place the pH electrode and temperature probe in the low buffer solution (here pH 4) and turn on stirring of the low buffer solution. When the relative pH output in the blue line is stable, go to NEXT STEP.



pH CALIBRATION

Step no.: 1 2 3 4

Follow the pH calibration procedure in the User Manual. Clean the pH electrode and the temperature probe. When ready go to next step.



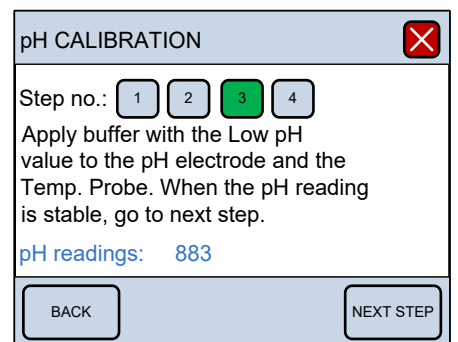
pH CALIBRATION

Step no.: 1 2 3 4

Apply buffer with the High pH Value to the pH electrode and the Temp. Probe. When the pH reading is stable, go to next step.

pH readings: 1863

BACK NEXT STEP



pH CALIBRATION

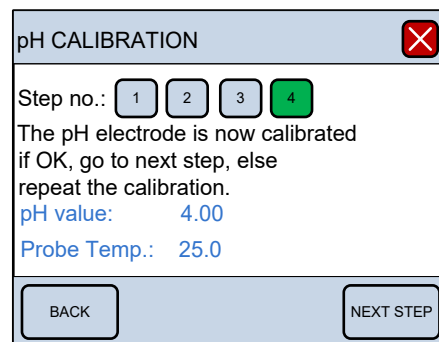
Step no.: 1 2 3 4

Apply buffer with the Low pH value to the pH electrode and the Temp. Probe. When the pH reading is stable, go to next step.

pH readings: 883

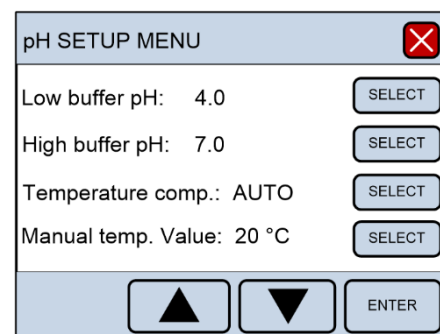
BACK NEXT STEP

Step 4 - The calibration is now finished. The values in the two bottom lines are the actual pH and temperature reading.



3.7.5.1 pH Set-up Menu

Before the pH calibration is performed be sure to select the way the pH electrode is to be used. The temperature is an important parameter in the calibration formula and is obtained automatically if AUTO is selected in the temperature compensation, as shown below. If MANUAL is chosen, the manual temperature is used in the pH calibration formula, and the temperature probe is deactivated. In the MANUAL mode, the temperature of the calibration buffers is measured with a thermometer and entered manually in the Manual temp. Value line.



3.7.4 SELECT RECORD OUT SELECT (OPTIONAL)

The Record Select Out Menu determines which data is sent to the BNC analog outputs (REC 1, REC 2 REC 3, REC 4) at the back of the Pressure Interface, four in total. Each output is individually programmable. Any changes made to the analog output will only affect the data collected by the external data acquisition system. Therefore, it is important to check the data acquisition setup when a change is made. The analog output works in range of -2,5V to +2,5V.

Use SELECT to select the channel number to be changed. Then press ENTER to go to the output set-up.

Use SELECT to select the line to be changed. Use Up and DOWN arrows or DEFAULT to change/select a new set-up.

The following parameters in the Pressure Interface can be selected as output on the analog channel for 110P-XL:

Probe temperature, chamber temperature, pH1 (Optional), pressure regulation ON/OFF, Flow ON/OFF, (Optional: Digital output 1, Digital output 2, Digital input 1, Digital input 2), Pressure P1, Pressure P2.

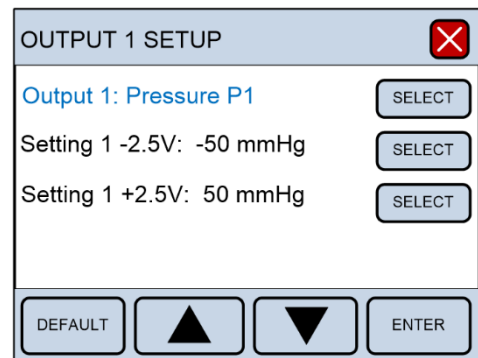
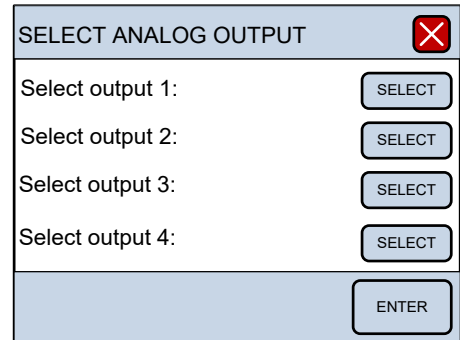
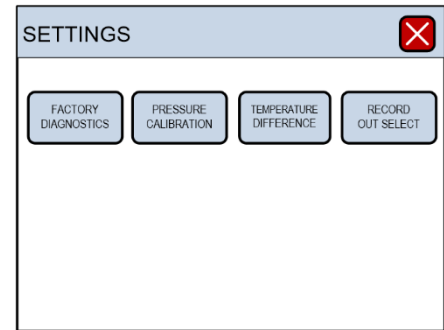
When the parameter is selected press ENTER to save the

NOTE: REMEMBER TO PRESS THE ENTER KEY TO SAVE THE LINE CHANGES TO MEMORY.

Example:

The output range is -2,5V to +2,5V. The user can select the parameter value that gives -2,5V and the value that gives +2,5V. In this example -50mmHg is -2,5V and 50mmHg is +2,5V.

Selecting asymmetrical values is also valid. They can be -2,5V = 0mmHg and +2,5V = 200mmHg.



3.7.5.2 Factory Diagnostics

Entering Factory Diagnostics will display the Login code to diagnostics window. This window is for trained technicians and is used for diagnostics and troubleshooting purposes. The general user will not have access to this window. However, entering the proper five-digit login code, will give the trained technician access to diagnostics panels that will provide information during a malfunction, or mechanisms to change other settings controlled by the on-board computer.

LOGIN CODE TO DIAGNOSTICS

Type login code to get acces

1 2 3 4 5
6 7 8 9 0

Code init value. 51761

CLR ENTER

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