AMPLIQON
PCR ENZYMES & REAGENTS

15 MIN HOT START

# GC TEMPase 2x Master Mix I and II

MADE IN DENMARK

**Cat. No.: A333799 – Sample**
**20 Reactions**

| - | GC TEMPase 2x Master Mix I, 1.5 mM $MgCl_2$ | GC TEMPase 2x Master Mix II, 1.5 mM $MgCl_2$ |
|---|---|---|
| **ID No.** | **5300400** | **5300500** |
| **Cap colour** | **Yellow** | **White** |
| **Content** | 0.5 ml | 0.5 ml |



## Key Features

Ampliqon offers a product series specifically developed for the amplification of GC-rich DNA sequences. GC TEMPase Master Mix I and II promotes excellent and robust amplification results with targets of varying degree and is especially intended for amplification of DNA targets with high GC content.

GC TEMPase 2x Master Mix I and GC TEMPase 2x Master Mix II are all-in-one 2x master mixes containing TEMPase Hot Start DNA polymerase, enhancer, dNTPs, $MgCl_2$ and GC Buffer I or GC Buffer II, respectively. Simply add primers, template and water to successfully carry out PCR.

GC-rich PCR reactions behave very individual and therefore it is not predictable, which GC TEPMPase Master Mix will perform best with your primer set. We recommend testing both GC TEPMPase Master Mixes for highest success rate.

TEMPase Hot Start DNA Polymerase is a chemically modified form of Ampliqon Taq DNA Polymerase and is activated by an initial heating step. The heat activation is beneficial when amplifying GC-rich DNA sequences.

### Composition of GC TEMPase 2x Master Mix I and II

- TEMPase Hot Start DNA Polymerase
- Optimized buffer components, 3.0 mM $MgCl_2$
- dNTPs
- Enhancer

### Recommended Storage and Stability

Long term storage at -20 °C. Product expiry at -20 °C is stated on the label.
Option: Store at +4 °C for up to 6 months.

### Quality Control

TEMPase Hot Start DNA Polymerase is tested for contaminating activities, with no traces of endonuclease activity, nicking activity or exonuclease activity.

## Protocol

This protocol serves as a guideline to ensure optimal PCR results when using GC TEMPase 2x Master Mix I and GC TEMPase 2x Master Mix II. Optimal reaction conditions such as incubation times, temperatures, and amount of template DNA may vary and must be determined individually.

1. Thaw the Master Mix and primer solutions. **It is important to thaw the solutions completely and mix thoroughly before use to avoid localized concentrations of salts**.

   **Important:** Spin vials briefly before use.

2. Prepare the reaction mix. Table 1 shows the reaction set up for a final volume of 50 µl. If desired, the reaction size may be scaled down.

**Table 1. Reaction mix and template DNA**

| Component | Vol./reaction* | Final concentration* |
|---|---|---|
| 2x Master Mix | 25 µl | 1x |
| 25 mM $MgCl_2$ | 0 µl (0 – 6 µl) | 1.5 mM (1.5 – 4.5 mM) |
| Primer A (10 µM) | 1 µl (0.5 – 5 µl) | 0.2 µM (0.1 – 1.0 µM) |
| Primer B (10 µM) | 1 µl (0.5 – 5 µl) | 0.2 µM (0.1 – 1.0 µM) |
| PCR-grade $H_2O$ | X µl | - |
| Template DNA | X µl | genomic DNA: 50 ng (10 – 500 ng)<br>plasmid DNA: 0.5 ng (0.1 – 1 ng)<br>bacterial DNA: 5 ng (1 – 10 ng) |
| **TOTAL volume** | 50 µl | - |

* Suggested starting conditions; theoretically used conditions in brackets

3. Mix the reaction mix thoroughly and dispense appropriate volumes into reaction tubes.

4. Add template DNA to the individual tubes containing the reaction mix.

5. Program the thermal cycler according to the manufacturer's instructions. **Each program must start with an initial heat activation step at 95°C for 15 minutes.** See Table 2 for an example.
   For maximum yield and specificity, temperatures and cycling times should be optimized for each new template target or primer pair.

6. Place the tubes in the thermal cycler and start the reaction.

**Table 2. Three-step PCR program**

| Cycles | Duration of cycle | Temperature |
|---|---|---|
| 1 | 15 minutes[a] | 95 °C |
| 25 – 35 | 30 seconds[b]<br>40 – 60 seconds[c]<br>40 – 60 seconds[d] | 95 °C<br>50 – 65 °C<br>72 °C |
| 1 | 5 minutes[e] | 72 °C |

[a] For activation of the TEMPase hot start enzyme.

[b] Denaturation step: This step is the first regular cycling event and consists of heating the reaction to 95 °C for 20 – 30 seconds. It causes melting of the DNA template by disrupting the hydrogen bonds between complementary bases, yielding single-stranded DNA molecules.

[c] Annealing step: The reaction temperature is lowered to 50 – 65 °C for 20 – 40 seconds allowing annealing of the primers to the single-stranded DNA template. Typically, the annealing temperature is about 3 – 5 °C below the $T_m$ (melting temperature) of the primers used.

d. Extension/elongation step: TEMPase polymerase has its optimum activity temperature at 72 °C. At this step the DNA polymerase synthesizes a new DNA strand complementary to the DNA template strand. The extension time depends on the length of the DNA fragment to be amplified. As a rule of thumb, at its optimum temperature the DNA polymerase will polymerize a thousand bases per minute.

e. Final elongation: This single step is occasionally performed at a temperature of 72 °C for 5 minutes after the last PCR cycle to ensure that any remaining single-stranded DNA is fully extended.



**Notes:**

- The final $MgCl_2$ concentration of this Master Mix is 1.5 mM. In some applications, more than 1.5 mM $MgCl_2$ is required for best results. Use 25 mM $MgCl_2$ to adjust the $Mg^{2+}$ concentration according to table 3.

**Table 3. Additional volume (µl) of $MgCl_2$ per 50 µl reaction**

| Final $MgCl_2$ conc. in reaction (mM) | 1.5 | 2.0 | 2.5 | 3.0 | 3.5 | 4.0 | 4.5 |
|---|---|---|---|---|---|---|---|
| Volume of 25 mM $MgCl_2$ | 0 | 1 | 2 | 3 | 4 | 5 | 6 |

- For longer DNA targets more DNA polymerase could be added to the PCR master mix.

## Related Products

| TEMPase Hot Start Master Mixes (500 x 50 µl reactions) * | Cat. No. |
|---|---|
| 2x Master Mix A**, 1.5 mM $MgCl_2$ final concentration | **A230303** |
| 2x Master Mix A**BLUE, 1.5 mM $MgCl_2$ final concentration | **A290403** |

*Master mixes available also in 1.1x variants as well as 2 mM $MgCl_2$ variants, **Mix A is Ammonium Buffer based, also available as Mix C based on Combination Buffer.

| Special TEMPase Master Mixes (500 x 50 µl reactions) | Cat. No. |
|---|---|
| Multiplex 2x Master Mix, 3 mM $MgCl_2$ final concentration | **A260303** |
| GC TEMPase 2x Master Mix I – for GC-rich templates | **A331703** |
| GC TEMPase 2x Master Mix II – for GC-rich templates | **A332703** |

| Taq Master Mixes (500 x 50 µl reactions) | Cat. No. |
|---|---|
| 2x Master Mix, 1.5 mM $MgCl_2$ final concentration | **A140303** |
| 2x Taq OptiMix CLEAR, 1.5 mM $MgCl_2$ final concentration | **A370503** |
| 2x Master Mix RED, 1.5 mM $MgCl_2$ final concentration | **A180303** |

| Taq DNA Polymerase (500 units) * | Cat. No. |
|---|---|
| Taq DNA Polymerase 5 U/µl | **A110003** |
| • with 10x Ammonium Buffer | **A111103** |

*Available in kits including one or two buffers (Ammonium Buffer, Standard Buffer or Combination Buffer). All kits include extra 25 mM $MgCl_2$

| Hot Start DNA Polymerase (500 units) * | Cat. No. |
|---|---|
| TEMPase Hot Start DNA Polymerase, 5 U/µl | **A220003** |
| • with 10x Ammonium Buffer | **A221103** |

*Available in kits including one or two buffers (Ammonium Buffer, Standard Buffer or Combination Buffer). All kits include extra 25 mM $MgCl_2$

| Buffers for DNA polymerases * | Cat. No. |
|---|---|
| 10x Ammonium Buffer, 3 x 1.5 ml | **A301103** |
| 10x Standard Buffer, 3 x 1.5 ml | **A302103** |
| 10x Combination Buffer, 3 x 1.5 ml | **A303103** |
| 5x PCR Buffer RED, 6 x 1,5 ml ** | **A301810** |
| PCR Grade Water, 6 x 5 ml | **A360056** |

*Ammonium Buffer, Standard Buffer and Combination Buffer are also available as $Mg^{2+}$ free buffers, detergent free buffers and $Mg^{2+}$ and detergent free buffers. **For direct gel loading and visualisation.

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Other product sizes, combinations and customized solutions are available. Please look at www.ampliqon.com or ask for our complete product list for PCR Enzymes. For customized solutions please contact us.

**Made in Denmark**

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