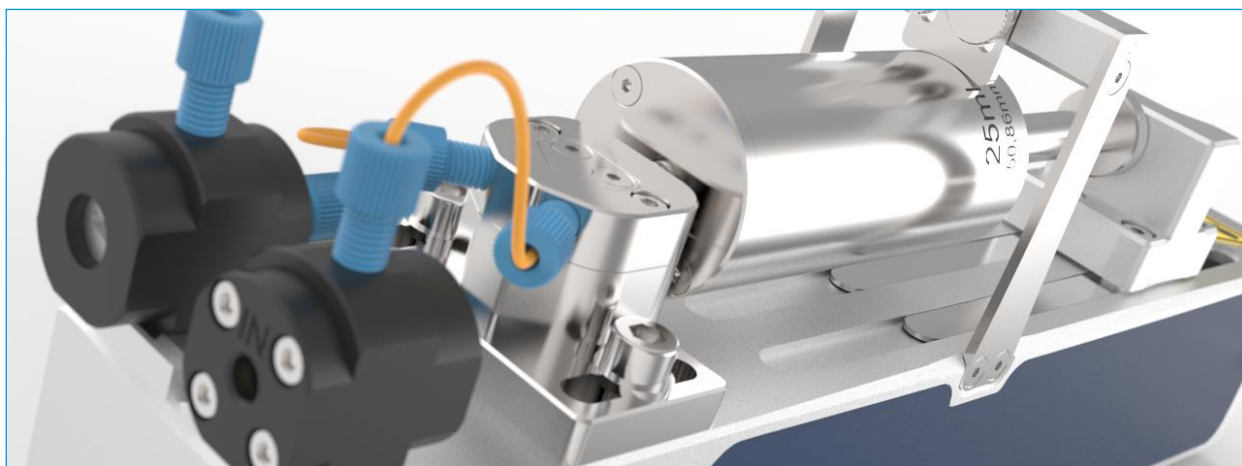
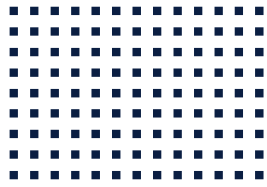


CETONI

CE NEMESYS MID PRESSURE Hardware Manual and Reference



ORIGINAL INSTRUCTIONS 1.00–JANUARY 2020



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1 Overviews and Directories

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2 Introduction

2.1 Foreword

Thank you for choosing a product from CETONI. With this user manual we would like to support you as much as possible in using your neMESYS pump. If you have any questions or suggestions, please do not hesitate to contact us directly.

The neMESYS syringe pump may only be put into operation after having read this manual thoroughly. We wish you every success in working with the device.

2.2 Symbols and Key Words Used

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



HINT. Describes practical tips and useful information to facilitate the handling of the software.



IMPORTANT. Signifies important hints and other useful information that may not result in potentially dangerous or harmful situations.



ATTENTION. Identifies a potentially harmful situation. Failure to avert this situation may result in damage to the product or anything in its proximity.



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

2.3 Norms and Guide Lines



CETONI GmbH declares under its sole responsibility, that the device complies with the health and safety requirements of the relevant European directives.

2.4 Application Purpose

2.4.1 General Description of the Advice

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

2.4.2 Intended Use

The neMESYS syringe pump serves for precise and pulsation-free dosing of fluids in the range of nanolitres per second up to millilitres per second. Pressures of up to several hundred bar can be reached depending on the device.

Application usually takes place in laboratory-like rooms.

2.4.3 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.

2.4.4 Safety Advice

The safety of the user and a failure-free operation of the devices are assured only if original parts are used. Only original accessories may be used. Warranty claims will not be accepted for damage due to the use of alien accessories or expendables.

The devices have been developed and constructed in such a way as to largely rule out hazards due to its intended use. Nevertheless, you must observe the following security measures in order to exclude any remaining hazards:

- CETONI GmbH points out the responsibilities of the operator for the operation of the devices. The laws and regulations of the place of installation must be observed while operating the devices! To ensure a safe work routine, operators and users must assume responsibility for adhering to regulations.
- The devices must not be used as a medical device or for medical purposes.
- 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 devices and the software.
- The devices and pipes must be checked for damage before operation. Damaged pipes and plug devices must be replaced immediately.
- Cables must be laid in a way that avoids any risk of stumbling.
- Any moving parts must not be touched whilst the devices are in operation. There is a risk of crushing!
- It is not allowed to use the devices in an explosive atmosphere or with potentially explosive substances.
- The device is designed and approved to work in fluidic systems, which fall within the scope of Article 4 Paragraph 3 of the Pressure Equipment Directive 2014/68/EU. This means that the system may not exceed a maximum volume of 1 liter. With the use of fluids from Group 1 according to Article 13 of the Pressure Equipment Directive 2014/68/EU, the maximum allowable system pressure is 200 bar. For fluids from Group 2 it is 1000 bar. If different, product-specific values for the maximum pressure are given in the section "Technical Data", these values must be complied with. Regarding the maximum operating temperature, the specification from the section "Technical Data" must be observed.

CETONI GmbH is not liable for consequences that may arise if the user expands the system by peripheral devices, such that one of the values or both values are exceeded.

It is the user's responsibility to become familiar with the mentioned Pressure Equipment Directive and to comply with the prevailing requirements.

- Wear protective glasses if you are working with corrosive, hot or otherwise dangerous substances during assembly work on the device.
- Transportation, storage or operation of the devices below 0°C with water in the fluid passages may cause damage to the modules.

2.4.5 Measures for Safe Operation

2.4.5.1 ELECTROMAGNETIC EMISSIONS

The Qmix system is intended for use in any type of facility, connected directly to the public power supply network that supplies buildings used for domestic purposes.

2.4.5.2 ELECTROSTATIC DISCHARGE

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

2.4.5.3 ELECTRIC DISTURBANCES

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

2.4.5.4 MAGNETIC DISTURBANCES

Do not place power connector cables, even of other appliances, in close proximity of the devices and their cables. Mobile communication devices may not be used in closer proximity of the devices or their cables than the recommended safety distance!

2.4.6 Safety Devices on the System

The system can be switched off at any time in an emergency using the mains switch on the Base Module (toggle switch on the side of the housing); this will cause no damage to the unit.

2.4.7 Condition of the Devices

Irrespective of the faultless manufacture of the devices, 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 should notice any damage, please do not use the devices and inform CETONI GmbH without delay. CETONI will put

your devices back to an operational condition at the earliest. Do not attempt to repair the devices yourself.

2.5 Warranty and Liability

The devices left our company in perfect condition. Only the manufacturer is permitted to open the devices. All guarantee and liability entitlements, particularly damage entitlements due to personal injuries, are void if the devices are opened by an unauthorized person.

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

The device conforms to the basic safety regulation standards. Industrial property rights are reserved on the circuits, methods, names, software programs, and units.

3 Technical Data

3.1 Product Image



3.2 Environment

OPERATING TEMPERATURE	0°C to 45°C
STORAGE TEMPERATURE	-20°C to 75°C
OPERATING AIR HUMIDITY	20% to 90%, non-condensing
STORAGE AIR HUMIDITY	20% to 90%, non-condensing

3.3 Mechanical Data

DIMENSIONS (L X W X H)	310 x 59 x 60 mm
WEIGHT	≈2000 g

3.4 Electrical Data

SUPPLY VOLTAGE	24 VDC
CURRENT DRAIN	0,3 A
POWER CONSUMPTION	15 W

3.5 Interfaces

CAN	1 Mbit/s
RS-232	section 6
ACCESSORY PORT	section 5

3.6 Dosing Performance

The following table provides an overview of minimum and maximum dosing speeds. The resulting flow rates shown here are based on the example of a 1 ml glass syringe with a 60 mm stroke as well as CETONI stainless steel syringes. Dosing precision slowly decreases below the speeds and flow rates referred to as pulsation-free.

The table also indicates the maximum pressure. In case of a glass syringe, the syringe itself is the limiting element. In case of stainless steel syringes it is the force of the module.

You need the nominal and maximum stroke for the software configuration of syringes. Please read the relevant sections in the software and syringe manual.

SPEEDS			MIN [$\mu\text{m}/\text{min}$]	MIN PULSATION-FREE [$\mu\text{m}/\text{min}$]	MAX [mm/s]
			0,069	60,282	6,00
SYRINGE	NOMINAL STROKE/ MAX. STROKE [mm]	MAX. PRESSURE	FLOW RATES		
			MIN [nl/min]	MIN PULSATION-FREE [$\mu\text{l}/\text{min}$]	MAX [ml/s]
1 ml-ILS GLASS SYRINGE	60 64	37 bar 500 psi	1,1	1,005	0,10
3 ml	59,64 61	199 bar 2883 psi	3,5	3,032	0,30
5 ml	58,81 61	118 bar 1706 psi	5,8	5,125	0,51
10 ml	58,89 61	59 bar 854 psi	11,6	10,236	1,02
25 ml	50,86 60	20 bar 295 psi	33,7	29,631	2,95
50 ml	51,91 60	10 bar 151 psi	66,1	58,064	5,78

4 Hardware Operation

Connect the syringe pump to your base module / system as described in the CETONI System manual.

If the module has not been configured, you will be required to perform a reference move during the configuration process. During the reference move the piston holder will move to its front position and be synchronized with the software display. To avoid damage the reference move may only be performed without a syringe.

After deactivating the base module the piston holder can be moved by applying some force (e.g. through residual pressure in the system). Therefore, it is sensible to repeat the reference run from time to time.



ATTENTION. The reference move must be performed without a syringe. Otherwise the device or the syringe may be damaged.



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

4.1 Mounting a Syringe

The syringe holder of Mid Pressure Syringe Pump allows the use of syringes with a ¼"-28 UNF outside thread at the tip and an M3 thread in the piston. The maximum diameter is 50 mm, the maximum syringe stroke 65 mm.

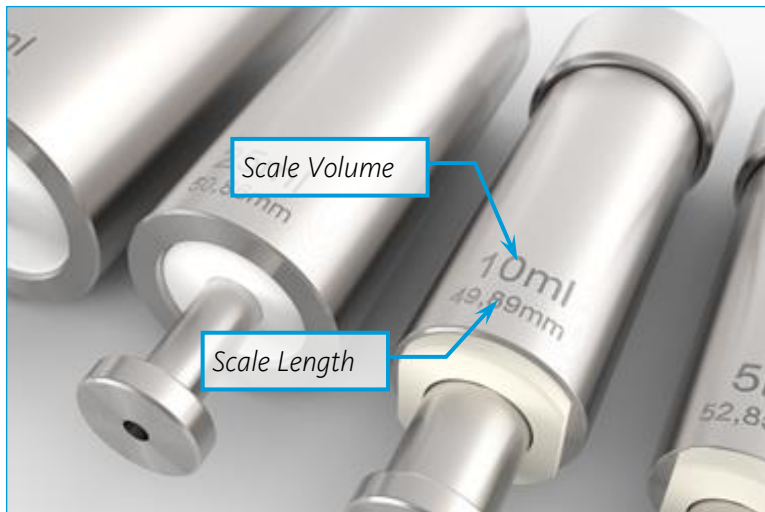


ATTENTION. On the Mid Pressure Syringe Pump please only use syringes offered by CETONI GmbH for this device. When using glass syringes, please make sure not to exceed their maximum operating pressure.

Before mounting a syringe to the Mid Pressure Syringe Pump, it must be configured and selected in the operating software. The respective process is described in the software manual. You will need the volume (scale volume), the nominal stroke (scale length) and the maximum stroke (piston stroke), which may be different.

The scale volume and scale length values are engraved on CETONI stainless steel syringes. Unless otherwise stated, the piston stroke is 60 mm. These values can also be found in the table in section 3.6.

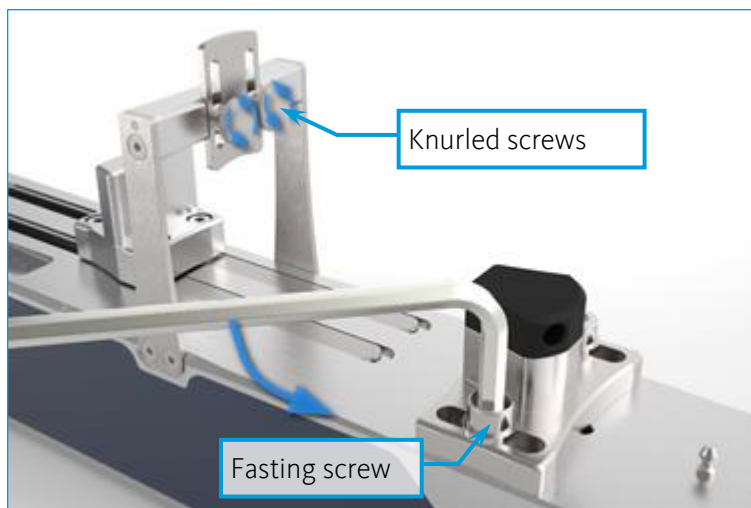
For more information with respect to syringes, please refer to the syringe manual.



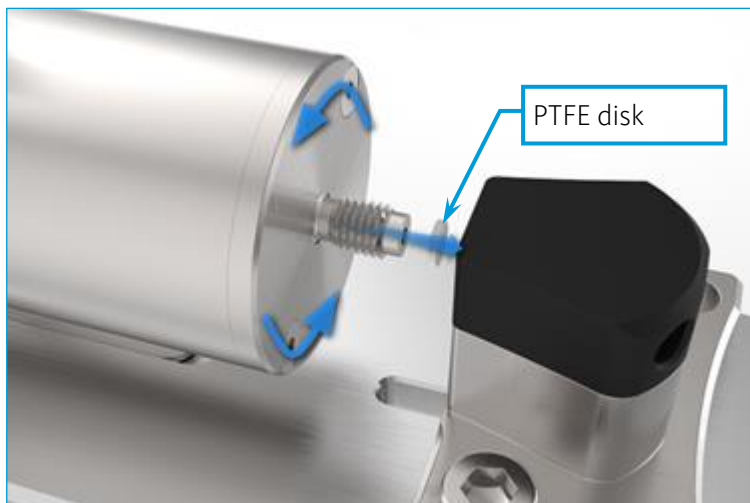
Please follow these steps to mount a syringe on the Mid Pressure Syringe Pump:

Loosen the screws on the syringe holder and push it all the way to the front, or completely remove it from the device.

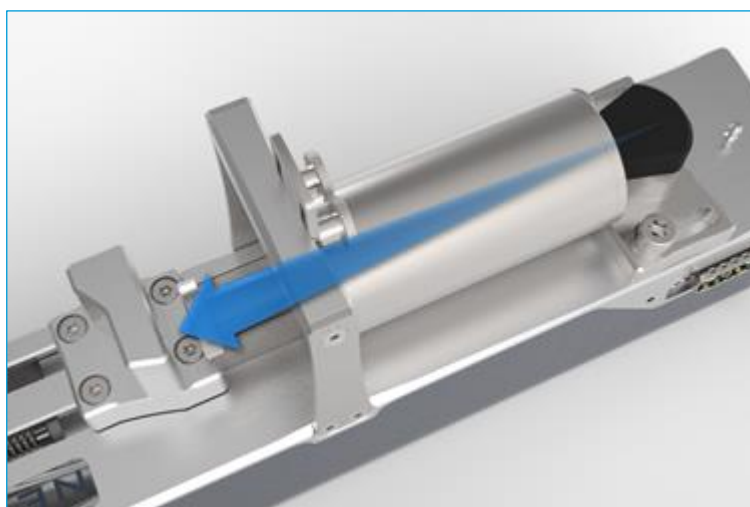
Loosen the knurled screws of the holding-down clamp, if installed.



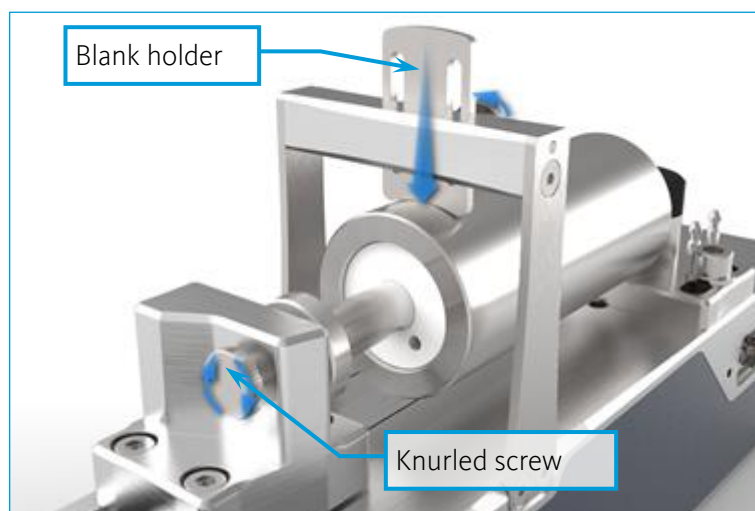
Screw the syringe into the syringe holder. Use one of the supplied PTFE disks to achieve a sealed connection.



In order to make use of the entire syringe volume, move the piston holder to the front position through the software. Push back the syringe holder until the piston touches the piston holder. Retighten the fastening screws of the syringe holder.



Lock the syringe piston with the knurled screw. To avoid bending the syringe in case of high pressure, lower the blank holder onto the syringe and fasten the two knurled screws.



IMPORTANT. Syringes, and particularly the seals, are wear parts. Check them on a regular basis and replace them if necessary.



ATTENTION. To avoid damage, please make sure that the remaining syringe stroke is always larger than or the same as that of the module.



ATTENTION. Before use, please check the resistance of syringe seals against the dosing medium. Use a different material, if necessary.

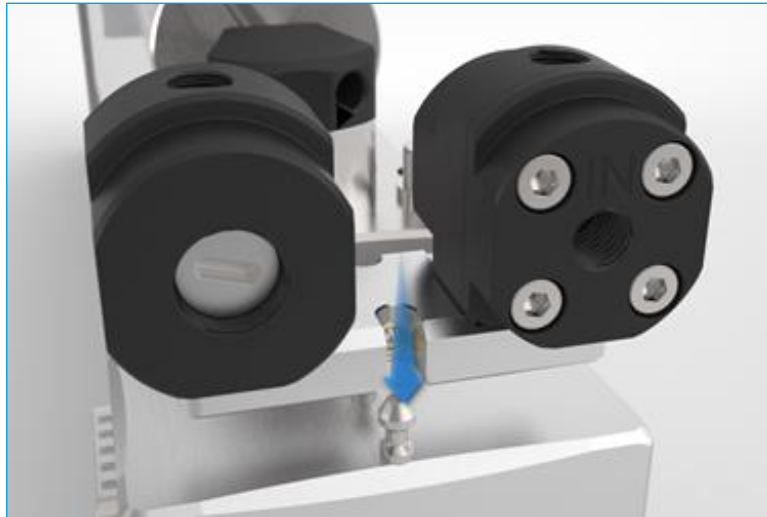
4.2 Fluidics / Valve

The syringe holder of the Mid Pressure Syringe Pump offers two ¼"-28 UNF threaded connections on the output side, allowing the use of common HPLC connectors.

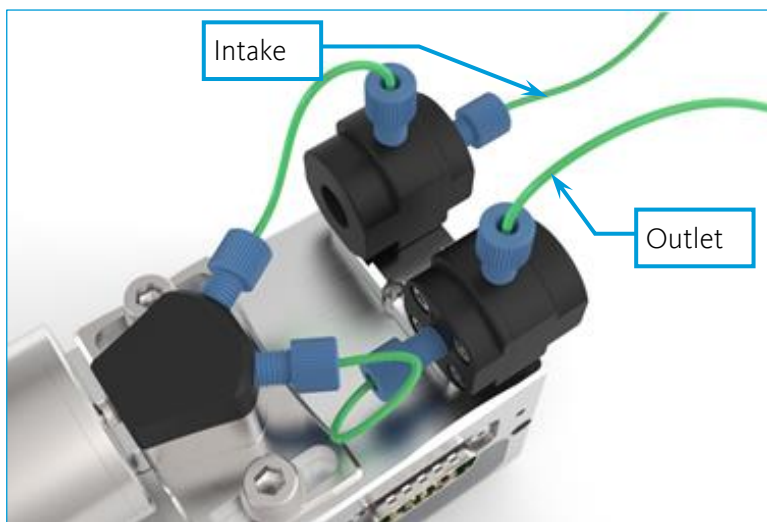
The Mid Pressure Syringe Pump can be fitted with an optional pair of non-return valves. They allow automatic switching of the syringe connector between your application (outlet) and a reservoir (intake) and thereby automatic refilling of the syringe.

Please refer to the associated valve manual for more detailed information about valves.

The valves are simply plugged onto the corresponding pins on the module.



Connect tubes between the syringe holder and the valves as follows:



ATTENTION. Before using the valve please check its chemical resistance against the media you intend to pump.

4.3 Mounting the Blank Holder

The blank holder prevents the syringe from bending upward, which is an effect that occurs in case of high pressure. As a consequence syringe wear is decreased as well. To mount the blank holder simply place it into the two gaps on the device and fasten it on both sides with the provided screws (2 mm Allen head).



5 Accessory Port

The neMESYS syringe pump is equipped with an accessory port or can be equipped with it as an optional extra. The additional port allows the use of a pressure sensor, for example.

The pin assignment of the connector at the module and the wire colors of the connecting cable, which can be purchased from CETONI, can be found in the table on the next page. Of course, you can also purchase ready-made periphery devices from CETONI GmbH.

A matching connector plug is also available from Hirose (order number HR10A-10P-12P(73)).

The configuration of pressure sensors is described in the software manual. Read and observe the relevant section before connecting a pressure sensor.



PIN	SIGNAL	DESCRIPTION		
1	Analog input AI1	0-5 V (to Pin 12)		
2	Analog input AI2	0-5 V (to Pin 12)		
3	Digital input 1	<0,8 V \triangleq Low	>2 V \triangleq High	24 V max.
4	Digital input 2	<0,8 V \triangleq Low	>2 V \triangleq High	24 V max.
5	Digital input 3	<1,7 V \triangleq Low	>4,2 V \triangleq High	24 V max.
6	Digital output 1 Valve voltage	NPN Max. 1 A	Active: 0 V (GND)	Inactive: open
7	Digital output 2 Switch valve	NPN Max. 1 A Active: 0 V (GND) Inactive: open		
8	Digital output 3	NPN Max. 1 A Active: 0 V (GND) Inactive: open		
9	Digital ground			
10	+24 V Out	+24 VDC / <1 A		
11	+5 V Out	+5 VDC / <150 mA		
12	Analog ground			

6 RS232 Connection

6.1 Pin Assignment of Module Interfaces



PIN		
1	Not connected	RS232 RX
2	Not connected	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

6.2 OEM RS232 Cable Set

6.2.1 RS232 Wiring

Insert the mixed D-Sub plug of the cable into the socket of the final module. The system should be deactivated when you do this. Tighten both screws on the plug manually. You do not need a bus termination plug, since the plug of the RS232 cable already contains a bus termination resistor.

Now, plug the 9-pin D-Sub socket of the cable into an RS232 connection on your PC or other controller. For greater distances to the socket please use a 1:1 cable with a 9-pin D-Sub plug.

Now, you can reactivate your system and send or receive data through RS232. Since every module contains a gateway from RS232 to the system’s internal CAN bus, you can now address each module of your system with only one RS232 cable.

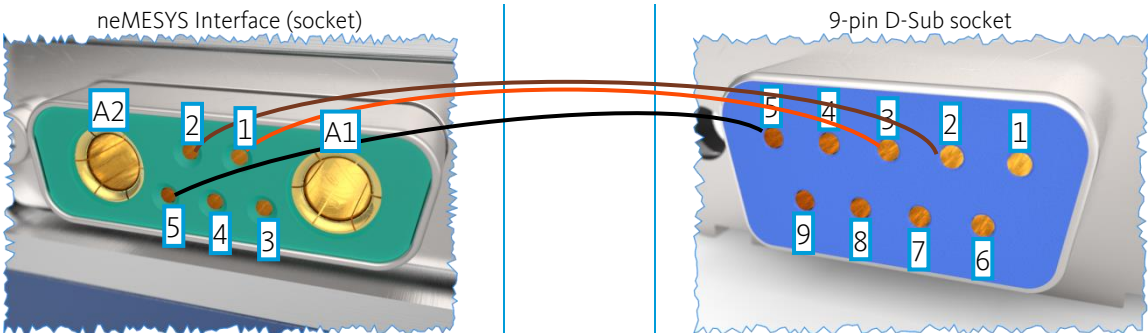
6.2.2 Communication Settings

For a functioning communication with the neMESYS modules you have to make the following communication settings for the serial interface on your PC or other controller:

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

6.2.3 Pin Assignment of the RS232 Cable

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



Pin		Cable	Pin	
1	RS232 RX	Orange	3	TXD Transmit Data
2	RS232 TX	Brown	2	RXD Receive Data
5	Signal GND	Black	5	GND Signal GND
D-Sub housing = shielding		Shielding		

7 Transport and Storage

Please do not lift or transport the modules while they are plugged into each other. Transport in assembled state is only permissible when using the original packaging.

Use the original packaging for shipping the modules. For storage, observe the information in the technical data section (chapter Fehler! Verweisquelle konnte nicht gefunden werden. Fehler! Verweisquelle konnte nicht gefunden werden.).



ATTENTION. Danger of damaging the device! Never transport modules while they are plugged into each other.

8 Maintenance and Care

When used properly, the device is maintenance-free. In case of problems that you cannot fix yourself or that require opening the device, please contact CETONI GmbH to coordinate any further actions. The device may be opened only by CETONI GmbH or authorized service personnel. Failure to adhere to this rule will void the warranty.

The software manual includes detailed information about malfunctions with respect to the operating software.

Wipe the device with a moist (not wet) cloth in such way that no liquids get into the inside. In case of heavy soiling you may use some detergent or alcohol.

9 Disposal

Please send your old devices back to CETONI GmbH. We will take care of proper disposal according to electric devices regulations.

If necessary, please decontaminate the device before sending it back and attach a completed decontamination declaration with your shipment.