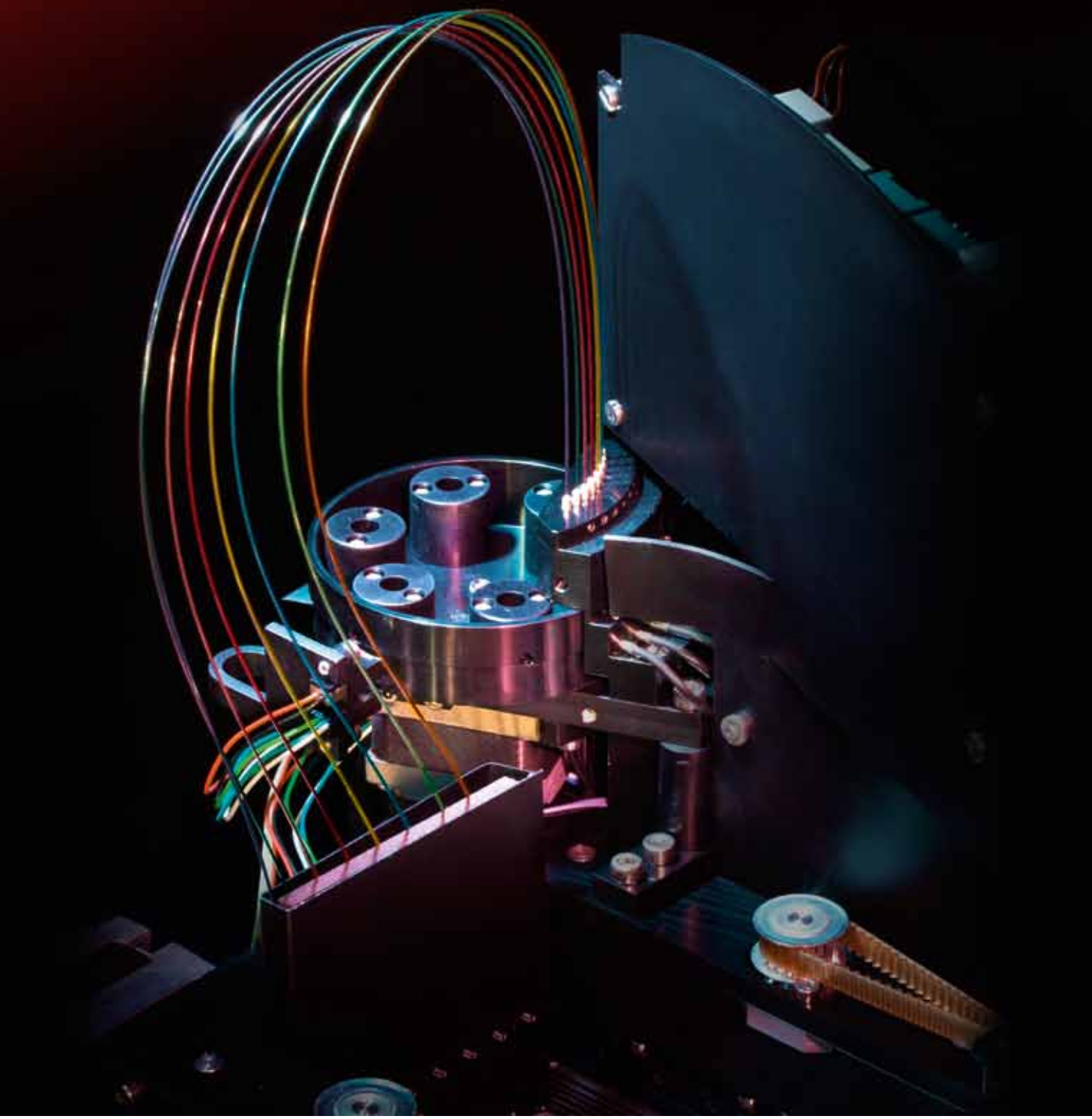
Biometra

An Analytik Jena Company

CATALOGUE

2012/2013



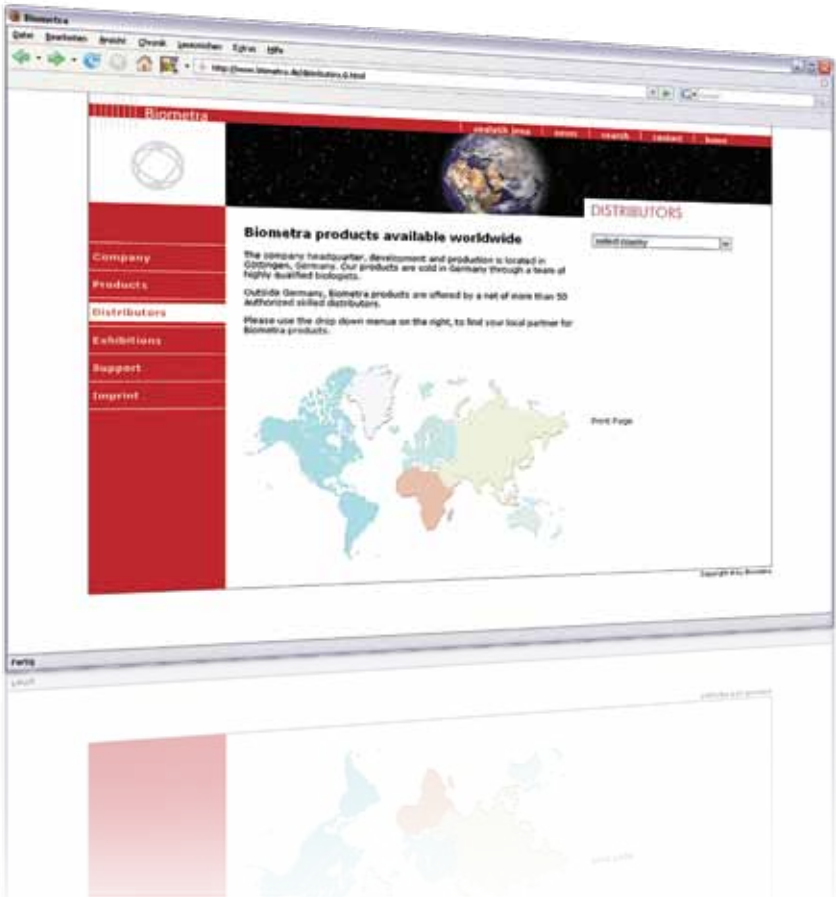
Innovation · Advancement · Development


TOptical
Module


CATALOGUE
2012/2013
Biometra

Distributors

Biometra – Worldwide



For technical questions or quotes relating to our products please contact your local distributor or Biometra. The website **http://www.biometra.de/distributors.0.html** gives a comprehensive overview of all Biometra distributors worldwide.

Germany
Biometra GmbH
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Fax +49 551-50686-66
info@biometra.com

Quality Management

ISO 9001:2008 Certified

In order to ensure a high service level Biometra adapted the quality standards of BS EN IS0 9001:2008 and has been certified by BSI Management Systems. Yearly QC assessment audits by BSI auditors and additional internal audits at regular intervals evaluate the established quality system to continually improve the effectiveness in accordance with the requirements of the international standard.

All Biometra laboratory instruments are produced with the highest practical standards of materials, workmanship and design. The production facilities meet European standards regarding health and safety as well as environmental regulations. All laboratory instruments produced and supplied by Biometra carry a CE-mark and include a declaration of conformity to the relevant EU guidelines.

Biometra guarantees the instruments to be free from defects in materials and workmanship under normal use or service.
If a unit proves defective in materials or workmanship during the warranty period, Biometra will repair or replace it free of charge if returned to Biometra. Freight charges are not covered by warranty.

This warranty is limited to the product and, if applicable, to the standard original accessories. It is presumed that this device will exclusively be operated in accordance with Biometra's instructions.

This guarantee does not cover damage in transit, damage caused by carelessness, misuse or neglect, or unsatisfactory performance as a result of conditions beyond our control; or consequential losses as a result of failure of our product.

Certificate of Registration

QUALITY MANAGEMENT SYSTEM - ISO 9001:2008

This is to certify that:

Biometra GmbH
Rudolf-Wissell-Strasse 30
37079 Göttingen
Germany

Holds Certificate No: FS 68563

and operates a Quality Management System which complies with the requirements of ISO 9001:2008 for the following scope:

The design development and manufacture of equipment and accessories for investigation and research in molecular biology and biochemistry, including electrophoresis, thermocyclers and instruments for analysis of DNA. The sale and distribution of third party equipment. The provision of repair and calibration services for customers equipment.

For and on behalf of BSI:

Managing Director, BSI EMEA

Originally registered: 08/05/2003 Latest issue: 21/12/2009 Expiry Date: 20/12/2012

Page: 1 of 1

NEW PRODUCTS

TOptical Thermocycler

- **Free configurable with up to 6 color filter modules for excitation and detection of commonly used fluorescent dyes**
- **Up to 6 fold multiplexing**
- **Excitation by three different coloured long living LEDs**
- **Patented array of high performance optical fibers for loss-free excitation and detection of fluorescence**
- **Highly sensitive Channel Photo Multiplier (CPM) with efficient noise reduction**
- **TProfessional Thermocycler retrofittable with optical module**
- **Block with or without gradient function**
- **Excellent heating and cooling rates and temperature uniformity**
- **Easy to use software for creating experiments, for analysis and data export**

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TProfessional TRIO Thermocycler

- **Three independent Thermocyclers in one housing**
- **Runs three different programs at the same time**
- **Maximum throughput 144 samples**
- **Three different block formats available**
- **Intuitive easy spreedsheet and graphical programming**
- **Versatile USB functions**

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TProfessional Basic XL

- **Anodized XL block for extra large volumes up to 100µl**
- **Especially suited for emPCR and bisulfite conversion**
- **Available with or without gradient function**
- **High temperature uniformity**
- **High heating and cooling rates**
- **Easy programming**

Page 26

Divider-Plates for Eco-Mini Electrophoresis

- **Double gel capacity: Divider-Plate Set (incl. 2 combs)**
- **Run up to 4 gels in a single run**
- **No additional Casting Stand and Electrophoresis Module required**
- **Fixed glass spacers for easy handling**

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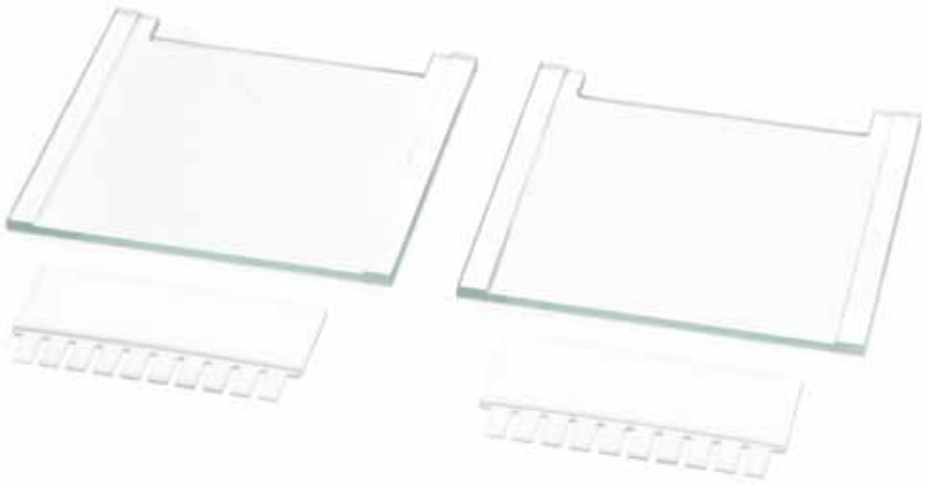

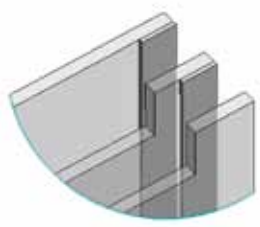

Compact Multi-Wide Electrophoresis

- **4 different gel sizes from 7 to 18 cm length**
- **Up to 192 samples per gel**
- **UV transparent gel trays**
- **Multichannel pipet compatible combs**
- **All-in-one gel casting system**

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BDAdigital

- **High-class digital single lens reflex camera with 12 megapixels**
- **Specifically developed software for „one-click" image acquisition**
- **Powerful BioDocAnalyze gel analysis software**
- **Choice of small darkhood or advanced hood version BDA Box**

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BioDocAnalyze Software

- **Basic revision of the popular BDA gel analysis software**
- **Optimized software interface for analyses in a few steps**
- **Helpful additional functions**
- **Part of BDA gel documentation systems or separate for import of jpg, tif or bmp files**

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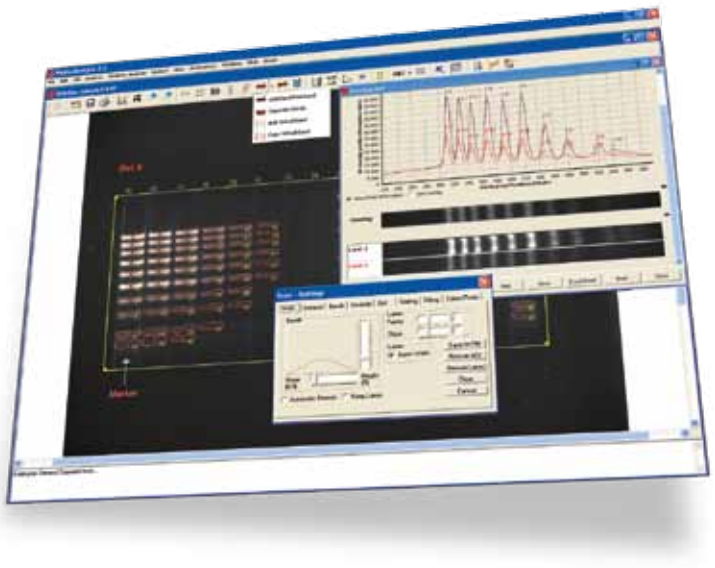

BLstar

- **Blue light LED illumination for e.g. green fluorescent stains**
- **Compact tables with 12.5 cm x 9 cm or 16 cm x 20 cm field of view**
- **Safe solution: No damage of DNA, no risk of UV exposure for users**

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TS1and TSC ThermoShaker

- **Increased mixing speed up to 1,800 rpm**
- ***NEW* temperature calibration function**
- ***NEW* interchangeable block modules for 24 x 1.5 ml and 24 x 2.0 ml**
- **Three instruments in one: thermomixer, mixer, incubator**

Pages 156 + 157

Thermostat KH-6

- **Space saving tower design**
- **Real Temperature Adjustment (RTA)**
- **5 selectable fixed temperatures**
- **Working temperature range = - 10 °C to + 80 °C**

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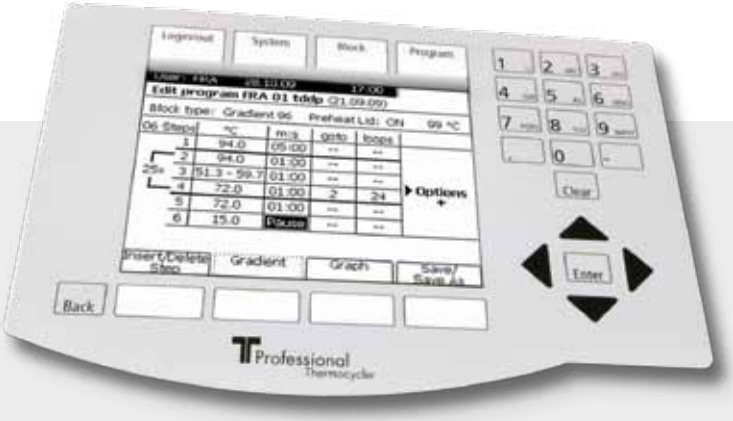
CONTENT

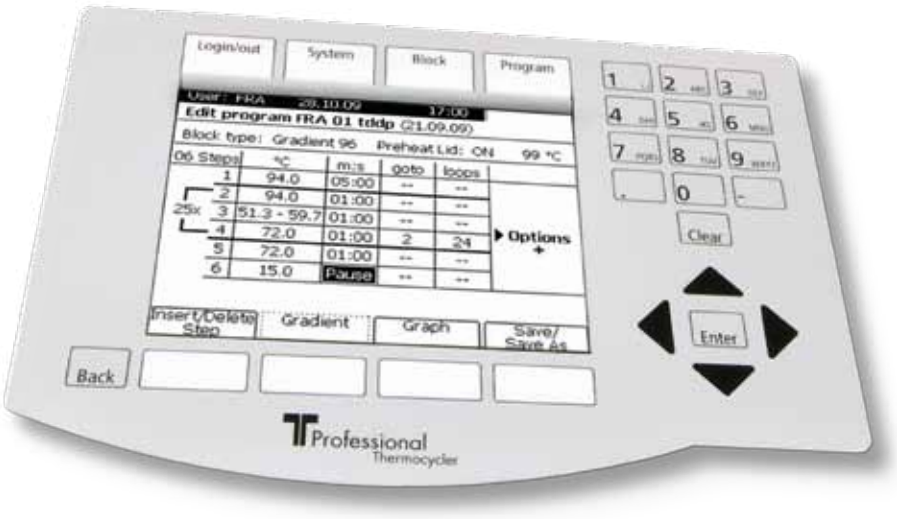

Edit program FRA 01 tdelp
Block type: Gradient 96
Preheat Lid: ON
99 °C
Options
Insert/Delete Step
Gradient
Graph
Back
Enter
Clear
Professional
Thermocycler

THERMOCYCLER

Thermocycler

Introduction

Biometra designs and manufactures thermocyclers for more than 20 years for all needs and all fields of application. No matter what tubes or plastic ware you are using, what sample volume or throughput you need, Biometra offers the right instrument.



High precision instruments

All Biometra Thermocyclers are high precision instruments. This becomes evident by the excellent temperature homogeneity provided by all Biometra sample blocks. To achieve highest heating and cooling rates, different technologies are used for the different thermocycler models.

High Performance Smart Lid (HPSL)

All Biometra Thermocyclers feature a special lid mechanics ensuring optimum pressure for all kind of tubes. This defined pressure is not only important to prevent condensation at the tube walls but also to ensure a tight contact between the tube walls and the sample block.
Only this tight contact guarantees an efficient heat transfer, thus enabling fast temperature equilibration of the reaction liquid. In addition, all Biometra instruments feature an extended lid frame that provides for a homogeneous temperature cushion above the block surface. Together with the high precision sample blocks, an excellent temperature homogeneity is achieved between all samples.

Easy Spreadsheet Programming (ESP)

All Biometra Thermocyclers provide spreadsheet programming. Avoiding endless serial program windows, all steps of a program are entered in a single screen. This makes the creation of new or editing existing programs fast and easy. The navigation with four cursor keys provides maximum convenience.

Low noise and heat emission

By using efficient Peltier technology and an intelligent power management, Biometra Thermocyclers are optimized for minimum power consumption.
Due to the low energy uptake the thermocycler heat sink does not require extensive ventilation during the heating and cooling phases. This is the basis for the low heat emission and silent operation of Biometra Thermocyclers.

Flexibility

Biometra Thermocyclers are as flexible as our customers needs. To support the usage of different types of plastic ware, we offer a broad range of exchangeable block modules for the TProfessional Thermocycler. The block modules can be exchanged within a few seconds. For the optimisation of new primer pairs they are also available with gradient function. Additionally, the TProfessional base unit can also be upgraded for Real-Time PCR by the TOptical block module.
The TProfessional TRIO is equipped with three blocks that allow to run three different protocols at the same time.

TOptical Thermocycler

The Real-Time PCR System with Maximum Flexibility

- **Free configurable with up to 6 color filter modules for excitation and detection of commonly used fluorescent dyes**
- **Up to 6 fold multiplexing**
- **Excitation by three different coloured long living LEDs**
- **Patented array of high performance optical fibers for loss-free excitation and detection of fluorescence**
- **Highly sensitive Channel Photo Multiplier (CPM) with efficient noise reduction**
- **TProfessional Thermocycler retrofittable with optical module**
- **Block with or without gradient function**
- **Excellent heating and cooling rates and temperature uniformity**
- **Easy to use software for creating experiments, for analysis and data export**

Modular block concept

The TOptical Thermocycler consists of the base unit of the TProfessional Thermocycler and the TOptical module. This modular system enables the upgrade of existing TProfessional Thermocyclers by the TOptical module to a complete real-time PCR Thermocycler. Simply insert the TOptical module and that's it – in a few seconds you can begin with real-time PCR. Or the TOptical module can be quickly exchanged for a TProfessional module and the TOptical Thermocycler be used as conventional thermocycler. For maximum flexibility five different modules in various block formats, ranging from 0.5 ml tubes up to 384 well microplates, are available.

Optional gradient function

Finding the best annealing temperature is, especially for real-time PCR experiments very important. Often time-consuming optimisation tests are conducted only limited, which leads to suboptimal results under routine conditions. To allow the testing of new primer combinations in a single run, the TOptical module optionally is available with gradient function.

With a gradient span of 40 °C and the linear gradient tool for programming of equal temperature increments between the 12 columns of the block the TOptical fulfills every wish for easy optimisation of real-time PCR assays. New primer pairs with unknown annealing temperatures can be tested quickly and new protocols are optimized in a very short time.

Flexible configuration with optical filter modules

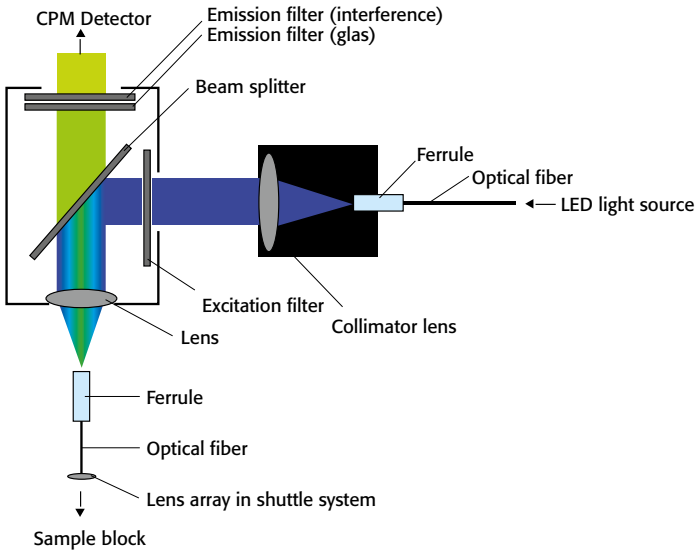
The patented* optical system of the TOptical Thermocycler provides a filter wheel for 6 color filter modules. The filter wheel can be freely equipped with color filter modules of choice. Furthermore, the system can also subsequently be upgraded with color filter modules and so the range of applications extended. In total 10 different color filter modules are available, covering the whole range of commonly used real-time PCR dyes, from the blue to the red absorption spectrum, including filter modules specially optimized for FRET applications.

*** Patent No. DE 2006 036 171 B4**

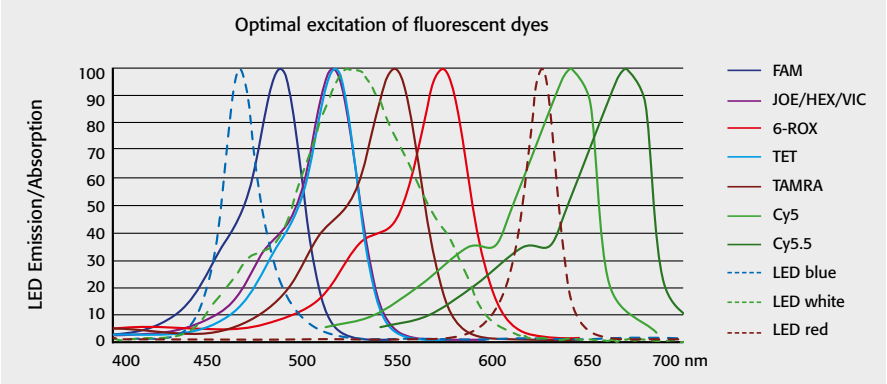
LED technology

The fluorescent dyes are excited by three LEDs in the colors blue, white and red. The combination of these three LEDs allows optimal excitation of fluorescent dyes over a wide spectral range. Unlike with so-called „wide blue" LEDs especially the short-wavelength blue spectral range and the long-wavelength red range are optimally covered. In combination with the high-performance optical fibers and the highly-sensitive Channel Photo Multiplier intensity losses in the quantum efficiency are avoided to ensure maximum sensitivity. Due to the excitation of each single well the use of passive reference dyes is not necessary, allowing multi-plexing of up to six targets. The longevity of the LEDs makes a regular exchange of the light source superfluous and thus helps avoid recurring costs.

TOptical Lightpath
Schematic drawing of the patented optical sytem. Fluorescent light for the excitation of dyes is emitted by the LEDs. The light is transmitted by high performance optical fibers to collimator lenses. The fluorescent light is bundled and transmitted to an excitation filter of a color filter module located on a rotating filter wheel. The light is deflected by a beam splitter and transferred by optical fibers to a lens array in a shuttle that scans the sample block column by column. The light excites the fluorescent dyes in the reaction mix. The fluorescent dyes then emit light of a higher wavelength that is collected by the lenses in the shuttle system and transferred by optical fibers back to the filter color module. In the color module the light passes the beam splitter and two emission filters and is then further transferred to the channel photo multiplier for detection.

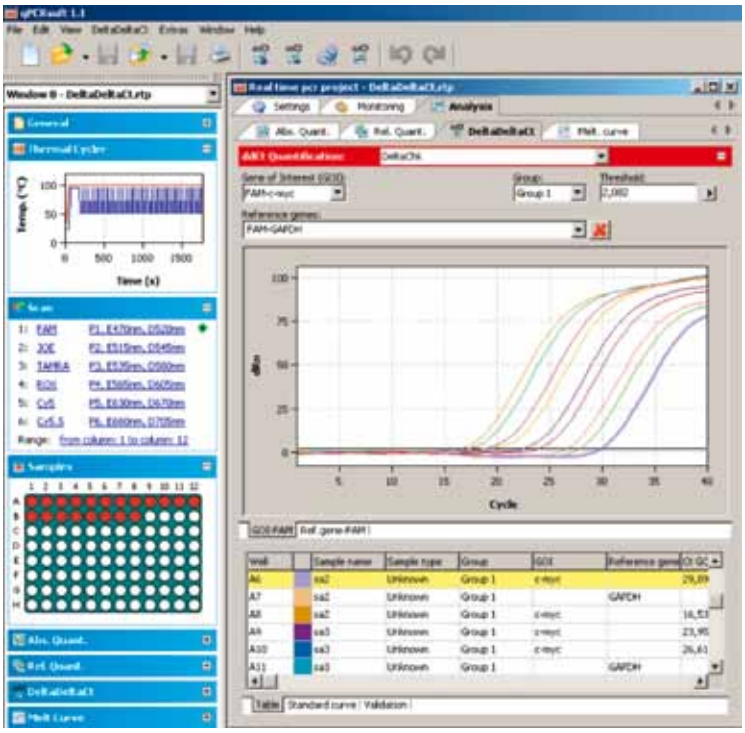


TOptical Excitation by LED
The excitation spetra of the blue, white and red TOptical LED (dotted lines) cover very well the absorption spectra of the commonly used fluorescent dyes FAM, JOE/HEX/VIC, 6-ROX, TET, TAMRA, CY5 and Cy 5.5 (solid lines). In combination with the beam transfer by high perfomance optical fibers superb sensitivity is achieved.



Software

The TOptical Thermocycler is controlled by PC software qPCRsoft. The software is especially developed to provide ease of use and clear arrangement of functional elements.
It includes the same easy spreadsheet or graphical programming function as the TProfessional Thermocycler. Information on sample is entered in a well arranged plate scheme that provides a comprehensive overview at a glance. Typical evaluation methods of the real-time PCR such as ΔΔCt method, absolute quantification, relative quantification, allelic discrimination, genotyping and efficiency calculation are already integrated. In addition, the software features the export of data as *.csv format or Excel files for further external analysis.



Practice of patented polymerase chain reaction (PCR) process requires a license. Please see Appendix, page 181.

Order Information

Item	Properties	Dyes	Order No.
TOptical Gradient 96 Thermocycler	without color filter module	–	070-500
TOptical 96 Thermocycler	without color filter module	–	070-501
TOptical Gradient 96 module	without color filter module	–	070-510
TOptical 96 module	without color filter module	–	070-511
TOptical filter module 1	470 nm / 520 nm	FAM, SYBR Green, Alexa488	070-520
TOptical filter module 2	515 nm / 545 nm	JOE, VIC, HEX, Yakima Yellow	070-521
TOptical filter module 3	535 nm / 580 nm	TAMRA, DFO, Alexa 546, NED	070-522
TOptical filter module 4	565 nm / 605 nm	ROX, TexasRed, Cy3.5	070-523
TOptical filter module 5	630 nm / 670 nm	Cy5, Alexa 633, Quasar 670	070-524
TOptical filter module 6	660 nm / 705 nm	LightCycler Red 705, Alexa 680	070-525
TOptical FRET filter module 1	470 nm / 580 nm	FAM / TAMRA	070-526
TOptical FRET filter module 2	470 nm / 670 nm	FAM / Cy5	070-527
TOptical FRET filter module 3	470 nm / 705 nm	FAM / Cy5.5	070-528
TOptical FRET filter module 4	515 nm / 670 nm	JOE / Cy5	070-529

Additional filter combinations available on request

TOptical Thermocycler

Technical Specifications

Block format	96 well
Lid temperature	30 – 99 °C
Temperature gradient	40 °C
Max. heating rate	6.0 °C / sec
Avg. heating rate	5.0 °C / sec
Max. cooling rate	4.5 °C / sec
Avg. cooling rate	3.5 °C / sec
Ramp adjustment	min 0.1 °C / sec, max. 5.0 °C / sec
Block temperature uniformity (15 sec after clock starts)	± 0.15 °C at 55 °C ± 0.25 °C at 72 °C ± 0.50 °C at 95 °C
Control accuracy	± 0.10 °C
Temperature range	3 – 99 °C
Temperature increments	min. 0.1 °C / cycle
Time increments	min. 1 sec / cycle
Heated Lid	manual opening mechanism, automatic pressure application
Contact pressure heated lid	10 kg, automated
Control mode	remote controlled via PC
No. of programs	unlimited on PC
Dimensions	28 cm x 38 cm x 43 cm, 28 cm x 64 cm x 43 cm when opened
Weight	15.6 kg (TOptical module 7.4 kg, TProfessional base unit 8.2 kg)
Power supply	100 V, 110 V, 230 V
Operating conditions	15 °C to 35 °C, max. 70 % humidity, max. 2000 m height
Supported plastic ware	96 well microplates with adhesive optical foil, strips of 8, 0.2 ml with optical lids, 0.2 ml single tubes with optical lids
Sensitivity	1nmol/l FAM at 30 µl sample volume in a 96 well PCR plate
Measuring time	96 well plate (single measurement, 6 colors) appr. 6 sec
Measuring range	± 130 000 bit (±17 bit)
Block capacity	96 well
Sample volume	10 – 80 µl
Light source	Three long living high power LEDs (blue, white, red)
Filter	Filterwheel with stepping motor, 6 positions for color modules
Lightpath	An array of 8 high performance optical fibers in a shuttle system directs LED light bundled by lenses to samples. The fluorescent dyes in the reaction mix are excited from above through the lid of the tubes. The reflected light is focused by lenses and directed through optical fibers to the photomultiplier
Detector	Highly sensitive channel photo multiplier (CPM), Optimal signal/noise ration by effective noise reduction (decreased SNR (signal/noise ratio)-technology)
Color modules	6 color modules for all commonly used Real-Time PCR dyes, 4 FRET filter combinations

Software

qPCRsoft	Control and analysis software
Analysis methods	Absolute quantification, Relative quantification, ΔΔCt method, Allelic discrimination, Genotyping, Efficiency calculation
Export functions	Excel, *.csv files
Security	Administrator function

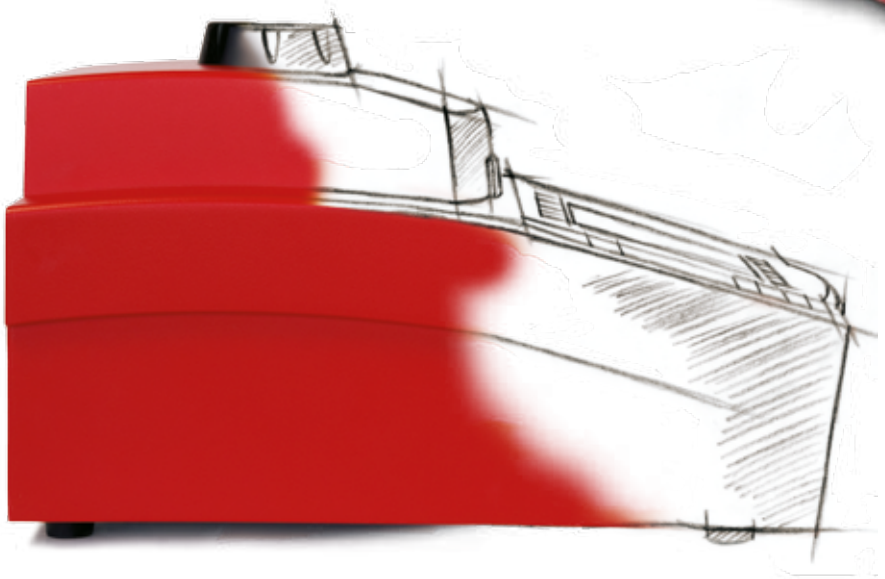
TProfessional Family

The Biometra TProfessional Thermocycler Family is inspired by the idea to simplify molecular biology research. Driven by Biometra's 20-year experience in Thermocycler design and production the TProfessional Thermocyclers were developed to set new a unrivalled standard. The instruments combine high end technology with functional and elegant design. Due to the energy efficient design of the housing, lid and block very high speed and excellent temperature uniformity are realised. Maximum comfort is provided to the user by the large display and innovative operating software. The result is four easy to use instruments with excellent technical specifications and highest ease of use:

1. **TProfessional Basic** for routine applications
2. **TProfessional Standard** with high speed silver block for advanced demands
3. **TProfessional** with high speed silver block and block exchange system for maximum flexibility
4. **TProfessional TRIO** with three independent blocks to run different PCR protocols in parallel or for high throughput purposes.

High Performance Smart Lid

The TProfessional Lid has been optimised to achieve two essential requirements: prevention of condensation and reliable contact between samples and thermoblock. The lid is powered by Biometra's well known Smart Lid technology with integrated clutch mechanism which automatically limits the lid pressure applied to the plastic ware and thus saves tubes from damage. This also ensures reproducible conditions amongst different PCR runs. In addition, due to the new design of the High Performance Smart Lid, by formation of a homogeneous air cushion an even temperature distribution between the samples is ensured, significantly improving temperature uniformity. With one press on the front button, the lid gently swings open and arrests in its end position. Moreover the robustness of the lid's mounting serves for a long lifetime.



Air stream design

The elegant TProfessional housing is designed for heavy use. Due to an optimised air stream design even higher efficiency and better temperature uniformity is achieved. Therefore the instrument works quietly and consumes little power which in turn leads to low heat emission. The compact footprint saves valuable bench space. Keypad and display have been set to an angle that ensures reflection-free viewing and ergonomic programming.

Easy spreadsheet or graphical programming

The TProfessional user interface incorporates Biometra's proven easy spreadsheet programming philosophy. All steps of a program are entered in a single screen avoiding endless serial programming windows. This makes the creation of new or editing of existing programs fast and easy. One touch leads from the spreadsheet to the alternative graphical programming mode. Programming of gradients has never been easier due to the linear gradient tool. The TProfessional manages up to 30 individual users (optionally password protected) and features larger memory for increased program capacity. Supervisor functions provide easy administration of user directories.

Quickstart of the last five programs

The TProfessional displays the five most recently used programs for quick start. Thus, commonly used programs can be started without searching the user directory. The last programs are saved for each user individually.

Pre-installed protocols

All Thermocyclers of the TProfessional family have a folder with pre-installed protocols for various PCR applications. The protocols can be copied into any user directory and modified specifically. The pre-installed protocols therefore offer an excellent tool to obtain the desired result as quickly as possible and without much programming effort.

Convenient setup of temperature gradients* or temperature optimisations steps**

Gradient steps are defined in a graphical screen, showing the individual temperature for each row. Another useful feature is the Linear Gradient Screen, where linear gradients with fixed temperature increments between the single rows can be programmed. Alternatively, the temperature gradient can be defined directly in the programming spreadsheet.
For the TProfessional TRIO Thermocycler by the new Temperature Optimisation function gradient-like programs, delivering three different annealing temperatures at a certain step can be created easily.

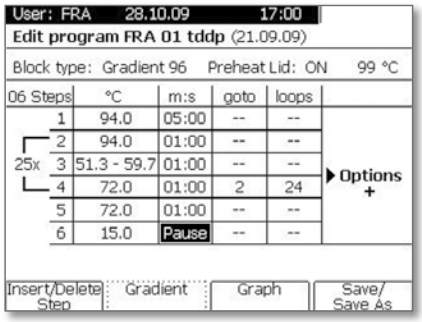
*** only for gradient enabled instruments**
**** only für TProfessional TRIO**

Network capability

TProfessional Manager Software allows to control up to 5 Thermocyclers of the TProfessional family*** in a powerful network. PCR runs can be managed and monitored and versatile memory management functions allow easy synchronisation of the connected TProfessional Thermocyclers.
Detailed run log files provide GLP conform documentation of PCR runs.
See also page 29.

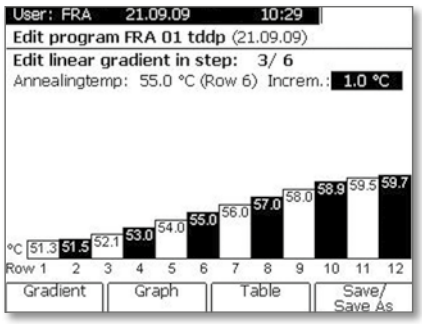
***** except TProfessional TRIO**

Programming

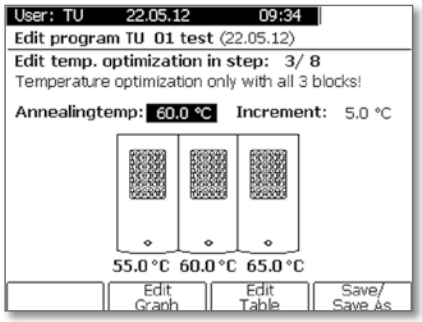


Quickstart

Gradient



Temperature optimisation step



TProfessional Thermocycler

Premium Performance with Maximum Flexibility

TProfessional Thermocycler

PCR licensed and authorized

- **High speed silver block**
- **Quick block exchange**
- **Seven different block modules**
- **Excellent temperature uniformity**
- **Upgradeable for Real-Time PCR**

High speed silver block

To achieve ultimate performance the TProfessional 96 well and 60 well modules are made of silver. Thanks to the excellent heat conductivity of silver, the block equilibrates extremely fast and provides maximum speed and temperature uniformity. To protect the valuable silver blocks against corrosion, the block surface is covered with a gold layer.

Exchangeable block modules

The TProfessional offers seven different block modules that can be exchanged in less than 10 seconds. The quick exchange block modules are automatically recognized and initialised by the thermocycler. The 96 well and 60 well modules are available with gradient option for quick optimisation of new protocols. With an extremely wide gradient span of 40 °C the blocks can be used for a variety of other applications such as e.g. restriction digests or protein crystallization. For high throughput applications a 384 well block is available.

Real-Time PCR

By the TOptical module the TProfessional can be upgraded to a Real-Time PCR thermocycler. The block exchange is as easy as with standard PCR block modules and can be carried out within a few seconds. The TOptical module is optionally available with or without a gradient function. See also page 17.

TProfessional

Order number	Item	Block format	Suitable plastic ware
070-900	TProfessional 60	60 well	0.5 ml tubes
070-901	TProfessional 96	96 well	0.2 ml tubes, plates, strips
070-902	TProfessional 384	384 well	384 well plates
070-800	TProfessional Gradient 60	60 well	0.5 ml tubes
070-801	TProfessional Gradient 96	96 well	0.2 ml tubes, plates, strips

TProfessional Thermocycler block modules

Order number	Block format	Suitable plastic ware	Max. heating and cooling rate
070-810	60 well Gradient	0.5 ml tubes	6.0 / 4.5 °C per sec
070-910	60 well	0.5 ml tubes	6.0 / 4.5 °C per sec
070-811	96 well Gradient	0.2 ml tubes, plates, strips	6.0 / 4.5 °C per sec
070-911	96 well	0.2 ml tubes, plates, strips	6.0 / 4.5 °C per sec
070-912	384 well	384 well plates	2.2 / 1.7 °C per sec

TProfessional Thermocycler Real-Time PCR block modules

Order number	Block format	Suitable plastic ware	Max. heating and cooling rate
070-510	96 well Gradient TOptical	0.2 ml tubes, plates, strips	6.0 / 4.5 °C per sec
070-511	96 well TOptical	0.2 ml tubes, plates, strips	6.0 / 4.5 °C per sec

Practice of patented polymerase chain reaction (PCR) process requires a license. Please see Appendix, page 181.

Technical Specifications
see page 30 – 31

Ordering Information
see page 33 – 34

TProfessional Standard Thermocycler

Top Performance for Advanced Demands

TProfessional standard Thermocycler

PCR licensed and authorized

- **High speed silver block**
- **Five different block modules**
- **Excellent temperature uniformity**
- **Same features as the TProfessional Thermocycler**
- **Available as SL version for plates with raised rim**

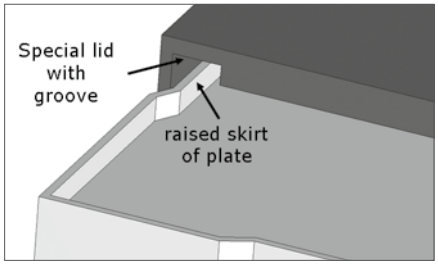
The TProfessional Standard Thermocycler offers the same technical features as the TProfessional Thermocycler, but in contrast to that has a fixed block that cannot be exchanged.

High speed silver block

To achieve ultimate performance the TProfessional Standard 96 well and the 60 well block are made of silver. Thanks to the excellent heat conductivity of silver, the block equilibrates extremely fast and provides maximum speed and temperature uniformity. Both block variants are available with gradient option for quick optimisation of new protocols. To protect the valuable silver blocks against corrosion, the block surface is covered with a gold layer. For high throughput applications a 384 well block is available.

TProfessional Standard SL

The TProfessional Standard SL features a special heated lid that additionally allows to incubate plates with raised rim. Regardless if low-profile 0.1ml plates, 0.2 ml standard plates, tubes or stripes all kind of plastic ware can be used with the heated lid of the Standard SL.



TProfessional Standard SL heated lid

TProfessional Standard

Order number	Item	Block format	Suitable plastic ware
070-950	TProfessional Standard 60	60 well	0.5 ml tubes
070-951	TProfessional Standard 96	96 well	0.2 ml tubes, plates, strips
070-971	TProfessional Standard SL 96	96 well	0.2 ml tubes, plates (also with raised rim), strips
070-952	TProfessional Standard 384	384 well	384 well plates
070-850	TProfessional Standard Gradient 60	60 well	0.5 ml tubes
070-851	TProfessional Standard Gradient 96	96 well	0.2 ml tubes, plates, strips
070-871	TProfessional Standard Gradient SL 96	96 well	0.2 ml tubes, plates (also with raised rim), strips

Practice of patented polymerase chain reaction (PCR) process requires a license. Please see Appendix, page 181.

Technical Specifications
see page 30 – 31
Ordering Information
see page 33 – 34

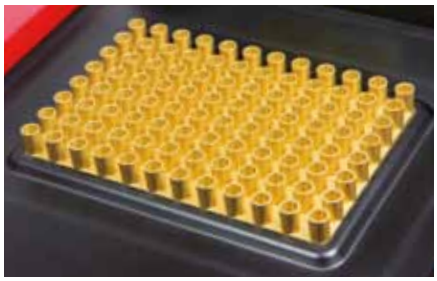
TProfessional Basic Thermocycler

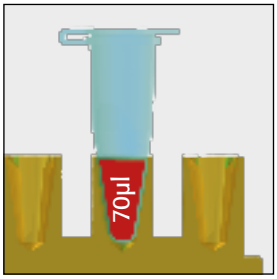
Professional Technology for Routine Applications

- **Gold anodised or anodized XL sample block**
- **Available with or without gradient function**
- **High temperature uniformity**
- **High heating and cooling rates**

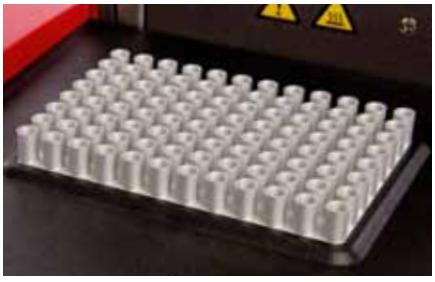
Gold anodised 96 well or anodised 96 well XL sample block

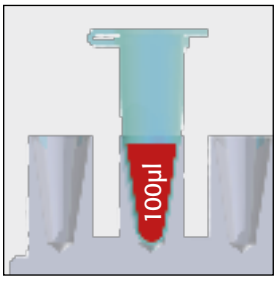
The TProfessional Basic makes the TProfessional technology affordable for routine applications. The instrument features a gold anodised 96 well block for standard volumes up to 70 µl or an anodised XL block for extra large volumes up to 100 µl such as sample preparation for Next Generation Sequencing or bisulfite conversion for DNA methylation studies. Both blocks offer the identical heating and cooling rates and superior temperature uniformity. The TProfessional Basic provides full functionality of easy spreadsheet and graphical programming and user specific quick start of the last five programs. Both blocks are optionally available with gradient function for the quick optimisation of new primer pairs.





96 well block





96 well XL block

TProfessional Basic

Order number	Item	Block format	Suitable plastic ware
070-601	TProfessional Basic Gradient	96 well	0.2 ml tubes, plates, strips
070-602	TProfessional Basic Gradient XL 96	96 well XL	0.2 ml tubes, plates, strips
070-701	TProfessional Basic	96 well	0.2 ml tubes, plates, strips
070-702	TProfessional Basic XL 96	96 well XL	0.2 ml tubes, plates, strips

Practice of patented polymerase chain reaction (PCR) process requires a license.
Please see Appendix, page 181.

Technical Specifications
see page 30–31
Ordering Information
see page 33–34

TProfessional TRIO Thermocycler

Three Thermocyclers in one for Maximum Flexibility and High Sample Throughput

- **Three independent thermocyclers in one housing**
- **Runs three different programs at the same time**
- **Maximum throughput 144 samples**
- **Three different block formats available**
- **Intuitive easy spreedsheet and graphical programming**
- **Versatile USB functions**

Three independent Thermocyclers in one instrument

The TProfessional TRIO Thermocycler offers three independent blocks in one housing thus different independent protocols can be run at the same time. Moreover by the new temperature optimisation function gradient-like programs, delivering three different annealing temperatures can be created easily. This makes the TProfessional TRIO Thermocycler the perfect instrument for laboratories with the demand for high flexibility and the need to often optimise new PCR-protocols. With a maximum capacity of 3 x 48 wells the TProfessional TRIO also offers high throughput in parallel.
The TProfessional TRIO Thermocycler is available in three different block versions for 48 x 0.2 ml tubes, 30 x 0.5 ml tubes or as combi block version for 48 x 0.2 ml or 18* x 0.5 ml tubes.

* **capacity increases to 35 x 0.5 ml tubes by use of small cap tubes**

Easy programming

The TProfessional TRIO Thermocycler offers the intuitive TProfessional software with easy spreadsheet programming philosophy. New programs are easily created in a well arranged screen that avoids the need to toggle between different windows. This makes the creation of new or editing existing programs fast and easy. One touch leads from the spreadsheet to an alternative graphical programming mode. Four softkeys directly below the display offer quick access to all functions needed in the individual context and four menu buttons above the display to the main menus. For easy retrieval, programs can be stored in 30 individual subdirectories (optionally password protected). By the administrator function the accumulation of unused programs or user directories can be managed to keep the memory content up-to date.

Keyboard and display are arranged at an angle to ensure reflection-free viewing and ergonomic programming.

High speed

By the elegant housing with improved air stream design and a completely new hardware environment the TProfessional TRIO achieves higher heating and cooling rates and better temperature uniformity. High ramping rates provide both short experimental times and increased specificity. The instrument works quietly and consumes little power, which in turn leads to low heat emission. The compact footprint saves valuable bench space.

Smart lid technology

The TProfessional TRIO Thermocyclers heated lids prevent condensation and provide reliable contact between samples and thermoblock. The lids are powered by Biometra's well known Smart Lid technology with integrated clutch mechanism which automatically limits the lid pressure applied to the plasticware and thus saves tubes from damage. In addition by formation of a homogeneous air cushion an even temperature distribution between the samples is ensured, significantly improving temperature uniformity. This also ensures reproducible conditions amongst different PCR runs.
The temperature of the independently working lids can be set individually in a range between 30 and 99 °C. This ensures optimal conditions also for other applications as PCR like e.g. enzymatic restriction reactions. With one press on the front button, the lids gently swing open and arrest in their end position. In combination with the now easier to access blocks this provides a maximum of convenience to the customer.

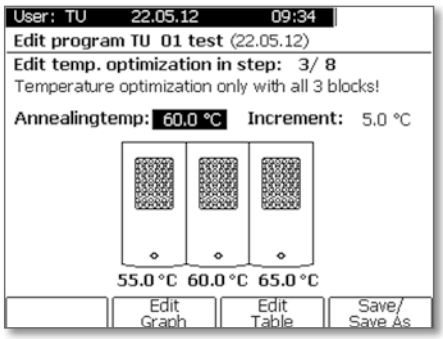
USB functions

The TProfessional TRIO Thermocycler is equipped with two USB ports. The USB B port serves for the connection of the thermocycler to a computer and the USB A port to connect a USB stick.
By using the USB functions it is very easy to synchronize the memory contents of instruments by the exchange of PCR-protocols. The USB functions are the ideal tool for administration of TProfessional TRIO Thermocyclers and to expand the memory capacity.

Convenient setup of Temperature Optimisation Steps

To find the optimal annealing temperature of new primer pairs the TProfessional TRIO Thermocycler offers the new Temperature Optimisation Step function. By making use of the three independent blocks the Temperature Optimisation Steps provide different annealing temperatures in a gradient-like fashion.
In the corresponding screen just enter an annealing temperature for the block in the middle and an increment, defining the temperature difference for the first and third block. For maximum ease of use programs containing Temperature Optimisation Steps automatically start on all three blocks so there is no need to start and stop the blocks individually. For easy identification during programming the Temperature Optimisation Steps are indicated by a staircase shaped icon (see figure Easy spreadsheet programming) and corresponding protocols become saved with the extension "TOS" (see figure Quick Start of the last five programs).

Temperature Optimisation Step programming



The annealing temperature defines the temperature for central block at this step and the increment the temperatures for the first and third block.

Order number	Item	Block format	Suitable plastic ware
070-720	TProfessional TRIO 30	3 x 30 well	0.5 ml tubes
070-723	TProfessional TRIO 48	3 x 48 well	0.2 ml tubes, plates, strips
070-724	TProfessional TRIO combi	3 x 48 well / 18* well combi	0.2 ml tubes, plates, strips or 0.5 ml tubes

*** capacity increases to 35 x 0.5 ml tubes by use of small cap tubes**

Practice of patented polymerase chain reaction (PCR) process requires a license. Please see Appendix, page 181.

Technical Specifications
see page 30–31
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see page 33–34

TProfessional Manager Software

For Controlling TProfessional Thermocycler in a Powerful Network

- **Same user interface as TProfessional Thermocycler**
- **Open, edit and save programs**
- **Copy programs and user directories**
- **MCF – memory cloning function**
- **GLP conform documentation**

The TProfessional Manager Software allows to control up to 5 thermocycler of the TProfessional family* in a powerful network. PCR runs can be managed and monitored and versatile memory management functions allow easy synchronisation of the connected TProfessional Thermocyclers. Detailed run log files provide GLP conform documentation of PCR runs.

*** except TProfessional TRIO**

User interface

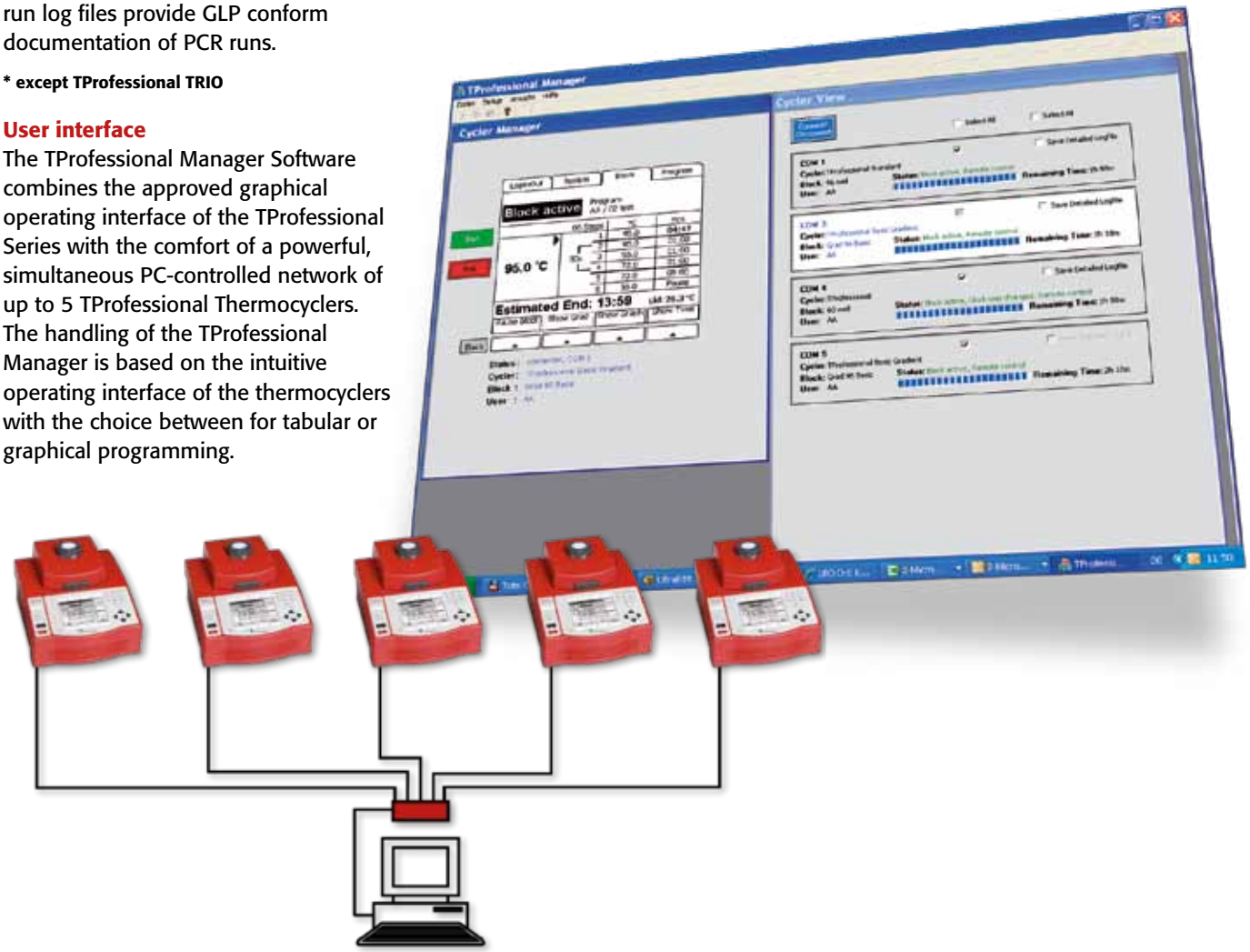
The TProfessional Manager Software combines the approved graphical operating interface of the TProfessional Series with the comfort of a powerful, simultaneous PC-controlled network of up to 5 TProfessional Thermocyclers. The handling of the TProfessional Manager is based on the intuitive operating interface of the thermocyclers with the choice between for tabular or graphical programming.

Memory management

The software allows the user to create, edit and save programs. Single user directories and programs can be easily copied and exchanged between the PC and the TProfessional Thermocylers. The MCF – memory cloning function allows to copy the complete memory contents between different TProfessional Thermocyclers. By this function all user directories including programs can be exchanged.

Documentation

For GLP conform documentation of PCR runs detailed log-files including temperature data can be generated and saved. During the PCR the software each second records the temperature data of the block sensors. By the extended self test the connected instruments perform a program that intensively checks all relevant functions. Moreover Service Info Files can be created that may serve the Biometra service department for rapid remote failure diagnosis if problems occur.



Order number	Item
070-070	TProfessional Manager Software, license file for unrestricted use

Ordering Information

see page 33

TPersonal Thermocycler

The Personal Cycler with the Maximum Power

- **Small footprint**
- **High throughput**
- **Fast heating and cooling**

Small footprint

The TPersonal is a highly integrated instrument. With a footprint of only 22 cm x 31 cm the TPersonal occupies minimum space on your lab bench.

Three different block formats

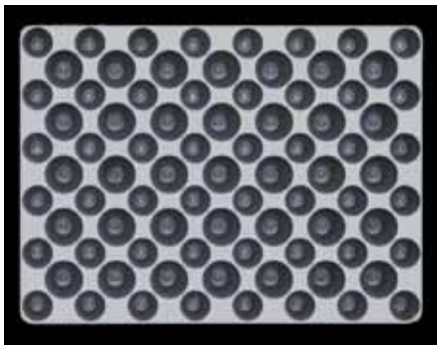
The TPersonal comes in three different block formats. The 48 well version can be used with 0.2 ml tubes, strips and 48 well microplates. Only few other Thermocyclers in this segment offer such a high sample capacity. The 20 well version is designed for 0.5 ml tubes. For maximum flexibility we also offer a combi-block version. The combi-block holds 48 x 0.2 ml tubes (strips or microplates) or 18 x 0.5 ml tubes.

High sample capacity

In the TPersonal 48 a maximum of 48 x 0.2 ml tubes can be run at the same time. This instrument can also be used with 48 well microplates or strips.

High speed

A new class of Peltier elements has been used in the TPersonal providing not only fast heating but also fast cooling. Most conventional Thermocyclers provide higher heating than cooling rates because due to thermodynamic principles, cooling is more energy consuming than heating. In contrast, due to its improved technology, the TPersonal is ideally equipped to ensure specific reaction conditions and short run times.



Easy to program

Navigation by cursor keys, four function keys as well as online help make programming of the TPersonal very easy. All program parameters can be set in one spreadsheet without the need to go through a never-ending flow of different screens. For maximum convenience programs can be stored in subdirectories. In the programming mode as well as during cycling all important parameters are displayed in a large backlight graphical display. The TPersonal Thermocycler can be controlled in network by the Thermocycler Manager PC software.

High Performance Smart Lid (HPSL)

The TPersonal is the first personal cycler featuring the High Performance Smart Lid technology. The adjustable heated lid applies a consistent, optimum pressure, irrespective of the type of plastic ware used. This ensures a perfect fit between the tubes and the block, leading to highly efficient heat transfer. Due to this automatic control mechanism, the samples cannot be damaged and condensation of the reaction mixture is totally prevented.

TPersonal Thermocycler

Order number	Item	Block format	Suitable plastic ware
050-550	TPersonal 20	20 well	0.5 ml tubes
050-551	TPersonal 48	48 well	0.2 ml tubes, plates, strips
050-552	TPersonal combi	48 well / 18* well combi	0.2 ml tubes, plates, strips or 0.5 ml tubes

*** capacity increases to 35 x 0.5 ml tubes by use of small cap tubes**

Practice of patented polymerase chain reaction (PCR) process requires a license. Please see Appendix, page 181.

Technical Specifications
see page 30 – 31
Ordering Information
see page 33 – 34

TRobot Thermocycler

The Perfect Solution for Integration in Robotic Systems

TRobot Thermocycler
PCR licensed and authorized

- **Small footprint (17 cm x 13 cm)**
- **Unique: Motorised plate lifter**
- **Motorised heated lid**
- **Easy integration in robotic systems from various suppliers**

Optimised for integration in robotic systems

The TRobot Thermocycler is specifically designed for integration in Robotic systems. Due to its minimum footprint the TRobot ideally fits robotic platforms where space naturally is limited. The TRobot is equipped with a motorised plate lifter which allows the removal of plates by a robotic arm.

Unique: Motorised plate lifter

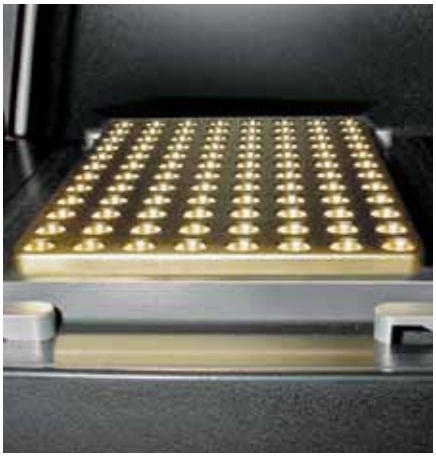
Removing plates after thermocycling is one of the major challenges in automisation. With conventional thermocycler systems, the plates frequently stick to the thermoblock after thermocycling. Consequently, they cannot be removed by a robotic arm and the whole system halts. To overcome this problem the TRobot has been equipped with a patented motorised plate lifter. This lifter elevates the plate from the block as the lid opens. Once lifted, the plate can be easily removed by the robotic arm.

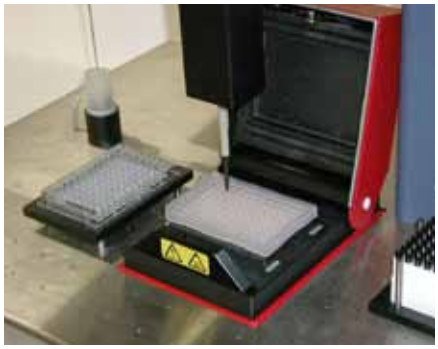
Two different block models

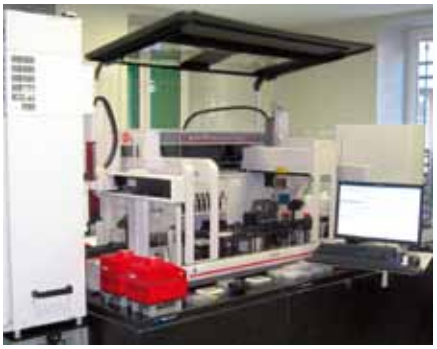
The TRobot is available in two different block versions for 96 well and 384 well plates. Taking advantage of the high thermal conductivity of silver the TRobot 96 achieves high ramping rates as well as excellent temperature uniformity. The TRobot 384 achieves perfect fit for 384 well plates. The 384 well block is coated with a special alloy to facilitate plate removal by a robotic arm.

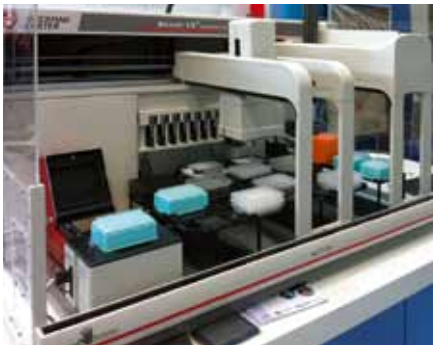
Software integration

In a robotic environment the TRobot is controlled by the PC of the robot. Integration of the Biometra Thermocycler Manager software allows quick access to all thermocycler functions. Alternatively, the TRobot control can be directly implemented into the control software of the robotic system. For this purpose a comprehensive description of the serial communication commands is available.









TRobot Thermocycler

Order number	Item	Block format	Suitable plastic ware
050-991	TRobot 96	96 well	96 well plates (0.2 ml tubes, strips)
050-992	TRobot 384	384 well	384 well plates

Practice of patented polymerase chain reaction (PCR) process requires a license.
Please see Appendix, page 181.

Technical Specifications
see page 30–31
Ordering Information
see page 33–34

Thermocycler

Technical Specifications

	TProfessional	TProfessional Standard	TProfessional Basic
Features	High Speed Large graphical Display Exchangeable Blocks Gradient version available	High Speed Large graphical Display Gradient version available	Large graphical Display Easy Spreadsheet programming Gradient version available
Block exchangeable	Yes	-	-
Block formats	60 well 96 well 384 well	60 well 96 well 384 well	96 well 96 well XL
Program memory	350 average programs	350 average programs	350 average programs
Temperature range	3 – 99 °C	3 – 99 °C	3 – 99 °C
Temperature gradient*	40 °C	40 °C	26 °C
Cool samples to 4 °C	Yes	Yes	Yes
Maximum heating	6.0 °C / sec	6.0 °C / sec	3.5 °C / sec
Maximum cooling	4.5 °C / sec	4.5 °C / sec	2.5 °C / sec
Average heating	5.0 °C / sec	5.0 °C / sec	3.0 °C / sec
Average cooling	3.5 °C / sec	3.5 °C / sec	2.0 °C / sec
Temperature Uniformity (15 sec after clock starts)	± 0.15 °C at 55 °C ± 0.25 °C at 70 °C ± 0.50 °C at 95 °C	± 0.15 °C at 55 °C ± 0.25 °C at 70 °C ± 0.50 °C at 95 °C	± 0.20 °C at 55 °C ± 0.30 °C at 70 °C ± 0.60 °C at 95 °C
Control accuracy	± 0.1 °C	± 0.1 °C	± 0.1 °C
Display	¼ VGA screen, 320 x 240 pixel	¼ VGA screen, 320 x 240 pixel	¼ VGA screen, 320 x 240 pixel
Auto restart after power failure	Yes	Yes	Yes
Programming modes	Easy Spreadsheet Programming (ESP) Graphical programming	Easy Spreadsheet Programming (ESP) Graphical programming	Easy Spreadsheet Programming (ESP)
Software options	Toggle between spreadsheet and graphical mode, gradient temperature graph*, adjustable ramp rates, extended self test, service files, automatic block recognition, PC control by TProfessional Manager Software	Toggle between spreadsheet and graphical mode, gradient temperature graph*, adjustable ramp rates, extended self test, service files, PC control by TProfessional Manager Software	Adjustable ramp rates, extended self test, service files, PC control by TProfessional Manager Software
Quick start of the last 5 programs	Yes	Yes	Yes
High Precision Smart Lid	Yes	Yes	Yes
Lid temperature range	30 – 99 °C	30 – 99 °C	30 – 99 °C
Max. power consumptiom	480 Watt	480 Watt	480 Watt
Noise emission	Very low	Very low	Very low
Interfaces	RS232 serial port	RS232 serial port	RS232 serial port
Dimensions (W x D x H)	28 cm x 38 cm x 24 cm	28 cm x 38 cm x 24 cm	28 cm x 38 cm x 24 cm

*** Applies to models with gradient feature**

	TProfessional TRIO	TPersonal	TRobot
Features	Three independent blocks Large graphical display High parallel thoughput Compact footprint	Compact footprint High capacity	Motorised lid Plate lifter
Block exchangeable	-	-	-
Block formats	30 well 48 well combi	20 well 48 well combi	96 well 384 well
Program memory	350 average programs	250 average programs	250 average programs; unlimited on PC
Temperature range	3 – 99 °C	3 – 99 °C	-3 – 99 °C
Temperature gradient*	Temperature Optimisation Step	-	-
Cool samples to 4 °C	Yes	Yes	Yes
Maximum heating	5.0 °C / sec	n.d.	n.d.
Maximum cooling	4.5 °C / sec	n.d.	n.d.
Average heating	4.2 °C / sec	3 °C / sec	3.5 °C / sec
Average cooling	3.8 °C / sec	3 °C / sec	2.5 °C / sec
Temperature Uniformity (15 sec after clock starts)	+/- 0.20 °C at 50 °C +/- 0.30 °C at 70 °C +/- 0.60 °C at 95 °C	± 0.5 °C	± 0.5 °C
Control accuracy	± 0.1 °C	± 0.1 °C	± 0.1 °C
Display	¼ VGA Screen, 320 x 240 pixel	High brightness CFL backlight graphical LC Display, 256 x 64 dots	-
Auto restart after power failure	Yes	Yes	Yes
Programming modes	Easy Spreadsheet Programming (ESP) Graphical programming	Spreadsheet Programming	PC software
Software options	Toggle between easy spreadsheet and graphical mode, adjustable ramp rates, time and temperature increments, extended self test, service info files, Temperature Optimsation Step (TOS), versatile USB functions for exchange of PCR-protocols	Adjustable ramp rates, time increments, temperature increments, PC control by Thermocycler Manager Software	Adjustable ramp rates, time increments, temperature increments, PC control by Thermocycler Manager Software
Quick start of the last 5 programs	Yes	-	-
High Precision Smart Lid	Yes	Yes	Yes
Lid temperature range	30 – 99 °C	30 – 99 °C	30 – 99 °C
Max. power consumptiom	1000 Watt	380 Watt	350 Watt
Noise emission	Very low	Very low	Very low
Interfaces	USB B, USB A	RS232 serial port	RS232 serial port
Dimensions (W x D x H)	30 cm x 38 cm x 19 cm	22 cm x 31 cm x 15 cm	17 cm x 23 cm x 20 cm

*** Applies to models with gradient feature**

Thermocycler Capacity and Suitable Consumables

Thermocycler	Consumable	Tubes 0.2 ml	Tubes 0.5 ml	Strips 8 x 0.2 ml	Plates 48 well	Plates 96 well	Plates 96 well (white, for qPCR)	Plates 384 well
	Order No.	050-310	050-320	050-214 050-215	050-225	050-232	050-259	050-240
TProfessional Gradient 60	070-800	-	60	-	-	-		-
TProfessional Gradient 96	070-801	96	-	12	2	1		-
TProfessional 60	070-900	-	60	-	-	-		-
TProfessional 96	070-901	96	-	12	2	1		-
TProfessional 384	070-902	-	-	-	-	-		1
TProfessional Standard Gradient 60	070-850	-	60	-	-	-		-
TProfessional Standard Gradient 96	070-851	96	-	12	2	1		-
TProfessional Standard Gradient SL 96	070-871	96	-	12	2	1		-
TProfessional Standard 60	070-950	-	60	-	-	-		-
TProfessional Standard 96	070-951	96	-	12	2	1		-
TProfessional Standard SL 96	070-971	96	-	12	2	1		-
TProfessional Standard 384	070-952	-	-	-	-	-		1
TProfessional Basic 96	070-701	96	-	12	2	1		-
TProfessional Basic XL 96	070-702	96	-	12	2	1		-
TProfessional Basic Gradient 96	070-601	96	-	12	2	1		-
TProfessional Basic Gradient XL 96	070-602	96	-	12	2	1		-
TProfessional TRIO 30	070-720	-	3 x 30	-	-	-		-
TProfessional TRIO 48	070-723	3 x 48	-	3 x 6	3 x 1	-		-
TProfessional TRIO combi	070-724	3 x 48	3 x 18 *	3 x 6	3 x 1	-		-
TPersonal 20	050-550	-	20	-	-	-		-
TPersonal 48	050-551	48	-	6	1	-		-
TPersonal combi	050-552	48	18*	6	1	-		-
TRobot 96	050-991	(96)	-	(12)	(2)	1		-
TRobot 384	050-992	-	-	-	-	-		1
TOptical Gradient 96	070-500						1	
TOptical 96	070-501						1	

*** capacity increases to 35 x 0.5 ml tubes by use of small cap tubes**

Thermocycler and Block Modules

Order Information

Item	Order No.
TOptical Gradient 96 for 96 tubes, strips or 96 well microplates	070-500
TOptical 96 for 96 tubes, strips or 96 well microplates	070-501
TProfessional Basic Gradient for 96 tubes (0.2 ml), strips or 96 well microplates	070-601
TProfessional Basic Gradient XL for 96 tubes (0.2 ml), strips or 96 well microplates	070-602
TProfessional Basic for 96 tubes (0.2 ml), strips or 96 well microplates	070-701
TProfessional Basic XL for 96 tubes (0.2 ml), strips or 96 well microplates	070-702
TProfessional Standard Gradient 60 for 60 tubes (0.5 ml)	070-850
TProfessional Standard Gradient 96 for 96 tubes (0.2 ml), strips or 96 well microplates	070-851
TProfessional Standard Gradient SL 96 for 96 tubes (0.2 ml), strips or 96 well microplates	070-871
TProfessional Standard 60 for 60 tubes (0.5 ml)	070-950
TProfessional Standard 96 for 96 tubes (0.2 ml), strips or 96 well microplates	070-951
TProfessional Standard SL 96 for 96 tubes (0.2 ml), strips or 96 well microplates	070-971
TProfessional Standard 384 for 384 well microplates	070-952
TProfessional Gradient 60 for 60 tubes (0.5 ml)	070-800
TProfessional Gradient 96 for 96 tubes (0.2 ml), strips or 96 well microplates	070-801
TProfessional 60 for 60 tubes (0.5 ml)	070-900
TProfessional 96 for 96 tubes (0.2 ml), strips or 96 well microplates	070-901
TProfessional 384 for 384 well microplates	070-902
TProfessional TRIO 30 for 3 x 30 tubes (0.5 ml)	070-720
TProfessional TRIO 48 for 3 x 48 tubes (0.2 ml)	070-723
TProfessional TRIO combi for 0.5 ml tubes (3 x 18) or 0.2 ml tubes (3 x 48)	070-724
TProfessional Manager Software	070-070
TPersonal 20 for 20 tubes (0.5 ml)	050-550
TPersonal 48 for 48 tubes (0.2 ml)	050-551
TPersonal combi for 18 x 0.5 ml or 48 x 0.2 ml tubes	050-552
TRobot 96 Thermocycler for [96 tubes (0.2 ml), strips or] 96 well microplates	050-991
TRobot 384 Thermocycler for 384 well microplates	050-992
Block modules	
TOptical module Gradient 96 for 96 tubes, strips or 96 well microplates	070-510
TOptical module 96 for 96 tubes, strips or 96 well microplates	070-511
TProfessional module Gradient 60 for 60 tubes (0.5 ml)	070-810
TProfessional module Gradient 96 for 96 tubes (0.2 ml), strips or 96 well microplates	070-811
TProfessional module 60 for 60 tubes (0.5 ml)	070-910
TProfessional module 96 for 96 tubes (0.2 ml), strips or 96 well microplates	070-911
TProfessional module 384 for 384 well microplates	070-912

Thermocycler Accessories

Order Information

Item	Order No.
Temperature verification	
Portable system for temperature verification of Thermocyclers (PTMD Type 700) inclusive 1 sensor for 0.2 ml and 1 sensor for 0.5 ml	050-420
Sensor for 0.5 ml well (PTMD), Type 600/700	050-416
Sensor for 0.2 ml well (PTMD), Type 600/700	050-417
Sensor for 384 well (PTMD), Type 600/700	050-418
Portable system for temperature verification of Thermocyclers (PTMD Type 700) inclusive 1 sensor for 384 well	050-421
PC-Software for PTMD type 700	050-422
Sensors for older versions of PTMDs	
Sensor for 0.5 ml well (PTMD), Type 500/505	050-411
Sensor for 0.2 ml well (PTMD), Type 500/505	050-412
Sensor for 384 well (PTMD), Type 500/505	050-413
Consumables	
Microplates	
48 well microplate, 50 pcs.	050-225
96 well microplate Polypropylen, full skirted, 25 pcs.	050-232
96 well microplate, non skirted, 25 pcs.	050-253
96 well microplate Polypropylen, non skirted, low-profile, 25 pcs.	050-213
96 well skirted, white 50 pcs.	050-259
384 well microplate, 50 pcs.	050-240
384 well microplate HSQ, 50 pcs.	050-231
Tubes and strips	
0.2 ml tubes, 1.000 pcs. transparent, with caps	050-310
0.5 ml tubes, 1.000 pcs. transparent, with caps	050-320
250 strips 0.2 ml 8 tubes and 8 flat caps each	050-254
250 strips 0.2 ml 8 tubes and 8 domed caps each	050-255
Microplate sealing	
Silicone mat, 50 pcs.	050-237
Adhesive sealing film, 100 pcs.	050-250
Optical adhesive film, 100 pcs.	050-258
Nop mat 96 well, 20 pcs.	050-251
Nop mat 384 well, 20 pcs.	050-252

Oligonucleotides

Extensive Portfolio that Meets all Possible Needs

Available in Germany only

- **DNA- and RNA oligonucleotides**
- **More than 150 fluorescent labels and 40 modifications**
- **High coupling efficiencies**
- **Also synthesis of very long oligonucleotides or synthesis of large quantities**
- **Fast delivery times**

DNA oligonucleotides

DNA oligonucleotides are offered in different synthesis quantities and different purification grades.
The products are dissolved in sterile water and adjusted to a concentration of 0.1 nmol/µl. For all synthesis setup fees and shipping costs are already included.

Standard synthesis (Mol. Biology Grade.)

- Efficient removal of non-incorporated nucleotides
- Deprotected and desalted

Synthesis scale	Order No.
0.05 µmol	120-000
0.20 µmol	120-100
1.00 µmol	120-200

Larger synthesis quantities on request.

Guaranteed minimum delivery quantity

Synthesis scale	Minimum delivery quantity
0.05 µmol	5 nmol
0.20 µmol	25 nmol
1.00 µmol	100 nmol

Modifications:

For oligonucleotides a wide range of modifications is available. More than 150 different color labels can be offered. Moreover 5'-modifications by non-nucleoside components such as amino, thio-linker or phosphates, 3'-modifications or internal modifications by nucleoside components can be provided. All modifications of oligonucleotides are inclusive a 2 fold HPLC purification (1x for synthesis, 1x after coupling of the modification) at no extra charge.

Modification*	Order No. 0.05 µmol scale	Order No. 0.2 µmol scale	Order No. 1.0 µmol scale
5'-Phosphate	121-000	126-000	121-200
5'-Aminolink	121-002	126-002	125-002
5'-Thiolink	121-005	126-005	125-005
5'-Biotin	121-007	126-007	121-207
3'-Biotin	121-009	126-009	125-009
5'-Digoxigenin**	121-010	126-010	125-010
5'-Fluorescein (5-FAM)	121-012	126-012	125-012
5'-Fluorescein (6-FAM)	121-030	126-030	125-030
3'-Fluorescein	121-013	126-013	125-013
5'-Rhodamine (5-TAMRA)	121-014	126-014	125-014
5'-Rhodamine (6-TAMRA)	121-031	126-031	125-031
5'-Texas Red	121-048	126-048	125-048
5'-ROX (6-ROX)	121-033	126-033	125-033
5'-Cy 5	121-034	126-034	125-034
5'-Cy 3	121-035	126-035	125-035
5'-HEX	121-036	126-036	125-036
5'-Tet	121-060	126-060	125-060
JOE	121-038	126-038	125-038
Rhodamine Green	121-039	126-039	125-039
dInosine	121-016	126-016	125-016
dUridine	121-017	126-017	125-017
dT-Aminolink	121-028	126-028	125-028
3' BHQ 493nm	121-070	127-070	125-070
5' BHQ 493nm	121-071	127-071	125-071
3' BHQ 534nm	121-072	127-072	125-072
5' BHQ 534nm	121-073	127-073	125-073
3' BHQ 579nm	121-074	127-074	125-074
5' BHQ 579nm	121-075	127-075	125-075
3' BHQ 672nm	121-076	127-076	125-076
5' BHQ 672nm	121-077	127-077	125-077

*** additional modifications available on request**
**** licensed from Boehringer Mannheim.**

Purification and documentation

The synthesis of oligonucleotides includes a standard Mol. Biol. Grade purification (see Page 37). By the standard purification salts, base protecting groups and short failure sequences up to 6 bases are removed efficiently.
For advanced demands also HPLC- and Cell Culture Grade purification are offered. Apart from salts and protecting groups by the HPLC step trityl-off failure sequences are depleted.
The HPLC purification is recommended whenever full-length or high reproducibility are essential as for cloning, PCR mutagenesis, probes, modified oligonucleotides and oligonucleotides longer than 40 bases. Cell Culture Grade delivers the highest quality including two HPLC purification steps and one sterile filtration step.

For quality documentation additionally to the synthesis documentation a quality protocol can be delivered.

HPLC-Purification (PCR-Grade)
- Efficient removal of non-incorporated nucleotides
- More than 95 % full-length products guaranteed

Synthesis scale	Order No.
0.05 µmol	120-002
0.20 µmol	120-102
1.00 µmol	120-202

Cell Culture Grade:
- Efficient removal of non-incorporated nucleotides
- More than 95 % full-length products guaranteed
- Two HPLC purifications, sterile filtration

Synthesis scale	Order No.
0.05 µmol	120-003
0.20 µmol	120-103
1.00 µmol	120-203

Item	Order No.
Analytical HPLC	120-400
Polyacrylamide-Gelelectrophoresis	120-500

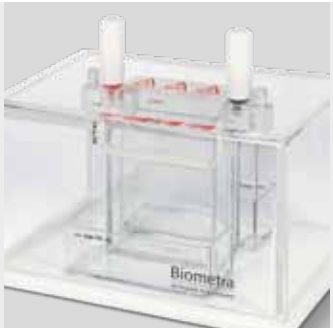
RNA oligonucleotides:

For the synthesis of long RNAs, labeled RNAs, 2'- and base modified RNAs, triphosphates, modified dinucleotides and dsRNAs a variety of new synthesis methods were developed to ensure a high yield and biological activity to the RNA oligonucleotides.
As a consequence high-quality synthesis products, especially also long RNA molecules can be are offered, which are further more protected against degradation by nucleases.

Typical examples of RNA applications include:
- dsRNA for gene silencing
- Chimeric DNA/RNA
- Ribozymes
- Investigation of ribozyme-substrate interactions
- Investigation of tRNA functions
- RNA footprinting to study RNA protein interaction
- Aptamers for spezific inhibition of protein functions
- Synthesis of RNA for *in-vitro* translation experminents
- RNA for *in vivo* investigations

Larger synthesis quantities on request, further modifications can be performed on request.

Item	Order No. 0.2 µmol scale	Order No. 1.0 µmol scale
Double stranded RNA	126-090	126-091
Standard RNA modification	126-074	126-075
ASPTO	126-070	126-071
RNA-ASPTO-modification	126-072	126-073
2'-5'- RNA modification	126-076	126-077
5-Methyl Uridine (rT) modification	–	126-078
5-C6 Amino Uridine modification	126-079	126-080
2-Amino Ribo Purine modification	126-081	126-082
2'-Amino RNA modification	126-083	126-084
2'-Fluoro RNA modification	–	126-085
2'-O-Me-RNA	126-086	126-087
Inosine-RNA	126-088	126-089


Biometra

Polyacrylamide Gel Electrophoresis

Agarose Gel Electrophoresis

ELECTROPHORESIS

Pulsed Field Gel Electrophoresis

Temperature Gradient Gel Electrophoresis

Sequencing

Power Supplies

Blotting

Polyacrylamide Gel Electrophoresis

Family Overview

Instrument Name	Gel Size W x L (cm)	Glass Plate Size W x L (cm)	Number of Gels	Gel Thickness (mm)	Number of Wells	Volume per Well (µl)	Buffer Volume Upper / Lower Chamber (ml)
Minigel-Twin	8.6 x 7.7	10.5 x 9.8	2	0.6	1 prep. 2 prep. 3 prep. 5 10 prep. 10 16 20	240 18 and 230 2 x 15 and 210 40 35 15 10 9	260 / 2 x 90
				1.0	1 prep. 1 prep. 2 prep. 3 prep. 5 10 prep. 10 16 20 28	450 400 30 and 380 2 x 25 and 350 70 60 25 20 15 8	
Mini-V8·10	8.7 x 7.2	10.25 x 7.25 10.25 x 8.25	2	0.75	6 10	40 (a) 20 (a)	600 – 650 (total) (Blotting: 1,000)
				1.5	1 prep. 6 10	475 (a,d) 80 (a) 40 (a)	
Eco-Mini	9.4 x 8.0	11.0 x 10.0	2 (4*)	0.75	1 prep. 9 MTP (c) 10 12 15	2 x 25 and 385 30 33 25 18	1,580 resp. 2,180 (Blotting 2,100)
				1.0	1 prep. 9 MTP (c) 10 12 15	2 x 35 and 515 43 45 35 25	
				1.5	1 prep. 9 MTP (c) 10 12 15	2 x 55 and 780 65 70 55 37	
Multigel **Multigel-Long**	11 x 7 11 x 12	14.8 x 9.3 14.8 x 14.3	2 2	0.6	24	14	170 / 260 170 / 260
				1.0	3 prep. 11 12 MTP (c) 24	2 x 40 and 500 50 45 18	
Model V15·17	17 x 15	19.7 x 16.0 19.7 x 18.5	1	0.8	1 prep. 10 12 14 20	1,000 (b,d) 94 (b) 72 (b) 59 (b) 34 (b)	400-500 / 400-500
				1.5	1 prep. 10 12 14 20	2,000 (b,d) 175 (b) 135 (b) 110 (b) 63 (b)	
				3.0	1 prep. 10 12 14 20	4,000 (b,d) 350 (b) 270 (b) 220 (b) 126 (b)	
Maxigel	17 x 18	20.2 x 20.8	2	1.0	1 prep. 3 prep. 12 18 24 25	1,800 2 x 50 and 1,600 140 90 50 40	250 / 350
				2.0	3 prep. 12 18 24 45	2 x 100 and 3,200 280 180 100 50	
Eco-Maxi	19.4 x 18.5	21.0 x 20.0	2	0.75	1 prep. 12 19 MTP (c) 25 30	2 x 30 and 970 70 32 30 20	750 / 4,650 (Blotting: 6,100)
				1.0	1 prep. 12 19 MTP (c) 25 30	2 x 45 and 1,310 95 45 40 29	
				1.5	1 prep. 12 19 MTP (c) 25 30	2 x 75 and 2,340 165 75 70 52	

(a) Volume calculated for an insertion depth of 5 mm
(c) microtiter plate compatible / multichannel pipet compatible
(b) Volume calculated for an insertion depth of 9 mm
(d) Volume of the preparative well
*** Use of Divider-Plates to double gel capacity**

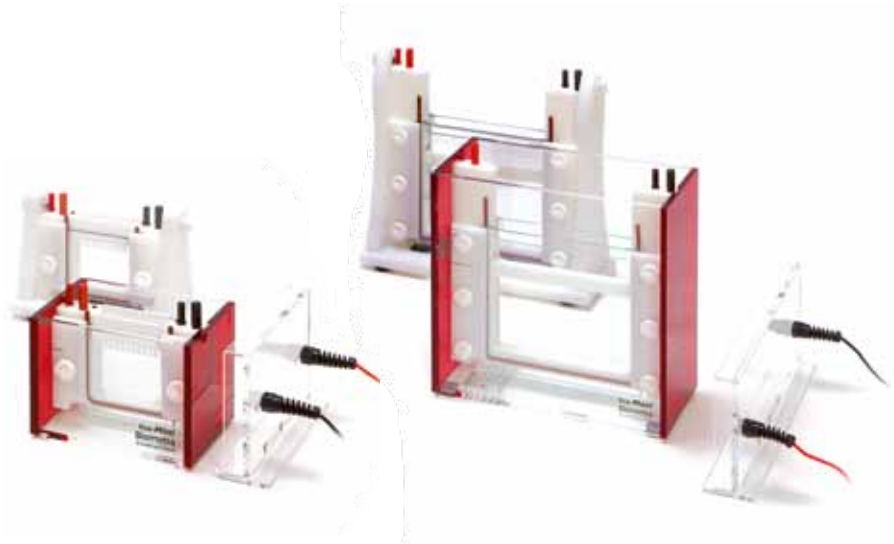
Vertical Electrophoresis Systems

Introduction

- **Gel sizes from 8.6 cm x 7.7 cm to 19.4 cm x 18.5 cm (W x L)**
- **Up to 4 gels**
- **Leak-free assembly**

Three different lines of polyacrylamide gel electrophoresis (PAGE) apparatus are available to meet customer requirements in native and SDS-PAGE.

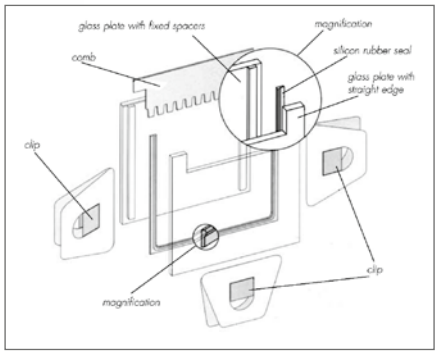
All Biometra slab gel systems feature safety lids to protect the user from electrical hazard. A complete range of analytical and semi-preparative combs is available for each system.



The Eco-Line models are available as **Eco-Mini** and **Eco-Maxi**. Both models are compatible with a variety of gel sizes from different suppliers.
A special designed casting stand for 1, 2 or 4 gels provides for convenient gel casting.
Glass plates with fixed glass spacers ensure perfect alignment and easy-to use, leak-free casting.

Assembly of glass plate sandwich **Minigel-Twin, Multigel, Multigel-Long** and **Maxigel** features a special system using fixed glass spacers and a one-piece profiled silicone rubber seal for rapid, reliable sealing without the need for additional sealing with agarose or silicone grease. Protection is provided against the neurotoxin acrylamide using the leak-free Biometra silicone seal.

For models **Mini-V8·10, Mini-V8·10 System** and **V15·17** injection moulded silicone gel casting clamps are available. The dovetail grooves of the clamps fit snugly onto the glass plates, ensuring a tight seal and even pressure over the entire surface. Moulded handles on each side of the clamp squeeze the plate tight against the side spacers and facilitate carrying.
The integrated bottom port permits optimal gel casting from the bottom of the gel with a syringe or gradient former.



Glass plate sandwich

Eco-Line

Introduction

- **Glass plates with fixed glass spacers**
- **Modular tank system for PAGE**
- **Electrophoresis and blotting**
- **Integrated cooling option**
- **Casting system for up to 4 gels**

Both sizes of the tank-style Eco-Line accommodate a variety of separation techniques, including SDS-PAGE, native, preparative and gradient electrophoresis, as well as blotting applications. Eco-Maxi has the capacity to run 1 or 2 gels, whereas Eco-Mini has the capacity to run up to 4 gels simultaneously.
The Electrophoresis Module (Gel Module) is due to integrated, special side clips easy to handle. Together with the Casting Stand a leak-proof system for gel pouring is guaranteed.
After polymerisation of the gels, the Electrophoresis Module together with the glass plate sandwich, is inserted into the buffer tank, forming now the upper buffer chamber. Interchangeable modules allow to switch from electrophoresis to tank blotting.
Locator slots are built into the tank side walls for easy and quick sliding of the gel electrophoresis or blotting module into locked position.
For all systems optional buffer tanks with integrated water circulation are available, so overheating is avoided and highest resolution guaranteed.

Compatibility of Eco-Line Modules

	Electrophoresis Module		Blotting Module		Cooling Option	
	Eco-Mini	**Eco-Maxi**	**Eco-Mini**	**Eco-Maxi**	**Eco-Mini**	**Eco-Maxi**
Polyacrylamide Gel Electrophoresis						
Eco-Mini System E *	+					
Eco-Mini E	+					
Eco-Mini System EB	+		+			
Eco-Mini EB	+		+			
Eco-Mini System EBC	+		+		+	
Eco-Mini EBC	+		+		+	
Eco-Maxi System EB		+		+		
Eco-Maxi EB		+		+		
Eco-Maxi System EBC		+		+		+
Eco-Maxi EBC		+		+		+
Tank Blot Apparatus						
Tankblot Eco-Mini C	+		+		+	
Tankblot Eco-Mini	+		+			
Tankblot Eco-Maxi C		+		+		+
Tankblot Eco-Maxi		+		+		

*** Indication of buffer chamber:**
E = Electrophoresis
B = Blotting
C = Cooling option

Eco-Line

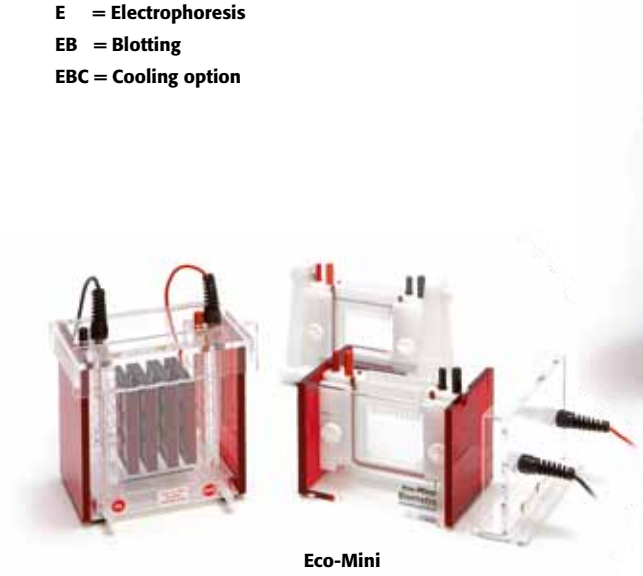
Overview

Eco-Line Overview

Item	Order No.	Components included: Buffer chamber E	Buffer chamber EB	Buffer chamber EBC with cooling option	Bigfoot Safety Lid	Electrophoresis Module	2 x glass plates with fixed spacers, 1.0 mm	2 x notched glass plates	Dummy Plate	2 x comb, 1.0 mm	Casting Stand	Blot Module	Blotting Cassettes	Foam pads
Polyacrylamide Gel Electrophoresis														
Eco-Mini System E	017-100	+			+	+	+	+	+	+	+			
Eco-Mini E	017-101	+			+	+	+	+	+	+				
Eco-Mini System EB	017-102		+		+	+	+	+	+	+	+			
Eco-Mini EB	017-103		+		+	+	+	+	+	+				
Eco-Mini System EBC with cooling option	017-104			+	+	+	+	+	+	+	+			
Eco-Mini EBC with cooling option	017-105			+	+	+	+	+	+	+				
Eco-Maxi System EB	017-400		+		+	+	+	+		+	+			
Eco-Maxi EB	017-401		+		+	+	+	+		+				
Eco-Maxi System EBC with cooling option	017-402			+	+	+	+	+		+	+			
Eco-Maxi EBC with cooling option	017-403			+	+	+	+	+		+				
Tank Blot Apparatus														
Tankblot Eco-Mini C with cooling option	018-100			+	+							+	+	+
Tankblot Eco-Mini	018-101		+		+							+	+	+
Tankblot Eco-Maxi C with cooling option	018-400			+	+							+	+	+
Tankblot Eco-Maxi	018-401		+		+							+	+	+

*** Indication of buffer chamber:**

E = Electrophoresis
EB = Blotting
EBC = Cooling option



Eco-Mini

Eco-Maxi

Eco-Mini

Modular Tank System for Polyacrylamide Gel Electrophoresis and Blotting

Eco-Mini Electrophoresis System

- **Gel dimensions 9.4 cm x 8.0 cm (W x L)**
- ***NEW* 1 to 4 gels**
- **Applicable for handcast gels and the most common pre-cast gels**
- **Casting stand for 1 up to 4 gels**
- **Cooling option (integrated water circulation system)**

Eco-Mini is compatible with self-poured gels as well as with the most common pre-cast gels. With the electrophoresis module, glass plates from 10.5 cm to 11.0 cm width and a length up to 11.0 cm may be used. Eco-Mini is compatible with the glass plates of Minigel-Twin.

For electrophoretic separation under controlled temperature conditions the use of the EBC buffer tank with cooling option (integrated water circulation system) is recommended.

The buffer chambers EB (without cooling option) and EBC (with cooling option) are compatible with the Blot Module for Tankblot Eco-Mini. The Blot Module for Eco-Mini is available separately.
For tank blotting, the use of buffer tank EBC with integrated cooling option is recommended.

The Bigfoot Safety Lid with its specially designed foot allows a space saving and safe storing of the lid when not placed on the buffer tank.

According to customer requirements a lot of special configurations by a large number of additional component parts are possible (i. e. analytical, preparative or microtiter plate compatible combs).

Special designed **Divider-Plates** (optional available) double gel capacity up to 4 gels by converting single-gel sandwiches into two-gel club sandwiches. The two-gel sandwiches fit into the same Casting Stand and Electrophoresis Module exactly like the single gel sandwiches.

Tankblot Eco-Mini C

Eco-Mini System E

The **Blot Module** for Eco-Mini is available separately and will convert the corresponding electrophoresis apparatus into a powerful wet-blotter (does not apply to the Eco-Mini E and Eco-Mini System E).

Casting Stand for Eco-Mini

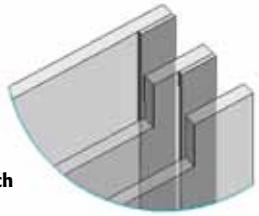
The casting stand allows an easy, fast and leak-proof assembly for up to 4 gels. Preliminary, for casting the gels one or two single-gel or two-gel sandwiches are set into the electrophoresis module and fixed with the side clips. Because the spacers are permanently fixed to one glass plate, the often difficult adjustment of spacers and glass plate is no longer necessary. In a second step, the electrophoresis module with the glass plates sandwiches is inserted into the specially designed gel casting stand and it is fixed easily and reliable by two eccentric vices. By the use of a unique high-tech material for the gasket in the casting stand and special anti-slip device of the side clips leakage proof is guaranteed.
After polymerisation of the gels, the complete assembly of electrophoresis module and glass plate sandwiches are taken from the casting stand into the buffer tank for electrophoretic separation. Specially formed slots in the side walls of the buffer tank allow a rapid and safe positioning of the module.

Electrophoresis Module

The Electrophoresis Module is designed for the use of handcast gels as well as for pre-cast gels in plastic cassettes. Common dimensions are 10 x 10 cm or 8 x 10 cm (L x W).

Electrophoresis Module

Casting Stand



Two-gel club sandwich

Eco-Mini & Tankblot Eco-Mini

Overview

Eco-Mini & Tankblot Eco-Mini: System Overview

		Components included												
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Item	**Order No.**	Buffer chamber E	Buffer chamber EB	Buffer chamber EBC with cooling option	Bigfoot Safety Lid	Electrophoresis Module	2 x glass plates with fixed spacers, 1.0 mm	2 x notched glass plates	Dummy Plate	2 x comb, 1.0 mm, 10 wells	Casting Stand	Blot Module	4 x Blotting Cassettes	8 x Foam pads
Eco-Mini System E	017-100	+			+	+	+	+	+	+	+			
Eco-Mini E	017-101	+			+	+	+	+	+	+				
Eco-Mini System EB	017-102		+		+	+	+	+	+	+	+			
Eco-Mini EB	017-103		+		+	+	+	+	+	+				
Eco-Mini System EBC	017-104			+	+	+	+	+	+	+	+			
Eco-Mini EBC	017-105			+	+	+	+	+	+	+				
Electrophoresis Module Eco-Mini	017-175					+								
Tankblot Eco-Mini C	018-100			+	+							+	+	+
Tankblot Eco-Mini	018-101		+		+							+	+	+
Blot Module Eco-Mini	018-105											+	+	+

(14) **Divider-Plate**

Eco-Maxi

Modular Tank System for Polyacrylamide Gel Electrophoresis and Blotting

Eco-Maxi Electrophoresis System

- **Gel dimensions 19.4 cm x 18.5 cm (W x L)**
- **Double-gel system**
- **Bigfoot Safety Lid**
- **Casting Stand for 1 or 2 gels**
- **Cooling option (integrated water circulation system)**

Eco-Maxi comes with glass plates with 21 cm width and 20 cm length. Eco-Maxi is also compatible for glass plates of Maxigel.

For electrophoretic separation under controlled temperature conditions the use of the EBC buffer tank with cooling option (integrated water circulation system) is recommended. The problem of smiling effects and inefficient protein resolution due to the heat development in larger gels is reliable avoided.

The buffer chambers EB (without cooling option) and EBC (with cooling option) are compatible with the Blot Module for Tankblot Eco-Maxi. The Blot Module for Eco-Maxi is available separately. For tank blotting, the use of buffer tank EBC with integrated cooling option is recommended. When using the buffer tank EB without cooling option, the transfer should be performed in a cold room.

The Bigfoot Safety Lid with its specially designed foot allows a space saving and safe storing of the lid when not placed on the buffer tank.

According to customer requirements a lot of special configurations by a large number of additional component parts are possible (i. e. analytical, preparative or microtiter plate compatible combs).

Tankblot Eco-Maxi C

Eco-Maxi System EB

The **Blot Module** for Eco-Maxi is available separately and will convert the corresponding electrophoresis apparatus into a powerful wet-blotter.

Casting Stand for Eco-Maxi
The casting stand allows an easy, fast and leak-proof assembly for 1 or 2 glass plates sandwiches.
Preliminary, for casting gels one or two glass plates sandwiches are set into the electrophoresis module and fixed with the side clips. Because the spacers are permanently fixed to one glass plate, the often difficult adjustment of large spacers and glass plate is no longer necessary.
In a second step, the electrophoresis module with the glass plates sandwiches is inserted into the specially designed gel casting stand and it is fixedeasily and reliable by two eccentric vices.
By the use of a unique high-tech material for the gasket in the casting stand and special anti-slip device of the side clips leakage proof is guaranteed.
After polymerisation of the gels, the complete assembly of electrophoresis module and glass plate sandwiches are taken from the casting stand into the buffer tank for electrophoretic separation. Specially formed slots in the side walls of the buffer tank allow a rapid and safe positioning of the module.

Electrophoresis Module and Casting Stand

Casting Stand

Eco-Maxi & Tankblot Eco-Maxi

Overview

Eco-Maxi & Tankblot Eco-Maxi: System Overview

		Components included										
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Item	**Order No.**	Buffer chamber EB	Buffer chamber EBC with cooling option	Bigfoot Safety Lid	Electrophoresis Module	2 x glass plates with fixed spacers, 1.0 mm	2 x notched glass plates	2 x comb, 1.0 mm, 10 wells	Casting Stand	Blot Module	2 x Blotting Cassettes	4 x Foam pads
Eco-Maxi System EB	017-400	+		+	+	+	+	+	+			
Eco-Maxi EB	017-401	+		+	+	+	+	+				
Eco-Maxi System EBC	017-402		+	+	+	+	+	+	+			
Eco-Maxi EBC	017-403		+	+	+	+	+	+				
Electrophoresis Module Eco-Maxi	017-475				+							
Tankblot Eco-Maxi C	018-400		+							+	+	+
Tankblot Eco-Maxi	018-401	+								+	+	+
Blot Module Eco-Maxi	018-405									+	+	+

(12) **Dummy Plate**

Eco-Mini

Order Information

Item	Order No.
Eco-Mini System E, complete system for 2 gels with buffer chamber E (without cooling base), Bigfoot Safety Lid, Electrophoresis Module, 2 glass plates with fixed 1.0 mm spacers, 2 notched glass plates, 1 dummy plate, 2 combs (1.0 mm, 10 well) and Casting Stand. Note: Buffer chamber E is not compatible with Eco-Mini Blot Module.	017-100
Eco-Mini E, dto., but without Casting Stand	017-101
Eco-Mini System EB, complete system for 2 gels with buffer chamber (without cooling base), Bigfoot Safety Lid, Electrophoresis Module, 2 glass plates with fixed 1.0 mm spacers, 2 notched glass plates, 1 dummy plate, 2 combs (1.0 mm, 10 wells) and Casting Stand. Note: Buffer chamber EB is compatible with Eco-Mini Blot Module	017-102
Eco-Mini EB, dto., but without Casting Stand	017-103
Eco-Mini System EBC, complete system for 2 gels with buffer chamber (with integrated cooling base), Bigfoot Safety Lid, Electrophoresis Module, 2 glass plates with fixed 1.0 mm spacers, 2 notched glass plates, 1 dummy plate, 2 combs (1.0 mm, 10 wells) and Casting Stand. Note: Buffer chamber EB is compatible with Eco-Mini Blot Module	017-104
Eco-Mini EBC, dto., but without Casting Stand	017-105

Order Information Tankblot Eco-Mini see section: Tankblot

Accessories

Casting Stand (two-place), up to 4 gels for Eco-Mini	017-180
Glass plate with fixed spacers, 1.0 mm	017-120
Glass plate with fixed spacers, 0.75 mm	017-121
Glass plate with fixed spacers, 1.5 mm	017-122
Notched glass plate	017-125
Dummy Plate for running single gels	017-127

Divider-Plates for double gel capacity	
Divider-Plate with fixed spacers, 1.0 mm	017-183
Divider-Plate with fixed spacers, 0.75 mm	017-184
Divider-Plate with fixed spacers, 1.5 mm	017-185

Divider-Plate Sets (2 Divider-Plates and 2 combs, 10 wells)	
Divider-Plate Set, 1.0 mm	017-187
Divider-Plate Set, 0.75 mm	017-188
Divider-Plate Set, 1.5 mm	017-189

Combs, 0.75 mm thick	**(max. volume/well)**	
9 wells, multichannel pipet compatible	30 µl	017-130
10 wells	33 µl	017-131
12 wells	25 µl	017-132
15 wells	18 µl	017-133
preparative, with 2 marker lanes	2 x 25 µl and 385 µl	017-134

Item		Order No.
Combs, 1.0 mm thick	**(max. volume/well)**	
9 wells, multichannel pipet compatible	43 µl	017-140
10 wells	45 µl	017-141
12 wells	35 µl	017-142
15 wells	25 µl	017-143
preparative, with 2 marker lanes	2 x 35 µl and 515 µl	017-144
Combs, 1.5 mm thick	**(max. volume/well)**	
9 wells, multichannel pipet compatible	65 µl	017-150
10 wells	70 µl	017-151
12 wells	55 µl	017-152
15 wells	37 µl	017-153
preparative, with 2 marker lanes	2 x 55 µl and 780 µl	017-154
Buffer chamber E (without cooling base) for Eco-Mini, without Bigfoot Safety Lid		017-169
Buffer chamber EB (without cooling base) for Eco-Mini and Tankblot Eco-Mini, without Bigfoot Safety Lid		017-170
Buffer chamber EBC (with integrated cooling base) for Eco-Mini and Tankblot Eco-Mini, without Bigfoot Safety Lid		017-171
Bigfoot Safety Lid, with cables and safety plugs for Eco-Mini and Tankblot Eco-Mini		017-172
Electrophoresis Module for Eco-Mini (1 - 4 gels)		017-175
Blot Module for Eco-Mini (incl. 4 Blotting Cassettes)		018-105
Rotary Table for twin-chambers (Minigel-Twin, Mini-V8.10, Eco-Mini family, Multigel and Multigel-Long)		010-019

Eco-Maxi

Order Information

Item	Order No.
Eco-Maxi System EB, complete system with buffer chamber EB (without cooling base), Bigfoot Safety Lid, Electrophoresis Module, 2 glass plates with fixed 1.0 mm spacers, 2 notched glass plates, 2 combs (1 mm, 12 wells) and Casting Stand Note: Buffer chamber EB is compatible with Eco-Maxi Blot Module	017-400
Eco-Maxi EB, dto., but without Casting Stand	017-401
Eco-Maxi System EBC, complete system with buffer chamber EBC (with integrated cooling base), Bigfoot Safety Lid, Electrophoresis Module, 2 glass plates with fixed 1.0 mm spacers, 2 notched glass plates, 2 combs (1.0 mm, 12 wells) and Casting Stand. Note: Buffer chamber EBC is compatible with Eco-Maxi Blot Module	017-402
Eco-Maxi EBC, dto., but without Casting Stand	017-403

Order Information Tankblot Eco-Maxi see section: Tankblot

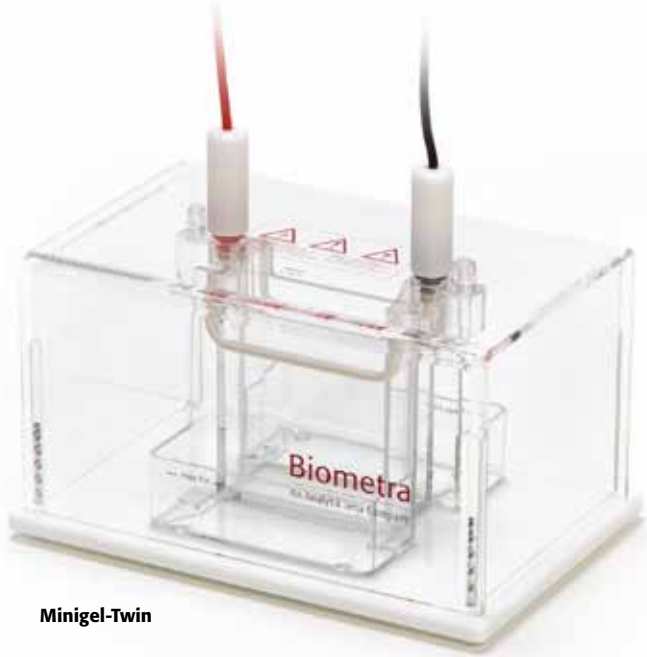
Accessories

Casting Stand (two place) for Eco-Maxi		017-480
Glass plate with fixed spacers, 1.0 mm		017-420
Glass plate with fixed spacers, 0.75 mm		017-421
Glass plate with fixed spacers, 1.5 mm		017-423
Notched glass plate		017-425
Dummy Plate for running single gels		017-426
Combs, 0.75 mm thick	**(max. volume/well)**	
12 wells	70 µl	017-430
19 wells, multichannel pipet compatible	32 µl	017-431
25 wells	30 µl	017-432
30 wells	20 µl	017-433
preparative, with 2 marker lanes	2 x 30 µl and 970 µl	017-434
Combs, 1.0 mm thick	**(max. volume/well)**	
12 wells	95 µl	017-440
19 wells, multichannel pipet compatible	45 µl	017-441
25 wells	40 µl	017-442
30 wells	29 µl	017-443
preparative, with 2 marker lanes	2 x 45 µl and 1,310 µl	017-444
Combs, 1.5 mm thick	**(max. volume/well)**	
12 wells	165 µl	017-450
19 wells, multichannel pipet compatible	75 µl	017-451
25 wells	70 µl	017-452
30 wells	52 µl	017-453
preparative, with 2 marker lanes	2 x 75 µl and 2,340 µl	017-454
Buffer chamber EB (without cooling base) for Eco-Maxi and Tankblot Eco-Maxi, without Bigfoot Safety Lid		017-471
Buffer chamber EBC (with integrated cooling base) for Eco-Maxi and Tankblot Eco-Maxi, without Bigfoot Safety Lid		017-472
Bigfoot Safety Lid, with cables and safety plugs for Eco-Maxi and Tankblot Eco-Maxi		017-474
Electrophoresis Module for Eco-Maxi (1 or 2 gels)		017-475
Blot Module for Eco-Maxi (incl. 2 Blotting Cassettes)		018-405

Minigel Family

Polyacrylamide Gel Electrophoresis

- **Leak-free sealing system (profiled silicone rubber seal)**
- **Fixed glass spacers**
- **Easy handling**
- **High sample resolution**
- **Short running times**



Minigel-Twin

Minigel-Twin

- Gel dimensions: 8.6 cm x 7.7 cm (W x L)
- Double-gel system

During electrophoresis the inner glass plate is in tight contact with the upper buffer reservoir for effi cient heat removal and smile-free runs.

Twin-gel system with optimised design that allows separation of up to 56 samples in one run.

One or two gel operation is possible.

Pre-cast gels
8 cm x 10 cm or 10 x 10 cm PAGE gels from most suppliers fit in Minigel-Twin.

Gel Casting Stand
The Gel Casting Stand is a useful accessory for Minigel-Twin that allows the casting of up to 5 single gels. The special design of the housing allows easy tilting to bring the gel sandwiches to an angle of 45° for the pouring process. This allows the gel solution to run slowly along one side of the plate sandwich to avoid air bubbles. After pouring the gels the casting stand has to be turned back to bring the gel sandwiches into vertical position for polymerisation.

Minigel Glass Plate Stand
In the Minigel Glass Plate Stand up to 6 separate glass plates or sets of glass plates for Minigel-Twin can be stored. Additional the Glass Plate Stand is the system of choice for drying of glass plates after cleaning.
This stand is not designed for gel casting.

Rotary Table
The Rotary Table for Twin-chambers allows easy sample loading by turning the whole chamber. The table fits to Minigel-Twin, Mini-V8.10, Eco-Mini family, Multigel and Multigel-Long.

Minigel Family

Polyacrylamide Gel Electrophoresis

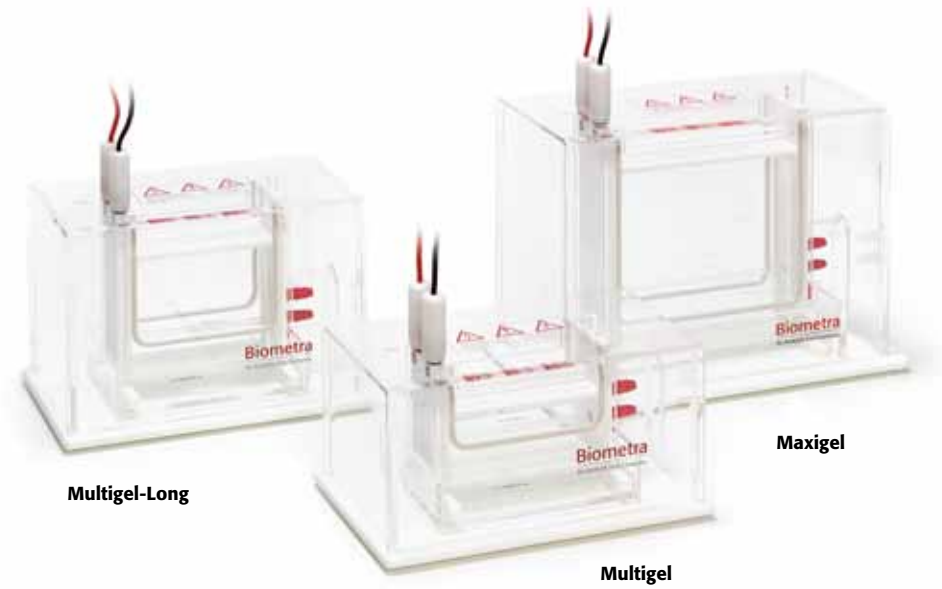
Multigel
- Gel dimensions:
  11 cm x 7 cm (W x L)
- Double-gel system
- Cooling option

The double-gel design permits rapid separation of up to 24 samples per gel (48 samples total). One or two gel operation is possible. Thanks to the built-in water cooling option the Multigel is also suited for native gels.

Multigel-Long
- Gel dimensions:
  11 cm x 12 cm (W x L)
- Double-gel system
- Cooling option

The double-gel design permits rapid separation of up to 24 samples per gel (48 samples total). One or two gel operation is possible. The built-in water cooling option allows temperature controlled runs preventing smiling effects at higher currents. The longer separation distance in combination with the effective cooling systems is ideally suited for SSCP analysis.

Both Multigel and Multigel-Long offer microtiter plate compatible/multichannel pipet compatible combs.



Multigel-Long

Maxigel

Multigel

Maxigel
- Gel dimensions:
  17 cm x 18 cm (W x L)
- Double-gel system
- Cooling option included

The Maxigel double-gel design features back-to-back vertical gels, each separating up to 45 samples (90 samples total). One or two gel operation is possible. The built-in water cooling option and long running distance are perfect to achieve excellent separation and high resolution. The Maxigel is used for large sample volumes, e.g. if prior concentration of the sample is not possible. Applications include separation of specific proteins from complex mixtures (antibody production, enzyme kinetics or toxicology studies) and native or SDS-PAGE gels.

The Maxigel is the system of choice where long running distance, high resolution or larger sample volumes are an issue.

Universal Glass Plate Stand
This stand with levelling feet can be used in combination with any gel size of Biometra slabgels. For gel casting up to 4 glass plate sandwiches that have been fixed with clips can be placed in the stand.

Minigel Family

Order Information

Item			Order No.
Minigel Systems			
Minigel-Twin, complete system with 2 sets of glass plates with fixed **1 mm** spacers, 2 silicone rubber seals, 2 combs (10 wells) and 1 set of clips (6 pcs)			010-100
Minigel-Twin, dto., but with fixed **0.6 mm** spacers			010-140
Minigel-Twin, buffer chamber and safety lid; without accessories			010-130
Accessories			
Glass plate with fixed spacers, 1.0 mm			010-001
Glass plate with fixed spacers, 0.6 mm			010-002
Notched glass plate with straight edge			010-003
Notched glass plate with inclined edge			010-004
Silicone rubber seal, 1.0 mm (2 pcs)			010-055
Silicone rubber seal, 0.6 mm (2 pcs)			010-056
Grey seal to be attached to the main chamber (4 pcs)			010-058
Clips (6 pcs)			010-057
Combs, 1.0 mm thick		**(max. volume/well)**	
5 wells		(70 µl)	010-010
10 wells		(25 µl)	010-011
10 wells, for big volumes and high protein concentrations		(60 µl)	010-023
16 wells		(20 µl)	014-017
20 wells		(15 µl)	010-012
28 wells		(8 µl)	014-019
preparative, without marker lane		(400 µl)	010-008
preparative, without marker lane		(450 µl)	014-023
preparative, with marker lane		(30 µl and 380 µl)	010-022
preparative, with 2 marker lanes		(2 x 25 µl and 350 µl)	010-009
Combs, 0.6 mm thick		**(max. volume/well)**	
5 wells		(40 µl)	010-015
10 wells		(15 µl)	010-016
10 wells, for big volumes and high protein concentrations		(35 µl)	010-024
16 wells		(10 µl)	014-018
20 wells		(9 µl)	010-020
preparative, without marker lane		(240 µl)	010-013
preparative, with 1 marker lane		(18 µl and 230 µl)	010-021
preparative, with 2 marker lanes		(2 x 15 µl and 210 µl)	010-014

Minigel Family

Order Information

Item			Order No.
Further Accessories			
Minigel Glass Plate Stand (for Minigel-Twin)			010-018
Gel Casting Stand for up to 5 mini-gels			010-032
Rotary Table for twin-chambers (Minigel-Twin, Mini-V8·10, Eco-Mini family, Multigel and Multigel-Long)			010-019
Multigel Systems			
Multigel, complete system with 2 sets of glass plates with fixed **1 mm** spacers, 2 silicone rubber seals, 2 combs (24 wells) and 2 sets of clips (12 pcs)			010-200
Multigel, dto., but with fixed **0.6 mm** spacers			010-220
Multigel, buffer chamber and safety lid; without accessories			010-230
Accessories			
Notched glass plate with straight edge			010-201
Glass plate with fixed spacers, 1.0 mm			010-202
Glass plate with fixed spacers, 0.6 mm			010-221
Silicone rubber seal, 1.0 mm (2 pcs)			010-255
Silicone rubber seal, 0.6 mm (2 pcs)			010-256
Short grey seal to be attached to the main chamber (4 pcs)			010-258
Long grey seal to be attached to the main chamber (4 pcs)			010-259
Clips (6 pcs)			010-057
Multigel-Long, complete system with 2 sets of glass plates with fixed **1 mm** spacers, 2 silicone rubber seals, 2 combs (24 wells) and 2 sets of clips (12 pcs)			010-300
Multigel-Long, dto., but with fixed **0.6 mm** spacers			010-320
Multigel-Long, buffer chamber and safety lid; without accessories			010-330
Accessories			
Notched glass plate with straight edge			010-301
Glass plate with fixed spacers, 1.0 mm			010-302
Glass plate with fixed spacers, 0.6 mm			010-321
Silicone rubber seal, 1.0 mm (2 pcs)			010-355
Silicone rubber seal, 0.6 mm (2 pcs)			010-356
Short grey seal to be attached to the main chamber (4 pcs)			010-258
Long grey seal to be attached to the main chamber (4 pcs)			010-359
Clips (6 pcs)			010-057
Combs for Multigel and Multigel-Long			
Combs, 1.0 mm thick		**(max. volume/well)**	
11 wells		(50 µl)	010-207
12 wells, multichannel pipet compatible		(45 µl)	010-203
24 wells		(18 µl)	010-204
preparative, with 2 marker lanes		(2 x 40 µl and 500 µl)	010-208

Item		Order No.
Combs, 0.6 mm thick	**(max. volume/well)**	
24 wells	 (14 µl)	010-222

Further Accessories

Rotary Table for twin-chambers (Minigel-Twin, Mini-V8·10, Eco-Mini family, Multigel and Multigel-Long)	010-019
Universal Glass Plate Stand with levelling feet, 4 positions for any gel size	010-029

Maxigel Systems

Maxigel, complete system with 2 sets of glass plates with fixed **1 mm** spacers, 2 silicone rubber seals, 2 combs (12 wells), 3 sets of clips (12 pcs) and 1 set of Maxi-Clips (4 pcs)	010-400
Maxigel, dto., but with fixed **2 mm** spacers	010-430
Maxigel, buffer chamber and safety lid; without accessories	010-440

Accessories

Notched glass plate with straight edge	010-401
Glass plate with fixed 1 mm spacers	010-402
Glass plate with fixed 2 mm spacers	010-403
Clips (6 pcs)	010-057
Maxi-clips (4 pcs)	010-416
Silicone rubber seal, 1.0 mm (2 pcs)	010-455
Silicone rubber seal, 2.0 mm (2 pcs)	010-457
Long grey seal to be attached to the main chamber (4 pcs)	010-459
Short grey seal to be attached to the main chamber (4 pcs)	010-458

Combs, 1.0 mm thick	**(max. volume/well)**	
12 wells	 (140 µl)	010-404
18 wells	 (90 µl)	010-405
24 wells	 (50 µl)	010-406
25 wells	 (40 µl)	014-020
preparative, without marker lane	 (1,800 µl)	014-022
preparative, with 2 marker lanes	 (2x 50 µl and 1,600 µl)	010-407

Combs, 2.0 mm thick	**(max. volume/well)**	
12 wells	 (280 µl)	010-408
18 wells	 (180 µl)	010-409
24 wells	 (100 µl)	010-410
45 wells	 (50 µl)	014-021
preparative, with 2 marker lanes	 (2x100 µl and 3,200 µl)	010-411

Further Accessories

Universal Glass Plate Stand with levelling feet, 4 positions for any gel size	010-029

Mini-V8·10

Integrated System for PAGE and Blotting

Mini-V8·10 Gel Electrophoresis System

- **Gel size 8.7 cm x 7.2 cm (W x L)**
- **Patented drop-in wedge automatically positions gels without the use of gaskets or clamps**
- **Blot Module for blotting in the electrophoresis tank**
- **Gel Casting System designed to cast 2 to 9 gels simultaneously (option)**

The **Mini-V8·10 Gel Electrophoresis System** is an integrated system for rapid, high-quality separation and blotting in a vertical minigel size format. Its two primary components, the Mini-V8·10 Gel Electrophoresis Apparatus and the Mini-V8·10 Blot Module, are supplemented by a complete selection of accessories.

Gels of different length and thickness can be electrophoresed using the **Mini-V8·10 Gel Electrophoresis Apparatus**. Up to 20 samples can be separated by running 2 gels simultaneously. 2 sets of spacers with different thickness (0.75 and 1.5 mm) allow optimal adaptation of gel thickness for various applications. As the Mini-V8·10 offers no fixed spacers it is recommended to use the Mini-V8·10 Gel Casting Clamp for simple, leak-free casting of gels. This allows casting of gels in a fraction of the time of the "conventional" tape or grease and binder clip methods. Most commercial available pre-cast 8 cm x 10 cm format PAGE gels can be used with the system. The 600 – 650 ml buffer volume ensures efficient cooling even at higher current.

Mini-V8·10 Blot Module

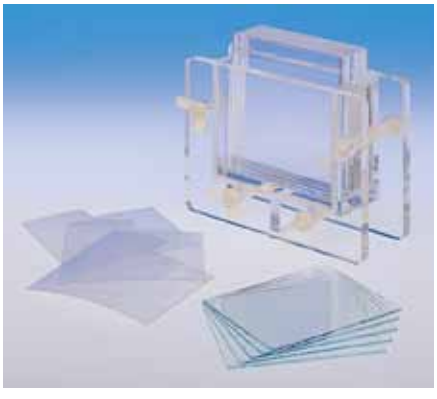
The Mini-V8·10 Blot Module operates in the electrophoresis tank of the Mini-V8·10 for the transfer of proteins and nucleic acids on to membranes. Two gels can be blotted simultaneously.

Mini-V8·10 Gel Casting Clamp

The Mini-V8·10 Gel Casting Clamp is sold separately. The silicone clamp provides leak proof casting and is designed to cast a single 8.7 cm x 7.2 cm format gel.

Mini-V8·10 Gel Casting System

The casting chamber is designed for easy set-up and cleaning and allows to cast 2 to 9 gels simultaneously.
A Gradient Former in combination with the luer fitting in the bottom of the casting chamber ensures casting of identical gradient gels. Special separation sheets make separation of gels after polymerisation very easy. Displacement blocks permit the casting of various numbers of gels.



Model V15·17

Gel Electrophoresis Apparatus for PAGE

Model V15·17

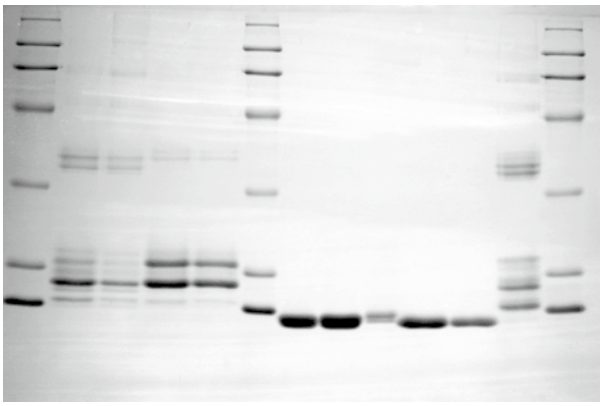
- **Gel size 17 cm x 15 cm (W x L)**
- **Built-in integral clamps hold the gel in place**
- **Fits gels of different thicknesses with straight or notched glass plates**

The Model V15·17 is designed for vertical gels 17 cm x 15 cm (W x L) for separation of up to 20 samples on a 0.8 mm, 1.5 mm or 3 mm thick gel.

The built-in integral clamps allow easy assembly and hold gels of different thickness leak-free in place. The V15·17 is the system of choice for laboratories with low sample throughput but the need of long running distances or large sample volumes (up to 4,000 µl).

Gel Casting Clamp

The Gel Casting Clamp is sold separately. The silicone clamp is designed to cast a single 17 cm x 15 cm gel and provides leak proof casting.



15 % SDS-polyacrylamide gel with discontinuous buffer system, electrophoresed at 80 V for 0.5 h, then at 120 V for 4.5 h.

Mini-V8•10

Order Information

Item		Order No.
Mini-V8•10 Gel Electrophoresis Apparatus, with buffer tank, safety lid, gel support tray, gel wedge block, 2 pairs of glass plates (2 short glass plates 7.25 cm x 10.25 cm and 2 long glass plates 8.25 cm x 10.25 cm), 2 sets of 0.75 mm thick side spacers and 2 x 10 well combs (0.75 mm thick) (Mini-V8•10 Gel Casting Clamp is sold separately.)		21078043
Mini-V8•10 Gel Electrophoresis System, system with Mini-V8•10 Gel Electrophoresis Apparatus and Mini-V8•10 Blot Module (Mini-V8•10 Gel Casting Clamp is sold separately.)		21078050

Accessories and Spare parts

Mini-V8•10 Gel Casting Clamp	(1/pkg)	21078241
Glass Plates (mixed pairs, 8.25 cm x 10.25 cm/7.25 cm x 10.25 cm)	(10 pairs)	21078035
Gel Loading Template	(4/pkg)	21078076
Spring Clips	(12/pkg)	11098019

Spacer Sets (side spacers):		
0.75 mm	(2 pairs)	11958147
1.5 mm	(2 pairs)	11958154

Combs, 0.75 mm thick	**(max. volume/well)***	
6 wells	(40 µl)	11958089
10 wells	(20 µl)	11958113

Combs, 1.5 mm thick	**(max. volume/well)***	
6 wells	(80 µl)	11958097
10 wells	(40 µl)	11958121
preparative, with 2 marker lanes	(475 µl)***	11958063

Platinum/Niobium Upper Electrode Replacement Kit Mini-V		11958162
Lower Electrode Replacement Kit Mini-V		11958261
Banana Plug Replacement Kit (includes 2 banana plugs, 1 red and 1 black cap nut and 2 lock washers)		11958469

Mini-V8•10 Blot Module, complete with blot restrainer, blot support frame, clamping knob and three transfer pressure pads	21078019

Accessories

Transfer Pressure Pads	(6/pkg)	11958048

Mini-V8•10 Gel Casting System, complete with a casting chamber with threaded posts, one end plate with silicone gasket and fill port, displacement blocks (1 x 1 mm, 2 mm and 5 mm and 3 x 9 mm), 20 gel separation sheets, 10 pairs of glass plates, wing nuts and cap nuts, stopcock, tubing connector, and stopper (Combs and spacers are sold separately!)	21078027

Model V15•17

Order Information

Item		Order No.
Model V15•17 Gel Electrophoresis Apparatus, complete with buffer chamber, safety lid, 1 pair of glass plates (1 short glass plate 19.7 cm x 16.0 cm and 1 long glass plate 19.7 cm x 18.5 cm), 1 pair of 1.5 mm thick side spacers, 1 x 1.5 mm thick bottom spacer, and 1 x 20 well comb (1.5 mm thick) (The Gel Casting Clamp is sold separately.)		21080023

Accessories and Spare parts		
Gel Casting Clamp (Model V15•17, V16, V16-2)	(1/pkg)	21070065
Gel Casting Clamp (Model V15•17, V16, V16-2)	(2/pkg)	21070073
Glass Plates (mixed pairs, 16.0 cm x 19.7 cm/18.5 cm x 19.7 cm)	(3 pairs)	11074010
Spring Clips	(12/pkg)	11098019

Spacer Sets (complete with 1 bottom spacer, 2 side spacers and 2 foam blocks)		
0.8 mm thick		41077017
1.5 mm thick		41077025
3.0 mm thick		41077033

Combs, 0.8 mm thick	**(max. volume/well)****	
10 wells	(94 µl)	11956026
12 wells	(72 µl)	11956034
14 wells	(59 µl)	11956042
20 wells	(34 µl)	21076013
preparative, with 2 marker lanes	(1,000 µl)***	11956117

Combs, 1.5 mm thick	**(max. volume/well)****	
10 wells	(175 µl)	11956059
12 wells	(135 µl)	11956067
14 wells	(110 µl)	11956075
20 wells	(63 µl)	21076021
preparative, with 2 marker lanes	(2,000 µl)***	11956125

*** Volume calculated for an insertion depth of 5 mm**

**** Volume calculated for an insertion depth of 9 mm**

***** Volume of the central preparative well**

Model V15•17

Order Information

Item		Order No.
Combs, 3.0 mm thick	**(max. volume / well)****	
10 wells	(350 µl)	11956083
14 well	(220 µl)	11956109
20 wells	(126 µl)	21076039
preparative, with 2 marker lanes	(4,000 µl)***	11956133
Power Cords	(1 pair)	11099025
Upper Platinum Wire Replacement		11958345
Lower Platinum Wire Replacement		11958329
Wire Hardware Replacement Kit (includes 2 red cap nuts, 2 black cap nuts, 4 O-rings, 4 rubber washers, 4 electrode boots and 4 hex nuts) (Does not include the electrode!)		11958213
Gasket Replacement for V15•17 (with 6 foam blocks)		21960059
Spacer Foam Blocks	(12/pkg)	21070057
Banana Plug Replacement Kit (includes everything in the Wire Hardware (11958212) Replacement Kit plus 2 banana plugs, 2 long ratchet rivets, 2 short ratchet rivets, 2 thin washers and 2 thick washers)		11958378
Gel Clamp Replacement Kit (includes spring, shoulder washer, tab, knob and support ring)		11958352
Safety Lid Replacement Kit V15•17 (includes safety lid, 2 long ratchet rivets, 2 short ratchet rivets, 2 thin washers and 2 thick washers)		11958360

*** Volume calculated for an insertion depth of 5 mm**

**** Volume calculated for an insertion depth of 9 mm**

***** Volume of the central preparative well**

Polyacrylamide Gel Electrophoresis

Applications for the Use of Multigel-Long

Visualisation of point mutations using SSCP electrophoresis (Single Strand Conformation Polymorphism)

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Single strand DNA fragments of equal length, but having minute differences in sequence can be differentiated from one another using Polyacrylamide gel electrophoresis (PAGE) (1). The reason for these sequence-dependent differences in mobility is that base pairings with complementary regions also occur within the single strand and influence the tertiary structure of the nucleic acid polymers in a sequence-dependent manner. Even the substitution of a single base can be demonstrated. Figure 1 shows the investigation of a Pro-347-Leu vs. Pro-347-Arg mutation in the human rhodopsin gene. The figures 2 to 4 show additional examples of mutations in the human rhodopsin gene or in the human X chromosomal chorioideremia gene. The bands of the different isoforms of the respective single strands are labeled a-b.

The application of the Multigel-Long device shown here was carried out overnight on PAA gels using a 6 % stacking gel and a 10 % separation gel in 1 x TBE buffer. The results show that the SSCP electrophoresis can be conducted with smaller gels efficiently and cost-effectively.
8 µl of PCR preparation were used. The samples were first diluted with loading buffer (1:2), denatured for 5 minutes at 98 °C and cooled on ice to obtain single strands.

Each main run was preceded by a 5-minute pre-run to allow a rapid initial migration of the single strands. Migration was terminated after the separation of the dye bands (bromophenol blue, xylene cyanole).
It was absolutely necessary to set the electrophoresis parameters so that the gel did not become warmer than 25 °C in order to prevent denaturation of the single strands. When using the optional cooling system, the SSCPE could be conducted with a maximum of 200 to 250 V; without cooling the voltage should not be more than 130 V.

Reference:
1. Orita, M., Iwahana, H., Kanazawa, H., Hayashi, K., Sekiya, T. (1989); Proc. Natl. Acad. Sci. 86, 2766-2770.

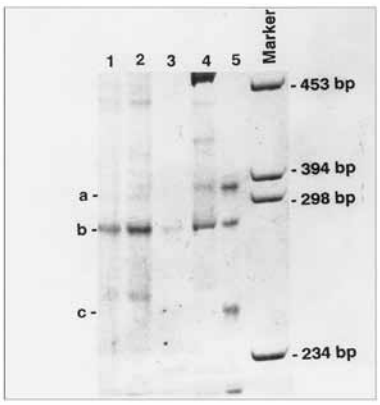
Fig. 1. Human rhodopsin gene (locus 3q21-24, exon 5, PCR product of 155 bp. Lanes 1 to 3: controls (unaffected subjects); Lane 4: Pro-347-Leu mutation; Lane 5: Pro-347-Arg mutation; Lane 6: molecular weight markers. Electrophoresis parameters: 100 V, 15 hours.

Fig. 2. Human rhodopsin gene (locus 3q21-24) exon 1 5'-halves, PCR product of 279 bp. Lanes 1, 2, 5–7: controls (unaffected subjects); Lane 3: Pro-23-His mutation; Lane 4: Thr-58-Arg mutation, in addition the fragment contains a Ksp 1-RFLP; Lane 8: molecular weight markers. Electrophoresis parameters: 120 V, 15 hours.

Fig. 3. Human chorioideremia gene (X chromosomal) exon B4, PCR product of 174 bp. Lane 1: hemizygous Glu-154-stop mutation (male patient with chorioideremia); Lane 2: heterozygous Glu-154-stop mutation (conductor, phenotypically healthy mother of the patient in Lane 1); Lane 3: Ser-158-stop mutation (male patient with chorioideremia); Lane 4: heterozygous Ser-158-stop mutation (conductor, phenotypically healthy mother of the patient in Lane 3); Lanes 5–7: controls (unaffected subjects); Lane 8: molecular weight marker. Electrophoresis parameters: 100 V, 16 hours.

Fig. 4. Human chorioideremia gene (X chromosomal) exon E, PCR product of 288 bp. Lanes 1 and 4: controls (unaffected subjects); Lane 2: homozygous splice mutation 5' mutation (male patient with chorioideremia); Lane 3: heterozygous splice mutation 5' (conductor, phenotypically healthy mother of the patient in Lane 3); Lane 5: molecular weight markers. In the upper part of the figure the transition from collecting to separation gel is illustrated with the slots cut off. Electrophoresis parameters: 100 V, 16 hours.

Fig. 1



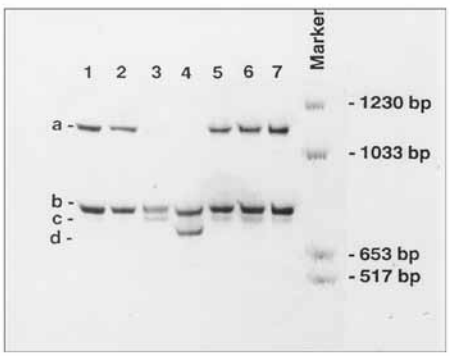
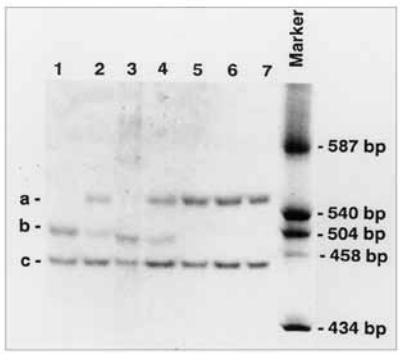


Fig. 2

Fig. 3



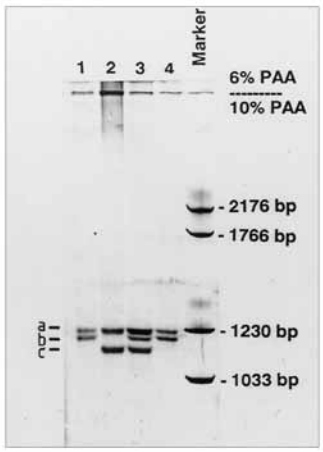


Fig. 4

Polyacrylamide Gel Electrophoresis

Applications for the Use of Minigel-Twin

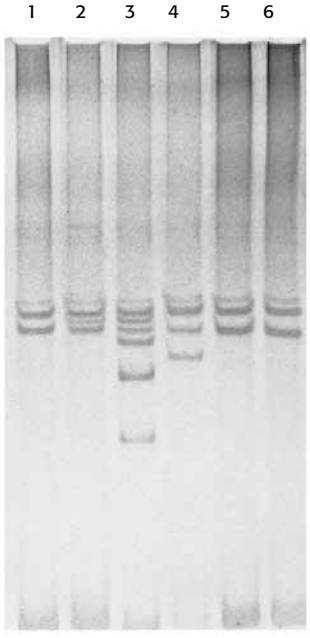
SSCP analysis of the lipoprotein lipase gene (Single Strand Conformation Polymorphism)

D. Evans, D. Wendt and U. Beisiegel, University Hamburg, University Hospital Eppendorf, 1. Medical Hospital, Martinistr. 52, 20251 Hamburg, Germany

Lipoprotein lipase (LpL) plays a key role in the metabolism of triglyceride rich lipoproteins. Patients who are homozygous or compound heterozygotes for mutations in the LpL gene present with Type I Hyperlipoproteinemia (HPL) which is characterized by fasting chylomicronemia with very high levels of triglycerides, pancreatitis and eruptive cutaneous xanthomatosis. Type I HLP is a rare desease with a frequency of 1 in a million, however heterozygotes occur with a frequency of up to 1 in 500. Heterozygosity for mutations in the LpL gene has been implicated in familial combined hyperlipidemia, Type III HLP and with elevated serum triglycerides. These conditions are associated with an increased risk of arthereosclerosis. Heterozygotes are also at increased risk of hypertriglyceridemia in the presence of environmental stress such as pregnancy, obesity and diabetes. The experiment shown here describe the use of SSCP electrophoresis to analyse the LpL gene of patients with the elevated serum triglycerides.
42 of a total of 88 patients (48 %) had mutations, and 27 patients (31 %) had mutations with amino acid changes.

SSCP analysis is performed non-radioactively. The Biometra Minigel-Twin has the advantage of high capacity, 40 samples can be processed simultaneously, with little sample volumes needed and separation being very rapid.

Silver staining also needs only one hour so that with a Minigel-Twin 80 samples can be screened in one day.
Exon 1-9 and the exon-intron bonds were amplified by PCR. For the SSCP analysis the PCR products were diluted 1 in 20 in denaturing SSCP analysis buffer (1 x TBE, 3.5 M urea), incubated at 96 °C for 5 min and cooled immediately on ice. Products were loaded onto 10 % polyacrylamide gels in 1 x TBE containing 10 % glycerol.
Gels were poured the Minigel-Twin with 0.6 mm spacers. Electrophoresis was at 10 mA for 3 hours at room temperature. DNA was visualized by staining with silver.



Exon 3
Lanes 1, 2 and 6: controls;
Lane 3: Ser-88-mutation;
Lane 4: Del-560->564-mutation;
Lane 5: Val-69-Leu-mutation.

Exon 6
Lanes 1 and 3: controls;
Lane 2: Ser-266-Pro-mutation.

Polyacrylamide Gel Electrophoresis

Applications for the Use of Minigel-Twin

Purification of DNA oligonucleotides with the Minigel-Twin electrophoresis instrument

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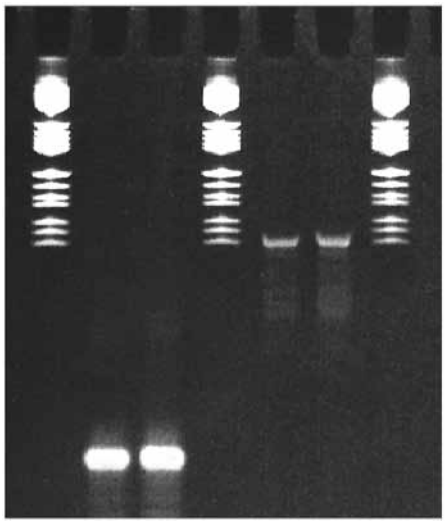
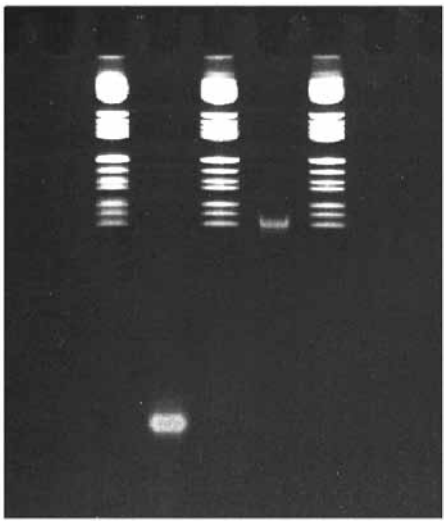
Crude oligonucleotides produced with automatic DNA synthesizers also contain fragments which are smaller than the full length products, down to decamer size or even smaller (left fig.). In order to get rid of undesired small byproducts the synthesis mixes were separated using Biometra's Minigel-Twin electrophoresis instrument with a 12 % denaturing (8 M urea) polyacrylamide gel and with TBE as a running buffer for 2 h at 100 V (const.). After separation the products were visualized by UV shadowing using a TLC plate illuminated with short-wave UV light (254 nm).

The full length products were cut out and eluted from the gel strip using an elution buffer (0.1 % SDS, 0.5 M ammonium acetate, 10 mM magnesium acetate). The right figure shows the purified oligonucleotides after further electrophoretic separation.



Separation of crude DNA synthesis products. Lanes 1, 4, and 7: molecular weight markers; Lanes 2 and 3: 20mer DNA oligonucleotide (2 µg/lane); Lanes 5 and 6: 60mer DNA oligonucleotide (2 µg/lane).



Separation of DNA synthesis products purified by PAGE. Lanes 1, 3, and 5: molecular weight markers; Lane 2: 20mer DNA oligonucleotide (1 µg/lane); Lane 4: 60mer DNA oligonucleotide (1 µg/lane).

Agarose Gel Electrophoresis

Introduction

- **Gel sizes from 5.7 cm x 8.3 cm up to 23.9 cm x 25.0 cm**
- **UV transparent gel trays**
- **Preparative, analytical and multi-channel pipet compatible combs**
- **User-friendly design**

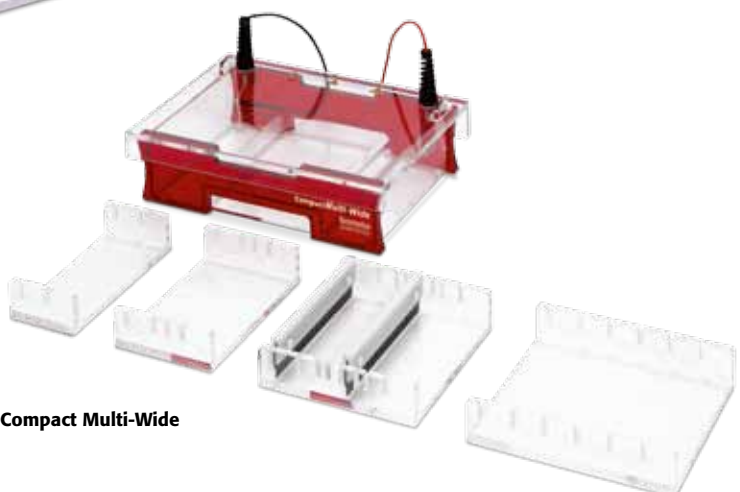
Biometra offers a complete range of instruments for the separation of nucleic acids in submerged agarose gel electrophoresis. All applications around electrophoresis of PCR products, small plasmids, separation of restriction digests as well as electrophoresis of RAPD or RFLP fragments are covered. Gel sizes range from mini over medium up to maxi-large formats.

All systems meet the highest standards in operational safety.

Two instrument families with different features are available: **Compact** and **Horizon.**

Horizon® Family

Compact Family



Compact Multi-Wide

Family Overview

Model	Gel size W x L (cm)	Comb thickness (mm)	Number of wells	Sample volume/ well (µl)*	Tooth width (mm)	Tooth distance (mm)	Buffer volume (ml)
Compact XS **Compact S**	8.2 x 7.1 8.2 x 10.5	1.0	8, MTP, 9 mm spacing 11 13 16, MTP, 4.5 mm spacing	30 20 16 12	7.5 5 4 3	1.5 1.5 1.5 1.5	360
		1.5	prep., 1 + 2 marker lanes 8, MTP, 9 mm spacing 11 13 16, MTP, 4.5 mm spacing	342 + 30 45 30 24 18	31.8 + 4.1 7.5 5 4 3	1.9 1.5 1.5 1.5 1.5	
Compact M	12.4 x 14.5	1.0	11 13, MTP, 9 mm spacing 18 21 25, MTP, 4.5 mm spacing	36 30 20 16 12	9 7.5 5 4 3	1.4 1.4 1.5 1.5 1.5	580
		1.5	prep., 1 + 2 marker lanes 11 13, MTP, 9 mm spacing 18 21 25, MTP, 4.5 mm spacing	594 + 30 54 45 30 24 18	53.3 + 4.1 9 7.5 5 4 3	1.9 1.4 1.4 1.5 1.5 1.5	
Compact Multi-Wide	15.0 x 7.0 15.0 x 10.0 15.0 x 15.0 15.0 x 18.0	1.0	prep., 1 + 2 marker lanes prep., 2 + 2 marker lanes prep., 4 + 2 marker lanes 14 16, MTP, 9 mm spacing 22 26 32, MTP, 4.5 mm spacing	528 + 16 261 + 16 127 + 16 36 30 20 16 12	130.5 + 4 64.5 + 4 31.5 + 4 9 7.5 5 4 3	1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5	1,100 - 1,300
		1.5	prep., 1 + 2 marker lanes prep., 2 + 2 marker lanes prep., 4 + 2 marker lanes 14 16, MTP, 9 mm spacing 22 26 32, MTP, 4.5 mm spacing	793 + 24 392 + 24 191 + 24 55 46 30 24 18	130.5 + 4 64.5 + 4 31.5 + 4 9 7.5 5 4 3	1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5	
Compact L **Compact XL**	23.9 x 20.0 23.9 x 25.0	1.0	22 26, MTP, 9 mm spacing 36 42 52, MTP, 4.5 mm spacing	36 30 20 16 12	9 7.5 5 4 3	1.5 3.1 1.5 1.5 1.5	1,660
		1.5	prep., 1 + 2 marker lanes 22 26, MTP, 9 mm spacing 36 42 52, MTP, 4.5 mm spacing	1,284 + 30 54 45 30 24 18	111.0 + 4.1 9 7.5 5 4 3	1.9 1.5 3.1 1.5 1.5 1.5	
Horizon® 58	5.7 x 8.3	0.8	8 14	15 7	5.3 2.4	1.6 1.6	100
		1.5	prep., 1 + 2 marker lanes 5 8 12, MTP, 4.5 mm spacing 14	250 50 25 15 13	42.8 9.5 5.3 2.8 2.4	1.6 1.6 1.6 1.6 1.6	
Horizon® 11·14	11 x 14	1.0	10 12, MTP, 9 mm spacing 14 20	33 30 20 16	7.9 7.2 4.7 3.8	3.2 1.8 3.3 1.7	700
		2.0	10 14 20 24, MTP, 4.5 mm spacing	66 40 32 22	7.9 4.7 3.8 2.8	3.2 3.3 1.7 1.7	
Horizon® 20·25	20 x 25	1.0	12 15 20 21, MTP, 9 mm spacing 30 42, MTP, 4.5 mm spacing	54 40 27 30 20 11	12.7 9.5 6.4 7.2 4.7 2.7	3.2 3.2 3.2 1.7 1.7 1.7	1,550
		2.0	20 30 42, MTP, 4.5 mm spacing	54 40 22	6.4 4.7 2.7	1.7 1.7 1.7	
		3.0	prep., 1 + 2 marker lanes 20 30	2,100 81 60	165.0 6.4 4.7	3.2 1.7 1.7	

*** refer to 5 mm thick gels**
MTP: multichannel pipet compatible

Compact Family

Straight Apparatus Family for Submerged Gel Electrophoresis

- **UV transparent gel trays**
- **Models for high-throughput applications**
- **Four multichannel pipet compatible combs per tray size**
- **Easy-to-use casting systems**

The Compact line is characterized by a straight design for everyday use. The robust construction of thick-walled acrylic glass and the long-life components as platinum electrodes and gold-coated safety plugs make it the ideal tool for both research and routine laboratories. There are four different chamber sizes supporting nine different gel sizes:

- **Compact XS/S** for mini gels with tray XS or S
- **Compact M** for midi gels with tray M
- **Compact L/XL** for maxi gels with tray L or XL
- **Compact Mulit-Wide** for mini-wide and midi-wide gels.

Model	Gel size (W x L)	Max. sample number
Compact XS	8.2 cm x 7.1 cm	32 with 2 combs
Compact S	8.2 cm x 10.5 cm	48 with 3 combs
Compact M	12.4 cm x 14.5 cm	100 with 4 combs
Compact L	23.9 cm x 20.0 cm	312 with 6 combs
Compact XL	23.9 cm x 25.0 cm	416 with 8 combs

Various details provide for ease of use: The safety lids open upwards giving free access to the chamber for sample pipetting. Besides that opening the lid upwards avoids the risk of sample and buffer spillage as often seen with sliding lids. The open Bigfoot Lid can be space-saving set upright on its back. The walls of the buffer chamber are partially cut out to enable an easy removal of the gel tray without touching the buffer. The choice of colour-coded 1.0 mm and 1.5 mm thick combs and the optimal number of comb positions per tray provide for high flexibility in applications.

Compact L/XL features four levelling feet and a bull´s eye level to ensure uniform runs with large gels even on working benches that are not levelled.

Gel Casting

Excellent „plug-and-cast" casting tanks for tray sizes XS, S and M make leakfree gel casting a matter of seconds: just drop the gel tray in and fix with minor contact pressure.

"Plug -and-cast" casting system Compact M

For maxi gels an easy-to-handle gel caster with levelling feet and bull´s eye level can be used for both tray sizes L and XL. Additionally, gel trays of other Biometra electrophoresis systems can be applied: Horizon 20·25, Sunrise 96, Sunrise 24·24/192/MTP, Agagel maxi (20 cm x 20 cm gel tray).

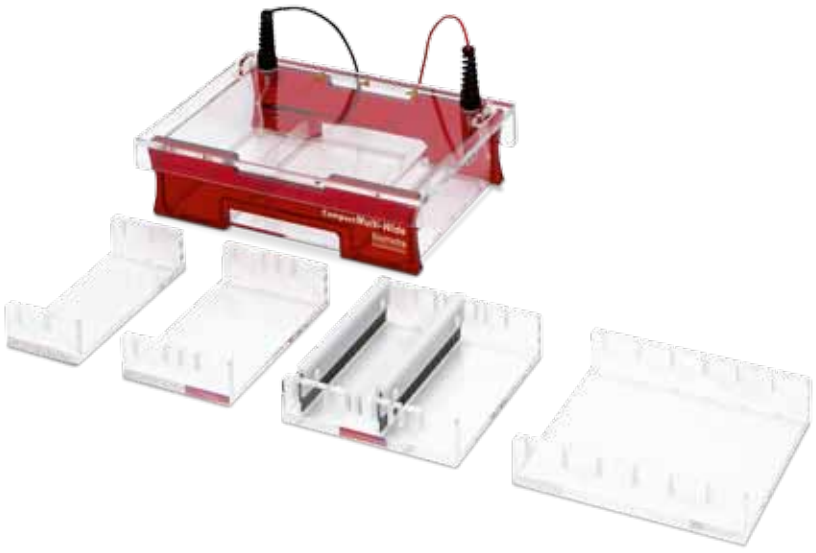
Certainly also the simple method using tape for tray sealing can be applied when somebody is used to do it that way.

Casting system Compact L/XL

Compact Family

Highly flexible systems

The new **Compact Multi-Wide** is the most variable model of the Compact Family, offering the greatest choice of gel lengths and combs for sample loading. As all gel trays have the same width, the combs fit to all of the gel trays which are available with this system.
The Compact Multi-Wide is a highly flexible system for rapid screening as well as multiple sample loading with short or long separation distances. It has a wide platform that can separate in preparative scale or up to 32 samples per comb. Depending on gel size, up to 6 combs can be placed on the gel tray.



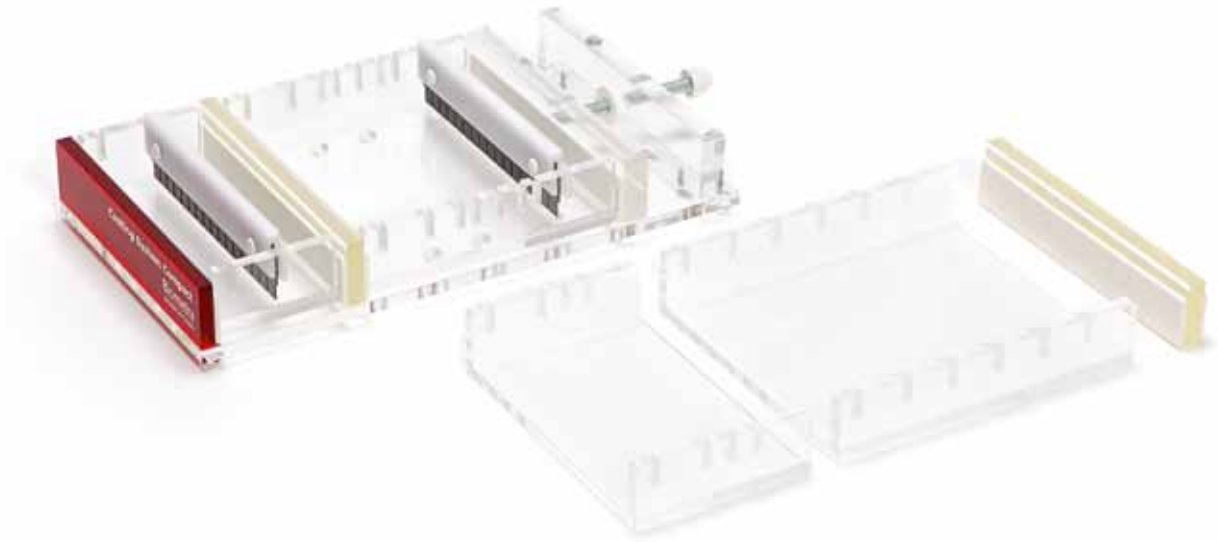
Gel Casting System

The all-in-one gel casting system accommodates gel tray length's from 7 to 18 cm. A movable wall with sliding casting dam gives the necessary flexibility for this purpose and allows fixing of the different gel trays very quick and easy.

Model	Gel size (W x L)	Max. sample number
Compact Multi-Wide	15.0 cm x 7.0 cm	64 with 2 combs
	15.0 cm x 10.0 cm	96 with 3 combs
	15.0 cm x 15.0 cm	160 with 5 combs
	15.0 cm x 18.0 cm	192 with 6 combs

By using the **movable casting dam** set the casting system can be upgraded into a highly flexible **multi-casting system**, which offers the convenience to cast simultaneously up to 3 x 7 cm long gels or 2 x 10 cm gels or 1 x 7 cm and 1 x 10 cm long gels or 1 x 7 cm and 1 x 15 cm long gels.

If adjustment of the casting system is necessary, a **levelling tray** with levelling feet and bull's eye level is optional available. This levelling tray is additionally compatible with Compact XS, S and M.



Compact Family

Highly flexible systems

		Chamber with safety lid				Combs					Casting system					UV transparent gel trays								
Item	**Order No.**	Compact XS / S	Compact M	Compact Multi-Wide	Compact L / XL	2 x 11-wells, 1.0 mm	2 x 16-wells, 1.0 mm	2 x 18-wells, 1.0 mm	3 x 36-wells, 1.0 mm	4 x 26-wells, 1.5 mm	Plug-and-cast, Compaxt XS	Plug-and-cast, Compaxt S	Plug-and-cast, Compaxt M	Maxi caster, Compact L / XL	All-in-one, Compact Multi-Wide	8.2 cm x 7.1 cm	8.2 cm x 10.5 cm	12.4 cm x 14.5 cm	15.0 x cm x 7.0 cm	15.0 x cm x 10.0 cm	15.0 x cm x 15.0 cm	15.0 x cm x 18.0 cm	23.9 xm x 20.0 cm	23.9 cm x 25.0 cm
Compact XS	025-000	+				+										+								
Gel casting cystem XS	025-010										+													
Compact XS system	025-099	+				+					+					+								
Compact S	025-100	+				+											+							
Gel casting cystem S	025-110											+												
Compact S system	025-199	+				+						+					+							
Compact M	025-200		+					+										+						
Gel casting cystem M	025-210												+											
Compact M system	025-299		+					+					+					+						
Compact L	025-300				+				+														+	
Gel casting cystem L / XL	025-310													+										
Compact L system	025-399				+				+					+									+	
Compact XL	025-400				+					+														+
Compact XL system	025-499				+					+				+										+
Compact Multi-Wide	025-500			+																				
Compact Multi-Wide	025-501			+			+												+					
Compact Multi-Wide system	025-591			+			+								+				+					
Compact Multi-Wide	025-502			+			+													+				
Compact Multi-Wide system	025-592			+			+								+					+				
Compact Multi-Wide	025-503			+			+														+			
Compact Multi-Wide system	025-593			+			+								+						+			
Compact Multi-Wide	025-504			+			+															+		
Compact Multi-Wide system	025-594			+			+								+							+		
Compact Multi-Wide	025-509			+			+												+	+	+	+		
Compact Multi-Wide system	025-599			+			+								+				+	+	+	+		
Gel casting system Multi-Wide	025-510														+									

Compact Family

Order Information

Item	Order No.
Compact XS: Chamber with bigfoot safety lid (W x D x H, cm = 13.6 x 21.6 x 10.6), UV transparent tray for gel size 8.2 cm x 7.1 cm, 2 combs (11 wells, 1.0 mm thick)	025-000
Gel casting system XS: Casting chamber for gel tray 8.2 cm x 7.1 cm, delivered without gel tray	025-010
Compact XS system: Compact XS + gel casting system XS (see 025-000 + 025-010)	025-099
Compact S: Chamber with bigfoot safety lid (W x D x H, cm = 13.6 x 21.6 x 10.6), UV transparent tray for gel size 8.2 cm x 10.5 cm, 2 combs (11 wells, 1.0 mm thick)	025-100
Gel casting system S: Casting chamber for gel tray 8.2 cm x 10.5 cm, delivered without gel tray	025-110
Compact S system: Compact S + gel casting system S (see 025-100 + 025-110)	025-199
Accessories for Compact XS and Compact S:	
Combs, 1.0 mm thick	
8 wells, 30 µl/well, multichannel pipet compatible, 9 mm spacing	025-001
11 wells, 20 µl/well	025-002
13 wells, 16 µl/well	025-003
16 wells, 12 µl/well, multichannel pipet compatible, 4.5 mm spacing	025-004
Combs, 1.5 mm thick	
Preparative comb: 1 well (342 µl) plus 2 marker wells (30 µl/well)	025-015
8 wells, 45 µl/well, multichannel pipet compatible, 9 mm spacing	025-011
11 wells, 30 µl/well	025-012
13 wells, 24 µl/well	025-013
16 wells, 18 µl/well, multichannel pipet compatible, 4.5 mm spacing	025-014
Gel trays	
Gel tray XS for 8.2 cm x 7.1 cm gel size, UV transparent, 2 comb positions with 3.0 cm distance	025-020
Gel tray S for 8.2 cm x 10.5 cm gel size, UV transparent, 2 comb positions with 4.7 cm distance, 3 comb positions with 3.1 cm distance	025-021
Loading stripes, adhesive, red/green/yellow, for gel tray XS and S	025-006
Compact M: Chamber with bigfoot safety lid (W x D x H, cm = 17.7 x 25.8 x 10.6), UV transparent tray for gel size 12.4 cm x 14.5 cm, 2 combs (18 wells, 1.0 mm thick)	025-200
Gel casting system M: Casting chamber for gel tray 12.4 cm x 14.5 cm, delivered without gel tray	025-210
Compact M system: Compact M + gel casting system M (see 025-200 + 025-210)	025-299
Accessories for Compact M:	
Combs, 1.0 mm thick	
11 wells, 36 µl/well	025-201
13 wells, 30 µl/well, multichannel pipet compatible, 9 mm spacing	025-202
18 wells, 20 µl/well	025-203
21 wells, 16 µl/well	025-204
25 wells, 12 µl/well, multichannel pipet compatible, 4.5 mm spacing	025-205

Well capacity refers to 5 mm thick gels.

Compact Family

Order Information

Item	Order No.
Combs, 1.5 mm thick	
Preparative comb: 1 well (594 µl) plus 2 marker wells (30 µl/well)	025-216
11 wells, 54 µl/well	025-211
13 wells, 45 µl/well, multichannel pipet compatible, 9 mm spacing	025-212
18 wells, 30 µl/well	025-213
21 wells, 24 µl/well	025-214
25 wells, 18 µl/well, multichannel pipet compatible, 4.5 mm spacing	025-215
Gel trays	
Gel tray M for 12.4 cm x 14.5 cm gel size, UV transparent, 3 comb positions with 4.5 cm distance, 4 comb positions with 3.3 cm distance	025-221
Loading stripes, adhesive, red/green/yellow, for gel tray M	025-206

Compact L: Chamber with levelling feet, gauge and bigfoot safety lid (W x D x H, cm = 29.4 x 38.2 x 11.2), UV transparent tray for gel size 23.9 cm x 20.0 cm, 3 combs (36 wells, 1.0 mm thick)	025-300
Gel casting system L/XL: Gel caster with levelling feet and gauge for gel tray 23.9 cm x 20.0 cm and gel tray 23.9 cm x 25.0 cm, delivered without gel tray	025-310
Compact L system: Compact L + gel casting system L/XL (see 025-300 + 025-310)	025-399
Compact XL: Chamber with levelling feet, gauge and bigfoot safety lid (W x D x H, cm = 29.4 x 38.2 x 11.2), UV transparent tray for gel size 23.9 cm x 25.0 cm, 4 combs (26 well, 1.5 mm thick)	025-400
Compact XL system: Compact XL + gel casting system L/XL (see 025-400 + 025-310)	025-499

Accessories for Compact L and Compact XL:

Combs, 1.0 mm thick	
22 wells, 36 µl/well	025-301
26 wells, 30 µl/well, multichannel pipet compatible, 9 mm spacing	025-302
36 wells, 20 µl/well	025-303
42 wells, 16 µl/well	025-304
52 wells, 12 µl/well, multichannel pipet compatible, 4.5 mm spacing	025-305
Combs, 1.5 mm thick	
Preparative comb: 1 well (1284 µl) plus 2 marker wells (30 µl/well)	025-316
22 wells, 54 µl/well	025-311
26 wells, 45 µl/well, multichannel pipet compatible, 9 mm spacing	025-312
36 wells, 30 µl/well	025-313
42 wells, 24 µl/well	025-314
52 wells, 18 µl/well, multichannel pipet compatible, 4.5 mm spacing	025-315
Gel trays	
Gel tray L for 23.9 cm x 20.0 cm gel size, UV transparent, 6 comb positions with 3.1 cm distance	025-320
Gel tray XL for 23.9 cm x 25.0 cm gel size, UV transparent, 8 comb positions with 3.0 cm distance	025-321
Loading stripes, adhesive, red/green/yellow, for gel tray L and XL	025-306

Well capacity refers to 5 mm thick gels.

Item	Order No.
Compact Multi-Wide: Chamber with safety lid (W x D x H, cm = 29.5 cm x 21.0 cm x 8.5 cm), without accessories	025-500
Compact Multi-Wide: Chamber with safety lid (W x D x H, cm = 29.5 cm x 21.0 cm x 8.5 cm), UV transparent tray for gel size 15.0 cm x 7.0 cm, 2 combs (16 wells, 1.0 mm thick)	025-501
Compact Multi-Wide, 1 gel tray 15.0 cm x 7.0 cm, 2 combs (16 well, 1.0 mm thick) **+ gel casting system Multi-Wide** (see 025-501 + 025-510)	025-591
Compact Multi-Wide: Chamber with safety lid (W x D x H, cm = 29.5 cm x 21.0 cm x 8.5 cm), UV transparent tray for gel size 15.0 cm x 10.0 cm, 2 combs (16 wells, 1.0 mm thick)	025-502
Compact Multi-Wide, 1 gel tray 15.0 cm x 10.0 cm, 2 combs (16 well, 1.0 mm thick) **+ gel casting system Multi-Wide** (see 025-502 + 025-510)	025-592
Compact multi-Wide: Chamber with safety lid (W x D x H, cm = 29.5 cm x 21.0 cm x 8.5 cm), UV transparent tray for gel size 15.0 cm x 15.0 cm, 2 combs (16 wells, 1.0 mm thick)	025-503
Compact Multi-Wide, 1 gel tray 15.0 cm x 15.0 cm, 2 combs (16 well, 1.0 mm thick) **+ gel casting system Multi-Wide** (see 025-503 + 025-510)	025-593
Compact Multi-Wide: Chamber with safety lid (W x D x H, cm = 29.5 cm x 21.0 cm x 8.5 cm), UV transparent tray for gel size 15.0 cm x 18.0 cm, 2 combs (16 wells, 1.0 mm thick)	025-504
Compact Multi-Wide, 1 gel tray 15.0 cm x 18.0 cm, 2 combs (16 well, 1.0 mm thick) **+ gel casting system Multi-Wide** (see 025-504 + 025-510)	025-594
Compact Multi-Wide: Chamber with safety lid (W x D x H, cm = 29.5 cm x 21.0 cm x 8.5 cm), 4 UV transparent trays for gel size: 15 cm x 7.0 cm / 10.0 cm / 15.0 cm and 18.0 cm, 2 combs (16 wells, 1.0 mm thick)	025-509
Compact Multi-Wide, 4 gel trays 15.0 cm x 7.0 cm / 10.0 cm/ 15.0 cm and 18.0 cm, 2 combs (16 well, 1.0 mm thick) **+ gel casting system Multi-Wide** (see 025-509 + 025-510)	025-599
Gel casting system Multi-Wide: all-in-one casting chamber for all Multi-Wide gel tray sizes: 15 cm x 7.0 cm / 10.0 cm / 15.0 cm and 18.0 cm	025-510

Accessories for Compact Multi-Wide:

Combs, 1.0 mm thick	
Preparative comb: 1 well (528 µl) plus 2 marker wells (16 µl/well)	025-537
Preparative comb: 2 well (261 µl) plus 2 marker wells (16 µl/well)	025-538
Preparative comb: 4 well (127 µl) plus 2 marker wells (16 µl/well)	025-539
14 wells, 36 µl/well	025-531
16 wells, 30 µl/well, multichannel pipet compatible, 9 mm spacing	025-532
22 wells, 20 µl/well	025-533
26 wells, 16 µl/well	025-534
32 wells, 12 µl/well, multichannel pipet compatible, 4.5 mm spacing	025-535
Combs, 1.5 mm thick	
Preparative comb: 1 well (793 µl) plus 2 marker wells (24 µl/well)	025-547
Preparative comb: 2 well (392 µl) plus 2 marker wells (24 µl/well)	025-548
Preparative comb: 4 well (191 µl) plus 2 marker wells (24 µl/well)	025-549
14 wells, 55 µl/well	025-541
16 wells, 46 µl/well, multichannel pipet compatible, 9 mm spacing	025-542
22 wells, 30 µl/well	025-543
26 wells, 24 µl/well	025-544
32 wells, 18 µl/well, multichannel pipet compatible, 4.5 mm spacing	025-545
Gel trays	
Gel tray for 15.0 cm x 7.0 cm gel size, UV transparent, 2 comb positions with 2.9 cm distance	025-521
Gel tray for 15.0 cm x 10.0 cm gel size, UV transparent, 2 comb positions with 4.4 cm distance, 3 comb positions with 2.9 cm distance	025-522
Gel tray for 15.0 cm x 15.0 cm gel size, UV transparent, 2 comb positions with 6.9 cm distance, 3 comb positions with 4.6 cm distance, 5 comb positions with 2.7 cm distance	025-523
Gel tray for 15.0 cm x 18.0 cm gel size, UV transparent, 2 comb positions with 8.4 cm distance, 3 comb positions with 5.6 cm distance, 6 comb positions with 2.8 cm distance	025-524
Movable casting dam set, 2 casting dams to convert the all-in-one casting system for Multi-Wide into a multi-casting system for the shorter gel trays	025-528
Casting/Levelling Tray, 20 x 30 cm	025-550

Well capacity refers for 5 mm thick gels.

Horizon® Family

Agarose Gel Electrophoresis Systems in Three Standard Sizes

- **Easy-to-use compact design**
- **Variety of preparative, analytical and multichannel pipet compatible combs**
- **Buffer circulation ports**
- **Gel Casting Systems**

Model	Gel size (W x L)	Max. sample number
Horizon® 58	5.7 cm x 8.3 cm	28 with 2 combs
Horizon® 11·14	11.0 cm x 14.0 cm	48 with 2 combs
Horizon® 20·25	20.0 cm x 25.0 cm	84 with 2 combs

The well-established Horizon® Family includes three different chamber sizes. All of them excel in their compact user-friendly construction. The safety interlock lid prevents an electrical connection until the lid is properly in place. Gel casting works very fast with patented drop-in dams and can be done either directly in the electrophoresis device or in an external gel casting system. Red visualisation strips under the gel trays aid in sample loading. The medium and large format systems Horizon® 11·14 and Horizon® 20·25 additionally offer a special equipment to perform Southern and Nothern capillary blotting.

Horizon® 58 is developed for the rapid separation of nucleic acids in agarose mini-gels. Casting components that withstand boiling agarose temperatures and the removable buffer tray for easy cleaning make the Horizon® 58 the system of choice for rapid routine use. For storage combs and gel casting dams can easily be placed in the electrophoresis unit. A separate casting system is available and comes ready-to-cast with gel tray and casting dams.

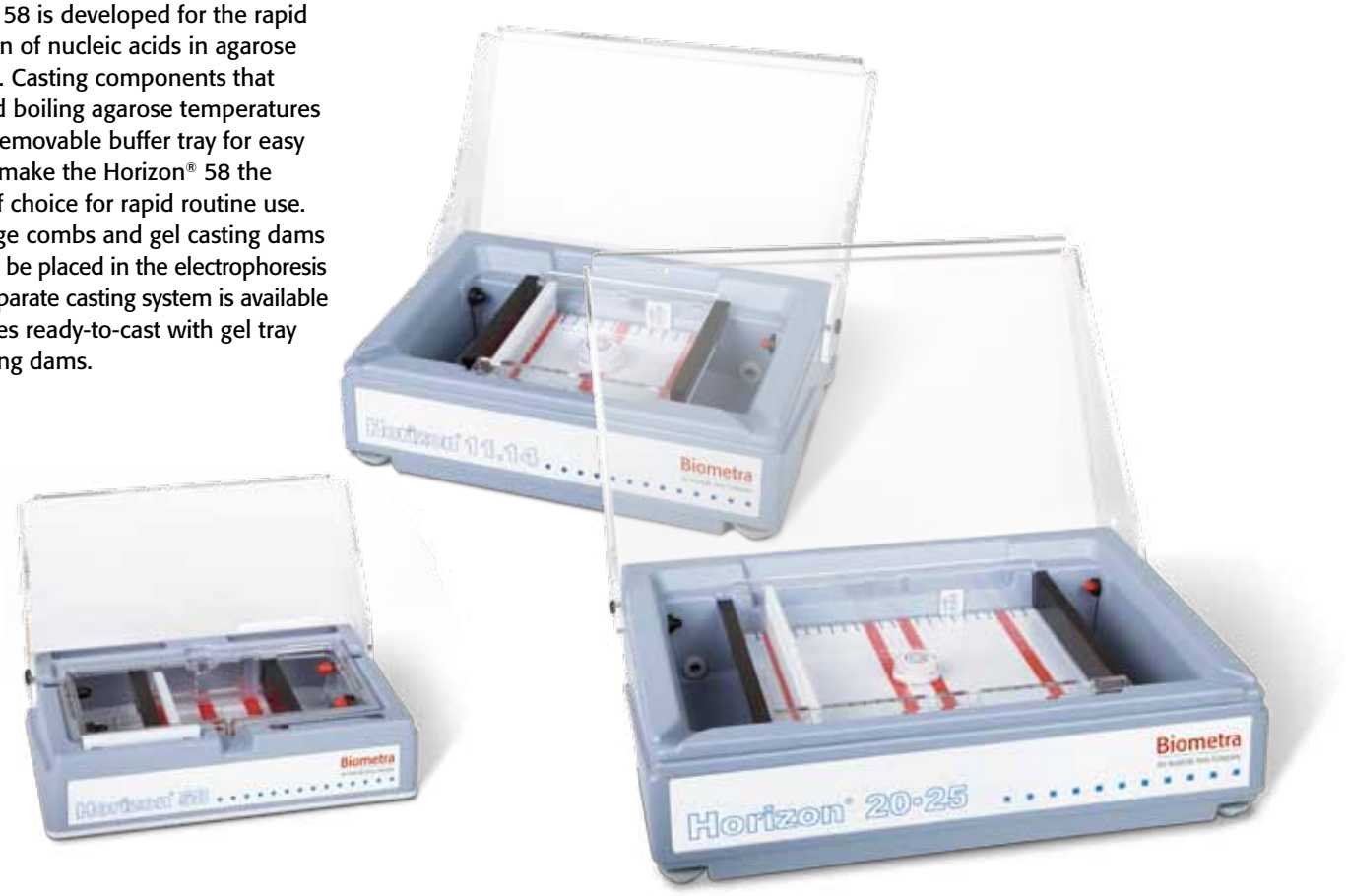
Horizon® 11·14 and Horizon® 20·25 have adjustable levelling feet and a bull's eye level to ensure uniform gel thickness for reproducible separation patterns. The gel trays are UV transparent and thus can be directly placed with gel on an UV table for visualisation. Both models have ports for buffer recirculation, e.g. for RNA electrophoresis.

The Horizon® 58 and Horizon® 11·14 casting systems come complete with gel tray and casting dams.

The Horizon® 11·14 casting system can be levelled by four levelling feet. For the Horizon® 58 casting system an additonal casting/levelling tray is available.

Horizon® 58 Gel Casting System

Horizon® 11·14 Gel Casting System



Horizon® 58

Order Information

Item	Order No.
Horizon® 58: Chamber (W x D x H, cm = 15.2 x 24.0 x 7.0), power cords, safety interlock lid, heat resistant gel tray 5.7 cm x 8.3 cm with 3 visualisation strips, 2 aluminium gel casting dams, 1 comb (8 wells, 0.8 mm thick), 1 comb (14 wells, 0.8 mm thick), removable buffer tray	41060039
Horizon® 58 Gel Casting System: Stand-alone moulded casting tray (W x D x H = 10 x 20.4 x 4.5 cm), 1 removable gel tray with 3 visualisation strips, 2 gel casting dams (Combs are sold separately.)	21065040

Accessories and spare parts

Combs, 0.8 mm thick	
Comb 8 wells, 15 µl/well	21065073
Comb 14 wells, 7 µl/well	21065115
Combs, 1.5 mm thick	
Preparative comb: 1 well plus 2 wells for marker lanes, 250 µl per preparative slot	21065131
Comb 5 wells, 50 µl/well	21065107
Comb 8 wells, 25 µl/well	21065081
Comb 12 wells, 15 µl/well, multichannel pipet compatible, 4.5 mm spacing	11951142
Comb 14 wells, 13 µl/well	21065123
Gel trays + dams	
Gel tray H58/Sunrise 58, 5.7 cm x 8.3 cm with 3 visualisation strips	21065164
Aluminium Gel Casting Dams without gaskets (pair)	21065065
Aluminium Gel Casting Dams with gaskets (pair)	41060054
Spare parts	
Power Cords (pair)	11099025
Electrode Replacement H58 (1 electrode/pkg)	21059027
Removable buffer tray incl. mounted electrodes	21065024
Reed Switch Replacement (Reed Switch only)	11950011
Reed Switch Hardware Replacement Kit (includes 2 O-rings, 2 red cap nuts, 2 black cap nuts, 2 rubber washers, electrode boots, 2 hex nuts, 2 screws, 2 banana plugs, and 2 lock washers)	21065156
Lid Replacement H58/Sunrise 58	21065214
Hinge Pins Replacement (2/pkg)	21065149
Casting/Levelling Tray, 20 x 30 cm	025-550

Horizon® 11·14

Order Information

Item	Order No.
Horizon® 11·14: Chamber (W x D x H, cm = 21.5 x 31.5 x 10.5), power cords, safety interlock lid, UV-transparent gel tray 11 cm x 14 cm, 2 aluminium gel casting dams, 1 comb (14 wells, 1 mm thick), buffer recirculation option, adjustable levelling feet, bull's-eye level	11068020
Horizon® 11·14 Gel Casting System for 11 cm x 14 cm gels: stand-alone moulded casting tray (W x D x H = 17.0 x 32.0 x 6.5 cm), 1 UV-transparent gel tray, aluminium gel casting dams, adjustable levelling feet (Combs are sold separately.)	11068046

Accessories and spare parts

Combs, 1.0 mm thick	
Comb 10 wells, 33 µl/well	11951068
Comb 12 wells, 30 µl/well, multichannel pipet compatible, 9 mm spacing	11951175
Comb 14 wells, 20 µl/well	31081011
Comb 20 wells, 16 µl/well	11951076
Combs, 2.0 mm thick	
Comb 10 wells, 66 µl/well	11951084
Comb 14 wells, 40 µl/well	31081029
Comb 20 wells, 32 µl/well	11951092
Comb 24 wells, 22 µl/well, multichannel pipet compatible, 4.5 mm spacing	11951159
Gel trays + dams	
UV-transparent gel tray H11·14/H5, 11 cm x 14 cm	11084019
Aluminium Gel Casting Dams without gaskets (pair)	11068053
Spare parts	
Power Cords (pair)	11099025
Electrode Replacement H11·14 (1 electrode/pkg)	11068061
Electrode Hardware Repair Kit (includes 2 rubber washers, 2 hex nuts, 2 electrode boots, 1 red cap nut, 1 black cap nut, 2 banana plugs, and 2 lock washers)	11980059
Levelling Foot Replacement (2/pkg)	11964130
Quick Connect Fitting Replacement (2/pkg)	11940012
Quick Connect Port Replacement (2/pkg)	11962026
Lid Replacement H11·14	11962040
Hinge Pins Replacement (2/pkg)	21065149

Well capacity refers to 5 mm thick gels.

Horizon® 20·25

Order Information

Item	Order No.
Horizon® 20·25: Chamber (W x D x H, cm = 32.0 x 42.5 x 12.0), power cords, safety interlock lid, UV-transparent gel tray 20 cm x 25 cm, 2 aluminium gel casting dams, 1 x 20 wells comb (1 mm thick), buffer recirculation option, adjustable levelling feet, bull's-eye level	21069026

Accessories and spare parts

Combs, 1.0 mm thick	
Comb 12 wells, 54 µl/well	11953064
Comb 15 wells, 40 µl/well	11953072
Comb 20 wells, 27 µl/well	41007014
Comb 21 wells, 30 µl/well, multichannel pipet compatible, 9 mm spacing	11951183
Comb 30 wells, 20 µl/well	11951043
Comb 42 wells, 11 µl/well, multichannel pipet compatible, 4.5 mm spacing	11951191
Combs, 2.0 mm thick	
Comb 20 wells, 54 µl/well	41007022
Comb 30 wells, 40 µl/well	11951019
Comb 42 wells, 22 µl/well, multichannel pipet compatible, 4.5 mm spacing	11951167
Combs, 3.0 mm thick	
Preparative comb: 1 well plus 2 wells for marker lanes, 2100 µl per preparative slot	61010021
Comb 20 wells, 81 µl/well	41007030
Comb 30 wells, 60 µl/well	11951050
Gel trays + dams	
UV-transparent Gel Tray H20·25/H4, 20 cm x 25 cm	31006026
Aluminium Gel Casting Dams without gaskets (pair)	21069059
Spare parts	
Power Cords (pair)	11099025
Electrode Replacement H20·25 (1 electrode/pkg)	21069042
Electrode Hardware Repair Kit (includes 2 rubber washers, 2 hex nuts, 2 electrode boots, 1 red cap nut, 1 black cap nut, 2 banana plugs, and 2 lock washers)	11980059
Levelling Foot Replacement (2/pkg)	11964130
Quick Connect Fitting Replacement (2/pkg)	11940012
Quick Connect Port Replacement (2/pkg)	11962026
Lid Replacement H20·25	11962032
Hinge Pins Replacement (2/pkg)	21065149

Well capacity refers to 5 mm thick gels.

Accessories for Discontinued Agarose Gel Electrophoresis Family Agagel

Order Information

Information about availability is supplied on request.

Item	Order No.
For Agagel Mini	
Comb depth and bull´s eye level	020-007
Combs, 1.0 mm thick	
Comb, double-sided, 4/1 wells*, 25/125 µl/well	020-003
For Agagel Midi-Wide and Agagel Maxi	
Comb depth and bull´s eye level	020-307
Combs, 1.0 mm thick	
Comb, double-sided, 10/2 wells*, 75/300 µl /well, reference 15/25 µl	020-303
Combs, 2.0 mm thick	
Comb, double-sided, 44/22 wells*, 27/50 µl /well, multichannel pipet compatible, 4.5/9 mm spacing	020-310
Gel trays + dams	
Rubber end blocks, 2/pkg	020-306
Agagel Maxi UV-transparent gel tray, with ruler, 20 cm x 20 cm	020-352
For Agagel Standard	
Combs, 1.0 mm thick	
Comb, 3 wells, 85 µl/well	020-201
Comb, 12 wells, 17 µl/well	020-202
Comb, 18 wells, 16 µl/well	020-207
Combs, 2.0 mm thick	
Comb, 12 wells, 40 µl/well	020-203
Gel trays + dams	
UV-transparent gel tray, with 2 casting gates, 10 cm x 10 cm	020-205
Casting gates, 4/pkg	020-216

***plus 2 marker wells**
Well capacity refers to 5 mm thick gels.

Accessories for Discontinued Agarose Gel Electrophoresis Family Sunrise™

Order Information

Information about availability is supplied on request.

Item	Order No.
For Sunrise 12·16 and Sunrise 96	
Combs, 1.5 mm thick	
Comb 12 well, 44 µl/well, multichannel pipet compatible, 9 mm spacing	10245439
Combs, 2.0 mm thick	
Comb 15 well, thick 40 µl/well	10245280
Gel trays + dams	
UV-transparent gel tray Sunrise 96, 12 cm x 24 cm	11084043
Spare parts	
Power Cords, not attached to lid (pair)	11099025
Electrode Replacement Kit Sunrise (for 2 electrodes)	11680014
Lid Replacement Kit Sunrise 12·14/Sunrise 96	11068152
For Sunrise 24·24, Sunrise 192 and Sunrise MTP	
Combs, 1.0 mm thick	
Comb 24 well, 27 µl/well	10245314
Combs, 1.5 mm thick	
Comb 26 well, 34 µl/well, multichannel pipet compatible, 9.0 mm spacing	10245326
Combs, 2.0 mm thick	
Comb 24 well, 54 µl/well	10245322
Gel trays + dams	
UV-transparent gel tray, 24 cm x 24 cm	31006067
Spare parts	
Power Cords, not attached to lid (pair)	11099025
Electrode Replacement Kit Sunrise (for 2 electrodes)	11680014
Lid Replacement Kit Sunrise 24·24/Sunrise 192/Sunrise MTP	21069182

Well capacity refers to 5 mm thick gels.

Rotaphor System 6.0

Pulsed Field Gel Electrophoresis (PFGE) System for the Separation of Large DNA Molecules

- **Separation of large DNA molecules (up to 8 Mb = 8,000 kb)**
- **Patented electrode rotor allows free electrical field angle**
- **Exceptional resolution**
- **Optimised protocols for different size ranges**

Monitor not supplied with the Rotaphor System

Rotating field electrophoresis (ROFE)

Pulsed field electrophoresis with the Rotaphor system allows the separation of DNA beyond the 50 kb limit of conventional agarose electrophoresis. Thanks to the patented electrode rotor, the electrical field can be applied in virtually any angle. To achieve a very homogeneous field, the two main rotor electrodes are flanked by 2 sets of secondary electrodes each.

Flexibility

Due to the unique design of the Rotaphor system, all common techniques for separation of large DNA molecules can be applied. This includes methods like CHEF, PAGE and naturally ROFE (Rotating Field Electrophoresis).

Buffer management

Since PFGE gels typically run for many hours (up to several days), the electrophoresis buffer has to be cooled. The Rotaphor electrophoresis chamber comes with a built-in buffer circulation pump which is connected to an external cooling thermostat. During the run the buffer temperature in the electrophoresis chamber is constantly monitored and precisely controlled by the Rotaphor software.

Easy control

The Rotaphor system includes a PC that controls the electrode rotor and the power supply over the Rotaphor interface card. The Rotaphor 6.0 software provides 17 pre-set programs for separation of different size ranges. Starting with the pre-set parameters, new applications are quickly optimised.

For each pre-set program the software shows a real gel image. Once a custom program has been optimised, a referring gel picture can be uploaded into the software. Thus, the Rotaphor software over time will not only be a control tool, but also a library of successful experiments linked to the underlying separation parameters. By linking programs to combined lists also complex sequences can be programmed.

Rotaphor rotor with computer controlled electrodes and connection plug. Electrodes are freely rotatable, thus providing a maximum of flexibility.

Rotaphor System 6.0

Order Information

Item	Order No.
Rotaphor 6.0 System, 230 V, PC with Windows® operating system (German)	021-100
Rotaphor 6.0 System, 110 V, PC with Windows® operating system (English)	021-190
Rotaphor 6.0 System, 230 V, PC with Windows® operating system (English)	021-200
The Rotaphor System includes: Electrophoresis chamber with electrode rotor and internal buffer circulation, power supply, gel tray, comb (18 well), frame for gel casting, sample mould, connection cables, computer with interface card and pre-installed Rotaphor 6.0 software	
Refrigerating circulator KH-6 (230 V), operating temperature range -10 °C to + 80 °C	043-500
Refrigerating circulator KH-6 (115 V), operating temperature range -10 °C to + 80 °C	043-590

Accessories	
Combs for 20 cm x 20 cm gels	
18 wells	021-011
25 wells	021-004
40 wells	021-005
50 wells	021-006
18 wells (for liquid samples)	021-007
Combs for 18 cm x 13 cm gels	
5 wells	021-008
12 wells	021-009
20 wells	021-010
Sample casting form (for 20 embedded samples, 14 mm x 10 mm x 1 mm each)	021-003
Preparative gel casting kit, 13 cm x 18 cm gel casting tray, comb 5 wells (3 marker slots, 2 preperative slots), comb 12 wells	021-001
Gel tray (20 cm x 20 cm gels) and casting frame	021-002

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

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.

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.

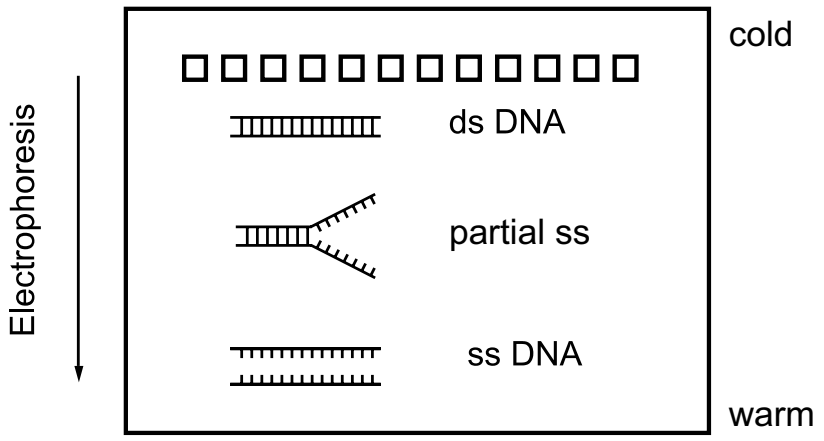
Technical Specifications
see page 86
Ordering Information
see page 87 – 88

Principle of TGGE

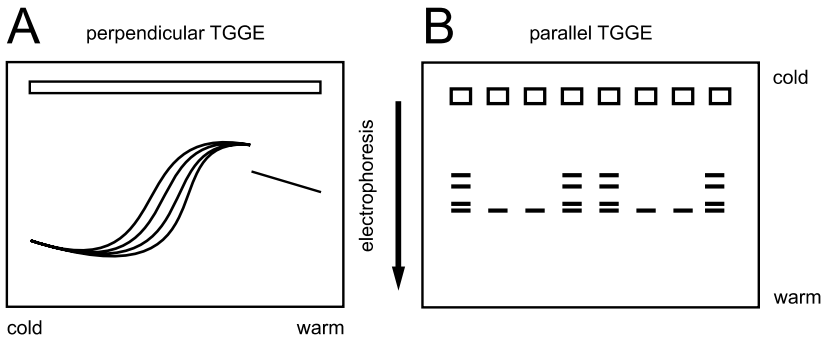
Separation by temperature gradient

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.

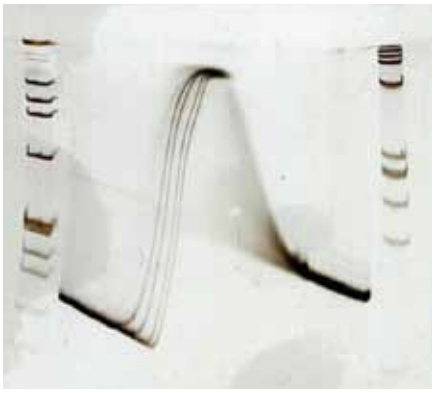
Parallele TGGE (B): Multiple samples are analysed in parallel (gradient parallel to migration of samples). This mode is applied for routine analysis of many samples.

TGGE in Mutation Analysis

From perpendicular to parallel analysis

Perpendicular TGGE for optimisation of temperature gradient

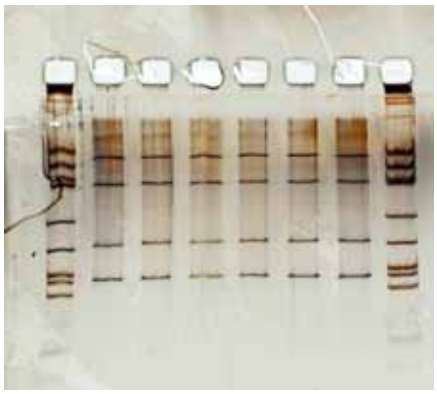
A 120 bp DNA fragment was separated in a perpendicular temperature gradient. Prior to analysis the sample has been mixed with non-mutated standard DNA. Mixture was denatured at 94 °C and then slowly cooled down to allow for heteroduplex formation.
By comparing the melting curve with the temperature lanes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

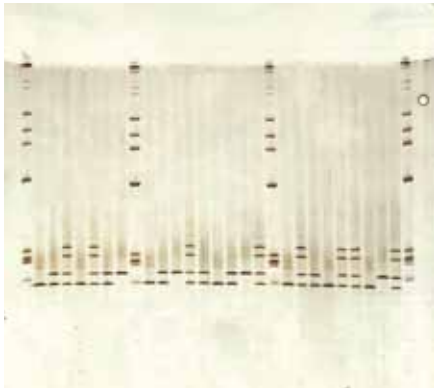
In contrast to conventional electrophoresis techniques, in TGGE separation is not improved by extended running times but by adjusting the temperature gradient. In this example a gradient of only 5 °C was applied to efficiently separate heteroduplex DNA samples. All bands in this gel are of identical 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.
Gels for the TGGE MAXI System 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
Electrophoresis unit		
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
Controller	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
Power supply	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.
Germany	
TGGE System, 230/115 V 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
Other countries	
TGGE system, 230/115 V 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.
Germany	
TGGE MAXI System, 230/115 V 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
Other countries	
TGGE MAXI System, 230/115 V 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, 8 pcs.	024-217
TGGE MAXI Applicator strip, silicone, 34 slots for 8 µl (for use with 024-227)	024-223

Model S2

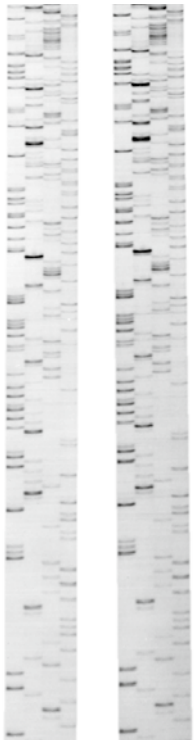
Sequencing Gel Electrophoresis System

- **Produces a 30 cm x 40 cm gel that fits easily on a standard 14 in x 17 in X-ray film**
- **Integral aluminum plate for even heat distribution to minimise band curvation ("smiling")**
- **Removable lower buffer tray with a separate chamber for collecting the buffer from the upper reservoir, eliminating the need to move the apparatus for buffer disposal**
- **Built-in integral clamps hold the gel in place**
- **Unique gasket sealing system ensures leak-free operation without grease or notched plates**
- **Safety interlock lids**
- **Additional combs and apparatus components available separately**

The Model S2 Sequencing Gel Electrophoresis Apparatus is designed for vertical polyacrylamide gel separations of oligo- and polynucleotides, nucleic acid sequencing, genotyping and polymorphic studies.

Model	Apparatus dimensions (W x D x H)	Gel dimensions (W x H)
S2	42.2 cm x 21.6 cm x 44.5 cm	31.0 cm x 38.5 cm

Working buffer volume: 1 L



DNA sequence analysis performed on the Model S2 System.
8 % polyacrylamide/8.3 M urea gel Tris-borate-EDTA buffer electrophoresed at 1.5 kV for 2.5 h.

Item	Order No.
Model S2 Complete with power cords, four 14 cm 0.4 mm vinyl sharktooth combs, set of 0.4 mm thick vinyl side spacers; pair of glass plates, roll of gel sealing tape; surface temperature monitor	21105036

Ordering Information for Accessories

see page 91 – 92

Model SA

Adjustable Sequencing Gel Electrophoresis System

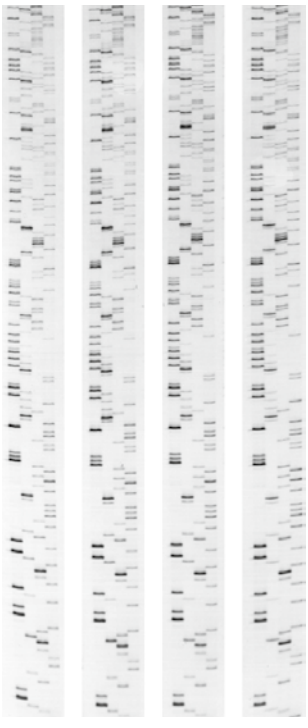
- **Snap-action section clamps allow quick and easy adjusting of the height**
- **Adjustable levelling feet and built-in levelling indicator ensure consistent and reproducible results**
- **Integral aluminium plate for even heat distribution to minimise "smiling"**
- **Removable lower buffer tray with a separate chamber for collecting the buffer from the upper reservoir eliminating the need to move the apparatus for buffer disposal**
- **Built-in integral clamps hold the gel in place**
- **Unique gasket sealing system ensures leak-free operation**
- **Safety interlock lids**
- **Combs and apparatus components available**

The Model SA sequencing apparatus is designed for the separation of oligonucleotides, polynucleotides and nucleic acid sequences in vertical polyacrylamide gels. With optional extensions the unit can easily be adjusted to three different heights: 32 cm, 43 cm or 60 cm.

Model	Apparatus dimensions (W x D x H)	Gel dimensions (W x H)
SA-32	29 cm x 22 cm x 41 cm	17 cm x 32 cm

Working buffer volume: 500 ml

Item	Order No.
Model SA-32 Complete with top and base sections, power cords; two 14 cm vinyl sharktooth combs; set of 0.4 mm thick spacers; pair of glass plates; roll of gel sealing tape; surface temperature monitor.	31096019 **(USA)** 31096027 **(EU)**
Gel Casting Clamp	31096324



DNA sequence analysis performed on the Model SA-60 System.
GEL-MIX 6,6 % SDS-polyacrylamide gel
Tris-borate-EDTA buffer electrophoresed at 55 W constant power (2.3 to 2.7 kV) for 3 h.

Ordering Information for Accessories

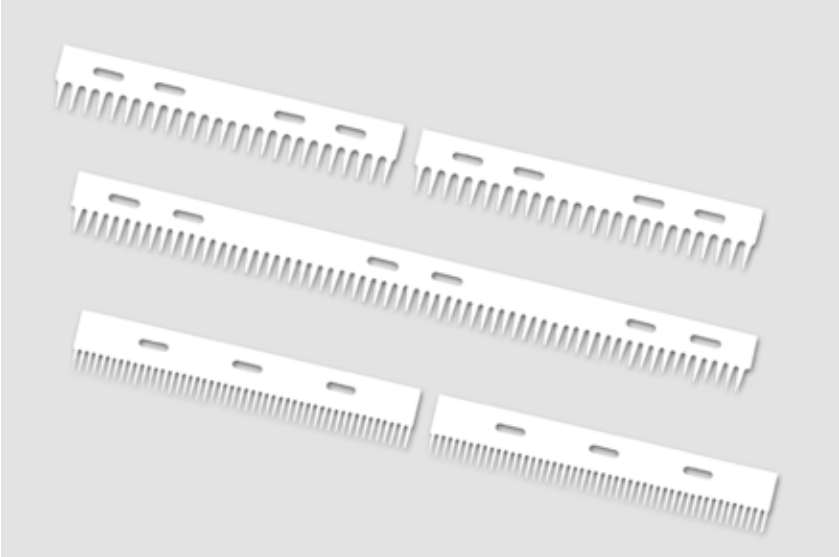
see page 91 – 92

Combs for Sequencing Apparatus

Shark Tooth Combs

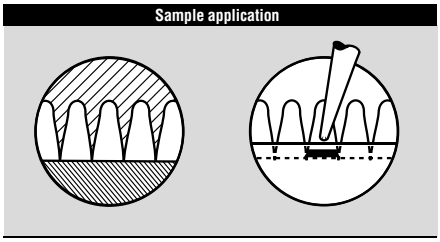
- **The teeth form barriers between adjacent lanes for sample loading**
- **Reduced risk of torn or deformed wells cause by square-toothed combs**
- **The minimal space between lanes facilitates accurate reading of sequences**
- **Generate flatter, more uniform loading surface than square-toothed combs**

Shark tooth combs are ideally suited for facilitating the analysis of sequencing reactions. They are designed for use with all sequencing apparatus models (S2, S2001 and SA). In addition, the combs can be used with all other systems with 0.4 mm spacers.



Square tooth combs for model S2001 and S2

Number of wells	Comb thickness	Volume/well	Order No.
16	0.4 mm	25 µl	21035043
20	0.4 mm	19 µl	21035076
20	0.8 mm	38 µl	21035084
20	1.6 mm	76 µl	21035092
32	0.4 mm	10 µl	21035100
32	0.8 mm	20 µl	21035118



Shark tooth combs for all models

Comb length	Comb thickness	Number of teeth	Volume/well	Pcs./Pckg.	Order No.
14 cm	0.4 mm	25	2 – 4 µl	6	21045018
28 cm	0.4 mm	50	2 – 4 µl	2	21046016
14 cm	0.4 mm	49	1 – 2 µl	4	21045026
14 cm	0.19 mm	25	2 – 4 µl	6	21105317
14 cm	0.35 mm	25	2 – 4 µl	6	21105341
28 cm	0.35 mm	62	2 – 4 µl	2	21035134

Combs for Sequencing Apparatus

Order Information

Square tooth combs for model SA

Number of wells	Comb thickness	Volume/well	Order No.
3	0.8 mm	480* µl	11092020
12	1.6 mm	60 µl	11092087
18	0.8 mm	16 µl	11092103

*** Central, preparative well**

Accessories

Item	Dimensions	Content	Order No.
Spacer set for Model S2001/S2	0.35 mm	2 Spacer, 12 End blocks	21105366
Spacer set for Model S2001/S2	0.4 mm	2 Spacer, 12 End blocks	21108014
Spacer set for Model S2001/S2	0.8 mm	2 Spacer, 12 End blocks	31109010
Spacer set for Model S2001/S2	1.6 mm	2 Spacer, 12 End blocks	31109028
Spacer set for Model SA-32	0,8 mm	2 Spacer	21093059
Spacer set for Model SA-32	1,6 mm	2 Spacer	21093075
Wedge spacer for Model S2001/S2	0.4 – 1.2 mm	2 Spacer	21107016
Wedge spacer for Model SA-32	0.4 – 1.2 mm	2 Spacer	21093083
End spacer for Model S2001/S2	0.4 mm	1 Spacer	21105077
End spacer for Model S2001/S2	0.8 mm	1 Spacer	21105069
End spacer for Model S2001/S2	1.2 mm	1 Spacer	21105325
End spacer for Model S2001/S2	1.6 mm	1 Spacer	21105051
Spacer silicone blocks		12 Pieces	21105382
Glass plate set for S2001/S2	33 cm x 39 cm	2 Plates	11034014
Glass plate set for SA-32	19.7 cm x 33.8 cm	2 Plates	21093067
Gel casting clamp for SA-32		1 Piece	31096324
Gel sealing tape		1 Roll	11032018
Gasket silicone grey		1 Piece	21105358
Sealing for buffer chamber SA		1 Piece	21093034
Clamps for gel sandwich		12 Pieces	11098019

Power Supplies

Introduction and Equipment Compatibility

Biometra offers a full range of power supplies for protein and nucleic acid electrophoresis, blotting and isoelectric focussing (IEF).

Low Voltage Power Supplies

- Wide output range up to 400 V and 1,000 mA
- Constant voltage or constant current, with automatic crossover
- Integrated timer: PS 300 T, PS 305 T and P25 T
- Gel Saver Function: PS 305 T
- Universal: Standard Power Pack P25 and P25 T for electrophoresis (max. 400 V) and blotting (max. 1,000 mA).

High Voltage Power Supplies

- Up to 3,000 V and 300 mA
- Constant voltage, current or power with automatic crossover
- Integrated timer: PS 9009
- Programmable: PS 9009
- Temperature regulation option: PS 9009

Standard Power Pack P25 T

Model PS 9009

	Low Voltage Power Supplies					High Voltage Power Supplies	
	Mini Power Pack PS 300 T*	**Model PS 304**	**Model PS 305 T**	**Standard Power Pack P25**	**P25 T**	**Model PS 3003**	**Model PS 9009**
Agarose gel electrophoresis							
Compact Family	+	+	+	+	+	+	+
Horizon Family	+	+	+	+	+	+	+
Sunrise Family	+	+	+	+	+	+	+
Agagel Standard	+	+	+	+	+	+	+
Agagel Mini, Midi-Wide, Maxi	+	+	+	+	+	+	+
Polyacrylamide gel electrophoresis (PAGE)							
Minigel Family	+	+	+	+	+	+	+
Eco-Line Family	+	+	+	+	+	+	+
Mini-V8·10	+	+	+	+	+	+	+
Mini-V8·10 System	-	(+)	+	+	+	+	+
Model V15·17, V16, V16-2	+	+	+	+	+	+	+
Sequencing gels							
Model S2 / S2001 / SA	-	-	-	-	-	+	+
Blotting							
Fastblot	-	(+)	(+)	+	+	(+)	(+)
Tankblot	-	(+)	+	+	+	(+)	(+)
Eco-Line Tankblot Family	-	(+)	+	+	+	(+)	(+)
Mini-V8·10 Blot Module	-	(+)	+	+	+	(+)	(+)

*** For maxi gels it is recommendet to run one gel**
( ) limited use

Power Supplies

Technical Specifications

Low Voltage Power Supplies

	Mini Power Pack PS 300 T	Model PS 304	Model PS 305 T	Standard Power Pack P25 / P25 T
				
Max. voltage [V]	300	300	300	400
Max. current [mA]	400	400	500	1,000
Max. power [W]	60	120	150	200
Const. voltage	+	+	+	+
Const. current	+	+	+	+
No. of outputs	2	2	2	4
Timer	+	-	+	-/+
Audible alarm	+	-	+	-/-
Programmable	-	-	-	-
"Gel Saver" function	-	-	+	-
Stackable	-	+	+	+
Apparatus dimensions (W x D x H, cm)	14.0 x 19.1 x 8.4	27.0 x 17.0 x 8.0	29.0 x17.0 x 8.0	27.0 x 25.0 x 9.8
Weight (kg)	0.9	2.0	2.0	2.9
Range of use:				
Agarose gel electrophoresis	+[c]	+	+	+
Polyacrylamide gel electrophoresis	+[c]	+	+	+
Semi-dry blotting	-	(+)[b]	(+)[b]	+
Tank blotting	-	(+)[b]	(+)[b]	+

High Voltage Power Supplies

	Model PS 3003	Model PS 9009
		
Max. voltage [V]	3,000	3,000
Max. current [mA]	300	300
Max. power [W]	300	300
Const. voltage	+	+
Const. current	+	+
Const. power	+	+
No. of outputs	3	2
Timer	-	+
Audible alarm	-	+
Programmable	-	+
Number of programs	-	8[a] (up to 10 steps) or 16 (1 step)
Integration Modi	-	Vh
External Temperature Sensor (option)	-	+
Stackable	+	+
Apparatus dimensions (W x D x H, cm)	27.0 x 34.0 x 11.0	27.0 x 34.0 x 11.0
Weight (kg)	4.0	5.0
Range of use:		
Agarose gel electrophoresis	+	+
Polyacrylamide gel electrophoresis	+	+
Sequencing	+	+
IEF	+	+
Semi-dry blotting	(+)[b]	(+)[b]
Tank blotting	(+)[b]	(+)[b]

[a] **Incl. 1 dedicated program special designed for IEF (Prog. 28: <15 µA - 300 mA)**
[b] **Use may be limited for blotting applications**
[c] **For maxi gels it is recommended to run one gel**

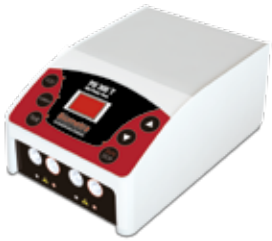
Low Voltage Power Supplies

For Agarose / Polyacrylamide Gel Electrophoresis and Blotting

Mini Power Pack PS 300 T

Ultra compact and lightweight instrument that requires the space of a DIN-A5 paper sheet. Designed for running two mini or two standard sized horizontal or vertical gels simultaneously. For maxi gels it is recommended to run one gel with this Power Pack.
For blotting applications the instrument is not recommended.
The integrated timer allows continuous or timed electrophoresis runs.
Operates at constant voltage or current with automatic crossover from one mode to the other when reaching set limits.
Last settings automatically restored at power on.

No. of outputs:	2
Voltage:	10 – 300 V, 1 Volt steps
Current:	10 – 400 mA, 1 mA steps
Power:	max. 60 W



Model PS 304 Power Supply

Lightweight and compact instrument recommended for routine electrophoresis such as horizontal and vertical electrophoresis as well as mini-tank-blotting applications. Limited use for semi-dry blotting applications.
Operates at constant voltage or current with automatic crossover from one mode to the other when reaching set limits.
Last settings automatically restored at power on.

No. of outputs:	2
Voltage:	1 – 300 V, 1V steps
Current:	1 – 400 mA, 1 mA steps
Power:	max. 120 W

Model PS 305 T Power Supply

Compact and powerful instrument with 0 – 999 minutes timer. Designed for horizontal and vertical electrophoresis as well as mini-tankblotting applications. Limited use for semi-dry blotting applications.
Unique “band saving” function which keeps bands sharp after the main run is complete.
Operates at constant voltage or current with automatic crossover from one mode to the other when reaching set limits.
Last settings automatically restored at power on.

No. of outputs:	2
Voltage:	1 – 300 V, 1V steps
Current:	1 – 500 mA, 1 mA steps
Power:	max. 150 W

Ordering Information

see page 99

Low Voltage Power Supplies

For Agarose / Polyacrylamide Gel Electrophoresis and Blotting

- **Max. voltage 400 V**
- **Max. current 1,000 mA**
- **Timer option**

Standard Power Packs P25 and P25 T with Timer function

Perfect choice for electrophoresis and blotting. Lightweight and compact instruments covering a wide range of applications from mini vertical or horizontal electrophoresis up to high-throughput electrophoresis and semi-dry blotting as well as tankblotting.

No. of outputs:	4
Output settings:	0 – 500 mA at 0 – 400 V 0 – 1,000 mA at 0 – 200 V
Power:	max. 200 W (continuous)

The **Standard Power Pack P25** offers a wealth of further features:
One large knob allows adjusting the output voltage or current at any time. The output is adjustable in 1 V or 1 mA steps. The large LCD display guarantees for easy to read actual or set values for the voltage and current outputs.
The P25 operates at constant voltage or constant current with automatic crossover from one mode of operation to the other mode of operation when reaching set limits. Special LED's indicate which parameter is kept constant.
For convenience the last settings are automatically restored at power on.

The **Standard Power Pack P25 T** with its very intuitive and user-friendly operation offers additional **Timer** control from 0 to 1,999 minutes.
The Power Pack P25 T can be used on timer or continuous mode. When the timer is activated the remaining time is shown in the display and the unit will switch off by itself after the given time interval has elapsed.

Ordering Information

see page 99

High Voltage Power Supplies

For DNA-Sequencing, Polyacrylamide Gel Electrophoresis and Isoelectric Focusing

- **Max. voltage 3,000 V**
- **Max. current 300 mA**
- **Timer and Program option**

Model PS 3003 High Voltage Power Supply

Basic high voltage instrument recommended or DNA sequencing and other electrophoresis applications like IEF, 2D-gel electrophoresis, PAGE and agarose gel electrophoresis as well as Western blotting (limited use).
Operates at constant voltage, current or power with automatic crossover from one mode of operation (e.g. const. current) to another mode of operation (e.g. const. voltage) when reaching set limits. The constant parameter is indicated by red LEDs. Automatic restart after power failure. Audible alarm for system failure. Last settings automatically restored at power on.

No. of outputs:	3
Voltage:	10 – 3,000 V, 10 V steps
Current:	1 – 300 mA, 1 mA steps
Power:	1 – 300 W, 1 W steps

Model PS 9009 Programmable High Voltage Power Supply

Programmable high voltage instrument with timer (1 – 9,999 minutes) or Vh integration for DNA sequencing and other electrophoresis applications like multiple step IEF, PAGE and agarose gel electrophoresis, as well as blotting (limited use).
Adjustable temperature probe available to regulate temperature at the plate surface of the electrophoresis system by reducing or stopping the voltage or current output when the set temperature is passed. Special program (#28) for IEF at very low current (< 1 mA – 300 mA).
Operates at constant voltage, current or power or with temperature limitation.
Automatic crossover from one mode of operation (e.g. const. current) to another mode of operation (e.g. const. voltage) when reaching set limits.
A flashing display indicates the constant mode. Stores up to 8 programs with 10 steps each or 16 one-step programs. Automatic restart with main electrical failure (< 12 h). Alarm sounds at end of run. Last settings automatically restored at power on.

No. of outputs:	2
Voltage:	10 – 3,000 V, 10 V steps
Current:	1 – 300 mA, 1 mA steps
Power:	1 – 300 W, 1 W steps

Ordering Information

see page 99

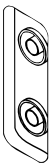
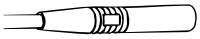
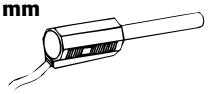
Power Supplies

Order Information

Item	Order No.
Low Voltage Power Supplies	
Mini Power Pack PS 300 T (100 – 240 V, EU plug), max. 300 V, 400 mA, 60 W	040-100
dto., (100 – 240 V, US plug)	040-190
Model PS 304 Power Supply (EU version, 230 V), max. 300 V, 400 mA, 120 W	10801017
dto., (USA version, 115 V)	31067304
Model PS 305 T Power Supply (EU version, 230 V), max. 300 V, 500 mA, 150 W, Timer	10839017
dto., (USA version, 115 V)	31067305
Standard Power Pack P25 (115 V/230 V), max. 400 V, 1,000 mA, 200 W	040-800
Standard Power Pack P25 T with Timer (115 V/230 V), max. 400 V, 1,000 mA, 200 W	040-850
High Voltage Power Supplies	
Model PS 3003 HV Power Supply (EU version, 230 V), max. 3,000 V, 300 mA, 300 W	10553003
dto., (USA version, 115 V)	31063003
Model PS 9009 Programmable HV Power Supply (EU version, 230 V), max. 3,000 V, 300 mA, 300 W, Timer	10556017
dto., (USA version, 115 V)	31067242
Temperature Probe for PS 9009 (new design)	31067291

Power Supply Adaptors

Order Information

	Power Supply Output Jacks		
Instrument Leads	**4 mm sheathed safety output jacks**  Found on all Biometra Power Supplies	**4 mm non-sheathed output jacks** Found on very old (non CE-labeled) versions of Power Supplies	**2 mm high-voltage output jacks**  May be found on Power Supplies of other suppliers
Sheathed 4 mm male plug  Installed on all current Biometra electrophoresis nits	**no adaptor necessary**	**010-026** or **010-027** 	**022-007** 
Sheathed 2 mm male plug  May be included with electrophoresis units from other suppliers	**022-018** 	**022-018** 	**no adaptor necessary**

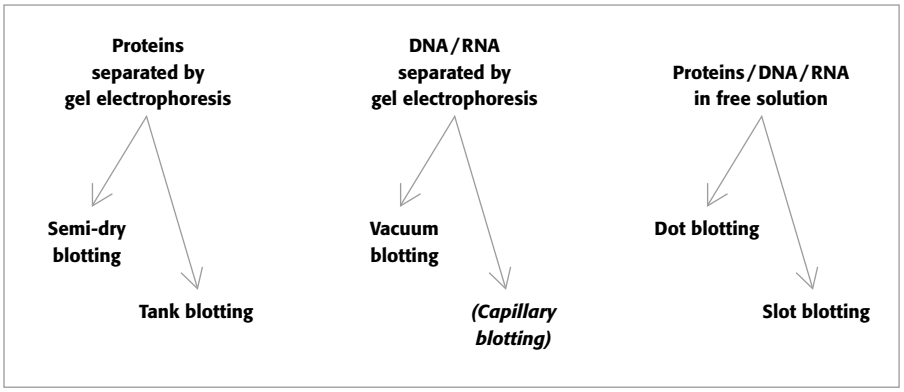
Item		Order No.
	Power supply adaptors	
	Standard safety adaptor set (4 mm/4 mm), conical, for use with sheated 4 mm male plug instrument leads to non-sheated 4 mm power supply output jacks	010-026
	Safety adaptor set (4 mm/4 mm), cylindrical, for use with sheated 4 mm male plug instrument leads to non-sheated 4 mm power supply output jacks	010-027
	Safety adaptor set (4 mm/2 mm), for use with sheated 4 mm male plug instrument leads to 2 mm high-voltage power supply output jacks	022-007
	Safety adaptor set (2 mm/4 mm), for use with sheated 2 mm male plug instrument leads to sheated 4 mm power supply output jacks	022-018
	Safety adaptor (4 mm/4 mm), special, for use with sheated 4 mm male plug instrument leads to recessed 4 mm Bio-Rad power supply output jacks	010-031

Blotting

Introduction

- **Semi-dry blotting**
- **Tank blotting**
- **Vacuum blotting**
- **Dot / Slot blotting**

Blotting techniques allow the transfer of proteins and nucleic acids (DNA, RNA) from polyacrylamide or agarose gels onto carrier membranes. Additional these techniques allow immobilisation of those components from solutions onto carrier membranes.
On the membrane the proteins and nucleic acids offer open access (compared to in-gel techniques) for detection methods for specific molecules (e.g. antibodies).



Technique	Typical use
Semi-dry blotting	Rapid, high-intensity transfer recommended for proteins up to 150 kD.
Tank blotting	Slower than semi-dry blotting. Efficient and quantitative transfer for small to big proteins. High effective cooling (big buffer volume).
Capillary blotting	*Over night transfer of nucleic acids from agarose gels onto a membrane (highly diffuse bands, much lower resolution than vacuum blotting).*
Vacuum blotting	Quick and efficient transfer of nucleic acids from agarose gels onto a membrane.
Dot / Slot blotting	Screening systems for immobilisation, concentration and binding of proteins and nucleic acids onto membranes.

Selection Guide

Product	Sample		Type of blotting	Heat exchanger	Number of gels
	Proteins	Nucleic acids			
Fastblot	+	(+)	electro (semi-dry)	built-in option	1 – ≥4*
Tankblot, Tankblot Eco-Line	+	(+)	electro (tank)	built-in option	1 – 4
Vacu-Blot	-	+	vacuum	-	1
Dot / Slot Blot (Dot Blot 96, Hybri·Slot 24)	+	+	vacuum	-	max. 96 samples

*** 1 – 4 stacked, depending on size of gel and apparatus >4 side by side**
(+) = limited use
(-) = not recommended

Fastblot

Rapid Semi-dry Blotting

- **Fast and homogeneous electrophoretic transfer of proteins**
- **Electrodes:**
  - Platinum / titanium
  - Plasticised carbon
- **Two different sizes:**
  - 16 cm x 20 cm
  - 23.5 cm x 38.5 cm
- **Recommended for proteins up to 150 kDa**
- **Cooling available**

Semi-dry blotting

Electro-blotting is an important method to transfer proteins and nucleic acids from polyacrylamide gels to nitrocellulose or other carrier membranes. Semi-dry blotting allows fast, efficient and homogenous transfer. In contrast to tank blotting little transfer buffer is required and transfer times are dramatically reduced.
Additionally, with semi-dry blotting discontinuous buffer systems can be used, e.g. one cathode buffer and two different anode buffers, to gently blot smaller proteins or to transfer proteins of very different sizes evenly.

High capacity

All Fastblot models offer the capacity to transfer multiple gels: stacked (with a dialysis membrane separating the gel sandwiches) or side by side. There is no requirement for additional plastic templates to prevent electrode short circuit as necessary for use with other brands of semi-dry blotters.

Electrode material

The first graphite electrodes used for protein transfer corroded easily. Biometra permanently improved the blotting electrodes based on a novel bio-inert plasticised carbon material. This type of electrodes (used for models **B33, B34** and **B64**) is stable for years.
Alternatively, Biometra offers corrosion-free metal electrodes without pores for maintenance free use and easy decontamination. These electrodes (used for models **B43** and **B44**) consist of a platinum-coated titanium anode and a stainless steel cathode.

Rapid transfer

Both, the plasticised carbon electrodes and the metal electrodes can be used for higher currents (max. 5 mA/cm² blot). Therefore blotting times are reduced to as little as 10 to 30 minutes. By applying higher current (> 1 mA/cm² blot), proteins with higher molecular weights can be blotted faster and with higher efficiency. Even smaller proteins can be transferred faster from thick gels and gels with small pores when blotting with high current.

Platinum / titanium, stainless steel electrodes

Plasticised carbon elektrodes

Fastblot

Rapid Semi-dry Blotting

Cooling option

Large proteins (>100 kDa) require longer transfer times. The heat generated during the extended transfer time can be removed by using the flow-through cooling system which is available with models **B33** and **B43**. Additionally this option is recommended for use with native gels and temperature sensitive proteins respectively.

Blotting of nucleic acids

Nucleic acids can also be electro-blotted using the Fastblot systems. For transfer of DNA from polyacrylamide gels onto a membrane electro-blotting is the only way. However, vacuum blotting is the method of choice for transferring nucleic acids from agarose gels onto membranes e.g. with the Biometra Vacu-Blot Apparatus (please refer to page 110).

Proteomics blotter

The XXL sized blotter **B64** offers passive cooling and is specially designed for the transfer of big (2D) gels in proteomics research or multiple gels side by side at the same time.

Literatur:

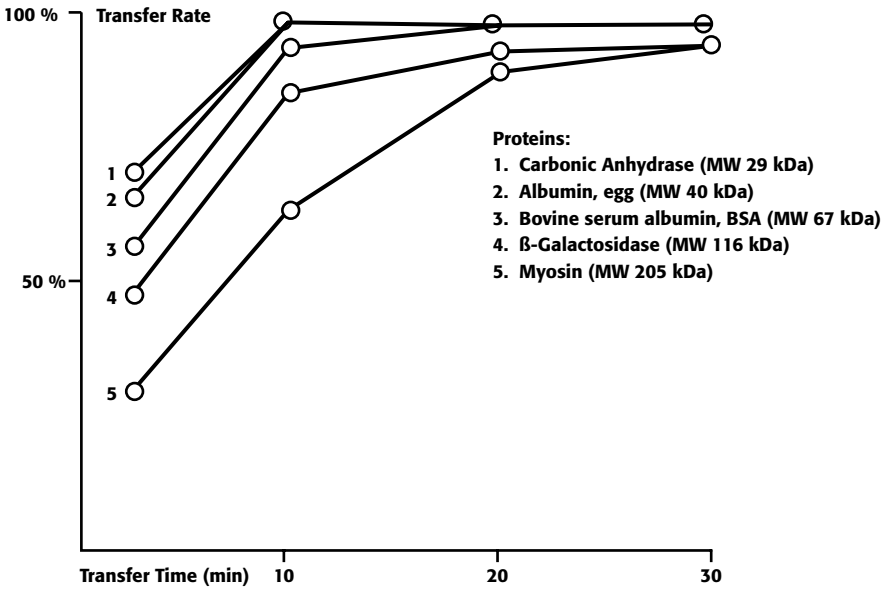
- Towbin, H., Staehlin, T., Gorden, J. (1979); Proc. Nat. Acad. Sci. 76, 4350 – 4356.
- Bittner, M., Kupferer, P., Morris, C. F. (1980); Anal. Biochem. 102, 459 – 471.
- Burnette, W. N. (1981); Anal. Biochem. 112, 195 – 203.
- Kyse-Andersen, J. (1984); J. Biochem. Biophys. Meth. 10, 203 – 209.

All Fastblots need a high capacity power supply. The ideal choice is the versatile Biometra Standard Power Pack P25, which can also be used for every type of standard electrophoresis application (see page 97).

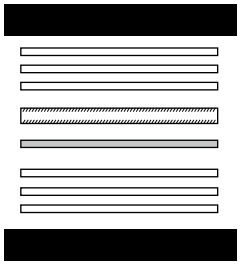
Fastblot B64

Fastblot

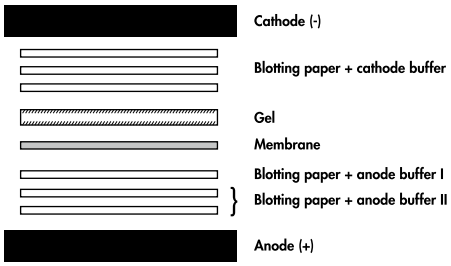
Order Information



Electrophoretic transfer of proteins
SDS-PAGE, acrylamide concentration: 10 %; Nitrocellulose blotting membrane, pore size 0.45 µm; current: 5 mA per cm² gel; thickness of gel: 1.0 mm; transfer buffer: Tris/Glycin/SDS (Using B43/B44 can reduce the transfer time in the range of 20 %.)



Standard blotting stack assembly



Blotting stack assembly for discontinuous buffer systems

Item	Order No.
Electrode surface 16 cm x 20 cm:	
Fastblot B33, plasticised carbon electrodes, *with flow-through cooling*	014-100
Fastblot B34, plasticised carbon electrodes, without cooling	014-200
Fastblot B43, anode: platinum-coated titanium, cathode: stainless steel, *with flow-through cooling*	015-100
Fastblot B44, anode: platinum-coated titanium, cathode: stainless steel, without cooling	015-200
Electrode surface 23.5 cm x 38.5 cm:	
Fastblot B64, plasticised carbon electrodes, with passive cooling	015-600

Accessories

Whatman 3MM Chr, 580 mm x 680 mm, 0.34 mm thick, 100/pkg	B3030931
Whatman 17Chr, 460 mm x 570 mm, 0.92 mm thick, 25/pkg	B3017915
Whatman GB005, 200 mm x 200 mm, 1.2 mm thick, 25/pkg	B10426981

See also chapter: Blotting Membranes and Whatman Paper

Tank Blot Apparatus and Blotting Modules

For Gentle Blotting of Large and Temperature-Sensitive Proteins

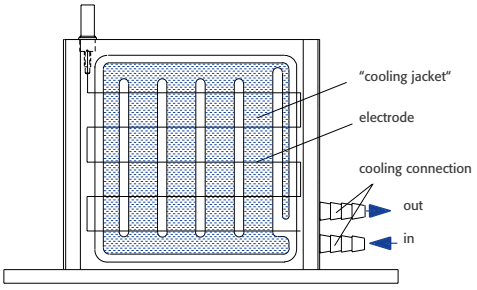
- **Best suited for large proteins and native enzymes**
- **Fast, efficient and reproducible transfer of proteins**
- **Effective cooling thanks to built-in cooling**
- **Simultaneous blotting of up to four gels**

During tank blotting proteins are transferred in a vertical buffer tank between electrodes arranged on the sidewalls onto membranes. Tank blotting is recommended particularly for blotting of large molecules (> 100 resp. 200 kDa, depending on the proteins characteristics) or of proteins which are difficult to transfer with other blotting techniques. It is the method of choice also for native and temperature-sensitive proteins. Transfer can be done fast or overnight. Thanks to the higher buffer volume transfer times of more than 24 h can be realised, e.g. for gentle blotting of very big proteins.

Different models are available: The highly sophisticated **Tankblot** for mini-gels offers the most effective cooling by the laterally integrated cooling jacket. **Tankblot Eco-Mini** and **Tankblot Eco-Maxi** are part of the modular Eco-Line and offer highly effective cooling of small and large gels by integrated cooling bases. The **Mini-V8·10 Blot Module** is designed for use in the buffer tank of the Mini-V8·10 vertical gel electrophoresis apparatus.

Tankblot

In the Tankblot a cooling jacket is integrated into the sidewalls. This results in convective chilling by circulation: the temperature is distributed more homogeneously (± 0.5 °C at 6 °C buffer temperature) than with other designs that use a magnetic stirrer circulating the buffer. Additionally this special design prevents formation of ion gradients without the need for a magnetic stirrer.
Depending on the selected buffer, transfer can be fast (between 30 min. and 4 h) or, under exceptionally gentle conditions, overnight (ca. 12 h). Thanks to the buffer volume of 1,200 ml long transfer times can be realised.



Cooling system of the Tankblot

Compatibility of gel sizes

Apparatus Blotting area (W x L, cm)	**Tankblot** 10.0 x 10.0	**Tankblot Eco-Mini** 9.4 x 8.0	**Tankblot Eco-Maxi** 22.0 x 19.0	**Mini-V8.10 Blot Module** 9.0 x 7.5
Minigel-Twin	+	+	+	(+)
Eco-Mini	+	+	+	(+)
Mini-V8·10	+	+	+	+
Multigel	-	-	+	-
Multigel-Long	-	-	+	-
Model V15·17	-	-	+	-
Maxigel	-	-	+	-
Eco-Maxi	-	-	+	-

+ = recommended **(+) = limited use** **- = not recommended**

Tank Blot Apparatus and Blotting Modules

For Gentle Blotting of Large and Temperature-Sensitive Proteins

Tankblot Eco-Line

Wire electrodes are placed on the side walls to provide uniform, reproducible protein transfer over a wide molecular weight range. The lower buffer chamber with built-in cooling base absorbs heat generated during rapid transfers and allows temperature controlled runs.
A stir bar may be added to the buffer chamber to further improve buffer circulation and heat exchange.
The colour coded blotting cassettes in combination with the colour coded connectors for the Bigfoot Safety Lid ensure accurate orientation of the gel sandwich during the transfer.
The tankblot is available as stand-alone apparatus or as a module compatible with the buffer chamber EBC (with integrated cooling base) or EB (without cooling option).
The **Electrophoresis Module** for Eco-Mini and Eco-Maxi are available separately and will convert the corresponding tank blotting systems into powerful PAGE electrophoresis systems.

Tankblot Eco-Mini

Tankblot Eco-Mini is designed to transfer up to four PAGE mini-gels (up to 9.5 cm x 8.5 cm) in separate blotting cassettes simultaneously.
The special design of the blotting cassettes allows easy assembly and loading into the blot module.
Additional the assembly defends blotting sandwiches from squeezing.

For more details see page 47

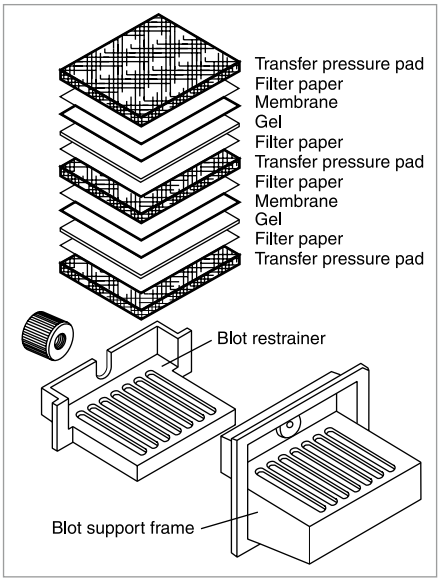
Tankblot Eco-Maxi

Tankblot Eco-Maxi is the large version for gel sizes up to 22 cm x 19 cm. The system offers the capacity of multiple transfers: several small gels or 1 large gel per cassette. Up to 2 large gels can be transferred simultaneously in separate blotting cassettes.
The special design for fixing the blotting sandwich in the blotting cassette prevents squeezing and allows easy handling.

For more details see page 49

Mini-V8·10 Blot Module

The Mini-V8·10 Blot Module operating in the buffer tank of the Mini-V8·10 electrophoresis apparatus allows the blot transfer of proteins from one or two 9.0 cm x 7.5 cm gels at a time.
The special design of blot support frame and blot restrainer allows easy handling. Slipping is eliminated and close contact between gel and membrane is guaranteed. The buffer volume of approx 1,000 ml is sufficient for cooling even at higher current. The Mini-V8·10 Blot Module is available separately or in combination with the Mini-V8·10 Gel Electrophoresis Apparatus.



Tank Blot Apparatus and Blotting Modules

Order Information

Item	Order No.
Tankblot, complete instrument with integrated cooling jacket, 1 gel cassette for up to four 10 cm x 10 cm gels, 2 fixation rings and 2 fiber pads	013-300
Accessories	
Gel cassette (blotting cassette) for up to four 10 cm x 10 cm gels, 1/pkg	013-301
Fixation rings for gel cassette, 4/pkg	013-304
Fiber pads, 4/pkg	013-305
Tankblot Eco-Mini C, complete instrument with integrated cooling base, Blot Module, 4 Blotting Cassettes and 8 foam pads Note: The instrument is compatible with Eco-Mini Electrophoresis Module	018-100
Tankblot Eco-Mini, complete instrument (without cooling base), Blot Module, 4 Blotting Cassettes and 8 foam pads Note: The instrument is compatible with Eco-Mini Electrophoresis Module	018-101
Accessories	
Buffer chamber EB (without cooling base) for Eco-Mini and Tankblot Eco-Mini, without Bigfoot Safety Lid	017-170
Buffer chamber EBC (with integrated cooling base) for Eco-Mini and Tankblot Eco-Mini, without Bigfoot Safety Lid	017-171
Bigfoot Safety Lid with cables and safety plugs for Eco-Mini and Tankblot Eco-Mini	017-172
Blot Module Eco-Mini, incl. 4 Blotting Cassettes, colour coded (black/red) each for 1 gel with size 9.4 x 8.0 cm and 8 foam pads	018-105
Blotting Cassette, colour coded (black/red), for Tankblot Eco-Mini Blot Module, 1/pkg	018-111
Foam pads for Tankblot Eco-Mini Blot Module, 4/pkg	018-113
Electrophoresis Module for Eco-Mini (1 - 4 gels)	017-175
Tankblot Eco-Maxi C, complete system with buffer chamber EBC (with integrated cooling base), Bigfoot Safety Lid, 2 Blotting Cassettes (black/red), each for 1 gel with size 22 cm x 19 cm, 4 foam pads Note: The instrument is compatible with Eco-Maxi Electrophoresis Module	018-400
Tankblot Eco-Maxi, complete system with buffer chamber EB (without cooling base), Bigfoot Safety Lid, 2 Blotting Cassettes (black/red), each for 1 gel with size 22 cm x 19 cm, 4 foam pads Note: The instrument is compatible with Eco-Maxi Electrophoresis Module	018-401
Accessories	
Buffer chamber EB (without cooling base) for Eco-Maxi and Tankblot Eco-Maxi, without Bigfoot Safety Lid	017-471
Buffer chamber EBC (with integrated cooling base) for Eco-Maxi and Tankblot Eco-Maxi, without Bigfoot Safety Lid	017-472
Bigfoot Safety Lid with cables and safety plugs for Eco-Maxi and Tankblot Eco-Maxi	017-474
Blot Module Eco-Maxi, incl. 2 Blotting Cassettes colour coded (black/red), each for 1 gel with size 22 cm x 19 cm and 4 foam pads	018-405
Blotting Cassette, colour coded (black/red), for Tankblot Eco-Maxi Blot Module, 1/pkg	018-411
Foam pads for Tankblot Eco-Maxi Blotting Module, 4/pkg	018-413
Electrophoresis Module for Eco-Maxi (1 or 2 gels)	017-475
Mini-V8·10 Blot Module, complete with blot restainer, blot support frame, clamping knob and three transfer pressure pads	21078019
Accessories	
Transfer pressure pad, 6/pkg	11958048

Tankblot

Application

Homogenous blotting of heterogenous protein mixtures

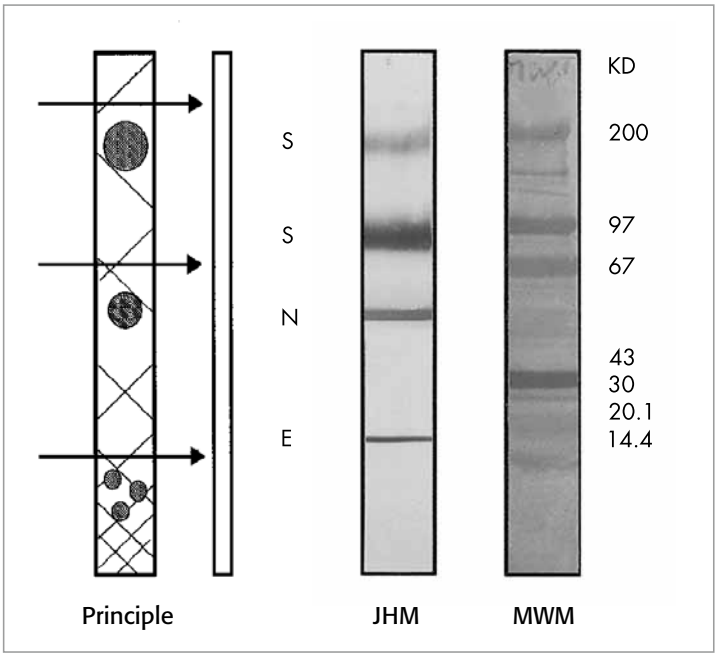
S. Schwender, Julius-Maximillians Universität Würzburg, Zentrallabor der Medizinischen Universität, Josef-Schneider-Str. 2, 97080 Würzburg, Germany and A. Hein, Ruprecht Karls Universität Heidelberg, Klinikum Mannheim, Institut für medizinische Mikrobiologie und Hygiene, Theodor-Kutzer-Ufer 1-3, 68167 Mannheim, Germany

Often, when establishing a Western blot system, certain proteins cannot be blotted quantitatively. They are either remaining in the gel (particularly large molecules) or they are blotting through the membrane (especially small molecules). In both cases a quantitatively false low detection signal will result, especially obvious when simultaneous blotting molecules which vary in size highly. The search for proteins of unknown size might thus be complicated.

Using gradient gels is a simple and effective way to circumvent these problems as well as to ensure homogenous blotting of molecules with different sizes.

Following SDS gel electrophoresis in gradient gels small molecules are located in areas of small mesh size, large ones in areas of wide mesh size.

During blotting large molecules leave the "low percentage" gel quite easily, in contrast, small molecules are retarded in the "high percentage" gel (figure). Thus, the resulting blot becomes very homogenous: The blotting membrane is reached both by small and by large proteins quantitatively (appr. 10 to 180 kDa). For demonstration SDS molecular weight markers (MWM) and coronavirus JHM proteins are separated in a gradient gel system using a resolving gel of only 5 cm height (stacking gel T= 5, C= 0.6; resolving gel T= 7, C= 0.6 up to T= 20, C= 0.6; ca. 25 °C; stacking gel 20 mA, 50 V; resolving gel 30 mA const., 70 – 200 V; ca.1h). After transfer in the Tankblot (25 mM Na_2HPO_4: pH 9.4, 1000 mA const., 30 V, 4 h) the marker proteins were stained unspecifically with amido black. Virus proteins (E=14 kDa, N= 56 kDa, S = 90 and 180 kDa) were labelled via specific antibodies and enzyme mediated colour conversion.



Item	Order No.
Blotting paper	
Whatman 3MM Chr, 580 mm x 680 mm, 0.34 mm thick, 100/pkg	B3030931
Whatman 17 Chr, 460 mm x 570 mm, 0.92 mm thick, 25/pkg	B3017915
Whatman GB005, 200 mm x 200 mm, 1.2 mm thick, 25/pkg	B10426981
Whatman GB005, 580 mm x 580 mm, 1.2 mm thick, 25/pkg	B10426994

See also chapter: Blotting Membranes and Whatman Paper.

Vacu-Blot

For Efficient Southern and Northern Blotting

- **Fast and efficient transfer of DNA or RNA**
- **Membrane sizes up to 20 cm x 20 cm**
- **Large buffer tank permits easy recycling of transfer buffer**
- **Optimised sealing system**
- **Reliable and quiet pump with adjustable vacuum**

Fast Transfer

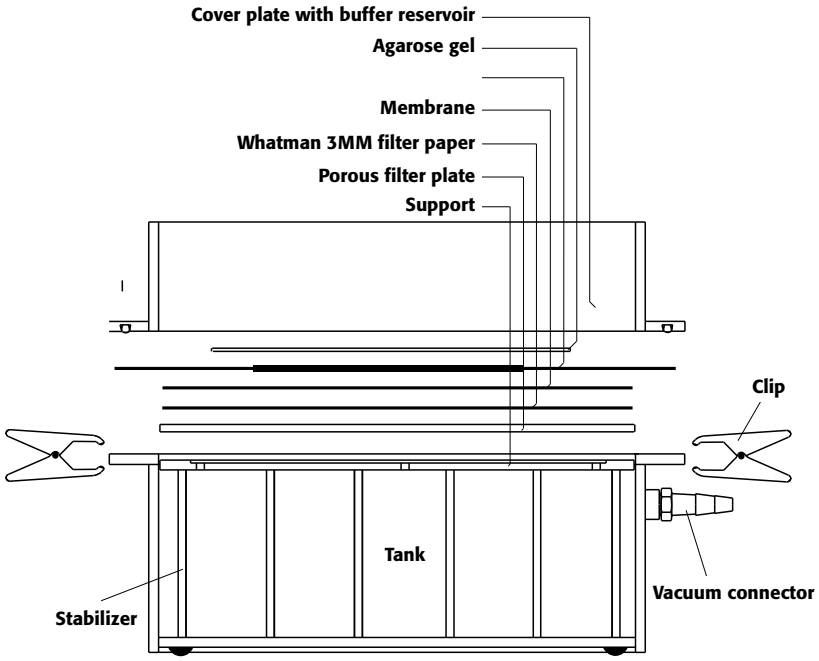
Transfer of nucleic acids to membranes during Southern or Northern analysis was traditionally done by capillary blotting, a time-consuming procedure that usually takes up to 12 hours. With vacuum blotting, transfer times can be reduced to 15 – 60 minutes, depending on the size of the DNA.

Durable

The **Vacu-Blot** is built for long life. It features a solid and durable construction made of acrylic glass. A reliable sealing system guarantees fast and efficient transfer on the whole gel. The large tank allows easy recycling of buffer and protects the pump from buffer aspiration. Therefore no additional separator or trapping bottle (e.g. Woulff's bottle) is required for use as necessary with other brands of vacuum blotting systems.

Flexibility

The Vacu-Blot was designed for maximum flexibility. The window gaskets (rubber sheets) can be cut to accept gels of all thicknesses and sizes up to 20 cm x 20 cm.
Vacuum should never be more than 50 mbar – 100 mbar below ambient pressure to prevent gel torsion and reduced transfer efficiency, as in an „collapsed" gel the DNA or RNA would be trapped.
The use of model MP86 vacuum pump (included in the Vacu-Blot System) is recommended as this pump offers controlled and adjustable vacuum.



Efficiency

Vacuum blotting guarantees reproducible blotting results. Compared to traditional transfer methods vacuum blotting offers increased transfer efficiency and allows the detection of low amounts of DNA during hybridisation.

Vacu-Blot

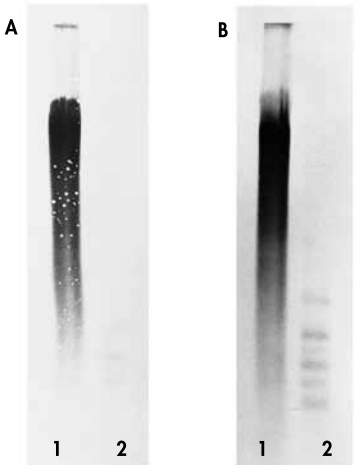
Application (Example) and Order Information

Vacuum blotting of Drosophila DNA: Faster and more efficient detection of the SD Responder Sequence

C. Seidl, TU München, Hospital rechts der Isar, Nuclear Medicine, Ismaninger Strasse 22, 81675 München, Germany, R. Schmidt, LMU München, Zoological Institute, Luisenstr. 14, 80333 München, Germany

The SD (segregation distorter) system of Drosophila melanogaster causes directed deviation of the expected gamete ratio of 1 : 1 in spermiohistogenesis. To detect the SD responder sequence, genomic DNA was transferred onto a nylon membrane and hybridised with a specific probe. DNA transfer from the gel onto the membrane was performed both by capillary transfer (left fig.) and by vacuum blotting with a Biometra Vacu-Blot (right fig.). Vacuum blotting with the Vacu-Blot proved to be far superior to capillary transfer because:

1. Transfer time could be reduced by 85 % (from 15 h down to 2 h).
2. DNA transfer showed improved homogeneity.
3. Transfer efficiency was increased, resulting in a higher detection limit in subsequent hybridisation.



Comparison of lane B2 and A2 indicates that DNA transfer with vacuum blotting (right) is more efficient and precise than capillary transfer (left).

Genomic DNA both undigested (lane 1) and digested (lane 2) with the restriction enzyme Xba I (19 U/µg DNA) of the mutant cn bw (cinnabar brown) of *Drosophila melanogaster* was separated on a 1 % agarose gel. Transfer was performed in 20 x SSC onto a nylon membrane using both transfer methods. To detect the SD responder sequence, the transferred DNA was hybridised with a digoxigenin-labeled oligonucleotide (26mer, 100 pMol each). The nucleotide sequence of this probe is contained in all variants of the 240 bp unit of the SD responder sequence (Wu et al. (1988) Cell, 54, 179-189).

Detection of the hybridised probes was carried out with anti-digoxigenin antibodies coupled to alkaline phosphatase by color reaction (NBT and BCIP).

Item	Order No.
Vacu-Blot System for blots up to 20 cm x 20 cm, 230 V Complete system consisting of transfer unit, 3 rubber sheets, 8 clips, membrane vacuum pump MP86 with manometer, adjustable vacuum gauge and tubing	053-000
dto., 115 V	053-090
dto., 100 V	053-091
Vacu-Blot without pump, incl. 3 rubber sheets, 8 clips and tubing	053-100
Accessories	
Rubber sheets (280 mm x 280 mm) for Vacu-Blot, 3 pieces	053-002
Porous filter plate for Vacu-Blot	053-004
Clips (1 set), 6 pieces	010-057
Whatman 3MM Chr, 580 mm x 680 mm, 0.34 mm thick, 100/pkg	B3030931
See also chapter: Blotting Membranes and Whatman Paper	
Membrane pump	
Membrane vacuum pump MP86, 230 V (50 Hz) with adjustable vacuum gauge and manometer, end vacuum 100 mbar, max. delivery 6 l/min	049-000
dto., 115 V (60 Hz)	049-090
dto., 100 V (50/60 Hz)	049-091
Accessories	
Vacuum tubing for MP86 (2 x 1 m)	049-002

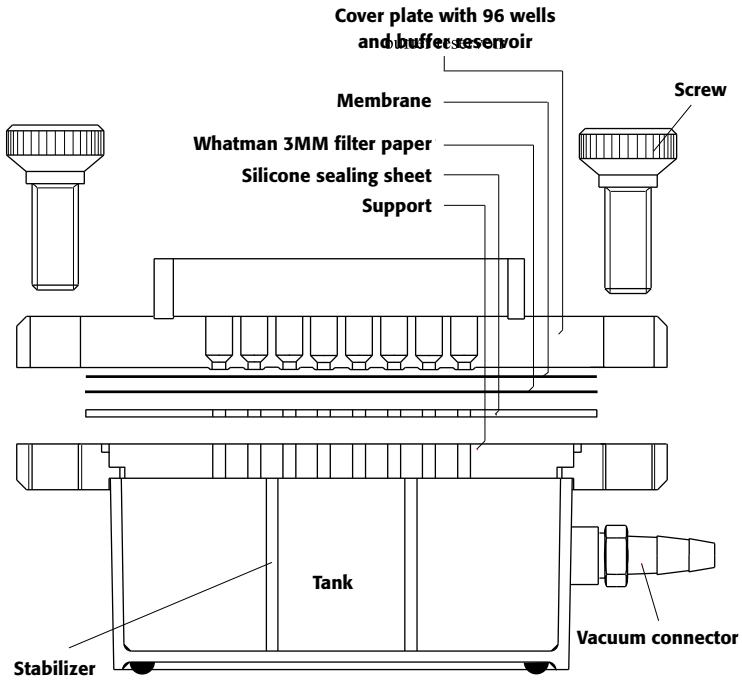
Dot Blot 96

Trouble-free Handling Guaranteed

- **Innovative sealing system**
- **No cross-contamination**
- **Multichannel pipet compatible for fast sample loading**
- **High capacity for up to 96 samples**
- **Precisely adjustable vacuum**

Reproducible

The **Dot Blot 96** system provides easy and reproducible methods for immobilising, concentrating and binding proteins, DNA or RNA in solution onto membranes. Typical applications are Dot Blot hybridisation of plasmid DNA, small RNA and DNA fragments, cloned bacteria, lymphomas and viral nucleic acids, screening of recombinant clones, screening of cell surface antigens, as well as filtration and immobilisation of small volumes onto immobilising matrices.



Easy to use

The Dot Blot 96 works without movable O-rings, making it extremely easy to set up. Its innovative sealing system eliminates lateral leakage that can cause cross-contamination between wells. Each well is numbered and lettered compatible to the standard 96-well plate format. Multichannel pipets for rapid handling of samples can be used.

High capacity

Up to 96 samples can be loaded in short time. The maximum sample volume is 350 µl per well.

Durable

Dot Blot 96 features a buffer tank design that eliminates the need for trapping bottles (separators), facilitates buffer recycling, and protects any vacuum pump from buffer aspiration. The use of model MP86 vacuum pump (included in the Dot Blot 96 System) is recommended as this pump offers controlled and adjustable vacuum to prevent damage of the transfer membrane.

Dot Blot 96

Order Information

Item	Order No.
Dot Blot 96 System, 230 V, complete system consisting of transfer unit, 1 sealing sheet, membrane vacuum pump MP86 with manometer, adjustable vacuum gauge and tubing	053-400
dto., 115 V	053-490
dto., 100 V	053-491
Dot Blot 96 without pump, transfer unit, 1 sealing sheet and tubing	053-401

Accessories

Silicone sealing sheet	053-402
Whatman 3MM Chr, 580 mm x 680 mm, 0.34 mm thick, 100/pkg	B3030931

See also chapter: Blotting Membranes and Whatman Paper

Membrane pump

Membrane vacuum pump MP86, 230 V (50 Hz) with adjustable vacuum gauge and manometer, end vacuum 100 mbar, max. delivery 6 l/min	049-000
dto., 115 V (60 Hz)	049-090
dto., 100 V (50/60 Hz)	049-091

Accessories

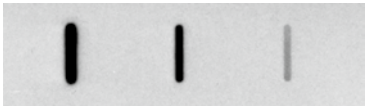
Vacuum tubing for MP86 (2 x 1 m)	049-002

Hybri·Slot™ 24

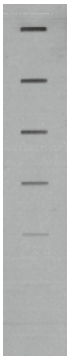
Designed to Immobilise Nucleic Acids or Proteins onto a Membrane

- **24 slots with 0.5 mm x 4.0 mm**
- **Small footprint**
- **Easy to assemble: no O-rings or gaskets required**
- **Designed to concentrate samples for the detection of picogram quantities of nucleic acids and nanogram quantities of proteins**

Hybri·Slot 24 extends the portfolio of apparatus for immobilising and concentrating of nucleic acids and proteins. The apparatus has been designed to immobilise samples in 0.5 mm x 4 mm slots. Compared to dot blotting the oblongness of the signals is more easy for densitometric analysis and detection of hybridisation artifacts. Typical applications are DNA and RNA filter-blot hybridisation, immunological screening and detection methods, as well as every type of semi-quantitative detection methods involving the immobilisation of samples onto membranes.



Example of radioactive detection of a DNA sequence filtered onto nitrocellulose using the HYBRI•SLOT Manifold.



Example of immunological detection of a protein filtered onto nitrocellulose using the HYBRI•SLOT Manifold.

Hybri·Slot 24	
Apparatus dimensions (W x D x H):	6.25 cm x 14.0 cm x 6.75 cm
Well volume:	5 – 850 µl
Slot dimension:	0.5 mm x 4.0 mm (2 mm^2)
Slot spacing (center to center)	9.0 mm (multichannel pipet compatible)

Item	Order No.
Hybri·Slot 24, complete filtration manifold with vacuum (bottom) block, middle block, engraved top block and 4 tri-wing bolts	21052014

Accessories

Whatman 3MM Chr, 580 mm x 680 mm, 0.34 mm thick, 100/pkg	B3030931

See also chapter: Blotting Membranes and Whatman Paper

Membrane Pump

Membrane vacuum pump MP86, 230 V (50 Hz), with adjustable vacuum gauge and manometer, end vacuum 100 mbar, max. delivery 6 l/min	049-000
dto., (115 V, 60 Hz)	049-090
dto., (100 V, 50/60 Hz)	049-091

Accessories

Vacuum tubing for MP86 (2 x 1 m)	049-002
Separator (Woulff's bottle) for connecting to MP26 und MP86	049-201


BioDocAnalyze


UVsolo TS
Biometra

GEL DOCUMENTATION

Introduction

A Choice of Systems for Different Needs

The whole range of Biometra gel imaging systems is suited for the documentation of agarose and polyacrylamide gels with fluorescent and visible coloured stains.

The most typcial stains for these applications are
Ethidium bromide, SYBR® Green, SYBR® Gold, SYBR® Safe, GelStar®, SYPRO® Orange, SYPRO® Ruby, Oriole™, SYPRO® Red, WesternDot™ 625 with Qdot®-nano crystals, and silver and Coomassie Blue.

For all of these stains the adequate bandpass filters and transilluminators are available.
Visible stains on membranes and also radiographs can be documented, additionally.

Laboratories with a very limited bench space will enjoy the system "**UVsolo TS**". This extraordinary compact system is designed for fast saving and printing of gels. No separate computer is necessary.

The computer driven systems of the **BioDocAnalyze (BDA) line** offer an advanced comfort and include a versatile software for analysing gel and blot images as standard delivery. Two different versions are available. They mainly differ in the type of camera included.

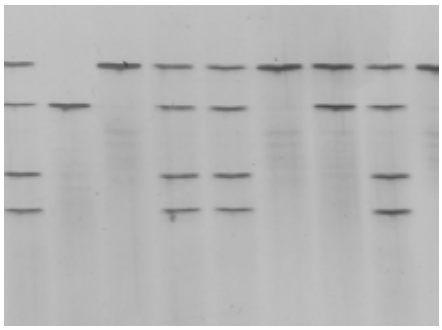
A detailed description of each system is given on the following pages.

System	Type of camera
BDAdigital	Digital single lens reflex camera for colour and black & white images
UVsolo TS, BDA live	Monochrome, scientific grade CCD camera for black & white images

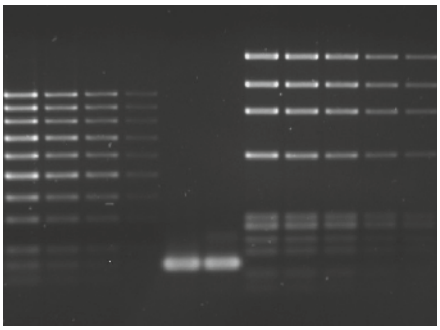
Decision guidance – which is the most appropriate system?

Requirement	Especial recommended system
Primarily saving and printing of images	UVsolo TS
Limited bench space	UVsolo TS, BDAdigital compact, BDA live compact
Coloured images	BDAdigital
Especial light-sensitive system	BDA live, UVsolo TS
Documentation of small gels with maximum zoom	UVsolo TS, BDA live
Documentation and analysis of large gels	BDAdigital
Quantification of samples	BDA live

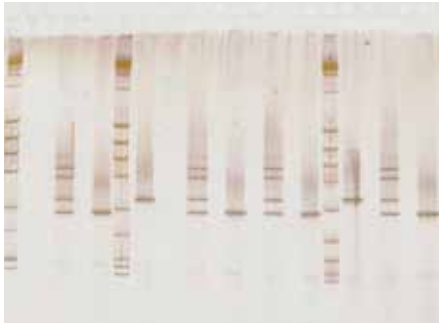
Gel images taken with Biometra gel documentation systems



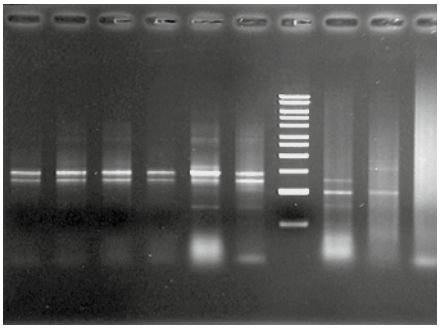
Silver stained polyacrylamide gel (white light, black & white photo)



Ethidium bromide stained agarose gel (UV light, black & white photo)



Silver stained polyacryamide gel (white light, colour photo)

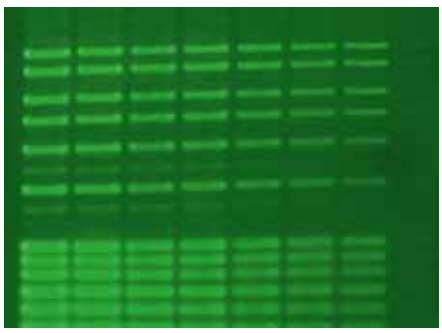


Ethidium bromide stained agarose gel (UV light, black & white photo)

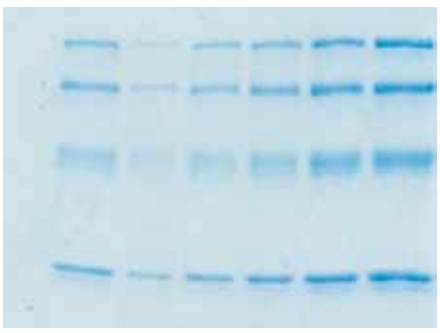
Technical Specifications

		BioDocAnalyze Systems	
	UVsolo TS	**BDAdigital**	**BDA live**
			
System			
Type	Stand-alone	Computer-controlled	Computer-controlled
Camera			
Resolution	1.3 MP	12.2 MP *	1.4 MP
Sensor	monochrome	colour	monochrome
Sensor size	½''	22.2 mm x 14.7 mm	½''
Data depth	8 bit (16 bit file)	8 bit (grey scales) 24 bit (colour)	12 bit
Light-sensitivity	++	+	++
Darkhood			
Filter changer	Filter drawer	4-position filter wheel **	4-position filter wheel **
Illumination			
White light from above	+	with BDA Box	with BDA Box
UV transilluminator	fixed	separate or pull-out **	separate or pull-out **
UV light from above	-	BDA Box 3	BDA Box 3
Software			
Image acquisition software	+	+	+
Gel analysis	optional	+	+ (2 x)
Similarity analysis	optional	optional	optional

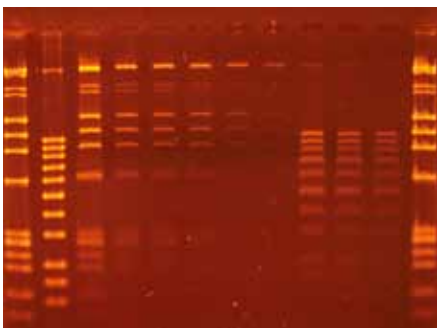
*** Please check homepage for current resolution**
**** Please find details in section "BioDocAnalyze Darkhood"**



SYBR® Green stained agarose gel (UV light, colour photo)



Coomassie Blue stained polyacryamide gel (white light, colour photo)



Ethidium bromide stained agarose gel (UV light, colour photo)

UVsolo TS

Stand-Alone Gel Documentation System

UVsolo TS is an extra compact system for gel documentation without the need for a personal computer. The system is designed to acquire gel images very easily and without any need for training.

- **Self-explanatory stand-alone system**
- **Light-sensitive 1.3 MP CCD camera**
- **Touch screen for simple handling**
- **Ideal for multi-user laboratories**

The system

The UVsolo TS system comes with a light-sensitive black & white CCD camera with a high resolution of 1.3 megapixels. An also light-sensitive zoom lens provides for images of high contrast.
The system is controlled by a touch screen with an intuitive to use image acquisition software.

With live view all changes of the camera´s integration time, the lens aperture setting or of the zoom area are displayed in real-time on the 8 inch screen. Saturation monitoring allows the easy capture of fully quantifiable images.
The gel images are saved in the universal file formats tif, jpg, or gif on USB storage device, the internal computer memory or via network connection on a network computer.
For prints a printer with USB interface can be connected to the UVsolo TS. With a software print button printing is directly started. Recommended printer is a high-resolution **thermal printer** which creates brilliant prints on high-glossy paper.

The transilluminator

Two different sizes are available: 20 cm x 20 cm UV filter size for small to middle sized gels or 21 cm x 26 cm filter size for larger gels.
It is possible to control the UV intensity in 3 levels: Image acquisition should always be done with maximum UV intensity with switch setting “High”. For cutting samples out of gels it is recommended to reduce the UV intensity to avoid a damage of the samples. This can be done with switch settings “Medium” and “Low”.

UV protection

Users of the UVsolo TS are savely protected against UV radiation: Opening the front door automatically switches off the UV light. A direct and safe view to the fluorescent gel under UV illumination is possible through the gel viewing window in the front door. For cutting gels under UV illumination two side-access doors are included.
When somebody prefers to cut out of the fluorescent gel with open front door this can also be done: The UV override switch allows to turn on UV light with open door. At the end it is only possible to close the door when the override switch is deactivated. This ensures a save operation for subsequent users.

UVsolo TS

Order Information

Documentation of coloured gels

The image acquisition of non-fluorescent gels, e.g. silver or Coomassie Blue stained polyacrylamide gels can be done with the optional available c**onverter plate**. This plate is directly placed on top of the UV transilluminator. The plate converts the UV light to visible light, similar to the light of a white light table.

Analysis of gel images

Main application of the UVsolo TS typically is saving and printing of gel images. But it is also possible to analyse gels with the optional gel analysis software BioDocAnalyze (BDA).

It is the same analysis software that is included as a standard in the Biometra computer-controlled systems "BDA". Users of the UVsolo TS install the optional BDA software on a separate personal computer. Gel images in tif or jpg file format can be imported into the BioDocAnalyze analysis software.

The calculation of fragment sizes or a quantification of sample material is easily done in a few steps.

For details please see section „BioDocAnalyze Analysis Software".

Features	Benefit
Touch Screen with image acquisition software	Easy to use, simple to clean
Saving of images on USB stick, computer or by network	High flexibility, perfect for groups with many users
Filter drawer for bandpass filters	Easy change of filter for use of different fluorescent staining dyes
Self-explanatory operation and maximum UV protection for users	Well-suited for laboratories with varying users and for practical courses
Compact system with footprint size of a transilluminator	Requires minimum of bench space

Item	Order No.
UVsolo TS: Monochrome, digital ½ ´´ CCD camera, resolution 1280 (H) x 1024 (V), manual zoom lens 8 – 48 mm, bandpass filter for e.g. EtBr, darkhood with 8 ´´ LCD touch screen with tilt capability, USB port for USB stick, network connectivity, safety interlocking door, UV override switch, gel viewing window, side access doors for gel cutting, UV transilluminator (312 nm, 20 cm x 20 cm filter size, UV intensity switch), overhead LED white light, USB 2.0 ports for connecting e.g. a printer. Dimensions with camera: 78.0 x 36.1 x 33.8 (H x W x D, cm), 230 V 50/60 Hz	033-000
UVsolo TS2: see UVsolo TS, but transilluminator with filter size 21 cm x 26 cm	033-001

Accessories

Bandpass filter for SYBR® Green stains, for UVsolo TS filter drawer	033-012
Bandpass filter for SYBR® Gold stains, for UVsolo TS filter drawer	033-013
Digital thermal printer Mitsubishi P95DE, high resolution (325 dpi), USB 2.0 port, dimensions: 8.5 x 15.4 x 23.9 (H x B x T, cm)	031-921
Thermal paper KP65HM, matt, high-contrast, 4 rolls à 20 m	031-985
Thermal paper K95HG, high-glossy, high-contrast, 5 rolls à 18 m	031-987
Converter plate: For application on a transilluminator for documentation of coloured gels, dimensions 0.8 x 30 x 24 (H x B x T, cm)	057-005
UV transparent acrylic tray for preparative tasks on a transilluminator, 31 cm x 36 cm	057-012
UV transparent gel scoop, scoop size 14 cm x 15 cm	057-013
UV bulb 8 W, 312 nm, for UV table	057-002
UV light face protection shield	055-001

Software

BioDocAnalyze (BDA) software: analysis software for gel images in tif, jpg, bmp or Biometra-specific BD1 format	035-004
Similarity Analysis module: Software module for cluster and RFLP analysis as upgrade for BDA software 035-004	035-114

BioDocAnalyze Systems

Computer-Controlled Imaging Systems

BioDocAnalyze (BDA) imaging systems are computer based systems and are designed to provide high functionality with easy-to-use operating interfaces. The quality systems are available as complete "plug-and-play" systems, but can also be ordered as core set plus additional hardware components assorted to individual needs.

Depending on the camera type a specific **image acquisition software** is included to attain optimal results and user comfort. The BioDocAnalyze system with digital single lens reflex camera is referred to as „**BDAdigital**", the system with monochrome CCD camera is named „**BDA live**".

The **BDA gel analysis software** is included in all BDA systems. It is an up-to-date software for fast and versatile analysis of gels and blots.

BDAdigital

BioDocAnalyze with Digital Single Lens Reflex Colour Camera

BDAdigital provides state-of-the-art digital photography. Heart of the system is a digital single lens reflex camera with amazing high resolution and autofocus.

- **High-class digital camera with 12.2 megapixels***
- **Specifically developed software for „one-click" image acquisition**
- **Powerful BioDocAnalyze gel analysis software**
- **Choice of small darkhood or advanced hood version BDA Box**

The camera is widely software-controlled and provides versatile functions for fast and easy image acquisition. A selection of pre-defined camera settings is available for different gel types and stainings. In addition, individual user profiles can be defined. The gel files can be reliably analysed by self-explanatory BDA software routines (For details please see section "BioDocAnalyze Analysis Software"). The high resolution images are particularly useful for the detection of close banded gels and for band quantification.
The combination of zoom lens with high resolution of the sensor makes the system ideal for acquisition of extra large gels.

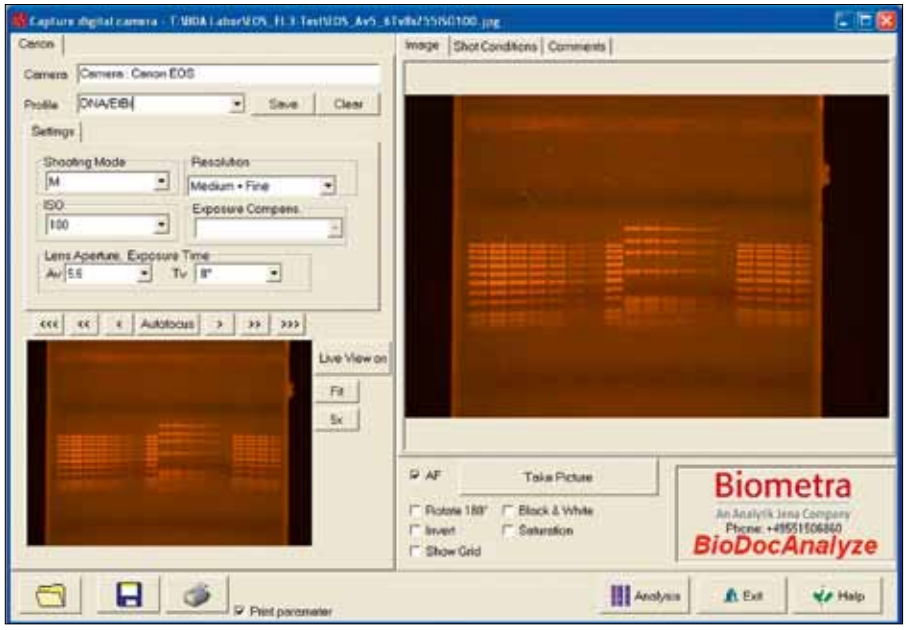


Image acquisition software

for control of

- Acquisition mode (auto, manual)
- Exposure time
- Lens aperture
- Automatic and manual focus
- User definable profiles for camera settings
- Colour and grey scales
- Brightness
- Contrast
- Gamma correction
- Gel rotation
- Live preview
- Inverting
- Saturation monitoring
- Creation of image sections
- Loading and saving files (tif, jpg, Biometra specific BD1)
- Printing

*** Please refer to the Biometra homepage for latest camera resolution.**

Darkhoods

The modular design offers the choice between the cost-effective **BDAdigital compact** with small darkhood or **BDAdigital** systems with the advanced darkhood **BDA Box**.

The small darkhood of BDAdigital compact is placed on top of a UV transilluminator. Together with a UV converter plate BDAdigital is ready for documentation and analysis of fluorescent and coloured gels and blots.

Application of the BDA Box is the perfect choice for all users looking for a bright overhead white light and for a pullout transilluminator. For details of BDA Box please refer to section "BioDocAnalyze Darkhood".

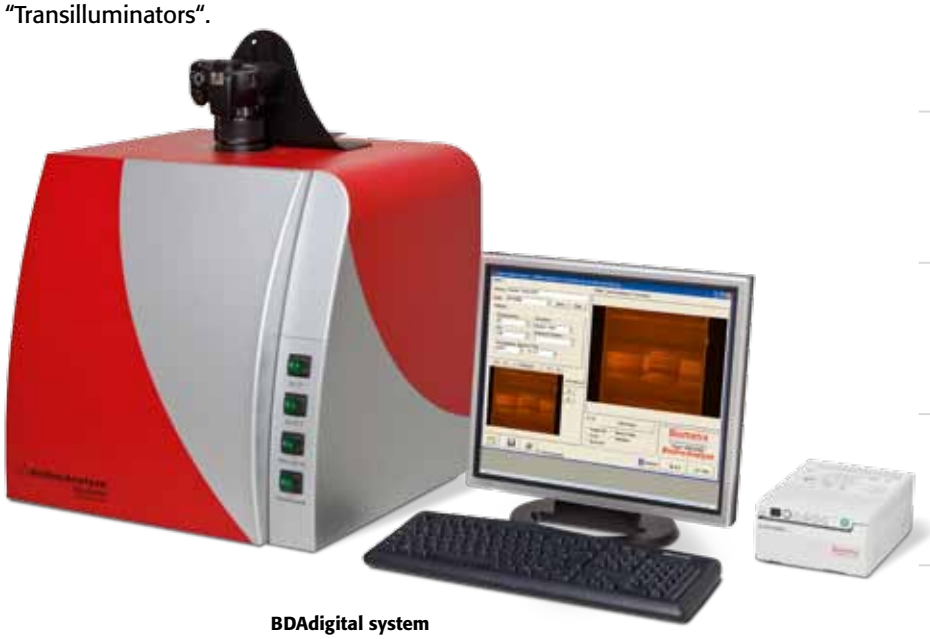
BDAdigital compact and UVstar transilluminator

Transilluminators

BDAdigital systems are equipped with a UV transilluminator out of the wide range of the UVstar line. It is recommend that BDAdigital compact is equipped with a transilluminator version with UV protection lid. Instead of that BDAdigital systems with BDA Box don´t need a UV protection lid mounted at the UV transilluminator as the BDA Box comes its own UV protection shield.

For details please see section "Transilluminators".

Effective anti-theft protection of the camera



BDAdigital system

Features	Benefit
High-resolution images in colour or in grey scales	High versatility
Real-time image preview	Exact gel positioning prior to UV exposure
Individual profiles with camera settings	Only one click for an image
Manual focussing possible	Even samples with diffuse bands can be photographed perfectly
Ingenious camera anti-theft mounting	No risk of camera theft
Independent use of camera possible	Camera can also be used for other laboratory tasks and microscopy photography
Small darkhood available	High-quality gel documentation with cost-effective and space-saving "compact"-set

Ordering Information

see page 133 – 135

BDA live

BioDocAnalyze with Digital Monochrome CCD Camera

- **Light-sensitive scientific-grade CCD camera**
- **High resolution camera of 1.4 MP and high-quality zoom lens**
- **Extended dynamic range of 12 bit for 4096 grey levels**
- **Powerful BioDocAnalyze analysis software (second licence included for free)**

BDA live is the system of choice for professional gel documentation.
A digital CCD camera with light-sensitive lens provides for brilliant gel images.
The camera comes with 1.4 megapixel resolution and a data depth of 12 bit making it ideal for precise band detection and accurate sample quantification.
The intuitive image acquisition software allows the creation of high-contrast images in a few steps.

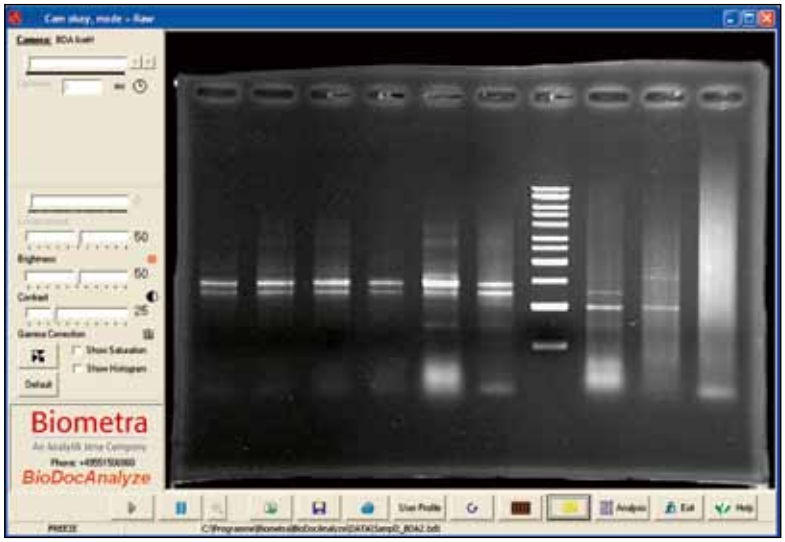


Image acquisition software
for control of

- Exposure time
- Brightness
- Contrast
- Gamma correction
- Signal enhancement
- Gel rotation
- Live view, freeze view
- Inverting
- Saturation monitoring
- Creation of image sections
- Loading and saving files (16 bit tif, 8 bit tif, jpg, bmp, Biometra specific BD1)
- Printing

BDA live is available as complete system including darkhood BDA Box, transilluminator, thermal printer, installed up to date computer and

BDA live system

converter plate or it can be composed of BDA live core set including camera and software plus further required components.

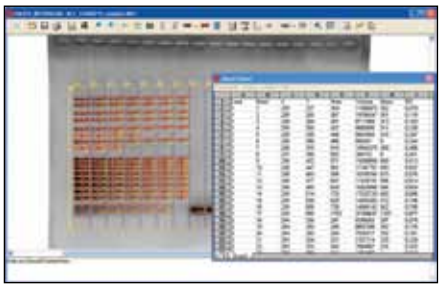
For users who are applying several different fluorescent dyes and want to use only one bandpass filter the "**BDA live Plus**" systems are the right choice. These systems include a bandpass filter with wider transmission pass than the more specific filtering bandpass filters of the "BDA live" systems. Recommended transilluminators for the "BDA live Plus" set are UV tables with strong filter effect: the "UVstar Plus" tables.

An especial space and budget-saving version of BDA live is the "**BDA live compact**" set. The set consists of the core set with camera, bandpass filter, image acquisition and analysis software (2 licences) plus small darkhood "BDA Hood". This hood is directly placed on top of the transilluminator. A small sliding door allows an easy aligning of the gel on the UV table.

The images can be directly transferred to the BDA analysis module. The **analysis software** offers the convenience of an automatic or semi-automatic band detection with subsequent size and mass calibration on the basis of custom markers.

BDA live sets and systems include two full licences of the analysis software. Additional licences are available.

For details of software features please see next page.



BDA live compact and UVstar transilluminator

Features	Benefit
Advanced camera specifications	Perfect performance for documentation, quantification and publication
Live image	Exact gel positioning before exposure to UV
Image acquisition software with optimisation tools like signal enhancement	Clear documentation of faint fluorescent samples for maximum results
Robust and easy to use	Perfect for practical courses and routine applications
Different darkhoods with similar mounting of camera	Upgrade from simple hood to advanced darkhood possible

For details of BDA Box and the bandpass filters please refer to section "BioDocAnalyze Darkhood".

Details of the transilluminators are found in section "Transilluminators".

Ordering Information

see page 133 – 135

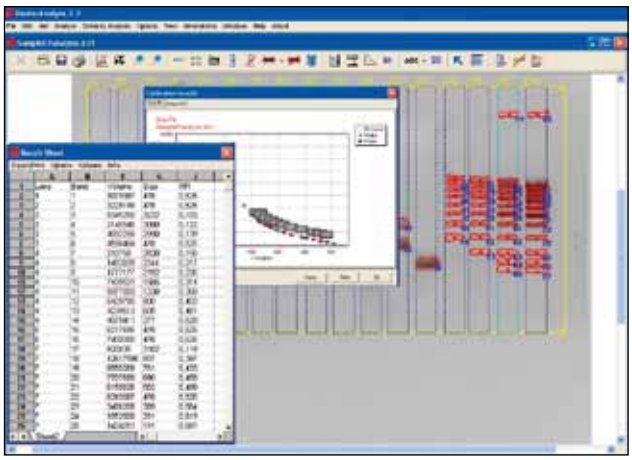
BioDocAnalyze Analysis Software

Gel Analysis in a Few Steps

- **Basic revision of the popular BDA gel analysis software**
- **Optimized software interface for analyses in a few steps**
- **Helpful additional functions**
- **Intuitive to handle gel analysis with accurate results**
- **Included in BDAdigital and BDA live**
- **Optional component for UVsolo TS**

The BioDocAnalyze (BDA) software is a powerful package of imaging and analysis software supporting different camera models. The software provides sample analysis of electrophoresis gels and blots with best results in a minimum amount of time.

The software can be used for fluorescent, colorimetric and chemiluminescent applications and accepts typical file formats like JPG, TIF, and BMP.
Gel images can be directly transferred from the image acquisition window of BDAdigital or BDA live to the analysis software window. Also files generated with other acquisition sources can be imported.
The user-friendly interface provides for efficient analysis and generates precise band size calculations. All important functions are addressed with dedicated icons. Sample quantifications are done with one mouse-click.



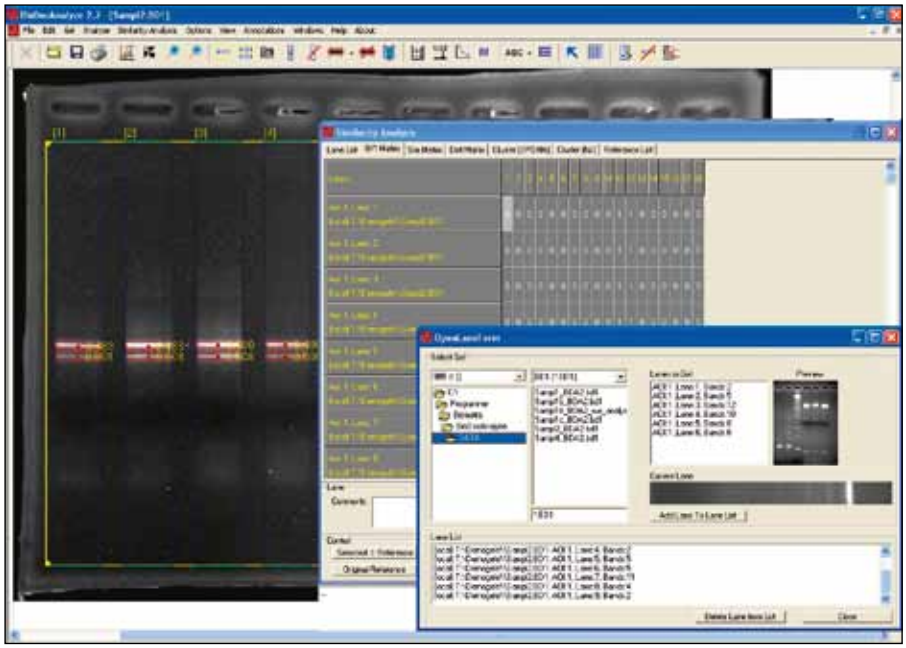
Features

- Automatic lane and band recognition
- Add, delete and separate lanes and bands
- Optimisation of detection parameters
- Different choices for background adjustment
- Automatic calculation for size/MW, mass, RF
- Result sheet
- Compensation of gel smiling and distortions
- Zoom, invert and pseudocolour functions
- Add annotations and arrows to lanes, bands and gel image
- Overlay and merging of gel images
- Simultaneous display of intensity profiles for several lanes

The analysis software convinces with its self-explanatory design and can be easily used without extensive training. Clear icons with displayed short instructions support every analysis step. The automatic search for lanes and bands is directly started after defining the area of interest on the gel image. When necessary the sensitivity for lane and band detection can be optimised by moving the parameter sliders. The new detection results are immediately displayed on the gel image. Detected bands are not only marked with a bar but are clearly visible surrounded in their edges. This unique BDA software feature provides a fast visible confirmation for correct detection. Alternatively to the automatic band detection individual manual band detection is possible. Band sizes or masses are automatically calculated when marker values are entered. All results can be displayed both on the gel image and in a table.

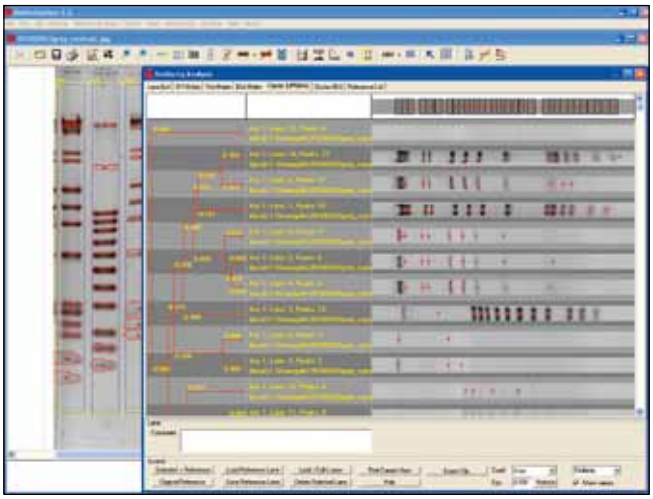
The table can be saved in Excel format. For illustration purposes comments and arrows can be added to the gel image. The legend list provides the choice of parameters to be displayed or printed. The analysed gel images are saved in the Biometra file format *.BD1 ensuring that the applied detection parameters are saved together with the gel image. For export of the gel image to other software it can be directly transferred by clipboard or can be saved as TIF, JPG or BMP file.

The „merging" function is particular helpful for the analysis of imported chemiluminescence blots: Different images or also frames and images can be overlayed, moved and merged. This allows for example the introduction of a marker taken with white light from above with the image of a chemiluminescence blot.



Similarity Analysis – upgrade module

The BioDocAnalyze software can be upgraded with the Similarity Analysis Module for comparison of fragment patterns. This module provides a striking and fast insight into the similarity of lanes. It can be used for cluster and RFLP analysis. The effect of coefficients, distinction sensitivity and the impact of individual lanes or bands to the similarity ranking can be monitored by one mouse-click.



Features

- Similarity Analysis according to RF or molecular weight of bands
- Cluster analysis (UPGMA, Neighbour Joining)
- Similarity and distance matrix
- 0/1 matrix
- Reference lanes, lane list
- Correlation coefficients Pearson, Dice, Jaccard, Cosine, Overlap
- Export and printing of tables and dendrograms

BioDocAnalyze Darkhood

BDA Box – The Ultimate Darkhood

- **Dedicated to imaging of fluorescent and coloured gels and blots**
- **Premium user convenience**
- **Integrated UV protection**
- **4 different configurations**

The BDA Box is designed for daily use in the laboratory. The robust construction provides high functionality and excellent ergonomics over years.

Design

Features	Benefit
Compact size and small footprint	• Saves valuable bench space
Smooth surfaces and inside coated with black protective varnish	• Easy to clean • Long-term resistent against ionic buffers and UV light • Reflexion free
Comfort sliding door	• Light-tight cabinet • Free access to the imaging area with one fingertip • Space-saving opening proper for narrow laboratory corridors • Gels can be placed directly in front of the hood for easy gel transfer to the UV table
Integrated UV protection shield	• Protects the user from UV exposure also during sliding out the UV table • Freely adjustable according to individual needs • Applicable for cutting gels without the need for additional protection equipment
Bright overhead white light	• Supports sample positioning and is suitable for acquisition of coloured blots
Panel with liquid protected switches for UV and white-light	• Clearly arranged and designed for intensive use
Easy access to lamps and filters and other replacement parts	• Absolute service friendly

Selection of darkhood configurations

Tailored to different budgets and application requirements four different darkhood versions are available:

	Darkhood version			
Feature	**BDA Box 1** Cost-saving version	**BDA Box 2** Standard version	**BDA Box 3** Advanced version	**BDA Box 2BL** for blue light LED table BLstar
Epi-white light	+	+	+	+
UV protection shield	+	+	+	- *
Mounting of UV band-pass filter	Directly screwed to camera lens	4-position filter wheel	4-position filter wheel	4-position filter wheel
Transilluminator	Fixed	-	-	Pull-out, with adapter for BLstar
Epi-UV light	-	-	+	-

*** Shield should be upgraded when a UV table is used in parallel to the blue light table.**

The BDA Box comes with an ingenious "all-in-one" camera mounting to be compatible with all supplied BioDoc-Analyze systems. Using an individual adapter, all different cameras can be mounted. This provides the possibility for users to adapt their existing hood to other camera types when application requirements are changing.

Transilluminators

UV transilluminators

The BDA Box can be equipped with one of the different UV table versions of **UVstar**. Important characteristics of UVstar are the excellent illumination uniformity and the very low background signal.

For documentation of gels with colourimetric dyes or radiographs a **UV converter plate** is supplied. The plate is directly placed on top of the UV table and thus extends the application range from documentation of fluorescent samples to all visible signals.

A more detailed description of transilluminators and the converter plate is given in section "Transilluminators".

There is the choice between:

Filter size:	20 cm x 20 cm 23 cm x 30 cm
UV wavelength:	254 nm 312 nm 365 nm 254/312 nm 312/365 nm
Mode of intensity setting:	50 or 100 % dual switch 10 to 100 % with 10% increment regulator
Filter glass specification:	High-grade filter Super Brilliant high-grade filter

Blue light LED transilluminators

Alternatively to a UV transilluminator a blue light table with LED illumination can be used. Blue light illumination is applicable for fluorescent stains with an excitation range around 470 nm. This is true for e.g. SYBR® Green, GelGreen™, SYBR® Safe, SYBR® Gold or SYPRO® Ruby.

Filter size:	BLstar 9: 9 cm x 12.5 cm BLstar 16: 16 cm x 20 cm
LED wavelength:	470 nm
Intensity setting:	BLstar 9: no intensity switch, only 100 % BLstar 16: 50 % or 100 % dual switch
Filter:	Lid with amber filter for visualisation of fluorescent signals

For details of the blue light transilluminators please see section „Transilluminators".

Overhead UV illumination

Some applications require a UV excitation from above: membrane blots with UV fluorescent stains. Even for gels showing a high background signal it can be advisable to excite the sample fluorescence from above. This will enhance the sample signal against the gel background noise.

BDA Box 3 is available with epi-UV of 254 nm and 365 nm. Alternative 312 nm UV is supplied on request.

Overhead white light in BDA Box1 and BDA Box 2

Overhead white light and overhead UV light in BDA Box 3

Filter wheel for bandpass filters

The acquisition of UV fluorescent images requires a specific bandpass filter in front of the camera lens.

There are different possibilities to place the filter in front of the camera lens:

Filter mounting	Application	BDA Box
Filter is directly screwed to the camera lens	• Cost-saving version for laboratories who mainly apply a certain stain, different stains with similar emission wavelengths or the bandpass filter with wide bandpass	BDA Box 1
With 4-position filter wheel	• High flexibility for use of staining dyes with different filter requirements • Accepts all filters with 58 mm diameter standard screw socket	BDA Box 2, BDA Box 2BL*, BDA Box 3

*** There is no need for a bandpass filter when using a blue light table. Nevertheless BDA Box 2BL comes with filter wheel to make a parallel use of a UV table easy.**

Filter wheel

Slider for easy inserting of new filters

Bandpass Filters for BioDocAnalyze Systems

High-Grade Filters for Different Dyes

For the documentation of UV fluorescent images a bandpass filter has to be attached in front of the camera lens. The filter has to be choosen in respect to the applied sample staining. The most commonly used filter has a transmission maximum of 590 nm and fits e.g. to ethidium bromide, Oriole™, SYPRO® Orange and SYPRO® Ruby staining. This filter is supplied as standard in BDA systems.
An alternative filter is available for fluorescent dyes with emission wavelengths between 500 and 580 nm, e.g. for SYBR® Green, SYBR® Gold, SYBR® Safe and GelStar®.

Optimal results with every dye are always achieved with the respective dedicated filter. Nevertheless it is possible to apply a bandpass filter with a wider bandpass which covers several dyes with different emission maxima. This might be helpful when a stand or a darkhood without filter wheel is used. Biometra offers such a bandpass filter with wide bandpass: filter BP590/200. It can be used together with a Biometra standard transilluminator UVstar as this comes with a high-grade filter for low background signal. To achieve an even more high-contrast image with the wide bandpass filter it is recommended to choose the Super Brilliant version of UVstar, one of the "UVstar Plus" transilluminators.

Chart of performance for the most commonly used fluorescent dye ethidium bromide

Bandpass filter		UV transilluminator	Performance (low background, bright sample signal)	Filter Order No.
BP590		UVstar Plus	+++	034-011
		UVstar	++	
BP590/200		UVstar Plus	++	034-015 resp. 034-016*
		UVstar	+	

Standard delivery in BDA systems: bandpass filter BP590 and transilluminator UVstar.

* For details please see "BioDocAnalyze Systems, Order Information".

UV fluorescent dye examples and compatible bandpass filters

Filter Transmission range	Compatible dye	Emission maximum	Filter Order No.
BP590, 565 – 615 nm Included in BDA systems	**For nucleic acids:**		034-011
	Ethidium bromide	595 nm	
	GelRed™	605 nm	
	For proteins:		
	Oriole™	604 nm	
	SYPRO® Orange	570 nm	
	SYPRO® Ruby	610 nm	
BP540/80, 500 – 580 nm Order separately	**For nucleic acids:**		034-012
	GelGreen™	525 nm	
	GelStar®	527 nm (RNA: 532 nm)	
	SYBR® Gold	537 nm	
	SYBR® Green I	521 nm	
	SYBR® Green II (for RNA)	521 nm	
	SYBR® Safe	530 nm	
BP590/200, 490 – 690 nm Included in BDA live Plus systems or order separately	**For nucleic acids and proteins:**		034-015 resp. 034-016 *
	All dyes compatible with filter 034-011 and 034-012, see above, and additionally:		
	For proteins:		
	SYPRO® Red	630 nm	
	For proteins, on Western Blots:		
	WesternDot™ 625 with Qdot® nanocrystals	625 nm	

* Application of bandpass filter BP590/200:

With BDA Box 2/3, in filter wheel:	Insert 034-016 (= filter 034-015 + adapter ring + sealing ring) directly in the filter wheel.
With BDA Box 1, small hood BDA Hood or with stand	With BDA live: Screw filter 034-015 directly to the camera zoom lens.
	With BDAdigital: Screw filter 034-015 with adapter ring 034-019 (58 – 55 mm) to the lens.

BioDocAnalyze Systems

Order Information

Item	Order No.
BDAdigital	
BDAdigital core set: Digital SLR camera[a] with USB2.0 interface, camera power supply, bandpass filter with transmission max. of 590 nm for e.g. ethidium bromide stains, BDA software for image acquisition and gel analysis	034-000
BDAdigital compact: BDAdigital core set, small darkhood BDA Hood	034-050
BDAdigital system 20: BDAdigital core set, BDA Box 2, transilluminator UVstar 20 (20 cm x 20 cm filter size), PC, TFT, thermal printer, UV converter plate	034-302 034-312 [b]
BDAdigital system 30: dto., but with transilluminator UVstar 30 (23 cm x 30 cm filter size)	034-303 034-313 [b]
BDA live	
BDA live core set: Digital monochrome ½'' CCD camera with FireWire interface, resolution 1384 x 1032 pixels, manual zoom lens 8 – 48 mm (F1.0 – F1.2), FireWire PCI express card, bandpass filter with transmission max. of 590 nm for e.g. ethidium bromide, BioDocAnalyze software for image acquisition and gel analysis (2 licenses)[e]	032-001
BDA live compact: BDA live core set, small darkhood BDA Hood	032-050
BDA live system 20: BDA live core set, BDA Box 2, transilluminator UVstar 20 (20 cm x 20 cm filter size), PC, TFT, thermal printer, UV converter plate	032-302 032-312 [b]
BDA live system 30: dto., but with transilluminator UVstar 30 (23 cm x 30 cm filter size)	032-303 032-313 [b]
BDA live Plus core set: Digital monochrome ½'' CCD camera with FireWire interface, resolution 1384 x 1032 pixels, manual zoom lens 8 – 48 mm (F1 – F1.2), FireWire PCI express card, bandpass filter BP 590/200 with wide bandpass, BioDocAnalyze software for image acquisition and gel analysis (2 licenses)	032-002
BDA live Plus system 20: BDA live Plus core set, BDA Box 2, transilluminator UVstar 20 Plus (20 cm x 20 cm filter size), PC, TFT, thermal printer, UV converter plate	032-304 032-314 [b]
BDA live Plus system 30: dto., but with transilluminator UVstar 30 Plus (23 cm x 30 cm filter size)	032-305 032-315 [b]
Stand and darkhoods (transilluminator not included)	
Stand: Height adjustable	031-908
BDA Box 1: Darkhood (52 cm x 54 cm x 51 cm, H x W x D), overhead white light, UV protection shield, for integration of a transilluminator with max. footprint of 42.5 cm x 43.0 cm (W x D), e.g. UVstar	034-801 [c] 032-801 [d]
BDA Box 2: Darkhood (52 cm x 54 cm x 51 cm, H x W x D), overhead white light, 4-position filter wheel, UV protection shield, drawer for transilluminator (for one of UVstar models below)	034-802 [c] 032-802 [d]
BDA Box 3: dto., plus overhead UV light (245 nm, 365 nm)	034-803 [c] 032-803 [d]
BDA Box 2BL: Darkhood (52 cm x 54 cm x 51 cm, H x W x D), overhead white light, 4-position filter wheel, drawer with adapter for blue light transilluminator BLstar	034-805 [c] 032-805 [d]

[a] **Please check our homepage www.biometra.com for the current camera resolution.**
[b] **PC with operating system in English language (system without annotation: PC with operating system in German language)**
[c] **including anti-theft adapter for BDAdigital camera**
[d] **including adapter for BDA live camera**
[e] **Without BDA Box 2/3 please order adapter ring 035-027 additionally for mounting the bandpass filter directly at the camera lens.**

BioDocAnalyze Systems

Order Information

Item	Order No.
UV-Transilluminators for BDA Box	
For separate transilluminators (with UV protection shield) and further information please refer to the order information in chapter "Transilluminators".	
UVstar 20: filter size 20 cm x 20 cm, 8 x 8 W UV bulbs (312 nm), 50 or 100 % intensity switch	057-503
UVstar 20i: dto., but with 10 – 100 % intensity setting	057-513
UVstar 30: filter size 23 cm x 30 cm, 12 x 8 W UV bulbs (312 nm), 50 or 100 % intensity switch	057-603
UVstar 30i: dto., but with 10 – 100 % intensity setting	057-613
UV-Transilluminators for BDA Box, with Super Brilliant filter	
UVstar 20 Plus: filter size 20 cm x 20 cm, 8 x 8 W UV bulbs (312 nm), 50 or 100 % intensity switch	057-523
UVstar 20i Plus: dto., but with 10 – 100 % intensity setting	057-533
UVstar 30 Plus: filter size 23 cm x 30 cm, 12 x 8 W UV bulbs (312 nm), 50 or 100 % intensity switch	057-623
UVstar 30i Plus: dto., but with 10 – 100 % intensity setting	057-633
UV-Transilluminators with 2 wavelengths, for BDA Box	
UVstar 20HM: filter size 20 cm x 20 cm, 4 x 8 W UV bulbs (254 nm) and 4 x 8 W UV bulbs (312 nm), 50 or 100 % intensity switch	057-543
UVstar 30HM: filter size 23 cm x 30 cm, 6 x 8 W UV bulbs (254 nm) and 6 x 8 W UV bulbs (312 nm), 50 or 100 % intensity switch	057-643
UVstar 20ML: filter size 20 cm x 20 cm, 4 x 8 W UV bulbs (312 nm) and 4 x 8 W UV bulbs (365 nm), 50 or 100 % intensity switch	057-553
UVstar 30ML: filter size 23 cm x 30 cm, 6 x 8 W UV bulbs (312 nm) and 6 x 8 W UV bulbs (365 nm), 50 or 100 % intensity switch	057-653
Blue light transilluminators, for BDA Box 2BL	
BLstar 9: viewing area 9 cm x 12.5 cm, 2 arrays of 470 nm LEDs, lid with amber filter, power supply	057-370
BLstar 16: viewing area 16 cm x 20 cm, 2 arrays of 470 nm LEDs, 50 or 100 % intensity switch, lid with amber filter, power supply	057-570
Accessories	
Thermal printer Mitsubishi P95DE, high resolution (325 dpi), USB2.0 interface, dimensions 8.5 x 15.4 x 23.9 (H x W x D, cm)	031-921
Thermal printer paper KP65HM, high contrast, 4 rolls à 20 m	031-985
Thermal printer paper KP91HG, high glossy, 4 rolls à 18 m	031-986
Thermal printer paper K95HG, high glossy, high contrast, 5 rolls à 18 m, only compatible with printer P95DE!	031-987
UV converter plate, for application on a transilluminator for documentation of colour stains (0.8 x 30 x 24, H x W x D, cm)	057-005
UV transparent acrylic tray for preparative tasks on a transilluminator, 31 cm x 36 cm	057-012
UV transparent gel scoop, scoop area 14 cm x 15 cm	057-013

Item	Order No.
BP590, bandpass filter for ethidium bromide stains (already included in all BDA systems), 58 mm Ø	034-011
BP540/80 bandpass filter with transmission range of 500 to 580 nm, e.g. for SYBR® Green stains, 58 mm Ø	034-012
BP590/200 bandpass filter with wide bandpass, transmission range of 490 – 690 nm for different dyes, e.g. ethidium bromide and SYBR® Green, 55 mm Ø	034-015
dto., but plus adapter ring for filter wheel of BDA Box 2/3	034-016
Adapter ring 55 – 58 mm for bandpass filter BP590/200 (034-015) mounting to lens adapter of BDAdigital (without use of BDA Box 2/3)	035-027
Adapter ring 55 – 58 mm for bandpass filter 034-011 and 034-012 mounting to BDAvideo and BDA live camera lens (without use of BDA Box 2/3)	034-019

Computer

Personal computer for BDAdigital, Windows 7 Professional, completely installed	034-916 034-917 [b]
Personal computer for BDA live, Windows 7 Professional, completely installed	032-916 032-917 [b]
19 inch TFT screen	035-923

[b] PC with operating system in English language (without annotation: PC with operating system in German language)

Software

BioDocAnalyze (BDA) software (already included in BDAdigital, BDA live): Analysis software for gel images in tif, jpg, bmp or Biometra specific BD1 format	035-004
Additional license for BioDocAnalyze gel analysis software 035-004	035-905
Additional license for BioDocAnalyze gel analysis software 035-004, minimum order quantity 3 pieces	035-907
Similarity Analysis module: Software module for cluster and RFLP analysis as upgrade for BDA software 035-004	035-114

Transilluminators

UVstar Transilluminators for UV Fluorescent Stains

- **Filter sizes from 15 cm x 15 cm up to 23 cm x 30 cm**
- **Exceeding uniform illumination**
- **High-grade filter glass for low background**
- **Super Brilliant version for superior contrast available**

Biometra UV transilluminators feature a uniform and bright illumination based on modern control electronics.
The exclusive application of high-grade filter glass provides for excellent documentation results with lowest background signal. The great illumination uniformity allows the reliable quantification of electrophoretically separated fluorescent samples.

Design

Features	Benefit
Compact size with small footprint	Saves bench space and is compatible with Biometra BDA gel documentation darkhoods
Stainless steel filter frame	Robust and easy to clean for daily routine
Freely adjustable UV protection shield	User UV protection during handling the gel
Lamp control with electronic high-frequency operating system	Flicker-free illumination and extended lamp durability
Quiet, temperature controlled ventilation	Samples are protected from heating.

Application

Features	Benefit
Optimised number of UV bulbs per filter size	The high excitation intensity provides high sensitivity for the detection of even faint signals.
Built-in sophisticated diffuser and reflector	The homogenous illumination allows for critical quantitative analysis of protein and DNA gels.
Dual intensity switch (50 or 100 %) or regulator for intensity setting in 10 % increments from 10 % up to 100 %	Sample excitation can be individually adapted to the applications like documentation or preparative tasks as well to sample specific traits.

UV wavelength selection

The UV tables offer the choice between three different UV wavelengths. The most commonly used wavelength for sample documentation is the midrange UV of 312 nm. It provides a sensitive signal detection with many fluorophores as ethidium bromide, SYBR® Gold, GelStar® or SYPRO® Orange and minimizes DNA photonicking compared to shorter wavelengths.
The short wave 254 nm is preferred to achieve even higher sensitivity, e.g. when using SYBR® Green I dye. The long wave 365 nm is useful for excitation of e.g. Green Fluorescent Protein (GFP) and especially for preparative purposes.

UVstar with 2 wavelengths

For an optimal excitation and illumination the use of only one UV wavelength is recommended as otherwise the UV bulbs with different UV wavelengths are mounted alternating in the table. But sometimes it might be desired to use a dual wavelength transilluminator however. For these purposes the models "UVstar HM" and "UVstarML" are offered. These UV tables are coming with the medium UV wavelength of 312 nm and additionally with a shorter UV (254 nm) or a longer UV light (365 nm).

"Super Brilliant" UVstar: UVstar Plus

The precise detection of very faint signals can be further optimised by the application of a newly developed filter glass. This unique background uniformity filter remarkably enhances the contrast and improves the illumination uniformity even more. UVstar plus works with excitation wavelengths 312 nm and 365 nm.
The Super Brilliant version of the UVstar should especially be the choice when the camera filter is not the standard filter with narrow bandpass (for e.g. ethidium bromide stain) but the bandpass filter with wide bandpass. This bandpass filter BP 590/200 features a wide bandpass for emission signals between 490 to 690 nm. This wide range enables the image acquisition of fluorescences of different stains with one bandpass filter only. For an improved contrast it is advisable to use a Super Brilliant UVstar, a UVstar Plus, which reduces the background signal at its best.

For further information please see also section "Bandpass Filter for BioDocAnalyze Systems".

UV transilluminators	Filter size (cm x cm)			
Filter type and intensity setting	**15 x 15**	**20 x 20**	**23 x 30**	**20 x 20 + 20 x 20 White light**
High-grade filter 50 or 100 % dual switch	UVstar 15	UVstar 20 UVstar 20HM UVstar 20ML	UVstar 30 UVstar 30HM UVstar 30ML	UVstar WL
10 – 100 % 10 % increment regulator	UVstar 15i	UVstar 20i	UVstar 30i	UVstar WLi
Super Brilliant high-grade filter 50 or 100 % dual switch	-	UVstar 20 Plus	UVstar 30 Plus	-
10 – 100 % 10 % increment regulator	-	UVstar 20i Plus	UVstar 30i Plus	-

Transilluminators

Blue Light LED BLstar Transilluminators for Fluorescent Stains

- **Blue light LED illumination for e.g. green fluorescent stains**
- **Compact tables with 12.5 cm x 9 cm or 16 cm x 20 cm field of view**
- **Safe solution: No damage of DNA, no risk of UV exposure for users**

BLstar 9

BLstar 16

Blue light transilluminators are a quite interesting alternative to UV transilluminators as there is no risk of sample damage during illumination. This is important when samples shall be processed furthermore after gel documentation. Users also benefit from it as there is no risk of UV exposure. Blue light excitation is applicable for fluorescent dyes for nucleic acid or protein stains with excitation wavelengths around 470 nm. Examples for compatible stains are: SYBR® Green, GelGreen™, SYBR® Safe, SYBR® Gold or SYPRO® Ruby.

Two different instruments are available within the BLstar line: **BLstar 9**, the small and handy solution for mini gels up 12.5 cm x 9 cm and **BLstar 16** for documentation of gels up to 16 cm x 20 cm.
Arrays of high-performance blue light LEDs are located at two sides below the illumination area. They provide for a great illumination uniformity and high signal intensity.
Both BLstar versions come with an installed lid with amber filter. The lid can be freely adjusted in different angles and allows an easy access to the gel during cutting out of the gel. There is no need to wear amber glasses as the amber lid serves as filter to see the fluorescent samples. This filter lid is also used for gel documentation with a camera. An additional bandpass filter in front of the camera lens is not necessary.
BLstar is compatible with BDAdigital and BDA live gel documentation systems. The small "BDA Hood" of "BDAdigital compact" or "BDA live compact" is directly placed over (BLstar 9) or on (BLstar 16) the blue light table.

For use of BLstar together with the advanced darkhood "BDA Box" please choose model "BDA Box 2BL". This darkhood with drawer for a transilluminator comes with a specific adapter for the BLstar tables.

BDAdigital compact and BLstar 16 transilluminator

Technical data:

Filter size:	BLstar 9: 12.5 cm x 9 cm BLstar 16: 16 cm x 20 cm
LED wavelength:	470 nm
Intensity setting	BLstar 9: no intensity switch, only 100 % BLstar 16: 50 % or 100 % dual switch
Filter:	Lid with amber filter for visualisation of fluorescent signals
Dimensions (W x D x H, cm):	BLstar 9: 21 x 21 x 4 BLstar 16: 34 x 25.5 x 8
Weight (kg):	BLstar 9: 2.3 BLstar 16: 4.6
Power:	Input 100 - 240 V AC, 50 - 60 Hz,1.0 A, output 24 V DC, 1.25 A

Transilluminators

Documentation of Visible Coloured Samples

UVstar with white light: UVstar WL

The UVstar transilluminator is also available as dual use version: UV table and white light table. UVstar WL features a 20 cm x 20 cm filter size for UV fluorescent samples and additional a 20 cm x 20 cm filter size for white light transillumination.
The white light table can be used for the documentation of all visible coloured samples like silver or Coomassie Blue stained gels as well as for radiographs. The UVstar WL can not be integrated into a Biometra darkhood due to its geometry.

UV to white light converter plate

Alternatively to the use of a white light table a converter plate can be applied at the top of a UV transilluminator. The converter plate converts the UV light to visible light and thus economically extents the application scope of all UV table models to the visualisation of coloured dyes.

Converter plate on top of a UVstar transilluminator

White light table WLstar

For documentation of only visible coloured samples without the need for any UV light the white light transilluminator WLstar is the table of choice. It comes with 20 cm x 20 cm or 23 cm x 30 cm filter size. The exceeding uniform illumination provides for bright sample images.

Filter type and intensity setting	Filter size (cm x cm)	
White filter	**20 x 20**	**23 x 30**
50 % / 100 % dual switch for intensity setting	WLstar 20	WLstar 30

Transilluminators

Order Information

The order numbers below refer to 230 V versions.
Order numbers of 115 V versions are supplied on request.

UVstar

Item	Order No.
UV Transilluminators with 50 or 100 % intensity switch	
UVstar 15 transilluminator, filter size 15 cm x 15 cm, 6 x 8 W UV bulbs (312 nm), 50 or 100 % intensity switch, UV protection shield	057 - 400
dto., but wavelength 254 nm	057 - 401
dto., but wavelength 365 nm	057 - 402
UVstar 20 transilluminator, filter size 20 cm x 20 cm, 8 x 8 W UV bulbs (312 nm), 50 or 100 % intensity switch, UV protection shield	057 - 500
dto., but wavelength 254 nm	057 - 501
dto., but wavelength 365 nm	057 - 502
UVstar 30 transilluminator, filter size 23 cm x 30 cm, 12 x 8 W UV bulbs (312 nm), 50 or 100 % intensity switch, UV protection shield	057 - 600
dto., but wavelength 254 nm	057 - 601
dto., but wavelength 365 nm	057 - 602
UVstar WL transilluminator, filter size 20 cm x 20 cm, 6 x 8 W UV bulbs (312 nm) + white light filter size 20 cm x 20 cm, 6 x 8 W white light bulbs, 50 or 100 % UV intensity switch, UV protection shield	057 - 700
dto., but UV wavelength 254 nm	057 - 701
dto., but UV wavelength 365 nm	057 - 702
UV Transilluminators with 10 – 100 % intensity control	
UVstar 15i transilluminator, filter size 15 cm x 15 cm, 6 x 8 W UV bulbs (312 nm), 10 – 100 % intensity setting, UV protection shield	057 - 410
dto., but wavelength 254 nm	057 - 411
dto., but wavelength 365 nm	057 - 412
UVstar 20i transilluminator, filter size 20 cm x 20 cm, 8 x 8 W UV bulbs (312 nm), 10 – 100 % intensity setting, UV protection shield	057 - 510
dto., but wavelength 254 nm	057 - 511
dto., but wavelength 365 nm	057 - 512
UVstar 30i transilluminator, filter size 23 cm x 30 cm, 12 x 8 W UV bulbs (312 nm), 10 – 100 % intensity setting, UV protection shield	057 - 610
dto., but wavelength 254 nm	057 - 611
dto., but wavelength 365 nm	057 - 612
UVstar WLi transilluminator, filter size 20 cm x 20 cm, 6 x 8 W UV bulbs (312 nm) + white light filter size 20 cm x 20 cm, 6 x 8 W white light bulbs, 10 – 100 % UV intensity setting, UV protection shield	057 - 710
dto., but UV wavelength 254 nm	057 - 711
dto., but UV wavelength 365 nm	057 - 712

UVstar Plus

Item	Order No.
UV Transilluminators with Super Brilliant filter and 50 or 100 % intensity switch	
UVstar 20 Plus transilluminator, filter size 20 cm x 20 cm, 8 x 8 W UV bulbs (312 nm), 50 or 100 % intensity switch, UV protection shield	057 - 520
dto., but wavelength 365 nm	057 - 522
UVstar 30 Plus transilluminator, filter size 23 cm x 30 cm, 12 x 8 W UV bulbs (312 nm), 50 or 100 % intensity switch, UV protection shield	057 - 620
dto., but wavelength 365 nm	057 - 622
UV Transilluminators with Super Brilliant filter and 10 – 100 % intensity control	
UVstar 20i Plus transilluminator, filter size 20 cm x 20 cm, 8 x 8 W UV bulbs (312 nm), 10 – 100 % intensity control, UV protection shield	057 - 530
dto., but wavelength 365 nm	057 - 532
UVstar 30i Plus transilluminator, filter size 23 cm x 30 cm, 12 x 8 W UV bulbs (312 nm), 10 – 100 % intensity setting, UV protection shield	057 - 630
dto., but wavelength 365 nm	057 - 632

UVstar with 2 wavelengths

UV Transilluminator with 50 or 100 % intensity switch	
UVstar 20HM transilluminator, filter size 20 cm x 20 cm, 4 x 8 W UV bulbs (254 nm) and 4 x 8 W UV bulbs (312 nm), 50 or 100 % intensity switch, UV protection shield	057 - 540
UVstar 30HM transilluminator, filter size 23 cm x 30 cm, 6 x 8 W UV bulbs (254 nm) and 6 x 8 W UV bulbs (312 nm), 50 or 100 % intensity switch, UV protection shield	057 - 640
UVstar 20ML transilluminator, filter size 20 cm x 20 cm, 4 x 8 W UV bulbs (312 nm) and 4 x 8 W UV bulbs (365 nm), 50 or 100 % intensity switch, UV protection shield	057 - 550
UVstar 30ML transilluminator, filter size 23 cm x 30 cm, 6 x 8 W UV bulbs (312 nm) and 6 x 8 W UV bulbs (365 nm), 50 or 100 % intensity switch, UV protection shield	057 - 650

BLstar

Blue light transilluminators, for BDA Box 2BL	
BLstar 9: viewing area 9 cm x 12.5 cm, 2 arrays of 470 nm LEDs, lid with amber filter, power supply	057 - 370
BLstar 16: viewing area 16 cm x 20 cm, 2 arrays of 470 nm LEDs, 50 or 100 % intensity switch, lid with amber filter, power supply	057 - 570

WLstar

White light Transilluminator with 50 or 100 % intensity switch	
WLstar 20 transilluminator, white light filter size 20 cm x 20 cm, 8 x 8 W white light bulbs, 50 or 100 % intensity switch	057 - 504
WLstar 30 transilluminator, white light filter size 23 cm x 30 cm, 12 x 8 W white light bulbs, 50 or 100 % intensity switch	057 - 604

Table dimensions (W x D x H):

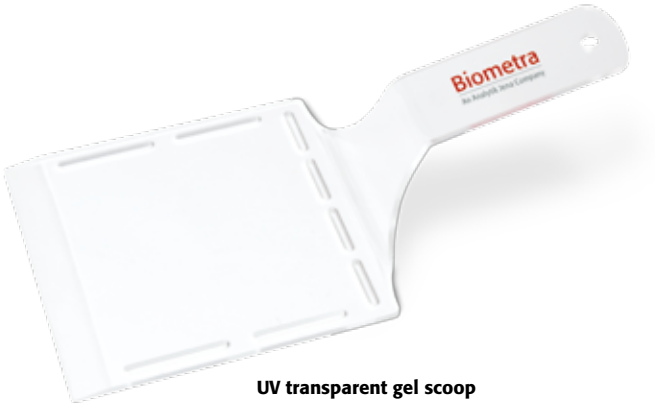
UVstar, UVstar plus and WLstar:	32.5 cm x 32.2 cm x 12.5 cm
UVstar WL:	47.8 cm x 32.2 cm x 15.5 cm
BLstar 9:	21.0 cm x 21.0 cm x 4.0 cm
BLstar 16:	34.0 cm x 25.5 cm x 8.0 cm

Transilluminators

Order Information

Item	Order No.
Accessories	
Converter plate: For application on an UV transilluminator for documentation of colour stains (0.8 x 30 x 24, H x W x D, cm)	057-005
UV light face protection shield	055-001
UV light protecting glasses	055-002
UV transparent acrylic tray for preparative tasks on a transilluminator, 31 cm x 36 cm	057-012
UV transparent gel scoop, scoop area 14 cm x 15 cm	057-013
Spare parts	
UV protection shield for UV transilluminators "UVstar"	057-010
UV protection shield for UV/white light transilluminator "UVstar WL"	057-011
UV bulb 8 W, 254 nm	057-007
UV bulb 8 W, 312 nm	057-002
UV bulb 8 W, 365 nm	057-009
White light bulb, 8 W	9-720-007

For order numbers of UV tables without UV protection shield please refer to section "BioDocAnalyze Systems".



UV transparent gel scoop

General Laboratory Equipment

Hybridisation Ovens

The Optimal Solution for Temperature Incubation of Samples for the Full Range of Hybridisation Methods

- **Broad range of hybridisation ovens**
- **Horizontal shaking platform (OV3, OV5)**
- **Two independent incubation chambers (OV5)**
- **All system include 4 hybridisation bottles and 5 hybridisation meshes**

Economical

The Biometra hybridisation ovens OV 1, OV 2, OV 3 and OV 5 utilize a heavy duty rotisserie for a variety of different glass bottles. Employing so-called "bottle-angling" a continuous flow of buffer across the complete surface of the hybridisation membranes is generated and the volume necessary for hybridisation can be decreased significantly.

Ease of handling

The large diameter of the bottle necks allows membranes to be easily inserted and removed. Bubble trapping or leaking using conventional hybridisation bags is avoided. Nylon meshes allow each hybridisation bottle to accomodate several membranes simultaneously or to incubate very large, overlapping membranes separated from each other. Therefore using the nylon meshes optimal utilisation of the system is given and which helps to avoid unnecessary delays.

Safety

Metal-framed, double glass vacuum doors (OV 2, 3 and 5) protect the user from low energy radiation like ß-emission. The stainless steel drip tray safely collects spills that may occur and is easy to clean.

Shaking platform

For all users performing hybridisation or other temperature-controlled incubations on a plane surface, the ovens OV 3 and OV 5 are equipped with a shaking platform. The rotation speed can be adjusted according to the different incubation protocols and needs.

Two ovens in one

The Duo-Therm Oven OV 5 combines a classic rotisserie oven with a rotisserie/ shaking oven. Both ovens work as separate, independent units. This unique workstation format lends itself to a wide variety of applications, for example:

- High throughput: using both rotisseries, two different sets of hybridisations (at different temperatures) can be performed simultaneously.
- While using the upper chamber for a hybridisation experiment, the lower chamber can be used for temperature incubation of hybridisation buffers.
- In situ hybridisations can be carried out in the upper oven as gels are being destained in a tray on the lower shaking platform.

The OV 5 accomplishes all this in a compact format and a small footprint.




	OV 1	OV 2	OV 3	OV 5
Order No.	**052-000 (230V) 052-090 (115V)**	**052-100 (230V) 052-190 (115V)**	**052-200 (230V) 052-290 (115V)**	**052-300 (230V) 052-390 (115V)**
Number of Hybridisation chambers	1	1	1	2 independent temperatures
Door	Single glass	Double glass, vacuum	Double glass, vacuum	Double glass, vacuum
Minimum temperature	10 °C above RT	10 °C above RT	10 °C above RT	10 °C above RT
Maximum temperature	85 °C	85 °C	85 °C	85 °C
Temperature Sensor	Platinum sensor	Platinum sensor	Platinum sensor	Platinum sensor
Control accuracy	± 0.1 °C	± 0.1 °C	± 0.1 °C	± 0.1 °C
Rotor speed	1 – 7 rpm	1 – 7 rpm	1 – 7 rpm	1 – 7 rpm
Capacity				
Bottles (30 cm)	6	6	6	2 x 6
Bottles (15 cm)	12	12	12	2 x 12
Bottles (10 cm)	12	12	12	2 x 12
Shaker platform	-	-	Yes	Yes, lower chamber
Shaker dimensions (W x D)	-	-	22 cm x 23.5 cm	22 cm x 23.5 cm
Shaker speed	-	-	6 – 60 rpm	6 – 60 rpm
Footprint (W x D)	44 cm x 37 cm	44 cm x 37 cm	44 cm x 37 cm	44 cm x 37 cm
Height	42 cm	42 cm	60 cm	71 cm
Weight	20 kg	20 kg	25 kg	38 kg
Content	4 large bottles, 5 meshes	4 large bottles, 5 meshes	4 large bottles, 5 meshes	4 large bottles, 5 meshes

Accessories	Order No.
Large hybridisation bottle (30 cm, diameter 3.5 cm)	052-001
Medium hybridisation bottle (15 cm, diameter 3.5 cm)	052-002
Small hybridisation bottle (10 cm, diameter 3.5 cm)	052-003
Cap for hybridisation bottle incl. O-ring seal, 2 pcs. each	052-022
Nylon meshes 23 cm x 23 cm, 5 pieces	052-006
Nylon meshes 15 cm x 10 cm, 5 pieces	052-007
Rack for 6 hybridisation bottles	052-008
Rotor for OV 1, 2, 3, 5	052-009
Spring clamps for 3.5 cm bottles, 2 pcs.	052-018
Spring clamps for 50 ml Falcon tubes, 2 pcs.	052-017

BioLink DNA Crosslinker

Immobilisation of Nucleic Acids to Membranes

The BioLink DNA crosslinker is a microprocessor controlled UV irradiation system dedicated to nucleic acid linking to membranes for Southern, Northern, Dot and Slot Blot applications. It can also be used for UV sterilisation and for elimination of PCR contaminations.

- **Crosslinking of DNA and RNA to nylon or nitrocellulose membranes**
- **Microprocessor control provides precise UV dosis control**
- **Irradiation can be defined as Energy (Joules/cm²) or Time (seconds)**
- **Preset programs for nucleic acid immobilisation at 120 mJoule/cm²**
- **Safety interlock door with UV protection glass**

Microprocessor control provides reproducibility

The programmable microprocessor constantly monitors the UV light emission. The irradiation stops exactly when the programmed energy is achieved. Thus the effect of decreasing UV intensity due to bulb aging is compensated.

Durability

The BioLink DNA Crosslinker combines the latest UV technology with high quality manufacturing: UV exposure chamber in stainless steel, protective quartz disk on the UV sensor cell and a highly resistant keypad.

Ease of use

The large display providing a series of predefined methods makes the BioLink an easy to use but yet powerful instrument for immobilisation of nucleic acids to membranes. The programmed data are shown on the LED display.

Feature	Technical data
UV light	5 x 8 W 254 nm
UV irradiation energy	0 up to 99.99 J/cm²
Maximum time of exposure	999.9 min
Instrument dimensions (H x W x D, cm)	30.5 x 36 x 35
Chamber (inside) dimensions (H x W x D, cm)	14.5 x 26 x 33

Item	Order No.
BioLink Crosslinker, 245 nm UV, 230 V,	054-100
BioLink Crosslinker, 254 nm UV, 115 V,	054-190
UV tube, 8 Watt, 254 nm, 29 cm long	057-007

Rocking Platforms

For Gel Staining and Destaining, Membrane Incubation and Other Applications

- **2 different sizes available**
- **Quiet operation**
- **High safety standard**

Biometra's **Rocking Platforms** feature rocksolid construction. The instruments are ideal for applications in which a gentle flow of solution is required. With shaking angles of 5° or 10° and variable shaking frequency they can be used in a multitude of applications. Both models can support a generous weight load and are designed for years of reliable service under the most demanding conditions.

The **Tumbling Tables** are ideal for applications requiring mixing or agitation of solutions, e.g. staining and destaining. In contrast to the Rocking Platforms WT15 and WT16, which move back and forth, the Tumbling Tables WT12 and WT17 move three-dimensionally.

Standard Rocking Platform WT15

Mini Rocking Platform WT16

Tumbling Table WT12

Mini Tumbling Table WT17

Item	Order No.
Standard Rocking Platform WT15 complete with rubber mat, 230 V	042-400
dto., 115 V	042-490
Mini Rocking Platform WT16 complete with rubber mat, 230 V	042-500
dto., 115 V	042-590
Tumbling Table WT12 complete with rubber mat, 230 V	042-100
dto., 115 V	042-190
Mini Tumbling Table WT17 complete with rubber mat, 230 V	042-600
dto., 115 V	042-690

	Standard Rocking Platform WT15	Mini Rocking Platform WT16	Tumbling Table WT12	Mini Tumbling Table WT17
Platform surface dimensions (cm)	35 x 40	26 x 29	35 x 40	26 x 29
Shaking frequency (cycles/min)	4 to 40	2 to 50	2.5 to 50	2 to 50
Shaking angle 5° (optional 10°)	+	+	-	-
Tumbling angle 5° (optional 10°)	-	-	+	+
Maximum load	10 kg	5 kg	10 kg	5 kg

Thermomixer and Thermoblock

Introduction

Thermomixers are the basic equipment of each laboratory. But thermomixers might be very different. Therefore, we offer a wide portfolio making it easy to find the appropriate mixer for different applications. Aside high-end instruments of the BioShake series, which are specially suited for mixing small volumes in microtiter plates, there are also systems for daily routine. All of our thermomixers have a choice of several different blocks, so every requirement can be met.

The choice of the optimal mixing frequency for a microtiter plate or a reaction tube should be done on the basis of the well size and the filling volume. This way, optimal results can be achieved in shortest time, reproducible without any loss of sample.

Recommended mixing frequencies for reaction tubes

	Recommended mixing frequencies [rpm] for tubes against filling volume [%] for aqueous substances			
Filling volume	**0.2 ml tube**	**0.5 ml tube**	**1.5 ml tube**	**2.0 ml tube**
10 % – 50 %	1,400 – 1,800	1,200 – 1,600	1,000 – 1,300	1,000 – 1,300
50 % – 75 %	1,200 – 1,500	1,100 – 1,300	1,000 – 1,200	900 – 1,200
75 % – 100 %	1,000 – 1,300	1,000 – 1,200	900 – 1,100	900 – 1,100

Recommended mixing frequencies for microtiter plates

	Recommended mixing frequencies [rpm] for microtiter plates against filling volume [%] for aqueous substances			
Filling volume	**96 well (Standard)**	**384 well (Standard)**	**384 well (Small volume)**	**1536 well (Standard)**
10 %	1,800 – 2,200	2,200 – 2,600	2,800 – 3,000	2,800 – 3,000
25 %	1,600 – 2,000	2,000 – 2,400	2,400 – 3,000	2,600 – 3,000
50 %	1,400 – 1,800	1,800 – 2,200	2,200 – 2,600	2,400 – 2,600
75 %	1,200 – 1,600	1,600 – 2,000	2,000 – 2,400	2,200 – 2,600

BioShake Series

Ultra rapid mixer and thermomixer for small and smallest volumes in microtiter plates and reaction tubes

The BioShake series puts the traditional way of thinking upside down and defines completely new the requirements of a laboratory mixer – a category which, in the light of downsizing of reaction volumes and upsizing of the well numbers in microtiter plates, is faced permanent increasing demands.

The BioShake series meets exactly these new requirements: These instruments are mixing also smallest volumes in shortest time, offer a simple handling, outstanding comfort and a maximum of safety, advantages unknown by then. In contrast to that the required space is minimum.

Integrated 3D-Shake-Control and anti-vibration technology enable high-precise and effective shaking on even smallest benches.
Time consuming centrifugation steps after mixing can be cut down. Annoying vibration and noise are things of the past.

3D-Shake-Control
Rapid and gentle mixing in orbits up to 3,000 rpm for optimal results of even sensitive samples and liquids.

Anti-Spill-Technology
Controlled planar mixing avoids wetting of lids, sample spillage and sample contamination with close-by samples.

Anti-Vibration-Technology
Outstanding smooth running conditions without any vibration and any noise.

BioShake iQ

BioShake XP

ThermoShaker TS1 and TSC

Standard thermoshaker for reaction tubes up to 2 ml

Established product line for standard applications in research as well as in routine laboratories.
Perfect for applications with volumes of more than 100 µl. For smaller volumes the use of the BioShake series is recommended. ThermoShaker TSC offers both heating and active cooling function.

These instruments have a slightly larger footprint than the BioShake series, but are still smaller, less heavy and more compact than the majority of instruments on the market.

ThermoShaker TS1

ThermoShaker TSC

Thermoblock TB2

Dry block thermostat for all routine applications in a laboratory

Reliable thermostat for tempering samples in small and larger tubes.
The temperature range is up to 130 °C.
The Thermoblock TB2 accepts 2 single or 1 combi block. By combination of different single blocks different tubes, i. e. 50 ml Falcon tubes and 0.2 ml tubes, can incubated at the same time and same temperature.

Thermomixer and Thermoblock

Overview

	BioShake	
		
	XP	iQ
Heating	-	+
Cooling	-	-
Mixing	+	+
Temperature range	-	RT to 99 °C
Temperature settings	-	0 °C to 99 °C
Block capacity	1 Adapter plate	
Number of removable blocks / modules	16 + customized	
Maximal vessel size	4 ml	
Mixing frequency	200 to 3,000 rpm	
Mixing orbit	2 mm	
Block types (vessel types and sizes)		
0.2 ml	+	+
0.5 ml	+	+
1.5 ml	+	+
2.0 ml	+	+
Lysis tubes 0.5 ml – 2.0 ml	+	+
Test tubes (Ø = 13 mm)	-	-
2.0 ml glass bottles (Ø = 12 mm)	+	+
4.0 ml glass bottles (Ø = 15 mm)	+	+
15 ml (Falcon tubes)	-	-
50 ml (Falcon tubes)	-	-
Microtiter plates (MTP)		
Flat bottom	+	+
96 well (deep well / v well / square well / u well)	(+ / + / + / +)	((+) / + /(+) / +)
384 well	+	+
1536 well	+	(+)
Microscope slide	-	-

	TB2 Thermoblock	TS1 ThermoShaker	TSC ThermoShaker
			
Heating	+	+	+
Cooling	-	-	+
Mixing	-	+	+
Temperature range	RT + 5 °C to 130 °C	RT + 5 °C to 100 °C	RT - 15 °C to 100 °C
Temperature settings	15 °C to 130 °C	25 °C to 100 °C	4 °C to 100 °C
Block capacity	2 Single or 1 Combi Block	1 Block Module	
Number of removable blocks / modules	10	5	5
Maximal vessel size	50 ml	2 ml	2 ml
Mixing frequency	-	250 to 1,800 rpm	
Mixing orbit	-	2 mm	
Block types (vessel types and sizes)			
0.2 ml	+	+	+
0.5 ml	+	+	+
1.5 ml	+	+	+
2.0 ml	+	+	+
Lysis tubes 0.5 ml – 2.0 ml	-	-	-
Test tubes (Ø = 13 mm)	+	-	-
2.0 ml glass bottles (Ø = 12 mm)	-	-	-
4.0 ml glass bottles (Ø = 15 mm)	-	-	-
15 ml (Falcon tubes)	+	-	-
50 ml (Falcon tubes)	+	-	-
Microtiter plates (MTP)	+	+	+
Flat bottom	+	-	-
96 well (deep well / v well / square well / u well)	(- / + / - / -)	(- / + / - / -)	(- / + / - / -)
384 well	-	-	-
1536 well	-	-	-
Microscope slide	+	-	-

BioShaker

Ultra Rapid Mixer and Thermomixer for Small and Smallest Volumes in Microtiter Plates and Reaction Tubes

- **3D-Shake-Control: rapid and gentle mixing in orbits for sensitive samples**
- **Anti-Spill-Technology: controlled planar mixing**
- **Anti-Vibration-Technology**
- **Outstanding smooth running conditions without vibration and noise**
- **Vortex and Short-mix function**
- **For microtiter plates, PCR plates, deep well plates, tubes and glass vials**
- **Sample preparation for Next Generation sequencing (e.g. bead-technology)**
- **Compact lightweight aluminum design**

The **BioShake XP** allows for the first time high precise and efficient mixing in the microlitre scale for a wide range of applications. Assays in microtiterplates or reaction vessels can be realised fast and safe with using adjustable speed of 200 up to 3.000 rpm.
The BioShake mixing-technology is obviously more robust, vibration free and needs less maintenance compared to classical mixers. Programming the BioShake XP works via direct touch buttons.
In addition two buttons for start and storage of time and mixing modes enable the instrument to run complex applications. This opens new points of view on the daily laboratory work and optimises routine application enormously. The short mix button allows short and fast mixing in between. The two line LCD display guarantees simultaneous and safe reading of all programmed and measured parameters as time and mixing frequency.

The **BioShake iQ** is the high end Thermoshaker of the BioShake series. In addition to the technical specification of the model BioShake XP, the BioShake iQ comes with a new very accurate heating technology. This allows highly reproducable results. The temperature range from RT to 99 °C is adjustable in 0.1 °C steps. The temperature accuracy is ± 0.1 °C, the temperature uniformity through all samples is about ± 1 °C. The BioShake series comes with a variety of standardised and specific adaptor plates and and exchangeable blocks. The adaptors allow an optimal fit for standard tubes, microtiter plates, glass vials and other sample vessels. An excellent temperature uniformity and homogeneity is guaranteed.

Item	Order No.
BioShake XP (100 – 240V, EU plug); without adapter plate	848-1808-0505
BioShake XP (100 – 240V, US plug); without adapter plate	848-1808-0555
BioShake XP (100 – 240V, Japan plug); without adapter plate	848-1808-0565
BioShake iQ (100 – 240V, EU plug); without adapter plate	848-1808-0506
BioShake iQ (100 – 240V, US plug); without adapter plate	848-1808-0556
BioShake iQ (100 – 240V, Japan plug); without adapter plate	848-1808-0566

Accessories	
Adapter for microtiter plates – flat bottom	848-1808-1021
Adapter for microplates – flat bottom, high base	848-1808-1022
Adapter for microtiter plates – 96 well round bottom, universal	848-1808-1031
Adapter for microtiter plates – 96 well standard PCR plate	848-1808-1041
Adapter for microtiter plates – 384 well standard PCR plate	848-1808-1051
Adapter for deep well microtiter plates – 96 well, 1,000 µl (Eppendorf)	848-1808-1121
Adapter for deep well microtiter plates – 96 well, 500 µl (Eppendorf)	848-1808-1131
Adapter – 24 x 2.0 ml tubes and 15 x 0.5 ml tubes	848-1808-1061
Adapter – 24 x 1.5 ml tubes and 15 x 0.5 ml tubes	848-1808-1062
Adapter – 40 x 0.5 ml tubes and 28 x 0.2 ml tubes	848-1808-1063
Adapter – 96 x 0.2 ml tubes	848-1808-1064
Adapter – 35 x 2.0 ml tubes and 24 x 0.5 ml tubes	848-1808-1065
Adapter – 35 x 1.5 ml tubes and 24 x 0.5 ml tubes	848-1808-1066
Adapter – 35 x lysis tubes 0.5 – 2.0 ml	848-1808-1067
Adapter – 30 x 2.0 ml glass vials (Ø = 12 mm)	848-1808-1071
Adapter – 20 x 4.0 ml glass vials (Ø = 15 mm)	848-1808-1072
Customized adapters – for specifically shaped microplates, tubes or vials (on request)	848-1808-1000

Technical specifications	BioShake XP	BioShake iQ
Removable blocks		
Microtiter plates	96-, 384- and 1536-well microtiter-, deep well- and PCR plates	
Tubes	0.2 – 2.0 ml Standard and lysis tubes	
Glass vials	2.0 and 4.0 ml glass vials	
Others	Upon request	
Temperature control		
Temperature range	-	Ambient to 99 °C
Temperature settings	-	In steps of 0.1 °C adjustable from 0 °C to 99 °C
Temperature accuracy	-	± 0.1 °C
Temperature uniformity	-	± 0.5 °C to 45 °C ± 0.7 °C to 75 °C ± 1.0 °C to 95 °C
Heating rate	-	Approx. 7 °C/min Approx. 10 min from ambient to 95 °C
Mixing function		
Mixing frequency for microtiter plates	200 – 3,000 rpm	
Mixing frequency for tubes	200 – 1,800 rpm	
Mixing orbit	2 mm	
Mixing frequency settings	50 rpm steps	
Mixing frequency accuracy	± 25 rpm	
Short-Mix-Function	Yes	
Time functions		
Timer	1 min to 99 h; automatical Stand-By	
Timer settings	1 min steps	
Display	Minutes, seconds	
Continous operation	Yes	
Acoustical alarm	Yes, at the end of program	
Program functions		
Program memory	2	
User defined program buttons	P1, P2	
Program capacity	3 Steps	
Display		
Display	LCD, double spaced	
Display set / actual values	Time, mixing frequency	
Electrical properties		
Controller	Micro controller	
Main switch	Yes	
Current supply	24 V DC, 100 Watt	
Power supply	100 – 240 V AC, 50 – 60 Hz, 24 V DC (output)	
Characteristics		
Housing	Aluminium (anodised)	
Environmental operating range	+5 °C to 45 °C (80 % max. relative humidity)	
Dimensions (W x D x H)	142 mm x 170 mm x 80 mm	
Weight	2.7 kg	

TS1 ThermoShaker

Compact Benchtop Thermomixer for all Applications Requiring Heating and/or Shaking in Microtubes up to 2.0 ml

- **Interchangeable block modules for microtubes up to 2.0 ml**
- **Three instruments in one: thermomixer, mixer, incubator**
- **Temperature range: RT + 5 °C to 100 °C**

The **ThermoShaker TS1** is a variable speed and variable temperature microtube shaking incubator. Combining the incubation phase with mixing has multiple benefits: reduction of reaction process times, reduction of operator's workload and increasing efficiency of many procedures (e.g. transformation of bacterial cells).

Five interchangeable block modules are available to meet the needs of most laboratory procedures for 0.2 ml, 0.5 ml, 1.5 ml and 2.0 ml microtubes as well as 96-well microtiter plates (PCR-plates).

Choosing the temperature calibration function allows the user to calibrate the unit over a range of approx. ± 6 % of the selected temperature to compensate differences in the thermal behavior of tubes or MTP's from different manufacturers.
The variable shaking speed from 250 to 1,800 rpm combined with the 2 mm shaking orbit and the soft start function allows gentle to vigorous mixing.
The high quality quiet motor ensures regulated and reproducible rotation throughout the speed range. Shaking can be configured for continuous or timed operation with buzzer and automatic switch-off.

The **ThermoShaker TS1** is designed for easy operation. Temperature, speed and time are indicated on the two-line display for both set and actual values. The apparatus is very compact, with a low profile and small footprint. Additionally the low voltage power supply enables safe cold room or incubator operation.

Technical specifications

Temperature control	
Temperature range	Ambient + 5 °C up to 100 °C
Temperature settings	+ 25 °C to 100 °C
Temperature accuracy	± 0.5 °C (at 37 °C)
Uniformity within the block	± 0.1 °C (temperature range + 25 °C to + 40 °C) ± 1.0 °C (temperature range + 40 °C to + 80 °C) ± 2.0 °C (temperature range + 80 °C to + 100 °C)
Heating rate	Approx. 4 °C/min (7 min from ambient to 37 °C)
Mixing function	
Mixing frequency	250 rpm to 1,800 rpm
Mixing orbit	2 mm
Adjustment of mixing frequency	10 rpm steps
Display	
Display	LCD, double spaced
Display set/actual values	Temperature, mixing frequency, time
Display resolution	0.1 °C
Removable blocks	
Reaction tubes	0.2 ml, 0.5 ml, 1.5 ml, 2.0 ml
Microtiter plates	96-well microtiter plates
Capacity	1 Block module
Program functions	
Timer	Yes (Count-Down, 1 min to 96 h)
Electrical properties	
Main switch	Yes
Electric power supply	100–240 VAC, 50/60 Hz, output DC 12 V, 3.5 A
Characteristics	
Environmental operating range	+ 5 °C to 40 °C (80 % max. relative humidity to 31 °C, linear decreasing to 50 % relative humidity at 40 °C)
Dimensions (W x D x H)	205 mm x 230 mm x 130 mm
Weight	Approx. 4 kg

Ordering Information

see page 159

TSC ThermoShaker

Compact Benchtop Thermomixer with Cooling Feature

Thermomixer for all applications which need heating, cooling and/ or mixing in microtubes up to 2 ml

- **Removable block modules for microtubes up to 2 ml**
- **Three instruments in one: thermomixer, mixer, incubator**
- **Temperature range: RT -15 °C to 100 °C**

The **ThermoShaker TSC** is a thermomixer with heating and cooling function, as well with a variable mixing speed from 250 rpm to 1,800 rpm. Active cooling with Peltier technology allows a temperature adjustment from + 4 °C to + 100 °C. Hereby, the application range is significantly enhanced compared to the ThermoShaker TS1.

Five removable block modules for 0.2 ml, 0.5 ml, 1.5 ml, 2.0 ml and 96-well microtiter plates (PCR-plates) meet the requirements of most laboratory applications.

Choosing the temperature calibration function allows the user to calibrate the unit over a range of approx. ± 6 % of the selected temperature to compensate differences in the thermal behavior of tubes or MTP's from different manufacturers.
The variable shaking speed from 250 rpm to 1,800 rpm combined with the 2 mm shaking orbit and the "Soft-Start" function allows gentle to vigorous shaking. The high-quality and extremely quiet motor guarantees controlled and reproducible shaking throughout the shaking range. A special counter weight technology serves for a stable stand (same with TS1). Shaking can be configured for continuous or timed operation with buzzer and automatic switch-off.

The **ThermoShaker TSC** has been designed for easy and optimal operation. Temperature, speed and time are indicated on the two-line display for set and actual values both. The TSC, as the TS1, is very compact, with low profile and small footprint. Additionally the low voltage power supply enables safe cold room or incubator operation.

Technical specifications

Temperature control	
Temperature range	Ambient - 15 °C to 100 °C
Temperature settings	+ 4 °C to 100 °C
Temperature accuracy	± 0.5 °C (temperature range < 85 °C) ± 2.0 °C (temperature range > 85 °C)
Uniformity within the block	± 0.1 °C (temperature range + 25 °C to + 40 °C) ± 1.0 °C (temperature range + 40 °C to + 80 °C) ± 2.0 °C (temperature range + 80 °C to + 100 °C)
Heating rate	Approx. 5 °C/min (from + 25 °C to 100 °C in 15 min
Cooling rate	Approx. 5 °C/min (temperature range 100 °C to RT) Approx 1.8 °C/min (temperature range RT to 15 °C under RT)
Mixing function	
Mixing frequency	250 rpm to 1,800 rpm
Mixing orbit	2 mm
Adjustment of mixing frequency	10 rpm steps
Display	
Display	LCD, double spaced
Display set/actual values	Temperature, mixing frequency, time
Display resolution	0.1 °C
Removable blocks	
Reaction tubes	0.2 ml, 0.5 ml, 1.5 ml, 2.0 ml
Microtiter plates	96-well microtiter plates
Capacity	1 Block module
Program functions	
Timer	Yes (Count-Down, 1 min to 96 h)
Electrical properties	
Main switch on instrument	Yes
Electric power supply	100 – 240 VAC, 50/60 Hz, output DC 12 V, 4.5 A
Characteristics	
Environmental operating range	+ 5 °C to 40 °C (80 % max. relative humidity to 31 °C, linear decreasing to 50 % relative humidity at 40 °C)
Dimensions (W x D x H)	205 mm x 230 mm x 130 mm
Weight	Approx. 4 kg

Ordering Information

see page 159

TB2 Thermoblock

Dry Block Heater for Incubation in Tubes up to 50 ml and up to 130 °C

- **Dual block system**
- **Removable heating blocks**
- **10 heating blocks for various reaction tubes**
- **Temperature range: RT + 5 °C to 130 °C**

Precise temperature control

The **Thermoblock TB2** has been developed for incubation of reaction tubes at fixed temperatures. Temperature control is achieved by means of a Pt1000 microsensor in order to obtain outstanding block uniformity (± 0.1 °C at 37 °C).

Dual block design

Incubation of a variety of samples contained in different reaction tubes causes no problems for the Thermoblock. The TB2 has a capacity for two blocks, i. e. either two single blocks or one combi block can be heated. Combinations of different single blocks allow simultaneous incubation of e.g. 15 ml Falcon tubes in one block and 1.5 ml reaction tubes in the other block.

Multi Function Control

The ergonomic waterproof front panel facilitates data entry and temperature readings. It features a central multi-functional control knob for:

- Starting the block
- Selecting temperatures up to 130 °C
- Choosing the optional external temperature sensor
- Start the count down timer
- Activate the temperature deviation alarm
- Use the delay function for start or stop of the TB2
- Different calibration options

Technical specifications

Temperature control	
Temperature range	Ambient +5 °C to 130 °C
Temperature settings	+ 15 °C to 130 °C
Temperature control accuracy	± 0.1 °C at 37 °C
Uniformity within the block	± 0.1 °C at 37 °C
Heating Rate	15 min from 25 °C to 100 °C
Display	
Display	Digital, LED
Display resolution	0.1 °C
Removable blocks	
Reaction tubes	0.2 ml, 0.5 ml, 1.5 ml, 2.0 ml
Other vessels	15 ml, 20 ml, test tubes, microscopic slides
Microtiter plates	96 well 0.2 ml, MTP with flat bottom
Single Block dimensions	100 mm x 70 mm x 62.5 mm
Combi Block dimensions	140 mm x 100 mm x 49 mm
Capacity	2 Single Blocks or 1 Combi Block
Program functions	
Timer	Yes
Temperature deviation alarm	Yes (± 0.5 °C to ± 10 °C)
Offset	Yes (± 2 °C for single point calibration)
External temperature sensor	Yes (optional)
Delay start and stop	Yes
Calibration	Yes (± 3 °C of the original reading)
Reset	Yes
Electrical properties	
Main switch on instrument	Yes
Electric power supply	220–240 V, 50–60 Hz, 300 W
Characteristics	
Environmental operating range	10 °C to 35 °C (80 % max. relative humidity)
Dimensions (W x D x H)	200 mm x 280 mm x 100 mm
Weight (incl. blocks)	5.8 kg

Ordering Information

see page 159

TB2 Thermoblock, TS1 and TSC ThermoShaker

Order Information

Item					Order No.
Thermoblock TB2, 230 V; constant temperature incubation system with positions for two single blocks or one combi block; without blocks					051-300
dto., 115 V					051-390
TB2 Blocks					
Note: Blocks for TB2 are not compatible with predecessor model TB1					
Single block	30 x 0.5 ml	tubes	conical wells	incl. tube cover plate and block lifter	051-310
Single block	70 x 0.2 ml	tubes	conical wells	incl. tube cover plate and block lifter	051-311
Single block	24 x 1.5 ml	tubes	conical wells	incl. tube cover plate and block lifter	051-312
Single block	24 x 2.0 ml	tubes	cylindrical wells	incl. tube cover plate and block lifter	051-313
Single block	20 x 1.3 cm	deep wells	cylindrical wells	incl. block lifter	051-315
Single block	8 x 15 ml	vessels (Falcon tubes)	conical wells	incl. block lifter	051-316
Single block	5 x 50 ml	vessels (Falcon tubes)	conical wells	incl. block lifter	051-317
Single block		without wells		incl. block lifter	051-319
Combi block	(full size)	96-well microtiter plate or 96 x 0.2 ml tubes		incl. block lifter	051-320
Combi block	(full size)	microscopic slides or microtiter plates with flat bottom		incl. block lifter	051-321
Accessories					
Block lifter for TB1 and TB2					051-230
Tube cover plate for TB2					051-331
External temperature sensor for TB2 (for tubes > 0.5 ml volume)					051-350

TB1 Blocks
Note: Blocks for TB1 are not compatible with TB2.
TB1 blocks and accessories are still available. For details have a look to our actual price list or Biometra homepage.

TS1 ThermoShaker, 115/230V; without block module	051-500
dto., 115/230V (Flat blade attachment plug)	051-590
Interchangeable block modules for TS1	
Block module for 20 x 0.2 ml + 12 x 1.5 ml tubes	051-512
Block module for 20 x 0.5 ml + 12 x 1.5 ml tubes	051-513
Block module for TS1, 96 well microtiter plates or 96 x 0.2 ml tubes	051-514
Block module for 24 x 1.5 ml tubes	051-515
Block module for 24 x 2.0 ml tubes	051-516

TSC ThermoShaker, 115/230 V, without block modules	051-600
dto., 115/230 V, with flat blade attachment plug, without block modules	051-690
Interchangeable block modules for TSC	
Block module for TSC, 20 x 0.2 ml + 12 x 1.5 ml tubes	051-612
Block module for TSC, 20 x 0.5 ml + 12 x 1.5 ml tubes	051-613
Block module for TSC, 96 well microtiter plates or 96 x 0.2 ml tubes	051-614
Block module for TSC, 24 x 1.5 ml tubes	051-615
Block module for TSC, 24 x 2.0 ml tubes	051-616

Geldryers

Two Sizes for Drying of Minigels up to Sequencing Gels

- **Reliable rubber mask sealing**
- **Precise temperature regulation between RT +5 °C and 90 °C**
- **Timer with LCD display**

Biometra's geldryers are designed for drying vertical slab gels and provide optimal drying for all types of gels. Both sizes of dryers (**Minidry** and **Mididry**) feature temperature regulation between ambient temperature +5 °C and 90 °C to optimise drying conditions and to prevent gel cracking. The geldryers are highly appreciated for their durability, very quiet operation and reliability. The gels are heated from below and the vacuum removes the moisture from below to dry the gel homogeneously. When applying the vacuum, a groove that frames the drying area provides optimum sealing.
All geldryers are equipped with a timer, which also shows the remaining drying time.

Minidry (D61), with a drying area of 18 cm x 18 cm, is for laboratories with low throughput.

Mididry (D62) is the geldryer of choice for drying multiple gels in parallel. The drying area is 30 cm x 40 cm. This standard size allows drying of up to 8 Minigels or 2 Multigel-Long or 2 Maxigel resp. Model V15·17 gels at the same time.

Recommended vacuum pumps are listed on the **Membrane Pumps** page.

The use of special filter paper and cellophane results in perfect flat and transparent gels for documentation and analysis (e.g. with the Biometra gel documentation system).

Item	Order No.
Minidry (D61), 18 cm x 18 cm drying area, 230 V	041-000
dto., 115 V	041-090
Mididry (D62), 30 cm x 40 cm drying area, 230 V	041-100
dto., 115 V	041-190

Accessories	
Filter paper, 25 sheets	041-003
Cellophane, 0.3 m x 50 m	041-004
Frit for Minidry (D61)	041-001
Frit for Mididry (D62)	041-101
Frit for Maxidry (D64, 40 x 60 cm)	041-301
Silicone mask for Minidry (D61)	041-013
Silicone mask for Mididry (D62)	041-103
Silicone mask for Maxidry (D64, 40 cm x 60 cm)	041-303

Recommended membrane vacuum pumps and pump systems are shown on page 161.

Membrane Pumps

Vacuum Pumps for the Laboratory

- **Evacuation and transfer of air and aggressive gases**
- **High vapor and condensate tolerance**

Typical applications of the membrane vacuum pumps are evacuation and transfer of air, gases and vapors.
We recommend to use the pumps with our following products: Geldryers, Vacu-Blot, Dot Blot 96, Hybri·Dot 96, Hybri·Slot 24, The Convertible.
In addition the pumps are suitable for rotary evaporation, vacuum filtration or vacuum distillation of solvents with high boiling point.

MP86

MP26

Membrane pump system II with MP20

Membrane pump system III with MP40

All pumps are gas-tight, 100 % oil-free, maintenance-free, quiet and provided with an adjustable vacuum gauge and manometer.

For use with geldryers we recommend the pump systems. The systems are delivered with a separator (Woulff's bottle) connected to the pump inlet to prevent contamination of the pump with liquids.

Pump type	Max. delivery at atm. pressure (l/min)	End vacuum (mbar abs.)	Recommended for use with				Comments
			Minidry	Mididry	Maxidry	Vacu-Blot, Dot Blot, Hybri·Dot 96, Hybri·Slot 24, The Convertible	
MP86	6	100	-	-	-	+	Highly condensate resistant
MP26	19	35	+	(+)	-	-	Functional design Low-price alternative to MP20
MP20	20	8	+	+	-	-	Superior condensate resistance and better end vacuum compared to MP26
MP40	34	8	+	+	+	-	Highest condensate resistance and best end vacuum

Membrane Pumps

Order Information

Item	Order No.
Membrane vacuum pump MP86, 230 V, 50 Hz with adjustable vacuum gauge and manometer, end vacuum 100 mbar, max. delivery 6 l/min	049-000
dto., 115 V, 60 Hz	049-090
Membrane vacuum pump MP26, 230 V, 50 Hz with adjustable vacuum gauge and manometer, end vacuum 35 mbar, max. delivery 19 l/min, incl. 1 m vacuum tubing	049-100
dto., 115 V, 50/60 Hz	049-190
Membrane pump system I, same as 049-100, but includes separator (Woulff's bottle), and 1 m vacuum tubing	049-200
dto., but based on 049-190	049-290
Membrane vacuum pump MP20, 230 V, 50 Hz, with adjustable vacuum gauge and manometer, end vacuum 8 mbar, max. delivery 20 l/min, incl. 1 m vacuum tubing	049-300
dto., 115 V, 60 Hz	049-390
Membrane pump system II, same as 049-300, but includes separator, baseplate and holder for separator, and 1 m vacuum tubing	049-400
dto., but based on 049-390	049-490
Membrane vacuum pump MP40, 230 V, 50 Hz, with adjustable vacuum gauge and manometer, end vacuum 8 mbar, max. delivery 34 l/min, incl. 1 m vacuum tubing	049-500
dto., 115 V, 60 Hz	049-590
Membrane pump system III, same as 049-500, but includes separator, baseplate and holder for separator, and 1 m vacuum tubing	049-600
dto., but based on 049-590	049-690

Accessories	
Vacuum tubing for MP86 (2 x 1 m)	049-002
Vacuum tubing for MP26, MP 20 and MP40 (2 x 1 m)	049-102
Separator bottle (Woulff's bottle) for MP26	049-201
Separator bottle and holder for MP20 and MP40 baseplate	049-402
Baseplate for MP20	049-401
Baseplate for MP40	049-601
Adjustable vacuum gauge with manometer (for connection to the pump inlet)	049-501

Thermostat KH-6 / For a Broad Range of Applications

Cooling Thermostat for Precise Temperature Control

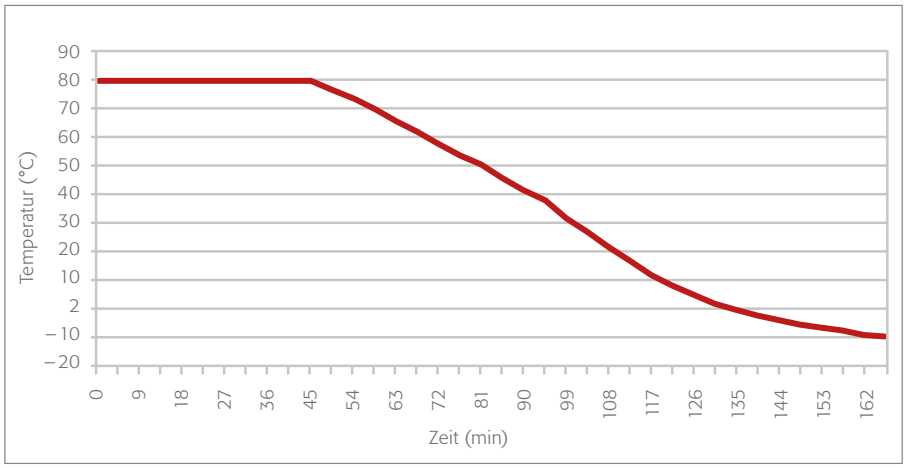
- **Space saving design**
- **Real Temperature Adjustment (RTA)**
- **5 selectable fixed temperatures**
- **CFC-free**

Precise and constant temperatures are often essential for a broad range of applications in laboratory, e.g. Pulse Field Gel Electrophoresis, native polyacrylamide gel electrophoresis (PAGE, slab gels), agarose gel electrophoresis (Compact and Horizon family), isoelectric focussing (IEF, 2-D gel electrophoresis) or DNA-sequencing (Sequencing gels).

The KH-6 offers an intuitively operable, digital multifunctional display.
The compact design is a result of modern SMD technology. The Real Temperature Adjustment (RTA) system allows corrections between the actual temperature displayed and the temperature in an external system by a correction value.

In the front panel integrated fill and drain ports, as well as the level indicator, ensure easy accessibility and trouble-free operation. The small internal reservoir eliminates evaporation and provides quick tempering.

The powerful pump (max flow rate 7.5 l/min or 15 l/min) ensures an excellent temperature uniformity and an efficient heat exchange with external objects. Thus, a high degree of temperature accuracy is attainable.



Technical specifications

Working temperature range	- 10 °C to + 80 °C
Fixed temperatures	5 (free selection)
Temperature accuracy	± 0.1 K
Display	Multifunction, digital
Heating capacity	2,000 W
Cooling capacity at 20 °C	250 W
Pump flow rate	7.5 l/min or 15 l/min
Max. pressure	300 mbar
Bath volume (internal)	2.8 l
Overall dimensions (W x L x D)	232 mm x 487 mm x 620 mm
Weight	30 kg

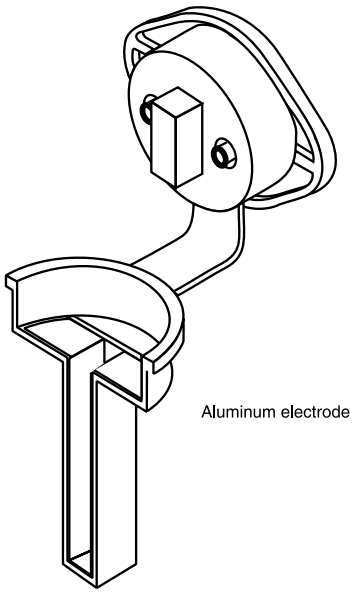
Item	Order No.
Refrigerated Circulator KH-6, 220 V, variable working range from -10 °C to + 80 °C	043-500
Refrigerated Circulator KH-6, 110 V, variable working range from -10 °C to + 80 °C	043-590

Disposable Electroporation Chambers

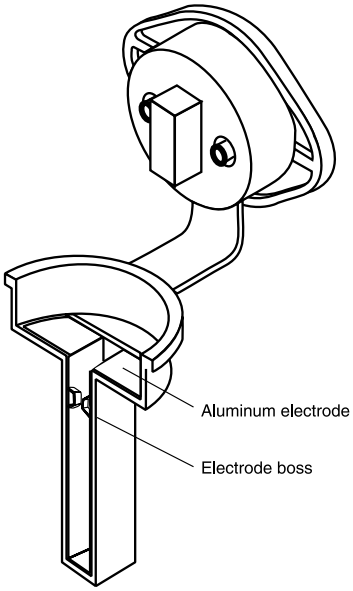
- **Disposable chambers save time and eliminate the possibility of carryover contamination.**
- **Each chamber is individually wrapped and radiation sterilised.**
- **Leak-proof, snap seal cap allows cells in the chamber to be resuspended by inverting.**
- **Electrical fields up to 1 kV/cm can be generated with the 0.4 cm gap chambers when using the Cell-Porator® System.**
- **Electrical fields up to 2.66 kV/cm can be generated with the 0.15 cm gap chambers with the Cell-Porator® System and up to 16.6 kV/cm when used in conjunction with the Voltage Booster.**

Biometra offers the original consumables for use with the Cell-Porator System and *E. coli* Pulser formerly supplied by Life Technologies Inc. (LTI).

The electroporation chambers are available in two different electrode gap sizes: 0.4 cm interelectrode gap (standard electroporation chambers) for use in electroporating plant or mammalian cells and a 0.15 cm interelectrode gap version (microelectroporation chambers) for use in electroporating yeast or bacterial cells.



Standard Electroporation Chamber



Micro Electroporation Chamber

Item	Gap size	Maximum field strength	Working volume	Order No.
Standard Electroporation Chambers (50 pcs./pkg.)	0.4 cm	1 kV/cm	0.25 – 1.0 ml	11601028
Micro Electroporation Chambers (50 pcs./pkg.)	0.15 cm	16.6 kV/cm	0.25 ml	11608031

Protran® and Optitran® Blotting Membranes

Nitrocellulose Membranes for a Wide Range of Applications

- **Standard membranes for protein and nucleic acid blotting**
- **Excellent sensitivity, resolution and low background**
- **Superior mechanical strength**
- **Compatible with a variety of assays and detection methods**

Protran®

- **Best and easiest blocking of unspecific binding compared to all blotting membranes**
- **Superior for chemiluminescence detection using horseradish peroxidase based systems**
- **Unsupported, 100 % pure nitrocellulose membrane**

Protran nitrocellulose membranes are the most frequently specified transfer media in the world for Western, Southern and Northern blotting. Additional the membrane is excellent for carbohydrate studies (Glycomics).

Protran membranes are manufactured using 100 % pure nitrocellulose to ensure the highest binding capacity possible. Other membranes referred to as "nitrocellulose" may actually contain large amounts of cellulose acetate which will lower the protein binding capacity.

Protran membranes have the best handling strength of all pure nitrocellulose membranes.
They are compatible with a variety of detection methods, including isotopic, chemiluminescent (peroxidase/ luminol-based), colorimetric and fluorescent. Unlike PVDF membranes, Protran nitrocellulose requires no methanol pre-wetting step. This makes it the membrane of choice for proteins which prefer aqueous environments. Prior to transfer, the membrane is simply wet in water, and then in the transfer buffer. No other pre-treatment steps are necessary.

High binding capacity

The 0.20 µm pore size of the Protran (BA83) nitrocellulose membrane ensures high binding capacity of small samples below 20 kD by reducing "blow-through". The 0.45 µm pore size membrane (BA85) is ideal for larger molecular weight samples.

Low background

In addition to the high binding capacity, Protran nitrocellulose membranes inherently have very low background. The superior surface properties of the membrane guarantee superior signal-to-noise ratios, without the need for stringent washing conditions.

Protein stability for years

A particular benefit of the proprietary Protran nitrocellulose formula is the proven excellent shelf life of proteins. Empirical evidence shows that proteins maintain molecular recognition activity for five years on Protran, which makes it the standard for protein blotting.

Optitran®

- **Reinforced nitrocellulose membranes**
- **Allows multiple reprobings without loss of membrane integrity**
- **Excellent signal-to-noise ratio**

The **Optitran** membrane consists of pure 100 % nitrocellulose cast onto both sides of an inert polyester support material. The support in no way affects transfer conditions or results and gives the membrane exceptional handling characteristics, allowing it to be reprobed repeatedly.

The Optitran nitrocellulose membrane provides high sensitivity with very low non-specific binding without stringent washing and blocking conditions using standard nitrocellulose protocols.

The combination of flexibility, strength and excellent signal-to-noise ratios makes the Optitran membrane ideal, especially when procedures involve repeated stripping and reprobing.

Optitran supported nitrocellulose membranes combine sensitivity, strength and savings.

Protran® and Optitran® Blotting Membranes

Blotting Membrane Selection Guide and Order Information

	Protran	Optitran
Membrane type	Nitrocellulose, 100 % pure	Nitrocellulose, reinforced
Binding capacity	80 – 90 µg/cm²	Approx. 75 µg/cm²
Pore sizes	0.45 µm 0.20 µm	0.45 µm
Transfer methods		
• Semi-dry blotting	++	++
• Tank blotting	++	++
• Vacuum blotting	++	++
• Capillary blotting	++	++
Immobilisation techniques		
• Drying	Proteins	Proteins
• UV-crosslinking	DNA and RNA	DNA and RNA
• Baking (80 °C)	DNA and RNA	DNA and RNA
Detection methods		
• Colorimetric	++	++
• Chemiluminescent*	++	++
• Isotopic	++	++
• Fluorescent	Proteins	-
Reprobing	+	++

++ = recommended
+ = limited use
- = not recommended
*** Use of horseradish peroxidise based systems is recommended.**

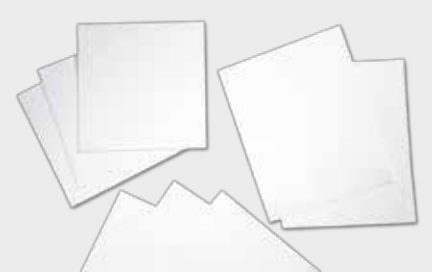
Item	Pore size	Dimensions	Quantity/Pack	Order No.
Protran-BA83	0.20 µm	30 cm x 3 m	1 roll	B10 401 396
Protran-BA85	0.45 µm	30 cm x 3 m	1 roll	B10 401 196
Protran-BA85	0.45 µm	30 cm x 60 cm	5 sheets/pack	B10 401 180
Protran-BA85	0.45 µm	33 cm x 56 cm	5 sheets/pack	B10 402 580
Optitran-BA-S 85	0.45 µm	30 cm x 3 m	1 roll	B10 439 196

Whatman® CHR Paper

Wide Range of High Quality Papers for Chromatography and Blotting

Universal use for the following applications:

- **Semi-dry blotting**
- **Tank blotting**
- **Capillary blotting**
- **Gel drying**
- **Gel wicking**
- **Chromatography**



3MM Chr

The world's most widely used blotting paper is a medium thickness paper (0.34 mm) with a flow rate (water) of 130 mm/30 min.
Specifically produced and tested for chromatographic techniques to ensure the wicking capability and uniformity of capillary action that is important for reproducible high-quality of blotting results. Pure cellulose produced entirely from the highest quality cotton linters with no additives of any kind to ensure that no contamination will occur during the transfer steps.
This paper is available in convenient sizes as sheets precisely cut or as rolls for cutting individual length.

17 Chr

Thick (0.92 mm) and highly absorbent paper with a very high flow rate (water) of 190 mm/30 min. Suitable for the heaviest loadings and ideal for preparative paper chromatography and electrophoresis applications like gel wicking and blotting.

GB005

An extra-thick (1.2 mm), highly absorbent paper recommended for applications where fewer layers of blotting paper must still ensure a high capacity. Fewer layers of blotting paper reduce the risk of trapping air bubbles. Recommended for semi-dry blotting of proteins.

Item		Order No.
3MM Chr (0.34 mm thick)		
200 mm x 200 mm,	100 sheets/pack	B3030861
315 mm x 355 mm,	100 sheets/pack	B3030335
350 mm x 450 mm,	100 sheets/pack	B3030392
460 mm x 570 mm,	100 sheets/pack	B3030917
580 mm x 680 mm,	100 sheets/pack	B3030931
20 mm x 100 m,	1 roll	B3030614
100 mm x 100 m,	1 roll	B3030672
150 mm x 100 m,	1 roll	B3030681
190 mm x 100 m,	1 roll	B3030690
230 mm x 100 m,	1 roll	B3030700
270 mm x 100 m,	1 roll	B3030704
GB005 (1.2 mm thick)		
200 mm x 200 mm,	25 sheets/pack	B10426981
580 mm x 580 mm,	25 sheets/pack	B10426994
17 Chr (0.92 mm thick)		
460 mm x 570 mm,	25 sheets/pack	B3017915

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Purchase of this instrument conveys a limited non-transferable immunity from suit for the purchaser's own internal research and development and applied fields other than human in vitro diagnostics under one or more of US Patents Nos. 5,038,852, 5,656,493, 5,333,675, 5,475,610, and 6,703,236, or corresponding claims in their non-US counterparts, owned by Applera Corporation. No right is conveyed expressly, by implication or by estoppel under any patent claim, reagents, kits, or methods such as 5´ nuclease methods, or under any other apparatus or system claim, including but not limited to US Patent No. 6,814,934 and its non-US counterparts, which describe and claim thermal cyclers capable of real-time detection. Further information on purchasing licenses may be obtained by contacting the Director of Licensing, Applied Biosystems, 850 Lincoln Centre Drive, Foster City, California 94404, USA.

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These trademarks and registered trademarks are accurate to the best of our knowledge at the time of printing.

analytikjena

Standard Terms and Conditions of Sale for – Business Abroad of Analytik Jena AG based in Jena

1. General

1.1 Our Terms and Conditions of Sale shall apply to all our deliveries and services, as well as to information and advice provided, and to repairs.

1.2 Our Terms and Conditions of Sale shall apply exclusively; we will not recognize general terms and conditions of the customer that conflict with or deviate from our Terms and Conditions of Sale, unless we have given express written consent to their effectiveness. Our Terms and Conditions of Sale shall apply even in the event that we perform deliveries without reservation although we are aware of customer conditions that conflict with or deviate from our Terms and Conditions of Sale.

1.3 All the agreements made between us and the customer for the performance of this contract have been set forth in writing in this contract.

1.4 Our Terms and Conditions of Sale shall only apply to entrepreneurs within the meaning of Section 14 of the German Civil Code (BGB) if the Contract forms part of the business operation, as well as to legal persons under public law and to separate estates under public law within the meaning of BGB Section 310 (1).

1.5 Our Terms and Conditions shall also apply to any future business with the customer.

2. Offer, Records

2.1 Our offer shall be non-binding until the order has been finally confirmed by us. Our silence in regard to any customer offer sent to us on the basis of a non-binding offer from us shall not be construed as acceptance of the customer's offer.

2.2 Any information and advice provided in regard to our products are based on the experience we have made so far. The values furnished in this context, particularly performance data, are experience values obtained under specially optimized conditions.
It cannot be inferred therefrom that the observance of operating and handling instructions, etc. may be dispensed with.

2.3 We reserve absolute property rights and copyrights with respect to the exploitation of cost estimates, drawings and other records. Such records shall only be made accessible to third parties if we have given our prior consent. Although due care has been used in the development of the technical data contained therein (including weights and dimensions), such data are subject to error. The same shall apply to information provided in our marketing documents. Such information shall, however, not be construed as a warranty assurance; for any warranty assurance to be applicable, our explicit confirmation shall be required.

2.4 The customer's order shall be a binding offer. We shall be entitled to accept such offer within two weeks by sending an order confirmation note or to ship the ordered item to the customer within such period.

2.5 We shall only be required to check our incoming e-mails once a workday. Any e-mail received by us between 9 a.m. and 5 p.m. shall be deemed received at 5 p.m., unless it can be demonstrated that we received it earlier. Any e-mail received outside of these hours shall be deemed received at 5 p.m. on the following workday, unless earlier receipt can be demonstrated. The obligations under BGB Section 312 e (1) Nos. 1 to 3 shall be deemed eliminated by agreement.

2.6 Any samples and specimens shall be non-binding samples for inspection. Any purchase based on samples and / or specimens shall be subject to standard industry or normal production deviations. No guarantee as to properties and durability shall be implied as a result
of the delivery of samples and / or specimens, unless such guarantee is expressly specified in the order confirmation note.

2.7 Samples and specimens shall be returned in perfect condition within four weeks at the latest. If they are not returned within such period, we shall be entitled to charge for the sample the purchase price specified in our current price list. Price lists can be requested from us at any time.

2.8 Unless otherwise expressly agreed upon, the details published by us in catalogs, brochures and other publications in any form whatsoever conclusively characterize the properties of the products delivered by us and their possible uses. Any other manufacturer's information relating to products not made by us shall not be binding. The data provided by us do not constitute any guarantee as to quality or durability and reflect our current state of knowledge.

2.9 Even after confirmation of order, we reserve the right to make any change necessary to accommodate technical progress.

3. Prices and Terms of Payment

3.1 Unless otherwise provided for in the order confirmation note, our prices shall be ex works and include loading in the factory, but exclude packing, freight, conveyance, insurance, customs duty, costs that may be incurred for any authentication, legalization of trade documents, official permits, as well as any other impost, fee and tax levied outside the Federal Republic of Germany. Furthermore, prices shall be exclusive of the value-added tax or sales tax applicable at the time of invoicing, which the customer shall pay to us additionally.

3.2 Unless otherwise stipulated in the order confirmation note, the purchase price shall be payable immediately without any deduction. For any settlement discount to be deducted, specific written agreement shall be required.

3.3 Unless any other term of payment has been agreed, payment shall be deemed defaulted if no payment has been made within 30 days of invoicing. Default interest shall be calculated on a per annum basis at 8 percentage points above the relevant base interest rate, as specified in BGB Section 247. This shall not preclude the claiming of a higher legal interest rate or of any further damage.

3.4 Payments shall be made in euros (€), free of postage and charges.
Payments shall be made by bank transfer only; payment by bill of exchange or by check shall not be recognized as performance of the obligation to pay. The timeliness of payment shall be judged on the basis of the date on which the money is credited to our bank account. You have fulfilled your obligation to pay if we can use, without any restriction, the amount invoiced and if there are no more restitution reservations.

3.5 The Parties may agree that the customer shall open an irrevocable documentary credit through his bank or any other bank acceptable to us. In such a particular case, the credit shall be opened in accordance with the General Customs and Practice for Documentary Credits, as applicable, which currently is the 2007 Revision of ICC Publication No. 600.

3.6 The customer shall only be entitled to offset claims against counterclaims if his counterclaims are final and absolute, are undisputed or have been recognized by us. Moreover, the customer shall be entitled to exercise a right of retention only in so far as his counterclaim is based on the same contractual relationship. The customer shall have no right of retention under BGB Section 320 (2) on grounds of partial performance.

3.7 If a delivery or service qualifies for exemption from value-added tax or sales tax, the customer shall have the duty to provide the required proof and / or assist in obtaining it. When it comes to intra-Community
deliveries of goods under Section 6 a of the German Turnover Tax Law (UStG), the customer shall communicate his VAT ID no., prove his status as an entrepreneur and help submit book-based and documentbased evidence of export shipments. Should the local tax authority refuse to grant exemption from sales tax, the customer shall hold us harmless from and / or indemnify us against sales tax, interest, delayed payment surcharges and any other incidental costs, unless we are responsible for such refusal to grant exemption.
We shall only be obligated to lodge a legal remedy at the customer's request if the latter pays an adequate advance on the costs of the legal remedy procedure, in addition to the indemnification provided for the preceding paragraph.

3.8 If we learn of facts, after accepting the order, which cast reasonable doubt on the customer's solvency, we shall have the right to demand that full payment be effected or relevant security be deposited before delivery will be made and / or to withdraw from the contract after a time limit set has produced no result. In addition to an existing delay in payment, relevant information, which is obtained with the diligence of a prudent businessman from a bank, credit bureau or a company transacting with the customer, shall be deemed proof of reasonable doubt about the customer's solvency.
If delivery has already been effected, the invoiced amounts concerned shall be payable immediately, irrespective of the terms of payment agreed, with bills of acceptance to be returned, as appropriate.

4. Delivery Time and Delay in Delivery

4.1 Delivery periods shall start at the order confirmation date, but not before the customer's obligations have been fulfilled in a timely and proper manner, notably not until the records, permits and releases to be furnished by the customer have been provided and the agreed initial payment has been received.

4.2 Delivery periods and deadlines shall be deemed met if the delivery item has left the plant or distribution warehouse or its readiness for delivery has been communicated prior to their expiry. This shall not apply if acceptance is required under the contract or if an installation obligation has been agreed.

4.3 Whenever time limits and deadlines not expressly designated as „invariable" in the order confirmation note are exceeded, the customer may accord us a reasonable grace period for delivery / performance. Only when this additional period of time has elapsed can we be regarded as having fallen into arrears.

4.4 We reserve the right of correct and timely self-supply.

4.5 In the event of force majeure or other unforeseeable extraordinary and non-culpable circumstances, such as operational breakdowns, strike, lockout, interference by authorities, power supply difficulties, etc., hindering us from performing our obligation in a timely fashion, the

delivery period shall be extended by the length of such hindrance plus a reasonable start-up time. This shall also apply if such circumstances occur at sub-suppliers. In important cases, we will notify the customer of the beginning and end of such circumstances as early as possible. If the above circumstances render delivery or performance impossible or unacceptable, we shall be relieved from the obligation to deliver. Specifically, the contract shall expire if official permission is required for the export of our deliveries and services and if a permit requested is not granted. If the delivery period is extended due to the circumstances referred to above or if we are relieved from the obligation to deliver, the customer shall not be entitled to derive any claims for damages therefrom. In so far as we are relieved from the obligation to deliver, we shall restitute any advance payments or deliveries that may have been made by the customer.

4.6 Should the performance of any delivery or service be delayed through a fault of ours, the customer shall be entitled to demand lump-sum damages for any completed week of delay, provided he can prove that he has suffered a loss from such delayed performance. During each of the first four weeks, lump-sum damages shall be 0.5 % and for each week following thereafter 1 % of the value of the part of delivery or service not performed within the time limit set. The total amount of lump-sum damages incurred shall be limited to 5 % of the value of the delivery or service not performed within the time limit set. Any further claims by the customer for damages and for compensation of expenses on grounds of delay in delivery shall be excluded. This shall not apply if liability is mandatory, as in the event of willful intent or gross negligence and / or for injury to life, body or health.
No change of the burden of proof to the customer's disadvantage shall be associated with that.

4.7 This shall not affect the customer's legal right of rescission, but presupposes that we are responsible for the delay incurred.

4.8 Once a delay has occurred, we shall be entitled to notify the customer of a new presumed date of delivery. In connection with such notification, we can furthermore demand, while setting a deadline, that the customer state whether he will withdraw from the contract on grounds of delay and / or he will claim damages or compensation of expenses instead of performance or whether he will insist on delivery. Should the customer then fail, within the time limit set, to make a statement, an unambiguous statement or a statement to the effect that he insists on delivery, his rights of rescission and to claim damages and / or compensation of expenses instead of performance shall be excluded if we fulfill our obligation within the new time limit notified pursuant to Sentence 1. When making the request provided for in Sentence 2, we will specifically point out to the customer what effect his conduct will have pursuant to Sentence.

4.9 If dispatch is delayed at the customer's request, we shall be entitled to demand payment and issue the relevant invoice at the original delivery deadline. This shall apply even if the original agreements of the contract do not obligate the customer to make any advance payment. Starting one month after notification of readiness for dispatch, we may bill the customer, for the storage costs incurred, 0.5 % of the order value for each commenced week of delay. The customer shall be allowed to provide proof to the effect that no damage or decrease in value has been caused at all or that such damage or decrease in value is considerably lower than the lump sum.
After a reasonable time limit set by us has elapsed and after we have given appropriate advance notice, we shall also be entitled to use the delivery item concerned in other ways and to effect delivery to the customer within a reasonably extended period of time. The provisions of this clause shall also apply if the customer is in delay of taking delivery.

5. Delivery, Passing of Risk and Dispatch

5.1 Partial delivery on a reasonable scale shall be permissible.

5.2 The risk shall pass to the customer when the item is transferred to the forwarder or carrier, at the latest when it leaves the plant or the distribution warehouse. This shall also apply if carriage-paid delivery has been agreed. The dispatch shall be effected on the customer's behalf.

5.3 If the dispatch is delayed as a result of circumstances for which the customer is responsible, the risk shall pass to the customer at the date at which the item is ready for dispatch. At the customer's request and expense, we shall, however, be obligated to effect the insurance cover he demands.

5.4 We shall insure the shipment against theft, breakage, transport, fire and water damage, as well as other insurable risks at the customer's request and expense.

6. Reservation of Title

6.1 We shall retain title to the delivery item until all the payments from the business relationship with the customer have been received. If the customer acts in breach of contract, notably when he is in payment arrears, we shall be entitled to repossess the delivery item. Repossession or the assertion of the reservation of title shall not require any withdrawal by us. Such acts or seizure of the delivery item by us shall not constitute withdrawal from the contract, unless we expressly declare so in writing. Following repossession of the delivery item, we shall be entitled to utilize such item. The proceeds from such utilization shall be credited against the customer's liabilities, less reasonable utilization costs.

6.2 The customer shall treat the delivery item with care and, if so requested by us, sufficiently insure it against damage while the reservation of titles is in effect. The customer shall already now assign to us any claim he may have against the insurer.

6.3 In the event of seizure or any third-party interference, the customer shall immediately notify us thereof in writing, so that we can lodge a suit pursuant to Section 771 of the German Code of Civil Procedure (ZPO). If the third party is unable to reimburse us for the court and out-of-court costs incurred in connection with a suit under ZPO Section 771, the customer shall be liable for any loss we sustain.

6.4 The customer shall be entitled to resell the delivery item in the ordinary course of business. However, he shall already now assign to us any claim to the value of the final amount invoiced (including value-added tax / sales tax) which he may accrue against buyers or third parties from such resale, irrespective of whether the delivery item was sold without or after processing. Even after assignment, the customer shall be entitled to collect such claims. This shall not affect our right to collect the claim ourselves.
However, we undertake not to collect the claim as long as the customer meets his payment obligations from the proceeds collected, is not in payment arrears and, most of all, no application for insolvency proceedings has been filed or payments have stopped. If the obligation of non-collection does not apply, we may demand that the customer reveal to us the assigned claims and the debtors thereof, provide any information that may be required for collection, surrender to us corresponding records and advise the debtors of the assignment.

6.5 The processing or transformation of the delivery item by the customer shall always be effected on our behalf. Should the delivery item be processed together with other objects not owned by us, we shall acquire co-ownership of the new object in the proportion of the value of the delivery item to the other processed objects at the time of processing. Moreover, the same shall apply both to the object created by such processing and to the item delivered under reservation.

6.6 Should the delivery item be inseparably mixed with other objects not owned by us, we shall acquire co-ownership of the new object in the proportion of the value of the delivery item to the other mixed objects at the time of mixing. If the mixing is carried out in such a way that the customer's object is to be regarded as the principal object, it shall be deemed agreed that the customer shall assign proportionate co-ownership to us. The customer shall safeguard on our behalf the sole ownership or co-ownership thus created.

6.7 For the purpose of securing our claim, the customer shall assign also any and all claims, including any ancillary rights, he may be entitled to against any third party as a result of the delivery item being connected to a plot of land.

6.8 At the customer's request, we shall release the securities we are entitled to if the realizable value of our securities exceeds the claims to be secured by more than 10 %.
We shall be responsible for the selection of the securities to be released.

6.9 If the law governing the territory where the delivery item is located does not allow any reservation of title to be made, we shall be entitled to exercise any right that we are allowed to reserve in respect to the delivery item. The customer shall have the duty to cooperate in any measure that we wish to take in order to protect our ownership right to the delivery item or, instead of such ownership right, any other security right. Specifically, we shall be entitled to request that the customer furnish other equivalent security (e.g., a guarantee).

7. Rights to Software

7.1 Any and all software shall remain our property. Software, documentation and updates shall not be made accessible to any third party without our prior written approval and shall neither be copied – not even for internal purposes – nor duplicated in any other form whatsoever. This shall not affect the right to make a back-up copy and the rights specified in Section 69 d (3)
and Section 69 e of the German Copyright Act (UrhG).

7.2 A non-exclusive and non-transferable right to use software, associated documentation and updates for the internal operation of the products for which programs are supplied shall be granted hereby.

7.3 Source programs shall not generally be made available. They shall be provided on the basis of a separate written agreement only.

8. Defects in Material and Title

8.1 We shall provide the promised services in a manner that will reflect the state of the art at the time when the order is placed, meet the relevant provisions of law and take the standards of the industry into account.

8.2 If our performance exhibits any defect in material or title (hereinafter referred to as „defect"), whosecause already existed at the passage of risk, the customer shall be entitled to subsequent performance, which, at our option, may take the form of rectification or replacement, with the proviso that we shall always be entitled to two rectification attempts. This shall not apply in the event of a recourse pursuant to BGB Section 478. We shall bear the expenses required for subsequent performance – such as wage, material, transport and travel costs – only if they do not increase as a result of any delivery item being subsequently transferred to a location other than the customer's registered office, unless such transfer constitutes a case of delivery recourse under BGB Sections 478 and 479 or such transfer is in line with the intended use. Replaced parts shall become our property and shall be returned to us.

8.3 If subsequent performance fails, the customer shall be entitled, at his option and without prejudice to any claims for damages and for compensation of expenses that may exist pursuant to Clause 9, to reduce payment or – if our breach of contract is substantial – to withdraw from the contract.

8.4 Whatever the case, prerequisites for any liability on our part for defects shall be that

a) caused by improper use, incorrect installation and / or start-up, faulty or negligent handling, notably by insufficiently trained personnel, or by the customer or third parties using inappropriate equipment and / or replacement material, by natural wear and tear, deficient construction work, chemical, electrochemical or electrical influences, in so far as such circumstances are not attributable to any fault of ours.
If our order confirmation note expressly points out that proper equipment and / or replacement material shall be obtained from us, any equipment and material obtained and used from third parties without our explicit consent shall be deemed improper in this context. Whenever this is the case, the customer shall have the duty to prove that such equipment and / or replacement material cannot have any effect on the function and wear of the product. Without any explicit reference in the order confirmation note being required, the same shall apply to parts and / or assemblies of the product which are exchanged by the customer or third parties;

b) the customer, while accepting a defective product even though he is aware of the defect, has, at the time of acceptance, reserved the rights available on grounds of defects;

c) the customer has carefully inspected the products delivered for completeness and propriety immediately after their arrival at his location, even if samples or specimens had been sent previously. Defects shall be reported in writing within eight days after receipt of the delivery item at the destination, or – if such defects were not detectable through proper inspection – within eight workdays following their detection. What is more, any defect detectable upon delivery shall be reported to the carrier, and the latter shall cause such defects to be recorded. If defects in quantity and weight had already been detectable upon delivery following the above inspection obligations, the customer shall, upon receipt of the products, raise complaints to the carrier about such defects and get written acknowledgement of the complaint raised.
In the event that damage is detected after delivery, we shall assume liability only if the customer reports the complaint in writing to the carrier immediately after detecting the damage – but not later than 14 days after taking delivery – and advises us of such complaint in writing without delay. If damaged products arrive late, we shall be liable if the carrier is notified within 21 days after such products have been made available to the customer. In such a case, too, we shall be notified in writing of the complaint without delay. Complaints shall contain a description of the defects, which shall be as detailed as possible,

d) the customer is not in payment arrears, taking into account retention of a reasonable guarantee, as specified in Clause 8.8.

8.5 The customer shall afford us the time and opportunity required for performing any rectification and replacement delivery that we deem necessary at our reasonable discretion.
Otherwise, we shall be released from any liability for consequential damage occurring because the customer failed to give us the time and opportunity required for effecting the necessary remedial measures and / or replacement deliveries. Only in urgent cases endangering operational safety and for the purpose of averting damage of disproportionate dimensions – of which we shall be informed immediately – or if we have run into a delay in remedying the defect shall the customer be entitled to correct the defect himself or have it corrected by a third party and to claim compensation from us for the costs incurred.

8.6 Claims arising from defects shall elapse after 12 months. This shall not apply in so far as claims are based on any intentional conduct attributable to us or in so far as BGB Section 438 (1) No. 2 (structures, objects for structures), Section 479 (1) (claims under a right of recourse), Section 634 a (1) No. 2 (construction defects) are applicable and longer time limits are prescribed, therefore. We shall be liable for replacement parts and / or rectification until the period of limitation applicable to the original delivery item elapses.

8.7 In so far as the customer accrues any claim against us under a right of recourse pursuant to BGB Section 478, we shall be liable only if the customer has not made any agreement with his buyer which goes beyond the statutory claims arising from defects and has not exempted the buyer from statutory inspection and complaint obligations.
Sentence 3 of Clause 8.2 shall apply accordingly. If the customer is held liable for any defect of the newly produced delivery item, he shall notify us thereof immediately.
He shall make his buyers undertake relevant commitments if they are entrepreneurs.
We reserve the right to meet any claim asserted by the buyer against the customer by way of entering into contract with the buyer. In such a case, the meeting of the buyer's claims shall be regarded as fulfillment of the claims which the customer may have.

8.8 In the event of complaints, the customer may withhold payments only to an extent that is in reasonable proportion to the expected defect removal costs. Again, such retention shall be permissible only if the customer's claims are undisputed or final and absolute. Whenever such complaint is unjustified, we shall be entitled to ask the customer to reimburse us for the expenses incurred.

8.9 The preceding provisions do not involve a change of the burden of proof to the customer's disadvantage.

9. Claims for Damages and Compensation of Expenses

9.1 We shall be liable under applicable law if the customer claims damages or compensation of expenses (hereinafter referred to as „claims for damages") based on willful intent or gross negligence, including willful intent and gross negligence committed by our representatives or vicarious agents. Also, we shall be liable under applicable law if we have culpably violated a material contractual obligation, as well as in cases of injury to life, body or health. Material contractual obligations are those obligations that must be fulfilled to make proper execution of the contract possible and on whose fulfilment the contracting parties can regularly rely. Furthermore, we shall be liable under applicable law if and when we have assumed guarantees, unless such guarantees give the customer rights which do not pertain to statutory liability for defects and whose restricted content was pointed out upon the assumption of the guarantee in question.

9.2 Damages for breach of a material contractual obligation shall be limited to the foreseeable, typical damage in so far as no willful intent or gross negligence and no liability for injury to life, body or health or from any assumed guarantee are involved. Such claims for damages shall elapse after 12 months.

9.3 Except as provided above, any liability for damages shall be excluded, irrespective of the legal nature of the claim asserted. Specifically, we shall not assume liability for damage not caused to the delivery item itself, such as loss of profit and other property damage sustained by the customer.

9.4 The mandatory provisions of the Product Liability Act shall remain unaffected.

9.5 The customer's claims for compensation of expenses shall be limited to the amount of the interest he holds in the performance of the contract.

9.6 In so far as our liability is excluded or limited, such limitation shall also apply with respect to the personal liability of our employees, workforce, staff, representatives and vicarious agents.

9.7 The preceding provisions do not involve a change of the burden of proof to the customer's disadvantage.

10. Manufacture to Customer's Instructions

10.1 As far as manufacture to clients' drawings, samples and other instructions given by the customer is concerned, we shall not assume any guarantee and liability for the functionality of the product and for other defects in so far as they are rooted in the customer's instructions.

10.2 The customer shall indemnify us against any third-party claims, including those arising from product liability, for damage caused by the product, unless we caused such damage in a willful or grossly negligent manner.

10.3 The customer shall give us the guarantee that the manufacture and delivery of the product made to his instructions does not infringe upon any third-party property rights.
If any property right is asserted against us, we shall be entitled, without legal examination of any third-party claim that may exist, to withdraw from the contract

after hearing the customer, unless the third party in question abandons the assertion of such property rights through a written statement to be made to us within eight days. The customer shall compensate us for any damage sustained as a result of such property rights being asserted. In the event of any withdrawal, we shall be compensated for the work performed so far. This shall not affect any claims for damages or any further rights which may be available under applicable law.

10.4 The molds, tools and design records produced for the execution of the order shall be our exclusive property. The customer shall not have any right to them, even if he shares the costs incurred in producing molds, tools and design records, unless any other agreement has been explicitly made.

11. Taking Equipment Back and Disposal

11.1 Unless otherwise agreed with us, the customer shall properly dispose of the product at his own expense and in conformity with applicable law, when the use of the product delivered ceases.

11.2 The customer shall release us, as the manufacturer, from any obligation to take old electrical equipment back – e.g., under Section 10 (2) of the German Electrical and Electronic Equipment Law (ElektroG) („manufacturer's obligation to accept returned goods") and / or his country's standard for the implementation of the RoHS Directive (Directive 2002 / 95 / EC) and / or regulations pertaining to this directive – as well as from any third-party right associated with it.

11.3 The customer shall ensure that any third party, to which he transfers the product delivered and which does not use the product in a private household, undertake the commitment provided for in Clause 11.1. Any claim resulting from non-compliance with these stipulations shall be at the customer's expense.

11.4 Our right to acceptance / release by the customer under Clauses 11.1 and 11.2, as well as to insist on his imposition of relevant obligations upon his buyers, and / or our right to disposal and acceptance by the customer at his own expense under Clause 11.3 shall not elapse until after two years after actual use of the equipment has definitively ended.

12. Place of Performance, Place of Jurisdiction and Governing Law

12.1 The place of performance for delivery shall be the manufacturing plant and our distribution warehouse, respectively. The place of performance for payment shall be our place of business.

12.2 The contract shall exclusively be governed by the laws of the Federal Republic of Germany. The United Nations Convention on the International Sale of Goods (CISC) and the rules of private international law shall not apply.

12.3 In the event of any dispute arising out of or in connection with the present contract, we shall be entitled to choose between recourse to general courts of law and to arbitral tribunals. Should any claim be asserted against us as a result of any dispute arising out of or in connection with the present contract, we shall be obligated to exercise our option within a reasonable period of time prior to the start of legal proceedings if the other Party so requests in due course. Only in the event of a refusal to choose or a late choice do we waive the defense of arbitral jurisdiction already now.

12.4 If recourse to arbitration proceedings is chosen, the following shall apply:
Any disputes arising out of or in connection with this contract or its validity shall be finally decided pursuant to the Arbitration Rules of the German Institution of Arbitration e.V. (DIS) in force on the date when the contract is concluded and without recourse to the ordinary courts of law.
The arbitral tribunal shall be composed of three arbitrators.
The place of arbitration shall be our place of business.
The procedural law of this place shall be applied if the Rules of DIS do not provide for any relevant regulations.
The language of the arbitral procedure shall be German.
The substantive law of the Federal Republic of Germany shall apply without reference to any other law. The application of the United Nations Convention on the International Sale of Goods – U.N. Sales Convention (CISC) – and the reference regulations of the private international law shall be excluded.
The reasons for the arbitration award shall be given in writing. The court of arbitration shall also decide on the costs of the proceedings and Parties necessarily incurred expenses.

12.5 If recourse to general courts of law is chosen, the following shall apply:
The place of jurisdiction shall be our place of business. However, we shall also be entitled to sue the customer at any other legal venue.

12.6 If individual provisions of the contract are or become invalid, the validity of the remaining terms of the contract shall not be affected. The eliminated provision shall be replaced by a term that comes the closest to the purpose of the provision that has been eliminated.

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