Leadscrew Tapping Cycle - A7/A8 Block Electric AFTE

Leadscrew tapping uses a fixed mechanical drive and hence the forward feed and retract feed are fixed by the pitch of the leadscrew. It is important that the leadscrew being used is the correct one for the thread that is being tapped.

Leadscrew tappers reverse the motor to withdraw the tap from the hole. On electric AFTE's their depth and datum signals are given by electric proximity switches on the A7/A8 Block which are to reverse the motor at depth and to stop it at the datum position.

The control for this is SEPARATE and is commonly carried out by machine builders own control circuitry.

The electric leadscrew tappers from Desoutter come equipped with three proximity switches for home/datum, depth and no-hole sensing.

In any Control Circuitry the following are recommended:

- **Cycle Button**: When pressed the tool will cycle.
- **Emergency Stop**: When pressed the tool will stop.
- **Inch Reverse**: Enables inch reversal of the tool when setting up (also used to return tool to datum after emergency stop is pressed or no hole sensed).
- **Inch Forward**: Enables the tool to be inched forward when setting up.

### Proximity Switch Types Connections and Use

<table>
<thead>
<tr>
<th>Block Type</th>
<th>Proximity Switch Type</th>
<th>Operating Voltage</th>
<th>Voltage Drop</th>
<th>Rated Operating Current</th>
<th>Operating Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>A7</td>
<td>M8 PNP NO</td>
<td>10-30V</td>
<td>&lt;=2.5V</td>
<td>250mA</td>
<td>-25 to 70 C</td>
</tr>
<tr>
<td>A8</td>
<td>M8 NPN NO</td>
<td>10-30V</td>
<td>&lt;=2.5V</td>
<td>250mA</td>
<td>-25 to 70 C</td>
</tr>
</tbody>
</table>

The output is short circuit protected (pulsed). After elimination of the short circuit the switch is ready again for operating.

Datum should be used to sense home position and hence to stop the motor at the end of a cycle.

**Datum**

- 24V (Brown) to 24V
- 0V (Blue) to 0V
- Output (Black) to STOP the motor

Depth should be used to sense end of stroke position and hence to actuate the reverse of the motor.

**Depth**

- 24V (Brown) to 24V
- 0V (Blue) to 0V
- Output (Black) to REVERSE the motor

No-Hole should be used to sense a component with no hole - the output should be used to stop the motor.

**No Hole**

- 24V (Brown) to 24V
- 0V (Blue) to 0V
- Output (Black) to STOP the motor

<table>
<thead>
<tr>
<th>Proximity Switch Type</th>
<th>Proximity Switch Part Number</th>
<th>Cable Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>M8 PNP NO</td>
<td>381223</td>
<td>381233</td>
</tr>
<tr>
<td>M8 NPN NO</td>
<td>396183</td>
<td>397043</td>
</tr>
</tbody>
</table>
Electric Motor Connection
The electric motor used on the AFTE’s are 3 phase mechanical brake motors and can be connected to into both 440-480 volts or 220-240 volts at 60Hz by changing the connections to the motor as shown below.

**STAR CONNECTION**
440/480V

**DELTA CONNECTION**
220/260V

The motors must be connected to a 3 phase supply in accordance to the Voltage Charts in the relevant service sheet and provided with a starter fitted with an overload protection.
Recommended overload settings and the connection type.

<table>
<thead>
<tr>
<th>Tool Series (Motor Part No.)</th>
<th>Speeds (50Hz)</th>
<th>Voltage /V</th>
<th>Frequency /Hz</th>
<th>Motor Connection</th>
<th>Power /hp</th>
<th>Full Load Current /A</th>
<th>Recommended Overload Setting /A</th>
</tr>
</thead>
<tbody>
<tr>
<td>AFTE270 (381253)</td>
<td>1100-2950</td>
<td>220/260</td>
<td>60</td>
<td>Delta</td>
<td>0.28</td>
<td>1.0</td>
<td>1.0-1.2</td>
</tr>
<tr>
<td>AFTE470 (310373)</td>
<td>180-1450</td>
<td>220/260</td>
<td>60</td>
<td>Delta</td>
<td>0.6</td>
<td>2.0</td>
<td>2.0-2.2</td>
</tr>
<tr>
<td>AFTE480 (380433)</td>
<td>180-1450</td>
<td>220/260</td>
<td>60</td>
<td>Delta</td>
<td>1.2</td>
<td>3.8</td>
<td>3.8-4.0</td>
</tr>
</tbody>
</table>

When connecting the motor ensure that the motor rotation is correct. Remove the belt from the pulley’s and view the motor from the shaft end of the motor. For right hand threads the rotation should be clockwise and anti clockwise for left hand threads.

To reverse the motor interchange U1 and V1 connections.

**NOTE:** Before cycling a leadscrew tapper check the following:-

1. Electric Motor is running in the correct direction.
2. Proximity switches are fitted correctly i.e. are sensing datum and depth and that the logic of the control circuitry is functioning correctly:- i.e. Depth reverses the direction of the electric motor. Datum stops the electric motor.
Operation of AFTE Tapper using a Programmable Controller

Electrical connections to AFTE270/470/480:
Consult tool service sheet for correct wiring of motor and proximity switches.

Control circuit:

<table>
<thead>
<tr>
<th>INPUT</th>
<th>OUTPUT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start signal NO X1</td>
<td>Y1 Motor relay forward output</td>
</tr>
<tr>
<td>Stop signal NC X2 Y1</td>
<td>Y2 Motor relay reverse output</td>
</tr>
<tr>
<td>SW2 depth signal X3</td>
<td>Programmable controller (PLC)</td>
</tr>
<tr>
<td>SW1 datum signal X4 Y3</td>
<td>Ready indicator output No Hole indicator output</td>
</tr>
<tr>
<td>Inch forward NO X5 Y4</td>
<td>Power indicator Y5</td>
</tr>
<tr>
<td>Inch reverse NO X6 Y5</td>
<td></td>
</tr>
<tr>
<td>SW3 No Hole signal X7</td>
<td></td>
</tr>
<tr>
<td>Motor cutout NC X8 Y6</td>
<td></td>
</tr>
</tbody>
</table>

Motor Switching Circuit:

<table>
<thead>
<tr>
<th>L1</th>
<th>L2</th>
<th>L3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3 off Fuses
Solid state motor reversing contactor
U1 V1 W1 Motor

Note*: Ultra-fast fuses must be used. The fuses must have an $I^2T$ rating lower than the contactor. Fuse size Ø10 x 38mm.
Motor rotation test must be carried out as described in AFTE service sheet before operating the tool.
Desoutter recommends that the SRC3D Solid State Relay from Intercable Danmark is used in the circuit.

Warning:
Customer is responsible for ensuring the safe installation and operation of the control equipment.
For motor connection instructions refer to ‘operating instructions’ supplied with the AFTE480 in conjunction with this document. The following supersedes the instruction concerning the ‘thermal cut-out’ connections.

The brake motors used on the AFTE480 and AFTE470 now contain a built in Thermistor Detector PTC (in place of the thermal cut-out) that is used for motor overload protection. To enable the thermistor to be utilised an external thermistor relay is required. Suitable thermistor relays are available from electrical/electronic suppliers. Below shows a typical connection diagram using a thermistor relay:

1) Relay energised when temperature OK.
2) Relay de-energised when over temperature or short circuit in thermistor circuit.
3) Connect in series with holding coil in the supply contactor or to TC1 & TC2 of the Desoutter control box.
4) "Release" (Over temperature) resistance is \( \geq 3990 \Omega \), "Reset" (Temperature within acceptable range) resistance is \( \leq 1650 \Omega \).
Auto Feed Drills and Tappers
AFTE270/470/480 Control

AFTE Terminology

No Hole Sensor

Home sensing ring

Leadscrew and Nut

Extension Tube

Crosshead And Crosshead screw

Depth

Quill

Lou Zampini & Associates
2 Douglas Pike, Rt. 7
Smithfield, RI 02917
1 800 353 4676
FAX 1 401 679 0165
Fitting/Changing The Leadscrew

The leadscrew is held in place by two set screws, the drive is supplied by a key. To get access to the leadscrew and set screws remove the plastic cover and either jog the drive electrically or remove the pulley housing cover and belt and manually turn the drive.

NOTE: Position the leadscrew nut approximately half way down the leadscrew – this will aid removal.
Removal of leadscrew

1. Loosen the set screws and pull down of the quill – this should dis-engage the leadscrew

2. With pliers remove the external snap ring on the leadscrew nut

3. Loosen crosshead on both the lead screw nut and the extension tube slide the crosshead back to allow the leadscrew to be removed
Fitting The Leadscrew

1. Position the leadscrew nut approximately half way on the leadscrew. The leadscrew nut has a flat on it which need to be located with a flat on the cross head when you slide the assembly in. The snap ring has to go over the nut after it has been put in the cross head.

2. With both crosshead screws loose slide the leadscrew nut assembly into the crosshead.

3. Fit the snap ring on the leadscrew nut and slide the crosshead such that it butts up against the snap ring. Tighten both crosshead screws.

4. Fit the drive key on the leadscrew and orientate the key with the mating key way. Push on the quill/output spindle to push the leadscrew assembly into the drive shaft. Lock in place with the two set screws.

For stroke setting refer to leadscrew tapper set up document.
1. Setting the HOME position proximity switch
With the “cross head” loosened on the “extension tube”, slide the “quill” back until the “home sensing ring” back until it is in front of the “home proximity switch”. Screw the “home proximity switch” in until it touches the “home sensing ring”. Back the “home proximity switch” approximately one turn – make sure it is still sensing.

2. Setting the DEPTH position proximity switch
With the leadscrew NOT fitted
With the “cross head” tightened on the “extension tube”, slide the “quill” forward until the “crosshead screw” is in front of the “depth proximity switch”. Screw the “depth proximity switch” in until it touches the “crosshead screw”. Back the “depth proximity switch” approximately one turn – make sure it is still sensing.
3. Setting the DEPTH position proximity switch
With the leadscrew fitted

Ensure the "cross head" is tightened on the "extension tube". Rotate the leadscrew manually or through a jog function in the controls until the "crosshead screw" is in front of the "depth proximity switch". Screw the "depth proximity switch" in until it touches the "crosshead screw". Back the "depth proximity switch" approximately one turn – make sure it is still sensing.
4. Setting the Stroke
This can only be done with the leadscrew fitted. Go to step 1 and make sure the home proximity switch is sensing.

With the “crosshead” loosened on the “extension tube” rotate the leadscrew manually or through a jog function in the controls until the “crosshead screw” to “depth proximity switch” distance is the stroke required.
5. The No Hole Sensor
This will give a signal if there is no hole to be tapped or if excess torque is required to tap the hole.
The leadscrew is spring loaded through "belleville" washers such that if it can not drive forward the leadscrew will be driven backwards.
To set the no hole sensor screw the proximity switch in until it bottoms out. Unscrew the proximity switch until it no longer senses – this will guarantee a signal in a no hole condition and give the finest setting for an "over torque" condition. "Over torque" will occur when the tap wears and will indicate that the tap should be changed.
The greater the distance the "no hole proximity switch" is backed out the more “over torque” it will cope with.
The two drawings below show the standard condition and with the leadscrew pushed back to give the “no hole” signal.