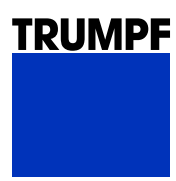


Lasers:

Solve every
task
perfectly

Machine Tools/Power Tools
Laser Technology/Electronics
Medical Technology



State-of- the-art laser technology.

The TRUMPF Group ranks among the world's leading manufacturers of laser and production technology. Our innovations set the standard in the development of laser technology, machine tools and power tools for sheet metal fabrication, and medical technology. Our customers have relied on the superior quality of our technical solutions since 1923. Today's TRUMPF Laser GmbH + Co. KG began in 1971 in Schramberg, Germany, with the development of a solid-state laser. This was followed in 1985 by TRUMPF's first CO₂ laser with a power of 1 kW. Today, we are the technology and world market leader in industrial lasers and laser systems. We continually develop new processes and increasingly powerful laser sources and systems, and consistently apply these developments to innovations targeting our cus-

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tomers' requirements. You can count on us for all of your projects. Our comprehensive services include feasibility studies performed in our application laboratories, laser processing and design consultation, and formulating a start-to-finish concept for your plant. Even if you just want information about a new focusing optics – we speak your language.



The all- rounder.

The laser is the most universal tool available for cutting, welding, marking, drilling, coating, hardening, and performing structural processing work on surfaces. A laser operates without contact, and with no wear and tear. Therefore, the heat-affected zone and component distortion produced by lasers is extraordinarily small. Refinishing work is usually unnecessary.

TRUMPF lasers have the flexibility to be used in a variety of applications, allowing for short processing times with optimum processing quality. Precision and a high level of automation go hand in hand when using amplified light.

TRUMPF lasers have proven themselves ten thousand times under today's toughest manufacturing conditions and in a wide range of industries, including automotive manufacturing, automotive supply, aerospace, electronic entertainment media, precision mechanics, and medical technology. Lasers are used for processing a wide variety of products, including car bodies, transmission, exhaust and control system components, sensors, tubes and profiles, electronic components, and solar cells. Our lasers repair and coat tools and molds, and can mark anything from pacemakers to apples.

Laser cutting, from thin to thick.

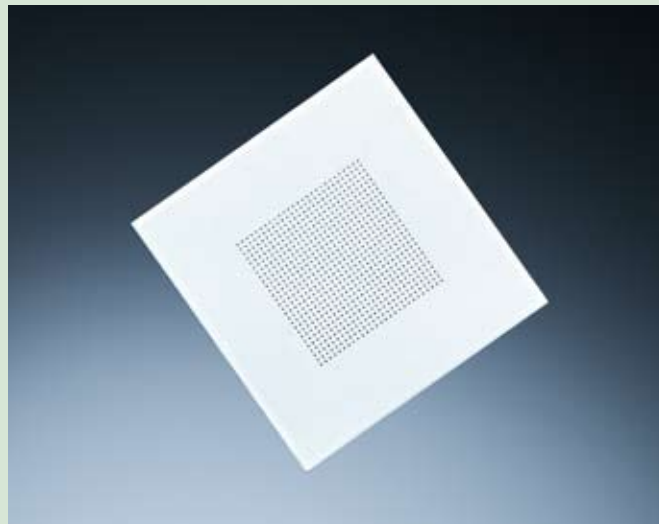


Narrow, high-strength laser weld seams.





Filigree spot welds.



Creating the smallest of holes with the highest precision.

Everything from a single source.

When you use TRUMPF lasers, you benefit from our decades of practical experience in all laser-related fields. With TRUMPF, after all, you get it all from a single source – everything from laser units, beam guidance components, and focusing optics, to software and complete systems. Our components can also be adapted to every job and easily integrated into your plant setup.

Service right from the start.

Our service begins even before you decide to buy a laser or laser system. We maintain application laboratories worldwide, where we can determine the feasibility of your desired application and show you what laser technology can do for your production processes. It goes without saying that – even after you purchase a TRUMPF laser – our application specialists will continue to assist you with application technology, incorporating lasers into component design and optimizing your production sequences.

TRUMPF CO₂ lasers:

Efficient
and
economical.

CO₂ lasers have been used for decades as the standard tool for processing an enormous variety of materials efficiently and economically. Worldwide, over 16,000 of our beam sources are used day in and day out, providing reliable service for cutting, welding, or surface treatment of two and three-dimensional workpieces.





Easy integration.

Their compact, sturdy design and open interface architecture make it easy to integrate TRUMPF CO₂ lasers into production systems. They can even be used on moving machine assemblies. Our lasers deliver top-notch quality and a high level of productivity.

Versatility.

The TRUMPF portfolio consists of TruFlow fast axial-flow lasers and TruCoax diffusion-cooled lasers. Their broad range of output options and outstanding beam characteristics make it easier to optimize the beam source with respect to your production process.

Lasers in the lower output range provide an economical means of cutting thin sheet metal and non-metal materials such as wood, paper, or plastics, and are also suitable for melting glass or perforating ceramic substrates. CO₂ lasers with output

greater than 2 kW may be used to cut 2-D or 3-D sheet metal components and for welding tubes, profiles, and components of transmissions or exhaust systems. Lasers in this performance class are also the preferred choice for applying or melting down anti-abrasion layers.

TruFlow lasers in the highest output range, from 12 to 20 kW, may be used for reliable welding of thick sheet metal in applications such as shipbuilding, construction machinery, or the production of transmission components for commercial vehicles.



TruFlow:

One series,
many
applications.



	TruFlow 700	TruFlow 1200	TruFlow 1500	TruFlow 2000	TruFlow 2700	TruFlow 3200	TruFlow 3600	TruFlow 4000
Laser power	700 W	1,200 W	1,500 W	2,000 W	2,700 W	3,200 W	3,600 W	4,000 W
Beam quality K (M ²)	0.6 (1.67) ¹	0.6 (1.67) ¹	0.6 (1.67) ¹	0.6 (1.67) ¹	0.6 (1.67) ¹	0.6 (1.67) ¹	0.6 (1.67) ¹	0.5 (2.0) ¹
Nominal power consumption ²	23 kW	23 kW	23 kW	27 kW	34 kW	36 kW	42 kW	44 kW
Dimensions beam source								
Length	1,185 mm	1,185 mm	1,185 mm	1,185 mm	1,185 mm	1,185 mm	1,185 mm	1,185 mm
Width	1,150 mm	1,150 mm	1,150 mm	1,150 mm	1,150 mm	1,150 mm	1,150 mm	1,150 mm
Height	650 mm	650 mm	650 mm	650 mm	650 mm	650 mm	650 mm	650 mm

	TruFlow 5000	TruFlow 6000	TruFlow 7000	TruFlow 8000	TruFlow 12000	TruFlow 15000	TruFlow 20000
Laser power	5,000 W	6,000 W	7,000 W	8,000 W	12,000 W	15,000 W	20,000 W
Beam quality K (M ²)	0.55 (1.82) ¹	0.55 (1.82)	0.55 (1.82) ¹	0.52 (1.9)	0.26 (3.8)	0.24 (4.2)	0.22 (4.5)
Nominal power consumption ²	56 kW	68 kW	80 kW	105 kW	120 kW	155 kW	200 kW
Dimensions beam source							
Length	1,185 mm	1,185 mm	1,185 mm	1,185 mm	1,665 mm	1,665 mm	1,665 mm
Width	1,150 mm	1,150 mm	1,150 mm	1,150 mm	1,524 mm	1,524 mm	1,524 mm
Height	650 mm	650 mm	650 mm	650 mm	1,100 mm	1,100 mm	1,100 mm

Valid for all laser types above:

Wavelength 10.6 µm (further more on demand)
 Output stability, according to the nominal power: ± 2%

¹ The HQ lasers have a beam quality of K = 0.9 resp. M² = 1.1. Their laser power is approx. 10 % lower than the stated values.

² Laser without cooling system.

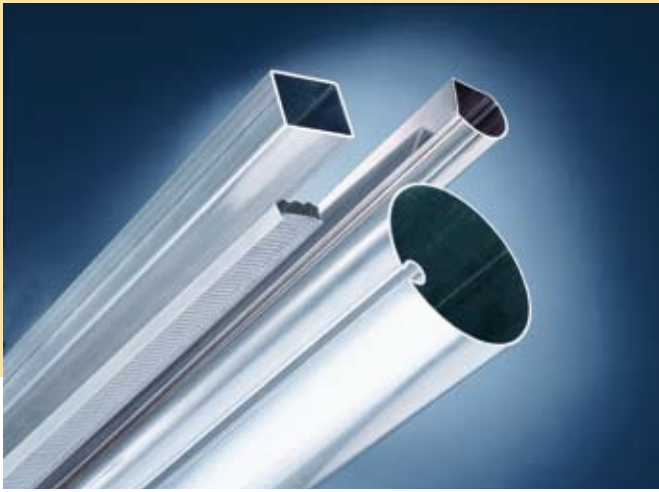


Laser welded transmission component.

TruFlow Series lasers offer you the highest level of availability and productivity – qualities that remain reliable even under the toughest production conditions. Output is available between 700 and 20,000 W, a range covering an immense array of applications. TruFlow lasers generate smooth cutting edges

at high advance speeds and narrow cutting kerfs. They can also be used to create narrow welded seams with a small heat-affected zone, thereby maintaining a very low thermal load on the component.





Welding and cutting of tubes and profiles.



Powder coating of a die-forging tool.

Universal and specialized.

The modular construction of the entire series lets you tailor your TruFlow laser specifically to your application. Its wide range of output options allows you to select the beam parameters required for a given application. In addition to its standard lasers for cutting and welding, TRUMPF also offers solutions tailored to specific tasks within an application, such as lasers with especially high focusability, or beam sources that can be optimized for specific surface applications.

Compact, reliable, robust.

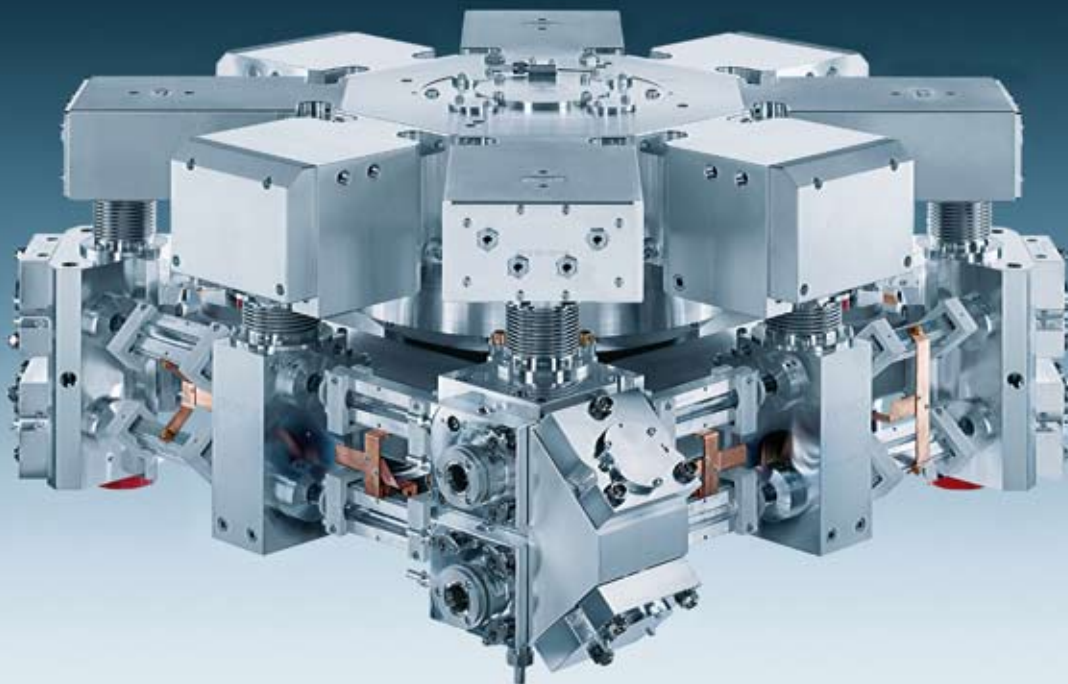
The compact, square design of the TruFlow laser resonator maximizes resonator length, allowing you to optimize beam characteristics, while minimizing overall dimensions. All major resonator components are water-cooled and offer a high level of thermo-dynamic stability, ensuring that TruFlow lasers are up to the challenge of the tough conditions of day-to-day industrial operations. TruFlow lasers are extraordinarily reliable, even on moving machine assemblies.

Efficient.

TruFlow lasers utilize only capacitive high-frequency excitation. It is the cleanest and most reliable form of laser excitation, providing high efficiency, constant beam parameters, and excellent laser output control.

Since it is magnetically suspended, the turbo radial blower is not subject to wear and tear, and is virtually maintenance-free. By continuously recirculating the laser gas, the blower provides high efficiency cooling and a high level of overall laser value.





Readily mixed.

Instead of using individual gas bottles, you can also use a premix gas bottle.

Easy operation.

All TruFlow lasers are run from the same control unit, and can be operated using an intuitive user interface. For integration into a higher-level production system control, the laser control unit is available with Profibus interface, or with analog interfaces for laser power and pulse frequency. For the ease of operation, the control reminds you of any maintenance interval that might come up.

TruCoax:

High performance
in a
little package.



	TruCoax 1000	TruCoax 2000
Laser power	1,000 W	2,000 W
Beam quality K (M ²)	0.9 (1.1)	0.9 (1.1)
Nominal power consumption ¹	20 kW	33 kW
Dimensions beam source		
Length	1,300 mm	1,840 mm
Width	430 mm	500 mm
Height	320 mm	540 mm

Valid for all laser types above:

Wavelength	10.6 μ m
Output stability, according to the nominal power	$\pm 2\%$

¹ Laser without cooling system.

Our TruCoax CO₂ laser is diffusion-cooled and provides a high level of beam quality at a laser power of up to 2,000 W.

TruCoax lasers are so compact that they can easily fit on the frame of a machine, and can even be combined with robotic systems. Part of what makes this possible is the design of the resonator. Its walls release the heat that is generated, and two coaxial, nested metal tubes act as high-frequency electrodes and as cooling elements.

Yet another advantage of the TruCoax laser is that the gas which is premixed in a small bottle is stored in the resonator. Plus, the TruCoax uses so little gas that you only need to replace the bottle every 1.5 to 2 years. It's hard to imagine how laser processing could be more user-friendly, or involve less maintenance.



TRUMPF solid-state lasers:

Versatility through diversity.

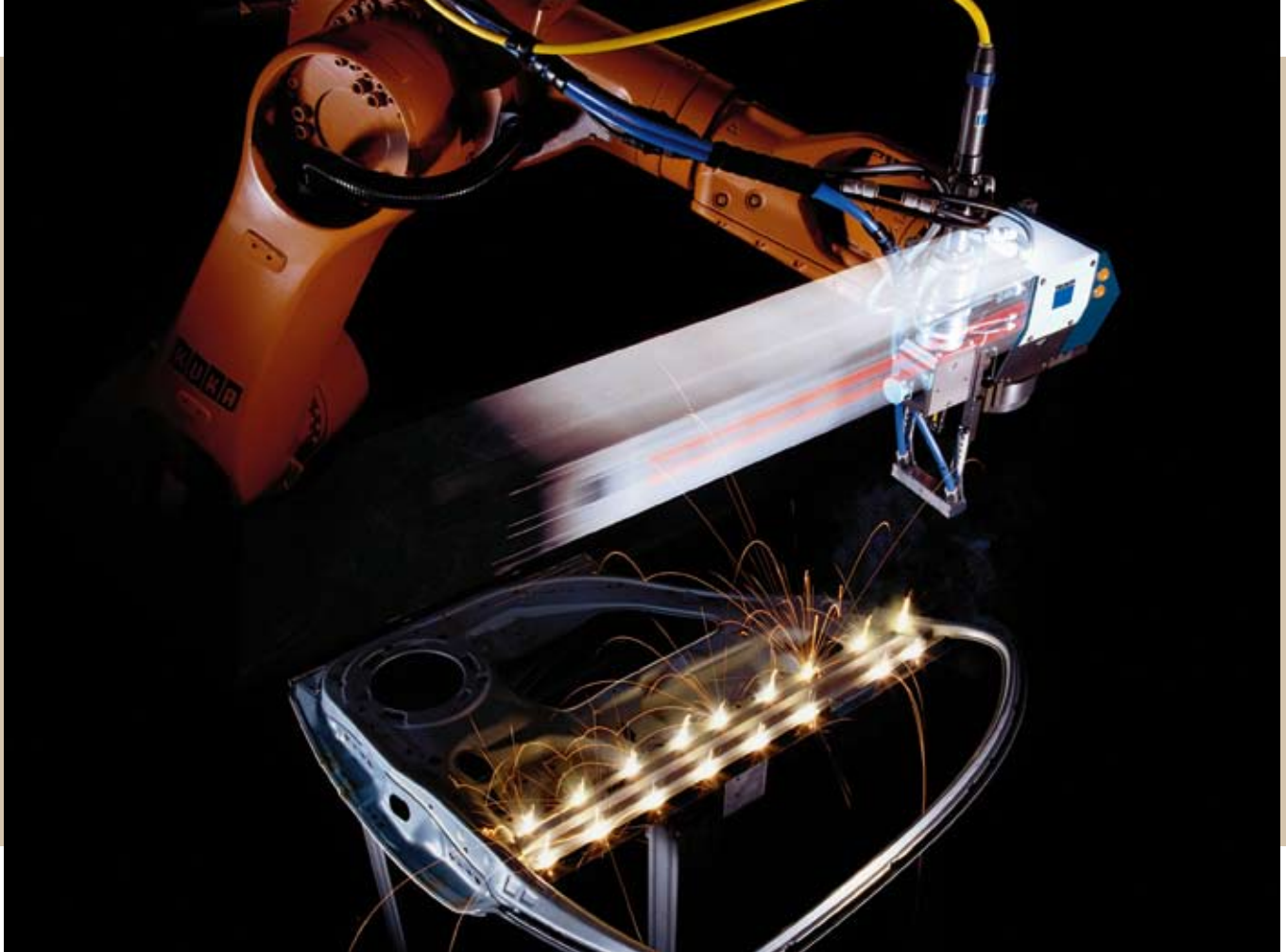
The power of TRUMPF solid-state lasers ranges from 20 to 16,000 W. Depending on the model, our solid-state lasers function according to either continuous wave or pulse operation. For pulse operation, the duration of the pulse can be in milliseconds, microseconds, nanoseconds, or even picoseconds, making these models suitable for an enormous variety of applications.

For welding or cutting, in the automotive industry, for aerospace applications, or even in heavy manufacturing: TruDisk lasers are the right choice for high-quality processing of metals and high laser power with extremely good beam quality.

The primary application for TruPulse lasers is spot and seam welding. "Cold" welding with TruPulse lasers is especially practical for components that tolerate only very low heat input and distortion. Materials with high melting points can be welded as easily as those with higher thermal conductivity. TruPulse lasers can also be used for cutting extremely fine contours in both metals and non-metals alike.

Our TruMicro lasers are suitable any time you need a controlled, highly precise, and reproducible means of removing material with a laser. For remote cutting, structuring, and drilling metals, semiconductors, and ceramics, our diode-pumped TruMicro lasers are specifically developed to meet the needs of microproduction technology.





Flexible.

The major advantage of solid-state laser technology is that the laser beam can be coupled with fiber-optic cables. Flexible laser light cables conduct the beam from its source to the processing site. Integrating lasers into production facilities or robotic equipment also showcases the advantages of laser light cable technology.

Intelligent design.

Our solid-state lasers give you fast, dynamic control, allowing laser power to be digitally controlled in real time, to achieve reproducible results from the very first second. All of the interfaces typically needed for communicating with external control units are at your disposal.

Intuitive.

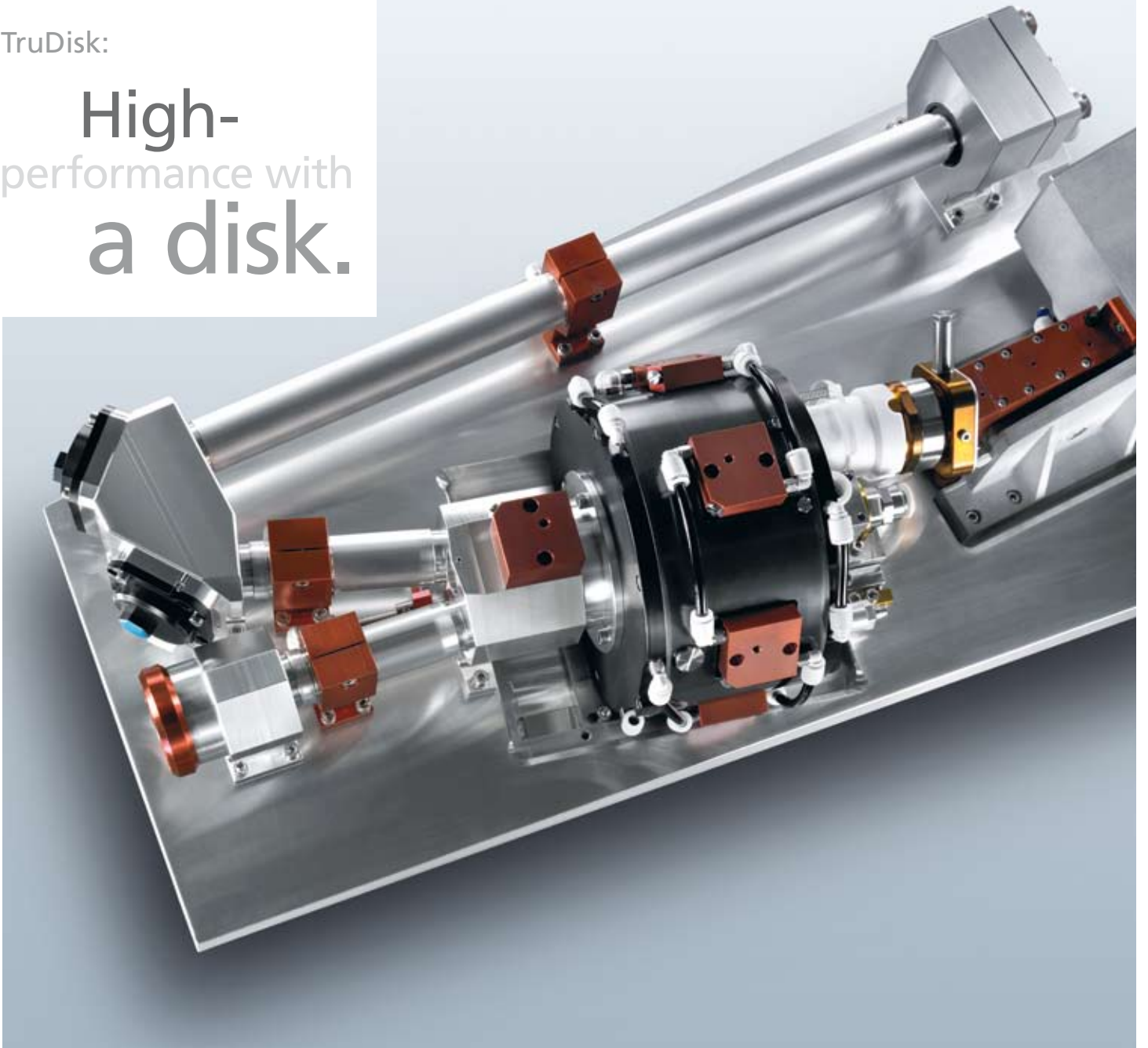
A touch screen and turn-push button are used to operate lasers through a user interface that is clearly structured and self-explanatory. The convenient operating panel can be separated from the laser, so that you can take it directly to the processing site and control all laser functions from there. Operating software allows you to store up to 200 programs, edit and scale pulse shapes, and use a single command to initiate ramping.

Secure data transmission.

Thanks to its Telepresence Portal, TRUMPF offers you unique solid-state laser services throughout the world, with over hundreds of continuously measured values available through secure remote access. As a result, our service experts can quickly troubleshoot and assess any error, often eliminating the problem immediately.

TruDisk:

High-
performance with
a disk.





	TruDisk 1000	TruDisk 2002	TruDisk 2602	TruDisk 3302	TruDisk 4002	TruDisk 5302
Laser device						
Laser power	1,000 W	2,000 W ¹	2,600 W ¹	3,300 W ¹	4,000 W	5,300 W ²
Beam quality ⁴	2 mm · mrad	8 mm · mrad	8 mm · mrad	8 mm · mrad	8 mm · mrad	8 mm · mrad
Min.∅ laser light cable	50 µm	200 µm	200 µm	200 µm	200 µm	200 µm
Consumption						
Nominal power consumption	5 kW	10 kW	13 kW	16 kW	19 kW	26 kW
Cooling water temperature range	5 – 20 °C	5 – 20 °C	5 – 20 °C	5 – 20 °C	5 – 20 °C	5 – 20 °C
Dimensions						
Width	1,460 mm	1,600 mm	1,600 mm	1,600 mm	1,600 mm	1,990 mm
Height	1,350 mm	1,550 mm	1,550 mm	1,550 mm	1,550 mm	1,550 mm
Depth	730 mm	950 mm	950 mm	950 mm	950 mm	1,200 mm

¹ optionally upgradable on up to 4,000 W

² optionally upgradable on up to 8,000 W

³ optionally upgradable on 12,000 W

⁴ optional beam quality of 4 mm · mrad at laser powers from 2,000 W to 6,000 W, from 12,000 W optional beam quality of 8 mm · mrad possible.



	TruDisk 6602	TruDisk 8002	TruDisk 10002	TruDisk 12003	TruDisk 16003
Laser device					
Laser power	6,600 W ²	8,000 W	10,000 W ³	12,000 W	16,000 W
Beam quality ⁴	8 mm · mrad	8 mm · mrad	8 mm · mrad	12 mm · mrad	12 mm · mrad
Min.∅ laser light cable	200 µm	200 µm	200 µm	300 µm	300 µm
Consumption					
Nominal power consumption	33 kW	39 kW	49 kW	60 kW	80 kW
Cooling water temperature range	5 – 20 °C	5 – 20 °C	5 – 20 °C	5 – 20 °C	5 – 20 °C
Dimensions					
Width	1,990 mm	1,990 mm	2,800 mm	2,800 mm	2,800 mm
Height	1,550 mm	1,550 mm	1,600 mm	1,600 mm	1,600 mm
Depth	1,200 mm	1,200 mm	1,400 mm	1,400 mm	1,400 mm



Scanner welded car body part.

Powerful and efficient.

The new TruDisk generation of disk lasers is even more powerful, cost-effective and compact than before, and offers you numerous advantages for the efficient part production. Laser powers range from one to 16 kW and, because of their disk geometry, TruDisk lasers have best beam quality in the high multi-kilowatt range. With most of the units you can choose between two beam qualities, so you always have the laser best suited to your individual production task. The excitation of the new TruDisk lasers is provided by extremely long-lasting laser diodes made by TRUMPF. This enables a high degree of laser efficiency and minimizes operating costs.

Modular and compact.

Beam generation, beam guidance, power supply, cooling and control of the TruDisk lasers are all modular in design and are located inside a compact housing. Everything is thought through and coordinated down to the smallest detail – for maximum availability and easy maintenance.

Precision cutting with TruDisk.



Laser welded seat structure.

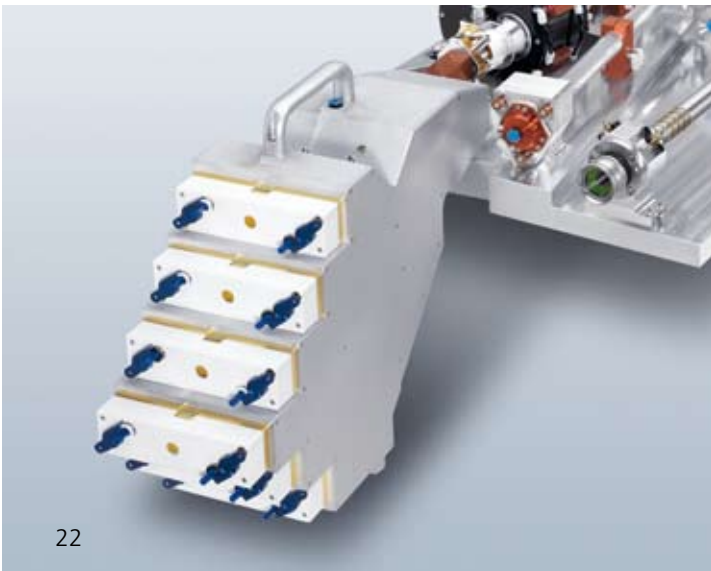


Reliable processing.

When scaling the laser power, the internal laser power density of the TruDisk lasers always lies within a secure range. Its patented resonator design makes the TruDisk laser resistant to back reflections on all optic components, so they remain extremely stable during the production process. Thanks to the absolute laser power control, you get reproducible production results at all times.

Customizable and upgradable.

The integrated beam guidance design can be customized, both in regards to the number of outputs as well as to „energy and time sharing“ options. Up to six laser light cables can be connected to a TruDisk – and they can also be easily reconnected even if you are working at the other outputs. The laser power of the disk lasers can also be individually configured – and the modular design means they can easily be upgraded later, on-site – in only a few hours.





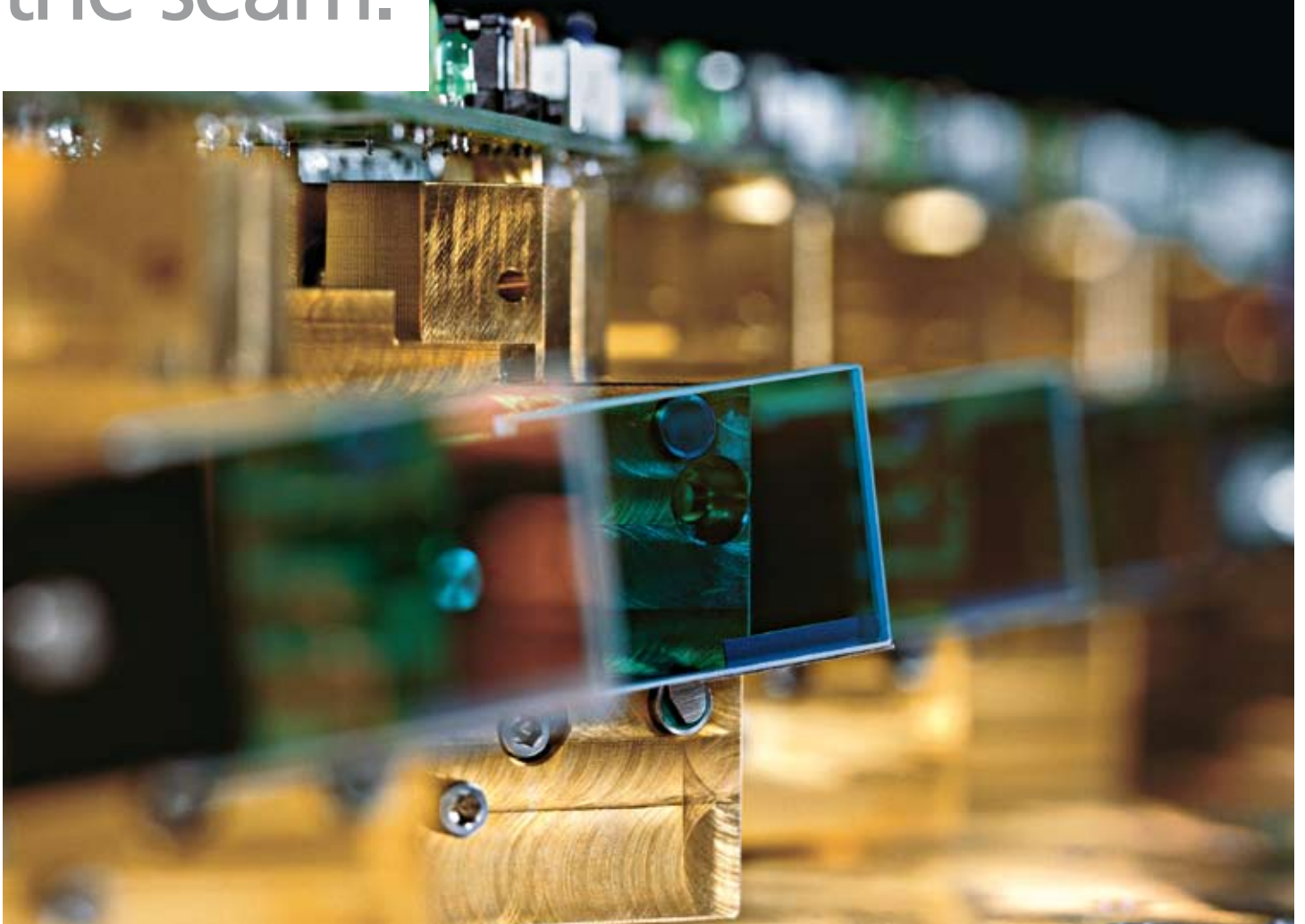
Always ready.

The new passively cooled pump modules of the TruDisk laser are ultra-long-lasting. This means they are no longer considered consumables, and operating costs can therefore be kept to a minimum. In the unlikely event that a module fails, the pump diodes instantly cover for each other: the power of the

remaining modules is automatically increased so that there is no loss of power at the workpiece. You can then replace the failed pump module in an orderly manner without interrupting production – in a matter of minutes, and in just a few steps.

TruPulse:

On the spot.
And
the seam.

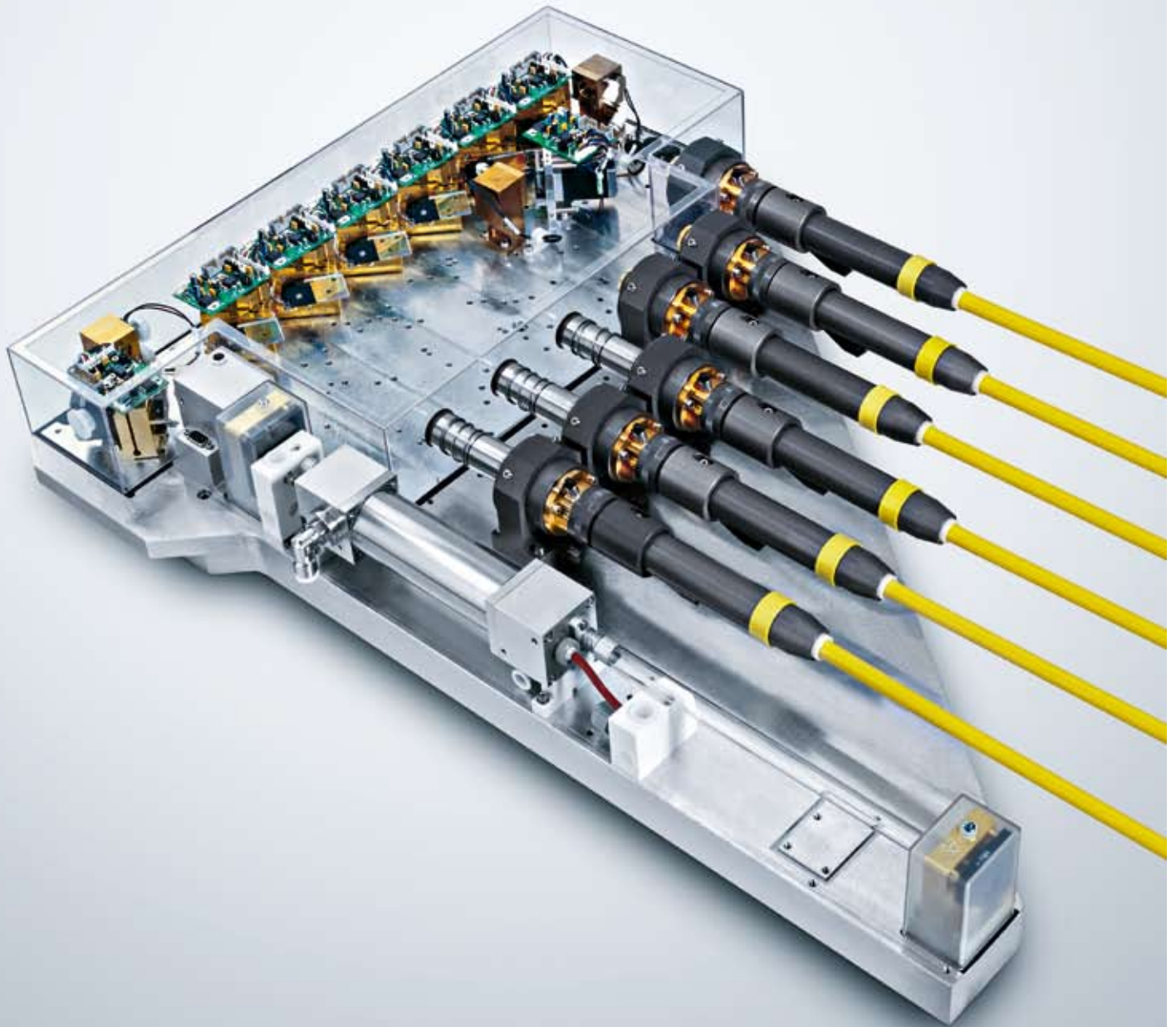




	TruPulse 21	TruPulse 33	TruPulse 44	TruPulse 62	TruPulse 74	TruPulse 103
Laser device						
Average power ¹	20 W	30 W	40 W	60 65 W	70 70 W	95 95 90 W
Max. pulse power	1,5 kW	3 kW	3 kW	3 5 kW	4 6 kW	5 6 8 kW
Max. pulse energy	15 J	30 J	30 J	20 50 J	30 60 J	30 60 90 J
Pulse duration	0.2 – 50 ms	0.2 – 50 ms	0.2 – 50 ms	0.2 – 50 ms	0.3 – 50 ms	0.3 – 50 ms
Beam quality	4 mm · mrad	12 mm · mrad	16 mm · mrad	8 mm · mrad	16 mm · mrad	12 mm · mrad
Min. ø laser light cable	100 µm	300 µm	400 µm	200 µm	400 µm	300 µm
Consumption						
Nominal power consumption A W ²	1.7 1.6 kW	1.6 1.5 kW	1.9 1.7 kW	3.0 2.8 kW	2.7 2.6 kW	4.0 3.8 kW
Max. cooling water consumption at 15 °C	0.2 m ³ /h	0.2 m ³ /h	0.2 m ³ /h	0.2 m ³ /h	0.2 m ³ /h	0.2 m ³ /h
Cooling water temperature range	6 – 30 °C	6 – 30 °C	6 – 30 °C	6 – 28 °C	6 – 28 °C	6 – 28 °C
Installation						
Cabinet	A	A	A	B B/C	B B/C	B B/C C

¹ At workpiece, controlled over entire life of lamps, depending on pulse duration and pulse power setting.

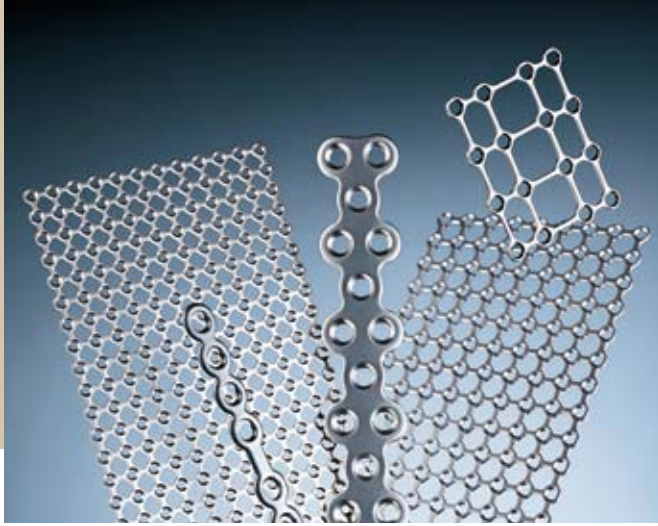
² A = air cooled | W = water cooled.



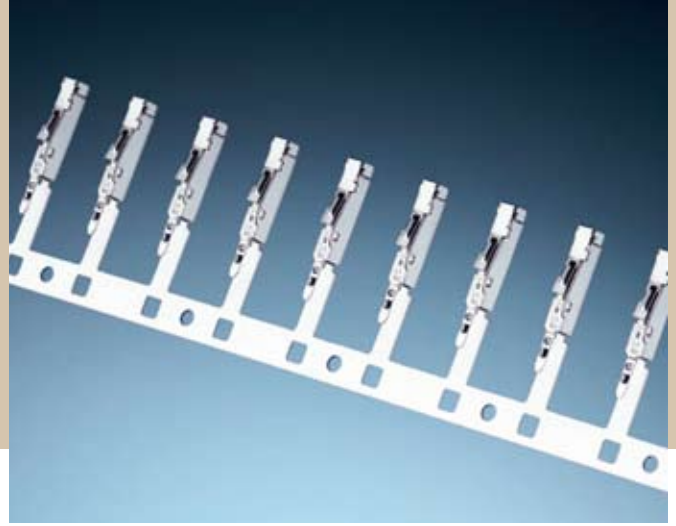
	TruPulse 106	TruPulse 124	TruPulse 156	TruPulse 203	TruPulse 304	TruPulse 556
Laser device						
Average power ¹	110 W	140 125 110 W	150 160 140 W	200 W	300 W	530 W
Max. pulse power	4 kW	6 6 9 kW	6 6 10 kW	6 8 kW	10 10 kW	10 10 kW
Max. pulse energy	30 J	30 70 90 J	30 80 120 J	55 90 J	60 90 J	60 100 J
Pulse duration	0.3 – 50 ms	0.3 – 50 ms	0.3 – 50 ms	0.3 – 50 ms	0.3 – 50 ms	0.3 – 50 ms
Beam quality	25 mm · mrad	16 mm · mrad	25 mm · mrad	12 mm · mrad	16 mm · mrad	25 mm · mrad
Min. ø laser light cable	600 µm	400 µm	600 µm	300 µm	400 µm	600 µm
Consumption						
Nominal power consumption A W ²	3.9 3.8 kW	3.9 3.8 kW	4.8 4.7 kW	7.8 kW	10.1 kW	16.7 kW
Max. cooling water consumption at 15 °C	0.2 m ³ /h	0.2 m ³ /h	0.2 m ³ /h	0.4 m ³ /h	0.5 m ³ /h	0.7 m ³ /h
Cooling water temperature range	6 – 28 °C	6 – 28 °C	6 – 28 °C	6 – 28 °C	6 – 28 °C	6 – 28 °C
Installation						
Cabinet	B	B B/C C	B B/C C	D	D/D+	D/D+

¹ At workpiece, controlled over entire life of lamps, depending on pulse duration and pulse power setting.

² A = air cooled | W = water cooled.



Cutting of the finest contours on titanium implants.



Laser welded connectors.

Finely tuned.

Several kilowatts of pulse power for a few milliseconds let you weld and cut in situations where other processes fail. Whether in terms of power, energy, or focusability, the TruPulse Series covers the entire parameter range for welding and cutting. With pulse powers as high as 10 kW, pulse duration between 0.2 and 50 ms, and pulse energy running up to a maximum of 120 J, these lasers are universal tools for use in both manual and automated applications.

Modular.

Beam generation, beam guidance, power supply, cooling, and control units are all set up as modules in a system that has been thought out and tested in great detail. One laser can service up to six processing stations, either in parallel or in sequence. For TruPulse lasers with powers of up to 150 W, you decide whether to use air or water cooling for your laser unit.

Laser welded battery.



Laser deposition welding on beryllium-copper.



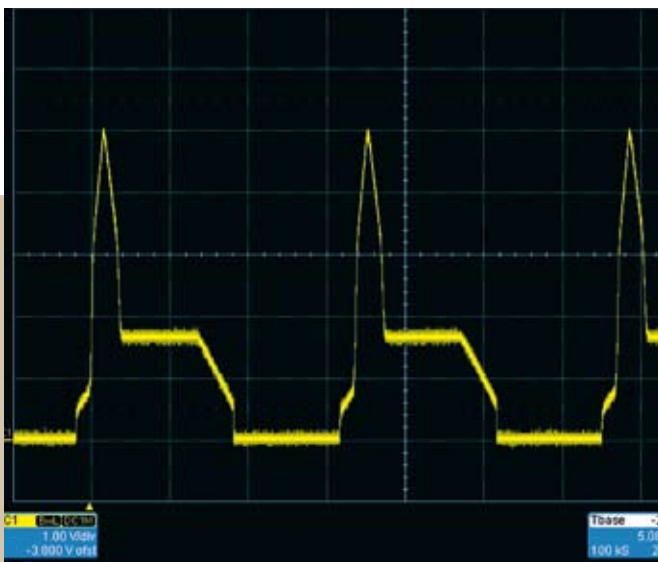
Cabinet	A	B	C	D	D+
Dimensions					
Width	485 mm	980 mm	980 mm	1,500 mm	1,500 mm
Height	700 mm	1,220 mm	1,220 mm	1,370 mm	1,370 mm
Depth	800 mm	505 mm	715 mm	730 mm	990 mm

Best results.

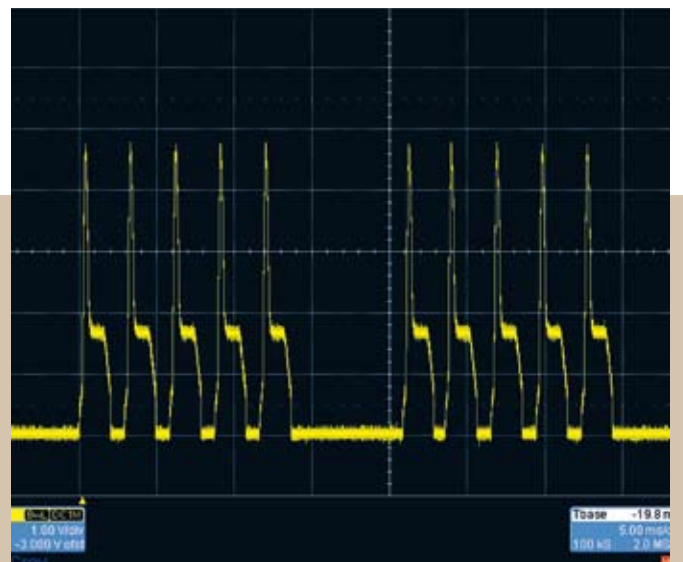
The power supply is highly dynamic, enabling ultra-short pulse rise times, and in conjunction with fast, real-time power control, provides high pulse-to-pulse stability – keeping your processing results constant at all times.

Laser pulse frequency is typically limited by pulse energy and average power. The Power Regulated Burst, however, lets you considerably exceed the average power for a short time and keep the welding time within a processing cycle to a minimum. Long Pulse Welding also opens up new possibilities, allowing you to generate a welding seam within a single laser pulse by quickly moving either the workpiece or laser beam.

Pulse shapes.



Power Regulated Burst.





Helpful.

The application wizard „Weldassist“ will help you optimize your welding parameters. If this is not sufficient, TRUMPF application specialists will be there for you with help and advice.

If the components you are processing with your laser must meet strict standards, our software module „Datastore“ will help you record and evaluate your quality-related laser parameters.





TruMicro:

Excellence
in small
dimensions.



	TruMicro 5050	TruMicro 5250	TruMicro 5350	TruMicro 7050	TruMicro 7250
Laser device					
Wavelength	1030 nm	515 nm	343 nm	1030 nm	515 nm
Max. average power	50 W	25 W	15 W	750 W	400 W
Beam quality	$M^2 < 1,3$	$M^2 < 1,3$	$M^2 < 1,3$	$M^2 < 13$ (LLK 01 ¹)	$M^2 < 13$ (LLK 01 ¹)
Polarisation ratio	Linear > 500:1	Linear > 500:1	Linear > 500:1		
Pulse duration	< 10 ps	< 10 ps	< 10 ps	30 – 700 ns ²	300 – 1500 ns ²
Max. pulse energy	250 µJ	125 µJ	75 µJ	50 mJ	10 mJ
Repetition rate	max. 400 kHz	max. 400 kHz	max. 400 kHz	5 – 50 kHz	5 – 100 kHz
Consumption					
Nominal power consumption	2.3 kW	2.3 kW	2.3 kW	5 kW	5 kW
Max. cooling water consumption at 18 °C	0.3 m ³ /h	0.3 m ³ /h	0.3 m ³ /h	0.9 m ³ /h	0.9 m ³ /h
Cooling water temperature range	6 – 18 °C	6 – 18 °C	6 – 18 °C	5 – 20 °C	5 – 20 °C
Dimensions					
Laser head	upon request	upon request	upon request		
Supply unit					
Width	650 mm	650 mm	650 mm	1,460 mm	1,460 mm
Height	1,150 mm	1,150 mm	1,150 mm	1,350 mm	1,350 mm
Depth	1,210 mm	1,210 mm	1,210 mm	730 mm	730 mm

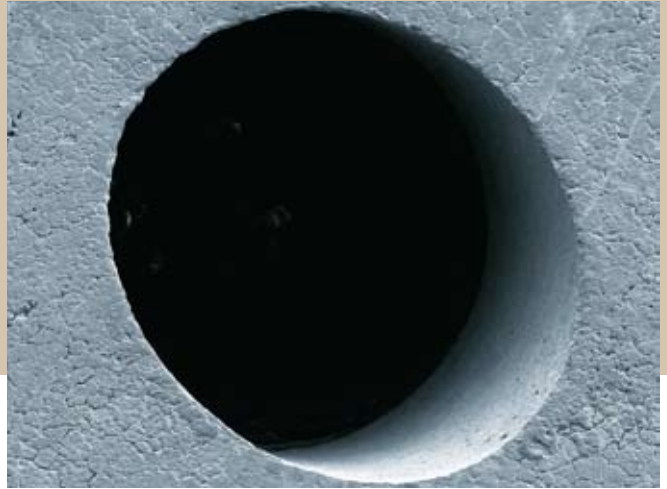
¹ The minimum fiber diameter depends on the pulse duration.

² Definite pulse duration on delivery.



Cold processing with picosecond pulses on a match-head.

Scale: ——— 30 μm



Drill-hole in stainless steel using TruMicro 5050.

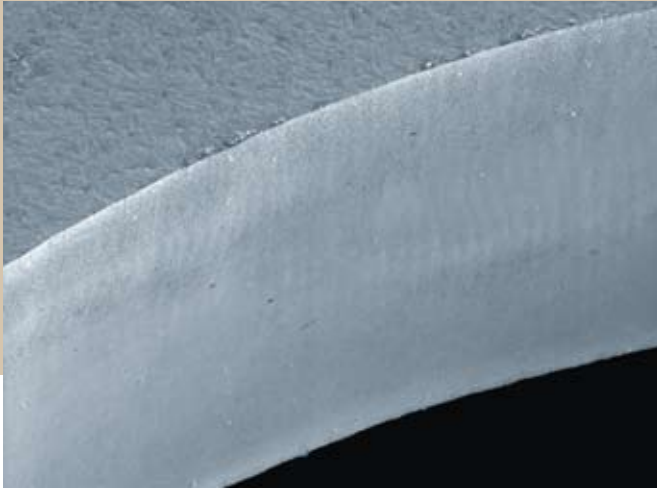
TruMicro Series 5000: Shorter than short.

The TruMicro Series 5000 is used for material ablation wherever mechanical or thermal influences, such as micro-cracks, burrs or deposits, are unacceptable or refinishing work must be avoided. These lasers enable micro processing with an ideal combination of quality, productivity and profitability.

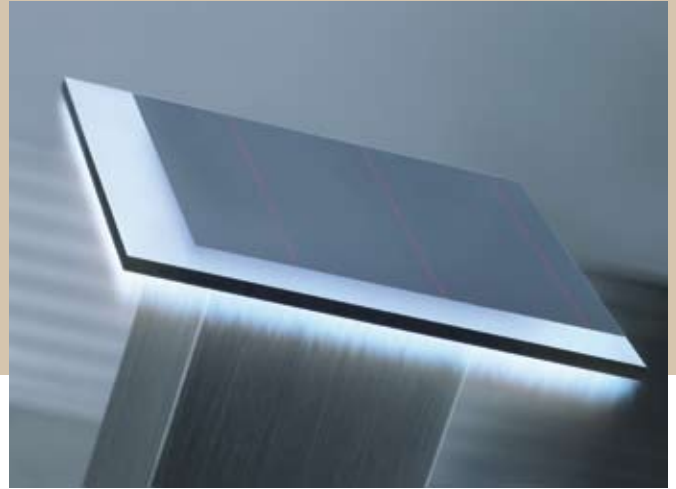
The decisive benefits of the TruMicro Series 5000 are short pulse durations which are smaller than 10 ps and their easy average power scaling, at pulse energies of up to 250 μJ . It is the unique combination of fiber and disk laser technology that enables penetration into these performance classes. Intensification of the picosecond pulses of a fiber laser with a disk laser is superior to other technologies in terms of laser power and pulse energy, while simultaneously retaining excellent beam quality.

The high peak pulse power of the TruMicro 5050 of 50 W with an infrared wavelength translates to high throughput times. With the TruMicro 5250 and 5350 you have two variants at your disposal, with outputs of 25 W in the green spectral range and 15 W in the ultraviolet spectral range. As a result, semiconductor materials, die-electrics and plastics are processed with outstanding quality and high throughput. In addition, a laser can operate several workstations simultaneously. And the overall cost of disk lasers from the TruMicro Series 5000 remains incredibly low throughout their entire service life.

Scale: ——— 50 μm



Cutting edge of a silicon wafer processed with TruMicro 5250.



Border deletion on a thin-film solar cell with TruMicro 7050.

TruMicro Series 7000: Short and productive.

The lasers in the TruMicro Series 7000 combine short pulses with high peak pulse powers. With these outputs – which are especially high for short pulsed lasers – you can quickly ablate large surface layers, create micro-drilled holes or even cut with the highest throughput.

With pulse durations ranging from several tens to several hundreds of nanoseconds, the TruMicro Series 7000 achieves laser powers of up to 750 W. The disk laser technology used here features a combination of short pulses and high pulse energies together with excellent beam quality. This enables remote processing, i.e. fast positioning of the laser beam with the aid of a scanner, for precision processes such as fine cutting or drilling the tiniest of holes.

The TruMicro Series 7000 is ideal for integration into production plants. The laser and supply unit form a compact device, and beam delivery to the focussing optics takes place via our flexible laser light cable. Beam switches and splitters are integrated into the laser unit, enabling laser power to be optimized during processing as well as between workstations.

Beam guidance and optics for solid-state lasers.

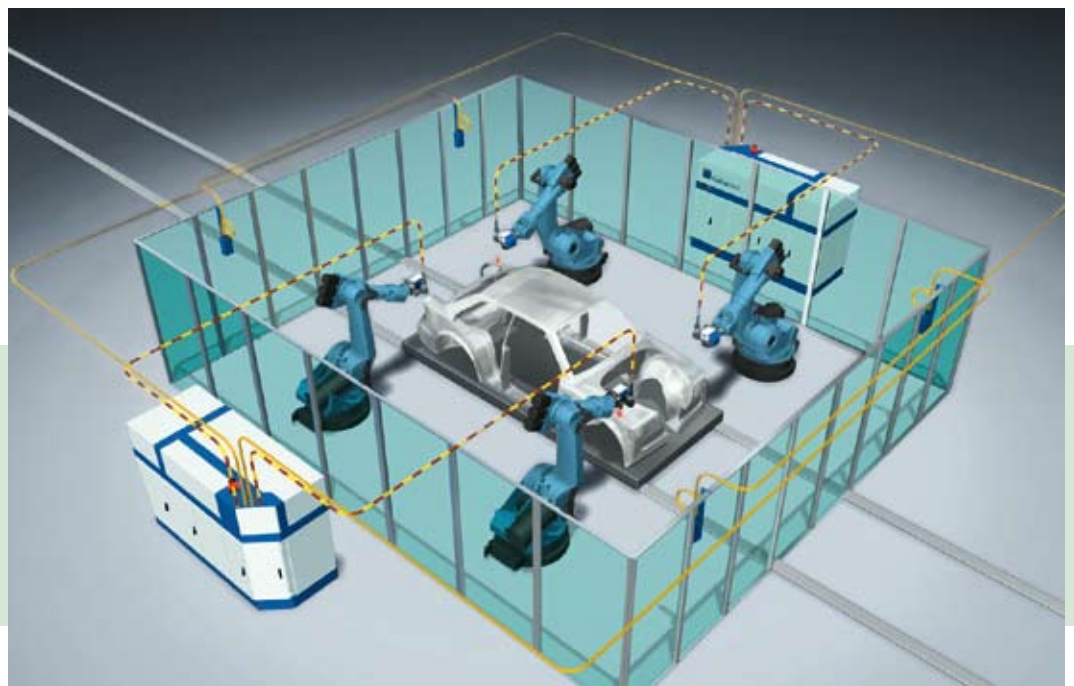


Flexible light transportation: The laser light cable.

Feeding the beam through a laser light cable makes it possible for the solid-state laser to be located away from the processing station. All that is required at the actual processing site are optics that focus the laser light on the workpiece and that can be easily integrated. The beam can be switched at the laser unit to a different output, or split into as many as six outputs, making it possible to supply up to six processing stations at once. The laser light cable can be easily connected by yourself, plug & play.

The TRUMPF LaserNetwork.

Link and distribute intelligently – the TRUMPF LaserNetwork gives you the flexibility you need to effectively use the energy available from one or more lasers at several processing stations. This allows you to make better use of individual laser capacity, increasing facility availability. The laser light cable transmits the necessary information about the laser unit and guidance system, even when you switch the cable from one outlet to another. The entire security circuit is monitored continuously, guaranteeing laser safety.





Focusing optics BEO D25.



Focusing optics BEO with D35 with camera.

The right optics for every job.

We offer an extensive line of focusing optics, for anything from welding and cutting to drilling and ablating applications. A variety of options are available for adapting all TRUMPF optics to any need.

Robust and proven.

The series of BEO focusing optics consists of three basic models that differ in terms of their size and collimation focal length. Depending on the laser you use, you will achieve a focal diameter between 10 μm and 1 mm. The BEO D25, the most compact focusing optics of the series, is used in welding applications with pulsed lasers, with outputs of up to 200 W. It is especially suited for integration into automated assembly systems. The BEO D35 can be used for welding, cutting, or drilling, in combination with pulsed or cw solid-state lasers that have powers in the kilowatt range. The BEO D70 focusing optics shows its strengths at large operating distances, when the focal diameter is small.

Monitored.

The optical construction of the controlled focusing optics of the CFO Series is similar to that of the BEO Series, but with the addition of sensors that monitor the functions of the optics. These sensors monitor the degree of contamination of the cover slide, the temperature and flow of cooling water and inert gas, as well as cross-jet pressure. TRUMPF service specialists can use our Telepresence service to call up monitoring data upon request, allowing them to troubleshoot, assess, and eliminate errors occurring anywhere along the beam path.

Controlled focusing optics CFO.



Programmable.

Programmable focusing optics of the PFO Series are scanner optics used for welding. Two mirrors are used to position the laser beam within the operating field. The mirror angles can be changed through a highly precise and dynamic process. In conjunction with pulsed or cw solid-state lasers, this system can be used for spot and seam welding, without having to move the workpiece or the focusing optics. The F-theta lens makes it possible to obtain constant focal conditions – and thus identical processing quality – for every point within the processing field.

TRUMPF offers three designs of these programmable focusing optics:

The PFO 20 is largely intended for seam and spot welding within small work areas, whereas the PFO 33 and PFO 3D are best used in conjunction with a laser with a high beam quality, such as the TruDisk laser, for remote welding applications, i.e., for welding at large working distances. The PFO 3D includes an integrated z-axis with a 140 mm stroke that even allows you to perform welding tasks within a three-dimensional workspace. The PFO control unit can be combined with that of a robot, which significantly enlarges the processing area, allowing welding "on-the-fly".

Like focusing optics of the CFO series, PFOs are also integrated in our global Telepresence network.

Programmable focusing optics PFO 3D.



For manual applications.

We offer a focusing optics with a stereo microscope for welding by hand. Along with the integrated visor, this feature allows the operator to make first-rate process observations, and work on even the thinnest welding wires by hand. The diameter of the welding point can be adjusted to the welding task by mechanically moving the motor-driven defocusing unit.



Programmable focusing optics PFO 20.

Manual focusing optics with stereo microscope.



TruServices:

We are
there
for you.

Our service begins even before you decide to buy a laser. We provide comprehensive consulting services to help you figure out what you really need.

Let's go.

Your laser will be operational in the shortest time possible. The laser, beam guidance system, focusing optics, programming, control unit, and, where applicable, automation components were developed for one another at TRUMPF – eliminating all interface problems.





Comprehensive support.

We support you with made-to-order services that go above and beyond the entire life cycle of your facility, maintaining the machine and upgrading it with new functions upon request. We will train you and your employees so that you can take full advantage of your laser system's potential. Our service is so extensive that we will even visit your site to optimize your machine parameters, in order to help you lower your parts costs and in-

crease both production speed and product quality. We keep downtime and service visits to a minimum, because, with your permission, our specialists can use our online Telepresence service to access your software directly and solve the problem at hand. And, should you need a spare part, we can be reached from anywhere in the world, 24/7, 365 days a year.



TRUMPF is certified according to DIN EN ISO 9001 and VDA 6.4

