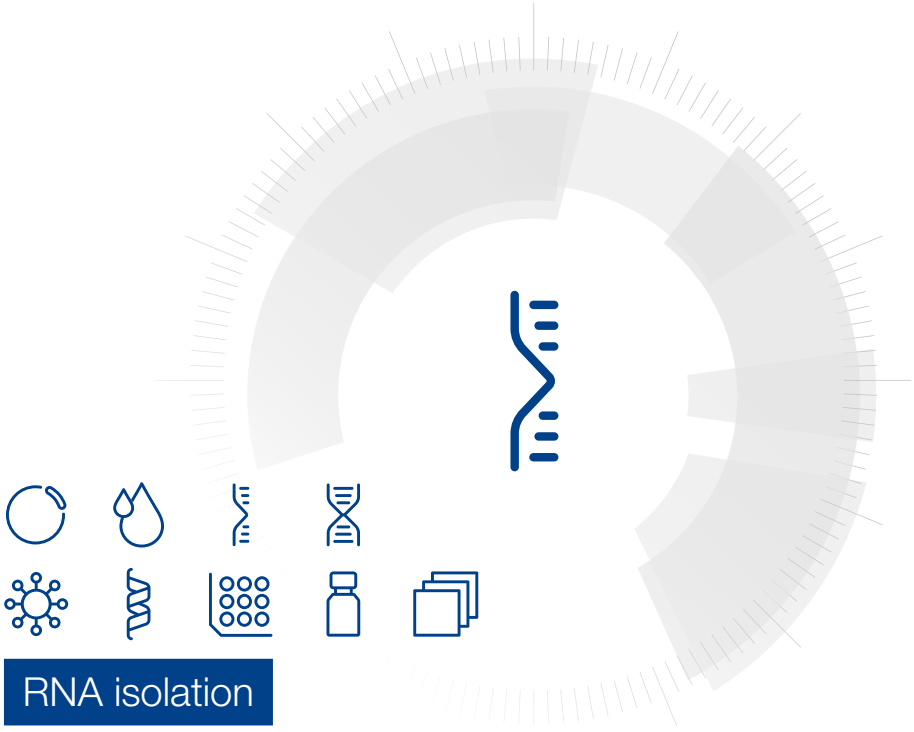
Bioanalysis

MACHEREY-NAGEL

User manual



RNA isolation

- NucleoMag® RNA

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1 Components

1.1 Kit contents

	NucleoMag® RNA	
REF	**1 × 96 preps 744350.1**	**4 × 96 preps 744350.4**
NucleoMag® B-Beads	2 × 1.5 mL	12 mL
Lysis Buffer MR1	60 mL	250 mL
Binding Buffer MR2	80 mL	400 mL
Wash Buffer MR3	80 mL	320 mL
Wash Buffer MR4	250 mL	1000 mL
Elution Buffer MR5*	30 mL	125 mL
Reducing Agent TCEP	1 vial (107 mg/vial)	4 vials (107 mg/vial)
rDNase, lyophilized**	3 vials (size D)	12 vials (size D)
Reaction Buffer for rDNase	30 mL	2 × 60 mL
RNase-free H_2O	13 mL	30 mL
Leaflet	1	1

* Elution Buffer MR5: RNase-free water

** For preparation of working solutions and storage conditions see section 3.

1.2 Equipment and consumables to be supplied by user

Product	REF	Pack of
• **Magnetic separation system** e.g., NucleoMag® SEP (see section 2.3)	744900	1
• **Separation plate for magnetic beads separation,** e.g., Square-well Block (96-well block with 2.1 mL square-wells)	740481 740481.24	4 24
• **Lysis tubes for incubation of samples and lysis,** e.g., Rack of Tube Strips (1 set consists of 1 Rack, 12 Strips with 8 tubes (1.2 mL wells) each, and 12 Cap Strips)	740477 740477.24	4 sets 24 sets
• **Elution plate for collecting purified nucleic acids,** e.g., Elution Plate U-bottom (96-well 0.3 mL microtiterplate with 300 µL U-bottom wells) e.g., Elution Plate Flat-bottom (96-well 0.3 mL microtiterplate with 300 µL flat-bottom wells)	740486.24	24
• **For use of kit on KingFisher® Flex instrument:** e.g., KingFisher® Accessory Kit B (Square-well Blocks, Deep-well tip combs, Elution Plates for 4 × 96 NucleoMag® RNA preps using KingFisher® Flex platform)	744951	1 set

1.3 About this user manual

It is strongly recommended for first time users to read the detailed protocol sections of the **NucleoMag® RNA** kit before using this product. Experienced users, however, may refer to the Protocol at a glance instead. The Protocol at a glance is designed to be used only as a supplemental tool for quick referencing while performing the purification procedure.

All technical literature is available online at *www.mn-net.com*.

2 Product description

2.1 The basic principle

The **NucleoMag® RNA** procedure is based on the reversible adsorption of nucleic acids to paramagnetic beads under appropriate buffer conditions. Sample lysis is achieved by homogenization in a solution containing chaotropic ions. For the adjustment of conditions under which nucleic acids bind to the paramagnetic beads, Buffer MR2 and the NucleoMag® B-Beads are added to the lysate. After magnetic separation, the paramagnetic beads are incubated with a recombinant DNase to remove co-purified DNA. Following a RNA rebinding step, contaminants and salts are removed using the Wash Buffers MR3 and MR4. Residual ethanol from previous wash steps is removed by air drying. Finally, highly pure RNA is eluted with Elution Buffer MR5 and the RNA can directly be used for downstream applications. The **NucleoMag® RNA** kit can be used either manually or automated on standard liquid handling instruments or automated magnetic separators.

2.2 Kit specifications

NucleoMag® RNA is designed for rapid manual and automated small-scale preparation of highly pure RNA from up to 20 mg tissue or 2×10^6 cells. The kit is designed for use with NucleoMag® SEP magnetic separator plate (see ordering information, section 6.2) or other magnetic separation systems (see section 2.4). Manual time for the preparation of 96 samples is about 120 minutes. The purified RNA can be used directly as template for RT-PCR, or any kind of enzymatic reactions.

For research use only.

Due to the recombinant DNase provided with the kit, eluted RNA is virtually DNA-free.

NucleoMag® RNA allows easy automation on common liquid handling instruments or automated magnetic separators, for example Thermo Fisher Scientific KingFisher® instruments. The actual processing time depends on the configuration of the instrument and the magnetic separation system used. Typically, 96 samples can be purified in less than 120 minutes using the NucleoMag® SEP on automation platforms.

The kit provides reagents for the purification of up to 30 µg of pure RNA from suitable samples. Depending on the elution volume used, concentrations of 10 – 30 ng/µL can be obtained.

NucleoMag® RNA can be processed completely at room temperature.

NucleoMag® B-Beads are highly reactive superparamagnetic beads. The binding capacity is approx. 0.4 µg / µL of RNA per 1 µL of NucleoMag® B-Bead Suspension. 1 µL of suspension contains 130 µg beads.

For more information, visit our website:

www.mn-net.com/bioanalytik/htp-information

At MN we support you with scripts for various platforms you only need to contact us and we will get back to you with the script. If you are looking for more tailored solutions we will also support you here, just contact us and we will make the automation for you a plesant and supported experience.

2.3 Handling, preparation, and storage of starting materials

Work environment

Maintain an RNase-free work environment. Wear gloves at all times during the preparation. Change gloves frequently

Sample storage and RNase inhibition

RNases can rapidly degrade RNA within the samples if samples are not protected from RNase activity after harvest. The following methods are recommended to avoid RNA degradation:

- Use freshly harvested sample for immediate lysis and RNA purification.
- Submerge and store samples in NucleoProtect® RNA or similar stabilization solutions. Make sure to allow for complete permeation of the sample with the stabilization solution before freezing it. Remove excess stabilization solution from the sample prior to RNA isolation according to the stabilization solution user manual.
- Flash freeze sample in liquid N_2 immediately upon harvest and store at -70 °C. Frozen samples are stable up to 6 months. Mortar and pestle can be used to pulverize the sample in a frozen state. Make sure that the sample does not thaw prior to contact with lysis buffer.
- Store samples in Lysis Buffer MR1 after disruption at -70 °C for up to one year, at 4 °C for up to 24 hours or at room temperature for up to several hours. Samples frozen in Lysis Buffer MR1 should be thawed slowly before starting with the isolation of RNA.

2.4 Magnetic separation systems

For use of **NucleoMag® RNA**, the use of the magnetic separator NucleoMag® SEP is recommended. Separation is carried out in a Square-well Block (see ordering information, section 6.2). The kit can also be used with other common separators. See suppliers ordering information for suitable separation plates.

Magnetic separator	Separation plate or tube
NucleoMag® SEP (MN REF 744900)	Square-well Block (MN REF 740481/.24)
Tecan Te-MagS™	1.5 mL tubes without lid (Sarstedt)

Static magnetic pins

Separators with static magnetic pins, for example, NucleoMag® SEP (for manual use and for use on liquid handling workstations): This type of separator is recommended in combination with a suitable microplate shaker for optimal resuspension of the beads during the washing and elution steps. Alternatively, beads can be resuspended in the

buffer by pipetting up and down several times. For fully-automated use on liquid handling workstations, a gripper tool is required, the plate is transferred to the magnetic separator for separation of the beads and transferred to the shaker module for resuspension of the beads.

Movable magnetic systems

Separators with moving magnetic pins: Magnetic pins/rods are moved from one side of the well to the other and vice versa. Beads follow this movement and are thus pulled through the buffer during the wash and elution steps. Separation takes place when the system stops.

Automated separators

Separators with moving magnets: Magnetic beads are transferred into suitable plates or tubes. Beads are resuspended from the rod-covered magnets. Following binding, washing or elution beads are collected again with the rod-covered magnets and transferred to the next plate or tube.

2.5 Adjusting the shaker settings

When using a plate shaker for the washing and elution steps, the speed settings have to be adjusted carefully for each specific separation plate and shaker to prevent cross-contamination from well to well. Proceed as follows:

Adjusting shaker speed for wash steps:

- Load 900 µL dyed water to the wells of the separation plate. Place the plate on the shaker and start shaking with a moderate speed setting for 30 seconds. Turn off the shaker and check plate surface for small droplets of dyed water.
- Increase speed setting, shake for an additional 30 seconds, and check plate surface for droplets again.
- Continue increasing the speed setting until you observe droplets on top of the separation plate. Reduce speed setting, check again and use this setting for the washing step.

Adjusting shaker speed for the elution step:

- Load 100 µL dyed water to the wells of the collection plate and proceed as described above.

2.6 Handling of beads

Distribution of beads

A homogeneous distribution of the magnetic beads to the individual wells of the separation plate is essential for a high well-to-well consistency. Therefore, before distributing the beads, make sure that the beads are completely resuspended. Shake the storage bottle well or place it on a vortexer shortly. Premixing magnetic beads with the binding buffer allows easier homogenous distribution of the beads to the individual wells of the separation plate. During automation, a premix step before aspirating the beads/binding buffer mixture from the reservoir is recommended to keep the beads resuspended.

Magnetic separation time

Attraction of the magnetic beads to the magnetic pins depends on the magnetic strength of the magnetic pins, the selected separation plate, distance of the separation plate from the magnetic pins, and the volume to be processed. The individual times for complete attraction of the beads to the magnetic pins should be checked and adjusted on each system. It is recommended using the separation plates or tubes specified by the supplier of the magnetic separator.

Washing the beads

Washing the beads can be achieved by shaking or mixing. In contrast to mixing by pipetting up and down, mixing by shaker or magnetic mixing allows simultaneous mixing of all samples. This reduces the time and number of tips needed for the preparation. Resuspension by pipetting up and down, however, is more efficient than mixing by a shaker or magnetic mix.

Method	Resuspension efficiency	Speed	Number of tips needed
Magnetic mix	+	++	Low
Shaker	++	++	Low
Pipetting	+++	+*	High

+: acceptable, ++: good, +++: excellent, * 8-channel pipetting device

2.7 Elution procedures

Purified RNA can be eluted directly with the supplied Elution Buffer MR5. Elution can be carried out in a volume of ≥ 50 µL. It is essential to cover the NucleoMag® B-Beads completely with Elution Buffer MR5 during the elution step. The volume of dispensed Elution Buffer MR5 depends on the magnetic separation system (e.g., the position of the pellet inside the separation plate). For efficient elution, the magnetic bead pellet should be resuspended completely in the Elution Buffer MR5. For some separators high elution volumes might be necessary to cover the whole magnetic bead pellet.

3 Storage conditions and preparation of working solutions

Attention: *Buffers MR1 and MR3 contain chaotropic salt! Wear gloves and goggles!*

CAUTION: Buffers MR1 and MR3 contain guanidinium thiocyanate which can form highly reactive compounds when combined with bleach (sodium hypochlorite). DO NOT add bleach or acidic solutions directly to the sample-preparation waste.

- All components of the **NucleoMag® RNA** kit should be stored at 15 – 25 °C and are stable: until see package label.
- All buffers are delivered ready to use.

Before starting **NucleoMag® RNA** protocol prepare the following:

- **rDNase working solution:** Add 800 µL of RNase-free H_2O to each rDNase vial and incubate for 1 min at room temperature. Gently swirl the vials to completely dissolve the rDNase. Be careful not to mix rDNase vigorously as rDNase is sensitive to mechanical agitation. If not used completely this working solution can be stored at -20 °C for at least 6 months. Do not freeze / thaw the rDNase working solution more than three times.
- **rDNase reaction mixture:** Add 9.2 mL Reaction Buffer for rDNase to 800 µL rDNase working solution and mix. The resulting rDNase reaction mixture will be sufficient for 32 isolations and should be used up. When performing less than 32 reactions prepare a smaller amount of the reaction mixture. For each isolation combine 276 µL of reaction buffer for rDNase with 24 µL of rDNase working solution.
- **Reducing Agent TCEP:** Add 750 µL of RNase-free H_2O to the TCEP vial and incubate for several minutes at 15 – 25 °C. Mix the vial to dissolve the TCEP completely. Store dissolved TCEP at -20 °C.

	NucleoMag® RNA	
REF	**1 × 96 preps 744350.1**	**4 × 96 preps 744350.4**
rDNase (lyophilized)	3 vials (size D)	12 vials (size D)
	Add 800 µL RNase-free H_2O to each vial	Add 800 µL RNase-free H_2O to each vial
TCEP	1 vial (107 mg)	4 vials (107 mg/vial)
	Add 750 µL RNase-free H_2O	Add 750 µL RNase-free H_2O to each vial

4 Safety instructions

When working with the **NucleoMag® RNA** kit wear suitable protective clothing (e.g., lab coat, disposable gloves, and protective goggles). For more information consult the appropriate Material Safety Data Sheets (MSDS available online at *www.mn-net.com/msds*).

Caution: Guanidin thiocyanate in Lysis Buffer MR1 and MR3 can form highly reactive compounds when combined with bleach! Thus, do not add bleach or acidic solutions directly to the sample preparation waste.

The waste generated with the **NucleoMag® RNA** kit has not been tested for residual infectious material. A contamination of the liquid waste with residual infectious material is highly unlikely due to strong denaturing lysis buffer but it cannot be excluded completely. Therefore, liquid waste must be considered infectious and should be handled and discarded according local safety regulations.

4.1 Disposal

Dispose hazardous, infectious or biologically contaminated materials in a safe and acceptable manner and in accordance with all local and regulatory requirements.

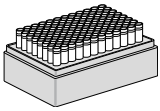
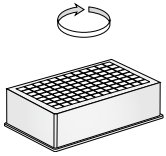
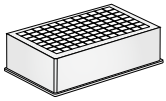
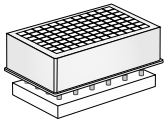
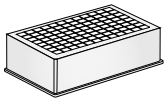
5 Protocol for the isolation of RNA

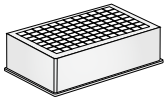
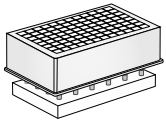
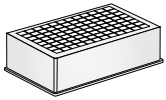
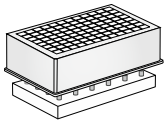
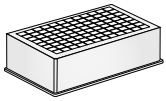
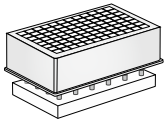
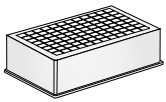
Protocol at a glance

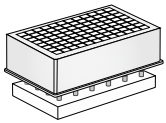
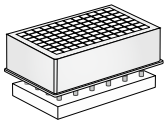
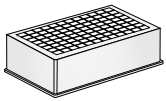
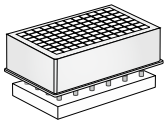
- For additional equipment and hardware requirements, refer to section 1.2 and 2.3, respectively.
- For detailed information on each step, see page 18.

Before starting the preparation:

- Check that rDNase was prepared according to section 3.

1	**Homogenize / lyse** samples	**Up to 20 mg tissue or 2 × 106 cells** **350 µL MR1** **6 µL TCEP** **Mix or use mechanical disruption**	
2	**Clear lysates** by centrifugation, transfer 350 µL of cleared lysate to a Square-well Block for further processing	**5,600 x *g*, 5 min** **350 µL cleared lysate**	
3	**Bind** RNA to NucleoMag® B-Beads	**28 µL NucleoMag® B-Beads** **350 µL MR2**	
		Mix by shaking for 5 min at RT *(Optional: Mix by pipetting up and down)*	
		Remove supernatant after 2 min separation **Dry for 5 min at RT**	
4	**Digest** DNA	Remove Square-well Block from NucleoMag® SEP **300 µL rDNase reaction mixture** **Mix** **Incubate 15 min at RT**	

5	**Rebind**	**350 µL MR2**	
		Mix by shaking for 5 min at RT *(Optional: Mix by pipetting up and down)*	
		Remove supernatant after 2 min separation	
6	**Wash** with MR3	Remove Square-well Block from NucleoMag® SEP **600 µL MR3**	
		Resuspend: Shake 5 min at RT *(Optional: Mix by pipetting up and down)*	
		Remove supernatant after 2 min separation	
7	**Wash** with MR4 (1 st)	Remove Square-well Block from NucleoMag® SEP **900 µL MR4**	
		Resuspend: Shake 5 min at RT *(Optional: Mix by pipetting up and down)*	
		Remove supernatant after 2 min separation	
8	**Wash** with MR4 (2nd)	Remove Square-well Block from NucleoMag® SEP **900 µL MR4**	

		Resuspend: Shake 5 min at RT *(Optional: Mix by pipetting up and down)*	↔
		Remove supernatant after 2 min separation	
9	**Dry** samples	Leave Square-well Block on NucleoMag® SEP **Air dry 10 – 15 min at RT**	
10	**Elute** RNA	Remove Square-well Block from NucleoMag® SEP **50-200 µL MR5**	
		Shake 5 – 10 min at RT *(Optional: Mix by pipetting up and down)*	↔
		Separate 2 min and transfer RNA into elution plate / tubes	

Detailed protocol

This protocol is designed for magnetic separators with static pins (e.g., NucleoMag® SEP) and suitable plate shakers (see section 2.3). It is recommended using a Square-well Block for separation (see section 1.2). Alternatively, isolation of RNA can be performed in reaction tubes with suitable magnetic separators. This protocol is for manual use and serves as a guideline for adapting the kit to robotic instruments.

Before starting the preparation:

- Check that rDNase was prepared according to section 3.

1 Homogenize/lyse samples

Lyse up to **20 mg of tissue** or **2 × 10^6 cells** in **350 µL Buffer MR1 +6 µL TCEP.**

For tissue samples: Use a suitable homogenization tool to homogenize samples in Buffer MR1. Samples can be disrupted using bead based homogenization tools, for example GenoGrinder* or Mixer Mill MM400** (see instrument manufacturer's recommendations for suitable plates or tubes for homogenization) or any other suitable homogenization tools.

For cells: Add Buffer MR1 to cell pellet. Pipette up and down several times to lyse the cells.

Optionally: Use NucleoSpin® RNA Filter Tubes or Plates (see ordering information, section 6.2*) or a syringe to reduce the viscosity of the lysate. Transfer lysate to the Square-well Block for further processing.*

2 Clear lysates

Centrifuge the samples for **5 min** at a full speed (**5,600 – 6,000 x *g***). Remove cap strips.

Transfer **350 µL of the cleared lysate** to a Square-well Block. Do not moisten the rims of the well.

Note: See recommendations for suitable plates or tubes and compatible magnetic separators section 1.2.

Alternatively, NucleoSpin® RNA Filter Tubes or Plates can be used to clear the crude lysate (see ordering information, section 6.2). Transfer the clear supernatant to the Square-well Block (see ordering information, section 6.2) for further processing.

* GenoGrinder: *http://www.spexcsp.com/sampleprep/*

** Mixer Mill MM400 *http://www.retsch.com/products/milling/ball-mills/mm-400/*

3 Bind RNA to NucleoMag® B-Beads

Add **28 µL resuspended NucleoMag® B-Beads** and **350 µL Buffer MR2** to the lysed sample. **Mix** by shaking for 5 min at room temperature or by pipetting up and down 6 times and a subsequent incubation for 5 min at room temperature. NucleoMag® B-Beads and Buffer MR2 can be premixed.

Be sure to resuspend the NucleoMag® B-Beads before removing them from the storage bottle. Vortex storage bottle briefly until a homogenous suspension has formed.

Separate the magnetic beads against the side of the wells by placing the Square-well Block on the NucleoMag® SEP magnetic separator. Wait at least **2 min** until all the beads have been attracted to the magnets. Remove and discard supernatant by pipetting. Remove supernatant completely.

Note: Do not disturb the attracted beads while aspirating the supernatant. The magnetic pellet is not visible in this step. Remove supernatant from the opposite side of the well.

Dry beads for **5 min** at **room temperature**. Keep the Square-well Block on the NucleoMag® SEP magnetic separator for the drying step.

4 Digest DNA

Remove the Square-well Block from the NucleoMag® SEP magnetic separator. Add **300 µL rDNase reaction mixture** and resuspend the beads by pipetting up and down. Incubate for **15 min** at **room temperature**. Do not separate the beads!

5 Rebind

Add **350 µL Buffer MR2** to each sample. **Mix** by shaking for 5 min at room temperature or by pipetting up and down 6 times and a subsequent incubation for 5 min at room temperature.

Separate the magnetic beads against the side of the wells by placing the Square-well Block on NucleoMag® SEP magnetic separator. Wait at least **2 min** until all the beads have been attracted to the magnets. Remove and discard supernatant by pipetting.

6 Wash with MR3

Remove the Square-well Block from the NucleoMag® SEP magnetic separator.

Add **600 µL Buffer MR3** to each well and resuspend the beads by shaking until the beads are resuspended completely (**5 min**). Alternatively, resuspend beads by repeated pipetting up and down (15 times). Incubate for **1 min**.

Separate the magnetic beads by placing the Square-well Block on the NucleoMag® SEP magnetic separator. Wait at least **2 min** until all the beads have been attracted to the magnets. Remove and discard supernatant by pipetting.

7 1 st Wash with MR4

Remove the Square-well Block from the NucleoMag® SEP magnetic separator.

Add **900 µL Buffer MR4** to each well and resuspend the beads by shaking until the beads are resuspended completely (**5 min**). Alternatively, resuspend beads by repeated pipetting up and down (15 times). Incubate for **1 min**.

Separate the magnetic beads by placing the Square-well Block on the NucleoMag® SEP magnetic separator. Wait at least **2 min** until all the beads have been attracted to the magnets. Remove and discard supernatant by pipetting.

8 2nd Wash with MR4

Repeat washing step once with **900 µL Buffer MR4**. Leave the Square-well Block on the NucleoMag® SEP magnetic separator for the following step.

9 Dry samples

Air dry the beads for **10 – 15 min** at **room temperature**.

10 Elute RNA

Remove the Square-well Block from the NucleoMag® SEP magnetic separator.

Add desired volume of **Buffer MR5 (at least 50 µL, 50 – 200 µL)** and resuspend the beads by shaking until the beads are resuspended completely (**5 min**). Alternatively, resuspend beads by repeated pipetting up and down (15 times).

Incubate the suspension for **5 min** at **room temperature**.

Separate the magnetic beads by placing the Square-well Block on the NucleoMag® SEP magnetic separator. Wait at least **2 min** until all the beads have been attracted to the magnets. Transfer the supernatant containing the purified RNA to a suitable collection plate (see ordering information, section 6.2).

6 Appendix

6.1 Troubleshooting

Problem	Possible cause and suggestions
RNA is degraded / no RNA obtained	*RNase contamination* • Create an RNase-free working environment. Wear gloves during all steps of the procedure. Change gloves frequently. Use of sterile, disposable polypropylene tubes or plates is recommended. Glassware should be oven-baked for at least 2 h at 250 °C before use.
Poor RNA yield	*Elution buffer volume insufficient* • Beads pellet must be covered completely with elution buffer. *Insufficient performance of elution buffer during elution step.* • Remove residual buffers during the separation steps completely. Remaining buffers decrease the efficiency of following wash and elution steps. *Beads dried out* • Do not let the beads dry as this might result in lower elution efficiencies. *Aspiration of attracted bead pellet* • Do not disturb the attracted beads while aspirating the supernatant, especially when the magnetic bead pellet is not visible in the lysate. *Aspiration and loss of beads* • Time for magnetic separation is too short or aspiration speed is too high.
Low purity	*Insufficient washing procedure* • Use only the appropriate combinations of separator and plate, for example Square-well Block in combination with NucleoMag® SEP. • Make sure that beads are resuspended completely during the washing procedure. If shaking is not sufficient to resuspend the beads completely mix by repeated pipetting up and down.

Problem	Possible cause and suggestions
Poor performance of RNA in downstream applications	*Carry-over of ethanol from wash buffers* • Be sure to remove all of the ethanolic wash solution, as residual ethanol interferes with downstream applications. *Low purity* • See above.
Carry-over of beads	*Time for magnetic separation too short* • Increase separation time to allow the beads to be completely attracted to the magnetic pins before aspirating any liquid from the well. *Aspiration speed too high (elution step)* • High aspiration speed during the elution step may cause bead carry-over. Reduce aspiration speed for elution step.
Cross contamination	*Contamination of the rims* • Do not moisten the rims of the Square-well Block when transferring the tissue lysate. If the rim of the wells is contaminated, seal the Square-well Block with Self adhering PE Foil (see ordering information, section 6.2) before starting the shaker.

6.2 Ordering information

Product	REF	Pack of
NucleoMag® RNA	744350.1	1 × 96 preps
	744350.4	4 × 96 preps
NucleoSpin® Filters	740606	50
NucleoSpin® RNA Filter Plates	740711	4
NucleoMag® SEP	744900	1
Square-well Blocks	740481.4	4
	740481.24	24
Self adhering PE Foil	740676	50 sheets
Rack of Tube Strips	740477.4	4 sets
(set consists of 1 Rack, 12 Tube Strips with 8 tubes each and Cap Strips)	740477.24	24 sets
Cap Strips	740638	30 strips
For use of kit on KingFisher® Flex instrument:		
e.g., KingFisher® Accessory Kit B Square-well Blocks, Deep-well tip combs, Elution Plates for 4 × 96 NucleoMag® RNA preps	744951	1 set

Visit www.mn-net.com for more detailed product information.

6.3 Product use restriction / warranty

All MACHEREY-NAGEL products are designed for their intended use only. They are not intended to be used for any other purpose. The description of the intended use of the products can be found in the original MACHEREY-NAGEL product leaflets. Before using our products, please observe the instructions for use and the safety instructions from the respective Material Safety Data Sheet of the product.

This MACHEREY-NAGEL product is carrying documentation stating specifications and other technical information. MACHEREY-NAGEL warrants to meet the stated specifications. The provided warranty is limited to the data specifications and descriptions as given in the original MACHEREY-NAGEL literature. No other statements or representations, written or oral, by MACHEREY-NAGELS employees, agents or representatives, except written statements signed by a duly authorized officer of MACHEREY-NAGEL are authorized. They should not be relied upon by the costumer and are not a part of a contract of sale or of this warranty.

Liability for all possible damages that occur in any connection with our products is limited to the utmost minimum as stated in the general business terms and conditions

of MACHEREY-NAGEL in their latest edition which can be taken from the company's website. MACHEREY-NAGEL does not assume any further warranty.

Products and their application are subject to change. Therefore, please contact our Technical Service Team for the latest information on MACHEREY-NAGEL products. You may also contact your local distributor for general scientific information. Descriptions in MACHEREY-NAGEL literature are provided for informational purposes only.

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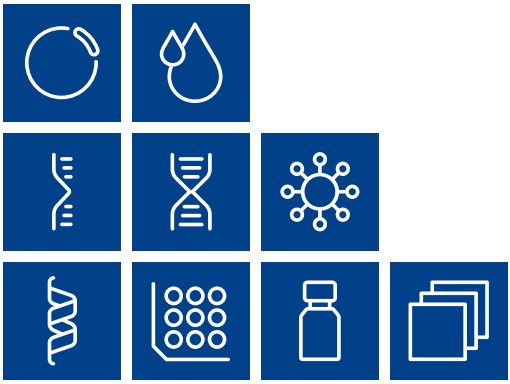
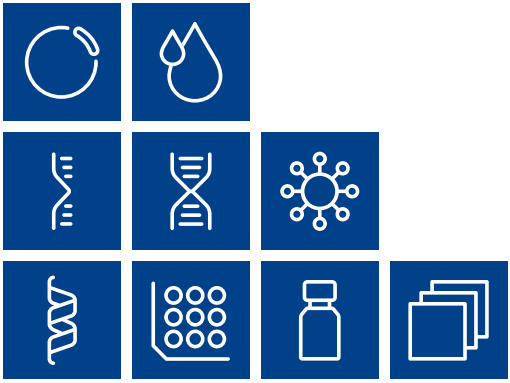


Plasmid DNA
Clean up
RNA
DNA
Viral RNA and DNA
Protein
High throughput
Accessories
Auxiliary tools



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