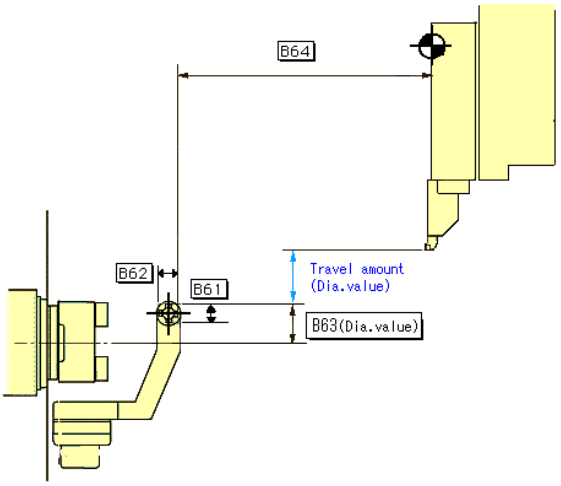
Tooleye Construction

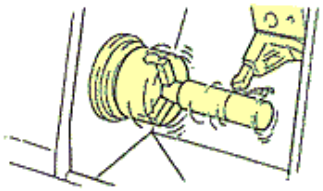
The TOOL EYE is used for tool tip position measurement. The arm is moved forward to the measuring position by a torque motor. Measuring sensors are provided at the end of the arm to enable the tip position to be measured by bringing the tip into contact with a sensor. After measurement, the arm is reversed to the storage position by the torque motor. Proximity sensors SQ7 (forward end) and SQ8 (reverse end) check the completion of forward and reverse movements, respectively, of the arm.



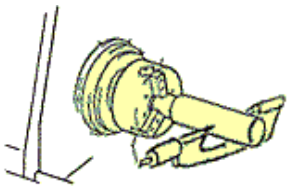
Tooleye adjustments:

Adjustment procedure to be used if cutting with the tool-setting data that uses the tool eye results in a cutting size different from the program-designated size or does not create programmed data

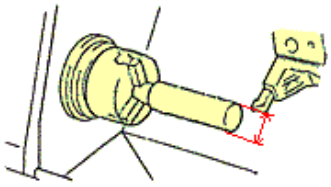
Parameter adjustment for outer-diameter tools



1. Have a suitable round work piece ready for use in turning outside diameter.
2. Chuck the round work piece and create a simple program with finishing.
3. Execute the program. No offset commands must be included in the program.



4. Measure the outside diameter of the finished work piece using a micrometer, and record the measured value.



5. Execute the same program in single-block operation mode and stop it at where the X-axial co-ordinate has become equal to the finishing diameter.
6. Call up the TOOL DATA display and move the cursor to "TOOL SET - X" on the line of the tool concerned

7. Press the TEACH menu key and enter the value recorded in step 4. The correct X-axial tool-setting data (measured data) will then be displayed. Record the displayed value

8. Remove the workpiece and measure the tool-setting data of the same tool using the tool eye.

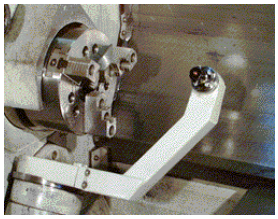
9. If a difference exists between the correct value recorded in step 7 above and the data that has been measured using the tool eye, change the setting of parameter B63 according to the difference.

10. Once again, measure the tool-setting data using the tool eye and repeat step 9 above until the measurement result becomes equal to the correct data.

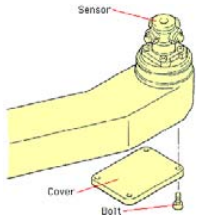
Parameter adjustment for inner-diameter tools

11. For an I.D. turning tool, perform inside turning and measure the bored inside diameter using a cylinder gauge. After that, obtain and record the correct tool-setting data for the I.D. turning tool in a similar manner to that of the O.D. turning tool described above.
12. Remove the work piece and measure the tool-setting data of the same tool using the tool eye. If a difference exists between the correct value and the data that has been measured using the tool eye, change the setting of parameter B61 according to the difference. Once again, measure the tool-setting data using the tool eye and repeat this step until the measurement result becomes equal to the correct data.

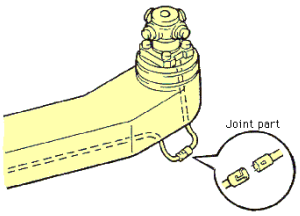
Replacement of tooleye sensor:



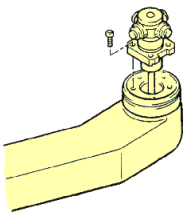
1. Press the display selector key and then press the TOOL DATA menu key. Then, press the MSR UNIT ON menu key to extend the tool eye arm to the measuring position.



2. Next, remove the four bolts from the rear of the tool eye sensor section and remove the cover.

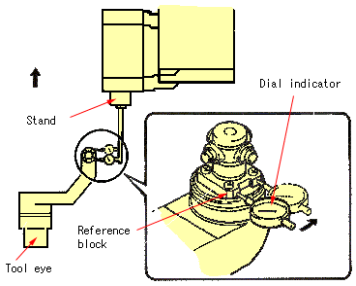


3. Pull out the joint part from the body of the arm and disconnect the joint by rotating the part slightly.



4. Remove the four bolts and remove the tool eye sensor section.

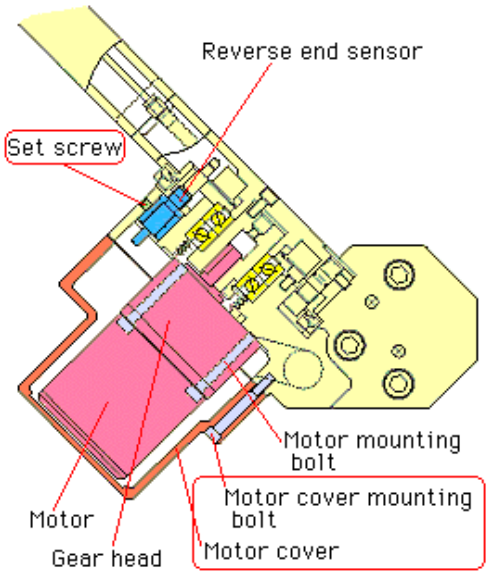
5. Mount a new tool eye sensor section in the reverse order to that of removal.



6. After replacement is complete, take the alignment. Mount a millimess or a dial indicator on the turret and make the sensor section parallel using the reference block of the sensor-fitted brass. The degree of parallelism to the X-axis is 0.01 mm (0.0004 in.) or less.

(The position in the Z-axis can be reset to the state at shipment by entering the difference between the value of already-measured tool set Z and the value after the sensor replacement to the parameter B64.)

Replacement of proximity sensor:



1. Turn power off.

2. Remove the front cover of the machine.

3. Disconnect the X2222 and X2223 connectors inside the junction box located at the rear of the spindle.

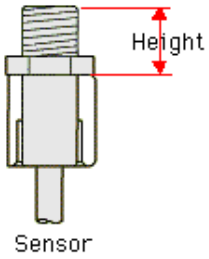
4. Remove the three M6 x 50 bolts from the motor cover of the tool eye, and remove the motor cover.

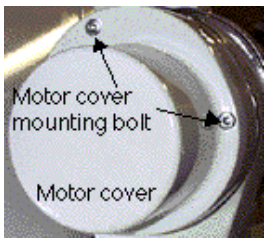
5. Remove the two set screws that hold the sensor (as shown below)

6. Remove the reverse end sensor by pulling it downward.

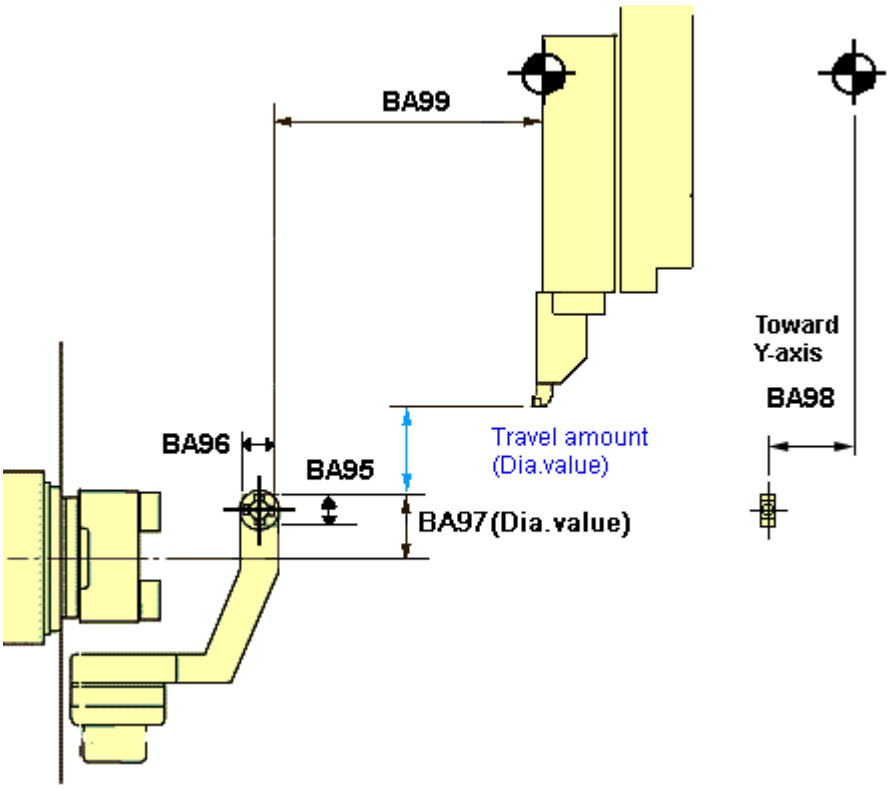
7. To remove the forward end sensor; remove the four M5 x 60 bolts from the motor, then rotate the gear head so that the sensor can be removed easily, and remove the sensor and its bushing together.

8. Before replacing the sensor, adjust the position of the new sensor to obtain the same height as that of the sensor to be replaced.
9. After replacement, return all removed parts to their original positions and states, then perform alignments and parameter adjustments.





Tool Eye Parameters Matrix



Parameters Table	MATRIX	
Name	Address	Input unit
Diameter of tool tip measuring sensor (X-axis direction)	BA95	0.0001mm
Diameter of tool tip measuring sensor (Y-axis direction)	BA96	
Diameter at the reference position of tool tip measuring sensor (X-axis)	BA97	
Diameter at the reference position of tool tip measuring sensor (Y-axis)	BA98	
Diameter at the reference position of tool tip measuring sensor (Z-axis)	BA99	

Adjustment of parameters in the X-axis direction

1. Adjustment in OD cutting

In case OD has been cut smaller than the final contour in the machining program:
(Example) If Specified value/100.000 > Actual value/99.900, add one-half of the error value to the parameter value BA97.

On the other hand, in case OD has been cut larger than the final contour:
(Example) If Specified value 100.000 < Actual value 100.100, deduct one-half of the error value from the parameter value BA97.

When changing parameters first, make a note of the original parameter value in BA97. Then convert the error value that should be changed into the one in submicron, and input it into parameters.

(Example) When 1285000 is entered in BA97
If the value needs to be changed by 0.1 mm, add/deduct the value of two-thousandth to/from 1285000.

Note: After changing the parameter, re-measure the tool tip position of all the OD tools.

2. Adjustment in ID cutting

Note: Before adjustment of ID machining, adjustment of OD machining must be completed. If not, the ID adjustment cannot be carried out.

In case ID has been cut smaller than the final contour in the machining program:
(Example) If Specified value/100.000 > Actual value/99.900, add one-half of the error value to the parameter value BA95.

On the other hand, in case ID has been cut larger than the final contour:
(Example) If Specified value 100.000 < Actual value 100.100, deduct one-half the error value from the parameter value BA95.

When changing parameter first, make a note of the original parameter value in BA95. Then convert the error value that should be changed into the one in submicron, and input it into parameters.

(Example) When 399000 is entered in BA95,
If the value needs to be changed by 0.1 mm, add/deduct 500 to/from 399000.

Note: After changing the parameter, re-measure the tool tip position of all the ID tools.

That is all for parameter adjustment of OD/ID machining. Take extra care to prevent accidents.