Cat.No. 317-150

Ribospin™ Seed/Fruit

TOTAL RNA PURIFICATION HANDBOOK

GeneAll

Customer & Technical Support

Do not hesitate to ask us any question.

We thank you for any comment or advice.

Contact us at

www.geneall.com

Tel : 82-2-407-0096

Fax : 82-2-407-0779

E-mail(Order/Sales) : sales@geneall.com

E-mail(Tech. Info.) : tech@geneall.com

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This protocol handbook is included in :

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

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Brief Protocol

Homogenization

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

Lyse

Protocol I	Protocol II
500 ul Buffer SL + 500 ul Buffer ML + 10 ul 2-ME Centrifugation] 1min, 10.000 xg	500 ul Buffer SL + 5 ul 2-ME Centrifugation] 1min, 10.000 xg 300 ul Supernatant + 300 ul Buffer ML

Filter

600 ul lysate (on EzPure filter)
Centrifugation] 1min, 10.000 xg

Bind

500 ul Supernatant + 250 ul Absolute ethanol (on column)
Centrifugation] 1min, 10.000 xg

Digest DNA

500 ul Buffer RBW (on column)
Centrifugation] 0.5 min, 10.000 xg
70 ul DNase reaction mixture (on column)
Incubation] 10 min, RT

Wash

500 ul Buffer RBW (on column)
Centrifugation] 0.5min, 10.000 xg
500 ul Buffer RNW (on column)
Centrifugation] 0.5 min, 10.000 xg
Additional centrifugation] 1 min, 10.000 xg

Elute

50 ul Nuclease-free water (on column)
Centrifugation] 1min, 10.000 xg

Downstream application


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Kit Contents

Cat. No. 317-150 (50 prep)

Components	Quantity	Storage
Buffer SL	30 ml	Room temperature (15~25°C)
Buffer ML	30 ml	
Buffer RBW	60 ml	
Buffer RNW	30 ml	
Buffer DRB	5 ml	
Nuclease-free water	15 ml	
GeneAll® Column type F (Blue ring) with collection tube	50 ea	
GeneAll® EzPure™ filter column (Yellow) with collection tube	50 ea	
1.5 ml microcentrifuge tube	50 ea	
Protocol handbook	1 ea	
DNase I	120 ul	-20°C

Materials Not Provided

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

Product Specifications

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

■ **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. (other starch-enriched grains)
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. (other starch-enriched rhizomes)

Product Disclaimer

GeneAll® Ribospin™ Seed/Fruit RNA mini kit is for research use only, and should not be used for drug, household, or other unintended uses. All due care and attention should be taken in every procedure in this handbook. Please consult the Material Safety Data Sheet (MSDS) for information regarding hazards and safe handling practices.

Quality Control

GeneAll® Ribospin™ Seed/Fruit RNA mini kit is manufactured in strictly clean condition, and its degree of cleanness is monitored periodically. For consistency of product, the quality certification process is carried out from lot to lot thoroughly, and only the qualified is approved to deliver.

Storage Conditions

All components of GeneAll® Ribospin™ Seed/Fruit RNA mini kit, except DNase I, should be stored at ambient temperature (15~25℃). DNase I should be stored at -20℃ for conservation of enzyme activity.
Storage at cold ambient temperature may cause precipitation in Buffer ML. If precipitate is seen, heat the buffer at 37℃ and agitate it for re-solubilization.
All components are stable for 1 year under these conditions.

Precautions

The buffers included in GeneAll® Ribospin™ Seed/Fruit RNA mini kit contain irritant which is 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.

Product Description

Ribospin™ Seed/Fruit RNA mini kit 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 RNA mini kit 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 Nortern blotting.

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 ul of DNase I with 70 ul of 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 ul of Buffer SL, 500 ul of Buffer ML, and 10 ul of β-mercaptoethanol to the sample and vortex vigorously for 15 seconds.**
   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 minutes at room temperature.**

4. **Centrifuge the lysate at 13,000 rpm (≥10,000 xg) for 1 minute and transfer 600 ul of the supernatant to an EzPure™ filter column (Yellow).**

5. **Centrifuge at 13,000 rpm (≥10,000 xg) for 1 minute and transfer 500 ul 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 column 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 ul of 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 spin column (Type F, Blue ring) and centrifuge at 13,000 rpm (≥10,000 xg) for 1 minute.**
   Transfer all solution including any precipitates on the mini spin column.
   After centrifugation, discard the pass-through and re-insert the mini spin column back into the same collection tube.

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

9. **Apply 70 ul of DNase I reaction mixture onto the center of the mini spin column for gDNA digestion. Incubate for 10 minutes at room temperature.**
   To make DNase I reaction mixture, prepare 2 ul of DNase I with 70 ul of Buffer DRB per isolation. DNase I is sensitive to physical damage. Therefore, do not mix vigorously. If you want to DNase I treatment in RNA eluate, skip step 8 and 9 and refer to "Appendix I".

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

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

12. **Centrifuge at maximum speed for an additional 1 minute to remove residual wash buffer. Transfer the mini spin 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 ul of Nuclease-free water to the center of the membrane in mini spin column and centrifuge at 13,000 rpm (≥10,000 xg) for 1 minute.**
    To increase the RNA concentration, reduce the volume of elution to 30 ul.
    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 ul of DNase I with 70 ul of 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 ul of Buffer SL and 5 ul of β-mercaptoethanol to the sample and vortex vigorously for 15 seconds.**

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

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

5. **Add 300 ul of Buffer ML to the supernatant and vortex vigorously for 15 seconds and transfer all of the mixture to an EzPure™ filter column (Yellow).**

6. **Centrifuge at 13,000 rpm (≥10,000 xg) for 1 minute and transfer 500 ul 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 column 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 ul of 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 spin column (Type F, Blue ring) and centrifuge at 13,000 rpm (≥10,000 xg) for 1 minute.**
   Transfer all solution including any precipitates on the mini spin column.
   After centrifugation, discard the pass-through and re-insert the mini spin column back into the same collection tube.

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

10. **Apply 70 ul of DNase I reaction mixture onto the center of the mini spin column for gDNA digestion. Incubate for 10 minutes at room temperature.**
    To make DNase I reaction mixture, prepare 2 ul of DNase I with 70 ul of Buffer DRB per isolation. 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 and 10 and refer to "Appendix I".

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

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

13. **Centrifuge at maximum speed for an additional 1 minute to remove residual wash buffer. Transfer the mini spin 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 ul of Nuclease-free water to the center of the membrane in mini spin column and centrifuge at 13,000 rpm (≥10,000 xg) for 1 minute.**
    To increase the RNA concentration, reduce the volume of elution to 30 ul.
    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 ul.
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 column	**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 type F mini spin column	**Low centrifugal force**	Increase g-force (< 10,000 xg) and time (~3min).
	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 spin 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 spin 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 ul RNA eluate
   - 5 ul Buffer DRB
   - 1 ul DNase I
2. Incubate the mixture for 10 minutes 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 minutes.

** 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 minutes - 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 need of additional material - 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 1g agarose in 72 ml water and heat to dissolve thoroughly.
2. Cool to 60°C.
3. Add 10 ml of 10X MOPS buffer, 18 ml of 37% formaldehyde, and 1 ul of 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 1X MOPS running buffer to cover the gel.

Preparation of RNA sample

1. Make the mixture.
   - ? ul RNA (up to 20 ug)
   - 2 ul 10X MOPS electrophoresis buffer
   - 4 ul formaldehyde
   - 10 ul formamide
2. Incubate the mixture for 15 minutes at 65°C.
3. Chill the sample for 5 minutes in ice.
4. Add 2 ul of 10X formaldehyde gel-loading dye to the mixture.
5. Load the mixture in a denaturing gel which is covered with a sufficient 1X 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		50	100-150	mini / 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	
		1,000	101-111	
	Midi	26	101-226	spin / vacuum
		50	101-250	
		100	101-201	

GeneAll® *Exfection™*
for preparation of highly pure 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

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

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				
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

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

* Each dNTPs is available

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

Products	Scale	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

NOTE

NOTE

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Mailing Address
GeneAll Biotechnology Co., LTD.
GeneAll Bldg., 303-7 Dongnam-ro,
Songpa-gu, Seoul, Korea 138-859

Ordering information
Tel: 82-2-407-0096
Fax: 82-2-407-0779
E-mail: sales@geneall.com

Technical information
Tel: 82-2-407-0096
Fax: 82-2-407-0779
E-mail: tech@geneall.com

Customer & Technical Support
Do not hesitate to ask us any question.
We thank you for any comment or advice.

www.geneall.com

GeneAll Bldg., 303-7 Dongnam-ro
Songpa-gu, Seoul, Korea 138-859

E-mail : sales@geneall.com

Tel : 82-2-407-0096
Fax : 82-2-407-0779

Edited by BR
Designed by Park So Yoon