Instruction manual

Palax X-Aim

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Contents

General

Function

The **Palax X-Aim positioning system** measures the diameter of the log and adjusts the splitting wedge position according to the measurement.

Main parts

The X-Aim-system includes three main parts and few sensors:

1. Hydraulic valve controls the splitting wedge cylinder and wedge position.

2. ECU reads sensors and controls the positioning of the wedge

3. Touch encoder provides human interface to system.

The sensors are used to measure log diameter and positions of actuators.

Operating principle

The log diameter is measured during sawing by measuring position of the clamp. After sawing, the measurement result is used to position to wedge in the middle of the cut firewood. If the diameter of the firewood is under an adjustable limit, the wedge is positioned to the upper position to split firewood only in half.

The X-Aim -system observes the changes in the diameter measurement results and tries to filter out unrealistic diameters, that are caused by branches and bumps.

If wedge positioning result is poor for some reason, the system can be bypassed for rest of the log or for the present. The user can adjust wedge position manually always, when splitting piston isn't pushing the firewood. The manual adjustment is made by rotating the touch encoder knob wheel. If the adjustment is made, when there is a log under the clamp, the X-Aim will stay manual mode for rest of the log.

The X-Aim collects productivity and service data from machine by saving use hours, splitting cycles, sawing area and volume of the processed wood.

Usage of the X-Aim

Using the touch encoder

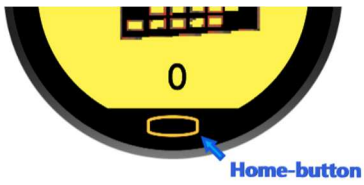
The touch encoder recognized three different user actions: turn of the knob wheel and swipes and taps of the touch screen.

Turn action is used to adjust wedge position manually and to set operating parameters to system.

Swipe action is used to change view. The process displays are changed by swiping left or right. The user parameters are select by swiping down from main view.

Tap action is used to push buttons in menus. The action varieties according view.

To the home screen can return from all menus, by pressing home button.

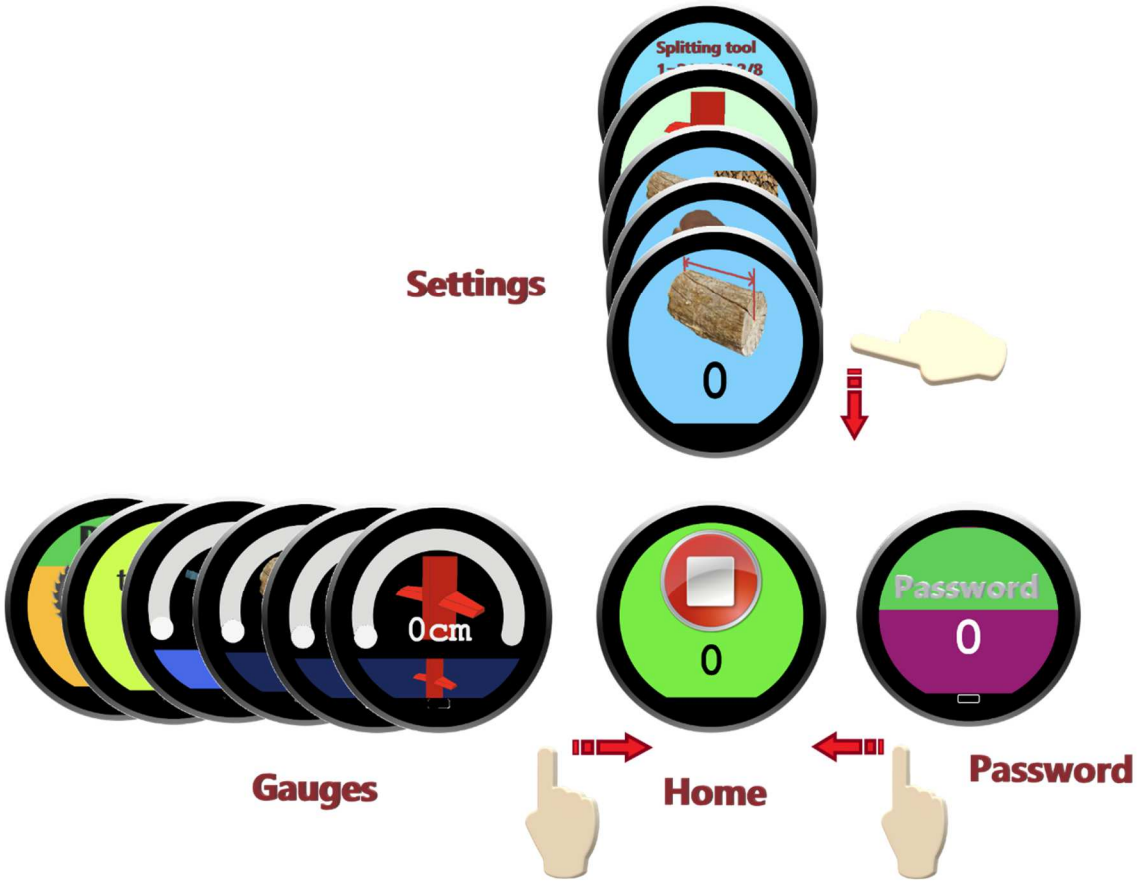


X-Aim menu

The X-Aim menus are divided to three main section.

1. **Home** screen tells the current state of machine to user. The view is changed, if user action is needed or there is something wrong with machine. The home screen can be always returned by pressing home-button.
2. The **settings** menus are reached by swiping touch screen down in home screen. User can adjust cutting length and log diameter smaller firewood is split in half. The settings are modified by turning the knob wheel.
3. Gauges and counters section includes several gauges linked to machine state and collected data. Gauges are reaches from home screen by swiping to right.

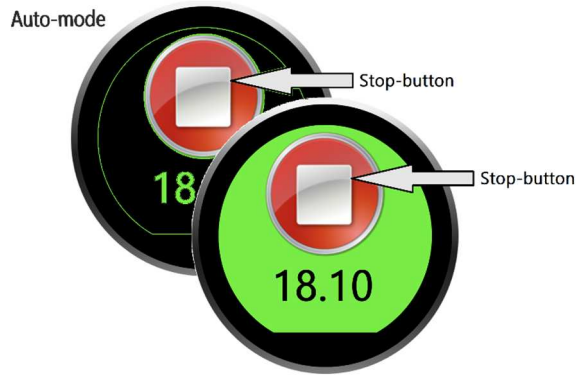
By left swiping from home screen, the password menu is shown. With the correct password some machine parameters can be adjusted.



Operating modes of the X-Aim

The X-Aim has three operating modes: **auto**-, **standby**- and **manual**-mode.

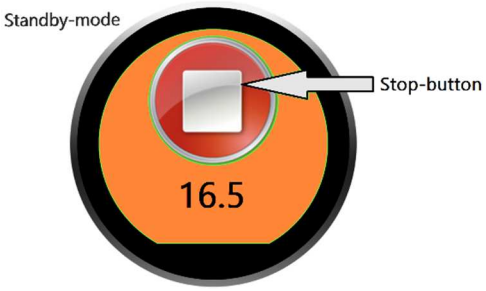
After initial operations, system is in **auto**-mode and it controls splitting wedge according to the log size. In auto-mode the background of the display is green or black and there is red-button to stop X-Aim.



Notice: The stop-button stops only the X-Aim system, not the machine

The meaning of number-field in this view variates according to the state of machine: if the machine is running, the first part of number tells the measured size of the log during sawing and the part after decimal point tells the target position of the splitting wedge. If the machine isn't running, the figure tells the position of wedge in precision of one decimal. The background is green, if the wedge has reached target position. If the position of wedge is out of tolerance, the background is black.

If user adjust splitting wedge position manually by turning the knob wheel, the system moves to **standby**-state. The splitting wedge is risen by turning wheel to clockwise and lowered by turning counterclockwise direction. The system stays on standby state during rest of current log and returns to automatic mode on next log. The X-Aim recognize the next log, after clamp has reach the lowest position between logs.



The number field shows the position of splitting wedge.

If the **stop**-button is pressed in auto- or standby mode the system moves to manual-mode and stays on it, while user start the auto-mode by pressing start-button.

On manual-mode the wedge position is shown on screen. The wedge position can still be adjusted by rotating the knob wheel.

Before automatic operation

After power up, the X-Aim-system needs to calibrate itself.

The clamp position measuring system needs to be calibrated also after power up. This calibration is made automatically. The X-Aim doesn't work properly, if the clamp hasn't reach the lowest position before automatic usage**. If there is a log under the clamp, when system is powered up, user must drive log out with infeed conveyor**. The measurement cycle of log starts, when saw moves downwards. **If the machine is paused, make sure that saw is in the upright position by driving it upwards**.

The calibration of wedge positioning is made automatically in auto-mode after initial actions and when machine is running and in auto-mode. During the wedge calibration, the system drives splitting wedge upwards for a certain time and take this wedge position as the highest position. This wedge position calibration is also made always, when system is set from manual to auto-mode.

The electric motor powered machines with chain saw haven't rotation supervisor sensor and machine operating information based on movements of saw and splitting piston. For that reason, wedge calibration is made after first movement of the piston or saw. User can activate wedge calibration before first log by activating splitting manually.

General instructions for automatic operation

Because some pieces of previous split firewood stay under the splitting wedge, the system can't adjust wedge freely downwards, it is most effective to operate logs stump end first. This way system can normally compensate the slight decreasing of the following piece and for next log the wedge can be driven upwards.

The logs can be curved and have large branch stumps and other knobs, so the measurement results of successive pieces might variate a lot. The X-Aim-system limits increase of next measurement result to 33% from previous result. If the measurement is more than 100% bigger than previous piece from same log, the result is ignored totally. With a new log, there is no limitations for measurement, so it is important to make first sawing of the log so, that the clamp supports log from a "clean" place. A good measurement for first piece of the log, helps system to operate the current log. The first measurement result of a new log is used for first and second piece of the log.

The splitting wedge positioning is started after the saw has returned to home position and the splitting piston is returning or returned to home position. For first piece of a new log, the wedge positioning is started right after the clamp has been tightened to log. For first piece, time for positioning is significantly shorter, so with small trees user might need to retard driving saw upwards for a short moment to give system time adjust wedge. The splitting starts, when saw moves upwards and this will interrupt positioning of the wedge.

User can set a diameter limit for smaller pieces to split in half. If measurement result is under this limit, system drives splitting wedge to highest position. If the previous piece is split to half, system won't adjust wedge for splitting to multiple pieces for first piece, which is bigger than limit. If two successive pieces are bigger than limit, the system starts to position the wedge for multiple pieces. Two measurement results need to be over the limit to move multiple splitting mode. This is to avoid the situation, that a single knob causes mode exchange. When splitting mode is changed from half splitting to multiple splitting during processing a log, the positioning and splitting result for few following pieces is often poor.

Automatic operation

After initial actions, X-Aim-system is ready to operate. In automatic-mode, system doesn't require user intervention. If log is very curvy or has big knobs or if any other reason positioning result of splitting wedge is poor, user can adjust manually the wedge position by knob wheel. System stays in standby-mode until next log. If user likes to stop the X-Aim, the stop-icon must be tapped. The system can be restarted by tapping the start-icon.

If the splitting wedge doesn't reach target position, the background of the touch screen is black. User can accept the situation and continue operating with machine, most probably the wedge will reach target position during splitting of the next pieces. If user likes to have optimal splitting result, user can stop operating machine and clean the bottom of the wedge. For the cleaning, the wedge can be driven upwards by hand valve and system will position the wedge for next piece. If manual driving is made by knob wheel, system stays on standby-mode for rest of log. Auto-mode for next piece can be returned by switching system via stop-mode back to auto-mode.

The splitting wedge is adjusted only, when splitting piston is moving backwards or the piston is back.

Home screen

The home screen indicates to user with symbols and colors the state of machine. The contents of the home screen is changed automatically. The chapters “**Initial actions**” and “**Operating modes**” presented some contents of home screen. In addition, there are several views linked to exceptional situations.

Following views are shown in automatic mode, when there is a situation which **prevents automatic positioning**.

Splitting not ready

Machine not running

“Splitting not ready” screen is shown, when splitting cylinder is pushing wood towards splitting wedge.

Exceptional situations, which doesn’t prevent the positioning of the splitting wedge

Supply voltage too low

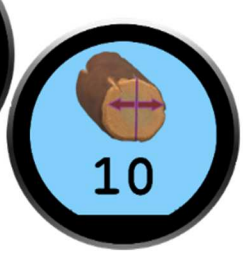
Blade speed too low

Blade speed too high

Settings

The user can adjust few parameters: length of the fire woods, the diameter that smaller trees are split in half, factor to calculate production volume, manual offset for wedge and optional selection for used splitting tool. The parameter adjusting screens are reached by swiping touch screen down from home screen.

Cutting lenght



Split in half

Volume factor

Wedge offset

Selected tool (option)

The set value is changed by rotating the knob wheel and it is saved automatically.

The “**Split in half**”-parameter affects machine operation, but the cutting length is only used to calculate volume of processed wood. The X-aim calculates the volume of each piece after sawing and is using the user set length and measured diameter of the wood. With parameter “volume factor”, user can adjust calculated volume. If logs are very curved, the volume factor can be set to smaller value (e.g. 90%) or if bulk fire wood production liked to be traced, the factor can be 200%.

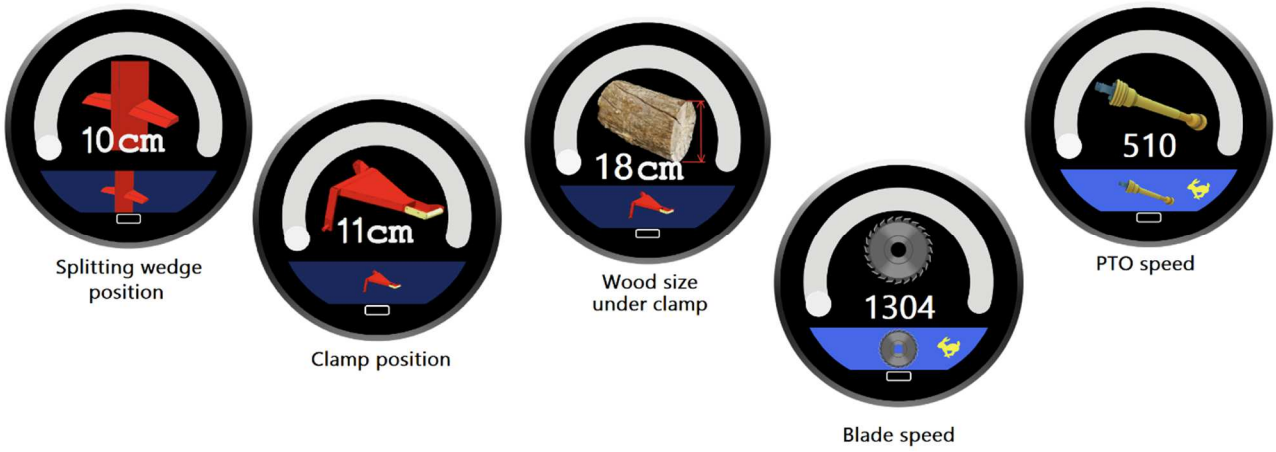
The wood metering does not require requirements for commercial operations and the volume calculated by system may not be used for any commercial activity.

With option “**wedge offset**” user can adjust positioning of the wedge. With a positive value, the wedge is positioned to higher position.

If X-aim is equipped with “**circular wedge**”-option, user can select used splitting tool.

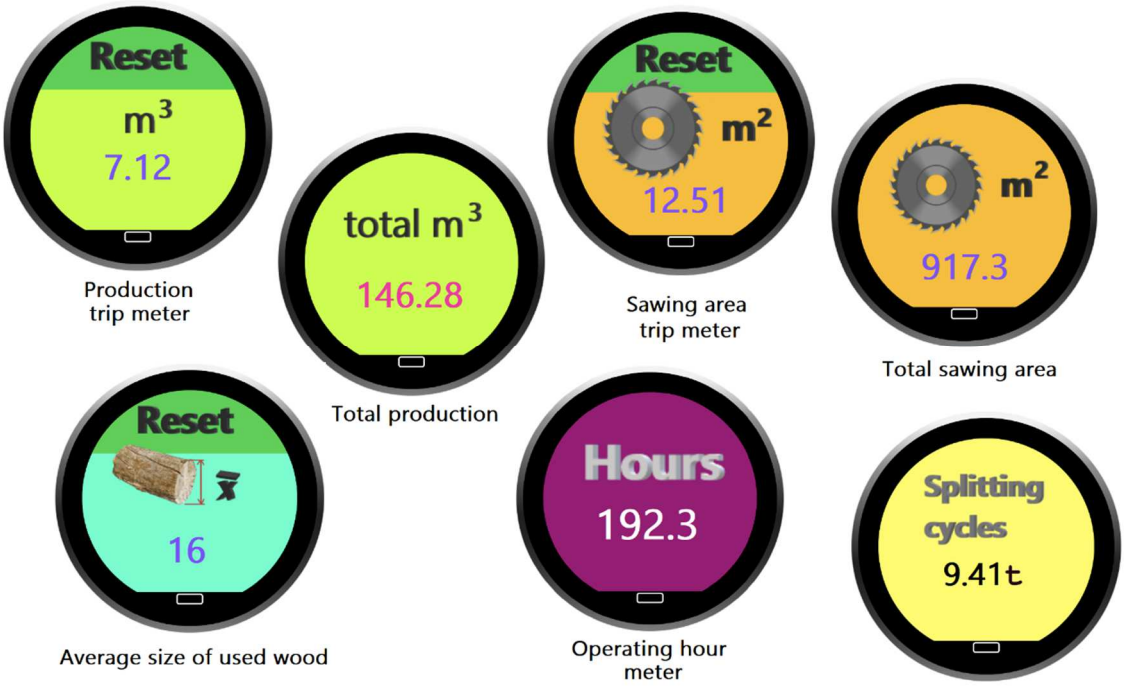
Gauges and counters

There are several gauges that show the status of actuators. The gauges and counters are reached from home screen by swiping to right.



With bigger logs, wood size under clamp is smaller than clamp position, because X-Aim notices the space between log and corner of the infeed conveyor.

The productivity of the machine can be traced with several counters:



The operating counters with reset-button can be reset by tapping the top of the screen. The productivity data is saved after every 30 minutes operating and, when machine is stopped normally. If machine is stopped with emergency stop button, the data isn't saved.

Changing splitting wedge

If user changes the splitting wedge, the wedge position need to calibrated. This is done by, switching off and on the automatic-mode of the X-Aim.

If circular wedge option is in use, the used wedge must be also selected.

Switching off the X-Aim

System is switched off by pressing emergency stop-button. If the stop-button is pressed over half second, the X-Aim reboots and clamp must be calibrated again.

Machine parameters

Access and purpose of the machine parameters, which are used to adapt X-Aim to machine, are presented in a separate service manual.

Short instructions

Before use:

1. Drive log away under the clamp and make sure, that the clamp reaches the down position.
2. Lift the saw to the up position.
3. Chain saw machines with electric motor, activate splitting once before working.

Start working.

Spare parts

Name	article	pieces	notes
ECU	50043964	1	
Touch encoder	50043982	1	
Rotary encoder	50043959	1	
Inductive sensor	50043980	4	
Inductive sensor	50058023	2	Splitting wedge
Power supply 12VDC	50044284	1	only machines with electric motor
Hydraulic valve	50044245	1	
Wire harness	50043996 / 50044719	1	C-machines / D-machines