



Digital Readout Systems

**Operating Manual
FRC99/1/2/3/4 (PCD) FRC99D
1, 2, 3 & (4) AXIS DRO SYSTEMS
& COUNTER FRC99/3-EDM
with ZERO-OUTPUT**

March 2007

Wherever precision measurement is required,
the fitting of a Metronics DRO is making
machine tools more productive and efficient.

Commissioning

Company: _____

Address: _____

Machine Tool: _____

Counters:

Counter	Preset	Reset	Other
1 Axis			
2 Axis.			
3 Axis			
W Axis			
Other			

Encoders:

Axes	Transducer	Filler	Other
X Axis	SA 90 x		
Y Axis	SA 90 x		
Z Axis	SA 90 x		
W Axis	SA 90 x		
Other			

Installation:

Installed By: _____

Date: _____

Special Comments: _____

Guarantee: 24 Months when inspected and signed by a Metronics appointee










.....
Metronics Signature



.....
Customer Signature

Date:.....

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1 Introduction

Congratulations on your purchase of a METRONICS Digital Readout System.

The fitting of a METRONICS D.R.O. will make your Machine Tool more productive and efficient. The METRONICS' system is sure to benefit your company by producing quality parts and thus ensuring a satisfied customer.

If you require assistance with your METRONICS Digital Readout System, please contact your METRONICS distributor or, call METRONICS Johannesburg at (011) 646-8738.

Thank you for choosing METRONICS. We hope that in the future you will again choose METRONICS for your measuring requirements.



NOTE

The information contained in this manual is subject to change without notice. METRONICS shall not be liable for errors contained herein or for incidental or consequential damage in connection with the furnishing, performance, or use of this material

1.1 Guarantee

METRONICS products and accessories are guaranteed against defects in material and workmanship for a period of 2 years from the date of purchase. METRONICS will, at its option and expense, repair or replace any part of the METRONICS D.R.O. System, which fails to meet this guarantee. Notice of the claimed defect must be received within the guarantee period.

This guarantee applies only to products and accessories installed to METRONICS specifications and operated in accordance with this reference manual. METRONICS shall have no obligation, with respect to any other defect or other condition caused in whole or part by the customer's incorrect use, improper maintenance, modification of the equipment, or by the repair or maintenance of the product by any person except persons considered by METRONICS to be qualified. Responsibility for loss in operational performance due to environmental conditions, such as humidity, dust, corrosive chemicals, deposits of oil or other foreign matter, spillage or other conditions beyond METRONICS' control cannot be accepted by METRONICS.

There are no other guarantees expressed or implied and METRONICS shall not be liable for consequential damages.

2 Overview



Read the information in your operating instructions before the first switch on!



Warning

Do not connect or disconnect transducers cables from the display unit with the electrical power on. This could result in damage to the units.

2.1 Functions and displays

Figure 1 below displays the features of your counter, which will be discussed within this manual.

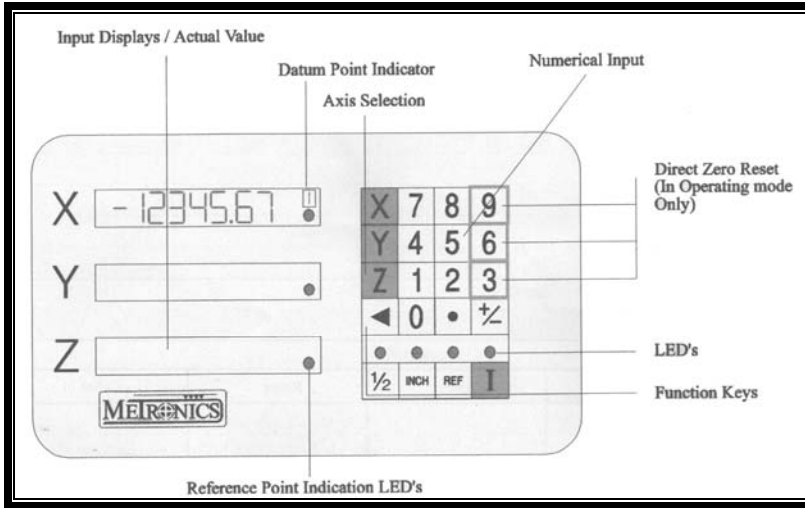


Figure 1 Front view of counter

Note: When in display mode, pressing the numeric keys 8, 5 or 2 shown in Figure 1, will display the feed rate for the corresponding X, Y or Z-axis. Pressing the same key will return the counter to display mode if parameter P12 is set to ON.

Table 1 below provides an explanation of the functions available

Function	Description	Reference	Function	Description	Reference	Function	Description	Reference
	Back step Delete	Sect. 6 on page 5		Halving the display	Sect 7 on page 6	→	Numerical input	Sect. 5.2 on page 4
	Datum Selection	Sect. 11 on page 12						
	Inch / mm	Sect. 8 on page 6		Decimal point (Comma)	Sect. 5.4 on page 4		Reference point evaluation	Sect. 9 on page 7
	Change sign	Sect. 5.3 on page 4		Absolute / Incremental	Sect. 10 on page 10	 	Direct zero reset keys	Sect. 4 on page 3

Table 1 Functions available

Figure 2 below shows the features at the rear of the counter.

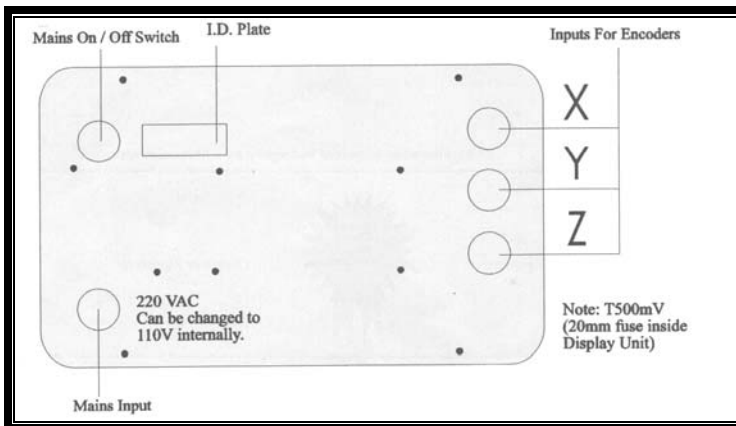








Figure 2 Rear view of counter

3 Switch - on




- The mains switch is at the rear of the housing.
- Switch on the display unit
- The display blinks on all axes. This indicates a power interruption
- Press any key to stop blinking
- 0.00 or 0.000 (if set to fine resolution) is displayed on all axes.
- The METRONICS DRO System is now ready for use

4 '0.00' Zero reset

	Direct Zero Reset	OR	Indirect Zero Reset
To Zero X	PRESS  ONCE	OR	PRESS ORANGE  TWICE
To Zero Y	PRESS  ONCE	OR	PRESS ORANGE  TWICE
To Zero Z	PRESS  ONCE	OR	PRESS ORANGE  TWICE

4.1.1 Example

1. Move the slide on the X, Y or Z-axis.
2. A number is displayed on the unit.
3. Activate the **DIRECT RESET OR INDIRECT RESET**
4. The display is reset to zero.




On entering the PRESET mode (section Preset below), the 9 6 and 3 act as numerals and not ZERO RESET.

Once the preset number has been entered the 9 6 and 3 resume the function of zero reset.

5 Preset

When the PRESET function is accessed the chosen axis will display 00000.00 in either metric or inch mode.

5.1 Maximum Value



MAX VALUE
17999.99mm OR
590.00.00 inch

The Maximum value, which can be entered, is 17999.99 mm or 590.0000 inch. If a greater number is entered, the display will zero itself.

5.2 To enter a number



1. Press orange axis selection key e.g. 
2. LED will blink
3. Key in a number e.g. 000123
4. Press same selection key to enter the number ()
5. LED stops blinking
6. The zero(s) on the left of the number disappear(s) (123)

Table 2 below shows two examples of numeric entry.







Example 1		Example 2	
The number to enter is 1234 in X axis		The number to enter is -456 in Z-axis.	
1. Press orange  axis key.	LED will blink	1. Press orange  axis key.	LED will blink
2. Key in number 1234	0001234	2. Press  button	-000.00
3. Press orange  axis key.	LED stops blinking	3. Key in number 456	-000456
4. Displayed number:	1234.00	4. Press orange  axis key.	LED stops blinking
		5. Displayed number:	-456.00

Table 2 Examples of numeric entry

5.3 Changing sign

The  button changes sign as illustrated in Table 3 below.




Original display	1234
Pressing  once achieves a negative display	-1234
Pressing  again achieves a positive display	1234

Table 3 Changing sign on the display

5.4 To enter a number with digits after the decimal point

Use the  button to enter decimals as illustrated in the example in Table 4 on page 5.

The number to be entered is 1234.56 in the Y axis	
Press orange  axis key.	LED will blink
Key in number 1234	0001234









Press 	
Key in number 56.	56 is entered. LED stops blinking.
DISPLAYED NUMBER:	1234.56


Table 4 Decimal entry





 DECIMAL ENTRY MODES	AUTOMATIC ENTRY:	<ul style="list-style-type: none"> After pressing  , two digits in mm mode and four digits in inch mode must be pressed. Press zero(s) where less than two digits (mm mode) or four digits (inch mode) are given.
	MANUAL ENTRY:	<ul style="list-style-type: none"> After pressing  , if less than two digits (mm mode) or four digits (inch mode) are pressed, enter the number by pressing orange   or  axis keys.

6 Back step / Delete Key

Operational in preset mode only.

You can correct your entry by pressing  to delete the right most digit.

The  function becomes inactive once a number has been automatically or manually entered in the PRESET mode.

 LED MUST NOT BLINK DURING NORMAL OPERATION	When  is pressed OUT OF PRESET mode, the LED below will blink  .
	Press  again to stop the blinking.

7 Halving the display

To halve the display, follow the steps in Table 5 below.












Description	Display
1. A number is displayed on the counter e.g. 44.00	44.00
2. Press the  key	The LED above the  glows
3. Press   or  Or press   or 	The display is halved and is now 22.00 in this example. The LED above the  key will switch off automatically.
Abort the halving procedure by pressing  again.	44.00 will again be displayed in this example

Table 5 Halving the display

8 Mm / inch mode (Parameter P01)

	<p>The display unit automatically starts up in the mode set in parameter P 01 (INCH ON/OFF)</p>
<p>UNIT STARTS UP IN SET MODE</p>	

Use the  key to switch measurement modes as discussed in Table 6 below.





Description	Display
1. The display is in mm mode e.g. 0.00mm is displayed.	The LED above the  glows. 0.00 is displayed.
2. Press the  key	0.0000 is now displayed
3. The display is in inch mode	The LED above the  key switches off
4. To revert to millimetres press the  key with the glowing LED.	The display is converted to mm. 0.00 is displayed.

Table 6 Changing from millimetres to inches and vice versa

9 Reference points

9.1 Manual reference point evaluation

Metronics display units are factory preset to a user-friendly 'Manual Reference Point' evaluation.

9.1.1 Finding the reference point



Metronics encoders have a reference point every 25mm.

REF EVERY 25mm

This section discusses how to find the reference point. Figure 3 below shows a graphical representation of the example in Table 7 below.

Description	Display
1. Find the work piece starting point (A in Figure 3)	
2. Press 9 6 and 3	All displays are set to zero.
3. Turn the hand wheel of the axis slide slowly, until you encounter the nearest reference point mark (B in Figure 3).	The LED next to the chosen display glows briefly as the transducer passes over the reference point.
4. Position the transducer exactly on the reference point by moving the slide carefully back and forth.	The LED next to the chosen display remains on when it is positioned precisely on the reference point mark.
5. Mark the slide with a pencil to indicate the position of the chosen reference point	
6. Write down the distance travelled between your work piece starting position and the chosen reference point. (A – B in Figure 3).	The number displayed is the distance between your work piece starting position and the chosen reference point.
7. Repeat the procedure for the remaining axes.	

Table 7 Finding a reference point manually

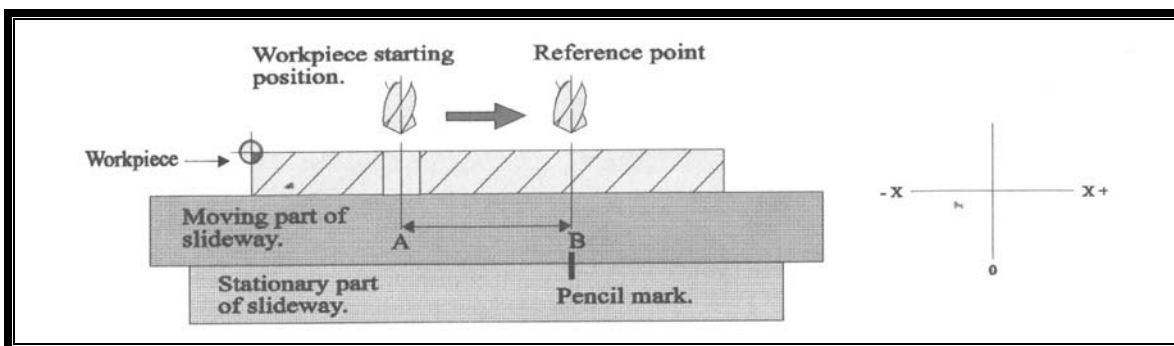


Figure 3 Finding the reference point

9.1.2 After a power failure: Re-establishing the work piece starting point


Table 8 below illustrates how to regain a work piece starting point.

Description	Display
1. Power is restored	Display will blink on all axes
2. Press any key	The blinking stops
3. Move the slide to the pencil mark indicating the reference point originally chosen	The LED remains on
4. Position the transducer exactly on the reference point.	
5. Reset the chosen axis to zero. Regain the work piece starting position by moving the distance measured at initial set-up (Distance A – B in Figure 3). The original positive or negative signs are inverted	0.00(mm) The number displayed is the distance between your work piece starting position and the chosen reference point
6. Reset the chosen axis to zero. The original work piece starting point has been re-established	0.00 (mm)
7. Repeat this procedure on the remaining axes	

Table 8 Manually re-establishing a reference point

9.2 Automatic reference point evaluation (Parameter P02)





(Standard setting LED)



In this mode the reference points MUST be evaluated before positioning the tool at the starting position of the work piece.

9.2.1 Evaluating the reference point

Figure 4 on page 9 shows how to obtain the reference point graphically. The steps in Table 9 on page 9 discuss how to achieve this on the counter.

DESCRIPTION	DISPLAY
1. Position the cutting tool at a small distance from your work piece starting position	
2. Press the  key	The LED above the  glows
3. Press the  or corresponding  to activate the X axis reference	0.00 (mm) The Reference LED in the chosen axis display glows.
4. Turn the hand wheel of the axis slide until you encounter the nearest reference point.	When the chosen axis begins to count, the transducer has passed over a reference point. The LED in the chosen axis display switches off
5. Position the transducer on the reference point by moving the slide back to zero.	0.00 (mm)



6. Mark the slide with a pencil to indicate the position of the chosen reference point.	
7. Position the cutting tool at the work piece starting position.	
8. Write down the distance traveled between your chosen reference point and the work piece starting position. (Distance C-D in Figure 4 below). Note whether the number is positive or negative.	The number displayed is the distance between your work piece starting position and the chosen reference point.
9. Press the  key	The LED above the  switches off.
10. Set the chosen axis to zero.	0.00 (mm)
11. Repeat this procedure for the remaining axes	

Table 9 Automatic reference point evaluation

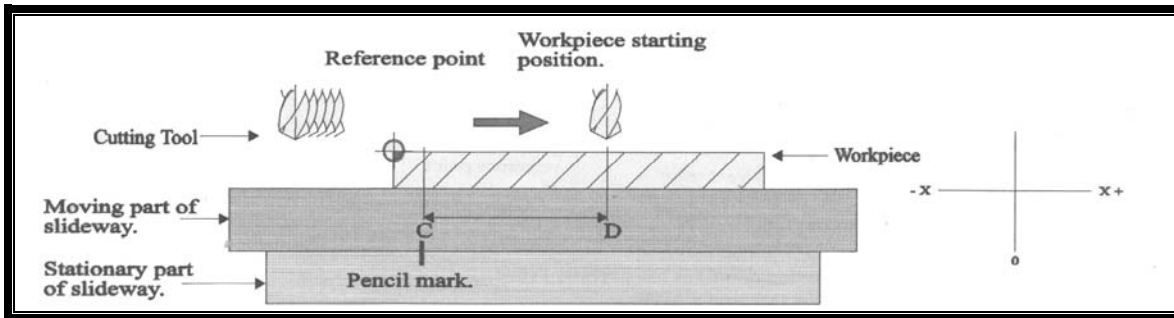






Figure 4 Automatic reference point evaluation

9.2.2 After a power failure / re-establishing the work piece starting point

Figure 5 on page 10 provides a visual representation for finding the reference point after a power failure. Table 10 on page 10 provides an in-depth description on how to achieve the work piece starting point.

Description	Display
1. Power is restored	Display blinks on all axes
2. Press any key	The blinking stops
3. Move the slide to the pencil mark indicating the reference point originally chosen	
4. Press 	The LED above  glows
5. Press  or corresponding  to activate the reference in the X axis	0.00 mm The LED in the chosen axis display glows
6. Move the slide back and forth across the pencil mark until counting starts. Note whether the value is positive or negative.	As the transducer traverses the reference point counting starts. The LED in the chosen axis display switches off.

7. Referring to the original value written down, regain the work piece starting position by moving the distance measured at initial setup. (Distance C-D in Figure 5 below)	The number displayed indicates the distance C-D
8. Press REF	The LED above the REF switches off
9. Set the chosen axis to zero. The original work piece starting point has been reestablished	0.00 mm
10. Repeat the procedure on the remaining axes	

Table 10 Finding the reference point after a power failure

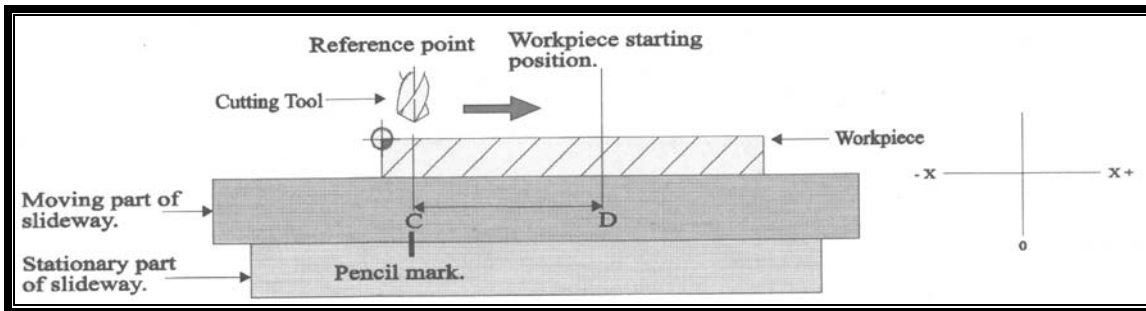


Figure 5 Finding the reference point after a power failure

10 Absolute / Incremental mode

10.1 Absolute Mode

The display unit starts up in ABSOLUTE mode.

All the given measurements and the total distance traveled are referred to one known position on the work piece.

The absolute **dimensions** refer to one absolute, fixed datum. The axis slide or the tool moves to a certain **position**. Figure 6 below provides an example of the absolute dimensions where the counter displays 0, 100, 200, 300, and 400 respectively. The distance A – B is an **absolute distance** of 400mm.

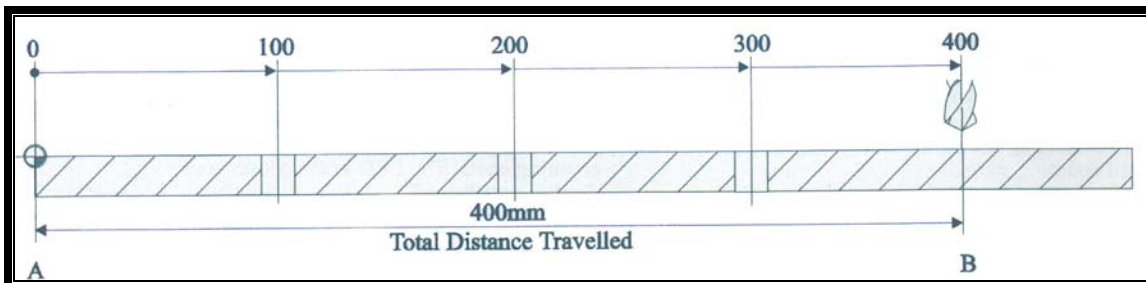


Figure 6 Absolute dimensions

10.2 Incremental mode

The incremental dimensions refer to the previous position of the axis slide or tool.

The axis slide or tool is to move by a certain amount.

Figure 7 below provides an example of incremental dimensions. The amount by which the tool has moved to each given position is added to the previous position(s) by the computer every time the display is zeroed. Examples of these incremental positions are 56.32, 43.75 and 55.20 mm respectively as illustrated in Figure 7. The absolute distance traveled is the sum of these movements, which is 155.27 mm as illustrated in Figure 7.

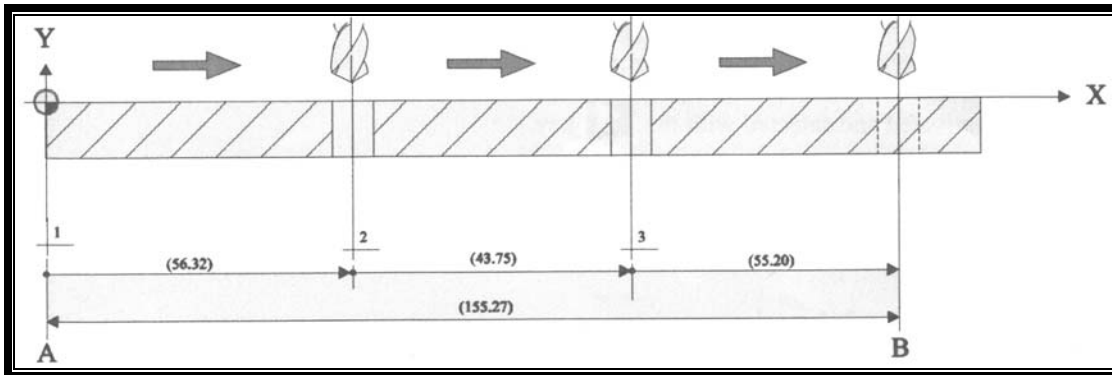


Figure 7 Incremental dimensions

Table 11 below provides the description of how to obtain incremental readouts on the counter. The description uses Figure 7 above as the example for obtaining incremental dimensions.







Description	Display
1. Position the cutting tool at the work piece starting position (A in Figure 7)	
2. Press  or  twice to zero the display.	0.00 mm
3. Press orange  key	The LED above the  glows Tool is at zero position relative to position 1
4. Move the tool by + 56.32mm	The tool is at position 56.32 relative to position 1.
5. Zero the display	0.00 mm
6. Move the tool by + 43.75mm	The tool is at position 43.75 relative to position 2.
7. Zero the display	0.00 mm
8. Move the tool by + 55.20mm	The tool is at position 55.20 relative to position 3.
9. Zero the display	0.00 mm
10. Press orange  to recall the absolute position (Work piece starting position).	The LED above the  switches off. The total distance traveled of 155.27 is displayed (A – B in Figure 7).

Table 11 Obtaining incremental dimensions on the counter

	The original work piece starting position is regained by returning to zero
---	---

11 Datum points

99 DATUM POINTS

The FRCD99D display unit permits the setting of 99 datum points for each axis.

You can set a certain correlation between encoder position and the display value by using datum points. Datum points are activated and selected with the key. The numerals to are used to select the datum points 01 to 99 when the DATUM MODE is activated.

11.1 Teaching Mode

In teaching mode the given distances are traversed by the machine axis. The value entered at the position of each datum point need not reflect the slide position relative to any absolute or previous position. When the datum points are being set, the operator may choose any value for each datum position.

Figure 8 below provides an illustrated example of finding the datum points. For example, Datum point 1 represents a travel of 72.00mm. The display can then be cleared (0.00). A second point can now be obtained by traveling 120.00mm. If the user wishes to return to zero, the absolute position can be

obtained by pressing as was discussed in section 10.2 on page 11, or one can backtrack through the datum points as discussed in section 11.1.1 on page 13.

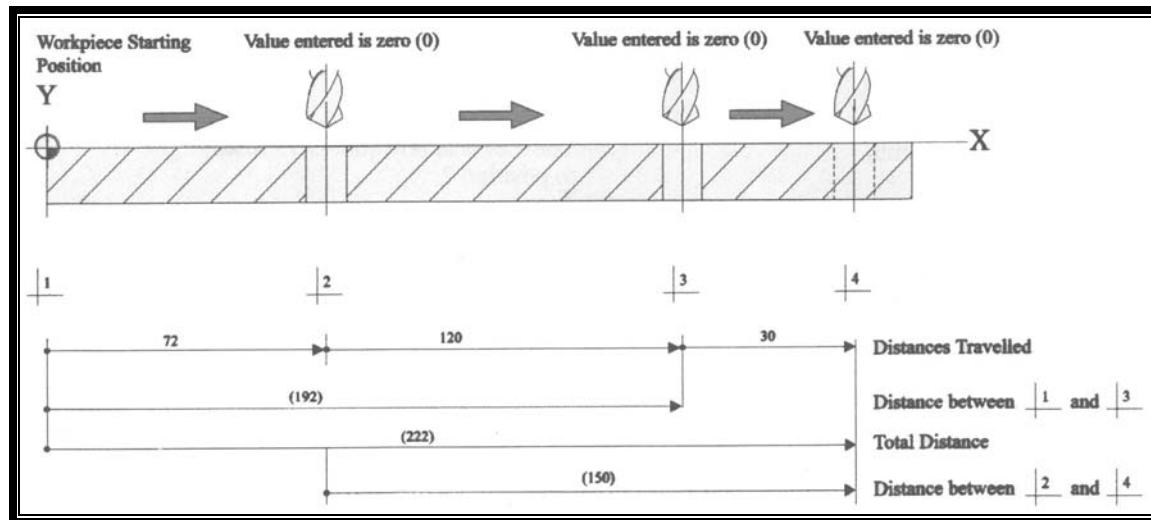


Figure 8 Example of datum points on the X-axis

Table 12 on page 13 provides a step-by-step example of how to set datum points whilst moving along the axis. Figure 8 above is referred to for this example.

Description	Display
1. Position the tool at the work piece starting position (position 1 in Figure 8)	
2. Zero the display	0.00 mm
3. Move along the machine slide or tool to datum position 2 in Figure 8.	The display shows the distance travelled 72 ¹















4. Press 	The LED below  blinks
5. Press 	The LED below  switches off. Display shows datum 2 i.e. 72 ²
6. Press   or  (which will then zero the display).	0.00 ² is displayed
7. Traverse the machine slide or tool to datum position 3	The display shows the distance traveled between points 2 and 3, which is 120.00 ²
8. Press 	The LED below  blinks
9. Press 	The LED below  switches off. Display shows datum 3 192.00 ³ and the total distance travelled between positions 1 and 3.
10. Press   or  (which will then zero the display)	0.00 ³ is displayed
11. Repeat the procedure for datum point 4	

Table 12 Achieving datum points by moving along the X-axis

11.1.1 Returning to a previous datum position

Table 13 below provides an illustration on how to return to a previous datum position. Entering the datum positions was discussed in section 11.1 on page 12.






Description	Display
1. Press 	The LED below  blinks
2. Press 	The LED below  switches off. The display shows the total distance traveled between datum 4 and datum 2 i.e. 50mm as shown in Figure 8 on page 12.
3. Move the slide back 150mm to datum 2.	The display will now show 0.00

Table 13 Returning to a previous datum position

	<ul style="list-style-type: none"> • Datum 1 could refer to the work piece starting position OR • Datum 1 could refer to the position where the first operation commences
---	---

11.1.2 To change a distance entered

Figure 9 below shows how a datum point is changed. In the example below the distance between points 2 and 3 will be changed from 28 mm to 30mm. The current position is datum point 1.

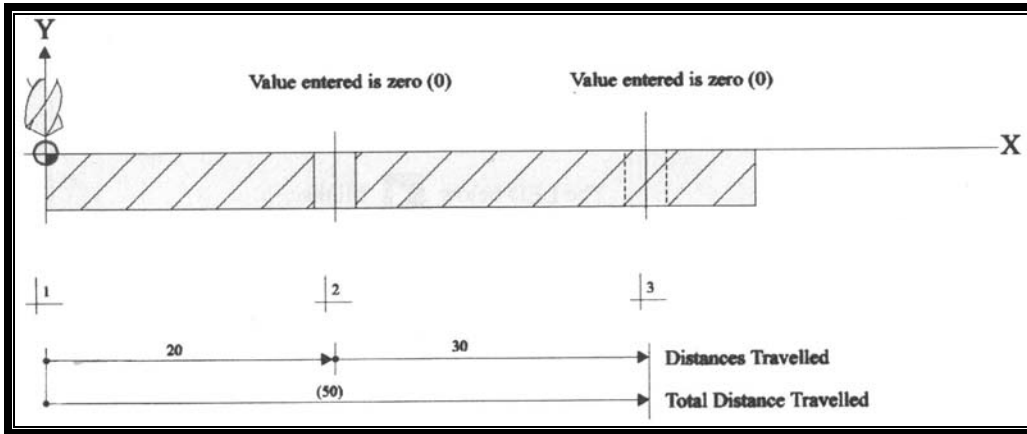


Figure 9 How to change a distance entered

Table 14 below provides a worked example on how to change a datum point. Reference will be made to Figure 9 above.











Description	Display
1. The slide is currently at datum point 1	0.00 is displayed.
2. Press 	The LED below  blinks
3. Press  for datum point 3	The distance to travel is displayed as -48.00 ³
4. Move the slide by 48mm until you reach zero	0.00
5. Move the slide the extra distance of 2mm	The display shows 2.00 ³
6. Press 	The LED below  blinks
7. Press  to enter datum point 3	The display shows 2.00 ³
8. Press  to zero the display	0.00
Testing the new datum point	
9. To test that the new datum point is 50mm, press 	The LED below  blinks
10. Press  in order to view datum point 1.	-50.00 ³ is displayed. Datum point 1 is 50mm from datum point 3.

Table 14 Changing a datum point

11.2 Presetting datum points

In PRESET MODE, given distances are entered without traversing the machine axis.

Chosen values, which need only have relevance to the operator, are established at the respective datum positions as follows:

1. Determine the values you wish to establish at each datum position. These values need only be of relevance to the operator.
2. Choose a reference point as the starting position (see section 9 on page 7).
3. Enter sizes from the starting position to each respective datum position (The sum of each distance)
4. Assign a positive or negative value to the number enter.
5. If necessary add or subtract the given distance from the values you wish to establish.

Figure 10 below shows how to preset the datum points. To preset datum point 2 in this example, a value of -30.00 must be entered.

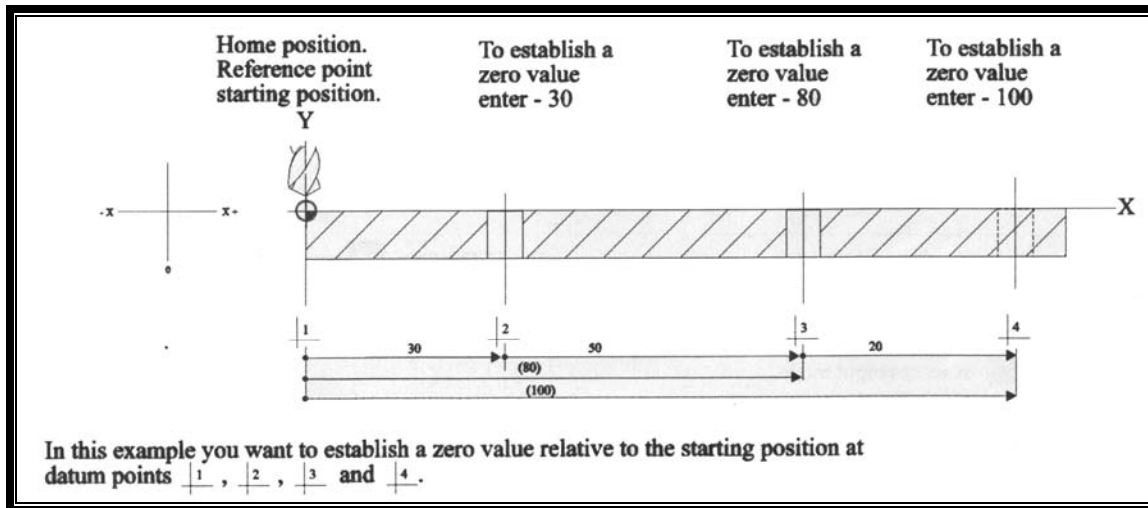







Figure 10 Presetting datum points

Table 15 on page 16 provides a worked example on presetting datum points, using Figure 10 above.

Description	Display
1. Position the tool at the work piece starting position (datum point 1)	
2. Zero the display.	0.00 ¹
3. Press 	The LED below  blinks
4. Press 	The LED below  switches off. 0.00 ² is displayed.
5. Press  to access input mode	00000.00 ² is displayed












6. To establish a zero value at datum point 2, press  and enter 30.00 (The distance between points 1 and 2 in Figure 10 on page 15).	-00030.00 ²
7. Press  to enter the number	- 30.00 ²
8. Now datum point 3 will be entered as shown in Figure 10 on page 15. A position of -80mm needs to be entered to obtain a zero point for this position.	
9. Press 	The LED below  blinks
10. Press 	The LED below  switches off. 0.00 ³ is displayed.
11. Press  to access input mode	00000.00 ³ is displayed
12. To establish a zero value at datum point 3, press  and enter -80.00 (The distance between points 1 and 2 in Figure 10 on page 15).	-00080.00 ³
13. Press  to enter the number	- 80.00 ²
14. Repeat this procedure for datum 4.	
15. Then recall datum 1 by pressing  and then 	0.00 ¹ is displayed.

Table 15 Worked example on entering datum points

12 Transducer accuracy test

Comparing the scale graduation against the reference marks performs this test. These tests should show that the transducer has not missed a single pulse and is accurate. **Accuracy is better than $\pm 3\mu\text{m}$ / per 1000mm)**

12.1 Display unit is in manual reference mode

Table 16 on page 17 discusses how transducer accuracy can be tested in manual reference mode (see section 9.1 on page 7 which discusses manual reference mode).

Description	Display
1. Position the chosen slide near to one of it's ends	
2. Turn the hand wheel of the axis slide slowly until you encounter the nearest reference point.	The LED next to the chosen display glows briefly as the transducer passes over the reference point.







3. Position the transducer exactly on the reference point by moving the slide carefully back and forth	The LED next to the chosen display remains on when it is positioned on the reference point.
4. Zero the axis display by pressing    or corresponding   or 	0.00
5. Move the slide axis to the opposite end	The reference LED will flash every 25mm in the chosen axis display
6. Position the transducer exactly on a reference point	The LED next to the chosen axis remains on
	The sum of the display is a multiple of 25

Table 16 Testing accuracy in manual reference mode

12.2 Display unit is set to automatic reference mode

Table 17 below discusses how accuracy can be tested in automatic reference mode (see section 9.2 on page 8 for a discussion on automatic reference point evaluation.)













Description	Display
1. Position the chosen slide near to one of it's ends	
2. Press the  key	The LED above the  key glows
3. Press   or  , or corresponding   or  to zero an axis	0.00
4. Move the slide in the opposite direction until counting STARTS and continue moving	As the transducer traverses the reference point counting STARTS. The LED in the chosen axis display switches off.
5. Move the slide to within ± 50 mm of the opposite end	
6. Press the  key	The LED above the  switches off.
7. Press the  key and hold it down.	
8. Continue moving the slide to the opposite end while holding down the  key until counting stops	As the transducer traverses the reference point the counting STOPS.
9. Before lifting your finger off the key note the value displayed.	The value displayed on the chosen axis indicates a multiple of 25

Table 17 Testing accuracy in automatic reference mode

13 Support: Metronics agents

Should you require support for your product, please phone one of the Metronics agents listed below.

Johannesburg

Metronics

Klaus Zimmermann

Tel: (011) 646 8738

Fax: (011) 486 3691

Cell: 083 268 6074

E-mail:

metronicscc@hotmail.com

Durban

TNC Services

Alan Thompson

Tel: (031) 764 2419

Fax: (031) 764 2419

Cell: 082 450 4361

Port Elizabeth

A & C PROJECTS

Steve Cooper

Tel: (041) 460 8171

Fax: (041) 460 8172

Cell: 082 854 0486

14 PARAMETERS for Metronics' SB-DRO FRC99/1/2/3/(4) & EDM with zero-output.

There are 16 Parameters Locations available in the DRO. The Parameters are only accessible if the correct ACCESS-CODE (15948) has been entered into the " X " Axis-display! (phone: METRONICS CC for more information). The parameters are then accessible by pressing the SET – Key 1 – 16 or MODE - Key 16 - 1 (on older counters MODE UP) to start from Parameter 1, or by pressing the MODE – Key (on older counters MODE DOWN Key) to start from Parameter 16 and then stepping down towards Parameter 1.

The Parameter mode (from any Parameter) is exited by pressing the ENT key and then the 9 Key.

Whilst in the Parameter mode, the two or three displays will show the present setup for the selected Parameter, as follows:

- X Display - This shows the Parameter number selected, if the Parameter applies to all of the axes. (E.g.: - P 01)
If the Parameter only applies to a specific axis, then the Parameter number will be followed by –1 for X-axis, -2 for Y-axis, -3 for Z-axis and –4 for W-axis (back-step Key). (E.g.: - P 10-2 if the Y-axis is selected).
- Y Display - This displays the setting for the actual Parameter selected. (E.g.: - INCH OFF)
- Z Display - This display will remain blank for all Parameters. (Except on 3-Axis counters in P 05-1, 2, 3, 4; it shows the Error factor correction amount per mm)

14.1 Parameter 01 (Affects all Axis)

This selects either Metric or Inch mode for all axes.

The inch mode is selected by pressing the + / - key.

The Y display will show "INCH ON"

To return to the metric mode, press the ± again.

The Y display will now show "INCH OFF"

14.2 Parameter 02 (Affects all Axis) LEd/Auto (Standard setting LEd)

This selects the type of Reference to be used.

There are two modes in which the Reference can be used:

LED MODE: This is the standard setting! In this mode the Reference LED will switch on the Axis LED (@the right of the display) when the Reference marks on scale and scanner coincide. The LED will remain on as long as the Reference-marks on the scale and scanner are aligned above each other within +/- 1 um.

AUTO MODE: In this mode the Axis Reference is set up to wait until the scale passes over the Reference point. The decimal points start blinking (only if the scales are connected) when the decimal (.) Key is pressed. ZERO reset

all 3 Axis to 0.00 by pressing 9, 6, 3. ! Now move a slide until the scanner passes over a Reference mark. As soon as the scanner passes over a Reference mark, the counter will start counting from that reference point in that axis. Repeat the same procedure on the remaining slides.

14.3 Parameter 03 INtENS H/L Press +/-Key (Affects all Axis)

Parameter 03 allows the operator to control the brightness of the display.

14.4 Parameter 04 There is no functions allocated to this Parameter.

14.5 Parameter 05 (Select Axis)

Linear Error compensation in microns plus or minus.

14.6 Parameter 06 (Select Axis) Press backstep Key for no Axis.

Parameter 06 controls the use of an optional fourth axis (W-Axis). The W-Axis can either be switched off (press backstep Key P 06 -0) or combined with any of the X, Y or Z-Axes. (If hardware is present)

14.7 Parameter 07 (Select Axis)

14.8 Zero output: ON – OFF (Relay for EDM Machines)

14.9 Parameter 08 (Select Axis) Invert Counting direction POS/NEG

Positive or Negative. Select positive or negative by pressing the +/- Key.
X = P08-1; Y = P08-2; Z = P08-3; W (back-step Key) = P08-4) .

14.10 Parameter 09 (Select Axis)

Division Factor: 0.1; 0.2; 0.4; 0.5; 0.8; 1; 2; 4. (See Table) Press the +/- Key to step up

14.11 Parameter 10 (Select Axis)

Scale-graduation used: 2; 4; 10; 20; 40; 100; 200. Press the +/- Key to step up (see Table)

14.12 Parameter 11 (Affects all Axis)

Feed-rate indicator calibration. Central setting = 50 (less than 50 (down to 01) decreases displayed value more than 50 (up to 99) increases displayed value mm/min.

14.13 Parameter 12 (Affects all Axis)

Feed-rate indicator ON / OFF. If ON when counter is in normal operating mode and Key 8 =X axis; Key 5 =Y; Axis; Key 2 =Z axis is pressed and the axis is moving in that particular axis the feed-rate in mm/min is displayed. **NOTE!** F is shown on the left-hand side of the Axis-display-window. The counter will register all movements while it is in this mode! If pressed again the normal counting-display is restored. (F will disappear !)

14.14 Parameter 13 Program Number (Software-number)

14.15 Parameter 14 There is no function allocated to this parameter.

14.16 Parameter 15 Clr AbS. (Press Key 5 to master clear all registers)

14.17 Parameter 16 Pcd OFF. Press +/-Key and scroll, rADIUS, HOLES, HOLE 1, On, OFF.

RESOLUTION AND DISPLAY SETTING TABLE

Display step		P10-1,2,3,4 (X,Y,Z,W) Signal period of scale in use (um)						
		2	4	10	20	40	100	200
mm	inch	P11-1,2,3,4 (X,Y,Z,W) Subdivision-factor (FACT.)						
0.001	0.00005	2	4	-	-	-	-	-
0.002	0.0001	1	2	-	-	-	-	-
0.005	0.0002	0.4	0.8	2	4	-	-	-
0.01	0.0005	0.2	0.4	1	2	4	-	-
0.02	0.001	-	-	0.5	1	2	2	4
0.05	0.002	-	-	0.2	0.4	0.8	-	-
0.1	0.005	-	-	0.1	0.2	0.4	1	2

Example: 40um Signal Period 'SCALE' to display 0.01 mm Resolution (see table in left column) 4th row! Go to Parameter P10 -? (Select Axis X, Y, Z, or W) and scroll to 40, and in Parameter P09 - ? (Select Axis X,Y, Z or W) FACTOR and scroll to 4 . When all parameters are set Press the ENT Key (decimal point Key) to exit Parameter mode. Finally press the 9 Key to clear the Parameter - code!!!

THE PARAMETER SETTINGS FOR THIS MACHINE ARE:

COMPANY NAME : _____

MAKE OF MACHINE : _____

TYPE OF MACHINE : _____

MODEL NUMBER : _____

COUNTER TYPE / MAKE : _____

NUMBER OF AXIS : _____

X AXIS SCALE MAKE GP : _____

Y AXIS SCALE MAKE GP : _____

Z AXIS SCALE MAKE GP : _____

W AXIS SCALE MAKE GP : _____

P01 - ALL INCH/MM : _____

P02 - ALL REFERENCE MODE LED/AUTO (LED STAND.) : _____

P03 - ALL BRIGHTNESS: H/L (H STAND) : _____

P04 - NONE NOT USED _____

P05 - 01 (X) LINEAR ERROR COMPENSATION IN MICRONS : _____

P05 - 02 (Y) LINEAR ERROR COMPENSATION IN MICRONS : _____

P05 - 03 (Z) LINEAR ERROR COMPENSATION IN MICRONS : _____

P05 - 04 (W) LINEAR ERROR COMPENSATION IN MICRONS : _____

P06 - 1, 2 or 3 4th AXIS LINKED TO X, Y, OR Z (1, 2, or 3) : _____

P07 - 1, 2, 3 or 4 RELAY OUTPUT X, Y, Z AXIS (1, 2, or 3) ON/OFF : _____

P08 - 01 (X) COUNTING DIRECTION POS / NEG : _____

P08 - 02 (Y) COUNTING DIRECTION POS / NEG : _____

P08 - 03 (Z) COUNTING DIRECTION POS / NEG : _____

P08 - 04 (W) COUNTING DIRECTION POS / NEG : _____

P09 - 01 (X) DIVISION FACTOR 0.1; 0.2; 0.4; 0.5; 0.8; 1; 2; 4. : _____

P09 - 02 (Y) DIVISION FACTOR 0.1; 0.2; 0.4; 0.5; 0.8; 1; 2; 4. : _____

P09 - 03 (Z) DIVISION FACTOR 0.1; 0.2; 0.4; 0.5; 0.8; 1; 2; 4. : _____

P09 - 04 (W) DIVISION FACTOR 0.1; 0.2; 0.4; 0.5; 0.8; 1; 2; 4. : _____

P10 - 01 (X) SCALE SIGNAL PERIOD 2; 4; 10; 20; 40; 100; 200. : _____

P10 - 02 (Y) SCALE SIGNAL PERIOD 2; 4; 10; 20; 40; 100; 200. : _____

P10 - 03 (Z) SCALE SIGNAL PERIOD 2; 4; 10; 20; 40; 100; 200. : _____

P10 - 04 (W) SCALE SIGNAL PERIOD 2; 4; 10; 20; 40; 100; 200. : _____

P11 - ALL FEED-RATE CALIBRATION 01 - 99 (STAND 50) : _____

P12 - ALL FEED-RATE INDICATOR ON / OFF : _____

P13 - PROGRAM SOFTWARE NUMBER : _____

P14 - NOT USED _____

P15 - ALL CLEAR ABSOLUTE PRESS NUMERIC KEY 5 : _____

P16 - PCD ON / OFF (SEE PROCEDURE PAGE 24) : _____

15 Zero-output on Metronics' EDM counter.

PROCEDURE

- 1) SWITCH ON COUNTER AND PRESS ANY KEY.
- 2) PRESS KEY MARKED +/- TO ACTIVATE THE RELAY OUTPUT.
THE LED BELOW THE KEY WILL START BLINKING.

(NOTE: ON SOME MODELS WITH THE OLD SOFTWARE THIS MUST BE DONE EVERY TIME THE COUNTER HAS BEEN SWITCHED OFF AND AFTER A POWER FAILURE!)

ON THE NEWER MODELS WITH THE NEW SOFTWARE THE COUNTER WILL SWITCH ON WITH THE SAME SETTING AS BEFORE THE COUNTER WAS SWITCHED OFF OR THE POWER FAILURE OCCURRED!

AS LONG AS THE LED BELOW THE +/- KEY IS BLINKING, THE RELAY OUTPUT IS ACTIVE !

- 3) INPUT THE DISTANCE TO ZERO PRECEDED BY A MINUS SIGN OR WITHOUT . (e.g. -23.02 or 23.02) DEPENDING ON THE COUNTING DIRECTION OF THE SCALE!!!! MAKE SURE IT IS MOVING IN THE RIGHT DIRECTION e.g. TOWARDS ZERO (0.00)

- 4) TO INPUT A SIZE, PRESS THE 'Z' KEY. THE DISPLAY WILL GO BLANK. THERE ARE TWO METHODS WHICH CAN BE USED:

5)

FIRST METHOD (FOR SIZES INCORPORATING A DECIMAL ELEMENT)

INPUT THE SIZE DIMENSIONS. e.g. 23.55. PRESS 'Z' THE COUNTER IS NOW IN INPUT MODE. PRESS FOR EXAMPLE 23.55 AS THE SIZE IS ENTERED IT WILL BE DISPLAYED ON THE LEFT HAND SIDE OF THE DISPLAY-WINDOW. PRESS 'Z' AGAIN TO ENTER THE SIZE. THE SIZE IS ACCEPTED WHEN THE NUMBER WHICH HAS BEEN ENTERED MOVES TO THE RIGHT SIDE OF THE DISPLAY.

SECOND METHOD: (FOR USE WHEN ONLY A WHOLE NUMBER IS REQUIRED. i.e. NO DECIMALS)

FIRST PRESS THE 'Z' KEY

ENTER THE WHOLE NUMBER (NO DECIMALS)

PRESS THE 'Z' KEY AGAIN.

WHEN THE NUMBER WHICH HAS BEEN ENTERED MOVES TO THE RIGHT SIDE OF THE DISPLAY WINDOW IT HAS BEEN ACCEPTED BY THE SYSTEM.

- 6) START THE MACHINING OPERATION.

WHEN THE DISPLAY REACHES ZERO, A RELAY OUTPUT SIGNAL IS TRIGGERED.

16 PCD Function. Calculation for equally spaced holes. (1 – 99 holes)

HOW TO USE THE PCD FUNCTION (P 16)

STEP 1: MOVE THE MACHINE TO CENTER OF THE PCD

ZERO THE X, Y & (Z AXIS IF INSTALLED) BY PRESSING THE NUMERIC KEY 9, 6 & (3. if installed) PRESS L1/L2 KEY (bottom right-hand key with orange rim) red LED above key will light up) AND ALSO ZERO X, Y & Z AXIS DISPLAY BY PRESSING 9, 6 & (3 KEY) press L1/L2 key again to return to L1 (LED above key is now off see also little display next to 'X' axis display!)

PRESS MODE KEY ONCE! P 16 WILL APPEAR IN THE 'X' AXIS DISPLAY and Pcd OFF in 'Y' AXIS DISPLAY. (or "On" depending in which state it was left at the previous exit)

NOTE!! DURING THE ENTER-PHASE OF THE VARIABLES, THE red LED above the SET KEY WILL BLINK!!!

NOW PRESS THE +/- KEY UNTIL "rAdIUS" APPEARS IN THE 'Y' AXIS DISPLAY! IN THE 'X' AXIS DISPLAY, IT WILL SHOW THE PREVIOUSLY USED RADIUS! ENTER THE DESIRED RADIUS AND PRESS THE +/- KEY ONCE! THE 'Y' AXIS DISPLAY WILL NOW DISPLAY "HOLES" IN THE 'X' AXIS DISPLAY THE PREVIOUSLY USED NUMBER OF HOLES IS DISPLAYED! NOW ENTER THE DESIRED NUMBER OF HOLES! (If you want to correct the input press the triangle key and re-enter value or rotate with +/- key until you reach HOLES again!) NOW PRESS THE +/- KEY AGAIN ONCE THE 'Y' AXIS DISPLAY WILL SHOW "HOLE 1" (meaning the angle of the first hole) THE 'X' AXIS DISPLAY WILL SHOW THE PREVIOUSLY USED ANGLE OF THE FIRST HOLE! NOW ENTER THE PRESENTLY DESIRED ANGLE OF THE FIRST HOLE. PRESS THE +/- KEY AGAIN ONCE! "P 16" WILL APPEAR IN THE 'X' AXIS DISPLAY and "Pcd On" IN THE 'Y' AXIS DISPLAY. (IF YOU WANT TO CHECK IF YOU HAVE ENTERED THE CORRECT VARIABLES REPEATEDLY PRESS THE +/- KEY UNTIL "Pcd On") NEXT PRESS THE COMMA KEY (decimal point which has ENT written underneath!) ONCE! (THE red LED above the SET key will stop blinking) THE COUNTER WILL NOW CALCULATE ALL THE CO-ORDINATES IN THE L1 POSITION ONLY (red LED above L1/L2 KEY must be OFF!) the red LED above MODE KEY WILL BLINK AS LONG AS THE COUNTER IS IN "PCD" MODE. THE red LED ABOVE THE L1/L2 KEY must NOT BE ON (e.g. only in the L/2 POSITION OF THIS TOGGLE KEY is the red LED on!) THE CENTER OF THE PCD IS STORED THERE AS ZERO PROVIDED IT WAS CLEARED DURING INPUT OR PRIOR TO PRESSING THE KEY WITH THE TRIANGLE ON IT!! NOW PRESS THE KEY WITH THE TRIANGLE (00 – 99 written underneath) THE LITTLE DISPLAY in LINE with the 'X' axis DISPLAY will change from L1 to 01 e.g. The position of the first hole!! The LED above the MODE key CONTINUES to blink until PCD MODE is exited ! NOW MOVE THE SLIDES OF THE MACHINE UNTIL THEY ARE BOTH ON ZERO THIS IS THE POSITION OF THE FIRST HOLE! NOW PRESS THE KEY with the TRIANGLE AGAIN AND THE LITTLE DISPLAY WILL NOW DISPLAY "02" e.g. HOLE NUMBER 2 MOVE SLIDES OF THE MACHINE UNTIL BOTH AXIS ARE ZERO THIS IS THE POSITION OF THE SECOND HOLE!! AND SO ON. YOU CAN ROTATE AS

**OFTEN AS YOU NEED TO!! IF YOU WANT TO RETURN TO THE CENTER OF THE PCD
ON COMPLETION OF THE OPERATIONS PRESS THE L1/L2 KEY ONCE (red LED on!)
AND MOVE SO THAT BOTH AXIS DISPLAYS SHOW ZERO!! YOU ARE NOW BACK
AGAIN AT THE CENTER OF THE PCD.
YOU CAN EXIT THE PCD FUNCTION AT ANY TIME BY PRESSING THE COMMA KEY !!**

IF YOU HAVE A PROBLEM PLEASE PHONE (011) 646-8738 Johannesburg South Africa