

2/12/2020

Super Star / Super HDH Winder with the Trio Control

Software Version 3.6-7Feb2020

Note: the Trio Control can now be used on our new Super HDH winding machine. Revision 3.6 changes are in red. Minor changes have not been listed.

Start Up Instructions

After connecting all the cables securely turn the power on. Make sure each cable goes to the properly labeled connector.

The proper Spindle Motor or Traverse Motor cable connector coming from the Main Control Box needs to connect to the matching Servo Motor Connector on the Machine. Carefully guide the cable connectors onto the Servo Motors by matching the flat surfaces on both connectors for sliding the two together and then give the cable connector a twist to lock it into place. Rotating the Control Box to make it easier for the cables to reach the Servo Motors helps to make it easier.

To turn on the machine flip on the start switch on the rear side of the Control Box. Keep in mind that if you need to restart the Control wait at least 30 seconds before re-starting the Control.

After the Control goes through the process of booting up you will come to the "Main Screen".

You will see three Flashing Messages at the top of the screen.

The first will say "**Machine Requires Homing**".

The second will say "**Traverse Drive Fault Reset Required**".

The third will say "**Spindle Drive Fault Reset Required**".

To eliminate the two Drive Fault Messages hit the **Reset** button.

On the lower right corner of the **Main Screen** you will see a light green message box appear saying “**Motors Ready**”. You will also see this message on the **Setup Screen** in the middle of the top of the screen under the word “**Setup**”.

After the two Drive Fault messages are cleared you can then press the “**Setup**” button to go to the **Setup Screen**.

On the **Setup Screen** you can press the **Home To Limit** Button and the machine will travel to the Machine Zero position. The machine will make that the Zero Position by default. **For Revision 3.6 you can now stop the traverse motion while Homing by pressing the Abort Button. Prior to this change you needed to shut off the Control.**

You can pick whatever position you want along the traverse for your Zero Point but for most purposes making the **Machine Zero** the **Home Zero** will work fine. You just Jog to where you want your Zero and then press the “**Set Zero**” button to create a custom Zero Position for programming your winding operation.

Note: When you jog the traverse to the left it will go beyond home to -.009 which is just beyond the Home Machine Zero. It will also trigger a Travel Over Limit Error. You can Jog off of the over limit and press reset. Do not use the Jog to bring the machine to the Home Position if you want to avoid this issue.

There is no Spindle Brake On/Off Switch. As long as the machine is powered up the Spindle and Traverse Motors will be held in place by the Control.

To rotate the Spindle for any reason without running a program you must use the Spindle Jog Buttons to move it to where you need it. Do not try to force the Spindle to rotate.

If you are used to manually rotating the spindle on your current machine or machines it will not take long to get used to letting the control rotate the spindle when needed for various purposes. Using the Foot Pedal will free up your hands for taking up wire if making a winding correction.

Programming instructions

Note: There is an **Emergency Stop Button** on the **Front Control Plate** of the Machine. To go back to running the Machine you will need to press the **Reset Button** twice.

Warning, to make sure the parameters you input are saved to flash memory do not shut off the control box until about 15 minutes have passed. We have noticed some parameters not being retained upon rebooting the control box from a shutdown.

Also, sometimes it looks like it is saving an input automatically when you are changing screens and see the “Saving” message. If you do not physically press the Save Button no changes will be saved. New changes might execute but not be remembered the next time you run the same Step. **New with Version 3.6: The Control automatically saves programming changes when moving from the Recipe Page to the Main Page. No need to press Save anymore on the Recipe Page.**

To enter the parameters for your program from the “**Setup**” page you can press the “**Recipe**” button to bring you to the Recipe page.

You could also press the “**Main**” button and see all the parameters on a list. If you select any of the parameters on the list you will be taken to the Recipe Page.

Before you begin to enter your parameters you will need to select the type of winding cycle you want to perform. Currently there are 3 types of cycles.

You can choose from a **Standard Winding**, from a **Variable** Pitch Winding or from an **Angle** Winding. There is also a special winding cycle not on the Drop Down List that will repeat a Step multiple times using a repeat value. The Steps will repeat using incremental Shifts which will save much programming time.

Acceleration will increase the rate the spindle achieves top RPM when the number is highest and when the number is lowest the spindle will be very slow in

achieving top RPM. The Programmable Range value must be input within the range of 10-1800. We suggest 100 to start with and for going to the highest RPM 200 and higher is suggested.

When imputing Parameters you can prevent possible crashes by not imputing a value that is out of the range listed. If the Parameter Field turns red it is a warning that a non valid value is being typed in. Do not save a Step that has a value highlighted in red.

The **Abort Button** is used to end the execution of a Recipe.

The **Reset Button** is used to clear errors on the Machine or Motors. It will not act as an Abort Button on a Recipe or Step.

You will need to press the **Abort Button** prior to being able to make edits to a Recipe or Step if you are on Pause or in the middle of a series of Steps.

If you don't press the **Abort Button** It will let you make edits but they will not take place until the Recipe or series of Steps has completed.

Don't forget to press Save after edits are completed. Try to get in the habit of pressing Save when moving from Step to Step just to make sure everything gets saved.

There are a total of 20 Recipes available. Each Recipe can contain 28 Steps each.

Special Winding Cycles

Standard Winding using the Go Back Function

We call it **Standard** because it would be used for winding a basic bobbin without the need for any special motions. When using the **Standard** Winding Cycle there is the **Go Back** function which you can utilize for fixing bad windings and for performing other tasks.

The **Go Back** Button will light up when you hit the **Pause** Button during a winding operation. If you are not **Paused** the function will not work.

On the **Main Page** within the **Options Box**, you can utilize the **Go Back** Function using the **HMI** or the **Foot Pedal** option. There is also an **Override** capability of up to 150%.

To go back in the **Foot Pedal** Mode press **Pause**, and then **Go Back** while in the **Jog-Pedal** selection. You will see the **Yellow Pedal Button** light up when it activates.

When using the **Go Back** function try to stay within a single Step or it could possibly create errors backing up into prior Steps. We have seen the turn count go negative when backing up beyond the Step we started in but it did seem to move forward okay back to where it was started from. It moved in the Slow Speed setting speed when moving forwards again.

Options Box

Go Back

Jog Press And Hold Will Rotate Spindle Back

One Rev Press Once To Rotate Spindle Back One Turn

Jog-Pedal Use for jogging with the Foot Pedal

N Revs input the number of turns to go back. (1-9999 turns)

The Go Back function will work with all the Winding Cycle Types.

Variable

When using the Variable Pitch Winding Cycle keep in mind that the controlling parameter is the width not the number of turns. So no matter how many turns are programmed, the cycle will end at the limit of the Width parameter.

The secret to connecting several variable steps together in a seamless manner is to have the shift plus the width of the first step become the shift of the next step.

You must also make sure the turn count is reached by the end of the width and have turns available for the slow down turns. If not, the spindle will overturn and create a circular line rather than having a seamless transition to the next step.

When programming the initial Step guess low on the turn count and go up from there until the turn count travels all the way to the programmed Step. If you have too many turns programmed for the width the turn count never gets to the point where the slow down turns will execute.

Also keep the RPM's low and gradually increase them keeping an eye on the slow down turns being able to bring the transition turns to a crawl so you do not overrun the width or turns programmed.

Angle

Angle Wind Settings

Spindle Turns (Output Value)

Peak Width 0-1 (Input Value)

Slope Right 0-1 (input Value)

Slope Left 0-1 (input Value)

Peak Center (Output value)

For creating a 45% pyramid type coil equal on both sides you would input the actual wire size Pitch and make the **Left Slope** and **Right Slope** values the **same** as the **Pitch**. That would make the outer left and right edges of the coil shrink by one Pitch value or wire diameter with each pass.

The Peak Width would be the width of the top of the coil as it grows before it comes to a point.

Unfortunately you will need to play with the Width and Slope values to fine tune the output turn count value. There is currently no way to input the turn count desired and have it just stop when that turn count is achieved.

The Peak Center is also an output value.

The key thing to remember when winding an Angle winding is that the **larger** your **Slope Right** or **Slope Left** value is relative to the **Pitch** value the more **shallow** the angle is. This will result in an angle **less** than 45 degrees.

Any Slope value **smaller** than the Pitch value of the wire will result in a **steeper** angle **more** than a 45 degree angle.

See the next page for examples of different types of angle windings.

Special Repeat Step Function Winding Cycle

This Special Winding Function is not on the Drop Down List of Winding Types.

Step Repeats: The number of times a step will repeat by shifting the same absolute or incremental distance between Step repeats.

The **Step Repeats** will work two ways. One way in **Absolute Shift Value** and the other in **Incremental Shift Value**.

By **Not** selecting the **Incremental Shift** option on the **Recipe Page** you can get a Step to repeat multiple times where it will be the same as if you kept pressing the Start Button after each Cycle. It will return to the same Shift location each time.

If you **Do** select the **Incremental Shift** option then you will see be able to use the function to wind multiple cycles equally spaced from each other such as when winding multiple segmented bobbins.

The Traverse will move to a new Shift location based on the last Shift location. This will save a lot of programming time adding up all the prior Shift values for each successive Step. The nice feature of this is the Shift being repeated will not start from where the winding process finishes up on the prior coil. It will move based on the prior Shift Value.

To make it work best you should have a Step 1 to get you into position for the subsequent Steps to be repeated X number of times in a Step 2. This allows you to use a different Shift to get to the starting position from the Shift that will be used for indexing between Steps.

Universal Winding

We so far have not programmed a dedicated special Universal coil winding cycle due to the high cost. We have found a shortcut to wind certain Universal coils though.

We are new at this but we managed to make it work using a workaround. By programming a Pitch value that is a multiple of the Width value the machine can make a Universal coil.

So the windings do not just keep on repeating in the same spot we have been using the Dwell function to slowly progress the windings. We have noticed that when the Pitch is larger than the Width the Dwell functions each time the wire reaches either side of the Width even if multiple Widths take place in a single revolution. This is good because the progression takes place on each side of the width rather than one in a full revolution.

So if you program a 1 degree Dwell and are using 3 crossovers per revolution you are actually getting 3 degrees of progression in a single revolution.

There are two types of Universal layering.

One is named Progressive. In a Progressive layering the sequence of the crossovers advance opposite to the winding direction. The Dwell function will not allow a Progressive winding to develop because it would need to work in reverse.

The other is named Retrogressive. In a Retrogressive winding the crossovers advance in the same direction as the coil rotation. When the Dwell executes it stops the Traverse motion for a small degree of the rotation. This creates a Retrogressive layering.

Also, if your calculated crossover count is not a whole number you will need to round up or down to the next crossover number so that the Programmed Pitch will equal the Width value. We do not know how this will work out for any Universal coils you need to wind. If you need better dedicated functionality it can be added with additional programming to suit your needs.

Step Settings Main and Recipe Pages

Shift 0-1000

Width -0-1000

Pitch .00001-6

Turns .100-9999999 **Revision 3.6 added two digits to the right of the decimal point.**

S.Slow 0-160

E.Slow 0-160

Accel 10-1800 (Higher the Number Quicker the Response)

By default Accel is 0 but we advise starting your programming with a setting of 100 so it will not be too slow in ramping up the speed. There is the possibility of causing a Machine Fault Error if you set this too high especially if it is in combination with using too high of an RPM in combination with a large wire AWG like explained in the next section.

High Speed .1-3000 RPM

Although the Highest Programmable speed 3000 RPM, that is subject to limitations. If the machine stalls and you see two errors come on the screen, it is because you were going too fast for the wire size. Generally speaking, the larger the Pitch of the wire the lower the upper limit is for the RPM.

If you see the error message "Stopped Due to Fault" in addition to the error message "Actuator Servo Drive Fault", your machine has stalled and the only way to get out of it is to reboot the Control. Pressing the reset Button will not help.

You will have to experiment with slower speeds until you get to the point where the machine will not fault out.

Low Speed .1-3000 RPM

Dwell .00-360.00

Start Pitch 0.00

End Pitch 0.00

Number of Steps 1-28 Number of Recipes 1-20

Override 10-150 HMI

Pedal

Spin Direction: Top Go (Top Going)

Top Come (Top Coming)

Wind Type: Standard

Angle

Variable

Traverse Start Direction: Right

Left

Clear Step button will clear all values for a Step. The Button needs to be held for several seconds before it will function. This prevents an accidental clearing of your values. In some cases certain values will not go to zero so this comes in handy to reset the Step to all zeros.

Auto Shift: The Auto Shift selection will make the Control shift move to the Shift position at the start of a Step when the Start Button is Pressed.

Auto Start: If the Auto Start is also selected the Control will proceed to start the Step after traveling to the Shift location.

Repeat Recipe: Normally if each Step in a series of Steps within a Recipe has both Auto Shift and Auto Start selected the Recipe will not Loop or go back to Step 1 unless the Repeat Recipe button is selected also.

Set Up Page

The Set Up Page allows you to manually jog the Spindle on the left side of the Screen or the Traverse on the right side of the Screen. Keep in mind this option is different from the coordinated motion of jogging both the Spindle and the Traverse while within a running Step or while in the Go Back Mode.

The Spindle can be rotated Top Going or Top Coming one revolution at a time. Below that choice you can type in up to 9999 turns of the Spindle. Press the Abort Button to stop execution of this function.

Jog Spindle: This allows you to Jog the Spindle.

Speed .1~20 RPS: This controls the Spindle speed while being Jogged.

Distance 0~9999 REV: This controls how many turns the Spindle will turn.

Revision 3.6: Reset to Zero Button starts from Zero at any position of the spindle.

The Traverse can be actuated to the right or left by pressing the + or – buttons. You can adjust the Jog Speed and the Shift Speed and the Accel/Decel rate.

Jog Traverse: This allows you to Jog the Traverse.

Jog Speed .1-3 In/Sec: This controls the Traverse Speed while being Jogged.

Shift Speed .1-3In/Sec: The Shift Speed setting controls the rate at which the traverse travels to home or travels to the Shift position.

Accel/Decel 5-100 In/Sec/Sec: The Accel/Decel setting controls the rate at which both the startup and slow down and regular running speeds accelerate and decelerate.

The Set to Limit and Set to Home options are used for Homing the machine upon start up and also can be used for setting a zero point for a winding operation independent of a Shift Value.

* Set To Limit and Set To Home on Set Up Page

Diagnostics Page

Unit System ^ Imperial

^ Metric

Traverse Drive Fault 0

Spindle Drive Fault 0

Forward Overtravel 0

Reversal Overtravel 0

Revision Number is listed currently 3.6

Factory Reset Procedure

On the Diagnosis Screen there is a Factory Reset screen that can be executed if you have a situation that will not resolve itself by rebooting the Control. This Reset will clear everything to factory settings but you will also lose all of your Recipes. If you Export your Recipes on a regular basis to the SD card in the machine you can Import them back into the Control after a Reset process to regain the Recipes. You will need to input a Code to perform the Reset. Type in our phone number without the area code and any dashes. 5085882900

On Revision 3.6 a Warning Message was added to make sure the operator fully understands the ramifications of doing a Factory Reset.

Factory Settings Screen

New with Revision 3.6 there is a newly added Factory Settings Screen where the machine type can be selected from a Drop Down List.

You can choose either the **Super Star** or the **Super HDH** Model.

From that list you can add a **Spindle Axis Scaling Value** into the Spindle Axis Value Field.

The Super HDH currently has a Spindle gear ratio of 8.585-1 and the Servo Motor uses 65,536 Pulses per revolution. If you multiply $65,536 \times 8.585$ you get 562,626.56 Pulses per revolution of the spindle.

We are working on going to a gear ratio of 9 which would allow for an even number of pulses. Right now the .56 pulse error would accumulate with large wind counts and create errors in turn counts. It is not an issue for average turn counts.

The Super Star has a 1-1 Spindle gear ratio so it uses the standard 65,536 Pulses for the Spindle Axis Scaling Value.

There is also a **Traverse Scaling Value** of 202504. This is the same standard value for both the Super Star and the Super HDH. The setting is relative to the Ball Screw Shaft Pitch and how many Servo Motor Pulses it takes to travel an inch.

Unless the gearing is modified the settings must be left as they are. They are also password protected the same way as the Factory Reset Procedure works.

Import / Export Page

Keep in mind that the Controller Box stores all recipes in flash memory. When you make edits or create new recipes they are created and kept in that flash memory.

So the Controller does not need the SD Card installed to function. The only purpose for the SD Card is for exporting to it or importing from it for backup purposes or for transferring recipes to other Controllers.

To get to the Import /Export Page you need to press on the Diagnostics button.

On each side of the Page you have the option to Import or Export Recipes.

You will see Import/Export choices of Single Recipes on the left side of the screen and Import/Export choices of All Recipes on the right side of the screen.

When you import all Recipes from another Super Star controller, then all existing recipes will be overwritten with whatever is on the exporting machine SD Card.

If you select just a single Recipe to import then only that particular Recipe number will be overwritten. For example if you want to import Recipe 3 from another controller only Recipe 3 will be overwritten on the receiving controller.

Don't assume all your edits will automatically be on the SD Card if you decide to transfer the contents to another Controller. You will need to update the SD Card by exporting to it first.

You can also remove the SD Card and copy it to your PC or an extra SD Card directly for an external backup choice.

Instructions for Foot Pedal Use

When a program is running you can switch back and forth by pressing the "**HMI**" to "**PEDAL**" button. This will allow you to take control of the spindle speed using the Foot Pedal.

Note: You cannot start the beginning of a Step by just pressing down on the Foot Pedal.

First change from "**HMI**" to "**PEDAL**" Mode. If you have not selected **Auto Shift** and **Auto Start** then you must press the "**Start**" button a second or third time after the initial press of the "**Start**" button. Don't be alarmed when running a program from the beginning using the Foot Pedal when you observe a slight motion of the spindle and traverse. The Spindle will turn about a 10th of a turn and the Traverse will move in sync with the Spindle. The Foot Pedal will now function for the remainder of the Step.

VPN Router

There is a VPN Router installed in the Control Box. If there is ever a need to update your programming to the latest version or to correct a known problem all you would need to do is connect the box to a an internet connection using a Cat 5 Cable. Our Programmer would log into the box remotely and update the programming.