ZNC drilling EDM

OPERATION MANUAL

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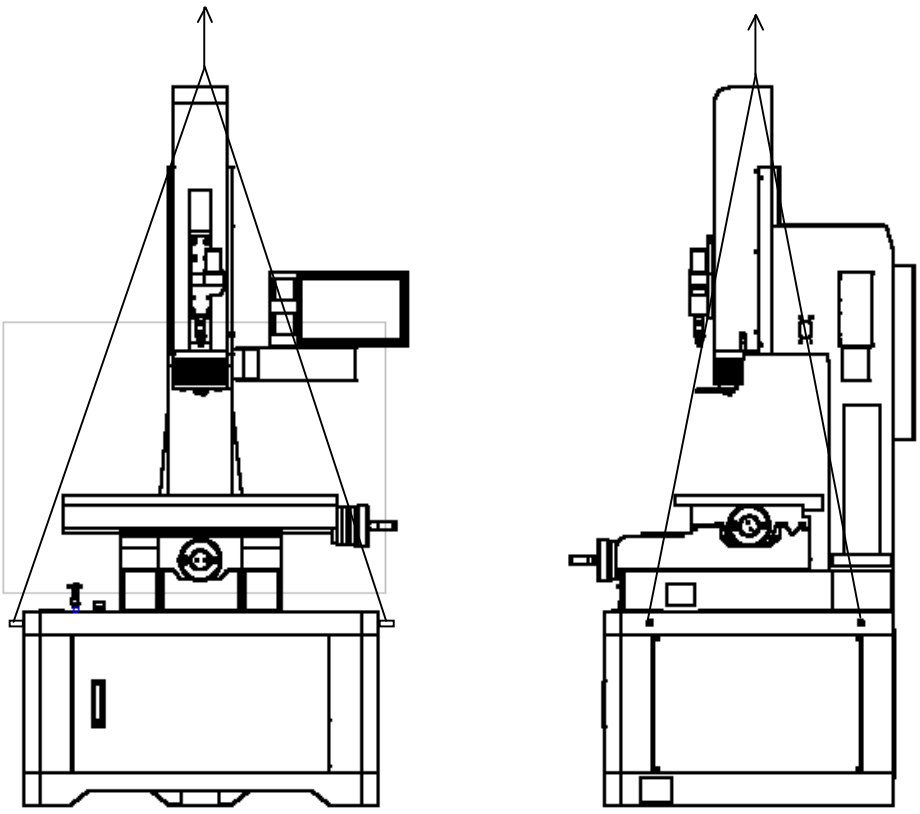
EDZNCOMV10UK

INDEX

1. MACHINE MOVING.

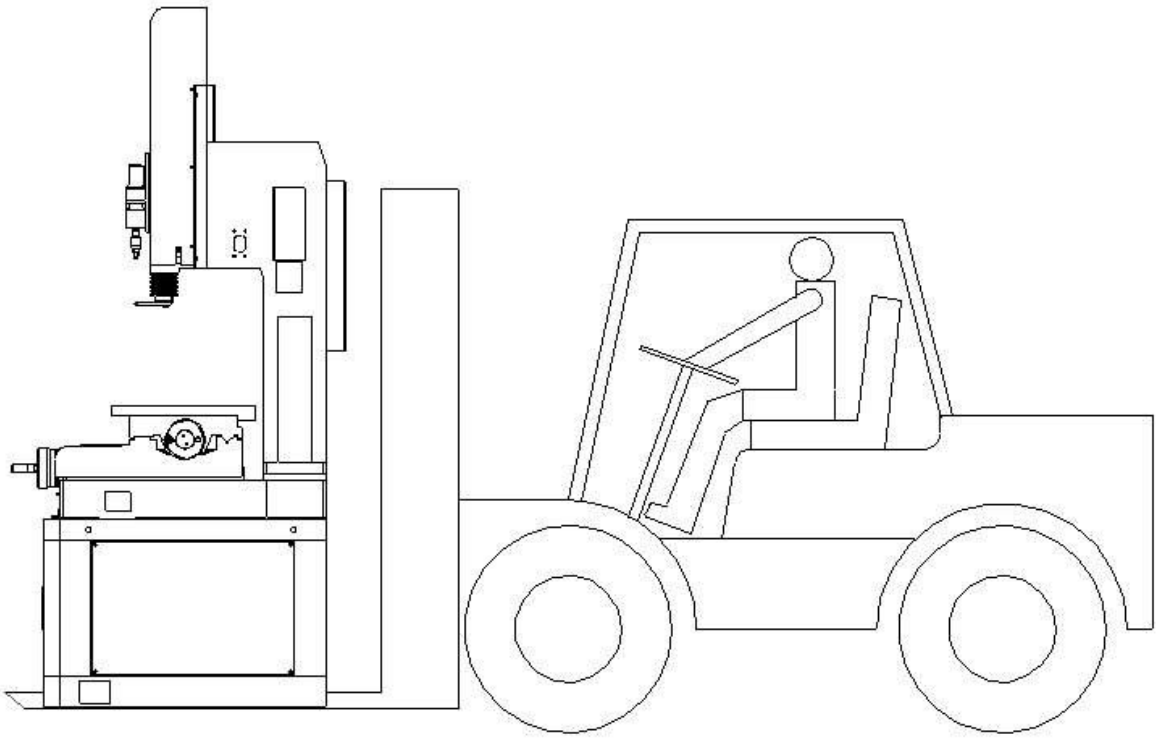
1.1 The machine life up and moving:

Please see below drawing for the machine life up and moving, please pay attention for the ropes at 4 corners, they must have same straightness when machine lifted up. The loading limit of lift rope must over 1000 kgs.



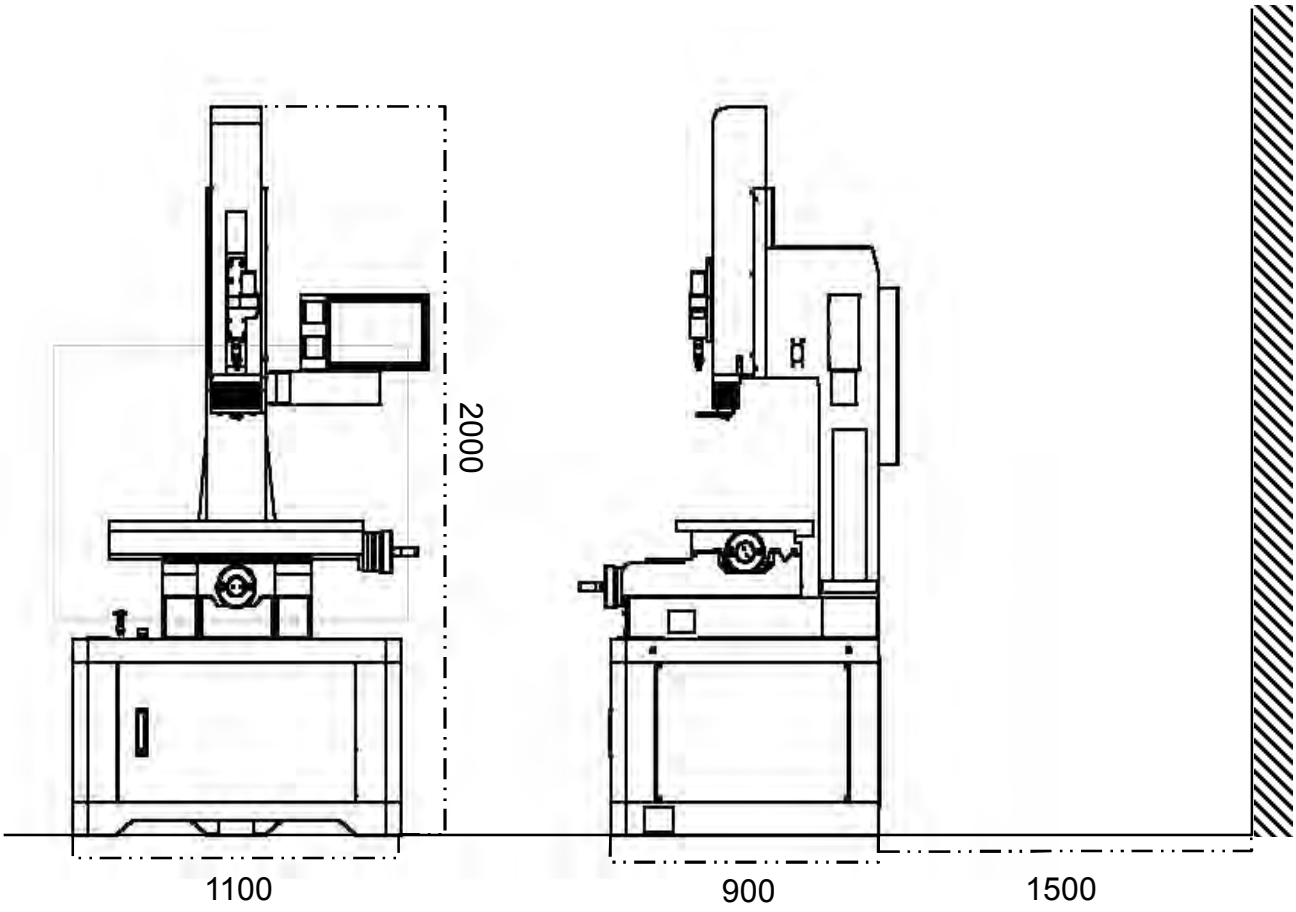
1.2 MACHINE MOVING BY FORKLIFT

Please see below drawing for moving by forklift. The teeth of forklift need to through over the machine base. The loading limit of forklift must over 1000 kgs.



2. The installation space and environment requirement

2.1 Installation space environment



Attention:

@ Machine needs to be installed as above drawing for the air cooling. If the space too small, machine might get poor air cooling, and it will cause machine abnormal.

@ The machine should be installed on the stable ground, DO NOT installed on the unstable environment.

@ Please do the machine leveling at once after machine set at right position.

@ Keep machine installed away from dirty or dusty environment. Please keep proper distance away from other machines.

2.2 Power environment

a、 The power supply **MUST** be same as the nameplate of the machine.

b、 Please check and make sure the 3 phase power supply of factory side before machine connected to the power source. You also can check with the nameplate which behind the machine to make sure machine is suit for your power supply or not. Also, please make sure the error range of power source **MUST stay in ±10%**. **If the power source not stays in this range, WE RECOMMEND YOU TO INSTALL THE A.V.R. DEVICE TO AVOID THE DAMAGE OF THE MACHINE. IF THE MAHCINE WAS DAMAGED OR CAUSED ANY PROBLEM BY UNSTABLE POWER SOURCE, THIS RESPONSIBILITY WILL BE VESTED TO THE CUSTOMER.** If the power source can not match the machine needs, please contact with your machine supplier or OCEAN's AGENCY or OCEAN, we will give the suitable suggest or solution to you.

c、 The power cable from generator to the circuit breaker at the power source CAN NOT over 5 meters. If customer has the special require, please contact with your machine supplier or OCEAN's AGENCY or OCEAN.

d、 The power supply of chiller MUST be connected with independent circuit breaker.

e、 The specification of the circuit breaker is 32A. You also can check with the nameplate to find out the capacity of the machine.

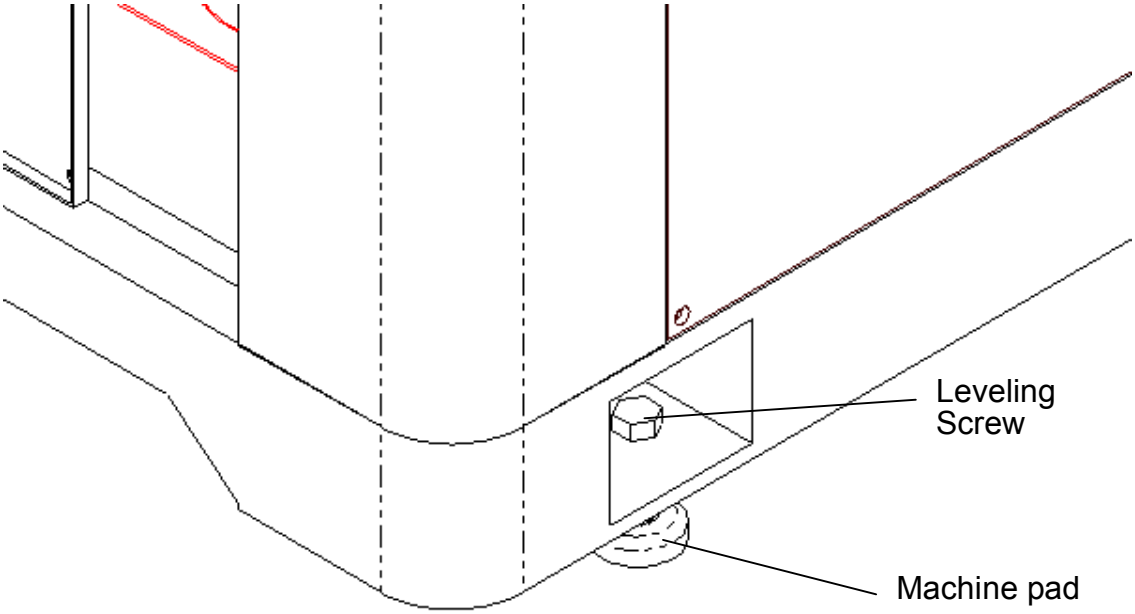
2.3 The explanation for main power of machine:

The cable of power supply of the machine has 4 wirings which are R, S, T and E. The E is yellow/green and it MUST connect to the Ground/Earth/E at the power source side. For R, S and T, you just only need to connect in sequence to the power source. Please check and make sure the 3 phase power supply of factory side before machine connected to the power source.

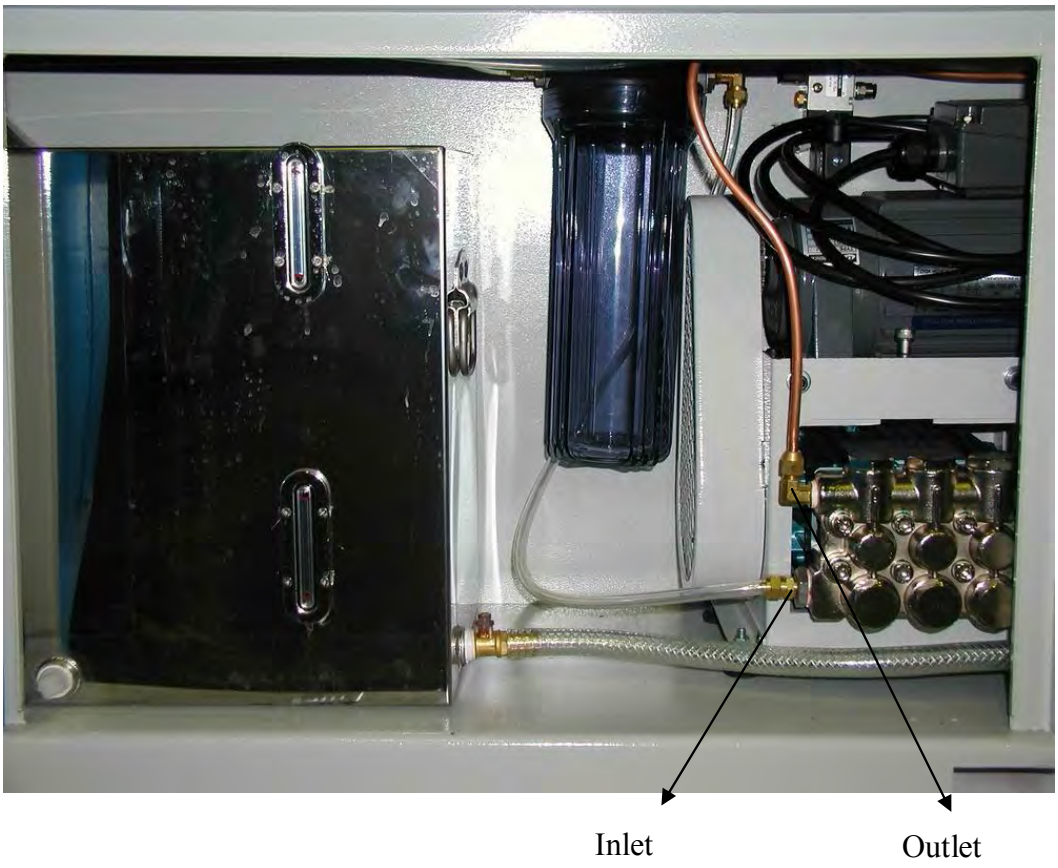
Between the power source of factory and the power supply of machine, it NEEDS an **independent circuit breaker**. The specification is 32A.

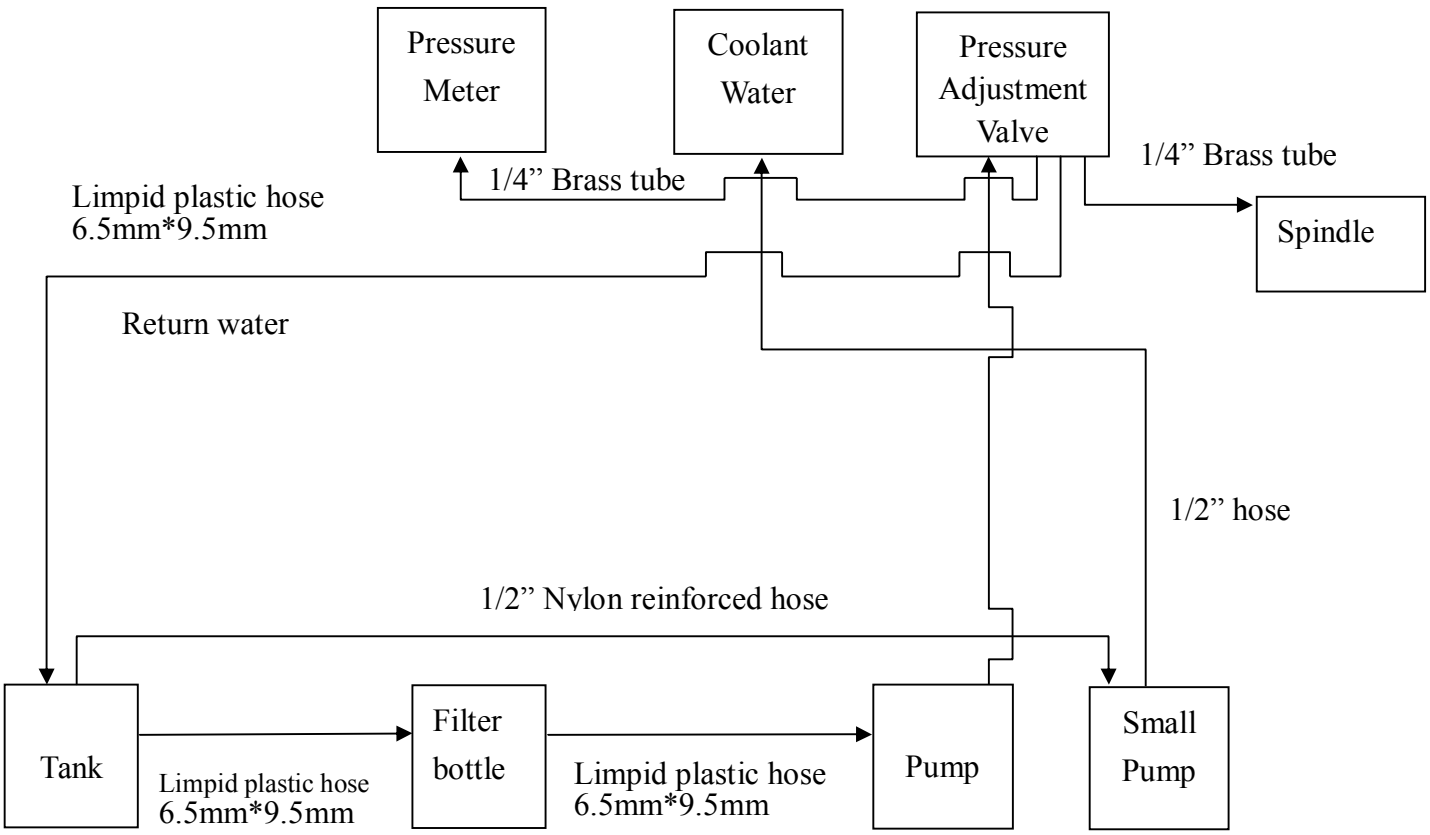
3. Machine leveling adjustment

After machine got the right place, please DO the machine leveling adjustment with leveling screws. You will need to put a leveling gauge on the work-table, through adjust the leveling screws to check the machine leveling. The machine leveling error range should be stay in 0.06mm/1M.



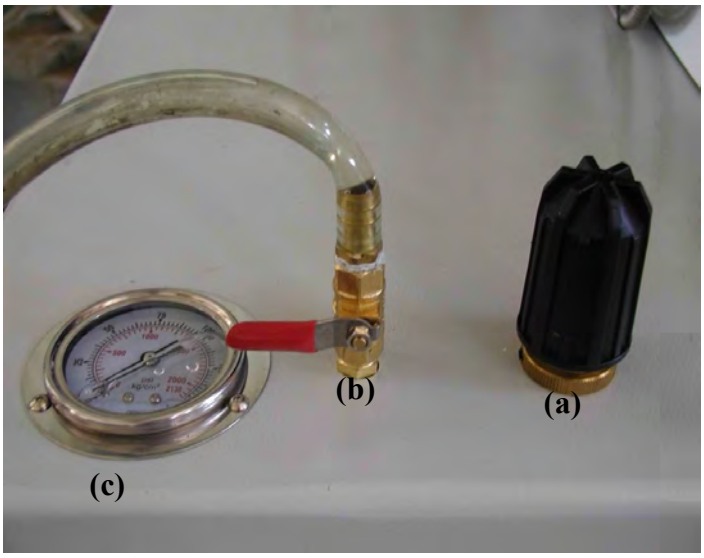
4. Electric pump system





5. Water pressure adjustment and explanation for other switches:

Water pressure adjustment explanation:



(1) (a) is pressure adjustment valve.
It can adjust the pressure of working liquid; turn it with clockwise to get higher pressure; turn it with counter-clockwise to reduce the pressure.

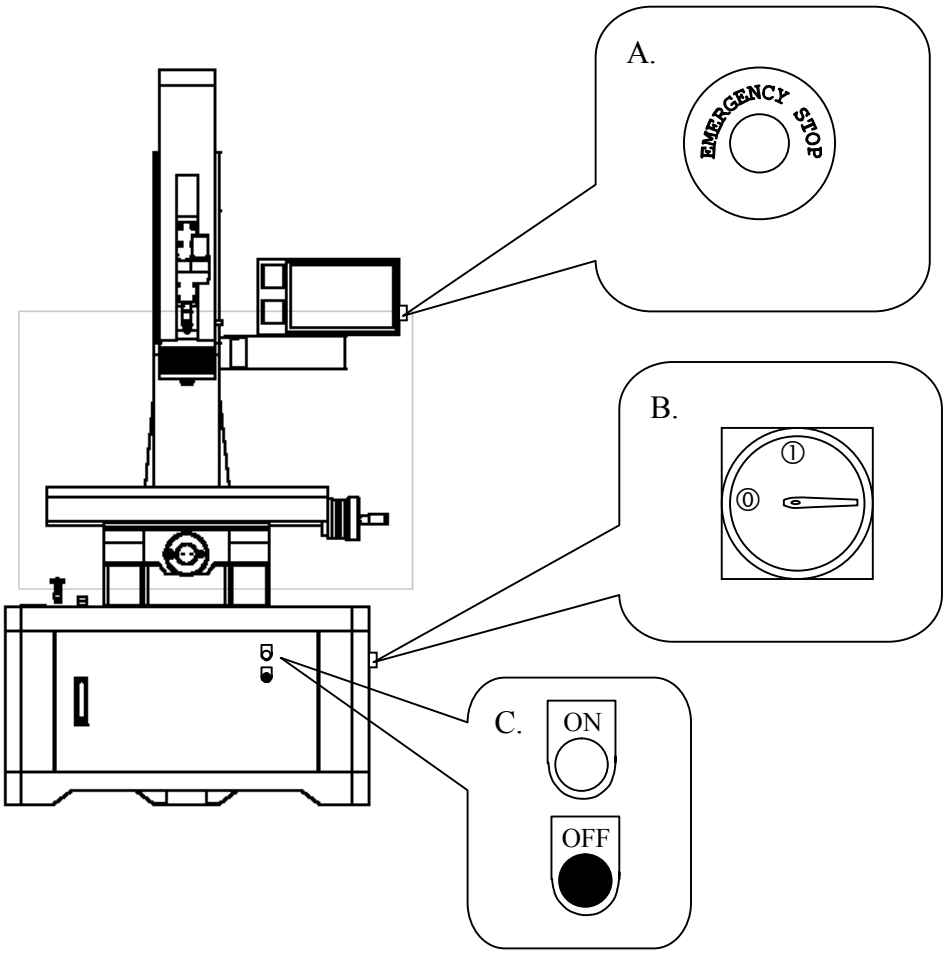
(2) (b) is control valve for coolant.
Through this valve to control the flushing of coolant, sometimes with good flushing can speed up the drilling efficiency.
If the machine has equipped with coolant or filter system, please turn on the coolant function on the operation panel, then use this valve to control the flushing.

(3) (c) is the pressure meter.
This meter shows the pressure of the working liquid. Generally to say, the big electrode tube uses smaller pressure; the smaller electrode tube uses higher pressure.

(4) Please exchange the lubrication oil every 1500 working hours. Please check the stick on the pump for the oil specification. Please fill up #30~#40 lubrication oil in the pump.
Please kindly be noticed with the wrong lubrication oil will cause damage of the pump.

5.2 Explanation for other switches:

The positions of other switches show as below:



A. Emergency switch: Press this switch to shut down machine right away.
B. Main power: 0 for turn off the main power, 1 for turn on the main power. If operator needs to check inside of the machine, please TURN OFF main power, then he can continue to check machine.
C. ON switch : Turn on the machine.
OFF switch : Turn off the machine.

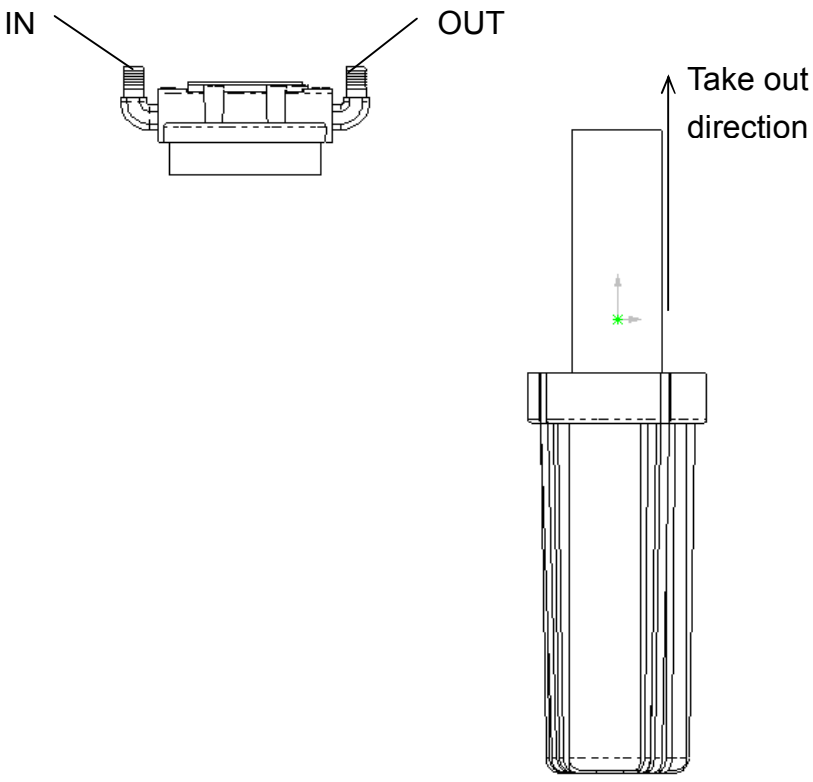
5.3 Other information :

1. There is a stainless steel water tank in the left side of the machine. Please full fill the water before start working.
2. There is a compressed air connecter at the left and back side of the machine, please provide a 6~7kg/cm^2 compressed air for machine.

6. The filter replacement steps:

6.1. Please open the left door of the machine, and look inside of it. You will see as below picture. The filter is in the center.

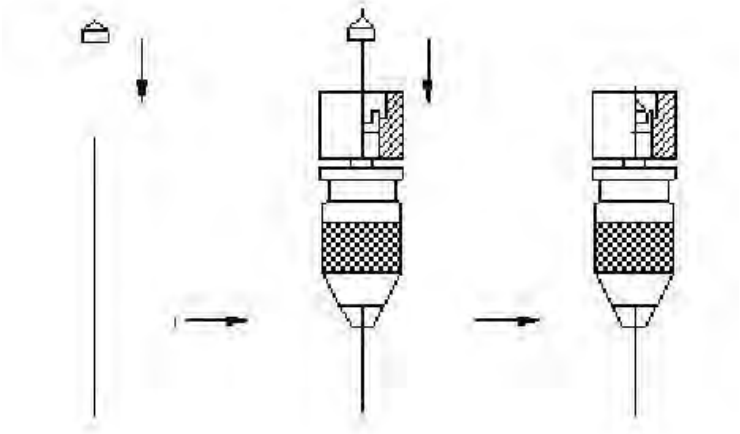
6.2. Please follow below drawing to take out and replace the filter.

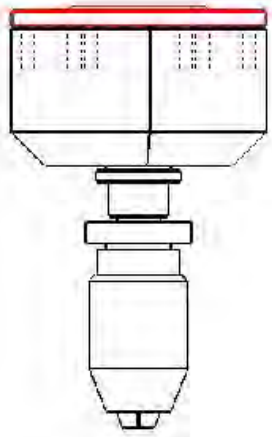


7. The electrode tube installation explanation

Please follow below drawing to install the electrode tube.

(1) Quick change electrode holder system (Pneumatic type)





Pneumatic type change electrode holder:

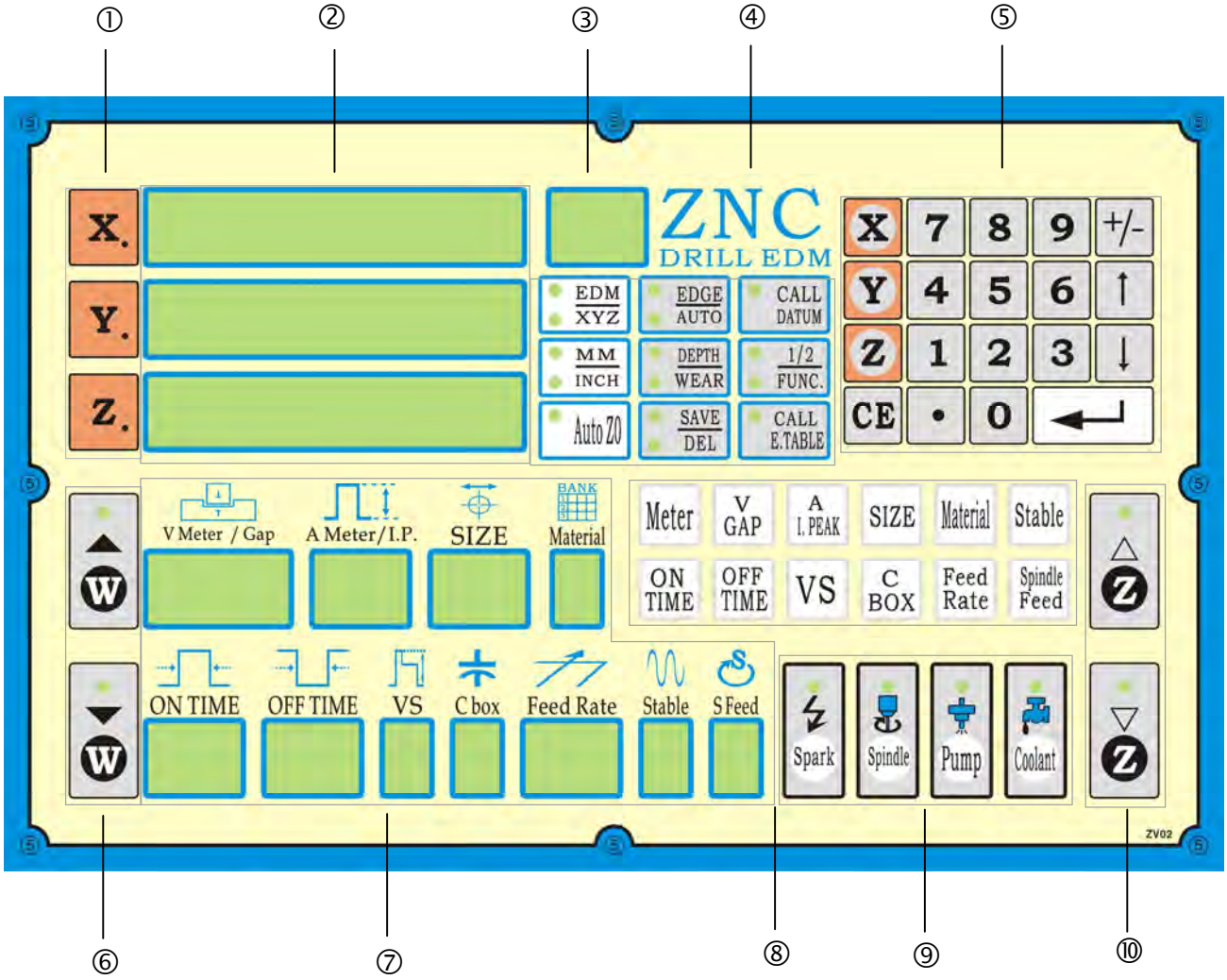
1. **Please press unclamp button at the right side of the column.**

CAUTION

Please follow below steps to take out electrode holder/chuck:

1. **MAKE SURE the pressure meter at 0 kg/cm^2.**
2. **Hold the electrode holder/chuck tightly, then press unclamp button.**
3. **If customer uses the electrode holder/chuck <u>which not produced by OCEAN TECHNOLOGIES</u>, it will cause Quick Change Electrode Holder System leaking or other problems. <u>OCEAN TECHNOLOGIES has no responsibility for the machine damage or the safety of operators.</u>**

8. Description of the Operation Panel:



(1) X. Y. Z. Hot key for reset/clean the coordinates of XYZ axes:

These keys can reset/clear the present coordinate values of XYZ axes to zero.

(2) X, Y, Z AXES Coordinates DISPLAY AREA:

This area can show you the coordinate values of XYZ axes.

The range is ±9999.999mm.

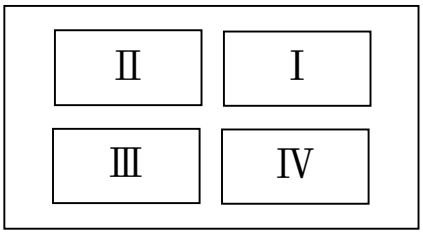
And there are more functions for message display mode, such as the words and parameters.

(3) FUNCTION DISPLAY AREA:

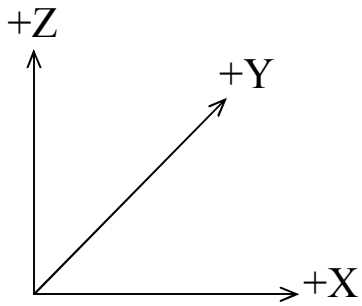
This area is using for show you the special function code. The function codes list as following:

L→ Working coordinate. L0 is the machine coordinate.
The way to reset the machine coordinate is below:
1. Move to X+ limit.
2. Press X key, and the X axis coordinate will start flashing. Then move machine to X- direction slowly. After the reference point founded, machine will response with a “beep” and X axis value will reset.
3. The other Y ands Z axes also use the same steps to reset.(Y+ and Z+)

※ L1~L9 are the working coordinates for user using.

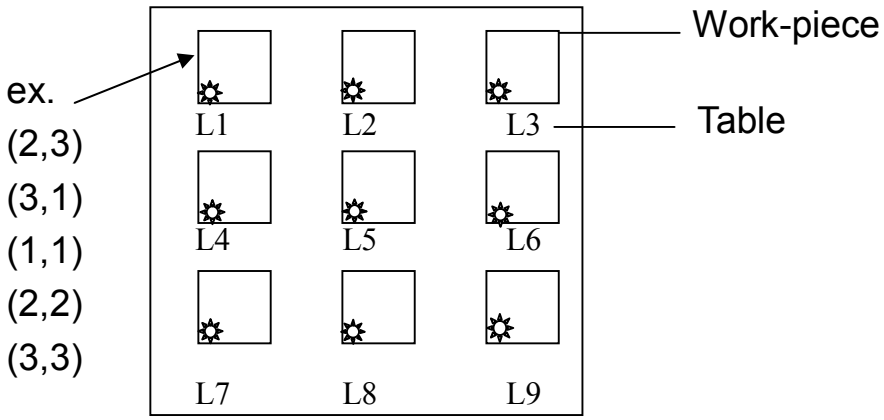


Worktable



coordinated

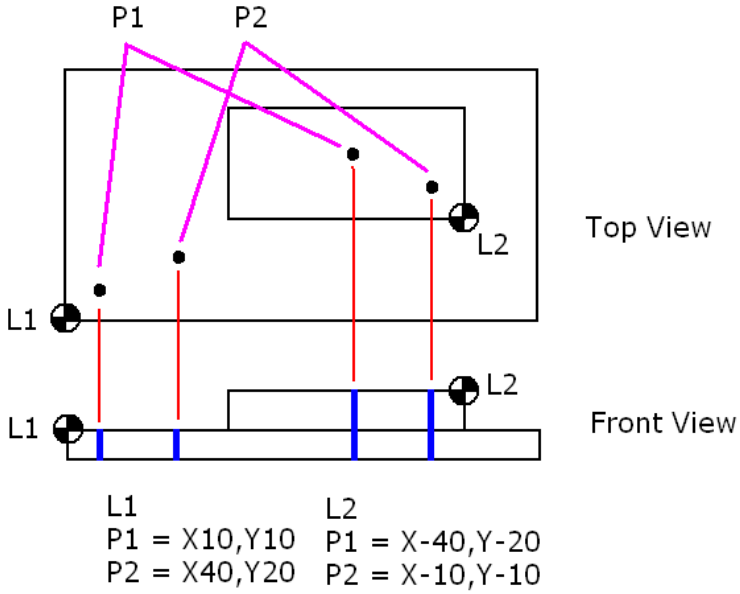
Application example:
Example 1:
Nine Working coordinates with multi work-pieces:
Set and fix the work-piece on the table, then set the reference point of each work-piece to L1~L9. Then call the coordinate L1 and drilling as the positions as the drawing: (2,3) (3,1) (1,1) (2,2) (3,0). Then call the coordinate L2 and drilling as the positions as drawing and so on. Till nine work-pieces were all finished.



Example 2:

Multi reference points on one work-piece:

There is a work-piece as below drawing. And there is two reference points on it.



So, you can set the reference points of L1 and L2 as the drawing, and you can drill one work-piece with two reference point for 4 different positions holes.

E ⟶ Drilling parameter table file

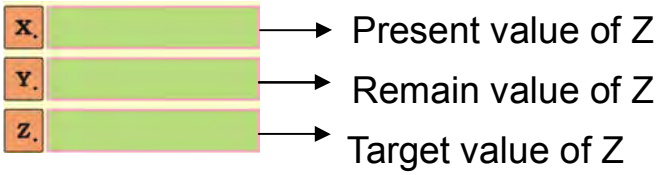
F ⟶ Special function, such as 1/2、CENTER.

(4) SETTING AREA:

a. 

EDM/XYZ function change key and indicated lamp:

When the EDM indicated lamp lighted on, the values of XYZ will be the present, remain and target values of Z axis.



b. 

MM/INCH function change key and indicate lamp:

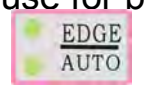
When MM indicated light on, system is using metric as the unit.

When INCH indicated light on, system is using inch as the unit.

c. 

AUTO Z0: Z axis auto zero:

When the LED is lighted on, it means the auto wear compensation function enable. When the LED is off, it means this function disable. This function set as enable after machine turned on. When this function enable, machine can do the auto edging of Z axis after user press Spark. And when Z axis arrived the target value, Z axis will auto return to the top of work-piece. If this function was turned off, that means when Z axis reached the target value, machine will stop sparking at the target value and do nothing else. This can use for blind hole.

d. 

EDGE/AUTO: Manual/auto edge finding function change key and indicate lamp: (Use “CE” key to cancel the edging function)

When EDGE LED is on, it means manual edge finding, this function works with Z↓ key.

When AUTO LED is on, it means automatic edge finding. And if Auto Z0 is on, the Z coordinate will set to zero when surface found automatically.

e. DEPTH/WEAR: Depth and wear setting change key and indicate lamp:

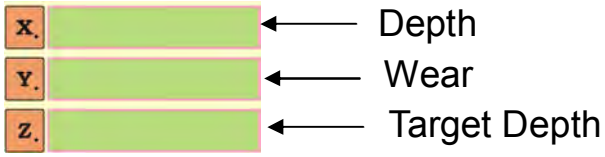
When DEPTH LED is on, it will display/set depth value on the X coordinate area.

When WEAR LED is on, it will display/set wear value on the Y coordinate area.

1. How to set Drill Depth:

   You can find this key on the operation panel. This is the Depth and Wear setting. Before use this key, please make sure there is no other function under key-in mode. Press one time of this key, system will entry the depth setting mode, and the LEDs of this key will turn on like .

   Coordinate areas mean:

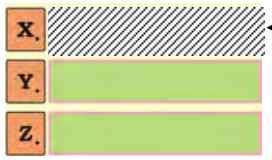
   Depth

   Wear

   Target Depth

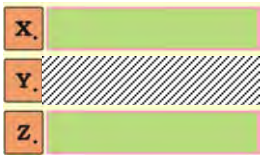
2. Press one more time will entry setting mode as below:

   =>

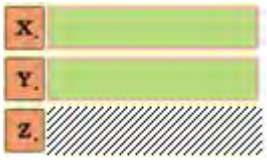
   Flashing, and key in the depth value with number keys, then press

   =>

   Flashing, and key in the wear value with number keys, then press

   =>

   System will show you the target depth and go back to XYZ coordinate display mode.

f. SAVE/DEL Setting key and indicated lamp: Working parameter data SAVE / DEL function: This function execute under CALL E. TABLE mode.

SAVE parameter data steps:

For example: save parameter data you want.

Press CALL E. TABLE key, the CALL E. TABLE LED will on, at the same time, the function window [E0] is flashing, then press one time on SAVE/DEL key, the LED will light at SAVE [○SAVE/DEL], then press [↵]. It will save data into the memory.

DELETE parameter data steps:

For example: Don't want new parameter or want set to default parameter:

Press CALL E. TABLE key, the CALL E. TABLE LED will on, at the same time, the function window [E0] is flashing, then press two times on SAVE/DEL key, the LED will light at DEL [SAVE/○DEL], then press [↵].It will delete present parameter , and set to default parameter.

g. 1/2 FUNC. Additional function:

1/2 function for center finding:

Step: (1) touch X-

(2) Set X axis coordinate zero

(3) Move to X+, and touch at X+ side.

(4) Press X (near number 7), and the X coordinate value will flash.

(5) Press 1/2 FUNC., the value at X coordinate will divide by 2.

(6) Move X coordinate to zero, then the center is at 0 point.

h. CALL DATUM CALL DATUM: Coordinate calling key (L0~L9) and indicate lamp:

Press this key to select the coordinate calling function. When you pressed this key, the function will flash, and change the value with number keys.

i. CALL FUNCTION CALL FUNCTION: Special function key and indicate lamp.

This key needs to work with some other keys. The description as following:

For example:

Touch one side of work-piece → Press X. → Move and touch the other side of work-piece → Press X → Press CALL FUNCTION → Move X axis to 0.000,

and this position is the center. *,**

***NOTE: Please make sure there will be nothing crashed or touched during this movement between the electrode tube and work-piece.**

****NOTE: Move slowly when electrode tube goes close to work-piece to prevent the bending of the electrode tube.**

j. 

CALL E. TABLE: Call Erosion database. (Reserved)
When indicate lamp is on means the function was enable.

(5) 

Numeric keys area:
This area is the Human-Machine Interface.

(6) 

W axis up /down key and indicate lamp.

(7) Drilling parameters display area:

a. V METER / GAP display area:
This parameter can set/change the GAP voltage. Range is 00~99. This is one of the drilling parameter.

b. A METER / I.P. display area:
This parameter can set/change the working peak current. Range is 0~31 / 0~63 steps. This is one of the drilling parameter.

c. SIZE display area
This parameter can set/change/call the diameter and drilling parameter of the electrode tube.

d. Material display area: Material database code
This is the present material database code. The value is from 0 to 9, total 10 kinds of material. Such as:

0→Steel (SKD-11)
1→Stainless steel
2→Copper
3→Tungsten carbide
4→Aluminum

e. ON-Time display area:
This parameter can set/change the ON-Time. Range is 5~99. This is one of the drilling parameter.

f. OFF-Time display area:
This parameter can set/change the OFF-Time. Range is 5~99. This is one of the drilling parameter.

g. VS display area:
This parameter can set/change the “LOW POWER”* of discharging. Range is 1~3. This is one of the drilling parameter.
*Note: LOW POWER is the working voltage of discharging.

h. C BOX display area :
This parameter can set/change the Rapid capacitor. Range is 0~F. This is one of the drilling parameter.

i. Feed Rate display area:
This parameter can set/change the feeding rate of Z axis. Range is 0~99. This is one of the drilling parameter, and it also can effect in manual mode.

j. Stable display area:
This parameter can set/change the stability of Z axis during discharging. Range is 0~F. This is one of the drilling parameter.

k. S-Feed display area:
This parameter can set/change the rotation speed of spindle. Range is 0~F. This is one of the drilling parameter.

(8) Drilling parameter setting area:

a. 

METER KEY: Reserved.

b. 

V GAP KEY: Sparking gap voltage setting key.

c. 

IP KEY: Sparking current setting key.

d. 

SIZE KEY: Electrode tube diameter setting key. (auxiliary parameter)

e. 

MATERIAL KEY: Material database setting key.(auxiliary parameter)

f. 

STABLE KEY: Stable rate setting key.

g. 

ON-TIME KEY: Sparking ON TIME setting key.

h. 

OFF-TIME KEY: Sparking OFF TIME setting key.

i. 

VS KEY: Low power of discharging setting key.

j. 

C-BOX KEY: Rapid capacitor setting key.

k. 

FEED RATE KEY: Z axis speed setting key.

l. 

SPINDLE FEED KEY: Spindle rotation speed setting key.

(9) I/O FUNCTION KEY:

a. 

Spark key and indicate lamp: Sparking start / stop.

b. 

Spindle key and indicate lamp: Spindle start / stop.

c. 

Pump key and indicate lamp: High pressure pump On / Off.

d. 

Coolant key and indicate lamp: Coolant On / Off.

(10) 

Z AXIS UP / DOWN KEY: Z axis up/down key and indicate lamp.

9. Description for the steps of working parameters:

Figure	Explanation	Steps
 V GAP	Gap voltage	0 ~ 99
 IP	Discharging current	0 ~ 31 0 ~ 63 (Optional)
 SIZE	Electrode tube diameter	0.1 ~ 3.0 0.1 ~ 6.3(Optional)
 Material	Material	0 ~9: 10 steps; It can save 10 kinds of materials.
 Stable	Stable	0 ~ F: 16 steps
 ON-Time	ON-Time	5 ~ 99: 95 steps
 OFF-Time	OFF-Time	5 ~ 99: 95 steps
 VS	Spark power	1 ~ 3: 3 steps
 C-BOX	Rapid capacitor	0 ~ F: 16 steps
 Feed Rate	Feed Rate	00 ~ 99: 100 steps
 Spindle Feed	Spindle Feed	0 ~ F: 16 steps

10. Operation steps:

A、 Please switch on the main power, and press ON key.

B、 Select Material, and then select tube size.

C、 Install electrode tube and ceramic guide.

D、 Turn on PUMP and adjust water pressure, and make sure water come out from tube. Turn off PUMP.

E、 Set correct DEPTH / WEAR.

F、 Turn on PUMP、SPINDLE and SPARK. Machine will start discharging.

Attention:

The top and bottom hole of drilling:

When you drill the work-piece with the Drill EDM, please make sure the finish quality of the top and bottom hole. Ex: The top/bottom hole got over/under size, or surface got tumor sharp.

EX: If you got over/under size of the finish hole, you might check with below:

a. The ceramic guide was too far from work-piece.

b. The electrode tube was bent.

c. The conductivity of working liquid has too much high.

11. TROUBLE SHOOTING

(1) Drilling unstable:

a. The working parameters set proper or not?
b. The servo speed set proper or not?
c. The work-piece fixed well or not?
d. Working liquid (distilled water) enough or not?
e. The quality of distilled water well or not?
f. The sizes of electrode tube and ceramic guide same or not?

(2) Electrode tube got abnormal wearing:

a. The sizes of electrode tube and ceramic guide same or not?
b. The material selection of electrode tube right or not?
c. The electrode tube bend or not?
d. The working parameters set proper or not?
e. Working liquid (distilled water) enough or not?
f. The quality of work liquid well or not?

(3) Tube got heating or over heating during drilling:

a. The water pressure set proper or not?
b. The water came out from the bottom of electrode tube or not?
c. The working parameters set proper or not? Over power or short circuit during drilling?

(4) The electrode tube got bent during drilling:

a. The ceramic guide clean or not?
b. The work-piece fixed well or not?
c. The working parameters set proper or not?

(5) Z-axis got shake during drilling:

a. Make sure the electrode tube is straight and didn’t bend or poor install.
b. The water came out from the bottom of electrode tube or not?
c. The sizes of electrode tube and ceramic guide same or not?
d. The working parameters set proper or not?

(6) The Z-axis moving by itself/without balance:

a. The balance VR on the Servo PCB needs to be re-adjustment.

(7) Top size bigger than bottom size of the finished hole:

a. The material selection of electrode tube right or not?
b. The working parameters set proper or not?
c. The conductivity of the working liquid is proper or not?

(8) Bottom size bigger than top size of the finished hole:

a. Make sure the electrode tube is straight and didn't bend.
b. Make sure the ceramic guide and work-piece fixed well.

(9) The electric pump not working (no water pressure):

a. Make sure the filter is changed regularly.
b. Make sure the water level in the water tank is high enough.
c. Make sure the O-ring of the filter can is in the right position of the filter can.
d. Take out the electrode holder/chuck and turn on the pump, full fill the water in the filter can, and use the compressed air gun to put the air into the inlet of filter can, the water will come out from spindle. If there is no water came out, please check the water system by section and section.

(10) Water pressure not enough:

a. Check and clean the valves inside of the pump.
b. Not enough working liquid in water tank?
c. The O-rings inside of the pump was malfunction?

12. Maintenance, Consumables and suggestion:

(1) The leveling checking

After machine installed, the first, third, and sixth month need to check and correct the leveling.

(2) Daily maintenance

Clear work-table, electrode holder, fixture for work-piece, and guide cover. Due to the machine uses water to be the working liquid, it will cause the metal parts might get rusty easily. So it is necessary to paint or spray the lubricating oil or rust-proof oil on metal parts.

(3) Weekly maintenance

Please check the filter weekly, if the filter or water too dirty, customer need to clean or replace with new one.

Please check or add the level of lubricating oil for Machine lubrication system.

(4) Monthly maintenance

Check and re-calibrate the vertical of the guide holder and guide plate.

(5) Consumables and suggestion

a. Ceramic guide
b. Electrode tube (brass / copper)
c. Filter
d. Rubber seal
e. Guide cover

◎Due to the material of the electrode tube will effect the drilling speed and the finish quality. Here comes the suggestion:

a. The work-piece is steel, brass electrode tube is recommended.
b. The work-piece is tungsten carbide or copper, copper electrode tube is recommended.

(6) Maintenance list

Item	Day	Week	Month	Season	Two season	Year
Work table	●	◎				
Parallel Plate	●	◎				
Guide	●	◎				★
Electrode holder	●	◎				
Water filter for pump	●		★1			
Air filter for Fan		●	◎			
Water filter for tank		●	◎		★	
Container for Air pressure filter, ◆		●	◎			
Axes lubrication		●◎				
Oil level of manual lubricator		●◎				
Waste oil collector(backside of Y axis)		●		◎		
Exterior of generator, ◆					●◎	
Exterior of machine					●◎	
Vertical accuracy of spindle			●			
Vertical accuracy of Guide holder plate			●			
Dust inside of generator, ◆					●◎	
Dust inside of bottom space of machine					●◎	
Machine Leveling				●		◎
Water filter made with metal, ▲				◎2		

Optional：▲

CA Serial：◆

Check & Act：●

Maintenance & Clean：◎

Replace：★

★1：

Depend on working hours, if the filter becomes all black then user needs to replace with new one.

◎2：

Depend on working hours, if the bubbles came out from 2/3 height of filter then user needs to replace with new one. If machine equipped with additional pressure gauge, when the pressure gauge reaches 2kg/cm2, the filter must be replaced.

13. The specification and tolerance of electrode tube:

The lengths for all of the electrode tubes are within ±1mm.

Copper					Brass				
OD.		ID.		Length	OD.		ID.		Length
Tube	Tol.	Tube	Tol.	mm	Tube	Tol.	Tube	Tol.	mm
0.2	-0.01 -0.02	0.1	±0.02	200	0.2	-0.01 -0.02	0.08	±0.02	200
0.3		0.12		300	0.3		0.11		300
0.4		0.15		300 400	0.4		0.2		300
0.5		0.18			0.5		0.2		300 400
0.6	-0.01 -0.02	0.2	±0.02		0.6		0.2		
0.7		0.2			0.7		0.2		
0.8		0.3			0.8		0.3		
0.9		0.3			0.9		0.3		
1.0		0.3			1.0		0.3		
1.1		0.3			1.1	-0.01 -0.03	0.4	±0.03	
1.2		0.4			1.2		0.4		
1.3		0.4			1.3		0.4		
1.4		0.4			1.4		0.5		
1.5		0.5			1.5		0.5		
1.6		0.5			1.6		0.5		
1.7		0.5			1.7		0.5		
1.8		0.6			1.8		0.6		
1.9		0.6			1.9		0.6		
2.0		0.6			2.0		0.6		
2.1	-0.01 -0.03	0.7	±0.03		2.1		0.7		
2.2		0.7			2.2		0.7		
2.3		0.7			2.3		0.7		
2.4		0.8			2.4		0.8		
2.5		0.8			2.5		0.8		
2.6		0.8			2.6		0.8		
2.7		0.9			2.7		0.9		
2.8		0.9			2.8		0.9		
2.9		0.9			2.9		0.9		
3.0		1.0			3.0		1.0		

14. Machining Condition

(1)Test data:

Unit : mm

File Name:			**Material:** SKD-11					Tube: Brass					
SIZE	Thickness	ON-T	OFF-T	VS	IP	GAP	F	C	S	STABLE	WEAR (%)	TIME	Kg/cm^2
0.2	10	8	17	1	7	22	20	1	F	1	100	33”	100
0.2	25	8	17	1	7	22	20	1	F	1	120	3'30"	100
0.3	25	15	25	2	6	22	25	0	F	0	108	1'30"	70
0.3	25	15	25	2	6	22	25	0	F	0	180	1'00"	70
0.4	25	20	10	2	5	22	25	1	F	0	76	1’47”	65
0.4	25	20	10	2	6	22	25	1	F	0	90	1’16”	65
0.5	25	25	20	2	12	22	30	0	F	0	156	43"	50
0.5	50	25	22	2	14	22	30	0	F	0	200	1'30"	50
0.6	50	30	20	3	12	22	30	0	F	0	150	1’50”	50
0.6	50	30	20	2	18	22	30	0	F	0	100	2’30”	50
0.7	25	30	20	3	15	22	25	0	F	0	120	44”	50
0.7	50	35	20	3	15	22	25	0	F	0	160	1’15”	50
0.8	25	30	20	2	21	22	30	0	F	0	106	42”	50
0.8	50	35	20	3	18	22	30	0	F	0	150	1’36”	50
0.9	25	30	20	2	21	22	30	0	F	0	105	43”	50
0.9	50	35	20	3	18	22	30	0	F	0	145	1’45”	50
1.0	25	30	20	3	18	22	30	0	F	0	96	45”	50
1.0	50	35	20	3	18	22	30	0	F	0	102	1’30”	50
1.5	25	45	20	3	19	22	30	0	F	0		1’25”	50
1.5	50	45	20	3	19	22	30	0	F	0		2’10”	50
2.0	25	40	20	3	31	22	30	0	F	0	72	1’33”	30
2.0	50	60	25	3	31	22	30	0	F	0	69	3’18”	30
3.0	25	30	20	3	22	22	30	0	A	0	58	3’07”	25
3.0	25	30	21	3	31	22	30	0	A	0	62	3’	25

※Only for reference, different material have different result.

Unit : mm

File Name:			Material: Carbide					Tube: Copper					
SIZE	Thickness	ON-T	OFF-T	VS	IP	GAP	F	C	S	STAB	WEAR (%)	TIME	Kg/cm^2
0.13	2	5	25	1	2	22	20	1	F	1	300	4'	100
0.13	4.5	5	25	1	2	22	20	1	F	1	411	7'	100
0.2	10	5	25	1	8	22	30	2	F	1	20	10’	75
0.2	10.5	5	20	1	7	22	30	3	F	1	30	10’30”	75
0.3	4.5	10	20	2	5	22	20	1	F	1	45	1'36"	60
0.3	10	8	45	2	6	22	20	1	F	1	51	4'67"	60
0.4	10	8	25	1	15	22	30	1	F	1	28	2’15”	60
0.4	25	8	25	1	15	22	30	1	F	1	35	4’40”	60
0.5	10	15	22	1	15	22	30	1	F	0	25	2’40”	60
0.5	25	18	25	1	18	22	20	1	F	0	150	5’	60
0.8	10	15	25	1	22	22	30	1	F	0	3.8	3’40”	50
0.8	27	15	25	1	22	22	30	1	F	0	7.5	7’53”	50
1.0	10	15	22	1	24	22	30	1	F	0	10	2’15”	50
1.0	27	15	25	1	24	22	30	1	F	0	4.8	7’35”	50
1.0	88	15	25	1	31	18	20	2	F	0	20	30'00"	65
1.0	88	15	25	2	13	18	20	2	F	0	40	21’45"	65
2.0	50	15	22	1	31	22	12	2	F	0	3.5	21’	30
2.0	71.5	15	22	1	31	22	10	2	F	0	5	34’	30
3.0	71.5	15	20	1	31	22	12	3	F	0	6	80’	25
3.0	71.5	15	24	2	31	22	12	3	F	0	22	76’	25

Unit : mm

File Name:			Material: Copper					Tube: Copper					
SIZE	Thickness	ON-T	OFF-T	VS	IP	GAP	F	C	S	STABLE	WEAR (%)	TIME	Kg/cm^2
0.4	18	20	17	2	12	22	16	1	F	1	183	1’22”	75
0.4	25	20	17	2	13	22	10	1	F	1	200	4’29”	75
0.4	63	20	17	2	12	25	16	1	F	1	165	7’07”	75
0.5	63	20	17	3	12	25	16	1	F	1	153	6’27”	60
0.7	18	20	18	3	15	22	20	1	F	1	105	1’23”	50
0.7	25	20	18	3	15	22	20	1	F	1	110	2’00”	50
0.7	63	20	18	3	15	25	20	1	F	1	98	4’55”	50
1.0	38	20	20	2	23	22	8	1	F	1	95	3'00"	50
1.0	63	25	25	3	14	25	25	1	F	1	60	7’24”	50

(2)**Built in:** Unit : mm

File Name: E0			Material: 0 **(SKD11)**			Tube: Brass			
SIZE	**ON-T**	**OFF-T**	**VS**	**IP**	**GAP**	**F**	**C**	**S**	**Stable**
0.1	6	15	1	3	24	20	2	F	2
0.2	8	15	2	5	24	25	2	F	2
0.3	16	18	2	6	22	25	1	F	0
0.4	20	15	2	8	24	20	0	A	0
0.5	25	20	2	11	22	25	0	A	0
0.6	25	20	2	13	22	25	0	A	0
0.7	25	20	2	15	22	25	0	A	0
0.8	25	20	2	18	22	30	0	A	0
0.9	30	20	3	18	22	30	0	A	0
1.0	30	20	3	18	22	30	0	A	0
1.1	30	20	3	18	22	30	0	A	0
1.2	30	20	3	18	22	30	0	A	0
1.3	30	20	3	18	22	30	0	A	0
1.4	30	20	3	18	22	30	0	A	0
1.5	30	20	3	18	22	30	0	A	0
1.6	30	20	3	18	22	30	0	A	0
1.7	30	20	3	18	22	30	0	A	0
1.8	30	20	3	18	22	30	0	A	0
1.9	30	18	3	19	22	30	0	A	0
2.0	30	20	3	20	22	30	0	A	0
2.1	30	20	3	21	22	30	0	A	0
2.2	30	20	3	22	22	30	0	A	0
2.3	30	20	3	23	22	30	0	A	0
2.4	30	20	3	24	22	30	0	A	0
2.5	35	20	3	25	24	30	0	A	0
2.6	35	20	3	26	24	25	0	A	0
2.7	35	20	3	27	24	25	0	A	0
2.8	35	20	3	28	24	25	0	A	0
2.9	35	20	3	29	24	25	0	A	0
3.0	45	20	3	30	24	25	0	A	0
3.1	45	25	3	31	24	25	0	A	0
3.2	45	25	3	32	24	25	0	A	0
3.3	45	25	3	33	24	25	0	A	0
3.4	45	25	3	34	24	25	0	A	0
3.5	55	40	3	35	24	25	0	A	0
4.0	55	40	3	40	30	25	0	A	0
5.0	65	45	3	50	30	25	0	A	0
6.0	65	45	3	60	30	25	0	A	0

Unit : mm

File Name:			Material: (Carbide)			Tube: Copper		
SIZE	**ON-T**	**OFF-T**	**VS**	**IP**	**GAP**	**F**	**C**	**S**
0.2	5	25	1	8	22	30	2	F
0.3	6	25	1	12	22	30	2	F
0.4	8	25	1	15	22	30	1	E
0.5	15	22	1	15	20	30	1	E
0.6	15	22	1	25	20	30	2	E
0.7	15	25	1	25	20	30	2	E
0.8	15	22	1	25	20	30	2	E
0.9	15	22	1	25	20	30	2	E
1.0	15	25	1	31	20	30	2	F
1.1	15	24	1	31	20	30	2	C
1.2	15	24	1	31	20	30	2	C
1.3	15	24	1	31	20	30	2	C
1.4	15	24	1	31	20	30	2	C
1.5	15	24	1	31	20	30	2	C
1.6	15	24	1	31	20	30	2	C
1.7	15	24	1	31	20	30	2	C
1.8	15	24	1	31	20	30	2	C
1.9	15	24	1	31	20	30	2	C
2.0	15	25	1	35	20	40	2	C
2.1	35	20	1	24	20	40	2	C
2.2	35	20	1	25	20	40	2	C
2.3	35	20	1	25	20	40	2	C
2.4	35	20	1	26	20	40	2	C
2.5	38	20	1	26	20	40	2	C
2.6	38	20	1	27	20	40	2	C
2.7	38	20	1	27	20	40	2	C
2.8	38	20	1	28	20	40	2	C
2.9	38	20	1	28	20	40	2	C
3.0	70	24	1	31	20	40	3	F

Unit : mm

File Name:			Material: (SUS)			Tube: Brass		
SIZE	**ON-T**	**OFF-T**	**VS**	**IP**	**GAP**	**F**	**C**	**S**
0.2	8	45	1	6	22	35	2	F
0.3	18	25	2	5	22	30	1	F
0.4	20	30	3	8	22	30	1	F
0.5	25	20	2	10	22	30	0	F
0.6	30	20	2	17	22	30	0	F
0.7	30	20	2	19	22	30	0	F
0.8	30	20	2	21	22	30	0	F
0.9	30	20	2	23	22	30	0	F
1.0	30	20	3	18	22	40	0	F
1.1	30	20	3	18	22	40	0	F
1.2	35	20	3	18	22	40	0	F
1.3	35	20	3	18	22	40	0	F
1.4	45	20	3	19	22	40	0	F
1.5	45	20	3	19	22	40	0	F
1.6	50	25	3	19	22	40	0	F
1.7	50	25	3	19	22	40	0	F
1.8	50	25	3	19	22	40	0	F
1.9	50	25	3	20	22	40	0	F
2.0	55	25	3	24	25	35	0	F
2.1	55	25	3	24	25	35	0	F
2.2	55	25	3	25	25	35	0	F
2.3	55	25	3	25	25	35	0	F
2.4	55	25	3	26	25	35	0	F
2.5	60	25	3	26	30	35	0	F
2.6	60	25	3	27	30	35	0	F
2.7	60	25	3	27	30	35	0	F
2.8	60	25	3	28	30	35	0	F
2.9	60	25	3	28	30	35	0	F
3.0	60	25	3	31	30	30	0	F

Unit : mm

File Name: E0			Material: (Aluminum)			Tube: Brass		
SIZE	ON-T	OFF-T	VS	IP	GAP	F	C	S
0.2	8	45	2	6	22	35	2	F
0.3	18	40	3	6	22	30	3	F
0.4	20	30	2	8	22	30	1	F
0.5	25	20	2	10	22	30	0	F
0.6	30	20	2	17	22	30	0	F
0.7	30	20	2	19	22	30	0	F
0.8	30	20	2	18	24	30	2	F
0.9	30	20	2	23	22	30	0	F
1.0	30	20	3	18	22	40	0	F
1.1	30	20	3	18	22	40	0	F
1.2	35	20	3	18	22	40	0	F
1.3	35	20	3	18	22	40	0	F
1.4	45	20	3	19	22	40	0	F
1.5	45	20	3	19	22	40	0	F
1.6	50	25	3	19	22	40	0	F
1.7	50	25	3	19	22	40	0	F
1.8	50	25	3	19	22	40	0	F
1.9	50	25	3	20	22	40	0	F
2.0	55	25	3	24	25	25	0	F
2.1	55	25	3	24	25	35	0	F
2.2	55	25	3	25	25	35	0	F
2.3	55	25	3	25	25	35	0	F
2.4	55	25	3	26	25	35	0	F
2.5	60	25	3	26	30	35	0	F
2.6	60	25	3	27	30	35	0	F
2.7	60	25	3	27	30	35	0	F
2.8	60	25	3	28	30	35	0	F
2.9	60	25	3	28	30	35	0	F
3.0	60	25	3	31	30	30	0	F

Unit : mm

File Name: E0			Material: (Inconel)			Tube: Brass		
SIZE	**ON-T**	**OFF-T**	**VS**	**IP**	**GAP**	**F**	**C**	**S**
0.2	8	20	2	6	22	15	2	F
0.3	10	20	2	7	22	15	2	F
0.4	25	20	2	10	22	20	1	F
0.5	25	20	2	15	22	30	1	F
0.6	25	20	2	15	22	40	1	F
0.7	25	20	2	15	22	40	1	F
0.8	25	20	2	15	22	40	1	F
0.9	25	20	2	15	22	40	1	F
1.0	35	25	3	15	22	40	1	F
1.1	35	25	3	15	22	40	1	F
1.2	35	25	3	16	22	40	1	F
1.3	35	25	3	17	22	40	1	F
1.4	35	25	3	18	22	40	1	F
1.5	35	25	3	20	22	40	1	F
1.6	35	25	3	20	22	40	1	F
1.7	35	25	3	20	22	40	1	F
1.8	35	25	3	20	22	40	1	F
1.9	35	25	3	20	22	40	1	F
2.0	40	25	3	22	22	40	1	F
2.1	40	25	3	22	22	40	1	F
2.2	40	25	3	22	22	40	1	F
2.3	40	25	3	22	22	40	1	F
2.4	40	25	3	22	22	40	1	F
2.5	50	40	3	25	22	40	1	F
2.6	50	40	3	25	22	40	1	F
2.7	50	40	3	25	22	40	1	F
2.8	60	50	3	28	22	40	1	F
2.9	60	50	3	31	22	40	1	F
3.0	60	50	3	31	22	40	1	F

Unit : mm

File Name: E0			Material: (Titanium)			Tube: Brass		
SIZE	**ON-T**	**OFF-T**	**VS**	**IP**	**GAP**	**F**	**C**	**S**
0.2	40	40	1	6	24	15	10	C
0.3	50	50	2	8	24	20	10	F
0.4	50	50	2	10	24	20	12	F
0.5	50	80	2	14	24	30	12	F
0.6	50	80	2	15	24	30	12	F
0.7	50	80	2	15	24	30	12	F
0.8	50	80	3	15	24	30	12	F
0.9	50	80	3	18	24	30	12	F
1.0	60	80	3	18	24	40	15	F
1.1	60	80	3	18	24	40	15	F
1.2	60	80	3	18	24	40	15	F
1.3	60	80	3	18	24	40	15	F
1.4	60	80	3	18	24	40	15	F
1.5	60	80	3	22	24	40	15	F
1.6	60	80	3	22	24	40	15	F
1.7	60	80	3	22	24	40	15	F
1.8	60	80	3	22	24	40	15	F
1.9	60	80	3	22	24	40	15	F
2.0	80	90	3	25	24	40	15	F
2.1	80	90	3	25	24	40	15	F
2.2	80	90	3	25	24	40	15	F
2.3	80	90	3	25	24	40	15	F
2.4	80	90	3	25	24	40	15	F
2.5	90	90	3	31	24	40	15	F
2.6	90	90	3	31	24	40	15	F
2.7	90	90	3	31	24	40	15	F
2.8	90	90	3	31	24	40	15	F
2.9	90	90	3	31	24	40	15	F
3.0	90	90	3	31	24	40	15	F

Unit : mm

File Name: E0			Material: (Copper)			Tube: Copper		
SIZE	**ON-T**	**OFF-T**	**VS**	**IP**	**GAP**	**F**	**C**	**S**
0.2	5	25	1	12	22	40	0	E
0.3	14	25	2	8	22	40	10	E
0.4	20	30	2	8	22	40	0	E
0.5	25	20	2	10	22	40	0	E
0.6	30	20	2	17	22	40	0	E
0.7	30	20	2	19	22	40	0	E
0.8	30	20	2	21	22	40	0	E
0.9	30	20	2	23	22	40	0	E
1.0	60	20	2	24	22	40	0	C
1.1	30	20	2	24	22	40	0	C
1.2	30	20	2	24	22	40	0	C
1.3	30	20	2	24	22	40	0	C
1.4	30	20	2	25	22	40	0	C
1.5	35	20	3	18	22	40	0	C
1.6	35	20	3	19	22	40	0	C
1.7	35	20	3	19	22	40	0	C
1.8	35	20	3	19	22	40	0	C
1.9	35	20	3	20	22	40	0	C
2.0	35	20	3	24	22	30	0	C
2.1	35	20	3	24	22	30	0	C
2.2	35	20	3	25	22	30	0	C
2.3	35	20	3	25	22	30	0	C
2.4	35	20	3	26	22	30	0	C
2.5	38	20	3	26	22	30	0	C
2.6	38	20	3	27	22	30	0	C
2.7	38	20	3	27	22	30	0	C
2.8	38	20	3	28	22	30	0	C
2.9	38	20	3	28	22	30	0	C
3.0	45	20	3	31	22	30	0	C

Anotronic-SKM EDMs
Manual, ZNC, CNC

Anotronic-Ocean
EDM Drilling Machines
Manual, ZNC, CNC

CNC Wire EDM Sub-Contract
On The Latest Technology
Machines

Anotronic Electrochemical
Deburring Machines (ECD)

Perhaps You Did Not Realise How Much ANOTRONIC™ Has To Offer!

Multi axis CNC Turning

- Full High capacity Machine Shop including fully Automated 5axis cnc Milling,Multi axis CNC Turning,Grinding etc.
- Laser Part marking
- CNC CMM inspection
- Sale of Standard Electric Discharge Machines (Manual, ZNC & CNC) to take components up to 2500mm x 1200mm x 700mm.
- Design, Manufacture & Sale of Electrochemical Deburring Machines (ECM)
- Comprehensive After Sales Service.
- Design, Manufacture & Sales of EDM & ECM Tooling and Electrodes.
- Multi axis CNC EDM & ECM Sub-Contract Service.
- ECM Sub-Contract Service.
- Wire EDM Sub-Contract Service with cutting areas up to 500mm x 320mm x 420mm HIGH.
- EDM small hole drilling Machines and Sub-Contract Service.
- EDM/ECM Consultancy Service.

CNC CMM inspection

Fully Automated 5axis cnc Milling

5axis cnc Milling

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