

# TGGE and TGGE MAXI

## Introduction

- **Peltier powered linear temperature gradient**
- **Microprocessor control for reliable assay conditions**
- **No casting of chemical gradient gels**

With the Biometra TGGE system biomolecules are separated in a temperature gradient according to their melting behavior. Unlike chemical gradients the Peltier driven temperature gradient can be controlled by a microprocessor thus providing unmatched reproducibility. With TGGE PCR fragments differing in a single position only can be separated quickly and cost efficiently.

### Precise

The heart of both TGGE systems is the temperature block which is powered by Peltier technology. Thanks to precise microprocessor control a strictly linear gradient is generated providing a maximum of reproducibility. Thus assay conditions can be much better (and easier) controlled compared to conventional chemical gradients or temporal gradients using water baths.

### Cost saving

TGGE provides fast and cost effective mutation screening of PCR fragments. Only those samples are selected for direct sequencing that are different from the wildtype (standard). The total number of sequenced samples can be dramatically reduced saving time and money.

### Sensitive

In contrast to direct sequencing TGGE also detects mutations in mixed DNA samples. Whenever heterozygous DNA is to be analysed, direct sequencing will not give a clear signal for the position of the mutation. This is especially problematic when the mutated gene is masked by a high background of normal cells. TGGE reliably detects mutations in a 1:10 dilution (and higher) of wildtype DNA.

### Patented technology

TGGE is protected by patents in most countries of the world. The patent for TGGE method and TGGE instrumentation is held by Qiagen AG, Hilden. Biometra is the exclusive licensee for manufacturing and distribution of TGGE instrumentation.



## TGGE and TGGE Maxi System

### Temperature Gradient Gel Electrophoresis



#### Biometra TGGE System

- Rapid separation of mixed DNA samples
- Quick optimisation of new protocols

The TGGE system was designed for maximum resolution in a small gel. The highly integrated system consists of the gradient electrophoresis unit and an external controller. Both, optimisation of temperature range and parallel analysis of multiple samples can be achieved in very short time. New protocols a rapidly established and high serial throughput can be achieved.



#### Biometra TGGE MAXI System

- Large format for separation of complex sample mixtures
- High parallel sample throughput

The TGGE MAXI system is the ideal instrument to investigate high numbers of samples in parallel. Due to the large thermal block of 20 cm x 20 cm a long separation distance for the analysis of complex sample mixtures is provided. The TGGE MAXI controller can control both the small and also the MAXI electrophoresis unit.

#### Technical Specifications

see page 76

#### Ordering Information

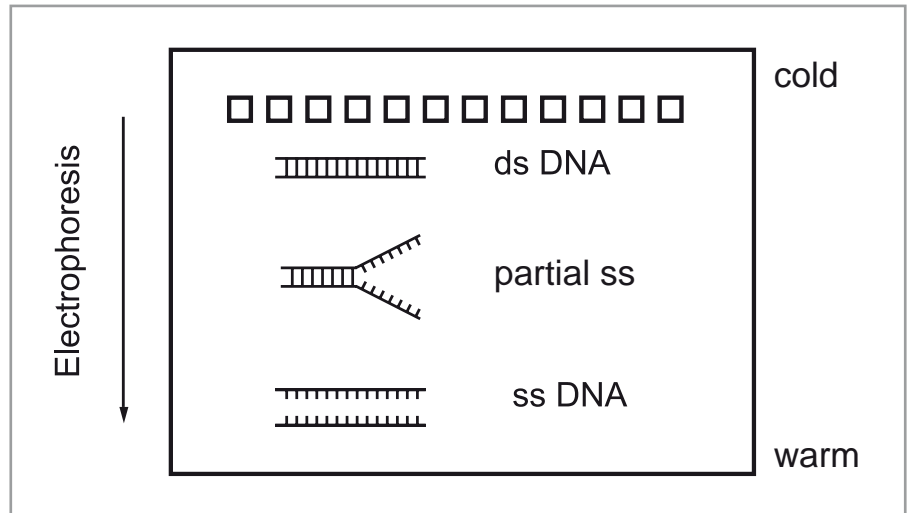
see page 77 – 78



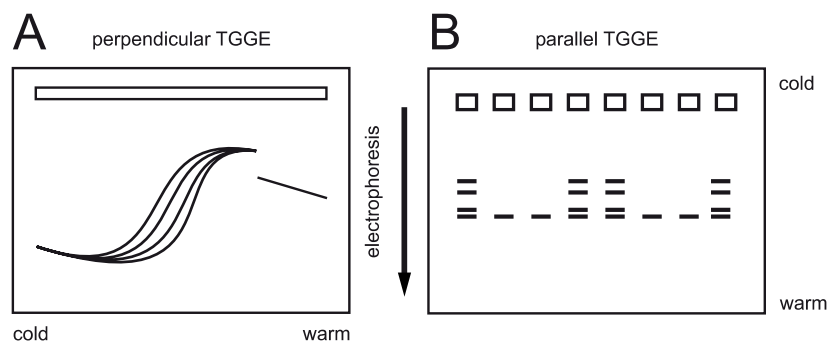
## Principle of TGGE

During migration through a temperature gradient DNA starts to melt. Once the DNA is partially single stranded, the sample is slowed down dramatically. Other samples that are still completely double stranded at this temperature further migrate through the gel. The lower the melting temperature of a DNA molecule, the earlier it stops in the gel. Since the melting temperature of DNA is determined by its primary sequence, there is a direct relation between.

TGGE is ideally suited to separate DNA fragments of identical size on the basis of their DNA sequence. This is typically used for screening of PCR fragments (of identical length) for mutations.



### Perpendicular and parallel TGGE: principle of analysis



**Perpendicular TGGE (A):** One sample is separated over a broad temperature range (gradient perpendicular to migration of samples). This mode is applied to identify the optimum temperature range for separation of this sample.

**Parallel TGGE (B):** Multiple samples are analysed in parallel (gradient parallel to migration of samples). This mode is applied for routine analysis of many samples.

## TGGE in Mutation Analysis

### Perpendicular TGGE for optimisation of temperature gradient

A 120 bp DNA fragment was separated in a perpendicular temperature gradient. Prior to analysis the sample has been mixed with non-mutated standard DNA. Mixture was denatured at 94 °C and then slowly cooled down to allow for heteroduplex formation.

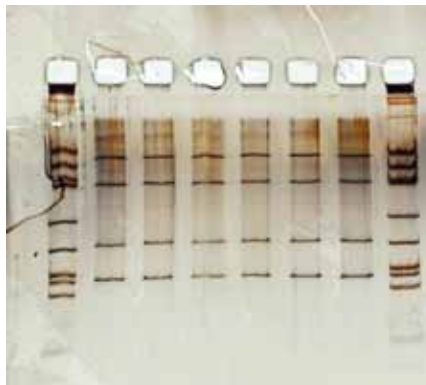
By comparing the melting curve with the temperature lanes on the block, the optimum gradient for parallel analysis of multiple samples is obtained.



Temperature gradient 30 °C (left) to 70 °C (right), 250 V, 45 min.

### Parallel analysis of heteroduplex samples

In contrast to conventional electrophoresis techniques, in TGGE separation is not improved by extended running times but by adjusting the temperature gradient. In this example a gradient of only 5 °C was applied to efficiently separate heteroduplex DNA samples. All bands in this gel are of identical length (120 bp), there is only a difference in one position of the DNA sequence.

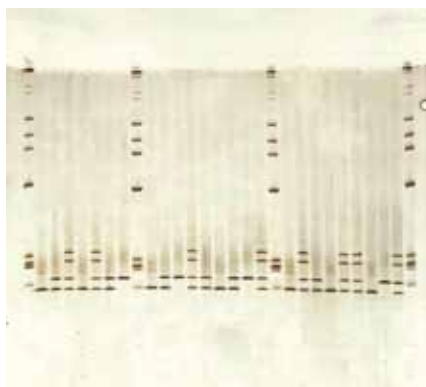


Temperature gradient 39 °C (top) to 44 °C (bottom), 150 V, 50 min.

### Parallel analysis of many samples with the TGGE MAXI System

In this example the bands have migrated to the middle of the gel resulting in a rather long separation time. To reduce running time, temperature at the top of the gel can be elevated. Thus samples melt already in the top part of the gel and can be distinguished.

Clean gels for the TGGE MAXI System (024-240) cover only half of the thermoblock. By using only part of the separation distance short analysis times are achieved.



Temperature gradient 35 °C (top) to 60 °C (bottom), 350 V, 4 hours

# TGGE

## Technical Specifications

	TGGE System	TGGE MAXI System
<b>Electrophoresis unit</b>		
Technology	Peltier	Peltier
Temperature range	5 – 80 °C	5 – 80 °C
Control accuracy	± 0.3 °C	± 0.3 °C
Temperature uniformity	± 0.5 °C	± 0.5 °C
Linear gradient	45 °C	45 °C
Themoblock dimensions	9 cm x 9 cm	20 cm x 20 cm
Glass plate dimensions	9 cm x 9 cm	23.5 cm x 23.5 cm
Gel dimensions	7.8 cm x 4.2 cm	20 cm x 21.7 cm
Separation distance (perpendicular/parallel)	4 cm/5 cm	16 cm/19 cm
Sample numbers (volume)	8 x (5 µl) (024-022) 12 x (3 µl) (024-025) 18 x (1.5 µl) (024-026) 1 x (50 µl) (024-023) 1 x (75 µl) (024-024)	32 x (5 µl) (024-229) 34 x (8 µl) (024-223) 1 x (75 µl) (024-228)
Apparatus dimensions (L x W x H)	23 cm x 23 cm x 23 cm	43 cm x 43 cm x 33 cm
Weight	4.2 kg	22.0 kg
<b>Controller</b>	External	External
	Control of electrophoresis and temperature gradient	Control of electrophoresis and temperature gradient
Dimensions (L x W x H)	31 cm x 22 cm x 12 cm	31 cm x 22 cm x 12 cm
Weight	3.8 kg	3.5 kg
<b>Power supply</b>	Integrated in controller	External
Max. Voltage	400 V	400 V
Max. Amperage	500 mA	500 mA
Max. Power	30 W	50 W
Control modus	Fixed voltage	Fixed voltage
Dimensions (L x W x H)		30 cm x 22 cm x 8 cm
Weight	-	6.5 kg

# TGGE

## Order Information

Model	Order No.
<b>Germany</b>	
<b>TGGE System, 230/115 V</b> Electrophoresis unit with high precision gradient block, 2 buffer chambers for variable positioning, controller with integrated power supply, starter kit (024-003)	024-000
TGGE Starter Kits for 25 gels including 1 glass plate with 1 slot (50 µl) for perpendicular TGGE (024-023), 1 glass plate 8 slots (5 µl) for parallel TGGE (024-022), 1 glass plate 12 slots (3 µl) for parallel TGGE (024-025), 3 cover plates (024-021), 4 reusable buffer wicks (024-016), 25 Polybond films (024-030), 100 ml sample AcrylGlide™ (211-319), 3 plastic clamps (024-007)	024-003
<b>Other countries</b>	
<b>TGGE system, 230/115 V</b> Electrophoresis unit with high precision gradient block, 2 buffer chambers for variable positioning, controller with integrated power supply, starter kit (024-093)	024-090
TGGE Starter Kits for 25 gels including 1 glass plate with 1 slot (50 µl) for perpendicular TGGE (024-023), 1 glass plate 8 slots (5 µl) for parallel TGGE (024-022), 1 glass plate 12 slots (3 µl) for parallel TGGE (024-025), 3 cover plates (024-021), 4 reusable buffer wicks (024-016), 25 Polybond films (024-030), 3 plastic clamps (024-007)	024-093
TGGE glass plate, 8 slots (5 µl)	024-022
TGGE glass plate, 1 slot (50 µl)	024-023
TGGE glass plate, 1 diagonal slot (75 µl)	024-024
TGGE glass plate, 12 slots (3 µl)	024-025
TGGE glass plate, 18 slots (1 – 2 µl)	024-026
TGGE glass plate, with 0.5 mm spacer, no slots	024-027
TGGE bonding plate, without spacers	024-021
TGGE buffer wicks, 7 cm x 7 cm, 100/pkg	024-015
TGGE PolyBond film, 8.8 cm x 8.8 cm, 25/pkg	024-030
TGGE PolyBond film, 8.8 cm x 8.8 cm, 100/pkg	024-034
TGGE cover plate + 10 hydrophobic cover films	024-031
TGGE hydrophobic cover film, 7 cm x 6 cm, 25/pkg	024-032
TGGE hydrophobic cover films, 100/pkg	024-035
TGGE self-adhesive slotformers (10 x multi-well, 9 x long-well)	024-121
Testkit for TGGE and TGGE Maxi including 40 µl wildtype DNA, 40 µl mutant DNA, 400 µl heteroduplex DNA, 1ml loading buffer	024-050
TGGE casting stand for 5 gels	024-028

# TGGE

## Order Information

Model	Order No.
<b>Germany</b>	
<b>TGGE MAXI System, 230/115 V</b> Electrophoresis unit with high precision gradient block, 2 buffer chambers for variable positioning, controller, power supply, manual, MAXI starter kit (024-204)	024-200
TGGE MAXI Starter Kit for 25 gels including 1 glass plate 1 slot (75µl) for perpendicular TGGE (024-228), 1 glass plates with spacer without slots (024-227), 1 silicone applicator strip 34 slots 8µl each (024-223), 2 glass plates without spacer (024-221), 12 binder clamps (024-207), 2 sealings (024-230), 25 cover films (024-232), 25 Polybond films (024-234), 4 reusable buffer wicks (024-216), 2 cover plates (024-221), 100 ml sample AcrylGlide™ (024-007)	024-204
<b>Other countries</b>	
<b>TGGE MAXI System, 230/115 V</b> Electrophoresis unit with high precision gradient block, 2 buffer chambers for variable positioning, controller, power supply, manual, MAXI starter kit (024-294)	024-290
TGGE MAXI Starter Kit for 25 gels including 1 glass plate 1 slot (75µl) for perpendicular TGGE (024-228), 1 glass plates with spacer without slots (024-227), 1 silicone applicator strip 34 slots 8µl each (024-223), 2 glass plates without spacer (024-221), 12 binder clamps (024-207), 2 sealings (024-230), 25 cover films (024-232), 25 Polybond films (024-234), 4 reusable buffer wicks (024-216), 2 cover plates (024-221)	024-294
TGGE MAXI glass plate, without spacer 23.5 cm x 23.5 cm	024-221
TGGE MAXI glass plate, with spacer, no slot former	024-227
TGGE MAXI glass plate perpendicular, spacer (1 mm) and 1 slot (75 µl)	024-228
TGGE MAXI glass plate parallel, spacer (1 mm) and 32 slots (5 µl)	024-229
TGGE MAXI silicone sealing for gel casting, 1 mm	024-230
TGGE MAXI gel cover film, 25/pkg	024-232
TGGE MAXI Polybond film, 25/pkg	024-234
TGGE MAXI Polybond film, 100/pkg	024-235
TGGE MAXI self-adhesive slotforming units for parallel gels (8 strips with 28 x 5 µl each and 9 x 200 µl)	024-222
TGGE MAXI buffer wicks re-usable, 4 pcs.	024-216
TGGE MAXI Applicator strip, silicone, 34 slots for 8 µl (for use with 024-227)	024-223

