

WE6800 Series DRO

USER'S GUIDE

VER5.01

WE6800M-2 DRO for 2 axes

WE6800M-3 DRO for 3 axes

WE6800E DRO for EDM



Rational Precision Instrument Co.,Ltd

Safety Precaution



Warning



- ◆ Do not use the display unit with voltages other than the indicated power voltage(AC 90-250V, 50-60HZ), and do not connect multiple plugs to a single outlet as this may result in fire or electric shock.
- ◆ Do not damage, modify, excessively bend, pull on, place heavy objects on or heat the power cord, as this may damage the power cord and result in fire or electric shock.



- ◆ Do not handle the power plug with wet hands as this may result in electric shock.
- ◆ Do not open the cover of the display unit to disassemble or modify the unit or to replace the fuses, as this may result in burns or injury. These actions may also damage the internal circuitry.



Caution



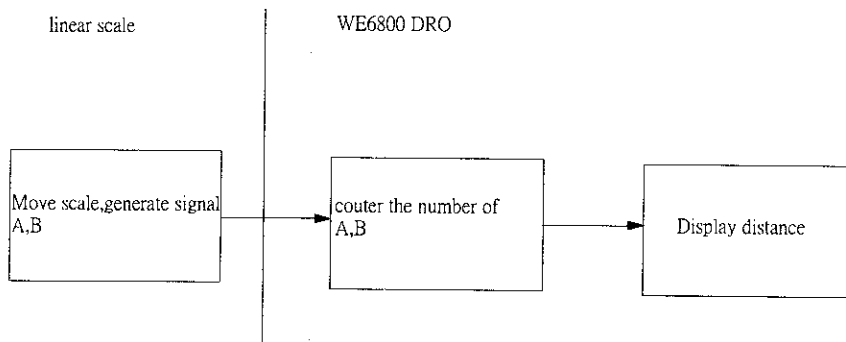
- ◆ When unplugging the power plug, do not pull on the power cord as this may damage the cord and result in fire or electrical shock. Be sure to grip the power plug when unplugging it from the socket.
- ◆ The unit does not have an explosion-proof structure. Therefore, do not use the unit in an atmosphere charged with inflammable gases as this may result in fire.
- ◆ When the unit will not be used for an extended period of time, be sure to unplug the power plug from the socket for safety.



- ◆ Be sure to turn off the power before connecting or disconnecting power and signal connectors in order to prevent damage or misoperation.
- ◆ The unit does not have an earthquake-proof structure. Therefore, do not use the unit in moving areas or areas exposed to strong shocks.

Principle

WE6800 series DRO provides displaying distance and position for machine tool, grinding machine, milling machine and EDM. Its principle is as follows:



WE6800 Serial DRO Specifications

Input power voltage	85 V - 265V
Power consumption	MAX.15W
Operating temperature	0° - 40° (32--104° F)
Storing temperature	0° - 40° (-4--104° F)
Relative humidity	< 90%
Weight	1.45Kg
Dimension	295 X 185 X 45 (Unit: mm)
No. of axes displayed	2 (WE6800M-2) , 3 (WE6800M-3, WE6800E)
Interface of linear scale	9PD/7PD/15PD
Scale Signal	TTL, drive capacity > 10 mA
Resolution of scale	0.05 μ m, 0.1 μ m, 0.2 μ m, 0.5 μ m, 1 μ m, 2 μ m, 5 μ m, 10 μ m, 20 μ m, 50 μ m
Pitch of linear scale	0.02mm
Precision of scale	High grade $\pm (3+3L/1000)$, standard grade $\pm (5+5L/1000)$

WE6800E

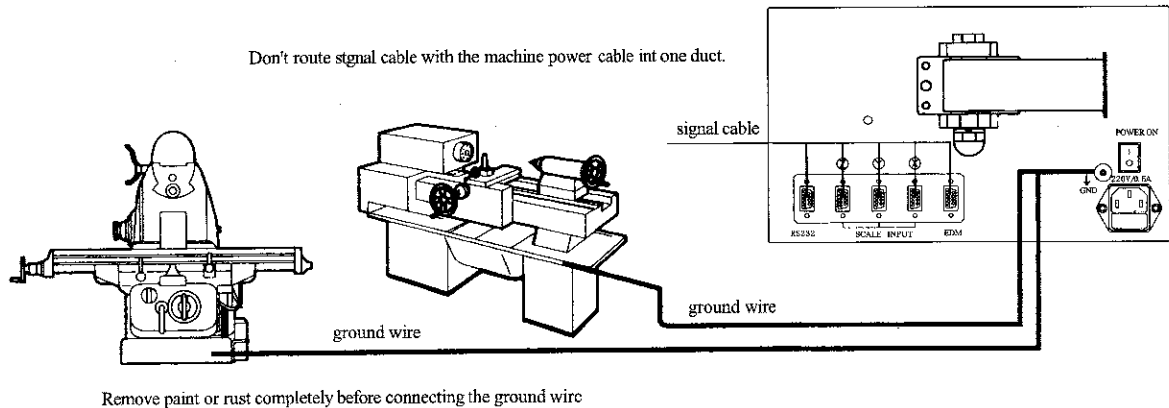
EDM interface	Output a on/off signal , drive capacity >100mA
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Options

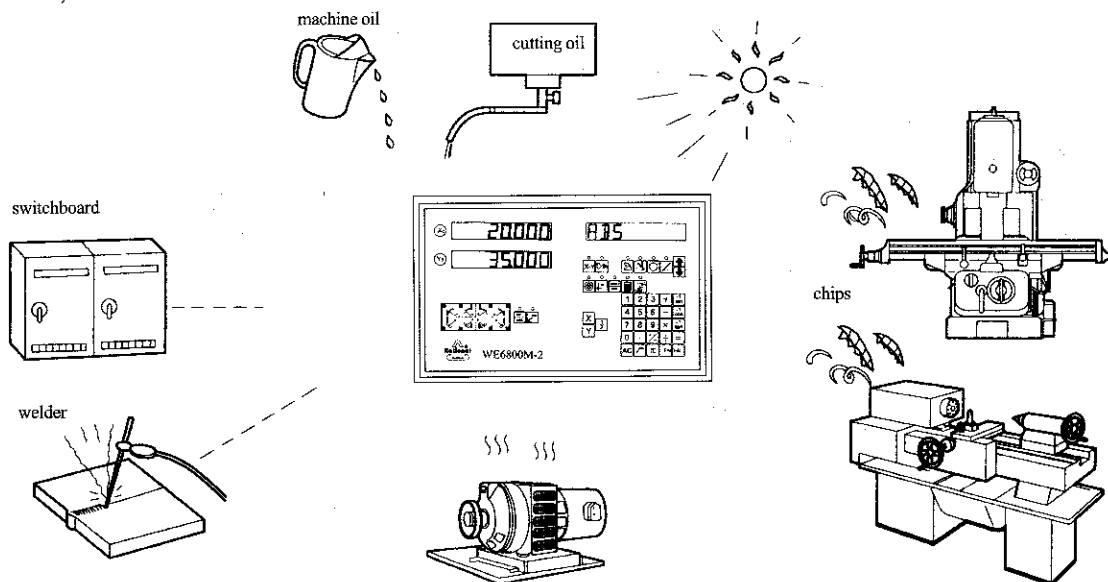
RS232 interface	A pin for TX signal, a pin for TX signal
Edge detection	High voltage 5V, drive capacity > 10mA

Handing Instruction

- ◆ Do not route the head connecting cable, power cord, etc, together with the machine power line in one duct.
- ◆ Supply power from an AC lamp source (AC 90 – 250 V, 50 – 60HZ)
- ◆ Connect the ground terminal to the machine with the supplied ground wire. Make sure the machine is grounded.



- ◆ Place the display unit more than 0.5m(20") away from a high voltage source, large current source, large power relay, etc.
- ◆ For installation of the display unit, avoid a location exposed to chips, cutting oil, or machine oil. If unavoidable, take appropriate countermeasures.
- ◆ Do not put a vinyl cover directly over the display unit or put it in a closed container.
- ◆ The ambient temperature should be in the range of 0°C to 40°C (32 to 104°F). Avoid exposure to direct sunlight, hot air currents, or heated air.



- ◆ If the power supply voltage is lower than specified, the display may not be illuminated even with the power switch turned on. Be sure to use the power in the specified range.
- ◆ Note that if the power is interrupted momentarily or the voltage drops temporarily below the normal operating range, an alarm may operate or a malfunction may occur.
- ◆ Be sure to use the display unit inside.

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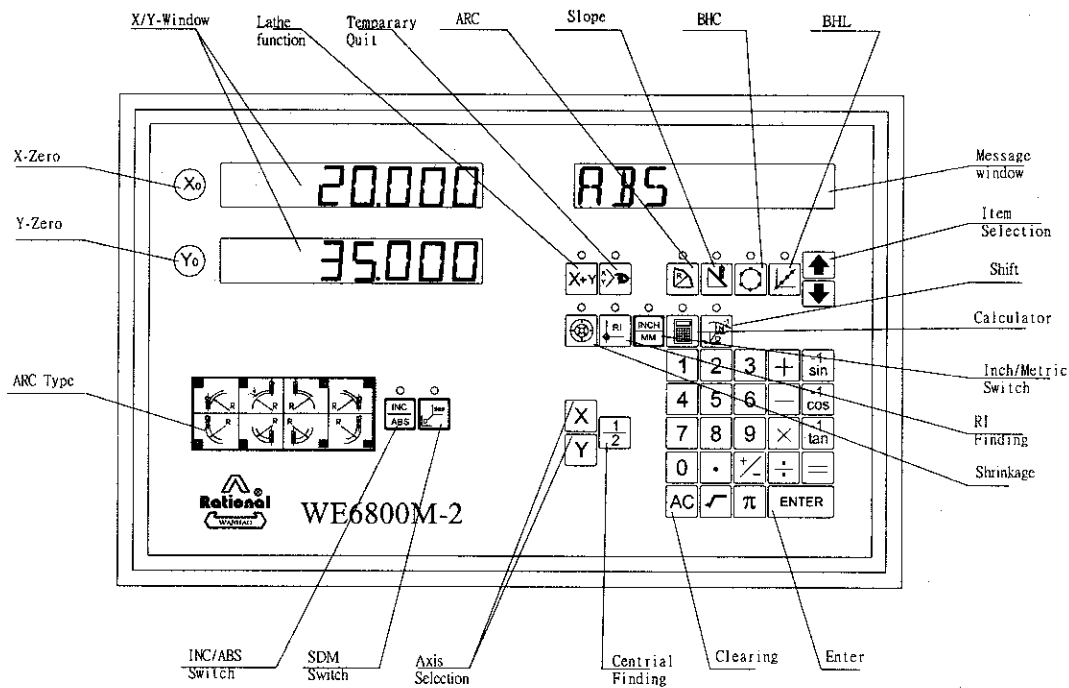
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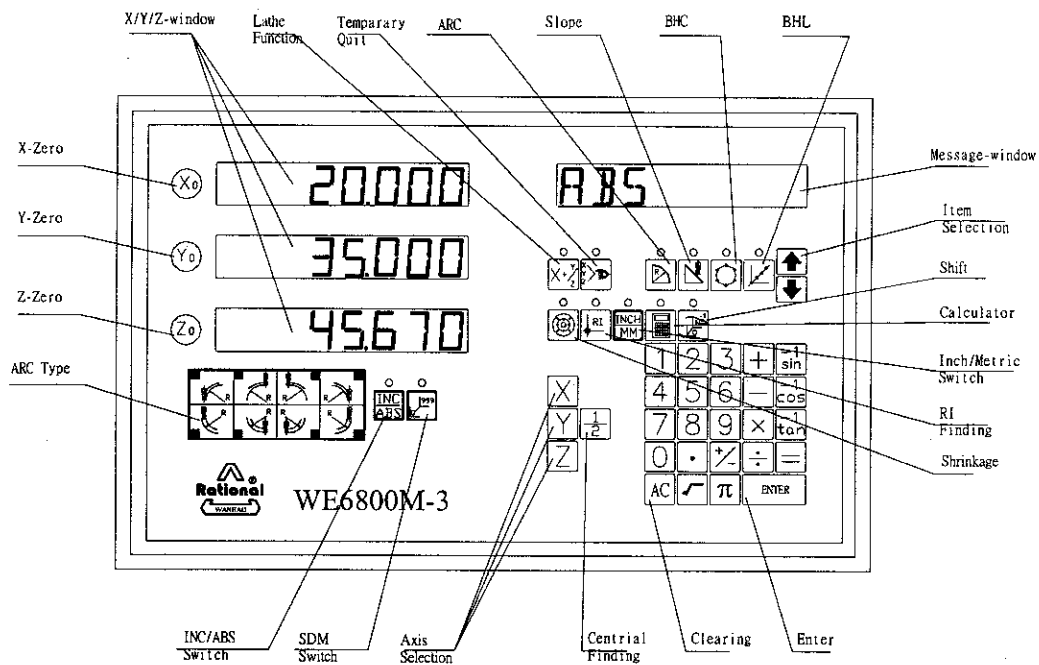
Chapter 1. INSTRUDITION

1.1 Front Panel

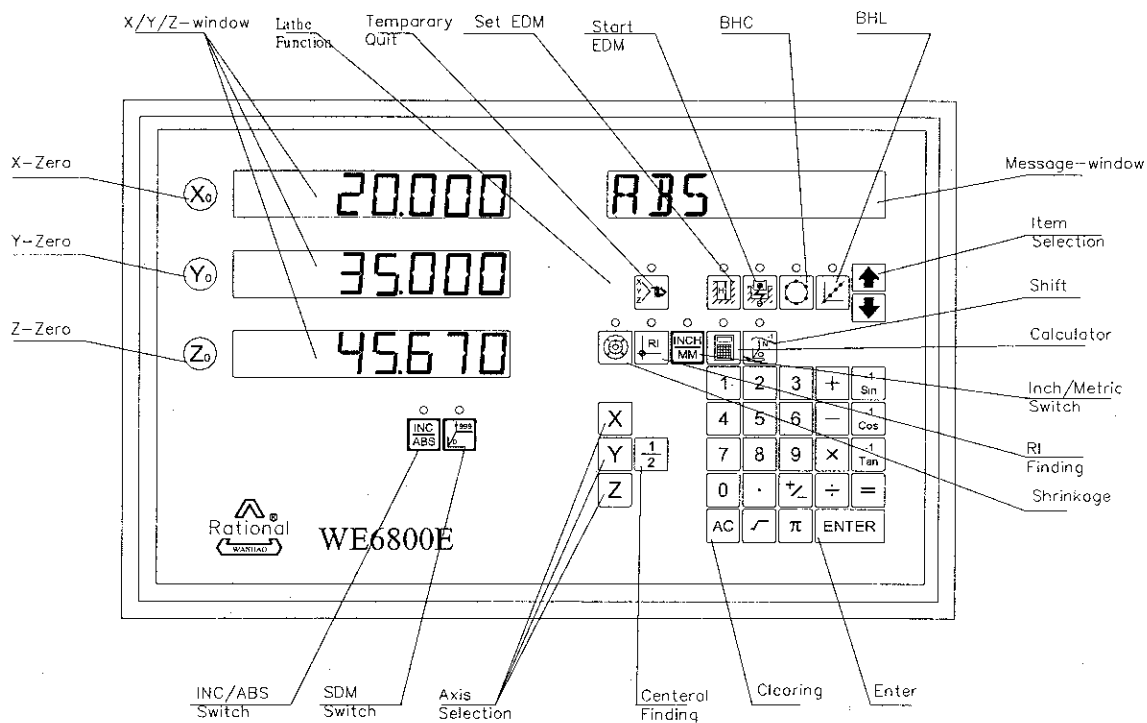
WE6800M-2 DRO for 2 axes



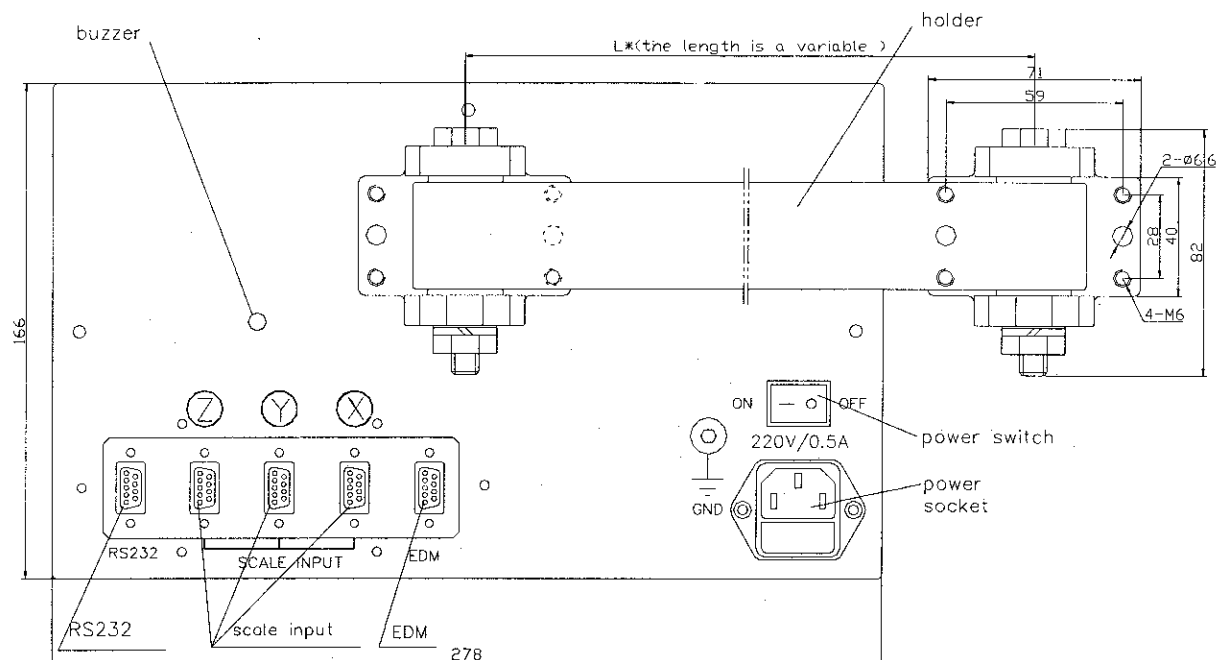
WE6800M-3 DRO for 3 axes



WE6800E DRO for EDM(electrode discharging machining)



1.2 Back Panel



1.3 Description of Key Function

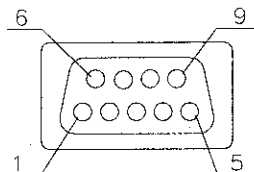
	KEY MARK	KEY NAME	FUNCTION	WE6800 M-2	WE6800 M-3	WE6800 E
1		X/Y/Z-Zero	Zero selected axis.	No		
2		Axis Selection	Select axis to operate.	No		
3		Inch/Metric Switch	Toggle display unit between metric and inch.			
4		Centrial Finding	Havle a display value of a axis.			
5		ABS/IINC Switch	Toggle between ABS/INC coordinate.			
6		RI Finding	Find the origin of the linear scale.			
7		Shrinkage	Toggle between shrinkage and unshrinkage.			
8		SDM Switch	Second data memory.			
9		Numeric Key	Enter number .			
10		Decimal Point	Enter decimal point.			
11		+/- Sign	Enter +/- sign.			
12		Enter	Confirm operation.			
13		Clearing	Candle incorrect operation.			
14		Temparary Quit	1 Leave processing temporarily to return normal display state. 2 Enter auto edge detection.		X	X
15		Temparary Quit	1 Leave processing temporarily to return normal display state. 2 Enter auto edge detection.	X		
16		Calculator	Enter /quit calculating state.			
17		Shift	1 Calculate inverse trigonometric unction in calculating function. 2 Enter No.of SDM xoordinate .			
18		Trigonometric Function	Calculate trigonometric or inverse trigonometric.			
19		Add, Decrease, Multiple, Divide	Operate adding, decreasing, multiplying,dividing.			
20		Radical Sign	Square root or square.			
21		Circumference Ratio	Enter circumference ratio.			
22		Equality Sign	Make calculating result.			
23		Set EDM	Set parameters of EDM.	X	X	
24		Start EDM	Enter EDM processing.	X	X	
25		BHC	Process holes displayed equally on a circle.			
26		BHL	Process holes displayed equally on a line.			
27		ARC	Simple R cutting function			X
28		SLOPE	Procees a slope.			X
29		Lathe Function	Enter or exit lathe function.		X	X
30		Lathe Function	Enter or exit lathe function.	X		X
31		Item Selection	Stroll up or down to select .			

Note: "X" indicates this model has no such a function.

1.4 Interface

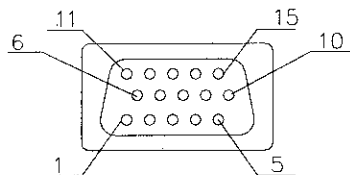
A Linear scale interface

1) 9PD Connector



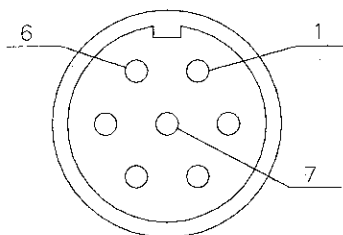
PIN	NAME	COLOR
1	+5V	RED
2	0V	BLK
3	A	BRW
4	B	YEL
5	RI	ORG

2) 15PD Connector



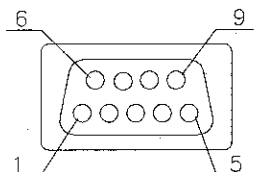
PIN	NAME	COLOR
1	+5V	RED
2	0V	BLK
3	A	BRW
4	B	YEL
5	RI	ORG

3) 7Pin Connector



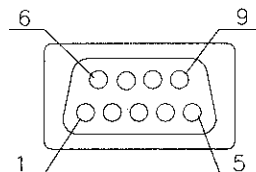
PIN	NAME	COLOR
1	OV	BLK
2	NC	
3	A	
4	B	YEL
5	+5V	RED
6	RI	ORG
7	FG	SHILD WIRE

B RS232 Interface



PIN	NAME	COLOR
1	NC	
2	TXD	YEL
3	RXD	ORG
4	NC	
5	GND	BRW

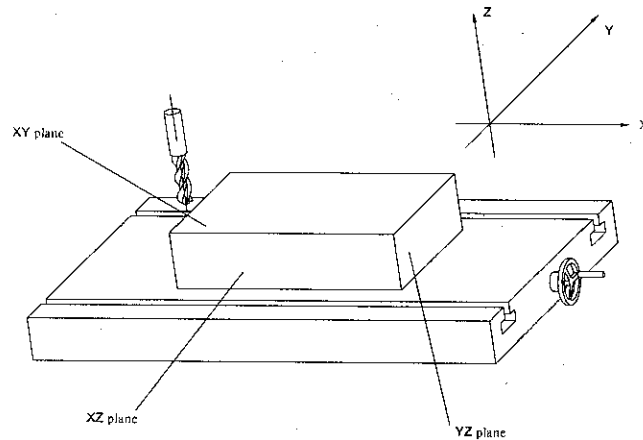
C EDM Interface



PIN	NAME	COLOR
1	NC	
2	COMMON	ORG
3	NORMAL CLOSE	BRW
4	NC	
5	IN+	RED
6	NORMAL OPEN	YEL
9	IN-	BLK

1.5 Coordinate System

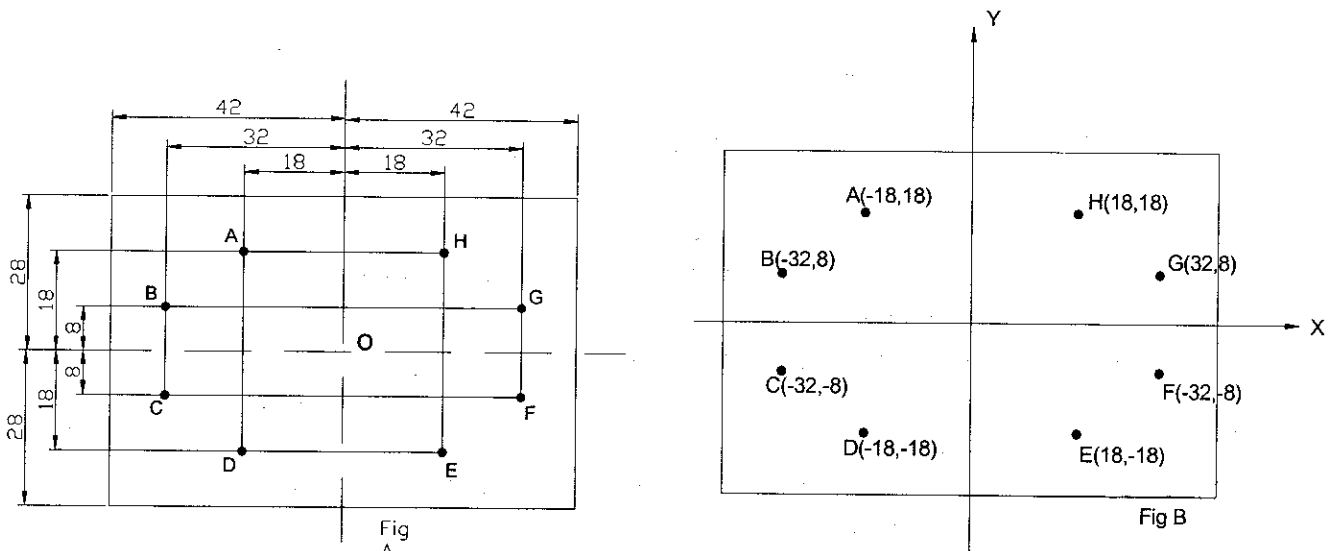
WE6800 DRO is an instrument which can measure, position workpiece when processing. Coordinate system must be defined first for more efficiency and accuracy.



In horizontal plane, the X axis is parallel with the operator, Y axis is perpendicular to X axis. Z-axis is perpendicular to horizontal plane. Positive direction of axis is set as the figure. It also can be changed as custom.

The value of one point position is the distance relative to the origin of coordinate

For a workpiece as Figure A, the value of each point position is as the Figure B when point O is the origin of coordinate.



Chapter 2. BASIC OPERATION

2.1 Power on

Function: Set the power switch on and WE6800 enter normal display state.

It can memorize the following parameter after power on:

- A: The scale position where power off;
- B: ABS/INC/SDM mode;
- C: Shrinkage is enabled or disable;
- D: Metric/Imperial mode;

The origin of the linear scale must be searched again if the scale is moved when power off.

Note:

Normal display state The state DRO automatically enter after on or exit from

"STEUP". In normal display state, X window, Y window, Z window displays the current value of X axis, Y axis or Z-axis separately. The message-window displays

⊗
 ⊙
 ⊚

"ABS", "INC" or "SDM XXX" (indicate the Number of SDM coordinate, with range of 000—999). When user switch among ABS/INC/SDM, MM/INCH, or shrink-age / Un-shrinkage, DRO will not leave this state. When you enter CALCULATOR function, input data to X (or Y or Z) axis, function of searching the Reference point (RI) of the linear scale or special function (BHC, BHL, ARC, SLOPE PROCESSING and EDM function), DRO is not in the normal display state.

2.2 Zeroing

Function: Zero the designated axis in normal display state. Zeroing is used to set the current point as datum point.

- Note:
- 1 The axes can't be zeroed when DRO is in other states (for example, in the state of calculating function or in special function). DRO should return normal display state;
 - 2 The axes can be zeroed in ABS/INC/SDM states;
 - 3 When zero in ABS coordinate, INC display value is cleared simultaneously. Zero in INC mode, which has on effect on ABS and SDM display value.

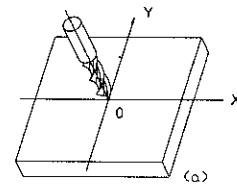
Example 1: Set the point O (as the figure illustrated) as datum

STEPS:

- 1: Return normal display state;
- 2: Move the machine table, and align the lathe tool with point O
The DRO displays as the right figure

3: Press ⊗ to zero X axis,

Press ⊙ to zero Y axis.



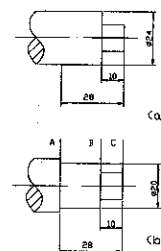
⊗
 ⊙
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 ⊗
 ⊙

2.3 Presetting Data to Designated Axis

Function: Preset a value to current position for a designated axis in normal display state.

- NOTES:
- 1 When the DRO is in other states(e.g. calculating function or special function), the axis can't be presetted.DRO should return normal display state before presetting data..
 - 2 Axis can be presetted in ABS/INC/SDM state.
 - 3 In SDM state, input mode"0" means that the display value is equal to the enter value; Input mode "1" means that the display value is equal to the negative of enter value.
 - 4 The range of input value is that the minimum value to the maximum value which could be displayed in the designated window.

Example: Machine the workpiece from the figure (a) to figure (b), and the plane C is the datum and counting direction is right.



STEPS:

- 1: Move the machine table, and align the lathe tool to plane B
- 2: Return normal display state;
- 3: Press , "0" is flashing in X window, waiting for entering a data;
- 4: Press in turn, which means the preset data is "-10";

If incorrect value is inputted, press to cancel and input again;

NOTE: In SDM state and SDM input mode is "1", needn't be inputted, otherwise, must be inputted.

- 5: Press to confirm the data that your input and end presetting it to X axis;

- 6: Moving the machine table until "-28.000" is displayed in X window.
Now it is the position of plane A.

- 7: Y axis, Z-axis can be presetted in the same way.

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⊗



⊗



⊗

2.4 Toggle display unit between mm and inch

Function: Length can be displayed either in "mm"(metric) or "inch"(imperial). Display unit can be toggled between mm and inch.

Example: Display value toggle between mm and inch


STEPS:

- 1: DRO return normal display state. The LED of INCH is not on, which means the current unit is mm(metric);

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- 2: Press , then the LED of INCH/mm is on, which means the display unit is inch now.

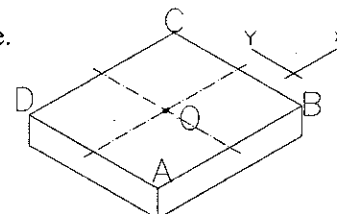
NOTE: In imperial, the LED of INCH is on; and in metric unit, the LED of INCH is off.



2.5 Mid-point Calculation

Function: Set the center of workpiece as datum by halving the displayed value.



Example: Set the center of rectangle as datum as the right figure

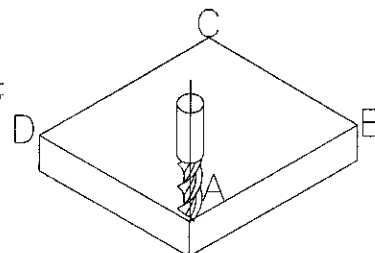
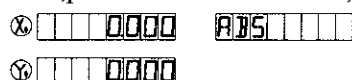


STEPS:



- 1: Place the workpiece on the machine table, with line AB parallel to X axis, line AD parallel to Y axis;



- 2: DRO return normal display state, move machine table, and align the lathe tool with point A;

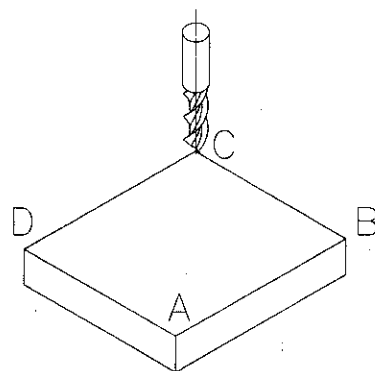
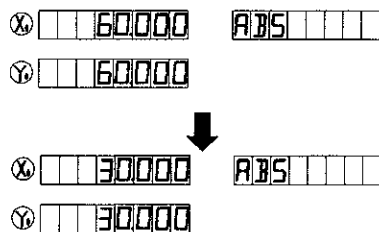
Press  to zero X axis, press  to zero Y axis;



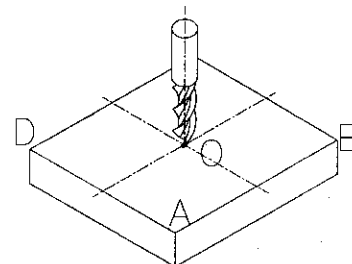
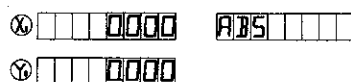
- 3: Align lathe tool with point C by moving machine table;

Press ,  in turn to halve the X axis display value;

Press ,  in turn to halve the Y axis display value;



- 4: Move the machine table until "0.000" is displayed in X window, Y window. The position (where the lathe tool is) is the workpiece's center.




2.6 Setting the Shrinkage Mode


Function: With this function, you can process the mould tools according to the dimension of the finished products without calculating dimension separately.

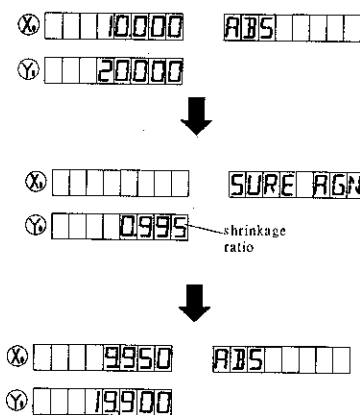
STEPS:



A: unshrinkage → shrinking

1: DRO return normal display state;

2: Press  and don't release. The Y window displays the current shrinkage ratio, the message-window displays "SURE AGN", which means you need to confirm once again.


3: Press  to enter shrinkage state; press any other key to return former state.



NOTE:  should not be released and press  simultaneously to enter shrinkage state; LED of shrinkage flashes in shrinkage mode;

B: shrinkage → unshrinking

1: DRO return normal display state;

2: Press , now DRO is in unshrinking mode, LED of shrinkage is off;



2.7 Absolute / Incremental / 1000 sets SDM









Function :

The WE6800 series DRO has 3 display modes: the absolute mode (ABS); the incremental mode (INC) and 1000 sets Second Data Memory (SDM) with the range of 000 to 999.

- 1: Zero point of workpiece is set at the origin point of ABS coordinate;
- 2: The relative distance between datum of ABS and SDM remains unchanged when ABS datum is changed.
- 3: If one point in ABS is zeroed, the point in INC is zeroed automatically; yet if one point in INC is zeroed, the point in ABS will remain unchanged.

1: toggle among ABS/INC/SDM coordinate

These three display modes can be changed only in normal display state.



- ABS → INC Press ;
- INC → ABS Press ;
- SDM → INC Press  to enter ABS or INC. If in ABS, press  again.
- SDM → ABS Press  to enter ABS or INC. If in INC, press  again.
- INC → SDM Press ;
- ABS → SDM Press ;

2: Set the new number of SDM in SDM mode




STEPS:

- 1: Enter SDM mode;

SDM 234



- 2: Press  (two axes DRO) or  (three axes DRO), message-window flashess, waiting for inputting a new number of SDM;





- 3: Enter a new number, for example, enter   

SDM 666


- 4: Comfirm new SDM number

Press  (two axes DRO) or  (three axes DRO), then the message-window stops flashing and the number of SDM is changed to 666.


3: Increase/Decrease the SDM number

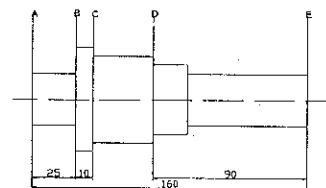
DRO return normal display state with the display mode SDM, press  to decrease the number of SDM by 1; press  to increase the number of SDM by 1.

Example : If the current SDM number is 777, and the message-window displays “SDM 777”, press

, then the message-window will display “SDM 776”, which means the current SDM number is 776.

If the current SDM number is 777 and the message-window displays “SDM 777”, Press

, then the message-window will displays “SDM 778”, which means the current SDM number is 778.



If a workpiece as the figure is to be machined where the datum plane is plane E, the coordinate can be set as the following steps:

- 1: Return normal display state with ABS coordinate;

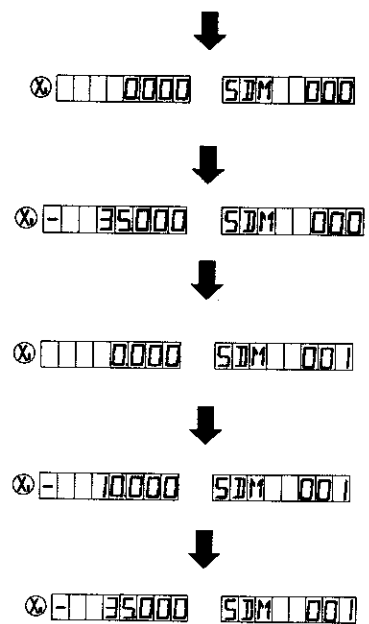
⊗ 



- 2: Move the machine table until the lathe tool is aligned with plane E, then zero X axis;

⊗ 

- 3: Move the machine table until the lathe tool is aligned with the plane D,
change SDM number to SDM 000 ,and press \odot to zero X
axis .Then the NO.000 SDM coordinate's datum is set at plane D.
- 4: Move the machine table until the lathe tool is aligned with plane C,
press \downarrow to change SDM to SDM 001,
Then press \odot to zero X axis ,and the SDM 001 with the
datum plane C is set.
- 5: Move the machine table until the lathe tool touches the plane B,the DRO
will display as the right:
- 6: Move the machine table until the lathe tool touches the plane A, the DRO
will display as the right:



2.8 Clearing All SDM Datum

Function: Clear the Datum of all SDM 0—999. After clearing ,the display value in SDM coordinate is equal to the value in ABS coordinate.

STEPS:

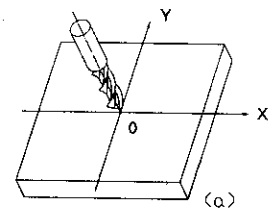
- 1: Return normal display state;
- 2: Press $\begin{matrix} \text{INC} \\ \text{ABS} \end{matrix}$ and AC simultaneously for 2 seconds,and the message window displays"CLS SDM"
flashingly ,which means it is clearing now.About ten seconds later,the clearing is completed ,
"CLS OK" is displayed in message window temporary and DRO return normal display state.

2.9 Finding the Absolute Reference Point of Scale (RI)

Function:

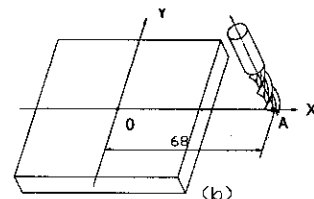
A absolute datum should be set when a workpiece is machined.
There are two cases which is often met

- The machine table can't stop but continue going further because of inertia if power is off suddenly when the machine table is going in full speed.There will be distance ΔL between the spot and the position the DRO memorize.That is to say the display value is not the actual value of the position when power is on again.






- If the machine table is moved without intention when DRO is off. How to restore the preset ABS and correct display value?

These questions can be solved easily with this function of search RI.



STEPS:

- 1: DRO is set in ABS coordinate.
- 2: Press , then the message window displays "SEL AXIS";
- 3: Select the axis which need search RI. For instance, select Y axis, then press , "FD.Y REF" is displayed in message window, and Y window flashes.
- 4: Move the machine table. The buzzer sounds when RI is searched, then Y window stops flashing and displays the value of the current position, the DRO returns normal display state.

In the course of searching, press  to quit this operation.

ABS



SEL AXIS



FD Y REF



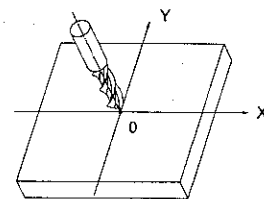
ABS

The machine table is moved when DRO is off. How to restore the former absolute ABS coordinate and correct display value?

Take WE6800M-2 as an example.

STEPS:

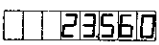
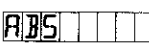
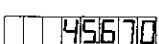

- 1) This operation (searching the absolute origin point of the scale) is necessary when a linear scale is installed or the default parameter is loaded. If not, the ABS coordinate would not be restored.
- 2) Set the point O as the datum of ABS. (Move the machine table until the lathe tool is aligned with point O, and zero the X axis, Y axis)



⊗  ABS 
 ⊙  







- 3) The machine table is moved when power is off;
- 4) Power is on, switch to ABS coordinate, the DRO maybe displays as the right:

⊗  ABS 
 ⊙  



- 5) Search the RI of X axis and Y axis. after RI is found, the ABS coordinate is restored.
- 6) Align the lathe tool with point O, "0.000" is displayed in X window and Y window, which means the point O is the origin and the ABS coordinate is restored.

⊗  ABS 
 ⊙  

NOTE:

- The linear scale has a RI every 50 mm. For the sake of search identical RI, move the scale around

the red mark " \triangle " to search RI.

- Setup correct RI mode is a premise

2.10 Clearing the Error message

If ERROR message is enabled, the message window will display "E1" if the signal of phase A and phase B of the linear scale changes at the same time; the message window will display "E2" if the linear scale runs too fast; the window will display "E3" if these two conditions occur simultaneously. When error information appears, the display value has an error of 1-2 count, so user need search RI to restore ABS coordinate. If user think that doesn't affect your work, press

AC to clear error message and continue your work.

Example : When signal of A phase and B phase is same in Y axis the window displays as the right:

⊗ **25400** **ABS**
⊙ **E1**



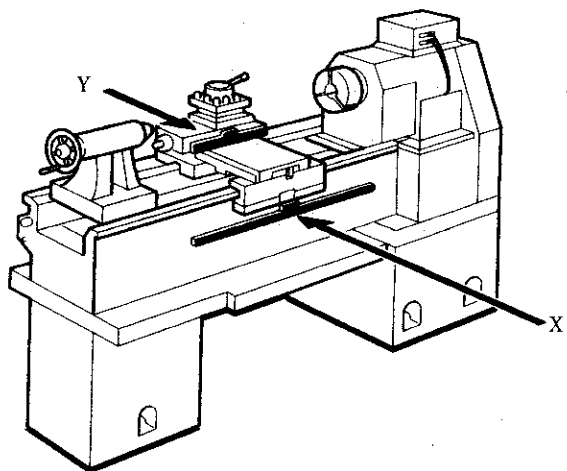
Press **AC** to clear the error information. Y window displays the value still, but it is error. The difference between the display value and the true value is about 1—2 times of resolution. For instance, the resolution of scale is 5μ , the difference is $5-10\mu$.

⊗ **25400** **ABS**
⊙ **50800**

2.11 Lathe Function



As the following figure showing, if two scales are installed in one axis, the position of the workpiece should be the sum of these two values ($X+Y$) in this direction. It is called lathe function.

- A. lathe mode 0: normal display (the lathe function is disabled)
- B. lathe mode 1: X window value = the value of X axis position + the value of Y axis position
- C. lathe mode 2: X window value = the value of X axis position + the value of Z-axis position



STEPS:

- 1: Set the lathe mode in initial system settings;
- 2: In normal display state, press **X+Y/Z** (three axes display) or **X+Y** (two axes display) to enter lathe function. Then the LED of the lathe function will be on (If the lathe mode is 0, the lathe function is disabled and the LED is off);

- 3: In lathe state, press  (three axes display) or  (two axes display) to exit the lathe function, and the LED turns off.



- A If in normal display state, the value of the position is as the right:



- B In lathe mode 1, the DRO will display as the following :

X window display value = value of X axis position + value of Y axis position

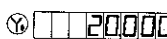


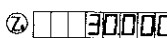


- C: In lathe mode 2, the DRO will display as the following :

X window display value = value of X axis position + value of Z axis position





2.12 Display value filter


When machine a workpiece by grinder, the display value varies quickly due to the vibration of grinder. User can't see display value clearly. WE6800 series DRO provides display value filter function to disable the quick change of display value

STEP:

- 1) Enter display value filter

In normal display state, press  and  simultaneously, enter display value filter

- 2) Exit display value filter

press , exit display value filter

Chapter 3 1000 group SDM coordinate

WE6800 has three display modes: the absolute mode(ABS),the incremental mode(INC)and the 1000 group second data memory (SDM 0—SDM999).

ABS datum of the workpiece is set at the beginning of the processing and the 1000 group SDM is set relative to ABS coordinate.

1000 group SDM coordinate can be divided into several segments,and every segment stores data of one workpiece.If one segment has 20 group SDM coordinate,DRO can be divided into 50 segments and can store data of 50 workpieces.

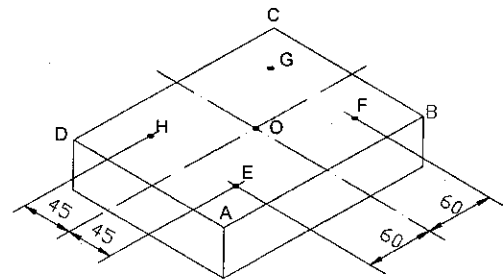
SDM 000 ----- SDM 019 data of the first workpiece
 SDM 020 ----- SDM 039 data of the second workpiece
 SDM 040 ----- SDM 059 data of the third workpiece

 SDM 960 ----- SDM 979 data of 49th workpiece
 SDM 980 ----- SDM 999 data of 50th workpiece

Example : The ABS datum is the center point O , the point E, F, G, H needed processing are set as datum of SDM 000 —SDM 003.

Two ways to set SDM coordinates:

- 1) Zeroing at the current point ;
- 2) Presetting datum of SDM coordinate

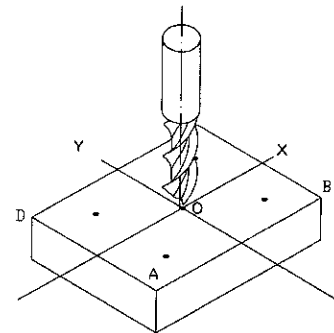


3.1 Zeroing at the Current Point

At first set the center point of the workpiece as the origin of the ABS, then align the lathe tool with point E,F,G,H by moving the machine table and zero them.It is the position to process where the "0.00" appears in X window,Y window by moving the machine table whether in ABS or in SDM coordinate.

STEPS:

1. Set the center point O as the datum of ABS
 Make line AB parallel to X axis,line AD parallel to Y axis.
 When position lathe tool to point O
 Zero X axis,Y axis in SDM 000
 Zero X axis,Y axis in SDM 001
 Zero X axis,Y axis in SDM 002
 Zero X axis,Y axis in SDM 003



⊗ 0000 ABS

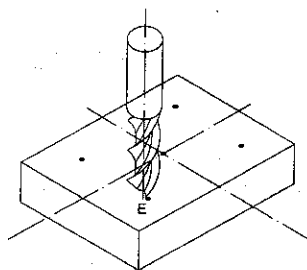
⊗ 0000

2. Set the point E as the datum of SDM 000
 SDM 000 ,align the lathe tool with point E and zero X axis,Y axis;DRO displays as the right:

⊗ 60000 SDM

⊗ 45000

Press $\odot X_0$, $\odot Y_0$

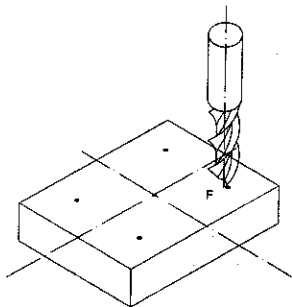


$\odot X$ 0000 **SDM 000**
 $\odot Y$ 0000

3. Set the point F as the datum of SDM 001

In SDM 001, align the lathe tool with point F, then zero X axis, Y axis; DRO displays as the right:

Press $\odot X_0$, $\odot Y_0$



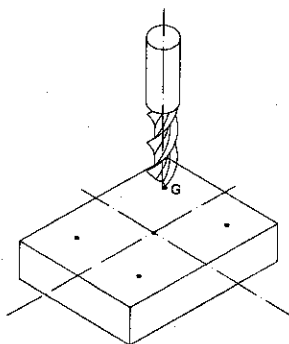
$\odot X$ 60000 **SDM 001**
 $\odot Y$ - 45000

$\odot X$ 0000 **SDM 001**
 $\odot Y$ 0000

4. Set the point G as the origin of SDM 002

In SDM 002, align the lathe tool with point G, and zero X axis, Y axis; DRO displays as the right:

Press $\odot X_0$, $\odot Y_0$



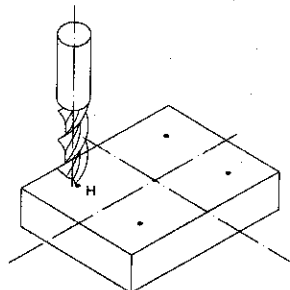
$\odot X$ 60000 **SDM 002**
 $\odot Y$ 45000

$\odot X$ 0000 **SDM 002**
 $\odot Y$ 0000

5. Set the point H as the origin of SDM 003

In SDM 003, align the lathe tool with point H, and zero X axis, Y axis; DRO displays as the right:

Press $\odot X_0$, $\odot Y_0$;



$\odot X$ 60000 **SDM 003**
 $\odot Y$ - 45000

$\odot X$ 0000 **SDM 003**
 $\odot Y$ 0000

6. Machine the workpiece according to the preset SDM coordinate;

7. Machine another workpiece according to the same blueprint; You only need set the center point as the datum of ABS. It is no necessary to set SDM coordinate again, as SDM can be set automatically. Point E, F, G, H is the zero point of SDM 000, SDM 001, SDM 002, SDM 003

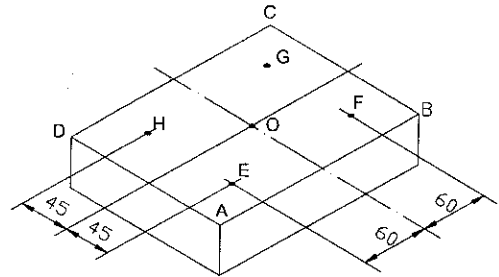
respectively. Point can be machined when enter corresponding SDM coordinate and "0.000" appears in screen by moving machine table. This function can save great plenty of time, in production.

3.2 Presetting datum of SDM Coordinate

Compared with the way of zeroing at current point, the another way (presetting datum of SDM coordinate) can set zero point of SDM more accurately and quickly without moving the machine table.

As the illustration, center point is the datum of ABS, the position of point E, F, G, H is $(-60, -45)$, $(60, -45)$, $(60, 45)$, $(-60, 45)$ in ABS coordinate.

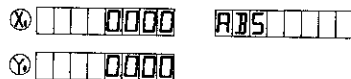
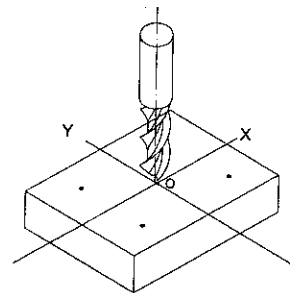
- A Enter SDM 000 and preset the position of point O as $(60, 45)$, which means the point E is the datum of SDM 000;
- B Enter SDM 001, preset the position of point O as $(-60, 45)$, which means the point F is the datum of SDM 001;
- C Enter SDM 002, preset the position of point O as $(-60, -45)$, which means the point G is the datum of SDM 002;
- D Enter SDM 003, preset the position of the point O as $(60, -45)$, which means the point H is the datum of SDM 003;



Pay attention that the preset value is negative to the actual value of position in ABS. If set "SDM DIR" as "1" in initial system settings, the caution is no necessary. The value DRO accepts is equal to the negative of the enter value.

STEPS :

- 1 Set "SDM DIR" as "1" in initial system settings;
- 2 Set the center point of the workpiece as the datum of ABS;
Line AB is parallel to X axis, line AD is parallel to Y axis.
Move machine table, align the lathe tool with point O



- 3 Set point E as the datum of SDM 000;
Enter SDM 000

The position of point E is $(-60, -45)$, press

X 6 0 $\frac{1}{2}$ ENTER in turn;
 Y 4 5 $\frac{1}{2}$ ENTER in turn;



X 60000 SDM 000
 Y 45000

- 4 Set point F as the datum of SDM 001;
 Enter SDM 001

The position of point F is (60, -45) ,press

X 6 0 ENTER in turn ;
 Y 4 5 $\frac{1}{2}$ ENTER in turn;



X - 60000 SDM 001
 Y 45000

- 5 Set point G as the datum of SDM 002;
 Enter SDM 002

The position of G is (60, 45) ,press

X 6 0 ENTER in turn;
 Y 4 5 ENTER in turn;



X - 60000 SDM 002
 Y - 45000

- 6 Set point H as the datum of SDM 003;
 Enter SDM 003

The postion of point H is (-60, 45) ,press

X 6 0 $\frac{1}{2}$ ENTER in turn;
 Y 4 5 ENTER in turn;



X 60000 SDM 003
 Y - 45000

Chapter 4 SPECIAL FUNCTION

WE6800 series DRO has special function as the following except measuring and positioning:

Bolt Hole Circle(BHC);

Bolt Hole Line(BHL);

ARC Processing(only for WE6800M-2, WE6800M-3);

Slope Processing (only for WE6800M-2, WE6800M-3);

Electrode discharging machining(EDM, only for WE6800E);

Please refer **Coordinate System** (in Chapter 1.) before reading this section.

4.1 Bolt Hole Circle

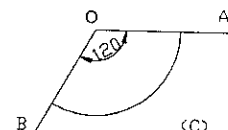
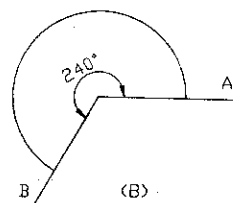
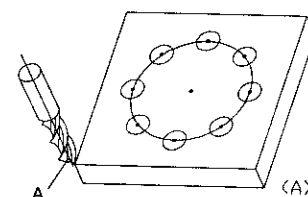
Function description:

WE6800 series DRO has the function of BOLT HOLE CIRCLE(BHC). This function can simplify the pressing of multiple holes which are attributed equally around the circumference of a circle. The DRO will guide operator to enter the following parameters:

RADIUS	Radius of circle
ST.ANGLE	Starting angle that the center of the first hole on the circle
END.ANGLE	Ending angle that the center of the last hole on the circle
HOLE NUM	Hole number
DIRECT	Angle direction.

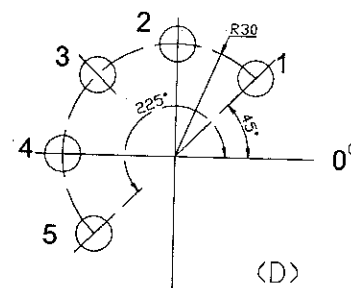
Angle direction has two: clockwise and counterclockwise. "0" indicates that it is counterclock from ST.ANGLE to END.ANGLE; "1" indicates that it is clockwise from ST.ANGLE to END.ANGLE. As the following figure, the ST.ANGLE is 0° , END.ANG is 240° . The figure

(B) illustrates the arc while angle direction is counterclockwise; figure (C) illustrates the arc while angle direction is clockwise.





As figure (D) illustrates, machine a hole every 45 deg from $0^\circ - 225^\circ$. Parameters are as the following:

RADIUS	20
ST. ANGLE	45
ENDANGLE	225
HOL NUM	5
DIRECT	0

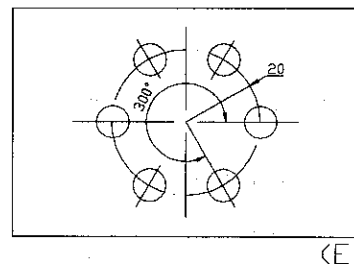


NOTE: If ST.ANGLE equals END.ANGLE, the holes are attributed equally around the whole circumference.

The positions of the hole center are calculated automatically. Press  or  to choose the hole No. and move the machine table until the "0.000" appears in X window, Y window. It is the position to process a hole.

Example: Machine holes on circumference as the figure (E).

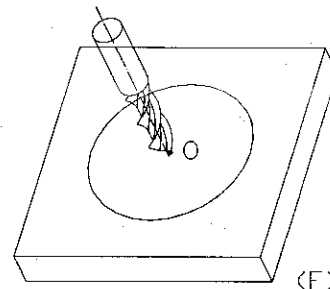
RADIUS	20mm
ST.ANGLE	0°
END.ANGLE	300°
HOLE NUM	6
DIRECT	0




STEPS:

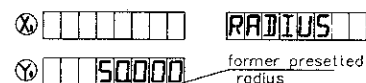
- 1: Set display unit to metric;

Move the machine table until the machine tool is aligned with the center of the circle, then zero X axis, Y axis.



- 2: Press  to enter Bolt Hole Circle function.

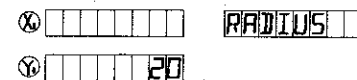
If all parameters have been set, press  to process directly.



- 3: Enter radius



Y window displays the formerly preset radius, message-window displays "RADIUS".



Press    in turn.



NOTE:

If "0" is inputted as the radius, the DRO will be requested to input again.

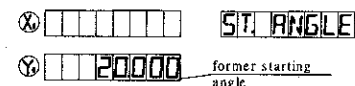
If incorrect parameter has been entered and you haven't press , press  to cancel and input

again; If you have pressed  and begin to set another parameter, you should press  to return RADIUS set and input again. Other parameters can be dealt with in the same way.

- 4: Input ST.ANGLE





Message window displays "ST.ANGLE", Y window displays the former preset starting angle.

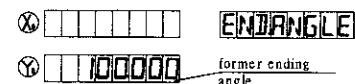
Press   in turn;



- 5: Input ending angle

Message window displays "END.ANGLE", Y window displays the former angle.

Press     in turn.



- 6: Input the number of hole

Message-window displays "HOLE NUM", Y window displays the former number,

Press in turn.

NOTE:

If "0" or "1" is inputted as the number of hole, the DRO will point out this mistake and remind inputting again.

↓

X										HOLE NUM
Y										6

X										DIRECT
Y										

- 7: Input angle direction

Message-window displays "DIRECT" Y window displays the former presetted direction;

Press in turn;

↓

X										DIRECT
Y										0

- 8: Message window displays "HOLE 1";

It is the position of the first hole to punch where the "0.000" is displayed in X window, Y window by moving the machine table.

X										0.000
Y										0.000

- 9: After finishing the first hole, press

Message window displays "HOLE 2";

Move the machine table the "0.000" is displayed in X window and Y window, it is the position of the second hole

X										0.000
Y										0.000

NOTE:

Press or to change holes number.

X										0.000
Y										0.000

- 10: Process the holes 3th-6th in the same way.

- 11: After processing all holes, press to return normal display state.

NOTE: In the course of BOLT HOLE CIRCLE processing, pressing (three axes display) or (two axes display) can leave BOLT HOLE CIRCLE function temporarily and return normal display state in order to check the position, and press (three axes display) or (two axes display) again to return BOLT HOLE CIRCLE function.



4.2 Bolt Hole Line

Function: WE6800 series DRO provides BOLT HOLE LINE(BHL) function. This function can simplify the processing multiple holes whose centers are attributed equally on one line.

Only the following parameters are to be input:

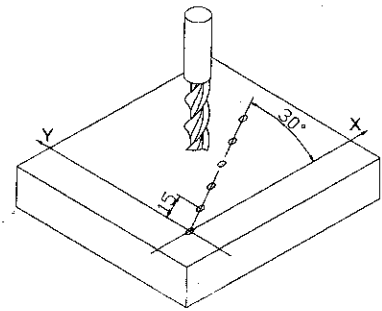
LINE DIS	Line distance (distance between the center of first hole and the center of the last hole)
LINE ANG	Line angle (angle between the line and the positive X axis)
HOLE NUM	Number of hole

DRO will calculate the positions of the hole after all the parameters have been entered. Press

 or  to select the No. of hole and move the machine until "0.000" is displayed in X window and Y window. It is the position of hole to machine.

Example:

LINE DIS	150mm
LINE ANG	30°
HOLE NUM	6




STEPS:

- 1: Set display unit to metric and the shrinkage is not taken into consideration.

Move the machine table until the machine tool is aligned with the center point of the first hole, and zero X axis, Y axis.

- 2: Press  to enter BOLT HOLE LINE function;

If all parameters have been entered, press  to start processing directly.

- 3: Input line distance

Y window displays the former preset line distance, and the message-window displays "LINE DIS".

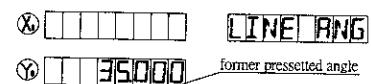
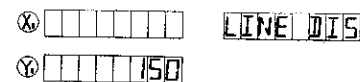
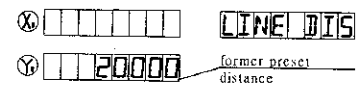
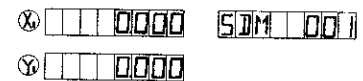
Press     in turn;

NOTE: If "0" is input as the line distance, the DRO will not accept and remind the operator to input again.

- 4: Input line angle

The message-window displays "LINE ANG", Y window displays the former preset line angle.

Press    in turn.



5: Input the number of hole

Message-window displays "HOLE NUM", Y window displays the former presetted hole number.

Press , in turn, processing begins

NOTE: If "0" or "1" is input as hole number, DRO will not accept and remain user to input again.

6: Message window displays "HOLE 1";

Move the machine table until "0.000" appears in X window, Y window, and it the center of the first hole to punch.

7: After finishing the first hole, press , and the message-window displays "HOLE 2";

Move the machine table until "0.000" appears in X, Y window, then you can punch the second hole at this point.

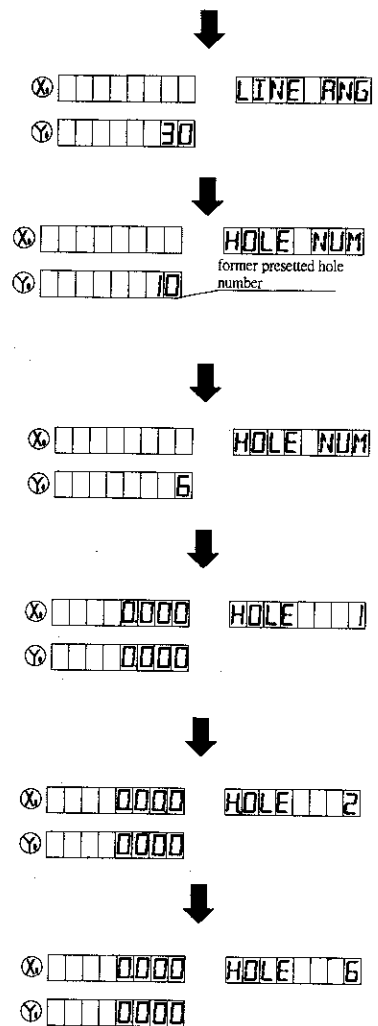
NOTE:

Press or to conveer among holes.

8: Process the holes 3th - 6th in the same way.9: Press to return normal display state when finishing processing.

NOTE:

In the course of BHL processing, you can press (three axes display) or (two axes display) to leave this function temporarily and return normal display of X, Y, Z-axis in order to check the position which the DRO calculated, then press (three axes display) or (two axes display) again to return BHL function.



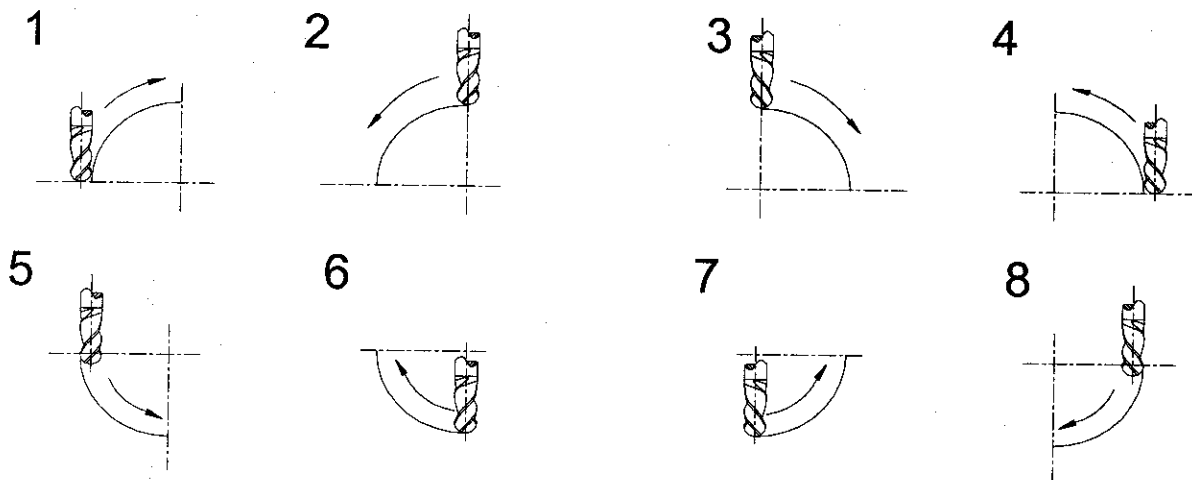
4.3 ARC Processing

This function is only for WE6800M-2, WE6800M-3.

It is very wastful to use numerical control lathe to process arc in the simple product or small production. This function make it convenience to process arc with normal lathe. Parameter "MAX CUT" is the arc length each process. The smaller the MAX CUT, the more smooth the arc plane, the longer processing time.

A: Process XZ, YZ plane

There are 8 mode as the following when processing arc in XZ, YZ plane:



Milling cutter may be flat-bottomed or arc-bottomed. If flat-bottomed, set the tool diameter as 0;

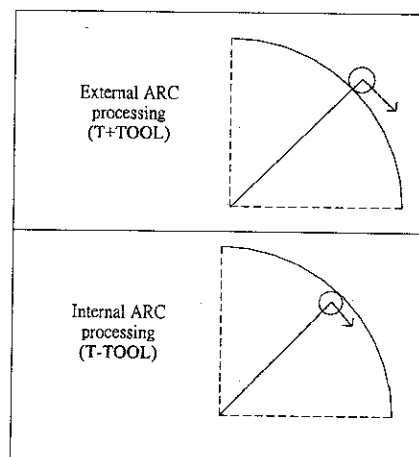
B: Process XY plane

DRO provides the above 8 modes in processing XY plane. The milling cutter is perpendicular to the machine plane. DRO has internal ARC processing and external ARC processing for each type:

External T+TOOL,
Internal T-TOOL.

Set the tool radius according to the actual milling cutter when process XY plane.

Tool compensation direction(when process XY plane)



Enter the following data for ARC processing:

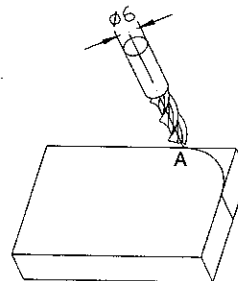
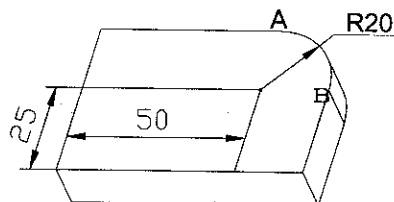
TYPE 1 - 8	Mode of the ARC processing
* T+TOOL / T-TOOL	Selection between T+TOOL/T-TOOL (This parameter is only for XY plane)
RADIUS	The radius of ARC that is to be processed
TOOL DIA	Tool diameter
MAX CUT	Feed step

Example 1:

Process an arc AB of 90° from point A to point B as the figure.

Parameters are as the following:

Machine plane	XY
ARC mode type	3
T + TOOL	
RADIUS	20mm
TOOL DIA	6mm
MAX CUT	0.5mm
Shrinkage is not taken into consideration.	



STEPS:

- 1: Set display unit is metric, and the LED of the shrinkage is off.
- 2: Move the machine table until the lathe tool is aligned with point A, then zero X axis, Y axis;

⊗ [][][][] 0000 SIM [][][]
 ⊙ [][][][] 0000




⊗ [][][][][][] SIMR [][][]
 ⊙ [][][][][][]



- 3: Enter ARC processing state;


Press  to enter ARC processing state.


If all parameters have been set, press  to process directly.


- 4: Select machine plane;



Press ,  to select XY.

NOTE:

 indicates XY plane;

 indicates YZ plane;

 indicates ZX plane;



You can also press  (two axes display) or  (three axes display) to switch plane among XY plane, YZ plane, ZX plane.

⊗ [][][][][][] SIMR [][][]
 ⊙ [][][][][][]



- 5: Select processing mode:

Message-window displays "TYPE 1—8", Y window displays the former processing mode;



Press ,  in turn to enter ARC type;

⊗ [][][][][][] TYPE [][][]
 ⊙ [][][][][][]





⊗ [][][][][][] TYPE [][][]
 ⊙ [][][][][][]

- 6: Select T + TOOL mode:

Press ,  to select the external arc processing;

NOTE:

 indicates T + TOOL mode(external arc processing);

 indicates T - TOOL mode(internal arc processing).

⊗ [][][][][][] T - TOOL
 ⊙ [][][][][][]



⊗ [][][][][][] T + TOOL
 ⊙ [][][][][][]

- 7: Set ARC radius

Message-window displays "RADIUS", Y window displays the former arc radius;

⊗ [][][][][][] RADIUS [][][]
 ⊙ [][][][][][] 50000

Press in turn to input the arc radius.

NOTE:

If "0" as the arc radius is input, the DRO will not accept the "0" and wait another number.

8 : Set Tool diameter

Message-window displays "TOOL DIA";

Y window displays the former presetted diameter

Press in turn to enter the tool diameter.

9 : Set the feed step

Message-window displays "MAX CUT";

Y window displays the former feed step.

Press in turn to input the feed step:

NOTE:

If "0" is inputted as the feed step, the DRO will not accept and wait for inputting another data.

10 : Process ARC

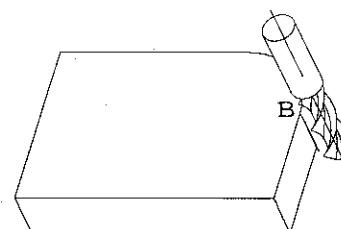
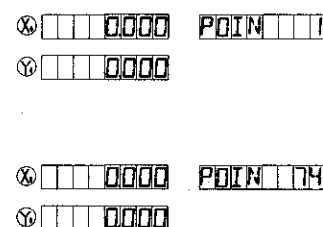
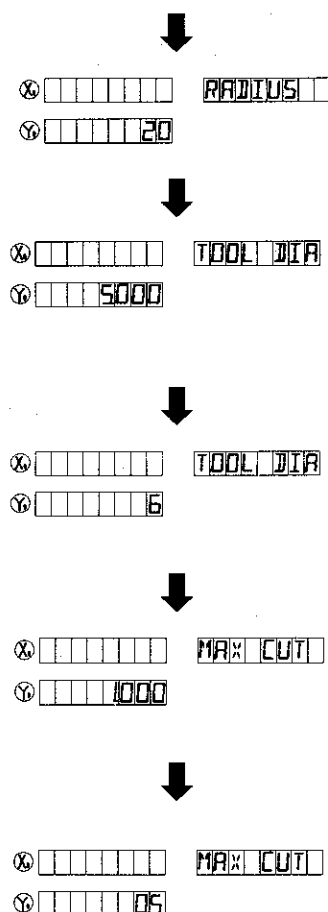
Message-window displays "POIN 1". Process until the "0.000" appears in X window, Y window. You have







finished the first point. Press to switch to the second point and repeat the same speed. Press in this way until the message-window displays "POIN 74". Pressing

or can select processing point.

11 : Press to exit ARC processing after machining is over.

NOTE:



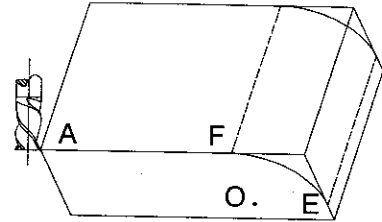
- ① In the ARC processing , pressing  (three axes display) or  (two axes display) can leave this function temporarily to return normal display of X,Y,or Z-axis in order ot check the position the DRO has calculated.Press  (three axes display) 或  (two axes display) to return ARC function.
- ② Processing  or  can switch among the parameters in the course of the presetting paramer.

Example 2:

Process the ARC EF as the figure from point E to point F.

Parameters are set as following:

Machine plane: XZ
 TYPE: 4
 RADIUS: Actual radius of the arc
 TOOL DIA: 0 (flat-bottomed tool)
 MAX CUT: preset as the costumer

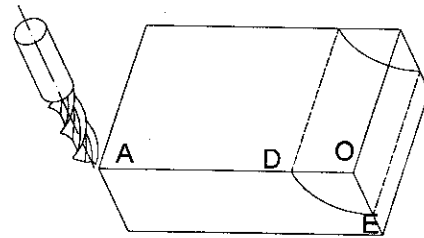


Example 3:

Process the ARC DE as the figure from point D to point E.

E. Parameters are as the following:

Machine plane: XZ
 TYPE: 6
 RADIUS: Actual radius of the arc
 TOOL DIA: Actual value (actual tool)
 MAX CUT: preset as the costumer

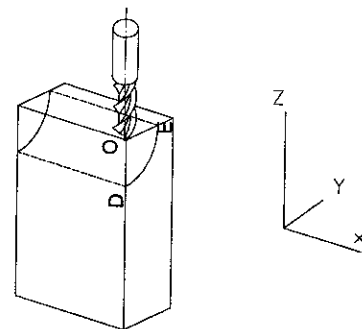


Example 4:

Process the ARC DE as the figure from point D to point E.

Parameters are as the following:

Machine plane: YZ
 TYPE: 7
 RADIUS: Actual radius of the arc
 TOOL DIA: Actual value (actual tool)
 MAX CUT: preset as the costumer

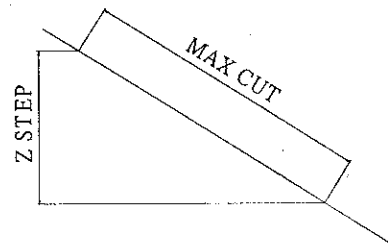


4.4 Slope Processing

This function is only for WE6800M-2, WE6800M-3.

Function: This function can calculate the position of every processing point automatically in processing slope. Only the following parameters need to be inputted:

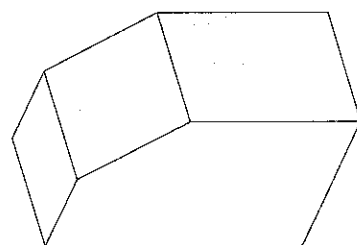
INCLE : Set machine plane XY, YZ or XZ
plane
INCLANG : the inclination angle of the slope
MAX CUT: the slope length each time processing



NOTE:

Z STEP and MAX.CUT are defined as the figure.

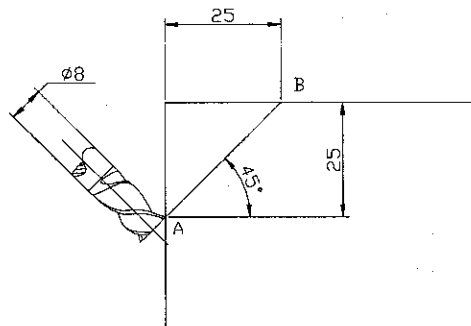
DRO will calculate the position of each processing on the slope automatically when all parameters have been input. Press or to select the processing point and process until "0.000" appears in the window.



Example 1:

Process the slope AB as the figure. The parameters are as following:

INCLE: XZ
INCLANG 45°
MAX.CUT 1.2mm



STEPS:

- 1: Set display unit to metric;
Set the SLOP.MODE 1 in initial system settings.

NOTE:

If the third parameter is Z STEP, Set the SLOP.MODE 0.

Move the machine table until the lathe tool is aligned with the starting point A, then zero X axis, Z axis.

Press , in normal display state.

- 2: Press to enter slop processing

Press to start processing directly if all parameter have been set.

0000 0001
 35000
 0000



INCL XY



- 3: Select machine plane:

Press , in turn to select the XY plane.

ⓧ
 ⓪
 Ⓥ

NOTE:

Pressing indicates XY plane;

Pressing indicates YZ plane;

Press indicates ZX plane;



You can also press (two axes display) or (three axes display) to switch among XY plane, YZ plane or ZX plane.

4: Enter INCL.ANG

Message-window displays "INCL ANG", Y window displays the former INCL.ANG.

ⓧ
 ⓪
 Ⓥ



Press , , in turn.

ⓧ
 ⓪
 Ⓥ



5: Enter MAX.CUT

Message-window displays "MAX CUT", Y window displays the former MAX.CUT.

ⓧ
 ⓪
 Ⓥ

Press , , , in turn;



NOTE:

If "0" is inputted as MAX CUT, DRO will not accept and wait for another data .

ⓧ
 ⓪
 Ⓥ

6: Processing

Message-window displays "POIN 1";

Process stop until the "0.000" appears , then press to process the next point.

7: Press or to select points

8: Press to return normal display state after processing is over.

4.5 Auto Edge Detection

Function:

- searching border automatically;
- measuring dimension of work-piece; ③ searching the center of work-piece.



NOTE: This is an additional function. It need pay additional.

Example:

Radius of EDGE DETECTOR 5 mm
 Work-piece dimension on X axis 65 mm
 Measure by using the linear scale installed at X axis.

STEPS:




1 : Set display unit to metric.

2 : Press  (three axes display) or  (two axes display)
 to enter AUTO EDGE DETECTION.


Message-window displays "SEL AXIS",

Y window displays the radius of the edge detector, the sign of the value displayed is the sign when the detector touches the first edge.

3 : Input the radius and sign of the detector.



Press    in turn, then the Y window displays "—5.000".

NOTE : You can skip this step if the diameter is set well.

4 : Select axis. Press  to select X axis.


"0.000" flashes in X window, waiting for detecting edge.

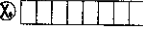

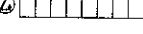
Y window, Z-window display the value of the current position.

Press  to select Y axis ; press  to select Z-axis in the same way

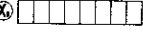

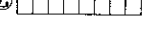
5 : Move the EDGE DETECTOR to touch the first edge, then the X window will display the position of the detector with "—5.000". The displayed value in X window is the measure value. You can touch the edge many times.

6 : Move the EDGE DETECTOR to touch another edge. The X window will show the length of the work-piece with "65.000";


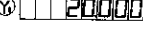
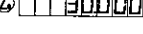
7 : Press  to exit this function. Move the EDGE DETECTOR until the X window displays "0.000", which means that this position is the center of the work-piece at the X axis direction.

X  SEL AXIS
 Y  10000
 Z 

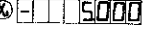
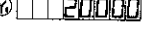
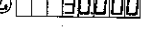


X  SEL AXIS
 Y  -5000
 Z 


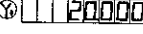
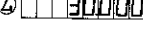


X  SCH 00
 Y  20000
 Z  30000





X  -5000 SCH 00
 Y  20000
 Z  30000



X  65000 SCH 00
 Y  20000
 Z  30000

NOTE:

- 1: Pressing  (three axes display) or  (two axes display) will exit this function when in EDGE DETECTION function.
- 2 : If you detect edge only, you needn't do step 6 and 7 .
- 3 : If do not find the center point, you needn't do step 7.

Chapter 5. EDM

(ELECTRICAL DISCHARGE MACHINING)

Note: Only WE6800E provides EDM function.

DRO will send out a signal and machining will stop as soon as the display value is equal to the expectant .

WE6800E provides 6 EDM modes:

- MODE 1 manual mode 1
- MODE 2 automatic mode 1
- MODE 3 manual mode 2
- MODE 4 manual mode 3
- MODE 5 manual mode 4
- MODE 6 automatic mode 2

EDM mode is set in initial system settings .

NOTES: Pay attention to the relay mode.

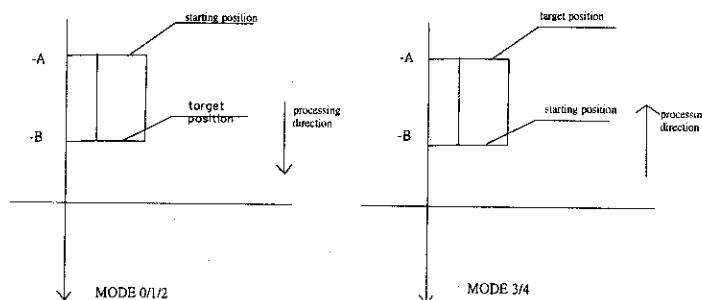


Fig 1 : Difference among EDM modes

Table 1: the difference between 6 EDM modes:(X:No have; √:Have; ↑:Up; ↓:Down)

EDM MODE	Edge detect	Direction of machining as depth is minus	Exit EDM after machining first hole	Z axis direction
1	X	↓	√	↓
2	√	No minus depth	X	↓
3	X	↓	X	↓
4	X	↑	√	↓
5	X	↑	X	↓
6	√	↓ (no plus depth)	X	↑

Positive direction of Z axis is down except mode 6, which means the display value will increase with the increasing depth during machining .

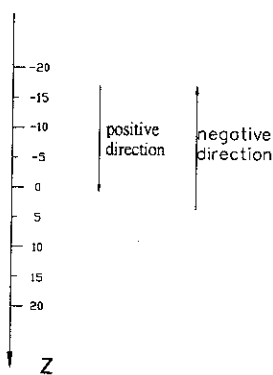


Fig 2

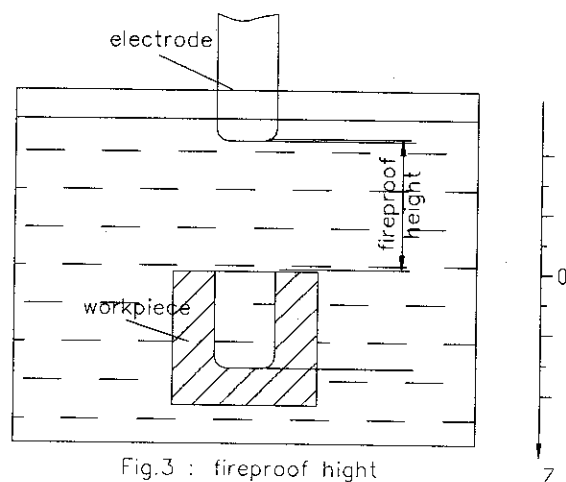


Fig.3 : fireproof height

WE6800E provides fireproof function. During EDM, charcoal will be produced on the machined surface. With accumulating charcoal, the electrode will be beyond liquid level, which could lead to a fire. If fireproof height is set, EDM will stop, the DRO will send an alarm and fire is avoided .