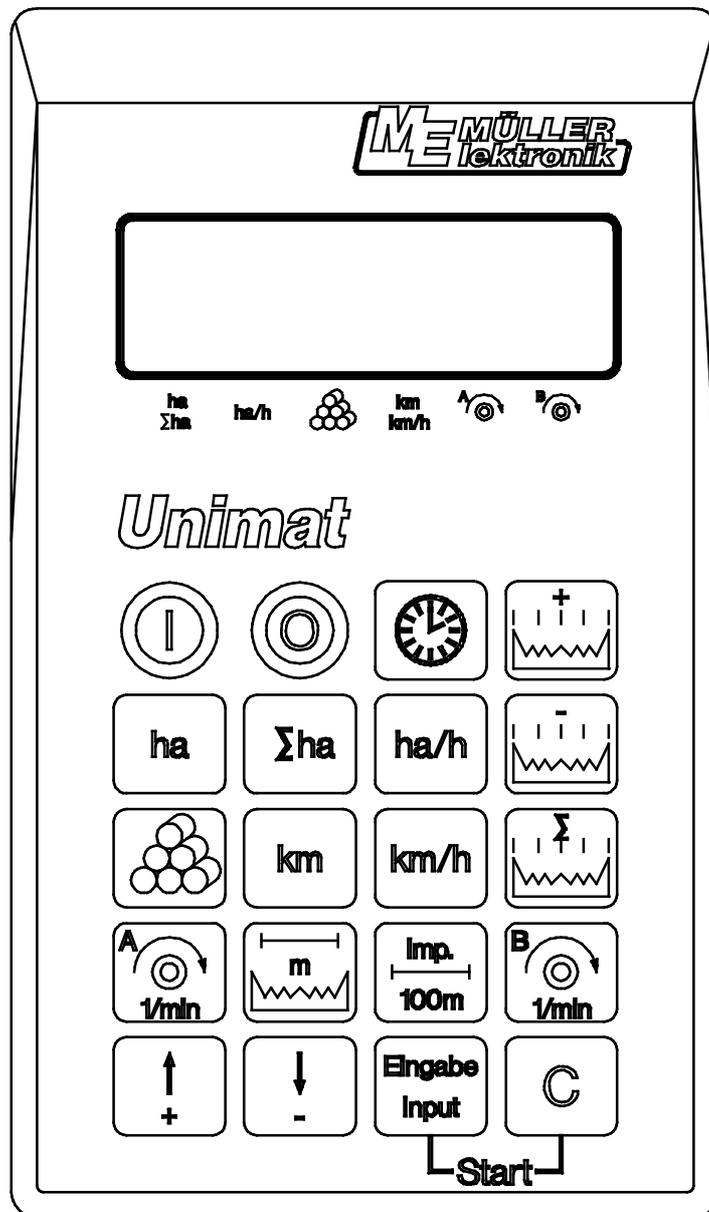


User's and Installation Guide

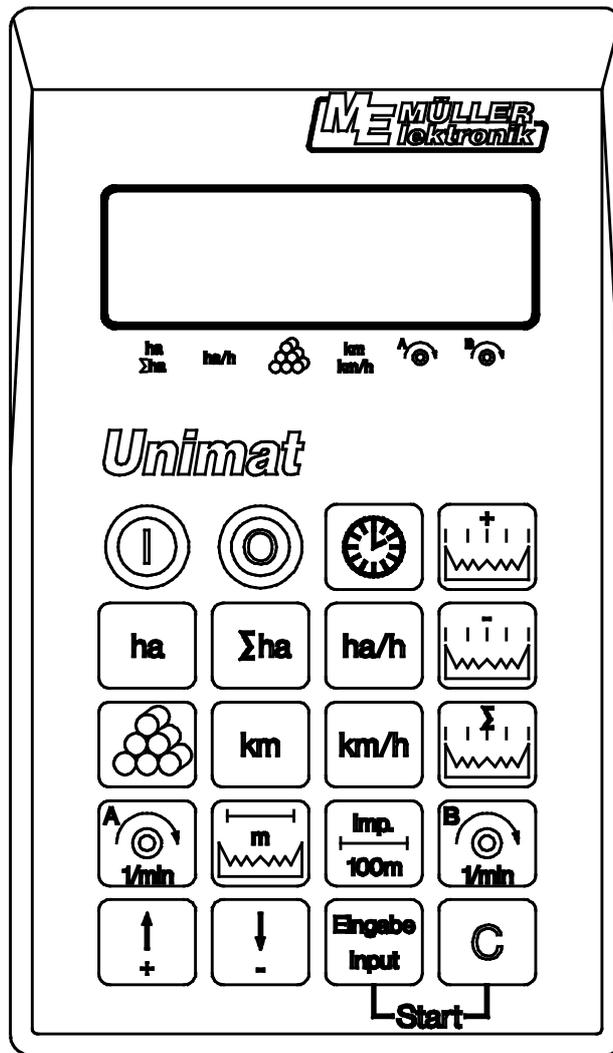
Unimat

December 1994



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1 System description

You have acquired a device, which can be installed as a measuring and control instrument on practically all self-driven agricultural machinery.

It consists of the board computer and a set of cables with sensors for recording the impulses. The harsh conditions under which it used were taken into account during construction.

As a result the the front plate consists of an extremely robust but at the same time very clear tactile keyboard, allowing quick and simple operation of the device.

The microcomputer – the heart of the device - is equipped with a CMOS memory and a lithium battery. All pre-set and recorded values remain stored in the device for many years, even when the board mains are switched off. They are available as soon as the device is switched on again.

The device has following functions:

- Calculation of the area and the total area e.g. per season
- Calculation of the working time
- Display of the current area performance
- Calculation of the distance covered
- Display of the current speed
- Events counter
- 2 rpm controls
- Boom section adjustment

2 Installation instructions

2.1 Computer

The operating voltage is **12 V** and must be taken directly from the battery or from the 12-volt starter. Care should be taken when laying the **battery cable** and it should be shortened if necessary. The crimp ring terminal for the ground line (blue) and the end sleeve for strands for the + line (brown) should be fitted using suitable pliers. The end sleeve for strands for the + line are in the connection clamp of the fuse holder.

brown = + 12 volts
blue = ground

Attention !!! The voltage supply must be taken directly from the battery or from the 12-v starter. Attention must be paid to polarity.

2.2 Sensors – generally

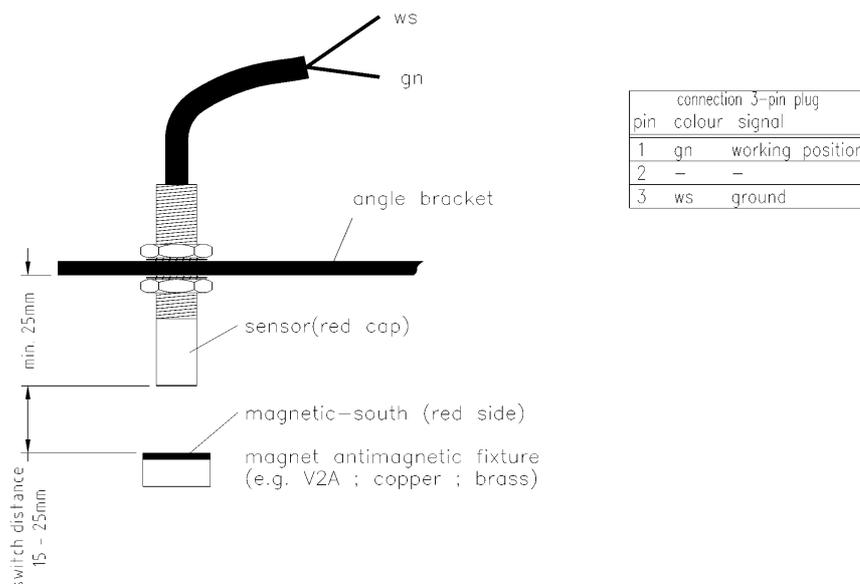
The sensor X with 2 sensing elements (measurement of distance on the combine harvester) and sensor Y (determination of the working position) consist of two magnet switches (Reed contacts).

When the magnet is drawn towards the sensor, the contacts close. This is registered by the computer.

Six conditions should be adhered to when mounting the Reed contact sensors:

- The magnet's mounting screw must point to the end of the sensor.
- The distance should be 15mm - 25mm.
- The magnet's direction of movement must run at a right angle to the magnet switch.
- The magnet must be mounted on iron using the V 4A screws supplied.
- The painted side of the magnet must be visible.
- The magnet switch must protrude at least 25mm out of the fixture.

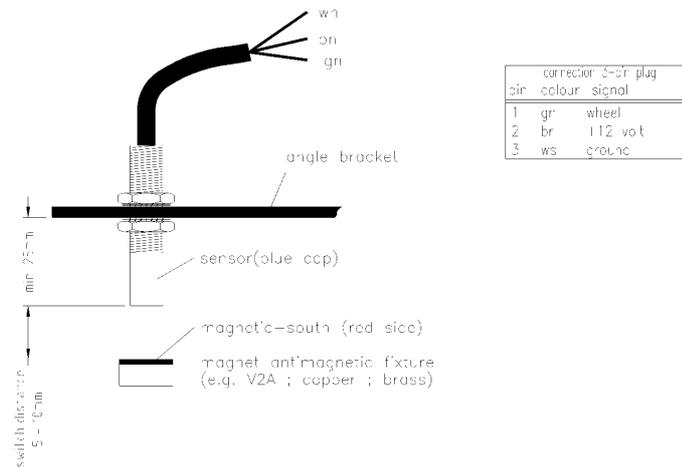
Diagramm A:



The sensor X with one sensing element and the rpm sensors have a an electronic switch.

With these sensors it is possible to record impulses e.g. from a cardan shaft. They should be mounted, as illustrated in diagramm b, at a distance of 5-10mm.

Diagramm B



2.3 Sensor X (distance impulses)

2.3.1 Possible operating modes

The sensor X is for the evaluation of the course and the speed. Depending on the purpose of the device, various sensors can be used, as described below.

- Sensor X (1 sensing element)
Impulse recording is taken at a non-driven wheel or at the cardan shaft on four-wheel drive tractors. (diagramm b; 5-10mm distance).
- Sensor X with forwards/backwards evaluation (2 sensing devices)
This sensor is intended to be used with combine harvesters, in order to achieve accurate area calculation, even when the mowing attachment in working position has to be towed free. (Reversing).
- Sensor X with forwards/backwards evaluation (2 sensing devices)
This sensor is intended to be used with combine harvesters, in order to achieve accurate area calculation, even when the mowing attachment in working position has to be towed free. (Reversing).
- Connection to the tractor signal socket.
The device can be connected with a special adapter if this socket exists.
Adapters are available for the tractors from the following manufacturers: Fendt; KHD, MF, FIAT, Steyr and MB-Trac.

2.3.2 Sensor X - Four-wheel drive tractors/MB-Trac

Mounting on MB-Trac and other four-wheel drive tractors (diagramm b). The distance impulses are taken from the cardan shaft. Mounting is carried out as follows:

Rivet the magnets to a hose clamp using a copper rivet. Then put this round the cardan shaft and tighten.

By means of the fixture provided mount the sensor X to a static part of the vehicle opposite the magnets. The sensor must point in the direction of the magnets. The distance should be 5-10mm. The ring on the left-hand side of the display must flash during the journey.

2.3.3 Sensor X - tractors without four-wheel drive and other machines.

The magnet is installed in the wheel shell of the tractor's front wheel or in the wheel shell of another machine. If the wheel's circumference is more than 2 m, 2 magnets have to be distributed evenly over the circumference. Mount the sensor to a static part of the vehicle using the fixture provided, so that the end of the sensors is pointing towards the magnets (diagramm b). The distance should be 5-10mm. The ring on the left-hand side of the display must flash during the journey.

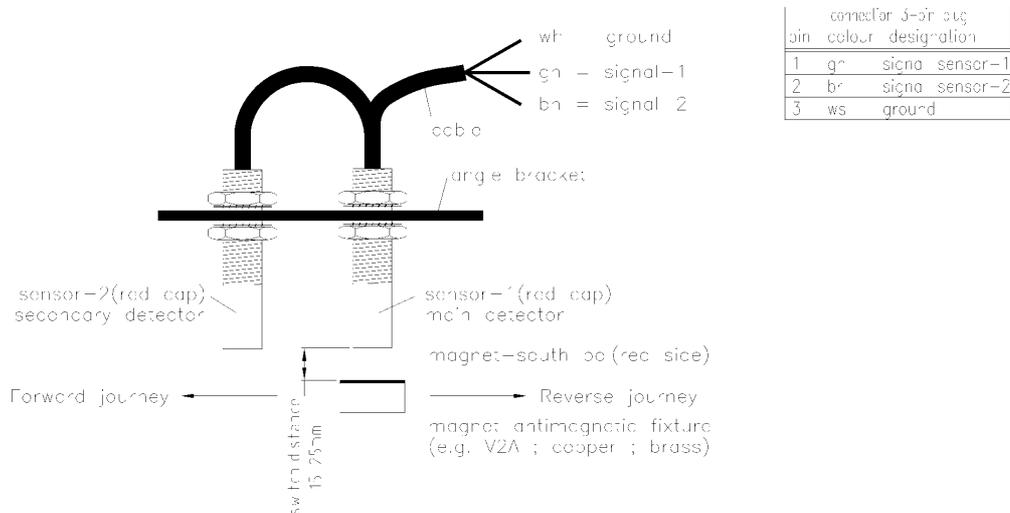
2.3.4 Sensor X - speed adapter (Unimog)

Dismantle the speedometer drive from the gearbox and screw on the speed adapter in its place. Apply multi-purpose grease to the shaft with the magnets and insert it with the yoke pointing downwards.

Screw the speedometer drive on to the adapter. The ring on the left-hand side of the display must flash during the journey.

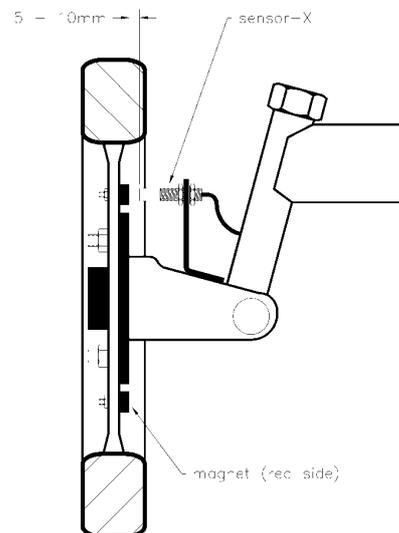
2.3.5 Sensor X with forward/reverse evaluation for combine harvesters

This sensor has 2 sensing devices. This allows the device to determine if the combine harvester is moving forwards or in reverse. Important is, when driving forwards, that the magnet first draws closer to the magnet switch with the long connecting cable.



The sensor is to be mounted using the flat profile supplied. Depending on how it is to be mounted, it has to be bored or bent.

Bore a 5mm hole or M5 screw thread in the wheel shell opposite the sensor. Screw the magnet directly in to the wheel shell using the V 4A screw. The distance of approx. 15mm - 25mm between the magnet and the sensor is set by the screw connection at the sensors.

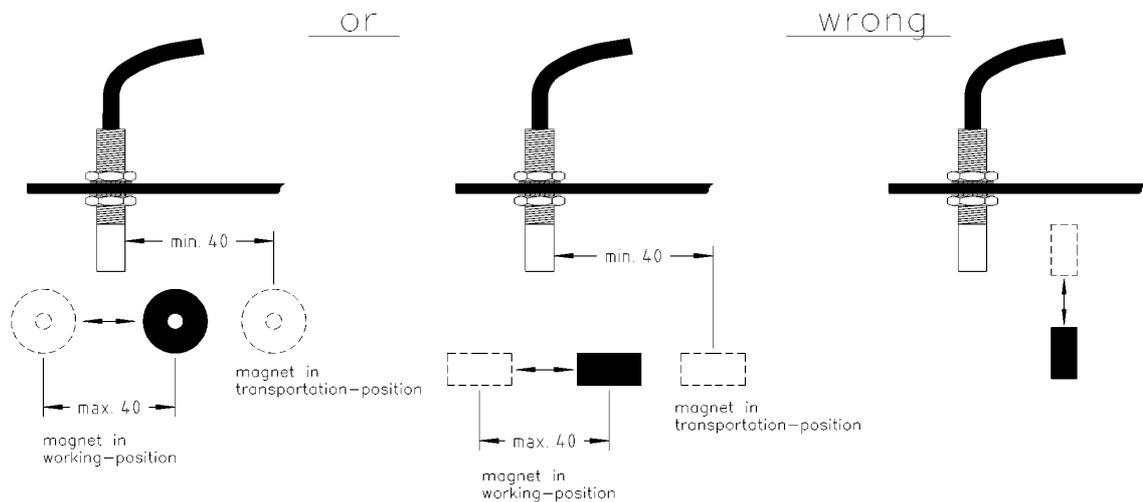


2.3.6 Connection to the tractor signal socket

Insert the correct adapter for the tractor into the signal socket and the computer's input X..

2.4 Sensor Y - working position

Mount the magnet on to a machine part using the V4A screws in such a way that its position changes from transport into working position. Mount the sensor on to a static part of the vehicle opposite. In order to close the contacts, the magnet in working position must be placed within a certain area in front of the sensor. In this way the impulses from sensor X to the computer take effect. If the machine is in working position, the arrow on the left-hand side of the display must be visible.



If the part of the machine being monitored moves more than 4 cm in front of the magnet switch in working position, a 2nd magnet is to be mounted in the magnet's direction of movement.

When the machine is brought to transport position, the magnet must move away from the sensor at a distance of at least 3 cm. The contacts are then opened and the impulses from sensor X to the computer are ineffective.

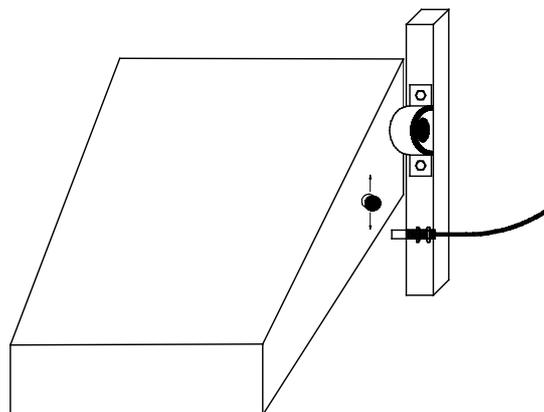
Assembly - examples:

a) Combine harvester

Bring the cutter bar into the working position "shortest length of stubble". Install the sensor with the flat profile provided in the proximity of the slope conveyor.

Screw the magnet to the slope conveyor opposite the sensor. (Bore a M5 thread). The cutter bar is brought into the position "longest stubble length". Check the magnet sensor position as described in diagram 2. If the magnet has moved too far from the sensor, install the 2nd magnet provided opposite the sensor. Note that the maximum distance between the magnets one

below the other should not exceed 7 cm. The distance of 15-25mm between the magnet and the sensor is set by the screw connection. If the cutter bar is in transport position, the distance between the sensor and the nearest magnet should be at least 3 cm



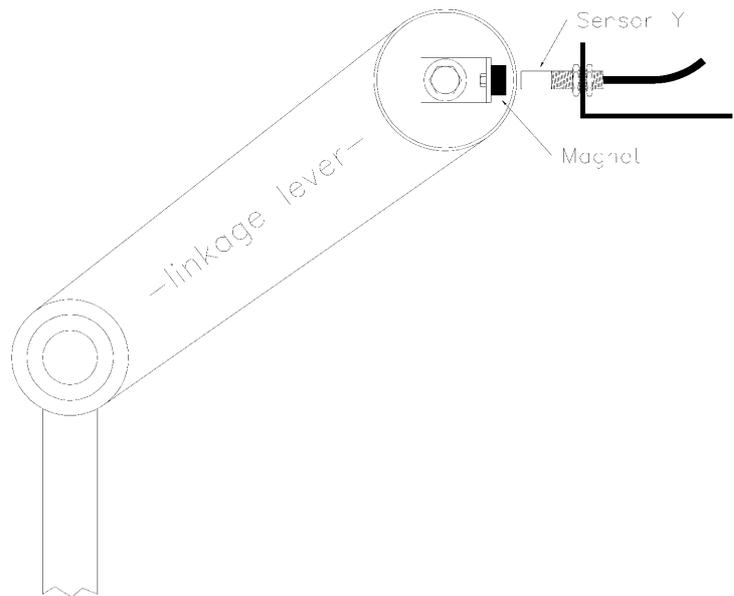
b) Tractor hydraulics

The tractor hydraulics are brought into working position by the machine attached. Screw the magnet on to the lifting arm (bore a M5 thread).

Mount the sensor to a static part of the vehicle opposite the magnets using the flat profile provided. The distance magnet - sensor (15-25mm) is set at the sensor by the screw connection. If, during operation, the lifting arm moves so much that the magnet leaves the sensor's active area, mount the 2nd magnet provided next to the existing one in the direction of movement (if necessary secure a small flat profile to the lifting arm).

Note that the maximum distance

between the magnets one above the other should not exceed 7 cm. In transport position, the distance between the sensor and the nearest magnet should be at least 3 cm.



c) Other machines

e.g. Beet harvesters can be monitored in the same way. The instructions in paragraphs 2.2 and 2.4 should be adhered to.

- d)** If a machine is brought into working position by a lever (e.g. plant protection sprayer, manure sprayer) assembly can be carried out as follows:

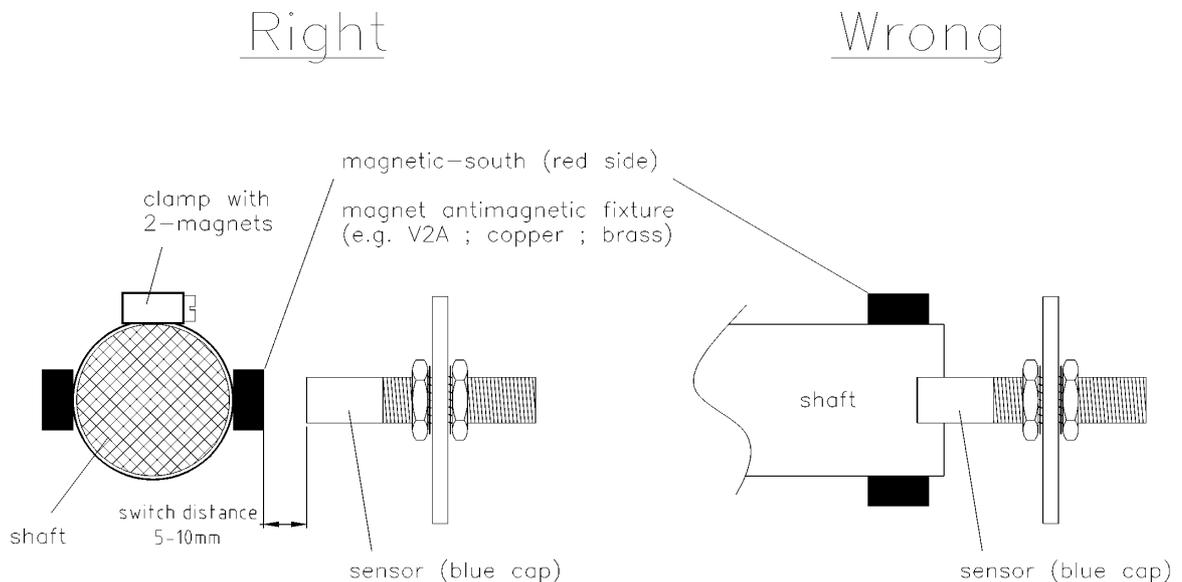
Screw the magnet to the lever. Mount the sensor in such a way that, in working position, it is opposite the magnet.

- e)** Sensor Y is not required with machines which are always in working position during operation. (manure sprayer). A Y sensor is also superfluous e.g. on seed machines when the sensor X (distance) is at the wheel of the seed machine. Idle runs on the headland are not evaluated as the machine is lifted and the wheel is not turning.

In this case a short circuit plug should be ordered instead of the sensor Y. (price advantage).

2.5 Sensor A, B (RPM monitoring)

Up to 2 rpm controls can be carried out. These sensors have an electronic component which reacts to a magnetic field and sends an impulse to the computer. 2 magnets must be attached to the shaft being monitored. The magnets must move past the end of the sensor at a distance of 5-10mm:

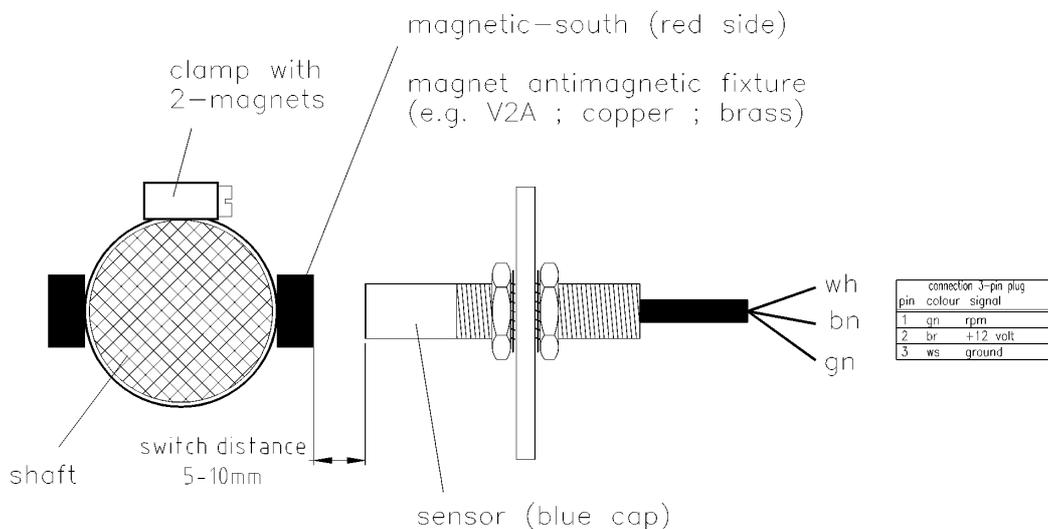


Please note that the painted end of the magnet must point to the sensor. The sensor can only recognize the south pole of the magnet. If the magnets are mounted to accessible but unprotected shafts, protection must be according to with the regulations of the Trade Association.

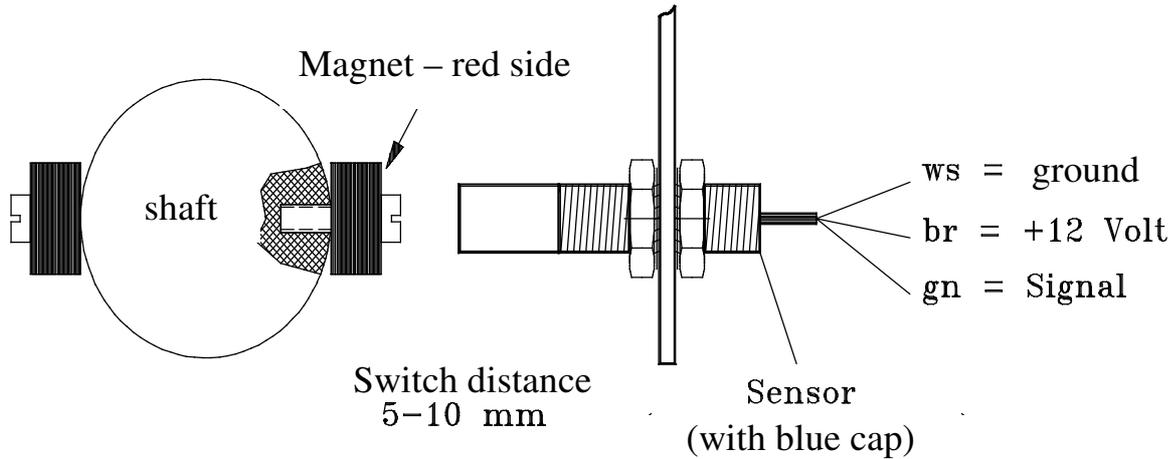
Assembly - examples

a) The shaft is directly accessible

In this case rivet 2 magnets with the rivets and washers provided carefully to the hose clamp. Carry out boring so that the magnets are approximately opposite each other. Shorten the ends of the hose clamp after mounting is completed



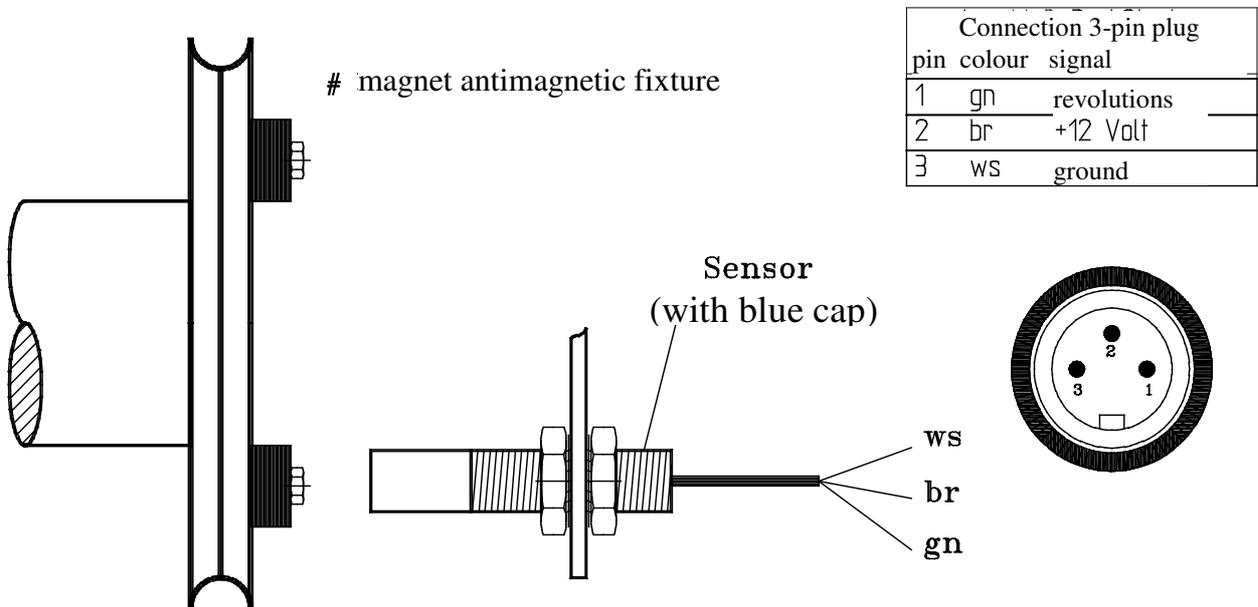
It is also possible to screw the magnets directly on to the shaft. To do this 2 x 5mm drill holes are required.



magnet antimagnetic fixture

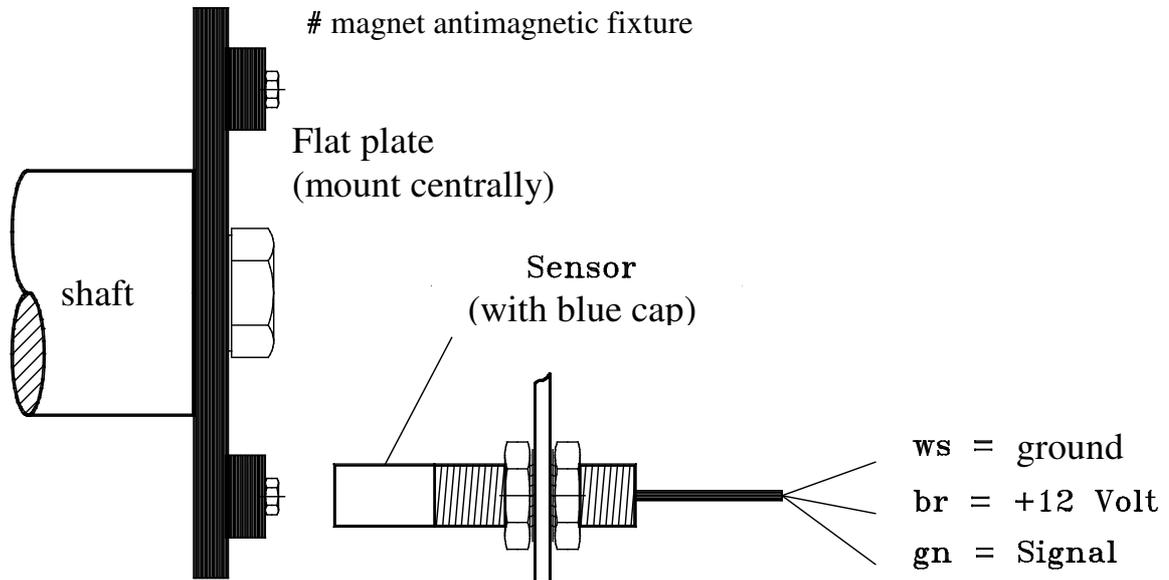
b) There is a wheel or a plate

In this case bore 2 x 5mm wholes. Screw the magnets directly on to the wheel or the plate. Fix the sensors in such a way that the the magnet moves past the end at a distance of 5-10 mm.



c) The shaft is inaccessible

In this case a hole must be bored at the end. Screw a plate (approx. 8 cm) or a flat profile (approx. 8 cm) on to the middle of the shaft lengthwise. Screw the magnets to the plate or the flat profile opposite. Fix the sensors in such a way that the magnets move past at a distance of 5-10mm.



2.6 Events counter

An events counter is switched parallel to the rpm sensor A. If e.g. bails are to be counted, mount the sensor in such a way that the magnet mounted at the link is led past the sensor at a distance of 5-10mm or it moves towards the sensor stopping short of 5-10mm. An impulse is sent to the computer and is registered in the events counter.

2.7 Cable assembly

Lay the cable to the computer very carefully using the installation material provided. Bore a 3mm hole for the sheet metal screws which secure the cable clamps. Use cable binders if the cable can be laid alongside an existing cable or wire.

Secure the cable directly behind the sensors so that any possible tension in the cable does not affect the interior of the sensors. Attention has to be paid to ensure that the function of the machine is not in any way impaired.

3 Operating instructions

3.1 Initial operation

The device carries out a self-test when switched on. When completed the function last used before switch-off is automatically selected.

In the case of an electrical fault the device displays:

HALP 00 or HALP 88.

In this case return the device for repair.

3.2 Description of the entry keys

The keyboard has two colours:

White keys = function keys (display the recorded data)

Grey keys = entry keys (enter the machine data)

When the + or – key is first pressed the display moves one position in the required direction.

When the key is pressed again the display continues to move until pressure from the key is lifted.

The board computer requires the following information before operation can commence: Impulses/100m, working width, number of boom sections and the nominal rpm.

3.2.1 "Working width" key



This key is used to enter the actual working width:

- Press the "working width" key
- Enter the value using the +/- keys
- Press the "enter" (=) key

Finally the value entered should be controlled once more by pressing the "working width" key

3.2.2 "Impulses/100m" key



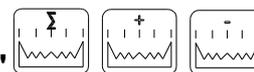
With this key the number of impulses recorded to the computer by the sensor X during a test journey of 100m are entered.

There are two possibilities to enter the data:

1. The impulses/100m value is known
 - Press the "impulses/100m" key
 - Enter the value using the +/- keys
 - Press the "enter" (=) key

2. The impulses/100m value is not known
 - Measure out and mark a distance of 100m on the field
 - Bring the vehicle to the start position
 - Press the "impulses/100m" and the "C" key simultaneously
 - Travel a distance of 100m. The computer adds up the impulses during the journey
 - Press the "enter" (=) key

3.2.3 "Number of boom sections" key; "Boom sections +/-"



1 to 12 boom sections can be entered.

For the combine harvester it is advisable to enter 4 boom sections. For a 6-row crop chopper enter 6 boom sections. Adjustment to the current working width can be carried out using the +/- keys. At the end of the field when the working position is switched off, the computer switches automatically to the full working width

- Press "Total boom sections" key
- Enter the value using the +/- keys
- Press the "enter" (=) key

3.2.4 Programming the shaft speed monitor



Before the season begins the nominal speed of the shaft to be monitored must be communicated to the Unimat.

The entry should be carried out as follows:

- Start up the machine (normal load)
- Press the "A" key (e.g. threshing drum) (current speed in rpm will be displayed)
- Press the "enter" key

The value displayed at this moment in time is stored as the nominal speed.

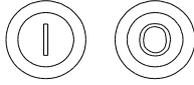
Programming the shaft speed B is carried out in the same way. If e.g. to transfer the board computer to another machine, monitoring has to be switched off, the following entry is required:

- Press the "A" key (display 0)
- Press the "enter" key
- Channel A rpm monitoring is so switched off

After the values described in paragraph 3.2.1 – 3.2.4 are entered, the board computer is ready for operation.

3.3 Description of the function keys

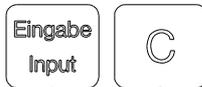
3.3.1 Device on/off



The device is switched on by pressing the On (I) key.
Switch off with the Off (O) key.

Should the voltage supply drop to below 9 volts e.g. when starting the tractor, the computer switches off automatically. It can be switched on again by pressing the On key.

3.3.2 "Start function"



The start function is released by pressing the "enter" and "C" keys simultaneously. That means that the memory for the area, time, distance and events counter is set to 0.

Time is restarted automatically by pressing this key. This function is to be carried out at the beginning of each operation.

3.3.3 "Time" key



The operating time since carrying out the "start function" (see 3.3.2) is displayed by pressing this key.

If the tractor is switched off and the computer is voltage-free, the time data entry is stopped. It restarts once the device is switched on again. The clock can also be stopped during operation. After the "time" key has been pressed, it can be pressed once again to stop the clock. To restart it the "time" key has to be pressed yet again.

3.3.4 "Area" key "



The area covered since carrying out the "start function" (see 3.3.2) is displayed here.

Measurement is interrupted as soon as the working position is no longer recorded to the computer from sensor Y.

3.3.5 "Total area" key



With this key the total area for a whole season is determined. When the key is pressed twice the life time (total area) is displayed. This value cannot be deleted with "C". The memory is set to 0 at the beginning of the season by pressing the "total area" and "C" keys simultaneously.

3.3.6 "Current area output" key



With this key the current area output is displayed in ha/h.

3.3.7 "Events counter" key



With this key the number of events (e.g. number of bales or other accountable processes) which have been determined via the A sensor after the start function are displayed.

3.3.8 "Distance" key



The distance covered since carrying out the "start function" (see 3.3.2) is displayed here.

3.3.9 "Speed" key



The current speed being travelled is displayed when this key is pressed.

With more than 25 km/h only the speed is displayed. The keyboard has no function in this case.

3.4 Operating procedure

Once the machine data have been entered (see 3.2.) only the start function has to be carried out before operation can begin (see 3.3.2). During operation any value required can be displayed. Once operation has ended all values can be called up and noted.

3.5 Converting the board computer

When transferring the computer from one machine to another, remove the sensor's multipole connectors. Then loosen the cable for the 12V voltage supply and remove the device from the console. Carry out this procedure in reverse order when installing the device. The device must then be adapted to the new machine.

This involves the "working width", the "impulses/100m" and if required the number of boom sections and shaft speed monitor (see initial operation).

The total area should also be noted and deleted.

4 Maintenance

The computer is maintenance-free. It has an internal safety fuse. During the winter it should be stored at room temperature and protected from dampness.

5 Guarantee

If used properly we grant 12 months' guarantee. Please return defective devices to us.

6 Error recovery

Error	Cause	Measures
6.1 The device does not switch on	Polarity reversal of the voltage supply	Check polarity
	Voltage supply interrupted	Check battery connection cable; control battery clamps and fuse
6.2 Area is not being measured	"Working width" or "Imp/100m" have not been entered	Enter values (see 3.2.1 und 3.2.2)
	No impulses from the transmitter for the distance. The ring in the display is not flashing.	Check sensor X. check the cable to the sensor for damage, replace sensor if necessary.
	Sensor X - 2 sensing elements. During forward journey the area is measured backwards and in reverse forward measurement	Swap the sensors at the wheel (see 2.3.5)
6.3 Speed is not displayed	Impulses are not reaching the computer	Correct the distance of the magnet to the sensor 5-10mm Check the cable for damage and replace if necessary
6.4 The rpm alarm goes off although speed within limit	The nominal speed given is too high	Repeat the programming with a lower nominal speed (see 3.2.3.)