Operating Instructions

On-board computer

LH 1600

Version 1.04 and 1.06

GB

Safety is our concern!

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1 SOCKET

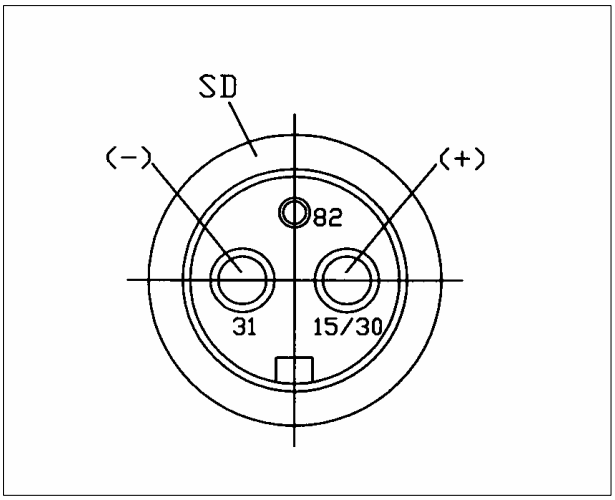
1.1 General Instruction

For the power supply of the on-board computer LH 1600 a socket according to DIN 9680 must be provided at the tractor.
Before the on-board computer is connected to the socket, the polarity of the socket must be checked. In spite of a pole protection in the circuit box (AK), an incorrect connected socket may lead to damage at the circuit board in the box.

1.2 Checking the correct polarity of the socket

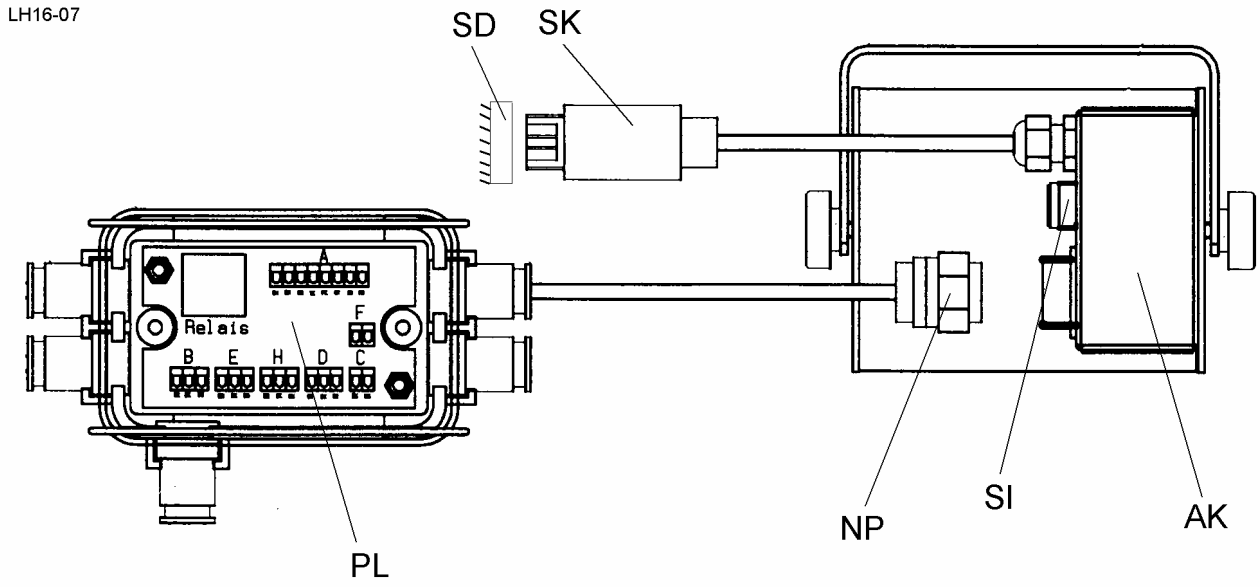
The pole 15/30 must be connected with (+) to the battery and the pole (31) with (-) earth.

The correct polarity of the socket (SD) can be checked without danger of damaging the circuit board as follows:



1. Pull out plug (NP), with nine poles to the distributor box, out of the on-board computer.
2. Then fit the plug of the Bordcomputer to the socket (SD) of the tractor.

If the display keeps dark, a failure of the power supply must exist. In this case first the fuses must be checked. First check the fuse of the socket (SD) and then the fuse (SI) at the circuit box between plug and on-board computer. If the fuses are not blown, the polarity of the socket (SD) must be reversed.



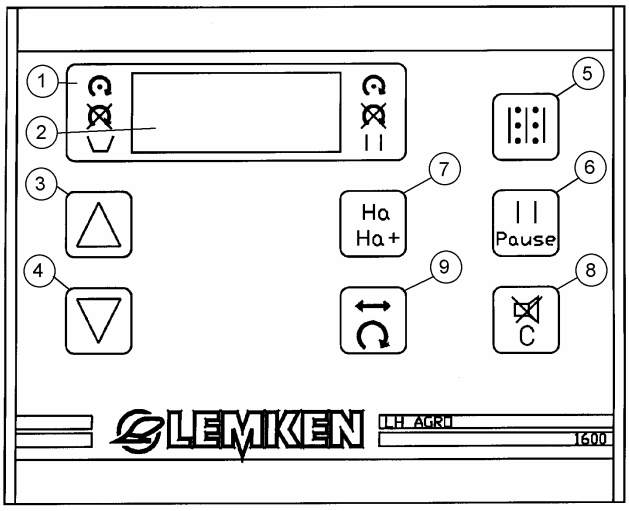
2 GENERAL USE

With the LH 1600 on-board computer the following can be controlled and monitored exactly:

1 Tramline control.
2 Hectare counter (hectare per field and hectare total)).
3 Tramline monitoring.
4 Hopper contents (warning) - optional equipment
5 Additionally the distance per impulse (hectare counting) can be calibrated automatically by means of the LH 1600.

3 KEYS AND FUNCTIONS

Keypad description:



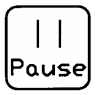
1 Warning indicator for tramlining, hopper (optional equipment) and stop (hold) function

2 4 position display

3  Arrow-key* for increasing the actual line and the entered data

4  Arrow-key* for decreasing the actual line and the entered data

5  Operation-key for adjusting the tramline rhythm, operating position

6 

Hold-key for stopping the tramline counting

7 

Hectare-key for indication of the single hectare counting and the total hectare counting.

8 

Clear-key for confirming warning signals and for cancelling entered data of the rhythm, the hectare counters, the calibration menu, the working width and the wheel circumference (cm/impulse). Never press the button longer than 2 seconds, as the data in the computer will be deleted (see section 6.2)

9  Program-key for 'calibration menu' (press once), the 'working width menu' (press twice) and for encoding the wheel circumference in cm per impulse (press three times)

* When pressing the hold-key (6) the tramline counting will be stopped, the arrow keys (3) and (4) will be deactivated at the same time.

4 USE OF THE LH 1600

4.1 General Instructions

The LH 1600 has been pre-programmed in the factory. The encoded data =

1 working width of the seed drill (250 cm, 300 cm, 400 cm or 450 cm),

2 distance per impulse (7,3, 22,84 or 24,43) and

3 tramline rhythm

must be checked before the first use and encoded once again, if necessary.

The tramline rhythm is calculated as follows:

Working width of the following implement divided by the working width of the seed drill = tramline rhythm.

Example: Working width of the following implement = 15 m
Working width of the seed drill = 3 m
15 m : 3 m = 5 The correct tramline is 5

Attention: Before encode the acoustical warning signal must be confirmed by means of pressing the clear-key (8).

4.2 Working width

Press program-key for 2 seconds. By means of pressing this key the first menu will be skipped and the second menu 'working width' appears. The encode of the working width is done by means of the arrow keys (3) and (4) after the displayed working width has been deleted by means of pressing the clear-key (8).

The working width must be entered in centimetres.

Attention: Any overlaps that may occur must be considered with the encoded width.

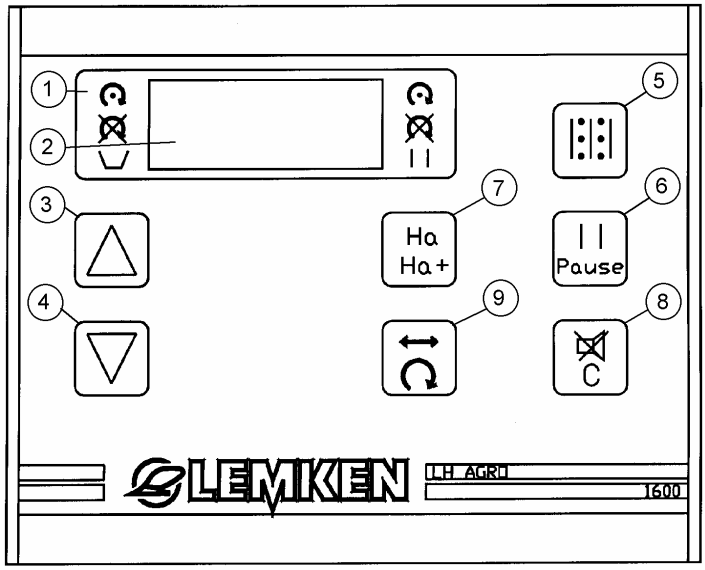
4.3 Encoding the wheel circumference in cm per impulse

There are two possibilities to encode the wheel circumference in cm per impulse.

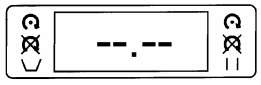
1. The manual encode of the distance per impulse according to the table in section 5.2.
2. The automatic encode of the wheel circumference in cm per impulse

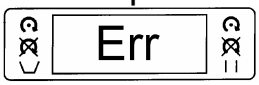
4.3.1 Manual encode of the wheel circumference in cm per impulse

Activate the third menu for the wheel circumference in cm per impulse by pressing the program-key (9) for approx. 3 seconds. The display will show the entered wheel *circumference in cm per impulse* in centimetres (for example 7,3, 22,84 or 24,43). If no value is entered by the factory, the display shows 0,00.



Before entering the wheel circumference in cm per impulse the clear-key (8) has to be pressed shortly to set the indicated value to zero.

Attention! When the delete key is pressed longer than 3 seconds, the indication 

appears when entering the wheel circumference. Now the wheel circumference cannot be entered. Therefore the operation key (9) must be pressed shortly. The failure message 

appears. Now the delete key (8) must be pressed shortly and the entering of the wheel circumference can be started as follows:

For the DKA with spike wheel and the EuroDrill with the tyres 6.00-16 the value 22,84 must be entered, for the EuroDrill with the tyres 10.00/75-15.3 the value 24,43 must be entered and for the Saphir 7 with spike wheel the value 7,3 must be entered by the arrow keys.

The values concerned can be read from the table in section 5.2.

The values 7,3, 22,84 and 24,43 include an estimated slippage of the drive wheel(s), which does not correspond to the real slippage. Therefore an automatic encoding of the wheel circumference in cm per impulse should be carried through, in order to ensure an exact seed rate kg/ha and hectare counting.

4.3.2 Dynamic encoding of the wheel circumference in cm per impulse

Beside the manual encode of the wheel circumference in cm per impulse, it can also be calculated and stored automatically. The dynamic method shows the advantage that the slippage of the drive wheel(s) will also be taken into account.

Carry out the calibration procedure as follows:

- Measure a distance of 100 metres.
- Drive to the start mark.
- Press the Program-key for approx. 3 seconds so that the entered wheel circumference in cm per impulse is displayed. The value 7,3, 22,84 or 24,43 which has been encoded in the factory, a self-encoded value or the value 0.00 is displayed Press the Clear-key (8) for approx. 3 seconds for cancelling the shown value. 2 horizontal lines will be displayed, the on-board computer is now ready for the dynamic encoding or calibration procedure.
- Drive the 100 metres distance and stop exactly at the end mark. Press the Program-key (9) again within 5 seconds after stopping and the new *wheel circumference in cm per impulse* is calculated and entered automatically.
- To leave the calibration menu, press the operation-key (5). The display will now show the actual tramline bout and the encoded tramline rhythm.
- The dynamic encoding procedure is now finished

NOTE! If the on-board computer calculates a wheel circumference that is not realistic, **“ERR”** will be displayed.

If the tramline sensor makes contact during the drive of 100 m, the dynamic encoding will be interrupted. The dynamic encoding procedure must then be carried through again.

If the wheel circumference cm per pulse or the working width is not entered, the hectare counter will not be able to calculate and indicate the cultivated area. Also the calibration menu cannot be used.

5 CALIBRATION TEST

For checking the adjusted quantity of seed a calibration test must be carried through as follows:

- Adjust the seed wheels, the slides and bottom flaps according to the calculation slide.
- Fill the hopper with seed
- Swing down the calibration trough
- Open emptying flaps
- Adjust the gearbox to its maximum position = 150.
- By means of the calibration crank, turn the gear box so that the calibration trough is filled two or three times with seed
- Adjust the gearbox for the first calibration test according to the calculation slide.
- After that empty the calibration trough and fit it again for collecting the seed
- The display of the on-board computer shows the tramline rhythm and the current line No. If both are equal (=3:3), the actual line must be switched forwards or backwards by means of the arrow keys (3, 4).
- Now the implement is ready for the calibration test.
- Two possibilities for the calibration test are provided:
  1. Calibration test according to the table
  2. Calibration test by means of the calibration menu

5.1 Calibration according to the table

With the calibration test according to the table (see page 7) the crank will be turned depending on the working width and relates to 1/50 ha. The number of crank turns must be counted.

5.2 Calibration test by means of the calibration menu

With the calibration test by means of the calibration menu the turns of the crank need not be counted. The counting function for 1/50 ha is carried through by the on-board computer.

The calibration test by means of the calibration menu - after the encoding of the wheel circumference in cm per impulse – is done as follows:

- As the machine is stationary a warning signal sounds. Confirm the warning signal by means of the clear-key (8), after that press program-key (9). The calibration menu appears. The display must be set to zero by means of a short press of the clear-key (8). Press clear-key (8) until the value 0.00 is shown.
- Take the on-board computer and go to the gearbox of the seed drill and turn the calibration crank steadily at a constant speed. A short time before reaching the value 0.02 for 1/50 ha a squeaking sound is emitted. That means that the value 0.02 for 1/50 ha will be reached soon. When the short sound becomes a continuous sound, stop turning the crank at once. The display shows A 0,02, which is corresponding to 1/50 ha.

ATTENTION: During the calibration test it must be ensured that the tramline sensor will not make contact.

Seed drill	Wheel / tyres	Turns of the calibration crank per 1/50 ha*	Calibration menu On-board computer	Distance per 1/50 ha*	Distance per impulse
EuroDrill 250 and – S250	6.00-16	91	0,02	80,00 m	22,84 cm
	10.00/75-15.3	83,5	0,02	80,00 m	24,43 cm
EuroDrill 300 and –S300	6.00-16	76	0,02	66,66 m	22,84 cm
	10.00/75-15.3	69,5	0,02	66,66 m	24,43 cm
EuroDrill 400 and –S400	10.00/75-15.3	52,25	0,02	50,00 m	24,43 cm
EuroDrill 450 and –S450	10.00/75-15.3	46,25	0,02	44,44 m	24,43 cm
DKA 250 and -S250	Spike wheel	91	0,02	80,00 m	22,84 cm
DKA 300 and –S300	Spike wheel	76	0,02	66,66 m	22,84 cm
DKA 400 and –S400	Spike wheel	57	0,02	50,00 m	22,84 cm
DKA 450 and –S450	Spike wheel	50,5	0,02	44,44 m	22,84 cm
Saphir 7/250	Spike wheel	34	0,02	80 m	7,3 cm
Saphir 7/300	Spike wheel	28,5	0,02	66,66 m	7,3 cm
Saphir 7/400	Spike wheel	21,5	0,02	50 m	7,3 cm

– Weigh the seed which is caught in the calibration trough and convert it into 1 ha as follows:

Weighed out quantity of seed for 1/50 ha and multiply it by 50 = quantity of seed per hectare

Example: Weighed out seed rate = 3.280 g (3,28 kg) -> 3,28 kg x 50 = 164 kg

With deviations from the required quantity of seed, adjust the gear box. A 10 % deviation can be corrected by a 10 % adjustment of the gear box.

Example: Required quantity of seed: 180 kg
Gear box adjustment in accordance to the calculation slide: 90
Weighed out quantity of seed: 164 kg

The quantity of seed must be increased by 10 %. Therefore the gear box adjustment must be increased by 10 %, that means the gear box adjustment 90 must be corrected by 10 % to 99. After that repeat the calibration test in order to verify that the correction was sufficient.

Further information can be found in the instruction book of the seed drill and on the calculation slide.

Warning! Never carry out the calibration test with the drill in tramline mode, if necessary switch forwards or backward the displayed drive bout by means of pressing the arrow-keys (3, 4).

6 TRAMLINING

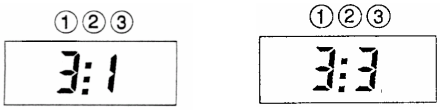
6.1 General Instructions

Pressing the operation-key (5) the actual line appears on the right-hand side of the display and on the left-hand side the set tramline rhythm.

The actual bout is counted each time the drill is raised. When the actual bout is equal to the set tramline rhythm a tramline is made

The next time the drill is raised the actual bout will change to 1.

Displayed:



Tramline will be made

1 Set tramline rhythm.

2 Indicator of tramline status.

3 Actual drive bout.

6.2 Tramline rhythm

Pressing the operation-key (5) for approx. 2 seconds will increase the set tramline rhythm by 1.

If one needs to increase the tramline rhythm by more than 1, release the key briefly and press again for approx. 2 seconds. After reaching 9, the tramline rhythm will return to 1.

WARNING! When pressing the clear-key (8) for 2 seconds, the encoded tramline rhythm and the actual drive bout will be deleted and adjusted to 1.1. With this setting a tramline will be made with each drive bout.

6.3 Tramline method

With the LH 1600 the tramlines can be made in two different methods.

6.3.1 Uneven method

The working width of sprayer's or fertiliser distributor's may be 2, 4, 6 or 8 times wider than the working width of the seed drill with the even method.

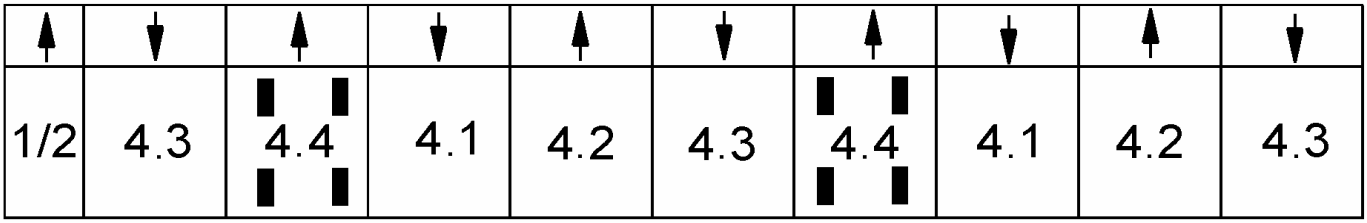
↑	↓	↑	↓	↑	↓	↑	↓	↑	↓
3.2	3:3	3.1	3.2	3:3	3.1	3.2	3:3	3.1	3.2

Example: Rhythm 3

With the rhythm 3 the tramline will be made in the third track.
With the rhythm 5 the tramline will be made in the fifth track.
With the rhythm 7 the tramline will be made in the seventh track.
With the rhythm 9 the tramline will be made in the ninth track.

6.3.2 Even method

The working width of sprayer's or fertiliser distributor's may be 3, 5, 7 or 9 times



wider than the working width of the seed drill with the uneven method.

Example: Rhythm 4

With the rhythm 2 the tramline will be made in the second track.
With the rhythm 4 the tramline will be made in the fourth track.
With the rhythm 6 the tramline will be made in the sixth track.
With the rhythm 8 the tramline will be made in the eighth track.

With the even method it must be seeded with half working width of the seed drill for the first drive bout. Therefore the stop slides of the seed rows concerned must be closed.

Attention: After the first round the slides of the closed seed rows must be opened again!

6.4 Altering to the required drive bout

Manual up/down counting of the actual drive bout can only take place when the operation-key (5) is pressed.

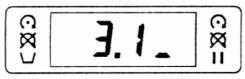
Pressing the arrow-keys (3) and (4) for approx. 2 seconds will adjust the actual drive bout up or down.

Before seeding the actual drive bout must be adapted to the method and rhythm of the tramline according to the following table.

Actual drive line for the first drive line on the field	Method	Rhythm
2	Uneven method	3
3	Uneven method	5
4	Uneven method	7
5	Uneven method	9
2	Even method	4
3	Even method	6
4	Even method	8
With the even method it must be seeded with half working width of the seed drill for the first drive bout. Therefore the stop slides of the seed rows units concerned must be closed.		

7 STOP-FUNCTION

Pressing this hold-key (6) will “stop” the tramline counter. This means that the drill can be lifted without counting the actual drive bout.



The hold function can be seen on the display. The hold function is active when the line is displayed next to the hold symbol.

The stop function is cancelled by pressing the hold-key (6) once again.

8 SINGLE HECTARE COUNTER AND TOTAL HECTARE COUNTER

Both the single hectare counter and the total hectare counter can be found on the same key. The first time the key is pressed, the single hectare counter will be displayed as this is the function that is required most often. Pressing the key for approx. 2 seconds the total hectare counter will be displayed.

8.1 Single hectare counter

Pressing this key will display the worked area in ha. The area is shown with 2 decimals from 0 to 99.99 ha and then with 1 decimal from 100.0 to 999.9 ha. No decimals are shown with areas from 1000 to 9999 ha.

Hectare counting is started and stopped with the fitted sensor, this results in the hectares only being counted when the drill is working.

Holding the **“C”** key pressed for approx. 2 seconds resets the single hectare counting.

8.2 Total hectare counter

Pressing this key for approx. 2 seconds, will display the total worked area in hectares. The area is shown with 2 decimals from 0 to 99.99 ha and then with 1 decimal from 100.0 to 999.9 ha. No decimals are shown with areas from 1000 to 9999 ha.

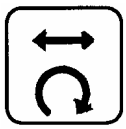
This function is used to see the total worked area of a season or a year. The total hectare counter works in synchronisation with the single hectare counter.

Holding the **“C”** key pressed for approx. 2 seconds clears the total hectare counter. Pressing the **“hectare”** key again the single hectare counter is displayed.

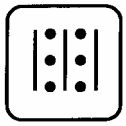
NOTE: If the drive bout counting changes or if a warning function is shown, the display will change to the operating position.

9 SENSOR TEST

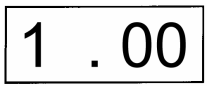
If it is suspected that a sensor does not function correctly, the system can be checked as follows:



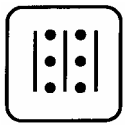
Encode a working width of 25.



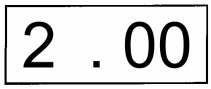
Activate the tramline function. The following display indication appears:



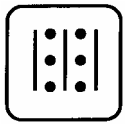
1 = RPM sensor for the intermediate shaft (tramline seed wheels) to be checked.
. = Sensor is activated.
0 = Counter from 0 to 99. As soon as the sensor gets contact, the number counts 1 among.



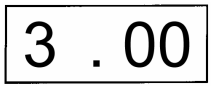
With a further press on this button the indication 2.00 appears:



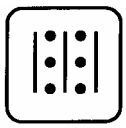
This test function is not used.



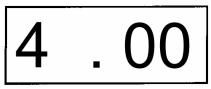
With a further press on this button the indication 3.00 appears:



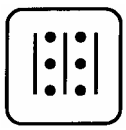
Now the implement sensor for the tramline mechanism is prepared for testing.



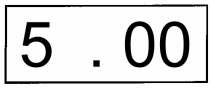
With a further press on this button the indication 4.00 appears:



This test function is not used.



With a further press on this button the indication 5.00 appears:

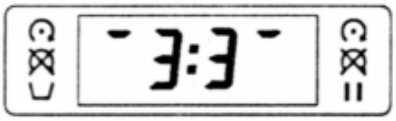


Now the gear box drive exit sensor is prepared for testing.

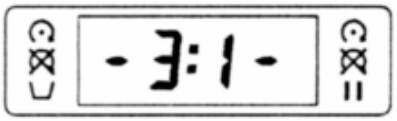
10 ALARM-FUNCTIONS

The LH 1600 is equipped with several functions.
Warnings are shown on the display plus an alarm sound.
Confirm the warning by pressing the clear-key (8).
The warning will disappear only when the system is working correctly again.

WARNING INDICATIONS:

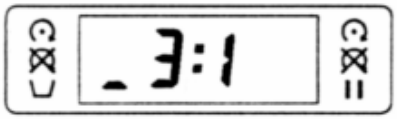


Warning for rotating tramlining shaft, when tramlines should be made. Failure = no tramlines will be made!

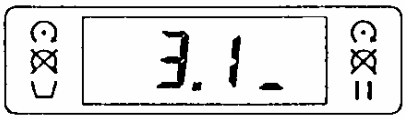


Warning when the tramline seed wheels are not rotating, when no tramlines should be made. This warning will also appear if the seed drill is stopped. If in this case the hectare counter should be displayed, press the clear-key (8) to confirm the warning signal.

Failure = tramlines will be made!



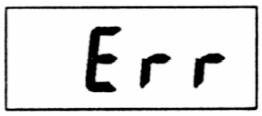
Warning for empty hopper (special equipment), but also for too low operation pressure inside the hydraulic accumulator of the single acting pre-emergence marker without track marker.



The hold-key (6) has been pressed and therewith interrupted the counting of the tramline.

11 MALFUNCTION INDICATION

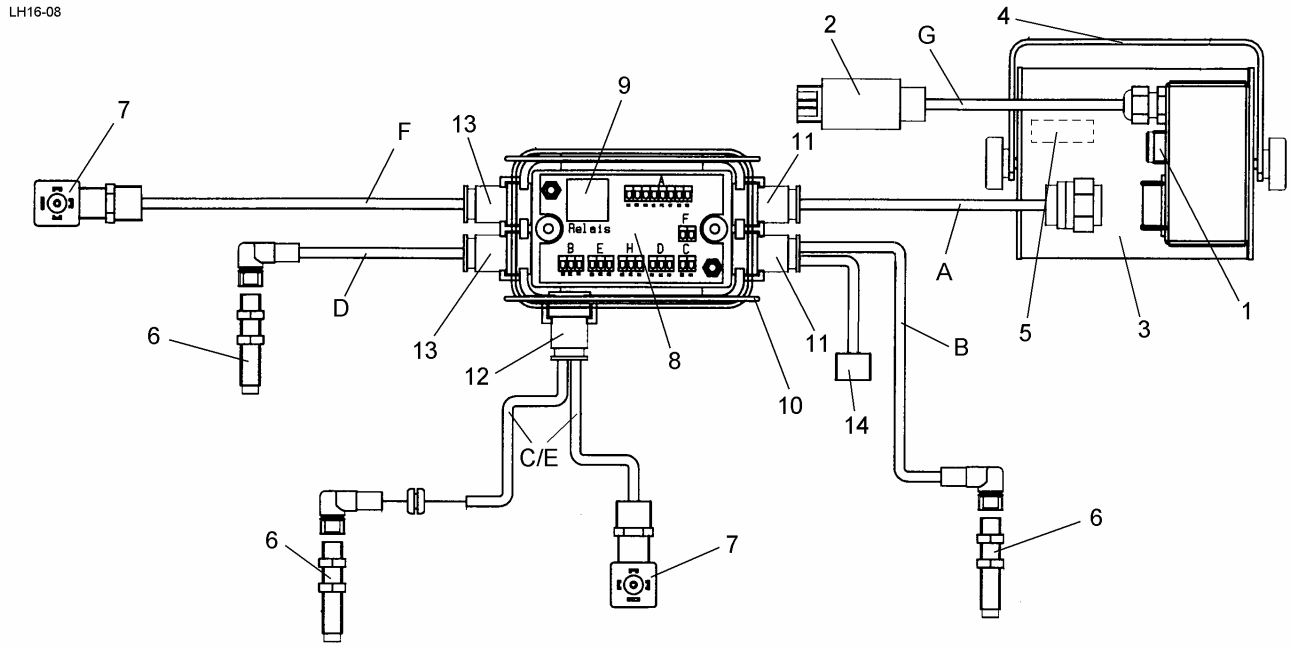
The LEMKEN 1600 is equipped with an error message to ensure that the on-board computer works correctly:



The LH 1600 displays this error message if the power supply to the on-board computer is too low.

Check the power supply to the on-board computer if this error message is displayed.

12 CABLING AND PARTS LIST



Pos.	Part No.	Description	Dimension
1	373 1301	Fuse	6,3 A – 5x20
2	373 2123	Plug	3-p 178-606
3	573 4405	Monitor	LH 1600
4	573 8048	Holder	LH 1600
5	573 4852	Eprom	LH 1600
6	573 4366	Sensor	M12x1x45 IF 5997
7	373 2158	Angle plug	4-p 27x27
8	573 4864	Circuit board	LH 1600 – G2.5
9	573 4826	Relay	LH 1600 12V – 30 A
10	373 1903	Spring clamp	D2 – 55/130
11	373 1912	Rubber bushing	D12,8
12	373 1913	Rubber bushing	2xD10
13	373 1911	Rubber bushing	D10
14	573 4379	Seed level sensor	KN 5106

13 CIRCUIT DIAGRAM