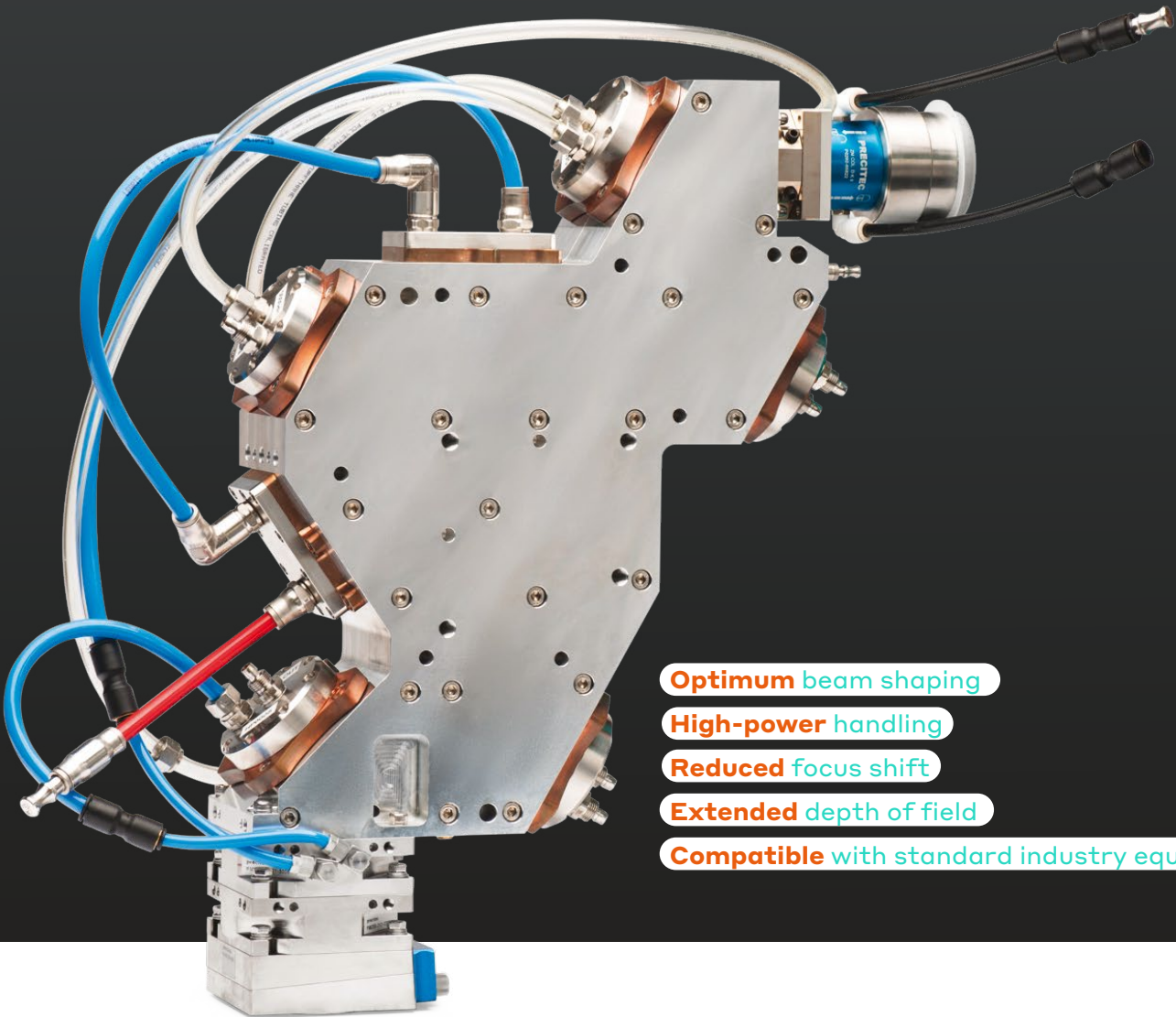


Optimize the performance
of **high-power** laser processes

High-power beam shapers for laser beam welding,
laser cutting and additive manufacturing



Optimum beam shaping

High-power handling

Reduced focus shift

Extended depth of field

Compatible with standard industry equipment

CANUNDA-HP offers modules and laser heads that enable all kinds of beam shaping to improve the quality and efficiency of high-power laser processes, compatible with standard laser heads.



CANUNDA-HP *ring* beam-shaper

Optimum beam shaping

- 600 μm inner diameter and 1 mm outer diameter ring
- **High homogeneity** up to 10%
- **Preserved BPP**
- **High depth of field** of +/- 3 mm

High-power handling

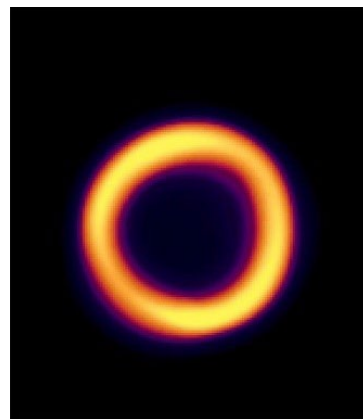
- **Fully reflective** system enabling optimal cooling
- Stable operation **up to 16 kW**
- **Focus shift highly reduced** to 1 mm
- **High transmission** superior to 99%

Standard industry equipment compatibility

- 335 mm x 250 mm x 75 mm system weighting only 15 kg
- **Standard LLK-D connexion** to the laser
- Output compatible with industry Cross-Jet
- System design for a 1030 nm 200 μm fiber core diameter 0,1 NA laser
- Laser head **adapted to any industry robot**

For a ready-to-use system

- **Quick installation** with **no alignment** needed
- Add-ons available for a quick alignment before the process (on-axis camera...)
- Add-ons available to ease the process (protective gaz...)
- Add-ons available to monitor the process (temperature...)



Standard ring shaping of CANUNDA-HP

CANUNDA-HP ring beam shaper specifications

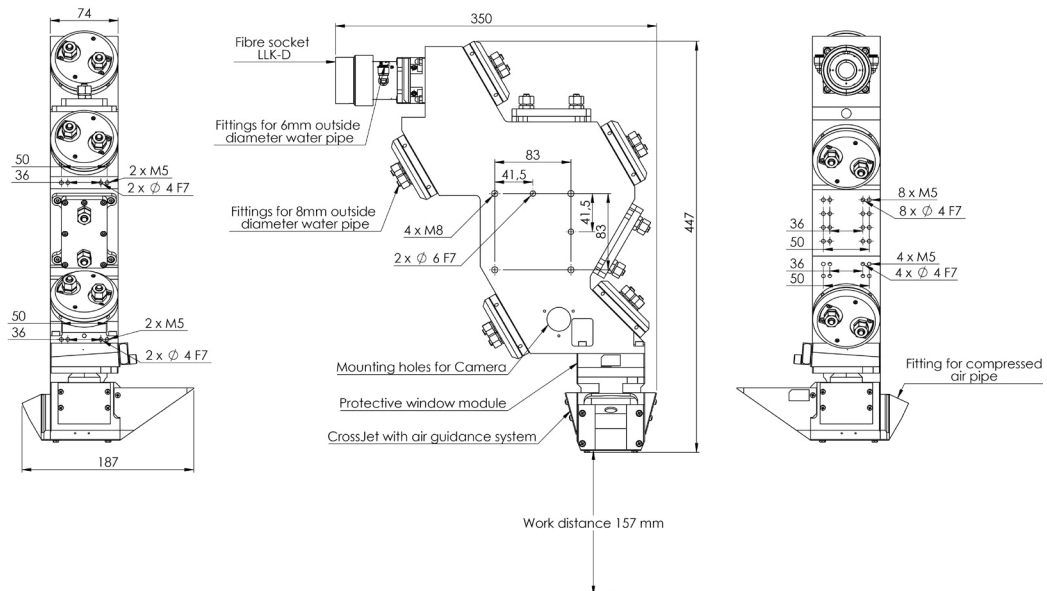
PARAMETER	UNIT	SPECIFICATION
Shape characteristics		
Shape	-	Annular
Internal diameter	µm	600
External diameter	µm	1 000
Depth of field	mm	6
Homogeneity (along the ring)	% RMS	10
System characteristics		
Transmission	%	99
Weight ^{*1}	kg	15
Dimensions ^{*2}	mm x mm x mm	335 x 250 x75
Integration in an industry environment		
Coolant flow (min)	L/min	2
Chiller cooling capacity (min) ^{*3}	kW	1
Input Connector	-	LLK-D type
Input laser wavelength	nm	1030
Input laser Beam Parameter Product (BPP)	mm.mrad	8
Input laser power (max)	kW	16
Input laser fiber core diameter	µm	200
Input laser fiber numerical aperture	-	0.10
Output Cross-Jet	-	Compatible with standard industry equipment
Mechanical holding	-	Compatibility with standard industry robots

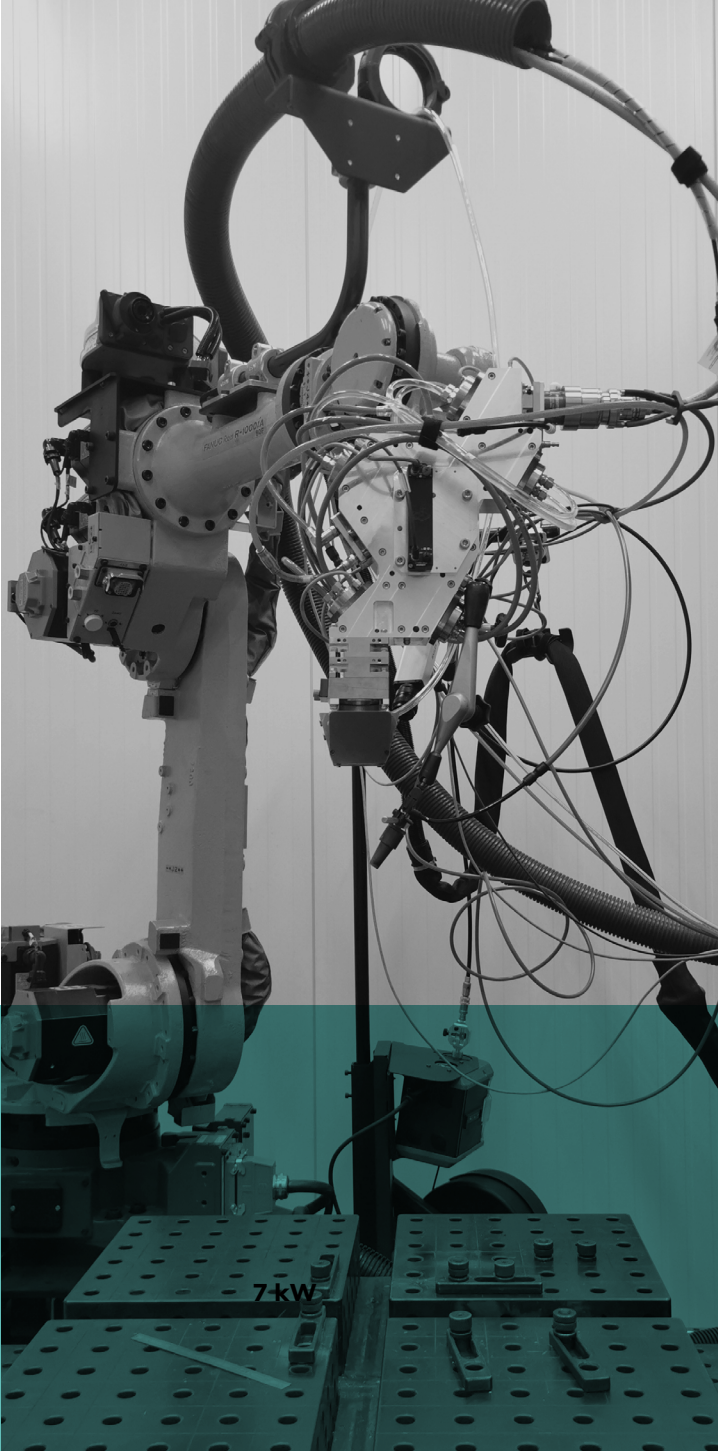
^{*1} LLK-D connector included, Cross-Jet included, add-ons excluded

^{*2} Cross-Jet excluded

^{*3} Independent chiller from the laser

Physical dimensions





Case study

Laser beam welding demonstrated in partnership with the **Institut Maupertuis**

Institut Maupertuis specializes in high-power laser processes including laser welding and additive manufacturing. It provides its partners with **optimal process solutions**.

The collaboration between Institut Maupertuis and Cailabs aims to develop a beam shaping solution to **improve complex laser welding processes**, especially for thick metal sheets.

For this, it is necessary to withstand very **high power** while ensuring a **stable process** in these extreme conditions. The fully reflective design of Cailabs' solution is of great interest because it allows for optimal cooling of the laser head. It provides a high-quality ring beam shape using Multi-Plane Light Conversion (MPLC), a technology developed by Cailabs.

Once Cailabs developed the laser welding head **CANUNDA-HP**, Institut Maupertuis was able to optimize its laser processes up to **16 kW**! Measurements performed at Institut Maupertuis using a PRIMES and a Beam Watch confirmed the effective stability of the laser head: **the focus shift is reduced** to 1 mm with an **optimum depth of field** of 6 mm. The resulting ring beam shape is well balanced and **provides very good quality weld seam**. The full penetration on a 6 mm thick stainless steel sheet is reached at 7kW.

	Welding seam	Macrograph
at 7 kW		

6 mm stainless steel welding seam on aluminum at 1 m/min with Argon shielding gas

Integration

in an industrial environment

1 **LLK-D connector**

2 **Collimation mirror**
water cooled

3 **Shaping mirror**
water cooled

4 **Focusing mirror**
water cooled

5 **Protective window**

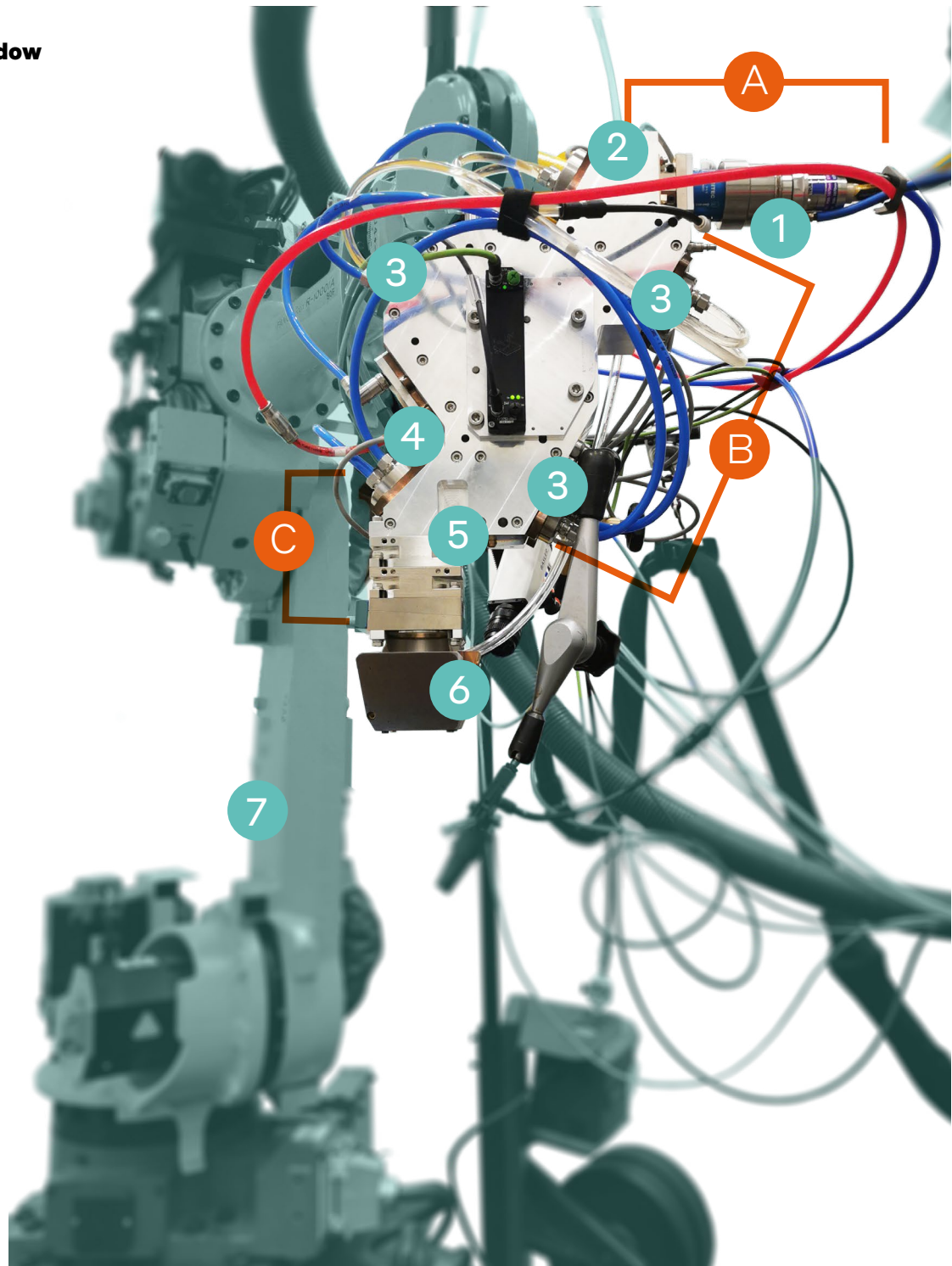
6 **Cross-Jet**

7 **Robot**

A **Collimation unit**

B **Shaping unit**

C **Focusing unit**





Custom CANUNDA-HP systems *available* on demand

Cailabs can develop beam shaping systems to suit your needs:

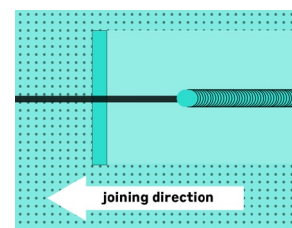
- Custom adaptation of the input laser: the beam shaping system can integrate lasers with various core diameters and numerical apertures, as well as all types of laser technology
- Custom beam shaping: complex beam shaping can be achieved with Cailabs' MPLC technology, such as separate or asymmetrical shapes, or small or large top-hat profiles
- Adaptation to all environments: it is possible to develop compatible beam shaping systems for all your machines, including galvanometer scanners

Benefits of laser beam shaping

High-power multimode laser beam shaping improves performance of many applications

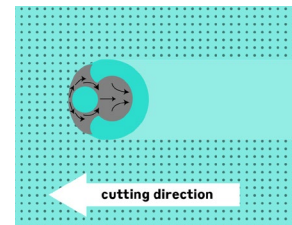
Laser beam welding

- 95-98% of defects elimination
- 70% of lead-time decrease
- 20% cost reduction



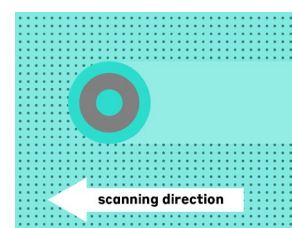
Laser beam cutting

- 100% cutting speed increase
- 50% lead-time decrease
- 20% cost reduction



Additive manufacturing

- 40% weight lost
- 83% of lead-time decrease
- 60% cost reduction



CANUNDA-HP main applications

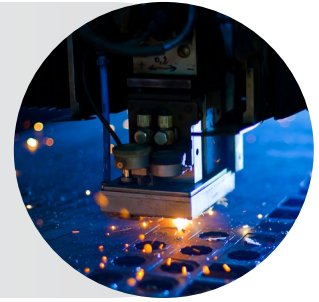


Laser beam welding

Currently, the challenge for laser welding is to improve the reproducibility and reliability of processes. This requires a very stable keyhole, which is possible to achieve by **optimizing the energy input on the workpiece using beam shaping such as the one provided by CANUNDA-HP.**

Laser cutting

The main challenge for laser cutting is to improve output by **increasing cutting speeds and reducing the number of poor quality parts produced**, which is made possible with CANUNDA-HP.



Additive manufacturing

The main challenge for additive manufacturing, also known as 3D printing, is producing parts requiring no post-processing at a higher speed. **CANUNDA-HP provides the beam shaping modules compatible with 3D-printing machines** that makes it possible.

Find out about all our CANUNDA solutions

The CANUNDA product line aims at improving all types of laser processes:

- **High-power continuous** laser processes such as laser beam welding or additive manufacturing with CANUNDA-HP
- **Ultra-short pulsed** processes such as micro-machining, glass processing or surface texturing with:

CANUNDA PULSE

CANUNDA-PULSE for top-hat generation and laser beam stabilization

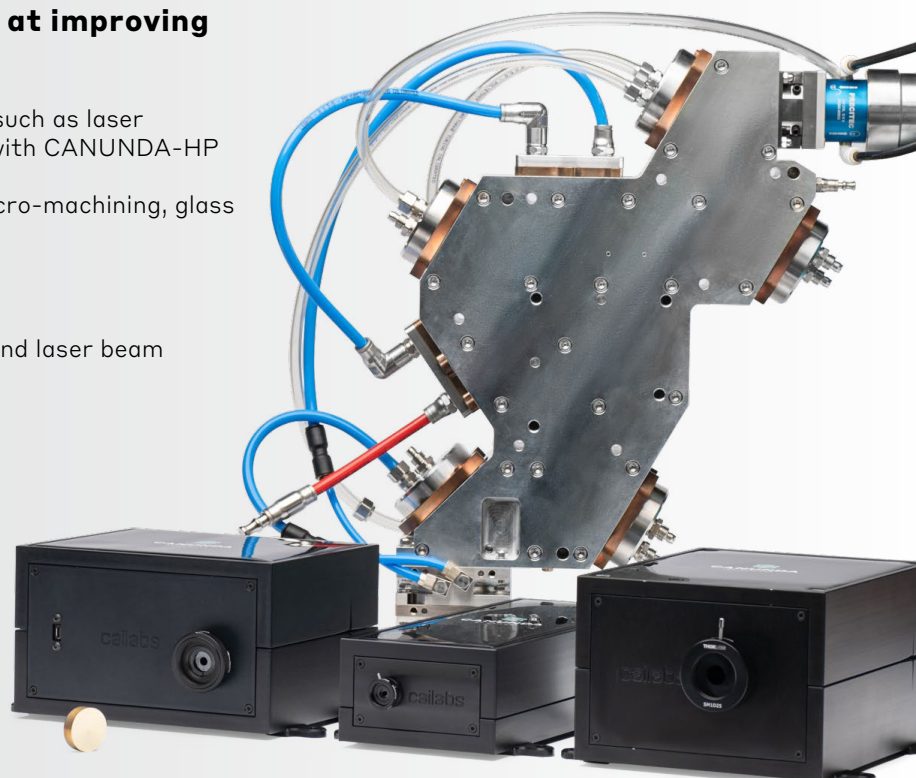
CANUNDA SPLIT

CANUNDA-SPLIT for beam division

CANUNDA AXICON

CANUNDA-AXICON for Bessel beams

All CANUNDA products are providing a high quality beam shaping and a compatibility to any industrial environment!



cailabs

SHAPING THE LIGHT

Founded in 2013, **Cailabs** is a French deep tech company which designs, manufactures and distributes innovative photonic products for telecommunications, free space transmission, industrial lasers, and LANs. A global leader in complex light shaping, its technology is currently protected by 19 patent families. Its innovative optical components are used in a variety of sectors and have contributed to several world records (notably the optical fiber bandwidth record achieved by the Japanese operator KDDI).

Ordering information

The **CANUNDA-HP** ring shaper is available off-the-shelf with the following ordering information:

Product number: **CAHP-R-001-1030**

- CAHP: CANUNDA-HP
- X-YYY: shape information
 - R: ring shape
 - 001: providing a 600 μm inner 1 mm outer diameter ring
 - Other dimensions coming soon
- ZZZZ: central wavelength 1030 nm

Customized systems are available on demand, contact us to get a quotation!

38 boulevard Albert 1er
35200 Rennes, France

www.cailabs.com
canunda@cailabs.com

 @CAILabs