

# Set and Inspect for Okuma

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## Caution – Software safety

The software you have purchased is used to control the movements of a machine tool. It has been designed to cause the machine to operate in a specified manner under operator control, and has been configured for a particular combination of machine tool hardware and controller.

Renishaw has no control over the exact program configuration of the controller with which the software is to be used, nor over the mechanical layout of the machine. Therefore, it is the responsibility of the person putting the software into operation to:

- ensure that all machine safety guards are in position and are correctly working before commencement of operation;
- ensure that any manual overrides are disabled before commencement of operation;
- verify that the program steps invoked by this software are compatible with the controller for which they are intended;
- ensure that any moves which the machine will be instructed to make under program control would not cause the machine to inflict damage upon itself or upon any person in the vicinity;
- be thoroughly familiar with the machine tool and its controller, understand the operation of work co-ordinate systems, tool offsets, program communication (uploading and downloading) and the location of all emergency stop switches.

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**IMPORTANT:** This software makes use of controller variables in its operation. During its execution, adjustment of these variables, including those listed within this manual, or of tool offsets and work offsets, may lead to malfunction.

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## Before you begin

This document contains basic information on installing and programming Set and Inspect for Okuma.

- Chapter 1 outlines the prerequisites for installing and running Set and Inspect for Okuma
- Chapter 2 covers the installation of Set and Inspect for Okuma
- Chapter 3 describes how to get started with your Set and Inspect for Okuma application

### About Set and Inspect for Okuma

Set and Inspect is a simple, intuitive on-machine probing app providing users with an easy-to-use probing solution.

Even users with no previous experience can take advantage of the benefits offered by Renishaw probing systems with this seamlessly integrated app.

Set and Inspect for Okuma: Renishaw part no. A-5999-1400.

### Prerequisites

In order to use the Set and Inspect for Okuma application, the following are required.

- Okuma API
- Renishaw macro software packages. (Exact packages will be dependent on your machine type and installed hardware: for details see page 3)
- Microsoft® .NET Framework 4.0 (supplied on the installation media)

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**NOTE:** Installation of the .NET Framework requires a minimum disk space of 850 MB (32-bit controls) or 2 GB (64-bit controls).

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Further information on these prerequisites is provided in Chapter 1.

### Renishaw customer services – calling a Renishaw subsidiary office

If you have a question about the software, first consult the documentation and other information included with your product.

If you cannot find a solution, you can receive information on how to obtain customer support by contacting the Renishaw subsidiary company that serves your country.

When you call, it will help the Renishaw support staff if you have the appropriate product documentation at hand. Please be prepared to give the following information (as applicable):

- The version of the software you are using
- The make and model of your CNC machine tool control
- The type of hardware that you are using
- The exact wording of any messages that appear on your screen
- A description of what happened and what you were doing when the problem occurred
- A description of how you tried to solve the problem

## Chapter 1 – Prerequisites

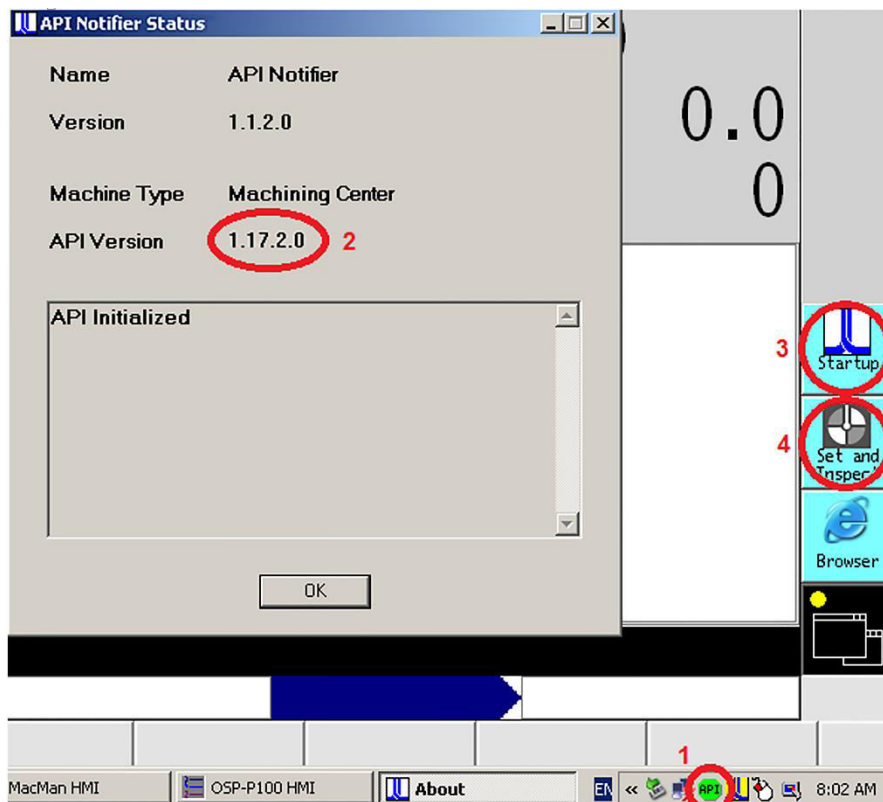
### Okuma API


The software is compatible only with API version 1.12.x.x or higher.

Ensure that the Okuma THINC API is installed.

If there is no API icon displayed at the bottom right of your screen, contact your local Okuma dealer to arrange for the API to be installed.

A firmware upgrade may be required to obtain this option.



If the API is installed, the API icon (1) will be present in the Windows taskbar. (To view the Windows task bar press CTRL and )

Double-click the API icon (1) to show the API version (2).

## Existing macro software

Other Renishaw macro software packages must be installed and configured on the CNC machine tool control in order for Set and Inspect to operate correctly.

See the relevant installation and programming manuals for help with these macro packages.

Machine type	Software type and part number			
	Inspection Plus	Contact tool setting	Non-contact tool setting	AxiSet™ Check-Up
Machining centres	A-4016-1035 (see table below)	A-4016-1039 ( <b>0N</b> or later)	A-4016-1051 ( <b>0D</b> or later)	
Lathe, MULTUS and MacTurn	A-4016-1056 ( <b>0F</b> or later)			A-5642-4200 ( <b>0E</b> or later)

## Inspection Plus mod levels

The mod level of Inspection Plus that must be installed is dependent on the required functionality. There is a minimum mod level required to work with Set and Inspect; a different minimum mod level is required if Set and Inspect is to be used in conjunction with the Reporter app.

Machine type	Inspection Plus part number	Set and Inspect only	Set and Inspect with Reporter app
Machining centres	A-4016-1035	Mod level <b>0T</b> or later	Mod level <b>0U</b> or later

## Microsoft .NET Framework 4.0

Microsoft .NET Framework 4.0 must be installed on the CNC machine tool control.

If not already present, this application will be installed as part of the Set and Inspect installation process.

**NOTE:** Installation of the .NET Framework requires a minimum disk space of 850 MB (32-bit controls) or 2 GB (64-bit controls).

## Chapter 2 – Installing Set and Inspect

### Software installation

In order to install Set and Inspect onto the machine tool control, content from the installation media device (A-5999-1400 or equivalent) must be copied onto a suitable, portable data device, such as a USB flash drive.

Insert the data device into a free port on the machine tool control.

Using Windows Explorer, navigate to the directory location of the data device and double-click (or single-click and press *Enter*) to run **Set and Inspect - Okuma Setup V\*.\*.\*.\*.exe**.

Follow the on-screen instructions to install the application.



The set-up process will install all required system components – such as the .NET 4.0 framework and the Set and Inspect application – to the target CNC machine tool control, and create a desktop shortcut.

An automated element of the installation process integrates with the Okuma system to create a vertical function key shortcut to Set and Inspect.




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**NOTE:** The CNC machine tool should be restarted on completion of the software installation process and after any machine configuration changes have been made.

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## Configuring Set and Inspect



On the Home page, click the **Configuration** soft key  to open the *Configuration* dialog.

**NOTE:** When first run, or whenever the current configuration is invalid, the *Configuration* dialog will open automatically when Set and Inspect is started.

The following settings can be adjusted to control the display and behaviour of the Set and Inspect application.

**NOTE:** Actual settings displayed are dependent on machine type selected.

### Application settings

Option	Default value	Description
Choose a language	English	The display language of the application.
Display theme	Dark	The colour theme used by the application.
Minimise after send	Off	Minimise the Set and Inspect window after successfully sending a program to the NC.
Display Set and Inspect screen after probing	Off	Open the Set and Inspect window after successfully receiving the cycle results from the NC.
Skip instructions	Off	Display further instructions after sending a program to the NC.
Show Program builder	Off	Displays the Program builder option in the Home screen. When selected, certain fields in the Program builder settings category must be configured.
Use mouse events for touchscreen	Off	Enable this setting if the touchscreen keypad does not appear when expected.

### Controller settings

Option	Default value	Description
Program number	REN-GUI-RUN	The file name of the generated G-code program uploaded to the NC. (Only visible when an Upload type of Auto is selected.)
Result handshake variable	n/a	A machine variable number that can be used by the Set and Inspect program. Ensure that no other applications (including Inspection Plus) or G-code programs use this variable. For example, enter the value 90 to use the machine variable V90.
Upload type	MDI	Select whether the G-code for the probing cycle is sent to the NC as a main program or an MDI string.

### Program builder settings

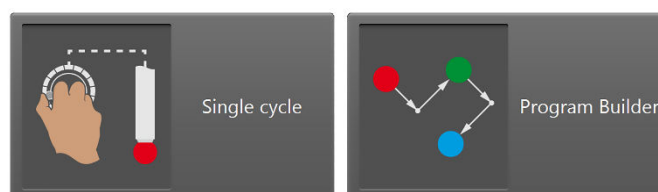
Option	Default value	Description
Probe offset number	n/a	The tool offset number for the probe. This is used when capturing the absolute position of the probe.
Program start commands	G40 G80 G90 G0 Z999.999 IF[VTLCN EQ 99]N10 T=1 M6 N10	Enter the G-code for the start of the program. The G-code must perform specific tasks in the following order: cancel unrequired G-code functions; return the spindle axis to the machine reference position; tool change the probe into the spindle. Any additional G-code commands should be added as required. Note: Do not enter a value for the program number as this will be specified by another setting.
Apply probe length commands	G01 G56 H=1	Enter the G-code to apply the probe length offset. The H input must represent the tool offset number that contains the probe length geometry. Note: Do not enter values for the Z-axis position (Z) or feedrate (F) as these will be programmed by other settings.
Program end commands	G90 G0 Z999.999	Enter the G-code to return the spindle axis to the machine reference position at the end of the program. These commands can be changed to move to probe to a specific machine position as required. Note: Do not enter commands for program end (M99/M30) as this will be specified by another setting.
Positioning feedrate	n/a	Enter the feedrate used for probe positioning moves. The value should be in mm/min or inch/min dependent on machine configuration.
Results output	None	Select whether the measurements results will be output using standard Inspection Plus printing or displayed in the Reporter app. The output destination of the results for Inspection Plus printing depends on the configuration of the available options on the NC.

## Machine settings

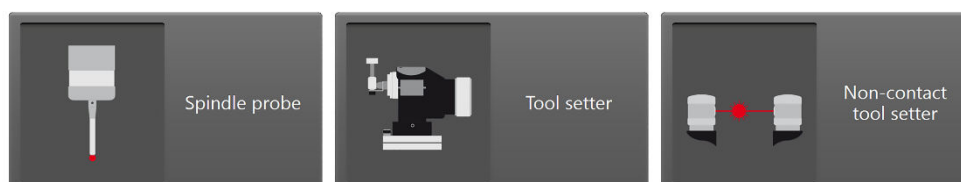
Option	Default value	Description
Machine type	P200 Horizontal machining center	The machine type. Changing this value will alter the selectable cycles, Help images and the generated NC code.
Sub spindle fitted	Off	Select this option if a sub spindle is available on the machine. This will turn on the sub-spindle probing routines.
Probe tool number	n/a	Enter the tool number used for the spindle probe.
Get tool data	Off	Retrieve tool data from the NC.
HSK/CAPTO spindle with straight shank	Off	Select this option if the HSK/CAPTO spindle with straight shank is supported.
Y-axis gauging option	Off	Select this option if the Y-axis gauging option is supported. This will turn on routines that can utilise Y-axis measurement moves.
Lower turret fitted	Off	Select this option if a lower turret is available on the machine.
EasySet VC base number (5 VCs required)	n/a	Select the base number for the EasySet common variables; 5 sequential common variables are required. Valid range is 1 to 95 (lathe) or 1 to 195 (machining centre).
AxiSet installed	Off	Select whether AxiSet™ Check-Up is installed. (Requires Y-axis gauging option to be set.)
AxiSet VC base number (5 VCs required)	n/a	Select the base number for the AxiSet Check-Up common variables; 5 sequential common variables are required. Valid range is 1 to 95.
Tool setter	Both	The type of tool setter installed on the machine. Changing this value will alter the selectable cycles and the generated NC code. (Only visible when a Machine type of machining center is selected.)
Rotary axis updates	None	Displays rotary axis update cycles. The user can select the required axis/axes. (Only visible when a Machine type of machining center is selected.)

Once selections are complete, click *OK*.

Based on the options selected in the *Configuration* dialog, the Set and Inspect *Home* screen will display Program builder next to Single cycle.



Selecting Single cycle will display the hardware that you can produce probing cycles for: Renishaw spindle probes, contact tool setters and/or non-contact tool setters.



### Backing up configuration settings

The settings entered into *Configuration* dialog are stored in a file called *user.config* under the Windows Local AppData location.

The specific name of the folder where the configuration settings are stored will vary from installation to installation, the following example shows a typical folder path:

```
%UserProfile%\AppData\Local\Renishaw_plc\SetAndInspect.exe_Url_ucfkeluk  
g3w2qvxyieu5m3hjbk3ufjvh\*.*.*.*\user.config
```

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**NOTE:** When Set and Inspect is either uninstalled or upgraded to a newer version, the *user.config* file will be retained so previous settings do not have to be re-entered into the *Configuration* dialog again.

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Should a manual backup for the configuration settings be required (e.g. to retain settings in the event of a PC crash), copy the *user.config* file and stored externally to the Okuma CNC.



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## Chapter 3 – Getting started with Set and Inspect

### Soft key navigation

Use the soft keys at the base of Set and Inspect screens to navigate around the app.



Step back to the previous screen.



Navigate directly to the Home screen.



Open the Configuration dialog. (Only visible in the Home screen.)



Minimise the application.



Display the About dialog. (Only visible in the Home screen.)



Display the last set of results data.



Add measurement cycle. (Only visible in the Program builder screen.)



Zoom to extents. (Only visible in the Program builder screen.)



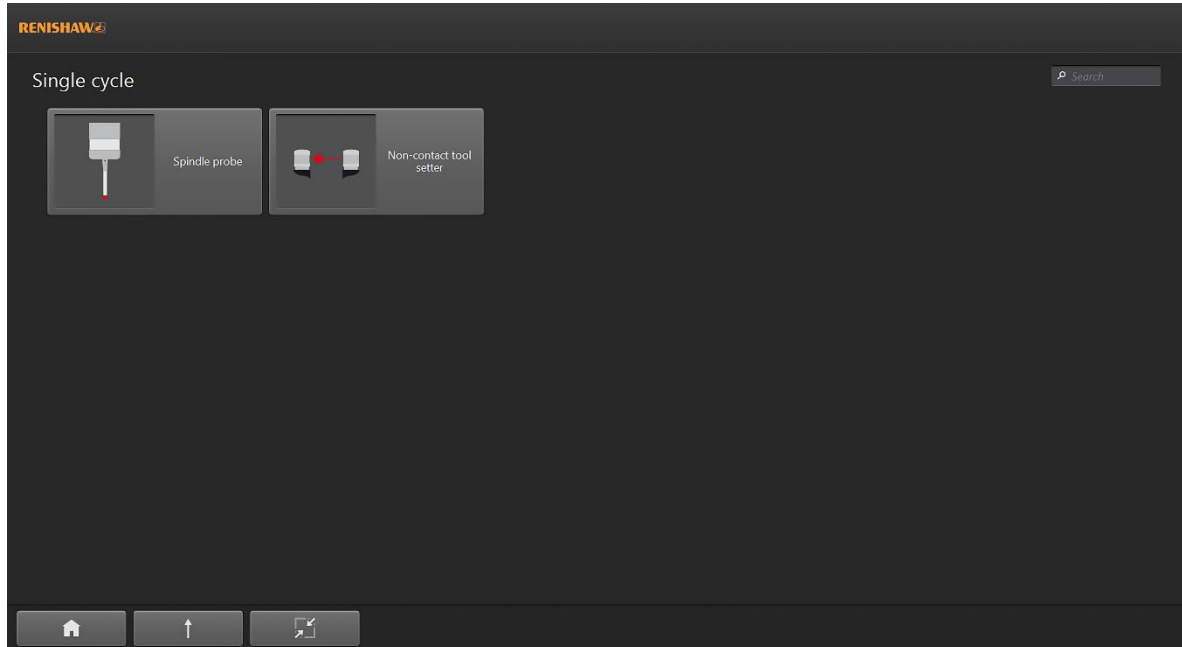
Display cycle information. Available for selected cycles only. Where available, cycle information will be displayed when a cycle is first selected. Once other fields have been populated, press this icon to display cycle information again.

### Program using Single cycle mode

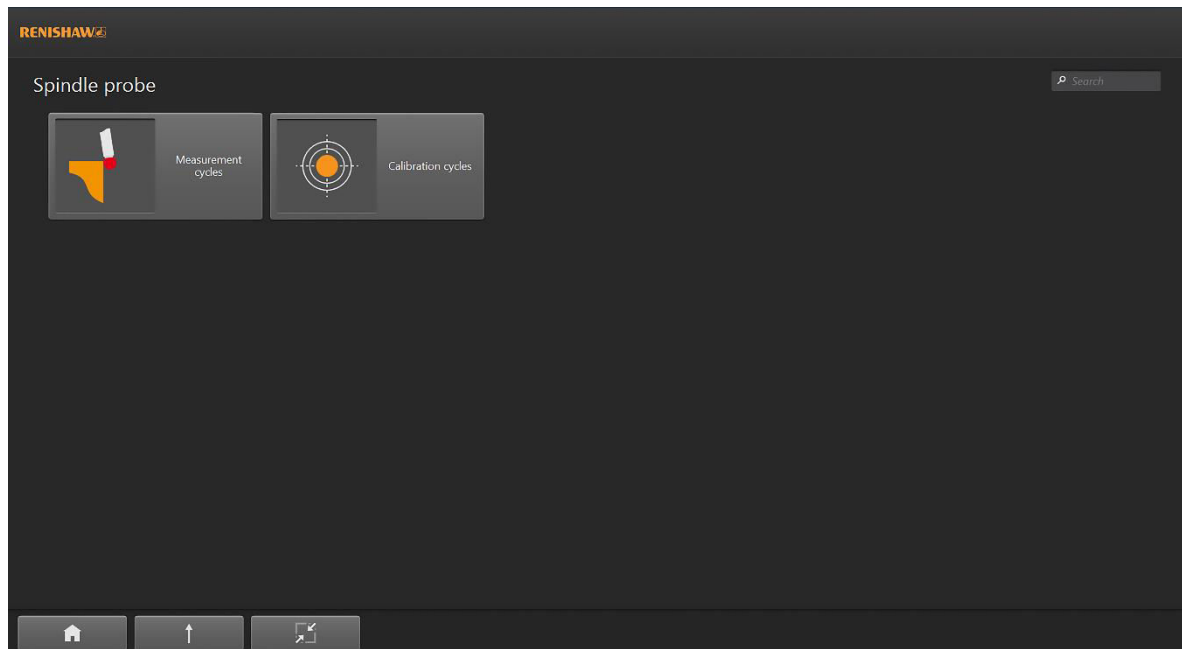
On the *Home* screen, select *Single cycle*.

The subsequent, *Single cycle* screen will display the hardware products available on your machine: in this example, a spindle probe and a non-contact tool setter.

Select *Spindle probe*.

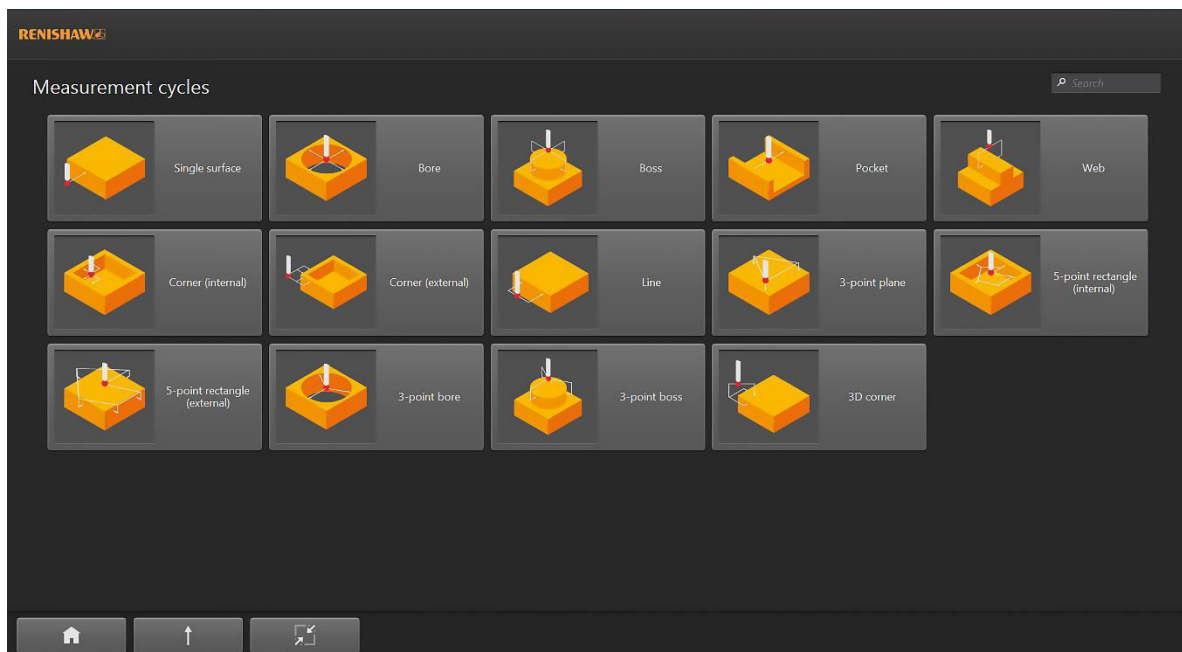


Select *Measurement cycles*.



Select the required measurement cycle.

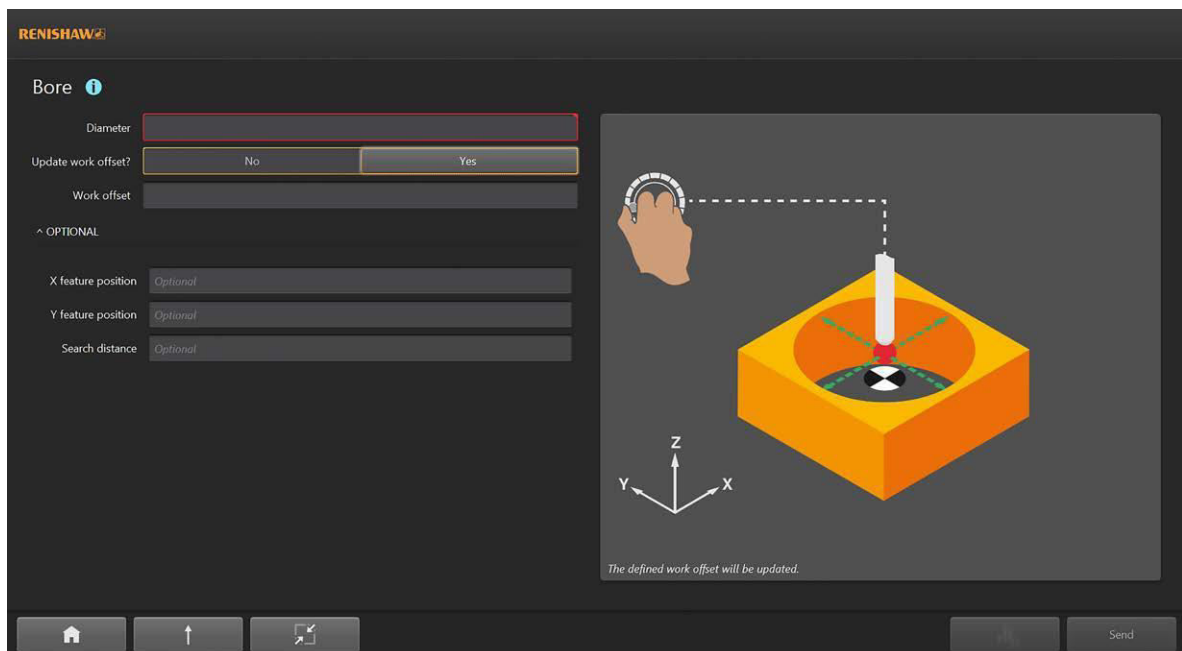
**NOTE:** Depending on screen resolution, you may need to navigate to a second screen to view all of the available cycles.



The following example uses a *Bore* cycle.

Enter the feature diameter into the *Diameter* field.

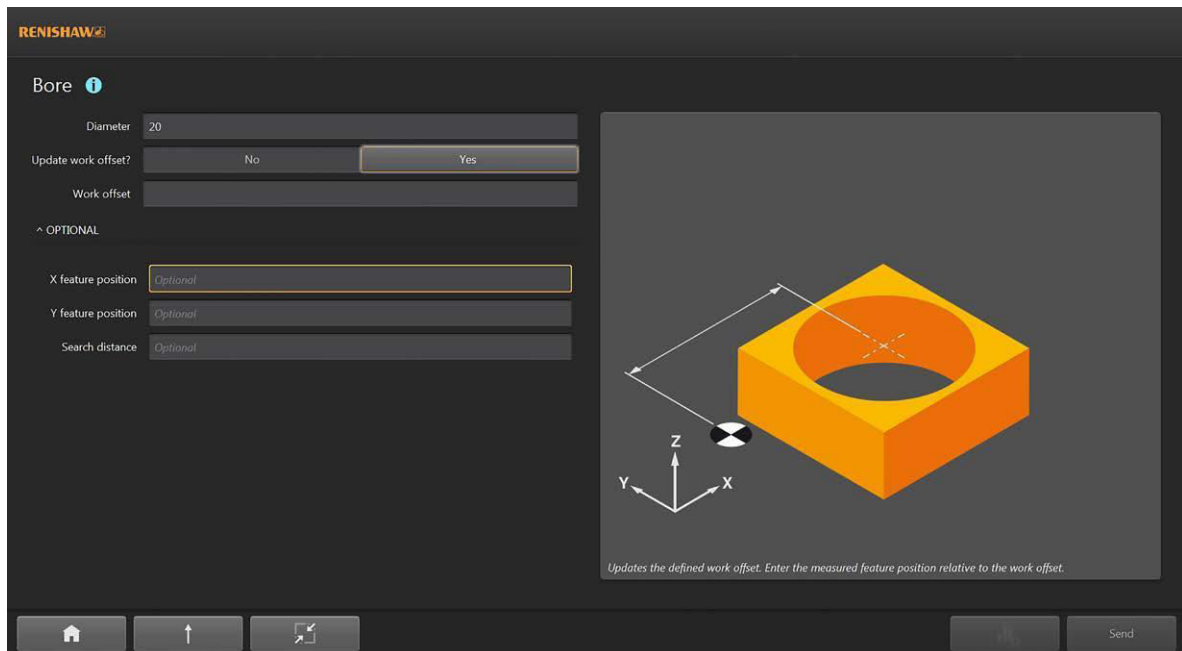
Where required, adjust the slider position to indicate that a work offset will be updated using the results of the bore cycle. This will make the *Work offset* property visible, allowing the necessary work offset to be defined. Further optional inputs will also become visible.



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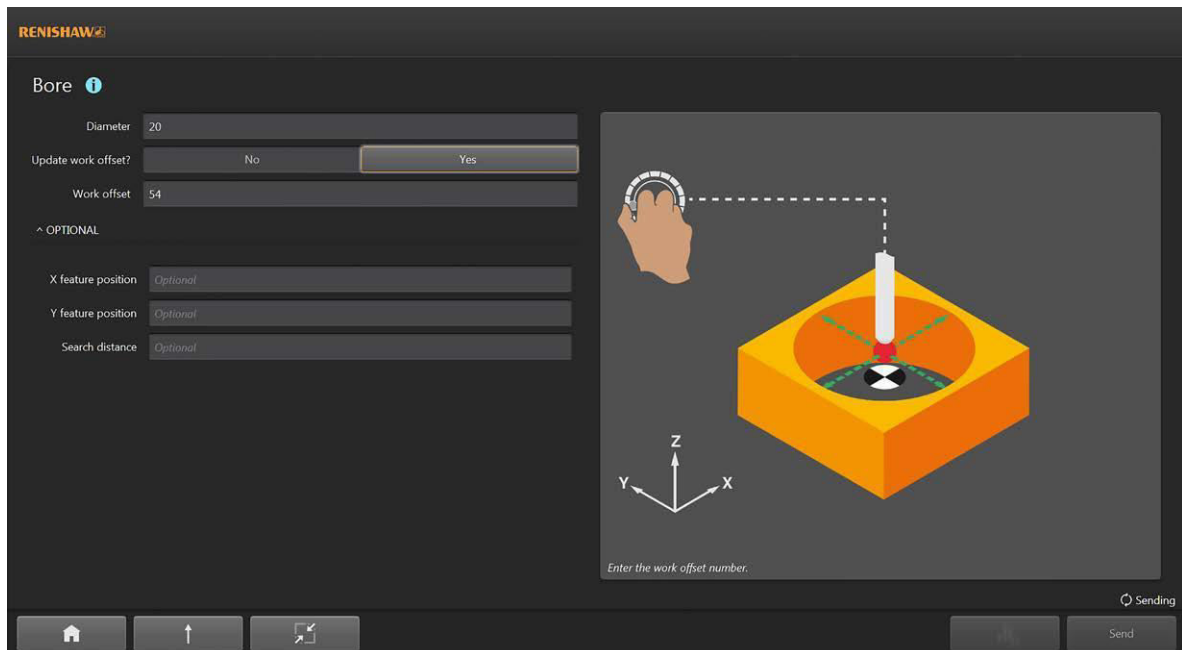
Further data can be entered into the *OPTIONAL* fields if required.

Notice how the Help image and the Help text (to the right of the screen) change when a different field is selected.



Once all required values have been entered into the cycle, load the probe to the machine spindle (if not already loaded).

Jog the probe to the start position (as indicated in the Help image) and press *Send*.



The app generates the required G-code program and loads it to the NC, either as the main program or in MDI mode (dependent on the *Upload type* selected during configuration).

Additional code is contained within the NC program to allow Set and Inspect to return the inspection results.

Where *Skip instructions* is not selected in the *Configuration* dialog, the *Instructions* screen will be displayed once the generated G-code has been loaded to the NC.



Follow the on-screen instructions to put the machine into the correct mode and press cycle start.

Once the NC program has finished running, the **Results** soft key will turn orange, indicating that the results are available to be viewed.

Press the **Results** soft key to view these results.



A simple table of results displays the *Nominal*, *Actual* and *Deviation* values for the measurements that have been returned.

Measurement	Nominal	Actual	Deviation
Diameter	20	19.99	0.01
X position	-	WCS set	-
Y position	-	WCS set	-

### Program using Program builder mode

On the *Home* screen, select *Program builder*.

The subsequent, *Program set-up* screen will display the settings that need to be configured for the program start and default values.

#### Program set-up

Option	Default value	Description
Program name	n/a	The name of the generated G-code program file uploaded to the NC.
Description	n/a	Enter a description for the part to be measured. This will be displayed in the Reporter app for corresponding measurement results. If no description is entered, the <i>Identification number</i> will be displayed.
Identification number	n/a	Enter an identification number for the part. This number will be used to differentiate measurement results in the Reporter app for this and other parts. Typically, this would be the same as the program number.
Work offset	n/a	Select the number of the work offset to be used by the program. Note: The X, Y and Z machine positions of the work offset will need to be set on the machine tool prior to running the program. If the program is to measure features in order to update this work offset, then the X, Y and Z machine positions will only need to be set approximately prior to running.

#### Program defaults

Option	Default value	Description
Z retract position	n/a	Enter the Z retract position relative to the active work offset. The Z retract position defines the Z-axis height used by the probe when moving between features in the X and Y axes. Adjusting this position will affect existing as well as subsequently programmed retract moves.

When complete, press *Next*.

The subsequent *Program end* screen will display the settings that need to be configured for the program end.

#### Program end

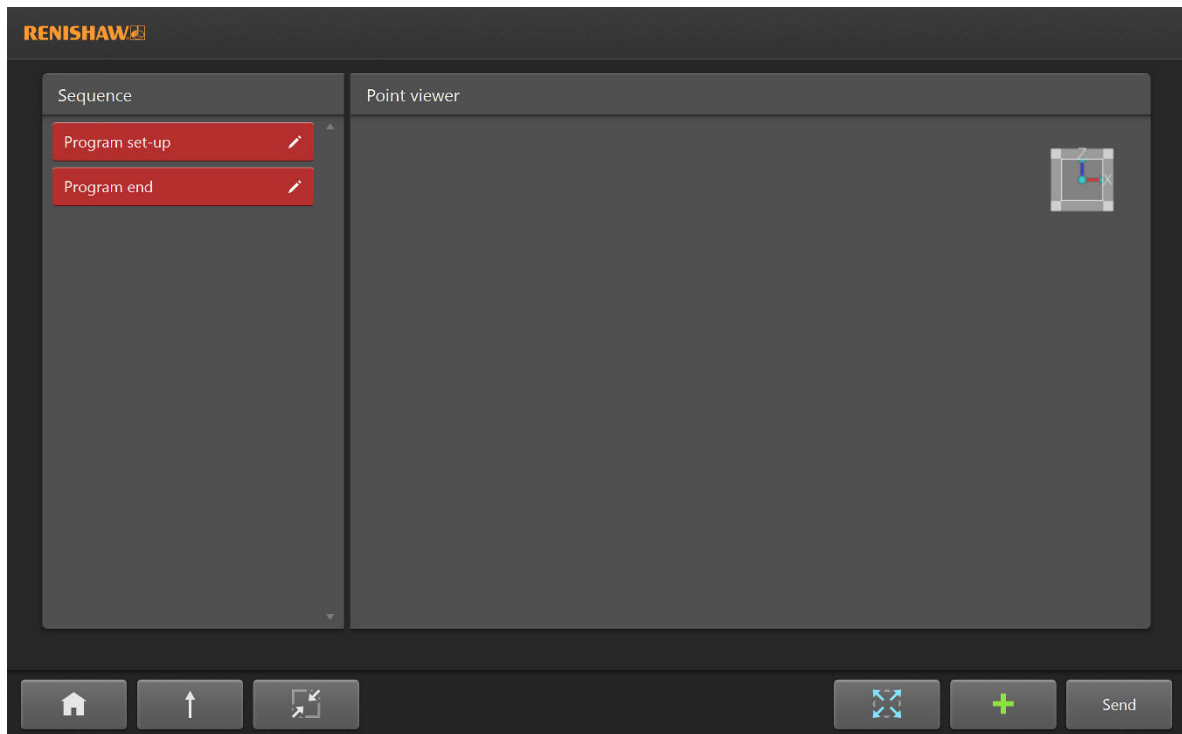
Option	Default value	Description
Program type	Main program	Select the program type. Use Main program when the probing routine is to be run directly; use Subprogram when calling the probing routine from another program.
Program end position	Spindle reference	Select whether the probe is to move to the Spindle reference position or remain at the Retract move position at the end of the program.

When complete, press *Next*.

The subsequent *Program builder* screen will show *Program set-up* and *Program end* nodes in the program *Sequence*.

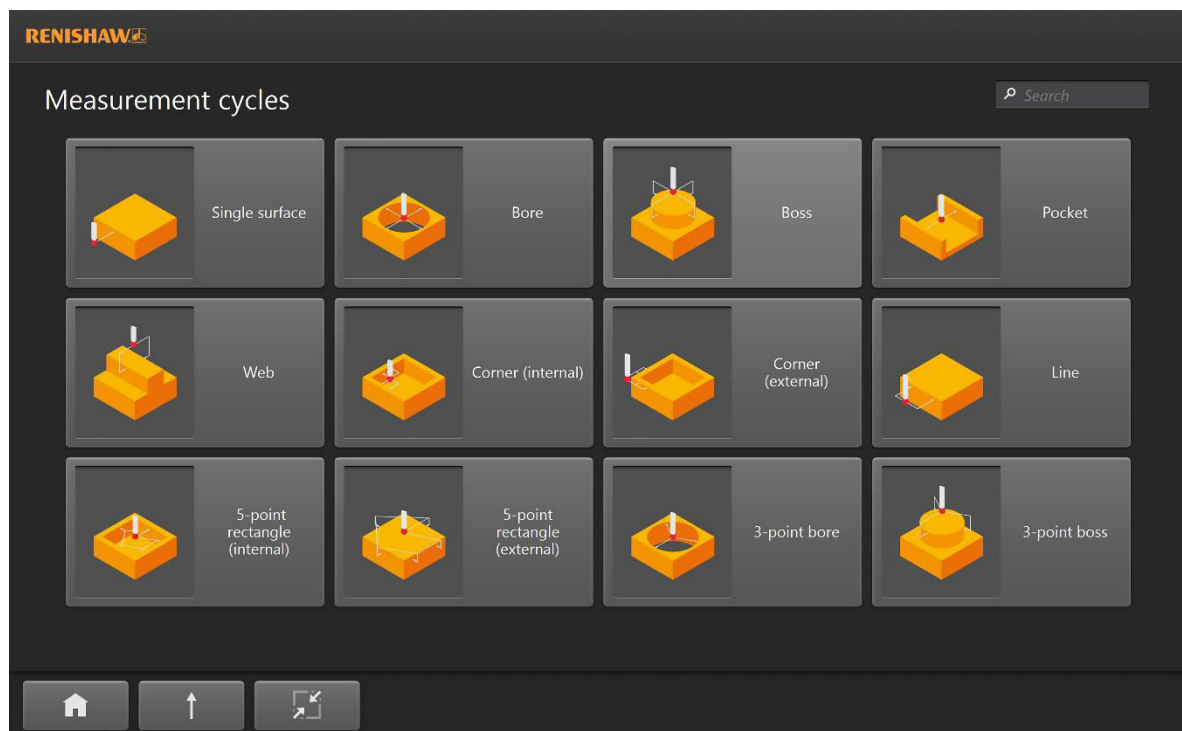
The settings of these nodes can be edited by selecting the Pen icon .

Press the **Add** soft key



Select *Measurement cycles* and then the required measurement cycle.

**NOTE:** Depending on screen resolution, you may need to navigate to a second screen to view all of the available cycles.



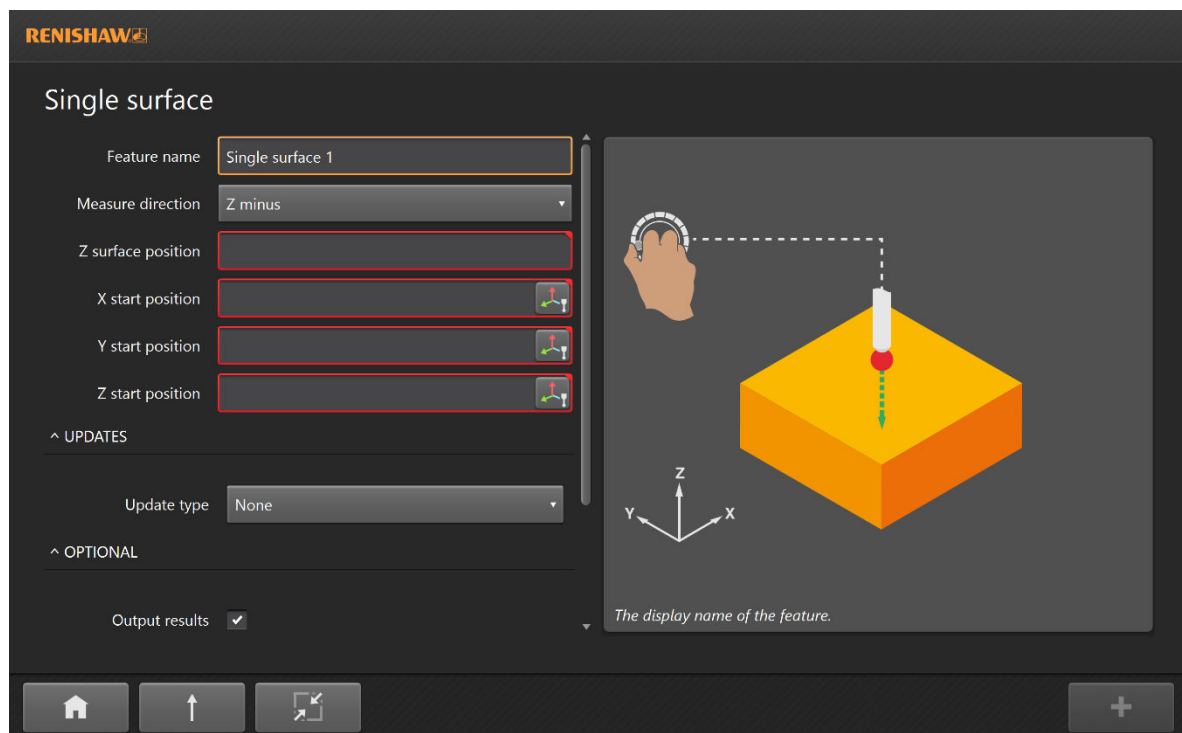
The following example uses a *Single surface* cycle.

The default *Feature name* will be displayed; in this example, *Single Surface 1*. The *Feature name* can be customised as required.

**NOTE:** If the results of the program are to be displayed in the Reporter app, the *Feature name* will be displayed with the results.

Using the drop-down list, select the *Measure direction* of the single surface measurement to be *Z minus*. Enter the nominal surface position into the *Z surface position* field.

**NOTE:** The surface or feature positions for any Program builder measurement cycle must be the **exact** position relative to the work offset.



Enter the X, Y and Z probe start positions relative to the selected work offset in the *X start position*, *Y start position* and *Z start position* fields.

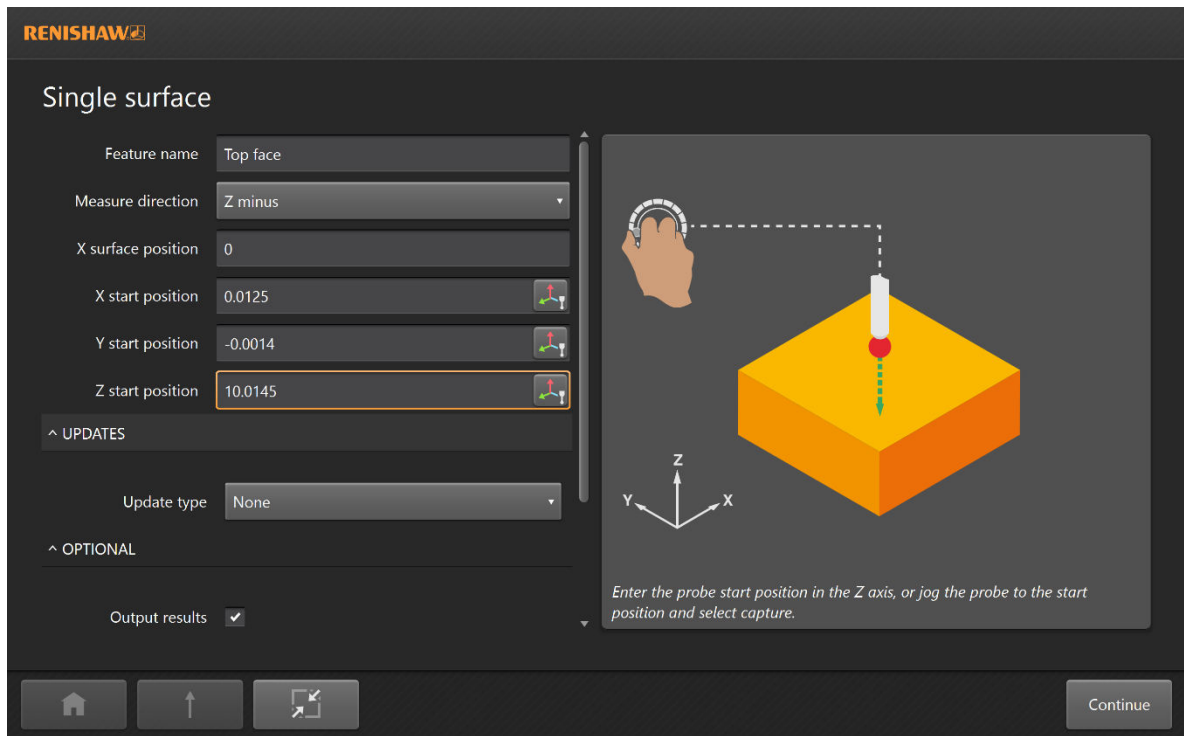
Alternatively, jog the probe to the start position (as indicated in the Help image) and press the *Capture*

button .

**NOTE:** When jogging the probe in the machine tool for the purpose of capturing positions, ensure that the active work offset is the same as the work offset selected for the Program builder program.



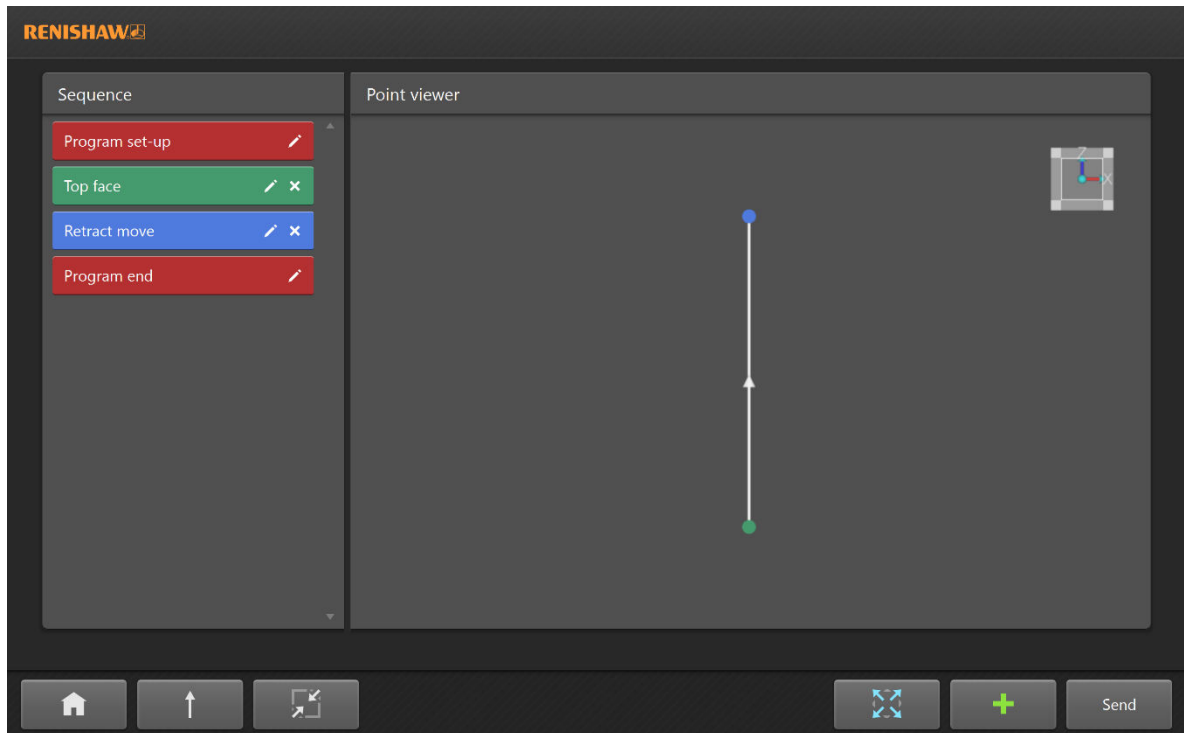
Press the **Add** soft key .




The *Program builder* screen will now show *Single surface* and *Retract move* nodes in the program *Sequence*.

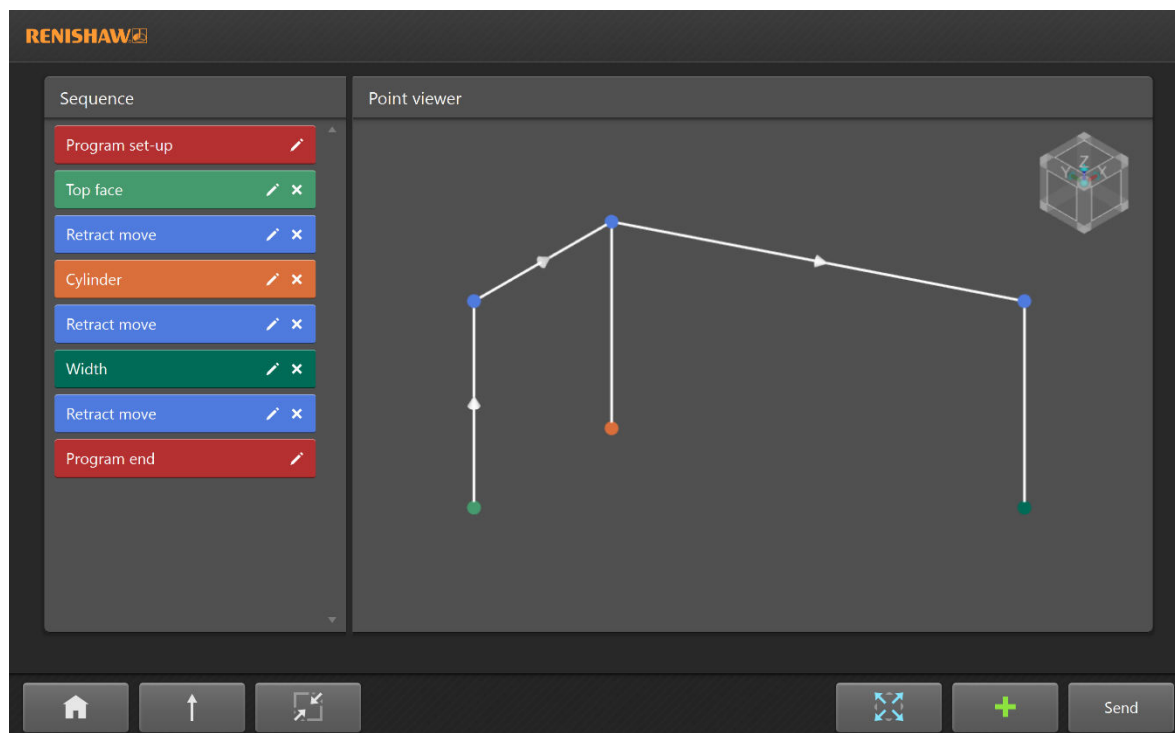
These represent the single surface measurement and the move to the retract height after the measurement has taken place.

*Sequence* elements are also represented in the *Point Viewer*.



More measurement cycles can be added using the **Add** soft key .

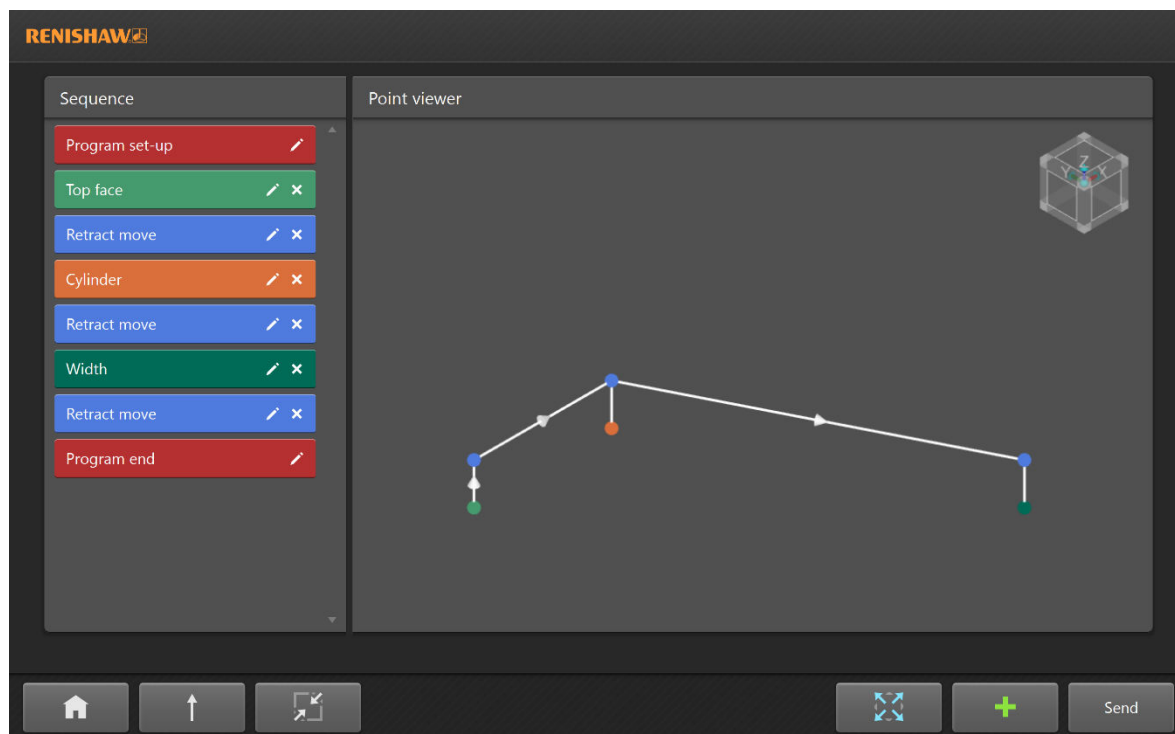
The following example shows the addition of *Bore* (named *Cylinder*) and *Web* (named *Width*) cycles.



All *Retract move* nodes use the same retract height value.

To change this, press the Pen icon on the *Retract move* node, change the Z value and press *Continue*.

All *Retract move* positions in the *Point viewer* will be adjusted to reflect the change.



When the program is complete, press *Send*.

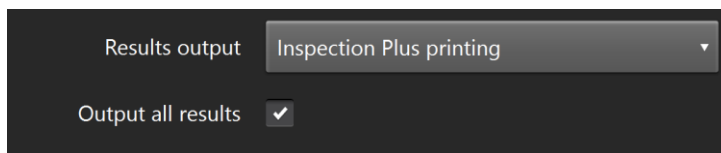
The app generates the required G-code and loads it to the NC.

## Outputting measurement results from Program builder

The default setting for the *Results output* in configuration is *None*. This can be modified to output results for either *Inspection Plus printing* or *Reporter app*.

### Inspection Plus printing

When *Inspection Plus printing* is selected, the additional setting *Output all results* will become visible.



When this option is selected (ticked), measurement results from every cycle created in Program builder will be output using Inspection Plus printing.

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**NOTE:** If there is a requirement to exclude the measurement of certain features from the output results, individual cycles in Program builder can be unticked.

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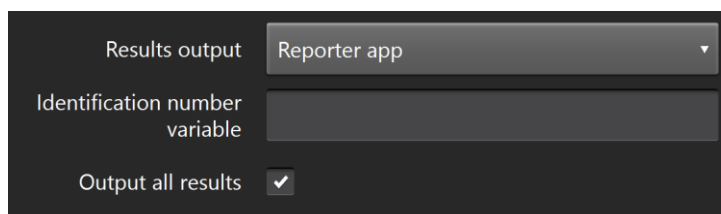
### Reporter app

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**NOTE:** The Reporter app can be installed to the same device as Set and Inspect. To ensure correct operation of the Reporter app, the correct mod level of Inspection Plus must have been correctly configured and macros uploaded to the machine tool.

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When *Reporter app* is selected, two additional settings – *Output all results* and *Identification number variable* – will become visible.



The *Output all results* setting operates in the same way as when *Inspection Plus printing* is selected: see above.

The *Identification number variable* determines the machine variable that will be used to store the *Identification number* of the part. The variable will be output in the G-code program by Program builder.

If the value is subsequently changed, the variable number must also be changed in the O8084 Comms macro supplied as part of the Inspection Plus package. For more information, see installation and user guide *Reporter for Okuma controls* (Renishaw part no. H-5999-8720).

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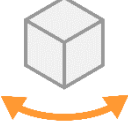









**NOTE:** Ensure that no other applications (including Inspection Plus) or G-code programs use this variable.

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### Program builder Point viewer interactions

The *Point viewer* can be manipulated using the following mouse and touch interactions.

**NOTE:** In order to use touch interactions, Set and Inspect must be used on a device with a touchscreen.

Interaction	Mouse	Touch
	In the <i>Point viewer</i> , press and hold the primary (left) mouse button and move the pointer.	
	In the <i>Point viewer</i> , press and hold the secondary (right) mouse button and move the pointer.	
	Position the mouse over a point in the <i>Point viewer</i> , press and release the primary (left) mouse button.	
	In the <i>Point viewer</i> , press and move the mouse wheel downwards (towards you).	
	In the <i>Point viewer</i> , press and move the mouse wheel downwards (away from you).	

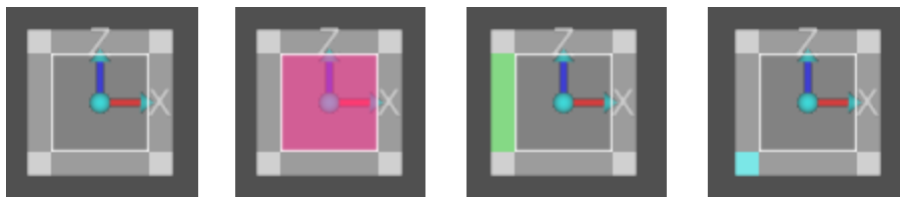
<sup>1</sup> Not available on Okuma controls with Microsoft® Windows® XP.

The *Point viewer* display can be reset by pressing the **Zoom to extents** soft key



The navigation cube in the top right-hand corner of the *Point viewer* can be clicked or touched and will orientate to rotate the view.

Clicking or tapping on corners, edges or faces of the navigation cube will adjust the view to predetermined orientations.



## Demo mode

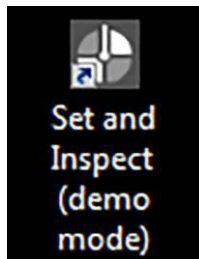
Users new to Set and Inspect may find it useful to install a copy of the software to a PC and familiarise themselves with its functionality by running the application in demo mode (off-machine mode).

This mode presents users with all of the same options, and provides the same functionality as an operational installation, but the G-code program is not loaded to the NC; instead it can be output to a user-defined folder location. See “G-code output in demo mode” below.

To operate in demo mode, install the software to a Windows-based PC using the instructions provided in Chapter 2 “Installing Set and Inspect”.

Using Windows Explorer, navigate to the Set and Inspect installation location: **C:\Program Files (x86)\Renishaw plc\Set and Inspect - Okuma V\*.\*** (or equivalent).

Copy and paste the *Set and Inspect (demo mode)* shortcut to the desktop.

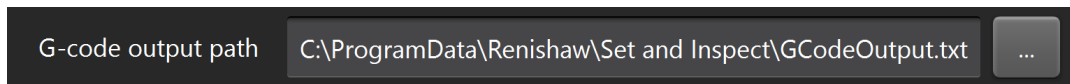


Double-click (or single-click and press *Enter* ) to run Set and Inspect in demo mode.

## G-code output in demo mode

When running in demo mode, a setting called G-code output path is visible in the *Application settings* section of the configuration. This setting allows a Windows folder location, used to store the G-code output from Set and Inspect, to be specified.

The default folder location and file name are:



This folder location and file name can be changed to any valid path, name and file extension. (File extension is optional.)

When operating in demo mode and using either Single cycle or Program builder, pressing the *Send* button will create this file rather than sending a program to the machine tool NC.

If the file already exists, it will be overwritten each time the *Send* button is pressed.

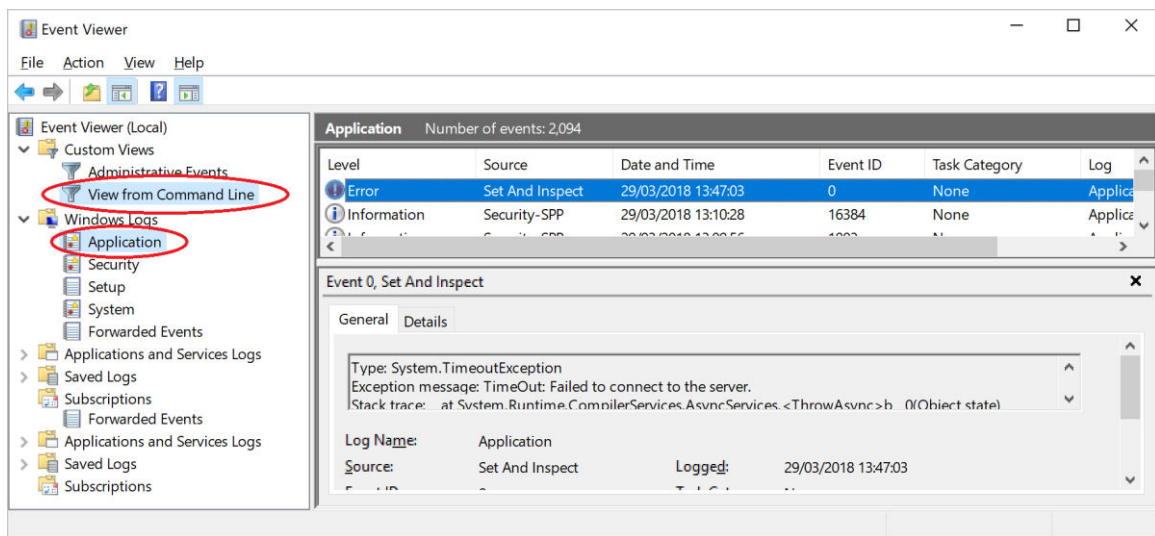
## Error logging with the Windows Event Viewer

Set and Inspect does not have a dedicated error log, but instead uses the Windows Event Viewer to log errors and warnings that may occur during use of the app.

From the Windows *Start* menu on the Okuma CNC, click *Windows Administrative Tools > Event Viewer*.

If the Event Viewer is being viewed by clicking an error dialog in Set and Inspect, then this will be under *Custom Views > View from Command Line (n)*.

If navigating to the Event Viewer independently, any Set and Inspect associated errors or warnings can be found under *Windows Logs > Application*.



Set and Inspect errors or warnings can be identified by looking for 'Set and Inspect' in the *Source* column.

Details of each error or warning can be found in the preview pane or by right-clicking on the error/warning and selecting *Event Properties*.



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