User Guide for Tool Setter Probe

Wiring Instruction

After mounting the tool setter probe on a position of the machine table, assuring the right connection of all cables as Figure 1.

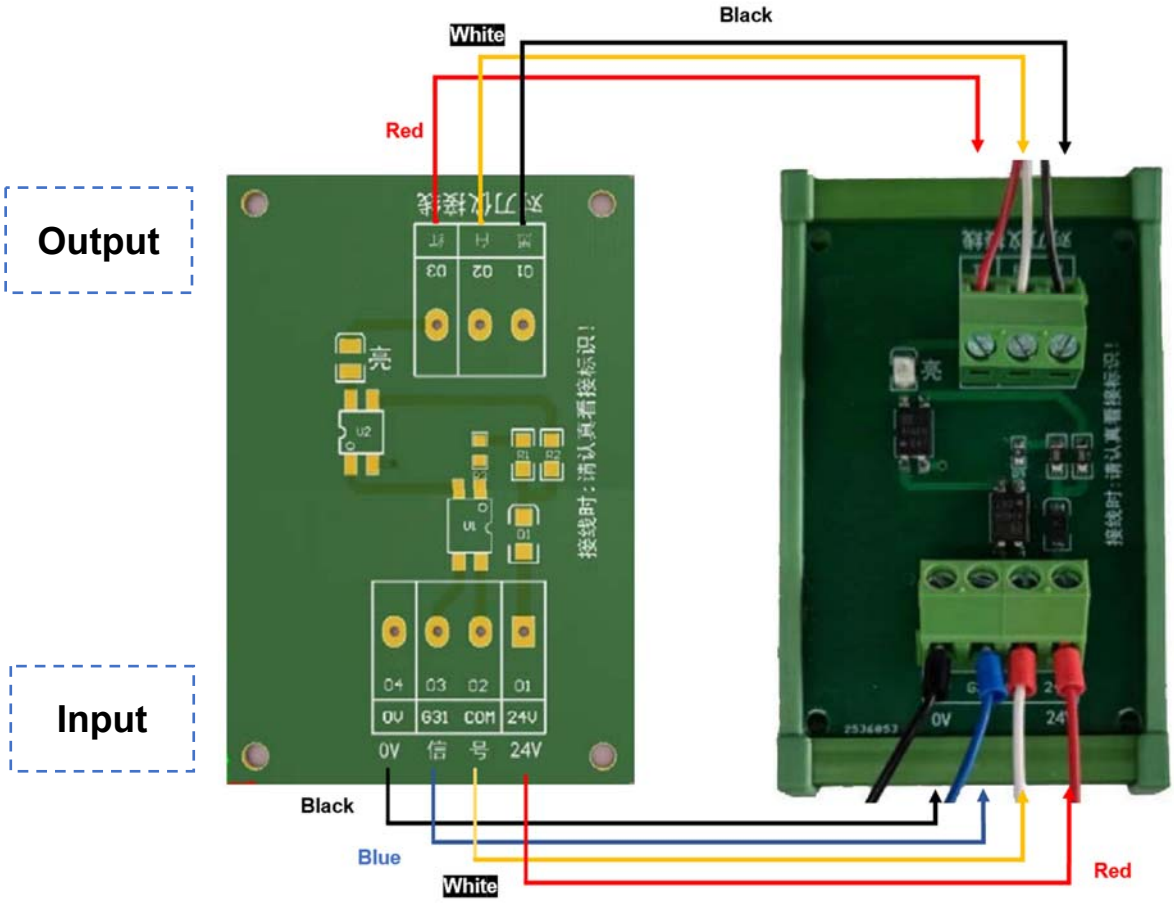

Figure 1: Wiring Instructions

- COM = 0V (Haas operating controller)

  COM = 24V (other operating controller)

  G31 = SKIP INPUT

  FANUC:X4.7 Brother:14 or 16

  Mitsubishi: SKIP Siemens:X122.13 or 132.13

Signal check

1. **SKIP INPUT(G31):**

   Press the probe lightly by hand and check if there is any signal input at the corresponding G31 skip port on the CNC controller.

2. **Check by the program:**

   In the MDI mode, execute a program as bellow to confirm again whether the G31 skip signal is recognized and input. When the program is executed, the machine table moves along the X-axis. At this time, lightly press the stylus, the machine table should stop immediately. In case of no signal, recheck the wiring.

   Format

G91 G31 X-50. F30; *M30;*

Calibrating the tool setter probe

During normal use, the difference between the touch position and the reported position does not change, but it is important that the probe is calibrated in the following circumstances:

1. when a probe system is to be used for the first time;
2. when a new stylus is fitted to the probe;
3. when it is suspected that the stylus has become distorted or that the probe has been crashed;
4. At regular intervals to compensate for mechanical changes of your machine tool;
5. If repeatability of relocation of the probe shank is poor. In this case, the probe may need to be recalibrated each time it is selected.

Calibration routines from step 1 to step 5.

STEP	MACRO	FUNCTION	DISCRIPTION
1	**O9750**	Parameters setting	The fundamental parameters setting program
2	**O9855**	Calibrate the tool setter probe's position relative to the machine's XYZ-axis coordinates.	The stylus calibrating program
3	**O9856**	Manually measure the tool length	Manually measurement program of tool length
4	**O9857**	Automated measure the tool length and tool diameter	Automated measurement program of tool length and tool diameter
5	**O9858**	Broken tool detection	Broken tool detection program

Settings data macro O9750

The user just needs to edit macro O9750 as required, other variables have been set as default.

MACRO VARIABLES	DISCRIPTIONS
#101	First touch feed rate
#102	Offset types(1=A,2=B,3=C)，Default=1
#103	Single-sided measurement setting
#104	Tool setter probe orientation setting
#105	Back-off distance, Default=0.3mm
#106	Two tool setter probe（0=No , 1=Yes）
#107	The units used for settings data, Default=1mm
#109	Tool offset type (1 = Radius, 2 = Diameter), Default=1
#111	Cutters larger than this size are measured single-sided
#113	Initial approach clearance point above the stylus
#114	Secondary approach clearance point above the stylus
#117	Default overtravel distance, Default=5mm
#118	Probe (Yes=1, No=0)
#120	Base number，Default=520
#121	Machine X axis
#122	Machine Y axis
#123	Machine Z axis
#124	Long tool/Short tool search feed rate，Default=2000
#125	Radial clearance，Default=5mm
#127	Rapid traverse feed rate，Default=5000mm/min
#128	Select language (1=English, 2=German, 3=French, 4=Italian)
#138	Long tool (If using a negative length, the user need to input the negative length value)
#139	Short tool (If using a negative length, the user need to input the negative length value)
#145	Zone check，Default=0.005mm

Probe orientation (#104) and single-sided diameter measurement (#103)

Position	Probe orientation #104	Side selection #103
1	2	1
2	2	-1
3	1	-1
4	1	1
5	-2	-1
6	-2	1
7	-1	1
8	-1	-1

#103	Single-sided measurement setting
#104	Tool setter probe orientation setting

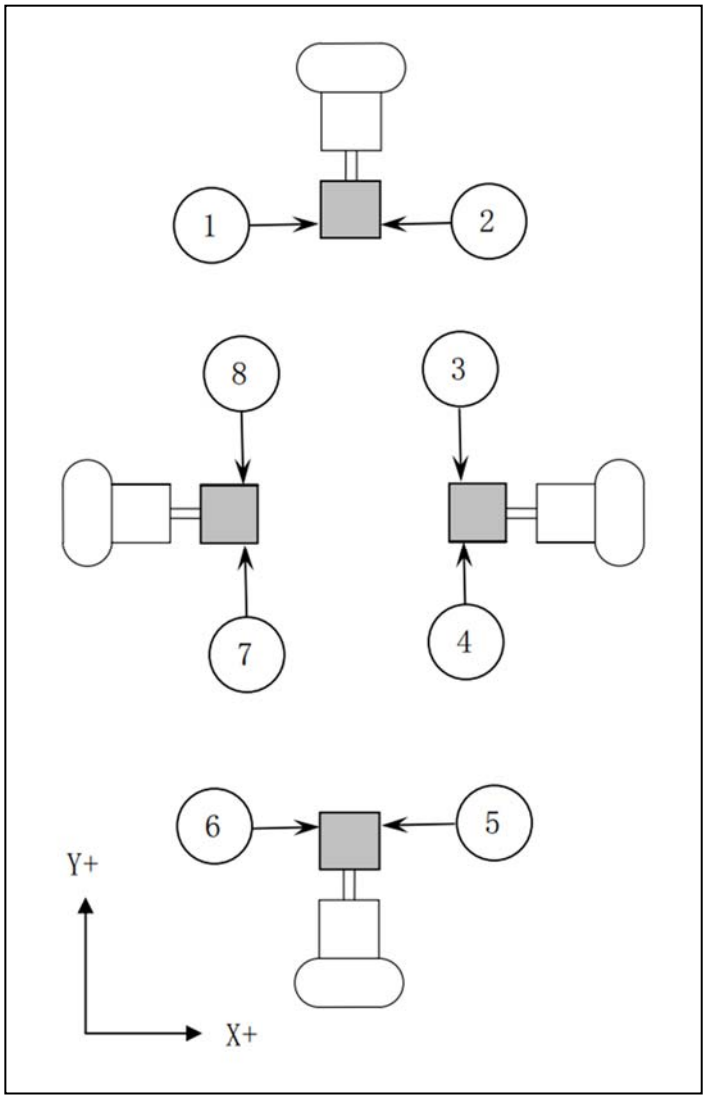

Figure 2: Orientation of the probe and single-sided diameter measurement settings

Calibrating the round stylus

Macro O9855 is used for calibrating the probe's stylus

1. Select the master tool in MDI mode and manually position it centrally over the round stylus and approximately 10mm of the top face. The diameter and length of the master tool must be known.
2. In MDI mode, cancel tool length and radius offset: G40 G80 G49. Ensure that calibration is not influenced by the offset values.
3. Run the O9855 cycle. The master tool first approaches from above, then approaches the round stylus from left, right, front, and back, and finally retracts 10mm above the top face.
4. Calibration values are found, or calculated, for the stylus.

Format

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O1050
G40 G80 G49
G65 P9855 D12.7 R10. T1.
M30
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D12.7: The diameter of the round stylus.

R10: The actual diameter of the master setting tool.

T1: The tool length offset to use.

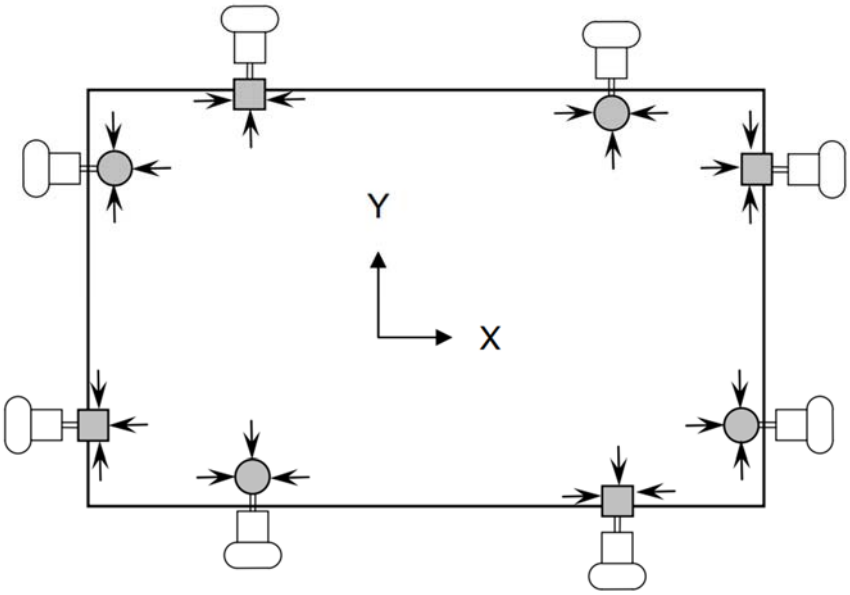

Figure 3: Example of machine tool movements

#520	The tolerances of automatic measure and manual measure
#521	X axis value of stylus
#522	-X axis value of stylus
#523	Y axis value of stylus
#524	-Y axis value of stylus
#525	The tool length tolerances of automatic measure and manual measure （*Static*）
#526	The tool length tolerances of automatic measure and manual measure （*Rotating*）

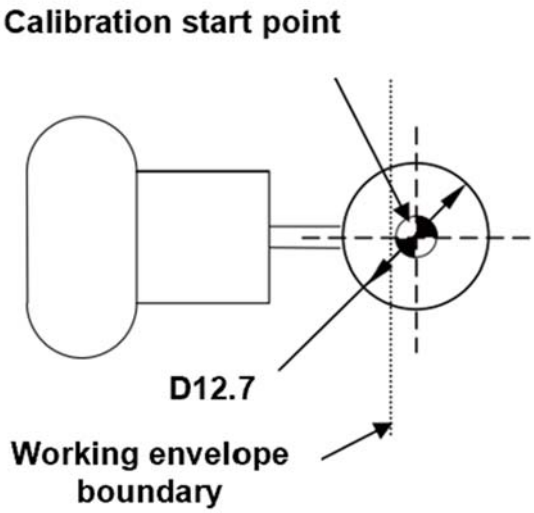

Figure 4: Setting of round stylus

Drilling/milling tool setting cycles

Manually length setting – macro O9857

(Static Tool) *O1051* *G40 G80 G49* *G65 P9856 T2.* *M30*	Manually position it centrally over the round stylus and approximately 10mm of the top face and run the cycle. The measured tool length value is stored in T2 offset after cycle
(Rotating Tool) *O1052* *G40 G80 G49* *G65 P9856 D160. T2.* *M30*	D160 = The diameter of the tool If the tool diameter exceeds 10mm, the measurement will be offset by the radius value

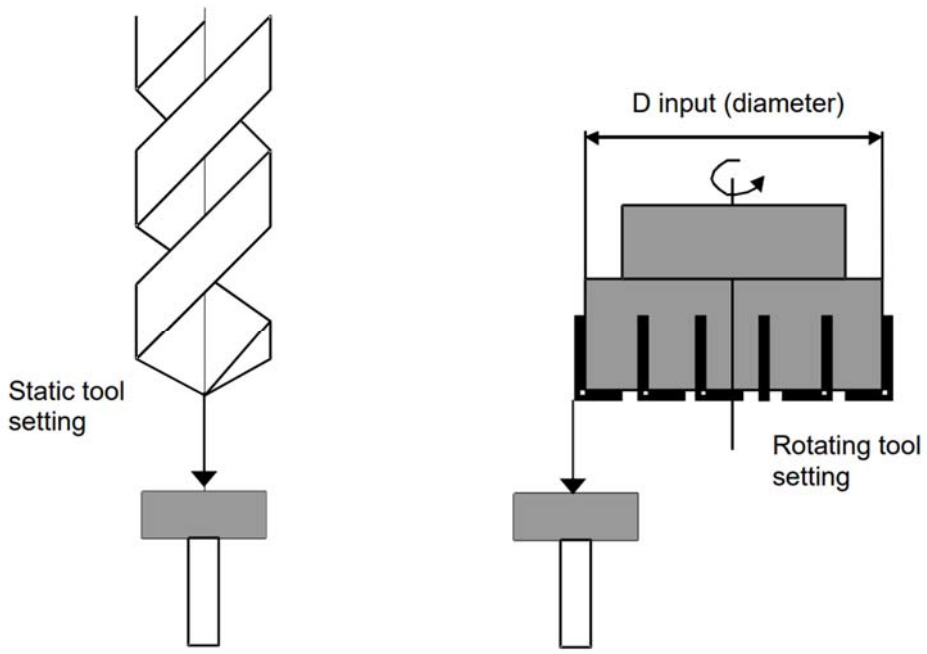

Figure 5: Tool length measurement

Automatic length and radius setting – macro O9857

O1053 *G40 G80 G49* *G65 P9857 B1 T3. D10.* *M30*	B1 = Automatic measure tool length T3 = The actual tool length will be updated in T3 offset after cycle
O1054 *G40 G80 G49 G65* *P9857 B2 T3. D10.* *M30*	B2 = Automatic measure tool radius T3 =The actual tool radius value is updated in T3 offset after cycle D10 = The diameter of tool
O1055 *G40 G80 G49 G65* *P9857 B3 T5. D6.* *M30*	B3 = Automatic measure tool length and radius T5 = Enter the approximate tool length value into Offset D6 = The diameter of tool

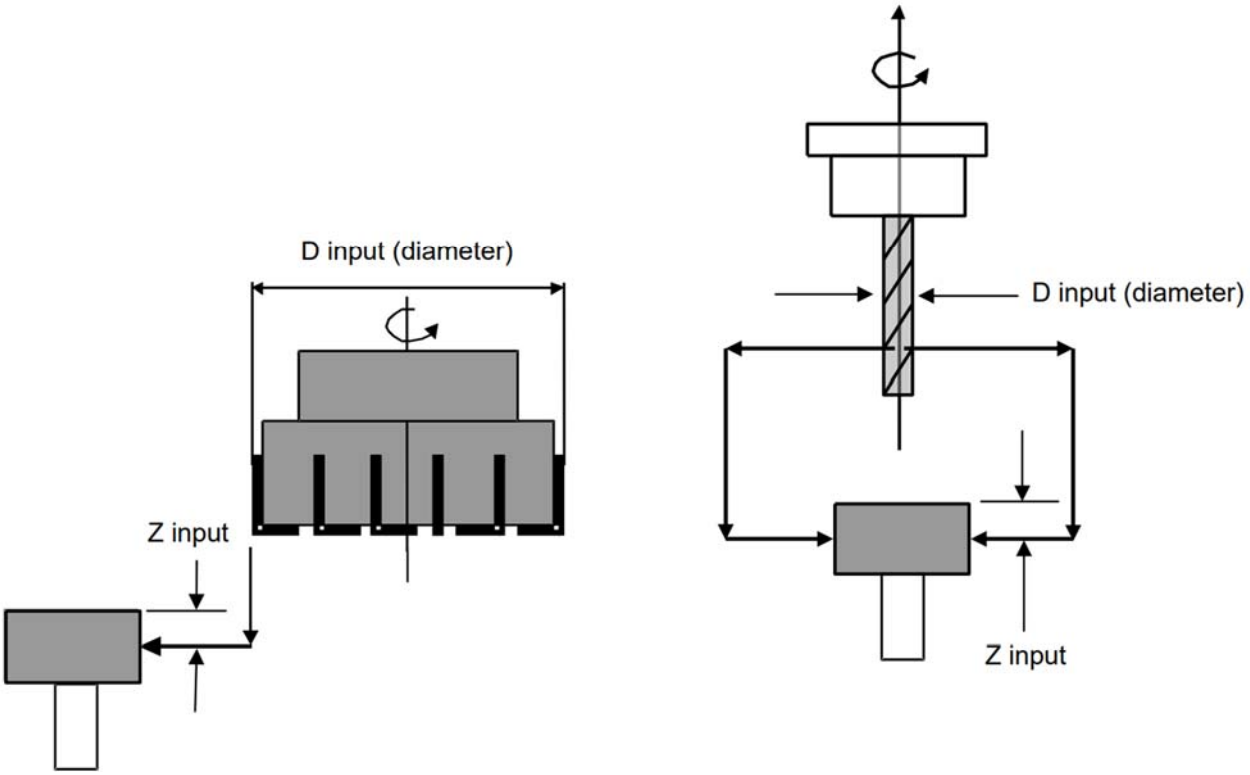

Figure 6: Tool length and radius measurement

Rotating tool broken tool cycle

O1056 *G40 G49 G80* *G65 P9858 T1. H0.5* *M30*	(The tolerance is a bidirectional tolerance.) when the measured tool length is out of tolerance: ALARM: TOOL* PULL* OUT If the tool is not touch the stylus: ALARM: BROKEN TOOL H0.5 = ± 0.5
O1056 *G40 G49 G80* *G65 P9858 D12. H0.5* *M30*	D12 = The diameter of tool This is used for non-center tools, such as face milling cutters. It will offset to the edge for measurement.