

**OPERATORS MANUAL &
FITTING INSTRUCTIONS
FOR THE
LH 1200 SPRAYER MONITOR**

LH No. 020-122-UK Version 2.00

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INTRODUCTION

Congratulations with your new LH 1200 sprayer monitor.

During development of this monitor we have made a point of producing a durable product that is primarily developed to monitor chemical application. The monitor however, includes a number of other functions, which enable it to be used in connection with almost any other implement.

If the monitor is used in accordance with the guidelines in this manual, the LH 1200 will be a true and reliable assistant for you for many years.

We have endeavoured to deliver a fault free product. To ensure optimal use of the equipment we ask that great attention be paid when reading the manual. We are more than happy to help should any queries arise, both when the product is used for the first time and at any later date. Regarding responsibility for use of the product we refer to our sales and delivery terms especially paragraph 7, which follows:

7. Product usage.
- 7.1 Any use of the product is at the sole risk of the buyer. The buyer is therefore not entitled to any form for compensation caused by, for example, any of the following:
- Disturbance to/from any electronic services or products that do not confirm to the standards for CE marking,
 - Missing or poor signal coverage or a succession hereof from external transmitters/receivers, used by the buyer,
 - Functional faults, which apply to or from a PC-program or PC-equipment, not delivered by the seller,
 - Faults that may arise from the buyers negligence to react to warnings and fault messages from the product, or which can be traced to negligence and/or absent constant control of the work carried out in comparison to the planned job.
- 7.2 When implementing any new equipment the buyer must take great care and pay attention. Any doubts as to correct operation/use should result in contacting the sellers service department.

This manual may not be altered, copied or manipulated in any way. Unoriginal manuals can lead to operational faults damaging machines or crops as a consequence thereof. LH Agro can therefore not be held responsible for damages incurred, which can be traced to the use of unoriginal or manipulated manuals. Original manuals can be requisitioned at any time from LH Agro.

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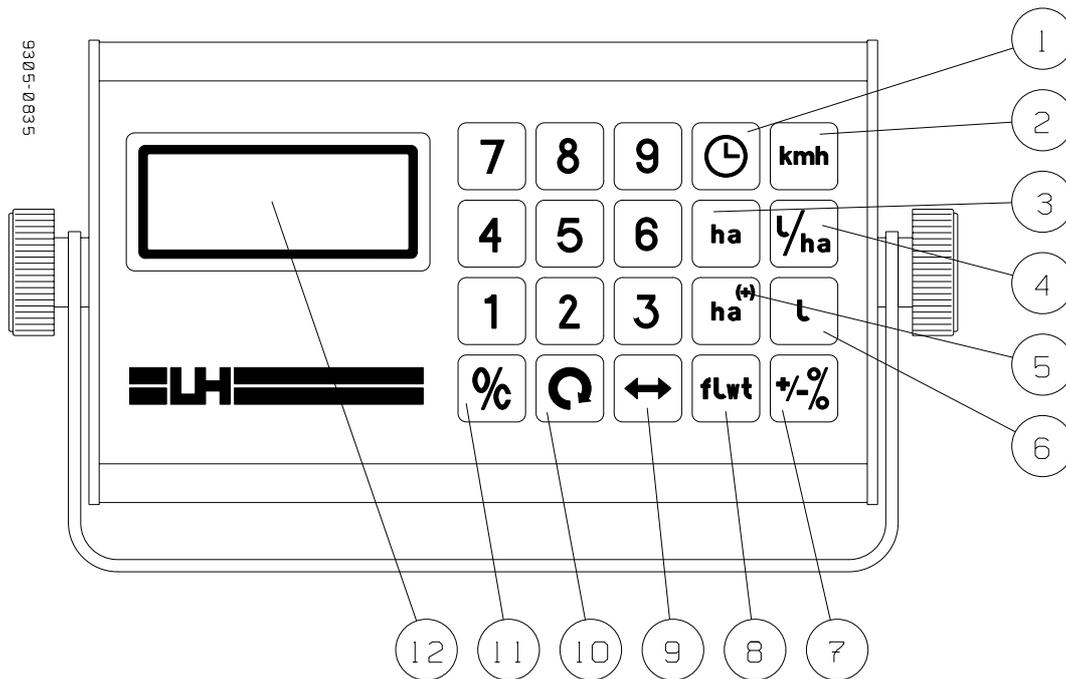
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OVERVIEW



Pos.	Description	Pos.	Description
1	Time functions	7	Flow figure calibration
2	Forward speed	8	Flow figure encodement
3	Area (trip)	9	Working width encodement
4	Application rate	10	Wheel circumference encodement
5	Area (total)	11	Reset key
6	Amount used (total)	12	Display

GENERAL USE

The LH 1200 is especially designed for use on a crop sprayer.

The following **primary functions** can be selected directly from the keypad:

1. **Work time**
2. **Forward speed**
3. **Area counters (trip- and total)**
4. **Chemical application rate**
5. **Chemical consumption (litre counter)**

The monitor can also be used in connection with other implements by encoding some special values (codes).

The **secondary functions** are as follows:

- *Distance in metres*
- *Shaft speed (RPM)*
- *Fertiliser application rate*
- *Sow seed application rate*
- *Fertiliser consumption (Kg counter)*
- *Sow seed consumption (Kg counter)*
- *Unit counter*

These functions can be placed into the following implement related sets:

FERTILISER DISTRIBUTOR

<i>Type A:</i>	<i>Type B:</i>
Work time	Work time
Forward speed	Forward speed
Area trip counter	Area trip counter
Area total counter	Area total counter
Shaft speed (RPM)	<i>Fertiliser application rate</i>
	<i>Fertiliser consumption</i>

Fertiliser APPLICATION RATE and CONSUMPTION are only possible on fertiliser distributors fitted with feed rollers.

SEED DRILL

<i>Type A:</i>	<i>Type B:</i>
<i>Work time</i>	<i>Work time</i>
<i>Forward speed</i>	<i>Forward speed</i>
<i>Area trip counter</i>	<i>Area trip counter</i>
<i>Area total counter</i>	<i>Area total counter</i>
<i>Shaft speed (RPM)</i>	<i>Seed application rate</i>
	<i>Seed consumption</i>

The above examples show that three basic functions ***Work time***, ***Forward speed***, and ***Area counter*** are always available. The secondary functions can be selected as required.

The monitor can measure distance in metres as an extra function. This function requires a special encodement (code) and can, therefore, only be used by itself. All other information displayed is incorrect when this function is selected.

When ***Forward speed*** is selected and the area override sensor is activated an "r" is displayed on the left-hand side of the display.

The LH 1200 is equipped with a system test program, which enables the user to test all connected sensors. For more information, see the "SYSTEM TEST" chapter on page 26.

OPERATING THE LH 1200

PRIMARY FUNCTIONS

WORK TIME

Key	Function
	<p>Work time in hours and minutes:</p> <p>Pressing this key displays the effective work time (max. 99 hours 59 minutes)</p> <p>The time counter is started and stopped by pressing the key.</p> <p>Flashing colon >:< means that the time counter is running.</p> <p>Constant colon >:< means that the time counter is stopped.</p>
	<p>Pressing this key for min. 3 seconds resets the counter.</p>

FORWARD SPEED

Key	Function
	<p>Kilometres per hour:</p> <p>Pressing this key displays the present forward speed in kilometres per hour with 1 decimal.</p> <p>Forward speed is <u>always</u> displayed when the monitor is switched on.</p> <p>An “r” on the left-hand side of the display under this function, indicates that the area override sensor has been activated.</p> <p>NOTE! This indicator is only displayed when forward speed has been selected.</p> <p>Forward speed is zeroed approx. 8 second after stopping.</p>

AREA COUNTERS

The area counters start and stop automatically when the implement is in work/not in work (implement sensor), and continue to count regardless of what other function in the “**primary functions**“ has been selected.

Area is not being measured if an “r” is displayed on the screen.

Key	Function
ha	<p>Area trip counter:</p> <p>Pressing this key displays the effective worked area. Area is displayed with 2 decimals from 0 – 99.99 ha. and with 1 decimal from 100 – 999.9 ha.</p> <p>The area counter is started and stopped with the fitted area override sensor. This ensures that area is only counted when the implement is working.</p> <p>The area trip counter counts synchronically with the area total counter.</p> <p>NOTE! This key has a different function if 8888 or 9999 are encoded as the working width.</p>
%c	Pressing this key for min. 3 seconds resets the counter.

ha ⁺	<p>Area total counter:</p> <p>Pressing this key displays the area total counter. The total effective area is displayed with 1 decimal from 0 to 999.9 ha. and without decimals from 1000 to 9999 ha.</p> <p>This function can be used to sum up the worked area for a season or a year.</p> <p>The area total counter counts synchronically with the area trip counter.</p> <p>NOTE! This key has a different function if 8888 or 9999 are encoded as the working width.</p> <p>Pressing this key again displays the area trip counter.</p>
%c	Pressing this key for min. 3 seconds resets the counter.

APPLICATION RATE FOR SPRAY CHEMICALS

Key	Function
	<p>Application rate: Pressing this key displays the present application rate in litres per ha. The calculated application rate is based on the flow through the flow meter and area metering. Thus, the application rate can only be displayed if the sprayer is in operation and the machine is moving forward. Correct performance presupposes correct calibration of the flow meter (see page 18). Flow meter calibration should be checked at regular intervals.</p> <p>NOTE! This key has a different function if 9999 has been encoded as the flow figure.</p>

SPRAY CHEMICAL CONSUMPTION

Key	Function
	<p>Litre counter: Pressing this key displays the total consumption of spray chemicals in litres. Correct performance presupposes flow meter calibration (see page 18). Flow meter calibration should be checked at regular intervals during the season.</p> <p>NOTE! This key has a different function if 9999 is encoded as a flow figure.</p>

SECONDARY FUNCTIONS, FERTILISER DISTRIBUTOR

There are two different function sets available for fertiliser distributors, depending on which type of spreader is being used.

As mentioned before, the functions **Work time**, **Forward speed**, and **Area counter** are always available and operate in the same way as described in the PRIMARY FUNCTIONS section of this manual.

RPM FOR DISC SPREADERS

Encoding a flow figure of 9999 alters the program in the LH 1200 allowing it to display RPM. RPM is displayed by pressing the L/Ha. key.

ENCODE:

flwt
9
9
9
9
Press the shown keys in this order.

Key	Function
L/ha	RPM: NOTE! The "L" key cannot be used when this encodement is used.

FERTILISER DISTRIBUTOR WITH FEED ROLLER (PNEUMATIC)

It is possible to meter the “flow” of fertiliser on this kind of fertiliser distributor using a special sensor, which gives a suitable number of pulses per revolution.

By encoding the calibration figure as a flow figure, the following functions are available:

ENCODE:

flwt
X
X
X
X
XXXX is the determined calibration figure in grams with 2 decimals. Thus, a calibration figure of 15.00 is encoded as 1500. The displayed application rate will be in Kg.

Key	Function
L/ha	Fertiliser application rate
L	Total fertiliser consumption

NOTE! It is a condition for the above functions that the sensor is correctly calibrated. A new calibration must take place if the spreader settings are altered.

SECONDARY FUNCTIONS, SEED DRILL

Exactly the same functions can be achieved for seed drills as described above for fertiliser distributors. The functions require the same sensors and the same keys are used.

SOW AXLE RPM

Encoding a flow figure of 9999 alters the program in the LH 1200 allowing it to display RPM. RPM is displayed by pressing the L/Ha. key.

ENCODE:

flwt 9 9 9 9 Press the shown keys in this order.

Key	Function
L/ha	RPM: NOTE! The "L" key cannot be used when this encodement is used.

SEED RATE MONITORING

It is possible to meter the “flow” of seed using a special sensor, which gives a suitable number of pulses per revolution. The calibration figure is determined during the normal calibration procedure for the seed drill.

By encoding the calibration figure as a flow figure, the following functions are available:

ENCODE:

flwt X X X X XXXX is the determined calibration figure in grams with 2 decimals. Thus, a calibration figure of 15.00 is encoded as 1500. The displayed seed rate will be in Kg.

Key	Function
L/ha	Seed rate
L	Total seed consumption

NOTE! It is a condition for the above functions that the sensor is correctly calibrated. A new calibration must take place if the seed drill settings are altered.

SECONDARY FUNCTIONS; SLURRY SPREADER

APPLICATION RATE MONITORING

Flow metering is possible on slurry spreaders either by using a flow meter (electromagnetic) or by a RPM sensor fitted to a positive displacement pump (exact volume per revolution).

By encoding an amount in kilos (with 2 decimals) per impulse as a flow figure the following functions are available:

ENCODE:

flwt
X
X
X
X
 XXXX is the known calibration figure in kg with 2 decimals. 5.00 kg is encoded as 500 The application rate will be shown as m³/ha.

Key	Function
L/ha	Slurry application rate
L	Total slurry consumption

NOTE! It is a condition for correct operation of the above functions that the flow sensor is calibrated.

SECONDARY FUNCTIONS, BALER

UNIT COUNTER

It is possible to count the number of bales baled. Encoding a flow figure of 9999 and pressing the L key enables the unit counter.

ENCODE:

flwt
9
9
9
9
 Press the shown keys in this order.

Key	Function
L	Units: NOTE! The L/MIN key and the L key cannot be used when this encodement is used.

SECONDARY FUNCTIONS, DISTANCE MEASURING

This function can only be used alone. When this function is activated, all other functions are unusable.

ENCODE:



Press the shown keys in this order.

Key	Function
ha	Distance in metres: NOTE! The maximum distance is 9999 metres.

ENCODING THE LH 1200

WORKING WIDTH

Key	Function
	Working width: The working width of the implement being used is encoded here.

Step	Key	Procedure
1		Press the working width key.
2		Encode the working width in centimetres using the numerical keys. Ensure that overlaps are accounted for. If the working width is unknown, then drive 5 bouts and measure the distance between the first and the last, then divide the distance by 5.
3		The encoded value is stored automatically until another working width is encoded; press any other key to leave this encodement.

FORWARD SPEED CALIBRATION (WHEEL CIRCUMFERENCE)

Key	Function
	Wheel circumference: The distance in centimetres that is driven per pulse from the speed sensor is encoded here.

Depending on which vehicle is used the speed signal can come from a sensor built into the gearbox, from a sensor fitted by the prop. Shaft (4-wheel drive) or from a sensor fitted by one of the wheels.

NOTE! It is recommended to fit as many magnets on the wheel as necessary to ensure that the encoded wheel circumference does not exceed **100 cm**.

Remember that it is important that the distance between the magnets is the same. Otherwise, the displayed speed will fluctuate.

WHEEL CIRCUMFERENCE WITH MAGNETS FITTED TO THE WHEEL

Step	Key	Procedure
1		Make a mark on the field and on the tire on the wheel with magnets fitted.
2		Drive slowly forward until the wheel has turned 10 times.
3		Make a mark on the field again.
4		Measure the distance between the 2 marks on the field and divide this distance with 10 the result being the effective wheel circumference.
5		Divide the effective wheel circumference with the number of magnets fitted to the wheel.
6		Press the wheel circumference key and an >0< appears on the left of the display indicating that "wheel circumference" has been selected.
7		Encode the result (from steps 1 to 5) in centimetres using the numerical keys.
8		The encoded value is stored automatically until another wheel circumference is encoded; press any other key to leave this encodement.

Example:

In the following example we assume that we use a tractor with a wheel circumference of 400 cm and 4 magnets fitted to the wheel:

Measurement shows that the effective wheel circumference = 396,6 cm.

There are 2 magnets fitted so the wheel circumference needs to be divided by 4.

396,6 / 2 = 99,15 cm

*Encode this as **99**.*

WHEEL CIRCUMFERENCE WITH A MAGNET FITTED TO CARDAN SHAFT

A magnet can be fitted to the cardinal shaft if, for some reason, it is not possible to fit any magnets onto a wheel. To determine the value to be entered as the "wheel circumference" use the following procedure:

Step	Key	Procedure
1		Enter a working width of 9999 as described on page 15.
2		Press the area total key.
3		Drive slowly forward until 1 appears on the display STOP IMMEDIATELY.
4		Make a mark on the field and on the tire.
5		Drive until the display changes from 10 to 11 STOP IMMEDIATELY.
6		Make a mark on the field again.
7		Measure the distance between the 2 marks on the field. Divide this distance with 10.
8		Press the wheel circumference key and an >0< appears on the left of the display indicating that "wheel circumference" has been selected.
9		Encode the value determined (in steps 1 to 7) in centimetres using the numerical keys.
10		The encoded value is stored automatically until another wheel circumference is encoded; press any other key to leave this encodement.

Remember to encode the correct working width for the implement again!

FLOWMETER CALIBRATION (FLOW FIGURE)

Key	Function
flwt	Flow figure:

1. If this is the first time that the monitor is being used with a sprayer, encode a "start" flow figure of 2000.
2. It is recommended to hold still when calibrating the flow meter to avoid incorrect readings on the sprayer tank indicator. If there is any doubt as to the accuracy of the tank indication, then weighing the sprayer will give greater accuracy.
3. Fill the sprayer with min. 600 litres (the more the better) and note the amount filled.
4. Reset the litre counter as follows:

Press



Press the L key once then press and hold down the 0/C key until the litre counter is zeroed.

5. Spray minimum 500 litres.
6. Read the amount remaining in the tank using the tank indicator.
7. Calculate the consumed amount using the following formula:

CONSUMPTION FROM TANK = Amount filled – Volume remaining in the tank

8. Insert the consumed amount in the following formula:

$$\text{NEW FLOW FIGURE} = \frac{\text{Old flow figure} \times \text{Consumed litres}}{\text{Amount displayed (litre counter)}}$$

9. Encode this new value as the new flow figure.

NOTE! If the percentile deviation of the flow meter is known, the calibration figure can be altered using the +/-% key. Each time the key is pressed the sign will be altered. The flow figure can only be altered in whole % using this key.

Procedure:

If the monitor has counted too many litres, a negative correction must be made.

The following example assumes that the monitor has counter 3% too much.

The correction is made as follows:

Press    

When the keys are pressed in this order, the flow figure will be altered by –3%.

NOTE! We recommend calibrating the flow meter several times during a season.

This control is always available, as you can check that the monitor has counted the exact contents of the sprayer tank, each time the tank has been emptied.

Clean and check the paddle wheel and shaft for wear at regular intervals.

VOLUME MONITORING CALIBRATION FOR SEED AND FERTILISER

The LH 1200 must be encoded with some special values for volume monitoring on seed drills and fertiliser distributors. The method of measurement is, in principal, the same as for flow metering on crop sprayers. The calibration value is the volume per pulse from the sensor.

Thus if you let the LH 1200 count the number of pulses during the normal drill/distributor calibration and thereafter divide the amount released (during calibration) by the number of pulses, a new calibration figure for the implement can be found.

NOTE! Please note that any changes/adjustments to the drill/distributor require a new calibration.

Procedure

1. Prepare the implement for calibration. Do not turn the metering shaft after the monitor has been prepared for calibration.
2. Encode a flow figure of 9999:



Press the keys in this order and the monitor is ready for counting pulses.

3. Reset the litre counter as follows:

Press



Press the L key then press and hold thereafter the 0/C key until the litre counter is zeroed.

4. Calibrate the implement as described in the manual for the implement and weigh the amount released **precisely**.
5. The calibration figure for the machine can be calculated as follows:

$$\text{NEW CALIBRATION FIGURE (FLOW FIGURE)} = \frac{\text{Amount released in grams} \times 100}{\text{Pulses displayed on the monitor}}$$

6. Encode the calculated values as the new flow figure.

NOTE! The calibration figure can be changed by using the +/-% key if the percentile deviation of the volume monitoring is known. Each time the key is pressed the sign is changed. It is only possible to adjust the calibration figure by whole % values.

Procedure:

If the monitor has counted too much, a negative correction must be made.

The following example assumes that the monitor has counted 3% more than the actual amount sown/spread. This can be corrected as follows:



Pressing the keys in the shown order will alter the calibration figure (flow figure) by -3%.

FITTING THE LH 1200

FITTING THE MONITOR

Fit the monitor where it can be easily seen by the operator whilst driving. We recommend on top of the instrument panel or to the right-hand side of the cabin above the lift operating handles.

The form supplied with the LH 1200 can be stuck in the cabin so that the noted values can easily be found and re-entered if necessary.

POWER SUPPLY

The supplied power cable should be connected to 12V so that the monitor is switched on and off with the ignition (ignition live).

The power cable wires should be connected thus:

Blue = +12V (power)

Brown = 0V (ground)

IMPORTANT! *Never incorrectly connect these wires, as the monitor will be damaged instantly.*

GENERAL WIRING

Lead all cables so that they are as protected as possible. Wherever possible lead the cables alongside existing cables, hydraulic pipes or similar, and fasten with the supplied cable ties.

Beware of moving parts and heat sources, e.g. exhaust pipes.

Cables in the cab that cannot be hidden should be fastened with adhesive cable fasteners, clean the surface thoroughly with, i.e. alcohol before sticking the cable fasteners to the surface.

FITTING THE SPEED SENSOR

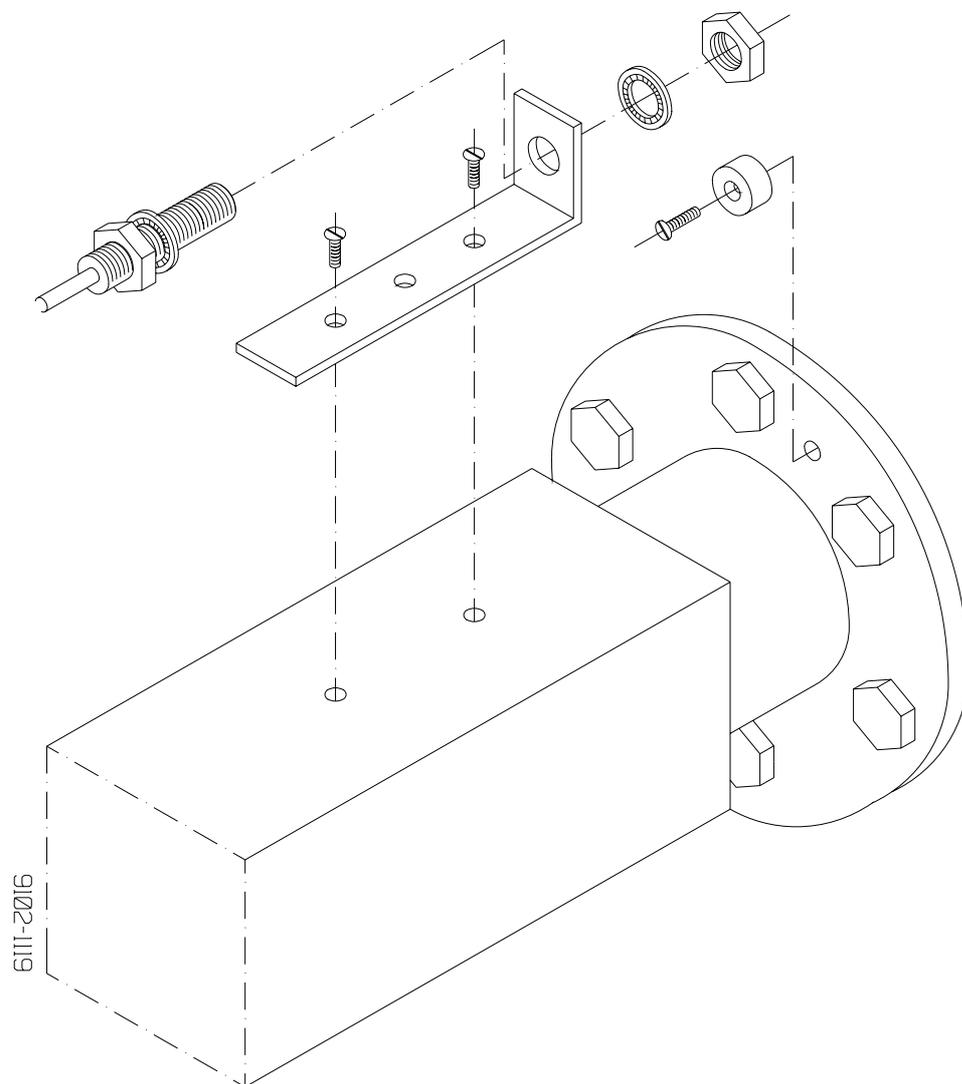
We recommend fitting the wheel sensor to the tractors right back wheel. See the following diagram.

The distance between the magnets and the wheel sensor must not be greater than 5 mm. Fit 2 magnets if the effective wheel circumference is larger than 200 cm.

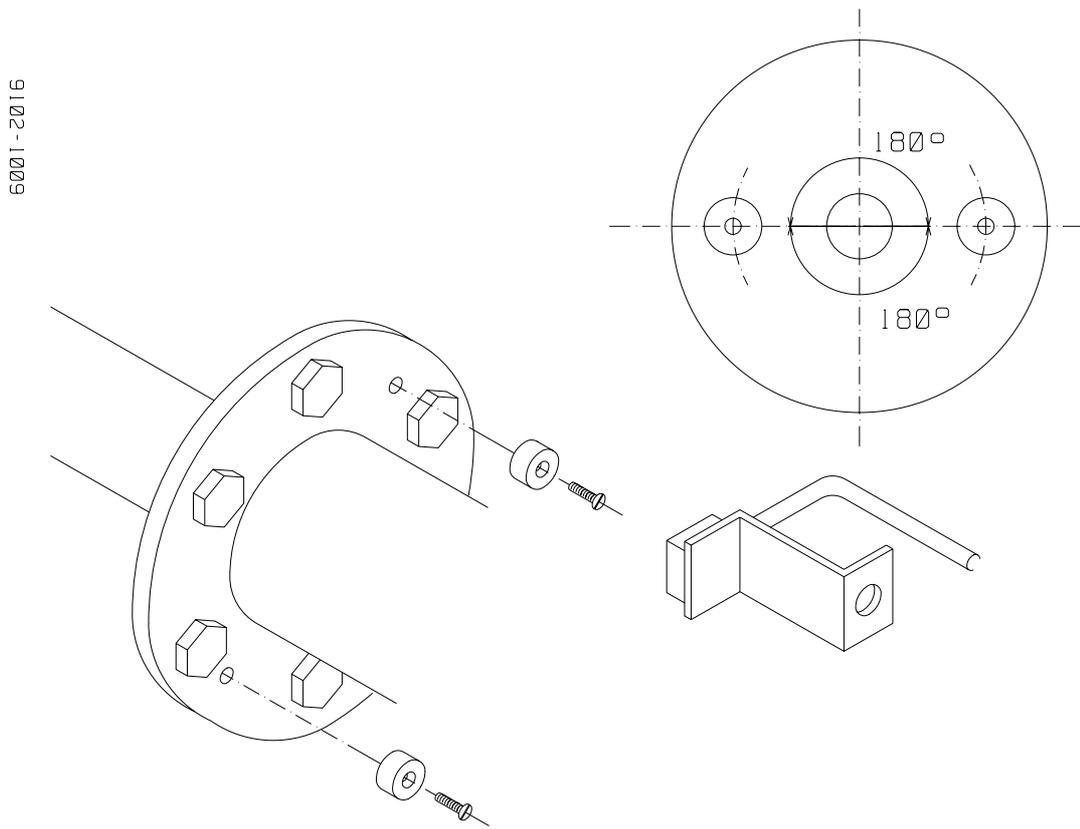
NOTE! The magnets **must** be fitted with equal distance otherwise the displayed forward speed will be erratic.

The magnets can, i.e. be fitted next to the wheel bolts.

Always fit the magnets with the “yellow dot” facing the sensor.

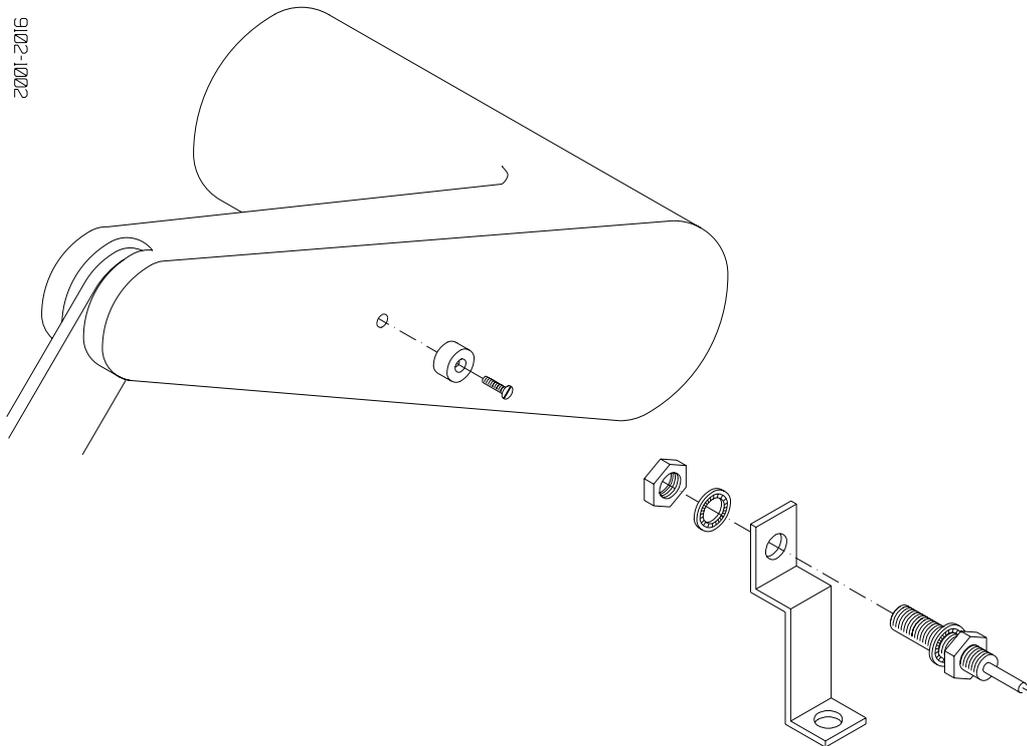


The wheel sensor can be fitted to the cardinal shaft on 4-wheel drive machines.
 A "bipolar" sensor must be used when fitting to the cardinal shaft. This sensor must be ordered separately as it is different than the supplied sensor (see the following diagram for a typical fitting of a sensor to the cardinal shaft):



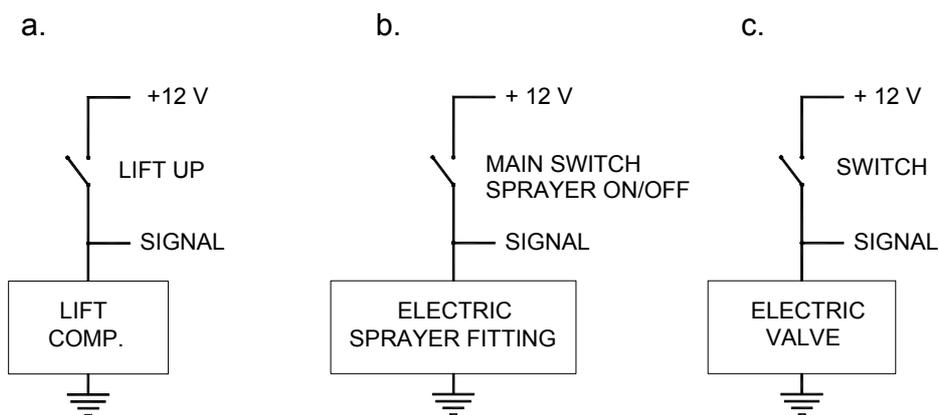
FITTING THE AREA ON/OFF (IMPLEMENT) SENSOR

Typical fitting of the implement sensor on the tractor's lift arms:



The implement sensor can be fitted in other positions (PTO handle, hydraulic cylinders, other handles, etc.). There must be movement of minimum 50 mm. The distance between the sensor and the magnet must not exceed 5 mm.

An electrical signal from, i.e. a sprayer switch box, etc. can be used as the implement signal. The signal **must** change to **0V (ground)**, when the implement is **not** working.



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IMPORTANT! Never connect power (+12V) to the brown output on the LH 1200, as this will damage the LH 1200.

FITTING THE FLOWMETER

Due to the large numbers of different field sprayers on the market it is impossible to make a universal flow meter fitting kit to suit all. However, the following guidelines should be followed:

The flow meter must be fitted so that it only measures the amount of liquid going to the boom, i.e. there can be no return to the tank after the flow meter. In some cases this is not possible, therefore it may be necessary to modify the sprayer control arrangement.

The cable from the flow meter **must** always point upwards. The cable length may be shortened, but ensure that it will allow the tractor to turn (trailed sprayers) or the sprayer to be raised/lowered (lift sprayers).

If the cable from the flow meter is connected via the 7-pin trailer plug, please connect according to the scheme on page 25.

TRAILER PLUG CONNECTIONS

SPRAYER

Sensor	Wire colour	Trailer plug pin no.
Flow meter	Blue (0V)	5
	Brown (signal)	2
	Black (+12V)	6
Wheel sensor	Blue (signal)	4
	Brown (0V)	5
Implement sensor	Blue (signal)	7
	Brown (0V)	5

FERTILISER DISTRIBUTOR/SEED DRILL

Sensor	Wire colour	Trailer plug pin no.
Volume sensor	Blue (+12V)	6
	Brown (0V)	5
	Black (signal)	2
Wheel sensor	Blue (signal)	4
	Brown (0V)	5
Implement sensor	Blue (signal)	7
	Brown (0V)	5

SYSTEM TEST

The entire system can be checked according to the following guidelines if you suspect that one of the sensors is not functioning correctly:

LH 1200 TEST is selected thus:

Press



Press the keys in the shown order.

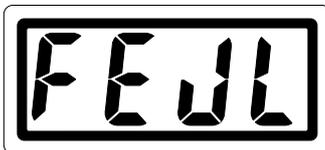
The following will be displayed:



- Pos. 1:** "F" is shown each time a pulse is given from the volume/volume sensor "F" is displayed when the sensor is activated (low), do not run therefore run the machine at full speed. It is best to activate the sensor by turning slowly by hand.
- Pos. 2:** "r" is displayed when the implement sensor is activated.
NOTE! "r" is displayed when the area counter is stopped.
- Pos. 3:** "h" is displayed when the wheel sensor is activated. "h" will be displayed each time the magnet is facing the sensor when you drive slowly forward.

ERROR WARNING

To ensure that data will not be lost, the LH 1200 has a built in error indication:



If your LH 1200 displays this error warning, the supply voltage to the monitor is too low. Check therefore the power supply to the monitor (both + and -).

NOTES
