Auto Feed Drills and Tappers Tapping Methods

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There are three different tapping methods available from Desoutter.

These are:-

1. Push Pull   Tapping
2. Tension   Tapping
3. Leadscrew   or   Pitch Controlled   Tapping

Brief Comparison of Tapping Methods

General Feature	Push Pull	Tension	Leadscrew
Thread Quality	Poor	Good	Good
Production Rate	Low	High	High
Depth Control	+/- .1	+/-.05	+/-.005
Ease of Pitch Change	Change Feed Rate on Flow Controls	Change Feed Rate on HCU	Change feed rate by changing the leadscrew
Motor Reversal Required	No	Yes	Yes
Axial Float Available	No	Yes	Yes

Summary of Product Offerings

	Pneumatic	Electric
Push Pull	AFD205/215-Speed-A1-K32-H21 Speeds 650/1000 AFD415-Speed-A1-B7/B8 Speeds 490/790/1250 AFD625-Speed-A1-B24-J19 Speeds 350/550/950	AFDE200-Speed-A1-K32-H21 Speeds 850/1200 AFDE400/410*/420*-Speed-A1-B24/B7/B8 Speeds 180/330/550/900/1200 AFDE610-Speed-A1-B24-J19 Speeds 180/330/550/900/1200 *AFDE700/710-Speed-A1-T34 Speeds 140/280/460/950 *Using Tapmatic or similar Tapping Heads Only
Tension Tapping	AFD425-Speed-A1-B24/B33 Speeds 350/550/950/2100/3300 AFD625-Speed-A1-B24/B33 Speeds 350/550/950/2100/3300	AFDE400/410/420-Speed-A1-B24/B33 Speeds 180/330/550/900/1200/1450/1750/2350/2850 AFDE610/620-Speed-A1-B24/B33 Speeds 180/330/550/900/1200/1450/1750/2350/2850 AFDE700/710-Speed-A1-T34/T33 Speeds 140/280/460/950/1400/1900/2850
Leadscrew Tapping	AFT470-Speed-A1-B24/32/33-L* Speeds 350/550/950/2100/3300	AFTE270-Speed-A7/A8-K32-L* Speeds 1100/1300/1850/2350/2950 AFTE470/480-Speed-A7/A8-B24/B32/B33 Speeds 180/330/550/900/1200/1450

Note: Electric speeds given are 50 Hz speeds, tools will run 20% faster on 60Hz.
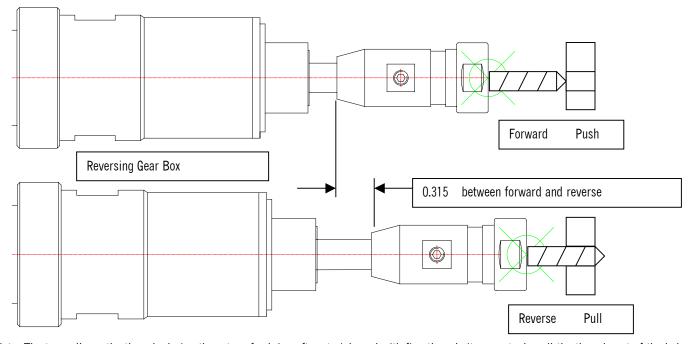
Description of Tapping Methods

1. **Push-pull   tapping**   uses a standard air fed unit AFD or AFDE and an output spindle with a reversing gearbox.
    As the unit feeds forward the tap produces the threaded hole.
    At depth the feed reverses and, as the AFD retracts, the tap holds the output spindle forward allowing the reversing gearbox to be
      pulled   into reverse. The tap is then driven in reverse until it exits the tapped hole.
    A clearance of 9/16   between the tap and the top of the material is required to allow the reversing gearbox to then return to the
    forward direction.

Forward   Push

Reversing Gear Box

0.315   between forward and reverse

Reverse   Pull

Note: The tap pulls on the threads during the return feed. In soft materials and with fine threads it can actualy pull the threads out of the hole.

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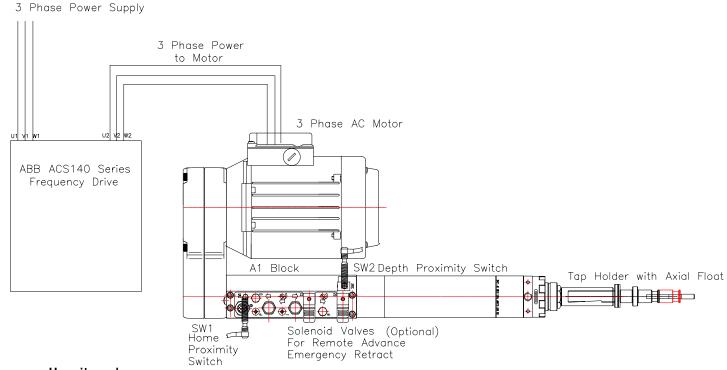
2.   **Tension   tapping** uses a standard AFDE unit or an AFD unit with external air motor drive (AFD425 or AFD625)
to allow the spindle direction to be reversed. The tap is held in an axially floating holder to allow it to cut it's own
thread. The axial float must always have tension, compression is optional depending on the application.

On AFDE units Desoutter has the following available for tension tapping:-

Tension/Compression Tapping by Reversing the Motor on a standard AFDE Unit

This can be carried out using the following   see diagram.

How it works

The tool will be set up with the motor running in the correct forward direction.

The unit can then be advanced through air pulse into 1 port or electrical pulse into S1 Solenoid Valve.

An HCU can be set to give the required rapid advance controlling the feed on the tap just as it enters the pre-drilled hole.

The tap holder with axial float will allow the tap to feed through at the rate required.
Note can be used with multiple spindle heads provided each spindle has axial float.

At end of stroke (adjustable from 0   4) the depth proximity switch will give an output signal to the frequency drive which will reverse the electric
motor.At the same time the unit will retract. The reverse RPM of the motor can be set higher than the forward RPM thereby allowing faster retract also
using the tap holder with axial float to aid this.

When unit returns to home position the home proximity switch will give a signal and motor direction will be reversed leaving it running in the forward
direction ready for the next tapping cycle.

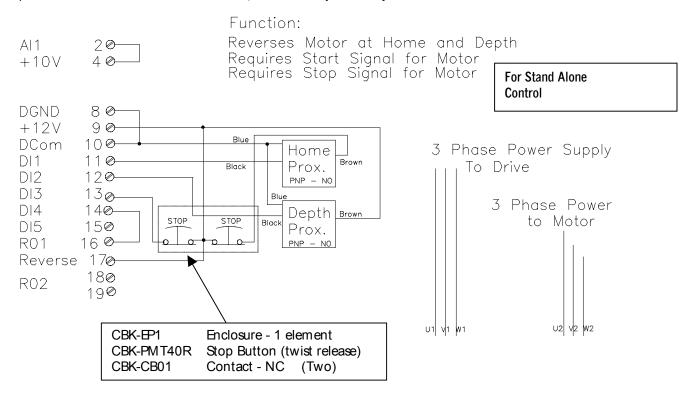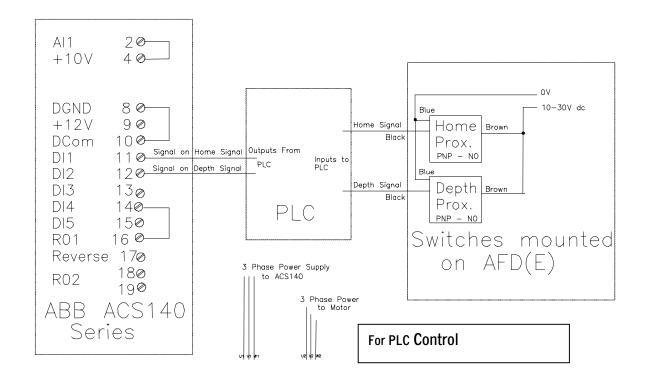Control can be stand alone through the frequency drive or through a PLC

Control Diagrams

The diagrams below show the connections for the ACS140 Frequency drive.

Certain parameters within the drive also need to be set, this should only be done by or with the data from Desoutter

Function:
Reverses Motor at Home and Depth
Requires Start Signal for Motor
Requires Stop Signal for Motor

For Stand Alone Control

AI1   2
+10V   4

DGND   8
+12V   9
DCom   10
DI1   11   Blue
DI2   12   Black
DI3   13
DI4   14
DI5   15
R01   16
Reverse   17
R02   18
           19

Home Prox. Brown PNP – NO

Depth Prox. Brown Black PNP – NO

STOP   STOP

3 Phase Power Supply To Drive

3 Phase Power to Motor

U1 V1 W1   U2 V2 W2

CBK-EP1	Enclosure - 1 element
CBK-PMT40R	Stop Button (twist release)
CBK-CB01	Contact - NC (Two)

NOTE: Drive MUST be properly grounded according to the Users Guide

AI1   2
+10V   4

DGND   8
+12V   9
DCom   10
DI1   11   Signal on Home Signal
DI2   12   Signal on Depth Signal
DI3   13
DI4   14
DI5   15
R01   16
Reverse   17
R02   18
           19

ABB ACS140 Series

Outputs From PLC   Inputs to PLC

PLC

Home Signal   Black
Depth Signal   Black

0V
10–30V dc

Blue Home Prox. Brown PNP – NO

Blue Depth Prox. Brown PNP – NO

Switches mounted on AFD(E)

3 Phase Power Supply to ACS140

3 Phase Power to Motor

U1 V1 W1   U2 V2 W2

For PLC Control

NOTE: Drive MUST be properly grounded according to the Users Guide

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Parameter Listing

For details on how to program refer to the ACS140 Programming Guide.

ACS 140 Complete Parameter List

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Only the basic parameters (shaded in grey) are initially visible.
The menu function -LG- can be used to make the full parameter set visible.

S = Parameters can be modified only when the drive is stopped.
M = Default value depends on the selected macro.

Code	Name	Range	Resolution	Default	User	S	M
Group 99 START UP DATA							
9902	APPLIC MACRO	0-7	1	0 (Factory)	1	X	
9905	MOTOR NOM VOLT	200-480V	-	*	From Motor Plate	X	X
9906	MOTOR NOM CURR	0.5*IN - 1.5IN	IN		From Motor Plate	X	
9907	MOTOR NOM FREQ	0 - 250 Hz	1 Hz	*	From Motor Plate	X	X
9908	MOTOR NOM SPEED	0 - 3600 rpm	1 rpm	*	From Motor Plate	X	X
Group 10 Command Inputs							
1001	EXT1 COMMANDS	0-10	1		5	X	X
1002	EXT2 COMMANDS	0-10	1		5	X	X
1003	DIRECTION	0-8	1		3	X	X
Group 11 Reference Select							
1101	KEYPAD REF SEL	1-2	1		1		X
1102	EXT1/EXT2 SEL	1-8	1		4	X	X
1103	EXT REF1 SELECT	0-8	1		1	X	X
1104	EXT REF1 MIN	0-250 Hz	1 Hz	0 Hz	0		
1105	EXT REF1 MAX (Forward Speed)	0-250 Hz	1 Hz		A		X
1106	EXT REF2 SELECT	0-8	1		1	X	X
1107	EXT REF2 MIN	0-100%	1%	0%	0		
1108	EXT REF2 MAX (Reverse Speed)	0-500%	1%	100%	A		
Group 12 Constant Speeds							
1201	CONST SPEED SEL	0-10	1		0	X	X
Group 14 Relay Outputs							
1401	Relay Output 1	0-11	1	3 (Fault)	6		
1402	Relay Output 2	0-11	1	2 (Run)	3		
Group 16 System Controls							
1601	RUN ENABLE	0-6	1		0	X	X
1602	PARAMETER LOCK	0-2	1	1 (open)	1		
1604	FAULT RESET SEL	0-7	1	6 (start/stop)	0	X	
Group 20 LIMITS							
2003	MAX CURRENT	0.5In-1.5In	0.1 A	1.5 In	From Motor Plate		
2005	OVERVOLT CTRL	0-1	1	1 (Enable)	1		
2006	UNDERVOLT CTRL	0-2	1	1 (Enable Time)	1		
2007	MINIMUM FREQ	0-250 Hz	1Hz	0 Hz	0		
2008	MAXIMUM FREQ (Reverse Speed)	0-250 Hz	1 Hz		A		X
Group 21 START/STOP							
2101	START FUNCTION	1-4	1	1 (Ramp)	1		
2102	STOP FUNCTION	1-2	1	1 (COAST)	1		
2103	TORQ BOOST CURR	0.5 In - 2.0 In	0.1 A	1.2 In	From Motor Plate		
2104	STOP DC INJ TIME	0-250s	0.1 s	0 s	0		
2105	PREMAGN SEL	0-6	1		0	X	X
2106	PREMAGN MAX TIME	0.0-25.0s	0.15 s	2.05 s	2		
Group 22 ACCEL/DECEL							
2201	ACC/DEC 1/2 SEL	0-5	1		0	X	X
2202	ACCELER TIME 1	0.1-1800 s	0.1;1 s	5 s	A		
2203	DECELER TIME 1	0.1-1800 s	0.1;1 s	5 s	A		
2206	RAMP SHAPE	0-3	1	0 (LINEAR)	0		
Group 25 CRITICAL FREQ							
2501	CRIT FREQ SEL	0-1	1	0 (OFF)	0		
Group 26 MOTOR CONTROL							
2603	IR COMPENSATION	0-30V	1	10V	10V	X	
2604	IR COP RANGE	0-250 Hz	1 Hz	50 Hz	60Hz	X	
2605	CARRIER FREQ. 1=LO NOISE	0-1	1	0(standard)	0	X	
2606	V/f RATIO	1-2	1	1(linear)	1	X	
Group 30 FAULT FUNCTIONS							
3010	STALL CURRENT	0.5*In-1.5*In	0.1 A	1.2*In	From Motor Plate		

☐ Basic parameters.   From the Application ☐

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Options for Tension/Compression Spindle Float on AFDE400/410/420/610/620

Option 1 - LCTH Length Compensating Tap Holder with Float, Tension/Compression

Features
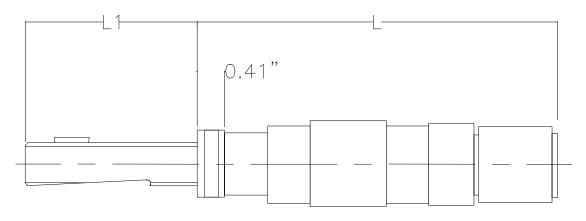Provides both radial float and tension and compression lead compensation.
Quick Change of Taps   51 series tap adaptors ordered separately
Low friction ball bearing drive
Tension and compression strokes can be varied to suit the application
L dimension is based on holder set for full compression.
If tension is required subtract tension stroke from L dimension shown in chart

L1 ⟵⟶ L

0.41"

Part Number	Max Dia	T.I.R. Float	Total Stroke	L	L1
321-1-210FC			0.59	4.85	2.59
321-1-210FT	1.38	0.070	0.59	4.26	2.59
321-1-210TNC			0.59	*	2.59
321-5-210-FC			1.58	6.82	2.59
321-5-210FT	1.38	0.070	1.58	5.24	2.59
321-5-210TNC			1.58	*	2.59

FC = Full Compression, FT = Full Tension,
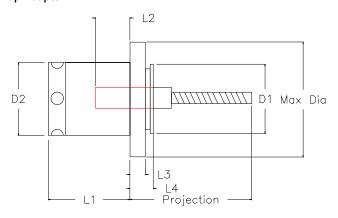TNC = Tension and Compression standard is 50% of each unless specified
* Will vary according to amount of tension and compression   subtract tension stroke from L

Quick Change Tap Adaptors   51 series

Quick-Change Tap Adaptors Permit
5-Second Change Of Taps

Quick-Change Tap Holders Permit
5-Second Change Of Tap Adaptors

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51 Series Tap Adaptors
NTA Non Torque Tap Adaptor

Item Number	Tap Size		L1	L2	L3	L4	D1	D2	Max Dia	Projection
51-106	0	6		0.31						1.51
51-108	8									1.57
51-110	10			0.39		0.37				1.73
51-112	12			0.31						1.79
51-004										1.80
51-005	5/16		0.84		0.16		0.73	0.748	1.18	1.95
51-006	3/8			0.39						2.11
51-007	7/16					0.38				2.36
51-008										2.55
51-009	9/16			0.31						2.79

NTER-CC Non Torque, Extended Range, Close Centre Tap Adaptor
Permits the use of larger taps with small diameter holders
NOT RECOMMENDED for high torque applications

Part Number	Tap Size		L1	L2	L3	D1	D2	Max Dia	Projection
51-010	5/8								4.24
51-011	11/16								4.39
51-012			0.83	0.99	2.19	1.17	0.748	1.18	4.55
51-013	13/16								4.77

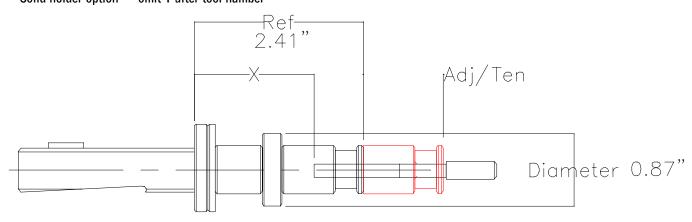Auto Feed Drills and Tappers **Tapping Methods**

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51-014	7/8							4.93

Option 2 - CCTH Size 401 Close Centre Tap Holder with Tension Lead Compensation

Features
Quick Change of Taps
Low friction ball bearing drive
Standard holders are full tension
Solid holder option   omit T after tool number

Ref
2.41"

X

Adj/Ten

Diameter 0.87"

Part Number	Tap Size	Projection	Adj/Ten	X	Shank
401-106-210T	#6	3.54	0.4	1.8	5/8
401-108-210T	#8	3.60	0.4	1.8	5/8
401-110-210T	#10	3.86	0.4	1.71	5/8
401-112-210T	#12	3.82	0.4	1.8	5/8
401-004-210T		3.95	0.4	1.71	5/8
401-006-210sT	3/8SS	4.29	0.4	1.71	5/8
401-005-210T	5/16	4.14	0.4	1.71	5/8
401-006-210T	3/8	4.29	0.4	1.71	5/8
401-007-210T	7/16	4.48	0.4	1.71	5/8
401-008-210T	1/2	4.67	0.4	1.71	5/8
401-009-210T	9/16	4.82	0.4	1.71	5/8
401-202-210T	1/8PipeTap	3.47	0.4	1.71	5/8

Quick Change Tap Adaptors

Quick-Change Tap Adaptors Permit
5-Second Change Of Taps

Auto Feed Drills and Tappers **Tapping Methods**

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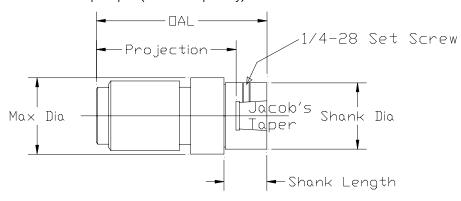
Option 3 - TMS FITH Jacob   s Taper Floating Interchangeable Tap Holder with
NTLA-T Non Torque Tap Adaptor with Tension Float (ordered separately)
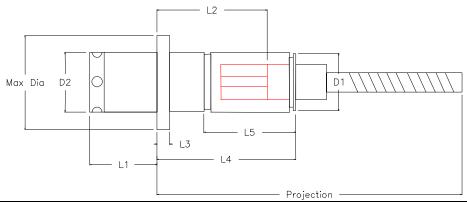
Features: Provides 0.070   TIR radial float
Low friction ball bearing drive
Order tap adaptor (51 series separately)

Part Number	Jacob s Taper No	OAL	Projection	Max Dia	Shank Dia	Shank Length	Adaptor Series
221-501	1	3.07	2.41	1.38	1.21	.75	51
221-502	2	3.15	2.27	1.38	1.23	.83	51

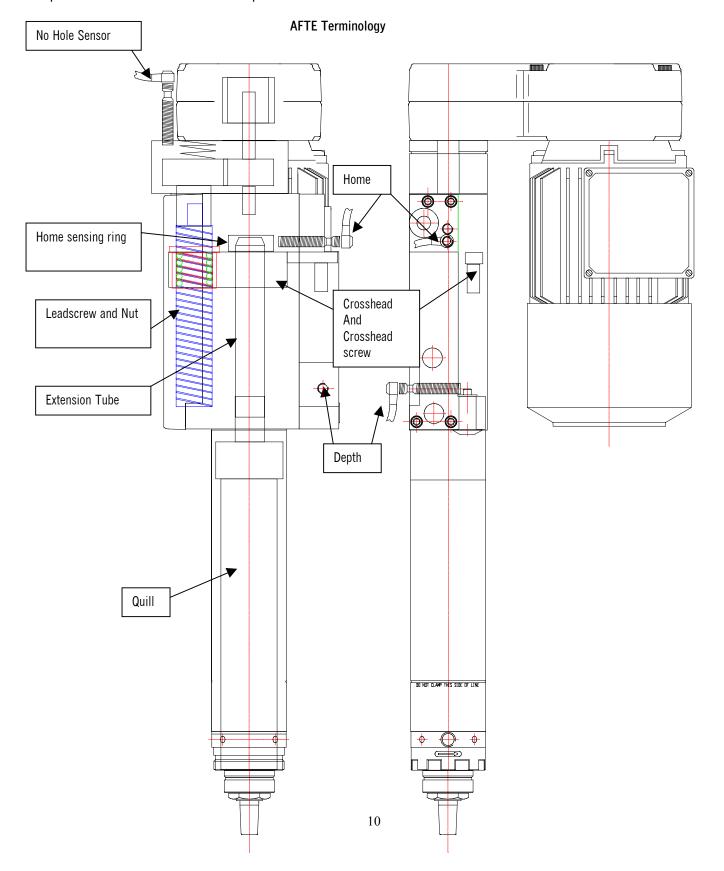| Part Number	Tap Size	L1	L2	L3	L4	L5	Tension	D1	D2	Max Dia	Projection
51-106-0-T	0 6										2.52
51-108-0-T	8										2.59
51-110-0-T	10		0.71		1.39	0.88					2.84
51-112-0-T	12										2.81
51-004-0-T											2.90
51-005-0-T	5/16	0.83		0.16			0.39	0.73	0.748	1.18	2.97
51-006-0-T	3/8										3.13
51-007-0-T	7/16		0.63		1.40	0.89					3.38
51-008-0-T											3.57

51-009-0-T	9/16											3.72

3. **Leadscrew   tapping** uses an AFTE unit or an AFT unit with external air motor drive (AFT470)
to allow the spindle direction to be reversed. Electric motor control is separate and is not available from Desoutter,
pneumatic motor control is also separate and a circuit is available from Desoutter.

AFTE Terminology

No Hole Sensor

Home sensing ring

Leadscrew and Nut

Extension Tube

Home

Crosshead
And
Crosshead
screw

Depth

Quill

DO NOT CLAMP THIS SIDE OF LINE

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In any Control Circuitry the following are recommended:

Cycle Button	When pressed the tool will cycle.
Emergency Stop	When pressed the tool will stop.
Jog Reverse	Enables jog reversal of the tool when setting up (also used to return tool to datum after emergency stop is pressed or no hole sensed.
Jog Forward	Enables the tool to be jogged forward when setting up.

Proximity Switch Types Connections and Use

Block Type	Proximity Switch Type	Operating Voltage	Voltage Drop	Rated Operating Current	Operating Temperature
A7	M8 PNP NO	10-30V	<=2.5V	250mA	-25 to 70 C
A8	M8 NPN NO	10-30V	<=2.5V	250mA	-25 to 70 C
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
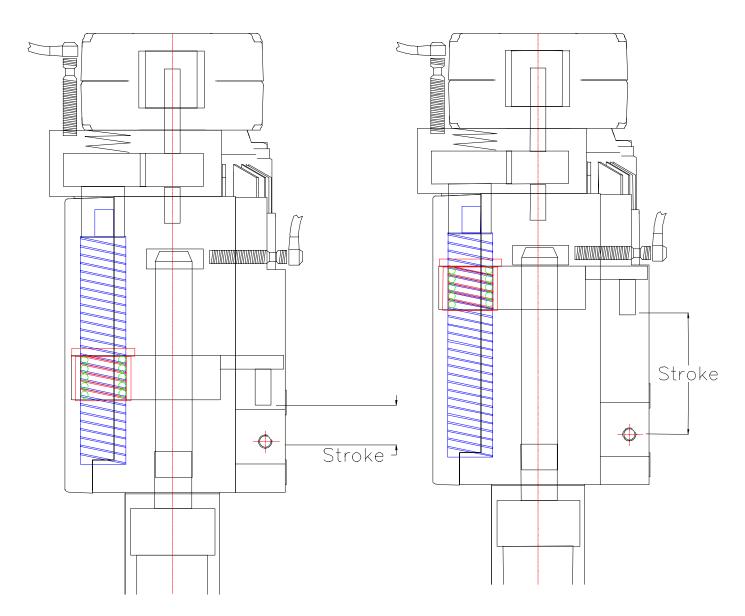   Output (Black)   to STOP the motor

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.

Stroke

Stroke

Example Strokes

The No Hole Sensor - Supplied

This will give a signal if there is no hole to be tapped or if excess torque is required to tap the hole.
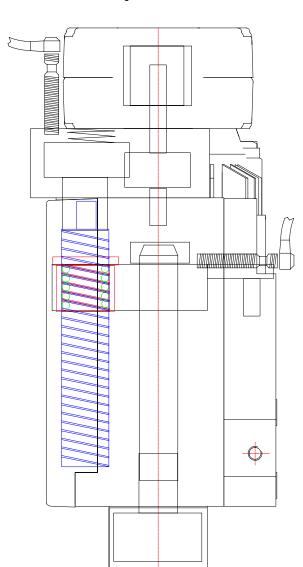
The leadscrew is spring loaded through   belleville   washers such that if it can not drive forward the leadscrew will be driven backwards.

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.
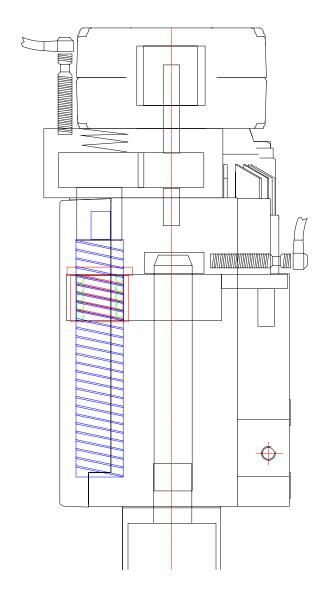
The greater the distance the   no hole proximity switch   is backed out the more   over torque   it will cope with.

The two drawings below show the standard condition and with the leadscrew pushed back to give the   no hole   signal.

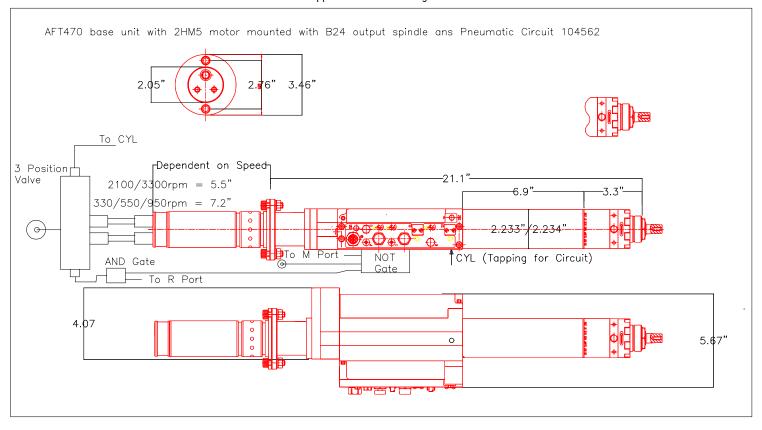**No Hole Signal**   **Standard Condition**

AFT470 All Pneumatic Lead Screw Tapper

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This is based on the AFTE470 all electric lead screw tapper with the following :-

AFT470 base unit with 2HM5 motor mounted with B24 output spindle ans Pneumatic Circuit 104562

2HM5 Air Motor used in direct drive   Refer to Air Motor Catalogue LT1317 Page 9 for details on the 2HM5 Only 330rpm to 3300rpm tools to be used.
The A1 control block is used and functions in exactly the same way - Refer to AFD Product Range Catalogue 1.1 Page 28.
External Air Circuit is required to reverse the motor (see circuit below), Desoutter Part No. 104562.
All leadscrew options are available   Refer to AFD Product Range Catalogue 1.1 Page 26.
All B and R series outputs fit the tool - Refer to AFD Product Range Catalogue 1.1 Page 30.
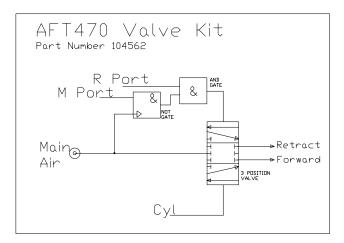Electrical Interfaces can also be used - Refer to AFD Product Range Catalogue 1.1 Page 28.

AFT470 Valve Kit
Part Number 104562

ABB ACS 140 Variable Frequency Drives for use with Desoutter Auto Feed Drills and Tappers

Possible uses include:

1.   Speed Change either automatically through a proximity switch or manually through the key pad.
      Can be used when changing hole size/material or   drapping   .
2.   Electric motor reversal for tension tapping.
3.   Rapid advance and motor reversal when lead screw tapping.

Basic Feature Summary:

Easy Integration
        Flexible application macros.
        On board power supply 12vdc, max 100mA for powering proximity switches.
        Five programmable digital inputs for logic functions.
        Two programmable analog inputs.
        Simple keypad entry for parameter setting.

Detachable Control Panel
        Parameters can be easily copied from drive to drive.
        Tamper proof setting

Multiple mounting possibilities   NOTE Must be mounted in an enclosure
        Wall mount
        Built in DIN rail mount
        Flange mount where the heat sink can be placed outside of a cabinet.

CE Marked, UL and CUL Approved
DC Braking Optional Accessory

Standard Ratings (ambient temperature 40 °C) and Frame Size

	Rated Motor Power (HP)	Rated Output Current 3 phase (A)			Rated Input Current 3 phase (A)	Frame Size/ Weight (lbs)
		Output Current I_2	Maximum Current Imax	Frequency Drive		
200-240V	0.75	3	4.5	ACS 143-1K1-1	4.2	B/2.4
3 phase	1.5	5.9	8.9	ACS 143-2K1-1	7.2	C/4.4
50/60 Hz	3	9	13.5	ACS 143-4K1-1	12	D/5.5
380-480V	1	2	3	ACS 143-1K6-3	2.7	B/2.4
3 phase	1.5	2.8	4.2	ACS 143-2K1-3	4	B/2.4
50/60Hz	2	3.6	5.4	ACS143-2K7-3	5.1	C/4.4
	3	4.9	7.4	ACS 143-4K1-3	6.4	D/5.5