Dobot Vision Kit Installation Guide

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ShenZhen Yuejiang Technology Co., Ltd.

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The user has the responsibility to make sure following the relevant practical laws and regulations of the country, in order that there is no significant danger in the use of the robotic arm.

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Preface

Purpose

This document describes the Dobot vision kit and its installation, making it easy for users to fully understand and use it.

Intended Audience

This document is intended for:

- Customer Engineer
- Sales Engineer
- Installation and Commissioning Engineer
- Technical Support Engineer

Change History

Date	Change Description
2022/12/13	Replace M1-related contents with M1 Pro Add MG400 installation instructions
2019/09/09	Update vision kit specification and installation
2018/04/27	The first release

Symbol Conventions

The symbols that may be found in this document are defined as follows.

Symbol	Description
⚠DANGER	Indicates a hazard with a high level of risk which, if not avoided, could result in death or serious injury
⚠WARNING	Indicates a hazard with a medium level or low level of risk which, if not avoided, could result in minor or moderate injury, robotic arm damage
⚠NOTICE	Indicates a potentially hazardous situation which, if not avoided, can result in robotic arm damage, data loss, or unanticipated result
🕮NOTE	Provides additional information to emphasize or supplement important points in the main text

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Contents

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1. Vision Kit Description

1.1 Overview

The image processing system extracts the characteristics of the objects through setting the range of hue, saturation, value and pixel area of the images obtained from the vision kit, transforms the image coordinates into Cartesian coordinates and transmits to the robot. Therefore, the robot can complete intelligent sorting tasks.

1.2 Vision Kit List

Figure 1.1 shows the vision kit list.

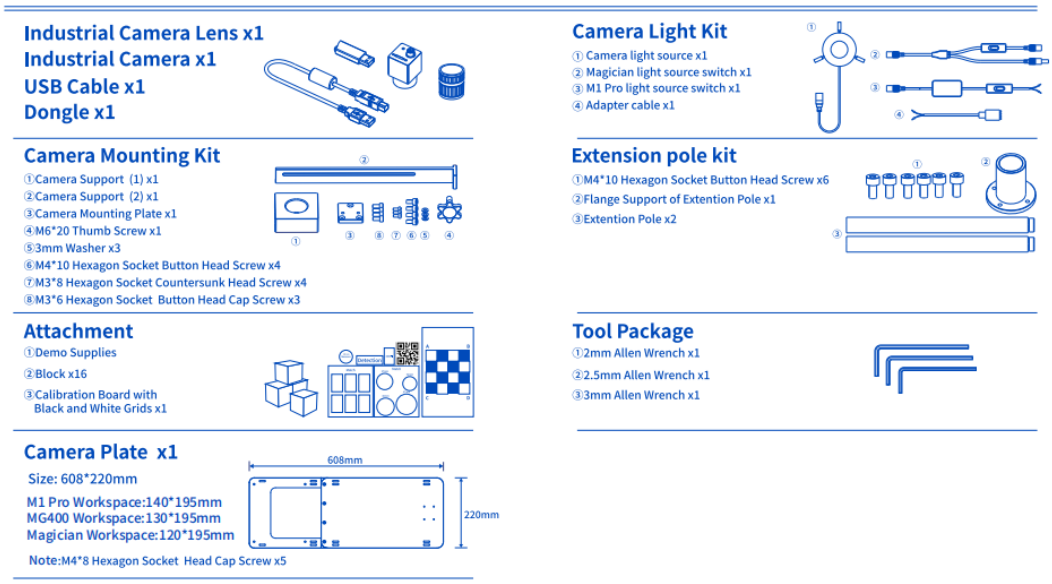

Figure 1.1 Vision kit list

1.3 Camera Parameter Description

Table 1.1 Camera Parameters Description

Parameters	Description
Camera model	MV-CE050-30UC
Sensor size	1/2.5"CMOS
Sensor model	AR0521
Effective pixels	5,000,000 pixels
Color	Color
Pixel Size	2.2um×2.2um

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Frame rate/Resolution	31 @2592×1944
SNR	>40dB
Dynamic range	>60dB
Shutter type	Rolling shutter
Exposure time	Bayer format：16μs~1s Other formats：28μs~1s
Exposure control	Automatic/Manual
Dimension	29mm*29mm*30mm
Data interface	USB3.0
Operating temperature	0~50° C
Lens mount	Mount C

1.4 Light Source Parameter Description

Table 1.2 Light Source Parameters Description

Parameters	Description
Light source model	JHZM-A40-W
Emitting color	White
LED quantity	48 light-emitting diode
Illumination	40000Lux
Brightness	Continuously adjustment, adjustable range: 0%~100% The color temperature remains unchanged
Wavelength	455nm~457.5nm
Output voltage	12V
Output power	3.5W~5W
Working distance	35mm-110mm
Specifications	Internal diameter: 40mm External diameter: 70mm Height: 25mm
Ring Diameter Inside	Max φ39mm
Weight	0.48KG
Working environment	Temperature: 0℃~40℃

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Parameters	Description
	Humidity: 20%RH~85%RH
Storage environment	Temperature: -20℃~40℃ Humidity: 20%RH~85%RH

1.5 Camera Lens Parameter Description

Table 1.3 Camera Lens Parameters Description

Parameters		Description	
Lens model		MVL-HF1228M-6MP	
Focal distance		12mm	
Maximum imaging size		1/1.8 " (φ9mm)	
Aperture range		F2.8-F16	
Control mode	Aperture	Manual	
	Focus	Manual	
Field angle	D	1/1.8 "	41.2°
	H		34.4°
	V		23.4°
Operating temperature		-10℃~+50℃	
Optical distortion		-0.38%	
Back focal length		17.526mm	
Shortest photography distance		0.06m	
Mount		Mount C	
Filter		M27*0.5	
Size		φ29mm*35.36mm	

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2. Installation Instructions

2.1 Installing Camera

Procedure

Step 1 Fix the camera flange support to the bottom of the extension pole using screws.

Figure 2.1 Install camera flange support

Step 2 Connect the two extension poles.

Figure 2.2 Connect the two extension poles

Step 3 Fix the end of the extension pole with camera flange support to the camera holder using four M4*10 hexagon socket head screws.

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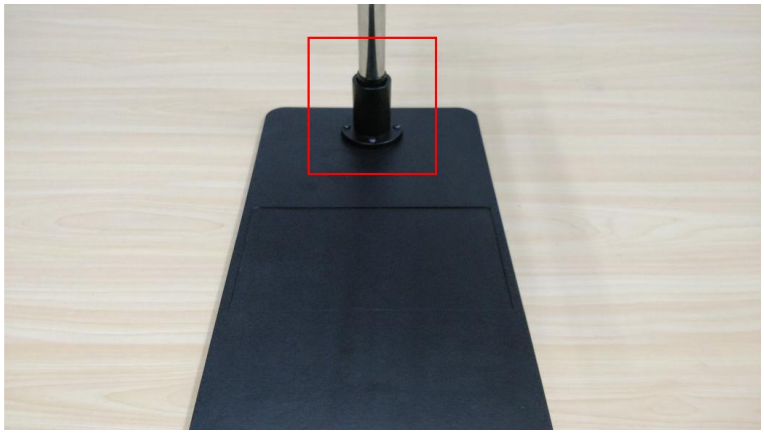

Figure 2.3 Fix extension pole

Step 4 Assemble the camera surpport using two M4*10 hexagon socket head cap screws, as shown in Figure 2.4.

Figure 2.4 Install camera support

Step 5 Fix the camera support to the extension pole by adjusting the stationary fixture.

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Figure 2.5 Fix the camera support

⚠NOTICE

Please adjust the height of the camera support based on site requirements. Make sure that the camera support does not hinder the movement of robot.

Step 6 Fix the camera to the camera mounting plate with three M3*8 hexagon socket countersunk head screws.

Figure 2.6 Fix camera plate

Step 7 Fix the camera to the camera support using two M3*6 hexagon socket head cap screws and two 3mm washers.

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Figure 2.7 Fix camera mounting plate

Step 8 Connect the camera to the computer using a USB cable (plug the blue connector into USB3.0 interface of the computer).

Figure 2.8 Connect camera to computer

Step 9 Adjust camera parameters.

MVS is a software for adjusting camera parameters. You can get MVS software from the DobotVisionStudio package.

Prerequisite:

- MVS has been installed.
- The camera has been connected to the computer.

Procedure:

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1. Open MVS, and click  to connect the camera.

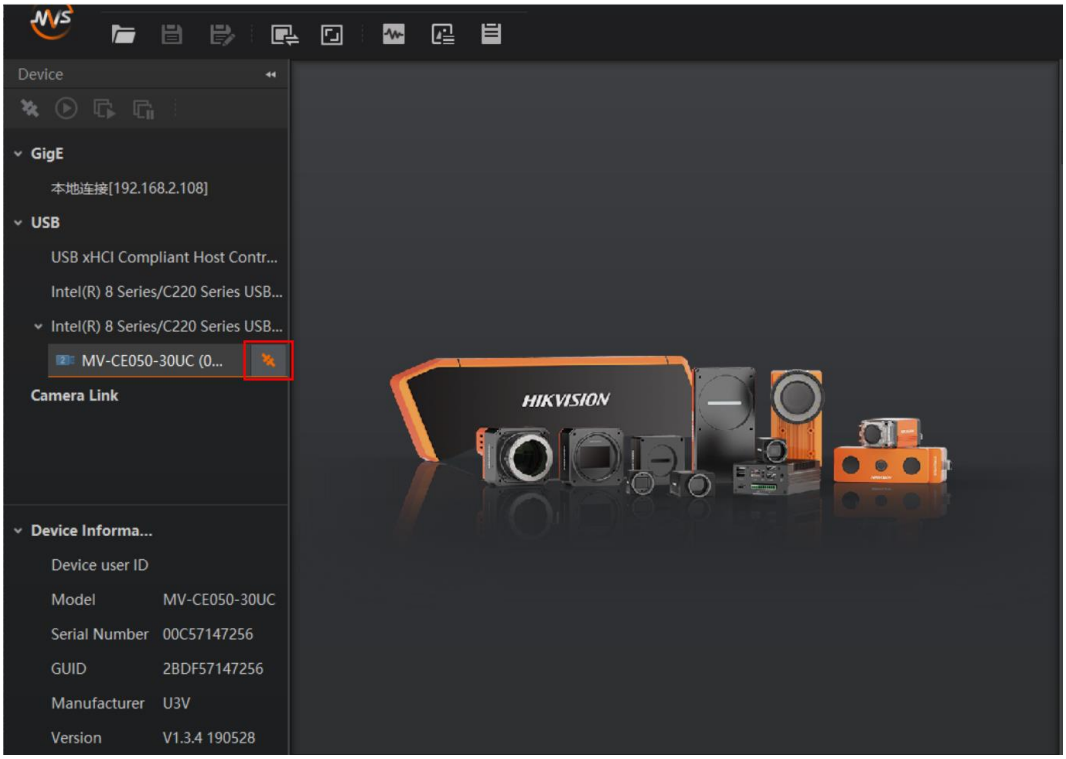

Figure 2.9 Connect camera

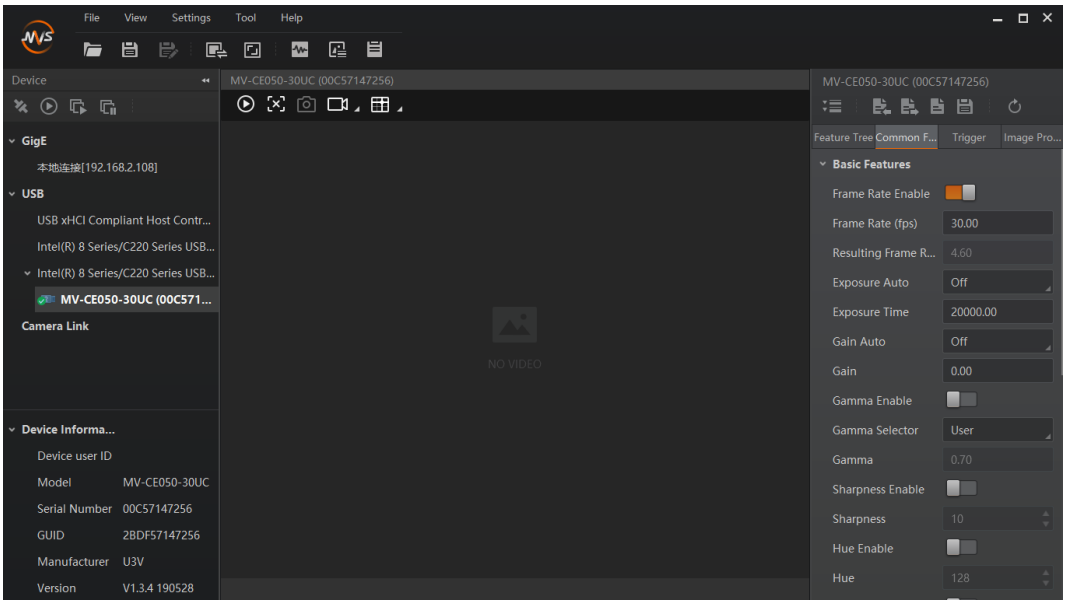

Figure 2.10 Connect camera successfully

2. Click  to capture an image.

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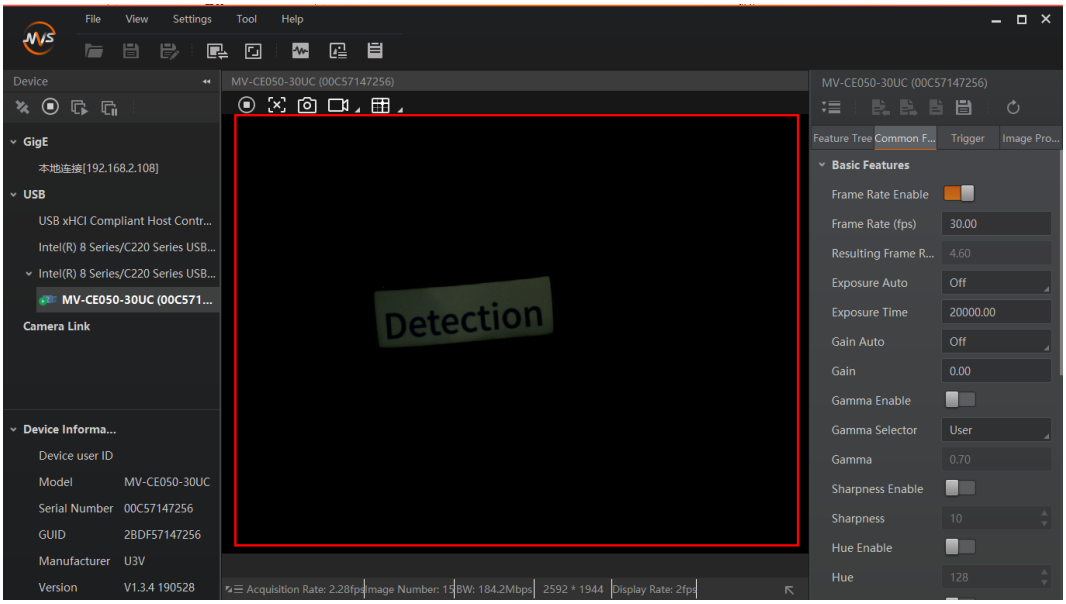

Figure 2.11 Capture imaging

3. Adjust the focal length, aperture, and exposure time according to the image.
   - Adjust the focal length by rotating the aperture, and lock the focal length by rotating the helix switch.

Figure 2.12 Adjust focal length

⚠NOTICE

If there is not enough light in the environment, turn on the light source. Please turn on or off the light source depending on the actual requirements. For the installation of light source, refer to Step 10 and Step 11.

- Adjust brightness by rotating the aperture shown in the red box below, and lock the aperture by rotating the helix switch.

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Figure 2.13 Adjust aperture

- Adjust exposure time or other parameters based on site requirements until imaging can be appeared clearly.

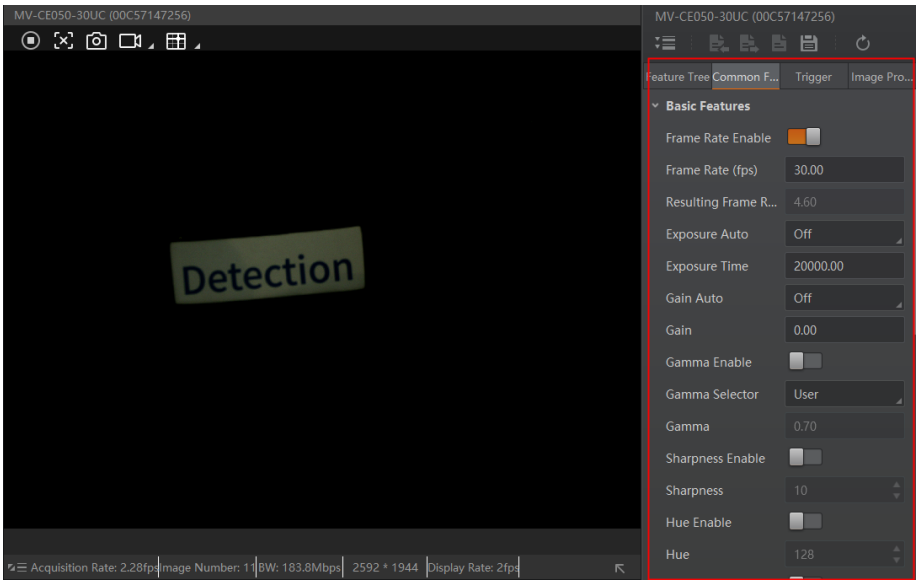

Figure 2.14 Adjust exposure time or other parameters

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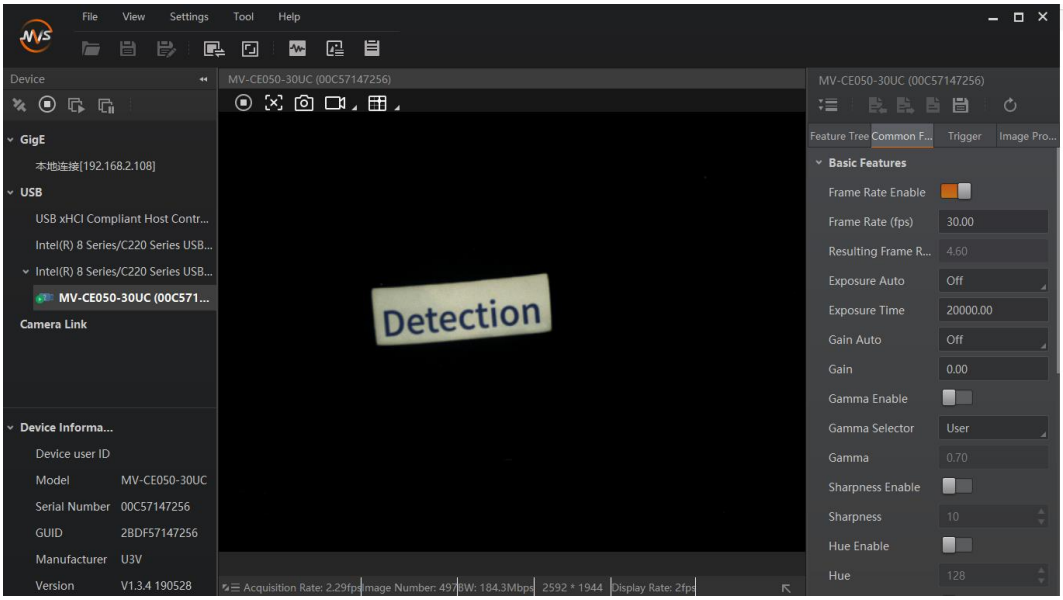

Figure 2.15 Result imaging

Step 10 Attach the light source kit to the camera, and fasten the kit with its three fixing knobs.

Figure 2.16 Fasten the light source kit

Step 11 Connect the light source switch.

- **Connect the light source switch to Magician**

1. Connect the light source switch to the light source.
2. Plug the light source switch to the power interface of Dobot Magician.
3. Connect the light source switch to the power adapter of Dobot Magician.

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Figure 2.17 Connect light source switch

- **Connect the light source switch to M1 Pro**

1. Connect the adapter cable to the M1 Pro light source switch. The red interface is 24V power interface, the black interface is GND interface.
2. Connect the M1 Pro light source switch to the light source.
3. Connect the adapter cable to the I/O interface on the base of Dobot M1 Pro, with red cable connected to 24V and black cable connected to GND.

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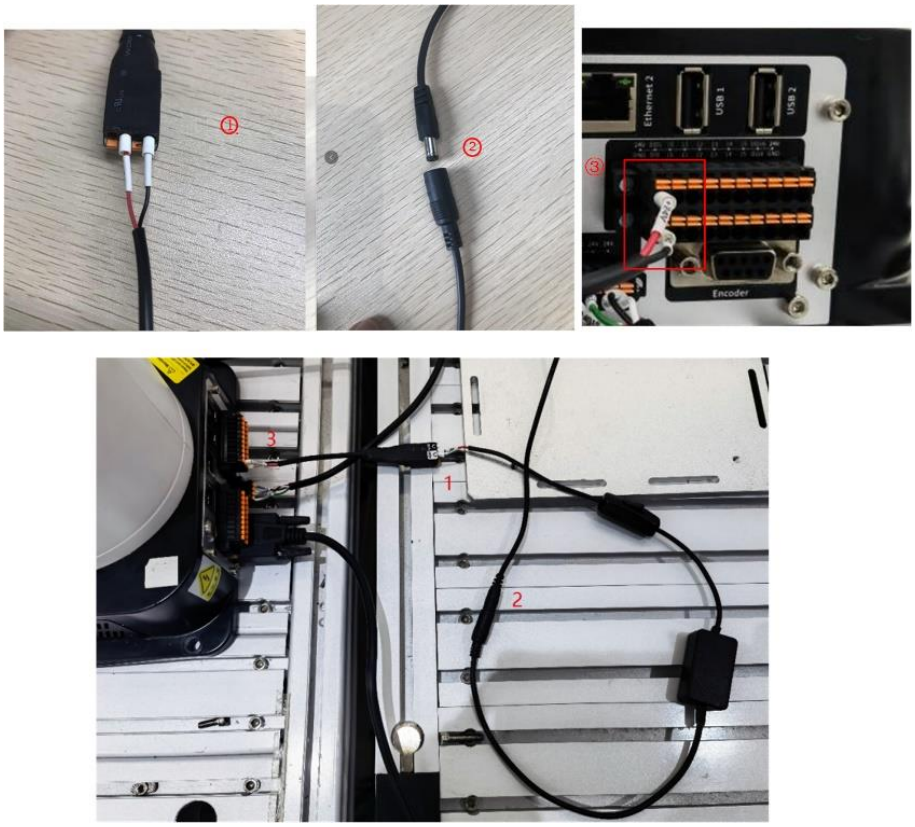

Figure 2.18 Connect light source switch

⚠NOTICE

If you need to use light source switch and air pump box at the same time. Please connect the power cable of air pump box to the adapter cable. As shown below, the red interface is 24V power interface, and the black interfaces is GND interface.

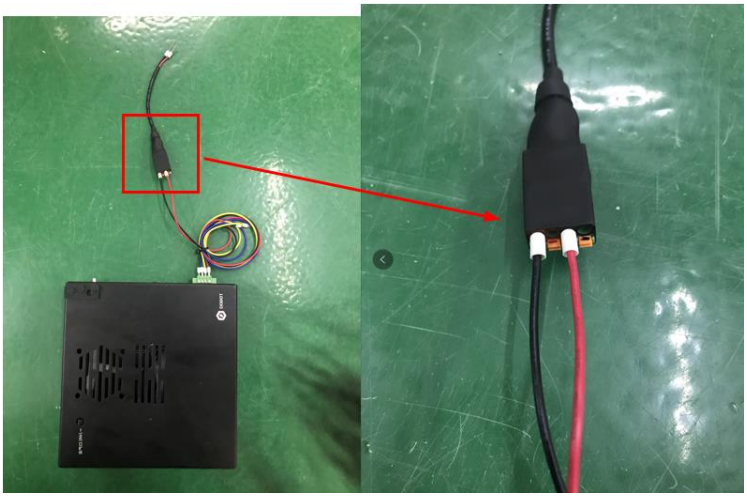

Figure 2.19 Connect air pump box

- **Connect the light source switch to MG400**

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1. Connect the adapter cable to the M1 Pro light source switch. The red interface is 24V power interface, and the black interface is GND interface.
2. Connect the MG400 light source switch to the light source.
3. Connect the adapter cable to the I/O interface on the base of Dobot MG400, with red cable connected to 24V and black cable connected to GND.

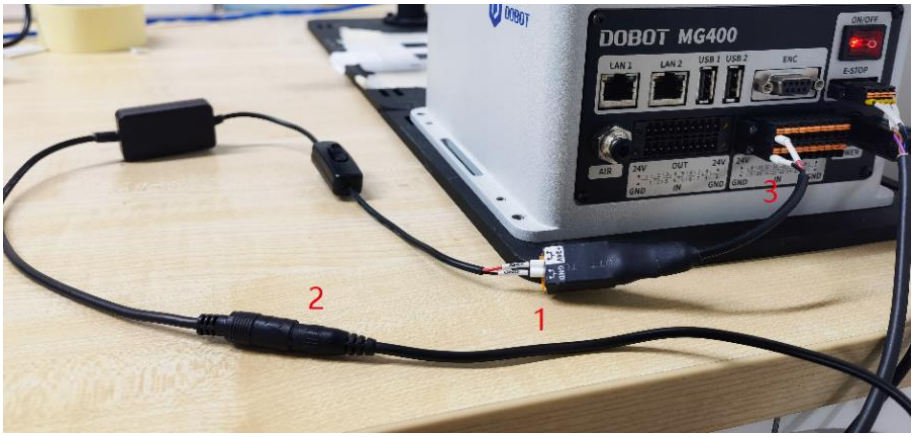

Figure 2.20 Connect MG400 to light source

2.2 Installing Dobot Magician

Procedure

Step 1 Fix Dobot Magician on the platform. For details, see *Dobot Magician User Guide*.

Step 2 Adjust the camera support to ensure that the camera can view the workspace of Dobot Magician.

Figure 2.21 Install Dobot Magician

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2.3 Installing Dobot M1 Pro

Procedure

Step 1 Fix Dobot M1 Pro on the platform. For details, see *Dobot M1 User Guide*.

Step 2 Adjust the camera support to ensure that the camera can view the workspace of Dobot M1 Pro.

Figure 2.22 Install Dobot M1 Pro

2.4 Installing Dobot MG400

Procedure

Step 1 Fix Dobot MG400 on the platform. For details, see *Dobot MG400 User Guide*.

Step 2 Adjust the camera support to ensure that the camera can view the workspace of Dobot MG400.

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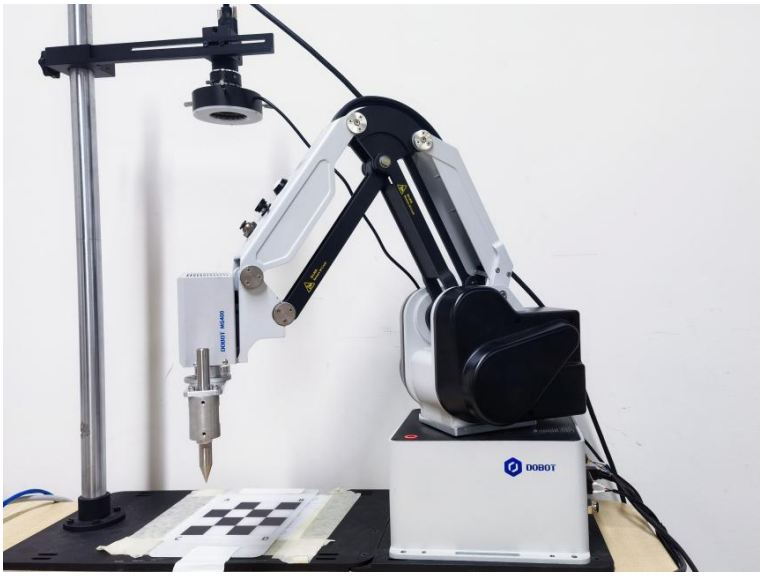

Figure 2.23 Install Dobot MG400

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