HB3710

Ribospin™ Seed/Fruit

TOTAL RNA PURIFICATION HANDBOOK

GeneAll

Customer & Technical Support

Should you have any further questions, do not hesitate to contact us.

We appreciate your comments and advice.

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This protocol handbook is included in :

GeneAll® Ribospin™ Seed/Fruit (317-150)

Visit www.geneall.com or www.geneall.co.kr for FAQ, Q&A and more information.

Brief Protocol

Homogenization

Protocol I	Protocol II
100 mg Seed or Fruit	100 mg Grain or Rhizome (Starch-enriched sample)

Lysis

Protocol I	Protocol II
500 µl Buffer SL +500 µl Buffer ML +10 µl β-ME Centrifugation] 1 min, 10,000 x g	500 µl Buffer SL+5 µl β-ME Centrifugation] 1 min, 10,000 x g 300 µl Supernatant+300 µl Buffer ML

Filtration

600 µl Lysate (on EzPure™ filter)
Centrifugation] 1 min, 10,000 x g

Binding

500 µl Supernatant+250 µl Absolute ethanol (on mini column)
Centrifugation] 1 min, 10,000 x g

DNA Digestion

500 µl Buffer RBW (on mini column)
Centrifugation] 0.5 min, 10,000 x g
70 µl DNase reaction mixture (on mini column)
Incubation] 10 min, RT

Wash

500 µl Buffer RBW (on mini column)
Centrifugation] 0.5 min, 10,000 x g
500 µl Buffer RNW (on mini column)
Centrifugation] 0.5 min, 10,000 x g
Additional centrifugation] 1 min, 10,000 x g

Elution

50 µl Nuclease-free water (on mini column)
Centrifugation] 1 min, 10,000 x g

Downstream application


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Kit Contents

Cat. No.	317-150	Storage
Components	**Quantity**	
No. of preparation	50	
Buffer SL	30 ml	
Buffer ML	30 ml	
Buffer RBW (concentrate) *	27 ml	
Buffer RNW (concentrate) * †	6 ml	
Buffer DRB	5 ml	Room temperature
DNase I (lyophilized) **	240 Kunitz units	(15~25°C)
Nuclease-free water	15 ml	
Mini column type F (with collection tube)	50	
EzPure™ filter (with collection tube)	50	
1.5 ml microcentrifuge tube	50	
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** Before first use, add absolute ethanol (ACS grade or better) into Buffer RBW and RNW as indicated on the bottle*

† Contains sodium azide as a preservative

*** Refer to instruction of DNase I on page 8*

Materials Not Provided

- Reagent : Absolute ethanol, β-mercaptoethanol (ACS grade or better)
- Disposable material : RNase-free pipette tips, Disposable gloves
- Equipment : Microcentrifuge, Vortex mixer, Equipment for disrupting sample

Product Specifications

Ribospin™ Seed/Fruit	
Type	Spin
Maximum amount of starting samples	100 mg/prep
No. of preparation	50
Preparation time	~ 30 min
Maximum loading volume of mini column	750 μl
Minimum elution volume	30 μl

Quality Control

All components in GeneAll® Ribospin™ Seed/Fruit are manufactured in strictly clean conditions, and its degree of cleanness is monitored periodically. Quality control is carried out thoroughly from lot to lot, and only the qualified kits are approved to be delivered.

Storage Conditions

All components of GeneAll® Ribospin™ Seed/Fruit should be stored at room temperature (15~25°C). After reconstitution of DNase I with Nuclease-free water, the DNase I solution should be stored at -20°C in aliquots for conservation of activity or used immediately for experiments.

During shipment or storage under cool ambient condition, a precipitate can form in Buffer ML. In such a case, heat the bottle to 56°C to dissolve completely. GeneAll® Ribospin™ Seed/Fruit is guaranteed until the expiration date printed on the product box.

Safety Information

The buffers included in the GeneAll® Ribospin™ Seed/Fruit contain irritants which are harmful when in contact with skin or eyes, or when inhaled or swallowed. Care should be taken when handling such materials. Always wear gloves and eye protection, and follow standard safety precautions.

Buffer ML contains chaotropes, which can form highly reactive compounds when combined with bleach. Do NOT add bleach or acidic solutions directly to the sample-preparation waste.

Product Disclaimer

GeneAll® Ribospin™ Seed/Fruit is for research use only, not for use in diagnostic procedure.

Prevention of RNase Contamination

RNase can be introduced accidentally during RNA purification. Wear disposable gloves always, because skin often contains bacteria and molds that can be a source of RNase contamination. Use sterile, disposable plastic wares and automatic pipettes to prevent cross-contamination of RNase from shared equipment.

Preparation of DNase I Solution

The DNase I is provided in a lyophilized format. It should be reconstituted thoroughly with Nuclease-free water (provided for RNA elution) before experiment.
To obtain DNase I solution, add 120 μl Nuclease-free water to the tube containing lyophilized DNase I (240 Kuniz units), and mix carefully and gently to avoid foaming. Dissolve the DNase I thoroughly, divide it into conveniently sized aliquots, and store at -20°C. For one preparation, 2 μl DNase I solution is required.

Protocol Selecting Guide for Starting sample

	The list of sample applied with Protocol I	The list of sample applied with Protocol II
Seeds	*Capsella bursapastoris* (Shepherd's purse) *Ulmus davidiana var. japonica* (Elm) *Daucus carota* (Carrot) *Raphanus sativus var. sativus* (Radish) *Zinnia violacea* (Garden zinnia) *Prunus armeniaca* (Apricot tree) *Apium graveolens* (Celery) *Pastinaca sativa* (Parsley) *Vitis vinifera* (Grape tree) *Cucurbita spp.* (Pumpkin) *etc.*	*Phaseolus vulgaris* (Kidney bean) *Phaseolus radiatus* (Mung beans) *Triticum aestivum* (Wheat) *Zea mays* (Corn) *Setaria italica* (Millet) *etc.*
Fruits	*Fragaria ananassa* (Strawberry) *Malus domestica* (Apple) *Solanum lycopersicum* (Tomato) *Musa sapientum L.* (Banana) *Mangifera indica* (Mango) *Pyrus serotina* (Pear) *Citrus unshiu* (Mandarin) etc.	
Rhizomes		*Ipomoea batatas* (Sweet potato) *Solanum tuberosum* (Potato) *Dioscorea opposita* (Yam) *etc.*

Product Description

Ribospin™ Seed/Fruit is designed for easy and convenient isolation of total RNA from difficult plant tissues such as seeds, fruits, and rhizomes. Especially, this kit can remove effectively large quantities of secondary metabolites including polysaccharides and polyphenolic compounds which can lead to inhibition of downstream application.

Ribospin™ Seed/Fruit provides two different procedures that are available for application of various plant tissues as follows : Protocol I for seed and fruit, Protocol II for starch-enriched grain and rhizome. For efficient RNA purification, this kit offers optimized lysis system according to the sample type and adopts EzPure™ filter column to eliminate impurities simply from lysate. Moreover, contamination of genomic DNA that causes interference in RNA analysis can be excluded by on-column DNase I treatment in these procedures.

The purified RNA is suitable for use in various downstream procedures including cDNA synthesis, RT-PCR, or Northern blotting etc.

For seed and fruit

Before starting

Thaw DNase I enzyme for use on ice.
Prepare DNase I reaction mixture just before step 9.
(DNase I reaction mixture : Mix 2 μl DNase I solution with 70 μl Buffer DRB)

1. **Grind sample to a fine powder completely using a mortar and pestle under liquid nitrogen. Place up to 100 mg of ground sample into a 1.5 ml microcentrifuge tube (not provided).**
   Quick and complete pulverization with liquid nitrogen is essential for good result in preparation. The commonly used technique for disruption is grinding with a mortar and pestle, however other method such as bead-beater or blender can be a good alternative.

2. **Add 500 μl Buffer SL, 500 μl Buffer ML, and 10 μl β-mercaptoethanol to the sample and vortex vigorously for 15 sec.**
   Buffer ML tends to congeal with starch-enriched samples such as grain and rhizome. It is hard to separate supernatant containing RNA from debris. Therefore, if the lysate solidifies after addition of Buffer ML, use "Protocol II" instead that is special procedure for RNA extraction from starch-enriched sample.

3. **Incubate the mixture for 3 min at room temperature.**

4. **Centrifuge the lysate at 13,000 rpm (≥10,000 x g) for 1 min and transfer 600 μl of the supernatant to an EzPure™ filter (yellow).**

5. **Centrifuge at 13,000 rpm (≥10,000 x g) for 1 min and transfer 500 μl of the pass-through to a new 1.5 ml microcentrifuge tube (not provided).**
   Through this step, large cell debris and most of genomic DNAs are filtered on the EzPure™ filter and small pellet as debris will be formed at the bottom of the collection tube. Be careful not to disturb the pellet when transferring supernatant.

6. **Add 250 μl absolute ethanol to the supernatant and mix it well by inversion.**
   Do not centrifuge at this step.

After addition of absolute ethanol, precipitates may be visible in the mixture which not affect RNA purification.

7. **Apply all of the mixture into a mini column type F (blue ring) and centrifuge at 13,000 rpm (≥10,000 x g) for 1 min.**
   Transfer all solution including any precipitates on the mini column.
   After centrifugation, discard the pass-through and re-insert the mini column back into the same collection tube.

8. **Add 500 μl Buffer RBW to the mini column and centrifuge at 13,000 rpm (≥10,000 x g) for 30 sec.**
   After centrifugation, discard the pass-through and re-insert the mini column back into the same collection tube.

9. **Apply 70 μl DNase I reaction mixture onto the center of the mini column for gDNA digestion. Incubate for 10 min at room temperature.**
   To make DNase I reaction mixture, prepare 2 μl DNase I solution with 70 μl Buffer DRB per on extraction. DNase I is sensitive to physical damage. Therefore, do not mix vigorously. If you want to DNase I treatment in RNA eluate, skip step 9~10 and refer to "Appendix I".

10. **Add 500 μl Buffer RBW to the mini column and centrifuge at 13,000 rpm (≥10,000 x g) for 30 sec.**
    After centrifugation, discard the pass-through and re-insert the mini column back into the same collection tube.

11. **Add 500 μl Buffer RNW to the mini column and centrifuge at 13,000 rpm (≥10,000 x g) for 30 sec.**
    After centrifugation, discard the pass-through and re-insert the mini column back into the same collection tube.

12. **Centrifuge at maximum speed for an additional 1 min to remove residual wash buffer. Transfer the mini column to a new 1.5 ml microcentrifuge tube (provided).**
    Residual ethanol may interfere with downstream reaction. Make sure that the membrane of column has to be dried completely.

13. Add 50 μl Nuclease-free water to the center of the membrane in mini column and centrifuge at 13,000 rpm (≥10,000 x g) for 1 min.

To increase the RNA concentration, reduce the volume of elution to 30 μl.

The purified RNA should be put on ice immediately for accurate analysis or stored at -70°C for long-term storage.

For starch-enriched grain and rhizome

Before starting

Thaw DNase I enzyme for use on ice.
Prepare DNase I reaction mixture just before step 10.
(DNase I reaction mixture : Mix 2 μl DNase I solution with 70 μl Buffer DRB)

1. **Grind sample to a fine powder completely using a mortar and pestle under liquid nitrogen. Place up to 100 mg of ground sample into a 1.5 ml microcentrifuge tube (not provided).**
   Quick and complete pulverization with liquid nitrogen is essential for good result in preparation. The commonly used technique for disruption is grinding with a mortar and pestle, however other method such as bead-beater or blender can be a good alternative.

2. **Add 500 μl Buffer SL and 5 μl β-mercaptoethanol to the sample and vortex vigorously for 15 sec.**

3. **Incubate the mixture for 3 min at room temperature.**

4. **Centrifuge the lysate at 13,000 rpm (≥10,000 x g) for 1 min and transfer 300 μl of the supernatant to a new 1.5 ml microcentrifuge tube (not provided).**

5. **Add 300 μl Buffer ML to the supernatant and vortex vigorously for 15 sec and transfer all of the mixture to an EzPure™ filter (yellow).**

6. **Centrifuge at 13,000 rpm (≥10,000 x g) for 1 min and transfer 500 μl of the pass-through to a new 1.5 ml microcentrifuge tube (not provided).**
   Through this step, large cell debris and most of genomic DNAs are filtered on the EzPure™ filter and small pellet as debris will be formed at the bottom of the collection tube. Be careful not to disturb the pellet when transferring supernatant.

7. **Add 250 μl absolute ethanol to the supernatant and mix it well by inversion.**
   Do not centrifuge at this step.

After addition of absolute ethanol, precipitates may be visible in the mixture which not affect RNA purification.

8. **Apply all of the mixture into a mini column type F (blue ring) and centrifuge at 13,000 rpm (≥10,000 x g) for 1 min.**
   Transfer all solution including any precipitates on the mini column.
   After centrifugation, discard the pass-through and re-insert the mini column back into the same collection tube.

9. **Add 500 μl Buffer RBW to the mini column and centrifuge at 13,000 rpm (≥10,000 x g) for 30 sec.**
   After centrifugation, discard the pass-through and re-insert the mini column back into the same collection tube.

10. **Apply 70 μl DNase I reaction mixture onto the center of the mini column for gDNA digestion. Incubate for 10 min at room temperature.**
    To make DNase I reaction mixture, prepare 2 μl DNase I solution with 70 μl Buffer DRB per one extraction. DNase I is sensitive to physical damage. Therefore, do not mix vigorously. If you want to DNase I treatment in RNA eluate, skip step 10~11 and refer to "Appendix I".

11. **Add 500 μl Buffer RBW to the mini column and centrifuge at 13,000 rpm (≥10,000 x g) for 30 sec.**
    After centrifugation, discard the pass-through and re-insert the mini column back into the same collection tube.

12. **Add 500 μl Buffer RNW to the mini column and centrifuge at 13,000 rpm (≥10,000 x g) for 30 sec.**
    After centrifugation, discard the pass-through and re-insert the mini column back into the same collection tube.

13. **Centrifuge at maximum speed for an additional 1 min to remove residual wash buffer. Transfer the mini column to a new 1.5 ml microcentrifuge tube (provided).**
    Residual ethanol may interfere with downstream reaction. Make sure that the membrane of column has to be dried completely.

14. Add 50 μl Nuclease-free water to the center of the membrane in mini column and centrifuge at 13,000 rpm (≥10,000 x g) for 1 min.

To increase the RNA concentration, reduce the volume of elution to 30 μl.

The purified RNA should be put on ice immediately for accurate analysis or stored at -70°C for long-term storage.

Troubleshooting Guide

Facts	Possible Causes	Suggestions
Low or no yield	**Incorrect use of lysis buffer**	According to the sample type, the process for lysis is different. Starch-enriched samples such as grains and rhizomes have to be processed by "Protocol II" for effective RNA extraction.
	Too much starting sample	Using too much sample leads to inefficient lysis followed by poor RNA yield. Reduce the amount of starting material.
	Insufficient pulverization	For best result, sample should be disrupted completely using proper method.
	Too low RNA mass in sample	Some samples have low RNA contents. To increase the RNA concentration in eluate, reduce the volume of elution to 30 μl.
RNA degradation	**Incorrect treatment of β-mercaptoethanol during lysis**	Ensure that the correct volume of β-mercaptoethanol is used in lysis buffer for RNase elimination. The effective amount of β-mercaptoethanol is 1% of the lysis volume.
	Improper storage of extracted RNA	The purified RNA should be stored at -70°C for long-term storage. Do not store at -20°C. If possible, perform downstream application immediately for accurate analysis after RNA extraction.
	RNase contamination	To prevent RNA degradation, wear gloves during all procedure and use RNase-free products with sterile and disposable plastic ware.
	Too old starting sample	After sufficient pulverization of starting material, store the sample properly at -70°C. If possible, perform the procedure of RNA extraction immediately after disruption of sample to decrease RNA degradation.

Troubleshooting Guide

Facts	Possible Causes	Suggestions
Clogging of EzPure™ filter	**Solidification of lysate**	According to the sample type, the process for lysis is different. If the lysate solidifies during lysis of protocol I, the sample may contain a lot of carbohydrate and polysaccharide. For effective RNA extraction from starch-enriched samples, apply "Protocol II".
	High viscosity of lysate	RNA can be sheared in viscous lysate that causes clogging of column. Increase centrifugal g-force and time to solve clogging if necessary.
Clogging of mini column type F	**Low centrifugal force**	Increase g-force (< 10,000 x g) and time (~3 min).
	Opaque or viscous binding mixture	According to the sample type, the lysate mixed with ethanol becomes opaque or viscous. It does not affect RNA purification. However, if column is clogged because of these problems, increase centrifugal g-force and time until all mixture passes through the membrane of mini column.
DNA contamination of RNA eluate	**High DNA mass in sample**	Some plant tissues have high DNA contents. In this case, genomic DNA can be included in RNA eluate. To reduce DNA contamination effectively, refer to the appendix I "DNase I treatment in eluate".
	Incorrect treatment of DNase I reaction mixture	For sufficient enzymatic reaction, add DNase I reaction mixture onto the center of the membrane in mini column.

DNase I treatment in eluate

Appendix I describes how to use the DNase I (included in this kit) to eliminate contaminating genomic DNA in RNA eluate. For samples containing high DNA contents, this method is strongly recommended. This procedure is more efficient than on-column DNase I treatment.

Protocol

1. Prepare the mixture as below in a 1.5 ml microcentrifuge tube.
   - 50 μl RNA eluate
   - 5 μl Buffer DRB
   - 1 μl DNase I solution
2. Incubate the mixture for 10 min at room temperature.
3. Add 1 μl 0.25 M EDTA per 50 μl eluate.
4. Inactivate DNase I enzyme at 75°C for 10 min.

** For efficient DNase I treatment and clean-up of eluated RNA, use of Riboclear™ plus (Cat.No. 313-150) is suggested.*

■ Related product

Product	Cat.No.	Size	Features and Benefits
Riboclear™ *Plus*	313-150	50 prep	- Preparation time : ~17 min - High recovery rate : ~95% - Stable and consistent yield - Efficient removal of genomic DNA including DNase I - Concentrated RNA eluate using micro column - Complete removal of salt and enzymes - No use of organic solvents, no ethanol precipitation

Electrophoresis method for using formaldehyde-agarose gel (Denaturing gel method)

A denaturing agarose gel is routinely used for the assessment of the quality of extracted RNA. The RNA isolated from samples forms secondary structure via intramolecular base pairing. Therefore, it is very difficult to analyze the result of electrophoresis because of migrating inaccuracy. However, the formaldehyde-agarose gel denatures the secondary structure of RNA, making accurate migration.
To confirm the RNA band after electrophoresis, the gel should be transferred to a UV transilluminator. Mainly, two RNA bands are shown. If they are intact, the RNA bands should be sharp and the intensity of upper band should be about twice compared to that of the lower band.

Preparation of denaturing gel

1. Put 1 g agarose in 72 ml water and heat to dissolve thoroughly.
2. Cool to 60°C.
3. Add 10 ml 10 X MOPS buffer, 18 ml 37% formaldehyde, and 1 μl 10 mg/ml ethidium bromide (EtBr).
4. Mix well then pour the gel into the gel tray and cool to solidify it.
5. Transfer the solidified gel from tray to tank, and add enough 1 X MOPS running buffer to cover the gel.

Preparation of RNA sample

1. Make the mixture.
   - ? μl RNA (up to 20 μg)
   - 2 μl 10 X MOPS electrophoresis buffer
   - 4 μl formaldehyde
   - 10 μl formamide
2. Incubate the mixture for 15 min at 65°C.
3. Chill the sample for 5 min in ice.
4. Add 2 μl 10 X formaldehyde gel-loading dye to the mixture.
5. Load the mixture in a denaturing gel which is covered with a sufficient 1 X MOPS electrophoresis buffer.
6. Run the gel and confirm the RNA band on transilluminator. Occasionally, destaining gel in dH_2O for several hours may be needed to increase the visibility of the RNA band.

Composition of buffers

10X MOPS buffer	10X formaldehyde gel-loading dye
- 0.2 M MOPS	- 50% glycerol
- 20 mM sodium acetate	- 10 mM EDTA
- 10 mM EDTA	- 0.25% (w/v) bromophenol blue
- pH to 7.0 with NaOH	- 0.25% (w/v) xylene cyanol FF

* Caution
When handling of formaldehyde-agarose gel, always use gloves and eye protector to avoid contact with skin and eyes. Especially, formaldehyde and ethidium bromide (EtBr) should be handled in a fume hood.

Ordering Information

GeneAll® *Hybrid-Q™* *for rapid preparation of plasmid DNA*

Products	Scale	Size	Cat. No.	Type
Plasmid Rapidprep	mini	50	100-150	spin
		200	100-102	

GeneAll® *Exprep™* *for preparation of plasmid DNA*

Products	Scale	Size	Cat. No.	Type
Plasmid SV	mini	50	101-150	spin / vacuum
		200	101-102	
	Midi	26	101-226	spin / vacuum
		50	101-250	
		100	101-201	

GeneAll® *Exfection™* *for preparation of transfection-grade plasmid DNA*

Products	Scale	Size	Cat. No.	Type
Plasmid LE *(Low Endotoxin)*	mini	50	111-150	spin / vacuum
		200	111-102	
	Midi	26	111-226	spin / vacuum
		100	111-201	
Plasmid EF *(Endotoxin Free)*	Midi	20	121-220	spin
		100	121-201	

GeneAll® *Expin™* *for purification of fragment DNA*

Products	Scale	Size	Cat. No.	Type
Gel SV	mini	50	102-150	spin / vacuum
		200	102-102	
PCR SV	mini	50	103-150	spin / vacuum
		200	103-102	
CleanUp SV	mini	50	113-150	spin / vacuum
		200	113-102	
Combo GP	mini	50	112-150	spin / vacuum
		200	112-102	

GeneAll® *Exgene™* *for isolation of total DNA*

Products	Scale	Size	Cat. No.	Type
Tissue SV	mini	100	104-101	spin / vacuum
		250	104-152	
	Midi	26	104-226	spin / vacuum
		100	104-201	
	MAXI	10	104-310	spin / vacuum
		26	104-326	
Tissue *plus!* SV	mini	100	109-101	spin / vacuum
		250	109-152	
	Midi	26	109-226	spin / vacuum
		100	109-201	
	MAXI	10	109-310	spin / vacuum
		26	109-326	

GeneAll® *Exgene™* *for isolation of total DNA*

Products	Scale	Size	Cat. No.	Type
Blood SV	mini	100	105-101	spin / vacuum
		250	105-152	
	Midi	26	105-226	spin / vacuum
		100	105-201	
	MAXI	10	105-310	spin / vacuum
		26	105-326	
Cell SV	mini	100	106-101	spin / vacuum
		250	106-152	
	MAXI	10	106-310	spin / vacuum
		26	106-326	
Clinic SV	mini	100	108-101	spin / vacuum
		250	108-152	
	Midi	26	108-226	spin / vacuum
		100	108-201	
	MAXI	10	108-310	spin / vacuum
		26	108-326	
Genomic DNA micro		50	118-050	spin
Plant SV	mini	100	117-101	spin / vacuum
		250	117-152	
	Midi	26	117-226	spin / vacuum
		100	117-201	
	MAXI	10	117-310	spin / vacuum
		26	117-326	
Soil DNA mini	mini	50	114-150	spin
Stool DNA mini	mini	50	115-150	spin
Viral DNA / RNA	mini	50	128-150	spin
FFPE Tissue DNA	mini	50	138-150	spin
		250	138-152	

GeneAll® *GenEx™* *for isolation of total DNA without spin column*

Products	Scale	Size	Cat. No.	Type
GenEx™ Blood	Sx	100	220-101	solution
		500	220-105	
	Lx	100	220-301	solution
GenEx™ Cell	Sx	100	221-101	solution
		500	221-105	
	Lx	100	221-301	solution
GenEx™ Tissue	Sx	100	222-101	solution
		500	222-105	
	Lx	100	222-301	solution

Products	Scale	Size	Cat. No.	Type

GeneAll® *GenEx™* *for isolation of total DNA*

GenEx™ Plant	Sx	100	227-101	solution
	Mx	100	227-201	
	Lx	100	227-301	
GenEx™ Plant *plus!*	Sx	100	228-101	solution
	Mx	50	228-250	
	Lx	20	228-320	

GeneAll® *DirEx™* series

for preperation of PCR-template without extraction

DirEx™	100	250-101	solution
DirEx™ *Fast*-Tissue	96 T	260-011	solution
DirEx™ *Fast*-Cultured cell	96 T	260-021	solution
DirEx™ *Fast*-Whole blood	96 T	260-031	solution
DirEx™ *Fast*-Blood stain	96 T	260-041	solution
DirEx™ *Fast*-Hair	96 T	260-051	solution
DirEx™ *Fast*-Buccal swab	96 T	260-061	solution
DirEx™ *Fast*-Cigarette	96 T	260-071	solution

GeneAll® **RNA series** *for preperation of total RNA*

RiboEx™	mini	100	301-001	solution
		200	301-002	
Hybrid-R™	mini	100	305-101	spin
Hybrid-R™ Blood RNA	mini	50	315-150	spin
Hybrid-R™ miRNA	mini	50	325-150	spin
RiboEx™ LS	mini	100	302-001	solution
		200	302-002	
Riboclear™	mini	50	303-150	spin
Riboclear™ *plus!*	mini	50	313-150	spin
Ribospin™	mini	50	304-150	spin
Ribospin™ II	mini	50	314-150	spin
		300	314-103	
Ribospin ™ vRD	mini	50	302-150	spin
Ribospin ™ vRD *plus!*	mini	50	312-150	spin
Ribospin ™ vRD II	mini	50	322-150	spin
Ribospin ™ Plant	mini	50	307-150	spin
Ribospin™ Seed / Fruit	mini	50	317-150	spin
Allspin™	mini	50	306-150	spin
RiboSaver™	mini	100	351- 001	solution

Products	Scale	Size	Cat. No.	Type

GeneAll® *AmpONE™* *for PCR amplification*

Taq DNA polymerase		250 U	501-025	(2.5 U/μℓ)
		500 U	501-050	
		1,000 U	501-100	
α-Taq DNA polymerase		250 U	502-025	(2.5 U/μℓ)
		500 U	502-050	
		1,000 U	502-100	
α-Pfu DNA polymerase		250 U	504-025	(2.5 U/μℓ)
		500 U	504-050	
		1,000 U	504-100	
Fast-Pfu DNA polymerase		250 U	505-025	(2.5 U/μℓ)
		500 U	505-050	
		1,000 U	505-100	
Hotstart Taq DNA polymerase		250 U	531-025	(2.5 U/μℓ)
		500 U	531-050	
		1,000 U	531-100	
Taq Premix	96 tubes	20 μℓ	521-200	lyophilized
		50 μℓ	521-500	
		20 μℓ	526-200	solution
		50 μℓ	526-500	
α-Taq Premix	96 tubes	20 μℓ	522-200	lyophilized
		50 μℓ	522-500	
		20 μℓ	527-200	solution
		50 μℓ	527-500	
HS-Taq Premix	96 tubes	20 μℓ	525-200	solution
		50 μℓ	525-500	
		20 μℓ	520-200	lyophilized
α-Pfu Premix	96 tubes	50 μℓ	523-500	solution
Taq Premix (w/o dye)	96 tubes	20 μℓ	524-200	lyophilized
dNTPs mix		500 μℓ	509-020	2.5 mM each
dNTPs set (set of dATP, dCTP, dGTP and dTTP)		1 ml x 4 tubes	509-040	100 mM

Products	Scale	Size	Cat. No.	Type
GeneAll® *AmpMaster™* *for PCR amplification*				
Taq Master mix	0.5 ml x 2 tubes		541-010	solution
	0.5 ml x 10 tubes		541-050	solution
α-Taq Master mix	0.5 ml x 2 tubes		542-010	solution
	0.5 ml x 10 tubes		542-050	solution
HS-Taq Master mix	0.5 ml x 2 tubes		545-010	solution
	0.5 ml x 10 tubes		545-050	solution
α-Pfu Master mix	0.5 ml x 2 tubes		543-010	solution
	0.5 ml x 10 tubes		543-050	solution
GeneAll® *HyperScript™* *for Reverse Transcription*				
Reverse Transcriptase	10,000 U		601-100	solution
RT Master mix	0.5 ml × 2 tubes		601-710	solution
RT Master mix with oligo $(dT)_{20}$	0.5 ml × 2 tubes		601-730	solution
RT Master mix with random hexamer	0.5 ml × 2 tubes		601-740	solution
RT Premix	96 tubes,	20 μl	601-602	solution
RT Premix with oligo $(dT)_{20}$	96 tubes,	20 μl	601-632	solution
RT Premix with random hexamer	96 tubes,	20 μl	601-642	solution
One-step RT-PCR Master mix	0.5 ml × 2 tubes		602-110	solution
One-step RT-PCR Premix	96 tubes,	20 μl	602-102	solution
First strand Synthesis Kit	50 reaction		605-005	solution
ZymAll™ RNase Inhibitor	10,000 U		605-010	solution
ZymAll™ RNase Inhibitor	4,000 U		605-004	solution
GeneAll® RealAmp™ *for qPCR amplification*				
SYBR qPCR Master mix (2X, Low ROX)	200 rxn	20 μl	801-020	solution
	500 rxn	20 μl	801-050	
SYBR qPCR Master mix (2X, High ROX)	200 rxn	20 μl	801-021	solution
	500 rxn	20 μl	801-051	

Products	Size	Cat. No.	Type
GeneAll® Protein series			
ProtinEx™ Animal cell / tissue	100 ml	701-001	solution
PAGESTA™ Reducing 5X SDS-PAGE Sample Buffer	1 ml × 10 tubes	751-001	solution
GeneAll® STEADi™ *for automatic nucleic acid purification*			
12 Instrument		GST012	system
24 Instrument		GST024	system
Genomic DNA Cell / Tissue	96	401-104	kit
Genomic DNA Blood	96	402-105	kit
Bacteria DNA	96	403-106	kit
Total RNA	96	404-304	kit
Viral DNA / RNA	96	405-322	kit
CFC Seed DNA / RNA	96	406-C02	kit

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