

## Laser Marking System LP-RF



**Easy-to-use  
powerful – flexible –  
time-saving**

Panasonic Industry presents the new Laser Marker LP-RF, an easy-to-use marking solution for Industry 4.0 applications for a variety of industries.

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### INTRODUCTION

The optimization of the production process continually calls for new developments and the use of the latest technologies. To ensure the traceability of components a robust, reliable and long-lasting marking is essential. Within modern, effective and flexible production lines laser markers are increasingly the application of choice. The reasons for this development are, in addition to the increasing need to label products, the technological and process-related advantages of the laser marking process compared to other labeling processes, such as the pad printing, inkjet printing, embossing or electrochemical processes (etching process), which in the past decades were mainly used for this purpose.



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### ADVANTAGES OF LASER MARKING SYSTEMS

Manufacturers of industrial Laser Marking Systems offer a wide range of different devices, which generally can be distinguished in the type of beam generation (laser source) and the methods selected for beam guidance. The perfect marking solution depends on the materials to be machined and the requirements for the marking, such as appearance, surface structure and processing time.

Besides the type of laser, which is clearly the key element, also the system components like the control unit and a comprehensive software are highly relevant for the ideal marking solution. Only a perfectly tuned system can contribute efficiently and reliably to a fast and flexible production process.

- › High quality and reproducibility of the markings
- › Durable and abrasion resistant markings (resistant to environmental influences)
- › High-speed marking
- › Micro-marking as well as large-area marking
- › Suitable for complicated component geometries
- › Marking in areas difficult to access
- › Non-contact procedure
- › No consumables such as paint required
- › No pre- and post-processing necessary

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### COMPARING THE MARKING METHODS

|                               | <b>Laser Marking</b>   | <b>Inkjet</b>   | <b>Dot peening</b>                                     | <b>Chemical etching</b>   |
|-------------------------------|--|---|--|---|
| <b>Scope of application</b>   | Many materials (labels, glass, metals and resins), high speed marking, and on-the-fly marking      | High-speed marking of moving products (marking on the fly)                            | Large / thick metal components                         | Thin metals   |
| <b>Marking quality</b>        | Excellent  | Average   | Poor   | High  |
| <b>Materials</b>              | Most Materials   | Most Materials  | Metal  | Metal   |
| <b>Mark permanence</b>        | Permanent  | Markings can be rubbed of in time   | Permanent  | Permanent   |
| <b>Marking speed</b>          | High   | High  | Low  | Low   |
| <b>Integration</b>            | Very flexible integration system   | Only possible if the marking remains the same   | Only possible if the marking remains the same          | impossible  |
| <b>Processing costs</b>       | Electricity cost   | Inks, cleaning fluids, ink disposal poses, additional environmental costs and impacts | The needle must be replaced depending on wear          | Masks with marking content, etching chemicals and chemical waste disposal |
| <b>Flexibility of marking</b> | Flexible designs: Vector graphics, barcodes and 2D codes, individual fonts, ASCII characters, etc. | Inflexible (mostly only alphanumeric marking possible)                                | Inflexible (mostly only alphanumeric marking possible) | Inflexible (mostly only alphanumeric marking possible)                    |
| <b>Maintenance</b>            | Almost maintenance-free  | Daily printhead cleaning, ink refilling   | Check the mechanical wear of the needle                | Cleaning the plant, renewing the chemical substances                      |
| <b>Capital costs</b>          | €€€  | €€  | €€   | €€  |
| <b>Running costs</b>          | €  | €€€€  | €€€  | €€€   |

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### LASER MARKING IN GENERAL

Laser marking of components is usually a thermal process, where focused laser radiation is used to alter the surface or the interior of a material. The decisive factor is that the material absorbs a high percentage of the used laser radiation to ensure the marking process of the given workpiece.

#### Processability of materials

The absorption capacity and thus the workability of a material depend heavily on the wavelength of the laser marking system.

For example the radiation of a CO<sub>2</sub> marking laser with a wavelength of 10.6 µm is well absorbed by plastics or organic materials but not by certain metals and steel. On the other hand the radiation from diode and solid-state lasers (e.g. fiber lasers) with a wavelength of 1064 nm is absorbed sufficiently by steel, light and non-ferrous metals and plastics, but not by organic materials.

#### Different marking methods

In principle, there is no material that cannot be marked with a Laser Marker. Various material-dependent and material-independent marking methods are available for this.

Annealing and engraving are particularly suitable for metals. With the marking method annealing, the color of the metal is changed superficially without significant material removal or material throw-up. This process has therefore been used in medical technology for a long time.

In comparison to annealing, engraving is based on the removal of material by melting displacement and evaporation. Here more or a few deep indentations arise, which are called engravings. These are used for counterfeit-proof and wear-resistant product labeling.

For plastic the marking methods called foaming and carbonizing. If the product is made of dark plastic, the method of foaming is used. The laser radiation melts the plastic, creating small gas bubbles through partial evaporation. The enclosed gas creates a visible mark on the product.

On the other hand bright plastics are carbonized during laser marking or a color change is generated. The laser radiation partially heats the material to over 100 degrees, causing the material to turn dark and a marking to be seen.

This method is characterized by a very high resistance to abrasion and chemicals.

For metal and plastic, there are other methods such as surface cleaning, layer removal or bleaching, you can read more about this on our website

<https://laser.panasonic.eu/en/laser-marking-systems/methods.htm>

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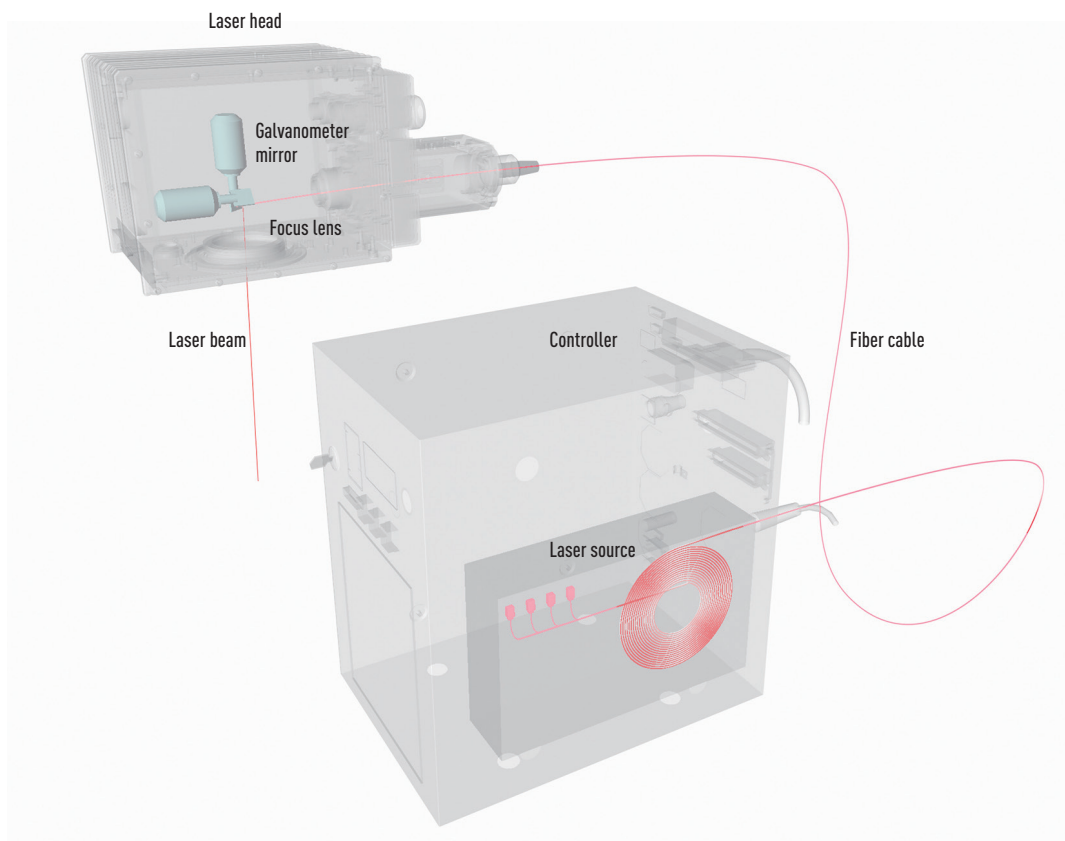
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### FIBER LASER TECHNOLOGY

Within a fiber laser the active medium is the core of an optical fiber that is doped with chemical elements of rare earth elements e.g. Ytterbium. This laser core is surrounded by a cladding into which the radiation from several laser diodes is coupled. Through multiple reflections in the cladding the pumping light is guided repeatedly through the optical fiber core whereby the electrons in the active laser medium are stimulated and laser radiation is generated. The fiber and special fiber Bragg gratings at the ends of the fiber are building the laser resonator. They ensure that the generated laser radiation will be reflected and guided through the fiber core to amplify the

laser radiation. After multiple reflections in the optical fiber a small percentage of the generated laser radiation is coupled into a glass fiber or a fiber optic cable. With the glass fiber or fiber optic cable the laser radiation is guided to the workpiece via e.g. a galvanometer scanner system.

Fiber lasers can generate laser radiation with powers of several 10 kW with a very good beam quality and high efficiency. Higher laser beam powers can be achieved by using special amplifiers or bundling several fibers.



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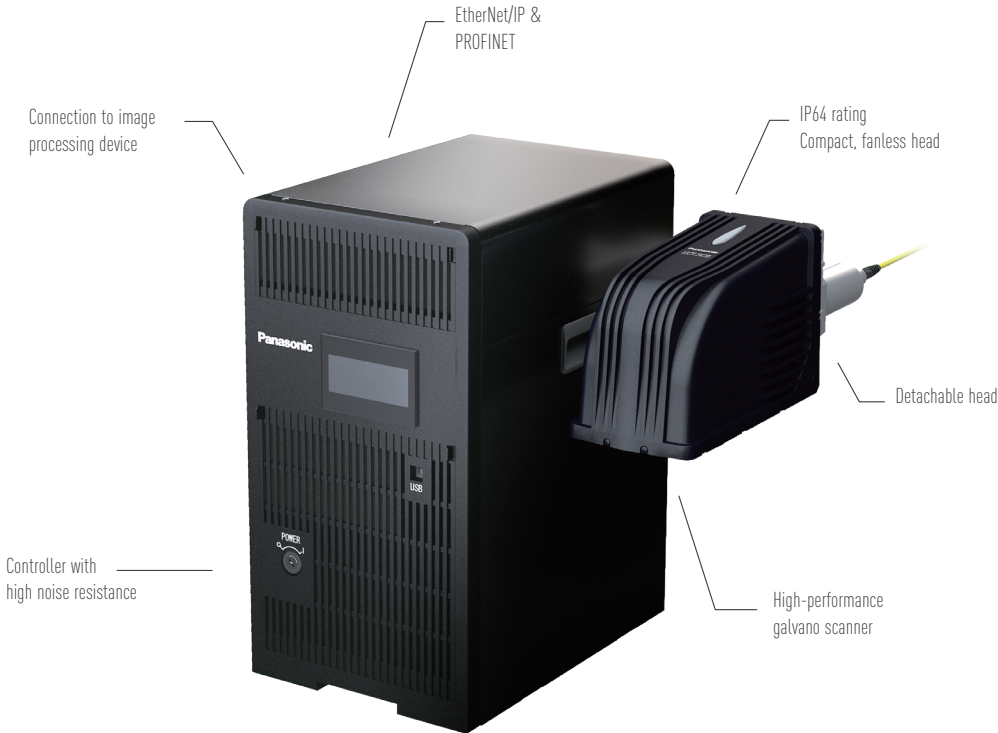
### FIBER LASER SYSTEM – LP-RF

Panasonic offers a wide range of fiber laser marking systems. From 12W to 100W systems and from high-end products with special 3D marking function to the entry-level model LP-RF for simple 2D applications.

#### Highlights & features

The new Panasonic Laser Marking System LP-RF features a state-of-the-art fiber laser, a new standard for “simple” laser marking systems, and responds to customers’ needs. It offers an easy-to-handle system for easy applications with a lot of highlights:

- › Detachable head
- › IP64 rating on the laser head
- › Connection to image processing device
- › Controller with high noise resistance
- › EtherNet/IP and ProfiNET
- › New easy handling software





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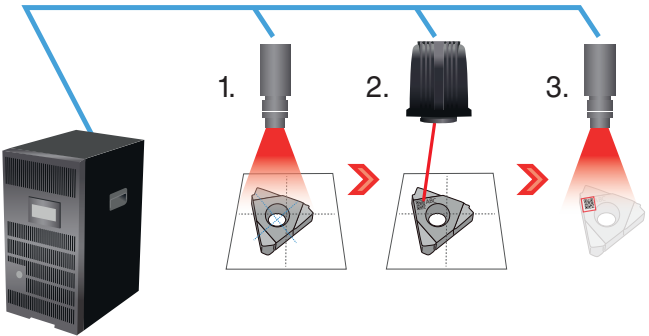
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The detachable laser head enables quick and easy installations even within challenging environments. Due to the design of the laser system only the compact head unit has to be positioned above the workpiece which will be marked.

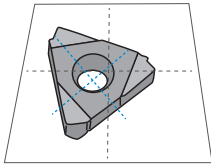
The head unit of the Panasonic Laser Marking System LP-RF was designed as a sealed system and does not require active cooling like a fan. Therefore it is water-resistant, dust-tight and so complies with the IP64 rating. The controller unit in which the laser radiation is generated is connected with a 3m fiber cable to the head unit. So it can be positioned in a cleaner area. That way the installation and maintenance time can be reduced.

In the compact laser head of the Panasonic Laser Marking System LP-RF a digital galvanometer scanner system is integrated to guide the laser beam to the correct marking position (on the workpiece). By using a digital galvanometer scanner system precise markings at high speeds are the result.

The high-noise resistant controller features a power transformer and varistor to ensure a safe and reliable use within the production process. Furthermore a variety of image processing devices can be connected directly to the controller.

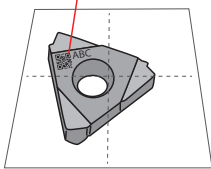


### 1. Detection of workpiece position



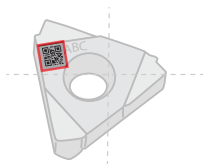
The camera scans and detects the position of the workpiece placed in the equipment.

### 2. Marking position correction



The angle is corrected based on the scanned position information before the LP-RF emits the laser beam.

### 3. Cross-check of scanned code information



The system checks whether the marked Data Matrix code can be scanned properly and cross-checks the scanned information with the marking data.

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The Panasonic Laser Marking System LP-RF also features a robust touch screen display at the controller that provides status information for fast troubleshooting if it is necessary.

The Panasonic Laser Marking System LP-RF offers a variety of interfaces such as connectors for I/O control, RS-232C, EtherNet/IP and

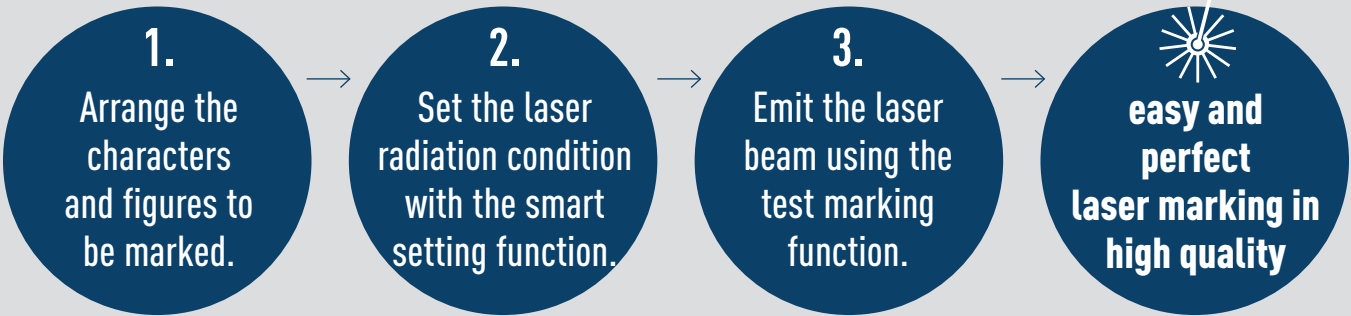
PROFINET to ensure a fast setup and integration in modern production environments as one part of the value-added chain. Due to the features of the Panasonic Laser Marking System LP-RF it can be fully integrated into a connected factory and contribute to Industry 4.0 applications.

## NEW “LASER MARKER NAVI SMART” SOFTWARE

### Smart setting function

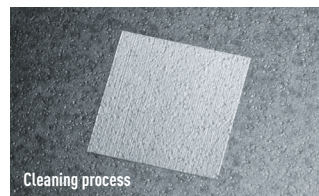
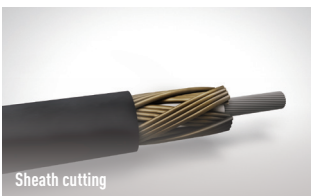
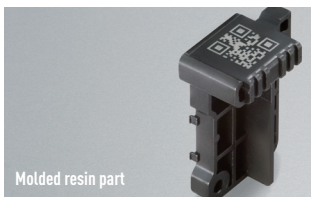
The new “Laser Marker NAVI smart” software, is provided with the Panasonic Laser Marking System LP-RF. Using the software the marking layout can be set up on a PC or tablet: Characters, logos as well as 2D codes can be adapted individually to ensure traceability.

The software layout can be customized to suit each professional environment. Additionally different settings can be protected via password according to the purpose of use, such as parameter setting or operating.



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### A diversity of applications

The Panasonic Laser Marking System LP-RF is capable of marking on a variety of materials including metals and plastic. This laser marker is suitable for marking two-dimensional barcodes on iron, SUS, aluminum and other metal parts used in automotive industry or other industries. Also for marking company/brand logos and rating information on plastic electronic parts and cases in lieu of attaching

labels. It irradiates a laser beam to mark on various materials, and its applications are not limited to the manufacturing industry. The condensing lens focuses laser light into a small-diameter, high-power laser beam for marking. Therefore, the LP-RF can mark extremely small characters on parts with a limited marking area, such as semiconductor packages and connectors.

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The function is packed with extensive know-how of laser marking parameters such as laser power, scan speed and pulse cycle. The user can select the desired marking result from 16 different types of materials and images.

The optimal settings can be chosen easily by choosing the material and color out of the database of preprogrammed laser parameters. This adjustment tool reduces the setup time and provides fast and high-quality results.

### SPECIFICATIONS

| Item                                     |              | Model No. | LP-RF200P  |
|--|--------------|-----------|--|
| Marking laser                            | Laser type   |           | Yb fiber laser; $\lambda = 1064\text{nm}$ class 4 laser  |
|  | Output class |           | 20W  |
| Guide laser / pointer                    |              |           | Red semiconductor laser; $\lambda = 655\text{nm}$ ; laser class 2, 1mW   |
| Scanning method                          |              |           | Galvanoscanner   |
| Marking field                            |              |           | 90mm x 90mm  |
| Work distance                            |              |           | 190mm  |
| Max. scan speed                          |              |           | 12,000mm/s   |
| Max. line speed                          |              |           | 240m/min.  |
| Character types                          |              |           | English uppercase letters, English lowercase letters, numerals, katakana, hiragana, kanji [JIS level 1 and level 2], symbols, user-defined characters (up to 50), TrueType |
| Barcodes                                 |              |           | Code39, Code128 [GS1-128], ITF, NW-7, EAN/UPC/JAN<br>GS1 DataBar Limited, GS1 DataBar Stacked,<br>GS1 DataBar Limited CC-A, GS1 DataBar Stacked CC-A                       |
| 2D codes                                 |              |           | QR Code, Micro QR Code, iQR Code, Data Matrix, GS1 Data Matrix, PDF417   |
| Logo/graphics                            |              |           | VEC, DXF, HPGL, BMP, JPEG, AI, EPS   |
| Communication ports                      |              |           | I/O terminal block (40 pins), I/O connector (40 pins)  |
| Interface                                |              |           | RS-232C, Ethernet  |
| Optional interfaces                      |              |           | PROFINET, EtherNet/IP, PROFINET Unit (LP-ANW11), EtherNet/IP Unit(LP-ANW10)  |
| Cooling method                           |              |           | Head: natural air cooling, Controller: forced air cooling  |
| Operating voltage                        |              |           | 180 - 264V AC (including power voltage fluctuation of $\pm 10\%$ ), 50/60Hz  |
| Power consumption                        |              |           | Maximum 370W (max. 2.1A)   |
| Degree of protection                     |              |           | Head: IP64   |
| Ambient temperature                      |              |           | 0 to +40°C   |
| Storage temperature                      |              |           | -10 to +60°C   |
| Ambient humidity                         |              |           | 35 to 85% RH   |
| Net weight                               | Head         |           | ≈ 8kg  |
|  | Controller   |           | ≈ 37kg   |
| Applicable standards                     |              |           | IEC 60825-1, FDA regulations, GB standard, KC mark   |
| Supplied software                        |              |           | Laser Marker smart Utility (Laser Marker NAVI smart, logo data editing software, ExportVec, FontMaker)   |
| Laser Marker NAVI smart display language |              |           | Japanese, English, Chinese (simplified Chinese), German  |
| OS supported by the supplied software    |              |           | Windows® 10 Pro (32 bit, 64 bit), Windows® 8 Pro (32 bit, 64 bit),<br>Windows® 7 Professional SP1 (32 bit, 64 bit)   |
| Optional power cable                     |              |           | LP-ACA12 - Rating 250V, VDE standards compatible (european standard)   |

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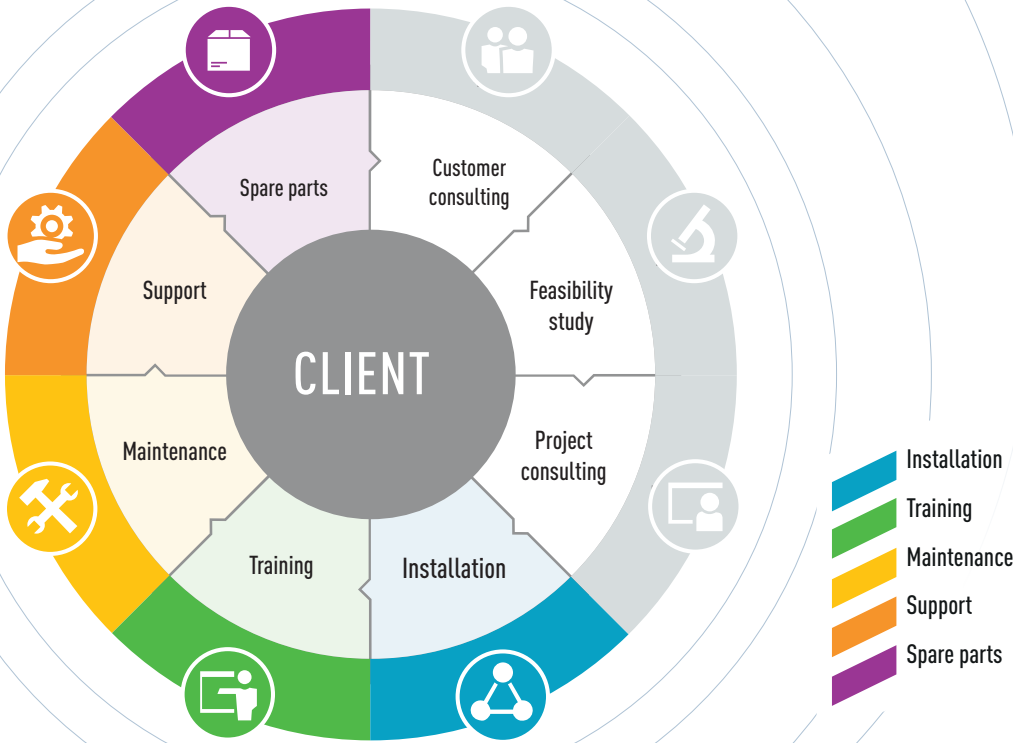
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## MAINTENANCE & SERVICES

To ensure reliable operation with consistent high-quality marking results Panasonic Industry focused on the robustness of the Panasonic Laser Marking System LP-RF. Even in environments with a high exposure of dust or oil mist it is only necessary to clean the lens protection glass with a dry and soft cloth. In order to optimize the running costs and reduce downtime of the laser marker the customer can easily change limited-life parts of the controller like fan filters, the fans itself, the internal battery or the contactor kit. Even changing the lens protection glass on the head unit does not require Panasonic personnel. However, our customers can expect to receive comprehensive support provided by trained experts.

**Services:**

Besides a comprehensive maintenance support Panasonic Industry offers a wide-ranging portfolio of customer support to ensure an optimal and cost-effective usability. Our services start with consultation and feasibility studies, assistance in the set-up phase up to maintenance and troubleshooting. We establish a close relationship with our customers from the pre- to aftersales stage and beyond the product life cycle itself.



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### ACCESSORIES

#### Workstations

Especially for low volume productions and prototyping Panasonic Industry offers workstations that solve a variety of tasks and offer a wide range of applications. The workstations can be individualized and customized to specific demands.

#### Extraction units

Panasonic Industry provides a variety of extraction systems that increase the service life of the laser and contribute to a clean production environment. A permanent safe and clean extraction process reduces dust and particles to ensure the ideal production process.

LC-1000



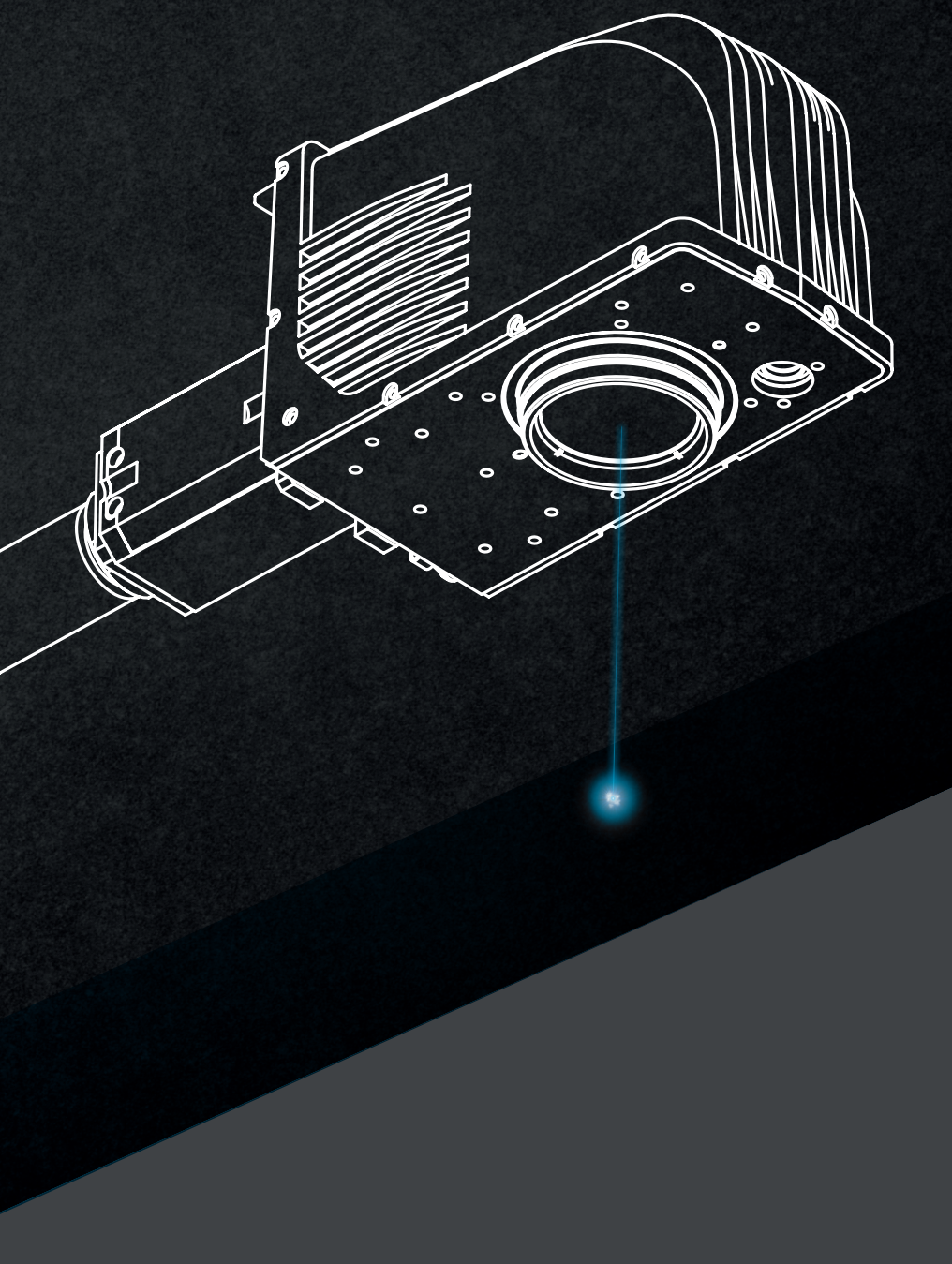
LFE-300



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