



HEIDENHAIN

Pilot



Working with the

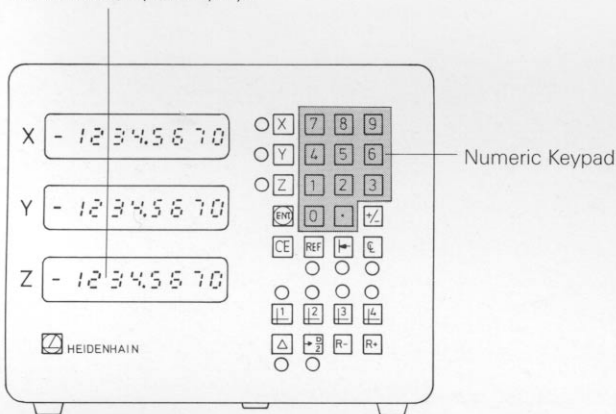
VRZ 720 B/760 B

Keys, Displays and Connections

VRZ 720 (2 axes)

VRZ 760 (3 axes)

Actual Value/Input Displays

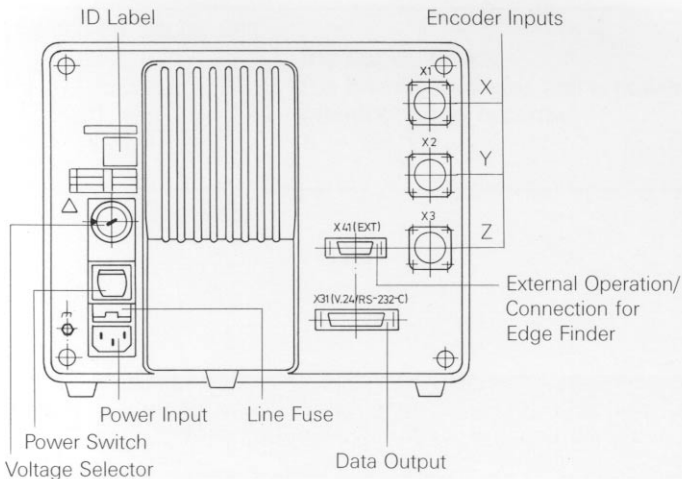


- | | | | |
|--|---|--|---|
| | Axis Selection | | Datum Points ¹⁾ |
| | Confirm entry | | Distance-To-Go
"Countdown Positioning" |
| | Clear Entry/Set Display to Zero* | | Tool Radius Entry |
| | REF Reference
Mark Evaluation | | Tool Radius
Compensation |
| | Touch Probe Function:
Datum = Workpiece Edge | | |
| | Touch Probe Function:
Datum = Centerline | | |

¹⁾ - key as mm/inch conversion key (key activation via operating parameter P 10 = 2; see Parameter Entry mm/inch)

*Depending on Parameter setting

Rear Panel: Connections



Keys, Displays and Connections

Switch-on

Working in REF mode

Datum Points

Setting the Datum

Absolute Dimensions/Incremental Dimensions

Positioning in Incremental Dimensions

Distance-to-go Display

Traversing to Zero

Tool Radius Compensation

Positioning with Tool Radius Compensation

Parameter Entry

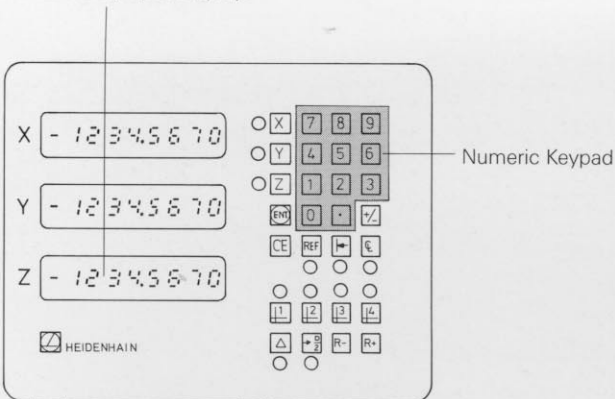
· Radius/Dia. · mm/inch · Edge Finder · Shrinkage · Reset

Probe Operating Mode

Datum = Workpiece Edge

Datum = Workpiece Center Line

Error Codes



Switch-on



Read the information on initial operation before the first switch-on! (See Operating Instructions).

The power switch is located on the rear panel.

Switch on display unit:



X 0.000
Y 0.000

The display blinks.

The blinking indicates that a power interruption has occurred.

Switch-on

Working in REF mode

Datum Points

Setting the Datum

Absolute Dimensions/Incremental Dimensions

Positioning in Incremental Dimensions

Distance-to-go Display

Traversing to Zero

Tool Radius Compensation

Positioning with Tool Radius Compensation

Parameter Entry

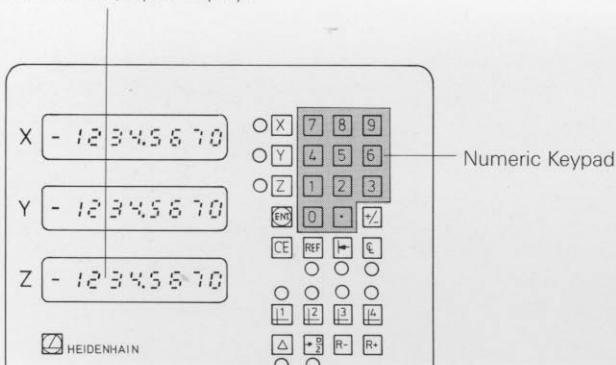
· Radius/Dia. · mm/inch · Edge Finder · Shrinkage · Reset

Probe Operating Mode

Datum = Workpiece Edge

Datum = Workpiece Center Line

Error Codes



Working in REF mode (REF Reference mark evaluation)

In REF mode, the datum points remain in memory even when the power is switched off. After REF operation is switched-on, the reference marks of the encoder must be crossed over. When the reference marks are crossed over, all datum points are reproduced.

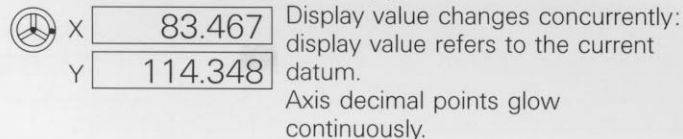
Switching on REF mode/Reproducing datum points

Switch-on reference mark evaluation:



X Display indicates the stored REF value and remains "frozen".
Y Axis decimal points blink.

▼
Traverse encoder reference mark(s):



 This is the symbol for the handwheel of your machine or positioning device.

The **REF**-key is a changeover key. REF operation is switched off by pressing once again.

Working in REF mode

Datum Points

Setting the Datum

Absolute Dimensions/Incremental Dimensions

Positioning in Incremental Dimensions

Distance-to-go Display

Traversing to Zero

Tool Radius Compensation

Positioning with Tool Radius Compensation

Parameter Entry

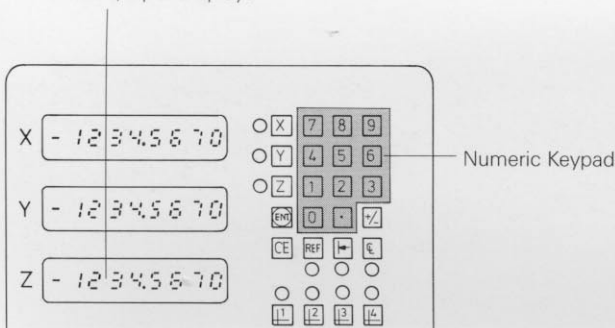
· Radius/Dia. · mm/inch · Edge Finder · Shrinkage · Reset

Probe Operating Mode

Datum = Workpiece Edge

Datum = Workpiece Center Line

Error Codes



Datum Points

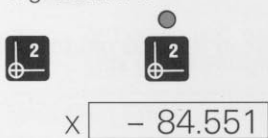
Using datum points you can set a certain correlation between encoder position and the display value.

The VRZ 720/760 Display Units permit the setting of four datum points which are selected under the symbols



Switching to another Datum (e. g. in the X axis)

e. g. Datum 2



Indicator on.

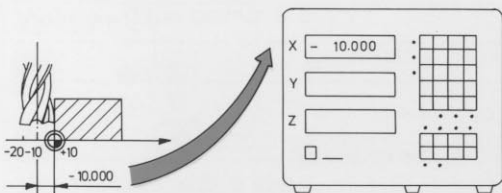
The display value changes suddenly. The value refers to the current selected datum.

A switch-over to another datum is possible both within as well as outside of the REF mode.

Setting the Datum



The datum points only remain stored in memory after the power is switched off if they are set in the REF mode (see "switch-on REF mode").



Datum Points

Setting the Datum

Absolute Dimensions/Incremental Dimensions

Positioning in Incremental Dimensions

Distance-to-go Display

Traversing to Zero

Tool Radius Compensation

Positioning with Tool Radius Compensation

Parameter Entry

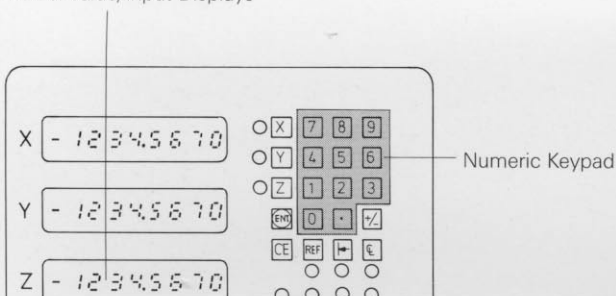
· Radius/Dia. · mm/inch · Edge Finder · Shrinkage · Reset

Probe Operating Mode

Datum = Workpiece Edge

Datum = Workpiece Center Line

Error Codes

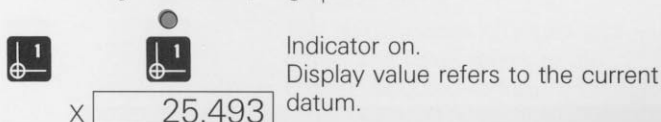


Setting the Datum

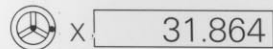
Axis selection, e.g. X axis:



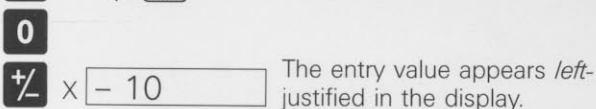
Addressing the datum, e.g. $\perp 1$:



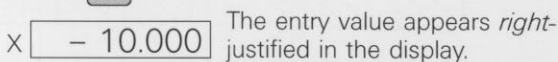
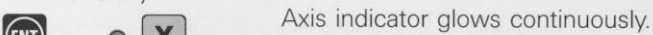
Traverse the machine slide or tool to the datum position:



Enter the new datum value for the current position, e.g. -10.000:



Transfer entry:



Falsely entered values can be corrected at any time by re-entering with the correct value.

If the entry value is still left-justified in the display, then **CE** must be pressed before entering the correct value.

Setting the Datum

Absolute Dimensions/Incremental Dimensions

Positioning in Incremental Dimensions

Distance-to-go Display

Traversing to Zero

Tool Radius Compensation

Positioning with Tool Radius Compensation

Parameter Entry

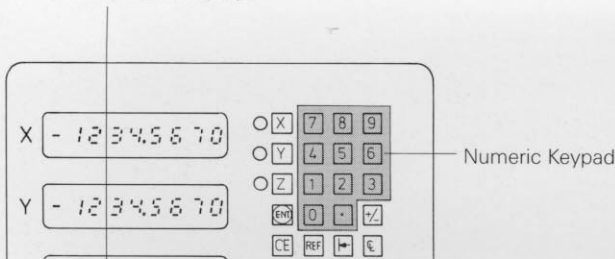
• Radius/Dia. • mm/inch • Edge Finder • Shrinkage • Reset

Probe Operating Mode

Datum = Workpiece Edge

Datum = Workpiece Center Line

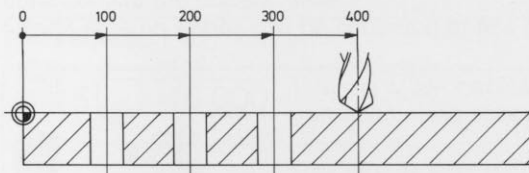
Error Codes



Absolute Dimensions/Incremental Dimensions

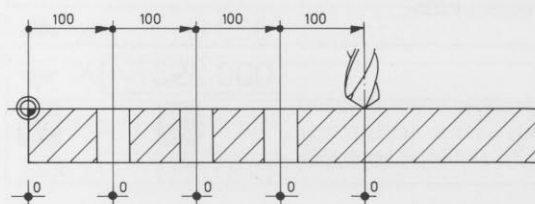
Absolute dimensions

refer to one absolute, fixed datum.
The axis slide or the tool is to move **to** a certain **position**.



Incremental dimensions

refer to the previous position of the axis slide or tool.
The axis slide or the tool is to move **by** a certain **amount**.



Absolute Dimensions/Incremental Dimensions

Positioning in Incremental Dimensions

Distance-to-go Display

Traversing to Zero

Tool Radius Compensation

Positioning with Tool Radius Compensation

Parameter Entry

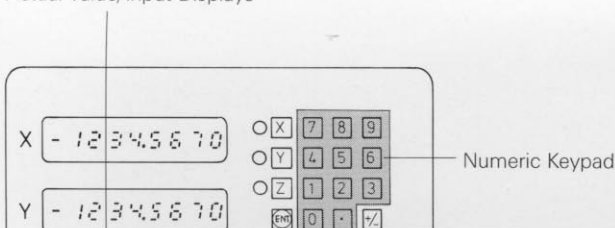
• Radius/Dia. • mm/inch • Edge Finder • Shrinkage • Reset

Probe Operating Mode

Datum = Workpiece Edge

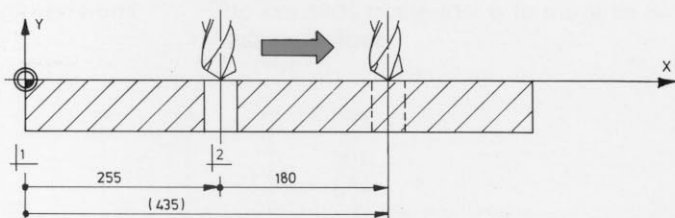
Datum = Workpiece Center Line

Error Codes



Positioning in Incremental Dimensions

Example for the X axis (axis indicator on)



Indicator on.
The display shows the absolute position value relative to datum 1.

X

Switch to datum 2:

Indicator on.

X

Display value refers to a preset datum 2.

Zero datum 2 in the X axis:

   Axis indicator blinks.

   Axis indicator glows.

X

Tool is at zero position relative to datum 2.

Move tool by +180 mm:

 X

Tool is at position 180 relative to datum 2.

Recall the absolute position:

Indicator on.

X

Tool is at position (180 + 255) = 435 relative to datum 1.

Positioning in Incremental Dimensions

Distance-to-go Display

Traversing to Zero

Tool Radius Compensation

Positioning with Tool Radius Compensation

Parameter Entry

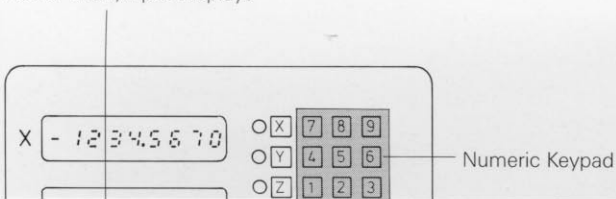
• Radius/Dia. • mm/inch • Edge Finder • Shrinkage • Reset

Probe Operating Mode

Datum = Workpiece Edge

Datum = Workpiece Center Line

Error Codes



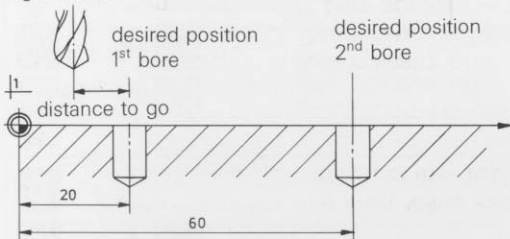
Distance-to-go Display

"Countdown Positioning"

The  key makes it possible to position in absolute dimensions also while "traversing to zero" with distance-to-go display.

Example:

Actual position
e.g. X 10.000



Distance-to-go Display

Traversing to Zero

Tool Radius Compensation

Positioning with Tool Radius Compensation

Parameter Entry

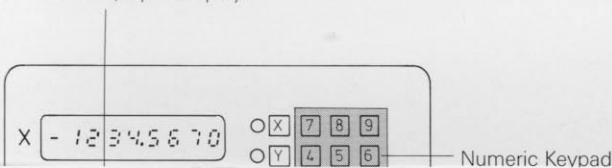
· Radius/Dia. · mm/inch · Edge Finder · Shrinkage · Reset

Probe Operating Mode

Datum = Workpiece Edge

Datum = Workpiece Center Line

Error Codes

**Traversing to Zero (Example X axis)**

Tool is located at the actual position e.g. $X = 10.000$.

X-axis indicator on.

Switch on distance-to-go display.



Indicator on.

The value zero appears in the display for each axis.

Enter desired position of the 1st bore:



Axis indicator blinks.



x

20

The entry value appears *left-justified* in the display.

Transfer entry:



Axis indicator on.

The distance remaining to the 1st bore appears with reverse sign in the display.

x

- 10.000

Traverse machine axis towards zero:



x

0.000

Tool is located at the position of the 1st bore.

Enter desired position of the 2nd bore:



Axis indicator blinks.



x

60

The entered value appears *left-justified* in the display.

Transfer entry value:



Axis indicator on.

The distance remaining to the 2nd bore appears with reverse sign.

x

- 40.000

Traverse machine axis towards zero:



x

0.000

Tool is located at the position of 2nd bore.



Indicator goes out.

x

60.000

The position of the 2nd bore relative to datum $\perp 1$ appears.

Traversing to Zero**Tool Radius Compensation****Positioning with Tool Radius Compensation****Parameter Entry**

• Radius/Dia. • mm/inch • Edge Finder • Shrinkage • Reset

Probe Operating Mode

Datum = Workpiece Edge

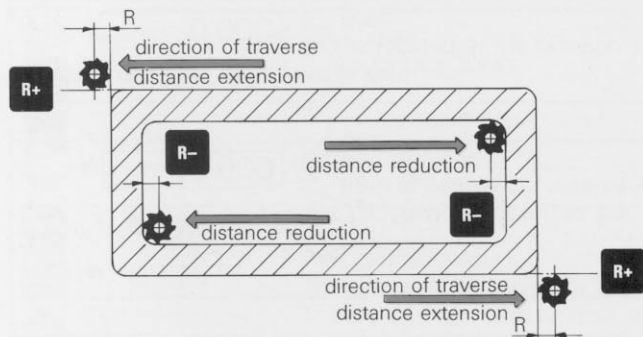
Datum = Workpiece Center Line

Error Codes

Tool Radius Compensation $\rightarrow \frac{D}{2}$ **R-****R+**

Tool radius compensation with the **R-** and **R+** key is only possible in the countdown positioning operating mode (Δ key depressed, indicator on).

The countdown positioning operating mode is not activated to enter the tool diameter with the $\rightarrow \frac{D}{2}$ key (Δ key not depressed, indicator off).

**Entering the Tool Diameter:** $\rightarrow \frac{D}{2}$ $\rightarrow \frac{D}{2}$

Indicator on.

X

The current tool radius appears in the Y-display, e.g. 10 mm.

Y

10.000

Enter value for diameter of the new tool, e.g. 15 mm:

1

X

The new value for the tool diameter appears at left in the display for Y.

5

Y

15.000

Transfer entry value: Changeover diameter $\rightarrow$ radius**ENT**

X

The new value for the tool radius appears at right in the display for Y.

Y

7.500

Display position values again:

 $\rightarrow \frac{D}{2}$ $\rightarrow \frac{D}{2}$

Indicator off.

X

30.433

The current position values appear again.

Y

- 20.501

Tool Radius Compensation**Positioning with Tool Radius Compensation****Parameter Entry**

· Radius/Dia. · mm/inch · Edge Finder · Shrinkage · Reset

Probe Operating Mode

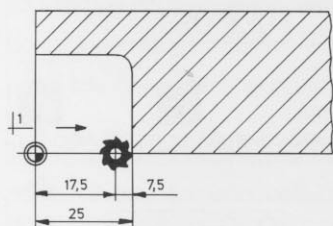
Datum = Workpiece Edge

Datum = Workpiece Center Line

Error Codes

Positioning with Tool Radius Compensation

Example:



Axis selection, e.g. X axis:



Axis indicator on.



Indicator on.

Enter value for target position:



Axis indicator blinks.



x

25

The entry value appears *left-*justified in the display.

Axis indicator blinks.

x

17.5

The value, adjusted for the tool radius, appears *left-*justified in the display.

Transfer entry:



Axis indicator on.

x

- 17.500

The adjusted value appears with a negative sign.

Traverse machine axis toward zero:



x

0.000

Tool is located at end position.



Indicator off.

x

17.500

The absolute dimension appears relative to the datum $\perp 1$.

Positioning with Tool Radius Compensation

Parameter Entry

· Radius/Dia. · mm/inch · Edge Finder · Shrinkage · Reset

Probe Operating Mode

Datum = Workpiece Edge

Datum = Workpiece Center Line

Error Codes

Parameter Entry

The VRZ is adapted to a specific machine by means of parameters.

Designation

Parameters are designated by the letter **P** and **two digits**.
Examples: P07 or P20.

Parameters which refer to an individual machine axis have a **third digit** which **identifies the axis**:

- 1** for the **X** axis (**1st** axis)
- 2** for the **Y** axis (**2nd** axis)
- 3** for the **Z** axis (**3rd** axis).

The digit identifying the axis is separated from the parameter number by a point.

Example

P03.1 = Parameter P03 for the X axis.

Example of parameter entry

Parameter **P03.2** is to be assigned the value **1**.

Activate parameter entry: press and hold the CE key, press number key for first digit of parameter number

Call parameter (Press and hold CE key. Enter zero.):

Activation of parameter operation.



X



Enter parameter number (e. g. 3):

3 X

The parameter number appears in the X display.

Y

The parameter value appears right-justified in the Y display.



Axis selection, e. g. Y axis:



Axis indicator on.

X

The axis number (2 for the Y axis) appears behind the point.

Y



Status change: Toggles between parameter value 0 or 1

+/- X

in the Y display.

Y



Transfer parameter to memory:

ENT X

The last position values appear in the display.

Y

Parameter Entry

· Radius/Dia. · mm/inch · Edge Finder · Shrinkage · Reset

Probe Operating Mode

Datum = Workpiece Edge

Datum = Workpiece Center Line

Error Codes

Parameter P03: Radius/Diameter Display

0 = radius display (normal display)
1 = diameter display

Parameter P10: mm/inch display

0 = mm display
1 = inch display
2 = mm/inch selection via -key



When P10 = 2, the key  cannot be used as a datum point key.

P10 = 2

○



Indicator off: mm display

●



Indicator on: inch display

Parameter P12: Edge Finder Stylus Radius

Entry range in mm: 0 to 99.999
Entry range in inch: 0 to 3.9369

The parameter is only active in conjunction with the probe operating mode.



The stylus radius must be entered in the same unit of measurement as is entered under parameter P10 (mm/inch).

Parameter P13: Shrinkage Allowance

Entry range from ± 0 to 99999 $\mu\text{m}/\text{m}$
($\cong \pm 0$ to 9.999%)



A *positive* entry value **reduces** the workpiece size.
A *negative* entry value **enlarges** the workpiece.
For work without material shrinkage or expansion, enter 0.

Parameter P20:**Resetting the display to zero with the CE key**

0 = Zero reset with CE key inhibited
1 = Zero reset with CE key enabled

If value "1" was addressed for parameter P20 then the addressed axis is zeroed upon activation of the -key.

• Radius/Dia. • mm/inch • Edge Finder • Shrinkage • Reset

Probe Operating Mode

Datum = Workpiece Edge

Datum = Workpiece Center Line

Error Codes

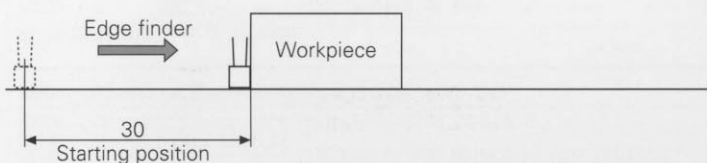
Probe Operating Mode

In the probe operating mode the HEIDENHAIN edge finder can be used to set a datum at a workpiece edge (with the  key) or at the workpiece center line (with the  key).

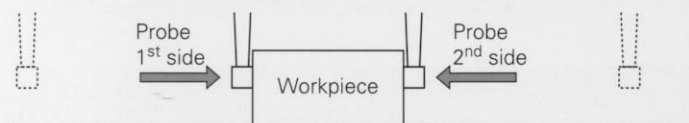
Before beginning probe operation, the edge finder stylus radius must be entered in parameter P12 (see chapter on parameters).

The probed workpiece positions can be output over the RS-232-C data interface of the VRZ (see Operating Instructions VRZ 720 B/VRZ 760 B).

Setting the Datum at the Workpiece Edge



Setting the Datum at the Workpiece Center Line



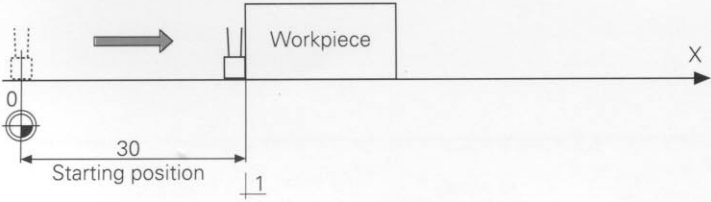
Probe Operating Mode

Datum = Workpiece Edge

Datum = Workpiece Center Line

Error Codes

Setting the Datum at the Workpiece Edge



Select datum, e.g. 1:



Indicator on.

Display value refers to the current datum.

x

Axis selection, e.g. X axis:



Axis indicator on.
The edge finder is at the starting position.



Indicator on.

Probing the workpiece edge:



x

The value is displayed corresponding to the probe trigger signal, adjusted for the stylus radius.
Display frozen.

Enter datum of the workpiece edge, e.g. 0



Axis indicator blinks.

The entry value appears *left*-justified in the display.

x

Transfer datum to memory:



Indicator goes out.



Axis indicator glows.

Display value refers to the new datum (here: - stylus radius 3.000).

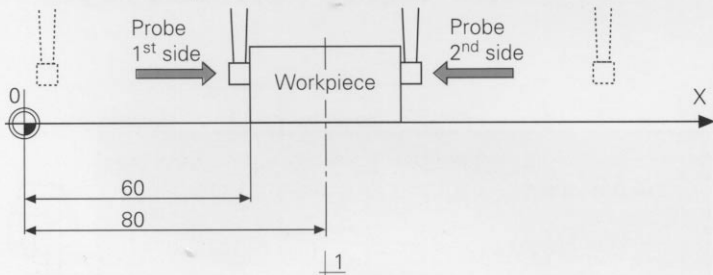
x

Datum 1 is now located at the workpiece edge.



The minimum path of traverse for probing is 200 µm.
If the path of traverse is less than 200 µm the error message E E E E E E E E appears.

Setting the Datum on the Workpiece Center Line



Select datum, e.g. $\perp 1$:



Indicator on.

X

0.000

Display value refers to the current datum.

Axis selection, e.g. X axis:



Axis indicator on.

The edge finder is located at the starting position.



Indicator on.

Probing the 1st workpiece edge:



Indicator blinks.



Probing the 2nd workpiece edge:



Indicator on.

x

Center line of the workpiece relative to the absolute datum appears.

Display frozen.

Enter datum of the workpiece center line:



Axis indicator blinks.

x

The entry value appears *left-justified* in the display.

Transfer datum to memory:



Indicator goes out.



Axis indicator glows.

x

Display value refers to the new datum (here: 20.000 + stylus radius 3.000).

Datum point $\perp 1$ is now located on the workpiece center line.



The probe operation can be interrupted by pressing the  key. The current datum points are displayed again.

Datum = Workpiece Center Line

Error Codes

Error Codes

Display Blinks	● A power interruption has occurred. ● The scale was moved too quickly, the permissible input frequency was exceeded. ● The encoder signal was interrupted. ▶ Press REF and cross over the reference marks.
----------------	---

EEEEEEEE	● Input error. The input range was exceeded. ● A non-permissible parameter number was selected. ▶ Acknowledge the error message with CE.
----------	--

0.0.0.0.0.3.7.5	● Overflow display. All decimal points light up. ▶ Retract the machine axes.
-----------------	---

0.0.0.1.2.3.4.5	● Gate array overflow. All decimal points blink. ▶ Turn the encoder off and then on again.
-----------------	---

Error 02	● External device not ready. A storage command was given but the peripheral device is not ready or not connected (Data Set Ready missing). No data are output. ▶ Acknowledge the error message with CE. Subsequent errors will not be displayed.
----------	--

Error 51	● Encoder signal amplitudes too large for the X-axis.
----------	---

Error 52	● Encoder signal amplitudes too large for the Y-axis.
----------	---

Error 53	● Encoder signal amplitudes too large for the Z-axis. ▶ Acknowledge the error message with CE.
----------	--

Error 61	● The distance-coded reference marks for the X-, Y- or Z-axes were crossed over too quickly. ● The value in parameter P09 for reference mark evaluation does not correspond to the reference marks of the encoder for the X-, Y- or Z-axis. ▶ Acknowledge the error message with CE and correct the error.
Error 62	
Error 63	

Error 80	If any of these error codes appear in the display during operation, contact your HEIDENHAIN Customer Service.
Error 81	
Error 82	
Error 83	
Error 84	
Error 98	
Error 99	