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BCW181P Laser Profiler Installation Manual

Document Version: V1.1.1

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Foreword

Thank you for using the BOCHU BCW181P Laser Profiler!

BCW181P Laser Profiler is a large field-of-view (FOV) line-scan profiler (hereinafter referred to as “the Profiler”) designed for welding systems. Equipped with an integrated line laser, it performs initial positioning, generates point cloud images, and captures the contour data of the welding workpiece to guide subsequent welding operations. The Profiler integrates wide dynamic range (WDR) image processing algorithms and high-precision measurement algorithms, enabling real-time output of highly accurate measurement results even in complex industrial environments.

This manual provides the Profiler's installation instructions. For more information, refer to other manuals or contact our technical support. We strive to ensure the applicability of this manual but reserve the right of final interpretation. Changes to this manual may be made without prior notice.

If you have any questions or suggestions during use, please contact us using the contact information provided in this manual.

Symbols

Notice: Indicates additional explanations or clarifications regarding the use of this product.

Caution: Indicates that improper operations may result in minor injury or equipment damage.

Warning: Indicates that improper operations may lead to death or serious injury.

Danger: Indicates that improper operations will result in death or serious injury.

Disclaimer

The operation of robot/external axes and the final welding results directly depend on welding materials, welding equipment, gas type, gas pressure, and configured parameters. Strictly and carefully configure all parameters according to your welding process requirements!

Improper parameter settings and operations may lead to compromised welding results, damage to the welding torch or other components, and even personal injury.The FSWELD Intelligent Welding Control System has made every effort to provide various protective measures. Equipment manufacturers and end-users must strictly adhere to operating

procedures to prevent accidents.

BOCHU shall not be liable for any direct or indirect losses arising from the following circumstances: damages caused by improper use of this manual or the product, failures to comply with safety operating procedures, or force majeure events such as natural disasters.

Additionally, operational equipment carries inherent risks. Users are obligated to implement robust fault-handling mechanisms and safety protections. BOCHU assumes no responsibility for any incidental or consequential losses resulting from such risks.

Revision History

Version No.	Date	Description
V1.0.0	2025/03/25	First English version.
V1.1.0	2025/08/26	1. Added the protective window replacement instructions for the Profiler. 2. Updated the product appearance and dimension of the Profiler.
V1.1.1	2026/04/24	1. Updated precautions for Section 3.1 Upright Installation of the Profiler. 2. Updated Section 4.3 The Mounting Bracket Dimension for Reverse Installation.

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Chapter 1 Product Overview

1.1 Product Introduction

BCW181P Laser Profiler is a large field-of-view (FOV) line-scan profiler (hereinafter referred to as “the Profiler”) designed for welding systems. Equipped with an integrated line laser, it performs initial positioning, generates point cloud images, and captures the contour data of the welding workpiece to guide subsequent welding operations. The Profiler integrates wide dynamic range (WDR) image processing algorithms and high-precision measurement algorithms, enabling real-time output of highly accurate measurement results even in complex industrial environments.

1.2 Specifications

Table 1-1 The Profiler Technical Parameters

Parameters	Values
Model	BCW181P-WL
Near FOV	1000 mm
Far FOV	2600 mm
Clearance Distance (CD)	700 mm
Measurement Range (MR)	1000 mm
Detection Accuracy	±5 mm (Regular-shaped parts)
Detection Speed	3 m/s @ ±5 mm detection accuracy
Scanning Frame Rate	1140 fps @ 1 m depth measurement range
Trigger Mode	External trigger, Encoder trigger
Laser Safety Class	Class 3B
Data Interface	Gigabit Ethernet (1000 Mbit/s)
Digital I/O	12-pin M12 connector with 3 opto-isolated inputs (Line 0/3/6), 3 opto-isolated outputs (Line 1/4/7), and 1 RS-232 serial port.
Power Supply	12 V DC to 24 V DC
Typical Power Consumption	19.2 W @ 24 V DC
Dimension	354.1 mm × 65 mm × 133.4 mm (L × W × H)

Parameters	Values
Weight	1.6 kg
Working Temperature	0℃ to +45℃
Storage Temperature	-30℃ to +80℃
Humidity	20% to 85% RH (Non-condensing)

1.3 Product List

Included components are BCW181P Laser Profiler, HypTronic3_HPC3870E-W EtherCAT CNC Host, and cables.

Table 1-2 Product list

HypTronic3_HPC3870E-W EtherCAT CNC Host*1	BCW181P Laser Profiler*1
	
IO-XX Towline Power Cable*1	**LAN-XX-A-CODE Towline Cable *1**
	

⚠Notice:

1. In the table, "XX" refers to cable length, which shall be adjusted according to actual installation conditions and system requirements.

2. Accessories and quantities may vary depending on the selected package. The product items listed above are for reference only. Please refer to the actual delivery for final confirmation.

Chapter 2 Hardware Wiring Instruction

2.1 Interface Specifications

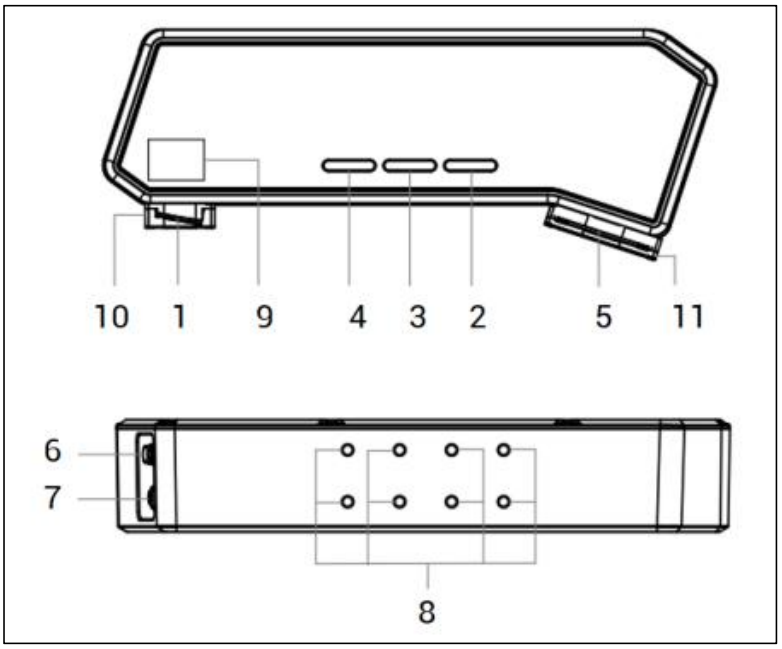


Figure 2-1 Interface layout and LED indicators

1. Laser
2. Laser Indicator
3. Status Indicator
4. Power Indicator
5. Image Sensor
6. Power and I/O Connector
7. Gigabit Ethernet Port
8. Screw Holes
9. Laser Safety Label
10. Protective Window Quick-Change for Laser Filter
11. Protective Window Quick-Change for Image Sensor Filter

Table 2-1 Interfaces and LED Indicators Description

No.	Name	Description
1	Laser	It sends out the laser to the object's surface.
2	Laser Indicator	It displays the operating status of the laser. The indicator light turns green when the laser is operating normally.
3	Status Indicator	It displays the operating status of the device. The indicator light turns yellow when the device is working properly.
4	Power Indicator	It displays the status of the power supply. The indicator light turns blue when the device is powered on normally.
5	Image Sensor	It acquires the laser contour of the object.
6	Power and I/O Connector	It provides power supply, input/output signal, and serial port functions. Featuring a threaded design, the interface can be screwed tight to reduce loosening caused by vibrations in the field.
7	GigE Interface	The aviation plug to RJ45 adapter with Gigabit Ethernet port features a threaded interface. The interface is used to secure the connection between the device and the cable. It can be screwed tight to reduce loosening caused by vibrations in the field.
8	Screw Holes	Eight M6 screw holes on the top of the device are used to fix the device to the mounting bracket. It is recommended to use the hexagon screws for installation. If other screws are required, countersunk screws are recommended. The screw length should be shorter than the combined thickness of the mounting plate and the depth of the screw hole.
9	Laser Safety Label	Displays the laser-related information and safety warnings of the Profiler. The yellow triangle on the label indicates the location of the laser emission.
10	Protective Window Quick-Change for Laser Filter	Supports and secures the protective window for the laser filter. It also allows for easy window removal and replacement on site.
11	Protective Window Quick-Change for Image Sensor Filter	Supports and secures the protective window for the image sensor filter. It also allows for easy window removal and replacement on site.

2.1.1 Power and I/O Connector

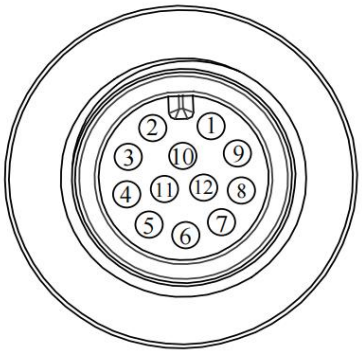


Figure 2-2 12-Pin M12 connector

The 12-pin M12 connector has 3 pairs of configurable I/O pins. Detailed pin assignments and electrical specifications are provided in Table 2-2.

Table 2-2 Pin Definitions of 12-Pin M12 Connector

No.	Signal	I/O Signal Source	Description
1	DC-PWR	—	DC positive terminal
2	GND	—	Power supply ground
3	OPTO_OUT0	Line 1	I/O opto-isolated output 1
4	OPTO_OUT1	Line 4	I/O opto-isolated output 4
5	OPTO_OUT2	Line 7	I/O opto-isolated output 7
6	OUT_COM	Line 1/4/7 Signal Ground	Output common terminal
7	OPTO_IN0	Line 0	I/O opto-isolated input 0
8	OPTO_IN1	Line 3	I/O opto-isolated input 3
9	OPTO_IN2	Line 6	I/O opto-isolated input 6
10	IN_COM	Line 0/3/6 Signal Ground	Input common terminal
11	RS232_R	—	Receive data
12	RS232_T	—	Transmit data

2.2 Device Wiring

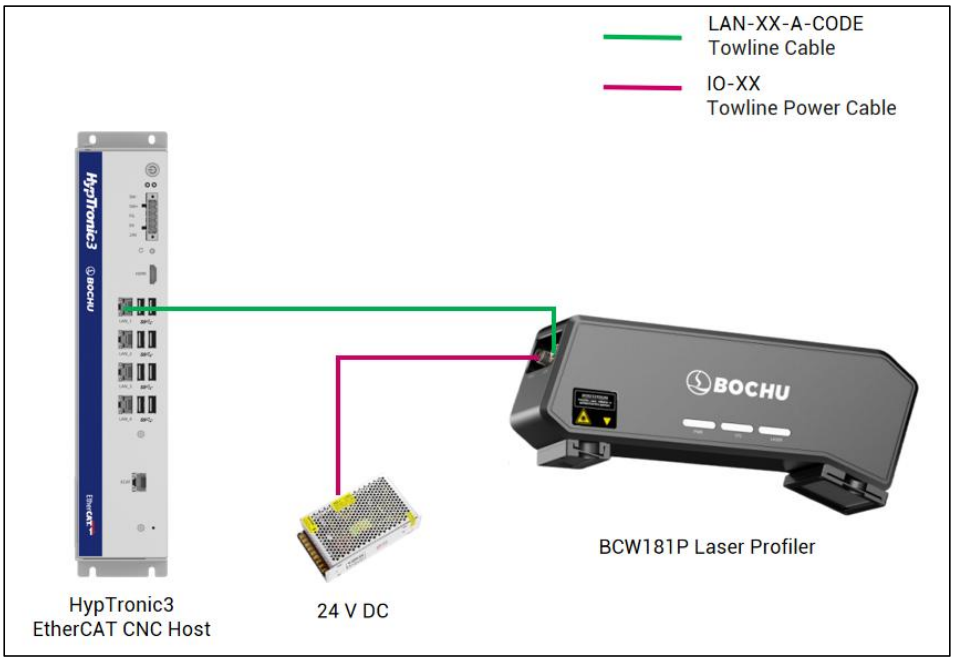


Figure 2-3 Device wiring diagram

⚠Notice: In the diagram, XX refers to cable length, which shall be adjusted according to actual installation conditions and system requirements.

The Profiler requires two cables for connection.

➢LAN-XX-A-CODE Towline Cable: One end connects to the Profiler, and the other end connects to the EtherCAT CNC host.

➢IO-XX Towline Power Cable: One end connects to the Profiler, and the other end connects to the 24 V switch power supply. For the power cable, the brown wire connects to the 24 V power supply negative (GND); the white wire connects to the 24 V power supply positive (VCC), as shown in Figure 2-4 and Figure 2-5.

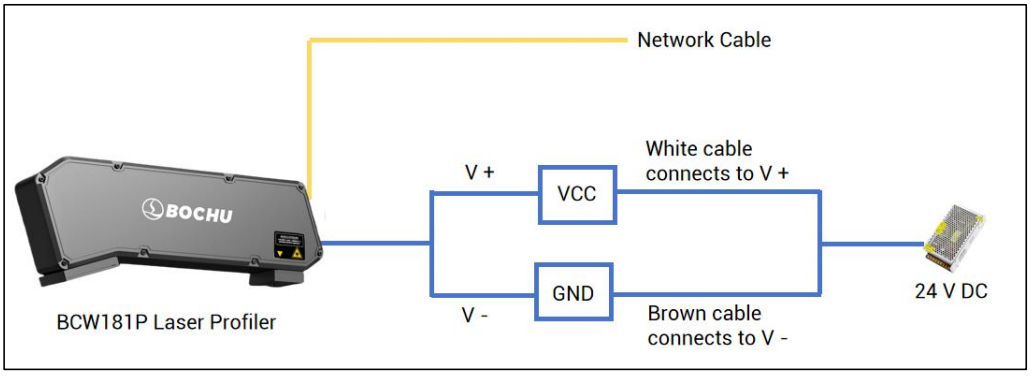


Figure 2-4 Power supply wiring diagram

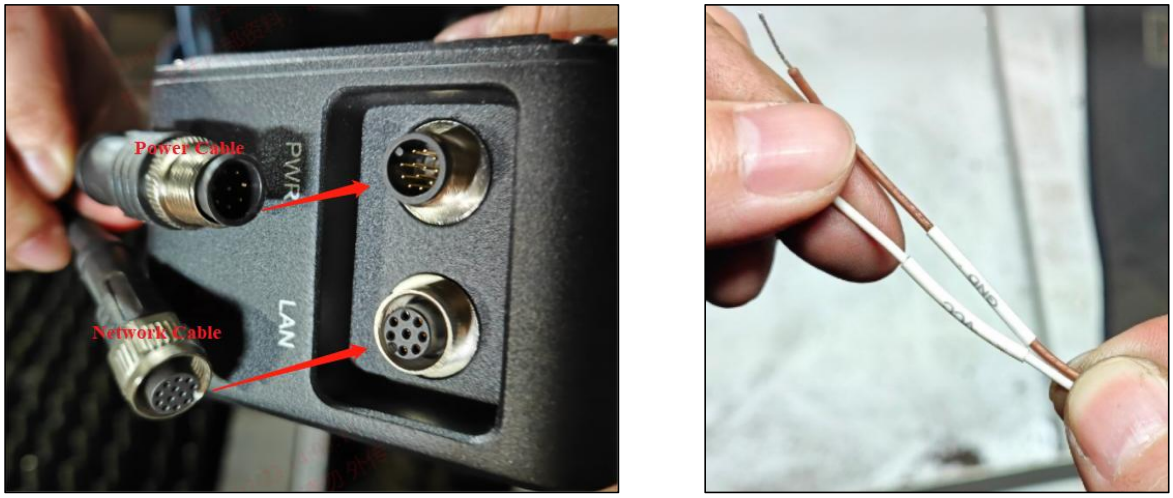


Figure 2-5 Physical power connection diagram

⚠Caution:

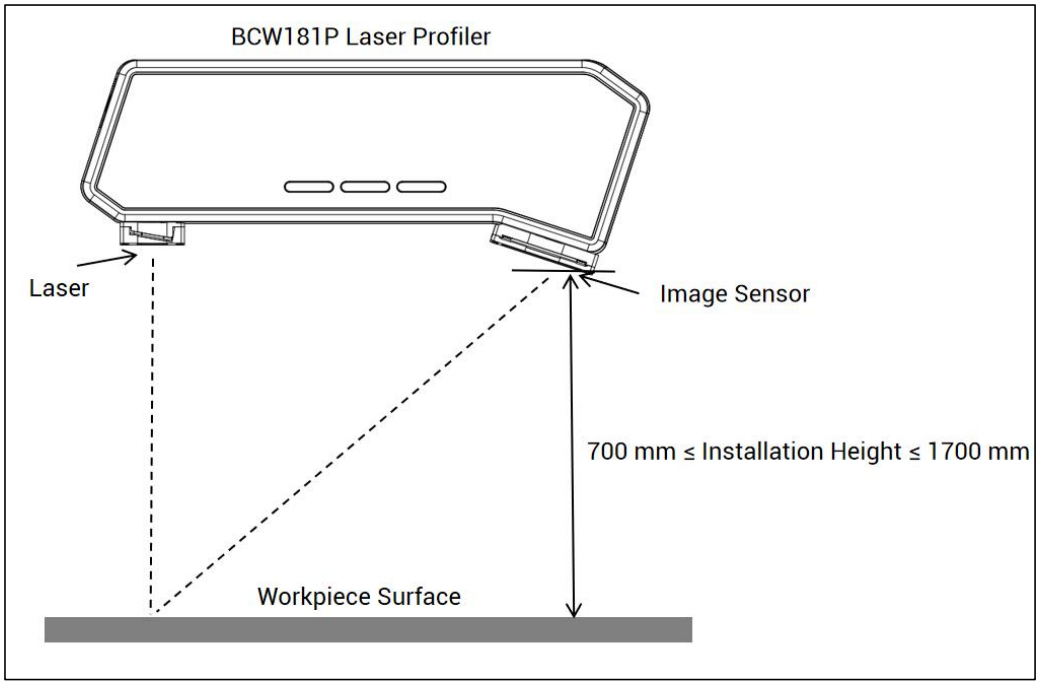
1. Both the network cable and power cable are part of the wiring bundle provided with the Profiler.

2. The 24 V power supply is exclusively for the Profiler. Do not connect other loads! Or it may cause the Profiler to malfunction.

2.3 Installation Position

The distance between the laser bottom and the workpiece surface shall be maintained between 700 mm and 1700 mm to ensure optimal measurement accuracy.

⚠Notice: Installation outside this range may result in increased calibration errors, degraded image, and functional impairment.



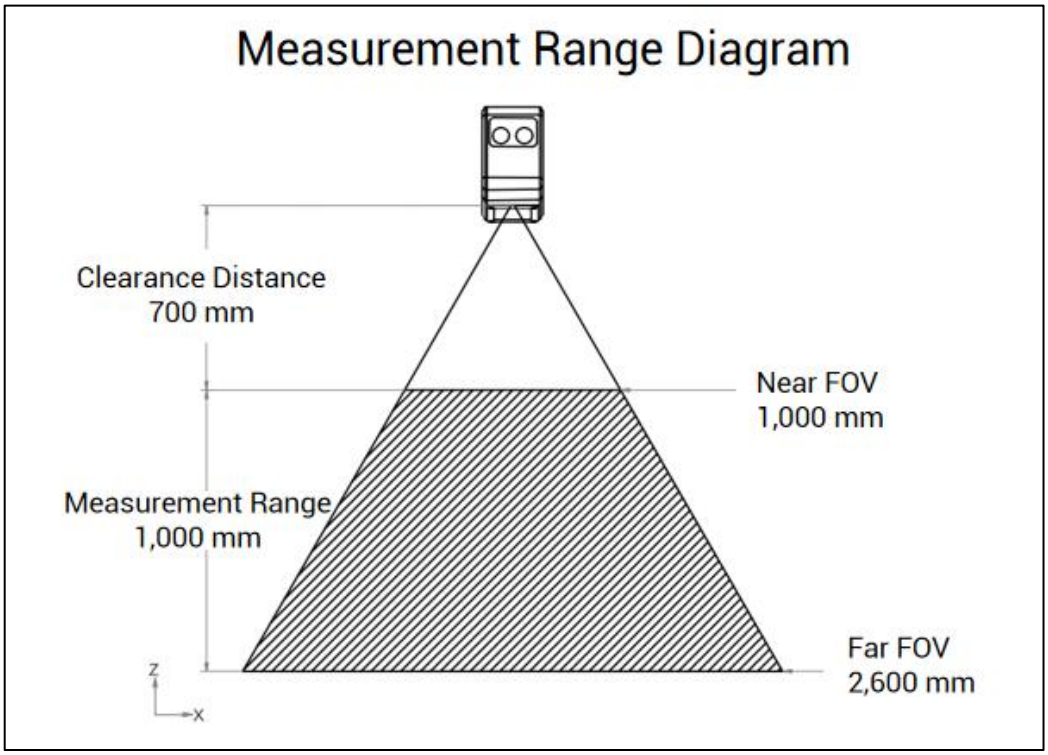


Figure 2-6 Device installation position reference

2.4 Safety Instructions

2.4.1 Laser Safety Instruction

Laser warning labels are affixed to the device. As a class 3B laser device, the laser safety marking is shown in Figure 2-7 below.

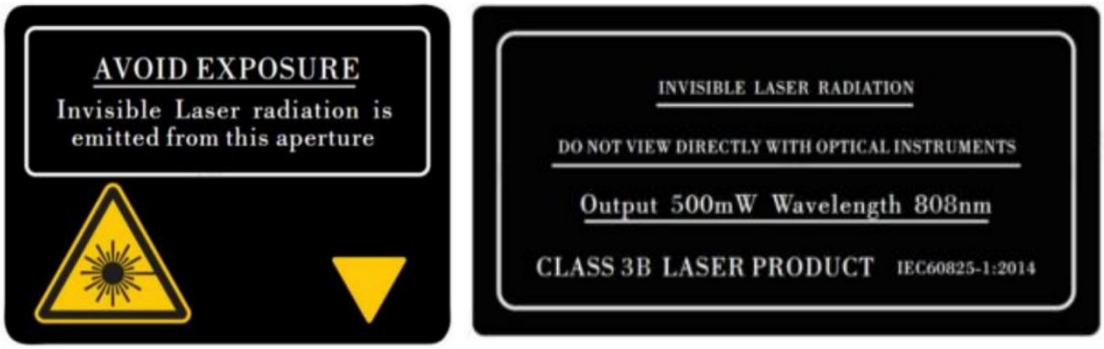


Figure 2-7 Laser warning labels

Critical Precautions:

- Avoid direct exposure to the laser beam. If necessary, actively protect yourself by redirecting the gaze or closing eyes.
- To ensure eye protection, operators must wear laser safety goggles at all times within the operational zone. Even with proper eyewear, never intentionally stare at direct or reflected laser beams.
- Avoid directing the laser beam onto highly reflective materials. If unavoidable, tilt the material angle to prevent hurt resulting from laser reflection.
- Deactivate the laser immediately when the device is not in operation.

2.4.2 Power Supply Switching Instruction

- Avoid operation in environments with elevated temperatures, high humidity, particulate contamination, and corrosive atmospheres.
- Adhere to the power supply's current and power output limits (specified on the nameplate) during operation. Before deployment, conduct comprehensive compatibility testing to validate load matching and preserve image sensor functionality.

- Maintain sufficient insulation distance between internal components and mounting screws. Ensure zero obstructions of airflow paths to the fan and cooling vents. And keep a distance of 10 cm to 15 cm between the device and the adjacent heat source.

Chapter 3 Installation Procedures

3.1 Upright Installation of the Profiler

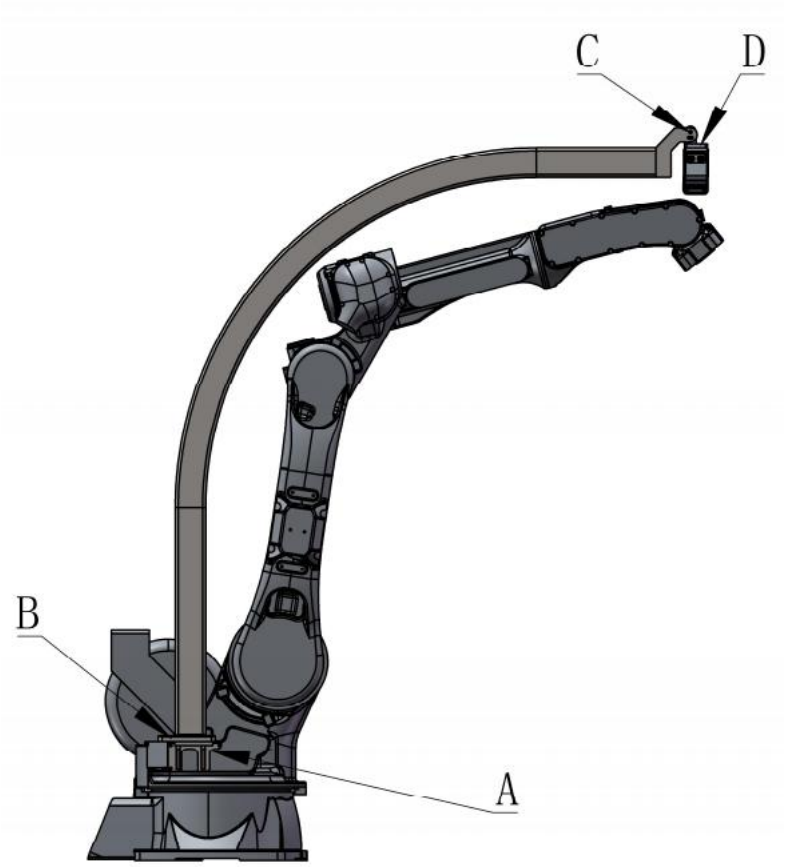


Figure 3-1 Structural assembly diagram (upright installation)

Follow the steps below to mount the Profiler.

Step 1 Prepare the bolts required for installation. Required bolt types for upright installation configuration are as follows:

Table 3-1 Bolt Types and Quantities for Upright Installation

Types	Quantities	Types	Quantities
M10 × 16 mm Hexagon Screw	3	M6 × 16 mm Hexagon Screw	4
M12 × 20 mm Hexagon Screw	6	M6 × 8 mm Hexagon Screw	8

Step 2 Secure the bracket base to the robot arm using three M10 × 16 mm hexagon screws.

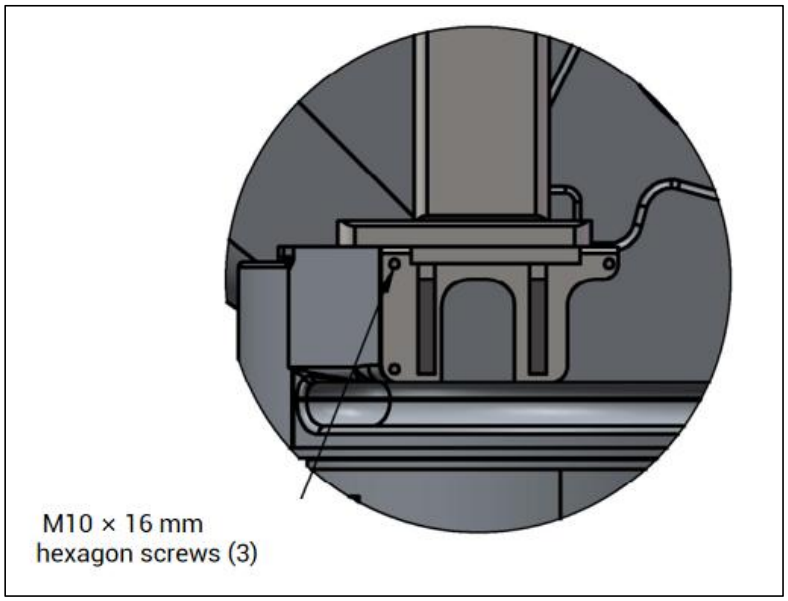


Figure 3-2 Secure the bracket base to the robot arm

Step 3 Use six M12 × 20 mm hexagon screws to connect the welded I-beam to the bracket base.

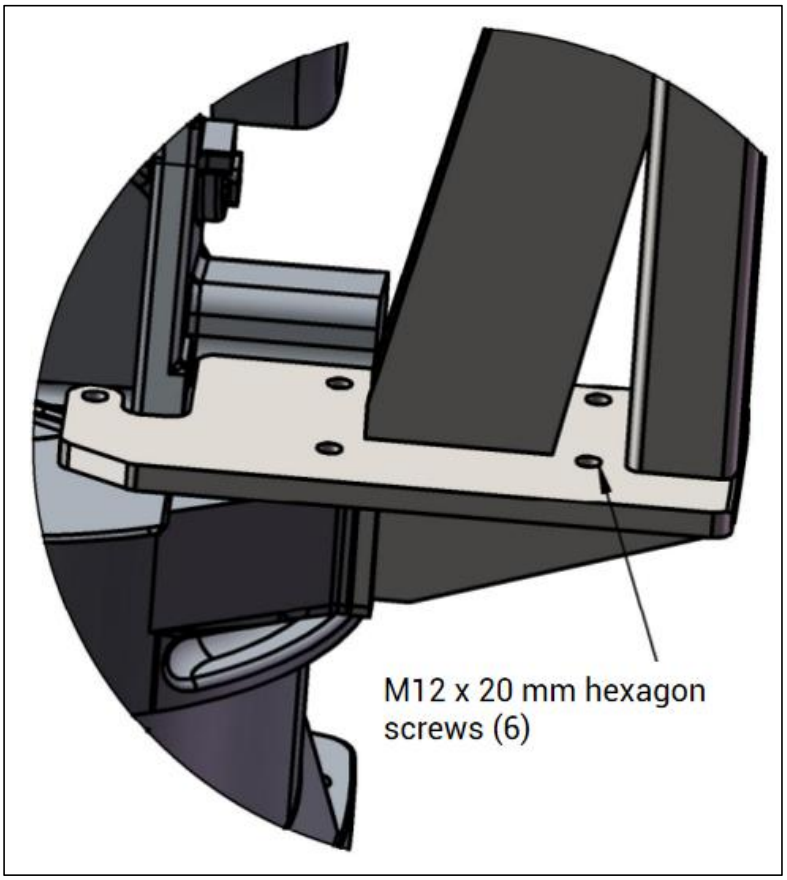


Figure 3-3 Connect the welded I-beam to the bracket base

Step 4 Prepare four M6 × 16 mm hexagon screws. Securely fasten the Profiler mounting plate to the welded I-beam end using two screws per side.

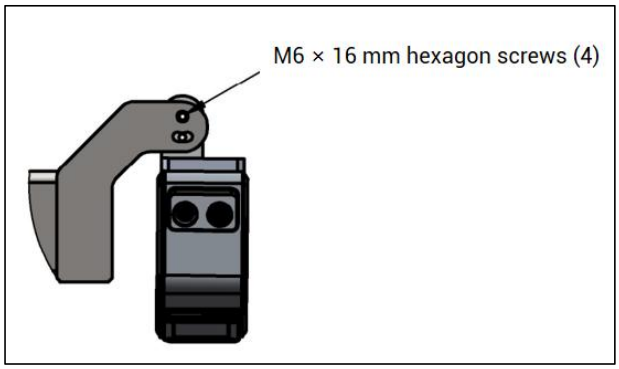


Figure 3-4 Fasten the Profiler mounting plate to the welded I-beam end

Step 5 Secure the Profiler onto the mounting plate using eight M6 × 8 mm hexagon screws.

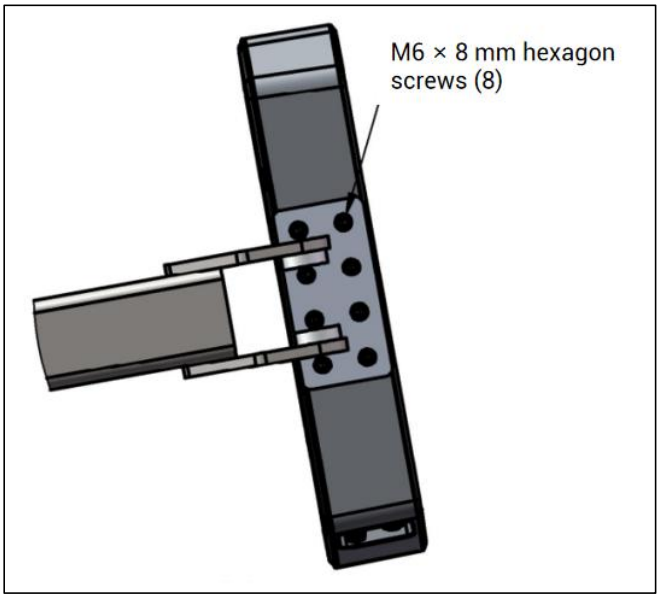


Figure 3-5 Secure the Profiler onto the mounting plate

Step 6 Finally, the Profiler is securely mounted onto the industrial robot arm via the mounting bracket in the standard upright configuration.

⚠Notice:

1. Due to structural variations across different robots, bolt specifications (types and dimensions) are model-specific. The bolts in this manual are only for reference.

2. The installation of the profiler must be perpendicular or parallel to the X direction of the robot base coordinate system.

3.2 Reverse Installation of the Profiler

The inverted installation components comprise the industrial robot, the adjustable mounting bracket, and the Profiler. Installation steps are described as follows.

Step 1 Secure the mounting bracket marked in red below to the industrial robot.

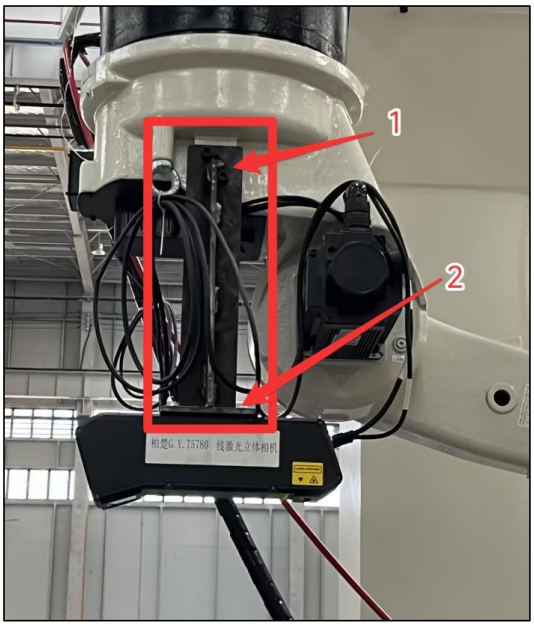


Figure 3-6 Reverse installation diagram

Step 2 Align the eight screw holes on the Profiler and the adapter plate, and use eight M6 × 8 mm hexagon screws to secure the device.

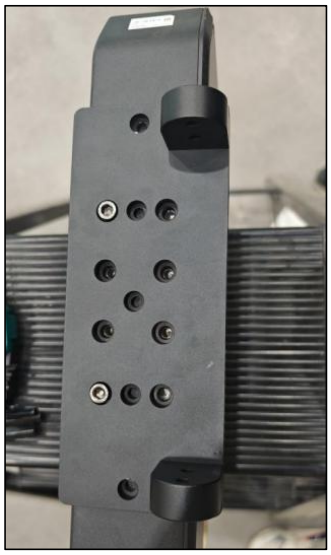


Figure 3-7 Manually adjust the hole's position

Step 3 Finally, the Profiler is securely mounted onto the robot arm via the mounting bracket in the reverse configuration.

Chapter 4 Installation Dimension

4.1 The Profiler Dimension

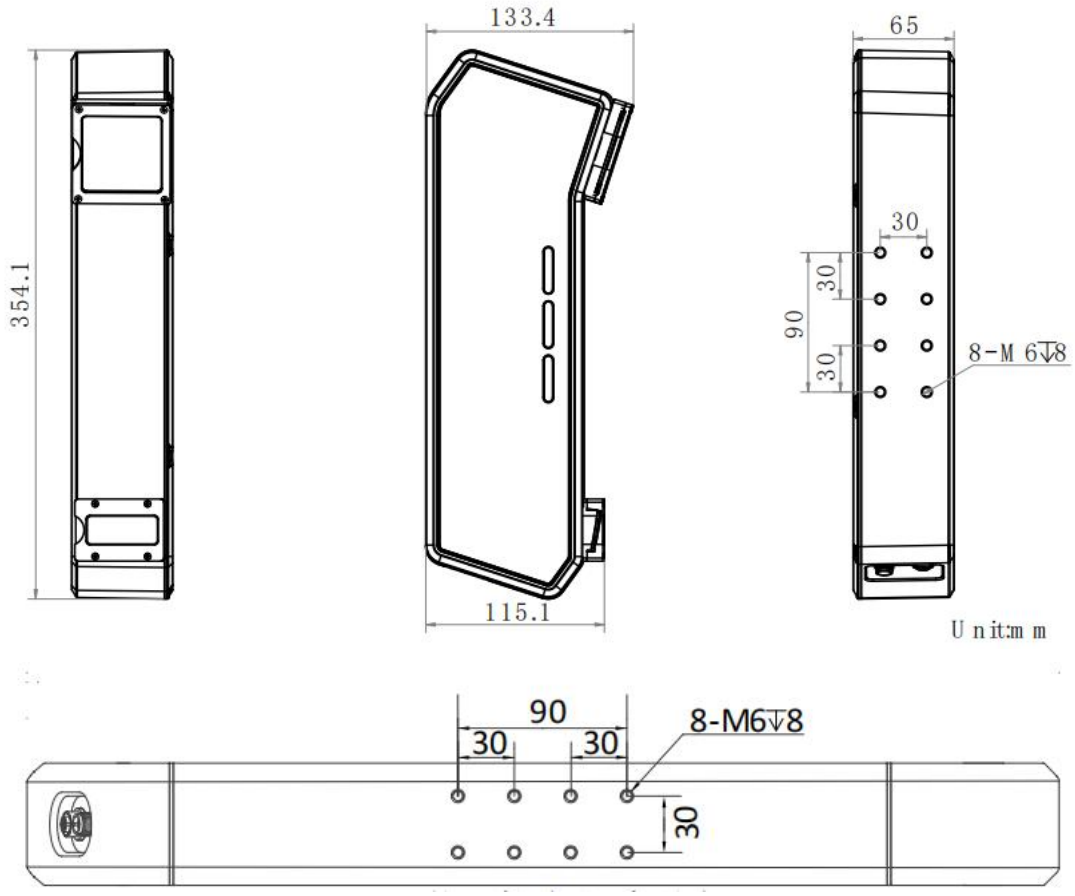


Figure 4-1 The Profiler dimension

4.2 The Mounting Bracket Dimension for Upright Installation

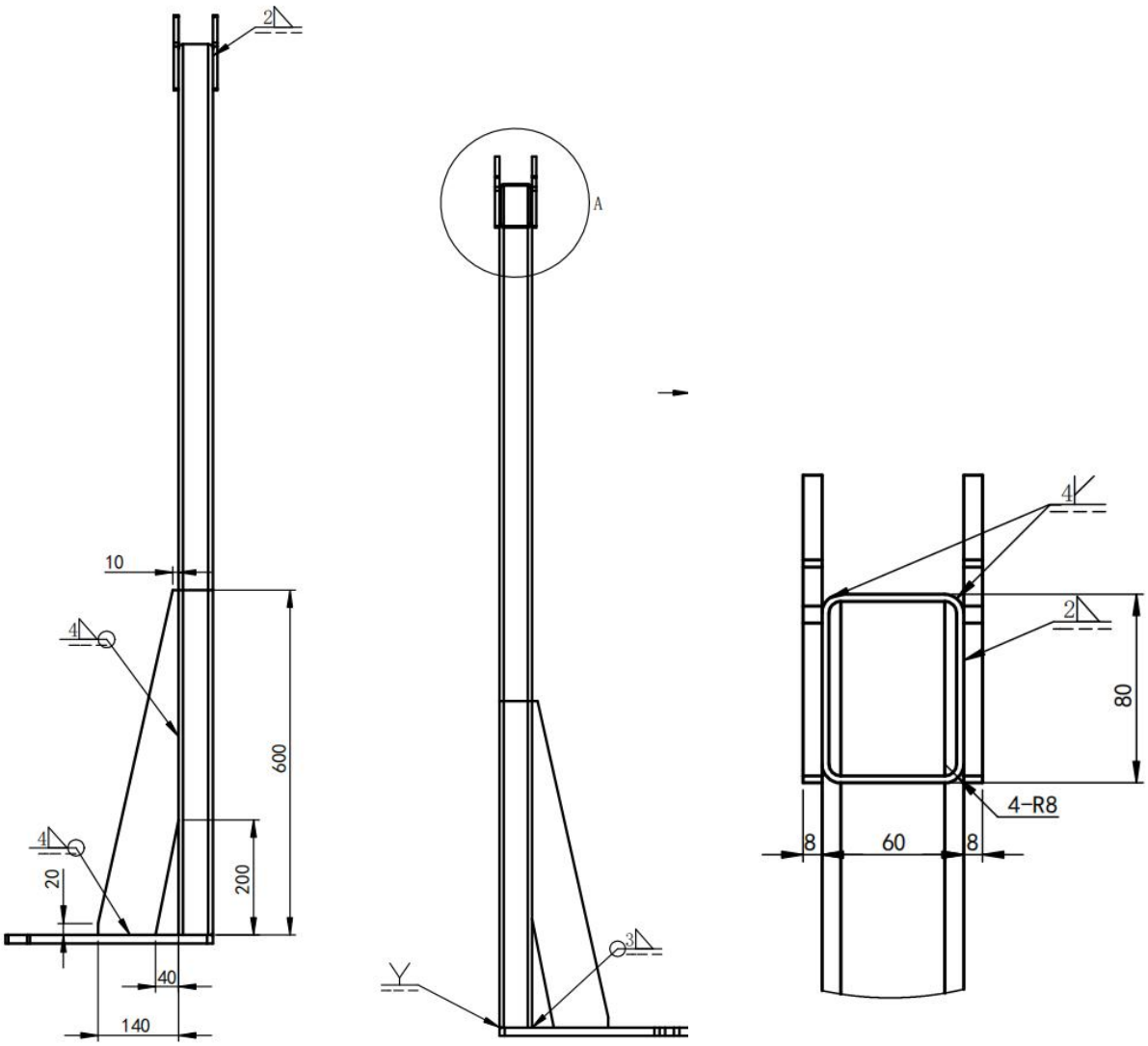


Figure 4-2 The upright installation dimension for the mounting bracket-1

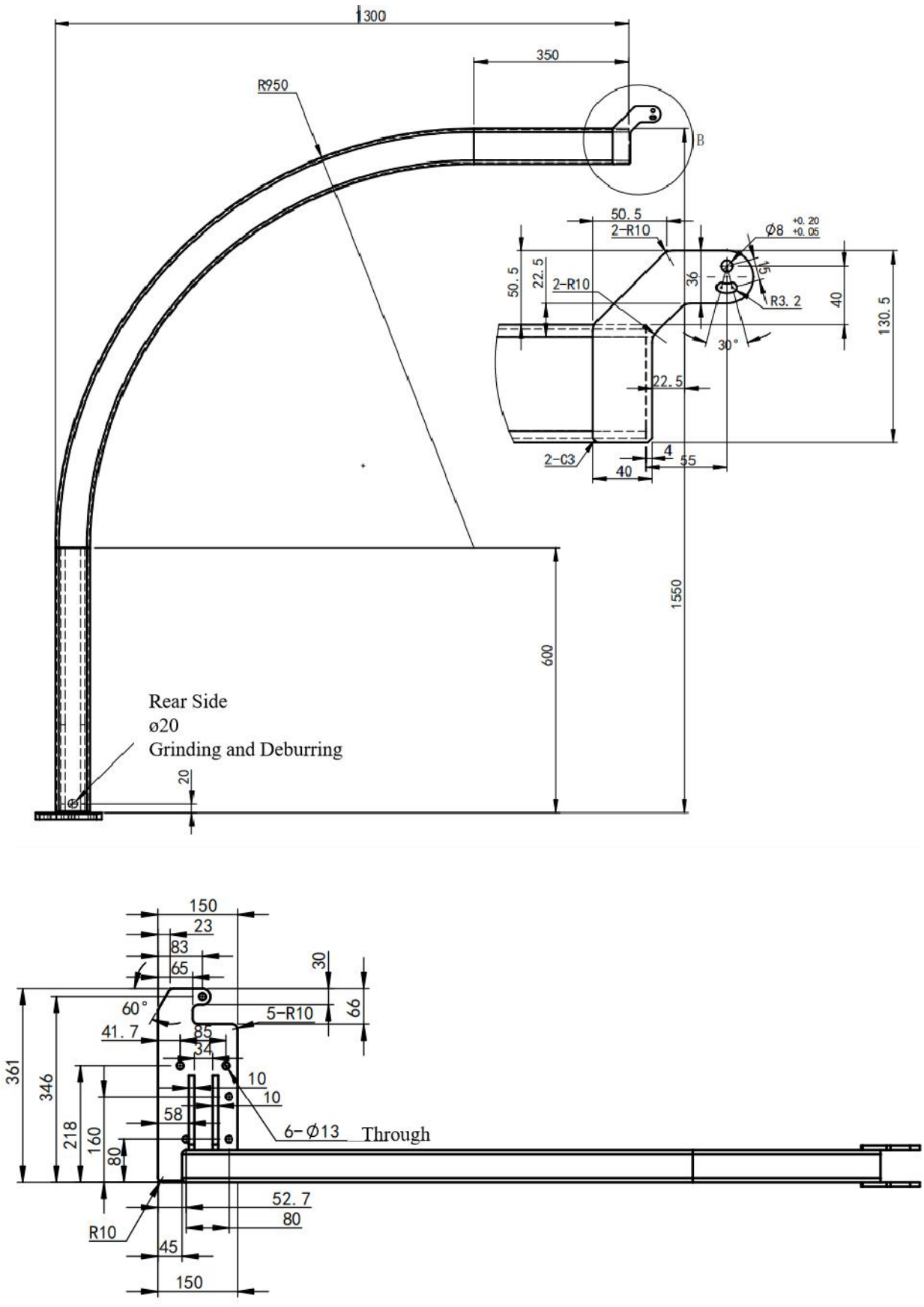


Figure 4-3 The upright installation dimension for the mounting bracket-2

4.3 The Mounting Bracket Dimension for Reverse Installation

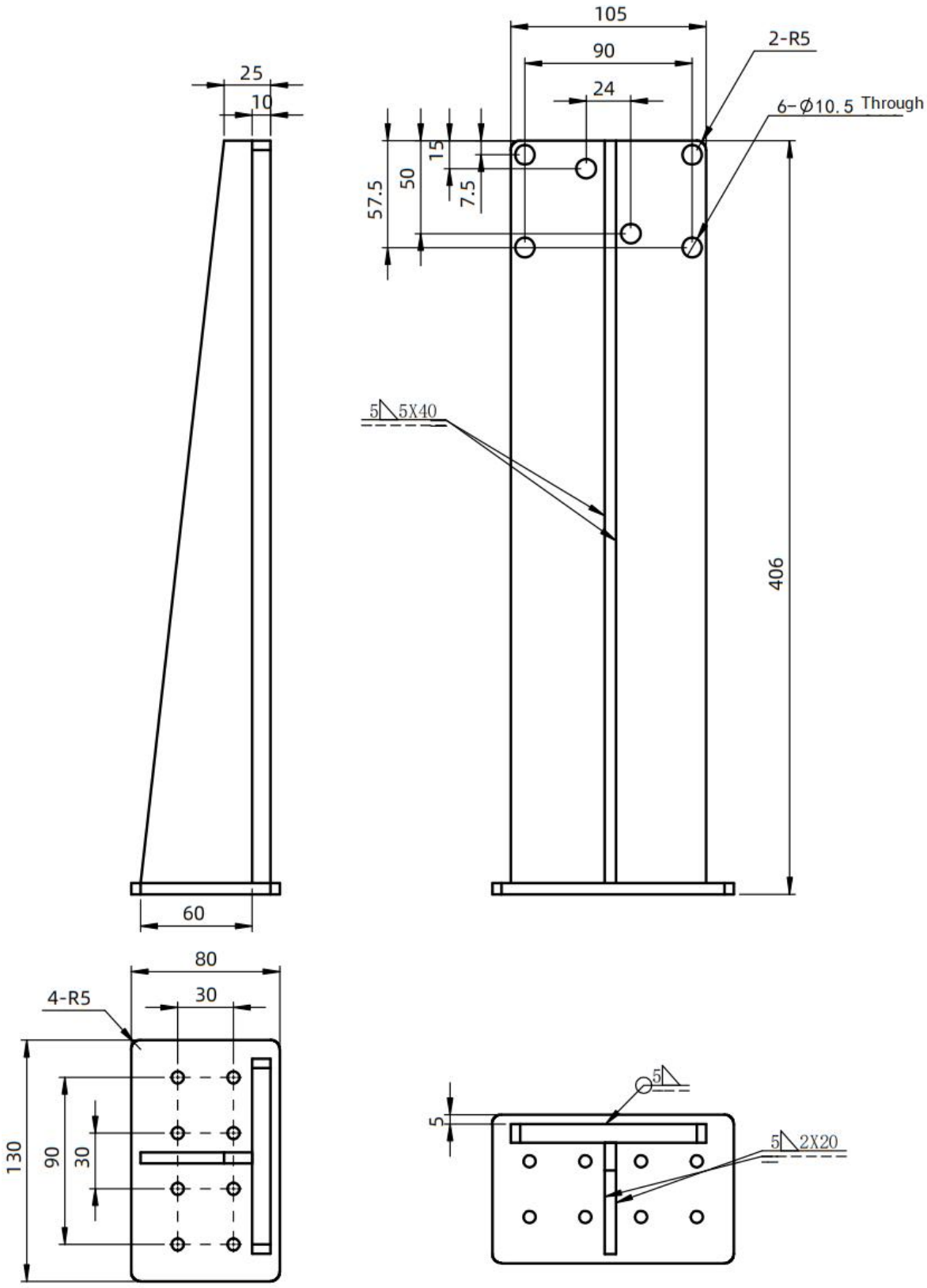


Figure 4-4 The mounting bracket dimension for reverse installation

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