

### C80 - Constant Surface Speed

### Digital Readout Display



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## NOTES

## SPECIFICATIONS

**Electrical****EMC and Low Voltage Compliance**

BS EN 55022:1998 Class B

BS EN 55024:1998

**Power Supply Unit (supplied)**

100 - 240V (47 - 63Hz)

External switch-mode

Conforms to Low Voltage Directive

EN 60 950:1992/

A1:1993/ A2:1994/ A3:1996/ A4:1997

**Physical****Height**

265mm (10.43")

**Width**

180mm (7.09")

**Depth (not including connectors)**

50mm (1.97")

**Weight**

2.9kg (6.38lb)

**Environmental****Operating Temperature**

0 to 45°C

**Storage Temperature**

-20 to 70°C

**Environmental Conditions**

Indoor Use, IP20 (IEC 529)

**Relative Humidity**

Maximum 80% for temperatures up to 31°C

decreasing linearly to 33% at 45°C

**Disposal**

At the end of its life, the **C80 CSS** system should be disposed of in a safe manner applicable to electronic goods.

**DO NOT BURN.**

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

**Input**

Three Spherosyn or Microsyn encoders.

**Resolutions****Spherosyn or Microsyn 10**

(menu selection)

5µm (0.0002")

10µm (0.0005")

20µm (0.001")

50µm (0.002")

**Microsyn 5**

(menu selection)

1µm (0.00005")

2µm (0.0001")

5µm (0.0002")

10µm (0.0005")

**Safety Standards****EN 12840: 2001\***

'Safety of machine tools - manually controlled turning machines with or without automatic control.'

\* Complies with EN12840:2001 DRO requirements when installed as per specifications



Certificate No FM36096

**NOTE: NEWALL MEASUREMENT SYSTEMS LTD  
RESERVES THE RIGHT TO CHANGE SPECIFICATIONS WITHOUT NOTICE.**

# CONNECTIONS

- The **C80 CSS** is suitable for use only with Newall Spherosyn and Microsyn analogue encoders.
- Ensure that all cables are secured to prevent the connectors from dropping into hazardous positions when unplugged, for example the floor or coolant tray.
- Ensure that all cables are routed to prevent them from being caught on moving parts.
- Turn off the power before connecting the encoder, by disconnecting the power supply connector.
- Ensure that the **C80 CSS** is grounded to the machine before turning on the machine supply.

## NOTES



DO NOT CONNECT THIS UNIT DIRECTLY TO THE MAINS SUPPLY.

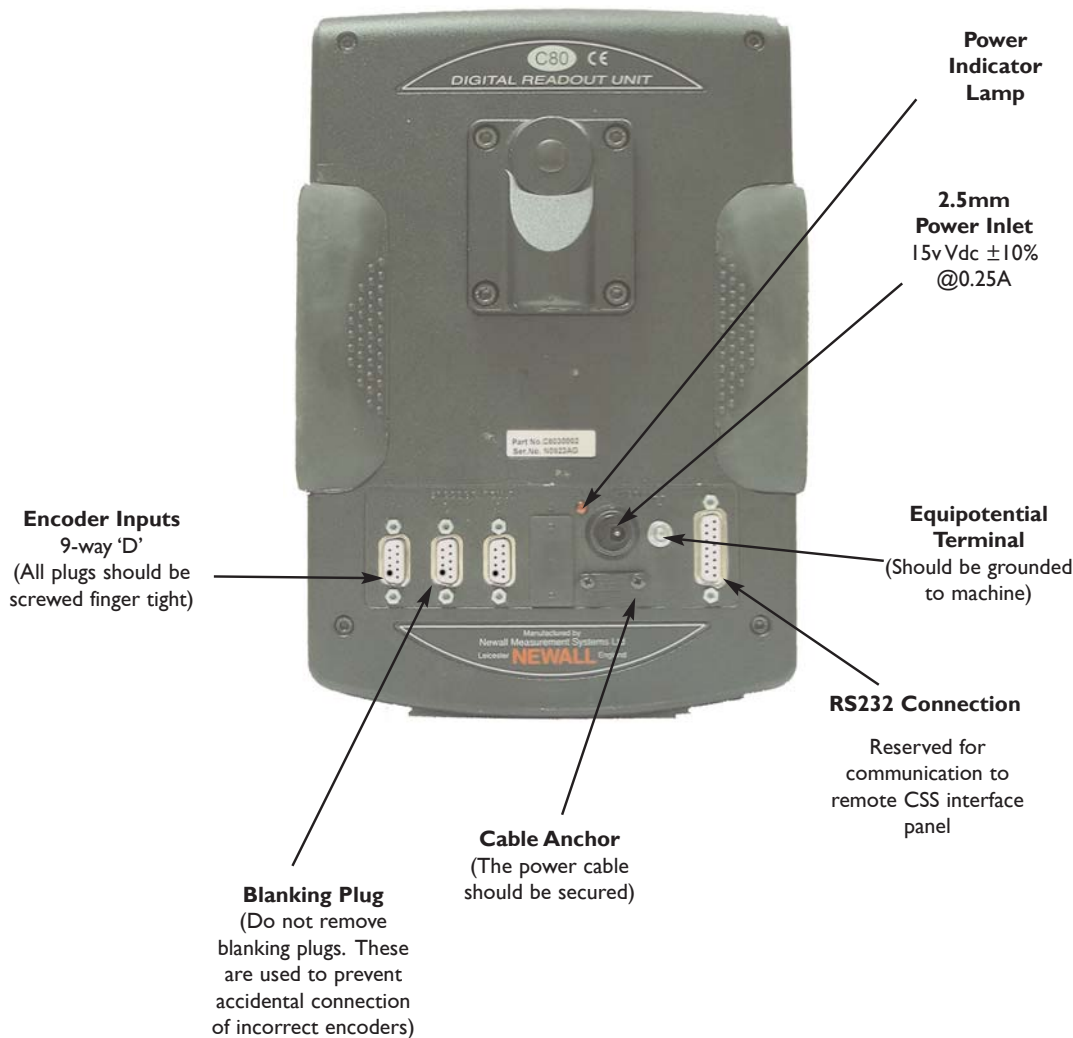


If you have a Newall encoder which is not fitted with D-type connector, an adaptor cable is available. Part No. 307-80980

Contact your supplier for details.



Units manufactured before March 2005 will have a different CSS communication port configuration. For further information contact your local office.

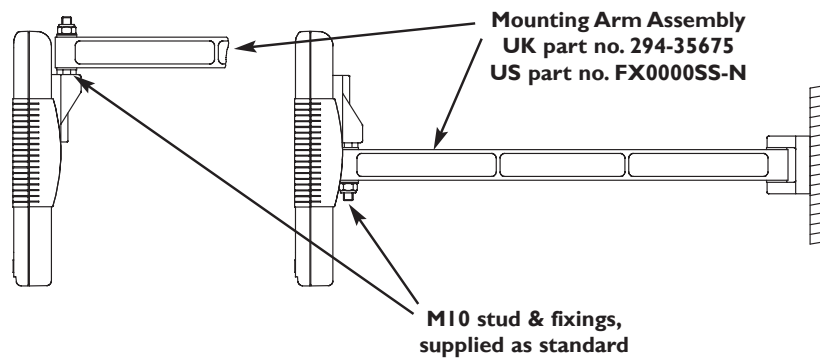


## NOTES

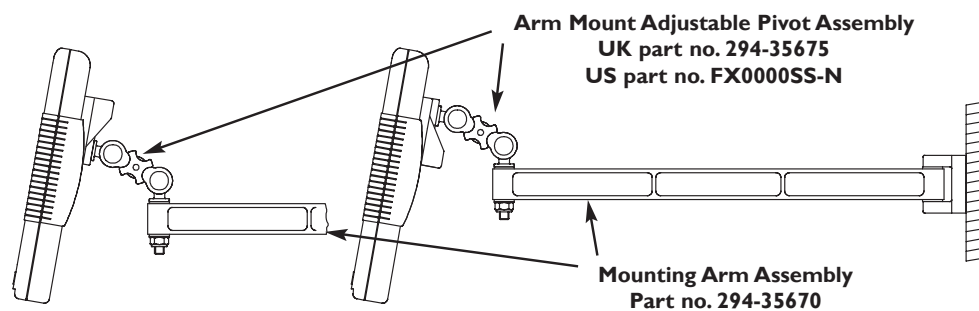
## MOUNTING

- The **C80 CSS** can be mounted in a variety of ways, depending on the mounting assemblies purchased with the unit:

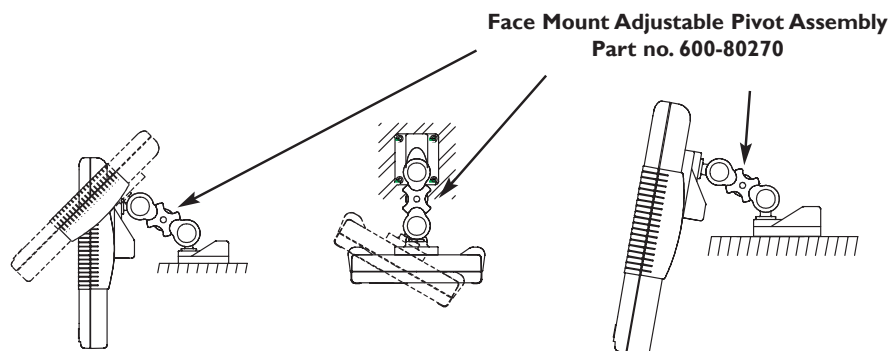
## Arm Mounting (Non-adjustable)



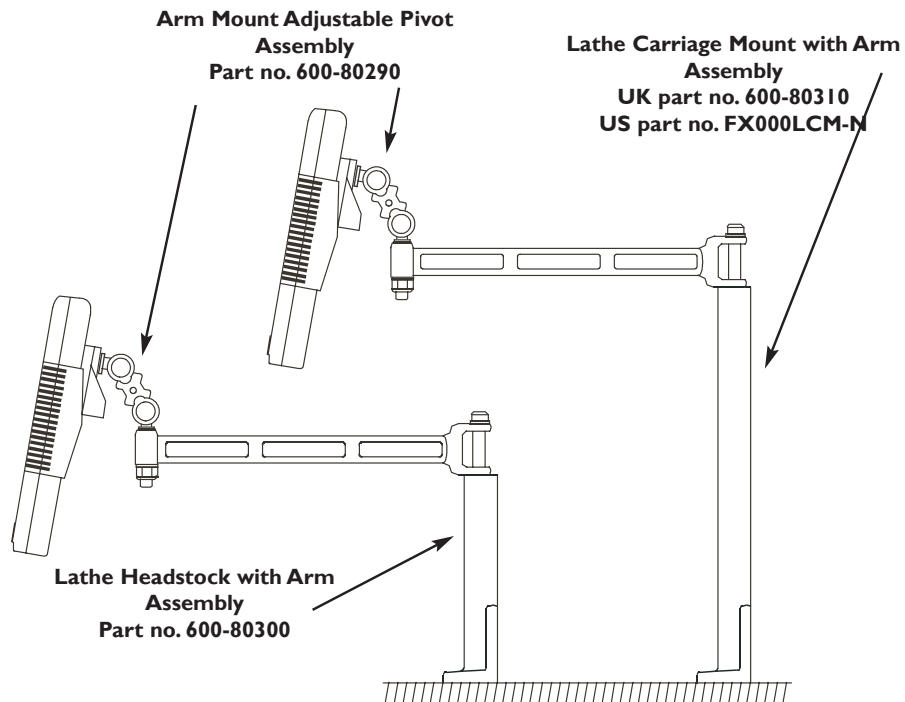
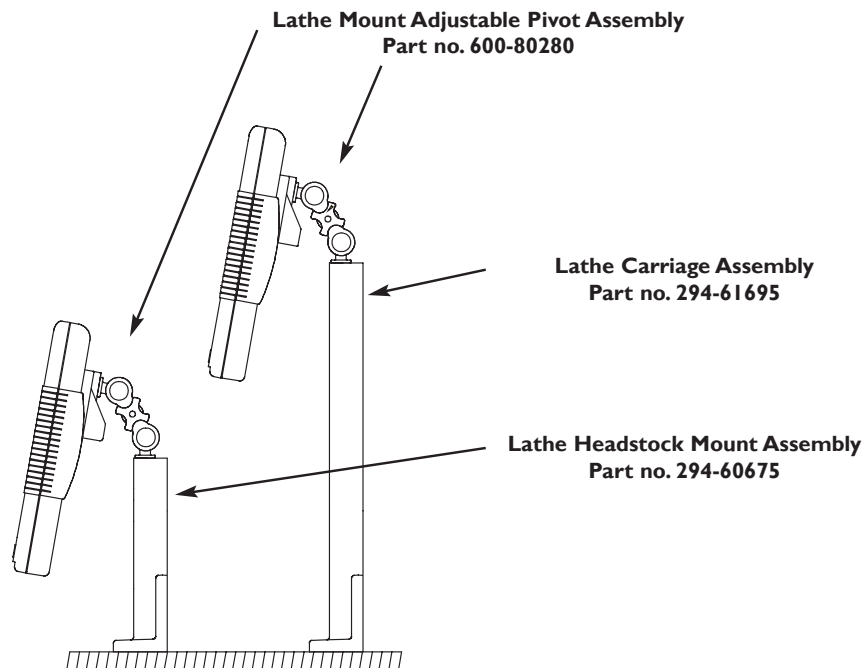
## Arm Mounting (Adjustable)



## Face Mounting (Adjustable)



## NOTES

**Lathe Mounting (Adjustable) With Arm Assembly****Lathe Mounting (Adjustable)**

## NOTES



During **Setup**, the displays may show information other than that described on this page.

See the section on **Setup** later in this guide.



For more information about the use of the **Navigation Keys** see the section on **Setup** later in this guide.



During **Setup**, the keys may be used for functions other than those described on this page.

See the section on **Setup** later in this guide.

**tip**

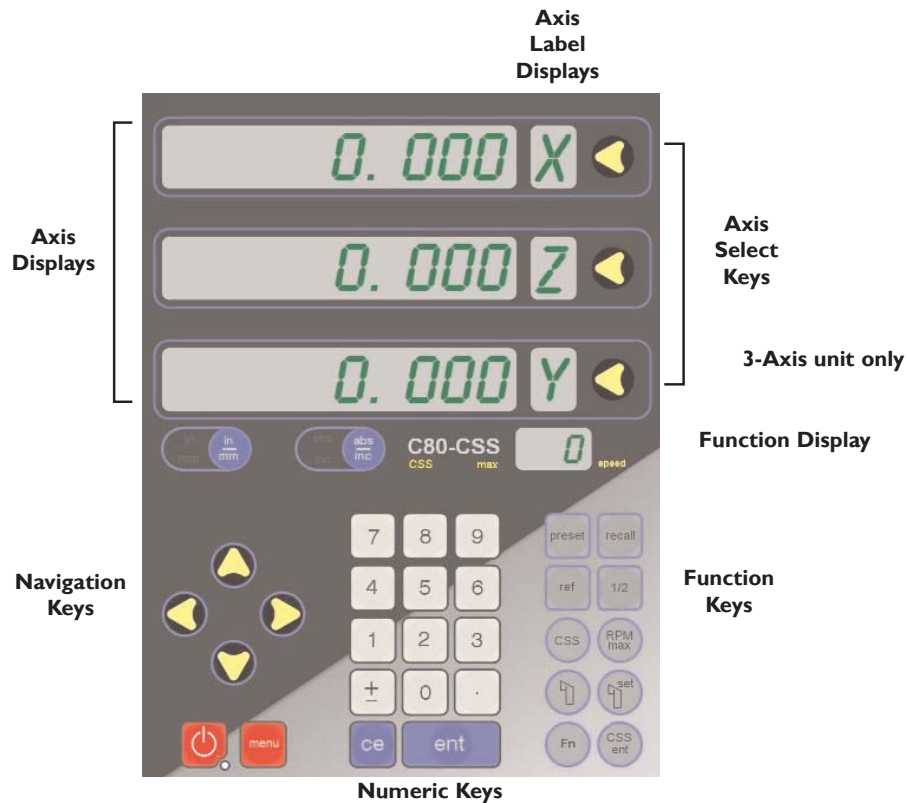
At the beginning of each working session, set the datum in **Absolute Mode**, then switch the **C80 CSS** to **Incremental Mode**.

By using the **C80 CSS** in this way, you will be able to return the machine to its absolute datum at any time, simply by switching back to **Absolute Mode**.

## OPERATION

## Understanding the Displays

- The three **Axis** displays normally show the positions of the X, Z and Y axes.
- The three **Axis Label** displays normally show X, Z and Y



## Using the Keypad

In normal operation, the keys are used as follows:

- Press to toggle the displays between inches and millimetres.
- Press to toggle the **C80 CSS** between absolute mode and incremental mode.

**Absolute Mode**

- In this mode, the **C80 CSS** will display the positions of the three axes relative to a fixed datum.

**Incremental Mode**

- In this mode, the **C80 CSS** can be used to display each position relative to the last position. This is also known as **point-to-point** use.

**Sleep Mode**

- Press to temporarily turn off the displays and the keypad.


While the unit is in **Sleep Mode**, all settings are preserved, but the positions of the three axes are updated. If any of the axes are moved while in **Sleep Mode**, the centre display will show and if any of the keys are touched, the centre display will show .

# STANDARD FUNCTIONS













## NOTES

### Setting the Datum for Each Axis



#### Zero

- To zero one display at the current position:  
Press the **Select Key**  for the axis to be zeroed. All readings will now be relative to this new zero point.

#### Preset

- To preset one display to a known fixed value:  
Press  then the **Select Key**  for the axis to be preset, then enter the value.  
**For Example:** Press         to enter the value . All readings will now be relative to this new value.
- If you make a mistake while entering a number, pressing  will clear the entry one character at a time.

#### Recall

- To quickly recall the last preset value for an axis:  
Press  then the **Select Key**  for the axis to be preset. All readings will now be relative to this new value.

**Note:** The X and Z axis absolute datum can only be set during the Tool Offset procedure as described later in this manual



Using **Zero** redefines the datum, so it will not be possible to restore the old datum.

Using **Preset**, **Recall** or **Centerfind** will change the datum - but in Absolute Mode, **Digifind** can still be used to return to the old datum.

#### tip



Do not move the machine when the **C80 CSS's** power is off.

When the power is switched back on again, the **C80 CSS** uses **Digifind** automatically to re-establish the datum for each axis.

### Using Digifind

In the event that a datum is lost, either due to movement following a power failure, or after a fixed point has been entered by mistake, it can easily be re-established, using **Digifind**.

In order to use **Digifind**, the absolute datum for each axis should be marked permanently on the machine.

- Set the axis close to the marked datum - to within:  
6.3mm (0.25") for a Spherosyn encoder or  
2.5mm (0.1") for a Microsyn encoder.
- Switch the **C80 CSS** to **Absolute** mode.
- Press  then the **Select Key**  for the axis to be restored. The display will update to show the exact distance from the datum.










**Digifind** works only in **Absolute Mode**.

### Using Centerfind

**Centerfind** works by halving the distance displayed on the selected axis. It works in **Incremental Mode only**.

**For Example:** To find the center of a workpiece that is 100mm wide:

- Set the tool to one edge of the workpiece and press the **Select Key**  for the axis to be centered. The display shows .
- Set the tool to the other edge of the workpiece. The display shows .
- Press   The display shows '0' in all axes. Press the **Select Key** for the axis to be centered.  
The display shows .
- Move the tool until the display shows . This is the center of the workpiece.

#### tip

Set the **C80 CSS** to **Incremental** before using **Centerfind**.

By doing this, you will be able to return the machine to its absolute datum afterwards, simply by switching back to **Absolute Mode**.

NOTES

# SETUP

## Using Setup Mode



Normally, **Setup** needs to be done only once, and it is possible that the factory default settings will be suitable and will not require change.



Not all options will be present, depending on the setting of other options.



The **Add Function** and **Delete Function** options allow for the download of programmable functions from a PC, connected to the C80 CSS via a serial lead connected to the 15D connection. The serial lead is an option and can be ordered separately if required. (Part No. 307-83210)  
Please contact your supplier for pricing information

Setup Mode can be accessed in two ways:

- Pressing the key during power on (during boot sequence)
- After power on by exiting all functions (CSS) and pressing

Upon entry into **Setup** the message will be displayed

In order to access the **Setup** functions, the security code must be entered

The screens will then change to show the current number of enabled axes.

For Example: Number Axis legend  
 2 Axis (can be 3)

- Press or to cycle up and down the list of options.

**Note:** Setup parameters should only be adjusted by qualified personnel and should only need setting once as the machine is commissioned.

The options are listed below, and each is described in detail on the following pages.

Option	Default	Display
Number of Axes	2	 
Encoder Type	all axes: X: Microsyn 5 Z: Spherosyn Y: Microsyn 5	  
Encoder Resolution	all axes: 0.005mm	
Tachometer PPR	60	 
Direction	all axes: I	
Error Compensation	all axes: Off	
Segmented Compensation	see note 1	
Linear Compensation	see note 1	
Add Function	see note 2	
Delete Function	see note 2	
Reset		
Store		

- When you have finished setting all the options, select .  
Press to store any changes made.  
The middle display shows for a few seconds, as your settings are stored.  
The **C80 CSS** exits from **Setup Mode**.
- Switch the power on and off to exit the set-up mode.



NOTES

## Number of Axes

This option enables the 3rd axis.

**Note:** Where a two axis display has been fitted, this will have to be replaced with a 3-axis display in addition to the 3rd axis encoder kit for the effects of this change to be seen.

Options available are 2 or 3.

For Example:



Press the or keys to toggle between 2 and 3-axes options.

**Note:** The compound axis position does not form any part of the CSS speed calculations.

## Encoder Type

There are three possible settings for each axis:

Spherosyn

Microsyn 10

Microsyn 5

- Press the **Select Key** next to the or to cycle between the three settings for each axis.

## Encoder Resolution

The **Resolution** settings available for each axis will depend on the encoder type, and also on the setting.

	Display	Spherosyn	Microsyn 10	Microsyn 5
	mm			
1µm	0.001	0.00005 .....	✓	✓
2µm	0.002	0.0001 .....	✓	✓
5µm	0.005	0.0002 .....	✓	✓
10µm	0.01	0.0005 .....	✓	✓
20µm	0.02	0.001 .....	✓	✓
50µm	0.05	0.002 .....	✓	✓

- Press the **Select Key** next to the or to cycle between the four available settings for each axis.

## Tachometer Configuration

In order for the correct RPM and surface speed to be measured the C80-CSS DRO needs to know how many pulses per revolution (PPR) are given by the tachometer fitted to the lathe. For accurate speed control the PPR should exceed 30. Where a lathe is configured with less than this accuracy of control, operation can not be guaranteed particularly at low values of RPM.

Values are entered using the numerical keypad. Values between 1 and 999 can be entered:

Move to the tachometer setup option, the display will show:

For Example:

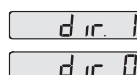


Using the numerical entry keys, key in the correct number of PPR for the tachometer unit fitted to the lathe. If in doubt contact the lathe supplier for this information. There is no need to press . If a mistake is made pressing the key will clear the data.

## Direction

The **Direction** setting allows you to match the C80 CSS to the actual direction of travel of any axis.

There are two possible settings for each axis:



- Press the **Select Key** next to the or to cycle between the two settings for each axis.

→ The **Encoder** settings must match the actual encoder in use, or the C80 CSS will not display correctly.

**tip**

The **Direction** setting for the X axis must be positive for increasing diameter.

NB, Direction is dependent on where the scale is mounted.

## NOTES

THE SERIAL PROGRAMMING LEAD IS SPECIFICALLY DESIGNED FOR CONNECTION TO C-SERIES DIGITAL READOUTS. INCORRECT CONNECTION MAY CAUSE FAILURE.

USE RESET WITH CAUTION. ALL STORED SETTINGS WILL BE LOST IF THIS FUNCTION IS USED.



If **Error Compensation** is applied, it is important that it is absolutely correct. If it is not correct, errors could be increased rather than reduced.

### tip

After setting up the **Error Compensation**, it is advisable to check its effect in normal operation.



**Segmented Compensation** need not be over the entire scale length.

It can be applied just to a length of high importance, or it can be as small as one segment.

See pages 11 and 12 for details on using Linear and Segmented Error Compensation

## Add / Delete Function

These two options allow you to download programmable functions from a PC connected to the **C80 CSS** via a serial lead connected to the I5D connection. This serial lead is an option and can be ordered separately if required using Part No. 307-83210. Please contact your supplier for pricing information.

New functions are available as Internet downloads and can be found on the Newall Website at [www.newall.com](http://www.newall.com)

## Reset

**This will restore all settings to their factory defaults and should, therefore, be used only if absolutely necessary.**

The middle display shows

- Press or the **select key** next to the to select the **Reset** function.
- While all the stored settings are being erased, the top display shows and the middle display shows , etc.
- When **Reset** has finished, the middle display returns to

The **C80 CSS** remains in **Setup Mode**.

## Error Compensation

Errors can result from a number of sources, including machine wear. Where the degree of error increases linearly along the length of travel of the scale, **Linear Error Compensation** should be applied. However, where the errors are local to an area of travel, the **Segmented Error Compensation** should be applied.

There are three possible settings for each axis:

Off

Segmented Compensation

Linear Compensation

- Press the **Select Key** next to the , or to cycle between the three settings for each axis.

If one or more axes are set to **Segmented Error Compensation**, or **Linear Error Compensation**, then the next setup option will be to configure the compensation for each of those axes.

- Press .

The middle display changes to .

### Segmented Error Compensation

*In this mode, the scale travel for each axis can be broken down into as many as 99 user-defined segments, with each segment having its own correction factor. The correction factors are calculated by the **C80 CSS** by comparison against known, user-supplied standards.*

- When power is applied, the display for any axis that is set to use **Segmented Compensation** shows .
- If the machine has not been moved since the power was turned off, simply press , and the **C80 CSS** will restore the last positions recorded.
- Alternatively, set each axis close to the **Reference Point** - to within:  
6.3mm (0.25") for a Spherosyn encoder or  
2.5mm (0.1") for a Microsyn encoder,  
and press the **Select Key** next to the , or . The **C80 CSS** will re-establish alignment with the correction parameters.

### Linear Error Compensation

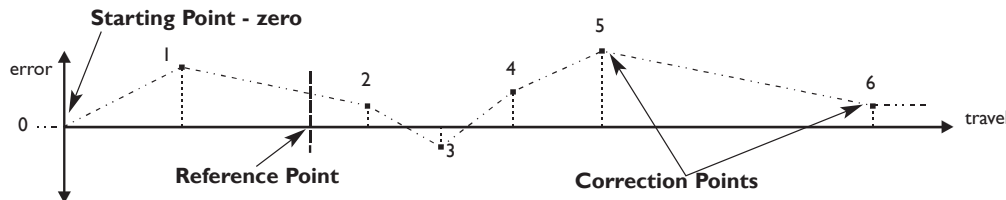
*In this mode, a single constant correction factor for each axis can be applied to all displayed measurements. The correction factor is calculated by the user, and specified in parts per million (ppm). Values between -9999 and +9999 are allowed.*

# Segmented Error Compensation

If one or more axes are set to **Segmented Error Compensation**, then the following procedure should be followed to configure the compensation for each of those axes.

## Identification of Correction Parameters

The scale travel is broken down into a number of user-defined segments, each with its own correction factor, measured against a high-accuracy standard. The following parameters need to be identified:



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.

## Setting the Correction Points

As you follow the steps below, it is essential to take the following precaution:

Always approach the **Starting Point**, **Correction Points** and **Reference Point** from the same direction. If you do not, then the size of the tool or probe will render the measurement inaccurate.

- Set one or more axes to **Segmented Compensation** as described on page 10.

The display should show **Err SET**.

- Press the **Select Key** (yellow key with a black circle) next to the **X**, **Z** or **Y** to enter the setup procedure for each axis to be configured.

The display changes to **SET ZERO**.

- Set the machine to the point you have chosen to be the **Starting Point**, and zero the high-accuracy standard at this point. Press **ent**.

- The display changes to **Go to 1**.

Set the machine to the point you have chosen to be **Correction Point 1**. Press **ent**.

- The display changes to **Entsd 1**.

Enter the distance from the **Starting Point**, as measured by the standard.

**For Example:** Press **6** **7** **8** **.** **9** **ent** to enter a **Correction Point** of 678.9.

The C80 CSS will calculate and display the correction factor for this point.

- Press (yellow key with a black circle) to go to the next point.

Repeat steps 2 and 3 for each **Correction Point**.

When all correction points have been entered, press **abs inc**.

- The display changes to **Go to REF**.

Set the machine to the point you have chosen as the **Reference Point**. Press **ent**.

- The display returns to **Err SET**.

If required, press the **Select Key** (yellow key with a black circle) next to **X**, **Z** or **Y** to enter the setup procedure for another axis.

## NOTES

Up to 99 segments can be defined per axis.

To take advantage of **Segmented Error Compensation**, you will need access to a high accuracy standard, such as a laser measuring system.

**Error Compensation** initially defaults to **Off**, with no points set.

If **Error Compensation** is set to **Off** after **Correction Points** have been set, the data is retained, but not applied. When **Segmented Error Compensation** is set to **On** again, the data will be re-applied.

This procedure must be carried out in strict sequence, and in full, to be valid. There must be no reversals in direction.

### tip

Pressing the **Select Key** (yellow key with a black circle) at steps 1, 2 or 3, will display the current uncorrected position relative to the (Starting Point).

### tip

Do not worry about the direction of the standard measurement. e.g. 678.9 and -678.9 are treated the same.

### tip

Pressing **ce** will clear an entry one character at a time.

After an entry has been completed by pressing **ent**, pressing **ce** will take you back one step at a time.

## NOTES



The **Correction Factor** cannot be established while in **Setup Mode**.

Carry out the measurements in **Normal Operating Mode**, then enter **Setup Mode** to set the **Correction Factor**.



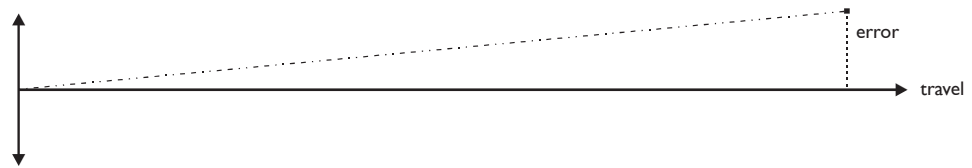
Only values between -9999 and 9999 are allowed.

**tip**

If you make a mistake while entering a number, pressing **ce** will clear the entry one character at a time.

## Linear Error Compensation

A single constant correction factor for each axis is applied to all displayed measurements.

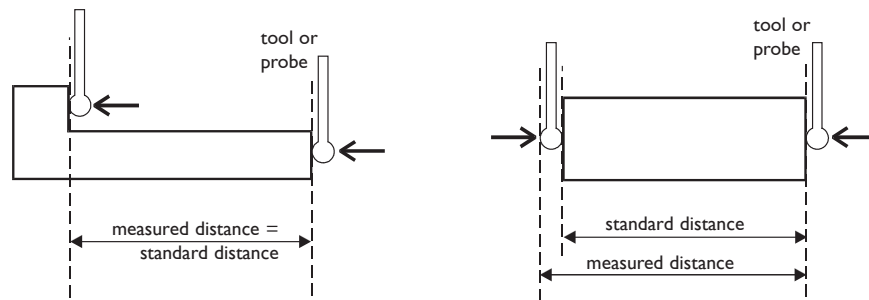


If one or more axes are set to **Linear Error Compensation**, then the following procedure should be followed to configure the compensation for each of those axes.

### Calculating the Correction Factor

As you follow the steps below, it is essential to take the following precaution:

- Either:** Use a stepped standard, and approach each edge from the same direction.  
**Or:** If you must approach each edge from opposite directions, then subtract the width of the tool or measuring probe from the value displayed on the **C80 CSS**.



**For Example:** To check the scale against a standard which is exactly 500mm wide:

- Set the tool or probe to one edge of the standard, and press the **Select Key** (yellow key with a black circle) for the axis to be corrected.

The display shows **0000**.

- Set the tool or probe to the other edge of the standard.

The display shows **499.800**.

- Calculate the correction factor:

$$\text{error} = 500.000 - 499.8 = 0.2\text{mm}$$

$$\text{Correction Factor} = \frac{\text{error}}{\text{standard}} = \frac{0.2}{500} \times 1,000,000 = +400 \text{ ppm (parts per million)}$$

This value displayed on the C80 CSS needs to be increased to match the standard, so this is a positive correction factor. If the display had shown 500.2 for the same standard, the correction factor would be negative -400 ppm.

### Setting the Correction Factor

- Set one or more axes to **Linear Error Compensation** as described on page 10

The display should show **Err SET**.

- Press the **Select Key** (yellow key with a black circle) next to the **X**, **Z** or **Y** to enter the setup procedure for each axis to be configured.

The display shows **[C] 0**, or a previously entered value.

**For Example:** Press **4** **0** **0** **±** **ent** to enter a **Correction Factor** of -400 ppm.

- Press **ent** again.

The display returns to **Err SET**.

If required, press the **Select Key** (yellow key with a black circle) next to the **X**, **Z** or **Y** to enter the setup procedure for another axis.

# MENU FUNCTIONS

## NOTES

### Selecting Menu Functions

Menu functions are selected by pressing the  key towards the bottom left of the keypad.


The second axis window will display 

- Press the  or  to cycle up and down the list of options

Structure	Default Setting
→ Rad/dia display for X-axis	Diameter
→ Rad	
→ Dia	
→ Zero approach (for each axis)	Off
→ On	
→ Off	
→ Zero approach limits	Not visible when Zero Approach is OFF
→ X	
→ Y	
→ Z	
→ Axis summing	
→ Fn function (reserved)	None
→ Store	

To exit from the menu structure:

Select **Store** to save changes

Press the  key again to cancel and exit without saving any changes.




Function descriptions in this manual assume X-axis is set to **Diameter Mode**.





## Radius / Diameter

Selecting the **Diameter** setting causes the **C80 CSS** to display double the actual movement on any axis.

There are two possible settings for each axis:

**Radius** 

**Diameter** 

- Press the **Select Key**  next to the ,  or  to cycle between the two settings for each axis.

### tip

The **Diameter** setting is useful for lathes, and other turning applications to display diameter rather than radius.

## NOTES

## Zero Approach

This setting provides a visual indication that one or more axes are approaching zero, by flashing the **Axis Label** display.

**For Example:** If **Zero Approach** is turned on for the X axis, with a **Zero Approach Limit** of 1.25, then the axis label display will flash for values

from  to 

- When the axis is within:  
  
0.05mm (0.002") for a Spherosyn encoder or  
  
0.025mm (0.001") for a Microsyn encoder





the display will stop flashing.

**Zero Approach On / Off**

There are two possible settings for each axis:







**Zero Approach On** 

**Zero Approach Off** 





- Press the **Select Key**  next to the ,  or  to cycle between the two settings for each axis.

**Zero Approach Limit**

This setting allows you to choose how close to zero the axis needs to be for the display to flash.

- Press  after setting **Zero Approach On / Off**.  
The displays for the selected axes change to  or a previously entered value.
- Press the **Select Key**  next to the ,  or  to choose which axis to edit.

**For Example:** Press      to enter a limit of 1.25.


- If required, press the **Select Key**  next to the ,  or  to enter the limit for another axis.








ALL RESTORE SETTINGS  
ARE SAVED IMMEDIATELY.

## Store

This will store all settings and exit to **Normal Operating Mode**.

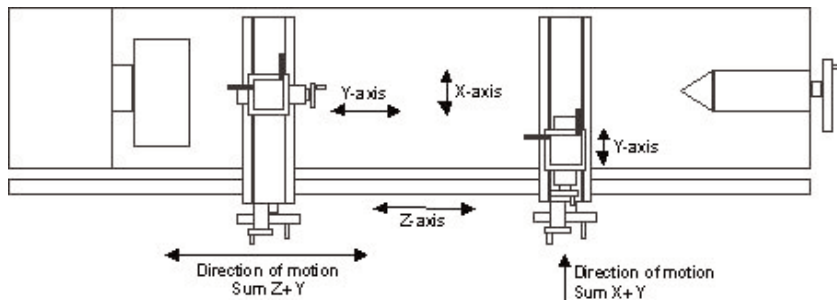
The middle display shows 

- Press  or the **Select Key**  next to the  to select the **Store** function.
- The middle display shows  for a few seconds, as your settings are stored.  
The **C80 CSS** exits from **Setup Mode**.
- Alternatively, pressing  at any time will exit from **Setup Mode** and abandon any changes.

## Axis Summing

This function allows for the movement of the Y-axis (compound slide) to be added to the movement of either the X-axis or the Z-axis. This function is only available on 3-axis systems and movement in the Y-axis is not included in the calculations for CSS speed control.

The summing function is useful when the compound slide is set to align with either the X-axis (0° to X) or Z-Axis (90° to X).



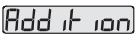


### To select the Function Mode

The selection of which axes are to be summed together is carried out in the menu selection.

To enter the menu options press the  key.

The second axis window will display 

Press the  or  to until the first axis shows 

The 2nd axis window will now show the current selected mode of operation:

Either 

Or:  Sum X-axis with Y-axis

Or:  Sum Z-axis with Y-axis

Press the  or  keys to select summing mode.

To exit from the menu structure save your changes:

Press the  or  keys to select  and then press 

The second axis will briefly show  before returning to normal operation.

To exit from the menu structure without saving any changes, Press the  key.

## NOTES




As the Y-axis does not form part of the CSS calculations it can still be re-datumed as required.

**NOTES****To use the Axis Summing Function**

The selection of which axes are to be summed together is carried out in the menu selection.

Press the  key to toggle the function On/Off

· If X + Y selected:


The X-display shows the Sum of the X and Y axes and the axis identifier shows 

The Z-display shows the Z-axis position as normal

The Y-display shows the Y-axis position as normal

· If Z + Y selected:

The X-display shows the X-axis position as normal

The Z-display shows the Sum of the Z and Y axes and the axis identifier shows 

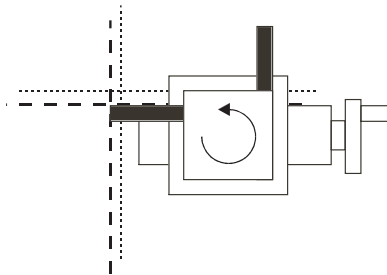
The Y-display shows the Y-axis position as normal



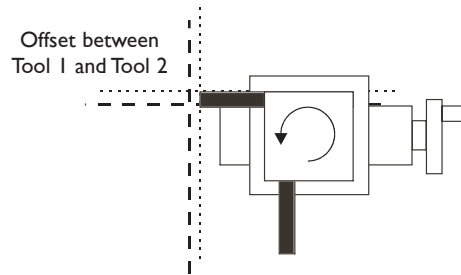
## Tool Offsets

This function allows you to program the **C80 CSS** with **Tool Offsets** for as many as 49 different tools, to save having to reset the datum every time you change tools.

- Offsets can be set only for the first two axes, which on a lathe are the X and Z axes. In the examples opposite, the X axis is set to the diameter of the part, and the Z axis is zeroed at the face.



Tool 1 in use




Tool post rotated to use Tool 2

### tip

This function allows you to program the C80 CSS with Tool Offsets for as many as 49 different tools with their associated surface cutting speeds, to save having to reset the datum every time you change tools.. This data is retained even after power loss


- **Tool 1 Offset** is special, in that it is tied to the **Machine Datum**, as explained below.

### Tool Set Mode

This mode is accessed through  and is used to set the offsets for each tool.

- On entering this mode the DRO will automatically switch to **Absolute Mode**.
- Note that the setting of **Tool 1 Offset** in this mode will affect the **Absolute Machine Datum**. This is the only method of setting the X-axis datum.

### Tool Usage Mode

This mode is accessed through  and is used once all offsets have been set.

**Note:** A change to the Machine Datum (Incremental or Z-axis Absolute mode), while in this mode will change all the offsets. This can be useful if the same set of tools is to be used on parts of varying sizes.

### Tool Mode Off

To turn off **Tool Set Mode** press .

## NOTES



It is not possible to change the X-axis datum for the [abs] mode other than by setting the Tool 1 datum


**tip**


If you make a mistake while entering a number, pressing **ce** will clear the entry one character at a time.

To turn the function off, finish making any entry, then press the key



again.


In  mode the speed is measured / displayed in m/min

In  mode the speed is measured / displayed in feet/min.




If the 'speed' legend is flashing then the machine spindle speed is not stable. In order to set a tool speed dynamically the speed must be stable and the 'speed' legend not flashing.

**To Set the Datum Tool**


- Press  to turn on **Tool Set Mode**.

**Note:** If CSS mode is operating it will be disabled.

- The display will show  before displaying the current tool X and Z axis offsets

The current tool number will be displayed in the function display window and the CSS legend will flash to show **Tool Set Mode** is active.

- Press the   arrow keys or key in    to select the Datum Tool (Tool No. 1)

The function display shows the tool number  and the axis display will show the current programmed offsets for that tool

- Take a skim cut along the outside diameter of the part or touch the tool to the surface of the part (if cylindrical). Move the tool away from the part, taking care not to move the X axis. Measure the diameter of the part using a suitable gauge.


Press the **Select Key**  next to the  and enter the diameter of the part as measured.

**For Example:** Press        to enter 20.5.



- Take a facing cut or touch the end of the part with the tool.

Press the **Select Key**  next to the  and press  to zero the axis.

- In order to associate a cutting speed with a tool press the  key.

The function display shows the relative actual surface speed at the tool tip  and the 'speed' legend will be illuminated. If the machine spindle is not turning the speed will be zero.




The top axis window will display the current programmed speed for the current tool




**For Example :**   The axis legend changes to 'S' to signify that speed is being displayed


- To set a new speed type in a new speed via the numeric keypad

**For Example:** Press    


- Using the machine potentiometer, drive the machine to the desired speed. The measured surface speed will be displayed in the function display window.

- When the desired speed has been reached, press the **Select Key**  next to the  axis.  
the current actual speed will be copied from the function display window to the  axis


- Once the tool speed has been set, press the  key to return to the tool set screen. The axis Legends will return to   and the displays returned to the tool current tool offsets etc.

- Press  to exit **Tool Set Mode**. The C80 CSS legend will be turned off.






**To Set the Tool: Offsets (02-49)**

- Press  to turn on **Tool Set Mode**.

**Note:** If CSS mode is operating it will be disabled.



- The display will show  before displaying the current tool X and Z axis offsets

The current tool number will be displayed in the function display window and the CSS legend will flash to show **Tool Set Mode** is active.

- Press the   arrow keys or key in the desired tool number, for example   

The function display shows the tool number  and the axis display will show the current programmed offsets for that tool


- 1 Touch the tool to the surface of the part. Move the tools away from the part, taking care not to move the X axis. Measure the diameter of the part using a suitable gauge.

Press the **Select Key**  next to the  and enter the diameter of the part as measured.

**For Example:** Press        to enter 15.7


- 2 Touch the end of the part with the tool.

Press the **Select Key**  next to the  and press  to zero the axis.

- 3 In order to associate a cutting speed with a tool, press the  key.

The function display shows the relative actual surface speed at the tool tip and the "speed" legend will be illuminated. If the machine spindle is not turning, the speed will be zero.




The top axis window will display the current programmed speed for the current tool



**For Example:**  The axis legend changes to 'S' to signify that speed is being displayed

- 4 To set a new speed type in a new speed via the numeric keypad

**For Example:** Press    

- Using the machine potentiometer, drive the machine to the desired speed. The measured surface speed will be displayed in the function display window.


- When the desired speed has been reached, press the **Select Key**  next to the  axis.  
the Current Actual Speed will be copied from the function display window to the  axis

- Once the tool speed has been set press the  key to return to the tool set screen. The axis legends will return to   and the displays will return to the tool current tool offsets.


Repeat steps 1 to 3 for each tool offset


- Press  to exit **Tool Set Mode**. The C80 CSS legend will be turned off.


**NOTES**


➔ If the  Tool Set key is pressed when CSS is enabled, CSS will be disabled

**tip**


If you make a mistake while entering a number, pressing  will clear the entry one character at a time.

To turn the function off, finish making any entry, then press the  key again .

➔ In  mode the speed is measured / displayed in m/min

In  mode the speed is measured / displayed in feet/min.

➔ If the 'speed' legend is flashing then the machine spindle speed is not stable. In order to set a tool speed dynamically the speed must be stable and the 'speed' legend not flashing.

➔ The associated surface speed can be edited at any time by pressing the  key and following step 3.

## NOTES



The constant surface speed associated with the tool will be automatically recalled along with the **Tool Offsets**.



If a mistake is made, pressing **ce** deletes entries one at a time. When all values have been deleted, the original Tool selection on entry will be restored.



Pressing the **1** key exits the tool selection mode without saving any changes.



Surface speed associations with tool numbers are not lost through power off.

**To Use the Tool Offsets**

- Press **1** to turn on **Tool Selection Mode**.

**Note:** If CSS mode is operating it will be disabled.

- The display will show the current selected tool (for example, Tool 5)

- Either:

- Press **◀** or **▶** to scroll to a new Tool number

*The display will update to show current selected Tool*

- Or key in a tool number directly

For Example: Press **0** **2**

*The display will show the Tool number as it is entered*

**Note:** If an illegal tool number is selected the display will flash and return to the current tool. The function display remains showing the tool that was selected on entry.

- Press **ent** to select the current displayed tool and return to standard mode. The function display window will be updated to display the new tool number.

When in CSS mode and an axis is moving the function display will show the current measured surface speed relative to the selected tool and the '**speed**' legend will be illuminated. When no axis is moving then the function display will revert to display the current selected tool.

**To edit the Tool Offsets for Worn or Replacement Tools**

- Press **1<sup>set</sup>** to turn on **Tool Set Mode**.
- Set the offsets for each replacement or worn tool as described in **Steps 1** and **2** for setting **Tool Offsets**.
- Press **1<sup>set</sup>** to turn off **Tool Set Mode**


# CSS CONTROL


## NOTES

To enter CSS control press the  key

For CSS operation to be available, a number of safety requirements must be met, as follows:

1. CSS must be enabled (machine interlocks)
2. The spindle must be engaged and rotating
3. A maximum operating speed has been taught

If conditions 1 & 2 above are not met, the function display will show  and CSS will not be entered.





- If this occurs, ensure the machine guards are in place, the E-stop is released and the machine is in gear with the spindle rotating.
- If the function display flashes  check the machine gear lever is correctly engaged and the potentiometer is in the **Off** position

Entering a Maximum Spindle Speed:

If the '**max**' legend below the C80 CSS icon is not illuminated then a new maximum spindle speed must be taught. This speed should always be taught with the workpiece to be machined located securely within the spindle. This speed setting is to ensure the safety of the operator.

When the maximum speed has not been taught, pressing the  key causes the '**max**' legend to Flash:

**For Example:**  '**max**' flashing

- If the machine potentiometer is NOT in the **Off** position the function display will flash .  
If this occurs, rotate the potentiometer counter clockwise until it is in the OFF position, and wait for the function display to switch to showing the current tool.
- Adjust the spindle speed using the machine potentiometer until the desired safe operating spindle speed has been attained.
- Leave the machine running at this speed until the '**max**' legend stops flashing. The DRO will not accept the setting of a speed until the speed is stable.
- Press the  key.
- The new maximum speed has been set and the '**max**' legend will remain **On**.
- Return the machine potentiometer to the **Off** position.
- Pressing the  key will now enable the machine to enter **CSS Mode** and the CSS legend will be displayed: 




Maximum speed settings are not retained after power down or on a change of gear for safety reasons.



The machine RPM can be read from the standard machine fitted RPM counter.



**tip** To change a maximum speed value once set, simply press the  button.



If a maximum speed has been taught the '**max**' legend will be illuminated.

## NOTES



It is not required to have the machine potentiometer in the **OFF** position to enter CSS but it has to be in the **OFF** position to exit CSS operation




**tip**

When changing from manual control to CSS, set the potentiometer to OFF

**When a maximum speed has been set**



If the '**max**' legend below the C80 CSS icon is illuminated then a maximum spindle speed has already been set



- Press the  key.
- The function display will briefly display  and CSS operation will be enabled (if the conditions discussed earlier have been met).
- The CSS legend will be illuminated to show CSS is now operational 
- Speed control for the machine now passes from the machine potentiometer to CSS DRO control.

**How to exit CSS operation**

To exit CSS mode ensure the machine potentiometer is in the off position.

- Press the  key.
- If the machine potentiometer is NOT in the OFF position, the function display will flash  and CSS will not be exited. This ensures a safe exit from CSS operation to potentiometer control.
- If this occurs, rotate the potentiometer counter clockwise until it is in the OFF position.
- The CSS legend will be turned OFF showing that CSS control has been terminated.

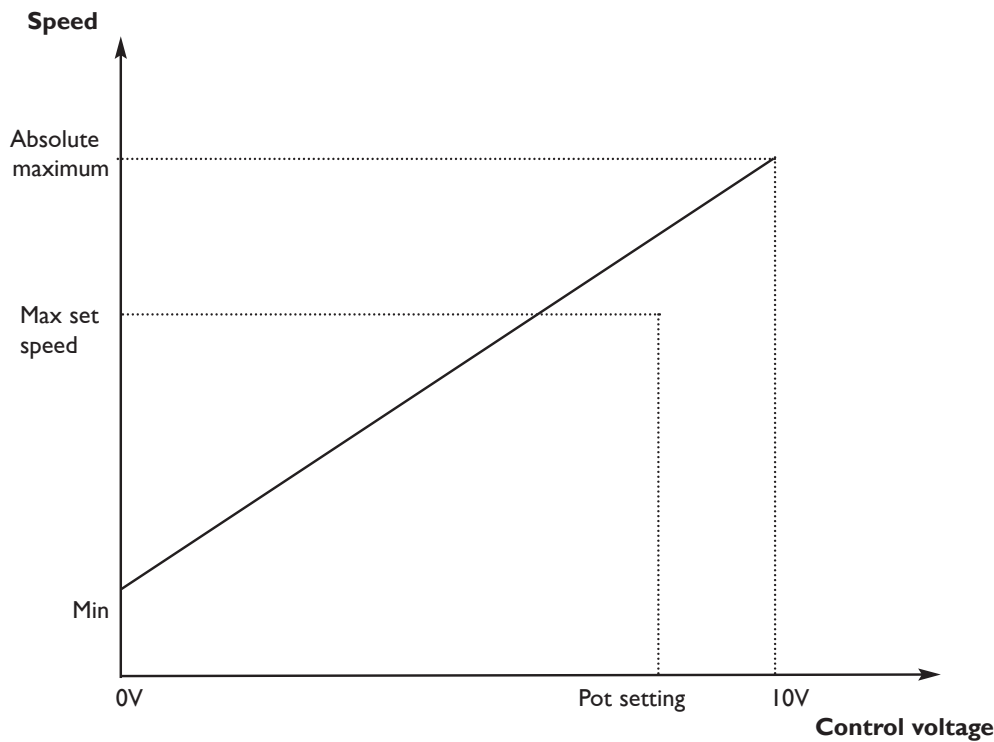
**CSS operation notes**

- Unless taught otherwise, the default speed for a Tool is 10m/min (33ft/min).
- The current Tool number can be quickly checked by not moving any axis. When stationary, the function display will show the current tool number and the '**speed**' legend will be turned off to signify this mode.
- When an axis is moving, the function display will show the current surface speed and the '**speed**' legend will be illuminated.
- During operation, if the maximum taught speed has been reached, the machine speed will be limited to the taught maximum speed and the '**max**' legend will flash until the speed drops back below this level.
- Changing gear will cause the "**max**" speed value to be lost.
- If the monitored speed runs over the target speed by more than 25% then the system will automatically shut down for safety reasons as a serious fault condition has occurred. In this circumstance the system will need to be reset.
- The compound Y axis movement forms no part of the CSS speed calculations on 3-axis units

# INTERFACE PANEL - HARDWARE

## Description

- Interface circuit is connected to the DRO through an RS232 cable. This connects from the auxiliary connector on the C80, to CON03 on the interface board.
- The 0V of the interface circuit is common to the 0V analogue of the inverter/potentiometer circuit.
- 24V inputs and outputs are isolated from the analogue circuits using opto-isolators and relays.
- A universal input mains power supply powers both the C80 CSS DRO and the interface panel. A 24V dc supply is required from the machine to provide the logic interface signals.
- The potentiometer must have a switch contact which is closed at its minimum position.



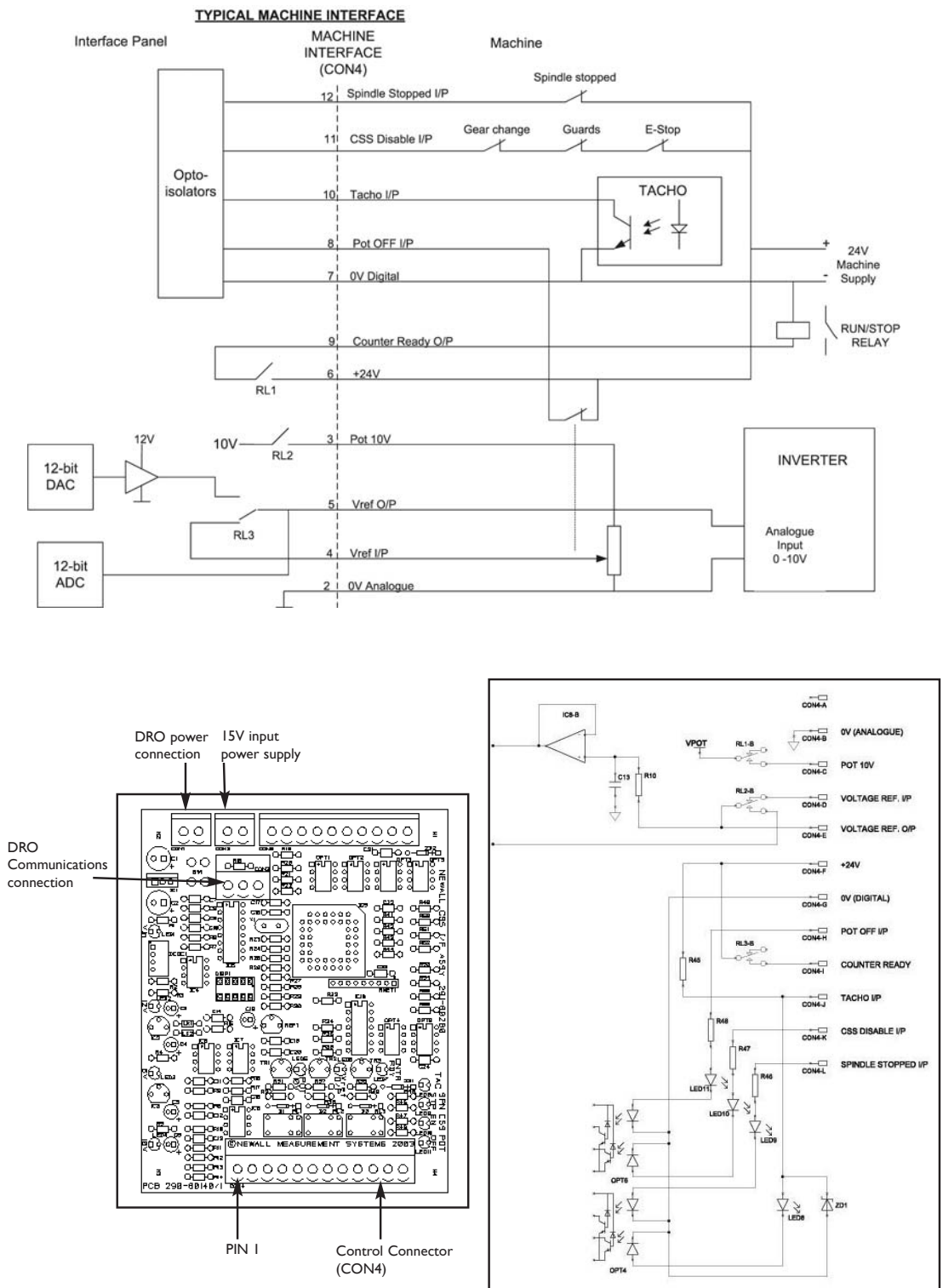
## Machine Interface - Terminal Descriptions

CON4

Terminal Number	Name	Type	Description
1	Not used	-	-
2	0V ANALOGUE	Supply	From Inverter Drive Supply
3	POT. 10V	Supply	Output 10V for POT.
4	Vref I/P	Input	Demand from POT (0-10V)
5	Vref O/P	Output	Speed demand to Drive (0-10V)
6	24V	Supply	DC supply from machine
7	0V Digital	Supply	Supply from machine electrics
8	Pot. OFF I/P	Input	HIGH (24V) when POT is OFF
9	COUNTER READY O/P	Output	Output from DRO (24V)
10	TACHO I/P	Input	Tacho I/P (TTL level or open collector NPN)
11	CSS ENABLE I/P	Input	High (24V) if In-Gear, Guards closed or E-Stop closed
12	SPINDLE STOPPED I/P	Input	Stopped = HIGH (24V): Forward or Reverse = LOW (0V)

## NOTES

The following diagram shows typical connections to a machine:






### Tacho Interface

The Tacho output (open-collector transistor or TTL output) is required to sink 2.4mA when low.

In Set-up the tacho value may be set to any value up to 999 pulses per rev. Practically, the lower limit is set by the resolution required at low speed. We would not recommend less than 60 ppr. This will resolve to 2 rpm.



## TROUBLESHOOTING

Symptom	Solutions
The display is blank.	<ul style="list-style-type: none"> <li>The <b>C80 CSS</b> may be in <b>Sleep Mode</b>. Press .</li> <li>Check that the power supply is correctly connected to a working mains outlet.</li> <li>Check that the power supply cables are not damaged.</li> <li>Check that the power supply voltage is 15Vdc <math>\pm 10\%</math>.</li> <li>Disconnect all encoder cables. A defective encoder can prevent the <b>C80 CSS</b> from working.</li> <li>Check power supply lead on rear of C80 CSS display to ensure that it is illuminated</li> </ul>
The display works, but resets from time to time without any keys being pressed.	<ul style="list-style-type: none"> <li>This suggests either that the supply voltage is too low, or that the power supply or mains supply has an intermittent fault.</li> <li>Check that the power supply voltage is 15Vdc <math>\pm 10\%</math>.</li> <li>Check that all connections are sound.</li> </ul>
The display works, but gives erratic readings, the last digit jitters or the measurements jump to new figures unexpectedly.	<ul style="list-style-type: none"> <li>This suggests that there may be a poor earth (ground) connection.</li> <li>Both the <b>C80 CSS</b>, and the machine on which it is installed, must have proper earth (ground) connections. (see page 3)</li> <li>There may be a problem with the encoder (see below).</li> </ul>
 or  appears in the display.	<ul style="list-style-type: none"> <li>This indicates that the unit is not receiving a proper signal from the encoder.</li> <li>Check that the encoder connections are secure.</li> <li>Check that there is no damage to the connectors or to the encoder.</li> <li>Switch the <b>C80 CSS</b> off and back on again.</li> <li>Swap the encoder to another axis to confirm whether the encoder or the <b>C80 CSS</b> is at fault (see tip).</li> <li>If there are only two axes used, check the <b>C80 CSS</b> is set for 2 axis in <b>Set Up</b></li> </ul>
The unit will not respond to any key presses.	<ul style="list-style-type: none"> <li>Disconnect the <b>C80 CSS</b> from its power supply, wait 15 seconds and then reconnect.</li> </ul>
Readings are incorrect	<ul style="list-style-type: none"> <li>Check <b>Encoder Type</b> to ensure correct selection.</li> <li>Check the <b>Radius / Diameter</b> setting. The <b>Diameter</b> setting will cause the axis to read double.</li> <li>Check <b>Error Compensation</b> factors.</li> <li>If using <b>Segmented Error Compensation</b>, verify the datum position.</li> <li>Swap the encoder to another axis to confirm whether the encoder or the <b>C80 CSS</b> is at fault (see tip).</li> <li>Check that there is no damage to the encoder or its cable.</li> <li>Check that the encoder is fixed firmly and aligned correctly, as described in the Spherosyn/Microsyn Installation manual.</li> <li>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.</li> <li>If you have a Spherosyn scale, check that the scale is not bent, by removing it and rolling it on a flat surface.</li> </ul>

If the solutions suggested above do not solve your problem, contact Newall for further instruction.

## CLEANING

- Disconnect the power supply from the **C80 CSS** before cleaning.
- Do not use corrosive or abrasive cleaning materials.
- Do not use compressed air.
- Apply a small amount of mild soap to a lint-free cloth. Use this to wipe over the case and keypad, taking care not to allow fluid into the connectors.

### NOTES

#### tip

Providing the machine has not been moved more than:  
6.3mm (0.25") for a Spherosyn Encoder or  
2.5mm (0.1") for a Microsyn Encoder

the datum position will not be lost by switching the power off and back on again.

#### tip

When swapping encoders to trace a fault:

1

Check that two axes are set to the correct encoder types.

2

Move the encoder from the malfunctioning axis to a working axis.

If the fault stays with the same encoder, then the encoder is at fault. If the fault does not follow with the encoder the C80 CSS is at fault



FOLLOW THESE INSTRUCTIONS CAREFULLY TO AVOID DAMAGE TO THE **C80 CSS**.

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