ANOTRONIC.™ SKM

operation manual

T30 ZNC

Rev UK02

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CHAPTER 1 : SPECIFICATION
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1-1 MACHINE BODY

SPECIFICATION	T30
X、Y-TRAVEL & SETTING ACCURACY	200x150mm
Z-TRAVEL (BACKSLIDE TRAVEL)	200mm
TABLE DIMENSION	360x220mm
WORK TANK DIMENSION	560x330x260mm
MAXIMUM TABLE - QUILL DISTANCE	420mm
MAXIMUM ELECTRODE WEIGHT	50kgs
MAXIMUM TABLE LOADING	350kgs
MACHINE WEIGHT	760kgs

1-2 POWER SUPPLY UNIT

SPECIFICATION	T30	
NOMINAL CURRENT	15A	30A
CONNECTED RATING	2KVA	4KVA
INPUT VOLTAGE	220 / 380 / 415 / 440	
MAXIMUM STOCK REMOVAL RATE	$100mm^3$/min	$200mm^3$/min
BEST SURFACE ROUGHNESS	Ra 0.2 µm (NFD)	
BEST ELECTRODE WEAR RATE	< 0.2% (OPTION < 0.1%)	

1-3   DIELECTRIC TANK

SPECIFICATION	T30
CAPACITY	120 litre
FILTERS	2pcs

1-4   STANDARD ACCESSORIES (AS FIG. 1-1)

1.   WORK FASTENING TOOL-KITS · · · · · · · · 1. UNIT

2.   MAGNETIC FLUSHING SET · · · · · · · · · · 1. UNIT

3.   ELECTRODE HOLDER · · · · · · · · · · · · 1. UNIT
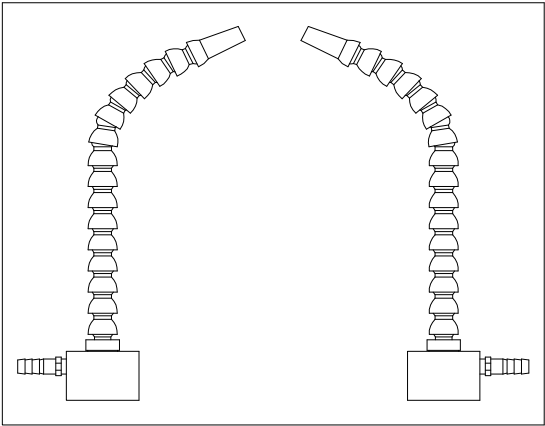
1-5   SPECIAL ACCESSORIES

1.   3R CHUCK

2.   ITS CHUCK

3.   PERMANENT MAGNETIC CHUCK

4.   DI - ELECTRIC COOLER
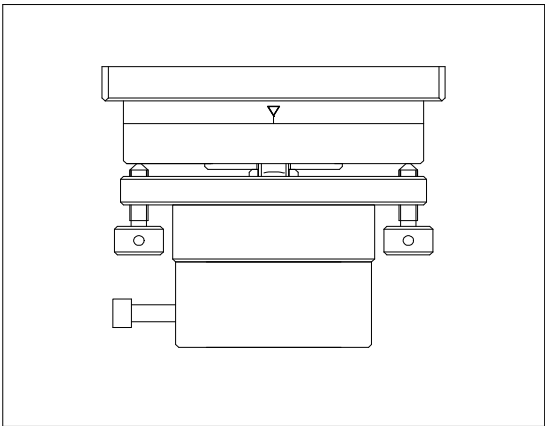
5.   SURFACE FINISH SCALE

6.   FIRE EXTIQUISHER

FIG 1-1
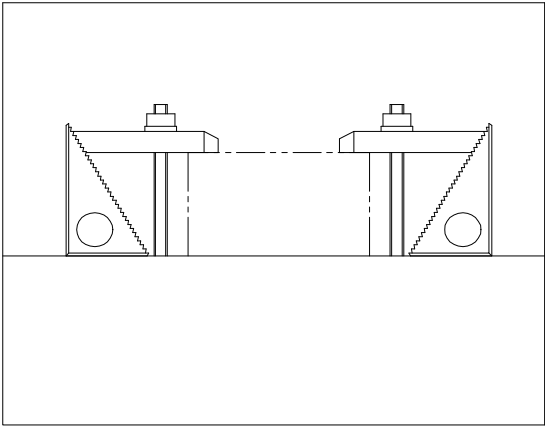
1

2

3

CHAPTER 2 : INSTALLATION PLACE

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2-1   PLACE

1.   THIS MACHINE IS A HIGH PRECISION UNIT, IT MUST BE INSTALLED IN AIRY AND
     CLEAN ROOM.

2.   THE MACHINE MUST BE PROTECTED FROM THE SUN X-RAYS OR HEAT FORM RADIATORS.

3.   THE SPACE AROUND THE MACHINE SHOULD BE LARGE ENOUGH FOR THE OPERATOR TO REMOVE
     THE COVER FOR THE MAINTENANCE OF THE MACHINE, AND TO OPEN/CLOSE THE MACHINE DOOR.

2-2   DIAGRAM OF MACHINE (NOT READY FOR EUROPEAN DIAGRAM)

FIG. 2-1 IS THE DIAGRAM ON THE RIGHT ILLUSTRATES THE AREA REQUIRED FOR INSTALLATION.

2-3   APPOINTMENTS REQUIRE

1.   POWER REQUIREMENTS

AC ELECTRICAL CURRENT (POWER SUPPLY) MUST BE SUPPLIED BY BUYER, AND THE MACHINE
SHOULD BE CONNECTED WITH MACHINE THROUGH A SAFETY AC BREAKER .

THE INPUT VOLTAGE ARE AC 220/380/415V 3 PHASE
MODEL   15A : POWER SUPPLY UNIT 3 PHASE 2 KVA

THE INPUT VOLTAGE ARE AC 220/380/415V 3 PHASE
MODEL   30A : POWER SUPPLY UNIT 3 PHASE 4 KVA

2.   FOR SAFE OPERATION ,THE MACHINE MUST BE GROUNDED AND THE OPERATOR SHOULD STAND
     ON A THICK WOODEN PLATFORM.

3.   ENSURE THAT THE OPERATION SITE IS WELL LIT AND VENTILATED, INVARIABLE TEMPERATURE IS
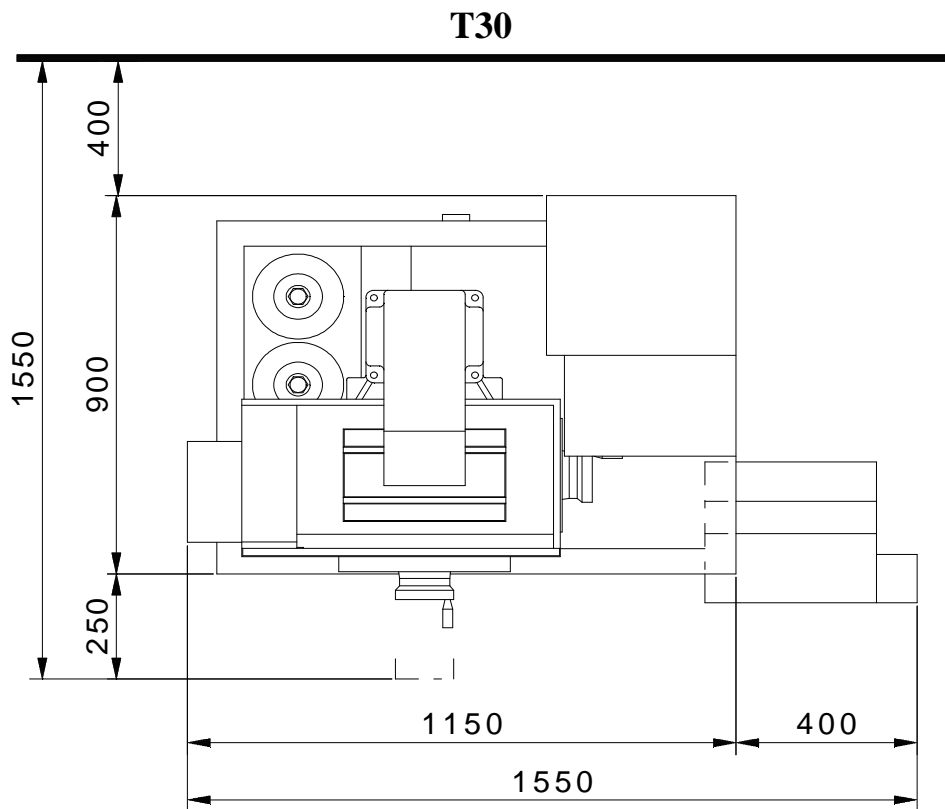   BETTER UNDER 28℃ (AIR CONDITIONER IS NECESSARY).

T30

FIG. 2-1

2-4   LEVEL ADJUSTMENT

THIS MACHINE IS SUPPORTED BY FOUR FEET THAT WHEN TURNED BY WRENCH (SIZE 26) (FIG. A) CONTROL THE LEVEL ADJUSTMENT.

2-5   Positioning of Dielectric recycle entrance box

The excess grease of machine are centralized to drain away by the discharge hose at the right front bottom of machine, but in order to transport considerations, the positioning of Dielectric recycle entrance box must be finished after the machine's installation.(REF. FIG. A)

Positioning seat of
Dielectric recycle entrance box

M5 Screws

26

Dielectric recycle entrance box
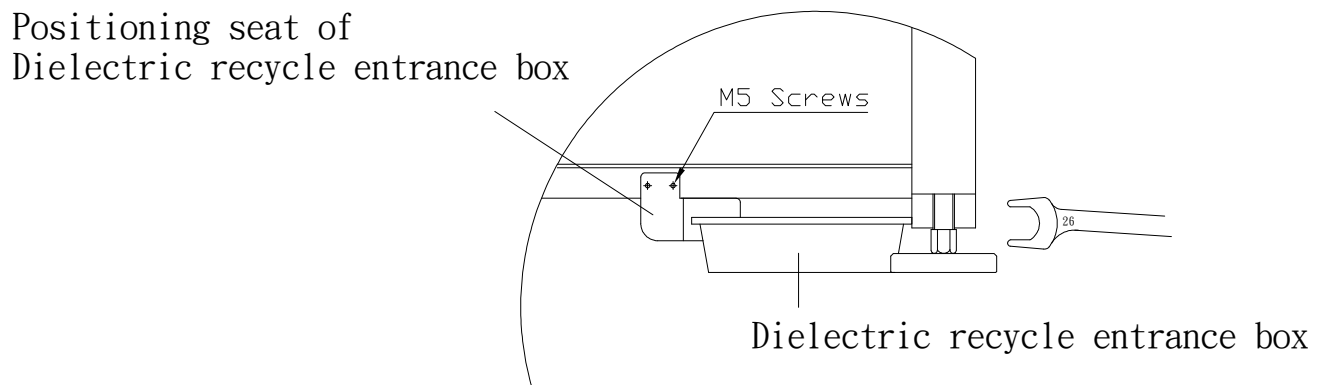
(REF. FIG. A)

2-6   DEGREASING

IN ORDER TO PROTECT MACHINE PARTS AND FINISHED SURFACES FROM RUSTING, THEY ARE COATED WITH OIL PRIOR TO SHIPMENT.   BEFORE OPERATING, THE MACHINE MUST BE DEGREASE. KEROSENE, GASOLINE OR FUEL OIL CAN ALL SERVE AS DEGREASING AGENTS.

CHAPTER 3 : INSTALLATION
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3-1 DIELECTRIC TANK

1. INJECT THE DIELECTRIC FLUID INTO DIELECTRIC TANK FROM DRAIN BOX OR WORK TANK.

2. CAPACITY :
      MODEL T30 : 120 LITERS

3. THE FOLLOWING DIELECTRIC FLUIDS ARE RECOMMENDED, THOUGH OTHERS OF EQUIVALENT MAY BE USED. (TABLE . A)

4. LUBRICATING OIL TGPE OF THE LUBRICATOR：MOBIL OR SHELL68#
      (OR SIMILAR LUBRICATING OIL)

Product	Use		Viscosity (20℃/ 68℉)	Density (20℃/ 68℉)	Flash point (℃:℉)	Aromatic contents (％)
	Max. removal	**Min.** wear				
AGIP Lamium 14	●	●	3.32	0.77	109/228.2	0.5
ARALUX MF	●	●	3.6	0.79	125/257	0
ESSO DE-FLUID 38	●	●	3.27	0.76	117/242.6	0.01
ESSO DE-FLUID	●	●	7.37	0.82	124/255.2	0.65
BP 200T	●	●	2.9	0.76	104/219.2	0
BP 250	●	●	6	0.81	125/257	2
YOU CAN USE THE OTHER SAME LEVEL DIELECTRIC OIL BESIDES ABOVE RECOMMENDATION LIST, BUT THE FLASH POINT MUST BE OVER THAN 70℃						

TABLE A

FIG. 3-1
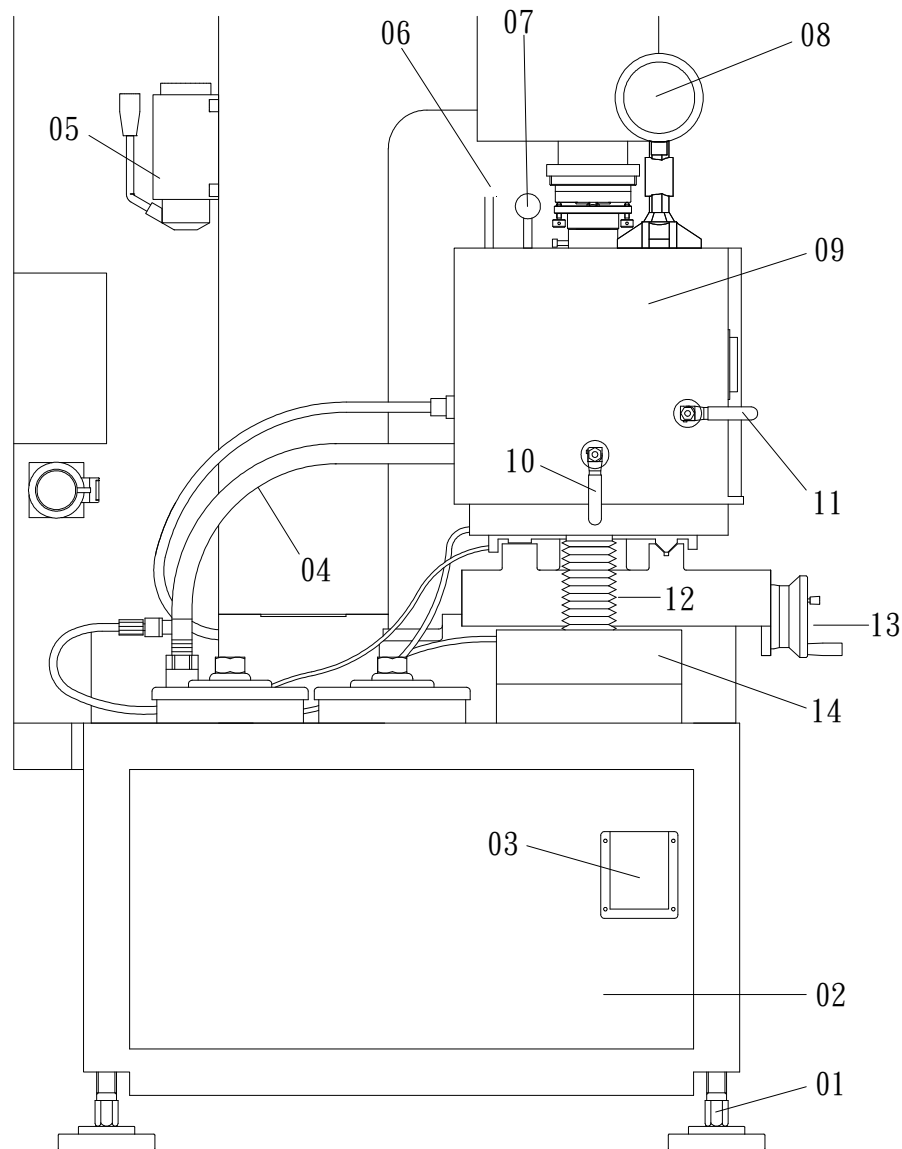
01: HORIZONTAL ADJUSTABLE BOLT   08: FIREPROOF LIGHT

02: DIELECTRIC TANK   09: THE WORK TANK

03: OIL LEVEL CHECK TANK   10: THE SHAKE-HANDLE FOR OVERFLOW CONTROL

04: THE TUBE OF Z-AXIS OIL SUPPLY   11: THE SHAKE-HANDLE FOR DRAIN & SUCTION CONTROL

05: OIL INJECTION TOOL   12 : DRAIN TUBE

06: THE CONTROL OIL LEVEL HANDLE   13 : MPG

07: THE DRAIN HANDLE   14: RECEIVED BOX

3-2 CONNECTION BETWEEN THE MACHINE AND POWER SUPPLY UNIT
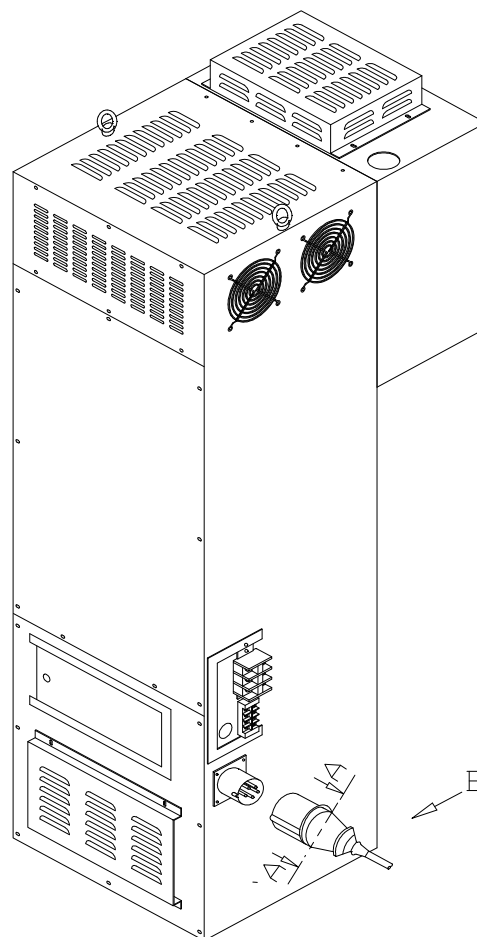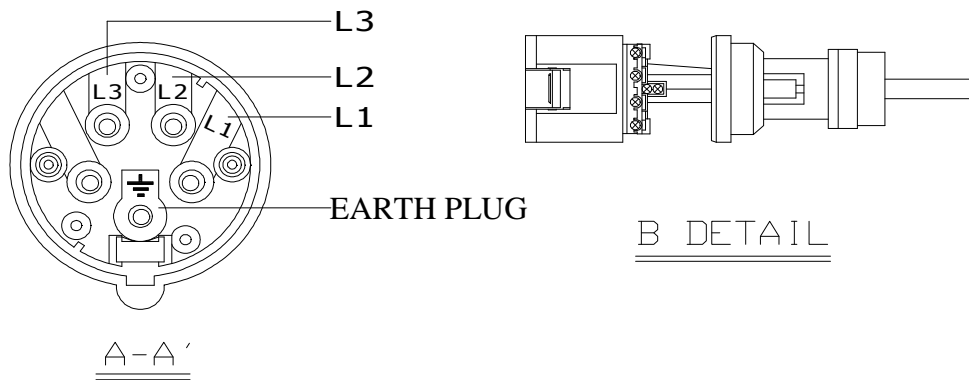
THE INSTRUCTION OF 5P ROUND CONNECTOR OF INPUT VOLTAGE.

L1 : CONNECTED WITH RED WIRE   L3 : CONNECTED WITH BLACK WIRE

L2 : CONNECTED WITH WHITE WIRE   EARTH PLUG: CONNECTED WITH YELLOW AND GREEN WIRE

A-A′

B DETAIL

CHAPTER 4: THE INSPECTION & PROCEDURE OF DIELECTRIC CIRCUIT
♠♠

PROCEDURE

1. CLOSE WORK TANK DOOR AND LOCK IT. (FIG.4-1)

2. TURN OFF 4 PCS FLUSH SWITCH D1-D4   (REFER TO SPECIFICATION LABEL)

3. TURN RIGHT THE PULL STICK E OF DRAIN (FIG.4-1) AND IT WILL OPEN THE DRAIN GATE. (TURN C.W.)

❋ PULL UP THE STICK E OF DRAIN AND TURN LEFT TO STABLE POSITION(TURN C.C.W.).

4. PULL UP THE STICK F OF OIL LEVEL CONTROL TO THE MAXIMUM POSITION.

❋ THE OIL LEVEL CAN BE ADJUSTED BY THE POSITION OF PULL STICK-F.

5. TURN RIGHT THE G PART FOR CLOSING THE FLUSHING SWITCH.(AS FIG. 4-2)

6. PULL THE INLET ROD (H PART OF FIG. 4-3) TO HORIZONTAL POSITION. (MEAN "OFF" POSITION.)

7. TURN ON THE POWER SUPPLY SWITCH. (FIG. 4-4) AND PRESS THE INLET KEY OF CONTROL PANEL THEN DIELECTRIC FLUID PUMP STARTS WORKING.

THE ITEM OF INSPECTION

1. DIELECTRIC FLUID PUMP: IF IT IS SPINNING IN THE DIRECTION OF ARROW MARK.
   (FIG 4-3) WHETHER PRESSURE IS ABOVE 1.5KG / $cm2$ AT PRESSURE GAUGE.

❋ IF IT HAS WRONG DIRECTION, THEN TURN OFF THE MAIN SWITCH, EXCHANGE TWO OF INPUT 3 PHASES ELECTRIC WIRE'S POSITIONS.

2. REFER TO SPECIFICATION LABEL OPEN THE FLUSHING COCKS-D1D2 LIGHTLY, AND FLUSHING SWITCH OF WORKHEAD TO CONFIRM WHETHER THEY CAN RUN NORMALLY.

❋ DO NOT OPEN TOO MUCH, TO AVOID SPLASHING ON OTHER PERSONS & ENVIROMOENT BECAUSE OF LARGE OIL PRESSURE.

3. OPEN D4 SLIGHTLY, AND MAKE SURE WHETHER THE SUCTION SWITCH-J(AS FIG. 4-3) IS IN GOOD-RUNNING OF FLUSHING FUNCTION WHEN IT IS AT THE HORIZONTAL POSITION -"ON", (FIG 4-1) WHETHER IT IS IN GOOD-RUNNING OF SUCTION FUNCTION WHEN IT'S AT THE VERTICAL POSITION.

4. OPEN D3 LIGHTLY -THE COCK OF FLUSHING OIL, AND PRESS THE SYNCHRONOUS FLUSHING CONTROL "ON" SWITCH OF CONTROL PANEL, THEN THE FLUSH OIL ACTION WILL ACCORD WITH THE UP-DOWN MOVEMENT OF Z-AXIS .

5. TURN THE INLET ROD OF DIELECTRIC FLUID -H (AS FIG. 4-3) TO HORIZONTAL "ON" POSITION , AND PRESS THE DIELECTRIC FLUID CONTROL "ON" SWITCH , THEN CHECK IF THERE ARE A LOT OF OIL ENTER WORK TANK AND TO THE INDICATED LEVEL?
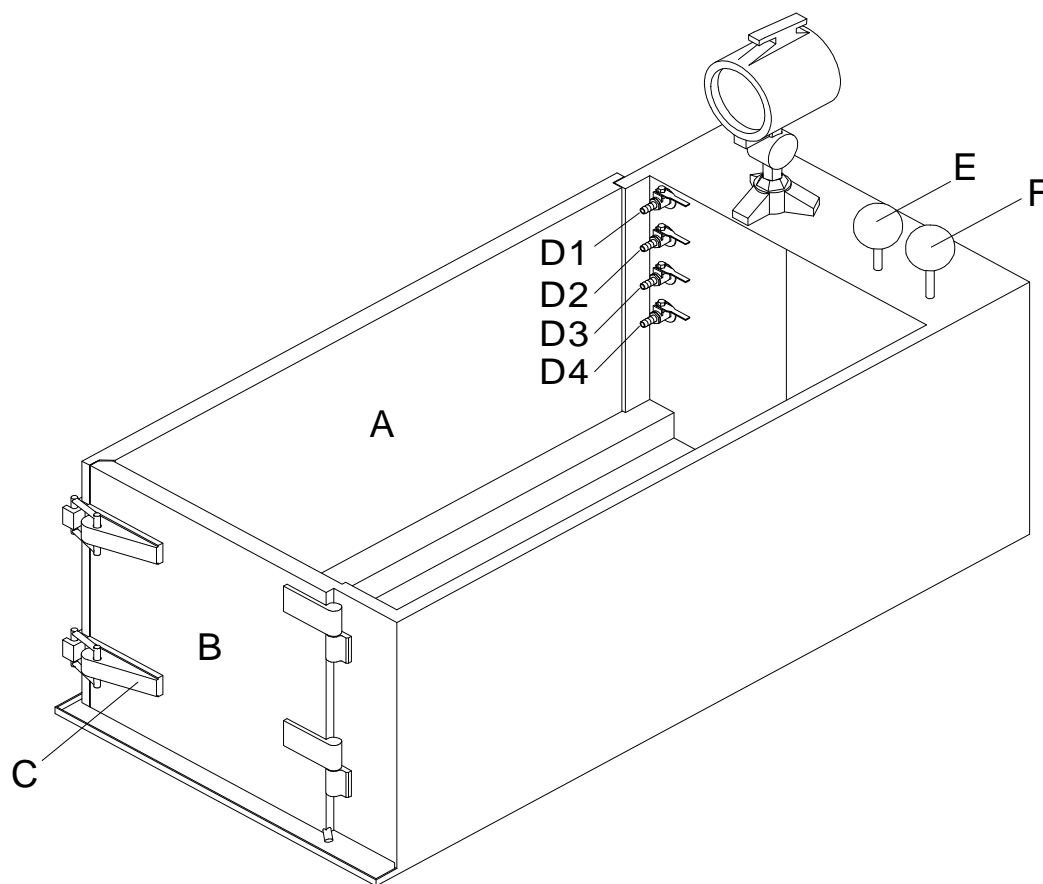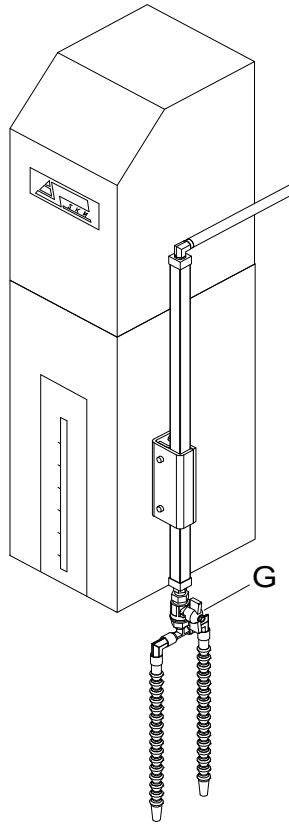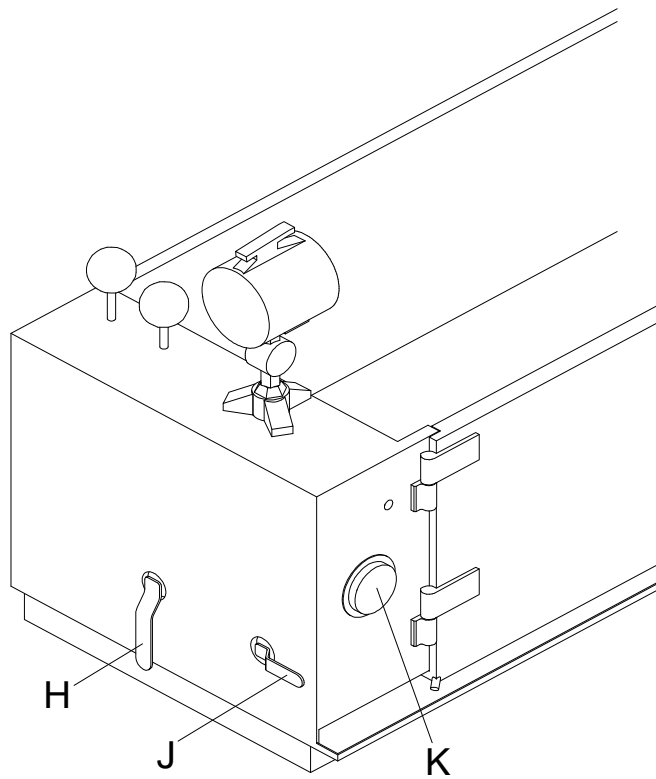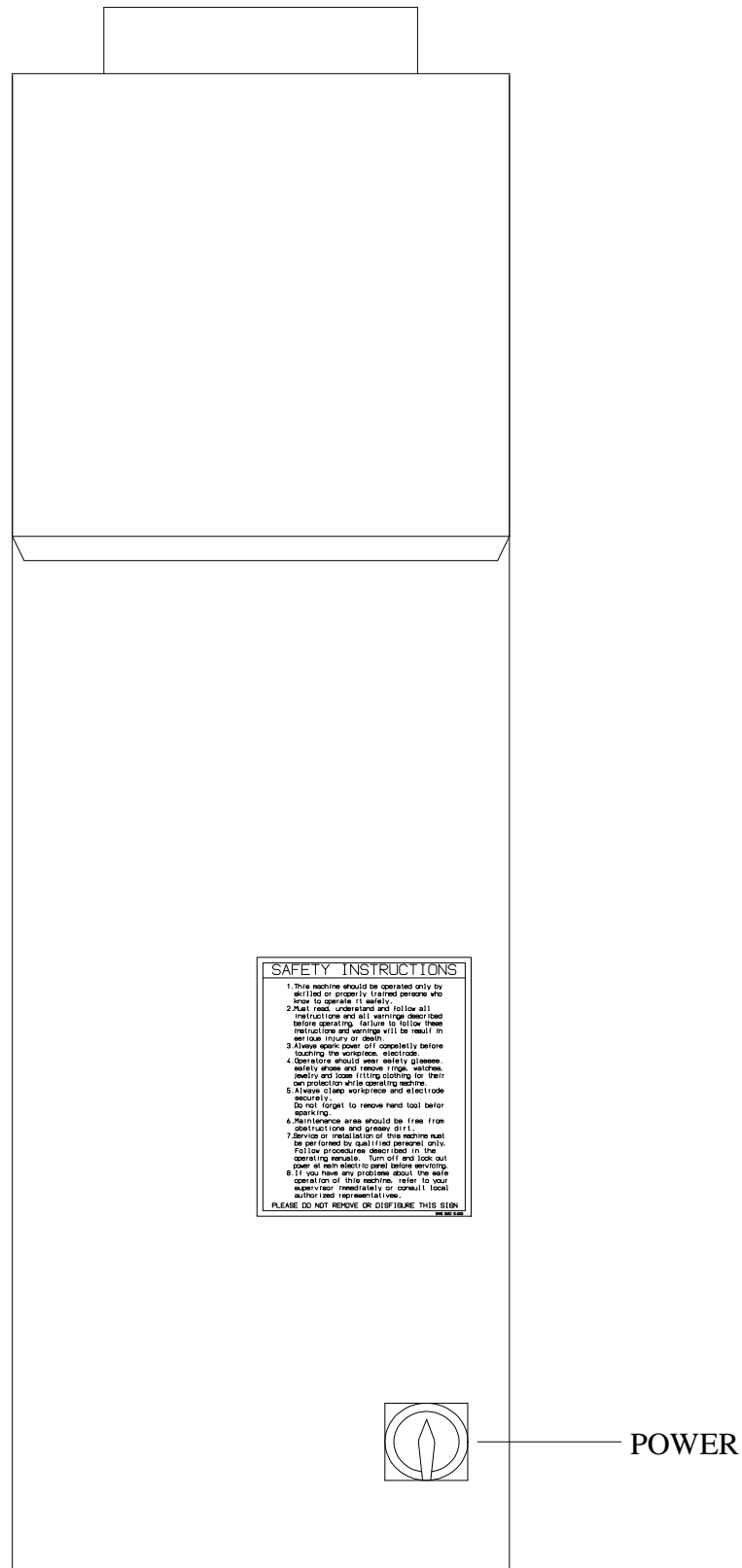

FIG. 4-1

G

FIG. 4-2

H

J

K

FIG. 4-3

SAFETY INSTRUCTIONS

1. This machine should be operated only by
   skilled or properly trained persons who
   know to operate it safely.
2. Must read, understand and follow all
   instructions and all warnings described
   before operating. failure to follow these
   instructions and warnings will be result in
   serious injury or death.
3. Always spark power off completely before
   touching the workpiece, electrode.
4. Operators should wear safety glasses.
   safety shoes and remove rings, watches.
   jewelry and loose fitting clothing for their
   own protection while operating machine.
5. Always clamp workpiece and electrode
   securely.
   Do not forget to remove hand tool befor
   sparking.
6. Maintenance area should be free from
   obstructions and greasy dirt.
7. Service or installation of this machine must
   be performed by qualified personnel only.
   Follow procedures described in the
   operating manuals. Turn off and lock out
   power at main electric panel before servicing.
8. If you have any problems about the safe
   operation of this machine. refer to your
   supervisor immediately or consult local
   authorized representatives.

PLEASE DO NOT REMOVE OR DISFIGURE THIS SIGN

POWER

FIG. 4-4

CHAPTER 5:   THE INSTRUCTION OF DIELECTRIC CIRCULATION
♠ ♠

01- INLET VALVE

02- CONTINUOUS INJECTION COCK

03- CONTINUOUS INJECTION COCK

04- SYNCHRONOUS FLUSHING COCK

05- COCK OF FLUSHING & DRAIN

06- COCK OF SUCTION

07- VALVE OF SUCTION

08-VACUUM PRESSURE GAUGE

09-MAGNETIC CONTROL VALVE

10-PRESSURE GAUGE (PRESSURE ~(0.8~1.5KG/CM2)

11-DRAIN GATE

12- THERMOMETER OF OIL

13- OVERFLOW CONTROL

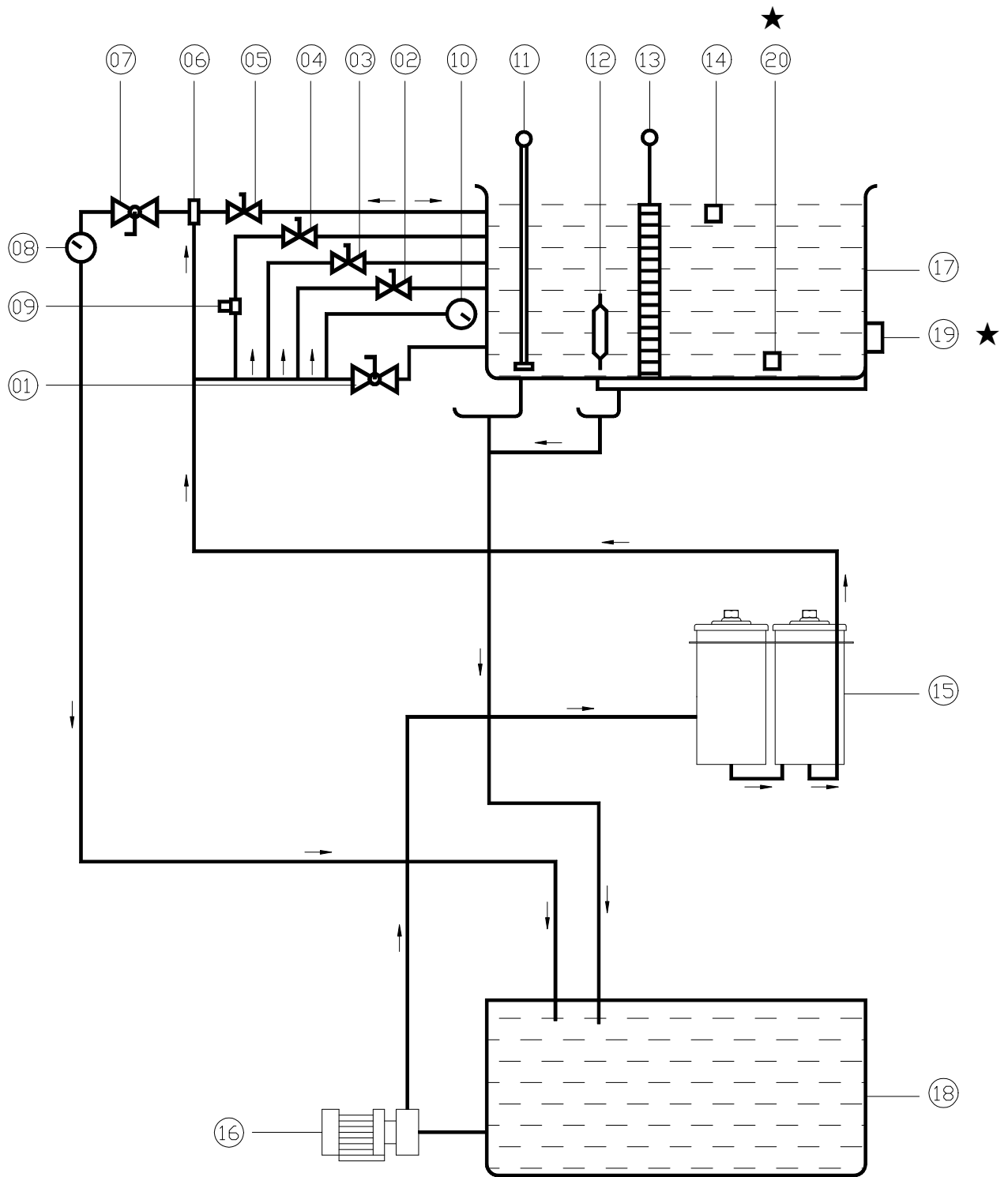14-LIQUID LEVEL FLAT SWITCH (FOR OVERFLOW SAFETY PROTECTION)

15-DUAL FILTER SYSTEM

16- CIRCULATION PUMP

17- WORK TANK

18- DIELECTRIC TANK

★19- THE SYSTEM OF SAFETY PROTECTION **(ONLY USE AT EROPE AND STATE STANDARD)**

★20- LIQUID LEVEL FLAT SWITCH (FOR SAFETY PROTECTION OF DIELECTRIC TANK)
   (ONLY USE AT EROPE AND STATE STANDARD)

DIELECTRIC CIRCULATION

CHAPTER 6 : MACHINE OPERATION
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6-1 SET UP ELECTRODE

1. PUT ELECTRODE INTO HOLDER AND FIX IT BY THE SCREW A(IN FIG. 6-1B).

2. FIX 2 SETS OF DIAL GAUGE ON WORK TABLE (AS FIG. 6-1C), CHECK IF THERE IS ANY DEVIATION BY MOVING THE Z AXIS UP-DOWN ARROWKEY OF MANUAL CONTROL PANEL.   YOU CAN CHECK THE VERTICALITY BETWEEN ELECTRODE AND WORK TABLE FROM THE DEVIATION AND ADJUST THE 4 SCREWS B TO SUITABLE VERTICALITY.

3. FIX 1 DIAL GAUGE ON THE WORK TABLE (AS FIG. 6-1D), AND MOVE X,Y AXIS FOR CHECKING IF THERE IS ANY DEVIATION OF HORIZONTALLY .

4. IT IS NECESSARY TO ADJUST B.C. SPECIAL SCREWS (AS FIG. 6-1A) WITH BALANCE, FOR EX: WHEN YOU LOOSE ONE OF B SCREWS, YOU HAVE TO TURN TIGHT THE OTHER B SCREW WHICH IS AT SYMMETRICAL SIDE .
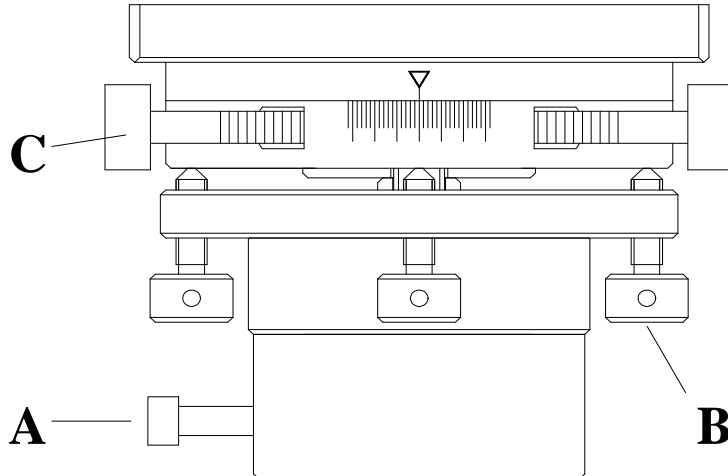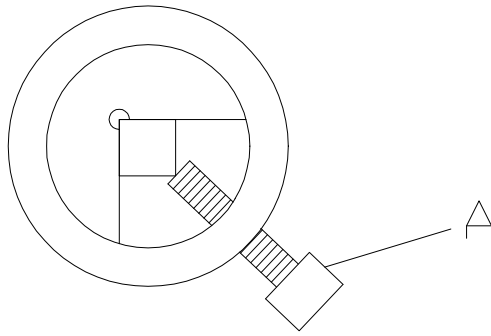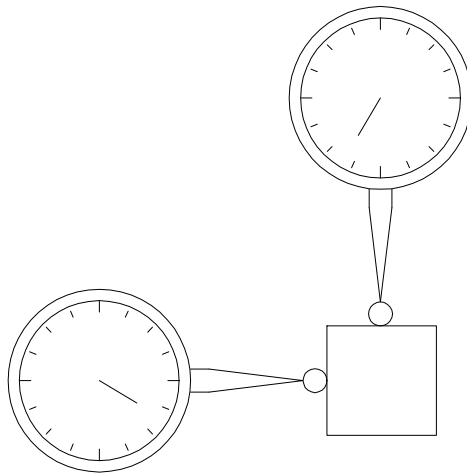

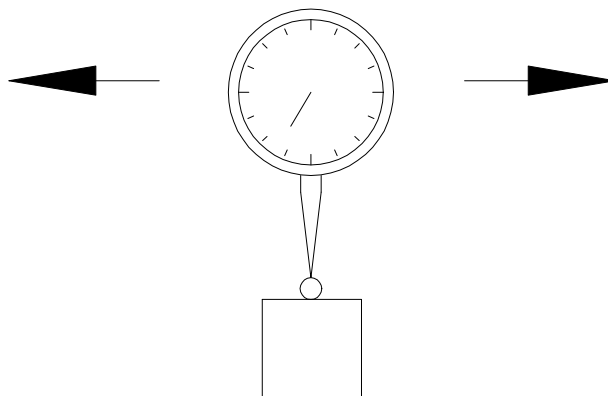**FIG. 6-1A**

FIG. 6-1B

FIG. 6-1C

FIG. 6-1D

6-2   CLAMPING WORKPIECE ON THE TABLE

1.   FIX THE WORKPIECE BY THE WORK FASTENING TOOL-KIT.(AS FIG. 6-2A)

2.   FIX THE WORKPIECE BY THE PERMANENT MAGNETIC CHUCK.(AS FIG. 6-2B)

3.   CHECK THE HORIZONTALLY OF WORKPIECE BEFORE FIXING.
YOU CAN FIX THE DIAL GAUGE ON THE CHUCK OF ELECTRODE (AS 6-2C) ,AND
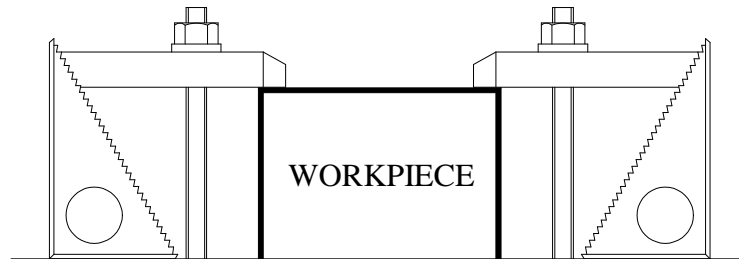MOVE THE X,Y AXIS FOR CHECKING IF THERE IS ANY DEVIATION OF HORIZONTALLY.
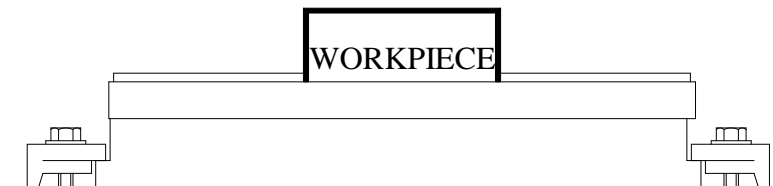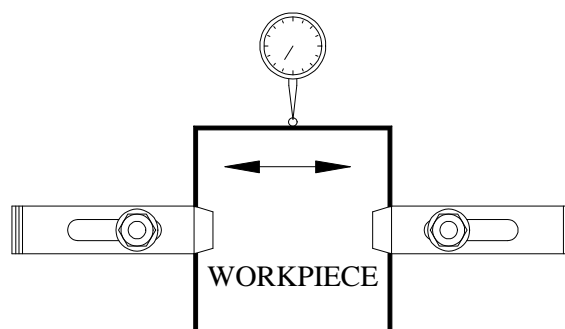
FIG. 6-2A

FIG. 6-2B

FIG. 6-2C

6-3 THE ADJUSTMENT OF LONGITUDINAL AND TRANSVERSE

1.:   LOOSE THE FIXED ROD OF X,Y AXIS BY SPINNING TO THE C.C. W. DIRECTION.

2.:   PUSH THE SAFETY LOCK PIN AND COMBINE WITH ONE OF 6 INTERIOR HOLES, THEN YOU CAN
      MOVE X OR Y AXIS.

3.:   IF YOU WANT X ,Y AXIS MOVE FORWARD, YOU CAN SPIN THE HAND WHEEL TO CW. DIRECTION,
      IF MOVE BACKWARD, SPIN THE HAND WHEEL TO CCW. DIRECTION.

4.:   AFTER SETTING THE REFERENCE VALUE, YOU CAN TURN THE FIXED ROD OF X,Y AXIS TO CC
DIRECTION , MOREOVER ,PULL THE SAFETY LOCK PIN FOR DEPART THE INTERIOR HOLE .
AFTER THESE 2 PROCESS, THE REFERENCE VALUE OF X,Y AXIS CAN NOT TO BE MOVED.
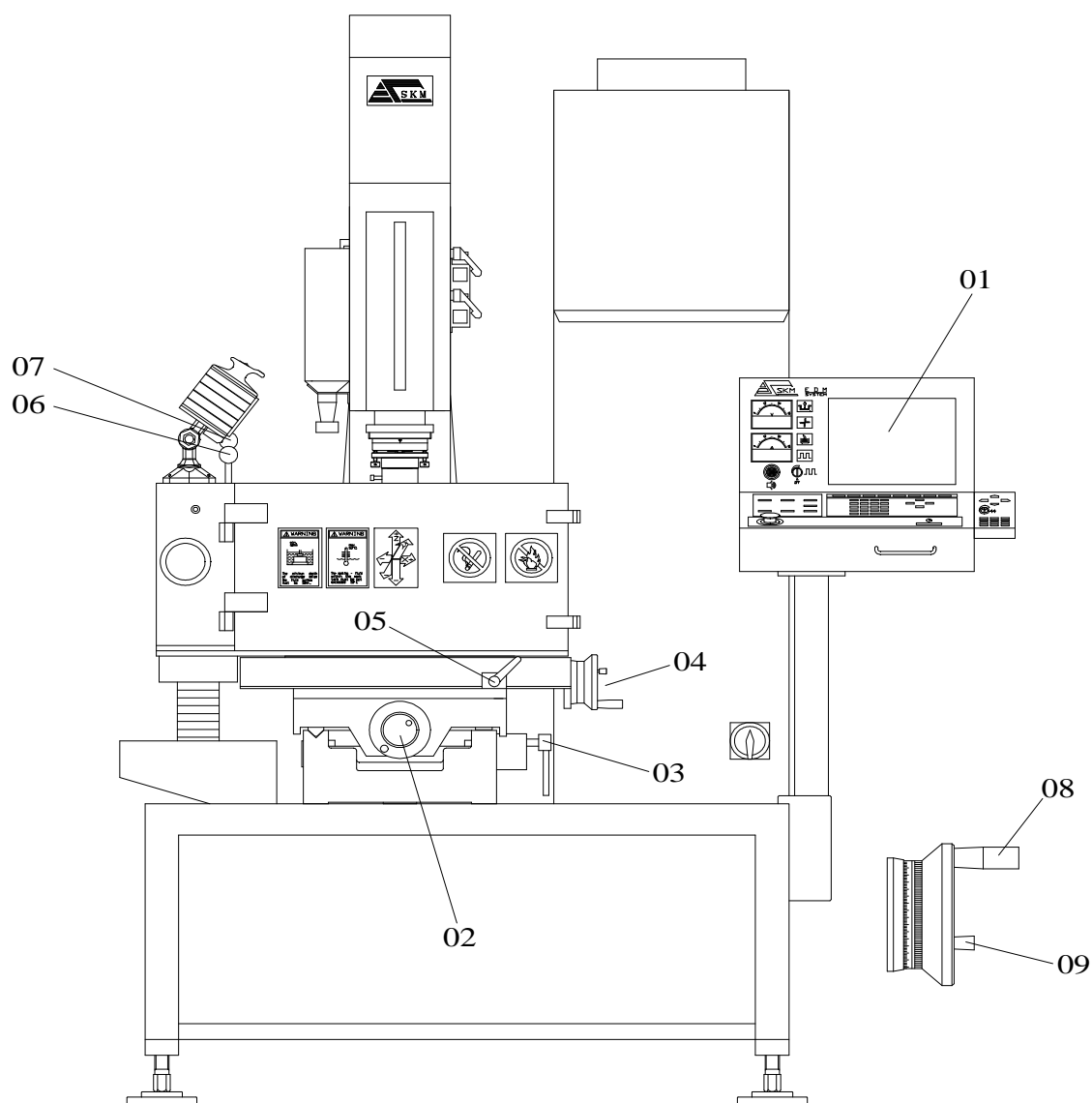
01 - REMOTE CONTROL PANEL   06 - THE DRAIN KNOB

02 - THE HAND WHEEL OF Y AXIS   07 - OVERFLOW CONTROL KNOB

03 - THE LOCK BLOCK OF Y AXIS   08 - THE KNOB OF HAND WHEEL

04 - THE HAND WHEEL OF X AXIS   09 - SAFETY LOCK PIN

05 - THE LOCK BLOCK OF X AXIS

FIG. 6-3

6-4   CLOSE THE DOOR OF WORK TANK

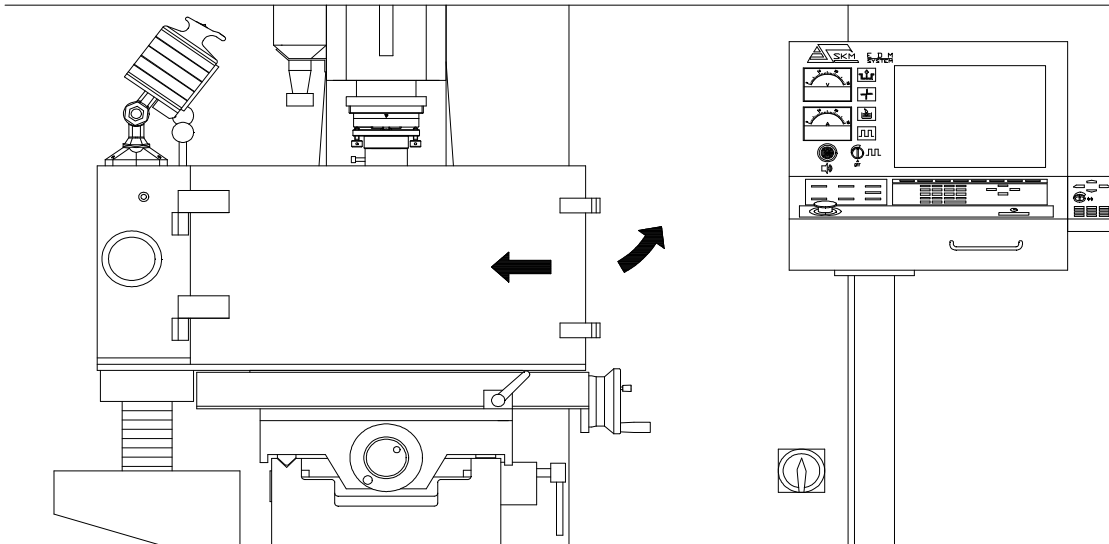CHECK IF LOCK IT EXACTLY AFTER CLOSING THE DOOR.

FIG. 6-4

Remark：the user has to drain out the dielectric fluid in worktank , then open iron door knob.

6-5   THE CONTROL OF WORK TANK

PLEASE REFER TO CHAPTER 6 FOR OPERATING THE WORK TANK & DIELECTRIC FLUID.

1.   THE METHOD OF FLOWING OIL:

OPEN ROD OF FLUID INLET BY TURNING THE ROD (FIG. 6-5A) TO THE HORIZONTAL POSITION, PUSH THE PUMP SWITCH "ON " OF CONTROL PANEL TO START FLOWING FLUID.   PULL THE ROD TO VERTICAL POSITION WHEN THE DIELECTRIC FLUID COVER THE WORKPIECE TO APPROX. 30-50MM.

2.   THERE ARE 4 FLUSHING MODES.   (FIG. 6-5B)

A.   CONTINUOUS INJECTION.

B.   CONTINUOUS INJECTION.

C.   PULSED INJECTION SYNCHRONIZED WITH PULSATION OF THE ELECTRODE.

D.   INJECTION AND SUCTION COMBINED.

E.   CONTINUOS FLUSHING AT WORKHEAD.

REMARK:

＊.   THE FLUSH COCK CONTROLS THE FLUSHING ACTION, EITHER STRONG OR WEAK.

    WHEN MACHINING, THE DIELECTRIC FLUID LEVEL MUST BE MAINTAINED BETWEEN 30-50MM OVER THE SURFACE OF THE WORKPIECE.

＊.   WHEN FINISH MACHINING, OPEN THE TANK DOOR FOR KEEP THE AGE OF SPONGE STICK .

＊.   CHECK IF RAN OUT OF OIL BEFORE OPENING TANK DOOR?

＊.   IT IS BETTER TO UTILIZE THE OTHER FLUSHING EQUIPMENT'S-MAGNETIC INDUCTION OIL NOZZLE BASE OR FLUSHING SOFT TUBE, TO DRAIN ARC, IT CAN KEEP THE QUALITY & SPEED OF SPARKING .
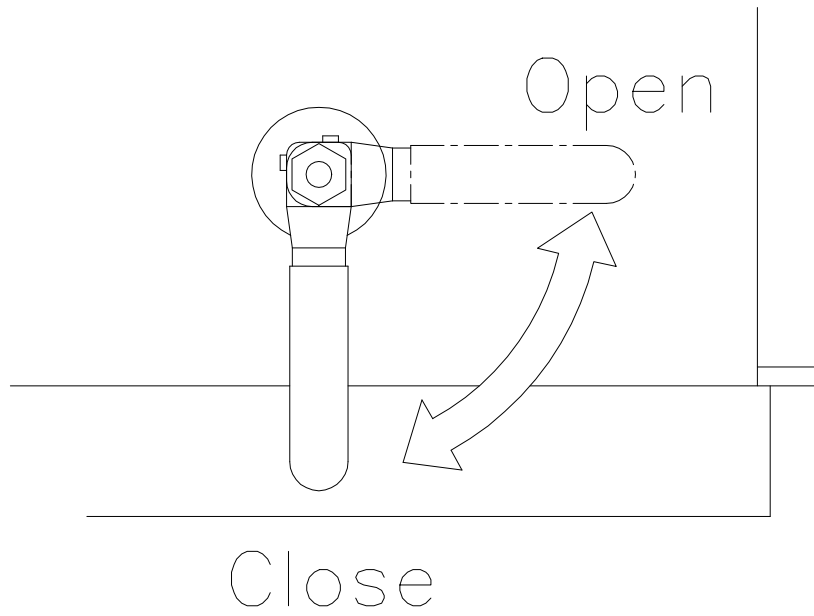
FIG. 6-5A
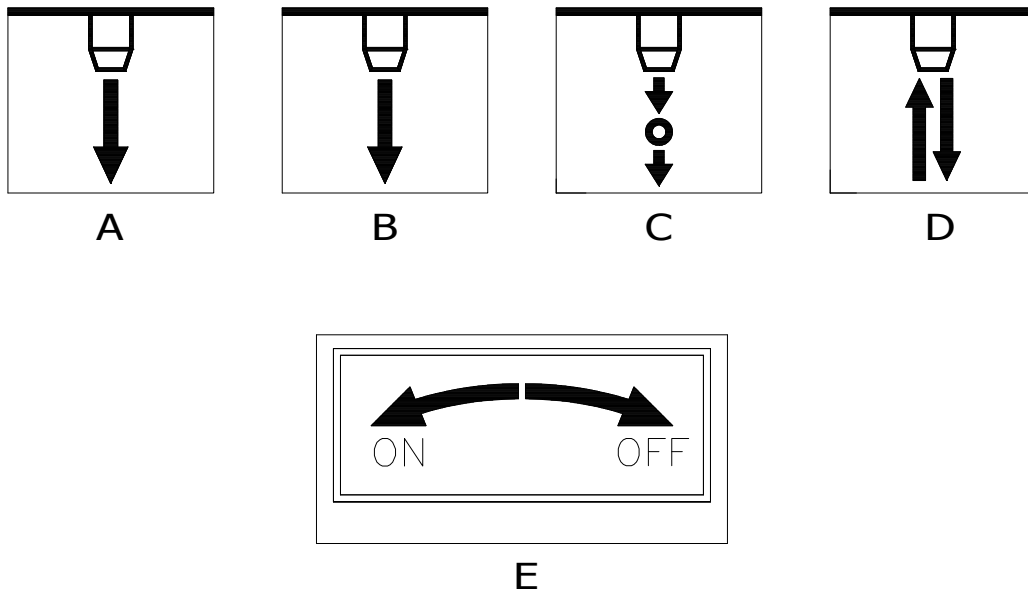
FIG. 6-5B

Machine Lubrication Instructions

MACHINE LUBRICATE IS VERY INPORTANT STEP，IT'S REGARDING PRECISION、LIFE AND AXIAS. MAINTENANCE STEP AS BELOW：（FIG..1）

WHEN LUBRICATE LOWER THAN UNDERLINE ，（FIG..2） IT SHOULD BE ADD NEW LUBRICATE TO UPLINE.

注意： 注油器是否有油
注油稠油工作， 每天進行一次。
每次二作程序為：
1.將注油拉柄， 拉兩次後， 令X、 Y、 Z、 Z2等軸走完全程。
2.如1項進行兩次即可。

ATTENTION:CHECK OIL IN THE LUBRICATOR.
THE LUBRICATOR SHOULD BE PROCEED ONCE A DAY.
PROCEDURE AS FOLLOWIFG:
1. PULL THE LUBRICATOR AT TWICE AND MOMENT X, Y, Z, AND Z2 TRAVEL STROKES.
2. PROCEED ABOVE PROCESS ONCE AGAIN

(Fig.1)

Grease Manual Lubricator

No. 68, Slide Way Oil Inlet

Grease Connector

Grease Gun

Manual Lubricator

The lubricated frequency is about 100cc/ 12hr working time.

Lubricating Grease # 0 Grease Inlet

C-axis

Air Compressor Lubricant Inlet

The lubricated frequency is about 20cc/ 480hr working time.

FRL(Filters, Regulators , Lubricators)

(Fig.2)

Part of Oil Filler	Oil Type	Applicable Models
XYZ axes (Manual Lubricator)	No. 68, Slide Way Oil (Mobil Mobil # 2) (Shell Shell # S2-M)	T、S、K、D、M Models
XYZ axes (Grease Manual Lubricator)	# 0 Grease	M860-M3010 Models
C-axis	# 0 Grease	C-axis Models
FRL (Filters, Regulators , Lubricators)	Air Compressor Lubricant	C-axis, ATC and D Models

The above oil are recommended to use.

SKM T30 ZNC GENERATOR
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ENCLOSING 30A   45A   60A   90A   120A   APPLICATION NOTE

CHAPTER 1 : ECOMA GENERATOR INTRODUCTION
♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠

ECOMA EDM SYSTEM CONTROL BOX , THE HARDWARE UTILIZED IS A 32-BIT INDUSTRIAL-USE HIGH SPEED COMPUTER FOR STABILITY, DURABILITY AND MATCHED POSITION CONTROL PRECISION.

Basic Functions

Ⅰ INNOVATIVELY EQUIPPED WITH THREE TYPES OF SAFETY DEVICES, HAS AN INFRARED FIRE MONITOR, OIL TEMPERATURE MONITOR, AUTOMATIC FIRE EXTINGUISHER AND MANY OTHER SAFETY DESIGN FEATURES TO PROVIDE ABSOLUTE DISTANCING FROM FLAMES.

Ⅰ HAS AN AUTOMATIC SPARKING OFF TIME ADJUSTMENT TO PREVENT CARBON ACCUMULATION AND ELECTRODE WEAR.

Ⅰ OPTIONAL AMPERAGE TUNING, PROVIDE 15A、30A OR HIGHER OUTPUT POWER SUPPLY.

Ⅰ INTERIOR DESIGNED WITH AUTOMATIC DETECTION SYSTEM, AUTOMATICALLY CURRENT PROTECTION CONTROL, TRANSISTOR OVERLOADING PROTECTION, RADIATOR DEVICES AND METAL SHELL GROUNDING DEVICE TO PREVENT MISCELLANEOUS MALFUNCTIONS HAPPENED .

Ⅰ ELECTRONIC APPARATUS USE EUROPEAN, AMERICAN AND JAPANESE PRODUCTS, ALL APPARATUS COMPLY WITH STANDARDISATION AND STRICT TESTING, THEREFORE, IT IS RELIABLE AND EASY TO MAINTAIN.

THESE FEATURES PROVIDE HIGH EFFICIENCY ZNC CONTROL AND SAFETY WORKING ENVIRONMENT.
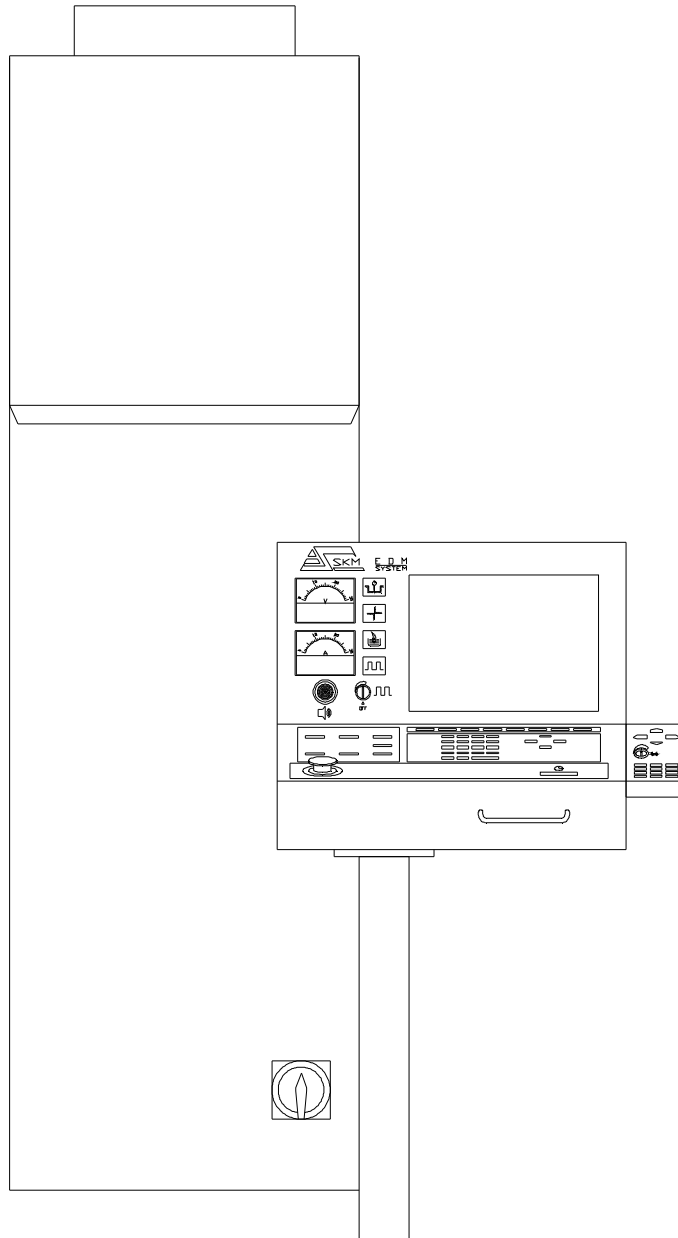
T30 (TFT THREE IN ONE MODEL)

CHAPTER 2 : EDM PRINCIPLES AND TECHNOLOGY
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ELECTRICAL DISCHARGE PROCESSING INVOLVES THE FLOWING OF AN DIELECTRIC FLUID BETWEEN THE WORK PIECE AND THE ELECTRODES, WHEREIN DIRECT CURRENT IS NORMALLY UTILIZED TO MAINTAIN POLE VOLTAGE TO PRODUCE AN ELECTRICAL POTENTIAL.   THE FEEDER DEVICE SUCH AS SERVO STRUCTURE HAS PRECISION INTERVAL POLE GAP DISTANCES (WITHIN APPROXIMATELY 0.02MM-0.1MM) TO PRODUCE A HIGH MAGNITUDE ELECTRIC FIELD THAT OVERCOMES THE INSULATING PROPERTIES OF THE DIELECTRIC FLUID TO GENERATE AN ELECTRICALLY CONDUCTIVE IONIZED CHANNEL OF FREE FLOWING ELECTRONS AS THE PRODUCED ELECTRIC CURRENT.   THIS TYPE OF CURRENT DOES NOT REQUIRE.
CONDUCTORS TO TRANSMIT THE PRODUCED FLOW OF CURRENT AND WE CALL IT AN ISOLATED ELECTRIC DISCHARGE REACTION.   IN THIS PHENOMENON, ELECTRICAL ENERGY IS INSTANTANEOUSLY TRANSFORMED INTO AN ULTRA-HIGH HEAT LEVEL OF APPROXIMATELY 10,000℃. DUE TO THE TRANSFORMATION OF THE ENERGY, THE HIGH-TEMPERATURE HEAT PRODUCED MELTS TO THE SURFACE OF THE WORK PIECE.   BY UTILIZING THIS REACTION, WE CAN FABRICATE ELECTRODES OF DIFFERENT SHAPES TO ERODE A RANGE OF DIFFERENT EXTERIOR CONTOURS IN THE MOLD OF THE WORK PIECE.
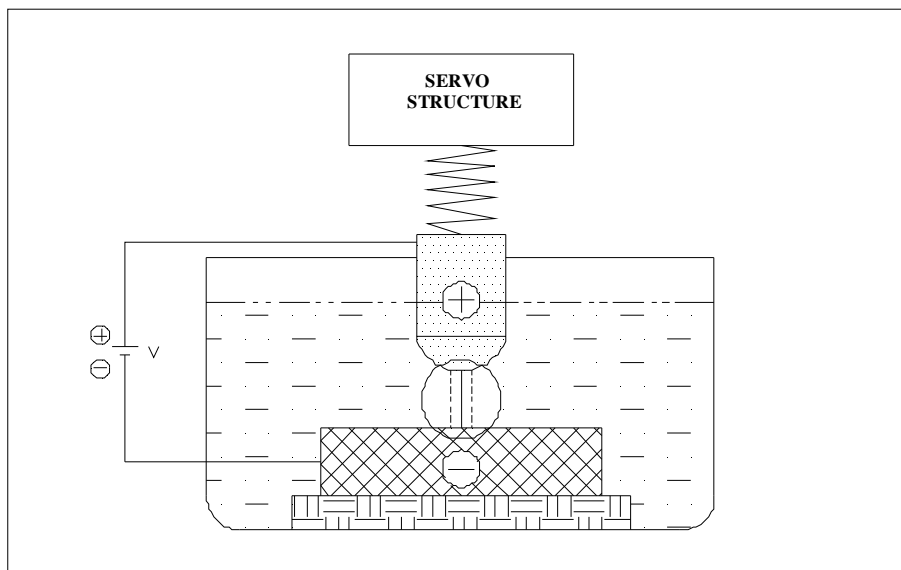
1.   WHEN VOLTAGE IS APPLIED TO THE ELECTRODE AND THE WORK PIECE, AN ELECTRICAL FIELD FORM AS THE VOLTAGE BUILDS UP, AND THIS WILL BE GETTING STRONGER WHEN THE DISTANCE BETWEEN ELECTRODE AND WORK PIECE GET CLOSER.
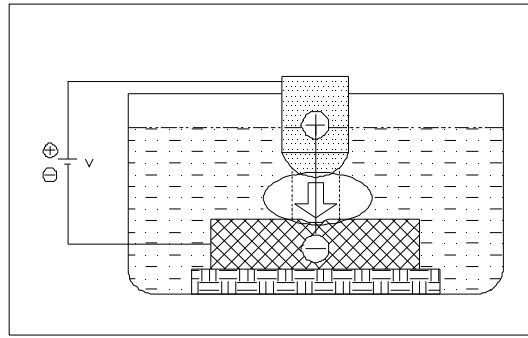
2.   WHEN THE POLE DISTANCE BETWEEN THE ELECTRODES AND THE WORK PIECE REACHES THE APPROPRIATE VALUE, THE INSULATION BREAKDOWN PRODUCES HIGH-IMPACT IONIZATION DUE TO THE INTENSIFICATION OF THE ELECTRIC FIELD.   THE ELECTRICAL ENERGY IS INSTANTLY TRANSFORMED INTO HEAT ENERGY TO ERODE THE WORK PIECE, RESULTING IN THE FORMING OF CAVITATION AND PRODUCING OF CARBON RESIDUES AND SO ON.   MEANWHILE, THE DIELECTRIC FLUID DISINTEGRATES INTO AN AIRBORNE GAS THAT RAPIDLY EXPANDS OUTWARD.
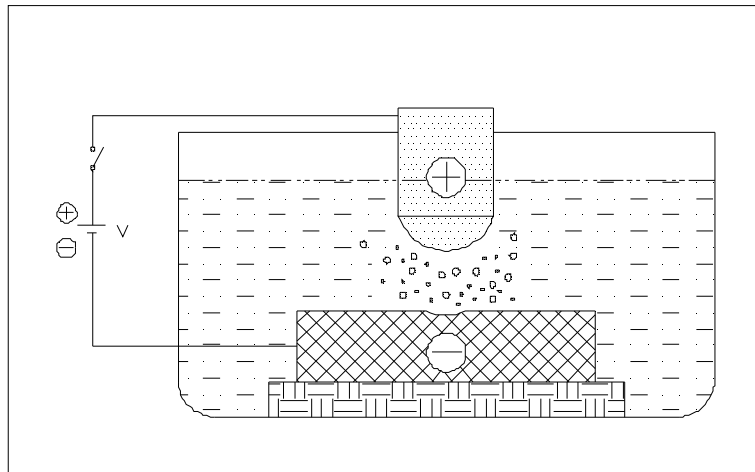
3.   THE TRANSPORTATION ENERGY AT THE CENTER POINT BETWEEN THE ELECTRODES IS CUT OFF LOST THROUGH DIELECTRIC RESOLUTION, WHICH IS MANIFESTED AS A SPARKING ELECTRICAL DISCHARGE OF THE DIELECTRIC FLUID.   AT THIS TIME, HIGH-TEMPERATURE GASES ARE ABSORBED INWARD.   THE MOLTEN MATERIAL OF THE WORK PIECE CONTINUES TO FLOW AND BE REMOVED AS THE DIELECTRIC FLUID DISINTEGRATES.

AFTER KNOWING THE PRINCIPLES AND PHYSICAL CHARACTERISTICS OF EDM, WE WOULD LIKE TO DESCRIBE THE RELATIVE FACTORS OF EDM INFLUENCE EFFICIENCY.   CAREFUL CONTROL OF THOSE VARIABLES GAP, POLARITY, AMPERAGE , DURATION , AND THIS IS ESSENTIAL TO BE SURE OF TOOLING AT MAXIMUM EFFICIENCY.   FOR EX.: POLARITY SELECTION;   MATCHING OF AMPERAGE AND DURATION ELECTRODE WEAR MAY VARY FROM 0.1% TO 99.8%.

6

CHAPTER 3 : ELECTRODE MATERIAL
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ANY MATERIAL WHICH IS A GOOD ELECTRICAL CONDUCTOR CAN BE USED.   MATERIALS WITH THE HIGHEST MELTING POINT AND THE LOWEST ELECTRICAL RESISTIVITY ARE THE BEST.   BECAUSE ELECTRODE COST IS CRITICAL FACTOR IN COST ANALYSIS, SELECTION OF ELECTRODE MATERIAL, THE QUANTITY AND THE METHOD OF MANUFACTURE ARE ALL IMPORTANT AND NEED CAREFUL CONSIDERATION.

ELECTRODE MATERIALS CAN USUALLY BE DIVIDED AS FOLLOWS:

1.   SILVER TUNGSTEN

2.   COPPER TUNGSTEN

3.   COPPER GRAPHITE

4.   CHROMIUM COPPER

5.   ELECTROLYTIC COPPER

6.   GRAPHITE

7.   BRONZE

8.   ALUMINUM ALLOY

9.   STEEL

OF ALL THE ABOVE, ELECTROLYTIC COPPER IS THE MOST POPULAR.   SILVER TUNGSTEN,COPPER TUNGSTEN ARE BOTH QUITE EXPENSIVE , SO THEY ARE USUALLY USED TO VERY SMALL AND HIGH PRECISION PARTS.   AFTER COST, THE MOST IMPORTANT FACTORS IN ELECTRODE SELECTION ARE LOW WEAR AND EASE OF ELECTRODE MANUFACTURING.

GRAPHITE FEATURES ARE LOW ELECTRODE WEAR AND HIGH REMOVAL RATE, BUT BREAKS EASILY AS LOW DENSITY.   SO IT IS BEST EMPLOYED WHEN FINE FINISH IS NOT REQUIRED.

STEEL IS MOST UTILIZED IN THE TOOLING OF SPLIT LINES PLASTIC AND DIE CASTING MOLD.

3-1 ELECTRODE MATERIALS CHARACTERISTICS

ELECTRODE MATERIAL	MELTING POINT	RESISTIVITY Ω mm^2/m	DENSITY g/mm^2
SILVER TUNGSTEN		0.048	0.016
COPPER TUNGSTEN		0.055	0.015
COPPER GRAPHITES		0.04	0.027
CHROMIUM COPPER		0.0236	0.0081
ELECTROLYTIC COPPER	1083	0.0167	0.0089
GRAPHITES	3700	0.085~0.15	0.0015~0.0018
BRONZE	1060		0.0082
ALUMINUM ALLOY			
STEEL	1539	0.0971	0.0087

3-2 ELECTRODE MANUFACTURING

1. TRADITIONAL MACHINING METHODS SUCH AS TURING, MILLING, SHAPING, GRINDING, ENGRAVING, ...ETC.

2. STAMPING

3. EXTRUSION OR DRAWING

4. GALVANIC PLATING

THE ABOVE METHODS OF PRODUCTION ARE ALL SUITABLE.   SELECTION OF ONE DEPENDS ON ELECTRODE MATERIAL.

＊. COMPLEX OR CONVOLUTED ELECTRODE SHAPE: IT MAY BE PRODUCED IN SEPARATED PARTS.

＊. IRREGULAR ELECTRODE SHAPE: IT MUST BE CENTERED ON EASILY MEASURE AXIS.

＊. LONG,THIN ELECTRODES : IT HAVE TO BE INSTALLED WITH CURRENT SUPPLIED TO THE ENDS AS WELL AS THE CENTER THEREBY ENSURING EVEN DISCHARGE OVER WHOLE WORK PLACE. (FIG.3-1)

＊. SMALL DIAMETER HOLE REQUIRE PIPE ELECTRODE: TO ENSURE HIGH EFFICIENCY IN FLUSHING AND DRAINING.(FIG.3-2)

＊. FOR THROUGH THE HOLE MACHINING ENSURE WORK HEAD ELECTRODE IS THIN.   THICK ELECTRODES IMPEDE PARTICLE DISCHARGE. (FIG.3-3)
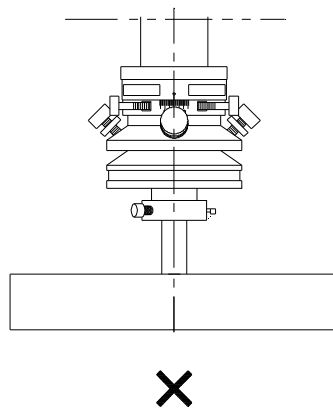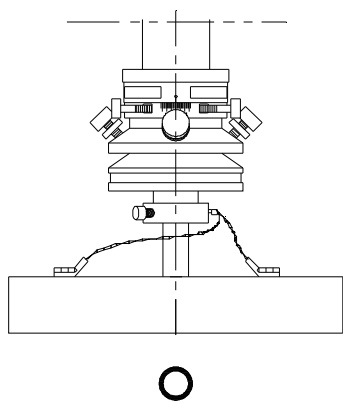
（**FIG. 3-1**）
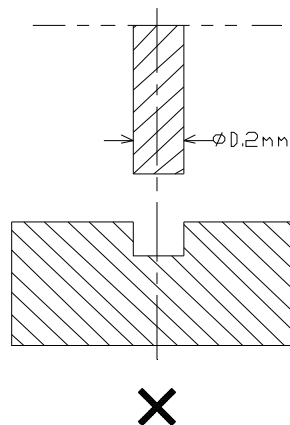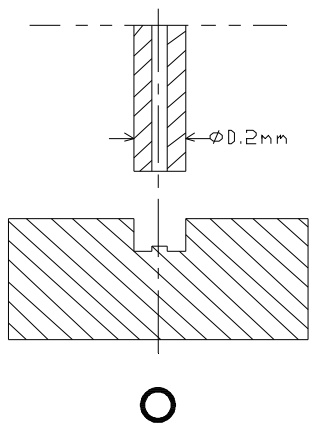
（**FIG. 3-2**）
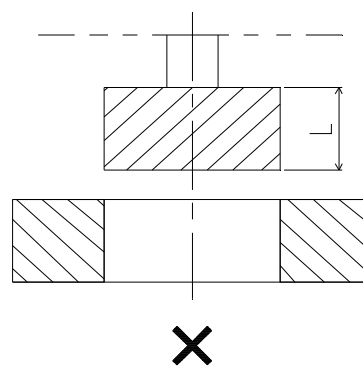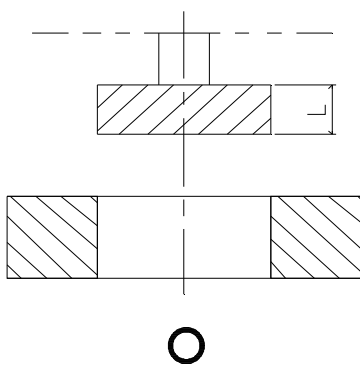
（**FIG. 3-3**）

CHAPTER 4 : EDM APPLICATION
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EDM APPLICATIONS DEPENDS ON A SKILLED OPERATOR THAT ANALYSES ALL THE EDM FACTORS TO PRODUCE HIGH QUALITY WORK. THERE ARE THE DISCHARGE FACTORS:

1. ELECTRODE MATERIAL

2. WORKPIECE MATERIAL

3. ELECTRODE VOLUME

4. SURFACE ROUGHNESS

5. SPARK GAP

6. ELECTRODE WEAR

7. REMOVAL RATE

(THE ABOVE FACTORS ARE EXPLAINED IN THE ENCLOSING   30A   45A   60A   90A   120A APPLICATION NOTE)

DURING SPARKING (DISCHARGE) THE GAP AREA MUST BE CONTINUOUS FLUSHED TO CLEAN OFF PARTICLES AND RESIDUE, AND THE DIELECTRIC FLUID ALSO HAVE TO KEEP CLEARING.

IF FLUSHING AND DRAINING OF THE CAVITY IS NOT GOOD ENOUGH, INCREASE THE SERVO TO HIGHER SETTING.   TO GET FINE FINISH, THE VERTICAL MOVEMENT MUST BE VERY FAST.

TO ACHIEVE LOW OR NO ELECTRODE WEAR,   START WITH A LOW DISCHARGE AMPERAGE,AND AS SOON AS THE WHOLE AREA OF ELECTRODE CONTACTS THE WORK PIECES, INCREASE AMPERAGE. THIS WILL PROTECT SHARP CORNER OR ANGLES.

TO SET SERVO SENSITIVITY BEAR IN MIND SENSITIVITY DEPENDS ON CURRENT; WHEN THE CURRENT IS LOW, THEN LITTLE AMPLITUDE AND HIGH SENSITIVITY.

4-1 DISCHARGE OPERATION PROCESS

1. TURNNING ON THE MIAN SWITCH IN "ON" POSITION.

    ↓

2. ELECTRODE ZERO VERTICLE ANGLE AND AT POSITION "0" .

    ↓

3. FINDING X.Y AIXS' REFERENCE POINT , SET UP THEIR POSITION.

    ↓

4. MOVING Z AXIS TO REFERENCE POINT, AND CLEAR IT'S VALUE TO "0".

    ↓

5. SETTING SERVO SENSITIVITY, AND SPARKING PARAMETER.

    ↓

6. SETTING SYNCHRONOUS FLUSHING SWITCH AND OVERFLOW CONTROL SWITCH & WORK HEAD
    LIFT CONTROL.

    ↓

7. DIELECTRIC PUMP AND FIRE CONTROL LAMP "ON" , ADJUST OVERFLOW GATE.

    ↓

8. DISCHARGE SWITCH "ON".

    ↓

9. OBSERVE THE INDEX OF VOLTAGE & AMPERAGE GAUGE, AND THE REACTION OF Z AXIS TO
    CHECK WHETHER THEY ARE STABLE WHEN SPARKING.

＊＊＊

(REMARK : DO NOT TOUCH THE WORK HEAD & ELECTRODE WHEN SPARKING.)

4-2 THE SAMPLE OF SPARKING

1. SPARKING FOR CUTTING (FIG. 4-1)

2. SPARKING FOR GRINDING (FIG. 4-2)

3. SPARKING FOR CARVING (FIG. 4-3 AND FIG. 4-4)
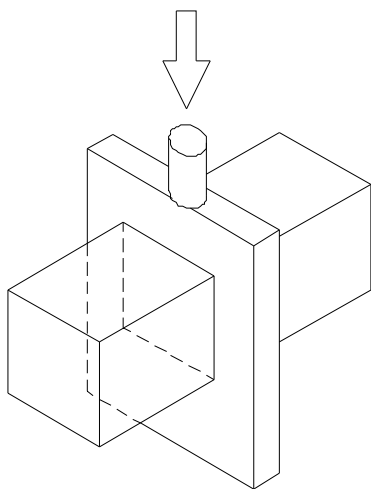
（**FIG. 4-1**）
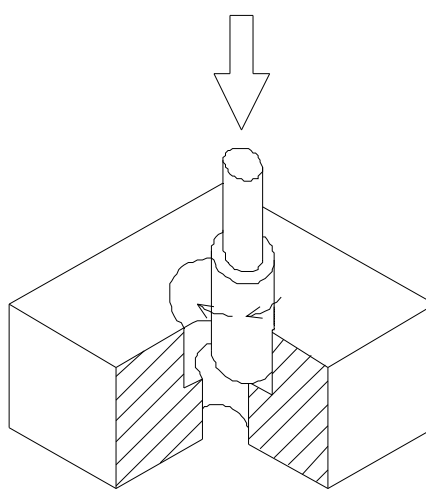
（**FIG. 4-2**）
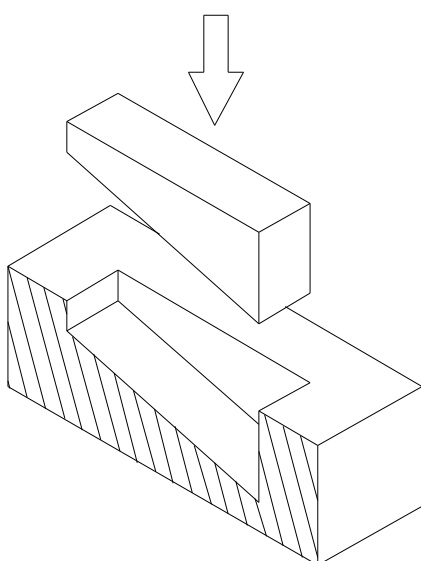
（**FIG. 4-3**）
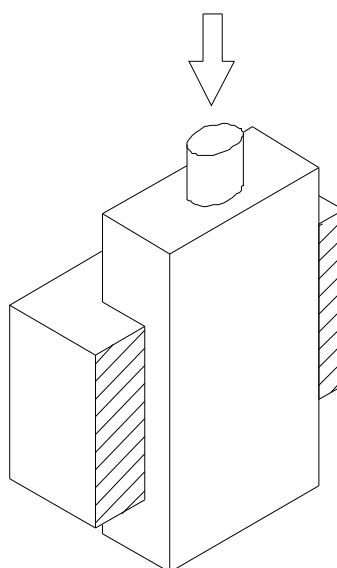
（**FIG. 4-4**）

CHAPTER 5 :ZNC SYSTEM INSTRUCTION
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5-1 PROGRAMMING EDM FUNCTION

CHARACTERS OF ZNC :

1. PROGRAMMABLE FUNCTION :

SUPPORTS SING-HOLE MULTI-DEPTH AUTOMATIC FINE FINISHING WITHOUT REQUIRING PROGRAM
RE-WRITE OR UTILIZING AUTOMATIC PROGRAMMABLE MULTIPLE DEPTH AUTO FINE FINISHING.
THE PROGRAMMING FACTORS INCLUDE- DEPTH,DISCHARGE PARAMETER AND TIME.

2. MEMORIZING PROGRAM:

SPARKING CONDITIONS AND PROCESSING SETTING CAN BE STORED IN MEMORY, AND RECALLED FOR
REPEAT INSTANCES OF THE JOB.

3. SPARKING PERIOD SETTING:

A SPARKING PERIOD SERVO THAT SUPPORTS THE ACTIVE UTILIZATION OF FINISHING DEPTH.

4. SURFACE FINISHING RATE:

OPTIONAL MIRROR SURFACE FINISHING SYSTEM CAN BE INSTALLED TO ACHIEVE ULTRA-FINE
SURFACE FINISHING OF MORE THAN RA0.2UM.

5. MEASUREMENT FEEDBACK:

THREE-AXIS LOCATIONS UTILIZES OPTICAL MEASUREMENT FEEDBACK FOR HIGH PRECISION
POSITIONING.   THE OPTICAL MEASUREMENT RESOLUTION CAN BE ADJUSTED IN GRADATION OF 1 UM
OR 5 UM.

6. MEASUREMENT EXCHANGE:

HAS METRIC AND INCH MEASUREMENT UNIT AS WELL AS CHINESE AND
ENGLISH LANGUAGE SWITCHING FUNCTIONS.

7.   POSITION MEMORIZING:

HAS THE FUNCTION OF MEMORIZING THE SETTING POSITION, IT CAN SAVE THE LAST SETTING POSITION AND CONTINUE MACHINING AFTER A POWER CUT.

8.   DIRECTION CONTROL:

OPTICAL MEASUREMENT DIRECTION CAN BE SET OR MODIFIED BY INTERNAL CODE.

9.   AUTOMATIC FINDING EDGE:

OPERATOR CAN USE FUNCTION KEY AND Z AXIS HAS THE FUNCTION OF AUTOMATIC EDGE SCANNING.

10.   AUTO HALVE CACULATION:

IT CAN FIND THE CENTER VALUE OF WORKPIECE.

11.   10.4″ TFT MONITOR:

THE SESTEM CAN USE 14″ COLOR MONITOR OR 10.4″ TFT COLOR LCD DISPLAY THE OPERATOR CON SELECT FUNCTION AND SET PARAMETE CONNENIENTLY.

12.   USE MEMORY CARD:

TO QUICKLY DOWN LOAD DATA AND AVOID DISKETTES DAMAGE, THE SYSTEM USE MEMORY CARD TO INSTEAD OF TRADITIONAL 3.5″ DISKETTES DISC.

5-2   REFERENCE PLANE SYSTEM
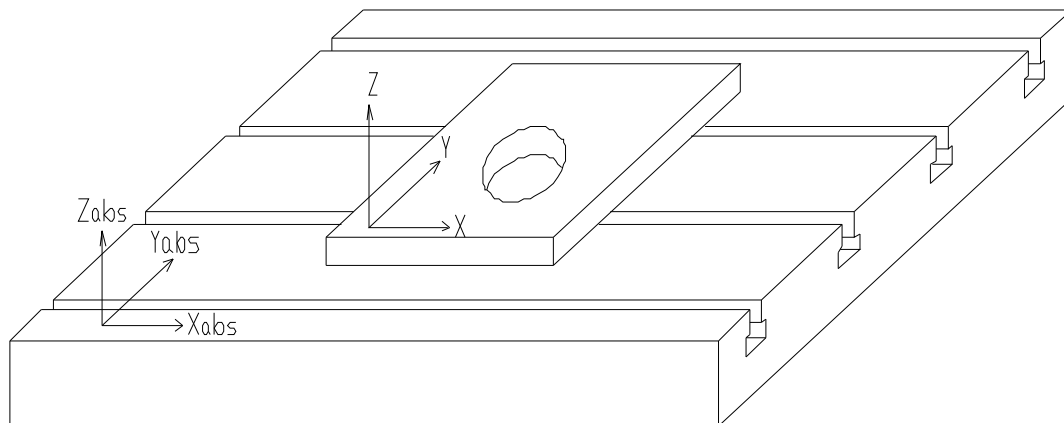
FIG. 5-1

THERE ARE 2 KINDS OF SYSTEMS OF REFERENCE PLANE (FIG. 5-1) :

1.   ABSOLUTE VALUE:

THIS IS THE REFERENCE VALUE AFTER FINDING EDGE, AND IT WILL BE STORIEDPERMANENTLY, EXCEPT RESET TO A NEW VALUE.

2.   RELATIVE VALUE:

THE RELATIVE (FIG. 5-2) VALUE IS DISPLAYED BY SMALL LETTER ON THE MONITOR AND CAN BE CHANGED OR VIEWED.

	ABSOLUTE VALUE		RELATIVE VALUE
→ X	0.000	X	- 3.000
		Y	- 2.000
Y	0.000	Z	- 10.000
Z	-10.000		

FIG. 5-2

5-3 OPERATION DESCRIPTION

1.   PROGRAM EDIT MODE:

USE THE NUMERICAL OR FUNCTION KEYS OF CONTROL PANEL TO EDITTHE PROGRAM AND MODIFY
THE EDM PARAMETERS .
THE MAIN EXECUTION PROGRAM IS CAPABLE OF ADDING AUXILIARY PROGRAM ROUTINES OR
MODIFYING ANY SPARKING CONDITION.
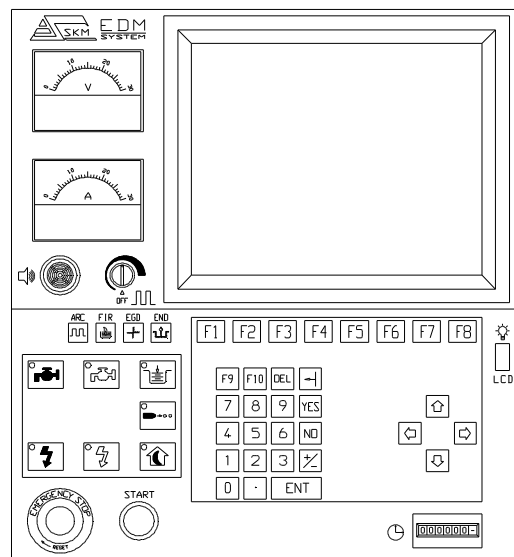
10.4″ TFT MONITOR

2.   THE SPARKING PROCESS:

USE THE KEYS TO CHOOSE THE NECESSARILY SPARKING NO.   AFTER EDITING THE PROGRAM OR
MODIFYING PARAMETERS, THEN PRESS F5 FUNCTION KEY AND PRESS DIELECTRIC FLUID PUMP "ON"
SWITCH OR OVERFLOW CONTROL SWITCH(IF NECESSARY), AFTER THIS MACHINE WILL START
SPARKING.

CHAPTER 6 :OPERATIONAL INSTRUCTION
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A. DESCRIPTION OF CONTROL PANEL (10.4″ TFT MONITOR)
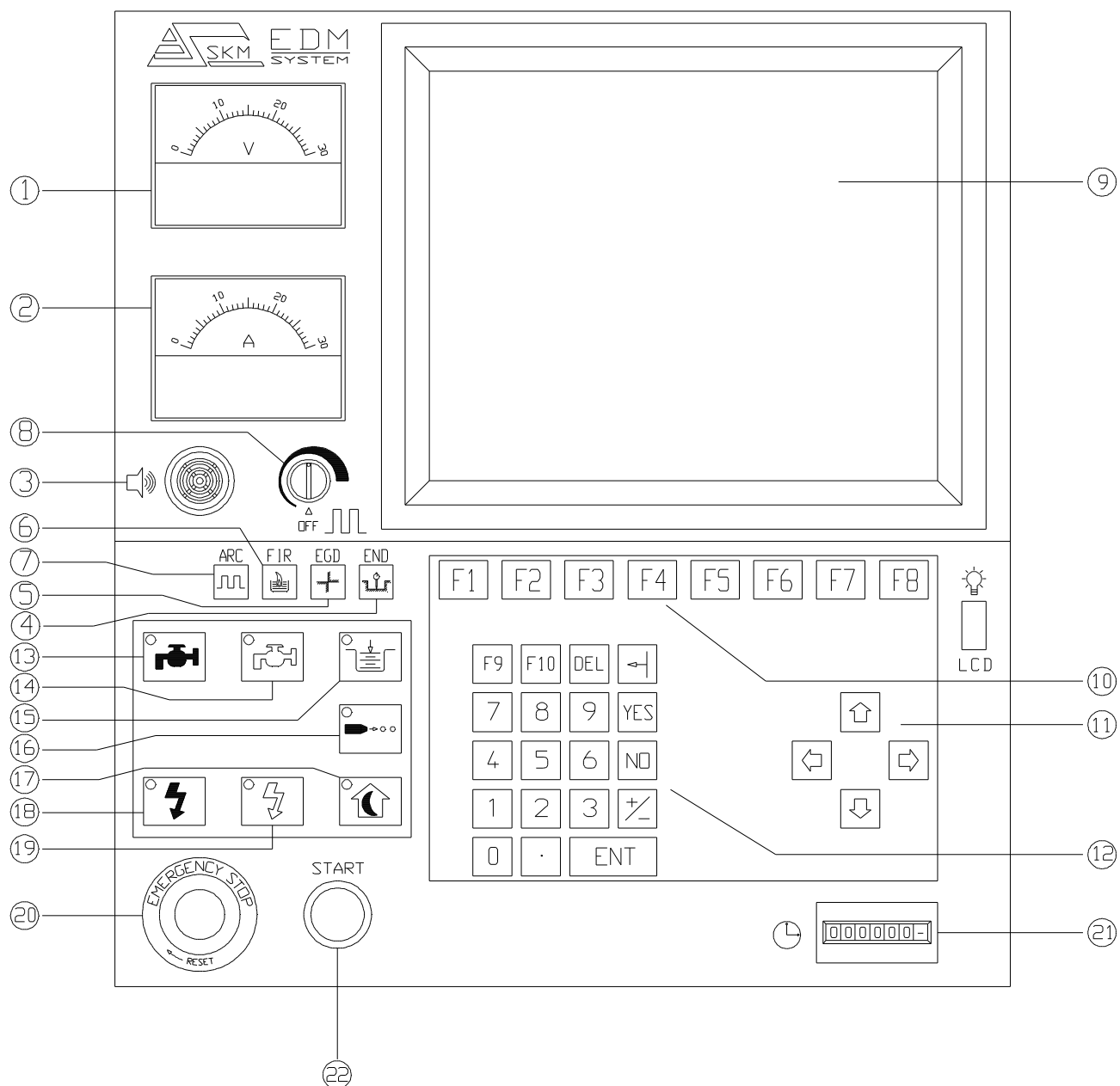
FIG. 6-1

B: MANUAL CONTROL PANEL (TFT MONITOR)
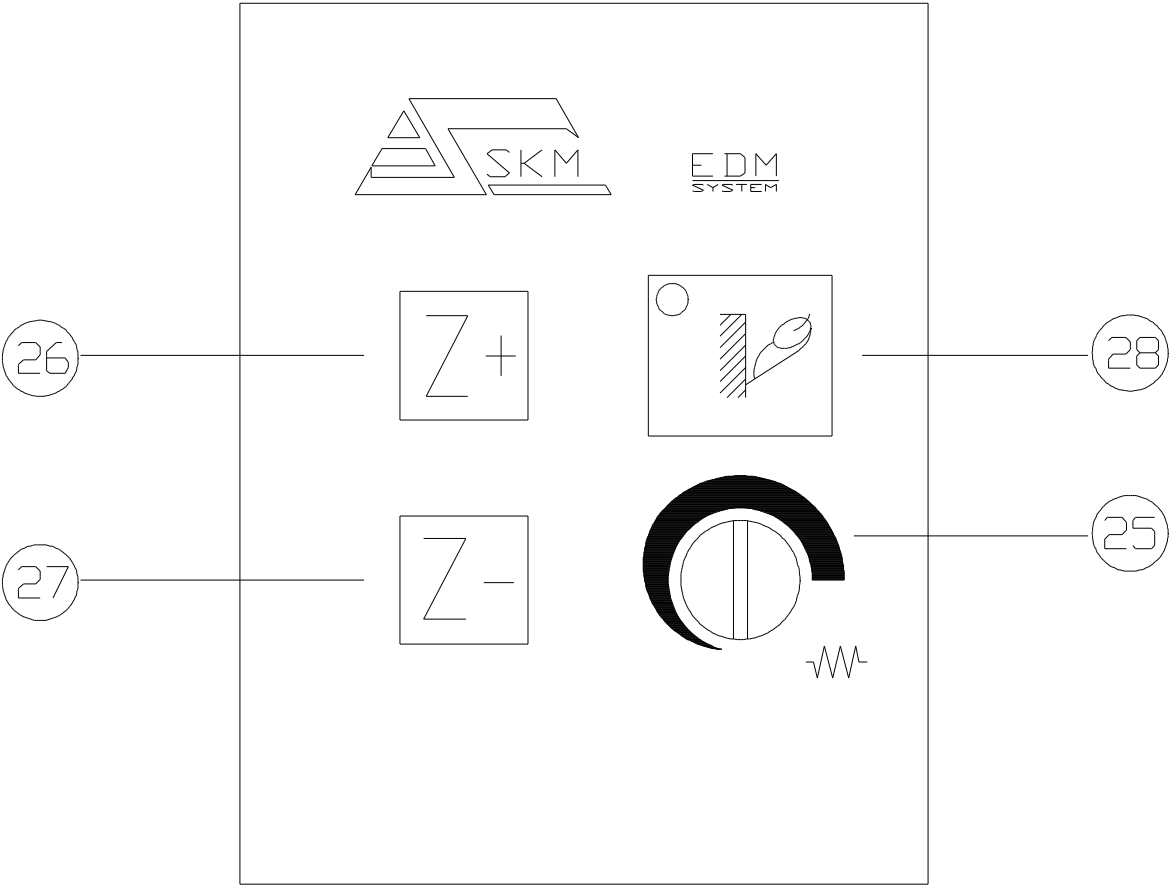
FIG. 6-2

6-1 CONTROL PANEL & REMOTE CONTROL INTRODUCTION

FIGURE 6-1 IS ZNC EDM SCREEN PAGE,AND FIG.6-2, IS MANUAL CONTROL PANEL DRAWING.

ALL OF DESCRIPTION OF FUNCTION KEYS ARE AS BELOW:

1. VOLTMETER : FOR SHOWING THE DISCHARGE VOLTAGE.

2. AMMETER : FOR SHOWING THE DISCHARGE AMPERAGE.

3. BUZZER : WARNING SOUND.

4. BOTTOM OF DEPTH INDICATOR LAMP.

5. EDGE FINDING INDICATOR LAMP.

6. TEMPERATURE/FIRE CONTROL INDICATOR LAMP.

7. ARC INDICATOR LAMP.

8. ARC ADJUST KNOB.

9. MONITOR SCREEN.

10. F1-F8 FUNCTION KEYS.

11. ARROWKEYS.

12. NUMERICAL KEYS.

13. DIELECTRIC FLUID PUMP "ON" SWITCH/LAMP.

14. DIELECTRIC FLUID PUMP "OFF" SWITCH/LAMP.

15. OVERFLOW CONTROL SWITCH/LAMP.

16. SYNCHRONOUS FLUSHING CONTROL LAMP.

17. SLEEP SWITCH/LAMP.

18. DISCHARGE "ON" SWITCH/LAMP.

19. DISCHARGE "OFF" SWITCH/LAMP.

20. EMERGECY STOP.

21. DISCHARGE TIMER.

22. START SWITCH / LAMP.

23. X.Y. AXIS SELECTION OF DIRECTION KEY.

24. F1-F8 FUNCTION KEYS (PRESS THE JOY KEY AND SELECT THE FUNCTION KEY AT THE SAME TIME) .

25. Z-AXIS SPEED CONTROL KNOB.

26. Z-AXIS UP SWITCH.

27. Z-AXIS DOWN SWITCH.

28. WORK PIECE ALIGNMENT (ELECTRIC CORRECT SWITCH) (PRESS THE JOY KEY AND SELECT THE FUNCTION KEY AT THE SAME TIME).

29. JOY KEY.

30. X、Y-AXIS SPEED CONTROL KNOB.(AUTO)

6-2   THE FUNCTIONS OF CONTROL PANEL & REMOTE CONTROL

1.   VOLTMETER :

REVEAL THE DISCHARGE VOLTAGE BETWEEN ELECTRODE AND WORKPIECE AND THE STABILITY OF SPARKING.

2.   AMMETER :

FOR REVEALING THE DISCHARGE AMPERAGE , AND OPERATOR CAN OBSERVE WHETHER THERE IS ANY DIFFERENCE BETWEEN SPARKING AND SETTING AMPERAGE.

3.   BUZZER :

IT HAS 2 SOUNDS, THE BIGGEST ONE IS FOR FIRING PROTECTION AND THE OTHER WILL ALARM WHEN DEPTH REACH ,THE ELECTRODE CONTACT WORKPIECE ,OR
ARCING.

4.   THE LAMP OF DEPTH REACH :

THE BUZZER WILL BE CAUSED AND THE LAMP LIGHTS WHEN DEPTH REACH, AND IT CAN BE STOP WHEN RISING THE Z-AXIS.

5.   EDGE FINDING INDICATOR LAMP:

THE BUZZER WILL BE CAUSED AND THE LAMP LIGHTS WHEN THE ELECTRODE CONTACT WORKPIECE.

6.   FIRE CONTROL INDICATOR LAMP:

WHEN THE WORK TANK IS ON FIRE, THE LAMP WILL LIGHT AND CAUSE BUZZER AND THE MACHINE WILL STOP DISCHARGING AT THE SAME TIME.

7.   ARC INDICATOR LAMP:

THE LAMP WILL LIGHT AND THE MACHINE WILL PLUSE A FEW SECOND FOR FLUSHING ARC WHEN ARC HAPPENS, AND THE MACHINE WILL STOP SPARKING AND THE BUZZER WILL CAUSE WHEN THE ARC SITUATION IS NOT RESOLVED.

8.   ARC ADJUST KNOB:

TURN ON THE SWITCH TO START MONITORING ARC.   TURN TO RIGHT DIRECTION TO INCREASE THE SENSITIVITY .

9.   MONITOR SCREEN:

FOR REVEALING THE SCREEN OF SKM CONTROLLER.

10. F1-F8 FUNCTION KEYS:

REFER TO   CHAPTER 8 FOR DETAILS.

11. ARROWK EYS:

REFER TO CHAPTER 8 FOR DETAILS.

12.   NUMERICAL KEYS:

REFER TO CHAPTER 8 FOR DETAILS.

13. DIELECTRIC FLUID PUMP "ON" SWITCH   AND LAMP:

PRESS THIS SWITCH FOR FLUSHING DIELECTRIC OIL AND THIS MACHINE WILL STOP FLUSHING WHEN PRESS "OFF" SWITCH OR DEPTH REACH.

14. DIELECTRIC FLUID PUMP "OFF" SWITCH/LAMP:

THE LAMP LIGHTS RED COLOR WHEN THE FUNCTION "OFF" IS USED.

15. OVERFLOW CONTROL SWITCH/LAMP:

THE OVERFLOW LAMP IS "ON" POSITION BUT THE MACHINE ALSO STOP DISCHARGING BEFORE THE LEVEL OF DIELECTRIC FLUID IS NOT AT REQUESTED POSITION.

16.   SYNCHRONOUS FLUSHING CONTROL LAMP.

17. SLEEP SWITCH :

Z-AXIS WILL RISING TO MAXIMUM POSITION WHEN THIS SWITCH IS "ON" OR REACH DEPTH.

18. DISCHARGE "ON" SWITCH/LAMP:

WHEN THE MACHINE BEGIN OF SPARKING THE LAMP IS GREEN COLOR.

19. DISCHARGE "OFF" SWITCH/LAMP.

20. THE SWITCH OF EMERGECY STOP:

PRESS THE SWITCH WHEN THERE IS ANY THING WRONG IN SPARKING AND THE MACHINE WILL STOP RUNNING.

21. DISCHARGE TIMER:

FOR CUMULATE CALCULATION OF SPARKING TIME.

22. START SWITCH / LAMP:

AFTER TURN " ON " MAIN POWER SWITCH , THE MACHINE STILL CAN NOT BE OPENED ALL OF ELECTRIC POWER BUT PRESSING " ON " THIS START KEY.
THIS SWITCH IS ALSO FOR ENDING & RESTART THE POWER FROM SLEEPING TIME DURATION.

23. X.Y. AXIS SELECTION OF DIRECTION KEY.

24. F1-F8 FUNCTION KEYS.

25. Z-AXIS SPEED CONTROL KNOB:

FOR ADJUSTING THE SPEED OF Z-AXIS UP-DOWN MOVEMENT.

26. Z-AXIS UP SWITCH:

WHEN MOVING THIS SWITCH IN SPARKING , THEN THE MACHINE WILL STOP DISCHARGING.

27. Z-AXIS DOWN SWITCH:

IT CAN NOT BE USED WHEN THE MACHINE IS IN SPARKING.

28. WORK PIECE ALIGNMENT (ELECTRIC CORRECT SWITCH) :

WHEN OPERATOR SET UP THE WORKPIECE, HE CAN USE THE ELECTRODE OR PROBE TO ALIGN THE HORIZONTAL AND VERTICAL WAYS OF WORKPIECE.   WHEN THIS SWITCH IS "OFF", THE SHORT CIRCUIT BETWEEN ELECTRODE AND WORKPIECE WILL CAUSE THE STOP MOVEMENT OF Z-AXIS WHICH IS FOR PROTECTING THE WORKPIECE, AT THIS MOMENT THE ALARM BUZZER AND LAMP INDICATOR WILL ACTIVE.
IF OPERATOR TURN ON THIS FUNCTION, THEN THE MACHINE CAN FORCE SHORT CIRCUIT DETECTING FUNCTION BYPASS AT THIS TIME.   THE Z-AXIS MOVEMENT WILL BE ALLOWED, THE OPERATOR CAN USE THIS FUNCTION TO ALIGN THE WORK PIECE BY WATCHING THE INDICATING LAMP.

CAUTION:

DUE TO SHORT CIRCUIT PROTECTING FUNCTION IS "OFF", OPERATOR USE JOY KEY TO MOVE Z-AXIS THAT HE SHOULD BE CAREFULLY TO AVOID TO CRASHING THE WORKPIECE.

NOTICE:

THE SWITCH SHALL BE USED WITH PRESSING JOY KEY ALTOGETHER

29.　JOY KEY:

FOR START THE FUNCTION OF NO. 28 AND FUNCTION KEYS-F1-F8.

30.　X、Y-AXIS SPEED CONTROL KNOB.(AUTO) :

THIS CONTROLLER CONTROL MOVING SPEED FOR X-Y AXIS. IT COULD ADJUST MOVING SPEED FROM FAST TO SLOW SPEED.

CHAPTER 7 : DESCRIPTION OF EDM PARAMETER
♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠

SKM EDM CNC PROVIDES THE FOLLOWING EDM PARAMETERS:

MFD	BP	AP	TA	TB	⧦	⁕	↑	↓	⬇	FA	FB
OFF	0	3	120	3	6	45	3	2	+	OFF	OFF

7-1   MFD (MIRROR FINISHING DISCHARGING)

MFD: SELECTION KEY OF MIRROR FINISHING DISCHARGE WITH THE FOLLOWING 9 DEFAULT VALUES.
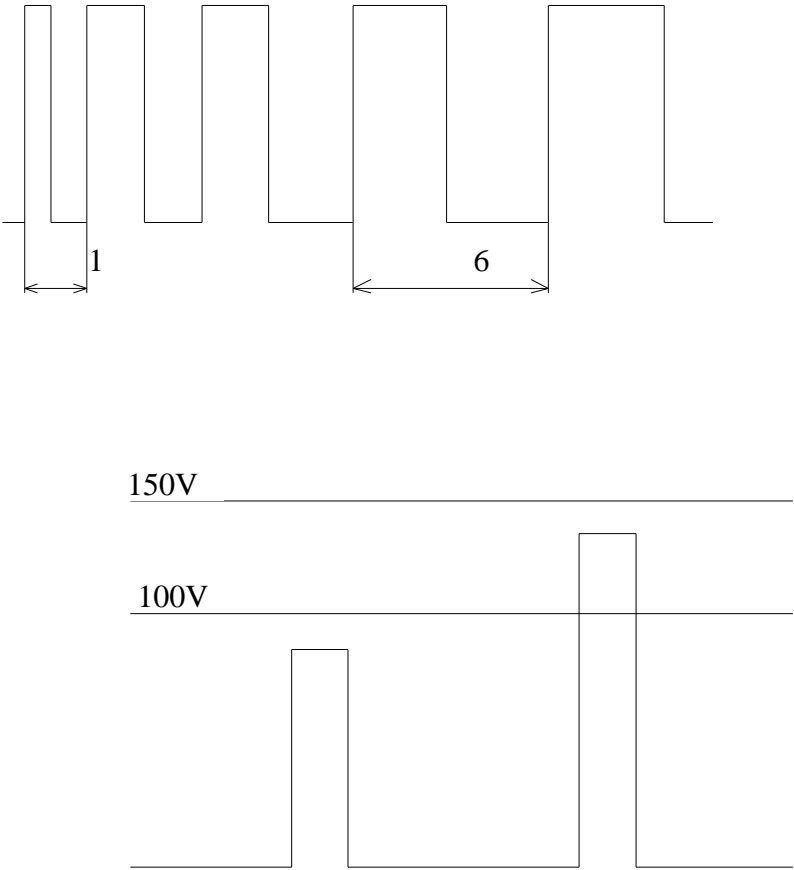
(MFD) SELECTION VS. SURFACE ROUGHNESS

SELECTION	SURFACE ROUGHNESS
1, 2……………………………	0.10 Raum
3, 4……………………………	0.13 Raum
5, 6……………………………	0.16 Raum
7, 8……………………………	0.20 Raum
9, 10………………………….	0.23 Raum

IF **MFD** IS SET AS ON(VALUE BETWEEN 1~9) THEN BP, AP, TA, TB WILL BE AUTOMATICALLY SET AS OFF(INACTIVE).

IF **MFD** IS SET AS OFF THEN THE ABOVE VALUES WILL BE RESET TO THEIR ORIGINAL VALUES.

7-2   BP (HIGH VOLTAGE VS. AMPERAGE SWITCH)

BP IS DEFINED AS THE FOLLOWING VALUES BY DEFAULT:
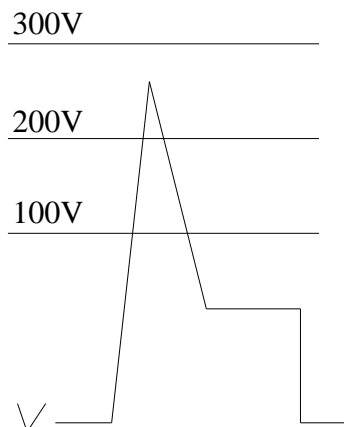
(BP)   260V SELECTION VS. AMPERAGE

SELECTION   AMPERAGE

0………………………………………….. 0A
1……………………………….. ……………1A
2……………………………….. ……………2A
3……………………………….. ……………3A
4……………………………….. ……………4A
5……………………………….. ……………5A

GENERALLY, BP IS THE SPARKING SPEED TO BE APPLIED IN FINE FINISHING OR ROUGH FINISHING.

IN **FINE FINISHING**, THE SPARKING TIME AND SPARKING DEPTH CANNOT BE TOO LONG THAT'S BECAUSE OF THE HIGHER ELECTRODE WEARING WILL BE HAPPENED UNDER THIS CONDITION.

IN ROUGHNESS FINISHING, BP IS THE IMPORTANT AUXILIARY PARAMETER. USUALLY, WE SET BP AS SECTION 1 OR 2. IT WILL COOPERATE WITH AP TO ACCELERATE SPARKING SPEED. THE PERFORMANCE WILL BE INCREASED BY 5~10%; THE ELECTRODE WEARING WILL BE INCREASED BY 1~1.5%.

7-3   AP (LOW VOLTAGE VS. AMPERAGE SWITCH)

AP IS DEFINED AS THE FOLLOWING VALUES BY DEFAULT:
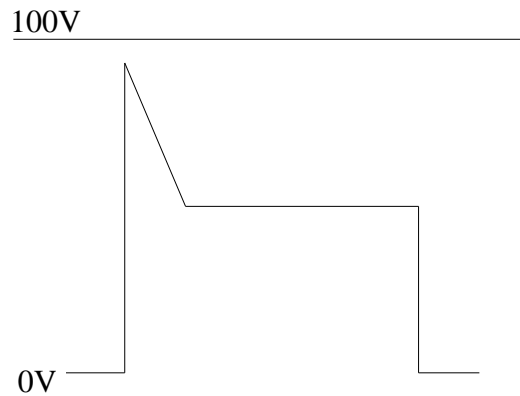
(AP) 90V AMPERAGE STEP VS. AMPERAGE

SELECTION	AMPERAGE	SELECTION	AMPERAGE
0………………..	0A	12…………………	12A
0. 5………………..	0.5A	15…………………	15A
1………………..	1A	21…………………	21A
1. 5………………..	1.5A	30…………………	30A
2………………..	2A	45…………………	45A
3………………..	3A	60…………………	60A
4. 5………………..	4.5A	90…………………	90A
6………………..	6A	120…………………	120A
9………………..	9A		

AP CAN BE APPLIED ON FINE AND ROUGH FINISH. THE *CUTTING SPEED*, *ELECTRODE WEARING RATE*, *GAP BETWEEN ELECTRODE AND WORK PIECE* AND *ROUGHNESS* CAN BE DETERMINED BY SETTING THE DIFFERENT COMBINATION OF **AP** AND **TA**(SPARKING ON TIME) VALUES. TO SEE THE DETAIL INFORMATION, SEE THE REFERENCE ON **APPLICATION NOTE**.

SURFACE / POWER RATIO TABLE

SURFACE AREA	POWER VALUE Cu+ (Electrode) Cuw+ (Electrode)	REFERENCE Gr+ (Electrode) Gr- (Electrode)
0mm²~10mm²	3A~6A	3A~6A
10mm²~25mm²	6A~12A	6A~12A
25mm²~100mm²	12A~21A	12A~21A
100mm²~400mm²	12A~45A	21A~45A
400mm²~1600mm²	21A~60A	45A~60A
1600mm²~6400mm²	21A~60A	60A~120A
6400mm² Above	21A~60A	120A

7-4 TA (SPARKING ON TIME)

TA IS DEFINED AS THE FOLLOWING VALUES BY DEFAULT:
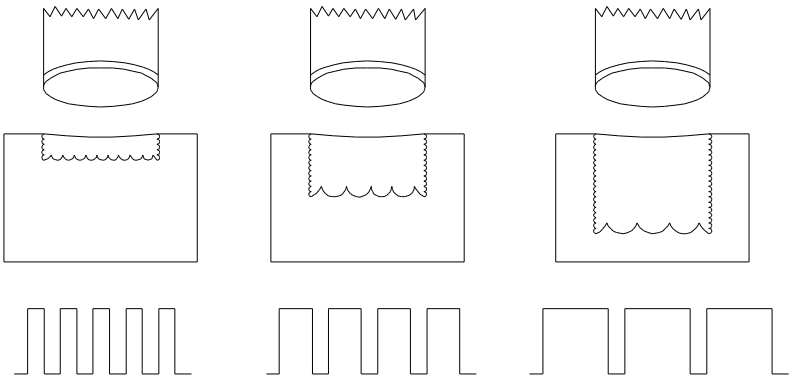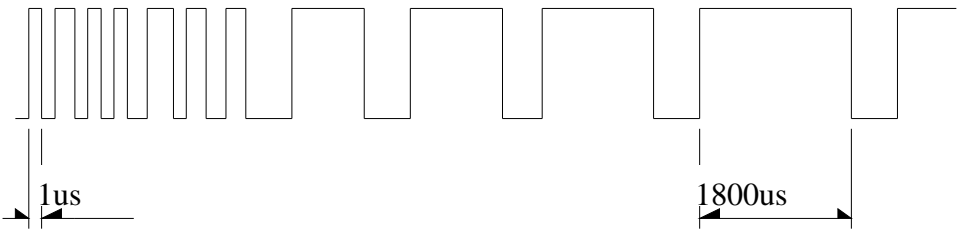
SPARKING ON TIME

1=1us	30=30us	400=400us
2=2us	45=45us	500= 500us
4=4us	60=60us	600= 600us
6=6us	90=90us	700= 700us
8=8us	120=120us	900= 900us
10=10us	150=150us	1200=1200us
15=15us	200=200us	1500=1500us
20=20us	300=300us	1800=1800us

TA IS USED TO CONTROL THE SPARKING ON TIME DURATION. GENERALLY SPEAKING,

1. THE COMBINATION OF **TA** AND **AP** VALUES WILL DETERMINE THE FINISH   ROUGHNESS. THE MINIMAL VALUE IS RMAX6~9µM/1µS, MAXIMAL VALUE IS RMAX90~120µM/1800µS.

2. FOR NON-WEARING FINISH, **TA** SHOULD BE SET AS 60µS OR ABOVE. IF TA IS DIRECTLY OPERATIONAL TO **AP**, THE ELECTRODE WEAR RATE WILL BE LESS. IF **TA** IS SHORT AND **AP** IS LARGE, THE ELECTRODE WEAR RATE WILL INCREASE.

3. SINCE DIFFERENT METALLIC MATERIALS HAVE DIFFERENT CHARACTERISTICS, IT'S NECESSARY TO USE DIFFERENT **TA** SETTING ACCORDING TO THE TABLE DEFINED IN **APPLICATION NOTE**.

THE COMBINATION OF **TA** AND AP VALUES WILL DETERMINE THE FINISH   ROUGHNESS, ELECTRODE WEAR RATE AND CUTTING SPEED. IT IS SHOWN ON **APPLICATION NOTE**.

HOWEVER, THE OTHER **EDM** CONDITIONS, FOR EXAMPLE, THE ILL SETTING VALUES OF TB(SPARKING OFF TIME), ⬙ SERVO SENSITIVE, ☀ SPARKING GAP VOLTAGE, ↑ ↓ ELECTRODE UP/DOWN PUMPING FREQUENCY WILL APPROACH THE MALFUNCTIONS OF FINISH INSTABILITY, ELECTRODE DAMAGE OR ARCING.

TO AVOID THESE MALFUNCTIONS, OUR **ZNC** CONTROLLER SUPPORTS '**AUTO SETTING**' FUNCTION THAT WILL LOOKING FOR APPROPRIATE COMBINATION VALUES OF **TB**、⬙、☀、↑、↓ BY REFERENCE THE SETTING VALUE OF **TA**. THIS FEATURE CAN FIX UP TO 80% OF FINISH CONDITION. HOWEVER, USER SHOULD TUNE THE **EDM** CONDITION MANUALLY FOR THE OTHER SPECIAL FINISH LIKE *DEEP HOLE*, *BLIND HOLE*, *LARGE AREA* OR *GRADIENT FINISH*.

7-5   TB (SPARKING OFF TIME)

TB IS DEFINED AS THE FOLLOWING VALUES BY DEFAULT:
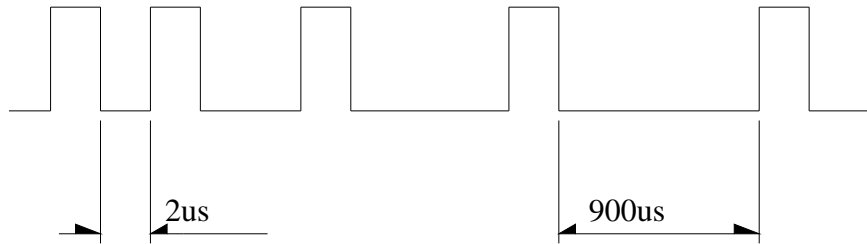
SPARKING   OFF   TIME

1= 2us	6=90us
2= 4us	7=200us
3= 8us	8=450us
4= 15us	9=900us
5= 45us	

1. **TB** IS THE TIME BETWEEN PULSES OFF TIME WHEN NO IMPACT IONIZATION OCCURS AND DIELECTRIC CONDITIONS ARE RE-ESTABLISHED. USUALLY WHEN THE DISCHARGE IS TABLE AND INTERVAL IS SHORT, EFFICIENCY IS HIGH AND A PROTECTIVE COATING WILL FORM ON THE ELECTRODE. HOWEVER, IT CAUSES POOR CARBON EVACUATION. SO, IT'S NECESSARY TO SET THE APPROPRIATE ↑ ↓ (ELECTRODE UP/DOWN PUMPING FREQUENCY) VALUES AND DIELECTRIC FLUID FLUSHING POSITION.

2. THE SHORTER OF **TB**, THE HIGHER OF AMPERAGE. THE LONGER OF **TB**, THE LOWER OF AMPERAGE. NO MATTER HOW DIFFERENT **TB** VALUE, THE SPARKING ENERGY ALWAYS BE THE SAME.

3. SINCE DIFFERENT METALLIC MATERIALS HAVE DIFFERENT CHARACTERISTICS, IT'S NECESSARY TO USE DIFFERENT **TB** SETTING TO REACH THE BEST FINISH RESULT.

4. UNDER THE STABLE FINISH CONDITION, THE SPARKING OFF TIME WILL BE THE SAME AS THE **TB** SETTING VALUE. HOWEVER, WHEN THE ABNORMAL SITUATION HAPPENED, FOR EXAMPLE, POOR PERFORMANCE OF CARBON EVACUATION OR ARCING, THE SPARKING OFF TIME WILL BE AUTOMATICALLY PROLONGED UP TO **5** TIMES OF **TB** SETTING VALUE FOR TROUBLE SHOOTING.

5. USER CAN INCREASE THE **TB** VALUE MANUALLY TO BE OF BENEFIT TO THE CARBON EVACUATION WHILE SPARKING IS UNSTABLE. GENERALLY, THIS OPERATION WILL BE APPLIED IN DEEP HOLE, BLIND HOLE OR GRADIENT SPARKING.

6. IF AMPERAGE OF **AP** IS LARGER THAN THE MAXIMAL SETTING VALUE DEFINED IN *SURFACE/POWER RATIO TABLE*, USER SHOULD ENLARGE THE **TB** VALUE TO PROTECT ELECTRODE FROM BEING FUSED SINCE HIGH **AP** WILL CAUSE THE HIGH TEMPERATURE ON ELECTRODE.

7-6 ⋙ (SERVO SENSITIVITY)

SERVO SENSITIVITY IS DEFINED AS THE FOLLOWING VALUES BY DEFAULT:
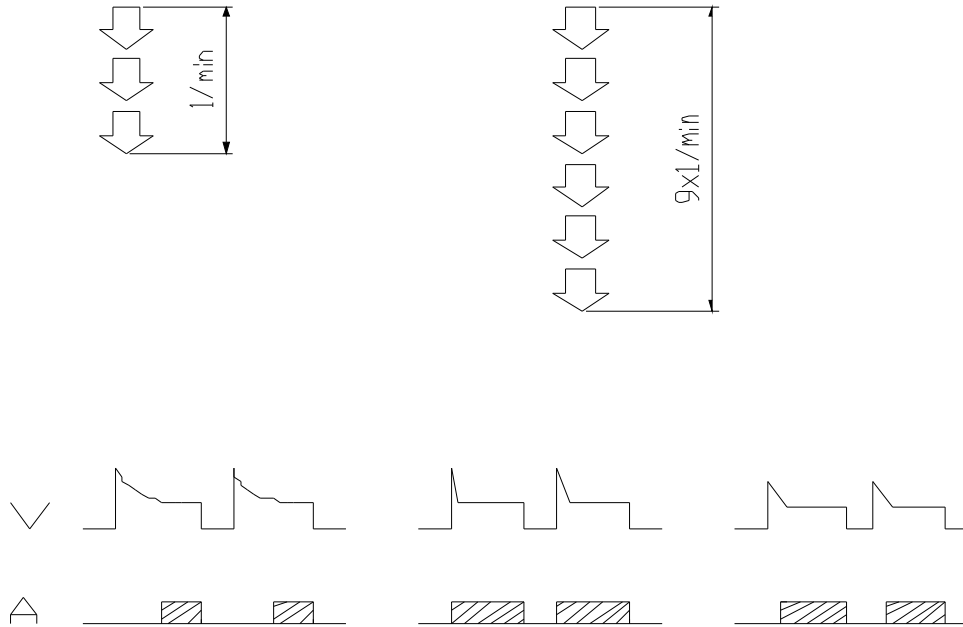
1. SERVO'S ADJUSTMENT MUST BE SYNCHRONIZED WITH SPARKING ON TIME(**TA**) AND AMPERAGE (**AP**). WHEN THE VOLTAGE METER IS STEADY, SYNCHRONIZATION HAS BEEN ACHIEVED.

2. THE SERVO MONITORS THE DISCHARGE GAP DURING DISCHARGE. MAINTAINING   THE PROPER GAP IS ONE OF THE MOST IMPORTANT FACTORS IN **EDM**. SO, WE HAVE VERY CAREFULLY DESIGNED THIS SYSTEM TO ENABLE THE MOST DIFFICULT WORK TO BE PERFORMED.

3. THE WORK HEAD VIBRATION DEPENDS ON THE SERVO SENSITIVITY. THE MORE SERVO SENSITIVITY, THE LARGER VIBRATION WILL BE ACHIEVED (RANGE BETWEEN ±**0.01MM~0.025MM**). THIS APPROACH IS GOOD FOR CARBON EVACUATION. HOWEVER, THE IMPROPER STRONG SERVO SENSITIVITY WILL DAMAGE ELECTRODE DURING SPARKING. ON THE CONTRARY, THE WEAK SERVO SENSITIVITY WILL CAUSE THE ILL-PERFORMANCE OF CARBON EVACUATION. FOR GENERAL, STRONG SERVO SENSITIVITY IS APPLIED ON ROUGH FINISH; WEAK SERVO SENSITIVITY IS FIT FOR FINE FINISH.

4. WHILE DOING SIDE PROCESSING, SERVO VIBRATION WILL CAUSE THE HEAD TO GENERATE BIG HOISE, IT IS NORMAL.

7-7 ⚹ GAP-V (SPARKING GAP VOLTAGE)

GAP-V(SPARKING GAP VOLTAGE) IS DEFINED AS THE FOLLOWING VALUES BY DEFAULT:
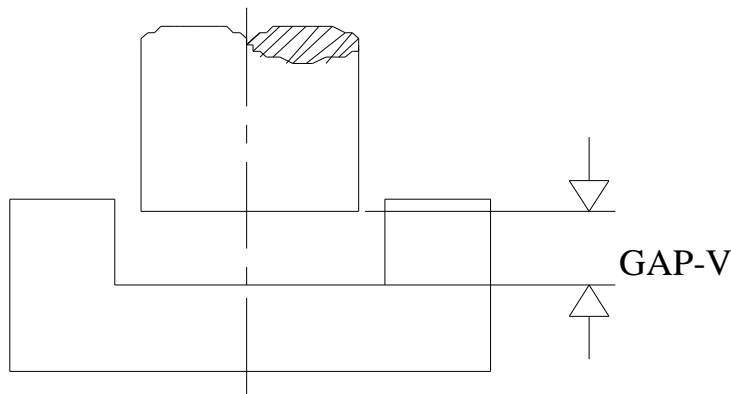
GAP-V

GAP-V(SPARKING GAP VOLTAGE) DETERMINES THE SPARKING DISTANCE BETWEEN ELECTRODE AND WORK PIECE. THE LOWER VALUE OF **GAP-V**, THE CLOSER OF SPARKING DISTANCE, HENCE THE MORE SPARKING ENERGY. IT WILL CAUSE THE SIDE EFFECT OF POOR CARBON EVACUATION PERFORMANCE AND INCREASING THE GAP TEMPERATURE THAT IS EASY TO MELT ELECTRODE.

ON THE OTHER HAND, THE HIGHER VALUE OF **GAP-V**, THE LONGER OF SPARKING DISTANCE, HENCE THE LOWER SPARKING ENERGY. IT'S GOOD FOR CARBON EVACUATION BUT INCREASES THE ELECTRODE WEAR RATE.

1. WHEN THE **GAP-V** VALUE IS SET AS **60V** OR ABOVE, IT FITS FOR FINE FINISH OR THE OTHER FINISH DIFFICULT TO EVACUATE CARBON LIKE DEEP HOLE, BLIND HOLE, LARGE AREA OR GRADIENT FINISH.

2. WHEN THE **GAP-V** VALUE IS SET AS **45V** OR BELOW, THE SPARKING ENERGY IS HIGHER AND ACHIEVES HIGHER EFFICIENCY, IT FITS FOR ROUGH FINISH. IT SHOULD BE NOTICED THAT THE LOWER VALUE OF **GAP-V** WILL CAUSE HIGHER GAP TEMPERATURE AND IS EASY TO MELT ELECTRODE, USER SHOULD BE CAREFUL TO SET THIS PARAMETER WHEN SPARKS ON A SMALL AREA. MOREOVER, YOU CAN INCREASE THE **TB** VALUE TO INCREASE COOLING TIME TO SOLVE THIS TROUBLE.

7-8 - ‾ (UP/DOWN PUMPING TIME)

- ‾ (UP/DOWN PUMPING TIME) IS DEFINED AS THE FOLLOWING VALUES BY DEFAULT:
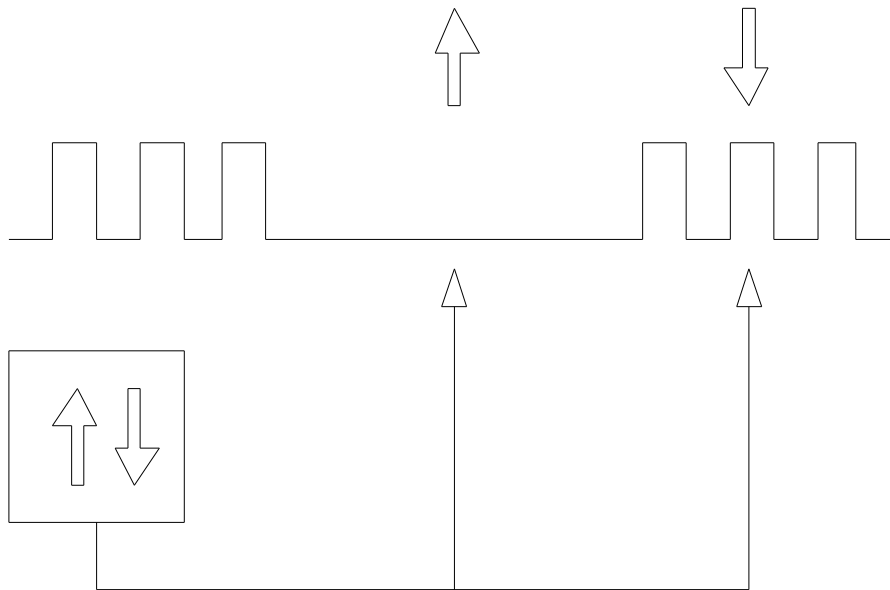
- ‾ (UP/DOWN PUMPING TIME) IS USED FOR THE FINISH PROCEDURE THAT IS DIFFICULT TO EVACUATE CARBON LIKE DEEP HOLE OR BLIND HOLD FINISH. THE MOTION OF PUMPING WILL INCREASE THE PERFORMANCE OF CARBON EVACUATION.

FOR GENERAL :

1. UNDER ROUGH FINISH PROCEDURE, BECAUSE THE SPARKING ENERGY IS HIGHER, IT IS EASY TO EVACUATE CARBON. THEREFORE, THE PUMPING FREQUENCY SHOULD BE SET AS LOWER (HIGHER ‾ VALUE AND LOWER - VALUE). ON THE CONTRARY, FOR THE FINE FINISH, WE SHOULD SET HIGHER PUMPING FREQUENCY TO INCREASE THE PUMPING PERFORMANCE (LOWER ‾ VALUE).

2. DURING PUMPING UP, SYSTEM WILL AUTOMATICALLY SHUT DOWN SPARKING POWER TO AVOID THE ABNORMAL SIDE SPARKING.

7-9 ELECTRODE POLARITY, DEEP HOLE AND LARGE AREA FUNCTION

E-P (ELECTRODE POLARITY) : + / -

ELECTRODE POLARITY IS SET THE POLARITY OF ELECTRODE. FOR GENERAL, POSITIVE ELECTRODE IS USED TO SPARKING WITH AP THAT IS APPLIED FOR ROUGH AND FINE FINISH; WHEN SPARKING WITH **BP** ONLY, BOTH OF POSITIVE AND NEGATIVE ELECTRODE ARE SUITABLE. THE ONLY DIFFERENT IS, NEGATIVE POLARITY ELECTRODE WILL CAUSE METALLIC POLISH ON WORK PIECE. SOME MATERIAL OF WORK PIECE NEEDS THE REQUIREMENT OF NEGATIVE POLARITY ELECTRODE. PLEASE REFERENCE **APPLICATION NOTE** FOR DETAIL INFORMATION.

FA (DEEP HOLE FUNCTION):

THE DEEP HOLE FINISH WILL APPROACH THE POOR PERFORMANCE OF CARBON EVACUATION AND RETARDING THE PUMPING DOWN MOTION. THE **FA** FUNCTION IS USED TO FIX THE TROUBLES HAPPENED IN DEEP HOLE FINISH. WHEN **FA** IS **ON**, IT WILL FORCE ELECTRODE DOWN TO THE PREVIOUS SPARKING ON POSITION THEN RELEASE TO SPEED CONTROL TO SERVO. THEREFORE, IT WILL INCREASE THE EFFICIENCY OF DEEP HOLE FINISH.

FB (LARGE AREA FUNCTION):

THE LARGE AREA FINISH WILL APPROACH THE DRAWBACK OF SUCKING THE WORK PIECE DURING PUMPING UP MOTION. THE FB FUNCTION IS USED TO FIX THE TROUBLES HAPPENED IN LARGE AREA FINISH. WHEN **FB** IS **ON**, IT WILL SLOW DOWN PUMPING MOTION TO ELIMINATE THE VACUUM TUBE BETWEEN ELECTRODE AND WORK PIECE. THEN RESET THE PUMPING MOTION TO NORMAL SPEED.

＊ : When FA、FB functions are under NA(OFF), Z-axis Pulse feed is at normal value. The setting of its feed can be set to modify it in the parameter of work piece.

GF：The setting of Orbit free function is ON/OFF. When the setting is ON, it won't stop immediately and it'll end the sparking under orbiting produced no sparkle completely. When the sparking to desired Z-axis Depth under the setting of NA (OFF), it'll end the sparking.

JC：The times setting of Toggle on Maximum travel pumping is NA(OFF) or over 5 Times (Minimum) to 99 times (Maximum). When pumping is over the 5th times under EDM pulse sparking condition (after setting it as 5 times), pulse retrace length is to drain the dregs away by longer travel. The length setting of its longer travel is as JL setting value.

JL：The length setting of drain the dregs away by Maximum travel is over 5mm(Minimum) to 99mm (Maximum). The unit of its length is mm.

7-10   BUZZER, DISCHARGE TIMER
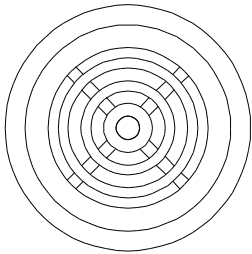
WARNING BUZZER
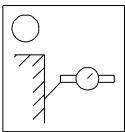
TO TOGGLE THE SWITCH **ON/OFF**, PUSH
DOWN THE BUTTON AND **JOY** SWITCH
SIMULTANEOUSLY.
WHEN IT IS TOGGLED **ON**, THE ELECTRODE
WON'T BE PROTECTED WHILE COLLIDING
WITH WORK PIECE.
IT'S USED FOR THE ELECTRODE ALIGNMENT.
USER SHOULD BE CAREFUL WHEN SWITCH
ON THIS FUNCTION.
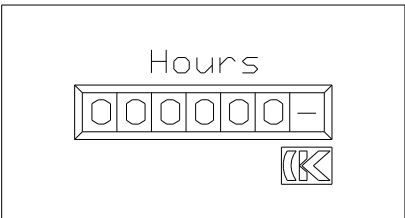
DISCHARGE TIMER

7-11   EMERGENCY STOP, MAIN POWER SWITCH
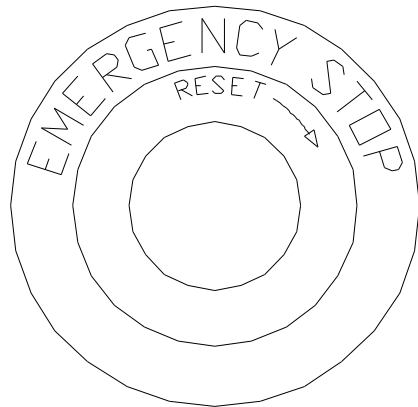
EMERGENCY STOP SWITCH
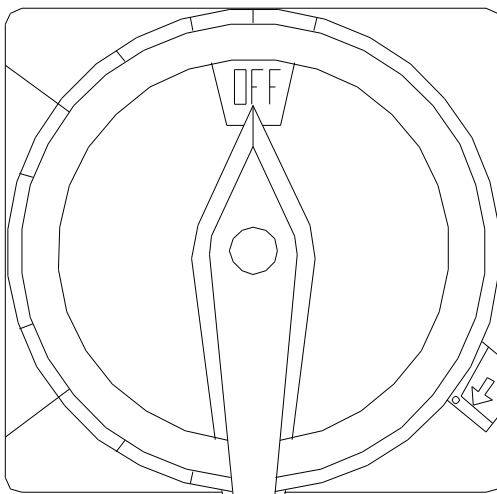
MAIN POWER SWITCH

THE AP VOLTAGE SELECTED SWITCH

矢粉
Si Powder

放電油
Dielectric Oil
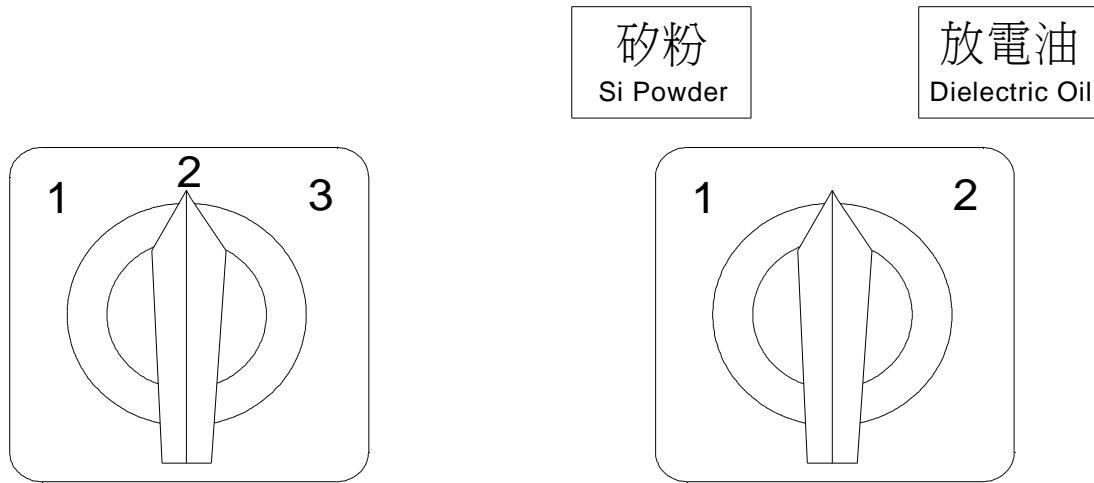
THE AP VOLTAGE SELECTED SWITCH PROVIDE 3 DIFFERENT AP VOLTAGE PARAMETER FOR DIFFERENT APPLICATION AS FOLLOWING:

1. FIRST STEP ---THIS STEP COULD GET SMOOTH SURFACE AND REDUCE WEARING ELECTRODE. HOWEVER,IT WILL SPEND MORE TIME ON THIS STEP.THEREFORE, THIS STEP IS SUITABLE FOR SMALL AND SHARP ELECTRODE.REGARDING TO SPECIFICATION,PLEASE SEE APPLICATION NOTE FOR MORE DETAIL.

2. SECOND STEP---THIS STEP IS FOR NORMAL OPERATION.REGARDING TO SPECIFICATION,PLEASE SEE APPLICATION NOTE FOR MORE DETAIL.

3. THIRD STEP---THIS STEP IS FOR FAST DEALING APPLICATION OR CARBON MATERIAL.PLEASE NOTE USE THIS STEP WILL WEAR ELECTRODE FAST AND GET MORE CRUDE SURFACE.

NOTE:

YOU SHOULD" **TURN OFF** " THE EQUIPMENT AND THEN SWITCH STEP .OTHERWISE, THIS EQUIPMENT WILL BE DAMAGE.

7-12 LIGHTING SYSTEM AND FIRE GUARD INDICATOR

1. ILLUSTRATION:

LIGHTING SWITCH

INFRARED DETECTOR

FIRE GUARD INDICATOR
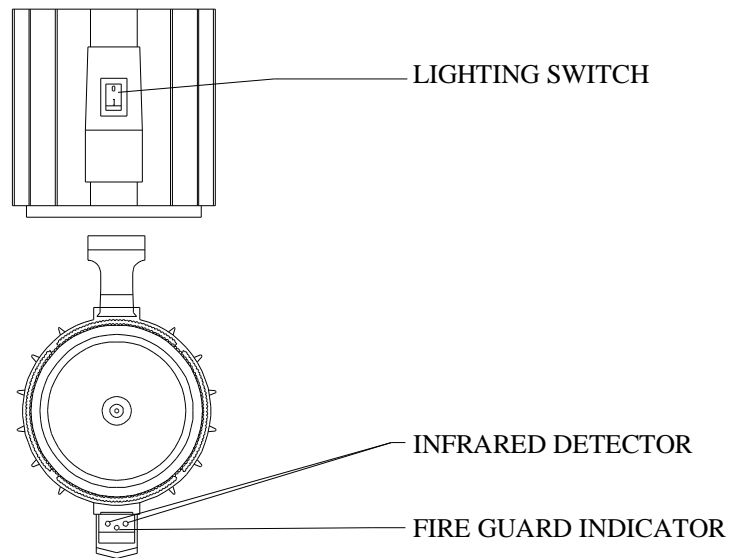
2. DESCRIPTION:

1> ACTIVATE LIGHTING SYSTEM:

    a. TURN ON LIGHTING SWITCH.

    b. THE FIRE GUARD FUNCTION WILL BECOME INVALID AND EXTINGUISH THE FIRE GUARD INDICATOR, THEREFORE, THE USER HAS TO TURN OFF THE LIGHTING SWITCH WHEN HE IS NOT AROUND THE WORK PLACE.

è LIGHTING RANGE
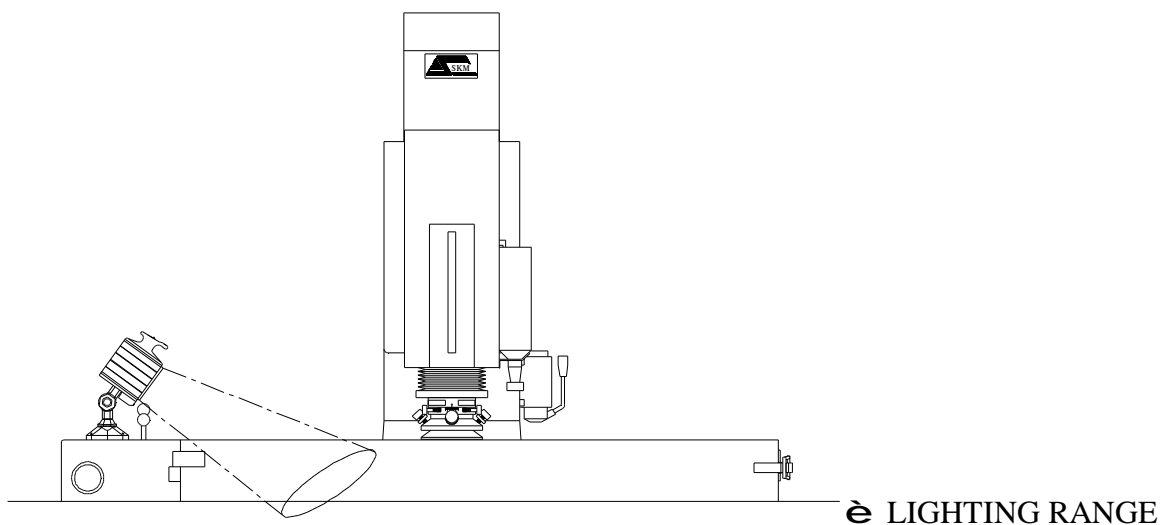
2>   ACTIVATE FIRE GUARD:

    a.   TURN OFF LIGHTING SWITCH TO EXTINGUISH WORKING LIGHT.

    b.   THE FIRE GUARD FUNCTION WILL BECOME VALID AND THE INDICATOR WILL ON. WHEN THE FIRE GUARD IS ACTIVATED, IT START TO MONITOR DURING SPARKING. IT WILL SHUT DOWN THE SYSTEM POWER AND GIVE A BEEP WARNING WHEN FLUID TEMPERATURE TOO HIGH OR FIRE ON WORKING PLATFORM.

    c.   THE FIRE EXTINGUISHER SHOULD BE REFILL ONCE A YEAR AND IT CAN BE USED ONLY ONE TIME, AND FOR THE REPLACEMENT, PLS REFER TO **SAFE GUIDE** CHAPTER 1-7 FOR DETAILS.   NOTICE THE EXPIRE DATE OF FIRE EXTINGUISHER AND ROUTINE CHECKING THE PRESSURE GAUGE EVERYDAY. IF THE PRESSURE IS TOO LOW, PLEASE REFILL THE STUFF.   THE MACHINE CAN BE OPERATED **ONLY ACCOMPANIED WITH THE FIRE EXTINGUISHER**.

FIRE EXTINGUISHER

è INFRARED SENSINGRANGE
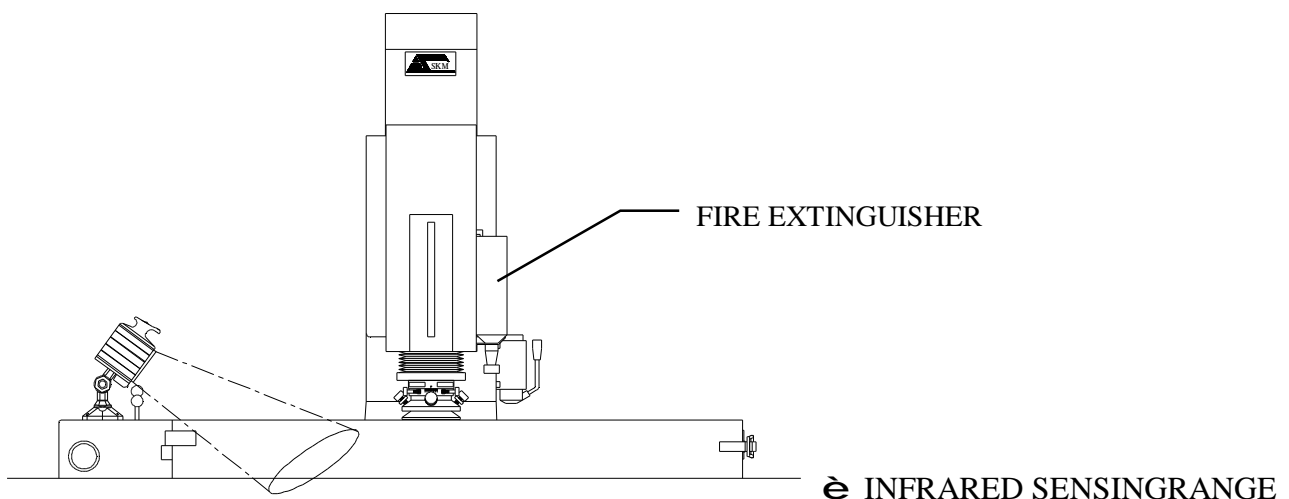
NOTE:

THE FIRE GUARD DETECTS THE FIRE SOURCE BY INFRARED SENSOR. TO AVOID THE ERROR FIRE ALARM HAPPENED, THE MACHINE SHOULD NOT BE DIRECTLY DISPOSED UNDER SUNLIGHT, BULB OR OTHER HEAT LIGHT SOURCE. WE STRONG RECOMMEND INSTALLING OUR MACHINE UNDER COLD LIGHT SOURCE LIKE FLUORESCENT LIGHT.

CONCERNING THE FIRE PREVENTION, PLS REFER TO SAFE GUIDE CHAPTER 1-5.

CHAPTER 8 : THE SYSTEM OPERATION AND APPLICATION
♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠

8-1   SYSTEM APPLICATION

Ⅰ、THE SPECIFICATION OF EACH FUNCTION KEY & SWITCH

1.   FUNCTION KEY F1-F10 : PROVIDE MANY DIFFERENT FUNCTIONS OF SKM CONTROLLER.

2.   NUMERICAL KEYS 0-9 ,+ / -, . : ALL OF TH0SE KEYS ARE FOR SETTING NUMBER, LIKE X.Y.Z AXIS VALUE SETTING, FINISHING SIZE, OR DISCHARGE TIME SETTING.

3.   CURSOR KEY ï ð ñ ò : ñ ò KEY FOR CHOOSING DIFFERENT COORDINATE (UP, DOWN, POSITIVE, NEGATIVE), - SUCH AS - ABSOLUTE & INCREMENTAL VALUE SETTING OR FOR PROGRAMMING.
ï ð KEY ARE FOR SPARKING CONDITIONS SETTING, SUCH AS : MFD,BP,AP,TA,TB,≋,≭,↑,↓, ⏬ , FA, FB, AND SETTING A PROGRAM.

4.   YES, NO, ENT KEY: FOR ANSWERING SELECTION, ENT KEY IS FOR RECONFIRMING AND PUTTING YOU ANSWER.

5.   DEL, ⏎ KEY : DEL KEY NOT BE USED, AND⏎ KEY IS SAME AS "BACKSPACE" KEY .

Ⅱ、THE INSTRUCTION & OPERATION PROCEDURE OF ZNC CONTROLLER'S FUNCTIONS:
AFTER TURN ON MACHINE, THE CAPITTAL SCREEN WILL SHOW THE LOGO OF SKM CO.,LTD AND PROVIDE THE MAIN FUNCTIONS OF SKM CONTROLLER AT THE SAME TIME (Ref. FIG. 8-1).

FIG.8-1

THIS CAPITAL SCREEN (FIG. 8-1) PROVIDE THE FOLLOWING FUNCTION:

1. F3 – PROGRAM EDIT
2. F4 – EDGE FINDING
3. F5 - MANUAL SPARKING
4. F6 – SYSTEM SETUP

HERE ARE THE PROCESS OF OPERATION AS BELOW:

(1) PROGRAM EDIT (F3)   (2) EDGE FINDING (F4)

(3) MANUAL SPARKING (F5)   (4) SYSTEM SETUP (F6)

8-2   F3 - PROGRAM

THE FUNCTION KEY PROVIDE THE OPERATOR FOR EDITING, MODIFYING OR RUNNING PROGRAM. AFTER PRESSING F3 KEY OF THE MAIN MENU, THE SCREEN IS SHOWN AS FIG.3. THE SCREEN IS DIVIDED INTO TWO SIDES.   LEFT SIDE IS PNC PROGRAM; RIGHT SIDE IS ZNC PROGRAM. THE OPERATOR CAN USE ←⟶ KEY TO SELECT PNC PROGRAM AREA FOR EDITING MULTI-CAVITY, POSITION FUNCTIONS AND CALL ZNC SPARKING PROGRAM.

ZNC PROGRAM AREA IS FOR EDITING Z AXIS SPARKING FUNCTIONS. ITS CONTENT IS SHOWING BY SINGLE OR MULTI-SECTION. THE INSTRUCTION OF FUNCTION KEYS IN AUTO RUNNING SCREEN'S BOTTOM BLOCK IS AS BELOW:
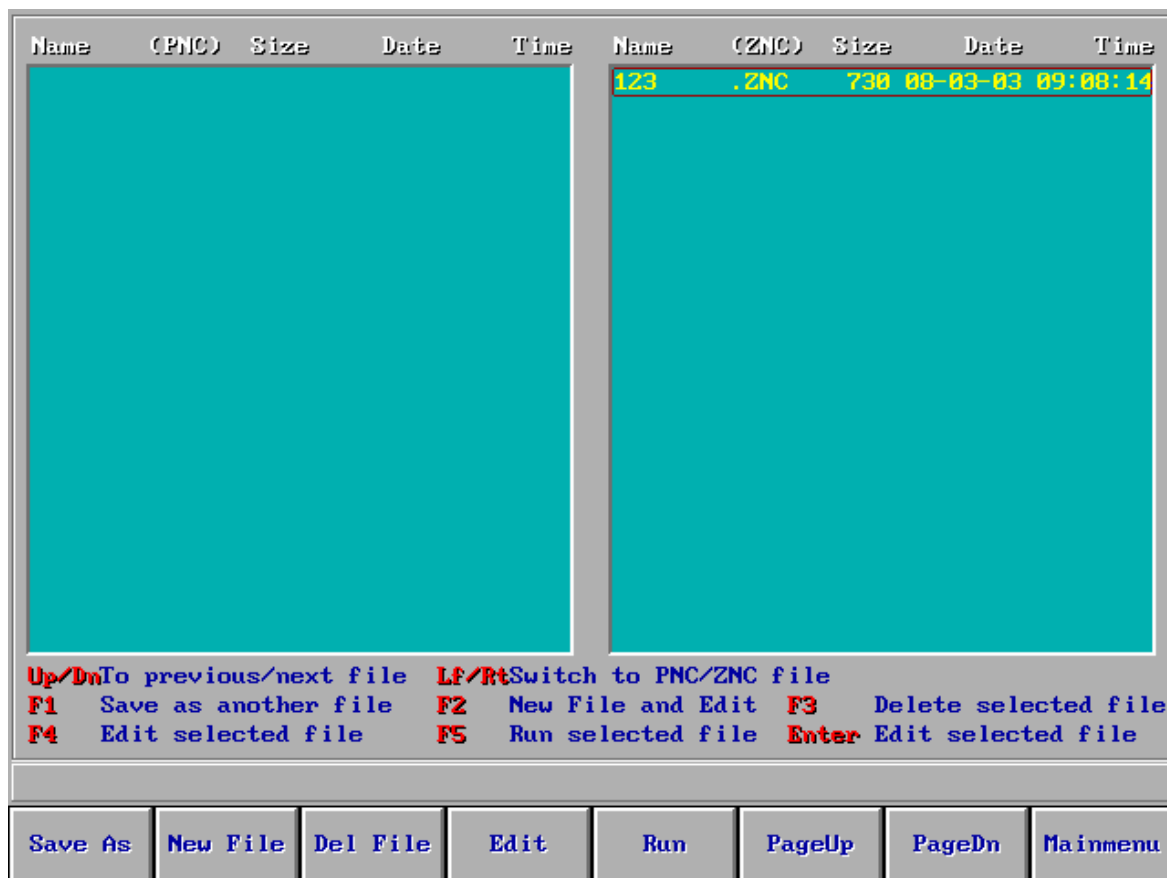
FIG. 3

F3/ F1 – SAVE AS

THE FUNCTION KEY (AS FIG.3-1). OFFER THE SELECTED FILE   BY CURRENT CURSOR TO SAVE AS
 ANOTHER FILENAME IN SMALL WINDOW.
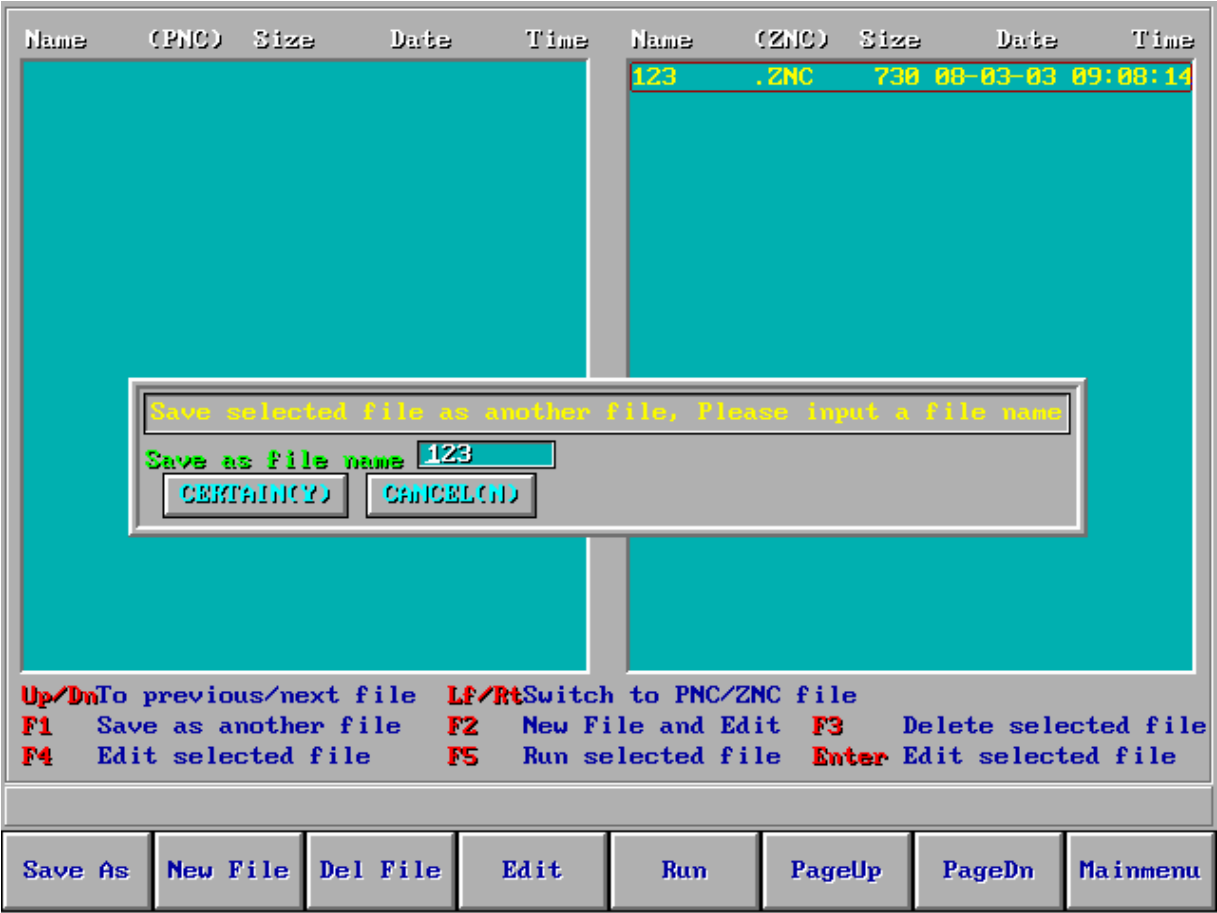
FIG. 3-1

F3 / F2 – NEW FILE

THE FUNCTION KEY IS FOR CREATING A NEW FILE NAME.   AFTER PRESSING THE FUNCTION KEY,
THE SCREEN WILL SHOW A SMALL WINDOW TO INPUT NEW FILE NAME. (AS FIG.3-2).   PLS REFER TO
THE INSTRUCTION OF F3 FOR THE DETAILS.
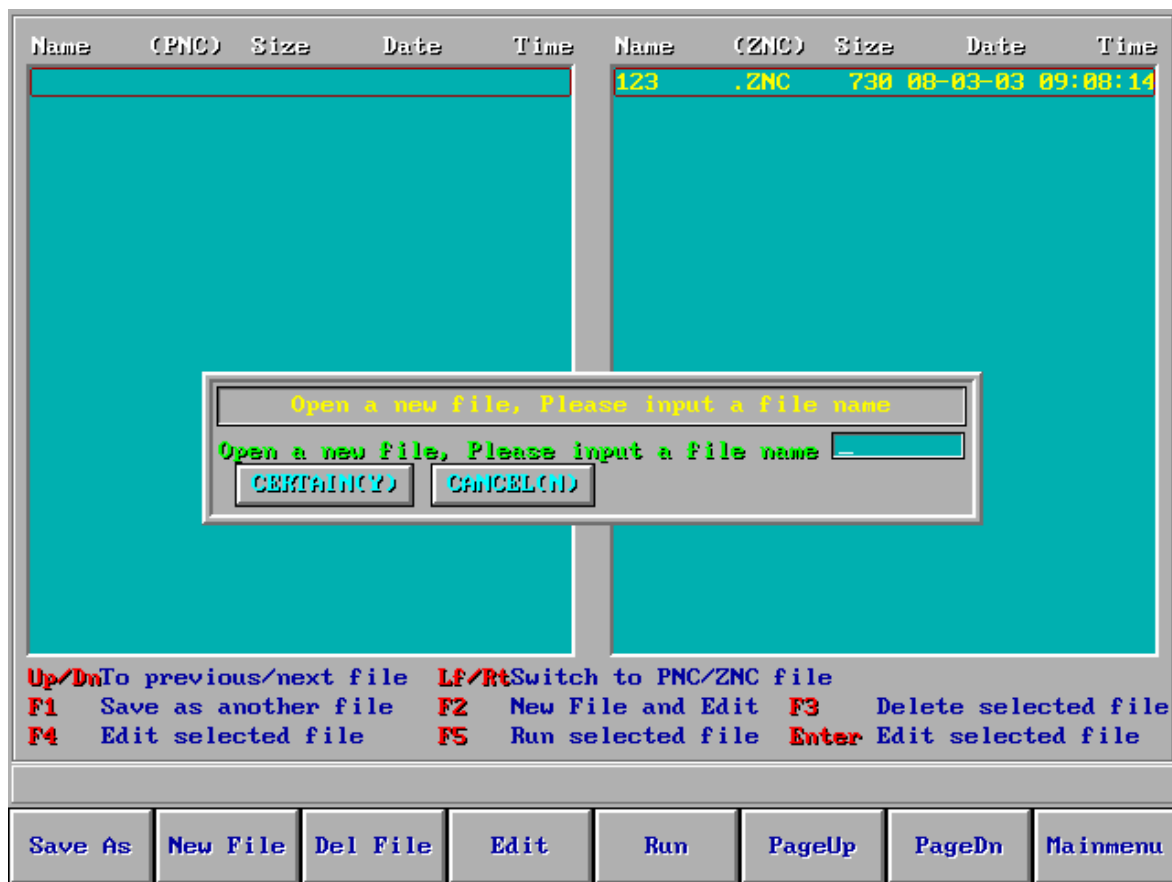
FIG. 3-2

F3 / F3   DEL FILE

THE FUNCTION KEY IS FOR CANCELING SELECTED FILES. AFTER PRESSING F3 KEY ,THE SCREEN

HAS A SMALL WINDOW TO ASK FOR MAKING SURE   TO CERTAIN "Y" OR DELETE "N"   (AS FIG.3-3).
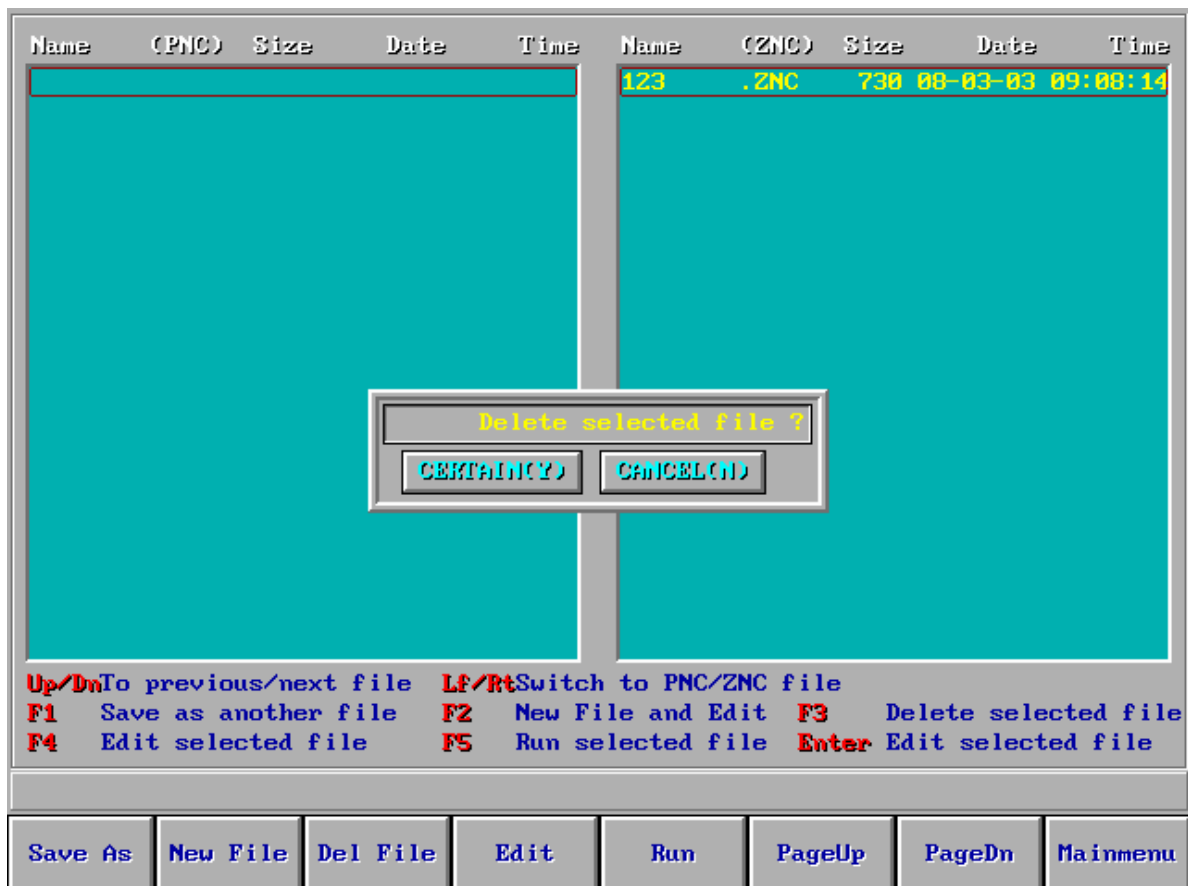
FIG. 3-3

F3 / F4   EDIT

THE FUNCTION FOR EDITING DESIRED FILES(AS FIG.3-4). PLS REFER TO THE INSTRUCTION OF F3/F4A

FOR THE DETAILS.

```
123.2NC:      1/10

⊙Field Definition:
 F9        : Insert a line,       F10 : Delete a line
 ╱         : Option skip          F4  : >> Next run from middle start
 Z-Depth : sparking Z-Depth (mm)
 Tmr       : sparking duration timer (min)
 MFD, BP, AP, ON, OFF, SERVO, GAP, DN, UP, E-P, FA, FB: EDM Parameter
 Z-LastDepth 0.000        (mm) Z-Safty Home 50.000       (mm) EDM-Code E
 ╱  Z-Depth  Tmr MFD BP AP  ON   OFF SVO GAP DN    UP    EP FA FB GF JC JL
     0.000    0   NA  0  0   30    2   50  50  0.3   0.8   +  NA NA NA NA 5

     0.000    0   NA  0  0   30    2   50  50  0.3   0.8   +  NA NA NA NA 5
     0.000    0   NA  0  0   30    2   50  30  0.3   0.8   +  NA NA NA NA 5
     0.000    0   NA  0  0   30    2   50  30  0.3   0.8   +  NA NA NA NA 5
     0.000    0   NA  0  0   30    2   50  30  0.3   0.8   +  NA NA NA NA 5
     0.000    0   NA  0  0   30    2   50  30  0.3   0.8   +  NA NA NA NA 5
     0.000    0   NA  0  0   30    2   50  30  0.3   0.8   +  NA NA NA NA 5
     0.000    0   NA  0  0   30    2   50  30  0.3   0.8   +  NA NA NA NA 5
     0.000    0   NA  0  0   30    2   50  30  0.3   0.8   +  NA NA NA NA 5
     0.000    0   NA  0  0   30    2   50  30  0.3   0.8   +  NA NA NA NA 5
     0.000    0   NA  0  0   30    2   50  30  0.3   0.8   +  NA NA NA NA 5

sparking Z-Depth

 PageUp   PageDown  AutoMatch  RunBlk  EdmTable  Save  Help  Exit
```

FIG. 3-4

F3 / F4A   PROGRAM EDITING

AFTER CREATING NEW FILE NAME OF PNC PROGRAM, THE SCREEN IS UNDER EDITING
CONDITION (AS FIG.3-4A).

FIG. 3-4A

1. THE DETAILS OF FUNCTION KEYS ARE EXPLAINED BY THE FIELD DEFINITION:

   F9: INSERT A LINE　　　　　　F10: DELETE A LINE

   ／: OPTION SKIP　　　　　　　>> : NEXT RUN FROM MIDDLE START

   A/R : ABSOLUTE / RELATIVE COORDINATES (A: ABSOLUTE COORDINATES, R: RELATIVE

   　　　COORDINATES).　AFTER POSITIONING, PRESS ANY NUMERICAL KEYS TO MODIFY

   　　　DESIRED SETTING.

   X、Y : XPOS、YPOS ARE WITH NO LIMIT TO THE VALUE OF BLOCKS FOR KEEP THE CURRENT

   　　　　POSITION.

   Z : ZNC SPARKING DEFINITION FILE NAME ; THE FIELDS PROVIDE TO KEY IN THE FILE NAME

   　　OF DESIRED SPARKING PROGRAM FOR Z AXIS.　AFTER INPUTTING THE FILE NAME, PRESS

   　　"F1" TO EDIT ZNC PROGRAM.

2. UNDER EDITING ZNC PROGRAM, THE TOP FIELDS ARE THE EDITING AREA OF THE DESIRED
   LINE BY CURSOR. THE OPERATOR CAN USE ←→ KEY TO MOVE THE CURSOR IN THE BLOCK.
   AND TO SELECT ANY LINE / BLOCK IN THE PROGRAM BY USING ↑↓ KEY.　F9 FUNCTION
   KEY IS FOR INSERTING A NEW LINE BELOW THE LINE WHERE THE CURSOR STAYED IN.　F10
   FUNCTION KEY IS FOR CANCELING THE DESIRED LINE.

3. FOR EX: TO ADD A FILE NAMED 123.PNC. WHEN ENTERING IT, IT CREATES THE FRIST LINE
   FOR EDITING AUTOMATICALLY. IN THE MEANWHILE THE OPERATOR CAN USE F9 TO INSERT
   A LINE OR F10 TO CANCEL THE DESIRED
   LINE. WHILE START TO INPUT THE VALUE, THE PROGRAM REGARDS THE LINE WHERE THE
   CURSOR STAYED IN AS THE EDITING LINE. AND THE OPERATOR CAN MOVE THE CURSOR IN
   THE BLOCK OF EDITING AREA BY　USING ←→ KEY.

   　THE INSTRUCTION OF BLOCK FUNCTIONS ARE AS BELOW:

   ／: OPTION SKIP ; WHEN INPUTTING ANY NUMERAL INTO THE FIELD, "／" SYMBOL WILL BE
   　　SHOWN IN THE BLOCK. WHILE THE PROGRAM RUNNING, THE LINE WILL BE IGNORED,
   　　SKIPPED. IF PRESS ANY NUMERAL AGAIN, THE "／" SYMBOL WILL DISAPPEAR.

   A/R : ABSOLUTE / RELATIVE VALUE IS THE DEFINITION OF CURRENT LINE'S X、Y AXIS
   　　　COORDINATES. ITS SELECT TYPE IS AS SAME AS ABOVE. TO PRESS ANY NUMERICAL
   　　　KEYS TO CHOOSE A OR R FOR SETTING.

   X、Y : XPOS、YPOS ARE WITH THE BLANK FOR KEEP THE CURRENT POSITION.

   Z、ZNC : AFTER POSITIONING, TO CALL THE FILE NAME OF DESIRED SPARKING SINGLE- OR
   　　　　MULTI-PROGRAM FOR Z AXIS. THE OPERATOR ALSO CAN CALL SAME OR DIFFERENT
   　　　　FILE NAME BY EACH LINE.

   ＞＞: IF THE MACHINING IS BROKEN UNDER MAKING THE MULTI-LINES MOVEMENT
   　　　PROGRAM, THE FUNCTION IS FOR SETTING TO START RUN FROM BROKEN LINE. AFTER
   　　　ENTERING THE PROGRAM, THE FIELD OF LINE IS MOVED TO RUNNING POSITION LAST
   　　　TIME. THEN PRESSING "F4 (MIDRUN)" KEY, THE "＞＞" SYMBOL APPEAR IN THE FRONT

OF LINE.WHEN RUN THIS PROGRAM IMMEDIATELY, THE SYSTEM WILL START TO RUN FROM MARKED "＞＞" LINE.

SPECIAL INSTRUCTION------AFTER FINISHING OR BREAKING PROGRAM MACHINING, THE FUNCTION OF MIDRUN KEY WILL BE CANCELED. AND THE "＞＞" SYMBOL WILL DISAPPEAR. WHILE FINISHED TO INPUT, THE DATA WILL AUTOMATICALLY BE SAVED IN EDITED LINE ONLY BY USING ↑↓ KEY FOR MOVING LINES. AT THE SAME TIME DESIRED DATA OF LINE IS SHOWN FOR EDITING OR REVISING IN THE EDITED FIELD. (REFER TO F7 INSTRUCTION).

AFTER FINISHING MOVEMENT PROGRAM, PLS CHECK IF THE FILE NAME OF ZNC IS NEW FILE NAME OR EXISTED ORIGINAL PROGRAM IN THE FIELD OF Z & ZNC. IF IT'S NEW FILE NAME, IT NEED TO BE EDITED. AT THE MEANTIME THE OPERATOR CAN EDIT ZNC FILE BY F1 AND FUNCTION KEY.

THE EDITING TYPE IS SHOWN UNDER THE SCREEN OF EDITING ZNC AS BELOW (FIG.3-4B):

THE INSTRUCTION OF FIELD ON THE SCREEN IS AS BELOW:

F9: INSERT A LINE   F10: DELETE A LINE

／: OPTION SKIP   >> : NEXT RUN FROM MIDDLE START

Z – Depth : Z AXIS RUNNING DEPTH (mm/inch)

Tmr: MAX TIME OF RUNNING SINGLE FILE (min)

FIG. 3-4B

EDM SPARKING CONDITION SETTING:

WHEN START TO EDIT, IT AUTOMATICALLY CREATE THE FIRST LINE FOR

EDITING. AND INCREASE LINE BY F9 KEY OR DELETE LINE BY F10. WHILE START TO INPUT THE

DATA, THE OPERATOR CAN SELECT DESIRED LINE BY THE CURSOR AND MOVE THE CURSOR IN

INPUTTING BLOCKS BY ⟵⟶ KEY.

THEN CHOOSE TO INPUT Z DEPTH VALUE & EDM SPARKING CONDITION VALUE. THE USER CAN

MODIFY EDM CONDITION SETTING VALUE BY "F1/F2" KEY. AFTER FINISHING, IT HAVE TO

MOVE LINE BY USING ↑↓ KEY.   THE DATA WILL AUTOMATICALLY BE SAVED IN EDITED

LINE . AT THE SAME TIME DESIRED DATA OF LINE IS SHOWN IN THE EDITED FIELD.

OTHER INSTRUCTION:

／: OPTION SKIP

>> : NEXT RUN FROM MIDDLE START

Z – DEPTH (X)：INDICATE THE RUNNING DEPTH OF PROGRAM'S END BLOCK.

WHEN IT'S ONLY DIFFERENT WORKING DEPTH AT THE SAME PROGRAM IN THE

FUTURE, PLS MOVE THE CURSOR TO THIS BLOCK FOR RENEW INPUTTING A

NEW VALUE . THEN THE SYSTEM WILL OFFSET THE BALANCE OF NEW AND

OLD VALUE TO EVERY REST BLOCKS. THE FUNCTION IS FOR OFFSETING ALL

EVERY BLOCK' DEPTH VALUE AUTOMATICALLY BY MODIFY Z DEPTH VALUE

WHEN RUNNING THE DIFFERENT DEPTH IN THE SAME PROGRAM.

Z SAFETY LENGTH (Y) : IT'S DEFINIED FOR BACKING THE SAFETY POSITION IN THE MOVEMENT

OF X、Y AXIS TO PROTECT THE WORKPIECE WHEN MAKE END-LINE

RUNNING.

SPARKING CONDITION ID: THE OPERATOR CAN INPUT A VALUE (1~300) IN THIS BLOCK BY

CALLING ANY STORED DISCHARGE CONDITION IN THE EDM TABLE. AFTER PRESSING ENT TO

CONFIRM, MEMORY SPARKING CONDITION VALUES IN THE EDM TABLE WILL BE

TRANSFERRED TO EDM CONDITION OF THE CURRENT EDITED LINE AUTOMATICALLY. THEN

PRESS F6 KEY TO SAVE AND FINISH THE EDITING.

WHEN IT'S ANY QUESTIONS IN THE OPERATION, THE OPERATOR CAN GET THE

HELPING TO EDIT ZNC FILES BY F7 INSTRUCTION.

F3 / F5   RUN

THE FUNCTION IS FOR AUTO-RUNNING THE SELECTED PROGRAM BY THE CURSOR. THE
OPERATOR HAVE TO SET THE OIL LEVEL OF WORK TANK OR THE NOZZLE EQUIPMENT IN
ADVANCE. AFTER OPENING THE DIELECTRIC MOTOR, PLS PRESS F5 (RUN) KEY. THE MACHINE
WILL AUTO-POSITIONING TO THE PROGRAM   TARGET POSITION AND AUTOMATICALLY TURN ON
THE DISCHARGE "ON" SWITCH FOR RUNNING PROGRAM. (WHEN WORKING THE PROGRAM, THE
USER CAN'T MANUALLY PRESS THE DISCHARGE "ON" SWITCH.)

F3 / F6、F7   PAGE UP、PAGE DOWN

F6、F7 key are for changing the screen pages.

F3 / F8   Main Menu

8-3   F4 EDGE FINDING

PRESS THE F4 FUNCTION KEY OF THE MAIN MENU (FIG. 8-1), AND THE SCREEN WILL DISPLAY AS
BELOW (AS FIG.4) :

THIS MENU (FIG. 4) PROVIDE THE FOLLOWING FUNCTION :
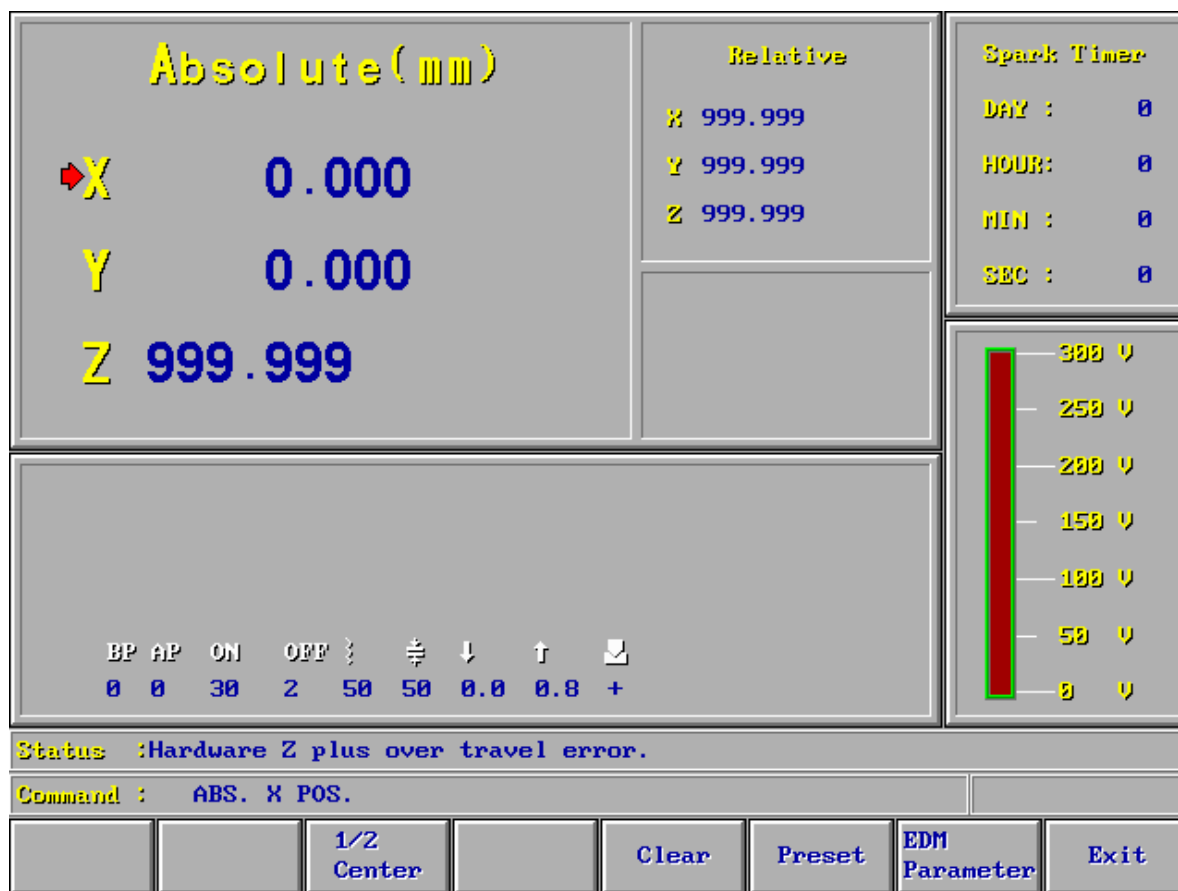
FIG. 4

(1) F3 - AUTO 1/2 CENT

USING THE ARROW KEYS TO INDICATED THE AXIS WHICH YOU WANT, PRESS F3, THEN THE

INDICATED VALUE OF THE AXIS WILL BE CALCULATED TO HALF ITS VALUE.   HERE IS THE

SCREEN AFTER YOU PRESS F3 KEY :

X HALF VALUE (YES/NO) =

IF YOU PRESS THE "YES" KEY AND "ENTER" KEY TO CONFIRM , THE INDICATED VALUE OF

AXIS WILL AUTOMATICALLY HALF VALUE.   IF YOU PRESS "NO" AND "ENTER" KEY TO ESCAPE, F3

FUNCTION IS CANCELED

(2) F5 - CLEAR AXIS VALUE

CLEAR THE VALUE OF THE AXIS WHERE THE ARROW KEY IS LOCATED, THE SCREEN IS AS BELOW

AFTER YOU PRESS THE F5 KEY :

X HALF VALUE (YES/NO CLEAR)=

ANSWER THE SAME AS IN F3 FUNCTION.

(3) F6 - PRESET AXIS VALUE

FOR PRESETING THE VALUE OF THE AXIS WHERE THE ARROW KEY IS LOCATED.

THE SCREEN WILL SHOW AS BELOW WHEN YOU PRESS F6:

ABS. X POS. SET=

WHEN YOU INPUT ANY NUMBER AND PRESS "ENTER" TO SURE ,THEN THE X-AXIS WILL SHOW THE

NUMBER YOU SET.

(4) F7 - PRESET SPARKING CONDITIONS

PRESET SPARKING CONDITION DATA TO SEARCH FOR Z AXIS'S WORKPEICE SURFACE OR

SPARKING POSITIONS.   THE SCREEN IS AS BELOW FROM FIG.4 TO FIG.4-7 AFTER PRESSING F7

KEY:

FIG.4-7

THERE IS THE SPARKING CONDITIONS AS BELOW ON THE SCREEN :

BP	AP	TA	TB	≩	米	↓	↑	⎍
0	0	30	3	5	50	0	2	＋

THERE IS A BLINKING BLOCK UNDER THE "BP" POSITION WHICH THE OPERATOR CAN MOVE IT BY " ç è " KEY TO CHOOSE THE CONDITION REQUIRED, THEN SELECT THE FOLLOWING KEYS .

A.   F1 - STEP UP 、 F2 - STEP DOWN : THESE 2 KEYS ARE FOR FINDING EDGE OF Z-AXIS ONLY.

WHEN SPARKING ON SWITCH IS PRESSED, THE SYSTEM WILL USE THIS CONDITIONS TO EXECUTE EDGE FINDING OR SPARKING.   CAUTION : AT THIS PAGE, THE SPARKING DEPTH CAN'T BE CONTROLLED. IF YOU WAIT TO CONTROL THE Z DEPTH, YOU SHOULD RETURN TO MANUAL SPARKING SCREEN.

B.   F8 - EXIT :

WHEN PRESS F8 THE SYSTEM WILL RETURN TO MAIN MENU, THE EDGE FINDING FUUCTION WILL BE GIVED UP. IN ADDITION, SPARKING TIMER AREA AND Voltage of workhead AREA HAVE BEEN SHOWN ON RIGHT SCREEN. AFTER TURNING ON SPARKING TIMER, IT STARTS TO COUNT TIME. WHEN TURN OFF   SPARKING TIMER, IT'S AUTOMATICALLY TO STOP COUNTING TIME. AFTER TURNING ON SPARKING TIMER NEXT TIME, IT'LL COUNT UP CONTINUOUSLY.

C.   F9 - CLEARING THE SPARKING TIMER SETTING.

In the other, The Voltage of work head is indicated on the screen and Voltage Meter at the same time.

8-4 F5 MANUAL SPARKING

THE MANUAL SPARKING IS THE MOST SIMPLE AND EFFICIENT MODE. (ALSO SETTING ON TIME) ,
TO COMPLETE A SINGLE CAVITY. IN THIS MODE IT IS ONLY NECESSARY TO PRESET THE Z-AXIS DEPTH
AND SPARKING CONDITION DATA. HERE IS THE SCREEN (FIG. 5) AFTER PRESSING F5 KEY IN MAIN
MENU(FIG.8-1).
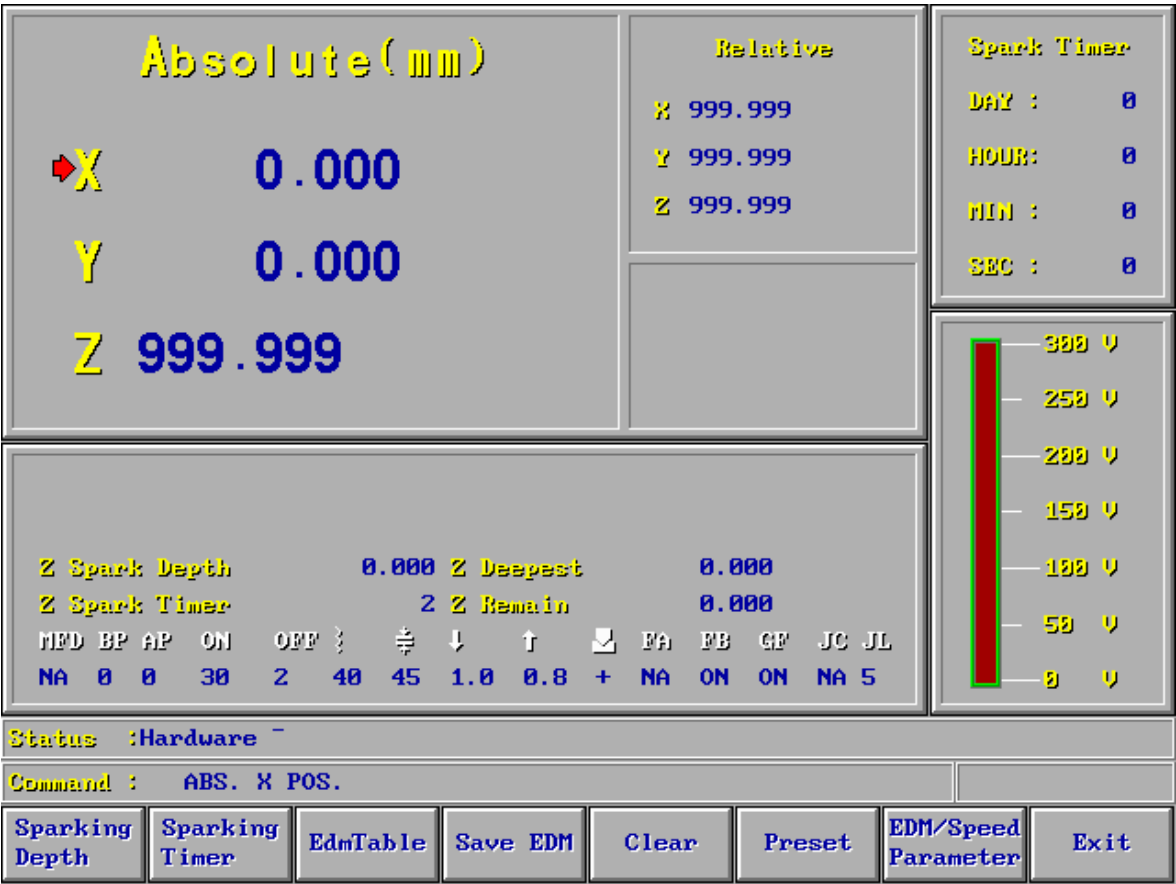
FIG. 5

THIS SCREEN OF FIG. 5 NOT ONLY CAN PROVIDE ALL OF SPARKING CONDITIONS, COORDINATE VOLTAGE AND SPARKING TIMER, IT ALSO SHOW THE FOLLOWING DIRECTION FOR EASY OPERATION.

Z SPARK DEPTH : SHOW THE PRESENT DEPTH OF Z-AXIS.

Z SPARK TIMER : TO PRESET THE SPARKING TIME.

Z LAST DEP : SHOWS THE LASTING DEPTH OF Z-AXIS.

AFTER FINDING THE REFERENCE VALUE OF Z-AXIS (BY FINDING EDGE PROCESS), THE OPERATOR CAN PRESS F1 (FOR PRESETING THE Z AXIS DEPTH) , AND THE SCREEN WILL DISPLAY AS BELOW:

SET   Z SPARK DEPTH=

PRESETTING THE DEPTH USING THE NUMERICAL KEY , AND PRESET THE SPARKING TIMER
BY PRESSING F2 KEY IF INECESSARY.

SET Z SPARK TIMER=

THE MACHINE WILL STOP SPARKING WHEN EITHER THE DEPTH OR TIMER IS REACHED, AND THE BUZZER WILL SOUND.
EX : SETTING THE SPARKING TO 5 MM AND SPARKING TIME TO 60 MIN.   AFTER TURNING ON SPARKING, IT STARTS COUNT TIME.   WHEN SPARKING SWHICH IS PRESSED, THE SYSTEM WILL DETECT THE Z DEPTH AND SPARKING TIME.   IF ANY ONE OF THESE CONDITIONS ARE REACHED.   THE SYSTEM WILL STOP SPARKING AND GIVE A FINISH SINGAL TO OPERATOR
IF SET SPARKING TIME TO ZERO, IT INDICATED THAT IT ISN'T LIMITED BY TIME.

F5 / F3   EDM table

By calling the sparking condition tables have 300 sets in the Memory offer the operator to select the sparking condition in the screen. After this function (as fig.5-3), there is a window show to confirm the desired line (the cursor stay in). Pls press "YES" key to setting EDM conditions or press "NO" key to cancel this function.(Refer to F6/F3).

FIG. 5-3

F5 / F4 SAVE to EDM table

This function is for saving the indicated EDM parameters in any blocks of EDM table.   When enter this function, the status is to show " save current EDM parameter to EDM system table(1~300)=." On the screen. Please input desired table index、line number. Then press "YES" key to confirm or press "NO" key to cancel this function. After finishing the setting, , the block of status showed the indicator of ending. (as fig.5-4)
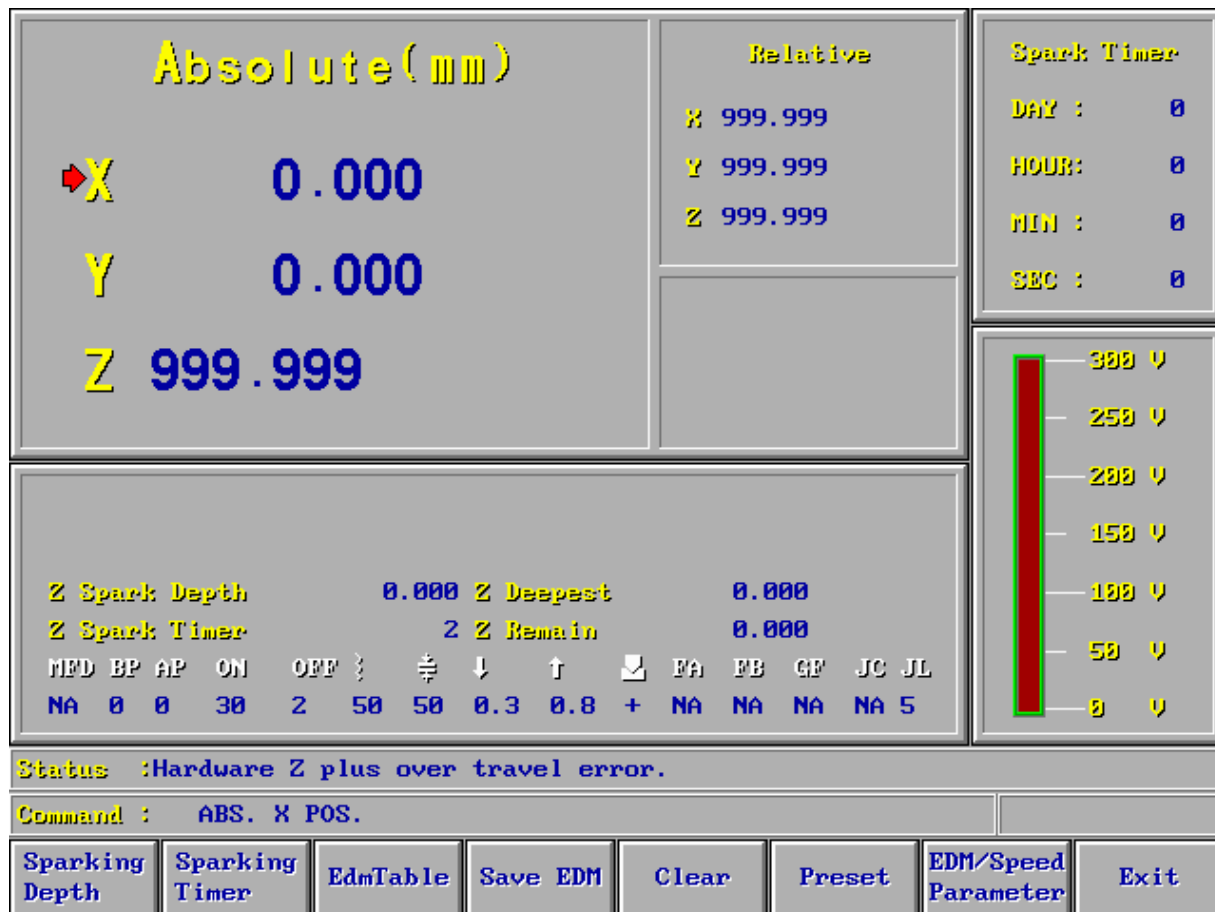
Fig. 5-4

After finishing to select the setting EDM condition, THE OPERATOR CAN MODIFY THE SPARKING CONDITION DURING SPARKING.
THE MANUAL SPARKING PAGE ALSO PROVIDE THE FUCTION OF F5 & F6 TO CLEAR OR PRESET THE COORDINATES.   BUT WHEN IT'S UNDER MANUAL SPARKING AT FIRST TIME,   IT CAN'T USE ABOVE TWO FUNCTIONS DURING RUNNUNG THE SPARKING. AFTER FINISHING THE FIRST MACHINING, ABOVE TWO FUNCTIONS CAN BE RUN.   TO CLEAR OR SET X、Y AXIS POSITIONS IS MORE ADVANTAGEOUS TO MULTI-HOLES MACHINING. AFTER MOVING TO THE DESIRED MACHINING POSITION, PLS PRESS SPARKING ON KEY TO MACHINING AGAIN UNDER THE SAME SPARKING DEPTH & SPARKING CONDITIONS. OTHERWISE REPEAT ABOVE METHOD TO MODIFY THE MACHINING. "F3"(Invalid) is for canceling or setting auto-matching EDM parameter function when finishing the program running.

F5 / F7 EDM SPARKING CONDITION SETTING:

PRESS F7 (SPARKING CONDITIONS SETTING) KEY UNDER DISCHARGING (AS FIG. 5), AND THE SCREEN WILL SHOW FROM FIG. 5 TO FIG. 5-7 AS BELOW:
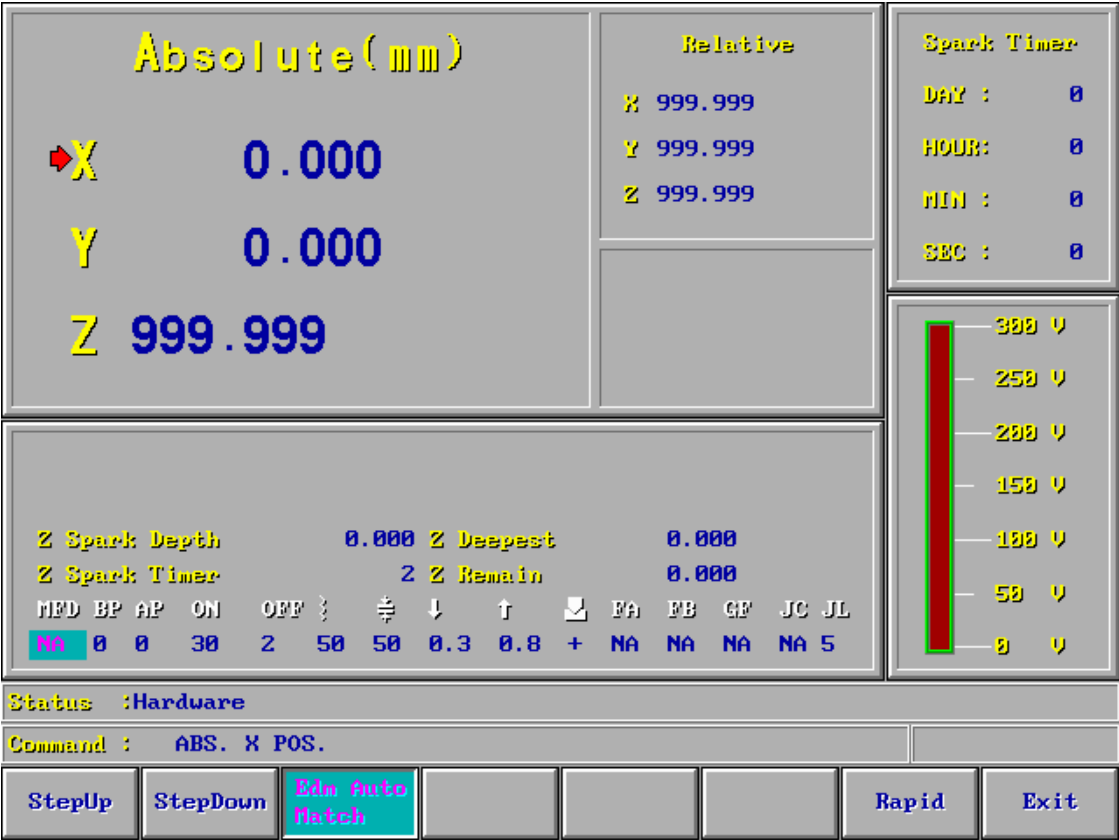
FIG.5-7

MOVE THE FLASHING CURSOR TO THE DESIRED CONDITION, THEN USE THE F1 OR F2 KEY TO STEP UP OR DOWN THE VALUE. (PLS REFER TO CHAPTER 7 FOR DETAILS OF THE FUNCTION KEYS)

MFD	BP	AP	TA	TB	≋	✳	↓	↑	⊥	FA	FB	GF	JC	JL
OFF	0	6	200	4	6	45	5	4	+	OFF	OFF	OFF	OFF	5

8-5   F6 PARAMETER SETTING

UNDER MAIN MENU (As FIG.8-1) PRESS F6 TO ISSUE PARAMETER SETTING COMMAND SHOWN FROM FIG. 8-1 TO FIG. 6.

```
  01. Linear scalar readout direction (0=-,1=+):
      X axis= 0     Y axis= 1     Z axis= 1
  02. Linear scalar readout pulse resoulation (1~20um):
      X axis= 1     Y axis= 1     Z axis= 1
  03. Linear scalar length correction (-99.9~99.9um):
      X axis= 0.00  Y axis= 0.00  Z axis= 0.00
  04. NC control system install (0=ZNC,1=PNC):
      System = 0
  05. AT-L(0~9->30A~400A) AT-S(10~19->30A~400A)
      Current = 10
  06. Position gain (1.0~10.0)
      X axis= 1.000 Y axis= 1.000 Z axis= 1.000
  07. Backlash compensation (-999~999mm)
      X axis= 0     Y axis= 0     Z axis= 0
  08. Motor acc\dec time constant (16~9999msec)
      XYZ axis= 50

                                        Page 1/2

Status  :
Command :

  PageUp    PageDn                                      Exit
```

FIG.6

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THERE ARE MACHINE PARAMETER SETTTING ITEMS SHOWN AS THE FOLLOWING:

1. F1 UP：

MOVE UP TO PREVIOUS ITEM.

2. F2 DOWN：

MOVE DOWN TO NEXT ITEM.

3. F3 PAGE：

TO LOOK UP NEXT PAGE OF PARAMETER SETTING ITEMS.

4. F4 SAVE:

SAVE THE MODIFIED PARAMETER TO SYSTEM.   SOME ITEM (SHOWN ON THE FOLLOWING WITH ＊SIGN) CANNOT BE SAVED BY USER DIRECTLY, SYSTEM WILL PROMPT FOR A PASSWORD, THESE SETTING CAN BE ACCESSED BY MANUFACTURER.   THE OTHER ITEMS CAN BE SAVED WITHOUT PASSWORD VERIFICATION.

(1) LINEAR SCALE READ OUT DIRECTION（0＝－，1＝＋）:＊

SETTINE THE DIRECTION OF X, Y AND Z-AXIS MOVEMENT.

(2) LINEAR SCALE READ OUT PULSE RESOLUTION（μM）:＊

SETTING THE SCALE READ OUT PULSE RESOLUTION.

(3) LINEAR SCALE LENGTH CORRECTION（0～±99.9μM/100MM）：＊

SETTING THE VALUE OF LINEAR SCALE LENGTH CORRECTION .

(4) Z-AXIS HEIGHT WHILE XY MOVING（MM）：

SETTING THE Z-UP POSITION WHILE THE ELECTRODE WAITING FOR BLOCK CHANGE OR Z-UP POSITION OF END OF PRGRAM RUNNING.

(5) DISPLAY UNIT（MM=0, INCH=1）：

SETTING THE UNIT OF COORDINATE VALUE.

(6) NC CONTROL SYSTEM INSTALL (0=ZNC, 1=PNC) : ∗

SETTING THE PLATFORM IS BASED ON ZNC OR PNC.

(7) AT CURRENT RANGE AT-L (0~9->30A~400A) AT-S (10~19->30A~400A): ∗

SETTING THE MAXIMUM CURRENT OF AT .

(8) XY POSITION SPEED (MM/MIN) :

NON AVAILABLE FOR ZNC.

(9) LANGUAGE INSTALL (0=ENGLISH, 1=CHINESE) :

SETTING THE MESSAGE SHOWING LANGUAGE.

(11)~(15) NON AVAILABLE FOR ZNC MACHINE.

F6 / F3   EDM Table

This function key is for calling stored discharge condition in the EDM table.   Under this function, the operator can edit、modify it . To save current EDM parameter to EDM system table is indicated to move the cursor to desired line number、blocks etc by ↑ ↓ ←→ keys in Main Menu. (as fig.6-3)

F1：Ste Pup
F2：Step Down
F3：Pa Up
F4：Pa Dn

```
   Domains of EDM members:

   Member Meaning                        Domain
   MFD     Mirror Finish Discharging     0~9 (0: NA)
   BP      High Voltage, Low Current     0~5 (0: NA)
   AP      Low Voltage, High Current     0~120A (16 stages)
   ON      Sparking Pulse On Time        1~1800 usec(24 stages)
   OFF     Sparking Pulse Off Time       1~9 stages
   SVO     SERVO Sensitive               0~100% (100 stages)
   GAP     Sparking Gap Voltage          30~120V (9 stages)
   DN      Pumping Down Erosion Time     0~99.9sec(1000 stages)
   UP      Pumping Up length             0.1~99.9mm(999 stages)
   EP      Electrode Polarity            0~1 (0:-, 1:+)
   FA      Deep Hole Sparking            0~1 (0:NA, 1:ON)
   FB      Large Ares Sparking           0~1 (0:NA, 1:ON)
   GF      Gap Free                      0~1 (0:NA, 1:ON)
   JC      Pumping count                 0:Disable, 5~99 count
   JL      Long pumping up length        5~999 mm

   [ CERTAIN(Y) ]  [ CANCEL(N) ]    F1:StepUp, F2:StepDown,
                                    F3:PgUp, F4:PgDn, F5: AutoMatch:ON
```

FIG. 6-3

8-6 THE PROCEDURE FINE FINISH ADJUSTMENT OF SKM EDM (GRAPHITE ELECTRODE)

NO.	BP	AP	TA	TB	↑	↓	⩘	⚹ (V)
1	1	30	90	4	3	5	7	45
2	1	21	60	4	3	5	7	45
3	1	15	60	4	3	5	7	45
4	1	12	60	4	3	4	6	45
5	0	9	60	4	3	4	6	45
6	0	6	60	3	3	*4	6	45
7	0	4.5	45	3	3	*4	6	45
8	0	4.5	20	2	3	*3	6	45
9	0	3	10	2	3	*2	6	50
10	0	1.5	8	2	2	*2	6	50
11	1	0	6	2	2	*1	5	60
12	0	0	4	2	2	*1	5	60

(1) POSITION 1-5 ARE FOR RONGH FINISH AND BEAR THE IOWEST WEAR RATE.

(2) POSITION 6-12 ARE FOR THE SPARKING CONDITION PROCEDURE OF FINE FINISH.

(3) PARAMETER WITH ＊SYMBOL CAN DEPEND ON ACTUAL STATE TO ADD OR DECREASE, THE MIN. IS "1" .

8-6-1　THE PROCEDURE FINE FINISH ADJUSTMENT OF SKM EDM

項次	BP	AP	TA	TB	↑	↓	≋	✳ (V)
1	0	30	700	3	3	5	7	45
2	0	21	600	3	3	5	7	45
3	0	15	500	3	3	5	7	45
4	0	12	400	3	3	4	6	45
5	0	9	300	3	3	4	6	45
6	0	6	200	3	3	4	6	45
7	0	4.5	150	3	3	4	6	45
8	0	4.5	90	3	3	*3	6	45
9	0	4.5	45	3	3	*2	6	45
10	0	4.5	20	3	2	*2	6	50
11	1	4.5	10	2	2	*1	5	50
12	0	3	120	3	3	*3	5	45
13	0	3	60	3	3	*3	5	45
14	0	3	30	3	2	*2	5	50
15	0	3	10	2	2	*1	5	50
16	0	3	4	2	2	*1	5	50
17	0	1.5	15	2	2	*1	5	50
18	0	1.5	8	2	2	*1	5	50
19	0	1.5	4	2	2	*1	5	60
20	2	0	15	2	2	*1	5	*120
21	2	0	8	2	2	*1	5	*120
22	1	0	2	1	2	*1	5	*120

(4)　POSITION 1-7 ARE FOR RONGH FINISH AND BEAR THE IOWEST WEAR RATE.

(5)　POSITION 8-11 ARE FOR FINE FINISH OF LARGE AREA.

(6)　POSITION 12-22 ARE FINE FINISH OF SMALL AREA.

(7)　FOR EX : YOU CAN SPARK BEGINNING FROM POSITION 6, AND THEN SETTING THE FOLLOWING PROGRAM FROM POSITION 7, 12, 14, 18, 22 IN SEGUENCE FOR FINE FINISH.

THE FORMULA OF FINISHING DISCHARGE DEPTH :

THE FINISHING DISCHARGE DEPTH = THE TOTAL DIFFERENCING DEPTH BETWEEN THE INTENDED AND THE PRESENTLY OF **AP** VALUE PLUS **TA** VALUE.

FOR EXAMPLE :

THE MACHINING CONDITION FROM 由 **AP=15A , TA=400us CHANGE TO AP=9A , TA=200us** FROM **FIGURE A** , THEN THE FINISHING DISCHARGE DEPTH IS :

AP   TA

   0.06mm   0.05mm   0.025mm   0.025mm

15A   → 12A   →   9A   400   → 300 →   200

FROM ABOVE :

AP FROM **15A TO 12A TO 9A**, THE NECESSARY DEPTH ARE **0.06 + 0.05 = 0.11mm**, **TA** FROM **400 TO 300 TO 200**, THE NECESSARY DEPTH IS **0.025 + 0.025 = 0.05mm**. THE TOTAL DEPTH **AP** + **TA** = **0.11mm+0.05mm=0.16mm**.

SO WHEN THE MACHINING CONDITION FROM **AP→15A、TA→400us**, CHANGE TO **AP→9A、TA→200us**, THE MINIMUM MACHINING DEPTH OF Z AXIS IS ABOUT **0.16mm**.

FIG. A

The Depth Setting of AP Position Difference			The Depth Setting of ON Position Difference					
	Z-Depth value	Orbiting Radius value		Z-Depth value	Orbiting Radius value		Z-Depth value	Orbiting Radius value
60A			1800			20		
↓	0.2mm	0.1mm	↓	0.04mm	0.02mm	↓	0.005mm	0.002mm
45A			1500			15		
↓	0.15mm	0.075mm	↓	0.04mm	0.02mm	↓	0.005mm	0.002mm
30A			1200			10		
↓	0.1mm	0.05mm	↓	0.04mm	0.02mm	↓	0.005mm	0.002mm
21A			900			8		
↓	0.08mm	0.04mm	↓	0.03mm	0.015mm	↓	0.005mm	0.002mm
15A			700			6		
↓	0.06mm	0.03mm	↓	0.03mm	0.015mm	↓	0.005mm	0.002mm
12A			600			4		
↓	0.05mm	0.025mm	↓	0.03mm	0.015mm	↓	0.005mm	0.002mm
9A			500			2		
↓	0.03mm	0.015mm	↓	0.03mm	0.015mm	↓	0.005mm	0.002mm
6A			400			1		
↓	0.03mm	0.015mm	↓	0.025mm	0.0125mm			
4.5A			300					
↓	0.02mm	0.01mm	↓	0.025mm	0.0125mm			
3A			200					
↓	0.01mm	0.005mm	↓	0.025mm	0.0125mm			
2A			150					
↓	0.005mm	0.002mm	↓	0.02mm	0.01mm			
1.5A			120					
↓	0.005mm	0.002mm	↓	0.02mm	0.01mm			
1A			90					
↓	0.005mm	0.002mm	↓	0.02mm	0.01mm			
0.5A			60					
↓			↓	0.015mm	0.0075mm			
BP			45					
1 2			↓	0.01mm	0.005mm			
↓	0.005mm	0.002mm	30					
1			↓	0.01mm	0.005mm			

CHAPTER 9 : MACHINE SIMPLE CHECK、MAINTENANCE、REPAIR

♠♠

1. SPECIAL EXPLAIN:

THE SERVO ACTIVITY BRINGS BUZZER THAT'S NORMAL CONDITION WHEN THE NACHINE PROCESSING FOR DIE SPARKING. AND CANNOT EFECT OF THE MACHINE EFFICENCY.

2. MACHINE LUBRICATE：

MACHINE LUBRICATE IS VERY INPORTANT STEP，IT'S REGARDING PRECISION、LIFE AND AXIAS. MAINTENANCE STEP AS BELOW：（FIG.9-1）
WHEN LUBRICATE LOWER THAN UNDERLINE ，（FIG.9-2） IT SHOULD BE ADD NEW LUBRICATE TO UPLINE.

注意： 注油器是否有油
注油漉油工作， 每天進行一次。
每次工作框序為：
1.將注油拉柄、 拉兩次後、 令X、 Y、 Z、 Z2等軸走完全程。
2.如1項進行兩次即可。

ATTENTION:CHECK OIL IN THE LUBRICATOR.
THE LUBRICATOR SHOULD BE PROCEED ONCE A DAY.
PROCEDURE AS FOLLOWIFG:
1. PULL THE LUBRICATOR AT TWICE AND MOMENT X,
Y, Z, AND Z2 TRAVEL STROKES.
2. PROCEED ABOVE PROCESS ONCE AGAIN
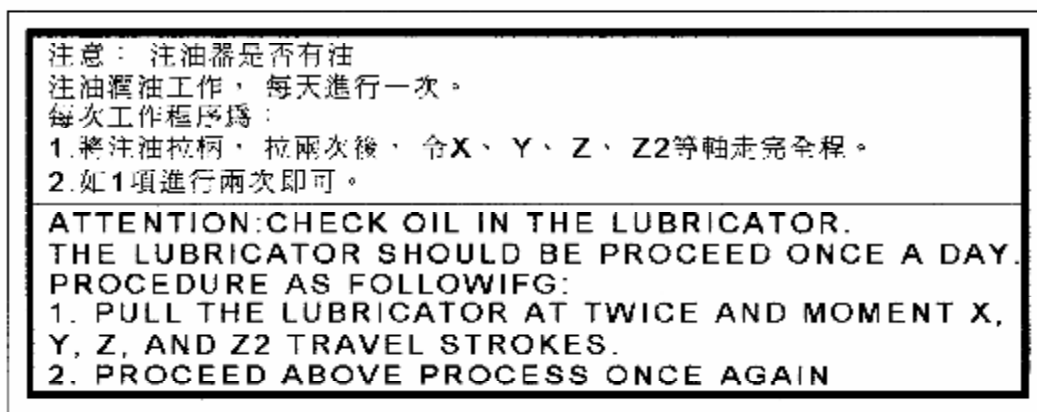
FIG.9-1

T30
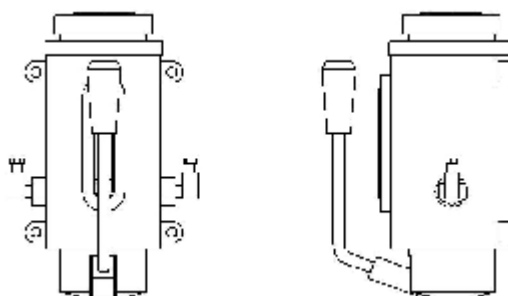
FIG.9-2

3. DIELECTRIC: （FIG.9-3）

（1） WHEN STOP WORK，CAN'T SEE OIL SURFACE OF OIL BOX，IT SHOULD ADD NEW OIL.

（2） WHEN ADD NEW OIL，IT MUST BE COURSE AT STOP WORK，PLS NOTE：DON'T LET OIL OVERFLOW.
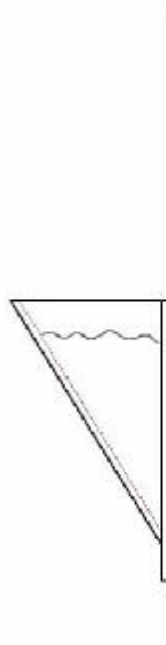
FIG.9-3

4. FILTER：

WE SUGGEST FILTER REPLACE CYCLE 600HR~1000HR，THE SERVICE LIFE DECIDE TO WORK CURRENT SITUATION，WHEN OPERATOR FIND CURRENT BECOME SMALL OF PUMP，THE REASON IS FILTER HAD OVER JAM，NOW PLS REPLACE FILTER，THE REPLACE STEP AS BELOW：（FIG.9-4）

1. FIX

2 .NYLON RING

3. LID OF

4. O RING

5. FIX NUT

6. PACKING

7. FILTER
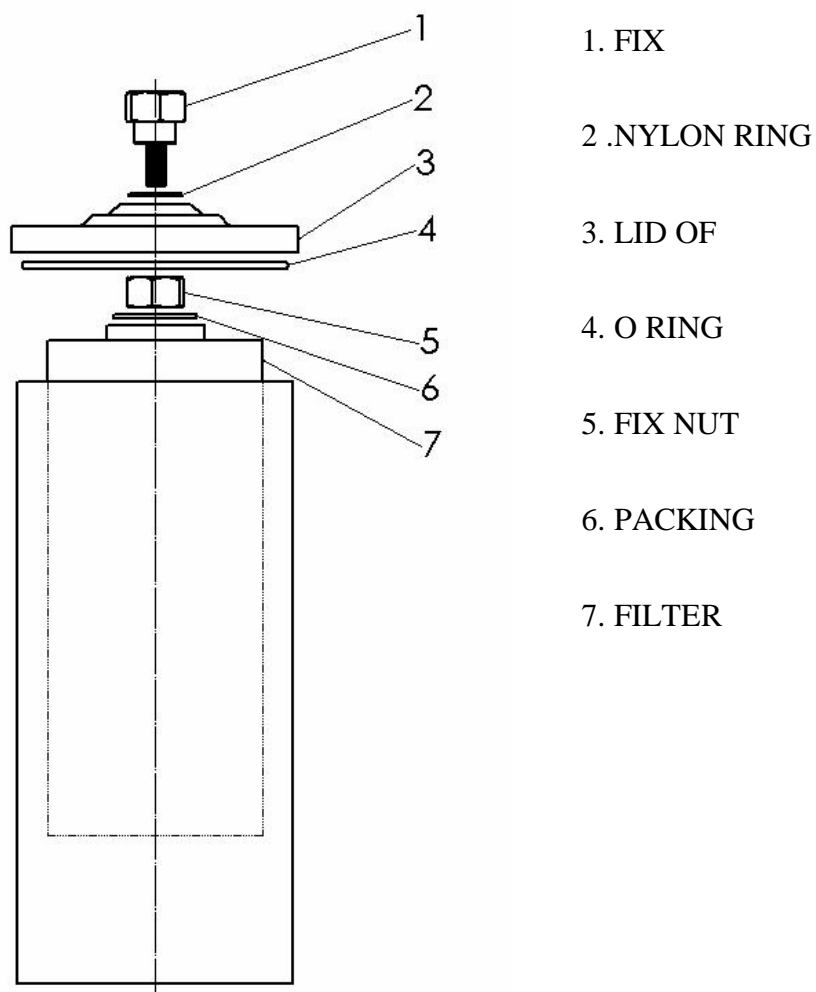
FIG.9-4

5. LEAKPROOF SPONGE STICK OF WORK TANK：

1. WHEN MACHINE DO NOT WORK，WE SUGGEST OPEN THE DOORKNOB，LET SPONGE STICK OF WORK
   TANK AT RELAX SITUATION. IT'S CAN EXTENDED SERVICE LIFE.

2. WHEN DOOR OF WORK TANK HAS LITTLE LEAK OIL，IT'S CAN ADJUST FIX POSTTION OF DOORKNOB
   TO ADD SPONGE STICK DENSITY.
   THE STEP：（FIG.9-5） AS BELOW （FIG.A）

a. TURN OFF M6 SCREW OF 2 PCS（FIG.A）BY WRENCH（SIZE4）.

b. MAKE DOORKNOB MOVEMENT TO RIGHT ABOUT 2mm.

c. LOCK M6 SCREW OF 2 PCS.

d. AS ABOVE MENTION TILL TO UNLEAK.

3. WHEN FINISH SECOND STEP，BUT STILL DONT IMPROVE LEAK OIL SITUATION.
   IT'S MEAN SPONGE STICK SERVICE LIFE WILL OVER，SO SHOULD REPLACE NEW SPONGE STICK.
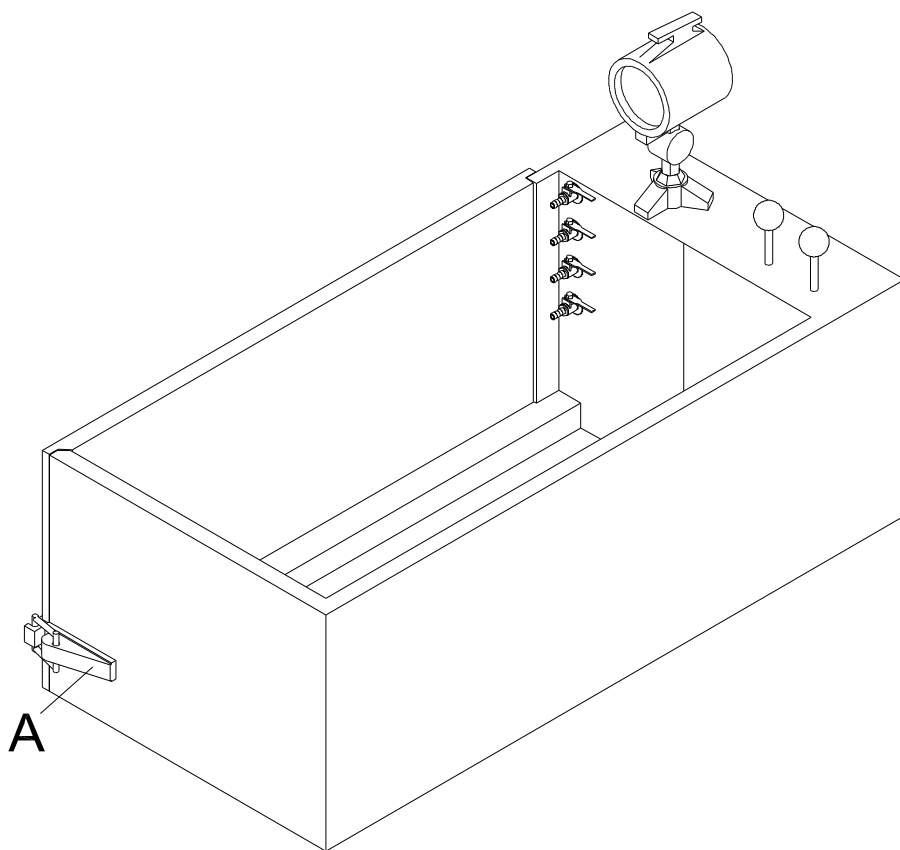
FIG.9-5
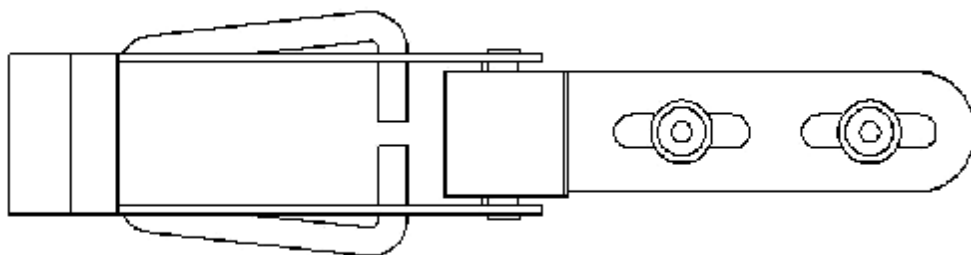
FIG.A

6. EXTINGUISHER：

OPERATOR CAN KNOW EXTINGUISHER SAFE USE LIFE FROM EXTINGUISHER METRE.（FIG.1-6）
WHEN NEEDLE AT GREEN AREA，IT'S MEAN CAN BE USE，WHEN NEEDLE TO LEFT LEAVE GREEN AREA，
IT´S MEAN REPLACE IT RIGHT NOW，OTHERWISE EXTINGUISH EFFECT WILL ALMOST DOWNTURN.
WHEN NEEDLE APOINT TO ZERO，IT'S MEAN NO EXTINGUISH EFFECT.

GREEN AREA
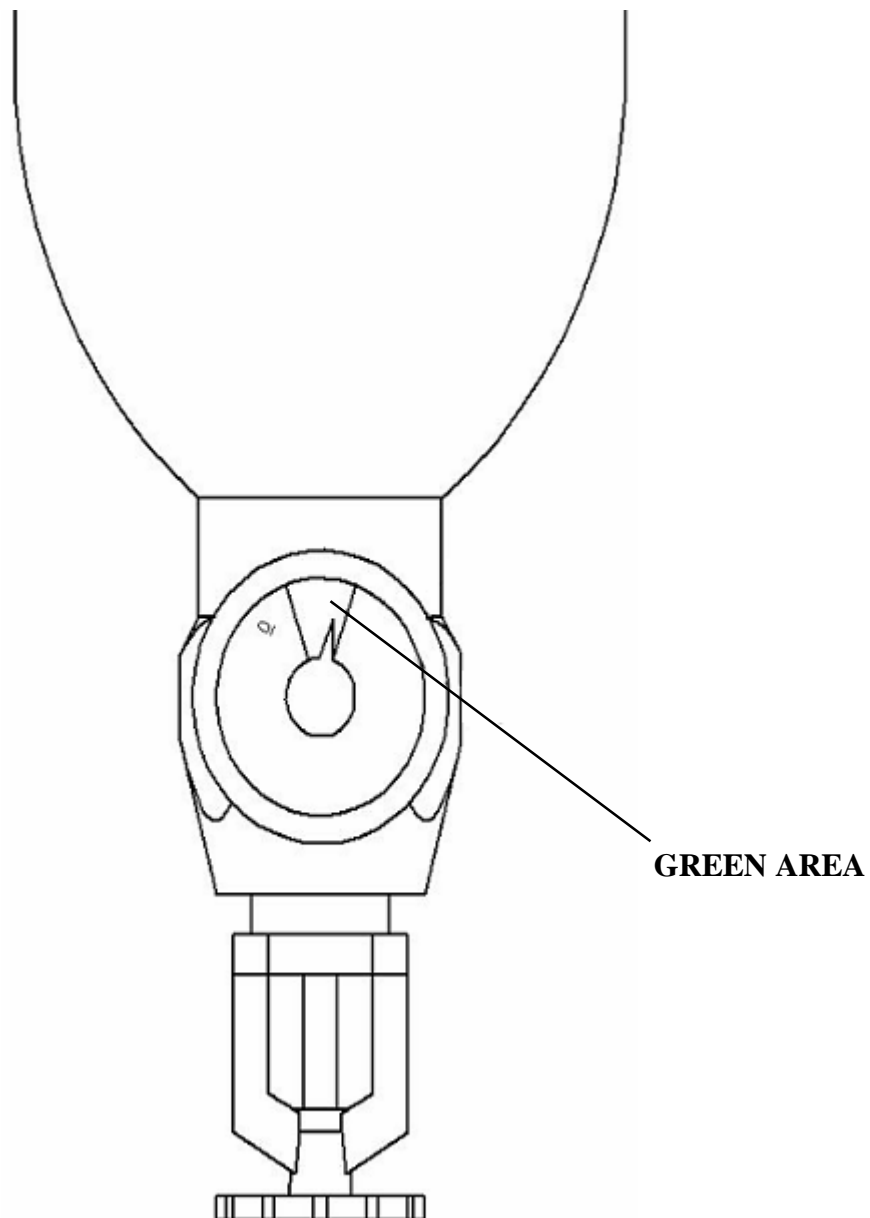
FIG.9-6

7. FILTER OF CONTROL BOX：

AIR FILTER OF OUT OF CONTROL BOX. SHOULD BLOW CLEAR BY AIRGUN EVERY WEEK.
THEN IT'S CAN ADD INLET QUANTITY OF AIR，ALSO CAN RAISE COOL EFFECT OF CONTROL BOX.
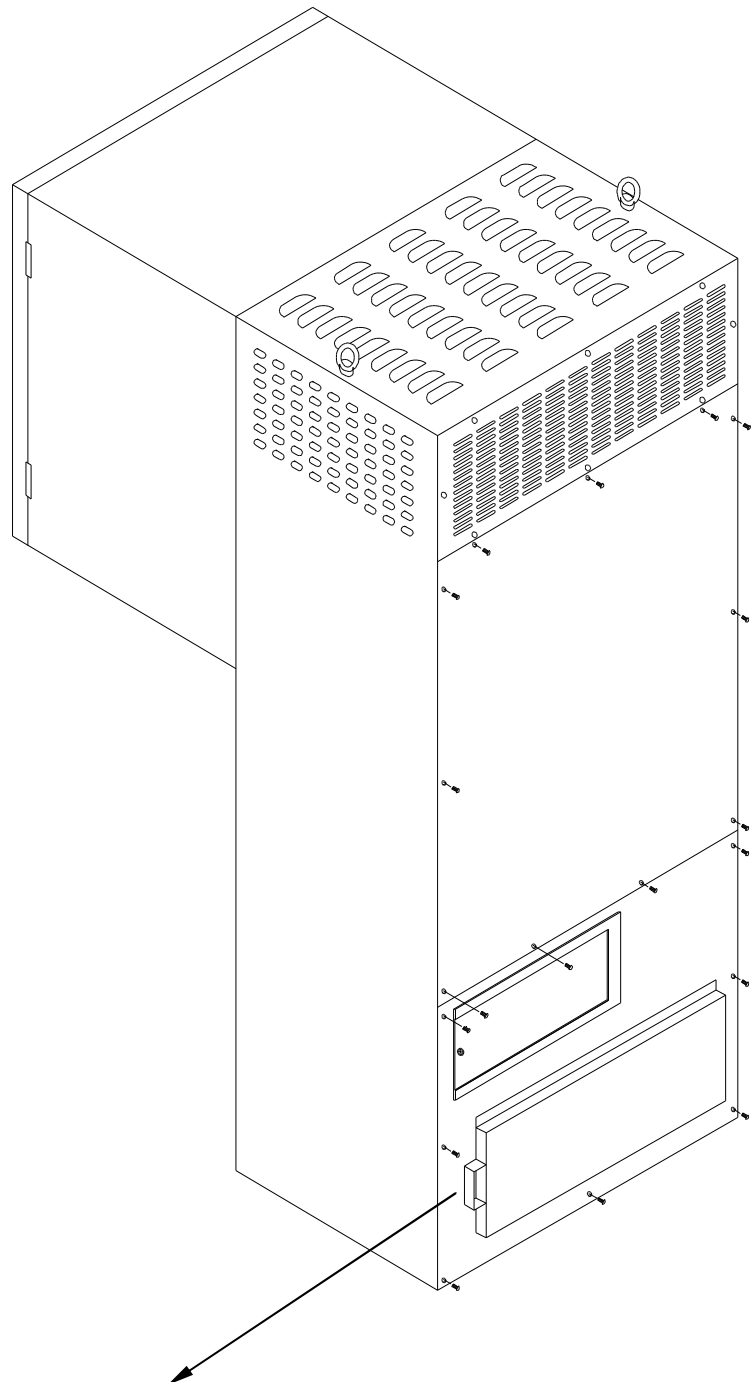
FROM ARROWHEAD DIRECTION TAKE OUT AIR FILTER

THERE ARE SOME POSSIBLE PROBLEMS AFTER TURN ON THE POWER SUPPLY(MAIN) SWITCH.

SITUATION 1: INDICATOR LIGHTS DON'T WORK.

MAINTENANCE ACTION:

1. CHECK IF THE VOLTAGE COMPLIES WITH LOCAL REQUIREMENTS?

FOR EX. 3 AC 220V IS FOR TAIWAN.

2. CHECK (FIG. 9) IF THE NO-FUSE-BREAKER (NFB) OF CONTROLLER NO.1 POSITION HAS TRIPPED?

IF " YES", RESET IT.

3. CHECK (FIG. 9) IF THE 10A NFB OF CONTROLLER NO.2 POSITION HAS TRIPPED?

IF "YES", RESET IT.

4. CHECK (FIG. 9) IF THE 2.5A NFB OF CONTROLLER NO.5 POSITION HAS TRIPPED?

IF "YES", RESET IT.

5. CHECK (FIG. 9) IF THE 3A NFB OF CONTROLLER NO.6 POSITION HAS TRIPPED?

IF "YES", RESET IT.

SITUATION 2: PUMP DOES NOT WORK.

ACTION:

1. CHECK IF THE VOLTAGE COMPLIES WITH THE LOCAL REQUIREMENT?

FOR EX. 3 PHASE/220V IS FOR TAIWAN.

2. CHECK(FIG. 9) IF THE PUMP MAGNETIC & OVER LOAD SWITCH OF CONTROLLER NO.3 POSITION HAS TRIPPED?

IF "YES", PUT DOWN THE RESET SWITCH.

SITUATION 3 :   NO DISPLAY ON THE MONITOR SCREEN.

ACTION:

1.   CHECK IF THE 2.5A NFB OF CONTROLLER NO. 7 POSITION (FIG. 9) HAS TRIPPED?

IF "YES", RESET IT.

SITUATION 4:   WORK HEAD DOES NOT MOVE UP OR DOWN.

ACTION :

1.   PUSH DISCHARGE SWITCH ON AND OFF FOR 2 TIMES CONTINUOUSLY.

2.   CHECK IF Z-AXIS TRAVEL IS OUT OF WORK PIECE?

IF "YES", TURN OFF THE MAIN SWITCH AND ADJUST Z-AXIS TO SUITABLE TRAVEL.

SITUATION 5 :   THE LIGHT DOES NOT WORK.

ACTION:

1.   CHECK (FIG. 9) IF THE 10A NFB OF CONTROLLER NO. 4 POSITION HAS TRIPPED?

IF"YES", RESET IT.

RESET
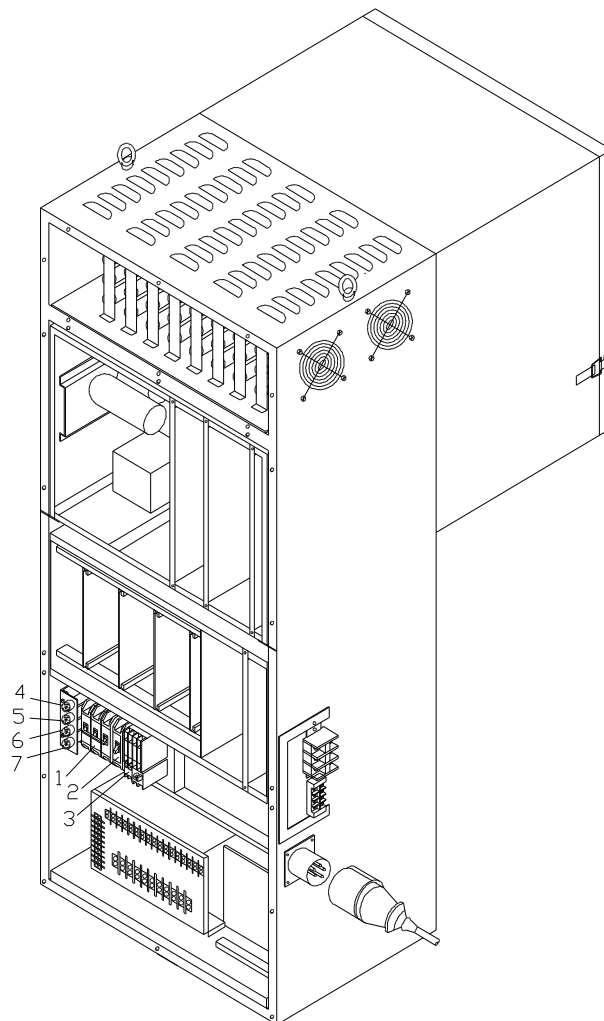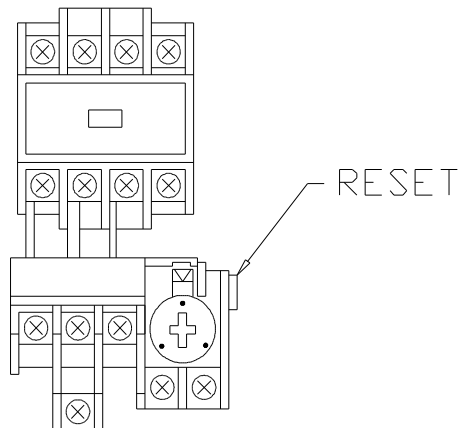
Generator

30A   45A   60A   90A   120A   APPLICATION NOTE

INDEX

一、 SURFACE FINISH IN EDM

SKM SAMPLE (VDI 3400)	Raμm
12	=0.40
15	=0.56
18	=0.80
21	=1.12
24	=1.60
27	=2.24
30	=3.15
33	=4.50
36	=6.30
39	=9.00
42	=12.5
45	=18.0

二、（**90V**）**ELECTROLYTIC COPPER**（**+**）**- STEEL**

銅 COPPER	▨	＋90V LV
鋼 STEEL	▨	－ ⎍

試 驗 條 件
TEST CONDITION

電 極 材 料 ELECTRODE	：電　　解　　銅 ELECTROLYTIC　COPPER
電　極　極　性 POLARITY　ELECTRODE	：正　極 POSITIVE
工 作 材 料 WORKPIECE	：鋼 STEEL
加　工　液 DIELECTRIC	：煤油（中國石油） CPC　KEROSENE
噴　　流 INJECTION	：0.5kg／cm²
試 驗 面 積 TEST　AREA	：20φmm

放 電 操 作 明 細 表
APPLICATION NOTE

銅 COPPER	▨	+90V LV
鋼 STEEL	▨	− ⊓⊔

電流 CURRENT POS LV	放電時間 ON TIME ON	休息時間 OFF TIME OFF	電壓表 VOLTAGE V	樣板—粗細度 SAMPLE-SKM VDI	消耗比 WEAR RATE %	進度 STOCK REMOVAL mm³/min	細 間 隙 m m 2 x G1	粗 間 隙 m m 2 x G2
0.5	1	*	50	12	8	0.1	0.030	0.038
0.5	2	*	50	14	6	0.2	0.032	0.040
0.5	4	*	50	16	4.7	0.2	0.034	0.044
0.5	6	*	50	18	2.9	0.3	0.035	0.046
0.5	8	*	50	20	2.5	0.4	0.036	0.047
0.5	10	*	50	21	1.5	0.5	0.042	0.054
0.5	15	*	50	22	1.4	0.8	0.046	0.060
0.5	20	*	50	23	1.3	1	0.052	0.068
0.5	30	*	50	24	1.1	0.9	0.056	0.074
0.5	45	*	50	25	0.5	0.8	0.061	0.080
0.5	60	*	50	26	-	0.5	0.066	0.088
1	1	*	60	14	8.1	0.2	0.031	0.039
1	2	*	60	16	6.7	0.2	0.033	0.042
1	4	*	60	18	5.3	0.3	0.035	0.046
1	6	*	60	20	3.6	0.4	0.037	0.048
1	8	*	60	21	3	0.6	0.038	0.049
1	10	*	60	22	2	1	0.043	0.056
1	15	*	60	23	1.9	1.6	0.047	0.062
1	20	*	60	24	1.8	2	0.053	0.070
1	30	*	60	25	1.5	1.2	0.057	0.075
1	45	*	60	26	0.5	0.9	0.062	0.082
1	60	*	60	27	-	0.6	0.067	0.090

* OFF segment is the actual discharge off time (μ Sec),General OFF settings about match to ON (discharge on time) 1 / 3. If the electrode area is less than the current value of the positive discharge, or depth of processing and other factors cause the unstable discharge, This should be adjusted the OFF time match to ON discharge time 1 / 2 or higher ratios such as 1:1 or more to stability of its discharge machining. At the same time should pay attention to adjust the discharge gap voltage (GV) at 35 ~ 40V can improve processing efficiency.

4

放 電 操 作 明 細 表
APPLICATION   NOTE

銅 COPPER	＋90V LV
鋼 STEEL	－ ⊓⊔

電流 CURRENT POS LV	放電時間 ON TIME ON	休息時間 OFF TIME OFF	電壓表 VOLTAGE V	樣板—粗細度 SAMPLE-SKM VDI	消耗比 WEAR RATE %	進度 STOCK REMOVAL mm³/min	細 間 隙 m m 2 x G1	粗 間 隙 m m 2 x G2
1.5	1	*	50	19	10.5	0.2	0.034	0.041
1.5	2	*	50	20	8	0.5	0.036	0.046
1.5	4	*	50	21	6.5	0.7	0.038	0.050
1.5	6	*	50	21	5	1.0	0.040	0.052
1.5	8	*	50	22	4	1.5	0.042	0.054
1.5	10	*	50	23	3	2	0.046	0.060
1.5	15	*	50	24	2.5	3	0.050	0.066
1.5	20	*	50	25	2	3.5	0.056	0.074
1.5	30	*	50	26	1.5	3	0.060	0.080
1.5	45	*	50	27	0.5	2	0.065	0.087
1.5	60	*	50	28	-	1.5	0.070	0.095
1.5	90	*	50	29	-	1	0.075	0.100
2	1	*	50	19	12	0.5	0.037	0.049
2	2	*	50	21	10	0.7	0.040	0.053
2	4	*	50	22	8	1.3	0.043	0.057
2	6	*	50	23	7	1.9	0.045	0.059
2	8	*	50	23	5.5	2.7	0.047	0.062
2	10	*	50	24	4.5	3.5	0.051	0.067
2	15	*	50	25	3.5	5	0.055	0.073
2	20	*	50	26	2	5.7	0.060	0.081
2	30	*	50	27	1.5	5.8	0.065	0.088
2	45	*	50	28	0.6	4.5	0.070	0.095
2	60	*	50	29	0.5	3.7	0.075	0.104
2	90	*	50	30	-	2.5	0.080	0.112

* OFF segment is the actual discharge off time (μ Sec),General OFF settings about match to ON (discharge on time) 1 / 3. If the electrode area is less than the current value of the positive discharge, or depth of processing and other factors cause the unstable discharge, This should be adjusted the OFF time match to ON discharge time 1 / 2 or higher ratios such as 1:1 or more to stability of its discharge machining. At the same time should pay attention to adjust the discharge gap voltage (GV) at 35 ~ 40V can improve processing efficiency.

放 電 操 作 明 細 表
APPLICATION NOTE

銅 COPPER	＋90V LV
鋼 STEEL	－ ⊓⊔

電流 CURRENT POS LV	放電時間 ON TIME ON	休息時間 OFF TIME OFF	電壓表 VOLTAGE V	樣板—粗細度 SAMPLE-SKM VDI	消耗比 WEAR RATE %	進度 STOCK REMOVAL mm³/min	細 間 隙 m m 2 x G1	粗 間 隙 m m 2 x G2
3	1	*	45	21	15	0.5	0.041	0.052
3	2	*	45	22	12	1	0.045	0.060
3	4	*	45	23	10	2	0.048	0.063
3	6	*	45	24	9	2.8	0.050	0.065
3	8	*	45	24	7	4	0.052	0.070
3	10	*	45	25	6	5	0.055	0.073
3	15	*	45	26	4.5	7	0.060	0.080
3	20	*	45	27	2.5	8	0.065	0.087
3	30	*	45	28	1.5	8.5	0.070	0.095
3	45	*	45	29	0.8	7	0.075	0.103
3	60	*	45	30	0.5	6	0.080	0.112
3	90	*	45	31	-	4.5	0.085	0.120
3	120	*	45	32	-	3	0.090	0.130

* OFF segment is the actual discharge off time (μ Sec),General OFF settings about match to ON (discharge on time) 1 / 3.
If the electrode area is less than the current value of the positive discharge, or depth of processing and other factors cause the unstable discharge, This should be adjusted the OFF time match to ON discharge time 1 / 2 or higher ratios such as 1:1 or more to stability of its discharge machining. At the same time should pay attention to adjust the discharge gap voltage (GV) at 35 ~ 40V can improve processing efficiency.

放 電 操 作 明 細 表
APPLICATION NOTE

銅 COPPER	⊞	＋90V LV
鋼 STEEL	⧄	－ ⊓⊓

電流 CURRENT POS LV	放電時間 ON TIME	休息時間 OFF TIME	電壓表 VOLTAGE	樣板－粗細度 SAMPLE-SKM VDI	消耗比 WEAR RATE	進度 STOCK REMOVAL	細 間 隙 m m	粗 間 隙 m m
LV	ON	OFF	V		%	mm³/min	2 x G1	2 x G2
4.5	2	*	40	23	21	1.7	0.050	0.064
4.5	4	*	40	24	19	2	0.054	0.070
4.5	6	*	40	25	16	4.5	0.058	0.076
4.5	8	*	40	25	14	8	0.062	0.080
4.5	10	*	40	26	10	9	0.065	0.085
4.5	15	*	40	27	7	16	0.073	0.095
4.5	20	*	40	28	5	19	0.075	0.100
4.5	30	*	40	29	3	22	0.080	0.105
4.5	45	*	40	30	1.5	24	0.085	0.110
4.5	60	*	40	31	1.2	21	0.095	0.130
4.5	90	*	40	32	0.8	17	0.100	0.140
4.5	120	*	40	32	0.5	12	0.110	0.150
4.5	150	*	40	33	-	10	0.120	0.165
4.5	200	*	40	34	-	8	0.130	0.180
6	2	*	40	24	35	2.5	0.056	0.072
6	4	*	40	25	28	4	0.060	0.078
6	6	*	40	25	24	6	0.065	0.083
6	8	*	40	26	20	13	0.068	0.086
6	10	*	40	27	13	18	0.070	0.090
6	15	*	40	28	10	20	0.075	0.095
6	20	*	40	29	5.5	23	0.080	0.108
6	30	*	40	30	4.0	26	0.090	0.122
6	45	*	40	31	2.5	29	0.100	0.135
6	60	*	40	32	2.0	30	0.110	0.150
6	90	*	40	32	1.0	25	0.115	0.160
6	120	*	40	33	0.8	22	0.120	0.165
6	150	*	40	34	0.5	18	0.130	0.180
6	200	*	40	35	-	15	0.140	0.196

* OFF segment is the actual discharge off time (µ Sec),General OFF settings about match to ON (discharge on time) 1 / 3. If the electrode area is less than the current value of the positive discharge, or depth of processing and other factors cause the unstable discharge, This should be adjusted the OFF time match to ON discharge time 1 / 2 or higher ratios such as 1:1 or more to stability of its discharge machining. At the same time should pay attention to adjust the discharge gap voltage (GV) at 35 ~ 40V can improve processing efficiency.

放 電 操 作 明 細 表
APPLICATION NOTE

銅 COPPER	⊞	＋90V LV
鋼 STEEL	⊡	－⊓⊔

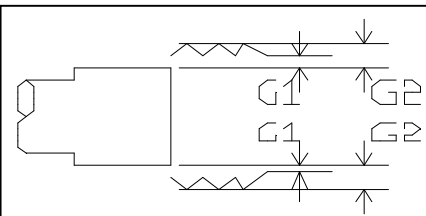| 電流 CURRENT POS LV	放電時間 ON TIME ON	休息時間 OFF TIME OFF	電壓表 VOLTAGE V	樣板—粗細度 SAMPLE-SKM VDI	消耗比 WEAR RATE %	進度 STOCK REMOVAL mm³/min	細 間 隙 m m 2 x G1	粗 間 隙 m m 2 x G2
9	10	*	40	27	21	20	0.075	0.097
9	15	*	40	28	16	28	0.080	0.105
9	20	*	40	30	10	34	0.085	0.117
9	30	*	40	31	6	38	0.095	0.130
9	45	*	40	32	4.5	42	0.105	0.145
9	60	*	40	33	3	45	0.115	0.160
9	90	*	40	34	2	47	0.125	0.175
9	120	*	40	35	1.5	44	0.135	0.191
9	150	*	40	36	1	40	0.150	0.213
9	200	*	40	37	-	37	0.160	0.230
12	10	*	35	28	23	25	0.080	0.150
12	15	*	35	29	18	38	0.085	0.113
12	20	*	35	30	13	47	0.090	0.122
12	30	*	35	32	8	55	0.100	0.140
12	45	*	35	33	6	62	0.110	0.155
12	60	*	35	34	4	67	0.120	0.170
12	90	*	35	35	3	72	0.130	0.186
12	120	*	35	36	2	70	0.140	0.203
12	150	*	35	37	1.5	66	0.155	0.225
12	200	*	35	38	0.5	63	0.170	0.246
12	300	*	35	39	-	60	0.180	0.270
12	400	*	35	40	-	55	0.195	0.295

* OFF segment is the actual discharge off time (μ Sec),General OFF settings about match to ON (discharge on time) 1 / 3. If the electrode area is less than the current value of the positive discharge, or depth of processing and other factors cause the unstable discharge, This should be adjusted the OFF time match to ON discharge time 1 / 2 or higher ratios such as 1:1 or more to stability of its discharge machining. At the same time should pay attention to adjust the discharge gap voltage (GV) at 35 ~ 40V can improve processing efficiency.

放電操作明細表
APPLICATION NOTE

| 銅 COPPER | +90V LV |
| 鋼 STEEL | − ⊓⊔ |

電流 CURRENT POS LV	放電時間 ON TIME ON	休息時間 OFF TIME OFF	電壓表 VOLTAGE V	樣板粗細度 SAMPLE-SKM VDI	消耗比 WEAR RATE %	進度 STOCK REMOVAL mm³/min	細間隙 m m 2 x G1	粗間隙 m m 2 x G2
15	10	*	35	29	25	35	0.085	0.113
15	15	*	35	30	20	50	0.090	0.122
15	20	*	35	31	16	76	0.100	0.135
15	30	*	35	33	10	85	0.110	0.150
15	45	*	35	34	7	91	0.120	0.170
15	60	*	35	35	5	95	0.130	0.186
15	90	*	35	36	3.8	97	0.140	0.203
15	120	*	35	37	2.5	100	0.150	0.220
15	150	*	35	38	1.5	105	0.165	0.245
15	200	*	35	39	1.0	96	0.180	0.265
15	300	*	35	40	0.5	92	0.195	0.295
15	400	*	35	41	-	88	0.210	0.322
15	500	*	35	42	-	76	0.225	0.350
21	10	*	35	30	28	48	0.095	0.127
21	15	*	35	31	24	92	0.105	0.140
21	20	*	35	32	19	98	0.115	0.155
21	30	*	35	33	15	115	0.128	0.175
21	45	*	35	35	10	138	0.140	0.196
21	60	*	35	36	8	145	0.155	0.218
21	90	*	35	37	5	147	0.165	0.238
21	120	*	35	38	4	150	0.175	0.257
21	150	*	35	39	3	155	0.190	0.280
21	200	*	35	40	1.5	150	0.205	0.305
21	300	*	35	41	1.0	150	0.220	0.330
21	400	*	35	42	0.5	135	0.235	0.355
21	500	*	35	43	0.3	130	0.245	0.370
21	600	*	35	43	-	115	0.270	0.410

* OFF segment is the actual discharge off time (μ Sec),General OFF settings about match to ON (discharge on time) 1 / 3. If the electrode area is less than the current value of the positive discharge, or depth of processing and other factors cause the unstable discharge, This should be adjusted the OFF time match to ON discharge time 1 / 2 or higher ratios such as 1:1 or more to stability of its discharge machining. At the same time should pay attention to adjust the discharge gap voltage (GV) at 35 ~ 40V can improve processing efficiency.

放 電 操 作 明 細 表
APPLICATION NOTE

銅 COPPER	＋90V LV
鋼 STEEL	－ ⎍⎍⎍

電流 CURRENT POS LV	放電時間 ON TIME ON	休息時間 OFF TIME OFF	電壓表 VOLTAGE V	樣板－粗細度 SAMPLE-SKM VDI	消耗比 WEAR RATE %	進度 STOCK REMOVAL mm^3/min	細間隙 m m 2 x G1	粗間隙 m m 2 x G2
30	10	*	35	31	32	70	0.100	0.145
30	15	*	35	32	27	125	0.115	0.155
30	20	*	35	33	22	130	0.125	0.170
30	30	*	35	34	18	165	0.140	0.190
30	45	*	35	36	15	185	0.155	0.218
30	60	*	35	37	12	205	0.170	0.240
30	90	*	35	38	9	210	0.185	0.265
30	120	*	35	39	7.5	215	0.200	0.290
30	150	*	35	40	6	220	0.215	0.315
30	200	*	35	41	3.5	220	0.230	0.332
30	300	*	35	42	2	230	0.240	0.366
30	400	*	35	43	1	220	0.255	0.395
30	500	*	35	44	0.5	210	0.270	0.430
30	600	*	35	44	0.5	205	0.285	0.445
30	700	*	35	45	0.5	200	0.300	0.480
30	900	*	35	46	0.5	200	0.300	0.530

* OFF segment is the actual discharge off time (μ Sec),General OFF settings about match to ON (discharge on time) 1 / 3.
If the electrode area is less than the current value of the positive discharge, or depth of processing and other factors cause
the unstable discharge, This should be adjusted the OFF time match to ON discharge time 1 / 2 or higher ratios such as
1:1 or more to stability of its discharge machining. At the same time should pay attention to adjust the discharge gap
voltage (GV) at 35 ~ 40V can improve processing efficiency.

放 電 操 作 明 細 表
APPLICATION　NOTE

銅 COPPER	＋90V LV
鋼 STEEL	－

電流 CURRENT POS LV	放電時間 ON TIME ON	休息時間 OFF TIME OFF	電壓表 VOLTAGE V	樣板－粗細度 SAMPLE-SKM VDI	消耗比 WEAR RATE %	進度 STOCK REMOVAL mm³/min	細間隙 m m 2 x G1	粗間隙 m m 2 x G2
45	10	*	35	32	35	130	0.125	0.165
45	15	*	35	33	32	165	0.130	0.175
45	20	*	35	34	30	190	0.140	0.190
45	30	*	35	35	25	240	0.155	0.211
45	45	*	35	37	20	290	0.170	0.240
45	60	*	35	38	16	320	0.185	0.265
45	90	*	35	39	13	340	0.200	0.290
45	120	*	35	40	10	350	0.215	0.315
45	150	*	35	41	8	360	0.230	0.332
45	200	*	35	42	6	370	0.250	0.376
45	300	*	35	43	4	370	0.270	0.410
45	400	*	35	44	2.5	360	0.290	0.450
45	500	*	35	45	1.5	350	0.310	0.490
45	600	*	35	46	1.0	340	0.325	0.525
45	700	*	35	47	0.8	330	0.340	0.560
45	900	*	35	49	0.5	310	0.380	0.620

* OFF segment is the actual discharge off time (μ Sec),General OFF settings about match to ON (discharge on time) 1 / 3. If the electrode area is less than the current value of the positive discharge, or depth of processing and other factors cause the unstable discharge, This should be adjusted the OFF time match to ON discharge time 1 / 2 or higher ratios such as 1:1 or more to stability of its discharge machining. At the same time should pay attention to adjust the discharge gap voltage (GV) at 35 ~ 40V can improve processing efficiency.

放 電 操 作 明 細 表
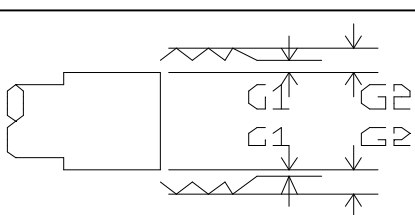# APPLICATION   NOTE

銅 COPPER	＋90V LV
鋼 STEEL	－ ⊓⊔⊓

電流 CURRENT POS LV	放電時間 ON TIME ON	休息時間 OFF TIME OFF	電壓表 VOLTAGE V	樣板—粗細度 SAMPLE-SKM VDI	消耗比 WEAR RATE %	進度 STOCK REMOVAL mm³/min	細間隙 m m 2 x G1	粗間隙 m m 2 x G2
60	10	*	35	33	38	180	0.140	0.185
60	15	*	35	34	34	240	0.145	0.195
60	20	*	35	35	28	290	0.150	0.206
60	30	*	35	36	25	340	0.165	0.228
60	45	*	35	38	22	380	0.185	0.265
60	60	*	35	39	18	420	0.200	0.290
60	90	*	35	40	15	440	0.220	0.320
60	120	*	35	41	12	460	0.235	0.337
60	150	*	35	42	10	470	0.250	0.376
60	200	*	35	43	7	480	0.265	0.405
60	300	*	35	44	4	465	0.285	0.445
60	400	*	35	45	2	460	0.300	0.480
60	500	*	35	46	1	450	0.325	0.525
60	600	*	35	47	0.5	435	0.340	0.560
60	700	*	35	48	0.5	420	0.360	0.600
60	900	*	35	50	0.5	400	0.400	0.660
60	1800	*	35	52	0.5	350	0.480	0.740

* OFF segment is the actual discharge off time (μ Sec),General OFF settings about match to ON (discharge on time) 1 / 3.
If the electrode area is less than the current value of the positive discharge, or depth of processing and other factors cause
the unstable discharge, This should be adjusted the OFF time match to ON discharge time 1 / 2 or higher ratios such as
1:1 or more to stability of its discharge machining. At the same time should pay attention to adjust the discharge gap
voltage (GV) at 35 ~ 40V can improve processing efficiency.

放 電 操 作 明 細 表
APPLICATION NOTE

銅 COPPER	＋90V LV
鋼 STEEL	−

電流 CURRENT POS LV	放電時間 ON TIME ON	休息時間 OFF TIME OFF	電壓表 VOLTAGE V	樣板—粗細度 SAMPLE-SKM VDI	消耗比 WEAR RATE %	進度 STOCK REMOVAL mm³/min	細間隙 m m 2 x G1	粗間隙 m m 2 x G2
90	20	*	35	36	31	400	0.175	0.235
90	30	*	35	37	27	490	0.180	0.250
90	45	*	35	38	22	540	0.190	0.275
90	60	*	35	39	19	600	0.200	0.295
90	90	*	35	40	16	650	0.225	0.325
90	120	*	35	41	13	690	0.240	0.340
90	150	*	35	42	10	720	0.255	0.380
90	200	*	35	43	7	700	0.270	0.410
90	300	*	35	45	5	670	0.300	0.485
90	400	*	35	47	3	650	0.345	0.565
90	500	*	35	49	1.5	640	0.390	0.625
90	600	*	35	51	1	630	0.450	0.690
90	700	*	35	53	0.5	620	0.500	0.760
90	900	*	35	55	0.5	610	0.550	0.830
90	1200	*	35	57	0.5	600	0.610	0.900
90	1500	*	35	59	0.5	570	0.680	0.970

* OFF segment is the actual discharge off time (μ Sec),General OFF settings about match to ON (discharge on time) 1 / 3. If the electrode area is less than the current value of the positive discharge, or depth of processing and other factors cause the unstable discharge, This should be adjusted the OFF time match to ON discharge time 1 / 2 or higher ratios such as 1:1 or more to stability of its discharge machining. At the same time should pay attention to adjust the discharge gap voltage (GV) at 35 ~ 40V can improve processing efficiency.

放 電 操 作 明 細 表
APPLICATION   NOTE

銅 COPPER	＋90V LV
鋼 STEEL	－

電流 CURRENT POS LV	放電時間 ON TIME ON	休息時間 OFF TIME OFF	電壓表 VOLTAGE V	樣板—粗細度 SAMPLE-SKM VDI	消耗比 WEAR RATE %	進度 STOCK REMOVAL mm³/min	細 間 隙 m m 2 x G1	粗 間 隙 m m 2 x G2
120	20	*	35	38	36	650	0.190	0.280
120	30	*	35	39	31	720	0.200	0.300
120	45	*	35	40	27	780	0.220	0.330
120	60	*	35	41	24	830	0.240	0.345
120	90	*	35	42	20	870	0.255	0.385
120	120	*	35	44	17	910	0.285	0.450
120	150	*	35	46	14	950	0.330	0.530
120	200	*	35	48	11	930	0.365	0.605
120	300	*	35	50	7	910	0.400	0.660
120	400	*	35	52	5	890	0.470	0.710
120	500	*	35	54	3	870	0.520	0.780
120	600	*	35	56	1.5	850	0.580	0.850
120	700	*	35	58	0.5	830	0.640	0.930
120	900	*	35	60	0.5	820	0.710	1.010
120	1200	*	35	62	0.5	810	0.790	1.120
120	1500	*	35	64	0.5	780	0.900	1.230

* OFF segment is the actual discharge off time (μ Sec),General OFF settings about match to ON (discharge on time) 1 / 3. If the electrode area is less than the current value of the positive discharge, or depth of processing and other factors cause the unstable discharge, This should be adjusted the OFF time match to ON discharge time 1 / 2 or higher ratios such as 1:1 or more to stability of its discharge machining. At the same time should pay attention to adjust the discharge gap voltage (GV) at 35 ~ 40V can improve processing efficiency.

三、（**90V**）**GRAPHITE**（＋）**- STEEL**

石　　墨	▨	＋ 90V LV
GRAPHITE		
鋼 STEEL	▨	－ ⊓⊔

試　驗　條　件
TEST　CONDITION

電 極 材 料 ELECTRODE	：石　　墨 GRAPHITE
電　極　極　性 POLARITY　ELECTRODE	：正　極 POSITIVE
工 作 材 料 WORKPIECE	：鋼 STEEL
加　工　液 DIELECTRIC	：煤油（中國石油） CPC　KEROSENE
噴　　流 INJECTION	：0.5kg／cm²
試 驗 面 積 TEST　AREA	：20φmm

放 電 操 作 明 細 表
APPLICATION　NOTE

石　墨 GRAPHITE	＋90V LV
鋼 STEEL	－ ⊓⊓

電 流 CURRENT POS LV	放電時間 ON TIME ON	休息時間 OFF TIME OFF	電壓表 VOLTAGE V	樣板—粗細度 SAMPLE-SKM VDI	消耗比 WEAR RATE %	進度 mm³/min STOCK REMOVAL	細 間 隙 m m 2 x G1	粗 間 隙 m m 2 x G2
6	2	*	40	24	37	20	0.048	0.064
6	4	*	40	25	34	25	0.051	0.069
6	6	*	40	27	31	43	0.055	0.075
6	8	*	40	28	25	68	0.066	0.087
6	10	*	40	29	20	95	0.070	0.098
6	15	*	40	30	11	15	0.078	0.110
6	20	*	40	31	6	21	0.086	0.121
6	30	*	40	32	3	20	0.098	0.137
6	45	*	40	33	1	19	0.105	0.150
6	60	*	40	33	0.5	17	0.114	0.162
6	90	*	40	34	0.3	15	0.125	0.180
9	2	*	40	25	32	52	0.055	0.075
9	4	*	40	26	28	65	0.057	0.078
9	6	*	40	28	25	78	0.062	0.084
9	8	*	40	29	20	105	0.068	0.096
9	10	*	40	30	18	12	0.072	0.102
9	15	*	40	31	12	20	0.080	0.115
9	20	*	40	32	7	27	0.090	0.126
9	30	*	40	33	3	38	0.105	0.138
9	45	*	40	34	1.5	41	0.117	0.162
9	60	*	40	35	0.6	42	0.120	0.168
9	90	*	40	36	0.3	40	0.135	0.182

* OFF segment is the actual discharge off time (μ Sec),General OFF settings about match to ON (discharge on time) 1 / 3. If the electrode area is less than the current value of the positive discharge, or depth of processing and other factors cause the unstable discharge, This should be adjusted the OFF time match to ON discharge time 1 / 2 or higher ratios such as 1:1 or more to stability of its discharge machining. At the same time should pay attention to adjust the discharge gap voltage (GV) at 35 ~ 40V can improve processing efficiency.

放 電 操 作 明 細 表
APPLICATION NOTE

石 墨 GRAPHITE	＋90V LV
鋼 STEEL	−

電流 CURRENT POS LV	放電時間 ON TIME ON	休息時間 OFF TIME OFF	電壓表 VOLTAGE V	樣板－粗細度 SAMPLE-SKM VDI	消耗比 WEAR RATE %	進度 STOCK REMOVAL mm³/min	細 間 隙 m m 2 x G1	粗 間 隙 m m 2 x G2
12	10	*	40	30	18	32	0.082	0.114
12	15	*	40	31	14	41	0.087	0.125
12	20	*	40	32	10	50	0.096	0.140
12	30	*	40	34	7	58	0.110	0.152
12	45	*	40	35	3.5	65	0.120	0.174
12	60	*	40	36	1.8	60	0.130	0.182
12	90	*	40	37	0.7	55	0.145	0.195
12	120	*	40	38	0.3	52	0.155	0.220
15	10	*	40	31	16	37	0.084	0.118
15	15	*	40	32	12	48	0.090	0.130
15	20	*	40	33	9	60	0.098	0.147
15	30	*	40	35	6	68	0.115	0.160
15	45	*	40	36	4	85	0.130	0.180
15	60	*	40	37	3	90	0.140	0.195
15	90	*	40	38	1.5	82	0.155	0.210
15	120	*	40	39	0.5	78	0.165	0.228

* OFF segment is the actual discharge off time (μ Sec),General OFF settings about match to ON (discharge on time) 1 / 3. If the electrode area is less than the current value of the positive discharge, or depth of processing and other factors cause the unstable discharge, This should be adjusted the OFF time match to ON discharge time 1 / 2 or higher ratios such as 1:1 or more to stability of its discharge machining. At the same time should pay attention to adjust the discharge gap voltage (GV) at 35 ~ 40V can improve processing efficiency.

放 電 操 作 明 細 表
APPLICATION NOTE

| 石 墨 GRAPHITE | +90V LV |
| 鋼 STEEL | − ⊓⊔ |

細 間 隙 m m 2 x G1	粗 間 隙 m m 2 x G2

電流 CURRENT POS LV	放電時間 ON TIME ON	休息時間 OFF TIME OFF	電壓表 VOLTAGE V	樣板—粗細度 SAMPLE-SKM VDI 度	消耗比 WEAR RATE %	進度 STOCK REMOVAL mm³/min	細間隙 m m 2 x G1	粗間隙 m m 2 x G2
21	10	*	40	33	12	55	0.090	0.130
21	15	*	40	34	9	75	0.095	0.142
21	20	*	40	35	7	84	0.102	0.158
21	30	*	40	36	4	105	0.115	0.178
21	45	*	40	37	2.5	138	0.132	0.202
21	60	*	40	38	1.5	145	0.150	0.225
21	90	*	40	39	0.5	140	0.165	0.260
21	120	*	40	40	-	130	0.175	0.270
30	10	*	40	34	12	82	0.108	0.152
30	15	*	40	35	9	110	0.120	0.175
30	20	*	40	36	7	132	0.135	0.200
30	30	*	40	37	4	150	0.145	0.215
30	45	*	40	38	2.5	185	0.160	0.240
30	60	*	40	39	1.5	190	0.170	0.250
30	90	*	40	40	0.5	210	0.190	0.290
30	120	*	40	41	-	220	0.105	0.300

* OFF segment is the actual discharge off time (μ Sec),General OFF settings about match to ON (discharge on time) 1 / 3. If the electrode area is less than the current value of the positive discharge, or depth of processing and other factors cause the unstable discharge, This should be adjusted the OFF time match to ON discharge time 1 / 2 or higher ratios such as 1:1 or more to stability of its discharge machining. At the same time should pay attention to adjust the discharge gap voltage (GV) at 35 ~ 40V can improve processing efficiency.
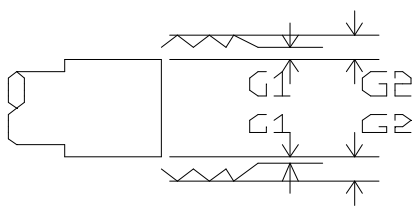
放 電 操 作 明 細 表
APPLICATION　NOTE

電流 CURRENT POS LV	放電時間 ON TIME ON	休息時間 OFF TIME OFF	電壓表 VOLTAGE V	樣板—粗細度 SAMPLE-SKM VDI	消耗比 WEAR RATE %	進度 mm³/min STOCK REMOVAL	細間隙 m m 2 x G1	粗間隙 m m 2 x G2
45	10	*	40	35	8	130	0.120	0.165
45	15	*	40	36	5	175	0.135	0.190
45	20	*	40	37	3.8	200	0.145	0.205
45	30	*	40	38	2.5	225	0.165	0.235
45	45	*	40	39	1.5	265	0.180	0.270
45	60	*	40	40	1.0	290	0.190	0.285
45	90	*	40	41	0.5	320	0.215	0.305
45	120	*	40	42	0.3	315	0.230	0.335
45	150	*	40	43	0.3	310	0.250	0.375

石　　墨 GRAPHITE ＋90V LV

鋼 STEEL　－

細間隙 m m 2 x G1　　粗間隙 m m 2 x G2

* OFF segment is the actual discharge off time (μ Sec),General OFF settings about match to ON (discharge on time) 1 / 3.
If the electrode area is less than the current value of the positive discharge, or depth of processing and other factors cause
the unstable discharge, This should be adjusted the OFF time match to ON discharge time 1 / 2 or higher ratios such as
1:1 or more to stability of its discharge machining. At the same time should pay attention to adjust the discharge gap
voltage (GV) at 35 ~ 40V can improve processing efficiency.

放 電 操 作 明 細 表
APPLICATION NOTE

| 石　墨 GRAPHITE | ＋90V LV |
| 鋼 STEEL | ＿ ⊓⊔ |

電流 CURRENT POS LV	放電時間 ON TIME ON	休息時間 OFF TIME OFF	電壓表 VOLTAGE V	樣板－粗細度 SAMPLE-SKM VDI	消耗比 WEAR RATE %	進度 STOCK REMOVAL mm³/min	細 間 隙 m m 2 x G1	粗 間 隙 m m 2 x G2
60	10	*	40	36	6	195	0.130	0.185
60	15	*	40	37	4	250	0.145	0.205
60	20	*	40	38	3	270	0.160	0.230
60	30	*	40	39	2	300	0.175	0.255
60	45	*	40	40	1	350	0.200	0.300
60	60	*	40	41	0.5	375	0.215	0.320
60	90	*	40	42	0.3	415	0.235	0.350
60	120	*	40	43	0.3	395	0.260	0.380
60	150	*	40	44	0.3	380	0.295	0.435

* OFF segment is the actual discharge off time (μ Sec),General OFF settings about match to ON (discharge on time) 1 / 3. If the electrode area is less than the current value of the positive discharge, or depth of processing and other factors cause the unstable discharge, This should be adjusted the OFF time match to ON discharge time 1 / 2 or higher ratios such as 1:1 or more to stability of its discharge machining. At the same time should pay attention to adjust the discharge gap voltage (GV) at 35 ~ 40V can improve processing efficiency.
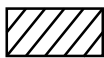
放 電 操 作 明 細 表
APPLICATION　 NOTE

| 石　　墨 GRAPHITE | ＋90V LV |
| 鋼 STEEL | － |

電流 CURRENT POS LV	放電時間 ON TIME ON	休息時間 OFF TIME OFF	電壓表 VOLTAGE V	樣板—粗細度 SAMPLE-SKM VDI	消耗比 WEAR RATE %	進度 STOCK REMOVAL mm³/min	細 間 隙 m m 2 x G1	粗 間 隙 m m 2 x G2
90	20	*	40	40	2	380	0.210	0.290
90	30	*	40	41	1.5	420	0.220	0.310
90	45	*	40	42	1	490	0.240	0.350
90	60	*	40	43	0.5	530	0.265	0.390
90	90	*	40	45	0.5	590	0.340	0.470
90	120	*	40	46	0.5	555	0.420	0.600
90	150	*	40	47	0.3	530	0.440	0.700
90	200	*	40	47	0.3	490	0.465	0.720

* OFF segment is the actual discharge off time (μ Sec),General OFF settings about match to ON (discharge on time) 1 / 3. If the electrode area is less than the current value of the positive discharge, or depth of processing and other factors cause the unstable discharge, This should be adjusted the OFF time match to ON discharge time 1 / 2 or higher ratios such as 1:1 or more to stability of its discharge machining. At the same time should pay attention to adjust the discharge gap voltage (GV) at 35 ~ 40V can improve processing efficiency.
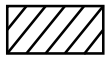
放 電 操 作 明 細 表
APPLICATION　NOTE

石　　墨 GRAPHITE ⊞ ＋90V LV

鋼 STEEL ▨ — ⊓⊔

電流 CURRENT POS LV	放電時間 ON TIME ON	休息時間 OFF TIME OFF	電壓表 VOLTAGE V	樣板—粗細度 SAMPLE-SKM VDI	消耗比 WEAR RATE %	進度 mm³/min STOCK REMOVAL	細間隙 m m 2 x G1	粗間隙 m m 2 x G2
120	20	*	40	43	1.5	535	0.270	0.400
120	30	*	40	44	1	600	0.300	0.440
120	45	*	40	45	0.5	690	0.345	0.475
120	60	*	40	46	0.5	745	0.425	0.610
120	90	*	40	47	0.5	835	0.470	0.710
120	120	*	40	48	0.3	780	0.515	0.820
120	150	*	40	49	0.3	750	0.575	0.910
120	200	*	40	50	0.3	695	0.640	1.000

* OFF segment is the actual discharge off time (μ Sec),General OFF settings about match to ON (discharge on time) 1 / 3. If the electrode area is less than the current value of the positive discharge, or depth of processing and other factors cause the unstable discharge, This should be adjusted the OFF time match to ON discharge time 1 / 2 or higher ratios such as 1:1 or more to stability of its discharge machining. At the same time should pay attention to adjust the discharge gap voltage (GV) at 35 ~ 40V can improve processing efficiency.

四、（**260V**）ELECTROLYTIC COPPER（**+**）**- STEEL**

銅 COPPE		＋260V LV
鋼 STEEL		－

試 驗 條 件
TEST　CONDITION

電 極 材 料 ELECTRODE	：電　　解　　銅 ELECTROLYTIC　COPPER
電　極　極　性 POLARITY　ELECTRODE	：正　　極 POSITIVE
工 作 材 料 WORKPIECE	：鋼 STEEL
加　工　液 DIELECTRIC	：煤油（中國石油） CPC　KEROSENE
噴　　流 INJECTION	：0.5kg／cm²
試 驗 面 積 TEST　AREA	：20φmm

放電操作明細表
APPLICATION　NOTE

銅 COPPER	＋260V LV
鋼 STEEL	—

電流 CURRENT POS LV	放電時間 ON TIME ON	休息時間 OFF TIME OFF	電壓表 VOLTAGE V	樣板—粗細度 SAMPLE-SKM VDI	消耗比 WEAR RATE %	進度 STOCK REMOVAL mm³/min	細間隙 m m 2 x G1	粗間隙 m m 2 x G2
1.5	10	*	80	18	3	<1	0.042	0.050
3	10	*	80	20	4	<1	0.045	0.055
3	30	*	80	22	1	1.5	0.048	0.060
3	60	*	80	24	0.5	1.0	0.052	0.068
4.5	10	*	80	24	6	2.5	0.050	0.066
4.5	30	*	80	25	1.5	4.5	0.055	0.073
4.5	60	*	80	26	0.5	3.5	0.067	0.082
6	10	*	80	26	7	4	0.053	0.078
6	30	*	80	28	2.5	6	0.068	0.093
6	60	*	80	29	0.5	5	0.075	0.103
9	10	*	80	27	8.5	5.5	0.058	0.087
9	30	*	80	29	3	7.5	0.072	0.100
9	60	*	80	30	1	6	0.080	0.116

* OFF segment is the actual discharge off time (μ Sec),General OFF settings about match to ON (discharge on time) 1 / 3. If the electrode area is less than the current value of the positive discharge, or depth of processing and other factors cause the unstable discharge, This should be adjusted the OFF time match to ON discharge time 1 / 2 or higher ratios such as 1:1 or more to stability of its discharge machining. At the same time should pay attention to adjust the discharge gap voltage (GV) at 35 ~ 40V can improve processing efficiency.

放電操作明細表
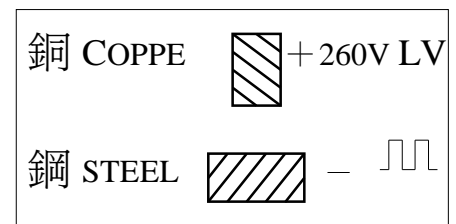# APPLICATION NOTE

銅 COPPER	+260V HV
鋼 STEEL	– ⊓⊓

電流 HV CURRENT POS	放電時間 ON TIME ON	休息時間 OFF TIME OFF	電壓表 VOLTAGE V	樣板—粗細度 SAMPLE-SKM VDI	消耗比 WEAR %	進度 STOCK REMOVAL mm³/min	細間隙 m m 2 x G1	粗間隙 m m 2 x G2
1	8	*	80	18	3	<1	0.042	0.050
1	10	*	80	20	4	<1	0.045	0.055
1	30	*	80	22	1	1.5	0.048	0.060
1	60	*	80	24	0.5	1.0	0.052	0.068
2	10	*	80	24	6	2.5	0.050	0.066
2	30	*	80	25	1.5	4.5	0.055	0.073
2	60	*	80	26	0.5	3.5	0.067	0.082
3	10	*	80	26	7	4	0.053	0.078
3	30	*	80	28	2.5	6	0.068	0.093
3	60	*	80	29	0.5	5	0.075	0.103
4	10	*	80	27	8.5	5.5	0.058	0.087
4	30	*	80	29	3	7.5	0.072	0.100
4	60	*	80	30	1	6	0.080	0.116
5	10	*	80	28	10	7	0.065	0.093
5	30	*	80	30	4	9	0.075	0.107
5	60	*	80	31	1.5	8	0.080	0.115
5	90	*	80	33	0.5	6.5	0.095	0.141

* OFF segment is the actual discharge off time (μ Sec),General OFF settings about match to ON (discharge on time) 1 / 3. If the electrode area is less than the current value of the positive discharge, or depth of processing and other factors cause the unstable discharge, This should be adjusted the OFF time match to ON discharge time 1 / 2 or higher ratios such as 1:1 or more to stability of its discharge machining. At the same time should pay attention to adjust the discharge gap voltage (GV) at 35 ~ 40V can improve processing efficiency.

五、（**260V**）**ELECTROLYTIC COPPER（-）- STEEL**

銅 COPPER ∕ — 260V LV

鋼 STEEL ∕∕∕ + ⊓⊔

試　驗　條　件
TEST　CONDITION

電 極 材 料 ELECTRODE	：電　　解　　銅 ELECTROLYTIC　COPPER
電　極　極　性 POLARITY　ELECTRODE	：負　　極 NEGATIVE
工 作 材 料 WORKPIECE	：鋼 STEEL
加 工 液 DIELECTRIC	：煤油（中國石油） CPC　KEROSENE
噴　　流 INJECTION	：0.5kg／cm²
試 驗 面 積 TEST　AREA	：20φmm

放 電 操 作 明 細 表
APPLICATION   NOTE

銅 COPPER ▨ —260V LV

鋼 STEEL ▨ + ⊓⊔

電流 CURRENT POS LV	放電時間 ON TIME ON	休息時間 OFF TIME OFF	電壓表 VOLTAGE V	樣板—粗細度 SAMPLE-SKM VDI	消耗比 WEAR RATE %	進度 STOCK REMOVAL mm³/min	細間隙 m m 2 x G1	粗間隙 m m 2 x G2
1.5	4	*	120	15	26	<1	0.030	0.038
3	4	*	120	20	28	<1	0.033	0.045
4.5	4	*	120	23	30	<1	0.036	0.050
6	4	*	120	26	31	1.3	0.042	0.062
9	4	*	120	29	32	2.5	0.056	0.084

 * OFF segment is the actual discharge off time (μ Sec),General OFF settings about match to ON (discharge on time) 1 / 3. If the electrode area is less than the current value of the positive discharge, or depth of processing and other factors cause the unstable discharge, This should be adjusted the OFF time match to ON discharge time 1 / 2 or higher ratios such as 1:1 or more to stability of its discharge machining. At the same time should pay attention to adjust the discharge gap voltage (GV) at 35 ~ 40V can improve processing efficiency.
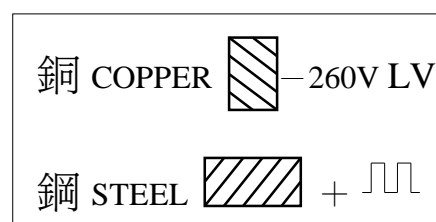
放 電 操 作 明 細 表
APPLICATION NOTE

銅 COPPER ▨ －260VHV

鋼 STEEL ▨ ＋ ⊓⊔

電流 HV (CURRENT POS)	放電時間 ON (ON TIME)	休息時間 OFF (OFF TIME)	電壓表 V (VOLTAGE)	樣板─粗細度 (SAMPLE-SKM VDI)	消耗比 % (WEAR RATE)	進度 mm³/min (STOCK REMOVAL)	細間隙 m m 2 x G1	粗間隙 m m 2 x G2
1	2	*	150	15	26	<1	0.030	0.038
2	2	*	150	20	28	<1	0.033	0.045
3	2	*	150	23	30	<1	0.036	0.050
4	2	*	150	26	31	1.3	0.042	0.062
5	2	*	150	29	32	2.5	0.056	0.084

* OFF segment is the actual discharge off time (μ Sec),General OFF settings about match to ON (discharge on time) 1 / 3. If the electrode area is less than the current value of the positive discharge, or depth of processing and other factors cause the unstable discharge, This should be adjusted the OFF time match to ON discharge time 1 / 2 or higher ratios such as 1:1 or more to stability of its discharge machining. At the same time should pay attention to adjust the discharge gap voltage (GV) at 35 ~ 40V can improve processing efficiency.

六、（**90V**）**ELECTROLYTIC COPPER**（**-**）**- COPPER**

銅 COPPER ⧄ −90V LV

銅 COPPER ⧄ + ⎍

試 驗 條 件
TEST　CONDITION

電 極 材 料 ELECTRODE	：電　　解　　銅 ELECTROLYTIC　COPPER
電 極 極 性 POLARITY　ELECTRODE	：負　　極 NEGATIVE
工 作 材 料 WORKPIECE	：銅 COPPER
加 工 液 DIELECTRIC	：煤油（中國石油） CPC　KEROSENE
噴　　流 INJECTION	：0.5kg／cm²
試 驗 面 積 TEST　AREA	：20φmm

放 電 操 作 明 細 表
APPLICATION   NOTE

銅 COPPER ▨	−90V LV
銅 COPPER ▧	+ ⊓⊔

細 間 隙 m m 2 x G1	粗 間 隙 m m 2 x G2

電流 CURRENT POS LV	放電時間 ON TIME ON	休息時間 OFF TIME OFF	電壓表 VOLTAGE V	樣板—粗細度 SAMPLE-SKM VDI	消耗比 WEAR %	進度 mm³/min STOCK REMOVAL	細間隙 m m 2 x G1	粗間隙 m m 2 x G2
3	2	*	40	18	42	<1	0.050	0.058
4.5	2	*	40	19	40	<1	0.052	0.061
6	2	*	40	20	38	<1	0.055	0.065
9	2	*	40	22	35	1	0.060	0.072
12	6	*	40	24	30	3.5	0.080	0.096
15	6	*	40	25	27	5.5	0.085	0.103
21	10	*	35	27	23	16	0.100	0.122
30	10	*	35	29	20	27	0.125	0.153
30	15	*	35	30	20	48	0.135	0.167
30	20	*	35	31	25	36	0.150	0.185
45	15	*	35	32	20	65	0.180	0.220
60	15	*	35	33	20	90	0.225	0.270

* OFF segment is the actual discharge off time (μ Sec),General OFF settings about match to ON (discharge on time) 1 / 3.
If the electrode area is less than the current value of the positive discharge, or depth of processing and other factors cause
the unstable discharge, This should be adjusted the OFF time match to ON discharge time 1 / 2 or higher ratios such as
1:1 or more to stability of its discharge machining. At the same time should pay attention to adjust the discharge gap
voltage (GV) at 35 ~ 40V can improve processing efficiency.

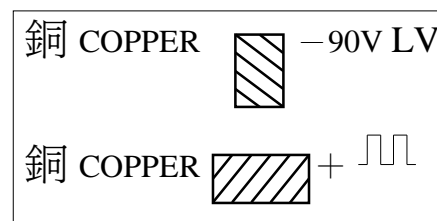## 七、（**260V, 90V**）**STEEL**（**+**） **- STEEL**
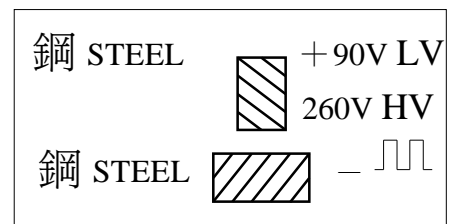
試　驗　條　件
TEST　CONDITION

電 極 材 料 ELECTRODE	：鋼 STEEL
電　極　極　性 POLARITY　ELECTRODE	：正　　極 POSITIVE
工 作 材 料 WORKPIECE	：鋼 STEEL
加　工　液 DIELECTRIC	：煤油（中國石油） CPC　KEROSENE
噴　　流 INJECTION	：0.5kg／cm²
試 驗 面 積 TEST　AREA	：20φmm

放 電 操 作 明 細 表
APPLICATION NOTE

鋼 STEEL	＋90V LV
	260V HV
鋼 STEEL	＿ ⊓⊔⊓

高壓電流 HI CURRENT POS	低壓電流 LOW CURRENT POS	放電時間 ON TIME	休息時間 OFF TIME	電壓表 VOLTAGE	樣板—粗細度 SAMPLE-SKM VDI 3400	消耗比 WEAR RATE	進度 STOCK REMOVAL	細 間 隙 m m	粗 間 隙 m m
HV	LV	ON	OFF	V	度	%	mm³/min	2 x G1	2 x G2
1	1.5	2	*	80	22	80	<1	0.040	0.052
2	3	2	*	80	23	65	<1	0.045	0.059
2	4.5	2	*	80	24	60	0.8	0.050	0.066
2	6	2	*	80	25	55	1.5	0.055	0.073
3	9	2	*	80	26	50	2.0	0.057	0.077
3	12	2	*	80	27	45	3.0	0.060	0.082
4	15	2	*	80	28	42	4.5	0.065	0.090
4	15	6	*	70	31	30	12	0.085	0.120
4	15	10	*	70	32	28	20	0.120	0.160
4	15	15	*	70	33	25	25	0.150	0.195
4	15	20	*	70	34	18	30	0.180	0.230
4	15	30	*	60	35	12	38	0.210	0.266
4	15	45	*	60	36	10	45	0.230	0.293
4	15	60	*	60	37	7	55	0.250	0.320
4	15	90	*	60	38	6	60	0.270	0.350
4	15	120	*	60	39	5	65	0.280	0.370
4	15	150	*	60	40	4.5	65	0.290	0.390
4	15	200	*	60	41	4	70	0.310	0.422
4	15	300	*	60	42	3	72	0.330	0.456
4	15	400	*	60	43	2	75	0.340	0.480
4	15	500	*	60	44	2	75	0.350	0.510
4	21	500	*	60	45	2	90	0.400	0.580
4	30	500	*	60	45	2.5	125	0.450	0.630
4	30	600	*	60	45	2	135	0.470	0.670
5	45	600	*	60	47	3	190	0.540	0.760
5	60	600	*	60	49	3	250	0.620	0.880

* OFF segment is the actual discharge off time (μ Sec),General OFF settings about match to ON (discharge on time) 1 / 3. If the electrode area is less than the current value of the positive discharge, or depth of processing and other factors cause the unstable discharge, This should be adjusted the OFF time match to ON discharge time 1 / 2 or higher ratios such as 1:1 or more to stability of its discharge machining. At the same time should pay attention to adjust the discharge gap voltage (GV) at 35 ~ 40V can improve processing efficiency.

八、（260V,90V）ELECTROLYTIC COPPER(+) - STEEL

銅 COPPER ＋90V LV

鋼 STEEL   ◩ 260V HV ⌐⌐⌐

▨

試 驗 條 件
TEST   CONDITION

電 極 材 料 ELECTRODE	：電　　解　　銅 ELECTROLYTIC COPPER
電　極　極　性 POLARITY ELECTRODE	：正　　極 POSITIVE
工 作 材 料 WORKPIECE	：鋼 STEEL
加　工　液 DIELECTRIC	：煤油（中國石油） CPC KEROSENE
噴　　流 INJECTION	：0.5kg / cm²
試 驗 面 積 TEST AREA	：20φmm

放電操作明細表
APPLICATION NOTE

銅 COPPER	▨	＋90V LV
STEEL		260V HV
鋼 STEEL	▨	ー ⊓⊔

高壓電流 HI CURRENT POS HV	低壓電流 LOW CURRENT POS LV	放電時間 ON TIME ON	休息時間 OFF TIME OFF	電壓表 VOLTAGE V	樣板－粗細度 SAMPLE-SKM VDI 3400	消耗比 WEAR RATE %	進度 STOCK REMOVAL mm³/min	細間隙 mm 2 x G1	粗間隙 mm 2 x G2
1	1.5	2	*	60	21	10	0.7	0.045	0.057
1	1.5	4	*	60	22	8	1.0	0.050	0.062
1	1.5	6	*	60	22	6.5	1.5	0.060	0.072
1	1.5	8	*	60	23	5	2.5	0.065	0.079
1	1.5	10	*	60	24	4.5	4	0.070	0.086
1	1.5	15	*	60	25	3	4.5	0.075	0.093
1	1.5	20	*	60	26	2.5	5	0.080	0.100
1	1.5	30	*	60	27	2	5	0.085	0.107
1	1.5	45	*	60	28	1.5	4	0.090	0.115
1	1.5	60	*	60	29	1.0	3	0.092	0.120
1	1.5	90	*	60	30	0.5	2	0.095	0.127
1	1.5	120	*	60	30	-	1.5	0.100	0.132
1	3	2	*	60	23	13	1.5	0.055	0.070
1	3	4	*	60	24	12	2.5	0.060	0.075
1	3	6	*	60	25	10	3.5	0.062	0.080
1	3	8	*	60	25	8.5	5	0.065	0.083
1	3	10	*	60	26	7	6.5	0.070	0.090
1	3	15	*	60	27	5.5	8	0.075	0.097
1	3	20	*	60	28	4	9.5	0.080	0.105
1	3	30	*	60	29	2.5	11	0.085	0.113
1	3	45	*	60	30	1.5	10	0.095	0.127
1	3	60	*	60	31	1.0	8	0.100	0.135
1	3	90	*	60	32	0.5	6	0.105	0.145
1	3	120	*	60	33	-	5	0.110	0.155

* OFF segment is the actual discharge off time (μ Sec),General OFF settings about match to ON (discharge on time) 1 / 3. If the electrode area is less than the current value of the positive discharge, or depth of processing and other factors cause the unstable discharge, This should be adjusted the OFF time match to ON discharge time 1 / 2 or higher ratios such as 1:1 or more to stability of its discharge machining. At the same time should pay attention to adjust the discharge gap voltage (GV) at 35 ~ 40V can improve processing efficiency.

九、（**90V**）COPPER TUNGSTEN(-) – TUNGSTEN CARBIDE

銅 COPPER　　　　　−90V LV

鎢 TUNGSTEN

碳化鎢
TUNGSTEN　CARBIDE
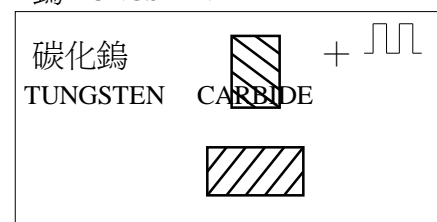
試　驗　條　件
TEST　CONDITION

電 極 材 料 ELECTRODE	：銅　　　鎢 COPPER　TUNGSTEN
電　極　極　性 POLARITY　ELECTRODE	：負　　　極 NEGATIVE
工 作 材 料 WORKPIECE	：碳化鎢 TUNGSTEN　CARBIDE
加　工　液 DIELECTRIC	：煤油（中國石油） CPC　KEROSENE
噴　　　流 INJECTION	：0.5kg／cm²
試　驗　面　積 TEST　AREA	：20φmm

放 電 操 作 明 細 表
APPLICATION NOTE

銅 COPPER	− 90V LV
鎢 TUNGSTEN	
碳化鎢 TUNGSTEN CARBIDE	+

電流 CURRENT POS LV	放電時間 ON TIME ON	休息時間 OFF TIME OFF	電壓表 VOLTAGE V	樣板―粗細度 SAMPLE-SKM VDI	消耗比 WEAR RATE %	進度 mm³/min STOCK REMOVAL	細間隙 m m 2 x G1	粗間隙 m m 2 x G2
3	2	*	30	14	16	1.3	0.036	0.044
4.5	2	*	30	16	16	1.8	0.038	0.048
6	2	*	30	17	16	2.1	0.041	0.052
6	30	*	30	22	20	5.5	0.048	0.060
9	4	*	30	19	17	2.6	0.045	0.055
9	30	*	30	25	22	8	0.050	0.063
12	4	*	30	20	18	4	0.048	0.060
12	30	*	30	27	23	11	0.054	0.068
15	4	*	30	22	18	5.5	0.050	0.064
15	30	*	30	28	23	13	0.058	0.083
21	4	*	30	25	18	8	0.056	0.072
21	30	*	30	31	25	18	0.065	0.097
30	4	*	30	26	18	11	0.060	0.077
30	30	*	30	33	26	25	0.080	0.125
45	4	*	30	27	18	13	0.068	0.085
45	30	*	30	35	27	32	0.094	0.150
60	4	*	30	30	18	16	0.080	0.112
60	30	*	30	38	27	40	0.110	0.190

* OFF segment is the actual discharge off time (μ Sec),General OFF settings about match to ON (discharge on time) 1 / 3. If the electrode area is less than the current value of the positive discharge, or depth of processing and other factors cause the unstable discharge, This should be adjusted the OFF time match to ON discharge time 1 / 2 or higher ratios such as 1:1 or more to stability of its discharge machining. At the same time should pay attention to adjust the discharge gap voltage (GV) at 35 ~ 40V can improve processing efficiency.

十、（**260V, 90V**）ALUMINIUM(+) - ALUMINIUM

試 驗 條 件
TEST   CONDITION

電 極 材 料 ELECTRODE	：鋁 ALUMINIUM
電 極 極 性 POLARITY ELECTRODE	：正 極 POSITIVE
工 作 材 料 WORKPIECE	：鋁 ALUMINIUM
加 工 液 DIELECTRIC	：煤油（中國石油） CPC KEROSENE
噴 流 INJECTION	：0.5kg / cm²
試 驗 面 積 TEST AREA	：20φmm

放 電 操 作 明 細 表
APPLICATION   NOTE

鋁 AL ▨ _⊓⊔

高壓電流 HI CURRENT POS / HV	低壓電流 LOW CURRENT POS / LV	放電時間 ON TIME / ON	休息時間 OFF TIME / OFF	電壓表 VOLTAGE / V	樣板—粗細度 SAMPLE-SKM VDI	消耗比 WEAR RATE / %	進度 mm³/min STOCK REMOVAL	細間隙 mm 2 x G1	粗間隙 mm 2 x G2
1	1.5	2	*	80	22	80	<1	0.040	0.052
1	3	2	*	80	23	65	<1	0.045	0.059
1	4.5	2	*	80	24	60	0.8	0.050	0.066
1	4.5	10	*	80	24	58	0.9	0.052	0.068
1	6	2	*	80	25	55	1.5	0.055	0.073
1	6	10	*	80	25	52	1.	0.056	0.075
1	9	2	*	80	26	50	2.0	0.057	0.077
1	9	6	*	80	27	45	3.0	0.060	0.082
1	9	10	*	80	27	44	3.3	0.062	0.085
1	12	2	*	80	28	42	4.5	0.065	0.090
1	12	6	*	70	31	30	12	0.085	0.120
1	12	10	*	70	32	28	20	0.120	0.160
1	15	2	*	80	28	42	4.5	0.065	0.090
1	15	6	*	70	31	30	12	0.085	0.120
1	15	10	*	70	32	28	20	0.120	0.160
1	15	15	*	70	33	25	25	0.150	0.195
1	15	30	*	70	34	18	30	0.180	0.230
1	15	60	*	60	35	12	38	0.210	0.266
2	21	15	*	60	36	10	45	0.230	0.293
2	21	30	*	60	37	7	55	0.250	0.320
2	21	60	*	60	38	6	60	0.270	0.350
3	30	15	*	60	39	5	65	0.280	0.370
3	30	30	*	60	40	4.5	65	0.290	0.390
3	30	60	*	60	41	4	70	0.310	0.422
4	45	15	*	60	42	3	72	0.330	0.456
4	45	30	*	60	43	2	75	0.340	0.480
4	45	60	*	60	44	2	75	0.350	0.510
5	60	15	*	60	45	2	90	0.400	0.580
5	60	30	*	60	45	2.5	125	0.450	0.630
5	60	60	*	60	45	2	135	0.470	0.670

* OFF segment is the actual discharge off time (μ Sec),General OFF settings about match to ON (discharge on time) 1 / 3. If the electrode area is less than the current value of the positive discharge, or depth of processing and other factors cause the unstable discharge, This should be adjusted the OFF time match to ON discharge time 1 / 2 or higher ratios such as 1:1 or more to stability of its discharge machining. At the same time should pay attention to adjust the discharge gap voltage (GV) at 35 ~ 40V can improve processing efficiency.

十一、（**260V, 90V**）**ELECTROLYTIC COPPER(+) - ALUMINIUM**

試 驗 條 件
TEST　CONDITION

電 極 材 料 ELECTRODE	：電　　解　　銅 ELECTROLYTIC　COPPER
電　極　極　性 POLARITY　ELECTRODE	：正　極 POSITIVE
工 作 材 料 WORKPIECE	：鋁 ALUMINIUM
加　工　液 DIELECTRIC	：煤油（中國石油） CPC　KEROSENE
噴　　流 INJECTION	：0.5kg / cm²
試 驗 面 積 TEST　AREA	：20φmm

放 電 操 作 明 細 表
APPLICATION　NOTE
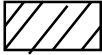
銅 COPPER ＋90V LV
260V HV

鋁 AL ⎍

高壓電流 HI CURRENT POS HV	低壓電流 LOW CURRENT POS LV	放電時間 ON TIME ON	休息時間 OFF TIME OFF	電壓表 VOLTAGE V	樣板—粗細度 SAMPLE-SKM VDI	消耗比 WEAR RATE %	進度 STOCK REMOVAL mm³/min	細間隙 m m 2 x G1	粗間隙 m m 2 x G2
1	1.5	2	*	80	22	80	<1	0.040	0.052
1	3	2	*	80	23	65	<1	0.045	0.059
1	4.5	2	*	80	24	60	0.8	0.050	0.066
1	4.5	10	*	80	24	58	0.9	0.052	0.068
1	6	2	*	80	25	55	1.5	0.055	0.073
1	6	10	*	80	25	52	1.	0.056	0.075
1	9	2	*	80	26	50	2.0	0.057	0.077
1	9	6	*	80	27	45	3.0	0.060	0.082
1	9	10	*	80	27	44	3.3	0.062	0.085
1	12	2	*	80	28	42	4.5	0.065	0.090
1	12	6	*	70	31	30	12	0.085	0.120
1	12	10	*	70	32	28	20	0.120	0.160
1	15	2	*	80	28	42	4.5	0.065	0.090
1	15	6	*	70	31	30	12	0.085	0.120
1	15	10	*	70	32	28	20	0.120	0.160
1	15	15	*	70	33	25	25	0.150	0.195
1	15	30	*	70	34	18	30	0.180	0.230
1	15	60	*	60	35	12	38	0.210	0.266
2	21	15	*	60	36	10	45	0.230	0.293
2	21	30	*	60	37	7	55	0.250	0.320
2	21	60	*	60	38	6	60	0.270	0.350
3	30	15	*	60	39	5	65	0.280	0.370
3	30	30	*	60	40	4.5	65	0.290	0.390
3	30	60	*	60	41	4	70	0.310	0.422
4	45	15	*	60	42	3	72	0.330	0.456
4	45	30	*	60	43	2	75	0.340	0.480
4	45	60	*	60	44	2	75	0.350	0.510
5	60	15	*	60	45	2	90	0.400	0.580
5	60	30	*	60	45	2.5	125	0.450	0.630
5	60	60	*	60	45	2	135	0.470	0.670

＊OFF segment is the actual discharge off time (μ Sec),General OFF settings about match to ON (discharge on time) 1 / 3. If the electrode area is less than the current value of the positive discharge, or depth of processing and other factors cause the unstable discharge, This should be adjusted the OFF time match to ON discharge time 1 / 2 or higher ratios such as 1:1 or more to stability of its discharge machining. At the same time should pay attention to adjust the discharge gap voltage (GV) at 35 ~ 40V can improve processing efficiency.

The Depth Setting of AP Position Difference			The Depth Setting of ON Position Difference					
	Z-Depth value	Orbiting Radius value		Z-Depth value	Orbiting Radius value		Z-Depth value	Orbiting Radius value
60A			1800			20		
↓	0.2mm	0.1mm	↓	0.04mm	0.02mm	↓	0.005mm	0.002mm
45A			1500			15		
↓	0.15mm	0.075mm	↓	0.04mm	0.02mm	↓	0.005mm	0.002mm
30A			1200			10		
↓	0.1mm	0.05mm	↓	0.04mm	0.02mm	↓	0.005mm	0.002mm
21A			900			8		
↓	0.08mm	0.04mm	↓	0.03mm	0.015mm	↓	0.005mm	0.002mm
15A			700			6		
↓	0.06mm	0.03mm	↓	0.03mm	0.015mm	↓	0.005mm	0.002mm
12A			600			4		
↓	0.05mm	0.025mm	↓	0.03mm	0.015mm	↓	0.005mm	0.002mm
9A			500			2		
↓	0.03mm	0.015mm	↓	0.03mm	0.015mm	↓	0.005mm	0.002mm
6A			400			1		
↓	0.03mm	0.015mm	↓	0.025mm	0.0125mm			
4.5A			300					
↓	0.02mm	0.01mm	↓	0.025mm	0.0125mm			
3A			200					
↓	0.01mm	0.005mm	↓	0.025mm	0.0125mm			
2A			150					
↓	0.005mm	0.002mm	↓	0.02mm	0.01mm			
1.5A			120					
↓	0.005mm	0.002mm	↓	0.02mm	0.01mm			
1A			90					
↓	0.005mm	0.002mm	↓	0.02mm	0.01mm			
0.5A			60					
↓			↓	0.015mm	0.0075mm			
BP			45					
1 2			↓	0.01mm	0.005mm			
↓	0.005mm	0.002mm	30					
1			↓	0.01mm	0.005mm			

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