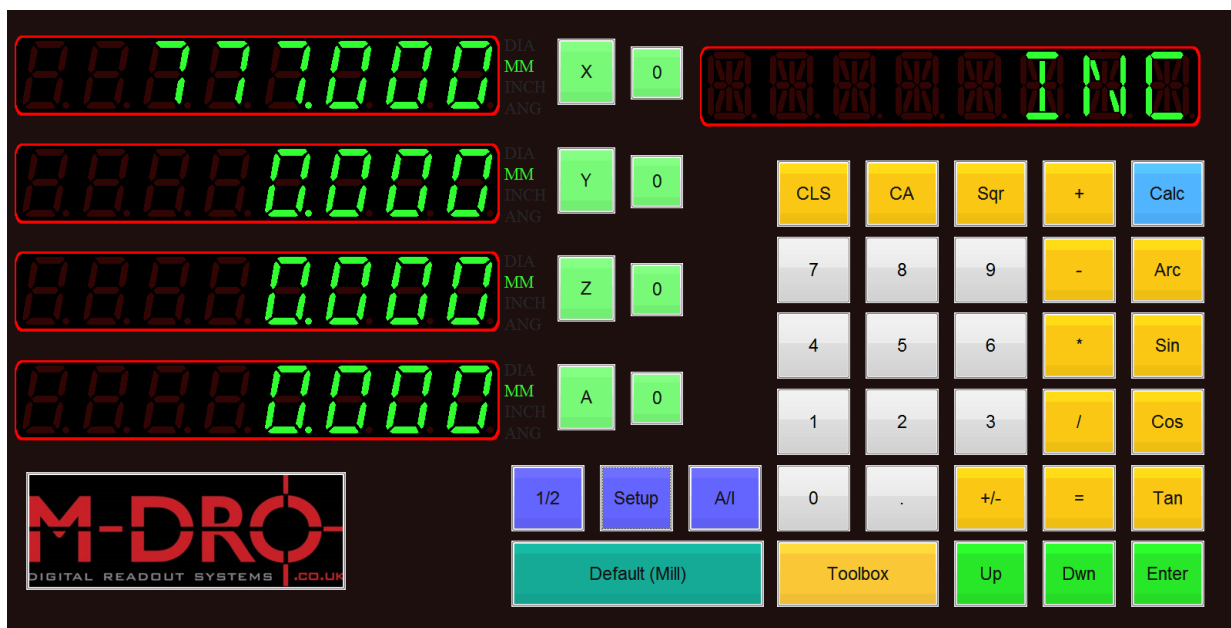




M-DRO PC Digital Readout Interface





Contents

Part No: DRO-USB-PC-4X-INST
Doc V: 1.1

NOTE: For driver install instructions please download the initial set up data sheet.

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Set up Menu

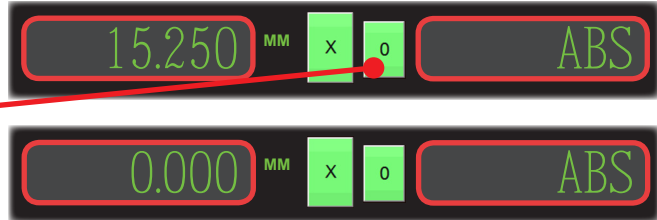
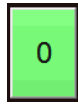
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Basic Functions

Zero an Axis

It is possible to zero an axis at any point. Press the zero next to the desired axis.



Metric and Imperial Units

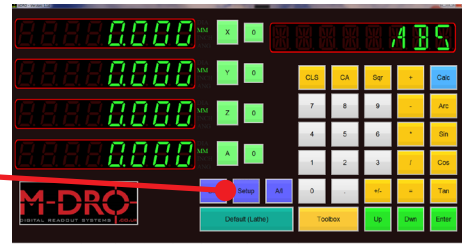
Any axis can be set to display metric or imperial. This is selected in the set up menu for each axis. The current selected units is indicated on each axis line.



Setting units on default machine configuration:

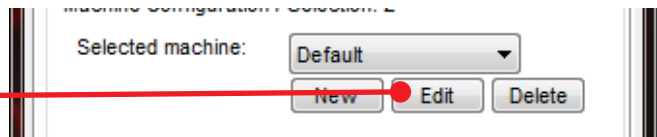
Step 1:

Enter the set up menu.



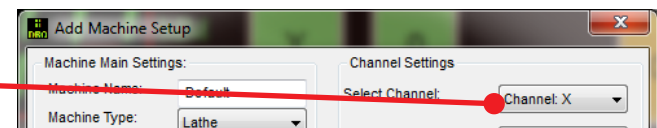
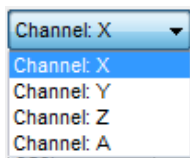
Step 2:

Select the required machine name and press edit.



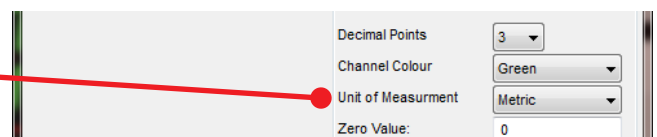
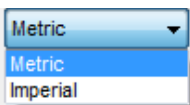
Step 3:

Select the required channel from the drop down menu.



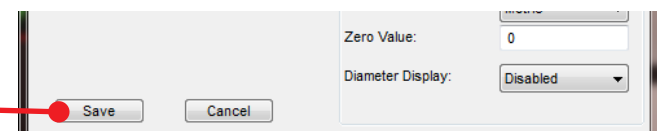
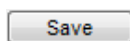
Step 4:

Select the MM or Imperial from the drop down menu.



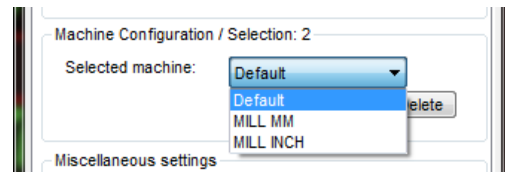
Step 5:

Repeat steps as required for each axis and press save.





Multiple machine configurations can be set up, this allows an easy method of switching between setups including mm/inch selection. A user defined name can be assigned to each configuration.



Set up a machine configuration:

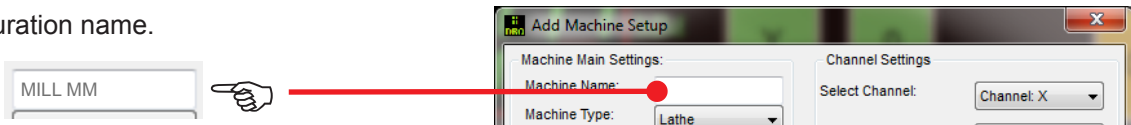
Step 1:

Enter the set up menu and press new.



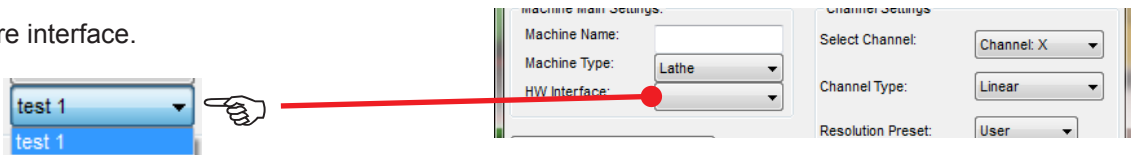
Step 2:

Enter a configuration name.



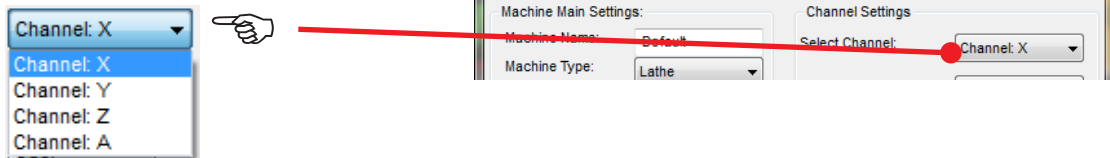
Step 3:

Select hardware interface.



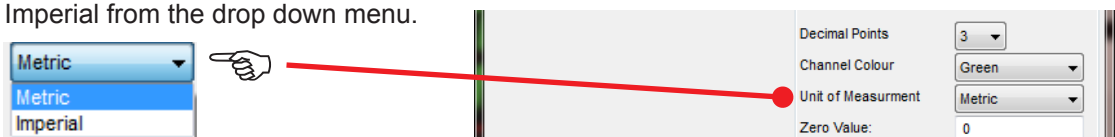
Step 4:

Select the required channel from the drop down menu.



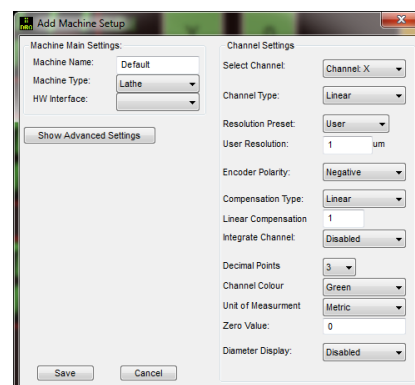
Step 5:

Select Metric or Imperial from the drop down menu.



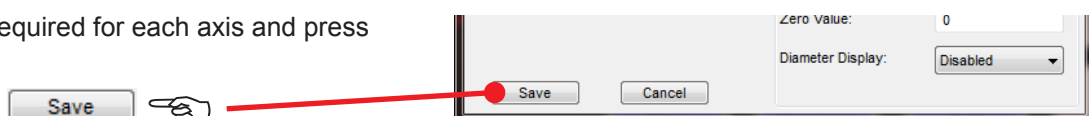
Step 6:

Other settings can be amended, including channel colour, radius diameter. Please read the set up section for more details.



Step 7:

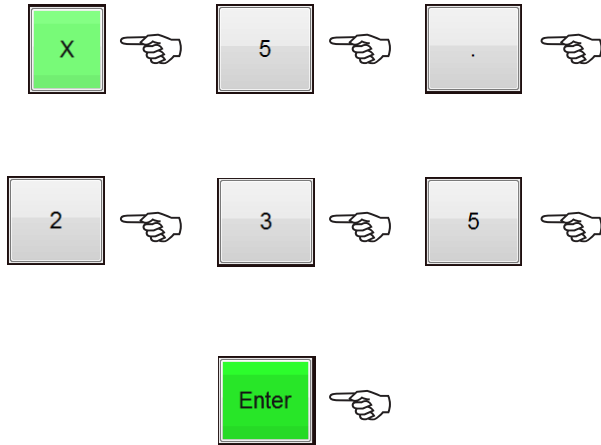
Repeat steps as required for each axis and press save.





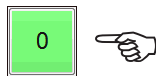
Presetting a Coordinate Datum

A datum offset value can be entered on any axis.
Select the axis for data entry and input the value.



Zero Preset Value

The user can define zero as any preset value for each axis, pressing the zero button will set the display to the preset value. For example the preset value is 50.000. Pressing the zero button will display the preset.



Setting the preset value;

Step 1:

Select the required machine name and press edit.



Step 2:

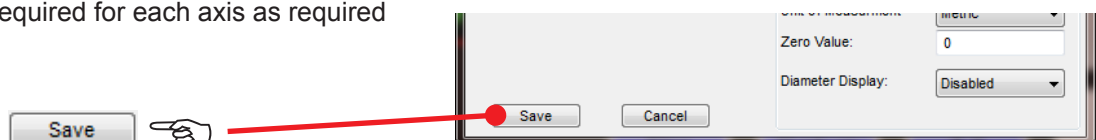
Select the required axis. Enter the value required. In this example 50.000



NB: Set value to 0 to restore standard zero function.

Step 3:

Repeat steps as required for each axis as required and press save.





Absolute and Incremental Zero

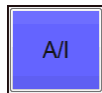
An Absolute zero (ABS) position is generally set as the main fixed datum on a work piece. An Incremental zero (INC) position is relative to the last position.



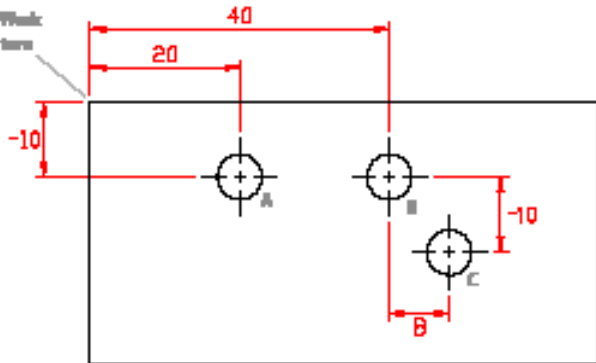
Example of ABS and Inc modes:

Step 1:

In the example opposite the absolute zero datum has been set in the top left hand corner of the work piece. Find the edge of the work piece and zero each axis in the ABS zero mode.

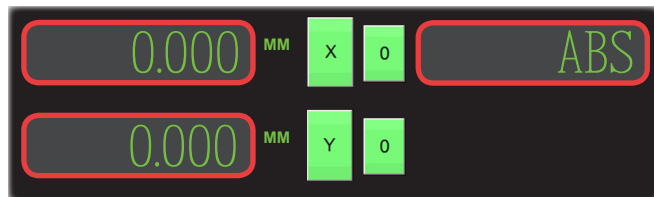
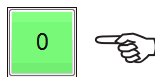


Absolute Work
Piece Datum



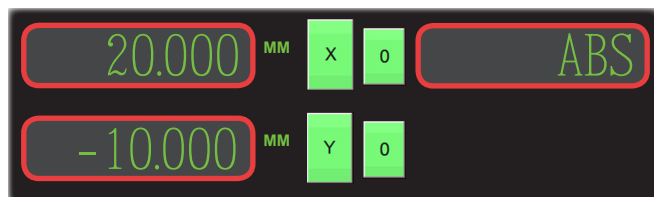
Step 2:

Find your absolute work piece datum and zero each axis in ABS mode.



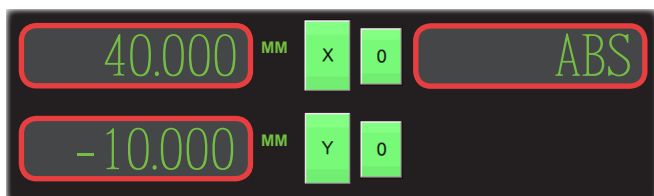
Step 3:

Move machine tool to position A. This point is relative to the absolute work piece datum (ABS).



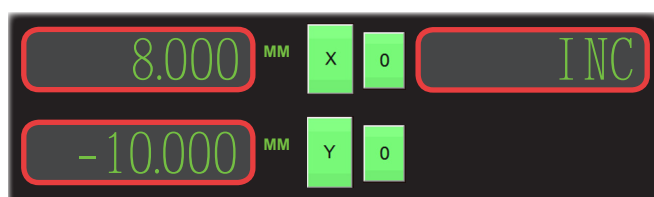
Step 4:

Move machine tool to position B. This point is relative to the absolute work piece datum (ABS)



Step 5:

Select Incremental mode (INC) and zero each axis. Move machine tool to position C. This point is relative to the last position



NB: To show the datum relative the work piece datum switch back to ABS display

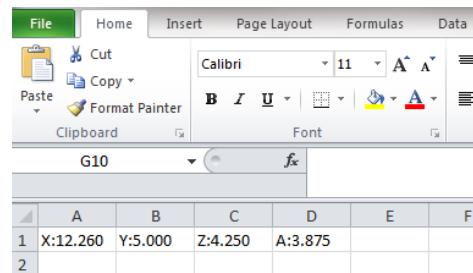
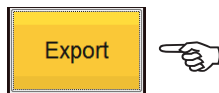




Data Export to Clipboard Function

Export data from the PC-DRO to the Windows clipboard. Although primarily aimed at export to Excel spreadsheet it can be used with any windows application supporting the copy and paste function.

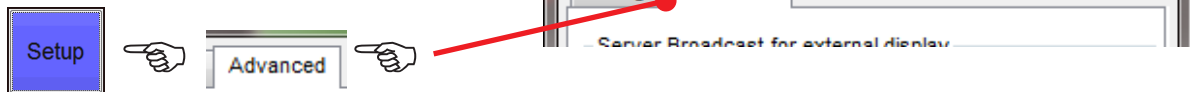
There is a choice of Manual export ('Export' button), or Automatic export where the clipboard text gets overwritten whenever a value changes. This works when the data is stable and when manually pasted in to other application, but if data is continuously changing then it is users responsibility to ensure valid data is saved.



Setting Manual Export;

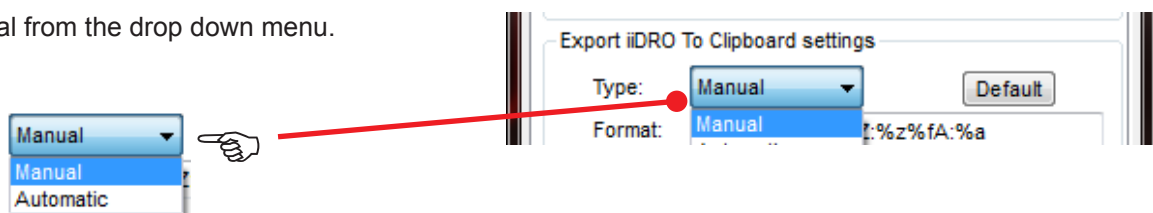
Step 1:

Select the required machine name and select advanced tab.



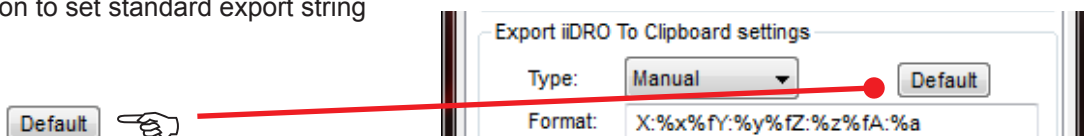
Step 2:

Select Manual from the drop down menu.



Step 3:

Select default button to set standard export string format.



Step 4:

Press Ok.





Step 5:

Press Export button.



Step 6:

Open Excel and use the windows Paste command to insert the exported data.

	A	B	C	D	E	F
1	X:12.260	Y:5.000	Z:4.250	A:3.875		
2						
3						

Setting Automatic Export:

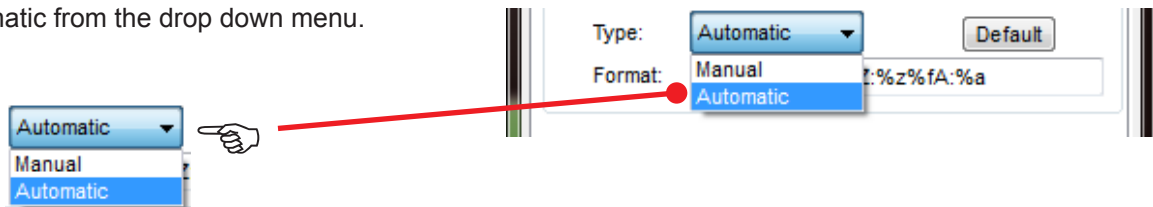
Step 1:

Select the required machine name and select advanced tab.



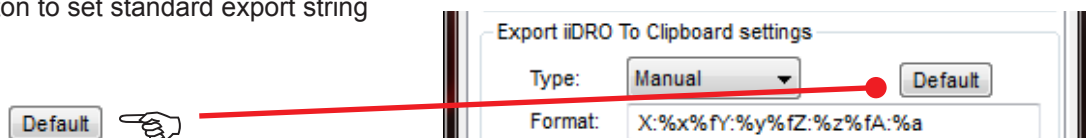
Step 2:

Select Automatic from the drop down menu.



Step 3:

Select default button to set standard export string format.



Step 4:

Press Ok.



Step 5:

Open Excel and use the windows Paste command to insert the exported data. Whenever a value changes on the an axis this will be exported to the windows clipboard and can then be pasted into Excel.

	A	B	C	D	E	F
1	X:12.260	Y:5.000	Z:4.250	A:3.875		
2						
3						



The Export string format can be customized using the following:

%f places a Tab character which allows for the string to be pasted into excel in separate columns and
%/ inserts a return to enter data in same row.

%date1 places the current date in DD/MM/YY format
%date2 places the current date in MM/DD/YY format
%time1 places the current time in HH:MM:SS format
%time2 places the current time in HH:MM format

Export M-DRO To Clipboard settings

Type:

Format:

Customizing Export String;

Example 1:

Enter export string:

%x %f %y %f %z %f %a

Places current XYZA in separate cells values in the same row.

	A	B	C	D	E	F
1	12.26	5	4.25	3.875		
2						
3						

Example 2:

Enter export string:

X Axis:%x %f Y Axis:%y %f Z Axis:%z %f A Axis:%a

Adds "X Axis:" reference text in the same cell as X values and repeats for each axis. All values are in the same row.

	A	B	C	D	E
1	X Axis: 12.260	Y Axis: 5.000	Z Axis: 4.250	A Axis: 3.875	
2					
3					

Example 3:

Enter export string:

%date1 %f X:%x %f Y:%y %f Z:%z %f A:%a

Adds a date cell. Adds "X:" reference text in the same cell as X values and repeats for each axis. All values are in the same row

	A	B	C	D	E	F
1	26/07/2015	X:12.260	Y:5.000	Z:4.250	A:3.875	
2						
3						

Example 4:

Enter export string:

%time1 %f X:%x %f Y:%y %f Z:%z %f A:%a

Adds the time the data was exported to cell. Adds "X:" reference text in the same cell as X values and repeats for each axis. All values are in the same row

	A	B	C	D	E	F
1	12:05:04	X:12.260	Y:5.000	Z:4.250	A:3.875	
2						
3						





Mill functions (Mill - machine type must be selected)

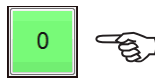
Centre Find

A simple function to find the centre of a work piece.



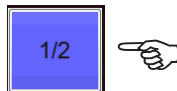
Step 1:

Align on the edge of the work piece (point A). Zero axis.



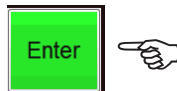
Step 2:

Align on the edge of the work piece (point A). Zero axis.



Step 3:

Move the machine tool X axis so the display reads zero. Press enter to exit.

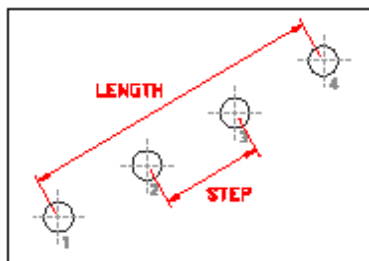
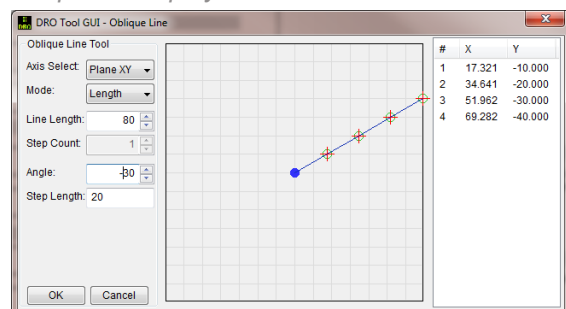


Line of Holes

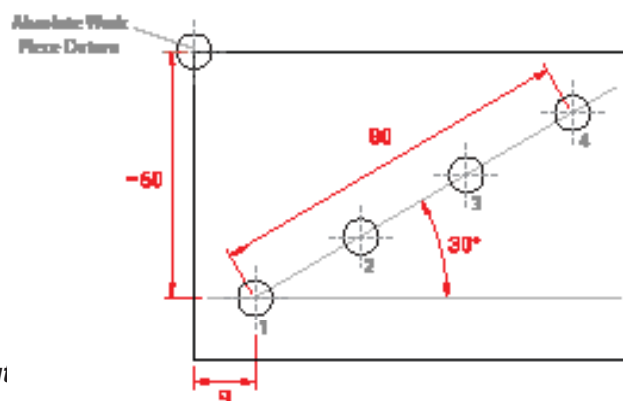
This function is used to process the equally spaced position of a user-defined number of holes along a straight line at any angle. Each position can be simply located by selecting the hole number and moving the machine tool slides until the display reads zero.

There are two modes for this function, either the overall distance from first hole to last hole can be entered (Line Length) or the distance between two neighboring holes (Step Count)

Graphical display of the Line of holes:



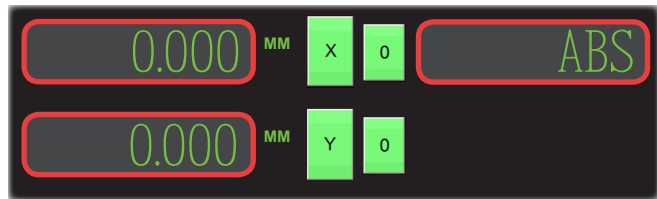
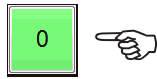
Example of line of holes, using overall line length





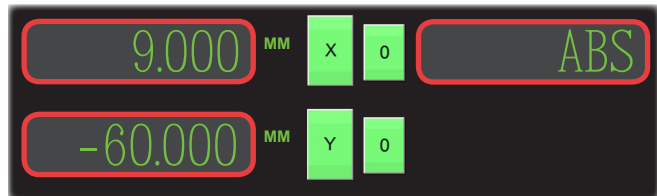
Step 1:

Find your absolute work piece datum and zero each axis in ABS mode. Align tool so that it is set at the X and Y zero position.



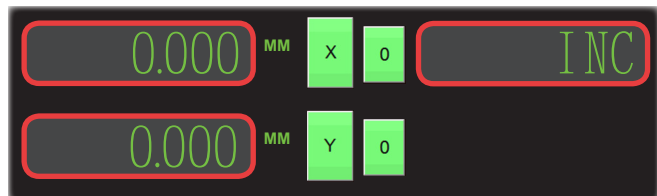
Step 2:

Move machine tool slide until X axis display reads 9 and Y axis display reads -60.



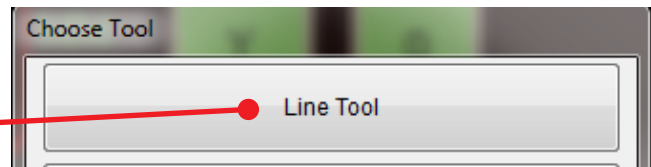
Step 3:

Select INC coordinate mode and zero each axis. This zero point is the centre of the first hole (Point 1)



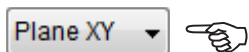
Step 4:

Enter Toolbox menu and select line tool.



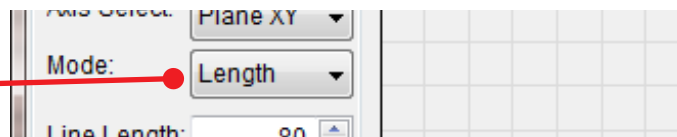
Step 5:

Select the Plane XY from drop down menu.



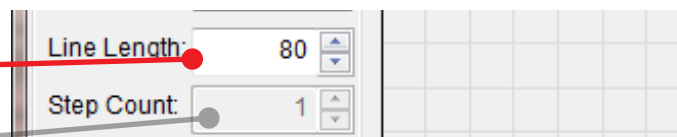
Step 6:

For this example ensure length is selected from drop down menu.



Step 7:

Enter the overall length of the line. For this example 80mm.



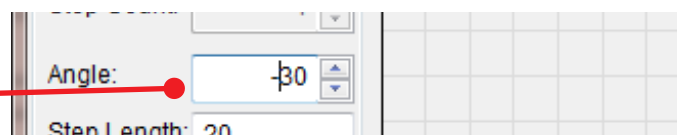
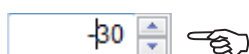
NB: If step mode is selected the number of steps can be entered on the step count entry.

If step mode is selected the step length is required



Step 8:

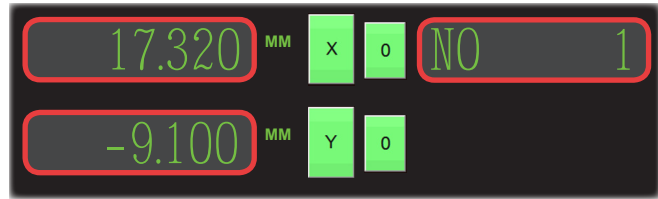
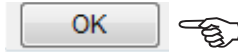
Enter the angle of the line. Negative value will set line angle in a anti-clockwise direction.





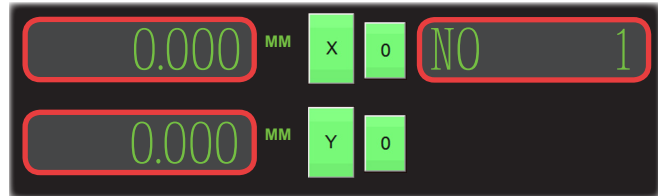
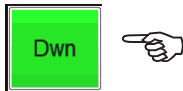
Step 9:

Press OK to confirm settings. The first hole will be at the current location.



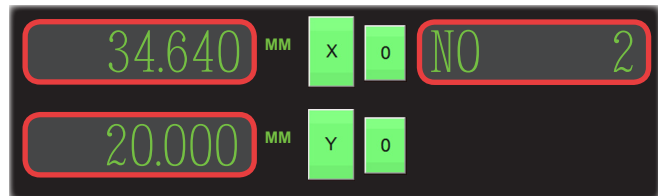
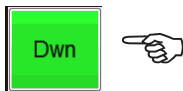
Step 10:

Once complete move the machine tool slides until the X and Y axis read zero. Press down arrow key to scroll to next hole.



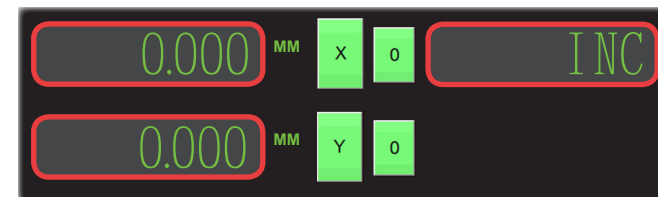
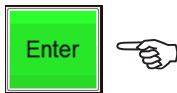
Step 11:

Once complete move the machine tool slides until the X and Y axis read zero. Press down arrow key to scroll to next hole.



Step 12:

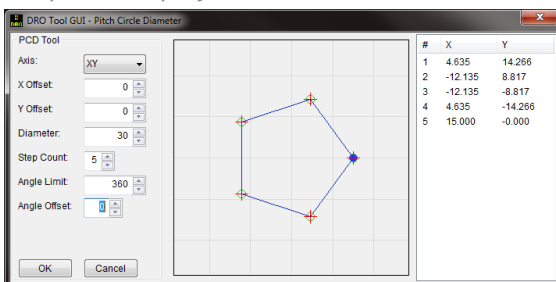
To exit the press the Enter button.



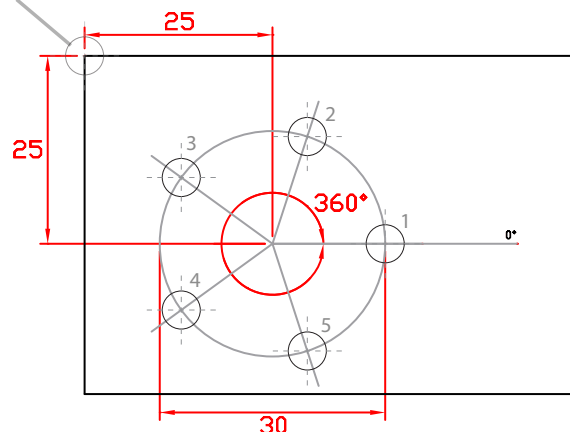
Pitched Circle Diameter (PCD)

This function is used to process the positions of equally spaced points/holes around a circle or arc. After the input of the parameters. Each position can then be located by selecting the hole number and moving the machine tool slides until the display reads zero.

Graphical display of the PCD:



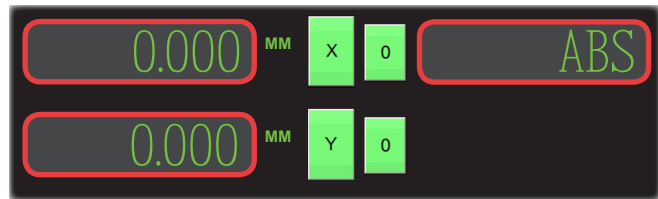
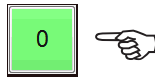
Absolute Work Piece Datum





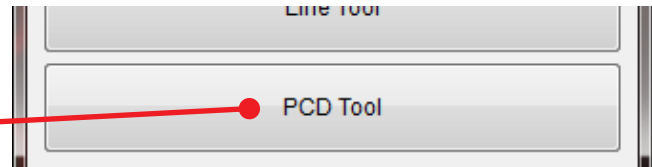
Step 1:

Find your absolute work piece datum and zero each axis in ABS mode. Align tool so that it is set at the X and Y zero position.



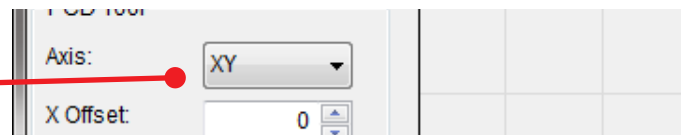
Step 2:

Enter Toolbox menu and select PCD tool.



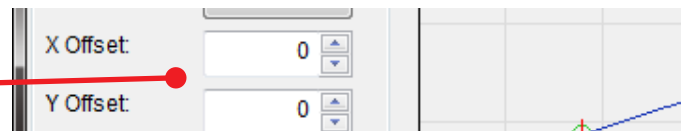
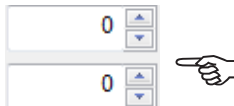
Step 3:

Select the Plane XY from drop down menu.



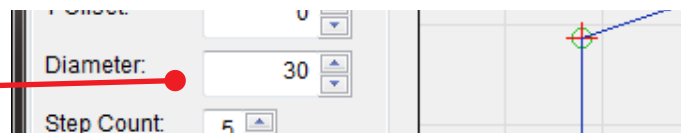
Step 4:

Enter X and Y offset as 25mm.



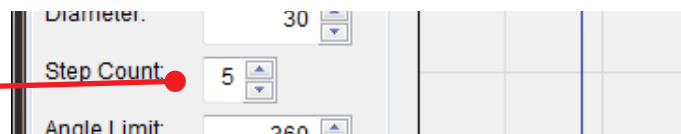
Step 5:

Enter the diameter of the PCD.



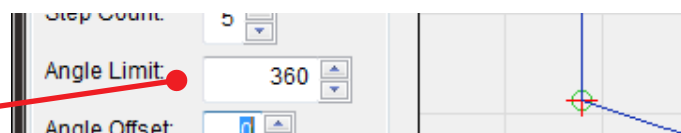
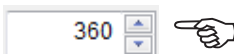
Step 6:

Enter the number of holes required for the PCD.



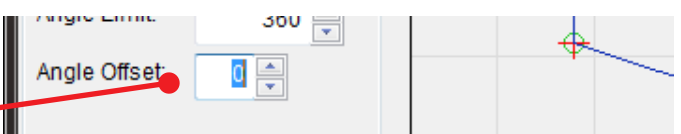
Step 7:

Enter the angle limit, for example 360 will complete the circle or 180 will divide a half circle into the number of holes required.



Step 8:

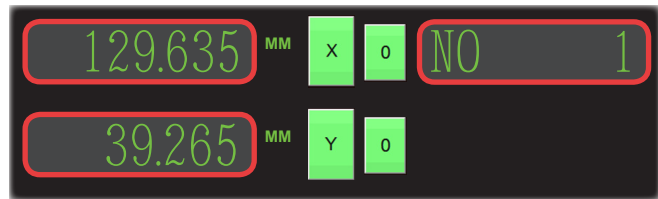
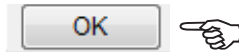
Enter the angle limit to give the start angle of the first hole. A zero value will position the first hole to the right and along the center line.





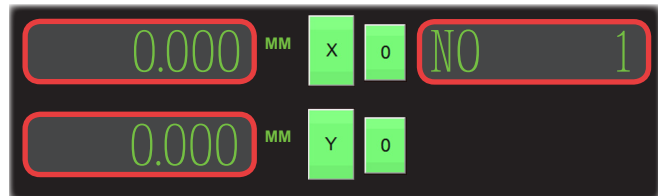
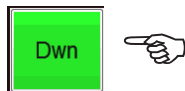
Step 9:

Press OK to confirm settings.



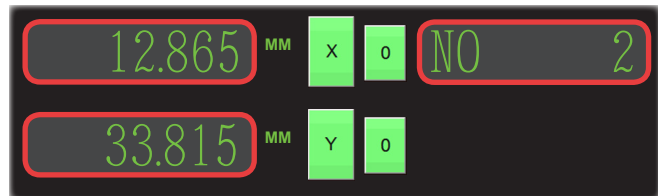
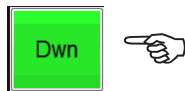
Step 10:

Move the machine tool slides until the X and Y axis read zero. Press down arrow key to scroll to next hole.



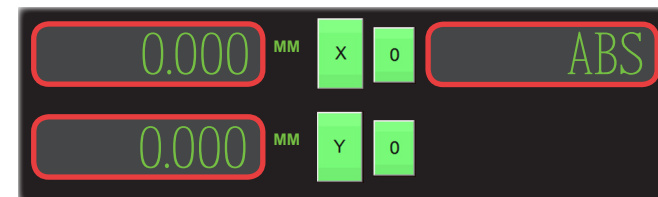
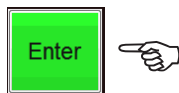
Step 11:

Once complete move the machine tool slides until the X and Y axis read zero. Press down arrow key to scroll to next hole.



Step 12:

To exit the press the Enter button.

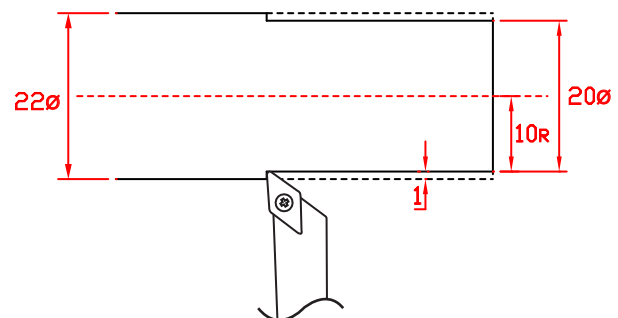


Lathe functions (Lathe - machine type must be selected)

Radius and Diameter Display

This functions allows the display to read the physical travel of the cross slide giving the radius value or double the reading giving the diameter of the work piece.

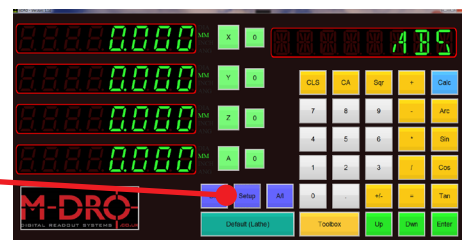
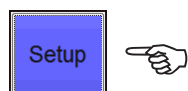
Diameter display is indicated by the "DIA" light beside each display line.



Selecting the axis for diameter display:

Step 1:

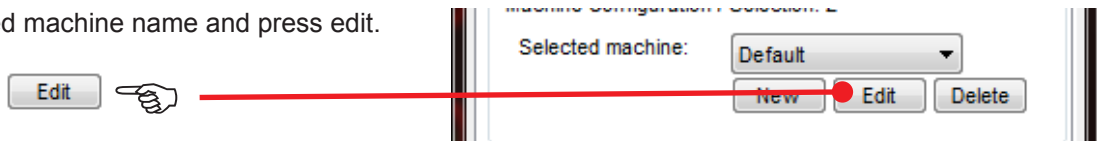
Enter the set up menu.





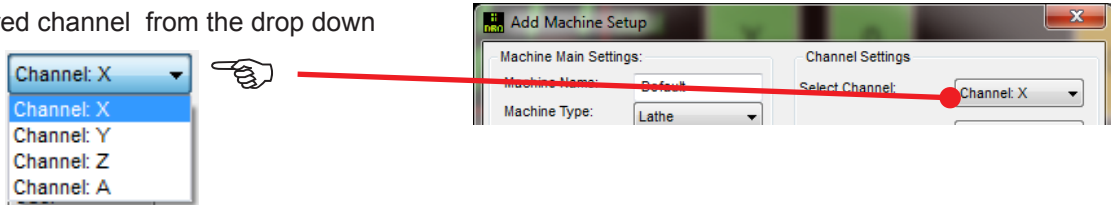
Step 2:

Select the required machine name and press edit.



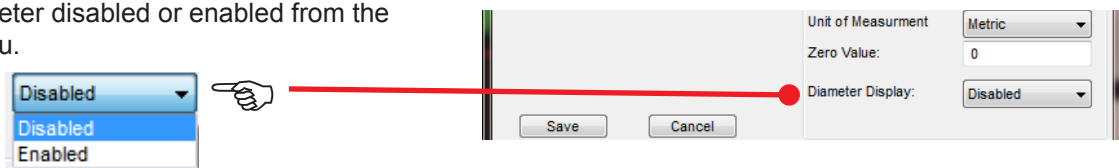
Step 3:

Select the required channel from the drop down menu.



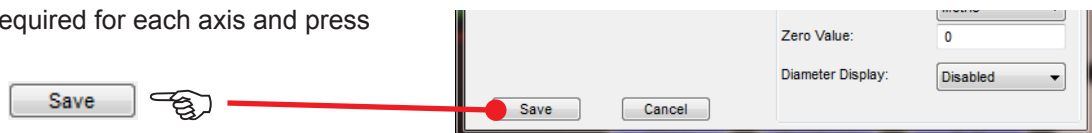
Step 4:

Select the diameter disabled or enabled from the drop down menu.



Step 5:

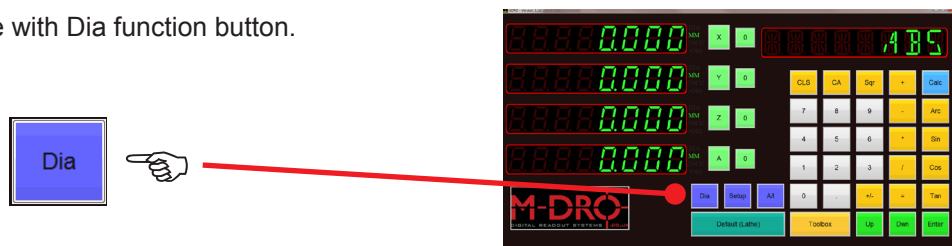
Repeat steps as required for each axis and press save.



Activate diameter display:

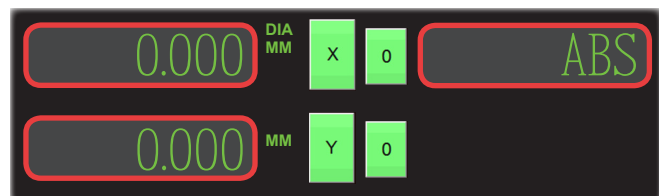
Step 1:

Select diameter mode with Dia function button.



Step 2:

Each axis will have the "DIA" light to indicate which axis have diameter display active.

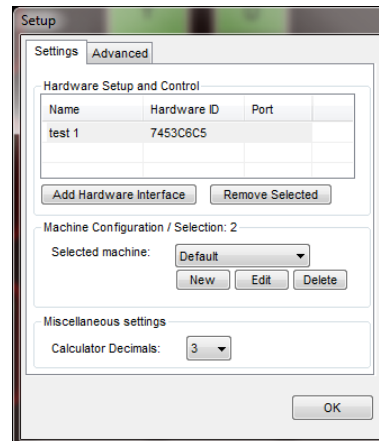




Set Up Mode

Two interfaces can be connected to the PC allowing up to eight encoders to be connected. The user can then select to display up to four of the encoders via the software.

To install the interfaces and licence code please read the initial set up guide. This can be downloaded from www.machine-dro.co.uk/downloads



Entering set up mode:

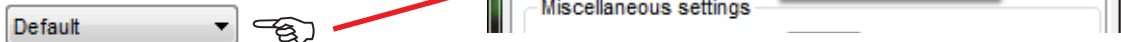
Step 1:

Enter the set up menu.



Step 2:

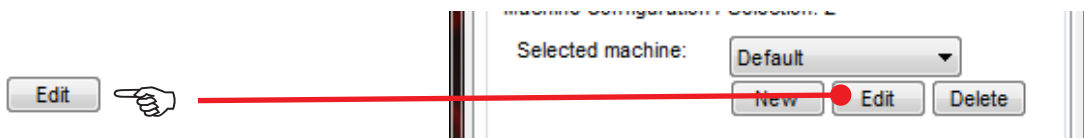
The standard set up includes a default machine configuration, this can be amended as required or additional machine configurations can be created. Select the required machine config from the drop down menu.



NB: Please see the metric and imperial units section on page 3 for creating new machine configurations.

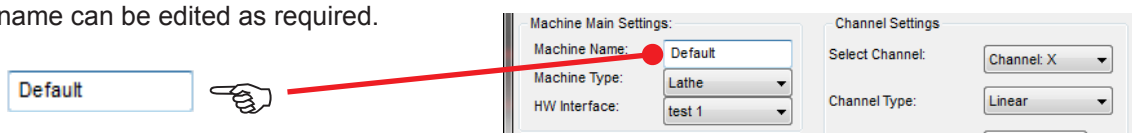
Step 3:

Select edit.



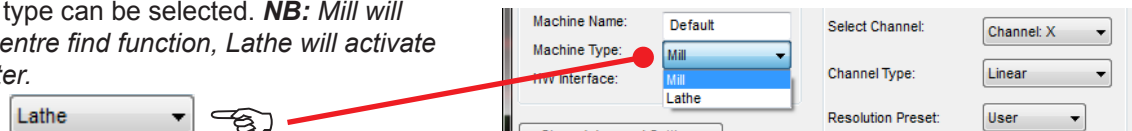
Step 4:

The machine name can be edited as required.



Step 5:

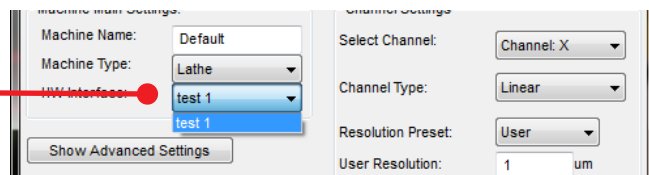
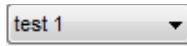
The machine type can be selected. **NB:** Mill will activate the centre find function, Lathe will activate radius/diameter.





Step 6:

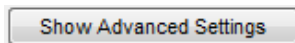
Select the required hardware interface, via the drop down menu.



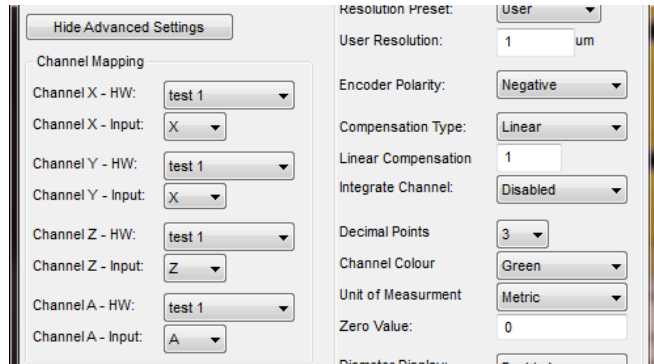
Show advanced settings for Dual interface setup:

Step 7:

If two hardware interfaces are connected, the user can select to display from any channel from either interface up to a maximum of four display lines on each machine configuration. Select show advanced settings.



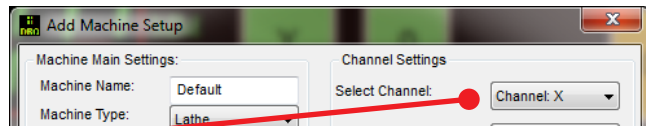
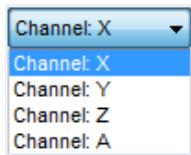
Select the hardware interface from the drop down menu, followed by the axis required to display from the selected interface. Repeat for each channel.



Selecting Linear or Angle Readout

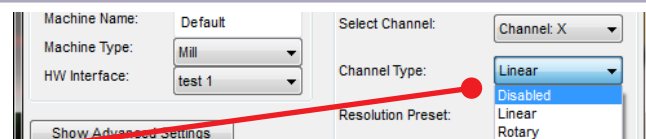
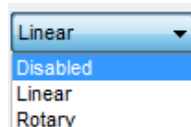
Step 1:

Enter the set up mode as above and ensure the hardware interface required. Select the required channel from the drop down menu.



Step 2:

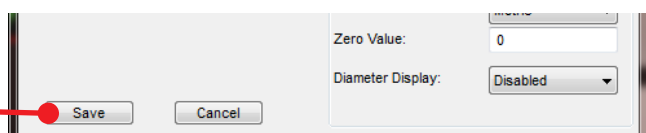
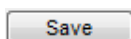
Select linear for linear travel or rotary for angle display from the drop down menu. Or disable the channel from displaying by selecting Disable.



NB: The resolution will need to be set to give correct reading, please see resolution setting section.

Step 3:

Repeat steps as required for each axis as required and press save.





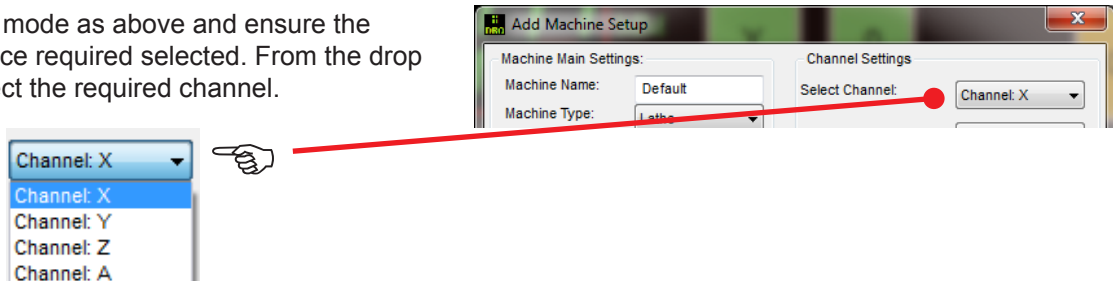
Setting Encoder Resolution

NB: The encoder resolution is directly related to the encoder specification. To change the resolution displayed on screen please see "Setting Display Resolution" for details.

Linear resolution setting:

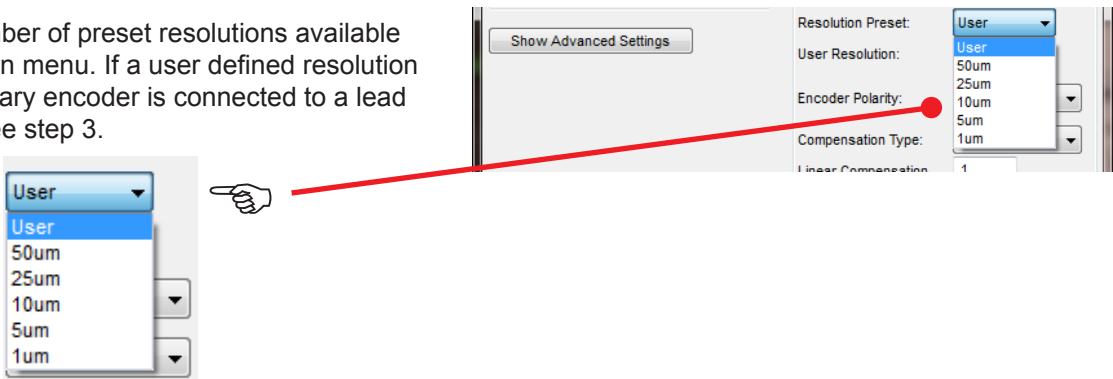
Step 1:

Enter the set up mode as above and ensure the hardware interface required selected. From the drop down menu select the required channel.



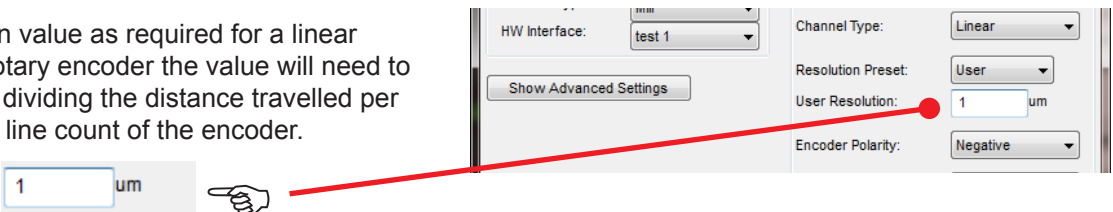
Step 2:

There are a number of preset resolutions available via the drop down menu. If a user defined resolution is required or rotary encoder is connected to a lead screw, please see step 3.



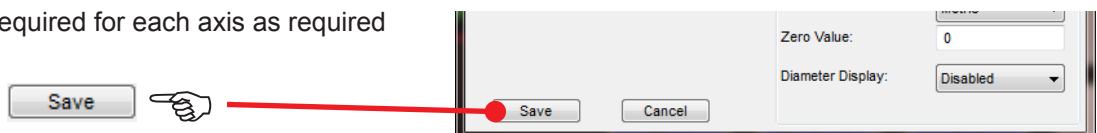
Step 3:

Enter a resolution value as required for a linear encoder. For a rotary encoder the value will need to be calculated by dividing the distance travelled per revolution by the line count of the encoder.



Step 4:

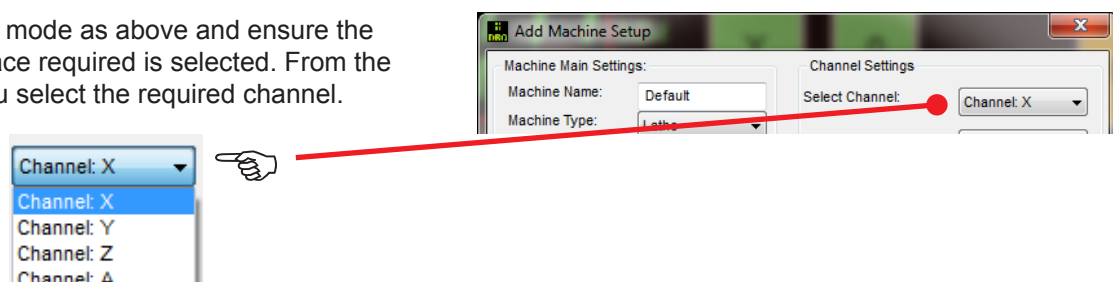
Repeat steps as required for each axis as required and press save.



Angle (rotary encoder) resolution setting:

Step 1:

Enter the set up mode as above and ensure the hardware interface required is selected. From the drop down menu select the required channel.





Step 2:

Enter line counts of the rotary encoder to be connected.

Counts per rev.(CPR):



Step 3:

Repeat steps as required for each axis as required and press save.



Linear Compensation

Step 1:

Enter the set up mode as above and ensure the hardware interface required selected. From the drop down menu select the required channel.



Step 2:

By default compensation type is linear.



Step 3:

Enter the compensation value based on 1000mm length. Enter a negative or positive value as required.



NB: The user resolution setting can also be used to compensate for any linear error, this includes rotary encoders when used with a lead-screw.

Integrate Channel (Axis Summing)

Step 1:

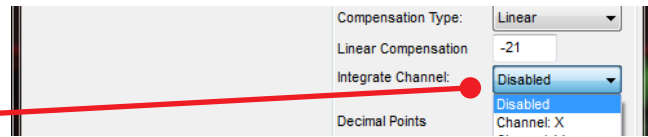
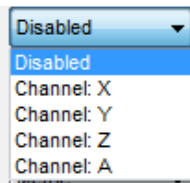
Enter the set up mode as above and ensure the hardware interface required selected. From the drop down menu select the required channel.





Step 2:

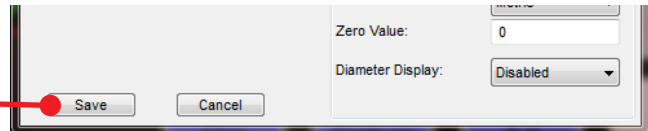
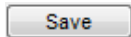
Select which axis to combine the encoder travels.



NB: Applications include: Milling machine quill and knee/head encoder outputs combined on the Z axis display, when lowering the quill or raising the height of the knee the console will maintain the distance from the spindle to table. Lathe carriage and compound slide encoder outputs combined. Carriage travel can be used as the coarse/main feed, with travel of the compound slide used as the fine feed. (Compound slide must be set parallel)

Step 3:

Repeat steps as required for each axis as required and press save.

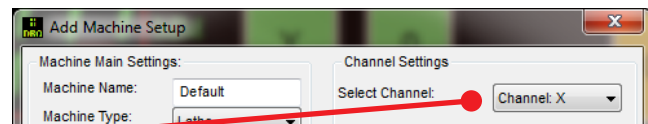
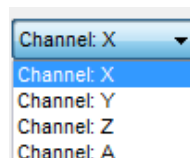


Setting Display Resolution

NB: This function allows the user to select the number of decimal places to display on screen. The encoder resolution is not effected by this setting, please see "Setting Encoder Resolution" for details.

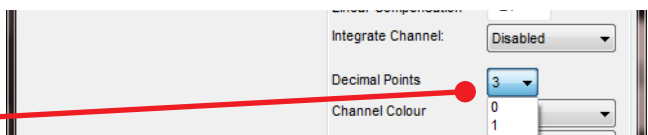
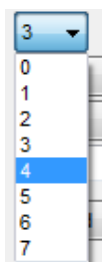
Step 1:

Enter the set up mode as above and ensure the hardware interface required selected. From the drop down menu select the required channel.



Step 2:

Select how many decimal places to display from the drop down menu.



Step 3:

Repeat steps as required for each axis as required and press save.

