

EasySet software for Okuma E100, U100, P100, P200 and P300 controllers

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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 tool 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 tool. Therefore, it is the responsibility of the person putting the software into operation to:

- ensure that all machine tool safety guards are in position and working correctly 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 that the machine tool will be instructed to make under program control will not cause the machine tool 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.

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.

Example code format

For clarity, code examples contained within this document are shown with spaces separating each input of the program call. In practice, it is not a requirement that these spaces be included.

For example, the following code:

M165 P1234 A1. B34.5 C67. D89.

may be entered as:

M165P1234A1.B34.5C67.D89.

NOTE: All code examples are shown with input data followed by a decimal point. Some controllers may operate correctly with these decimal points omitted, however, care should be taken to determine that this is the case before running any programs.

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Before you begin

This software must be installed and used in conjunction with the Inspection Plus package listed below. It provides an additional set of easy job set-up cycles with minimum programming requirements.

EasySet software availability

For use with Inspection Plus software

Control type

Okuma E100, U100, P100, P200 and P300

Software disc no.A-4016-1035
(Kit no. A-4016-1036)

Description

EasySet is a set of additional job set-up cycles with minimal programming requirements. These cycles call up resident Renishaw inspection cycles for machining centres, which **MUST** already be loaded into the machine tool part program memory area before use.

These cycles facilitate easy job set-ups by the machine operator, avoiding the need to create a program to position the probe prior to the setting cycle call. The software allows the operator to position the probe stylus at a suitable start position in jog mode before running the cycle. This cycle also allows a quick and easy way to measure the part without creating a program. By leaving out the S input and running the cycle, the results of the measurement will be displayed in the GAUGING RESULTS screen.

Important information

- Suitable training on how to use both the regular Renishaw cycles and EasySet is assumed.
- EasySet software does not replace the regular inspection software. It only has quick job set-up functionality and is only suitable where the full programming method, as used in the regular software, is inconvenient.



CAUTION: EasySet cycles are not designed for, and should NOT be called directly by, the machining program unless tests have been made to ensure that the cycles function correctly in this way. The tool length offset must NOT be active when running these cycles, otherwise mispositioning will take place.

- The spindle probe must be active and linked to the skip input.
- On controls with a programmable MDI screen, EasySet may be called from the MDI screen. If your control does not have this type of screen, a one line program stored in user memory can be generated to call EasySet.
- The EasySet cycles must be tested during installation for safe operation and compatibility with your machine (see “Software installation” on page 17).
- To keep the number of inputs to a minimum, there are some edits which must be made prior to use as shown:
 - Probe length offset number.
 - Default work offset number to be set.
 - Search distance.

(See “Software installation” on page 17.)

- It should be noted that the feature being measured becomes the datum as listed below:
 - With bores and bosses, the centre points will be written into the work offset.
 - With webs and pockets, the centre points will be written into the work offset.
 - X, Y and Z surface positions will be written into the work offset.
- EasySet will run in either inch or metric mode.

Getting started

The following instructions will be helpful, allowing you to safely use the EasySet cycles.

- Make sure the specified Inspection Plus software package and EasySet are loaded.
- Familiarise yourself with the Inspection Plus software.
- Ensure the probe is calibrated.
- Edit the defaults in EasySet macro EASYSET.LIB (see “Software installation” on page 17).
- Test the cycles for safe and correct operation.

Setting a G-code to call the cycles in MDI

By setting the G-code macro call function, the program line can be shortened. This is done as follows:

1. Select the Parameter key.
2. Select the Change display key.
3. Select G-/M-CODE MACRO then close the window.
4. Arrow across to an unused field between G111 and G120.
5. Enter O9023 in the field, for example, G111 O9023.

The call line in MDI will now be G111.

Setting EasySet as a LIBRARY program

To enable the program to be called from the MDI screen, the EASYSET.LIB program must be registered in the controller. First the BUFFER SIZE should be set to a value larger than the sum of all LIB files, e.g. if the total LIB size is 85 K, the BUFFER SIZE must be bigger than 85000. To do this, follow the steps below:

1. Select AUTO mode.
2. Select LIBRARY PROGRAM (if it does not appear on the screen, press the right arrow key until it appears).
3. Select BUFFER SIZE. Set this to a value larger than the sum of all LIB files and any SSB files that they call. If tool setting cycles are to be called, you will also need to ensure the Renishaw tool setting macro is renamed with an .LIB extension in place of .SSB.

4. Select REGIS.
5. Use the arrow keys to select EASYSET.LIB then press OK.

This has now registered the EASYSET program. If this has failed, please read the Okuma programming manual or contact your Okuma dealer for assistance.

IMPORTANT: If the REN1.SSB, REN2.SSB or EASYSET.LIB files are edited, then the library buffer will need to be initialised and all .SSB and .LIB files will need to be re-registered to load the new files.

If you cannot set up a G-code and/or library program, rename EASYSET.LIB to EASYSET.SSB. The cycle can then be called up in the following way:

```
CALL O9023 PA=1. PD=20. PS=1.
```

Cycle inputs

Input	Description
PA =	<p>Cycle type:</p> <p>1 = bore setting 2 = boss setting 3 = pocket setting 4 = web setting 5 = X+ surface setting 6 = X- surface setting 7 = Y+ surface setting 8 = Y- surface setting 9 = Z surface setting 101 = Probe calibration – length 102 = Probe calibration – stylus offsets</p>
PD =	Bore or boss diameter.
PX =	<p>Pocket or web width when the feature lies along the X axis.</p> <p>or</p> <p>= X surface set (A6.) (fitted to Inspection Plus versions).</p> <p>The datum is set to the surface position found unless an Xx. value is entered to set a referred datum relative to the surface.</p>
PY =	<p>Pocket or web width when the feature lies along the Y axis.</p> <p>or</p> <p>= Y surface set (A7.) (fitted to Inspection Plus versions).</p> <p>The datum is set to the surface position found unless a Yy. value is entered to set a referred datum relative to the surface.</p>
PZ =	<p>Boss (A2.) or web (A4.) feature.</p> <p>The Z-axis depth for probing when measuring the feature. It is the incremental distance from the current stylus position to the measuring position. The distance is always a minus (-) value (example Z-10).</p> <p>or</p> <p>= Z surface set (A9.).</p> <p>The datum is set to the surface position found unless a Zz. value is entered to set a referred datum relative to the surface.</p>

- PS = The work offset to be updated if it is required to update an offset other than the default work offset.
- S = 1 (work offset 1) to S = 200 (work offset 200)
- PT = The tool offset number of the probe – required only for length calibration.

Cycle format

There are two types of format used, depending on whether you are using Manual Data Input (MDI) or the program method as shown:

MDI format

G111 PA = a PD = d PS = s

or

CALL O9023 PA = a PD = d PS = s

Program format

O0001 ;

G111 PA = a PD = d PS = s

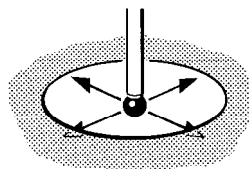
or

CALL O9023 PA = a PD = d PS = s

M30

NOTE: ALL the following examples are shown using the MDI screen format.

Bore



Position the probe stylus at the approximate bore centre and at depth in the bore.

G111 PA = 1. PD = 25. PS = 1.

or

CALL O9023 PA = 1. PD = 25. PS = 1.

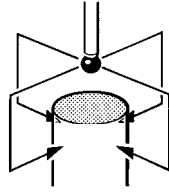
Set the current work offset to the bore centre by running in a 25 mm diameter bore.

Where PA = 1 Bore cycle.

PD = 25 Approximate diameter of the bore.

PS = 1 Set G15 H1.

Boss



Position the probe stylus at the approximate boss centre and about 10 mm above the boss.

G111 PA = 2. PD = 50. PZ = -20. PS = 12.

or

CALL O9023 PA = 2. PD = 50. PZ = -20. PS = 12.

Set the work offset H12 to the boss centre by running on a 50 mm diameter boss.

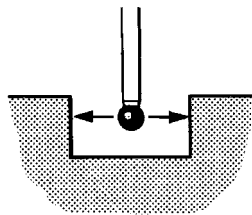
Where PA = 2 Boss cycle.

PD = 50 Approximate diameter of the boss.

PZ = -20 Incremental -Z distance to the measuring point.

PS = 12 Set G15 H12.

Pocket



Position the probe stylus at the approximate pocket centre and at the required Z depth.

G111 PA = 3. PX = 25. PS = 12.

or

CALL O9023 PA = 3. PX = 25. PS = 12.

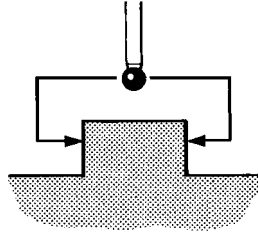
Set the work offset 12 by running in a 25 mm wide pocket and measuring in the X-axis direction.

Where PA = 3 Pocket cycle.

PX = 25 Approximate width of the pocket.

PS = 12 Set G15 H12.

Web



Position the probe stylus at the approximate web centre and about 10 mm above the web.

G111 PA = 4. PY = 25. PZ = -15.

or

CALL O9023 PA = 4. PY = 25. PZ = -15.

Set the current work offset by running on a 25 mm wide web and measuring in the Y-axis direction and stepping down in Z.

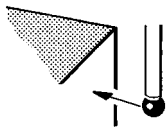
Where PA = 4 Web cycle.

PY = 25 Approximate width of the web.

PZ = -15 Incremental -Z distance to measuring point.

Single surface setting

The following is assumed on a vertical machining centre viewed from the front.



A5. (X+) surface to the right of the stylus (machine to move X+).

Position the probe stylus adjacent to and within 10 mm of the surface.

G111 PA = 5. PX = 65. PS = 1.

or

CALL O9023 PA = 5. PX = 65. PS = 1.

Set work offset H1 by measuring against a known X-axis surface

Where PA = 5 Single surface measure moving the probe in an X+ direction.

PX = 65 Nominal position of the surface.

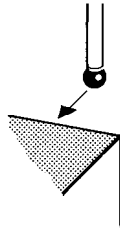
PS = 1 Set G15 H1 work offset.

A6. (X-) surface to the left of the stylus (machine to move X-).

G111 PA = 6. PX = 65. PS = 1.

or

CALL O9023 PA = 6. PX = 65. PS = 1.

A7. (Y+) surface behind the stylus (machine to move Y+).

G111 PA = 7. PY = 37. PS = 1.

or

CALL O9023 PA = 7. PY = 37. PS = 1.

A8. (Y-) surface in front of the stylus (machine to move Y-).

G111 PA = 8. PY = -40. PS = 1.

or

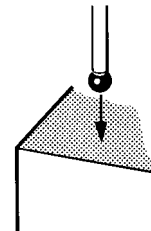
CALL O9023 PA = 8. PY = -40. PS = 1.

A9. (Z) surface below the stylus (machine to move Z-).

G111 PA = 9. PZ = 0. PS = 1.

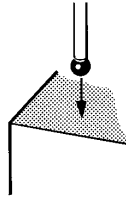
or

CALL O9023 PA = 9. PZ = 0. PS = 1.



Calibration

Length calibration



Position the probe stylus above a Z reference surface of known position and make sure the appropriate work offset (G15 H) is active and the approximate probe length is in the probe's tool offset. The active tool number's HA offset is updated.

PA = 101. Calibration on a (Z) surface below the stylus (machine to move Z-).

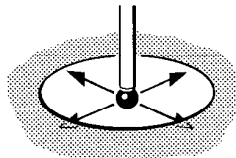
G111 PA = 101. PZ = 0.

or

CALL O9023 PA = 101. PZ = 0.

Where PA = 101 Calibrate probe length Z- direction.
PZ = 0 Z surface.

XY calibration (with auto centre find)



Position the probe stylus at the approximate bore centre and at depth in the bore. This cycle will rotate the probe to find the accurate bore centre, so only an approximate XY start position is required. The probe will be calibrated in 30 degree vectors.

G111 PA = 102. PD = 25.

or

CALL O9023 PA = 102. PD = 25.

Where PA = 102 XY calibration of stylus.
PD = 25 Accurate diameter of the bore.

NOTE: The cycle may take a few seconds to start due to the start-up logic and conditions.

Software installation

Macro edit – probe number

O9023

(REN EASYSET)

PV29 = VTLCN ** (PROBE OFFSET) Edit ** if the probe's offset number is not the same as its tool number.

Macro edit – default work offset number

PV28 = ** (DEFAULT WORK OFFSET) Edit ** to suit the work offset number that is most commonly used.

Macro edit – search distance and stand-off

PV27 = ** (DEFAULT Q IN MM) Edit ** to suit the search distance past the nominal surface required. 10 mm (0.4 in) is recommended.

PV30 = 10 (STAND OFF) This is used to set the stand-off distance, and is used for calculations.

Edit offset type

VS55 = 1 (Geometry only offset) VS55 = 0 (Geometry and wear offset)

Macro edit – restricted use of (A9.) Z surface measure

Some applications are set to use the air gap (negative) type tool offsets. This may cause incorrect values to be set into the Z register work offset when using the A9. input.

To avoid using the A9. Z measure direction, the following edit should be made:

```
O9023(REN EASYSET)
IF[PA EQ 4] GOTO N9
IF[PA LE 6] GOTO N11
IF[PA LE 8] GOTO N13
IF[PA EQ 9] GOTO N16      Delete this line
GOTO17
```

Editing the probe on/off commands

Sub-program O9724 in the Inspection Plus file REN1.SSB contains the logic for programs O9832 (probe on) and O9833 (probe off):

VS53=1 (PROBE ON COMMAND) 1=M127 ON, 2=SPIN ON (used in programs O9832 and O9833)

VS54=1 (PROBE OFF COMMAND) 1=M127 OFF, 2=SPIN OFF, 3=M367 OFF (used in programs O9832 and O9833)

See Appendix C in Inspection Plus manual H-2000-6550 for more details.

Testing the cycle

When testing the cycle, position the probe stylus at least 100 mm (4.0 in) away from any surface, then run the following:

O0000 ;

G111 PA = 2. PD = 50. PZ = -20. This example is shown in millimetres and called from MDI mode.

When running the above cycle the sequence should be:

1. Y – (D/2 + ball rad + 5 mm) Y- move.
2. Z – 20.0 move Z- move.
3. Y – (D/2 - 10 mm) Y+ move.
4. Return to initial X, Y, Z start position.
5. Generate "PROBE FAIL" alarm.

Any mispositioning taking place in the Z axis can be caused by an active "H" offset command.

If no mispositioning takes place, and the whole sequence 1 to 5 was followed, then the cycle is working correctly on your machine.

Additional cycle inputs

EasySet software can be customised to use other cycle inputs provided by the host software package, however, this will tend to compromise the simple programming feature of this package. The following example shows how this can be done:

Example: Add in the PT input for bore measure
Host software – Inspection Plus

Change the macro O9023 bore cycle call as follows:

```
CALL O9814 PD=PD PR=PR PQ=PQ
```

to:

```
CALL O9814 PD=PD PR=PR PT=PT PQ=PQ
```

NOTES: Refer to the host programming manual for cycle input descriptions.

The PT = t input is already included in the bore/boss and web/pocket cycles.

Alarms

91 FORMAT ERROR

PA = a. or PS = s. input out of range or missing, or
PZ = z. input too large or too small when using PA = 9.

NOTES: When used with the multi-axis inspection software this alarm is also generated for a missing PE = e. input.

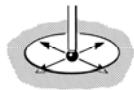
All other alarms are as described in the inspection manual alarm listing.

For Inspection Plus software versions

91 or 591 FORMAT ERROR

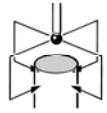
PA = a. or PS = s. input out of range or missing.

Renishaw/Okuma EasySet cycles (sub program O9023)



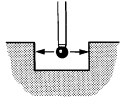
CALL O9023 PA = 1 PD = d PS = s

PA = 1 Bore cycle.
 PD = d Approximate size of bore.
 PS = s Set work offset, e.g. PS = 1, set G15 H1.



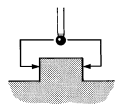
CALL O9023 PA = 2 PD = d PZ = z PS = s

PA = 2 Boss cycle.
 PD = d Approximate size of boss.
 PZ = z Incremental Z- distance from start point.
 PS = s Set work offset, e.g. PS = 1, set G15 H1.



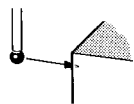
CALL O9023 PA = 3 PX = x or PY = y PS = s

PA = 3 Pocket cycle.
 PX = x or PY = y Approximate width of pocket.
 PS = s Set work offset, e.g. PS = 1, set G15 H1.



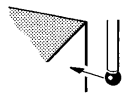
CALL O9023 PA = 4 PX = x or PY = y PZ = z PS = s

PA = 4 Web cycle
 PX = x or PY = y Approximate width of web.
 PZ = z Incremental Z- distance from start point.
 PS = s Set work offset, e.g. PS = 1, set G15 H1.



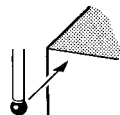
CALL O9023 PA = 5 PX = x PS = s

PA = 5 Single surface measure X+ direction.
 PX = x Nominal position of face.
 PS = s Set work offset, e.g. PS = 1, set G15 H1.



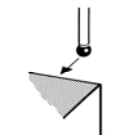
CALL O9023 PA = 6 PX = x PS = s

PA = 6 Single surface measure X- direction.
 PX = x Nominal position of face.
 PS = s Set work offset, e.g. PS = 1, set G15 H1.



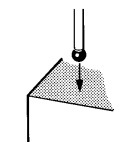
CALL O9023 PA = 7 PY = y PS = s

PA = 7 Single surface measure Y+ direction.
 PY = y Nominal position of face.
 PS = s Set work offset, e.g. PS = 1, set G15 H1.



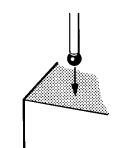
CALL O9023 PA = 8 PY = y PS = s

PA = 8 Single surface measure Y- direction.
 PY = y Nominal position of face.
 PS = s Set work offset, e.g. PS = 1, set G15 H1.



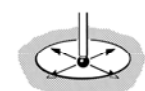
CALL O9023 PA = 9 PZ = z PS = s

PA = 9 Single surface measure Z- direction.
 PZ = z Nominal position of face.
 PS = s Set work offset, e.g. PS = 1, set G15 H1.



CALL O9023 PA = 101 PZ = z

PA = 101 Length calibration.
 PZ = z Position of reference face (ensure correct G15 H is active).



CALL O9023 PA = 102 PD = d

PA = 102 XY calibration.
 PD = d Accurate size of bore.

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