



# **CE** ROTAXYS 360 Hardware Manual



**ORIGINAL INSTRUCTION 1.11 - MAY 2017** 



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# 1 Overviews & Indexes

## 1.1 Content

1	Overv	views & Indexes	5
	1.1	Content	5
	1.2	Revision History	7
2	Introd	luction	8
	2.1	Foreword	8
	2.2	Symbols and Keywords	8
3	Basic I	Information	9
	3.1	Intended Use	9
	3.1.1	General Description of the Machine	9
	3.1.2	Appropriate Use	9
	3.1.3	Reasonably Foreseeable Misuse	9
	3.1.4	Safety Measures	9
	3.1.5	Measures for Safe Operation	10
	3.1.6	Safety Facilities on the Device	11
	3.1.7	Device Condition	11
	3.2	Warranty and Liability	12
	3.3	Scope of Delivery	13
	3.4	Optional Accessories	14
4	Techn	ical Data	15
	4.1	Performance Data	15
	4.1.1	Environment	15
	4.1.2	Mechanical Data	15
	4.1.3	Electrical Data	16
	4.1.4	Positioning Unit	17
	4.2	Accessory Port	18

	4.3	Pin Assignment Module Interfaces	19
5	Transp	port & Storage	20
6	Initial	Operation	21
	6.1	Setting up the Device	21
	6.2	Connecting the Device	22
	6.2.1	Operation as a Standalone Device	22
	6.2.2	Operation with neMESYS or Qmix Devices	23
7	Hardv	vare Operation	24
	7.1	Introduction	24
	7.2	Installation of the Optional Sample Table	24
	7.3	Tool Holder – Installation / Exchange	26
	7.4	Connecting a Tube	27
	7.4.1	Attaching a Tube to the Tool Holder	27
	7.4.2	Attaching a Tube to the Pivoting Boom	28
	7.4.3	Attaching a Tube to the Sample Table	29
	7.5	Valve and Stripper	31
8	Maint	enance & Care	33
	8.1	Introduction	33
	8.2	Troubleshooting	33
9	Dispo	sal	34

## 1.2 Revision History

REV	DATE	CHANGE
1.00	24.06.2015	Creation of rotAXYS Manual
1.01	15.03.2016	New corporate design
1.10	23.01.2017	Accessory Port and valve added
1.11	09.05.2017	Description added for moving to adjustment position

# 2 Introduction

## 2.1 Foreword

Thank you for purchasing a CETONI product. With this manual we would like to support you in using the device. For additional questions or comments please feel free to contact us directly.

Please read this manual carefully before operating the device. We wish you the best of success in your work with the rotAXYS 360 positioning system.

## 2.2 Symbols and Keywords

This manual uses the following symbols, intended to help you navigate the document:



**HINT**. User tips and useful information to simplify the use of the software.



**IMPORTANT**. Important information and additional, particularly useful information. This symbol does not refer to dangerous or hazardous situations.



**ATTENTION**. This symbol signifies a potentially hazardous situation. Failing to avoid it may cause damage to the product or its environment.

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**CAUTION**. This symbol signifies a potentially dangerous situation. Failing to avoid it may cause light or insignificant injury or material damage.

# 3 Basic Information

## 3.1 Intended Use

### 3.1.1 General Description of the Machine

rotAXYS 360 is a positioning system. It can position lightweight items, such as cannulas or tubes in a circular area with a radius of approximately 200 mm. It can also lift items up to approximately 96 mm.

### 3.1.2 Appropriate Use

The rotAXYS 360 positioning system is intended to position small, lightweight items, such as tubes or cannulas in a circular area with a radius of approximately 200 mm. Therefore, it is suitable for putting down, picking up and observing samples in titer plates. The device is typically used in lab-like environments.

### 3.1.3 Reasonably Foreseeable Misuse

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



**CAUTION**. The device must not be used as a medical product or for medical purposes.

### 3.1.4 Safety Measures

Operator safety and failure-free operation of the device can only be guaranteed when using original equipment parts. Only original accessories may be used. Warranty claims are void if damage was caused by using third-party equipment or third-party material.

The device was developed and designed in such way as to largely rule out dangers, if used properly. Nevertheless, you should observe the following safety measures to rule out any residual danger.

• CETONI GmbH would like to point out the operator's responsibilities when using the device. The laws and regulations relevant to using this device must be observed. In the interest of a safe work process the operator and user of the device is responsible for observing all relevant laws and regulations.

- Before each operation of the device the user has to ensure that the device is functioning safely and is in proper condition.
- The user must be familiar with the operation of the device and the software.
- Before starting operation, the device and wiring must be checked for damage. Damaged wires and plugs must be replaced immediately.
- Cables must be routed in such way as to rule out any trip hazards.
- Do not touch moving parts on the device during operation. There is a risk of crushing.
- Make sure to wear safety goggles during installation work on the device or when you work with corrosive, hot or otherwise dangerous substances.

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**CAUTION**. It is not allowed to use the devices in an explosive atmosphere or with potentially explosive substances!

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**CAUTION**. The device must not be used as a medical product or for medical purposes.



**IMPORTANT**. During operation of the device all relevant laws and regulations applicable at the operating location must be observed. In the interest of safe work processes the operator and user is responsible for observing all relevant rules and regulations.

### 3.1.5 Measures for Safe Operation

#### 3.1.5.1 ELECTROMAGNETIC EMISSIONS

The device is designed for usage in any facility, including living spaces and facilities directly connected to a public supply network that also supplies buildings used for residential purposes.

#### 3.1.5.2 ESD DISCHARGE

Floors should be wood or concrete or covered with ceramic tiles. If floors are covered with synthetic material, relative air humidity must be at least 30%.

#### 3.1.5.3 ELECTRICAL DISTURBANCES

Supply voltage quality should be equal to a typical business or hospital environment.

#### 3.1.5.4 MAGNETIC DISTURBANCES

Power lines, including those of other devices, should not be placed near the device or its cables. Portable and mobile two-way radios should be kept at the minimum safe distance from the device and its wiring.

### 3.1.6 Safety Facilities on the Device

In cases of emergency the device can be deactivated at any time using the power switch on the base module (toggle switch on the side of the device), without causing any damage to the device itself. If the device is operated without the base module, you can simply pull the plug out of the power supply socket.

### 3.1.7 Device Condition

Despite flawless workmanship, the device may be damaged during operation. Therefore, you should visually inspect the device components mentioned before each use. Pay particular attention to crushed cables and deformed plugs. If you find any damage, please refrain from using the device and contact CETONI GmbH immediately. We will repair your device as soon as possible. Never attempt to repair the device yourself.

## 3.2 Warranty and Liability

The device has left our facilities in perfect condition and may only be opened by CETONI GmbH. If the device is opened by an unauthorized person, all warranty and liability claims shall be void, in particular those referring to personal injury.

The warranty period is 1 year from the day of delivery. Any work done on the device within this period shall not extend or renew the warranty.

CETONI GmbH assumes responsibility for its devices with respect to safety, reliability and function only if installation, readjustment, changes, extensions and repairs are done by CETONI GmbH or an authorized party, and if the device is used in accordance with the user manual.

The rotAXYS 360 positioning system complies with the applicable safety rules and standards. CETONI GmbH reserves all property rights for the relevant wiring, processes, names, software and devices.

## 3.3 Scope of Delivery

The following items should have been supplied:

#### **ROTAXYS 360 AXIS SYSTEM**



#### **INTERCONNECT CABLE**

for the connection to the Qmix base module

#### **CD-ROM QMIXELEMENTS**

- Device driver for USB interface
- QmixElements software
- Qmix SDK



## 3.4 Optional Accessories

#### SAMPLE TABLE

with holders for 6 well plates and 6 beakers





### TUBE HOLDER

#### **VALVE AND STRIPPER**



### USB-TO-CAN ADAPTER AND INTERCONNECT CABLE



# 4 Technical Data

## 4.1 Performance Data

### 4.1.1 Environment

OPERATING TEMPERATURE	-10°C to 45°C
STORAGE TEMPERATURE	-10°C to 45°C
OPERATING AIR HUMIDITY	20% to 80%, non-condensing
STORAGE AIR HUMIDITY	20% to 80%, non-condensing
ACOUSTIC POWER LEVEL	< 70 dB(A)

### 4.1.2 Mechanical Data

WEIGHT

≈6000 g excluding table

DIMENSIONS



#### WORKING AREA



### 4.1.3 Electrical Data

POWER SUPPLY	24 VDC
PEAK CURRENT DRAW	2 A

## 4.1.4 Positioning Unit

MOTORS		Stepper motors
POSITION CONTROL		Open loop
	TRAVEL RANGE	100 mm
LIFTING AXIS	MAX. SPEED	73 mm/s
	REPEATABILITY	0,2 mm
	TRAVEL RANGE	360°
TURNING AXIS	MAX. SPEED	292°/s
	REPEATABILITY	0,13° = 0,5 mm at radius 204
	TRAVEL RANGE	159 mm
RADIAL AXIS	MAX. SPEED	175 mm/s
	REPEATABILITY	0,5 mm

## 4.2 Accessory Port



PIN	SIGNAL		DESCRIPTION	l i i i i i i i i i i i i i i i i i i i
1	Analog input Al1		Not connected	
2	Analog input Al2		Not connected	
3	Digital input DI1	<0,8 V ≙ Low	>2,4 V ≙ High	24 V max.
4	Digital input DI2	<0,8 V ≙ Low	>2,4 V ≙ High	24 V max.
5	Digital input DI3	<1,7 V ≙ Low	>2,4 V ≙ High	24 V max.
6	Digital output DO1 Valve voltage	NPN Max. 1 A	Active: 0 V (GND)	Inactive: 24 V (pullup 10k $\Omega$ )
7	Digital output DO2 Switch valve	NPN Max. 1 A	Active: 0 V (GND)	Inactive: 24 V (pullup 10kΩ)
8	Digital output DO3	NPN Max. 1 A	Active: 0 V (GND)	Inactive: 24 V (pullup 10kΩ)
9	Digital ground			
10	+24 V Out		+24 VDC / <1 A	
11	+5 V Out		+5 VDC / <150 m/	Ą
12	Analog ground			

## 4.3 Pin Assignment Module Interfaces



PIN	
1	Not connected
2	Not connected
3	CAN High
4	CAN Low
5	Signal GND
A1	+24 V
A2	GND

# 5 Transport & Storage

Always use the original package for transporting and shipping the device.

Please refer to section 4.1.1 for more information on operation and storage of the device.



**CAUTION**. There is a risk if injury and material damage due to falling objects. Never carry the device by the pivoting arm. Instead always hold the housing itself.

# 6 Initial Operation

## 6.1 Setting up the Device

Place your rotAXYS 360 positioning system on a level, horizontal surface, such as a table, base cabinet or equipment trolley. Make sure there is enough space for the pivoting boom to reach all required positions.

The electrical power connections are located at the back of the device. They are shown in the image below.





**CAUTION**. There is a risk of injury due to damaged wires and plugs. Check the device and wires for damages before operation. Never operate the device with damaged wires or plugs. Only use the cables supplied with the device.



**CAUTION**. There is a risk of stumbling due to connection cables. Make sure to rule out such dangers when you install the cables.



**IMPORTANT**. Install the software and the device drivers before connecting the device to a PC.

## 6.2 Connecting the Device

### 6.2.1 Operation as a Standalone Device

- 1. Connect the USB plug 1 of the USB-to-CAN adapter to a USB outlet on your PC.
- 2. Connect the second socket of the adapter 2 to the associated interconnect cable 3 and connect the cable's input plug 4 to the input connector on the back panel of the rotAXYS positioning system.
- 3. Connect the cable ends 5 to a 24 Volt power supply (black = ground, red = 24 Volt).
- 4. Switch the terminator switch to the "ON" position.



### 6.2.2 Operation with neMESYS or Qmix Devices

- Connect the output socket 1 of the last module of your neMESYS or Qmix system using the associated interconnect cable 2 to the input plug 3 at the back panel of the rotAXYS 360 positioning system.
- 2. You can use the output socket 4 of the rotAXYS 360 positioning system to connect additional devices using a second interconnect cable. In this case you have to turn the terminator switch to the "OFF" position.
- 3. If you don't connect any additional devices and the rotAXYS 360 positioning system is the last device in your system, please turn the terminator switch to the "ON" position. This activates the bus termination resistor of the internal data bus.



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**CAUTION**. There is a risk of crushing due to moving parts. Never touch the device during operation.



**CAUTION**. There is a risk of injury due to moving parts or pointed tools mounted to the tool holder. Do not approach moving parts during operation.

# 7 Hardware Operation

## 7.1 Introduction

The rotAXYS 360 positioning system is optionally supplied with a table to accommodate 6 micro titer plates and 6 sample containers as well as a tool holder with a ¼"-28 UNF thread. The tool holder allows the installation of a tube or cannula by using HPLC fittings. The following sections will demonstrate how to use this table and the tool holder.

## 7.2 Installation of the Optional Sample Table

Pass the central opening of the sample table over the pivoting boom of the device as shown in the image below and place it precisely on the cover plate of the device.



Now attach the sample table by inserting the four M4 screws supplied into the mounting holes in the sides of the top cover plate.



After the installation you can place sample containers such as well plates or beakers on the sample table.



## 7.3 Tool Holder – Installation / Exchange

Remove the two screws on the underside of the pivoting boom using a 2 mm Allen wrench. You can now remove and replace the tool holder. Attach the new tool holder by reinserting and tightening the screws.



After installing the tool (for example, a cannula), please check that the positional deviation between the tool tip and the hole in the cover plate of the device is within a tolerable range for your application. To do this, move to the adjustment position by clicking the QmixElements main menu item *Device -> rotAXYS360 -> Move to XY Calibration Position*.



If the deviation is too great, check the straightness of the tool and the correct mounting of the tool holder.



## 7.4 Connecting a Tube

### 7.4.1 Attaching a Tube to the Tool Holder

The tool holder of the rotAXYAS 360 has a ¼ "-28 UNF threaded through hole which you can screw in fittings and adapters (e.g. Luer Lock) from both sides.





**ATTENTION**. There is a risk of damaging the electronics of the device due to faulty fluidic connections. Test the tightness of all fluidic connections on a regular basis and every time you connect a new tube.

### 7.4.2 Attaching a Tube to the Pivoting Boom

Attach the tube to the holder on the pivoting boom using the rubber clip. Make sure there is a sufficient length of tube to allow movement across the entire work area.



### 7.4.3 Attaching a Tube to the Sample Table

By using the optional tube holder you can attach the tube to the sample table in such way that it does not protrude into the working area of the axis system.



Attach the tube holder on a convenient location of the sample table using the knurled screw on the bottom. By loosening the second lateral knurled screw, you can adjust the height of the tube holder.





**IMPORTANT**. Place the tube in such way as to avoid protrusion into the working area of the pivoting boom.

With the two tube clamps you can fix the tube. Loosen the knurled screw of the tube clamp. Insert the tube into the hole that fits the diameter and tighten the knurled screw. This clamps the tube clamp on the rod and fixes the tube.



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**IMPORTANT**. The tube should be placed in such way that it does not cause tension on the tube holder anywhere in the vertical stroke range of the lifting axis or the turning range.

## 7.5 Valve and Stripper

The valve allows samples to be taken at defined times. When removing a cannula from a vial with a septum, the stripper prevents the tubes from sticking to the cannula.

Attach the valve and stripper unit as described in *section 7.3*. Lay the cable as described for the tubes in *sections 7.4.2 and 7.4.3*. Finally, insert the round plug into the *Accessory Port (4.2)* on the back of the housing.

The connection block has three ¼"-28 UNF connections, into which you can screw fittings or an adapter to Luer Lock for holding a cannula. The assignment of the fluidic connections is shown in the following picture. The downward connection is open in de-energized state (NO  $\triangleq$  Normally Open). When energized, the valve heats up slightly. If this should interfere with your application, it is possible to turn the valve on the connection block. Be especially careful in this case and tighten the valve screws to a torque of 0.2~0.25 Nm.





**IMPORTANT**. Install tubes and cables so that the mobility of the pivoting boom is not restricted and the entire working area can be operated.

When immersed in a vial and inserted through the septum the stripper deflects. When the cannula is withdrawn subsequently, it stripes the vial from the cannula.





**IMPORTANT**. Observe the height of your sample and the dimensions of the rebounded stripper. Enter a value in the software under *"Safe Rotation Height"*, which allows a safe motion without collision.



# 8 Maintenance & Care

## 8.1 Introduction

When used properly the device is maintenance-free. The manufacturer recommends sending the devices to CETONI GmbH for maintenance every two years. In cases of malfunction please contact CETONI GmbH.



**IMPORTANT**. If you send the device back to CETONI, please decontaminate it, if required, and add a completed decontamination declaration to your shipment.

## 8.2 Troubleshooting

Should you encounter mechanical problems that you can't fix yourself or which require opening the device, please contact CETONI GmbH to discuss further actions. The device may only be opened by CETONI GmbH or authorized service staff. Violating this rule will void the warranty.



**ATTENTION**. There is a risk of damaging electrical or mechanical components. Refrain from using the device if you become aware of any damage. Do not attempt to repair the device yourself. Instead let CETONI GmbH repair the device and return it to a safe condition.

Malfunctions connected to the operating software are described in the software manual.

# 9 Disposal

Please send your old devices back to CETONI GmbH. We will take care of proper disposal pursuant to the relevant laws and regulations.



**IMPORTANT**. Before you send the device back to CETONI, please decontaminate it, if required, and add a completed decontamination declaration to your shipment.