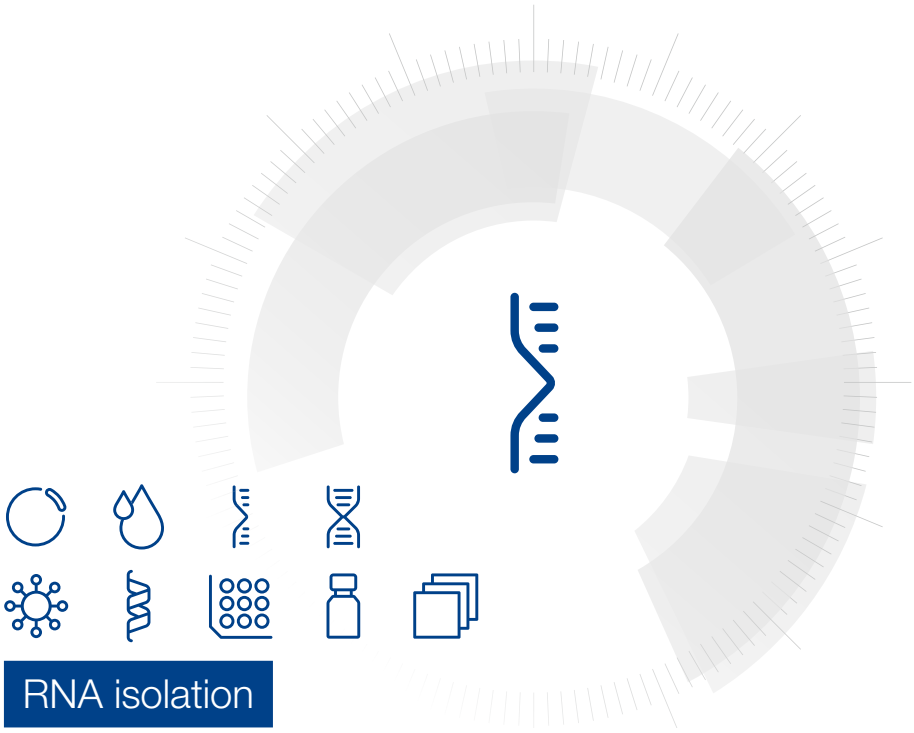
Bioanalysis

MACHEREY-NAGEL

User manual



RNA isolation

- NucleoMag® RNA Pro
- NucleoMag® RNA/DNA Pro

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Table of contents

1 Components

1.1 Kit contents

	NucleoMag® RNA Pro		NucleoMag® RNA/DNA Pro
REF	**1 × 96 preps 744360.1**	**4 × 96 preps 744360.4**	**1 × 96 preps 744370.1**
NucleoMag® B-Beads	2 × 1.5 mL	6 × 1.5 mL	2 × 1.5 mL
Lysis Buffer MRL	60 mL	250 mL	60 mL
Binding Buffer MRB	80 mL	400 mL	80 mL
Wash Buffer MRW	125 mL	400 mL	125 mL
Elution Buffer MRE*	30 mL	125 mL	30 mL
Reducing Agent TCEP	1 vial (107 mg/vial)	4 vials (107 mg/vial)	1 vial (107 mg/vial)
rDNase, lyophilized**	3 vials (size D)	12 vials (size D)	3 vials (size D)
Reaction Buffer for rDNase	30 mL	2 × 60 mL	30 mL
RNase-free H_2O	13 mL	30 mL	13 mL
Buffer DNA Wash (Concentrate)**			2 × 12 mL
Buffer DNA Elute			12 mL
Leaflet	1	1	1

* Elution Buffer MRE: 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 RNA isolation from plant material: Lysis Buffer RL1	740385.125	125 mL
NucleoSpin® RNA/DNA Buffer Set For parallel RNA and DNA purification in separate eluates: Buffer DNA Elute, Buffer DNA Wash	740944	100 preps
For use of kit on KingFisher® Flex instrument: e.g., 96-well Accessory Kit B (Square-well Blocks, Deep-well tip combs, Elution Plates for 4 × 96 NucleoMag® RNA (Pro) preps using KingFisher® Flex platform)	744951	1 set
For use of kit on MagnetaPure 32 Plus or IsoPure Mini: e.g., 96 Deep-well plates for magnetic rod systems	744955	25
For use of kit on MagnetaPure 32 Plus or IsoPure Mini: e.g., 8-Place tip combs for magnetic rod systems	744960	50

1.3 About this user manual

It is strongly recommended for first time users to read the detailed protocol sections of the **NucleoMag® RNA Pro / NucleoMag® RNA / DNA Pro** 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 Pro** as well as the **NucleoMag® RNA/DNA Pro** 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, alcoholic solvents and the NucleoMag® B-Beads are added to the lysate. Contaminants and salts are removed using the Wash Buffer MRW and 70 % ethanol. After magnetic separation, the paramagnetic beads are incubated with a recombinant DNase to remove co-purified DNA. Following a RNA rebinding step,a final washing step is performed using 70 % ethanol. Residual ethanol from previous wash step is removed by air drying. Finally, highly pure RNA is eluted with Elution Buffer and the RNA can directly be used for downstream applications. In combination with the **NucleoSpin® RNA/DNA Buffer Set** as well as with the **NucleoMag® RNA/DNA Pro Kit** it is also possible to isolate RNA and DNA from the same sample in separate fractions. The **NucleoMag® RNA/DNA Pro** kit is identical to the **NucleoMag® RNA Pro** kit but in addition contains the buffers to isolate also the DNA in a separate fraction. Both kits can be used either manually or automated on standard liquid handling instruments or automated magnetic separators

We can provide personalized support, protocol information, or verified scripts for numerous platforms. For more information, please contact our technical support or visit ***www.mn-net.com/automation***.

2.2 Kit specifications

NucleoMag® RNA Pro as well as the **NucleoMag® RNA/DNA Pro** kit 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 as well as 40 mg of plant leaf material. The kit is designed for use with NucleoMag® SEP magnetic separator plate (see ordering information, 9.2) or other magnetic separation systems (see section 2.4). Manual time for the preparation of 96 samples is about 120 minutes or around 90 minutes with an automated magnetic rod system. The purified RNA can be used directly as template for RT-PCR, or any kind of enzymatic reactions.

Both kits allow easy automation on common liquid handling instruments or automated magnetic separators, for example MagnetaPure32 Plus, IsoPure Mini or Thermo Fisher Scientific KingFisher®instruments. The actual processing time depends on the configuration of the instrument and the magnetic separation system used.

For research use only.

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

The kit provides reagents for the purification of up to 60 µg of pure RNA from suitable samples. Depending on the elution volume used, concentrations of 10 – 600 ng/µL can be obtained.

NucleoMag® RNA Pro as well as the **NucleoMag® RNA/DNA Pro** kit can be processed completely at room temperature.

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 pleasant 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 N2 immediately upon harvest and store at -70 – 80 °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 MRL or RL1 after disruption at -70 – 80 °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 MRL or RL1 should be thawed slowly before starting with the isolation of RNA.

2.4 Magnetic separation systems

For use of **NucleoMag® RNA Pro** as well as the **NucleoMag® RNA/DNA Pro** kit, the use of the magnetic separator NucleoMag® SEP is recommended. Separation is carried out in a Square-well Block (see ordering information, section 9.2). 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 MRE. Elution can be carried out in a volume of ≥ 50 µL. It is essential to cover the NucleoMag® B-Beads completely with Elution Buffer MRE during the elution step. The volume of dispensed Elution Buffer MRE 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 MRE. 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 MRL and MRW contain chaotropic salt! Wear gloves and goggles!*

CAUTION: Buffers MRL and MRW 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 Pro** as well as the **NucleoMag® RNA/DNA Pro** 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 Pro / NucleoMag® RNA/DNA Pro** 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.
- The DNA Wash solution is delivered as a concentrate. To prepare the final DNA Wash solution, add four volumes of ethanol (50 %) to the DNA Wash Concentrate (add 48 mL 50 % ethanol to 12 mL DNA Wash Concentrate).
- 70 % (v/v) ethanol for washing steps
- 100 % ethanol for the binding step of the RNA extraction protocol from plant material (see section 6)

NucleoMag® RNA Pro / NucleoMag® RNA/DNA Pro			
REF	**1 × 96 preps 744360.1**	**4 × 96 preps 744360.4**	**1 × 96 preps 744370.1**
rDNase (lyophilized)	3 vials (size D) Add 800 µL RNase-free H_2O to each vial	12 vials (size D) Add 800 µL RNase-free H_2O to each vial	3 vials (size D) Add 800 µL RNase-free H_2O to each vial
TCEP	1 vial (107 mg) Add 750 µL RNase-free H_2O	4 vials (107 mg/vial) Add 750 µL RNase-free H_2O to each vial	1 vial (107 mg) Add 750 µL RNase-free H_2O
Buffer DNA Wash (Concentrate)	–	–	2 × 12 mL Add 48 mL ethanol (50 %) to each bottle

4 Safety instructions

When working with the **NucleoMag® RNA Pro / NucleoMag® RNA/DNA Pro** 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 MRL and MRW 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 Pro / NucleoMag® RNA/DNA Pro** 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.

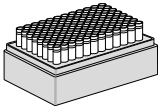
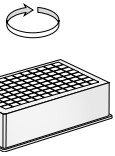
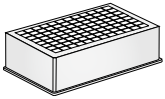
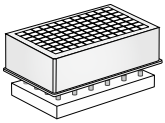
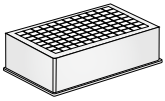
5 Protocol for the isolation of RNA from cells and tissue

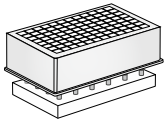
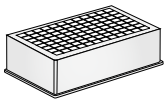
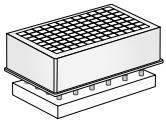
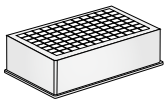
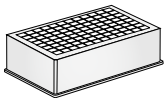
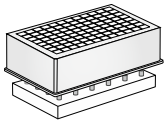
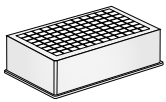
Protocol at a glance

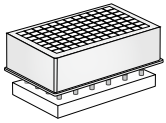
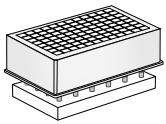
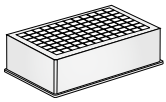
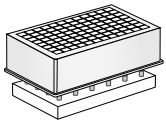
- For additional equipment and hardware requirements, refer to section 1.2 and 2.4, respectively.
- For detailed information on each step, see page 16.

Before starting the preparation:

- Check that rDNase was prepared according to section 3.

1	**Homogenize / lyse** samples	**Up to 20 mg tissue or 2 × 10^6 cells** **350 µL MRL** **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** nucleic acids to NucleoMag® B-Beads	**20 µL NucleoMag® B-Beads** **250 µL MRB**	
		Mix by shaking for 5 min at RT *(Optional: Mix by pipetting up and down)*	
		Remove supernatant after 2 min separation	
4	**Wash** with MRW	**Remove Square-well Block from NucleoMag® SEP** **900 µL MRW**	

		Resuspend: Shake 5 min at RT *(Optional: Mix by pipetting up and down)*	↔
		Remove supernatant after 2 min separation	
5	**Wash** with 70 % ethanol	**Remove Square-well Block from NucleoMag® SEP** **900 µL 70 % ethanol**	
		Resuspend: Shake 5 min at RT *(Optional: Mix by pipetting up and down)*	↔
		Remove supernatant after 2 min separation **Dry for 5 min at RT**	
6	**Digest** DNA	**Remove Square-well Block from NucleoMag® SEP** **300 µL rDNase reaction mixture** **Mix** **Incubate 15 min at RT**	
7	**Rebind**	**350 µL MRB**	
		Mix by shaking for 5 min at RT *(Optional: Mix by pipetting up and down)*	↔
		Remove supernatant after 2 min separation	
8	**Wash** with 70 % ethanol	**Remove Square-well Block from NucleoMag® SEP** **900 µL 70 % ethanol**	

		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 MRE**	
		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 2.4). 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 MRL +6 µL TCEP.**

For tissue samples: Use a suitable homogenization tool to homogenize samples in Buffer MRL. 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 MRL to cell pellet. Pipette up and down several times to lyse the cells.

2 Clear lysates

Centrifuge the samples for **5 min** at a full speed (5,600 – 6,000 × g, or 11,000 × g for single-spin tubes). 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.

3 Bind nucleic acids to NucleoMag® B-Beads

Add **20 µL resuspended NucleoMag® B-Beads** and **250 µL Buffer MRB** 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 MRB 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.

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

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

4 Wash with MRW

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

Add **900 µL Buffer MRW** 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.

5 Wash with 70 % ethanol

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

Add **900 µL 70 % ethanol** 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.

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

6 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!

Note: If you want to isolate RNA and DNA in the same eluate, omit the drying step from protocol step 5 and the DNA digestion and move to protocol step 8, the 2nd 70 % ethanol wash.

7 Rebind

Add **350 µL Buffer MRB** 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.

8 Wash with 70 % ethanol

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

Add **900 µL 70 % ethanol** 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. 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 MRE (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 9.2).

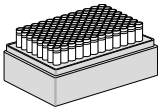
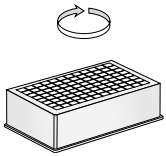
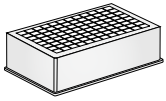
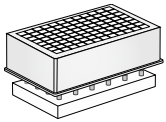
6 Protocol for the isolation of RNA from plant material

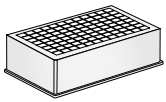
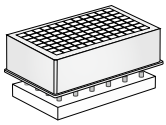
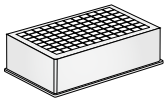
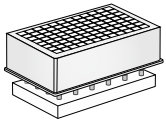
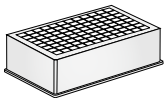
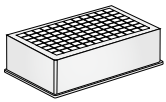
Protocol at a glance

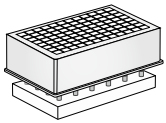
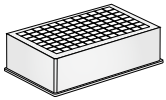
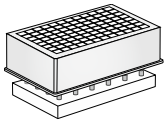
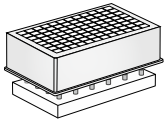
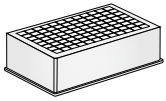
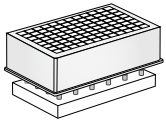
- For additional equipment and hardware requirements, refer to section 1.2 and 2.4, respectively.
- Additional Lysis Buffer RL1 (REF 740385.125) is needed for the extraction of RNA from plant material (see ordering information, section 9.2)
- For detailed information on each step, see page 22.

Before starting the preparation:

- Check that rDNase was prepared according to section 3.

1	**Homogenize / lyse** samples	**Up to 40 mg plant leaves** **350 µL RL1** **6 µL TCEP** **Grind plant leaves in liquid N2 and add to RL1 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** nucleic acids to NucleoMag® B-Beads	**20 µL NucleoMag® B-Beads** **250 µL 100 % ethanol**	
		Mix by shaking for 5 min at RT *(Optional: Mix by pipetting up and down)*	
		Remove supernatant after 2 min separation	

4	**Wash** with MRW	**Remove Square-well Block from NucleoMag® SEP** **900 µL MRW**	
		Resuspend: Shake 5 min at RT *(Optional: Mix by pipetting up and down)*	
		Remove supernatant after 2 min separation	
5	**Wash** with 70 % ethanol	**Remove Square-well Block from NucleoMag® SEP** **900 µL 70 % ethanol**	
		Resuspend: Shake 5 min at RT *(Optional: Mix by pipetting up and down)*	
		Remove supernatant after 2 min separation **Dry for 5 min at RT**	
6	**Digest** DNA	**Remove Square-well Block from NucleoMag® SEP** **300 µL rDNase reaction mixture** **Mix** **Incubate 15 min at RT**	
7	**Rebind**	**350 µL MRB**	

		Mix by shaking **for 5 min at RT** *(Optional: Mix by pipetting up and down)*	
		Remove supernatant after 2 min separation	
8	**Wash** with 70 % ethanol	**Remove Square-well Block from NucleoMag® SEP** **900 µL 70 % ethanol**	
		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 MRE**	
		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 2.4). 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.

- Additional Lysis Buffer RL1 is needed for the extraction of RNA from plant material (see ordering information, section 9.2)

Before starting the preparation:

- Check that rDNase was prepared according to section 3.

1 Homogenize/lyse samples

Lyse up to **40 mg of plant leaves** in **350 µL Buffer RL1 + 6 µL TCEP.**

Grind plant material in liquid N2 and mix thoroughly with RL1 before thawing or use a suitable homogenization tool to homogenize samples in Buffer RL1. 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.

2 Clear lysates

Centrifuge the samples for **5 min** at a full speed (5,600 – 6,000 × g, or 11,000 × g for single-spin tubes). 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.

3 Bind nucleic acids to NucleoMag® B-Beads

Add **20 µL resuspended NucleoMag® B-Beads** and **250 µL 100 % ethanol** 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 ethanol 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.

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

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

4 Wash with MRW

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

Add **900 µL Buffer MRW** 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.

5 Wash with 70 % ethanol

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

Add **900 µL 70 % ethanol** 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.

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

6 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!

Note: If you want to isolate RNA and DNA in the same eluate, omit the drying step from protocol step 5 and the DNA digestion and move to protocol step 8, the 2nd 70 % ethanol wash.

7 Rebind

Add **350 µL Buffer MRB** 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.

8 Wash with 70 % ethanol

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

Add **900 µL 70 % ethanol** 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. 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 MRE (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 9.2).

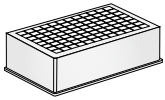
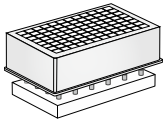
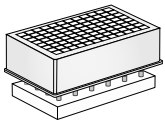
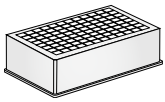
7 Protocol for the isolation of RNA and DNA in separate eluates

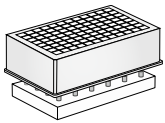
Protocol at a glance

- For additional equipment and hardware requirements, refer to section 1.2 and 2.4, respectively.
- **The NucleoMag® RNA/DNA Pro kit (744370.1) or the NucleoMag® RNA Pro kit in combination with the NucleoSpin® RNA/DNA Buffer Set (REF 740944) is needed to perform the protocol** (see ordering information, section 9.2)
- For detailed information on each step, see page 26.

Before starting the preparation:

- Check that rDNase was prepared according to section 3.
- Prepare Buffer DNA Wash according to section 3 of the handbook.

	Homogenize / lyse samples / 1st wash	**Perform the protocol for RNA isolation from cells and tissue or from plant material until step 4, wash with MRW**	
A	**Wash** with DNA Wash	Remove Square-well Block from NucleoMag® SEP **900 µL DNA Wash**	
		Resuspend: Shake 5 min at RT *(Optional: Mix by pipetting up and down)*	
		Remove supernatant after 2 min separation	
B	**Dry samples**	Leave Square-well Block on NucleoMag® SEP **Air dry 10 – 15 min at RT**	
C	**Elute DNA**	Remove Square-well Block from NucleoMag® SEP **100 µL DNA Elute**	

	Shake 5 – 10 min at RT *(Optional: Mix by pipetting up and down)*	⟷
	Separate 2 min and transfer DNA into elution plate / tubes	
Digest DNA / Rebind / 3rd wash / RNA elution	**Proceed with the protocol for RNA isolation from cells and tissue or from plant material with step 6, Digest DNA.**	

Detailed protocol

This protocol is designed for magnetic separators with static pins (e.g., NucleoMag® SEP) and suitable plate shakers (see section 2.4). 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.

- **The NucleoMag® RNA/DNA Pro kit (744370.1) or the NucleoMag® RNA Pro kit in combination with the NucleoSpin® RNA/DNA Buffer Set (REF 740944) is needed to perform the protocol** (see ordering information, section 9.2)

Before starting the preparation:

- Check that rDNase was prepared according to section 3.
- Prepare Buffer DNA Wash according to section 3 of the handbook.

Homogenize/lyse samples / Clear lysates / Bind nucleic acids to NucleoMag® B-Beads / Wash with MRW

Follow the protocol for the isolation of RNA from cells and tissue (section 5) or from plant material (section 6) for the first four protocol steps. Then perform the next three steps A-C to isolate the DNA first.

A Wash with DNA Wash

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

Add **900 µL Buffer DNA Wash** 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.

B **Dry samples**

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

C **Elute DNA**

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

Add 100 µL of **Buffer DNA Elute** 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 DNA to a suitable collection plate (see ordering information, section 9.2).

Digest DNA / Rebind / 3rd wash / RNA elution

Proceed with the respective protocol for the isolation of RNA from cells and tissue (section 5) or from plant material (section 6) with the DNA digestion step (step 6) and execute the residual protocol without any additional change.

8 Support protocols

8.1 NucleoMag® RNA Pro - Support protocol for the isolation of RNA from yeast and bacteria

This protocol is designed for the extraction of RNA from yeast and bacteria using the NucleoMag® RNA Pro Kit (REF 744360.1/.4) in combination with magnetic separators with static pins (e.g., NucleoMag® SEP) and suitable plate shakers (see section 2.4). 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.

The following items are not supplied with the NucleoMag® RNA Pro Kit (REF 744360.1/.4):

- MN Bead Tube Holder (REF 740469)
- MN Bead Tubes Type A (0.6 – 0.8 mm ceramic beads) (REF 740786.50).

Before starting the preparation:

- Check the NucleoMag® RNA Pro handbook for preparation of the individual components (see section 5).
- Check that rDNase was prepared according to section 3.

1 Harvest and lyse samples

Grow microorganisms in the appropriate liquid medium. Harvest microbial cells from the culture medium by centrifugation. Discard the supernatant.

Up to approximately 80 – 90 mg of wet weight microbial culture pellet can be used as sample material per extraction.

Add **700 µL Buffer MRL + 12 µL TCEP to the microbial culture pellet.** Dissolve the pellet by vortexing or pipetting.

Transfer the lysate to a Bead Tube Type A. Vortex 12 min at room temperature using the MN Bead Tube Holder on Vortex-Genie® 2 at maximum speed.

2 Clear lysates

Centrifuge the Bead Tube A for **5 min** at **5,600 – 6,000 x *g***.

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.

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

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

3 Bind nucleic acids to NucleoMag® B-Beads

Add **20 µL resuspended NucleoMag® B-Beads** and **250 µL Buffer MRB** 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 MRB 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.

4 Wash with MRW

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

Add **900 µL Buffer MRW** 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.

5 Wash with 70 % ethanol

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

Add **900 µL 70 % ethanol** 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.

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

6 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!

Note: If you want to isolate RNA and DNA in the same eluate, omit the drying step from protocol step 5 and the DNA digestion and move to protocol step 8, the 2nd 70 % ethanol wash.

7 Rebind

Add **350 µL Buffer MRB** 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.

8 Wash with 70 % ethanol

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

Add **900 µL 70 % ethanol** 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. 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 MRE (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 9.2).

8.2 NucleoMag® RNA Pro - Support protocol for the isolation of RNA and DNA from yeast and bacteria in separate eluates

This protocol is designed for the extraction of RNA and DNA from yeast and bacteria using the NucleoMag® RNA Pro Kit (REF 744360.1/.4) in combination with the NucleoSpin® RNA/DNA Buffer Set (REF 740944), magnetic separators with static pins (e.g., NucleoMag® SEP) and suitable plate shakers (see section 2.4). 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.

The following items are not supplied with the NucleoMag® RNA Pro Kit (REF 744360.1/.4):

- MN Bead Tube Holder (REF 740469)
- MN Bead Tubes Type A (0.6 – 0.8 mm ceramic beads) (REF 740786.50)
- NucleoSpin® RNA/DNA Buffer Set (REF 740944, see ordering information, section 9.2)

Before starting the preparation:

- Check the NucleoMag® RNA Pro handbook for preparation of the individual components (see section 5).
- Check that rDNase was prepared according to section 3.
- Prepare Buffer DNA Wash according to section 3

Harvest and lyse samples / Clear lysates / Bind nucleic acids to NucleoMag® B-Beads / Wash with MRW

Follow the protocol for the isolation of RNA from yeast and bacteria (see section 8.1) for the first four protocol steps. Then perform the next three steps A-C to isolate the DNA first.

A Wash with DNA Wash

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

Add **900 µL Buffer DNA Wash** 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.

B Dry samples

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

C **Elute DNA**

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

Add 100 µL of **Buffer DNA Elute** 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 DNA to a suitable collection plate (see ordering information, section 9.2).

Digest DNA / Rebind / 3rd wash / RNA elution

Proceed with the respective protocol for the isolation of RNA from yeast and bacteria (see section 8.1) with the DNA digestion step (step 6) and execute the residual protocol without any additional change.

9 Appendix

9.1 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.
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.

Problem	Possible cause and suggestions
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 9.2) before starting the shaker.

9.2 Ordering information

Product	REF	Pack of
NucleoMag® RNA Pro	744360.1 744360.4	1 × 96 preps 4 × 96 preps
NucleoMag® RNA/DNA Pro	744370.1	1 × 96 preps
NucleoMag® SEP	744900	1
Square-well Blocks	740481.4 740481.24	4 24
Self adhering PE Foil	740676	50 sheets
Rack of Tube Strips (set consists of 1 Rack, 12 Tube Strips with 8 tubes each and Cap Strips)	740477.4 740477.24	4 sets 24 sets
Cap Strips	740638	30 strips
96 Deep-well plates for magnetic rod systems	744955	25
8-well Tip Combs for magnetic rod system	744960	50
8-well Accessory Kit magnetic rod systems	744961	1 set
MN Bead Tube Type A	740786.50	50
MN Bead Plate Type A	740850.1 740850.4 740850.24	1 4 24
MN Bead Tube Holder	740469	1
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
NucleoSpin® RNA/DNA Buffer Set	740994	100 preps
Lysis Buffer RL1	740385.125	125 mL

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

9.3 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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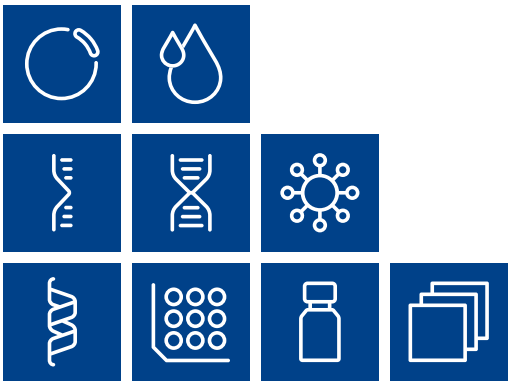
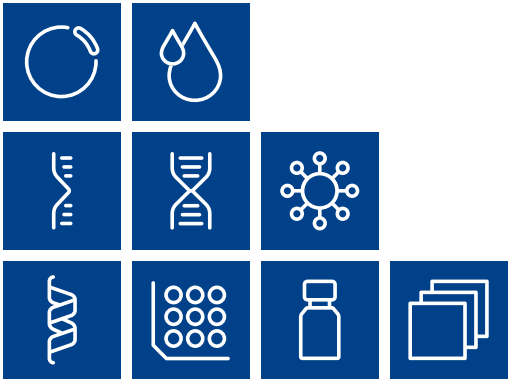


Plasmid DNA
Clean up
RNA
DNA
Viral RNA and DNA
Protein
High throughput
Accessories
Auxiliary tools



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