IPG Fiber Laser

Fiber laser： YLS-1000

10.1 Optical characteristics

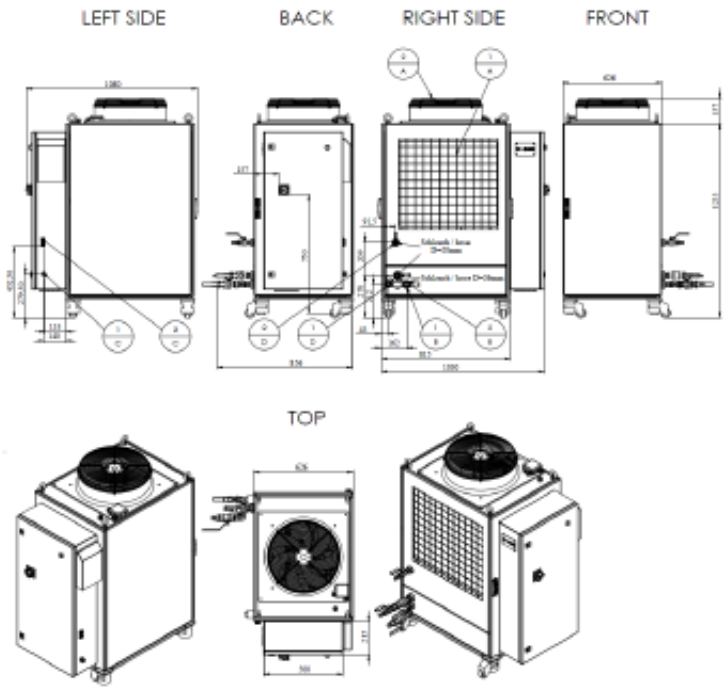
NN	Characteristics	Test conditions	Symbol	Min.	Typ.	Max	Unit
1	Operation Mode			CW, QCW			
2	Polarization			Random			
3	Nominal Output Power		P nom	1000			W
4	Output Power Tuning Range			10		105	%
5	Emission Wavelength	Nominal output power		1070		1080	nm
6	Emission Linewidth	Nominal output power			3	6	nm
7	Switching ON/OFF Time	Nominal output power			80	100	μsec
8	Output Power Modulation Rate	Nominal output power				5.0	kHz
9	Output Power Instability	Over 8 hrs, T water =const, Nominal output power			± 1.0	± 2.0	%
10	Beam Parameter Product*		BPP($1/e^2$) *		4.0	4.5	mm*mrad
11	Output Fiber Core Diameter			100			μm
12	Feeding fiber length			20			m
13	Fiber Cable Bend Radius : unstressed stressed		R	100 200			mm
14	Output Connector			HLC-8, CBH-compatible			

10.2 General characteristics

NN	Parameters	Test conditions	Min.	Typ.	Max	Unit
1	Operation Voltage, three phases		400/3P+PE			VAC
2	Frequency		50			Hz
3	Total Power Consumption	Nominal output power	8.5	9.0	10	kW
4	Maximum operation current	400 VAC			18	A
5	Starting current				32	A
6	Operating Ambient Air Temperature Range with built-in Conditioner		10		50	°C
7	Humidity with built-in Conditioner	T < 40 °C			95	%
8	Storage Temperature	Without water	- 40		+ 75	°C
9	Dimensions, W x D x H of Laser Cabinet, see the picture below		806 x 806 x 900			mm
10	Dimensions, W x D x H of Chiller Cabinet, see the picture below		626 x 1030 x 1390			
11	Laser Weight			600		kg

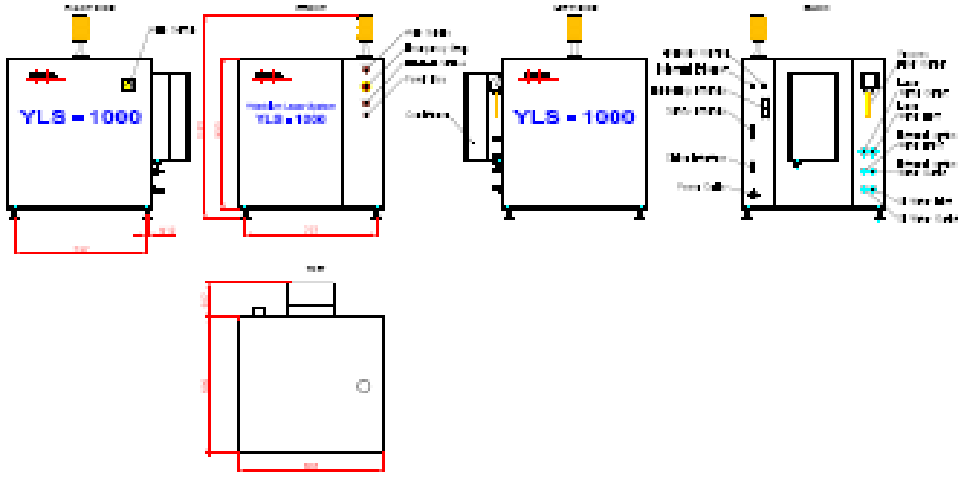
10.3 Chiller specification

LC 71.01-A4.5 Air-water chiller layout*



*Laser system operation without IPG chiller is not possible

10.4 Outside Dimensions of the device



10.5 Conditioner

NN	Option	Key Parameters	Related Parts
1	Conditioner for laser cabinet Model: Seifert KG-4266711	320 W cooling capacity. 520(H)x270(W)x207(D) Weight: 20 kg	Laser operation at high temperature and humidity

Fiber laser：YLS-2000

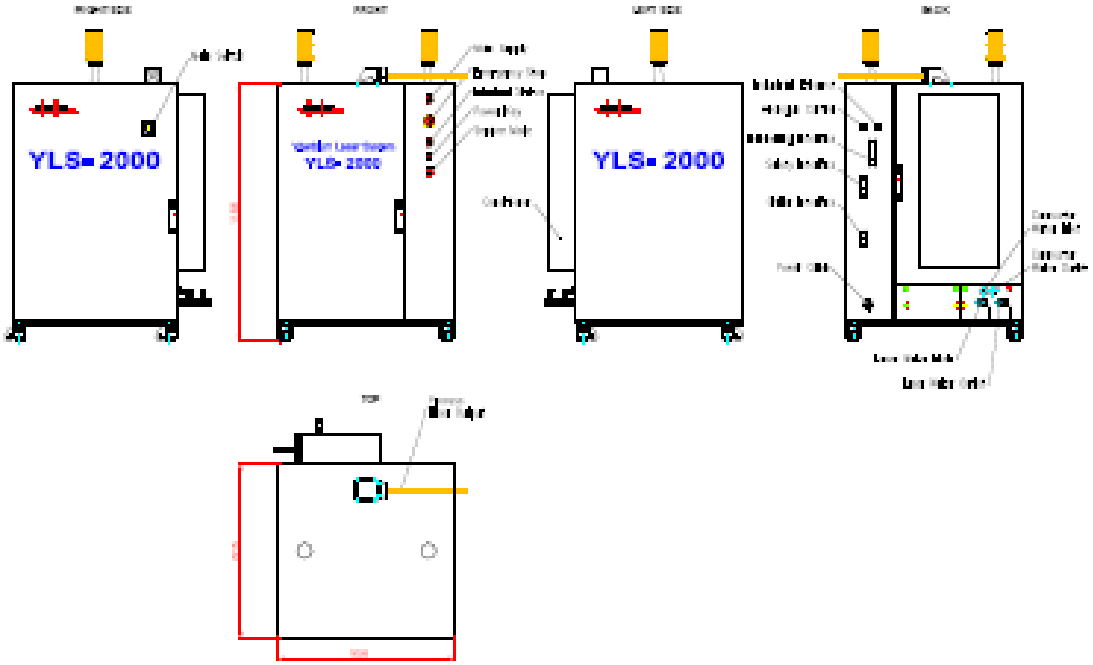
9.1 Optical characteristics

NN	Characteristics	Test conditions	Symbol	Min.	Typ.	Max	Unit
1	Operation Mode			CW, QCW			
2	Polarization			Random			
3	Nominal Output Power		P nom	2000			W
4	Output Power Tuning Range			10		105	%
5	Emission Wavelength	Output power 2000 W		1070		1080	nm
6	Emission Linewidth	Output power 2000 W			3	6	nm
7	Switching ON/OFF Time	Output power 2000 W			80	100	μsec
8	Output Power Modulation Rate	Output power 2000 W				5.0	kHz
9	Output Power Instability	Over 8 hrs, T water =const, Output power 2000 W			1.0	2.0	%
10	Internal Fiber/Fiber coupler			Installed			
11	Beam Parameter Product* at entrance to Fiber/Fiber coupler	Feeding fiber core diameter 50 um, length 5 m	BPP* ($1/e^2$)		2.0	2.5	mm*m rad
12	Beam Parameter Product* at output of Fiber/Fiber coupler	Process fiber core diameter 150 um, length 20 m	BPP* ($1/e^2$)			6.0	mm*m rad
13	Process fiber length			20			m
14	Fiber Cable Bend Radius : * unstressed * stressed		R	100 200			mm

9.2 General characteristics

NN	Parameters	Test conditions	Min.	Typ.	Max	Unit
1	Operation Voltage, three phases		400 – 460/3P+PE			VAC
2	Frequency		50/60			Hz
3	Power Consumption	Output power 2000 W		7	8	kW
4	Maximum operation current	400 VAC			15	A
5	Starting current				16	A
6	Operating Ambient Air Temperature Range		10		50	°C
7	Laser cooling water Temperature Range		20	21	22	°C
8	Laser cooling water Flow Rate		12	16		l/min
9	Laser COLD START Temperature		20			°C
10	Humidity : with built-in Conditioner	T < 40 °C			95	%
11	Storage Temperature	Without water	- 40		+ 75	°C
12	Dimensions, W x D x H of Laser Cabinet, see the picture below		856 x 806 x 1186			mm
13	Laser Weight			340		kg

9.3 Outside Dimensions of the device



9.4 Beam Coupler specifications

NN	Option	Key Parameters	Conditions
1	Internal Fiber/Fiber coupler, 50 um x 150 um	BPP*(1/e^2) ≤ 6.0 mm*mrad	Feeding fiber core diameter 50 um, length 5 m Process fiber core diameter 150 um, length 20 m
2	Process fiber 150 um /20 m	BPP*(1/e^2) ≤ 6.0 mm*mrad	

9.5 Conditioner

NN	Option	Key Parameters	Related Parts
1	Conditioner for laser cabinet Model: Seifert KG-4270 400	600 W cooling capacity. 810(H)x395(W)x135(D) Weight: 33 kg	Laser operation at high temperature and humidity

II. Use-cost of IPG2000W fiber laser

1. Cutting parameters (actual reached parameters)

Material thickness mm	Material type	Cutting speed (mm/min)	Cutting power kw	Auxiliary gas
1	Steel/carbon steel	7000	0.5	Oxygen
		8500	0.75	
		11000	0.9	
		12000	1.0	
	Stainless steel	5000	0.5	Oxygen
		9000	0.75	
		11000	1.0	
1.5	Stainless steel	2500	0.5	Oxygen
		6000	0.75	
		8000	1.0	

2. Operating cost

1) Consumption of laser cutting machine

Item	Name	power consumption（kw/h）	Total power (kVA)	Factor	Total Dissipated Power	Consumption ($)
power consumption	Fiber laser	8	37.5	37.5×70% =26.25	26.25 degree/h	26.25×$.16 $/degree= $4.20 /h
	Main boady	12				
	Cooling unit	6				
	Air compressor	7.5				
	Dust-removing equipment	4				
gas consumption for laser generator	High purity nitrogen 99.999%	None				
	Special gas for laser generator	None				

2). Cutting auxiliary gas consumption

Cut carbon steel (take example of continuous process 2mm carbon steel):

Gas consumption per hour is about 1 bottle of oxygen, the price of one bottle oxygen (pressure 14.5Mpa, purity 99.5%) is $2.40. So the auxiliary gas consumption is $2.40/hour.

Cut stainless steel or aluminum alloy plate (take example of continous process 2mm stainless steel or aluminum alloy plate):

Gas consumption per hour is about 4 bottles of nitrogen, the price of one bottle nitrogen (pressure 14.5Mpa, purity 99.99%) is $3.20. So the auxiliary gas consumption is $12.80/hour.

Note: If the customer often cutting stainless steel, we strongly recommend customer to use liquid nitrogen. The use cost of liquid nitrogen (pure nitrogen 99.999%) is probably 0.6 times of bottled pure nitrogen (99.999%).

3) Other consumable

Focusing lens: one piece per year, the unit price is $480.00 for 7200 working hours.
So consumption per hour is (1x480)÷7200= $.06 /hour

Protective glass: 2 pieces per month, the unit price is $48, for 600 working hours.
So consumption per hour is 2x$48)÷600= $.16/hour

Ceramic Ring: 2 pieces per year, the unit price is $240 , for 7200 working hours.
So consumption per hour is (2x$240)÷7200= $.06/hour

Cutting Nozzle: the unit price is $55, for 300 working hours.
So consumption per hour is $55÷300= $.18/hour

4) Total operating cost

No.	Item	Carbon steel(2mm)	stainless steel or aluminum alloy plate (2mm)	
			bottled pure nitrogen	liquid nitrogen
1	power consumption	$4.25/hour		
2	Gas consumption for laser generator	0		
3	Cutting auxiliary gas consumption	$2.40/hour	$12.80/hour	$7.32/hour
4	Focusing lens consumption	$.06/hour		
5	Protective glass consumption	$.16/hour		
6	Ceramic Ring consumption	$.06/hour		
7	Cutting Nozzle consumption	$.18/hour		
Total		$ 6.92/hour	$17.32/hour	$11.43/hour

Ⅳ. Fiber laser cutting head

Recommend to use Precitec cutting head, the model is HPSSL.

Ⅴ. Cutting capacity

Material	Cutting thickness: mm/inches			Note
	YLR-500	YLS-1000	YLS-2000	
mild steel plate	5/ .196”	8 / .314”	14 / .551”	
Stainless steel	2 / .078”	4 / .157”	6 / .236”	
aluminum alloy plate	1 / .040”	2 / .080”	4 / .157”	