Operating Instructions

Plough Control EPS

VEO-R 360

Version 1.0
up to
Version 4.0

- EN -

Safety is our concern!

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DEFINED USE

- Please familiarise yourself with the LEMKEN VEO-R 360 and its operations before putting the implement to work. Therefore use this instruction book with the „General Health- and Safety precautions“!
- Under „defined use“ the manufacturer’s prescribed operation-, maintenance- and repair conditions are to be adhered to!
- The LEMKEN VEO-R 360 may only be operated, maintained and repaired by such persons who have been made acquainted with it and who have been advised about the dangers!
- The applicable accident prevention advice as well as the generally accepted safety technical, working, medical and road traffic rules should be adhered to!

CONTENTS

1 GENERAL INFORMATION

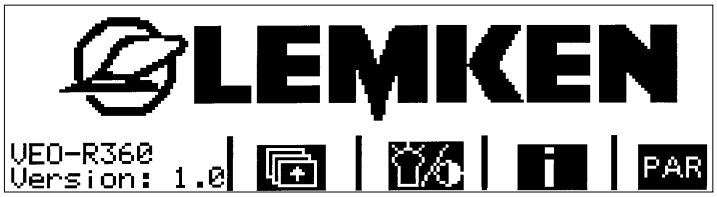
For the electronic plough control VEO-R 360 there must be provided an operating voltage of 12 V – range of tolerance between 10 and 15 volt. It must be ensured that the plough control is provided with this operating voltage to ensure a smooth operation. Excess voltage and undervoltage lead to a breakdown and can destroy operating tools. Furthermore it must be ensured that there is a power covering of the power supply of at least 16 A.

The electronic plough control VEO-R 360 has been developed for the LEMKEN mounted reversible ploughs Vari-Opal. This control is available as version 1.0, 2.0, 3.0 and 4.0. Which adjustment- and control functions are possible with which version can be learned from the following table:

Function	Version			
	1.0	2.0	3.0	4.0
Pitch adjustment	x	x	x	x
Switching over the turnover ram	x	x	x	x
Front furrow width	x	x		
Working width per body	x	x	x	x
Furrow press arm operation	x	x	x	x
Depth adjustment of the depth control wheel		x		x

This plough control includes a job computer with operator terminal. The job computer is fitted at the plough and the operator terminal is placed in the tractor cabin.

If the electronic plough control is switched on, the start menu MB 0 appears on the display of the operator terminal.



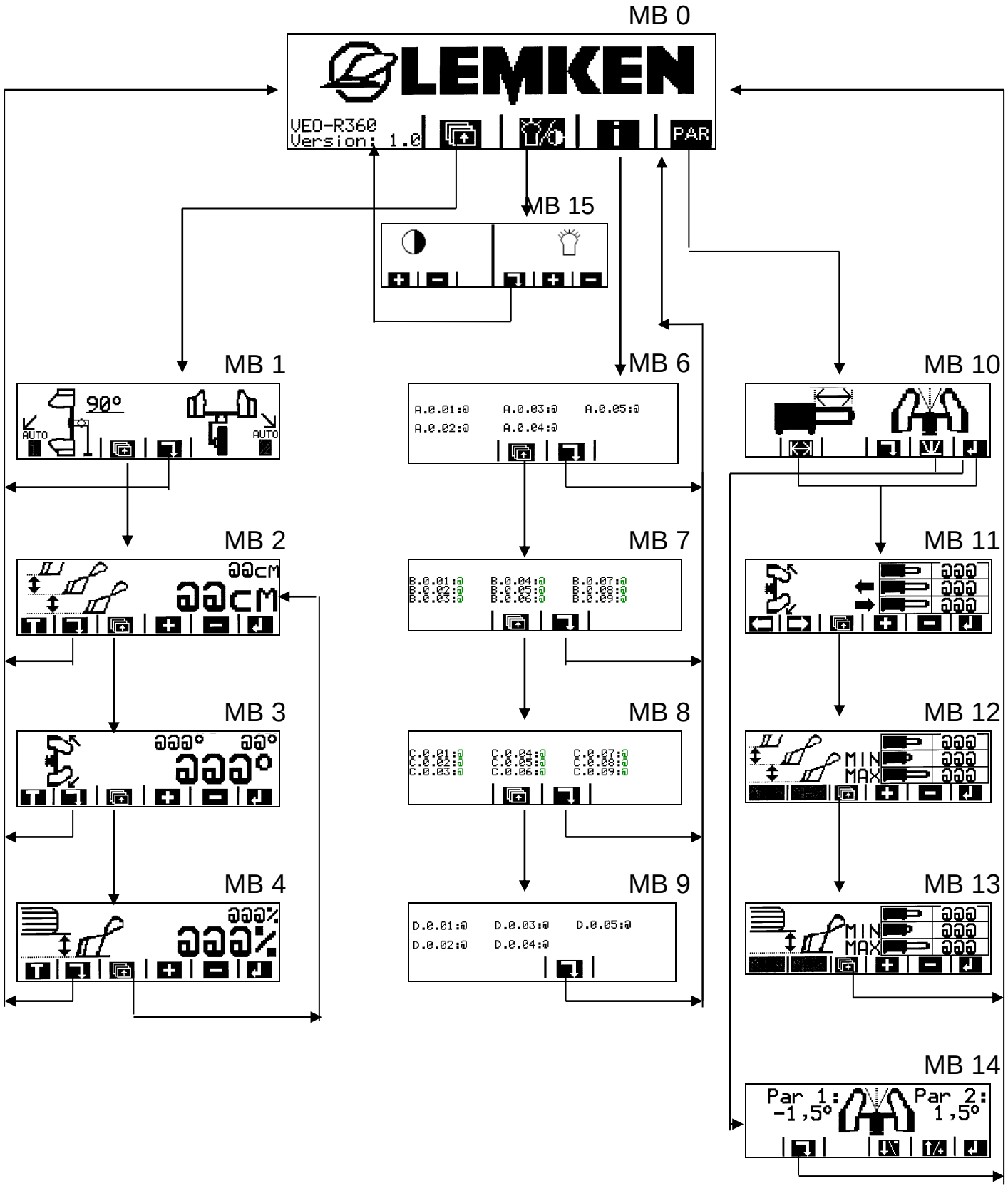
From here all operation menus can be reached by pressing the key  .

By means of pressing the Return-key,  the start menu MB 0 will always appear on the display.

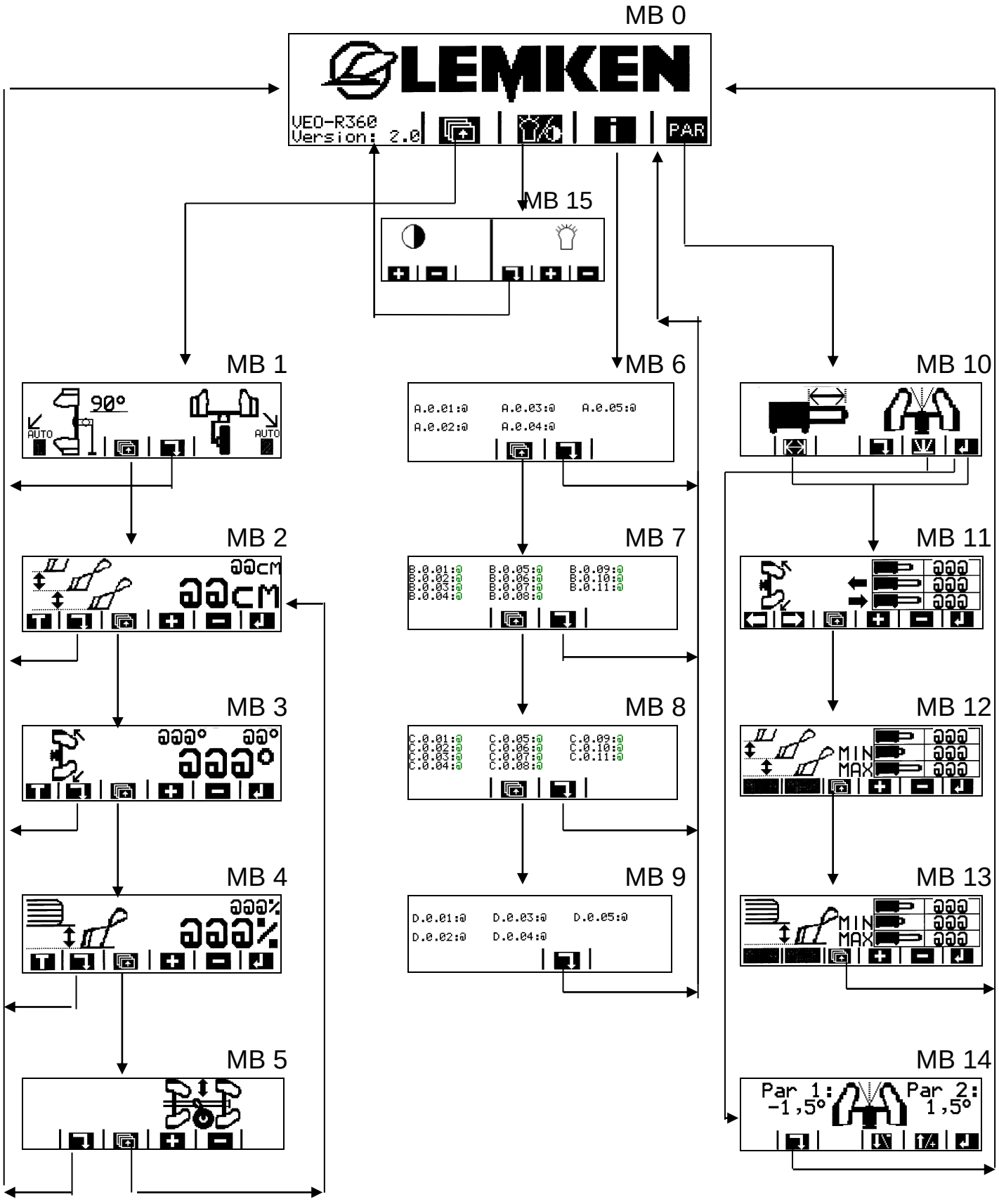
Warning! Switch on main switch (6) first after starting the tractor engine! (With some tractors a voltage drop or the power supply to the implement will be interrupted completely during the starting procedure. With switched on operator terminal a failure message appears on the display (2). Then the operator terminal must be switched off and then on again. After that the control is operable again!)

2 MENU TABLE

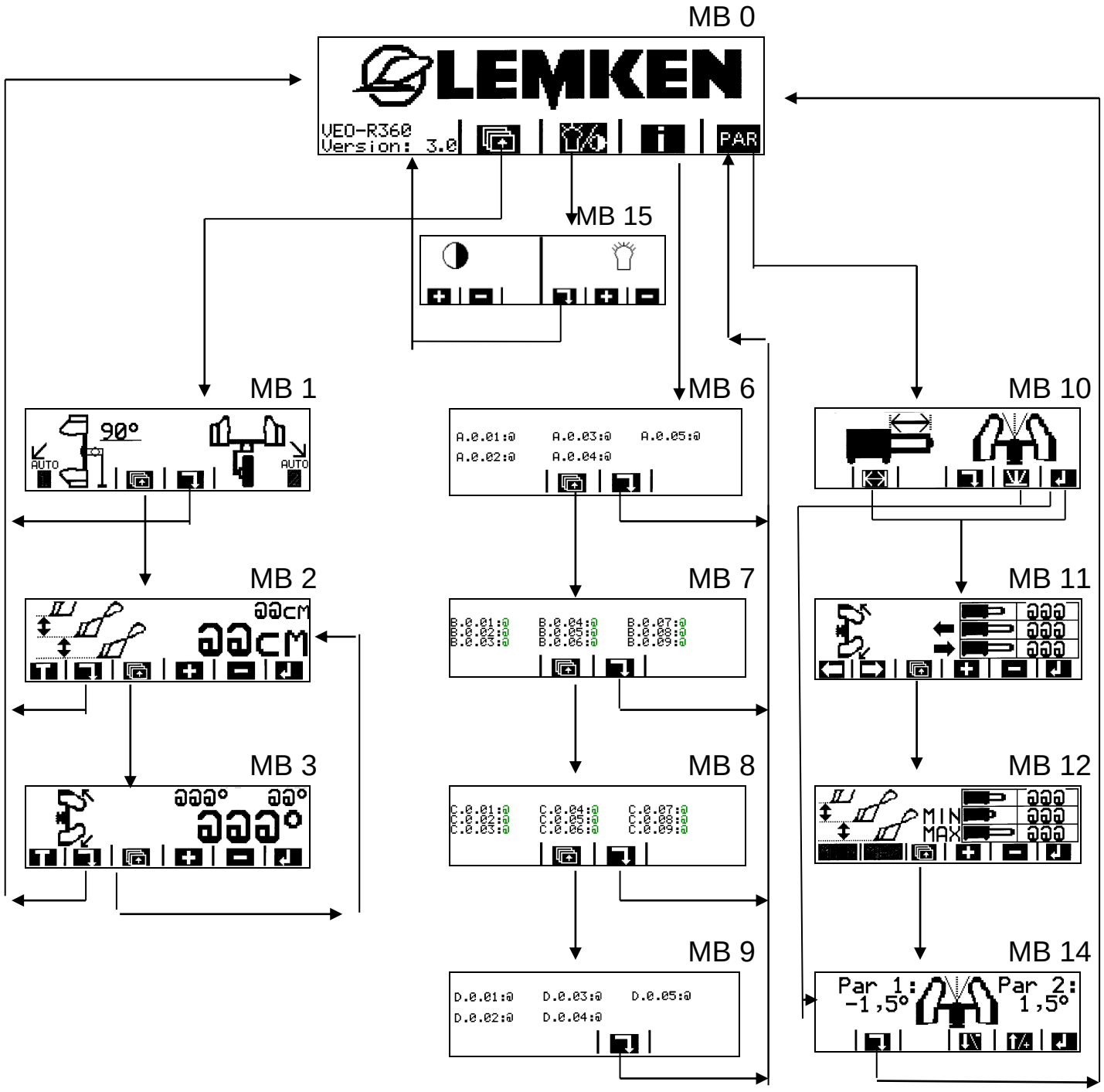
2.1 Version 1.0



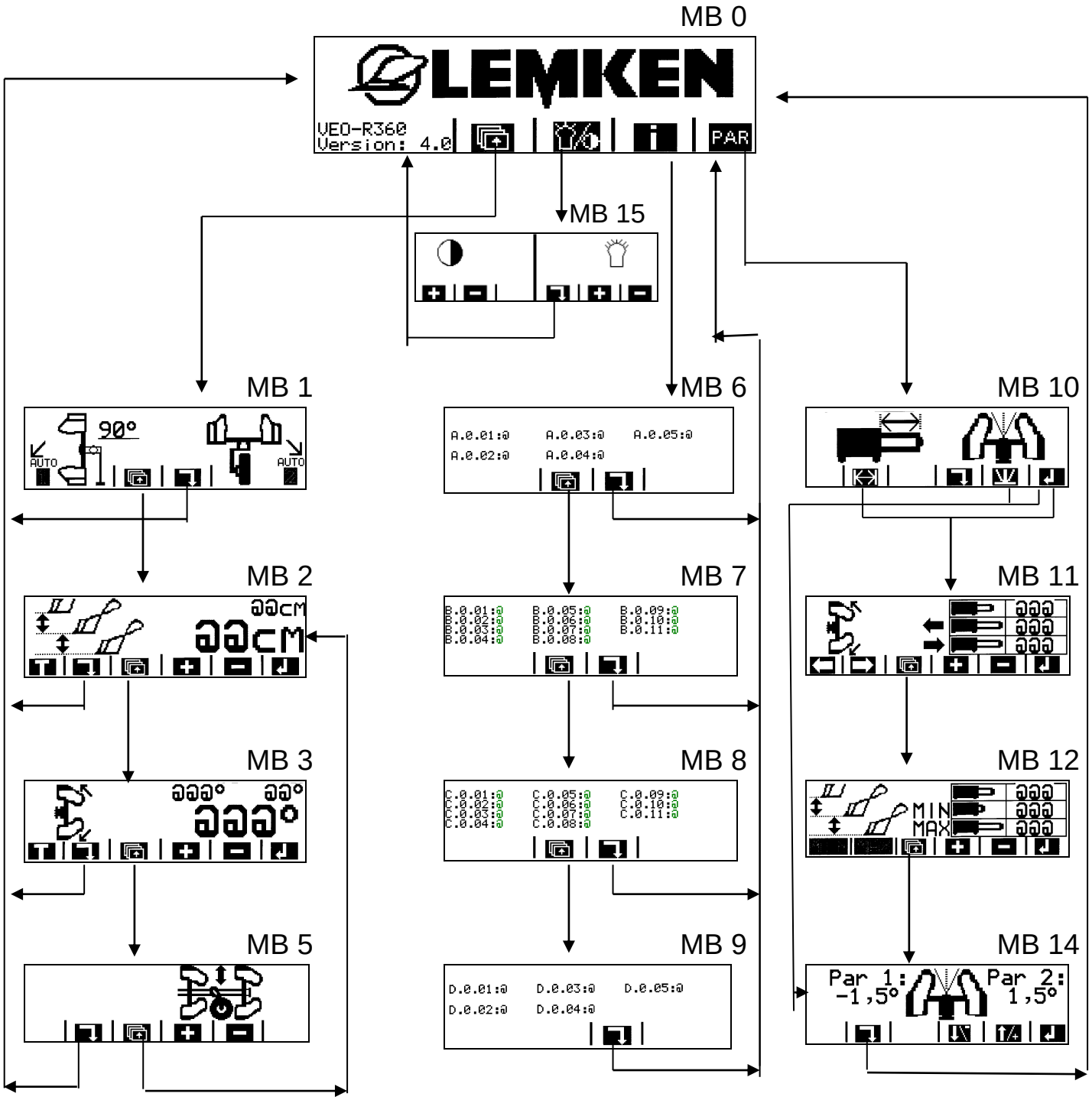
2.2 Version 2.0



2.3 Version 3.0



2.4 Version 4.0



3 GUIDE FOR ADJUSTMENTS AND FUNCTIONS

4 OPERATOR TERMINAL LST 2 WITH DISPLAY

4.1 Operator terminal

The operator terminal LST 2 (1) consists out of a compact unit with

(2) - Display,
(3) + (4) - Auto keys,
(5) - Function keys,
(6) - Main switch,
(7) - Horn,
(8) - Light-emitting diodes,
(9) - Fuses F1 and F2,
(10) - Interface for additional operation apparatus (as joystick),
(11) - Connection bushes for the connection between operator terminal and job computer
(12) - Diagnostic interface and
(13) - Lead „power supply“ with 3-poles plug according to DIN 9680

4.2 Display

On the display first the functions will be indicated which can be chosen by the functions keys (5) and second the current operation situation of the plough control.

5 KEYS AND THEIR FUNCTIONS

5.1 Auto-keys

5.1.1 Auto-key (3)

When pressing the Auto-key (3) on the left side of the operator terminal, the plough frame will be swung-in, turned and swung-out again automatically.

5.1.2 Auto-Taste (4)

When pressing the right hand Auto-key (4), the catch pin of the furrow press arm will be operated.

The Auto-keys can only be activated in the menus MB 2, MB 3, MB 4 and MB 5.

In the menu MB 1 the plough can only be set into the attaching- or detaching position or to the transport position by pressing the Auto-keys.

5.2 Function keys

The function keys (5) show no definite function. When pressing one of the function-keys, always that function will be carried out, which is indicated on the display directly above the function-key concerned.
During the automatic operation (started from menu MB 2, MB 3, MB 4 or MB 5) all function keys, as shown on the display, are STOP keys.

Following each function-key will be described depending on the display indication:

5.2.1 Function keys in the menus (MB 1 to MB 5)

 Enter-key	The actual value will be saved.
 Return-key	Back to the start menu (MB 0).
 Leaf-key	Leafing through the menus MB 1 to MB 5 according to the menu table.
 Plus-key	Increasing actual value.
 Minus-key	Decreasing acutal value.
 T-key	1. press briefly = saved value of corresponding menu will be activated. 2. press longer than 2 seconds = all saved values (out of MB 2, MB 3 and MB 4) will be activated.

5.2.2 Functions in the menu (MB 15)

 Plus-key	Increasing the light/contrast.
 Minus-key	Decreasing the light/contrast.
 Return-key	Back to the start menu MB 0.

5.2.3 Function keys in the menus (MB 6 to MB 9)

 Leaf-key	Leafing through the menus according to the menu table.
 Return-key	Back to the start menu MB 0.

5.2.4 Function keys in the menus (MB 10 to MB 14)

 Align-key	When pressing this key together with the Enter-key, the align-operation will be reached.
 OT-key	When pressing this key together with the Enter-key, the menu „switch over moment“ will be reached.
 Arrow-right hand-key	When pressing this key together with the Enter-key, the right hand extended measurement of the turnover ram will be saved.
 Arrow-left hand-key	When pressing this key together with the Enter-key, the left hand extended measurement of the turnover ram will be saved.
 MIN-key	When pressing this key together with the Enter-key, the minimum closed measurement of the hydraulic ram will be saved.
 MAX-key	When pressing this key together with the Enter-key, the maximum extended measurement of the hydraulic ram will be saved.

5.2.5 Other function keys

 STOP-key	During the automatic operation all automatic sequences can be interrupted.
 OK-key	With a failure message = ERROR the failure will be confirmed by pressing this key. The audible warning stops. If the failure still appears, this one will be indicated by flashing light emitting diodes.

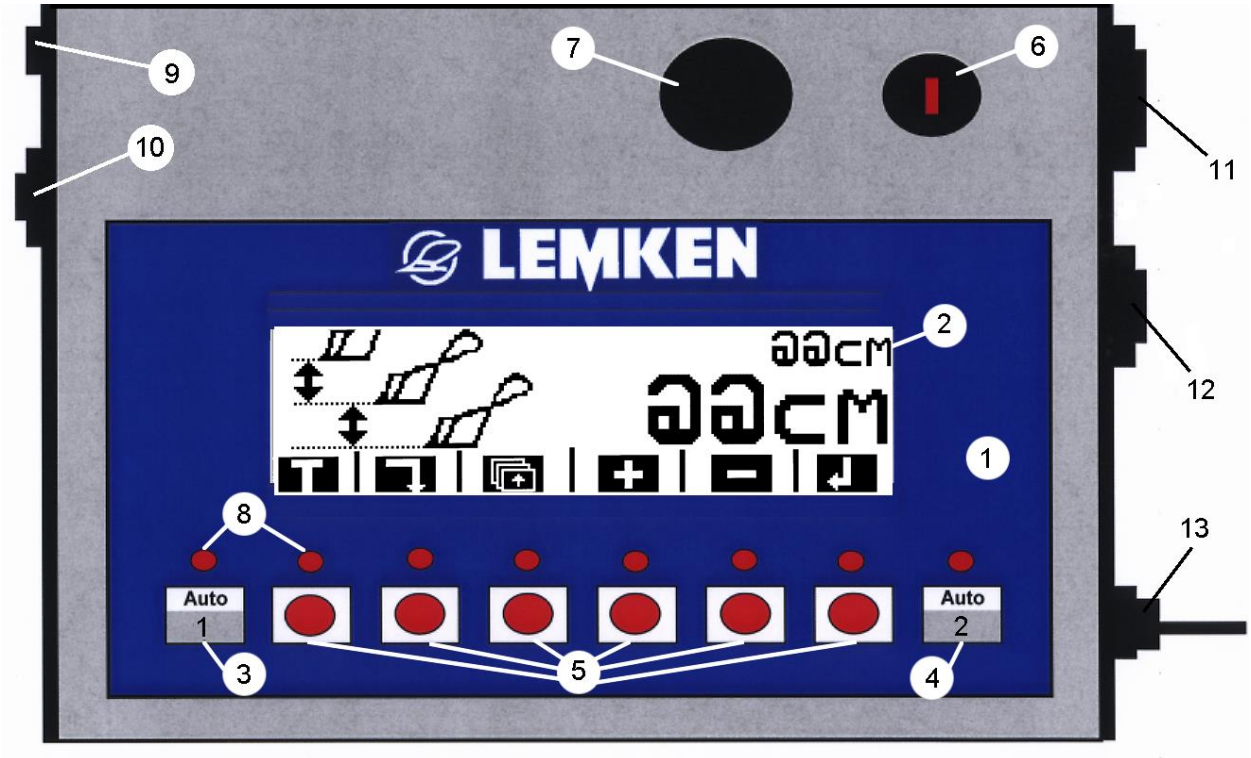
6 OPERATION

6.1 Turning the plough frame

6.1.1 Automatic operation

Press the left hand 

key in the menus MB2, MB3, MB4 or MB5.



Now the plough will be swung-in, turned and swung-out again automatically. Therewith those values for the working width per body, the pitch and the front furrow width will be reached as before the turnover operation.

6.1.2 Manual operation

When HAND appears in the menu MB 3, the plough frame can be turned manually.

Therefore first the key  must be pressed and when reaching the middle position the key  must be pressed = the turnover ram must be switched over by hand.

HAND appears only, when the working width adjustment ram and if fitted the front furrow width adjustment ram are in a position where a trouble free turnover procedure is ensured.

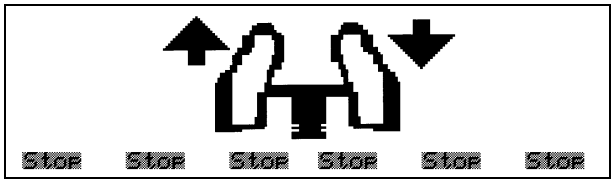
The function „manual turning of the plough frame“ must only be used when the automatic operation is impossible, e.g. due to a defective turning potentiometer.

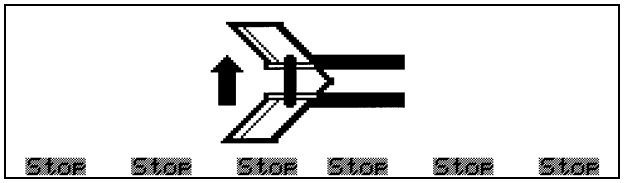
6.2 Furrow press arm

Press the right hand 

key in the menus MB2, MB3 or MB4.

The catching pin of the furrow press arm will now be operated and a pull press unlocked. After a few seconds the catching pin will be set automatically into the catching position again.
During the swinging- and turnover operation respectively the furrow press arm operation, on the display the symbol of that function appears which will be carried through at that moment.





At the same time STOP-symbols appear down on the display. With danger press one of those STOP keys; that function that will be carried through at the moment will be interrupted immediately.

6.3 Adjustments

The working width per body, the front furrow width and the right hand and left hand pitch adjustment can be adjusted, changed and saved by touch of a key.

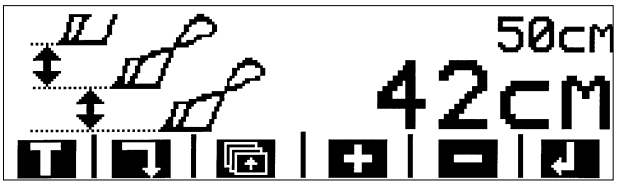
6.3.1 Working width per body (MB2)

Increasing working width per body

⇨ press 

Decreasing working width per body

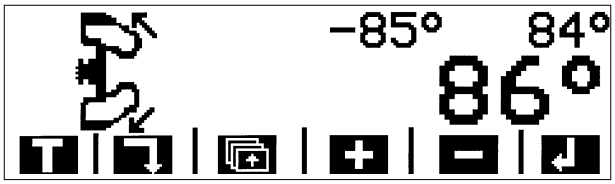
⇨ press 



Press  to save the adjusted values.

6.3.2 Pitch (MB3)

The pitch must be adjusted separately for the left hand and right hand work.



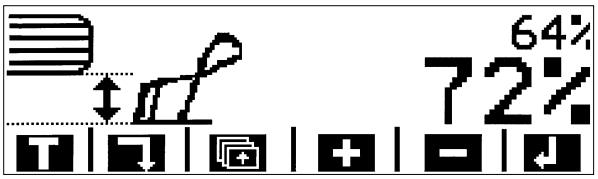
Set body more to the point -> press 

Set body more to the blade -> press 

The right hand pitch can be adjusted in the range from 70° to 90°.
The left hand pitch can be adjusted in the range from –70° to –90°.

Press  to save the adjusted values.

6.3.3 Front furrow width adjustment (MB4) (with version 1.0 and 2.0)



Increasing front furrow width

⇨ press 

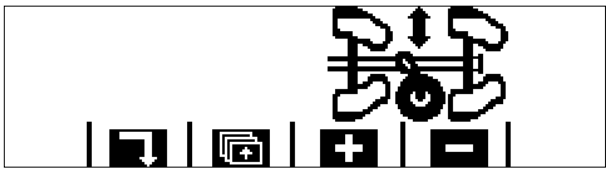
Decreasing front furrow width

⇨ press 

The front furrow width will be indicated in %.

Press  to save the adjusted values.

6.3.4 Depth control wheel (MB5) (with version 2.0 and 4.0)



Increasing the working depth

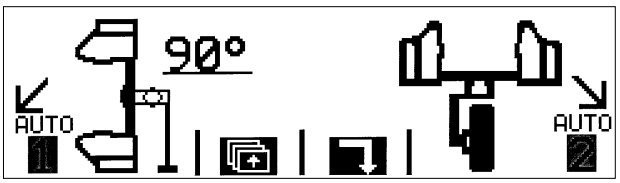
⇨ press 

Decreasing the working depth

⇨ press 

6.4 Attaching and detaching position

To ease the attaching and detaching of the plough, the plough can be set to the ideal attaching and detaching position.
Therefore the **Auto 1** key must be pressed in the menu MB 1

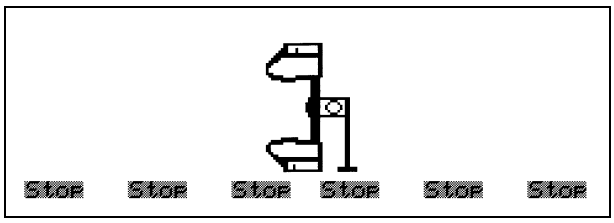


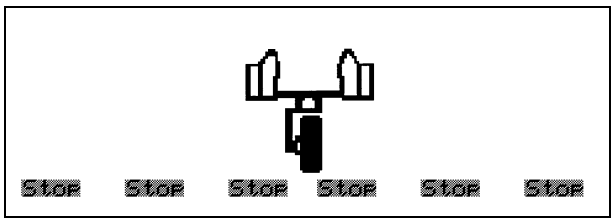
Now the working width is adjusted to 40 cm, the pitch to 90° and the front furrow width to 50 %.

6.5 Transport position

Before the plough frame will be turned to transport position, turn the locking pin at the headstock by 180°.
After that press the **Auto 2** key with completely lifted plough.
Now the plough frame will be turned automatically into the half-turned transport position.

That function will be indicated on the display which will be carried through at that moment.

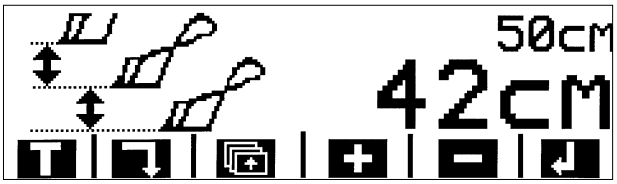


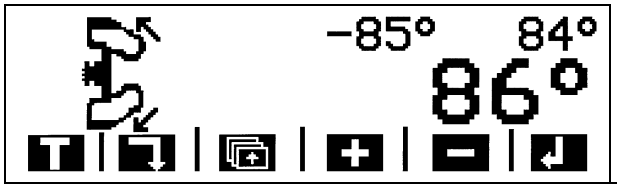


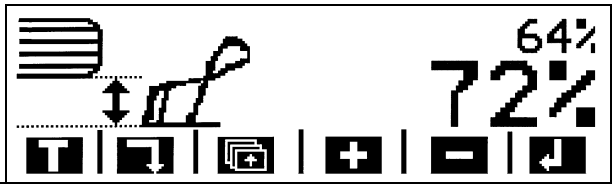
At the same time STOP-symbols appear down on the display. With danger press one of those STOP keys; that function that will be carried through at the moment will be interrupted immediately.

6.6 Saving operation in the menus MB 2, MB 3 and MB 4

Each actual value of the pitch adjustment, the working width or the front furrow width can be saved, so that they can be activated, if required.







With each saving procedure the previous saved values will be overwritten.

Warning! The saved value (small indicated numerical value) is indicated right on top of the display. The acutal value (large indicated numerical value) is indicated below!

6.6.1 Changing an actual value

Press + or −, see section „*Adjustments*“. The change of the actual value will not be saved.

6.6.2 Saving an acutual value

Press ↵ the current value will be saved, the previously saved value will be overwritten.

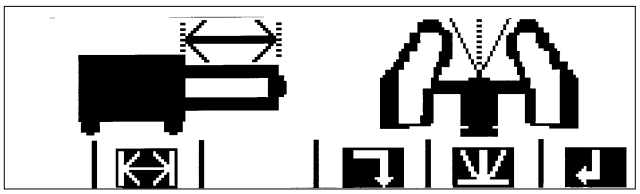
6.6.3 Activating the saved value

If the saved value should be activated which is indicated right in the left top of the display T must be pressed briefly.

If all saved values for the working width per body, the pitch and the front furrow width then T must be pressed longer than 2 seconds.

7 CALIBRATING THE MEASURING UNITS

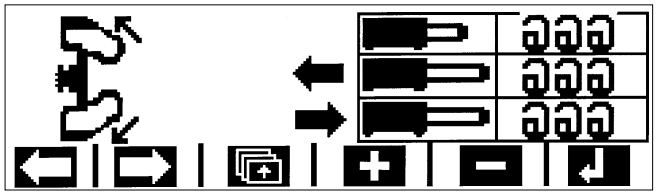
7.1 General Instructions



The calibrating of the measuring units has already been done in the factory
If on the display, e.g. the failure message A.1.X appears, this points to a faulty measurement, which the system does not allow. In this case the measuring unit of each hydraulic ram must be calibrated again.

Therefore the plough frame must be lifted completely and swung-in and in the menu MB 0 the key PAR and after that in the menu MB 10 the keys  and  pressed at the same time.

7.1.1 Calibrating the turnover ram



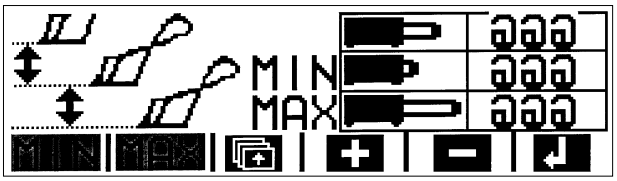
For calibrating the turnover ram, the plough frame must be set to the right-hand turning and left-hand turning working position by pressing the **Minus-key** (piston rod closes) and following pressing of the **Plus-key** (piston rod opens). The **Minus-key** must be pressed until the plough frame has reached the middle position. The **Plus-key** must be pressed until the calibrating turnover ram has opened completely.

<u>Warning</u>! In the calibrating operation the switch over of the hydraulic ram must be done manually.

After the turnover ram has opened completely, the **Enter-key** and one of both **arrow-keys** must be pressed, to save the opened length of the turnover ram.
If the plough is in right-hand working position, the keys **Enter** and **arrow-right-hand** must be pressed.
If the plough is in left-hand working position, the keys **Enter** and **arrow-left-hand** must be pressed.
After that press the **Minus-key**, to turn the plough frame into the opposite plough position. When reaching the middle position, the Plus-key must be pressed again. After the hydraulic ram is opened completely, the Enter-key and the corresponding arrow-key must be pressed to save the opened length of the turnover ram.

Now the turnover ram is calibrated.

7.1.2 Calibrating the working width adjustment ram



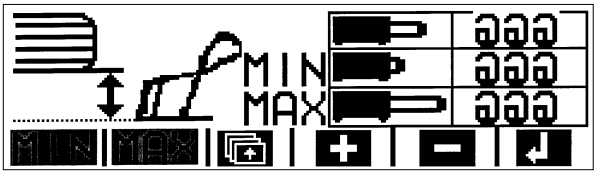
Press [+] to open the hydraulic ram completely.

After that press the keys [MAX] and [↵] at the same time to save the value.

Press [−] to close the hydraulic ram completely.

After that press the keys [MIN] and [↵] at the same time, to save the value. Now the working width adjustment ram is calibrated.

7.1.3 Aligning the front furrow width ram (with version 1.0 and 2.0)



Press [+] to open the hydraulic ram completely.

After that press the keys [MAX] and [↵] at the same time to save this value.

Press [−] to close the hydraulic ram completely.

After that press the keys [MIN] and [↵] at the same time to save this value. Now the front furrow width adjustment ram is calibrated.

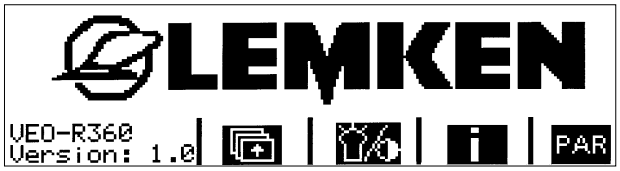
7.2 Switch over moment of the turnover ram

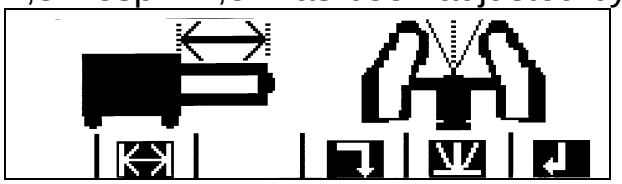
If the turnover ram turns too late or too early, this leads to interruptions or malfunctions of the turnover procedure. A too early turnover will be recognised by hard turnover hitches or by turning back the plough frame after a noticeable hitch. A too late turnover will be recognised by an interruption of the turnover procedure. In the case of a malfunction the turnover moment can be optimised as follows. But before it must be ensured that the tractor hydraulics show sufficient pressure and supplies sufficient oil.

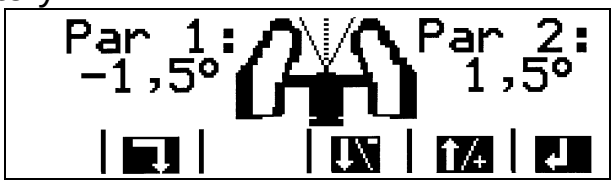
Warning! Before the adjustment of the switch over moment the measuring unit of the hydraulic ram must be calibrated!

7.3 Adjusting the switch over moment

The switch over moment can be adjusted from 2,5° before OT (= upper dead centre) to 0°.
Right turning from 2,5° to 0° and left turning from –2,5° to 0°.
1,5° resp. –1,5° has been adjusted by the factory.







Starting from the menu MB 0 first the PAR key and after that in the menu MB10 the keys and must be pressed at the same time. Now in the menu MB 14 the parameters 1 and 2 can be changed.

PAR 1 if the right turning turnover moment should be changed.
PAR 2 if the left turning turnover moment should be changed.

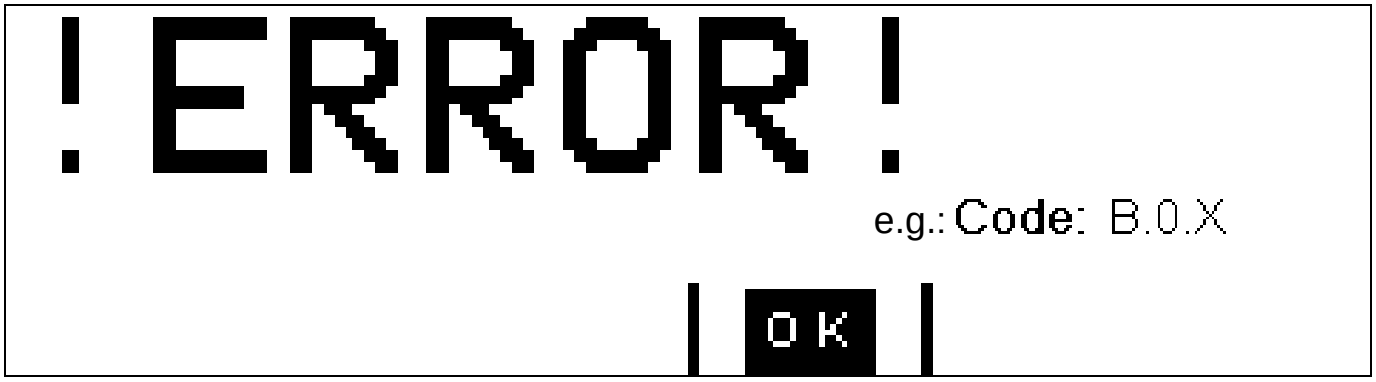
By pressing the key the cursor must be activated first.

By pressing the keys and the cursor will be moved to PAR 1 or PAR 2 and after that press .

Now the value will be changed by pressing the keys or and saved by pressing .

8 MALFUNCTIONS AND ELIMINATION

With malfunctions the failure message „ERROR“ appears, a horn sounds and 8 light-emitting diodes are shining.
Additionally a failure code appears on the display, e.g. Code: B.0.X .



The failure message will be confirmed by pressing the OK-button. The horn stops and the failure message disappears on the display. Only the shining of the light-emitting diodes shows that there is still a malfunction.

Each indicated code shows which failure exists, e.g.:

Code: A.1.X = Voltage regulator is defect or measurement (calibration) failure. For failure identification first the key , then the key and then the key must be pressed to reach the menu MB 6. See section “*Failure identification and analysing”*

Code: B.0.X = Parting of a cables – For identifying the failure, first the Return-key, then the Info-key and then the leaf-key must be pressed to reach the menu MB 7. See section “*Failure identification and analysing”*

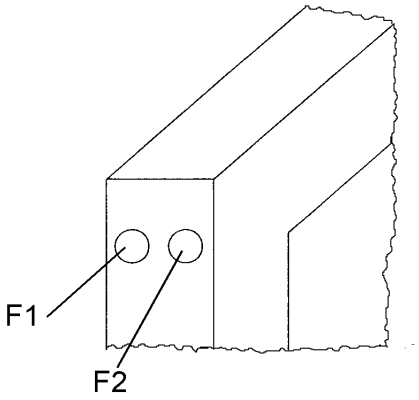
Code: C.0.X = Short circuit - For identifying the failure, first the Return-key, then the Info-key and then the leaf-key must be pressed to reach the menu MB 8. See section “*Failure identification and analysing”*

Code: D.0.X = System failure - For identifying the failure, first the Return-key, then the Info-key and then the leaf-key must be pressed to reach the menu MB 9. See section “*Failure identification and analysing”*

Warning! The light-emitting diodes shine until the failure has been found and the malfunction is eliminated.

8.1 Fuses

The fuses F1 and F2 fitted laterally at the housing of the operator terminal are used for the electrical protection of the electronic plough control VEO-R 360. In the case of a malfunction they must be checked and replaced if required. If despite of correct power supply the display is still dark, the fuse F1 must be checked. The fuse F2 must be checked, if despite of correct power and oil supply no manual and automatic functions can be carried through with the plough.



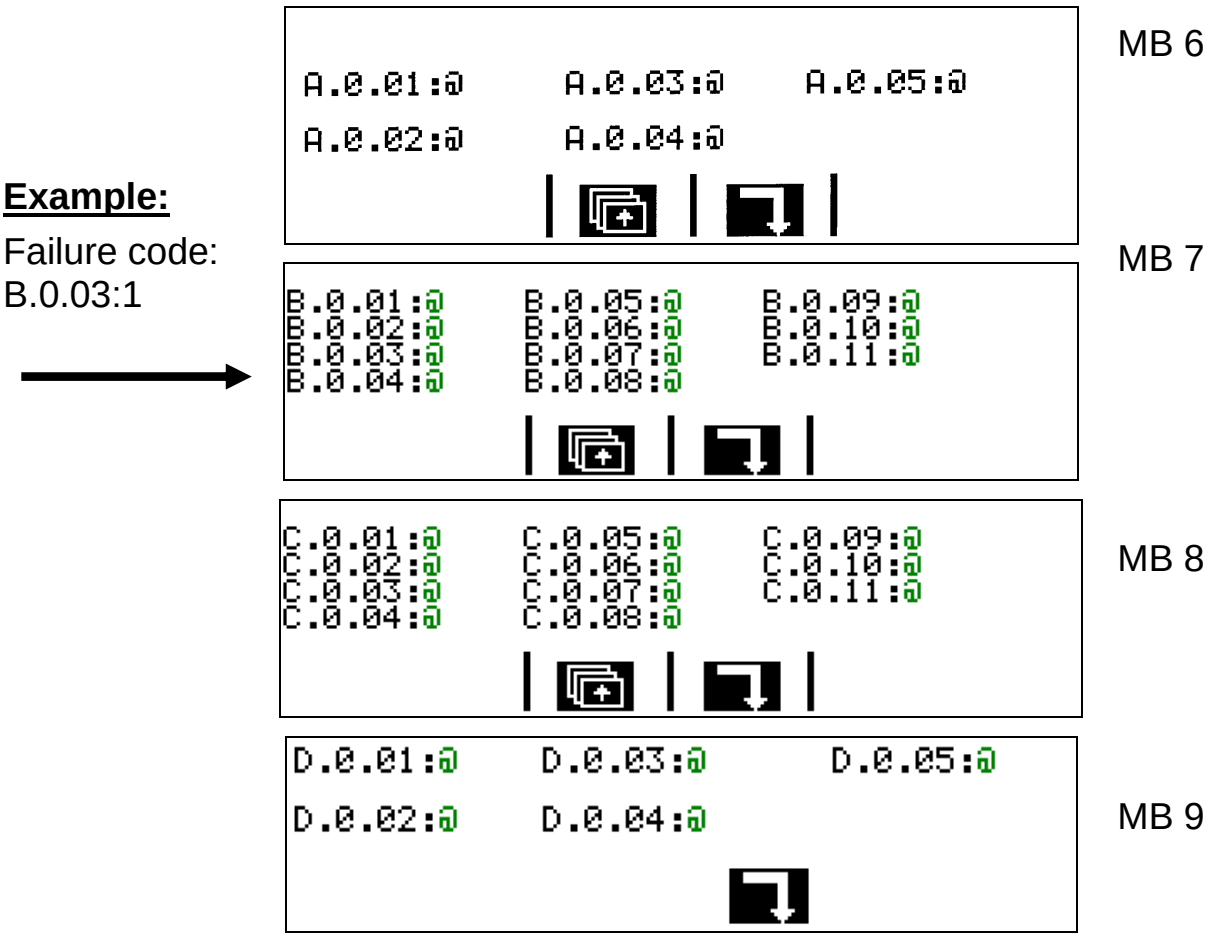
The fuse F1 is a slow glass fuse with 1 A (part No.: 373 1306) and the fuse F2 is a slow glass fuse with 16 A (part No.: 373 1308).

8.2 Failure identification and analysing

After pressing the keys and in the menus MB 0 and the key the menus MB 6 to MB 9 appear. The following menus MB 6 to MB 9 are failure lists.

Example:

Failure code:
B.0.03:1



There, where behind the Code the No. 1 appears, e.g. Code: B.0.03: **1,** the failure must be searched for, and that according to the following failure analysing table. In the line behind the Code B.0.3 the failure description and the remedy of the corresponding failure will be found

0 behind the failure code means: perfect function!

1 behind the failure code means: failure!

The example shows a parting of a cable to the valve Y2a. The elelctric connection to the magnet valve is interrupted.

As soon as the light-emitting diodes do no shine anymore, the malfunction is effectively eliminated.

Failure code	Description	Reason	Remedy
A.0.01	Fuse F2 defect		Replace fuse (16A slow)
A.0.02	Failure sensor voltage	Faulty sensor voltage, voltage regulator defect	Service
A.0.03	Measurement failure turnover axle	Faulty calibration of the turning potentiometer	New aligning
A.0.04	Measurement failure working width ram	Faulty calibration of the working width ram	New aligning
A.0.05	Measurement failure front furrow ram	Faulty calibration of the front furrow ram	New aligning
B.0.01	Parting of a cable to the valve V1a	Electric connection to the magnet valve is interrupted	Check connection from the cable to the valve and repair it again
B.0.02	Parting of a cable to the valve V1b	Electric connection to the magnet valve is interrupted	Check connection from the cable to the valve and repair it again
B.0.03	Parting of a cable to the valve V2a	Electric connection to the magnet valve is interrupted	Check connection from the cable to the valve and repair it again
B.0.04	Parting of a cable to the valve V2b	Electric connection to the magnet valve is interrupted	Check connection from the cable to the valve and repair it again
B.0.05	Parting of a cable to the valve V3a	Electric connection to the magnet valve is interrupted	Check connection from the cable to the valve and repair it again
B.0.06	Parting of a cable to the valve V3b	Electric connection to the magnet valve is interrupted	Check connection from the cable to the valve and repair it again
B.0.07	Parting of a cable to the valve V4	Electric connection to the magnet valve is interrupted	Check connection from the cable to the valve and repair it again
B.0.08	Parting of a cable to the valve V5	Electric connection to the magnet valve is interrupted	Check connection from the cable to the valve and repair it again
B.0.09	Parting of a cable to the valve V6	Electric connection to the magnet valve is interrupted	Check connection from the cable to the valve and repair it again
B.0.10	Parting of a cable to the valve V7a	Electric connection to the magnet valve is interrupted	Check connection from the cable to the valve and repair it again
B.0.11	Parting of a cable to the valve V7b	Electric connection to the magnet valve is interrupted	Check connection from the cable to the valve and repair it again

C.0.01	Short circuit of valve V1a	Electric connection to the magnet valve is interrupted	Check connection from the cable to the valve and repair it again
C.0.02	Short circuit of valve V1b	Electric connection to the magnet valve is interrupted	Check connection from the cable to the valve and repair it again
C.0.03	Short circuit of valve V2a	Electric connection to the magnet valve is interrupted	Check connection from the cable to the valve and repair it again
C.0.04	Short circuit of valve V2b	Electric connection to the magnet valve is interrupted	Check connection from the cable to the valve and repair it again
C.0.05	Short circuit of valve V3a	Electric connection to the magnet valve is interrupted	Check connection from the cable to the valve and repair it again
C.0.06	Short circuit of valve V3b	Electric connection to the magnet valve is interrupted	Check connection from the cable to the valve and repair it again
C.0.07	Short circuit of valve V4	elektrische Verbindung zum Magnetventil gestört	Check connection from the cable to the valve and repair it again
C.0.08	Short circuit of valve V5	Electric connection to the magnet valve is interrupted	Check connection from the cable to the valve and repair it again
C.0.09	Short circuit of valve V6	Electric connection to the magnet valve is interrupted	Check connection from the cable to the valve and repair it again
C.0.10	Short circuit of valve V7a	Electric connection to the magnet valve is interrupted	Check connection from the cable to the valve and repair it again
C.0.11	Short circuit of valve V7b	Electric connection to the magnet valve is interrupted	Check connection from the cable to the valve and repair it again
D.0.01	Collecting failure	General collecting failure job computer	> Call LEMKEN Service
D.0.02	CAN-BUS collecting failure	Interruption/trouble of communication between operation terminal and job computer	visible control, call LEMKEN Service, if required
D.0.03	Power failure	Failures of the tractor electricities	Call tractor manufacturer’s service
D.0.04	Storing failure	Failure with the storing units of the computer	Call LEMKEN service
D.0.05	High temperature failure	Too high temperature has appeared	Stop work until the computer is cool again

The failure codes B.0.05, B.0.06, C.0.05 and C.0.06 are not activated with version 3.0.

8.3 Function of valves

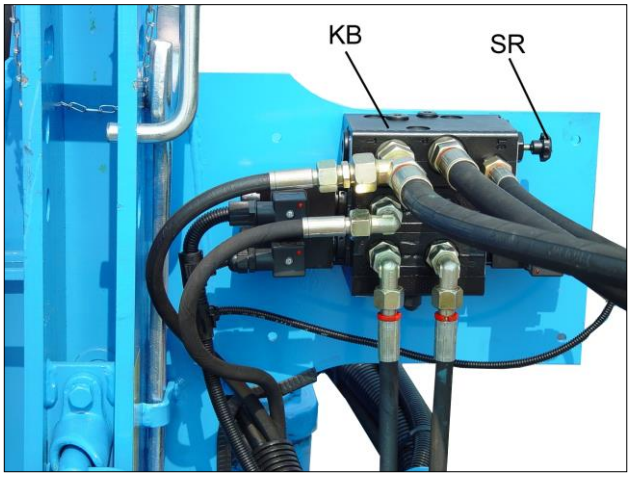
The single valves will be switched for the following functions:

Valve V1a	=	Valve for increasing the working width
Valve V1b	=	Valve for decreasing the working width
Valve V2a	=	Valve for closing the turnover ram
Valve V2b	=	Valve for opening the turnover ram
Valve V3a	=	Valve for increasing the front furrow width (with version 1.0 and 2.0)
Valve V3b	=	Valve for decreasing the front furrow width (with version 1.0 and 2.0)
Valve V4	=	Valve for furrow press arm
Valve V5	=	Valve for quick run
Valve V6	=	Valve for Load-Sensing operation (option)
Valve V7a	=	Valve for opening the hydraulic ram of the depth control wheel
Valve V7b	=	Valve for closing the hydraulic ram of the depth control wheel

Warning! For the operation of each hydraulic use the tractor must be equipped with a hydraulic assembly with a constant oil flow- or a Load-Sensing - system.

8.4 Combi block

The combi block (KB) is provided in front left at the turnover axle. It supplies oil to each hydraulic ram. By means of the adjuster screw (SR) the combi block can be adjusted to each hydraulic system.



Tractor with Load-Sensing hydraulic system

⇨ Turn-in adjuster screw (SR) until its stop

Tractor with constant power hydraulic system

⇨ Turn-out the adjuster screw (SR) until its stop

Tractor with constant pressure hydraulic system

⇨ Turn-in adjuster screw (SR) until its stop

- Before use, please familiarise yourself with the LEMKEN implement, the appropriate plough control and its use. Therefore use this instruction book as well as the instruction book of the concerned plough with its safety instructions!
- Before turning the plough must be lifted completely!
- For transport always convert the Uni wheel as described in the instruction book of the concerned plough!
- In transport position the plough headstock must be locked by means of the locking pin!
- When the plough should be turned again, the locking pin must be unlocked again and the plough lifted completely!