MAX PHOTONICS

MFSC 6000W_Pro(Pro45 Series)
SINGLE MODULE CW FIBER LASER
TECHNICAL SPECIFICATION

Version: V1.0
Date: 2025

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I. Main parameters:

Models	MFSC-6000W_Pro45
OPTICAL SPECIFICATIONS	
Nominal Power	6000W
Power Redundancy	20%(Typ.)
WPE (Wall Plug Efficiency)	45%(Typ.)
Mode of Operation	CW/Modulated
Polarization	Random
Power Tunability	2% to 100%
Wavelength	1080 ± 10 nm
Power Stability	±1 %
Laser Beam Quality, BPP	3.0 to 4.0 mm x mrad
Modulation Frequency	≤5 KHz
Preview Red Light Power	200 to 1000 µW (Class 2)
FIBER DELIVERY SYSTEM	
Interface	G5 QBH
Length	25 m
Diameter	100 µm
Bending Radius	static 100mm (Min.) / dynamic 200mm (Min.)
ELECTRICAL RATINGS	
Bus Control System	EtherCAT/IO
Supply Voltage	400(+/-10%) V/3P+PE @ 50Hz and 480(+6%/-13%) V/3P+PE @ 60Hz
Standby Power	≤100W
OTHER SPECIFICATIONS	
Power Cable	14 meters
Signal cable	14 meters
Operating Temperature	10°C to +40°C; no freezing
Storage Temperature	-10°C to +60°C
Humidity	10 to 90%
Cooling Method	Water Cooling
Cooling Medium	Distilled water/ Glycol Antifreeze (Conductivity Value: 40±5uS/cm)
Dimension	640*1000*700 mm
Weight	230(±5) kg
QUALITY CERTIFICATES	
Certificates	CE, FDA, ETL (power supply)
Safety Standard	ISO 13849-1:2015 Performance Level D (PL-d)

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II. Cooling Requirements:

No.	Characteristics	Min.	Unit
1	Cooling Method	Water Cooling (Copper Free inside Laser)	
2	Water Temperature	20-25	℃
3	Hydraulic pressure	≤4	bar
4	Water flow requirements	50	L/min
5	Chiller rated cooling capacity	8.3	kW

Output Head	Cooling Method	Water pipe size requirement	Water Flow Rate (L/min)	Hydraulic pressure (bar)	Cooling Temperature (℃)
G5 QBH	Water cooling	Outer diameter* inner diameter=Φ8*Φ5	≥2	≤3	28-30

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Attachment

Attachment 1: Remote control

PIN #	Signal Name	Type	Functionality	Wire Color
1	EXLOCK_CH1B	IN	**Interlock Input (Dual Channels)** The external interlock signal from External to Laser. When the connections of "EXLOCK_CH1A"&"EXLOCK_CH1B" and "EXLOCK_CH2A"&"EXLOCK_CH2B" are good, the Laser is good to work; If either connection between "EXLOCK_CH1A" and "EXLOCK_CH1B" or "EXLOCK_CH2A" and "EXLOCK_CH2B" are breached by a door interlock or other means, Laser emission is OFF.	Blue and White
2	EXLOCK_CH1A			Blue
3	EXLOCK_CH2B			Blue
4	EXLOCK_CH2A			Blue and White
5	REMOTE_AC_KEY_B	IN	**Key Switch for External Control** "KEY_B" is Negative(-), "KEY_A" is Positive(+); when those two pins are connected, the Laser is good to work with external control signal; when disconnected, Laser Emission is OFF.	Brown and White
6	REMOTE_AC_KEY_A			Brown
7	REMOTE_DC_PWR_SW1	IN	**External Start** External control Laser Emission ON/OFF; when "SW1" and "SW2" are connected, Laser Emission is ON; when disconnected, Laser Emission is OFF.	Yellow and Black
8	REMOTE_DC_PWR_SW2			Yellow
9	AN_OUT_PWR_5V	OUT	**Monitoring of Output Power** Send Laser output power to External.	Brown and White
10	AN_PWR_PEAK_10V	IN	**0-10V Output Power Control** External 0-10V input to control Laser output power, 1V--10%, 10V--100%.	Green
11	ISO_REF_VSS	AGND	**Ground** Analog ground for Pin 9,10,12.	Green and White
12	AN_BACK_PWR_5V	OUT	**Monitoring of Back Reflected Power** Monitor and feedback the reflectivity status.	Brown
13	PWM-	IN	**PWM Input** Digital Input with PWM signal to control output power.	Black and White
14	PWM+			Black
15	ENABLE-	IN	**Enable Signal** When voltage of those two pins is High(24V), the Laser is Enabled; When voltage of those two pins is Low(0V), the Laser is Disabled.	Red and White
16	ENABLE+			Red
17	EX_RED_CONTROL-	IN	**Guide Laser ON/OFF** When voltage of those two pins is High(24V), the guide laser is ON; When voltage of those two pins is Low(0V), the guide laser is OFF.	Yellow and Black
18	EX_RED_CONTROL+			Yellow
19	EX_RESET-	IN	**Reset** When voltage of those two pins is High(24V), the RESET is triggered; When voltage of those two pins is Low(0V), NO RESET.	Green and White
20	EX_RESET+			Green
21	LASER_READY	OUT	**Laser Ready**	Black

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			This signal is High(24V) if the following criteria are met: ✓ Laser Power Supply is ON ; ✓ No error is present; Otherwise, the signal is Low(0V).	
22	ERROR/ALARM+	OUT	**Alarm** When there is no alarm, the signal is High(24V); When there is an alarm, the signal is Low(0V).	Black and White
23	LASER_EMISSION_ON	OUT	**Emission is ON** When the Emission is ON, the signal is High(24V); When the Emission is OFF, the signal is Low(0V).	Red
24	MAIN_PWR_STATE	OUT	**Main Power Status** When the key switch turns ON, the signal is High(24V); When the key switch turns OFF, the signal is Low(0V).	Red and White
25	ISO_COM	GND	**Ground** Digital Ground for Pin 21,22,23,24.	Orange
26	ISO_COM			Orange and Black
27	EMERGENCY1_INPUT-	IN	**Emergency Stop Input 1** If the two pins are connected, Laser Emission is ON, ALARM OFF; If the two pins are disconnected, Laser Emission is OFF, ALARM ON.	Orange and Black
28	EMERGENCY1_INPUT+			Orange
29	N/A	N/A	Reserved for Further Extension	Purple and Black
30	N/A			Purple
31	N/A			Light Green and Black
32	N/A			Light Green
33	EMERGENCY2_INPUT-	IN	**Emergency Stop Input 2** When the two pins are connected, Laser Emission is ON, ALARM OFF; When the two pins are disconnected, Laser Emission is OFF, ALARM ON.	Light Blue and Black
34	EMERGENCY2_INPUT+			Light Blue
35	READY_LED-	OUT	**"LASER READY" Signal to External** When the Laser is ready, the signal is High(24V), send the signal to External with the "READY" status.	Purple and Black
36	READY_LED+			Purple
37	LASER_ON_LED-	OUT	**"LASER ON" Signal to External** When Laser Emission is ON, send the signal to External with the "Emission ON" status.	Light Green and Black
38	LASER_ON_LED+			Light Green
39	OUTPUT_EMERGENCY_1A	OUT	**EMERGENCY Circuit 1 Status** Open means Emergency push button on laser is pressed; Closed means Emergency push button on laser is unpressed.	Light Blue and Black
40	OUTPUT_EMERGENCY_1B			Light Blue
41	N/A	N/A	**Reserved for Further Extension**	Blue

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42	N/A	N/A	**Reserved for Further Extension**	Blue and White
43	N/A	N/A	**Reserved for Further Extension**	Yellow
44	N/A	N/A	**Reserved for Further Extension**	Yellow and Black
45	N/A	N/A	**Reserved for Further Extension**	Brown
46	OUTPUT_EMERGENCY_2A	OUT	**EMERGENCY Circuit 2 Status** Open means Emergency push button on Laser is pressed; Closed means Emergency push button on Laser is unpressed.	Brown and White
47	OUTPUT_EMERGENCY_2B			Green

Remarks: 0…+3 V = LOW, +20…+30 V = HIGH.

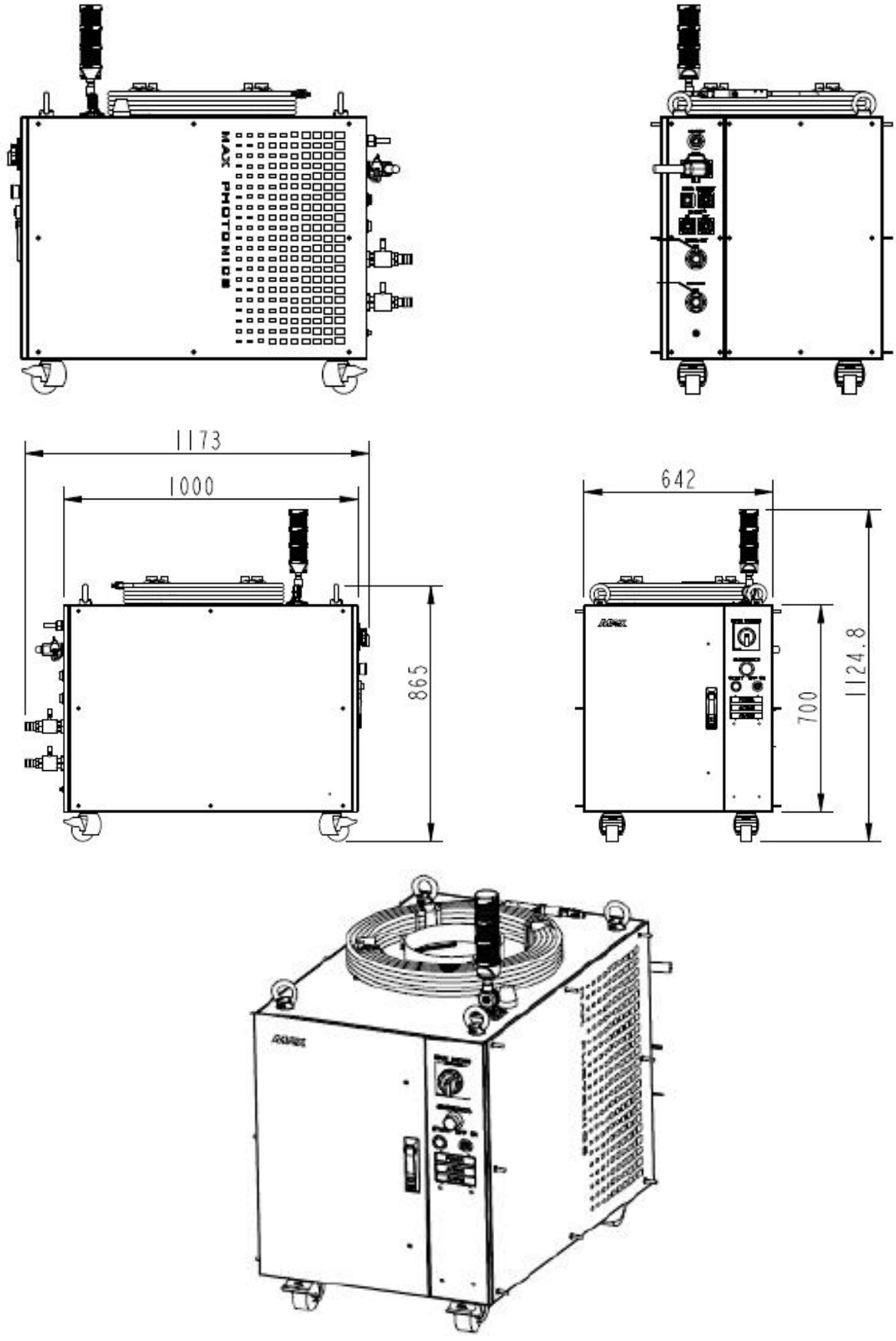
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Attachment 2: EtherCAT Bus Laser External Control Signal Type

EtherCAT Bus Laser External Control Signal Type								
Signal Name	**External Control Line (Chinese)**	**External Control Line (English)**	**Color of External Control Line**	**Transmission Direction**	**Type**	**Initial State**	**Definition Description**	**Signal Source**
Output Emergency Stop	Output E-stop A	EMGERNCY_BUTTON_A	Light blue	Slave station to master station	Dry Contact (Passive)	Normally closed	The signal is closed under normal conditions of the laser, when a fault occurs, the emergency stop signal is open, and the master station is notified	Emergency Stop Button on Front Panel
	Output E-stop B	EMGERNCY_BUTTON_B	Light blue & Black					
Emergency stop 1 (ARM)	EMGERNCY_1_INPUT+	EMGERNCY_1_INPUT+	orange	Master station to slave station	Dry Contact (Passive)	Normally open	Dual channels emergency stop input signal, any channel is disconnected, and the laser gives an emergency stop alarm. Short circuit is required during normal operation.	Master Station
	EMGERNCY_1_INPUT-	EMGERNCY_1_INPUT-	Lampblack					
Emergency stop 2 (ARM)	EMGERNCY_2_INPUT+	EMGERNCY_2_INPUT+	Sky blue	Master station to slave station	Dry Contact (Passive)	Normally open		Master Station
	EMGERNCY_2_INPUT-	EMGERNCY_2_INPUT-	Sky blue black					
Interlock1 (ARM)	Interlock 1A	EXLOCK_CH1A	Blue	Master station to slave station	Dry Contact (Passive)	Normally open	Emergency stop + front safety door + rear safety door(signal in series), No emit laser will come out if any part is disconnected	Master Station
	Interlock 1B	EXLOCK_CH1B	Blue & White					
Interlock2 (FPGA)	Interlock 2A	EXLOCK_CH2A	Blue & White	Master station to slave station	Dry Contact (Passive)	Normally open	Emergency stop + front safety door + rear safety door(signal in series), No emit laser will come out if any part is disconnected	Master Station
	Interlock 2B	EXLOCK_CH2B	Blue					
Ready	READY Indicator+	READY_LED+	Purple	Slave station to master station	Dry Contact (Passive)	Normally open	After the interlock signal is closed, the laser sends a Ready signal to close, and the machine indicator light turns on	Laser slave station
	READY Indicator-	READY_LED-	Purple & Black					
Output Power	Output Indicator+	LASER_ON_LED+	Green	Slave station to master station	Dry Contact (Passive)	Normally open	The light signal is enabled, and the machine indicator lights up green	Laser slave station
	Output Indicator-	LASER_ON_LED-	Green & Black					
PWM Input	PWM+	PWM+	Black	Master station to slave station	Pulse Signal	Low level	It is valid under "EtherCAT+PWM" mixed control; it is invalid under "Pure EtherCAT bus" control	Master Station
	PWM-	PWM-	Black & White					

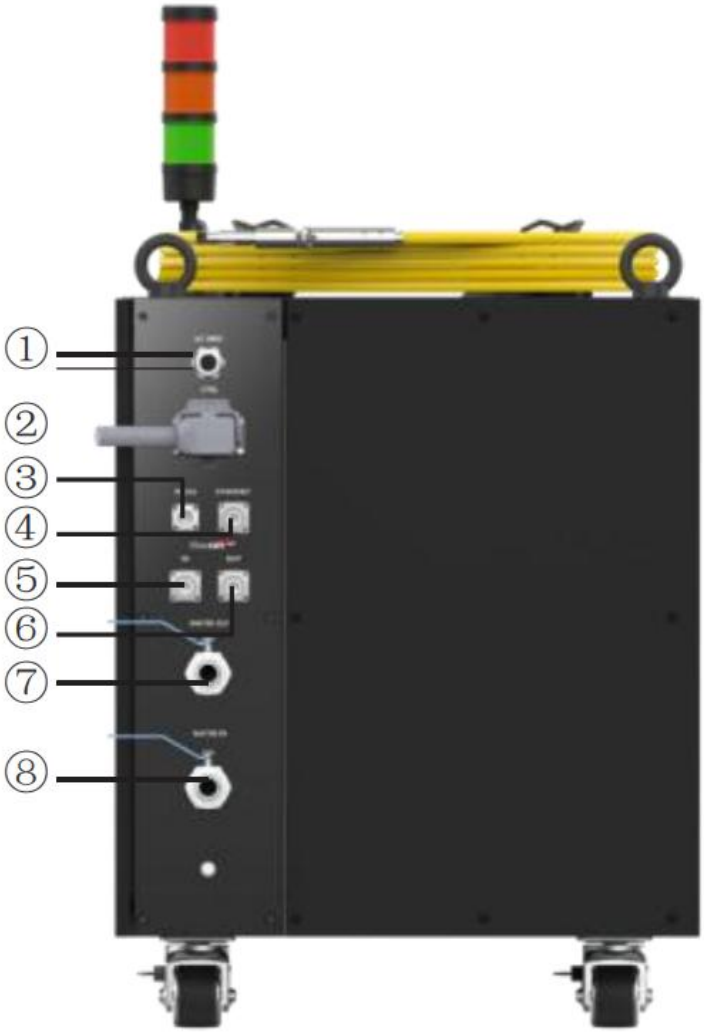
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Attachment 3: Dimensional drawing



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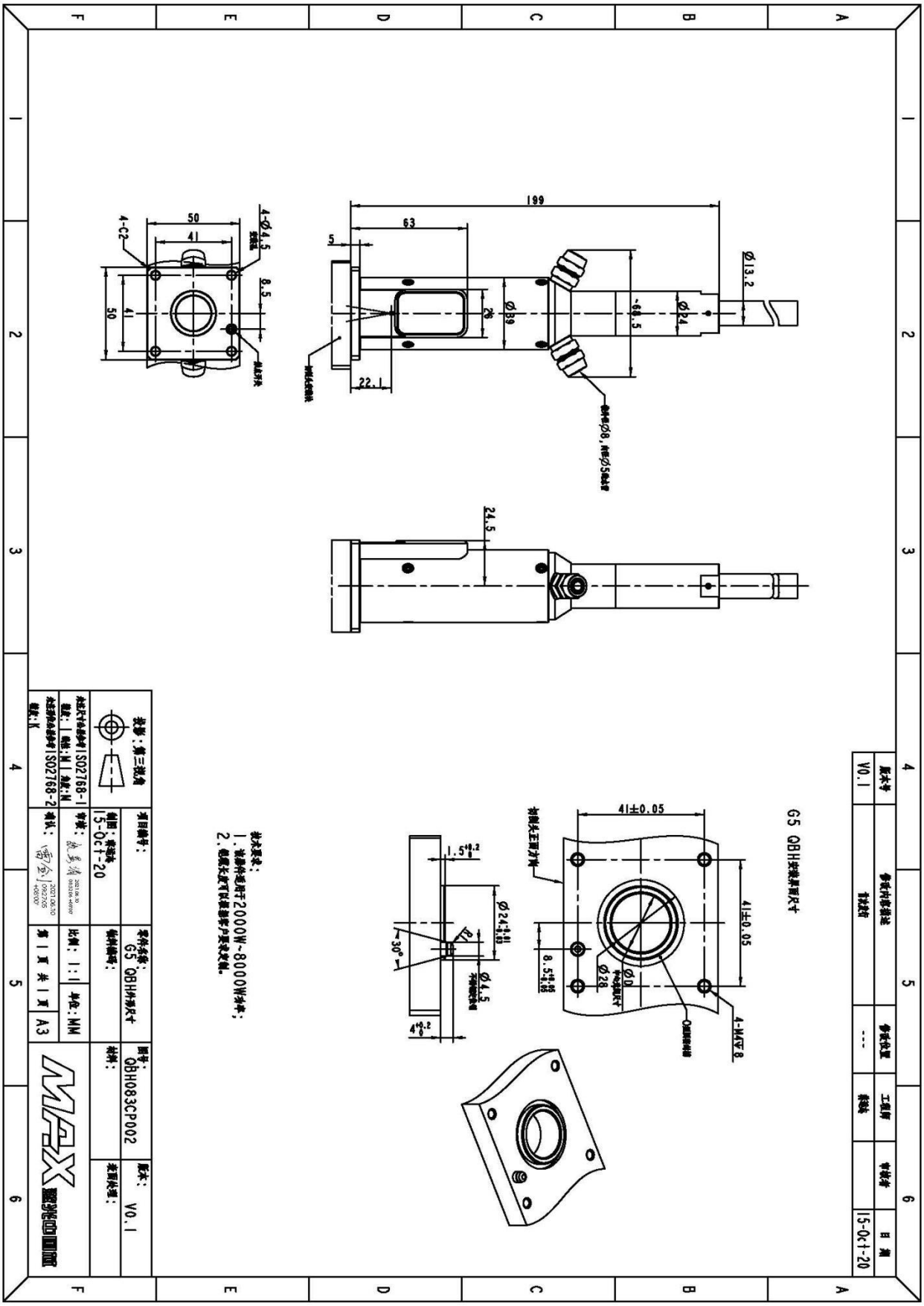
Attachment 4: Rear Panel Interface



No.	Items	Characteristics
1	AC Input	LAAP 53112650(To connect Power Cord)
2	CTRL	Han 55DDD
3	RS232	WY20-12pin
4	ETHERNET	DH-RJ45
5	ECAT IN	DH-RJ45
6	ECAT OUT	DH-RJ45
7	WATER OUT	Cooling Water Inlet and Outlet Water Pipe Size: Outer diameter* inner diameter=Φ36*Φ25.4
8	WATER IN	

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Attachment 5: Output head



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