



# **Luc-Pair™ Firefly Luciferase HS Assay Kit**

**For Firefly luciferase assays**

**Cat. No. LF007 (100 reactions)**

**Cat. No. LF008 (300 reactions)**

**Cat. No. LF009 (1000 reactions)**

## **User Manual**

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## USER MANUAL

### Luc-Pair™ Firefly Luciferase HS Assay Kit

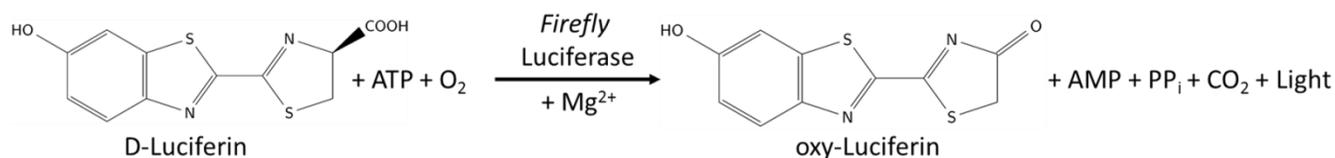
- I. Introduction and Principles
- II. Contents and Storage
- III. Preparation of Cell Lysates Using FLuc-Lysis Buffer
- IV. Preparation of FLuc Assay Working Solution
- V. Procedure
- VI. Limited Use License and Warranty

#### I. Introduction and Principles

The study of transcriptional regulation using reporter gene expression is common and necessary in cell biology research and pharmaceutical discovery. Luciferase is the most widely used genetic reporter for gene expression studies due to several advantages, including:

- 1) high sensitivity in a large dynamic range
- 2) natural absence from mammalian cells
- 3) consistent reproducibility
- 4) cost effectiveness
- 5) simple assay format

Firefly (*Photinus pyralis*) luciferase has been widely used as reporter because the assay is quick, easy and sensitive. Firefly luciferase has been proven to be an ideal reporter for monitoring both promoter activity and post-transcriptional regulation in the control of gene expression. It is a cytoplasmic enzyme with a molecular weight of 61 kDa and catalyzes the following reaction:

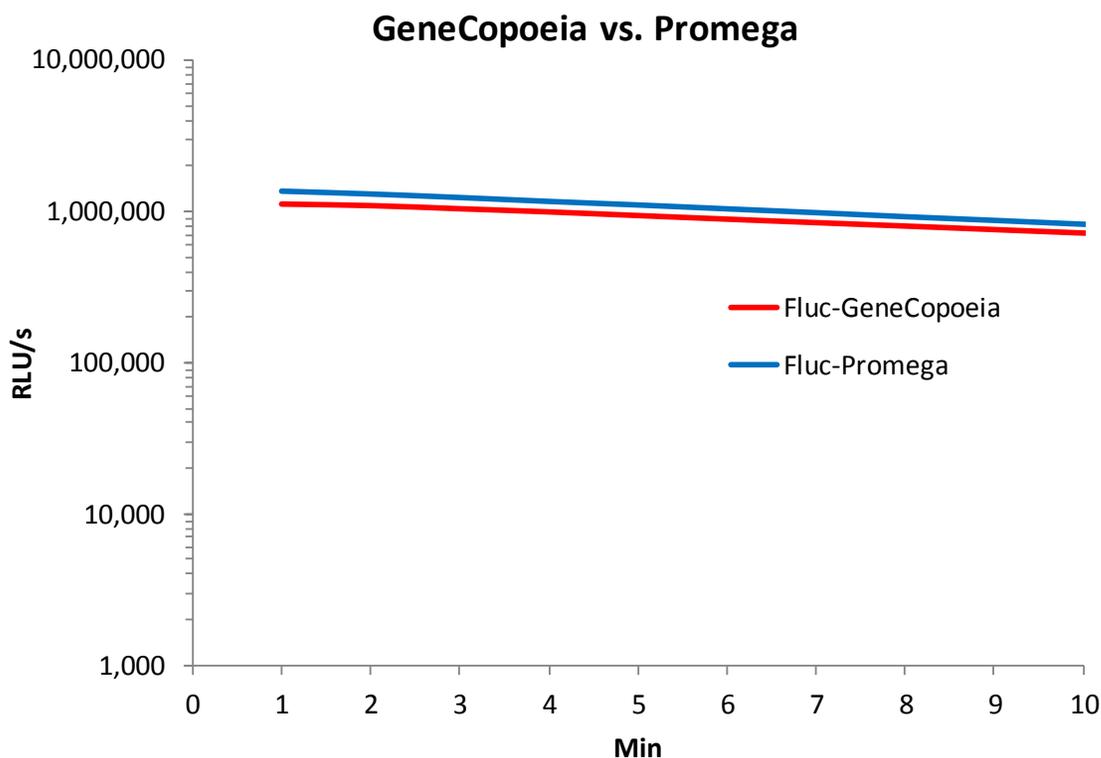


The intensity of light emission is proportional to the amount of luciferase and is measured using a luminometer or multi-function microplate reader.

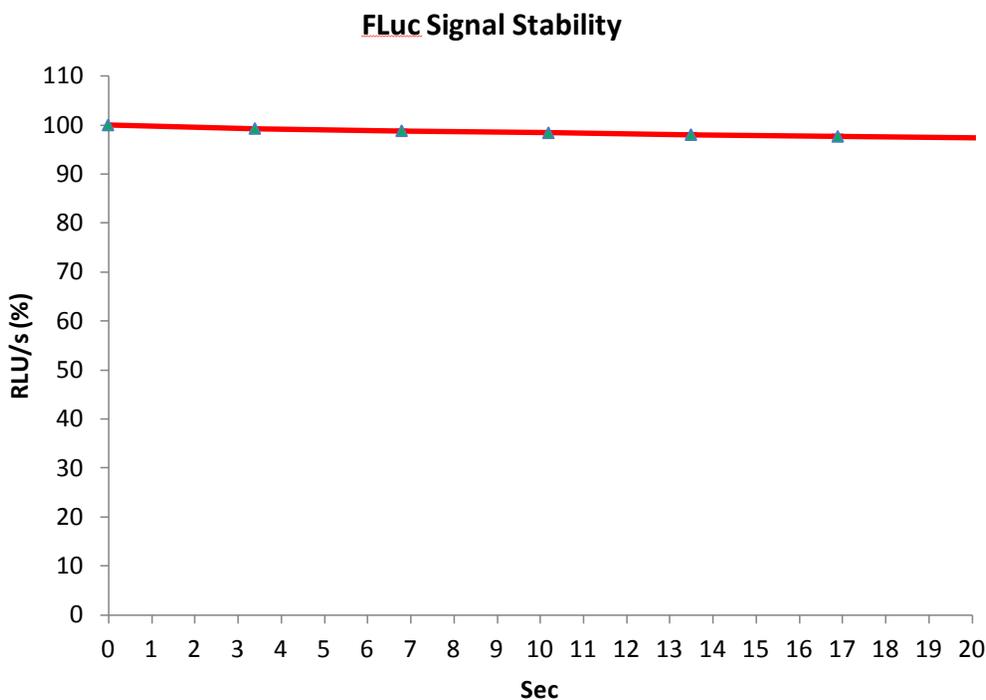
Using this assay system allows one to monitor the transcriptional activation of *cis*-elements in proximity to the gene of interest. However, it has been more difficult to measure the transcriptional repression via 3' UTR regulation of genes since the enzyme-substrate activity window is relatively small. Longer stability of the enzyme-substrate complex allows greater flexibility in monitoring true repressive events. Further, biological variation and stochastic events may add noise, thereby reducing the differences in observed luciferase activity. Thus, normalizing the expression of an experimental reporter to the expression of an independent control reporter can help differentiate between true signal and nonspecific cellular responses. Normalization is also needed for adjusting differences in transfection efficiencies and cell viability.

The GeneCopoeia Luc-Pair™ Firefly Luciferase HS Assay Kit development team incorporated several features into the reagents to enhance product performance and convenience, including the following:

- **High sensitivity.** The reagents have been developed so that the signals for Firefly luciferase exhibit greatest sensitivity (Figure 1).
- **Versatility.** The system has been designed for assays with many different eukaryotic (vertebrates, lower invertebrates) cells using micro-plates or single-tube luminescence readers.
- **Low background.** The system produces very limited background luminescence. No subtraction is required from readings.
- **Simplicity.**
- **Reproducibility.** This system is designed to yield reliable, linear results for a concentration range over several orders of magnitude.



**Figure 1. Activity of Firefly luciferase signals using GeneCopoeia Luc-Pair™ Firefly Luciferase HS Assay Kit.** HEK 293 cells were transfected with Promega pGL4.13 reporter vectors for 48 hours. The FLuc (FLuc-GeneCopoeia) activity was measured as described in the procedure. The Promega's Luciferase Assay System was used (FLuc-Promega) in comparison.



**Figure 2. Signal stability of luciferase using GeneCopeia Luc-Pair™ Firefly Luciferase (FLuc) HS Assay Kit.** HEK 293 cells were transfected with Promega pGL4.13 reporter vectors for 48 hours. The FLuc (FLuc-GeneCopeia) activity was measured as described in the procedure. A Sample Injector was used to dispense the Fluc Working Solution, set shaking to mix for one Sec, and immediately start counting the signal for 20 Sec consecutively.

## II. Contents and Storage

Cat. Nos. LF007, LF008 and LF009

Contents	Quantity	Shipping temperature	Storage temperature
	100 reactions 300 reactions 1000 reactions		
<b>FLuc-Lysis Buffer (10×)</b> Cell Lysis buffer	1.0 mL 1.0 mL × 3 10 mL	Ice pack	–20°C Stable for at least 6 months
<b>FLuc-H Buffer (5×)</b> Firefly luciferase buffer	1.0 mL × 2 1.0 mL × 6 10 mL × 2	Ice pack	–20°C Stable for at least 6 months
<b>FLuc-H Sub (100×)</b> Firefly luciferase substrate	100 µL 100 µL × 3 500 µL × 2	Ice pack	–20°C Stable for at least 6 months

### III. Preparation of Cell Lysates Using Lysis Buffer

The FLuc-Lysis Buffer is supplied as a 10× concentrate. It may show turbid after thawing which won't affect the luciferase assays. Vortex 3-5 sec after thawing, and prepare a sufficient quantity of the 1× working concentration by adding 1 volume of 10× FLuc-Lysis Buffer to 9 volumes of distilled water and mix. The diluted FLuc-Lysis Buffer (1×) may be stored at -20°C for 1-2 months; however, we recommend preparing the volume of Luc-Lysis Buffer required just before use.

#### A. Lysis of Cells Cultured in Multi-well Plates

1. Determine transfection parameters (i.e., plated cell density and subsequent incubation time) such that cells are 80-95% confluent at the desired time of lysate preparation. Remove the growth medium from the cultured cells, and gently apply a sufficient volume of phosphate buffered saline (PBS) to wash the surface of the culture vessel. Swirl the vessel briefly to remove detached cells and residual growth medium. Completely remove the rinse solution before applying Lysis Buffer.
2. Dispense into each culture well the minimum volume of 1× FLuc-Lysis Buffer required to completely cover the cell monolayer. The recommended volumes of 1× FLuc-Lysis Buffer to add per well are as follows:

Culture Plate	1× FLuc-Lysis Buffer (µL)
6-well	500
12-well	250
24-well	100
48-well	65
96-well	20

**Note:** The FLuc-Lysis Buffer provided in the kit is sufficient for directly lysing cells in 24-, 48- or 96-well culture plates. If a 6-well or 12-well plates are used, we recommend either purchasing more FLuc-Lysis Buffer (Cat. No. LF007-01) or harvesting cells by scraping or trypsinization according to the procedures in **III-B** below.

3. Place the culture plates on a rocking platform or orbital shaker with gentle rocking/shaking to ensure complete and even coverage of the cell monolayer with 1× FLuc-Lysis Buffer. Rock the culture plates at room temperature for 10-15 minutes.

**Note1:** If cell clumps appear, pipetting several times could be helpful to disperse the cells. Alternatively, collect the cell lysates including cell clumps in tubes and vortex 5-10 sec after cooling down on ice, then 1 to 2 freeze-thaw cycles to accomplish complete lysis of cells. Overgrown cells are more resistant to complete lysis, and typically require an increased volume of 1× FLuc-Lysis Buffer to ensure complete lysis.

**Note2:** The Firefly luciferase contained in the cell lysates is stable for at least 30minutes at room temperature (22°C) and up to 2 hours on ice. -70°C is recommended for long-term storage. Subjecting cell lysates to more than 5 freeze-thaw cycles may result in gradual loss of luciferase reporter enzyme activities.

4. Transfer the lysate to a tube or vial for further handling and storage. Alternatively, reporter assays may be performed directly in the 96-well culture plate if the plates are compatible with the type of luminometer being used.

#### B. Lysis of Cells in tubes.

5. For cells cultured in suspension, or cells harvested by scraping or trypsinization. Collect  $1-2 \times 10^5$  cells in 1.5mL tubes, rinse cells with 1mL of PBS buffer, spin at 500g for 5 minutes, and completely remove the rinse solution.

6. Add 50-100 $\mu$ L of 1 $\times$ FLuc-Lysis Buffer to make 2 $\times$ 10<sup>3</sup> cells/ $\mu$ L, vortex 5-10 sec to completely disperse the cells, then 1 to 2 freeze-thaw cycles to accomplish complete lysis of cells.
7. Proceed to luciferase assays.

**Note:** The Firefly luciferase contained in the cell lysates are stable for at least 30 minutes at room temperature (22°C) and up to 2 hours on ice. –70°C is recommended for long-term storage. Subjecting cell lysates to more than 5 freeze-thaw cycles may result in gradual loss of luciferase reporter enzyme activities. 2 $\times$ 10<sup>3</sup> cells/ $\mu$ L in 1 $\times$ FLuc-Lysis Buffer is good for the assay in normal transfected cells. If the cells have lower transfection efficiency or the promoter is very weak, you may increase the cell numbers. This FLuc-Lysis Buffer is optimized for compatible with the following FLuc detection assays. If other cell lysis buffers are used, the signal strength of the luciferases could be affected.

### IV. Preparation of FLuc Assay Working Solution

**Note1.** FLuc-H Buffer is stable at –20°C for at least 6 months. Freezing and thawing the reagents 5-6 cycles won't affect the activity of the luciferases. Aliquot is recommended if more freeze-thaw cycles are required.

**Note2.** Working Solutions (Buffers contain Substrates) are stable at room temperature for 1-2 hours. Prepare only the required amount of Working Solution before use.

**Note3.** Light intensity is a measure of the rate of catalysis by the luciferases, and is therefore, temperature sensitive. The temperature optimum for the activity of the luciferases is approximately room temperature (20–25°C), so it is important that the reagents be equilibrated to room temperature before beginning measurements. This kit is designed for single luciferase detection, and may not be used for dual luciferase detection.

1. Thaw the FLuc-H Buffer (5 $\times$ ) thoroughly at room temperature, inverting the tube several times and then vortex for 3-5 seconds.
2. Dilute 1:5 in distilled water to make 1 $\times$ FLuc-H Buffer. Prepare 100 $\mu$ L of each Buffer for each reaction (well). Duplicates or triplicates for each sample are recommended.

**Example:** If you have 5 samples in duplicated reactions, prepare 1mL of 1 $\times$ FLuc-H Buffer. By diluting 0.2mL of the 5 $\times$ FLuc-H Buffers with 0.8mL ddH<sub>2</sub>O. Preparing a little extra may be helpful to avoid buffer shortage caused by pipetting error.

3. Prepare the FLuc Assay Working Solution (e.g.10 samples) by adding 10 $\mu$ L of FLuc-H Sub (100 $\times$ ) to 1mL of 1 $\times$ FLuc-H Buffer. Mix well by inverting the tube several times.
4. Incubate at room temperature for 5 minutes (capped and protected from light) before adding to the samples.

## V. Assay Procedure

1. Set up the luminometer. Follow the manual associated with your plate reader. Set the measurement for 1-2 seconds of integration.
2. Pipette the cell lysis samples (20µL per well) into a 96-well white (opaque) or black plate, or luminometer tubes.
3. Add the FLuc Assay Working Solution from step IV-4 (100µL per well or tube) to the samples. Gently pipette up and down mix the sample and assay solution. Do not vortex.

**Note:** If you have many samples and use 96-well plates, we recommend using a multi-channel pipette in order to reduce the time between additions of Assay Working Solution to each well.

**Auto-Injector:** If using Injectors, follow the procedures described in the manual of the device.

4. Proceed with the measurement.

**Note:** If using single luminometer tubes, make sure the processing times before the luminescence detection are identical for all samples.

5. Save the reading if the luminometer reader does not automatically record the readings.
6. Remove the plates or luminometer tubes.

**IMPORTANT NOTE:** Because the luminescent signals are affected by assay conditions, raw results should be compared only between samples measured at the same time and using the same medium/serum combination.

## VII. Limited Use License and Warranty

### Limited Use License

Following terms and conditions apply to use of the Luc-Pair™ FLuc Luciferase HS Assay Kit (the Product). If the terms and conditions are not acceptable, the Product in its entirety must be returned to GeneCopoeia within 5 calendar days. A limited End-User license is granted to the purchaser of the Product. The Product shall be used by the purchaser for internal research purposes only. The Product is expressly not designed, intended, or warranted for use in humans or for therapeutic or diagnostic use. The Product must not be resold, repackaged or modified for resale, or used to manufacture commercial products or deliver information obtained in service without prior written consent from GeneCopoeia. This Product should be used in accordance with the NIH guidelines developed for recombinant DNA and genetic research. Use of any part of the Product constitutes acceptance of the above terms.

### Limited Warranty

GeneCopoeia warrants that the Product meets the specifications described in the accompanying Product Datasheet. If it is proven to the satisfaction of GeneCopoeia that the Product fails to meet these specifications, GeneCopoeia will replace the Product. In the event a replacement cannot be provided, GeneCopoeia will provide the purchaser with a refund. This limited warranty shall not extend to anyone other than the original purchaser of the Product. Notice of nonconforming products must be made to GeneCopoeia within 30 days of receipt of the Product. GeneCopoeia's liability is expressly limited to replacement of Product or a refund limited to the actual purchase price. GeneCopoeia's liability does not extend to any damages arising from use or improper use of the Product, or losses associated with the use of additional materials or reagents. This limited warranty is the sole and exclusive warranty. GeneCopoeia does not provide any other warranties of any kind, expressed or implied, including the merchantability or fitness of the Product for a particular purpose.

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