Mini Peristaltic Pump MP-SC

735356: Mini Peristaltic Pump
MP-SC Single Channel

USER'S MANUAL

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Warranty

Research Use Only

Manufacturer:

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Hugo Sachs Elektronik (HSE) warranties the Mini Peristaltic Pump MP-SC for a period of one year from the date of purchase. At its option, HSE will repair or replace the unit if it is found to be defective as to workmanship or materials. This warranty does not extend to any instrumentation which has been (a) subjected to misuse, neglect, accident or abuse, (b) repaired or altered by anyone other than HSE without HSE express and prior approval, (c) used in violation of instructions furnished by HSE. This warranty extends only to the original customer purchaser. IN NO EVENT SHALL HSE ELEKTRONIK BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES. Some states and regions do not allow exclusion or limitation of incidental or consequential damages so the above limitation or exclusion may not apply to you. THERE ARE NO IMPLIED WARRANTIES OF MERCHANTABILITY, OR FITNESS FOR A PARTICULAR USE, OR OF ANY OTHER NATURE. Some states or regions do not allow this limitation on an implied warranty, so the above limitation may not apply to you. Without limiting the generality of the foregoing, HSE shall not be liable for any claims of any kind whatsoever, as to the equipment delivered or for non-delivery of equipment, and whether or not based on negligence. Warranty is void if the device is changed in any way from its original factory design or if repairs are attempted without written authorization by HSE. Warranty is void if parts or connections not manufactured by HSE are used with the equipment. If a defect arises within the warranty period, promptly contact Hugo Sachs Elektronik, Gruenstrasse 1, D-79232 March-Hugstetten Germany by phone at +49(0)7665/9200-0 or email support@hugo-sachs.de. In the USA, call 800 -272-2775 or 508-893-8999 or email: support@hbiosci.com).

Goods will not be accepted for return unless an RMA (Returned Materials Authorization) number has been issued by our customer service department. The customer is responsible for shipping charges. Please allow a reasonable period of time for completion of repairs, replacement and return. If the unit is replaced, the replacement unit is covered only for the remainder of the original warranty period dating from the purchase of the original device. This warranty gives you specific rights, and you may also have other rights, which vary from state to state.

Out of Warranty Service

Proceed exactly as for Warranty Service on previous page. If our service department can assist you by phone or other correspondence, we will be glad to help at no charge. Repair service will be billed on the basis of labour and materials. A complete statement of item spent and materials used will be supplied. Shipment should be prepaid. Your bill will include return shipment freight charges. Disassembly by the user is prohibited. Service should only be carried out by experienced HSE technicians.

Repair Facilities and Parts

HSE stocks replacement and repair parts. When ordering, please describe parts as completely as possible, preferably using our part numbers. If practical, enclose a sample photo or drawing.

Safety Information

Please read the following safety precautions to ensure proper use of your MP-SC. If the equipment is used in a manner not specified, the protection provided by the equipment may be impaired.

Use Proper Input Plug

Use only the specified power supply for this product and make sure input plug is certified for country of use

Make Proper Connections

Make sure to use the appropriate connection for your country. Attach the connector of the MP-SC power supply always correctly to the input socket at the rear side of the MP-SC and the power socket.

Observe All Terminal Ratings

Review the operating manual to learn the ratings on all connections.

Avoid Exposed Circuitry

Do not touch any electronic circuitry inside of the product.

Do Not Operate with Suspected Failures

If damage is suspected on or to the product do not operate the product. Contact qualified service personnel to perform inspection.

Orient the Equipment Properly

Do not orient the equipment so that it is difficult to manage the connection and disconnection of devices.

Place Product in Proper Environment

Review the operating manual for guidelines for proper operating environments. not be used in the presence of a flammable atmosphere such as an anaesthetic mixture with air, oxygen, or nitrous oxide.

Observe all Warning Labels on Product

CAUTION Refer to manual. Read all labels on product to ensure proper usage.

Caution Notice

CAUTION: FOR RESEARCH USE ONLY. NOT FOR CLINICAL USE ON PATIENTS.

The unit itself does not generate waste but may be used with samples that are hazardous. Please use appropriate PPE and ensure disposal in accordance with local regulations and practices. This product should not be used in the presence of a flammable atmosphere such as an anaesthetic mixture with air, oxygen, or nitrous oxide.

Compliance

These systems have been designed to meet the standards for electromagnetic compatibility (EMC) intended for laboratory equipment applications as well as the applicable safety requirements for electrical equipment for measurement, control, and laboratory use.

Introduction

This User's Manual explains the installation, function and use of the Mini Peristaltic Pump, Single Channel MP-SC.
Carefully read the operating instructions as well as other materials in this manual.

This manual is not a warranty of product performance. If you need help or have questions, please contact us and we will assist you. We want you to be completely satisfied with this product.

Product Overview

The MP-SC is a compact peristaltic pump with integrated stepper motor and electronic control. It is ideal for precise dosing in space-constrained setups such as isolated organ systems, ephys imaging setups or other laboratory equipment. The pump ensures smooth flow with low pulsation and offers flexible control options. It can be external controlled by an analog voltage (0-5 or 0-10V) and allows constant pressure perfusion in combination with a pressure transducer and our PLUGSYS modules TAM-D and SCP. The flowrate in such a setup is calculated and displayed on the SCP Servo Controller Module.

Key Features

- Pump head with 4 rollers
- Very quiet audible noise
- Gound connector for electrical noise sensitive applications
- Adjustable speed via potentiometer on the top panel or external control 0-5V or 0-10 V
- Compatible tubing: ID 0.89–3.15 mm, wall thickness 0.8–1.0 mm, see tube list
- Max flow: 38 mL/min, max speed: 100 rpm
- Power supply: 12VDC / 1.5A
- Compact design
- Direction and start/stop control via switches

- Supply voltage: DC 12V, 1.5A via universal power supply 115/230V, exchangeable connectors for EU, USA, CHINA, UK

Unpacking & Inspection

CAUTION: The MP-SC contains electrostatic sensitive components. Please observe precautions for handling the device to prevent damage.

Please first check the contents of the shipment for completeness and note whether any damage has occurred during transport. If the contents are incomplete, or if there is damage on the MP-SC or it´s accessories, notify the supplier from whom you have ordered the device or Hugo Sachs Elektronik directly.

Check to ensure that all items ordered and listed are included in the shipment. The shipment includes the following items:

- Mini Peristaltic Pump MP-SC
- Multirange power supply including exchangeable connectors for AU,CN, EU, UK, US.
- User´s manual (operating instructions)

Bild des Packungsinhaltes

Detailed Description

Main Design Features: Top

1. Power On/Off switch with status LED
2. Push button for maximum speed of Pump
3. Switch for external/internal speed control
4. Selector switch for pump direction
5. Speed knob with lock

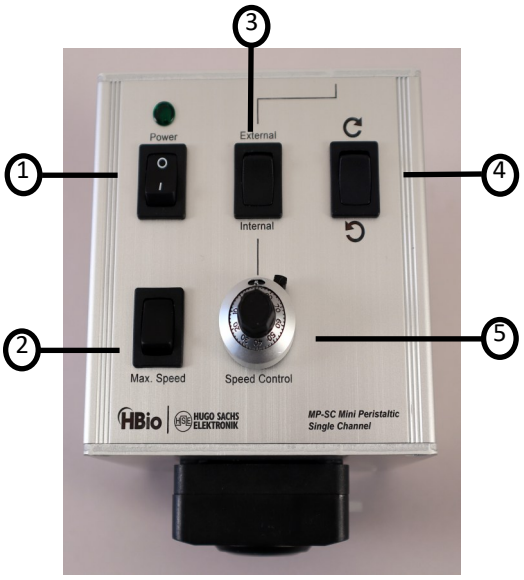


Image 1: Top

Main Design Features: Front

1. Tube clamp
2. Left notch for tubing
3. Tube clamp lock
4. Roller block
5. Right notch for tubing

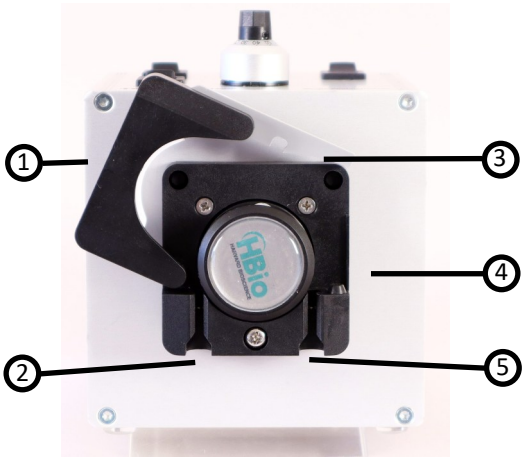


Image 2: Front

Main Design Features: Rear

1. 4mm banana socket for grounding
2. BNC connector for external pump control with input voltage selector, 0-5V or 0-10V
3. Input voltage connector 12V DC 1.5A

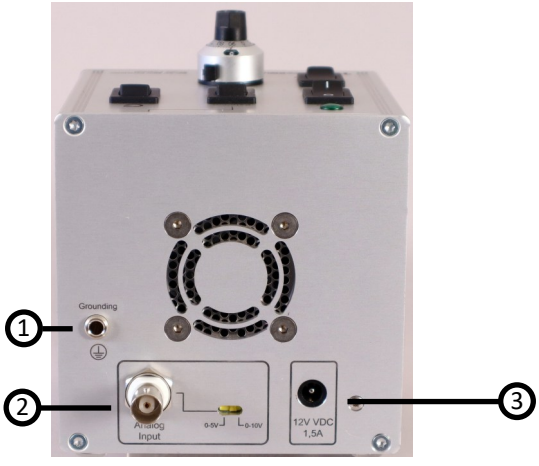


Image 3: Rear

Setting up the pump

1. Position your Mini Peristaltic Pump MP-SC on a solid, flat surface
2. Plug in the power cord to the input voltage connector at the rear of your MP-SC
3. Connect the power supply to a wall outlet socket
4. Mount a pump tubing as described below

Tube mounting to the Pump

1. Left indentation for tubing
2. Right indentation for tubing
3. Left stopper on tubing
4. Right stopper on tubing

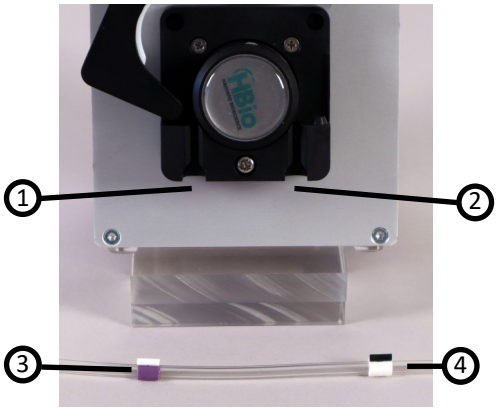
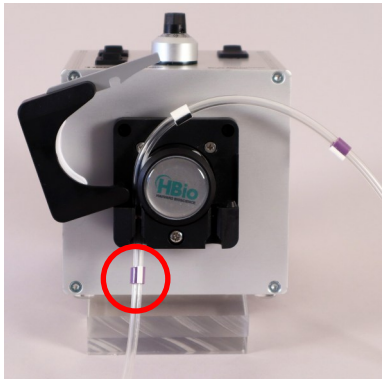
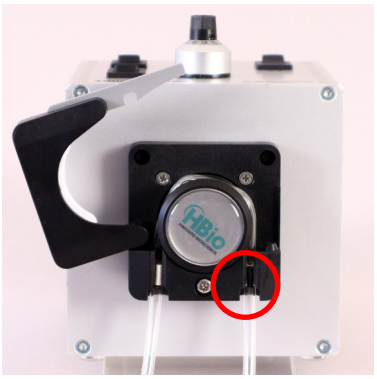


Image 4

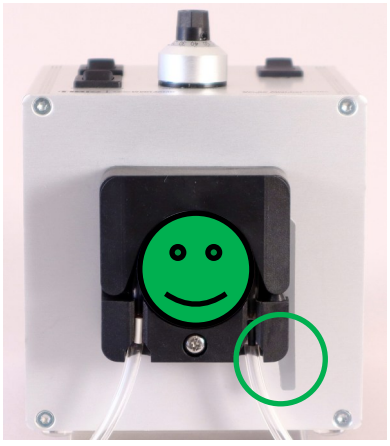


Push the left side segment of the tubing into the left intentation of the pump head:
Make sure that the notch on the stopper is oriented away from the pump head.

Pull the tube upward to slide the stopper into the intentation. The notch has to face outward.



Pull the tube around the roller block and insert the right side of the tubing segment into the right intentation. The stopper notch has to face outward.



Close the pump head firmly . Make sure the tube clamp lock is closed completely.

Start using the pump

1. If you want to control the pump speed via the external analog input, connect a BNC cable to the Analog Input BNC connector at the rear panel of the pump and to the BNC analog output connector at the external control device. Make sure the correct input voltage is set to 0-5 or 0-10V at the pump, according to the output signal level on your control device. Read the specifications of your external control device for the output voltage.

   The HSE SCP pump control module uses 0 - 10V for a wide range speed control and fine adjustment.
   At 0V the pump stops, at 10V the pump runs full speed (100rpm).
   Select External at the top panel of the pump. The internal speed control is inactive in this case.

2. If you want to adjust the pump speed manually, make sure the External/ Internal switch is put to Internal and make a coarse pre-adjustment of the pump speed control dial.
3. Check the pump direction button for the correct setting.
4. Mount the tubing as described in this manual on page 7. Make sure to use the correct tubing size according to the desired flow rate of your application. For reference use the table on page 9 of this manual.
5. Start the pump by switching the pump on. For ease of use there is no separate Start/Stop button. The LED next to the Power On/Off switch turns green.
6. To flush or prime the tubing, press and hold the Max Speed button on the top panel.
7. Adjust the pump speed when used in internal mode. For reference use the table on page 9 of this manual.
8. Remove air bubbles from the tubing by lifting the tubing ends over the pump and tap at the tubing.

How to check pump flowrate

- The pump flowrate can be calculated by measuring the transported volume over 1 minute

  Best methode will be:

- Set the pump potentiometer dial knob to 10.0
- Prepare 100ml of distilled water in a beaker and immerse the inlet tubing. Prepare a calibrated glass cylinder or a ml calibrated Falcon tube to trap the delivered fluid. Put the output tubing into the calibrated cylinder or the Falcon tube
- Run the pump exactly for one minute and measure the delivered volume. To improve the accuracy a balance could also be used. On water 1ml is equal to 1g.
- If you get e.g. 20ml/min in speed setting 100 you will get 10ml/min in speed setting 50 and 5ml/min in speed setting 25.
- To fix the dial knob, you can use the black lever which blocks the dial knob.

Flow rate calibration

- The pump flowrate can be calibrated by measuring the transported volume over 1 minute

  Best methode will be:

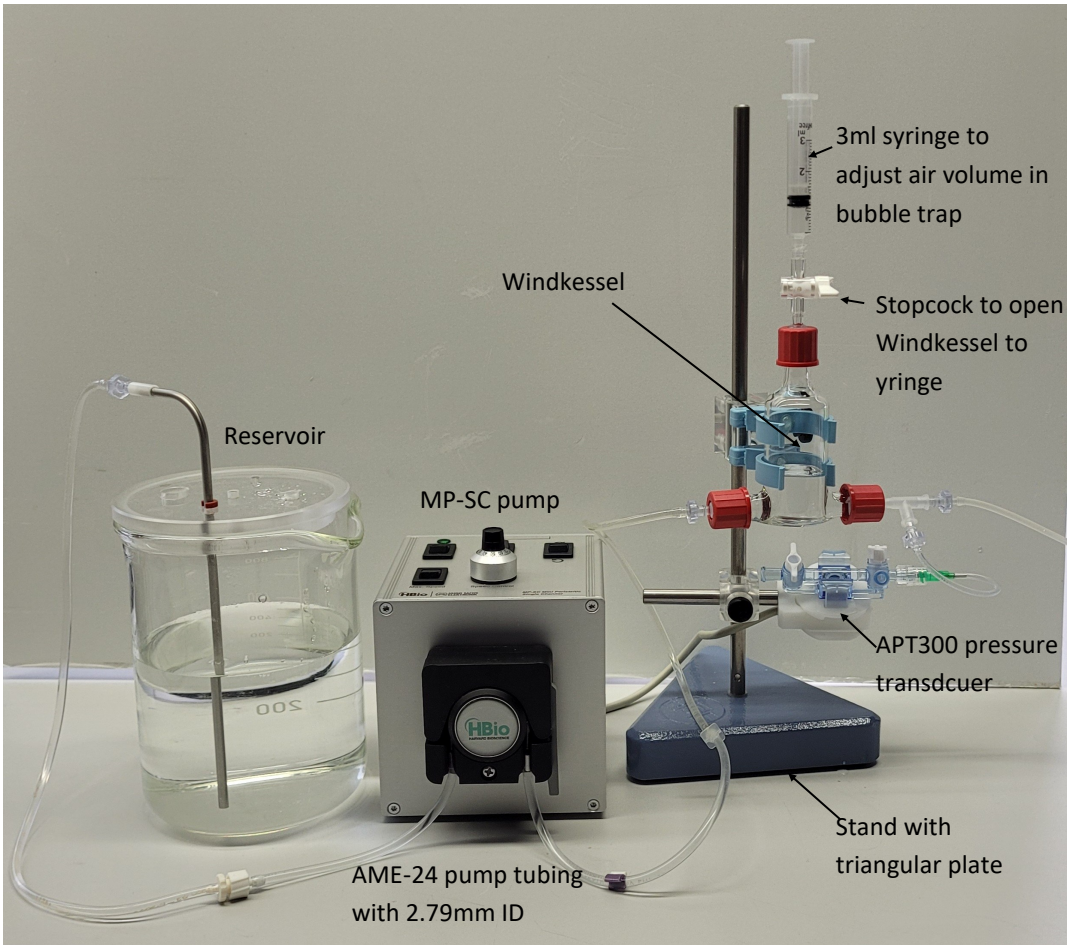
- Set the pump potentiometer dial knob to 5.0 (50% of full speed)
- Prepare 100ml of distilled water in a beaker, immerse the inlet tubing and fill the pump tubing and the extension tubing completely bubble free with distilled water.
- Prepare a calibrated glass cylinder or a ml calibrated Falcon tube to sample the delivered fluid. Put the output tubing into the calibrated cylinder or the Falcon tube
- Take stopc clock or a time and run the pump exactly for one minute and measure the supplied volume.
  To improve the accuracy a balance could also be used. With water 1g is equal to 1ml.
- If you get e.g. 15ml/min in speed setting 5.0 you will get 30ml/min in speed setting 10.0 and 3ml in speed setting 1.0 or in other words:

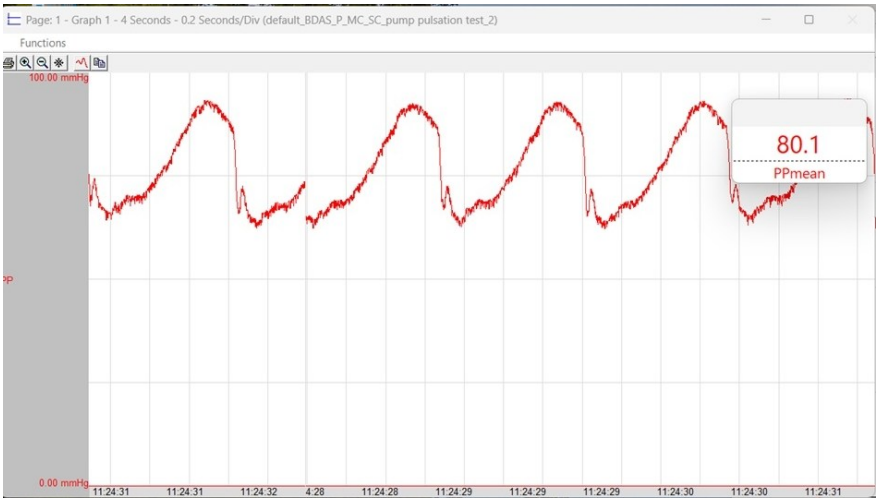
  the measured volume divided by 5 gives you the flow in setting 1.0
  All other flow can be calculated and set by turning the dial
- To fix the dial knob, you can use the black lever which blocks the dial knob

Pump pulsation:

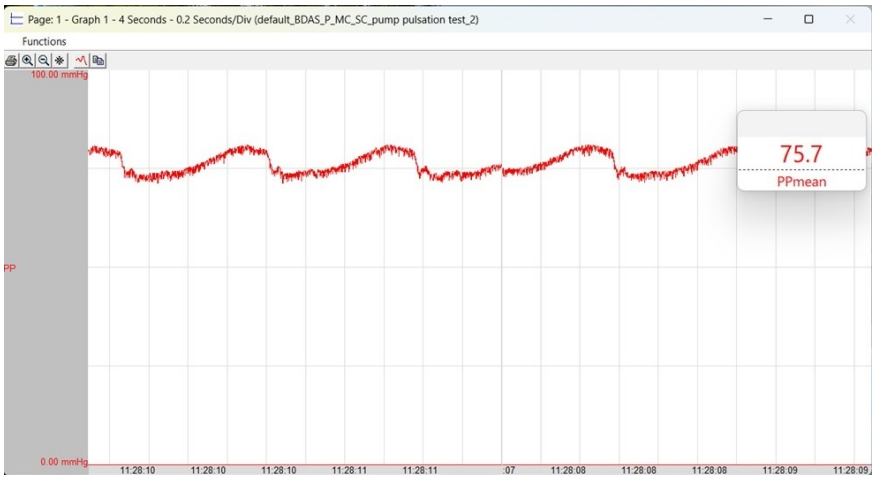
All peristaltic pumps have a pulsation which depends on the number of rollers, the used pump tubing diameter, the pump speed and the resistance the pumps pumps against.
If a damping vessel (Windkessel) is installed, the pulsation can be damped by more air in the windkessel.
Compared to fluid the air is compressible and damps the pulsation.

Below an example setup with reservoir, MP-SC pump, Windkessel and a pressure transducer. Not on the photo is the amplifier and the PC data acquisitions system. The recordings below are made with PC data acquisition Ponemah-BDAS.

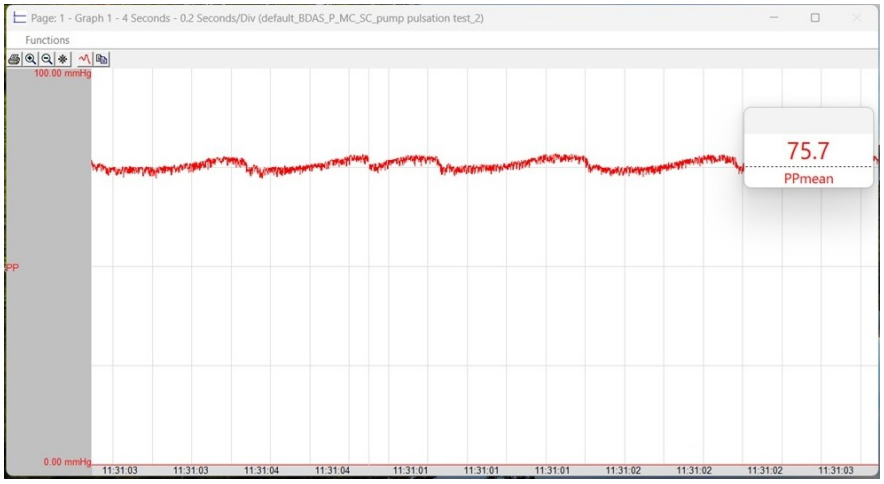




Pulsation without Windkessel, or Windkessel completely filled with fluid

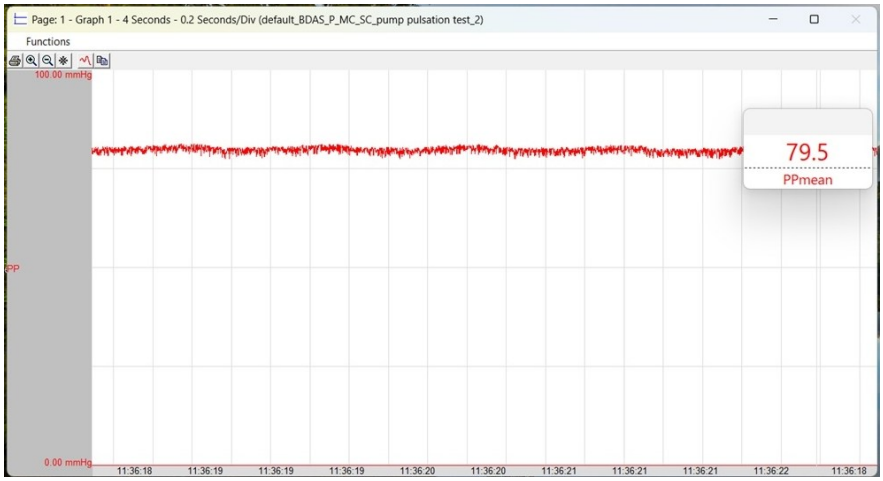


Pulsation with 2ml air in Windkessel

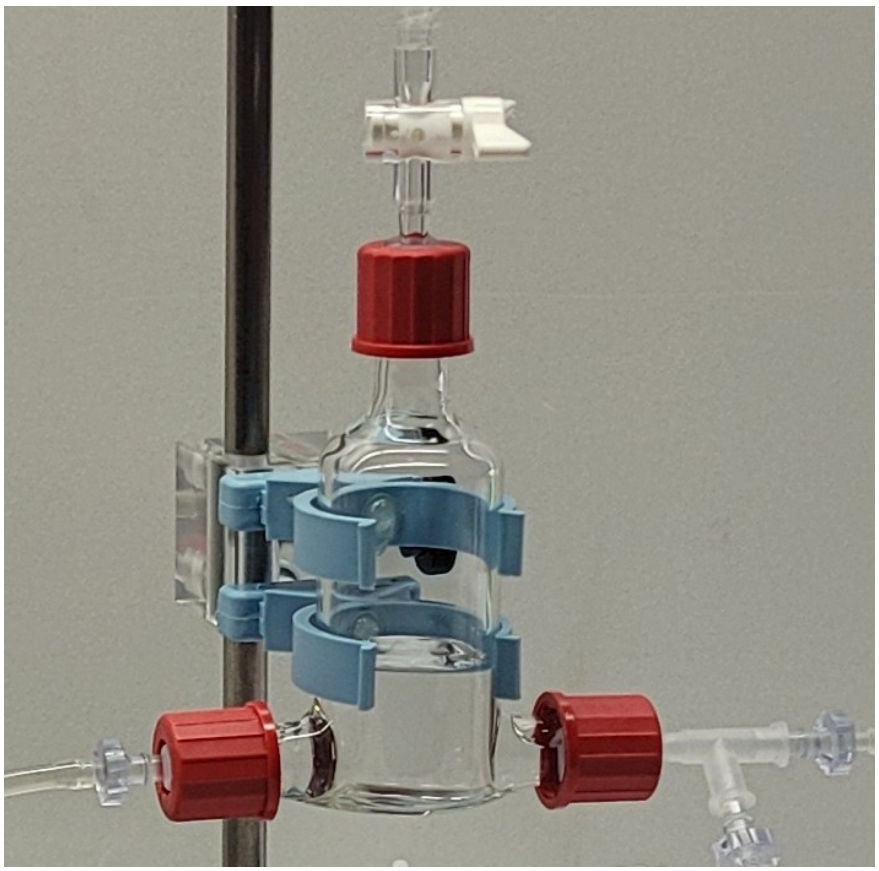


Pulsation with 4ml air in Windkessel

Pulsation with 6ml air in Windkessel



Very low pulsation with 10ml air in Windkessel



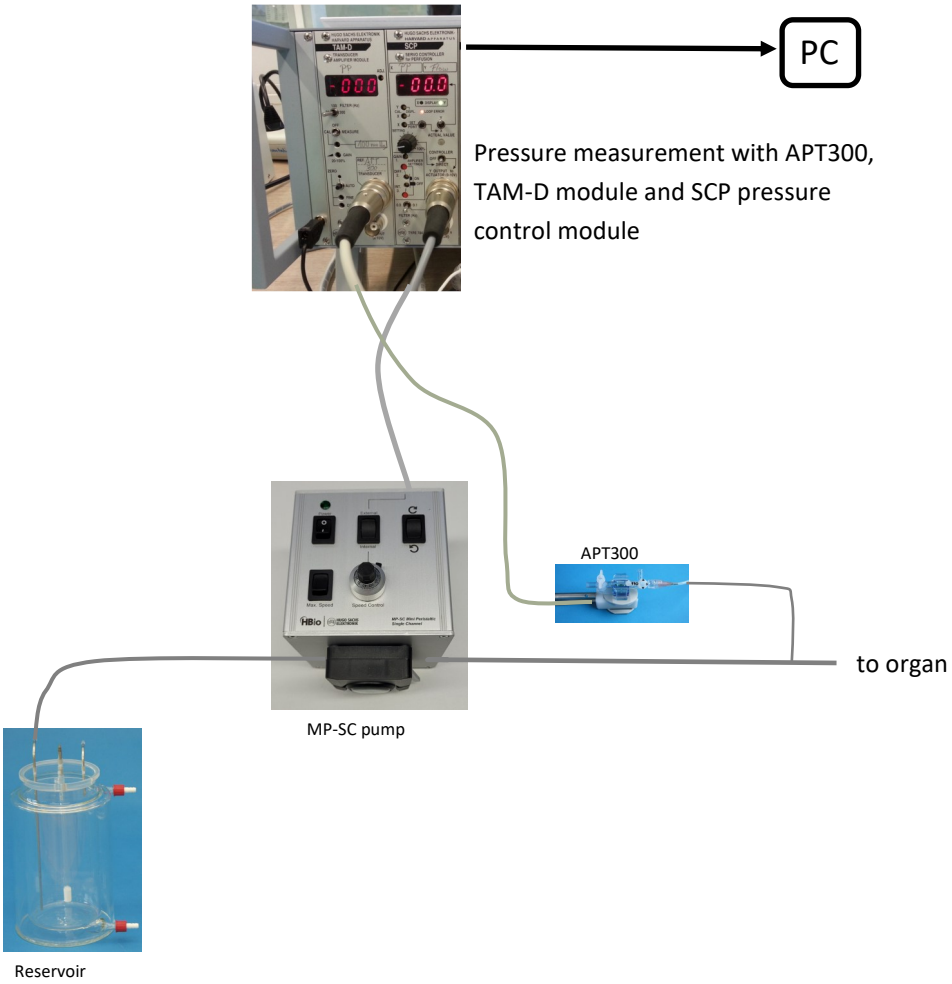
HSE Windkessel 73-3717 on a 73-0500 stand.

Windkessel filled with 10ml air to get most damping.

Example: Constant pressure perfusion by external speed control

Required items:

- PLUGSYS housing
- TAM-D transdcuer amplifier module
- APT300 pressure transducer with stand and holder
- SCP Servo controller module
- USB Control module with DAQ software and PC
- MP-SC pump with pump tubing



Description of the measurement principle:

The pressure in the perfusion cannula is measureed as near as possible to the organ with the APT300 transducer.
The pressure signal is amplifier and displayed on the TAM-D module and sent internally to the SCP controller module.
On the SCP controller module a SETPOINT (the required pressure) e.g. 80mmHg is set.
If the SCP controller is startet it speeds up the pump until 80mmHg are reached. Then it holds the 80mmHg constant.
If there are changes in the organs flow resistance the SCP controller changes the speed of the pump so that always 80mmHg perfusion pressure is held constant.

Tubing Size Table with minimal and maximal flow rates

3-Stop Collared Pump Tubing

			Tygon E-Lab tubing	Tygon E-LFL	PharMed®		
AME #	TUBING ID [mm]	Color Code	Ordering #	Ordering #	Ordering #	minimum flow rate	maximum flow rate
						2 rpm	100 rpm
00	0,13	orange-black	731816	--	--	0,004	0,20
01	0,19	orange-red	731817	--	733176	0,0044	0,22
02	0,25	orange-blue	731818	--	--	0,008	0,40
03	0,38	orange-green	731819	--	--	0,0168	0,84
04	0,44	green-yellow	731820	--	--	0,024	1,20
05	0,51	orange-yellow	731821	--	--	0,03	1,50
06	0,57	white-yellow	731822	--	--	0,04	2,00
07	0,64	orange-white	731823	--	--	0,052	2,60
08	0,76	black-black	731824	--	--	0,07	3,50
09	0,89	orange-orange	731825	--	733180	0,092	4,60
10	0,95	white-black	731826	--	--	0,106	5,30
11	1,02	white-white	731827	733220	733181	0,122	6,10
12	1,09	white-red	731828	--	--	0,136	6,80
13	1,14	red-red	731829	--	733182	0,146	7,30
14	1,22	red-grey	730126	--	--	0,16	8,00
15	1,30	grey-grey	731830	--	733183	0,176	8,80
16	1,42	yellow-yellow	731831	733223	733184	0,2	10,00
17	1,52	yellow-blue	731832	733224	733185	0,22	11,00
18	1,65	blue-blue	731833	733225	733186	0,246	12,30
19	1,75	blue-green	731834	--	--	0,27	13,50
20	1,85	green-green	731835	--	733187	0,296	14,80
21	2,06	purple-purple	731836	733227	733188	0,35	17,50
22	2,29	purple-black	731837	733228	733189	0,42	21,00
23	2,54	purple-orange	731838	--	733190	0,52	26,00
24	2,79	purple-white	730155	733230	733191	0,62	31,00
25	3,17	black-white	731839	NA	--	0,8	40,00

Specifications

Maximum rpm of pump	100 rpm / min
Step Resolution	0.1 rpm
Maximum Flow Rate	40 ml/min (depending on tubing and medium)
Analog Signal Input	BNC socket 0 - 5V or 0 - 10V
Hight	11 cm (4.33”)
Width	11 cm (4.33”)
Depth	12 cm (4.72”)
Weight	0.8kg (1.76lbs)
Power	Wide range power supply 110 -230 V, 50/60 Hz, exchangeable plug adapters for EU, USA, CHINA, UK
Operating Temperature	4°C to 40°C (40°F to 104°F)
Operating Humidity	< 80% RH, non-condensing
Mode of Operation	Continuous
Classification	Class II
Pollution	IP2X
Installation	Category

Servicing and maintenance

The Mini Peristaltic Pump—Single Channel MP-SC does not require any regular service or maintenance. The tubing wear out over time and shall be replaced regularly.

Any splashes of salt solution should be removed immediately with a cloth to prevent corrosion damage to the metal parts, the connectors and the electronics.

For cleaning the front panel, connectors and cables never use scouring powder or cleaning agents which attack plastics or aluminium.

Any dust should be removed with a lint-free cloth or with a fine dust brush.

Heavier dirt can be removed with soapy water or a domestic cleaning agent, using a soft cloth. Then wipe up with clean water. Never allow any liquid to find its way inside the instrument or into switches or sockets.

Any spots on the aluminium front panel can be removed with an ordinary plastic rubber.

The interior of the module does not require any servicing or cleaning.

Return Shipment

To send back the amplifier it is essential to have very good packaging. It is best to use the supplied storage box together with an additional packaging around the amplifier.

Order Information

Part Number	Description
735356	Mini Peristaltic Pump—Single Channel MP—SC