



HRT I

Manual

HEAD acoustics Remote-operated Turntable
(Code 6498)

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1. INTRODUCTION

1.1 Document conventions

The warning labels in this document are divided into three subsections.

The signal word section always contains one of the four signal words DANGER, WARNING, CAUTION or NOTICE.

Safety symbols provide graphical information about a potential hazard, prohibitions and mandatory actions. The symbol panel may contain more than one safety symbol to illustrate the information given in the message panel.

The text message contains three elements:

- The hazard type and its source.
- The consequence of not avoiding the hazard.
- Rules and/or restrictions to avoid the hazard.

1.2 Safety symbol classification (exemplary)

	Hazard alert symbol The hazard alert symbol advises about information that is primarily related to the nature of hazards. It describes hazards, briefs how to avoid the hazard or illustrates the potential consequences of the hazard. Sometimes the safety symbol is surrounded by a yellow equilateral triangle to highlight it.
	Prohibition symbol The prohibition symbol advises about actions that shall not be taken. The black image in the center is surrounded by a red circular band with a 45° diagonal band from upper left to lower right.
	Mandatory symbol The mandatory symbol advises about executing actions and using equipment to avoid hazards. The white image in the center is located within a solid blue circular shape.
	Useful advice, application tips, or additional information.

1.3 Warning labels (exemplary)

⚠ DANGER	
	Type and source of the hazardous situation → Imminent danger.
	Consequences → Hazardous situation will result in death, serious injury and / or material / equipment damage.
	Recommendations / actions to avoid the hazardous situation.
⚠ WARNING	
	Type and source of the hazardous situation → Possible imminent danger.
	Consequences → Hazardous situation may result in death, serious injury and / or material / equipment damage.
	Recommendations / actions to avoid the hazardous situation.
⚠ CAUTION	
	Type and source of the hazardous situation → Possible imminent danger.
	Consequences → Hazardous Situation may result in minor or moderate injury and / or material / equipment damage.
	Recommendations / actions to avoid the hazardous situation.
NOTICE	
	Type and source of the hazardous situation → Possible danger to material/equipment.
	Consequences → Hazardous situation may result in damage to the material / equipment.
	Recommendations / actions to avoid the hazardous situation.

1.4 Equipment description

HRT I (HEAD acoustics Remote-operated Turntable) is an electric motor driven turntable. It may be operated manually or remotely. During acoustic measurements, HRT I bears the measurement object. In between acoustic measurements, HRT I rotates the measurement object to specific angles in the measurement field.

1.5 Scope of supply

The scope of supply consists of the following items:

- HRT I HEAD acoustics Remote-operated Turntable (Code 6498)
- CUD III (Code 6092) Adapter USB ↔ D-Sub 9-pin
- CAB II.10 (Code 6093-10) Cable D-Sub 9-pin, 10m
- Power supply adapter
- Manual (Hardcopy)

1.6 Intended use

It is the operators' responsibility to use the equipment in the intended way only. The equipment shall be used only indoors in industrial and laboratory environments. The equipment is not intended for outdoor use.

The equipment must not be used in any way that may lead to personal injury or material damage. Using the equipment outside the intended scope of use or disregarding the manufacturer's instructions is the user's sole responsibility. The manufacturer does not assume any responsibility for misuse of the equipment.

The equipment shall be operated within its performance limits and in compliance with the supplied documentation.

The equipment is intended for technical work. It shall not be utilized for private use.

Using this equipment requires expert knowledge. It shall only be operated by specialized personnel. HEAD acoustics offers trainings for using the equipment.

The supplied technical documentation shall always be available for the user during operation. It shall accompany the equipment during its whole lifecycle. HEAD acoustics provides the latest manual revision on demand.

1.7 Disclaimer of liabilities and warranty

HEAD acoustics GmbH does not assume any liability for personal and/or property damage which occurs because of improper use of the equipment.

Improper use, disassembly, modifications of the equipment as well as non-compliance with the manual terminate all warranty claims.

1.8 Declaration of conformity

There is a copy of the original declaration of conformity in this manual.

1.9 Document terminology

Term	Description
may, can	Used to indicate optional directives or features. ¹
shall, require, must	Indicates a mandatory requirement to be followed. ¹
should	Used when stating recommendations that are understood to be advisory. ¹

1.10 Reference documentation

Document Name
ACQUA Help System

1.11 Acronyms and abbreviations

Acronym/Abbreviation	Description
°	Degree
ACQUA	Advanced Communication Quality Analysis
DC	Direct current
CCW	Counterclockwise
CW	Clockwise
IEC	International Electrotechnical Commission
LED	Light-emitting diode
mm	Millimeter
Nm	Newton meter
Kg	Kilogram
rpm	Revolutions per minute
V	Volt
W	Watt

¹ IEC Glossary

1.12 Vendor contact

1.12.1 Contact information

HEAD acoustics GmbH
Ebertstraße 30a
D-52134 Herzogenrath
Germany

Phone +49 (0)2407-577-0

Fax: +49 (0)2407-577-99

E-mail: telecom@head-acoustics.de

Website: <http://www.head-acoustics.de>

1.12.2 Support & consulting

Phone: +49 (0)2407-577-0

Fax: +49 (0)2407-577-99

Service e-mail: service@head-acoustics.de

Support e-mail: telecom-support@head-acoustics.de

Consulting e-mail: Telecom-Consulting@head-acoustics.de

1.12.3 Customer training

HEAD acoustics provides scheduled trainings on selected topics.

On request HEAD acoustics provides customized or on-site courses focused on subjects that are of particular interest to the customer's individual application tasks.

For Trainings in Europe please contact:

Phone: +49 (0)2407-577-26

E-mail: telecom-training@head-acoustics.de

For trainings in the USA please contact:

Phone: +1-248 486-0099

E-mail: info@head-acoustics.com

2. SAFETY INSTRUCTIONS

2.1 General information

WARNING



Reading safety information in the manual is obligatory for a safe operation of the equipment.

Ignoring the manual may result in death, serious injury and/or equipment damage.

The equipment shall only be used by personnel who have completely read and understood the manual. The equipment has left HEAD acoustics factory in correct order and condition regarding safety. In order to maintain this condition and to ensure a safe operation, the operator shall read and understand the safety notes and adhere to all safety-related rules and warnings contained in the documentation before working with the equipment.

2.2 Safety notes

WARNING



HRT I is energized during operation.

Inobservance of any safety instruction concerning electricity may lead to an electric shock. The electric shock may result in death, serious injury and/or damage to the equipment.



Do not open the equipment. The equipment shall only be opened by authorized HEAD acoustics service personnel.

Switch off and isolate the HRT I before carrying out any maintenance work.



Keep clear the emergency stop button. It shall be accessible at all times.

Solely use the power supply adapter included in the delivery.

Only connect the power supply adapter to a socket with protective grounding.

Do not step on the power supply adapter.

Do not position the power supply adapter on the ground.

Do not operate the equipment in dusty or humid environment.

Isolate HRT I during thunderstorms.

Isolate HRT I if it makes unusual noises.

Do not energize damaged or suspected damaged equipment.

Consider positioning of the cabling.

Do not put any load on the cabling.

⚠ WARNING



The rotation of HRT I may lead to a rupture of the measuring object's cabling.

Cable rupture and exposed electrical wires may lead to an electric shock. The electric shock may result in death, serious injury and/or damage to the equipment.

Do not touch a ruptured cable and /or object in direct contact with it.

Make sure the cabling of the measurement object does not twist during the rotation.

Consider the rotation of the rotary plate when laying the cables of the measurement object.

Only use the delivered power supply adapter. It contains a protective conductor.

⚠ CAUTION



HRT I may be started remotely via control software.

Starting HRT I remotely while personnel works on it may result in minor or moderate injury.

Make sure to clear all personnel from HRT I before starting it.

Never touch moving parts.

⚠ CAUTION



Parts of HRT I are rotating during operation. Loose clothing, jewelry or long hair may entangle with moving parts.

Clothing, jewelry or hair being entangled in HRT I may result in minor or moderate injury and/or damage to the equipment.

Do not wear loose clothing, jewelry or long hair while operating HRT I.

Stay clear of HRT I when moving parts are in motion.

Push the emergency stop button if personnel and / or objects entangle with the moving parts.

Do not cover HRT I if energized and in use.

⚠ CAUTION



Devices placed on HRT I may be heavy. The tilting moment of HRT I is 20 Nm. Devices placed on HRT I may fall down.



Heavy devices that fall down may crush limbs resulting in minor or moderate injury.

Fix devices placed on HRT I appropriately.

Once placed, stay clear of devices on HRT I.

Make sure the devices placed on HRT I have a free range of motion.

Never extend the tilting moment with devices placed on HRT I.

Position HRT I on a plane and solid surface. It shall be always in a safe position.

Even out slight bevel with the height-adjustable feet of HRT I.

Use the height-adjustable feet only for horizontal alignment.

⚠ CAUTION



HRT I has rotating parts. HRT I has a load capacity of maximum 50 kilograms.

Stepping on HRT I while in motion or standstill may result in minor or moderate injury and/or damage to the equipment.

Never step on HRT I.

Never use HRT I to transport or spin persons / living things.

NOTICE

HRT I has a load capacity of maximum 50 kilograms. The tilting moment of HRT I is 20 Nm.

Overloading HRT I may result in damage to the equipment.

Always check the weight of the device / object before putting it on HRT I.

Never extend the tilting moment with devices placed on HRT I.

NOTICE

Dirt, dust and fluids may enter the equipment through openings.

This may result in damage to the equipment.

Operate and store the equipment in a clean and dry environment.

NOTICE

HRT I is not intended for continuous and uninterrupted rotation.

3. TRANSPORTATION & STORAGE

3.1 Safety

NOTICE	
	Fluids and / or high humidity may affect the packing material of the equipment. Contact with fluids and / or high humidity may result in damage to the equipment. Always keep the transport box in a dry environment.
	Do not transport or store the transport box / equipment upside down. Staying upside down for a long time may result in damage to the equipment. The label on the transport box indicates the topside of the equipment. Always transport the equipment according to the labeling on the box.
	The equipment is fragile. Heavy shocks, dropping, hard impact may cause damage to the equipment. Transport the equipment carefully. Consider positioning during transport and storage.

⚠ CAUTION

HRT I is heavy. It weights approximately 19 kilograms.

Lifting HRT I in a wrong posture may result in minor or moderate injury.

Move HRT I close to your body and use your legs when lifting it.

Keep your elbows close to your body and keep the load as close to your body as possible.

Avoid twisting, especially when bending forward while lifting. Turn by moving the feet rather than twisting the torso.

Keep the load close to the body. When lifting large, bulky loads, it may be better to bend at the waist instead of at the knees in order to keep the load closer to your body.

Personnel with back problems shall not lift HRT I. Ask fellow colleagues for support.

3.2 Compliance with transport regulations

Please also adhere to any country-specific laws and regulations.

3.3 Transportation

The equipment is shipped enclosed by cold foam in a cardboard box. The packing material should be kept for storage and transport.

Before shipping the equipment, always label the transport box with the safety signs from [Section 3.1](#).

3.4 Unpacking

Open the cardboard box carefully without damaging it. Remove the equipment and the accessories from the box. Verify if the content of the box equals the scope of supply from [Section 1.5](#).

3.5 Storage

3.5.1 Equipment storage

Store the equipment in a dry and clean environment at room temperature.

3.5.2 Documentation storage

Store the delivered hardcopy manual together with the equipment. HEAD acoustics provides the latest manual revision on demand.

4. TECHNICAL DESCRIPTION

4.1 Technical data HRT I

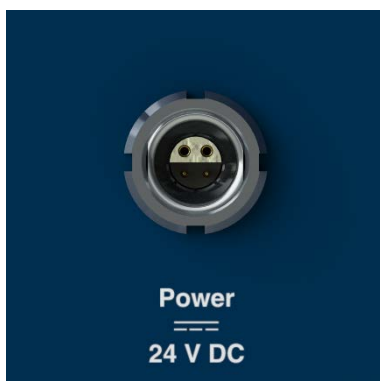
Technical data – HRT I	
General	
Operation:	Operation via control software. Manual control via operating panel.
Power supply:	24 V, max. 60 W
Interfaces & connectors	
Power socket	4-pin LEMO socket
RS 485	D-Sub 9-pin socket
Display	4-digit display
On / Off button	Pushbutton with LED indication
Zero-point button	Pushbutton with LED indication
CCW button	Pushbutton
CW button	Pushbutton
E-Stop button	Mushroom button
Technical specifications	
Maximum load	50 kg
Tilting moment	20 Nm
Rotation speed	0 – 2 rpm
Reproducibility	± 0.02°
Environmental conditions	
Operating temperature range:	0°C – 40°C, 32°F – 104°F
Storage temperature range:	-10°C – 60°C, 14°F – 140°F
Air humidity:	0 – 90 % rel. humidity, non-condensing

Dimensions	
Overall dimensions (WxHxD):	450 mm x 88 (up to 123) mm x 450 mm
Rotary plate diameter	430 mm
Central hole diameter	90 mm
Weight:	19 kg

4.2 Functional description

4.2.1 Operating panel

Power



4-pin LEMO socket to connect power supply.

RS 485



D-Sub 9-pin socket (female). Connection to PC. For data exchange with PC. Disconnecting the RS 485 connection stops the drive motor immediately.

Display



Displays the current set position of the rotary plate.

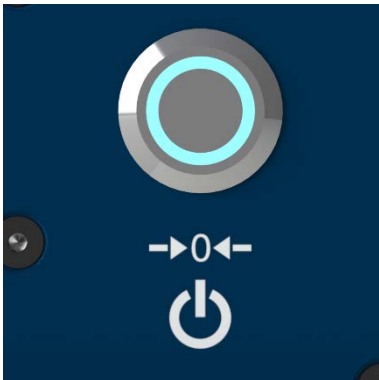
The value ranges from 0° to 359.9° in unipolar mode.



The value ranges from -179.9° to 180° in bipolar mode.

Switching between unipolar and bipolar mode is only possible via control software (refer to [section 6](#)).

Power On / Off button, Zero-point button

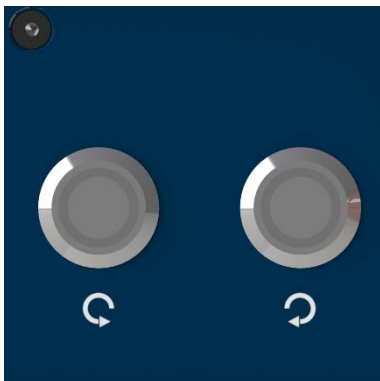


On / Off button to turn on HRT I.

For operating instructions, refer to [section 5.4.1](#).

Zero-point button to set the current position of the rotary plate as zero-point.

For operating instructions, refer to [section 5.4.3](#).

CCW / CW button

Rotate the rotary plate counterclockwise.



Rotate the rotary plate clockwise.

For operating instructions, refer to [section 5.4.2](#).

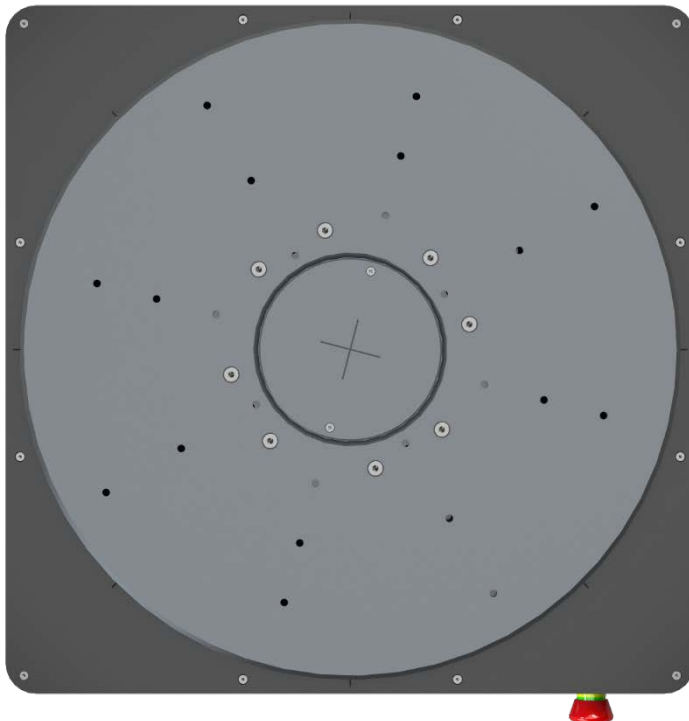
Emergency stop button

The emergency stop button stops the drive motor immediately and isolates it from power supply.

Only use the emergency stop button in case of emergency.

For operating instructions, refer to [section 5.4.4](#).

4.2.2 Top view



HRT I has a rotary plate on top of the housing. The rotary plate is attached to the driving unit located inside of the housing. The housing and the rotary plate have a hole in the center. A cover seals the hole. Remove the cover to provide a cable passage in the center (refer to [section 5.5](#)).

5. OPERATING INSTRUCTIONS

5.1 Setup and commissioning

5.1.1 Required software

- ACQUA (see HRT I datasheet for further information)
- Alternatively: RC-HRT I (application software to control only HRT I)

5.1.2 Required hardware

- ACQUA compatible PC (see ACQUA datasheet for further information)
- Any other hardware depends on the desired measurement configuration.

5.1.3 General notes

	• Do not use DC extension cables. This may lead to excessive voltage drops. • The power plug shall be accessible all the time. • Isolate the equipment from the power supply before leaving it unattended. • Maintenance on the equipment shall only be carried out by authorized HEAD acoustics service personnel. • Before connecting, ensure that all electronic devices comply with IEC 60950, IEC 61010 or comparable safety standards.
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5.1.4 EMC information

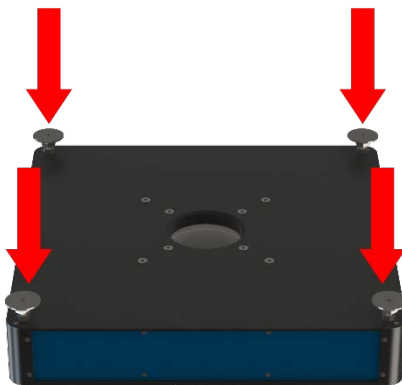
	HRT I complies with group 1, class B. Group 1: There is no intentionally generated and / or used energy in the frequency range between 9 kHz and 400 GHz. Class B: The product is suitable for use in domestic establishments and in establishments directly connected to a low voltage power supply network which supplies buildings used for domestic purposes.
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5.2 Height adjustment of HRT I

HRT I has four height-adjustable feet. Use them to even out slight bevel of the surface where HRT I is positioned. Furthermore, use the height-adjustable feet to gain more space underneath HRT I (for cabling etc.). Use a spirit level to even out HRT I accurately.

The height-adjustable feet are fully screwed-in by default.

1. Slightly lift HRT I at the corner of the desired height-adjustable foot.



2. Turn the height-adjustable foot counterclockwise to extend the height.



Alternatively:

Turn the height-adjustable foot clockwise to reduce the height.

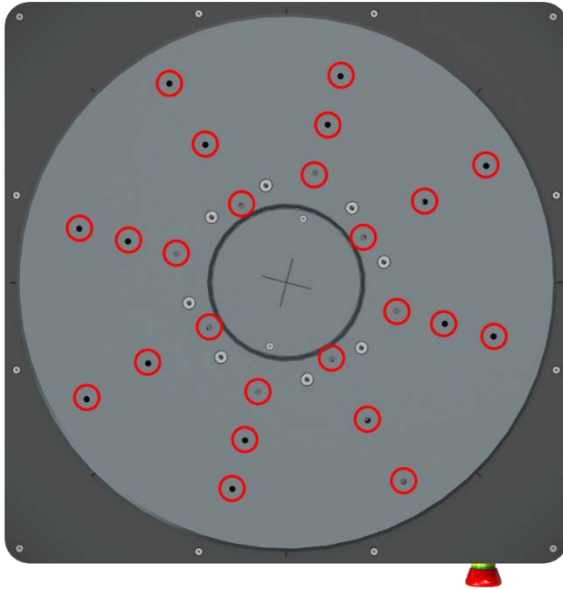


3. The maximum height of HRT I is 123 mm. Stay within this limit to prevent instability.



5.3 Attach measurement object on HRT I

The rotary plate of HRT I contains 24 threaded holes (M6) for attaching a measuring object on it. Distances between the threaded holes vary (refer to [section 10](#)). The maximum screw-in depth for the threaded holes is 6 mm.



CAUTION

The measurement object and the mounting material are provided by the user.

The use of inappropriate measurement objects and / or mounting devices may result in minor or moderate injury and / or damage to the equipment.

Use measurement object that are appropriate and suitable for the application.

Always use appropriate mounting material (e.g. not sharp-edged) for assembling measurement objects on HRT I.

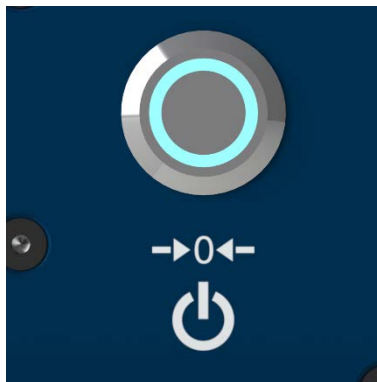
5.4 Manual operation

5.4.1 Start up & Shut down

Press the On / Off button briefly to start HRT I. The LED of the button illuminates blue. The latest used position of the rotary plate appears on the display.

HRT I is ready for operation.

Press the On / Off button briefly to shut down HRT I. The currently set position of the rotary plate is saved and will be available for the next start up. The LED of the button turns off.



If HRT I is shut down incorrectly, HRT I stops in an inappropriate position. After restarting it, the value in the display flashes. Set the value to zero to continue with normal operation (refer to [section 5.4.3](#)).
Incorrect shut down:

- Disconnecting power cable.
- Power blackout.
- Triggering emergency stop.

5.4.2 Rotate the rotary plate



- Press the button briefly to rotate the rotary plate counterclockwise in 0.1° steps.
- Press and hold the button to rotate the rotary plate persistently counterclockwise.
- Release the button to stop the rotation.

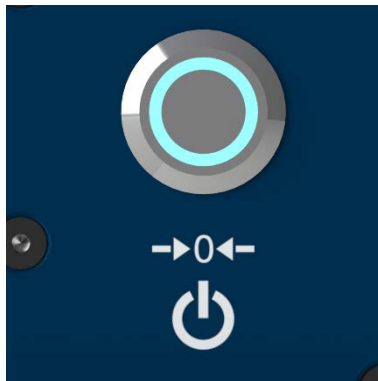


- Press the button briefly to rotate the rotary plate clockwise in 0.1° steps.
- Press and hold the button to rotate the rotary plate persistently clockwise.
- Release the button to stop the rotation.



5.4.3 Set zero-point reference / origin

1. Press and hold the zero-point button for at least three seconds to set the current position of the rotary table as origin.



2. The displayed value sets to zero.



5.4.4 Emergency stop

WARNING



HRT I has an emergency stop button.

Hazardous / emergency situations may result in death, serious injury and/or damage to the equipment.

Push the emergency stop button in case of emergency.

Push the emergency stop button if the rotary plate rotates unintendedly.

Push the emergency stop button in case of emergency. HRT I stops immediately.



The emergency stop button locks after pushing it.
Resolve the hazardous situation that caused the emergency stop before unlocking the emergency stop button.
Reset the emergency stop button to its initial position to continue with normal operation.

Slightly turn the emergency stop button in clockwise / counterclockwise direction.
The emergency stop button will return to its initial position.

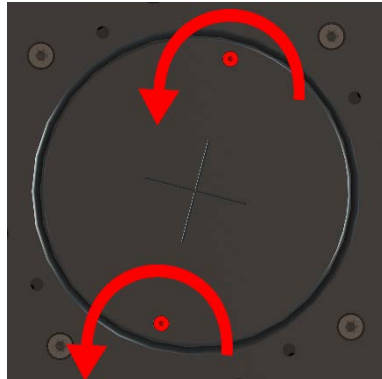


After interrupting the operation with the emergency stop button, HRT I is not in an appropriate position. After restarting it, the display flashes. Set the position to zero to continue with normal operation (refer to [section 5.4.3](#))

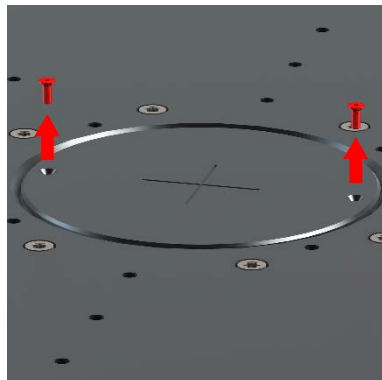
5.5 Cable passage

5.5.1 Remove cover

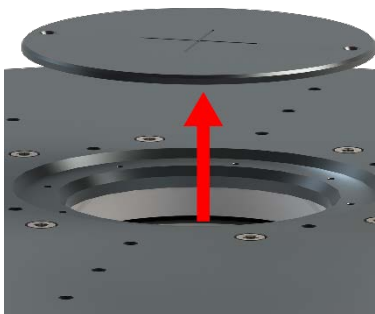
1. Loosen the screws that retain the cover with an M3 Allen wrench.



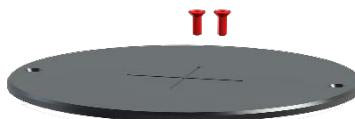
2. Remove the screws.



3. Remove the cover.



4. Store the removed components (screws, cover) in a safe position.



WARNING



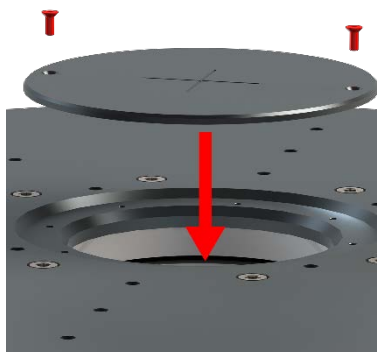
Leaving the screws in the threads during operation may result in cable rupture.

Cable rupture and exposed electrical wires may lead to an electric shock. The electric shock may result in death, serious injury and/or damage to the equipment.

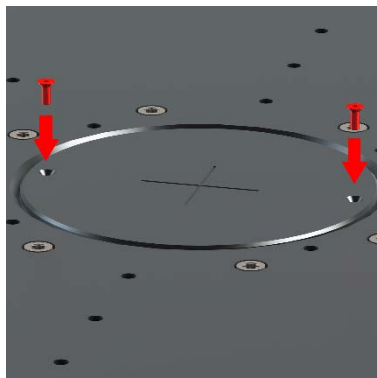
Do not insert the screws in the threads when the cover is removed.

5.5.2 Assemble cover

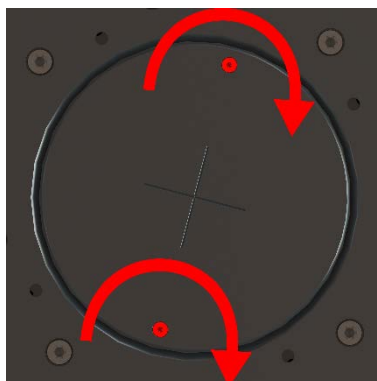
1. Position the cover that the screw holes overlap to the provided screw holes of the rotary plate.



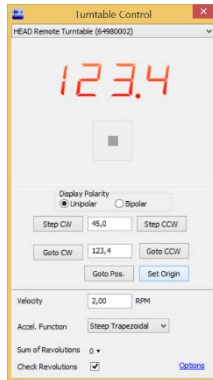
2. Insert the screws



3. Screw in and tighten the screws with an M3 Allen wrench. Make sure the cover is even and has a tight fit.



6. HRT I REMOTE CONTROL VIA CONTROL SOFTWARE



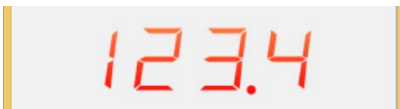
Control HRT I remotely via the control software. All functions are accessible in one GUI window.

ACQUA:

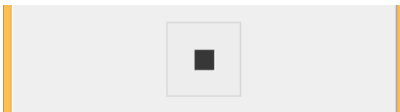
1. Start ACQUA.
2. Select Tools → ACQUAlyzer.
3. Select Settings → Turntable.

RC-HRT I:

Start the software with the desktop link or from the start menu.

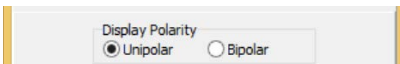


Current position of the rotary plate.



Stop button

Stop the movement of the rotary plate immediately.



Display polarity

Unipolar: The polarity ranges from 0° to 359.9°.

Bipolar: The polarity ranges from -179.9° to +180°.



Rotate the rotary plate the distance of the entered value in CW or CCW direction.

Enter the desired distance that the rotary plate shall rotate.

- Select “Step CW” to rotate the entered distance in clockwise direction.
- Select “Step CCW” to rotate the entered distance in counterclockwise direction.

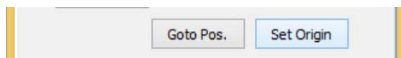


A screenshot of a software interface with a light gray background. It contains four buttons: 'Goto CW' and 'Goto CCW' at the top, and 'Goto Pos.' and 'Set Origin' at the bottom. A text input field between 'Goto CW' and 'Goto CCW' contains the value '123,4'.

Rotate the rotary plate to the entered position in CW or CCW direction.

Enter the desired target value

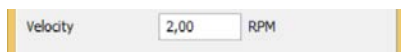
- Select “Go to CW” to rotate to the entered position in clockwise direction.
- Select “Go to CCW” to rotate to the entered position in counterclockwise direction.
- Select “Go to Pos.” to rotate the fastest way to the entered position.



A screenshot of a software interface with a light gray background. It contains two buttons: 'Goto Pos.' and 'Set Origin'.

Zero-point / Origin

Select “Set origin” to set the current position of the rotary plate as zero-point reference / origin.



A screenshot of a software interface with a light gray background. It contains a label 'Velocity' on the left, a text input field in the middle containing the value '2,00', and the label 'RPM' on the right.

Velocity

Set customized velocity of the rotary plate in rpm.

Range: 0.01 rpm – 2 rpm

Acceleration function

The acceleration function describes the relation between motor velocity and time.

- Rectangular
HRT I accelerates to full speed in very short time.
HRT I decelerates to zero speed in very short time.
- Steep Trapezoidal
HRT I accelerates to full speed in short time.
HRT I decelerates to zero speed in short time.
- Medium Trapezoidal
HRT I accelerates smoothly to full speed.
HRT I decelerates smoothly to zero speed.
- Flat Trapezoidal
HRT I accelerates very smoothly to full speed.
HRT I decelerates very smoothly to zero speed.

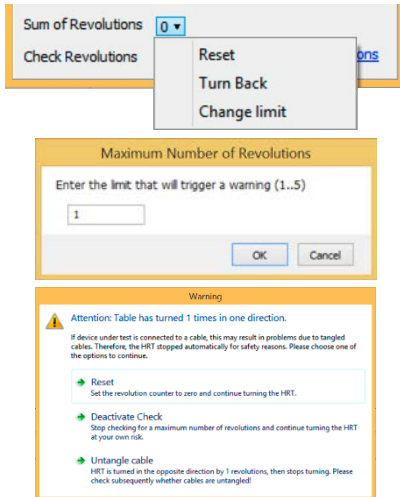


Sum of revolutions

Number of full revolutions in either CW or CCW direction.

Monitor the value to avoid twisting the cabling of the measurement object.





Select ▼ to select options from a drop-down list:

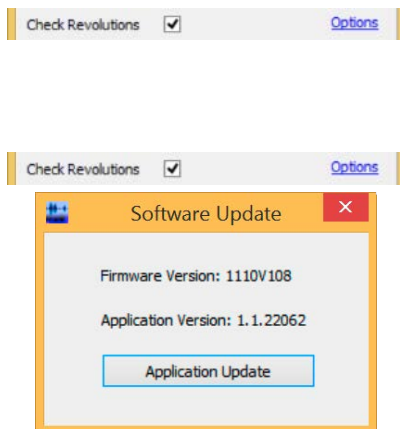
- Reset
Reset the number of full revolutions to zero.
- Turn back
Rotate the covered distance into the opposite direction.
- Change limit
Open the dialogue to set the maximum number of full revolutions. Enter the desired number in the box and select “OK”.
If HRT I reaches the maximum number of full revolutions, HRT I stops rotating and a warning window pops-up.

Check Revolutions

Check the box to monitor the number of full revolutions.

The box is checked by default.

Unchecking the box deactivates the limitation of full revolutions (not recommended).



Options

Firmware version: Operating firmware of the drive unit.

Application version: Application firmware for HRT I.

Update the application version of the connected HRT I by selecting “Application Update” and opening the update file.

7. CLEANING

WARNING



Only clean the equipment when it is disconnected from the power supply.

Cleaning energized equipment may lead to an electric shock. The electric shock may lead to death, serious injury and/or damage to the equipment.



Switch off and isolate the equipment before cleaning.

Never open the equipment. The equipment shall only be opened by authorized HEAD acoustics service personnel.

Clean the equipment with a soft, lint-free cloth slightly moistened with water. The equipment is not water resistant.

8. DISPOSAL

NOTICE



Parts of the equipment consist of hazardous substances.

Disposing of the equipment in domestic waste may contaminate the environment.

Send the equipment back to HEAD acoustics or its local sales or service partner after decommissioning.

Follow the local waste and disposal regulations.

Do not dispose of defective batteries. Contact HEAD acoustics for further advice.

HEAD acoustics is obliged to take back batteries that are included in company equipment (2012/19/EU). If batteries are sent to HEAD acoustics, all shipping fees must be prepaid by the sender. If the battery is non-removable, HEAD acoustics will take care of the removal, disposal and replacement (subject to charge) for the customer.

Send batteries from HEAD acoustics to the following shipping address:

HEAD acoustics GmbH

"Battery disposal"

Postfach 3340

52120 Herzogenrath

Germany

9. ANNEX A: SUPPLIER'S DECLARATION OF CONFORMITY



EU Declaration of Conformity

The device / system:

HRT I (6498)

built according to the documentation **HRT I 6498**, revision **01** is declared to be in compliance with the essential requirements of the following Council Directives of the European Parliament and of the Council: 2014/30/EU (EMC), 2014/35/EU (LVD), 2006/42/EC (MD).

This declaration is valid for all devices manufactured according to the product documentation which is held at HEAD acoustics GmbH.

The evaluation of the device / system was carried out in conformity with the following harmonized standards:

Product Family Standard: EN 61326-1: 2013

EMC according to: EN 55011: 2009+A1: 2010

Safety according to: EN 61010-1: 2013
EN ISO 10218-1: 2012

The last two digits of the year in which the CE marking was affixed are 17.

This declaration of conformity is issued under the sole responsibility of the manufacturer:

Name: HEAD acoustics GmbH
Address: Ebertstr. 30a, 52134 Herzogenrath, Germany

Signed for and on behalf of:

Name: Dr.-Ing. G. Mauer
Function: Manager development Telecom

Herzogenrath
.....
Location

20.11.17
.....
Date

.....
Signature

10. ANNEX B: DRAWING ROTARY PLATE

Please refer to the next page.

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