CETONI

CE PERISYS
Manual Hardware
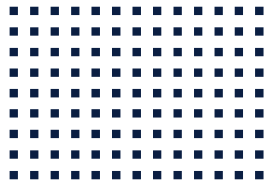
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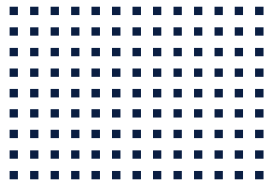
1   Overviews and Indexes

1.1   Content

Change History

REV	DATE	CHANGE
1.00	06.11.2013	First version of the manual
1.01	03.09.2014	Integration of flow rate table
1.02	15.12.2014	Scope of Supply removed
1.03	11.03.2016	Revision Guide Design

2 Introduction

2.1 Foreword

Thank you for your purchase from CETONI. With this manual we would like to support you in using the peRISYS peristaltic pump. If you have questions or ideas, we would also be happy to talk to you directly.

The peRISYS peristaltic pump may be used only after carefully reading this manual. We wish you the best of success in your work with the peRISYS peristaltic pump.

2.2 Symbols and Keywords

The following symbols are used in this manual and will help you navigate this document:

HINT. Usage tips and useful information to facilitate the use of hard and software.

IMPORTANT. Important notes and other helpful information, not including dangerous or harmful situations.

CAUTION. Identifies a potentially harmful situation. Failure to avoid this situation may harm the product or something in its environment.

WARNING. Potentially dangerous situation. Failure to avoid this situation may cause minor injuries or material damage.

2.3   Norms and Guidelines

CE CETONI GmbH hereby declares in its sole responsibility that peRISYS peristaltic pumps
comply with the health and safety requirements of the relevant European guidelines.

2.4   Intended Use

2.4.1   General Description of the Machine

peRISYS pumps are peristaltic pumps. They allow the pumping of fluids by mechanical deformation of a
hose.

2.4.2   Proper Use

The peRISYS peristaltic pumps serve for precise and continuous dosing of fluids with low pulsation
against a limited back pressure.

Application usually takes place in laboratory-like rooms.

2.4.3   Reasonably Foreseeable Misuse

Using the device for applications other than the intended one may lead to dangerous situations and
must be avoided.

!!   **CAUTION**. The devices must not be used as medical products or for medical purposes.

2.4.4   Safety Measures

Safe and error-free operation of the devices can only be guaranteed when using original parts. Only
original accessories may be used. Damage caused by using third party accessories or material will void
the warranty.

The devices were developed and designed in such way as to largely rule out hazards during proper use.
However, the following safety measures must be observed to avoid any residual hazards.

- CETONI GmbH refers to the operator's responsibility with respect to operating the devices. The operation is subject to laws and regulations applicable at the operating location. In the interest of safe operation, operators and users are responsible for observing such regulations.

- Devices must not be used as a medical product or for medical purposes.

- The user must verify the functional safety and proper condition of the devices before each use.

- The user must be familiar with the operation of the devices and software.

- Before operation, the devices and wires/cables must be checked for damage. Damaged wires/cables and plugs must be replaced immediately.

- Cables must be placed in such way as to avoid the risk of stumbling!

- During operation, moving parts on the devices must not be touched. Crushing hazard!

- The devices must not be operated in explosive environments or with explosive materials!

- Always wear safety goggles when doing assembly work on the device, when working with corrosive, hot or otherwise hazardous substances.

- Transport, storage and operation of the devices below 0°C with water in the fluid channels may cause damage to the devices.

2.4.5   Measures for Safe Operation

2.4.5.1   ELECTROMAGNETIC RADIATION

peRISYS peristaltic pumps are suitable for use in all facilities immediately connected to a public utility network, which also supplies buildings used for residential purposes.

2.4.5.2   ELECTROSTATIC DISCHARGES

Flooring should be made from wood, concrete or ceramic tile. If the floor is covered with synthetic material, relative air humidity must be at least 30%.

2.4.5.3   ELECTRICAL DISTURBANCES

The quality of supply voltage should be equal to the quality encountered in a typical business or hospital environment.

2.4.5.4   MAGNETIC DISTURBANCES

Power lines, including those of other devices must not be placed near the devices or their associated cables. Portable and mobile two-way radios must not be operated within the suggested safety distance from the devices and their associated cables.

2.4.6   System Safeguards

In emergencies the system can be deactivated at any time by flipping the main power switch on the base module (rocker switch at the side of the housing). This will not damage the device.

2.4.7   Condition of Devices

Despite impeccable workmanship, devices may get damaged during operation. Therefore, you should always carry out a visual inspection of the mentioned components before each use. Pay particular attention to crimped cables, damaged hoses, deformed plugs. If you find any damage, please refrain from using the device and alert CETONI GmbH immediately. We will repair your device as quickly as possible. Do not attempt to carry out any repairs yourself.

2.5   Warranty and Liability

The devices have left our facilities in perfect working order. Only the manufacturer is permitted to open devices. If devices are opened by an unauthorized person, the warranty and any liability will become void, particularly claims for any personal damages.

The warranty period is one year from the day of delivery. Any work carried out during the warranty period shall not extend or renew this period.

CETONI GmbH accepts responsibility for the safety, reliability and function of the devices only if installation, readjustment, changes, extensions and repairs are carried out by CETONI GmbH or an authorized entity, and if the devices are used in accordance with the operating instructions.
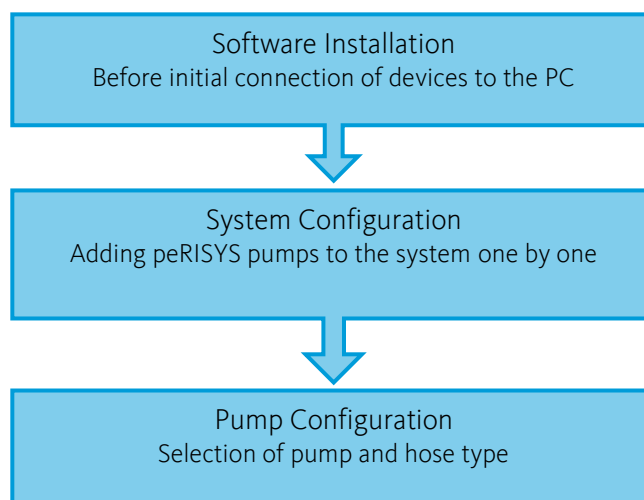
peRISYS peristaltic pumps comply with the applicable safety standards. Any property rights for circuitry, processes, names, software programs and devices are reserved.

3   Initial Startup

i   **IMPORTANT**. Please carefully read this manual and the associated software manual in their entirety before starting up your peRISYS peristaltic pump.

To ensure failure-free initial start-up of your syringe pump system, the following sequence must be adhered to. The individual steps are described in more detail in the sections below.

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┌─────────────────────────────────────────────┐
│           Software Installation             │
│  Before initial connection of devices to    │
│                  the PC                      │
└─────────────────────────────────────────────┘
                      ↓
┌─────────────────────────────────────────────┐
│            System Configuration             │
│  Adding peRISYS pumps to the system one by   │
│                  one                        │
└─────────────────────────────────────────────┘
                      ↓
┌─────────────────────────────────────────────┐
│             Pump Configuration              │
│       Selection of pump and hose type        │
└─────────────────────────────────────────────┘
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3.1   Software Installation

Before connecting the system the supplied software and drivers must be installed. The installation process is described in the associated software manual, which you can find on the provided CD or USB drive.

i   **IMPORTANT**. Install the operating software and the device drivers as described in the software manual before connecting your device to your PC through the USB interface.

i   **IMPORTANT**. Deactivate the standby mode of your PC in order to avoid malfunctions.

3.2   System Configuration

Place your system on a firm and level surface and in the desired sequence, but without connecting the devices.

3.2.1   Connecting the Base Module

After installing the software and device drivers, connect the USB-connector of the base module (USB type B) with a free USB connector on your PC (USB type A). Plug the base module into a power outlet using the supplied power cable. The device can be connected to AC power sources ranging from 90 to 264 volts and 47 to 63 Hz.
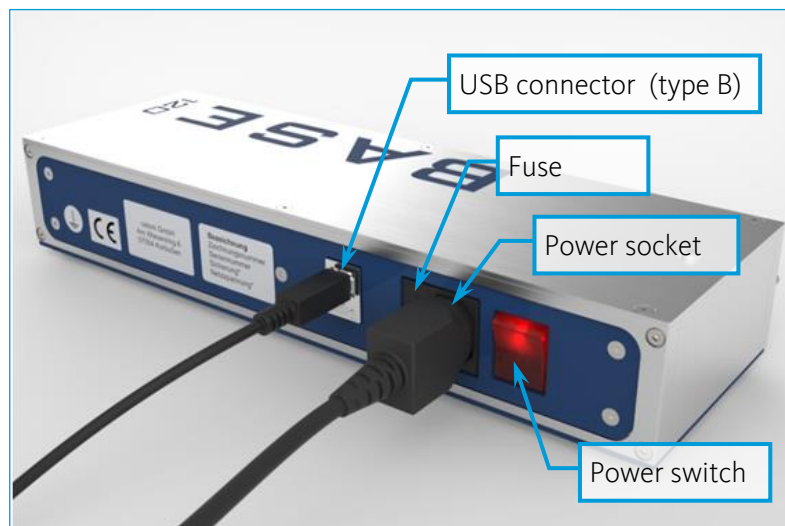
WARNING. Danger of injury due to damaged power lines and plugs! Check the device and power lines for damage! Never operate the device with damaged power lines or plugs! Only use supplied cables.

WARNING. Danger of stumbling due to connecting cables! Place cables in such way as to avoid danger of stumbling!

To turn the unit on and to put into operation, press the power button. When the unit is turned on the On / Off switch should light. If this is not the case, make sure that the power cord is properly connected to the device and the mains socket.

3.2.2   Connecting the peRISYS peristaltic pumps

Before initial use the modules have to be configured individually through the software. The exact process is described in the software manual and will be described here briefly:

In QmixElements every module is plugged into the base module, configured and unplugged individually. Once all modules are configured, the system can be assembled
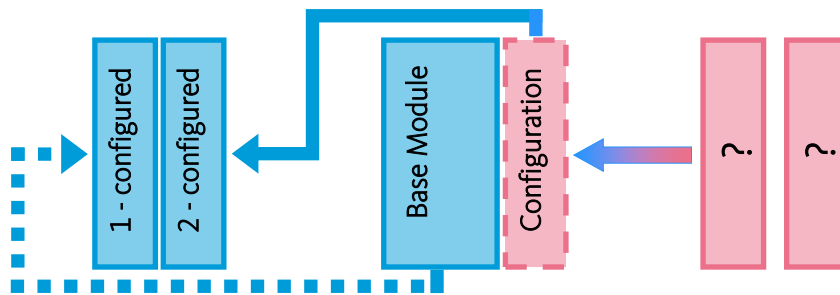

Following, we will describe the mechanical connection of additional modules. To ensure correct function of the overall system, please read and observe the respective section in the associated software manual, before connecting additional modules.

> **i** **IMPORTANT**. Please read and observe the respective section in the software manual before connecting any additional modules.

Turn on the base module to which you want to connect the peRISYS peristaltic pump. Now insert the interconnect cable into the output connector of the module to which the peRISYS peristaltic pump is supposed to be connected (as shown in the image below, this can also be a base module). Connect the other end of the interconnect cable with the left connector on the back panel of the peRISYS peristaltic pump.
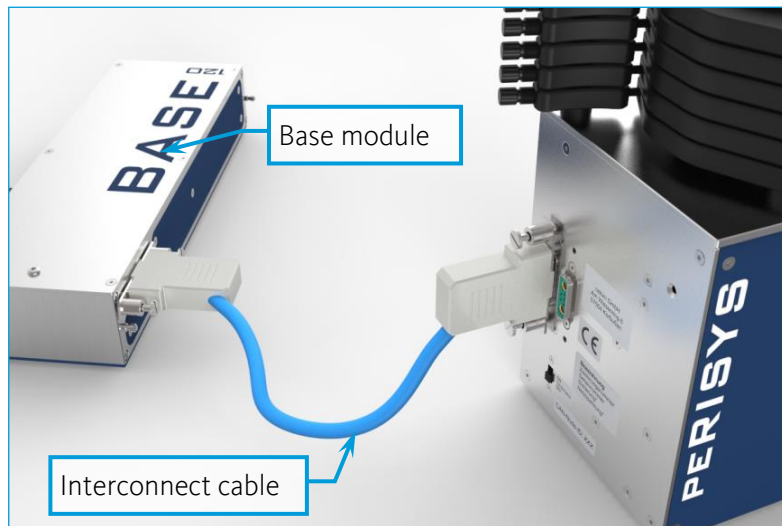
Base module

Interconnect cable

If the peRISYS peristaltic pump is the last module within the system, please slide the "terminator" switch to "on". Otherwise there may be data communication errors.

Terminator switch
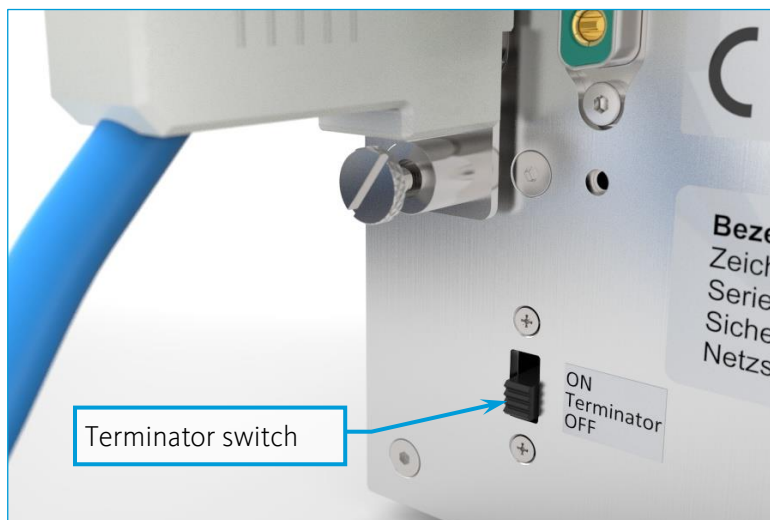
i **IMPORTANT**. If the peRISYS peristaltic pump is the last module within the system, please slide the "terminator switch" to "on". Otherwise there may data communication errors.

However, if you want to add more modules, leave the switch in the "off" position and connect additional modules to the output connector using interconnect cables.

Interconnect cable
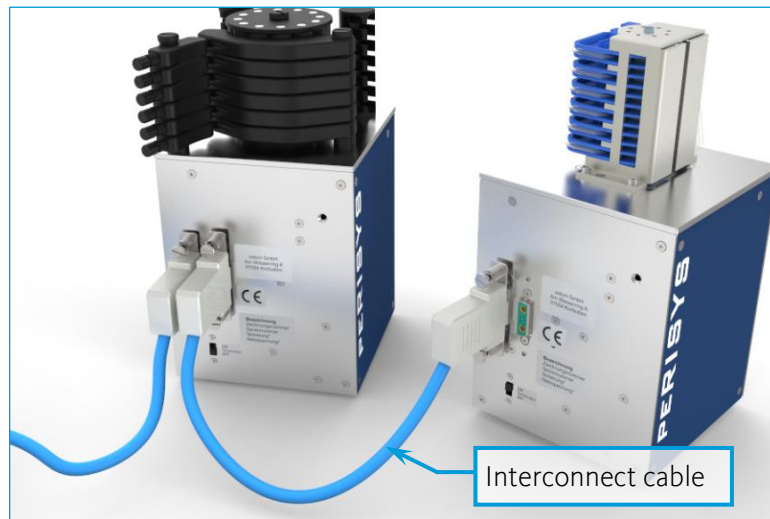
## 3.3   Pump Configuration

Among other things the configuration of peRISYS peristaltic pumps includes the selection of the pump type and the selection and insertion of hoses. All necessary information with respect to technical data and hardware operation as well as the configuration of peRISYS peristaltic pumps can be found in the following sections of this manual.

In case of necessary actions within the software, reference will be made to the relevant section of the software manual. The software manual will also provide additional important and helpful information.

4 peRISYS Peristaltic Pumps
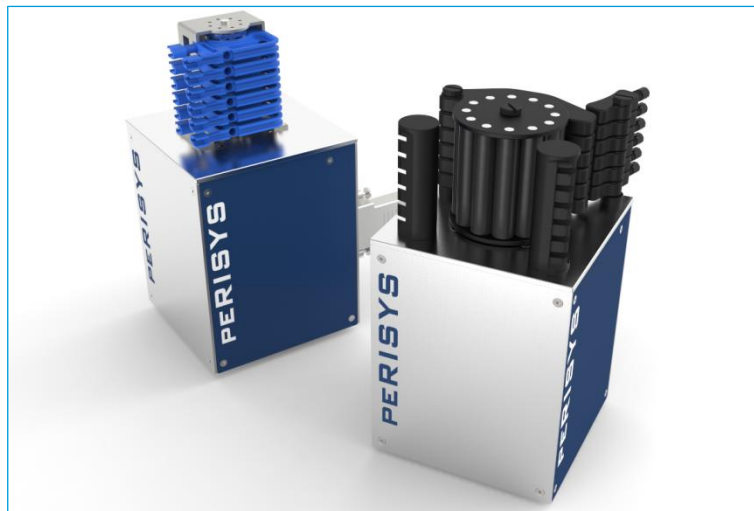
4.1 Technical Data

4.1.1 Mechanical Data

DIMENSIONS (L X W X H)	135 x 135 x 260 mm
WEIGHT	≈3300 g

4.1.2 Electrical Data

SUPPLY VOLTAGE	24VDC
CURENT DRAIN	0.35 A
POWER CONSUMPTION	8,5 W

4.1.3 Interfaces

CAN	1 Mbit/s

4.1.4　Environment

OPERATING TEMPERATURE	0°C to 40°C
STORAGE TEMPERATURE	-20°C to 75°C
OPERATING AIT HUMIDITY	20% to 90%, non-condensing
STORAGE AIR HUMIDITY	20% to 90%, non-condensing

4.1.5　Dosing

MAXIMUM SPEED	60 rpm

4.1.6   Dosing Performance

The speed of peRISYS peristaltic pumps can be adjusted from 0.075 – 60 rotations per minute (rpm). The resulting flow rate depends on the material and dimensions of the hose being used. Volume flow is further influenced by counter-pressure, the viscosity of the medium being pumped and the operating time of the hose.

The following table represents the anticipated flow rates (per minute) for peRISYS I and S version matched with typical tubing sizes (reference values based on ambient conditions with distillate water).

TUBING ID (MM)	PERISYS I		PERISYS S	
	MIN. FLOW RATE (ML/MIN)	MAX. FLOW RATE (ML/MIN)	MIN. FLOW RATE (ML/MIN)	MAX. FLOW RATE
0,13	0,0001	0,0800	0,0004	0,2801
0,19	0,0002	0,1247	0,0006	0,5102
0,25	0,0002	0,1943	0,0010	0,7684
0,38	0,0005	0,4266	0,0018	1,4214
0,44	0,0007	0,5698	0,0022	1,7650
0,51	0,0010	0,7642	0,0027	2,1986
0,57	0,0012	0,9535	0,0032	2,5977
0,64	0,0015	1,1997	0,0039	3,0948
0,76	0,0021	1,6817	0,0050	4,0234
0,89	0,0029	2,2835	0,0064	5,1343
0,95	0,0032	2,5871	0,0071	5,6825
1,02	0,0037	2,9606	0,0079	6,3495
1,09	0,0042	3,3536	0,0088	7,0453
1,14	0,0046	3,6458	0,0094	7,5594
1,22	0,0052	4,1316	0,0105	8,4110
1,30	0,0058	4,6386	0,0116	9,2973
1,42	0,0068	5,4348	0,0134	10,6889
1,52	0,0077	6,1272	0,0149	11,9032
1,65	0,0088	7,0605	0,0169	13,5520
1,75	0,0097	7,7996	0,0186	14,8714
1,85	0,0107	8,5532	0,0203	16,2326
2,06	0,0127	10,1675	0,0240	19,2173
2,29	0,0149	11,9531	0,0283	22,6613
2,54	0,0173	13,8666	0,0332	26,5804
2,79	0,0196	15,6984	0,0383	30,6476

given data may vary depending on surrounding conditions

4.2　Transport and Storage

Please use the original package for transporting and shipping the modules. Please refer to section 4.1.4 for more information about storage.

4.3　Maintenance and Care

If used properly, the device is maintenance-free. If you encounter problems that you cannot fix yourself or that require opening the device, please contact CETONI GmbH to determine further action. The device may be opened exclusively by CETONI GmbH or authorized personnel. Otherwise the warranty will be void.

The software manual contains detailed information with respect to malfunctions of the operating software.

Wipe the device with a moist (not wet) cloth, in order to avoid liquid dripping into the device. In case of heavy soiling you may also use some detergent or alcohol.

4.4　Hardware Operation

Connect your peRISYS peristaltic pump to your base module / system as described in section 3.2.2 and in the software manual.

CAUTION. Do not touch moving parts on the device during operation. There is a danger of crushing!

CAUTION. Make sure that no body parts, such as fingers, hair, etc, or items like jewelry or loose cables, hoses and so forth get caught in the rotating pump head.

The drive and controller for peRISYS peristaltic pumps are developments made by CETONI GmbH, facilitating convenient integration into existing neMESYS or Qmix systems.

However, in case of the pump head we have decided to use existing and widely available systems and products from Ismatec (1) and Spetec (2). This makes it possible to also use the comprehensive hose selection of these manufacturers.
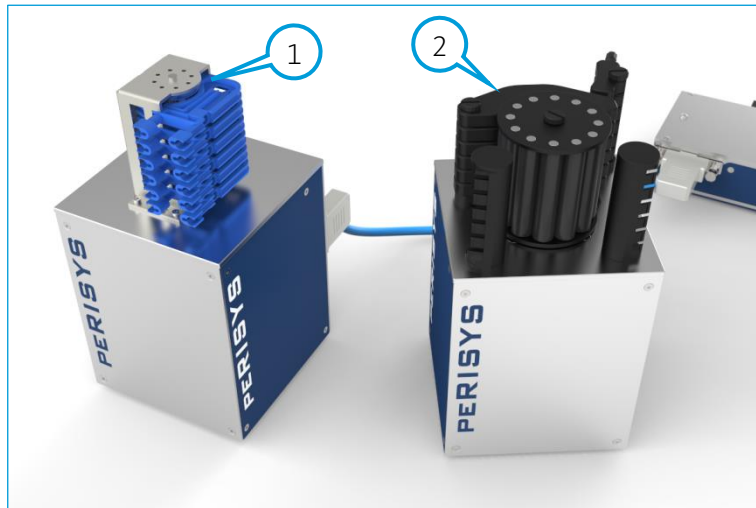
Pump head Ismatec and Spetec

The attachment of hoses to the two pump heads will be described in the following sections:

4.4.1   Mounting Hoses – peRISYS-I

The peRISYS-I pump head works with so-called hose cassettes. The pump head can be fitted with up to six cassettes. Each cassette can be fitted with a different hose. Hoses must have two stoppers.

Insert a stopper into the respective receptacle on the cassette. Then wrap the hose around the cassette without twisting it and insert the second stopper into the second receptacle of the cassette. When you are finished, it should look like the cassette on the left side of the image.
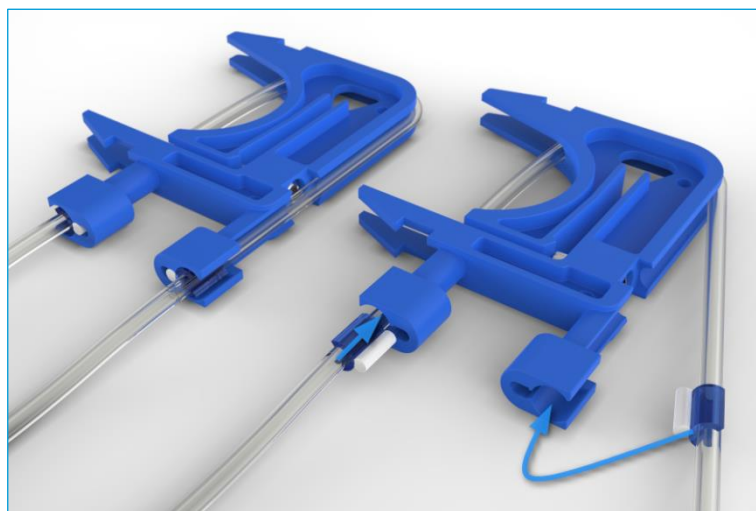
Cassettes

Afterwards, you can click the cassettes into the pump head. To achieve this, attach one of the fixing clips (1) and push the cassette onto the pump head until the second clip (2) clicks into place.

The direction in which you mount the cassette is up to you. This lets you decide which direction you want the hoses to point to.
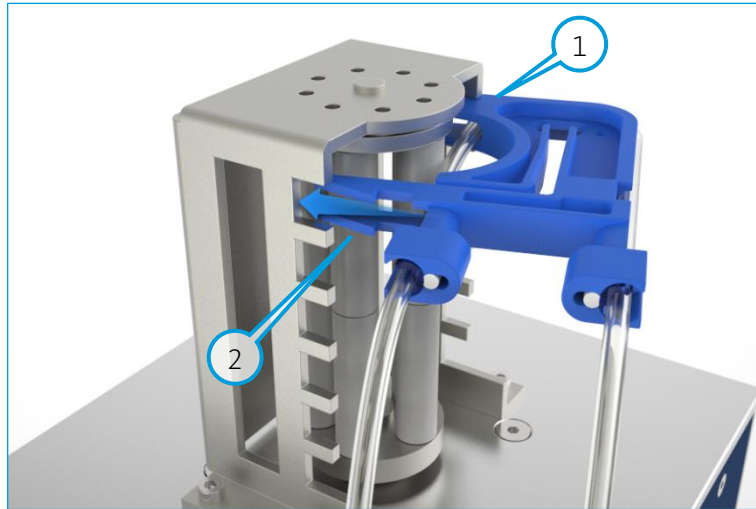
Follow the same process with the remaining cassettes.

If you don't want to attach hoses to all six channels, you can mount empty cassettes to vacant channels in order to avoid touching the rotating pump head inadvertently. Once the pump head is fully fitted, you can start up the pump.

CAUTION. Mount empty cassettes to vacant channels in order to avoid touching the rotating pump head and minimize the risk of injury.

When using new hoses there may be incidents in which the pump does not deliver medium. In such cases you can sprinkle the hose and let the pump run for about 15 – 30 minutes with the hose inserted.

Cassettes can be adjusted for different hose diameters and wall thicknesses by way of an adjustment screw. If you turn the screw clockwise with a 2.5mm Allen key, the pressure on the hose will increase. This makes sense in case of thin hoses. For thick hoses you should loosen the screw a little. The more the hose is compressed the faster it will wear out. Do not tighten the screw beyond the necessary point.
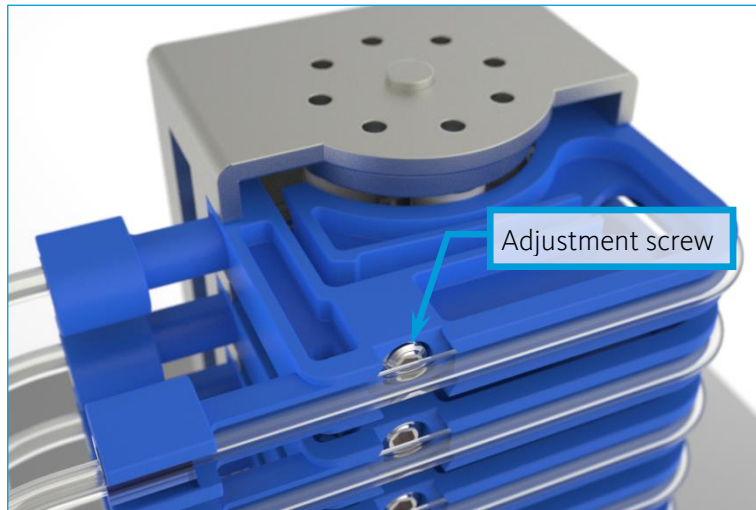
Adjustment screw

IMPORTANT. Avoid overly tightening the adjustment screw in order to minimize wear.

If you want to remove a cassette from the pump head, press down on the fixing clip until you are able to push out the cassette.
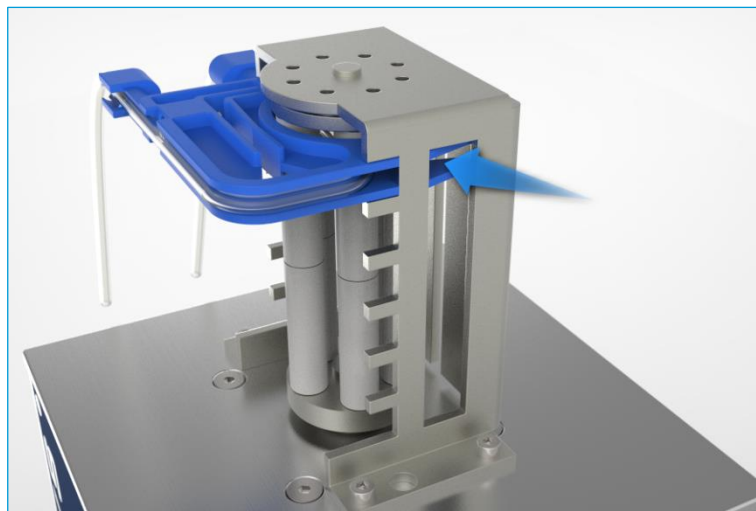

Replacement cassettes can be ordered from Ismatec using the order number IS 10365.

4.4.2   Mounting Hoses – peRISYS-S

On the peRISYS-S pump head hoses are pressed against the rollers with clamping bars. To insert a hose, turn the catch clockwise and open the clamping bar.

Clamping bar

Catch
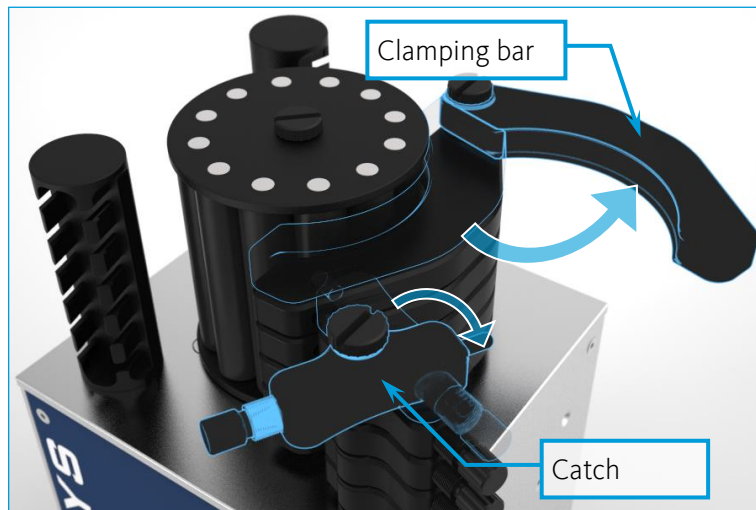
The peRISYS-S pump head is designed for the use of hoses with two stoppers. The device is fitted with two columns. Each column has two comb bars. Insert a stopper into one of the comb bars on one of the columns. Now wrap the hose around the roller head without twisting it and insert the second stopper into the comb bar on the second column. The different comb bars make it possible to use hoses with different stopper spacing distances.


Columns with comb bars

Stopper
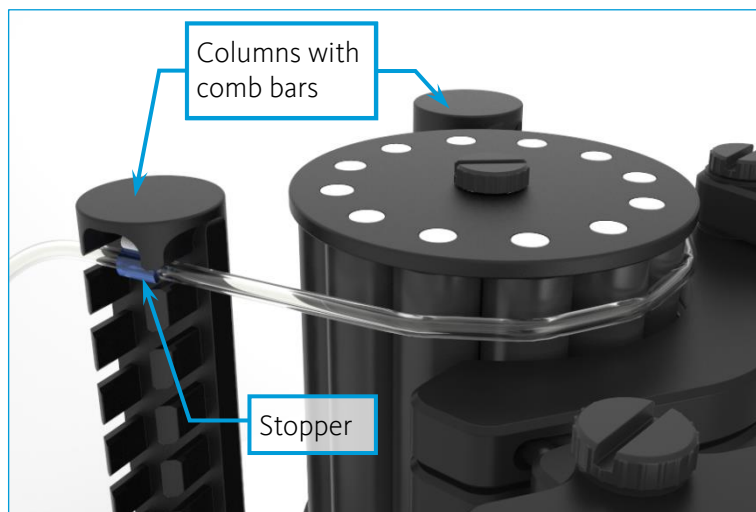
Once you have inserted the hose, close the clamping bar and turn the catch to the lock position.

When using new hoses there may be incidents in which the pump does not deliver medium. In such cases you can sprinkle the hose and let the pump run for about 15 – 30 minutes with the hose inserted.

Individual channels can be adjusted for different hose diameters and wall thicknesses by way of adjustment screws located on the catches. If you turn the screw clockwise, the pressure on the hose will increase. This makes sense in case of thin hoses. For thick hoses you should loosen the screw a little. The more the hose is compressed the faster it will wear out. Do not tighten the screw beyond the necessary point.
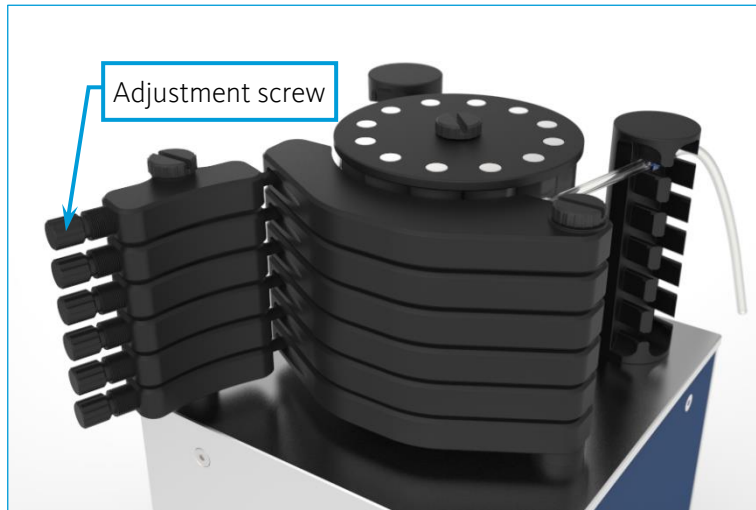
IMPORTANT. Avoid overly tightening the adjustment screw in order to minimize wear.

5 Disposal

Please return your old devices to CETONI GmbH. We will take care of proper disposal according to the relevant regulations.

If necessary, please decontaminate the device before returning it and attach the completed declaration of conformity.