



OPERATORS MANUAL
AT-X
AT4-VD
AN4-VD

ORIGINAL



ORIGINAL

EY-VAATIMUSTENMUKAISUUSVAKUUTUS TUOTTEESTA

LLP Farm Machinery Group Oy vakuuttaa, että markkinoille saatettu kone täyttää direktiivin 2006/42/EY ja standardit SFS-EN ISO 12100 ja SFS-ISO730-1.

FÖRSÄKRAN OM ÖVERENSSTÄMMELSE

LLP Farm Machinery Group Oy försäkrar härmed att tillförda maskin uppfyller maskindirektivet 2006/42/EY och standard SFS-EN ISO 12100 och SFS-ISO730-1.

CERTIFICATE OF CONFORMITY FOR A PRODUCT

LLP Farm Machinery Group Oy certifies that the following machine, which has been brought into the market, conforms to directives 2006/42/EY and standards SFS-EN ISO 12100 and SFS-ISO730-1.

SAMSVARSEKLÆRING FOR MASKIN

LLP Farm Machinery Group Oy bekrefter herved at følgende maskin, som er sendt ut på markedet, er i samsvær med direktivene 2006/42/EF, SFS-EN ISO 12100 og SFS-ISO730-1.

Tuote / Produkt / Product / Produkt: _____

Valmistusnumero / Tillverkningsnummer
/ Serial number / Serienummer: _____

Teknisen tiedoston kokoaja / Teknisk
dokumentation samlare / Technical file collector: Sakari Ruotanen

Valmistaja / Tillverkare / Manufacturer
/ Produsent: LLP Farm Machinery Group Oy

Osoite / Adress / Address / Adresse: Levytie 4, FIN-74510 Iisalmi

Puhelin / Telefon / Telephone: +358 (0) 201 984 020

Paikka / Ort / Place / Sted: Iisalmi _____

Aika / Datum / Date / Dato: _____

Allekirjoitus / Underskrift / Signature
/ Signatur: _____

Nimenselvennys / Namnförtydligande
/ Clarification of signature
/ Tydeliggjøring av signatur: Markku Lappalainen _____

WARRANTY TERMS

All the products produced by LLP Farm Machinery Group Oy have twenty four (24) months warranty.

During the warranty period all the defects in material and in workmanship will be covered, in practical life FMG will replace defected parts with the new parts. Travelling expenses and freight of parts are not included in warranty.

Warranty will start in the beginning of usage of the product, if nothing else has been agreed.

Warranty is not covering damages due to misuse of product or use in the purposes where it has not been designed, lack of services or product has been modified without the permission of FMG.

Wearing of the normal usage is not covered by the warranty.

Losses in income, costs and loosen working hours caused by the defected part is not covered by the warranty.

Warranty repairs should be done by the FMG service dealer or service dealer appointed by the manufacturer.

In case the defects shown in reclamation is not valid or if case otherwise is not in the warranty area FMG has right to reject from the compensation.

Warranty reclamation should be done in written form by the FMG seller within one (1) month after notifying the defect.

In case of defect procedure is as follows:

- clarify the defect and defected area
- be prepared to deliver defected parts to the manufacturer
- contact FMG seller and make reclamation as follows:
 - type of the product and serial number
 - delivery date of the product (invoicing date)
 - date of the damage
 - description of the damage and pictures
 - description of the working conditions and the type of the base machine

TO THE OPERATOR

The purpose of this manual is to provide support and instructions to grader users. Manual contains detailed instructions for driving, operating and maintaining the grader. Make sure that your new grader is always handled and maintained in the correct way in order to ensure reliability and economical operation for many years.

We recommend that you read the manual thoroughly. Follow the maintenance and service program carefully and include the daily maintenance in your normal routine. This is both you and your tractor interest.

Maintenance, repairs and adjustments which are not described in this Operator Manual require the use of special tools and exact technical data. In case of that kind need please contact your FMG seller or factory.

Use only genuine FMG spare parts for optimum performance from your tractor and grader. Spares will be sold through the FMG seller.

TABLE OF CONTENTS

1. SAFETY INSTRUCTIONS	6
2. CONSTRUCTION	8
3. SPECIFICATIONS	9
4. QUICK USER GUIDANCE	9
5. GENERAL DESCRIPTION OF GRADER CONTROL	15
6. SCREEN	16
7. DRIVE MODE SELECTION, selection button A	19
7.1. Select User A1.....	19
7.2. Select Memory A2.....	20
7.3. Blade Up Auto A3.....	20
7.4. Blade Down Auto A4.....	21
7.5. Extension automatic A5.....	21
8. MEMORY LOCATIONS, SELECTION BUTTON M	22
9. PARAMETERS, SELECTION BUTTON P	23
9.1. Joystick P1.....	24
9.2. Adjustment of the movements P2.....	24
9.3. Setting of the sensors P3.....	25
9.4. Other settings P4.....	27
9.5. Defaults P5.....	27
9.6. Language selection P6.....	27
10. DIAGNOSTICS, SELECTION BUTTON D	27
10.1. Monitor D1.....	27
10.2. Mark register (not in use for the moment) D2.....	30
10.3. Sensor settings D3.....	30
11. GRADER USE	33
11.1. Constant pressure of blade.....	33
11.2. Stop to work.....	33
11.3. Grader operating instructions.....	34
12. MAINTENANCE	35
12.1. Daily.....	36
12.2. Weekly.....	36
12.3. Every 500 hours.....	36
12.4. Annual Maintenance.....	36
12.5. Lubrication.....	37
12.6. Screws to be tightened.....	38
13. LED-LIGHT OPERATION	39

1. SAFETY INSTRUCTIONS

This section summarizes the regulations that must always be followed when working with the grader. However, these regulations do not exempt the driver from statutory and other national regulations regarding traffic safety and occupational health and safety. Safety regulations that apply to different types of working sites and existing road traffic laws must always be observed. Tractor safety regulations accepted by the Finnish occupational safety and health administration have already been taken into account in the equipment design. The following section describes general safety precautions that must be observed regarding the use of the grader.



IMPORTANT

Do not use the grader for other purposes than it has been designed. Please read this manual carefully before using the implement.



IMPORTANT

Use the rotary beacon while working.



IMPORTANT

Before driving, make sure that all movements and functions work correctly.



IMPORTANT

Advise other users on the use of the implement and ask them to read the manual.



IMPORTANT

When using extension wings ensure that the space needed at the both side is enough.



IMPORTANT

If larger tractor tyres are used the turning angle of the grader should be limited so that the space between the blade and the tire is min 20 mm.



DANGER

Do not operate with damaged implement.



DANGER

When testing different movements of the grader make sure that there is no one close to tractor. Safety distance 5 meters.



DANGER

Pay attention to the turning of the blade because especially in winter conditions turned blade start to turn the tractor.



WARNING

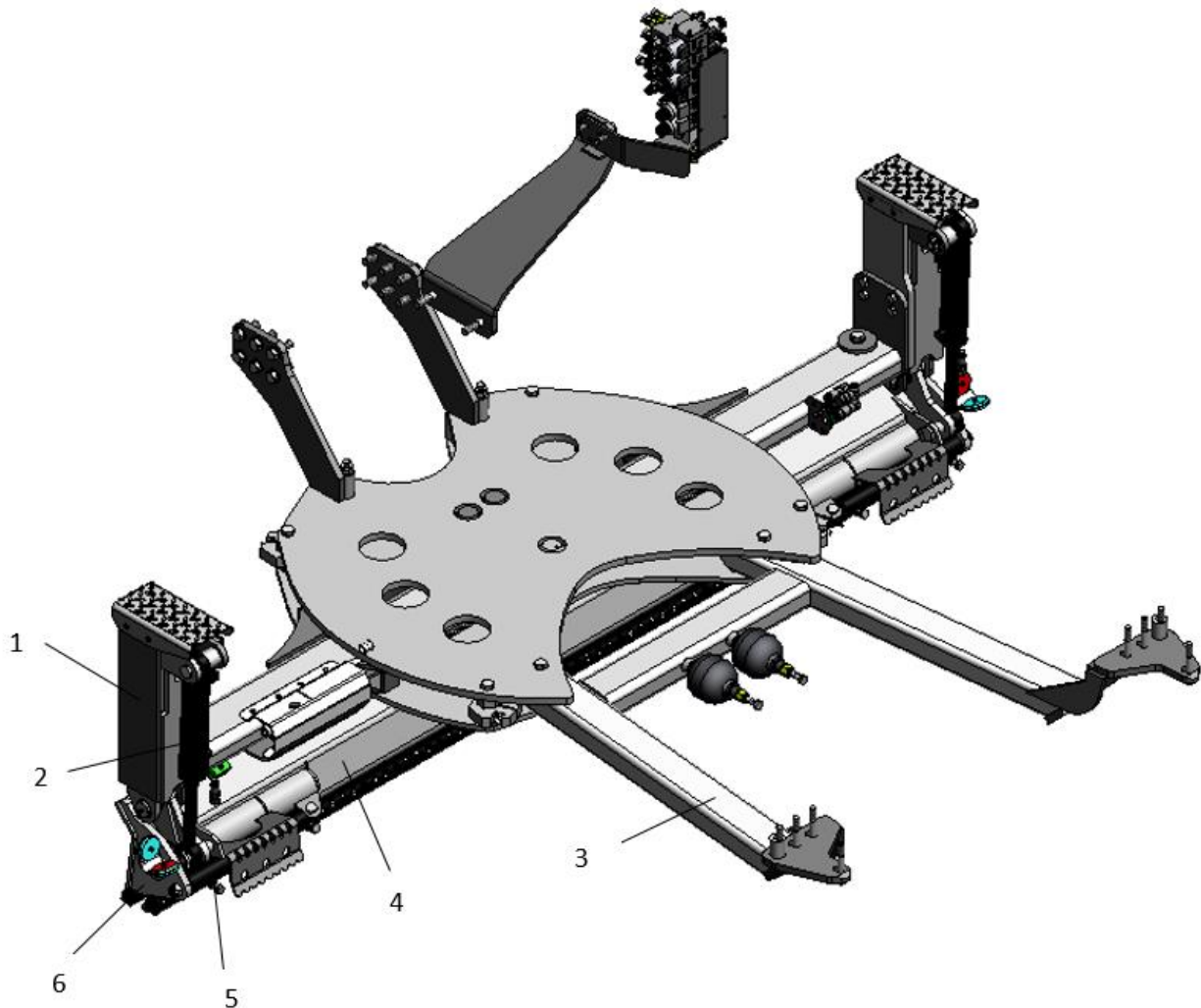
Read the operators manual before starting the use.



WARNING

Pay attention to other road users.

2. CONSTRUCTION



Picture 1. Grader construction

- 1. Lift cylinders inside the beam**
- 2. Tilt cylinders of the blade**
- 3. Grader frame**
- 4. Blade frame**
- 5. Cylinders of the extension wings**
- 6. Extension wings**

3. SPECIFICATIONS

	AT-X	AN4-VD	AT4-VD
Transportation width	2580 mm	2660 mm	2690 mm
Max working width	3180 mm	3275 mm	3290 mm
Max turning angle	+/- 30°	+/- 20°	+/- 22°
Height of the blade	350 mm	350 mm	350 mm
Weight of the grader	910 kg	910 kg	910 kg
Weight of the grader frame	540 kg	540 kg	540 kg
Width without blade frame	2350mm	2380mm	2460mm
• width with steps	2600mm	2630mm	2710mm

4. QUICK USER GUIDANCE

Grader usage:

Grader will be used in balancing roads and yards both in building and in maintenance purposes. In winter time grader will be used in removing ice and slush from the road both with the snow ploughing and between snow ploughing. In case of small amount of snow grader is good in snow ploughing.

Controls:



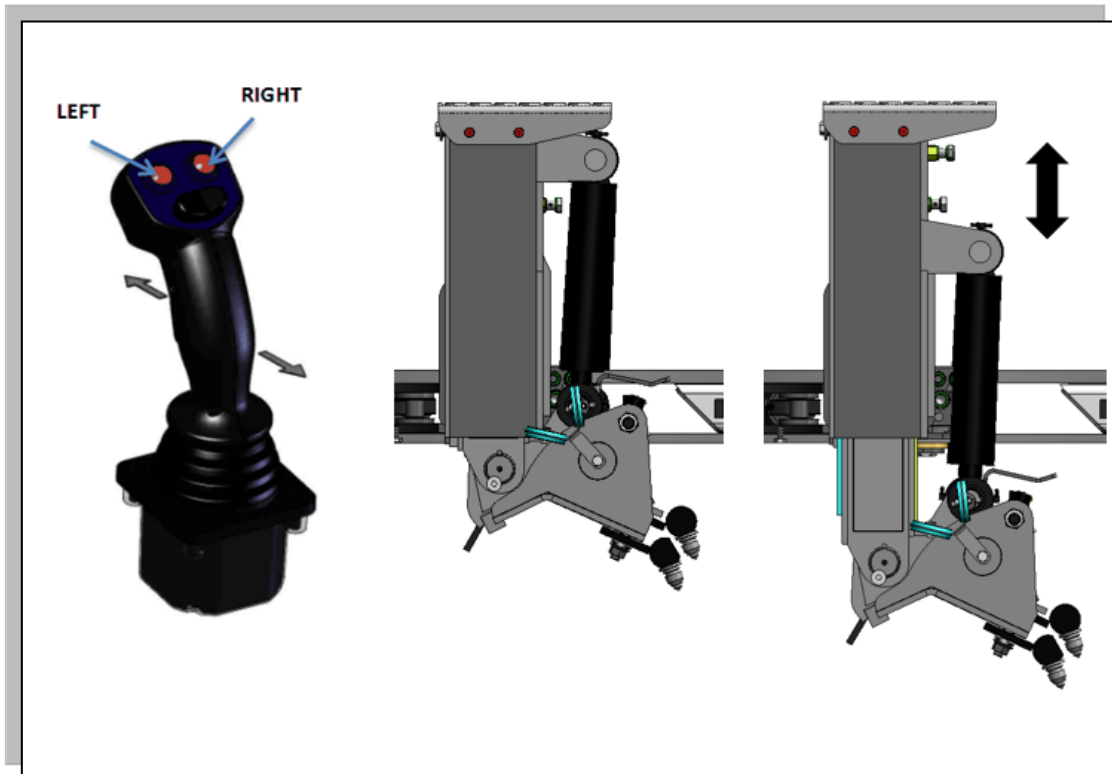
Picture 2. Joystick and screen

Grader start:



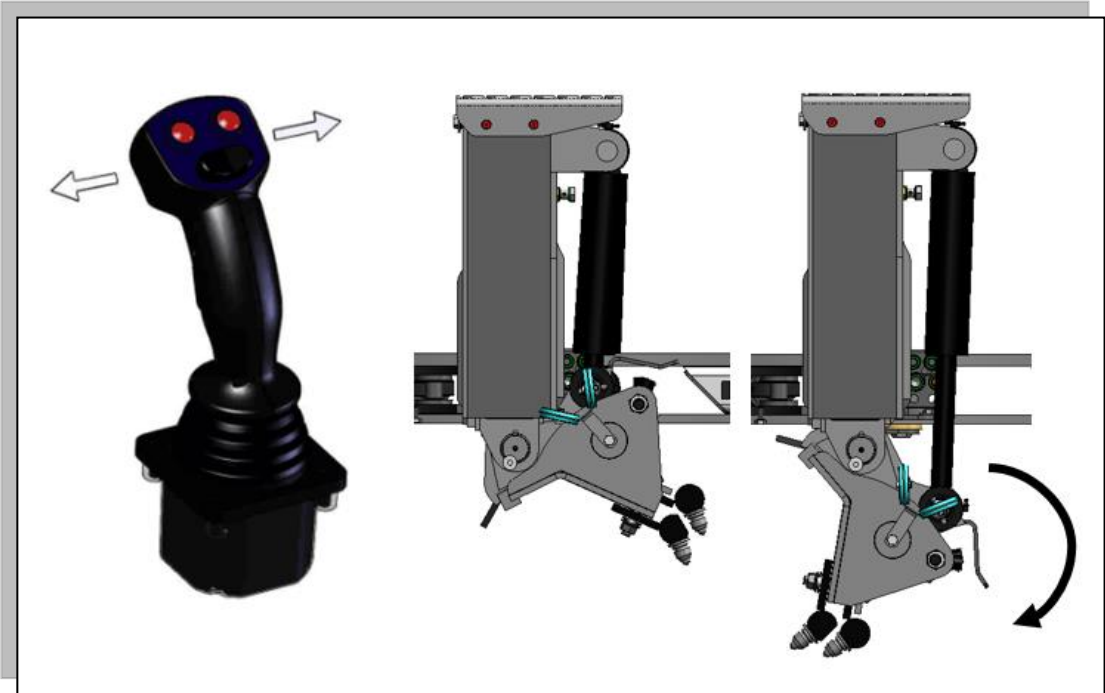
Picture 3. Ok-button in screen

- put grader on by pressing OK - button (Picture 3).



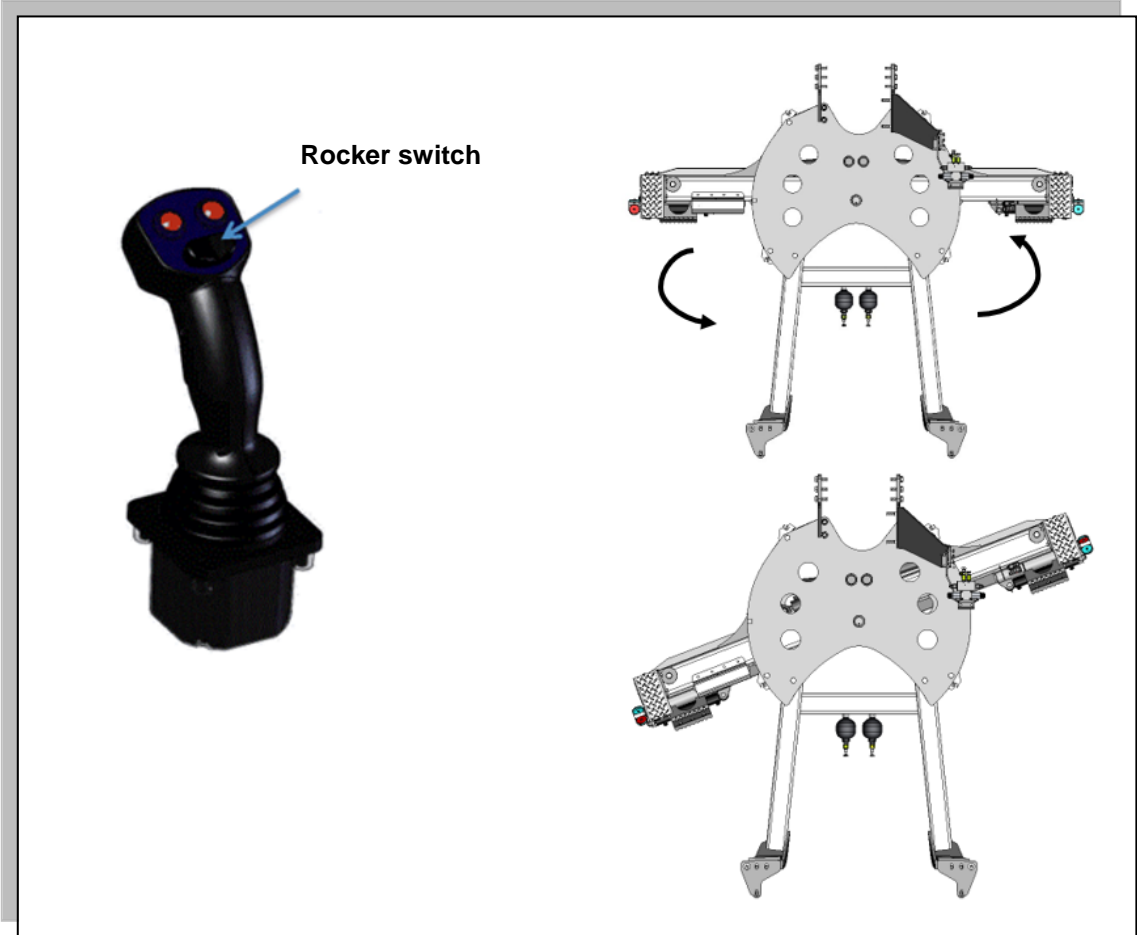
Picture 4. Height adjustment of the lifting beam

- joystick forward/reverse movement adjust height of the lifting beam (Picture 4). Only one side movement will be reached by pressing left or right button with the forward/reverse movement of joystick.



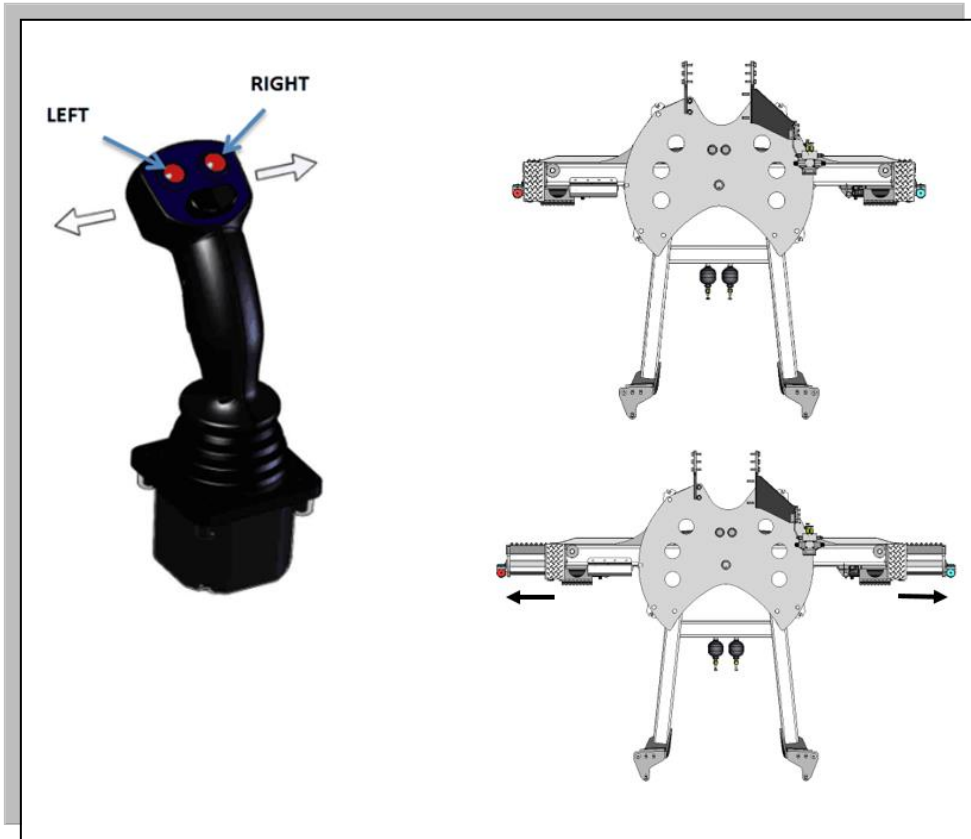
Picture 5. Adjustment of the blade position

- with the side movement of the joystick blade will be adjusted to the working position or upper position (picture 5).



Picture 6. Turning of the blade

- blade will be turned left and right with the rocker switch on top of the joystick (picture 6).



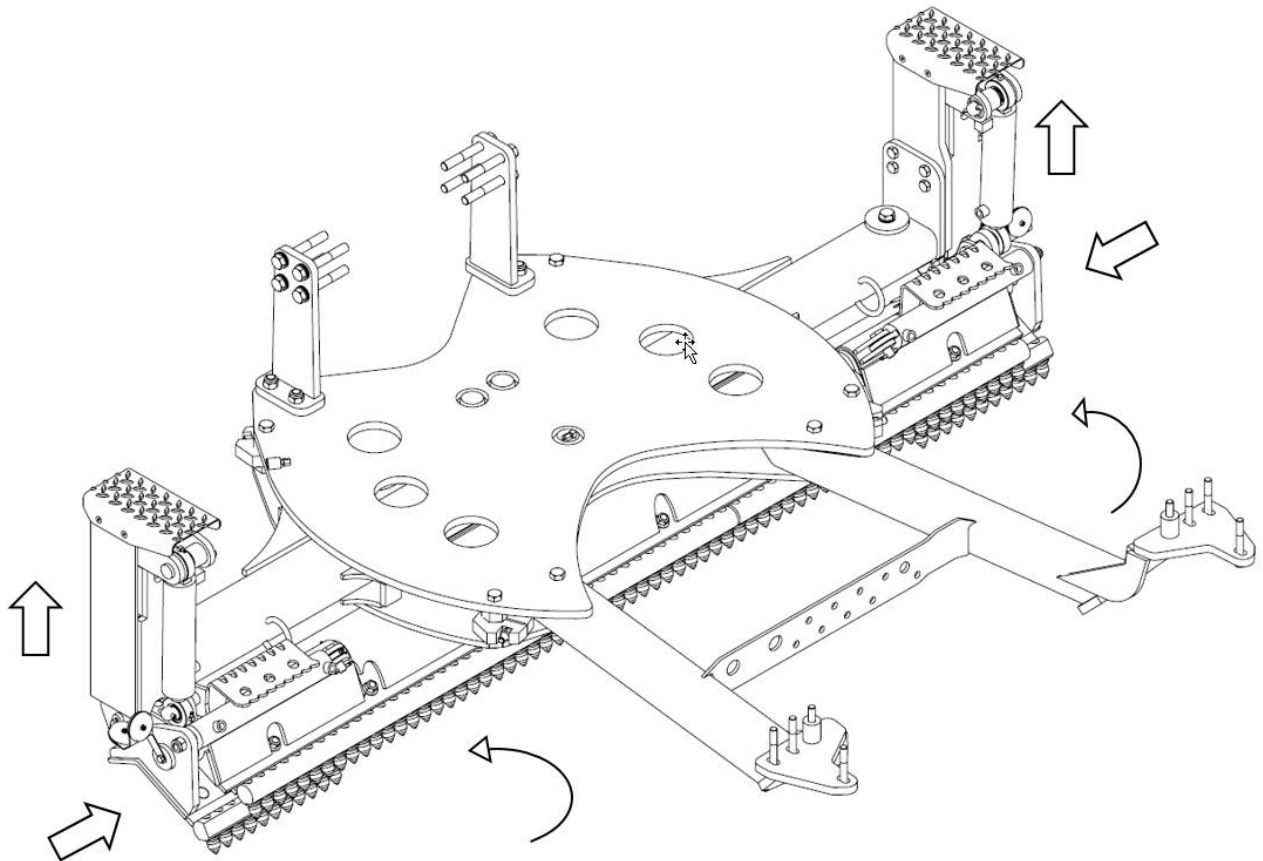
Picture 7. Movement of the extension wings

- extension wings will be moved by pressing left or right button with the side movement of the joystick (picture 7).



Picture 8. Side selection buttons of the joystick

- with the side selection buttons (red) will be selected which side functions will be steered (picture 8). Left button activate left side functions and right side activates right side functions
- power will be turned off from the grader by pressing OK – button 5 sec.



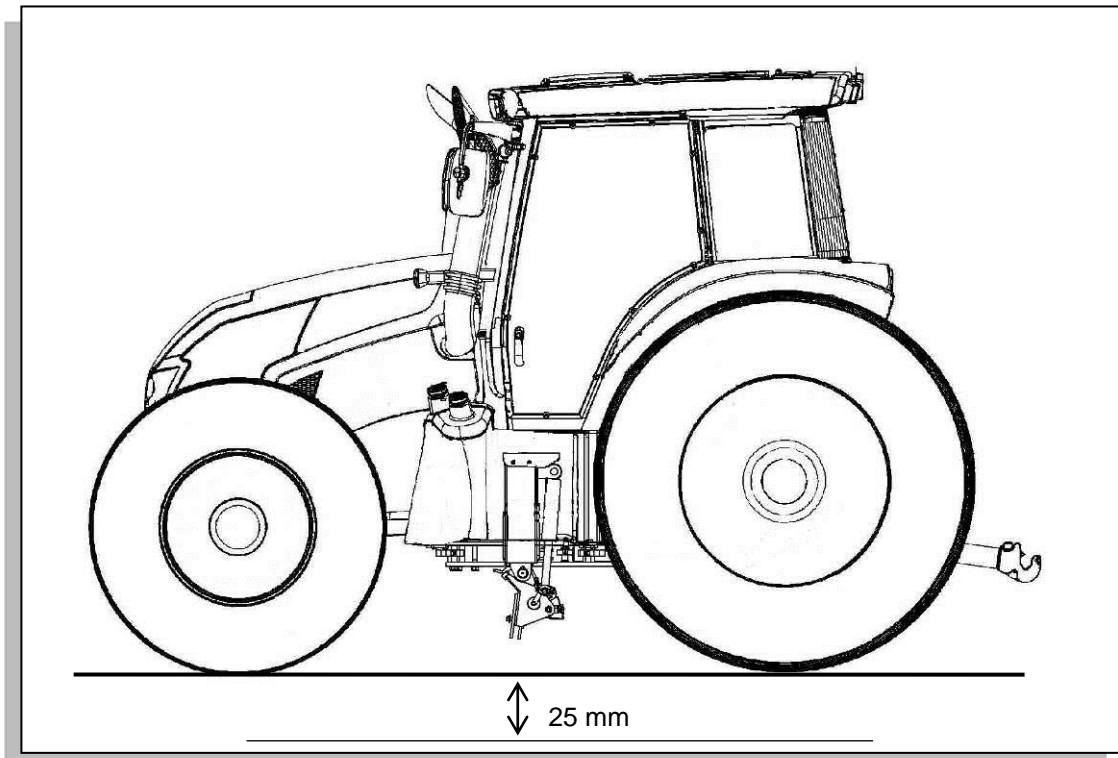
Picture 9. Home position of the movements

NB! Grader will automatically drive all the movements to the home position when power will be turned off – position (picture 9). You can stop the movements to the home position by moving joystick.



**Take care of the other person close by the grader!
CRUSHING DANGER!**

Typical working depth is around 25 mm depending on surface quality (picture 10).



Picture 10. Working depth

5. GENERAL DESCRIPTION OF GRADER CONTROL

The control of the grader consists of screen, joystick and control box. Info flow between units is operated by CAN-BUS.

Joystick is able to program personally like directions and speeds of movements.

With the selection and adjustment buttons on the screen will be programmed user settings, grader limits and diagnostics.

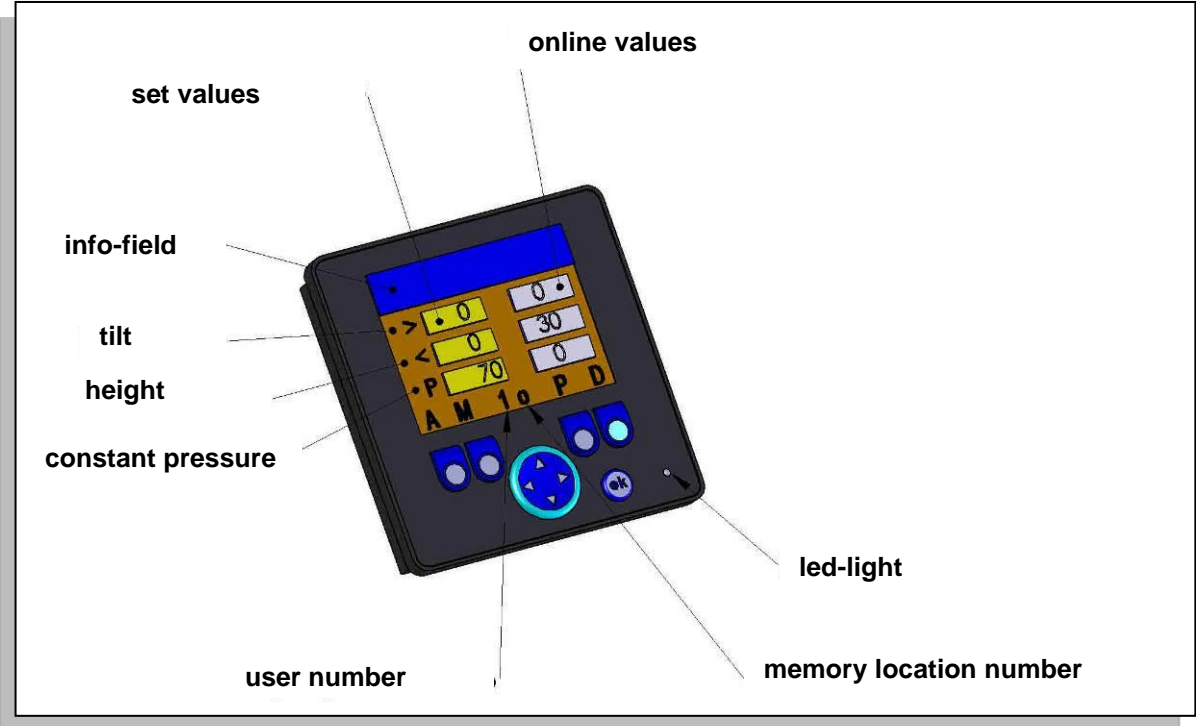
Needed operation will be selected by using adjustment buttons up/down, push right gives operation push left returns it and saving will be done with the OK button.

The control has both automatic functions, like reversing and home drive and functions which are able to program by the user.

The grader has constant pressure function where pressure of the blade will be adjusted according the need. In case of stone or other obstacle blade will release and return back to the adjusted position.

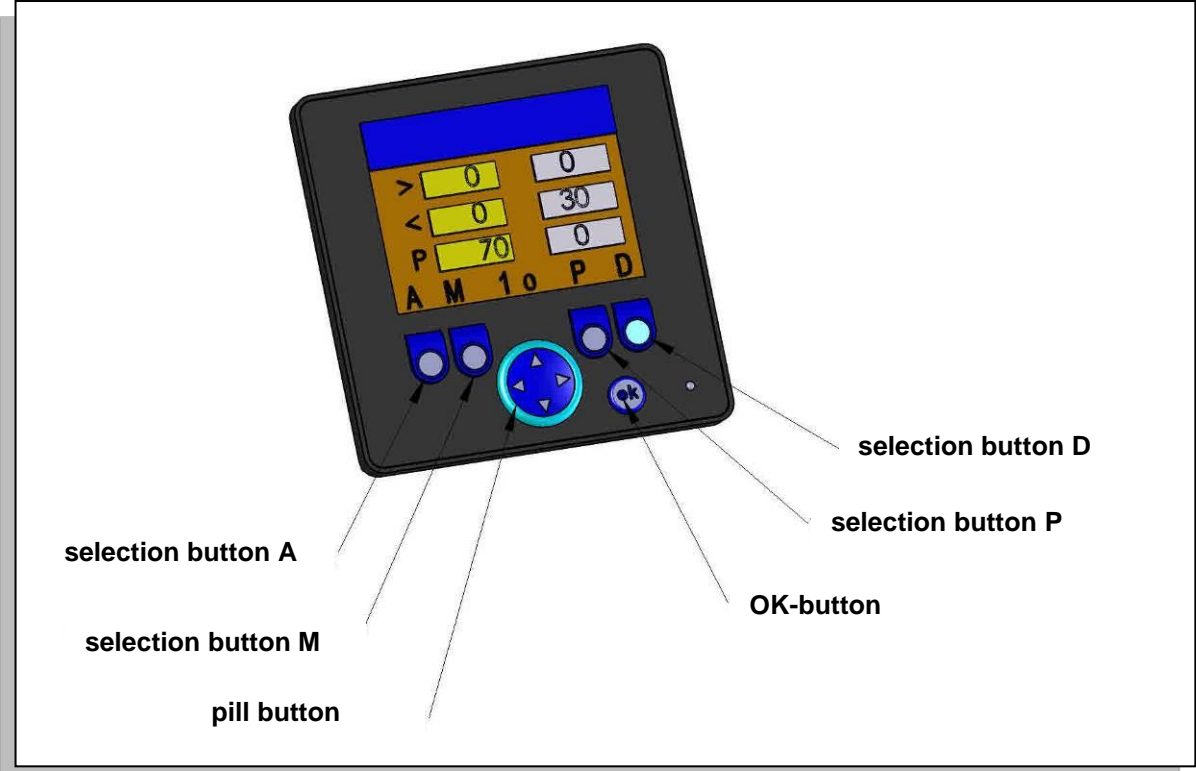
With the position control sensors blade will be adjusted to the different down-grade (inclined) position

6. SCREEN

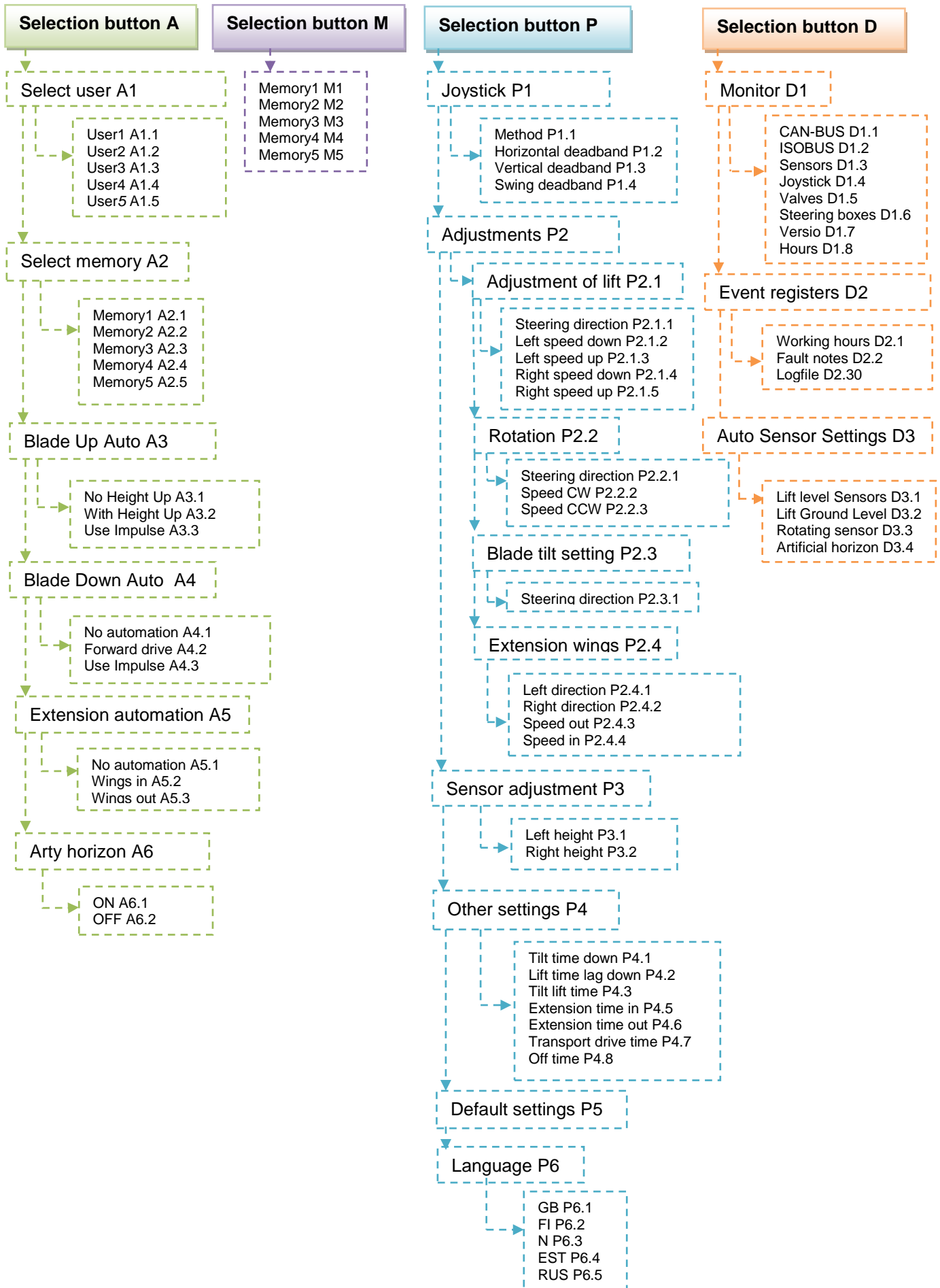


Picture 11. Screen values

Info – field will tell by text what function will be used. In case of many functions field will show “multidrive”



Picture 12. Screen buttons



When the grader power is on screen will show FMG logo on a black base (picture 13). Grader power will be turned on by pressing OK – button and after that screen will be in basic mode (picture 14).

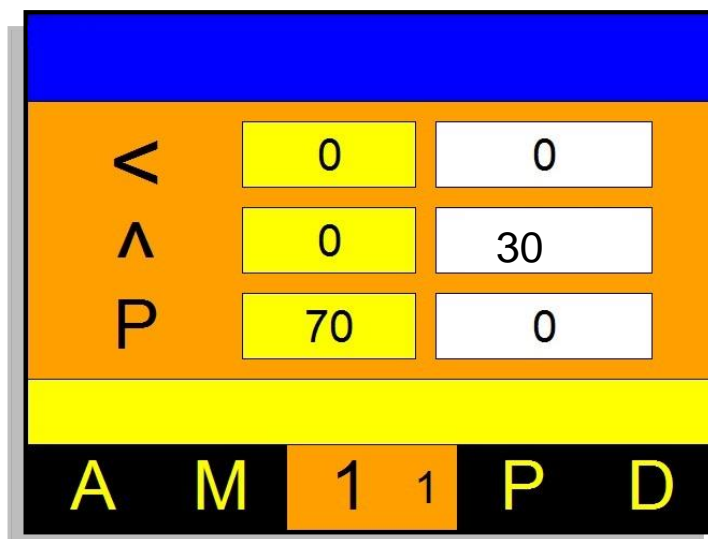


Picture 13. Screen when tractor main power is on

Working pressure for the blade will be adjusted with the pill buttons left/right when screen is on the basic mode. With pill buttons up/down will be adjusted max working depth, however manually steered blade would be also higher. Grader has to be calibrated in order to get correct height from the ground. Calibration will be told in page 29.

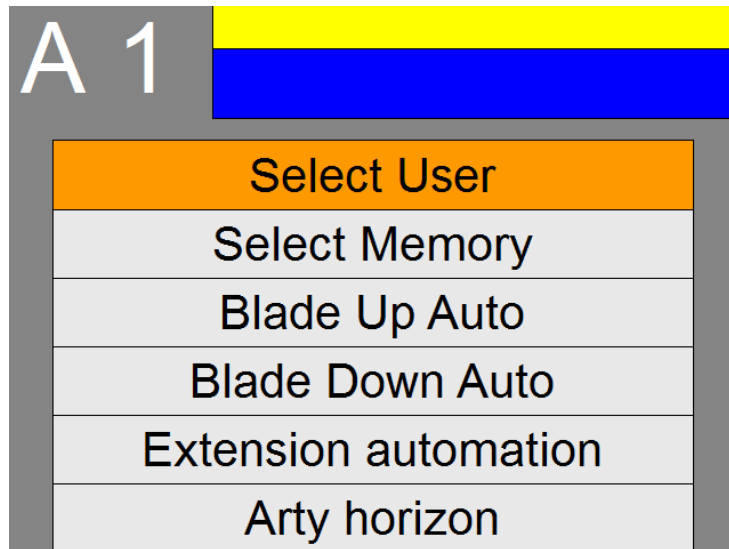
Top value shows blades downgrade, which will be adjusted by driving lift cylinders to the different height. Downgrade value tells the difference of the lift beams heights and will be saved by pressing selection button M.

Set values will be shown with the yellow base on the left hand side and online values will be shown on a right hand side with the white base.



Picture 14. Screen on basic mode

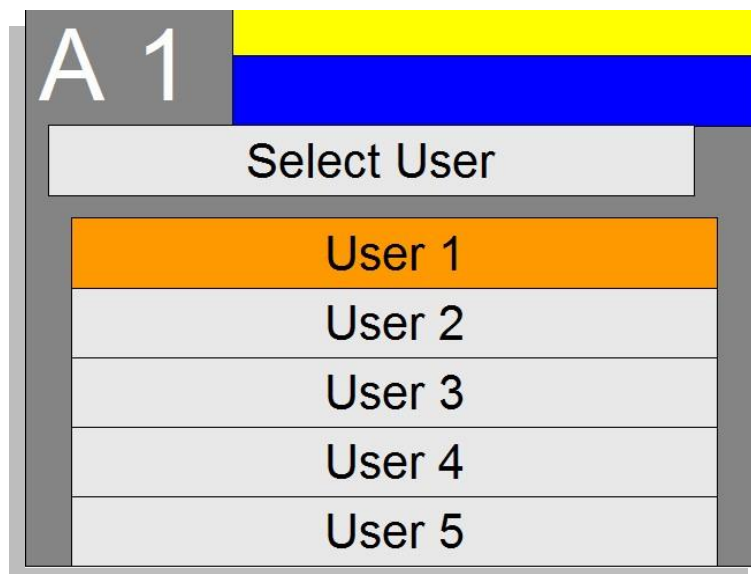
7. DRIVE MODE SELECTION, selection button A



Kuva 15. Selection button A

7.1. Select User A1

Space for 5 users, user 1...5



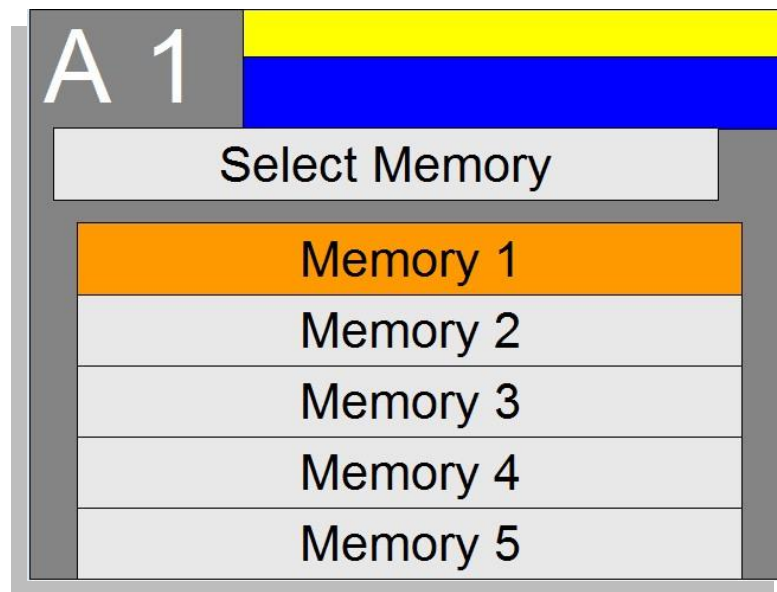
Picture 16. User parameters

User will be selected by pressing pill buttons up/down and by pressing OK – button.

Every user is able to set his own settings which will be find under the selection button P (page 26).

7.2. Select Memory A2

Select saved settings.



Picture 17. Memory selection

The height of the blade and downgrade, constant pressure and automatic settings are stored to the memory location.

Memory location will be picked up by using adjustment buttons up/down and selected with the right button.

7.3. Blade Up Auto A3

- No height up A3.1
 - in case of reversing, blade will be tilted automatically without lift cylinders lift
- With Height up A3.2
 - in case of reversing, lift cylinders will be lifted automatically
 - lift cylinders will go down automatically to the adjusted value, if blade down auto is on.
- Use impulse A3.3
 - blade will go up to adjusted height by impulse.

7.4. Blade Down Auto A4

- No automation A4.1
 - blade won't go down automatically
- Down with the forward drive A4.2
 - blade will go down when the reverse gear will be taken off
- Down with the impulse A4.3
 - blade will go down with the joystick impulse

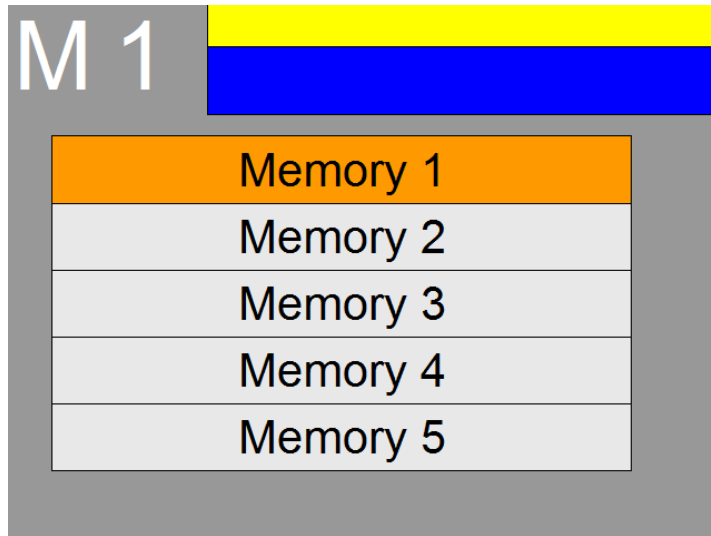


Warning! Blade Up and down Auto with beam cylinders will work only if grader has position sensor cylinders.

7.5. Extension automatic A5

- No extension automatic A5.1
 - Extension wings works only manually
- Extension wings in A5.2
 - wings goes in with the reverse drive
 - with the lift automatic impulse on wings goes in in case of blade lift
- Extension wings out A5.3
 - in case of down automatic on extension wings goes out when lowering the blade

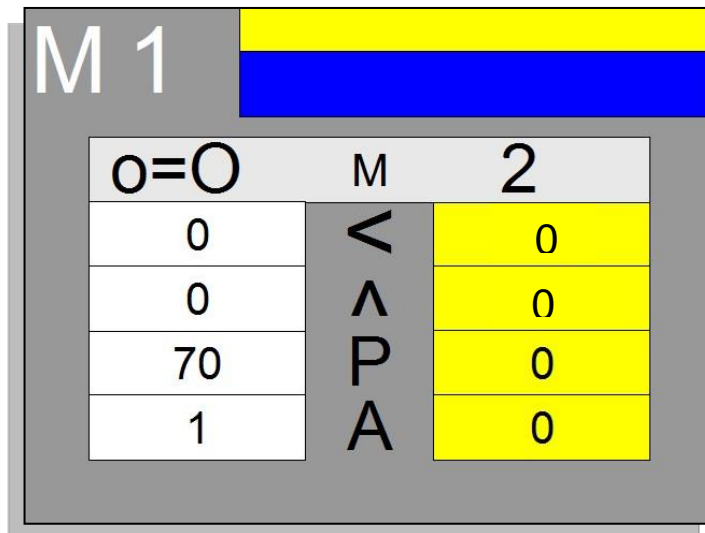
8. MEMORY LOCATIONS, SELECTION BUTTON M



Picture 18. Selection button M

Memory location will be picked up with the pill button up/down and selected by pushing right pill button (picture 18).

On the left side are current values and on right side is saved values (Picture 19).



Picture 19. Value savings

Saving of the current values will be done by pushing OK- button (Picture 20).

M 1		
O=O	M	2
0	<	0
0	^	0
70	P	70
1	A	1

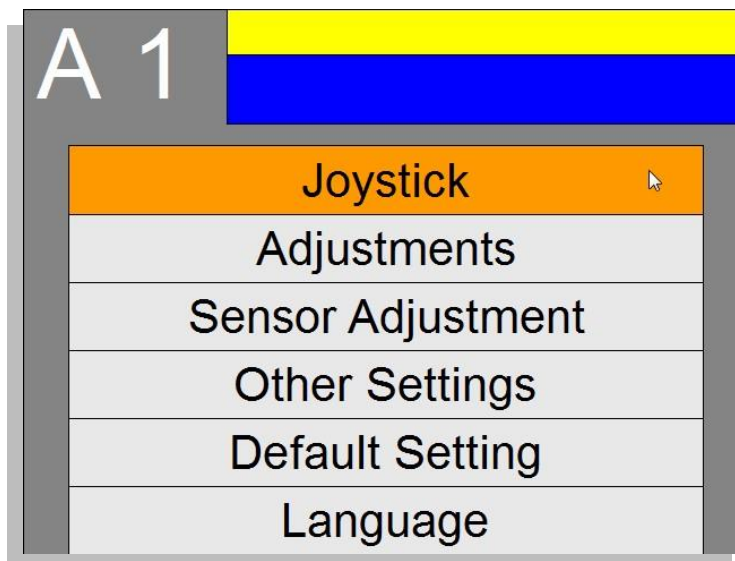
Picture 20. Value savings

Possible settings to the memory location as follows:

- the height of the blade and downgrade (inclination)
- constant pressure
- automatic settings (lift, lowering and extensions)

Memory locations are individually for each user.

9. PARAMETERS, SELECTION BUTTON P



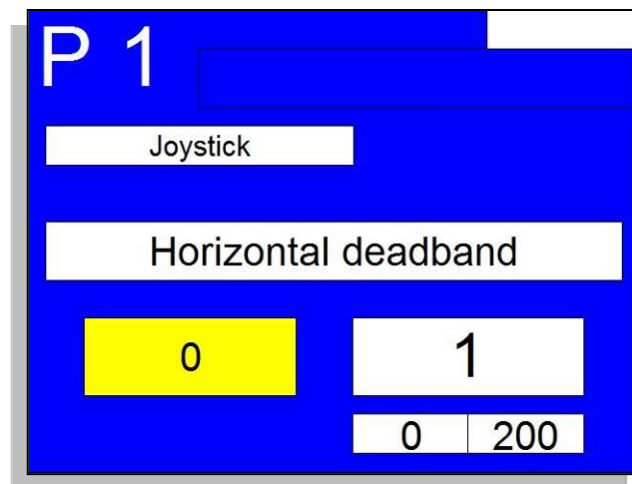
Picture 21. Selection button P

The operation will be picked up by using adjustment buttons up/down, push right gives operation push left returns it and saving with the OK button.

9.1. Joystick P1

- Method P1.1 (not in use for the moment)
- Horizontal dead zone P1.2
 - sideways dead zone of joystick will be adjusted to avoid involuntary movements.

Values will be set by pressing pill buttons up/down and saved by pressing OK – button (Picture 22).



Picture 22. Value saving

- Vertical dead zone P1.3
 - forward/reverse dead zone will be adjusted to avoid involuntary movements
- Rocker switch dead zone P1.4
 - rocker switch dead zone will be adjusted to avoid involuntary turning

9.2. Adjustment of the movements P2

Adjustment of lift beams P2.1

- Joystick steering direction P2.1.1
 - steering direction of joystick is able to change
- Left beam speed down P2.1.2
- Left beam speed up P2.1.3
- Right beam speed down P2.1.4

- Right beam speed up P2.1.5

Rotation

- Steering direction P2.2.1
 - steering direction is able to change
- Speed CW (clockwise) P2.2.2
- Speed CCW (anticlockwise) P2.2.3

Tilt setting of the blade P2.3

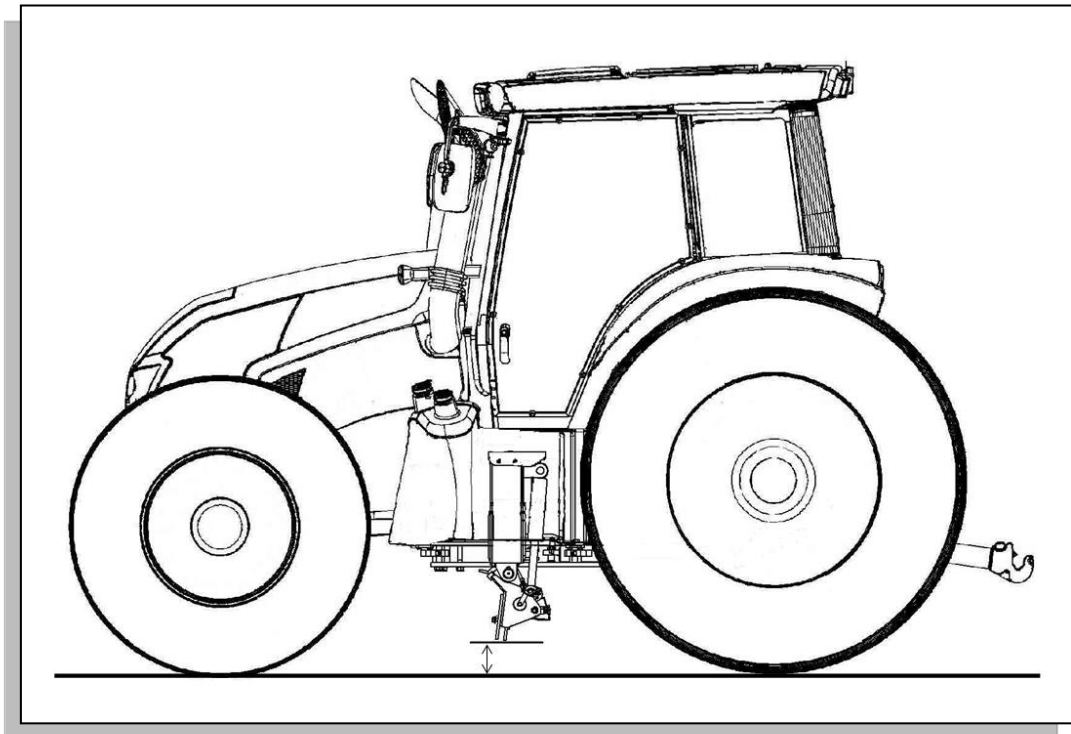
- Steering direction will be changed P2.3.1

Extensions (extension wings) P2.4

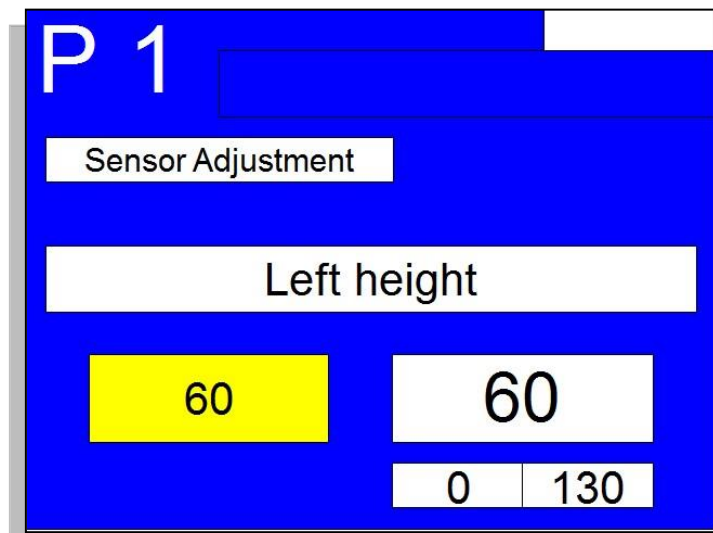
- Left direction will be changed P2.4.1
- Right direction will be changed P2.4.2
- Speed out will be adjusted P2.4.3
- Speed in will be adjusted P2.4.4

9.3. Setting of the sensors P3

- Left height P3.1
 - calibration (zero level) of the left lift beam. Tractor will be driven to the balanced floor and blade will be driven to the working position (picture 23). Left height of the blade will be measured and set by pressing pill buttons up/down and saved by pressing OK – button (picture 24).



Picture 23. Blade height from the floor



Picture 24. Saving of the left height value

- Right height P3.2

- calibration (zero level) of the right lift beam. Tractor will be driven to the balanced floor and blade will be driven to the working position (picture 23). Right height of the blade will be measured and set by pressing pil buttons up/down and saved by pressing OK – button (picture 24).

Calibration of the position sensor cylinders will be done by driving blade to the floor and set by pressing OK – button. See section 10 diagnostic, ground level D3.2

9.4. *Other settings P4*

- The lowering time of the tilt (downgrade) will be adjusted
 - The time lag of the beams lowering will be adjusted
 - The time lag of the beams lifting will be adjusted
 - The extension in time will be adjusted
 - The extension out time will be adjusted
 - The home drive time (to the transport position) will be adjusted
 - Control off time
- automatic control of off time will be adjusted.



NB! In automatic control off can't work at the same time with home drive!

9.5. *Defaults P5*

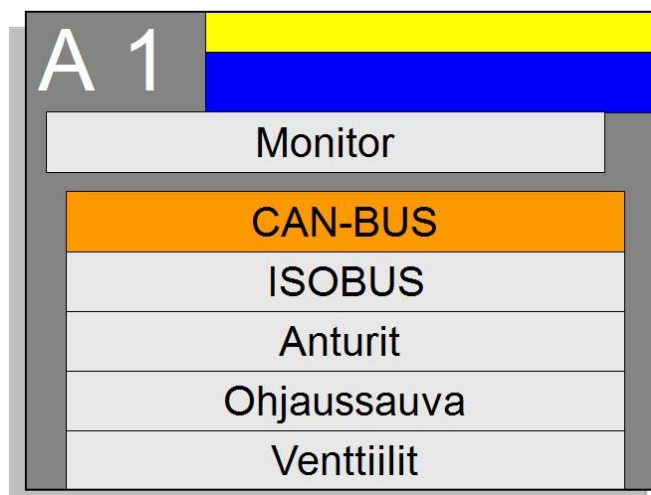
Factory setting will be selected

9.6. *Language selection P6*

Language of user interface

10. DIAGNOSTICS, SELECTION BUTTON D

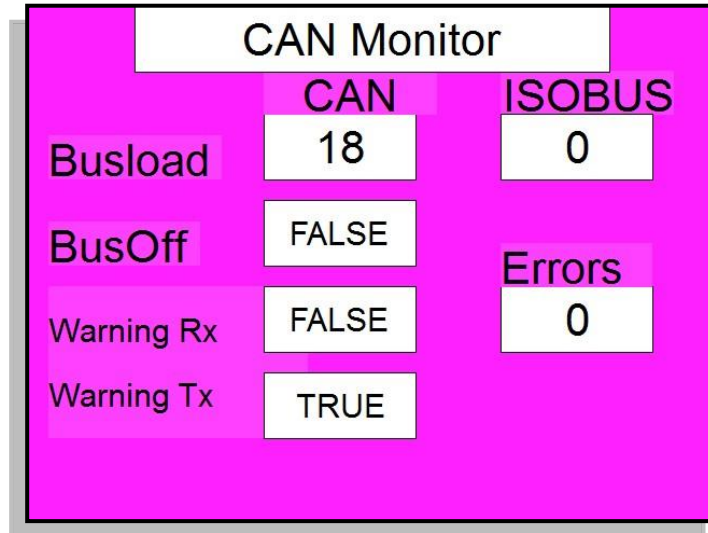
10.1. *Monitor D1*



Picture 25. Monitor

- CAN-BUS D1.1

- information change will be checked in CAN-BUS (Picture 26)

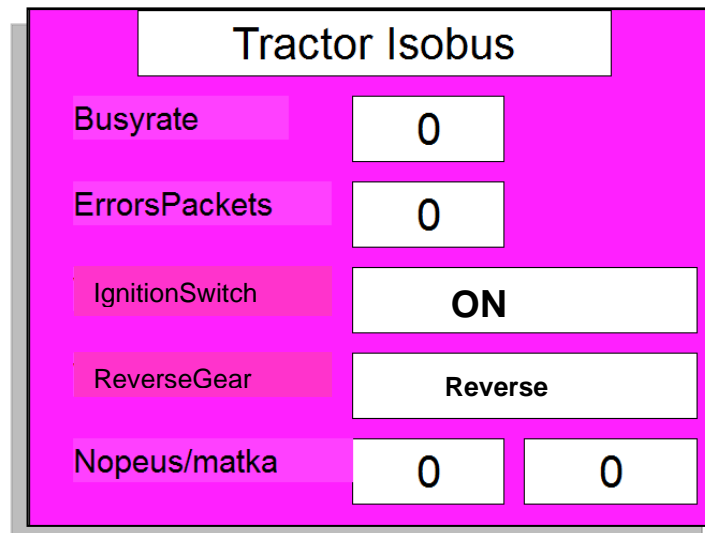


	CAN	ISOBUS
Busload	18	0
BusOff	FALSE	
Warning Rx	FALSE	Errors
Warning Tx	TRUE	0

Picture 26. CAN-BUS

- ISOBUS D1.2

- information change will be seen between ISOBUS and grader (picture 27).

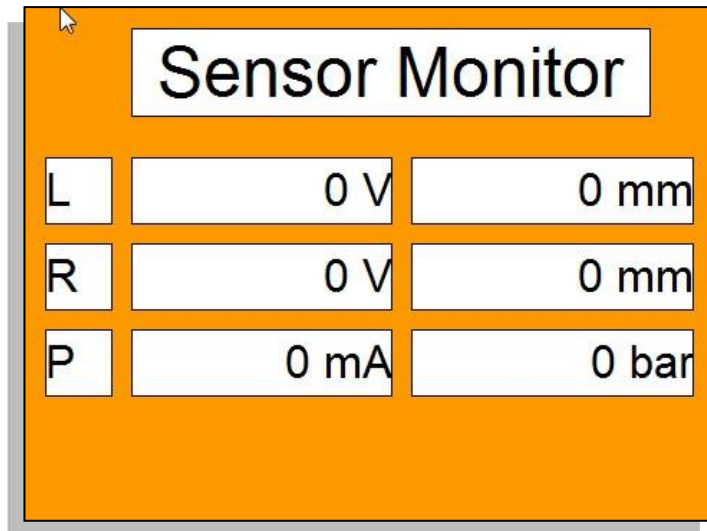


Tractor Isobus	
Busyrate	0
ErrorsPackets	0
IgnitionSwitch	ON
ReverseGear	Reverse
Nopeus/matka	0
	0

Picture 27. Isobus

- Sensors D1.3

- values from sensors (Picture 28)



Picture 28. Values from the sensors

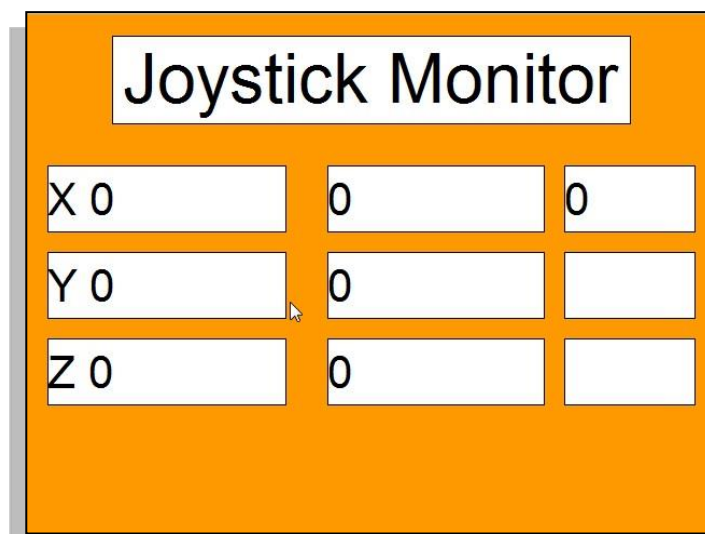
L – left side position control sensor

R – right side position control sensor

P – pressure sensor

- Joystick D1.4

- checking of the joystick functions (Picture 29)



Picture 29. Joystick information

X – Horizontal

Y – Vertical

Z – Rocker switch

- Valves D1.5
 - steering power, power to the electronic valves
- Control units D1.6
 - internal info from control unit as temperature
- Versio D1.7
 - versio of the program
- Working hours D1.8
 - data of the working hours

10.2. *Mark register (not in use for the moment) D2*

- Working hours D2.1
- Bug report D2.2
- Mark register D2.3

10.3. *Sensor settings D3*

- Height sensors D3.1

Calibration of the height sensors will be set by driving beam cylinders fully up and down and saving by pressing OK – button (Picture 30).

**Auto Sensor Settings
Lift Level Sensors**

	Left		Right	
	Old	New	Old	New
In	100	326	100	478
Out	4600	332	4600	483

OK to accept, D to return.

D

Picture 30. Setting of the height sensors

- Ground level D3.2

Calibration of the ground level will be done by driving blade to the floor and saving by pressing OK – button (Picture 31).

**Auto Sensor Settings
Lift Ground Level**

	Left		Right	
	Old	New	Old	New
In	100	326	100	478
Out	4600	332	4600	483

OK to accept, D to return.

D

Picture 31. Ground level setting

- Rotation sensor (only in NX - series) D3.3

Calibration of the turning beam will be done by driving beam to the limit stopper on a both side.

Calibration of the articulated frame will be done by driving frame to the limit stopper to the both side.

Calibration of the wheels will be done by steering wheels to the limit stopper to the both side.

Savings will be done by pressing OK – button.

Auto Sensor Settings RotatingSensor				
	Left		Right	
	Old	New	Old	New
Blade	258	19	3830	22
Frame	19468	19468	45030	19468
Front Axe	19353	19353	44928	19353

OK to accept, D to return. **D**

Picture 32. Setting of the rotation sensor



NB! In calibration mode limit stopper is not in use, please take care of tyres.

- Artificial horizon (not in use for the moment) D3.4



Danger!

When automatic functions are on, blade will do its movements automatically and due to that safety reasons have to be taken care like safety zone 5 m.



Important!

When automatic functions are on, driving direction should be changed only when tractor is stopped to avoid blade damages!

11. GRADER USE

11.1. *Constant pressure of blade*

Constant pressure keeps automatically blade in the working position. The control system provides the required pressure.

If the blade hits a solid obstacle, the lift cylinder release and corrects the blade position after the obstacle has been passed.

11.2. *Stop to work*

Working could be stopped by pushing OK button 5 sec. The blade will be steered automatically to the transportation position. The blade extensions go in and the beams and the blade are lifted, finally control unit turn power off.



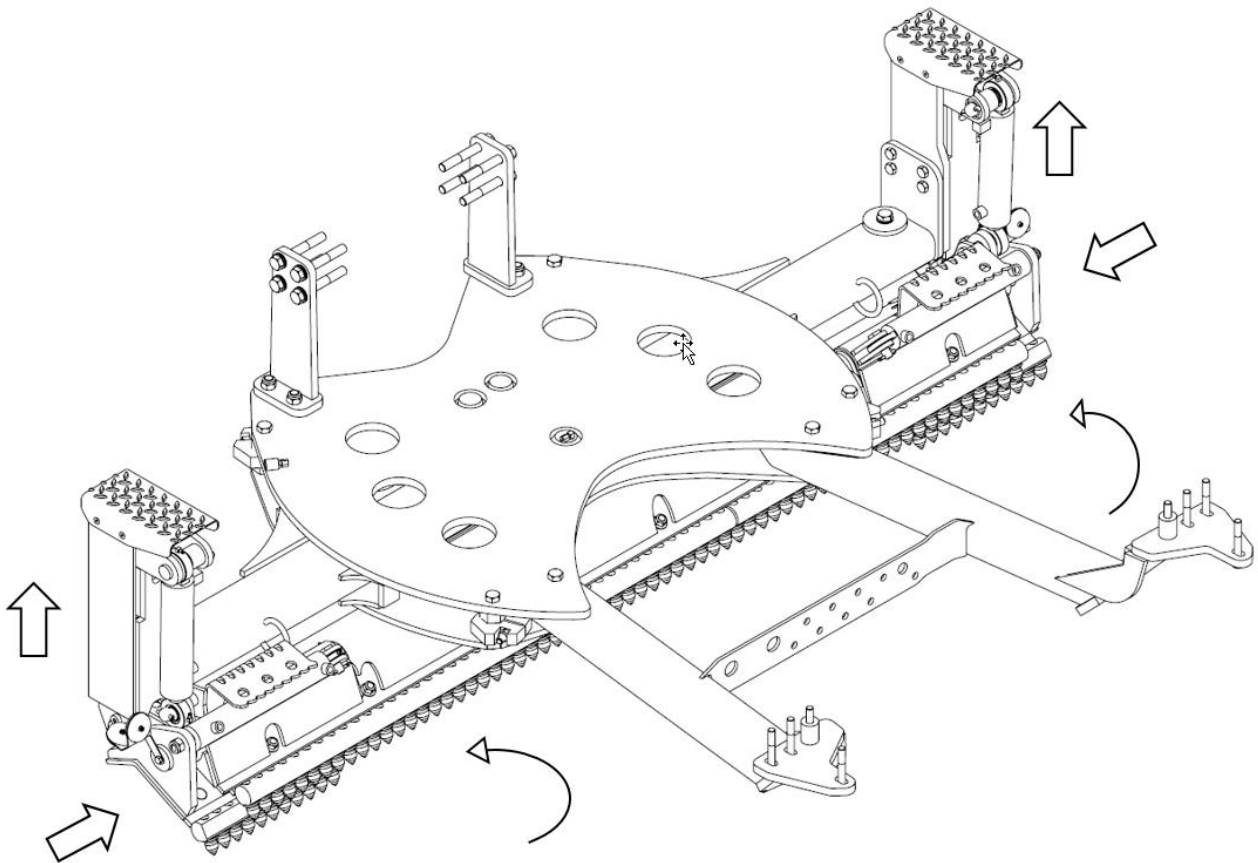
Note: The blade's movement to transport position can be interrupted by moving the control joystick or by pressing any other switch!

The control unit switches off automatically following 15 minutes of inactivity.



Danger

When blade will be turned to the transportation position, it will make movements automatically and due to that take care of the safety and remember 5 m safety zone.

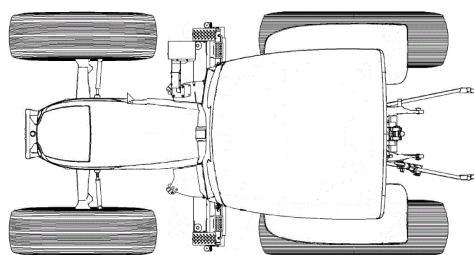


Picture 33. Grader movements to the transportation position

11.3. Grader operating instructions

Blade and tilt cylinders up and extensions in (Picture 34).

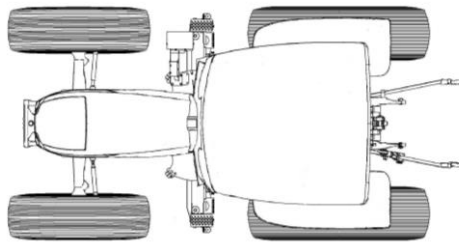
- This position is used in transportation
- This position offers the biggest ground clearance



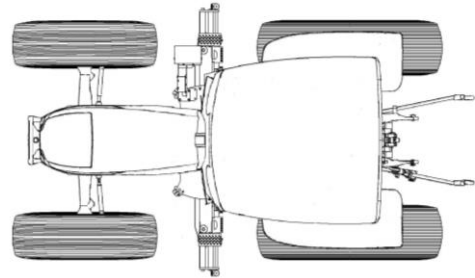
Picture 34. Grader in transportation position

Grader down, extensions in (Picture 35) or out (Picture 36), blade turned left (Picture 37) or right (Picture 38).

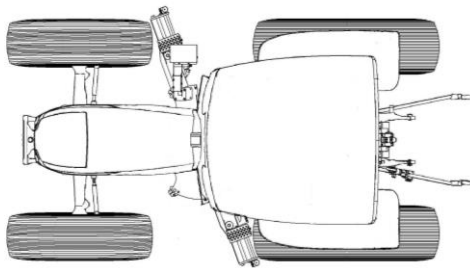
- Intended for moving material, balancing and ploughing
- In these positions, blade vertical and horizontal tilt can also be used
-



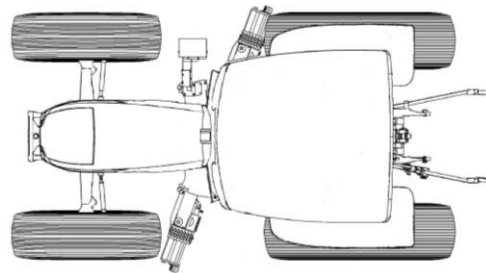
Picture 35. Grader down, extensions in



Picture 36. Grader down, extensions out



Picture 37. Grader turned left



Picture 38. Grader turned right



DANGER

Pay attention to the direction of the blade in relation to the tractor. The blade attempts to steer the tractor (especially in winter conditions).

12. MAINTENANCE

Correct maintenance at the appropriate time is essential for the grader to operate reliably. Maintenance costs are small compared with any repair costs resulting from lack of maintenance. The most important measures are those that you carry out yourself; these include lubrication and various checks and adjustments.

12.1. Daily

- Check blade condition
- Check blade attachments
- Check movements
- Check constant pressure function
- Clean the implement at the end of the work day

12.2. Weekly

- Lubricate the grease nipples
- Check the hydraulic coupling for leaks

12.3. Every 500 hours

- Check pin condition
- Check screw tightness

12.4. Annual Maintenance

All above mentioned and adjustment of the grader control which recommended to be done in the FMG service.



NB:

When carrying out servicing, you must follow the service intervals, i.e. you must also have carried out all previously listed items.



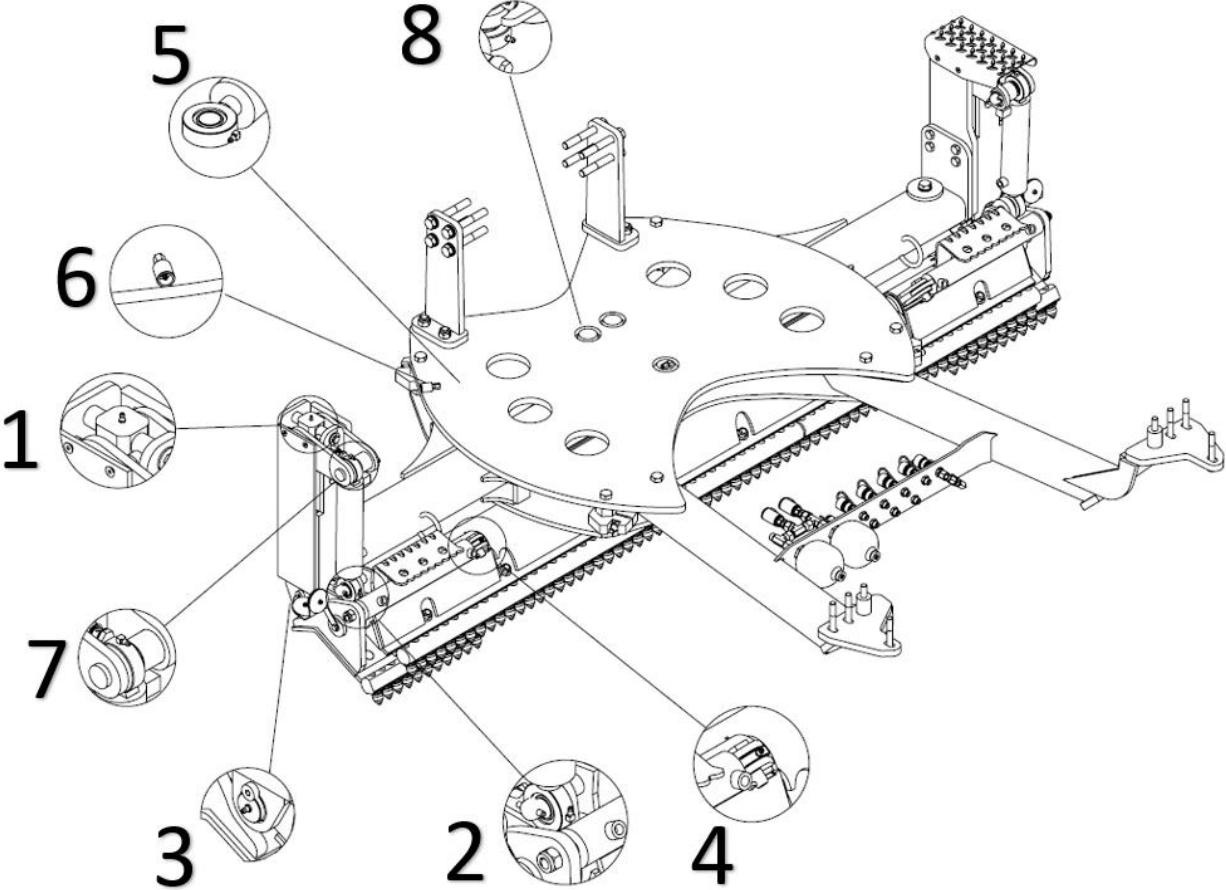
NB:

Also check that screws are tightened correctly after the first use.

12.5. Lubrication

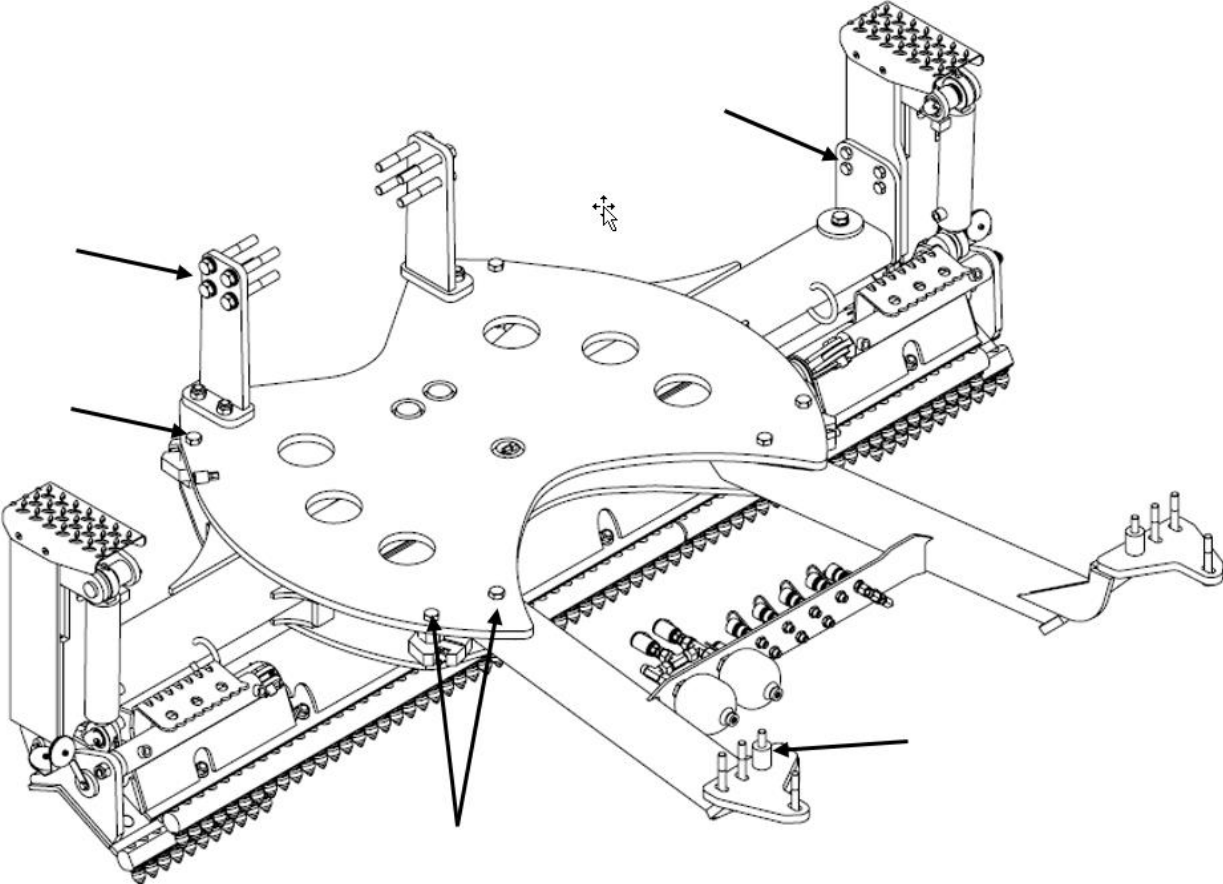
POS	QTY	50h	200h
1	2		•
2	2	•	•
3	2	•	•
4	2		•
5	2		•
6	1	•	•
7	2		•
8	2		•

Lubricate the grease nipples according to this table.



12.6. *Screws to be tightened*

Tighten the screws shown in the table every 500 hours.



13. LED-LIGHT OPERATION

Colour	Status	Description
–	permanently off	no operating voltage
orange	1 x on	initialisation or reset checks
green	5 Hz	no operating system loaded
	2 Hz	application is running (RUN)
	permanently on	application stopped (STOP)
red	5 Hz	application stopped due to undervoltage
	permanently on	system fault (fatal error)



LLP FARM MACHINERY GROUP OY

LEVYTIE 4
74510 IISALMI, FINLAND

PUH. +358 (0) 20 1984 020
FAX +358 (0) 20 1984 029

www.fmg.fi

