H44 SERIE

Multi axis Hall contact-less joystick

DESCRIPTION

The H44 serie Multi axis contact-less joystick controller are designed for precision fingertip control applications where safety and long trouble-free life are primary requirements. It is available in one, two or three axis configurations and can accommodate a choice of handles, including push-button switch versions. Two mounting flange options allow attachment above or below the panel. The H44 serie has compact sizes, low operational force and high reliability are ideal for applications which include powered wheelchairs, robotics, UAV, CMM machines, medical and CCTV equipment, professional camera controls and remote controlled chest-packs.

FEATURES

- Sensor: Hall sensor
- Lever Action (Centering): Spring centering
- Mechanical Angle of Movement: X and Y axes: ±20°; Z axis: ±18°
- Lever gate profiles (options): Single axis, round, square, cross
- Signal output: analog voltage, RS485, RS422, RS232, USB, CAN
- Power supply: DC5V, DC12-28V, Power consumption: less than 9-25MA@5V PS
- Electrical life: 1,000,000 cycles
- Operating temperature: -40°C to +70°C
- IP Grade: IP67

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Product model and parameters (Overview)

1	2	3	—	4	—	5

H44
Product series

Handle

MKF-JS08
MKF-JS03
MKF-JS20
MKF-JS04
MKF-JS10
MKF-JS47

Number of axis
1X/1Y = 1 axis (X, Y)
2P = 2 axis (Cross)
2C = 2 axis (Round)
3T = 3 axis Twisted Top

Output Options
H02 = 0V to 5V
H47 = 0.3V to 4.7V
H01 =0.5V to 4.5V

Double Sensors
2H04 = 1V to 4V
RS232 = RS232
RS422 = RS422
RS485 = RS485
485M = 485Modbus
USB = USB2.0
MOUSE = USB mouse
CAN20 = CAN 2.0B

Power Supply Options
0 = No PS(USB)
S = DC5V
12W = DC12V
24W = DC24V

Note: RS232, RS422, RS485, 485 Modbus, CAN signal output do not have DC24V power supply.

Available handles:

MKF-JS08
No button
Axes: 1, 2, 3

MKF-JS03
1 button Axes:
1, 2, 3

MKF-JS20
No button
Axes: 1, 2, 3
Handle is retractable,
Shorten length 10mm
For portable devices

MKF-JS04
D1=1 button
D0=No button
Axes: 1, 2, 3

MKF-JS10
No button
Axes: 2, 3
For portable
devices

MKF-JS47
1 button
Axes: 1, 2, 3

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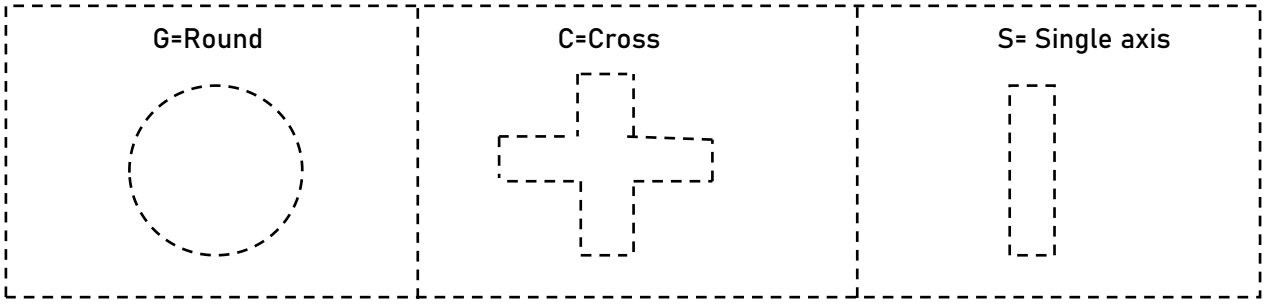
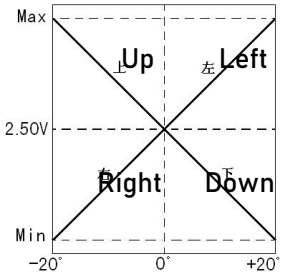
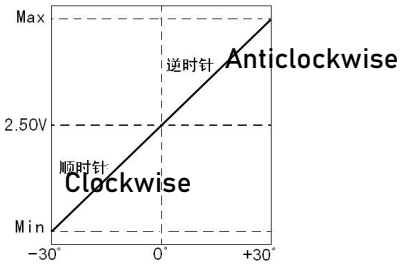


Signal output of analog voltage:



X Y Axis



Z axis

Schematic diagram of The button:

Electrical parameters of a button:

- ✧ Normal open
- ✧ Current: 1A/24V or 0.5A/24V
- ✧ IP Grade: Handle B IP67; Handle D IP54

XYZ Electrical parameter:

- ✧ Minimum working voltage: 3.8V (5V PS) or 8V (12-24V PS)
- ✧ Maximum input voltage: 5.5V (5V PS) or 28V (12-24V PS)
- ✧ Working current: less than 25mA (5V PS, during signal output of analog voltage)
- ✧ Analog voltage signal output load: more than 1KΩ
- ✧ Central voltage of analog voltage signal output: 2.50V or 50%Vdd
- ✧ Analog voltage output signal: 0V～5V / 0.3V ～4.7V / 0.5V ～ 4.5V / 1V～ 4V

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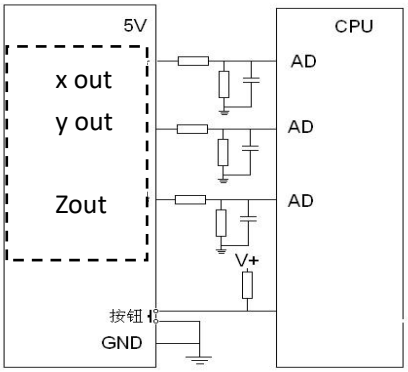
WIRING DIAGRAM



If CPU voltage is 3.3V, then the divider resistance is 1.5KΩ and 3KΩ Capacitance =1NF

If CPU voltage is 5V, cancel the divider resistance and connect to CPU pin directly. The capacitance is not essential;

Connect resistance 10KΩ to the upper button

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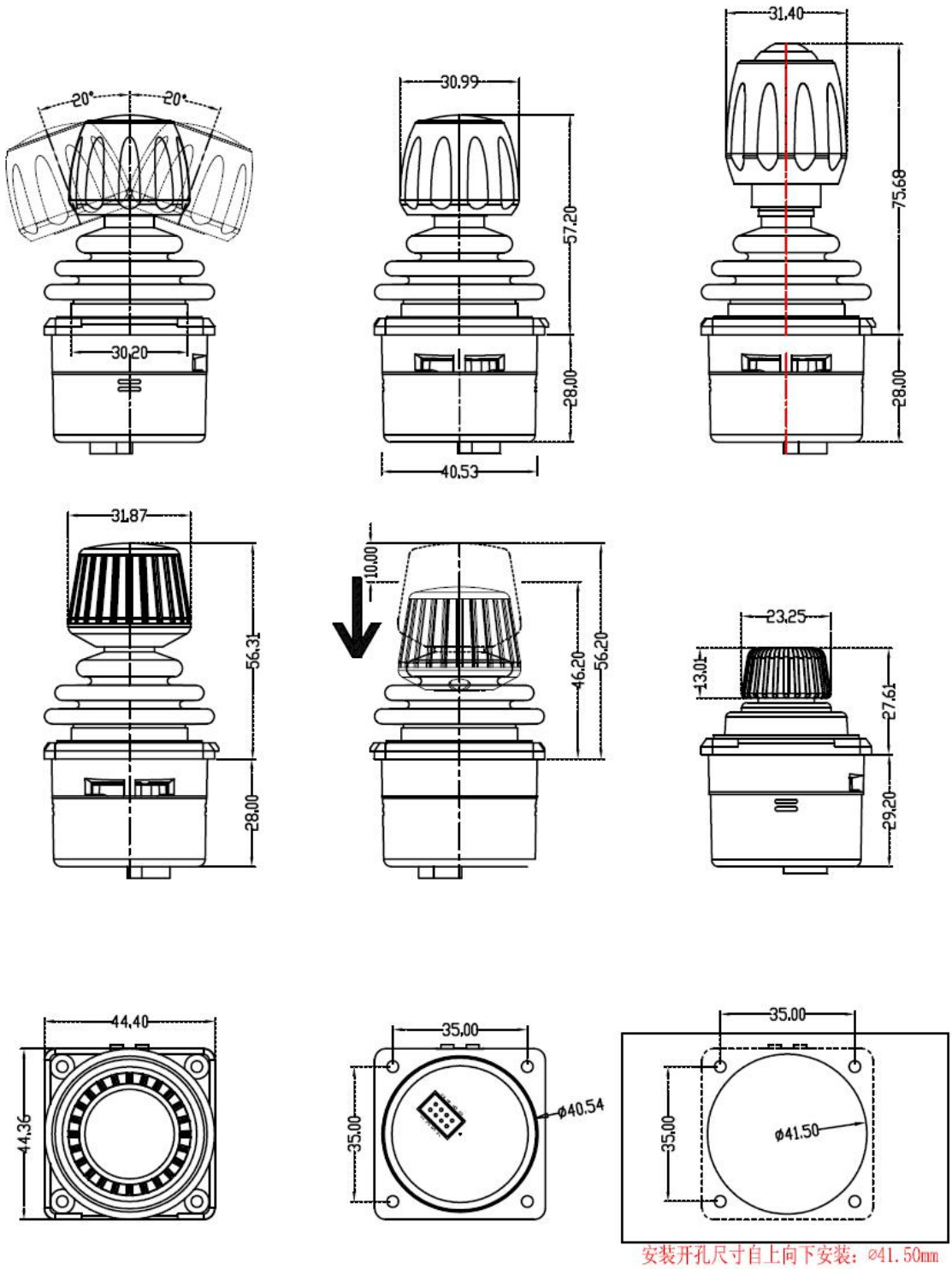
DIMENSION



Mounting hole size, mount from top to bottom

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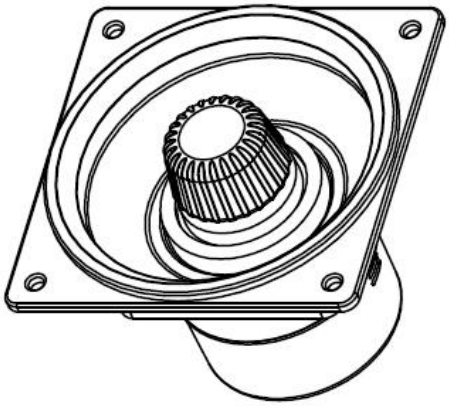

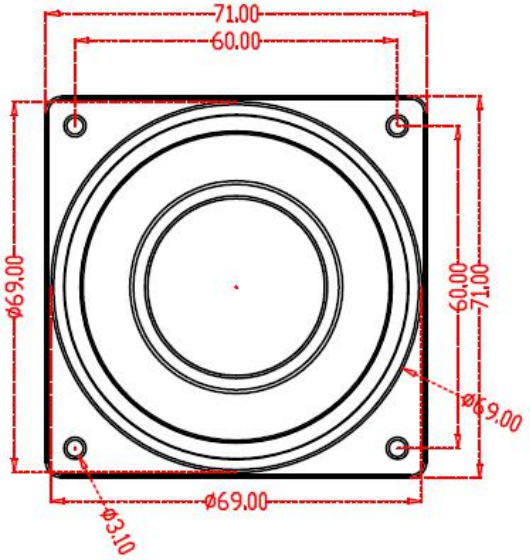

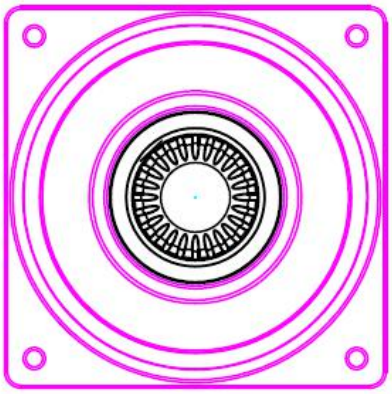

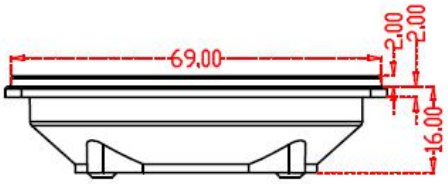

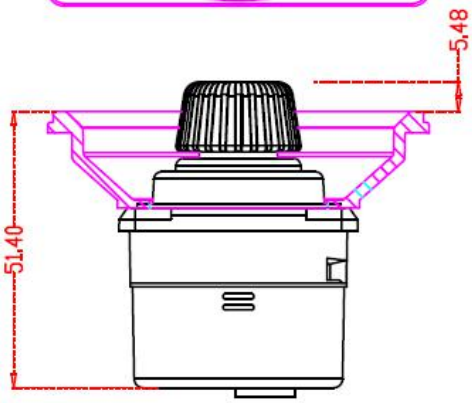

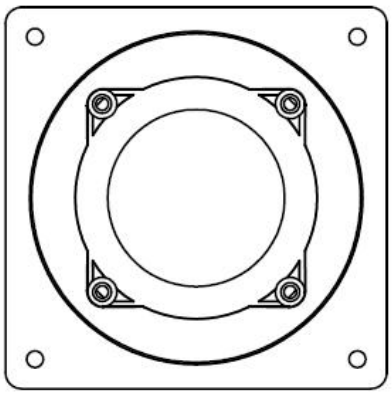

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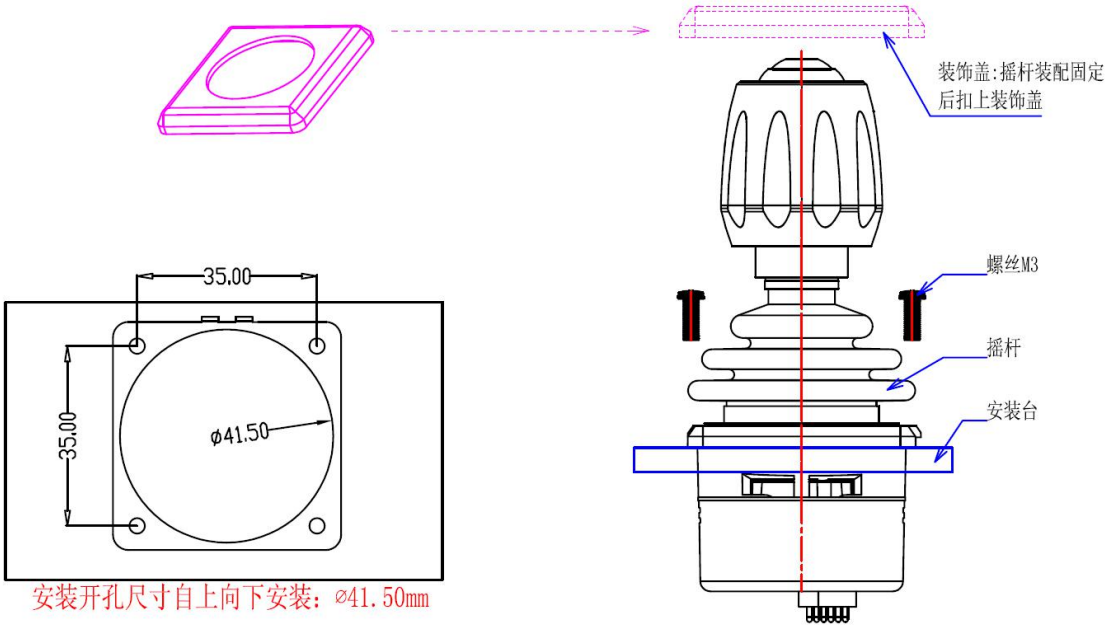
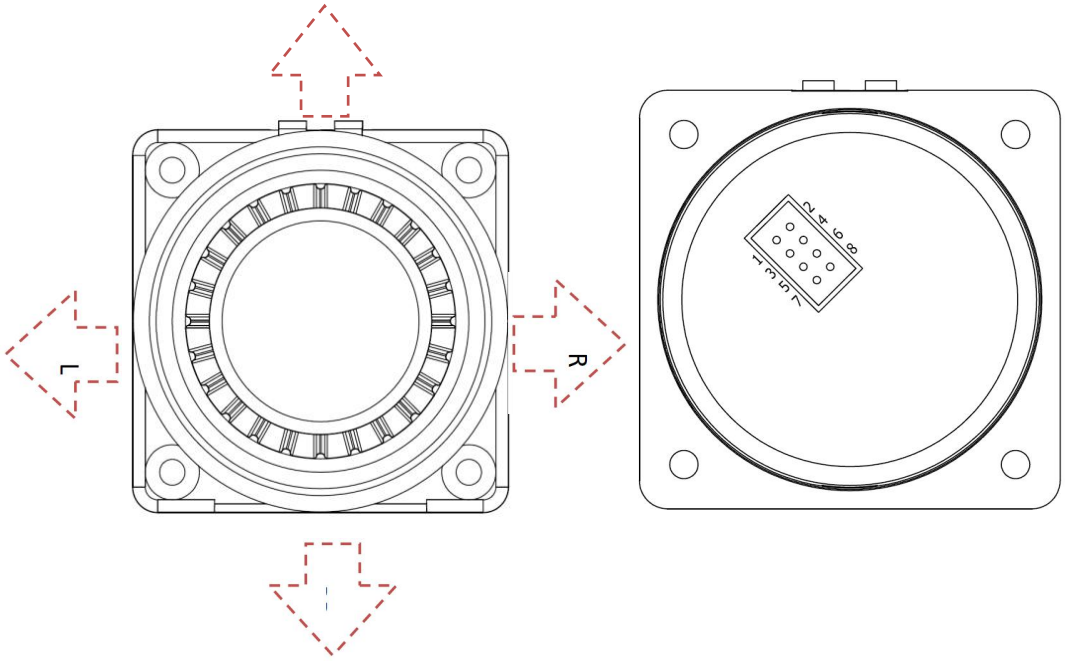
INSTALLATION DRAWING



Top view of joystick:



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WIRE LEADS

Lead length: 24 AWG,20cm (including Connector)
Terminal model: PHD2.0-8P

Pin definition of connector -(1,3 axes)analog voltage signal output:

Single sensor

Pin	Symbol	Color	Remark
1	V+	Red	Power +
2	Y	Green	Y Output
3	GND	Black	GND （Power -）
4	X	Yellow	X Output
5	B	White	Button (the 1st pin of button)
6	Cen	Brown	Central potential signal (not essential)
7	Z	Blue	Z Output
8	B	White	Button (the 2nd pin of button)

Pin definition of connector -(2 axes)analog voltage signal output:

Single sensor

Pin	Symbol	Color	Remark
1	V+	Red	Power +
2	X	Yellow	X Output
3	GND	Black	GND （Power -）
4	Y	Green	Y Output
5	B	White	Button (the 1st pin of button)
6	Cen	Brown	Central potential signal (not essential)
7	Z	Blue	Z Output
8	B	White	Button (the 2nd pin of button)

Pin definition of connector: -(2 axes redundant signal) analog voltage signal output:

Double Sensors

Pin	Symbol	Color	Remark
1	V+	Red	Power +
2	X1	Green	X Output 1
3	GND	Black	GND （Power -）
4	Y1	Yellow	Y Output 1
5	Y2	White	Y Output 2
6	Cen	Brown	Center reference (VCC/2)
7	X2	Blue	X Output 2
8	B	White	Button (connected to pins 1 and 8)

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Pin definition of connector -RS232 signal output:

Pin	Symbol	Color	Remark
1	V+	Red	Power +
2	RX	Yellow	RS232 Receive data (INPUT)
3	GND	Black	GND （Power -）
4	TX	Green	RS232 Transmit data(OUTPUT)
5	X		(Factory test X)
6	NC		Null
7	Y		(Factory test Y)
8	B		(Factory test Z)

Pin definition of connector -RS422 signal output:

Pin	Symbol	Color	Remark
1	V+	Red	Power +
2	RX+	Yellow	RS422 Receive data +
3	GND	Black	GND （Power -）
4	RX-	Green	RS422 Receive data -
	X		(Factory test X)
6	TX+	Blue	RS422 Transmit data +
7	Y		(Factory test Y)
8	TX-	White	RS422 Transmit data - / (factory test Z)

Pin definition of connector -RS485 signal output:

Pin	Symbol	Color	Remark
1	V+	Red	Power +
2			
3	GND	Black	GND （Power -）
4			
5	X		(factory test X)
6	RS485A+	Blue	RS485 data +
7	Y		(factory test Y)
8	RS485A-	White	RS485 data - / (factory test Z)

Pin definition of connector -CAN signal output:

Pin	Symbol	Color	Remark
1	V+	Red	PS+
2	TX	Green	RS232 data send (for parameter setting)
3	GND	Black	GND （Power -）
4	RX	Yellow	RS232 Receiver data (for parameter setting)
5	CAN-H	Blue	CAN signal high
6	Y		(factory test Y)
7	CAN-L	White	CAN signal low / (factory test Z)
8	X		(factory test Y)

Only red, black, blue and white leads and RS232 is used for CAAN communication parameter setting;

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Pin definition of connector -USB signal output:

Pin	Symbol	Color	Remark
1	Z		Test- Z (for factory test)
2	V+	Red	Power+
3	X		Test-X(for factory test)
4	D-	White	USB D-
5	Y		Test-Y(for factory test)
6	D+	Blue	USB D+
7	GND	Shielded	Shielded layer of USB wire
8	GND	Black	GND （Power -）

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CAN BUS COMMUNICATION

CAN2.0B

- ✧ Can ID : Extended Frames ID, Standard Frames ID (the user is allowed to change ID through the rs485 Port)
- ✧ Interval 5-200ms scheduled sending, 20ms by default (can be modified through rs485)
- ✧ baud rate：default=250K (change baud rate via RS485)

Data message format (HEX)

BYTE0	XXL X axis low	X axis data 0X0100～0X0800～0X0F00
BYTE1	XXH X axis high	
BYTE2	YYL Y axis low	Y axis data 0X0100～0X0800～0X0F00
BYTE3	YYH Y axis high	
BYTE4	ZZL Z axis low	Z axis data 0X0100～0X0800～0X0F00
BYTE5	ZZH Z axis high	
BYTE6	Button	Button
BYTE7	0XA5	Tail

XXL	XXH	YYL	YYH	0X00	0X00	Button	A5
X low	X high	Y low	Y high	0X00	0X00	Button	Tail

YYYY Y axis angle
XXXX X axis angle
ZZZZ Z axis angle
Button Button

E.g. 00 08 00 08 00 08 00 A5

X axis data

MAX Left MIN	Stop	MIN Right MAX
0X0100- -- -- 0X07ff	0800	0X0801- -- -- 0X0F00

Y axis data

MAX Lower MIN	Stop	MIN Upper MAX
0X0100- -- -- 0X07ff	0800	0X0801- -- -- 0X0F00

Z axis data

MAX WIDE MIN	Stop	MIN TELE MAX
0X0100- -- -- 0X07ff	0800	0X0801- -- -- 0X0F00

Button data

Bit7	Biy6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
0	0	Button	0	0000			

1: a button is pressed; 0: no button is pressed

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I. General protocol

(no address byte, applicable to RS232,RS422 and RS485) factory setting) ;

1. Joystick Transmit data (9 bytes joystick→PC) :

Baud rate: 9600.8.1.N

Data format (HEX)

0xFF	YYH	YYL	XXH	XXL	ZZH	ZZL	Button	CH
Head	Y high	Y low	X high	X low	Z high	Z low	button	checksum

YYYY Y axis angle

XXXX X axis angle

ZZZZ Z axis angle

BB joystick button

CH =XXH+XXL+YYH+YYL+ZZH+ZZL+Button (00-FF)

X axis data

MAX	Left	MIN	Stop	MIN	Right	MAX
0X0020-	--	-- 0X01ff	0x0200	0X0201-	--	-- 0X03E0

Y axis data

MAX	Lower	MIN	Stop	MIN	Upper	MAX
0X0020-	--	-- 0X01ff	0x0200	0X0201-	--	-- 0X03E0

Z axis data

MAX	WIDE	MIN	Stop	MIN	TELE	MAX
0X0020-	--	-- 0X01ff	0x0200	0X0201-	--	-- 0X03E0

Button data

Bit7	Biy6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
0	0	Joystick button	0	0000			

Joystick button =1: a button is pressed; 0: no button is pressed;

E.G. FF 02 00 02 00 03 FF 00 06

2. Data sent by joystick with address bite (10 bytes) (joystick→PC)

FF	Add	YYH	YYL	XXH	XXL	ZZH	ZZL	Button	CH
Head	Address	Y high	Y low	X high	X low	Z high	Z low	button	checksum

Add 0X01-0X40 is same with the address inquired

Others are same with the general protocol

CH =Add+XXH+XXL+YYH+YYL+ZZH+ZZL+Button (Low bytes of sum)

E.g. FF 01 02 00 02 00 02 00 00 07

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Communication parameter of Joystick setting

- ✧ Users can set and modify the communication parameters of the joystick (including CAN, RS232, RS422);
- ✧ All the above "parameters" can be modified only through RS422 or RS232 ports of the joystick, including CAN parameters.
- ✧ PC→joystick (RS422, RS485 or RS232) ,PC (serial debugging tool) software sends instructions to the joystick(RS422,RS485 or RS232).
- ✧ (If there is no serial debugging tool software, you can ask our technician for it.)
- ✧ If PC does not have COM port RS232 (DB9 9 pin head), you can use USB-RS232 converter (standard converter DB9 head, not TTL level converter)
- ✧ RS422, RS485 or RS232 communication interface on the joystick, default baud rate 9600.8.1.N

I. Basic parameter settings

(1). ACK Confirmation (joystick-PC)

AA 55 AF

It indicates that the joystick successfully receives instructions and executes them.

(2). Setting the joystick ID;

ID is the Address in RS232/RS422 or CANopen communication protocol (PC-> joystick)

Format

0xaf	0x0d	00	00	00	Address	0xf5
Head	Command	Data1	Data 2	Data 3	Data 4	End

Add=0x01～0x7F address:1-127

Add=0x00 Null

E.g.

Setting ID=1: af 0d 00 00 00 01 f5 (HEX)

Setting ID=2: af 0d 00 00 00 02 f5 (HEX)

The Joystick return ACK

(3)、Reset Joystick (PC->Joystick)

0xaf	0x15	00	00	00	Add	0xf5
Head	Command	Data1	Data 2	Data 3	Data 4	End

Add=0x01～0x7f

（If the ADD has the same address as the joystick, it can reset the joystick.）

Add=0x00 Reset all joysticks

Add out of range (0-0x7f) invalid

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E.g.

Reset all joysticks: af 15 00 00 00 00 f5 (HEX)
Reset joysticks(ID=1): af 15 00 00 00 01 f5 (HEX)
Reset joysticks(ID=2): af 15 00 00 00 02 f5 (HEX)

(4). Setting the center position of the joystick

(Setting Joystick centered position) (PC - > joystick)

It has set up this feature when the factory. Users can ignore the instructions.

0xaf	0x09	00	00	00	00	0xf5
Head	Command	Data1	Data 2	Data 3	Data 4	End

Joystick receiving this data, it's current location as a center point

E.g. af 09 00 00 00 00 f5 (HEX)

(5). Communication port selection: (PC - > joystick)

Communication ports RS232/RS422/CAN one of them

(The factory has chosen this port)

0xaf	0x05	XX	00	00	00	0xf5
Head	Command	Data1	Data 2	Data 3	Data 4	End

XX=00 CAN Port;
XX=01 RS232 Port;
XX=02 RS422 Port;
XX=03 RS485 Port;（RS232/422/485 Protocol）
XX=04 RS485 Port Modbus RTU Protocol;

E.g. af 05 00 00 00 00 f5 (HEX) CAN
af 05 01 00 00 00 f5 (HEX) RS232
af 05 02 00 00 00 f5 (HEX) RS422
af 05 03 00 00 00 f5 (HEX) RS485
af 05 04 00 00 00 f5 (HEX) RS485 Modbus RTU

(6).Refresh Rate Settings (PC - > joystick)

Refresh rate = the cycle time of sending 1 frame of data, such as setting 20 ms (sending 1 frame of data to the host every 20MS)

Format:

0xaf	0x11	00	00	00	Ref	0xf5
Head	Command	Data1	Data 2	Data 3	Data 4	End

Ref =0x0A～0x64 (5-100)ms, The unit is "milliseconds"
(Default: 20ms)

Setting this parameter will take effect after reset or restart.

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E.g. Set refresh rate = 20MS (send one frame per 20MS, send 50 times per second)

20MS af 11 00 00 00 14 f5 (HEX)
25MS af 11 00 00 00 19 f5 (HEX)
33MS af 11 00 00 00 21 f5 (HEX)
50MS af 11 00 00 00 32 f5 (HEX)

The joystick receives this instruction→ returns ACK→resets the joystick
Note: If the baud rate is low, the frame interval time will be longer
Default refresh rate 20ms

(7).Communication mode(Including CAN and RS232/422)

Master mode: automatic transmission on time
Slave mode: master query, slave return data
The factory has been set up and stored permanently.
Format:

0xaf	0x08	00	00	00	Mode	0xf5
Head	Command	Data1	Data 2	Data 3	Data 4	End

Mode=00 Master (Timely Send)
Mode=01 Slave

E.g. (PC->Joystick)
Master mode: af 08 00 00 00 00 f5 (HEX)
Slave mode: af 08 00 00 00 01 f5 (HEX)
Joystick return ACK（AA 55 AF ）(joystick->PC)

(8). Setting Number of axis of joystick: (PC-> joystick) only set by manufacturer
The factory has been set up and the user does not need:

0xaf	0x0c	axis	00	00	00	0xf5
Head	Command	Data1	Data 2	Data 3	Data 4	End

axis=0 :1 axis
axis=1 :2 axis
axis=2 :3 axis

E.g. (PC->Joystick)
2 axis: af 0c 00 00 00 00 f5 (HEX)
3 axis: af 0c 01 00 00 00 f5 (HEX)
4 axis: af 0c 02 00 00 00 f5 (HEX)

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2. Set Communication parameter of RS232,RS422 and RS485

(10). Set the baud rates of RS232, RS422 and RS485 (PC - > joystick)

The RS232 and RS422 baud rates are the same, and the settings are valid at the same time.

0xaf	0x0b	00	00	00	Baud	0xf5
Head	Command	Data1	Data 2	Data 3	Data 4	End

Baud=0X00 Baud rate=9600 Default
Baud=0X01 Baud rate =19200
Baud=0X02 Baud rate =57600
Baud=0X03 Baud rate =115200
Baud=0X04 Baud rate =2400
Baud=0X05 Baud rate =4800

E.g. (PC->Joystick)

Baud rate =9600 af 0b 00 00 00 00 f5 (HEX) Default
Baud rate =19200 af 0b 00 00 00 01 f5 (HEX)
Baud rate =57600 af 0b 00 00 00 02 f5 (HEX)
Baud rate =115200 af 0b 00 00 00 03 f5 (HEX)
Baud rate =2400 af 0b 00 00 00 04 f5 (HEX)
Baud rate =4800 af 0b 00 00 00 05 f5 (HEX)
Joystick return ACK（AA 55 AF ）(joystick->PC)

(11). Inquire the position of the joystick (PC - > joystick)

This instruction is valid only when "slave mode"

When the joystick does not receive the inquiry instruction, it does not send data, and when it receives the inquiry instruction, the joystick returns a frame of data.

0xaf	0x07	00	00	00	Addr	0xf5
Head	Command	Data1	Data 2	Data 3	Data 4	End

- Add = 0x01-0x7f
  (PC->joystick) af 07 00 00 00 01 f5 (HEX)
  (josytick->PC) FF 01 08 00 70 00 00 00 00 00 79

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3. Parameter Setting of Remote Control Camera

(12).Set the address of the camera (PC - > joystick)

0xaf	0x0f	Cam	00	00	00	0xf5
Head	Command	Data1	Data 2	Data 3	Data 4	End

Cam=0x00-0x7f

E.g. (PC->Joystick)
Camera ID=01: af 0f 01 00 00 00 f5
Camera ID=02: af 0f 02 00 00 00 f5

(13). Setting up communication protocol (only for RS232. RS422, RS485)
(PC - > joystick)

0xaf	0x0e	Pro	00	00	00	0xf5
Head	Command	Data1	Data 2	Data 3	Data 4	End

Pro =0X00 Standard 9 bytes/10 bytes or Modbus protocol
Pro =0X01 Camera remote control protocol PELCO-D
Pro =0X02 Camera remote control protocol PELCO-P

Standard Protocol: af 0e 00 00 00 00 f5 (HEX) Default
Pelco-D Protocol: af 0e 01 00 00 00 f5 (HEX)
Pelco-P Protocol: af 0e 02 00 00 00 f5 (HEX)

3. The parameter setting of CAN communication:
It is set by RS232 or RS422 port.

(14). Set CAN port baud rate: (PC->joystick)

0xaf	0x06	XX	00	00	00	0xf5
Head	Command	Data1	Data 2	Data 3	Data 4	End

XX=00 125K
XX=01 250K (default)
XX=02 500K
XX=03 1000K

E.g. af 06 00 00 00 00 f5 (HEX) CAN baud rate=125K
af 06 01 00 00 00 f5 (HEX) CAN baud rate=250K (default)
af 06 02 00 00 00 f5 (HEX) CAN baud rate=500K
af 06 03 00 00 00 f5 (HEX) CAN baud rate=1000K

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(15).CAN protocol settings: (PC - > joystick)

The protocol defines the rules of CAN ID, and Data frames have no effect.

0xaf	0x0a	00	00	00	SS	0xf5
Head	Command	Data1	Data 2	Data 3	Data 4	End

SS = 00 Standard protocol, ID = setting ID (see (11) joystick sending node ID setting)
SS = 01 CANopen protocol ID = 180 + ID (see (2) Setting the joystick ID address)
The factory has been set up.

E.g. af 0a 00 00 00 00 f5 (HEX) Can Standard protocol,
af 0a 00 00 00 01 f5 (HEX) CANopen Protocol

(16). Set the sending node ID of the joystick: (PC - > joystick)
It only applies to CAN Standard Protocol, but CANopen Protocol does not.

0xaf	0x01	D1	D2	D3	D4	0xf5
Head	Command	Data1	Data 2	Data 3	Data 4	End

D1.7=0 29 bits extended frame
D1.7=1 11 bits standard frame

- 29 bits extended frame: data range 0X0-0X0FFFFFFF, D1-D4 are corresponding to node identifications

E.g. Set the joystick's ID= identification-extended frame "0X00F0F101"
af 01 00 f0 f1 01 f5 (HEX)

- 11 bits standard frame: data range 0X000-0X3FF,D3-D4 are corresponding to node identifications

E.g. Set the joystick's ID= identification- standard frame "0X1E1"
af 01 80 00 01 E1 f5 (HEX)

(17). Set the ID of the joystick to receive data: (PC - > joystick)
It is only used for "standard protocols" and CANopen protocol is not used.

0xaf	0x02	D1	D2	D3	D4	0xf5
Head	Command	Data1	Data 2	Data 3	Data 4	End

D1.7=0 29 bits extended frame
D1.7=1 11 bits standard frame

- 29 bits extended frame: data range 0X0-0X0FFFFFFF, D1-D4 are identification code(HEX)

E.g. Set the receiving node identification code-extended frame "0X00F0F101"
af 02 00 f0 f1 01 f5 (HEX)

- 11 bits standard frame: data range 0X000-0X3FF,D3-D4 are identification code(HEX);

E.g. Set the receiving node identification code- standard frame "0X1E1"
af 02 80 00 01 E1 f5 (HEX)

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(18). Set the shielded node identification of joystick (PC->joystick)

0xaf	0x03	D1	D2	D3	D4	0xf5
Head	Command	Data1	Data 2	Data 3	Data 4	End

D1.7=0 29 bits of extended frame
D1.7=1 11 bits of standard frame

- 29 bits extended frame: data range 0X0-0X0FFFFFFF, D1-D4 are corresponding to node identification code;

E.g. Set the shielded node identification code-extended frame "0X00002201"
af 03 00 00 22 01 f5 (HEX)

- 11 bits standard frame: data range 0X000-0X3FF,D3-D4 are corresponding to node identification code;

E.g. Set the shielded node identification code-standard frame "0X122"
af 03 80 00 01 22 f5 (HEX)

4.Setting the communication parameters of Modbus RTU (RS485):

(19). Setting "Device Address": Default 1
Reference to "I,(2), Setting the ID Address of the joystick"

(20). Operating mode of joystick (PC-> joystick):
Reference to "I, (7), Communication Mode"
When in master mode, the joystick receives the correct "host reads data" instruction (01 03 40 01 00 04 0009), and the working mode is automatically changed to slave mode, but after restarting the joystick, it restores the master mode.

(21). Set the register address (PC - > joystick):
Data format:

0xaf	0x18	D1	D2	D3	D4	0xf5
Head	Command	Data1	Data 2	Data 3	Data 4	End

D1: Register address high byte
D2: Low byte register address
D3 and D4 = constant 0x00
Factory default register address = 0x4001
Permanent storage in joystick after installation

For example;
set the register address = 0x4001 (hexadecimal), if the octal to hexadecimal.
ID=0X4001 af 18 40 01 00 00 f5
After setting up a successful function, the joystick returns a "Reader Code" (with CRC Check) for testing.
01 03 40 01 00 04 00 09

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Testing:

(PC Sent) 01 03 40 01 00 04 00 09

(Joystick return)**01 03 08 00 00 02 00 02 00 02 00 94 ED**

USB interface

USB HID Protocol

USB 2.0 HID human-machine interface protocol standard

Microsoft operation system is supported, driving free; directX is supported, for related routine, inquire "joystick directx input" online;

I. Data format (7-byte HEX):

Angle of 3-axis joystick and keyboard status data sent by USB keyboard

byte1	byte2	byte3	byte4	byte5	byte6	byte7
XXL	XXH	YYL	YYH	ZZL	ZZH	BB1

XXXX: X axis data, 0000-03FF,(BYTE2 data is high, BYTE1 data is low)

0X0000-0X01FE LEFT

0X0200 Stop

0X0200-0X03FF RIGHT

YYYY: Y axis data, 0000-03FF,(BYTE4 data is high,BYTE3 data is low)

0X0000-0X01FE LOWER

0X0200 Stop

0X0200-0X03FF UPPER

ZZZZ: Z axis data, 0000-03FF,(BYTE6 data is high,BYTE5data is low)

0X0000-0X01FE anticlockwise (wide)

0X0200 Stop

0X0200-0X03FF clockwise (tele)

BB1: the first group of buttons

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Button 8	Button 7	Button 6	Button 5	Button 4	Button 3	Button 2	Button 1

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The joysticks are USB 2.0 HID compliant"game controllers",these utilize the DirectX API and are "plug-and-play"in MS Windows.

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