Sling Automatic Lens Tracking and Control System

(Lens Tracker)

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SHANGHAI Chengye Intelligent Technology Co.Ltd.

CATALOGUE

Sling Automatic Lens Tracking Control System (Lens Tracker)

Operation Instructions

1 Foreword

The development of modern equipment technology has increasingly uplifted the height of some large load-handling equipment and greatly improved loading and unloading conditions. However, the driver's cab is usually placed at a high position, usually at the top of the crane, about 40-50 meters high above the ground. The height can reach up to 60-70 meters if the lifting device needs to go deep into a cabin. Therefore, the driver may find it difficult to see clear the operating conditions of the spreader, which would affect the production speed and would probably give rise to security hazards.

For this reason, it is of great importance to equip these large-scale handling equipment with a device or system that can auto zoom with the up-and-down movements of the spreader and shoot video all the way to show clearly the lifting target. By such a means, the driver can observe the movements of the spreader via the device and hence operate the spreader more accurately, realizing the goal of safe operation.

The automatic spreader lens tracking control system is a new built-in device that adjusts and controls relevant equipment to accomplish and achieve the goal mentioned in the aforementioned situation.

2 System Functions

This new automatic control system is featured by built-in design, high degree of automation, simple system functions, easy operation and high practical utility.

2.1 Automatically calculate the height and pitch angle parameters of the spreader

By accepting the standard industrial signals given by the lifting motion of the spreader, the system can calculate automatically the actual height (h) of the spreader and the pitch angle (α) of the cradle head.

2.2 Automatically control the lens of the camera

After storing the calculated parameters into the built-in control module, the system can realize the zoom control of the camera lens, enabling the camera lens to zoom in or out along with the changing heights of the spreader.

2.3 Automatically adjust the pitch angle of the cradle head

After storing the calculated parameters into the built-in control module, the system will be able to adjust the pitch angle of the cradle head, enabling the lens to follow the spreader all the way.

2.4 Realize automatic tracking

The system can realize the functions of 2.2 and 2.3 according to a preset programme, to automatically track the lifting target and give the driver a clear view of the target.

2.5 Make manual adjustments

Since a cumulative error may occur in the actual motion and calculation, the system is designed with a manual adjustment programme for the operator to manually configure the parameters according to on-scene situations and restore the precise control parameters.

3 System Procedures

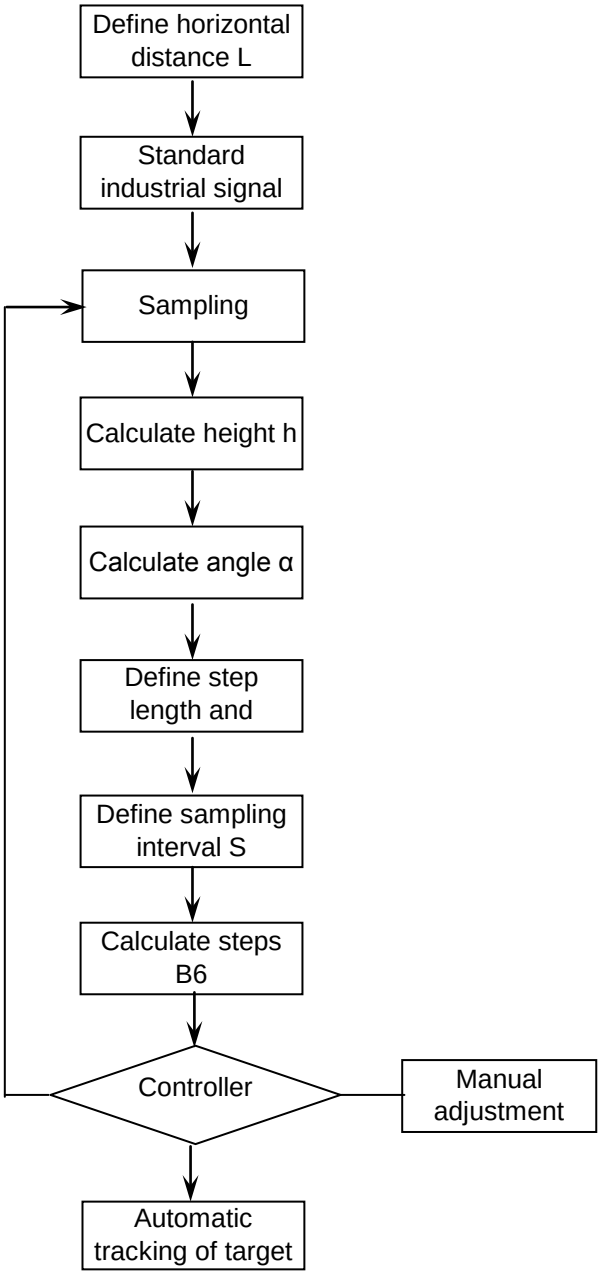

Figure 1

4 Components of the Control System

4.1 CY-661B System

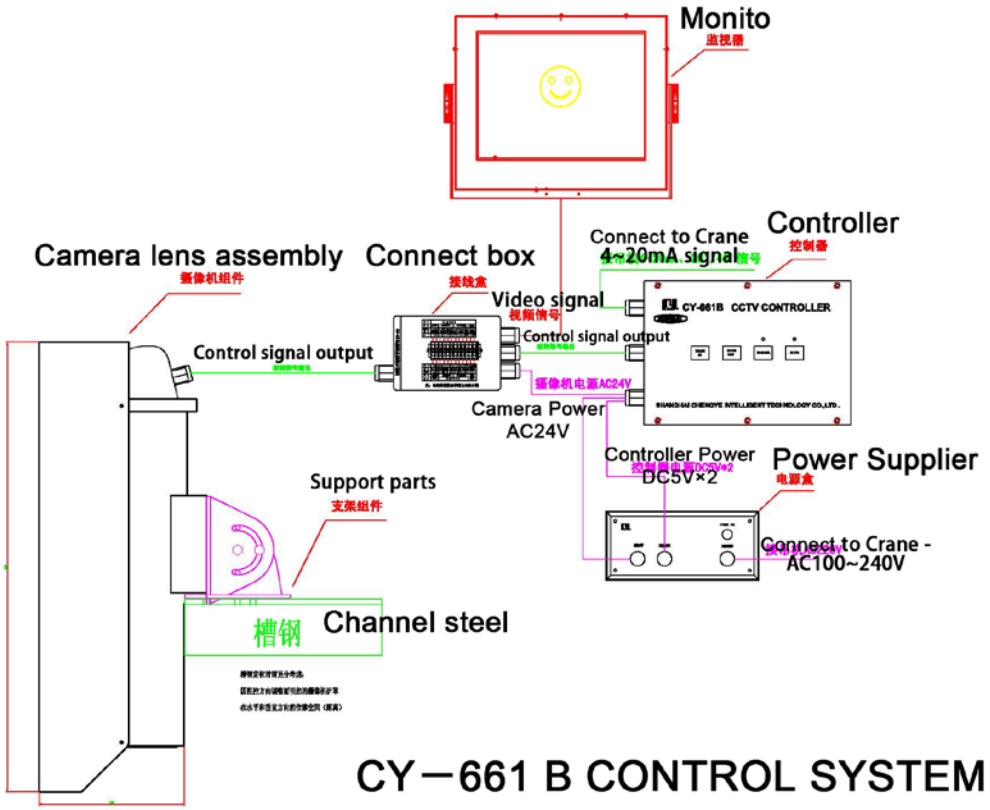

Figure 2

4.1.1 CY-661B Camera System

This part is composed of two sub-parts, camera & lens and support frame.

4.1.1.1 CY-661B Camera & Lens

This part consists of a camera, a lens, a control motor, modules, a protective cover, a junction box and other components. Please view Figure 2.

4.1.1.2 CY-661B Support Components

Support frame consists of frames and channel steels.

4.1.2 CY-661B Controller

The controller is composed of a control module, a drive module, control buttons and a chassis.

4.1.2.1 CY-661B Control Panel

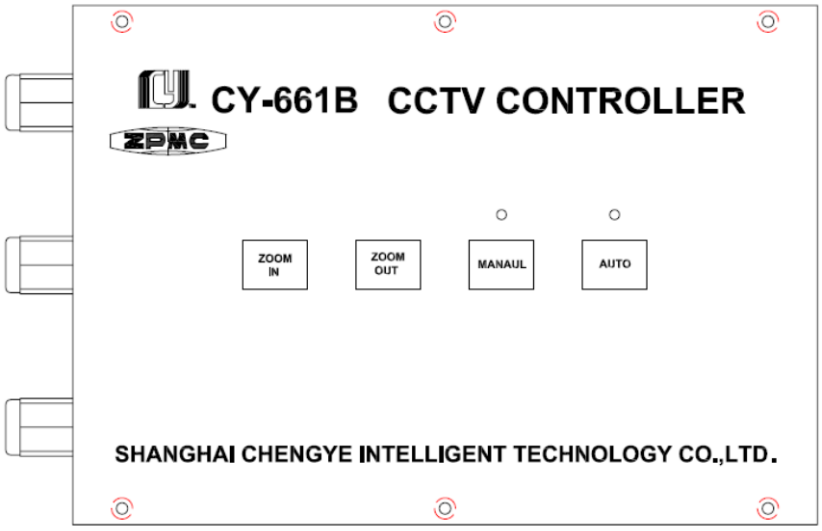

Figure 3

Buttons: ZOOM IN – Manual zoom adjustment
ZOOM OUT – Manual zoom adjustment (reverse)
AUTO – Selection of automatic mode
MANAUL – selection of manual mode

Indicators: Green – indicator of manual mode
Red – indicator of automatic mode

4.1.2.2 Panel Control of CY-661B System

After the system boots up, the red indicator above the AUTO button will light up, indicating that the controller is in the automatic mode. In this mode, the CY-661B system collects height signals from the spreader's 4-20mA current via the control module and accordingly send out corresponding control signals to control the focal length change of camera lens through the drive module. When the spreader moves up and down, the spreader's images on the screen will be relatively stable within a certain range, to achieve a clear view of operation status when the spreader moves to a distant position. The controller can be configured into the automatic or manual mode. The green indicator above the Manual button will light up under the manual mode. The operator can adjust the focal length of camera lens through the ZOOM IN or ZOOM OUT buttons on the chassis front panel. When the automatic mode is back on, the screen will re-show images of the spreader at the actual height.

4.1.3 CY-PE05 Power Supplier

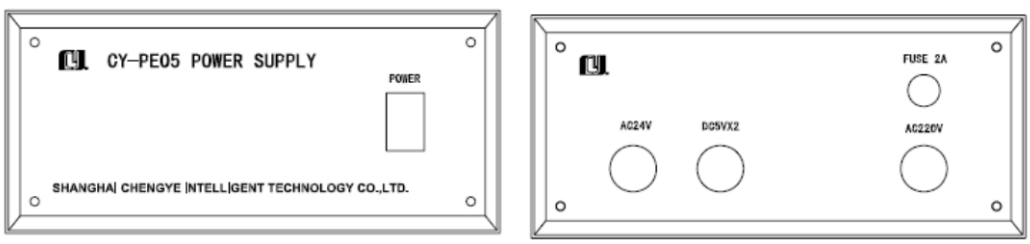

Figure 4

The power supplier provides three sets of output power, which includes two sets of DC5V power for the controller, one of which for the control panel after 3.3V voltage stabilization and the other for the drive plate; and a set of AC24V with a 2A fuse for the front-end camera. (See Figure 4)

The input power (AC100~240V) of the power supplier is supplied by the lifting machine.

4.1.4 Display Device

The display device is usually a 19-inch or 20-inch LCD monitor. CY-661B and CY-661D can use the same model of display device. Specifics for model selection should satisfy the needs of the customer. The device can be stalled on the front left or right corner of the driver's cab or hung in the upper front of the driver's cab.

4.2 CY-661D System

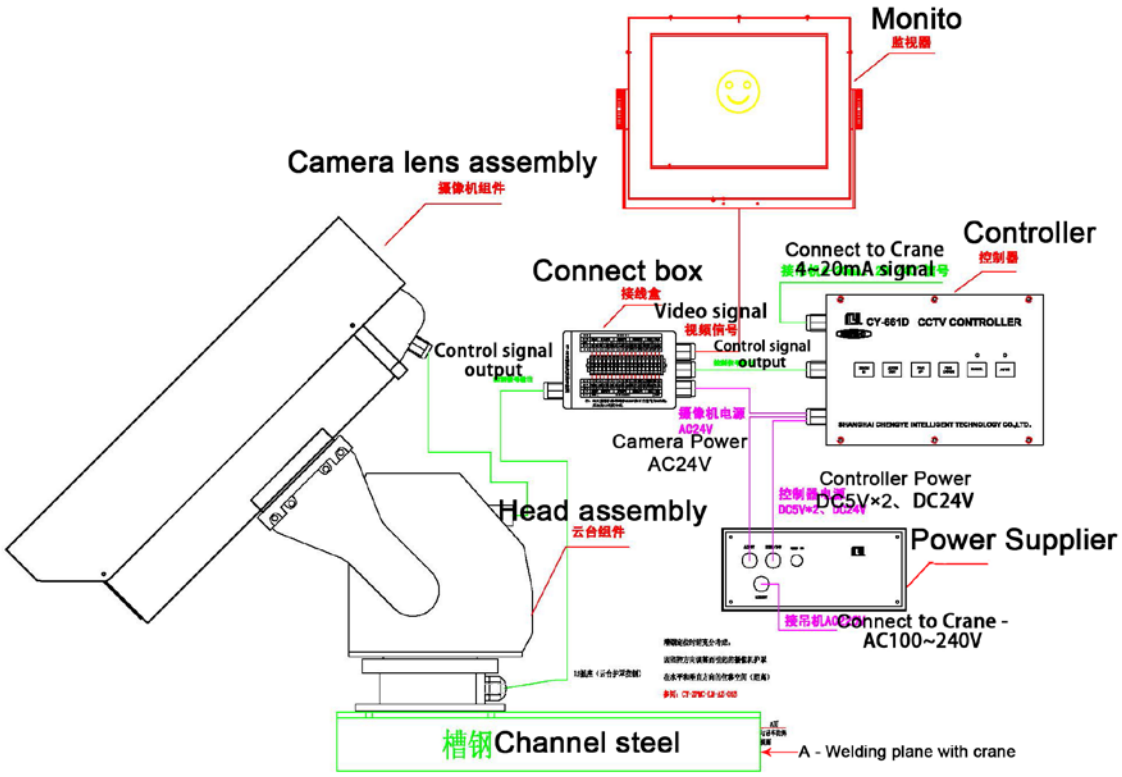

Figure 5

4.2.1 CY-661D Camera System

This part is composed of two sub-parts, camera & lens and cradle head.

4.2.1.1 CY-661D Camera & Lens

This part consists of a camera, a lens, a control motor, modules, a protective cover, and other components. Please view the details in Figure 3.

4.2.1.2 CY-661D Cradle Head

This part consists of a cradle head, a control motor, a control module and other components. Please see Figure 3.

4.2.2 CY-661D Controller

The controller is composed of a control module, a drive module, a power supply switch, control buttons and a chassis.

4.2.2.1 CY-661D Control Panel

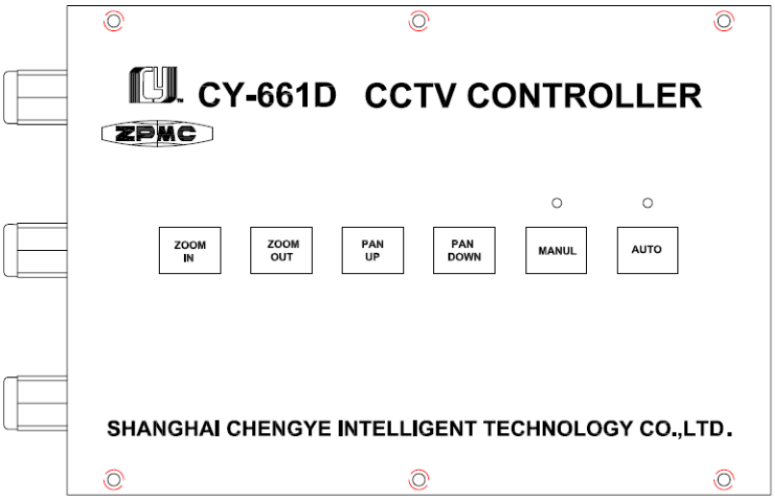

Figure 6

Buttons: ZOOM IN – Manual zoom adjustment
ZOOM OUT – Manual zoom adjustment (reverse)
PAN UP – Manual Adjustment of Cradle Head
PAN DOWN – Manual Adjustment of Cradle Head (reverse)
AUTO – Selection of automatic mode
MANAUL – selection of manual mode

Indicators: Green – indicator of manual mode
Red – indicator of automatic mode

4.2.2.2 Panel Control of CY-661D System

- After the system boots up, the red indicator above the AUTO button will light up, indicating that the controller is in the automatic mode. In this mode, the CY-661D system collects height signals from the spreader's 4-20mA current via the control module and accordingly send out corresponding control signals to control the focal length change of camera lens through the drive module. When the spreader moves up and down, the spreader's images on the screen will be relatively stable within a certain range, to achieve a clear view of operation status when the spreader moves to a distant position. The controller can be configured into automatic or manual mode. The green indicator above the Manual button will light up under the manual mode. The operator can adjust the focal length of camera lens through the ZOOM IN or ZOOM OUT buttons on the chassis panel and adjust the angle of the cradle head by using the PAN UP or PAN DOWN button. When the automatic mode is back on, the screen will re-show images of the spreader at the actual height.

4.2.3 CY-PE0524 Power Supplier

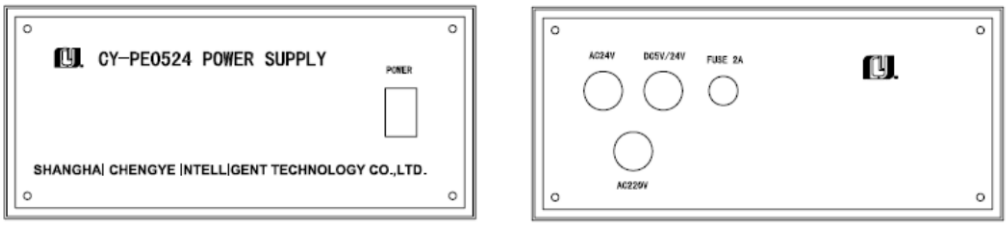

Figure 7

The power supplier provides four sets of output power, which includes two sets of DC5V power for the controller, one of which for the control panel after 3.3V voltage stabilization and the other for the zooming and focusing of the drive panel; a set of DC24V for the cradle head adjustment of the drive panel; and a set of AC24V with a 2A fuse for the front-end camera. (See Figure 7)

The input power of the power supplier is supplied by the lifting machine, The input voltage:AC100~240V.

4.2.4 Display Device

The display device is usually a 19-inch or 20-inch LCD monitor. CY-661B and CY-661D can use the same model of display device. Specifics for model selection should satisfy the needs of the customer. The device can be stalled on the front left or right corner of the driver's cab or hung in the upper front of the driver's cab.

5 Installation of Systems

5.1 Installation of CY-661B System

5.1.1 Installation of CY-661B Camera System

The CY-661B system does not include a cradle head. It must be installed on the upper side of the spreader, namely the top of the trolley frame in the middle of the spreader. Keep the support perpendicular to the horizontal during installation (see Figure 2). The installed position has a decisive role in the effects of system operation.

Therefore, it is very important to keep this instruction in mind when installing the CY-661B camera system. The camera system contains a junction box; please strictly follow the instructions when wiring the box.

5.1.2 Installation of CY-661B Controller

The CY-661B controller can be firmly installed (side hanging) at the side of the console in the driver's cab, making it convenient for the driver to operate buttons. Please keep the controller from moisture and salt. This installation method applies to both CY-661B and CY-661D.

5.1.3 Installation of CY-PE05 Power Supplier

It would be best to install the power supplier within the electric panel in the driver's cab. The input power is AC100~240V, while the output power includes two sets of DC5V and one set of AC24V. The input and output of power are realized through three aviation plugs. The AC100~240V

power supplier is welded to the 1-core and 3-core ends of the 3-core aviation plugs. The two sets of DC5V are welded to the 1 & 4-core and 2& 5-core ends of the 6-core aviation plugs, among which 1-core and 2-core ends are positive and the 4-core and 5-core ends are negative. The AC24V is welded to the 2-core aviation plug. Please see the Wiring Table for CY-661B Equipment for specific wiring details.

5.1.4 Installation of Display Device

The display device is usually installed in a position as required by the customer. The LCD monitor contains AC100~240V/DC12V 6A power matchers, so it is necessary to supply AC100~240V power for the matcher. The connection of video cables: weld the BNC connector on the video cable. Insert the AV1 terminal plug into the LCD monitor and set the LCD monitor at the AV1 display mode.

5.2 Installation of CY-661D

5.2.1 Installation of CY-661D Camera System

The CY-661D camera system includes a cradle head, which should be installed in a position according to design requirements. Keep it parallel with the horizontal during installation (see Figure 5); otherwise, it is prone to damaging the cradle head. Therefore, it is very important to keep this instruction in mind when installing the CY-661D camera system. The camera system contains a junction box; please strictly follow the instructions when wiring the box.

5.2.2 Installation of Y-661D Controller

The CY-661B controller can be firmly installed (side hanging) at the side of the console in the driver's cab, making it convenient for the driver to operate buttons. Please keep the controller from moisture and salt. This installation method applies to both CY-661B and CY-661D.

5.2.3 Installation of CY-PE0524 Power Supplier

It would be best to install the power supplier within the electric panel in the driver's cab. The input power is AC100~240V, while the output power includes two sets of DC5V, one set of AC24V and one set of DC24V. The input and output of power is realized through three aviation plugs. The AC100~240V power supplier is welded to the 1-core and 3-core ends of the 3-core aviation plugs. The two sets of DC5V and one set of DC24V are welded to the 6-core aviation plug. The two sets of DC5V are welded to 1 & 4-core ends and 2 & 5-core ends, among which 1-core and 2-core ends are positive and the 4-core and 5-core ends are negative. The one set of DC24V is welded to the 3 & 6-core ends, among which the 3-core end is positive and the 6-core end is negative. And AC24V is welded to a 2-core aviation plug. Please see the Wiring Table for CY-661D Equipment for specific welding details.

5.2.4 Installation of Display Device

The display device is usually installed in a position as required by the customer. The LCD monitor contains AC100~240V/DC12V 6A power matchers, so it is necessary to supply AC100~240V power for the matcher. The connection of video cables: weld the BNC connector on the video cable. Insert the AV1 terminal plug into the LCD monitor and set the LCD monitor at the AV1 display mode.

5.3 Connection of Systems

System connection is the key to the entire project. According to the configuration of equipment connectors, connect different types of signals and control cables accurately with corresponding interfaces.

5.3.1 Connection of the CY-661B System

Under normal circumstances, the CY-661B system is connected according to the Wiring Diagram in Figure 8 and the Wiring Table in Figure 9.

CY-661B Connect box wiring diagram

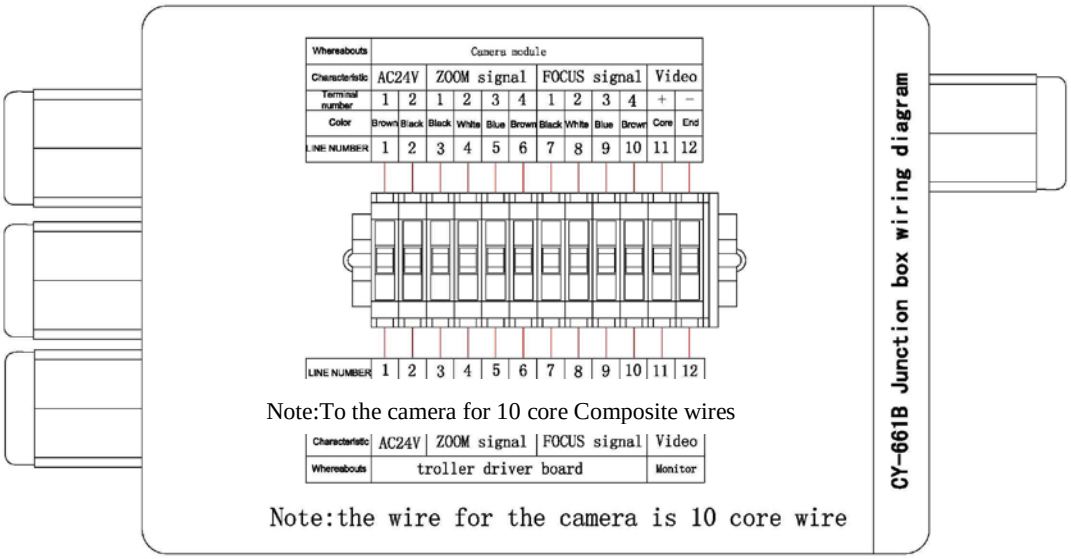

Figure 8

CY-661B Controller wiring table

NO1

Whereabouts	Camera module											
Corresponding terminal	12 terminal connection											
Characteristic	AC24V		ZOOM signal				FOCUS signal				Video	
Terminal number	1	2	3	4	5	6	7	8	9	10	+	−
Color	Brown	Black	Black	White	Blue	Brown	Black	White	Blue	Brown	Core	End
LINE NUMBER	1	2	3	4	5	6	7	8	9	10	11	12
LINE NUMBER	1	2	3	4	5	6	7	8	9	10	11	12
Color	Red	Orange	Purple	Yellow	Blue	Green	Black	White	Grey	Brown	Core	End
Terminal number	1	2	1	2	3	4	1	2	3	4	+	−
Characteristic	AC24V		ZOOM signal				FOCUS signal				Video	
Corresponding terminal	2 Core		4 Core				4 Core				BNC	
Whereabouts	troller driver board										Monitor	

NO2

Whereabouts	Crane				Power box					
Corresponding terminal					6 Core				3 Core	
Characteristic	20/40		4-20mA		DC5V		DC5V		AC220V	
Terminal number					1	4	2	5	1	3
Color										
LINE NUMBER	13	14	15	16	17	18	19	20	21	22
LINE NUMBER	13	14	15	16	17	18	19	20	21	22
Color										
Terminal number	3	4	5	6	1	2	3	4		
Characteristic	20/40		4-20mA		DC5V		DC5V		AC220V	
Corresponding terminal	8 Core				4 Core					
Whereabouts	troller driver board								Crane	

Figure 9

5.3.2 Connection of the CY-661D System

Under normal circumstances, the CY-661D system is connected according to the Wiring Diagram in Figure 10 and the Wiring Table in Figure 11.

CY-661D Connect box wiring diagram

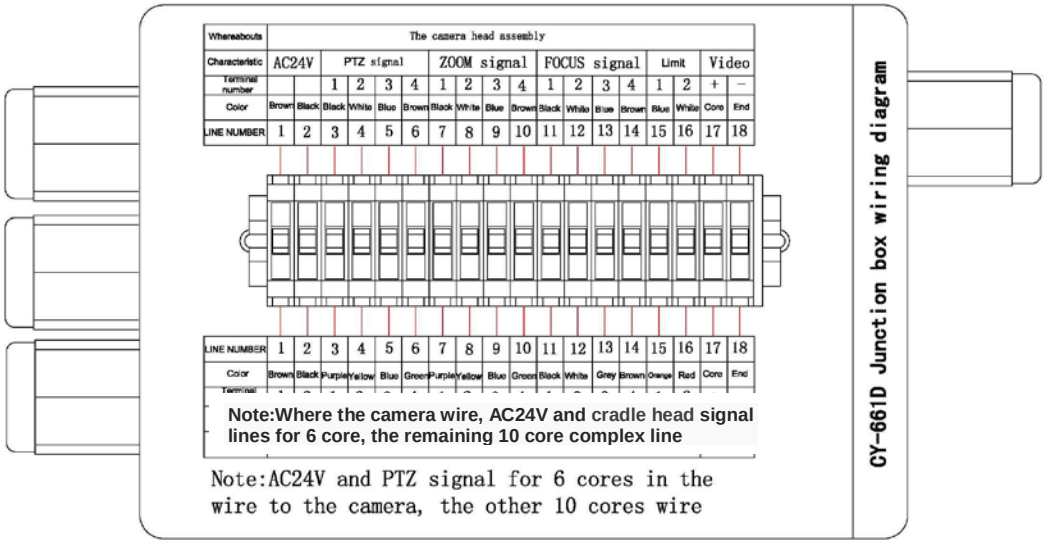

Figure 10

CY-661D Controller wiring table

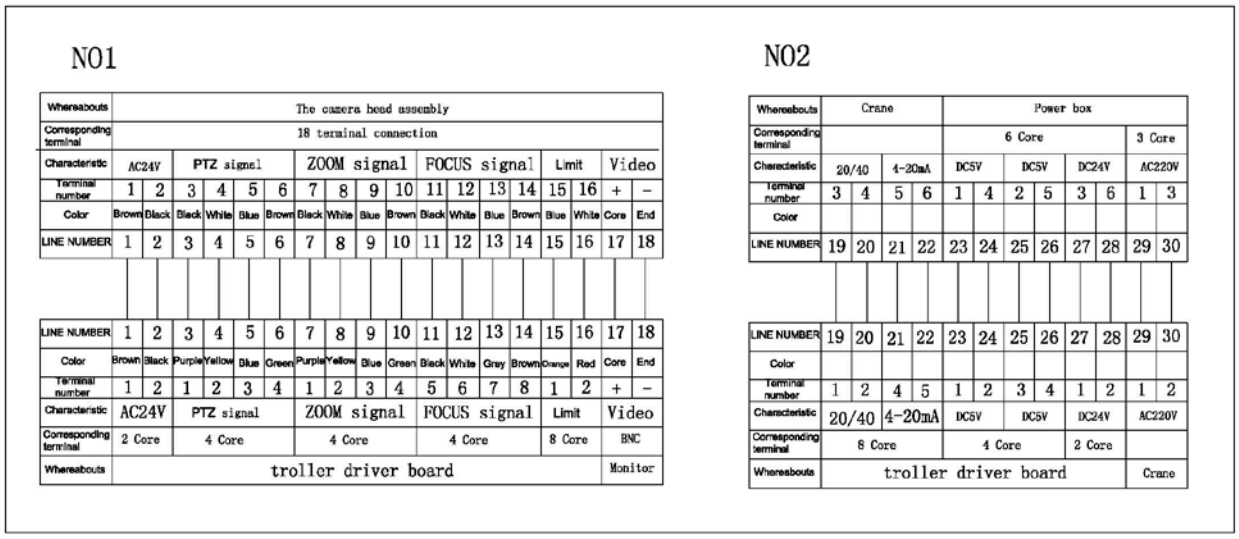

Figure 11

6 System Operation

6.1 Conditions for Normal System Functioning:

1. Normal power supply for the system
2. All signals of the system are accurately connected;
3. There are normal, strong 4-20mA signals.
4. Collected data are saved in the system.

Only all the four conditions above are satisfied can the system operate normally.

6.2 Boot-up

6.2 .1 Automatic mode

When CY-661B and CY-661D operates normally, the red indicator above the AUTO button on the panel will light up, indicating the system is working under the automatic mode. In this case, the system will follow and track the spreader as its height changes. In the automatic mode, the buttons of ZOOM IN, ZOOM OUT, PAN UP and PAN DOWN on the panel will be all out of function.

6.2 .2 Manual mode

Press the MANUAL button, then the green indicator above will light up, switching the system into the manual mode. In this case, you can press the buttons on the panel to adjust the focal length of the camera and the angle of the head cradle.

The ZOOM IN and ZOOM OUT buttons of the CY-661B system are to adjust the focal length of the camera. (See Figure 12)

The ZOOM IN, ZOOM OUT, PAN UP and PAN DOWN buttons of the CY-661D system are to adjust the focal length of the camera and the angle of the cradle head. (See Figure 13)

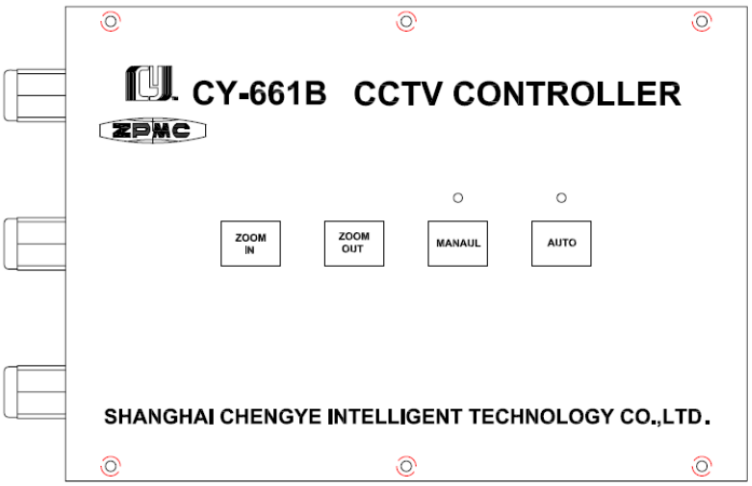

Figure 12

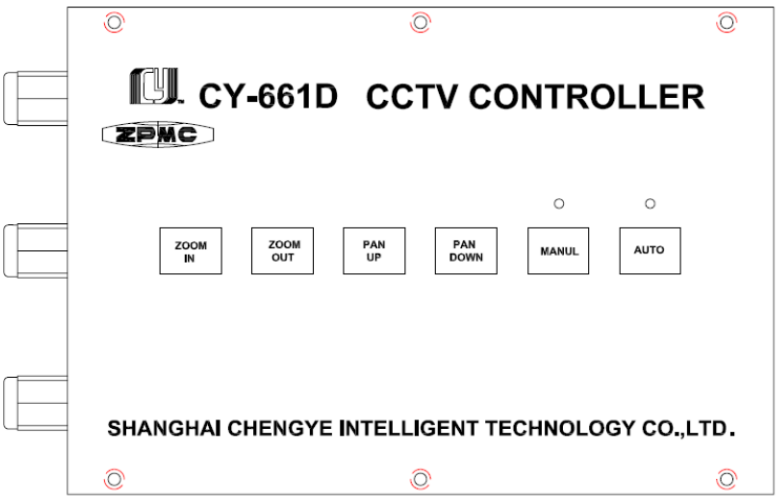

Figure 13

When the manual mode is switched to the automatic mode, the screen will re-show the images about the height of the spreader.

7 Pay-off Table

7.1 Pay-off Table of CY-661B

Pay-off Table of CY-661B Table 1

End A	End B	Number of Cores	Features
AC100–240V end for CY-PE05 power supplier in driver's cab	AC100-240V power supply end of the spreader	2	AC100–240V
DC5V end for controller in driver's cab	DC5V end of power supplier in driver's cab	2	DC5V
DC5V end for controller in driver's cab	DC5V end of power supplier in driver's cab	2	DC5V
20'/40' of controller in drivers' cab	Output end for changing spreader signals	2	Switching value
4-20mA (-) of controller in drivers' cab	Output end (-) for changing spreader signals	2	Current
ZOOM1 of controller in drivers' cab	Front-end junction box ZOOM1	1	Synchronous motor driver
ZOOM2 of controller in drivers' cab	Front-end junction box ZOOM2	1	Synchronous motor driver
ZOOM3 of controller in drivers' cab	Front-end junction box ZOOM3	1	Synchronous motor driver
ZOOM4 of controller in drivers' cab	Front-end junction box ZOOM4	1	Synchronous motor driver
FOCUS1 of controller in drivers' cab	Front-end junction box FOCUS1	1	Synchronous motor driver
FOCUS2 of controller in drivers' cab	Front-end junction box FOCUS2	1	Synchronous motor driver
FOCUS3 of controller in drivers' cab	Front-end junction box FOCUS3	1	Synchronous motor driver
FOCUS4 of controller in drivers' cab	Front-end junction box FOCUS4	1	Synchronous motor driver
AC24V of power supplier in driver's cab	AC24V of controller in drivers' cab	2	Camera power+
AC24V of controller in drivers' cab	Front-end junction box AC24V		
AV1 of monitor in in driver's cab	Front-end junction box AV+	1	Video signal+
AV1 of monitor in in driver's cab	Front-end junction box AV-	1	Video signal-

Notes: For CY-661B system, lay a 0.5×10 core cable from the driver's cab to the junction box of the front-end camera.

Lay a 0.5×4 core cable from the controller in the driver's cab to the power supplier

Lay a video coaxial cable from the monitor in the driver's cab to the junction box of the front end camera

Lay a 1×2 core cable from the power supplier of the driver's cab to the AC100~240V end

7.2 Pay-off Table of CY-661D

Pay-off Table of CY-661D Table 2

End A	End B	Number of Cores	Features
AC100~240V end for power supplier in driver's cab	AC100~240V power supply end	2	AC100~240V
20'/40' of controller in driver's cab	Output end for changing spreader signals	2	Switching value
4-20mA' + of controller in driver's cab	Output end for changing spreader signals	2	Current
ZOOM1 of controller in driver's cab	Front-end junction box ZOOM1	1	Zoom motor driver
ZOOM2 of controller in driver's cab	Front-end junction box ZOOM2	1	Zoom motor driver
ZOOM3 of controller in driver's cab	Front-end junction box ZOOM3	1	Zoom motor driver
ZOOM4 of controller in driver's cab	Front-end junction box ZOOM4	1	Zoom motor driver
FOCUS1 of controller in driver's cab	Front-end junction box FOCUS1	1	Focus motor driver
FOCUS2 of controller in driver's cab	Front-end junction box FOCUS2	1	Focus motor driver
FOCUS3 of controller in driver's cab	Front-end junction box FOCUS3	1	Focus motor driver
FOCUS4 of controller in driver's cab	Front-end junction box FOCUS4	1	Focus motor driver
PAN1 of controller in driver's cab	Front-end junction box PAN1	1	Motor driver of cradle head
PAN2 of controller in driver's cab	Front-end junction box PAN2	1	Motor driver of cradle head
PAN3 of controller in driver's cab	Front-end junction box PAN3	1	Motor driver of cradle head
PAN4 of controller in driver's cab	Front-end junction box PAN4	1	Motor driver of cradle head
LIMITED of controller in driver's cab	Front-end junction box LIMITED	2	LIMITED control of cradle head
AC24V of power supplier in driver's	AC24V of controller in driver's cab	2	Camera power+
AC24V of controller in driver's cab	Front-end junction box AC24V		

AV1 of monitor in driver's cab	Front-end junction box AV	2	Video signals+
ZOOM1 of front-end junction box	ZOOM1 of camera in protective cover		Zoom motor driver
DC5V end for controller in driver's cab	DC5V end for power supplier in driver's cab	2	DC5V
DC5V end for controller in driver's cab	DC5V end for power supplier in driver's cab	2	DC5V
DC24V end for controller in driver's cab	DC24V end for power supplier in driver's cab	2	DC24V

Notes: For CY-661D system, lay a 0.5×10 core cable from the driver's cab to the junction box of the front-end camera.

Lay a 0.5×6 core cable from the driver's cab to the junction box of the front-end camera

Lay a 0.5×6 core cable from the controller to the power supplier in the driver's cab

Lay a video coaxial cable from the monitor in the driver's cab to the junction box of the front end camera

Lay a 1×2 core cable from the power supplier in the driver's cab to the AC100~240V end

The system has obtained the CE certification.

8 Special statement

● This system has been awarded with national patent of the People's Republic of China, and any infringement shall be subject to legal accountability.

● The trademark ZPMC has become a legal registered trademark of Shanghai Zhenhua Heavy Industry Co., Ltd. and Shanghai Chengye Technology & Engineering Co., Ltd.

● The copyright of this system software has been registered at the Copyright Office of the People's Republic of China, and any passing-off or counterfeiting act shall be subject to legal accountability.

● The system covered by this Operation Instruction is subject to upgrading, updating, modification without notice.

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