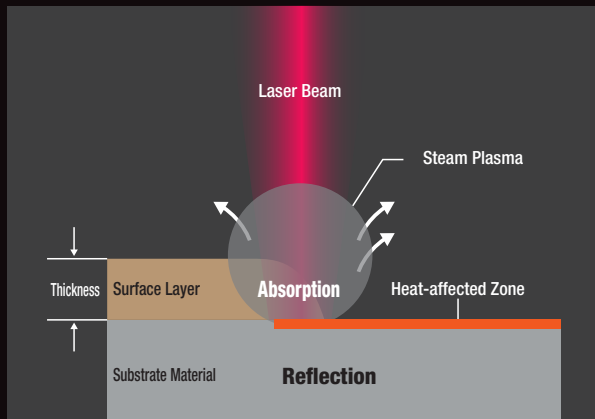


# Technology

## Principle of Laser Detachment

LaserKEREN® processing takes advantage of the difference in laser energy absorption between the substances to be detached and the base material. If the laser energy absorption rate of the substances to be detached is higher than that of the base material, the substances absorb the laser energy and evaporate, but the base material does not absorb the laser energy (due to reflection, type of material, etc.), so there is almost no damage to the base material itself. In addition, the focused light of the laser is a point of several tens of microns and moves very fast, so it has very little thermal effect on the base material. However, laser processing is not a panacea either, and if there is no difference between the energy absorption rate of the substances to be detached and the base material, it cannot process the material. With LaserKEREN®, the scanning speed, beam width and energy of the laser spot light can be adjusted to the optimum values for the evaporation of the substances to be detached.

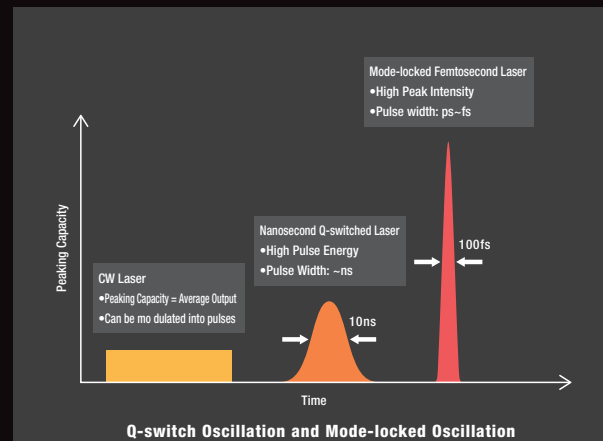


## Information on Fiber Laser Oscillator

The fiber laser oscillator employed in the LaserKEREN® has a structure in which an excitation light is input to a special optical fiber whose core has rare earths added to it, only the light with a specific wavelength is confined in the core and amplified, and it is taken out as laser light. This is an ideal laser that can achieve everything from down-sizing, high efficiency, high reliability, high laser quality, and high output power thanks to this structure. The guaranteed service life of our laser oscillator is 10,000 hours. However, this is a period for which we guarantee 100% output power, and after this period has passed, the output power will gradually decrease to 99%, 98%, 97%, and so on. The laser oscillator does not require any maintenance or consumable parts.

## Difference in Laser Output Method

Concerning the types of laser used by the LaserKEREN® devices, our LaserKEREN® devices use fiber lasers, and we employ two types of oscillators whose laser output methods differ from each other to allow selective use of them according to the processing contents. In both methods, the YAG wavelength is used and, by moving the laser spot (point) at a high speed, the laser radiation is converted into a linear shape. To move a linear beam, the laser injection gun is manually moved. It is also possible to change the width of the linear beam, but as increasing the width widens the processing range, the speed at which the laser injection gun is manually moved gets slower.



### 1 Continuous Oscillation (Continuous Wave Fiber Laser)

The indicated Watt value is extremely high compared to that of the Q-switched pulse type. The laser at the indicated Watt can be continuously output. The power consumption is also great, and the necessary power source is three-phase 200-400 V. As the generated heat quantity is extremely large, a water-cooling chiller is required, and the device size necessarily becomes large. We employ this method in high-power LaserKEREN® devices.

### 2 Q-switched Pulse Oscillation (Q-Switched Pulse Fiber Laser)

Although the indicated Watt value is low, it is possible to intermittently (nano-second intervals) output peak power (max.) at a level several times higher than the indicated Watt value. Another feature of this method is low power consumption. Average power consumption is also low, and the cooling method is air-cooling, making it possible to reduce the device weight. We employ this method in low-power LaserKEREN® devices.

## Processing Examples (When using LZK2000)



Other than the above, coatings such as DLC and PVD, detachment of rubber and resin attached on the mold surface, removal of weld burn, degreasing before welding, peeling off of various plated materials, peeling off of aluminum/stainless steel surfaces, peeling off of stone/wood surfaces.

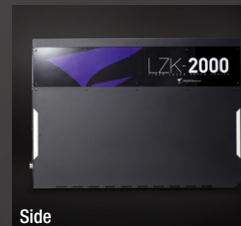
# Products

## High-Power Device

LZK-1000/2000

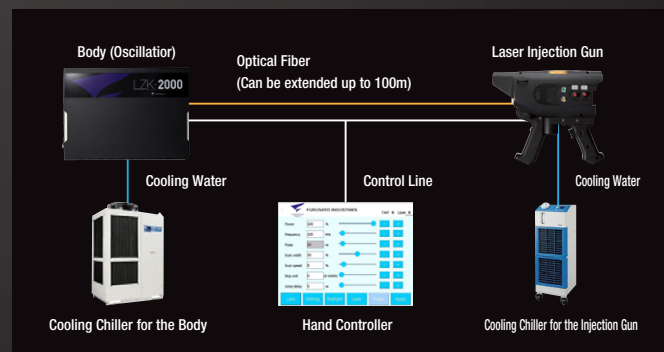


It is a device that radiates a continuous beam of fiber laser (CW laser) linearly to the material surface and performs processing while moving the laser injection gun. Since it has more energy per unit time than the pulsed oscillation type laser used in the low-power LaserKEREN® devices, it is suitable for processing the material with significant corrosion or the substance to be detached is thick. The excitation method using an optical fiber, the scanning method of the laser injection, and the wavelength of the injected laser are the same as those of the low-power LaserKEREN®.



## Configuration of High-Power LaserKEREN® Device

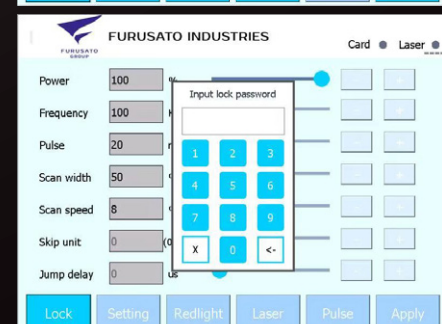
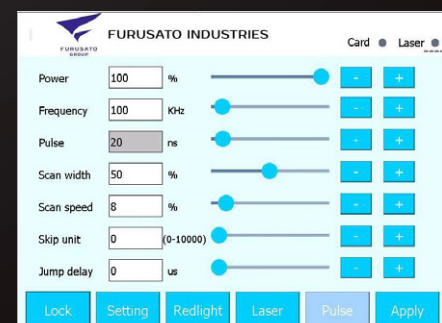
- In order to generate and inject a high-power laser, 2 cooling chillers for the main body and the injection gun are required.
- The fiber cable that connects the oscillator body and the injection gun can be extended up to 100 meters by using an optional relay coupler.
- Various settings can be changed with a controller installed near the laser injection gun to make it easier for operators to handle.



### Device Specification

Model	LZK-1000	LZK-2000
Maximum Power	1000W	2000W
Size	750×1420×1200mm	750×1420×1200mm
Weight	500kg	550kg
Size of injection gun	600×300×170mm (including the protrusion)	600×300×170mm (including the protrusion)
Weight of injection gun	3kg	3kg
Fiber Length	10m (can be extended up to 100m)	10m (can be extended up to 100m)
Power Consumption	4500W ※Without the chiller	7500W ※Without the chiller
Power Requirement	Three-phase 200~400V±10% 50/60Hz	Three-phase 200~400V±10% 50/60Hz
Cooling Method	Water-cooling	Water-cooling
Laser Type	Fiber Laser	Fiber Laser
Center Wavelength	1080 ±5nm	1080 ±5nm
Output (%)	0, 20, 40, 60, 80, 100 % (6steps)	0, 20, 40, 60, 80, 100% (6steps)
Laser Mode	CW	CW
Spot Diameter	0.257mm	0.257mm
Area	100mm at most	100mm at most
Scan Speed	3000mm/s at most	3000mm/s at most
Focal Length	F=180mm	F=180mm
Working Distance	210mm	210mm
Device Configuration	Body (Oscillator), Chiller for the body, Chiller for the injection gun, Fiber, Injection gun, Controller	Body (Oscillator), Chiller for the body, Chiller for the injection gun, Fiber, Injection gun, Controller

### Controller Screen



# Products

## Low-Power Device

Separate Type LZK-50S/100S

This LaserKEREN® device is suitable for field work as it can be carried on the back. It operates with utility power (single-phase 100~240V). Since the Laser Unit and the Controller are separated, it is possible to carry only the Laser Unit itself (about 30kg) on the back .



Laser Unit

Controller



Laser Unit

Injection Gun

Controller

Usage Example (only carrying the Laser Unit)

The backpack is not a set product.

### Separate Type Specification

Model	LZK-50S	LZK-100S
Maximum Power	50W	100W
Size	Laser Unit : 450×458×253mm Controller : 320×380×185mm	Laser Unit : 450×458×253mm Controller : 320×380×185mm
Weight	50kg of which Controller: 20kg	60kg of which Controller: 23kg
Size of injection gun	340×180×100mm(including protrusion)	340×180×100mm(including protrusion)
Weight of injection gun	2.5kg	2.5kg
Fiber Length	2m/5m (non-extendable)	2m/5m (non-extendable)
Power Consumption	1150W	1400W
Power Requirement	Single-phase 100~240V 50/60Hz	Single-phase 100~240V 50/60Hz
Cooling Method	Air-cooling	Air-cooling

Model	LZK-50S	LZK-100S
Laser Type	Fiber Laser	Fiber Laser
Center Wavelength	1064 ±5nm	1064 ±5nm
Output (%)	0,20,40,60,80,100% (6steps)	0,20,40,60,80,100% (6steps)
Laser Mode	Pulse	Pulse
Spot Diameter	0.057mm	0.057mm
Pulse Frequency	60KHz Fixed	100KHz Fixed
Area	90mm at most	90mm at most
Scan Speed	2000mm/s at most	2000mm/s at most
Focal Length	F=160mm	F=160mm
Working Distance	190mm	190mm
Device Configuration	Laser Unit, Injection gun, Controller	Laser Unit, Injection gun, Controller

Integrated Type LZK-50/100

It is a LaserKEREN® device with an integrated cabinet that is ideal for installation . It comes with casters to move it easily. This device also operates with utility power (single-phase 100~240V).

### Integrated Type Specification

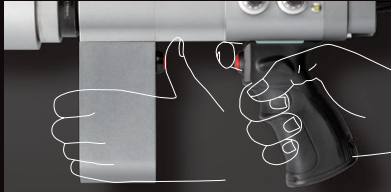
Model	LZK-50	LZK-100
Maximum Power	50W	100W
Size	480×570×930mm	480×570×930mm
Weight	60kg	65kg
Size of injection gun	340×180×100mm(including protrusion)	340×180×100mm(including protrusion)
Weight of injection gun	2.5kg	2.5kg
Fiber Length	2m/5m(non-extendable)	2m/5m(non-extendable)
Power Consumption	1150W	1400W
Power Requirement	Single-phase 100~240V 50/60Hz	Single-phase 100~240V 50/60Hz
Cooling Method	Air-cooling	Air-cooling
Laser Type	Fiber Laser	Fiber Laser

Model	LZK-50	LZK-100
Center Wavelength	1064 ±5nm	1064 ±5nm
Output (%)	0,20,40,60,80,100% (6steps)	0,20,40,60,80,100% (6steps)
Laser Mode	Pulse	Pulse
Spot Diameter	0.057mm	0.057mm
Pulse Frequency	60KHz Fixed	100KHz Fixed
Area	90mm at most	90mm at most
Scan Speed	2000mm/s at most	2000mm/s at most
Focal Length	F=160mm	F=160mm
Working Distance	190mm	190mm
Device Configuration	Body(integrated with injection gun)	Body(integrated with injection gun)

# Safety

## Laser injection W button

Two injection buttons are arranged, and the laser is injected only when both buttons are pressed. This is a mechanism for preventing erroneous operation caused by contact with a tool or through inadvertence.



## IC card authentication

Unless a given user is authenticated by touching the contact - type IC chip incorporated in a certificate of safety training that is issued to those who have finished the LaserKEREN® processing qualification course held by us, it is not possible to start up the machine.



## Emergency stop button

In emergency situations, pressing this button immediately stops the laser injection.

## Physical key

A physical “key” can restrict the user.

## Error code display area

If there is an unexpected problem with the device, an error code will be displayed.

## Output Change Dial

The output power can be changed in 6 steps (0%, 20%, 40%, 60%, 80%, 100%).

## Laser operation status signal

On both the machine body and the laser injection gun, the standby state and injection in progress indicator signals light up.



LZK2000 Injection Gun side Signal

Body side Signal

LZK100S Injection Gun side Signal

## Freezing prevention heater (for water-cooling device only)

To prevent freezing of cooling water inside the oscillator in a cold region, a heater is incorporated in the main body.

## Cooling water warning

When the flow rate of cooling water falls below the standard value for some reason, in order to prevent damage to the oscillator optical system, an error is displayed, and the laser oscillation is stopped at the same time.

# Information

## Automatization of LaserKEREN® work by means of robot and dedicated device

Leveraging the robot technologies, we have accumulated while introducing them to various industries, we offer devices that achieve automatization of Keren works in various manufacturing lines. There is no restriction on the robot manufacturer and specifications to be automatized. For incorporation into existing manufacturing equipment, consult us.

## Customization of LaserKEREN® device

For various customizations of Keren devices at customers in Japan, we are capable of providing detailed services because we are based in Japan. Example) Distance between workpiece and injection gun, dust suction device, fiber length, and change of oscillator.

## After-sales service

As all of the LaserKEREN® devices are manufactured in Japan, we are capable of conducting repair and maintenance of those devices in Japan. Countries available with on-site after-sales service: China, Thailand, Korea For after-sales service in other countries, make an inquiry to us via e-mail.

# Option

## ■ Coupler for the Fiber Laser

It is a device used to extend the fiber. (For LZK1000, 2000)



Model	Fiber to Fiber Coupler ac QB-QB
-------	---------------------------------

## ■ Extension Fiber

It is used to extend between the injection gun and oscillator body. (For LZK1000, 2000)



Model	QBH Fiber Optic Cables 100um
Length	10M, 20M, 30M, 40M, 50M, 80M, 100M

## ■ Cable Reel

A long cable can be wound and stored compactly. It will be manufactured according to each fiber length of the device.



**Laser KEREN®**



For the latest and detailed information, visit the LaserKEREN® website at <https://laserkeren.jp>. The website provides the latest information on products, safety management methods, movies showing how the products are processed, and support information. Safety precautions : Laser light poses a great risk when it is used in a wrong manner. Do not directly look into the laser light or look at it via a reflective object such as a mirror. Correctly use the device after sufficiently taking safety measures.●The specifications and appearances of the products in this catalog are subject to change without prior notice. LaserKEREN® is a registered trademark of Furusato Industries, Ltd. The names of products, methods, etc. in this catalog are our registered trademarks.

For more  
details ▶

LaserKEREN®  
Website



<https://laserkeren.jp>



Manufacturer

**FURUSATO INDUSTRIES**

**LaserKEREN® Development Group**  
**Building Materials Development Division**

1-2-10, Minamishin-machi, Chuo-ku, Osaka 540-0024 JAPAN  
Email: [support@laserkeren.jp](mailto:support@laserkeren.jp) URL: <https://laserkeren.jp>  
Please contact us at the email address above.

Mikeren



Hakurin



2020 Vol 1.1  
Catalog contents are as  
of August 2020.