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TOUCH PROBE

Overview

A touch trigger probe, or touch probe, is used to set tool dimensions, such as length, radius, and insert lengths, automatically. When the touch probe is ordered as an option with a machine, it comes from the factory mounted on the left side of the table. This makes room for a rotary table installation. If desired, the touch probe can also be mounted on the right side of the table.

To use the touch probe, a measuring cycle subroutine is required. Measuring cycles are general subroutines designed to solve specific measurement tasks. Measuring cycle data must be adapted to the specific requirements of the individual machine, as well as, assign initial values.

Parts Required

<table>
<thead>
<tr>
<th>Qty</th>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ELE-0309</td>
<td>4.7kohm resistor</td>
</tr>
<tr>
<td>1</td>
<td>HDW-0035</td>
<td>T-slot nut, 1/2 - 13X5/8</td>
</tr>
<tr>
<td>1</td>
<td>PRB-0029</td>
<td>TS27R probe with holder</td>
</tr>
<tr>
<td>1</td>
<td>WIR-0051</td>
<td>Connector housing, 6 wire, female</td>
</tr>
<tr>
<td>1</td>
<td>WIR-0052</td>
<td>Connector housing, 6 wire, male</td>
</tr>
<tr>
<td>2</td>
<td>WIR-0056</td>
<td>Pin, 02-09-1204 brnz mlx, 22 awg</td>
</tr>
<tr>
<td>1</td>
<td>WIR-0099</td>
<td>Flex connector, 1/4 str s t</td>
</tr>
<tr>
<td>1</td>
<td>WIR-0123</td>
<td>Conduit, sealtite flex, 1/4, 76 inches (VMC3020), 81 inches (VMC4525)</td>
</tr>
<tr>
<td>1</td>
<td>WIR-0320</td>
<td>Conduit, black, high flex, 81 inches</td>
</tr>
<tr>
<td>1</td>
<td>WIR-0449</td>
<td>Connector, 1/4 inch flex</td>
</tr>
<tr>
<td>1</td>
<td>WIR-0451</td>
<td>Connector, black, swivel, 1/2 inch</td>
</tr>
<tr>
<td>1</td>
<td>WIR-0497</td>
<td>Connector, Furrell Appleton, 1/2 inch</td>
</tr>
<tr>
<td>2</td>
<td>WIR-0544</td>
<td>Pin, 02-09-2118 mlx, 22 awg</td>
</tr>
</tbody>
</table>
Installation

Set up touch probe

1. Mount the touch probe onto the front left corner of the table (See Figure 1).
2. Route signal cable from the probe to the CCU (compact control unit) electronics cabinet at the backside of the machine.
3. Following wiring diagram B in the Appendix, wire the female Molex connector (WIR-0051) with the signal wire coming from the touch probe. Install voltage drop resistor (ELE-0309) to pins one and two of the connector. Wire a 24 volt line from the power supply, mounted on the left side wall of the electronics cabinet, to the connector.
4. Plug the connector—that was just wired—to the prewired male Molex connector coming from interface connector X121 of the CCU module face panel (See Appendix wiring diagram A).

Go into ISO side of NCK

2. Press CNC ISO > CNC ISO soft keys, then press the Input hard key. Wait as the control switches over to the ISO side.
3. Press the Startup soft key.
4. Enter the password for manufacturer level access. For MMC103, press the System hard key. For MMC100, press SHIFT + SYSTEM/ALARM hard keys.

   NOTE: If the message bar--located at the bottom of the display screen--displays the message “Actual access level: Manufacturer,” then the password is already set. Continue to “Verify machine data” below.
5. Press the Set Password soft key.
6. Enter password into the designated field. Type SUNRISE, in all uppercase lettering, in the password field.
7. Press the Input hard key, then press the OK soft key.

Verify machine data

1. For MMC103, press the System hard key. For MMC100, press SHIFT + SYSTEM/ALARM hard keys.
2. Press the Startup soft key.
3. Press the **Machine data** soft key.
4. Press the **Display data** soft key. On the MMC103, press the **Display MD** soft key.
5. Using the arrow hard keys to navigate, find each machine data line, listed in Table 1, on the display screen. Verify the machine data values found on the display matches the machine data values in Table 1.

<table>
<thead>
<tr>
<th>Machine data line</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>9750 CMM_MEAS_PROBE_INPUT = 0</td>
<td>Measuring input for workpiece probe (This value must be 0 for a Fadal 810D/840D)</td>
</tr>
<tr>
<td>9751 CMM_MEAS_T_PROBE_INPUT = 0</td>
<td>Measuring input for tool probe (This value must be 0 for a Fadal 810D/840D)</td>
</tr>
<tr>
<td>9752 CMM_MEAS_DIST = 1.0 (inches, 50.8mm)</td>
<td>Maximum measuring distance--before and after the measuring point--for automatic measuring in the program</td>
</tr>
<tr>
<td>9753 CMM_MEAS_DIST_MAN = 2.0 (inches, 50.8mm)</td>
<td>Maximum measuring distance for manual measuring--before and after the measuring point</td>
</tr>
<tr>
<td>9754 CMM_MEAS_DIST_TOOL_LENGTH = .5 (inches, 50.8mm)</td>
<td>Maximum measuring distance for tool length--before and after the measuring point</td>
</tr>
<tr>
<td>9755 CMM_MEAS_DIST_TOOL_RADIUS = 1.0 (inches, 25.4mm)</td>
<td>Maximum measuring distance for tool radius--before and after the measuring point</td>
</tr>
<tr>
<td>9756 CMM_MEASURING_FEED = 10 (ipm, 1270mm)</td>
<td>Measuring feedrate</td>
</tr>
<tr>
<td>9757 CMM_FEED_WITH_COLL_CTRL = 25 (ipm, 635mm)</td>
<td>Plane feedrate with collision monitoring</td>
</tr>
<tr>
<td>9758 CMM_POS_FEED_WITH_COLL_CTRL = 25 (ipm, 635mm)</td>
<td>Infeed rate with collision monitoring</td>
</tr>
<tr>
<td>9759 CMM_MAX_CIRC_SPEED_ROT_SP = 15 (inches, 381mm)</td>
<td>Maximum circumferential speed during tool measuring with rotation spindle</td>
</tr>
<tr>
<td>9760 CMM_MAX_SPIND_SPEED_ROT_SP = 500 (rpm)</td>
<td>Maximum speed during tool measuring with rotating spindle</td>
</tr>
<tr>
<td>9761 CMM_MIN_FEED_ROT_SP = 10 (ipm, 254mm)</td>
<td>Minimum feedrate during tool measuring with rotating spindle</td>
</tr>
<tr>
<td>9762 CMM_MEAS_TOL_ROT_SP = .001 (ipm, .0254mm)</td>
<td>Measurement accuracy during tool measurement with rotating spindle</td>
</tr>
<tr>
<td>9763 CMM_TOOL_PROBE_TYPE = 0</td>
<td>Tool probe type (This must be 0 for a Fadal 810D/840D)</td>
</tr>
<tr>
<td>9764 CMM_TOOL_PROVE_ALLOW_AXIS = 133</td>
<td>Allowed axis directions for tool probe (ZXY) (This must be 133 for a Fadal 810D/840D)</td>
</tr>
<tr>
<td>9765 CMM_T_PROBE_DIAM_LENGTH_MEAS = .1 (inches, 2.54mm)</td>
<td>Tool probe diameter for length measurement</td>
</tr>
<tr>
<td>9766 CMM_T_PROBE_DIAM_RAD_MEAS = .5 (inches, 12.7mm)</td>
<td>Tool probe diameter for radius measurement</td>
</tr>
<tr>
<td>9767 CMM_T_PROBE_DIST_RAD_MEAS = .25 (inches, 6.35mm)</td>
<td>Infeed distance of tool probe upper edge for radius measurement</td>
</tr>
<tr>
<td>9768 CMM_T_PROBE_APPROACH_DIR = -1 (negative motion in the Z-axis)</td>
<td>Plane approach direction, tool to the tool probe</td>
</tr>
</tbody>
</table>

*Table 1: Machine data lines and their descriptions.*
Verify channel data
1. Press the Channel data soft key. On the MMC103, press the Channel MD soft key.
2. Using the arrow keys to navigate, locate the following channel machine data lines:
   - 28000 MM_REORG_LOG_FILE_MEM = 20
   - 28010 MM_NUM_REORG_LUD_MODULES = 8

Reset the NCK
1. For MMC103, press the System hard key. For MMC100, press SHIFT + SYSTEM/ALARM hard keys.
2. Press the Startup soft key.
3. Press the NCK reset soft key. An overlay box labeled “Start-up” will display asking if an NCK power on reset is desired.
4. Press the Yes soft key to accept a the NCK reset. Wait as the NCK resets.
5. Reference each axis.
   - IF REQUIRED, manually jog each axis to its alignment marks.
     a) Press the MPG hard key. Wait for the LED above the key to illuminate.
     b) Select an axis with the axis selector switch.
     c) Align the selected axis to its mark by using the handwheel.
     d) Repeat steps 2 and 3 for all the axes.
     e) Press JOG hard key when done.
   - Reference the axes.
     f) Select an axis with the axis selector switch.
     g) Press the REF POINT hard key.
     h) Press the “plus” hard key.
     i) Repeat steps 2, 3, and 4 for all the axes.
     j) The axes are referenced when the crosshair symbol displays to the left of each axis.

Load new measuring cycles
The new measuring cycles are contained in the utilities diskette supplied with the touch probe kit. These measuring cycles update the ones currently in the NCK. Determine which option, MMC103 or MMC100, the machine has and follow those steps to upload the new measuring cycles.
MMC103

1. Press the System hard key.
2. Press the Services soft key.
3. Press the Data in soft key.
4. Press the Disk... soft key. Insert the utilities diskette in the floppy disk drive when prompted to do so, then press the OK soft key.
5. An overlay box appears displaying the contents of the utilities diskette. Using the arrow hard keys, select the file Bt.tea. The file is selected when it is highlighted with the blue bar.
6. Press the Start soft key.
7. Press the Yes all soft key to accept the overwriting of the existing BD0301_TEA file. The message “Job is ready” displays at the bottom of the screen when the file is finished uploading.
8. Repeat steps 4, 5, 6, and 7 for the remaining measuring cycles listed below.

<table>
<thead>
<tr>
<th>Cycle</th>
<th>Cycle</th>
<th>Cycle</th>
<th>Cycle</th>
<th>Cycle</th>
<th>Cycle</th>
</tr>
</thead>
<tbody>
<tr>
<td>CYCLE107_SPF</td>
<td>CYCLE971_SPF</td>
<td>E_MS_PIN_SPF</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CYCLE108_SPF</td>
<td>CYCLE976_SPF</td>
<td>E_MT_CAL_SPF</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CYCLE109_SPF</td>
<td>CYCLE977_SPF</td>
<td>E_MT_LEN_SPF</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CYCLE111_SPF</td>
<td>CYCLE978_SPF</td>
<td>E_MT_RAD_SPF</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CYCLE114_SPF</td>
<td>E_MS_CAL_SPF</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CYCLE198_SPF</td>
<td>E_MS_CAN_SPF</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CYCLE199_SPF</td>
<td>E_MS_HOL_SPF</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9. Return to Shopmill.
10. Press the Shopmill soft key. Wait as the control switches over to Shopmill.
12. Press the Setting soft key.
13. Verify and modify, if necessary, the setting data:

<table>
<thead>
<tr>
<th>DATC Data</th>
<th>ATC Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retract: Z</td>
<td>.750</td>
</tr>
<tr>
<td>Safety: Z</td>
<td>.100</td>
</tr>
<tr>
<td>Feed:</td>
<td>10 ipm</td>
</tr>
<tr>
<td>Jog Increment:</td>
<td>100</td>
</tr>
</tbody>
</table>

MMC100

Setup requires an external computer with a 3.5 inch floppy disk drive and the PCIN communications program loaded. The new measuring cycles are uploaded to the MMC100 from the utilities diskette using the external computer.
Set up communications parameters

1. Press the Shift + SYSTEM /ALARM hard keys.
2. Press the CNC ISO soft key, then the CNC ISO ✔ soft key.
3. Verify the user access level:
5. Press the STARUP soft key.
6. The message “Actual access level: Manufacturer” should display in the message bar at the bottom of the screen display. If the level is not set to Manufacturer or no message displays, continue at “d.” If the level is set to Manufacturer, go to step 4.
7. Press the Set password soft key.
8. Type SUNRISE. The password is set in all uppercase letters. If necessary, press the Shift hard key while typing the password.
10. Press the Services soft key.
11. Press the Data out soft key.
12. Highlight the Start-up data line using the up and down arrows.
13. Press the RS232 C User vertical soft key.
14. Press the Set soft key. At this point, two options columns are displayed (See Figure 2). The left options column is the parameters for communications. The right options column is the “Special Functions.”

![Figure 2](Communications parameter settings for MMC100.)
The parameters for communications should be as follows:

Interface: COM1
Protocol: RTS/CTS
Baud Rate: 2400 (see note below)
Stop Bits: 1
Parity: none
Data bits: 8
Xon: 11
Xoff: 13
End of Trans: 03

**NOTE:** On external computers loaded with either the Windows 95 or NT 4.0 operation system, a baud rate of 4800bps or higher may also be used. On external computers loaded with the Windows 98 operating system, setting a baud rate above 2400bps can cause a data transmission failure. In either case, if a transmission failure were to occur, use a baud rate of 2400bps.

“**Binary Format (PC form)**” should be selected on the second-to-last line in the *Special Functions* column. Also, all the boxes to the left of each line, in the *Special Functions* column, should be clear.

15. Press the **Save setting** vertical soft key.

**Set up external computer**

The communication parameters at the external computer must correspond to the communication parameters at the control. If applicable, set LPT1 to bi-directional in the BIOS of the external computer.

**NOTE:** The PCIN communications program is a DOS based program. Therefore, an RTS/CTS error may occur if PCIN is being run in Microsoft Windows. If an error occurs, try turning off power management in Windows, turning off the screen saver, and restarting the computer in DOS mode. If an error still occurs, consult your IT department for further assistance.

1. Start up the PCIN communications program.
2. Select **V24_INI** at the top of the screen (See “a” in Figure 3). Press **ENTER**, two times if necessary, to display the communication parameters box.
3. Set COM number to “1” or “2” (depending on the COM port communications cable connection at the external computer). Navigate to the COM NUMBER line using the arrow keys. Use the arrow keys to select the proper COM port settings (See “b” in Figure 3).
4. Set XON/XOFF parameter to “OFF.” Use the arrow keys to navigate to the XON/XOFF SET line. Use the arrow keys to select ON or OFF setting in the box that displays (See “c” in Figure 3).
5. Set ETX to “ON.”
6. Press ENTER.
7. Select YES in the SAVE INPUT (Y/N) box that displays.
8. Select DATA_OUT at the top of the screen (See “d” in Figure 3).
9. Press ENTER.

Upload new measuring cycles
1. Insert the utilities diskette into the floppy drive of the external computer.
2. Type **a**: in the Filename box.
3. Press ENTER. The contents of the utilities diskette displays in the **a**: directory box.
4. Select the **Bt.tea** file.
5. Press the ENTER key.
6. At the pendant, press the **Start** soft key.
7. Press the OK soft key. The Transmission in Progress! window displays.
8. Press the OK soft key to upload the file. The Transmission in progress! window closes when the data transfer is complete.
9. Repeat steps 4, 5, 6, 7, and 8 for the remaining measuring cycles listed below.

<table>
<thead>
<tr>
<th>CYCLE107_SPF</th>
<th>CYCLE971_SPF</th>
<th>E_MS_PIN_SPF</th>
</tr>
</thead>
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<tr>
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<td></td>
</tr>
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<td>E_MS_CAN_SPF</td>
<td></td>
</tr>
<tr>
<td>CYCLE199_SPF</td>
<td>E_MS_HOL_SPF</td>
<td></td>
</tr>
</tbody>
</table>

11. Press the \textbf{Shopmill} soft key. Wait as the control switches over to Shopmill.
13. Press the \textbf{Setting} soft key.
14. Verify and modify, if necessary, the setting data:

<table>
<thead>
<tr>
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<td>10 ipm</td>
</tr>
<tr>
<td>Jog Increment:</td>
<td>100</td>
</tr>
</tbody>
</table>

**Probe Setup**

\textbf{Calibrate probe}

\textbf{NOTE:} The calibrated probe data will stored and set for the tool probe parameters.

1. Select a tool, such as an end mill tool, to use as the calibration tool for the probe. Load the tool into the spindle.
2. Jog the calibration tool over to the touch probe. Position the tool approximately two inches (2") above the center of the measuring surface of the touch probe.
3. For MMC103, press the \textbf{System} hard key. For MMC100, press \textbf{SHIFT + SYSTEM/ALARM} hard keys.
4. Press the \textbf{Machine manual} soft key.
5. Press the \textbf{Measure tool} soft key.
6. Press the \textbf{Calibrate probe} soft key.
7. Press the \textbf{Alternate} soft key to select the \textit{Length and diameter} measurement option.
8. Press the CYCLE START (green) hard key. Calibration is executed automatically at the measuring feedrate. The current distance measurements between the machine zero and touch probe are calculated and stored in an internal data area.

**Setup tools in Tool List**

1. For MMC103, press the System hard key. For MMC100, press SHIFT + SYSTEM/ALARM hard keys.
2. Press the Tool zero offset soft key.
3. Modify the tools in the tool list so they correspond to the tools in the turret. **NOTE**: Endmills require a diameter and “endmill” selected as the description. Drills require an angle and “drill” selected as the description.

**Measure tool**

1. For MMC103, press the System hard key. For MMC100, press SHIFT + SYSTEM/ALARM hard keys.
3. Press the Measure tool soft key.
4. Position the tool close to the measuring surface of the touch probe.
5. Press the Length auto soft key.

6. Press the CYCLE START hard key. The measurement is taken automatically at the measuring feedrate. The tool dimension data is calculated and stored in the tool list.
7. Load the next tool from the turret.
8. Repeat this step for all the tools being measured.
FOR THE PROBE OPTION CONNECTOR X121 IS PRE-WIRED WITH 8451 WIRE. PIN 10-0V BLACK, PIN 9-SIGNAL RED.

SIEMENS 810D

A

Wiring Diagram - TS27 Probe
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