



# One-step NZYSpeedy RT-qPCR Probe kit, ROX plus

## Catalogue number:

MB35001, 100 reactions x 20 µL  
MB35002, 500 reactions x 20 µL

## Description

One-step NZYSpeedy RT-qPCR Probe kit, ROX plus is an optimized and highly efficient reaction mixture developed for first-strand cDNA synthesis and subsequent real-time PCR in a single tube. The kit includes a One-step NZYSpeedy qPCR Probe master mix developed for fast PCR, provided as a 2x reaction mixture, which contains all components necessary for real-time PCR, including dNTPs, stabilizers, and enhancers. In addition, a separate NZYRT mix that comprises a balanced mixture of both Reverse transcriptase and Ribonuclease Inhibitor is also provided. This kit enables fast and highly reproducible procedures on the most common real-time PCR apparatus, from either total RNA or mRNA. It was developed for probe-detection technology, including molecular beacons. The latest developments in PCR enhancers have been incorporated in the One-step NZYSpeedy RT-qPCR Probe kit, ROX plus, including buffer chemistry and a polymerase with hot-start-like activity. This optimized mixture together with the NZYRT mix results in highly sensitive and successful results.

## Shipping Conditions

The product is shipped with dry ice.

## Storage Conditions

This master mix should be stored at -85°C to -15°C in a freezer without defrost cycles in order to guarantee maximal shelf life. Minimize the number of freeze-thaw cycles by storing in working aliquots. The product will remain stable till the expiry date if stored as specified.

## Compatible real-time PCR instruments

The kit was developed to be compatible with instruments that measure the passive reference signal. However, it is also compatible with instruments that do not require a passive reference signal for data normalization. It has been optimized to be compatible with the following real-time PCR instruments:

**Applied Biosystems™** : 7000; 7300; 7700; 7900; 7900HT; 7900HT FAST; StepOne™ & StepOne™plus

## Protocol

The following protocol serves as a general guideline and a starting point for any One-step RT-qPCR procedure. Optimal reaction conditions (incubation times and temperatures, template

concentration) may vary and may require further optimization in particular conditions.

**RT-qPCR reaction set-up:** the given volumes are based on a standard 20 µL final reaction mix and can be scale adjusted.

One-step NZYSpeedy qPCR Probe master mix (2x), ROX plus	10 µL	1x
10 µM forward primer	0.8 µL	400 nM
10 µM reverse primer	0.8 µL	400 nM
10 µM probe	0.2 µL	100 nM
NZYRT mix	0.8 µL	-
Template	up to 7.4 µL	-
Nuclease-free water	up to 20 µL	-

**Testing and Ct values:** When comparing this RT-qPCR master mix with a mix from another supplier we strongly recommend amplifying from a 10-fold template dilution series. Loss of detection at low template concentration is the only direct measurement of sensitivity. An early Ct value is not an indication of good sensitivity, but rather an indication of speed.

## Suggested thermal cycling conditions

One-step NZYSpeedy RT-qPCR Probe kit, ROX plus was optimized for the amplification of RNA fragments up to 200 bp under different RT-qPCR cycling conditions. The table below displays a standard 2-step cycling setup optimized on a number of platforms. However, these conditions may be adapted to suit different machine-specific protocols.

Cycles	Temp.	Time	Main reaction
1	50 °C	10-20 min (*)	Reverse Transcription
1	95 °C	2-5 min	Polymerase activation
40	95 °C	5 sec	Denaturation
	60 °C	30 sec-50 sec	Annealing/Extension

(\*) Reverse transcriptase has a high processivity and may take as little as 10 minutes to synthesize cDNA. However, in specific situations increasing reaction time up to 20 minutes may be beneficial.

## General considerations

Because of the chemical instability of the RNA and the ubiquitous presence of RNases, working with RNA is more demanding than working with DNA. Therefore, special precautions should be taken when working with RNA. We recommend using RNase-free plasticware/reagents and work in an RNase-free area. In addition, to help prevent any carry-over DNA contamination, you should assign independent areas for reaction set-up, PCR amplification and any post-PCR gel analysis. It is essential that any tubes containing amplified PCR product are not opened in the PCR set-up area.

**Primers and probe:** These guidelines refer to the design and set-up of dual-labelled probes. Please refer to the relevant literature when using other probe types. The specific amplification, yield and overall efficiency of any real-time RT-PCR can be critically affected by the sequence and concentration of the probes and primers, as well as by the amplicon length. We strongly recommend taking the following points into consideration when designing and running your real-time RT-PCR experiment:

- Primers should have a melting temperature ( $T_m$ ) of approximately 60 °C. The probe  $T_m$  should be approximately 10°C higher than that of the primers;
- The fragment should be between 80-200 bp length and not superior to 300 bp;
- Final primer concentrations of 400 nM are suitable for most probe-based reactions. However, to determine the optimal concentration we recommend titrating in the range 0.2-1  $\mu$ M. Forward and reverse primers concentration should be equimolar;
- A final probe concentration of 100 nM is suitable for most applications; we recommend that the final probe concentration is at least two-fold lower than the primer concentration;
- For multiplex RT-qPCR, the probe concentrations higher than 100 nM can result in cross channel fluorescence.

**Template:** It is important that the RNA template is purified and devoid of any contaminating of RT-qPCR inhibitors (e.g., EDTA). The recommended amount of template is dependent upon the type of RNA used. Please consider the following points when selecting RNA templates:

- **Total RNA:** purified total RNA can be used in the range from 1 pg to 1  $\mu$ g per 20  $\mu$ L reaction
- **mRNA:** purified mRNA can be used from 0.01 pg per 20  $\mu$ L reaction

To obtain high yield of highly purified RNA we suggest using the NZY Total RNA Isolation Kit (MB134).

**MgCl<sub>2</sub>:** It is not necessary to supplement the reaction mixture with MgCl<sub>2</sub> as the One-step NZYSpeedy qPCR Probe master mix (2x), ROX plus already contains an optimized concentration of MgCl<sub>2</sub>.

**RT-qPCR controls:** Data reliability may be affected by the presence of contaminating DNA. We suggest that you always include no-RT-control reactions, by replacing the NZYRT mix with PCR-grade water.

**RT-qPCR optimization:** it may be necessary to improve the efficiency of some reactions, such as multiplexing with more than two probes, or if the target amplicon is longer than 200 bp. In these cases, the reverse transcription reaction time can be extended up to 30 minutes; the annealing/extension time can be extended up to 60 seconds and/or the temperature can be increased up to 65°C.

### Quality control assays

#### Genomic DNA contamination

The product must comply with internal standards of DNA contamination as evaluated through real-time qPCR.

#### Nuclease assays

0.2-0.3  $\mu$ g of pNZY28 plasmid DNA are incubated with the kit mixes for 14-16 hours at 37 °C. Following incubation, the DNA is visualised on a GreenSafe-stained agarose gel. There must be no visible nicking or cutting of the nucleic acid.

#### Functional assay

One-step NZYSpeedy RT-qPCR Probe kit, ROX plus is extensively tested for activity, processivity, efficiency, sensitivity, and heat activation.

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For life science research only. Not for use in diagnostic procedures.