Ver 1.0

HB 3410

Cat.No. 314-150 / 314-103

Ribospin™ II

RNA PURIFICATION HANDBOOK

GeneAll

Customer & Technical Support

Do not hesitate to ask us any question.

We thank you for any comment or advice.

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This protocol handbook is included in :

GeneAll® Ribospin™ II (314-150, 314-103)

Visit www.geneall.com or www.geneall.co.kr for FAQ, QnA and more information.

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Kit Contents

Ribospin™ II

Size	314-150	314-103
	mini	mini
No. of preparation	50	300
GeneAll® Column type F (with collection tube)	50	300
1.5 ml microcentrifuge tube	50	300
Buffer RAL	40 ml	240 ml
Buffer RW	40 ml	240 ml
Buffer RSW (concentrate) *	12 ml	36 ml x 2
Nuclease-free water	15 ml	90 ml
Buffer DRB	5 ml	30 ml
DNase I (lyophilized) **	120 ul	720 ul
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** Before using for the first time, add absolute ethanol (ACS grade or better) into buffer RSW as indicated on the bottle*
** Contains sodium azide as a preservative*
*** For the long-term storage of lyophilized DNase I, store at 4°C. But after reconstitution of DNase I, store at -20°C.*

Product Specifications

Ribospin™ II	
Type	Spin
Maximum amount of starting samples	~ 30 mg tissue or ~ 1 x 10^7 cells
Maximum loading volume	~ 750 ul
Minimum elution volume	~ 30 ul
Maximum binding capacity	~ 500 ug

Quality Control

Ribospin™ II is manufactured under strictly clean and periodically monitored conditions. For consistency in all products, quality certification is carried out thoroughly and only the qualified items are approved for delivery.

Storage Conditions

All components of GeneAll® Ribospin™ II should be stored at room temperature (15 ~ 25°C), except DNase I. After reconstitution of DNase I with Nuclease-free water, it should be stored at -20°C for conservation of enzyme activity unless immediately used for experiments.

All components of GeneAll® Ribospin™ II are stable for 1 year under recommended storage condition.

User Precautions

The buffers included in Ribospin™ II contain irritants which are harmful when in contact with skin or eyes, or when inhaled or swallowed. Care should be taken during handling. Always wear gloves and eye protector, and follow standard safety precautions. In case of contact, wash immediately with plenty of water and seek medical advice.

Buffer RAL and buffer RW contain chaotropes which can form highly reactive compounds when combined with bleach. Do NOT add bleach or acidic solutions directly to the sample-preparation waste.

Materials Not Provided

Reagent

- β-mercaptoethanol, ACS grade or better
- 70% ethanol, ACS grade or better
- Absolute ethanol, ACS grade or better

Disposable material

- RNase-free pipette tips
- Sterile 1.5 ml microcentrifuge tubes

Equipment

- Equipment for homogenizing sample
- Microcentrifuge
- Suitable protector (ex; lab coat, disposable gloves, goggles, etc)

Preventing RNase Contamination

RNase can be introduced accidentally during RNA preparation. Wear disposable gloves always, because the skin can be a source of RNase contamination. Use sterile, disposable plasticwares and pipettes reserved for RNA work to prevent RNase contamination on the procedure.

Initial Preparation of DNase I working solution

To obtain a working solution of DNase I, add 120 ul (Cat. No. 314-150) or 720 ul (Cat. No. 314-103) of Nuclease-free water (provided for RNA elution) to the tube containing lyophilized DNase I. The brief method for preparing the working solution is also printed on the product label. Please refer to it.

After reconstitution of DNase I with Nuclease-free water (provided for RNA elution), it should be stored below -20°C as small aliquots for long-term storage of DNase I.

Product Description

GeneAll® Ribospin™ II is devised to purify RNA from cultured cells or animal tissues (~ 30 mg tissue or ~ 1 x 10^7 cells). With the GeneAll's glassfiber membrane technology, highly pure RNA can be conveniently isolated in less than 30 minutes instead of the time consuming and hazardous conventional methods which require alcohol precipitation or toxic chemicals such as phenol/chloroform.

The optimized buffer system of GeneAll® Ribospin™ II maximizes the specific binding efficiency of RNA to the glassfiber membrane but minimizes the contamination of impurities by a series of optimized wash buffer. Also, the contaminated DNA residues can be easily eliminated during the preparation by on-column digestion using DNase I included in this kit. Pure RNA which finally prepared in Nuclease-free water can be applied to the most of downstream application which require the pure RNA, and this whole procedure can be completely performed at room temperature.

The purified RNA should be treated with care because RNA is relatively unstable and fragile. It is strongly recommended to store the eluate at 4°C for immediate analysis or at -70°C for long-term storage.

We strongly recommend reading the procedure to using GeneAll® Ribospin™ II.

GeneAll®

Protocol for total RNA purification with On-column DNase I treatment from animal cell

Before experiment

- *Prepare DNase I reaction mixture as below;*
  - ① *Thaw a working solution of DNase I on ice*
  - ② *Mix 2 ul of DNase I solution with 70 ul of buffer DRB per preparation*
  - ③ *Mix gently by pipetting without vortex.*
  - v *Make the mixture as just before step 7 as possible*
  - v *Treat DNase I always on ice*

1. Harvest cell samples in a tube.

Cells grown in monolayer

Harvest 5 x 10^6 cells carefully using scraper, pellet cells by centrifugation at low speed (below 800 x g) for 5 minutes, and then discard the culture medium.

Cells grown in suspension

Pellet 5 x 10^6 cells by centrifugation at low speed (below 800 x g) for 5 minutes, and then discard the culture medium.

* Do not wash the cells before lysing with buffer RAL as this may cause mRNA degradation.

2. Add 350 ul of buffer RAL (Table 1) to the tube and lyse the sample by pipetting or micro-homogenizer.

Lyse the 5 x 10^6 cells in 350 ul buffer RAL. An insufficient lysis may result in low RNA recovery rate or column clogging.

Table 1. Reagent volumes for sample amounts

Cell numbers	Buffer RAL
~ 5 x 10^6 cells	350 ul
5 x 10^6 ~ 1 x 10^7 cells	700 ul

3. **Add 1 volume of 70% ethanol to the lysate and mix well by pipetting. Do not centrifuge.**

4. **Transfer the mixture to a mini spin column (type F).**

5. **Centrifuge at ≥10,000 x g for 1 min at room temperature. Discard the pass-through and reinsert the mini spin column back into the collection tube.**

   If the mixture volume exceeds 750 ul, repeat the step 4 ~ 5 with the remainder of the sample.

6. **Add 350 ul of buffer RW and centrifuge for 30 sec at ≥10,000 x g. Discard the pass-through and reinsert the mini spin column back into the collection tube.**

7. **Add 70 ul of DNase I reaction mixture on to the center of the mini spin column membrane and incubate for 10 min at room temperature.**

   To make DNase I reaction mixture, add 2 ul of DNase I solution to 70 ul of Buffer DRB per isolation. And keep it on ice to protect the activity of DNase I until use.

8. **Add 350 ul of buffer RW and centrifuge for 30 sec at ≥10,000 x g. Discard the pass-through and reinsert the mini spin column back into the collection tube.**

9. **Add 500 ul of buffer RSW and centrifuge for 30 sec at ≥10,000 x g. Discard the pass-through and reinsert the mini spin column back into the collection tube.**

10. **Add 500 ul of buffer RSW again and centrifuge for 30 sec at ≥10,000 x g. Discard the pass-through and reinsert the mini spin column back into the collection tube.**

11. **Centrifuge at full speed (>13,000 x g) for 1 min to remove residual wash buffer. Place the mini spin column into a fresh 1.5 ml microcentrifuge tube (provided).**

    Residual ethanol may interfere with downstream applications. Care must be taken at this step for eliminating the carryover of buffer RSW.

12. Add 50 ul of Nuclease-free water to the center of the membrane in the mini spin column. Let it stand for 1 min.

Elution volume can be adjusted according to an experiment's purpose.
Using the eluent volume of less than 50 ul will be decrease the total RNA yield but increase the concentration of RNA. But for effective elution of RNA, more than 30 ul of the eluent should be applied, because too lower volume of eluent cannot soak the membrane completely.

13. Centrifuge at ≥10,000 x g for 1 min at room temperature.

Purified RNA can be stored at 4°C for immediate analysis, otherwise it is recommended to store at -70°C for long-term storage.

Protocol for total RNA purification with On-column DNase I treatment from animal tissue

Before experiment

- *The protocol is suitable for fresh, frozen and RiboSaver™ stabilized tissue sample.*
- *In case that the preserved sample in RNA stabilization solution like RiboSaver™, the stabilization solution should be discarded completely.*
- *Make 1% β-mercaptoethanol (ex, 10 ul per 1 ml) with buffer RAL before every experiment.*
- *Prepare DNase I reaction mixture as below;*

  ① Thaw a working solution of DNase I on ice

  ② Mix 2 ul of DNase I solution with 70 ul of buffer DRB per preparation

  ③ Mix gently by pipetting without vortex.

  v Make the mixture as just before step 7 as possible

  v Treat DNase I always on ice

1. Homogenize ~ 20 mg of tissue as described in step 1a, 1b, or 1c.

Thoroughly disrupt the tissue in buffer RAL and lyse the samples perfectly. Unclarified sample may cause clogging of the column in subsequent steps.
For the effective application of fiber-rich tissues (ex, heart, muscle, skin), we strongly recommend to use up to 10 mg per preparation. If using more than 10 mg, the lysate would not be clarified completely and it will lead to clogging of spin column membrane.

Table 2. Reagent volumes for tissue amounts

Tissue amounts	Buffer RAL (including 1% β-mercaptoethanol)
~ 20 mg	350 ul
20 mg ~ 30 mg	700 ul

1a. Grind the tissue sample to a fine powder with liquid nitrogen in a pre-chilled mortar and pestle. Put up to 20 mg of the powdered tissue into 1.5 ml microcentrifuge tube. Add 350 ul of buffer RAL (including 1% β -mercaptoethanol) and pulse-vortex for 30 sec.

1b. Homogenize up to 20 mg of the tissue sample in 350 ul of buffer RAL (including 1% β-mercaptoethanol) using homogenizer.

1c. Homogenize the tissue sample in 2.0 ml collection tube using bead-beater. Add 350 ul of buffer RAL (including 1% β-mercaptoethanol) and pulse-vortex for 30 sec.

2. **Centrifuge at ≥10,000 x g for 2 min at room temperature and transfer the supernatant to a fresh 1.5 ml microcentrifuge tube (not provided).**

   This step can help avoid clogging of a mini spin column caused by incompletely homogenized debris.

3. **Add 1 volume of 70% ethanol to the supernatant and mix well by pipetting. Do not centrifuge at this step.**

4. **Transfer the mixture to a mini spin column (type F).**

5. **Centrifuge at ≥10,000 x g for 1 min at room temperature. Discard the pass-through and reinsert the mini spin column back into the collection tube.**

   If the mixture volume exceeds 750 ul, repeat the step 4 ~ 5 with the remainder of the sample.
   Make sure that no lysate remains in the column after centrifugation. If the residual lysate has remained, centrifuge again at higher speed until all of the solution has passed through.

6. **Add 350 ul of buffer RW and centrifuge for 30 sec at ≥10,000 x g. Discard the pass-through and reinsert the mini spin column back into the collection tube.**

7. **Add 70 ul of DNase I reaction mixture on to the center of the mini spin column membrane and incubate for 10 min at room temperature.**

   To make DNase I reaction mixture, add 2 ul of DNase I solution to 70 ul of Buffer DRB per isolation. And keep it on ice to protect the activity of DNase I until use.

8. **Add 350 ul of buffer RW and centrifuge for 30 sec at ≥10,000 x g. Discard the pass-through and reinsert the mini spin column back into the collection tube.**

9. **Add 500 ul of buffer RSW and centrifuge for 30 sec at ≥10,000 x g. Discard the pass-through and reinsert the mini spin column back into the collection tube.**

10. **Add 500 ul of buffer RSW again and centrifuge for 30 sec at ≥10,000 x g. Discard the pass-through and reinsert the mini spin column back into the collection tube.**

11. **Centrifuge at full speed (>13,000 x g) for 1 min to remove residual wash buffer. Place the mini spin column into a fresh 1.5 ml microcentrifuge tube (provided).**

    Residual ethanol may interfere with downstream applications. Care must be taken at this step for eliminating the carryover of buffer RSW.

12. **Add 50 ul of Nuclease-free water to the center of the membrane in the mini spin column. Let it stand for 1 min.**

    Elution volume can be adjusted according to an experiment's purpose. Using the eluent volume of less than 50 ul will be decrease the total RNA yield but increase the concentration of RNA. But for effective elution of RNA, more than 30 ul of the eluent should be applied, because too lower volume of eluent cannot soak the membrane completely.

13. **Centrifuge at ≥10,000 x g for 1 min at room temperature.**

    Purified RNA can be stored at 4°C for immediate analysis and can be stored at -70°C for long-term storage.

Troubleshooting Guide

Facts	Possible Causes	Suggestions
Low yield	**Sample not homogenized completely**	Insufficient disruption can lead to decrease in yield of total RNA. Insufficient disruption of samples may attributed to several reasons; - Insufficient mixing with buffer RAL - Too much samples in the starting sample - Poor disruption of sample Confirm complete homogenization of the sample in buffer RAL.
	Too much starting sample	Reduce the amount of starting sample. Especially for tissue sample, obey the correct amount of starting sample as indicated in the protocol.
	Poor quality of starting material	Process the sample immediately after harvest from animal if possible. Freeze the harvested tissue rapidly in liquid nitrogen and store at -70°C for later use.
	Culture media not completely removed	Remaining culture media affect lysis efficiency and binding condition. Discard the remaining culture media as completely as possible.
Column clogging	**Sample not homogenized completely**	Insufficient disruption can lead to decrease in yield of total RNA. Insufficient disruption of samples may attributed to several reasons; - Insufficient mixing with buffer RAL - Too much samples in the starting sample - Poor disruption of sample Confirm complete homogenization of the sample in buffer RAL.
	Too much starting sample	Reduce the amount of starting sample. Especially for tissue sample, obey the correct amount of starting sample as indicated in the protocol.

Facts	Possible Causes	Suggestions
RNA degradation	**Sample manipulated too much before process**	Process the tissue sample immediately after harvest from animal. For cultured cells sample, minimize washing steps in cell harvest.
	Improper storage of RNA	Store isolated RNA at -70°C, Do not store at -20°C.
	Use of RNase-contaminated reagents or disposables	Make sure to use RNase-free products only.
	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 concentration of β-mercaptoethanol is 1% of the buffer RAL.
DNA contamination	**Incorrect treatment of DNase I reaction mixture**	For sufficient enzymatic reaction, add DNase I reaction mixture onto the center of the membrane in mini spin column.
Eluate does not perform well in downstream application	**Residual ethanol remains in eluate**	To remove any residual ethanol included in buffer RSW from mini spin column membrane, additional centrifuge step should be performed certainly (step 11). If the carryover of ethanol still remains in the column membrane, perform step 11 again until completely done.

APPENDIX I

Purification of total RNA without DNase I treatment

Appendix I describes how to purify the total RNA without DNase I treatment from the samples. If DNase I treatment is not required, follow this procedure.

1. Prepare the lysate using an appropriate sample preparation protocol as follows.

For Cell samples

Harvest cell sample in a tube and add 350 ul of buffer RAL (Table 3). Then, homogenize the cell sample by pipetting or microhomogenizer.

Refer to Table 3 for suitable volume of buffer RAL according to cell amount.

For Tissue samples

Prepare tissue sample in a tube and add 350 ul of buffer RAL (including 1% β-mercaptoethanol). Then, homogenize the tissue sample by using an appropriate homogenizer.

Centrifuge at ≥10,000 x g for 2 min at room temperature and transfer the supernatant to a fresh 1.5 ml microcentrifuge tube.

β-mercaptoethanol must be added to buffer RAL for homogenizing the tissue samples.
Add 1% β-mercaptoethanol to buffer RAL proportionally (ex. Add 10 ul of β-mercaptoethanol to 1 ml of buffer RAL).
Refer to Table 3 for suitable volume of buffer RAL according to tissue amount.

Table 3. Volume of buffer RAL for homogenizing samples.

Amount of starting material	Volume of buffer RAL
$< 5 \times 10^6$ cells or 20 mg tissues	350 ul
$5 \times 10^6 \sim 1 \times 10^7$ cells or 20 ~ 30 mg tissues	700 ul

2. Add 1 volume of 70% ethanol to the lysate and mix well by pipetting. Do not centrifuge.

3. **Transfer the mixture to a mini spin column (Type F).**

4. **Centrifuge ≥10,000 x g for 1 min at room temperature. Discard the pass-through and reinsert the mini spin column back into the same tube.**

   If the mixture volume exceeds 750 ul, repeat step 3 ~ 4 with the remainder of the sample.

5. **Add 700 ul of buffer RW and centrifuge for 30 sec at ≥10,000 x g. Discard the pass-through and reinsert the mini spin column back into the collection tube.**

6. **Add 500 ul of buffer RSW and centrifuge for 30 sec at ≥10,000 x g.**
   Discard the pass-through and reinsert the mini spin column back into the collection tube.

7. **Add 500 ul of buffer RSW again and centrifuge for 30 sec at ≥10,000 x g.**
   Discard the pass-through and reinsert the mini spin column back into the collection tube.

8. **Centrifuge at full speed (>13,000 x g) for 1 min to remove residual wash buffer.**
   Place the mini spin column into a fresh 1.5 ml microcentrifuge tube (provided).

9. **Add 50 ul of Nuclease-free water to the center of the membrane in the mini spin column. Let it stand for 1 min.**

   Elution volume can be adjusted according to an experiment's purpose. Using the eluent volume of less than 50 ul will be decrease the total RNA yield but increase the concentration of RNA. But for effective elution of RNA, more than 30 ul of eluent should be applied, because too lower volume of eluent cannot soak the membrane completely.

10. **Centrifuge at ≥10,000 x g for 1 min at room temperature.**

    Purified RNA can be stored at 4°C for immediate analysis and can be stored at -70°C for long-term storage.

APPENDIX 2

DNase I treatment in RNA eluate

Appendix 2 describes how to use the DNase I (included in this kit) to eliminate contaminating genomic DNA in RNA eluate. For high DNA contents samples, this procedure is more efficient than on-column DNase I treatment and we are strongly recommended for those samples.

1. **The mixture as below in a 1.5 ml microcentrifuge tube.**
   - **50 ul RNA eluate**
   - **5 ul Buffer DRB**
   - **1 ul DNase I solution**

2. **Incubate the mixture for 10 min at room temperature.**

3. **Add 1 ul of 0.25 M EDTA per 50 ul eluate.**

4. **Inactivate DNase I enzyme at 75˚C for 10 min.**

** For efficient and convenient method of clean-up the DNase I treated-RNA eluate, refer to Appendix 3 or use Riboclear™ plus! (Cat. No. 313-150)*

APPENDIX 3

Clean-Up of total RNA

Appendix 3 provides a convenient method for clean-up of total RNA previously purified by other methods.

Before experiment

- *A maximum of 100 ug RNA/100 ul can be cleaned up by this protocol.*
- *In case that DNase I treatment step is needed, refer to Appendix 2.*

1. **Adjust the sample to 100 ul with Nuclease-free water, add 350 ul of buffer RAL and mix thoroughly.**

2. **Add 250 ul of absolute ethanol to the sample and mix well by pipetting. Do not centrifuge.**

3. **Transfer the sample to the mini spin column (type F) and centrifuge at ≥10,000 x g for 30 sec. Discard the pass-through and reinsert the mini spin column back into the collection tube.**

4. **Add 500 ul of buffer RSW and centrifuge for 30 sec at ≥10,000 x g. Discard the pass-through and reinsert the mini spin column back into the collection tube.**

5. **Add 500 ul of buffer RSW again and centrifuge for 30 sec at ≥10,000 x g. Discard the pass-through and reinsert the mini spin column back into the collection tube.**

6. **Centrifuge at full speed (>13,000 x g) for 1 min to remove residual wash buffer. Place the mini spin column into a fresh 1.5 ml microcentrifuge tube.**

   Residual ethanol may interfere with downstream applications. Care must be taken at this step for eliminating the carryover of buffer RSW.

7. **Add 50 ul of Nuclease-free water to the center of the membrane in the mini spin column. Let it stand for 1 min.**

   Elution volume can be adjusted according to an experiment's purpose. Using the eluent volume less than 50 ul will be decrease the total RNA yield but increase the concentration of RNA. But for effective elution of RNA, more than 30 ul of eluent should be applied, because too lower volume of eluent cannot soak the membrane completely.

8. **Centrifuge at ≥10,000 x g for 1 min at room temperature.**

   Purified RNA can be stored at 4°C for immediate analysis and can be stored at -70°C for long-term storage.

Ordering Information

Products	Scale	Size	Cat. No.	Type
GeneAll® *Hybrid-Q™* *for rapid preparation of plasmid DNA*				
Plasmid Rapidprep	mini	50	100-150	spin
		200	100-102	
GeneAll® *Exprep™* *for preparation of plasmid DNA*				
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*				
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*				
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*				
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	

Products	Scale	Size	Cat. No.	Type
GeneAll® *Exgene™* *for isolation of total DNA*				
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
GeneAll® *GenEx™* *for isolation of total DNA without spin column*				
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

Ordering Information

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

Products	Scale	Size	Cat. No.	Type
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

Products	Scale	Size	Cat. No.	Type
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*

Products	Scale	Size	Cat. No.	Type
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 ™ 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

GeneAll® *AmpONE™* *for PCR amplification*

Products	Scale	Size	Cat. No.	Type
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

Ordering Information

GeneAll® *AmpMaster*™ *for PCR amplification*

Products	Scale	Size	Cat. No.	Type
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*

Products	Scale	Size	Cat. No.	Type
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 ㎕	601-602	solution
RT Premix with oligo $(dT)_{20}$	96 tubes,	20 ㎕	601-632	solution
RT Premix with random hexamer	96 tubes,	20 ㎕	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 ㎕	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*

Products	Scale	Size	Cat. No.	Type
qPCR Master mix (2X, Low ROX)	200 rxn	20 ㎕	801-020	solution
	500 rxn	20 ㎕	801-050	
qPCR Master mix (2X, High ROX)	200 rxn	20 ㎕	801-021	solution
	500 rxn	20 ㎕	801-051	

GeneAll® **Protein series**

Products	Size	Cat. No.	
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 puritication*

Products	Size	Cat. No.
STEADi™ 12 Instrument		GST012
STEADi™ 24 Instrument		GST024
STEADi™ Genomic DNA Cell / Tissue Kit	96	401-104
STEADi™ Genomic DNA Blood Kit	96	402-105
STEADi™ Bacteria DNA Kit	96	403-106
STEADi™ Total RNA Kit	96	404-304
STEADi™ Viral DNA/RNA Kit	96	405-322
STEADi™ CFC Seed DNA / RNA Kit	96	406-C02

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