Sensata
Technologies

| DP1200 Series
Digital Readout

USER MANUAL

Contents

Specification

Electrical

EU Directive 73/23/EEC (Low Voltage Directive)
BS EN 55022:1998 Class B
BS EN 55024:1998

Input to Power Supply Unit (Supplied)
100-240V (47-63Hz)
External switch-mode - Output voltage 15VDC
Input Voltage to DP1200 15-24VDC ±10%
Conforms to Low Voltage Directive

Physical

Height	215mm (8 ½")	Depth	68mm (2 ¾")
Width	310mm (12 ¼")	Weight	3.5kg (7 ¾lb)

Environment

Climatic Range	Storage Temperature	-20°C (-4°F) to 70°C (158°F)
	Working Temperature	-10°C (14°F) to 50°C (122°F)
	Working Humidity	95% R.H. at 31°C (87.8°F)
IP-Ingress Protection	IP54 Panel Mount	
	IP40 Stand Alone	

Accreditation

Disposal

At the end of its life, you should dispose of the DP1200 system in a safe manner applicable to electrical goods

Do not burn

The casework is suitable for recycling. Please consult local regulations on disposal of electrical equipment

Input & Resolutions

Encoder inputs 1, 2 & 3 can be used with Spherosyn 2G and Microsyn 2G analogue encoders. Encoder input 4 can be used with Spherosyn 2G / Microsyn 2G or 5v TTL Quadrature, depending on the model ordered.

Note: It is possible to upgrade the DP1200 from a 2 or 3 Axis up to 4 Axes, See Page 26 - Unlock Axis.

Display Resolution Options

Spherosyn 2G or Microsyn 2G 10µm	Microsyn 2G 5µm
5µm (0.0002")	1µm (0.00005")
10µm (0.0005")	2µm (0.0001")
20µm (0.001")	5µm (0.0002")
50µm (0.002")	10µm (0.0005")

Newall Measurement Systems Limited reserves the right to make changes to this specification without notice

Mounting Options

This section details the various mounting options for the DP1200, both the standard version and the panel mount version.

Mill Mount (Non Adjustable)
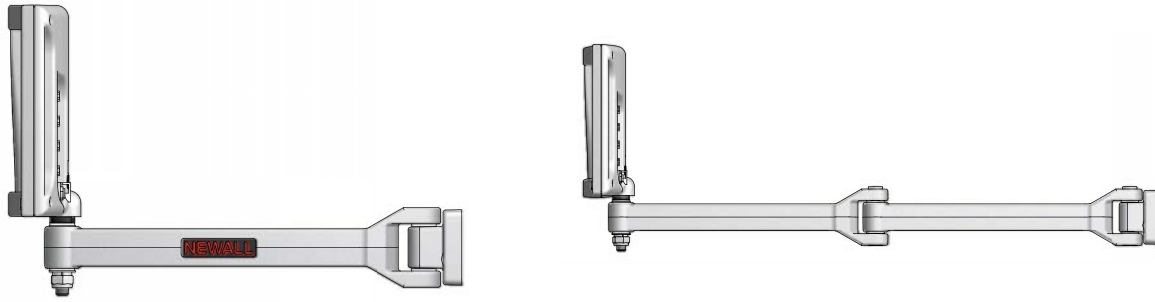
Lathe Mount (Non Adjustable)

Adjustable Mount Options

Panel Mount Option

297.0

205.00 Fixing Ctrs.

Cutout

202.0

Corners R5 Min./R15 Max.

Ø4.50 0 4off

300.00 Fixing Ctrs.

Panel cut out

DP1200 DRO
Manufactured by
Newall Measurement Systems Limited
Leicester NEWALL England
TM

CE   Part No.
Serial No.

Probe   Encoder Inputs
1
2
3
4
Ext.
Ref

Aux.
Conn.

DC Input
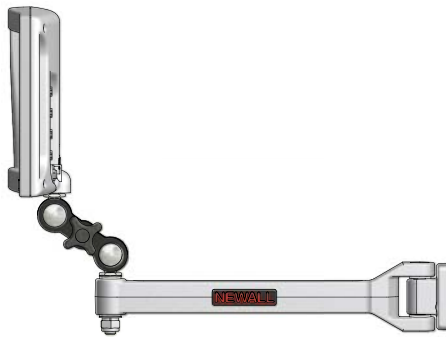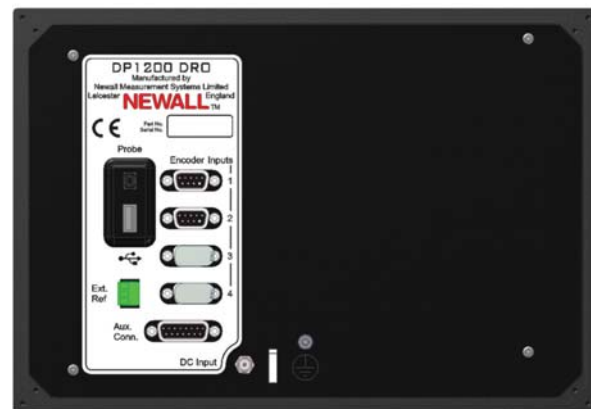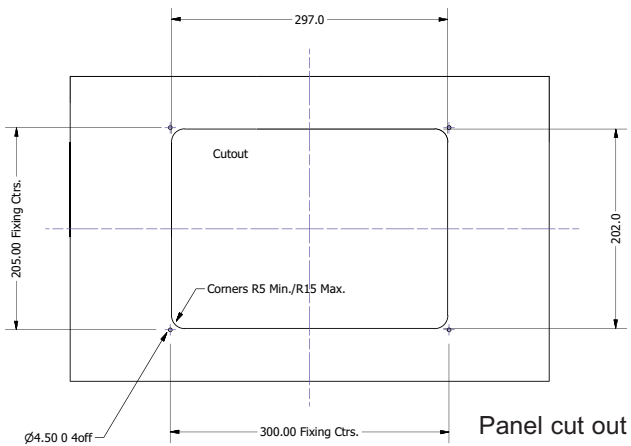
Connection Details

This chapter details the cable connections for the DP1200.

Important Information

Encoder inputs 1, 2 & 3 can be used with Spherosyn 2G and Microsyn 2G analogue encoders. Encoder input 4 can be used with Spherosyn 2G / Microsyn 2G or 5v TTL Quadrature, depending on the model ordered.

Please ensure that:

✓ All cables are secured to prevent the connectors from dropping into hazardous positions (for example the floor or coolant tray) when unplugged.

✓ All cables are routed to prevent them from being caught on moving parts.

✓ Before the machine power is turned on, the DP1200 is grounded to the machine, using the braided grounding lead provided.

✓ The power has been disconnected, before you connect the encoder(s).

⚠ **DO NOT CONNECT THIS UNIT DIRECTLY TO THE MAINS SUPPLY.**

If the Newall encoder has a round 7 pin connector, an adaptor cable (part no. 307-80980) is required. Contact your local Newall supplier for details.

Connections

Encoder input connection
1, 2, 3 or 4 according to model

Probe connection

Auxiliary / RS232 output

Cable clamp

External reference connection

External PSU input

Cabinet equipotential terminal for grounding to machine
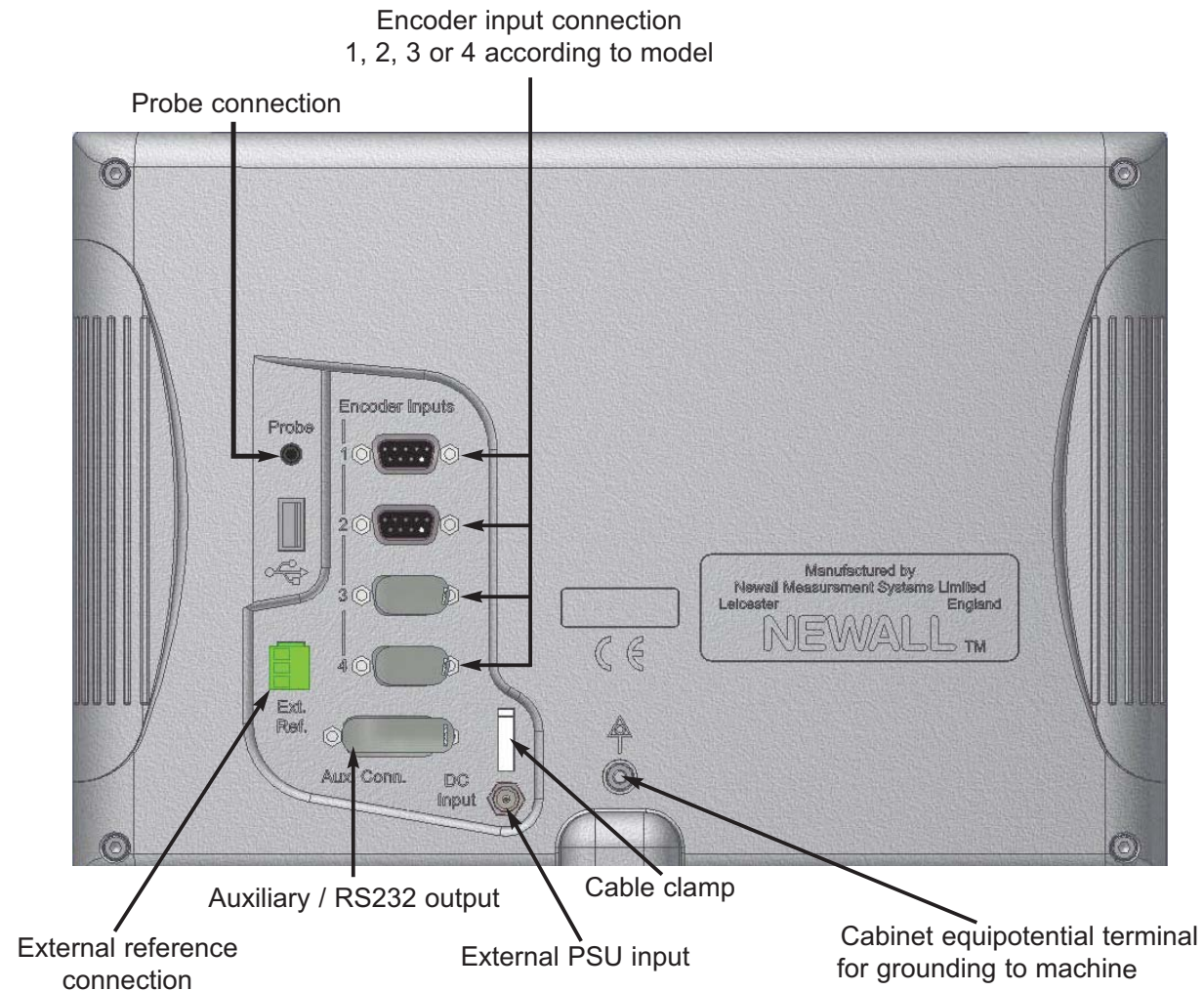
Display and Keypad

This section explains how to interpret the display and use the keypad.

Understanding The Display

Axis 1 →

Axis 2 →

Axis 3 →

Axis 4 →

DP1200 v1.0.0
Feed (mm/min): 0
◄ Tool: ►
01
-1   Menu   +1

Message
Display
LCD

Power LED

Understanding The Keypad

Axis Selection Key		ref	Digifind / Reference
Numeric Keys		zero set	Switches between Zero and Axis Preset modes
		abs inc	Switches between Absolute and Incremental modes
		in mm	Switches between Inch and mm display
ent	Enter Key	Soft Keys (left, middle & right)	
ce	Clear Numeric Entry		
½	Centre Find	Navigation Keys	
⟲	Undo Key	Sleep Key	

Invalid Key Warning

The DP1200 is equipped with a visual and audible indication to warn the user when an invalid key has been pressed.
If an invalid key has been pressed, all the displays will flash on and off twice along with a double beep tone. No operation will change until a correct key for that operation has been pressed.

Setting Up The Unit

Setup Menu Navigation

How to enter setup
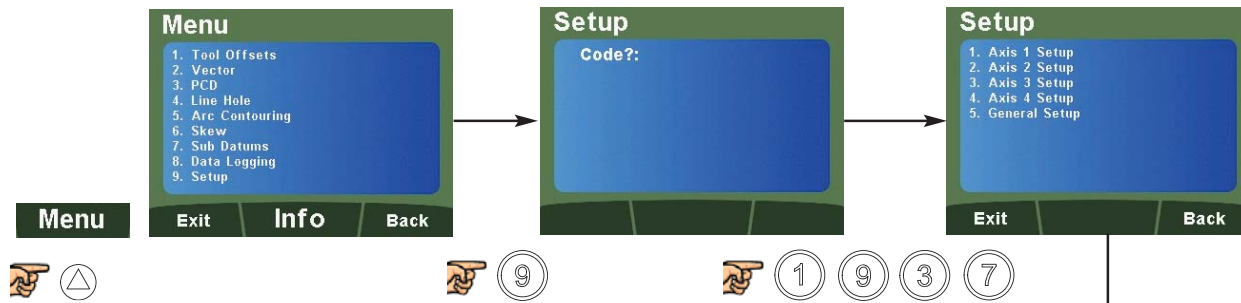
Navigating Axes 1, 2, 3 & 4 (Analogue) Setup
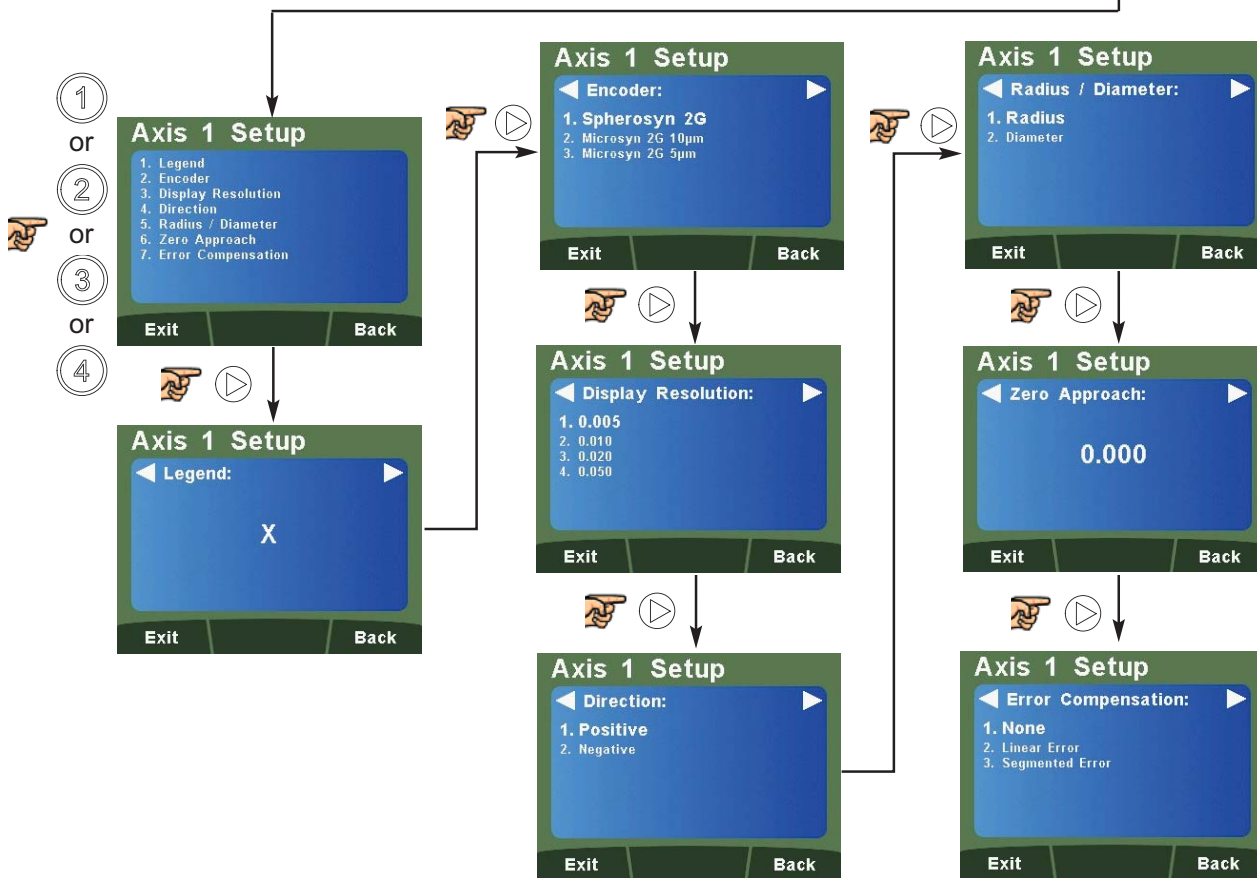
Quick Navigation of Axes 1, 2, 3 & 4 (Analogue) Setup

The DP1200 supports a quick navigation feature using the LCD screen and numeric keys, enabling the user to navigate to specific areas without scrolling through each and every menu. This is particularly useful when navigating to one specific item.

Below are the quick navigation keys for the setup of Axes 1, 2, 3 or 4 dependant on model (where navigation to the main axis setup menu is completed).
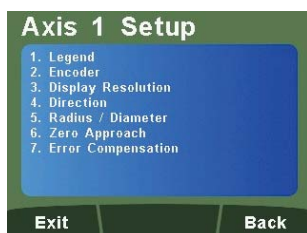
Numeric Key	Setup Function
1	Legend Setup
2	Encoder Setup
3	Display Resolution Setup
4	Direction Setup
5	Radius / Diameter Setup
6	Zero Approach Setup
7	Error Compensation Setup

Setting Up The Unit

Setup Menu Navigation (continued)

Navigating Axis 4 Setup (Digital Linear)

```
Axis 4 Setup
1. Legend
2. Encoder
3. Reference Source
4. Encoder Resolution
5. Angular Display
6. Angular Mode
7. Display Resolution
8. Direction
9. More
              Exit          Back
```

☞ ④ →

```
Axis 4 Setup
◄ Encoder Resolution:  ►

         0.0001

              Exit          Back
```
→
```
Axis 4 Setup
◄ Signal Checking:  ►
1. On
2. Off


              Exit          Back
```

```
Axis 4 Setup
◄ Legend:  ►

           W


              Exit          Back
```

```
Axis 4 Setup
◄ Display Resolution:  ►

         0.005

              Exit          Back
```

```
Axis 4 Setup
◄ Zero Approach:  ►

         0.000

              Exit          Back
```

```
Axis 4 Setup
◄ Encoder:  ►
1. Linear
2. Rotary (Angular)
3. Rotary (Linear)

              Exit          Back
```

```
Axis 4 Setup
◄ Direction:  ►
1. Positive
2. Negative


              Exit          Back
```

```
Axis 4 Setup
◄ Error Compensation:  ►
1. None
2. Linear Error


              Exit          Back
```

```
Axis 4 Setup
◄ Reference Source:  ►
1. Internal
2. External



              Exit          Back
```

```
Axis 4 Setup
◄ Radius / Diameter:  ►
1. Radius
2. Diameter



              Exit          Back
```

Quick Navigation of Axis 4 Setup (Digital Linear)

The quick navigation feature for the setup of axis 4 digital linear is detailed below (where navigation to the main axis setup menu is completed).

```
Axis 4 Setup
1. Legend
2. Encoder
3. Reference Source
4. Encoder Resolution
5. Angular Display
6. Angular Mode
7. Display Resolution
8. Direction
9. More
        Exit          Back
```
⑨
```
Axis 4 Setup
1. Radius / Diameter
2. Signal Checking
3. Zero Approach
4. Error Compensation




9. Back
        Exit          Back
```

Numeric Key	Setup Function
1	Legend Setup
2	Encoder Setup
3	Reference Source Setup
4	Resolution Setup
7	Display Resolution Setup
8	Direction Setup
9	More Options
Press Key 9 for the options below	
1	Radius / Diameter Setup
2	Signal Checking Setup
3	Zero Approach Setup
4	Error Compensation Setup
9	Back to Previous Options

Setting Up The Unit

Setup Menu Navigation (continued)

Navigating Axis 4 Setup (Digital Rotary Angular)

Axis 4 Setup
1. Legend
2. Encoder
3. Reference Source
4. Encoder Resolution
5. Angular Display
6. Angular Mode
7. Display Resolution
8. Direction
9. More

Exit   Back

Axis 4 Setup
◄ Encoder Resolution: ►
1. Program Resolution
2. Teach Resolution

Exit   Back

Axis 4 Setup
◄ Signal Checking: ►
1. On
2. Off

Exit   Back

Axis 4 Setup
◄ Legend: ►

W

Exit   Back

Axis 4 Setup
◄ Angular Display: ►
1. Decimal
2. Degrees Minutes Seconds

Exit   Back

Axis 4 Setup
◄ Zero Approach: ►

0.000°

Exit   Back

Axis 4 Setup
◄ Encoder: ►
1. Linear
2. Rotary (Angular)
3. Rotary (Linear)

Exit   Back

Axis 4 Setup
◄ Angular Mode: ►
1. Rollover
2. Continuous

Exit   Back

Axis 4 Setup
◄ Error Compensation: ►
1. None

Exit   Back

Axis 4 Setup
◄ Reference Source: ►
1. Internal
2. External

Exit   Back

Axis 4 Setup
◄ Direction: ►
1. Positive
2. Negative

Exit   Back

Quick Navigation of Axis 4 Setup (Digital Rotary Angular)

The quick navigation feature for the setup of axis 4 digital rotary angular is detailed below (where navigation to the main axis setup menu is completed).

Axis 4 Setup
1. Legend
2. Encoder
3. Reference Source
4. Encoder Resolution
5. Angular Display
6. Angular Mode
7. Display Resolution
8. Direction
9. More

Exit   Back

Axis 4 Setup
1. Radius / Diameter
2. Signal Checking
3. Zero Approach
4. Error Compensation

9. Back

Exit   Back

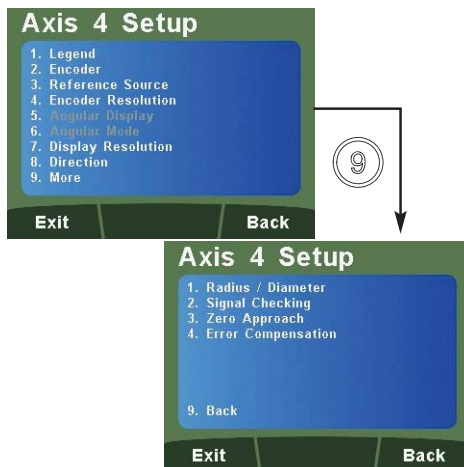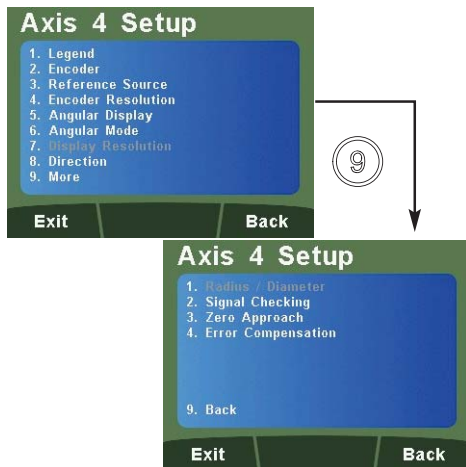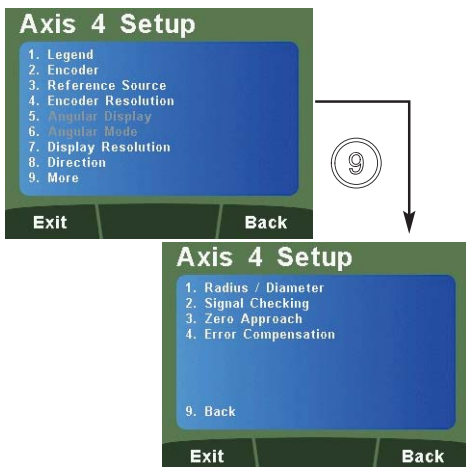| Numeric Key	Setup Function
1	Legend Setup
2	Encoder Setup
3	Reference Source Setup
4	Resolution Setup
5	Angular Display Setup
6	Angular Mode Setup
8	Direction Setup
9	More Options
Press Key 9 for the options below	
2	Signal Checking Setup
3	Zero Approach Setup
4	Error Compensation Setup
9	Back to Previous Options

Setting Up The Unit

Setup Menu Navigation (continued)

Navigating Axis 4 Setup (Digital Rotary Linear)

Quick Navigation of Axis 4 Setup (Digital Rotary Linear)

The quick navigation feature for the setup of axis 4 digital rotary linear is detailed below (where navigation to the main axis setup menu is completed).

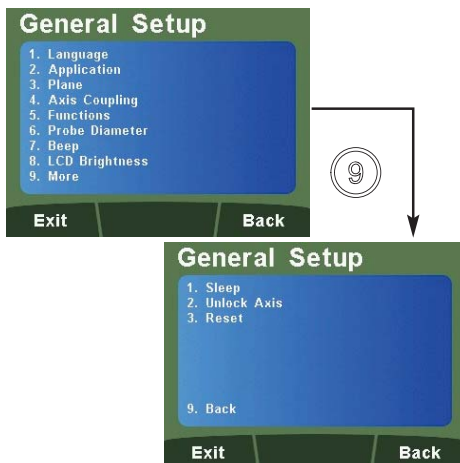| Numeric Key	Setup Function
1	Legend Setup
2	Encoder Setup
3	Reference Source Setup
4	Resolution Setup
7	Display Resolution Setup
8	Direction Setup
9	More Options
Press Key 9 for the options below	
1	Radius / Diameter Setup
2	Signal Checking Setup
3	Zero Approach Setup
4	Error Compensation Setup
9	Back to Previous Options

Setting Up The Unit

Setup Menu Navigation (continued)

Navigating General Setup

Quick Navigation of General Setup

The quick navigation feature for general setup is detailed below (where navigation to the main axis setup menu is completed).

Numeric Key	Setup Function
1	Language Setup
2	Application Setup
3	Plane Setup
4	Mill Summing Setup
5	Functions Setup
6	Probe Diameter Setup
7	Beep Setup
8	LCD Brightness Setup
9	More Options
Press Key 9 for the options below	
1	Sleep Setup
2	Unlock Axis
3	Reset Setup
9	Back to Previous Options

Setting Up The Unit

Setup Axis 1, 2, 3 & 4 (Analogue)

Legend Setup

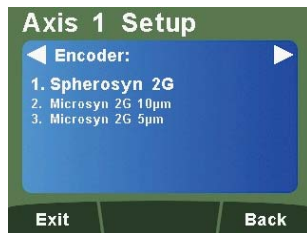The legend of the axis can be set to any of the options in the table below.

Navigate to

Axis 1 Setup
◄ Legend: ►

X

Exit   Back

Use the key list to select the desired character

Key	1st Press	2nd Press	3rd Press	4th Press	5th Press
0	0	N/A	N/A	N/A	N/A
1	X^1	Y^1	Z^1	1	N/A
2	A	B	C	2	N/A
3	D	E	F	3	N/A
4	G	H	I	4	N/A
5	J	K	L	5	N/A
6	M	N	O	6	N/A
7	P	Q	R	S	7
8	T	U	V	8	N/A
9	W	X	Y	Z	9

Encoder Setup

Navigate to

Axis 1 Setup
◄ Encoder: ►
1. Spherosyn 2G
2. Microsyn 2G 10µm
3. Microsyn 2G 5µm

Exit   Back

① To select **Spherosyn 2G** as the encoder type

② To select **Microsyn 2G 10µm** as the encoder type

③ To select **Microsyn 2G 5µm** as the encoder type

Note: The encoder type must match the actual encoder in use, or the DP1200 will not display correctly

Display Resolution Setup

Navigate to

Axis 1 Setup
◄ Display Resolution: ►
1. 0.005
2. 0.010
3. 0.020
4. 0.050

Exit   Back

Spherosyn 2G & Microsyn 2G 10µm

① To select **5µm (0.0002")**

② To select **10µm (0.0005")**

③ To select **20µm (0.001")**

④ To select **50µm (0.002")**

Microsyn 2G 5µm

① To select **1µm (0.00005")**

② To select **2µm (0.0001")**

③ To select **5µm (0.0002")**

④ To select **10µm (0.0005")**

Direction Setup

Navigate to

Axis 1 Setup
◄ Direction: ►
1. Positive
2. Negative

Exit   Back

① To select **Positive**

② To select **Negative**

Example:

If the current setting is **Positive** and the measurement increases from right to left, changing the setting to **Negative** will cause the measurement to decrease.

Radius / Diameter (Measure Setup)

Navigate to

Axis 1 Setup
◄ Radius / Diameter: ►
1. Radius
2. Diameter

Exit   Back

① To select **Radius**

② To select **Diameter**

The radius/diameter function allows the operator to display actual (radius) or twice-actual (diameter) measurements for each axis.
This function is generally used in turning applications, such as the cross travel on a lathe displaying the diameter reading rather than the radius, is the desired result.

Setting Up The Unit

Zero Approach Setup

This setting provides a visual indication that one or more axes are approaching zero. This is done by using the far left LED segment on each axis, as the axis approaches zero, each segment of the '0' lights up in quick succession. Once zero has been reached, the '0' to the far left will be constantly on.

Navigate to

Axis 1 Setup
◄ Zero Approach: ►

0.000

Exit   Back

Enter any value using the numeric keys to provide zero approach limits. This can be entered in inches or millimeters by toggling the (in/mm) key.

Note: To disable the zero approach function, enter a value of 0.000.

Default is 0.000

Error Compensation

A digital readout (DRO) system helps to improve productivity. It decreases the number of scrapped parts, as the operator no longer has to be concerned about making mistakes related to counting the revolutions on the dials. The DRO system also helps to eliminate some errors related to ballscrew backlash.

The DRO system will operate to its published accuracy, provided all components are in working order and properly installed. Field calibration is not necessary.

Accuracy problems with machined parts may be caused by machine error, DRO system error, or a combination of both. The first step in determining the source of error is to check the DRO system. This is completed by comparing the movement of the Newall reader head to the position reading shown on the display. A high accuracy standard, such as a laser interferometer is required. A dial indicator can be used to check short distances, but a laser provides the best results. if a dial indicator must be used, be sure it is the highest available accuracy.

Instructions

Check the accuracy of the DRO system

1. Place the target of the laser or the needle of the dial indicator directly on the Newall reader head. It is absolutely critical to take the readings directly from the Newall reader head. If a dial indicator must be used, be sure that the needle of the indicator is perpendicular to the reader head and not angled. If readings are taken anywhere else on the machine, machine errors may distort the results.

2. When the reader head moves, the movement registers on the laser / indicator and the DRO display.

3. Set the laser / dial indicator and DRO position displays to 0.

4. Make a series of movements and compare the position readings between the laser / dial indicator and the DRO display. If the readings match within the accuracy specified, then the DRO system is operating properly. If this is the case, proceed to the next step, "Evaluate machine errors". If the readings do not match, contact your local Newall Service Representative before proceeding with error compensation.
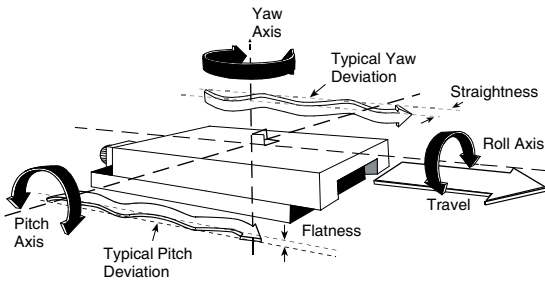
Evaluate machine errors

1. Put the laser target / dial indicator on the part of the machine where the machining is performed.

2. Make a series of movements and compare the position readings between the laser / dial indicator and the DRO display. The difference between the laser / dial indicator reading and the reading on the DRO display is the machine error.

3. Plot the machine error along the entire axis of travel to determine the nature of the error. If it is a linear error, you can use linear error compensation. If the error is not linear, you should use segmented error compensation.
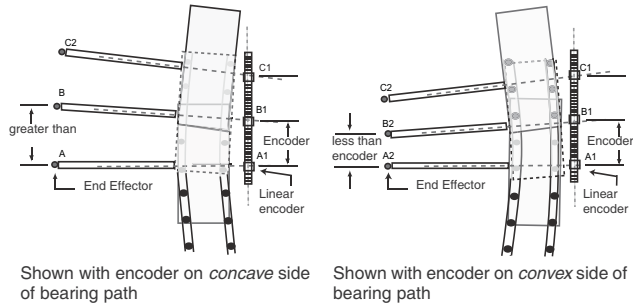
Setting Up The Unit

Types of Machine Error

There are many types of machine error, including pitch, roll, yaw, flatness, straightness, and Abbé error. The diagrams below demonstrate these errors.

Way errors

Abbé error

Shown with encoder on *concave* side of bearing path

Shown with encoder on *convex* side of bearing path

Linear Error Compensation

In this mode, a single constant correction factor is applied for each axis to all displayed measurements. The correction factor is calculated, and specified in parts per million (ppm).
In this mode a single constant correction factor for each axis is applied to all displayed measurements.
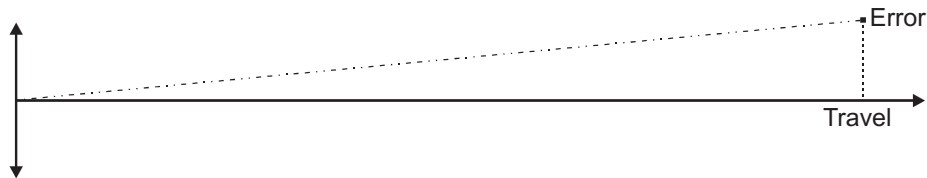
As you follow the procedure ensure that you approach each edge from opposite directions, then subtract the width of the tool from the value displayed on the DP1200. The DP1200 Automatically takes into account the probe diameter as per setting (Linear Only).

(Fig 1)   Tool or Probe

standard distance

measured distance
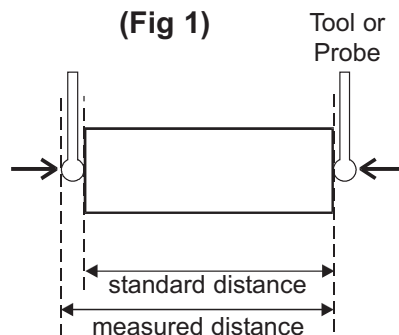
Setting Up The Unit

Error Compensation Setup

Navigate to

Axis 1 Setup
◄ Error Compensation: ►
1. None
2. Linear Error
3. Segmented Error

Exit   Back

☞ ① To select no Compensation (**None**)

☞ ② To select **Linear Error Compensation**

☞ ③ To select **Segmented Error Compensation**

Linear Error Compensation Setup

Setup

☞ △

Linear Error
1. Teach
2. Program

Exit   Back

☞ ① To select **Teach** mode

☞ ② To select **Program** mode

Teach Mode

Teach mode is an easier way of calculating linear errors using the DP1200 to automatically calculate the error, by comparing the actual measurement and the physical movement.
Follow the steps below;

0.000

Linear Error

Move To Start

Exit   OK   Back

499.875

OK
☞ △

Linear Error

Move To End

Exit   OK   Back

OK
☞ △
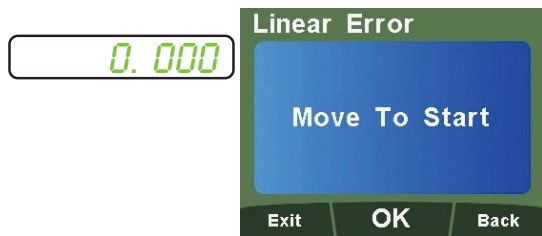
Move tool / probe to start position (See Fig 1)   Move tool / probe to end position (See Fig 1)
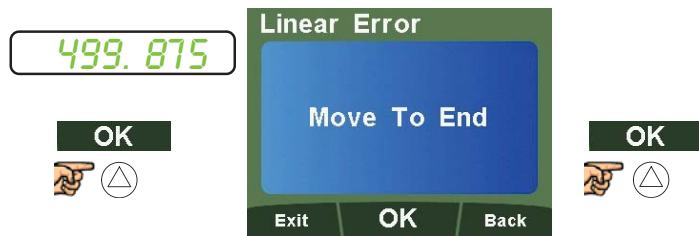
500.000

☞ ⑤ ⓪ ⓪

Linear Error
Movement?:
0.000

Exit   Back

☞ (ent)

Linear Error
Error (ppm):
250

Exit   Accept   Back
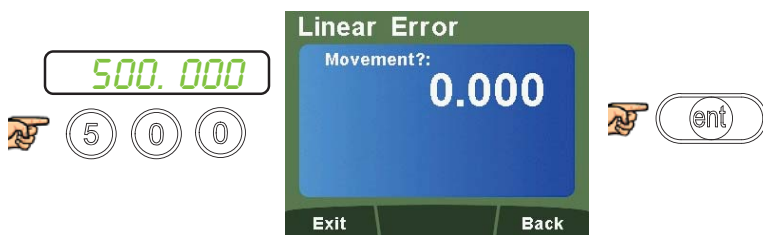
Accept
☞ △

Enter the actual measurement using the numerical keypad   Check / Accept correction factor

Program Mode

First determine the correction factor required. To do this, use the following equation.
(In the example the standard distance is 500.000mm and the measured distance is 500.200mm)

Correction factor = error / actual x 1,000,000
Correction factor = (500 - 500.200) / 500.000 x 1,000,000
Correction factor = -400

☞ (±) ④ ⓪ ⓪   ☞ (ent)

Linear Error
Error (ppm):
-400

Exit   Accept   Back

Accept
☞ △
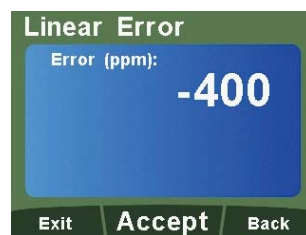
Setting Up The Unit

Segmented Error Compensation

The scale travel is broken down into as many as 200 user-defined segments, each with their own correction factor, measured against a high-accuracy standard. The following parameters need to be identified;

Starting point - zero

Error

0

1

2

3

4

5

6

Travel

Reference point
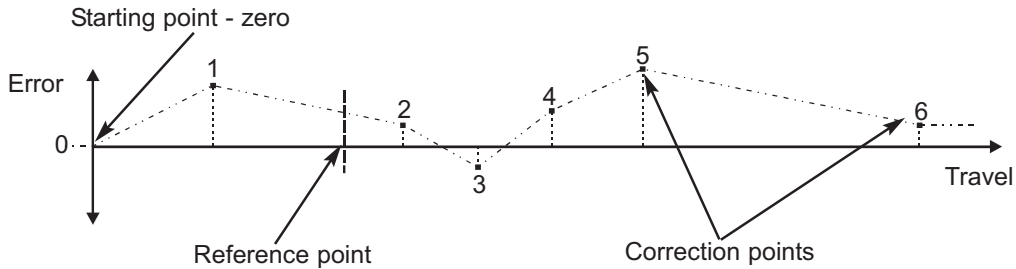
Correction points

Each Correction Point is measured with respect to the Starting Point - zero - which is usually set close to one end of the scale. The Reference Point can be set anywhere along the scale, and does not need to coincide with either the absolute datum or any of the correction points. However, it may be convenient to make the absolute datum and the reference point the same.
Always approach the Starting Point, Correction Points and Reference Point from the same direction. If not, the size of the tool or probe will render the measurement inaccurate.

Segmented Error Compensation Setup

Setup

☞ △

Segmented Error
1. Teach
2. Program

Exit   Back

☞ ① To select **Teach** mode

☞ ② To select **Program** mode

Teach Mode

☞ ①

Segmented Error

Move To Reference

Exit   OK   Back

OK

☞ △

Segmented Error

Move To Zero

Exit   OK   Back

OK

☞ △

Segmented Error

Move To Point 1

Exit   OK   Back

OK

☞ △

Segmented Error
Movement?:
0.000
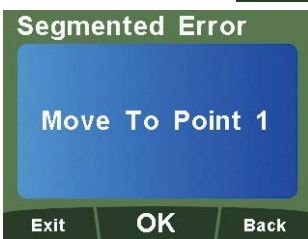
Exit   OK   Back

Enter movement using the numeric keypad

☞ (ent)

Segmented Error
Correction:
0.200

Exit   Accept   Back

Accept

☞ △

Segmented Error

Continue?

Exit   Yes   No
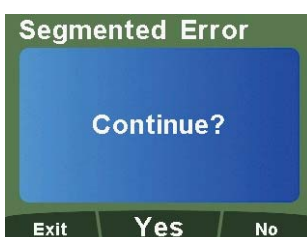
Select "Yes" to move on to point 2 (maximum 200 points). Select "No" to accept the segmented compensation.

Setting Up The Unit

Program Mode

The program mode enables the user to define the correction points manually and then enter them into the DP1200. The position is where the correction point occurs, and the correction point is the value to be corrected at that point.

Position 1: Enter a value using the numeric keypad for the 1st correction point (I.E 5.000)

Correction 1: Enter a value using the numeric keypad for the correction value (I.E -0.010)

Note: The correction value is limited to a minimum of 0.005mm (0.0002")

to navigate between points. A maximum of 200 points are available.

OK to accept the compensation at the point reached.

Setting Up The Unit

Setup Axis 4 (Digital Linear)

For models with 5v TTL quadrature 4th axis

Legend Setup

Please refer to Page 10, Legend Setup

Encoder Setup

```
Axis 4 Setup
◄ Encoder:        ►
1. Linear
2. Rotary (Angular)
3. Rotary (Linear)


Exit              Back
```
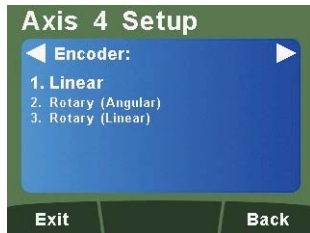
☞ ① To select **Linear** as the encoder type

Reference Source Setup

The DP1200 is capable of using an internal reference or an external reference source for the digital 4th axis. An internal reference is the reference mark provided by the encoder.

```
Axis 4 Setup
◄ Reference Source:  ►
1. Internal
2. External


Exit              Back
```
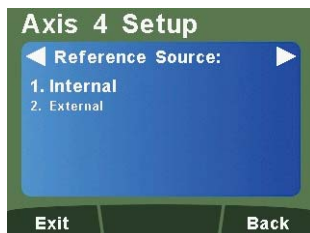
☞ ① To select **Internal** referencing

☞ ② To select **External** referencing

Encoder Resolution

Enter the resolution of the encoder for the 4th digital axis using the numerical keys.
It is important the resolution of the encoder is entered exactly or inaccurate measurements will occur.

Example:

Linear encoder has a resolution of 0.001mm.

Navigate to

```
Axis 4 Setup
◄ Encoder Resolution:  ►


   0.0001


Exit              Back
```

☞ ⓪ ⊙ ⓪ ⓪ ① (ent)

Note: Inch / mm function must be set to reflect entered resolution

Display Resolution

Enter the resolution that is required to be displayed using the numerical keys.
The displayed resolution can only be the same or higher than the encoder resolution.

Example:

Linear Encoder has a resolution of 1µm (0.001) and is to be displayed at 5µm (0.005).

Navigate to

```
Axis 4 Setup
◄ Display Resolution:  ►


   0.005


Exit              Back
```

☞ ⓪ ⊙ ⓪ ⓪ ⑤ (ent)

Note: Inch / mm function must be set to reflect entered resolution

Setting Up The Unit

Direction Setup

Please refer to Page 10, Direction Setup

Radius / Diameter (Measure Setup)

Please refer to Page 10, Radius / Diameter (Measure Setup)

Signal Checking Setup

The DP1200 has the facility to detect if the encoder attached to the 4th digital axis has become disconnected, sustained severe cable damage, or with some encoders, experienced electronic failure.

Mode of Operation

The detection mechanism monitors the incoming signals from the encoder to look for an illegal combination of input levels.

If the encoder becomes disconnected, then the illegal input combination is generated internally within the DP1200. The display will then show 'SIG FAIL'. If it is possible to correct the fault, press the axis zero key to reset that display. If the 'SIG FAIL' message continues to be displayed then the fault has not been corrected.

A	B	RM	Status
L	L	H	SIG FAIL
L	H	X	OK
H	L	X	OK
X	X	L	OK

X = any state i.e can be either high (H) or low (L).

Note: Please check the encoder specification for information on the synchronisation of the index marker pulse. If the encoder is capable of generating the illegal condition (A low, B low and RM high), then signal checking function should be **TURNED OFF**.

Axis 4 Setup

◄ **Signal Checking:** ►
1. On
2. Off

Exit   Back
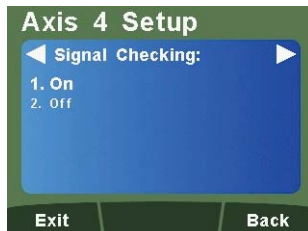
① To enable Signal Checking

② To disable Signal Checking

Zero Approach Setup

Please refer to Page 11, Zero Approach Setup

Error Compensation Setup

Please refer to Page 11, Error Compensation Explanation
Page 12, Type of Machine Error
Page 12, Linear Error Compensation Explanation
Page 13, Linear Compensation Setup

Setting Up The Unit

Setup Axis 4 (Digital Rotary Angular)

For models with 5v TTL quadrature 4th axis. The rotary angular option is for customers using a rotary encoder who want an angular displayed measurement
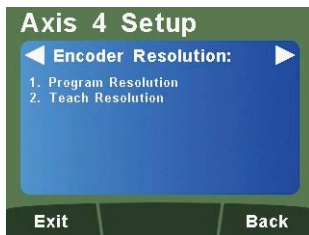
Legend Setup

Please refer to Page 10, Legend Setup

Encoder Setup

Axis 4 Setup
◄ Encoder: ►
1. Linear
2. Rotary (Angular)
3. Rotary (Linear)

Exit   Back
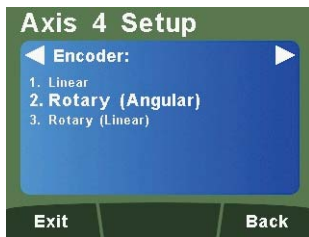
☞ ② To select **Rotary** (**Angular**) as the encoder type

Reference Source Setup

Please refer to Page 16, Reference Source Setup

Encoder Resolution Setup

Axis 4 Setup
◄ Encoder Resolution: ►
1. Program Resolution
2. Teach Resolution

Exit   Back
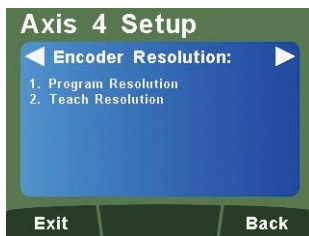
☞ ① To select **Program Resolution**

☞ ② To select **Teach Resolution**

Program Resolution Setup

This setting allows the user to program the DP1200 with a rotary encoder resolution.
Rotary encoder resolutions are usually expressed as **Pulses Per Turn**. This is the number of pulses output per revolution.
Information on the **PPT** can be found in the encoder manufacturer's specification and is also generally marked on the encoder.

Navigate to

Example

Rotary encoder has a
PPT
of 1024

Axis 4 Setup
◄ Encoder Resolution: ►

1024

Exit   Back

☞ ① ⓪ ② ④   ☞ (ent)
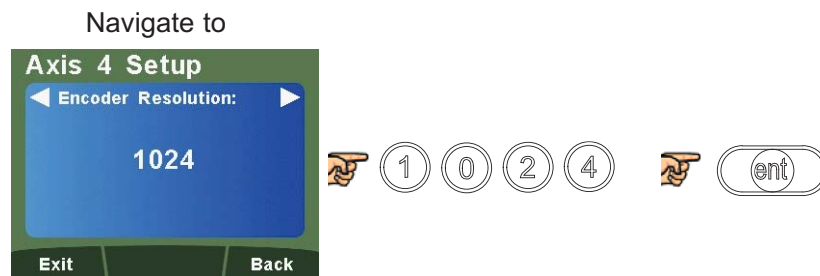
PPT = Counts per Revolution (CPR) /4

Teach Resolution Setup

Axis 4 Setup

Rotate Axis

Exit   Back

Rotate rotary encoder until a value is displayed in the LCD display.

For this example an 1800 pulse encoder is connected.

Axis 4 Setup
◄ Encoder Resolution: ►

1800

Exit   Accept   Back

Accept
☞ △

Setting Up The Unit

Angular Display Setup

Axis 4 Setup
◄ Angular Display: ►
1. Decimal
2. Degrees Minutes Seconds

Exit   Back
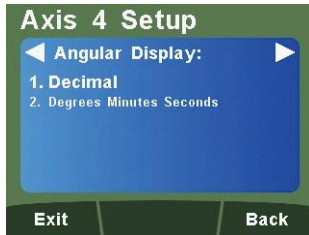
☞ ① To select **Decimal** (Degrees)

☞ ② To select **Degrees Minutes Seconds**

Angular Mode Setup

This function allows the selection of rollover at 360° back to zero or to provide a continuous measurement.

Axis 4 Setup
◄ Angular Mode: ►
1. Rollover
2. Continuous

Exit   Back

☞ ① To select **Rollover** (Rollover at 360°)

☞ ② To select **Continuous**

Direction Setup

Please refer to Page 10, Direction Setup

Signal Checking Setup

Please refer to Page 16, Signal Checking Setup

Zero Approach Setup

This setting provides a visual indication that one or more axes are approaching zero. It does this by using the far left LED segment on each axis, as the axis approaches zero, each segment of the '0' lights up in quick succession. Once zero has been reached, the '0' to the far left will be constantly on.

Navigate to

Axis 4 Setup
◄ Zero Approach: ►

0.000°

Exit   Back

Enter any value using the numeric keys to provide zero approach limits. This can be entered in degrees or degrees minutes seconds, dependant on the Angular Display Setting.

Note: To disable the zero approach function, enter a value of 0.000.

Default is 0.000

Setting Up The Unit

Setup Axis 4 (Digital Rotary Linear)

For models with 5v TTL quadrature 4th axis. The rotary linear option is for customers using a rotary encoder who want linear displayed measurement

Legend Setup

Please refer to Page 10, Legend Setup

Encoder Setup

```
Axis 4 Setup
◄ Encoder:              ►
1. Linear
2. Rotary (Angular)
3. Rotary (Linear)

Exit              Back
```
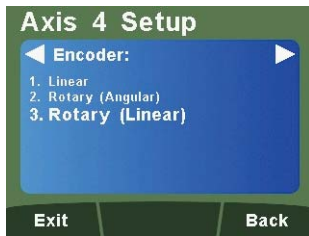
☞ ③ To select **Rotary (Linear)** as the encoder type

Encoder Resolution Setup

```
Axis 4 Setup
◄ Encoder Resolution:   ►
1. Program Resolution
2. Teach Resolution

Exit              Back
```

☞ ① To select **Program Resolution**

☞ ② To select **Teach Resolution**

Program Resolution Setup

```
Axis 4 Setup
◄ Encoder Resolution:   ►

      0.0001

Exit              Back
```

Enter the linear resolution via the numeric keypad.

Example: 10mm linear movement required from 1 revolution of an 1800 pulse rotary encoder

$$\frac{10}{1800} \text{ /4} = 0.0013888$$

Teach Resolution Setup

```
Axis 4 Setup


  Move To Start

Exit    OK    Back
```
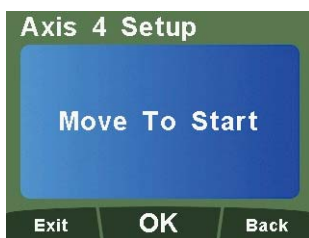
Move the rotary encoder to a known start point

OK

☞ △

```
Axis 4 Setup


  Move To End

Exit    OK    Back
```

Move the rotary encoder to a known end point

OK

☞ △

```
Axis 4 Setup
Movement?:

      0.000

Exit              Back
```

Enter the linear movement using the numerical keys

☞ (ent)

```
Axis 4 Setup
◄ Encoder Resolution:   ►

    0.00695894

Exit   Accept   Back
```

The resolution is calculated by the DRO and displayed

Accept

☞ △

Setting Up The Unit

Display Resolution Setup

Please refer to Page 15, Display Resolution Setup

Direction Setup

Please refer to Page 10, Direction Setup

Radius / Diameter (Measure Setup)

Please refer to Page 10, Radius / Diameter (Measure Setup)

Signal Checking Setup

Please refer to Page 16, Signal Checking Setup

Zero Approach Setup

Please refer to Page 11, Zero Approach Setup

Error Compensation Setup

Please refer to Page 11, Error Compensation Explanation
Page 12, Type of Machine Error
Page 12, Linear Error Compensation Explanation
Page 13, Linear Compensation Setup

Setting Up The Unit

General Setup

Language Setup

General Setup
◄ Language: ►
1. **English (British)**
2. English (US)
3. 中文
4. Dansk
5. Español
6. Français
7. More

Exit   Back

Choose the required language the unit is to display. If the language required is not in the 1st menu press "**7**" to display more languages.

Application Setup

General Setup
◄ Application: ►
1. Mill
2. Lathe
3. Generic

Exit   Back

☞ ① To select **Mill**

☞ ② To select **Lathe**

☞ ③ To select **Generic**

Note: When set to Lathe, Axis 1 (top) changes to diameter measurement

Note: When set to Lathe or Mill, some functions are automatically turned off

Plane Setup

This setting defines the machining face of the work piece, for example; on a turret mill it would typically be the X Axis and the Y Axis. This setting is used by the mill functions.
This setting refers to the legend that has been set for Axes 1, 2 & 3. In the **example** Axis 1 has a legend of '**X**', Axis 2 has a legend of '**Y**', and Axis 3 has a legend of '**Z**'.

General Setup
◄ Plane: ►
1. XY
2. XZ
3. YZ

Exit   Back
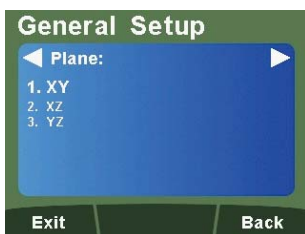
☞ ① To select **X** and **Y** axes

☞ ② To select **X** and **Z** axes

☞ ③ To select **Y** and **Z** axes

Axis Coupling Setup

This feature enables the permanent summing of Axis 4 with one of the other axes. It is most commonly used for mills. The axes selected in the plane setting parameter will not be summed.
Example: The plane has been set to the X and Y Axes, then the fourth axis is summed with Z, (3rd Axis.)

General Setup
◄ Axis Coupling: ►
1. On
2. Off

Exit   Back

☞ ① To enable the Axis Coupling feature

☞ ② To disable the Axis Coupling feature

Note: When this feature is active, the 4th Axis display will be blank.

Setting Up The Unit

Functions Setup

Allows the user to enable or disable Mill / Lathe functions. Functions in white text are enabled. Functions in grey text are disabled.

Note: Some functions may already be disabled if the DP1200 is set as a Mill or Lathe at application setup, and dependant on the number of axes available.
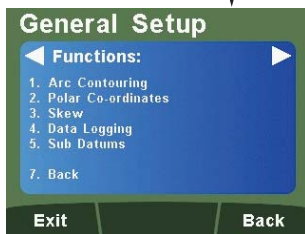
Numeric Key	Function
1	Tool Offsets
2	Vector
3	Taper Angle
4	Axis Summing
5	PCD
6	Line Hole
7	More
Press Key 7 for the options below	
1	Arc Contouring
2	Polar Co-ordinates
3	Skew
4	Data Logging
5	Sub Datums

Probe Diameter Setup

Allows the user to enter a probe diameter to be used with the DP1200. The probe diameter information can be found in the probe specification.

Example: The probe diameter is 5mm.

☞ ⑤ (ent)

Note: Default value is 4mm

Note: Inch/mm key must be set accordingly

Beep Setup

☞ ① Beep **On**

☞ ② Beep **Off**
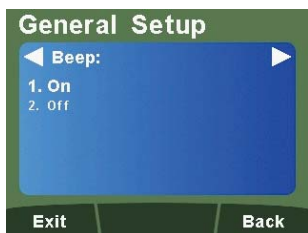
Note: Default is Beep On

LCD Brightness Setup

The DP1200 allows the user to adjust the brightness of the LCD screen for user preference.

☞ ① To select **20%** brightness

☞ ② To select **40%** brightness

☞ ③ To select **60%** brightness

☞ ④ To select **80%** brightness

☞ ⑤ To select **100%** brightness
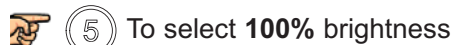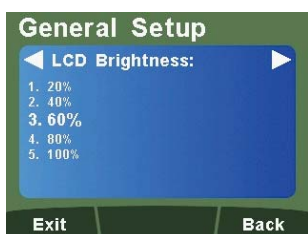
Note: Default is 60% brightness

Setting Up The Unit

Sleep Setup

Allows the user to select a time period where the unit will automatically go into Sleep Mode. If no movement is made or keys pressed for the time period set, the sleep mode will be activated.
Example: The sleep time is required after 5 minutes

☞ (5) (ent)

Note: To deactivate this feature, enter a value of "0" (default)

Unlock Axis

Allows the unit to be upgraded from a 2 or 3 Axis unit up to 4 Axes. Please contact your local authorised Newall distributor to purchase this option.

Contact Newall to progress further

Reset Setup

Allows the user to reset the unit back to factory defaults.
There are three factory default settings according to the application.
Example: The unit is being reset as a **Lathe**.

☞ (1) To default as **Mill**

☞ (2) To default as **Lathe**

☞ (3) To default as **Generic**

☞ (△)

Note: When the DP1200 is setup as a Lathe, the 'X' (top) Axis default setting is DIA, therefore the 'X' (top) Axis will display double.

OEM Defaults: The DP1200 may have OEM default settings specific to a machine. In this case, the DP1200 will only display one reset option. This reset will default all the parameters to match the OEM defaults set for the machine when the DRO was originally installed.

Standard Functions

This Section details the standard functions of the DP1200.

Absolute / Incremental

Press (abs/inc) to toggle between absolute and incremental mode

The DP1200 has a dedicated key to switch the positional displays between absolute (abs) and incremental (inc) measurements. The current display mode is indicated by a red LED either above or below the key as shown on the right.

Absolute (abs) mode has been selected

Incremental (inc) mode has been selected
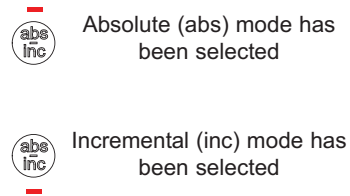
Using Incremental Mode

In Incremental Mode the DRO displays the position relative to the last position. This is also known as point-to-point use. In this mode you can set the value for each axis or zero it to create an Incremental Datum. This does not effect the machine's Absolute Datum that you configure in Absolute Mode.
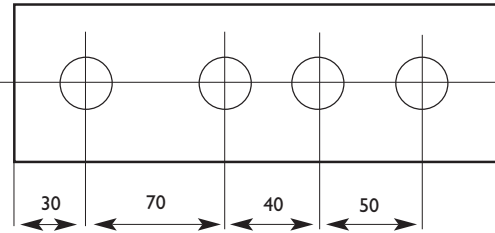
Using Absolute Mode

In Absolute Mode the DRO displays the positions of all the axes with respect to a fixed datum. The datum is set by entering an axis position when in Absolute Mode.
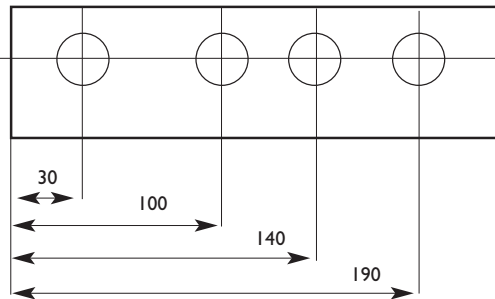
Example of Absolute and Incremental use

Set absolute zero at lower left corner of the part

```
0. 000
0. 000
```

Move to first position in ABS (Hole A)

```
30. 000
30. 000
```

Move to second position in ABS (Hole B)

```
150. 000
100. 000
```

Switch to incremental mode and zero the display

```
0. 000
0. 000
```
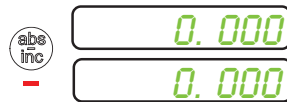
Make an incremental move to Hole C

```
0. 000
50. 000
```

Switch to absolute mode

```
150. 000
150. 000
```
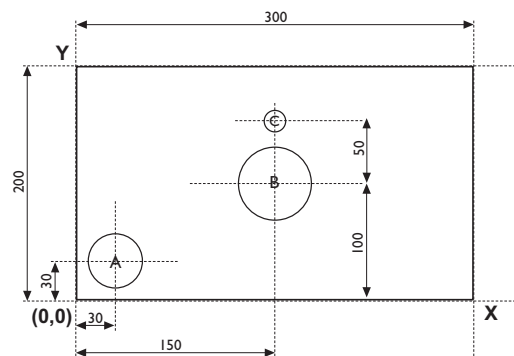

Inch and mm

Press (in/mm) to toggle between Inch and mm mode

The DP1200 has a dedicated key to switch the positional displays between imperial (inch) and metric (mm) measurements. The current display mode is indicated by a red LED either above or below the key as shown on the right.

Imperial (Inch) mode has been selected

Metric (mm) mode has been selected
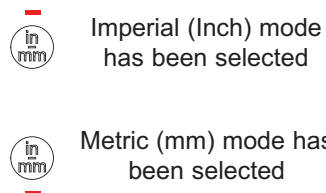
Standard Functions

Zero and Preset an Axis

Press (zero set) to toggle between 'Set' and 'Zero' Mode

The DP1200 has a dedicated key to switch the operation of the axis selection key between Zero Mode and Set Mode. The selected mode is indicated by an LED either above or below the key as shown on the right.

(zero set)   Zero mode has been selected

(zero set)   Set mode has been selected
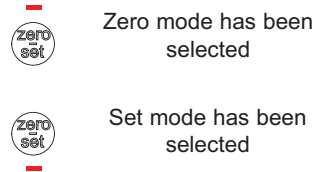
Using Set Mode

With Set Mode selected, this enables the select axis keys to prompt a numeric entry into the desired axis. Once the correct value has been selected, it can be set into the axis by pressing (ent) . This can be seen in the example on the right.

`0. 000` ◁ ← Press the axis select key relevant to the axis

`0` Input the required numeric value

☞ (±) (1) (4) (5) (·) (2) (3) ☞ (ent)

`-145. 230`

Zeroing an Axis in Set Mode

With Set Mode selected, it is possible to zero the axis conveniently by double pressing the relevant select axis key. This can make use of the DP1200 Zeroing and Set Modes quicker and easier. This is shown in the example on the right.

`-145. 230` ◁

☞ ◁ ◁

`0. 000`
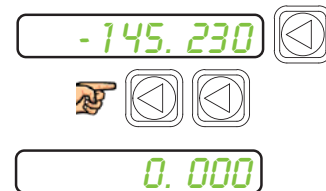
Using Zero Mode

With Zero Mode selected, this enables the select axis keys to zero each axis independently. This can be seen in the example on the right.

◁ ← Press the axis select key relevant to the axis

`0. 000`
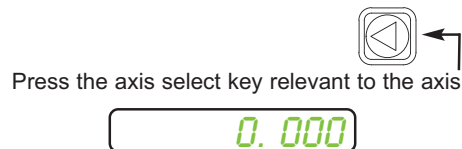
Undo Function

The DP1200 stores the last 10 positions/numeric inputs, which can be accessed using the undo (↩) feature.

Example 1 - non movement

Display shows `-145. 230` input a value `95. 520`

An incorrect figure has been entered and you want to get back to the dimension displayed before

Press (↩) , display now shows `-145. 230`

Example 2 - movement

Input a value `5. 000` move to that point, display now shows `0. 000`

Input a value `10. 000` move to that point, display now shows `0. 000`

Press (↩) once, display now shows `-10. 000` this is the position of your second point
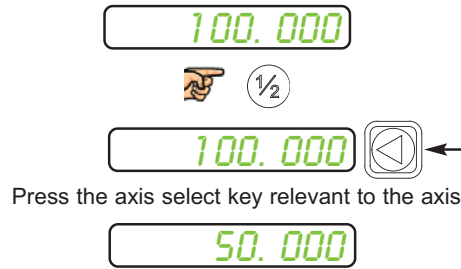
Press (↩) again, display now shows `-15. 000` this is the position of your starting point

Standard Functions

Half Function / Centre Find

Press $\frac{1}{2}$ key to initiate the half function.

The DP1200 has a dedicated key to halve the value of any axis. This is done by initiating the half mode and selecting the required axis. This can be seen in the example on the right.
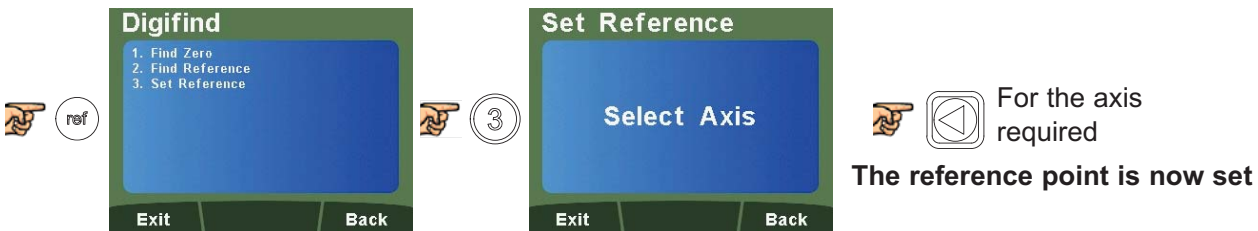
```
100. 000
```
☞ $\frac{1}{2}$
```
100. 000   ◁ ←
```
Press the axis select key relevant to the axis
```
50. 000
```

Digifind / Reference Function

The DP1200 comes equipped with Digifind, a feature unique to Newall Digital Readouts. Digifind eliminates the risk of losing your position and datum setup. Digifinds precise setup of a workpiece is carried out only one time. When the unit is powered on, it displays the position at power off, compensated for any movement of a Spherosyn Encoder up to 0.2500" (6mm) and a Microsyn Encoder up to 0.1000" (2.5mm) in either direction since the unit was last used. If the machine has moved beyond 0.2500" (6mm) for Spherosyn or 0.1000" (2.5mm) for Microsyn, Digifind allows a quick means to find the datum if lost. Follow the steps below;

Make a mark on both a stationary part and moving part of the machine. The marks must be aligned and will serve as the machine "home" position. (The mark must be indelible and must allow the operator to move the machine to within a 0.2500" (6 mm) for Spherosyn or 0.1000" (2.5mm) for Microsyn around the mark at any time.) Alternatively, you can use a convenient reference point on the workpiece.

Setting the reference

☞ ref

Digifind
1. Find Zero
2. Find Reference
3. Set Reference

Exit   Back

☞ ③

Set Reference

Select Axis

Exit   Back

☞ ◁   For the axis required

The reference point is now set

Finding the reference

If datum is lost at anytime, it is possible to "Find" the datum again. Position the machine within a 6mm (0.2500") band for Spherosyn or a 2.5mm (0.1000") band for Microsyn.

☞ ref

Digifind
1. Find Zero
2. Find Reference
3. Set Reference

Exit   Back

☞ ②

Find Reference

Select Axis

Exit   Back

☞ ◁   For the axis required

The position to the absolute zero for that axis is now displayed
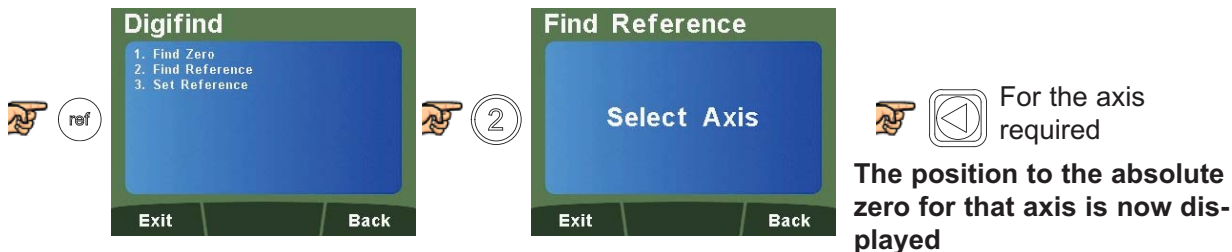
Finding zero

As a fail safe, Digifind can "Find" the last datum or absolute zero set. Position the machine within a 6mm (0.2500") band for Spherosyn or a 2.5mm (0.1000") band for Microsyn.

☞ ref

Digifind
1. Find Zero
2. Find Reference
3. Set Reference

Exit   Back

☞ ①

Find Zero

Select Axis

Exit   Back

☞ ◁   For the axis required

The original datum is reset
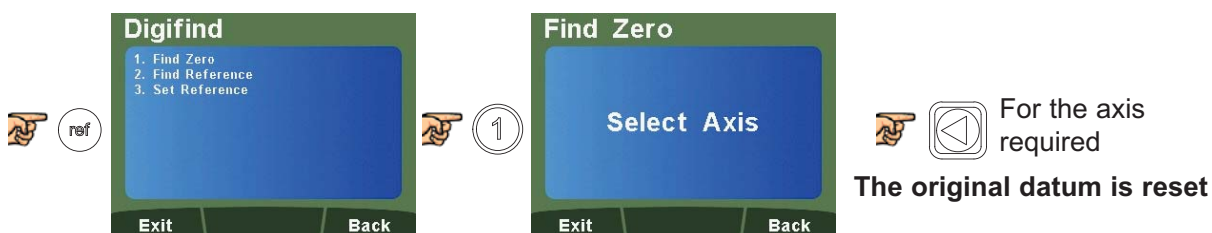
Standard Functions

Sub Datums / Memory

The DP1200 can store up to 200 SDM (Sub-Datum) positions, or machining steps, into the memory. Using SDM allows the operator to work to zero by calling up stored dimensions, instead of "working up" to drawing dimensions. This eliminates the need to constantly refer to the drawing and reduces the possibility of scrapping parts due to misread dimensions. It also speeds up positioning as the operator is working to zero.

The SDM's are stored as co-ordinates relative to the absolute datum position. If the absolute datum position changes, the SDMs will "shift" to the new datum.

Once a repetitive sequence of co-ordinates is entered into SDM, the co-ordinates can be recalled at any time.The positions remain in memory until altered by the operator. Simply assign any SDM number 1 - 200 to each machining step. When machining, call up each step (SDM) number and work to zero. Sub Datums can be used for any or all axes. There are two ways to store Sub Datums; Teach Mode and Program Mode.

See examples below.

How to navigate to the Sub Datum Function

Menu

Menu
1. Tool Offsets
2. Vector
3. PCD
4. Line Hole
5. Arc Contouring
6. Skew
7. Sub Datums
8. Data Logging
9. Setup

Exit | Info | Back

Sub Datums
1. Use Datums
2. Teach Datums
3. Program Datums

Exit | Use | Back

1 — Use SDM's

2 — Teach SDM's

3 — Program SDM's

How to use Sub Datum Teach Mode

Select **Teach Datums** to reach the screen below

Teach Datums

Datum:
◄001►

Exit | Acquire | Back

Move machine to the first sub datum location

Acquire

Repeat until all sub datums have been entered

Back to return to the Sub Datums Menu or **Exit** to return to normal operation

How to use Sub Datum Program Mode

Select **Program Datums** to reach the screen below

Program Datums

Datum:
◄001►

Exit | Back

Enter sub datum value for this axis

ent Repeat for each axis

to move to next sub datum

Back to return to the Sub Datums Menu or **Exit** to return to normal operation

Standard Functions

Sub Datums / Memory (Continued)

How to use Sub Datums
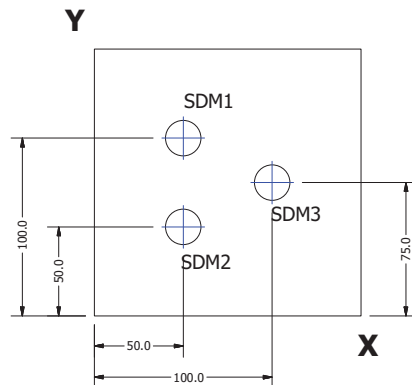
Select **Use Datums** to reach the screen below
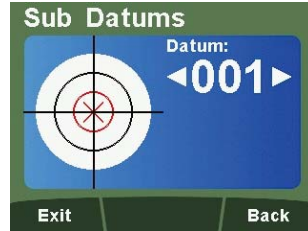
The DRO will display the distance needed to move to the sub datum point. The sub datum point destination is 0 for each respective axis.

☞ ◁ ▷ to scroll through sub datums or use the numeric keypad to input the sub datum required

☞ **Back** △ to return to the Sub Datums Menu or ☞ **Exit** △ to return to normal operation

Example of Sub Datums

Sleep Mode

The DP1200 offers two different ways to put the DRO into sleep mode; using the sleep key or automatically after a set period of time (See Page 24 - Sleep Setup).

Entering Sleep Mode using the sleep key

☞ ⏻ to turn all displays off apart from the Power LED. Any key presses or movement will **not** bring it out of this mode. To return to normal operation ☞ ⏻ , the unit will boot up to the start screen. Once any key is pressed, the DP1200 will return to normal operation.

Entering Sleep Mode automatically

Once setup, (See Page 24 - Sleep Setup), apply no movement or any key presses for the period of time set and the DP1200 will turn off all displays apart from the power LED. Any key presses or movement **will** bring it out of this mode.
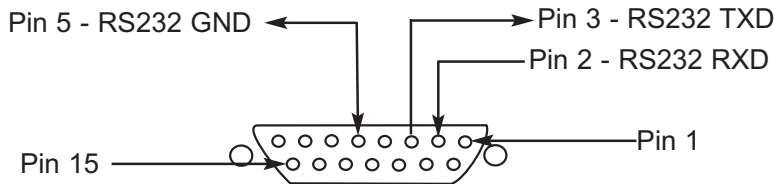
Standard Functions

RS232 (Data Logging) / Data Acquisition

The DP1200 can offer basic serial communication via a dedicated RS232 compatible port, which is used for data logging purposes.
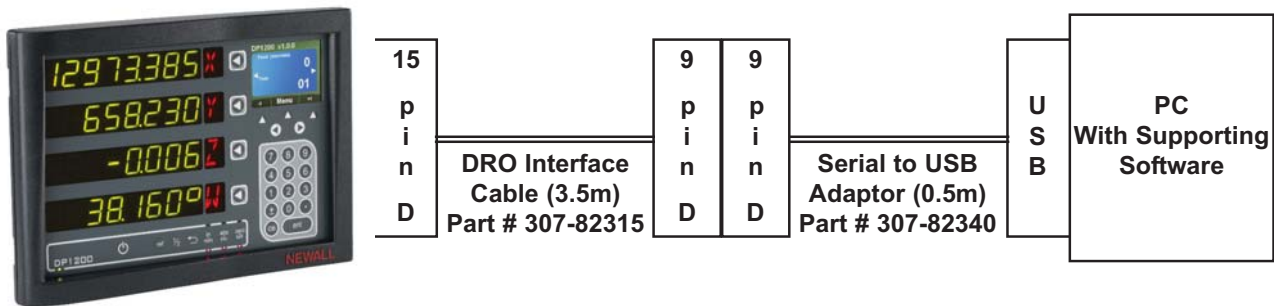
RS232 Connections

The RS232 is connected to the DP1200 via a 15-pin D-type connector at the rear of the display. The required connection details are shown below.

Pin 5 - RS232 GND   Pin 3 - RS232 TXD
Pin 2 - RS232 RXD
Pin 1
Pin 15

The RS232 port allows position data from the DRO to be sent to a computer.

Applications:
- Quality Control – Save dimensional data from finished parts
- Test and measurement
- Length gauges

15 pin D	DRO Interface Cable (3.5m) Part # 307-82315	9 pin D	9 pin D	Serial to USB Adaptor (0.5m) Part # 307-82340	USB	PC With Supporting Software

RS232 Setup

Menu

Menu
1. Tool Offsets
2. Vector
3. PCD
4. Line Hole
5. Arc Contouring
6. Skew
7. Sub Datums
8. Data Logging
9. Setup

Exit   Info   Back

☞ ⑧ To select **Data Logging**

Standard Functions

RS232 Setup (Continued)

Data Logging
Output:
1. Off
2. Enter Key
3. Periodic
Exit   Go   Back
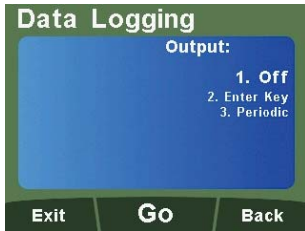
👉 ① To turn Data Logging off

👉 ② To use Enter Key to trigger Data Logging

👉 ③ To select Data Logging periodically

Go

If **off** is selected 👉 △ to return to the main menu and disable Data Logging
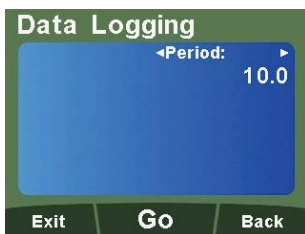
If **Enter Key** or **Periodic** are selected 👉 ▷

Data Logging
◀Baud Rate: ▶
1. 9600
2. 14400
3. 19200
4. 38400
5. 57600
6. 115200
Exit   Go   Back

Select the Baud Rate to match the baud rate supported at the PC

👉 ▷

Data Logging
◀Parity: ▶
1. None
2. Even
3. Odd
Exit   Go   Back

👉 ① To select **None** (disable Parity)

👉 ② To select **Even** Parity

👉 ③ To selects **Odd** Parity

👉 ▷

Note: Period will only be shown if the **Periodic** output was selected

Data Logging
◀Period: ▶
10.0
Exit   Go   Back

Enter, using the numeric keypad, the number of seconds between each communication 👉 (ent)

Go

👉 △

Menu
1. Tool Offsets
2. Vector
3. PCD
4. Line Hole
5. Arc Contouring
6. Skew
7. Sub Datums
8. Data Logging
9. Setup
Exit   Info   Back

Exit

👉 △ The RS232 is now live and functioning
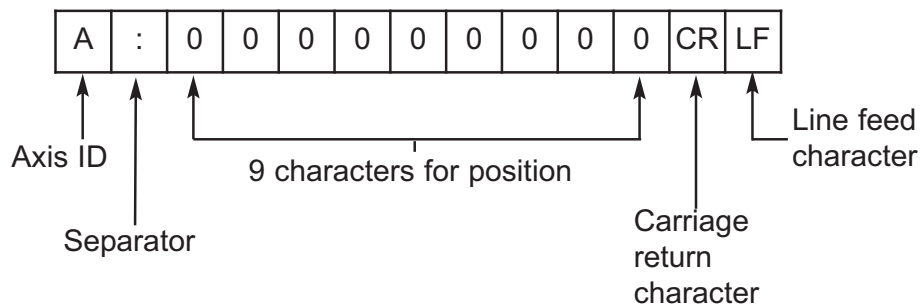
Standard Functions

RS232 Output Data Format

The output data from the RS232 is as follows;

The current axis data for the axes available on the system is transmitted.

For two axes systems, only two axes of data will be transmitted.

The data packet structure of 12 characters is defined as follows:

A	:	0	0	0	0	0	0	0	0	0	CR	LF

- Axis ID
- Separator
- 9 characters for position
- Carriage return character
- Line feed character

The **Axis ID** is the representation of the axis at the time of printing. This will be shown by the legend set for the axis at that time. Please see example below;

Example:

The example below shows an RS232 output from a 4 axes DP1200, with the legend set as "X" (1st axis) "Y" (2nd axis), "Z" (3rd axis) and "W" (4th axis).

X: 531.420
Y: 497.615
Z: 15.006
W: 131.295

Mill Functions

PCD / Bolt Hole Circle

The DP1200 calculates positions for a series of equally spaced holes around the circumference of a circle. Once the parameter data is entered, the DP1200 displays the distance to the next hole. The operator works to zero for each hole location. See example (**Fig 1**).

Note: This function only operates in the axes that have been setup in the plane (See Page 24 - Plane Setup).

Menu

> **Menu**
> 1. Tool Offsets
> 2. Vector
> 3. PCD
> 4. Line Hole
> 5. Arc Contouring
> 6. Skew
> 7. Sub Datums
> 8. Data Logging
> 9. Setup
> Exit   **Info**   Back

☞ △

☞ ③   To select **PCD** (Bolt Hole Circle)

Example

☞ ◁   Enter 1st centre coordinate   ☞ ① ② ⑤ ▫ ② ⑤ ☞ ent

☞ ◁   Enter 2nd centre coordinate   ☞ ⑨ ⑨ ▫ ⑦   ☞ ent

☞ ▷

> **PCD Setup**
> ◂Centre: ▸
> 125.250
> 99.700
> Exit   Go   Back

Enter the diameter dimension   ☞ ① ⑤ ⓪

☞ ent

> **PCD Setup**
> ◂Diameter: ▸
> 150.000
> Exit   Go   Back

Enter the number of holes required   ☞ ⑤

☞ ent

> **PCD Setup**
> ◂Holes: ▸
> 5
> Exit   Go   Back

Enter start angle required   ☞ ① ⑧   ☞ ent

Note: The PCD will be calculated from the 3 o'clock position, counter-clockwise. Enter the angle as a negative value if it is given as clockwise from 3 o'clock.

> **PCD Setup**
> ◂Start Angle: ▸
> 18.000
> θ
> Exit   Go   Back

Enter end angle required   ☞ ① ⑧   ☞ ent

Note: End angle must equal start angle for a full circle PCD routine.

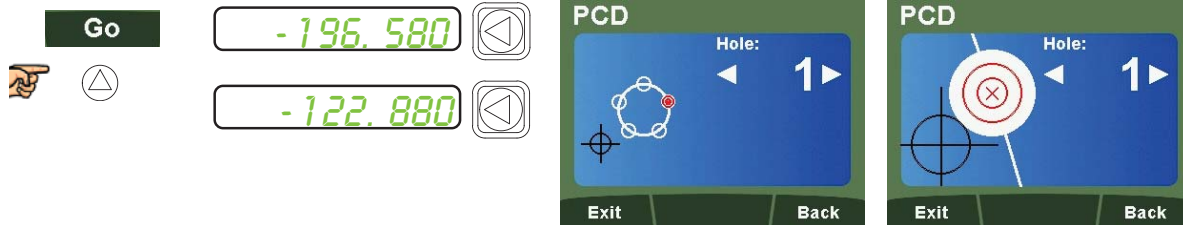> **PCD Setup**
> ◂End Angle: ▸
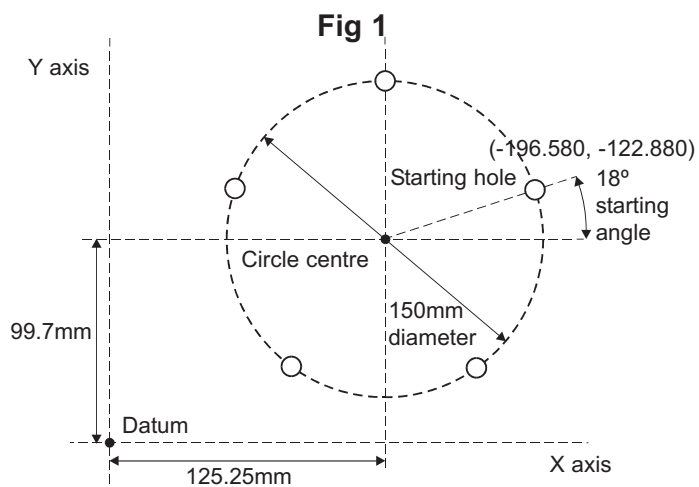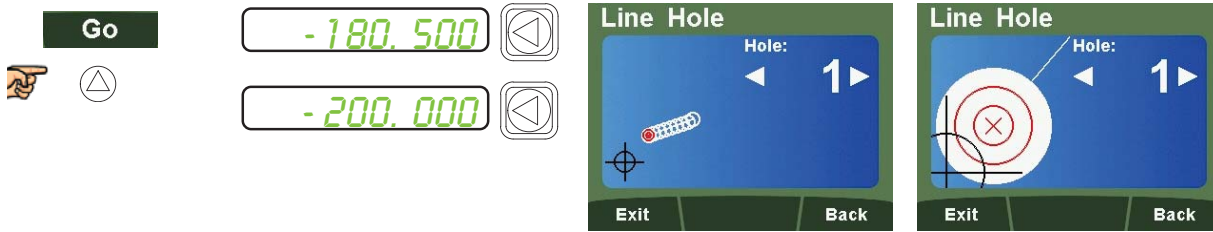> 18.000
> θ
> Exit   Go   Back

Mill Functions

PCD / Bolt Hole Circle (Continued)

Note: At this point you can use the ◁ ▷ keys to navigate back and forth through the menus.

To start the PCD / Bolt Hole Circle Routine;

Go
☞ △

-196.580 ◁
-122.880 ◁

PCD
Hole: ◀ **1**▶
Exit   Back

PCD
Hole: ◀ **1**▶
Exit   Back

Navigate through the sequence of holes by using ◁ ▷ keys.

Fig 1

Y axis

(-196.580, -122.880)
Starting hole   18°
starting
angle

Circle centre

150mm
diameter

99.7mm

Datum

125.25mm

X axis

Mill Functions

Line Hole

The DP1200 calculates positions for a series of equally spaced holes on a line. Once the parameter data is entered, the DP1200 displays the distance to the next hole. The operator works to zero for each hole location. See example (**Fig 2**).

Note: This function only operates in the axes that have been setup in the plane (See Page 24 - Plane Setup).

☞ **Menu** ☞ △

Menu
1. Tool Offsets
2. Vector
3. PCD
4. Line Hole
5. Arc Contouring
6. Skew
7. Sub Datums
8. Data Logging
9. Setup

Exit   Info   Back

☞ ④   To select **Line Hole**

Example

☞ ◁   Enter 1st start coordinate

☞ ① ⑧ ⓪ · ⑤   ☞ ent

Line Hole Setup
◄Start: ►
180.500
200.000

Exit   Go   Back

☞ ◁   Enter 2nd start coordinate

☞ ② ⓪ ⓪   ☞ ent

☞ ▷

Enter the line hole length dimension   ☞ ③ ⑤ ⓪

☞ ent

Note: Length = total length of line hole sequence, not distance between adjacent holes.

Line Hole Setup
◄Length: ►
350.000

Exit   Go   Back

Enter the number of holes required   ☞ ⑨

☞ ent

Line Hole Setup
◄Holes: ►
9

Exit   Go   Back

Enter angle required in degrees   ☞ ② ⓪   ☞ ent

Line Hole Setup
◄Angle: ►
20.000
θ

Exit   Go   Back

Note: At this point you can use the ◁ ▷ keys to navigate back and forth through the menus.

Mill Functions

Line Hole (Continued)

To start the line hole circle routine;

Go

👉 △

| - 180.500 | ◁ |
| - 200.000 | ◁ |

Line Hole

Hole:

◀ **1** ▶

Exit   Back

Line Hole

Hole:

◀ **1** ▶

Exit   Back

Navigate through the sequence of holes by using ◁ ▷ keys.

Fig 2

Y axis

350mm line length

20º line angle

9 holes

Starting point

200mm

Datum

X axis

180.5mm
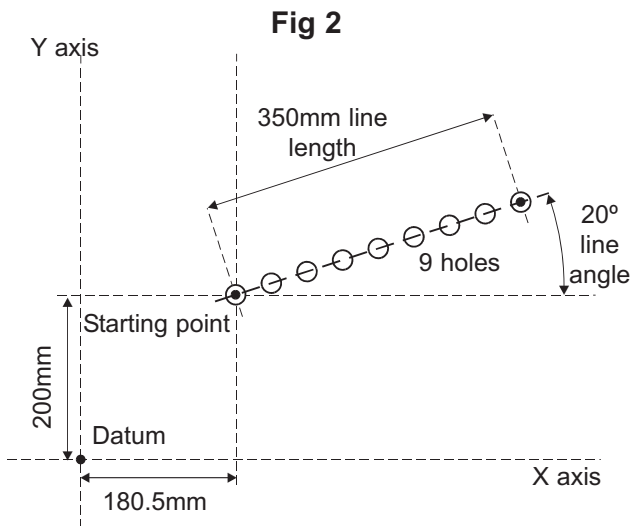
Mill Functions

Arc Contouring

The DP1200 calculates positions for rough machining of an arc or radius. The message display prompts the user for parameters needed to complete the calculations.

Once parameters are entered, the DP1200 shows the co-ordinates, which are point to point positions along the arc. The operator works to zero for each hole location. See example below.

The arc feature is dependant on the **Plane** setting for the axes it will operate in (See Page 24 - Plane Setup).

Menu

```
Menu
1. Tool Offsets
2. Vector
3. PCD
4. Line Hole
5. Arc Contouring
6. Skew
7. Sub Datums
8. Data Logging
9. Setup

Exit    Info    Back
```

☞ 5 To select **Arc Contouring**

Note: Use the ◁ ▷ keys to navigate through the parameters.

```
Arc Setup
◄Centre:►
0.000
0.000

Exit    Go    Back
```
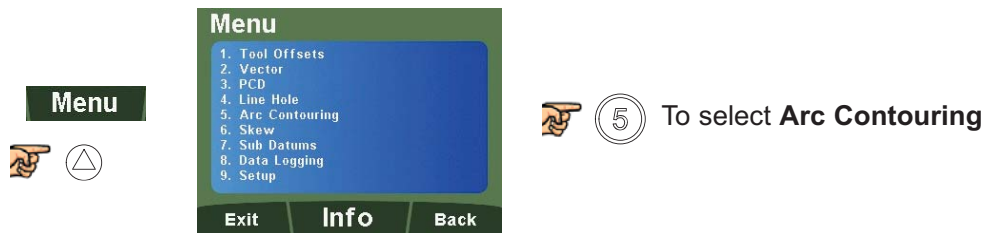
Enter coordinates for the center of the arc.

☞ ◁ 3 ▫ 3 5 ☞ ent

☞ ◁ 2 ▫ 3 6 ☞ ent

☞ ▷

```
Arc Setup
◄Radius:►
100.000

Exit    Go    Back
```
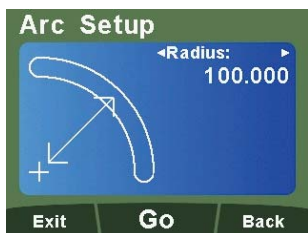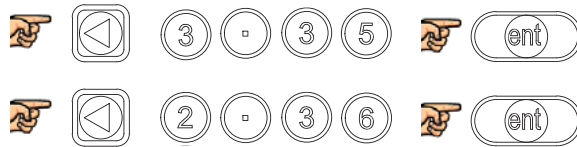
Enter the radius dimension.

☞ 2 ▫ 7

☞ ent

```
Arc Setup
◄Start:►
0.000
100.000

Exit    Go    Back
```

Enter coordinates for starting point of arc.

☞ ◁ 2 ▫ 2 5 ☞ ent

☞ ◁ 4 ▫ 8 2 6 ☞ ent

☞ ▷
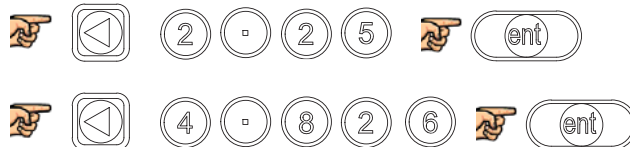
Mill Functions

Arc Contouring (Continued)

Arc Setup
End: 100.000 0.000
Exit Go Back

Enter coordinates for ending point of arc.

☞ ◁ 5 ▫ 3 5 ☞ ent

☞ ◁ 4 ▫ 1 7 4 ☞ ent

☞ ▷

Arc Setup
Tool Dia.: 10.000
Exit Go Back
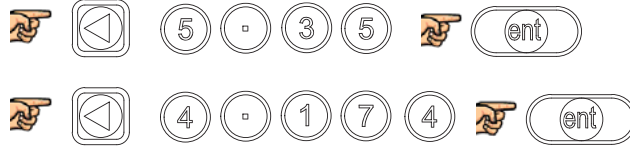
Enter the tool diameter to be used.

☞ 0 ▫ 5 ☞ ent

Arc Setup
Arc Type:
1. Internal
2. External
Exit Go Back
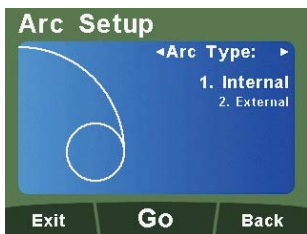
Select the appropriate arc type. For this example, we will select internal.

☞ 1

☞ ▷

Arc Setup
Max Cut: 1.000
Exit Go Back

Enter the maximum cut required.

☞ 0 ▫ 1 5 ☞ ent

To start the arc feature;

Go

☞ △

Navigate through the sequence of points using the ◁ ▷ keys.

Arc Contouring
Hole: ◁ 01 ▶
Exit Back

Arc Contouring
Hole: ◁ 01 ▶
Exit Back

Y axis | Starting Point

0.15" Maximum Cut

4.826"
0.5" Tool Diameter

Ending Point

4.174"
2.7" Radius

2.36"
Arc Centre

Internal Cut

Datum

X axis

2.25" 3.35" 5.35"

40
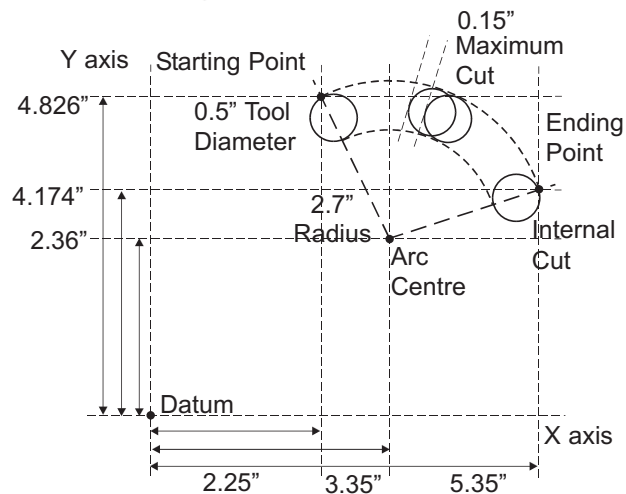
Mill Functions

Polar Co-ordinates

The Polar Coordinate function enables the operator to convert the displayed data from the conventional Cartesian Coordinates ("X" & "Y") to polar coordinates (radius length + angle).

The two axes used for polar coordinates are defined in the parameter setting for plane (See Page 24 - Plane Setup). The fourth axis cannot be used for polar coordinates.

The example below demonstrates its operation.

DP1200 v0.4.0

Feed (mm/min):

0

Tool:

01

-1   Menu   +1

☞ ◁ ▷   until the display shows

Polar Co-ordinates

Angle:

0.00000

Radius:

0.000

Menu

Move from the starting point to the ending point.

-10.000

20.000

Polar Co-ordinates

Angle:

116.56505

Radius:

22.361

Menu
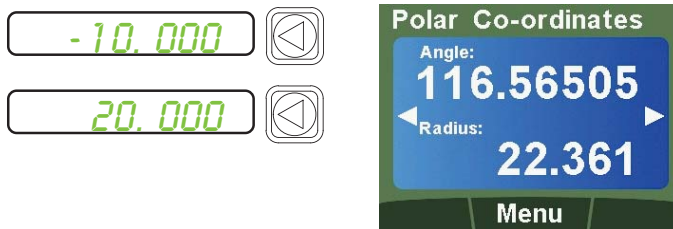
The message display will show the angle and the radius length.
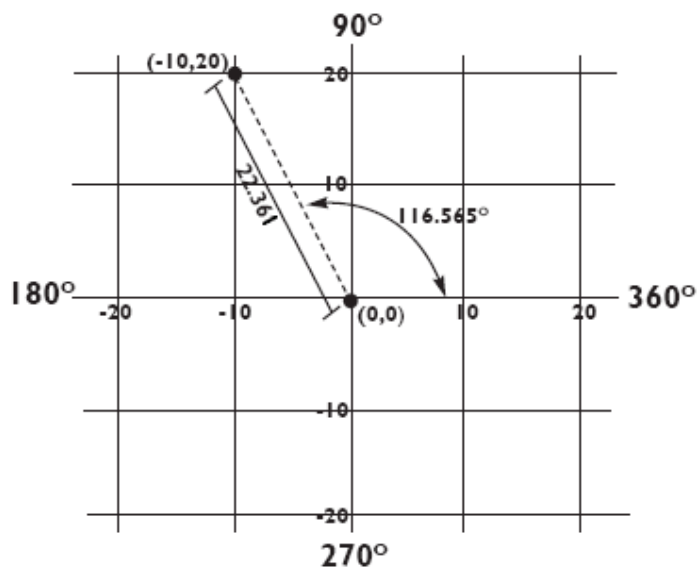
Mill Functions

Skew

The Skew Feature provides capability for the DRO to find the skew angle of a part. It is very useful for the machine operator to know if the part is square to the bed.

It can also be used to find other angles on the workpiece.

The plane setting parameter defines which axes are used for this feature.

Menu

1. Tool Offsets
2. Vector
3. PCD
4. Line Hole
5. Arc Contouring
6. Skew
7. Sub Datums
8. Data Logging
9. Setup

Exit   Info   Back

☞ ⑥ To select the **Skew** function.
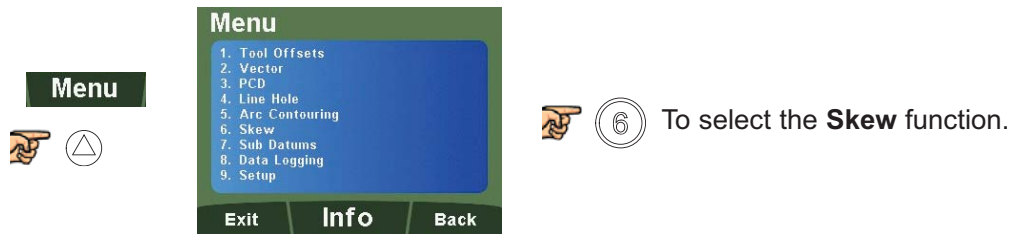
Note: Use the ◁ ▷ keys to navigate through the parameters.
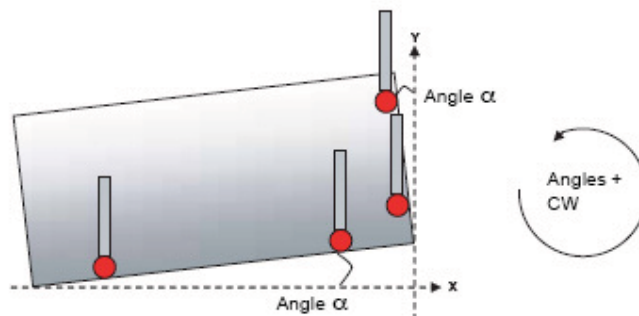
Note that positions 1 and 2 are points on the first plane (Angle 1). Positions 3 and 4 are points along the second plane (Angle 2).

Skew

Position 1

Exit   Back
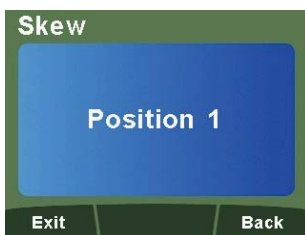
Touch the probe to any position along the ("X") first plane.
Or
Touch the tool to any position along the first plane ☞ (ent)

Skew

◄ Position 2

Exit   Back
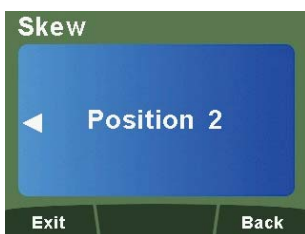
Touch the probe to a second point along the ("X") first plane.
Or
Touch the tool to a second point along the first plane ☞ (ent)
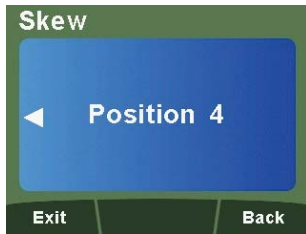
Skew

◄ Position 3

Exit   Back
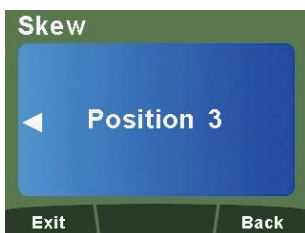
Touch the probe to any position along the ("Y") second plane.
Or
Touch the tool to any position along the second plane ☞ (ent)

Mill Functions

Skew (Continued)

Skew

◄ Position 4

Exit | Back

Touch the probe to a second point along the ("Y") second plane.
Or
Touch the tool to a second point along the second plane 👉 (ent)

Skew

Angle 1:
180.00000

Angle 2:
180.00000

Exit | Again | Back

The angle for ("X") plane 1 and ("Y") plane 2 are shown on the DRO.

Lathe Functions

Tool Offsets

The Tool Offset function allows the operator to enter and store offsets for a range of tools. This enables the operator to change tools without resetting absolute zero or datum. Using Tool Offsets ensures that diameter and length measurements will remain consistent after tool changes. This speeds up tool changes and increases productivity as it eliminates the need for the operator to stop and manually measure the diameter.

The number of Tool Offsets available is 50. This large number allows tools to be grouped where more than one set is used. For convenience, it is highly recommended that tools are physically marked with their corresponding tool number.

There are two ways to set Tool Offsets, Teach Mode and Program Mode.

The DP1200 provides capability for Tool Offsets for up to 3-axes. A 3 or 4 axes DP1200 is required to use 3-axes of Tool Offsets.

DP1200 Tool Offsets are all in reference to the datum.

☞ (1) To select **Tool Offsets**
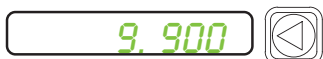

☞ (1) To select **Teach Offsets**

☞ (2) To select **Program Offsets**

Teach Offsets

Enter the tool dimensions one axis at a time. In this example, the "X" axis of Tool 1 is entered.

☞ ◁ of the required axis

Take a skim cut if "X" is selected. Take a face cut if "Z" is selected.
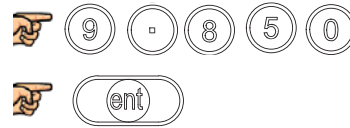The axis window shows the size of the tool with respect to the datum.

☞ (ent)

Note: The tool can now be moved away from the part

Lathe Functions

Teach Offsets (Continued)

```
  9.850   [◁]
```

Teach Offsets
Tool:
01
Value?

Exit   Back

Measure the part using an accurate gauge and enter this value.

☞ ⑨ �▫ ⑧ ⑤ ⓪

☞ (ent)

Repeat this process for all tools required.
Note: Use the ◁ ▷ keys to navigate through the tools

Program Offsets

Enter the tool dimensions one axis at a time.

```
 102.225   [◁]
  50.000   [◁]
  25.755   [◁]
```

Program Offsets
Tool:
01
◄   ►

Exit   Back

☞ [◁] of the required axis

Enter the position value using the numeric keys

☞ (ent)

Repeat this process for all tools required.

Once complete: **Exit**
☞ △

Note: Use the ◁ ▷ keys to navigate through the tools.

Lathe Functions

Vector

Vectoring combines the movement of the "X" and "Z" axes with the angle of the compound.
Note: Vector is only available on 3 and 4 axes units.

If the compound is set at an angle, vector is very useful. If the compound is aligned with the "X" or "Z" axis, the summing function should be used.

Menu

1. Tool Offsets
2. Vector
3. PCD
4. Line Hole
5. Arc Contouring
6. Skew
7. Sub Datums
8. Data Logging
9. Setup

Exit   Info   Back

👉 ② To select **Vector**

Enter the desired vector angle.

Vector Setup

Angle:

30.000

Exit   Go   Back

Example

👉 ③ ⓪   👉 ent   To start: Go 👉 △

Note: Changing of the angle is always done through the Vector Setup Screen. The angle cannot be changed while the vector function is running.

25.000 ◁
43.300 ◁
50.000 ◁

Vector

Angle:

30.000

Tool:

01

-1   Done   +1

Axis 1 shows combined "X" axis movement

Axis 2 shows combined "Z" axis movement

Axis 3 shows normal position display

To exit: Done 👉 △

46

Combined X movement = X + Z'(Sin α)

Combined Z movement = Z + Z'(Cos α)

X

Z

α vectoring angle
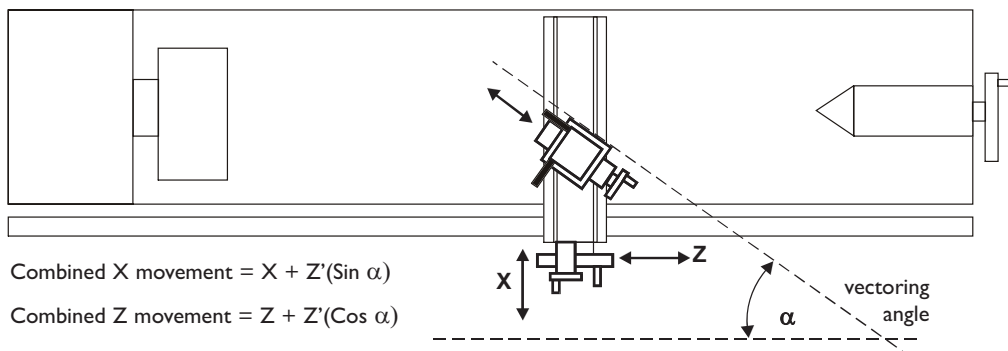
Lathe Functions

Taper Angle

The Taper Function shows the angular displacement of the displayed position. Axis 1 and 2 are used for this function. The taper function ignores the parameter setting for the plane.
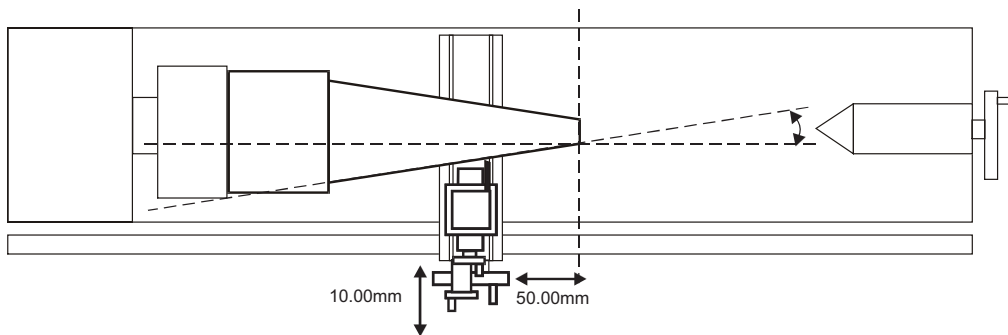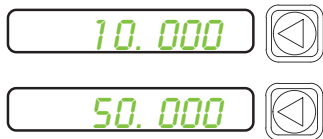
The example below demonstrates its operation.

☞ ◁ ▷ until the display shows

Touch the tool to one end of the taper and zero both axes, then touch the tool at the other end of the taper. The message window will now display the taper angle, as shown below;
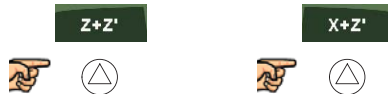
Lathe Functions

Axis Summing

The Summing Function allows the sum of the two selected axes to be displayed. Axis 4 is not used with this function. See Axis Coupling Setup (Page 24) for details on using Axis 4.
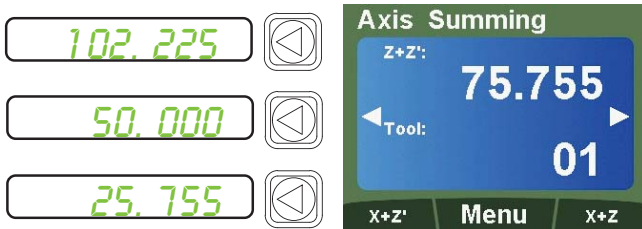
DP1200 v0.4.0
Feed (mm/min): **0**
Tool: **01**
-1 | Menu | +1

until the display shows

Axis Summing
X+Z: **0.000**
Tool: **01**
Z+Z' | Menu | X+Z'

Select the required plane

Z+Z'

X+Z'

The un-summed position data will be shown in the axis window.
The summed position will be shown in the LCD display.

```
102.225
50.000
25.755
```

Axis Summing
Z+Z': **75.755**
Tool: **01**
X+Z' | Menu | X+Z

Combined Movement
Z + Z^1

Combined Movement
X + Z^1
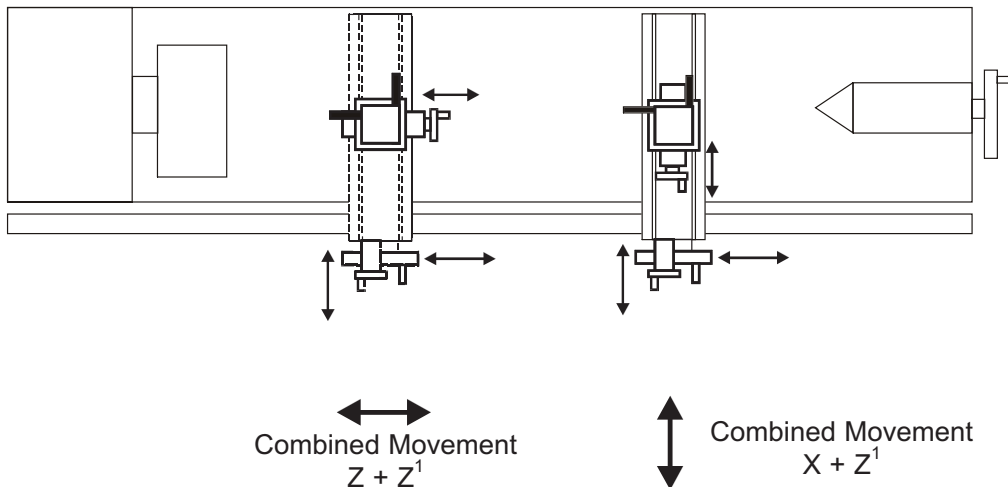
Troubleshooting Guide

The DP1200 has a dedicated information screen which provides useful information when contacting Newall or troubleshooting the unit. This is especially useful when a panel mount unit is in use.

Menu
1. Tool Offsets
2. Vector
3. PCD
4. Line Hole
5. Arc Contouring
6. Skew
7. Sub Datums
8. Data Logging
9. Setup

Exit   Info   Back

☞ △ **Info**

Info
Serial Number: JA0001AN
Model Number: DP120021100S10
Axis Config: 4 Analogue
Type: Generic
Defaults: Newall

Firmware: 1.0.2
FPGA: 0.0.1
DSU: None

Exit   Back

☞ △ **Back**   To return to menu

Symptom	Solution
The display is blank	• The DP1200 maybe in sleep mode. Press any key to exit sleep mode • Check that the power supply is correctly connected to a working mains outlet • Check that the power supply cables are not damaged • Check that the power supply voltage is 15 - 24Vdc ±10% • Check the power supply indicator is illuminated on the front of the DP1200.
The display works, but resets from time to time without any keys being pressed.	Either the supply voltage is too low, or the power supply or mains supply has an intermittent fault. • Check that the power supply voltage is 15 - 24Vdc ±10%. • Check that all the connections are secure.
The display works, but gives erratic readings, the last digit jitters or the measurements jump to new figures unexpectedly.	There may be a poor earth (ground) connection. Both the DP1200, and the machine on which it is installed, must have proper earth (ground) connections. There may be a problem with the encoder.
The unit does not respond to any key presses.	Disconnect the DP1200 from its power supply, wait 15 seconds and then reconnect.
'no Sig' or 'SIG FAIL' appears in the display.	This indicates that the unit is not receiving a proper signal from the encoder. • Check that the encoder connections are secure. • Check that there is no damage to the connectors or to the encoder. • Switch the DP1200 off and back on again. • Swap the encoder to another axis to confirm whether the encoder or the DP1200 is at fault.
Readings are incorrect.	• Check the Encoder Type to ensure it is correct. • Check the Radius / Diameter setting. The Diameter setting causes the axis to read double. • Check the Error Compensation factors. • If using the Segmented Error Compensation, verify the datum position. • Swap the encoder to another axis to confirm whether the encoder or the DP1200 is at fault. • Check that there is no damage to the encoder or its cable. • Check that the encoder is fixed firmly and aligned correctly, as described in the Spherosyn / Microsyn Installation manual. • Check that there is no binding on the scale. With the scale brackets slightly loosened, you should be able to slide the scale back and forth with minimal resistance. • If you have a Spherosyn scale, check that the scale is not bent, by removing it and rolling it on a flat surface.

If the solutions suggested above do not solve your problem, contact Newall's Technical Support Department for further instruction.

Swapping encoders to trace a fault:
1. Check that the two axes are set to the correct encoder types.
2. Disconnect the DP1200 power supply.
3. Disconnect the encoder from the malfunctioning axis and move to a working axis.
4. Reconnect the DP1200 power supply and turn on.
If the fault stays with the same encoder, then the encoder is at fault. If the fault does not follow with the encoder the DP1200 is at fault.

Providing you have not moved the machine more than 6.3mm (0.25") for a Spherosyn Encoder or 2.5mm (0.1") for a Microsyn Encoder, switching the power off and back on again does not lose the datum position.

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