

# ***HR-6000-3S***

## **Technical User Manual**

Version 1.0

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# SECTION 1 - SAFETY INSTRUCTIONS

## SUMMARY

All persons operating this machine must have read and understood all of the following sections of this Manual:

- Section 1: SAFETY INSTRUCTIONS
- Section 3: OPERATING INSTRUCTIONS

However, as a memory aid, the following is a summary of the Safety Section.

### Put Safety First

**Mandatory Information** – What operators and maintenance people must have read and understood.

**Signatures** – Everyone involved with this machine must sign to confirm they have read and understood mandatory information.

**Basic Rules** – only use this machine when

- It is in good working order.
- All safety equipment is in place and functional.
- Operations are in compliance with this manual.
- Materials are within designed specifications and are non-hazardous.

**Owner is responsible for:**

- Keeping Manual accessible at the machine.
- Ensuring only reliable, fully trained personnel work with the machine.
- Clearly defining responsibilities of all personnel working with the machine.
- Keeping the machine in good working order.

**Operator and Maintenance Personnel are responsible for:**

- Keeping all safety equipment in order, checking its function at the beginning of each shift, and reporting any shortcomings.
- Shutting down machine and reporting any faults or malfunctions that could impair safety.
- Understanding and obeying safety hazard labels.
- Replacing any damaged or missing safety hazard labels.
- Not wearing un-restrained long hair, loose clothing or jewellery.
- Wearing all required personal protective equipment.
- Not wearing gloves within 24 inches of moving blade.
- Maintaining a clean working area and machine.
- Always using Lock-out when performing maintenance or repairs.

# 1.1 Foreword

## Put Safety First!

This Safety Section contains important information to help you work safely with your machine and describes the dangers inherent in our machines. Some of these dangers are obvious, while others are less evident.

It really is important to PUT SAFETY FIRST. Make it a habit to consider the hazards associated with any action BEFORE you do it. If you feel any uncertainty, stop and find a safer approach to the action. If you're still uncertain, ask for advice from your supervisor.

The SAFETY FIRST approach is particularly necessary when you do something new, or different, and most people instinctively recognize this, although impatience may still cause them to take unnecessary risks.

Danger also lurks in the routine task that we have done over and over. Here, familiarity, boredom, or tiredness may lull us into unthinking, automatic repetition. Be alert for this, and when you feel it happening, stop and take stock of your situation. Review the safety hazards associated with what you are doing. That should get your brain working again.

Certainly production is important, but if you think you're too busy to put safety first, think how much production you'll lose if you get hurt.

You owe it to yourself, your family, and your co-workers to PUT SAFETY FIRST.

## Mandatory Information

All persons operating this machine must have read and understood all of the following sections of this Manual:

- Section 1 SAFETY INSTRUCTIONS
- Section 3 OPERATING INSTRUCTIONS

Personnel involved in installation and maintenance of the machine must have read and understood all sections of the manual

Persons who have difficulty reading, or for whom English is not their first language, must receive particularly thorough instruction.

## Signatures

Everyone involved in operation of this machine must sign below to confirm that:

I have read and understood all parts of Section 1 – Safety Instructions, and Section 3 – Operating Instructions.

| Name | Date | Signature |
|------|------|-----------|
|      |      |           |
|      |      |           |
|      |      |           |
|      |      |           |
|      |      |           |

Everyone involved in the installation, inspection, maintenance, and repair of this machine must sign below to confirm that:

I have read and understood all parts of this Operation and Maintenance Manual.

[illegible]

## 1.2 Basic Rules

### Intended Use

Our machines are designed and built in line with the state of the art methodology.

However, all machines may endanger the safety of their users and/or third parties, and be damaged, or damage other property, if they are operated incorrectly used, beyond their specified capacity, or for purposes other than those specified in this Manual.

### Exclusion of Misuse

Misuse includes, for example:

- Sawing hazardous materials.
- Sawing work pieces which exceed the minimum or maximum workload or capacity.
- Operating the machine without all original safety equipment and guards.

### Operability

The machine may only be operated:

- When it is in good working order, and
- When the operator has read and understood the Safety and Operating Instructions Sections of the Manual, and
- When all operations and procedures are in compliance with this Manual.

Due to the nature of the industry QED Multisaw cannot accept any liability for personal injury or property damage due to operation of this machinery.

## **1.3 Responsibilities of the owner**

### **Organization of work**

This Operation and Maintenance Manual must always be kept near the machine so that it is accessible to all concerned.

The general, statutory and other legal regulations on accident prevention and environmental protection must also be observed, in addition to the Manual material. The operators and maintenance personnel must be instructed accordingly. This obligation also includes the handling of dangerous substances and the provision and use of personal protective equipment.

### **Choice and qualification of personnel**

Ensure that work on the machine is only carried out by reliable persons who have been appropriately trained for such work.

### **Training**

Everyone working on or with the machine must be duly trained with regard to the correct use of the machine, the correct use of safety equipment, the foreseeable dangers that may arise during operation of the machine, and the safety precautions to be taken.

In addition, the personnel must be instructed to check all safety devices at regular intervals.

### **Define responsibilities**

Clearly define exactly who is responsible for operating, setting-up, servicing and repairing the machine. Define the responsibilities of the machine operator and authorize him to refuse any instructions by third parties if they run contrary to the machine's safety.

Persons being trained on the machine may only work on or with the machine under the constant supervision of an experienced operator. Observe the minimum age limits required by law.

### **Condition of Machine and Workplace**

Ensure that the machine and its safety equipment are kept in good working order.

Ensure that the work area is well lit, and protected from the elements, such as rain, snow, abrasive dust, and extremes of temperature.

Ensure that the machine is installed with sufficient clearance around it for the safe loading and unloading of work pieces.



# 1.4 Responsibilities of the Operator and Maintenance Personnel

## Safety equipment

All machines are delivered with safety equipment that must not be removed or bypassed during operation.

The correct functioning of safety equipment on the machine must be checked:

- At the start of every shift.
- After maintenance and repair work
- When starting for the first time, and after prolonged shutdowns

## Emergency Stop Button (E-Stops)

Always be aware of the location of the Emergency Stop Button(s). Do not allow material or objects to block your access to an Emergency Stop.

## Damage

If any changes capable of impairing safety are observed in the machine or its operation, such as damage, malfunctions, or irregularities, then appropriate steps must be taken immediately, the machine switched off, locked-out, and the fault reported to the responsible person.

## Safe operation

The machine may only be operated when in good working order and when all protective equipment and guards are in place and operational.

Keep a safe distance from all moving parts – especially the blades, feeds, chains, belts and pulleys. Long and heavy stock should always be properly supported in front of and behind the saw.

## Faults

The machine must be switched off and locked-out before starting to remedy any faults.

## Safety hazard labels

Safety hazard labels and other instructional labels on the machine must be observed. They must be clearly visible and legible at all times. If they become damaged they must be replaced.

## Clothing, jewellery, protective equipment

Personnel operating or working on the machine must not wear un-restrained long hair, loose-fitting clothes and dangling jewellery.

When operating or working on the machine, always wear suitable, officially tested personal protective equipment such as safety glasses and safety boots and any other equipment required by plant regulations.

### Gloves

Experience has shown that careless use of gloves around machinery is a major factor in serious hand injuries.

Gloves should not be worn when operating or adjusting the machine, except:

- Wear protective gloves when handling bandsaw blades at blade changes.
- Gloves may be worn when handling work pieces.

### **Hearing protection**

Ear protection must be worn whenever necessary.

- The level and duration of noise emission requiring hearing protection depends upon the national regulations in the country in which the machine is being used.
- The actual level of noise emission by band sawing machines depends upon work piece size, shape and material, blade type, blade speed and feed rate.
- The only practical course of action is to measure the actual noise emission levels for the type of work that is typically done. With reference to national standards, decide upon the necessary hearing protection required.
- In the absence of such measurements, it is advisable for anyone exposed to long periods of moderate to loud noise to wear hearing protection. It is important to understand that hearing loss is gradual and easily goes un-noticed until it is serious and irreversible.

### **Workplace**

A clear working area without any obstructions is essential for safe operation of the machine. The floor must be level and clean, without any build-up of chips, off-cuts, coolant, lubricant or hydraulic oil.

The workplace must be well lit, and protected from the elements, such as rain, snow, abrasive dust, and extremes of temperature

Nothing may ever be placed on, or leaned against the machine, with the obvious exception of the work piece on the table and conveyor of the machine.

### **Master Disconnect**

Lock-out the machine before undertaking any maintenance or repair work on it. 'Lock-out' refers switching off the master electrical disconnect switch, and locking it out so that it cannot be switched on again without authorization.

On Multisaw machines the Master Disconnect Switch will be of one of three types:

- Rotary switch mounted in electrical control cabinet door and inter-locked with door.
- Lever switch mounted in separate box mounted on the machine.
- Supply disconnect switch supplied by user at installation and usually wall-mounted within sight of the machine, depending upon local regulations.

In almost all jurisdictions, it is required that owners of industrial equipment establish and post lock-out procedures. Know and use the lock-out procedures of your company or organization.

### **Residual Risks**

- The machine is still not completely de-energized if an electrical cabinet door type switch is locked-out.
- The line side of the disconnect switch itself remains energized.
- Variable speed blade drives store dangerous voltage in their capacitors, and this requires time to dissipate. After locking out power, wait 3 minutes before beginning to work on machine electrical circuits.
- If compressed air is supplied to the machine to power a mist lubrication system or other devices, it should be disconnected, and any stored air pressure released before working on the machine.
- The weight of individual machine components represents stored potential energy that can be released if they fall when disconnected. Secure these components with adequate hoisting gear before dis-assembly.

## 1.5 Hazard Labels

As organisation's safety requirements differ, Multisaw leaves the application of safety labels up to the organisation's discretion.

Below is a guideline to suggested safety labels.

The safety hazard labels attached to your machine represent important safety information to help you avoid personal injury or death.

All supervisors, operators, and maintenance personnel must locate and understand the safety information associated with each hazard label prior to operating or servicing the machine.

Many of the safety hazard labels shown below are located at various positions on the machine to indicate possible safety hazards. It is important to replace any safety hazard label that becomes damaged or illegible.

### HAZARDOUS VOLTAGE INSIDE



- Contact with high voltage may cause death or serious injury.
- Never perform maintenance on, or near, electrical components until the machine's electrical power source has been disconnected.
- Lock-out power in accordance with your company's lock-out procedures before any such maintenance.
- The "Stop" or "Emergency Stop" push button does not disconnect the machine's power supply. Hazardous voltage is still present in the machines electrical circuits.
- The machine's Electrical Disconnect Switch does disconnect voltage from the machine's circuits; however hazardous voltage is still present inside the main electrical cabinet, on the infeed (line) side of the main fuses. Therefore keep hands and tools away from the infeed side of the control panel main fuses. If these fuses need to be replaced, use a fuse puller.

- Allow three minutes after locking-out power before opening any electrical enclosures. Your machine may be equipped with a variable frequency drive that stores high voltage within its capacitors. Three minutes will allow sufficient time for this voltage to safely discharge.
- Never spray coolant directly at electrical components or cabinets.

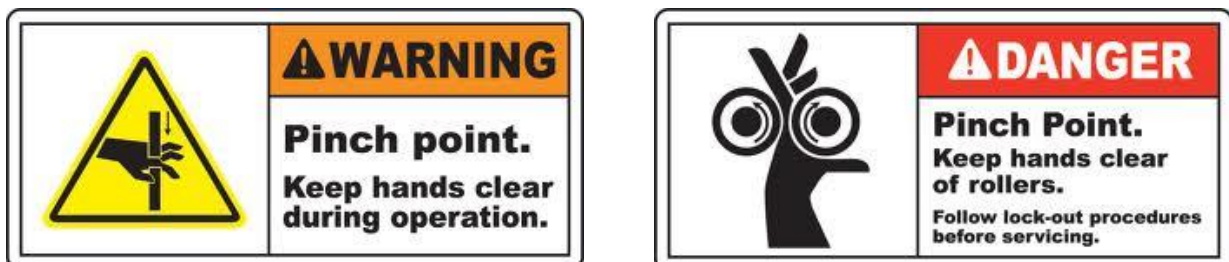
## MOVING PARTS CAN CRUSH AND CUT



## TAKE NOTE:

- Keep hands clear of moving chains, sprockets, feeds, belts, pulleys and blades.
- Lock-out power in accordance with your company's lock-out procedures before attempting to clear a jam in the machine.
- Be aware that feeds and other moving parts may start unexpectedly, either because the machine is operating automatically, or because another person initiates the motion.
- If the machine is stalled because of a jam, it may start without warning when the jam is cleared, unless the machine power is locked out.

## PINCH POINT





- Machine parts may move without warning, either because the machine is operating automatically, or because another person initiates the motion.
- Keep hands clear of all pinch points, whenever the machine is running.

### MOVING BANDSAW OR CIRCULAR SAW BLADE WILL CUT



- Do NOT operate machine with guards removed.
- Do NOT place hands or fingers near moving bandsaw or circular saw blade.
- For blade changing, always follow the proper Blade Changing Procedure.

### FLYING DEBRIS AND LOUD NOISE



- Debris such as a piece of wood or wood chips may fly off the machine. Such debris may damage eyes. Wear safety goggles when operating machinery.
- It is important to understand that hearing loss is gradual and easily goes un-noticed until it is serious and irreversible.
- Wear ear protection to prevent hearing loss or damage while operating machinery.

# SECTION 2 - INSTALLATION

## 2.1 Upon delivery

Upon delivery of your new Pinnacle Linear Saw, it is imperative that a thorough inspection be undertaken to check for any damage that could have been sustained during shipping. Special attention should be paid to the Electrical and Pneumatic systems to check for damaged cords, hoses and fluid leaks. In the event of damage caused during shipping, contact your carrier to file a damage claim.

## 2.2 Safety precautions

The machine has been designed to give years of reliable service. It is essential that operators be alerted to the safe operation of this saw and the practices to avoid that could lead to injury. Be sure to read Section 1 - Safety Instructions. The following safety rules are at the minimum necessary for the safe installation of the Machine. Take every precaution for the protection of operators and maintenance personnel.

- Power hook-ups and repairs should only be attempted by qualified tradesmen.
- The saw should be located in an area with sufficient room to safely load stock into the saw. Secure the saw to the floor.
- The area around the saw should be maintained in a clean and tidy condition to avoid obstacles operators could trip over.
- The machine should only be operated according to its specifications. Avoid unsafe usage practices.
- If at any time the machine does not appear to be operating properly it should be stopped immediately and repaired.

### THE OPERATOR MUST:

- Never operate the machine unless all guards and doors are in place and closed.
- Keep a safe distance from all moving parts - especially chains, sprockets, feeds, belts, pulleys and blades.
- Never wear loose clothing and gloves while operating the Machine.
- Cover long hair.
- Properly support long and heavy stock in front of and behind the saw.
- Never attempt to dislodge or move stock/material while the blade is moving. Take the time to stop the saw blade, remove obstructions, and start the blade.
- Wear eye and ear protection.
- Maintain proper adjustment of blade tension, blade guides, and bearings.
- Not remove jammed cut off pieces until blade has stopped.
- Not make modifications to the machine without prior approval from QED Multisaw. Any approved modifications should only be undertaken by trained, qualified personnel.

## 2.3 Foundation, Levelling and Anchoring

The machine location should be carefully selected. A flat concrete floor area or foundation should be chosen. It should have enough free space surrounding the machine to enable free access for safe operation and maintenance.

Machine should be levelled in both directions i.e. along and across especially when machine is to be inserted into a larger conveyor system.

Machine must be properly aligned with other machinery or material handling systems prior to fastening.

Machine must be fastened securely to the floor or machine foundation. Failure to do so will be in contradiction to these instructions and can result in excessive vibration.

Excessive vibration can result in the loosening of fasteners which could cause severe injury.

Excessive vibration can result in miss alignment of the machine or surrounding machinery.

## 2.4 Wiring connections:

After the machine is levelled and anchored the necessary power hook-up needs to be performed. In order to provide safe operation as well as to prevent potential damage to the machine, only qualified personnel should make the connections.

BEFORE START-UP THE FOLLOWING TWO POINTS SHOULD BE CHECKED:

- 1 Signs of damage that may have occurred during shipping to the electrical cables and hydraulic/pneumatic hoses.
- 2 The hydraulic oil level is between the upper and lower lines on the level gauge.

As supplied, the machine is set to run on three phase voltage as indicated on the serial plate and voltage label.

Power connection to the machine is made to L1, L2, L3 and Ground terminals in the main electrical box. For machines equipped with a variable frequency drive unit, an earth ground is also recommended.

During the initial hook-up it is very important to check that the phase order is correct. This is achieved by connecting the power input and checking saw and feed direction.

### EARTH GROUNDING PROCEDURE

- 1 Customer to provide a sufficient ground connection for the machine.
- 2 It is desirable that the overall resistance to ground measured at the ground rod does not exceed 3 ohms. Customer is advised to consult local power company for further information on grounding.

An additional point to check is ensuring continuity of ground within control enclosure. Start with main power entrance ground terminal where internal ground conductors should originate and connect to, DIN terminal strip, control transformer and the lid of control enclosure.

Properly functioning ground system will;

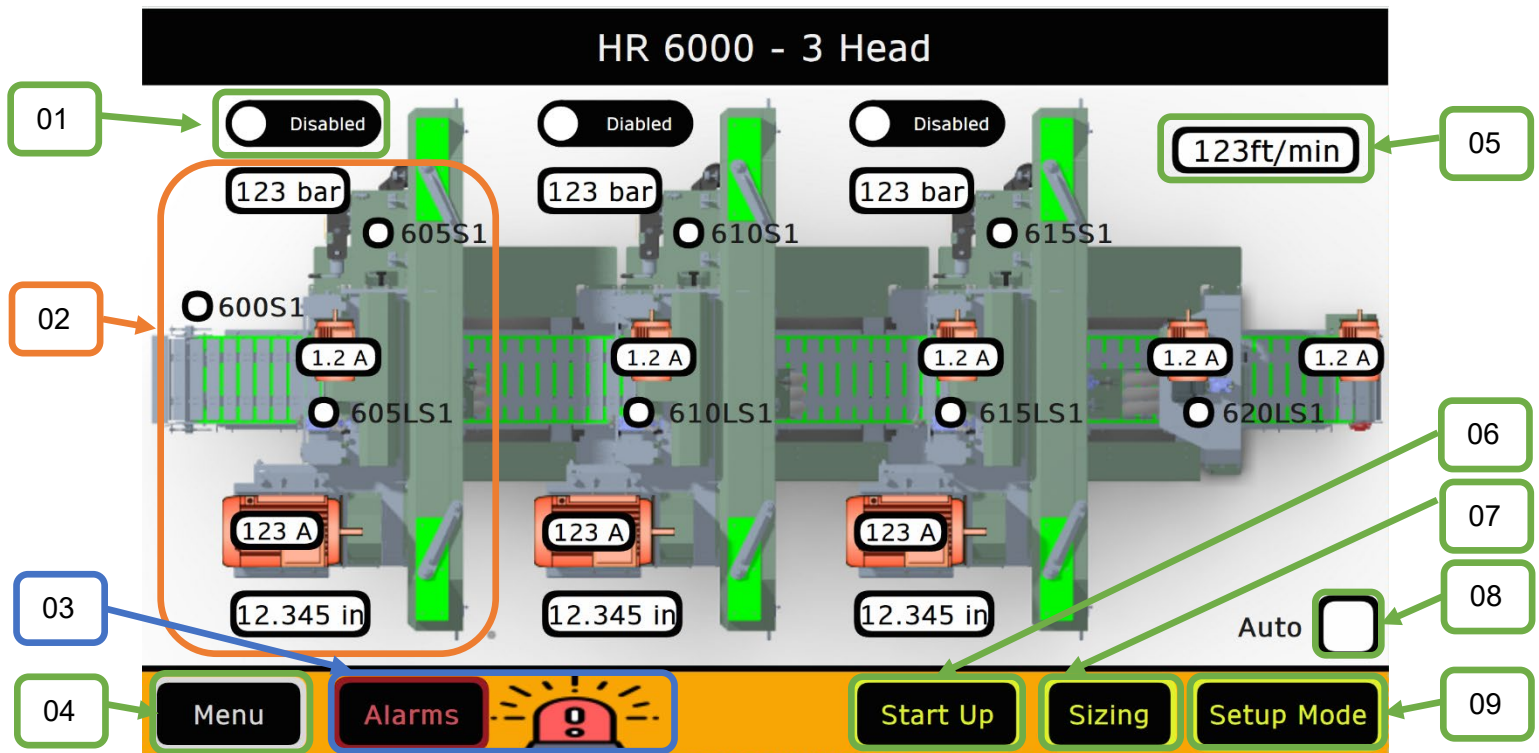
- Provide safety for personnel.



- Ensure correct operation of electrical/electronic devices.
- Prevent damage to electrical/electronic apparatus.
- Help dissipate lightning strokes.
- Divert stray radio frequency (RF) energy from electronic/control equipment.

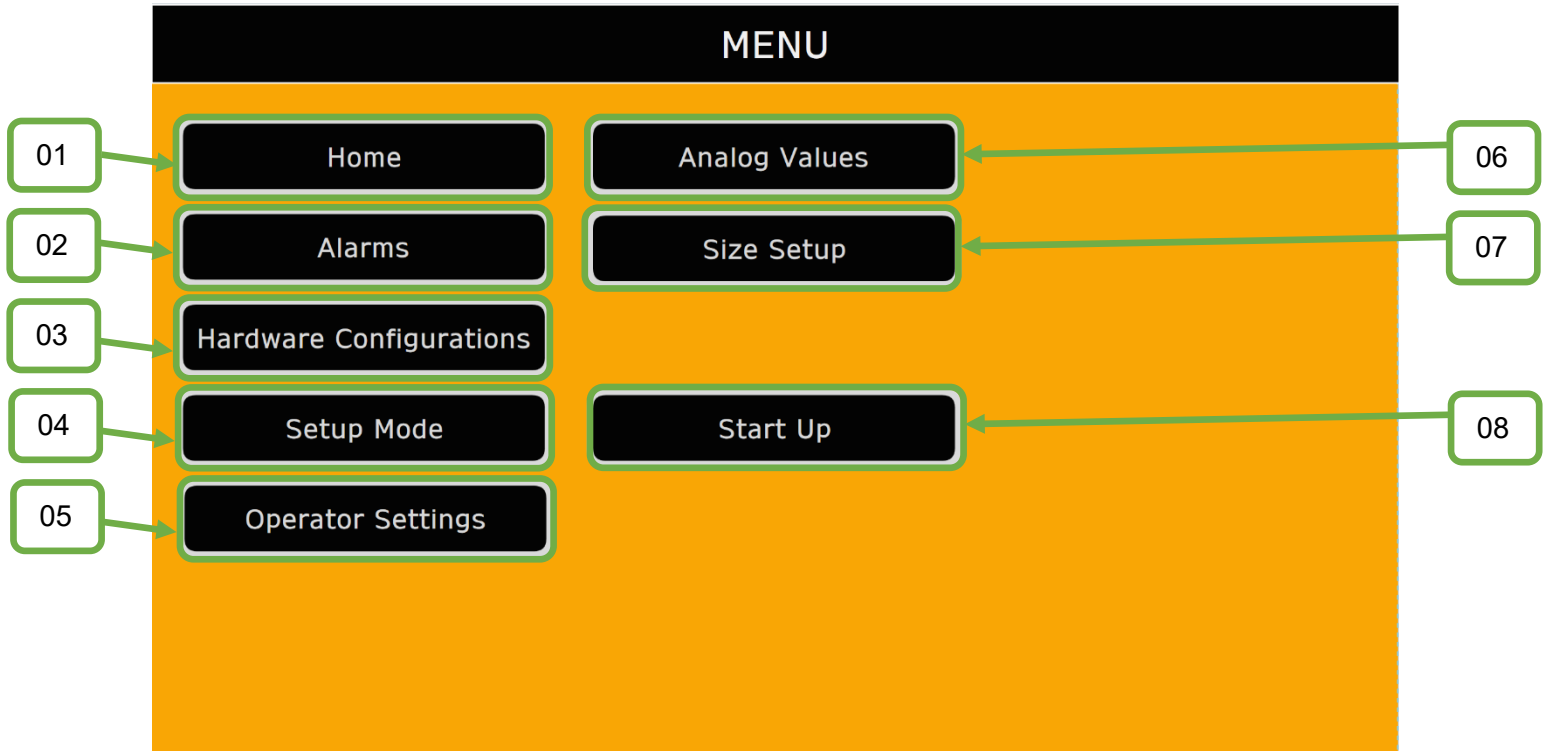
# SECTION 3 – SCREEN EXPLANATION

## 3.1 HMI INFO – MAIN SCREEN



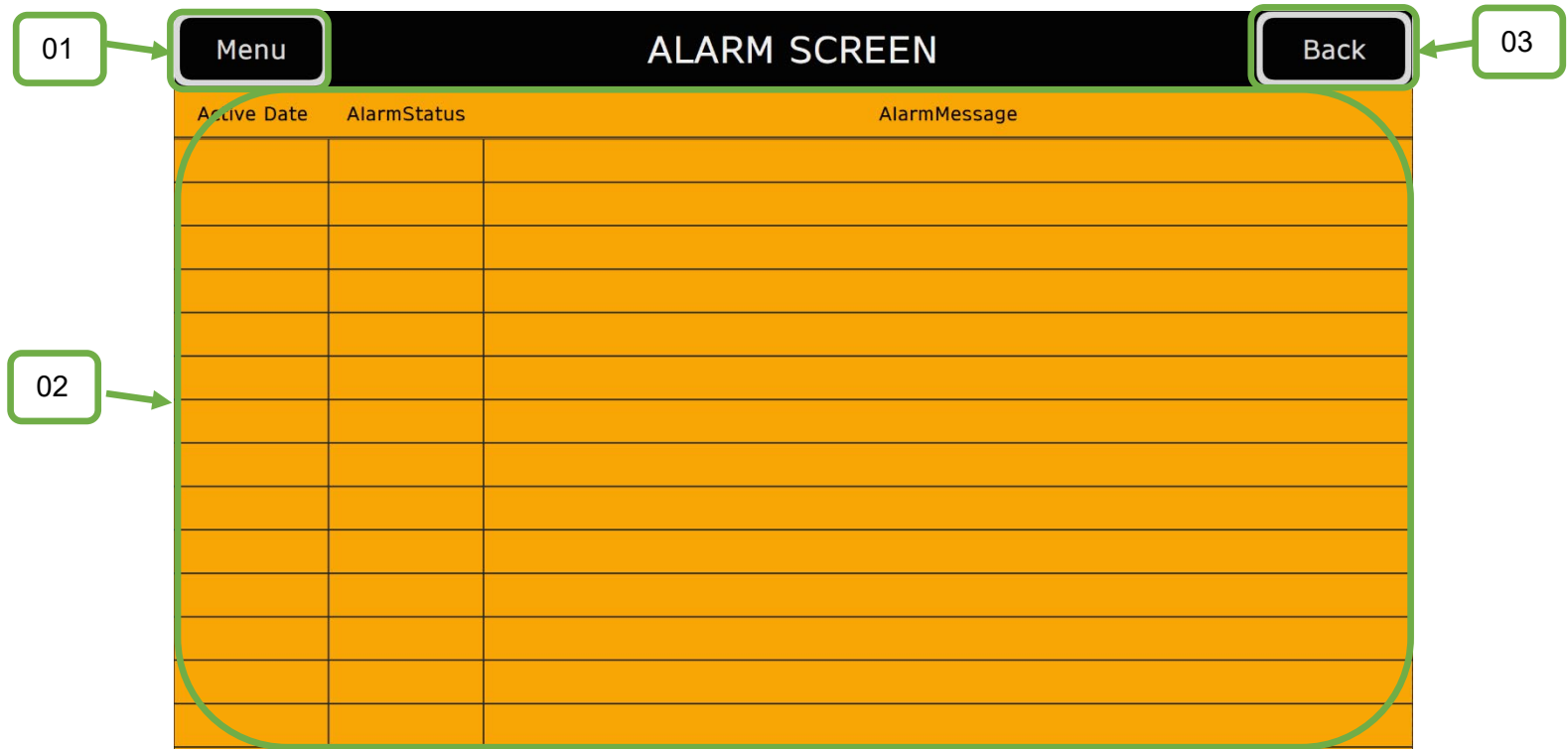
1. Press to access Enable or Disable each of the Heads – This will exclude the head from the sizing calculation.
2. Displays the current status of various Parameters of the HEAD, Motor current, sensor status and the selected size in inches.
3. Press to access Alarms – The indicator to the right will display when an alarm is active
4. Press to access the MENU
5. Displays the current feed speed in feet per minute
6. Press to access the START UP page
7. Press to access SIZING setup
8. Displays when auto mode is enabled – Must be enabled to start up the HR6000
9. Press to access the SETUP MODE – Used to manually activate all motors, gearboxes, pneumatics and hydraulics

## 3.2 HMI Menu



1. Press to return to the HOME screen – MAIN SCREEN
2. Press to access the ALARMS – Displays the current alarm status
3. Press to access the HARDWARE CONFIGURATIONS – The HMI hardware settings not HR6000 hardware
4. Press to access the SETUP MODE – Used to manually activate all motors, gearboxes, pneumatics and hydraulics. All parameters and setpoints are controlled under the setup menu.
5. Press to access the OPERATOR SETTINGS – The control setpoints for the blade tension and motor current
6. Press to access the Analog Values – Displays the Current and Tension of the Heads, used during setup and installation.
7. Press to access the SIZE SETUP page
8. Press to access the START UP page – Displays the start-up parameters, the buttons to tension the blades and buttons to enable or disable the heads

### 3.3 HMI ALARM SCREEN

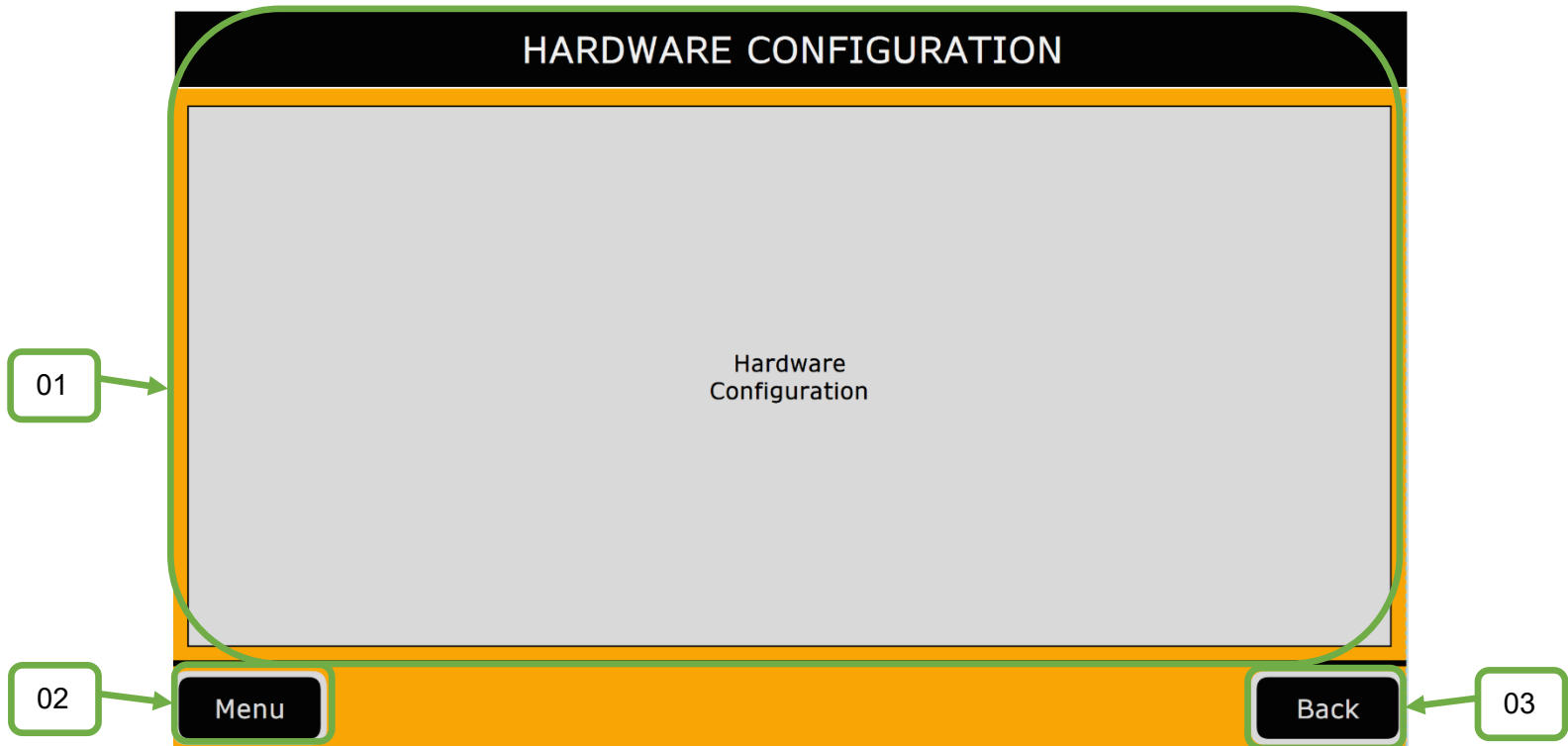


The image shows a mockup of an HMI Alarm Screen. At the top, there is a black header bar with the text "ALARM SCREEN" in white. On the left side of the header bar is a button labeled "Menu" (callout 01), and on the right side is a button labeled "Back" (callout 03). Below the header bar is a large orange rectangular area with rounded corners, representing a table. The table has three columns: "Active Date", "AlarmStatus", and "AlarmMessage". The table contains 15 empty rows. A callout 02 points to the left side of the table area.

| Active Date | AlarmStatus | AlarmMessage |
|-------------|-------------|--------------|
|             |             |              |
|             |             |              |
|             |             |              |
|             |             |              |
|             |             |              |
|             |             |              |
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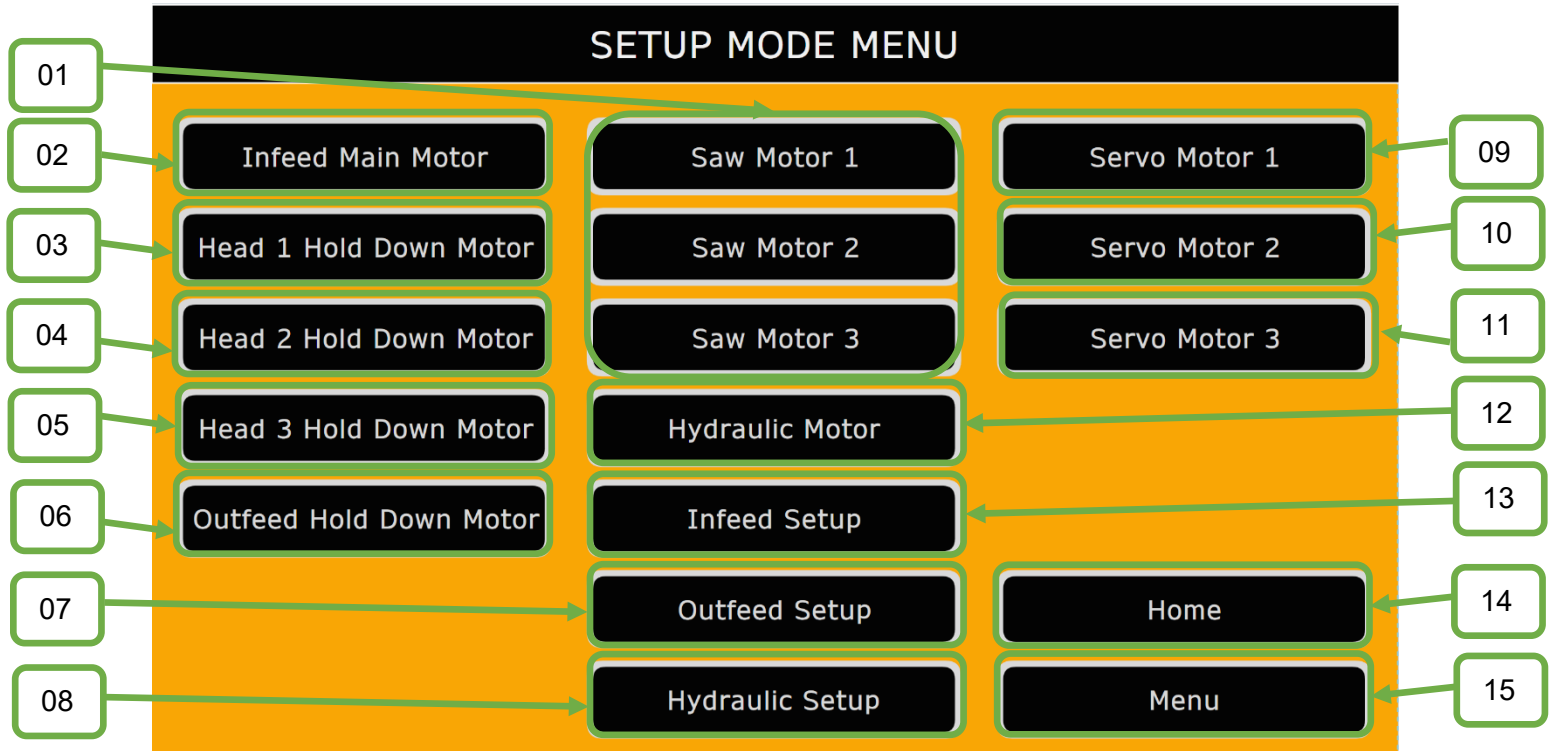
1. Press to return to the MENU
2. Displays the current ALARM status of the HR 6000
3. Press to return to the PREVIOUS page

### 3.4 HMI HARDWARE CONFIGURATION



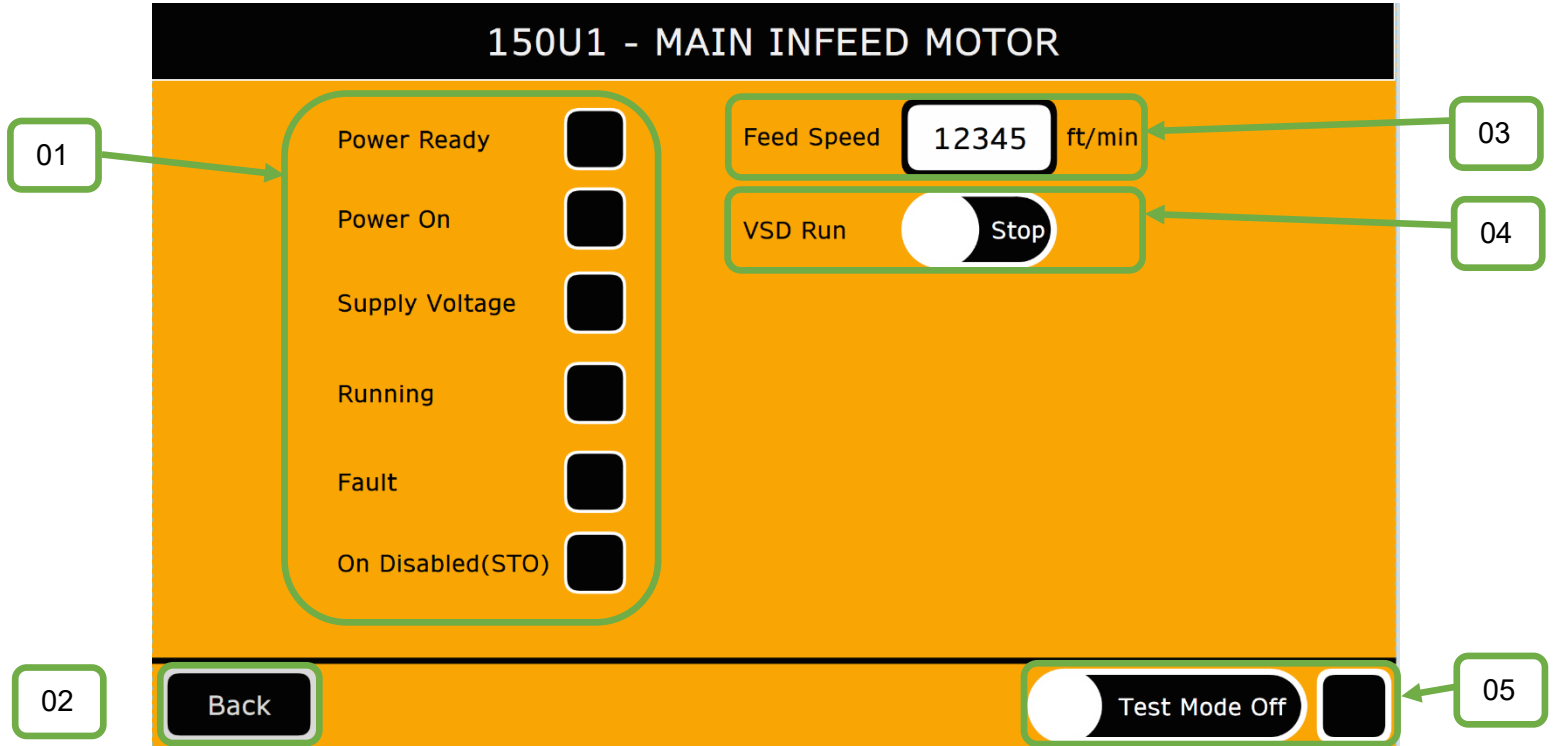
1. Displays the HARDWARE CONFIGURATIONS of the HMI
2. Press to return to the MENU
3. Press to return to the PREVIOUS page

### 3.5 HMI SETUP MODE MENU



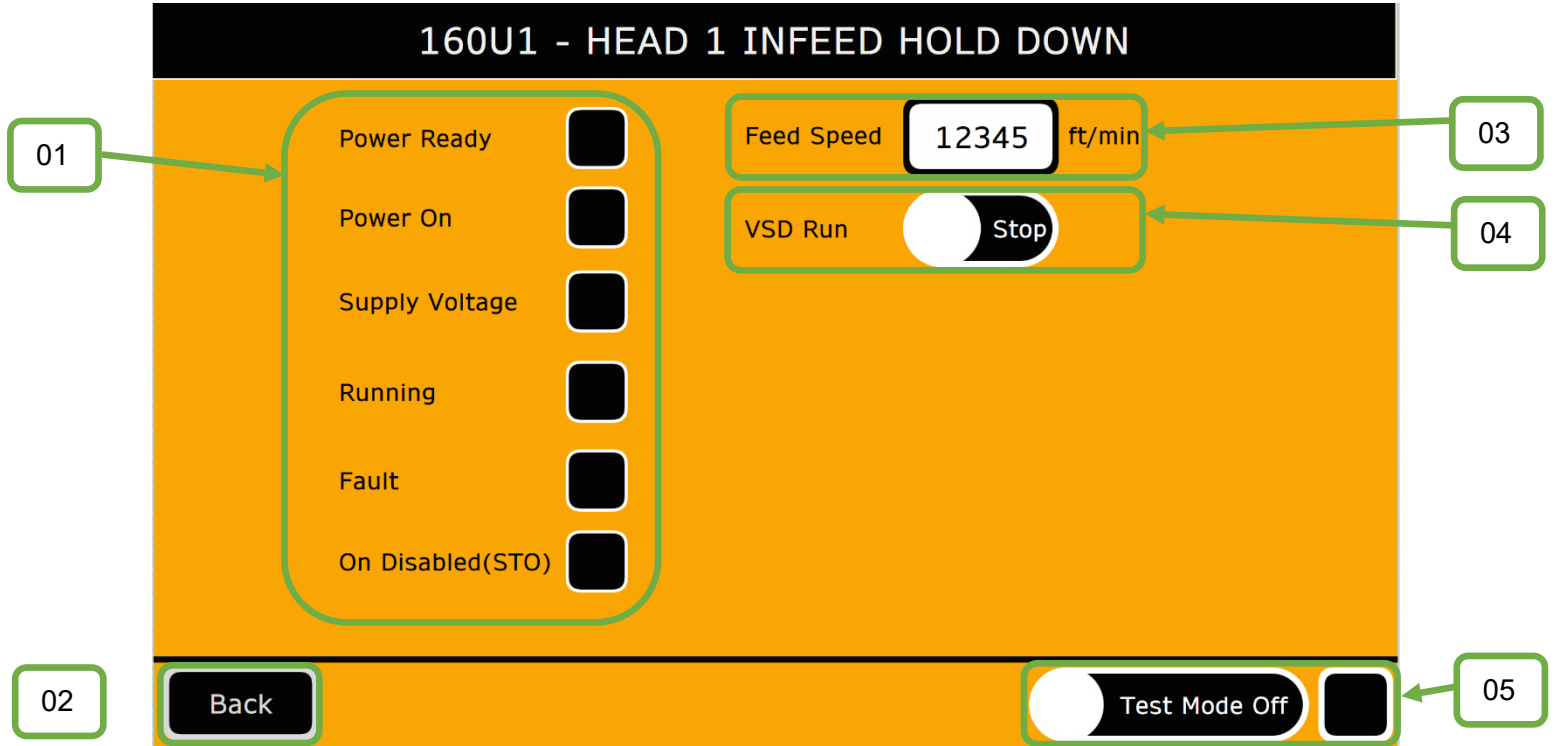
1. Press to access SAW MOTOR 1, 2 and 3 setup and manual controls.
2. Press to access the INFEED MAIN MOTOR
3. Press to access the HOLD DOWN MOTOR for head 1
4. Press to access the HOLD DOWN MOTOR for head 2
5. Press to access the HOLD DOWN MOTOR for head 3
6. Press to access the OUTFEED HOLD DOWN MOTOR
7. Press to access the OUTFEED SETUP – Manual controls and inputs
8. Press to access the HYDRAULIC SETUP – Manual controls for the solenoids
9. Press to access SERVO MOTOR 1
10. Press to access SERVO MOTOR 2
11. Press to access SERVO MOTOR 3
12. Press to access the HYDRAULIC MOTOR
13. Press to access the INFEED SETUP – Manual controls and inputs
14. Press to return to the HOME screen
15. Press to return to the MENU screen

### 3.6 HMI 150U1 – Main Infeed Motor



4. Displays the current statuses of the VSD for the motor
5. Press to return to the SETUP MODE MENU
6. The set point speed of the VSD
7. Press to run the VSD when test mode is enables
8. Press to enable or disable test mode

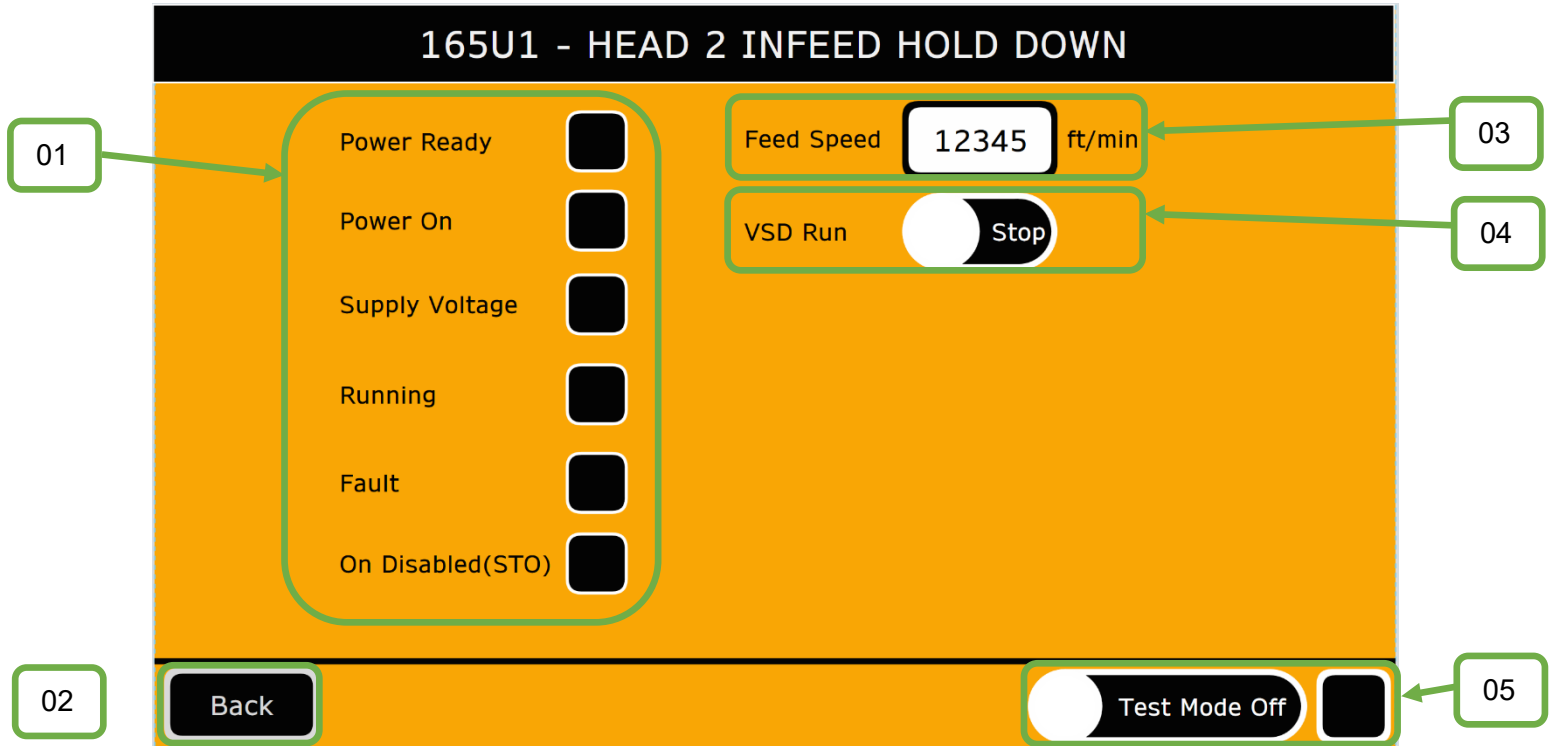
### 3.7 HMI 160U1 – Head 1 Infeed Hold Down



1. Displays the current statuses of the VSD for the motor
2. Press to return to the SETUP MODE MENU
3. The set point speed of the VSD
4. Press to run the VSD when test mode is enables
5. Press to enable or disable test mode

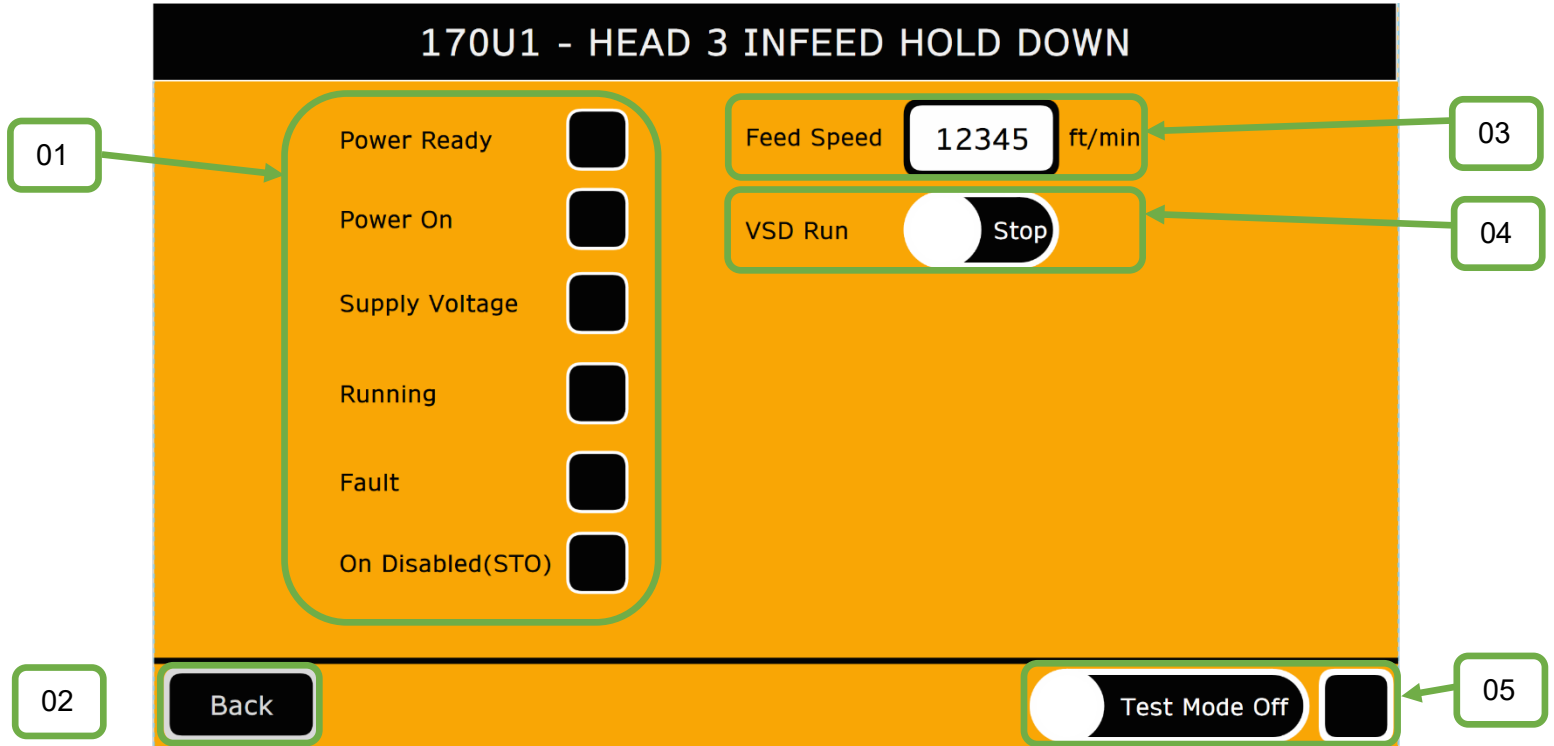


### 3.8 HMI 165U1 – Head 2 Infeed Hold Down



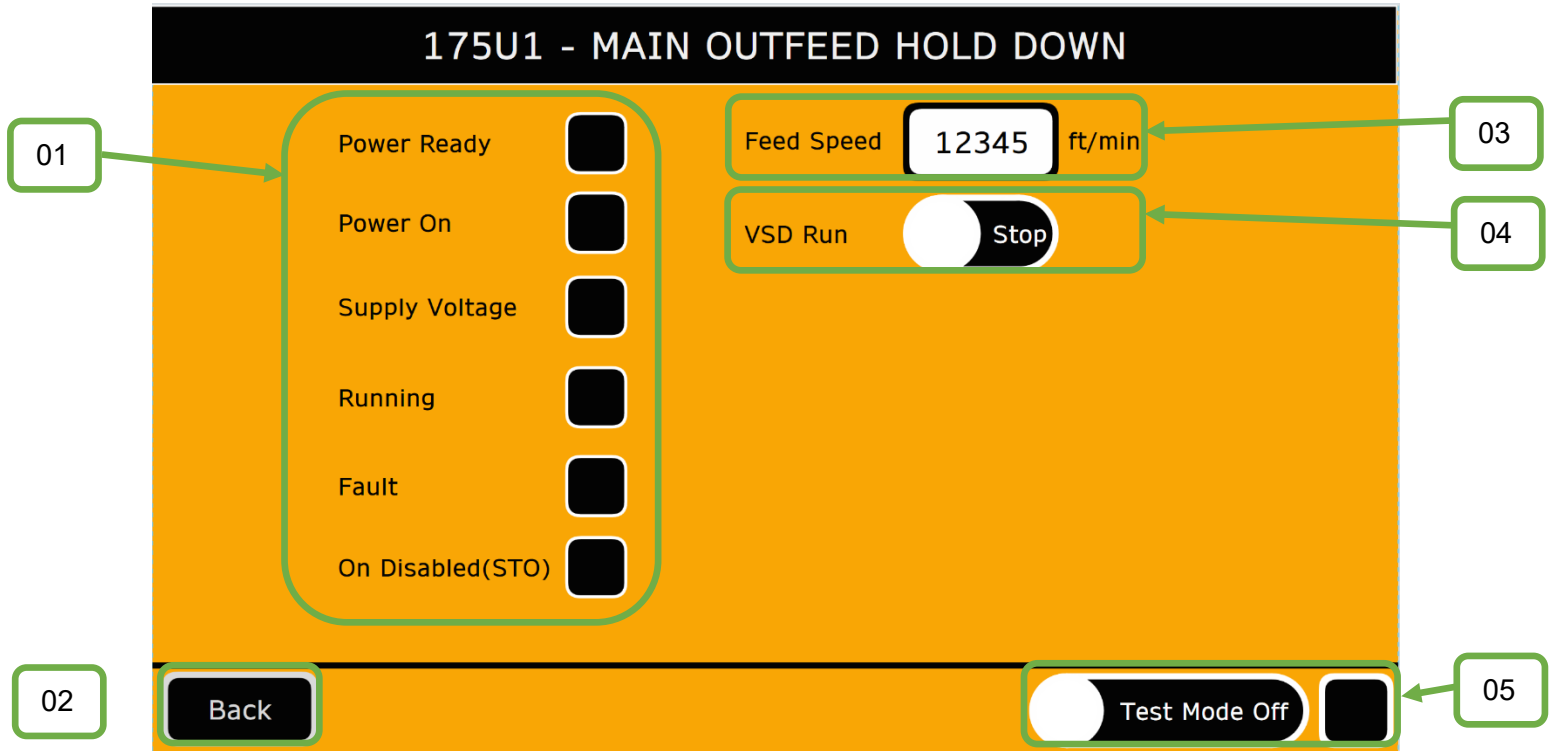
1. Displays the current statuses of the VSD for the motor
2. Press to return to the SETUP MODE MENU
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5. Press to enable or disable test mode

### 3.9 HMI 170U1 – Head 3 Infeed Hold Down



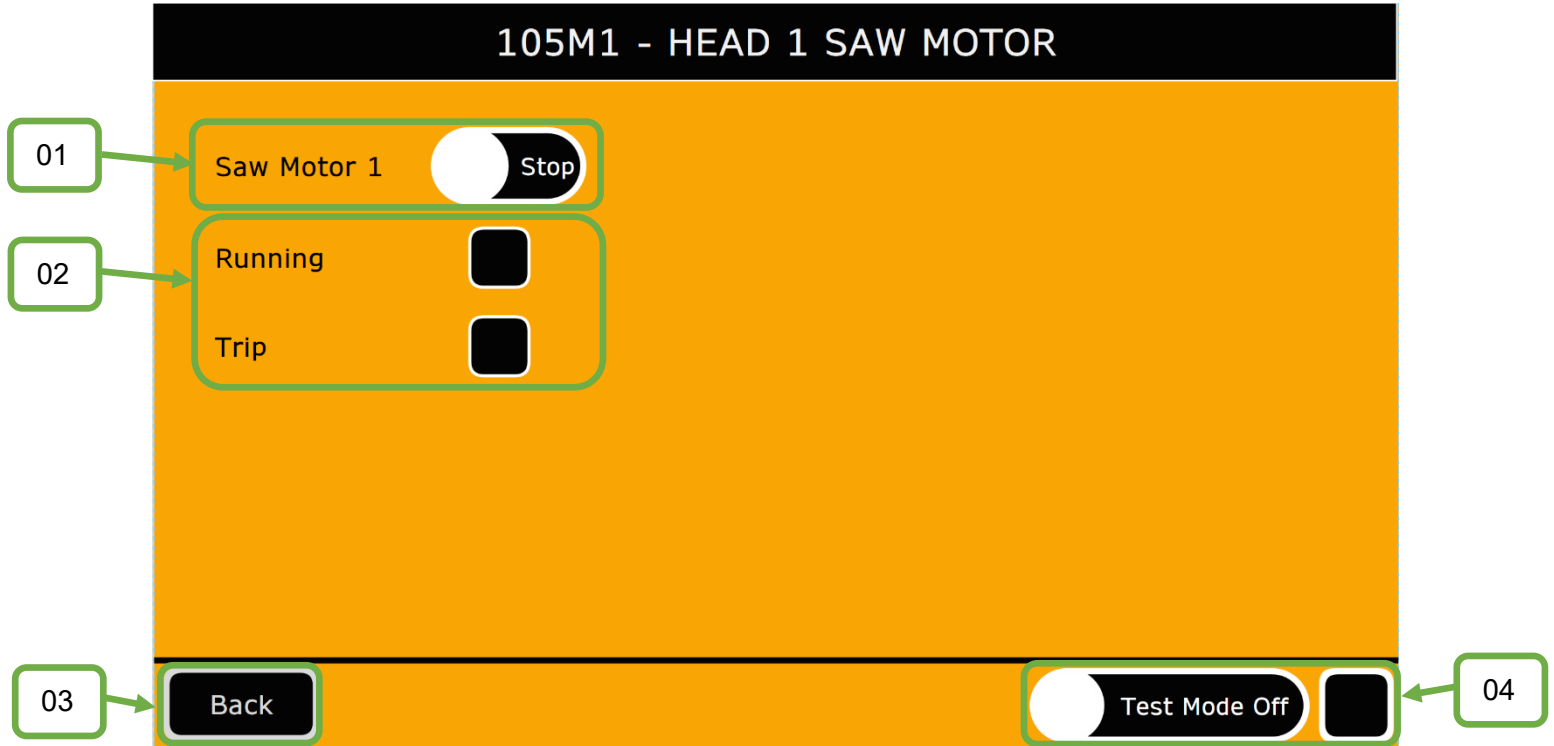
1. Displays the current statuses of the VSD for the motor
2. Press to return to the SETUP MODE MENU
3. The set point speed of the VSD
4. Press to run the VSD when test mode is enables
5. Press to enable or disable test mode

### 3.10 HMI 175U1 – Main Outfeed Hold Down



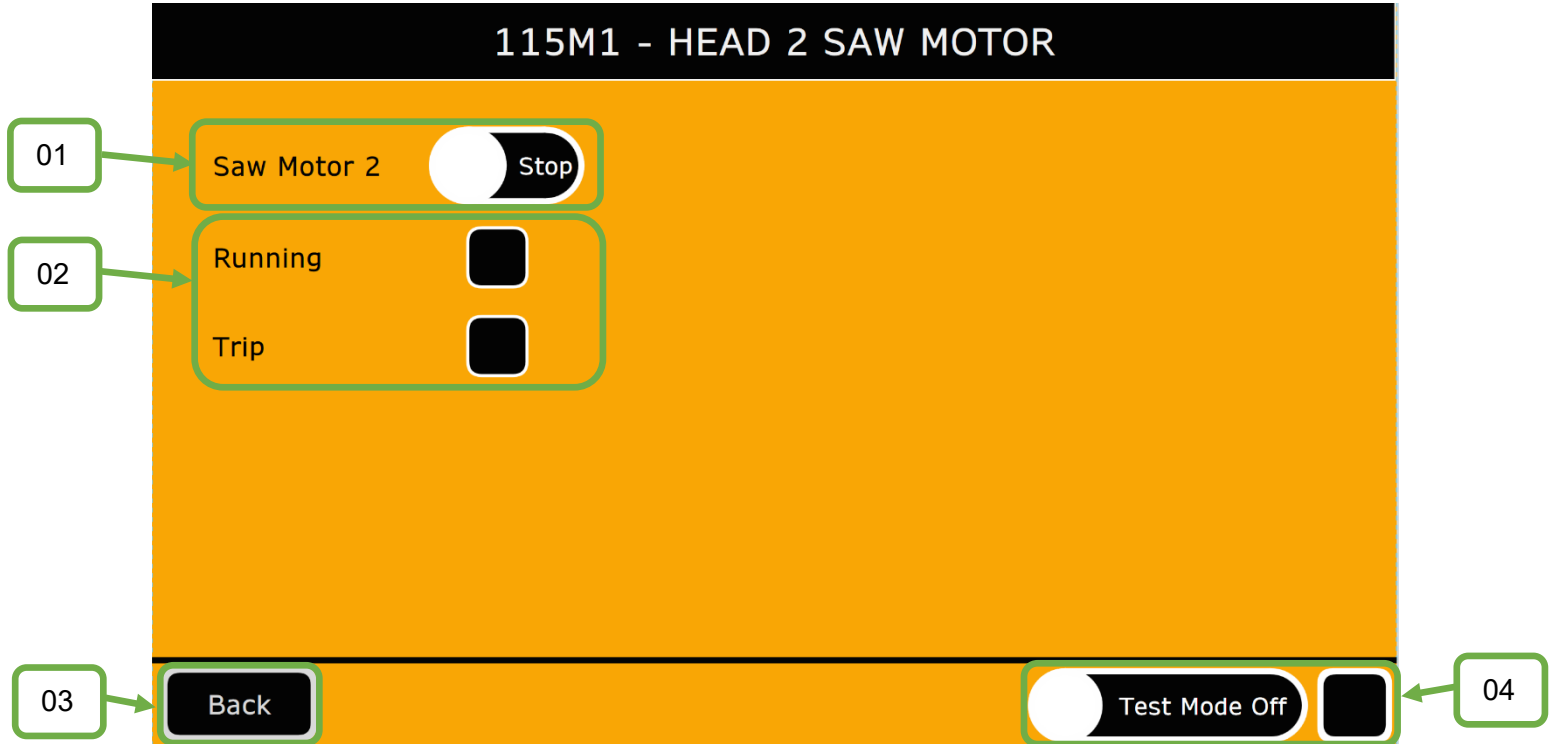
1. Displays the current statuses of the VSD for the motor
2. Press to return to the SETUP MODE MENU
3. The set point speed of the VSD
4. Press to run the VSD when test mode is enables
5. Press to enable or disable test mode

### 3.11 HMI 105M1 – HEAD 1 SAW MOTOR



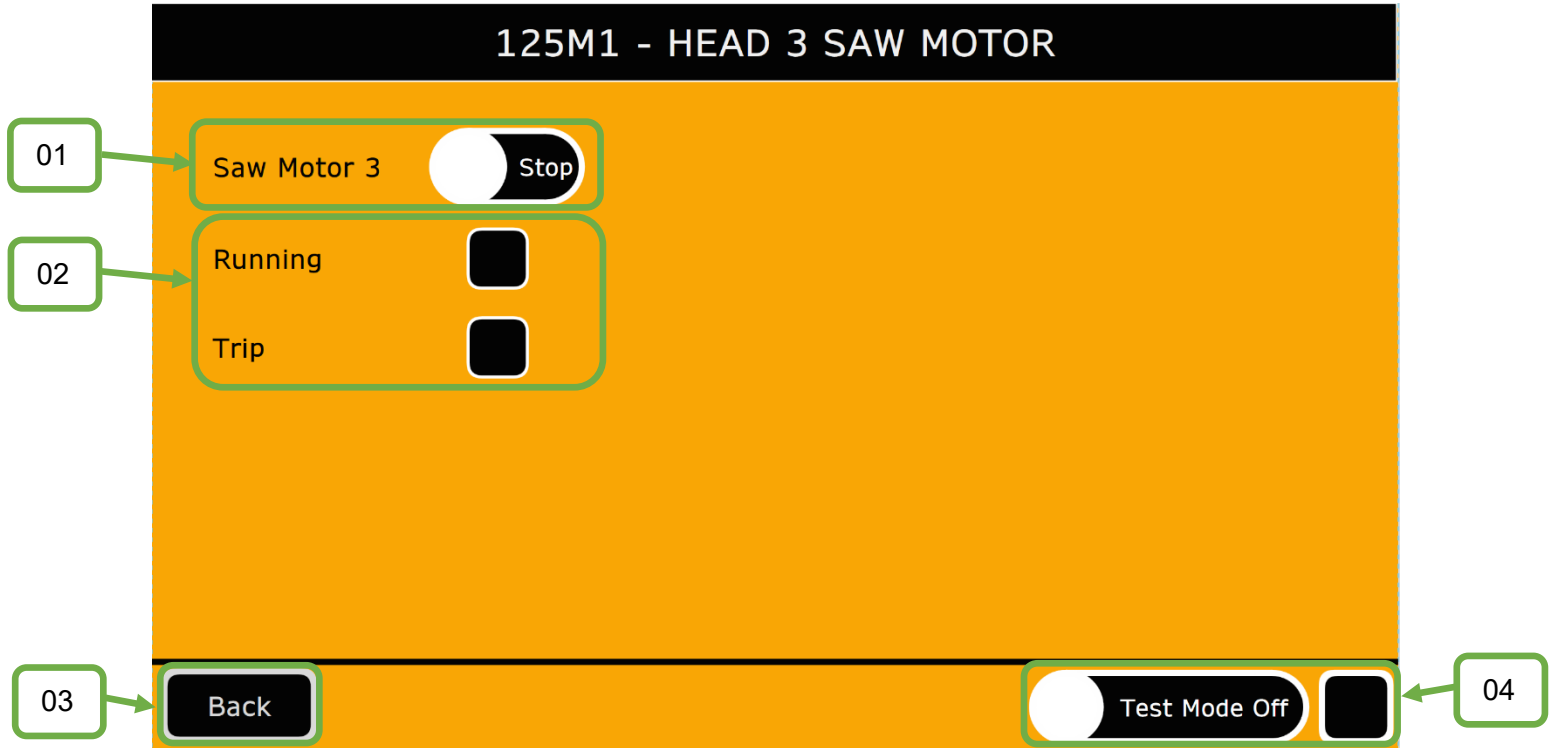
1. Press to Manually Start and Stop the Saw Motor
2. Displays the current statuses of the Motor
3. Press to return to the SETUP MODE MENU
4. Press to enable or disable test mode

### 3.12 HMI 115M1 – HEAD 2 SAW MOTOR



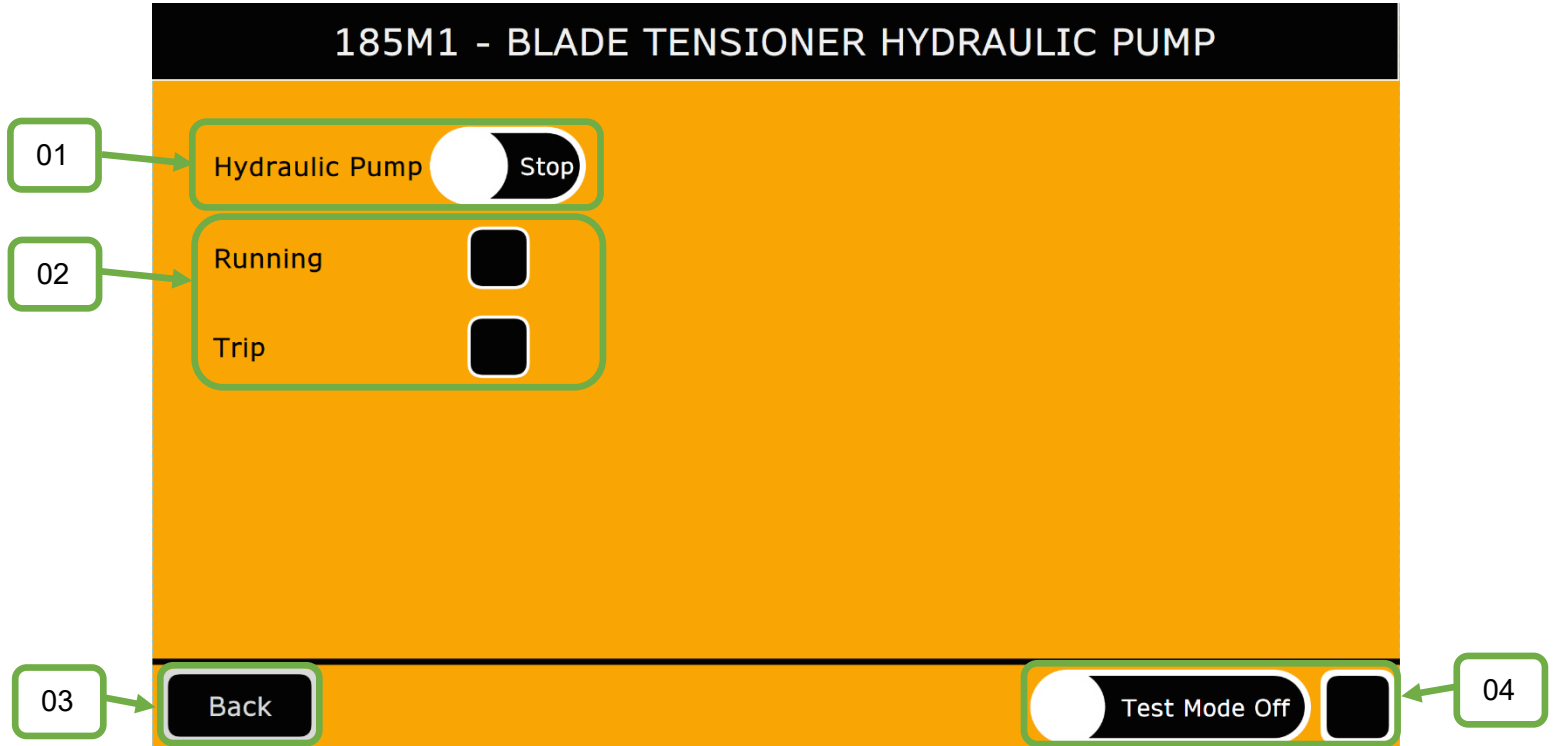
1. Press to Manually Start and Stop the Saw Motor
2. Displays the current statuses of the Motor
3. Press to return to the SETUP MODE MENU
4. Press to enable or disable test mode

### 3.13 HMI 125M1 – HEAD 3 SAW MOTOR



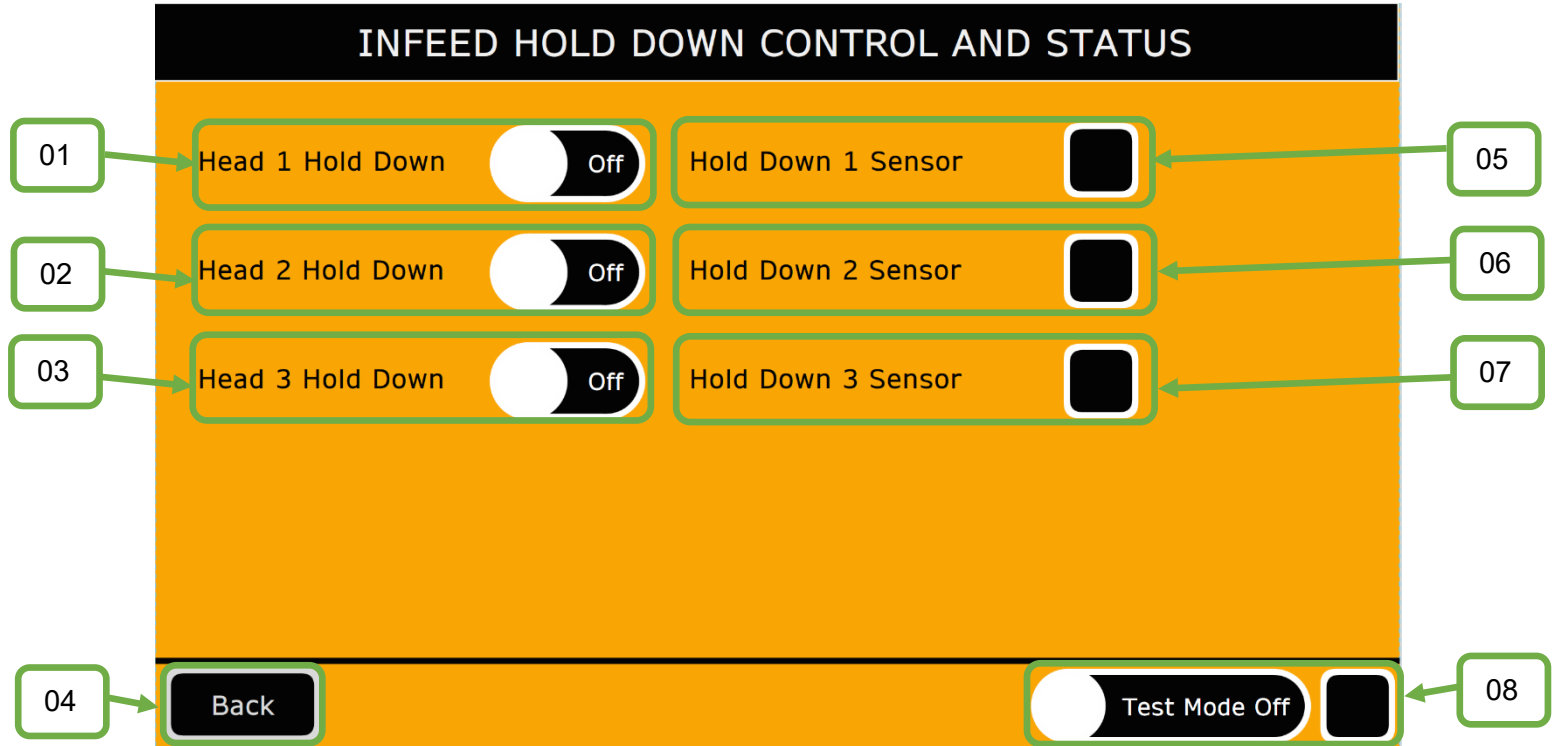
1. Press to Manually Start and Stop the Saw Motor
2. Displays the current statuses of the Motor
3. Press to return to the SETUP MODE MENU
4. Press to enable or disable test mode

### 3.14 HMI 185M1 – BLADE TENSIONER HYDRAULIC



1. Press to Manually Start and Stop the Hydraulic Pump
2. Displays the current statuses of the Hydraulic Pump
3. Press to return to the SETUP MODE MENU
4. Press to enable or disable test mode

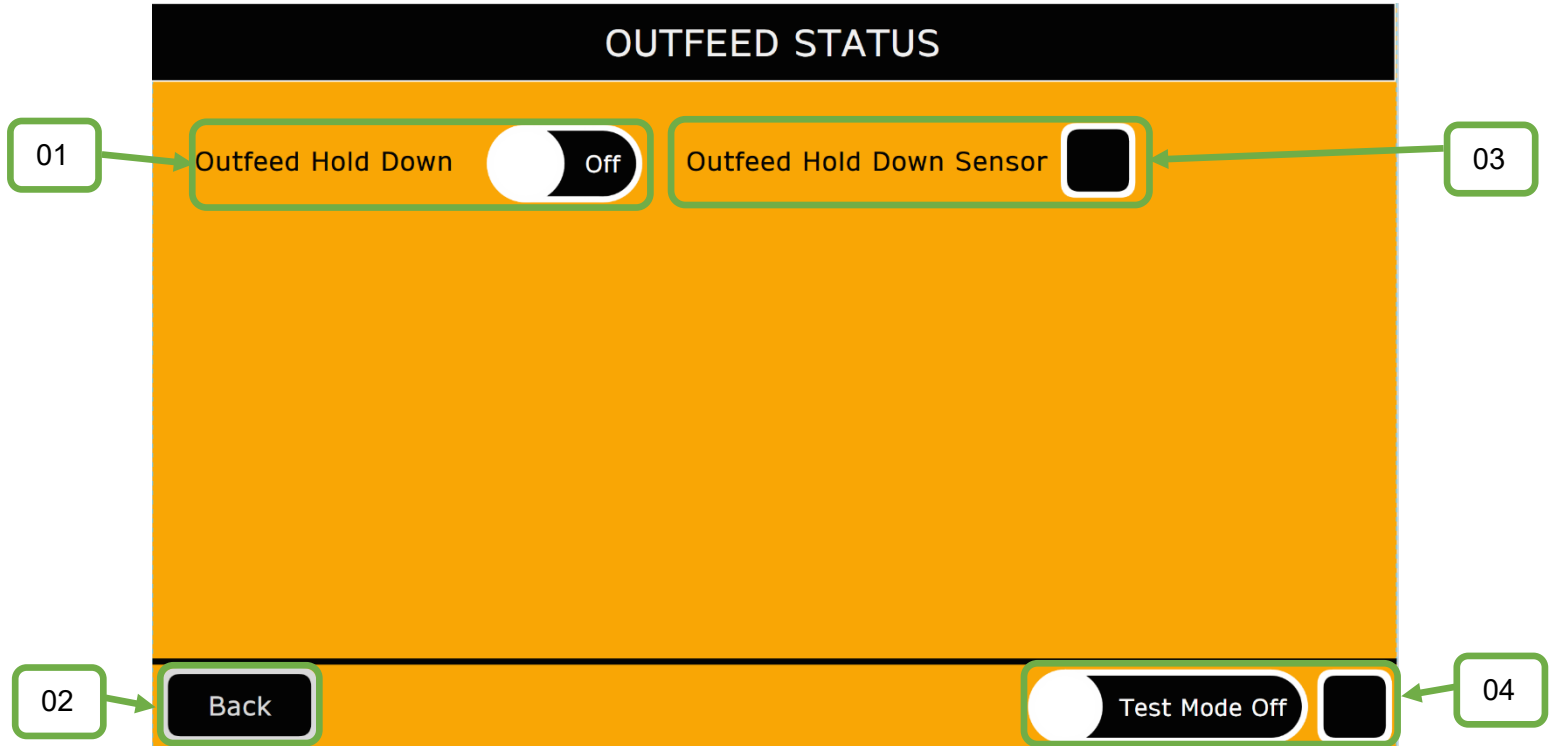
### 3.15 HMI INFEEED SETUP



1. Press to Manually active Head 1 Hold Down
2. Press to Manually active Head 2 Hold Down
3. Press to Manually active Head 3 Hold Down
4. Press to return to the SETUP MODE MENU
5. Indicates when the cylinder sensor 1 is detecting the open position of the cylinder
6. Indicates when the cylinder sensor 2 is detecting the open position of the cylinder
7. Indicates when the cylinder sensor 3 is detecting the open position of the cylinder
8. Press to enable or disable test mode

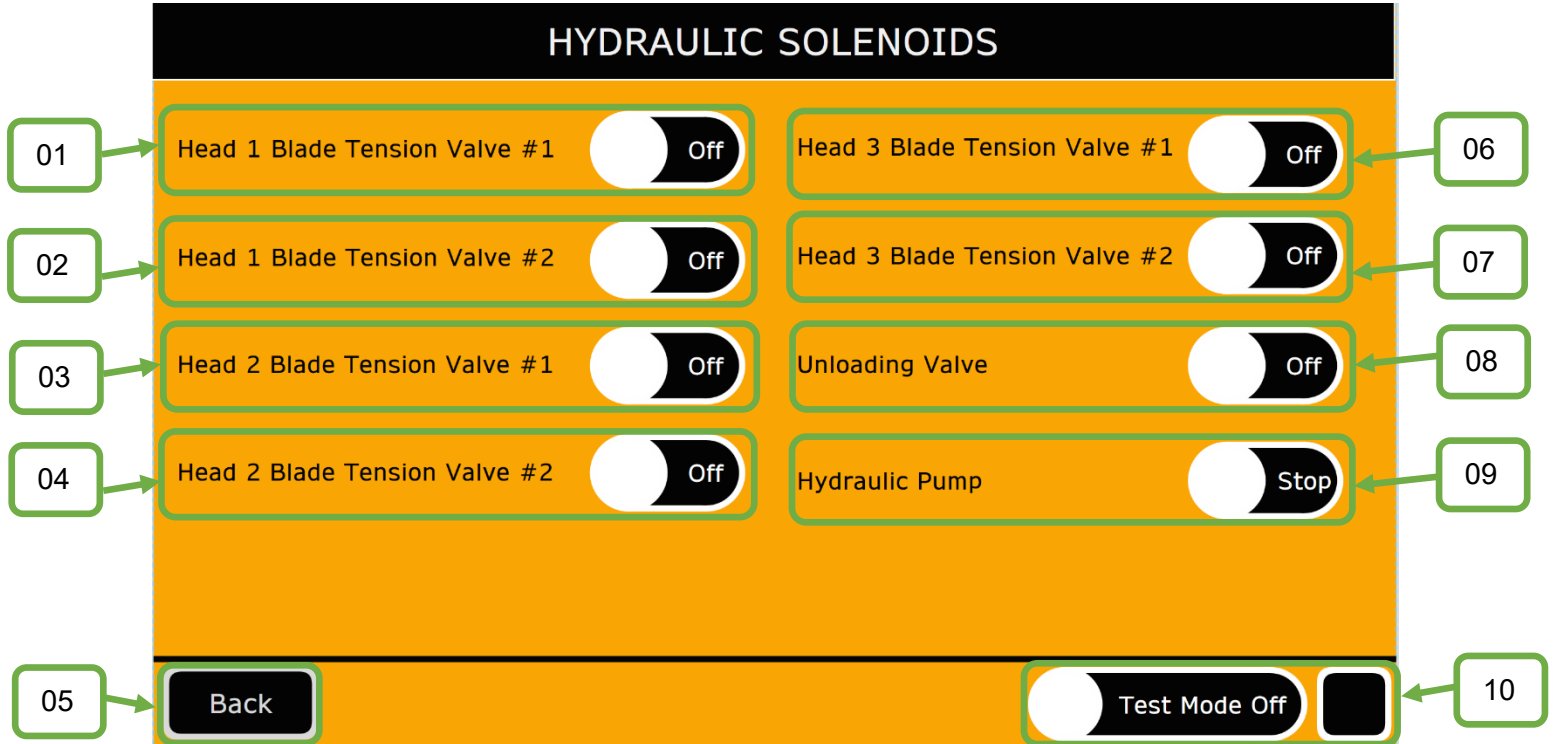


### 3.16 HMI OUTFEED SETUP



1. Press to Manually active the OUTFEED Down
2. Press to return to the SETUP MODE MENU
3. Indicates when the cylinder sensor is detecting the open position of the cylinder
4. Press to enable or disable test mode

### 3.17 HMI HYDRAULIC SETUP



1. Press to increase the tension of HEAD 1's hydraulics
2. Press to decrease the tension of HEAD 1's hydraulics
3. Press to increase the tension of HEAD 2's hydraulics
4. Press to decrease the tension of HEAD 2's hydraulics
5. Press to increase the tension of HEAD 3's hydraulics
6. Press to decrease the tension of HEAD 3's hydraulics
7. Press to return to the SETUP MODE MENU
8. Press to turn the UNLOAD valve on and off. The UNLOAD must be on to activate the hydraulics.
9. Press to turn the hydraulic pump on and off
10. Press to enable or disable test mode

## 3.18 HMI SERVO 1 SETUP

**810U1 - HEAD 1 BLADE POSITIONING**

**01** Comms Ready ☐ Axis Warning ☐  
 Power On ☐ Error ☐  
 Homed ☐ Error ID 12345

**02** Enable MoveRel Stop  
 Home MoveAbs

**03** Back

**04** Position 123.456  
 Jog Velocity 12345  
 Acceleration 12345  
 Deacceleration 12345  
 810U1 Total Current 123.45

**05** Rel Position 12.345  
 Abs Position 12.345

**06** Test Mode Off ☐

1. Displays the status of the SERVO DRIVE and MOTOR
  - a. Comms Ready and Power On must be ON for the drive to be tested
  - b. No errors should be present, reset under the Alarms page
2. Manual control of the SERVO DRIVE
  - a. Enable – Drive must be in an enabled state to control the drive manually
  - b. Home – The drive must always be HOMED before operation.
  - c. Move Relative – Moves the set distance irrespective of the current position
    - i. Relative move of 100 mm will move the head 100 mm
  - d. Move Absolute – Moves to set distance taking into account the current position
    - i. Absolute move of 100 mm will move 100 mm if the current position is 0
3. Press to return to the SETUP MODE MENU
4. Indicates the current positions and settings on the SERVO DRIVE
  - a. Position – Displays in inches the current position
  - b. Jog Velocity – The Velocity at which the heads will move
  - c. Acceleration – The time it takes to reach its max speed
  - d. Deceleration – The time it takes to stop at position.
  - e. Total Current – Displays the current feed back of the SERVO MOTOR
5. Inputs for the Relative Position and Absolute Position.
6. Press to enable or disable test mode

## 3.19 HMI HEAD 2 SERVO SETUP

**815U1 - HEAD 2 BLADE POSITIONING**

|                                                                                                                                                                                                                                                 |                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <div>01</div> <div>Comms Ready <input type="checkbox"/></div> <div>Power On <input type="checkbox"/></div> <div>Homed <input type="checkbox"/></div>                                                                                            | <div>Axis Warning <input type="checkbox"/></div> <div>Error <input type="checkbox"/></div> <div>Error ID <span style="border: 1px solid black; padding: 2px;">12345</span></div> | <div>Position <span style="border: 1px solid black; padding: 2px;">123.456</span></div> <div>Jog Velocity <span style="border: 1px solid black; padding: 2px;">12345</span></div> <div>Acceleration <span style="border: 1px solid black; padding: 2px;">12345</span></div> <div>Deacceleration <span style="border: 1px solid black; padding: 2px;">12345</span></div> <div>810U1 Total Current <span style="border: 1px solid black; padding: 2px;">123.45</span></div> <div>06</div> |
| <div>04</div> <div> <div>Enable <input type="checkbox"/></div> <div>MoveRel <input type="checkbox"/></div> <div>Stop <input type="checkbox"/></div> <div>Home <input type="checkbox"/></div> <div>MoveAbs <input type="checkbox"/></div> </div> |                                                                                                                                                                                  | <div>Rel Position <span style="border: 1px solid black; padding: 2px;">12.345</span></div> <div>Abs Position <span style="border: 1px solid black; padding: 2px;">12.345</span></div> <div>07</div>                                                                                                                                                                                                                                                                                     |
| <div>05</div> <div>Back <input type="button" value="Back"/></div>                                                                                                                                                                               |                                                                                                                                                                                  | <div>Test Mode Off <input type="checkbox"/></div> <div>08</div>                                                                                                                                                                                                                                                                                                                                                                                                                         |

1. Displays the status of the SERVO DRIVE and MOTOR
  - a. Comms Ready and Power On must be ON for the drive to be tested
  - b. No errors should be present, reset under the Alarms page
2. Manual control of the SERVO DRIVE
  - a. Enable – Drive must be in an enabled state to control the drive manually
  - b. Home – The drive must always be HOMED before operation.
  - c. Move Relative – Moves the set distance irrespective of the current position
    - i. Relative move of 100 mm will move the head 100 mm
  - d. Move Absolute – Moves to set distance taking into account the current position
    - i. Absolute move of 100 mm will move 100 mm if the current position is 0
3. Press to return to the SETUP MODE MENU
4. Indicates the current positions and settings on the SERVO DRIVE
  - a. Position – Displays in inches the current position
  - b. Jog Velocity – The Velocity at which the heads will move
  - c. Acceleration – The time it takes to reach its max speed
  - d. Deceleration – The time it takes to stop at position.
  - e. Total Current – Displays the current feed back of the SERVO MOTOR
5. Inputs for the Relative Position and Absolute Position.
6. Press to enable or disable test mode

## 3.20 HMI HEAD 3 SERVO SETUP

The screenshot shows the '820U1 - HEAD 3 BLADE POSITIONING' HMI screen. It is divided into several sections:

- 01** (Green box): A status section on the left containing three indicators: 'Comms Ready' (ON), 'Power On' (ON), and 'Homed' (ON).
- 02** (Green box): A status section in the middle containing three indicators: 'Axis Warning' (OFF), 'Error' (OFF), and 'Error ID' (12345).
- 03** (Green box): A status section on the right containing five numerical displays: 'Position' (123.456), 'Jog Velocity' (12345), 'Acceleration' (12345), 'Deceleration' (12345), and '810U1 Total Current' (123.45).
- 04** (Green box): A control section on the left containing five toggle buttons: 'Enable' (ON), 'MoveRel' (ON), 'Stop' (ON), 'Home' (ON), and 'MoveAbs' (ON).
- 05** (Green box): A 'Back' button at the bottom left.
- 06** (Green box): A 'Test Mode Off' toggle button at the bottom right.
- 07** (Green box): A section on the right containing two numerical displays: 'Rel Position' (12.345) and 'Abs Position' (12.345).
- 08** (Green box): A small square indicator next to the 'Test Mode Off' button.

1. Displays the status of the SERVO DRIVE and MOTOR
  - a. Comms Ready and Power On must be ON for the drive to be tested
  - b. No errors should be present, reset under the Alarms page
2. Manual control of the SERVO DRIVE
  - a. Enable – Drive must be in an enabled state to control the drive manually
  - b. Home – The drive must always be HOMED before operation.
  - c. Move Relative – Moves the set distance irrespective of the current position
    - i. Relative move of 100 mm will move the head 100 mm
  - d. Move Absolute – Moves to set distance taking into account the current position
    - i. Absolute move of 100 mm will move 100 mm if the current position is 0
3. Press to return to the SETUP MODE MENU
4. Indicates the current positions and settings on the SERVO DRIVE
  - a. Position – Displays in inches the current position
  - b. Jog Velocity – The Velocity at which the heads will move
  - c. Acceleration – The time it takes to reach its max speed
  - d. Deceleration – The time it takes to stop at position.
  - e. Total Current – Displays the current feed back of the SERVO MOTOR
5. Inputs for the Relative Position and Absolute Position.
6. Press to enable or disable test mode

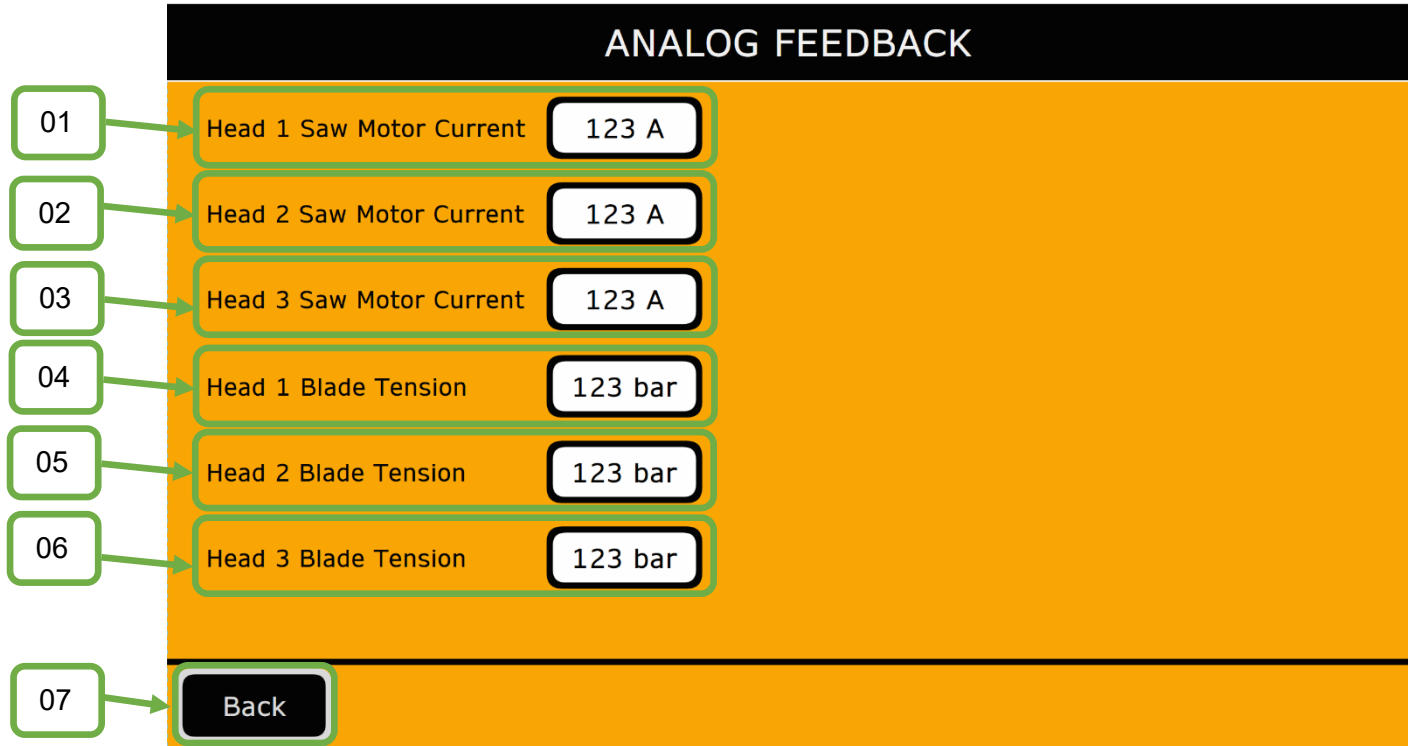
## 3.21 HMI OPERATOR SETTINGS

The screenshot shows the 'OPERATOR SETTINGS' screen with a yellow background and a black header. The settings are organized into two columns. The left column contains three trip current settings for motors 810U1, 815U1, and 820U1, each with a value of 123.45. The right column contains five tension-related settings: Current Set Point (123 A), Feed Speed Factor (123), Tension High Limit (123 bar), Tension Low Limit (123 bar), Tension High Alarm (123 bar), and Tension Low Alarm (123 bar). A 'Back' button is located at the bottom left. Numbered callouts (01-10) point to specific elements: 01 points to the 810U1 Trip Current label, 02 to 815U1 Trip Current, 03 to 820U1 Trip Current, 04 to the Back button, 05 to the Current Set Point label, 06 to the Feed Speed Factor label, 07 to the Tension High Limit label, 08 to the Tension Low Limit label, 09 to the Tension High Alarm label, and 10 to the Tension Low Alarm label.

| OPERATOR SETTINGS  |         |
|--------------------|---------|
| 810U1 Trip Current | 123.45  |
| 815U1 Trip Current | 123.45  |
| 820U1 Trip Current | 123.45  |
| Current Set Point  | 123 A   |
| Feed Speed Factor  | 123     |
| Tension High Limit | 123 bar |
| Tension Low Limit  | 123 bar |
| Tension High Alarm | 123 bar |
| Tension Low Alarm  | 123 bar |
| Back               |         |

1. Displays the trip current of MOTOR 1
2. Displays the trip current of MOTOR 2
3. Displays the trip current of MOTOR 3
4. Press to return to the previous MENU
5. Input the current set point for the two motors
6. Input the factors at which the feed speed must be reduced by.
7. Input the Tension High Limit – Max blade tension
8. Input the Tension Low Limit – Min blade tension
9. Input the High Tension alarm – Max tension before shutting down the feed works and alarming the operator.
10. Input the Low Tension alarm – Min tension before shutting down the feed works and alarming the operator. (The blade motors will also shut down to prevent a blade sliding off the wheels)

## 3.22 HMI ANALOG FEEDBACK



1. Displays the current motor 1 AMPS
2. Displays the current motor 2 AMPS
3. Displays the current motor 3 AMPS
4. Displays the tension of head 1 blade
5. Displays the tension of head 2 blade
6. Displays the tension of head 3 blade
7. Press to return to the previous MENU

## 3.23 HMI SIZE SETUP

The screenshot shows the 'Size Setup' HMI screen. It features a table for inputting cutting patterns for three heads, a section for servo status, and a section for blade width and auto mode. Numbered callouts (01-11) point to specific elements:

|               | Head 1    | Head 2    | Head 3    |
|---------------|-----------|-----------|-----------|
| Push Button 1 | 12.345 in | 12.345 in | 12.345 in |
| Push Button 2 | 12.345 in | 12.345 in | 12.345 in |
| Push Button 3 | 12.345 in | 12.345 in | 12.345 in |
| Push Button 4 | 12.345 in | 12.345 in | 12.345 in |
| Push Button 5 | 12.345 in | 12.345 in | 12.345 in |
| Home Value    | 12.345 in | 12.345 in | 12.345 in |

|         | Power                    | Homed                    |
|---------|--------------------------|--------------------------|
| Servo 1 | <input type="checkbox"/> | <input type="checkbox"/> |
| Servo 2 | <input type="checkbox"/> | <input type="checkbox"/> |
| Servo 3 | <input type="checkbox"/> | <input type="checkbox"/> |

Blade Width: 1.234 in

Auto Mode: ☐ Off

Buttons: Menu, Back

1. Input the required cutting pattern for button 1 (The third head or last head activated is the bottom blade, head 1 will always be head 3 size + head 2 size + head 3 size + blade thickness)
2. Input the required cutting pattern for button 2
3. Input the required cutting pattern for button 3
4. Input the required cutting pattern for button 4
5. Input the required cutting pattern for button 5
6. Input the homing value for both servo drives – This is the measured distance between the blade tip and the feed bed of the HR 6000
7. Press to return to the previous MENU
8. Displays the Status of the DRIVE
9. Input the Blade Thickness (All sizes are in decimal inches)
10. Press to enable or disable auto mode
11. Press to return to the previous PAGE



## 3.24 HMI SYSTEM START PAGE

The screenshot shows the 'System Start Page' with the following layout and callouts:

- 01** points to the 'Head 1 Saw' status area, which includes a 'Disabled' toggle switch and a '123 A' current display.
- 02** points to the 'Head 1 Position' display showing '123.456 in'.
- 03** points to the 'Alarms' button, which is highlighted in red and has a red alarm bell icon to its right.
- 04** points to the 'Back' button.
- 05** points to the 'Saw 1' status area, which includes 'Pressurise' and 'De-Pressurise' toggle switches (both 'Off') and a '123 bar' tension display.
- 06** points to the 'Feed Speed Set Point' display showing '123 ft/min'.
- 07** points to the 'Feed Speed Current' display showing '123 ft/min'.
- 08** points to the 'Sizing' and 'Setup Mode' buttons.

Other visible elements include 'Head 2 Saw', 'Head 3 Saw', 'Saw 2', 'Saw 3', 'Auto Mode Off' toggle, and a bell icon.

1. Displays which of the 2 heads is Enabled or Disabled
2. Displays the current position of each Servo Drive
3. Press to access Alarms – The indicator to the right will display when an alarm is active
4. Press to return to the previous PAGE
5. Used to tension the blades before starting the Main motors – The blade motors will not start until the saw is at the correct pressure.
6. Displays the feed speed and set point for the feed speed.
7. Press to enable or disable auto mode
8. Press to access the SIZING and/or SETUP MENU

# SECTION 4 – OPERATION

This section has been prepared to give the operator the ability to set up the saw for most cutting situations. Before cutting any material, the operator should be familiar with all operations and controls as well as the basic cutting theory described below.

## 4.1 Blade Basics

Technology is rapidly changing all aspects of sawmilling. The advances made in the bandsaw blade industry have definitely brought down the cost per cut. Tipped blades (Stellite) last much longer, cut faster, and more accurately than conventional swaged or spring-set blades. In order to take advantage of the superiority of tipped blades, it is advised to properly “break-in” a new blade. This is accomplished by running the saw without cutting for approximately half an hour, and thereafter resting the blade for a further half hour. Proper break-in will alleviate blade vibration; improve surface finish, accuracy, and blade life.

After “break-in”, the following points must be closely monitored to ensure long blade life:

1. Proper blade tension should be maintained.
2. Sufficient coolant application is essential with most sawing applications. A high quality and well mixed coolant will extend blade life, and also increase cutting rate and quality.
3. The appropriate feed rate must be used during cutting.

## 4.2 FEED SPEED

1. Feed speed is controlled by a variable on the HMI and needs to be adjusted accordingly.
2. The feed control is interlocked with the saw motors and thus proper startup procedures should be followed.
3. Feed should never be run at less than 30% of maximum, running the feed slower than this will result in the feed motor overheating.

## 4.3 Blade Tracking

The saw blade can be tracked using the tracking screw as follows:

|                                |                               |
|--------------------------------|-------------------------------|
| Rotate screw clockwise         | Blade tracks toward Column    |
| Rotate screw counter clockwise | Blade tracks away from column |

If one is not sure of how a saw is going to track it is best to start the machine slowly by either turning the wheel by hand and adjusting accordingly, or by starting and stopping the saw motor quickly. This will avoid running the bandsaw off the wheels if the tracking is very badly out. Full attention must be paid while tracking to avoid running the teeth of the blade onto the wheel. This will damage the blade, and possibly the wheel face.

## 4.4 Blade Change

### Handling Blades:

1. Sawblades are by nature very sharp and thus great care should be taken when handling saws.
2. Appropriate gloves should always be worn to avoid injury during the blade change procedure.
3. Always ensure that the machine is locked out before installing or removing sawblades.

### Straining The Blade:

The hydraulic system on the machine's blade tensioning system is configured to pump up until the correct operating pressure for the required band saw strain. Once the set pressure is achieved the pump will bypass at this stage the gauge pressure will go up, but very slowly. One should not carry on pumping past this point.

|                              |   |                 |
|------------------------------|---|-----------------|
| Operating Hydraulic Pressure | = | 95 – 105 Bar    |
| Operating Bellow Pressure    | = | 1.96 – 2.17 Bar |

## 4.5 Start-Up Procedure

1. Ensure that machine is clear and that all bystanders are aware of machine startup.
2. Switch on power to machine (main breaker)
3. Ensure all E-stops are deactivated
4. Ensure that air supply is present (machines with pneumatic operation only)
5. Ensure that all selector switches are off to avoid unexpected movement of components.
6. Strain saw HEADRIGS for startup
7. Start HEADRIG 1 (note that on multi head machines, or twin machines the HEADRIGS are interlocked, thus HEADRIGS must be started in sequence, and not at the same time)
8. Start HEADRIG 2 (only applies to machines with more than 1 HEADRIG)
9. Start HEADRIG 3 (only applies to machines with more than 2 HEADRIG)
10. Start the main feed chain and set the feed speed
11. Select desired size to be cut
12. Machine is now ready for production

## 4.6 Shut Down Procedure

### Emergency Shut-down

1. Press E-stop immediately
2. Power will be cut from all powered drives
3. Switch lockout switch to OFF position when safe to do so
4. Lock lockout switch using a padlock before approaching the machine

### Normal shut-down

1. Stop feed and saws in opposite order to startup procedure
2. Switch lockout switch to OFF position when safe to do so
3. Lock lockout switch using a padlock before approaching the machine

# SECTION 5 - TROUBLE SHOOTING AND MAINTENANCE

## 5.1 Safety During Maintenance And Trouble Shooting

“Lock-Out”, or “Lock-out Tag-out” are terms that refer to procedures taken to prevent the unexpected start-up, or other release of energy by a machine, whenever anyone is required to remove or bypass safety devices, or whenever anyone is required to place part of his/her body in a hazard area.

In almost all jurisdictions, it is required that owners of industrial equipment establish and post lock-out procedures. Know and use the lock-out procedures of your company or organization. In the absence of such posted procedures, use the following.

## 5.2 Lock-Out Procedure

Whenever work is to be performed on a machine, which requires bypassing of safety devices, or placement of part of anyone’s body in a hazard area *and* in the absence of posted company procedures, the following steps shall be taken:

1. Position and support the head in a suitable position for the work to be done (for machines with movable heads).
2. Operator shuts down the machine.
3. The supervisor in charge of the machine must be informed of the intention to lock-out the machine.
4. The main power disconnect switch must be turned off, and locked in the off position by means of a padlock. The person performing the work on the machine must keep the key for this padlock. If more than one person is performing the work on the machine, then a multiple lock hasp shall be used, and each person shall apply his or her own lock to the hasp.

5. Prior to starting any work on the locked-out machine, the supervisor shall attempt to start the machine to ensure that the lock-out device provides adequate protection. Operating control must be reset to the “OFF” position after this test.
6. Work on the locked-out machine may now proceed.

## 5.3 Troubleshooting

| Problem                             | Probable Cause                                                                                   | Solution                                                                                       |
|-------------------------------------|--------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|
| 1. Blade comes off wheels           | 1a Not enough blade tension<br>1b Improper tracking                                              | 1a Increase blade tension<br>1b Set tracking                                                   |
| 2. Blade stalls in cut              | 2a Not enough blade tension<br>2b Feed rate too high<br>2c Blade blunt<br>2d Blade set too small | 2a Increase blade tension<br>2b Decrease feed rate<br>2c Change blade<br>2d Increase blade set |
| 3. Blade vibrates excessively       | 3a Blade not level<br>3b Poor weld on blade<br>3c Worn wheel bearings                            | 3a Change blade<br>3b Change blade<br>3c Change wheel bearings                                 |
| 4. Machine vibrates excessively     | 4a drive shaft loose<br>4b Worn wheel bearings<br>4c Wheel out of balance                        | 4a tighten drive shaft<br>4b Change wheel bearings<br>4c check wheel balance                   |
| 5. Blades breaking                  | 5a Poorly welded blades<br>5b Excessive tension<br>5c Over-running of saws                       | 5a Check welding and annealing<br>5b Reduces tension<br>5c Reduce runtime                      |
| 6. Saws will not start              | 6a Motor overload tripped<br>6b Main Breaker tripped<br>6c E-Stop depressed                      | 6a Reset overload<br>6b Reset main breaker<br>6c Reset E-Stop                                  |
| 7. Saws start but feed will not run | 7a Potentiometer set on 0<br>7b Feed inverter tripped<br>7c Feed jammed                          | 7a Set Potentiometer<br>7b Reset power<br>7c Unjam feed                                        |

## 5.4. General Maintenance Schedule HR6000 Resaw

### Maintenance Program

| Item                                | Action                         | Frequency                              |
|-------------------------------------|--------------------------------|----------------------------------------|
| Sawblades                           | change                         | On cutting performance - every 4 hours |
| Saw Guides                          | change                         | On inspection, check at blade change   |
| Entire machine                      | clean and inspect              | 1 time per shift                       |
| Bandsaw tilt head + Non-drive wheel | clean and inspect              | 1 time per shift                       |
| Bandsaw drive housing + Drive wheel | clean and inspect              | 1 time per shift                       |
| Electrics and motors                | clean and inspect              | 1 time per shift                       |
| Air pressure                        | Check 6 bar                    | 1 time per shift                       |
| Pneumatics                          | Check for leaks, drain filters | 1 time per shift                       |
| Drive chains                        | inspect and lubricate          | every 4 shifts                         |
| Hold down arms                      | check chain tight              | every 4 shifts                         |
| Sizing linear bearings              | Inspect and grease             | Every 2 weeks                          |
| Bandsaw drive housing + Drive wheel | grease                         | 1 time per month                       |
| Bandsaw tilt head                   | grease                         | 1 time per month                       |
| All bolts and grub screws           | check and tighten              | 1 time per month                       |
| Gearboxes                           | Oil level                      | 2 time per month                       |
| Electric connections                | check all tight                | every 3 months                         |
| Slat chain                          | check wear                     | every 3 months                         |
| Slat chain wear strip               | check wear                     | every 3 months                         |
| Slat chain return wear strip        | check wear                     | every 3 months                         |
| Band Wheel crown                    | Check                          | every 6 months                         |
| All Bearings                        | Check & grease                 | every 6 months                         |
| Machine alignment                   | Check                          | Every 6 months                         |
| Wheel alignment                     | Check                          | Every 6 months                         |
| Blade guide alignment               | Check                          | Every 6 months                         |
| Pneumatic cylinders and valves      | Full service                   | Annual shutdown                        |