nanosystec
PRECISION AUTOMATION

Rápido

Laser System for Selective Precision Soldering

Rápido

Selective Precision Soldering with Rápido

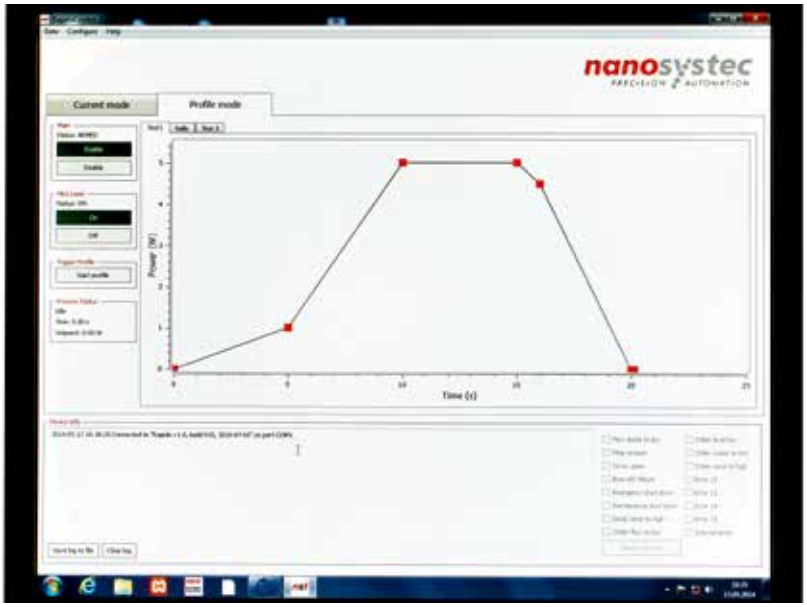
The industrial laser system Rápido – ideal for demanding selective soldering processes.

The diameter of the laser radiation can be narrowed down to as little as 0.1 mm at the working point. Depending on the task, optical lens assemblies form the laser beam which can be circular or have different shapes fitting the solder pad. The control electronics have standard interfaces for easy integration into the production line.

A CCD camera mounted on the focusing lens supports the image data processing and allows the visual inspection and documentation of the soldering point.

Reliable Diode Laser Modules with a long Lifetime

Diode laser modules with a long lifetime generate optical output powers between 10 W and 200 W. The wavelength is 980 nm or 450 nm. The high efficiency with 40 % or better results in low power consumption and a practically maintenance-free usage. The optical power is transported with an armoured fiber.



Programmable Power Profiles

Rápido allows the programming of three power profiles. Each profile has up to 20 set points over a time base between 1 s to 600 s. Power profiles are useful for pre-heating the solder point and for a controlled-cool down sequence. The adaption to various solder tasks is therefore easy.

Advantages of Laser Soldering

- **The laser beam fits the solder pad precisely**
- **Local heating**
- **Guaranteed high quality of soldering**
- **Focus down to 0.1 mm**
- **Parallel soldering of multiple points**
- **Temperature range between 80 °C and 400 °C**
- **Suitable for all soldering materials**

Powerful Control Electronics

16 digital I/O ports (5 V or 24 V) isolated by opto couplers as well as an analog port (10 V) are used for the integration of Rápido into production systems. A serial interface connects Rápido with computers or other instruments. If rapid changes of the laser power are needed, the analog interface 0-10 V allows the manipulation within milliseconds.

The user interface is easy to use. It shows the selected operational mode, the actual current as well as the power values and displays all safety-relevant values in clear text. All important values like the diode laser temperature are controlled.

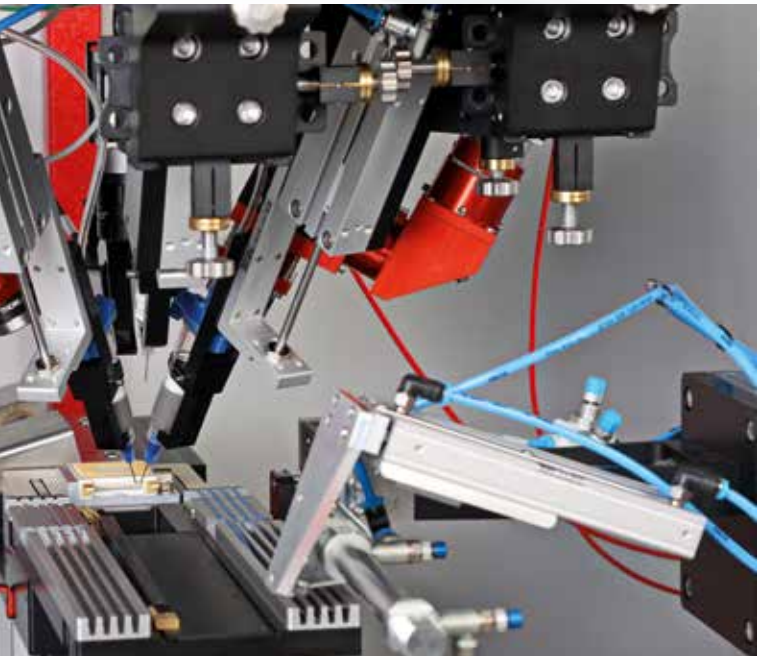
Important parameters and messages are displayed in clear text on the user interface.

Rápido is a Class IV laser system. If integrated into larger systems like NanoRapid, the interlocks of Rápido are used to meet all requirements for a Class 1 system.

Closed-Loop Temperature Control

Rápido Blue uses a diode module at 450 nm. The optical path of the integrated pyrometer is perfectly superimposed with the work beam. Down to a focus of 100 µm, the temperature is precisely measured and transferred to the electronics via an analog interface. Within milliseconds, the optical power can be adjusted to a preset level. The range between 80 °C and 400 °C is large enough to work with all soldering materials typically used.

Rápido Blue provides an integrated pyrometer which measures the temperature in the solder joint with high accuracy and adjusts the optical power within milliseconds.



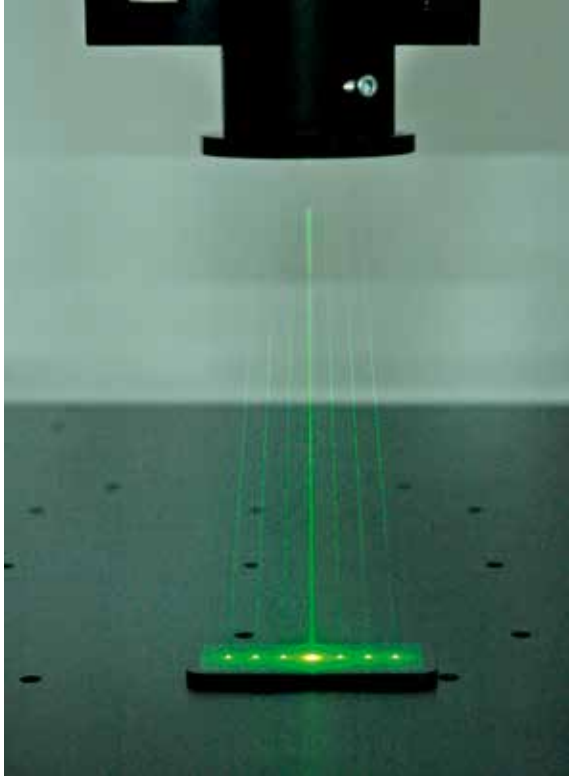
Lens Assembly with CCD Camera

Rápido works with many variations of lens assemblies. The geometry of the focused laser beam will be adopted to the task. The minimum spot diameter is 0.1 mm and the beam can be formed to project a round spot, a straight line or a rectangular shape. For soldering many individual spots at the same time, the Multi-Beam Optics (MBO) is the right choice.

Rápido controls one or two laser diode modules. Working with two simultaneous outputs provides a balanced geometry as the part can be soldered from two sides. In this way, tombstone effects or shifting of the parts are avoided.

A CCD camera attached to the solder head allows for automated machine vision. Images with the corresponding algorithms are used for the precise positioning of the laser beam on the solder joint. In addition, the images can be stored for quality control and process development purposes.

Moving the laser beam with a **XY scanner with fθ optic** from soldering point to soldering point within a few milliseconds reduces the processing time. A computer controls the movement of the laser beam within a field of approximately 100 mm x 100 mm. Any pattern can be programmed.



A Multi Beam Optic reduces the process time as a number of soldering joints can be processed simultaneously.

Multi-Beam Optics

The **multi-beam optics (MBO)** is ideal for high production volumes and a constant pattern of soldering points. The optic splits the incoming laser beam up into several subbeams which hit each solder pad. The time reduction is proportional to the number of soldering points.

High productivity
Assuming the solder time per point is 1.5 s with a total of 10 soldering points, a total time of 15 s is needed, positioning time not included.

With a MBO, the time remains 1.5 s for all 10 soldering points which is an increase in productivity by a factor of 10.

Technical Data

Optical Output Power	10 W, 50 W, 100 W, 150 W, 200 W
Wavelength	450 nm, 980 nm
Pilot laser	650 nm, 1 mW (optional, not available for all modules)
Pulse width	2 ms to continuous emission, full power
Trigger signal	TTL and/or 24 V
Power profile	20 power values per profile
Electrical supply	120/230 V, 50/60 Hz
Cooling	Water (tap water or recirculating chiller)
Dimensions	19 in. rack mount, 4 HU, 600 mm depth
Weight	23 kg

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11/2022 by nanosystec GmbH