

# Molecular Biology



- ▶ *Standard & Real-Time PCR*
- ▶ *Transcription*
- ▶ *Lyophilisates*
- ▶ *Cloning and Mutagenesis*
- ▶ *Preparation and Cleanup*



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**Jena Bioscience GmbH was founded in 1998 by a team of scientists from the Max-Planck-Institute for Molecular Physiology in Dortmund. 25+ years of academic knowhow were condensed into the company in order to develop innovative reagents and technologies for the life science market.**

Since the start up, the company has evolved into an established global reagent supplier with about 8000 products in stock and a customer base in 80+ countries. Jena Bioscience serves three major client groups:

- **Research laboratories at universities, industry, government, hospitals and medical schools**
- **Pharmaceutical industry in the process from lead discovery through pre-clinical stages**
- **Laboratory & diagnostic reagent kit producers and re-sellers**

**Our company premises are located in the city of Jena / Germany.**



Jena Bioscience's products include nucleosides, nucleotides and their non-natural analogs, recombinant proteins & protein production systems, reagents for Click Chemistry, for crystallization of biological macromolecules and tailor-made solutions for molecular biology and biochemistry.

In our chemistry division, we have hundreds of natural and modified nucleotides in stock. In addition, with our pre-made building blocks and in-house expertise we manufacture even the most exotic nucleotide analog from mg to kg scale.

In the field of recombinant protein production, Jena Bioscience has developed its proprietary LEXSY technology. LEXSY (Leishmania Expression System) is

based on a S1-classified unicellular organism that combines easy handling with a eukaryotic protein folding and modification machinery including mammalian-like glycosylation. LEXSY is primarily used for the expression of proteins that are expressed at low yields or are inactive in the established systems, and expression levels of up to 500 mg/L of culture were achieved.

For the crystallization of biological macromolecules – which is the bottleneck in determining the 3D-structure of most proteins – we offer specialized reagents for protein stabilization, crystal screening, crystal optimization and phasing that can reduce the time for obtaining a high resolution protein structure from several years to a few days.

Our reagents are complemented with a large selection of molecular biology kits for PCR, mutagenesis, cloning and alike as well with innovative reagents for the functionalization and labeling (fluorophores, haptens) of biomolecules with focus on Click Chemistry approaches.

We combine highest quality standards for all our products (certified according to DIN EN ISO 9001) with individualized customer support. We establish direct lines of communication from clients to our in-house scientists, resulting in productive interactions among people with similar research interests who speak the same language. Furthermore, we offer support programs and attractive discount schemes for young scientists establishing their own labs. If you wish to receive more information, just send an e-mail to [info@jenabioscience.com](mailto:info@jenabioscience.com).



Our company premises are located in the Saalepark Industrial Estate in the northern part of the city of Jena / Thüringen / Germany. In March 2015 we moved all operations to our own, new 2.500 sqm company building.

## **Imprint**

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## Standard PCR

### Product Selection Guide: Convenience versus Flexibility

Tailor-made solutions for a broad range of applications

Product	Cat.-No.	Convenience ○○○○	Flexibility ○○○○	Yield
<b>Direct PCR and Multiplex PCR Kits</b>				
Direct PCR Kit	PCR-111	○●○○○	○●○○○	++
Multiplex PCR Master	PCR-110	○●○○○	○●○○○	+++
Multiplex PCR Master with UNG (Uracil-N-Glycosylase)	PCR-112	○●○○○	○●○○○	+++
<b>Ready-to-Use Mixes</b>				
Red Load Taq Master	PCR-108	○●○○○	○●○○○	++
Red Load Taq Master / high yield	PCR-106	○●○○○	○●○○○	+++
Red Load Hot Start Master	PCR-109	○●○○○	○●○○○	++
Taq Master	PCR-102	○○●○○	○○●○○	++
Taq Master / high yield	PCR-101	○○●○○	○○●○○	+++
Hot Start Master	PCR-103	○○●○○	○○●○○	++
<b>Core Kits</b>				
Taq Core Kit	PCR-232	○○○●○	○○○●○	++
Taq Core Kit / high yield	PCR-231	○○○●○	○○○●○	+++
Hot Start Core Kit	PCR-233	○○○●○	○○○●○	++
High Fidelity Core Kit	PCR-234	○○○●○	○○○●○	+++
High Fidelity Hot Start Core Kit	PCR-235	○○○●○	○○○●○	+++
Pfu-X Core Kit	PCR-237	○○○●○	○○○●○	++
<b>Thermophilic Polymerases</b>				
Taq Pol	PCR-202	○○○○●	○○○○●	++
Taq Pol / high yield	PCR-201	○○○○●	○○○○●	+++
Hot Start Pol	PCR-203	○○○○●	○○○○●	++
High Fidelity Pol	PCR-204	○○○○●	○○○○●	+++
High Fidelity Hot Start Pol	PCR-205	○○○○●	○○○○●	+++
Pfu-X Polymerase	PCR-207	○○○○●	○○○○●	++
Sequencing Pol	PCR-206	○○○○●	○○○○●	++
<b>Ready-to-Use Lyophilisates</b>				
Red Load Taq Master Lyophilisate	PCR-151	●○○○○	●○○○○	++
Taq Master Lyophilisate	PCR-152	●○○○○	●○○○○	++
Hot Start Master Lyophilisate	PCR-153	●○○○○	●○○○○	++

Specificity	Fidelity	Application
++	+	<ul style="list-style-type: none"> <li>Unprecedented convenience for amplification without prior DNA purification</li> </ul>
+++	+	<ul style="list-style-type: none"> <li>Designed for parallel amplification of a multitude of PCR fragments in a single tube</li> </ul>
+++	+	<ul style="list-style-type: none"> <li>Designed for parallel amplification and qPCR applications</li> <li>UNG (Uracil-N-Glycosylase) minimizes the risk of carry-over-contaminations</li> </ul>
++	+	<ul style="list-style-type: none"> <li>Routine PCR / optimized for minimal by-product formation</li> <li>Plate based PCR and automated pipetting, direct gel loading</li> </ul>
+	+	<ul style="list-style-type: none"> <li>Routine PCR / optimized for high efficiency in a broad range of reaction conditions</li> <li>Direct gel loading, not recommended for automated pipetting</li> </ul>
+++	+	<ul style="list-style-type: none"> <li>High specificity PCR / high sensitivity PCR</li> <li>Plate based PCR and automated pipetting, direct gel loading</li> </ul>
++	+	<ul style="list-style-type: none"> <li>Routine PCR / optimized for minimal by-product formation</li> <li>Plate based PCR and automated pipetting</li> </ul>
+	+	<ul style="list-style-type: none"> <li>Routine PCR / optimized for high efficiency in a broad range of reaction conditions</li> <li>Not recommended for automated pipetting</li> </ul>
+++	+	<ul style="list-style-type: none"> <li>High specificity PCR / high sensitivity PCR</li> <li>Plate based PCR and automated pipetting</li> </ul>
++	+	<ul style="list-style-type: none"> <li>Routine PCR / optimized for minimal by-product formation</li> <li>Plate based PCR and automated pipetting</li> </ul>
+	+	<ul style="list-style-type: none"> <li>Routine PCR / optimized for high efficiency in a broad range of reaction conditions</li> <li>Not recommended for automated pipetting</li> </ul>
+++	+	<ul style="list-style-type: none"> <li>High specificity PCR / high sensitivity PCR</li> <li>Plate based PCR and automated pipetting</li> </ul>
++	++	<ul style="list-style-type: none"> <li>High fidelity PCR</li> <li>Amplification of very long templates up to 30 kb, GC-rich and other difficult templates</li> </ul>
+++	++	<ul style="list-style-type: none"> <li>High fidelity PCR</li> <li>High specificity PCR / high sensitivity PCR</li> </ul>
++	+++	<ul style="list-style-type: none"> <li>Efficient amplification with highest fidelity</li> <li>Engineered Pfu polymerase with higher accuracy and increased processivity</li> </ul>
++	+	<ul style="list-style-type: none"> <li>Routine PCR / optimized for minimal by-product formation</li> <li>Plate based PCR and automated pipetting</li> </ul>
+	+	<ul style="list-style-type: none"> <li>Routine PCR / optimized for high efficiency in a broad range of reaction conditions</li> <li>Incorporation of labeled or other modified nucleotides</li> </ul>
+++	+	<ul style="list-style-type: none"> <li>High specificity PCR / high sensitivity PCR</li> <li>Plate based PCR and automated pipetting</li> </ul>
++	++	<ul style="list-style-type: none"> <li>High fidelity PCR</li> <li>Amplification of very long templates up to 30 kb, GC-rich and other difficult templates</li> </ul>
+++	++	<ul style="list-style-type: none"> <li>High fidelity PCR</li> <li>High specificity PCR / high sensitivity PCR</li> </ul>
++	+++	<ul style="list-style-type: none"> <li>Efficient amplification with highest fidelity</li> <li>Engineered Pfu polymerase with higher accuracy and increased processivity</li> </ul>
++	+	<ul style="list-style-type: none"> <li>Incorporation of ddNTPs and dNTPs at equal rates</li> <li>DNA sequencing</li> </ul>
++	+	<ul style="list-style-type: none"> <li>Preloaded tubes and plates for routine PCR, stable at room temperature</li> <li>Direct loading of the PCR product onto the gel</li> </ul>
++	+	<ul style="list-style-type: none"> <li>Preloaded tubes and plates for routine PCR</li> <li>Stable at room temperature</li> </ul>
+++	+	<ul style="list-style-type: none"> <li>Preloaded tubes and plates for high specificity / high sensitivity PCR</li> <li>Stable at room temperature</li> </ul>

## Direct and Multiplex PCR Kits

**Direct PCR Master** is designed for amplification of target DNA directly from whole blood, animal and plant tissues. No pre-treatment or prior purification of DNA is required.

**Multiplex PCR Master** allows parallel amplification of multiple fragments in a single PCR assay. Heat-activatable hot-start polymerase prevents extension of non-specifically annealed primers and primer-dimer formations. Optionally available: Multiplex PCR Master with Uracil-N-Glycosylase (UNG). UNG removes residual uracil from dU-containing DNA. As a consequence, carry-over contaminations of previous PCRs are avoided.

Product	Cat.-No.	Amount	Price (EUR)
<b>Direct PCR Master</b> 2x conc. mix	PCR-111S	2x 1.25 ml	160,00
	PCR-111L	10x 1.25 ml	640,00
<b>Multiplex PCR Master</b> 2x conc. mix	PCR-110S	2x 1.25 ml	170,00
	PCR-110L	10x 1.25 ml	680,00
<b>Multiplex PCR Master with UNG</b> 2x conc. mix	PCR-112S	2x 1.25 ml	190,00
	PCR-112L	10x 1.25 ml	760,00



Find out about **Direct PCR and Multiplex PCR Lyophilisates** (page 21)

## Ready-to-Use Mixes



**Ready-to-Use Mixes** (Fig. 1) contain all reagents required for PCR (except template and primer) in a premixed 5x concentrated solution in a single tube. Heat-activatable Hot Start Master is used to amplify low-copy-number targets in complex backgrounds or in case of prolonged room-temperature setups.

Product	Cat.-No.	Amount	Price (EUR)
<b>Taq Master</b> Master mix of DNA polymerase, dNTPs and reaction buffer	PCR-102S	100 reactions	40,00
	PCR-102L	500 reactions	160,00
<b>Taq Master / high yield</b> Master mix of DNA polymerase, dNTPs and high yield buffer	PCR-101S	100 reactions	40,00
	PCR-101L	500 reactions	160,00
<b>Hot Start Master</b> Master mix of heat-activatable DNA polymerase for high specificity, dNTPs and reaction buffer	PCR-103S	100 reactions	80,00
	PCR-103L	500 reactions	320,00



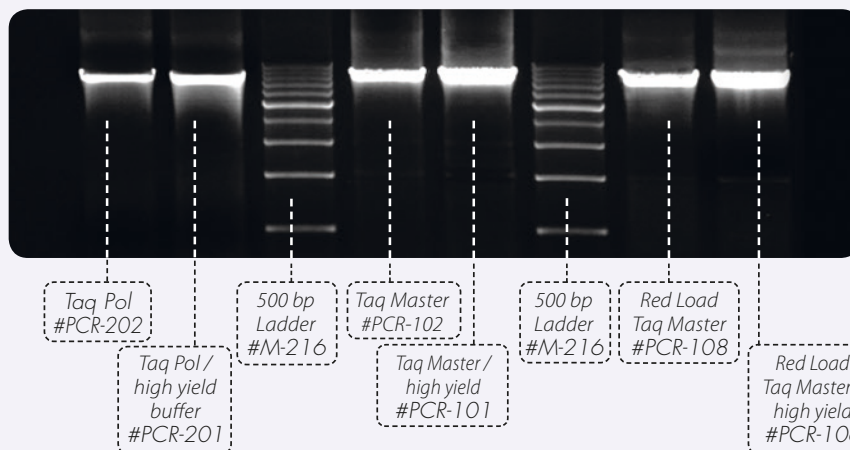
**Ready-to-Use Mixes for direct gel loading** (Fig. 1) additionally contain an inherent red dye. PCR reaction products are thus ready-to-load onto agarose or acrylamide gels.

Product	Cat.-No.	Amount	Price (EUR)
<b>Red Load Taq Master</b> Taq master mix for direct gel loading	PCR-108S	100 reactions	45,00
	PCR-108L	500 reactions	180,00
<b>Red Load Taq Master / high yield</b> Taq master mix for direct gel loading including high yield buffer	PCR-106S	100 reactions	45,00
	PCR-106L	500 reactions	180,00
<b>Red Load Hot Start Master</b> Hot start master mix for direct gel loading	PCR-109S	100 reactions	90,00
	PCR-109L	500 reactions	360,00



Find out about **Taq and Hot Start Master Lyophilisates** (page 22)



**Figure 1**

Taq Pol Master Mixes allow most convenient assay set-up, Lambda phage DNA, 4 kb fragment

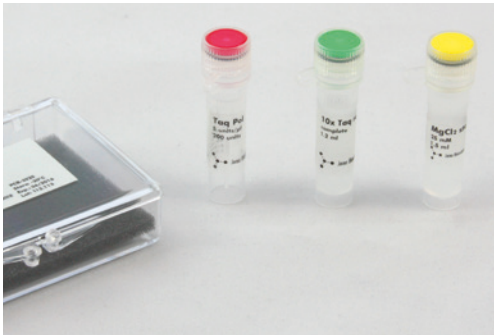
## Core Kits – Complete sets of PCR reagents



**Core Kits** consist of all reagents required for PCR (except template and primer). Components (polymerase, dNTP-Mix, complete reaction buffer containing  $MgCl_2$ ) are provided individually. Additional  $MgCl_2$  stock solution allows optimization of magnesium-sensitive PCR reactions. Depending on focus of particular application (yield, specificity, accuracy) various types of enzymes are offered.

Product	Cat.-No.	Amount	Price (EUR)
<b>Taq Core Kit</b> Kit of Taq polymerase, dNTPs and reaction buffer	PCR-232S	200 units	48,00
	PCR-232L	1.000 units	192,00
<b>Taq Core Kit / high yield</b> Kit of Taq polymerase, dNTPs and high yield buffer	PCR-231S	200 units	48,00
	PCR-231L	1.000 units	192,00
<b>Hot Start Core Kit</b> Kit of hot-start Taq polymerase, dNTPs and hot start buffer	PCR-233S	200 units	83,00
	PCR-233L	1.000 units	332,00
<b>High Fidelity Core Kit</b> Kit of Taq-Pfu polymerase blend, dNTPs and high fidelity buffer	PCR-234S	100 units	56,00
	PCR-234L	500 units	224,00
<b>High Fidelity Hot Start Core Kit</b> Kit of hot-start Taq-Pfu polymerase, dNTPs and buffer	PCR-235S	100 units	76,00
	PCR-235L	500 units	304,00
<b>Pfu-X Core Kit</b> Kit of proofreading polymerase, dNTPs and reaction buffer	PCR-237S	100 units	68,00
	PCR-237L	500 units	272,00

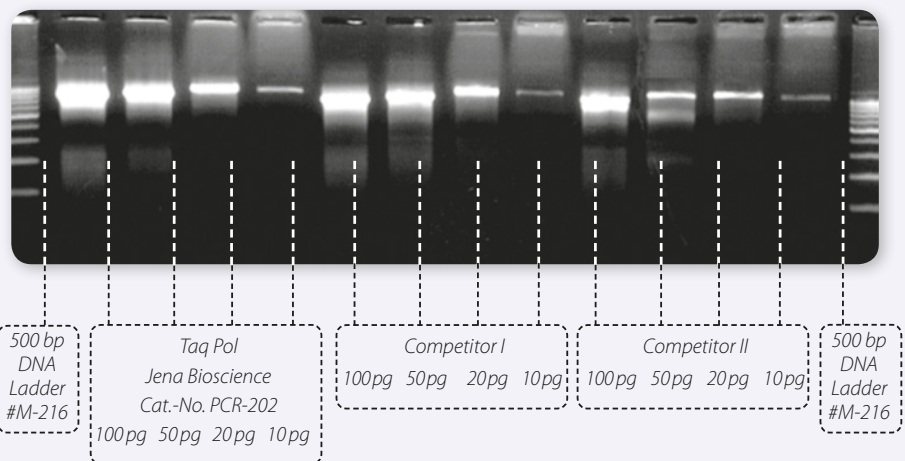
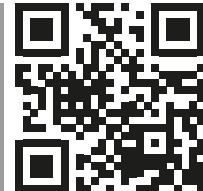
## Thermophilic Polymerases



Jena Bioscience offers a selection of **Thermophilic polymerases** for applications ranging from routine PCR to sophisticated assay setups. Taq polymerase is the enzyme of choice for most standard assays. Together with high yield buffer system, enhanced efficiency and facilitated incorporation of labeled or modified nucleotides are achieved. Hot Start polymerase is most suitable to amplify low-copy number targets in complex backgrounds or if prolonged room-temperature setups are required. Select High-Fidelity enzymes for amplification of long fragments (up to 30 kb) and GC-rich templates at low error rates. Pfu-X polymerase with proofreading function is designed for highly accurate amplification purposes whereas sequencing polymerase accomplishes efficient incorporation of ddNTPs.

Product	Cat.-No.	Amount	Price (EUR)
<b>Taq Pol</b> Taq polymerase, reaction buffer	PCR-202S	200 units	35,00
	PCR-202L	1.000 units	140,00
<b>Taq Pol / high yield</b> Taq polymerase, high yield buffer	PCR-201S	200 units	35,00
	PCR-201L	1.000 units	140,00
<b>Hot Start Pol</b> Hot-start Taq polymerase, reaction buffer	PCR-203S	200 units	70,00
	PCR-203L	1.000 units	280,00
<b>High Fidelity Pol</b> Taq-Pfu polymerase blend, reaction buffer	PCR-204S	100 units	48,00
	PCR-204L	500 units	192,00
<b>High Fidelity Hot Start Pol</b> Hot-start Taq-Pfu blend, reaction buffer	PCR-205S	100 units	68,00
	PCR-205L	500 units	272,00
<b>Pfu-X Polymerase</b> Proofreading DNA polymerase, reaction buffer	PCR-207S	100 units	60,00
	PCR-207L	500 units	240,00
<b>Sequencing Pol</b> Taq Pol mutant for incorporation of ddNTPs, reaction buffer	PCR-206S	200 units	70,00
	PCR-206L	1.000 units	280,00

Find further product information in our **Thermophilic Polymerases Guide:**  
[www.jenabioscience.com/thermophilic\\_polymerases](http://www.jenabioscience.com/thermophilic_polymerases)



**Figure 2**  
 One important parameter that separates high-quality polymerases from others is amplification of long fragments from minimum amounts of template. The gel shows Jena Bioscience's Taq Pol routine QC assay – amplifying a 4 kb fragment from lambda DNA in a dilution series from 100 pg down to 10 pg of template – compared to other Taq polymerases. Its high amplification efficiency – especially at lowest template amounts – and minimal formation of by-products distinguish Taq Pol from competitor enzymes. Assay: Amplification of lambda DNA (template dilution series), 4 kb fragment, 1.25 units Taq Pol / reaction. 95 °C, 2 min; 30x (95 °C, 10 s; 61 °C, 20 s; 72 °C, 4 min); 72 °C, 4 min.



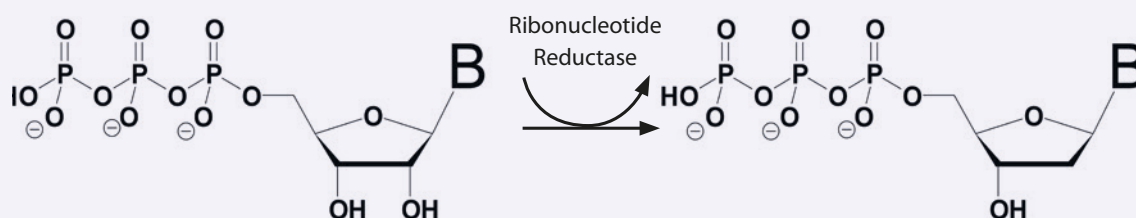
## dNTPs

Jena Bioscience's enzymatic **dNTP** manufacturing process (Fig. 3) ensures  $\geq 99\%$  purity (confirmed by RP-HPLC). Nucleoside triphosphates exhibit no detectable bacterial/human DNA, DNases, RNases, nicking activity or proteases. Each lot is tested functionally by a set of PCRs, RT-PCRs and Klenow reactions. Available quantities range from small ( $\mu\text{l}$ ) to large (liter) scales. Nucleotides are supplied premixed or as individual solutions. On request, Jena Bioscience provides custom formulations, packaging & labeling ([pcr@jenabioscience.com](mailto:pcr@jenabioscience.com)).

Product	Cat.-No.	Concentration	Amount	Price (EUR)
<b>dNTP Mix / 10 mM</b> Premix of dATP, dCTP, dGTP and dTTP	NU-1006S	10 mM each dNTP	200 $\mu\text{l}$	18,91
	NU-1006L		1 ml	75,65
<b>dNTP Mix / 25 mM</b> Premix of dATP, dCTP, dGTP and dTTP	NU-1023S	25 mM each dNTP	200 $\mu\text{l}$	36,78
	NU-1023L		1 ml	147,09
<b>dNTP Mix including dUTP</b> Premix of dATP, dCTP, dGTP and dUTP	NU-1020S	10 mM dATP, dCTP, dGTP, 20 mM dUTP	200 $\mu\text{l}$	23,11
	NU-1020L		1 ml	92,46
<b>dNTP Bundle</b> Set of dATP, dCTP, dGTP, dTTP	NU-1005S	100 mM	4x 200 $\mu\text{l}$	43,08
	NU-1005L		4x 1 ml	172,30
<b>dNTP Bundle including dUTP</b> Set of dATP, dCTP, dGTP, dUTP	NU-1009S	100 mM	4x 200 $\mu\text{l}$	47,28
	NU-1009L		4x 1 ml	189,11
<b>dATP Solution</b>	NU-1001	100 mM	1 ml	59,89
<b>dCTP Solution</b>	NU-1002	100 mM	1 ml	59,89
<b>dGTP Solution</b>	NU-1003	100 mM	1 ml	59,89
<b>dTTP Solution</b>	NU-1004	100 mM	1 ml	59,89
<b>dITP Solution</b>	NU-1007	100 mM	1 ml	75,65
<b>dUTP Solution</b>	NU-1008	100 mM	1 ml	75,65



Our **dNTP's** are also available as lyophilisates (page 23)



*B = Adenine, Cytosine, Guanine, Uracil*

### Figure 3

The bacterial enzyme ribonucleotide reductase selectively reduces the 2'-OH-group of NTP raw materials resulting in their corresponding dNTPs. This enzymatic synthesis is performed on the kg-scale and reaches turnover of nearly 100% within a few days.



Find further product information in our **dNTP Guide**: [www.jenabioscience.com/dNTP-Guide](http://www.jenabioscience.com/dNTP-Guide)



## DNA Markers / Ladders

Choose Jena Bioscience's **Log Scale DNA Ladders** (Fig. 4) for size determination and concentration estimations of DNA fragments derived from PCR and restriction digests on agarose gels. Markers contain blue/orange tracking dyes for visualization of DNA migration during electrophoresis. Log Scale DNA Ladders are ready-to-use and cover the full range of 20 bp to 10 kb (10 or 15 ng/μl each fragment).



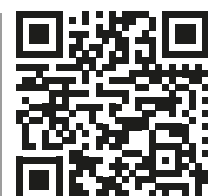
Product	Cat.-No.	Size	Color	Amount	Price (EUR)
<b>20 bp DNA Ladder</b>	M-212S	20 bp – 200 bp	orange	500 μl, 100 lanes	66,00
	M-212L			5x 500 μl, 500 lanes	264,00
<b>50 bp DNA Ladder</b>	M-213S	50 bp – 500 bp	orange	500 μl, 100 lanes	55,00
	M-213L			5x 500 μl, 500 lanes	220,00
<b>100 bp DNA Ladder</b>	M-214S	100 bp – 1 kb	orange/blue	500 μl, 100 lanes	44,00
	M-214L			5x 500 μl, 500 lanes	176,00
<b>200 bp DNA Ladder</b>	M-215S	200 bp – 2 kb	blue/blue	500 μl, 100 lanes	44,00
	M-215L			5x 500 μl, 500 lanes	176,00
<b>500 bp DNA Ladder</b>	M-216S	500 bp – 5 kb	blue/blue	500 μl, 100 lanes	33,00
	M-216L			5x 500 μl, 500 lanes	132,00
<b>1 kb DNA Ladder</b>	M-217S	1 kb – 10 kb	blue/blue	500 μl, 100 lanes	33,00
	M-217L			5x 500 μl, 500 lanes	132,00

### DNA Fragment Separation on Agarose Gels

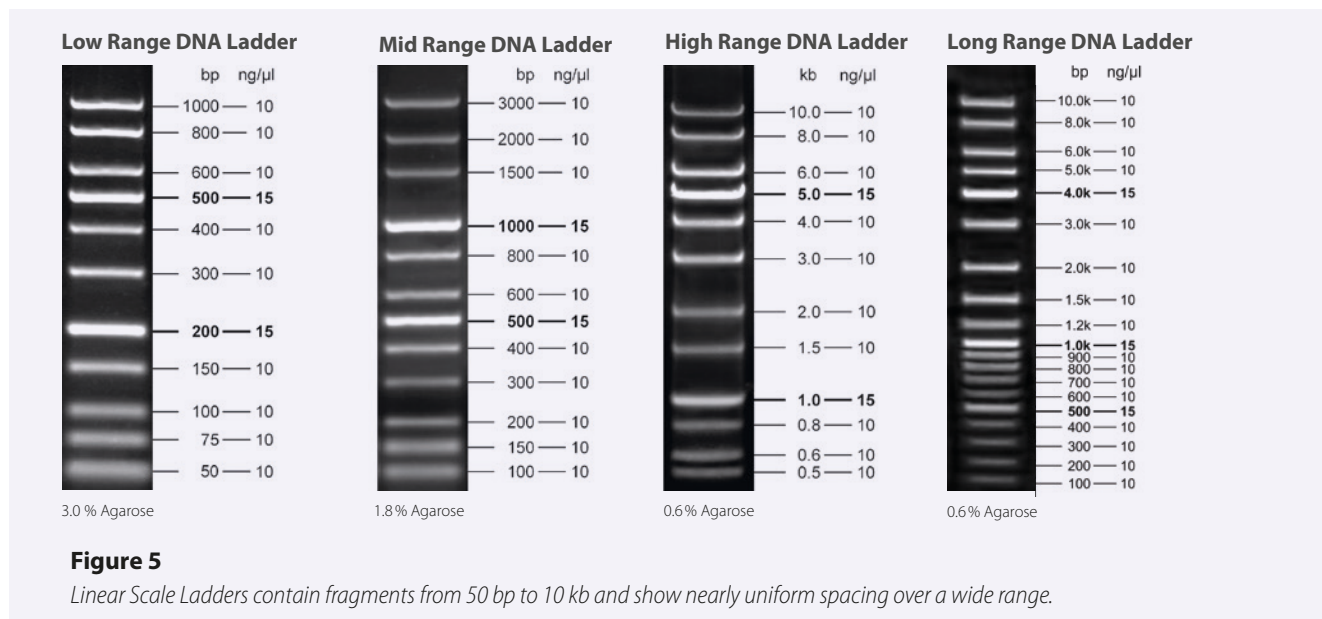
DNA fragment size	Agarose gel concentration	Orange G running at approx.	Bromophenol blue running at approx.	Xylene cyanol running at approx.
< 20 bp	3.6%	2 bp	40 bp	280 bp
50 bp – 500 bp	3.0%	2 bp	60 bp	500 bp
100 bp – 1 kb	2.4%	3 bp	100 bp	900 bp
200 bp – 2 kb	1.8%	5 bp	200 bp	1.8 kb
500 bp – 5 kb	1.2%	10 bp	500 bp	4.5 kb
> 1 kb	0.6%	100 bp	1.2 kb	12 kb



Find further product information in our **DNA Ladders Guide:**  
[www.jenabioscience.com/DNA-Ladders-Guide](http://www.jenabioscience.com/DNA-Ladders-Guide)



Choose Jena Bioscience's **Linear Scale DNA Ladders** (Fig. 5) if band analysis requires uniform spacing of DNA Ladder fragments. Markers contain blue/orange tracking dyes for visualization of DNA migration during electrophoresis. Linear Ladders are supplied ready-to-use and cover the full range of 50 bp to 10 kb (10 or 15 ng/ $\mu$ l each fragment).



Product	Cat.-No.	Size	Color	Amount	Price (EUR)
Low Range DNA Ladder	M-202S	50 bp – 1 kb	orange/blue	500 $\mu$ l, 100 lanes	60,50
	M-202L			5x 500 $\mu$ l, 500 lanes	242,00
Mid Range DNA Ladder	M-202S	100 bp – 3 kb	orange/blue	500 $\mu$ l, 100 lanes	49,50
	M-203L			5x 500 $\mu$ l, 500 lanes	198,00
High Range DNA Ladder	M-202S	500 bp – 10 kb	blue/blue	500 $\mu$ l, 100 lanes	38,50
	M-204L			5x 500 $\mu$ l, 500 lanes	154,00
Long Range DNA Ladder	M-202S	100 bp – 10 kb	orange/blue	500 $\mu$ l, 100 lanes	71,50
	M-205L			5x 500 $\mu$ l, 500 lanes	286,00

**Log Scale DNA Ladders with Fluorescent Stain** contain an additional EvaGreen™ fluorescent DNA intercalator dye (Cat.-No.: PCR-256; p. 13). Ladders are directly loaded on agarose gels, thus no gel staining procedures are required. For sample preparation **Gel Loading Buffer with DNA Stain** (Cat.-No.: PCR-255; p. 13) is recommended.

Product	Cat.-No.	Size	Color	Amount	Price (EUR)
Fluorescent 20 bp DNA Ladder	M-232S	20 bp – 200 bp	orange, green fluorescent	500 $\mu$ l, 100 lanes	71,50
	M-232L			5x 500 $\mu$ l, 500 lanes	286,00
Fluorescent 50 bp DNA Ladder	M-233S	50 bp – 500 bp	orange, green fluorescent	500 $\mu$ l, 100 lanes	60,50
	M-233L			5x 500 $\mu$ l, 500 lanes	242,00
Fluorescent 100 bp DNA Ladder	M-234S	100 bp – 1 kb	orange / blue, green fluorescent	500 $\mu$ l, 100 lanes	49,50
	M-234L			5x 500 $\mu$ l, 500 lanes	198,00
Fluorescent 200 bp DNA Ladder	M-235S	200 bp – 2 kb	blue / blue, green fluorescent	500 $\mu$ l, 100 lanes	49,50
	M-235L			5x 500 $\mu$ l, 500 lanes	198,00
Fluorescent 500 bp DNA Ladder	M-236S	500 bp – 5 kb	orange / blue, green fluorescent	500 $\mu$ l, 100 lanes	38,50
	M-236L			5x 500 $\mu$ l, 500 lanes	154,00
Fluorescent 1 kb DNA Ladder	M-237S	1 kb – 10 kb	blue / blue, green fluorescent	500 $\mu$ l, 100 lanes	38,50
	M-237L			5x 500 $\mu$ l, 500 lanes	154,00



**Linear Scale DNA Ladders with Fluorescent Stain** with EvaGreen™ fluorescent dye (*Cat.-No.: PCR-256; p. 13*) show virtually uniform spacing of the entire fragment range. Ladders are directly loaded on agarose gels, thus no gel staining procedures are required. For sample preparation **Gel Loading Buffer with DNA Stain** (*Cat.-No.: PCR-255; p. 13*) is recommended.

Product	Cat.-No.	Size	Color	Amount	Price (EUR)
<b>Fluorescent Low Range DNA Ladder</b>	M-222S	50 bp – 1 kb	orange / blue, green fluorescent	500 µl, 100 lanes	66,00
	M-222L			5× 500 µl, 500 lanes	264,00
<b>Fluorescent Mid Range DNA Ladder</b>	M-223S	100 bp – 3 kb	orange / blue, green fluorescent	500 µl, 100 lanes	55,00
	M-223L			5× 500 µl, 500 lanes	220,00
<b>Fluorescent High Range DNA Ladder</b>	M-224S	500 bp – 10 kb	blue / blue, green fluorescent	500 µl, 100 lanes	44,00
	M-224L			5× 500 µl, 500 lanes	176,00
<b>Fluorescent Long Range DNA Ladder</b>	M-225S	100 bp – 10 kb	orange / blue, green fluorescent	500 µl, 100 lanes	77,00
	M-225L			5× 500 µl, 500 lanes	308,00

**Jena Bioscience classic DNA Ladders** allow sizing and concentration estimations of DNA fragments on agarose gels generated by PCR or restriction digest.

Product	Cat.-No.	Amount	Price (EUR)
<b>λDNA / Hind III Digest</b>	M-101S	100 µg	12,00
	M-101L	500 µg	48,00
<b>λDNA / EcoR I Digest</b>	M-102S	50 µg	12,00
	M-102L	250 µg	48,00
<b>λDNA / EcoR I / Hind III Digest</b>	M-103S	100 µg	12,00
	M-103L	500 µg	48,00
<b>λDNA / Sty I Digest</b>	M-104S	100 µg	12,00
	M-104L	500 µg	48,00
<b>λDNA / Pst I Digest</b>	M-105S	100 µg	12,00
	M-105L	500 µg	48,00
<b>λDNA / BstE II Digest</b>	M-106S	100 µg	12,00
	M-106L	500 µg	48,00
<b>pBR322 / Hinf I Digest</b>	M-107S	100 µg	48,00
	M-107L	500 µg	192,00
<b>pUC19 / BsiS I (Hpa II) Digest</b>	M-108S	100 µg	48,00
	M-108L	500 µg	192,00
<b>pUC19 / BseB I / Taq I Digest</b>	M-109S	100 µg	48,00
	M-109L	500 µg	192,00



Combine **DNA Ladders (1:1)** for analysis of small and large fragments on one gel.

## Supplements

**Standard PCR Supplements** consist of tools for routine applications and optimization of difficult primer-template combinations. It includes kits to facilitate amplification of GC-rich structures, enhance yields or serve as internal lab standards.

### Gel Loading Buffer for agarose or polyacrylamide gels

Product	Cat.-No.	Amount	Price (EUR)
Blue	PCR-254-bl	5× 1 ml	25,00
Green	PCR-254-gr	5× 1 ml	25,00
Orange	PCR-254-or	5× 1 ml	25,00

### Gel Loading Buffer for agarose or polyacrylamide gels with EvaGreen™ fluorescent DNA stain

Product	Cat.-No.	Amount	Price (EUR)
Blue	PCR-255-bl	5× 1 ml	35,00
Green	PCR-255-gr	5× 1 ml	35,00
Orange	PCR-255-or	5× 1 ml	35,00

### EvaGreen™

Product	Cat.-No.	Amount	Price (EUR)
Fluorescent Gel Stain for DNA gel electrophoresis	PCR-256	500 µl	40,00

### PCR Control Kit

Product	Cat.-No.	Amount	Price (EUR)
Amplification standard for beta-actin gene fragment from human genomic DNA	PCR-253	500 reactions	50,00

### Control DNA

Product	Cat.-No.	Amount	Price (EUR)
Lambda DNA, 100 ng/µl	PCR-259	100 µg	35,00
Human Genomic DNA, 100 ng/µl	PCR-261	50 µg	115,00

### PCR Reaction Buffer

Product	Cat.-No.	Amount	Price (EUR)
Taq Reaction Buffer complete – 10×	PCR-262-c	5× 1.2 ml	10,00
Taq Reaction Buffer without MgCl <sub>2</sub> – 10×	PCR-262-wo	5× 1.2 ml	10,00
High Yield Buffer complete – 10×	PCR-263-c	5× 1.2 ml	10,00
High Yield Buffer without MgCl <sub>2</sub> – 10×	PCR-263-wo	5× 1.2 ml	10,00
Hot Start Buffer complete – 10×	PCR-264-c	5× 1.2 ml	10,00
Hot Start Buffer without MgCl <sub>2</sub> – 10×	PCR-264-wo	5× 1.2 ml	10,00
MgCl <sub>2</sub> stock solution – 25 mM	PCR-266-25	4× 1.5 ml	10,00

### PCR Additives Kit

Product	Cat.-No.	Amount	Price (EUR)
Taq Stabilizer and GC Enhancer	PCR-252	500 reactions	40,00


### PCR-grade Water, nuclease-free

Product	Cat.-No.	Amount	Price (EUR)
S pack	PCR-258S	10× 1.2 ml	14,00
L pack	PCR-258L	50 ml	16,00
XL pack	PCR-258XL	500 ml	28,00

## Real-Time PCR (qPCR)

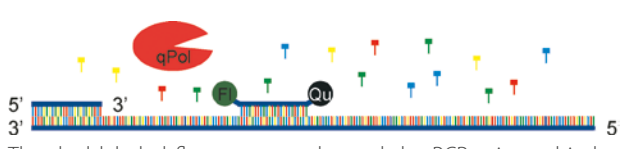
### qPCR with Dual Labeled Fluorescent Probes

**1**



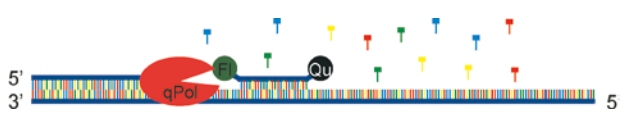
A quantitative real-time PCR assay with fluorescent probes requires polymerase, dNTPs, the dual labeled fluorescent probe, primers and template DNA. The proximity of fluorophore and quencher prevents the reporter dye on the probe from fluorescing.

**2**



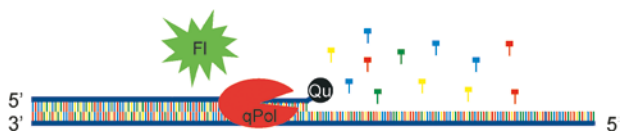
The dual labeled fluorescent probe and the PCR primers bind to their target sequences during the annealing step.

**3**



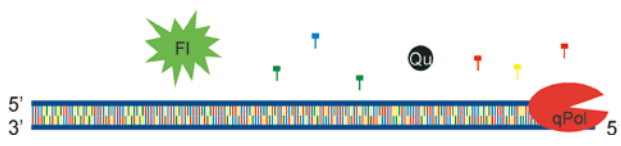
During the PCR extension step, the polymerase extends the primer.

**4**



When the polymerase reaches the probe, its 5'→3' exonuclease activity cleaves the fluorophore from the probe. The fluorophore is released and becomes fluorescent.

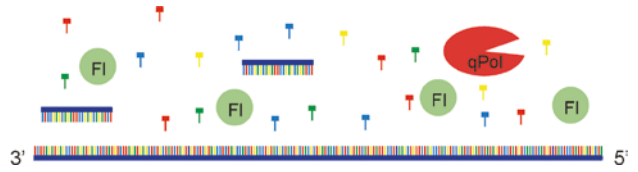
**5**



After complete extension the detected fluorescence intensity is proportional to the amount of accumulated PCR product. The next PCR amplification cycle will be run.

### qPCR with EvaGreen™ Fluorescent DNA Stain

**1**



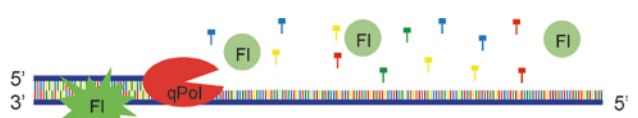
A quantitative real-time PCR assay with EvaGreen™ requires polymerase, dNTPs, EvaGreen™ Fluorescent DNA Stain, primers and template DNA. The dye molecules are nonfluorescent by itself.

**2**



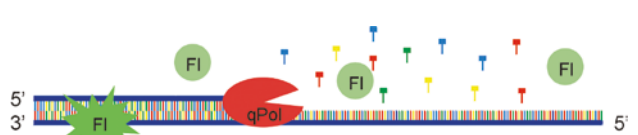
The PCR primers bind to their target sequences during the annealing step.

**3**



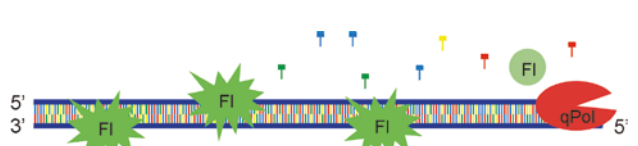
During the PCR extension step, the polymerase extends the primer.

**4**



EvaGreen™ molecules bind to the amplicon. Due to their specific interaction with dsDNA the bound dye molecules become highly fluorescent.

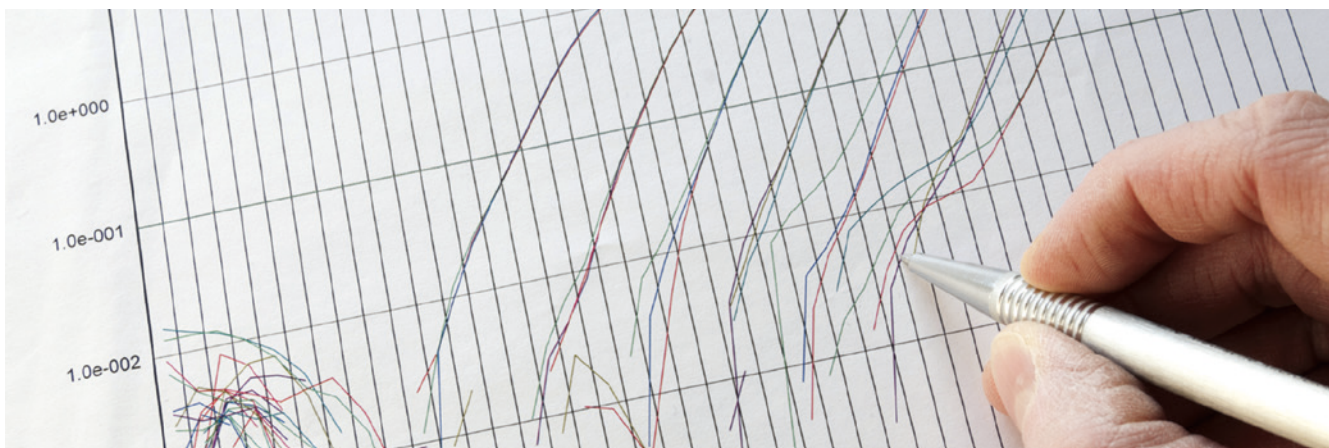
**5**



After complete extension the detected fluorescence intensity is proportional to the amount of accumulated PCR product. The next PCR amplification cycle will be run.



Find **Single Labeled Probes** on page 36





## Master Mixes for Dual Labeled Fluorescent Probes

The **JBS qPCR Master series** allows quantitative real-time analysis of DNA samples based on detection of labeled DNA probes. Master Mixes contain all reagents required for qPCR (except template, primer and labeled fluorescent probe) in a premixed 2x concentrated solution, including hot-start polymerase. Its activity is blocked at ambient temperature and switched on automatically at the onset of initial denaturation to prevent extension of nonspecifically annealed primers and primer-dimer formation.

Both qPCR ProbesMaster Mixes with and without **UNG (Uracil-N-Glycosylase)** are available in combination with **low/high ROX** as reference dye for cyclor-internal signal normalization. To facilitate pipetting into opaque plasticware, a blue dyed version of the qPCR ProbesMaster Mixes is available. Mixes are recommended for use with Dual Labeled Fluorescent Probes (p. 15), e.g. TaqMan®, Molecular Beacons or FRET probes.

Product	Cat.-No.	Color	Amount	Price (EUR)
<b>qPCR ProbesMaster</b> 2x conc master mix	PCR-311S	clear	2x 1.25 ml	110,00
	PCR-311L		10x 1.25 ml	440,00
	PCR-311S-bl	blue dyed	2x 1.25 ml	110,00
	PCR-311L-bl		10x 1.25 ml	440,00
<b>qPCR ProbesMaster with UNG</b> 2x conc master mix	PCR-301S	clear	2x 1.25 ml	130,00
	PCR-301L		10x 1.25 ml	520,00
	PCR-301S-bl	blue dyed	2x 1.25 ml	130,00
	PCR-301L-bl		10x 1.25 ml	520,00
<b>qPCR ProbesMaster with lowROX</b> 2x conc master mix	PCR-315S	clear	2x 1.25 ml	110,00
	PCR-315L		10x 1.25 ml	440,00
	PCR-315S-bl	blue dyed	2x 1.25 ml	110,00
	PCR-315L-bl		10x 1.25 ml	440,00
<b>qPCR ProbesMaster with UNG/lowROX</b> 2x conc master mix	PCR-305S	clear	2x 1.25 ml	130,00
	PCR-305L		10x 1.25 ml	520,00
	PCR-305S-bl	blue dyed	2x 1.25 ml	130,00
	PCR-305L-bl		10x 1.25 ml	520,00
<b>qPCR ProbesMaster with highROX</b> 2x conc master mix	PCR-312S	clear	2x 1.25 ml	110,00
	PCR-312L		10x 1.25 ml	440,00
	PCR-312S-bl	blue dyed	2x 1.25 ml	110,00
	PCR-312L-bl		10x 1.25 ml	440,00
<b>qPCR ProbesMaster with UNG/highROX</b> 2x conc master mix	PCR-302S	clear	2x 1.25 ml	130,00
	PCR-302L		10x 1.25 ml	520,00
	PCR-302S-bl	blue dyed	2x 1.25 ml	130,00
	PCR-302L-bl		10x 1.25 ml	520,00

## Dual Labeled Fluorescent Probes

**Dual Labeled Fluorescent Probes** are DNA oligonucleotides of 20–30 bp carrying a fluorophore (5'-end) and a quencher (3'-end). The labeled probe hybridizes sequence-specifically to its complementary section of the amplicon. During DNA extension of each PCR cycle, the fluorophore reporter is being cleaved and released. As a result, the detectable fluorescence signal is proportional to the amount of accumulated PCR product. All labeled probes are purified by HPLC and quality checked by MALDI-TOF. Select from Jena Bioscience's extensive reporter/quencher repertoire or inquire for alternative combinations ([pcr@jenabioscience.com](mailto:pcr@jenabioscience.com)).

5'-reporter, excitation max, emission max			3'quencher, quenching range (quenching max)					
			BHQ-1®	BHQ-2®	BHQ-3®	ECLIPSE®	DABCYL®	TAMRA®
			480–580 nm (535 nm)	550–650 nm (579 nm)	620–730 nm (672 nm)	390–625 nm (522 nm)	380–550 nm (453 nm)	470–560 nm (544 nm)
LC°Cyan500	450 nm	500 nm	FP-120 from 238,00 €	–	–	FP-151 from 238,00 €	FP-111 from 238,00 €	FP-101 from 238,00 €
FAM	495 nm	520 nm	FP-121 from 105,00 €	–	–	FP-152 from 105,00 €	FP-112 from 105,00 €	FP-102 from 105,00 €
TET	521 nm	536 nm	FP-122 from 238,00 €	–	–	FP-153 from 238,00 €	FP-113 from 238,00 €	FP-103 from 238,00 €
JOE	522 nm	548 nm	FP-123 from 171,00 €	–	–	FP-154 from 171,00 €	FP-114 from 171,00 €	FP-104 from 171,00 €
Yakima Yellow	530 nm	549 nm	FP-134 from 171,00 €	–	–	FP-155 from 171,00 €	FP-117 from 171,00 €	FP-106 from 171,00 €
HEX	535 nm	556 nm	FP-124 from 171,00 €	FP-133 from 171,00 €	–	FP-156 from 171,00 €	FP-115 from 171,00 €	FP-156 from 171,00 €
Cy3	546 nm	563 nm	–	FP-125 from 171,00 €	–	–	–	–
TAMARA	564 nm	579 nm	–	FP-126 from 238,00 €	–	FP-157 from 238,00 €	–	–
ROX	576 nm	601 nm	–	FP-127 from 238,00 €	–	FP-158 from 238,00 €	–	–
Texas Red	586 nm	610 nm	–	FP-132 from 238,00 €	–	FP-159 from 238,00 €	–	–
LC°Red610	590 nm	610 nm	–	FP-131 from 238,00 €	–	FP-160 from 238,00 €	–	–
LC°Red640	625 nm	640 nm	–	FP-135 from 238,00 €	FP-144 from 238,00 €	–	–	–
Cy5	646 nm	662 nm	–	FP-136 from 171,00 €	FP-141 from 238,00 €	–	–	–
Cy5.5	683 nm	705 nm	–	FP-137 from 171,00 €	FP-142 from 238,00 €	–	–	–
IRD700	685 nm	705 nm	–	FP-138 from 171,00 €	FP-143 from 238,00 €	–	–	–

TAMRA is widely used as quencher especially in combination with the reporter FAM. Please note that TAMRA is no dark quencher and contributes to an increase in background signal intensity because of its fluorescence emission.

Black Hole dark quencher (BHQ) probes are an advanced alternative to TAMRA and ensure an improved signal-to-noise ratio.

*"Black Hole Quencher"™ and "BHQ"™ are trademarks registered with the US Patent and Trade Office (USPTO) Registration Number 2,883,942 and the World Intellectual Property Organization (WIPO) registration number 832 809. These compounds are protected under international patent protection filed with the USPTO under patent application 09 / 567,863 currently under allowance. Black Hole Quencher dyes are licensed for sale by Biosearch Technologies, Inc., Novato, California, USA, and these products are sold exclusively for research and development purposes only. These products may not be used for any human or veterinary clinical or diagnostic purposes or any commercial purpose without express permission from Biosearch. Further, these products may not be re-sold, distributed, re-labeled or re-packaged.*

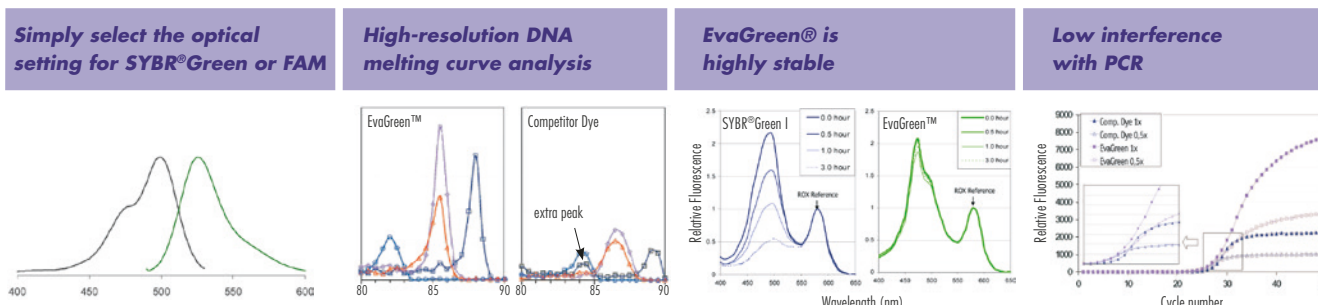
*Cy3, Cy5 and Cy5.5 are trademarks of Amersham Pharmacia Biotech Limited or its subsidiaries.*

## Master Mixes with EvaGreen™

The **JBS qPCR GreenMaster Series** allows quantitative real-time analysis of DNA samples based on EvaGreen™ fluorescent DNA stain. During PCR, EvaGreen™ intercalates into the amplified DNA. No synthesis of labeled probes is required, thus target DNA may rapidly be analyzed. Master Mixes contain all reagents required for qPCR (except template, primer and labeled fluorescent probe) in a premixed 2x concentrated solution, including hot-start polymerase. Its activity is blocked at ambient temperature and switched on automatically at the onset of initial denaturation to prevent extension of nonspecifically annealed primers and primer-dimer formation.

Both qPCR GreenMaster mixes with and without **UNG** are available in combination with **low/high ROX** as reference dye for cyclor-internal signal normalization. To facilitate pipetting into opaque plasticware a blue dyed version of the qPCR ProbesMaster Mixes is available.

**EvaGreen™ Fluorescent DNA Stain** is developed for DNA analysis including real-time PCR (qPCR), high-resolution DNA melting curve analysis (HRM), routine DNA quantification and capillary gel electrophoresis. Upon binding to DNA, the non-fluorescent dye becomes highly fluorescent while showing no detectable inhibition to the PCR process. The dye is extremely stable both thermally and hydrolytically.



Excitation and emission spectra of EvaGreen™ is similar to SYBR®Green/FAM. Excitation max: λEx=500 nm, Emission max: λEm=530 nm(EvaGreen™ bound to dsDNA in PBS buffer pH 7.3)

DNA melting curve analysis using EvaGreen™ and Competitor Dye with 4 different amplicons. Competitor Dye shows occasional formation of an extra melting peak.

Degeneration of SYBR®Green I within 3 hours at 99°C. EvaGreen™ shows no detectable decrease in fluorescence intensity. (Each fluorophore 1.2 μM in Tris-HCl buffer pH 9.0)

PCR amplification plots using EvaGreen™ and Competitor Dye at two different concentrations. Competitor Dye exhibits significant PCR inhibition at 1x concentration while EvaGreen™ does not.

Product	Cat.-No.	Color	Amount	Price (EUR)
<b>qPCR GreenMaster with UNG</b> 2x conc master mix	PCR-303S	clear	2x 1.25 ml	130,00
	PCR-303L		10x 1.25 ml	520,00
	PCR-303S-bl	blue dyed	2x 1.25 ml	130,00
	PCR-303L-bl		10x 1.25 ml	520,00
<b>qPCR GreenMaster</b> 2x conc master mix	PCR-313S	clear	2x 1.25 ml	110,00
	PCR-313L		10x 1.25 ml	440,00
	PCR-313S-bl	blue dyed	2x 1.25 ml	110,00
	PCR-313L-bl		10x 1.25 ml	440,00
<b>qPCR GreenMaster with UNG/ lowROX</b> 2x conc master mix	PCR-306S	clear	2x 1.25 ml	130,00
	PCR-306L		10x 1.25 ml	520,00
	PCR-306S-bl	blue dyed	2x 1.25 ml	130,00
	PCR-306L-bl		10x 1.25 ml	520,00
<b>qPCR GreenMaster with lowROX</b> 2x conc master mix	PCR-316S	clear	2x 1.25 ml	110,00
	PCR-316L		10x 1.25 ml	440,00
	PCR-316S-bl	blue dyed	2x 1.25 ml	110,00
	PCR-316L-bl		10x 1.25 ml	440,00
<b>qPCR GreenMaster with UNG/ highROX</b> 2x conc master mix	PCR-304S	clear	2x 1.25 ml	130,00
	PCR-304L		10x 1.25 ml	520,00
	PCR-304S-bl	blue dyed	2x 1.25 ml	130,00
	PCR-304L-bl		10x 1.25 ml	520,00
<b>qPCR GreenMaster with highROX</b> 2x conc master mix	PCR-314S	clear	2x 1.25 ml	110,00
	PCR-314L		10x 1.25 ml	440,00
	PCR-314S-bl	blue dyed	2x 1.25 ml	110,00
	PCR-314L-bl		10x 1.25 ml	440,00



## qPCR Core Kits

**qPCR Core Kits** are designed for quantitative real-time analysis of DNA samples based on dual labeled probes as well as EvaGreen™ fluorescent intercalator dye.

Product	Cat.-No.	Amount	Price (EUR)
<b>qPCR Probes Core Kit</b> Heat-activatable DNA polymerase, dNTPs, qPCR buffer	PCR-331S	100 reactions × 50 µl	90,00
	PCR-331L	500 reactions × 50 µl	360,00
<b>qPCR Green Core Kit</b> Heat-activatable DNA polymerase, dNTPs, qPCR buffer with EvaGreen™	PCR-333S	100 reactions × 50 µl	90,00
	PCR-333L	500 reactions × 50 µl	360,00

## qPCR Supplements

Helpful tools for real-time PCR set-ups and adaption to individual demands.

Product	Cat.-No.	Amount	Price (EUR)
<b>Fluorescein Reference Dye</b>	PCR-355	1.000 reactions	25,00
<b>ROX Reference Dye</b>	PCR-351	500 reactions	25,00
<b>EvaGreen™ Fluorescent DNA Stain</b>	PCR-352	500 reactions	40,00
<b>Thermolabile UNG (Uracil N-Glycosylase)</b>	PCR-353	200 units	100,00
<b>qPCR Control Kit</b>	PCR-354	500 reactions	130,00



## Transcription

### Reverse Transcription (RT) Kits

**SCRIPT One-Step RT-qPCR Master Mixes** allow quantitative mRNA detection by reverse transcription and real-time PCR. Reactions are carried out sequentially in a single tube, thus minimizing pipetting steps and contamination risk. Targets from <1 pg mRNA or 10 pg total RNA are detectable. All mixes are supplied as 2× concentrated solution containing all reagents required for RT-qPCR (except template and primers). Kits are available in combination with **Dual Labeled Fluorescent Probes or EvaGreen™ fluorescent DNA stain**.

Product	Cat.-No.	Amount	Price (EUR)
<b>SCRIPT One-Step RT-qPCR ProbesMaster</b> 2× conc master mix	PCR-512XS	500 µl	95,00
	PCR-512S	2× 1.25 ml	380,00
	PCR-512L	10× 1.25 ml	1.520,00
<b>SCRIPT One-Step RT-qPCR ProbesMaster with ROX</b> 2× conc master mix	PCR-513XS	500 µl	95,00
	PCR-513S	2× 1.25 ml	380,00
	PCR-513L	10× 1.25 ml	1.520,00
<b>SCRIPT One-Step RT-qPCR GreenMaster</b> 2× conc master mix	PCR-514XS	500 µl	95,00
	PCR-514S	2× 1.25 ml	380,00
	PCR-514L	10× 1.25 ml	1.520,00
<b>SCRIPT One-Step RT-qPCR GreenMaster with ROX</b> 2× conc master mix	PCR-515XS	500 µl	95,00
	PCR-515S	2× 1.25 ml	380,00
	PCR-515L	10× 1.25 ml	1.520,00

**SCRIPT One- and Two-Step RT-PCR kits** enable mRNA quantification by reverse transcription and PCR in single tube (One-Step) or completed individually as separate reactions (Two-Step). Choose SCRIPT One-Step RT-PCR kit if same genes of multiple mRNA targets should be amplified. To increase cDNA yield or when multiple genes of single sample should be analyzed, select SCRIPT Two-Step RT-PCR kit. Targets from <1 pg mRNA (One-Step)/<10 pg mRNA (Two-Step) or 10 pg total RNA are detectable.

Product	Cat.-No.	Amount	Price (EUR)
<b>SCRIPT One-Step RT-PCR Kit</b> One-Step RT-PCR Kit for highly sensitive and specific amplification	PCR-509XS	20 reactions × 50 µl	95,00
	PCR-509S	100 reactions × 50 µl	380,00
	PCR-509L	500 reactions × 50 µl	1.520,00
<b>SCRIPT High Fidelity One-Step RT-PCR Kit</b> One-Step RT-PCR Kit for highly precise and fast amplification	PCR-510XS	20 reactions × 50 µl	108,00
	PCR-510S	100 reactions × 50 µl	432,00
	PCR-510L	500 reactions × 50 µl	1.728,00
<b>SCRIPT RT-PCR Two-Step Kit</b> Two-Step RT-PCR Kit for highest sensitivity and specificity	PCR-506S	25 reactions × 50 µl	118,00
	PCR-506L	200 reactions × 50 µl	670,00

**SCRIPT Reverse Transcriptase** is a genetically engineered version of M-MLV Reverse Transcriptase with eliminated RNase H activity and increased thermal stability. The enzyme is a RNA-directed DNA polymerase that synthesizes a complementary DNA strand initiating from a primer using single-stranded RNA or DNA as template. Its enhanced thermal stability in combination with the deactivated RNase H activity results in increased specificity, higher cDNA yield and improved efficiency for full length cDNA synthesis compared with standard M-MLV RT. The enzyme is recommended for synthesis of cDNA from 100 bp up to 10 kb length.

Product	Cat.-No.	Amount	Price (EUR)
<b>SCRIPT cDNA Synthesis Kit</b> First strand cDNA synthesis with high sensitivity and efficiency	PCR-511XS	20 reactions × 20 µl	60,00
	PCR-511S	100 reactions × 20 µl	240,00
	PCR-511L	500 reactions × 20 µl	960,00
<b>SCRIPT Reverse Transcriptase</b> Reverse Transcriptase with increased thermal stability	PCR-505S	10 kunits	140,00
	PCR-505L	50 kunits	560,00

## Supplements

Product	Cat.-No.	Amount	Price (EUR)
<b>Random Hexamers</b> 100 µM	PM-301S	200 µl	25,00
	PM-301L	1 ml	100,00
<b>Random Octamers</b> 100 µM	PM-302S	200 µl	25,00
	PM-302L	1 ml	100,00
<b>Oligo (dT)15</b> 100 µM	PM-303S	200 µl	25,00
	PM-303L	1 ml	100,00
<b>Oligo (dT)20</b> 100 µM	PM-304S	200 µl	25,00
	PM-304L	1 ml	100,00
<b>Oligo (dT)20</b> 100 µM	PM-305S	200 µl	35,00
	PM-305L	1 ml	140,00

## *In vitro* Transcription Kits and RNA Polymerases

***In vitro* Transcription kits** are supplied as reagents based on *in vitro* transcription with T7 or SP6 RNA polymerases. Kits contain all reagents (including control template) required. Efficient transcription of DNA templates containing a T7 promoter site is guaranteed.

Product	Cat.-No.	Amount	Price (EUR)
<b>T7 Transcription Kit</b> T7 RNA Polymerase Kit	PCR-601S	40 reactions × 20 µl	48,00
	PCR-601L	200 reactions × 20 µl	192,00
<b>SP6 Transcription Kit</b> SP6 RNA Polymerase Kit	PCR-602S	10 reactions × 20 µl	63,00
	PCR-602L	50 reactions × 20 µl	252,00
<b>T7 RNA Polymerase</b> RNA Polymerase	PCR-603S	4 Kunits	48,00
	PCR-603L	20 Kunits	192,00
<b>SP6 RNA Polymerase</b> RNA Polymerase	PCR-604S	1 Kunit	63,00
	PCR-604L	5 Kunits	525,00

## NTP Solutions

Jena Bioscience's enzymatic **NTP** manufacturing process and refined purification protocols ensure ≥99 % purity (RP HPLC). All nucleotide triphosphates are quality checked with respect to macromolecular contaminations (DNases, RNases, nicking activity or proteases). Each lot is tested functionally by T7 RNA Polymerase-mediated *in vitro* transcription. Jena Bioscience NTPs are suitable for molecular biology applications including *in vitro* transcription and RNA labeling. Available quantities range from small (µl) to large (liter) scales.

Product	Cat.-No.	Concentration	Amount	Price (EUR)
<b>NTP Mix</b> Premix of ATP, CTP, GTP and UTP	NU-1024S	25 mM each NTP	200 µl	12,30
	NU-1024L		1 ml	49,20
<b>NTP bundle</b> Set of ATP, CTP, GTP and UTP	NU-1014S	4× 100 mM	4× 200 µl	21,01
	NU-1014L		4× 1 ml	84,05
<b>ATP Solution</b>	NU-1010	100 mM	1 ml	27,58
<b>CTP Solution</b>	NU-1011	100 mM	1 ml	27,58
<b>GTP Solution</b>	NU-1012	100 mM	1 ml	27,58
<b>UTP Solution</b>	NU-1013	100 mM	1 ml	27,58

## Lyophilisates

### Real-Time PCR Lyophilisates

**Ready-to-Use Lyophilisates** are delivered in PCR reaction tube strips or 96-well plates preloaded with a complete master mix in a dry, room temperature stable format. Facilitate handling with ready-to-use lyophilisates: no need for freezing, thawing or pipetting on ice and the few remaining pipetting steps minimize the risk of errors or contaminations.

**Direct PCR Lyophilisates** are designed for amplification of target DNA directly from whole blood, animal and plant tissues. No pre-treatment or prior purification of DNA is required. The **Multiplex PCR Master Lyophilisate** is especially designed for parallel amplification of a variety of fragments in a single PCR assay. The mix is recommended for use in routine PCR reactions and suitable for multiple target gene amplification in a single tube.

### Direct PCR and Multiplex PCR Lyophilisates

Direct PCR Lyophilisate – Lyophilized Master Mix for direct PCR amplification from blood, animal and plant tissue			
Product	Cat.-No.	Amount	Price (EUR)
<b>8-tube strips</b> high profile	PCR-160S-8TS	12 strips (96 reactions)	140,00
	PCR-160L-8TS	60 strips (480 reactions)	560,00
<b>96-well plates</b> flat top / without skirt / high profile	PCR-160S-FTP	2 plates (192 reactions)	210,00
	PCR-160L-FTP	10 plates (960 reactions)	840,00
<b>96-well plates</b> half skirt / high profile	PCR-160S-HSP	2 plates (192 reactions)	210,00
	PCR-160L-HSP	10 plates (960 reactions)	840,00

Multiplex PCR Master Lyophilisate – Lyophilized Master Mix for multiplex PCR application			
Product	Cat.-No.	Amount	Price (EUR)
<b>8-tube strips</b> high profile	PCR-161S-8TS	12 strips (96 reactions)	140,00
	PCR-161L-8TS	60 strips (480 reactions)	560,00
<b>96-well plates</b> flat top / without skirt / high profile	PCR-161S-FTP	2 plates (192 reactions)	210,00
	PCR-161L-FTP	10 plates (960 reactions)	840,00
<b>96-well plates</b> half skirt / high profile	PCR-161S-HSP	2 plates (192 reactions)	210,00
	PCR-161L-HSP	10 plates (960 reactions)	840,00

### qPCR ProbesMaster Lyophilisate

qPCR ProbesMaster Lyophilisate – Lyophilized real-time PCR Master Mix for dual labeled probes			
Product	Cat.-No.	Amount	Price (EUR)
<b>8-tube strips</b> optical clear caps / low profile	PCR-156S-8TL	12 strips (96 reactions)	120,00
	PCR-156L-8TL	60 strips (480 reactions)	480,00
<b>8-tube strips</b> optical clear caps / high profile	PCR-156S-8TS	12 strips (96 reactions)	120,00
	PCR-156L-8TS	60 strips (480 reactions)	480,00
<b>96-well plates</b> flat top / without skirt / low profile	PCR-156S-FTL	2 plates (192 reactions)	180,00
	PCR-156L-FTL	10 plates (960 reactions)	720,00
<b>96-well plates</b> flat top / without skirt / high profile	PCR-156S-FTP	2 plates (192 reactions)	180,00
	PCR-156L-FTP	10 plates (960 reactions)	720,00
<b>96-well plates</b> half skirt / low profile	PCR-156S-HSL	2 plates (192 reactions)	180,00
	PCR-156L-HSL	10 plates (960 reactions)	720,00
<b>96-well plates</b> half skirt / high profile	PCR-156S-HSP	2 plates (192 reactions)	180,00
	PCR-156L-HSP	10 plates (960 reactions)	720,00



## qPCR GreenMaster Lyophilisate

### qPCR GreenMaster Lyophilisate – Lyophilized real-time PCR Master Mix with green-fluorescent DNA stain

Product	Cat.-No.	Amount	Price (EUR)
<b>8-tube strips</b> optical clear caps / low profile	PCR-157S-8TL	12 strips (96 reactions)	120,00
	PCR-157L-8TL	60 strips (480 reactions)	480,00
<b>8-tube strips</b> optical clear caps / high profile	PCR-157S-8TS	12 strips (96 reactions)	120,00
	PCR-157L-8TS	60 strips (480 reactions)	480,00
<b>96-well plates</b> flat top / without skirt / low profile	PCR-157S-FTL	2 plates (192 reactions)	180,00
	PCR-157L-FTL	10 plates (960 reactions)	720,00
<b>96-well plates</b> flat top / without skirt / high profile	PCR-157S-FTP	2 plates (192 reactions)	180,00
	PCR-157L-FTP	10 plates (960 reactions)	720,00
<b>96-well plates</b> half skirt / low profile	PCR-157S-HSL	2 plates (192 reactions)	180,00
	PCR-157L-HSL	10 plates (960 reactions)	720,00
<b>96-well plates</b> half skirt / high profile	PCR-157S-HSP	2 plates (192 reactions)	180,00
	PCR-157L-HSP	10 plates (960 reactions)	720,00

## Taq & Hot Start Master Lyophilisates

### Red Load Taq Master Lyophilisate – Lyophilized Taq Master Mix containing red gel loading dye

Product	Cat.-No.	Amount	Price (EUR)
<b>8-tube strips</b> high profile	PCR-151S-8TS	12 strips (96 reactions)	90,00
	PCR-151L-8TS	60 strips (480 reactions)	360,00
<b>96-well plates</b> flat top / without skirt	PCR-151S-FTP	2 plates (192 reactions)	135,00
	PCR-151L-FTP	10 plates (960 reactions)	540,00
<b>96-well plates</b> half skirt	PCR-151S-HSP	2 plates (192 reactions)	135,00
	PCR-151L-HSP	10 plates (960 reactions)	540,00

### Taq Master Lyophilisate – Lyophilized Taq Master Mix

Product	Cat.-No.	Amount	Price (EUR)
<b>8-tube strips</b> high profile	PCR-152S-8TS	12 strips (96 reactions)	90,00
	PCR-152L-8TS	60 strips (480 reactions)	360,00
<b>96-well plates</b> flat top / without skirt	PCR-152S-FTP	2 plates (192 reactions)	135,00
	PCR-152L-FTP	10 plates (960 reactions)	540,00
<b>96-well plates</b> half skirt / low profile	PCR-152S-HSP	2 plates (192 reactions)	210,00
	PCR-152L-HSP	10 plates (960 reactions)	840,00

### Hot Start Master Lyophilisate – Lyophilized Hot Start Master Mix

Product	Cat.-No.	Amount	Price (EUR)
<b>8-tube strips</b> high profile	PCR-153S-8TS	12 strips (96 reactions)	120,00
	PCR-153L-8TS	60 strips (480 reactions)	480,00
<b>96-well plates</b> flat top / without skirt / high profile	PCR-153S-FTP	2 plates (192 reactions)	180,00
	PCR-153L-FTP	10 plates (960 reactions)	720,00
<b>96-well plates</b> half skirt / high profile	PCR-153S-HSP	2 plates (192 reactions)	180,00
	PCR-153L-HSP	10 plates (960 reactions)	720,00

## Reverse Transcription Lyophilisates

One-Step RT-PCR Master Lyophilisate – Lyophilized One-Step RT-PCR Master Mix			
Product	Cat.-No.	Amount	Price (EUR)
8-tube strips	PCR-159S-8TS	12 strips (96 reactions)	340,00
	PCR-159L-8TS	60 strips (480 reactions)	1.360,00
96-well plates flat top / without skirt	PCR-159S-FTP	2 plates (192 reactions)	510,00
	PCR-159L-FTP	10 plates (960 reactions)	2.040,00
96-well plates half skirt	PCR-159S-HSP	2 plates (192 reactions)	510,00
	PCR-159L-HSP	10 plates (960 reactions)	2.040,00

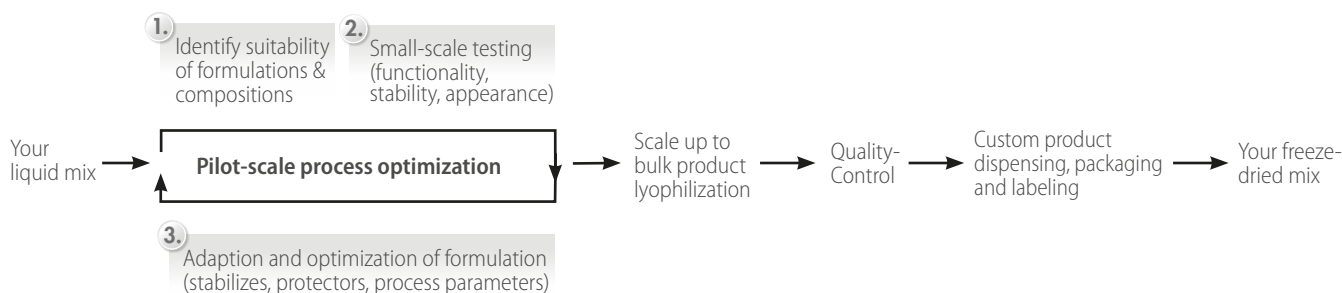
RT Master Lyophilisate – Lyophilized Master Mix for Reverse Transcription			
Product	Cat.-No.	Amount	Price (EUR)
8-tube strips	PCR-158S-8TS	12 strips (96 reactions)	280,00
	PCR-158L-8TS	60 strips (480 reactions)	1.120,00
96-well plates flat top / without skirt	PCR-158S-FTP	2 plates (192 reactions)	420,00
	PCR-158L-FTP	10 plates (960 reactions)	1.680,00
96-well plates half skirt	PCR-158S-HSP	2 plates (192 reactions)	420,00
	PCR-158L-HSP	10 plates (960 reactions)	1.680,00


dNTP Lyophilisate			
Product	Cat.-No.	Amount	Price (EUR)
dATP Lyophilisate	NU-1001-10	10 mg	26,27
	NU-1001-100	100 mg	210,16
dCTP Lyophilisate	NU-1002-10	10 mg	26,27
	NU-1002-100	100 mg	210,16
dGTP Lyophilisate	NU-1003-10	10 mg	26,27
	NU-1003-100	100 mg	210,16
dTTP Lyophilisate	NU-1004-10	10 mg	26,27
	NU-1004-100	10 mg	210,16

 dNTP's are also available as solutions (page 9)


## Jena Bioscience Lyophilization Service

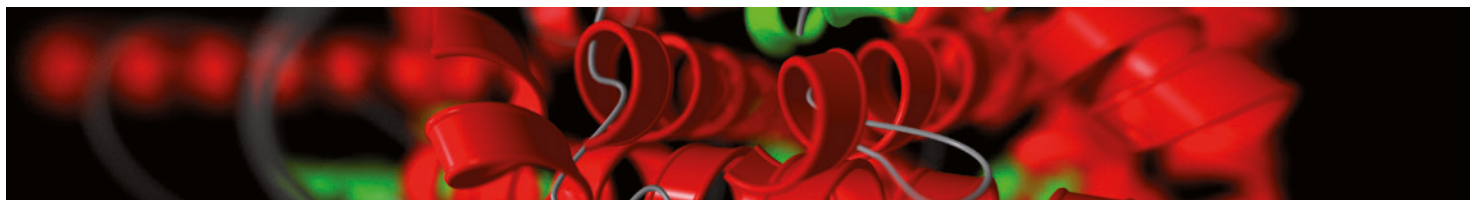
Freeze-dried mixes are stable at ambient temperatures, minimize contamination risk and reduce costs for storage and shipping. In close cooperation with our customers we develop individualized mixes for various application (e.g. lab-on-a chip, diagnostic assays). Products cover the entire enzyme range (e.g. standard to real-time PCR & reverse transcription).





For more information contact us [pcr@jenabioscience.com](mailto:pcr@jenabioscience.com)  
Find more details here: [www.jenabioscience.com/Custom\\_Lyophilisates](http://www.jenabioscience.com/Custom_Lyophilisates)





## Cloning and Mutagenesis

### Restriction Enzymes

Enzyme	Cat.-No.	Amount	Price (EUR)	Enzyme	Cat.-No.	Amount	Price (EUR)	Enzyme	Cat.-No.	Amount	Price (EUR)
<b>Acc I</b>	EN2004-01	500 units	50,00	<b>Dra I</b>	EN2145-01	2,000 units	33,00	<b>Pvu I</b>	EN2320-01	200 units	33,00
	EN2004-02	5× 500 units	200,00		EN2145-02	5× 2,000 units	130,00		EN2320-02	5× 200 units	130,00
<b>Alu I</b>	EN-101S	600 units	28,70	<b>EcoR I</b>	EN-114S	15,000 units	28,70	<b>Pvu II</b>	EN-128S	4,500 units	28,70
	EN-101L	5× 600 units	114,80		EN-114L	5× 15,000 units	114,80		EN-128L	5× 4,500 units	114,80
<b>Apa I (25 °C)</b>	EN2015-01	2,000 units	28,70	<b>EcoRV</b>	EN-115S	3,000 units	28,70	<b>Rsa I</b>	EN-129S	1,000 units	28,70
	EN2015-02	5× 2,000 units	114,80		EN-115L	5× 3,000 units	114,80		EN-129L	5× 1,000 units	114,80
<b>ApaL I</b>	EN-172S	2,000 units	25,00	<b>Fok I</b>	EN2710-01	500 units	36,00	<b>Rsr II</b>	EN2342-01	100 units	36,00
	EN-172L	5× 5,000 units	100,00		EN2710-02	5× 500 units	143,00		EN2342-02	5× 100 units	143,00
<b>Asu II</b>	EN-102S	3,500 units	28,70	<b>Hinc II</b>	EN2200-01	1,000 units	36,00	<b>Sal I</b>	EN-130S	2,000 units	28,70
	EN-102L	5× 3,500 units	114,80		EN2200-02	5× 1,000 units	143,00		EN-130L	5× 2,000 units	114,80
<b>Ava I</b>	EN2006-01	2,000 units	36,00	<b>Hind III</b>	EN-116S	7,500 units	28,70	<b>Sau3A I</b>	EN-150S	500 units	28,70
	EN2006-02	5× 2,000 units	143,00		EN-116L	5× 7,500 units	114,80		EN-150L	5× 500 units	114,80
<b>Ava II</b>	EN2007-01	1,000 Units	39,00	<b>Hinf I</b>	EN-117S	2,500 units	28,70	<b>Sca I</b>	EN-131S	1,200 units	28,70
	EN2007-02	5× 1,000 Units	156,00		EN-117L	5× 2,500 units	114,80		EN-131L	5× 1,200 units	114,80
<b>BamH I</b>	EN-103S	7,500 units	28,70	<b>Hpa I</b>	EN-118S	750 units	28,70	<b>Sfi I (50 °C)</b>	EN-132S	400 units	28,70
	EN-103L	5× 7,500 units	114,80		EN-118L	5× 750 units	114,80		EN-132L	5× 400 units	114,80
<b>Ban II</b>	EN2060-01	1,000 units	41,00	<b>Kpn I</b>	EN-119S	3,500 units	28,70	<b>SgrB I</b>	EN-133S	1,600 units	28,70
	EN2060-02	5× 1,000 units	162,00		EN-119L	5× 3,500 units	114,80		EN-133L	5× 1,600 units	114,80
<b>Bcl I (50 °C)</b>	EN-104S	2,500 units	28,70	<b>Mbo I</b>	EN-120S	300 units	28,70	<b>Sla I</b>	EN-134S	5,000 units	28,70
	EN-104L	5× 2,500 units	114,80		EN-120L	5× 300 units	114,80		EN-134L	5× 5,000 units	114,80
<b>Bgl I</b>	EN-105S	2,000 units	28,70	<b>Mbo II</b>	EN2284-01	250 units	36,00	<b>Sma I (25 °C)</b>	EN-135S	1,100 units	28,70
	EN-105L	5× 2,000 units	114,80		EN2284-02	5× 250 units	143,00		EN-135L	5× 1,100 units	114,80
<b>Bgl II</b>	EN-106S	1,300 units	28,70	<b>Mlu I</b>	EN2287-01	1,000 units	36,00	<b>SnaB I</b>	EN-136S	350 units	28,70
	EN-106L	5× 1,300 units	114,80		EN2287-02	5× 1,000 units	143,00		EN-136L	5× 350 units	114,80
<b>BseA I (55 °C)</b>	EN-107S	650 units	28,70	<b>Mnl I</b>	EN2289-01	250 units	36,00	<b>Spe I</b>	EN2398-01	500 units	41,00
	EN-107L	5× 650 units	114,80		EN2289-02	5× 250 units	143,00		EN2398-02	5× 500 units	162,00
<b>BseB I (60 °C)</b>	EN-108S	4,500 units	28,70	<b>MspC I</b>	EN-121S	1,300 units	28,70	<b>Sph I</b>	EN-137S	250 units	28,70
	EN-108L	5× 4,500 units	114,80		EN-121L	5× 1,300 units	114,80		EN-137L	5× 250 units	114,80
<b>BseC I (55 °C)</b>	EN-109S	3,500 units	28,70	<b>Nae I</b>	EN-122S	300 units	28,70	<b>SseB I</b>	EN-138S	1,500 units	28,70
	EN-109L	5× 3,500 units	114,80		EN-122L	5× 300 units	114,80		EN-138L	5× 1,500 units	114,80
<b>BshF I</b>	EN-110S	7,000 units	28,70	<b>Nar I</b>	EN2291-01	200 units	36,00	<b>Ssp I</b>	EN-139S	600 units	28,70
	EN-110L	5× 7,000 units	114,80		EN2291-02	5× 200 units	143,00		EN-139L	5× 600 units	114,80
<b>BsiS I (55 °C)</b>	EN-111S	2,200 units	28,70	<b>Nco I</b>	EN-123S	600 units	28,70	<b>Sst I</b>	EN-140S	1,600 units	28,70
	EN-111L	5× 2,200 units	114,80		EN-123L	5× 600 units	114,80		EN-140L	5× 1,600 units	114,80
<b>BssA I (65 °C)</b>	EN-112S	250 units	28,70	<b>Nde I</b>	EN2293-01	2,000 units	31,00	<b>Sty I</b>	EN-141S	6,000 units	28,70
	EN-112L	5× 250 units	114,80		EN2293-02	5× 2,000 units	124,00		EN-141L	5× 6,000 units	114,80
<b>BssH II (50 °C)</b>	EN2115-01	200 units	41,00	<b>Nhe I</b>	EN-146S	550 units	28,70	<b>Taq I (65 °C)</b>	EN-142S	3,500 units	28,70
	EN2115-02	5× 200 units	162,00		EN-146L	5× 550 units	114,80		EN-142L	5× 3,500 units	114,80
<b>BstE II (60 °C)</b>	EN-144S	1,750 units	28,70	<b>Not I</b>	EN-124S	300 units	28,70	<b>Tth111 I (65 °C)</b>	EN2420-01	1,000 units	45,00
	EN-144L	5× 1,750 units	114,80		EN-124L	5× 300 units	114,80		EN2420-02	5× 1,000 units	180,00
<b>BstX I (50 °C)</b>	EN2118-01	1,000 units	41,00	<b>Nru I</b>	EN-125S	700 units	28,70	<b>Xba I</b>	EN-143S	3,500 units	28,70
	EN2118-02	5× 1,000 units	162,00		EN-125L	5× 700 units	114,80		EN-143L	5× 3,500 units	114,80
<b>CspA I</b>	EN-113S	150 units	28,70	<b>PspI (25 °C)</b>	EN-126S	900 units	28,70				
	EN-113L	5× 150 units	114,80		EN-126L	5× 900 units	114,80				
<b>Dpn I</b>	EN-160S	200 units	28,70	<b>Pst I</b>	EN-127S	8,000 units	28,70				
	EN-160L	5× 100 units	114,80		EN-127L	5× 8,000 units	114,80				

## Enzyme Finder

Enzyme	Cleavage Site 5 → 3	JBS Enzyme	Enzyme	Cleavage Site 5 → 3	JBS Enzyme	Enzyme	Cleavage Site 5 → 3	JBS Enzyme
<b>Aat I</b>	AGGCTCT	SseB I	<b>BstMB I</b>	IGATC	{Dpn I}, Mbo I, Sau3A I	<b>Nde I</b>	CAATATG	Nde I
<b>Acc I</b>	GTIMKAC	Acc I	<b>BstN I</b>	CCIWGG	BseB I	<b>Nde II</b>	IGATC	{Dpn I}, Mbo I, Sau3A I
<b>Acc III</b>	TTCGGGA	BseA I	<b>BstO I</b>	CCIWGG	BseB I	<b>NgoM IV</b>	GICCGGC	{Nae I}
<b>Acc113 I</b>	AGTIACT	Sca I	<b>BstP I</b>	GIGTNACC	BstE II	<b>Nhe I</b>	GCTAGC	Nhe I
<b>Acc65 I</b>	GGTACC	{Kpn I}	<b>BstN I</b>	TACIGTA	SnaB I	<b>Not I</b>	GCGGGCCG	Not I
<b>Afa I</b>	GTIAC	Rsa I	<b>BstX I</b>	CCANNNNINTGG	BstX I	<b>Nru I</b>	TCGICGA	Nru I
<b>Afl I</b>	GIGWCC	Sin I	<b>Bsu15 I</b>	ATTCGAT	BseC I	<b>Nsp III</b>	CIYCGRG	Ava I
<b>Afl II</b>	CITTAAG	MspC I	<b>BsuR I</b>	GGICC	BshF I	<b>Nsp V</b>	TTICGAA	Asu II
<b>Age I</b>	AICCGGT	CspA I	<b>BsuTU I</b>	ATTCGAT	BseC I	<b>Pae I</b>	GCATGIC	Sph I
<b>Aha III</b>	TTTAAA	Dra I	<b>BtsC I</b>	GGATG (2/0)	{Fok I}	<b>PaeR7 I</b>	CTTCGAG	Sla I
<b>Ahl I</b>	AICTAGT	Spe I	<b>CciN I</b>	GCIGCCGC	Not I	<b>Pal I</b>	GGICC	BshF I
<b>Ajn I</b>	ICCWGG	{BseB I}	<b>Cfr10 I</b>	RCCGGY	BssA I	<b>Pau I</b>	GICGGCC	BssH II
<b>Alu I</b>	AGICT	Alu I	<b>Cfr13 I</b>	GIGNCC	PspP I	<b>Pce I</b>	AGGICCT	SseB I
<b>Alw44 I</b>	GTGCAC	ApaL I	<b>Cfr42 I</b>	CCGICGG	SgrB I	<b>Pdi I</b>	GCCGGC	Nae I
<b>Ama87 I</b>	CIYCGRG	Ava I	<b>Cfr9 I</b>	CICGGG	{Sma I}	<b>Pff I</b>	GACNINNGTC	Tth111 I
<b>Apa I</b>	GGGCC	Apa I	<b>Cla I</b>	ATTCGAT	BseC I	<b>Pho I</b>	GGICC	BshF I
<b>ApaL I</b>	GTGCAC	ApaL I	<b>Cpo I</b>	CGIGWCCG	Rsr II	<b>PinA I</b>	AICCGGT	CspA I
<b>AsiA I</b>	AICCGGT	CspA I	<b>Csp I</b>	CGIGWCCG	Rsr II	<b>Ple19 I</b>	CGATTCG	Pvu I
<b>Asp I</b>	GACNINNGTC	Tth111 I	<b>Csp45 I</b>	TTICGAA	Asu II	<b>Psp124B I</b>	GAGCTIC	Sst I
<b>Asp718 I</b>	GGTACC	{Kpn I}	<b>Csp6 I</b>	GTAC	{Rsa I}	<b>Psp6 I</b>	ICCWGG	{BseB I}
<b>Asp59 I</b>	GIGNCC	PspP I	<b>CspA I</b>	AICCGGT	CspA I	<b>PspA I</b>	CICGGG	{Sma I}
<b>Asu II</b>	TTICGAA	Asu II	<b>Din I</b>	GGCIGCC	{Nar I}	<b>PspE I</b>	GIGTNACC	BstE II
<b>AsuNH I</b>	GICTAGC	Nhe I	<b>Dpn I</b>	GATTC	Dpn I, {Mbo I}, {Sau3A I}	<b>PspG I</b>	ICCWGG	{BseB I}
<b>Ava I</b>	CIYCGRG	Ava I	<b>Dpn II</b>	IGATC	{Dpn I}, Mbo I, Sau3A I	<b>PspOM I</b>	GICGGCC	{Apa I}
<b>BamH I</b>	GIGATCC	BamH I	<b>Dra I</b>	TTTAAA	Dra I	<b>PspP I</b>	GIGNCC	PspP I
<b>Ban II</b>	GRGCYC	Ban II	<b>Ec1136 II</b>	GAGCTC	{Sst I}	<b>Pst I</b>	CTGCAIG	Pst I
<b>Ban III</b>	ATTCGAT	BseC I	<b>Eco105 I</b>	TACIGTA	SnaB I	<b>Psy I</b>	GACNINNGTC	Tth111 I
<b>Bbe I</b>	GGCGCIC	{Nar I}	<b>Eco130 I</b>	CICWWGG	Sty I	<b>Pvu I</b>	CGATTCG	Pvu I
<b>Bbu I</b>	GCATGIC	Sph I	<b>Eco147 I</b>	AGGICCT	SseB I	<b>Pvu II</b>	CAGICTG	Pvu II
<b>Bcl I</b>	TIGATCA	Bcl I	<b>Eco24 I</b>	GRGCYC	Ban II	<b>Rsa I</b>	GTIAC	Rsa I
<b>Bco I</b>	CIYCGRG	Ava I	<b>Eco32 I</b>	GATIATC	EcoRV	<b>Rsr I</b>	CGIGWCCG	Rsr II
<b>Bcu I</b>	AICTAGT	Spe I	<b>Eco88 I</b>	CIYCGRG	Ava I	<b>Rsr II</b>	CGIGWCCG	Rsr II
<b>Bfr I</b>	CITTAAG	MspC I	<b>Eco91 I</b>	GIGTNACC	BstE II	<b>Sac I</b>	GAGCTIC	Sst I
<b>Bfu I</b>	IGATC	{Dpn I}, Mbo I, Sau3A I	<b>EcoICR I</b>	GAGCTC	{Sst I}	<b>Sac II</b>	CCGICGG	SgrB I
<b>Bgl I</b>	GCCNNNINNGGC	Bgl I	<b>EcoO65 I</b>	GIGTNACC	BstE II	<b>Sal I</b>	GTCGAC	Sal I
<b>Bgl II</b>	GAATCT	Bgl II	<b>EcoR I</b>	GAATTC	EcoR I	<b>Sau3A I</b>	IGATC	{Dpn I}, Mbo I, Sau3A I
<b>BmeT110 I</b>	CIYCGRG	{Ava I}	<b>EcoR II</b>	ICCWGG	{BseB I}	<b>Sau96 I</b>	GIGNCC	PspP I
<b>Bmt I</b>	GCTAGIC	{Nhe I}	<b>EcoR I</b>	GAATTC	EcoR I	<b>Sca I</b>	AGTIACT	Sca I
<b>Bpu14 I</b>	TTICGAA	Asu II	<b>EcoRV</b>	GATIATC	EcoRV	<b>Sfi I</b>	GCCNNNINNGGCC	Sfi I
<b>BpvU I</b>	CGATTCG	Pvu I	<b>EcoT14 I</b>	CICWWGG	Sty I	<b>Sfo I</b>	GGCIGCC	{Nar I}
<b>Bsa29 I</b>	ATTCGAT	BseC I	<b>EcoT38 I</b>	GRGCYC	Ban II	<b>Sfr274 I</b>	CTTCGAG	Sla I
<b>Bse118 I</b>	RCCGGY	BssA I	<b>Ege I</b>	GGCIGCC	{Nar I}	<b>Sfr303 I</b>	CCGICGG	SgrB I
<b>BseA I</b>	TTCGGGA	BseA I	<b>Ehe I</b>	GGCIGCC	{Nar I}	<b>Sfu I</b>	TTICGAA	Asu II
<b>BseB I</b>	CCIWGG	BseB I	<b>Erh I</b>	CICWWGG	Sty I	<b>SgrB I</b>	CCGICGG	SgrB I
<b>BseC I</b>	ATTCGAT	BseC I	<b>FauND I</b>	CAITATG	Nde I	<b>Sla I</b>	CTTCGAG	Sla I
<b>BseG I</b>	GGATG (2/0)	{Fok I}	<b>Fba I</b>	TIGATCA	Bcl I	<b>Sma I</b>	CCCGGG	Sma I
<b>BseP I</b>	GICGGC	BssH II	<b>Fbl I</b>	GTIMKAC	Acc I	<b>SnaB I</b>	TACIGTA	SnaB I
<b>BshF I</b>	GGICC	BshF I	<b>Fok I</b>	GGATG (9/13)	Fok I	<b>SpaH I</b>	GCATGIC	Sph I
<b>BshT I</b>	AICCGGT	CspA I	<b>FriO I</b>	GRGCYC	Ban II	<b>Spe I</b>	AICTAGT	Spe I
<b>BsiHKC I</b>	CIYCGRG	Ava I	<b>Fun II</b>	GAATTC	EcoR I	<b>Sph I</b>	GCATGIC	Sph I
<b>BsiS I</b>	CICGG	BsiS I	<b>Hae III</b>	GGICC	BshF I	<b>SseB I</b>	AGGICCT	SseB I
<b>BsoB I</b>	CIYCGRG	Ava I	<b>Hap II</b>	CICGG	BsiS I	<b>Ssp I</b>	AATATT	Ssp I
<b>Bsp106 I</b>	ATTCGAT	BseC I	<b>Hinc II</b>	GTYIRAC	Hinc II	<b>Sst I</b>	GAGCTIC	Sst I
<b>Bsp119 I</b>	TTICGAA	Asu II	<b>Hind II</b>	GTYIRAC	Hinc II	<b>Stu I</b>	AGGICCT	SseB I
<b>Bsp120 I</b>	GICGGCC	{Apa I}	<b>Hind III</b>	AAGCTT	Hind III	<b>Sty I</b>	CICWWGG	Sty I
<b>Bsp13 I</b>	TTCGGGA	BseA I	<b>Hinf I</b>	GAATC	Hinf I	<b>Taq I</b>	TICGA	Taq I
<b>Bsp143 I</b>	IGATC	{Dpn I}, Mbo I, Sau3A I	<b>Hpa I</b>	GTTAAC	Hpa I	<b>Tel I</b>	GACNINNGTC	Tth111 I
<b>Bsp19 I</b>	CICATGG	Nco I	<b>Hpa II</b>	CICGG	BsiS I	<b>Tli I</b>	CTTCGAG	Sla I
<b>Bsp68 I</b>	TCGICGA	Nru I	<b>Kas I</b>	GICGGCC	{Nar I}	<b>Tth111 I</b>	GACNINNGTC	Tth111 I
<b>BspAN I</b>	GGICC	BshF I	<b>Kpn I</b>	GGTACIC	Kpn I	<b>Vha464 I</b>	CITTAAG	MspC I
<b>BspC I</b>	CGATTCG	Pvu I	<b>Kpn2 I</b>	TTCGGGA	BseA I	<b>Xba I</b>	TTCTAGA	Xba I
<b>BspD I</b>	ATTCGAT	BseC I	<b>Ksp I</b>	CCGICGG	SgrB I	<b>Xho I</b>	CTTCGAG	Sla I
<b>BspE I</b>	TTCGGGA	BseA I	<b>Ksp22 I</b>	TIGATCA	Bcl I	<b>Xma I</b>	CICGGG	{Sma I}
<b>BspT I</b>	CITTAAG	MspC I	<b>KspA I</b>	GTTAAC	Hpa I	<b>XmaC I</b>	CICGGG	{Sma I}
<b>BspT104 I</b>	TTICGAA	Asu II	<b>Kzo9 I</b>	IGATC	{Dpn I}, Mbo I, Sau3A I	<b>Xmi I</b>	GTIMKAC	Acc I
<b>BspX I</b>	ATTCGAT	BseC I	<b>Mbo I</b>	IGATC	{Dpn I}, Mbo I, Sau3A I	<b>Zho I</b>	ATTCGAT	BseC I
<b>BsrF I</b>	RCCGGY	BssA I	<b>Mbo II</b>	GAAGA (8/7)	Mbo II	<b>Zrm I</b>	AGTIACT	Sca I
<b>BssA I</b>	RCCGGY	BssA I	<b>Mlu I</b>	AICCGGT	Mlu I			
<b>BssH I</b>	CTTCGAG	Sla I	<b>Mly113 I</b>	GGICGCC	Nar I			
<b>BssH II</b>	GICGGC	BssH II	<b>Mnl I</b>	CCTC (7/6)	Mnl I			
<b>BssT1 I</b>	CICWWGG	Sty I	<b>Mro I</b>	TTCGGGA	BseA I			
<b>Bst2U I</b>	CCIWGG	BseB I	<b>MroN I</b>	GICGGC	{Nae I}			
<b>Bst98 I</b>	CITTAAG	MspC I	<b>Msp I</b>	CICGG	BsiS I			
<b>BstB I</b>	TTICGAA	Asu II	<b>MspC I</b>	CITTAAG	MspC I			
<b>BstE II</b>	GIGTNACC	BstE II	<b>Mva I</b>	CCIWGG	BseB I			
<b>BstEN II</b>	IGATC	{Dpn I}, Mbo I, Sau3A I	<b>Mvr I</b>	CGATTCG	Pvu I			
<b>BstF5 I</b>	GGATG (2/0)	{Fok I}	<b>Nae I</b>	GCCIGCC	Nae I			
<b>BstKT I</b>	GATTC	{Dpn I}, {Mbo I}, {Sau3A I}	<b>Nar I</b>	GGICGGC	Nar I			
<b>BstMA I</b>	CTGCAIG	Pst I	<b>Nco I</b>	CICATGG	Nco I			

Enzyme available from Jena Bioscience

Isochizomer available from Jena Bioscience

Neoschizomer available from Jena Bioscience

- Single Letter Code: R = A or G, Y = C or T, M = A or C, K = G or T, S = C or G, W = A or T, H = A or C or T, B = C or G or T, V = A or C or G, D = A or G or T, N = A or C or G or T
- Isochizomers have same recognition sequence and cutting pattern.
- Neoschizomers (same recognition sequence but different cutting pattern) are indicated with brackets {enzyme}.





## Restriction Enzymes Buffer Guide

Find relative activities of restriction enzyme related to Jena Bioscience buffer system listed below. Enzyme activity under optimal conditions is assumed to be 100 %.

Reactions were carried out at 37 °C (unless indicated otherwise) and in the presence of BSA, 100 µg/ml, except for Fok I (200 µg/ml). In-house experiments show that BSA significantly enhances digestion efficiencies. Its presence enables complete and reproducible cleavage for a broad range of DNA substrates. It further stabilizes the enzymes during digestions of more than one hour at 37 °C whereas usually, restriction endonucleases in reaction buffers lacking BSA are stable less than 10–20 minutes. Also, BSA binds metal ions, and other chemicals that are potentially present in buffers or DNA preparations, leading to inactivation of restriction endonucleases.

Restriction Enzyme	JBS Reaction Buffer	Reaction Conditions <sup>1</sup>		Enzyme activity (%) <sup>2</sup>					
		min. Time	Temp.	UB	B1	B2	B3	B4	B5
<b>Acc I</b>	UB	60 min	37 °C	100	100	75	<25	–	100
<b>Alu I</b>	UB	5 min	37 °C	100	100	100	75	10–25	75
<b>Apa I</b>	UB	60 min	25 °C	100	25	50	0	–	100
<b>ApaL I</b>	B1	15 min	37 °C	75–100	100	100	10	<10	10–25
<b>Asu II</b>	B2	5 min	37 °C	75–100	75	100	50–75	25	50
<b>Ava I</b>	UB	60 min	37 °C	100	25	100	50	–	25
<b>Ava II</b>	B5	60 min	37 °C	–	50	50	10	–	100
<b>BamH I</b>	UB	5 min	37 °C	100	75	75–100	100	50–75	75
<b>Ban II</b>	UB	60 min	37 °C	100	75	25	50	–	100
<b>Bcl I</b>	B2	5 min	50 °C	75–100	10–25	100	75	50–75	10–25
<b>Bgl I</b>	Bgl I Buffer	5 min	37 °C	75–100	10–25	75–100	75–100	75–100	50
<b>Bgl II</b>	B3	5 min	37 °C	75–100	10	75	100	75–100	10
<b>BseA I</b>	BseA I Buffer	5 min	55 °C	75–100	10	50	75–100	50–75	10
<b>BseB I</b>	B2	5 min	60 °C	75–100	10–25	100	50	25–50	<10
<b>BseC I</b>	B3	5 min	55 °C	75–100	10	50	100	75–100	50
<b>BshF I</b>	B5	5 min	37 °C	75–100	50–75	75–100	75	50–75	100
<b>BsiS I</b>	BsiS I Buffer	5 min	55 °C	75–100	25	50	25	10–25	100
<b>BssA I</b>	BssA I Buffer	5 min	65 °C	75–100	10	25	75	50	25
<b>BssH II</b>	UB	60 min	50 °C	100	100	100	100	–	100
<b>BstE II</b>	UB	5 min	60 °C	100	50	50–75	75–100	50	75
<b>BstX I</b>	B3	60 min	50 °C	75–100	<25	100	100	–	50
<b>CspA I</b>	CspA I Buffer	5 min	37 °C	75–100	50	<10	<10	<10	<10
<b>Dpn I</b>	UB	5 min	37 °C	100	75–100	75–100	50–75	10	75–100
<b>Dra I</b>	B5	60 min	37 °C	75–100	100	100	75	–	100
<b>EcoR I</b>	EcoR I Buffer	5 min	37 °C	75–100	25–50	50–75	75	50–75	75
<b>EcoRV</b>	B2	15 min	37 °C	75–100	10–25	100	50	<10	75
<b>Fok I</b>	B2	60 min	37 °C	75–100	–	–	–	–	–
<b>Hinc II</b>	Hinc II Buffer	60 min	37 °C	75–100	50	50	50	–	50
<b>Hind III</b>	UB	5 min	37 °C	100	25–50	100	10–25	10–25	50
<b>Hinf I</b>	B3	5 min	37 °C	75–100	10–25	50	100	75–100	50
<b>Hpa I</b>	B5	5 min	37 °C	75–100	25–50	10–25	10–25	10–25	100
<b>Kpn I</b>	Kpn I Buffer	5 min	37 °C	75–100	75–100	25–50	<10	<10	50
<b>Mbo I</b>	Mbo I Buffer	5 min	37 °C	75–100	50–100	50–100	50–100	50	50–100
<b>Mbo II</b>	B1	60 min	37 °C	75–100	100	50	25	–	100
<b>Mlu I</b>	B3	60 min	37 °C	75–100	25	75	100	–	50
<b>Mnl I</b>	UB	60 min	37 °C	100	75	100	50	–	75
<b>MspC I</b>	B4	5 min	37 °C	75–100	<10	25–50	75–100	100	50
<b>Nae I</b>	B1	5 min	37 °C	75–100	100	25–50	25	<10	50
<b>Nar I</b>	Nar I Buffer	60 min	37 °C	75–100	–	–	–	–	–
<b>Nco I</b>	UB	5 min	37 °C	100	50–75	75–100	100	100	75
<b>Nde I</b>	B5	60 min	37 °C	75–100	50	100	75	–	100
<b>Nhe I</b>	B5	5 min	37 °C	75–100	100	50–75	0–20	<10	100
<b>Not I</b>	UB	20 min	37 °C	100	<10	25–50	75–100	75	50
<b>Nru I</b>	UB	5 min	37 °C	100	<10	<10	75	50–75	10
<b>PspP I</b>	B2	5 min	25 °C	75–100	50–75	100	50	25–50	10
<b>Pst I</b>	Pst I Buffer	5 min	37 °C	75–100	10–25	50–75	75–100	50–75	50
<b>Pvu I</b>	B3	60 min	37 °C	75–100	<25	75	100	–	50
<b>Pvu II</b>	B2	5 min	37 °C	25–50	25–50	100	100	25–50	50
<b>Rsa I</b>	B2	5 min	37 °C	75–100	75–100	100	50	<10	<10
<b>Rsr II</b>	B5	60 min	37 °C	–	50	75	<25	–	100
<b>Sal I<sup>3</sup></b>	UB	5 min	37 °C	100	<10	25–50	50	100	<10
<b>Sau3A I</b>	B2	60 min	37 °C	75–100	50	100	50	<10	50
<b>Sca I</b>	UB	5 min	37 °C	100	<10	50–75	100	75–100	25
<b>Sfi I</b>	UB	5 min	50 °C	100	75–100	100	25–50	10–25	75–100
<b>SgrB I</b>	UB	5 min	37 °C	100	75–100	75	50–75	25–50	<10

Restriction Enzyme	JBS Reaction Buffer	Reaction Conditions <sup>1</sup>		Enzyme activity (%) <sup>2</sup>					
		min. Time	Temp.	UB	B1	B2	B3	B4	B5
<i>Sla</i> I	UB	5 min	37 °C	100	25–50	75	75–100	100	10–25
<i>Sma</i> I	UB	5 min	25 °C	100	<10	<10	<10	<10	100
<i>Sna</i> B I	UB	5 min	37 °C	100	50–75	50	25	<10	100
<i>Spe</i> I	B2	60 min	37 °C	75–100	75	100	50	–	75
<i>Sph</i> I	UB	5 min	37 °C	100	75–100	100	50	50	50
<i>Sse</i> B I	UB	5 min	37 °C	100	50–75	75–100	100	50–75	50
<i>Ssp</i> I	B3	5 min	37 °C	75–100	10–25	50–75	100	75–100	50
<i>Sst</i> I	UB	5 min	37 °C	100	100	25–50	25	<10	50
<i>Sty</i> I	UB	5 min	37 °C	100	25–50	75–100	100	75–100	<10
<i>Taq</i> I	Taq I Buffer	15 min	65 °C	75–100	10–25	50–75	75–100	50–75	50
<i>Tth</i> 111 I	UB	60 min	65 °C	100	100	25	25	–	100
<i>Xba</i> I	UB	5 min	37 °C	100	50–75	100	75	75	75

• Please keep in mind that different isoschizomers with the same specificity, supplied by different suppliers, could be of distinct origin and may vary in optimal reaction conditions or other properties. For this reason we recommend the use of original Jena Bioscience reaction buffers and assay conditions to achieve best results.

• The following enzymes can exhibit "star" activity under certain conditions: *Bam*H I, *Bcl* I, *Bse*B I, *Bss*A I, *Bss*H II, *Eco*R I, *Eco*R V, *Hind* III, *Hpa* I, *Kpn* I, *Nco* I, *Nru* I, *Pst* I, *Pvu* II, *Sal* I, *Sca* I, *Sna*B I, *Sph* I, *Ssp* I, *Xba* I.

1 Recommended amount of enzyme: One  $\mu$ l enzyme per  $\mu$ g DNA substrate.

2 Upon request all buffers are available separately.

3 Apply 2x UB final concentration.

<b>Universal Buffer</b>	<b>10x UB</b>	proprietary
<b>Buffer 1</b>	<b>10x B1</b>	100 mM Tris-HCl (pH 7.9 at 25 °C) 100 mM MgCl <sub>2</sub> 10 mM Dithiothreitol 1 mg/ml BSA
<b>Buffer 2</b>	<b>10x B2</b>	100 mM Tris-HCl (pH 7.9 at 25 °C) 100 mM MgCl <sub>2</sub> 500 mM NaCl 10 mM Dithiothreitol 1 mg/ml BSA
<b>Buffer 3</b>	<b>10x B3</b>	500 mM Tris-HCl (pH 7.9 at 25 °C) 100 mM MgCl <sub>2</sub> 1000 mM NaCl 10 mM Dithiothreitol 1 mg/ml BSA
<b>Buffer 4</b>	<b>10x B4</b>	100 mM Tris-HCl (pH 7.9 at 25 °C) 100 mM MgCl <sub>2</sub> 1500 mM NaCl 10 mM Dithiothreitol 1 mg/ml BSA
<b>Buffer 5</b>	<b>10x B5</b>	200 mM Tris-Acetate (pH 7.9 at 25 °C) 100 mM Mg-Acetate 500 mM K-Acetate 10 mM Dithiothreitol 1 mg/ml BSA

#### Buffer system of Jena Bioscience restriction enzymes

• Some restriction endonucleases require Triton-X (TX-100). This means that 100 % of the activity is obtained using this additive. Several enzymes – *Bam*H I, *Bgl* I, *Bse*A I, *Bsi*S I, *Bss*A I, *Bst*E II, *Csp*A I, *Dpn* I, *Eco*R I, *Fok* I, *Hinc* II, *Kpn* I, *Mbo* I, *Mme* I, *Nar* I, *Not* I, *Nru* I, *Pst* I, *Sca* I, *Sna*B I and *Taq* I – require unique buffers for optimal reaction conditions. The composition of each unique buffer is presented in specific restriction endonuclease description and as well in the Data Sheet provided with each Enzyme.

• 10x reaction buffers should be thawed completely and mixed thoroughly before using.



## Modifying Enzymes

DNA Polymerases			
Product	Cat.-No.	Amount	Price (EUR)
<b>DNA Polymerase I, Klenow Fragment</b> Fragment of DNA Polymerase I lacking 5'→3' exonuclease activity	EN-148S	300 units	25,00
	EN-148L	5× 300 units	100,00
<b>DNA Polymerase I, Klenow Fragment, 3'→5' exo-</b> Fragment of DNA Polymerase I lacking 5'→3' and 3'→5' exonuclease activity	EN-151S	200 units	28,70
	EN-151L	5× 200 units	114,80

Find **Jena Bioscience thermophilic polymerases** (page 8)

Ligases / Phosphatases / Kinases			
Product	Cat.-No.	Amount	Price (EUR)
<b>T4 DNA Ligase</b> <i>E. coli</i> lambda lysogen NM 989	EN-149S	400 Weiss units	25,00
	EN-149L	5× 400 Weiss units	100,00
<b>Shrimp Alkaline Phosphatase (rSAP)</b> recombinant, <i>Pichia pastoris</i> , <i>Pandalus borealis</i>	EN-174S	400 units	70,00
	EN-174L	5× 400 units	280,00
<b>T4 dNMP Kinase,</b> T4 deoxy-Nucleotide Monophosphate Kinase Bacteriophage T4, recombinant, <i>E. coli</i>	PR-340	100 µg	207,00

Nucleases			
Product	Cat.-No.	Amount	Price (EUR)
<b>DNase I (RNase free)</b> DNA modifying enzyme, Bovine pancreas	EN-173S	2.000 Kunitz units	49,00
	EN-173L	5× 2.000 Kunitz units	196,00
<b>RNase I (DNase free)</b> recombinant, <i>E. coli</i> , Endonuclease	EN-176S	2.000 units	32,00
	EN-176L	5× 2.000 units	232,00
<b>Exonuclease I</b> recombinant, <i>E. coli</i>	EN-177S	4 kunits	55,00
	EN-177L	5× 4 kunits	220,00
<b>Exonuclease III</b> recombinant, <i>E. coli</i>	EN-157S	10 kunits	55,00
	EN-157L	5× 10 kunits	220,00

## Cloning Kit

The CyClone Ligase-free Cloning Kit generates plasmids to be used for transformation in only two simple steps. No time consuming ligation step is necessary.

Product	Cat.-No.	Size	Price (EUR)
<b>CyClone Ligase-free Cloning Kit</b> Efficient plasmid construction for transformation of <i>Escherichia coli</i>	PP-110S	20 Assays	98,00
	PP-110L	100 Assays	392,00

## Random Mutagenesis Kits

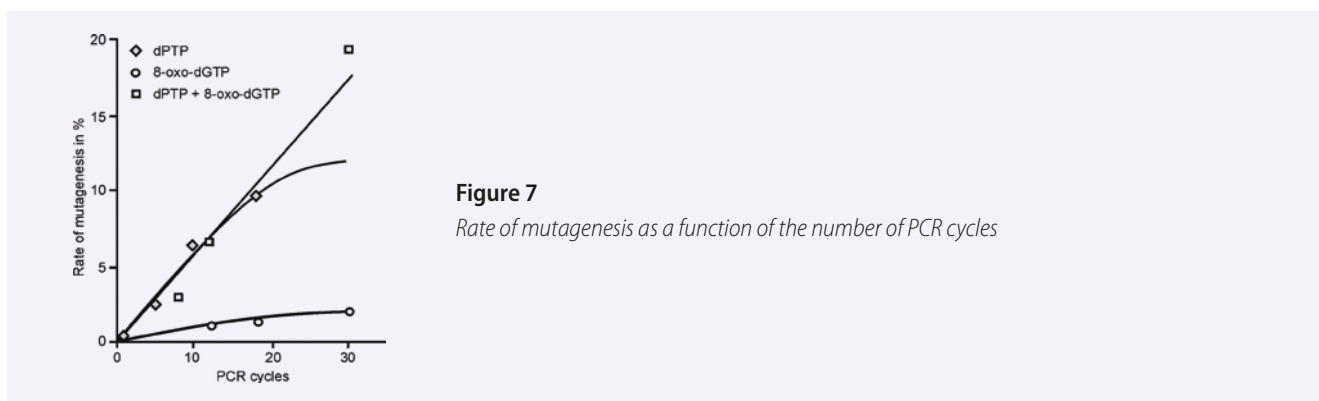
The unique Jena Bioscience product series for random mutagenesis consists of ready-to-go kits for inserting random mutations into your gene of interest. All materials are accompanied by a streamlined documentation that maximizes success.

Within three billion years of evolution, nature has produced a plethora of proteins simply by repeated cycles of random mutagenesis followed by *in vivo* selection for superior function of the encoded proteins. This example of natural evolution has guided researchers within the last two decades to develop strategies for *in vitro* permutation of proteins.

Among the variety of strategies applied, three major powerful techniques have emerged.

### Mutagenesis by dNTP Analogs

The method can achieve rates of mutagenesis of up to 20%. It is based on incorporation of mutagenic dNTP analogs (8-oxo-dGTP and dPTP) into an amplified DNA fragment by a standard PCR. The mutagenic dNTPs are eliminated by a second PCR step in the presence of the four natural dNTPs, leaving highly mutated DNA ready for further investigation.

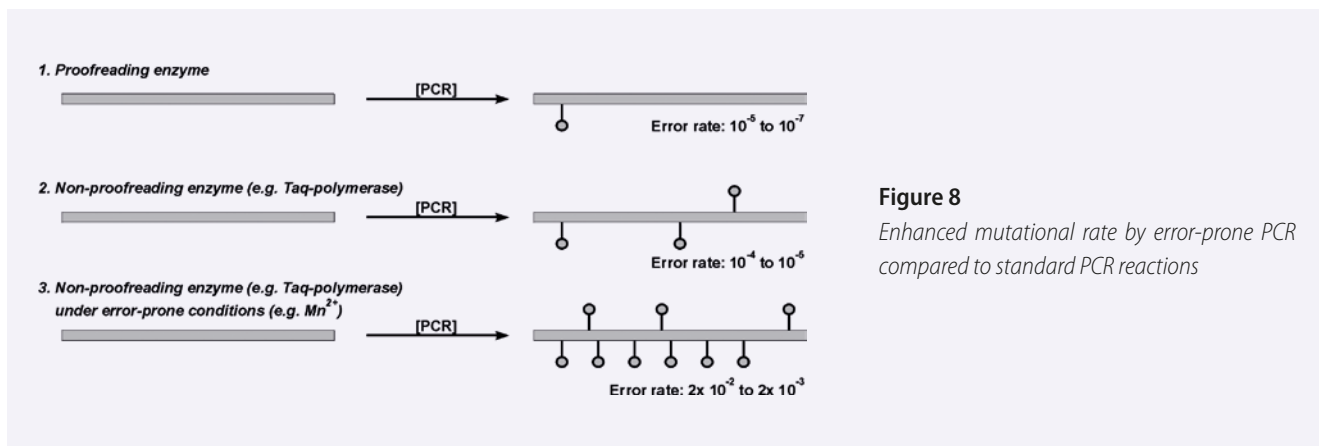


**Figure 7**  
Rate of mutagenesis as a function of the number of PCR cycles

Product	Cat.-No.	Size	Price (EUR)
<b>JBS dNTP-Mutagenesis Kit</b> Random Mutagenesis by dNTP Analogs	PP-101	15 reactions	240,00

### Mutagenesis by Error-Prone PCR

Mutagenesis is performed by a PCR reaction under conditions (increased MgCl<sub>2</sub> concentration, additional MnCl<sub>2</sub> and unbalanced dNTP ratio) that induce an increased error-rate of the DNA-polymerase. Simply run the PCR protocol provided in the manual and achieve rates of mutagenesis in the range of 0.6–2.0% in a single PCR step!



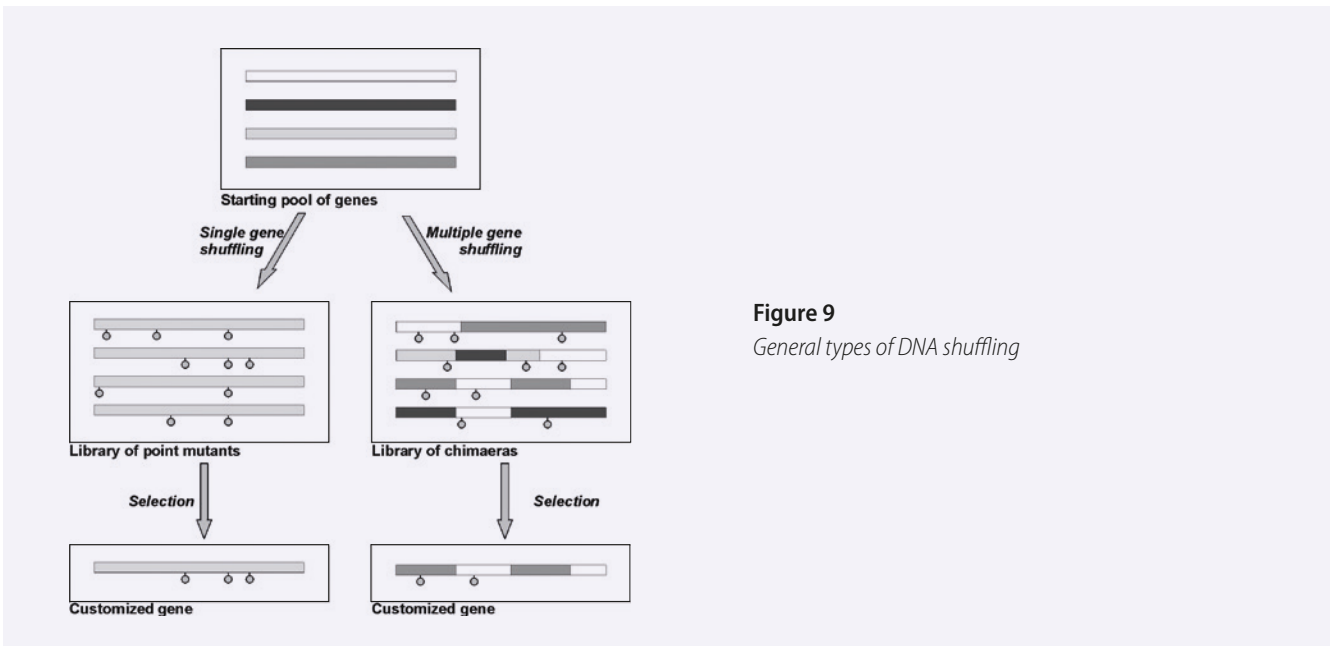
**Figure 8**  
Enhanced mutational rate by error-prone PCR compared to standard PCR reactions

Product	Cat.-No.	Size	Price (EUR)
<b>JBS Error-Prone Kit</b> Random Mutagenesis by Error-Prone PCR	PP-102	15 reactions	190,00



### Mutagenesis by DNA Shuffling

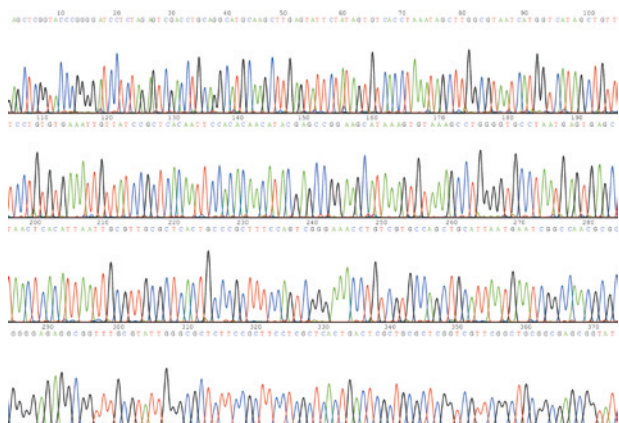
Developed by Stemmer (1994) DNA shuffling generates libraries by random fragmentation of one gene or a pool of related genes, followed by the reassembly of the fragments in a self-priming PCR reaction. The rates of mutagenesis are similar to the error-prone PCR but DNA shuffling allows the recombination of sequences from different, related genes.



**Figure 9**  
General types of DNA shuffling

Product	Cat.-No.	Size	Price (EUR)
<b>JBS DNA-Shuffling Kit</b> Random Mutagenesis by DNA Shuffling	PP-103	15 reactions	240,00

### DNA Sequencing



Our **DNA Cycle Sequencing Kit** is designed for DNA sequencing using the Sanger Method (dideoxy chain termination method). The performance of the kit is based on a specifically modified Taq polymerase capable of incorporating ddNTPs and dNTPs equally. Uniform band patterns and low background signals are achieved. The termination mixtures containing 7-deaza-dGTP ensures minimal band compression of GC-rich DNA regions. The reaction chemistry of the kit is optimized for automated DNA sequencers and requires fluorescent-labeled primers.

Product	Cat.-No.	Size	Price (EUR)
<b>DNA Cycle Sequencing Kit</b> for sequencing based on fluorescent-labeled primers	PCR-401S	100 reactions	150,00
	PCR-401L	500 reactions	600,00

Also available: **Sequencing Polymerase** (#PCR-206) for incorporation of ddNTPs (page 8).

## Molecular Biology Buffers and Reagents

Jena Bioscience offers a broad range of pre-mixed buffers and stock solutions, provided ready-to-use.

Product	Cat.-No.	Concentration & pH	Amount	Price (EUR)
Ammonium Acetate Solution	BU-101	5 M	100 ml	25,00
BSA Solution	BU-102	10 mg/ml	2x 1 ml	38,00
Calcium Chloride Solution	BU-103	2.5 M	100 ml	25,00
DTT Solution	BU-104	1 M	2x 1 ml	38,00
EDTA Solution	BU-105	0.5 M, pH 8.0	100 ml	25,00
Hepes Buffer	BU-106-70	1 M, pH 7.0	100 ml	35,00
Hepes Buffer	BU-106-75	1 M, pH 7.5	100 ml	35,00
Imidazole	CSS-095	1 M, pH 6.5	100 ml	45,00
Imidazole	CSS-355	1 M, pH 7.0	100 ml	45,00
Imidazole	CSS-344	1 M, pH 7.5	100 ml	45,00
Imidazole	CSS-345	1 M, pH 8.0	100 ml	45,00
Imidazole	CSS-346	1 M, pH 9.0	100 ml	45,00
Magnesium Chloride Solution	BU-110-100	100 mM	100 ml	25,00
Magnesium Chloride Solution	BU-110-1M	1 M	100 ml	35,00
Magnesium Sulfate Solution	BU-111-100	100 mM	100 ml	25,00
Magnesium Sulfate Solution	BU-111-1M	1M	100 ml	35,00
MES Buffer	BU-109	1 M, pH 6.5	100 ml	35,00
MOPS Running Buffer	BU-112S	10x conc	100 ml	35,00
	BU-112L		1 l	140,00
PBS Buffer	BU-115S-1	1x conc, pH 7.6	100 ml	20,00
	BU-115L-1		1 l	25,00
	BU-115S-10	10x conc, pH 7.6	100 ml	25,00
	BU-115L-10		1 l	35,00
PCR-grade Water	PCR-258S	-	10x 1,2 ml	14,00
	PCR-258L		50 ml	16,00
	PCR-258XL		500 ml	28,00
Potassium Acetate Solution	BU-107	3 M, pH 5.2	100 ml	25,00
Potassium Chlorid Solution	BU-108-100	100 mM	100 ml	25,00
Potassium Chlorid Solution	BU-108-3M	3 M	100 ml	35,00
SDS PAGE Sample Buffer	BU-117	5x conc	1 l	20,00
Sodium Acetate Solution	BU-113	3 M, pH 5.2	100 ml	25,00
Sodium Chloride Solution	BU-114-100	100 mM	100 ml	25,00
Sodium Chloride Solution	BU-114-5M	5 M	100 ml	35,00
SSC Buffer	BU-118S	20x conc	100 ml	24,00
	BU-118L		1 l	48,00
TAE Buffer	BU-119-10	10x conc	1 l	32,00
TAE Buffer	BU-119-50	50x conc	1 l	48,00
TBE Buffer	BU-120	10x conc	1 l	24,00
Tris-EDTA Buffer	BU-121S-1	1x conc, pH 7.6	100 ml	24,00
	BU-121L-1		1 l	48,00
Tris-EDTA Buffer	BU-121S-100	100x conc, pH 7.6	100 ml	35,00
	BU-121L-100		1 l	140,00
Tris-Glycine Buffer	BU-122	10x conc	1 l	48,00
Tris-Glycine-SDS Buffer	BU-123	Tris-Glycine-SDS Buffer, 10x conc	1 l	48,00
Tris-HCl Buffer	BU-124S-70	1 M, pH 7.0	100 ml	24,00
	BU-124L-70		1 l	48,00
Tris-HCl Buffer	BU-124S-80	1 M, pH 8.0	100 ml	24,00
	BU-124L-80		1 l	48,00
Tris-HCl Buffer	BU-124S-85	1 M, pH 8.5	100 ml	24,00
	BU-124L-85		1 l	48,00

## RNA/DNA Preparation and Cleanup

### Total RNA Purification Kit

**Total RNA Purification Kit** is designed for isolation of small amounts of total RNA from various samples including blood, animal and plant tissue, bacteria and viruses.

Product	Cat.-No.	Size	Price (EUR)
<b>Total RNA Purification Kit</b> Isolation of total RNA by silica-gel membrane adsorption	PP-210XS	10 preparations	24,00
	PP-210S	50 preparations	90,00
	PP-210L	250 preparations	360,00
<b>qDNA Removal Kit</b> Removal of contaminating gDNA from RNA	PP-219	50 preparations	85,00

### Plasmid DNA Purification



**Fast-n-Easy DNA purification Series** is designed for isolation of high-purity plasmid or cosmid DNA from cells for subsequent sequencing, restriction digests or transformations. Through column based DNA isolation method, no time consuming phenol-chloroform extraction and alcohol precipitation are required. Protocol can either be applied on micro-centrifuges or on vacuum manifolds.

Product	Cat.-No.	Size	Price (EUR)
<b>Fast-n-Easy Plasmid Mini-Prep Kit</b> Column based isolation of plasmid DNA	PP-204XS	10 preparations	12,00
	PP-204S	50 preparations	45,00
	PP-204L	250 preparations	180,00
<b>Fast-n-Easy Plasmid Midi-Prep Kit</b> Column based isolation of plasmid DNA, midi-scale	PP-211S	20 preparations	138,00
	PP-211L	100 preparations	552,00
<b>Fast-n-Easy Plasmid Maxi-Prep Kit</b> Column based isolation of plasmid DNA, maxi-scale	PP-212S	10 preparations	156,00
	PP-212L	50 preparations	624,00

 Need Refill? **Fast-n-Easy Plasmid Mini-Prep Columns and Collection tubes** are available for purchase individually!

Product	Cat.-No.	Size	Price (EUR)
<b>Fast-n-Easy Plasmid Mini-Prep Kit - Refill Pack</b> Spin Columns and Collection Tubes	PP-220	100 preparations	45,00
<b>Fast-n-Easy Plasmid Midi-Prep Kit - Refill Pack</b> Pre Columns, Binding Columns and Collection Tubes	PP-221	40 Pre Columns + 40 Binding Columns	138,00
<b>Fast-n-Easy Plasmid Maxi-Prep Kit - Refill Pack</b> Pre Columns, Binding Columns and Collection Tubes	PP-222	20 Pre Columns + 20 Binding Columns	156,00

## DNA Cleanup

**DNA Preparation and Cleanup Kits** remove impurities of PCR reaction mixes (e.g. primer dimers, primers, nucleotides, proteins, salt, agarose, ethidium bromide) based on silica-membrane technology. Purification of linear and circular DNA (100 bp to 10 kb) without organic extractions is achieved.

**SAP-Exo Kit** removes excess primers and dNTPs within 15 minutes. The kit is specially recommended to clean-up PCR products for subsequent applications like sequencing, genotyping, cloning or SNP analysis.

**Nucleotide Removal Kit** allows separation of non-incorporated dye-labeled, marker-labeled or unlabeled nucleotides from DNA. The kits contain ready-to-use spin columns preloaded with a gel filtration resin.

Product	Cat.-No.	Size	Price (EUR)
<b>PCR Purification Kit</b> Spin-column based DNA cleanup from PCR samples	PP-201XS	10 preparations	12,00
	PP-201S	50 preparations	45,00
	PP-201L	250 preparations	180,00
<b>Agarose Gel Extraction Kit</b> Spin-column based DNA cleanup from agarose gels	PP-202XS	10 preparations	12,00
	PP-202S	50 preparations	45,00
	PP-202L	250 preparations	180,00
<b>SAP-Exo Kit</b> Shrimp Alkaline Phosphatase + Exonuclease I for cleanup of PCR products	PP-218S	200 reactions × 10 µl	105,00
	PP-218L	1.000 reactions × 10 µl	420,00
<b>Nucleotide/Dye Removal Kit</b> Fast removal of unincorporated dye-nucleotides or dye-terminators	PP-216XS	10 preparations	24,00
	PP-216S	50 preparations	95,00
	PP-216L	250 preparations	380,00





## Genomic DNA Preparation, column based

**Spin column based genomic DNA preparation kits** are designed for isolation of genomic DNA from whole blood, tissue culture cells, animal tissue, plant tissue, yeast, gram-positive and gram-negative bacteria. The spin column based method completely removes PCR inhibitors such as divalent cations and proteins. The obtained DNA is suitable for a variety of applications, including real-time PCR, southern blot analysis, genotyping and discovery or validation of SNP/SSR markers.

Product	Cat.-No.	Size	Price (EUR)
<b>Blood-Animal-Plant DNA Preparation Kit</b> Spin column based genomic DNA purification from blood, animal and plant cells	PP-213XS	10 preparations	17,50
	PP-213S	50 preparations	70,00
	PP-213L	250 preparations	280,00
<b>Bacteria DNA Preparation Kit</b> Spin column based genomic DNA purification from bacteria	PP-214XS	10 preparations	20,00
	PP-214S	50 preparations	80,00
	PP-214L	250 preparations	320,00
<b>Yeast DNA Preparation Kit</b> Spin column based genomic DNA purification from yeast	PP-215XS	10 preparations	20,00
	PP-215S	50 preparations	80,00
	PP-215L	250 preparations	320,00

## Genomic DNA Purification, solution based

**Genomic DNA Purification Kits** allow isolation of total DNA from a variety of sample sources including whole blood, bacteria, plant cells, fresh or frozen animal tissues and cells or yeast. The solution based systems minimize DNA fragmentation that may be problematic in other spin-column / filtration based methods. Enhanced safety and environmental compatibility are obtained as no phenol or chloroform is applied.

Product	Cat.-No.	Size	Price (EUR)
<b>Blood DNA Preparation Kit</b> Genomic DNA purification from whole blood	PP-205XS	20 preparations	13,50
	PP-205S	100 preparations	54,00
	PP-205L	500 preparations	216,00
<b>Bacteria DNA Preparation Kit</b> Genomic DNA purification from bacteria	PP-206XS	20 preparations	15,25
	PP-206S	100 preparations	61,00
	PP-206L	500 preparations	245,00
<b>Plant DNA Preparation Kit</b> Genomic DNA purification from plant tissue	PP-207XS	20 preparations	13,50
	PP-207S	100 preparations	54,00
	PP-207L	500 preparations	216,00
<b>Animal and Fungi DNA Preparation Kit</b> Genomic DNA purification from animal tissue and fungi	PP-208XS	20 preparations	13,50
	PP-208S	100 preparations	54,00
	PP-208L	500 preparations	216,00
<b>Yeast DNA Preparation Kit</b> Genomic DNA purification from yeast	PP-209XS	20 preparations	15,25
	PP-209S	100 preparations	61,00
	PP-209L	500 preparations	245,00

## Custom Oligonucleotides

### PCR Primer

**DNA Primers** from Jena Bioscience are synthesized according to custom primer sequence. They are suitable for a variety of molecular biology or analytical/diagnostic applications ranging from simple PCR and sequencing to probes for quantitative gene detection.

Scale [ $\mu\text{mol}$ ]	Standard Purification*		HPLC Purification	
	€ per base	Yield [OD <sub>260</sub> ]	€ per base	Yield [OD <sub>260</sub> ]
0.02**	0,29	3	0,85	1
0.04	0,37	5	0,98	2.5
0.2	0,98	16	1,49	8
1.0	2,40	80	2,98	35

\* Standard and OPC purification can only be ordered for oligos <45 bases.

\*\* The 0.02  $\mu\text{mol}$  scale can only be ordered for oligos <34 bases. Guaranteed yields apply for a 20mer + / - 20%. For oligos >33 bases we cannot give a yield guarantee. No extra charge for 5' and internal wobbles (degenerated bases). 3' wobbles require a setup fee of 20. For technical reasons we have to double the price per base for oligos >80 bases.

### Amount of DNA

A yield of 1 OD<sub>260</sub> represents approximately 33  $\mu\text{g}$  of single-stranded DNA with an equal number of the four bases. This corresponds to approximately 5 nmol (50  $\mu\text{l}$  / 100  $\mu\text{M}$ ) of a 20-mer oligonucleotide.

### Storage

Avoid repetitive freeze/thaw cycles and long term storage at concentrations below 20  $\mu\text{M}$ . Aliquot oligonucleotides before freezing.

### Synthesis Report

A comprehensive Synthesis Report comes along with every oligo, indicating its name and sequence, synthesis scale and yield (OD,  $\mu\text{g}$ , nmol), delivery mode (lyophilized or solution), molecular weight, melting temperature, GC-content, purification mode and quality control.

Delivery Mode	Storage Temperature	Shelf Life
Lyophilized	-20 °C	1 year
Lyophilized	Room temperature	2 months
Solution	-20 °C	6 months
Solution	Room temperature	1 week



Analyze your oligonucleotide (GC content, melting temperature  $T_m$ , concentration) with our Jena Bioscience **Oligonucleotide Data Calculator**



## Single Labeled Oligos

A large variety of **Modified Oligonucleotides** is available from Jena Bioscience in Standard and HPLC purification. For other modifications, larger scales or further information please inquire ([info@jenabioscience.com](mailto:info@jenabioscience.com)).

Modification	5' Flourescent Label	5' Non-Flourescent Label	3' Flourescent Label	3' Non-Flourescent Label	Internal Flourescent Label	Internal Non-Flourescent Label
2' Deoxyuridine		✓		✓		✓
FAM	✓		✓		✓	
AldC		✓		✓		✓
AldU		✓		✓		✓
Alkyne				✓		
Alrol				✓		
Alxyl		✓				
Atto 425	✓		✓		✓	
Atto 550	✓		✓		✓	
Atto 647N	✓		✓			
BHQ-1				✓		
BHQ-2				✓		
BHQ-3				✓		
Biotin		✓		✓		
Biotin-dT **						✓
C2 Amino-dT						✓
C6 Amino		✓				
C6 Amino-dT						✓
C7 Amino				✓		
C12 Amino		✓				
C8 Alkyne-dC		✓		✓		✓
C8 Alkyne-dU		✓		✓		✓
C3 spacer		✓		✓		✓
C6 spacer						✓
C9 spacer		✓		✓		
C12 spacer						✓
Cholesteryl-TEG		✓		✓		
Cy3	✓		✓		✓	
Cy5	✓		✓		✓	
Cy5.5	✓		✓		✓	
Dabcyl				✓		
ddC				✓		



Find **Dual Labeled Probes** on page 16.

Modification	5' Fluorescent Label	5' Non-Fluorescent Label	3' Fluorescent Label	3' Non-Fluorescent Label	Internal Fluorescent Label	Internal Non-Fluorescent Label
Digoxigenin		✓				
dspacer						✓
FITC	✓		✓		✓	
Fluorescein	✓		✓		✓	
HEG spacer		✓		✓		✓
HEX	✓		✓		✓	
Hexynyl		✓				
Inosine		✓		✓		✓
Inverted dT				✓		
IRD 700	✓					
IRD 800	✓					
JOE	✓		✓		✓	
Methylcytosin		✓		✓		✓
pdC						✓
pdU						✓
Phosphate		✓		✓		
ROX	✓		✓		✓	
TAMRA	✓		✓		✓	
TET	✓		✓		✓	
Texas Red	✓		✓		✓	
Thiol-C3				✓		
Thiol-C6		✓		✓		✓
Yakima Yellow	✓		✓			

### Oligonucleotide purification scales

Choose purification method (Standard, HPLC) and scales of your modified oligonucleotides.

Purification	0.02 µmol	0.04 µmol	0.2 µmol	1.0 µmol
Standard	3 OD <sub>260</sub>	5 OD <sub>260</sub>	12 OD <sub>260</sub>	50 OD <sub>260</sub>
HPLC	1 OD <sub>260</sub>	2 OD <sub>260</sub>	5 OD <sub>260</sub>	12 OD <sub>260</sub>



Find detailed information on DNA and RNA Oligos in our **Primer and Oligonucleotide list**  
[www.jenabioscience.com/Oligo-Pricing](http://www.jenabioscience.com/Oligo-Pricing)





# Terms and Conditions of Sales

## Ordering

You have the following options when ordering products directly from Jena Bioscience:

- Mail orders
- Telephone orders
- 24 hour fax ordering
- Online ordering

Please provide us with the following information when ordering:

- Your name, name of institution
- Billing and shipping address
- PO number (if applicable)
- Catalog number of products and quantities needed
- Contact person and contact data for questions

## Mail orders

Please send your mail orders to the following address:

Jena Bioscience GmbH  
Loebstedter Strasse 71  
07749 Jena, Germany

## Telephone orders

We will accept telephone orders from Monday to Friday between 8:00 am and 16:00 pm Central European Time.  
+49 – 3641 – 628 5000

## 24 hour fax ordering

24 hour fax ordering  
Please send your fax order to:  
+49 – 3641 – 628 5100

## Online ordering

Jena Bioscience products can be ordered online. When ordering by e-mail, please direct your orders to [orders@jenabioscience.com](mailto:orders@jenabioscience.com)

Products can also be ordered online in our online shop:  
<http://www.jenabioscience.com>

### Important Notice:

*Products that have been ordered by mistake cannot be returned to Jena Bioscience. Products that are returned unrequestedly to Jena Bioscience will not be accepted, but fully charged to the customer's account.*

## Shipping

All customers will receive a fax confirmation of the order with invoice and shipping waybill number. International orders are shipped either by General Overnight, by FedEx or by UPS Express service, depending on the customer's location and on the products to be shipped. Domestic shipments within Germany are sent by General Overnight Express service. If you wish your order to be shipped by a different carrier, please contact us and provide all necessary information with your order. All orders are shipped EXW (Incoterms 2000). Please contact us if a different shipping term is required for your order.

## Prices and Charges

Please note that the prices of products in the catalog and on our website do not include freight charges, duties, taxes or customs fees. Freight charges will be prepaid and added to the invoice. Freight charges for online orders are indicated when you check out of the online store. If you need information on freight charges for your particular order, please contact us with all necessary information.

Jena Bioscience will not pay any duties, taxes or customs fees. Products and prices are subject to change without notice. Current pricing will be

confirmed at the time of your order. No minimum order required. We offer free shipping of all orders worth EUR 250+ (excl. VAT) within Germany.

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Invoices will be issued after your order has been shipped and will be sent to the billing address by separate mail. Invoices will not be included within the shipments. In case of partial deliveries, separate invoices will be issued after each shipment has left Jena Bioscience. You will find payment information (bank addresses and account data) on each invoice. Jena Bioscience accepts payment by:

### Check

Please send your payment checks to the following address:  
Jena Bioscience GmbH  
Loebstedter Strasse 71  
07749 Jena, Germany

We kindly ask you to make sure that our invoice number and your customer number appear on the check.

### Wire transfer

Please remit your payments to one of the following bank accounts:	
Commerzbank AG	Account No.: 264622200
- Mittelstandsbank Leipzig -	Bank code (BLZ): 82040000
Region Jena	IBAN: DE4482040000264622200
Fischergasse 10	SWIFT: COBADEFF821
07743 Jena, Germany	

Sparkasse Jena-Saale-Holzland	Account No.: 32417
Ludwig-Weimar-Gasse 5	Bank code (BLZ): 83053030
07743 Jena,	IBAN: DE22830530300000032417
Germany	SWIFT: HELADEF1JEN

HypoVereinsbank - UniCredit Bank AG	Account No.: 4196090
Niederlassung Thüringen	Bank code (BLZ): 83020087
Schillerstrasse 4	IBAN: DE05830200870004196090
07745 Jena	SWIFT: HYVEDEMM463
Germany	

Our VAT number (for EU customers): DE 195825742

### Credit card

Jena Bioscience accepts the following credit cards:

- VISA
- Mastercard
- American Express



If you wish to pay by credit card, please provide the following credit card information:

- Card holder
- Card number
- Expiry date
- Security code (VISA / Mastercard: 3 digits, to be found on your card's back side in the upper right corner of the signature field; AmEx: usually 4 digits (sometimes only three), to be found on the front side of your card above the card number)

### Patent Disclaimer

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**Shipping address**

**Billing address**

Name	Customer number
University / Company	University / Company
Institute / Department	Institute / Department
Address	Address
Postcode	Postcode
City / Signature	City / Signature
Phone	VAT number (EEC only)
Fax	PO number
Email	Date / Signature

If you wish to pay by credit card, please provide the following credit card information:

I want to pay by


Card holder	Card number
Expiry date	Security code

(VISA / Mastercard: 3 digits on card's back side, upper right corner of signature field;  
AmEx: 4 digits, card's front side, above card number)

	Catalog number	Product	Quantity	Net Price per Item EURO	Net Price all Items EURO
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
				<b>Total</b>	



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