

**KENT  
USA**

Since 1979

**WSi-200**  
**Wire Cut EDM**  
*Operation Manual*



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# KENT USA

## WIRE CUT MAINTENANCE MANUAL

### WSi-200

*WI* SERIES

Address: 1231 EDINGER AVE., TUSTIN, CA 92780 U.S.A.

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- FLUSHING WATER\_SYSTEM :
- Fig.16----- FIG16-WATER\_SYSTEM1: wire diagram 1 of water system  
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Fig.18----- FIG18-WATER\_SYSTEM3: wire diagram 3 of water system
- SUBMERGE WATER\_SYSTEM :
- Fig.16----- FIG16-WATER\_SYSTEM4: wire diagram 4 of water system  
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# Brief Introduction

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# 1 BRIEF INTRODUCTION

Wire EDM service manual consists of following items:

- (1) Define and describe each part of the system structure.
- (2) Explain the function of each part of the system structure.
- (3) Troubles with the system structure and the troubleshooting

Using this manual requires following basic knowledge -

- (1) Very familiar with the operation of this wire EDM.
- (2) With basic concepts on basic electricity and computer related knowledge.
- (3) With rough idea about mechanical structure.
- (4) Know how to use a multimeter.

## 1.1 HINTS FOR SERVICE

This service manual uses following symbols -

Symbols	DESCRIPTIONS
⚡ <b>Warning</b>	Improper measuring may cause danger to the service men.
! <b>Note</b>	Error wiring or incorrect installation with electronic /mechanical components may cause damage to the machine.
✍ <b>Hint</b>	Provide useful information for service.

### ⚡ **Warning**

1. A service man always inspects the machine while the machine is switched on. It is very easy to cause shock danger if he is slightly careless.
2. For inspecting the machine while the machine is working, do not touch the cutting wire because the cutting wire has a very high voltage. Touching it may cause electric shock.
3. For inspecting mechanical structure, if any part of the machine is moved for inspecting convenience, do not stretch hands into the machine structure, or the hands may be jammed.

### ! **Note**

- \* Please keep one backup file of system parameter setting. For service, if the system parameter must be altered, please backup one file containing this parameter setting. After altering the parameter, if the machine still can't work well, you can restore the original parameter.

**Hint****\* Parameter**

Please set a parameter required for operation. If you set an error parameter, it may cause the machine to work improperly or unable to work. A parameter is a very important data for a machine.

**\* Backup**

A backup file of parameter is a necessary auxiliary tool. The backups mentioned in this service manual refer to the backups of parameters. A disk with backup data is called backup disk.

**1.2 Necessary tools for service**

(1) Multi-meter: It is often used for repairing wire EDM. There are digital type meter (suggested) and needle type meter.

Basic functions required for a meter -

- ① Be able to measure ACV 0~750V
- ② Be able to measure DCV 0~250V
- ③ Be able to measure  $\Omega$  file 0~1M $\Omega$



- (2) Screwdriver: It is a necessary tool to remove screws or connect circuit terminals.



- (3) Solder iron and solder tin: They are used to solder the circuit and slip-off electronic components.



- (4) Hex wrench and adjustable wrench: They are used to remove the mechanical parts and the shape-forming plates.



- (5) Long nose pliers and side cutting pliers: They are used to strip or cut the power cords.



### 1.3 Example of service

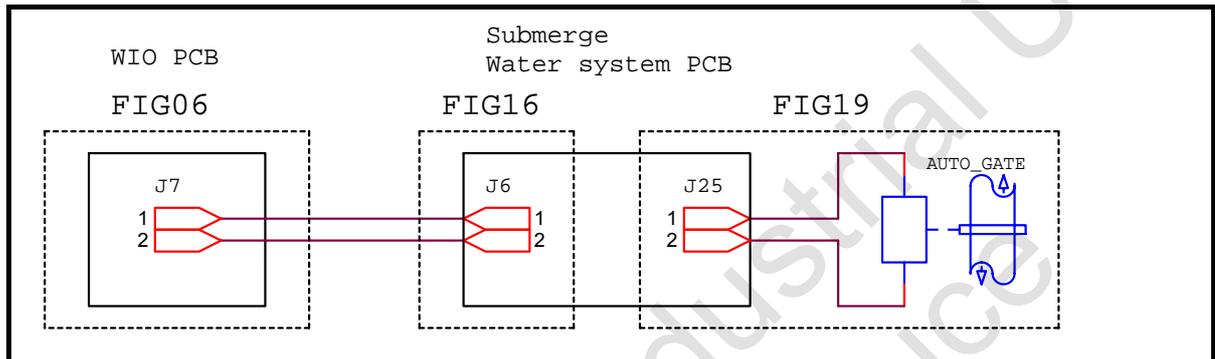
When the machine works abnormally, you may follow the instructions of this service manual to shoot the troubles.

For example, if the manual threading action cannot be started, you'll find "manual threading function invalid" shown in § 6.5 of Catalogue of Service Examples. It reads as follows -

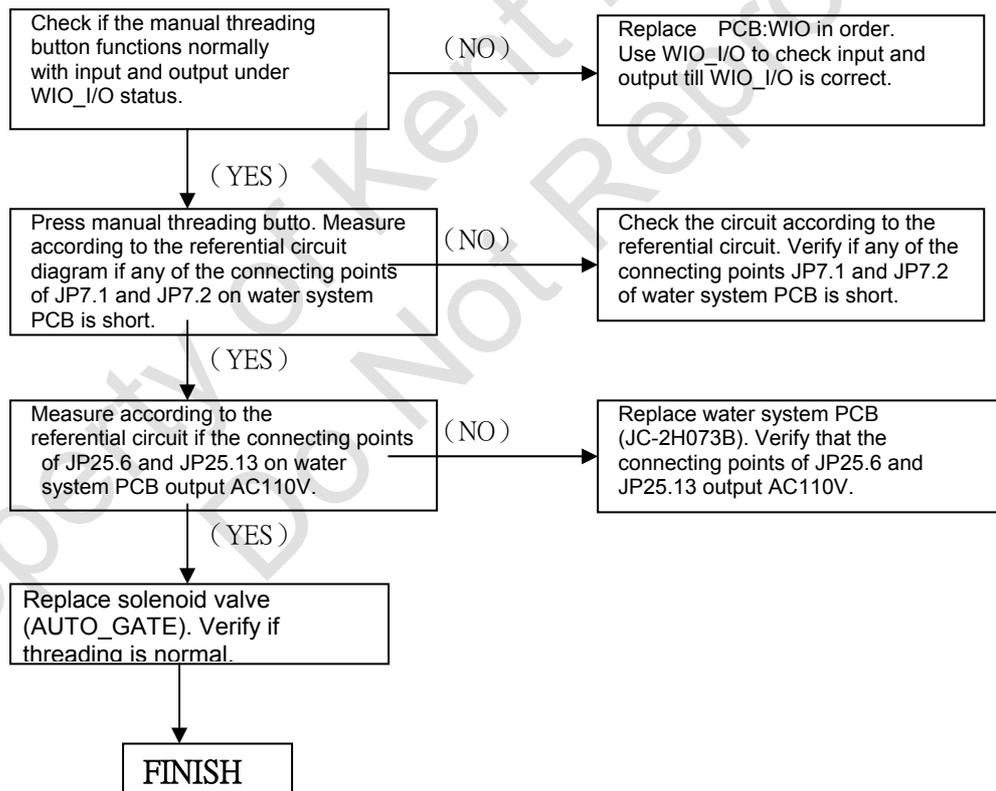
Manual threading function is invalid while high pressure PUMP works normally.

※ If high pressure PUMP is abnormal, refer you to the chapter of Inspection Steps on high pressure PUMP.

### Referential Circuit



### Inspection Steps



※ After above steps, if the machine still can't feed thread, please check if the thread winding system is normal. Then, check if the thread feeding mechanism inside the machine works normally.

The referential circuit diagram of above components is explained as follows -

FIG12-CONNTCTOR: The connector circuit of the side plate of the electric control box.

FIG19-WATER\_SYSTEM7: Circuit 7 of water system

## (2) Circuit Diagrams

- ① FIG01-CONTROLLER: Wiring diagram of controller
- ③ FIG03-TRANSFORMER: wiring diagram of transformer
- ④ FIG04-CIRCUIT\_PANEL: wiring diagram of auto control panel
- ⑤ FIG05-WCUT\_AWT: wiring diagram of auto threading (cut and pull) PCB
- ⑥ FIG06-WIO: wiring diagram of WIO PCB
- ⑦ FIG07-UPS,MOTION: wiring diagram of UPS - MOTION
- ⑧ FIG08-SWITCH POWER1: wiring diagram 1 of power supply unit
- ⑨ FIG09-SWITCH POWER2: wiring diagram 2 of power supply unit
- ⑩ FIG10-DRIVER: wiring diagram of motor driver
- ⑪ FIG11-EDM POWER: wiring diagram of electric discharge crystal box
- ⑫ FIG12-CONNECTOR: wiring diagram of the connector for the side plate of the electric control box
- ⑬ FIG13-FAN&MAIN\_SWITCH: wiring diagram of electric fan and main power switch
- ⑭ FIG14-MACHINE\_CIRCUIT1: wiring diagram 1 of the machine
- ⑮ FIG15-MACHINE\_CIRCUIT2: wiring diagram 2 of the machine

## FLUSHING WATER\_SYSTEM :

- ⑯ FIG16- WATER\_SYSTEM4: wiring diagram 1 of water system
- ⑰ FIG17- WATER\_SYSTEM5: wiring diagram 2 of water system
- ⑱ FIG18- WATER\_SYSTEM6: wiring diagram 3 of water system

## SUBMERGE WATER\_SYSTEM :

- ⑯ FIG16- WATER\_SYSTEM4: wiring diagram 4 of water system
- ⑰ FIG17- WATER\_SYSTEM5: wiring diagram 5 of water system
- ⑱ FIG18- WATER\_SYSTEM6: wiring diagram 6 of water system
- ⑲ FIG19- WATER\_SYSTEM7: wiring diagram 7 of water system

# Freamwork of Wire EDM

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## 2 FRAMEWORK OF WIRE EDM

### 2.1 FRAMEWORK OF THE SYSTEM

Different from the traditional DOS System, WINDOWS XP Embedded (XPe) processing system developed by JSEDM provides multiple functions and modeling platform. In addition, the system can be reliable based on the high process efficiency.

The controller platform is a 32-bit industrial computer with a touch screen. It has functions of data processing, NC program simulation, movement control, Signal logic processing and Discharge power control and etc.

Our system utilized AC based servo motor as six axis control. Variable frequency drive can be one of the options to control the water system. For the wire system, it controls the speed and tension of the wire. The EDM system structure is shown below in figure 2.1.

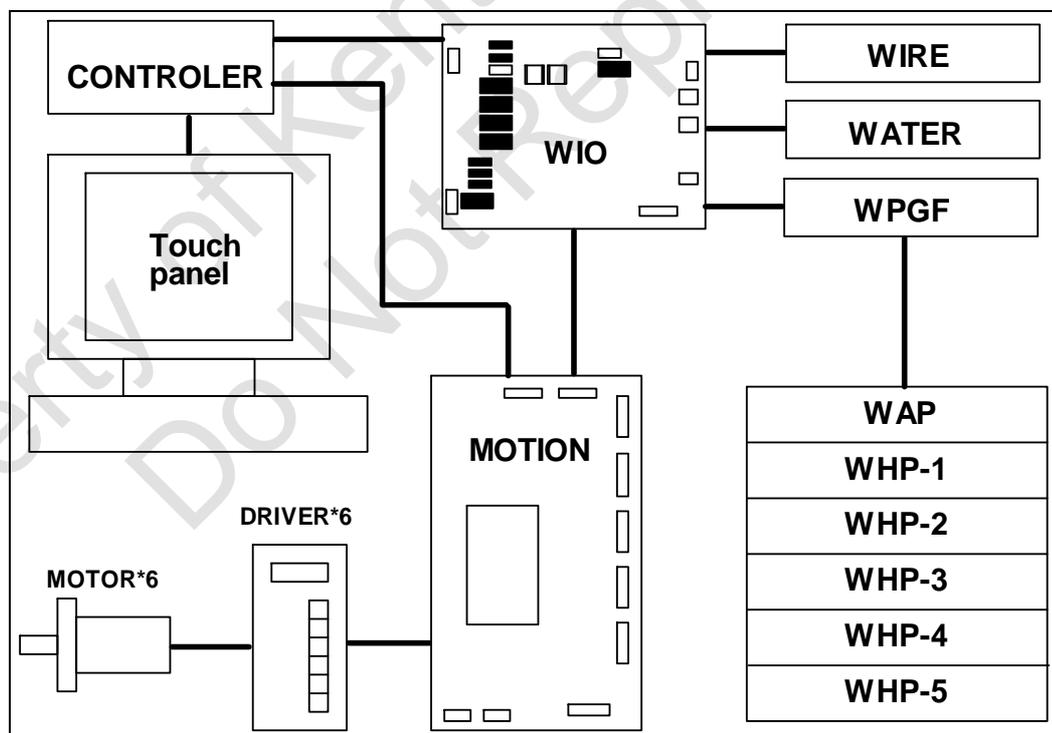


Fig. 2.1 WIN System Framework of Wire EDM

The machine, water system and wire system framework are as the following Fig. 2.2 shown.

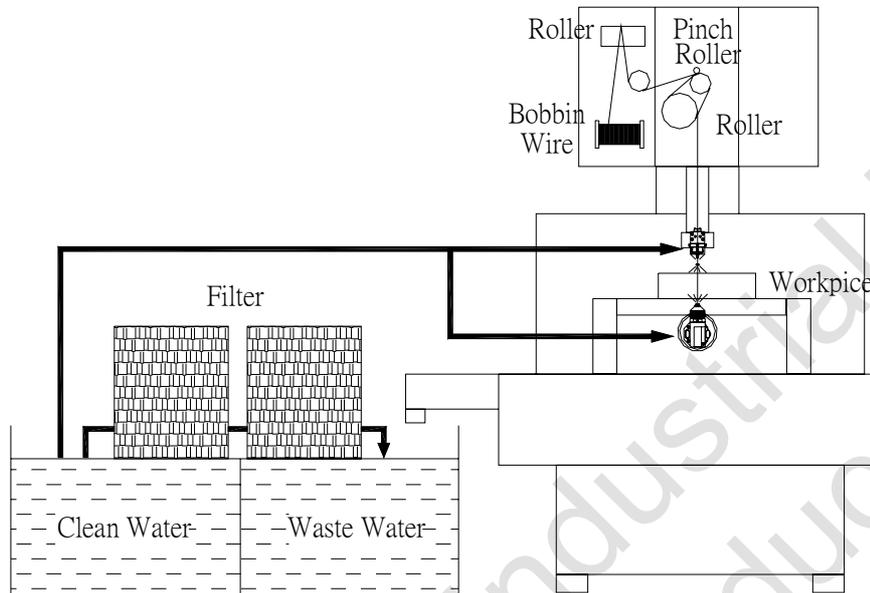


Fig. 2.2 machine, water system and wire system framework

### 2.1.1 CONTROL SYSTEM

#### MOTIONboard

MOTION Board is a control card that is developed for the CNC controlling system. The control card controls all the motion of the CNC machine which contains six axis motional server control. To learn more, please refer to Chapter 3 Motion board.

#### WIO Board

WIO provides a unique in/output function and server signal conversion and transmission. To learn more please refer to Chapter 3 WIO.

#### WPGF Board

This product detects and controls the shape of the electronic wave and then adjust the Discharge parameter based on the detecting result. To learn more please refer to Chapter 3, WPGF Board.

## 2.1.2 SYSTEM OF SPARKLE

Fig. 2.3 illustrates the framework of sparkle of wire EDM. This system consists of 3 sets of AC power. The 1<sup>st</sup> AC power called LOW POWER provides the energy required by gap ignition. The 2<sup>nd</sup> set AC power called HIGH POWER provides discharge energy. The 3<sup>rd</sup> set AC power is a protective power for MOSFET of HIGH POWER.

The system of sparkle consists of 6 circuit boards - 1 WPGF board, 1 WAP board and 5WHP boards(WI-20 type 4WHP boards) . WPGF board detects and controls the discharge status. WAP board induces the gap to discharge, and uses Power Sink circuit to protect MOSFET of WHP board. WHP board functions to switch high power and high current, and provides the energy required by discharge processing.

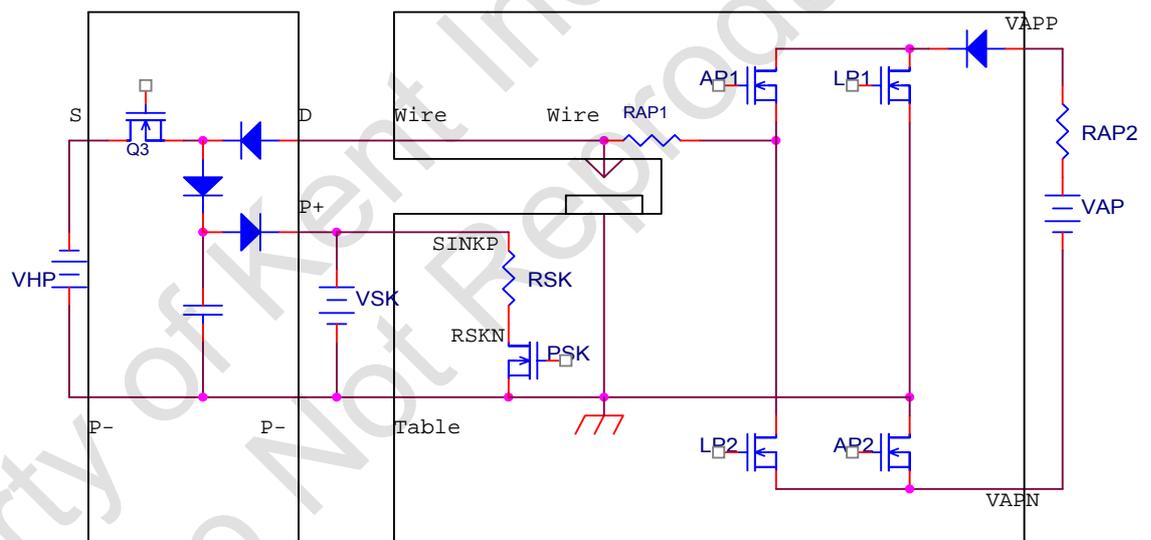


Fig. 2.3 Circuit of discharge framework

In main discharge circuit, except MOSFET of WHP board. there are no other elements in parallel on the circuit. In other words, when MOSFET is ON, almost the whole circuit is under “SHORT” status. At this time only the stray inductance on the circuit can limit the discharge current. In order to get a higher instant current, it is necessary to lower the wiring inductance as much as possible by means of - (1) Increase the number of wiring in parallel, (2) Use co-axial wire to eliminate mutual induction between conducting wires.

For further details on WPGF, WAP and WHP boards, refer you to Chapter 3 “Usage”.

## 2.2 Parts and Part numbers of Wire EDM

Wire EDM is mainly composed of electric control box, machine frame and water system. The above mentioned controls and the servo system are one portion of the electric control box, while wire system is a small portion of the machine structure. This paragraph will introduce each structure, the name and the part number of each small part and each position. Figure 2.4 illustrates the part numbers of 3 major parts of the Wire EDM.

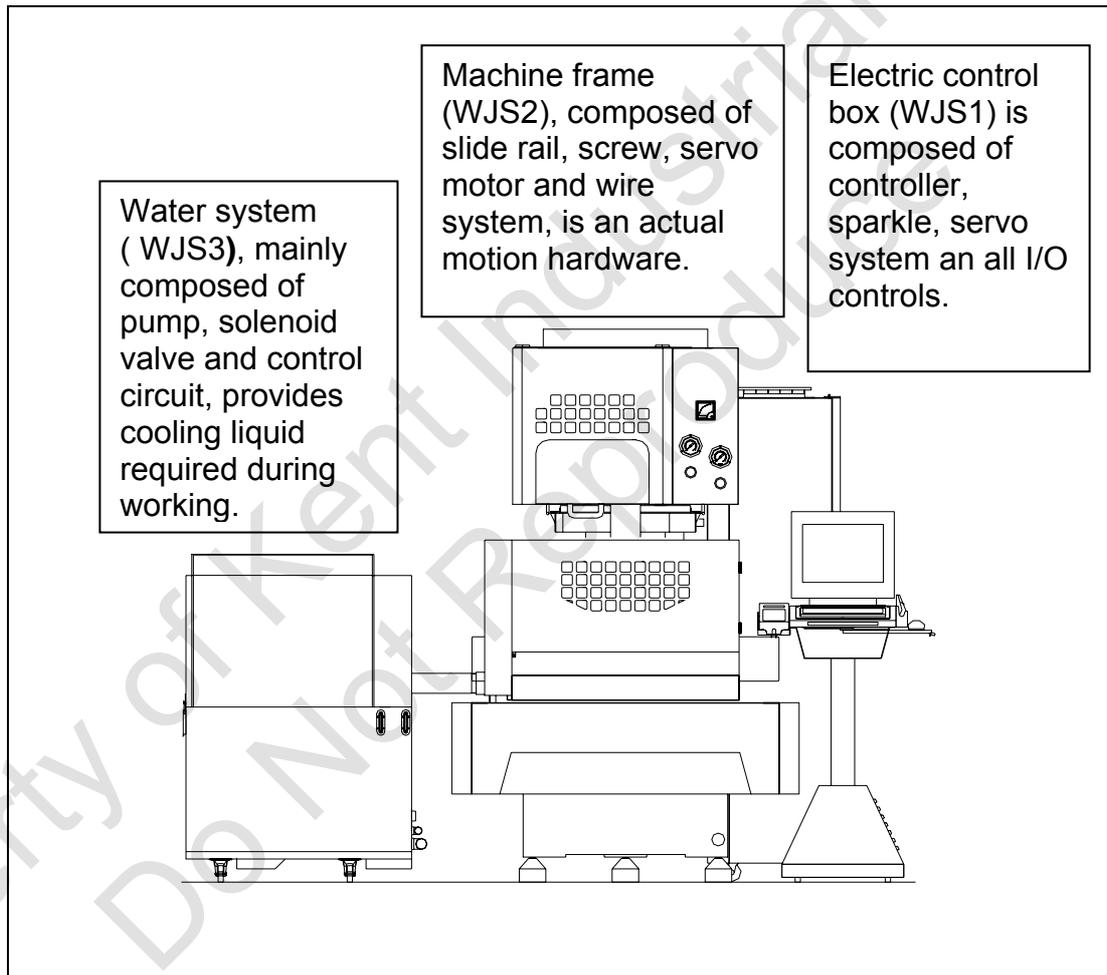
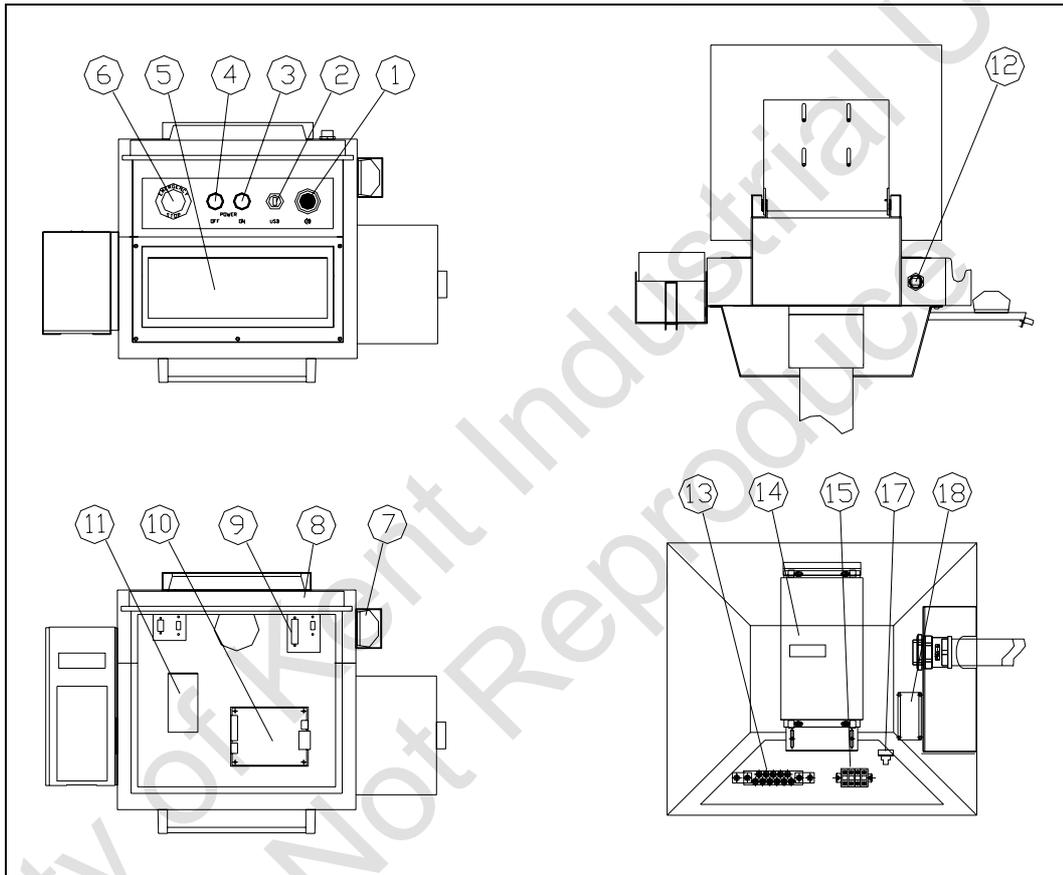


Fig. 2.4 The position of each part of the Wire EDM

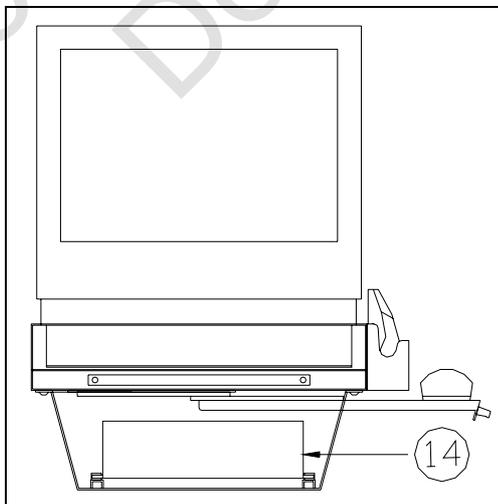
2.2.1 WI Electronic control box, WJS1 parts, Number, Location

In addition to the control system and the discharge system, the electric control box consists of power supply system and the distribution board .

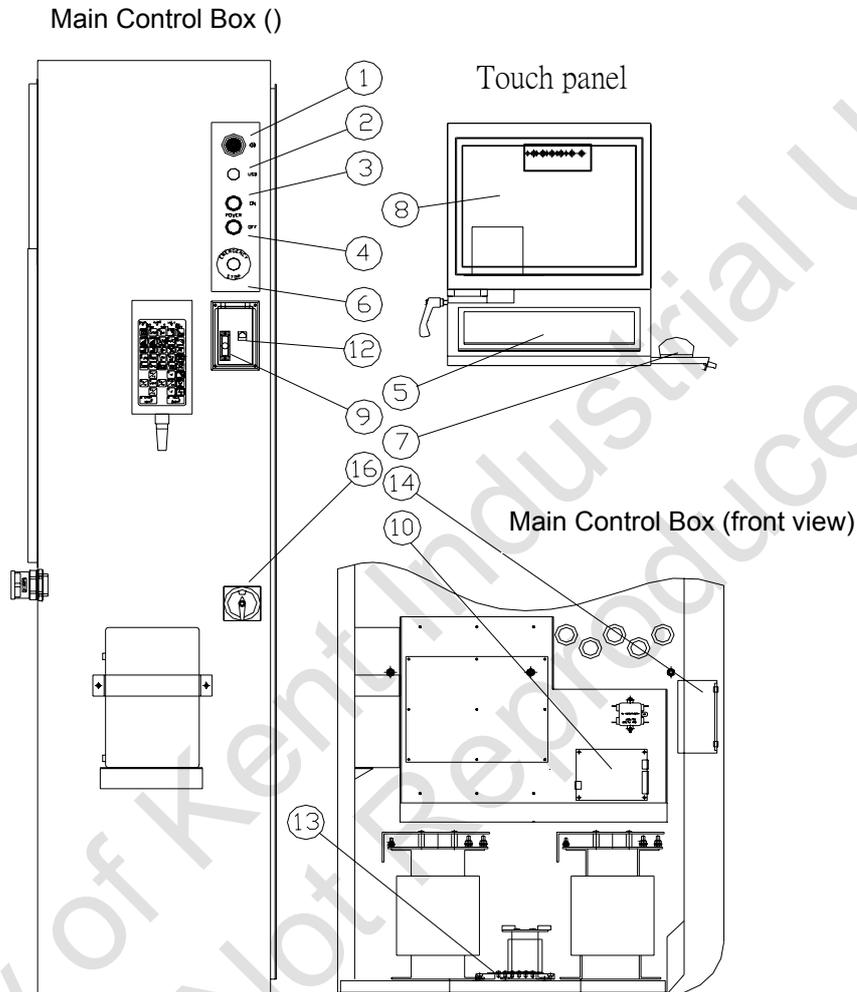
A. Part of Controller Platform location (Floor standing)



A-1. Part of Controller Platform location (Lower arm)



## A-2. Part of Controller Platform location (WI-200 USED)



**PART (I) : Referential circuit drawing FIG01-CONTROLLER&LCD FIG013-FAN&MAIN SWITCH(WI-200)- consists of following parts -**

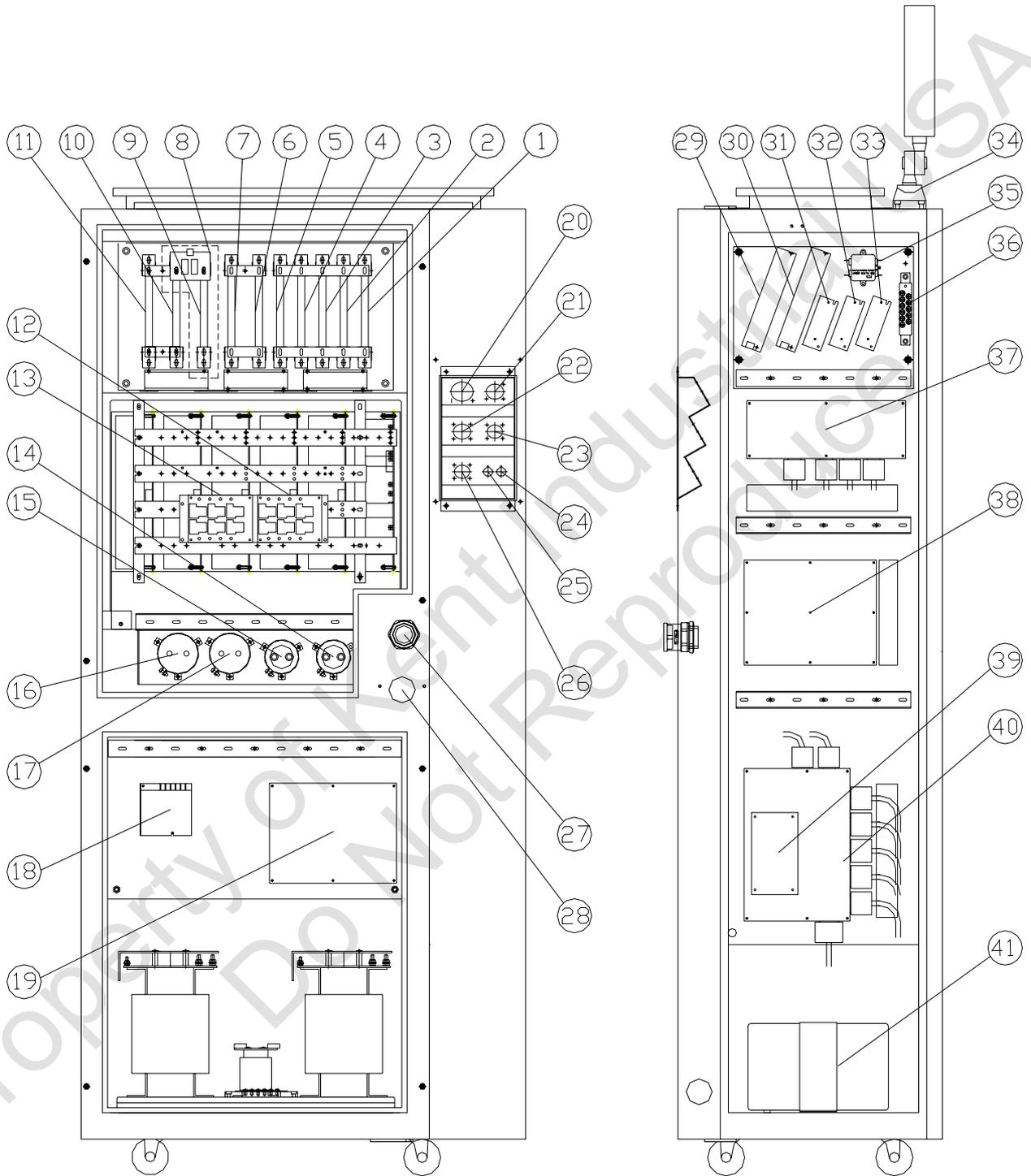
- ① ALARM\_BUZZER: buzzer (DC24V)
- ② USB-ADAPTER2 : USB port
- ③ ON\_SW: Power ON button
- ④ OFF\_SW: Power OFF button
- ⑤ KEYBOARD : KEYBOARD ◦
- ⑥ E-STOP\_SW: emergency stop button ◦
- ⑦ MOUSE : MOUSE ◦

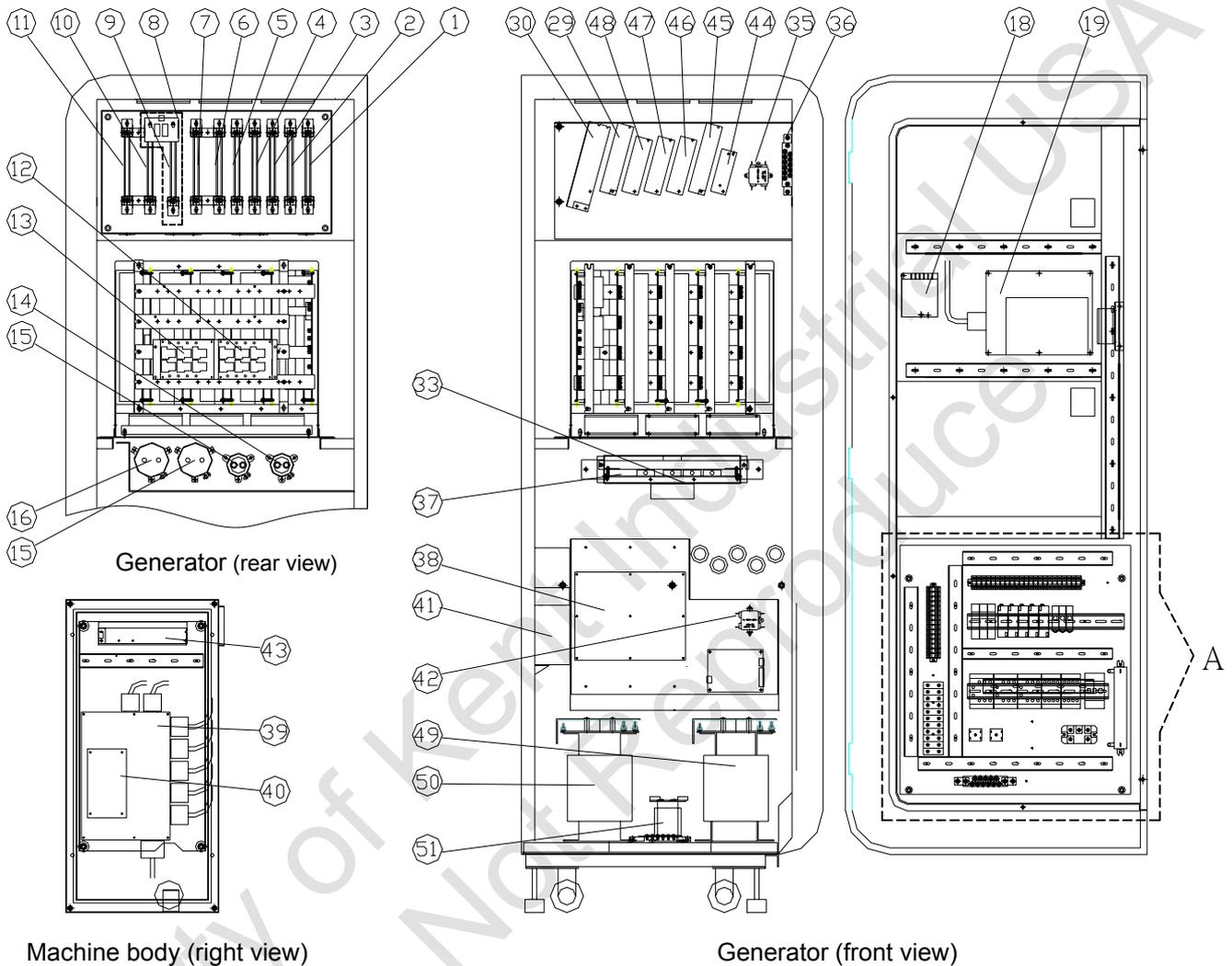
- ⑧ Touch panel : Touch panel
- ⑨ RS-232 : RS-232 connector
- ⑩ KEY-CPU : KEY-CPU board
- ⑪ Power supply : Power supply (NES-15-5)
- ⑫ RJ-45 : NET connector
- ⑬ CONTROLLER\_BAR : grounding copper plate
- ⑭ CONTROLLER : CONTROLLER
- ⑮ TB1:Terminal block
- ⑯ MAIN\_SW : MAIN POWER\_SW (WI-200)。
- ⑰ CN9 : connector 2P 16MM ( Controller AC110V power ) 。
- ⑱ FAN12 : FAN 110V 3"

※ Note: Warehouse Number Synopsis of Radial type small electric control box

No.	Part Name	Circuit No.	Warehouse No.
①	Buzzer (DC24V)	ALARM_BUZZER	EBZ4-28V
②	USB-ADAPTER2	USB-ADAPTER2	EPBJC2T051
③	Power ON button	ON_SW	ESWG1C
④	Power OFF button	OFF_SW	ESWR1C
⑤	KEYBOARD	KEYBOARD	E0LWE178AN
⑥	Emergency stop button	E-STOP_SW	ESW401
⑦	MOUSE	MOUSE	E0LWE197AN
⑧	Touch panel(Floor standing、Lower arm)	Touch panel	E0LWE179AN
	Touch panel(WI-200)		EMN08-1
⑨	RS-232 connector	RS-232	ENTD025P
⑩	Remote control converted board	KEY-CPU	EPCJC2S069B
⑪	Power supply (RS-15-5)	SWP12	EPWS-15-5
⑫	NET connector	RJ-45	ENT03
⑬	grounding copper plate	CONTROLLER_BAR	EOC10P
⑭	CONTROLLER	CONTROLLER	E0LWE180AN
⑮	Terminal block	TB1	EWD011
⑯	MAIN POWER_SW	MAIN_SW	ESWKG321E
⑰	connector 2P 16MM	CN9	EHD2R16
⑱	FAN 110V 3"	FAN12	EFN110V3

**B. Main Control Box (front view) ((Floor standing 、 Lower arm)**



**B-1. Main Control Box (WI-200 USED)**

**PART ( I ):** Referential circuit drawing FIG11-EDM POWER consists of following parts –

- ① FNR3: non-induced current limit resistor (25Ω/250W)
- ② FNR4: non-induced current limit resistor (25Ω/250W)
- ③ FNR5: non-induced current limit resistor (25Ω/250W)
- ④ FNR6: non-induced current limit resistor (25Ω/250W)
- ⑤ FNR7: non-induced current limit resistor (25Ω/250W)
- ⑥ FNR8: non-induced current limit resistor (18Ω/250W)

- ⑦ FNR9: non-induced current limit resistor (18Ω/250W)
- ⑧ PCD : PCD\_PCB
- ⑨ FNR10: non-induced current limit resistor (80Ω/250W)
- ⑩ FNR9: non-induced current limit resistor (18Ω/250W)
- ⑪ FNR9: non-induced current limit resistor (18Ω/250W)
- ⑫ WRA : WRA PCB
- ⑬ WRB : WRB PCB
- ⑭ POWER\_C4: Low voltage discharge capacitance (4700μF/200V)
- ⑮ POWER\_C3: POWER SINK capacitance (4700μF/200V)
- ⑯ POWER\_C1: Hi voltage discharge capacitance (4700μF/400V)
- ⑰ POWER\_C2: Hi voltage discharge capacitance (4700μF/400V)
- ⑱ WRS : WRS PCB
- ⑳ WPGF : WPGF PCB

**PART ( II ):** Referential circuit drawing FIG12-CONNECTOR consists of following parts -

- ⑳ CON1: 37 PIN connector (limit switch, vertical correcting signal, Z-axis brake power, power of wire feeding wheel and AC 110V)
- ㉑ CON4: 24 PIN connector (water system signal)
- ㉒ CON2: 24 PIN connector (signal of auto threading )
- ㉓ CON3: 16 PIN connector (wire system power)
- ㉔ CON7: connector of RSF liner scale (Y axis)
- ㉕ CON6: connector of RSF liner scale (X axis)
- ㉖ CON5: 16 PIN connector (water system signal)
- ㉗ Electrode Wire port
- ㉘ Number Tag Wire port

**PART ( III ):** Referential circuit drawing FIG08-SWITCH\_POWER1 、FIG09- SWITCH\_POWER2 、FIG07-UPS&NOTION(WI-200)consists of following parts –

- ⑱ SWP6: Power supply (RS-35-24) provides power to WRS PCB.
- ⑲ SWP7: Power supply (RS-150-24) provides power to WIO PCB.
- ⑳ SWP8: Power supply (RS-150-24) provides power to WIO 、MOTION PCB.
- ㉑ SWP9: Power supply (RS-35-5) provides power to MOTION PCB.
- ㉒ SWP10: Power supply (RS-35-5) provides power to WIO PCB.
- ㉓ SWP11: Power supply (RS-35-5) provides power to WPGF PCB.
- ㉔ SWP\_LF2: power filter (AC110V/10A)
- ㉕ SWP\_FG\_BAR2 : grounded copper plate
- ㉖ SWP\_LF2 : power filter (WI-200 AC110V/5A) 。
- ㉗ SWP9 : Power supply (D-60B WI-200) provides power to MOTION PCB 。
- ㉘ SWP5 : Power supply (S-35-5) , provides power to WHP PCB 。
- ㉙ SWP4 : Power supply (NES-100-15) , provides power to WHP PCB 。
- ㉚ SWP3 : Power supply (NET-50A) , provides power to WAP PCB 。
- ㉛ SWP2 : Power supply (NET-50A) , provides power to WAP PCB 。
- ㉜ SWP1 : Power supply (NET-50A) , provides power to WAP PCB 。

**PART (IV):** Referential circuit drawing FIG06-WIO consists of following parts –

- ⑳ ALM LIGHT
- ㉔ WIO : WIO PCB

**PART (V):** Referential circuit drawing FIG07- UPS&MOTION consists of following parts –

- ㉔ MOTION\_CPU : MOTION\_CPU PCB
- ㉕ MOTION : MOTION DA&IO PCB
- ㉖ UPS : UPS , AC110V/650W

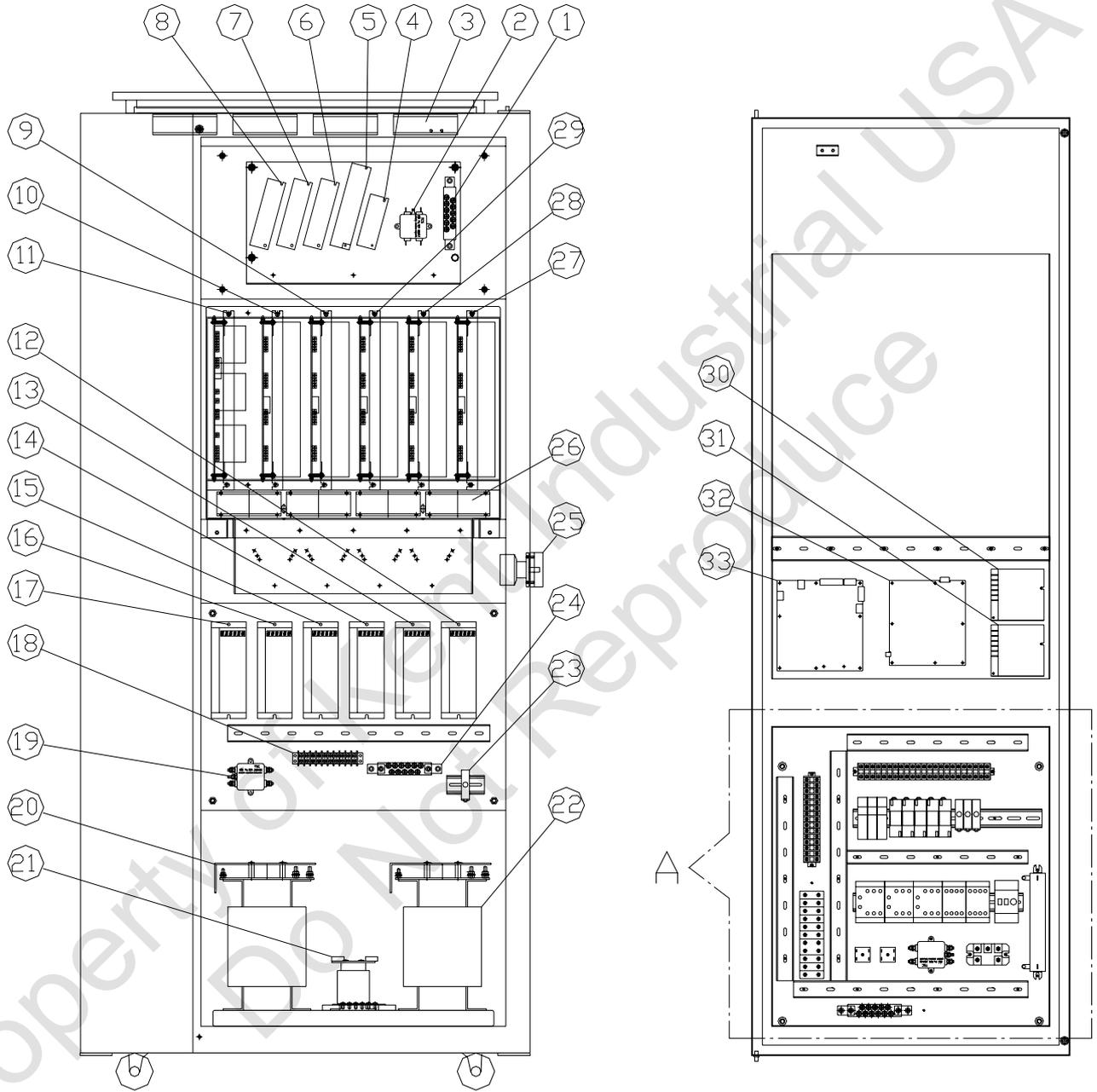
**PART (VII) : Referential circuit drawing FIG03- TRANSFORMER(WI-200) , consists of following parts –**

- ④⑨ X-FMR2 : transformer 2 ( 4.5KVA ) ◦
- ⑤⑩ X-FMR1 : transformer 1 ( 4.5KVA ) ◦
- ⑥⑪ X-FMR3 : transformer 3 ( 110W ) ◦

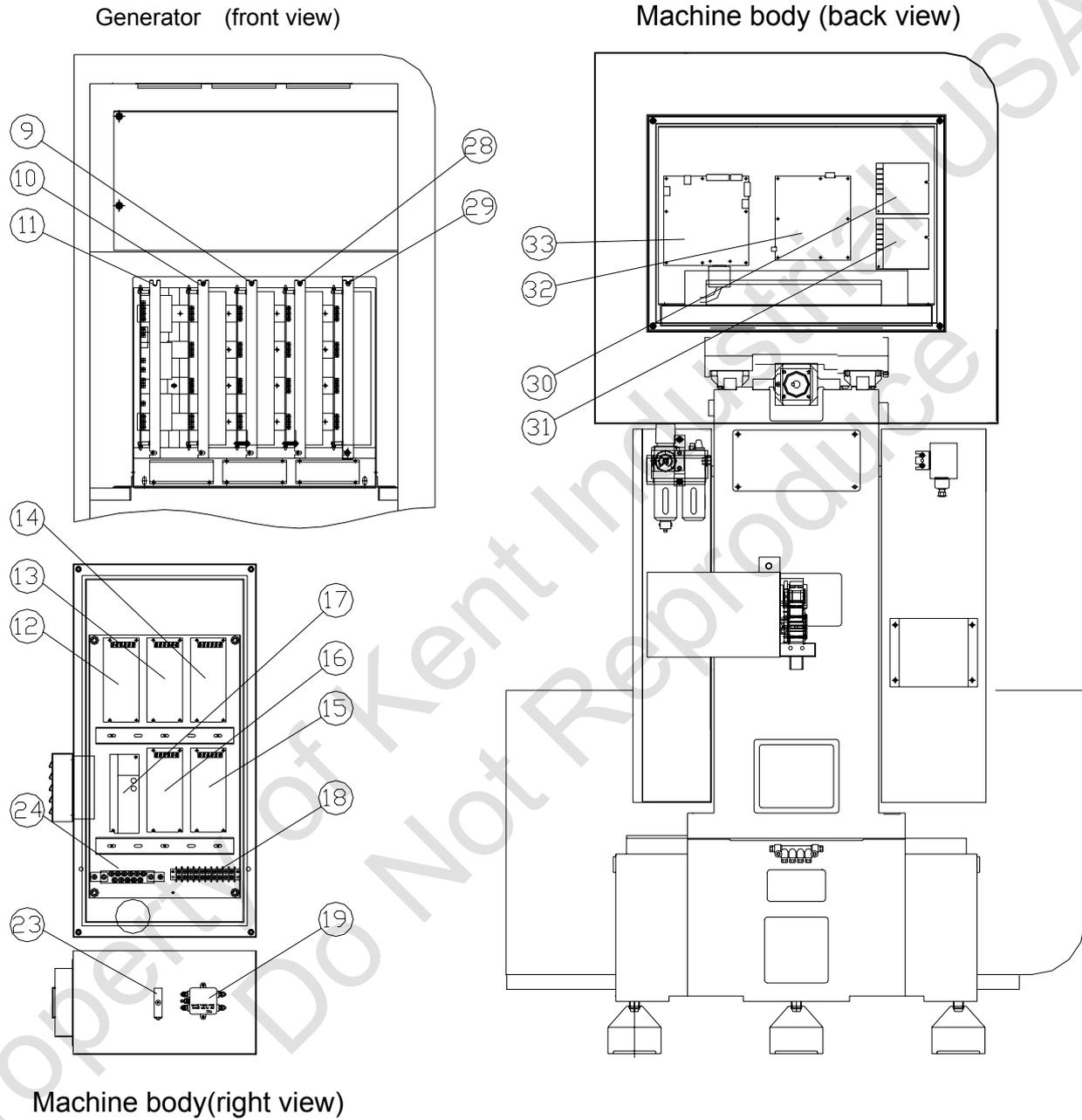
No.	Part Name	Circuit No.	Warehouse Part No.
①	Non-induced current limit resistor ( 25Ω/250W )	FNR3	ERNS0251250
②	Non-induced current limit resistor ( 25Ω/250W )	FNR4	ERNS0251250
③	Non-induced current limit resistor ( 25Ω/250W )	FNR5	ERNS0251250
④	Non-induced current limit resistor ( 25Ω/250W )	FNR6	ERNS0251250
⑤	Non-induced current limit resistor ( 25Ω/250W )	FNR7	ERNS0251250
⑥	Non-induced current limit resistor ( 18Ω/250W )	FNR8	ERNS0181250
⑦	Non-induced current limit resistor ( 18Ω/250W )	FNR9	ERNS0181250
⑧	PCD_PCB	PCD	EPCJC2K157
⑨	Non-induced current limit resistor ( 80Ω/250W )	FNR10	ERNS0801250
⑩	Non-induced current limit resistor ( 18Ω/250W )	FNR1	ERNS0181250
⑪	Non-induced current limit resistor ( 18Ω/250W )	FNR2	ERNS0181250
⑫	WRA PCB	WRA	EPCJC2T056A
⑬	WRB PCB	WRB	EPCJC2T056A
⑭	POWER SINK capacitance ( 4700μF/200V )	C3	ECE4700U/200V
⑮	Low voltage discharge capacitance	C4	ECE4700U/200V
⑯	Hi voltage discharge capacitance ( 4700μF/400V )	C1	ECE4700u/400V
⑰	Hi voltage discharge capacitance ( 4700μF/400V )	C2	ECE4700u/400V
⑱	Power supply ( NES-35-24 )	SWP6	EPWS-35-24
⑲	WRS PCB	WRS	EPBJC2T058A
⑳	37 PIN connector	CON1	EHD37P40B
㉑	24 PIN connector	CON4	EHD24P32B
㉒	24 PIN connector	CON2	EHD24P32B
㉓	16 PIN connector	CON5	EHD16P28
㉔	connector of RSF liner scale (Y axis)	CON7	EHDF120
㉕	connector of RSF liner scale (X axis)	CON6	EHDF120

No.	Part Name	Circuit No.	Warehouse Part No.
②⑥	16 PIN connector	CON3	EHD16P28
②⑦	Electrode Wire Port		
②⑧	Number Tag Wire Port		
②⑨	Power supply (RS-150-24)	SWP7	EPWS-150-24
③⑩	Power supply (RS-150-24)	SWP8	EPWS-150-24
③①	Power supply (RS-35-5)	SWP9	EPWS-35-5
③②	Power supply (RS-35-5)	SWP10	EPWS-35-5
③③	Power supply (RS-35-5)	SWP11	EPWS-35-5
③④	Alarm Light	ALM LIGHT	ESWR01
③⑤	power filter (AC110V/10A)	SWP_LF2	ELF10A
③⑥	Grounding copper plate	SWP_FG_BAR2	EOC10P
③⑦	WPGF PCB	WPGF	EPBJC2S116B
③⑧	WIO PCB	WIO	EPBJC2T037A
③⑨	MOTION_CPU PCB ◦	MOTION-CPU	EPBJC2N099A
④⑩	MOTION DA&IO PCB ◦	MOTION	EPCJC2N100B
④①	UPS , AC110V/650W ◦	UPS	EUPS
④②	power filter (AC110V/5A WI-200)	SWP_LF3	ELF5A
④③	Power supply (D-60B WI-200)	SWP9	EPWD-60B
④④	Power supply (S-35-5 WI-200)	SWP5	EPWS-35-5
④⑤	Power supply (NES-100-15 WI-200)	SWP4	EPWS-100-15
④⑥	Power supply (NET-50A WI-200)	SWP3	EPWT-40A
④⑦	Power supply (NET-50A WI-200)	SWP2	EPWT-40A
④⑧	Power supply (NET-50A WI-200)	SWP1	EPWT-40A
④⑨	transformer 1 (4.5KVA)	X-FMR1	ETF37
⑤⑩	transformer 3 (110W)	X-FMR3	ETF36
⑤①	transformer 2 (4.5KVA)	X-FMR2	ETF35

**C. Main Control Box (right view) (Floor standing 、 Lower arm)**



C-1 . Generator Overview(WI-200 USED)



**PART ( I ):** Referential circuit drawing FIG08-SWITCH\_POWER1 consists of following

- ① SWP\_FG\_BAR2 : grounding copper plate
- ② SWP\_LF3 : power filter ( AC110V/5A ) ◦
- ④ SWP5 : Power supply ( RS-35-5 ) , provides power to WHP PCB.
- ⑤ SWP4 : Power supply ( SE-100-15 ) , provides power to WHP PCB.
- ⑥ SWP3 : Power supply ( NET-50A ) , provides power to WAP PCB.
- ⑦ SWP2 : Power supply ( NET-50A ) , provides power to WAP PCB.
- ⑧ SWP1 : Power supply ( NET-50A ) , provides power to WAP PCB.

**PART ( II ):** Referential circuit drawing FIG11-EDM POWER consists of following parts

- ⑨ WHP : WHP PCB ◦
- ⑩ WHP : WHP PCB ◦
- ⑪ WAP : WAP PCB ◦
- ⑳ WHP : WHP PCB ◦
- ㉑ WHP : WHP PCB ◦
- ㉒ WHP : WHP PCB ◦

**PART ( III ):** Referential circuit drawing FIG10-DRIVER consists of following parts –

- ⑫ DRIVER1 : servo driver of X axis (1KW, 750W or 400W)
- ⑬ DRIVER2 : servo driver of Y axis (1KW, 750W or 400W)
- ⑭ DRIVER3 : servo driver of YZaxis (400W, brake included)
- ⑮ DRIVER4 : servo driver of U axis (400W)
- ⑯ DRIVER5 : servo driver of Vaxis (400W)
- ⑰ DRIVER6 : servo driver of W axis (400W)
- ⑱ DRIVER\_TERMINAL : terminal block
- ㉓ SWP\_L3 : power filter ( AC220V/10A )
- ㉔ FUSE1 : fuse ( 10A/30 mm )

- ②④ EARTH BAR : **grounding copper plate**

**PART (IV):** Referential circuit drawing FIG03-TRANSFORMER consists of following parts –

- ②① X-FMR1 : **transformer 1 ( 4.5KVA )** ◦  
②① X-FMR3 : **transformer 3 ( 110W )** ◦  
②② X-FMR2 : **transformer 2 ( 4.5KVA )** ◦

**PART (V):** Referential circuit drawing FIG13-FAN&MAIN\_SWITCH consists of following parts –

- ③ FAN1~ FAN4: **fan AC220V** ◦  
②⑤ MAIN\_SW : **MAIN POWER\_SW**  
②⑥ FAN5~ FAN8: **fan (AC220V)** ◦

**PART (VI):** Referential circuit drawing FIG05-AWT\_CPU&AWT\_CUT consists of following parts –

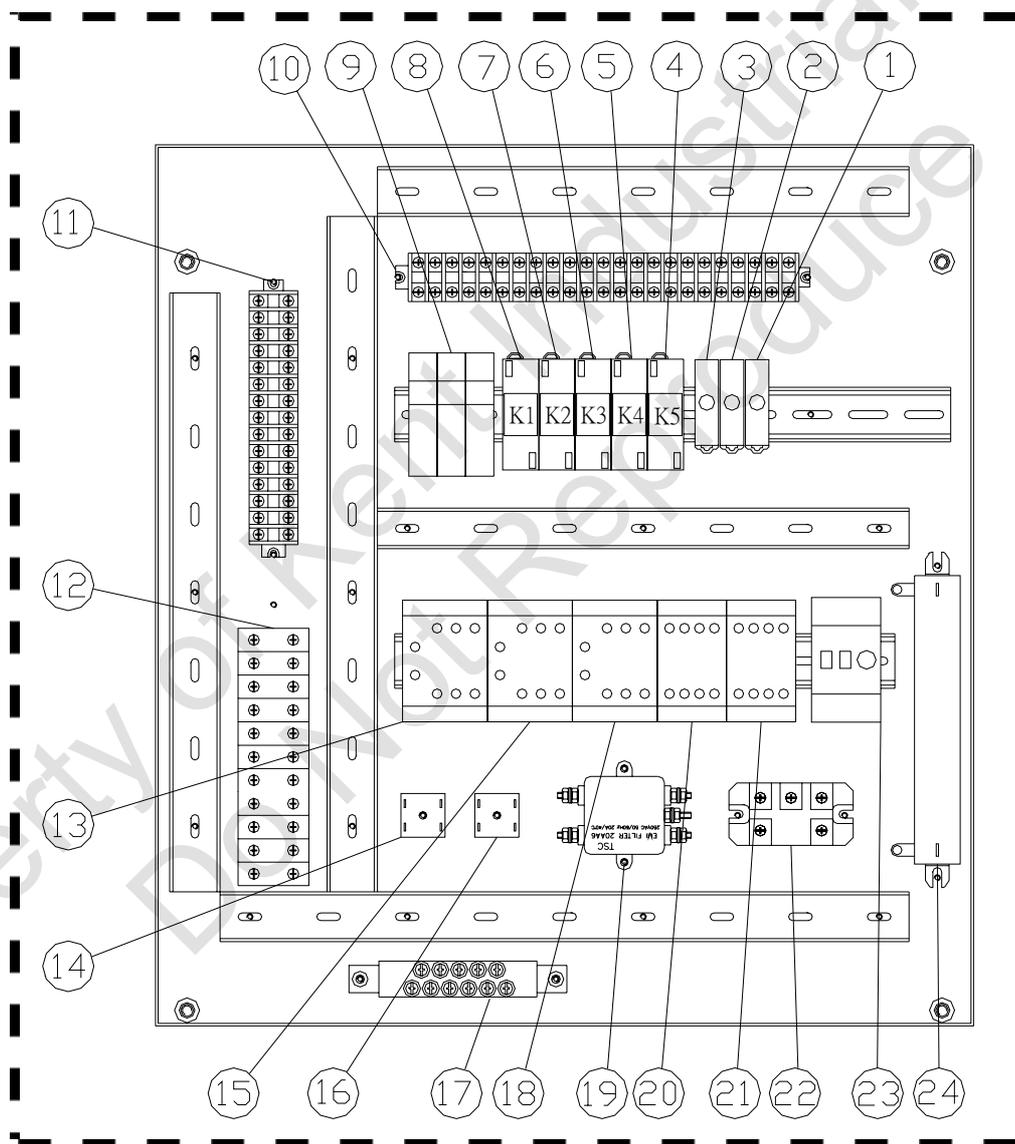
- ③① SWP12 : **Power supply ( RS-35-24 )** , provides power to AWT\_CPU PCB.  
③① SWP13 : **Power supply ( RS-35-5 )** , provides power to AWT\_CPU PCB.  
③② AWT\_CUT : **Auto threading Control board**  
③③ AWT\_CPU : **Auto threading cutting power board**

No.	Part Name	Circuit No.	Warehouse Part No.
①	grounded copper plate	SWP_BAR1	EOC10P
②	power filter ( AC110V/5A )	SWP_LF3	ELF5A
③	fan (AC220V)	FAN1~ FAN4	EFT4
④	Power supply ( RS-35-5 )	SWP5	EPWS-35-5
⑤	Power supply ( SE-100-15 )	SWP4	EPWS-100-15
⑥	Power supply ( NET-50A )	SWP3	EPWT-40A
⑦	Power supply ( NET-50A )	SWP2	EPWT-40A
⑧	Power supply ( NET-50A )	SWP1	EPWT-40A
⑨	WHP PCB	WHP	EPBWHP99
⑩	WHP PCB	WHP	EPBWHP99
⑪	WAP PCB	WAP	EPBWAP
⑫	servo driver of X axis ( 400W )	DRIVER1	ESD12
	servo driver of Xaxis ( 750W )		ESD13
⑬	servo driver of Y axis ( 400W )	DRIVER2	ESD12
	servo driver of Yaxis ( 750W )		ESD13
⑭	servo driver of Z axis ( 400W )	DRIVER3	ESD12
⑮	servo driver of U axis ( 400W )	DRIVER4	ESD12
⑯	servo driver of V axis ( 400W )	DRIVER5	ESD12
⑰	servo driver of W axis ( 400W )	DRIVER6	ESD10
⑱	terminal block	DRIVER_TERMINAL	EWD0110
⑲	power filter ( AC220V/10A )	SWP_L3	ELF10A
⑳	transformer 1 ( 4.5KVA )	X-FMR1	ETF37
㉑	transformer 3 ( 110W )	X-FMR3	ETF36
㉒	transformer 2 ( 4.5KVA )	X-FMR2	ETF35
㉓	fuse ( 10A/30 mm )	FUSE1	EFSS02
㉔	grounding copper plate	EARTH BAR	EOC10P
㉕	MAIN POWER_SW	MAIN_SW	ESWKG321E
㉖	fan (AC220V)	FAN5~ FAN8	EFT4
㉗	WHP PCB	WHP	EPBWHP99
㉘	WHP PCB	WHP	EPBWHP99
㉙	WHP PCB	WHP	EPBWHP99
㉚	Power supply ( RS-35-24 )	SWP12	EPWS-35-24
㉛	Power supply ( RS-35-5 )	SWP13	EPWS-35-5

No.	Part Name	Circuit No.	Warehouse Part No.
③②	Auto threading Control board	AWT_CUT	
③③	Auto threading Cutting Power board	AWT_CPU :	

**C. PARTS OF AUTO CONTROL PANEL**

**【 A 】**

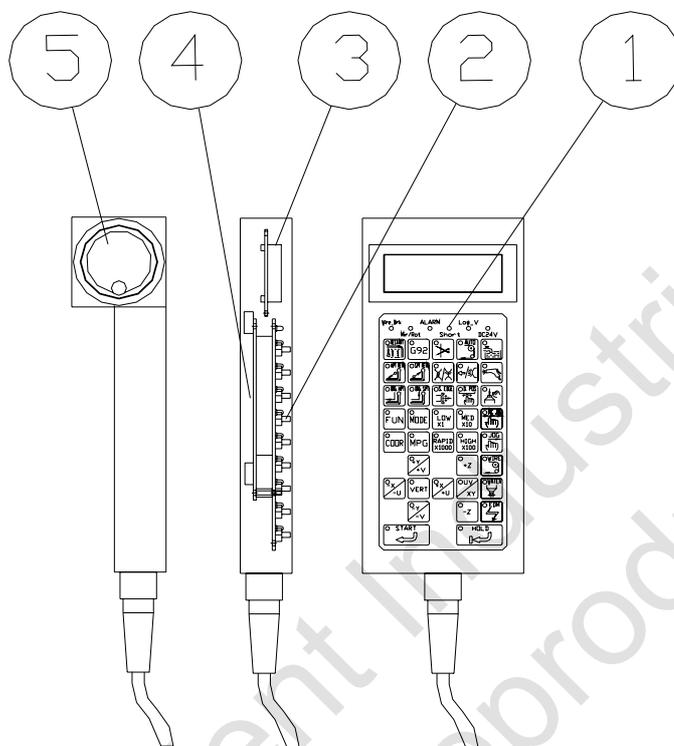


**PART ( I ):** Referential circuit drawing FIG04-CIRCUIT\_PANEL consists of following

- ① PANEL\_FUSE4 : fuse ( 10A/30 mm ) ◦

- 
- ② PANEL\_FUSE3 : **fuse** ( 10A/30 mm ) ◦
  - ③ PANEL\_FUSE2 : **fuse** ( 5A/30 mm ) ◦
  - ④ PANEL\_K5 : RELAY ( DC24V ) ◦
  - ⑤ PANEL\_K4 : RELAY ( DC24V ) ◦
  - ⑥ PANEL\_K3 : RELAY ( DC24V ) ◦
  - ⑦ PANEL\_K2 : RELAY ( DC24V ) ◦
  - ⑧ PANEL\_K1 : RELAY ( AC110V ) ◦
  - ⑨ PANEL\_FUSE1 : **Fuse of main power (32A)**
  - ⑩ PANEL\_TB1 : **terminal block**
  - ⑪ PANEL\_TB2 : **terminal block**
  - ⑫ PANEL\_TB2 : **terminal block ( 60A )**
  - ⑬ PANEL\_FR1 : **solenoid valve of main power (AC110V)**
  - ⑭ PANEL\_BD3 : **power rectifier of POWER SINK**
  - ⑮ PANEL\_FR2 : **solenoid valve of motor power (AC110V)**
  - ⑯ PANEL\_BD2 : **power rectifier of low voltage discharge**
  - ⑰ SWP\_FG\_BAR4 : **grounding copper plate**
  - ⑱ PANEL\_FR3 : **solenoid valve of high voltage discharge (AC110V)**
  - ⑲ PANEL\_FILTER1 : **power filter of low voltage discharge(10A)**
  - ⑳ PANEL\_FR4 : **solenoid valve of low voltage discharge (AC110V)**
  - ㉑ PANEL\_FR5 : **solenoid valve of mold calibration discharge(AC110V)**
  - ㉒ PANEL\_BD1 : **power rectifier of high voltage discharge (AC110V)**
  - ㉓ PANEL\_QF1 : **overload relay of high voltage discharge**
  - ㉔ PANEL\_R1 : **current release resistor of high voltage discharge**

No.	Part Name	Circuit No.	Part No.
①	fuse ( 10A/30 mm )	PANEL_FUSE4	EFS10A30
②	fuse ( 10A/30 mm )	PANEL_FUSE3	EFS10A30
③	fuse ( 5A/30 mm )	PANEL_FUSE2	EFS5A30
④	RELAY ( DC24V )	PANEL1_K5	ERY2P24V
⑤	RELAY ( DC24V )	PANEL1_K4	ERY2P24V
⑥	RELAY ( DC24V )	PANEL1_K3	ERY2P24V
⑦	RELAY ( DC24V )	PANEL1_K2	ERY2P24V
⑧	RELAY ( AC110V )	PANEL1_K1	ERY2P110V
⑨	Fuse of main power (32A)	PANEL1_FUSE1	ENFB3P32A
⑩	terminal block	PANEL1_TB1	20A : EWD011
⑪	terminal block	PANEL1_TB2	20A : EWD011
⑫	terminal block	PANEL1_TB2	60A : EOC1PS
⑬	solenoid valve of main power (AC110V)	PANEL1_FR1	EESW02
⑭	power rectifier of POWER SINK	PANEL1_BD3	EBC2506
⑮	solenoid valve of motor power (AC110V)	PANEL1_FR2	EESW02
⑯	power rectifier of low voltage discharge	PANEL1_BD2	EBC2506
⑰	grounding copper plate	SWP_FG_BAR4	EOC10P
⑱	solenoid valve of high voltage discharge (AC110V)	PANEL1_FR3	EESW02
⑲	power filter of low voltage discharge(10A)	PANEL1_FILTER1	ELF10A
⑳	solenoid valve of low voltage discharge (AC110V)	PANEL1_FR4	EESW14
㉑	solenoid valve of mold calibration discharge(AC110V)	PANEL1_FR5	EESW14
㉒	power rectifier of high voltage discharge (AC110V)	PANEL1_BD1	EBC00
㉓	overload relay of high voltage discharge	PANEL1_QF1	ENFBMC25-25
㉔	current release resistor of high voltage discharge	PANEL1_R1	ERN0181250

**D. REMOTE CONTROL PANEL**

**PART (VII):** Referential circuit drawing FIG01-CONTROLLER&LCD consists of following parts –

- ① Aluminum plate
- ② REMOTE : Keyboard
- ③ LCD 20\*4 : LCD monitor
- ④ KEY-CPU : KEY-CPU Board
- ⑤ MPG : Manual rotation wheel

Number	Part name	Circuit No.	Part No.
①	Aluminum Plate	Non-Circuit part	E0LWE192BN
②	Keyboard	REMOTE	EPCJC2S071A
③	LCD Monitor	LCD 20*4	EMN07
④	KEY-CPU Board	KEY-CPU	EPCJC2S069B
⑤	Manual Rotation Wheel	MPG	EHW01

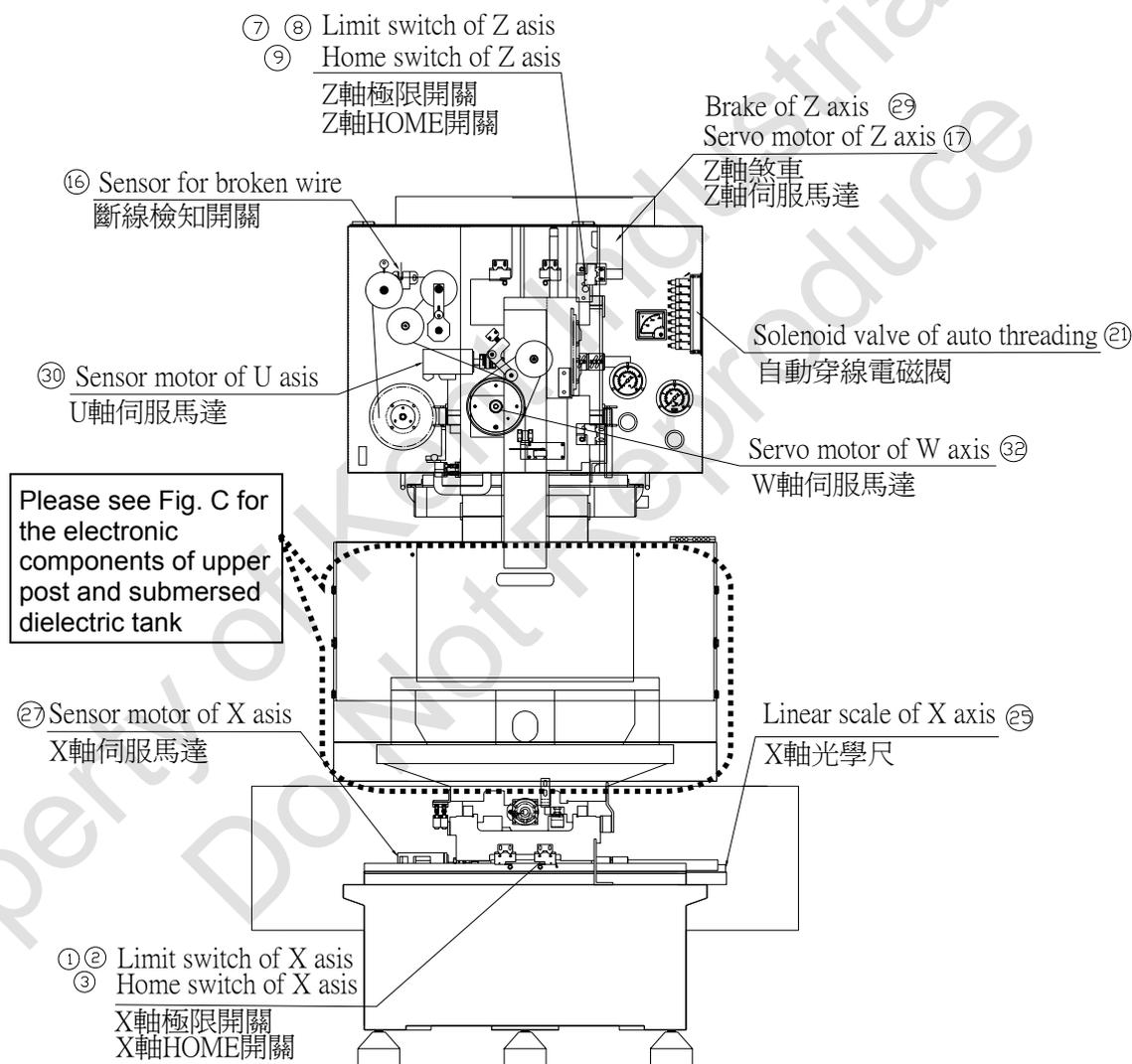
**PART (I):** Referential circuit drawing FIG04-CIRCUIT\_PANEL consists of following parts

- 
- ① PCD\_PANEL: RELAY (MY2J/DC24V)
- ② PANEL\_FUSE4: fuse ( 10A/30 mm )
- ③ PANEL\_FUSE3: fuse ( 10A/30 mm )
- ④ PANEL\_FUSE2: fuse (5A/30 mm)
- ⑤ PANEL\_K7 : RELAY (DC24V)
- ⑥ PANEL\_K6 : RELAY ( AC110V )
- ⑦ PANEL\_K5 : RELAY ( AC110V )
- ⑧ PANEL\_K4 : RELAY ( AC110V )
- ⑨ PANEL\_K3 : RELAY ( AC110V )
- ⑩ PANEL\_K1 : RELAY ( AC110V )
- ⑪ PANEL\_K2: RELAY (DC24V)

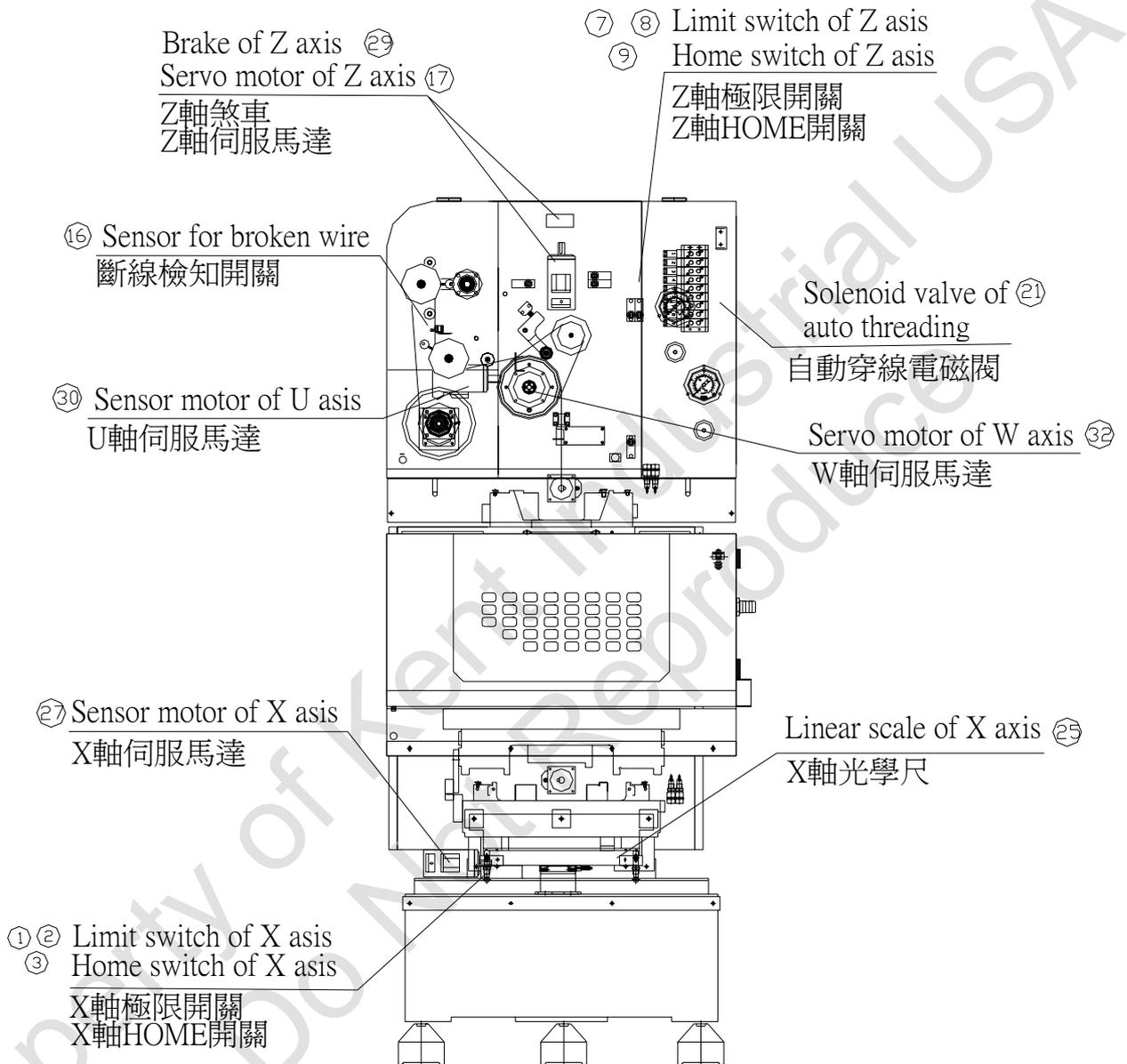
## 2.2.2 THE ELECTRONIC COMPONENTS OF MACHINE \WJS2

Following drawings illustrate the structure of Wire EDM. This machine adopts 5 AC servo motors to control X axis, Y axis, Z axis, U axis, V axis and (W axis, the 6<sup>th</sup> axis, if auto threading).

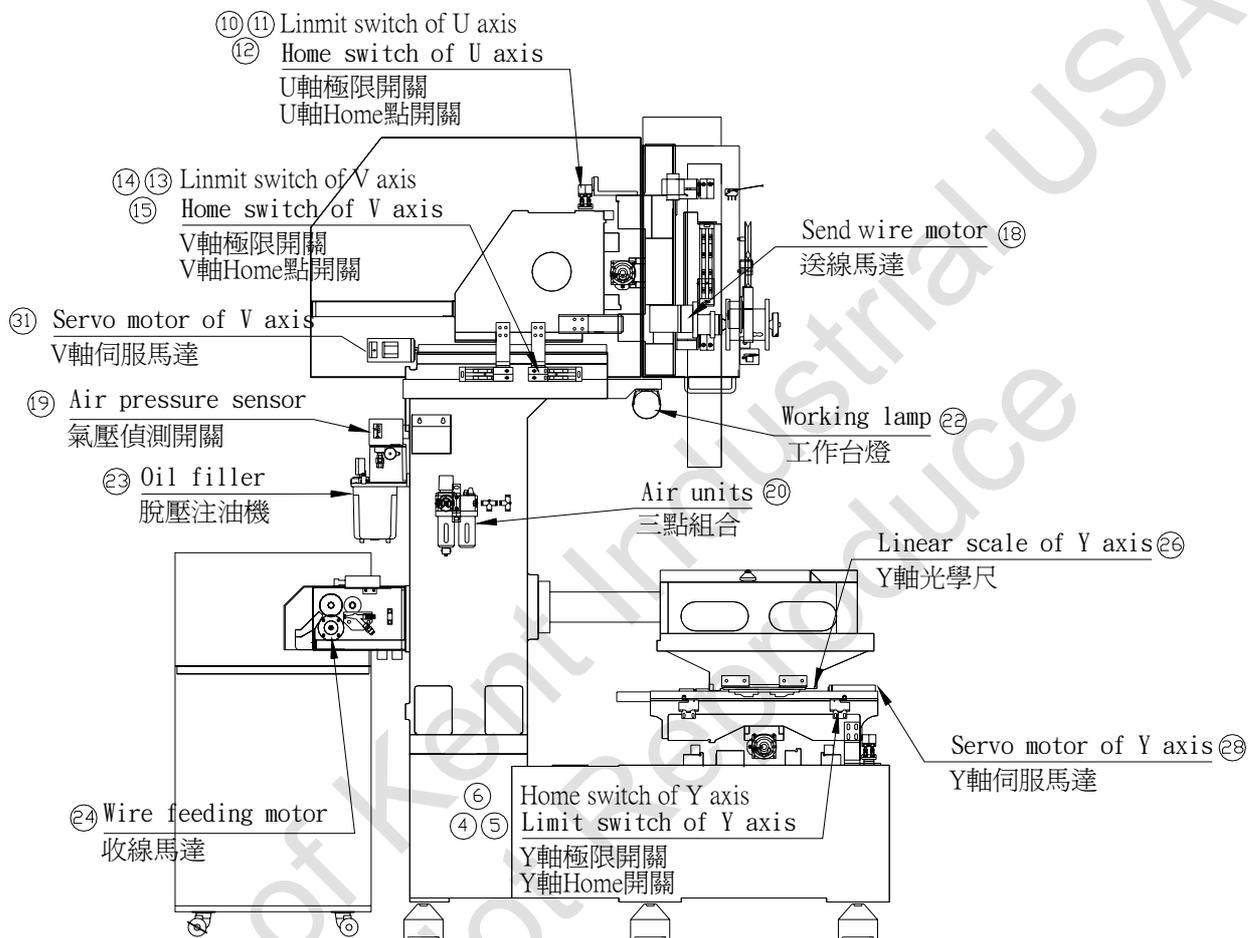
### A. Electronic components of the machine (front view)



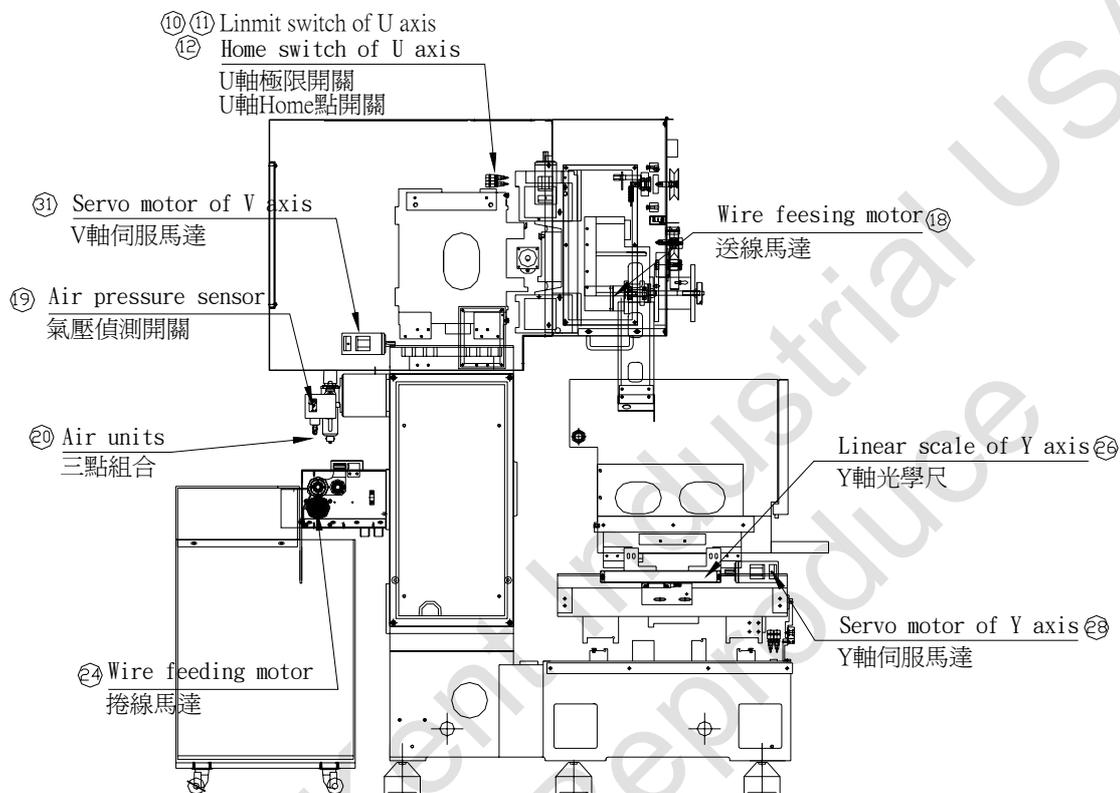
**A-1. Electronic components of the machine (front view) (WI-200 USED)**



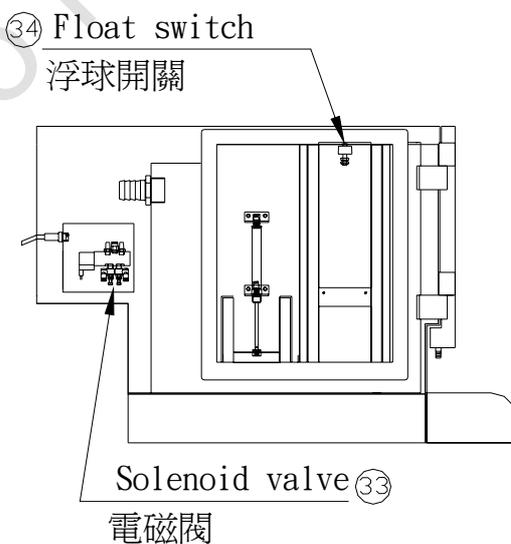
**B. Electronic components of the machine (side view)**



**B-1. Electronic components of the machine (side view) (WI-200 USED)**



**C. Dielectric tank and electronic components of upper post (submerged type)**



**PART ( I ):** Referential circuit drawing FIG14-MACHINE\_CIRCUIT1 consists of following parts -

- ① X\_LIMIT\_SW+: limit switch of X axis (+)
- ② X\_LIMIT\_SW -: limit switch of X axis (-)
- ③ X\_HOME\_SW: HOME switch of X axis
- ④ Y\_LIMIT\_SW+: limit switch of Y axis (+)
- ⑤ Y\_LIMIT\_SW -: limit switch of Y axis (-)
- ⑥ Y\_HOME\_SW: HOME switch of Y axis
- ⑦ Z\_LIMIT\_SW+: limit switch of Z axis (+)
- ⑧ Z\_LIMIT\_SW-: limit switch of Z axis (-)
- ⑨ Z\_HOME\_SW: HOME switch of Z axis
- ⑩ U\_LIMIT\_SW+: limit switch of U axis (+)
- ⑪ U\_LIMIT\_SW-: limit switch of U axis (-)
- ⑫ U\_HOME\_SW: HOME switch of U axis
- ⑬ V\_LIMIT\_SW+: limit switch of V axis (+)
- ⑭ V\_LIMIT\_SW-: limit switch of V axis (-)
- ⑮ V\_HOME\_SW: HOME switch of V axis
- ⑯ WIRE\_BREAK\_SW: sensor for broken wire
- ⑰ Z\_BRAKER: brake of Z axis (WI-200)
- ⑱ SEND\_WIRE\_MOTOR: wire feeding motor

**PART ( II ):** Referential circuit drawing FIG15-MACHINE\_CIRCUIT2 consists of following parts -

- ⑲ AIR\_SW10: AIR PRESSURE SENSOR
- ⑳ AIR UNITS
- ㉑ AIR\_SW1~AIR\_SW9: solenoid valve of auto threading
- ㉒ WORK\_LAMP: working lamp
- ㉓ OIL\_FILLER: oil filler
- ㉔ WIRE\_FEED\_MOTOR: wire feeding motor
- ㉕ X\_SCALE: linear scale of X axis

- ②⑥ Y\_SCALE: linear scale of Y axis
- ②⑦ X\_MOTOR: servo motor of X axis
- ②⑧ Y\_MOTOR: servo motor of Y axis
- ②⑨ Z\_MOTOR: servo motor of Z axis(brake included)
- ③⑩ U\_MOTOR: servo motor of U axis
- ③① V\_MOTOR: servo motor of V axis
- ③② W\_MOTOR: servo motor of W axis(FOR W axis USED ONLY)

PART ( III ): Referential circuit drawing FIG16-WATER\_SYSTEM4 consists of following parts -

- ③③ Relay gate \_KA2: REALY GATE\_KA2
- ③④ SL6: Float switch 06

**※ NOTE: SYNOPOSIS OF WAREHOUSE PART NUMBERS OF THE MACHINE**

No.	Part No.	Circuit No.	Part No.
①	Limit switch of X axis (+)	X_LIMIT_SW+	M1SS127AN
②	Limit switch of X axis (-)	X_LIMIT_SW-	M1SS127AN
③	HOME switch of X axis	X_HOME_SW	M1SS127AN
④	Limit switch of Y axis (+)	Y_LIMIT_SW+	M1SS127AN
⑤	Limit switch of Y axis (-)	Y_LIMIT_SW-	M1SS127AN
⑥	HOME switch of Y axis	ZY_HOME_SW	M1SS127AN
⑦	Limit switch of Z axis (+)	ZX_LIMIT_SW+	M1SS127AN
⑧	Limit switch of Z axis (-)	Z_LIMIT_SW-	M1SS127AN
⑨	HOME switch of Z axis	Z_HOME_SW	M1SS127AN
⑩	Limit switch of U axis (+)	U_LIMIT_SW+	M1SS127AN
⑪	Limit switch of U axis (-)	U_LIMIT_SW-	M1SS127AN
⑫	HOME switch of U axis	U_HOME_SW	M1SS127AN
⑬	Limit switch of V axis (+)	V_LIMIT_SW+	M1SS127AN
⑭	Limit switch of V axis (-)	V_LIMIT_SW-	M1SS127AN
⑮	HOME switch of V axis	V_HOME_SW	M1SS127AN
⑯	Sensor for broken wire	WIRE_BREAK_SW	E0BWG27AN
⑰	Brake of Z axis (WI-200)	Z_BRAKER	M1SSJ218AN
⑱	Send wire motor	SEND_WIRE_MOTOR	M0BWD61CN
⑲	Air pressure sensor	AIR_SW10	M1PGA53AN

⑳	AIR UNITS	Non-circuit part	M1PGA38AN
㉑	Solenoid valve of auto threading	AIR_SW1~AIR_SW9	M0LJU72AN
㉒	Work lamp	WORK_LAMP	M0BWG80BN
㉓	Oil filler	OIL_FILLER	M0BWSJ41AN
㉔	Wire winding motor	WIRE_FEED_MOTOR	M0BWD146CN
㉕	200 Linear scale of X axis	X_SCALE	M0BWSO005AN
	430、30E Linear scale of X axis		M0BWF30AN
	530、50E Linear scale of X axis		M0LJF32BN
	640、60E Linear scale of X axis		M0CAF22BN
㉖	200 Linear scale of Y axis	Y_SCALE	M0BWSO002AN
	430、30E Linear scale of Y axis		M0LJF33BN
	530、50E Linear scale of Y axis		M0LJF33BN
	640、60E Linear scale of Y axis		M0CAF23BN
㉗	Servo motor of X axis(400W)	X_MOTOR	M0BWF31BN
	Servo motor of X axis(750W)		M0CAF25BN
㉘	Servo motor of Y axis(400W)	Y_MOTOR	M0BWF31BN
	Servo motor of X axis(750W)		M0CAF25BN
㉙	Servo motor of Z axis(400W)	Z_MOTOR	M0BWF22AN
㉚	Servo motor of U axis(400W)	U_MOTOR	M0BWF31BN
㉛	Servo motor of V axis(400W)	V_MOTOR	M0BWF31BN
㉜	Servo motor of W axis(400W)	W_MOTOR	M0LJU106AN
㉝	Relay gate_KA2	RELAY_GATE_KA2	M0LJU72AN
㉞	Float switch 06	SL6	M1SSC27BN

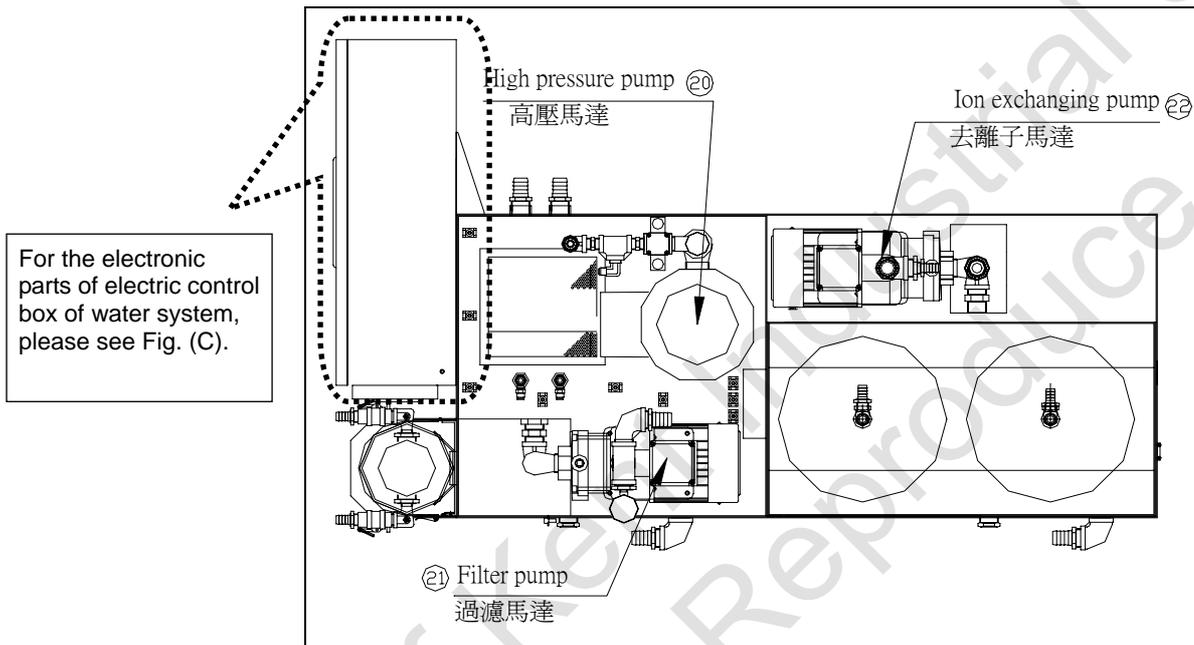
Part NO. for WI-200

No.	Part No.	Circuit No.	Part No.
①~⑮	Limit、HOME switch of X~V axis	X~V LIMIT、HOME_SW	M1SSJ219BN

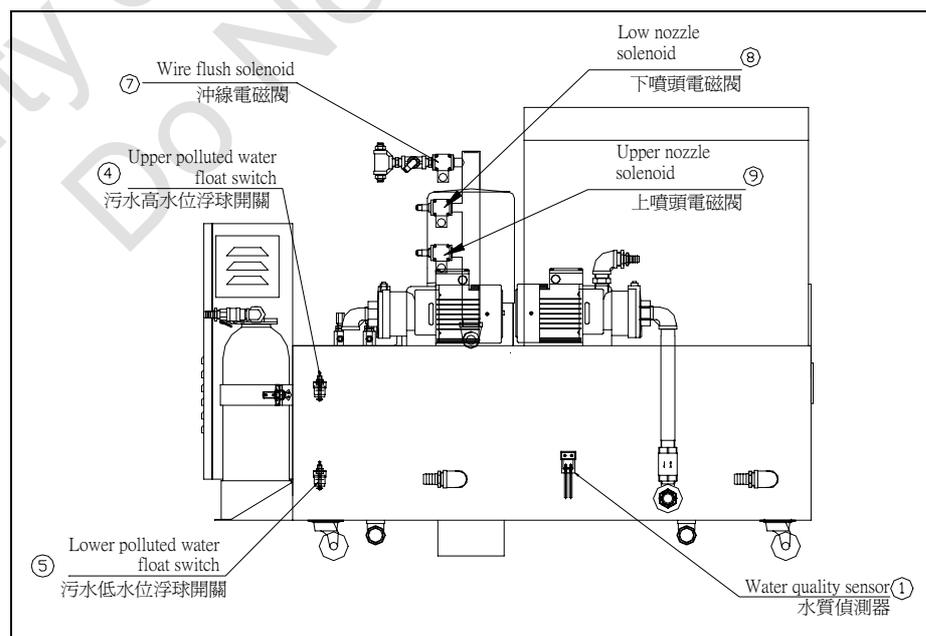
### 2.2.3 Electronic Parts of Water System WJS3

Following water system structure shows its circulation and cooling function through high voltage motor, filter motor, ion removing motor and water input motor( Immerse Type) . The electric control box of the water system controls the operation of 4 motors(Sprinkling Type: 3 motor).

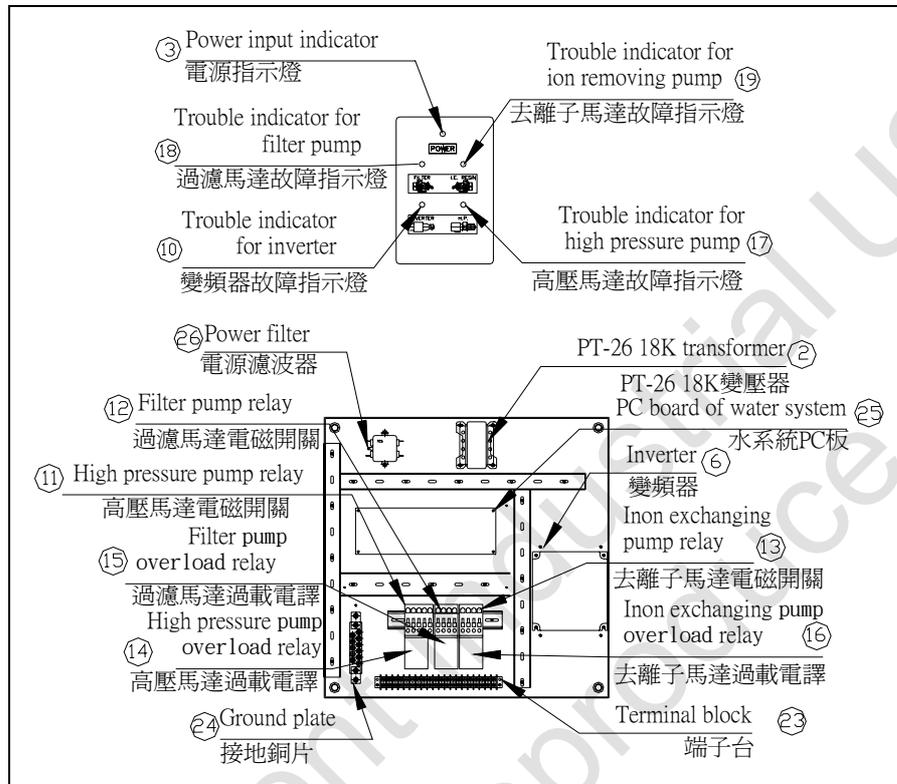
#### A. Electronic parts of Sprinkling type(W-A30E) water system (top view)



#### B. Electronic parts of Sprinkling type(W-A30E) water system (side view)



### C. Electronic parts of electric control box of Sprinkling type (W-A30E) water system



※ Note : Water system 「circuit chart」 and 「Component number chart」 is the same as Sprinkling type

**PART ( I ):** Referential circuit drawing FIG16-WATER\_SYSTEM1 consists of following parts –

- ① WATER\_QUILTY\_SENSOR: water quality sensor
- ② T1: PT-26 18K transformer
- ③ LP1: power input indicator of water tank (showing normality)
- ④ SL1: float switch of polluted water (high level)
- ⑤ SL2: float switch of polluted water (low level)
- ⑲ PCB : JC-2F107A: PC board of water system
- ⑲ LF1: power filter ( AC110V/10A )

**PART ( II ):** Referential circuit drawing FIG17-WATER\_SYSTEM2 consists of following parts –

- ⑥ INVERTER: inverter
- ⑦ AUTO\_GATE: solenoid valve of wire flush

- ⑧ HI\_GATE02: solenoid valve of lower nozzle
- ⑨ HI\_GATE01: solenoid valve of upper nozzle
- ⑩ LP2: trouble indicator of inverter
- ⑫ PCB : JC-2F107A: PC board of water system

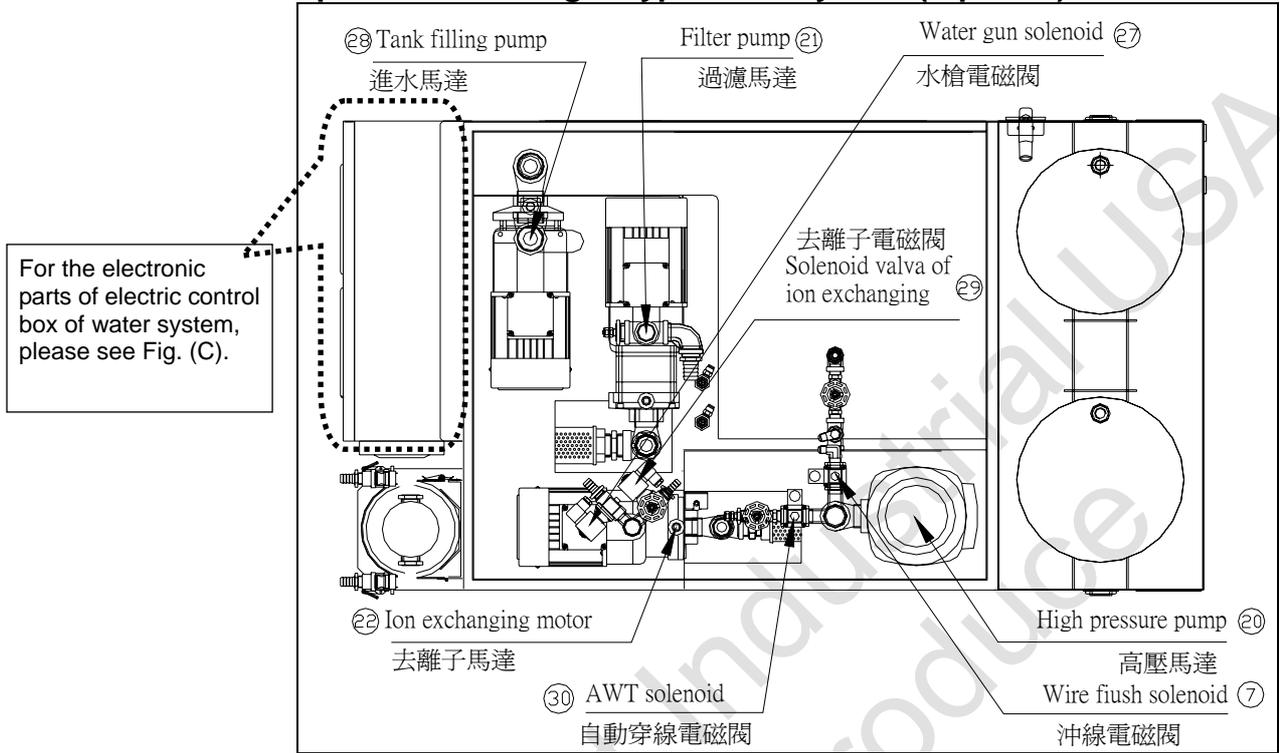
**PART ( III ):** Referential circuit drawing FIG18-WATER\_SYSTEM3 consists of following parts –

- ⑪ K1: high press motor relay
- ⑫ K2: filter motor relay
- ⑬ K3: ion removing motor relay
- ⑭ FR1: overload relay of high voltage motor
- ⑮ FR2: overload relay of filter motor
- ⑯ FR3: overload relay of ion removing motor
- ⑰ LP3: indicator showing water level low
- ⑱ LP4: trouble indicator for high press motor
- ⑲ LP5: trouble indicator for filter motor
- ⑳ M2: high press motor
- ㉑ M3: filter motor

No.	Part Name	Circuit No.	Warehouse Part No.
①	WATER_QUILTY_SENSOR	WATER_QUILTY_SENSOR	E0BWJ27BN
②	PT-26 18K transformer	T1	ETFPT26
③	PowerInput indicator of water tank (showing normality)	LP1	ELP00
④	float switch of polluted water (high level)	SL1	M1SSC27AN
⑤	float switch of polluted water (low level)	SL2	M1SSC27AN
⑥	Inverter - AC220V - AC380V	INVERTER (TECO)	ECF04 ECF05
⑦	solenoid valve of wire flush	AUTO_GATE	M0BWSJ14FN
⑧	solenoid valve of lower nozzle	HI_GATE02	M0BWSJ14FN
⑨	solenoid valve of upper nozzle	HI_GATE01	M0BWSJ14FN
⑩	trouble indicator of inverter	LP2	ELP01
⑪	high press motor relay	K1	EESW02-1

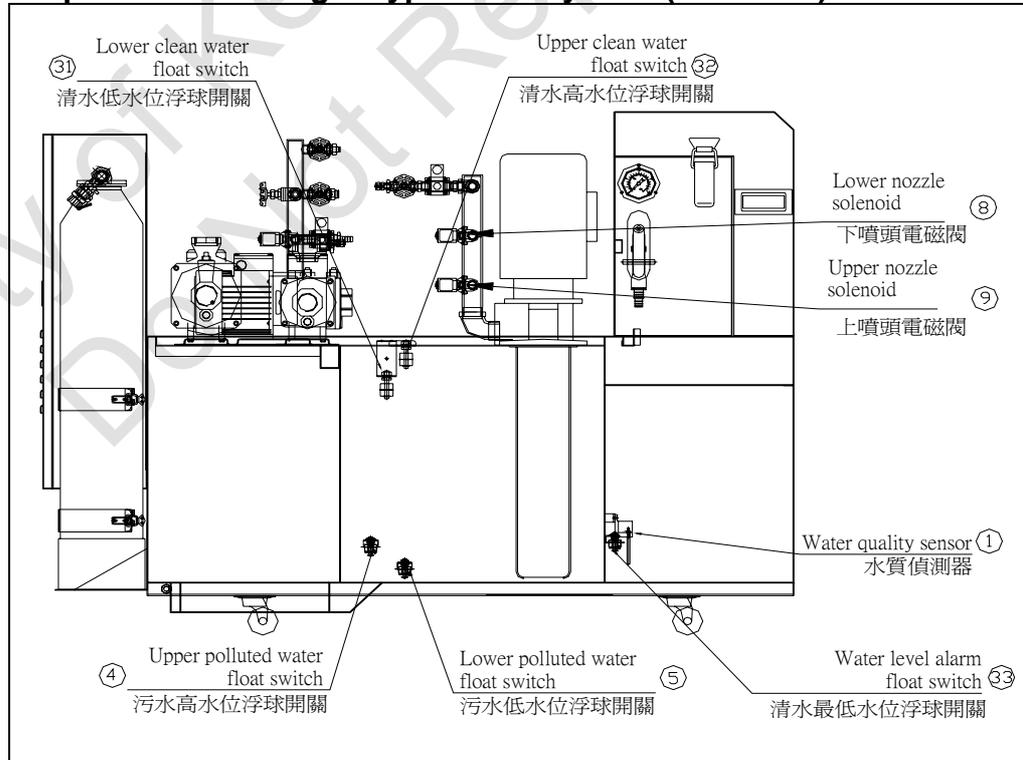
No.	Part Name	Circuit No.	Warehouse Part No.
⑫	filter motor relay	K2	EESW14-1
⑬	ion removing motor relay	K3	EESW14-1
⑭	overload relay of high voltage motor	FR1 -AC220V -AC380V	EPRY08-1 EPRY07-1
⑮	overload relay of filter motor	FR2-AC220V -AC380V	EPRY05-1 EPRY03-1
⑯	overload relay of ion removing motor	FR3-AC220V -AC380V	EPRY02-1 EPRY01-1
⑰	indicator showing water level low	LP3	ELP01
⑱	trouble indicator for high press motor	LP4	ELP01
⑲	trouble indicator for filter motor	LP5	ELP01
⑳	high press motor	M2	M0BWSJ54CN
㉑	filter motor	M3	M0BWSJ53AN
㉒	ion removing motor	M4	M0BWSJ53AN
㉓	PANEL1_TM1: terminal block	PANEL1_TM1	EWD0120
㉔	grounding copper plate	FG	E0C10P
㉕	water system PCB	PCB : JC-2F107A	EEPCJC2F107A
㉖	power filter ( AC110V/10A )	LF1	ELF10A

**A. Electronic parts of Submerged type water system (top view)**



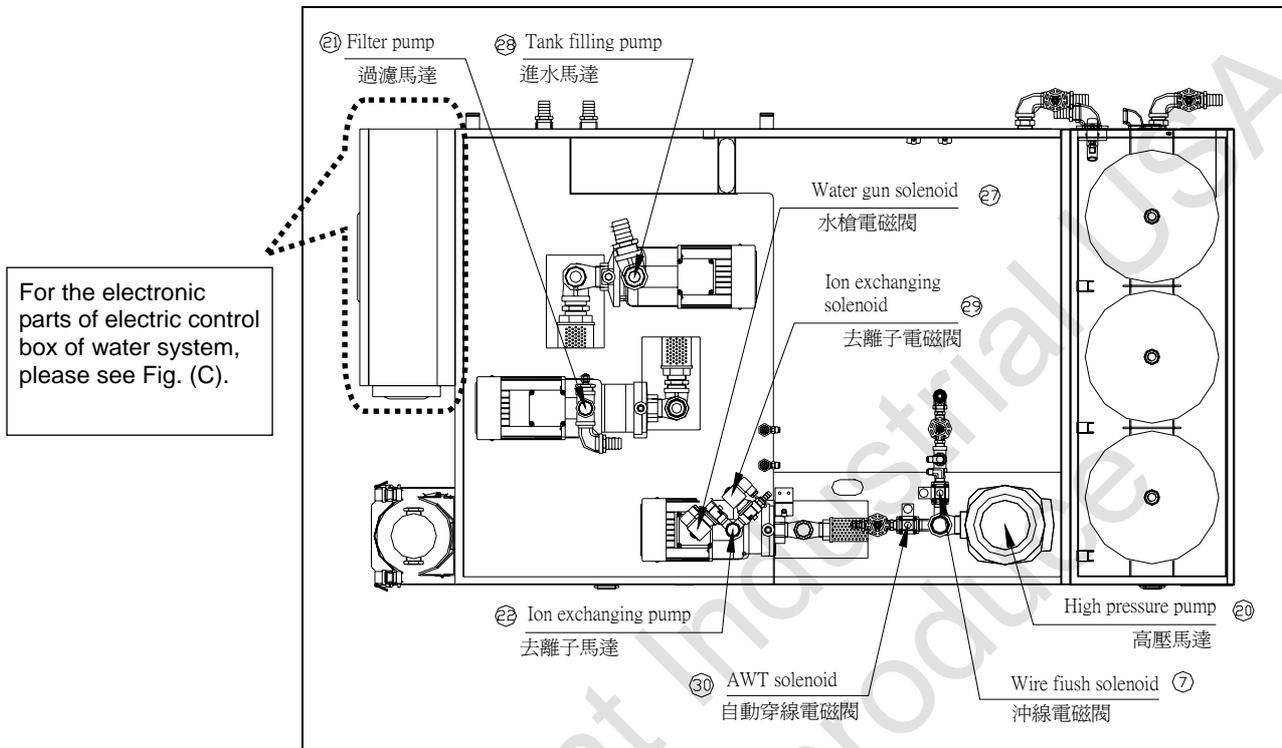
Applicable Type of machine: WI-430S、WI-430SA

**B. Electronic parts of Submerged type water system (side view)**



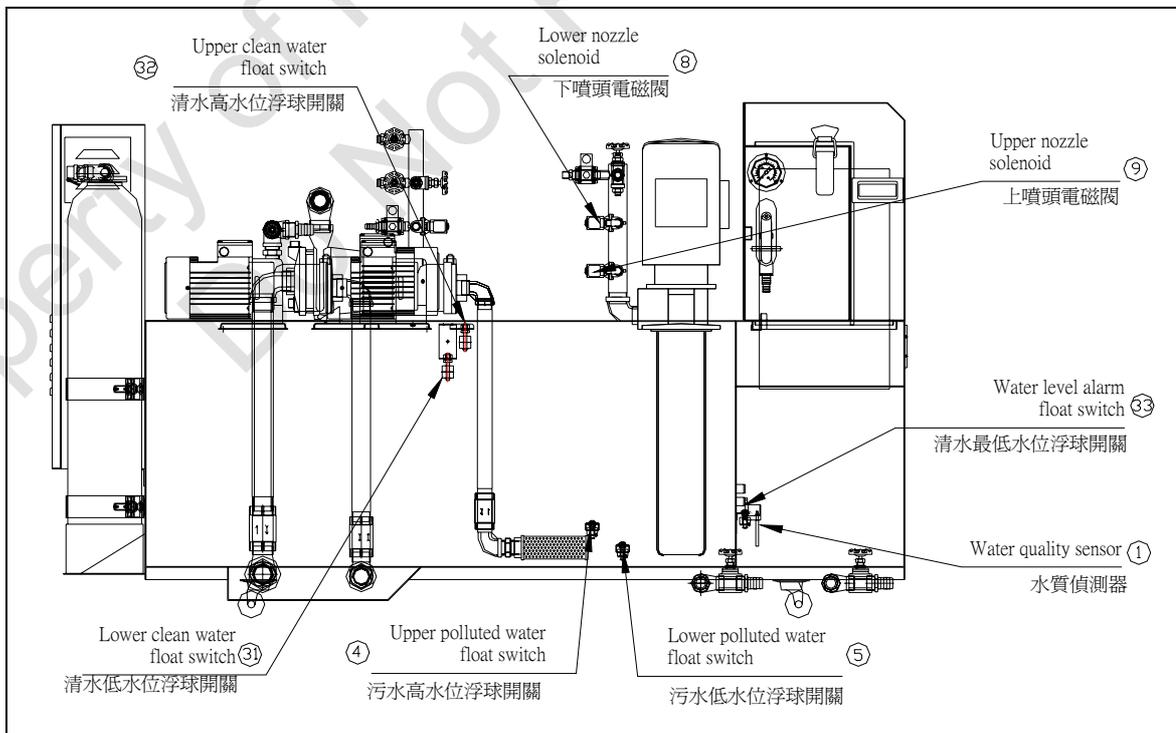
Applicable Type of machine : WI-430S、WI-430SA

**A-1. Electronic parts of Submerged type water system (top view)**



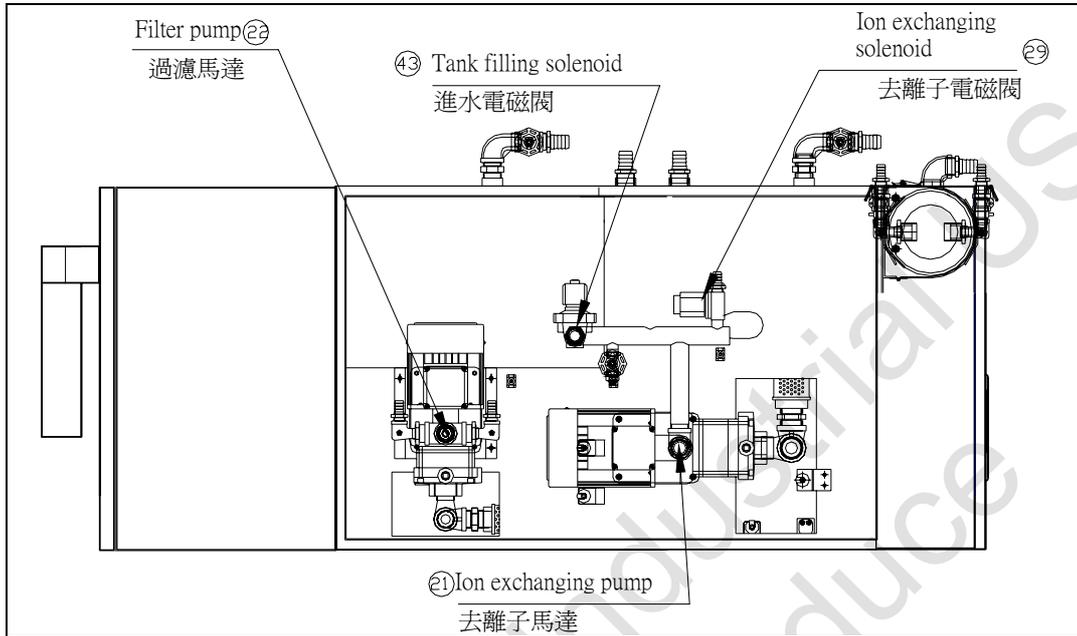
Applicable Type of machine : WI-640S、WI-640SA

**B-1. Electronic parts of Submerged type water system (side view)**



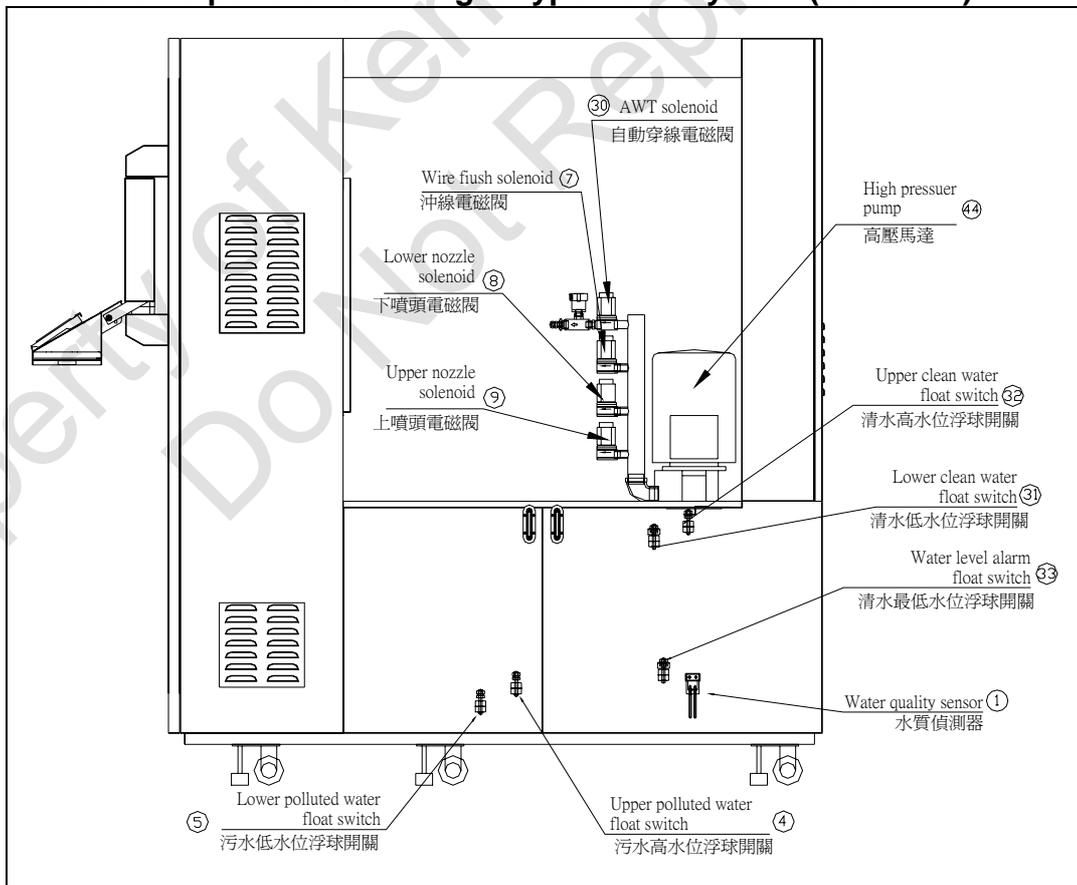
Applicable Type of machine : WI-640S、WI-640SA

**A-2. Electronic parts of Submerged type water system (top view)**



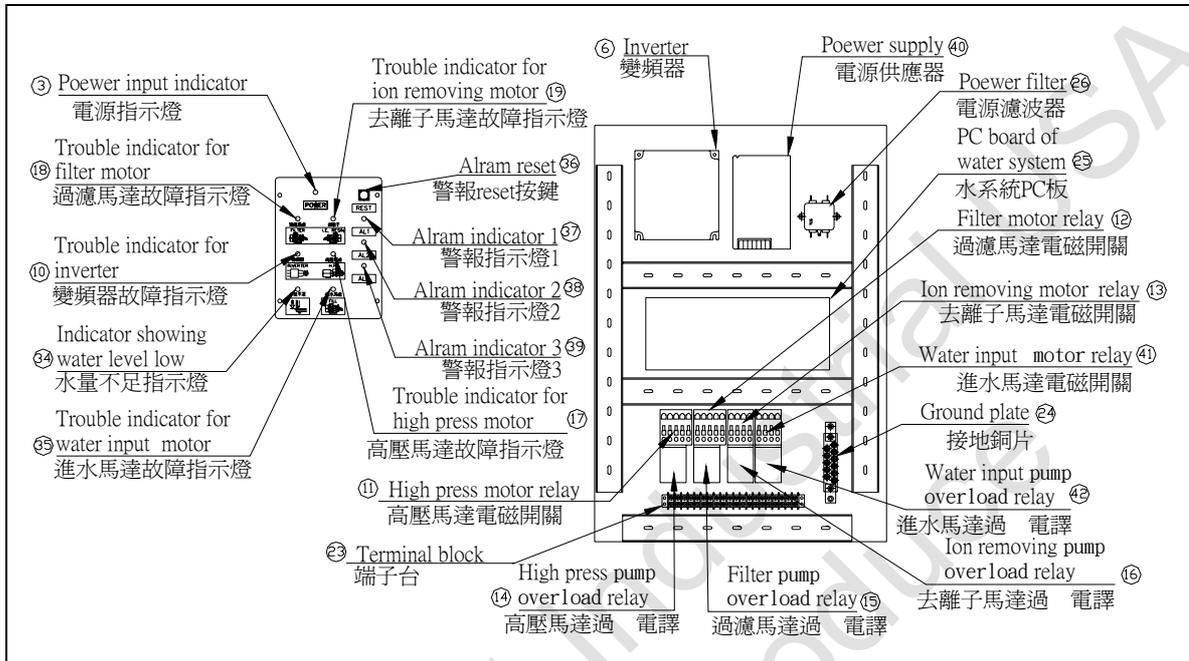
Applicable Type of machine : WI-200S 、 WI-200SA

**B-2. Electronic parts of Submerged type water system (side view)**



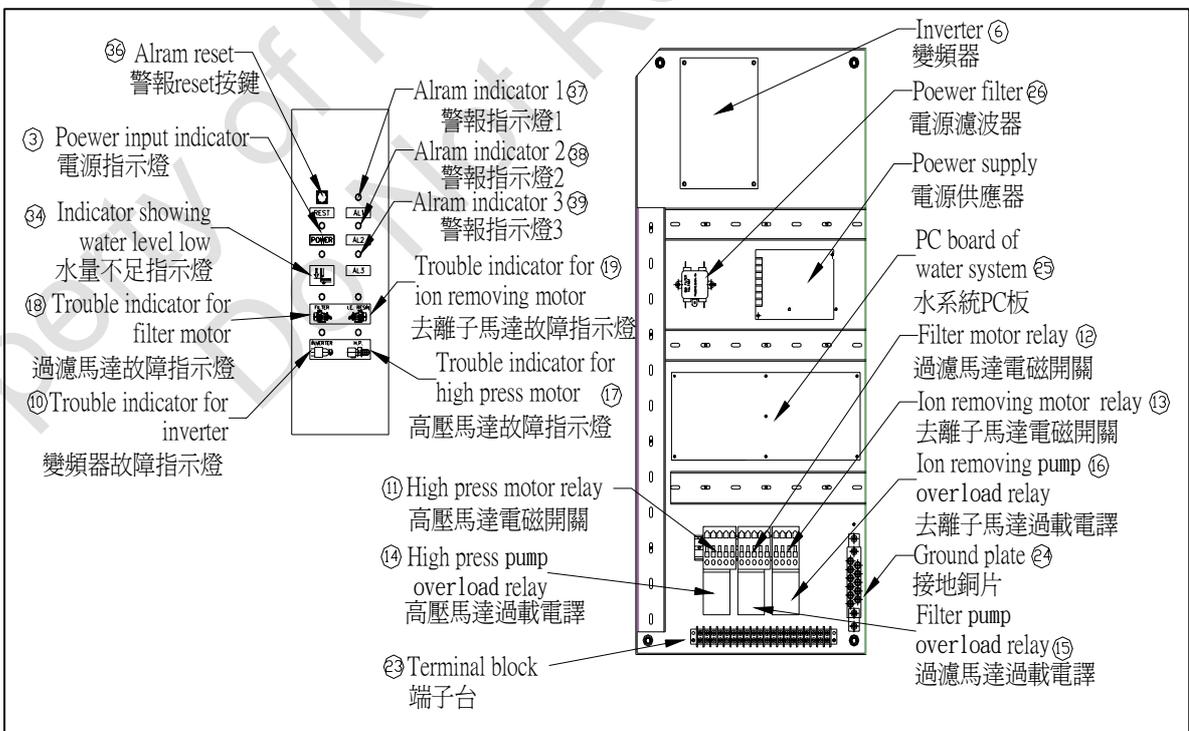
Applicable Type of machine : WI-200S 、 WI-200SA

**C. Electronic parts of electric control box of Submerged type water system**



Applicable Type of machine : WI-430S、WI-430SA、WI-640S、WI-640SA

**C-1. Electronic parts of electric control box of Submerged type water system**



Applicable Type of machine : WI-200S、WI-200SA

**PART ( I ):** Referential circuit drawing FIG16-WATER\_SYSTEM4 consists of following parts –

- ① WATER\_QUILTY\_SENSOR: water quality sensor
- ④ SL1: float switch of polluted water (high level)
- ⑤ SL2: float switch of polluted water (low level)
- ⑫ PCB\_JC-2H073B: PC board of water system
- ⑰ SL4: float switch of clean water (low level)
- ⑱ SL3: float switch of clean water (high level)
- ⑳ SL5: float switch of clean water (lowest level)

**PART ( II ):** Referential circuit drawing FIG17-WATER\_SYSTEM5 consists of following parts –

- ③ LP1: power input indicator of water tank (showing normality)
- ⑥ INVERTER: inverter
- ⑩ LP2: trouble indicator of inverter
- ⑳ M2: high press motor
- ⑫ PCB\_JC-2H073B: PC board of water system
- ⑰ LF1: power filter ( AC110V/10A )
- ⑳ SWITCH01: alarm reset
- ㉑ LED01: alarm indicator 1
- ㉒ LED02: alarm indicator 2
- ㉓ LED03: alarm indicator 3
- ㉔ SWP1: power supply ( D-60B )
- ㉕ M2 : high press motor(WI-200 USED)

**PART ( III ):** Referential circuit drawing FIG18-WATER\_SYSTEM6 consists of following parts –

- ⑪ K1: high press motor relay
- ⑫ K2: filter motor relay

- ⑬ K3: ion removing motor relay
- ⑭ FR1: overload relay of high voltage motor
- ⑮ FR2: overload relay of filter motor
- ⑯ FR3: overload relay of ion removing motor
- ⑰ LP4: trouble indicator for high press motor
- ⑱ LP5: trouble indicator for filter motor
- ⑲ LP6: trouble indicator for ion removing motor
- ⑳ PCB\_JC-2H073B: PC board of water system
- ㉓ LP3: indicator showing water level low
- ㉔ LP7: trouble indicator for water input motor
- ㉕ K4: water input motor relay
- ㉖ FR4: overload relay of water input motor

**PART (V):** Referential circuit drawing FIG19-WATER\_SYSTEM7 consists of following parts –

- ⑦ AUTO\_GATE: solenoid valve of wire flush
- ⑧ HI\_GATE02: solenoid valve of lower nozzle
- ⑨ HI\_GATE01: solenoid valve of upper nozzle
- ㉑ M3: filter motor
- ㉒ M4: ion removing motor
- ㉓ PANEL1\_TM1: terminal block
- ㉔ FG: grounding copper plate
- ㉕ PCB\_JC-2H073B: PC board of water system
- ㉗ GUN\_GATE: solenoid valve of water gun
- ㉘ M5: water input motor
- ㉙ DEN\_GATE: solenoid valve of ion removing
- ㉚ UP-AUTO\_GATE: solenoid valve of auto threading
- ㉛ WATER\_GATE : solenoid valve of water(WI-200 USED) ◦

**SYNOPSIS OF WAREHOUSE PART NUMBERS OF WATER SYSTEM**

No.	Part Name	Circuit No.	Part No.
①	water quality sensor	WATER_QUILTY_SENSOR	E0BWJ27BN
③	power input indicator of water tank (showing normality)	LP1	ELP00
④	float switch of polluted water (high level)	SL1	M1SSC27BN
⑤	float switch of polluted water (low level)	SL2	M1SSC27BN
⑥	Inverter -AC220V -AC380V	INVERTER (TECO)	ECF04 ECF05
⑦	solenoid valve of wire flush	AUTO_GATE	M0BWSJ14FN
⑧	solenoid valve of lower nozzle	HI_GATE02	M0BWSJ14FN
⑨	solenoid valve of upper nozzle	HI_GATE01	M0BWSJ14FN
⑩	trouble indicator of inverter	LP2	ELP01
⑪	high press motor relay	K1	EESW02-1
⑫	filter motor relay	K2	EESW14-1
⑬	ion removing motor relay	K3	EESW14-1
⑭	overload relay of high voltage motor	FR1 -AC220V -AC380V	EPRY08-1 EPRY07-1
⑮	overload relay of filter motor	FR2 -AC220V -AC380V	EPRY05-1 EPRY03-1
⑯	overload relay of ion removing motor	FR3 -AC220V -AC380V	EPRY02-1 EPRY01-1
⑰	trouble indicator for high press motor	LP4	ELP01
⑱	trouble indicator for filter motor	LP5	ELP01
⑲	trouble indicator for ion removing motor	LP6	ELP01
⑳	high press motor	M2	M0LJH013EN
㉑	filter motor	M3	M0EWQ38CN
㉒	ion removing motor	M4	M0BWSJ53AN
㉓	terminal block	PANEL1_TM1	EWD0120
㉔	grounding copper plate	FG	E0C10P
㉕	PC board of water system	PCB : JC-2H073B	EPCJC2H073B
㉖	power filter ( AC110V/10A )	LF1	ELF10A
㉗	solenoid valve of water gun	GUN_GATE	M0BWSJ14FN
㉘	water input motor	M5	M0JAQ84CN
㉙	solenoid valve of ion removing	DEN_GATE	M0BWSJ14FN
㉚	solenoid valve of auto threading	UP-AUTO_GATE	M0BWSJ14FN
㉛	float switch of clean water (low level)	SL4	M1SSC27BN
㉜	float switch of clean water (high level)	SL3	M1SSC27BN

No.	Part Name	Circuit No.	Part No.
③③	float switch of clean water (lowest level)	SL5	M1SSC27BN
③④	indicator showing water level low	LP3	ELP01
③⑤	trouble indicator for water input motor	LP7	ELP01
③⑥	alarm reset	SWITCH01	EPCJC2H073B
③⑦	alarm indicator 1	LED01	EDLIR5
③⑧	alarm indicator 2	LED02	EDLIR5
③⑨	alarm indicator 3	LED03	EDLIR5
④⑩	power supply ( D-60B )	SWP1	EPWD-60B
④①	water input motor relay	K4	EESW14-1
④②	overload relay of water input motor	FR4 -AC220V -AC380V	EPRY06-1 EPRY04-1
④③	solenoid valve of water(WI-200 USED)	WATER_GATE	M0EWR12AN
④④	high press motor(WI-200 USED)	M2	M0BWSJ54CN

# Operation Panel

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### 3 PC BOARD OF ELECTRIC CONTROL BOX

In the electric control box of wire EDM, there are several PC boards. The service men must understand their functions, settings, operational power and the connecting wires on the PC boards. Furthermore, the service men must understand their mutual relationships so as to shoot the troubles quickly.

#### 3.1 IPC Intel® Atom™ High Value Fanless Embedded Box PC

The industrial pure, which adopt CPU with Intel® Atom™ is responsible for platform data processing, NC program interpretive, motion control, in/output signal logic process and discharge power control function. Besides, the storage for this IPC contains CF card with 4G storage and 2G RAM. It supports up to 6 USB 2.0 port, 4 COM terminal, and 2 1G Ethernet, which makes it easy to integrate and maintain.

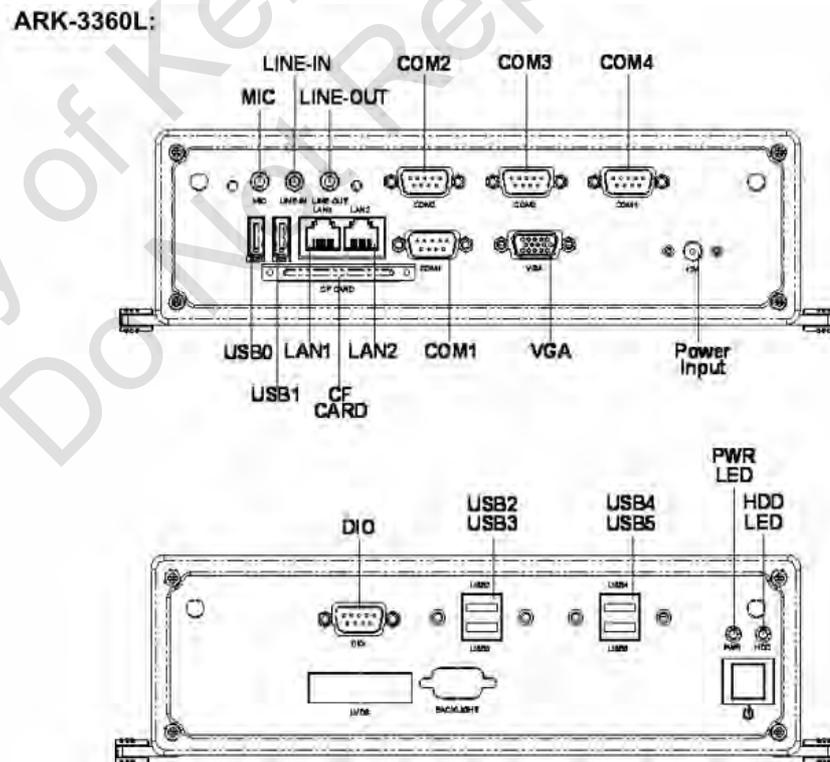
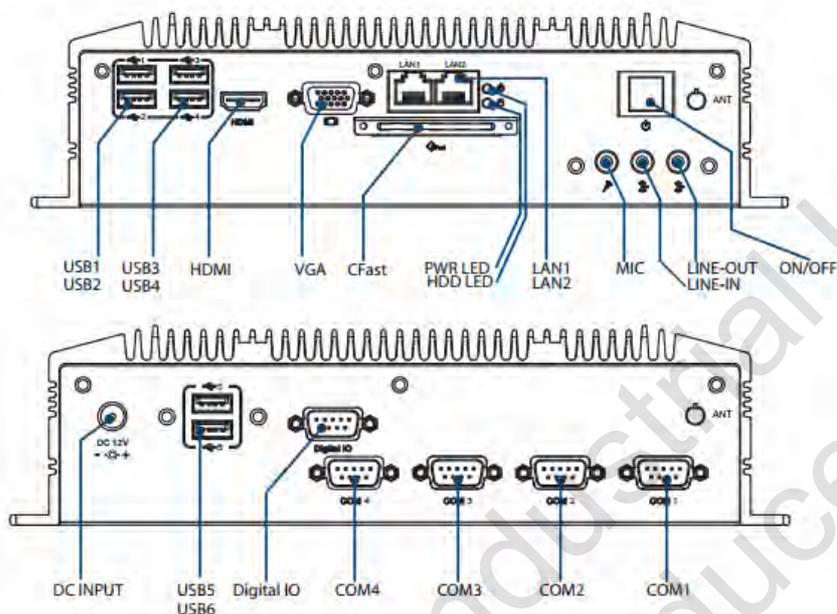


Fig. 3.1 ARK-3360 Controller port locations

ARK-2120 :



**Fig. 3.1 ARK-2120 Controller port locations**

### 3.2 Motion-DA\_IO Board Guide

Motion-DA\_IO Board is a control card developed for CNC control system. It controls all movement of 6-axis motion sever, discharge voltage control and water quality detection.

#### 3.2.1 FUNCTIONS

- (1) Machine original port and signal input of travel limit
- (2) Input of wire broken signal and the input of vertical alignment signal
- (3) Z axis brake control (DC24V)
- (4) Output voltage of edge search and detect gap voltage.
- (5) Detect water resistivity,
- (6) Connect the servo system of 6 axes ( X, Y, Z, U, V and W.)
- (7) Sever drive Servo On output , Alarm Reset output , Servo output and Driver Alarm Output .
- (8) X and Y axes provide a linear scale and a receiving mode for shaft encoder.
- (9) Z, U, V and W, 4 axes, provide the receiving of shaft encoder.
- (10) The signal type of shaft encoder and linear scale is a line driver namely A, A/, B, B/, C and C/.

( 11 ) Control motion servo site In control system of servo motion site, there are between CPU and servo drive

A. Mode of velocity control loop: It receives the position command of CUP and the position feedback signal from the motor. The offset difference is converted into velocity command which is sent to the motor driver to form a close loop control.

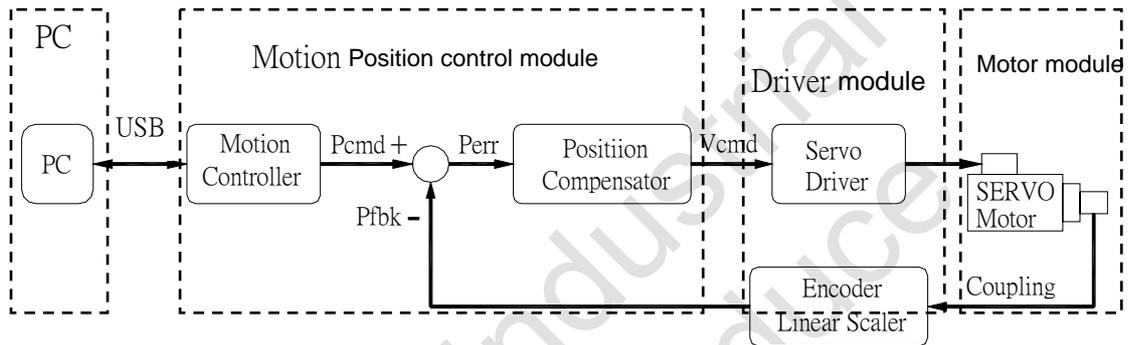


Fig. 3.2 Relationship between **MOTION** board and control system of servo position

3.2.2 **System connecting diagram**

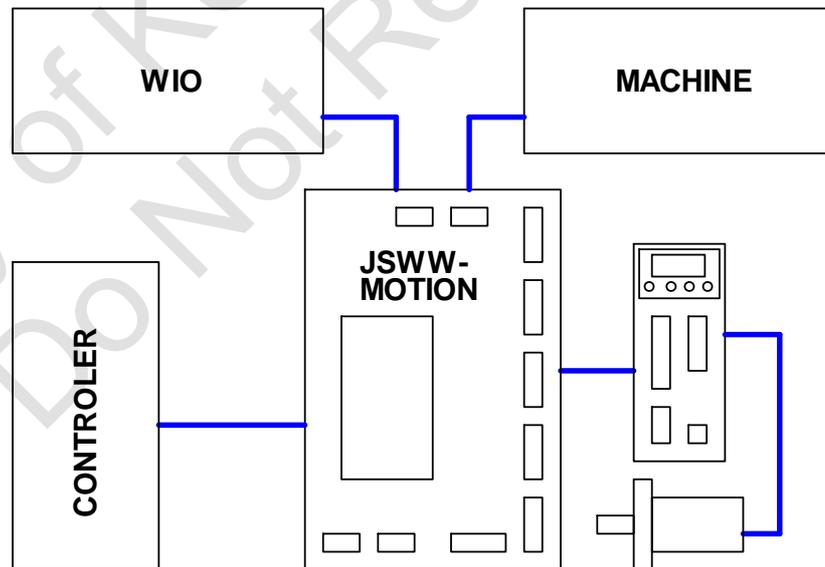


Fig. System connection diagram of 3.3 MOTION

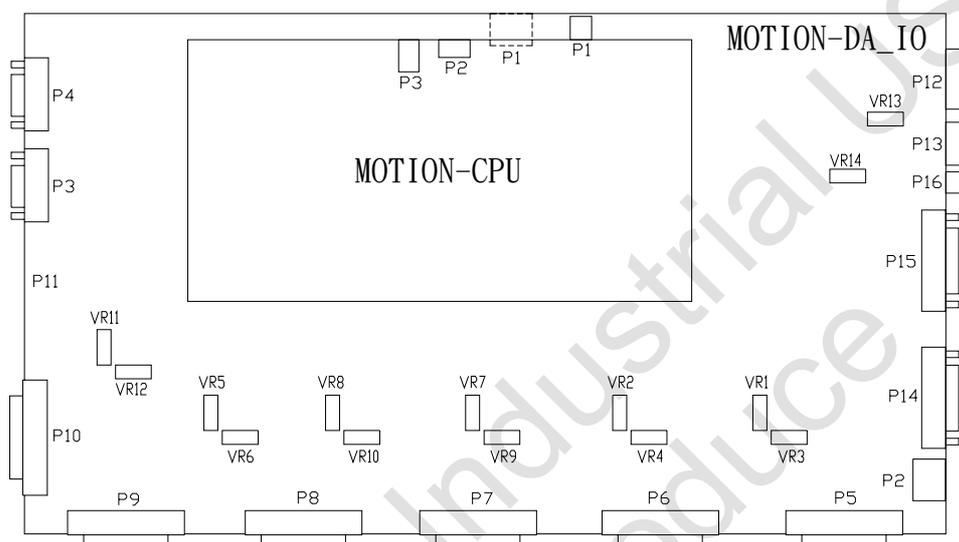
### 3.2.3 Installation and application of the hardware

#### 1. Install the hardware -

- (1) Check if MOTION CPU is steady stabled on MOTION DA\_IO board.
- (2) Extend 37PIN、24PIN metal connection to P14、P15 (DB15)、P12、P13、P16 and stable it on MOTION board.
- (3) Connect the Cable of P5、P6、P7、P8、P9、P10、Sever system (Driver) .
- (4) Wait till other hardware devices of the system are completely installed.
- (5) Switch on the power (start the machine). Thus, the installation is completed.

## 3.2.4 Set hardware configuration Guide

## (1) Connector Number



**Fig. 3.4 MOTION  
External view**

## 1. Guide Light guide

Guide	LED Light
DC+5V Power light	LED2、LED3
DC+24V Power light	LED4
DC+3.3V Power light	LED5
Servo ON light	LED10(X)、LED11(Y)、LED22(U)、 LED23(V)、LED34(Z)、LED35(W)
Servo Alarm light	LED6(X)、LED7(Y)、LED18(U)、 LED19(V)、LED30(Z)、LED31(W)
Servo Ready light	LED8(X)、LED9(Y)、LED20(U)、 LED21(V)、LED32(Z)、LED33(W)
Alarm CLR light	LED12(X)、LED13(Y)、LED24(U)、 LED25(V)、LED36(Z)、LED37(W)
X axis + Limit	LED44
X axis home Limit	LED48
X axis - Limit	LED52

Guide	LED Light
Y axis + Limit	LED56
Y axis home Limit	LED60
Y axis - Limit	LED63
U axis + Limit	LED57
U axis home Limit	LED61
U axis - Limit	LED64
V axis + Limit	LED46
V axis home Limit	LED50
V axis - Limit	LED54
Z axis + Limit	LED45
Z axis home Limit	LED49
Z axis - Limit	LED53
W axis + Limit	LED58
W axis home Limit	LED62
W axis - Limit	LED65
Auto Vertical (H)	LED47
Auto Vertical (L)	LED51
wire broken signal	LED55
Emergency stop	LED59

There are two parts that the motion board can be adjust, which is electric conduction adjustment and Offset, Gain adjustment.

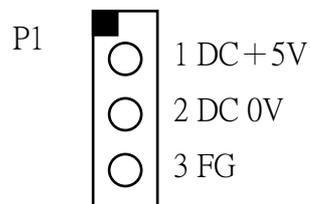
Guide	Variable Resistance	Guide	Variable Resistance
X axis OFFSET	VR3	X axis GAIN	VR1
Y axis OFFSET	VR4	Y axis GAIN	VR2
U axis OFFSET	VR9	U axis GAIN	VR7
V axis OFFSET	VR10	V axis GAIN	VR8
Z axis OFFSET	VR6	Z axis GAIN	VR5
W axis OFFSET	VR12	W axis GAIN	VR11
Water Drain	VR13		

### 3.2.5 Output / Input connectors

**P1** : DC Power Input connectors

P1 : DC5V Power Input

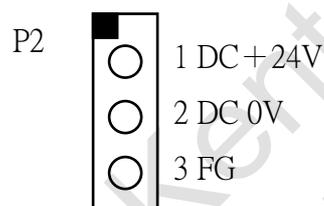
515H3R : 515H3R male connector 90°



**P2** : DC Power Input connectors

P2 : DC24V Power Input

515H3R : 515H3R male connector 90°

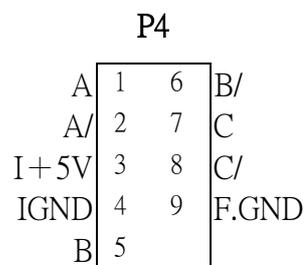
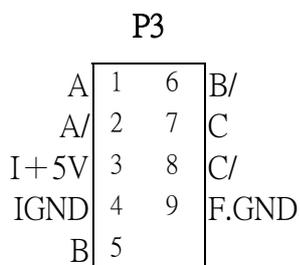


**P3**、**P4** : Input port of linear scale Encoder

P3 : Input port of X axis linear scale Encoder

P4 : Input port of Y axis linear scale Encoder

DB9F: 9 PIN D-Type female header 90°



**P5~P10 : DRIVER connection wires**

SCSI II : 36 PIN female connector 180°

**P5 : Connect X axis Driver****P8 : Connect V axis Driver****P6 : Connect Y axis Driver****P9 : Connect Z axis Driver****P7 : Connect U axis Driver****P10 : Connect W axis Driver**

P5			J6				
EX C	1	19	EX A	EY C	1	19	EY A
EX C/	2	20	EX A/	EY C/	2	20	EY A/
EGND	3	21	EX B	EGND	3	21	EY B
X	4	22	EX B/	X	4	22	EY B/
X_DDA_A	5	23	X	Y_DDA_A	5	23	X
X_DDA_A/	6	24	X	Y_DDA_A/	6	24	X
X_DDA_B	7	25	X	Y_DDA_B	7	25	X
X_DDA_B/	8	26	X_SERVO_ALARM	Y_DDA_B/	8	26	Y_SERVO_ALARM
EGND	9	27	X	EGND	9	27	X
X	10	28	EGND	X	10	28	EGND
E+24V	11	29	RX_LIM_R	E+24V	11	29	RY_LIM_R
RX_SERVO_ON	12	30	RX_LIM_L	RX_SERVO_ON	12	30	RY_LIM_L
X	13	31	RX_ALARM_RESET	X	13	31	RY_ALARM_RESET
X_VCMD	14	32	X	Y_VCMD	14	32	X
X_VCMD_G	15	33	X	Y_VCMD_G	15	33	X
X	16	34	X	X	16	34	X
X	17	35	X	X	17	35	X
FG	18	36	X	FG	18	36	X

P7			P8				
EU C	1	19	EU A	EV C	1	19	EV A
EU C/	2	20	EU A/	EV C/	2	20	EV A/
EGND	3	21	EU B	EGND	3	21	EV B
X	4	22	EU B/	X	4	22	EV B/
U_DDA_A	5	23	X	V_DDA_A	5	23	X
U_DDA_A/	6	24	X	V_DDA_A/	6	24	X
U_DDA_B	7	25	X	V_DDA_B	7	25	X
U_DDA_B/	8	26	U_SERVO_ALARM	V_DDA_B/	8	26	V_SERVO_ALARM
EGND	9	27	X	EGND	9	27	X
X	10	28	EGND	X	10	28	EGND
E+24V	11	29	RU_LIM_R	E+24V	11	29	RV_LIM_R
RU_SERVO_ON	12	30	RU_LIM_L	RV_SERVO_ON	12	30	RV_LIM_L
X	13	31	RU_ALARM_RESET	X	13	31	RV_ALARM_RESET
U_VCMD	14	32	X	V_VCMD	14	32	X
U_VCMD_G	15	33	X	V_VCMD_G	15	33	X
X	16	34	X	X	16	34	X
X	17	35	X	X	17	35	X
FG	18	36	X	FG	18	36	X

P9			P10				
EZ C	1	19	EZ A	EW C	1	19	EW A
EZ C/	2	20	EZ A/	EW C/	2	20	EW A/
EGND	3	21	EZ B	EGND	3	21	EW B
X	4	22	EZ B/	X	4	22	EW B/
Z_DDA_A	5	23	X	W_DDA_A	5	23	X
Z_DDA_A/	6	24	X	W_DDA_A/	6	24	X
Z_DDA_B	7	25	X	W_DDA_B	7	25	X
Z_DDA_B/	8	26	Z_SERVO_ALARM	W_DDA_B/	8	26	W_SERVO_ALARM
EGND	9	27	X	EGND	9	27	X
X	10	28	EGND	X	10	28	EGND
E+24V	11	29	RZ_LIM_R	E+24V	11	29	RW_LIM_R
RZ_SERVO_ON	12	30	RZ_LIM_L	RW_SERVO_ON	12	30	RW_LIM_L
X	13	31	RZ_ALARM_RESET	X	13	31	RW_ALARM_RESET
Z_VCMD	14	32	X	W_VCMD	14	32	X
Z_VCMD_G	15	33	X	W_VCMD_G	15	33	X
X	16	34	X	X	16	34	X
X	17	35	X	X	17	35	X
FG	18	36	X	FG	18	36	X

**P14、P15 : LIMIT connection wires**

P14 : X axis、Y axis、Z axis Input

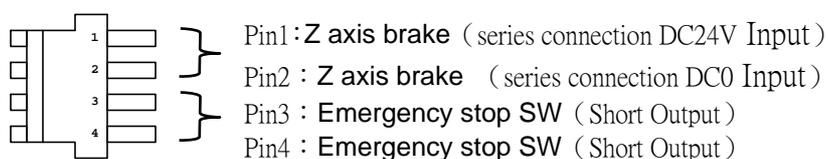
P15 : U axis、V axis、W axis Input

DB15F : 15 PIN D-Type female connector 180°

P14			P15				
X_LIMIT+	1	9	X_HOME+	U_LIMIT+	1	9	U_HOME+
X_LIMIT-	2	10	X、Y、Z COM	U_LIMIT-	2	10	U、V、W COM
Y_LIMIT+	3	11	Y_HOME+	V_LIMIT+	3	11	Y_HOME+
Y_LIMIT-	4	12	X、Y、Z COM	V_LIMIT-	4	12	U、V、W COM
Z_LIMIT+	5	13	Z_HOME+	W_LIMIT+	5	13	W_HOME+
Z_LIMIT-	6	14	X、Y、Z COM	W_LIMIT-	6	14	U、V、W COM
AUTO_VER_H	7	15	AUTO_VER_L	WIRE_BREAK+	7	15	WIRE_BREAK-
AUTO_VER_GND	8			U、V、W CMD	8		

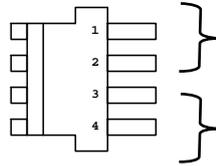
**J11: Connect with Motion ( Emergency stop SW、Z axis brake ) connector**

VH3.96 : 4PIN L type male connector 90°



**P12 : Voltage input connector**

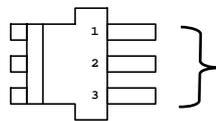
VH3.96 : 4PIN L type male connector 90°



Pin1 : GAP voltage input ( machine-head )  
 Pin2 : GAP voltage input ( machine-body )  
 Pin3 : input short circuit detect – voltage input  
 ( machine-head )  
 Pin4 : input short circuit detect + voltage input  
 ( machine-body )

**P13 : Water Resistivity input connector**

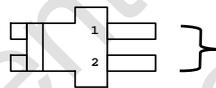
VH3.96 : 3PIN L type male connector 90°



Pin1 : Water Resistivity Detector 1  
 Pin2 : Water Resistivity Detector 2  
 Pin3 : Ground connection

**P16 : Short circuit detect voltage output connector (connected with WIO board)**

VH3.96 : 2PIN L type male connector 90°



Pin1 : short circuit detect + voltage input  
 ( machine-head )  
 Pin2 : short circuit detect – voltage input  
 ( machine-body )

**3.2.6 User Guide**

Hardware adjustment on Motion board is limited; most adjustment can be adjusted on the software. This makes maintenance easier and also increases the range of adjustment. So make sure to be careful while setting the parameter.

### 3.3 Motion-CPU Board Guide

It can handle digital signal immediately to make the detection or filter wave of analogy signal much easier. Before processing the digital signal, it must first change the signal from analogy to digital through the Analog-to-digital converter (ADC). And the output of the digital signal process then change to analogy signal output through the Digital-to-analog converter (DAC).

#### 3.3.1 Hardware configuration setting and Guide

##### (1) Panel Guide

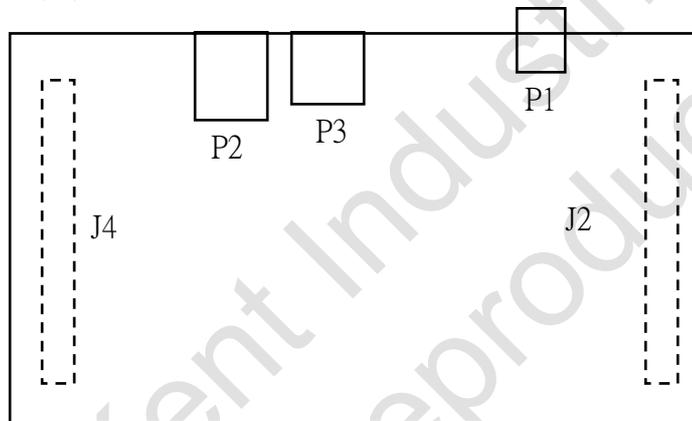


Fig. 3.5 Motion-CPU external view

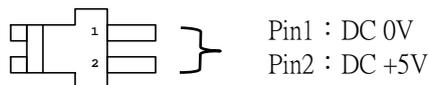
##### (2) Guiding light guide

Guide	LED light
DC5V Power light	LED1
DSP for DC3.3V	LED2
DC3.3V Power light	LED7
Status light	LED3、LED4、LED5、LED6

#### 3.3.2 Output / Input connectors

**P1** : Testing input power connector

VH3.96 : 2PIN L type male connector 90°



**P2** : to controller signal transport USB connector

**P3** : Reserve (RS-485 transport)

### 3.4 WIO Board guide

Wired EDM Input/Output Signal Transmission board is abbreviated as WIOboard. This produce provides input and output functions only for Wire EDM. In addition to the input and output signals on the control panel, WIO board processes all the other input and output signals,

#### 3.4.1 FUNCTIONS

- ( 1 ) Z axis brake control (DC24V)
- ( 2 ) Switch on the hi/low power of super fine circuit, and the transfer and transmission of discharge power
- ( 3 ) Input of wire broken signal
- ( 4 ) Output voltage of wire wheel.
- ( 5 ) Switch on water system to control 8 steps of water pressure, flow and water level alarm.
- ( 6 ) Start cycle system and control water system alarm.
- ( 7 ) Output voltage of edge
- ( 8 ) Control the wire tension and the output of wire speed.
- ( 9 ) 4 steps of hi/low voltage control.
- ( 10 ) AWT function input/output signal process ◦

#### 3.4.2 SYSTEM CONNECTION DIAGRAM

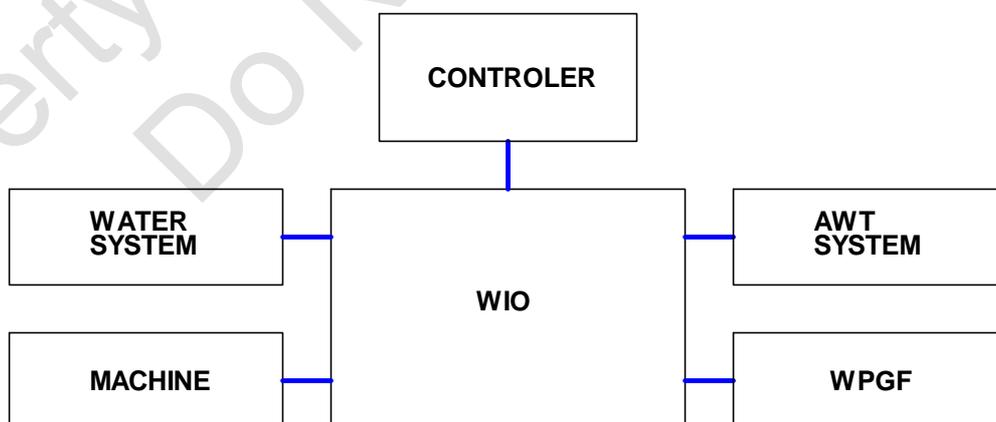


Fig. 3.6 WIO system connection

### 3.4.3 Hardware installation and Guide light guide

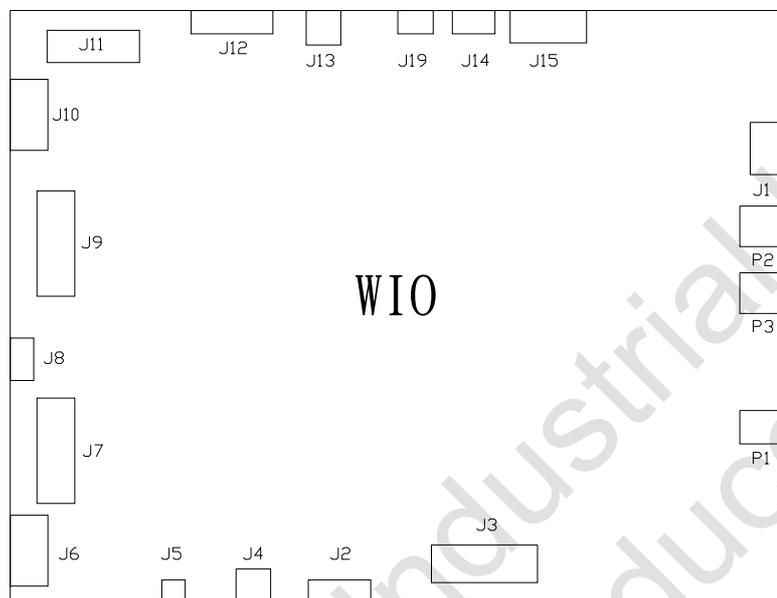


Fig. 3.7 WIO external view

#### 1. Hardware installation steps

- (1) Set the hardware configuration ( refer to hardware configuration setting ) .
- (2) Turn off the power of the system.
- (3) Stable WIOST board on electrical cabinet.
- (4) Connect P1 to controller USB Cable.
- (5) Connect P2 to WPG board USB Cable.
- (6) If using auto-threading function , connect P3 to AWT\_CPU board USB Cable.
- (7) Connect I/O terminal J3 、 J7 、 J9 、 J11 、 J15.
- (8) Connect wire tension , wire speed control Cable to J12.
- (9) Connect edge detect voltage Cable to J5.
- (10) Connect J14 to Motion Cable.
- (11) Connect J19 to UPS Cable.
- (12) Connect J1 、 J4 、 J13 、 power Cable.
- (13) Connect J10 AC power and VR power Cable.
- (14) Wait until the system finish its hardware setting.
- (15) The installation process will finish after turning on the power ◦

## 2. Guide light guide

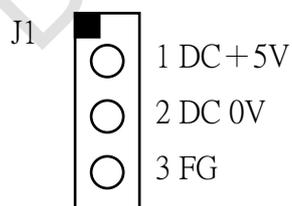
Guide	LED light	Guide	LED light
DC+24V Power light	LED1	DC+3.3V Power light	LED2
Controller USB Power light	LED3	DC+5V to 3.3V Power light	LED4
Emergency stop SW	LED11	Air sensor	LED14
Panel auto-threading switch	LED15	wire broken signal	LED17
Water system alarm	LED29	main power	LED35
Edge power(DC12V)	LED36	high voltage power	LED37
low voltage power	LED38	Spark power	LED39
Z axis brake	LED41	Water pressure level encode bit0	LED43
Water pressure level encode bit1	LED44	Water pressure level encode bit2	LED45
Water system power switch	LED46	HI pump motor switch	LED47
Ion exchange switch	LED48	Semi-automatic threading	LED49
Squirt electromagnet valve switch	LED50	Semi-automatic threading spout	LED51
High speed water inflow electromagnet valve switch	LED52	Water outflow air valve	LED53

## 3.4.4 Output / Input connectors

**J1** : DC Power Input connectors

J1 : DC5V Power Input

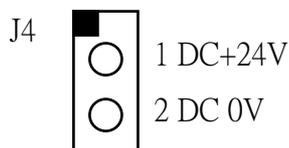
515H3R : 515H3R male connector 90°



**J4 : DC Power Input connectors**

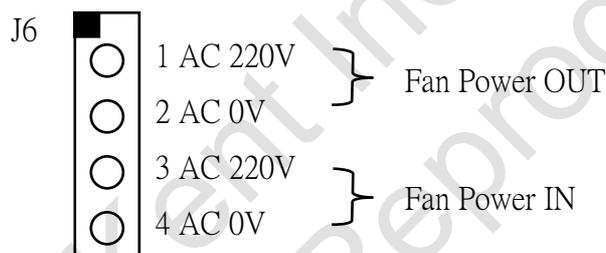
J4 : DC24V Power Input

515H2R : 515H2R male connector 90°

**J6 : AC Fan Power**

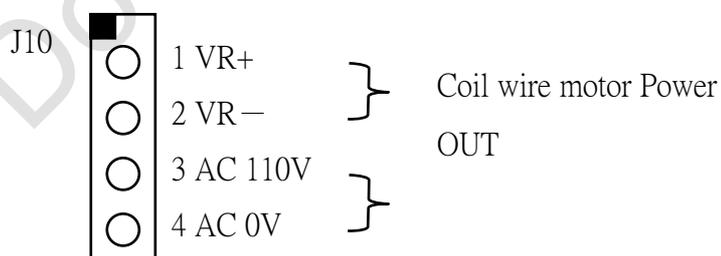
J6 : AC220V Power Input

515H4R : 515H4R male connector 90°

**J10 : Coil wire motor power input and power output**

J10 : AC220V Fan Power

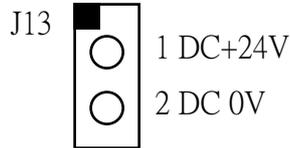
515H4R : 515H4R male connector 90°



**J13 : DC Power Input connectors**

J13 : wire tension 、 wire speed motor power input

515H2R : 515H2R male connector 90°



**P1** : to controller signal transport USB connector

**P2** : to WPGF board signal transport USB connector (RS-485 transport)

**P3** : to AWT\_CPU board signal transport USB connector (RS-485 transport)

**P4** : Reserve input backup point

**J3 : ATX 12PIN connectors**

UP_AUTO_WA	WATFIL	WATDRN	X	X	WATALM
UP_AUTO_WA	WATFIL	WATDRN	X	X	WATALM

UP\_AUTO\_WA : AWT spout

WATFIL : Immerse type high speed water inflow

WATDRN : Immerse type water outflow

WATALM : Water system alarm



**J7 : ATX 16PIN connectors**

WAT_GUN	AUTO_WAT	DENON	WATON	WATPW	WAT1	WAT2	WAT3
WAT_GUN	AUTO_WAT	DENON	WATON	WATPW	WAT1	WAT2	WAT3

WAT\_GUN : Water gun

AUTO\_WAT : Auto water

DENON : Ion exchange switch

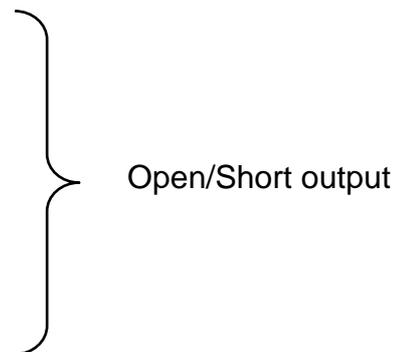
WATON : HI pump motor switch

WATPW : Water system power switch

WAT1 : Water pressure level encode bit0

WAT2 : Water pressure level encode bit1

WAT3 : Water pressure level encode bit2



**J9 : ATX 14PIN connectors**

X	X	X	EDMPW	HIPW	LOPW	SPKPW
X	X	X	EDMPW	HIPW	LOPW	SPKPW

EDMPW : EDM power

HIPW : high voltage power

LOPW : low voltage power

SPKPW : Spark edge

AC 110V output

**J11 : ATX 12PIN connectors**

SEND_WV_L	M_WIRE_BK+	AIR_SENSOR+	IN_AUTO_WA+	X	Z_BRK+
SEND_WV_N	M_WIRE_BK-	WIRE_BK+	X	I_COM	Z_BRK-

Z\_BRK : Z axis brake

I\_COM : Wire break signal (WIRE\_BK-)

Air sensor (AIR\_SENSOR-)

Panel semi-automatic threading button (IN\_AUTO\_WA-)

WIRE\_BK : Wire break signal (WIRE\_BK+)

M\_WIRE\_BK : to Motion Wire broken signal

AIR\_SENSOR : Air sensor (AIR\_SENSOR+)

IN\_AUTO\_WA : Panel semi-automatic threading button (IN\_AUTO\_WA+)

SEND\_WV : Coil wire motor power output

DC+24V output

Negative terminal

Open/Short output

AC 110V

**J15 : ATX 10PIN connectors**

E_STOP+	OFF-SW	ON_SW_B	BUZZER-	BUZZER+
I_COM	X	ON_SW_C	X	X

BUZZER : BUZZER

ON\_SW : ON switch

I\_COM : Emergency switch-、OFF switch - Negative terminal

OFF-SW : OFF switch +

E\_STOP : Emergency switch +

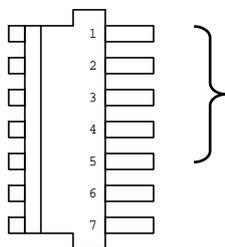
DC+24V output

Open/Short output

Open/Short output

**J2 : WARNING LIGHT 、PCD\_PC board connectors**

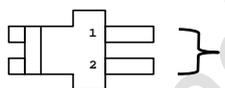
VH3.96 : 7PIN L type male connector 90°



Pin1 : DC+24V ( WARNING LIGHT 、PCD\_PCB DC24V )  
 Pin2 : PCD\_PC board ( DC0V )  
 Pin3 : Warning light ( G DC0V )  
 Pin4 : Warning light ( Y DC0V )  
 Pin5 : Warning light ( R DC0V )  
 Pin6 : Reserve point  
 Pin7 : Reserve point

**J5 : Short circuit detect voltage output connector connected with Motion board**

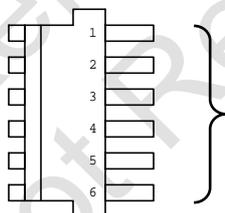
VH3.96 : 2PIN L type male connector 90°



Pin1 : Short circuit detect + voltage input machine-head  
 Pin2 : Short circuit detect - voltage input machine-head

**J12 : connector of wire speed and wire tension output**

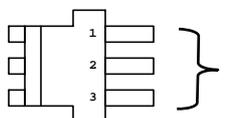
VH3.96 : 6PIN L type male connector 90°



Pin1 : Frame GND  
 Pin2 : wire speed output +  
 Pin3 : wire speed output -  
 Pin4 : wire tension +  
 Pin5 : wire tension -  
 Pin6 : Frame GND

**J19 : UPS input connector**

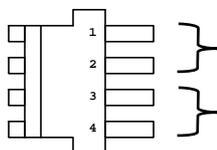
VH3.96 : 3PIN L type male connector 90°



Pin1 : Open/Short Input  
 Pin2 : DC 0V Output  
 Pin3 : DC+5V Output

**J14 : Connector connected with Motion ( Emergency stop SW 、 Z axis brake )**

VH3.96 : 4PIN L type male connector 90°



Pin1 : Z axis brake ( series connection DC24V Input )  
 Pin2 : Z axis brake ( series connection DC0 Input )

## O-BITS(O00~O31)

O_BIT	DEFINE	NOTE
O0	Y0	Reserve point SPO0
O1	Y1	Reserve point SPO1
O2	Y2	Reserve point SPO2
O3	Y3	Reserve point SPO3
O4	Y4	Reserve point SPO4
O5	Y5	Reserve point SPO5
O6	Y6	Reserve point SPO6
O7	Y7	Reserve point SPO7
O8	UP_WATER	Threading spout
O9	WATER_FILL	Immerse type high speed water inflow
O10	WATER_DRAIN	Immerse type water outflow
O11	PCD	PCD circuit
O12	WARNING LIGHT(G)	Warning light(G)
O13	WARNING LIGHT(Y)	Warning light Y)
O14	WARNING LIGHT(R)	Warning light (R)
O15	Y15	Reserve point SPO15
O16	WATER_PRESS3	Water pressure level encode bit0
O17	WATER_PRESS2	Water pressure level encode bit1
O18	WATER_PRESS1	Water pressure level encode bit2
O19	WATER_POWER	Water system power switch
O20	WATER_ON	Hi pump motor switch
O21	DEICEN_ON	Ion exchange switch
O22	AUTO_WATER	Semi-automatic threading
O23	WATER_GUN	Water gun
O24	POWER_DOWN	Main power down
O25	EDGE_SAFE	Edge power(DC12V)
O26	HI_POWER	Hi power
O27	LOW_POWER	low power
O28	SPARK_POWER	Sparkling Mode
O29	Y29	Reserve point SPO29
O30	Z_BRAKE	Z axis brake
O31	LAMP	Working light (Temporary not available)

## I-BITS(I00~I23)

I_BIT	DEFINE	NOTE
I0	E_STOP	Emergency stop SW
I1	OFF_SW_B	Power off switch
I2	UPS_ALARM	UPS unusual signal
I3	AIR_SENSOR	Air sensor
I4	IN_AUTO_WA	Panel Semi-Automatic threading button
I5	X5	Reserve point SPI5
I6	WIRE_BREAK-	Wire break signal
I7	RECYCLE_BOX	Receive wire bin inspect (temporary not available)
I8	X8	Reserve point SPI8
I9	X9	Reserve point SPI9
I10	X10	Reserve point SPI10
I11	X11	Reserve point SPI11
I12	X12	Reserve point SPI12
I13	X13	Reserve point SPI13
I14	X14	Reserve point SPI14
I15	X15	Reserve point SPI15
I16	WATER_UP_A	Drop sink upper water level examine (Temporary not available)
I17	WATER_LOW_A	Drop sink lower water level examine (Temporary not available)
I18	WATER_ALARM	Water alarm

### 3.5 WPGF Board

Wire EDM Discharge Pulse Generator Function Board is called WPGF board, which provides wire EDM with detection and control function on discharge waveform. Thus, discharge parameter can be adjusted according to the finding of discharge detection.

#### 3.5.1 Functions

WPGF Board is the discharge control signal generator for EDM. The main function is to load the discharge parameter and detect the discharge status from the WIO Board. Next, the WPGF Board will sent the signal to WHP Board and WAP Board in order the control the sequence of the discharge.

#### 3.5.2 System connecting diagram

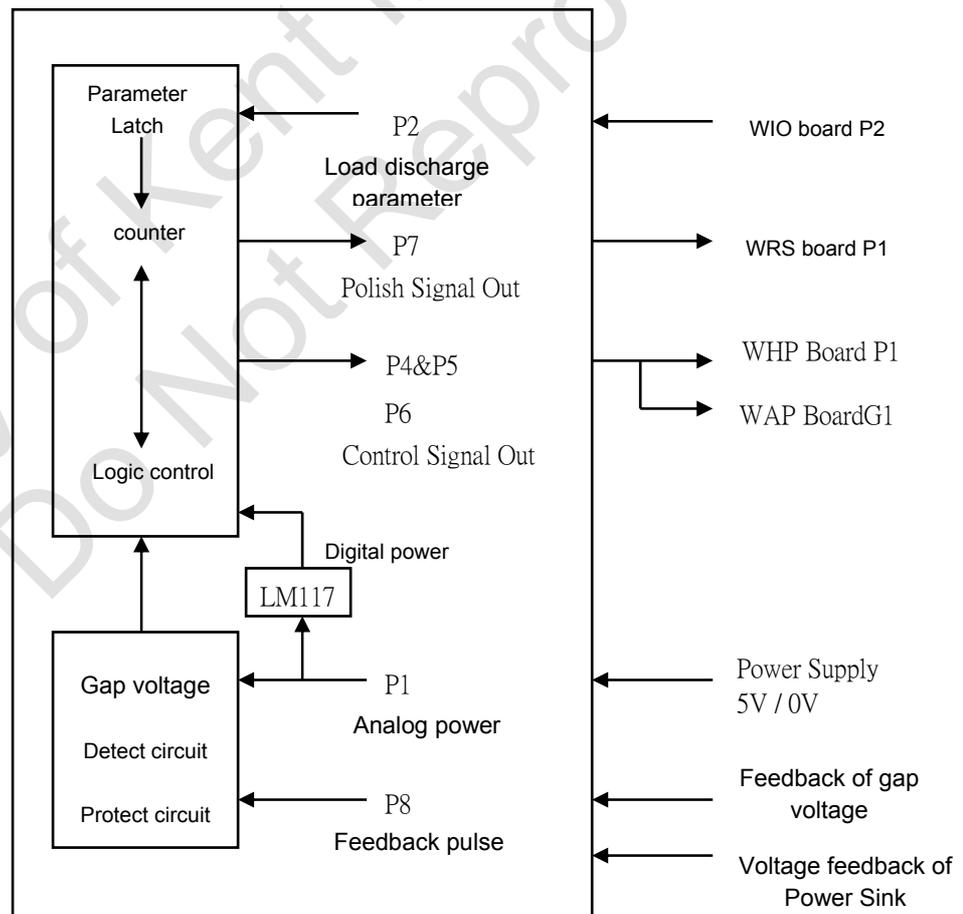


Fig 3.8 WPGF system connecting diagram

### 3.5.3 Installation steps and the usage of hardware

#### 1. WPGF Board Installation sequence

- (1) Plug in the cable to the Power Port P1
- (2) Plug in USB-B Type cable P2
- (3) Plug the Signal cable to P4、P5、P6、P7、P8。
- (4) Plug in the cable for the Discharge Gap Voltage and Power Sink
- (5) Other system hardware installation complete
- (6) Turn ON the power to complete the installation

#### 2. Signal Light

Description	Signal Light
DC+5V Power Light	LED1
DC+3.3 Light	LED2
Power Ready	LED3
Discharge ON Signal 2 input	LED4
WPGF ON Signal Light (Sparkling)	LED5
Discharge ON Signal 1 input	LED6
Polish ON Signal Light	LED7
Retention point	LED8
Polish control Signal Input	LED9
AC/ DC Power control signal input	LED10
AC/ DC Power ON Signal Light	LED11
Discharge parameter loading control signal (ENABLE)	LED12
Discharge Machining Signal Light	LED13
Discharge Parameter Address	LED14、LED16、LED18
Discharge Parameter Data	LED20、LED22、LED24、LED26、LED28、LED29、LED30、LED31
Discharge Normal Light	LED15
Discharge Arc Light	LED17
Discharge Short circuit Light	LED19
Discharge SINK Light	LED21
Discharge GAP < 10V	LED23
Discharge 10V < GAP > 45V	LED25
Discharge GAP > 70V	LED27

3. Port No.

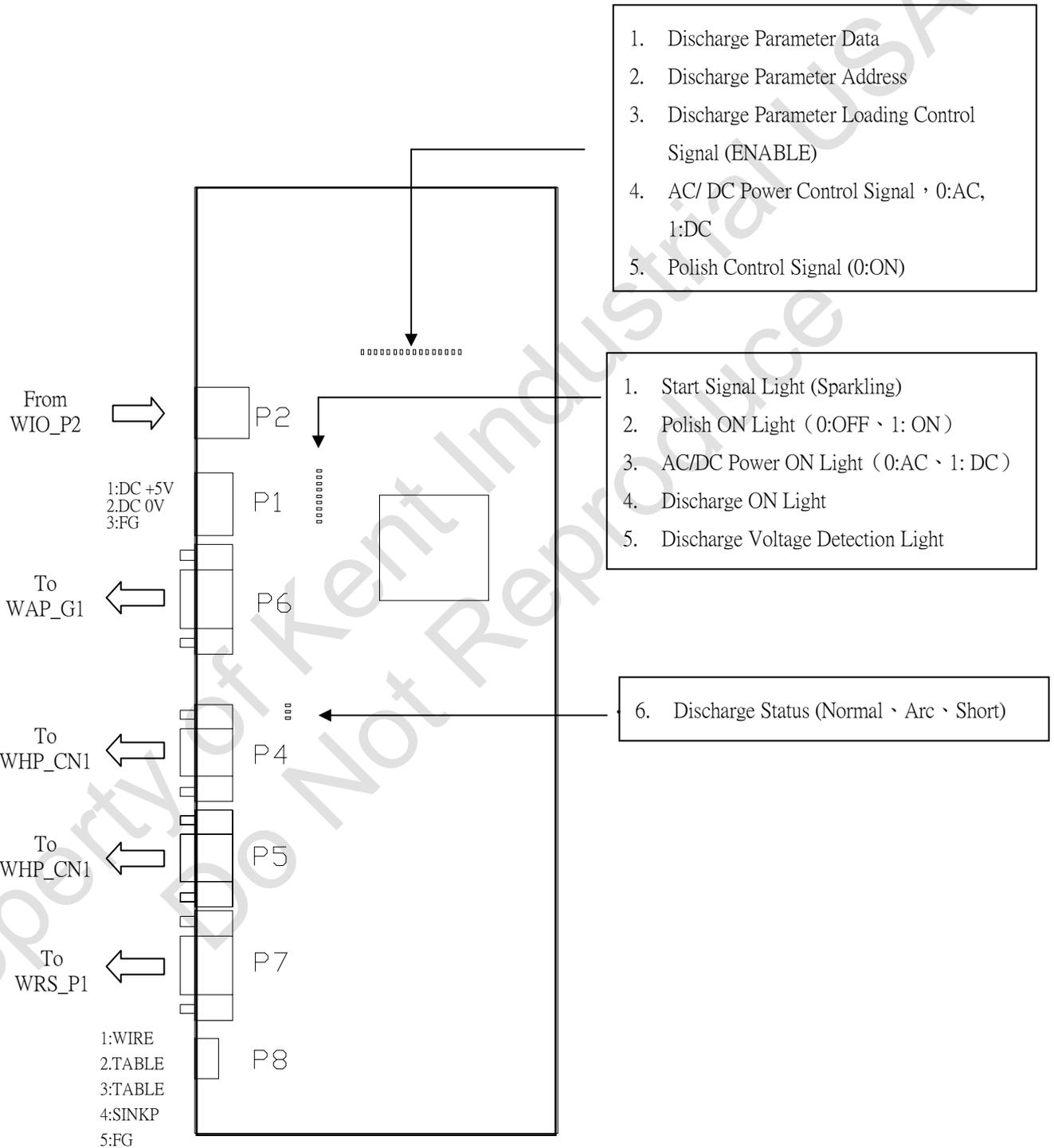
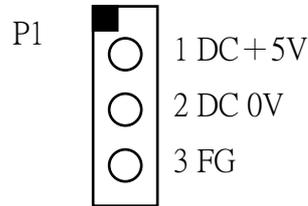


Figure3.9 WPGF Circuit board

**P1** : DC Power Input connectors

P1 : DC5V Power Input

515H3R : 515H3R male connector 90°

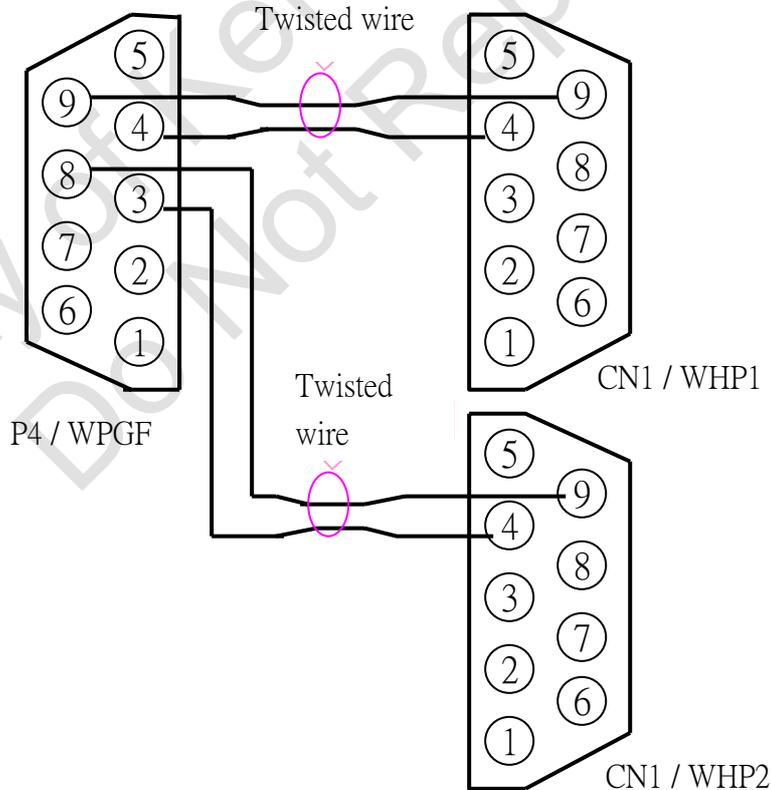


**P2** : For WIO signal transmission USB\_B Type Port (RS-485 Transmission)

**P3** : For retention

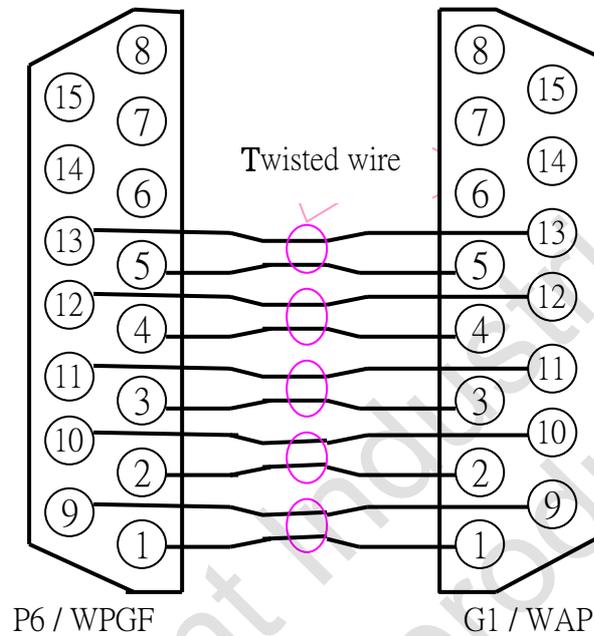
**P4**、**P5** : WPGF sends the control signal to the discharge power of WHP board

DB9F : 9 PIN D-Type female port 90°



**P6** : The ignition signal will be send from WPGF board to WAP board

**DB15F** : 15 PIN D-Type Female port 90°

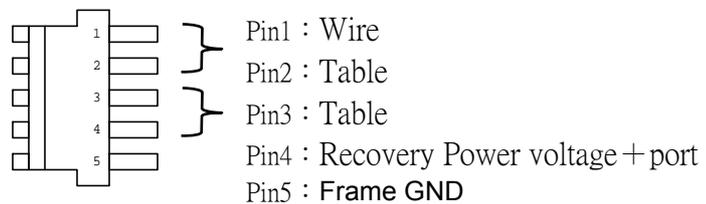


**P7** : WPGF will send the signal of the polish loop and low voltage power to WRS Board.

**DB26F** : 26PIN D-Type female port 180°

**J8** : Gap Voltage and Recovery power voltage port

**VH3.96** : 5PIN L type male port 90°



### 3.6 WHP Board

Wire EDM High Power discharge board is called WHP. This product provides Wire EDM with high power switching capability for discharge, and can quickly switches processing capability required by wire EDM.

#### 3.6.1 Briefly introduce the functions

- (1) Receiving method of optical coupler signal
- (2) Convert signal for TTL and CMOS.
- (3) Push-Pull type PreAmplifier design.
- (4) PostAmplifier employs 8 pieces MOSFET in parallel with link balance design.
- (5) MOSFET is protected by a turn-off snubber circuit, and has Power Sink circuit.

#### 3.6.2 Specifications

- (1) Input control signal.
  - A. Receiving method: Differential receiving via Opticoupler (HCPL-2601).
  - B. Signal address: TTL level (HI : below 0.8V. LOW : above 2.4V)
  - C. Range of signal frequency: 0~110KHz
  - D. Width of signal pulse: 50ns~900ns
  - E. Fitting type: D-type 9Pin male fitting (DB-9M)
  - F. Cable fitting type: D-type 9Pin female fitting (DB-9F)
- (2) PostAmplifier switching circuit
  - A. Capability of current switching: 125A/us ( 8 pcs MOSFET in parallel. 4 pcs WHP board in parallel, and can be switched to 500A/us ) ◦
  - B. External voltage between P+ (SINKP) terminal and P- (TABLE) terminal: DC90V , P+ connects (+).
  - C. External voltage between S (VHPN) terminal and P- (TABLE) terminal: DC220V , P- connect (+)
  - D. D (WIRE) terminal and P- (TABLE) terminal must connected with coaxial cable.
- (3) Others
  - A. Power required: +12V/2.5A , -5V/5A
  - B. Size: length →300mm, width→180mm
  - C. Product name: WHP

### 3.6.3 Connecting diagram of the system

Fig. 3.10 shows the system connecting diagram of WHP. WHP connects the discharge circuit through P + , P – , D and S. Thus, P1 receives WPGF signal. Fig.3.11 shows the wiring diagram of WHP board

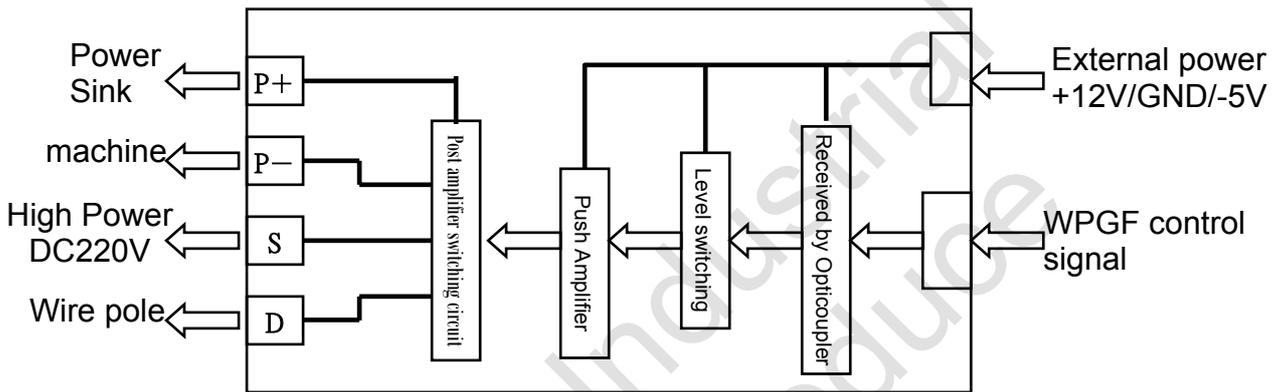


Fig. 3.10 system connecting diagram of WHP board

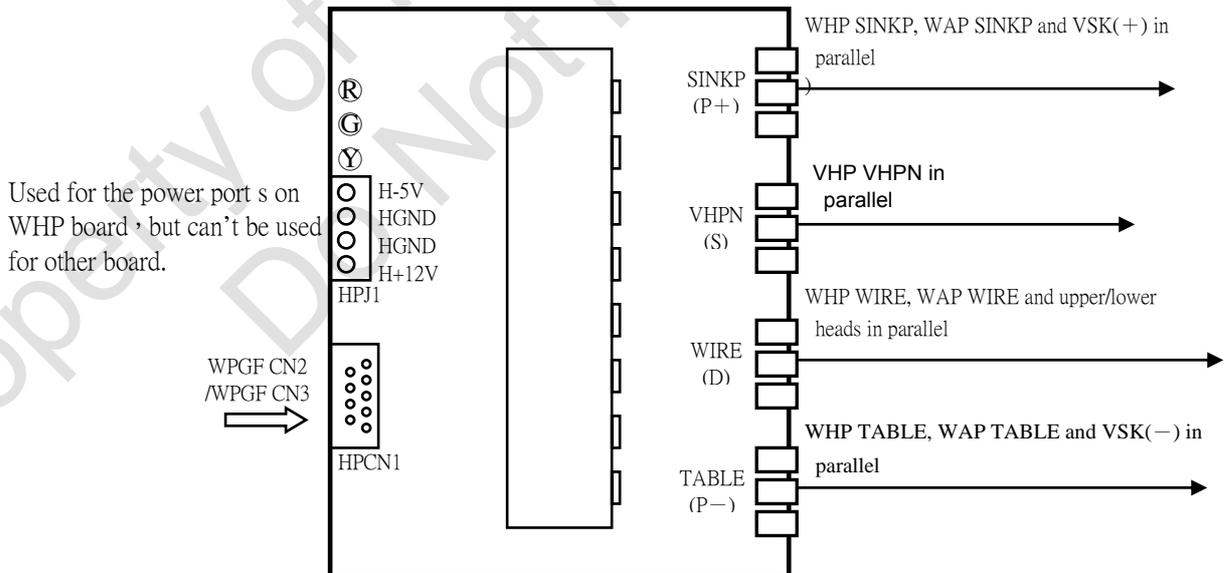


Fig. 3.11 WHP wiring diagram

### 3.6.4 Installation and usage of hardware

#### 1. Installation steps of hardware

Installation steps of WHP hardware:

- (1) Insert WHP board to the port of discharge power box.
- (2) Fix the terminals P+ (SINKP), P- (TABLE), D (WIRE) and S (VHPN) of WHP board and the copper bars of the back plate of the discharge power box.
- (3) Insert power wire to JP1 terminal.
- (4) Insert the signal to the fitting of P1(HPCN1).
- (5) Wait till other hardware equipments of the system is installed.
- (6) Switch on power (start the machine). The installation is completed.

#### 2. Panel

LED of WHP panel

Ⓡ Red LED: +12V lamp

Ⓞ Green LED: -5V lamp

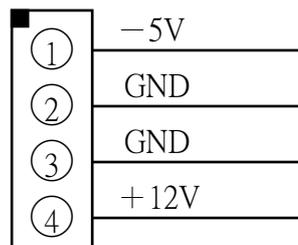
Ⓢ Yellow LED: lamp of control signal

(1) No discharge: 3 lamps Ⓡ Ⓞ Ⓢ keep on lighting.

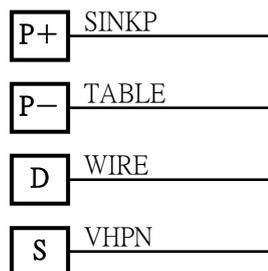
(2) Discharge: 2 lamps Ⓡ Ⓞ keep on lighting. Lamp Ⓢ flickers, and its frequency boosts as the discharge frequency boosts.

#### 3. Output / Input connectors

(1) Definition of JP1 Pin of WHP board



(2) The connecting terminal of WHP board and discharge circuit



#### 4. Wiring

Connect P+, P-, D and S to discharge circuit -

Fig. 3.20 illustrates the relationship between WHP board and discharge circuit:

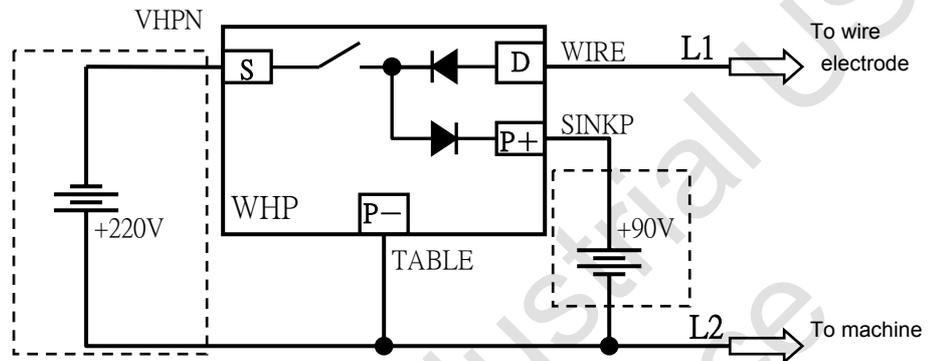


Fig. 3.12 WHP board and discharge

In Fig. 3.12, L1 and L2 are coaxial cables connected to the wire electrode and the machine (workpiece) respectively.

It is necessary to have a gap between the wire electrode and the machine (workpiece), so the coaxial cable from the WHP board is connected to a place near the machine, and then reconnected to the wire electrode and the machine by USB..

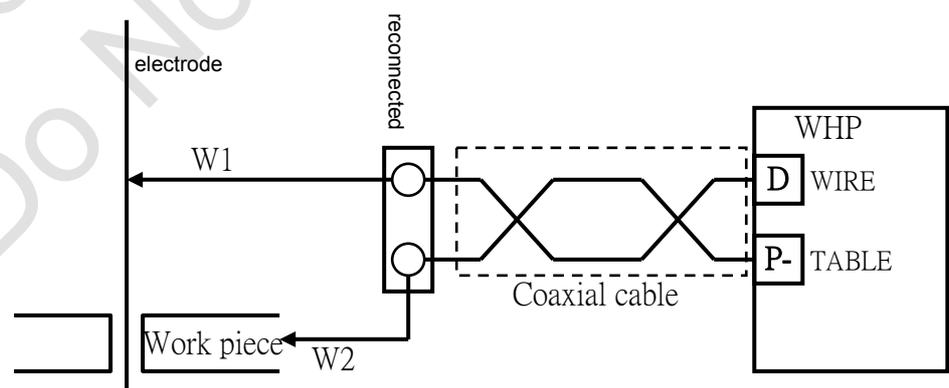


Fig. 3.13 wiring of coaxial cable

Fig. 3.13 illustrates the wiring of WHP board connected to the machine. Coaxial cable has a length limit. After reconnection, W1 and W2, the shorter the better, should not effect the operation.

## 5. USAGE

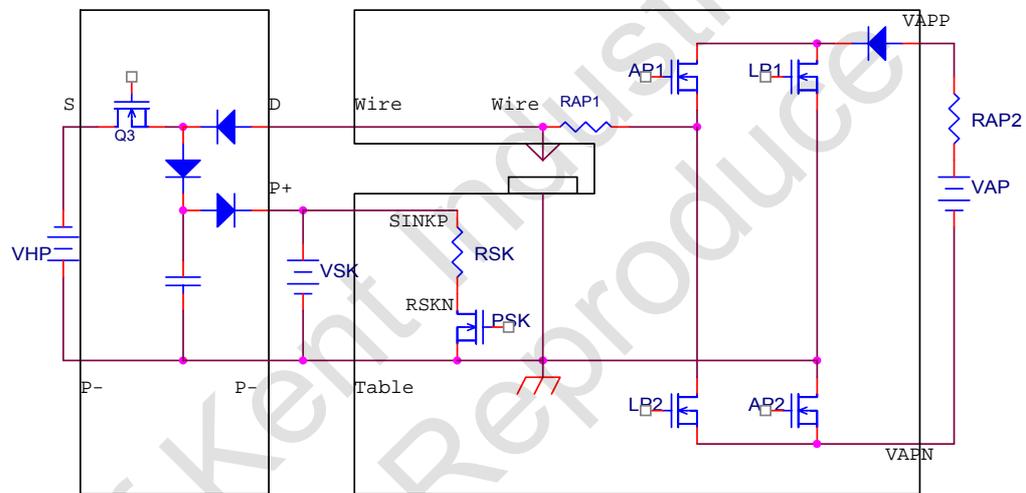
Hints for using WHP board -

- (1) When WHP board operates under high frequency (higher than 50KHZ), the radiating vanes will distinctively boost temperature. Therefore, A sufficient installation space added with an electric fan for cooling purpose is necessary. It enhances radiation efficiency.
- (2) If processing speed is less than  $180\text{mm}^2$ , operation with 4 WHP boards is suggested. If processing speed is over  $180\text{mm}^2$ , operation with 6 WHP boards is suggested.
- (3) Under high speed process, there is a high frequency vibration current of 90A between the high frequency Discharge power (220V) and WHP board. Therefore, the connection between the capacity power and the WHP board should be made by 2 ~ 3 power cords ( $8\text{mm}^2$  multi-cores) in parallel. Shorter power cords are better because they can avoid weld short caused by overheating.
- (4) When the WHP board operates, the fast changes of the voltage and the current will produce huge noises of electric field and magnetic field. Therefore, the signal wire should be twisted wire. Besides, place the electric control box at a proper plate to avoid electromagnetic interferences.

### 3.7 WAP Board

Wire EDM low voltage Alternative Power ignition board “WAP”. During the process of wire EDM discharge, WAP produces alternative current to induce the gap to discharge electricity. Power Sink circuit on WAP board controls Power Sink voltage so as to protect the transistor of High Power board.

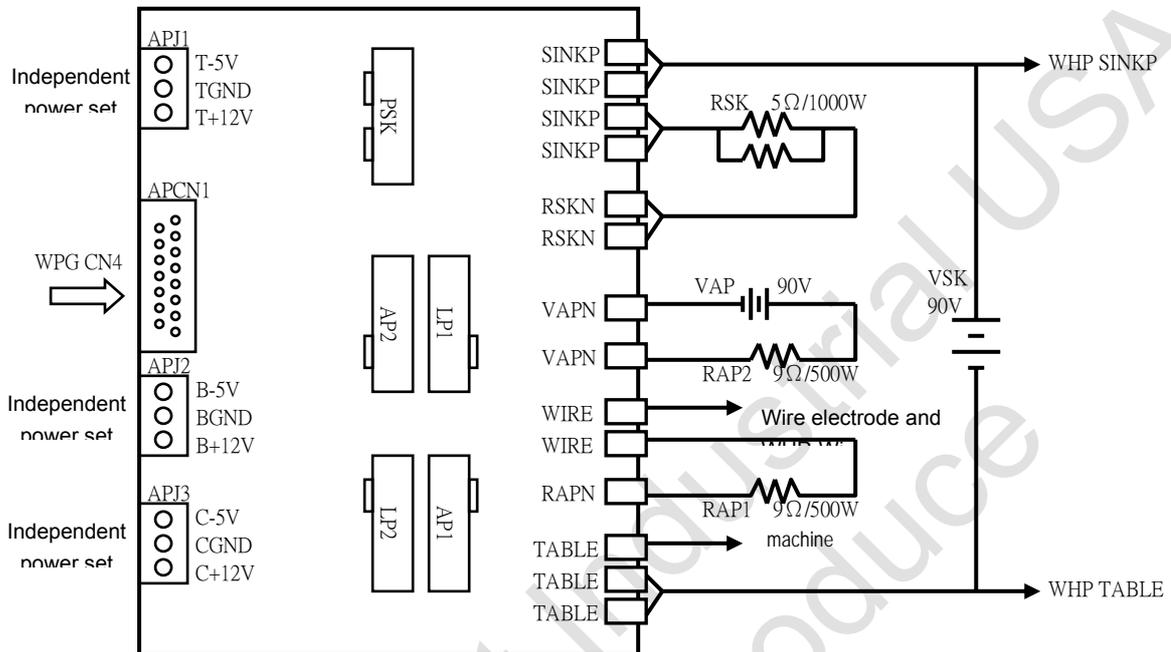
#### 3.7.1 Framework of AC Power Circuit



#### 3.7.2 Functions

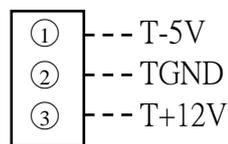
- (1) This circuit board consists of 2 circuits – AC power generating circuit and Power Sink circuit.
- (2) AC power generating circuit consists of 4 switches which can convert DC power into AC output power so as to provide Wire EDM with AC ignition.
- (3) Power Sink circuit keeps Power Sink capacity in a certain range so as to protect High Power transistor. Vsk power provides a capacity initial value, and connects the capacitor through a switch-controlled Rsk (resistance). When the capacity voltage of Power Sink is too high, Rsk resistance will release energy to keep the capacity voltage in a certain range.
- (4) Each switch has an independent Optocoupler to receive the control signal, and drives MOSFET switch through its own MOSFET drive circuit.

### 3.7.3 System Connecting Diagram

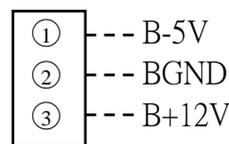


#### Power Supply:

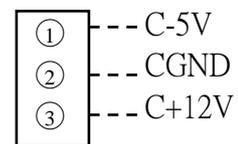
- (1) Power VAP: 90VDC provides energy required by low voltage ignition. During discharge, the maximum voltage should not exceed 105V. Power VAP connects the diode D to insure one-way current.
- (2) Power VPS: Its voltage value is 90V~105V, and  $\geq$  VAP voltage so as to provide Power Sink with initial power.
- (3) 3 independent DC Power Supply units with 3 independent ground wires: They provide the power required to drive 5 switches. Each switch provides +12V/-5V DC voltage as shown below – T (PSK, LP1), B (LP2, AP2) and C (AP1)



APJ1



APJ2



APJ3

#### Specifications of Insulation & high power resistance

- (1) RAP1 and RAP2, total 2 sets required, are the current-limiting resistors with 18Ω/250W. Each should be able to induce 1.6uH (maximum).
- (2) RSK (25Ω/250W), 5 sets in parallel, are the energy release resistors of Power Sink capacitor.

### 3.7.4 Install hardware

- (1) Fix WAP board at the insert port of discharge power box.
- (2) Connect the power resistance of RAP and RSK of WAP board according to paragraph 3.7.3 “system connecting diagram”.
- (3) Connect VAP and VSK power of WAP board according to paragraph 3.7.3 “system connecting diagram”.
- (4) Connect the wire output terminal of WAP board to the wire electrode. Connect Table to the machine by coaxial cable.
- (5) Insert 3 power plugs, APJ1, APJ2 and APJ3. Each plug should have independent power supply with an independent ground wire.
- (6) Insert signal fitting APCN1.
- (7) Wait till other hardware of the system are completely installed.
- (8) Switch on power (Start the machine). Installation is completed.

### 3.7.5 LED Lamp signals

This circuit board has 3 kinds of lamp signals – red, green and yellow. Red lamp indicates the voltage of +12V power normal. Green lamp indicates the voltage of –5V power normal. Each power set has one each of red, green and yellow indicating lamps. Yellow lamp indicates the control signal of each switch. When yellow lamp lights, it indicates “no signal”. When yellow lamp slightly lights, or becomes dim, it indicates a signal that the related switch is switching. This circuit has a total of 5 switches (5 yellow lamps).

### 3.8 Discharge Reducing Module

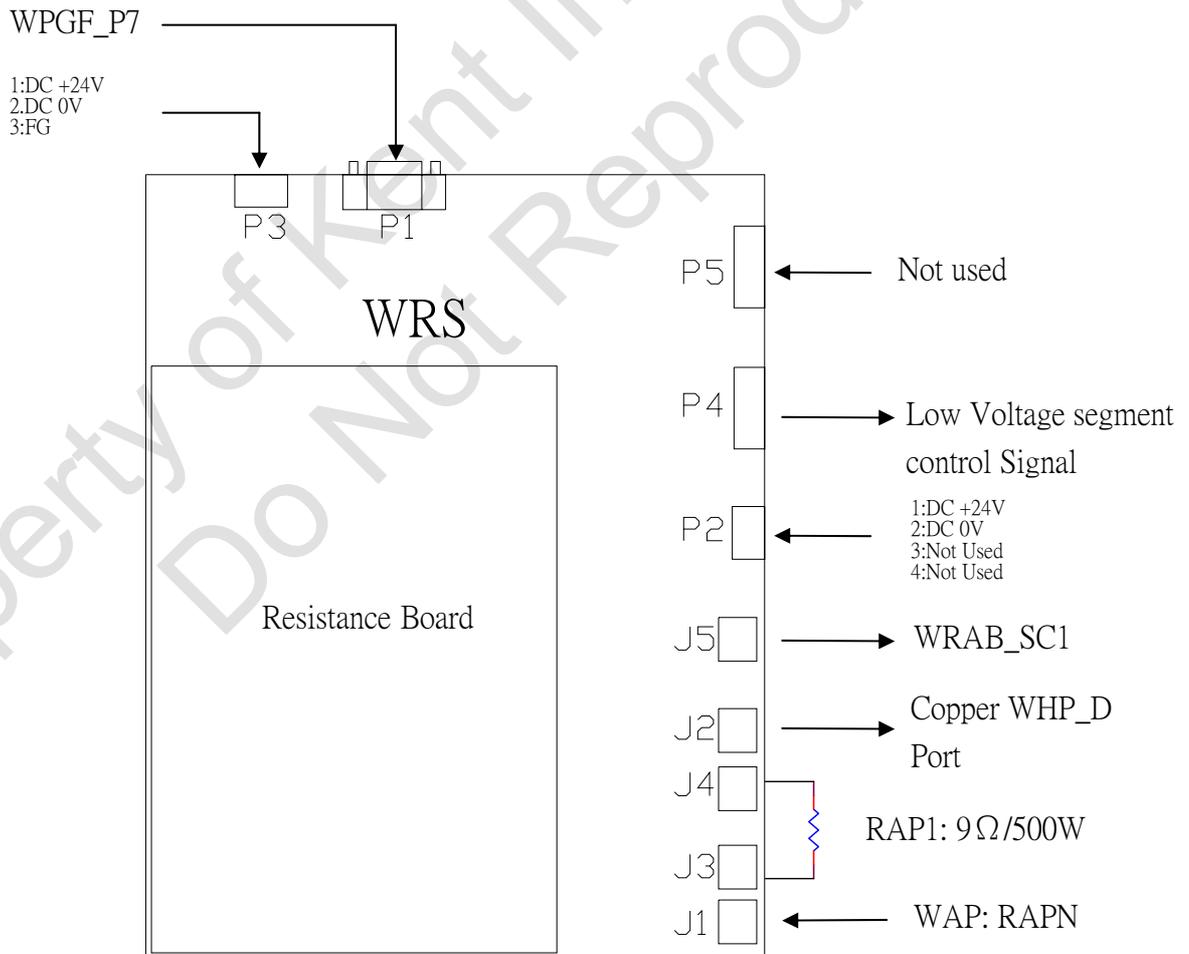
Discharge reducing module of Wire EDM consists of 3 circuit boards - Wire EDM ( WRS) Relay board (WRAB\*2) board This product provides Wire EDM with a switching function of reducing discharge energy, and adjusts discharge energy according to the control signal sent from WPGF.

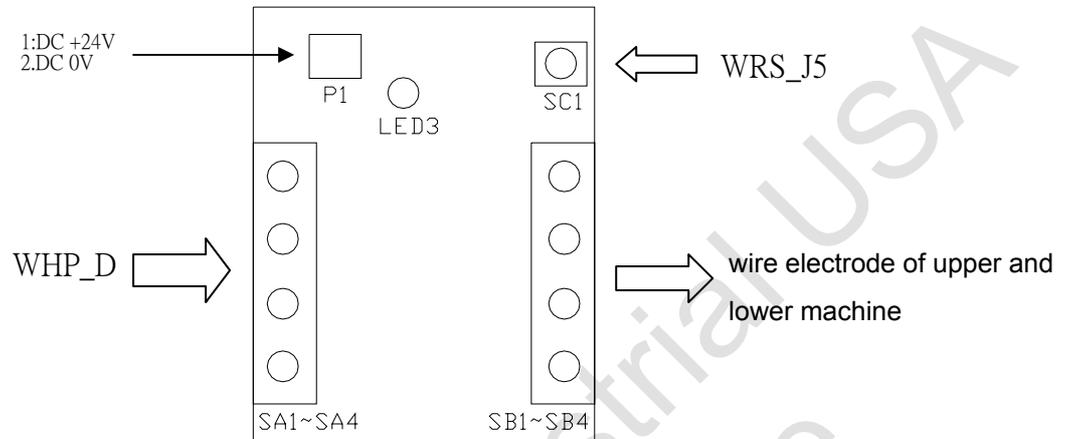
#### 3.8.1 Functions

WRS board is a switch for reducing discharge energy for Wire EDM. Its major function is to receive the discharge mode sent by WPDF board as well as the parameter signal of discharge energy, and then proceeds with the discharge circuit switching and the regulation of discharge energy according to the parameter received. WRAB board the switching circuit boards of power circuit of Wire EDM.

#### 3.8.2 Panels

A : Panel drawing of WRS circuit board



**B : Panel drawing of WRAB circuit board**

WRAB board

**3.8.3 Installation and usage of hardware****1. WRS Hardware HMI setting**

- (1) Plug the Input Parameter Signal Cable to WRS Board P1
- (2) Plug the power to the power port P3 on the WRS Board.
- (3) Based on the circuits on the WRS board and WAP board above, connect the RAPN point on the WAP board with point J1 on the WRS board. (Use low inductance material to connect) .
- (4) Complete the all the wiring on the WRS board including connection J1, J2, J3, J4 and J5.
- (5) Plug in the Output control signal to P2 on the WRS Board.
- (6) Plug the low voltage segment control signal into P4 on WRS Board.
- (7) Put WRAB into the Power Box and then complete the wiring for the.
- (8) Wait for other hardware to complete installation.
- (9) Turn on the power to complete the program installation.

## 2. Signal Light

Description	Signal Light
Not Used	LED1
High Voltage/Polish switch signal light	LED2
DC+24V Power Signal Light	LED3
Low voltage segment signal light	LED4(DC120V) 、 LED5(DC100V) LED6(DC90V) 、LED5(DC80V)
Not used	LED8~ LED11

Description	Signal Light
Current constraint and resistance switch signal light	LED12(MORMAL_9Ω) LED13(FINE_266Ω) LED14(FINE_200Ω) LED15(FINE_100Ω) LED16(FINE_50Ω)

## 3. In/Output Connector

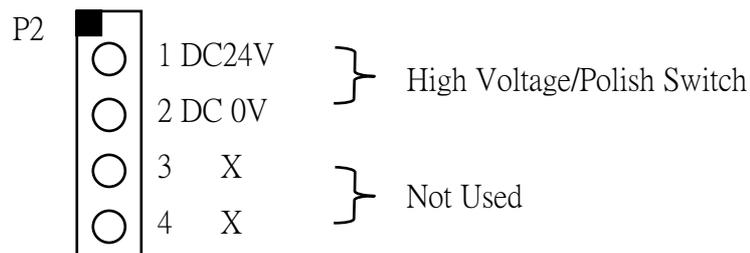
**P1** : WPGF control signal will input to WRS board

DB26F : 26PIN D-Type female port 90°

**P2** : High voltage/Polish switch

P2 : DC+24 Power output

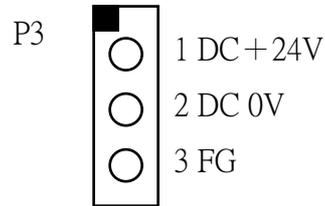
515H4R : 515H4R male port 90°



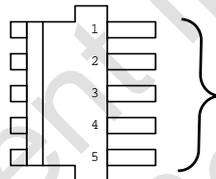
**P3 : DC Power Input port**

P3 : Provide DC24V Power Input

515H3R : 515H3R male port 90°

**P4 : Low voltage segment control signal output ( DC24V )**

VH3.96 : 5PIN L type male port 90°



Pin1 : DC common point 0V

Pin2 : ※ ( Control AC\_80V )

Pin3 : ※ ( Control AC\_90V )

Pin4 : ※ ( Control AC\_100V )

Pin5 : ※ ( Control AC\_120V )

PS : Pin2~ Pin5 can only individually output DC+24V

**P5 : Not Used****3.9 Remote & Key\_cpu board operational description**

Remote Box includes two parts: Remote control and Key\_cpu

**3.9.1 Functions**

(1) Utilize RS485 transmission to read the command from the keys and the light signal.

(2)

LCD coordinate

(3) can use with the rotating wheel. (Optional)

(4) Provide EMERGENCY STOP (Optional)

### 3.9.2 Specification

(1) Remote control

- A. Number of key : 42 Key
- B. Key placement : Figure 3.13
- C. Total number of key lights : 4 LED ◦
- D. Total number of machine status light : 38

(2) Key\_cpu

A. Connector :

- A. Power connecting platform: 515H3R green port (P1).
- B. 2.54 6PIN male outlet 90° ( P2 ) MPG.
- C. 2.54 16PIN male outlet 90 ( P3 ) to LCD display screen.
- D. Not use when USB\_B type (P4) is connecting to remote control.
- E. 2.54 8PIN male outlet 90° ( P5 ) connected to the remote control.
- F. 2.54 2PIN male outlet 90° ( P6 ) connected to the Emergency Stop.

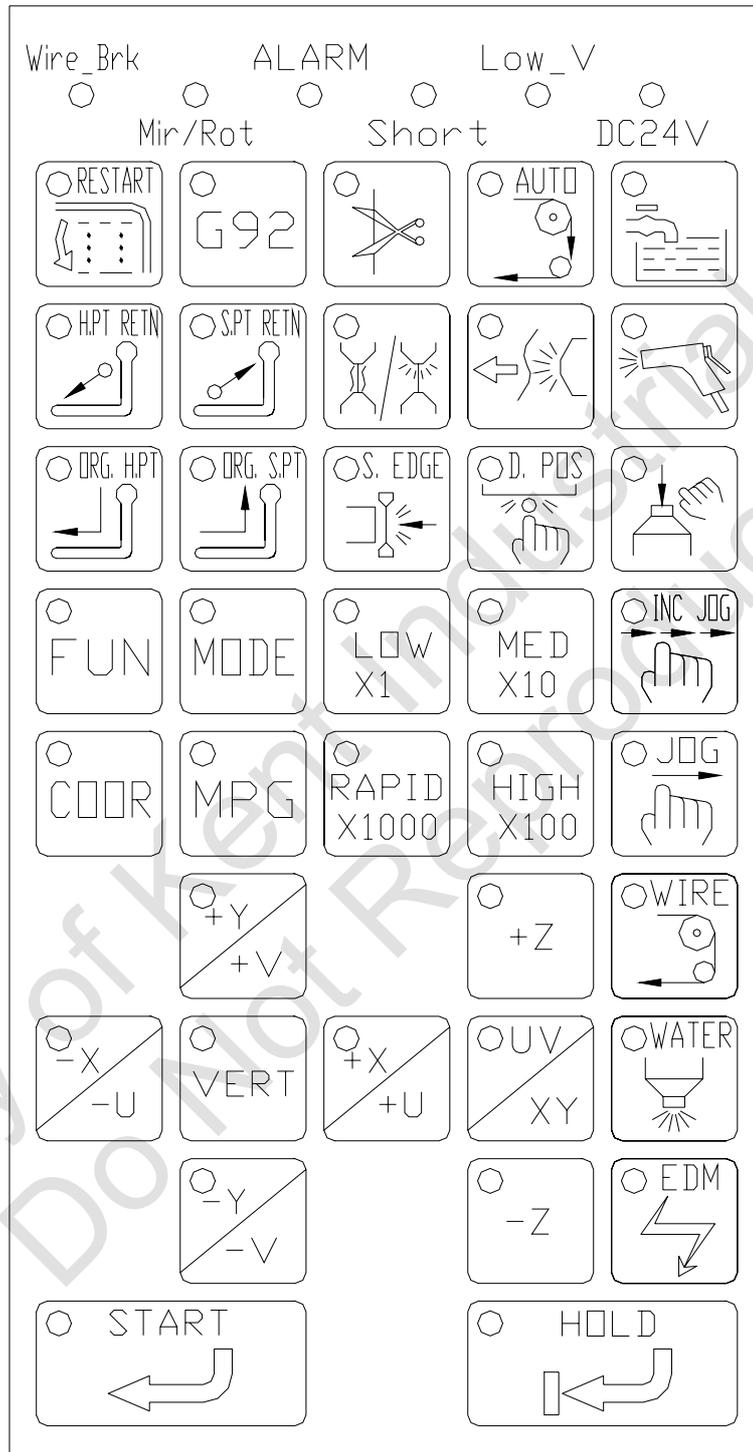
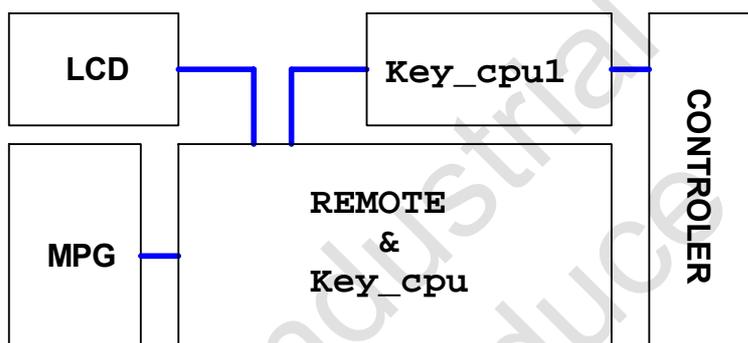


Figure 3.14 Remote Box

### 3.9.3 System connecting diagram

The figure below is the wiring connection of the remote box. The motion of the remote box depends on Key\_cpu. The motion of the key represents the input signal to the Key\_cpu board, and the light on the Key\_cpu board is the output signal.



### 3.9.4 Hardware Installation and Operational Description

#### 1. Hardware Installation Procedure

Remote box hardware installation procedure :

- (1) Turn off the system
- (2) Connect the remote control with Key\_cpu
- (3) Fix the main control board and Key\_cpu on the top of sheet metal of the remote box.
- (4) Connect the LCD display screen with Key\_cpu\_P3
- (5) Connect the extension cord on the wire box with Key\_cpu\_P
- (6) Wait for other hardware to complete the installation
- (7) Turn on the power to complete the installation.

#### 2. Key\_cpu light、VR

Description	Light / VR
DC+5V Power light	LED1
DC+3.3 Power light	LED2
USB Power light for remote control	LED3
Enable light	LED4
LCD brightness adjustment	VR1

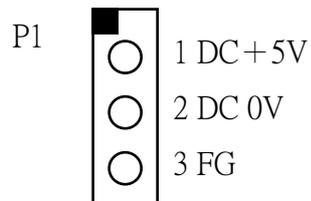
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## 2. Output / Input connectors

**P1** : DC Power Input connectors

P1 : DC5V Power Input

515H3R : 515H3R male port 90°



**P2** : MPG port

**P3** : LCD display port

**P4** : USB\_B type message transmission port (Only for Key\_cpu1)

**P5** : Key\_cpu → Key\_cpu1 message transmission port

**P6** : Emergency switch port

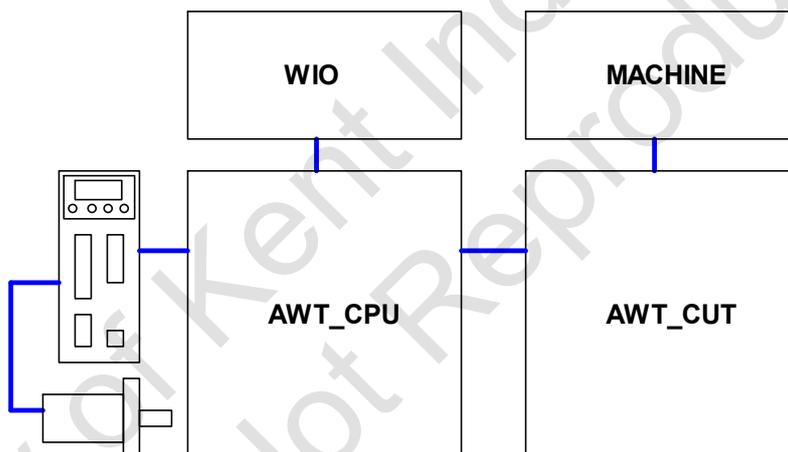
### 3.10 AWT\_CPU& AWT\_CUT Board Operation

There is two parts include in AWT input and output function:  
Server drive system control and Cutting wire power adjustment.

#### 3.10.1 Functions

- (1) C\_MODE switch to multiple modes (Torque、Position Control)
- (2) Transmission and adapter function for the server signal
- (3) AWT input and output signal process
- (4) Power output of the wire preheat and cut

#### 3.10.2 System connecting diagram



#### 1. Hardware installation procedure

- (1) Turn off the System
- (2) Fix the AWT\_CPU& AWT\_CUT in the electrical box
- (3) Connect USB Cable on the WIO board to AWT\_CPU\_P3 ◦
- (4) Connect CON2 with AWT\_CPU\_P7 ◦
- (5) Connect AWT\_CPU with the signal wire of the AWT\_CUT board
- (5) Connect Cable P1 with Cable P2.
- (6) Wait for other hardware to complete the installation.
- (7) Turn on the power to complete the installation.

**2. Signal Light 、VR Description (AWT\_CPU)**

Description	Signal Light / VR
DC+5V Power light	LED1
DC+24V receive wire 、 Threading motor board (server) Power light	LED2 、 LED4
DC+24V Power light	LED3
DSP only DC+3.3V Power light	LED5
Status light(For detecting PC board)	LED6 、 LED7 LED8 、 LED9
DC+3.3V Power light	LED10
DC+5V (Input digital analogy converter) Power light	LED11
DC+12V (Input digital analogy converter) Power light	LED12
DC-12V (Input digital analogy converter) Power light	LED13
Servo Alarm light	LED14
Servo Ready light	LED15
Servo ON light	LED16
Alarm CLR light	LED17
no speed suppress input	LED18
Command speed option 1 input	LED19
Switch Mode Input ( C_MODE: Torque 、 Position control )	LED20
Second gain setting	LED21
Cut wire position (I42)	LED22
Curve wire detection(I43)	LED23
W axis GAIN	VR1
W axis OFFSET	VR4
Send wire Gear GAIN	VR2
Send wire Gear OFFSET	VR3

**Signal Light Guide (AWT\_CUT)**

Description	Signal Light
DC+5V Power light	LED1
DC+18V Power light	LED2 、 LED4
DC+24V Power light	LED3

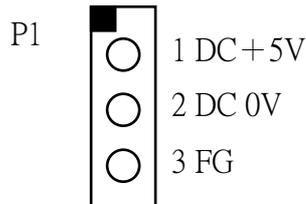
### 3.10.3 Output / Input connectors

#### 1.(AWT\_CPU input and output connector)

**P1** : DC Power Input connectors

P1 : DC5V Power Input

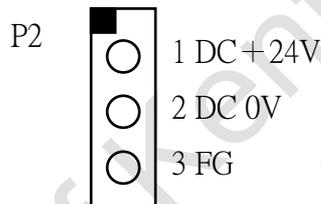
515H3R : 515H3R male port 90°



**P2** : DC Power Input connectors

P2 : DC24V Power Input

515H3R : 515H3R male port 90°



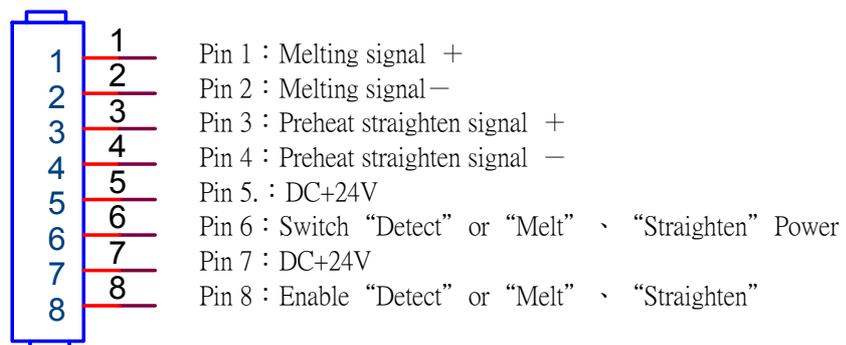
**P3**、**P4** : RS485 transmission port、DRIVER signal port

P3 : RS485 transmission port ( USB\_B Type signal transmission port )

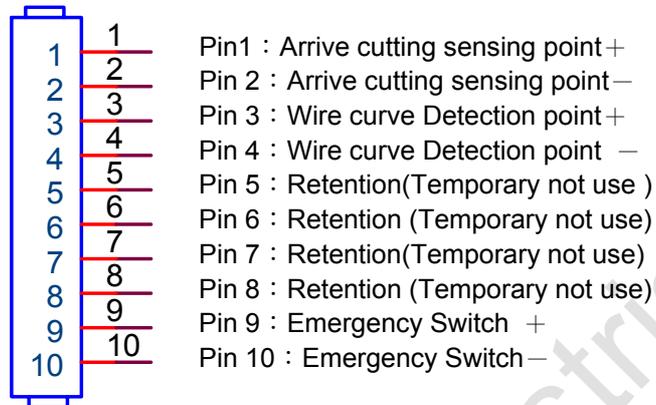
P4 : DRIVER signal port ( SCSI II : 36 PIN female port 180° )

**P5** : melt、Preheat and strengthen signal input port

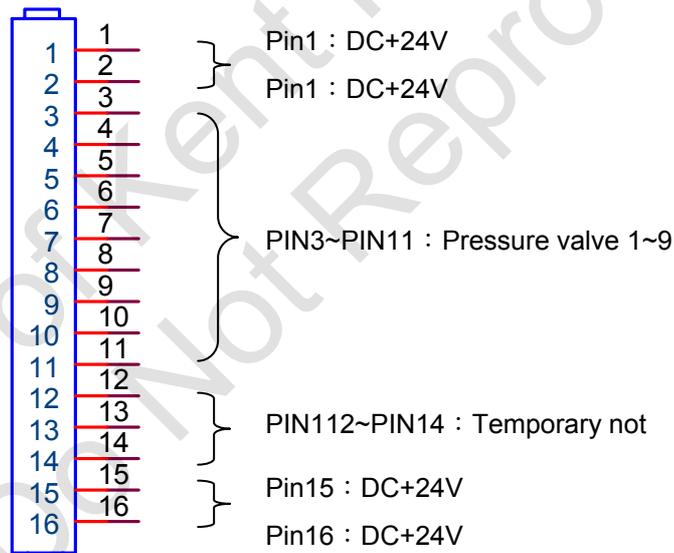
XH2.54/8PIN/male port 90°



**P6 : Melt 、Preheat Straighten signal input port**  
XH2.54/10PIN/male port 90°

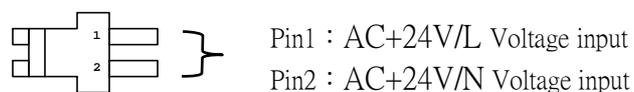


**P7 : Pressure Valve Power input port**  
XH2.54/16PIN/male port90°

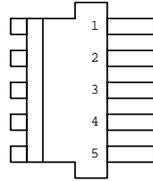


**2.(AWT\_CUTinput and output connector)**

**P1 : AC+24V Power output**  
VH3.96 : 2PIN L type male port 90°



**P3** : Detect Sensing 、Melting 、Preheat and straighten power output  
 VH3.96 : 5PIN L type male port 90°



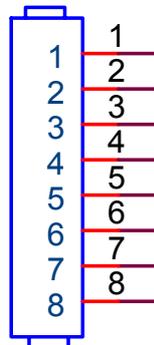
Pin1 : Wire curve sensing

Pin2 : Power for common point detecting and straighten

Pin3 : Melting power

Pin4 : Arrive sensing decelerate position and melting, straighten power

**P2** : Melt 、Preheat Straighten signal input port  
 XH2.54/8PIN/ male port 90°



1

Pin 1 : Melting signal +

2

Pin 2 : Melting signal -

3

Pin 3 : Preheat straighten signal +

4

Pin 4 : Preheat straighten signal -

5

Pin 5 : DC+24V

6

Pin 6 : Switch "Detect" or "Melt" 、 "Straighten" Power

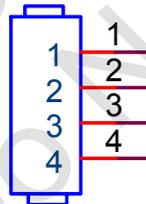
7

Pin 7 : DC+24V

8

Pin 8 : Enable "Detect" or "Melt" 、 "Straighten"

**P4** : Melt 、Preheat and straighten signal input port  
 XH2.54/10PIN/ male port 90°



1

Pin1 : Arrive cutting sensing point +

2

Pin 2 : Arrive cutting sensing point -

3

Pin 3 : Wire curve detection point +

4

Pin 4 : Wire curve detection point -

# Wiring

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## 4. Wiring

Wiring here refers to the wire distributions on the circuit panel (FIG04-CIRCUIT\_PANEL), connector from the generator (FIG12-CONNECTOR), WIO board (FIG06-WIO) and the terminal block of the machine (FIG14-MACHINE\_CIRCUIT1、FIG15-MACHINE\_CIRCUIT2). To learn more, please refer to Chapter 9 “Wiring”

### 4.1 Wiring of Distribution Panel (FIG04-CIRCUIT\_PANEL)

The distribution panel controls and supplies power to the whole electric box. The power includes power of controller, discharge power, servo motor and servo power and the power of convertible type power supply. The voltage output from the transformer inside the electric box is input to the circuit panel through the terminal block (PANEL\_TB1). The current goes through the circuit of the distribution panel, and the power is output from the terminal panel (PANEL\_TB2) to each part. For explanation on wiring, PANEL\_TB1.1 stands for the contact of Terminal ①. The rest can be deducted accordingly.

#### HINT

- \* See the circuit of FIG04-CIRCUIT\_PANEL
- \* See the explanation and the position of the parts in the front view of the electric control box

#### (1) Wiring of the contact of the terminal block (PANEL\_TB1):

- PANEL\_TB1.1: Input of main power (R)
- PANEL\_TB1.2: Input of main power (S)
- PANEL\_TB1.3: Input of main power (T)
- PANEL\_TB1.4: WIO\_J9.11
- PANEL\_TB1.5: WIO\_J9.4
- PANEL\_TB1.6: transformer X-FMR3\_AC0V/1A
- PANEL\_TB1.7: transformer X-FMR3\_AC110V/1A
- PANEL\_TB1.8: ON\_SW\_PIN4
- PANEL\_TB1.9: ON\_SW\_PIN3
- PANEL\_TB1.10: WIO\_J15.8
- PANEL\_TB1.11: WIO\_J15.3
- PANEL\_TB1.12: WIO\_J9.10
- PANEL\_TB1.13: WIO\_J9.3
- PANEL\_TB1.14: WIO\_J9.9
- PANEL\_TB1.15: WIO\_J9.2
- PANEL\_TB1.16: WIO\_J9.8

PANEL_TB1.17: WIO_J9.1	
PANEL_TB1.18: transformer X-FMR1.12_AC_60V/4A	} Lower pressure segment output power
PANEL_TB1.19: transformer X-FMR1.13_AC_70V/4A	
PANEL_TB1.20: transformer X-FMR1.13_AC_80V/4A	
PANEL_TB1.21: transformer X-FMR1.13_AC_90V/4A	
PANEL_TB1.22: WRS_P4.1	} Lower pressure segment signal output
PANEL_TB1.23: WRS_P4.2	
PANEL_TB1.24: WRS_P4.3	
PANEL_TB1.25: WRS_P4.4	
PANEL_TB1.26: WRS_P4.5	

## (2) Wire connection of Terminal block (PANEL\_TB2)

PANEL_TB2.41: transformer (X-FMR2) input R
PANEL_TB2.42: transformer (X-FMR2) input S
PANEL_TB2.43: transformer (X-FMR2) input T
PANEL_TB2.44: transformer (X-FMR3) input R
PANEL_TB2.45: transformer (X-FMR3) input S
PANEL_TB2.46: transformer (X-FMR1) input R
PANEL_TB2.47: transformer (X-FMR1) input S
PANEL_TB2.48: transformer (X-FMR1) input T
PANEL_TB2.49: coil of solenoid valve (Control power input of DRIVER.)
PANEL_TB2.50: coil of solenoid valve (Control power input of DRIVER.)
PANEL_TB2.51: AC160V (R) of transformer (X-FMR1) output, power input of high voltage discharge
PANEL_TB2.52: AC160V (S) of transformer (X-FMR1) output, power input of high voltage discharge
PANEL_TB2.53: AC160V (T) of transformer (X-FMR1) output, power input of high voltage discharge
PANEL_TB2.54: AC0V/4A of transformer (X-FMR1) output, power input of POWER SINK
PANEL_TB2.55: AC90V/4A of transformer (X-FMR1), power input of POWER SINK
PANEL_TB2.56: power output (+) of low voltage discharge
PANEL_TB2.57: power output (-) of low voltage discharge
PANEL_TB2.58: power output (+) of POWER SINK
PANEL_TB2.59: power output (-) of POWER SINK
PANEL_TB2.60: 1. AC0V/4A of transformer (X-FMR1) output, input of spark edge voltage discharge. 2. AC0V/4A of transformer (X-FMR1) output, power input of low voltage discharge.

PANEL\_TB2.61: AC35V/4A of transformer (X-FMR1) output,. Input of spark edge voltage discharge.

PANEL\_TB2.71: power output (+) of high voltage discharge

PANEL\_TB2.72: power output (-) of high voltage discharge

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## 4.2 Wire connection of WIO board (FIG06-WIO)

WIO board provides Wire EDM with special input/output functions. Except the input/output signals of the control panel, the rest input and output signals are controlled by WIO board, water pressure segment, Wire feed, wire tension, wire broken sensors .....alignment jig. The output/input signals of WIO board are connected to the connectors (J3、J7、J9、J11、J15.....). Therefore, J11.1 stands for the contact ① of header J11. WIO board is connected to the machine and the water system through the connectors (**CON1, CON2, CON3, CON4 and CON5**). Therefore, most of the output signals of WIO board are connected to the connectors (**CON1, CON2, ON3, CON4 and CON5**).

### HINT

- \* See circuit diagram FIG06-WIO.
- \* See Chapter 2 Electric Control Box –rear view of parts
- \* The wire diagram of WIO board just illustrates the output/input signals as J1~J16. For the wire diagram of the connectors, and P1~P5, please see Chapter 3 WIO board.

#### (1) Wire connection of header (WIO\_J3)

- J3.6 : Connect CON5.7, start signal (-) of up auto water.
- J3.12 : Connect CON5.8, start signal (+) of up auto water.
- J3.11 : Connect CON4.13, start signal (+) of water-in motor
- J3.5 : Connect CON4.14, start signal (-) of water-in motor
- J3.10 : Connect CON4.15, start signal (+) of water draining gate
- J3.4 : Connect CON4.16, start signal (-) of water draining gate
- J3.7 : Connect CON4.17, alarm signal (+) of water system
- J3.1 : Connect CON4.18, alarm signal (-) of water system

#### (2) Wire connection of header (WIO\_J7)

- J7.12 : Connect CON4.1, power input signal (+) of water system
- J7.4 : Connect CON4.2, power input signal (-) of water system
- J7.13 : Connect CON4.3, switch-on signal (+) of water system
- J7.5 : Connect CON4.4, switch-on signal (-) of water system
- J7.14 : Connect CON4.5, start signal (+) of deionization motor
- J7.6 : Connect CON4.6, start signal (-) of deionization motor
- J7.11 : Connect CON4.7, BIT1 signal (+) of water stage control
- J7.3 : Connect CON4.8, BIT1 signal (-) of water stage control
- J7.10 : Connect CON4.9, BIT2 signal (+) of water stage control
- J7.2 : Connect CON4.10, BIT2 signal (-) of water stage control
- J7.9 : Connect CON4.11, BIT3 signal (+) of water stage control
- J7.1 : Connect CON4.12, BIT3 signal (-) of water stage control

- J7.15 : Connect CON5.7 , water flush signal (+) of manual threading.
- J7.7 : Connect CON5.8 , water flush signal (-) of manual threading.
- J7.16 : Connect CON5.9 , start signal (+) of water gun.
- J7.8 : Connect CON5.10 , start signal (-) of water gun.

(3) Wire connection of header (WIO\_J9)

- J9.8 : Connect distribution panel PANEL\_TB1.16.power control signal of spark mold correction.
- J9.1 : Connect distribution panel PANEL\_TB1.17.power control signal of spark mold correction
- J9.9 : Connect distribution panel PANEL\_TB1.14, control signal of low voltage power.
- J9.2 : Connect distribution panel PANEL\_TB1.15, control signal of low voltage power
- J9.10 : Connect distribution panel PANEL\_TB1.12, control signal of high voltage power.
- J9.3 : Connect distribution panel PANEL\_TB1.12, control signal of high voltage power
- J9.11 : Connect distribution panel PANEL\_TB1.4 , discharge input power signal.
- J9.4 : Connect distribution panel PANEL\_TB1.5 , discharge input power signal.

(4) Wire connection of header (WIO\_J11)

- J11.7 : Connect CON1.32.Z axis brake (DC24V) .
- J11.1 : Connect CON1.33.Z axis brake (DC0V) .
- J11.4 : Connect CON1.29.wire broken sensor ( + ) .
- J11.2 : Connect CON1.28.wire broken sensor ( - ) .
- J11.11 : Connect Motion\_P16.1. Notify Motion Board wire broken sensor( + ) .
- J11.5 : Connect Motion\_P16.2. Notify Motion Board wire broken sensor( - ) .
- J11.10 : Connect CON3.7.air sensor ( + ) .
- J11.2 : Connect CON3.8.air sensor ( - ) .
- J11.9 : Connect CON3.9. Panel semi-automatic threading button signal( + ) .
- J11.2 : Connect CON3.10. Panel semi-automatic threading button signal( - ) .
- J11.12 : Connect CON1.35.power of wire feeding wheel.
- J11.6 : Connect CON1.34.power of wire feeding wheel.

(5) Wire connection of header (WIO\_J15)

- J15.3 : Connect distribution panel PANEL\_TB1.10 , power maintain signal ( + ) .

J15.8 : Connect distribution panel PANEL\_TB1.11 , power maintain signal ( - ) .

J15.10 : Connect CON8.1.emergency stop ( + ) .

J15.5 : Connect CON8.8.emergency stop ( - ) .

J15.6 : Connect CON8.5 , buzzer ( + ) .

J15.7 : Connect CON8.4 , buzzer ( - ) .

J15.2 : Connect CON8.2 , OFF\_SW\_PIN1.

(6) Wire connection of header (WIO\_J1 、 J4 、 J5 、 J6 、 J10 、 J13 、 J14 、 J19)

J1 : DC5V input power for WIO Board.

J4 : DC24V input power for WIO Board.

J5 : to Motion\_P12 , edge find voltage.

J6 : In/ output AC220V power for Radiate fan.

J10 : Input AC110V power for send wire wheel motor 、 AC110V input power for WIO Board ◦

J13 : DC24V input power for receive wire motor.

J14 : Concatenate signal with Motion Board.

J19 : UPS transmission control signal.

(7) Wire connection of header (WIO\_J12)

J7.1 : Connect grounding cooper plate.

J7.2 : Connect CON3.1 , wire winding motor ( DC24V ) .

J7.3 : Connect CON3.2 , reel motor ( DC0V ) .

J7.4 : Connect CON3.3 , tension brake ( DC24V ) .

J7.5 : Connect CON3.4 , tension brake ( DC0V ) .

J7.6 : Connect grounding cooper plate.

(8) Wire connection of header (P1 、 P2)

P1 : Transmission signal control.

P2 : WPGF transmission signal.

P3 : AWT\_CPU transmission signal.

(9) Wire connection of header (WIO\_J2)

J2.1 : ① Connect Warning light(DC24V) ◦

② Connect PCD\_JP1.1 , PCD board(DC24V) ◦

J2.2 : Connect PCD\_JP1.2 , PCD board(DC0V) ◦

J2.3 : Connect Warning light (green) ◦

J2.4 : Connect Warning light (yellow) ◦

J2.5 : Connect Warning light (red) ◦

### 4.3 Wire connection of MOTION board (FIG07-UPS&MOTION)

MOTION board is a control card for CNC machine. It controls the six-axis motion server control signal. Besides it also controls other signal such as machine origin, wire break notification, vertical adjustment and limit switch

#### HINT

- \* See the circuit of FIG07-UPS&MOTION\_PANEL
- \* See the explanation and the position of the parts in the front view of the electric control box

#### (1) Wire connection of header (P1~P12)

- P1 : DC5V input power for MOTION Board.
- P2 : DC24V input power for MOTION Board.
- P3 : input signal of X axis linear scale.
- P4 : input signal of Y axis linear scale.
- P5 : X-axis server control signal.
- P6 : Y-axis server control signal.
- P7 : U-axis server control signal.
- P8 : V-axis server control signal.
- P9 : Z-axis server control signal.
- P10 : W-axis server control signal.
- P11 : Series connect signal with WIO board Z-axis brake, emergency Switch.
- P12 : Discharge voltage 、 edge 、 voltage.

#### (2) Wire connection of header (P14)

- P14.1 : Connect CON1.3 、 signal of X axis limit (+)
- P14.2 : Connect CON1.1 、 signal of X axis limit (-)
- P14.3 : Connect CON1.7 、 signal of Y axis limit (+)
- P14.4 : Connect CON1.6 、 signal of Y axis limit (-)
- P14.5 : Connect CON1.21 、 signal of Z axis limit (+)
- P14.6 : Connect CON1.19 、 signal of Z axis limit (-)
- P14.7 : Connect CON1.30 、 sensor signal of vertical alignment (upper+)
- P14.8 : Connect CON1.20 、 sensor signal of vertical alignment (-)
- P14.9 : Connect CON1.4 、 signal (+) of X axis mechanical origin
- P14.10 : Connect CON1.2 、 signal (-) of X 、 Y 、 Z axis mechanical origin
- P14.11 : Connect CON1.8 、 signal (+) of Yaxis mechanical origin
- P14.12 : open circuit

- 
- P14.13 : Connect CON1.22 , signal (+) of Z axis mechanical origin
  - P14.14 : open circuit
  - P14.15 : Connect CON1.31 , sensor signal of vertical alignment (lower+)

(3) Wire connection of header (P15)

- P15.1 : Connect CON1.12 , signal of U axis limit (+)
- P15.2 : Connect CON1.10 , signal of U axis limit (-)
- P15.3 : Connect CON1.16 , signal of V axis limit (+)
- P15.4 : Connect CON1.15 , signal of V axis limit (-)
- P15.5 : open circuit
- P15.6 : open circuit
- P15.7 : open circuit
- P15.8 : open circuit
- P15.9 : Connect CON1.13 , signal (+) of U axis mechanical origin
- P15.10 : Connect CON1.11 , signal (-) of U 、 V axis mechanical origin
- P15.11 : Connect CON1.17 , signal (+) of V axis mechanical origin
- P15.12 : open circuit
- P15.13 : open circuit
- P15.14 : open circuit
- P15.15 : open circuit

#### 4.4 Wire connection of machine to CON1, CON2 and CON3

Terminal block TB1 and terminal block TB2 of the machine are connected to the electric control box (WJS1) through the connectors CON1, CON2 and CON3.

##### HINTS

- \* See wire diagram FIG14-MACHINE\_CIRCUIT1 and FIG15-MACHINE\_CIRCUIT2 .
- \* See Chapter 2, the parts in the side view of electric control box

##### (1) Wire connection the machine to CON1 (37PIN)

CON1.1 : Connect MACHINE\_TB1.1, signal of X axis limit (+)

CON1.2 : Connect MACHINE\_TB1.2, common point of limit signal of X and Y axes.

CON1.3 : Connect MACHINE\_TB1.3, signal of X axis limit (-)

CON1.4 : Connect MACHINE\_TB1.4, signal (+) of X axis mechanical origin

CON1.5 : Connect MACHINE\_TB1.5, signal (-) of X axis mechanical origin

CON1.6 : Connect MACHINE\_TB1.6, signal of Y axis limit (+)

CON1.7 : Connect MACHINE\_TB1.7, signal of Y axis limit (-)

CON1.8 : Connect MACHINE\_TB1.8, signal (+) of Y axis mechanical origin

CON1.9 : Connect MACHINE\_TB1.9, signal (-) of X axis mechanical origin

CON1.10 : Connect MACHINE\_TB1.10, signal of U axis limit (+)

CON1.11 : Connect MACHINE\_TB1.11, common point of limit signal of U and V axes

CON1.12 : Connect MACHINE\_TB1.12, signal of U axis limit (-)

CON1.13 : Connect MACHINE\_TB1.13, signal (+) of U axis mechanical origin

CON1.14 : Connect MACHINE\_TB1.14, signal (-) of U axis mechanical origin

CON1.15 : Connect MACHINE\_TB1.15, signal of V axis limit (+)

CON1.16 : Connect MACHINE\_TB1.16, signal of V axis limit (-)

CON1.17 : Connect MACHINE\_TB1.17, signal (+) of V axis mechanical origin

CON1.18 : Connect MACHINE\_TB1.18, signal (-) of V axis mechanical origin

CON1.19 : Connect MACHINE\_TB1.19, signal of Z axis limit (+)

CON1.20 : Connect MACHINE\_TB1.20, common point of Z axis limit signal

CON1.21 : Connect MACHINE\_TB1.21, signal of Z axis limit (-)

CON1.22 : Connect MACHINE\_TB1.22, signal (+) of Z axis mechanical origin

CON1.23 : Connect MACHINE\_TB1.23, signal (-) of Z axis mechanical origin

CON1.24~CON1.27 : open circuit

- CON1.28 : Connect MACHINE\_TB2.24, signal (+) of wire broken sensor
- CON1.29 : Connect MACHINE\_TB2.25, signal (+) of wire broken sensor
- CON1.30 : Connect MACHINE\_TB2.26, signal of sensor of vertical alignment  
(upper)
- CON1.31 : Connect MACHINE\_TB2.27, signal of sensor of vertical alignment  
(lower)
- CON1.32 : Connect MACHINE\_TB2.28, brake of Z axis (DC24V)
- CON1.33 : Connect MACHINE\_TB2.29, brake of Z axis (DC0V)
- CON1.34 : Connect MACHINE\_TB2.30, power of wire feeding wheel
- CON1.35 : Connect MACHINE\_TB2.31, power of wire feeding wheel
- CON1.36 : Connect MACHINE\_TB2.59, power of worktable
- CON1.37 : Connect MACHINE\_TB2.60, power of worktable

(2) Wire connection of machine to CON2 (24PIN)

- CON2.1 : Connect MACHINE\_TB2.32, control signal (+) of auto threading valve  
01
- CON 2.2 : Connect MACHINE\_TB2.33, control signal (-) of auto threading valve  
01
- CON 2.3 : Connect MACHINE\_TB2.34, control signal (+) of auto threading  
valve 02
- CON 2.4 : Connect MACHINE\_TB2.35, control signal (-) of auto threading valve  
02
- CON 2.5 : Connect MACHINE\_TB2.36, control signal (+) of auto threading  
valve 03
- CON 2.6 : Connect MACHINE\_TB2.37, control signal (-) of auto threading valve  
03
- CON 2.7 : Connect MACHINE\_TB2.38, control signal (+) of auto threading  
valve 04
- CON 2.8 : Connect MACHINE\_TB2.39, control signal (-) of auto threading valve  
04
- CON 2.9 : Connect MACHINE\_TB2.40, control signal (+) of auto threading  
valve 05
- CON 2.10 : Connect MACHINE\_TB2.41, control signal (-) of auto threading  
valve 05
- CON 2.11 : Connect MACHINE\_TB2.42, control signal (+) of auto threading  
valve 06
- CON 2.12 : Connect MACHINE\_TB2.43, control signal (-) of auto  
threading valve 06

- 
- CON 2.13 : Connect MACHINE\_TB2.44, control signal (+) of auto threading valve 07
  - CON 2.14 : Connect MACHINE\_TB2.45 control signal (-) of auto threading valve 07
  - CON 2.15 : Connect MACHINE\_TB2.46, control signal (+) of auto threading valve 08
  - CON 2.16 : Connect MACHINE\_TB2.47 control signal (-) of auto threading valve 08
  - CON 2.17 : Connect MACHINE\_TB2.48, wire curve signal 01 ( + )
  - CON 2.18 : Connect MACHINE\_TB2.49, common point of detection signal of auto threading
  - CON 2.19 : Connect MACHINE\_TB2.50, open circuit
  - CON 2.20 : Connect MACHINE\_TB2.51, open circuit
  - CON 2.22 : Connect MACHINE\_TB2.52, power (+) of wire cutting
  - CON 2.23 : Connect MACHINE\_TB2.53, cut wire, pull wire, electric wire common point detection signal 02 ( + ) °
  - CON 2.24 : Connect MACHINE\_TB2.54, wire pulling power (+), common point of detection signal of auto threading

(3) Wire connection of machine to CON3

- CON3.1 : Connect MACHINE\_TB2.55, wire winding motor (DC24V)
- CON3.2 : Connect MACHINE\_TB2.56, wire winding motor (DC0V)
- CON3.3 : Connect MACHINE\_TB2.57, motor of tension (DC24V)
- CON3.4 : Connect MACHINE\_TB2.58, motor of tension (DC0V)
- CON3.5 : Connect MACHINE\_TB2.61, control signal (+) of auto threading valve 09
- CON3.6 : Connect MACHINE\_TB2.62, control signal (-) of auto threading valve 09
- CON3.7~ CON3.16 : no connection

#### 4.5 Wire connection of water system to CON4 and CON5

The connectors JP4 and JP5 of the PCB of Water system (WJS3) are connected to electric control box (WJS1) through Connector CON4. and CON5

#### HINT

- \* See the circuit diagram FIG16-WATER\_SYSTEM4.
- \* See Chapter 2 “the components in front view of electric control box” .

##### (1) Wire connection of water system to CON4 (24PIN)

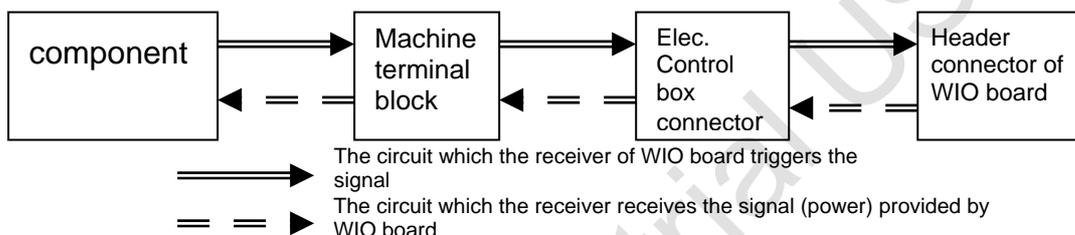
- CON4.1 : ConnectJP4.1, power input signal (+) of water system
- CON4.2 : ConnectJP4.2, power input signal (-) of water system
- CON4.3 : ConnectJP4.3, switch-on signal (+) of water system
- CON4.4 : ConnectJP4.4, switch-on signal (-) of water system
- CON4.5 : ConnectJP4.5, start signal (+) of deionization motor
- CON4.6 : ConnectJP4.6, start signal (-) of deionization motor
- CON4.7 : ConnectJP4.7, BIT1 signal (+) of water stage control
- CON4.8 : ConnectJP4.8, BIT1 signal (-) of water stage control
- CON4.9 : ConnectJP4.9, BIT2 signal (+) of water stage control
- CON4.10 : ConnectJP4.10, BIT2 signal (-) of water stage control
- CON4.11 : ConnectJP5.1, BIT3 signal (+) of water stage control
- CON4.12 : ConnectJP5.2, BIT3 signal (-) of water stage control
- CON4.13 : ConnectJP5.3, start signal (+) of water-in motor
- CON4.14 : ConnectJP5.4, start signal (-) of water-in motor
- CON4.15 : ConnectJP5.5, start signal (+) of water draining gate
- CON4.16 : ConnectJP5.6, start signal (+) of water draining gate
- CON4.17 : ConnectJP5.7, alarm signal (+) of water system
- CON4.18 : ConnectJP5.8, alarm signal (-) of water system
- CON4.19 : ConnectJP5.9, detection signal (+) of water quality
- CON4.20 : ConnectJP4.10, detection signal (-) of water quality
- CON4.21~22 : open circuit
- CON4.23 : ConnectLF1.1, power AC0V/3A of water system
- CON4.24 : ConnectLF1.3 , power AC110V/3A of water system

##### (2) Wire connection of the system to CON5 (16PIN)

- CON5.1~4 : open circuit
- CON5.5 : ConnectJP7.1, water flush signal (+) of manual threading
- CON5.6 : ConnectJP7.2, water flush signal (-) of manual threading
- CON5.7 : ConnectJP7.3, water flush signal (+) of manual threading (upper)
- CON5.8 : ConnectJP7.4, water flush signal (-) of manual threading (upper)
- CON5.9 : ConnectJP7.5, start signal (+) of water gun
- CON5.10 : ConnectJP7.6, start signal (-) of water gun

## 4.6 Wire connection of machine terminal block (MACHINE\_TB1、MACHINE\_TB2)

The components of the machine are connected to the machine terminal block (MACHINE\_TB1 and MACHINE\_TB2). Therefore, the circuit of the signals (power) triggered or received by the receiver is shown below:



### HINT

- \* See circuit diagram FIG14-MACHINE\_CIRCUIT1  
FIG15-MACHINE\_CIRCUIT2.
- \* See Chapter 2 “electronic components in side view and of the machine”.

#### (1) Wire connection of machine terminal block MACHINE\_TB1

- TB1.1 : Connect X\_LIMIT\_SW+ (X+ limit switch) <NC> contact
- TB1.2 : Connect X\_LIMIT\_SW+ , X\_LIMIT\_SW- , Y\_LIMIT\_SW+ and Y\_LIMIT\_SW- (X and Y limit switches) <COM> contact
- TB1.3 : Connect X\_LIMIT\_SW- (X- limit switch) <NC> contact
- TB1.4 : Connect X\_HOME\_SW (X HOME switch) <COM> contact
- TB1.5 : Connect X\_HOME\_SW (X HOME switch) <NC> contact
- TB1.6 : Connect Y\_LIMIT\_SW+ (Y+ limit switch) <NC> contact
- TB1.7 : Connect Y\_LIMIT\_SW- (Y- limit switch) <NC> contact
- TB1.8 : Connect Y\_HOME\_SW (Y HOME switch) <COM> contact
- TB1.9 : Connect Y\_HOME\_SW (Y HOME switch) <NC> contact
- TB1.10 : Connect U\_LIMIT\_SW+ , (U+ limit switch) <NC> contact
- TB1.11 : Connect U\_LIMIT\_SW+ , U\_LIMIT\_SW- , V\_LIMIT\_SW+ and V\_LIMIT\_SW- (U & V limit switches) <COM> contact
- TB1.12 : Connect U\_LIMIT\_SW- (U- limit switch) <NC> contact
- TB1.13 : Connect U\_HOME\_SW (U HOME switch) <COM> contact
- TB1.14 : Connect U\_HOME\_SW (U HOME switch) <NC> contact
- TB1.15 : Connect V\_LIMIT\_SW+ (V+ limit switch) <NC> contact
- TB1.16 : Connect V\_LIMIT\_SW- (V- limit switch) <NC> contact
- TB1.17 : Connect V\_HOME\_SW (V HOME switch) <COM> contact
- TB1.18 : Connect V\_HOME\_SW (V HOME switch) <NC> contact
- TB1.19 : Connect Z\_LIMIT\_SW+ (Z+ limit switch) <NC> contact
- TB1.20 : Connect Z\_LIMIT\_SW+ 、 Z\_LIMIT\_SW- (Z limit switch) <COM> contact
- TB1.21 : Connect Z\_LIMIT\_SW- (Z- limit switch) <NC> contact
- TB1.22 : Connect Z\_HOME\_SW (Z HOME switch) <COM> contact
- TB1.23 : Connect Z\_HOME\_SW (Z HOME switch) <NC> contact

(2) Wire connection of machine terminal block **MACHINE\_TB2**

TB2.24 : Connect WIRE\_BREAK\_SW (wire broken sensor) &lt;NO&gt; contact

TB2.25 : Connect WIRE\_BREAK\_SW (wire broken sensor) &lt;COM&gt;

contact

TB2.26 : Connect VERTICAL\_CON (Connector of vertical alignment jig) &lt;①&gt;

contact

TB2.27 : Connect VERTICAL\_CON(Connector of vertical alignment jig) &lt;④&gt;

contact

TB2.28 : Connect Z\_BRAKER ( Z axis brake ) &lt; + &gt; contact

TB2.29 : Connect Z\_BRAKER ( Z axis brake ) &lt; - &gt; contact

TB2.30 : ConnectR1 ( dimmer ) contact

TB2.31 : Connect SEND\_WIRE\_MOTOR ( wire feeding motor ) contact

TB2.32 : ConnectAIR\_SW1 ( air valve 01 of auto threading ) &lt; + &gt; contact

TB2.33 : ConnectAIR\_SW1 ( air valve 01 of auto threading ) &lt; - &gt; contact

TB2.34 : ConnectAIR\_SW2 ( air valve 02 of auto threading ) &lt; + &gt; contact

TB2.35 : ConnectAIR\_SW2 ( air valve 02 of auto threading ) &lt; - &gt; contact

TB2.36 : ConnectAIR\_SW3 ( air valve 03 of auto threading ) &lt; + &gt; contact

TB2.37 : ConnectAIR\_SW3 ( air valve 03 of auto threading ) &lt; - &gt; contact

TB2.38 : ConnectAIR\_SW4 ( air valve 04 of auto threading ) &lt; + &gt; contact

TB2.39 : ConnectAIR\_SW4 ( air valve 04 of auto threading ) &lt; - &gt; contact

TB2.40 : ConnectAIR\_SW5 ( air valve 05 of auto threading ) &lt; + &gt; contact

TB2.41 : ConnectAIR\_SW5 ( air valve 05 of auto threading ) &lt; - &gt; contact

TB2.42 : ConnectAIR\_SW6 ( air valve 06 of auto threading ) &lt; + &gt; contact

TB2.43 : ConnectAIR\_SW6 ( air valve 06 of auto threading ) &lt; - &gt; contact

TB2.44 : ConnectAIR\_SW7 ( air valve 07 of auto threading ) &lt; + &gt; contact

TB2.45 : ConnectAIR\_SW7 ( air valve 07 of auto threading ) &lt; - &gt; contact

TB2.46 : ConnectAIR\_SW8 ( air valve 08 of auto threading ) &lt; + &gt; contact

TB2.47 : ConnectAIR\_SW8 ( air valve 08 of auto threading ) &lt; - &gt; contact

TB2.48 : Connect AUTO\_WIRE\_PART ( auto threading gadget ) &lt;A&gt;

contact

TB2.49 : Connect AUTO\_WIRE\_PART ( auto threading gadget ) &lt;B&gt; contact

TB2.50 : open circuit

TB2.51 : open circuit

TB2.52 : Connect AUTO\_WIRE\_PART ( auto threading gadget ) &lt;C&gt; contact

TB2.53 : Connect AUTO\_WIRE\_PART ( auto threading gadget ) &lt;D&gt; contact

TB2.54 : Connect AUTO\_WIRE\_PART ( auto threading gadget ) &lt;B&gt; contact

TB2.55 : Connect WIRE\_FEED\_MOTOR ( wire winding motor ) &lt; + &gt; contact

TB2.56 : Connect WIRE\_FEED\_MOTOR ( wire winding motor ) &lt; - &gt; contact

TB2.57 : Connect WIRE\_TENSION\_BRAKER ( wire winding motor ) &lt; + &gt;

Contact

- 
- TB2.58 : Connect WIRE\_TENSION\_BRAKER ( wire winding motor ) < - >  
contact
- TB2.59 : ①Connect LP1 ( working lamp ) contact  
②Connect OIL\_FILLER ( oil feeder ) contact
- TB2.60 : ①Connect LP1 ( work lamp ) contact  
②Connect OIL\_FILLER ( oil filler ) contact
- TB2.61 : Connect AIR\_SW9 ( air valve 09 of auto threading ) < + > contact
- TB2.62 : Connect AIR\_SW9 ( air valve 09 of auto threading ) < - > contact

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## 4.7 Other wire connections

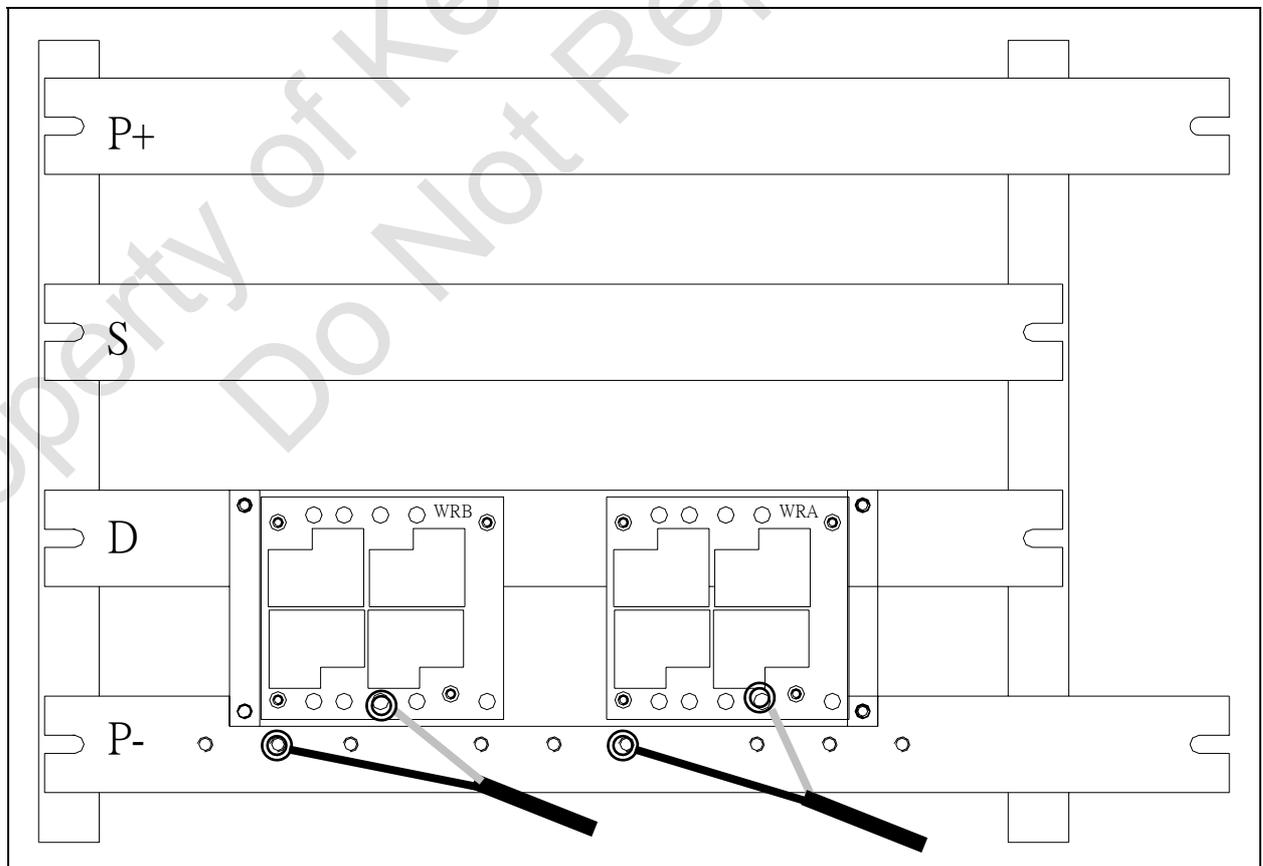
In addition to above mentioned wire connections, we want to discuss the wire connections of discharge system and servo system. Thus, the service men can quickly find the circuits when they shoot the troubles.

### (1) Wire connection of discharge system

#### HINT

- \* See circuit diagram FIG11-EDM POWER.
- \* See Chapter 2 “the components of electric control box”.

- ① The machine head (upper) has 2 electrode wires – black and white wires. The black wire is connected to the copper bar (piece) P of the discharge box. The white electrode wire is connected to the contact WHP\_WIRE on the small PC board of discharge box.
- ② The wire connection and the position of the electrode wire of the machine head (lower) are the same as those of the machine head (upper).
  - \* Following figure illustrates the electrode wires of the machine heads (upper and lower) connected to the discharge system.



## (2) Wire connection of servo driver (circuit diagram FIG10-DRIVER)

In the circuit diagram, DRIVER1\_CN2 stands for the connector of X axis Servo Driver CN2 Other servo drivers are expressed in the same way.

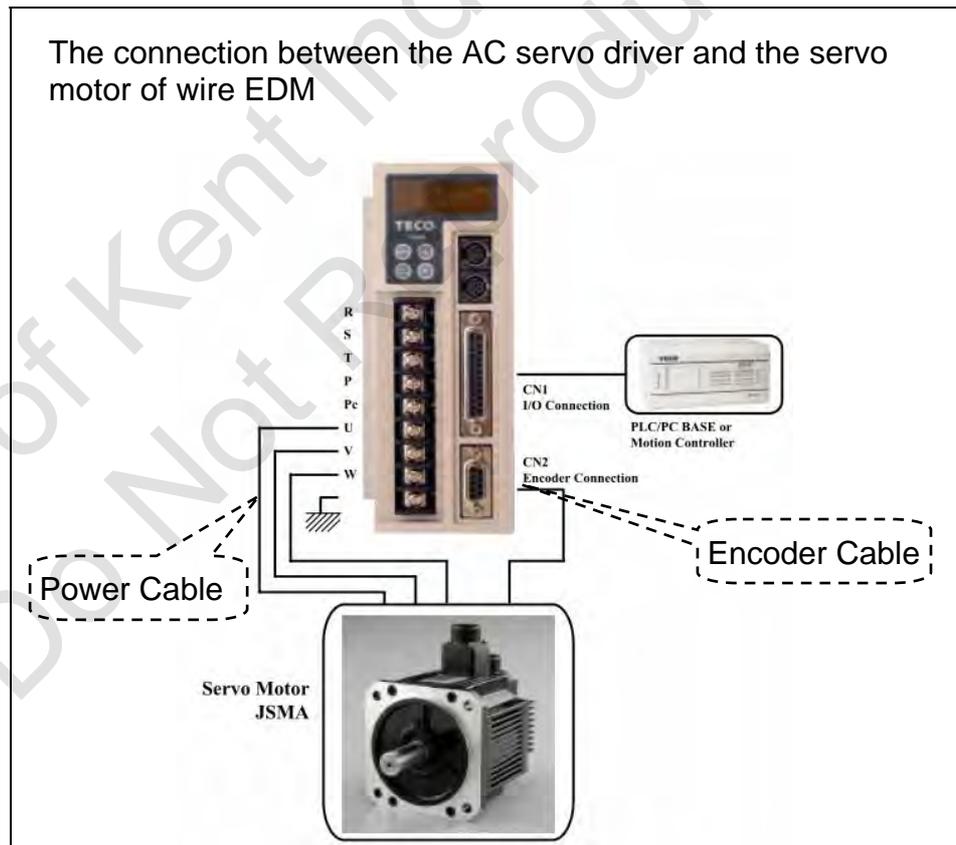
**HINT**

- \* See circuit diagram FIG10-DRIVER.
- \* See Chapter 2 "The components of electric control box".

DRIVER1\_ CN2 : Connect MOTION\_P5(X)  
 DRIVER2\_ CN2 : Connect MOTION\_P6(Y)  
 DRIVER3\_ CN2 : Connect MOTION\_P9(Z)  
 DRIVER4\_ CN2 : Connect MOTION\_P7(U)  
 DRIVER5\_ CN2 : Connect MOTION\_P8(V)  
 DRIVER6\_ CNX6 : Connect AWT\_CPU\_P4(W)

Above connecting wires adopt the connector of SCSI 50-36Pin.

- \* The wire connection between servo driver and motor is shown below -

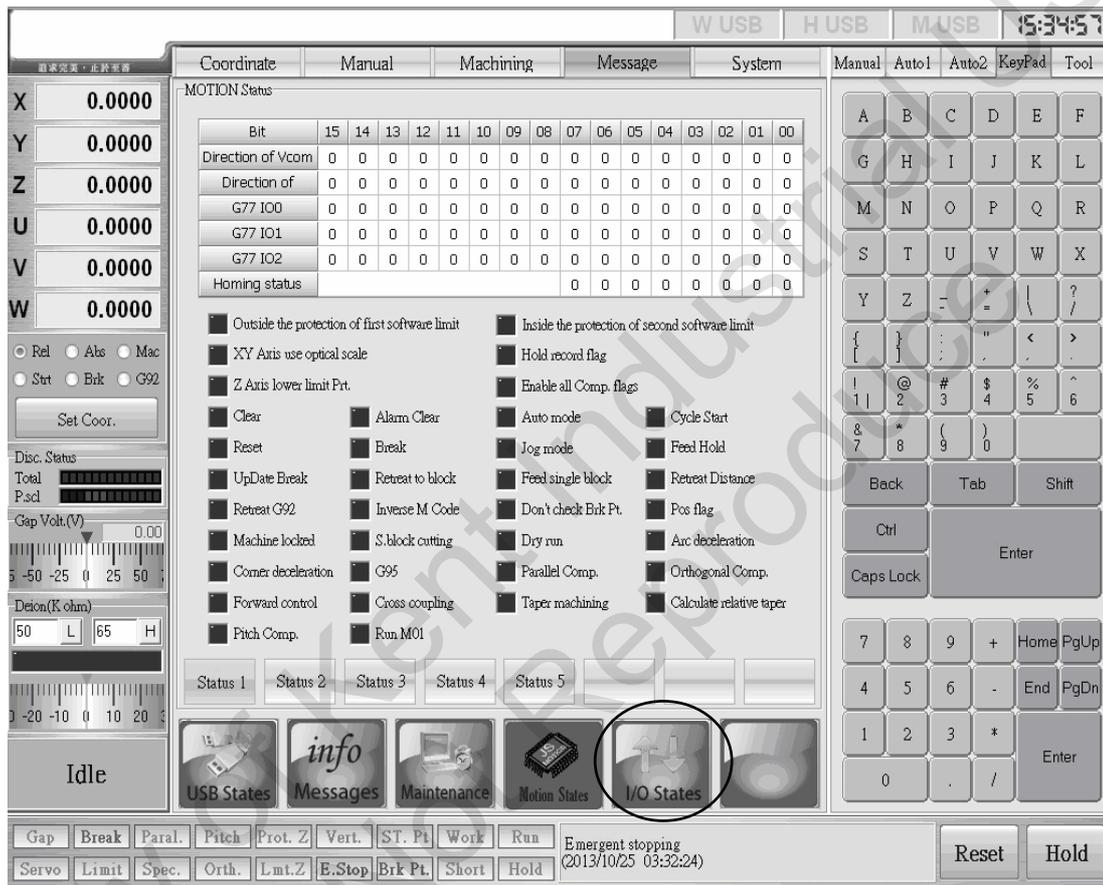


# Introduction of Input/Output(I/O)

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# 5 INPUT and OUTPUT(I/O)

I/O represents INPUT and OUT. According to the figure below, the information of Input and Out are display under the Message. There are two kinds of detections under Message: Motion Status and I/O Status (WIO)



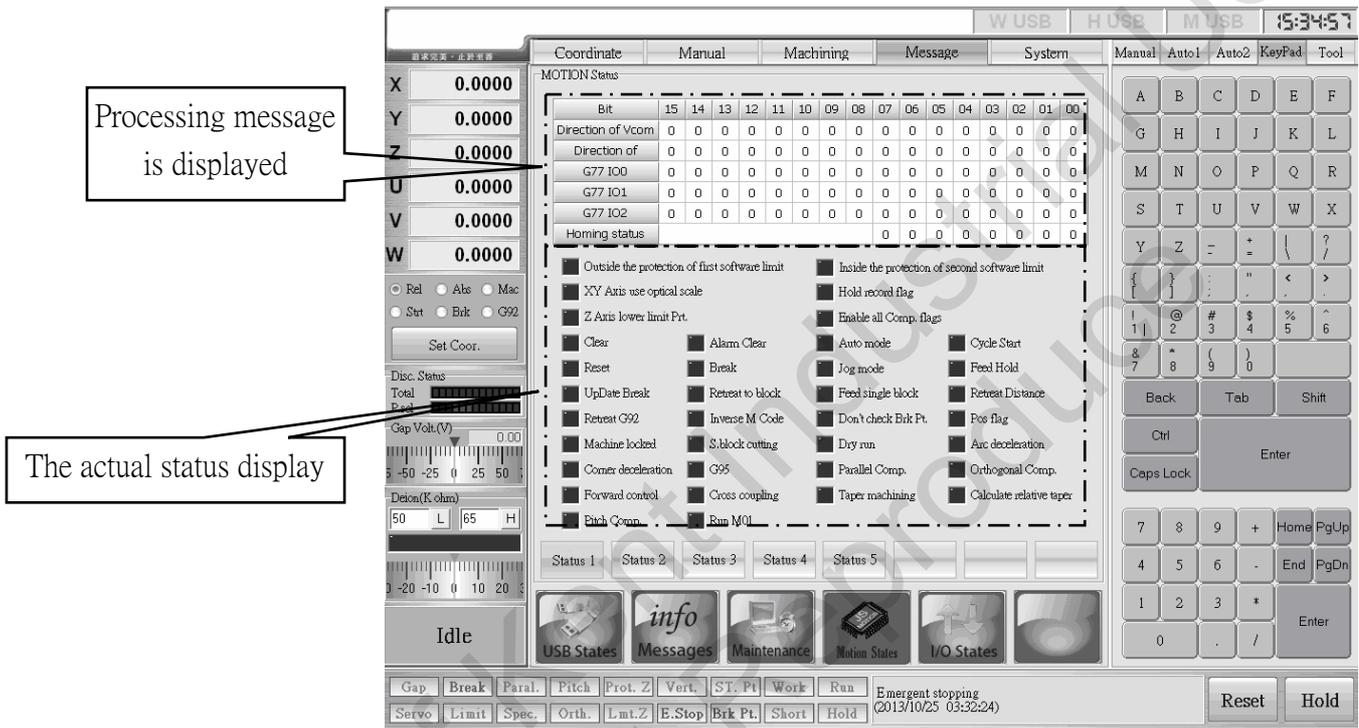
Hint

\* I Bits and O Bits are important to the EDM technician because the technician can know the overall status by I and O bits signal.

### 5.1 Motion Status

Message Display:

- (1) Click《Message》then select《MOTION Status》to enter Status 1 screen The display screen can be divided into position signal display and Status in real time.



Hint

\* Move the mouse to position signal box to know more about the status of the machine

Vcom direction(vcom\_dir) :

07	06	05	04	03	02	01	00
x	x	W axis (1:positive)	V axis (1:positive)	U axis (1:positive)	Z axis (1:positive)	Y axis (1:positive)	X axis (1:positive)
15	14	13	12	11	10	09	08
x	x	x	x	x	x	x	x

G77 IO0 direction (G77\_IO0) :

07	06	05	04	03	02	01	00
M00 (1:ON)	Water M83/M43 (1:ON)	Wire M82/M42 (1:ON)	Cutting power M81/M41 (1:ON)	Corner M26/M36 (1:ON)	Arc M25/M35 (1:ON)	Approach M23/M33 (1:ON)	Single block hold M21/M22 (1:ON)

15	14	13	12	11	10	09	08
G95 (1:ON)	G92 stop (1:ON)	G00 stop (1:ON)	×	M70 Hold (1:ON)	M30 Hold (1:ON)	M02 Hold (1:ON)	M01 Hold (1:ON)

G77 IO1 direction (G77\_IO1) :

07	06	05	04	03	02	01	00
Wait deceleration completed (1:ON)	Arc deceleration (1:ON)	Line end Point (1:ON)	Line start Point (1:ON)	Volt too low Hold (1:ON)	Limit protection Hold (1:ON)	Wire broken Hold (1:ON)	Retreat Hold (1:ON)
15	14	13	12	11	10	09	08
Cutting mode (0:vertical)	Path return (1:ON)	Taper calculation mode (1:ON)		×	Dry run corner deceleration (1:ON)	Wait in section end (1:ON)	Retreat state (1:ON)

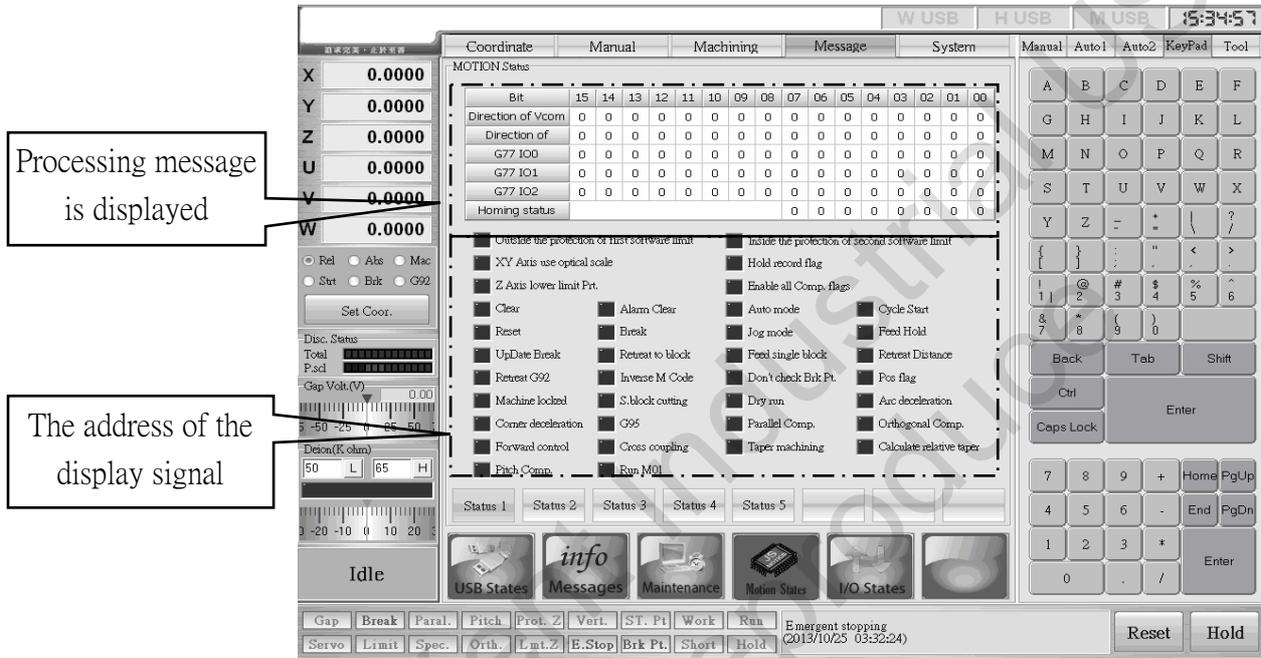
G77 IO2 direction (G77\_IO2) :

07	06	05	04	03	02	01	00
×	×	×	M500 Hold (1:ON)	M99 Hold (1:ON)	M98 Hold (1:ON)	M60 Hold (1:ON)	M50 Hold (1:ON)
15	14	13	12	11	10	09	08
Execute M01 (1:ON)	Short-circui t signal (1:ON)	×	×	×	×	×	×

Status of find origin :

07	06	05	04	03	02	01	00
Y axis Optical Scale (1:ON)	X axis Optical Scale (1:ON)	W axis Encoder (1:ON)	V axis Encoder (1:ON)	U axis Encoder (1:ON)	Z axis Encoder (1:ON)	Y axis Encoder (1:ON)	X axis Encoder (1:ON)

- (2) Click 《Message》 then select 《Status 2》 to enter the Status 2 display screen. It can be divided into 2 parts: Machining signal display and Position signal display. The number on the machining first message will change while machining.



DSP GPIO A Port status (GPIO\_A) :

07	06	05	04	03	02	01	00
U axis origin (1:ON)	U axis +Limit (1:ON)	Y axis -Limit (1:ON)	Y axis origin (1:ON)	Y axis +Limit (1:ON)	X axis -Limit (1:ON)	X axis origin (1:ON)	X axis +Limit (1:ON)
15	14	13	12	11	10	09	08
W axis origin (1:ON)	Z axis -Limit (1:ON)	Z axis origin (1:ON)	Z axis +Limit (1:ON)	V axis -Limit (1:ON)	V axis origin (1:ON)	V axis +Limit (1:ON)	U axis -Limit (1:ON)

DSP GPIO B Port Status (GPIO\_B) :

07	06	05	04	03	02	01	00
×	×	×	E.STOP (1:ON)	×	×	W axis -Limit (1:ON)	W axis +Limit (1:ON)
15	14	13	12	11	10	09	08
×	×	×	×	×	×	×	×

## DSP GPIO F Port status (GPIO\_F) :

07	06	05	04	03	02	01	00
W axis Servo Ready (0:ON)	Z axis Servo Ready (0:ON)	V axis Servo Ready (0:ON)	U axis Servo Ready (0:ON)	Y axis Servo Ready (0:ON)	X axis Servo Ready (0:ON)	×	×
15	14	13	12	11	10	09	08
×	×	X axis Servo alarm (1:ON)	Y axis Servo alarm (1:ON)	U axis Servo alarm (1:ON)	V axis Servo alarm (1:ON)	Z axis Servo alarm (1:ON)	W axis Servo alarm (1:ON)

## DSP EIO Port Status (EIO\_DATA1) :

07	06	05	04	03	02	01	00
×	×	×	×	×	Wire break signal (0:ON)	Lower test point of vertical calibrator (0:ON)	Upper test point of vertical calibrator (0:ON)
15	14	13	12	11	10	09	08
×	×	×	×	×	×	×	×

## X~W axis\_status[ID\_X~ID\_W] :

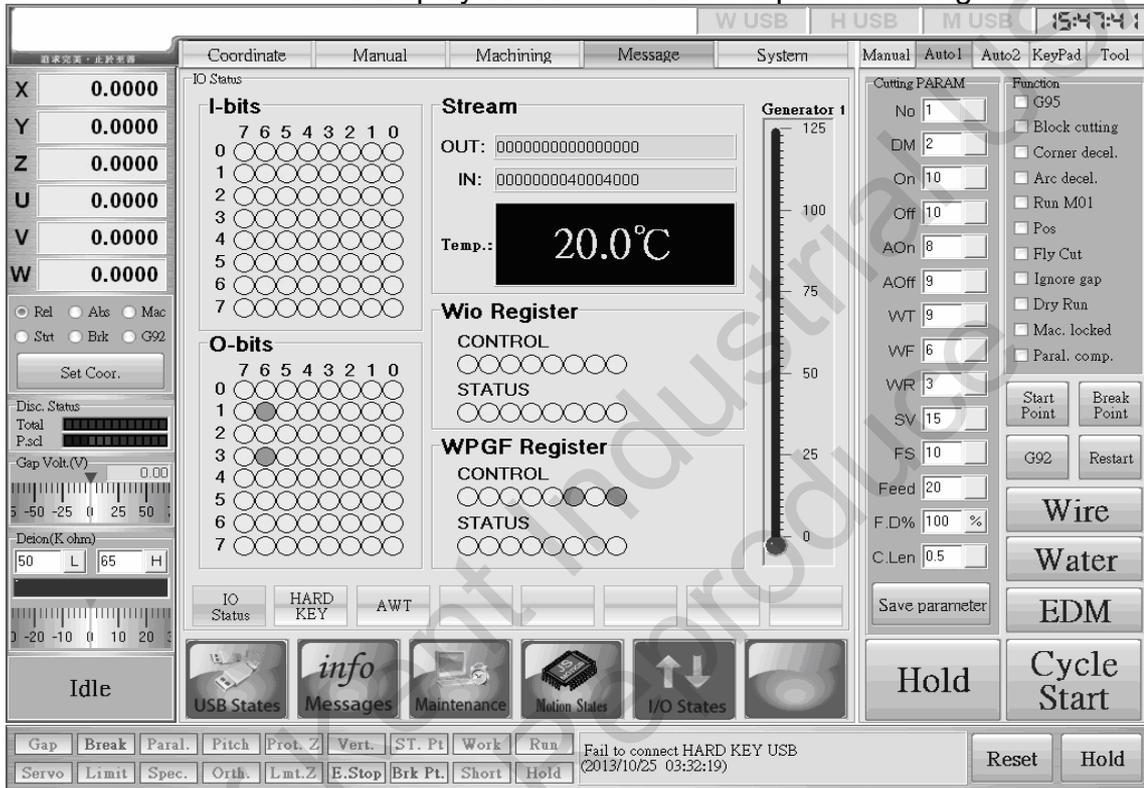
07	06	05	04	03	02	01	00
×	Origin switch trigger (1:ON)	Negative limit trigger (1:ON)	Positive limit trigger (1:ON)	Servo alarm (1:ON)	Servo Ready (0:ON)	-Limit Exchange (1:ON)	Cycle Start (1:ON)
15	14	13	12	11	10	09	08
Z Axis lower limit protection (1:ON)	Find out the machine origin (1:ON)	Lag (time) trigger (1:ON)	Lag (distance) trigger (1:ON)	Second software limit trigger (1:ON)	First software limit trigger (1:ON)	Negative protection trigger (1:ON)	Positive protection trigger (1:ON)

### 5.2 I/O Status Display (WIO)

Display screen operation :

- (1) Click 《Message》 then select 《I/O Status》 to enter I/O Status.

The display screen will show the position of signal



#### I-bits

	07	06	05	04	03	02	01	00
00	Wire recycle beam Detection	wire broken signal	x	Panel key switch	Air sensor	ups Error Message	Power off switch	Emergency stop
01	x	x	x	x	x	x	x	x
02	x	x	x	x	x	Water system alarm	x	x
03	x	x	x	x	x	x	x	x
~	x	x	x	x	x	x	x	x
07	x	x	x	x	x	x	x	x

## O-bits

00	07	06	05	04	03	02	01	00
	×	×	×	×	×	×	×	×
01	07	06	05	04	03	02	01	00
	×	Warning light(R)	Warning light(Y)	Warning light(G)	PCD Loop	Sluicing Pressure valve	Electromagnetic Water inflow	AWT water stream (Upward)
02	07	06	05	04	03	02	01	00
	Water gun	AWT water stream (downward)	Ion removal motor switch	Hi pump motor switch	Electromagnetic water valve	Water pressure NO. bit2	Water pressure NO. bit1	Water pressure NO. bit0
03	07	06	05	04	03	02	01	00
	×	Z axis brake (+24V)	wire broken signal	Manual discharge switch	low power	HI power	Edge power	Main Power switch
04	07	06	05	04	03	02	01	00
~ 07	×	×	×	×	×	×	×	×

## 5.3 Using I/O to check circuit

- (1) Utilize MOTION\_I/O status to check the circuit status .

Take MOTION position DSP GPIO A\_00 for example :

DSP GPIO A\_01 position is the input signal of the machine origin on X axis. When the switch of the mechanical origin is not ON the content shows "0" . However, When the switch of the mechanical origin is ON, the content shows 1(0→1)If the display screen follows DSP GPIO A\_01 describe above that means the switch of the machine origin on X axis is regular. ; When the switch of the mechanical origin is not ON , the content shows "1".This means the switch is short of the mechanical origin on X axis. Please refer to Chapter 2 to find the position of the machine origin on the X axis and then refer to Chapter 4 wiring to check the wiring for the switch of the mechanical origin on X axis. After the problem is solved, the content will display "0"

 Hint

- \* Utilize MOTION\_I/O to check the circuit is one of the solution when EDM is not able to operate “Find Origin” on X axis.
- \* The part No. of the mechanical origin switch on X axis is X\_HOME\_SW, Please refer to Chapter 2 machine

(2) Utilize WIO\_I/O signal to check the circuit.

Take the signal O0306 when turn on the emergency switch for instance: After enter WIO\_I/O, position O0306 will show“” At this time the brake of the Z axis should be released. If it is still showing “”this means the brake of Z axis is still not released in other words the circuit of the brake on Z axis is abnormal for the WIO board in J11.1 and J11.7 or DC +24V is not input on the WIO board. At this time, check the circuit of the brake of Z axis or replace a WIO board.

 Hint

- \* The brake on Z axis is installed on the motor of Z axis , and the part No. of the motor is Z\_BRAKER , Please refer to Chapter 2 machine structure

(3) Utilize WIO\_I/O signal to check the circuit.

Take the reel system for example:

- ① Check the switch of the wire break signal ( WJS2B4 )

In WIO\_I, position I0006 is the signal of the wire break detection switch, the display will show“” while wire break. When toggle the switch, the display will show“” at I0006. If the display does not change, please check the circuit of the switch.

 Hint

- \* When the wire is break , the reel system is not able to operate.
- \* To learn more about the position of the wire break detection switch, please refer to Chapter2.2 WIR\_BREAK\_SW Structure

# Breakdown analysis and inspection process

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## **6 Breakdown analysis and inspection process**

During the inspection process for the WEDM, you need to refer to the WEDM diagrams attached to the end of this manual; the diagrams on the forward chapters are the detail ones for WEDM. The engineer can solve the machine problems soon if he could read the diagrams carefully and combine them well.

The alarm inspection can be divided into five parts:

1. Servo exercise system
2. Water system
3. Wire system.
4. Sparking system
5. Other breakdowns

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### 6.1 The Inspection process and samples of the servo exercise system

Most alarms happen when the servo exercise breakdowns, and the alarms can't be removed up unless it is eliminated. For this, you should know the relative diagram and PCB of the servo exercise system and refer to the below drawing (Chart 16.1).

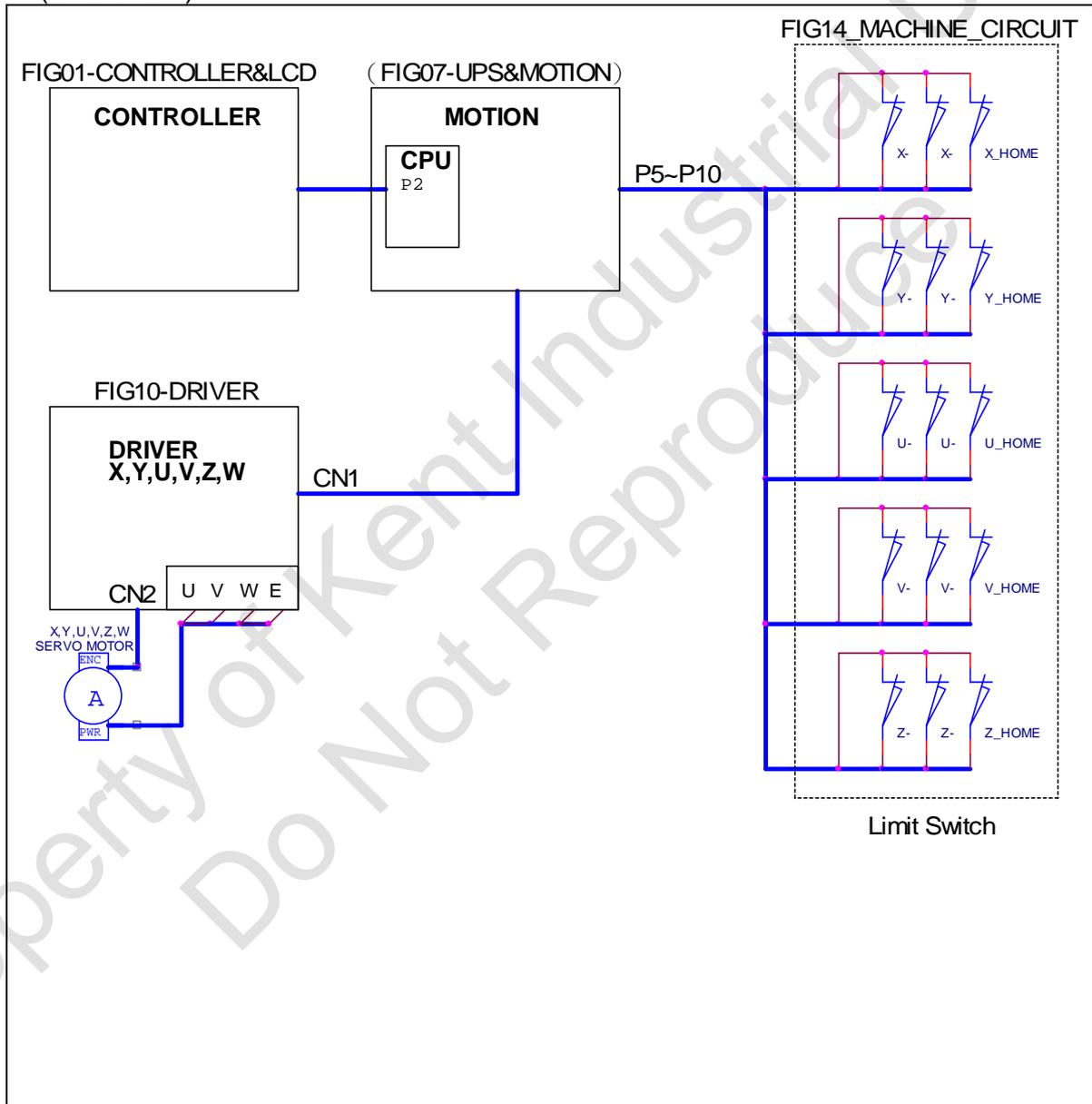
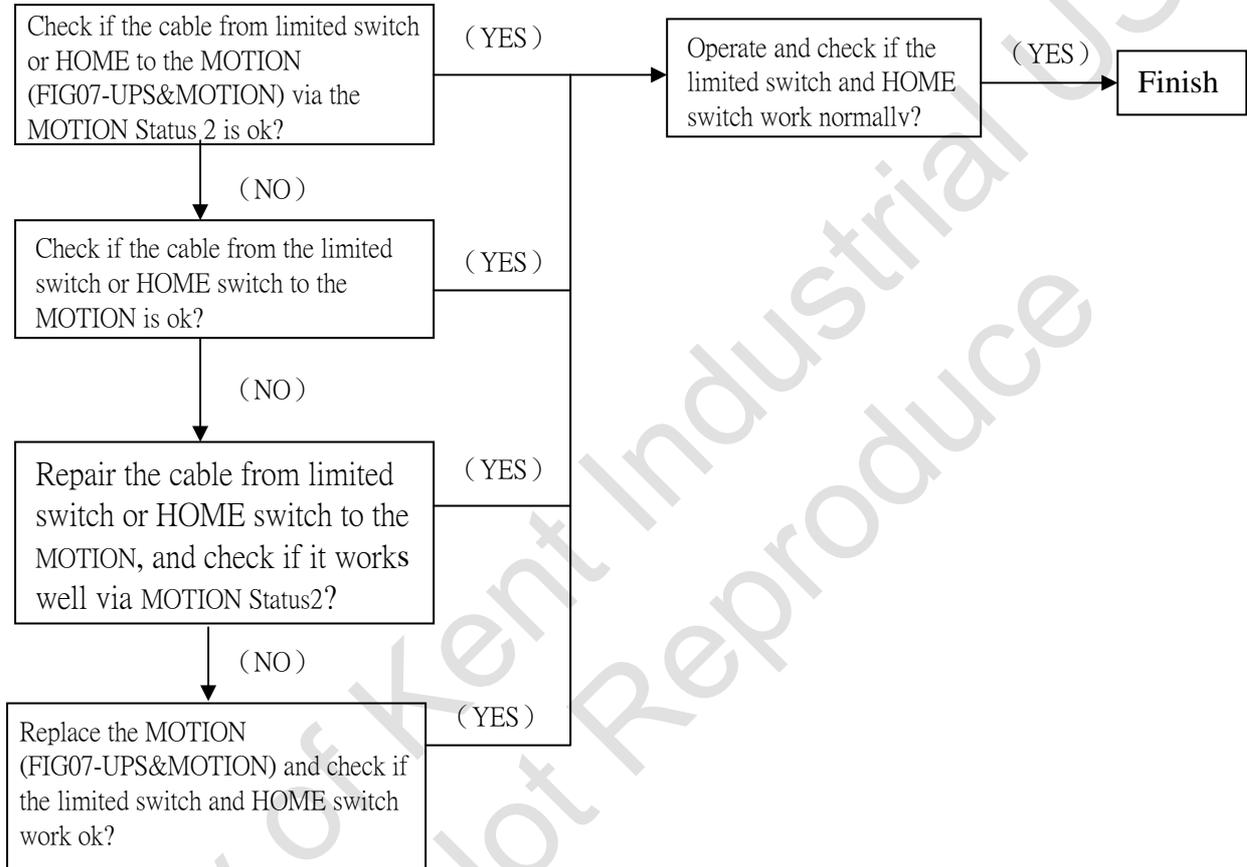


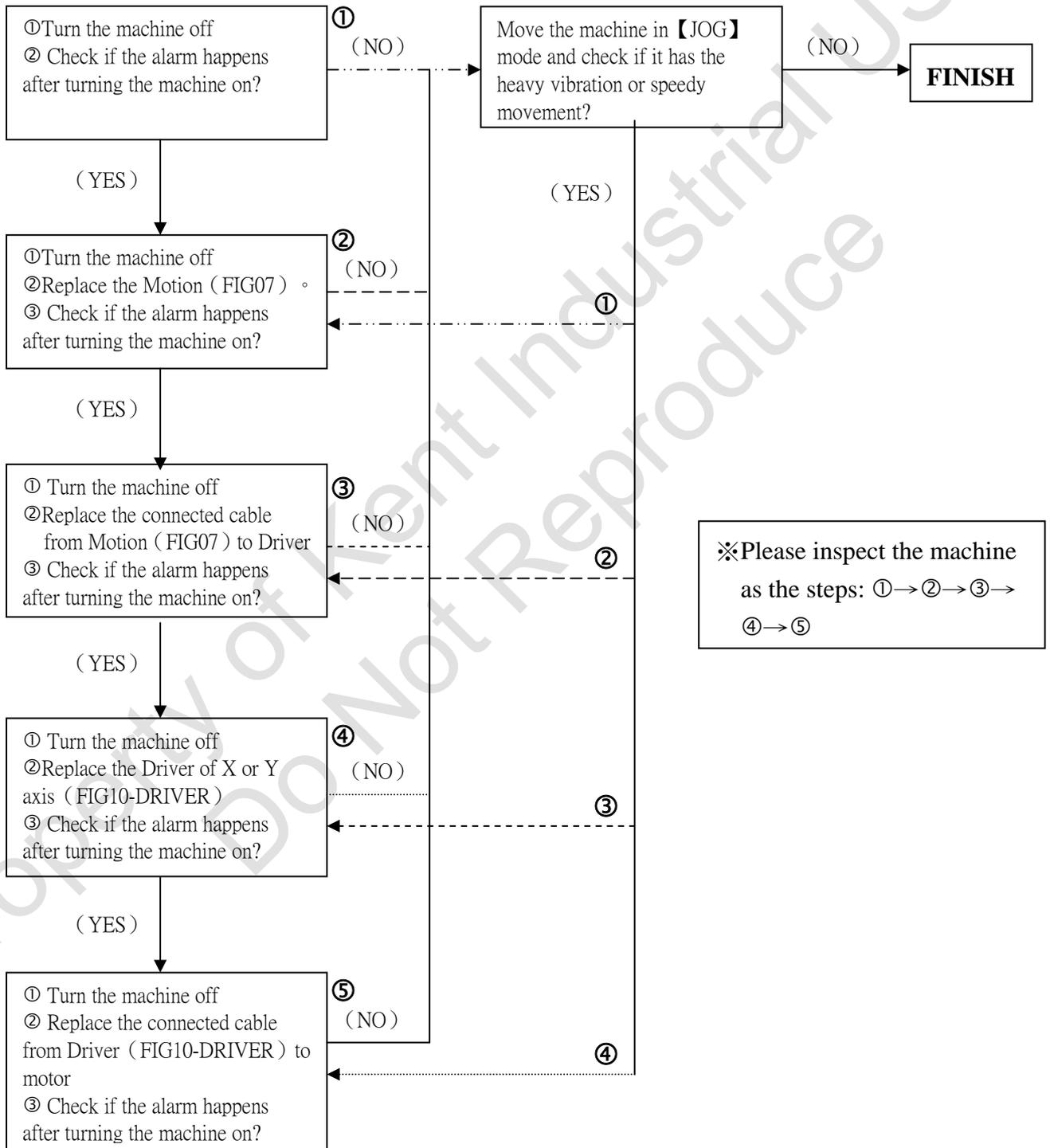
Chart 16.1 : COMPLETE DIAGRAM OF THR SERVO EXERCISE

### 6.1.1 Inspection process

**Process 1 : Eliminate the servo exercise system breakdown from the cable problem of limited switch and HOME switch.**



**Process 2: Eliminate the breakdown you can't move the machine table from the alarm cause by servo exercise system.**  
**Eliminate the breakdown of heavy vibration or speedy movement when moving the machine table. (Take the X axis and Y axis as the example)**



**NOTE:**

1. Please replace the MOTION ( FIG07 ) and its connected cable if the alarm still happens after inspecting as above steps.
2. Please check if the axis connector of AC servomotor and ball screw unwinds after inspecting as above steps and moving the machine in <JOG> mode, and it still vibrates.
3. Please replace the power cable and code cable of motor after inspecting as above steps, and the alarm are still on after turning the machine on.
4. Please contact with JSEDM if the servo exercise system problems still can't be solved after inspecting as above steps.

## 6.2 The maintenance example and inspection process of the water system

There are four pumps in the water system: the high-pressure pump, to provide the cool water when cutting; the filter pump, to filter the dirty water from the dirty water tank to the clean water tank; the resin pump, to filter the electric conduction resin from the clean water tank; the poured pump (for submerged type), to provide the cool water when machining for submerged water tank. The control diagrams of these four pumps are separated, and please refer to the below water system diagram and control process.

The control process and ref. Diagram of high-pressure pump  
FIG16-WATER\_SYSTEM14~FIG19-WATER\_SYSTEM57 :

Emergency switch on ( E-STOP\_SW ) → AC 110V is input from the JP14.2and JP14.7 of the water system PCB→magnetic switch( K1 )is sucked→ the inverter in standby situation.

Press <WATER>→HP pump starts→ AC 110V input from JP25.1、JP25.8 及 JP25.2、JP25.9→ upper and lower valve ( HI\_GATE01、HI\_GATE02 ) turn on → the upper and lower machine head start to pour the water.

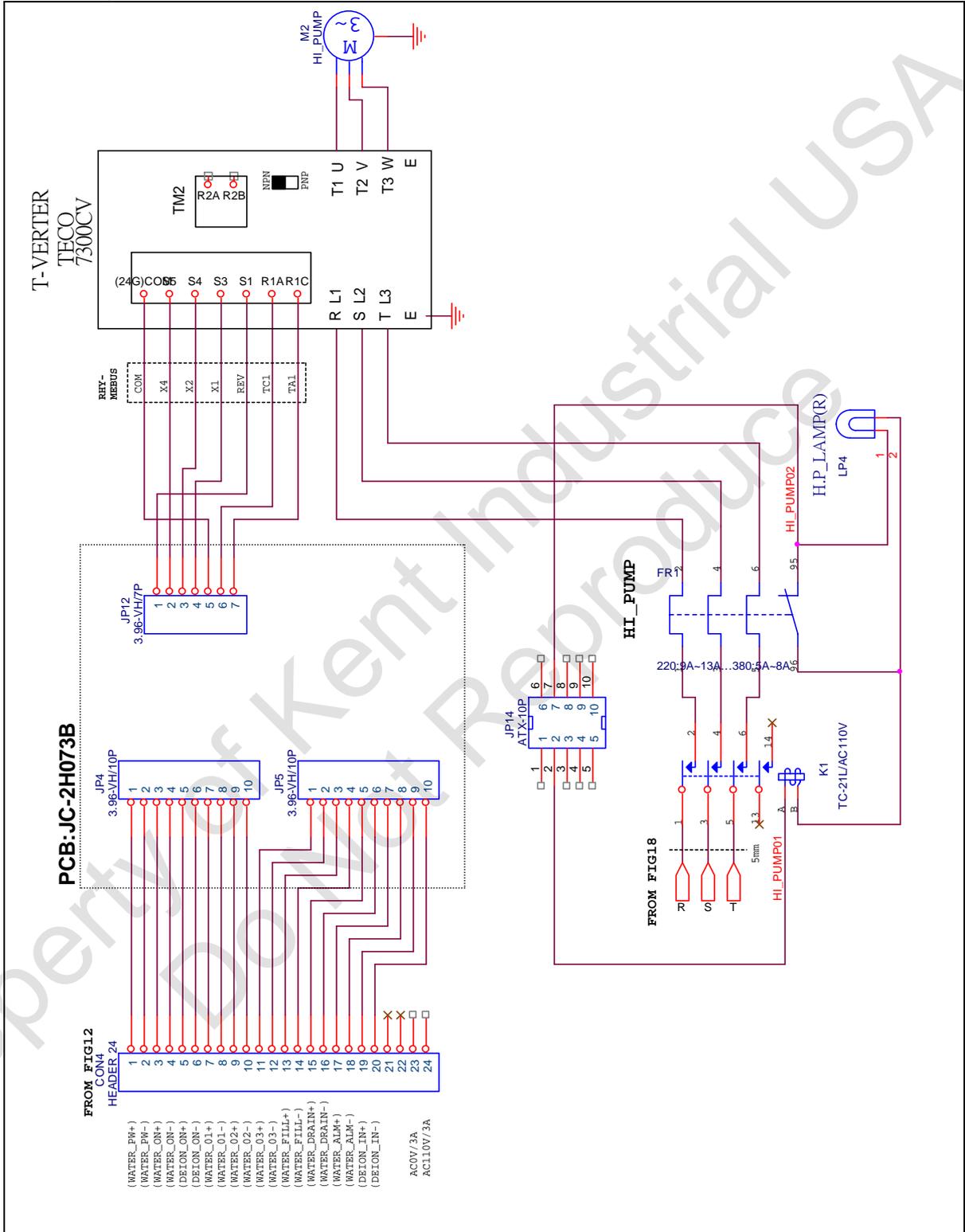
When the inverter is in standby situation, the display of the inverter frequency would change when shifting the water pressure step.

STEP	FREQUENCY	STEP	FREQUENCY
0	5.0 HZ	4	37.5 HZ
1	10.0 HZ	5	45.0 HZ
2	20.0 HZ	6	52.5 HZ
3	30.0 HZ	7	60.0HZ

PS : Please fix the ( WIRE\_BREAK\_SW ) before pressing <WATER> or it doesn't work.

The signal of the water pressure step is provided from the J19.7~J19.12of WIOS, and please replace the WIOST if the inverter frequency doesn't coordinate to step. You might adjust the water pressure step by pressing the <+>、<->

Ref. Diagram is as below:

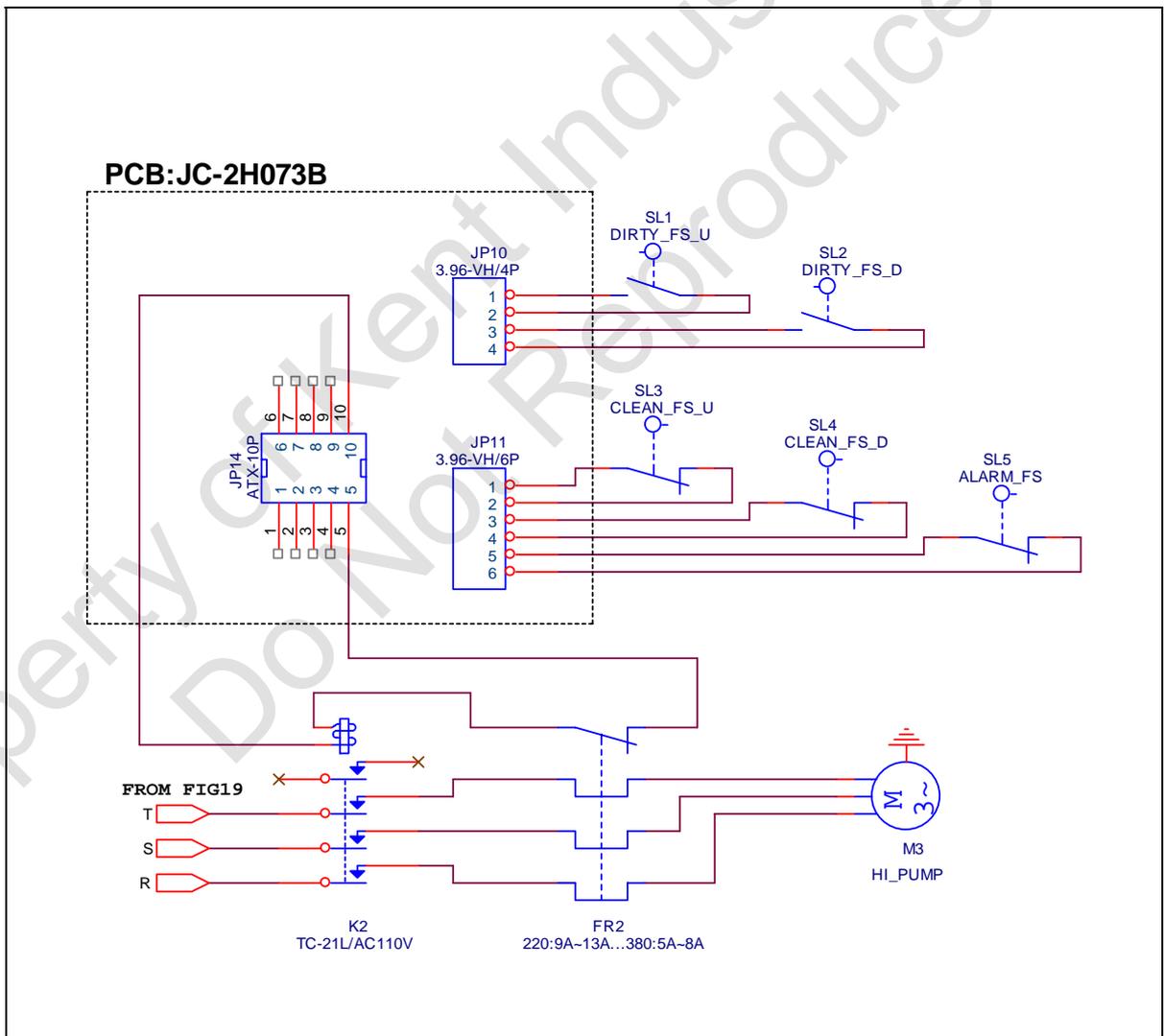


Control process and ref. diagram of filter pump:

When the fluid level of the dirty water tank is higher than the water sensor (SL1) and the one of the clean water tank is lower than the water sensor (SL4) → the output from the JP14.5 and JP14.10 from water system PCB is AC 110V → the magnetic switch (K2) is sucked → the filter pump starts.

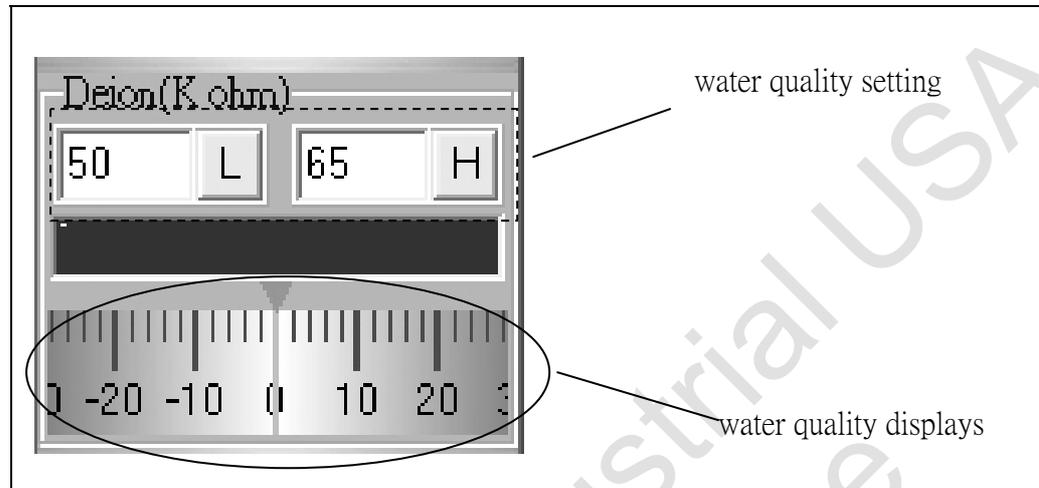
After running, the fluid level of the dirty water tank starts to go down → when the fluid level of the dirty water tank is lower than the water sensor (SL2) or the one of the clean water tank is higher than the water sensor (SL3), and there is no voltage output from the JP14.5 and JP14.10 from the water system → the magnetic switch (K2) is released → the filter pump stops.

Ref. diagram is as below:



Control process and ref. diagram of resin pump

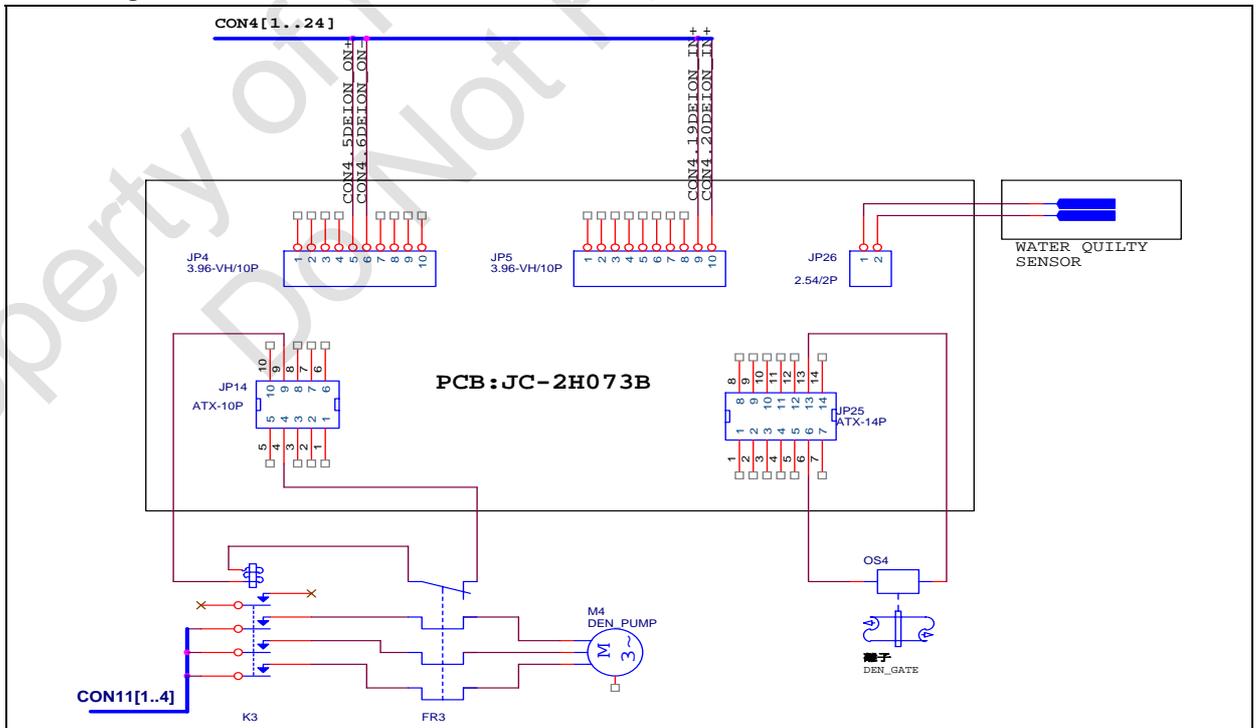
The display and setting of water quality on Main page is as below :



Water quality setting : WAL=70 · WAH=90

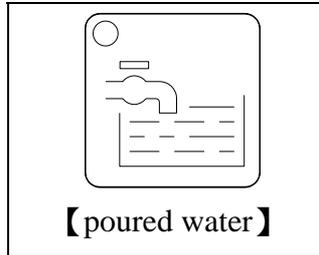
When the water electric resistance value is lower than 70K→the output of the JP14.4 and JP14.9 from the water system PCB is AC 110V→magnetic switch is sucked ( K3 ) →resin pump starts, and the output of the JP25.6 · JP25.13 from the water system PCB is AC 110V→turn the resin value ( DEN\_GATE )on; after running, the value of water electric resistance starts to go up, and when its' higher than 90K, there is no voltage output from the JP14.4 and JP14.9 of the water system PCB→ the magnetic switch ( K3 ) is released→ resin pump stops.

Ref. diagram is as below :



Control process and ref. diagram of the poured pump:

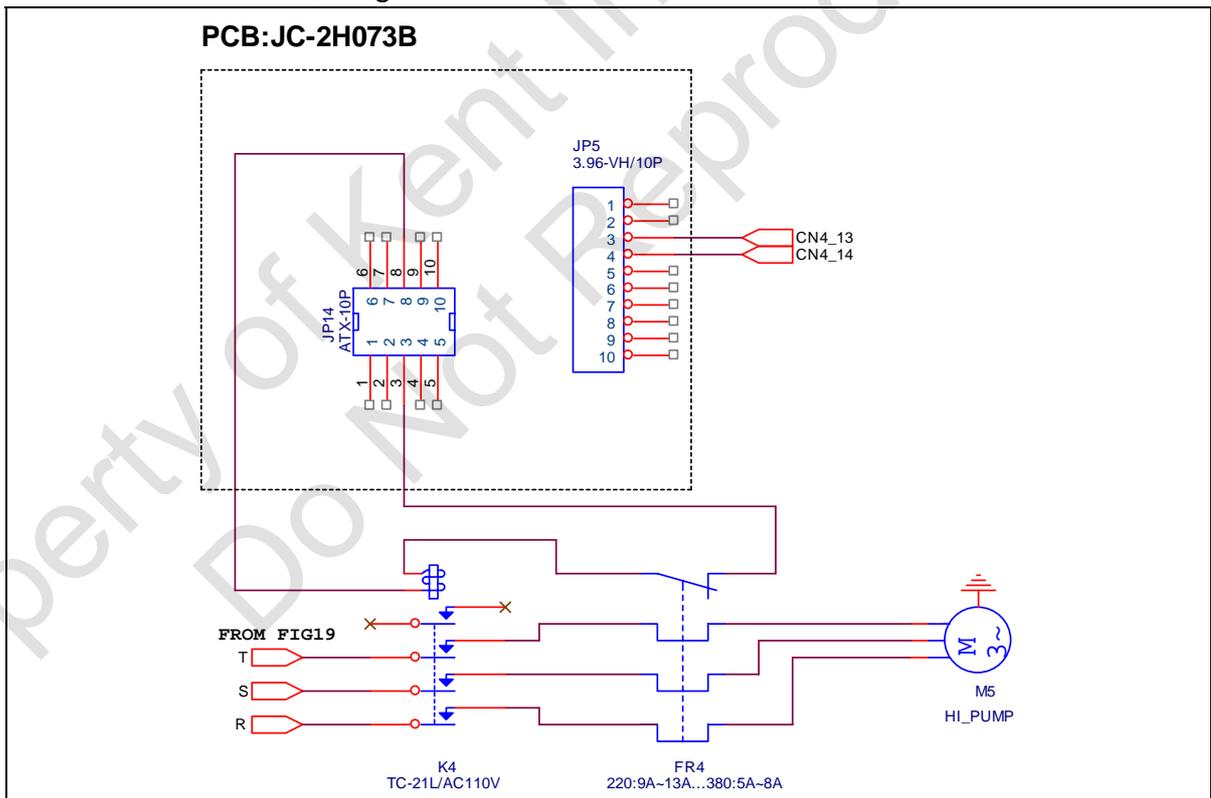
Press the **【poured water】** on the control panel :



When **【poured water】** is on → the output of the JP14.3 and JP14.8 is AC110V → the magnetic switch is sucked ( K4 ) → the poured pump starts

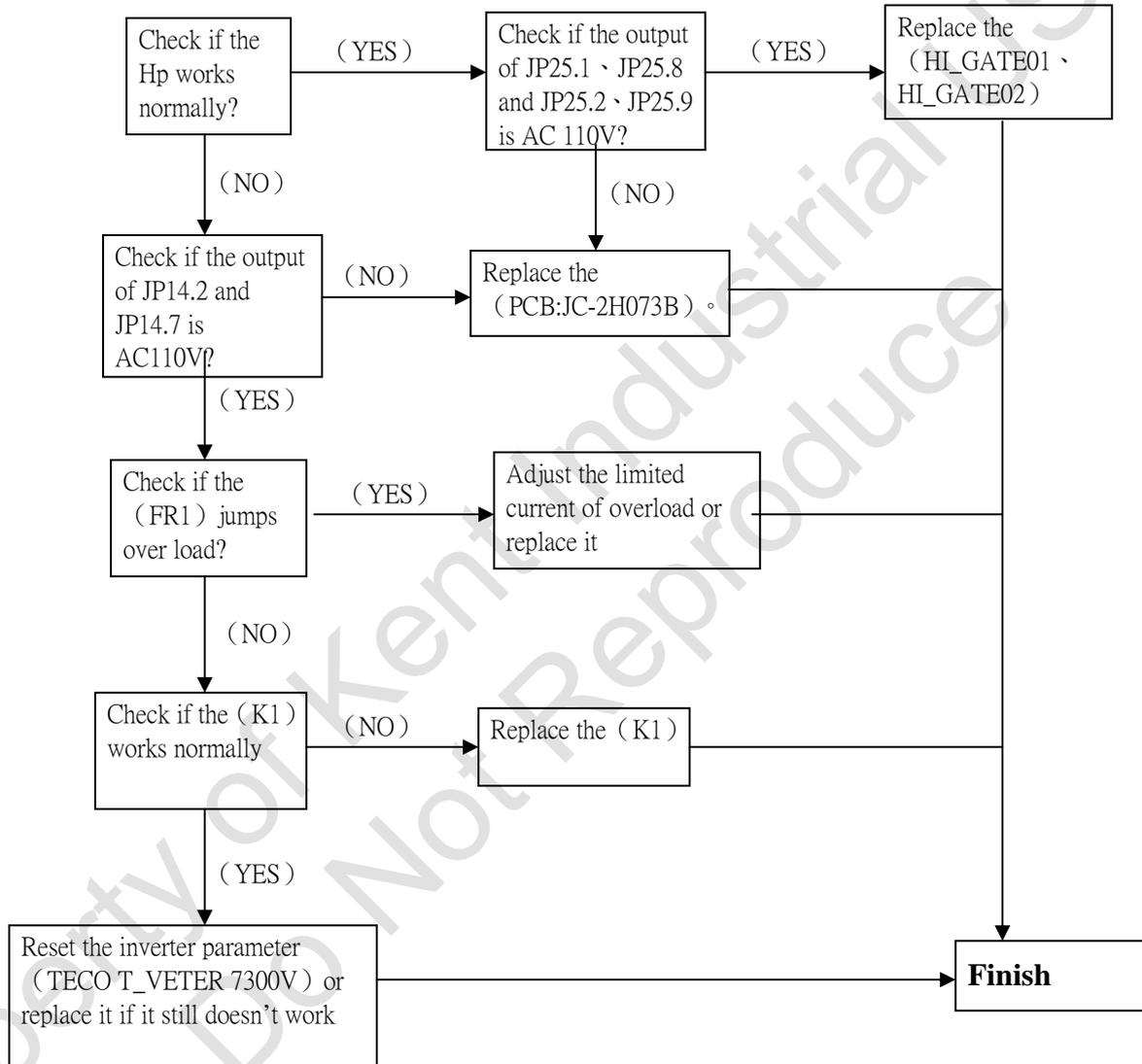
When **【poured water】** is off → there is no AC110V from the JP14.3 and JP14.8 of the water system PCB → the magnetic switch ( K4 ) is released → the poured pump stops

Ref, diagram is as below :



### 6.2.1 Inspection process

**Ins. process 1 : No cool water comes out when cutting**



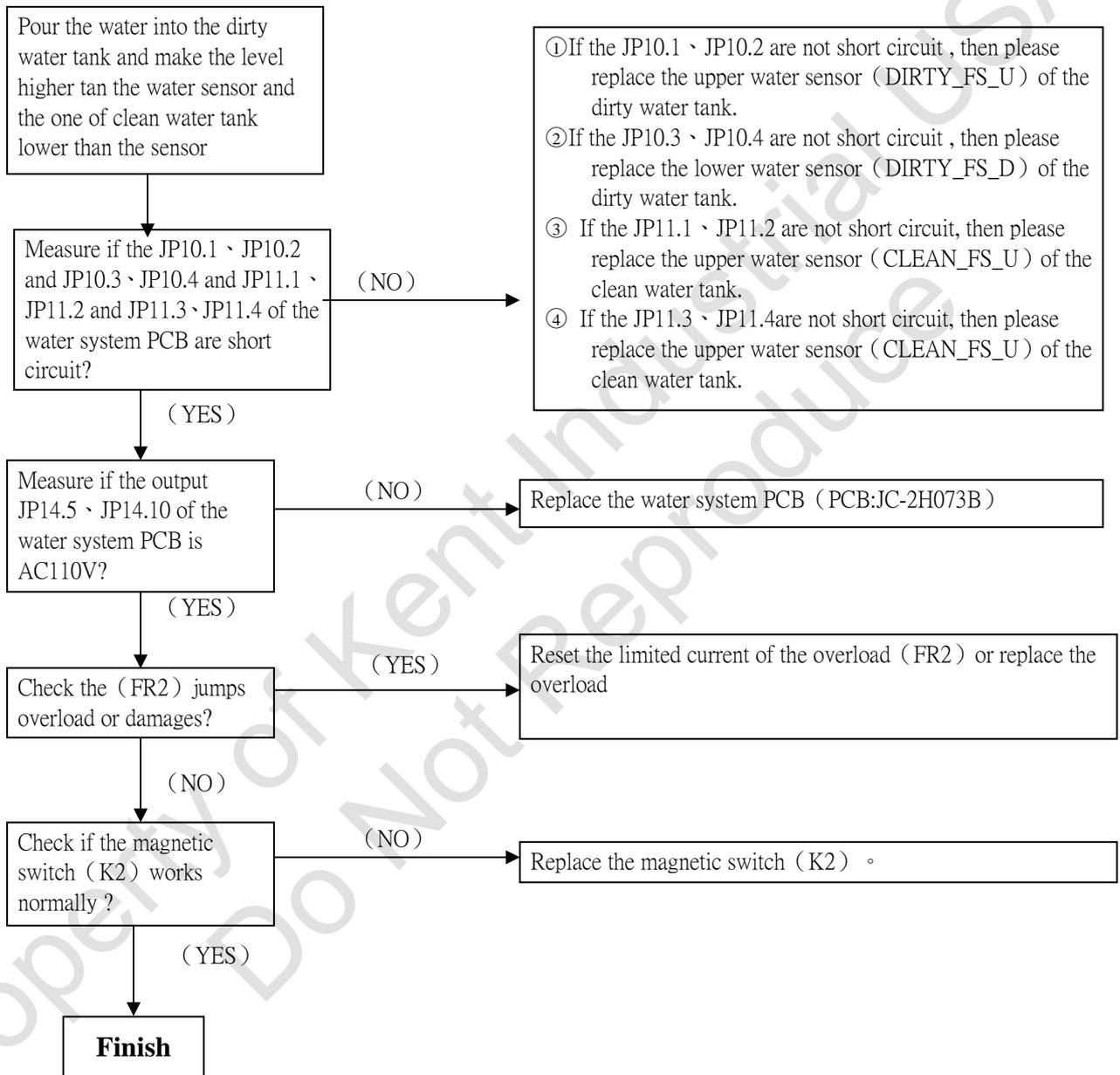
HINT

- ※ Alarm happens when the inverter breakdowns.
- ※ Please replace the HP after inspect as above steps.

DANGER

- If the magnetic works, then please measure if there is the power (3Φ · AC220V or AC380V) input without lack of PH.
- Please turn the machine power off when replacing the PCB, magnetic value, magnetic switch, overload, and etc.

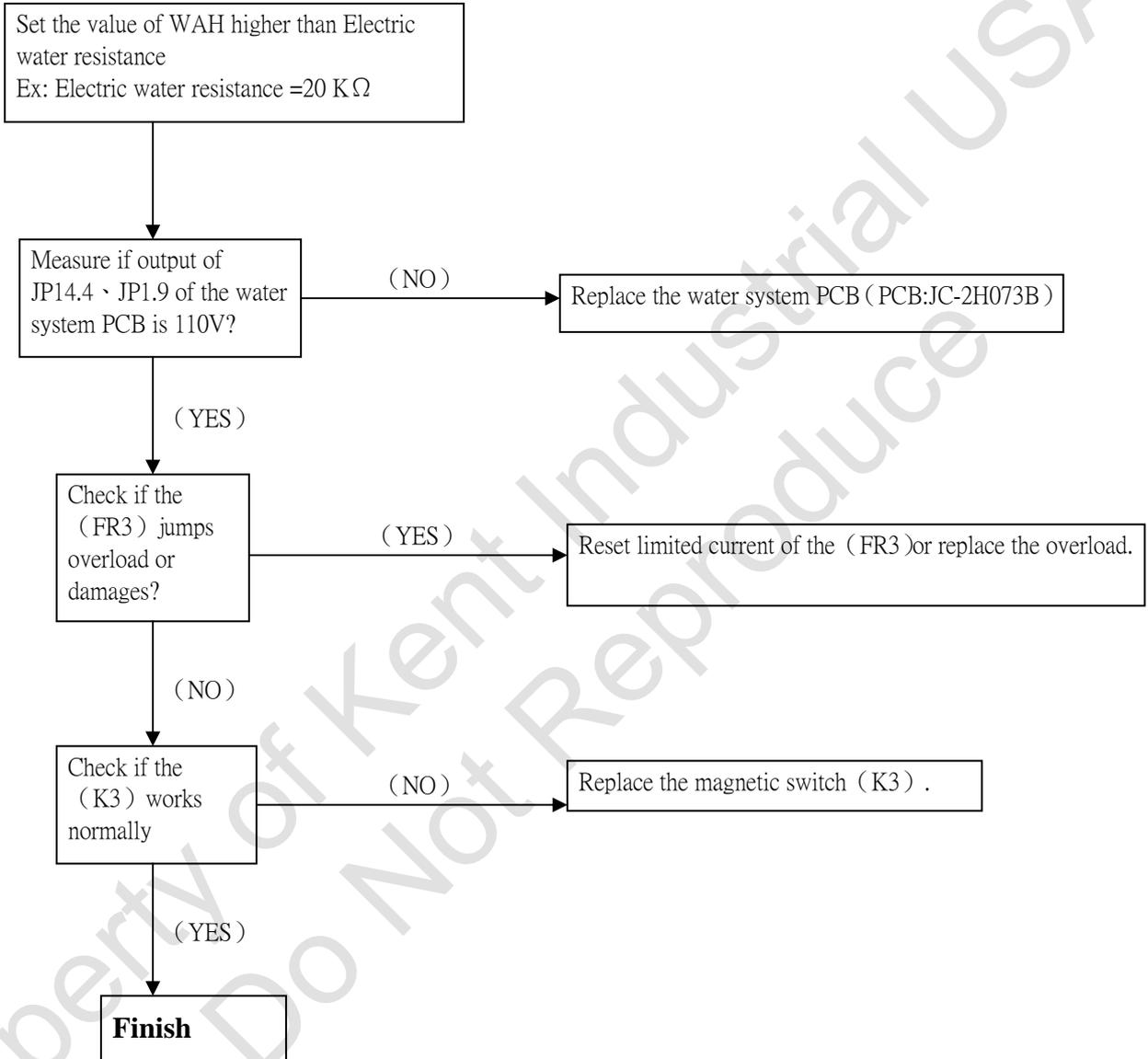
**Ins. process 2 : The breakdown of dirty water can't be filtered from the dirty water tank**



HINT

- If the magnetic switch works, but the filter pump doesn't, then please measure if the input of the magnetic switch is AC220V or AC380V ( 3PH ) .
- Please check if there is any block in the poured pipe of the filter pump, then please clean it, replace the sluice or the filter pump.

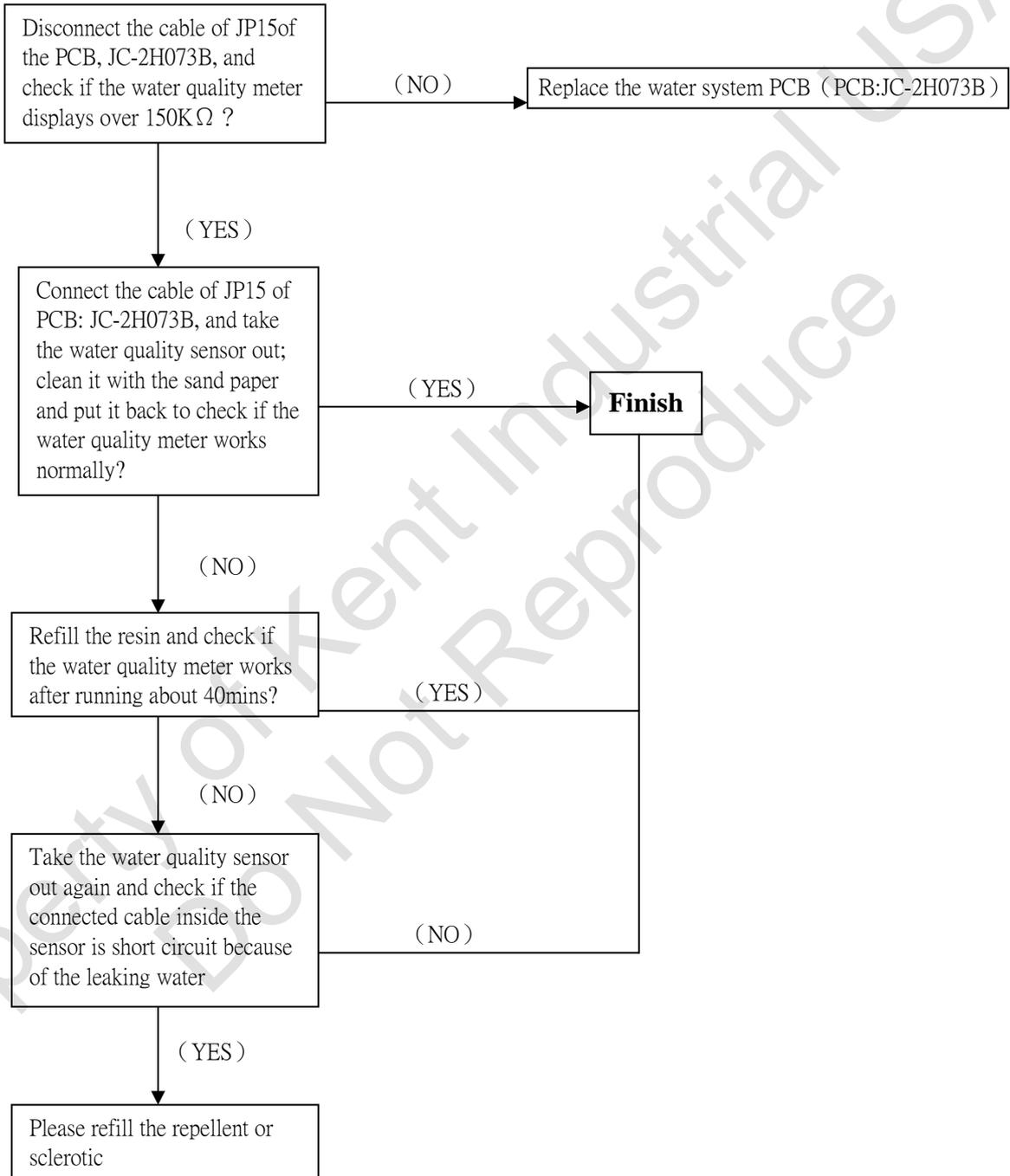
**Ins. process 3 : The breakdown of resin pump doesn't work ◦**



HINET

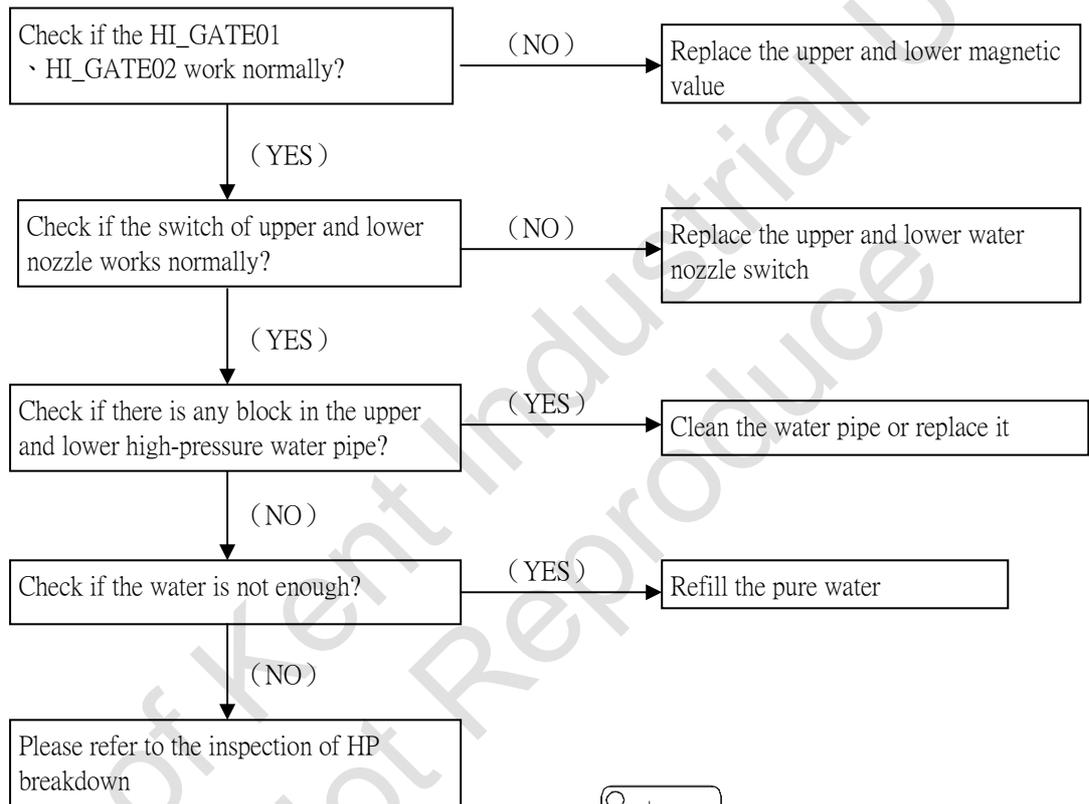
1. If the magnetic switch works, but the filter still doesn't work, then please measure if the input of the magnetic switch is AC220V or AC380V (3PH) .
2. Sometimes, the filter pump keeps running because the water quality displays 0KΩ only; that is the short circuit caused by the rust of the water quality sensor, and please clean the rust or replace the water quality sensor.

**Ins. process 4 : Water quality meter displays 0KΩ only, and can't go up ◦**

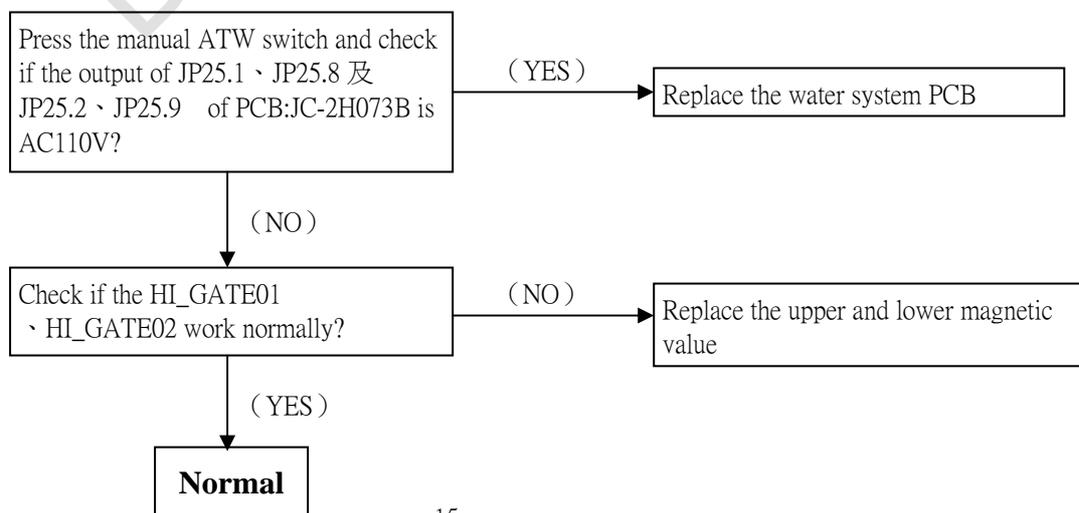


**Ins. process 5 : Inspection of special problems for water system ◦**

**Breakdown 1 : Press <WATER> ; the water pressure of upper and lower is not enough**



**Breakdown 2 : Press the manual ATW switch  , and the upper or lower machine head pours out**



## 6.2.2 Inspection example

Q1 : The shift of the water pressure section is not correct

Ins. : Check if the output of J7.1、J7.9 and J7.2、J7.10 and J7.3、J7.11 on the WIO ( FIG06-WIO ) is correct, and replace the inverter if it is not.

PS : When shifting the water pressure section, the frequency of inverter displays correctly, but the upper and lower water is not enough; that is because the water in the clean water tank is not enough, and please fill the enough water.

Q2 : Lower water pours incorrectly

Ins. : Replace the lower water magnetic value ( HI\_GATE02 ) .

Q3 : HP doesn't work

Ins. : Replace the overload ( FR1 ) .

Q4 : The speed of the filter pump is too slow

Ins. : ① Replace the filter pump.

② Clean the block in the resin pump or replace the sluice.

Q5 : HP doesn't work because the inverter jumps overload

Ins. : Replace the inverter.

PS : Please confirm if the input power of the inverter is correct .

Special Ins. : The power HP leak caused by the breakdown of main power fuse ( PANEL\_FUSE1 ) on the ( FIG04-CIRCUIT\_PANEL ) of generator, and replace the overload.

Q6 : The water quality meter displays  $0K\Omega$  only after the resin pump works for long time

Ins. : Replace the resin after confirming the water quality sensor is not short circuit

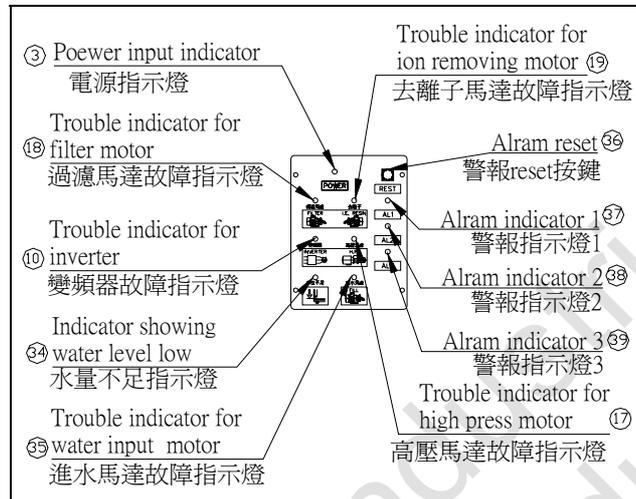
PS : Replace the water quality sensor if it is short circuit, and replace the resin if it still displays  $0 K\Omega$  after running about 3~4 hours.

Q7 : The filter pump doesn't work

Ins. : Clean the block in the upper water level sensor

### 6.2.3 Alarm indication of water system (submerged type)

The alarm light position of the lower water system (submerged type) :



Power input indicator : ON→means the water system has the power

Trouble indicator for filter motor : ON→means the filter pump breakdowns

Trouble indicator for ion removing motor : ON→means the resin pump  
breakdowns

Trouble indicator for inverter : ON→mean the inverter breakdowns

Trouble indicator for high press motor : ON→means the HP pump breakdowns

Indicator showing water level low : ON→means the water quantity is not enough

Trouble indicator for fill motor : ON→means the poured pump breakdowns

The situations of alarm indicator 1~3 are as follows : ( ON ; OFF )

Alarm situation	Alarm indicator 1	Alarm indicator 2	Alarm indicator 3
01	ON	OFF	OFF
02	OFF	ON	OFF
03	ON	ON	OFF
04	OFF	OFF	ON
05	ON	OFF	ON
06	OFF	ON	ON
07	ON	ON	ON

The alarm of water system lights on when inspecting the breakdown, and the LED displays its breakdown situation. (LED displays backwards and forwards means ok, and it crashes if not.)

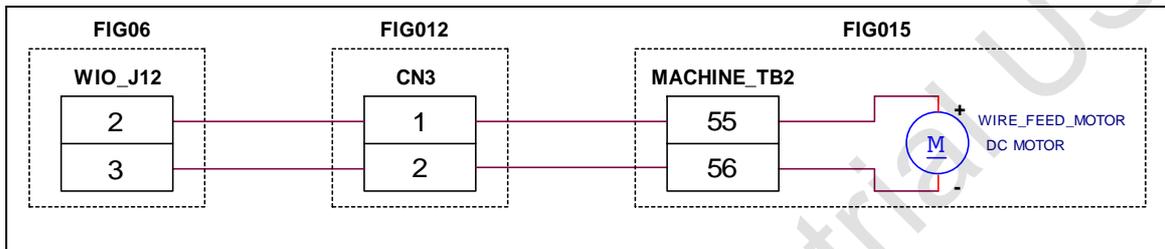
The LED indication of the breakdown is as follows,

- a. 01 → the water level is too low; the HP breakdowns when its light is on  
Ins.: 1. raise the water up to the lower water level floating SW over 10mins 2. press the RESET 3. press the E.STOP; the error remains after pressing the RESET and E.STOP
- b. 02 → the breakdown of floating SW in the dirty water tank (can't be lowered)  
Ins.: 1. lower the floating SW in the dirty tank 2. press the RESET 3. press E.STOP; the error remains after pressing the RESET and E.STOP
- c. 03 → press E.STOP (ALARM light is off) ◦
- d. 04 → Auto water level control malfunctioning ( Above machine head float sensor ON, Below machine head float sensor OFF, Outlet float sensor OFF "OR" Above machine head float sensor ON, Below machine head float sensor OFF, Outlet float sensor ON overtime error.) Solution: 1. Check Above, below machine head float sensors and outlet sensor, make sure they are working fine. 2. Press RESET 3. Press E. STOP 4. Turn Off Soaking.
- e. 05 → Auto water level control malfunctioning ( Above machine head float sensor OFF, Below machine head float sensor ON ,Outlet float sensor OFF over 40 sec) ◦ Solution ; 1. Check below machine head and outlet sensors and make sure they are working fine. 2. Press RESET 3. Press E. STOP 4. Turn Off Soaking.
- f. 06 → Auto water level control malfunctioning ( Above machine head float sensor OFF, Below machine head float sensor, Outlet float sensor OFF error, low water level alarm) ◦ Solution ; 1. Check Below machine head float sensor, Outlet sensor and filter motor/low water level float sensor and make sure they are working fine 2. Press RESET 3. Press E. STOP 4. Turn Off Soaking.
- 07 → Auto water level control malfunctioning ( Above machine head float sensor ON, Below machine head float sensor ON , Outlet float sensor OFF over 50 sec) ◦ Solution ; 1. Check Below machine head float sensor, Outlet sensor and filter motor and make sure they are working fine 2. Press RESET 3. Press E. STOP 4. Turn Off Soaking.

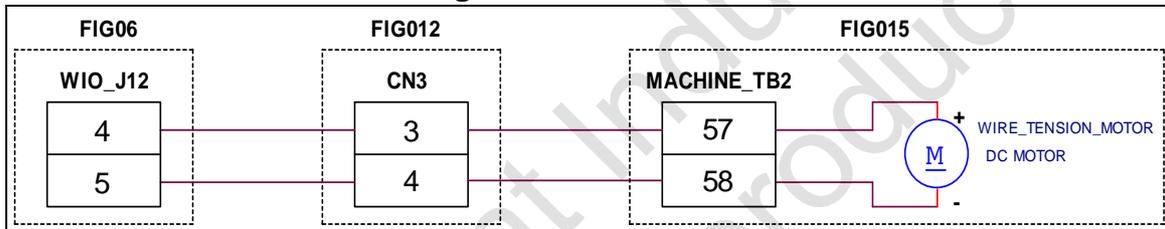
### 6.3 Inspection process of wire system

There are two individual diagrams of wire feed speed control and wire feed tension control in wire system, and the diagrams are as follows,

#### Wire control speed diagram:



#### Wire tension control diagram:



WIO\_J12 : no. J12 connecter in WIO

CON3 : no. CON3 connecter on the side of generator

MACHINE\_TB2 : no. MACHINE\_TB2 terminal seat on the back of the machine body

WIRE\_FEED\_MOTOR : the DC motor of wire feed speed control

WIRE\_TENSION\_BRAKER : the brakes of wire feed tension control

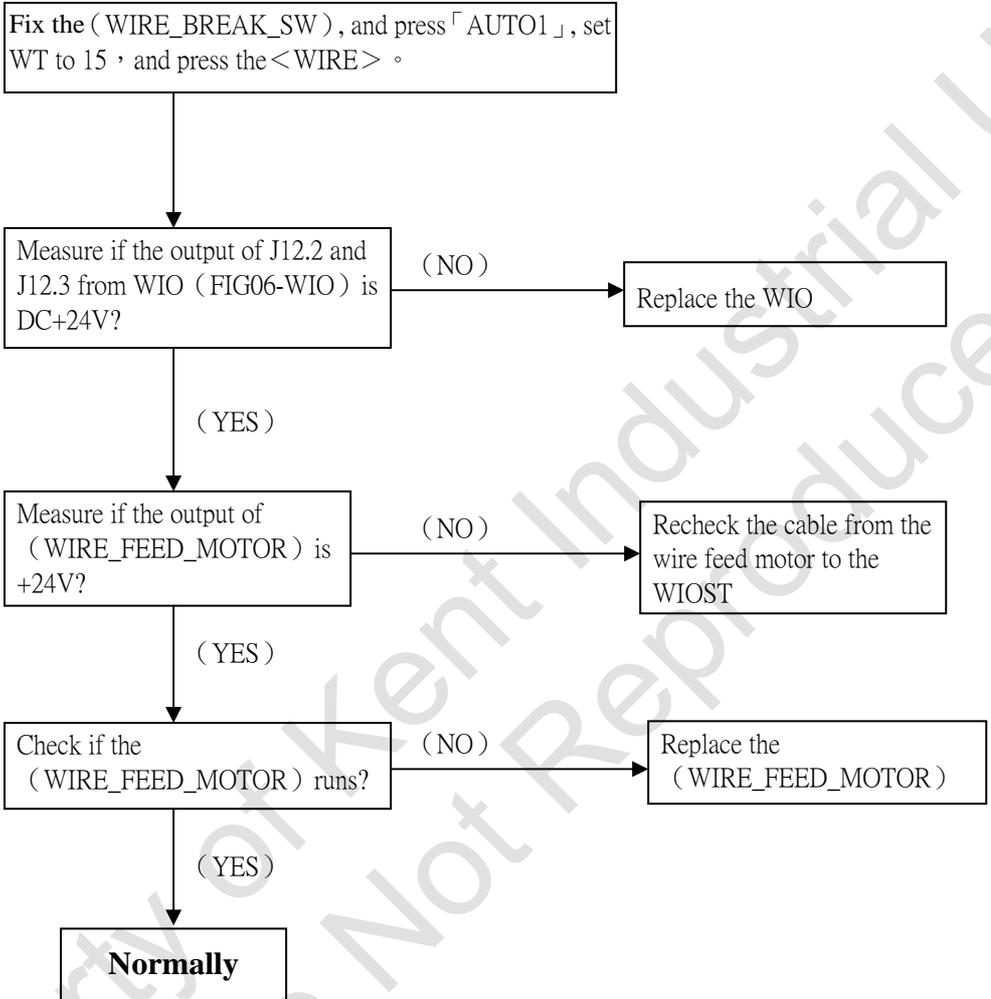
Movement of wire system : press the <WIRE>, and two sets of output +24V from the WIOST would be used for the wire feed motor and wire tension brakes

PS : Before pressing <WIRE>, please confirm the ( WIRE\_BREAK\_SW ) is fixed well or the <WIRE> doesn't work

The wire feed wheel runs when the wire feed motor runs; the running of the tension brakes is the torsion to make the opposite direction of wire tension wheel and wire feed direction

**6.3.1 Inspection process**

**Ins. process 1 : The inspection process of the wire feed motor ◦**



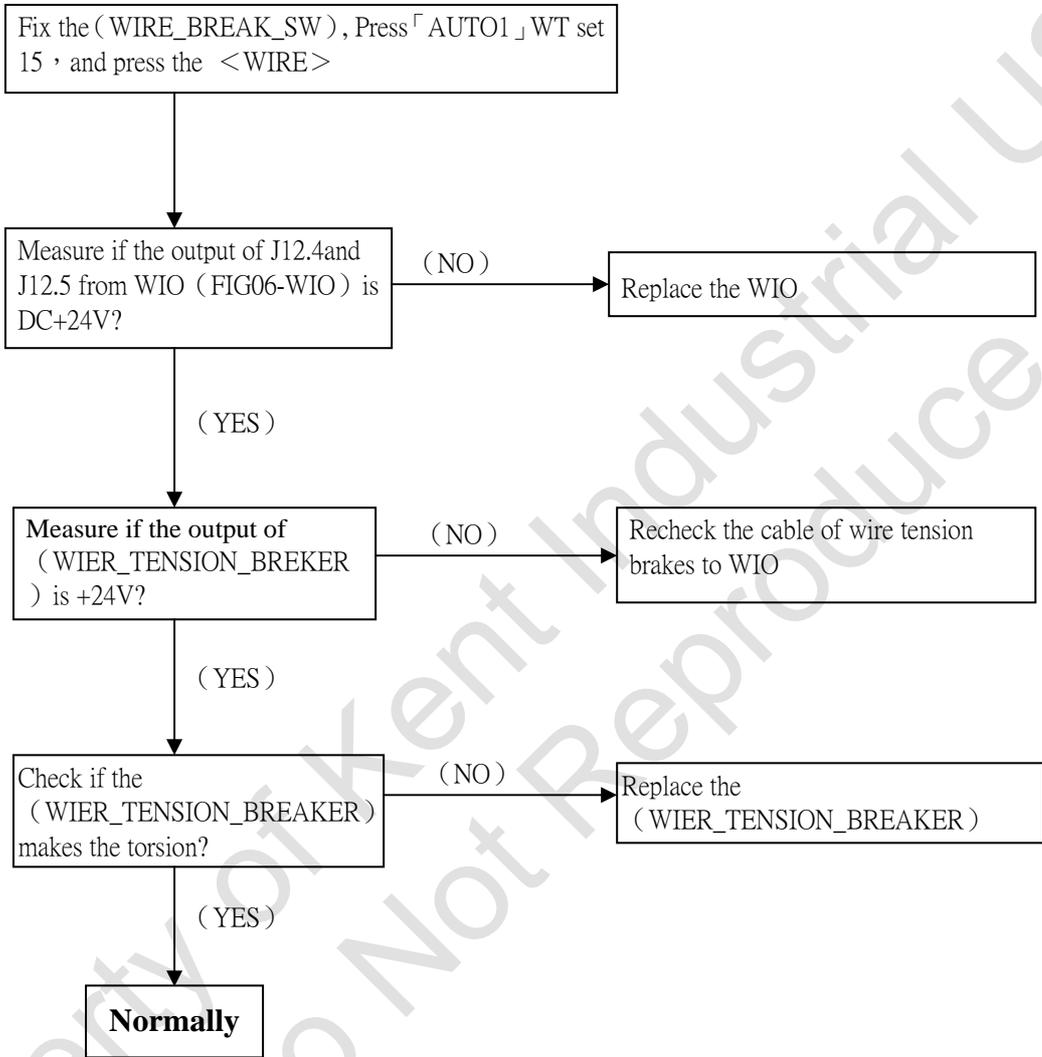
HINT

Check if the motor runs from the movement of wire-collected wheel

NOTE

When fixing the ( WIER\_BREAK\_SW ) , please check if the functions of ( WIER\_BREAK\_SW ) through the MOTION status 2 ◦ I/O status in the meanwhile.

**Ins. process 2 : Inspection process of wire tension brake (Not use in AWT) ◦**



 HINT

Check if the wire tension brakes make the torsion through turning the wire tension wheel by hand.

### 6.3.2 Inspection example

Q1 : Wire tension is not enough

Ins. : Replace the WIO ( FIG06-WIO ) .

Q2 : The wire feed motor doesn't run

Ins. : Replace the ( WIRE\_FEED\_MOTOR ) .

Q3 : The wire feed motor doesn't run

Ins. : Reconnect the connected power cable of wire feed motor.

Q4 : Press the <WIRE>, and the wire feed motor and bearings have the strange sound

Ins. : Re-maintain the wire-collected wheel and wire-clipped wheel.

※Please refer to the maintenance process in the maintenance manual and the note in the repairing manual.

Q5 : Press the <WIRE>, and the wire feed motor doesn't work

Ins. : The <WIRE> doesn't work because of the ( WIRE\_BREAK\_SW ) breakdowns, and replace the ( WIRE\_BREAK\_SW ) .

Q6 : The wire feed motor runs after pressing the <WIRE>, but the brass wire doesn't run.

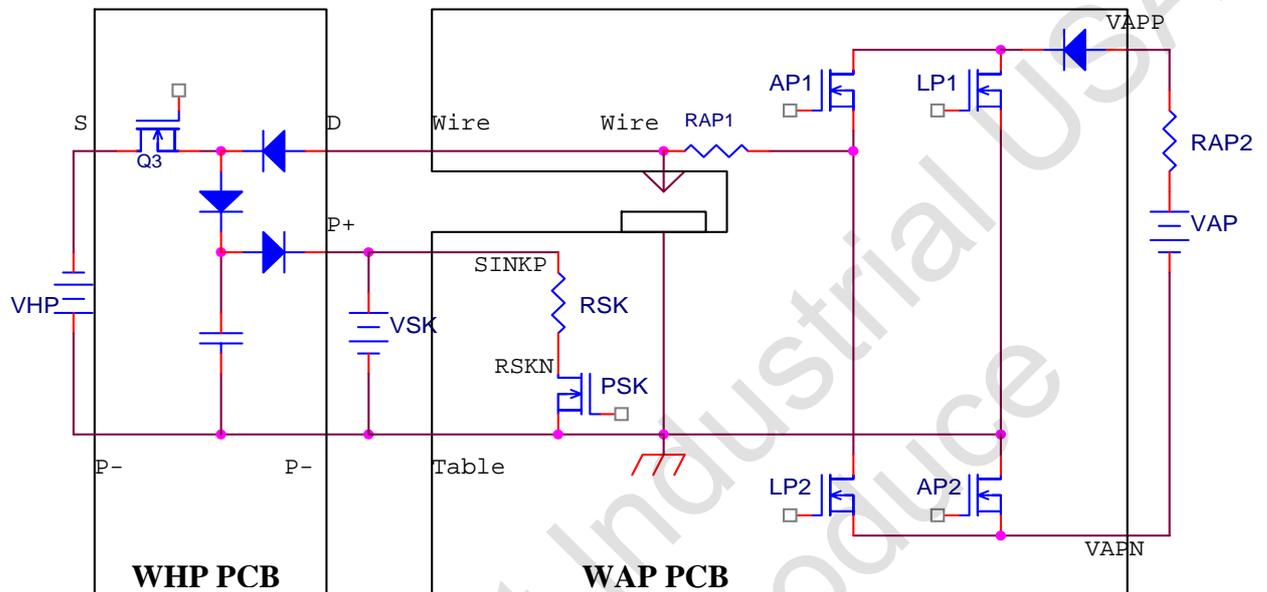
Ins. : Replace the wire-collected wheel and wire-clipped wheel because of the pockmark.

 HINT

\* If the wire feed motor has the strange sound or the motor runs but the wire can't be feed when pressing the < WIRE >, then please look into the chapter 2.4.5 in the maintenance manual and maintain or replace the parts according to the instruction.

## 6.4 Inspection process and example of sparking system

The structure of the WIRE CUT EDM sparking power is as below:



There are three sets of DC power in this system, the first set, LOW POWER, provides the power for gap sparking, the second one, HIGH POWER, provides the main power for the machine sparking, and the third one, POWER SINK, provides the protection power for the MOSFET of HIGH POWER.

The sparking system is combined with the 6 PCB :

1. ( WPGF ) \*1pc
2. ( WAP ) \*1pc
3. ( WHP ) \*5pcs

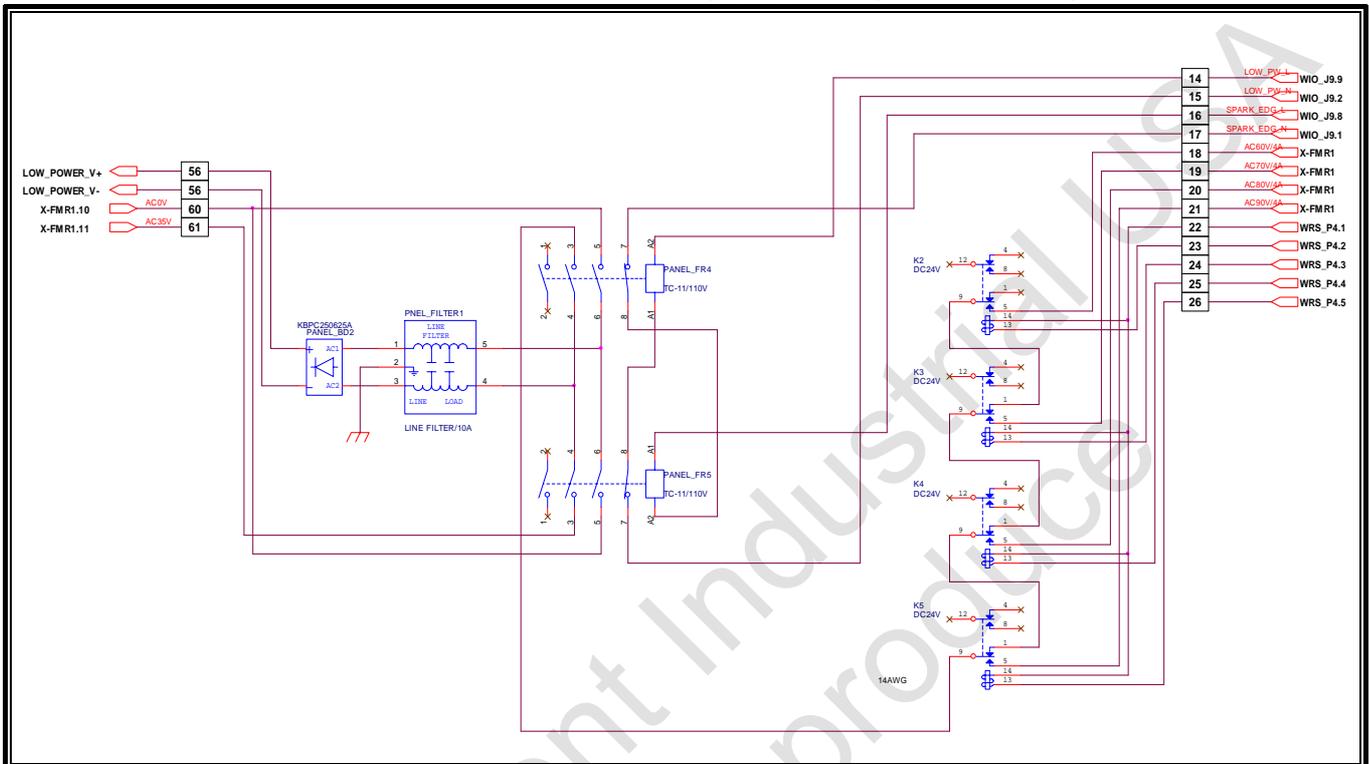
WPGF is used for the inspection and control of sparking situation

WAP is used for guiding the gap voltage and protecting the MOSFET of WHP PCB with the Power Sink circuit

WHP has the shifting capability of high duty and high current, and shifts the power when machining. There is no other element except the MOSFET of WHP in the sparking circuit; that is the whole circuit is short circuit when it is in MOSFET ON. What it limits is the stray inductance of the circuit only, so you have to lower the assembly line inductance of the whole circuit for the higher blink current as possible as you can.

Indication of every DC current and diagram :

**VAP** : provides the power for WAP when gap sparking, and the diagram is as below:

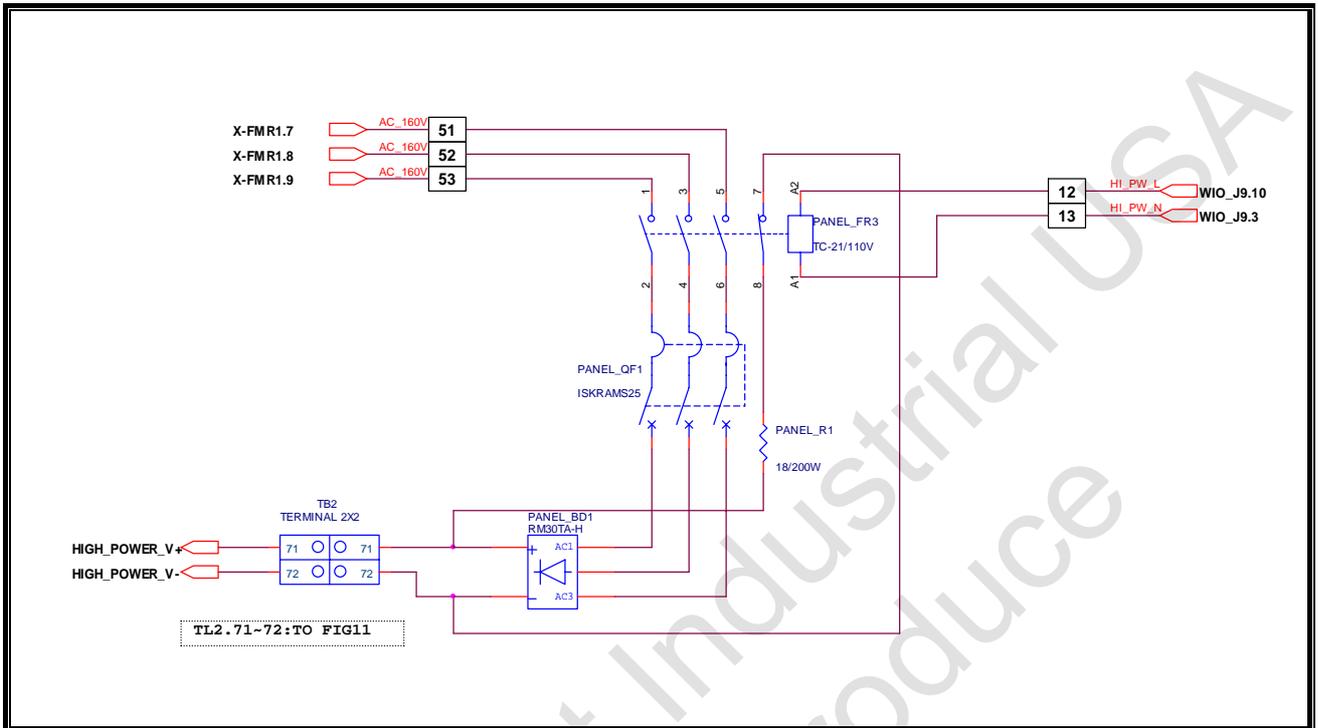


There are five kinds of output for the VAP power, DC40V · DC80V · DC90V · DC110V · DC120V; the DC40V is used for the mold adjustment when machining, and DC80V ~ DC120V are used when machining. The power process is as follows,

The process of VAP power output,

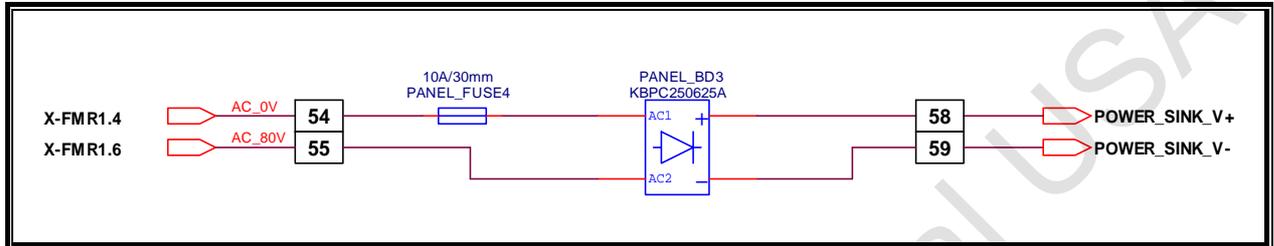
- ① When pressing the <EDM POWER>, the terminal output of J9.2 · J9.9 from the WIO is 110V, and guided by the (PANEL\_FR4); the current is provided by the TB1\_AC60V~TB1\_AC90V to (PANEL\_FR4), and the output of DC current through the (PANEL\_BD2) is about DC80V~DC120V; the output of TB1\_AC60V~TB1\_AC90V are controlled by the 2~5PIN of WRS.
- ② When pressing the <SPARK MODE>, the terminal output of J9.1 · J9.8 of WIO is 110V, and guided by the (PANEL\_FR5); the output through the (PANEL\_BD2) is DC40V.

**VHP** : provides the power for WHP when machining, and the diagram is as below :



The process of VHP power: when pressing the <EDM POWER>, the terminal output of the J9.3 · J9.10 from the WIO is 110V, and guided by the ( PANEL\_FR3 ) ; the DC power supplied by M1AC160V and through the magnetic switch and ( PANEL\_BD1 ) is about DC220V.

**VSK** : provides the WHP protection power for WAP when machining, and the diagram is as below:



Process of VSK power: when the system is on ( press the <ON> ) , the input of TB1AC80V is AC80V, and the output of DV power through the ( PANEL\_BD3 ) is DC110V.

The inspection process if the sparking system works well is as follows,

- ① Press the <WIRE> to start the wire system, and check if the gap voltage is +12V?
- ② Under the **【JOG】** mode, press the <WIRE> 、 <WATER> 、 <EDM POWER> , and press the <D.POS>; check if the gap voltage is +90V?
- ③ Machining the outside of the work piece with the lower power( such as, ON=2 , OFF=13 , A.ON=1 , A.OFF =15 ) , and then increase the ON TIME to check if the spark becomes bigger?

The common problems for the sparking system:

- ① There is no gap voltage +12V between the brass wire polar and work piece when starting the wire system.
- ② Under the **【JOG】** mode, press the <WIRE> 、 <WATER> 、 <EDM POWER> , and press the <D.POS>; there is no gap voltage +90C between the brass wire polar and work piece.
- ③ The brass wire breaks when touching the work piece with the lower sparking power.
- ④ The spark doesn't become bigger when increasing the ON TIME.

HINT

※ There is no gap voltage when starting the system because the brass wire touches the machine body and causes the short circuit; when inspecting the gap voltage +12V, take the brass wire out first , fix the ( WIRE\_BREAK\_SW ) , and then press the <WIRE> to check the output of gap voltage.

**6.4.1 Inspection process**

**Ins. process 1 : There is no gap voltage +12V**

- ① Disconnect the connected cable of J5 in WIO (FIG06-WIO)
- ② Fix the ( WIRE\_BREAK\_SW )
- ③ Press the <WIRE>

Measure if the output of J5.1 and J5.2 from WIO (FIG06-WIO) is +12V?

(NO)

Replace WIO

(YES)

Connect the connected cable of J5 in WIO

Turn the machine off, and take the WPGF ; turn it on and press the < WIRE > to check if there is gap voltage+12V?

(YES)

Replace WPGF

(NO)

Turn the machine off, and take the WAP off ; turn it on, and press the < WIRE > to check if there is gap voltage+12V?

(YES)

Replace WAP

(NO)

Turn the machine off, and take the ( WHP\_1~WHP\_5 ) off ; turn it on, and press the <WIRE> to check if there is gap voltage+12V?

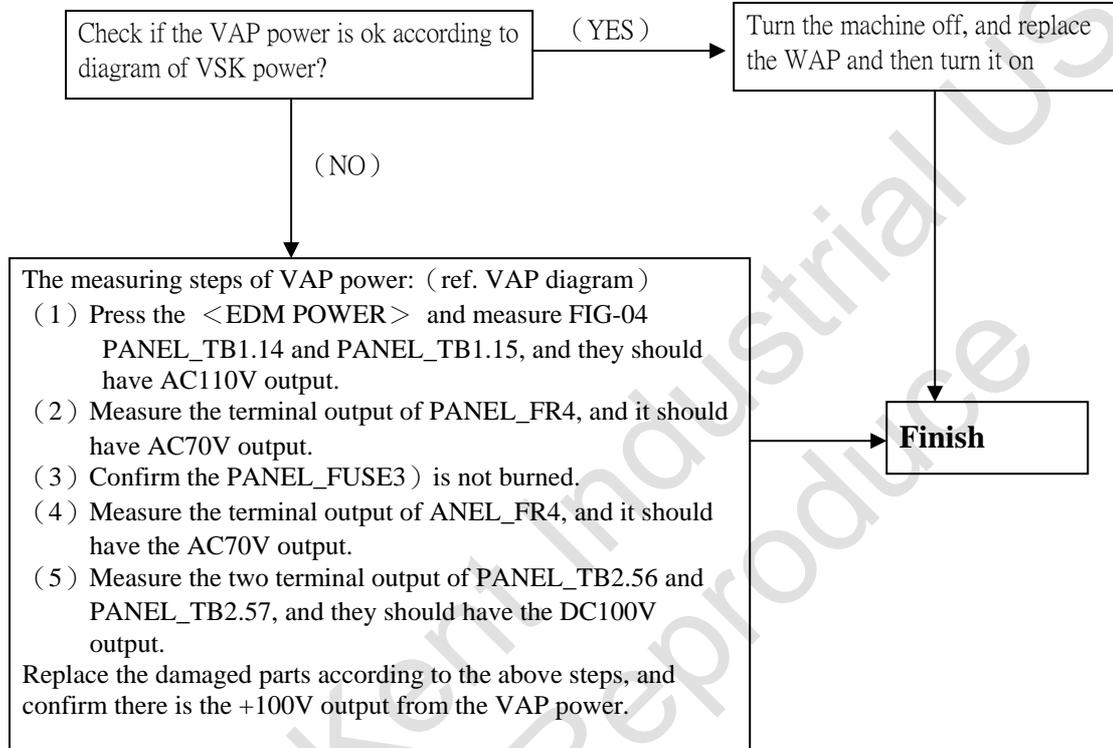
(YES)

Replace WHP

**Finish**

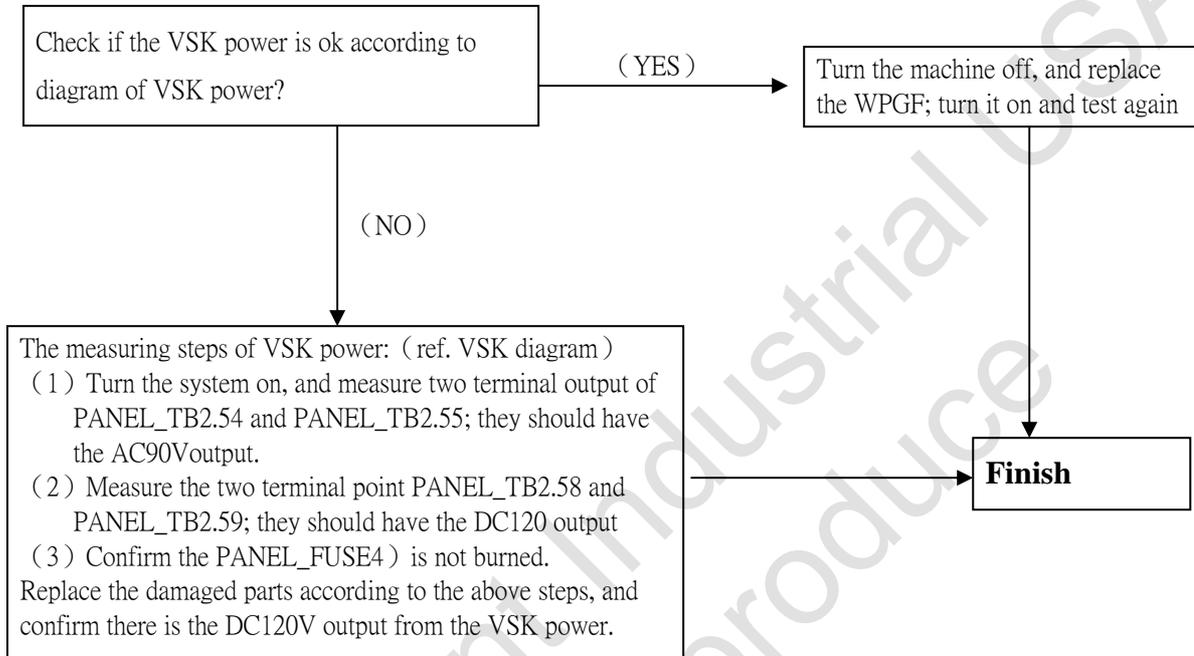
※When taking the WHP, please take the PCB, in order, and turn the machine on to test.

**Ins. process 2 : Under the [JOG] mode, press the <D.POS>, and there is no gap voltage +90V**



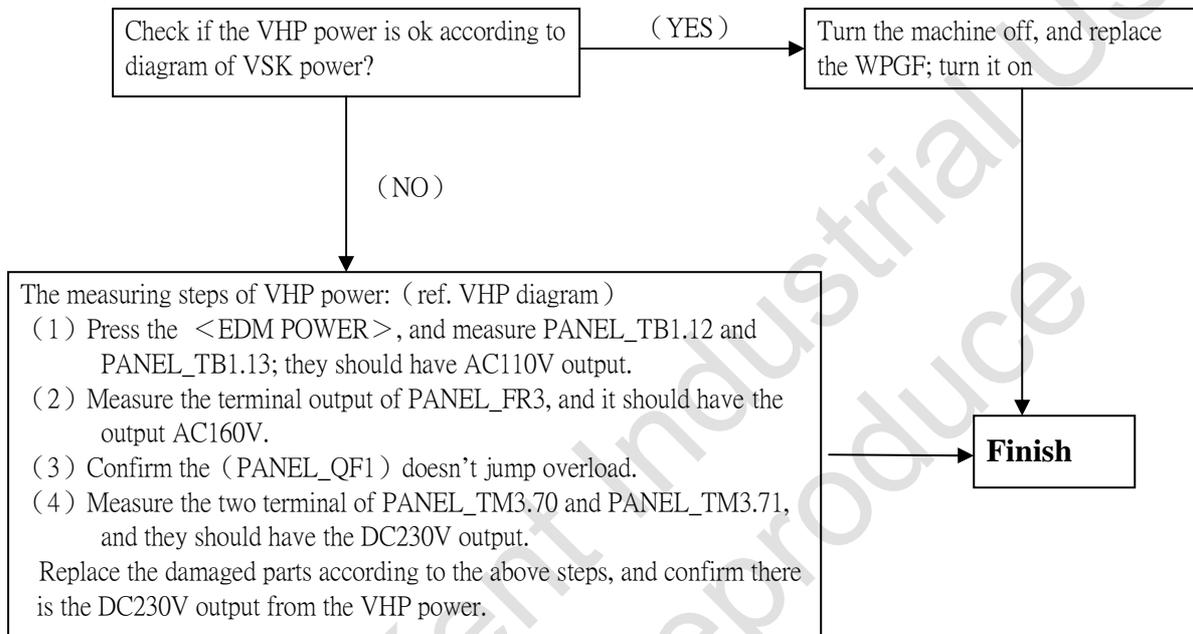
- ※Before pressing the <D.POS>, press the <WIRE>、<WATER>、<EDM POWER> first, or it doesn't work when pressing the <D.POS>.
- ※Replace the WIO if there is no output of AC110V from PANWL\_TB1.14 and PANEL\_TB1.15 when pressing the <EDM POWER>.

**Ins. process 3 : The brass wire breaks when touching the work piece with the low sparking power**



※Please replace the WAP first if the ( PANEL\_FUSE4 ) is burned as soon as turning the system on; replace it and then turn it on. Replace the ( PANEL\_BD3 ) if it is still burned after turning the machine on.

**Ins. process 4 : The sparking power doesn't go up when the ON TIME goes up**



- ※Replace the WIO if the problem is still after replacing the WPGF
- ※Replace the WIO if there is no output of AC110V from the PANEL\_TM1.12 and PANEL\_TM1.13 when pressing the <EDM POWER>.

### 6.4.2 Inspection example

Q1 : When machining, the sparking power can't be raised by adjusting the ON TIME

Ins. : No VHP is because of no output; the reason is the DC24V relay controls the VHP of the WIO is burned, and it works after replacing the burned relay.

Q2 : The sparking power can't be raised when machining.

Ins. : No VHP is because of no output; the reason is the ( POWER\_C1 ) is burned, and it works after replacing ( POWER\_C1 ) and its connected cables.

Q3 : There is no gap voltage

Ins. : ① WHP is damaged and causes the short circuit.

② It is short circuit because the heat of electric cable connected to ( FNR3~FNR7 ) in VSK makes the part SINK of WAP , WHP, and ( PANEL\_FUSE4 ) of VSK are burned; replace the WHP, WAP, fuse, and electric cables.

Q4 : The brass wire breaks when touching the work piece

Ins. : It is caused by the breakdown of SWITH POWER T-50A ( SWP5 ) provides the power of SINK in WAP, and the brass wire breaks easily without the protection of SINK.

Q5 : There is no gap voltage when machining.

Ins. : It is short circuit because electric cables from the power box of generator to the machine head are dissolved; replace the electric cables.

Q6 : The sparking power is not stable when machining.

Ins. : It is caused by the disconnection of ( PANEL\_FR3 ) on VHP controlled by the connected cables of WIO disconnection; connect the cables well.

Q7 : The gap voltage is (higher than) 200V when pressing the < EDM POWER >

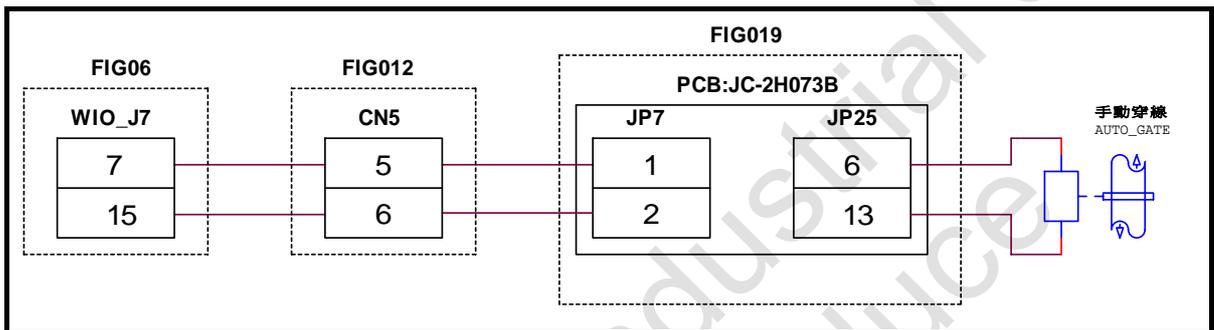
Ins. : Replace the WHP99

## 6.5 Inspection of other breakdowns

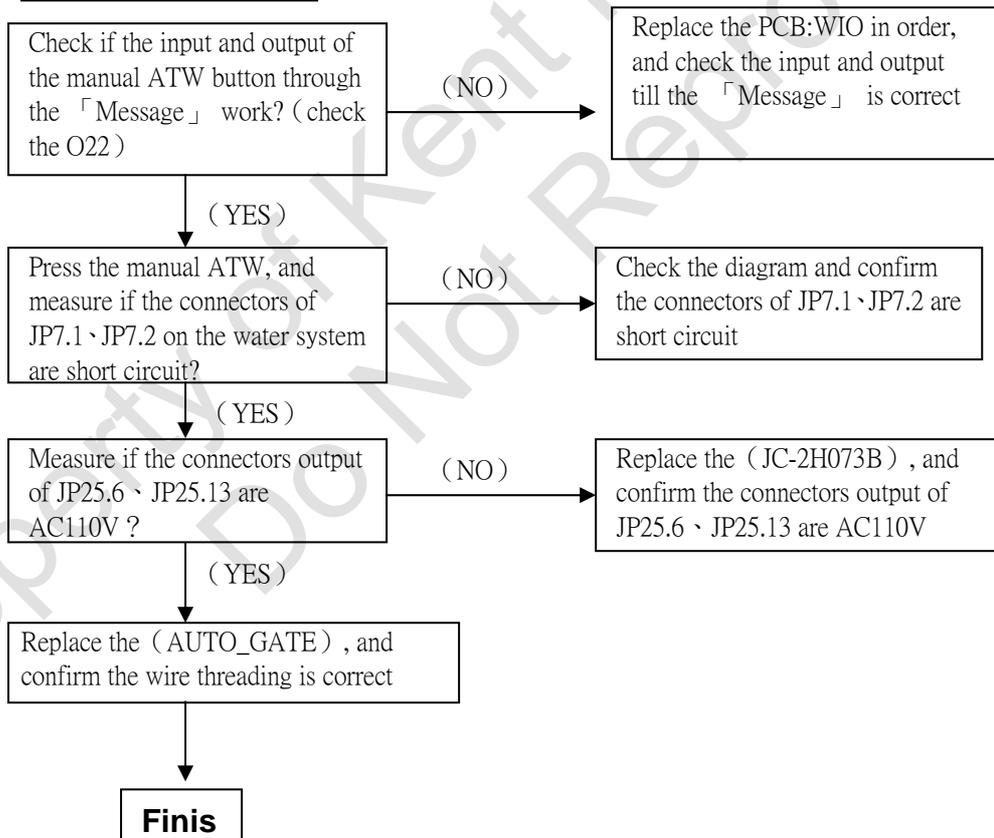
Q1 : The function of manual wire thread doesn't work ( the HP runs normally.)

※Please refer to the inspection process of HP if it doesn't run well.

Ref. diagram



Inspection process

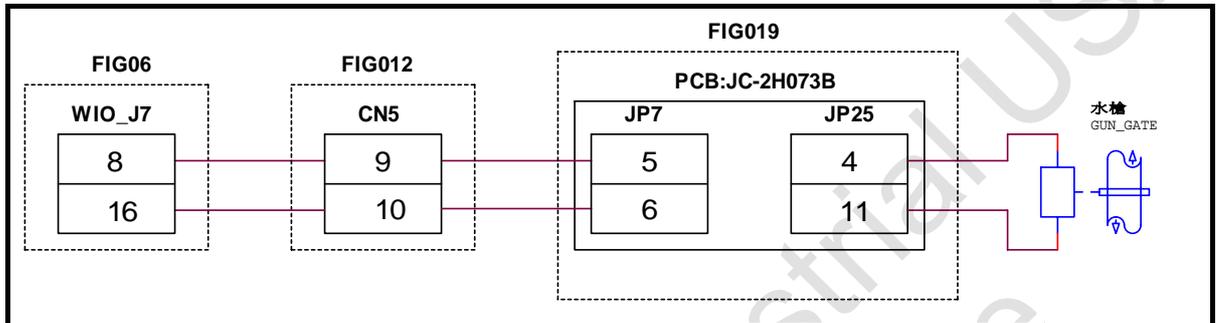


※Please check if the wire feed system runs well first, and then check the whole inner wire system if inspecting as above steps.

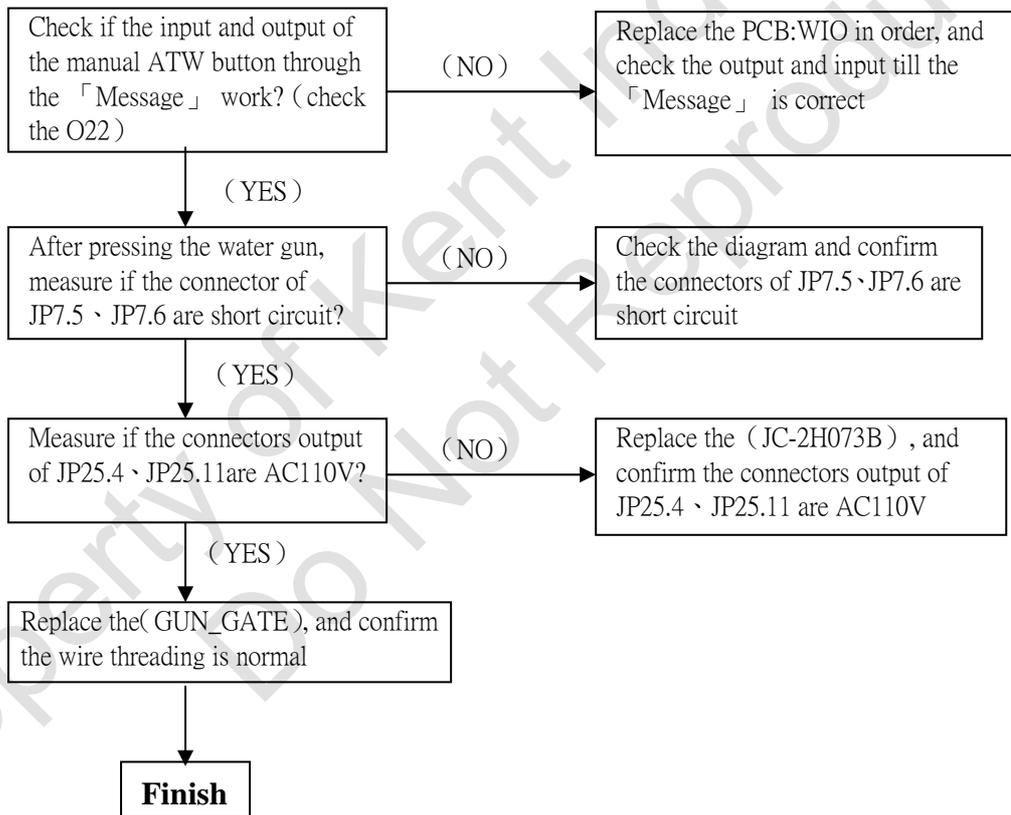
Q2 : The water gun doesn't work (the resin pump runs well.)

※Please refer to the inspection process of resin pump if doesn't runs well.

**Ref. diagram**

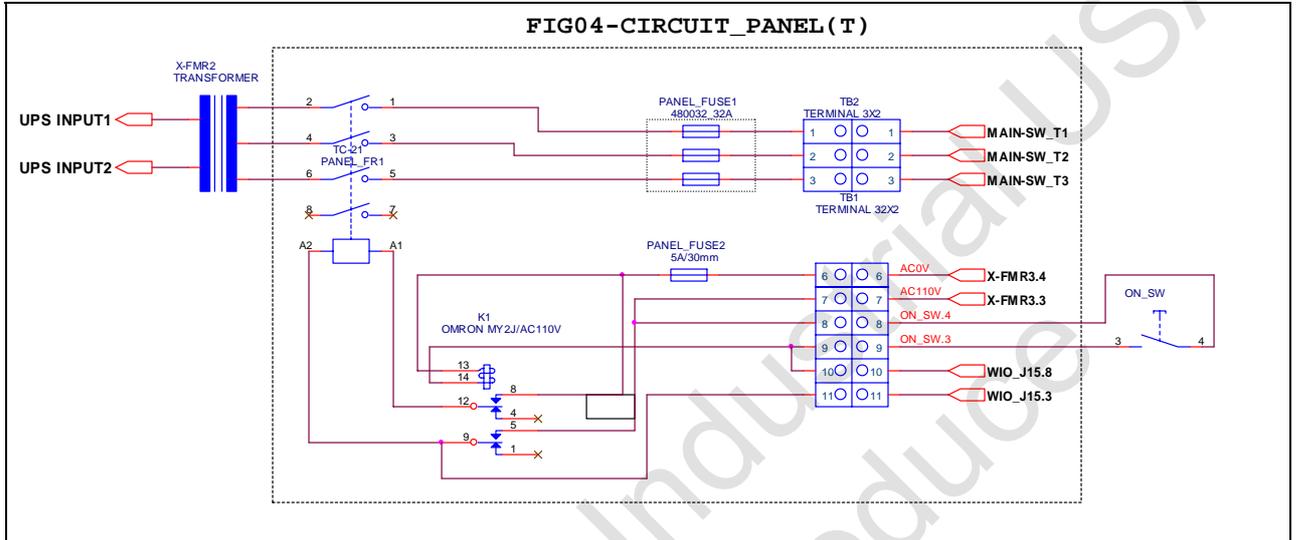


**Inspection process**

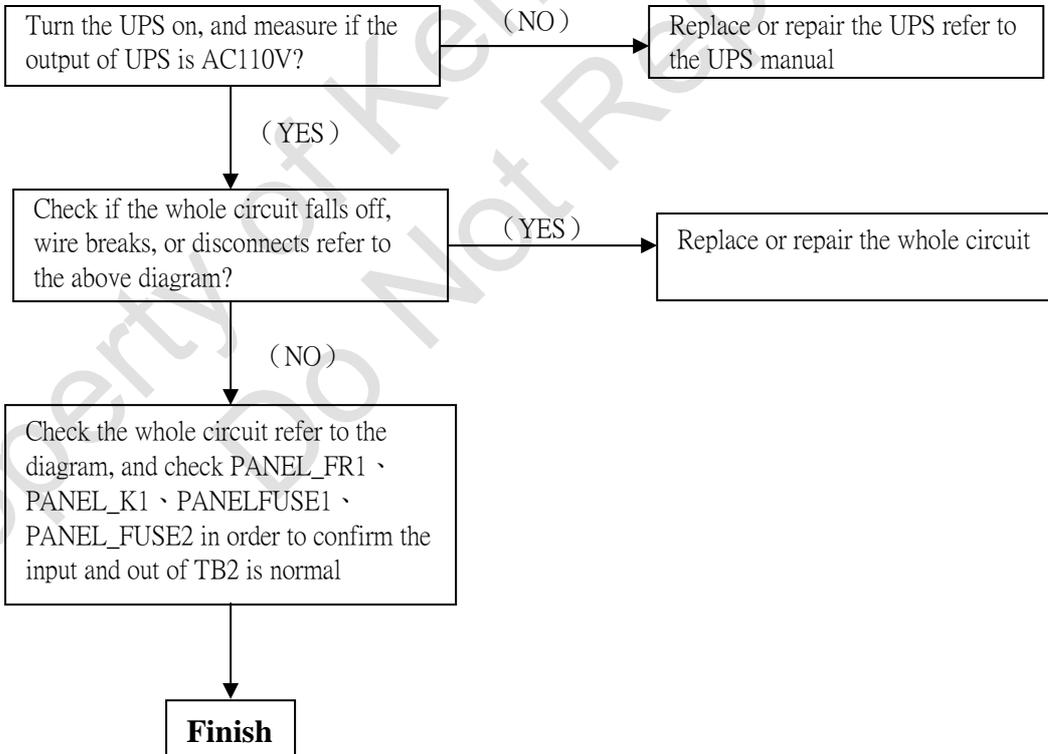


**Q3 : The system can't be turned on after pressing the ON ( ON\_SW )**

Ref. diagram



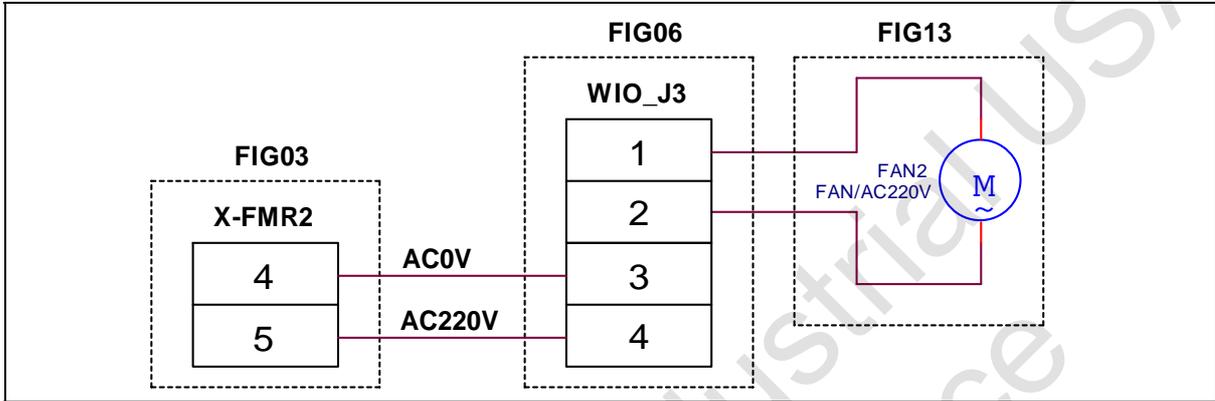
Ins. process



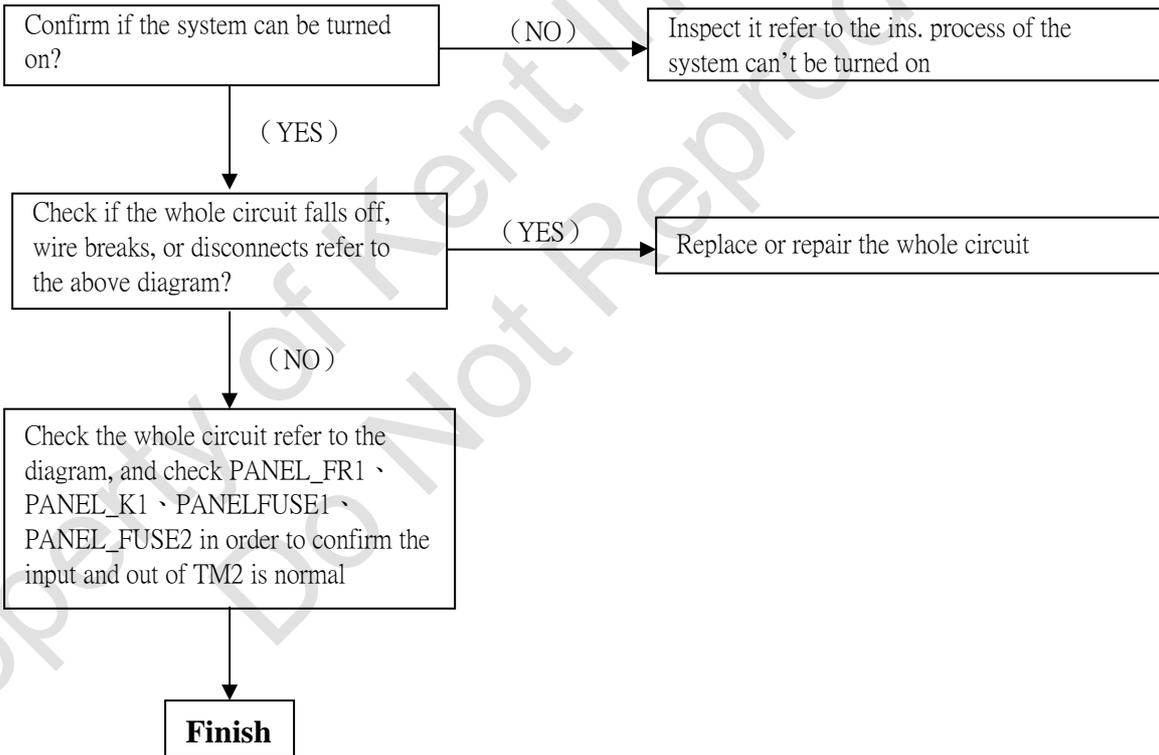
※If the system still can't be repaired after inspecting as above steps, please reinstall the system software or replace the control.

**Q4 : The fan doesn't runs after pressing the ON ( ON\_SW )**

Ref. diagram



Ins. process



※Replace the fan after inspecting as above steps, and the fan still doesn't work

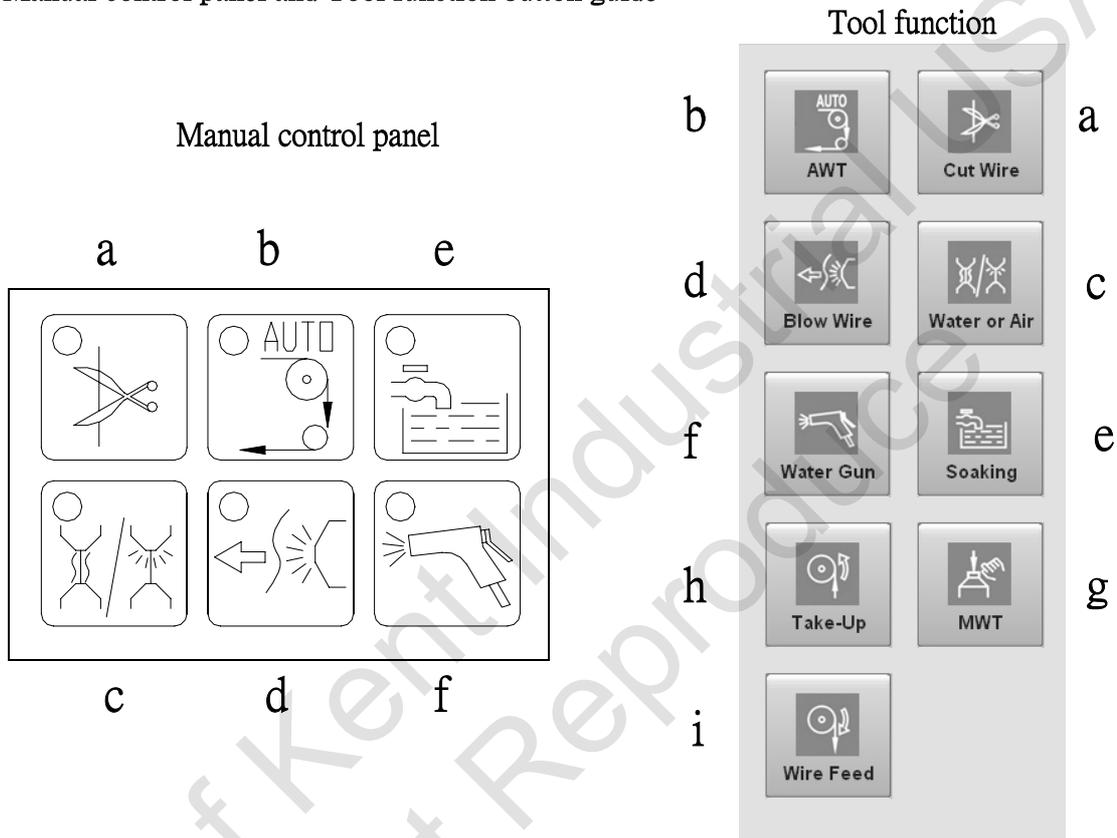
# Set Auto Threading

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# 7 Set AUTO Threading

## 7.1 Control panel of auto threading and its test/repair

### 1. Manual control panel and Tool function button guide



- Wire cutting: Cut off the wire (Auto Threading models only)
- Auto threading: Under wire broken status, the wire will be threaded to the wire collecting wheel. Under wire unbroken status, there is no action. (Auto Threading models only)
- Air-carrying wire/water carrying wire: air-carrying wire (indicator OFF) → Under auto threading mode, there is no water flush between upper and lower machine heads when the wire passes the workpiece. Water-carrying wire (indicator ON) → Under auto threading mode, there is water flush between upper and lower machine heads when the wire passes the workpiece.
- Blowing waste wire: Start the function of blowing waste wire. When a waste wire is jammed, and not blown away, use this function to blow the waste wire out. (auto threading models only)
- Immerse · sluicing switch : Immerse/ sluicing function will start while switching on this switch (Immerse type) ◦

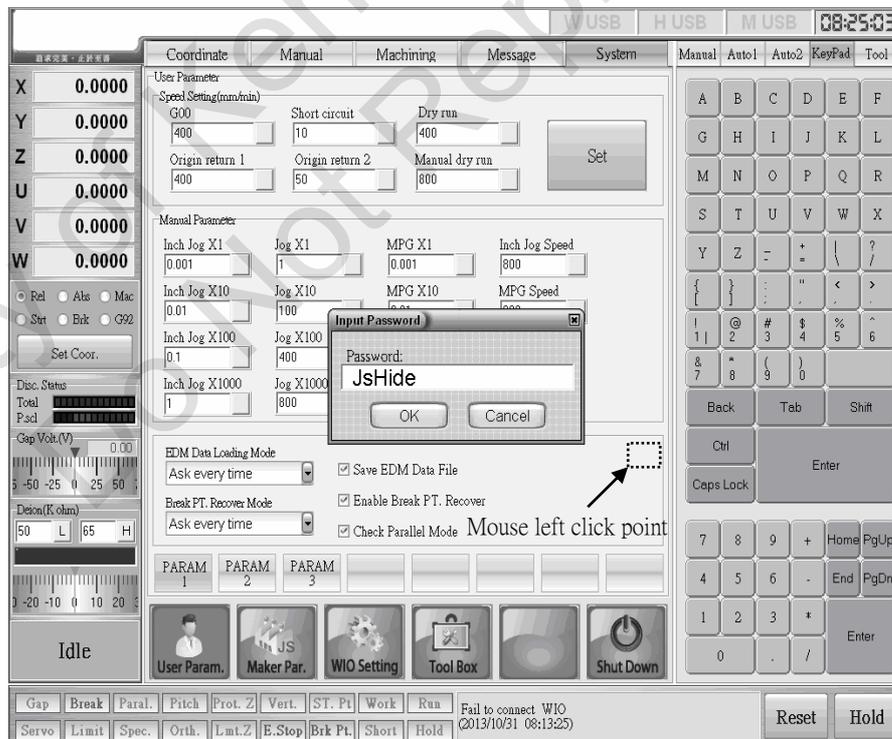
- f. Switch of water gun: Start the function of water gun (submersing models only)
- g. Semi-auto threading: Manually thread the wire to the electrode of lower machine head. Semi-auto threading water carries the wire to the wire collecting wheel.
- h. Wire UP: Roll the wire upward. (auto threading models only)
- i. Wire DOWN: Under semi-auto threading, use this function to roll down the wire from the tension wheel to the bottom of the upper machine head. Then, manually thread the wire through the workpiece and the electrode of the lower machine head. Start auto-threading function. Thus, the wire can be manually threaded to the wire collecting wheel. (auto threading models only)

## 2. Inspect and repair the auto functions

### 2.1 Activate the testing screen :

- ① Move the mouse to where the arrow is pointed to , then left click till the password input screen occur .  
The enter password 「JsHide」 .

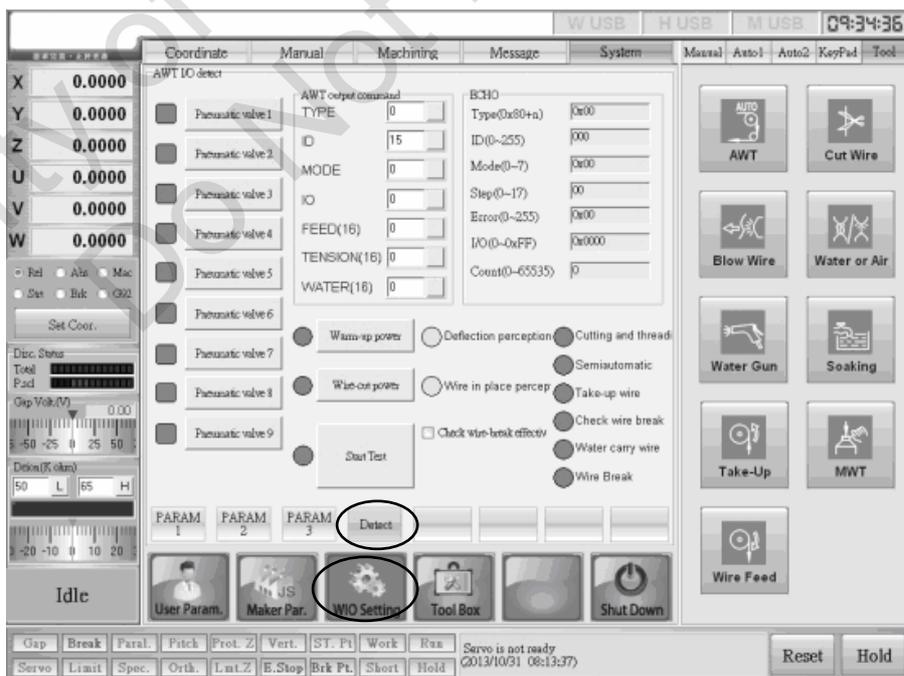
※Note : Case (upper/lower) matters



- ② Check 「Display "wio" for the hidid screen setting」 refer to the picture Below



- ③ Click 「WIO Setting」 → 「Detect」 to enter the auto-threading testing pint screen



Above mentioned buttons can be used to repair the auto threading gadgets. After Start Test button is pressed, each button stands for one pneumatic valve as shown below - Refer you to the following illustrations of auto threading gadget and pneumatic valve.

- a. Pneumatic valve 1 : “heating & straightening” electric conduction cylinder Adjustment → flowing rate is “1 second to reach the setting value”. The needle of the pressure meter should not bounce back when the pressure reaches the setting value.
- b. Pneumatic valve 2 : “wire meltdown” cylinder. Adjustment → Flow rate is “1 second to reach the setting value. The needle of the pressure meter should not bounce back when the pressure reaches the setting value. Check if the cylinder works properly. If not so, Check if the cylinder is properly installed.
- c. Pneumatic valve 3 : “melting down, straightening & clamping” cylinder Adjustment under clamping → Flow rate is “1 second to reach the pressure setting value”. The needle of the pressure meter should not bounced back when the pressure reaches the setting value.
- d. Pneumatic valve 4 : “wire head detection” cylinder Adjustment → Flow rate is “1 second to reach the pressure setting value”. The needle of the pressure meter should not bounced back when the pressure reaches the setting value. Check if the cylinder works properly. If not so, Check if the cylinder is properly installed.
- e. Pneumatic valve 5 : “copper wire off-center” cylinder Adjustment → Flow rate is “1 second to reach the pressure setting value”. The needle of the pressure meter should not bounced back when the pressure reaches the setting value.
- f. Pneumatic valve 6 : “Blow waste wire away” cylinder
- g. Pneumatic valve 7 : The first blowing Adjustment → Thread the 0.15mm wire through the water cover of the upper machine head, and 40mm above the upper machine head. Press Blowing 1 button, and check if the wire swing is within the range of the water nozzle of lower water cover.
- h. Pneumatic valve 8 : Adjustment → Thread the 0.15mm wire through the water cover of the upper machine head, and 400mm above the upper machine head. Press Blowing 1 button, and check if the wire swing is within the range of the water nozzle of lower water cover.
- i. Pneumatic valve 9 : While “Wire clamping” cylinder experience high temperature · copper wire remain certain tension ◦ While cutting thin wire, to avoid rebound force and bend occur, copper wire must be steady clipped before the cutting start.

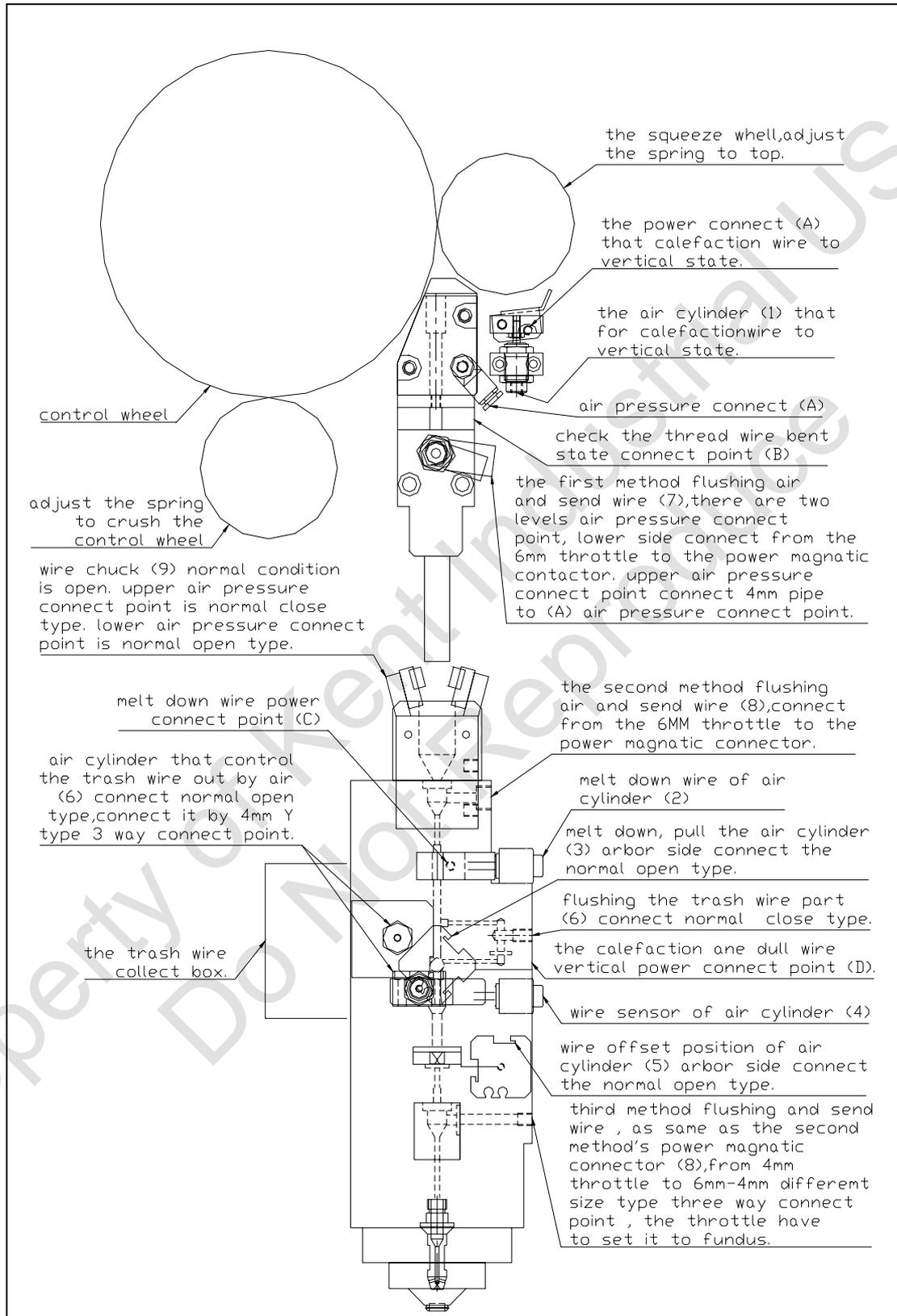
j. Heat experience power · wire cutting power: This is used to check the K1 and K2 switch function on the AWT\_CUT board. It is used to detect the main function under K1 and K2 switch on AWT\_CUT board which is shown as the figure below

AWT_CUT	K1	K2
WIO testing		
Start testing	OFF	OFF
Stop testing	ON	ON
Heat experience power	OFF	ON
Wire cutting power	OFF	ON/ OFF

k. Wire curve detection : Switch on air pressure valve 1 · air pressure valve 2 · clip the copper wire between control wheel and wire clipping wheel. Contact copper wire to coil wire detection point (as shown in Fig. B :Auto-threading machine), at this time the signal will shine, which shows that the wire curve detect function works fine.

l. Wire receive detection : Switch on air pressure valve 1 · air pressure valve 4 · clip the copper wire between control wheel and wire clipping wheel. Contact copper wire to wire receive detection air pressure vat 4 (as shown in Fig. Auto-threading machine 4), at this time the signal will shine, which shows that the wire detection function works fine.

After switching off “Start testing”, start the cutting wire mode, semi-automatic (start the semi-automatic threading after cutting the wire), receive wire (receive wire motor starts after cutting the wire), check cut off wire (check if tension wheel is turned on or not), water stream aim to AWT (light shines when this function is active), wire cut off (light shines when cut off is processing or when it's finish). Steps above only shows during regular threading examine, if there's any irregular process, user can differentiate by these lights.



## 7.2 Auto-threading function – Variable setting

From **Machining** → **Smart Func.** → **AWT** → **AWT Setting2**

This is auto-parameter variable setting page. While facing threading failure because of setting problems, user can adjust the variable according to this chart.

Wire diameter					Function description
0.1	0.15	0.2	0.25	0.3	
5	5	7	10	15	Warm-up ON Time(ms)
35	20	15	5	5	Warm-up OFF Time(ms)
3	4	8	10	15	Wire-cut ON Time(ms)
20	30	10	10	10	Wire-cut OFF Time(ms)
150	170	220	300	350	Total Warm-up Time(10ms)
150	200	350	400	440	Total Wire-cut Time(10ms)
460	470	480	500	520	Received waste wire time(10ms)
210	220	230	240	250	The speed of the receive waste wire(servo motor)
62	64	66	70	75	The rolling velocity of determine the wire is break or not(servo motor)
85	90	95	100	105	The speed of the receive waste wire(DC motor)
42	44	46	50	52	The rolling velocity of determine the wire is break or not(DC motor)
6	6	6	6	6	Water Pressure intensity when wire pass through the upper
5	5	5	5	5	Wire-cut mode : ( Temporary not used )
20	35	45	60	60	Preheat tension
60	80	100	120	150	Trimming tension
4000	4000	4000	4000	4000	Distance 1 speed (mm/min)
5000	5000	5000	5000	5000	Distance 2 speed (mm/min)
4000	4000	4000	4000	4000	Distance 3 speed (mm/min)
5000	5000	5000	5000	5000	Distance 4 speed (mm/min)
6000	8000	10000	12000	12000	Distance 5 speed (mm/min)
6000	8000	10000	12000	12000	Distance 6 speed (mm/min)
6000	8000	10000	10000	12000	Upward wire withdrawing speed(mm/min)
3000	4000	6000	6000	6000	Downward wire feeding speed (mm/min)
2000	2500	4000	4000	4000	Curve wire speed
8	10	12	12	13	Remove waste ON time setting
3	3	7	7	7	Manual threading mode-water pressure default
2	2	3	3	3	Manual threading mode-wire tension default

To enter this setting screen you must enter password: "jsedm"

### 7.3 Breakdown exclude

#### AWT description

- (1). Problem with the threading process after threading the wire into the guide with a depth of 1 ~ 2 mm.
- A :
1. Please check the wire if its rust or not.(The oxide particle that is on the wire will result the wire having a rough surface.)
  2. Check the copper wire quality. (Highly recommend not to use the wire that has been produced over 6 months.)
  3. Please check the inner surface of upper guide and make sure its clean.
  4. Please clean the upper guide and make sure there is no scratch or wire inside the guide.
  5. While cutting the wire, if the power connect part (JU120AN) moves speed too fast, it will cause the cooper wire being compressed. The compressed wire will not able to go through the lower guide. Please adjust the airflow from the cylinder.
  6. Discharging won't happen when cutting the wire. If there is, please check the power connect part (JU120AN) and the (JU53CN).
- (2). After pressing the AUTO key (Auto threading wire key) the braking wheel (WD48AN) will rotate in clockwise. Please check the part list (JY025-A)

#### Checking process:

- A :
1. Please check JU110BN and make sure there are no chips.
  2. Please check the lower guide (WA52AN) and make sure there are no chips.
  3. When the cooper wire threads into the low arm , please check machine coordinate from the Z-axis.
- (3). When operation the wire treading function, the wire is able to thread through wire sensor (JU110BN), but not able to reach the cut wire point (JU126AN). Please check the JY025-A and JY026-A

#### Checking process:

- A :
1. Please check the conduit (JU99) and make sure there is no wire inside. (The different series has different part numbers: WA430A · WA530A type is JU99AN · WA640A type is AU07AN)
  2. Make sure JU74B and JU118B are clean.

- (4). The copper wire is not fully attached on the braking wheel (WD48AN).  
Please check the part list (JY025-A)

Checking process:

- A : 1. Please check the braking wheel (WD48AN).  
2. Please check the creasing wheel (JU16BN) and stable the wheel by adjusting the screw

- (5). Could not thread through the upper guide. Please check the part list (JY028-A)

Check process:

- A : 1. Please check the power connects and upper guide (WA76AN), make sure there is no scratch or wire inside the guide.  
2. Please check the upper guide make sure there is no chip inside.  
3. When ATW cut the cooper wire, if the following phenomenon happened such as discharge, wire overheat, or wire apex becomes obtuse, please check the attachment

- (6). Wire will slip off after being cut. Please check the JY026-A

Check process:

- A : 1. Please check the cylinder (JU01).  
2. Make sure (JU91) and (JU41) are fixed .  
3. Make sure (JU91B) and (JU131A) are not damaged.  
4. Please remove the waste wire.

- (7). Unable to break the wire. Please check JY025-A

Check process:

- A : 1. Please check the cylinder (JU01) is working fine.  
2. Make sure JU53C and JU120A are not damaged.  
3. The temperature of the ATW equipment too low and the wire tension too small.  
4. Please check JU121 and make sure the cables are connected properly.

- (8). The braking wheel won't stop when the wire reaches the wire holder (JU91B).  
Please check the JY025-A

Check process:

- A :
1. Make sure the cylinder (JU01) is working fine.
  2. Make sure there is no wear mark on JU107.
  3. Make sure the spring is not elastic fatigue.
  4. Make sure the cable on JU107 is connected properly.
  5. Make sure JU16B is clean and not being insulated.

(9). The flushing water from the upper guide is scattering. Please check the JY028-A

Check process:

- A :
1. Control the amount of water being released by adjusting valve (AJ29D).
  2. The upper diamond guide (WA103) is damaged.
  3. The upper diamond guide (WA103) and upper guide are too close to each other.

(10). Copper wire isn't able to thread through the lower guide.

Check process:

- A :
1. Make sure there is no chip in the lower guide.
  2. If there is scratch or wire stock inside the lower guide, this means the lower guide is damaged.

(11). The copper wire are not able to reach the wire recycle system while threading. Please check the JY007-A and AY050-A

Check process:

- A :
1. Please check the Z-Axis machine coordinates because it will impact the feeding length on W-Axis.
  2. Make sure the power connect feed (WA76DN) is not damaged.
  3. Please check if there is water come out from the part (WA51EN).
  4. Make sure no chips are in WA51EN.
  5. Make sure the flushing wheel (WA04CN) is working fine, otherwise please change the bearings (WA02).
  6. Make sure no chips are in the space from water flushing wheel (WA04CN), WAT43B to WD70BN and WD71AN.

(12). The copper wire has difficulty passing through the wire break point.

Checking process:

- A : 1. The curvation of the wire can be an issue.  
 2. After cutting the wire, the cut point not well.  
 3. Verticality issue of the upper machine head  
 4. The speed of the wire passing through the workpiece is too fast.

(13). The cooper wire have deflection condition to big.

Check process:

- A: 1. Please check the Attachment 1.

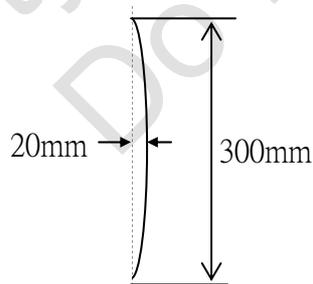
Environment:

The copper wire needs to be produced within 6 months, the radian can not over 20 mm and with a length of 300 mm. Besides, the room temperature has to control with in  $25^{\circ}\text{C} \pm 3^{\circ}\text{C}$ .

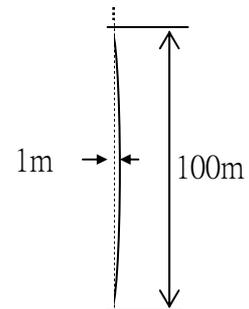
Do not randomly change the specification and brand of the wire. Because the quality and material of the wire produced by different companies are different, during auto threading the wire might fail to thread.

Maintain and clean regularly.

(Naturally Droop)



(After Burning)



(14) Copper Wire curves irregularly

- A: While heating, the color of the wire will turn red and the diameter shrink due to the high temperature. Please go to **【Auto PARM】** → 《Auto Feed》 → (Auto Feed Setting 2) to increase the parameter of the heating time based on the wire condition.

## (15) Copper Wire isn't straight

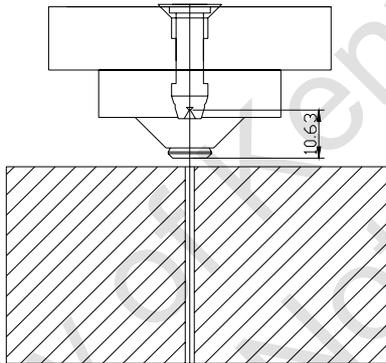
A: While heating, the curvature of the wire is too big is due to the low heating temperature. Please go to **【Auto PARM】** → 《Auto Feed》 → (Auto Feed Setting 2) to decrease the parameter of the heating time based on the wire condition.

## (16) The tip of the wire becomes round after being cut.

A: Cutting wire function is turning on too long. Please go to **【Auto PARM】** → 《Auto Feed》 → (Auto Feed Setting 2) to decrease the parameter of the cutting time based on the wire condition.

## (17) A cross section is formed on the tip of the wire after being cut.

A: Please go to **【Auto PARM】** → 《Auto Feed》 → (Auto Feed Setting 2) to decrease the parameter of the cutting time based on the wire condition.



1. The diameter of the hole of diamond guide is 0.255mm. Copper Wire cannot thread through if its curve irregularly.

2. The distance between the diamond guide and the workpiece is 10~11mm.

Please

make sure the copper wire is straight enough to thread through the workpiece

51. MOLJU107AN  
52. MOLJU108AN  
53. MOLJU109AN  
54. MOLJU111AN  
55. MOLJU112AN  
56. MOLJU113AN  
57. MOLJU82AN  
58. MOLJU80AN

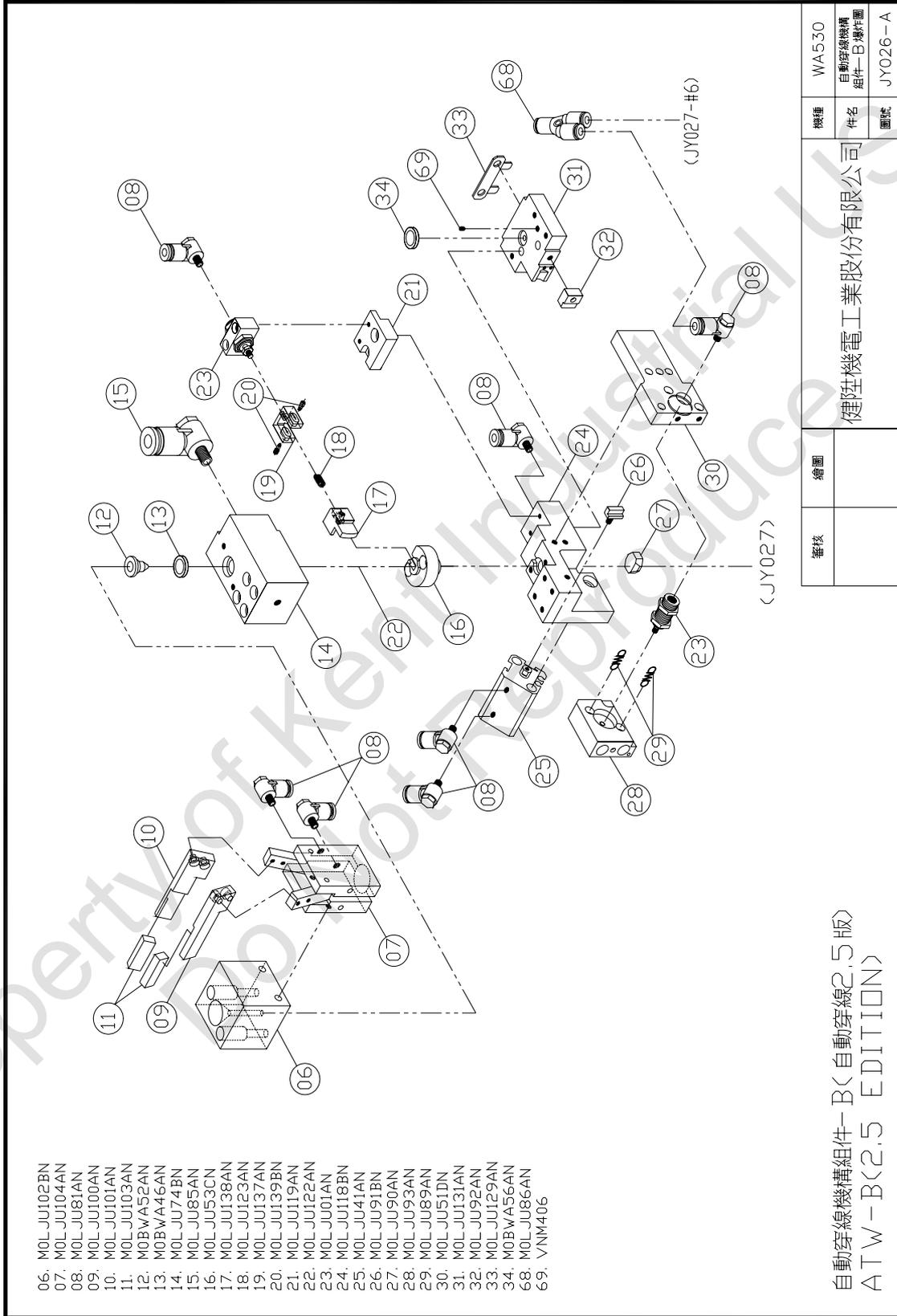
01. MOLJU36AN  
02. MOLJU13BN  
03. MOLJU29AN  
04. MOLJU16BN  
05. MOLJU17BN  
06. MOLJU38AN  
07. MOLJU15AA  
08. MOLJU12BN  
09. MOLJU27AN  
10. MOLJU33AN  
11. M0BW48AN  
12. M0BW49AA  
13. M0BW404AN  
14. MOLJU01AN  
15. MOLJU114AN  
16. MOLJU03AA  
17. MOLJU115AN  
18. MOLJU110BN  
19. MOLJU26BN  
20. M0BW446AN  
21. M0BWA52AN  
22. MOLJU99AN  
23. MOLJU81AN  
24. M0BW087AN  
25. M0BWD71AN  
26. MOLJU38AN  
27. M0BW430AN  
28. MOLJU06BN  
29. MOLJU18BN  
30. MOLJU05BN  
31. MOLJU20AN  
32. MOLJU35BN  
33. MOLJU37BN  
34. MOLJU34BN  
35. MOLJU09AN  
36. MOLJU08BN  
37. MOLJU106AN  
38. MOLJU19AN  
39. MOLJU32AN  
40. MOLJU31AN  
41. MOLJU30BN  
42. MOLJU72AN  
43. M1PGA41AN  
44. M1PGA44AN  
45. MOLJU84AN  
46. M1PGA40AN  
47. M0BWA75AN  
48. MOLJU105AN  
49. MOLJU133AN  
50. MOLJU98AN

01. 02. 03. 04. 05. 06. 07. 08. 09. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58.

A 詳細圖  
A PART

W-A530 W-A530S 自動穿線機構組件-A  
(自動穿線2,4版)  
W-A530 W-A530S ATW-A(2.4 EDITION)

|    |    |    |                |
|----|----|----|----------------|
| 審核 | 繪圖 | 機種 | WA530          |
|    |    | 件名 | 自動穿線機構組件-A,零件圖 |
|    |    | 圖號 | JY025-A        |

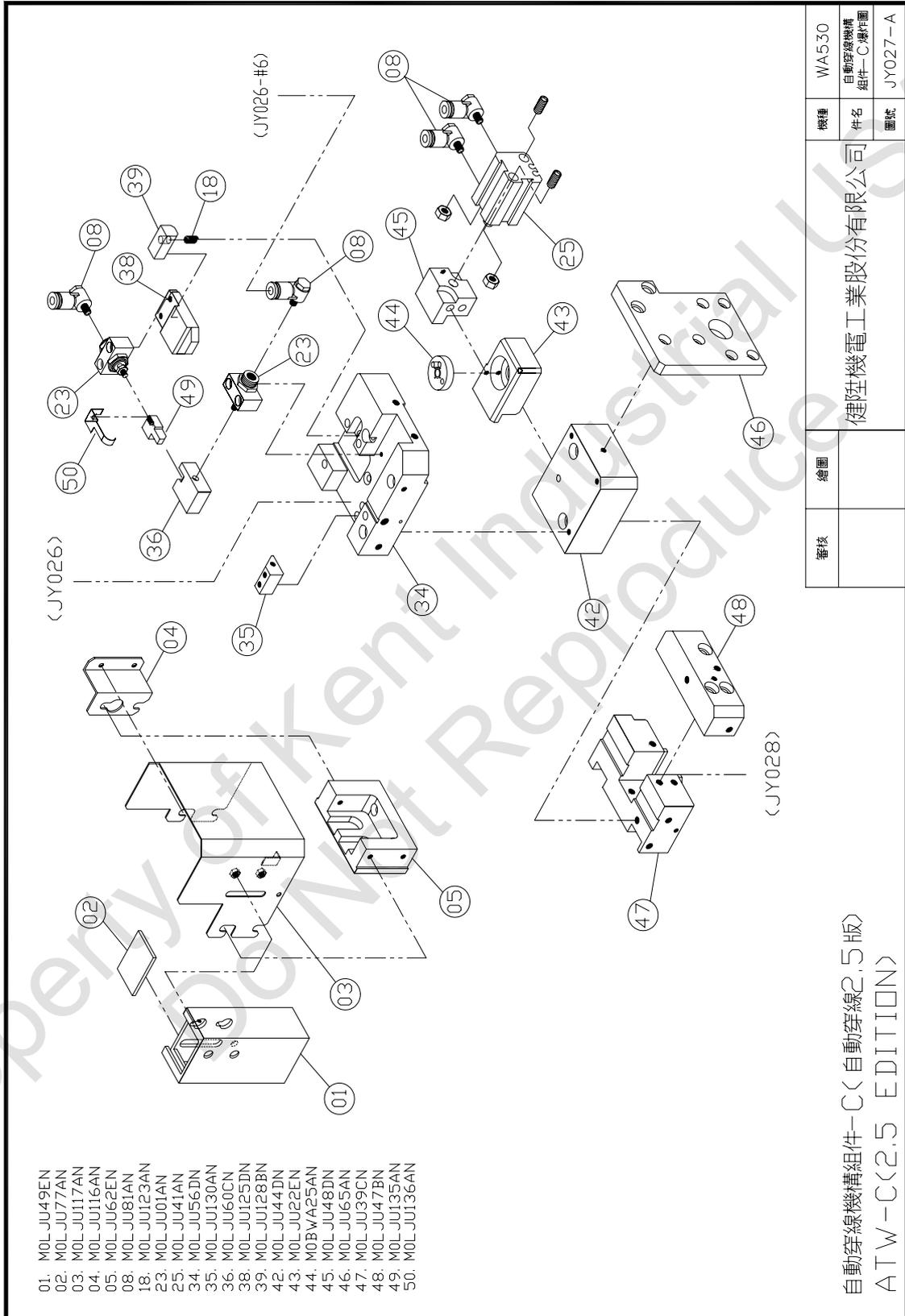


- 06. M0LJU102BN
- 07. M0LJU104AN
- 08. M0LJU81AN
- 09. M0LJU100AN
- 10. M0LJU101AN
- 11. M0LJU103AN
- 12. M0BWA52AN
- 13. M0BWA46AN
- 14. M0LJU74BN
- 15. M0LJU85AN
- 16. M0LJU53CN
- 17. M0LJU138AN
- 18. M0LJU123AN
- 19. M0LJU137AN
- 20. M0LJU139BN
- 21. M0LJU119AN
- 22. M0LJU122AN
- 23. M0LJU01AN
- 24. M0LJU118BN
- 25. M0LJU41AN
- 26. M0LJU91BN
- 27. M0LJU90AN
- 28. M0LJU93AN
- 29. M0LJU89AN
- 30. M0LJU51DN
- 31. M0LJU131AN
- 32. M0LJU92AN
- 33. M0LJU129AN
- 34. M0BWA56AN
- 68. M0LJU86AN
- 69. VNM406

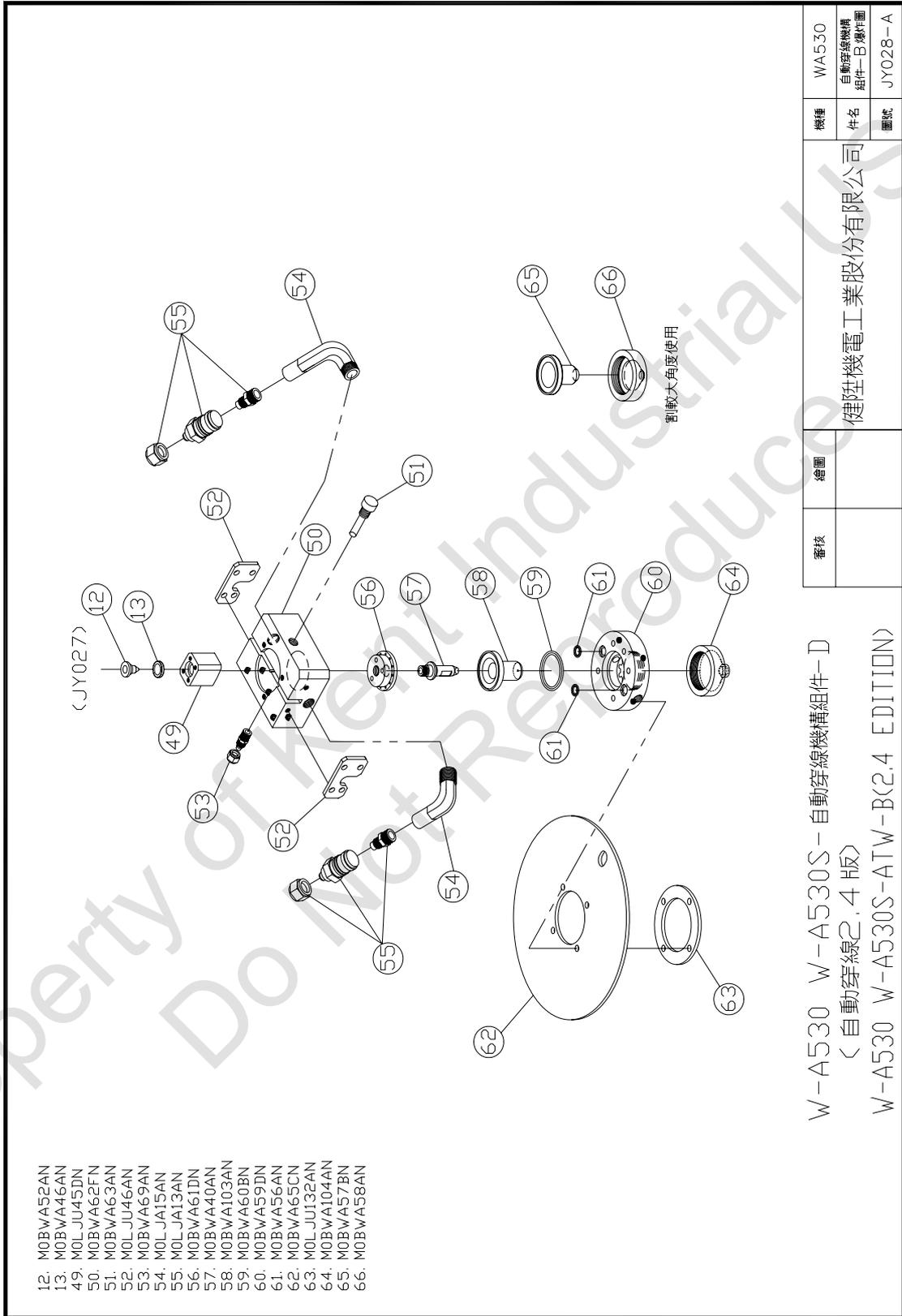
自動穿線機構組件-B<自動穿線2.5版>  
ATW-BK2.5 EDITION

|    |    |    |               |
|----|----|----|---------------|
| 審核 | 繪圖 | 機種 | WA530         |
|    |    | 件名 | 自動穿線機構組件-B操作圖 |
|    |    | 圖號 | JY026-A       |

健旺機電工業股份有限公司



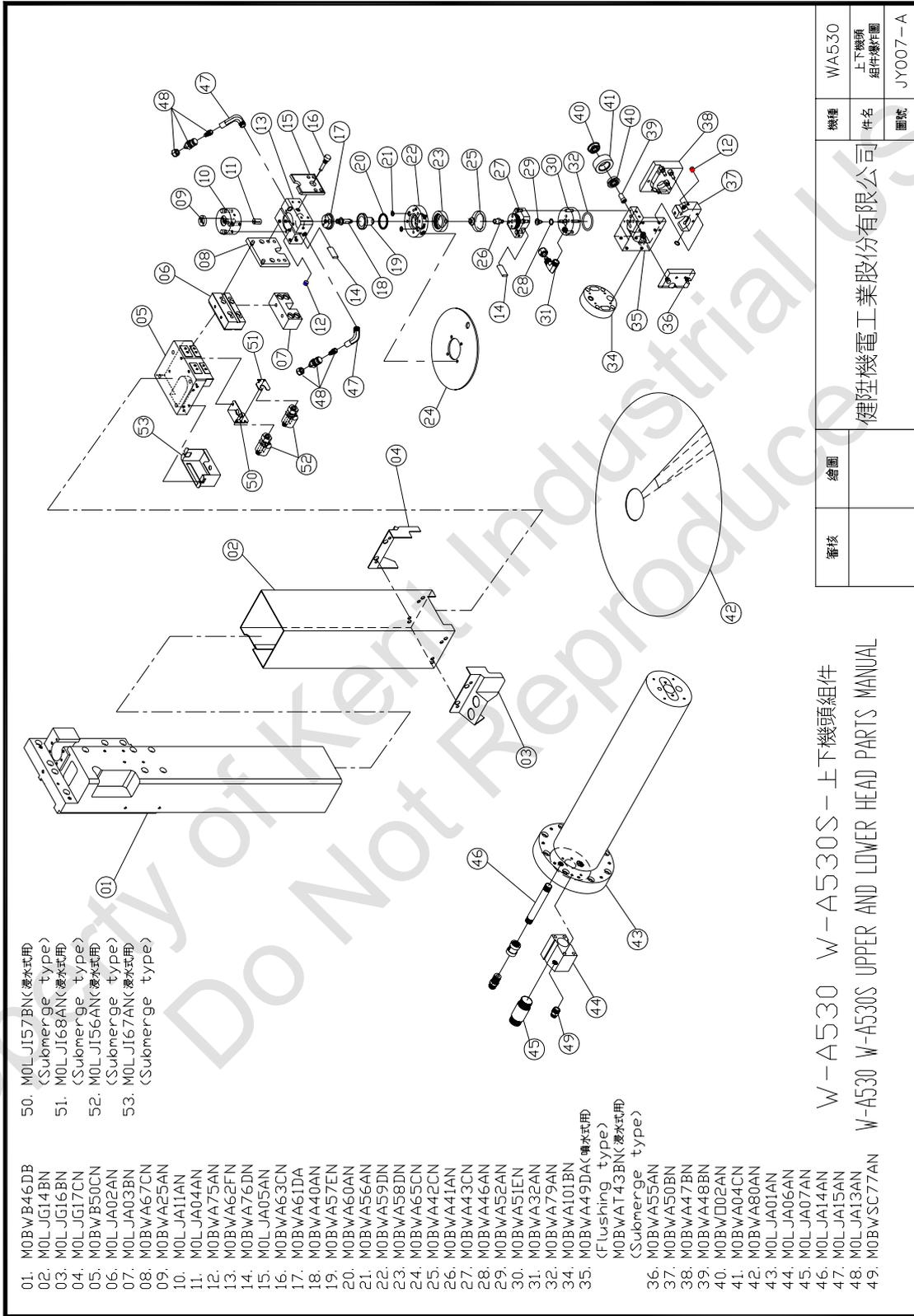
自動穿線機構組件-C(自動穿線2.5版)  
 ATW-C(2.5 EDITION)



|    |                 |
|----|-----------------|
| 機種 | WA530           |
| 件名 | 自動穿線機構組件-D(爆炸圖) |
| 圖號 | JY028-A         |

健陞機電工業股份有限公司

|    |    |
|----|----|
| 審核 | 繪圖 |
|----|----|



- 50. MOLJI57BNK(潛水式用)  
(Submerge type)
- 51. MOLJI68ANK(潛水式用)  
(Submerge type)
- 52. MOLJI56ANK(潛水式用)  
(Submerge type)
- 53. MOLJI67ANK(潛水式用)  
(Submerge type)

- 01. MOBWB46DB
- 02. MOLJG14BN (Submerge type)
- 03. MOLJG16BN (Submerge type)
- 04. MOLJG17CN (Submerge type)
- 05. MOBWB50CN (Submerge type)
- 06. MOLJA02AN (Submerge type)
- 07. MOLJA03BN (Submerge type)
- 08. MOBWA67CN (Submerge type)
- 09. MOBWA25AN (Submerge type)
- 10. MOLJAI1AN
- 11. MOLJA04AN
- 12. MOBWA75AN
- 13. MOBWA62FN
- 14. MOBWA76DN
- 15. MOLJA05AN
- 16. MOBWA63CN
- 17. MOBWA61DA
- 18. MOBWA40AN
- 19. MOBWA57FN
- 20. MOBWA60AN
- 21. MOBWA56AN
- 22. MOBWA59DN
- 23. MOBWA58DN
- 24. MOBWA65CN
- 25. MOBWA42CN
- 26. MOBWA41AN
- 27. MOBWA43CN
- 28. MOBWA46AN
- 29. MOBWA52AN
- 30. MOBWA51EN
- 31. MOBWA32AN
- 32. MOBWA79AN
- 33. MOBWA101BN
- 34. MOBWA49DA(噴水式用)  
(flushing type)
- 35. MOBWA43BN(潛水式用)  
(Submerge type)
- 36. MOBWA55AN
- 37. MOBWA50BN
- 38. MOBWA47BN
- 39. MOBWA48BN
- 40. MOBWA02AN
- 41. MOBWA04CN
- 42. MOBWA80AN
- 43. MOLJA01AN
- 44. MOLJA06AN
- 45. MOLJA07AN
- 46. MOLJA14AN
- 47. MOLJA15AN
- 48. MOLJA13AN
- 49. MOBWSC77AN

W-A530 W-A530S-上下機頭組件  
W-A530 W-A530S UPPER AND LOWER HEAD PARTS MANUAL

|    |    |    |               |
|----|----|----|---------------|
| 審核 | 繪圖 | 機種 | WA530         |
|    |    | 件名 | 上下機頭<br>組件爆炸圖 |
|    |    | 圖號 | JY007-A       |

健陸機電工業股份有限公司

## TEST STANDARD OF AUTO THREADING :

| Wire diameter | Threading height of air-carrying-wire without workpiece | Successful possibility |                | Threading times without machine shutdown |
|---------------|---|------------------------|----------------|--|
|               |   | Wire broken point      | Original point |  |
| 0.1           | 50  | 85%                    | 90%            | over 100 times                           |
| 0.15          | 60  | 85%                    | 90%            | over 100 times                           |
| 0.2           | 90  | 85%                    | 90%            | over 100 times                           |
| 0.25          | 100   | 85%                    | 90%            | over 100 times                           |
| 0.30          | 100   | 85%                    | 90%            | over 100 times                           |

## ※ Remarks:

- Preheat time and wire cutting time vary depending on the wire diameters, brand names and the materials. (Japanese wires are more stable. Hitachi wire cutting wire is recommended.) Adjust preheat by increasing or decreasing 0.1 second, and use Wire Cut function to cut off the wire. Cut the wire at the tension wheel by scissors. Then, pull the wire out. Hold one end of the cutoff wire so as to hang the wire vertically in the air. Observe wire verticality. (Place it in front of a white background. Draw a frame of 300mm x 10mm on the white background.) If the wire winds within the 300mm x 10mm frame, it is OK. The wire adjusted by above preheat can thread through 80mm height under no workpiece condition and auto threading function of water-carrying-wire. Its successful possibility is 95%. If 100 mm threading height is required, the wire winding must be within 300mm x 5mm frame. Adjust wire cutting by increasing/decreasing time by 0.1 second each time till the wire can be cut off.

**7.4 Driver setting****7.4.1 AWT driver setting ( W axis )**

|   |  |
|---|--|
| 02 (Setup of control mode)                            | 5  |
| 03 (Selection of torque limit)                        | 1  |
| 06 ((Selection of ZEROSPD input)                      | 1  |
| 11(Circuit gain of Speed 1)                           | 300  |
| 12 (Time constant of circuit integration for Speed 1) | 300  |
| 13 (Wave filter of Speed 1 sensor)                    | 0  |
| 14 (Time constant of wave filter of Tension 1)        | 100  |
| 20 (inertia ratio )                                   | 600  |
| 44 (No. of output pulse per revolution)               | 2500   |
| 46 (Reversal of pulse output logic)                   | 0  |
| 50 (Output gain of speed control)                     | 100  |
| 51 (Reversal of speed command input)                  | 1  |
| 52 (Offset of speed control)                          | 0 (controller Motion status 3 screen parameter : LAG X~W |
| 5B (Selection of torque command)                      | 1  |
| 5C (Input gain of torsion control)                    | 65   |
| 5D (input reversal of torque command)                 | 0  |
| 5E (Input reverse turn of torsion control)            | 300  |

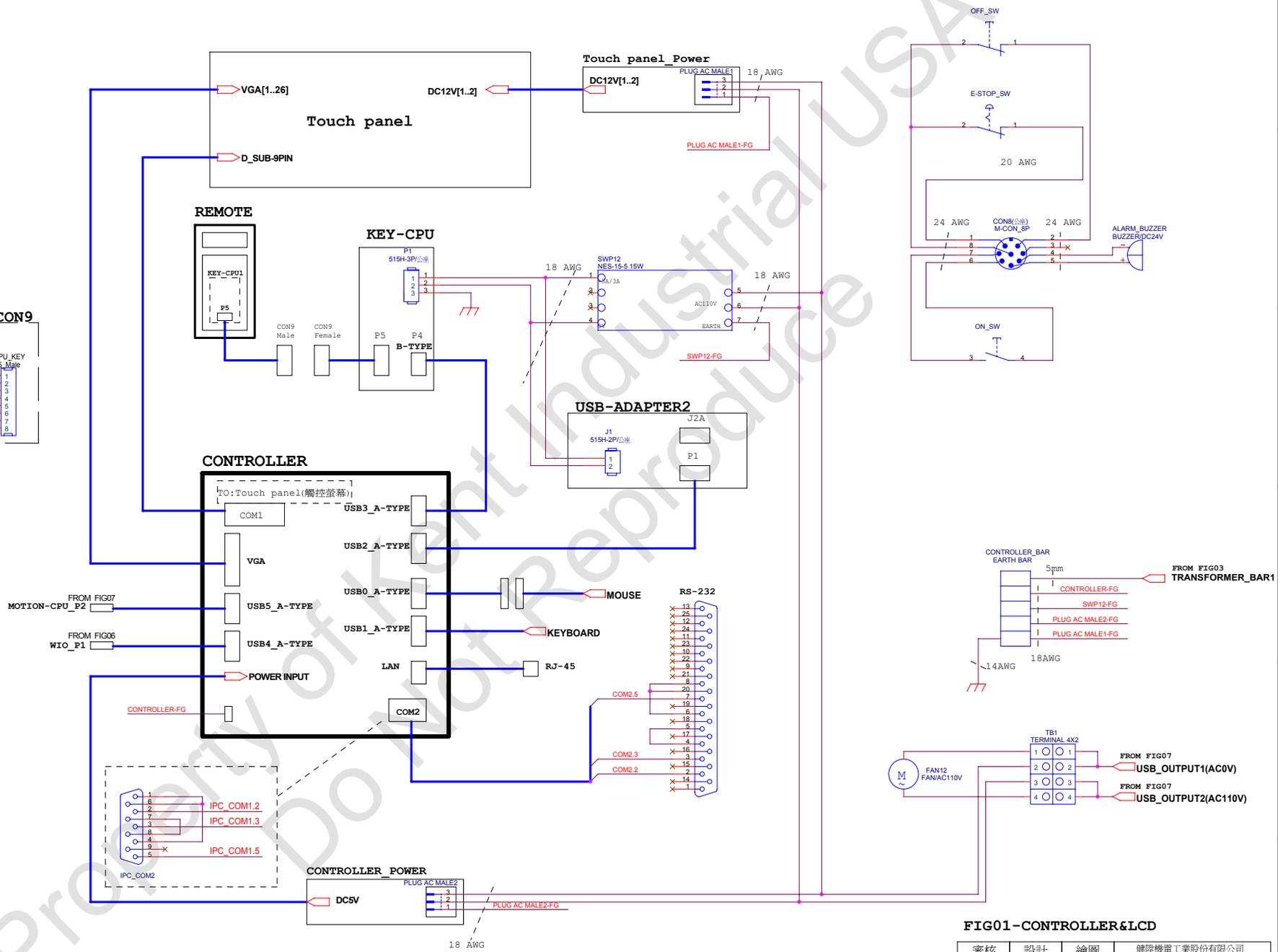
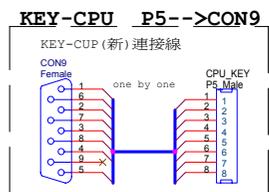
# Electric Drawing

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Do Not Reproduce

WI\_(640S,430S)浸水式+自動穿線配線圖  
WI\_(640S,430S)Submerge+AWT Electric Drawing

- FIG01-CONTROLLER(控制器配線)
- FIG03-TRANSFORMER(變壓器配線)
- FIG04-CIRCUIT\_PANEL(自控盤)
- FIG05-WCUT\_AWT(自動穿線)
- FIG06-WIO(WIO板配線)
- FIG07-UPS&MOTION(MOTION板配線)
- FIG08-SWITCH POWER1(電源配線1)
- FIG09-SWITCH POWER2(電源配線2)
- FIG10-DRIVER(伺服器配線)
- FIG11-EDM POWER(放電箱配線)
- FIG12-CONNECTOR(側板連接頭配線)
- FIG13-FAN&MAIN SWITCH(風扇及主電源開關配線)
- FIG14-MACHINE\_CIRCUIT3(機台配線3)
- FIG15-MACHINE\_CIRCUIT4(機台配線4)
- FIG16-WATER\_SYSTEM4(浸水式水系統配線4)
- FIG17-WATER\_SYSTEM5(浸水式水系統配線5)
- FIG18-WATER\_SYSTEM6(浸水式水系統配線6)
- FIG19-WATER\_SYSTEM7(浸水式水系統配線7)

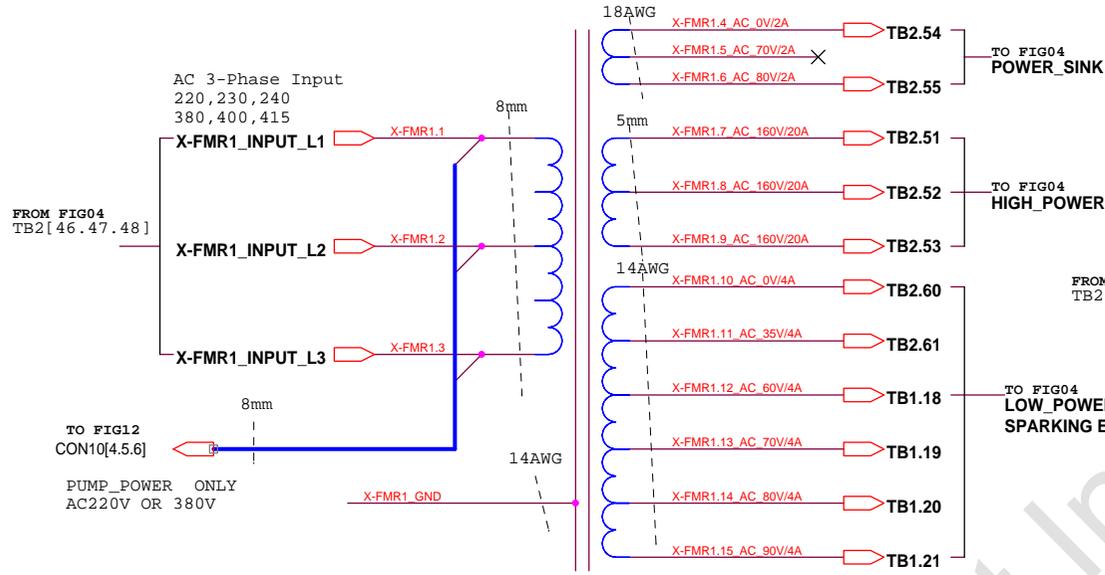
|                                   |    |    |                                  |                              |            |
|-----------------------------------|----|----|----------------------------------|------------------------------|------------|
| 審核                                | 設計 | 繪圖 | 健陸機電工業股份有限公司<br>台中市工業區12路8號      |                              |            |
|                                   |    |    | Title<br>WCUT_ELECTRIC_SCHEMATIC |                              |            |
|                                   |    |    | Size<br>A3                       | Document Number<br>TABLE.DSN | Rev<br>1.0 |
| Date: Wednesday, October 16, 2013 |    |    | Sheet                            | 0                            | of 19      |



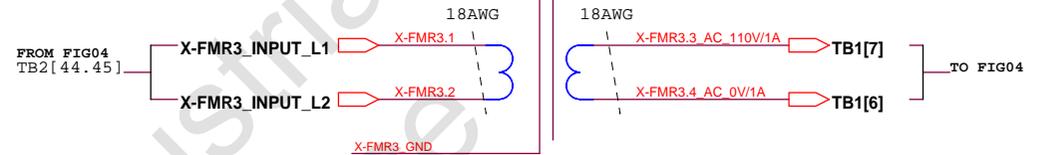
**FIG01-CONTROLLER&LCD**

|                                   |                 |                |                             |
|-----------------------------------|-----------------|----------------|-----------------------------|
| 審核                                | 設計              | 繪圖             | 健陸機電工業股份有限公司<br>台中市工業區12路8號 |
|                                   |                 |                | Rev 1.0                     |
| Size A.3                          | Document Number | CONTROLLER.DSN | Rev 1.0                     |
| Date: Wednesday, October 16, 2013 | Sheet 1         | of 19          |                             |

X-FMR1  
TRANSFORMER01-4.5KVA



X-FMR3  
TRANSFORMER03- 110W  
(目前用1HP標準規格)



X-FMR2  
TRANSFORMER-4.5KVA

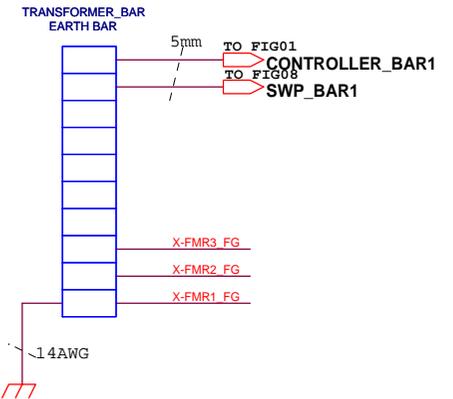
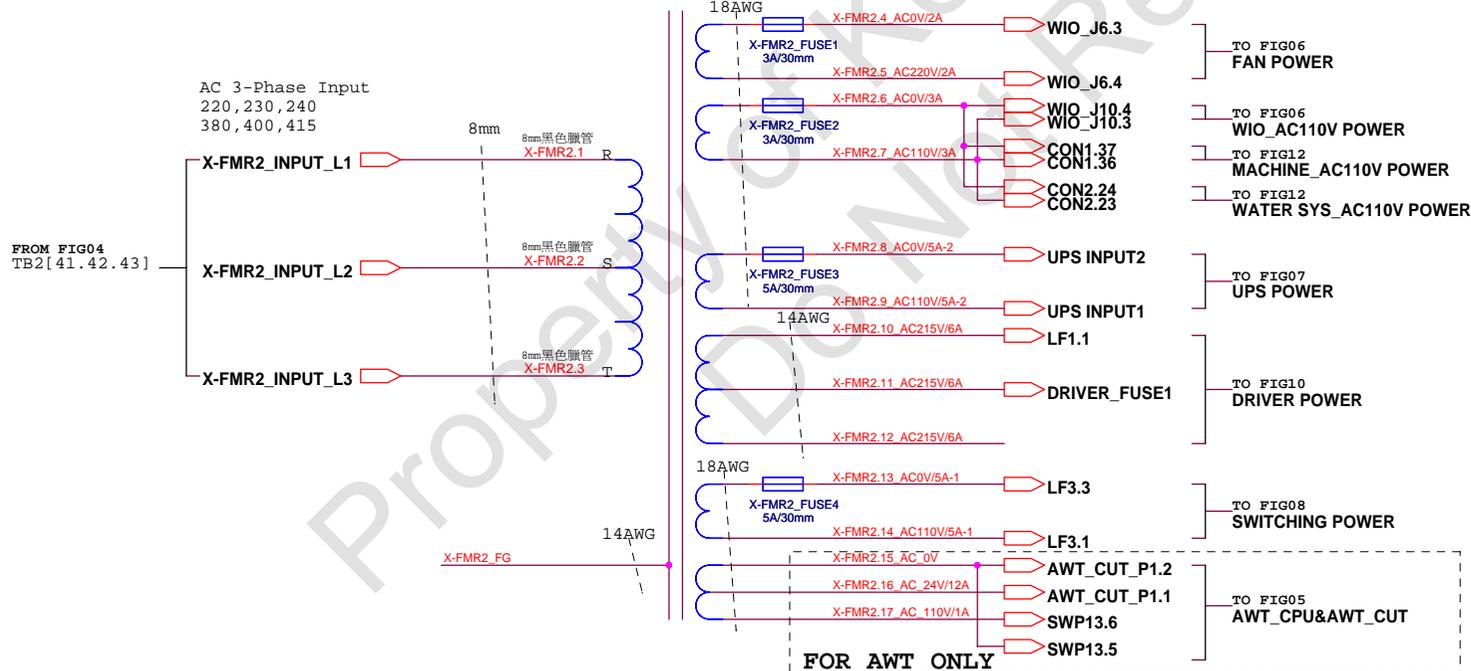
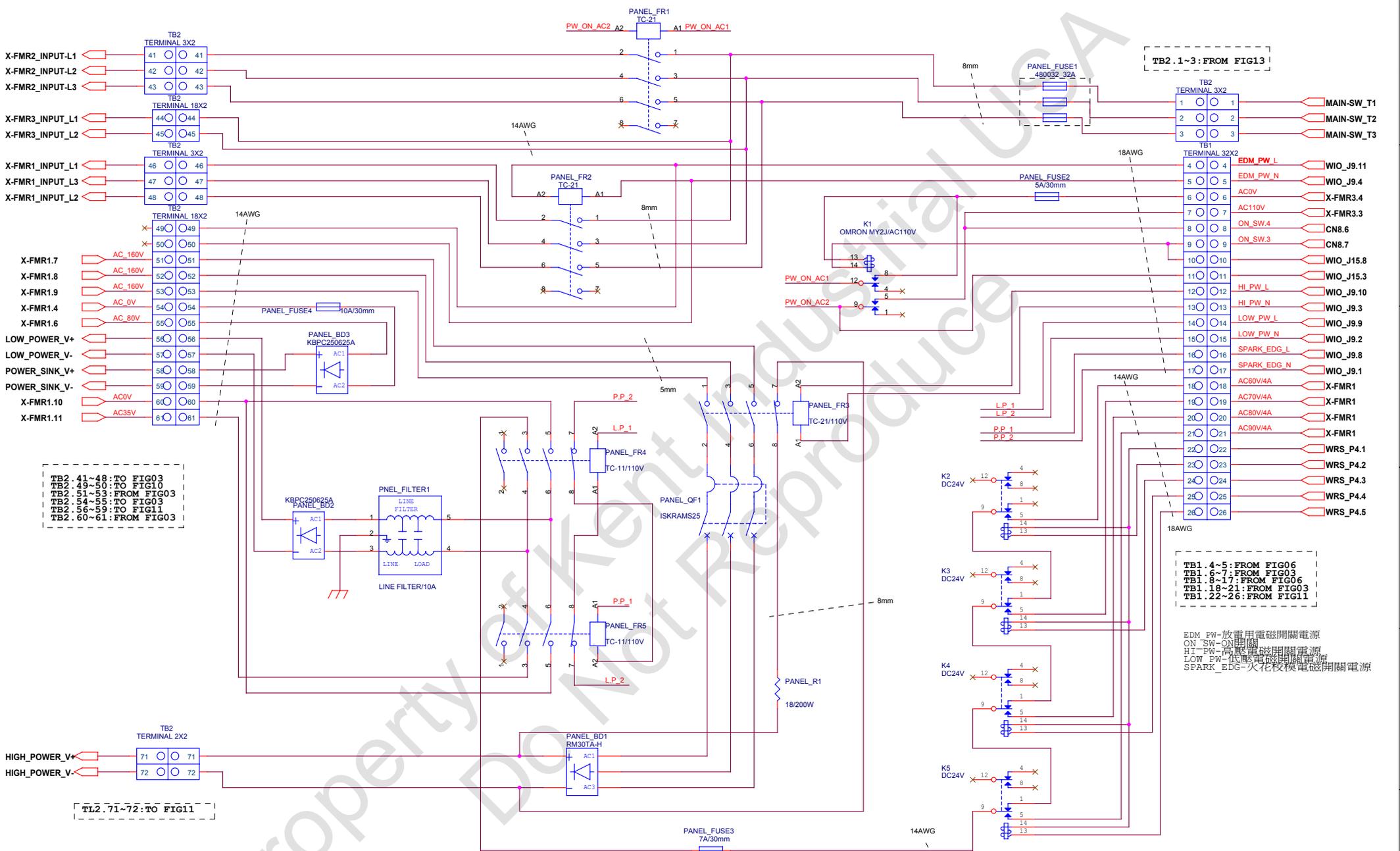


FIG03 - TRANSFORMER ( T+AWT )

|                                   |    |    |                                  |                                    |            |
|-----------------------------------|----|----|----------------------------------|------------------------------------|------------|
| 審核                                | 設計 | 繪圖 | 健陸機電工業股份有限公司<br>台中市工業區12路8號      |                                    |            |
|                                   |    |    | Title<br>WCUT_ELECTRIC_SCHEMATIC |                                    |            |
|                                   |    |    | Size<br>A3                       | Document Number<br>TRANSFORMER.DSN | Rev<br>1.0 |
| Date: Thursday, November 24, 2016 |    |    | Sheet 3 of 18                    |                                    |            |



TB2. 41~48: TO FIG03  
 TB2. 49~50: FROM FIG10  
 TB2. 51~53: FROM FIG03  
 TB2. 54~55: TO FIG03  
 TB2. 56~59: TO FIG11  
 TB2. 60~61: FROM FIG03

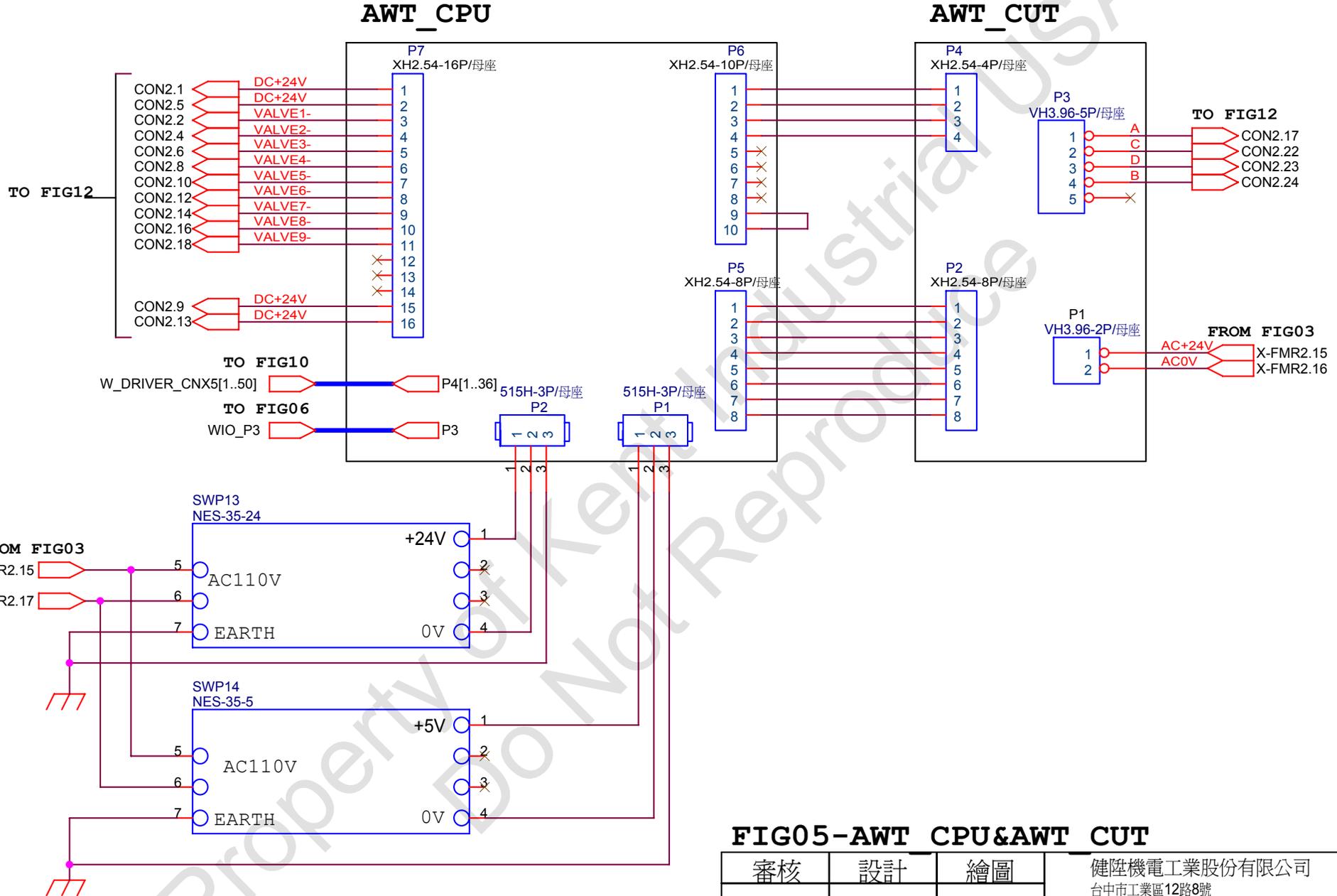
TL2. 71~72: TO FIG11

TB1. 4~5: FROM FIG06  
 TB1. 6~7: FROM FIG03  
 TB1. 8~17: FROM FIG03  
 TB1. 18~21: FROM FIG03  
 TB1. 22~26: FROM FIG11

EDM-PW-放電用電磁開關電源  
 ON-SW-ON開關  
 HI-PW-高壓電磁開關電源  
 LOW-PW-低壓電磁開關電源  
 SPARK-EDG-火花校模電磁開關電源

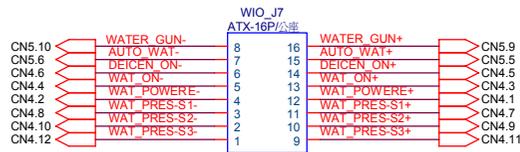
FIG04-CIRCUIT\_PANEL (T)

|                                   |    |    |                             |                       |
|-----------------------------------|----|----|-----------------------------|-----------------------|
| 審核                                | 設計 | 繪圖 | 健隆機電工業股份有限公司<br>台中市工業區12路8號 |                       |
|                                   |    |    | Title                       | WCUT_ELECTRIC_SCHEMAT |
|                                   |    |    | Size                        | Document Number       |
|                                   |    |    |                             | CIRCUIT_PANEL.DSN     |
|                                   |    |    | Rev                         | 1.0                   |
| Date: Wednesday, October 16, 2013 |    |    | Sheet                       | 4 of 18               |



**FIG05-AWT CPU&AWT CUT**

|                                   |    |    |                                  |  |            |
|-----------------------------------|----|----|----------------------------------|--|------------|
| 審核                                | 設計 | 繪圖 | 健陸機電工業股份有限公司<br>台中市工業區12路8號      |  |            |
|                                   |    |    | Title<br>WCUT_ELECTRIC_SCHEMATIC |  |            |
|                                   |    |    | Size                             | Document Number<br>ATW_CPU&ATW_CUT.DSN | Rev<br>1.0 |
| Date: Wednesday, October 16, 2013 |    |    | Sheet                            | 5                                      | of 19      |



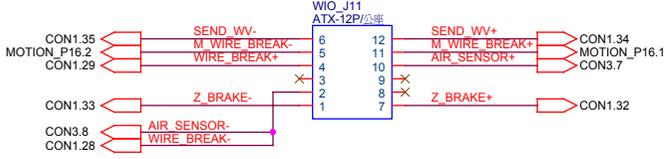
NOTE:WIO\_J7.[1~16]----->FROM FIG12

AUTO\_WAT--半自動穿線      WAT\_ON--高壓馬達開  
 WAT\_POWER--水系統電源      DENON--離子馬達開  
 WAT\_PRES1~3--水壓段數      WATER\_GUN--水槍



NOTE:WIO\_J9.[1~14]----->FROM FIG04

EDM\_POWER\_IN--放電輸入電源      HIGH\_POWER--高壓電源  
 LOW\_POWER--低壓電源      SPARK\_EDGE--火花校模



NOTE: J11.[1.7]----->FROM FIG12  
 J11.[2.4]----->FROM FIG12

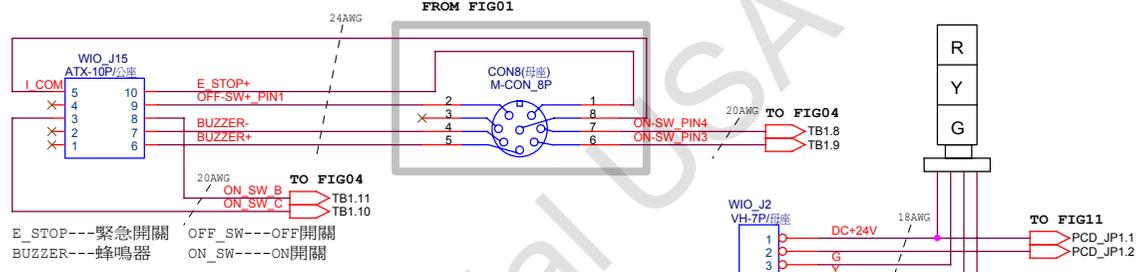
J11.[2.10]----->FROM FIG12  
 J11.[5.11]----->FROM FIG07  
 J11.[6.12]----->FROM FIG12

Z\_BRAKE--z軸煞車      WIRE\_BREAK--斷線檢知開關  
 AIR\_SENSOR--氣壓偵測      SEND\_WV--送線輪馬達  
 M\_WIRE\_BREAK--斷線檢知



NOTE:WIO\_J3.[1~12]----->FROM FIG12

WATER\_FILL--機台浸水      WATER\_DRAIN--機台洩水  
 WATER\_ALARM--水系統警報      UP\_AUTO\_WA--穿線水柱



E\_STOP---緊急開關      OFF\_SW---OFF開關  
 BUZZER---蜂鳴器      ON\_SW---ON開關

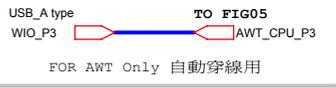
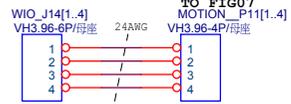
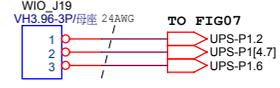
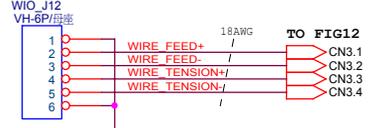
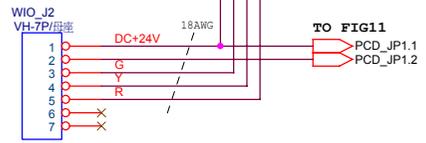
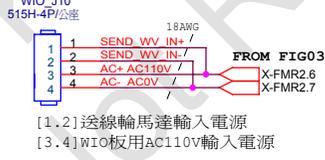
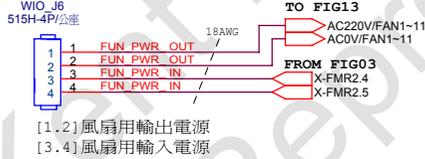
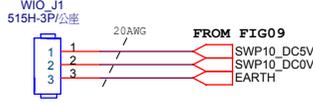
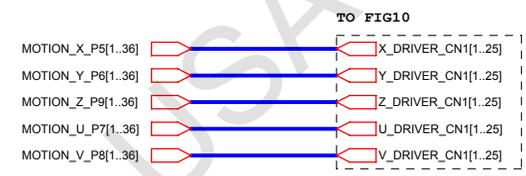
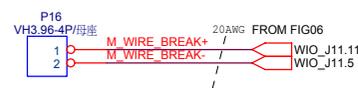
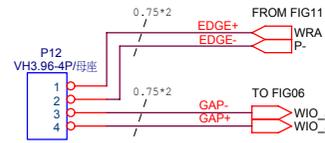
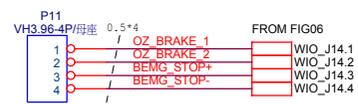
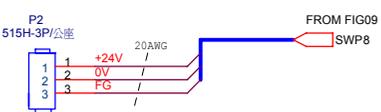
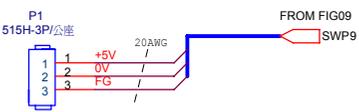
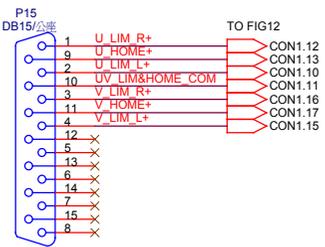
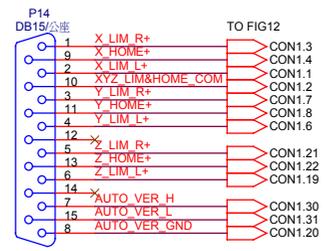


FIG06-WIO (Submerge+AWT)

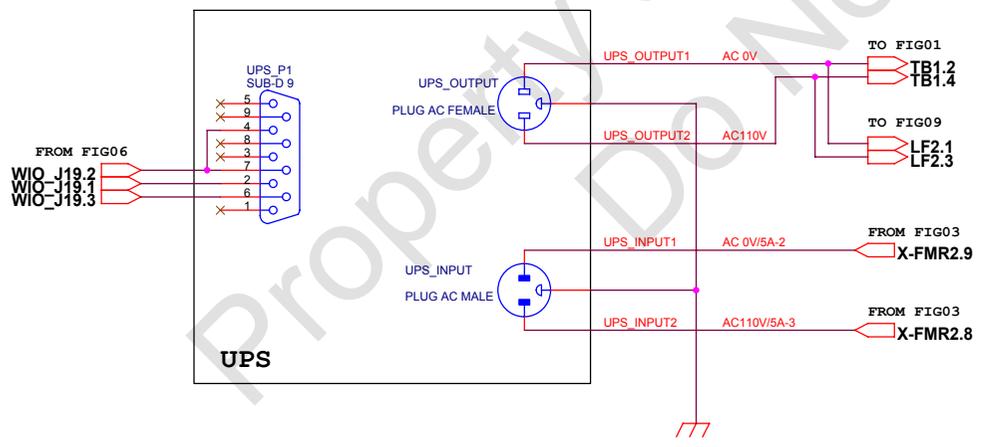
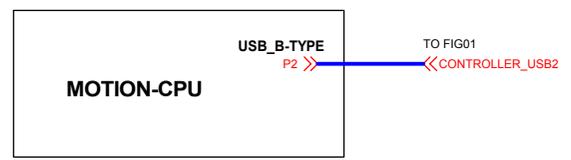
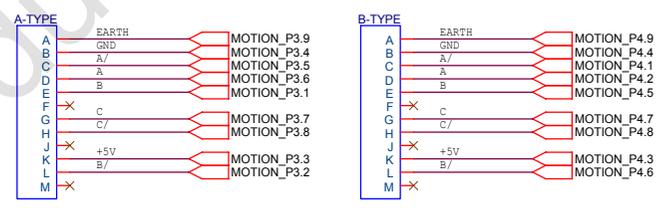
|                                   |    |                            |                                  |            |
|-----------------------------------|----|----------------------------|----------------------------------|------------|
| 審核                                | 設計 | 繪圖                         | 健陸機電工業股份有限公司<br>台中市工業區12路8號      |            |
|                                   |    |                            | Title<br>WCUT_ELECTRIC_SCHEMATIC |            |
| Size<br>A3                        |    | Document Number<br>WIO.DSN |                                  | Rev<br>1.0 |
| Date: Wednesday, October 16, 2013 |    |                            | Sheet<br>6                       | of<br>19   |



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|        |        |        |        |
|--------|--------|--------|--------|
|        | 640    | 530    | 430    |
| CN6(X) | A-TYPE | A-TYPE | B-TYPE |
| CN7(Y) | A-TYPE | A-TYPE | B-TYPE |

FROM FIG12



**FIG07-UPS&MOTION**

|                                   |    |    |                                  |                                   |
|-----------------------------------|----|----|----------------------------------|-----------------------------------|
| 審核                                | 設計 | 繪圖 | 健陞機電工業股份有限公司<br>台中市工業區12路8號      |                                   |
|                                   |    |    | Title<br>WCUT_ELECTRIC_SCHEMATIC |                                   |
|                                   |    |    | Size<br>A3                       | Document Number<br>UPS&MOTION.DSN |
|                                   |    |    | Rev<br>1.0                       |                                   |
| Date: Wednesday, October 16, 2013 |    |    | Sheet<br>7                       | of<br>19                          |

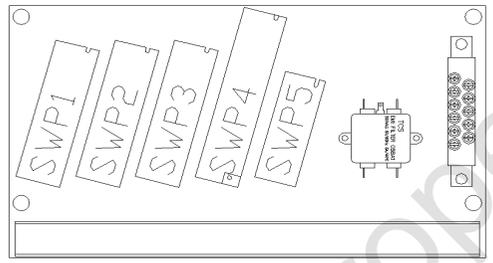
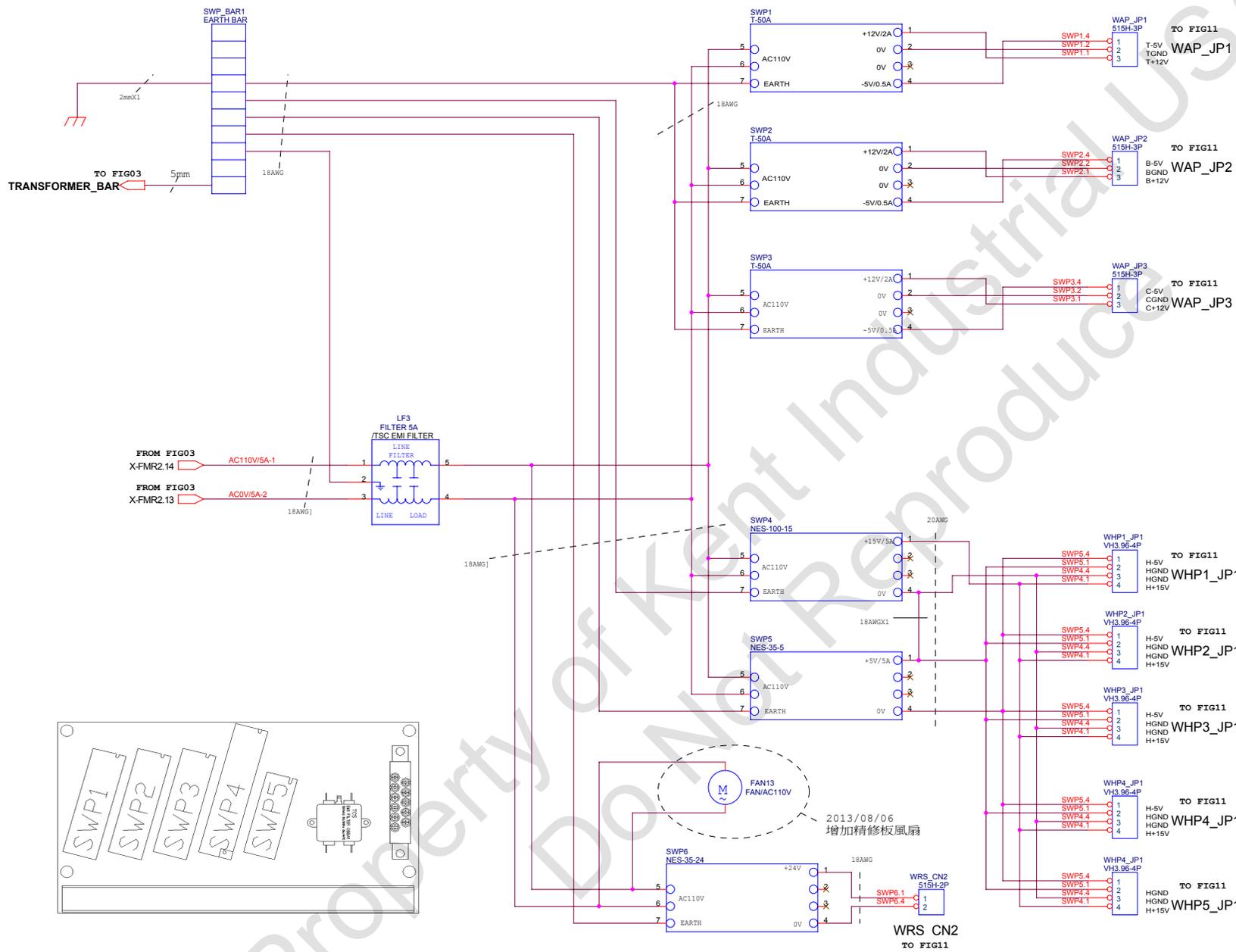
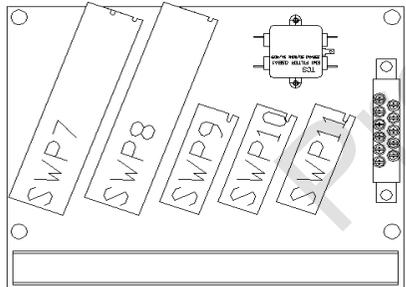
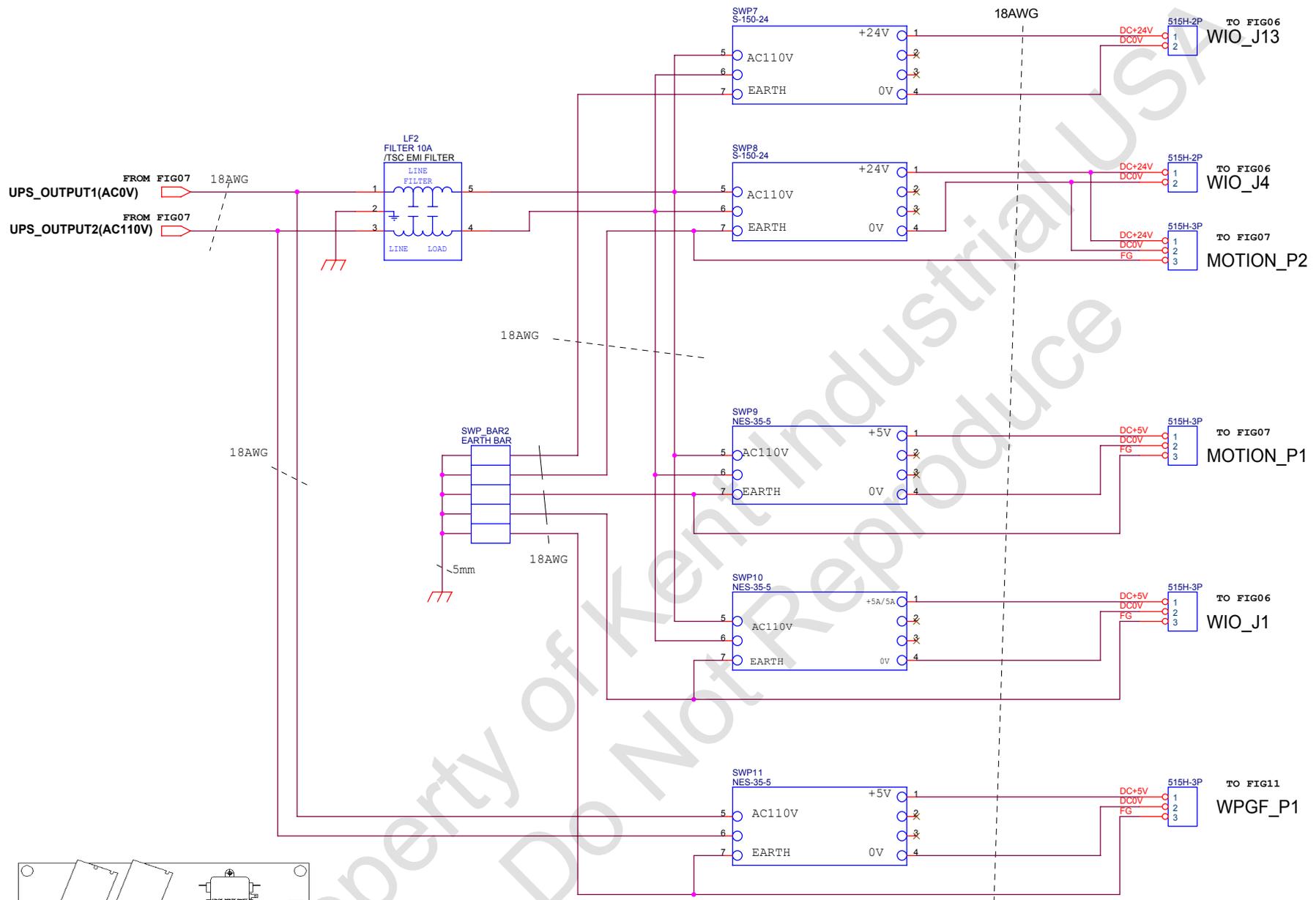


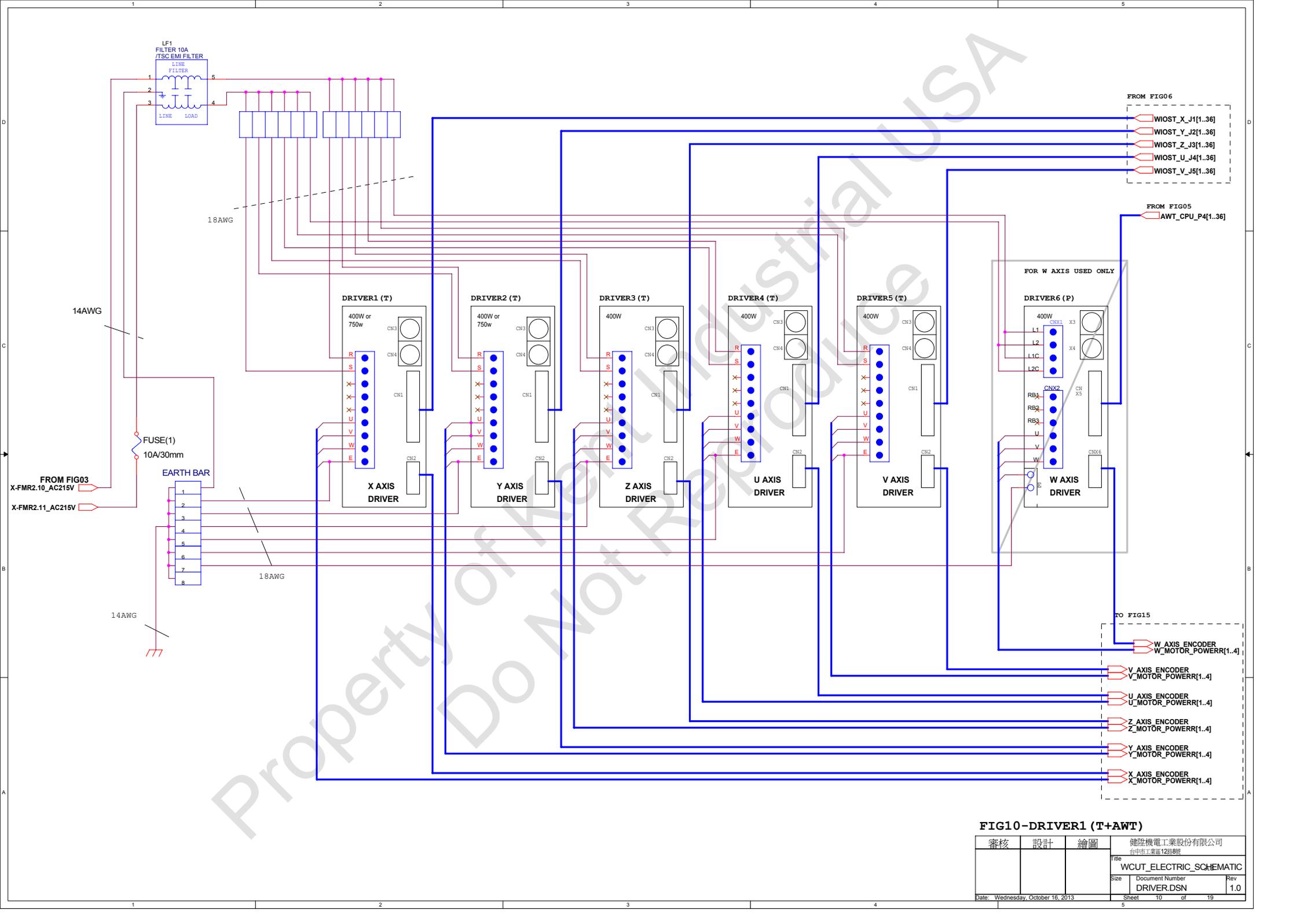
FIG08-SWITCH POWER1

|                                   |    |                                      |                                  |            |
|-----------------------------------|----|--------------------------------------|----------------------------------|------------|
| 審核                                | 設計 | 繪圖                                   | 健陸機電工業股份有限公司<br>台中市工業區1288號      |            |
|                                   |    |                                      | Title<br>WCUT_ELECTRIC_SCHEMATIC |            |
| Size<br>A3                        |    | Document Number<br>SWITCH_POWER1.DSN |                                  | Rev<br>1.0 |
| Date: Wednesday, October 16, 2013 |    |                                      | Sheet<br>8                       | of<br>19   |



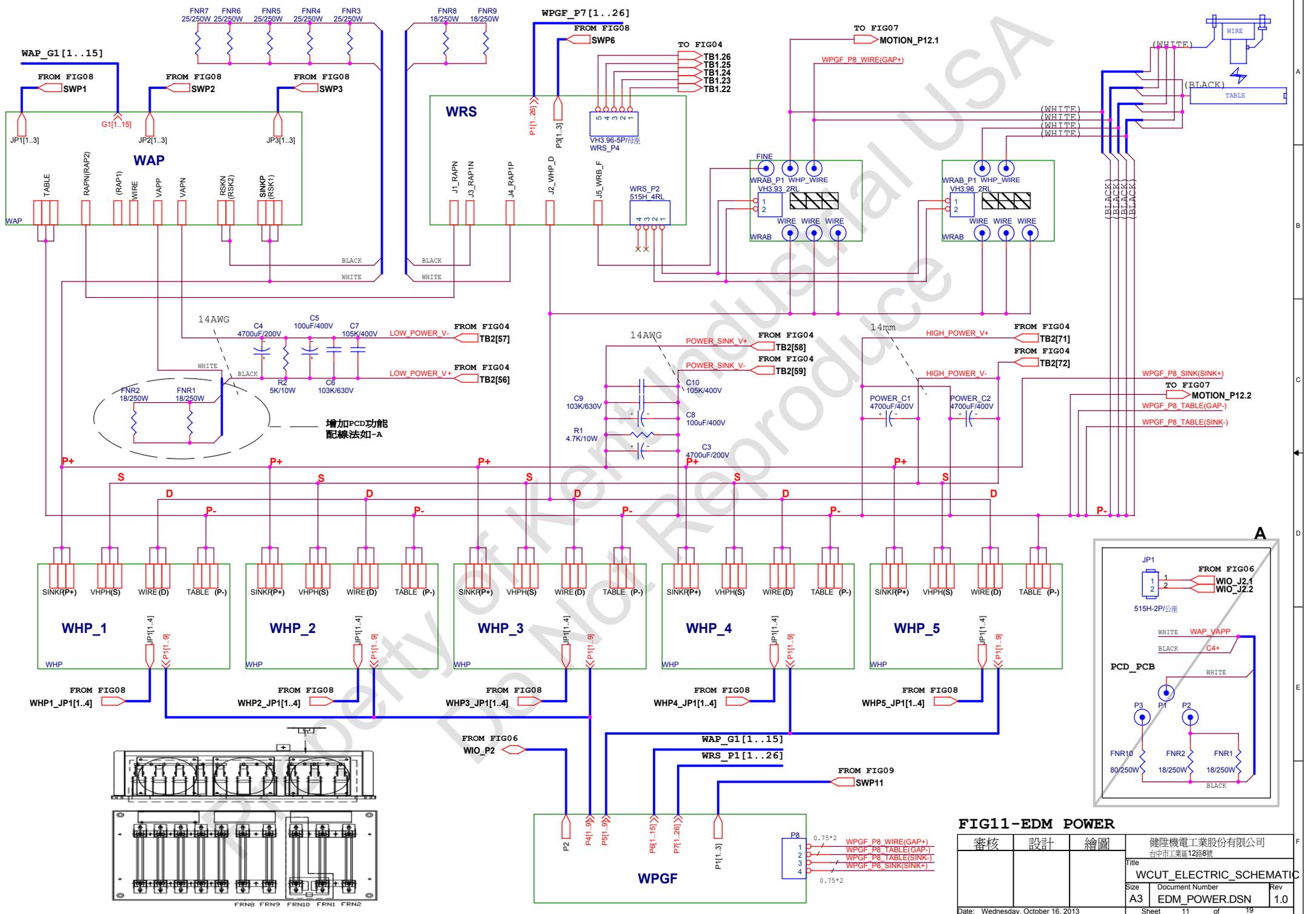
**FIG09-SWITCH POWER2**

|    |    |    |                                   |                                      |
|----|----|----|-----------------------------------|--------------------------------------|
| 審核 | 設計 | 繪圖 | 健陸機電工業股份有限公司<br>台中市工業區12路8號       |                                      |
|    |    |    | Title<br>WCUT_ELECTRIC_SCHEMATIC  |                                      |
|    |    |    | Size<br>A3                        | Document Number<br>SWITCH_POWER2.DSN |
|    |    |    | Date: Wednesday, October 16, 2013 | Rev<br>1.0                           |
|    |    |    | Sheet<br>9                        | of<br>19                             |

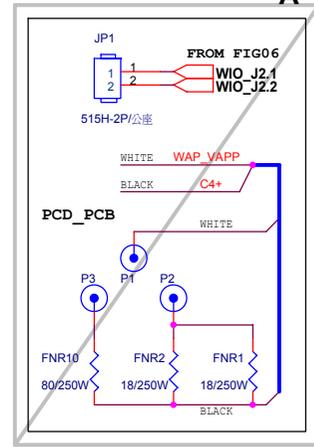


**FIG10-DRIVER1 (T+AWT)**

|    |    |    |                                   |          |
|----|----|----|-----------------------------------|----------|
| 審核 | 設計 | 繪圖 | 健隆機電工業股份有限公司<br>台中市工業區12路8號       |          |
|    |    |    | Title: WCUT_ELECTRIC_SCHEMATIC    |          |
|    |    |    | Size: Document Number             | Rev: 1.0 |
|    |    |    | Date: Wednesday, October 16, 2013 |          |
|    |    |    | Sheet: 10                         | of: 19   |

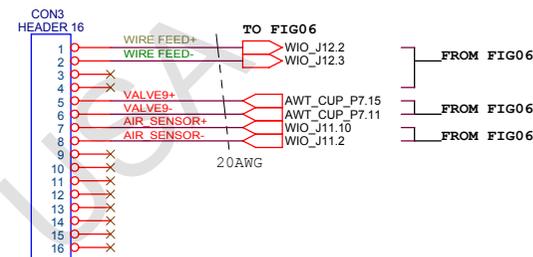
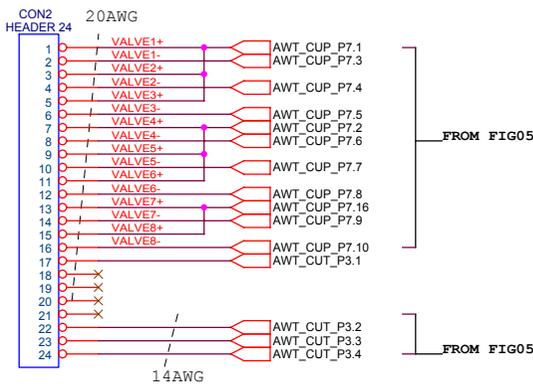
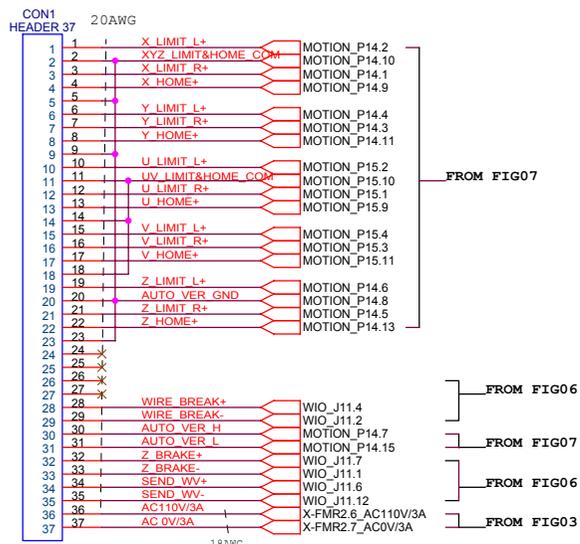


增加PCD功能  
配線法如-A

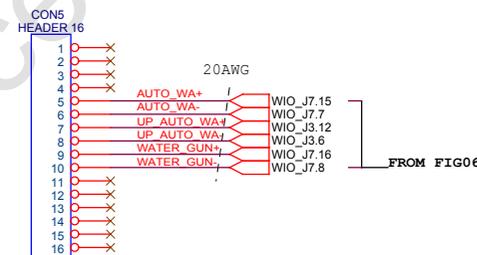
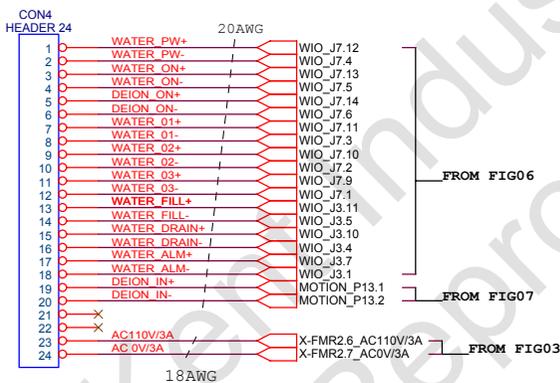


**FIG11-EDM POWER**

|                                   |    |    |  |  |
|-----------------------------------|----|----|--|--|
| 審核                                | 設計 | 繪圖 | 健隆機電工業股份有限公司<br>台中市工業區12路8號              |  |
|                                   |    |    | Title<br>WCUT_ELECTRIC_SCHEMATIC         |  |
|                                   |    |    | Size Document Number<br>A3 EDM_POWER.DSN |  |
|                                   |    |    | Rev<br>1.0                               |  |
| Date: Wednesday, October 16, 2013 |    |    | Sheet 11 of 19                           |  |

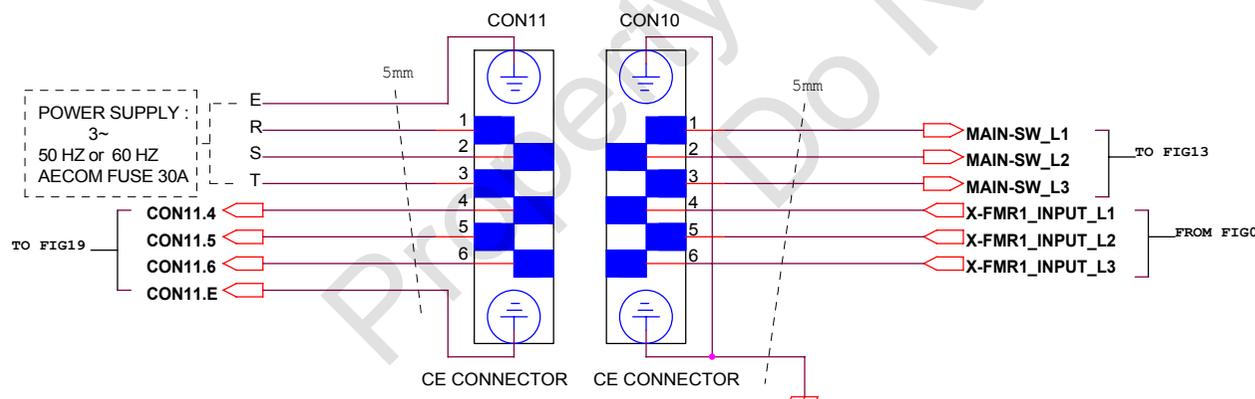
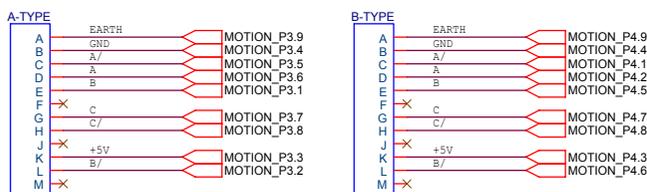


FOR ATW Only 自動穿線用



FOR SCALER USED ONLY

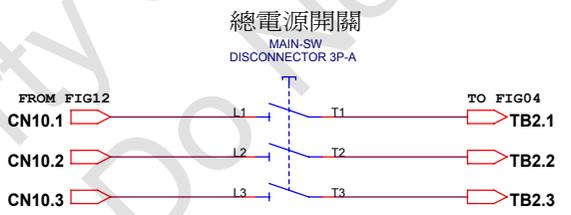
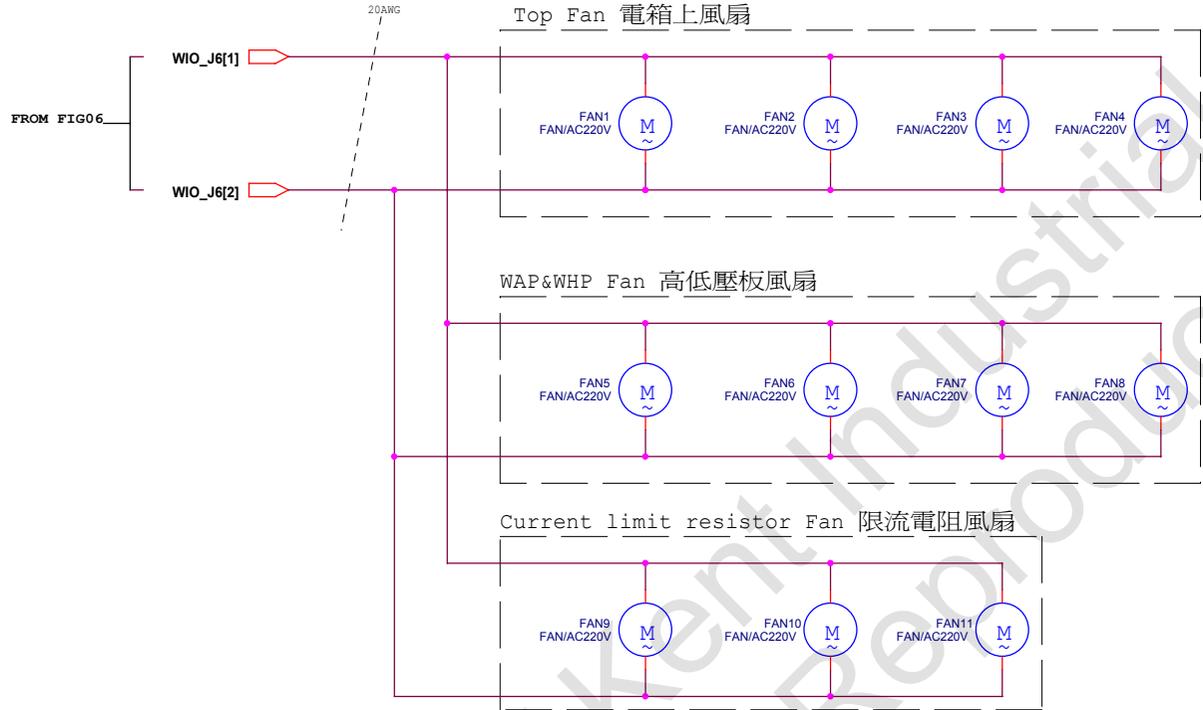
|       |        |        |        |
|-------|--------|--------|--------|
|       | 640    | 530    | 430    |
| P3(X) | A-TYPE | A-TYPE | B-TYPE |
| P4(Y) | A-TYPE | A-TYPE | B-TYPE |



| 15PIN_D型接頭綠色 |   |    | Motion_P14 |   |   | Motion_P15 |    |   |    |    |    |
|--------------|---|----|------------|---|---|------------|----|---|----|----|----|
| 1            | 黑 | 9  | 灰          | 1 | 黑 | 9          | 灰  | 1 | 黑  | 9  | 灰  |
| 2            | 棕 | 10 | 白          | 2 | 棕 | 10         | 白  | 2 | 棕  | 10 | 白  |
| 3            | 紅 | 11 | 粉紅         | 3 | 紅 | 11         | 粉紅 | 3 | 紅  | 11 | 粉紅 |
| 4            | 橙 | 12 | 青          | 4 | 橙 | 12         | 不接 | 4 | 橙  | 12 | 不接 |
| 5            | 黃 | 13 | 黑紅         | 5 | 黃 | 13         | 黑紅 | 5 | 不接 | 13 | 不接 |
| 6            | 綠 | 14 | 黑綠         | 6 | 綠 | 14         | 不接 | 6 | 不接 | 14 | 不接 |
| 7            | 藍 | 15 | 黑白         | 7 | 藍 | 15         | 黑白 | 7 | 不接 | 15 | 不接 |
| 8            | 紫 |    |            | 8 | 紫 |            |    | 8 | 不接 |    |    |

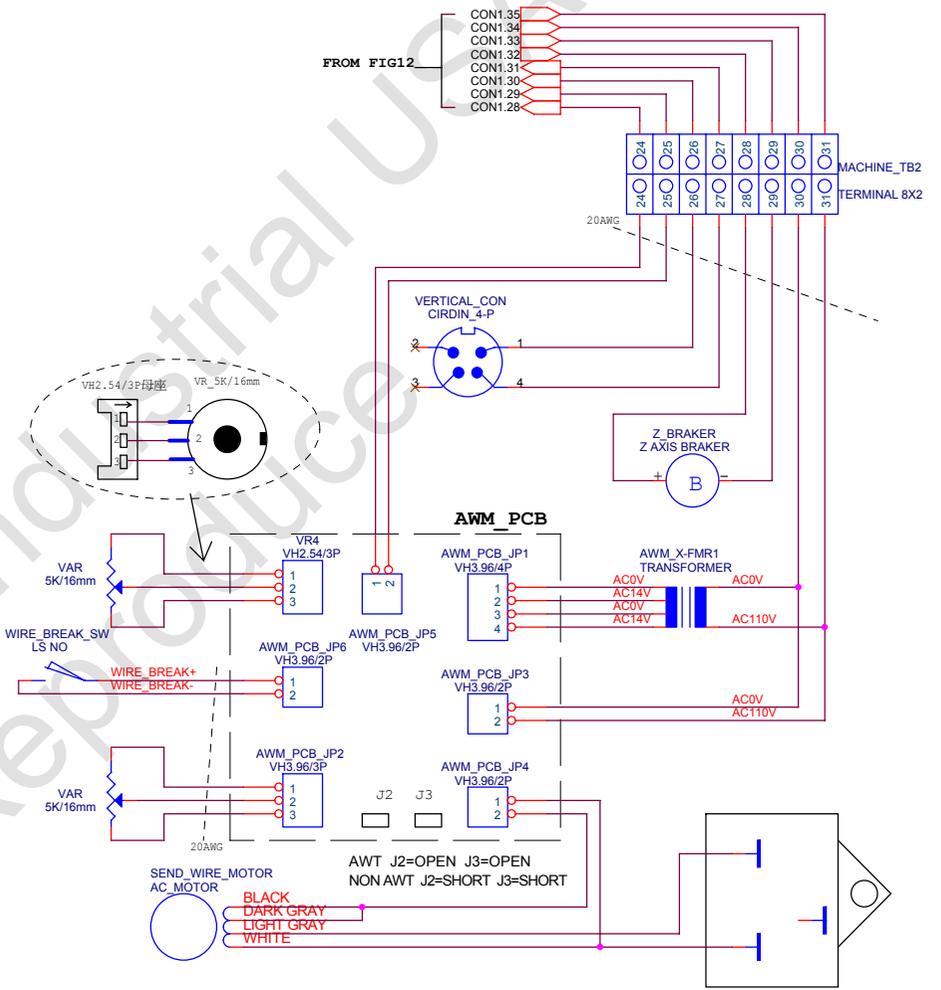
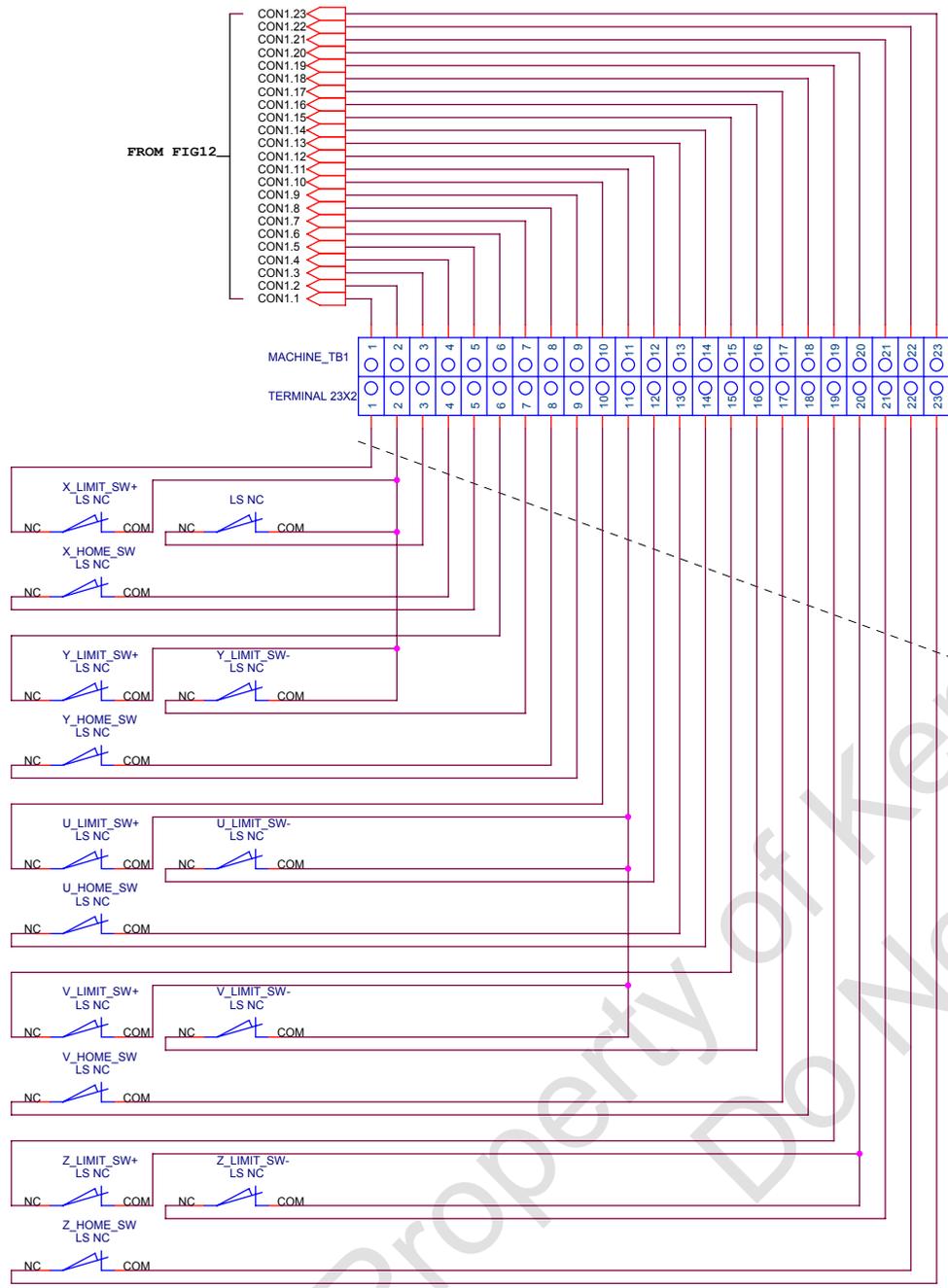
FIG12-CONNECTOR (Submerge+ATW)

|            |    |                                  |                                  |            |  |
|------------|----|----------------------------------|----------------------------------|------------|--|
| 審核         | 設計 | 繪圖                               | 健陸機電工業股份有限公司<br>台中市工業區12路8號      |            |  |
|            |    |                                  | Title<br>WCUT_ELECTRIC_SCHEMATIC |            |  |
| Size<br>A3 |    | Document Number<br>CONNECTOR.DSN |                                  | Rev<br>1.0 |  |



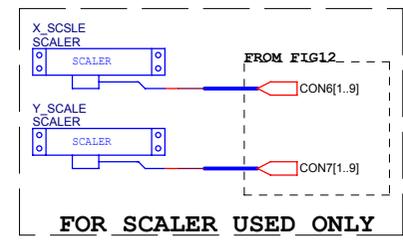
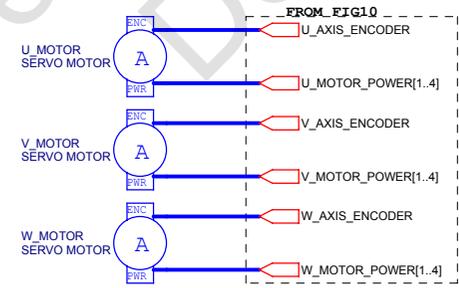
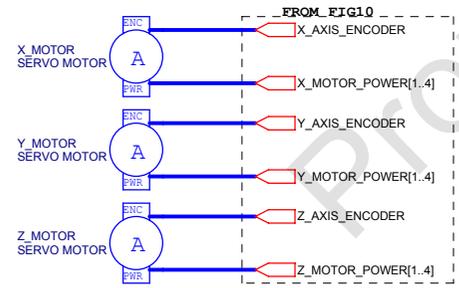
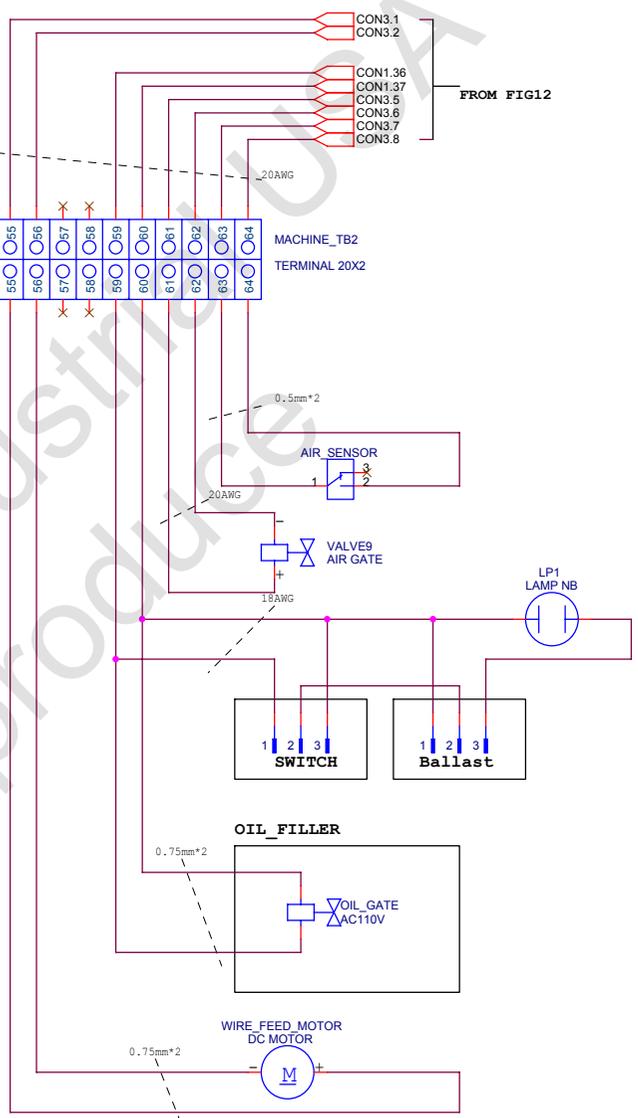
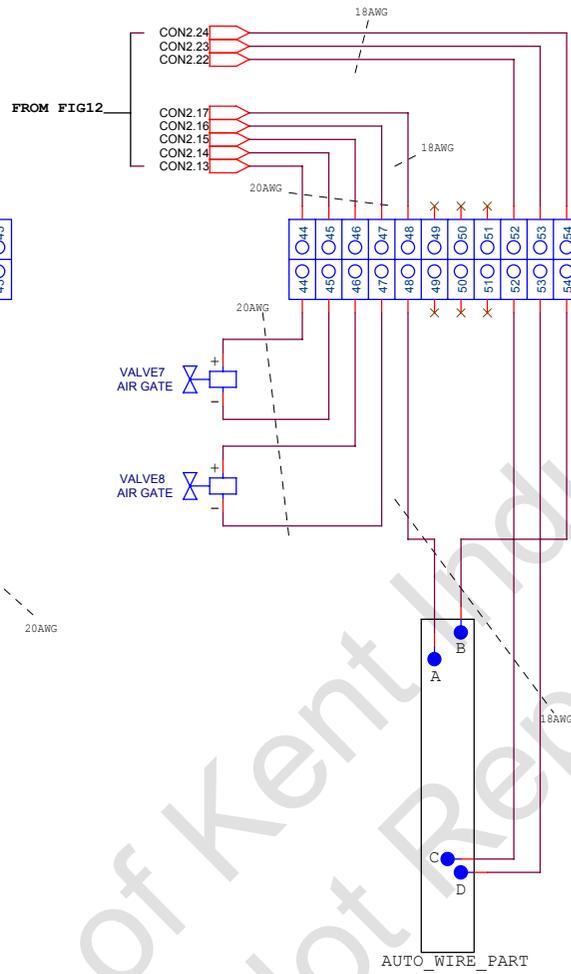
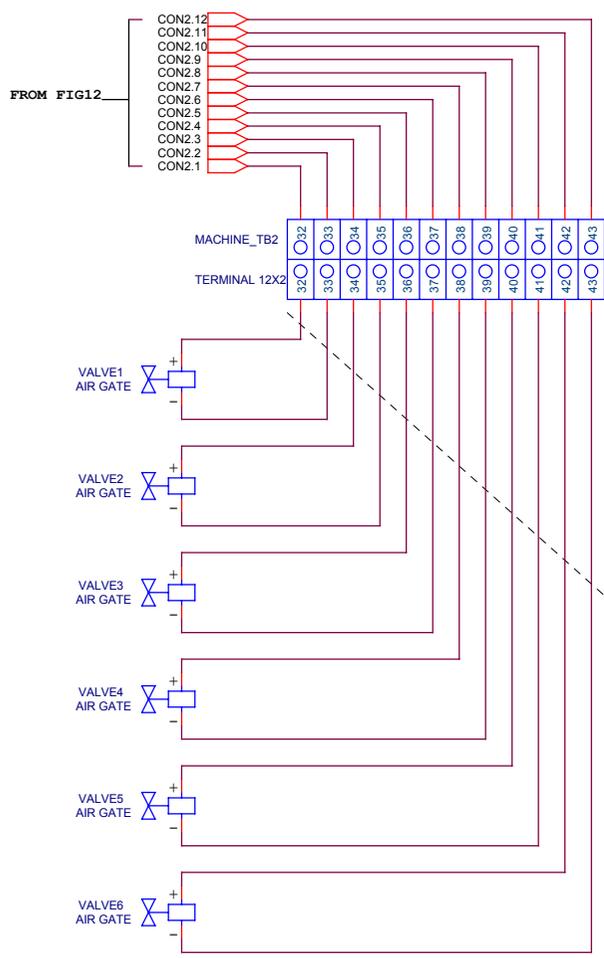
**FIG13-FAN&MAIN SWITCH**

|                                   |    |    |                                  |  |
|-----------------------------------|----|----|----------------------------------|--|
| 審核                                | 設計 | 繪圖 | 健陸機電工業股份有限公司<br>台中市工業區12路8號      |  |
|                                   |    |    | Title<br>WCUT_ELECTRIC_SCHEMATIC |  |
|                                   |    |    | Size<br>A3                       | Document Number<br>FAN&MAIN_SWITCH.DSN |
| Date: Wednesday, October 16, 2013 |    |    | Rev<br>1.0                       | Sheet<br>13 of 19                      |



**FIG14-MACHINE CIRCUIT3  
(Flushing+AWT,Submerge+ATW)**

|                                   |    |    |                                  |  |
|-----------------------------------|----|----|----------------------------------|--|
| 審核                                | 設計 | 繪圖 | 健陞機電工業股份有限公司<br>台中市工業區12路8號      |  |
|                                   |    |    | Title<br>WCUT_ELECTRIC_SCHEMATIC |  |
|                                   |    |    | Size<br>A3                       | Document Number<br>MACHINE_CIRCUIT.DSN |
|                                   |    |    | Rev<br>1.0                       |  |
| Date: Wednesday, October 16, 2013 |    |    | Sheet<br>14                      | of<br>19                               |

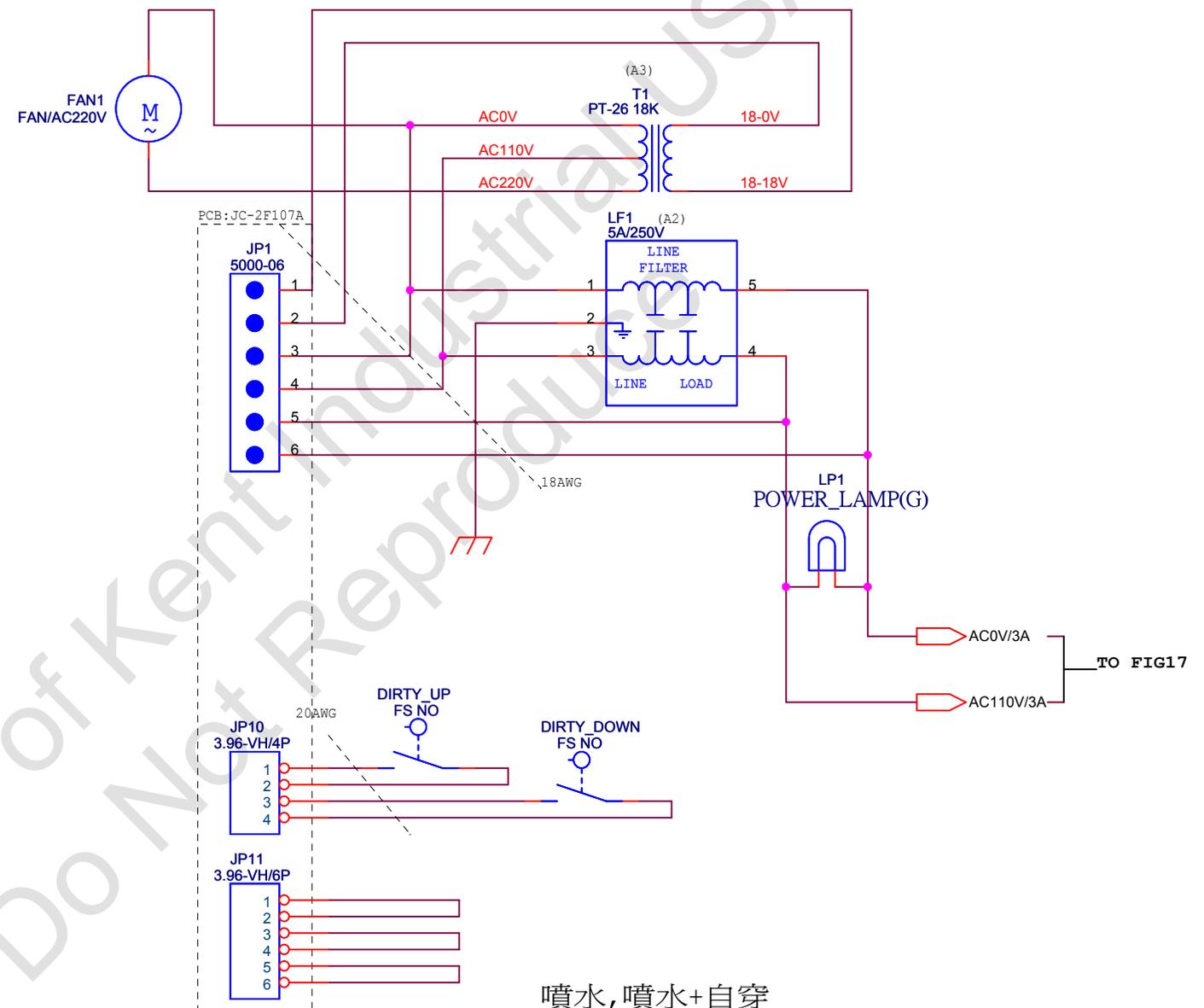
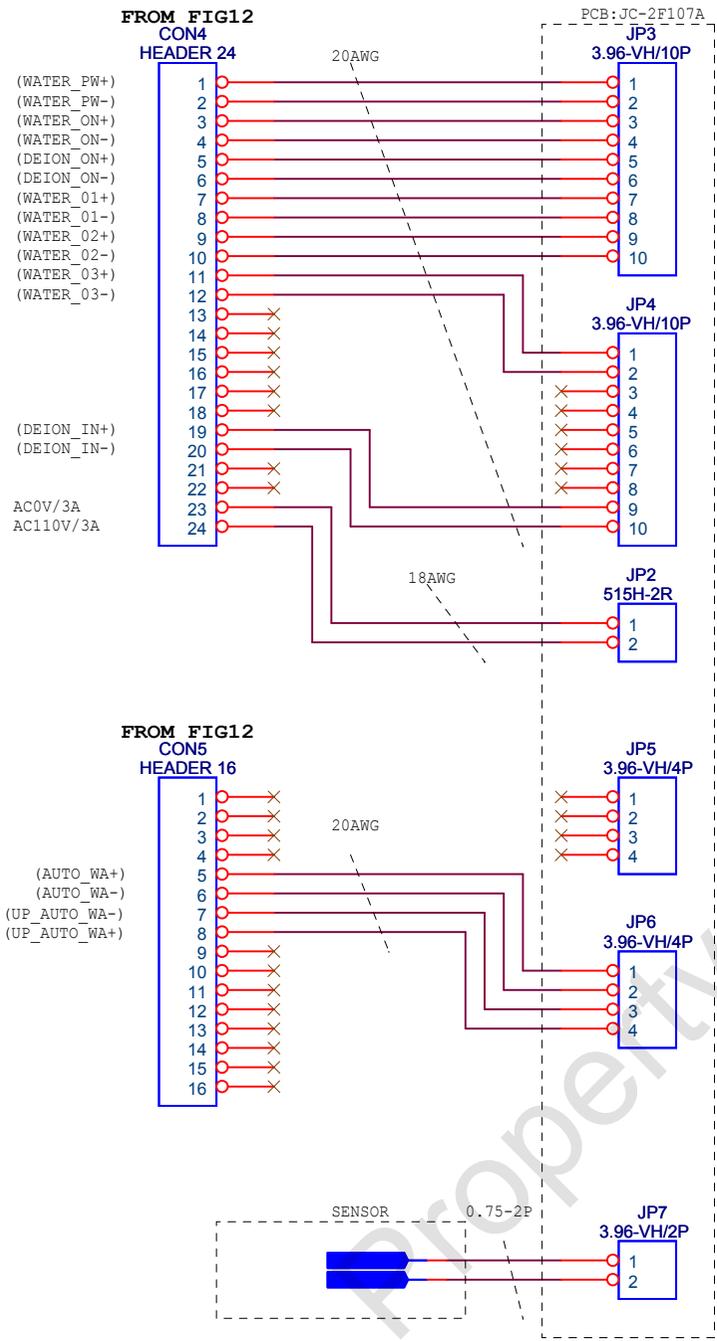


**FIG15-MACHINE CIRCUIT4  
(Flushing+AWT,Submerge+ATW)**

|                                   |    |    |                                  |  |            |
|-----------------------------------|----|----|----------------------------------|--|------------|
| 審核                                | 設計 | 繪圖 | 健陸機電工業股份有限公司<br>台中市工業區12路8號      |  |            |
|                                   |    |    | Title<br>WCUT_ELECTRIC_SCHEMATIC |  |            |
|                                   |    |    | Size<br>A3                       | Document Number<br>MACHINE_CIRCUIT.DSN | Rev<br>1.0 |
| Date: Wednesday, October 16, 2013 |    |    | Sheet<br>15                      | of<br>19                               |            |

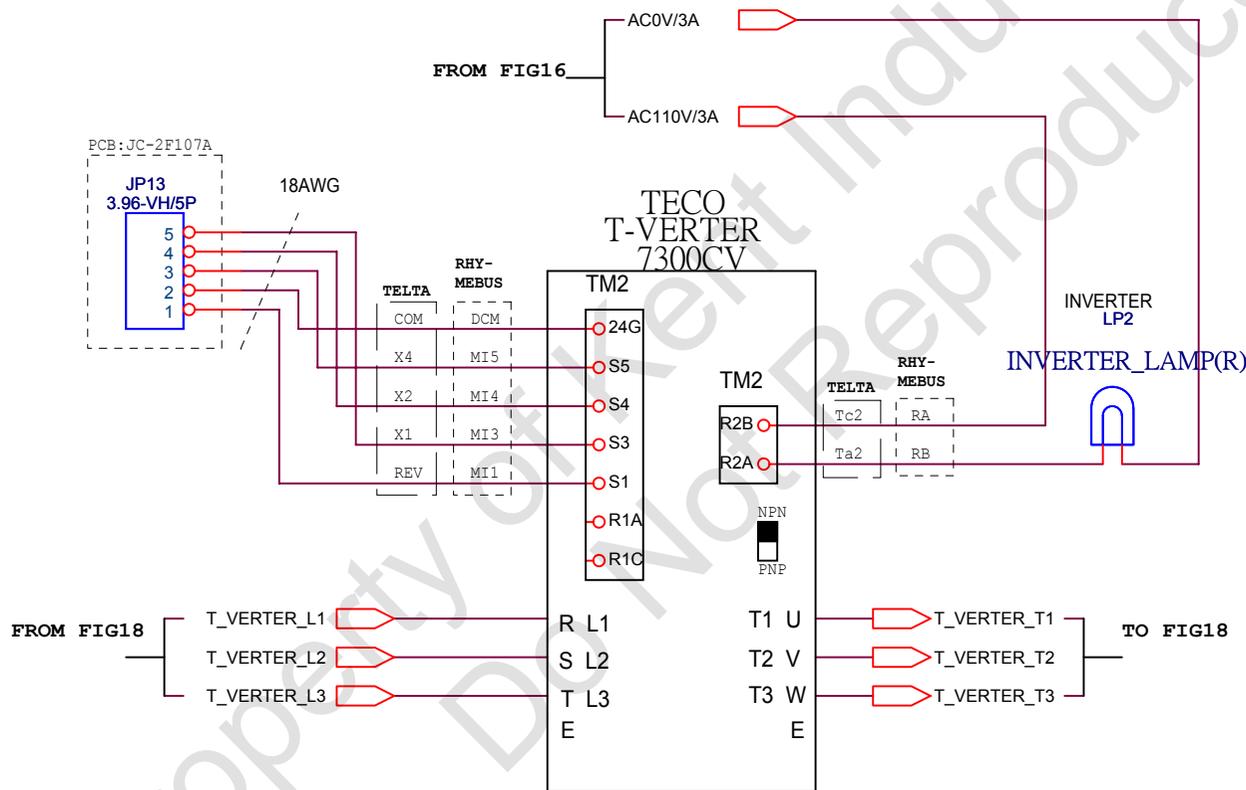
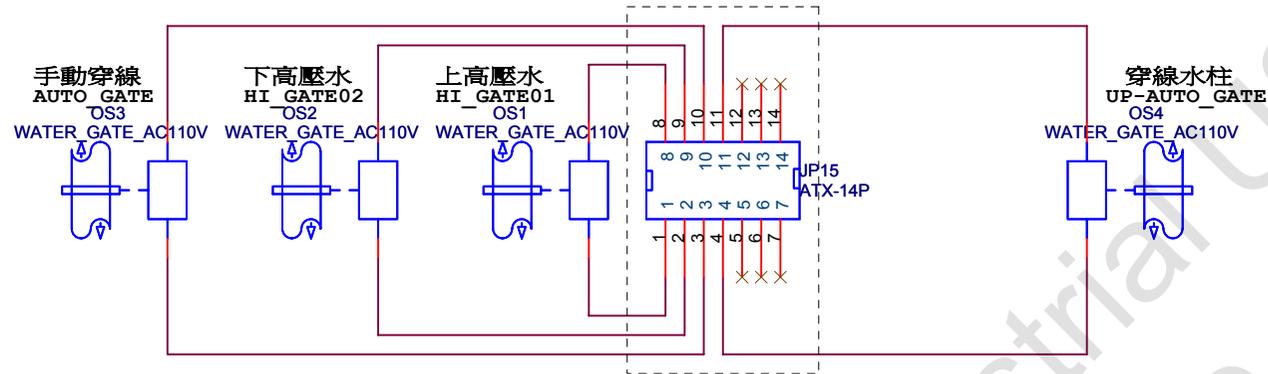
# Flushing Water system

Property of Kent Industrial USA  
Do Not Reproduce



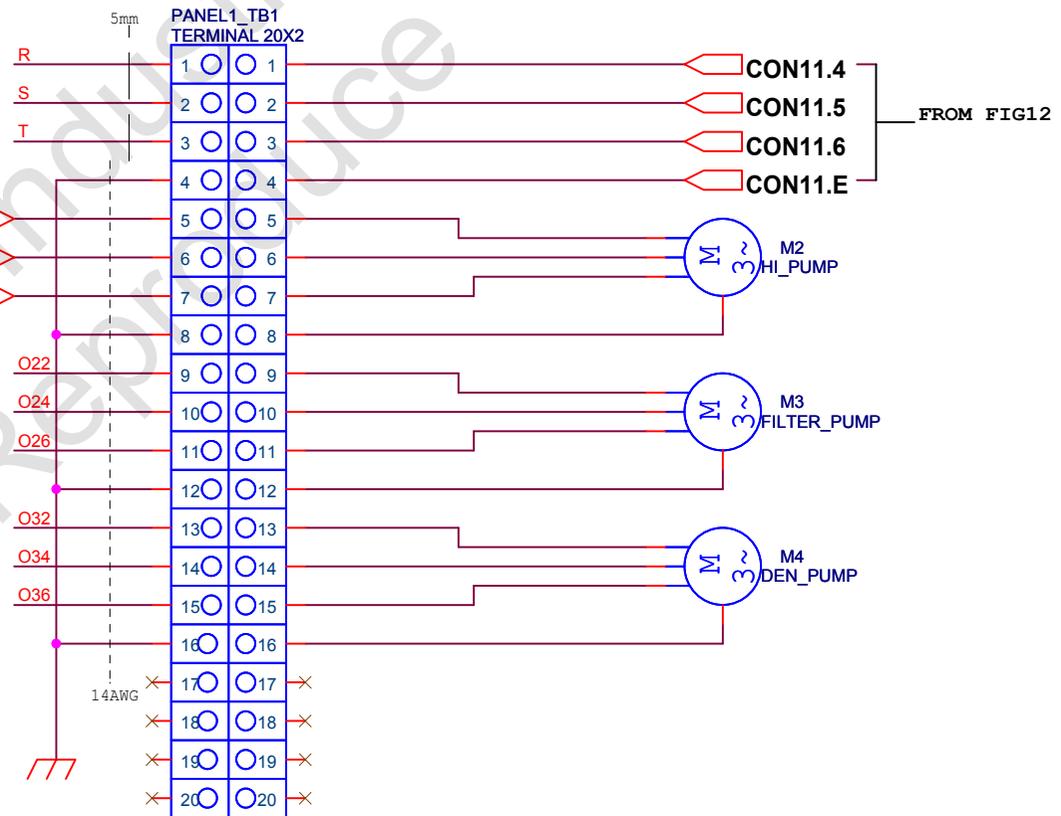
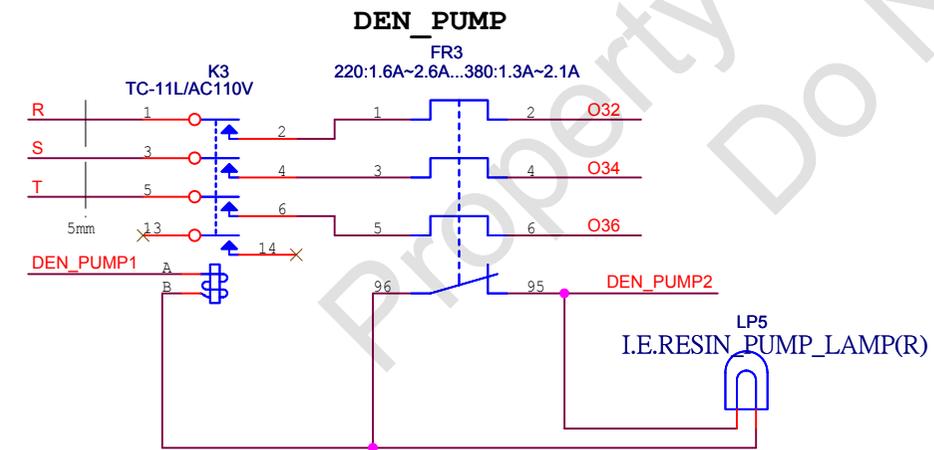
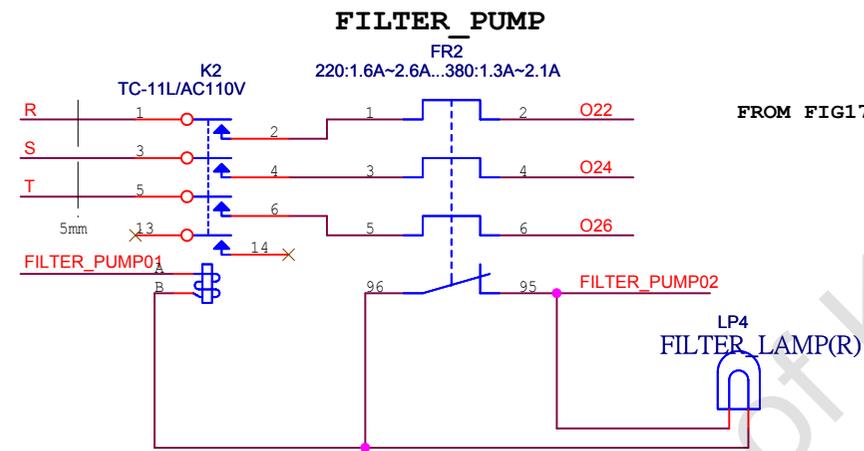
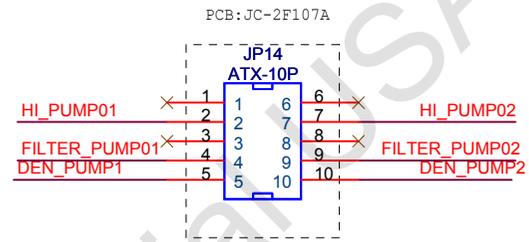
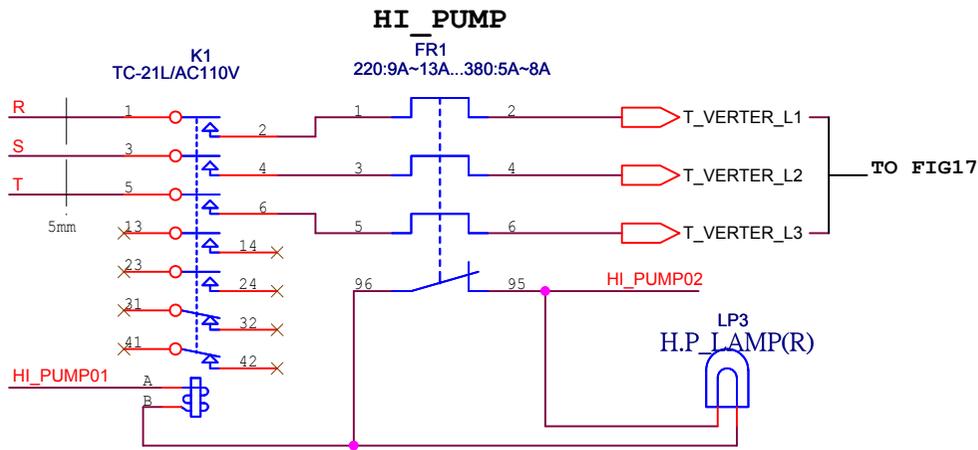
噴水, 噴水+自穿  
**FIG16-WATER SYSTEM1**

|                                  |       |    |                                  |    |                                      |
|----------------------------------|-------|----|----------------------------------|----|--------------------------------------|
| 審核                               | 設計    | 繪圖 | 健陞機電工業股份有限公司<br>台中市工業區12路8號      |    |                                      |
|                                  |       |    | Title<br>WCUT_ELECTRIC_SCHEMATIC |    |                                      |
| Date: Monday, September 21, 2015 | Sheet | 16 | of                               | 19 | Size<br>A4                           |
|                                  |       |    |                                  |    | Document Number<br>WATER_SYSTEM1.DSN |
|                                  |       |    |                                  |    | Rev<br>1.0                           |



**FIG17-WATER SYSTEM2** 噴水, 噴水+自穿

|                                  |                   |    |                                  |  |  |
|----------------------------------|-------------------|----|----------------------------------|--|--|
| 審核                               | 設計                | 繪圖 | 健陞機電工業股份有限公司<br>台中市工業區12路8號      |  |  |
|                                  |                   |    | Title<br>WCUT_ELECTRIC_SCHEMATIC |  |  |
| A4                               | Document Number   |    | Rev                              |  |  |
|                                  | WATER_SYSTEM2.DSN |    | 1.0                              |  |  |
| Date: Monday, September 21, 2015 |                   |    | Sheet 17 of 19                   |  |  |

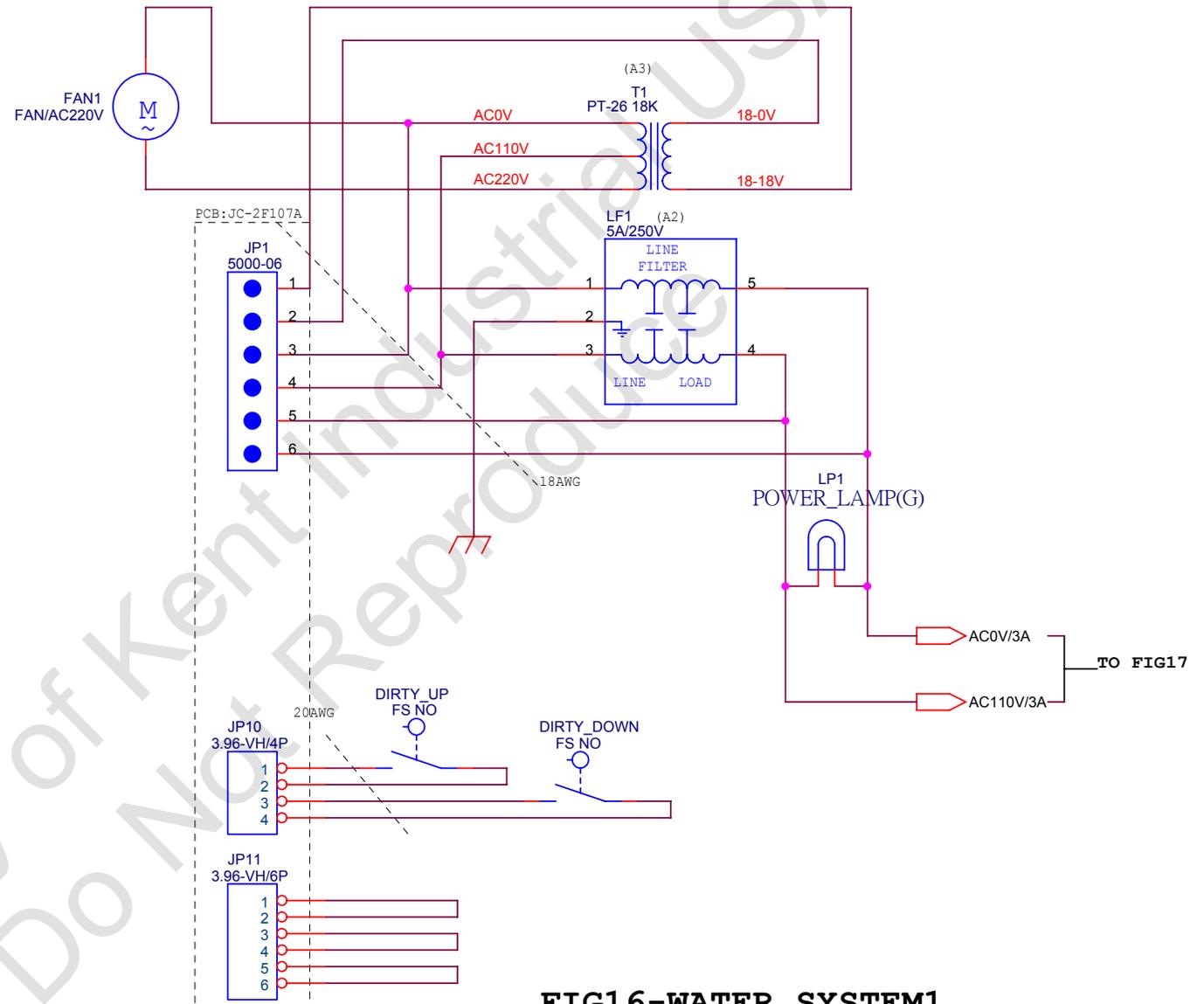
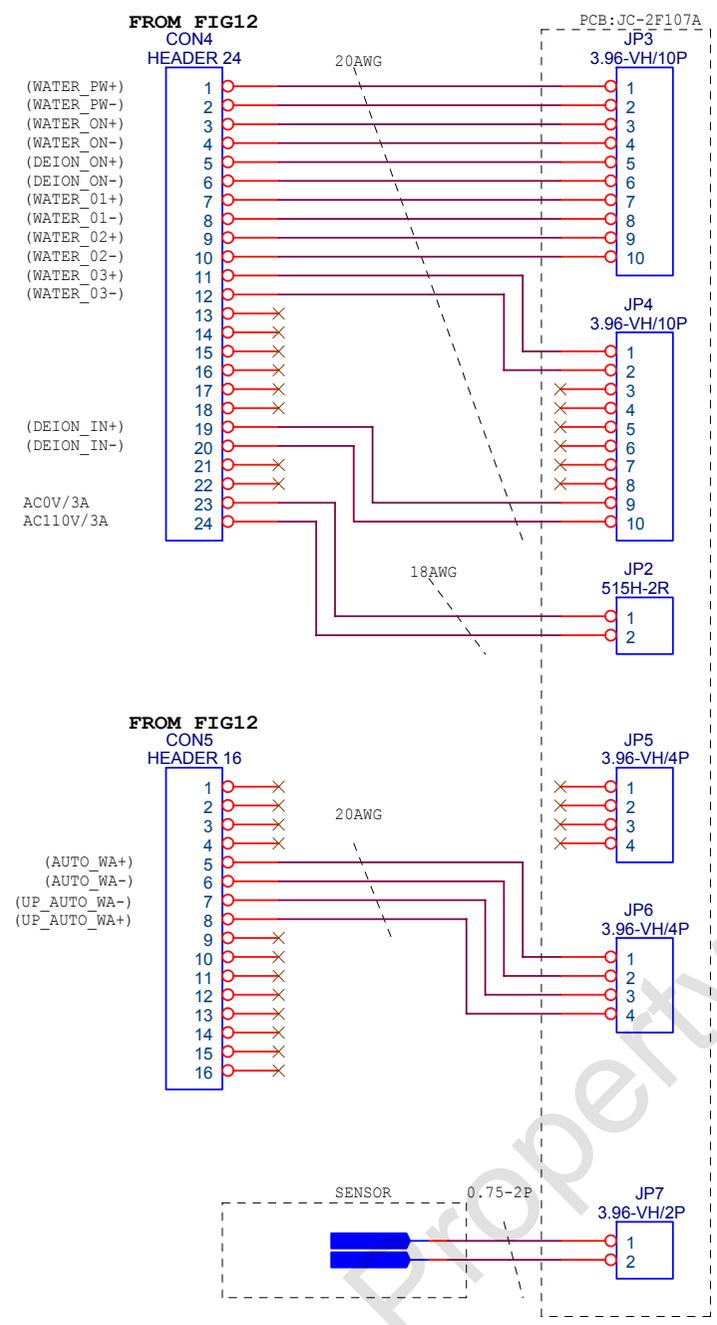


**FIG18-WATER SYSTEM3** 噴水, 噴水+自穿

|                                  |       |    |                                |    |                                      |
|----------------------------------|-------|----|--------------------------------|----|--------------------------------------|
| 審核                               | 設計    | 繪圖 | 健陞機電工業股份有限公司<br>台中市工業區12路8號    |    |                                      |
|                                  |       |    | Title<br>WCUT_ELECTRIC_SCHEMAT |    |                                      |
| Date: Monday, September 21, 2015 | Sheet | 18 | of                             | 19 | Rev<br>1.0                           |
|                                  |       |    |                                |    | Document Number<br>WATER_SYSTEM3.DSN |

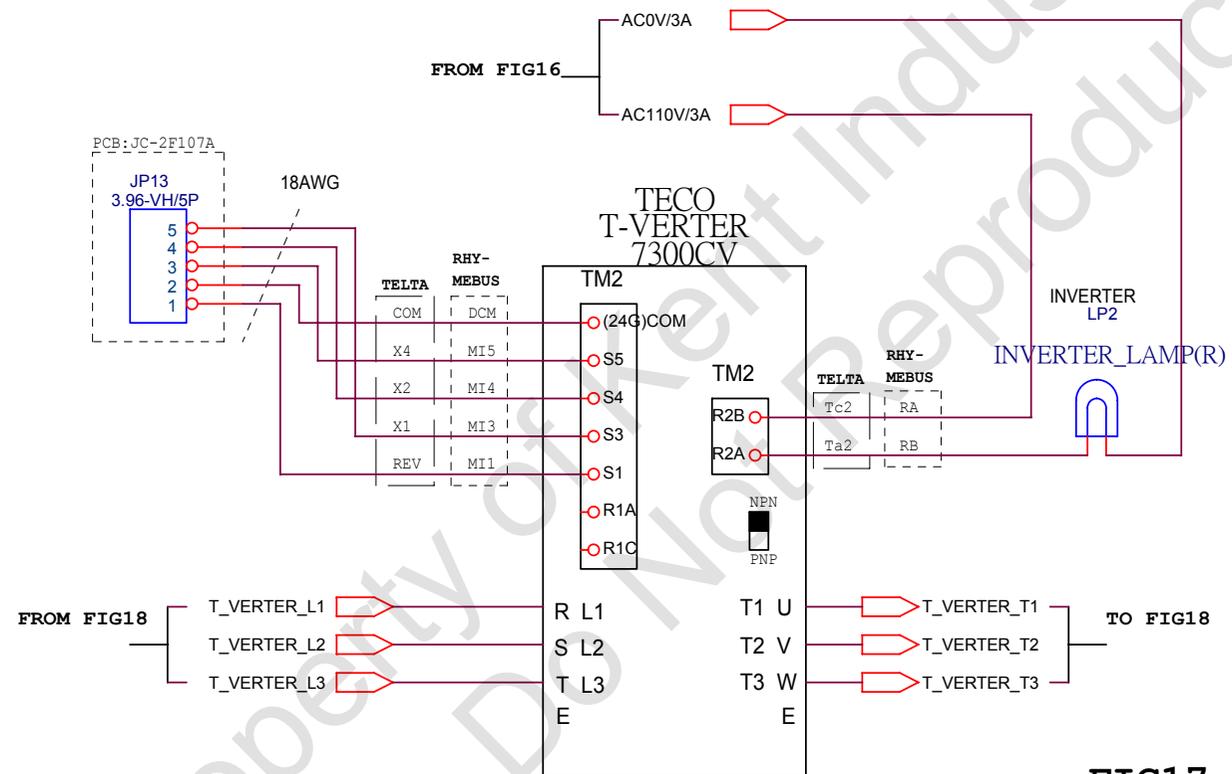
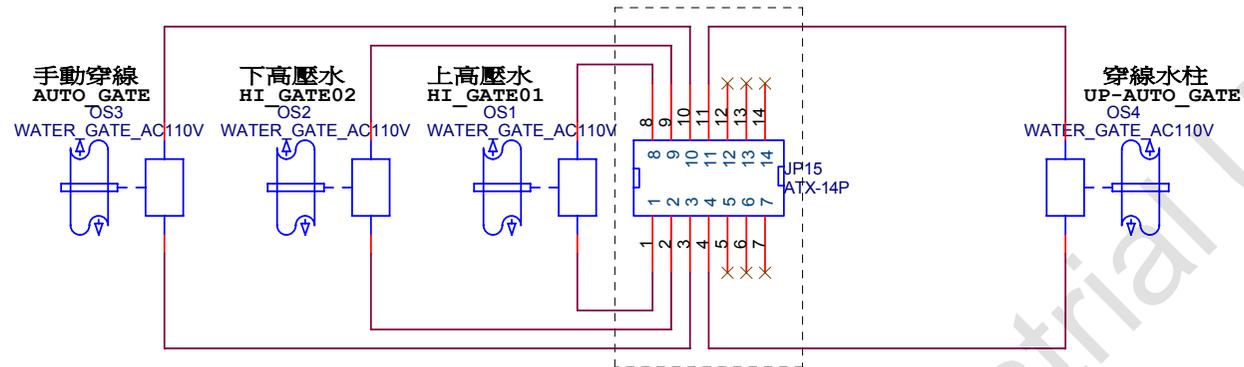
# Submerge Water system

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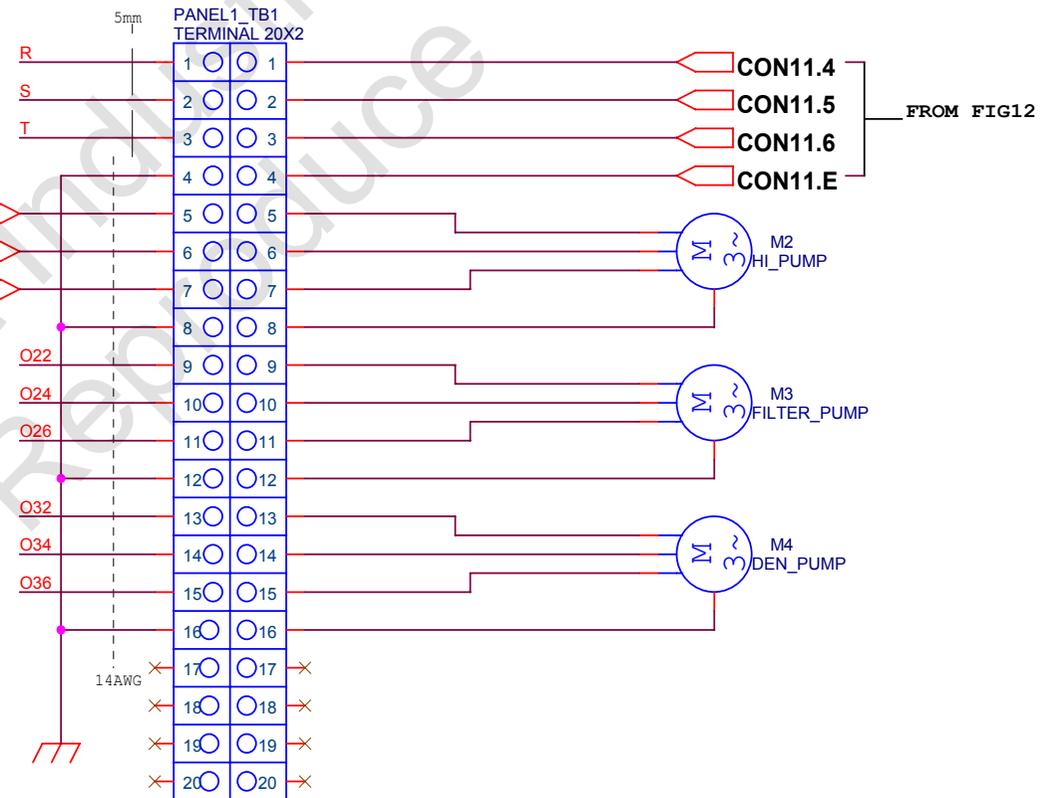
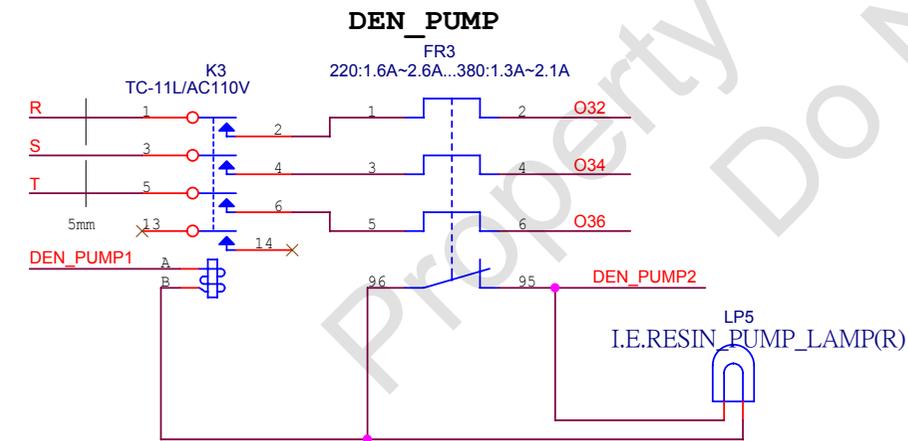
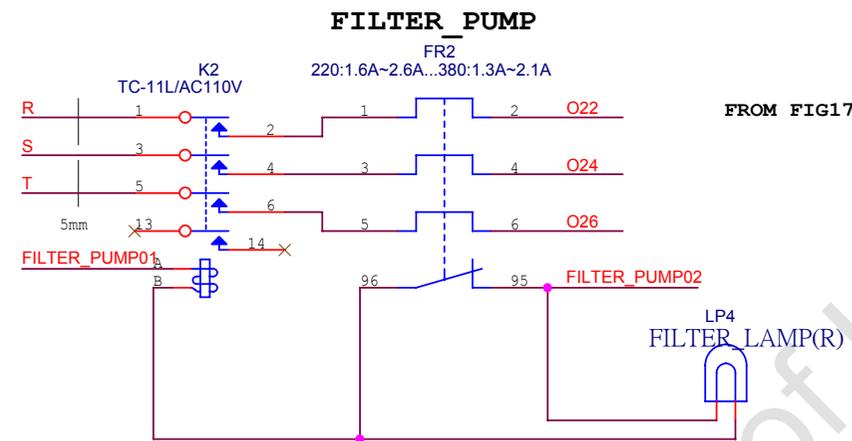
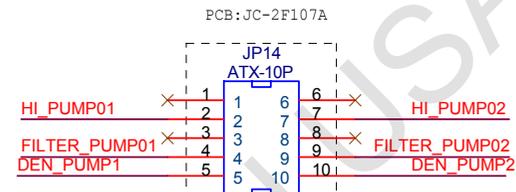
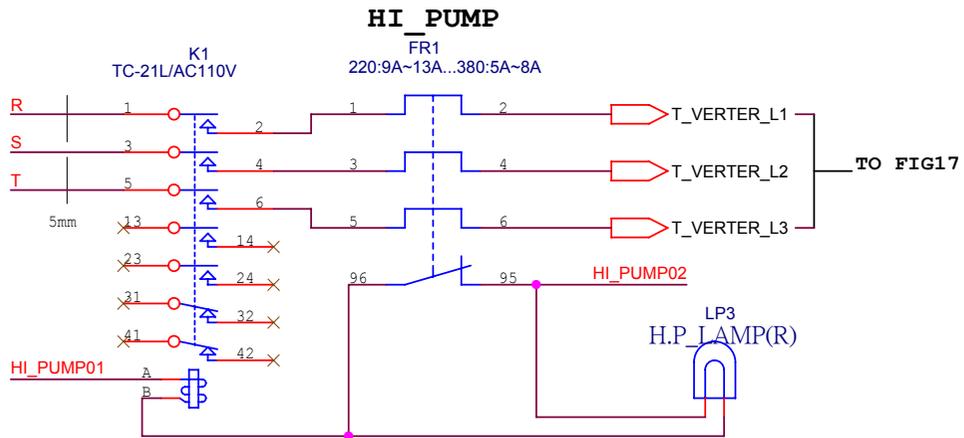
**FIG16-WATER SYSTEM1  
(Flushing, Flushing+AWT)**

|                                   |    |    |                                  |                                      |            |
|-----------------------------------|----|----|----------------------------------|--------------------------------------|------------|
| 審核                                | 設計 | 繪圖 | 健陸機電工業股份有限公司<br>台中市工業區12路8號      |                                      |            |
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|                                   |    |    | Size<br>A4                       | Document Number<br>WATER_SYSTEM1.DSN | Rev<br>1.0 |
| Date: Wednesday, October 16, 2013 |    |    | Sheet 16 of 19                   |                                      |            |



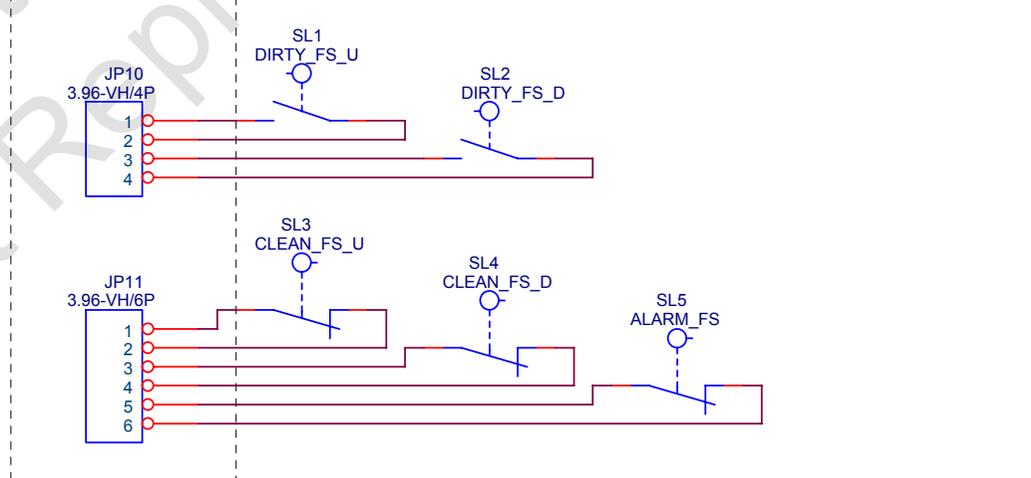
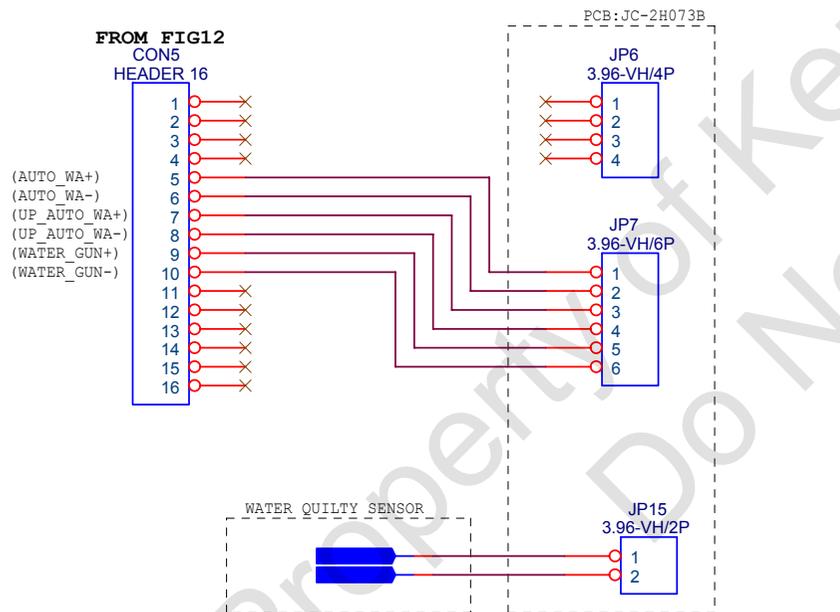
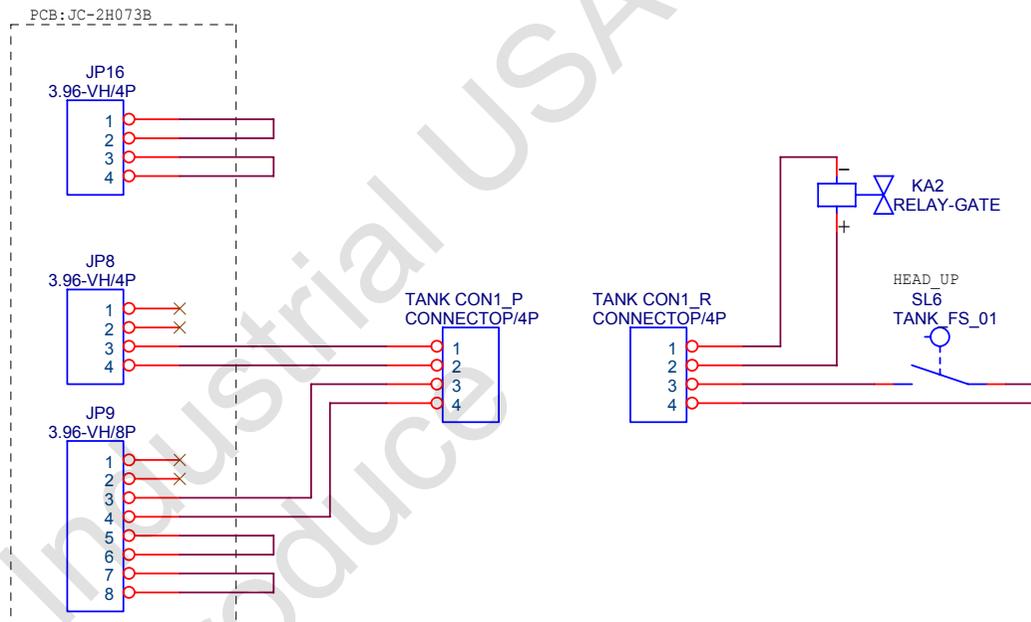
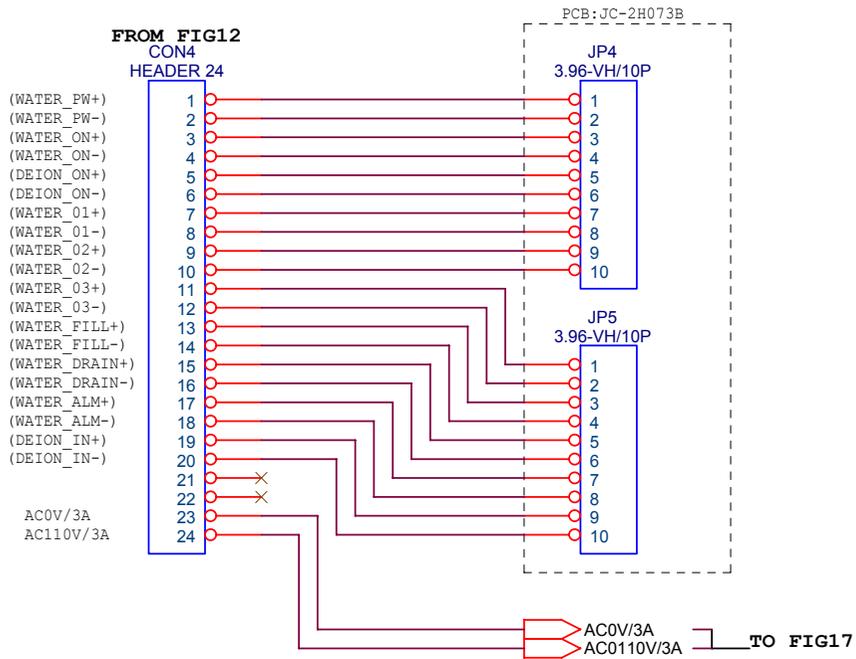
**FIG17-WATER SYSTEM2  
(Flushing, Flushing+AWT)**

|                                   |    |    |                                  |                                      |            |
|-----------------------------------|----|----|----------------------------------|--------------------------------------|------------|
| 審核                                | 設計 | 繪圖 | 健陞機電工業股份有限公司<br>台中市工業區12路8號      |                                      |            |
|                                   |    |    | Title<br>WCUT_ELECTRIC_SCHEMATIC |                                      |            |
|                                   |    |    | Size<br>A4                       | Document Number<br>WATER_SYSTEM2.DSN | Rev<br>1.0 |
| Date: Wednesday, October 16, 2013 |    |    | Sheet 17 of 19                   |                                      |            |



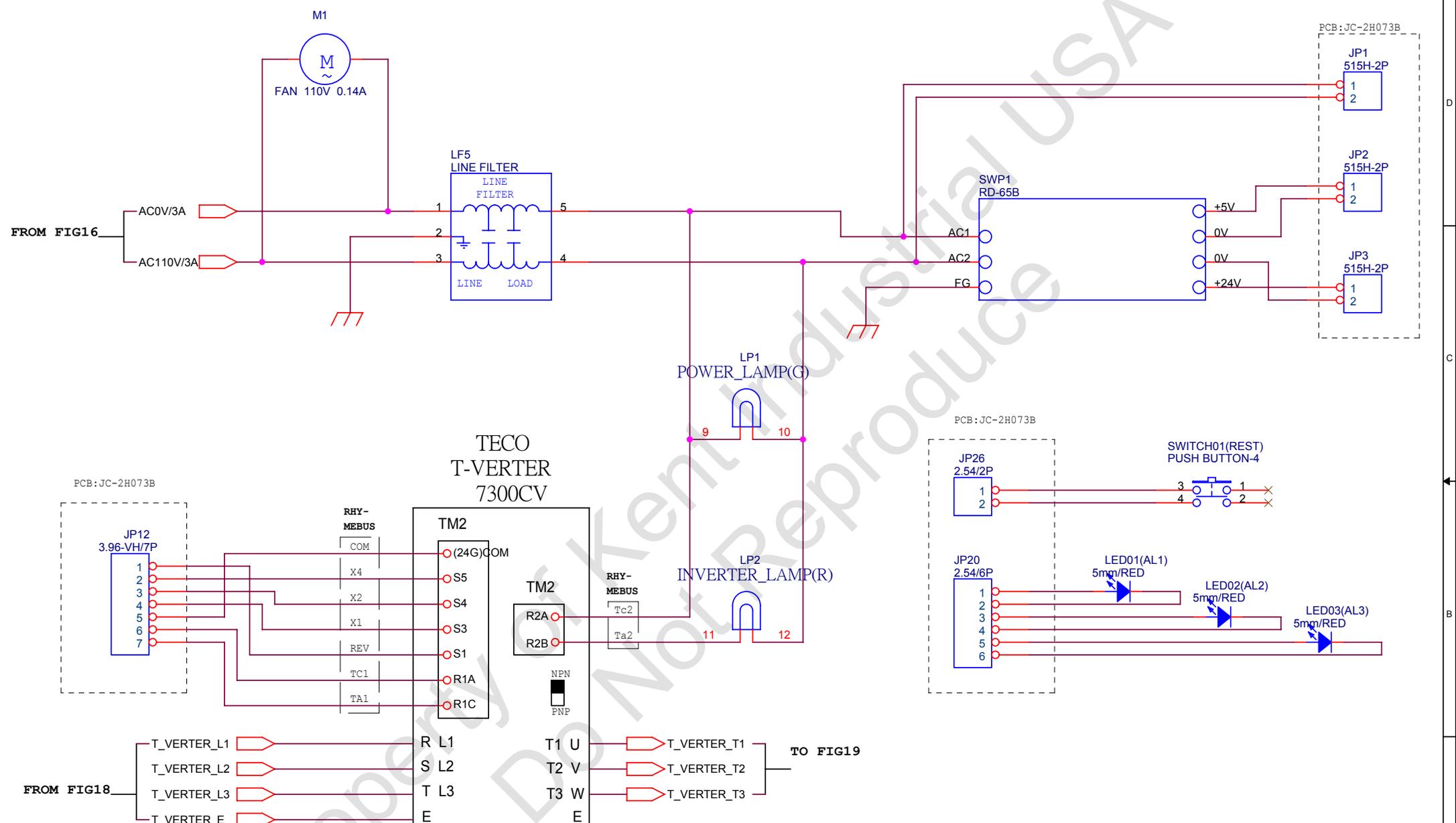
**FIG18-WATER SYSTEM3  
(Flushing, FFlushing+AWT)**

|                                   |    |    |                                  |                                      |
|-----------------------------------|----|----|----------------------------------|--------------------------------------|
| 審核                                | 設計 | 繪圖 | 健陸機電工業股份有限公司<br>台中市工業區12路8號      |                                      |
|                                   |    |    | Title<br>WCUT_ELECTRIC_SCHEMATIC |                                      |
|                                   |    |    | Size<br>A4                       | Document Number<br>WATER_SYSTEM3.DSN |
|                                   |    |    | Rev<br>1.0                       |                                      |
| Date: Wednesday, October 16, 2013 |    |    | Sheet<br>18                      | of<br>19                             |



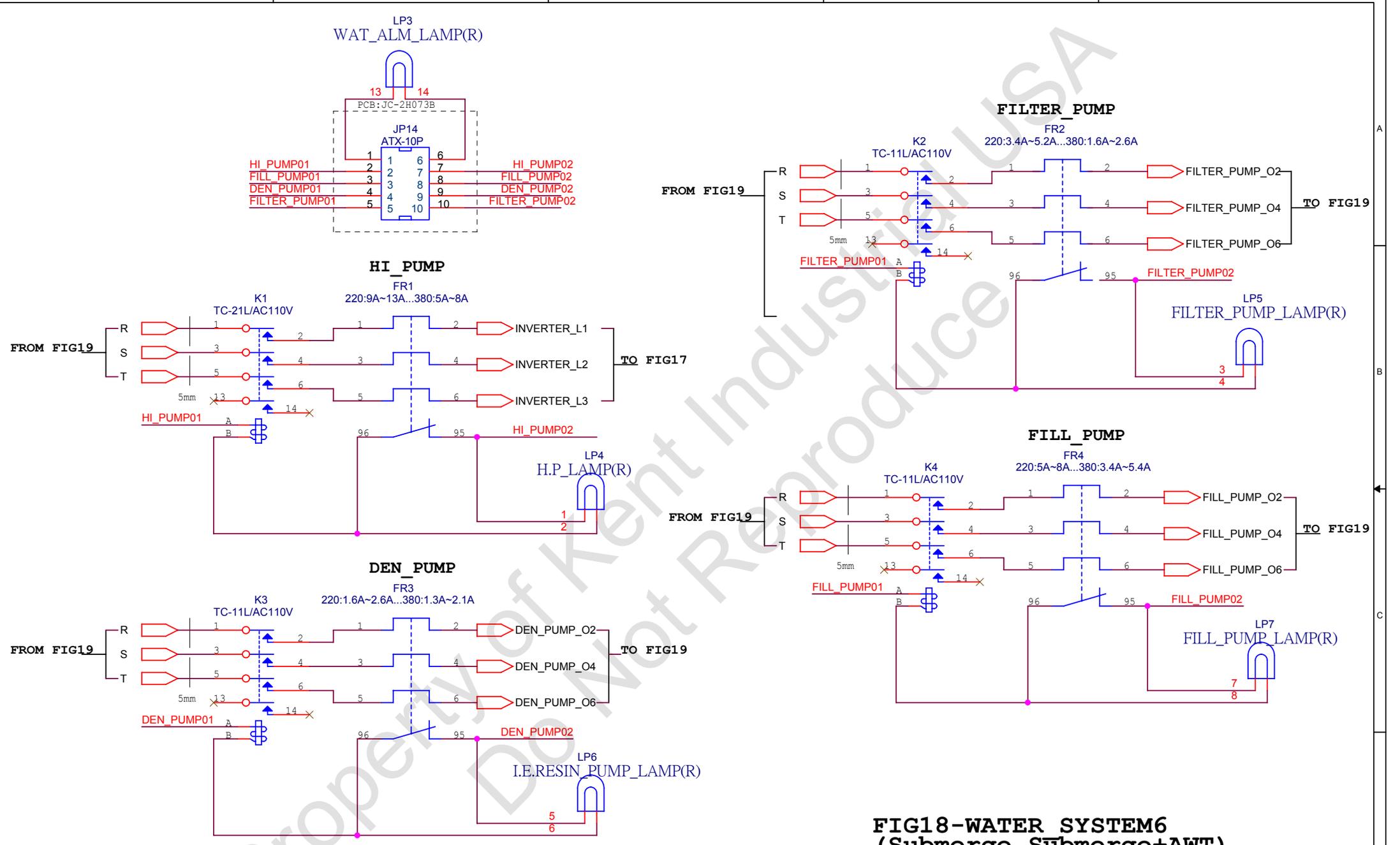
**FIG16-WATER SYSTEM4  
(Submerge, Submerge+ATW)**

|                                   |    |    |                                  |                                      |            |
|-----------------------------------|----|----|----------------------------------|--------------------------------------|------------|
| 審核                                | 設計 | 繪圖 | 健陞機電工業股份有限公司<br>台中市工業區12路8號      |                                      |            |
|                                   |    |    | Title<br>WCUT_ELECTRIC_SCHEMATIC |                                      |            |
|                                   |    |    | Size<br>A4                       | Document Number<br>WATER_SYSTEM1.DSN | Rev<br>1.0 |
| Date: Wednesday, October 16, 2013 |    |    | Sheet<br>16                      | of<br>19                             |            |



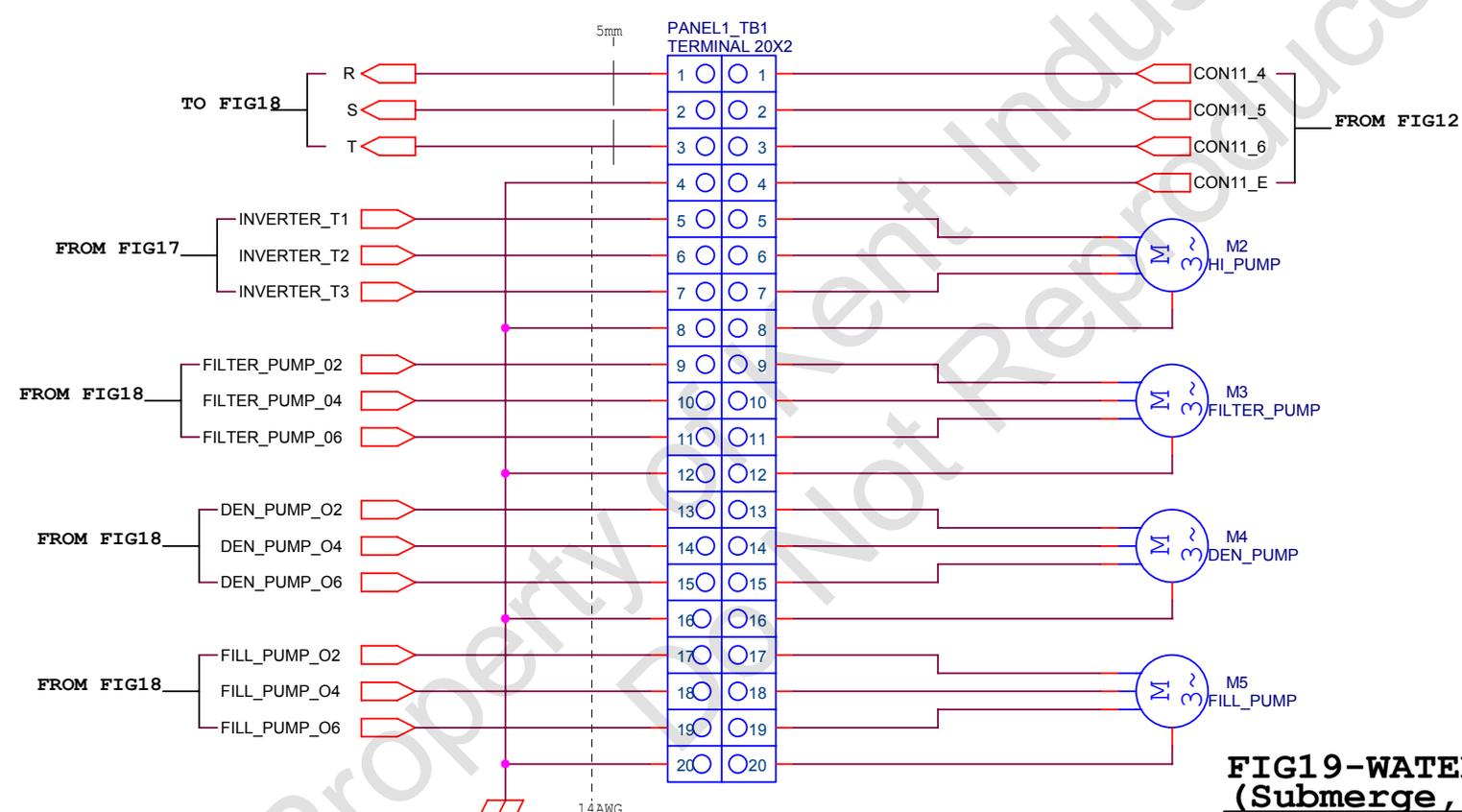
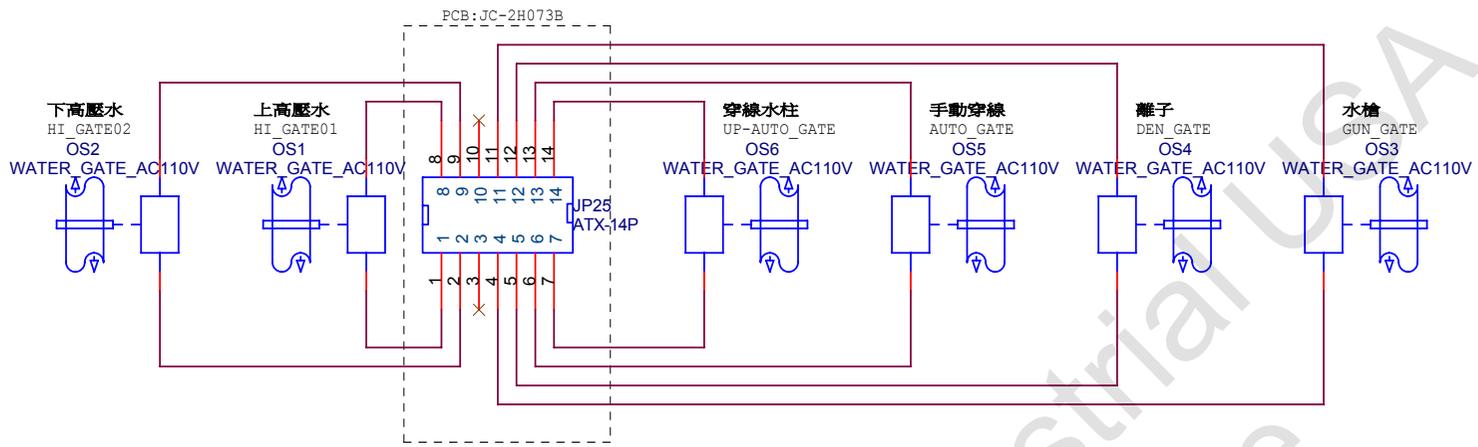
**FIG17-WATER SYSTEM5  
(Submerge, Submerge+ATW)**

|                                   |    |    |                                  |                                      |            |
|-----------------------------------|----|----|----------------------------------|--------------------------------------|------------|
| 審核                                | 設計 | 繪圖 | 健陸機電工業股份有限公司<br>台中市工業區12路8號      |                                      |            |
|                                   |    |    | Title<br>WCUT_ELECTRIC_SCHEMATIC |                                      |            |
|                                   |    |    | Size<br>A4                       | Document Number<br>WATER_SYSTEM2.DSN | Rev<br>1.0 |
| Date: Wednesday, October 16, 2013 |    |    | Sheet 17 of 19                   |                                      |            |



**FIG18-WATER SYSTEM6  
(Submerge, Submerge+AWT)**

|                                   |    |    |                                  |                                      |            |
|-----------------------------------|----|----|----------------------------------|--------------------------------------|------------|
| 審核                                | 設計 | 繪圖 | 健陞機電工業股份有限公司<br>台中市工業區12路8號      |                                      |            |
|                                   |    |    | Title<br>WCUT_ELECTRIC_SCHEMATIC |                                      |            |
|                                   |    |    | Size<br>A4                       | Document Number<br>WATER_SYSTEM3.DSN | Rev<br>1.0 |
| Date: Wednesday, October 16, 2013 |    |    | Sheet 18 of 19                   |                                      |            |

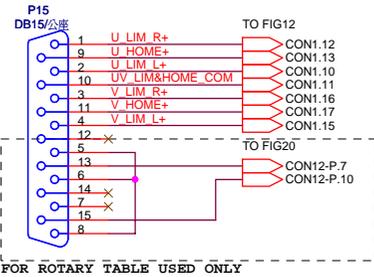
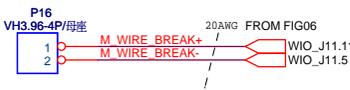
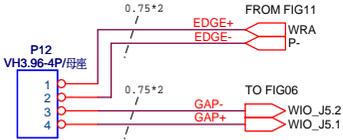
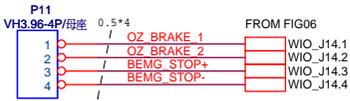
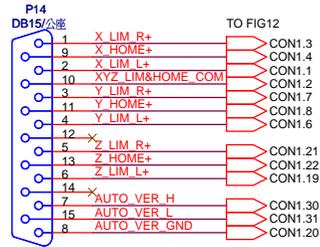


**FIG19-WATER SYSTEM7  
(Submerge, Submerge+AWT)**

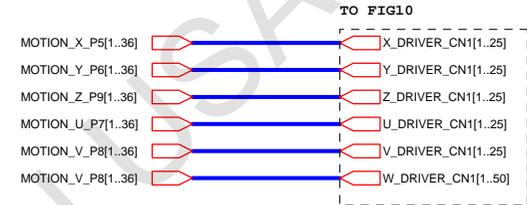
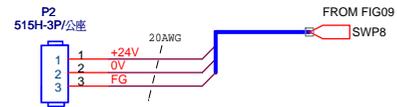
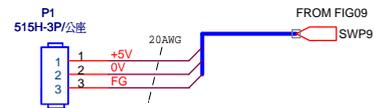
|                                   |    |    |                                  |                                      |            |
|-----------------------------------|----|----|----------------------------------|--------------------------------------|------------|
| 審核                                | 設計 | 繪圖 | 健陞機電工業股份有限公司<br>台中市工業區12路8號      |                                      |            |
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|                                   |    |    | Size<br>A4                       | Document Number<br>WATER_SYSTEM4.DSN | Rev<br>1.0 |
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# Rotary table system

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FOR ROTARY TABLE USED ONLY



FOR SCALER USED ONLY

|        |        |        |        |
|--------|--------|--------|--------|
|        | 640    | 530    | 430    |
| CN6(X) | B-TYPE | A-TYPE | A-TYPE |
| CN7(Y) | B-TYPE | B-TYPE | A-TYPE |

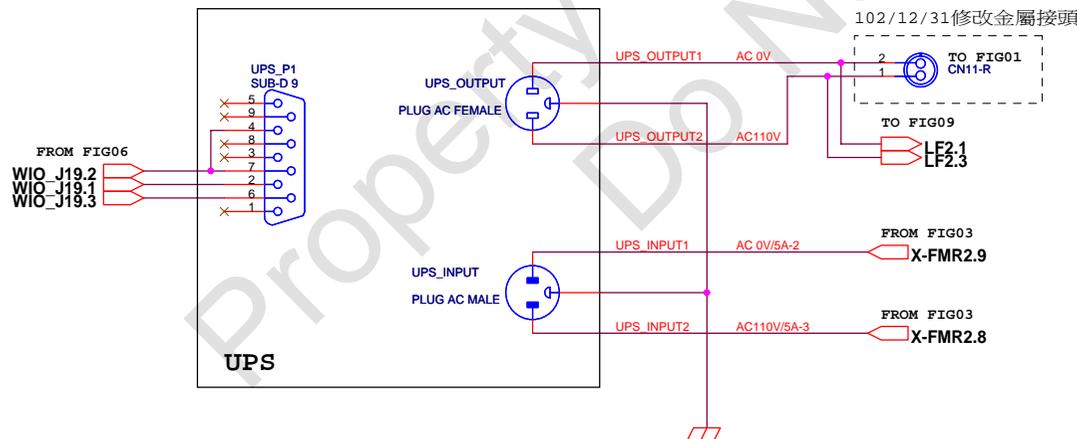
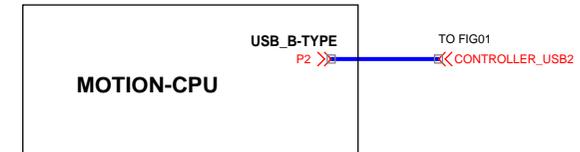
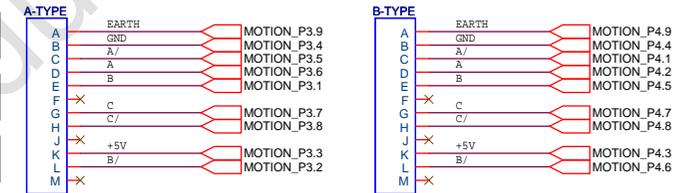
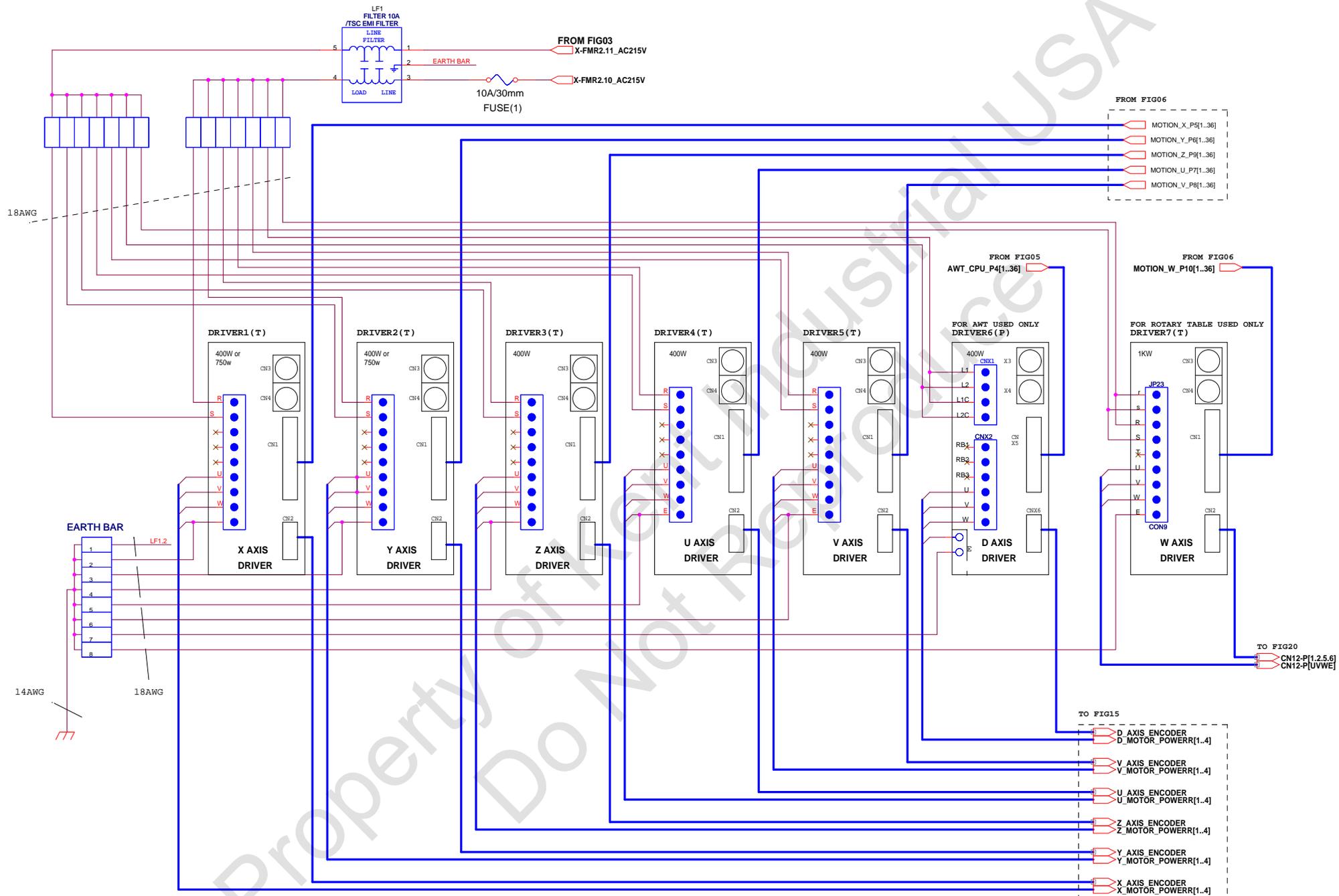


FIG07-UPS&MOTION

|                                    |    |    |                                  |                                   |            |
|------------------------------------|----|----|----------------------------------|-----------------------------------|------------|
| 審核                                 | 設計 | 繪圖 | 健陸機電工業股份有限公司<br>台中市工業區12路8號      |                                   |            |
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|                                    |    |    | Size<br>A3                       | Document Number<br>UPS&MOTION.DSN | Rev<br>1.0 |
| Date: Thursday, September 08, 2016 |    |    | Sheet<br>7                       | of<br>20                          |            |



**FIG10-Driver1 (T+AWT+Rotary Table)**

|                                    |    |    |                               |                 |
|------------------------------------|----|----|-------------------------------|-----------------|
| 審核                                 | 設計 | 繪圖 | 健隆機電工業股份有限公司<br>台中市工業區12路8號   |                 |
|                                    |    |    | Title WCUT_ELECTRIC_SCHEMATIC |                 |
|                                    |    |    | Size                          | Document Number |
|                                    |    |    |                               | Rev 1.0         |
| Date: Thursday, September 08, 2016 |    |    | Sheet 10                      | of 20           |

潭佳委外富宇製作  
(零件: 連接盒+防爆+斷點+防水等級IP68)

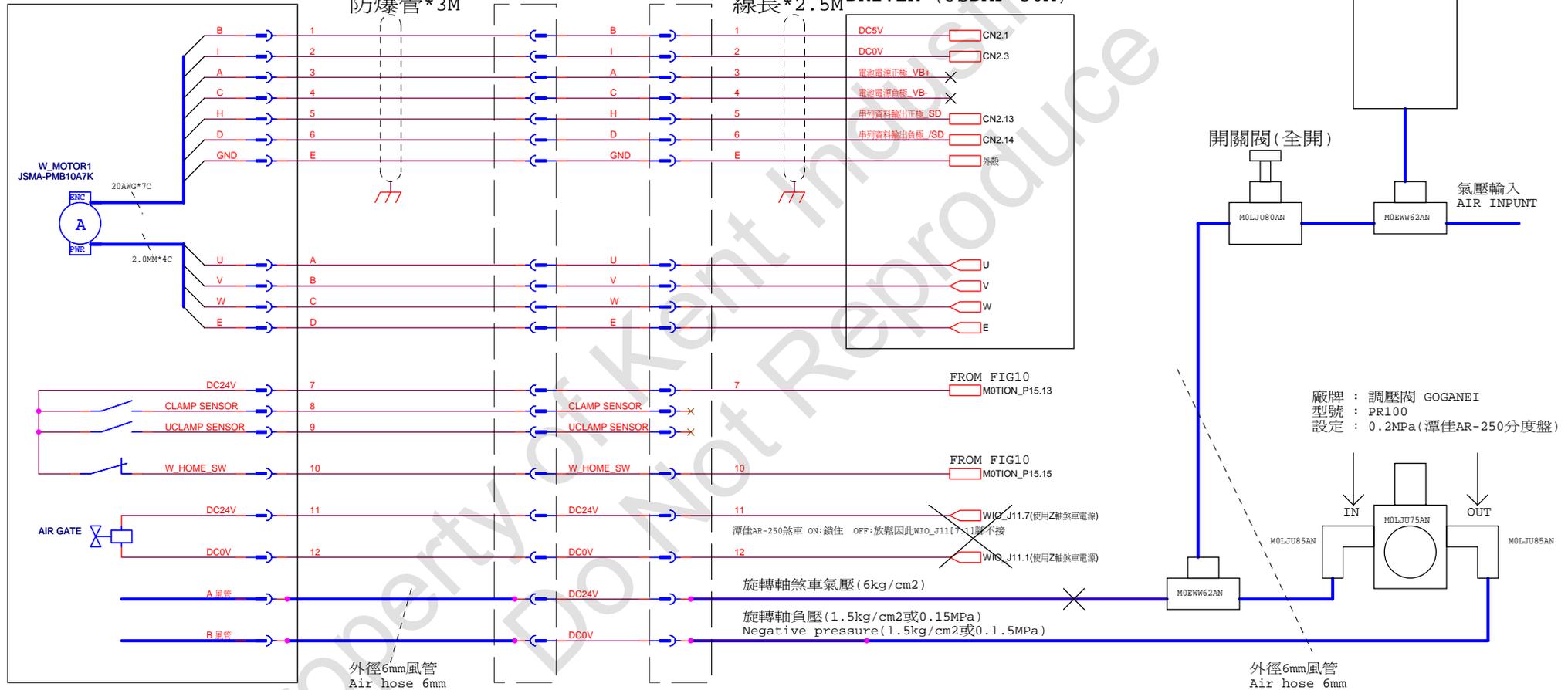
潭佳AR-250+東元伺服馬達  
TJR AR-250+Servo motor

CN12-R  
CAO16.29

CN12-P  
JCVI16

FROM FIG10  
東元驅動器 (JSDAP-30A)  
DRIVER (JSDAP-30A)

氣壓偵測器  
Barometric pressure (6kg/cm2)



× 表示不使用  
not use

FIG20-ROTARY TABLE

|                                    |                               |            |                                  |  |
|------------------------------------|-------------------------------|------------|----------------------------------|--|
| 審核                                 | 設計                            | 繪圖         | 健陸機電工業股份有限公司<br>台中市工業區12路8號      |  |
|                                    |                               |            | Title<br>WCUT_ELECTRIC_SCHEMATIC |  |
| Size<br>A3                         | Document Number<br>W AXIS.DSN | Rev<br>1.0 |                                  |  |
| Date: Thursday, September 08, 2016 | Sheet<br>20                   | of<br>20   |                                  |  |