



***SAMI* AUTOCHOPPER**



## SERVICE MANUAL

S110-TC440

S185-TC440

S110-TEC440

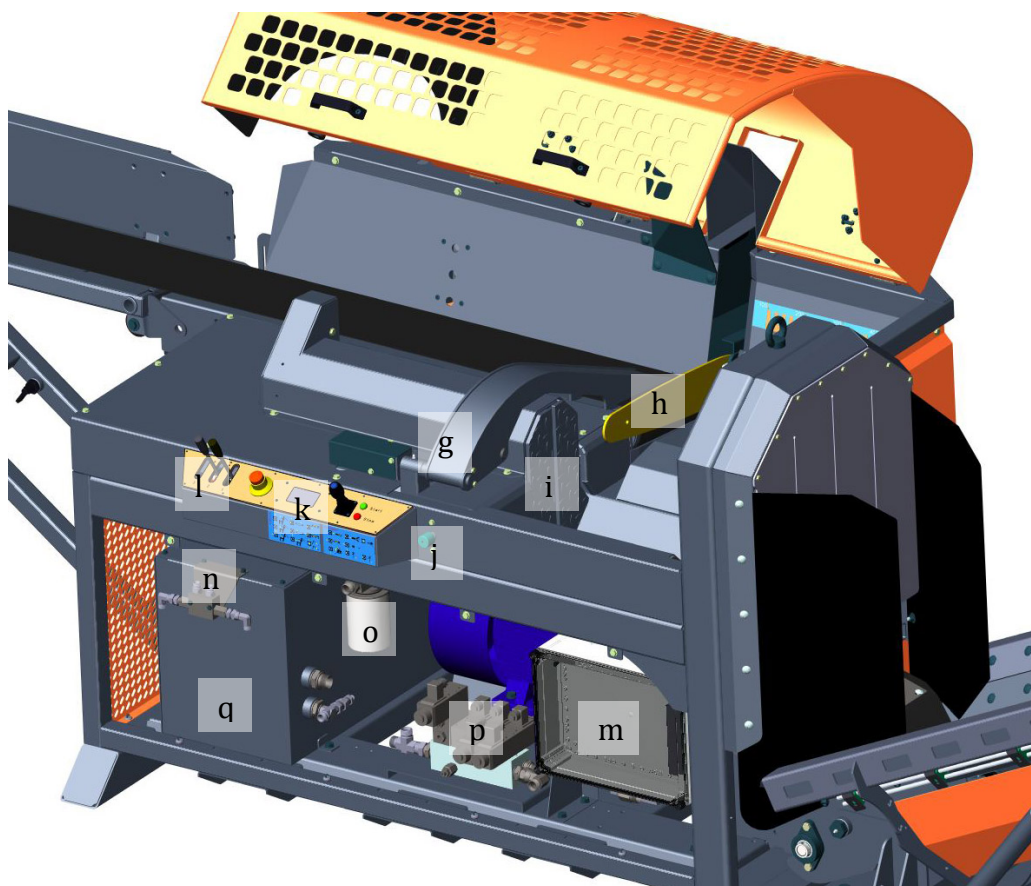
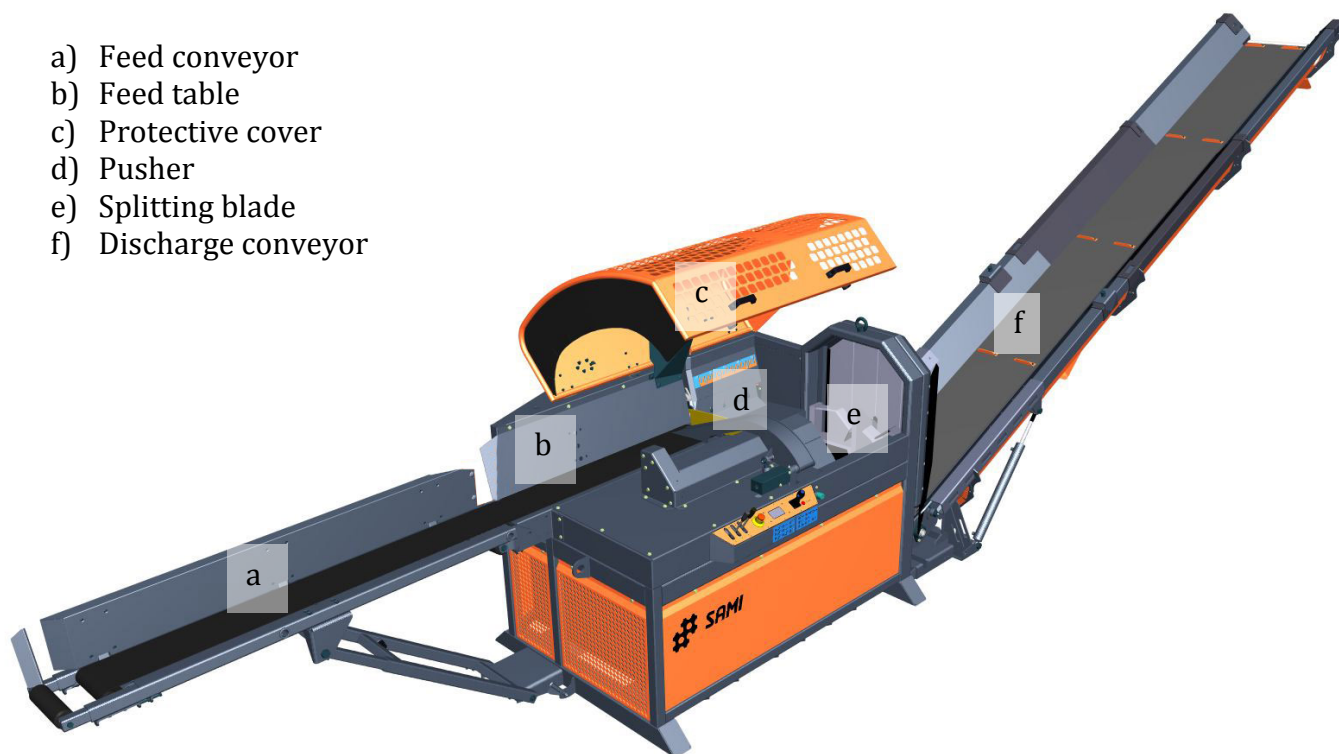
S185-TEC440

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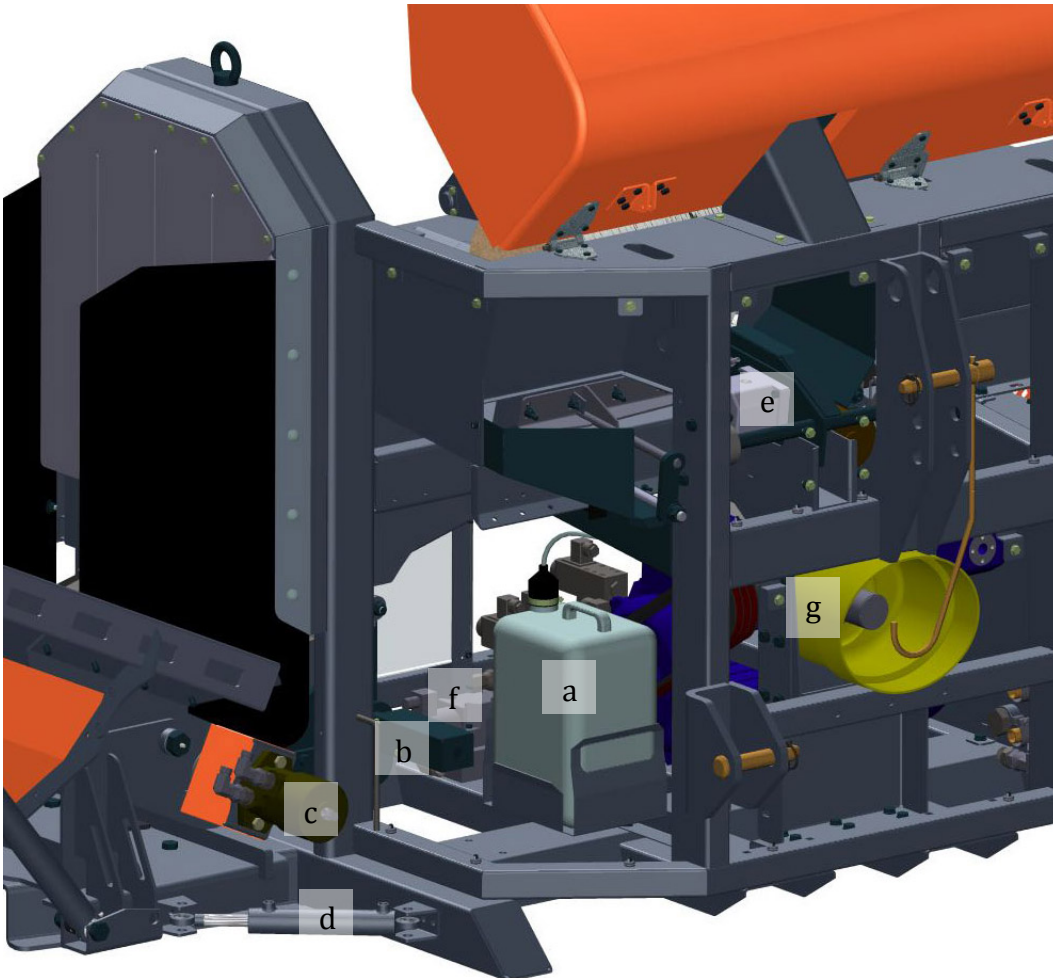
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## 1 Machine parts

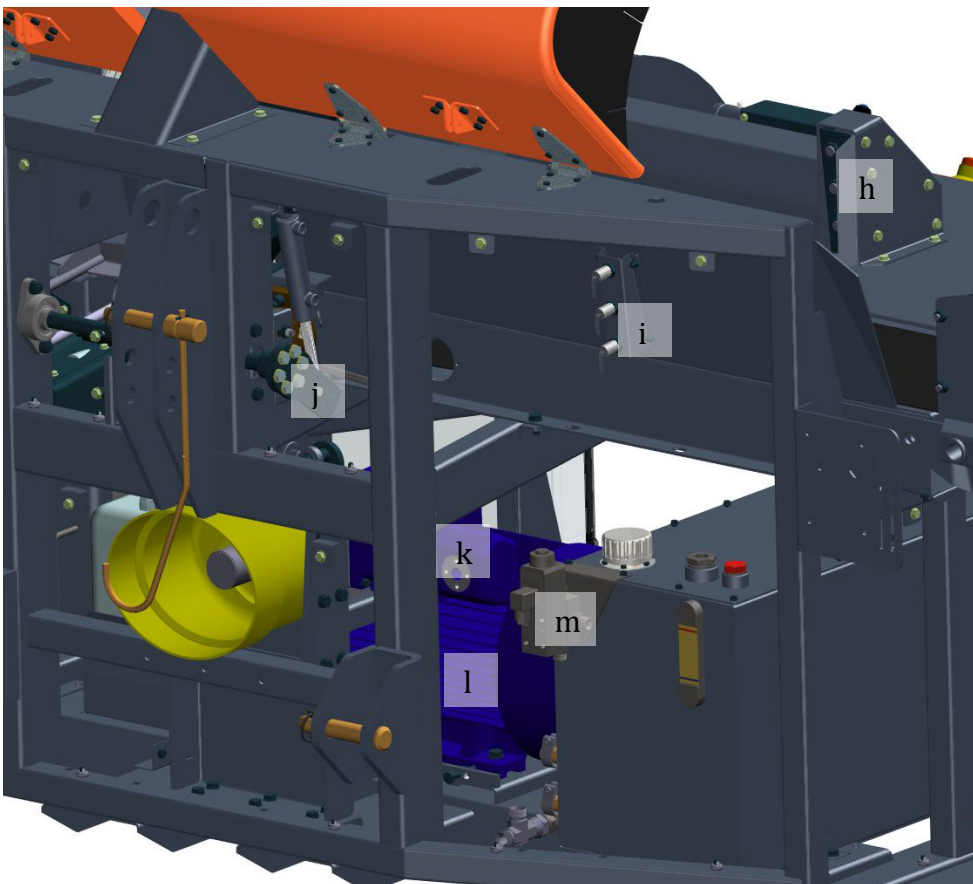
- a) Feed conveyor
- b) Feed table
- c) Protective cover
- d) Pusher
- e) Splitting blade
- f) Discharge conveyor



- g) Presser
- h) Cutting unit
- i) Splitting piston
- j) Saw speed control
- k) Control panel
- l) Manual control valve
- m) Switchboard
- n) Discharge conveyor lock valve
- o) Oil filter
- p) Valve block
- q) Oil tank



- a) Chain oil
- b) Splitting blade lifter
- c) Discharge conveyor hydraulic motor
- d) Discharge conveyor side shift
- e) Saw hydraulic motor
- f) Splitting piston control valve
- g) Bevel gear (TEC), Multiplier gearbox (TC)



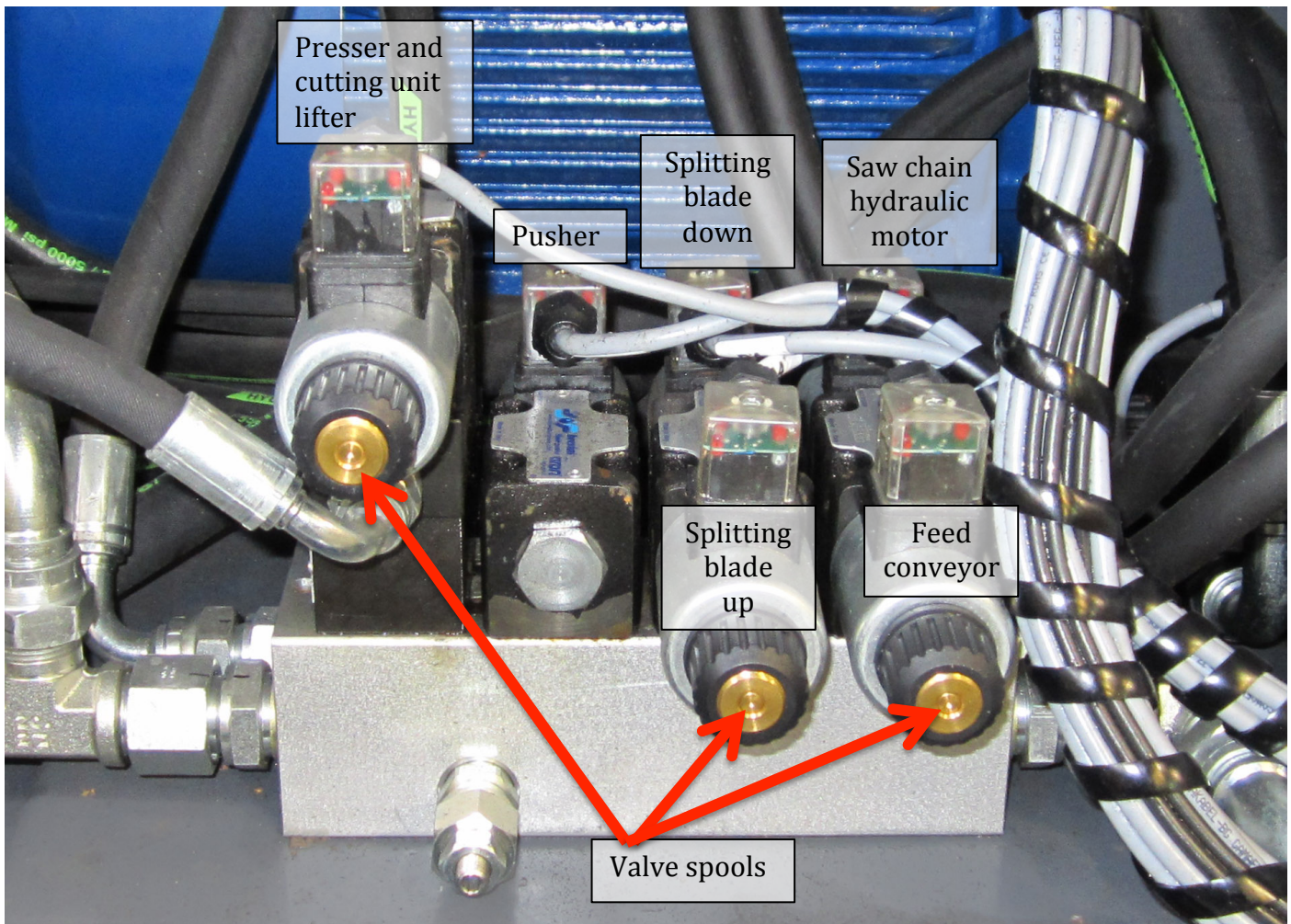
- h) Photoelectric transmitters
- i) Photoelectric receivers
- j) Cutting unit lifter
- k) Hydraulic pump
- l) Electric motor (TEC)
- m) Feed conveyor reverse control valve



## 2 Valves

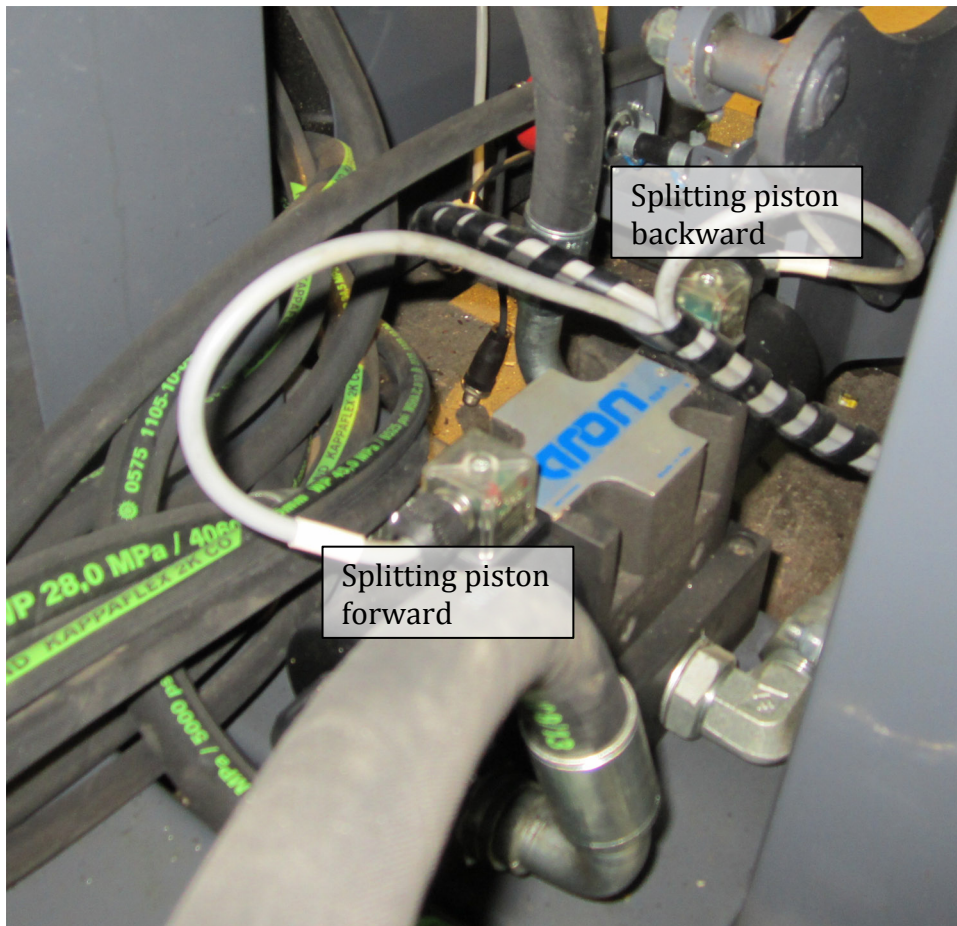
### 2.1 Control valves

Indicator light is illuminated on the coil when valve is in use. It's possible to operate the valves manually by pressing on the spool with a small screwdriver.

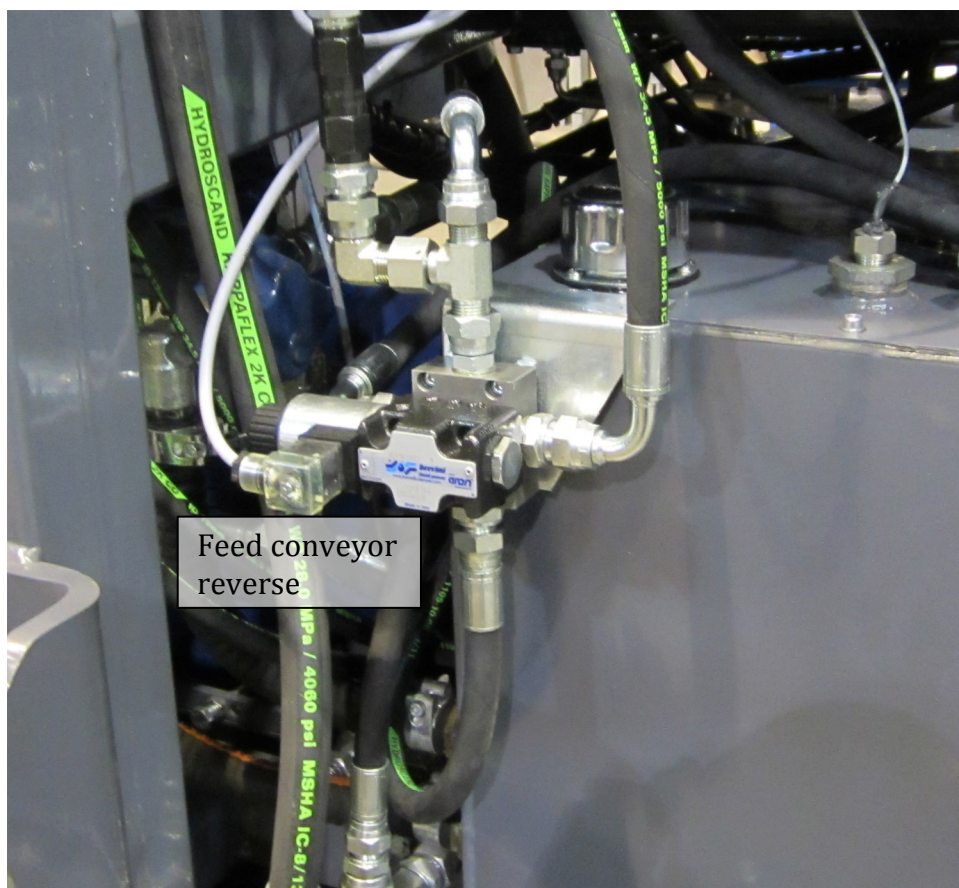


Control valves on the valve block.





Splitting piston control valve behind the switchboard.



Feed conveyor reverse control valve is attached to the oil tank.

## 2.2 LS-valve

LS-valve is used to temporarily throttle the flow of oil to the discharge conveyor hydraulic motor. This is necessary to get enough power to move the splitting blade and pusher.

In TC-machines the LS-valve is located next to the chain oil canister.

In TEC-machines the LS-valve is located next to the hydraulic oil tank.

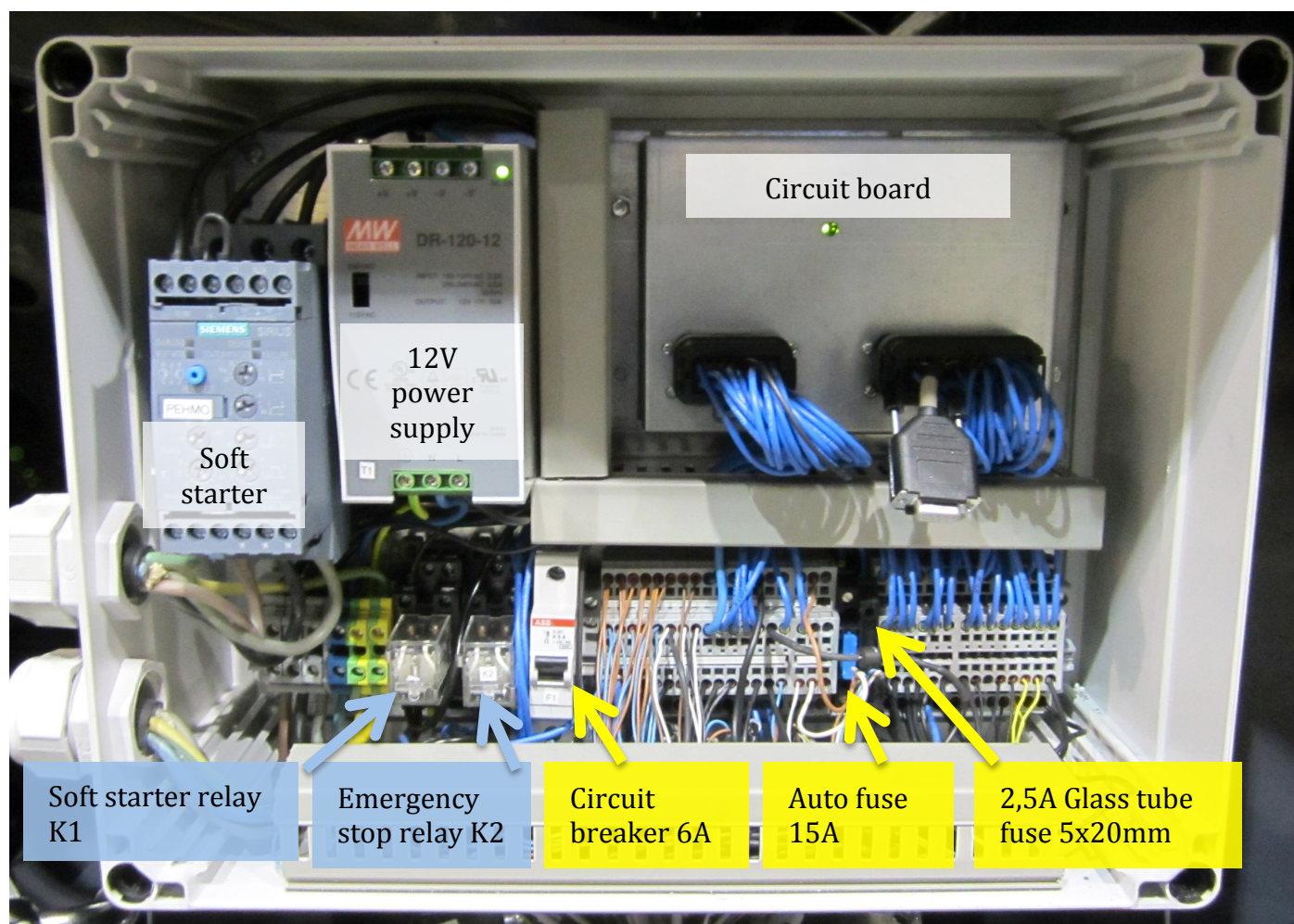


LS-valve in TC-machine.



### 3 Switchboard and soft starter

#### 3.1 Switchboard

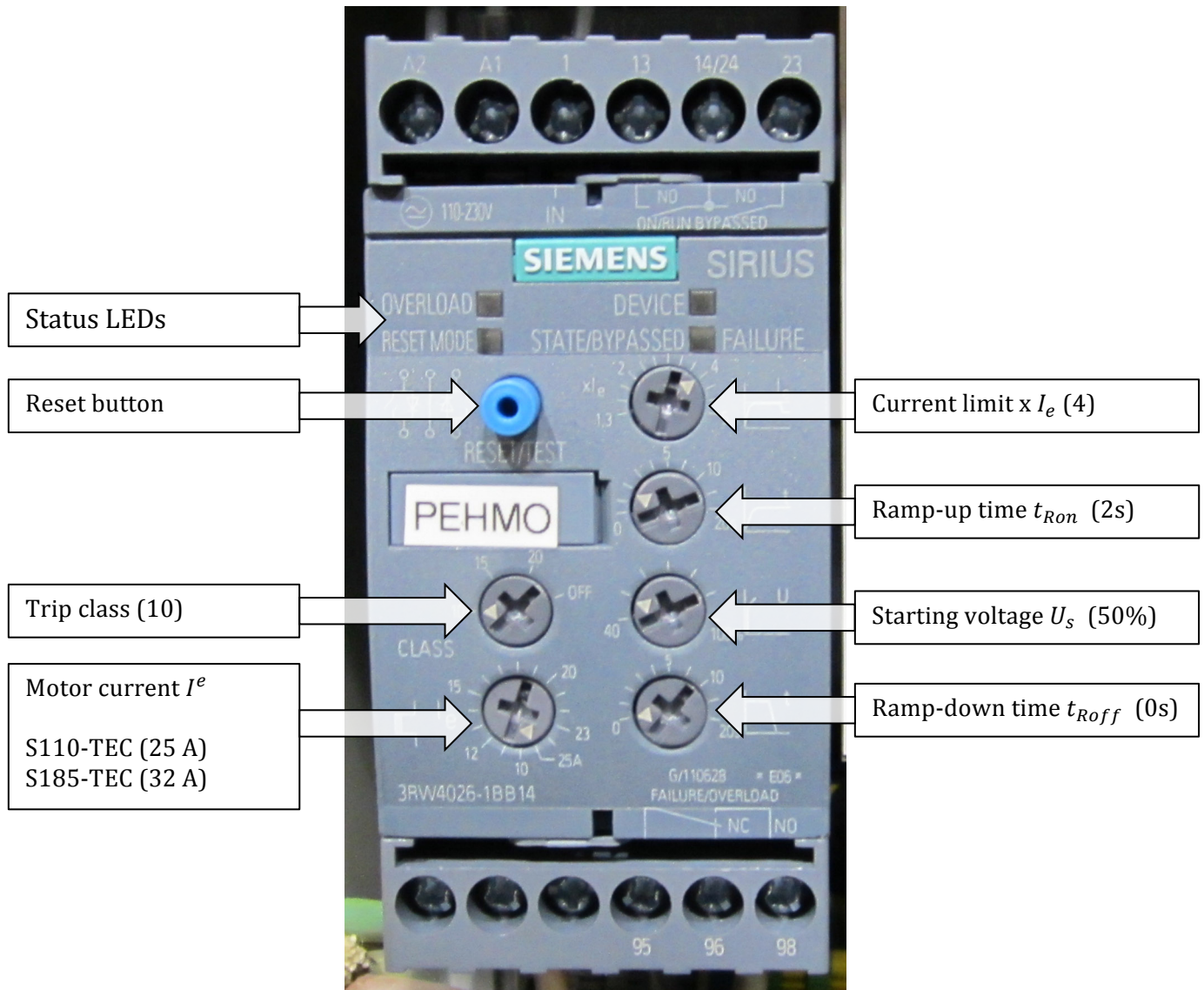


Switchboard from TEC-machine. Soft starter and power supply are only installed in TEC-machines.



### 3.2 Soft starter

Soft starter parameters are marked to the picture (factory settings in parentheses).



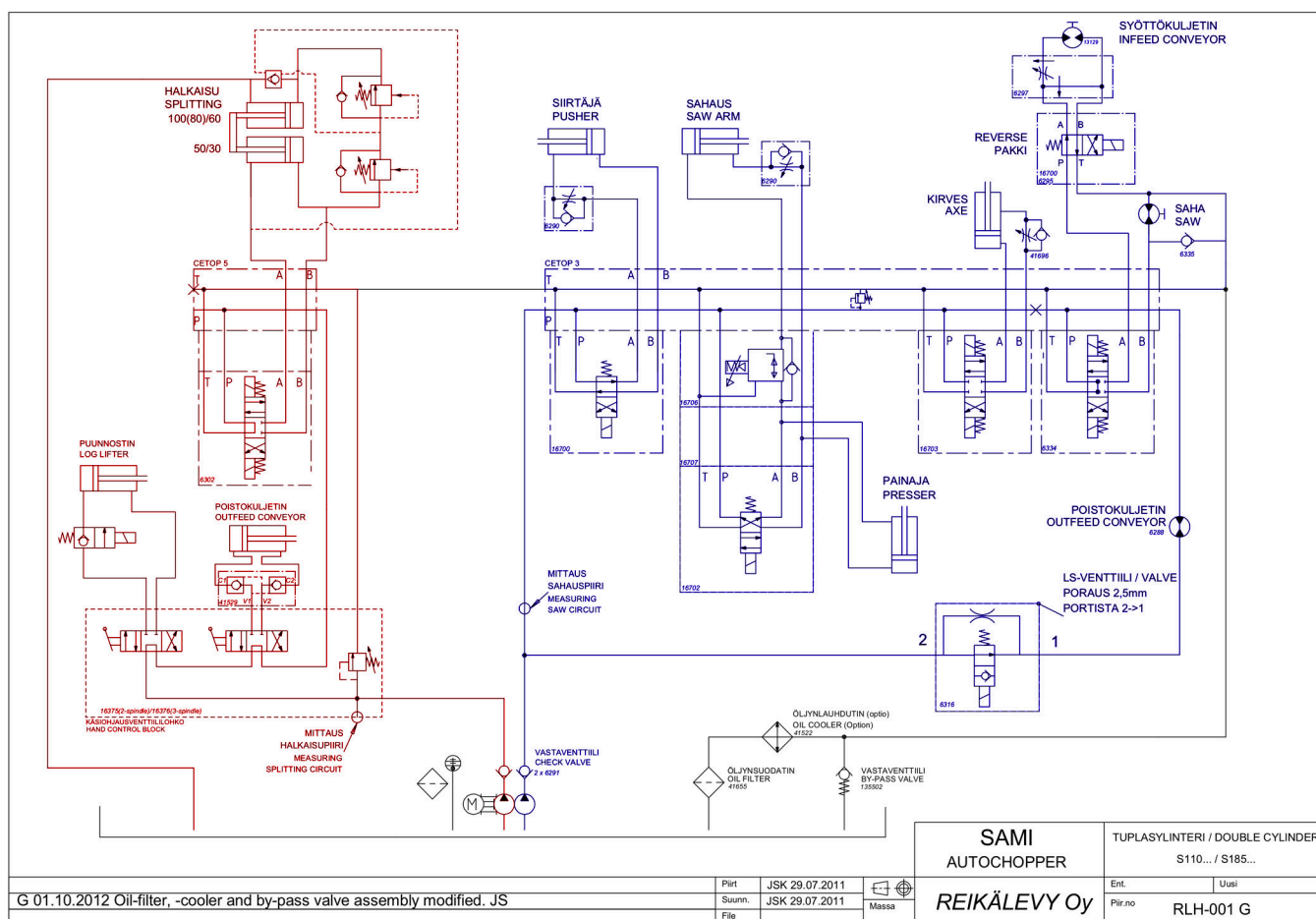
Soft starter from S110-TEC machine.

Soft starter manual is available for download at:

[http://www.industry.usa.siemens.com/automation/us/en/industrial-controls/products/soft-starters/documents/manual\\_sirius\\_softstarter\\_en\\_0110.pdf](http://www.industry.usa.siemens.com/automation/us/en/industrial-controls/products/soft-starters/documents/manual_sirius_softstarter_en_0110.pdf)

## 4 Hydraulic circuits

Autochopper hydraulics consists of two hydraulic circuits, splitting circuit and sawing circuit. Splitting circuit includes splitting cylinder and components connected to manual control valve (log lifter, discharge conveyor side shift, raising and lowering discharge conveyor, external hydraulics). Everything else is connected to the sawing circuit.



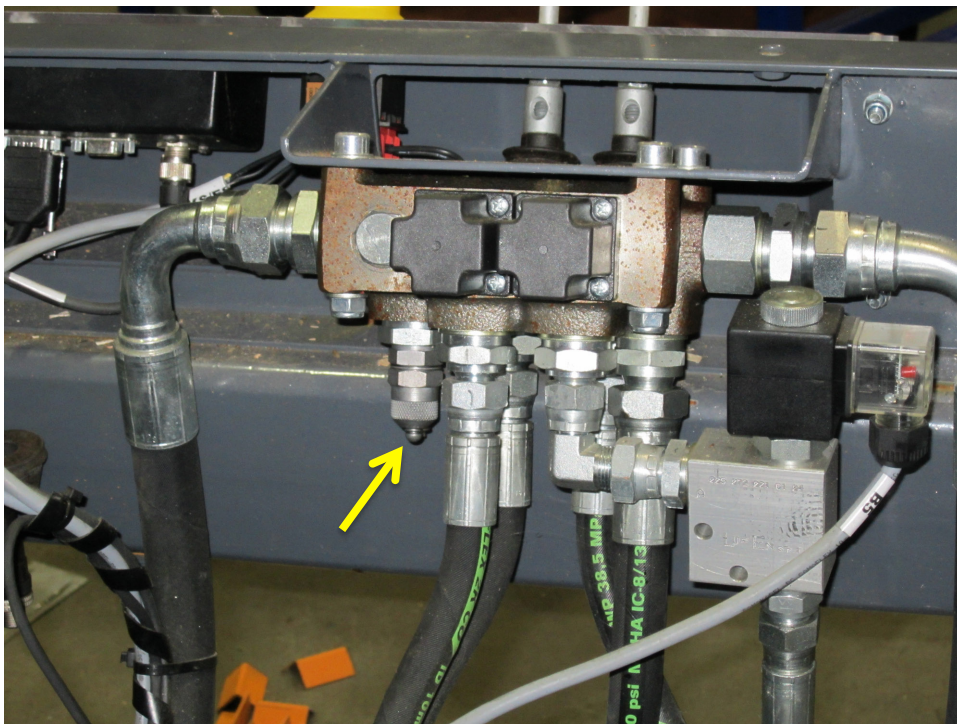
Hydraulic diagram. Splitting circuit marked with red and sawing circuit marked with blue.

## 5 Hydraulic pressure measurement and adjustment

Required tools:

- 4 mm hex key
- 5 mm hex key
- 6 mm hex key
- 13 mm wrench
- 17 mm wrench
- Pressure gauge 0-25 bar
- Pressure gauge 0-250 bar
- Phillips screwdriver

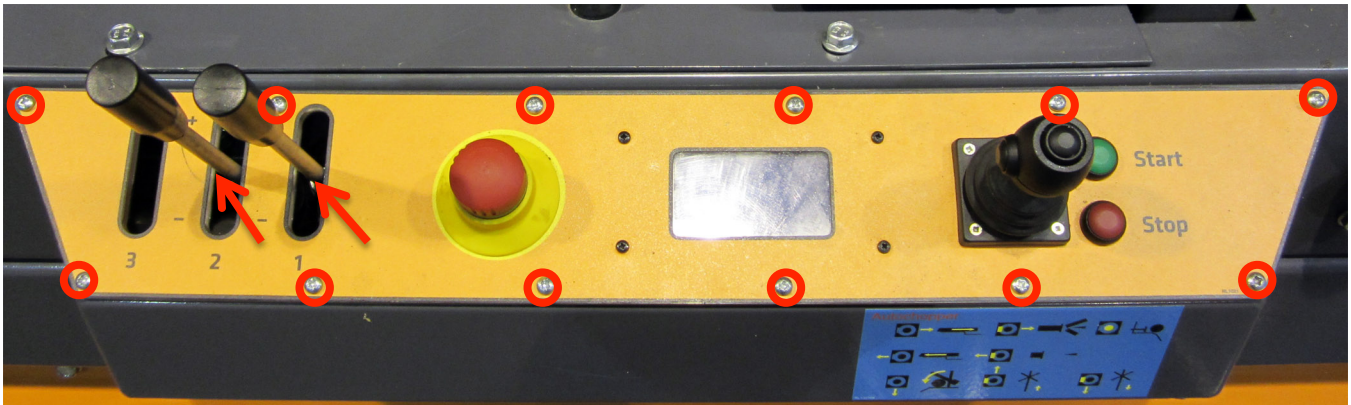
### 5.1 Splitting circuit pressure measurement



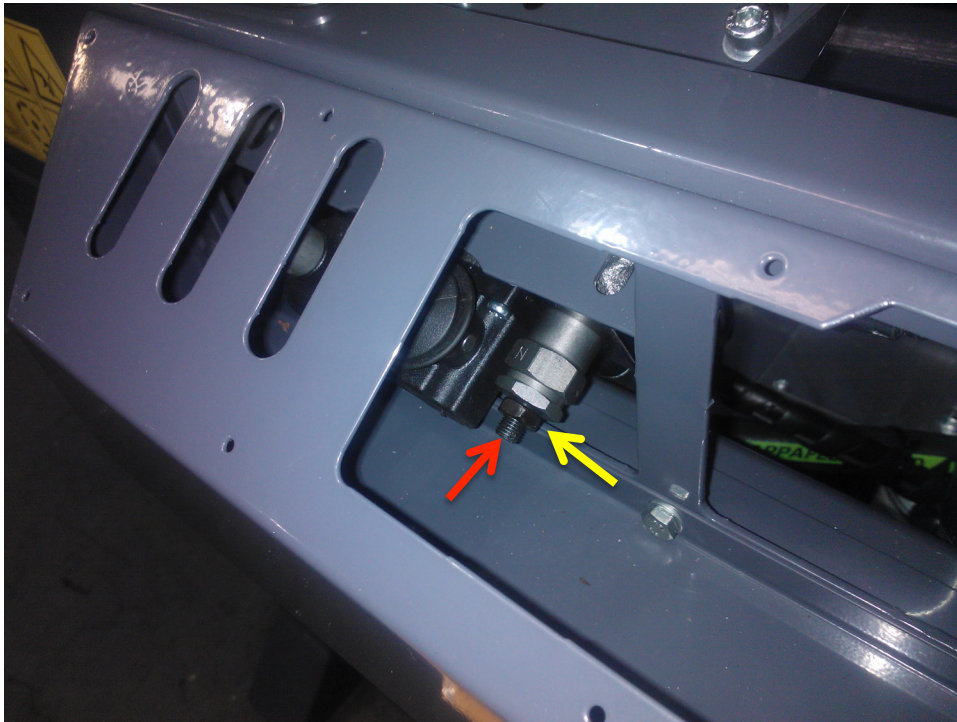
- Splitting circuit pressure is measured from the manual control valve.
- Connect pressure gauge (0-250 bar) to the pressure test coupling marked with yellow arrow (M16x2 thread).
- Stress the circuit by extending the discharge conveyor or lifting the log lifter up.
- Check pressure from pressure gauge.
  
- Splitting circuit adjustment values.
  - S110 models – 170 bar
  - S185 models – 210 bar



## 5.2 Splitting circuit pressure adjustment



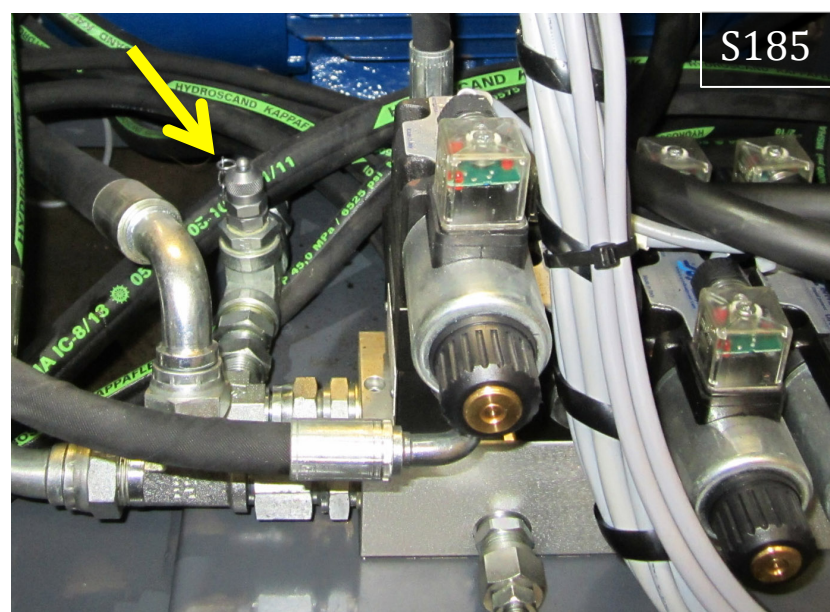
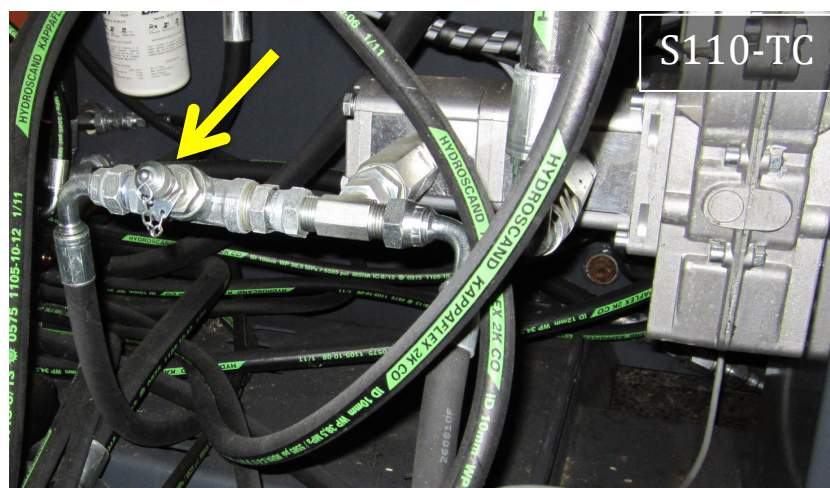
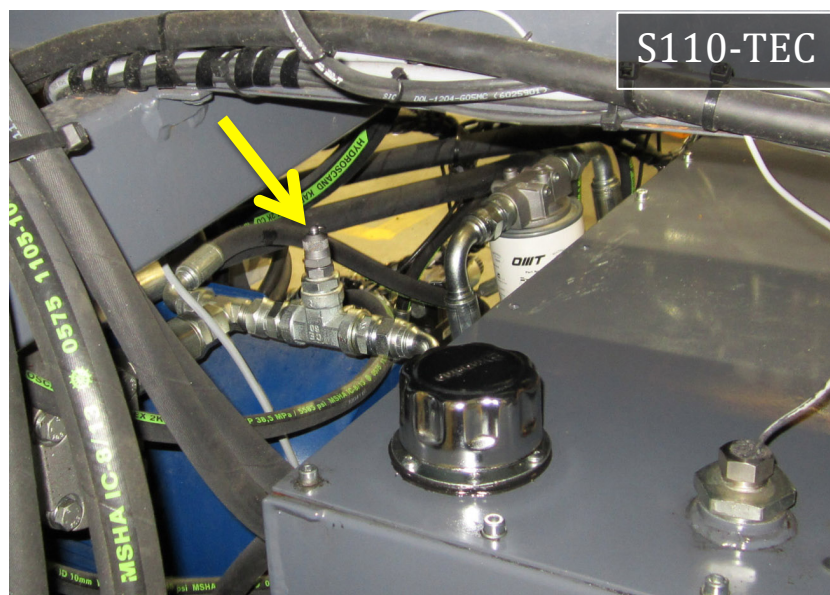
- Unscrew control panel screws (Phillips screwdriver) and manual control valve levers.
- Move control panel to the side.



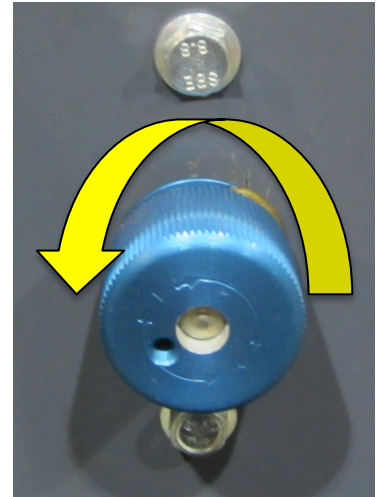
- Connect pressure gauge (0-250 bar) to the pressure test coupling marked with yellow arrow (M16x2 thread).
- Loosen the locknut marked with yellow arrow (13 mm wrench).
- The adjustment screw (4 mm hex key) is marked with red arrow.
- Turning the adjustment screw clockwise increases the pressure. Turning counterclockwise reduces the pressure.
- Tighten locknut after adjustment.



### 5.3 Sawing circuit pressure test couplings



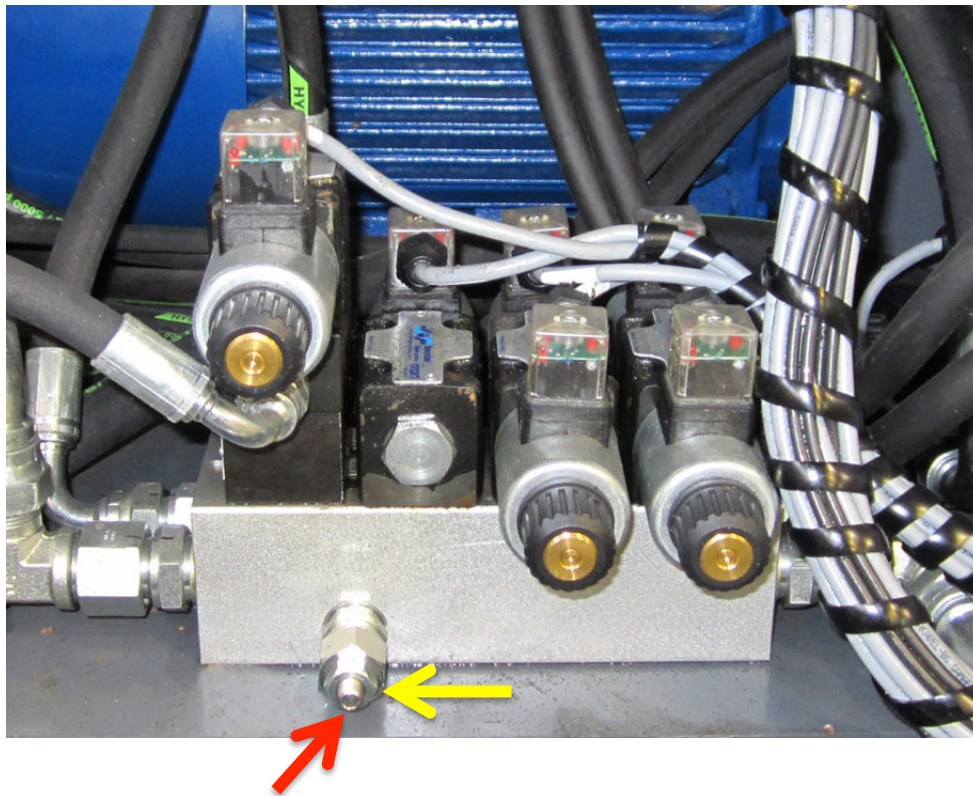
## 5.4 Sawing circuit pressure measurement



- Connect pressure gauge (0-250 bar) to the pressure test coupling (M16x2 thread).
- Place a piece of wood under the cutting unit.
- Adjust saw speed control to maximum speed.  
Saw should hit the wood so hard that the chain stops spinning.
- Saw using the manual mode.
- Check pressure from pressure gauge.
  - Sawing circuit adjustment value is 180 bar in all models.



## 5.5 Sawing circuit pressure adjustment

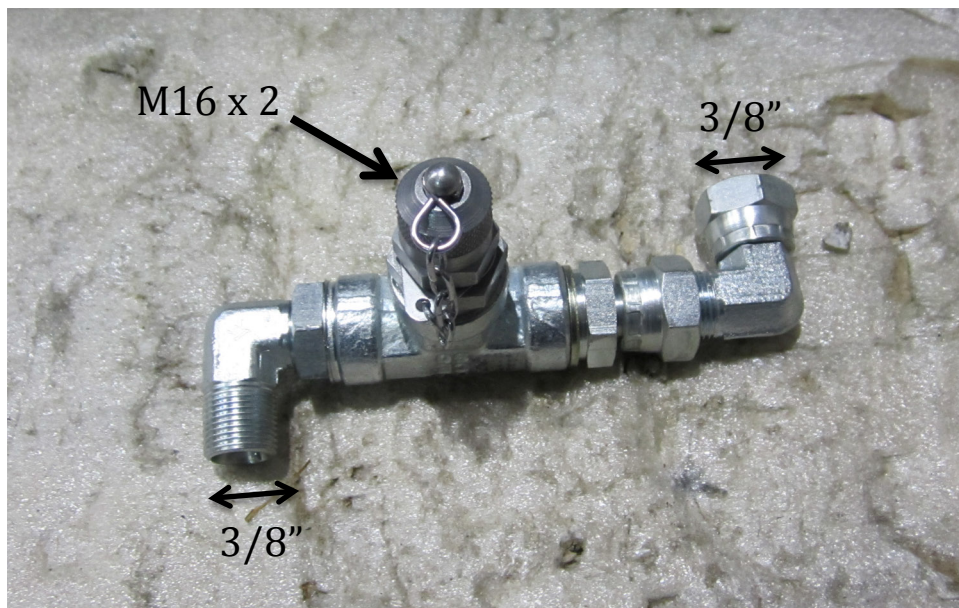


- Sawing circuit pressure is adjusted from the valve block.
- Loosen the locknut marked with yellow arrow (17 mm wrench).
- The adjustment screw is marked with red arrow (5 mm hex key).
- Turning the adjustment screw clockwise increases the pressure. Turning counterclockwise reduces the pressure.
- Tighten locknut after adjustment.

## 5.6 Cutting unit pressure measurement

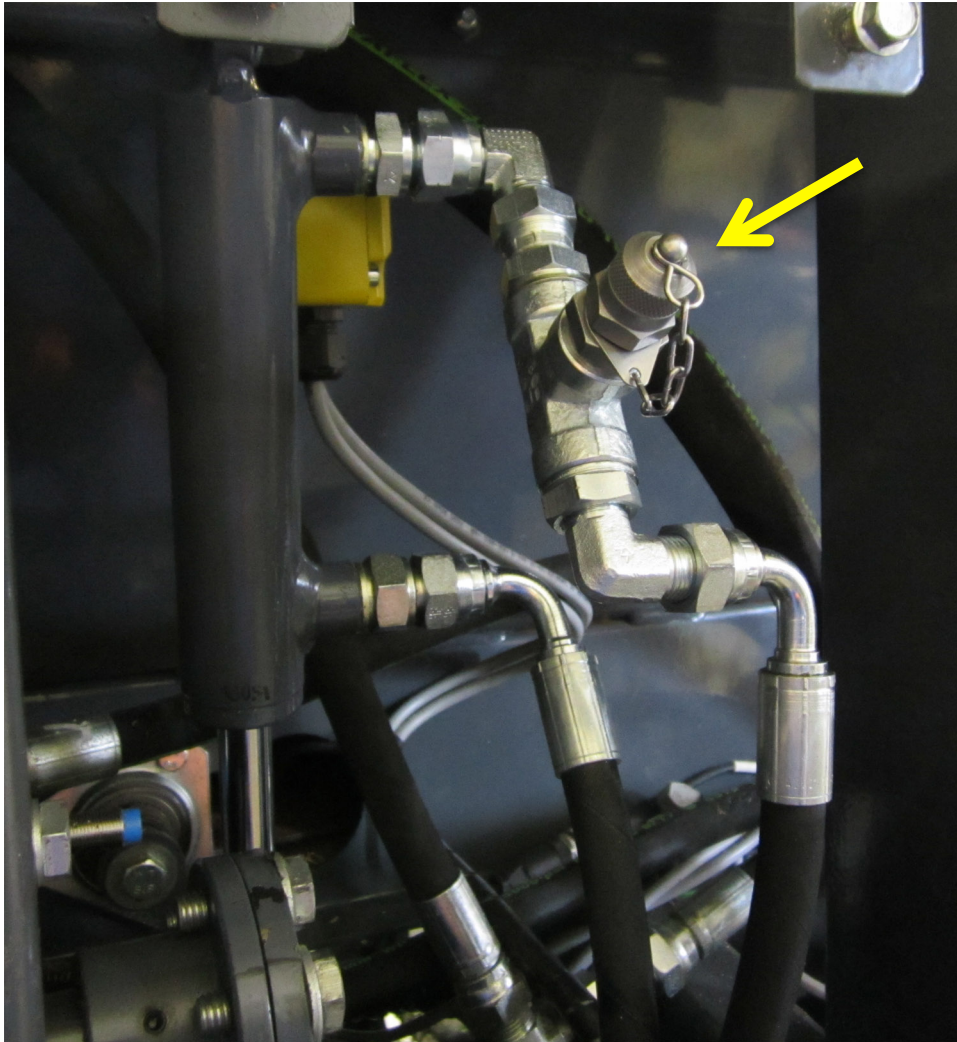


- Remove upper hydraulic hose from the cylinder (22 mm wrench).



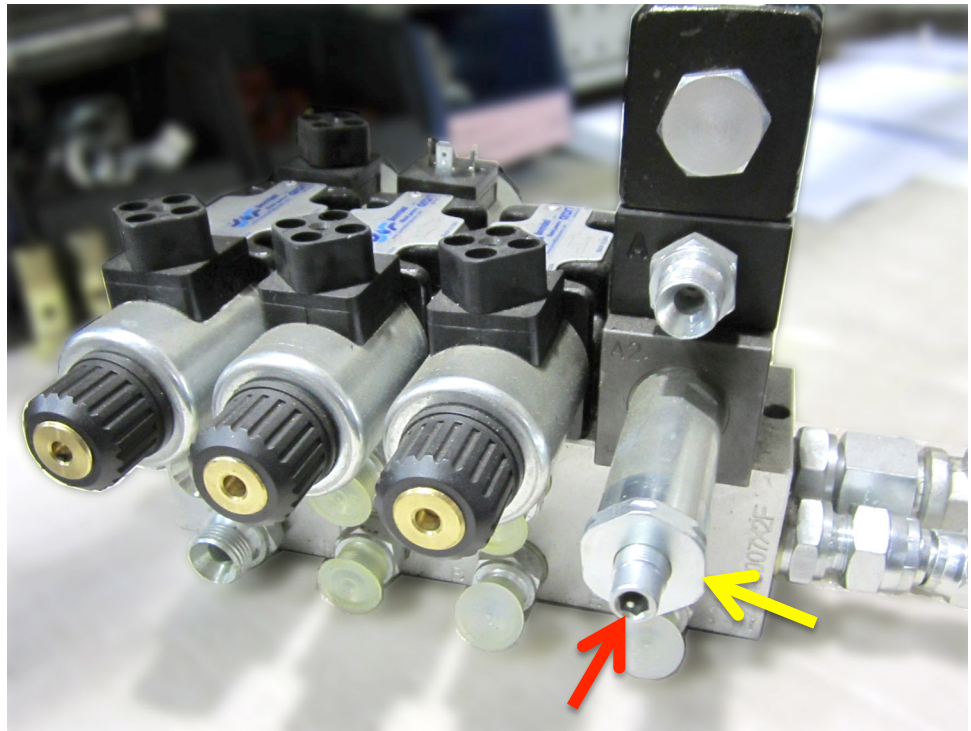
- Connect pressure test coupling between the cylinder and the hydraulic hose.





- Connect pressure gauge to the test coupling marked with yellow arrow.
- Start the machine in manual mode and start sawing.
- Pressure gauge should read 10 bar.
- Adjust pressure if necessary.

## 5.7 Cutting unit pressure adjustment



- Pressure adjustment screw is located in the back of the valve block.
- Loosen the locknut marked with yellow arrow.
- Pressure is adjusted by turning the screw marked with red arrow (6 mm hex key).
- Turning the screw clockwise increases the pressure. Turning counterclockwise decreases the pressure.
- If pressure gauge is unavailable, turn the adjustment screw all the way in and then open the screw 6 full rounds. This sets the pressure to ~10bar.
- Tighten the locknut.

## 6 Sequence valve adjustment

Required tools:

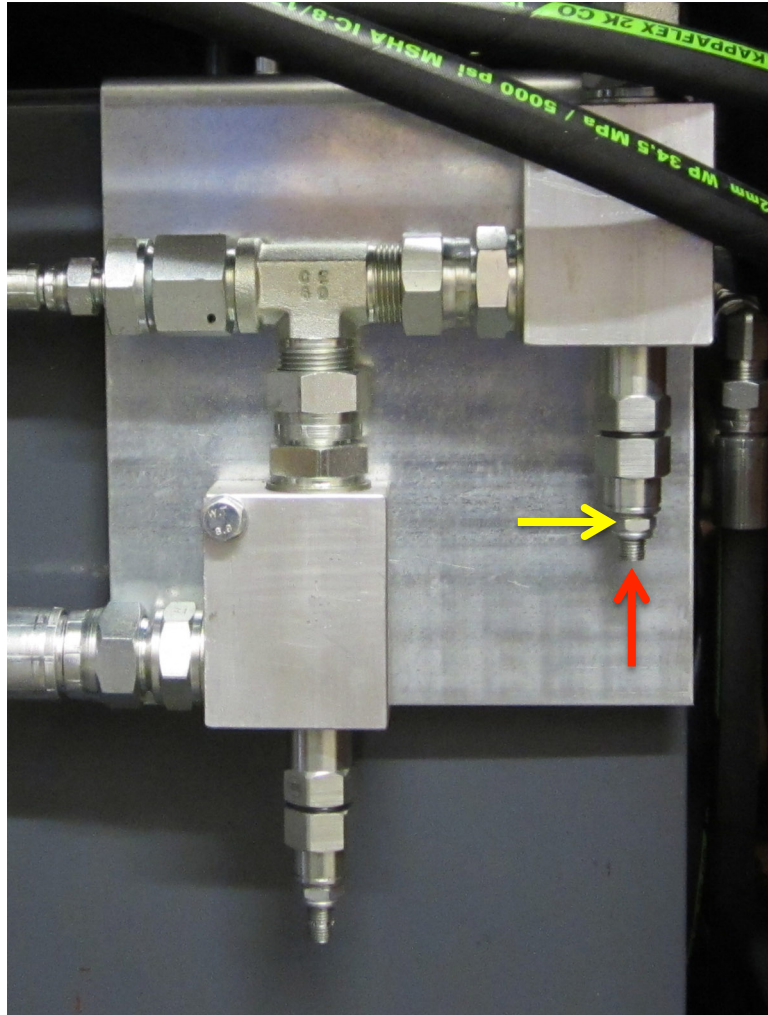
- 4 mm hex key
- 13 mm wrench

Sami Autochopper is equipped with two different size splitting cylinders. Smaller cylinder is fast and bigger cylinder has more power. Sequence valves control transition between the two cylinders. It is possible to adjust the transition by adjusting the sequence valves.



- Place a piece of thick wood sideways in front of the splitting blade.
- The idea is to just stress the splitting cylinders, not split the wood.
- Push the splitting piston against the piece of wood using manual mode.
- Take note of the delay when the bigger cylinder starts to push.
- If the delay is over 3 seconds the sequence valve needs to be adjusted.





- Loosen the locknut marked with yellow arrow (13 mm wrench).
- The adjustment screw (4 mm hex key) is marked with red arrow.
- Turning the adjustment screw clockwise increases the delay between cylinders. Turning counterclockwise reduces the delay.
- Tighten locknut when the delay is appropriate (1-2 seconds).

Warning! Don't adjust the delay too short. Too short delay can slow down the splitting piston movement.



## 7 Angle sensor calibration

Required tools:

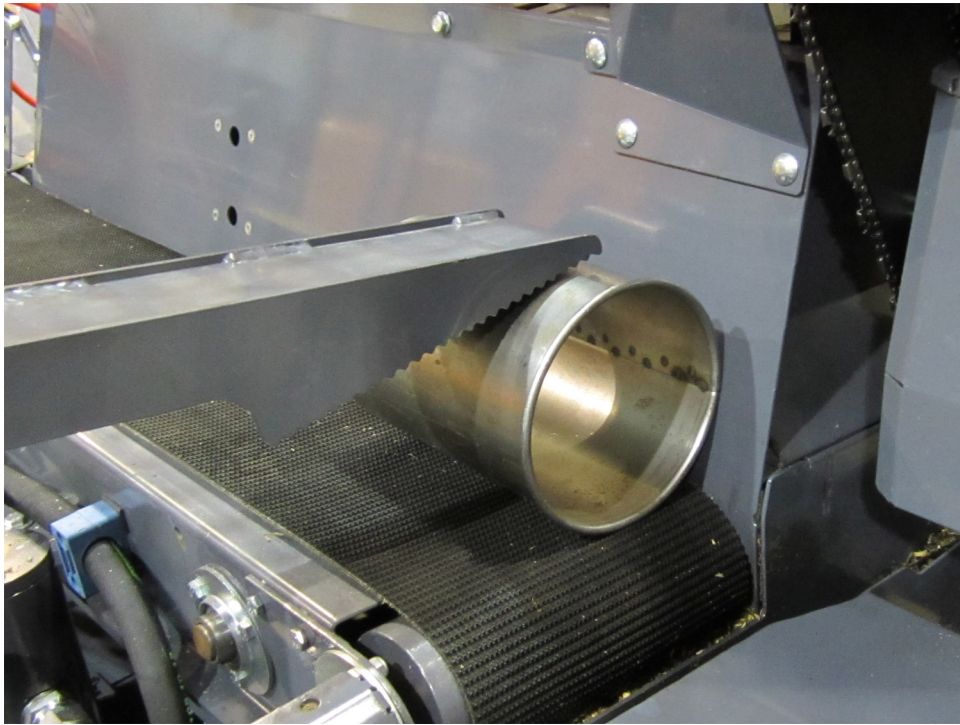
- 3 mm hex key
- 5 mm hex key
- 8 mm wrench

Angle sensor calibration needs to be checked if the wood counter isn't working properly or the splitting blade isn't centering correctly.



A round cylinder is needed for the calibration.

## 7.1 Checking presser calibration



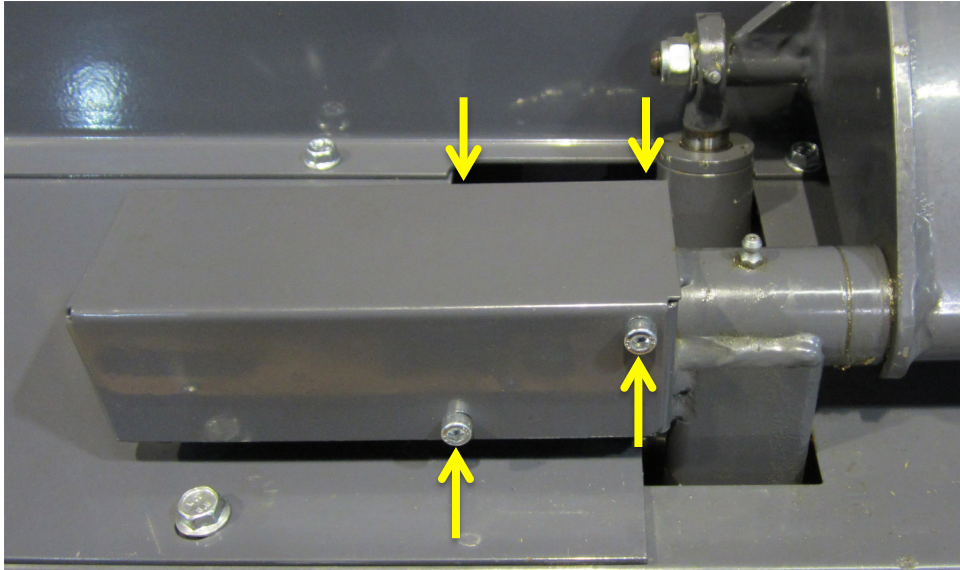
- Place cylinder (for example 160 mm) under the presser.

```
Back  Menu
User setup
Machine info
Service menu
I/O states
```

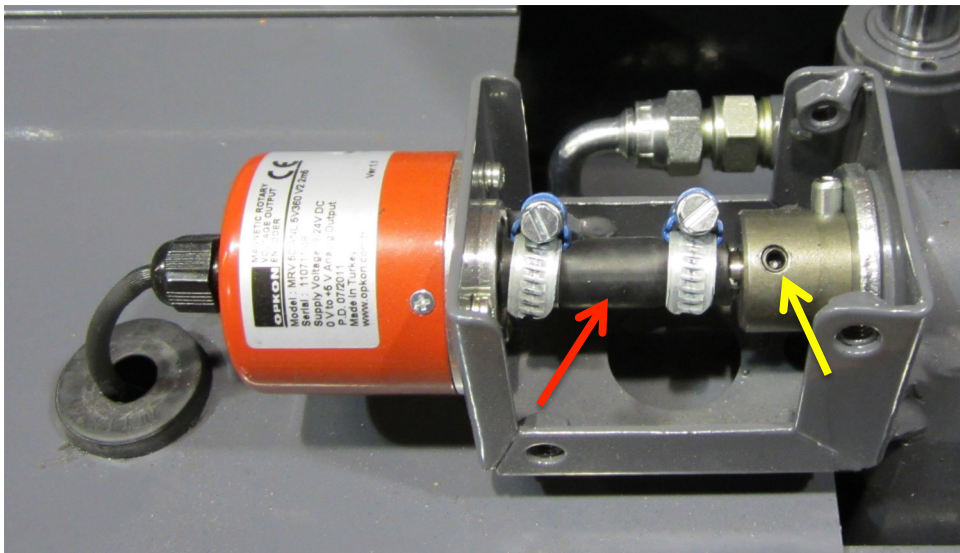
```
I/O states
Presser adc: 940
Presser value: 160mm
Axe adc: 630
Axe value: 250mm
```

- Open menu from the control panel and choose "I/O states".
- Check that the presser value matches the cylinder diameter.
- If presser value differs from the cylinder diameter, the angle sensor needs to be calibrated.

## 7.2 Presser angle sensor calibration



- Remove angle sensor cover (5 mm hex key).



- Loosen the lock screw marked with yellow arrow (3 mm hex key).
- Presser value is adjusted by rotating the shaft marked with red arrow.

```

Back    Menu
User setup
Machine info
Service menu
I/O states
  
```

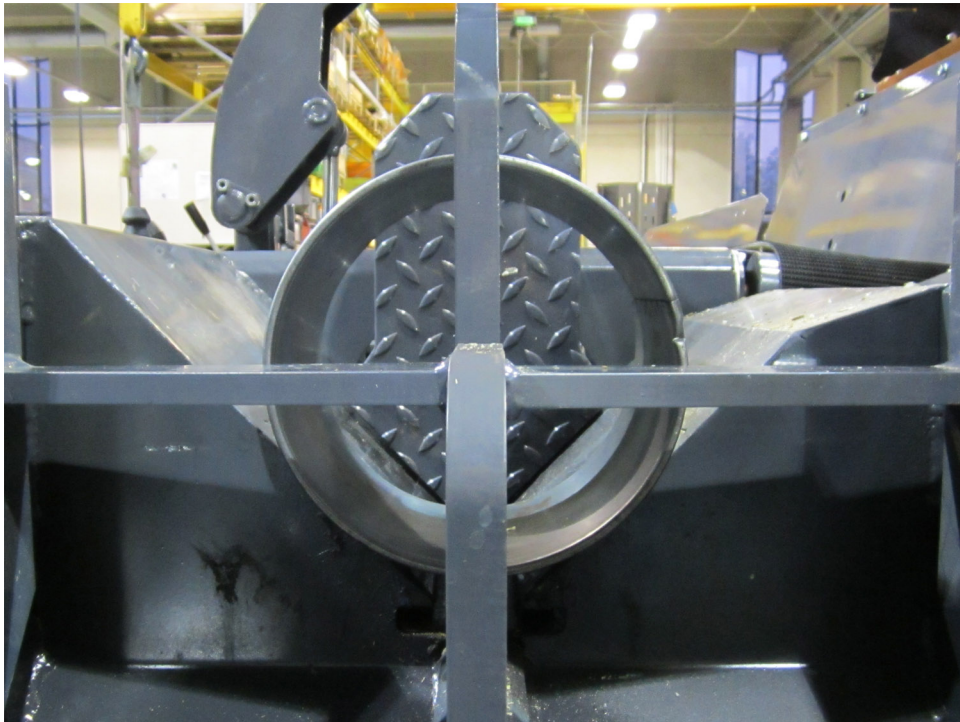
```

I/O states
Presser adc: 940
Presser value: 160mm
Axe adc: 630
Axe value: 250mm
  
```

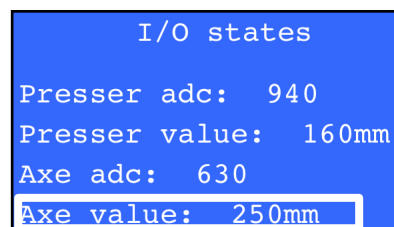
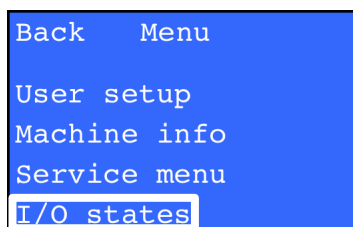
- Rotate the shaft until presser value matches the cylinder diameter.
- Tighten lock screw.
- Reinstall angle sensor cover.



### 7.3 Checking splitting blade calibration

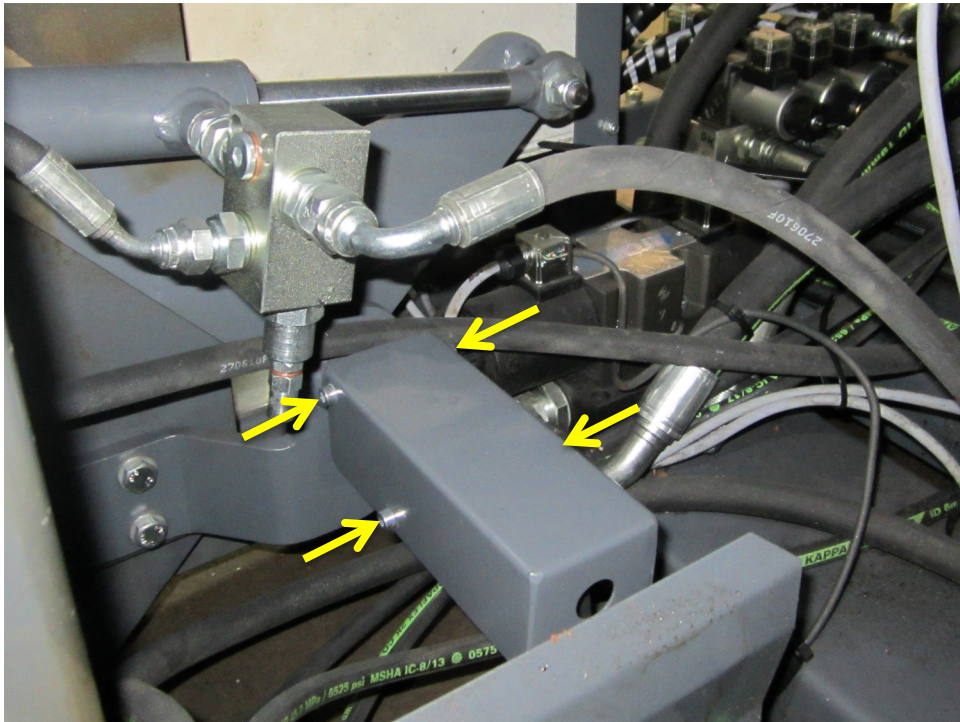


- Place cylinder (for example 250mm) in front of the splitting blade and center the blade using the manual mode.



- Open menu from the control panel and choose "I/O states".
- Check that the axe value matches the cylinder diameter.
- If axe value differs from the cylinder diameter, the angle sensor needs to be calibrated.

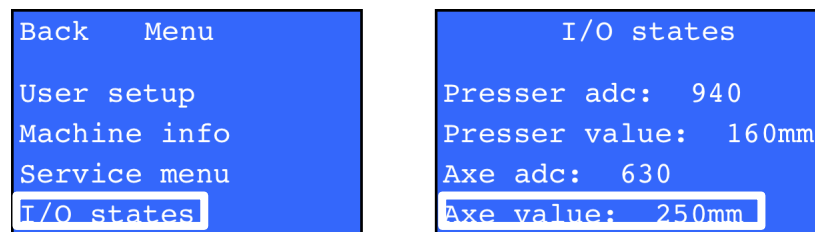
## 7.4 Splitting blade angle sensor calibration



- Remove angle sensor cover (5 mm hex key).



- Loosen the lock screw marked with yellow arrow (8 mm wrench).
- Presser value is adjusted by rotating the shaft marked with red arrow.



- Rotate the shaft until presser value matches the cylinder diameter.
- Tighten lock screw.
- Reinstall angle sensor cover.



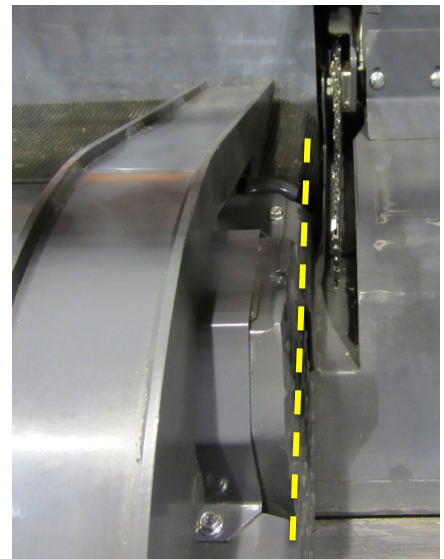
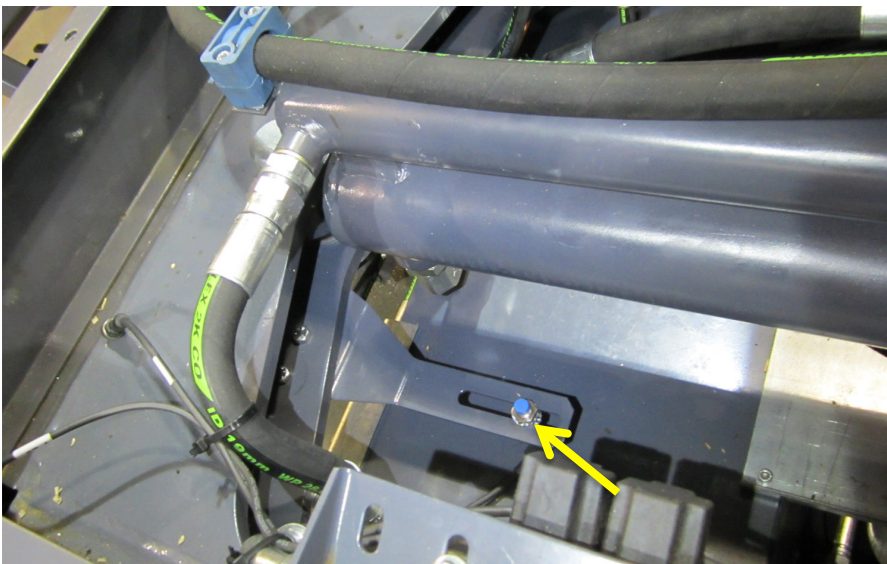
## 8 Inductive sensors

Required tools:

- 17 mm wrench
- 24 mm wrench
- 5 mm hex key

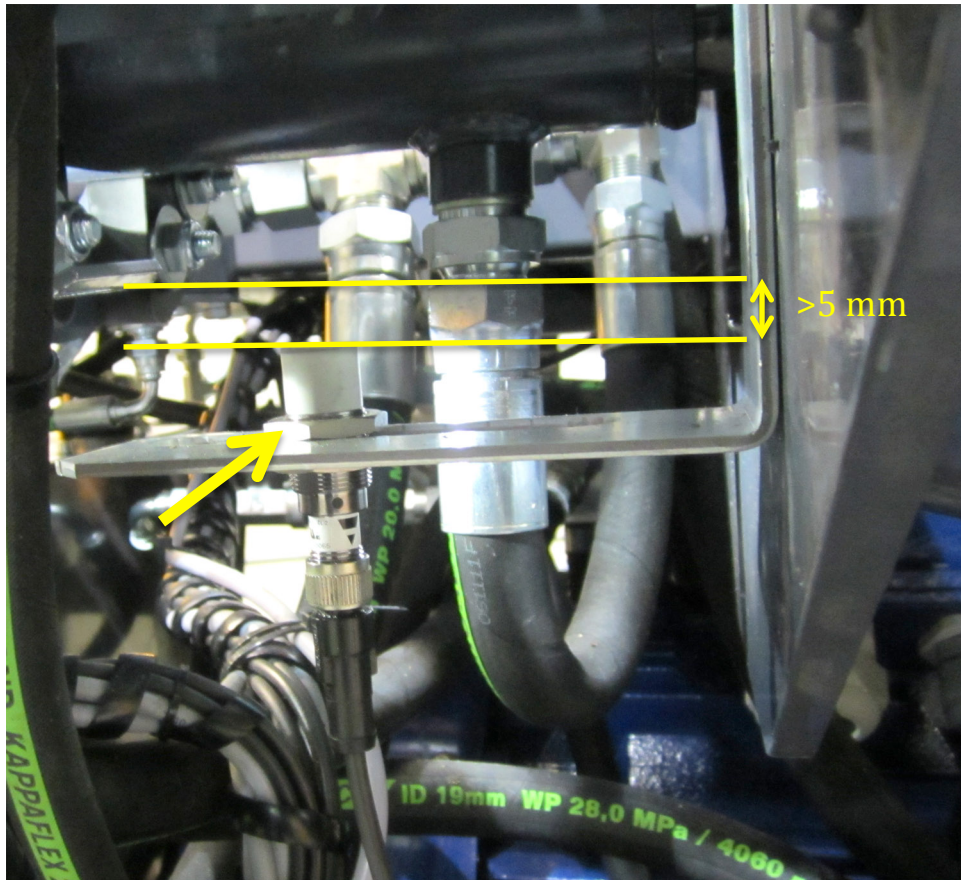
Before adjusting the inductive sensors make sure that the oil temperature sensor is intact.

### 8.1 Splitting piston back limit



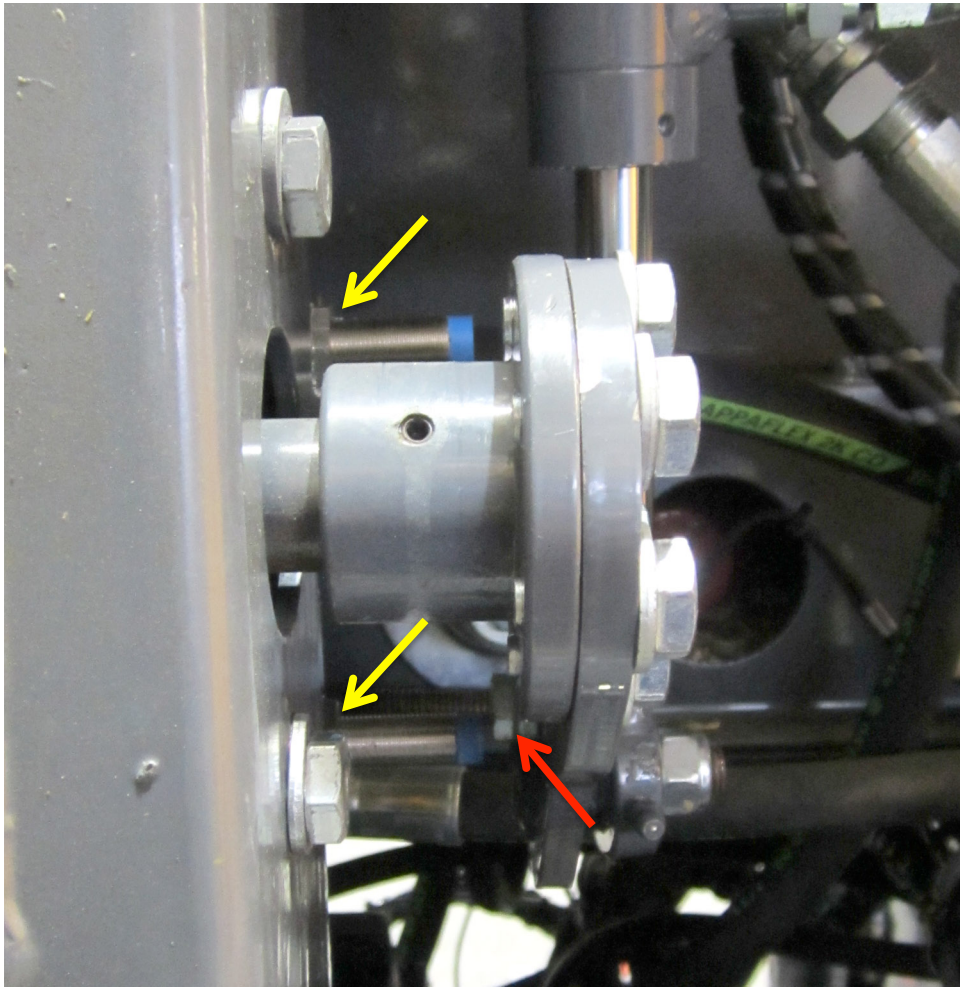
- Sensing distance of the sensor is 8 mm.
- Loosen the locknut marked with yellow arrow (17 mm wrench) and move the sensor so that the splitting piston stops at the same level with the feed table.
- Leave about 4 mm space between the sensor and identifier plate.

## 8.2 Splitting piston front limit



- Sensing distance of the sensor is 14 mm.
- Loosen the locknut marked with yellow arrow (24 mm wrench) and move the sensor so that the splitting piston goes as close as possible to the splitting blade without hitting it.
- Leave at least 5 mm space between the sensor and identifier plate because the splitting piston moves a bit vertically when under heavy load.

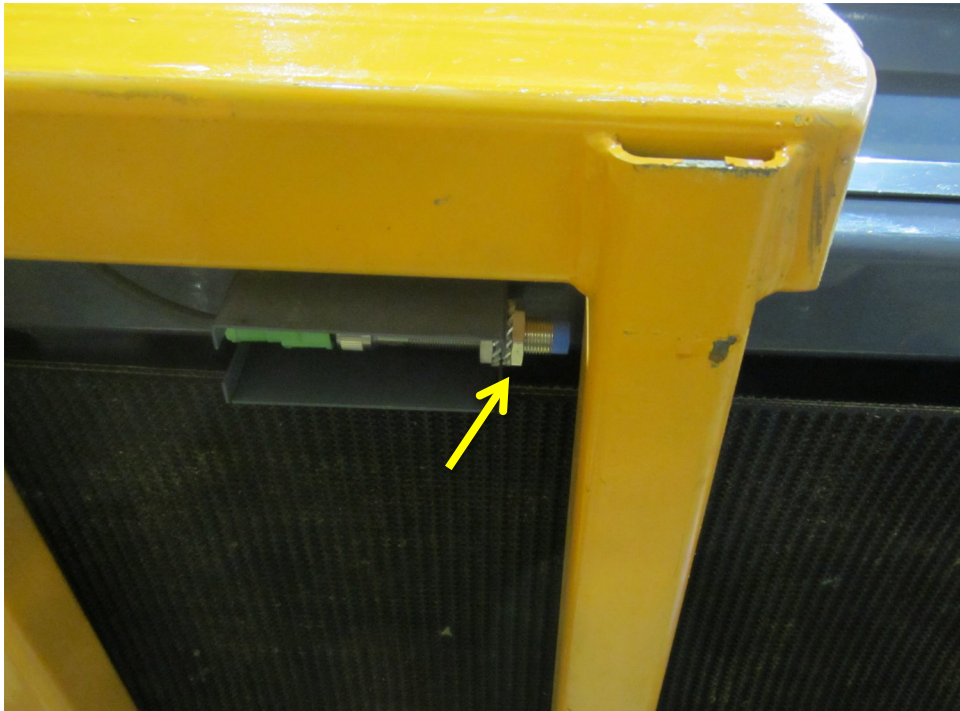
### 8.3 Cutting unit



- Sensing distance of the sensors is 8 mm.
- Loosen the locknuts marked with yellow arrows (17 mm wrench) and move the sensors so that there's about 2 mm between the sensors and the screw marked with red arrow.
- If the sensors need to be adjusted vertically, loosen the sensor holders (5 mm hex key) and move the holders.



## 8.4 Log lifter



Log lifter sensor is attached to the feed conveyor.

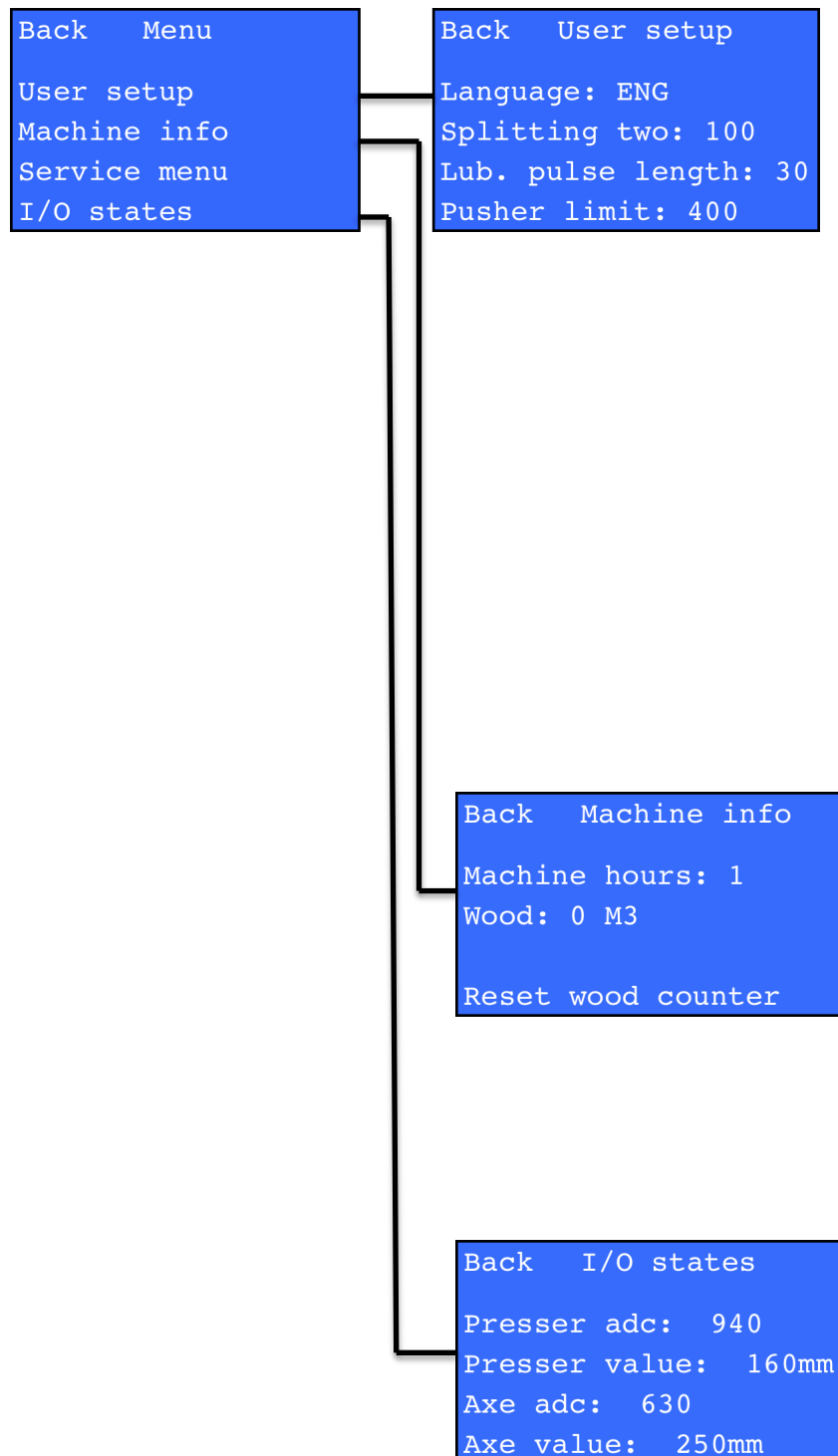
- Sensing distance of the sensor is 8 mm.
- Loosen the locknut marked with yellow arrow (17 mm wrench) and move the sensor so that there's about 2 mm between the sensor and the log lifter.
- Adjust sensor vertically so that the log lifter is flush with the feed conveyor.



Log lifter flush with the feed conveyor.

## 9 Control panel settings

### 9.1 User settings



#### Language:

Language selection.

#### Splitting two:

Wood smaller in diameter than the set value is split in half.

#### Lub. pulse length:

Chain oil pump adjustment.  
Increasing the value supplies more oil to the chain and decreasing the value supplies less oil.

#### Pusher limit:

Adjusts LS-valve operation with the pusher. Setting is not in use in newest software versions.

#### Machine hours:

Machine operating hours.

#### Wood:

Amount of wood gone through the machine in solid cubic meters.

#### Reset wood counter:

Resets the wood counter.

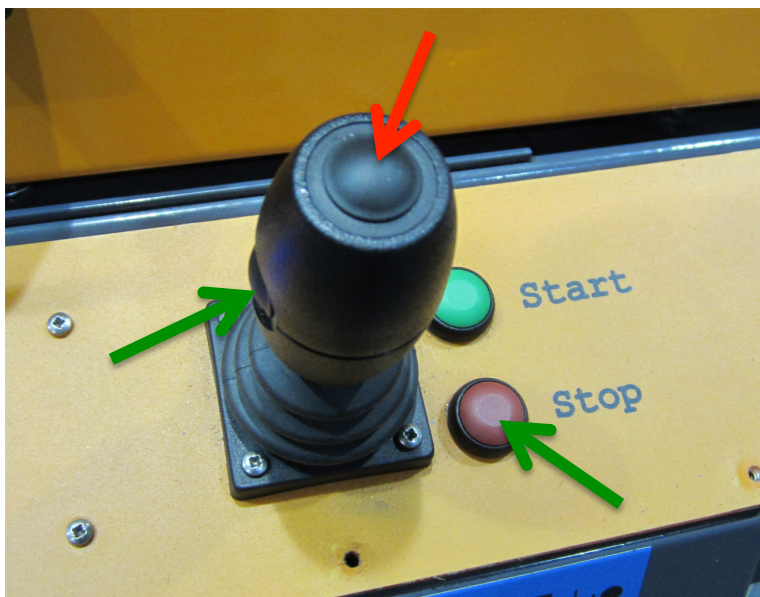
#### Presser value:

Wood diameter measured by the presser in millimetres.

#### Axe value:

Splitting blade state in millimetres.

## 9.2 Service menu



To access the service menu open the menu from control panel.

Move selection to "Service menu".

Hold down joystick side button and stop button (green arrows).

While holding down the buttons press the button on top of the joystick (red arrow).

```
Back  Service menu
Sensors
Function
Set defaults
I/O states
```

```
Back  Sensors
Log diameter
Axe position
Encoder
```

### Log diameter:

Conversion table for presser angle sensor output to wood thickness.

*Values are set correctly at the factory and there's no need to change them.*

### Axe position:

Conversion table for splitting blade angle sensor output to splitting blade position.

*Values are set correctly at the factory and there's no need to change them.*

### Encoder:

See more at the section "cutting length adjustment".



```

Back  Service menu
Sensors
Function
Set defaults
I/O states

```

```

Back  Function
Sensor distance: 710
Diam. Meas. Delay: 210
Pusher F delay: 215
Pusher B delay: 110
Sawing time: 2200
Saw up time: 600
Splitting F time: 1800
Splitting B time: 1500
Lub. pulse length: 30
Language: ENG
Reverse: 1

```

**Sensor distance:**

Distance from photoelectric sensors to cutting unit. Only affects the length of the first and last cut from the wood. See more at the section “cutting length adjustment”.

**Diam. Meas. Delay:**

Delay between presser control valve activation and wood thickness measurement.

**Pusher F delay:**

Defines how long the pusher is moved forward in order to push the wood to splitting spout.

**Pusher B delay:**

Defines how long pusher is waited to move back before continuing operation.

**Sawing time:**

Defines the time in which the saw must reach lower inductive sensor. If the time is exceeded the sawing procedure is repeated 5 times. If the inductive sensor is still not reached machine operation is stopped.

**Saw up time:**

Defines the time in which rising saw must reach upper inductive sensor.

**Splitting F time:**

Defines the time in which forward moving splitting piston must reach the front limit.

**Splitting B time:**

Defines the time in which backward moving splitting piston must reach the back limit.

**Lub. Pulse. Length:**

Chain oil pump adjustment. Increasing the value supplies more oil to the chain and decreasing the value supplies less oil.

**Language:**

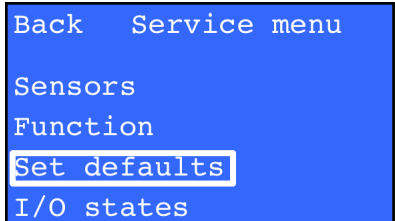
Language selection.

**Reverse:**


Feed conveyor reverse.

1 – Reverse active.

0 – Reverse inactive.

A screenshot of a blue menu screen with white text. The text is arranged in a list: 'Back', 'Service menu', 'Sensors', 'Function', 'Set defaults' (highlighted with a white box), and 'I/O states'.

Back    Service menu  
Sensors  
Function  
Set defaults  
I/O states

A screenshot of a blue menu screen with white text. The text is arranged in a list: 'Back', 'RESET', 'Restore settings' (highlighted with a white box), and 'ATTENTION! Restores factory settings'.

Back    RESET  
Restore settings  
ATTENTION! Restores  
factory settings

**Restore settings:**

Restores factory settings.

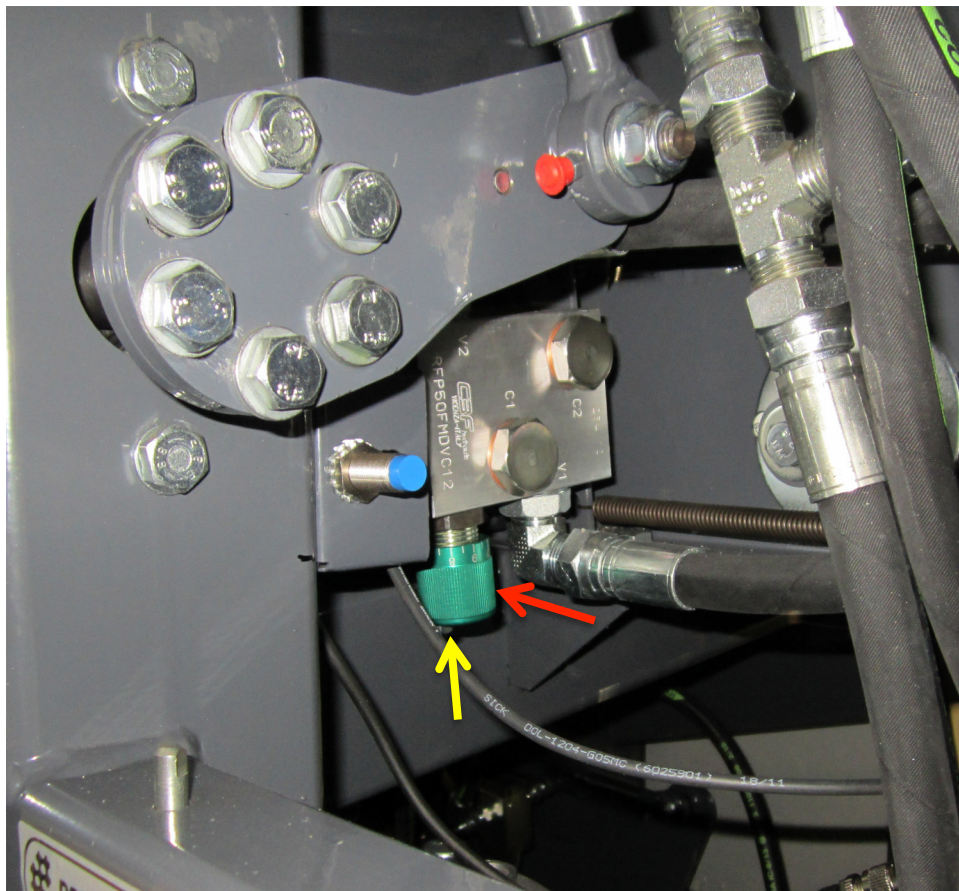
Check cutting length after  
restoring settings.

## 10 Cutting length adjustment

Required tools:

- 3 mm hex key
- 10 mm wrench
- Tape measure

Before adjusting cutting length make sure that the wood isn't slipping on the feed conveyor. In order to stop the wood from slipping the feed conveyor must be set to slow enough speed. Also make sure that the oil temperature sensor is intact.



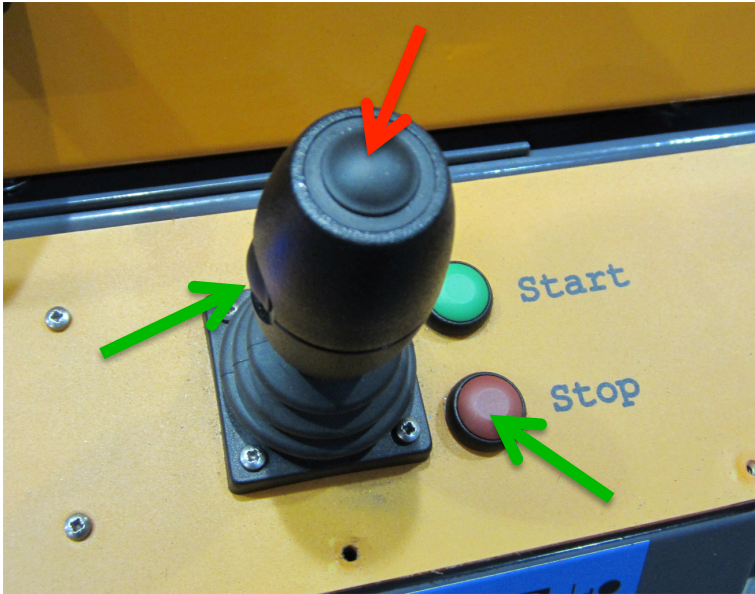
Speed control is located in the feed conveyor hydraulic motor.

- Open the lock nut (10 mm wrench) and lock screw (3 mm hex key) marked with yellow arrow.
- Speed is adjusted from the controller marked with red arrow. Turning clockwise slows down and turning counterclockwise speeds up the conveyor belt.
- Factory setting is 2 rounds clockwise. This setting works well in dry conditions.
- In snowy or icy conditions the conveyor belt must be slowed down more.
- Check cutting length after adjusting the speed.

**ATTENTION!** When using external feed table conveyor speeds must be matched with Autochopper.



If cutting length is incorrect after adjusting the speed of feed conveyor, machine settings need to be changed. Settings are located in the control panel service menu.



To access the service menu open the menu from control panel.

Move selection to "Service menu".

Hold down joystick side button and stop button (green arrows).

While holding down the buttons press the button on top of the joystick (red arrow).

```
Back  Service menu
Sensors
Function
Set defaults
I/O states
```

```
Back  Sensors
Log diameter
Axe position
Encoder
```

```
Back  Encoder
Enc. ratio: 110
Basic advance: -15
```

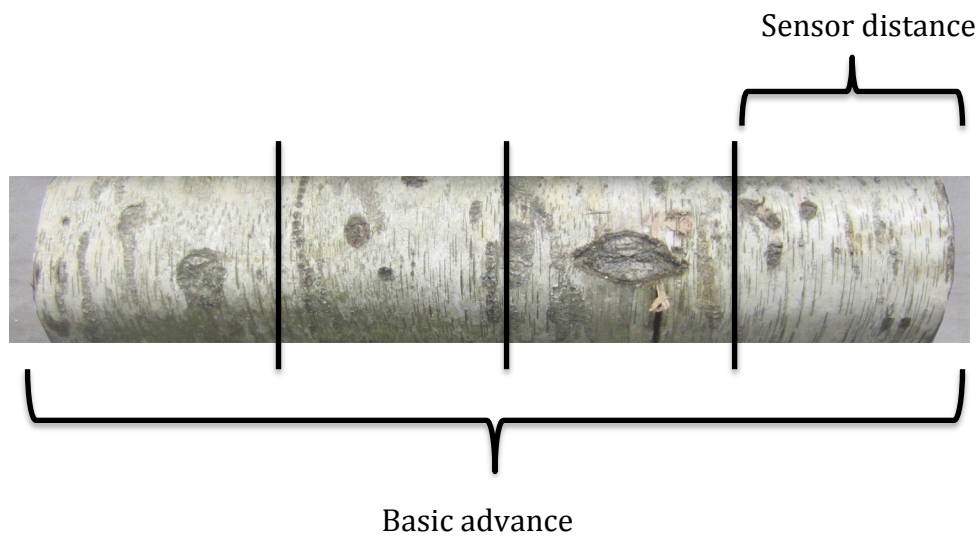
Encoder ratio is the ratio between feed conveyor angle sensor reading and cutting length. Encoder ratio must always be 110.

Basic advance is used for fine-tuning the cutting length. Increasing basic advance shortens the cutting length and decreasing basic advance lengthens the cutting length.

```
Back  Service menu
Sensors
Function
Set defaults
I/O states
```

```
Back  Function
Sensor distance: 710
```

Sensor distance is the distance from photoelectric sensors to cutting unit. Changing the value only affects the length of the first and last cut from the wood. Increasing the value increases the cutting length and decreasing the value shortens the cutting length.

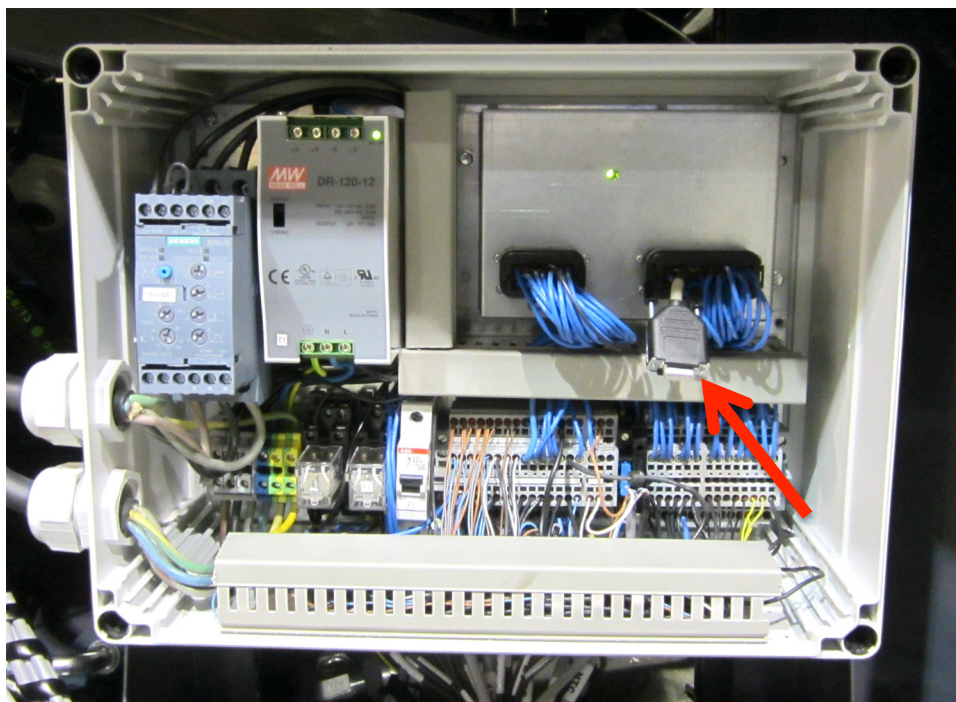


Start cutting length adjustment by test driving the machine and measuring chopped wood on the discharge conveyor. First adjust the basic advance.

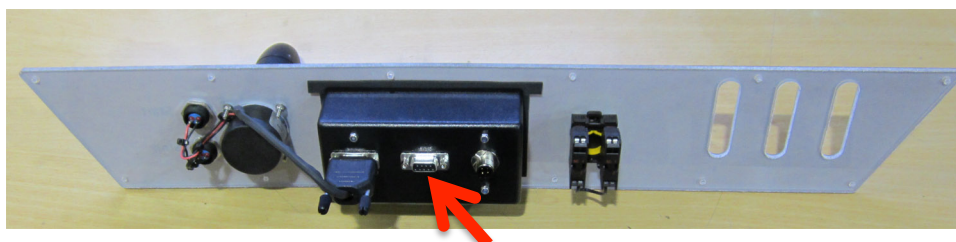
- At first, don't pay attention to the first and last piece of wood. These should be adjusted last.
- If chopped wood is too short -> decrease basic advance.
- If chopped wood is too long -> increase basic advance.
- When basic advance is set correctly, adjust the first and last pieces to correct length by changing the sensor distance.
  - Increasing sensor distance lengthens the cutting length.
  - Decreasing sensor distance shortens the cutting length.

## 11 Programming

Computer equipped with RS-232 port (or USB – RS-232 converter), programming cable and software are needed for programming. Programming software is available for download at: <http://www.flashmagictool.com/>.



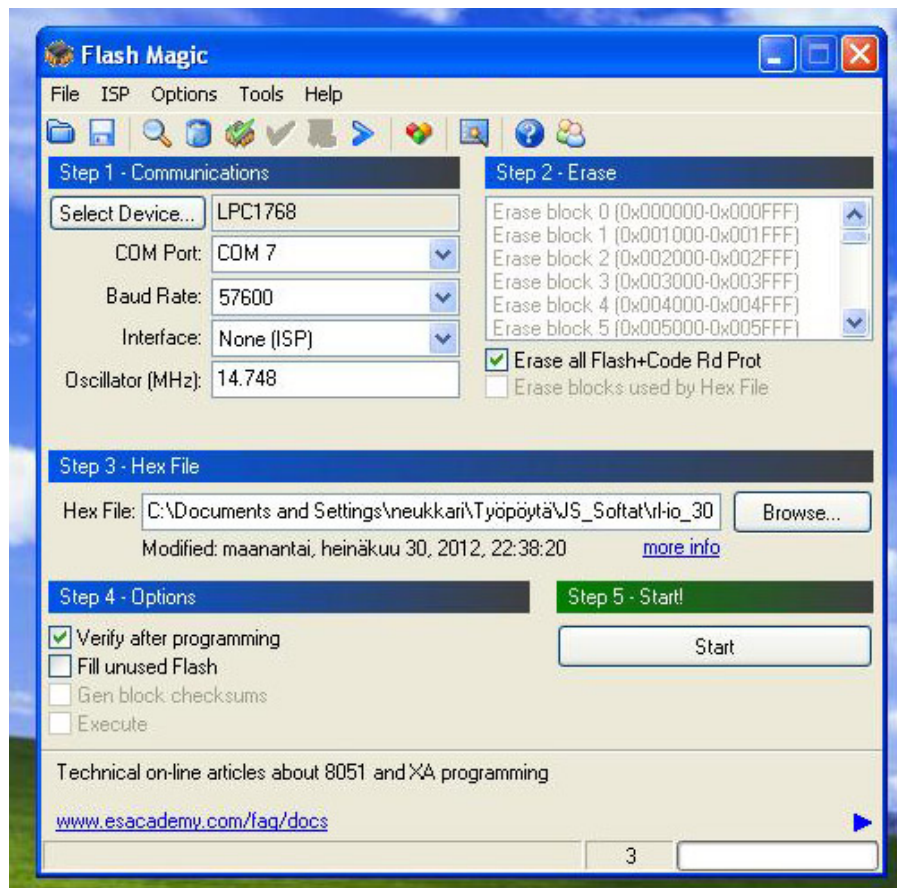
Circuit board programming connector is located in the switchboard.



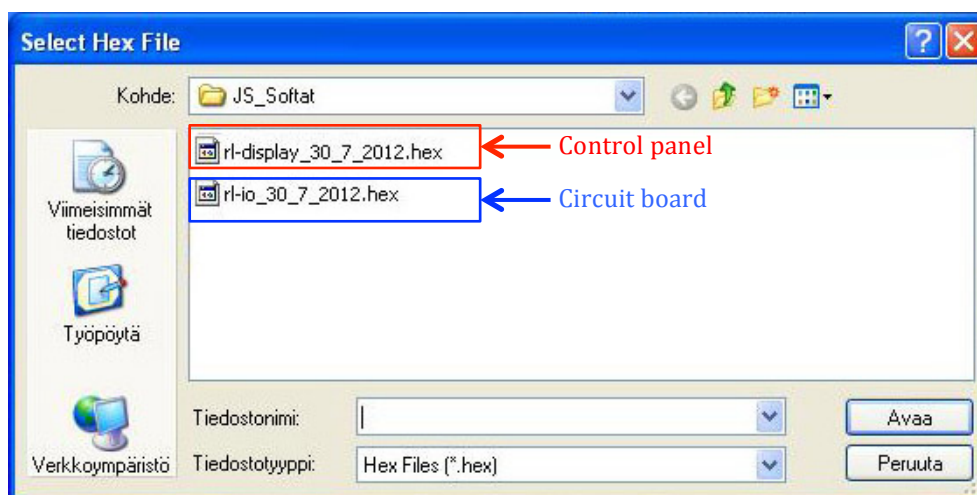
Control panel programming connector is located behind the control panel.



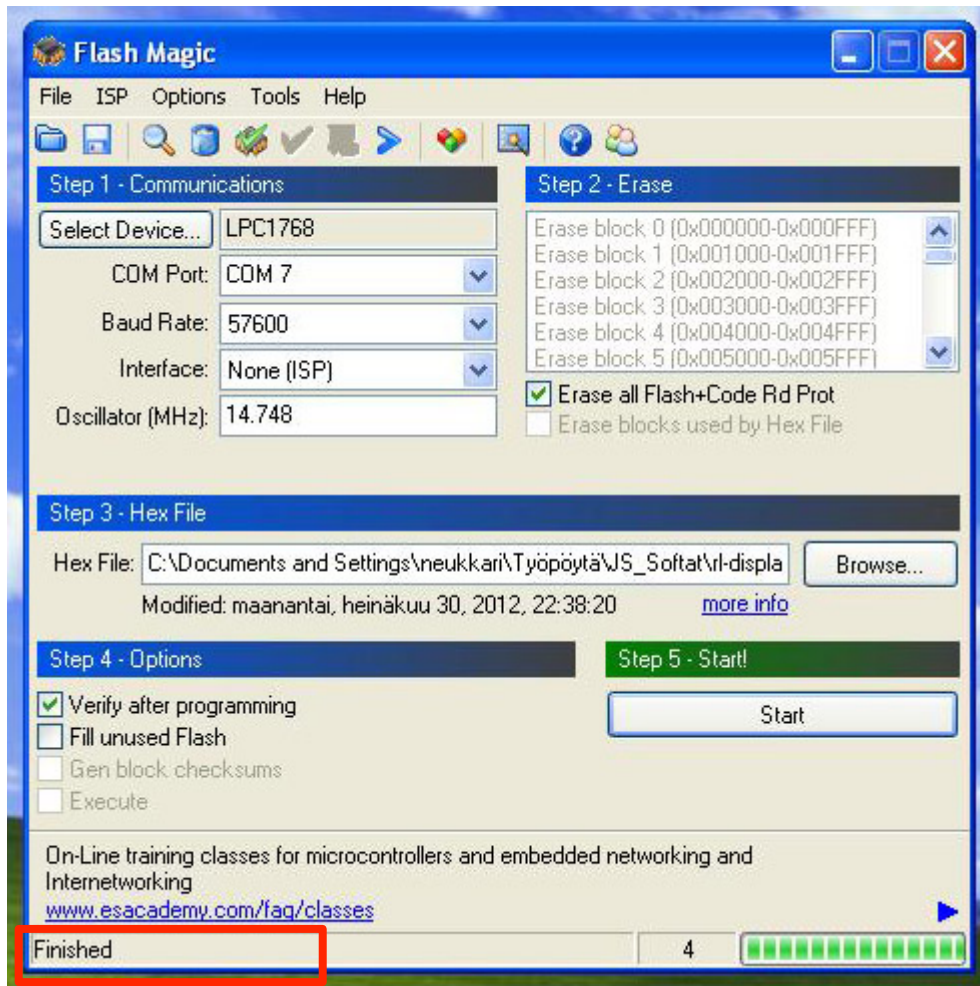
## 11.1 Using Flash Magic



- Flash Magic main window and settings.
- Press "Browse" to select a file to program.



- Choose a file for control panel or circuit board.
  - Display... .hex = control panel software.
  - Io... .hex = circuit board software.
- Press "Start" to begin programming.



- Flash Magic reports "Finished" when the programming is complete.

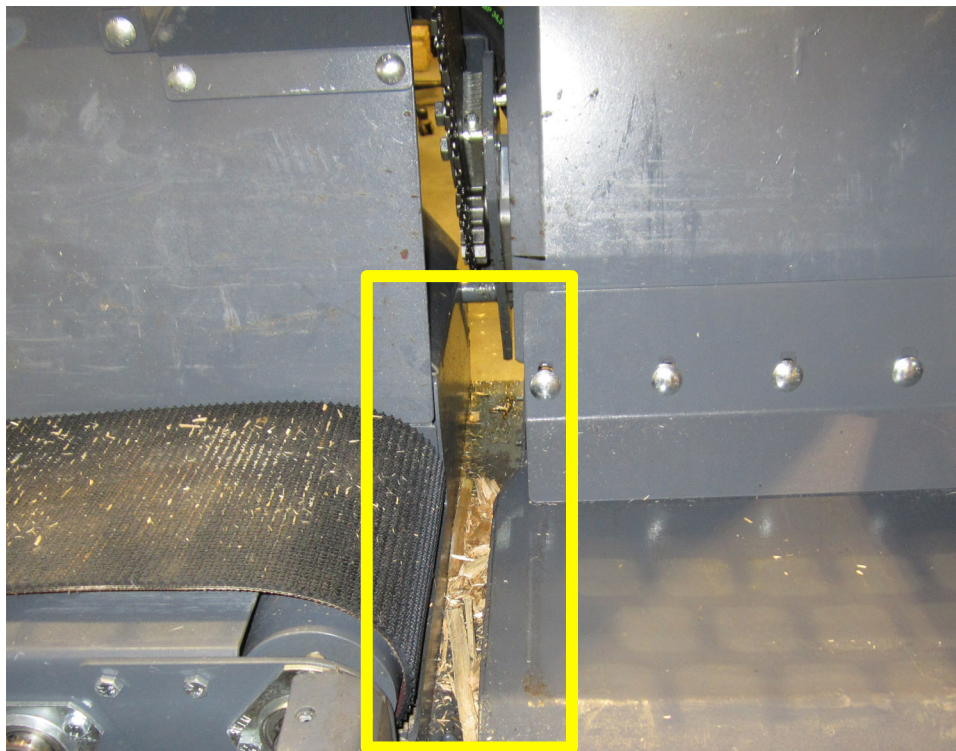
After programming disconnect power from Autochopper and wait 10 seconds before reconnecting power.

**ATTENTION!** If programming fails:

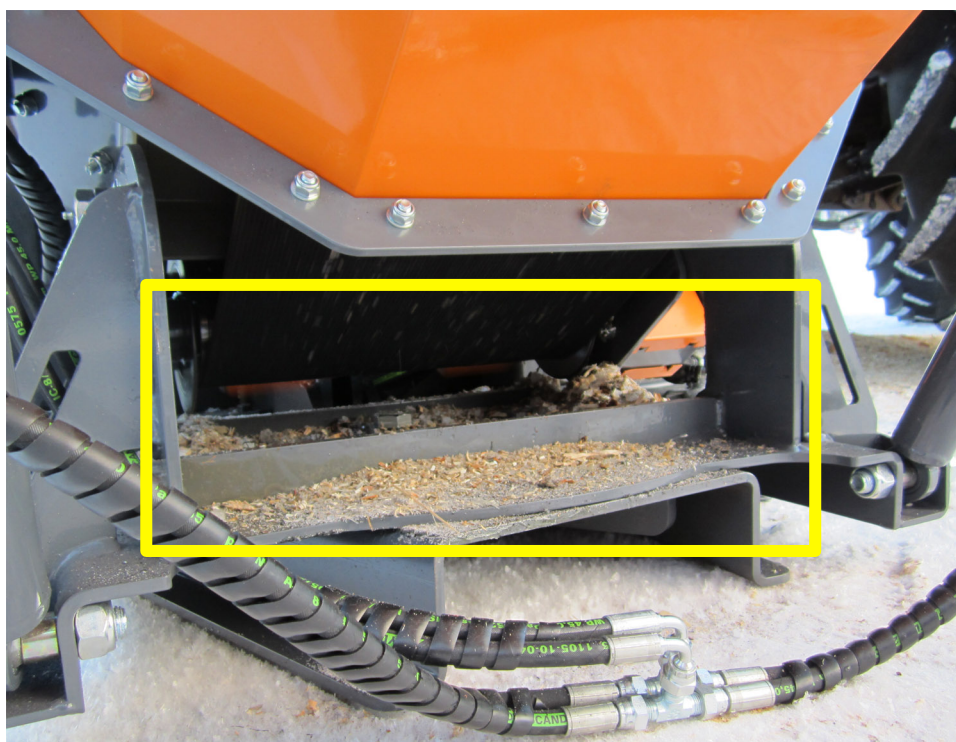
- Make sure that the selected COM-port is correct.
- Try to lower the baud rate.

## 12 Cleaning the machine

Chopping wood creates sawdust inside and around the machine. In order to ensure trouble-free operation, few parts of the machine must be cleaned regularly. Cleaning is even more important in snowy and icy conditions.

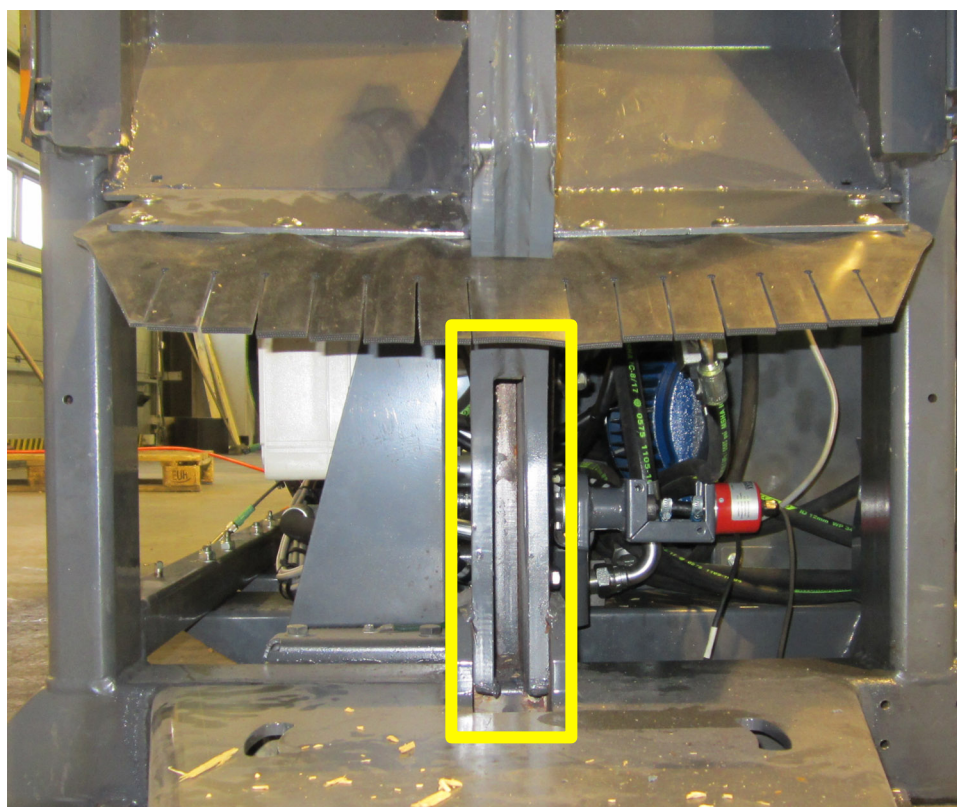
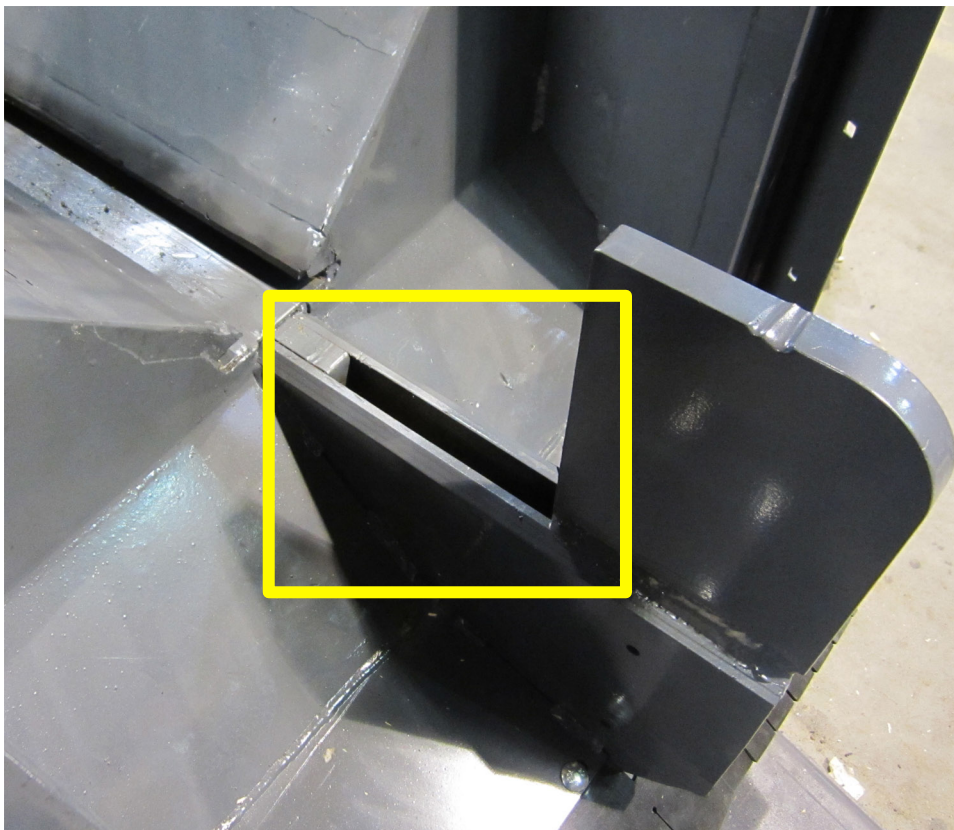


Spout under the saw.



Discharge conveyor stand.





Sawdust can pile up under the splitting blade preventing the blade from moving to bottom position. Remove the splitting blade to clean the area. Use a metal rod to clean the area.



Sawdust can gather inside the feed table. Sawdust can interfere with the angle sensor inside the feed table. Clean the area with compressed air.