neMESYS®

Original Operation Manual 1.04 - October 2010

Manual

Hardware

neMESYS Mid Pressure

cetoni®

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1 Overviews and tables

1.1 Table of contents

1.2 Change history

Rev	Date	Change
1.00	16.11.2009	• Manual Compilation
1.01	04.12.2009	• Flow Rates Updated
1.02	24.02.2010	• Amendments regarding new machine directive
1.03	29.06.2010	• Adaption of some formulations
1.04	07.10.2010	• Amendments regarding new valves

2 Safety instructions

2.1 Symbols and key words used

The following symbols are used in this manual and are designed to aid your navigation through this document:

IMPORTANT

Indicates tips for users and other especially useful information on how to act in dangerous or harmful situations.

NOTICE

Indicates a potentially harmful situation. Failure to avert this situation may result in damage to the product or anything nearby.

CAUTION

Indicates a potentially dangerous situation. Failure to avert this situation may result in slight or minor injuries and property damage.

2.2 Standards and directives

CE This unit has been tested and registered in accordance with the limit values for industrial units; class 1, group B. cetoni GmbH declares under its sole responsibility that this product conforms to the relevant directives listed on the last page.

Operation is subject to the following conditions:

1. The device must not emit damaging radiation.
2. The unit must be able to process damaging radiation, including radiation of a nature that could lead to an undesirable operation.

The product fulfils limit values in accordance with EN55011, class 1, group B. The unit underwent and passed tests in accordance with DIN EN 61000-4-4 (Burst) and DIN EN 61000-4-5 (Surge).

3 Basic information

3.1 Foreword

Thank you for deciding to purchase a cetoni product. We have designed this manual to support you as far as possible in your handling of the neMESYS syringe pump system. We are directly available for any questions or suggestions that you may have.

You should not use the neMESYS syringe pump system before you have carefully read and understood this manual. We wish you success in your work with the high-precision neMESYS syringe pump system.

3.2 Application purpose

3.2.1 Intended Use

The neMESYS devices are syringe pumps. They allow emptying and filling syringes by the relative linear movement of a syringe- and a pistonholder.

3.2.2 Intended Use

The neMESYS syringe pump system is used for precise and pulsation-free dosing of fluids in the range of nanolitres per second up to millilitres per second. With the Mid Pressure Module, pressures up to 200 bar can be achieved (depending on the syringe type used.)
Application usually takes place in laboratory-like rooms.

3.2.3 Reasonably Foreseeable Faulty Application

A use for applications distinct from the intended purpose can lead to dangerous situations and is to be omitted.

CAUTION

The unit must not be used as a medical device or for medical purposes.

3.2.4 Safety advice

The safety of the user and failure-free operation of the unit are only assured if original parts are used. Only original accessories must be used. Warranty claims will not be accepted for damage due to the use of third-party accessories or consumables.

The device has been developed and constructed in such a way as to largely exclude hazards due to its intended use. Nevertheless, you should observe the following security measures in order to exclude any remaining hazards.

- cetoni GmbH would like to make it clear that the operation of the device is the responsibility of the operator. While operating the device, the laws and regulations of the place of installation must be observed! In the interest of a safe work routine, operators and users are responsible for maintaining regulations.

- Before operating the unit, the user must at all times ensure the operational reliability and the adequate and orderly condition of the unit.

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

- The unit and pipes must be checked for damage before operation. Damaged pipes and plugging devices must be replaced immediately.

- Cables must be laid in a way that avoids any risk of stumbling.

- Moving parts must not be touched while the device is in operation. There is a risk of crushing!

- The pressurised medium may leak out if the connections of the high-pressure module are not secured properly. There is risk of injury! Please ensure that all fittings are fastened and tightened properly and you must wear protective glasses.

- Do not operate the device in an explosive atmosphere or with explosive materials!

- Please note that the syringes may wear out during continuous operations. This may lead to leakages. Replace the leaking syringes immediately.

- The glass syringes may break at high pressures. Use the glass syringes only if you can ensure that the maximum pressure specified by the manufacturer is not exceeded.

- Put measures in place, e.g. a relief valve to remove pressure from the system if there is a defect or incorrect operation.

3.2.5 Measures for safe operation

3.2.5.1 Electromagnetic emissions

The neMESYS dosing system is intended for use in any type of facility, including living quarters, and those that are connected to a public mains network that supplies buildings used for living purposes.

3.2.5.2 Electrostatic discharge

Floors should be made of wood, concrete, or ceramic tiles. If the flooring is synthetic, the relative humidity must be at least 30%.

3.2.5.3 Electric disturbances

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

3.2.5.4 Magnetic disturbances

Do not place power connector cables and other appliances in close proximity to the unit and its cables. Portable and mobile communication devices should not be used in closer proximity of the unit or its cables than the recommended safety distance!

3.2.6 Safety devices on the unit

The unit can be switched off at any time in an emergency (rocker switch on the side of the housing); this will not cause damage to the unit.

3.2.7 Condition of the unit

Irrespective of the faultless manufacture of the unit, damage can occur whilst the unit is in operation. With this in mind, always carry out a visual check of the components mentioned before use. Pay particular attention to crushed cables, damaged tubing, and deformed plugs. If you notice any damage, please do not use the device and inform cetoni GmbH without delay. cetoni will return the device to an operational condition as quickly as possible. Do not attempt to carry out a repair to the unit.

3.3 Warranty and liability

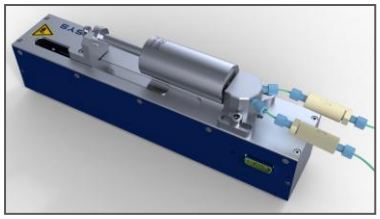
This unit left our company in perfect condition. The manufacturer is the only entity permitted to open the unit. If the unit is opened by an unauthorised person, all guarantee and liability entitlements, particularly damage entitlements due to personal injuries, lapse.

The duration of the warranty is 1 year from the day of delivery. It is not extended or renewed due to work carried out under warranty.

cetoni GmbH only considers itself responsible for the unit with regard to safety, reliability and function; if assembly, new settings, changes, extensions and repairs are carried out by cetoni GmbH or an authorised centre, and if the unit has been used in accordance with the instruction manual.

The dosing unit system is subject to safety regulation standards. Industrial property rights are reserved on the circuits, methods, names, software programs and units.

4 Technical data



Environment

Temperature (operation)..... 0°C to 45°C
Temperature (storage)..... -40°C to 75°C
Air humidity (operation) 20% to 80%, non-condensing
Air humidity (storage) ... 20% to 80%, non-condensing
Acoustic capacity of the device is below 70 dB(A)

Mechanical data

Weight.....1.8 kg
Dimensions.....(L x W x H) 310 x 69.5 x 92 mm

Electrical data

Supply voltage .....9 – 24 VDC
Typical current ..... 0.4 A
Current peak ..... 1 A

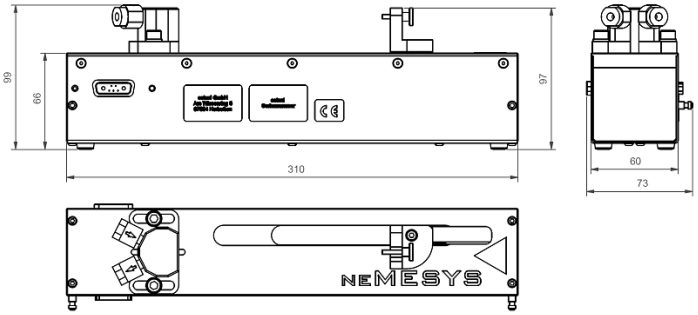
Interfaces

CAN ..... max. 1 Mbit / s
RS-232 ..... max. 115200 bit/s

Configuration

Three-way valve .....optional
Syringe outer diameter ..... 6 to 25 mm
Syringe piston stroke ..... 62 mm

Dimensions



4.1 Dosing capacity

The precision while dosing with the neMESYS mid pressure module is largely influenced by the size of the syringes. The following table provides an overview of the achievable dosing precision while using the cetoni stainless steel syringes.

All syringes have a maximum cylinder stroke of 60 mm. However, the given volume (2.5ml, 10ml, 25ml and 50ml) is already achieved at a lower stroke, as you can see in the table.

Velocity min (nm/s)	**26.30**
Velocity max (mm/s)	**4.664**
Smallest step (µm)	**0.017**
Max. pusher force (N)	**1000**
Syringe 2.5ml / 49.99 mm stroke	
Flow rate min (nl/s)	**1.315**
Flow rate max (µl/s)	**233.3**
Dosing volume min (nl) = 1 step	**0.858**
Syringe 10ml / 49.89 mm stroke	
Flow rate min (nl/s)	**5.270**
Flow rate max (µl/s)	**934.8**
Dosing volume min (nl) = 1 step	**3.437**
Syringe 25 ml / 50.86 mm stroke	
Flow rate min (nl/s)	**12.92**
Flow rate max (µl/s)	**2292**
Dosing volume min (nl) = 1 step	**8.428**
Syringe 50 ml / 51.91 mm stroke	
Flow rate min (nl/s)	**25.32**
Flow rate max (µl/s)	**4492**
Dosing volume min (nl) = 1 step	**16.52**

5 Transportation and storage

5.1 Transportation

Use only the original packaging designed for the individual modules for transportation or shipping.

Please do not lift and transport assembled modules. The assembled device can only be transported if it is in original packaging.

NOTICE

Risk of damaging the casing!

In order to avoid damage, do not transport individual modules in an assembled state.

5.2 Storage

Observe the information given in the technical data sheets for the operation and storage of the individual modules. (Chapter 3)

6 Initial start-up

6.1 Quick start

Please observe the following steps when bringing the neMESYS-Dosing Platform into service and for testing:

IMPORTANT

Please read the manual carefully and completely before bringing your neMESYS Dosing Platform into service.

(1) Install the software from the CD contained in the scope of supply onto your computer. To do this, start the *neMESYS UserInterface Setup.exe* program from the CD (section 6.2.)

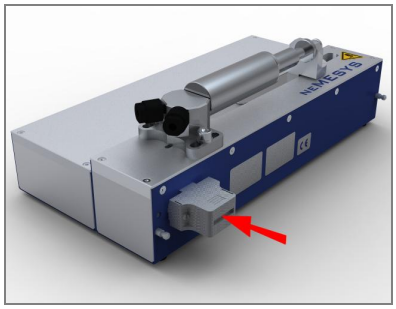
(2) Place your neMESYS Basic Module on a flat surface close to your PC. Connect **one** dosing module with it.

NOTICE

Risk of damaging the device configuration!

In order to avoid configuring incorrectly, *connect only **one** dosing unit with the basic module while starting the software for the first time! Before adding more modules, please refer to Section 7.3*

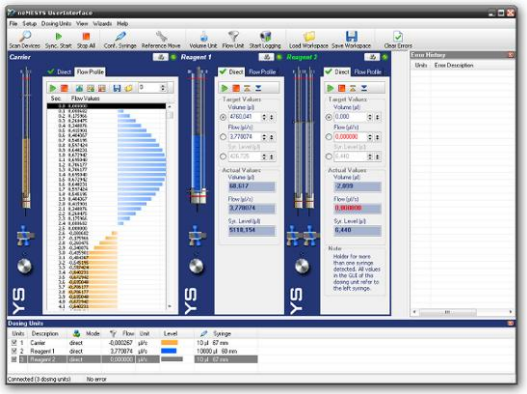
(3) Connect the bus terminating plug into the socket of the last connected dosing unit of your syringe pump platform.



(4) Connect your basic module with your PC using the USB cable provided (Section 6.5). Your PC should detect a new USB device and install the necessary drivers.

(5) Using the power connector cable supplied, connect the basic module to the mains power supply.

(6) Run the software *neMESYS UserInterface* and follow all the steps in order to configure your dosing platform (Section 1).



6.2 Step 1 - Installing the software

IMPORTANT

In order to ensure that the time-sensitive control processes of the neMESYS software are not affected, no applications requiring high processing power should be used on the control PC.

To install the software, insert the neMESYS CD-ROM into the CD drive. Then run the *"neMESYS UserInterface Setup.exe"* file from the CD. The installation wizard will then guide you through the process of installing the neMESYS software and the hardware drivers.

IMPORTANT

The user must be logged into Windows as the administrator in order to carry out the installation of the hardware driver.

During the installation, the hardware device drivers will be installed. This step is only necessary if the drivers have not already been installed on the computer. If the hardware drivers are already installed, please deactivate the *Hardware device drivers* component (Figure 1).

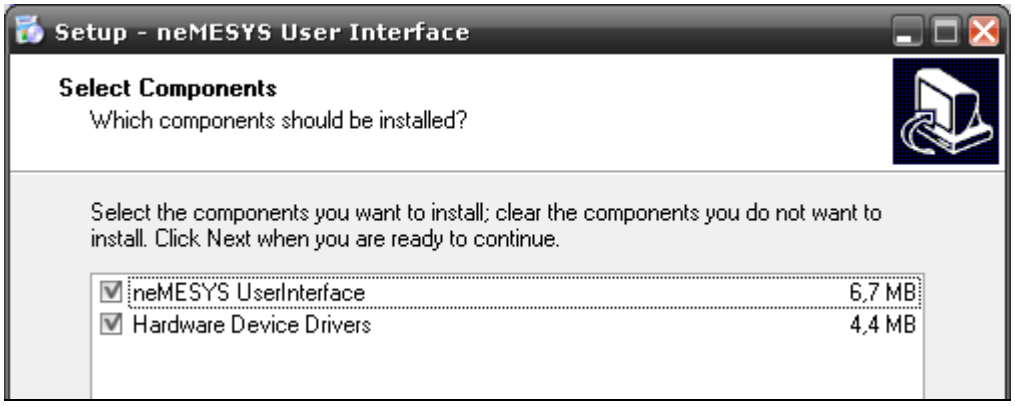


Figure 1 - Hardware device driver installation

Your computer must fulfil the following system requirements in order to use the *neMESYS UserInterface*:

- PC with Pentium processor (or better) - min. 600 MHz,
- at least 64 MB RAM,
- free hard disk space of approx. 10 Mbyte,
- at least 2 free USB (1.1 or 2.0) interfaces,

- Operating system Windows XP, Windows 2000, Windows 98 SE or Windows ME,
- Scroll wheel mouse.

6.3 Step 2 - Setting up the device

Set your neMESYS module on a flat, horizontal surface, e.g. on tables, floor-standing cupboards or apparatus trolleys. The dosing platform can be placed in either a horizontal or vertical position.

NOTICE

Consider the reduced stability in the upright position and try to minimize the risk of overturning. Place the devices at least 40cm from the edge of the table to avoid them dropping from the table in case of overturning.

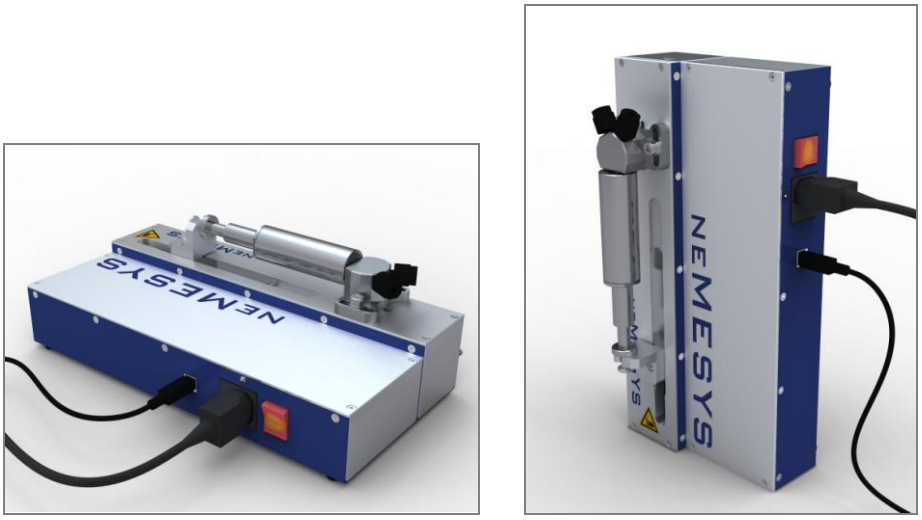


Figure 2 - neMESYS Set-up

6.4 Step 3 - Bus terminating connector

Insert the bus-terminating-plug into the socket of the last connected dosing unit of your dosing platform. Ensure that this plug is plugged into the unit before the unit is switched on. If this plug is not plugged into the unit, disturbances to the data communication may occur.

6.5 Step 4 - Connecting the device

Connect the inlet connector for non-heating apparatus fitted to the unit to the mains power supply with the power cable. The USB cable is used to connect the dosing platform (USB type B) to a free USB socket on the PC (USB type A).

CAUTION

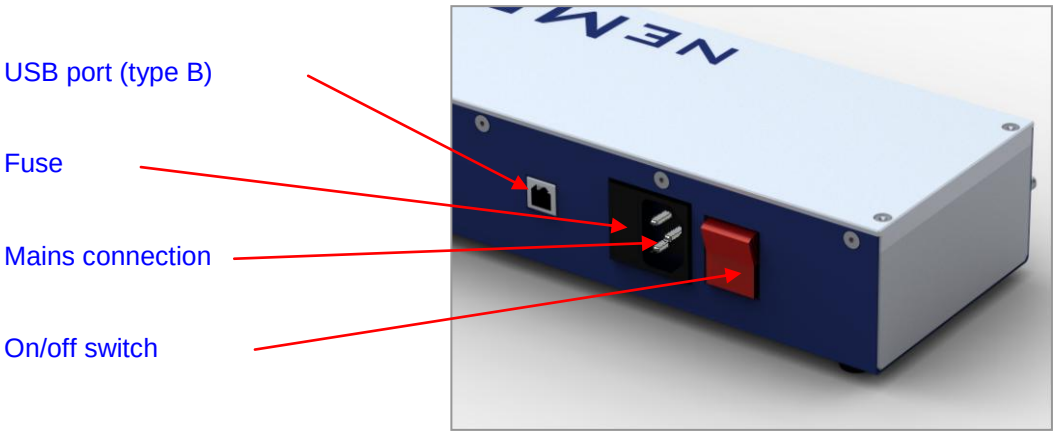
Risk of injury from damaged cables and plug devices.

Inspect the unit and lines for damage before starting the unit! Never operate the unit with damaged lines and plugging devices!

Switch the power on in order to start the unit and bring it into an operational condition. The LED on the power switch should illuminate when the unit is turned on. If this is not the case, check that the power connector cable is correctly plugged into both the unit and mains power supply.

IMPORTANT

*Install the neMESYS software and device drivers **before** using the USB port to connect the unit to the PC.*



IMPORTANT

Only use the cables supplied.

CAUTION

Danger of tripping over the power and connection cable.

When laying cables, ensure any risk of stumbling is avoided!

6.6 Step 5 - Installing a new USB device

When you connect the neMESYS dosing platform to the PC via a USB port for the first time, or if a different USB port is used at a later date, the Windows hardware wizard will recognise a new USB device and then automatically install the necessary drivers.

(1) The hardware wizard recognises a new unit on the USB port

Figure 3 - Windows Hardware Wizard

(2) The system displays the following dialog window. It should be configured as shown in the diagram and confirmed with *Next*.

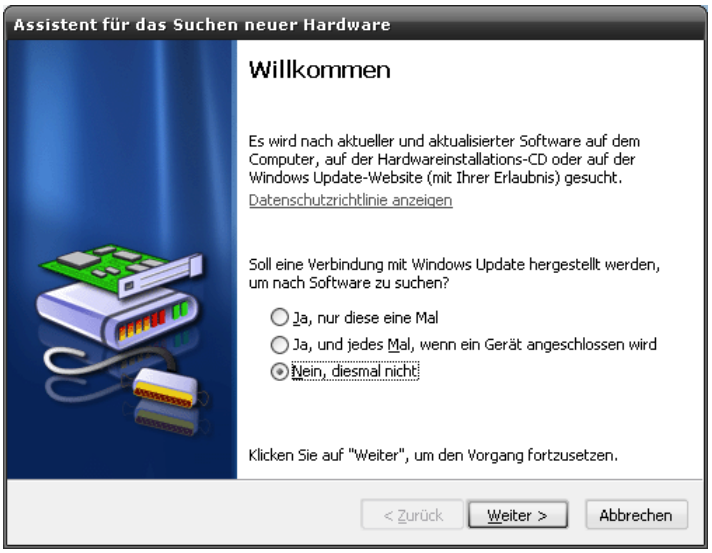


Figure 4 -Hardware wizard - welcome

(3) In the dialog window that follows, please select automatic installation and again confirm this window with *Next*.

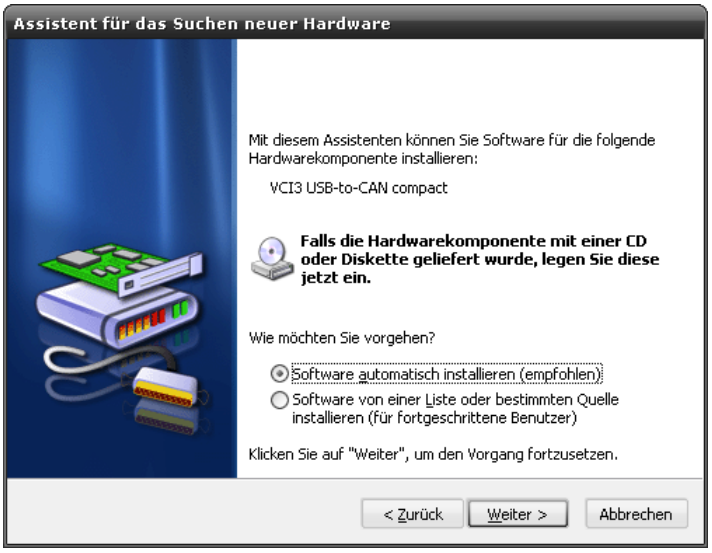


Figure 5 - New USB-to-CAN compact device detected

(4) Windows detects a driver for the new device and the following dialog appears

Figure 6 -Driver found

Complete the installation by clicking on *Finish*.

IMPORTANT

In order to install new hardware, the user must be logged in to Windows as and administrator.

You can start the neMESYS UserInterface after the driver has been successfully installed. Please follow the points in section 6 Initial start-up in order to correctly configure the dosing unit.

NOTICE

Risk of data loss due to switching off in an uncontrolled manner!

***First** exit the neMESYS UserInterface software **before** switching off the unit! This is the only way that all settings will be correctly saved and that configuration data will not be lost.*

7 Operating the device

7.1 Overview

User software that runs under the Windows operating system is available to control the unit. This software enables you to conveniently control all unit parameters, uncomplicated programming of various flow profiles for each individual syringe pump, and to graphically visualise the unit condition on each individual axis.

Sleep mode must be deactivated on the laptop when operating the software, as the system entering sleep mode can cause the hardware device driver to malfunction.

NOTICE

Risk of malfunctions / data loss caused by standby / sleep mode.

Deactivate standby / sleep mode on your PC or laptop to prevent the hardware driver from malfunctioning.

7.2 Detecting dosing units automatically

A search must be carried out every time the neMESYS UserInterface software is started. To start the search click on the *magnifying glass symbol* in the toolbar or on the *Set up* menu on *Search Devices.* At the same time, connection to the unit will be initialised.

When the search is carried out for the first time, a hardware selection dialog window appears so that you can select the unit with which the PC should connect. (e.g. in case you use multiple basic modules at the same time on one PC). Select an entry from the list and click *"OK"*: If this list is empty, then no basic module is connected to your PC.

The software will now run a search for any attached dosing units and identify them (Figure 7).

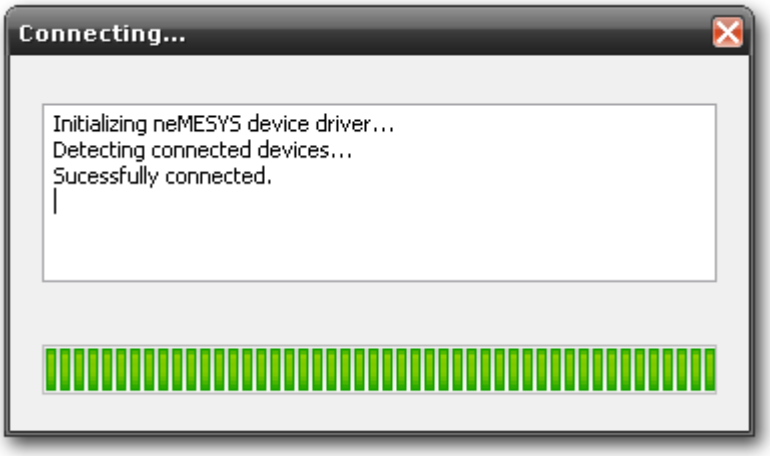


Figure 7 - Status window initialisation and search for dosing units

A user panel for all correctly configured dosing units will be displayed and the dosing unit will appear on the list of dosing units.

7.3 Adding dosing units

Certain steps must be taken if you would like to add additional dosing units to the dosing system. All dosing units are supplied with factory settings. This means that all dosing units have the same address. For this reason, it is not possible to immediately connect and use all dosing units. Please observe the following steps to add new dosing units to the dosing platform.

NOTICE

Risk of incorrect configuration and damage to the dosing units!

*Only add **one** additional module to your system and configure this before you add more modules.*

(1) In the *"Setup"* menu, please select the *"Add Dosing Unit"* menu item in order to configure your connected dosing unit and for the software to recognise this. A dialog window will appear. Follow the step-by-step instructions in the dialog window:

Figure 8 - Add dosing init dialog

(2) Switch your dosing platform off.

NOTICE

Risk of data loss due to switching off in an uncontrolled manner.

Do not switch off the dosing platform while the neMESYS UserInterface software is in use, except in an emergency or if the software clearly stipulates the same. This is the only way that all settings will be correctly saved and that configuration data will not be lost.

(3) Place the module that is to be connected next to your dosing platform on a flat horizontal base. The locating pins of the last dosing platform module lay opposite the locating hole of the module to be connected.

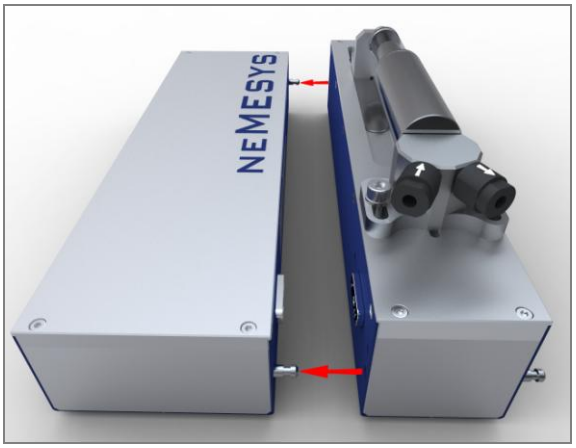


Figure 9 - Positioning dosing units

(4) Plug the new module onto the dosing platform. The locating pins are inserted into their respective locating holes and the D-sub connectors are connected together with a secure contact.
In order to guarantee a clean contact between the modules, both modules must lay flat on each other. Ensure that the modules are not tilted or twisted.

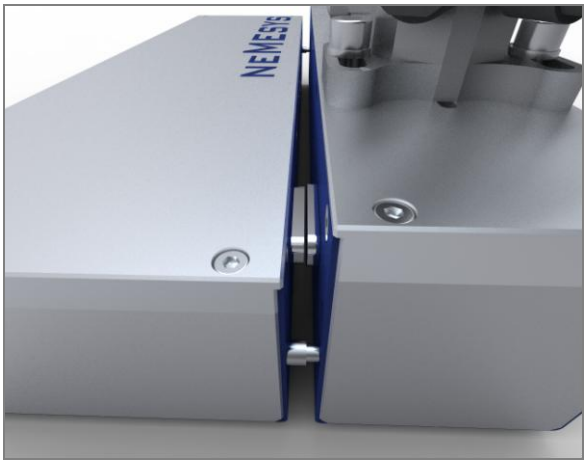


Figure 10 - Placing dosing units

(5) Plug the bus terminating plug in the newly installed module onto the dosing platform.

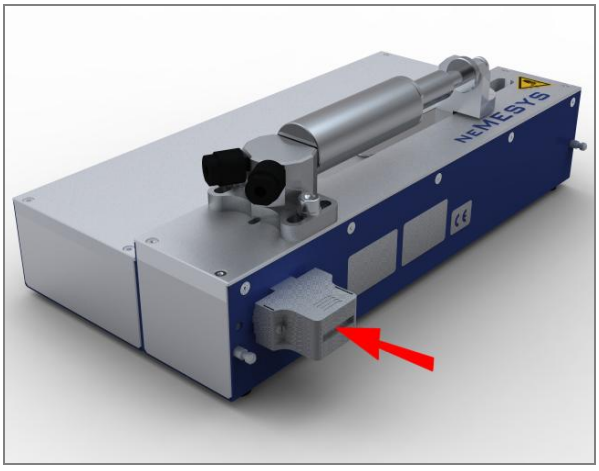


Figure 11 - Assembling bus terminating plug

(6) Switch the dosing platform on again and click *"OK"*.

NOTICE

Risk of incorrect configuration and damage to the dosing units!

*Only **one** non-configured dosing unit with default values can be connected to the dosing platform (initial connection).*

The software will now configure and add the units independently. To begin with, a search is made to detect dosing units that have already been configured and connected. When the search is carried out for the first time and several basic modules are connected with the PC, a hardware selection dialog window will appear for you to select the unit with which the PC should connect. Select an entry from the list and click *"OK"*: If the list is empty, then no Starter or Base Module is connected to your PC. No hardware selection dialog will appear if only one Starter or Base module is connected to the PC. If this is the case, the software will connect with the module automatically.

The search will start now:

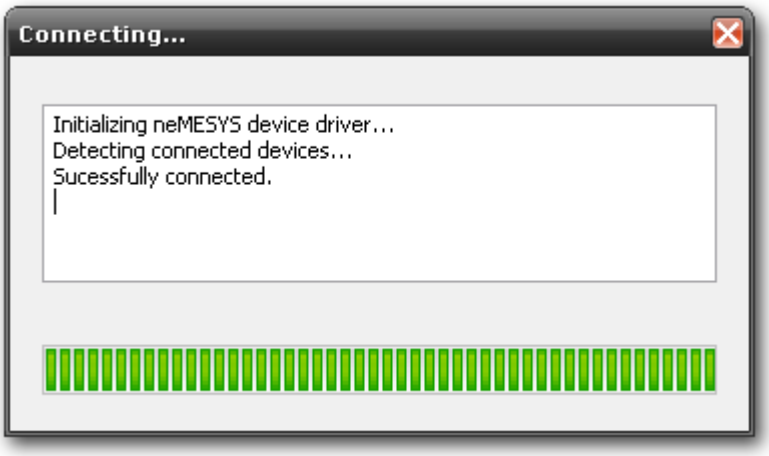


Figure 12 - Searching for dosing units

When the search is completed, user panels will be superimposed for all detected dosing units. The software will then search for newly connected dosing units with factory settings:

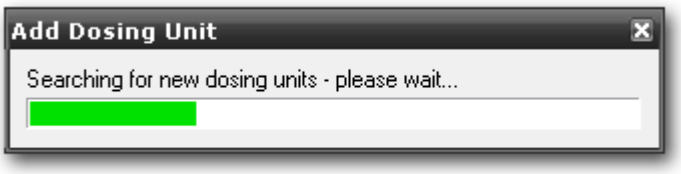


Figure 13 - Searching for dosing unit with factory settings

When the software has recognised the connected dosing unit, this will be automatically configured and will receive a unique unit address in the dosing platform.

On completion of the configuration, the software will conduct a further search in order to identify the properly configured dosing units. The newly configured dosing unit should now appear with the previously configured units.

When the newly installed dosing unit has been identified, the software will inform you that a calibration of the dosing unit is necessary.

Figure 14 - Reference move for new dosing units

Please calibrate by clicking on *OK* to confirm the dialog window. During calibration, all drives are moved to their lower end position and zero position.

NOTICE

Risk of damaging syringes!

The system may only be calibrated if there is no syringe installed on the dosing unit.

On completion of the calibration, the connected dosing unit is operational and can be used by you. If you have purchased more dosing units, please connect the next dosing unit with the dosing platform (previously configured units must not be removed). To do so and for every additional unit, repeat steps 1 - 7. Repeat this process until all dosing units are connected to the dosing platform and have been configured by the software.

IMPORTANT

The order in which the dosing units are connected and configured is also the order in which they will be displayed in the software. For this reason, do not change the order of the dosing units after configuration.

7.4 Removing dosing units

NOTICE

Risk of damage when removing the plugged-together dosing units through tilting!

When you remove the dosing unit, ensure that the units are separated from each other in as parallel a manner as possible.

Please follow the following steps in order to remove dosing units from your syringe pump system:

(1) Select the last dosing unit in the software. To do so, click on the unit in the list of dosing units. The selected unit is highlighted in colour as shown in Figure 15:

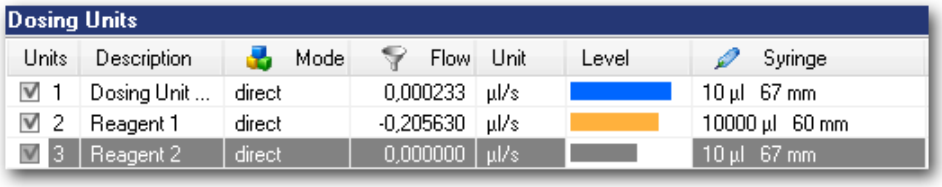


Figure 15 - List of dosing units

(2) In the Setup menu, click on "Remove dosing unit" (Figure 16) to remove the dosing unit from your syringe pump system.

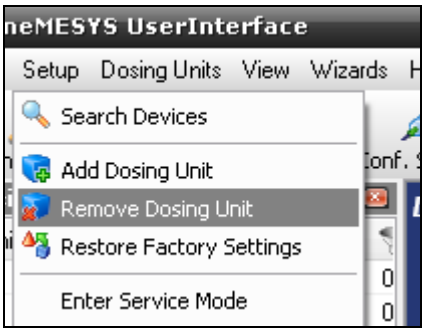


Figure 16 - Remove dosing unit menu item

(3) A dialog window will appear. Follow the step-by-step instructions in the dialog window:

Figure 17 - Remove dosing unit dialog

(1) Switch your dosing platform off

(2) Remove the **last** dosing unit.

(3) Connect the bus terminating plug into the socket of the last dosing unit of your dosing platform.

(4) Switch the dosing platform on again.

(5) Close the 'Remove dosing units' dialog window by clicking on *OK*. A new search will be run in order to detect the new configuration and number of dosing units in the dosing platform.

NOTICE

Risk of damage with an incorrect configuration!

Follow the steps above for each dosing unit you are removing. Never remove a dosing unit from your dosing platform without following this procedure.

IMPORTANT

After removing a dosing unit, place the bus terminating plug into the last connected dosing unit again.

8 Operating the hardware

8.1 Fluid connections

Fittings with ¼"-28UNF thread are recommended for fluid connections, since the valves and the T-piece have this thread. Please ensure that fluid lines have been connected properly in all dosing units and check for their proper sealing after they are connected. cetoni is not liable for the damages caused by faulty fluid connections.

NOTICE

Risk of damage to device electronics by faulty fluid connections. Always check the sealing of all fluid connections after connecting and at regular intervals.

8.2 Syringe fitting

NOTICE

Only use the syringes offered by cetoni GmbH particularly for the Mid Pressure If you want to use glass syringes make sure that their maximum operation pressure will not be exceeded.

Please follow the steps below to clamp the syringes:

(1) Unscrew the syringe base from the device with a 5mm Allen wrench.

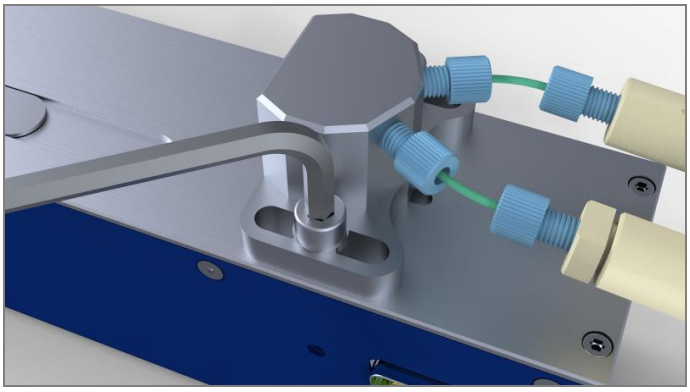


Figure 18 - Syringe base disassembly

(2) Connect the the valves and the empty syringe with the T-piece. Use a plastic sealing washer while screwing-in the syringe, so that it seals properly. Connect your tubes to the valves now. The tube screwed to the valve with the arrow in the direction of the syringe must hang with the open end down in a reservoir containing the fluid to be dosed.

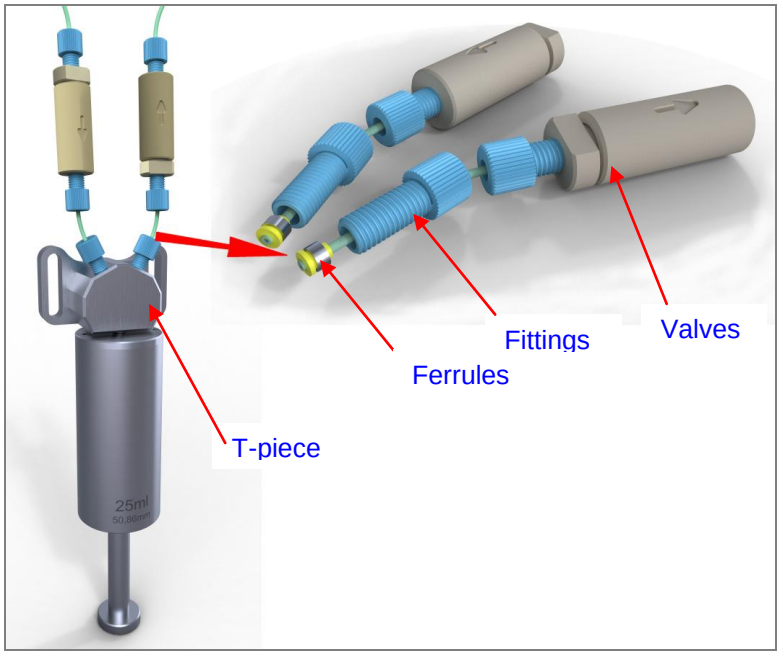


Figure 19 - Syringe and tube assembly

(3) If you draw up into the syringe now, fluid is taken in from the reservoir (shown in light blue in Figure 20). With subsequent pressures, the fluid again exits the other tube along with the air in the system.

Repeat this procedure until the system is adequately ventilated and press the syringe to its limit.

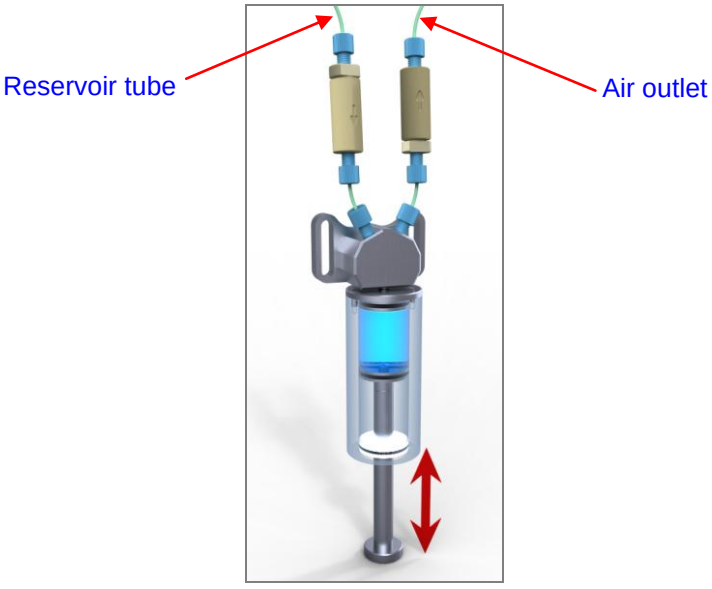


Figure 20 - Ventilating

(4) In order to use the entire syringe volume later, carry out a reference move next. To do so, select the relevant device in the list of dosing units and right click on the list to open up a popup menu. Now choose the *Reference move* item.

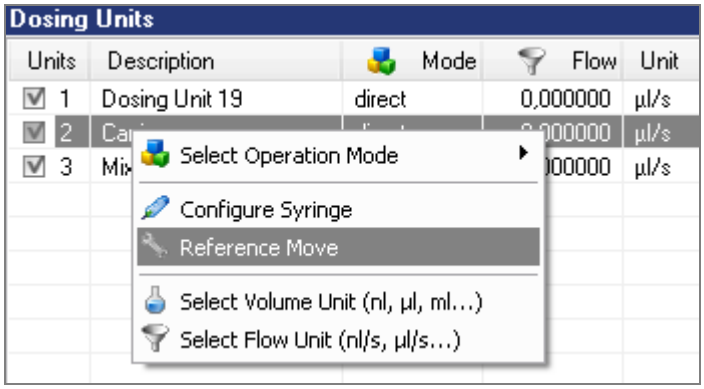


Figure 21 - Reference move

CAUTION

Risk of crushing by touching moving parts!

Do not touch any moving parts on the unit whilst it is in operation!

(5) The piston base comes to its final position after the reference move. Place the prepared syringe base with the syringe on the device and fasten the syringe piston with the knurled knob on the piston base.

Now you can screw-in the syringe base again with the 5mm Allen wrench.

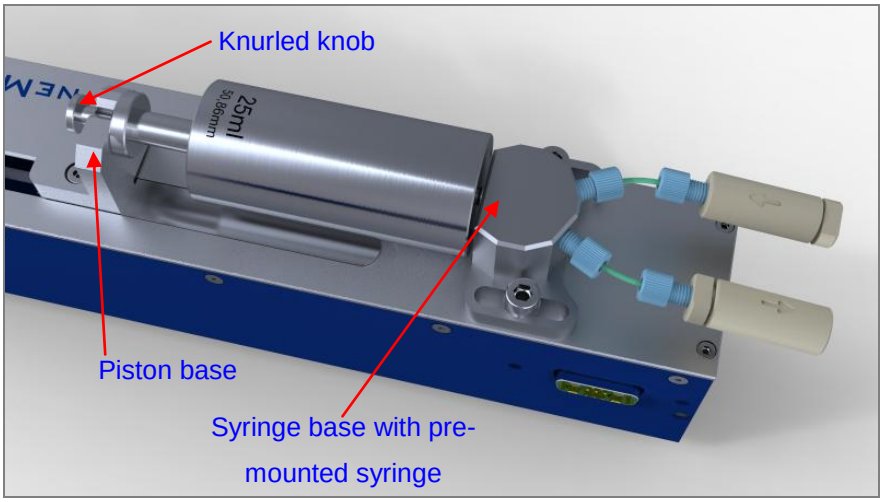


Figure 22 - Syringe base assembly

NOTICE

Damage to syringe during continuous use!!

Long dosing may lead to wearing out of the syringe. Please inspect the syringe at regular intervals and replace it, if required.

NOTICE

Risk of damaging the syringe whilst clamping!

Place the empty syringe in the reference position of the axis. If this is not possible, keep the traverse path of the syringe and axis in mind.

8.3 Valves

The valves enable the use of a reagent and its rendering without having to change or manually fill the syringe.

The valves are two check valves connected opposite each other, which switch independently in case of a change in the direction of the fluid and can sustain pressures up to 130 bar. The valves are screwed-in with the T-piece so that inlet and outlet can be interchanged easily if required or the valves can be removed for cleaning.

The valve bodies are made of PEEK and the valve seal of FKM. Furthermore a ball of Silicon nitride (Si3N4) and a stainless steel spring are contained. Before using, check the tolerance of these materials with respect to the medium to be used.

NOTICE

Examine the chemical compatibility of the media you want to pump in combination with the encasing material PEEK and the sealing materials FKM and Si3N4 as well as stainless steel.

IMPORTANT

In order to guarantee a safe function of the valves, do not dose with highly viscous media or those with solid content.

9 Syringes

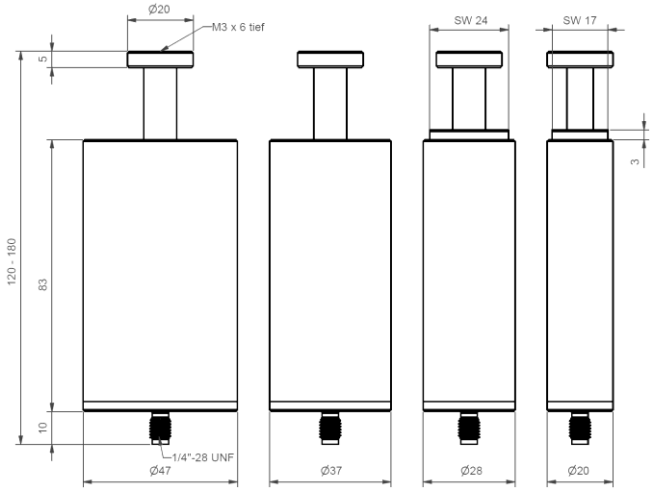
9.1 Technical data

Environment

Temperature (operation) ..... seal-based
Temperature (storage) .....-40°C to 75°C
Air humidity (operation).....0% to 100%
Air humidity (storage) ....20% to 80%, non-condensing

Mechanical data

Weight 2,5ml: 235g
..... 10ml: 450g
..... 25ml: 515g
..... 50ml: 690g
Dimensions (L x Ø) ..... 5ml: 120 x 20mm
..... 10ml: 120 x 28mm
..... 25ml: 120 x 37mm
..... 50ml: 120 x 47mm



Configuration

EPDM is used as the standard seal. An extra set and two sets each of FKM and NBR have been enclosed as spares. More materials are available on request.

9.2 Assembly / Disassembly

In order to clean the syringes systematically or to change the seals, the syringes must be disassembled. The procedure is explained below.

9.2.1 Disassembly 2.5ml & 10ml syringe

These syringes consist of a syringe body, a front and an end piece. In order to remove the front piece, loosen the two screws with a 2mm Allen wrench. Now you can press out the front piece from the syringe body with the help of the syringe piston and, if required, replace the O-ring seal (red in the diagram).

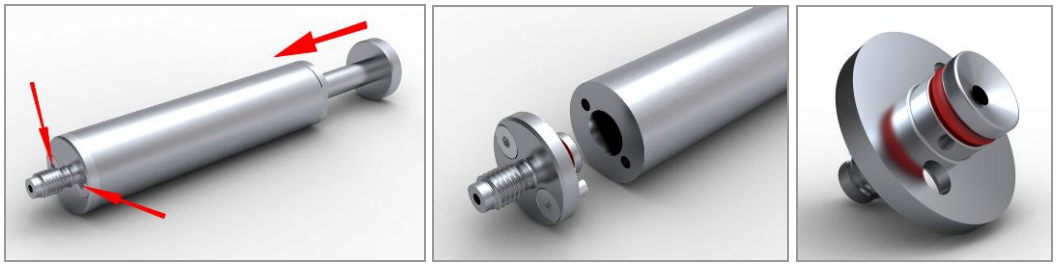


Figure 23 - Front piece disassembly

Now remove the piston from the syringe. You can then unscrew the end piece. If it is not possible to do this by hand, use a 17mm flat wrench for 2.5 ml syringe and 24mm flat wrench for the 10ml syringe or clamp the end piece **carefully** to a bench vice.
When you have removed the end piece, you can remove the O-ring seal (red in the diagram) from the syringe body.

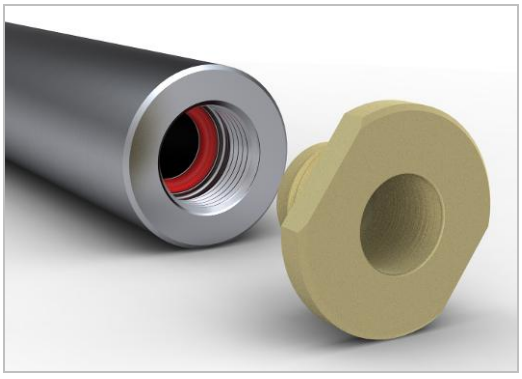


Figure 24 - End piece disassembly

9.2.2 Disassembly 25ml & 50ml syringe

The disassembly of the front piece is the same as that of the two smaller syringes described in 9.2.1.

There is no screwed end piece in this case. Instead, a Teflon guide washer with an O-ring is clicked in place in the syringe body. A strong pull at the base is enough to remove the entire end piece along with the guide washer.

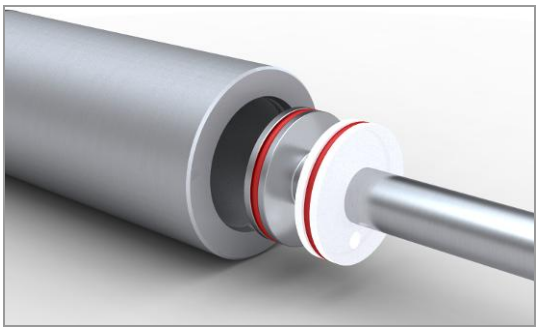


Figure 25 - Removing base

9.2.3 Assembly 2.5ml & 10ml syringe

Follow the reverse order for assembling the syringes:

- Insert the front piece with attached O-ring into the syringe body and tighten the two screws.
- Push the end piece and the O-ring on the syringe base. Finally, you can insert the base in the syringe body and fasten the end piece.

Figure 26 - Base assembly

9.2.4 Assembly 25ml & 50ml syringe

You can simply reverse the disassembly steps here as well:

- Insert the front piece with attached seal into the syringe body and tighten the two screws.
- Guide the base with the attached seal and guide washer and push the guide washer in the syringe body far enough to place the O-ring in its slot.

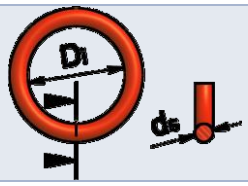
9.3 Care and maintenance of the syringes

With proper use, the syringes, including the O-ring seals, are maintenance free. Lubrication of the O-ring, with silicon grease for instance, considerably increases its life and must be done if your application permits.

Commercial O-rings are used as seals. They are available in various materials (FPM, EPDM, NBR and VMQ) from cetoni GmbH.

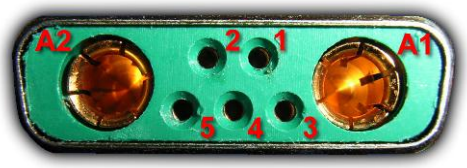
If you wish to take the O-ring from another supplier, you must adhere to the dimensions and hardness specified in the following table.

O-rings for 2.5ml and 10ml syringes have different sizes. In the 25ml and 50ml syringes, the O-ring in the guide washer does not come in contact with the media and thus does not need to be replaced. However, its dimensions are the same as the other two rings.

Syringe type	**O-ring dimensions (Di x ds) :** 	**Minimum shore hardness**
2.5ml	5x1.5 and 8x1.5 (1 piece each)	70
10ml	13x1.5 and 16x1.5 (1 piece each)	70
25ml	22x1.5 (2 pieces)	50
50ml	32x1.5 (2 pieces)	50

10 Electrical connections

10.1 Pin assignment module interface

Pin	Male	Female
		
1	RS232 NC	RS232 RX
2	RS232 NC	RS232 TX
3	CAN High	CAN High
4	CAN Low	CAN Low
5	Signal GND	Signal GND
A1	+24 V	+24 V
A2	GND	GND

10.2 OEM RS232 cable set

10.2.1 RS232 cabling

Plug the mixed D-sub male connector of the cable into the female connector of the last dosing unit in your dosing platform. The device should be switched off during cabling. Then tighten both screws. You do not need the terminating plug because a terminating resistor is already built into the RS232 cable.

Plug the 9pin-D sub female connector into your PC or any other control. If you need to bridge a longer distance please use a 1:1 cable with 9 pin D-sub male to female.

Now you can switch on your dosing platform and send or receive data via RS232. Because each dosing unit contains a built in RS232-to-CAN gateway you can address each dosing unit of your dosing platform with only one single RS232 cable.

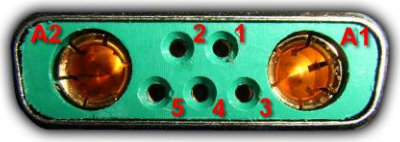
10.2.2 Communication settings

You need to setup the following RS232 communication settings for your PC or any other control for proper communication with neMESYS dosing units:

- Baud rate: **115200**
- Data bits: **8**
- Parity: **none**
- Stop bits: **1**
- Flow control: **none**

10.2.3 Pin assignment OEM-RS232 cable

The OEM RS232 cable adapts the female neMESYS device interface to a standard female 9 Pin D-Sub connector. The following table shows the pin assignments of the neMESYS interface and 9 Pin D-Sub:

Pin	Interface neMESYS (female)	Cable	Pin	9 Pin D-Sub female
				
1	RS232 RX	orange	2	RXD Receive Data
2	RS232 TX	brown	3	TXD Transmit Data
5	Signal GND	black	5	GND Signal GND
housing	PE-potential earth	shield	housing	

11 Maintenance and care

If used in accordance with the intended purpose, the device is maintenance-free. The manufacturer recommends sending the devices to cetoni GmbH every 2 years for maintenance. Should there be a failure despite this, please contact cetoni GmbH.
While sending the device back, decontaminate the device if necessary and enclose the completed contamination declaration.

11.1 Troubleshooting

If there are any mechanical problems you cannot remove on your own or those that require the device to be opened, please contact cetoni GmbH to clarify the further procedure. The device must be opened only by cetoni GmbH or its authorised service personnel. Otherwise, the guarantee and warranty claim will be void.
The software manual gives details about problems related to the operating software.

11.2 Cleaning

Wipe the device with a damp cloth. The cloth must be moist and not wet to ensure that the liquid does not drip into the device. If there is heavy contamination, you can also use a little detergent or alcohol.

12 Disposal

Please send back all your old devices to cetoni GmbH. It will ensure that the device is disposed of as per the German Electrical and Electronic Devices Act.
While sending the device back, decontaminate the device if necessary and enclose the completed contamination declaration.

13 Conformity declaration

EG-Konformitätserklärung
EC Declaration of Conformity
im Sinne der EG-Richtlinie 2006/42/EG über Maschinen (Anhang II A)
according to EC directive 2006/42/EC on machinery (Annex II A)

Name und Anschrift des Herstellers:
Name and address of the manufacturer:

cetoni GmbH
Am Wiesenring 6
07554 Korbußen

Diese Erklärung bezieht sich nur auf die Maschine in dem Zustand, in dem sie in Verkehr gebracht wurde; vom Endnutzer nachträglich angebrachte Teile und/oder nachträglich vorgenommene Eingriffe bleiben unberücksichtigt. Die Erklärung verliert ihre Gültigkeit, wenn das Produkt ohne Zustimmung umgebaut oder verändert wird.
This declaration relates exclusively to the machinery in the state in which it was placed on the market, and excludes components which are added and/or operations carried out subsequently by the final user. The declaration is no more valid, if the product is modified without agreement.

Hiermit erklären wir, dass die nachstehend beschriebene Maschine / Anlage
***Herewith we declare**, that the machinery described below*

Produktbezeichnung / product denomination:	**neMESYS Mitteldruckmodul**
Serien- / Typenbezeichnung / *model/type*:	NEM-B401-01

allen einschlägigen Bestimmungen der Maschinenrichtlinie 2006/42/EG entspricht.
Ggf.: Die Maschine/Anlage entspricht zusätzlich den Bestimmungen der Richtlinien 2006/95/EG über elektrische Betriebsmittel und 2004/108/EG über elektromagnetische Verträglichkeit.
is complying with all essential requirements of the Machinery Directive2006/42/EC.
Where appropriate: In addition the machinery is in conformity with the EC Directives 2006/95/EC relating to electrical equipment and 2004/108/EC relating to electromagnetic compatibility.

Angewandte harmonisierte Normen / *Harmonised Standards used*
EN V 61000-6-2
DIN EN 61010-1
DIN EN ISO 14121-1

Angewandte sonstige technische Normen und Spezifikationen
Other technical standards and specifications used:

Name, Anschrift und Kennnummer der benannten Stelle, die das EG-Baumusterprüfverfahren durchgeführt hat, sowie die Nummer der EG-Baumusterprüfbescheinigung oder die das umfassende Qualitätssicherungssystem genehmigt hat.
***the name, address and identification number of the notified body** which carried out the EC type-examination and the number of the EC type-examination certificate or which approved the full quality assurance system*

Bevollmächtigter für die Zusammenstellung der relevanten technischen Unterlagen (EU-Adresse)
***The person authorised to compile the relevant technical documentation** (must be established within EU):*
Herr Michael Kuntschke
cetoni GmbH
Am Wiesenring 6
07554 Korbußen

Korbußen, 23.03.2010	Kunze, Tilo - Geschäftsführer	
Ort, Datum *Place, Date*	Name, Vorname und Funktion des Unterzeichners *surname, first name and function of signatory*	Unterschrift *Signature*