



47000
47005
47040
47045

WILS-TRONIC HIGH-TORQUE



OPERATING INSTRUCTIONS & SERVICE MANUAL

Rev: A, 5/11/2007

**TO REDUCE THE RISK OF INJURY AND EQUIPMENT DAMAGE
USER MUST READ AND UNDERSTAND OPERATOR'S MANUAL.**

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SAFETY INSTRUCTIONS



WARNING!

READ AND UNDERSTAND ALL INSTRUCTIONS

Failure to follow all instructions listed below, may result in accident, fire and/or personal injury.

SAVE THESE INSTRUCTIONS

1. **KNOW YOUR POWER TOOL.** Read this service manual carefully.
2. **GROUNDING INSTRUCTIONS.** This product is equipped with a cord having an equipment-grounding conductor and a grounding plug. The plug must be plugged into an appropriate outlet that is properly installed and grounded in accordance with all local codes and ordinances.
3. **KEEP GUARDS IN PLACE** and in working order.
4. **KEEP WORK AREA CLEAN.** Cluttered areas and benches invite accidents.
5. **AVOID DANGEROUS ENVIRONMENT.** Keep work areas well lit.
6. **STORE IDLE TOOLS.** When not in use, tools should be stored in dry, high or locked-up place – out of reach of children.
7. **DON'T FORCE TOOLS.** It will do the job better and safer at the rate for which it was designed.
8. **USE RIGHT TOOLS.** Don't force small tool or attachment to do the job of a heavy-duty tool.
9. **WEAR PROPEL APPAREL.** No loose clothing or jewelry to get caught in moving parts. Rubber gloves and footwear are recommended when working outdoors.
10. **USE SAFETY GLASSES** with most tools. Also face or dust mask if cutting operation is dusty.
11. **DON'T ABUSE CORD.** Never carry tool by cord or yank it to disconnect from receptacle. Keep cord from heat, oil and sharp edges.
12. **SECURE WORK.** Use clamps or a vise to hold work. It's safer than using your hands to operate tool.
13. **DON'T OVERREACH.** Keep proper footing and balance at all times.
14. **MAINTAIN TOOL WITH CARE.** Keep tools sharp and clean for best and safest performance. Follow instructions for lubricating and changing accessories.
15. **DISCONNECT TOOLS:** When not in use; before servicing; when changing accessories such as blades, bits, cutters, etc.
16. **REMOVE ADJUSTING KEYS AND WRENCHES.** Form habit of checking that keys and adjusting wrenches are removed from tool before turning it on.
17. **AVOID ACCIDENTAL STARTING.** Don't carry plugged-in tool with finger or switch.
18. Remove the plug from the socket before carrying out any adjustment, servicing or maintenance.

INITIAL HOOK-UP

Components Included in the Kit:				
Model:	47000	47005	47040	47045
Control Box	46000-2130	4600-2120	46040-2110	46040-2120
Foot Switch Assembly	46000-2200			
Power Cable Assembly	46000-2250		46040-2250	
Accessory Tool Kit	46000-3019			
Mid-Torque Motor	47000-3000 *includes motor mount			
Telescopic Shaft	46500-4000			
Service Manual	SM-296 & SM-298			

1. Confirm incoming electrical supply matches the model of the Wils-Tronic you have purchased.
2. Using the specified Hubbell receptacle:
3. Connect the 3Ø 230V, 60hz electrical power (Allowable range for the 230V Wils-Tronic is 3 phase, 180 to 264 Volts, 48 to 62 Hz) as shown in Table 1 to the receptacle using the diagram that comes with the plug and shown in Figure 1. Do not plug in the Wils-Tronic power cable into the receptacle at this time.

Table 1: 230V, 3 Phase Hook Up

Wire Color Receptacle terminal (Alternatively)

Green	Ground (G)
Red	L1 (X)
White	L2 or L3 (Y or Z)
Black	L3 or L2 (Z or Y)

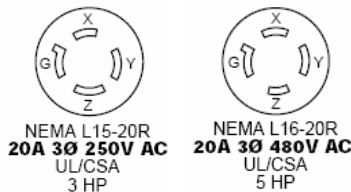


Figure 1: Plug Terminal Hook Up

THE GROUND WIRE MUST BE HOOKED UP or serious electric shock can occur while using the machine.

OBSERVE THE VOLTAGE REQUIREMENTS of the machine, do not exceed Maximum Volts or serious failure WILL occur and warranty will be void.

OPERATION

- Connect the power cable to the control cabinet connector P1.
- Connect Motor cable to control cabinet connector P2.
- Connect the Foot pedal assembly to control cabinet connector P3.

POWER UP PROCEDURE:

- Plug the power cable from the Wils-Tronic into the power receptacle.
- Observe the “Phasing OK” pilot light illuminate.
If it does not, then swap two legs of the three-phase power as described in Table 1.
- Unlatch the E-Stop button.
- Depress the “Power On” button.
 - Allow the HMI and the Keypad to fully boot up. It should read “Thomas C. Wilson, Inc. – Wils-Tronic Mid-Torq” after a successful boot.
 - “Power On” button should illuminate.
 - “Stop” button should illuminate.
 - “Drive ready” pilot light should illuminate.
- Turn the “Hand / Auto” switch to the desired operating mode.

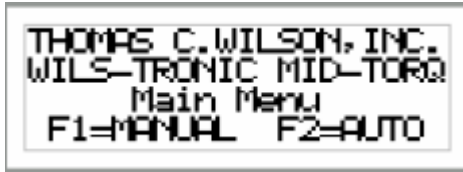
RUNNING IN MANUAL “MAN” MODE:

- Make sure the Selector Switch on the control panel is set on Hand.

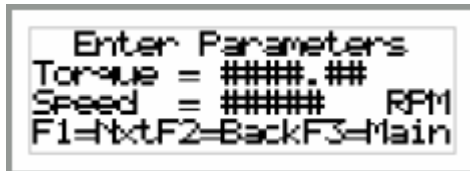


OPERATION CONT.

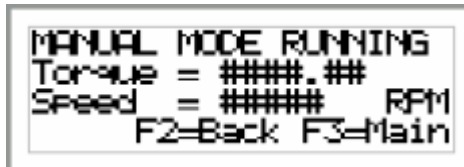
- Select “F1” from the Main screen.



- Enter Torque on the Keypad with the following keystrokes.
 - ↵ (Enter Key)
 - 0 0 0 0 (Password – enter once every 5 minutes)
 - ↵ (Enter Key)
 - ↵ (Enter Key) (Flashing Square on the digits)
 - X X X .X X (Enter torque in this 4-digit notation without any decimals)
 - ↵ (Enter Key)
 - Clr / Esc button to save



- Select “F1” (Nxt) from the current screen to view the Manual Running screen where current torque and speed can be read.
- Adjust speed via the rotary potentiometer on the control panel. The percent values are read off the potentiometer scale and RPM are the motor output values.



Tip! – Turning the POT knob slowly assures that current spikes will not trip off the torque set point.

OPERATION CONT.

- Press “Start”
- Observe “Start” pushbutton illuminate.
- Observe motor running.
- Press “Stop”
- Observe stop pushbutton to illuminate.
- Note that the motor stops.
- Begin rolling tubes to specified torque.
- Press start, allow tool to reach operating RPM, insert expander
- The unit will stop after the tube is expanded to the desired diameter
- Press and hold the “Stop” button or foot pedal to extract the expander
- Release the “Stop” button or foot pedal to stop the shaft
- Continue on to next tube
- Press the “Stop” pushbutton or Stop on foot pedal to halt the process.

Tip! – After a manual cycle has been run, the stop button must be reset prior to restarting.

RUNNING IN AUTOMATIC “AUTO” MODE:

- Make sure the Selector Switch on the control panel is set on Auto.

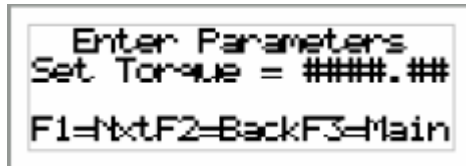


OPERATION CONT.

- Select “F2” from the Main screen.



- Enter Torque on the Keypad with the following keystrokes.
 - ↵ (Enter Key)
 - 0 0 0 0 (Password – enter once every 5 minutes)
 - ↵ (Enter Key)
 - ↵ (Enter Key) (Flashing Square on the digits)
 - X X X .X X (Enter torque in this 4-digit notation without any decimals)
For example 7500 will be interpreted as 75.00 ft*lbs
 - ↵ (Enter Key)
 - Clr / Esc button to save



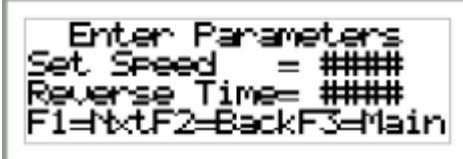
- Select “F1” (Nxt) from the current screen.
- Enter Set Speed (forward) and Reverse Time on the Keypad with the following keystrokes. *Note that the rotary potentiometer is disabled in the Programming mode.*
 - ↵ (Enter Key)
 - X X X ↵ (Enter Set Speed RPM in this 3-digit notation without any decimals)
For example 145 will be interpreted as 145 RPM
 - ↵ (Enter Key, toggles to next value)

OPERATION CONT.

- X X X X ζ (Enter Reverse Time in this 4-digit notation without any decimals)

For example 0008 will be interpreted as 8 Seconds

- \downarrow (Enter Key)
- Clr / Esc button to save



```

Enter Parameters
Set Speed   = ####
Reverse Time = ####
F1=Next F2=Back F3=Main
  
```

- Select “F1” from the current screen.
- Enter Reverse Speed and Dwell Time on the Keypad with the following keystrokes.

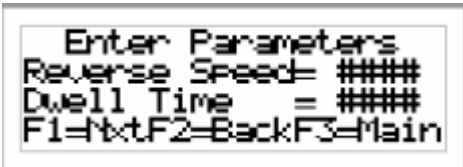
- \downarrow (Enter Key)
- X X X \downarrow (Enter Reverse Speed RPM in this 3-digit notation without any decimals)

For example 200 will be interpreted as 200 RPM

- \downarrow (Enter Key, toggles to next value)
- X X X X \downarrow (Enter Dwell Time in this 4-digit notation without any decimals)

For example 0010 will be interpreted as 10 Seconds

- \downarrow (Enter Key)
- Clr / Esc button to save



```

Enter Parameters
Reverse Speed = ####
Dwell Time    = ####
F1=Next F2=Back F3=Main
  
```


OPERATION CONT.

- Select “F1” for the next screen and to view the Program Running screen where current torque and speed can be read. In the case where the machine is in the stopped mode it is the last operated RPM that is displayed.



- Begin rolling tubes to specified torque.
- Press “Start”
- Wait for unit to reach operating RPM, insert expander
- The unit will stop after the tube is expanded to the desired diameter and dwell for a short time
- It will automatically reverse for a short time at the pre-programmed RPM; remove the expander before it stops turning in reverse
- It will automatically stop, dwell, and begin rotating forward again
- Continue on to next tube
- Press the “Stop” pushbutton or Stop foot pedal to halt the process.

SETTING PASSWORD:

For all new Wils-Tronics the default password will be “0000”. Parameters can only be adjusted once the proper password has been entered. For ultimate security the users should immediately reset the password. New passwords may be any combination of 4 to 6 digits. To change the password, follow the instructions below.

- Select “F5” from the Main screen.
- You will be prompted for the current password
- Enter 0 0 0 0 ↵ (Password – enter once every 5 minutes)

OPERATION CONT.

- You will return to the Main screen – you are now logged in.
- Select “F5” again you will now be allowed to access the change screen.
- ↵ (Enter Key, again for edit mode)
- X X X X X X ↵ (Enter password in this 4-6 digit notation)
- Clr / Esc button to save
- Select “F3” to return to the main screen.

PROGRAMMING PARAMETERS:

Certain fine tuning capabilities are available with the Wils-Tronic. Please consult the factory for adjusting these settings. For normal applications there is no need to do so.

- Select “F4” from the Main screen.
- Enter Acceleration and Deceleration time on the Keypad with the following keystrokes. It is recommended to keep the factory settings unless operating conditions warrant otherwise.
- ↵ (Enter Key)
- 0 0 0 0 ↵ (Password – enter once every 5 minutes)
- ↵ (Enter Key, again for edit mode)
- X X X. X ↵ (Enter time in this 4-digit notation without any decimals)
For example 0005 will be interpreted as .5 Seconds
- Clr / Esc button to save

GLOSSARY OF TERMS:

- ↵ (**Enter Key**) = On the HMI keypad this is the Key in the lower Right hand corner. It is equivalent to the enter key on a standard keyboard.
- **Clr/Esc key** = On the HMI Keypad this is the key to the left of the “Enter” key. It’s function is to escape from edit screens and clear any data keyed in during the current edit mode. (See Figure 2)
- **Man** = Manual mode, in this mode Speed is set via the analog

OPERATION CONT.

potentiometer and Table 2, and Torque limit via the keypad. In this mode Forward and Reverse function are separate and have to be manually invoked. There are no automatic features in this mode. *Speed: 0-400 RPM, Torque: 15-120 ft-lb*

- **Auto** = Program mode, in this mode enter the desired torque and speed via the keypad. In this mode Forward and Reverse functions are automated and user can enter the reverse speed, reverse time and the dwell time. *Speed: 0-400 RPM, Torque: 15-120 ft-lb, Dwell Time: 1-20 sec, Reverse Time: 1-20 sec, Reverse Speed: 0-375 rpm*
- **Torque** = this is the value the operator must enter into the Wils-Tronic as a set point. When this amount of torque is applied to the expander, the rolling operation is seen as complete and the unit instantaneously stops.
- **Accel Time** = this is the time entered in the Program mode that allows the user to control the amount of time it takes for the Wils-Tronic to start once the “Start” pushbutton is depressed. Factory preset value is 2 seconds and this should not be changed unless application parameters warrant it.
- **Decel Time** = this is the time entered in the Program mode that allows the user to control the amount of time it takes for the Wils-Tronic to halt once the torque limit is reached. Factory preset value is .5 seconds and this should not be changed unless application parameters warrant it.
- **Set Speed** = this is the speed entered in the Program mode that allows the user to specify the RPM during rolling entered on the keypad (the rotary potentiometer is disabled in the program mode).
- **Reverse Speed** = this is the speed set in the program mode. It sets the reverse RPM that allows the operator to remove the expander when the rolling operation is complete. For convenience this setting can be much less than the forward settings, since tool extraction can occur rapidly.
- **Dwell Time** = this is the pause time set in the program mode. It is the amount of time that elapses between when the torque limit is reached and the reverse operation begins. It is also the amount of time that elapses once the reverse operation ceases and forward operation resumes.

OPERATION CONT.

APPENDIX A - APPROPRIATE OPERATING TORQUE SETTINGS:

The true benefit offered by the Wils-Tronic is properly rolled tube ends that are mechanically joined and leak free. Without fatigue the Wils-Tronic will roll continuously consistent properly rolled tubes.

The optimum joint is one that develops a leak tight joint with adequate strength for the service intended with the minimum amount of “Cold Working” or “reduction of the tube wall (Percent Reduction)”. Experience indicates that joints of this type are obtainable with non-ferrous tubes in surface condensers by expanding to a wall reduction of 3% to 4% after metal-to-metal contact of the tube O.D. with the tube sheet hole. Steel tubes in heat exchangers may require wall reductions of 5% to 10%; soft copper and aluminum tubes in heat exchangers also require larger wall reductions in the area of 8% to 12%.

Only adequate trial and error will determine the correct “Cold Working” or “Wall reduction” that will work in a given application.

Offered above is a starting point of given torque values and wall reduction of sample tubes that have been documented on the 46540 Mid Torque version of the Wils-Tronic. The end user is responsible for selecting the appropriate “Percent Reduction” and should use this information only as a guide to get started. The torque needs to be fine tuned to the application from this point.

Table 3: 2-1/2" Diameter tubes with a 1/4" thick tube sheet

Material	Wall Thickness	% Reduction	Torque Setting
Steel with 114 Expander	12GA	2%	15
		8%	20
		12%	25
		25%	30
With Combination beading Expander	12GA	20%	75

OPERATION CONT.

APPENDIX B - OPERATING SPEED FOR MANUAL MODE:

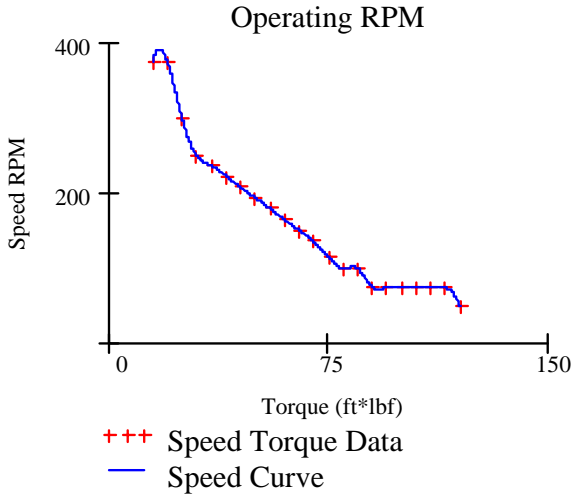


Table 4: Torque vs RPM chart (with POT reference marks)

Torque Setpoint	RPM	Torque Setpoint	RPM	Torque Setpoint	RPM	Torque Setpoint	RPM
15	375	44	211	74	119	104	75
16	375	46	205	76	111 = 30%	106	75
18	375	48	200	78	104	108	75
20	375	50	194	80	100	110	75
22	347 = 90%	52	189 = 50%	82	100	112	75
24	315 = 80%	54	183	84	100	114	75
26	286	56	177	86	96	116	73 = 20%
28	265 = 265%	58	171	88	85	118	65
30	250	60	165	90	75	120	50
32	243	62	159	92	75		
34	238	64	154	94	75		
36	235	66	148 = 40%	96	75		
38	229	68	143	98	75		
40	223 = 60%	70	136	100	75		
42	217	72	128	102	75		

TROUBLE-SHOOTING

Unit	Problem	Solution
HMI – Key-pad	Screen reads “firmware Error”	The software installation process was interrupted - Force a new boot by cycling the power and pressing the enter key prior to the appearance of the message.
	All Variables appear as “????”	CAN communication is not present. Either the PLC power is off, the plug is disconnected or there are loose wire between the connections.
PLC	Cannot connect laptop, “Communication interruption” error	<ul style="list-style-type: none"> - CAN connection is incorrect with the PC - Parameter settings are not correct; remove CAN plug from the HMI and try again. Reset communication parameters. - If problems still persist remove the AIF card on top of the Vector drive also, and then reset the communication parameters.
	Communication parameters keep resetting when the power is cycled.	- Save the parameters from within the running program before logging out (Code C003).
	Cannot change communication parameters	- The DDS software must be successfully logged on to the PLC in order to modify the settings.

TROUBLE-SHOOTING

Unit	Problem	Solution
Vector Drive	Cannot locate drives	- Connection to Vector drive is incorrect or missing.
	Communication error	- The communication parameters in the PLC were not set or saved with code C003.
	Motor identification appears to complete successfully, but there is no activity in the inverter load screen.	<ul style="list-style-type: none"> - The communication parameters in the PLC were not set or saved with code C003. - There is some communication interruption, reboot the Wils-Tronic and retry. - The HMI keypad is conflicting with the laptop connection on the CAN network. Disconnect the Keypad CAN connector and retry.
Motor	Motor starts to run but pulses. Drive ready light flashes on and off.	-Motor wired incorrectly for the wrong voltage. Wye instead of Delta, or Delta instead of Wye (440 vs. 220)

SPECIFICATIONS

MODEL	47000	47005	47040	47045
VOLTAGE	3 PHASE 230	3 PHASE 230	3 PHASE 440	3 PHASE 440
FREQUENCY	60 Hz	50 Hz	60 Hz	50 Hz
TUBE SIZE	Up to 3" (Up to 76mm)	Up to 3" (Up to 76mm)	Up to 3" (Up to 76mm)	Up to 3" (Up to 76mm)
RPM	0-400	0-400	0-400	0-400
TORQUE	80-300 FT- LBS	80-300 FT- LBS	80-300 FT- LBS	80-300 FT- LBS
DIMENSION *Control Box Only	17.5 in x 26 in x 25.5 in (445mm x 660mm x 648mm)	17.5 in x 26 in x 25.5 in (445mm x 660mm x 648mm)	17.5 in x 26 in x 25.5 in (445mm x 660mm x 648mm)	17.5 in x 26 in x 25.5 in (445mm x 660mm x 648mm)
WEIGHT *Control Box Only	95 lbs (43 kg)	95 lbs (43 kg)	95 lbs (43 kg)	95 lbs (43 kg)

LIST OF ACCESSORIES

Item	Part No.	Description
• Mobile Stand	46000-5400	
• Stationary Stand	46000-5010	
• Quick Connector, 1/2" SQ.	21489-0500	
• Quick Connector, 3/4" SQ.	21489-0750	
• Quick Connector, 1" SQ.	21489-1000	
• Extension Coupling, 3/4" SQ.	46500-4400	
• Extension Coupling, 1" SQ.	46500-4500	
• #2 Morse Taper Adapter	46500-6000	
• Telescopic Shaft	46500-4000	1" Square Drive

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