Flowmate Control FMC/EC/GZD-EC

Operation manual

Article number: 70051422

Production year: 2008
Effective: 01001 **≥Mach ID**
Prod. Series nr:

Falling into disuse

When the lifespan of the machine has finished, its separate parts must be properly disposed of. Keep local legislations in mind with this!

Metal parts
You must deliver all metal parts to a metal recycling company.

Plastic parts
All plastic parts can be disposed of as unwanted garbage.

Oil
the hydraulic oil must be disposed of at a used-oil recycling company.

Rubber
Rubber parts such as tyres and hoses must be disposed of at a rubber processing company.

Electronic waste
Electronic waste, such as the electronic control box and the machine boxes must be disposed of at specialist companies.

Fertiliser
Remaining fertiliser must be stored or disposed of in accordance with the regulations for chemicals.

EC declaration of conformity

In accordance with EU Directive 98/37/EG and 2006/42/EC*

We

Kverneland Group Nieuw-Vennep BV
Hoofdweg 1278
NL-2153 LR Nieuw-Vennep
The Netherlands

declare fully under own responsibility that the product

Flowmate Control FMC/EC/GZD-EC

to which this declaration refers, complies with the relevant basic safety and health requirements under EU directives 98/37/EC and 2006/42/EC*.

For the relevant implementation of the safety and health requirements mentioned in the EU directive, the following standards must be taken into account:

- EN ISO 12100-1; 2003-1 :2009
- EN ISO 12100-2; 2003-1 :2009
- EN ISO 4254-1 :2009
- EN ISO 4254-6 :2009
- EN 12761-1 :2009
- EN 12761-2 :2009

M.J.A. Beijaard
Authorized to compile the technical dossier.

Kverneland Group Nieuw-Vennep BV
Nieuw-Vennep, 29.12.2009

P. Scherpenisse
Managing Director
EU authorized representative**

* The machine complies with the relevant basic safety and health requirements under both EU directives.
The EU Directive 98/37/EC is applicable until 28/12/2009. The EU Directive 2006/42/EC is valid from 29/12/2009

** Only applicable to EU directive 2006/42/EC

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H1 INTRODUCTION

Dear Customer
Before using your new Kverneland sprayer for the first time, please make sure that you are fully familiar by carefully reading these operating Instructions. Please pay particular attention to the safety instructions.

Careful reading of the operating Instructions will help you handle the machine, prevent failures and accidents and increase the service life of your machine.

Kverneland cannot accept liability for any damage or operating problems due to failure to observe the operating instructions.

The compulsory training on handover and the commissioning and initial operation by your authorised dealer will also help you to familiarise yourself with the machine and enable you to learn the correct handling procedures.

§1.1 COMPLAINTS

The following conditions shall be applicable:

1. Machines, accessories and spare parts must be checked on delivery for any transport damage and for any missing items. All complaints must be notified immediately.
2. Complaints shall only be taken into account if they are notified immediately in writing, and at the latest within fourteen days after delivery of the item in question at the customer's premises.
3. In the event of concealed faults, the written complaint must be submitted on detection of the fault and at the latest within six months after receipt of the goods. The legal expiry periods remain unaffected.

§1.2 WARRANTY

1. The seller shall make good any problems under warranty by repair or replacement, at the seller's own choice. Replaced parts shall become the property of the seller. Failing repair or replacement, the buyer shall be entitled to demand either reduction of the price or cancellation of the contract, at the buyer's own choice.
2. The warranty period for our products is 12 months as from the date of delivery to the end customer. All wearing parts are excluded from the warranty.
3. The warranty is null and void if
   a) The warranty card is not returned to Kverneland duly completed.
   b) No warranty shall be accepted for damage due to the following causes:
      Unsuitable or inappropriate use, incorrect assembly or operation by the customer or by a third party, natural wear, incorrect or negligent handling, unsuitable operating substances and fluids, replacement materials, defective construction works, unsuitable construction foundation, chemical, electrochemical or electrical influences, provided that they are not due to the fault of the seller.
4. For essential third party products, the seller's warranty obligation is limited to transfer of the claims assigned to the seller against the supplier of the third party product.
5. Warranty claims must be submitted to the customer service of Kverneland warranty application forms. Claims can only be processed if they are completed in full and submitted at the latest two months after occurrence of the cause of the claim.

6. After agreement with the seller, the customer must allow the seller sufficient time and opportunity to implement all the repairs and spare part deliveries that the seller considers necessary by reasonable assessment. Otherwise, the seller is freed from the warranty obligation.
   Only in urgent cases of danger to operating safety and in order to prevent disproportionately serious damage shall the buyer be entitled to remedy the faults personally or have them remedied by third parties and demand that the seller reimburse the necessary costs. These cases must be notified immediately to the seller.
7. If the buyer is a businessman as defined in German commercial law, the seller shall be liable for the direct costs of repair or replacement, to the extent that the complaint is found to be justified, the costs of the replacement part, including dispatch, the reasonable costs of removal and installation, and, in addition, the costs of providing assembly engineers and assistants, if such provision can be reasonably demanded in view of the individual case. Otherwise, the costs shall be borne by the buyer.
8. The warranty period for the replacement part and repair is three months, but this period must at least run until the expiry of the original warranty period for the supplied item.
9. If the buyer or a third party makes incorrect changes or repairs to the delivered item without the prior consent of the seller, the seller's warranty obligation shall be cancelled for the resulting consequences.

§1.3 LIABILITY

Without prejudice to any other provisions of the present general conditions of sale and delivery and to the provisions of the product liability law, the seller's liability for damage caused by culpable breech of contract and by prohibited conduct shall be limited as follows:

1. The seller shall be liable for the full extent of damage caused by deliberate or grossly negligent conduct by the seller's representatives or supervisory employees.
2. In the event of a breech of main or secondary contractual obligations, to the extent that the said obligations are of particular importance to attaining the contract aims (cardinal duties), the seller shall be liable, depending on the cause, for each culpable action of the seller or of the seller's legal representatives and persons employed in fulfilling the contract, provided that a liability as specified under No. 1 above is not already incurred.
3. In addition to the duties laid down in no. 2, the seller shall be liable, depending on the cause, for any deliberate misconduct and gross negligence of the persons employed in fulfilling the contract, provided that a liability as specified under no. 1 above is not already incurred. No liability beyond no. 2 above shall be accepted for the seller's own negligence and for simple negligence and for any simple negligence of the seller's legal representatives and of all persons employed in fulfilling the contract.
4. If a liability as specified under nos. 2 and 3 is incurred, the extent of the said liability shall be limited to reparation of the typically foreseeable damage.
5. The above regulations laid down in nos. 1 to 4 shall apply accordingly for the case of liability due to culpability on concluding the contract. Any claims for damages on these grounds shall be limited expressly by this provision with retroactive effect.

§1.4 INTENDED USE

1. The spray computer Flowmate Control FMC, Electrical Control EC and Electrical Control GZD-EC are exclusively built for normal use in agricultural work (intended use).
2. Any use beyond the above shall be deemed to be not in conformity with the intended use. The manufacturer shall not be liable for any ensuing damage; the user alone shall bear the risks of such use.
3. The intended use also includes adherence to the manufacturer's specified operating, maintenance and repair Instructions.
4. The spray computer Flowmate Control FMC, Electrical Control EC and Electrical Control GZD-EC may only be used, maintained and repaired by persons familiar with the machines and instructed in the dangers involved.
5. The relevant accident prevention regulations and all other generally recognised health and safety and road safety regulations must be observed.
6. Any modifications to the machine by the customer shall automatically cancel any liability of the manufacturer for any resulting damage.

§1.5 SAFETY INSTRUCTIONS

Please also observe the safety instructions in the operating instructions for the basic unit of the sprayer !

H2 SYSTEM OVERVIEW AND ASSEMBLY

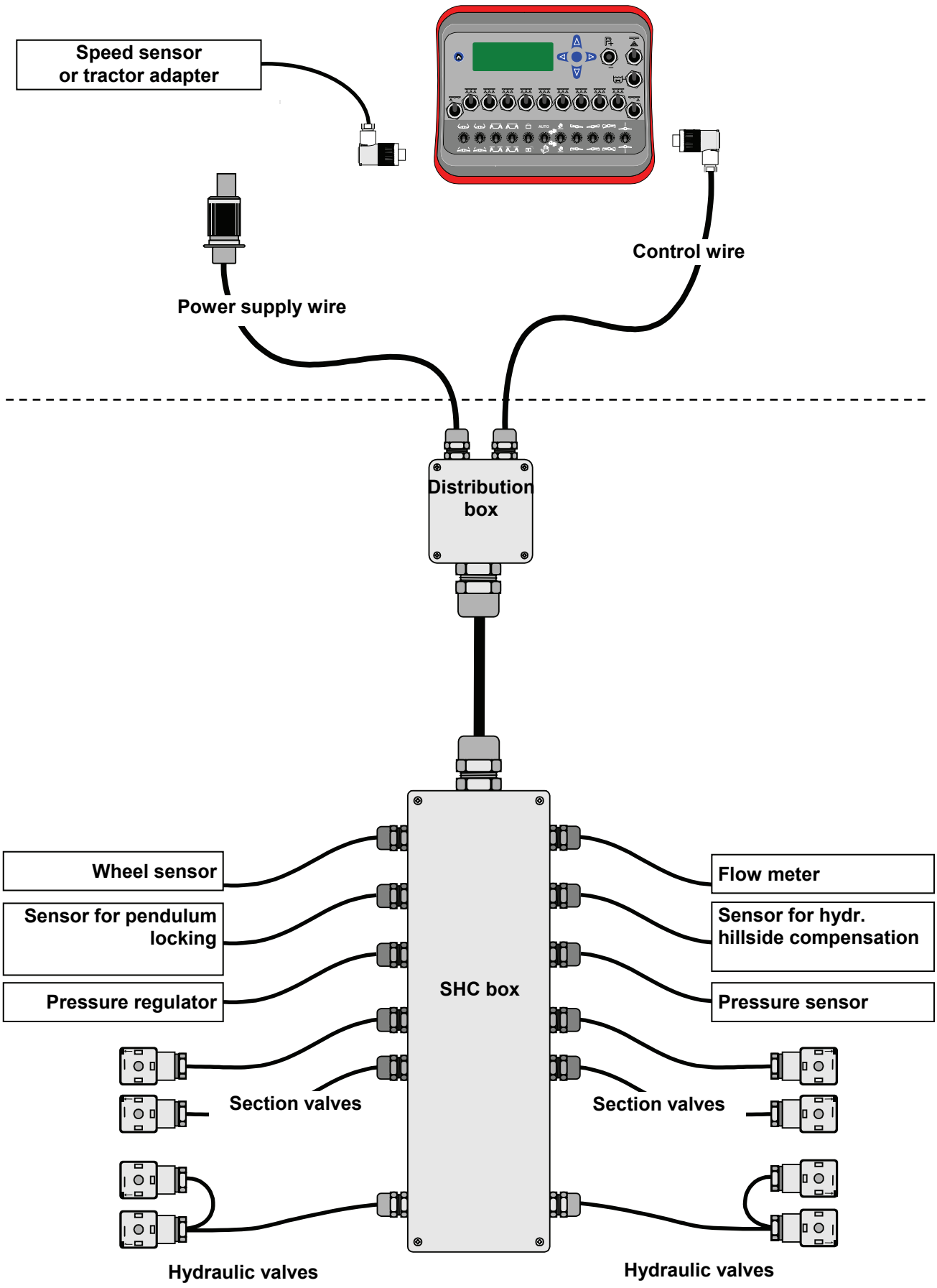
§2.1 SYSTEM OVERVIEW

The System Flowmate Control FMC comprises the following components (see fig.):

- Control box
- Distribution box
- SHC box (**s**ection-**h**ydraulic-**c**ontrol)

The control box is assembled in the tractor cabin and contains the spraying computer and the remote control for the control of the spraying and hydraulic functions.
The transmission of the control commands is done according to the new CAN bus protocol (ISO 11783) via the control wire and the distribution box to the SHC box on the sprayer (see fig.).
Pressure regulator, Section valves and solenoid valves are actuated, the signals of the sensors such as wheel sensor, flow meter etc. are detected and transmitted to the computer in the control box via the SHC box.
The supply of current is via the current supply wire and the distribution box on the sprayer.
From the distribution box, the control box in the tractor and the SHC box are supplied with current.

System overview and assembly



§2.2 ASSEMBLY

Assemble the control box (fig. 1) in the tractor cabin with the enclosed assembly material (fig. 2). Ensure that a position favourable for operation in the driver's field of vision is selected.

The control wire for the spraying system is inserted in the left-hand socket (1) on the reverse of the control box and secured by means of a screw-type connection (fig. 1).

If the speed measurement is done via the tractor, the wire of the speed sensor or the adapter cable to take over the speed signal from the tractor's electronics is inserted in the right-hand socket (2) and screwed tight.
If the speed measurement is done via a sensor on the wheel of the sprayer (trailer sprayer), the sensor cable is connected on the SHC box of the sprayer.

The control box is switched on via the switches (3) on the reverse (fig. 1).

§2.2.1 Supply of energy

In newer types of tractor which are equipped with an energy supply socket to DIN 9680, the energy supply wire of the Flowmate Control, which leads to the distribution box on the sprayer, can be inserted directly on the DIN socket of the tractor (see system overview).

In older tractors not equipped with a DIN socket, the battery wire (4) (fig. 3) is necessary and must be connected directly to the battery. The battery wire is not standard and must be ordered separately.
Use of the battery wire, which is fused with a 30 A fuse, ensures that the Flowmate Control is always sufficiently supplied with energy.

When connecting to the battery, pay attention to correct poling!
The brown core with the integrated 30 A fuse must be connected to the **+** pole, the blue core to the **-** pole. Please ensure clean contacts!

By no means can the supply of energy be produced via the so-called cigarette lighter, as it cannot provide the current required!

The other side of the wire is equipped with a standard socket, which must be attached in a dry, protected area in the rear of the tractor or the tractor cabin. The energy supply wire of the Flowmate Control, which leads to the distribution box on the sprayer, is inserted in this socket.

Before connecting the Flowmate Control to the 12 Volt electrics, the following checks must be made:

- Check electric components and wires for possible damage. Damaged wires are no longer waterproof and can cause short circuits.
- Check the wire length; it must also be sufficient for taking bends.
- Check correct connection of the plug to the control box.
- Naturally, the 12 Volt battery must also be sufficiently charged (9 Volts at least).

Note: Please ensure that the two wires (energy supply and control wire) are laid carefully between the tractor and the sprayer in work so that nobody can trip up and the wire does not get caught anywhere.
However, the wire must not be tied up too tightly, because otherwise it can tear in bends or in lifting or lowering.
Further, please ensure that the wires cannot come into contact with moving or hot parts of the tractor.

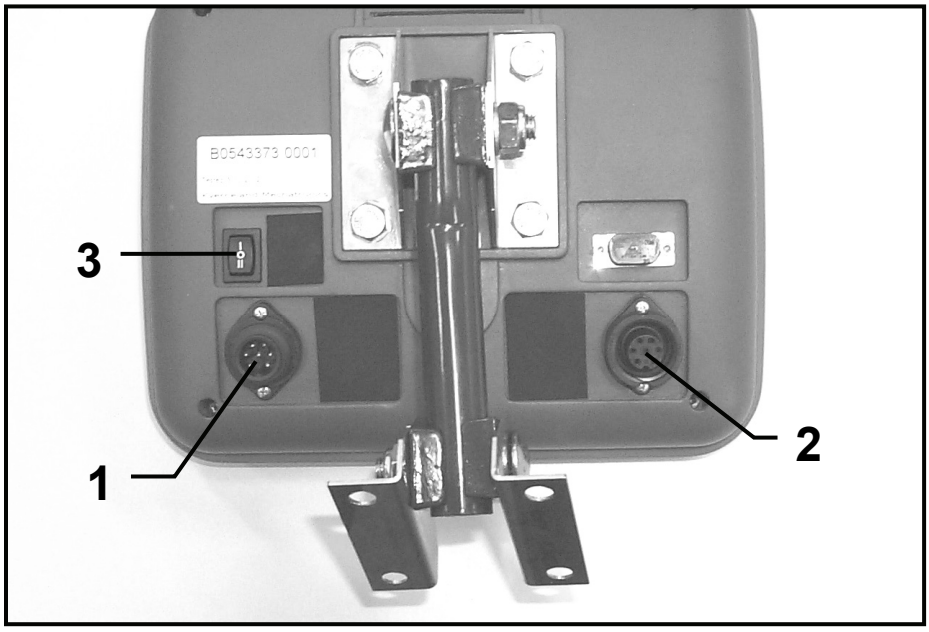


Fig. 1

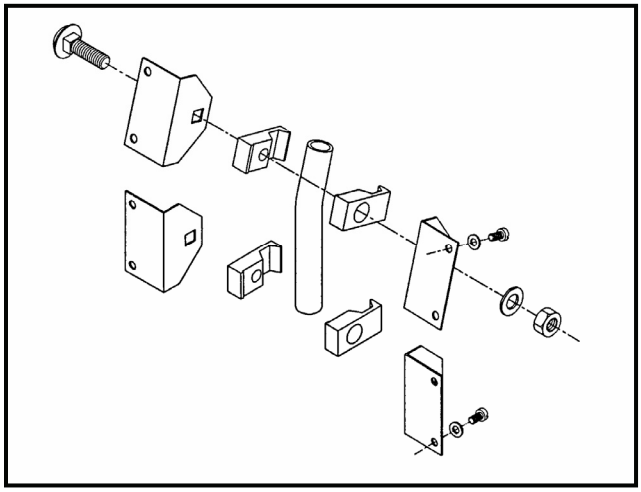


Fig. 2

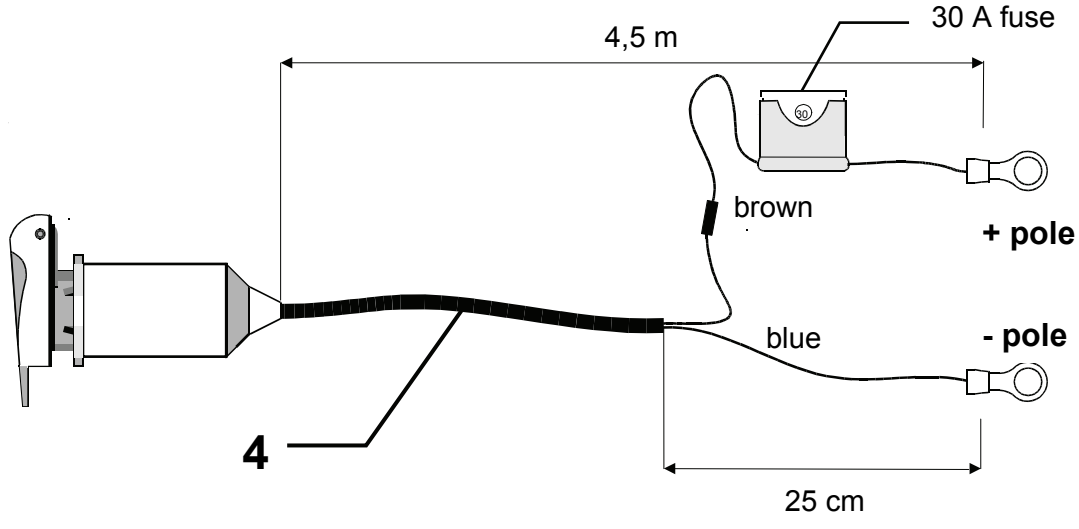


Fig. 3

If live parts or wires are damaged, short circuits can result. Therefore, the energy supply wire must always be equipped with a 30 A fuse. Without properly fusing, a fire can be caused by a short-circuit!

§2.2.2 Assembling the speed sensor

If a sensor with a counting ring is selected for the speed measurement, it should be attached to a non-driven wheel as far as possible. If an added appliance is used, the parts are fitted to the inside of the front right wheel of the tractor.
If a trailer with a spray computer is ordered, the speed sensor with the counting ring is assembled in the factory. In this case, the system merely needs to be calibrated (see paragraph “§5.10 on page 41).

Proceed as follows when assembling the counting ring:

- To start with, the wheel (5) to which the counting ring (6) is to be fitted is dismantled (fig. 4).
- Push the drilling template (7) over the four long screws of the counting ring (6) and align the ring centrically to the edge of the rim, to the hub opening and to other circular shapes of the wheel with the help of the circles on the drilling template. This can be done both on the outside and also on the inside of the wheel (fig. 4).
- Then the bores (8) are marked, centred and drilled with a 10.5 mm drill (fig. 4).
- Screw the ring on the inside of the wheel and attach the spacers (9) between the ring and the rim. Check whether the ring has been aligned precisely parallel to the rim (fig. 5).
  N.B.: Longer spacers are needed for trailed sprayers.
- After this, fit the wheel back onto the tractor or sprayer.

Note: In most four-wheel driven tractors, the speed sensor can often be fitted to the cardan shaft without problems by means of a self-made holder. The sensor can react to protruding metal parts on this shaft (hose clamps or welded-on nuts). The counting ring then does not need to be dismantled!

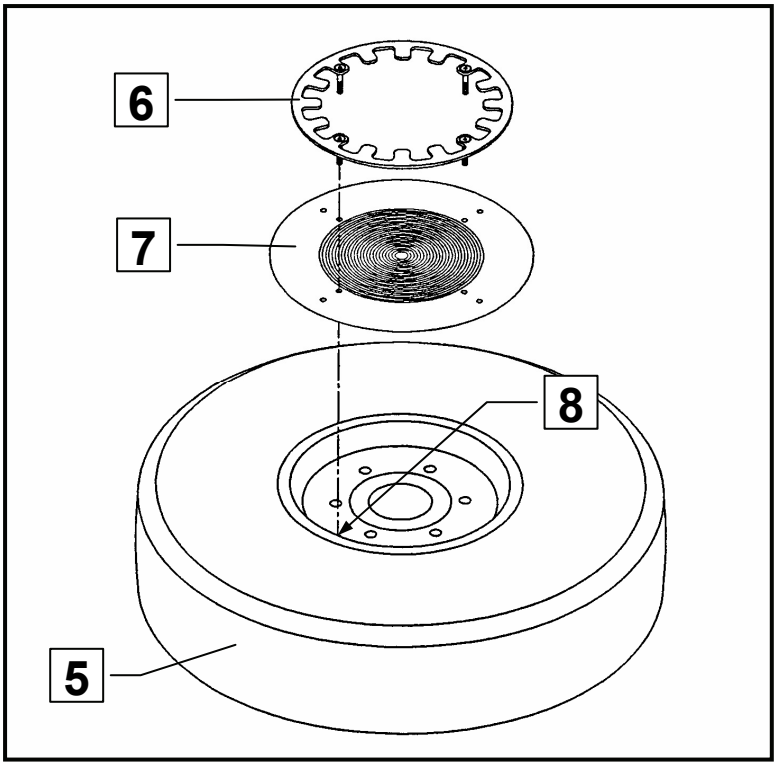


Fig. 4

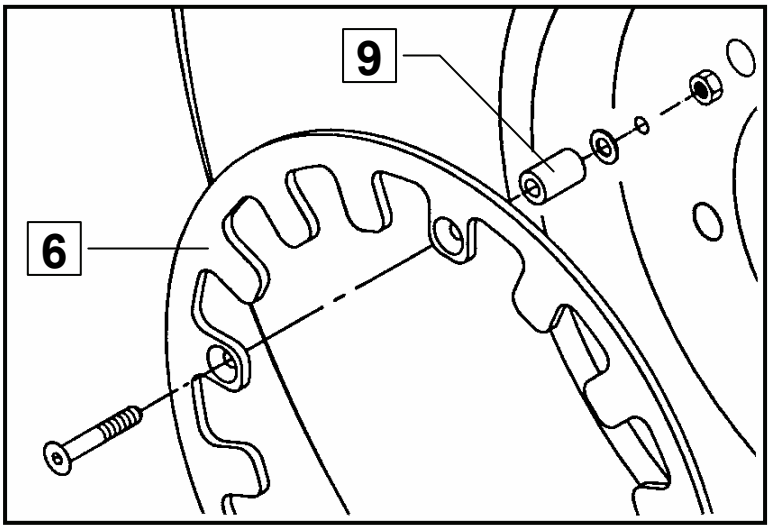


Fig. 5

Assembling the sensor

- The speed sensor (10) must be fitted in such a way that it is as close as possible to the counting ring (6). Trailer sprayers have their own holder on the axle of the sprayer for this purpose. If an add-on sprayer is used, the holder for the speed sensor must be fitted in the outer area of the front tractor axle in such a way that it also turns in steering (fig. 6)
  As a matter of principle, please ensure that the sensor is not put at risk by plants on the field and other objects.
- If no suitable screw or clamp-type fitting is available, the centring bores of the wheel axle or the king-pin must be drilled open and a thread cut into the bore. Please ensure that the sensor must transmit at least 50 impulses over a distance of 20 metres.

Note: The clamp (11) must be fitted with at least two screws in order to prevent the sensor from vibrating or being pushed away from the counting ring.
THE SENSOR MUST NOT TOUCH THE COUNTING RING UNDER ANY CIRCUMSTANCES!

- The supplied bar (12) can be used for the assembly of the sensor in the area of the front wheel of the tractor (fig. 7).
- Assemble the sensor in the clamp holder and rectify any possible inclination of the counting ring with the shims (13) (fig. 8).
- Move the sensor in the clamp holder (11) in such a way that the distance from the counting ring is 3 to 6 mm (fig. 7 and 9).
- The speed sensor (10) must be arranged on the cams in such a way that the middle of the sensor is opposite the inside edge (14) of the cams (fig. 9).

Note: If the sensor is fitted too far towards the outer edge of the counting ring, it does not recognise the individual cams. In this case, no impulses are transmitted and the system does not count.

- Check whether the sensor counts each cam, the control lamp on the sensor must light up each time. This is checked by lifting the axle of the tractor or the EMPTY field sprayer with a jack and turning the wheel by hand.

When lifting the wheel, always operate the parking brake of the tractor first and secure the vehicle against rolling away with wedges to be on the safe side!

Calibration of the speed sensor is described in paragraph “§5.10 on page 41.

- Lay the sensor wire to the driver's cabin and connect the plug to the control box (fig. 1).

Note: When laying the sensor wire, please also consider the maximum steering angle!

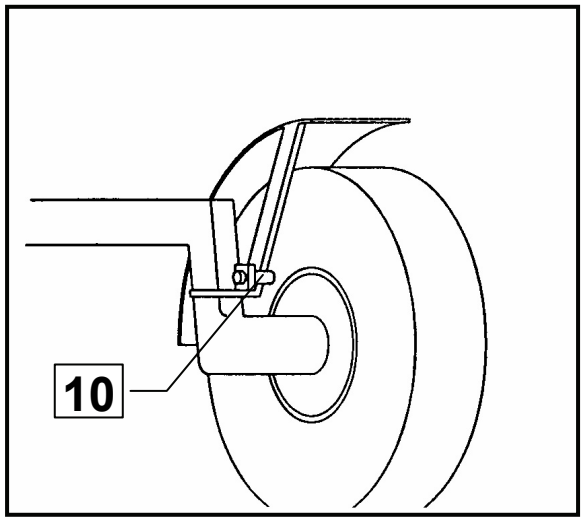


Fig. 6

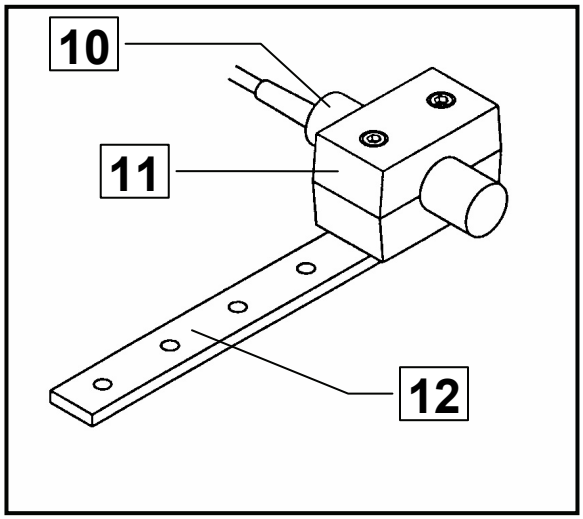


Fig. 7

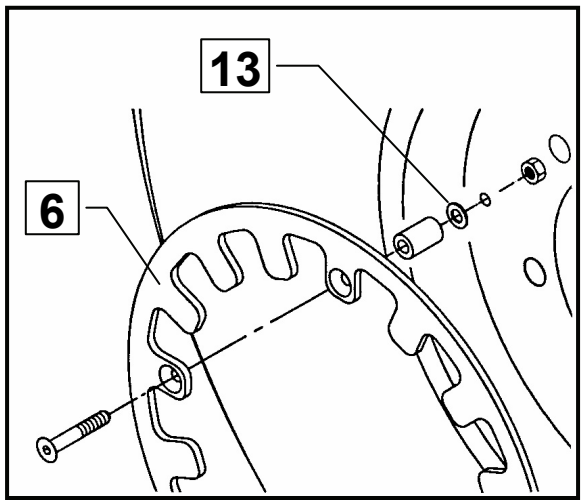


Fig. 8

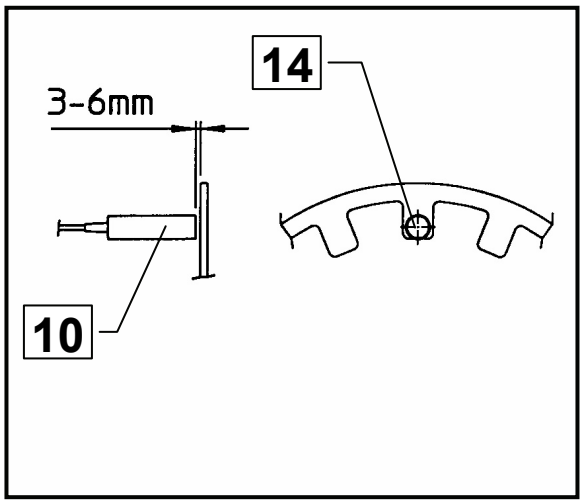


Fig. 9

H3 CONTROL BOX

The control box of the Flowmate Control FMC (fig. 1) contains an electrical remote control for the spraying functions and the hydraulic functions (spray boom and drawbar) and the actual spraying computer.

§3.1 SPRAYING FUNCTIONS

The following spraying functions can be electrically remote controlled on the control box (fig. 1):

Central switch "Spraying" On/Off (1)
When the central switch is operated (1) all the Section valves (7) (fig. 2) are opened or closed at the same time (Switch upwards = valves are open).

Section switch (2)
When the Section switch is operated, (2) the Section valves (7) (fig. 2) are opened or closed (Switch upwards = valve is open).

Switch for edge nozzles or Sections (3)
The two outside switches (3) can be used to switch edge nozzles. There are 2 possibilities for this:

a) Edge nozzle for precise edge-of-field spraying:
In this case, there is a switch-over between the outermost nozzle and the edge nozzle (with a smaller spraying angle to the outside).
The working width is not altered.

b) Edge nozzle to enlarge the working width at the edge of the field:
In this case, the edge nozzle (with a larger spraying angle to the outside) is used additionally in order to enlarge the spraying width at the edge of the field.

Note: The kind of use of the two outside switches (3) must be pre-selected in the "*Setting menu"* (*screen 16*) of the spraying computer.

Switch for pressure adjustment +/- (4)
When the switch is operated (4), the spraying computer automatically switches from **Automatic** to **Manual mode.** At the same time, the pressure regulation motor (8) (fig. 2) is actuated in the direction in question (**+** or **-**) as long as the switch (4) is held down. The spraying pressure (bar) can thus be altered manually. The actual spraying pressure can be read of the manometer on the machine

Attention: The desired spraying pressure has to be set while spraying (central switch spraying "**On**")

Switch for return agitator (5)
Motor (9) (fig. 2) for the agitator switch-off is actuated via switch (5). The return agitator can be switched off as required, e.g. for complete emptying of the container or also for foaming pesticides.

Note: The fact that the agitator has been switched on can be seen by a rotating beam (6) in the top left of the display (*main menu, screen 1*) (fig. 1).

Control box

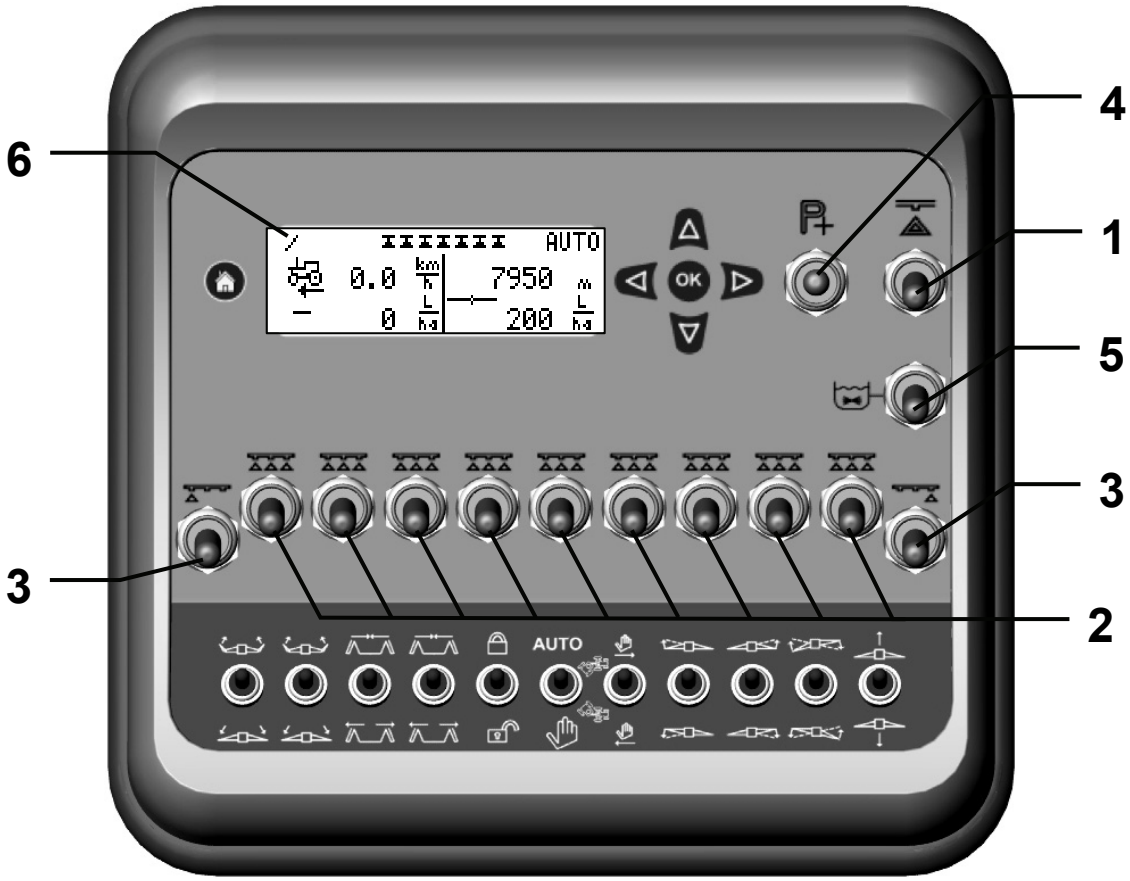


Fig. 1

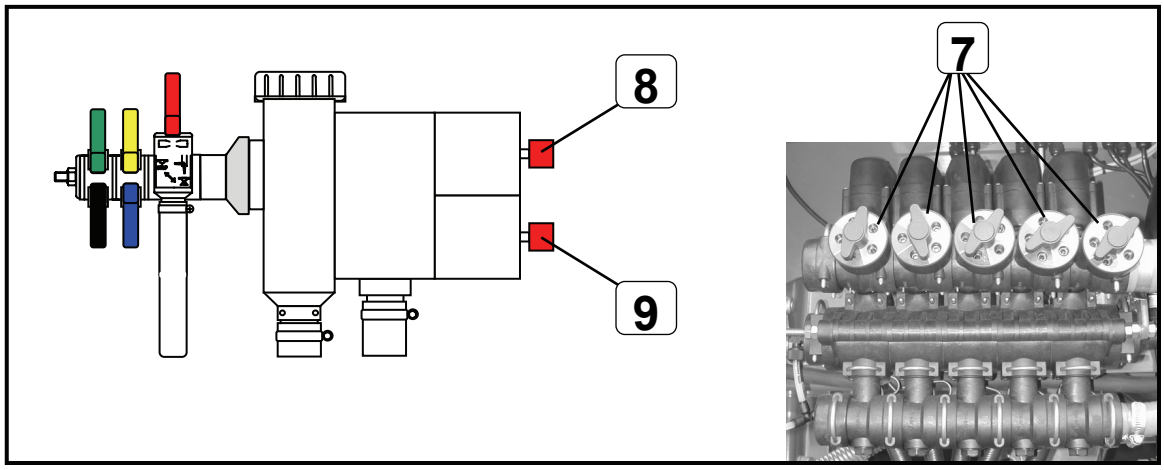


Fig. 2

§3.2 HYDRAULIC FUNCTIONS

The lower field (10) of the control box contains the switches for the hydraulic functions of the spray boom and the drawbar - or axle steering (fig. 3).
Depending on the kind of hydraulic system on the spraying unit, there are 2 different control boxs, which can only be distinguished externally by the switches for the hydraulic functions.

- In the version with pre-selection switching, *toggle switches* with 2 switching positions are fitted.
- In the version with electro-hydraulic controls (oil circulation system) *keys* with a middle position have been installed.

§3.2.1 Hydraulic system with pre-selection switching

- On the tractor side, 1 single-acting and 1 double-acting hydraulic ventil is necessary.
- With the single-acting hydraulic ventil the height adjustment of the spray boom is performed.
- All the double-acting hydraulic functions are pre-selected via the corresponding toggle switch on the control box (fig. 3) and implemented via a double-acting hydraulic ventil on the tractor.
- The direction of operation of the hydraulic ventil decides on the direction of operation of the function implemented.

Note: The height adjustment of some types of field-sprayers is done directly via a single-acting hydraulic ventil on the tractor. In that case, toggle switch for height adjustment on the control unit is *without function* (see also instruction manual of the spray boom).

Procedure for control:

- To operate a function, push the corresponding toggle switch upwards, the corresponding solenoid valve (11) on the spray boom is opened (fig. 4).
  Attention: In order to avoid damage to the spray boom, only activate one function at a time, i.e. the remaining toggle switches must be pushed down. In symmetrical functions such as folding, both sides (right and left) can be activated at the same time as a rule.
- To implement the function, operate the double-acting control device in the corresponding direction until the function has been completely implemented.
- After this, push the toggle switch down again.

§3.2.2 Hydraulic system with electro-hydraulic control (oil circulation system)

- On the tractor side, only 1 single-action hydraulic ventil and a pressure-free return line are necessary.
- The hydraulic ventil of the tractor is to be set in such a way that it is permanently supplied with pressure.
- All the hydraulic functions can be operated directly via the switches on the control box.
- The direction of operation of the switch in question decides on the direction of operation of the function implemented.

Fig. 3

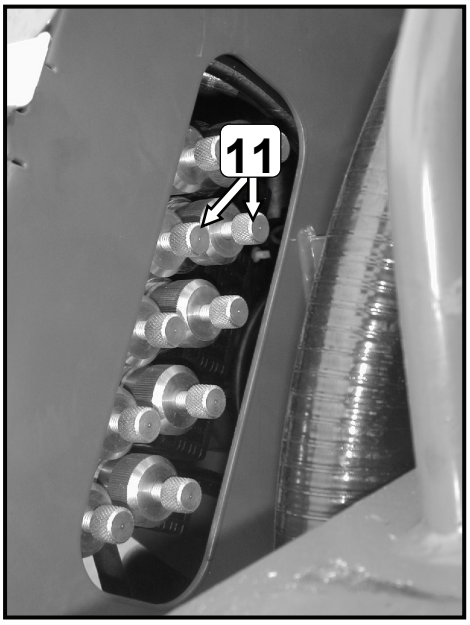


Fig. 4

§3.2.3 Occupation of the switches

The switches for the hydraulic functions have been provided with symbols and have the following function:


Raise/lower spray boom[1]


Hydraulic hillside correction[2]


Independent slope correction, ***right***
HC: Vertical folding of the ***right side*** boom package


Independent slope correction, ***left***
HC: Vertical folding of the ***left side*** boom package


Lockage of the pendulum system **open/close**


HSS, HSA, HB(WP): **Inner boom parts** (right and left) folding out-/in
HC 18-24 : Horizontal folding out-/in of right or left boom segments
HE : Folding out- /in of the complete boom.


HSS, HSA, HB(WP) : **Outer boom parts** (right and/or left) folding out-/in

Drawbar – or axle steering : **- Automatic mode[3]**
- Automatic middle position[3]
- Manual mode


Drawbar – or axle steering in manual mode: **right/left**

N.B.: The occupancy of the switches and the functions can differ depending on the type and equipment of the spray boom.
(See also the operating instructions for the sprayer and the spray boom)

[1] If the height adjustment of the boom is done directly via a single-acting hydraulic ventil on the tractor, the switch for height adjustment on the control unit is *without function*.
[2] The hydraulic hillside correction is blokked electronically when the lockage of the pendulum is closed.
[3] The function *Automatic mode* is blokked electronically when is the spray boom is folded in.

§3.3 SPRAY COMPUTER

§3.3.1 General

The FMC spray computer ensures that the application rate in litres per hectare, regardless of the driving speed and current working width, always precisely matches the programmed nominal value.
The computer permanently calculates the necessary flow of liquid (l/min) which must be conveyed to the nozzles on the basis of the programmed application rate (l/ha), the current driving speed (km/h) and the currently active working width (m).
The necessary flow of liquid Q (l/min) can be calculated with the following formula:

$$\text{Q (l/min)} = \frac{\text{working width (m) x driving speed (km/h) x application rate (l/ha)}}{600}$$

The flow of liquid calculated in this way is compared with the actual flow of liquid flowing to the nozzles at the present time by the electronics.
This actual value is established by a flow meter installed between the pressure regulator and the section valve block.
If the actual through flow quantity deviates from the calculated through flow, the pressure regulator is actuated until the two values are identical again.
This measurement and regulation process permanently takes place with the result that the flow of fluid is immediately regulated by the pressure regulator if the driving speed or the active working width (section switching) are altered. The application rate in litres per hectare always remains constant.

The required quantity (nominal value) can be adjusted by the driver at any time while driving. It is also possible to adapt the quantity at certain places on the field. A touch of a button is sufficient to switch back to automatic operation, with automatic regulation to the programmed nominal value resulting.

The FMC spraying computer also has a warning system, which emits a signal if an upper or a lower limit for the spraying pressure is reached. A warning signal is also emitted if a certain. programmable liquid level in the spray tank is fallen short of.

The computer also permanently computes the remaining area or the remaining distance which can be sprayed with the amount of fluid currently in the container.
The sprayed area and consumed amount of liquid can be stored for up to 20 parcels of land.

§3.3.2 Menu structure

The computer is operated via the keyboard (12) with **4 arrow keys** and the **OK key** (fig. 5)

The display of the values for monitoring and setting is done via the display (13).

With the help of the **"HOME" key (14)** it is simple to return from any place in the programme to *Screen 1* in the main menu (= ***main screen 1***).
In *Screen 1* the automatic middle position of the hydraulic hillside correction is activated with this key, see also paragraph §4.1.9 .

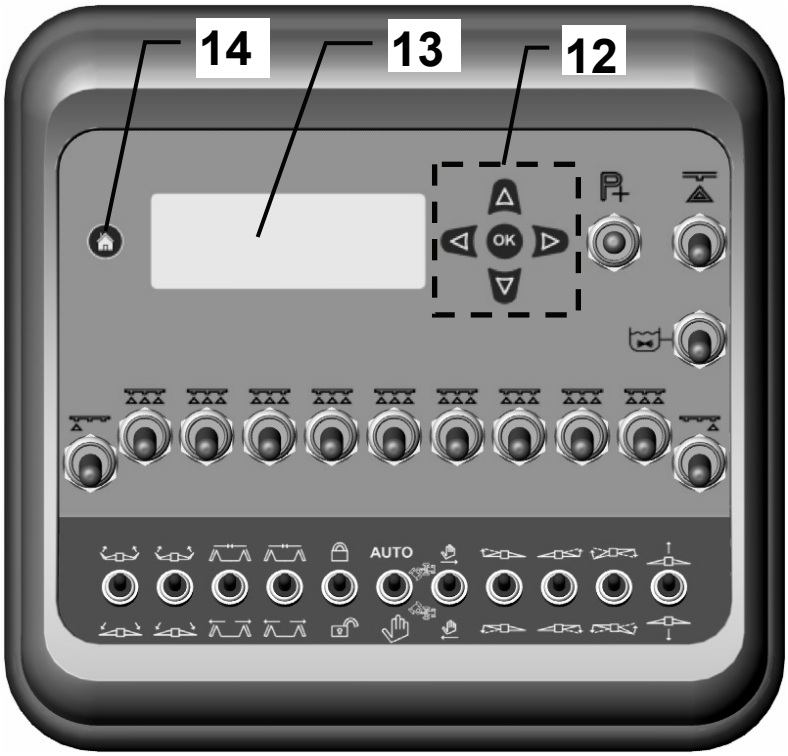


Fig. 5

Menu structure

The programme is structured in 3 menu levels:

- Main menu
- Setting menu (SETUP FUNCTIONS)
- Service menu

§3.4 ENTERING AND CHANGING VALUES

Entering and changing of values is done in the same way on all menu screens. The entry is done via the **4 arrow keys** and the **OK key** on the keyboard (12) (fig. 5).
The keys have the following functions:

By pressing the **OK key**, you reach the entry mode, the first changeable value in the menu screen in question flashes.
The value can now be altered via the **or** arrow keys.

If you are already in the entry mode, pressing the **OK key** confirms the entry of a value, the next entry value flashes and can be altered.

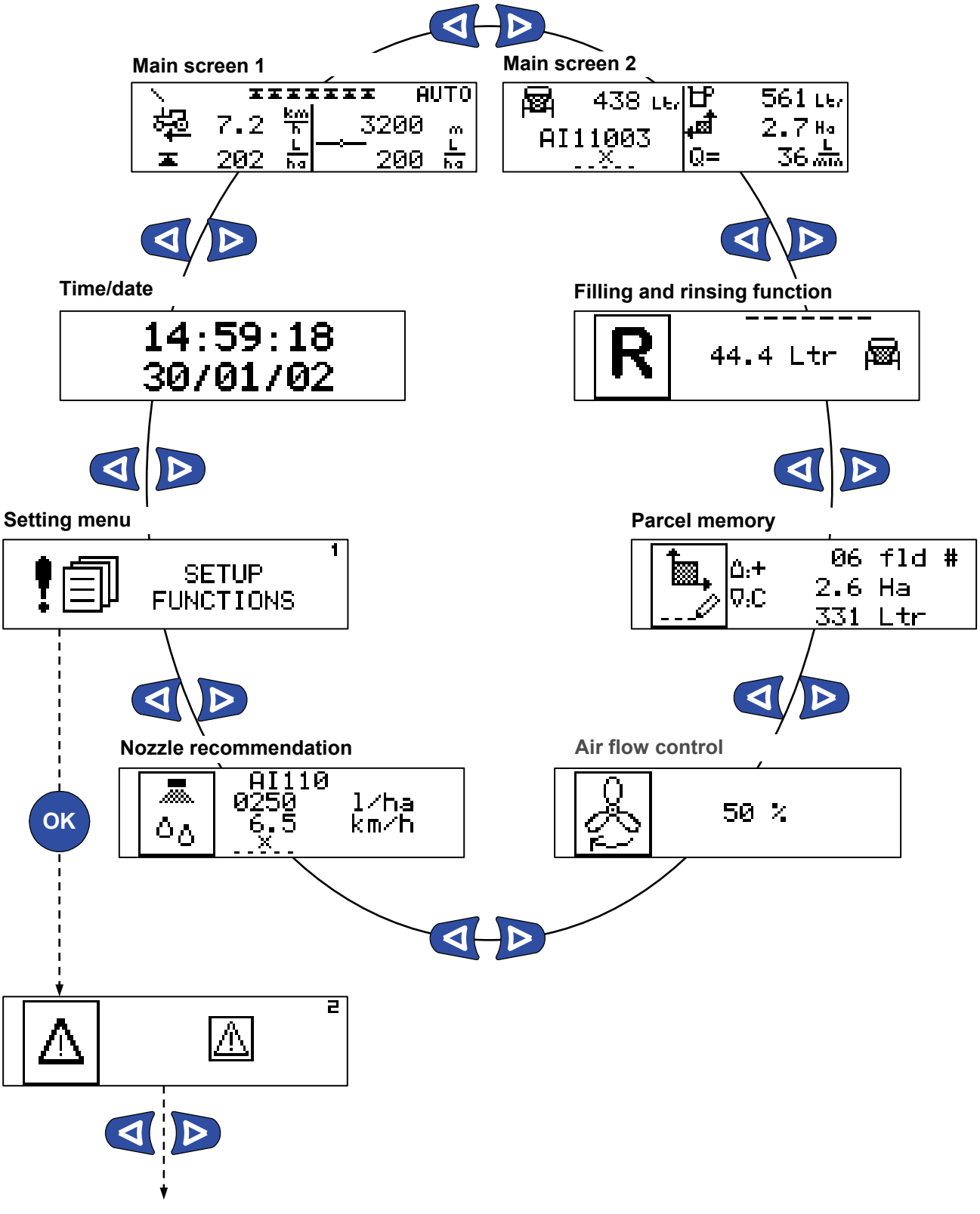
With the arrow keys you change from one menu screen to the next within one menu level.

If you are already in the entry mode, you can change from one entry value to the next **without** altering the value.

By using arrow keys and the flashing value can be altered in entry mode.
Saved values, e.g. sprayed area and quantity consumed, can be deleted by pressing the arrow key .
If both arrow keys are pressed at the same time, the basic setting of the entry value in question appears.
After entry or alteration of a value, the **OK key** must be pressed as confirmation.

H4 MAIN MENU

The main menu is the menu level in which the user moves in spraying work.
It comprises 7 different *"screens"*, which can be scrolled with the help of the arrow keys ◁ ▷.
Screen *'Filling and rinsing function'* is not accessible when the central switch for spraying is on **"On".**
The two most important screens for control of the spray work are ***Main screen 1*** and ***Main screen 2***.

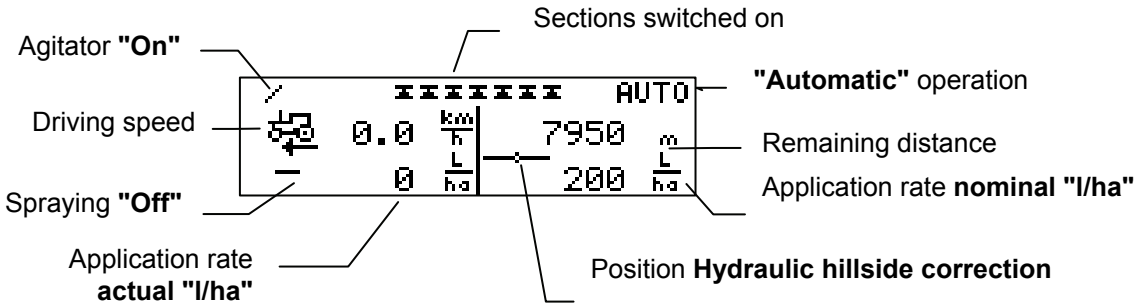


§4.1 MAIN SCREEN 1

When the control box Flowmate Control is switched on, ***Main screen 1*** automatically appears in the main menu.

If you press the - key, you move from any place in the programme back to ***Main screen 1***.
When you press the -key while being in **Main screen 1** the hydraulic hillside correction goes automatically to middle position.
But only if the sprayer is equipped with electrohydraulic control and a sensor which measures the position of the hydraulic hillside correction (see also paragraph §4.1.9 *Automatic middle stand of the hydraulic hillside correction*).

In ***main screen 1*** the following values or information are displayed:



§4.1.1 Return agitator

If a rotating beam can be seen in the top left of the display, the return agitator has been switched on. When the return agitator has been switched off, the beam disappears.

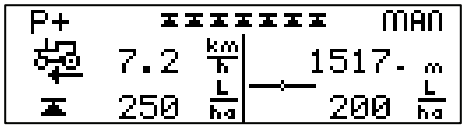
§4.1.2 Section switching

The spray cone symbols at the top of the display show the sections which have been switched on and off. The display is also given with the central **Spraying** switch on **"Off"**.

§4.1.3 Mode of operation

AUTO
MAN

The mode of operation is displayed at the top right of the display.
Automatic or **manual operation**
When the control box is switched on, the computer automatically switches to automatic operation.
To switch into manual operation, press switch **P** in the required direction (**+** or **-**) and keep held until the required application rate is reached.
In the top left of the display appears **P+** or **P-** instead of the rotating beam for the agitator.



In manual operation, it is for example possible to increase the application rate partially for certain parts of the field (e.g. batches of weeds). By pressing the **OK key**, you return to automatic operation. The amount of application rate is again regulated according to the programmed nominal value.

§4.1.4 Driving speed

Here, the current driving speed appears, measured via a wheel sensor or taken over from the tractor electronics.
If the speed measurement fails (e.g. defective sensor), the computer automatically calculates at the simulation speed, which can be programmed in the *Setting menu* (SETUP FUNCTIONS).

§4.1.5 Current application rate l/ha

l/ha

During spraying operation, the display shows the actual application rate in l/ha at the bottom left. The programmed nominal value is shown on the right. If the control system is working in automatic operation (see above), nominal and actual values must be about identical. If the value deviate, refer to the troubleshooting table.

The nominal value can be altered via the arrow keys during spraying operation.
The step width at which the nominal value can be altered by pushing a button can be altered between 1 and 20 l/ha in the *Setting menu* (SETUP FUNCTIONS).

§4.1.6 Central switching "Spraying"

The bottom left of the display shows whether the central switch for spraying is on **"On"** or **"Off"**.

§4.1.7 Remaining distance or remaining area

If the amount has been entered after filling the spray tank (see *Main screen 2*), the computer calculates how many metres or hectares can still be treated before the tank is empty. This value is displayed on the right next to the driving speed on the display. In the *Setting menu* (SETUP FUNCTIONS) a choice can be made between display of the remaining distance in **metres** or **hectares**.

m

ha

§4.1.8 Position of the hydraulic hillside correction

Via the display on the right, the position of the hydraulic hillside correction is shown if the spray boom is equipped with the corresponding sensor. For example, the display makes finding the middle position for retraction easier.

§4.1.9 Automatic middle position of the hydraulic hillside correction

When you press the  -key while being in **Main screen 1** the hydraulic hillside correction goes automatically to middle position.

- ➔ By the hydraulic system with electrohydraulic control (oil circulation) the hillside correction goes automatically to the middle position
- ➔ By the hydraulic system with pre-selection switching the pair of solenoid valves for hydraulic hillside correction is opened. The double-acting hydraulic ventil on the tractor must be opened in right direction. When the middle position is reached, the pair of solenoid valves closes automatically. Tuning into the middle position is done semi-automatic

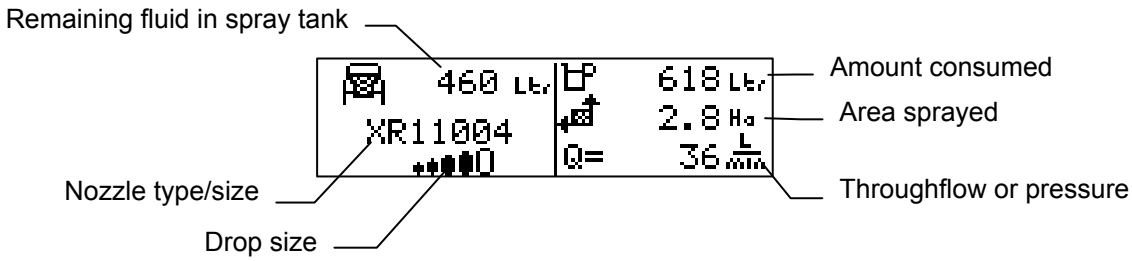
Note: When the lockage of the pendulum is closed, the hydraulic hillside correction is blocked. That means: it can not be controlled by hand and the automatic middle position of the hydraulic hillside correction is not functioning.

For good functioning of the '*automatic middle position'* and a correct presentation of the '*hydraulic hillside correction'* on the display, the appropriate sensor on the sprayer must be calibrated correctly. The calibration of the sensor is done in the '*setting menu*' (setup functions) in screen 8.

§4.2 MAIN SCREEN 2

Switching over between ***Main screen 1*** and ***Main screen 2*** is very easy with the arrow keys.

In ***Main screen 2*** the following values or information are displayed:



N.B.: The mode of procedure in entering, changing and deleting values in the display is the same in all menu screens and is described in the Section ***"Entering and changing values"***.

§4.2.1 Amount of fluid in the spray tank

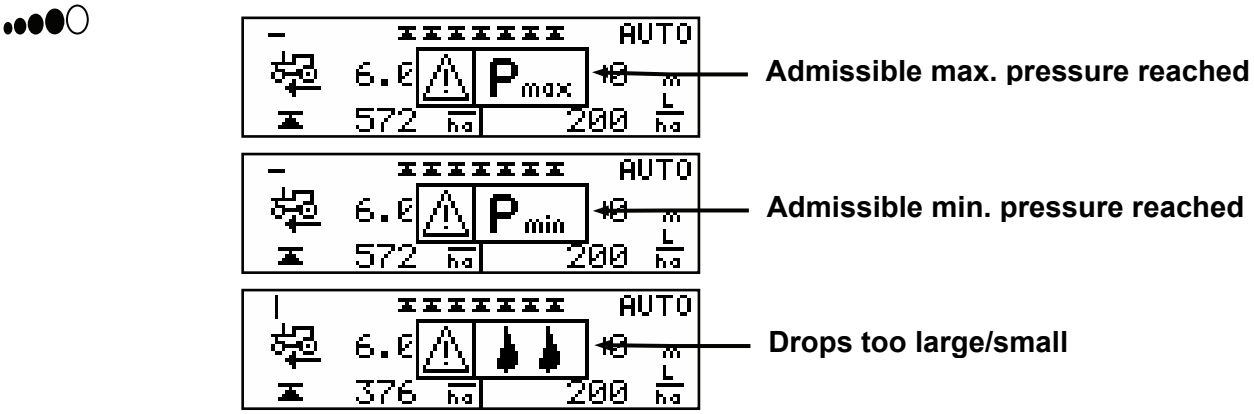
On the display, the amount remaining in the spray tank is shown. When the user has filled the container, he can enter the amount directly. During spraying work, the computer calculates the value back until a value of zero is reached.
On the basis of this remainder and the programmed application rate in l/ha, the computer permanently calculates the remaining distance or area which can be sprayed with the remainder in the tank (Display see *Main screen 1*).

N.B.: The amount must not necessarily be entered. The function of the automatic regulation of the application rate is not impaired by this.

- To enter the amount filled, press the **OK key**, the numeric value flashes.
- Simultaneous pressing of **and** can be used to enter a standard value, e.g. nominal volume, which can be programmed in the *Setting menu* (SETUP FUNCTIONS).
- To enter an arbitrary value, press the **OK –** key. The first number is flashing and can be changed with the or keys.
  Press the key to go to the next number, that starts flashing.
- Confirm the value entered with the **OK key**, the next parameter (nozzle type/size) flashes.

§4.2.2 Setting of nozzle and drop size

XR110 04 If the nozzle type/size used and the required drop size are entered here, the computer can warn the user if the admissible working range of the nozzle is exceeded.



- To enter the nozzle type, press the **OK key 2 times**, so the nozzle designation flashes.
- By pressing either **or** select nozzle type/size and confirm with **OK key**, the next parameter (drop size) flashes.
- By pressing either **or** select drop size and confirm with **OK key**, the next parameter (consumed amount) flashes.

A maximum of 4 different nozzles, which can be pre-programmed in the *Setting menu* (SETUP FUNCTIONS) are available for selection.

There are the following possibilities of selection for the drop sizes:

Very fine
Fine
Medium
Large
Very large

If the selected nozzle type does not support a drop spectrum, for example as with injector nozzles, a cross appears on the display. In this case, there is no possibility of setting for the drop size.

N.B.: The warning reports with regard to the pressure range and drop size have no influence on the automatic regulation of the application rate.

The computer can also make suggestions for the selection of the matching nozzle size (see paragraph §4.6 *"Nozzle recommendation"*).

§4.2.3 Amount consumed

Here, the amount of fluid sprayed is displayed in litres.
The value can be deleted as follows:

- Press the **OK key 2 times**, then press the arrow key until the value flashes.
- By pressing the arrow key delete the value and confirm with the **OK key**, the next parameter (sprayed area) flashes.

The value displayed here can also be transferred to the parcel memory (see paragraph §4.4 *"Parcel memory"*).

§4.2.4 Sprayed area

Here, the sprayed area is displayed in hectares.
The value can be deleted as follows:

- Press the **OK key 2 times**, then press the arrow key ▷ until the value flashes.
- By pressing the arrow key ▽ delete the value and confirm with the **OK key**, the next parameter (through flow or pressure) flashes.

The value displayed here can also be transferred to the parcel memory (see paragraph §4.4 *"Parcel memory"*).

§4.2.5 Through flow or pressure

Q=
P=

Here, the through flow in litres per minute or the spraying pressure in bar are displayed.
The change-over is done as follows:

- Press the **OK key 2 times**, then press the arrow key ▷ until the letter **P** or **Q** flashes.
- By pressing the arrow key ▽ **or** △ switch over to **Q** or **P** as the case may be and confirm with the **OK key**.

Note: The spraying computer is optionally supplied with a flow meter or a pressure sensor. If a flow meter is used, the pressure displayed is merely a calculated value. The actual pressure can be seen on the manometer of the sprayer.

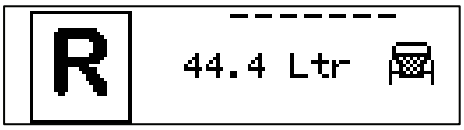
If the controls work with a pressure sensor, the through flow displayed is merely a calculated value. Differences between the actual value and the calculated value can result from certain circumstances, e.g. worn or contaminated spraying nozzles.

The selection of the sensor (flow meter or pressure sensor) to be used for the regulation can be done in the *Setting menu* (SETUP FUNCTIONS).

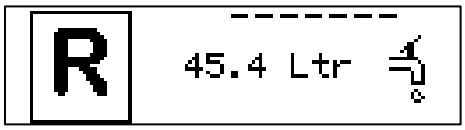
§4.3 FILLING AND RINSING FUNCTION

From ***Main screen 1*** you reach the ***"Filling and rinsing function"*** screen by pressing the arrow key 2x, when the central switch **Spraying** is **"OFF"** (see fig. page 26).

Filling function:



Rinsing function:



To switch over to the other function, press the **OK key**, the *Spray tank* or *Water tap* symbol flashes. With the arrow keys or switch to the other symbol and confirm with the **OK key**.

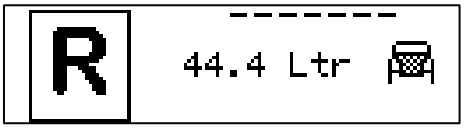
R The display shows the amount of fluid necessary to fill or to rinse the conduit system. The amount of fluid depends on the length and the cross-section of the individual line sections which have to be filled or rinsed and on the number of sections switched on. The necessary data of the conduit system have already been programmed ex works and can be amended if necessary in the *Service menu*.

§4.3.1 Filling function

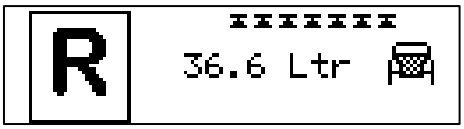
With the help of the filling function, the conduit system can be filled with spraying fluid up to the nozzles at the start of spraying work. This means that spraying fluid is available directly at the nozzles at the start of spraying at the edge of the field and you can start immediately when you have switched on.

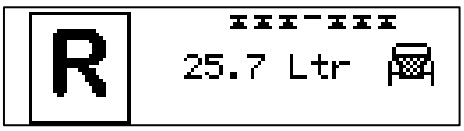
Mode of procedure in filling the conduits:

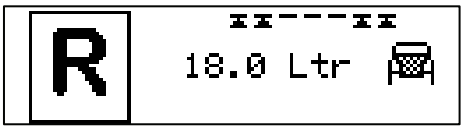
- Central switch for **Spraying** to **"Off"**.
- Set all the valves on the sprayer to the **"Spraying"** position (see operating instructions for sprayer).
- All section switches to **"On"**. The display shows the amount of fluid needed in litres.

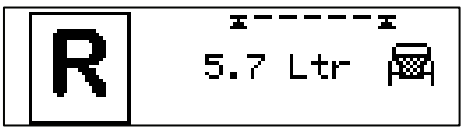


- Central switch for **Spraying** to **"On"**. This initiates the filling process.
  The through flow amount is used to calculate the residual amount of filling water and displayed. Each filled section is automatically switched off by the computer.

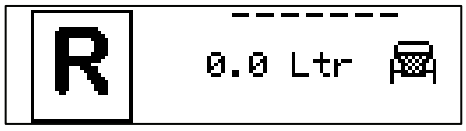








- If the display 0.0 Ltr is shown, all the sections have been filled and a signal sounds. The software of the system has now switched off all the sections.



- Set the central switch for **Spraying** to **"Off"**. This turns the signal sound off.

Note: The central switch for **Spraying** must be on **"Off"** before you can leave the screen and return to *Main screen 1* or *Main screen 2*.

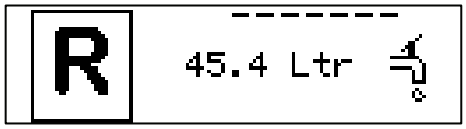
§4.3.2 Rinsing function

If the spraying work is interrupted with the spray tank partly filled, the rinsing function enables deliberate removal of the spraying fluid in the conduit system following regular spraying work. At the same time, the entire conduit system is filled/scavenged with a minimum requirement of clear water, as the sections are automatically switched off at different times as a function of the length of the hose of the feed conduits.
In this way, the spray fluid is used optimally and sedimentation in the conduit system avoided.

Note: If the sprayer is equipped with a pressure equalising system, a small amount of rinsing water enters the spray tank during the rinsing function via the constant-pressure vales (3-directional valves). The remaining fluid is slightly diluted.

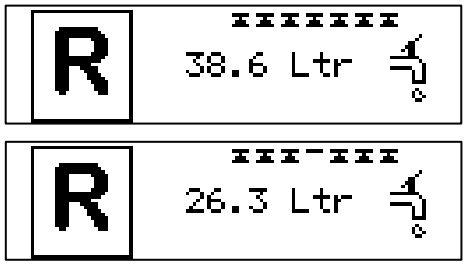
Mode of procedure in rinsing the conduits:

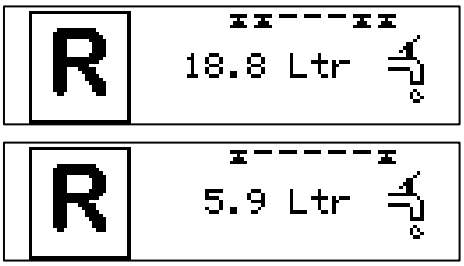
- Central switch for **Spraying** to **"Off"**.
- Set all the valves on the sprayer to the **"Rinse"** position (see operating instructions for sprayer).
  - Close valve on spray tank
  - Open valve on rinsing tank
  - Switch agitators off
- All section switches to **"On"**. The display shows the amount of fluid needed in litres.



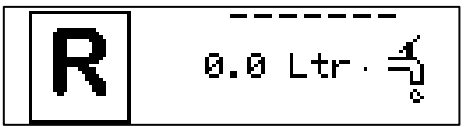
- Central switch for **Spraying** to **"On"**. This initiates the rinsing process.
  Note: The rinsing must be done during driving and on an untreated part of the field as the spraying fluid in the conduits is removed with a normal concentration.

  The through flow amount is used to calculate the residual amount of filling water and displayed. Each rinsed section is automatically switched off by the computer.





- If the display 0.0 Ltr is shown, all the sections have been rinsed and a signal sounds. The software of the system has now switched off all the sections.



- Set the central switch for **Spraying** to **"Off"**. This turns the signal sound off.

Note: The central switch for **Spraying** must be on **"Off"** before you can leave the screen and return to *Main screen 1* or *Main screen 2*.

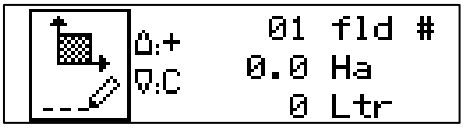
Remember that the conduit system has not yet been properly rinsed after the rinsing function. Merely the spraying fluid has been displaced in the conduit system and removed. The rinsing function must be done at least two or three times for proper rinsing of the conduits.

§4.4 PARCEL MEMORY

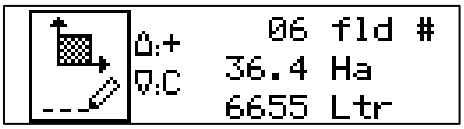
From ***Main screen 1*** you have to press the arrow key ▷ 3 times to get to the ***"Parcel memory"*** screen (see fig. page 26).

The FMC spraying computer has 20 numbered memory spaced for storing the sprayed area in hectares and the consumption in litres for 20 parcels of land.
In this way, the current accumulated values for area and quantity from ***Main screen 2*** can be stored under a freely optional parcel number or be added to the values already available in the memory.
To store the current accumulated values from ***Main screen 2*** proceed as follows:

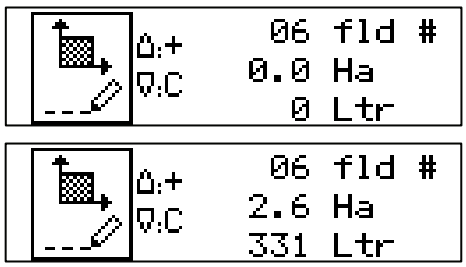
- Press the **OK key**, the parcel number flashes.



- By using the arrow keys △ or ▽ select the parcel number and confirm with the **OK key**, the signs **"+"** and **"C"** flash.

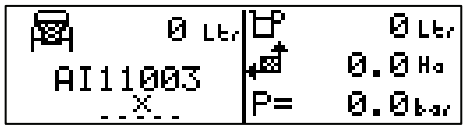


- To delete the values already existing , firstly press the arrow key ▽ , then the **OK**-key and then the arrow key △ .
- Confirm with the **OK key**; the current accumulated values from ***Main screen 2*** are now stored under this parcel number.



- If the current accumulated values from ***Main screen 2*** are to be added to the values already in the memory, all you have to do is press the arrow key ▲ and confirm with the **OK key**.

After storage or addition, the current accumulated values in ***Main screen 2*** are automatically reset to **"0"**.

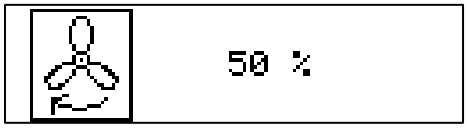


§4.5 AIR-PLUS CONTROL

From ***Main screen 1*** you press one of the arrow keys ◀ ▶ 4 times to get to the ***"Air-plus control"*** screen (see fig. page 26). This screen appears only if the sprayer is equipped with a spray boom with air assistance (Air-plus spray boom).

In this screen you can control the air output of the fan in a range of 0 to 100% in steps of 10%

- Use the arrow keys ▲ or ▼ to change the air output and confirm with the **OK key**.



See also the instruction manual of the Air-plus spray boom for more specific recommendations.

§4.6 NOZZLE RECOMMENDATION

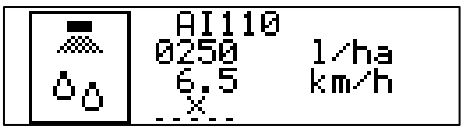
From ***Main screen 1*** you press the arrow key ◀ 3 times to get to the ***"Nozzle recommendation"*** screen (see fig. page 26).

Here, the following inputs are necessary:

1. Nozzle type (e.g. XR 110 or AI 110)
2. Required application rate in l/ha
3. Required driving speed
4. Drop size (only possible if the nozzle type supports a drop spectrum)

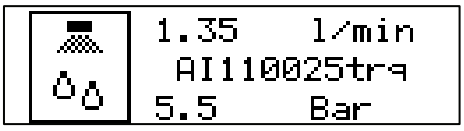
After these data have been input, a recommendation appears on the screen. It contains the nozzle size and colour, the necessary nozzle output in l/min and the spraying pressure necessary for this in bar.
If the recommended nozzle size is not available, either change the driving speed or use a nozzle which is most similar to the recommended type in its features.

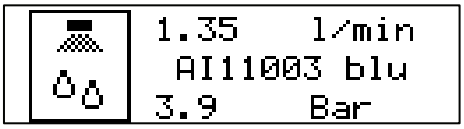
- To input, press the **OK key**, the type of nozzle flashes.
- Use the arrow keys or to input the required type of nozzle and confirm with the **OK key**, the application rate flashes.



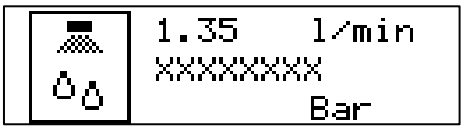
- In the same way, input the required application rate in l/ha, driving speed in km/h and drop size (only possible if the type of nozzle supports a drop spectrum) and confirm with the **OK key**.

In our example, the system suggests 2 solutions, which appear alternately on the screen (with an audible signal):





If the admissible pressure range of the nozzle cannot be adhered to with the nozzle stated, the required application rate, driving speed and drop size, neither the pressure nor the type of nozzle are displayed, but merely crosses:



After you have made a note of the recommended solutions, change to ***Main screen 2*** (see page 30) and input the recommended nozzle and possibly the drop size you have selected.

The computer is now in a position to warn you if the admissible pressure range of the nozzle (or possibly the drop size you have selected) is exceeded.

§4.7 TIME/DATE

From ***Main screen 1*** you can reach the **"Time/Date"** screen by pressing arrow key once (see fig. page 26).

In the time without spraying, the display can also be used as a **clock**. However, this is only possible if the sprayer is mounted to the tractor, as the supply of energy of the control box is via the connection wire of the sprayer and the distribution box on the sprayer.

The time can be set in the *Setting menu* (SETUP FUNCTIONS).

Control box

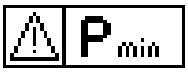
H5 SETTING MENU

From ***Main screen 1*** press the arrow key ◁ twice to reach the ***"SETUP FUNCTIONS"*** screen. (*see fig. page 26*) Press the **OK key** to open the ***Setting menu***. In the ***Setting menu*** settings which do not have to be altered regularly are made, e.g. calibration of the flow meter and the speed sensor. The various values are set in the same way as in the main menu via the **4 arrow keys** and the **OK key** (see paragraph §3.4 **"Entering and changing values"** on page 25).
The ***Setting menu*** comprises 34 numbered *"screens"*, which can be scrolled via the arrow keys ◁ ▷ . The possibilities of setting in the individual screens are described in the following section:

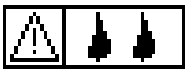
§5.1 WARNING REPORTS

In *Screen 2* the warning function can be switched off, which means that the following warning reports no longer appear during the spraying work:

Pressure range of the nozzle exceeded, pressure is too high!

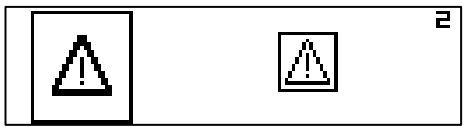


Pressure range of the nozzle exceeded, pressure is too low!

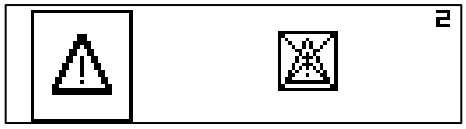


Drops too large/small!

Min. tank content fallen short of (value freely programmable, see *Screen 7*)



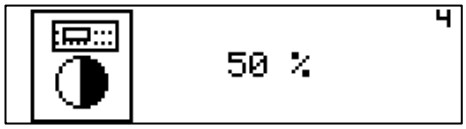
△ **Warning function switched on**



▽ **Warning function switched off**

§5.2 DISPLAY CONTRAST

In *Screen 4* the display contrast can be set in %.
The legibility of the display depends on the arrangement of the control box in the tractor, the sun's radiation and the angle of observation of the display. The display contrast can be adapted to the conditions of use in question (basic setting = 50 %).

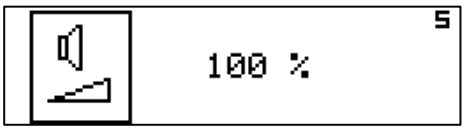


△ **Increase contrast**

▽ **Decrease contrast**

§5.3 SIGNAL VOLUME

In *Screen 5* the volume of the signal sound can be set from 0 – 100 %.
The setting is not done linearly (basic setting = 100 %).

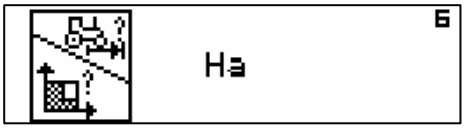


Increase volume

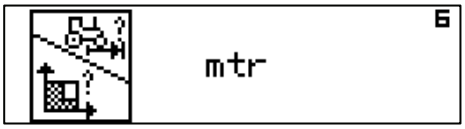
Decrease volume

§5.4 REMAINING DISTANCE OR REMAINING AREA

In *Screen 6* you can state whether **Main screen 1** (page 27) is to display the value for the remaining distance in meters or area in hectares (basic setting = mtr).

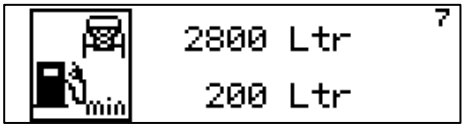


Remaining area in ha



Remaining distance in m

§5.5 FILLING AMOUNT AND MINIMUM FILLING LEVEL



In *Screen 7* 2 figs can be set:

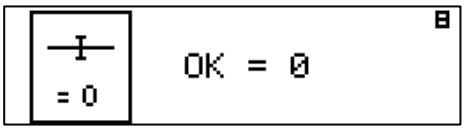
The first value should sensibly match the quantity, with which the spray tank is most frequently filled. As a rule, this is the nominal volume.
The value set here can be very easily taken on in ***Main screen 2*** as the standard filling amount after the filling process (see paragraph §4.2.1 **Amount of fluid in the spray tank** page 29).

With the second value, the minimum filling level for the warning function is set. If this value is reached or fallen short of, the driver is informed about an almost empty spray tank with the following warning. A signal sounds at the same time.

The warning report has no influence on the automatic regulation of the application rate.

§5.6 CALIBRATION OF THE MIDDLE POSITION HILLSIDE CORRECTION

The middle position of the hydraulic hillside correction is calibrated in screen 8.



For a correct display of the symbol (**M**) (fig. 6)of the *hydraulic hillside correction,* the appropriate sensor must be calibrated correctly.

Use the following procedure for calibration:

- Bring the hydraulic hillside correction to the middle position by activating switch **(D)** on the control unit (fig. 6).
  ☞ The central position has been reached when the lower rectangular tube (17) of the pendulum frame is parallel to the carrying frame (16) (fig. 7).
  The central position can be determined with aid of a spirit level in the boom, while the machine is standing on a horizontal underground (fig. 8).
- The sign **(M)** for the position of the hydraulic hillside correction on the display must be no exactly in the middle at the display of the control unit (fig. 6) If not, another calibration of the middle position of the hydraulic hillside correction is necessary.
- Switch to the entry mode by pressing the **OK – key**; the symbol for the middle position **"OK = 0"** is blinking.
- Confirm the middle position by pressing the **OK – key** ; The middle position is now calibrated.

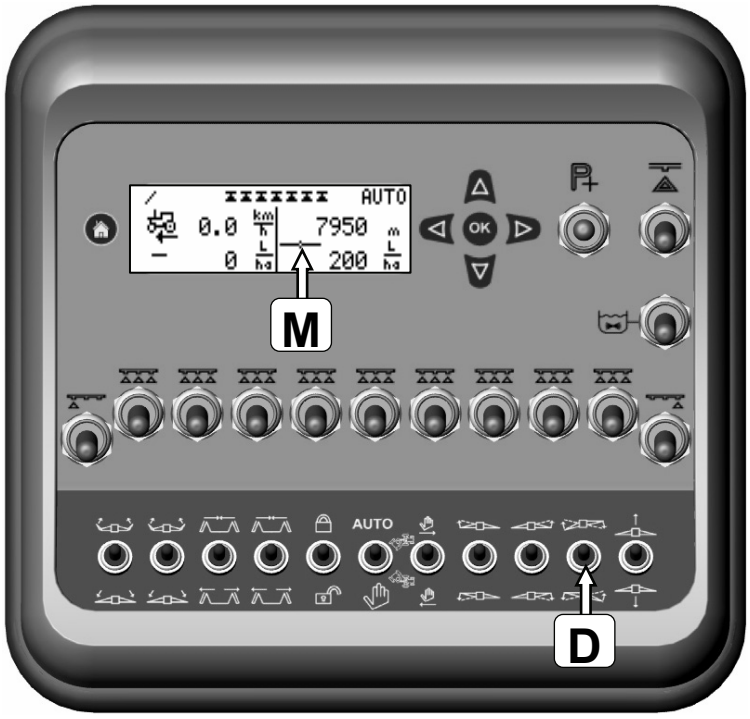


Fig. 6

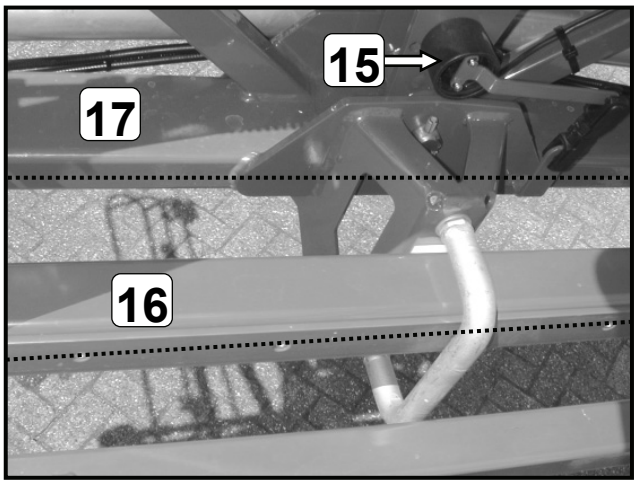
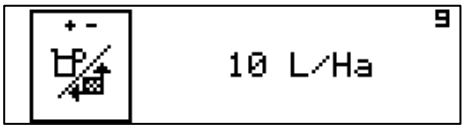


Fig. 7

Fig. 8

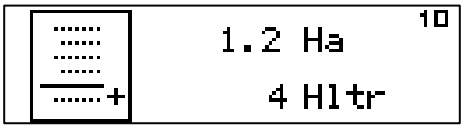
§5.7 STEP WIDTH WHEN ALTERING THE APPLICATION RATE

In *Screen 9* the step width, with which the application rate in l/ha per push of a button can be adjusted in ***Main screen 1***, can be set. The step width can be set between 1 and 20 l/ha (basic setting = 10 l/ha).

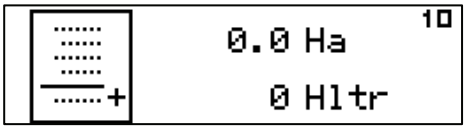


§5.8 TOTAL MEMORY

Screen 10 contains a total memory, in which the total sprayed area in hectares and the consumed amount in hectolitres are accumulated regardless of the parcel memory in the main menu. For example, the values for a complete spraying period can be accumulated here.

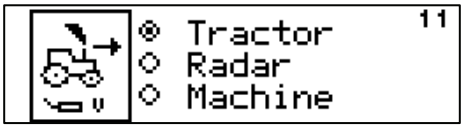


To delete the values, the arrow key must be pressed in input mode (see page 25).



§5.9 SPEED SIGNAL

In *Screen 11* you must select the signal to be used for the speed measurement (basic setting = Tractor).
There are 3 possibilities of selection:



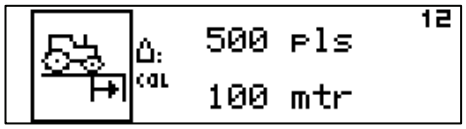
1. Tractor: The speed signal comes from a speed sensor on the tractor (sensor on the wheel or cardan shaft) or is taken on from the tractor electronics via an adapter wire.
   In both cases, there is a connection to the 7-poled socket on the back of the control box.
2. Radar: The speed signal comes from a radar sensor on the tractor which is connected via the 7-poled socket on the back of the control box.
3. Machine: The speed signal comes from a wheel sensor on the sprayer (trailed sprayer). The sensor is connected to the SHC box on the sprayer.

§5.10 CALIBRATION OF THE DRIVING SPEED

In *Screen 12* there is the calibration of the driving speed.
If the speed is measured by radar, the calibration is done in *Screen 13*.

In order to calculate the driving speed, the system must know how many impulses the speed sensor emits per metre of driven distance. The number of impulses depends on the circumference of the wheel and the number of transmitters per revolution.

The upper value corresponds to the number of impulses matching the lower value, the measured distance



If the impulse values for a certain measurement distance is already known, the two values, measurement distance and matching number of impulses, can be input directly (e.g. change of tractors in joint use of machines).

If the driving speed has to be calibrated, please proceed as follows:

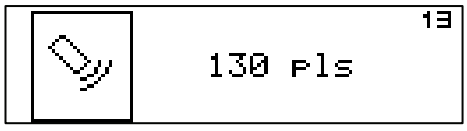
- A measurement distance, for example 100 metres, is precisely set.
- At the start of the measurement distance, press arrow key , the calibration process is started, a signal sounds.
- Run along the measurement distance and press the **OK key** at the end, the measurement distance flashes.
- Confirm the measurement distance with the **OK key**.

If the measurement distance set does not correspond to the lower value in the display, change the value in the display accordingly.

Note: The calibration run should be done on a field with the spray tank half full. In this way, errors by slip, subsiding wheels etc. are reduced to a minimum.

§5.11 CALIBRATION OF THE DRIVING SPEED (WITH RADAR)

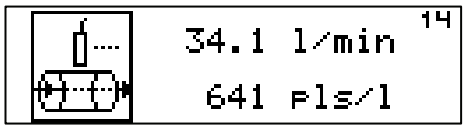
If the driving speed is measured by a radar sensor on the tractor, the calibration is done in *Screen 13*.



The number of impulses must be entered manually according to the information in the operating instructions for the tractor. (basic setting = 130 impulses)

§5.12 CALIBRATION OF THE FLOWMETER

Screen 14 contains the calibration of the flow meter.
To calculate the through flow in l/min the spraying computer needs the ratio of numbers of impulses to litres. The number of impulses per litre is stated on the flow meter.



To calibrate the flow meter, the number of impulses (e.g. 641 pls/l) is to be input in *Screen 12* (as the bottom value). We recommend checking this value annually (best of all before the spraying season) by "gauging by litres".
To "gauge by litres" only clear water may be used and the spraying system must be cleaned thoroughly beforehand (see operating instructions spraying system).

Mode of procedure in "gauging":

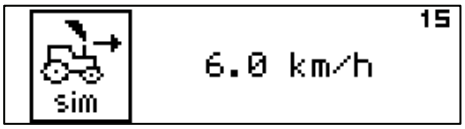
- Fill the sprayer with clear water and set all operating elements to **“Spraying”**.
- Switch the power take-off shaft on and allow to run at 540 rpm.
- On the control box, switch all section switches to **“On”**.
- Central switch **Spraying** to **“On”**.

- On the spraying computer, select *Screen 14* in the *Setting menu*, the current through flow quantity and impulse value are displayed (see above).
- After this, the nozzle output is to be determined with at least 5 nozzles distributed across the entire width of the spray boom by using a measurement vessel.
- The values are averaged and calculated by multiplication with the number of nozzles of the overall output of the spray boom.
- If the determined overall output in l/min does not match the l/min display value, the value shown in the display must be corrected according and confirmed with the **OK key**.

Important Note: The power take-off shaft speed and the pressure regulator may not be altered during the entire sequence (from collecting the fluid up to and including the correction of the l/min value)!

§5.13 SIMULATION SPEED

Screen 15 is used to set the simulation speed.



The simulation speed ought if possible to be the speed at which spraying is normally done. This prevents the system from regulating the pressure down if the vehicle is still stationary for a short time at the edge of the field at the start of spraying.

The simulation speed is automatically used as a substitute value if the central switch is set to **"Spraying"** and no speed signal is available, e.g. in a defect of the speed sensor or in "gauging" of the spraying system if the vehicle is stationary.
The simulation speed is also used for the anticipation regulation (*Screen 21*).

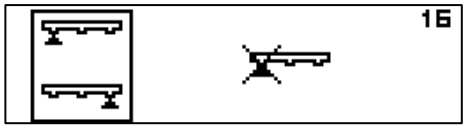
§5.14 EDGE NOZZLES

Screen 16 is used to set how the two outer switches (3) on the control box (see fig. 1, page 19) are used.
The following 2 possibilities exist:

a) Use of edge nozzles for precise field-edge spraying:

- In this case, the two outer switches (3) (fig. 1, page 19) are used to switch between the outer nozzle and the edge nozzle. The edge nozzle has an asymmetric spraying image, the spraying angle towards the edge of the field is smaller, resulting in a sharper demarcation of the working width.
- The working width of the spray boom is not altered in the switch-over.
- In the programming of the sections (Screens 17/19) no working width can be programmed for the two outer switches L5 and R5 in this case.

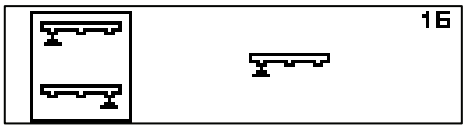
In *Screen 16* select the pictogram with **X**.



b) Use of edge nozzles to enlarge the working width at the edge of the field:

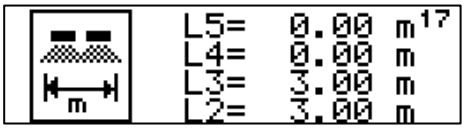
- In this case, the edge nozzle (with a larger spraying angle to the edge of the field) is used additionally to enlarge the working width at the edge of the field.
- When programming the sections (*Screens 17/19*) the corresponding working width must be programmed for both outer switches L5 and R5 in these cases.

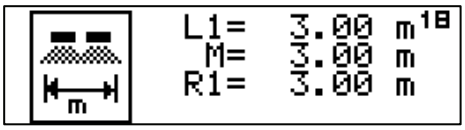
In *Screen 16* select the pictogram without **X**.

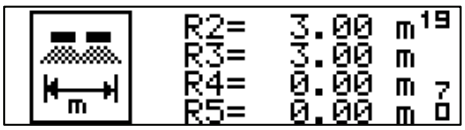


§5.15 SECTION SIZE

In *Screens 17, 18* and *19* the spraying width of the individual sections is input.
Correct entering of the values is a prerequisite for a correct regulation of the application rate and accumulation of hectares and litres.
The middle section is marked with **M**. The remaining sections are numbered from the inside to the outside and marked for each side with **L** (left) and **R** (right).



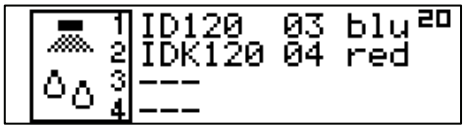




A maximum of 9 sections can be programmed. The two outer section switches on the control box are used to switch over edge nozzles. Only in case of using edge nozzles to enlarge the working width at the edge of the field, a value for the spraying width must be entered for **L5** and **R5** (see *Screen 16*).

§5.16 NOZZLE SELECTION

In *Screen 20* a re-selection of up to 4 nozzles can be made from an extensive list of most common nozzles. For each nozzle type the size must be inserted. Here, we recommend selecting the nozzles (type and size) which are used in operation during the entire season or are installed in the multi-nozzle holder.

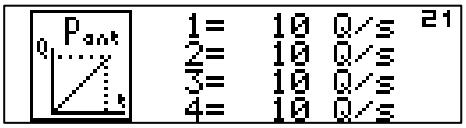


When a nozzle type is used for spraying that is not in the list of the Flowmate Control ("unknown nozzle"), chose the dotted line - - - instead of nozzle type. The needed characteristics of the nozzle can be inserted in S*creen 22*.

The pre-selection is the prerequisite for the warning function for the pressure range and the drop size to be used, as only one nozzle from *Screen 20* can be selected in **Main screen 2** (see page 29).

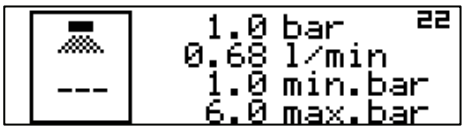
§5.17 ANTICIPATION REGULATION

The anticipation regulation is only necessary if the spraying system is not equipped with a pressure equalising system.
The anticipation regulation corrects the pressure regulator for example if the main valve is still closed and sections are switched on or off while turning at the end of the field. This has the benefit that the regulator is practically in the correct position when the main valve is opened and does not need to regulate for some time before the required application rate is reached again.
The running time of the regulator in anticipation regulation depends, amongst other things, on the regulator (regulation characteristics) and the nozzle size. Depending on the regulator type and the nozzle size, there are experimentally determined values. In *Screen 21* the 4 values (Q/s) for the 4 nozzles pre-selected in *Screen 21* can be input (basic setting = 10 Q/s).



§5.18 AN UNKNOWN NOZZLE

When a nozzle type is used that is not in the large nozzle list of the Flowmate Control ("unknown"), this nozzle can be characterised in *Screen 22.*



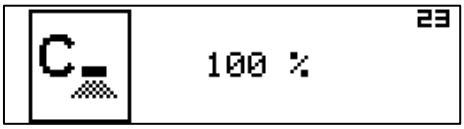
It is necessary to insert two values: one value of pressure and another value for the corresponding nozzle output. The pressure has to be in the pressure range of the nozzle. While measuring the through flow, the computer can calculate the corresponding pressure. The user chose between pressure and flow on the display in **Main Screen 2**.

When the minimum and maximum value for pressure (P-min and P-max) are inserted, the computer can give a warning signal when the minimum or maximum value is exceeded

To activate the defined "unknown nozzle" on **Main Screen 2**, it must be pre-selected in *Screen 20* like other nozzle types. To this, select the dotted line at one of the four positions in *screen 20.* The dotted line is at the end of the list (see *Screen 20*).

§5.19 ADJUSTMENT OF THE THROUGH FLOW MEASUREMENT

In *Screen 23* it is easily possible to amend the calibration of the through flow measurement as a percentage without having to convert the number of impulses (basic setting = 100 %).



The flow meter is calibrated for the use of water. On the other hand, if liquid fertiliser is applied, the higher viscosity results in a deviating number of impulses per litre. If you now alter the setting of the through flow measurement from 100 % to, for example, 93 %, the flow meter again registers the correct number of litres.

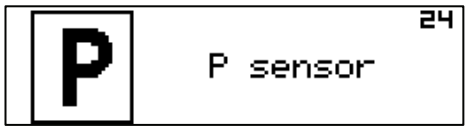
In principle: If the actual through flow quantity is smaller than the displayed value, a value under 100 % is to be selected, if the actual through flow quantity is larger than the displayed value, a value above 100 %.

If your spraying computer is equipped with pressure regulation, a correction value for worn or contaminated nozzles can be entered:

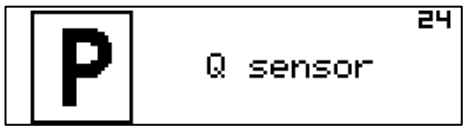
- For worn nozzles, a value above 100 % is to be selected.
- For contaminated nozzles, a value below 100 % is to be selected.

§5.20 PRESSURE OR THROUGHFLOW REGULATION

In *Screen 24* you can select whether the regulation of the application rate is done on the basis of the through flow or the pressure.



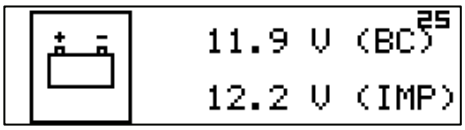
Regulation on the basis of pressure



Regulation on the basis of throughflow

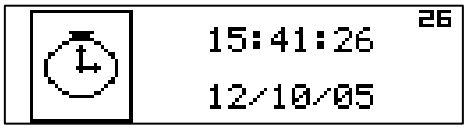
§5.21 VOLTAGE DISPLAY

In *Screen 25* the voltages on the control box (upper value) and on the SHC box of the sprayer (lower value) are displayed.
The display of the voltage values facilitates diagnosis in faults in the energy supply.
The prerequisite for flawless function of the system is, that the two voltage values amount to at least 9 Volts.



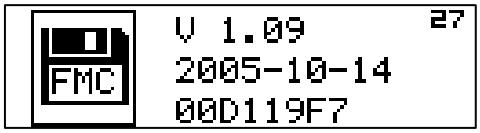
§5.22 TIME / DATE

In *Screen 26* time and date can be set.
Only after confirmation of the last value (year) with the **OK key** or quitting the screen will the clock start again.



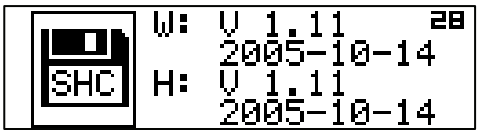
§5.23 PROGRAMME VERSION

In *Screen 27* the version of the software with the matching date is displayed.

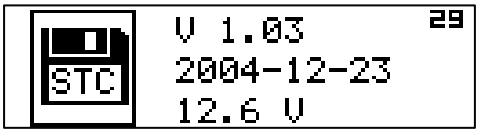


Screen 28 shows the programme version of the SHC-box and the corresponding date.

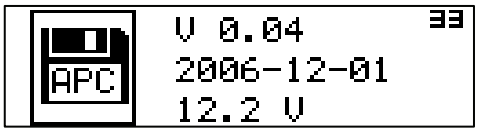
W(ater) Programme version for the liquid system
H(ydraulic) Programme version for the hydraulic system



Screen 29 shows the programme version of the STC-box (jobcomputer for drawbar - or axle steering) and the corresponding date. For facilitating the diagnose in case of failure, the electrical tension (Volt) on the STC-box is also shown.

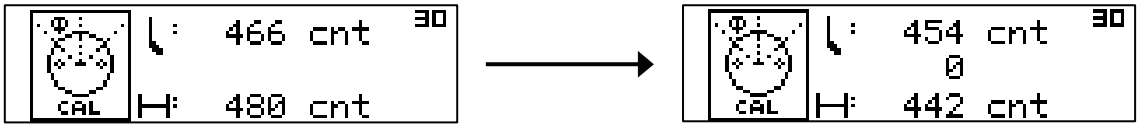


Screen 33 shows the programme version of the APC-box (jobcomputer for air fan and oil cooler) and the corresponding date. For facilitating the diagnose in case of failure, the electrical tension (Volt) on the APC-box is also shown.



§5.24 AUTOMATIC DRAWBAR - OR AXLE STEERING

The both potentiometers (18 and 19) of the *Automatic drawbar - or axle steering* are calibrated in *Screen 30* (fig. 9, 10 or 11).



For good functioning of the Automatic drawbar - or axle steering and the Automatic middle position of the drawbar/axle, the middle position of both potentiometers (18 and 19) must be calibrated correctly (fig. 9, 10 or 11).

Mode of procedure in calibration of the potentiometers

- Switch the drawbar - or axle steering in the manual mode by pressing switch AUTO downwards.
- Drive with the tractor carefully straight on and steer the drawbar/axle with the switch manually till the sprayer follows the tractor in a straight line.

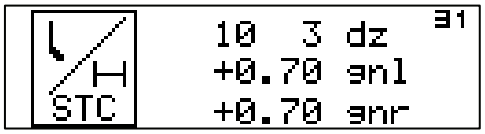
  Note: The drawbar/axle should be now exactly in the middle position and drive in the imaginary extension of the tractor middle line

- Switch to the entry mode by pressing the **OK-key**. The upper value on screen 30 (= value for the potentiometer on tractor side) is blinking (fig. 9). The screen displays an additional value (**"0"** or **"1"**) between the two other values.
- Confirm the displayed value for the front potentiometer with the **OK key.**
  The next parameter (value **"0"** or **"1"**) is blinking. Don't change this value.
- Confirm the value **"0"** or **"1"** with the **OK-key**; the second value for potentiometer (19) on the drawbar - or axle steering point (B) is blinking (fig. 10 or 11).

  Remark: The value "0" means that the automatic mode in the software for the drawbar - or axle steering is activated. When the sprayer is not equipped with *Automatic drawbar - or axle steering* (the front potentiometer is not mounted (18, fig. 9)), the software can be deactivated by entering **"1"**.

- Confirm the displayed value for the rear potentiometer (19, fig. 10 or 11) with the **OK key.**

The values for the potentiometers for *Automatic central position* have now been recalibrated.



In *screen 31* the *dead zone dz* of the potentiometers and the steering response can be adjusted. The *dead zone* of the rear potentiometer (19, fig. 10 or 11) (at the drawbar or the swivel axle) is a narrow area where the central position may deviate from the preset central position.
The *dead zone* of the potentiometer at the tractor side (18), that registers the angle between tractor and drawbar (fig. 9), is a narrow area around the central position of the potentiometer, in which the potentiometer (18) can be moved by the steer bar (20) without giving a signal to the jobcomputer.

This prevents many very small steering impulses caused by small movements of potentiometer resulting from unevenness of the field, small steering actions of the tractor, etc. The dead zone reduces the wear and oil heating in the hydraulic system and makes the sprayer following more calmly.

The *dead zone "dz"* of the front potentiometer (18, fig. 9) is factory-set at a value between 8 - 12 and can be modified if necessary, for instance if the drawbar / swivel axle is found to steer too often or too little.

The *dead zone "dz"* of the rear potentiometer (19, fig. 10 or 11) is factory-set at a value between 2 - 6 and does not have to be modified as a rule.

The values for *gnl* and *gnr* allow you to separately correct the steering degree to the left and to the right. Dependent on the tractor type, the sprayer type, the way the steering beam is mounted (20, fig. 9) and the driving speed, it may be necessary to correct the *automatic steering*. At a negative value, the steering responds stronger to a steering pulse. The sprayer will be running more outward (outside the tractor track). At a positive value the sprayer will be running more inward (within the tractor track). Modify these values on the basis of your experience in the field.

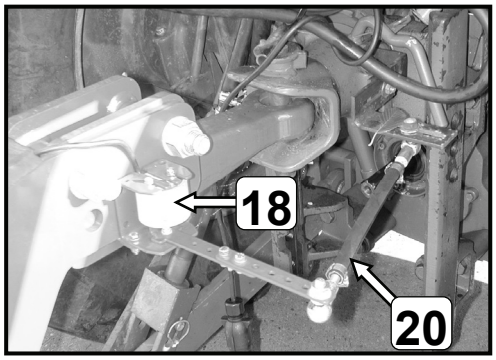


Fig. 9

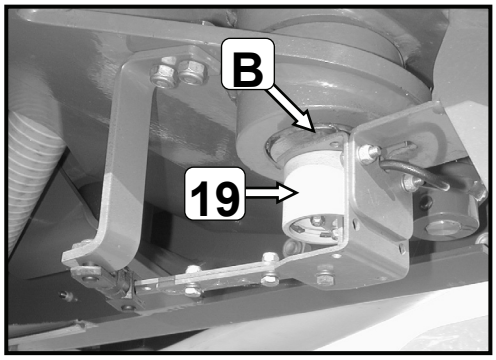


Fig. 10

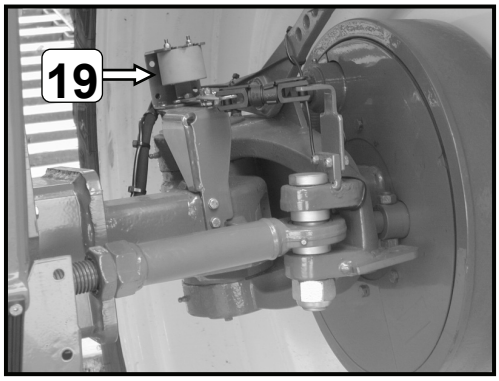
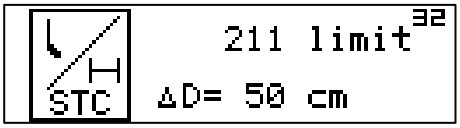


Fig. 11

Adjustment procedure:

- Switch to input mode by pressing the **OK key**; the value on the left (front potentiometer (18, fig. 9) on *screen 31 will be blinking*.
- Press arrow key ▷ until you reach the value to be changed. Then this value is blinking.
- Change the value with the arrow keys ▽ and △ as desired and confirm with the **OK key**. The next value will be blinking.
- Change this value, if required, with the arrow keys ▽ and △ press the **OK key** or press the arrow key ▷ until you pass the last value in the screen and the next screen is displayed.



In *screen 32* the maximum steering deflection and the steering delay can be set.

Note: Only set or modify the value for the maximum steering deflection for a track width below (<) 1.80 m. For a track width of 1.80 m of more, the steering deflection must be as large as possible.

Limiting the steering deflection will prevent damage to the machine, for instance due to the sprayer wheels touching the tank.

Procedure for setting the steering deflection

- Calibrate the central position of the potentiometers according to the procedure described above.
- Move the drawbar/axle to the central position using *Automatic central position*.
- Switch to input mode by pressing the **OK** key; the value of the rear potentiometer (19, fig. 10 or 11) and maximum steering deflection is *blinking*.
- Put the drawbar/swivel axle steering to *manual operation* by pushing down the switch AUTO
- With the tractor stopped: manually steer the drawbar/axle with the aid of the switch until the desired maximum steering deflection has been reached. For the swivel axle steering you should allow a safety margin of a few centimetres between wheel and tank.

  Note: Steer once to the left as well as to the right until the desired maximum steering deflection has been reached. Select the lowest value if these values are not equal!
- The value of potentiometer at the desired steering angle now blinks on the screen. Press the **OK key** to confirm the value.

If the sprayer is equipped with automatic swivel axle steering, you can also program a path-dependent delay in *screen 32*. This will prevent that at a steering movement of the tractor, the swivel axle is directly steered out and the wheels are steered out of the tractor track. The necessary delay depends on the position of the swivel axle, the driving speed and the response time of the hydraulic system. The value for the delay is factory set at: ΔD = 0.50 for swivel axle steering.

Note: for drawbar steering the value must not be changed and it must be ΔD = 0.00 !

The optimum value can be determined by taking a few turns in the field and checking whether the sprayer wheels start steering at the right moment.

Procedure to modify the delay

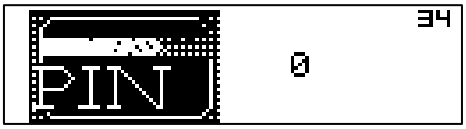
- Switch to input mode by pressing the **OK** key; the value of the rear potentiometer (19, fig. 10 or 11) at maximum steering deflection is *blinking*.
- Press the arrow key ▷; the delay value is *blinking.*
- Change the delay value with the arrow keys ▽ and △ as desired and confirm the new value with the **OK key**.

§5.25 END

With *Screen 34*, the end in the *Setting menu* is reached.
If you press the arrow key ▷ you return to ***Main screen 1***.
If you press the **OK key** you go to the **Service level.**

§5.26 SERVICE MENU

In the service menu, basic settings are made in the factory and normally do not need to be altered. The service menu can be scrolled with the help of the arrow keys like other menu levels. However, no alterations can be made.



If alterations have to be made for some reasons, this is only possible if the correct PIN code has been entered in *Screen 35*.
If need be, please get in touch with the Kverneland after-sales service.

§5.27 TROUBLESHOOTING TABLE

Possible faults	Check
Wheel sensor, through flow sensor do not work	- Is a voltage of 12 V available on the connection jack of the SHC box for the sensor? [1)] - Is the LED of the sensor on? (N/A for through flow sensor.) - Check input signal on the SHC box? [1)] - Does the sensor work in test operation? - Are all the wires connected correctly?
Pressure sensor does not work	- Is a voltage of 5/12 V available on the connection jack of the SHC box for the sensor? [1)] - Are all the wires connected correctly?
Faulty display of the driving speed	- Does the sensor work? Is the setting correct? - Is the wheel/radar setting correct? - Calibration done correctly? - Does the system work at simulation speed?
Faulty display of the through flow	- Does the sensor work? - Is the computer set to "through flow quantity"? - Calibration done correctly?
No transmission of data	- Does the energy supply work? - Are all the wires connected correctly? - Does the Run LED on the motherboard of the SHC box flash? [1)] - Does the Run LED on the motherboard of the control box flash? [1)]
Faulty display of the pressure	- Does the sensor work? - Calibration done correctly?
Sections cannot be switched via the control box	- Are all the wires connected correctly? - Does the Run LED on the motherboard of the SHC box flash? [1)] - Is the switch of the control box set to “ON”? - Check output signal of the SHC box? [1)] - Does the output work in test operation?
Malfunction of the through flow regulation	- Does the speed sensor work correctly? - Do the through flow and pressure sensors work correctly? - Is the "Through flow quantity/Pressure" setting correct? - Does the system work at simulation speed? - Does the pressure regulator working correctly? - Are all the settings correct? - Have all the calibration processes been done correctly?
Filling/rinsing function is not implemented correctly	- Are all the settings for filling/rinsing function correct? - Is the "Filling/rinsing function" setting correct?
Difference between nominal and actual value of the application rate	- Does the pressure regulator work without faults? - Does the through flow sensor work without faults?
!S Alarm top left of display	- No connection to the section valve block
!H Alarm top left of display	- No connection to the hydraulic valve block

[1)] **All checks, which have to be made on the motherboard on the inside of the SHC box or control box may only be done by personnel with matching training!**

ELECTRICAL CONTROL EC

H6 SYSTEM OVERVIEW AND ASSEMBLY

§6.1 SYSTEM OVERVIEW

The System Electrical Control EC comprises the following components (see fig.):

- Control box with energy supply wire
- Steering wire and division-box for spraying functions and hydraulic functions
  (The trailed sprayer with longer wires)

The control box is assembled in the tractor cabin and contains the remote control for the control of the spraying and hydraulic functions.
The supply of energy is done by an 12 Volt energy supply wire in the control box.

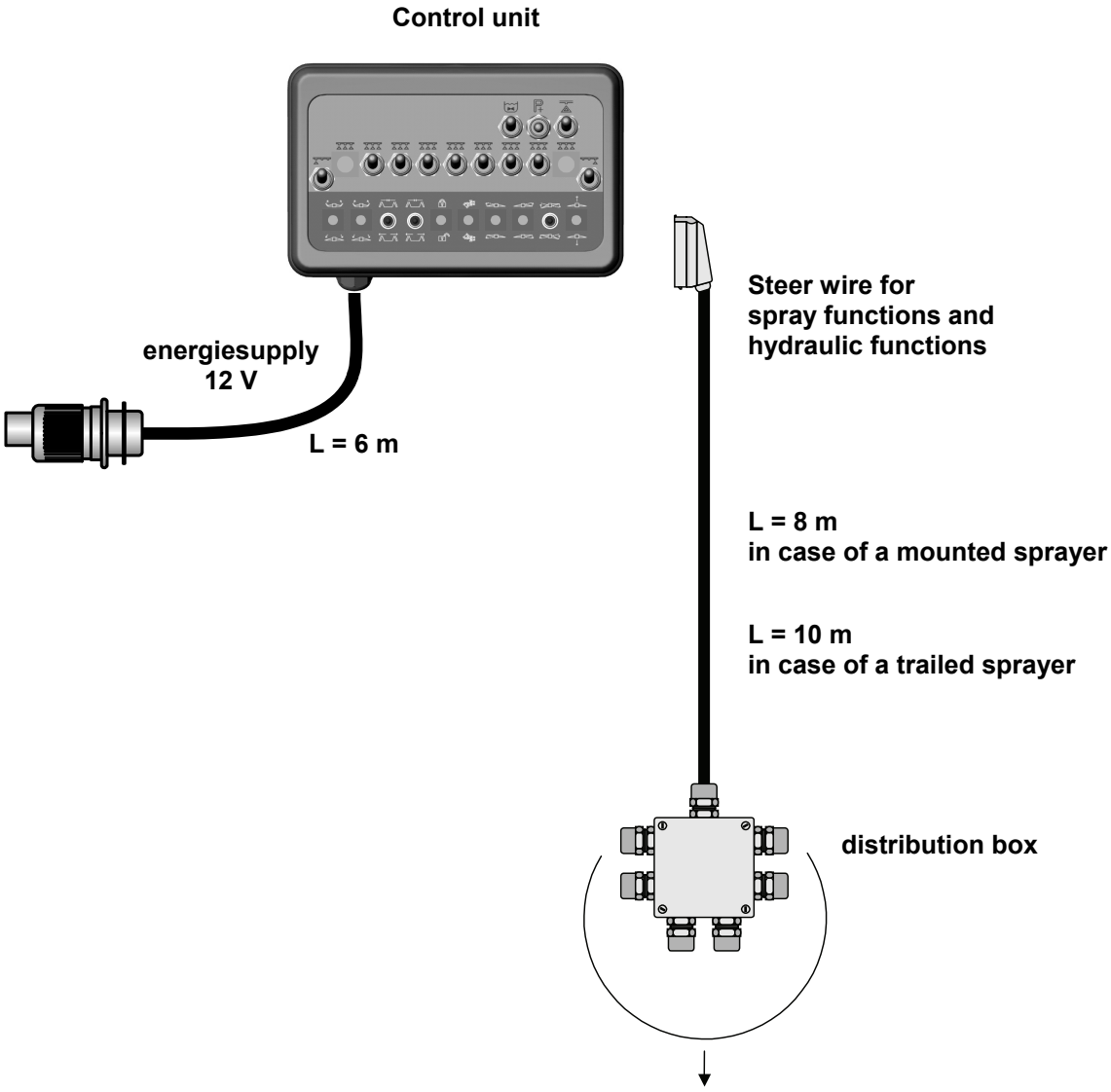
The steering wire is used for switching the next spray functions:

- central switch "Spraying"
- sections "on/off"
- return-agitator "on/off"
- manual pressure setting

Moreover, the next hydraulic functions are switched:

- folding out-/in of the spray boom
- hydraulic hillside correction
- Lockage of the pendulum system
- height adjustment of the spray boom

Control box



Spray functions:	Hydraulic functions:
- central switch **"Spraying"** - section switching - agitator switching - manual pressure setting	- folding of the spray boom - hydraulic hillside correction - hydraulic pendulum lockage - height adjustment of the spray boom

§6.2 ASSEMBLY

Assemble the control box (fig. 1) in the tractor cabin with the enclosed assembly material (fig. 2). Ensure that a position favourable for operation in the driver's field of vision is selected.
The control wire for the spraying system and the hydraulic functions is inserted in the socket (2) on the reverse of the control box (fig. 1).
The control box is switched on via the switches (3) on the reverse (fig. 1).
I = On
0 = Off

§6.3 SUPPLY OF ENERGY

In newer types of tractor which are equipped with an energy supply socket to DIN 9680, the energy supply wire of the Electrical Control EC, which leads to the distribution box on the sprayer, can be inserted directly on the DIN socket of the tractor.

In older tractors not equipped with a DIN socket, the battery wire (5) (fig. 3) is necessary and must be connected directly to the battery. The battery wire is not standard and must be ordered separately.
Use of the battery wire, which is fused with a 30 A fuse, ensures that the Electrical Control EC is always sufficiently supplied with energy.

When connecting to the battery, pay attention to correct poling!
The brown core with the integrated 30 A fuse must be connected to the **+** pole, the blue core to the **-** pole. Please ensure clean contacts!

By no means can the supply of energy be produced via the so-called cigarette lighter, as it cannot provide the current required!

The other side of the wire is equipped with a standard socket, which must be attached in a dry, protected area in the rear of the tractor or the tractor cabin. The energy supply wire of the Electrical Control, which leads to the distribution box on the sprayer, is inserted in this socket.

Before connecting the Electrical Control EC to the 12 Volt electrics, the following checks must be made:

- Check electric components and wires for possible damage. Damaged wires are no longer waterproof and can cause short circuits.
- Check the wire length; it must also be sufficient for taking bends.
- Check correct connection of the plug to the control box.
- Naturally, the 12 Volt battery must also be sufficiently charged (9 Volts at least)

Note: Please ensure that the two wires (energy supply and control wire) are laid carefully between the tractor and the sprayer in work so that nobody can trip up and the wire does not get caught anywhere. However, the wire must not be tied up too tightly, because otherwise it can tear in bends or in lifting or lowering. Further, please ensure that the wires cannot come into contact with moving or hot parts of the tractor.

Danger: If live parts or wires are damaged, short circuits can result. Therefore, the energy supply wire must always be equipped with a 30 A fuse. Without properly fusing, a fire can be caused by a short-circuit!

Control box

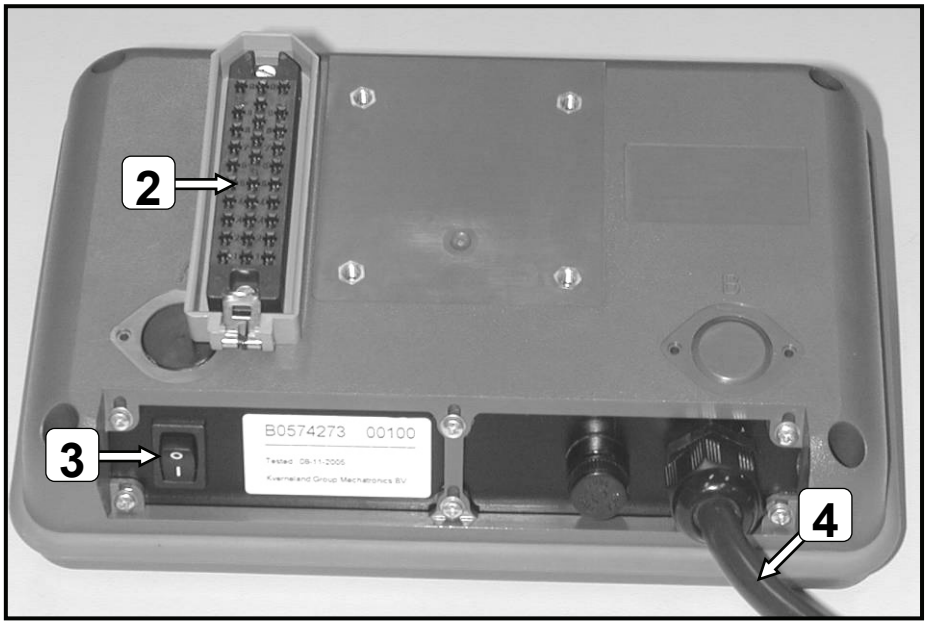


Fig. 1

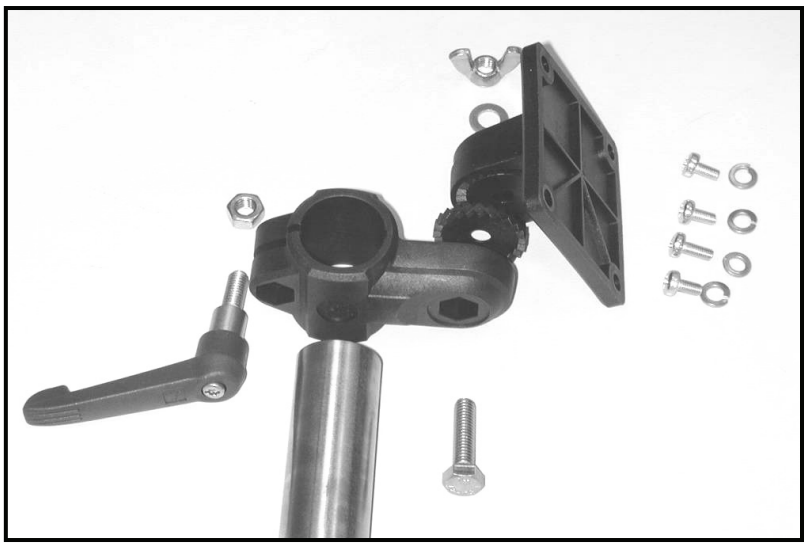


Fig. 2

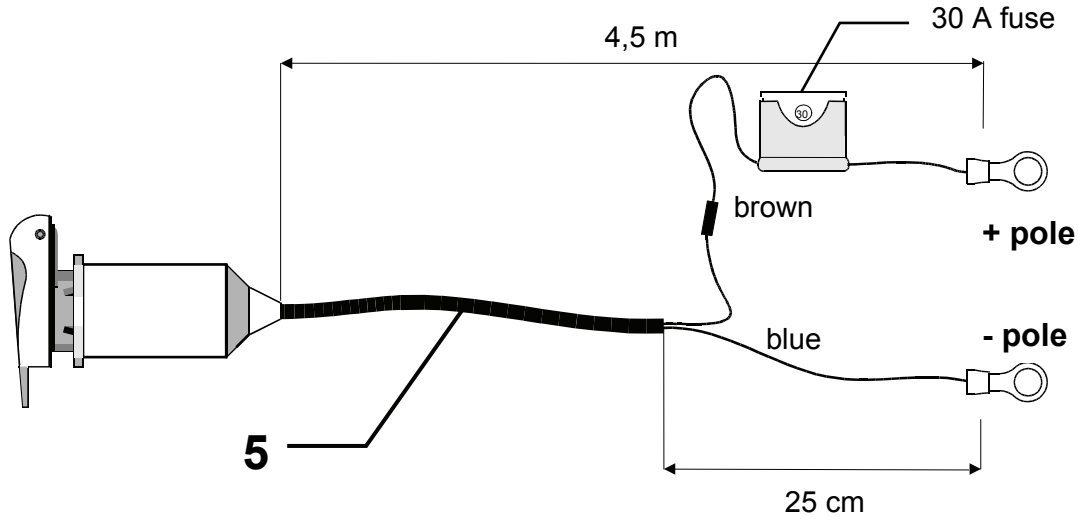


Fig. 3

H7 CONTROL BOX EC

The control box of the Electrical Control EC (fig. 1) contains an electrical remote control for the spraying functions and the hydraulic functions.

The whole system has a safety fuse of 25 Amp. on the back side of the control unit (fig. 2).

§7.1 SPRAYING FUNCTIONS

The following spraying functions can be electrically remote controlled on the control box (fig. 1):

Central switch "Spraying" On/Off (1)
When the central switch is operated (1) all the Section valves (6) (fig. 3) are opened or closed at the same time. (Switch upwards = valves are open)

Section switch (2)
When the Section switch is operated, (2) the Section valves (6) (fig. 3) are opened or closed. (Switch upwards = valve is open)

Switch for edge nozzles or Sections (3)
The two outside switches (3) can be used to switch edge nozzles. There are 2 possibilities for this:

a) Edge nozzle for precise edge-of-field spraying:
In this case, there is a switch-over between the outermost nozzle and the edge nozzle (with a smaller spraying angle to the outside).
The working width is not altered.

b) Edge nozzle to enlarge the working width at the edge of the field:
In this case, the edge nozzle (with a larger spraying angle to the outside) is used additionally in order to enlarge the spraying width at the edge of the field.

Switch for pressure adjustment +/- (4)
When the switch is operated (4), the pressure regulation motor (7) (fig. 3) is actuated in the direction in question (**+** or **-**) as long as the switch (4) is held down. The spraying pressure (bar) can thus be altered manually. The actual spraying pressure can be read of the manometer on the machine.

Attention: The desired spraying pressure has to be set while spraying (central switch spraying "**On**")

Switch for return agitator (5)
Motor (8) (fig. 3) for the agitator switch-off is actuated via switch (5). The return agitator can be switched off as required, e.g. for complete emptying of the container or also for foaming pesticides.

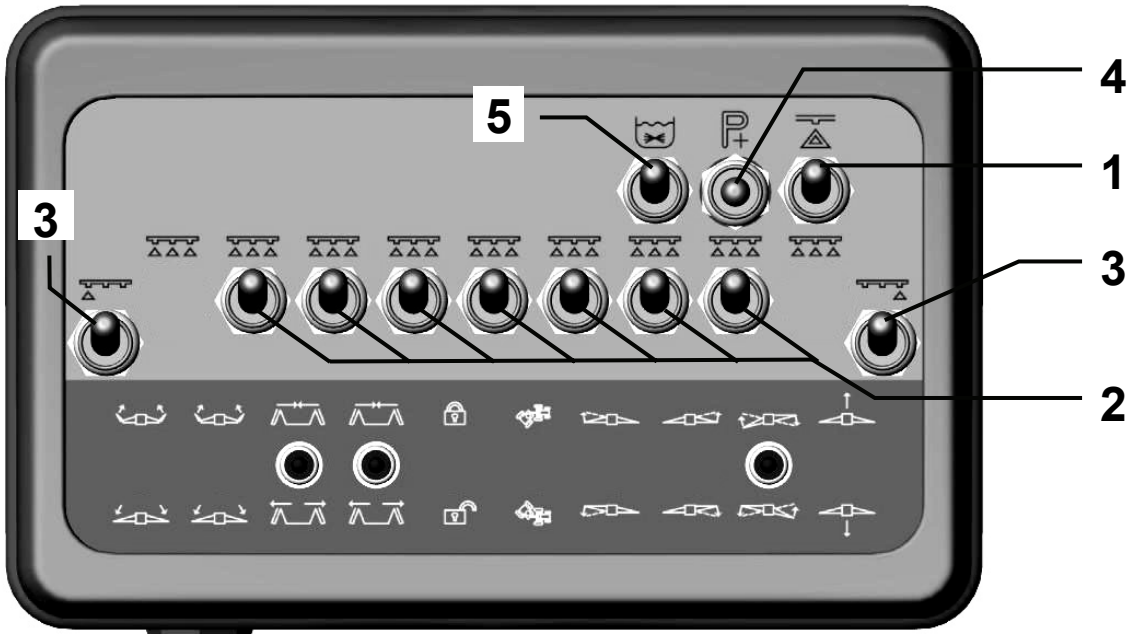


Fig. 1

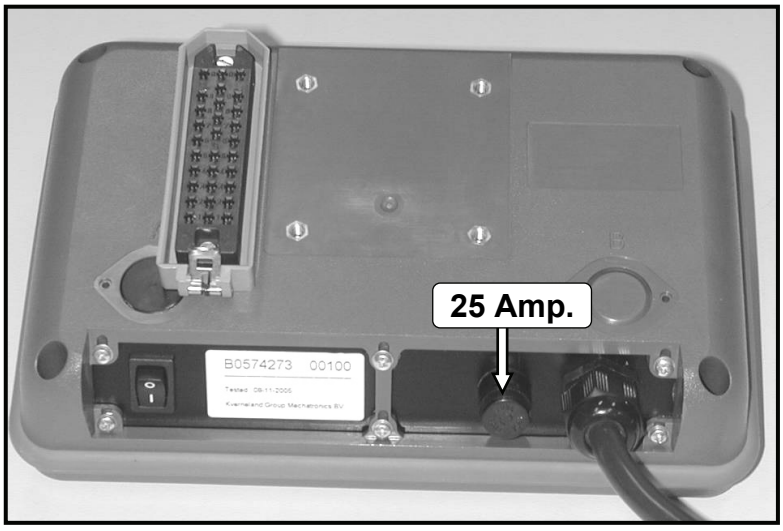


Fig. 2

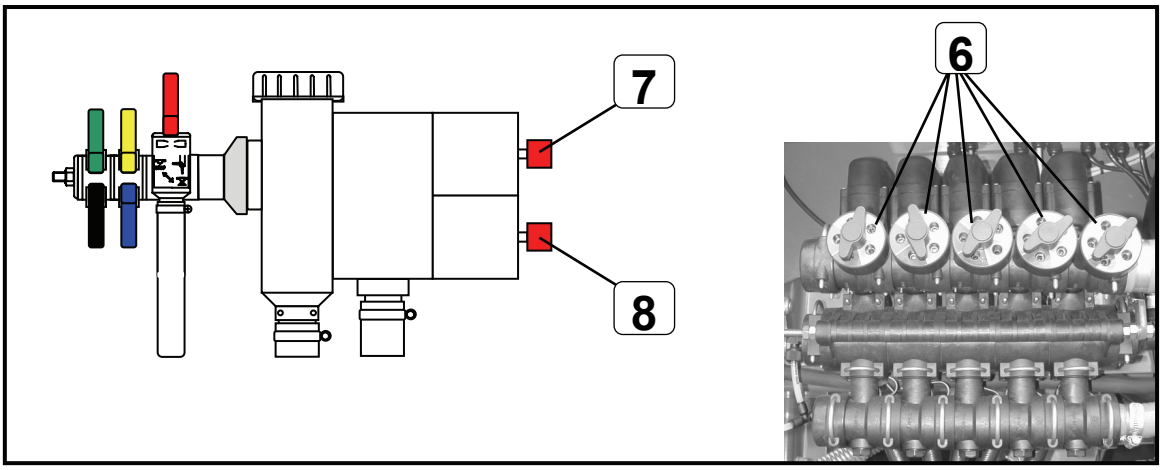


Fig. 3

§7.2 HYDRAULIC FUNCTIONS

The lower field (9) of the control box contains the switches for the hydraulic functions of the spray boom and the drawbar - or axle steering (fig. 4).
The hydraulic functions are operated by a hydraulic system with pre-selection switching. This system is characterised by:

- On the tractor side, only 1 single-acting and 1 double-acting hydraulic ventil is necessary.
- With the single-acting hydraulic ventil the height adjustment of the spray boom is performed.
- All the double-acting hydraulic functions are pre-selected via the corresponding toggle switch on the control box (Switch field 9)(fig. 4) and implemented via a double-acting control appliance on the tractor.
- The direction of operation of the hydraulic ventil decides on the direction of operation of the function implemented.

Procedure for control:

- To operate a function, push the corresponding toggle switch upwards, the corresponding pair of solenoid valves (10) (or solenoid valve for some types of spray booms) on the spray boom is opened (fig. 5).
  Attention: In order to avoid damage to the spray boom, only activate one function at a time, i.e. the remaining toggle switches must be pushed down. In symmetrical functions such as folding, both sides (right and left) can be activated at the same time as a rule (not in case of HPT spray boom).
- To implement the function, operate the double-acting control device in the corresponding direction until the function has been completely implemented.
- After this, push the toggle switch down again.

Control box

Fig. 4

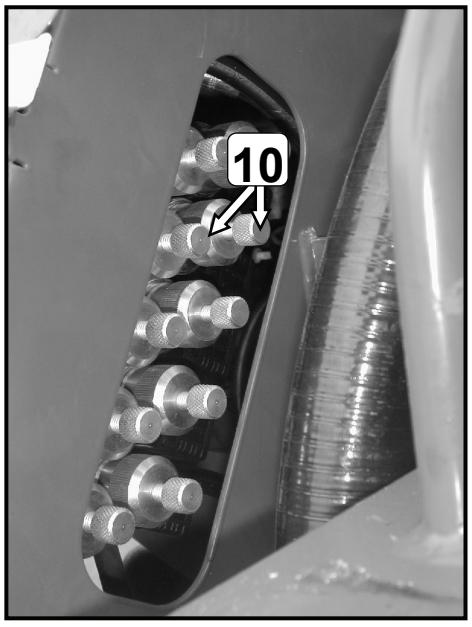


Fig. 5

§7.2.1 Occupation of the switches

The switches for the hydraulic functions have been provided with symbols and have the following function:

Switch **A**: Height adjustment of the spray boom [1]

Switch **E**: Hydraulic hillside correction

Switch **D**: Lockage of the pendulum system **open/close** [2]

Switch **B**:

HPT	**Right** boom parts folding in/out
HSS	**Inner boom parts** (right and left) folding out-/in
HE / HSS	Folding out- /in of the complete spray boom.

Switch **C**:

HPT	**Left** parts folding in/out
HSS	**Outer boom parts** (right and/or left) folding out-/in

[1] Only in case the height adjustment is not preformed with an additional single-acting hydraulic ventil.
[2] Only in case the spray boom is not equipped with mechanical pendulum lockage.

N.B.: The occupancy of the switches and the functions can differ depending on the type and equipment of the spray boom.
(See also the operating instructions for the sprayer and the spray boom)

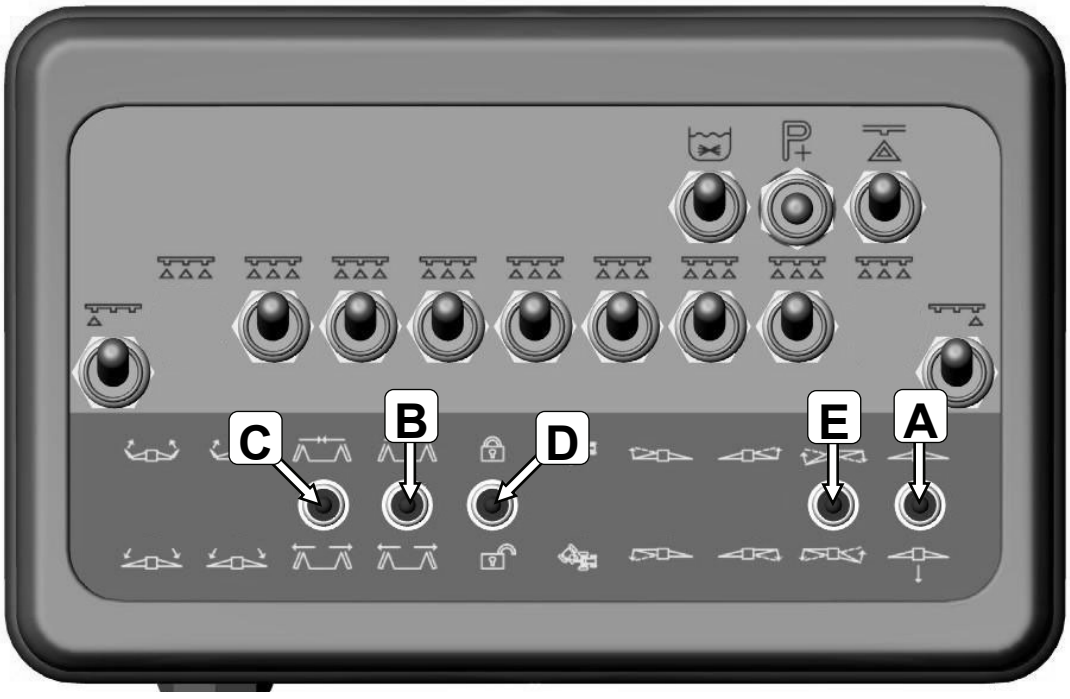


Fig. 6

ELECTRICAL CONTROL GZD-EC

H8 CONTROL BOX GZD-EC

The control box of the Electrical Control GZD-EC (fig. 1 and 2) contains an electrical remote control for some spraying functions and the hydraulic functions. Assemble the control box (fig. 1) in the tractor cabin. Ensure that a position favourable for operation in the driver's field of vision is selected.
The control box is switched on via the switches (1) on the reverse (fig. 1). When the control box is switched on, the light (2) is on.
The control wire for the spraying system and the hydraulic functions is inserted in the socket (1) on the bottom of the control box and secured by means of a screw-type connection (fig. 1)
I = On
0 = Off

Attention: After use, switch off the control unit to save the battery of the tractor.

§8.1 SUPPLY OF ENERGY

In newer types of tractor which are equipped with an energy supply socket to DIN 9680, the energy supply wire of the electrical functions of the sprayer, which leads to the distribution box on the sprayer, can be inserted directly on the DIN socket of the tractor.

In older tractors not equipped with a DIN socket, the battery wire (4) (fig. 2) is necessary and must be connected directly to the battery. The battery wire is not standard and must be ordered separately.
Use of the battery wire, which is fused with a 30 A fuse, ensures that the electrical functions of the sprayer are always sufficiently supplied with energy.

When connecting to the battery, pay attention to correct poling!
The brown core with the integrated 30 A fuse must be connected to the **+** pole, the blue core to the **-** pole. Please ensure clean contacts!

By no means can the supply of energy be produced via the so-called cigarette lighter, as it cannot provide the current required!

The other side of the wire is equipped with a standard socket, which must be attached in a dry, protected area in the rear of the tractor or the tractor cabin. The energy supply wire of the electrical functions of the sprayer is inserted in this socket.

Before connecting the Electrical Control GZD-EC by means of the control wire to the 12 Volt electrics, the following checks must be made:

- Check electric components and wires for possible damage. Damaged wires are no longer waterproof and can cause short circuits.
- Check the wire length; it must also be sufficient for taking bends.
- Check correct connection of the plug to the control box.
- Naturally, the 12 Volt battery must also be sufficiently charged (9 Volts at least)

Note: Please ensure that the two wires (energy supply and control wire) are laid carefully between the tractor and the sprayer in work so that nobody can trip up and the wire does not get caught anywhere. However, the wire must not be tied up too tightly, because otherwise it can tear in bends or in lifting or lowering. Further, please ensure that the wires cannot come into contact with moving or hot parts of the tractor.

Danger: If live parts or wires are damaged, short circuits can result. Therefore, the energy supply wire must always be equipped with a 30 A fuse. Without properly fusing, a fire can be caused by a short-circuit!

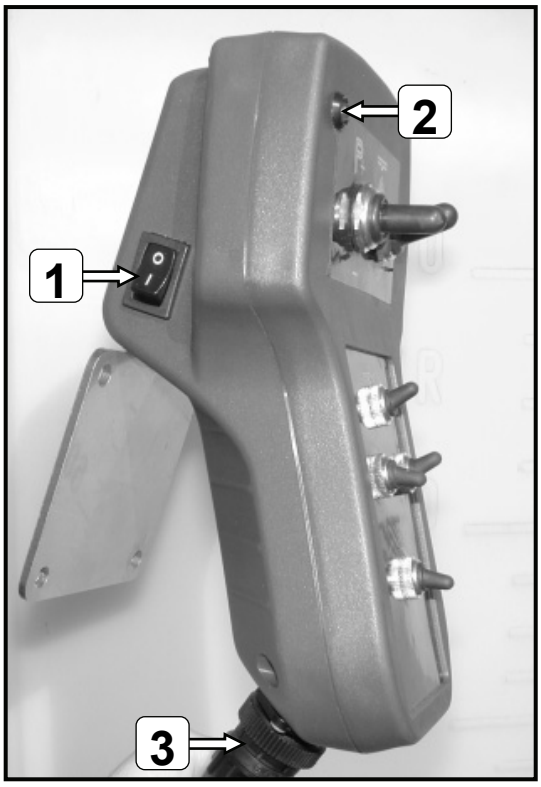


Fig. 1

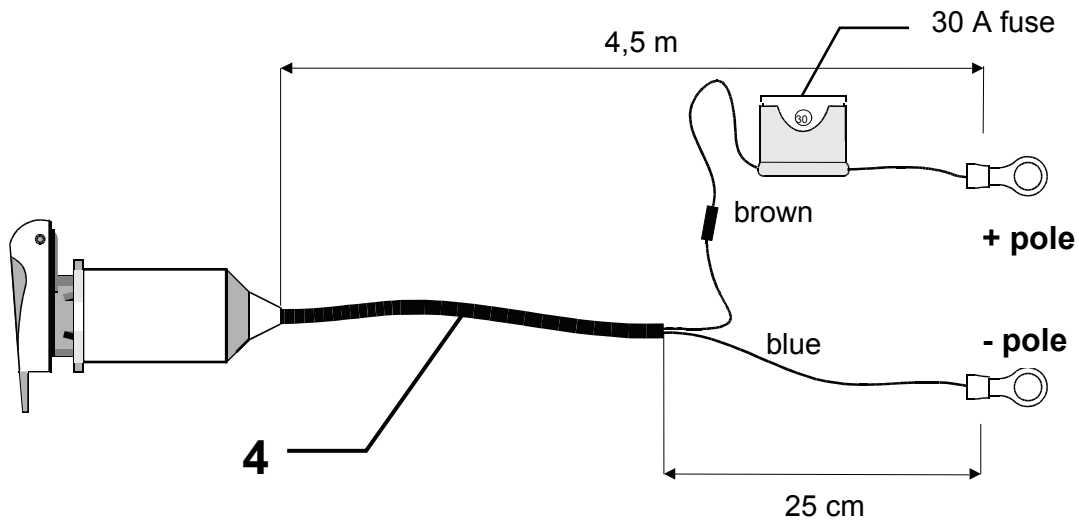


Fig. 2

§8.2 SPRAYING FUNCTIONS

The following spraying functions can be electrically remote controlled on the control box (fig. 3):

Central switch "Spraying" On/Off (6)
When the central switch (6) (fig. 3) is operated, the main valve (13) (fig. 4) is opening or closing the liquid supply to the sections (Switch upwards = valve is open).
The sections opened by the section valves (i) are now supplied with spraying liquid (fig. 4).

Switch for pressure adjustment +/- (5)
When the switch is operated (5) (fig. 3) the pressure regulation motor (12) (fig. 4) is actuated in the direction in question (**+** or **-**) as long as the switch (3) is held down. The spraying pressure (bar) can thus be altered manually. The actual spraying pressure can be read of the manometer (11) on the machine (fig. 4).

Attention: The desired spraying pressure has to be set while spraying (central switch spraying "**On**")

§8.3 HYDRAULIC FUNCTIONS

The lower field of the control box contains the switches (7 – 10) for the hydraulic functions of the spray boom (fig. 3).
The hydraulic functions are operated by a hydraulic system with pre-selection switching. This system is characterised by:

- On the tractor side, only 1 single-acting and 1 double-acting hydraulic ventil is necessary.
- With the single-acting hydraulic ventil the height adjustment of the spray boom is performed.
- All the double-acting hydraulic functions are pre-selected via the corresponding toggle switch on the control box (switches 7 – 10, fig. 3) and implemented via a double-acting control appliance on the tractor.
- The direction of operation of the hydraulic ventil decides on the direction of operation of the function implemented.

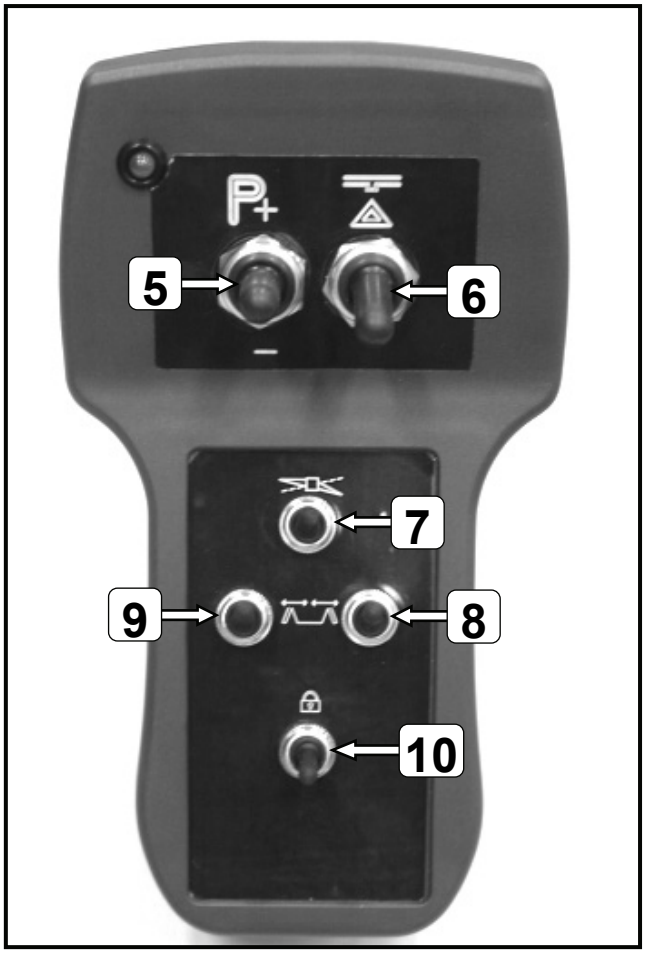


Fig. 3

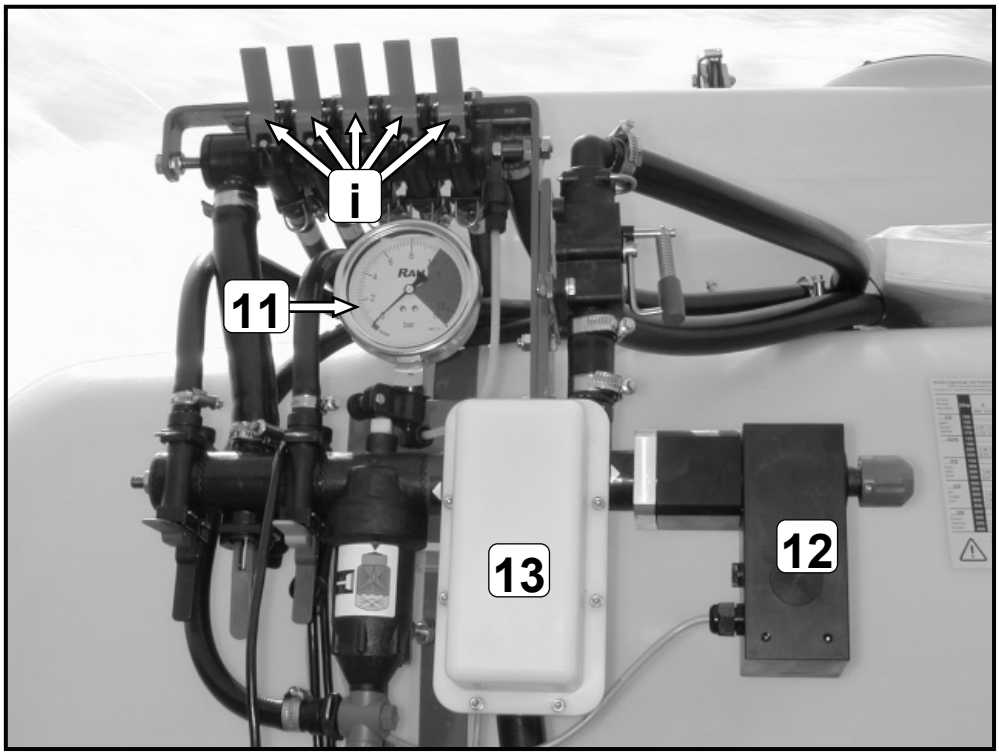


Fig. 4

§8.3.1 Procedure for control

- To operate a function, push the corresponding toggle switch upwards, the corresponding pair of solenoid valves (14) (or solenoid valve in case of HPT spray boom) on the spray boom is opened (fig. 5).
  Attention: In order to avoid damage to the spray boom, only activate one function at a time, i.e. the remaining toggle switches must be pushed down. In symmetrical functions such as folding, both sides (right and left) can be activated at the same time as a rule (not in case of HPT spray boom).
- To implement the function, operate the double-acting control device in the corresponding direction until the function has been completely implemented.
- After this, push the toggle switch down again.

§8.3.2 Occupation of the switches

The switches for the hydraulic functions have been provided with symbols and have the following function (fig. 6):

 Hydraulic hillside correction (7)

Switch **8**:

HSS, HB : **Inner boom part** (right and left) folding out-/in

HPT: **right** boom parts folding out-/in

Switch **9**:
HSS, HB: **Outer boom part** (right and left) folding out-/in
HPT: **left** boom parts folding out-/in

 Lockage of the pendulum system **open/close** (10)

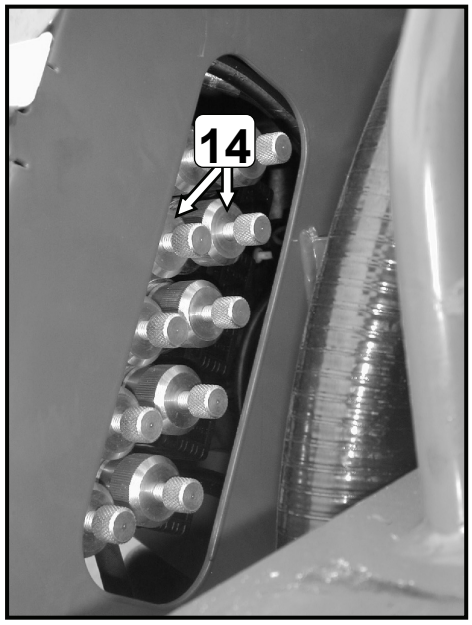


Fig. 5

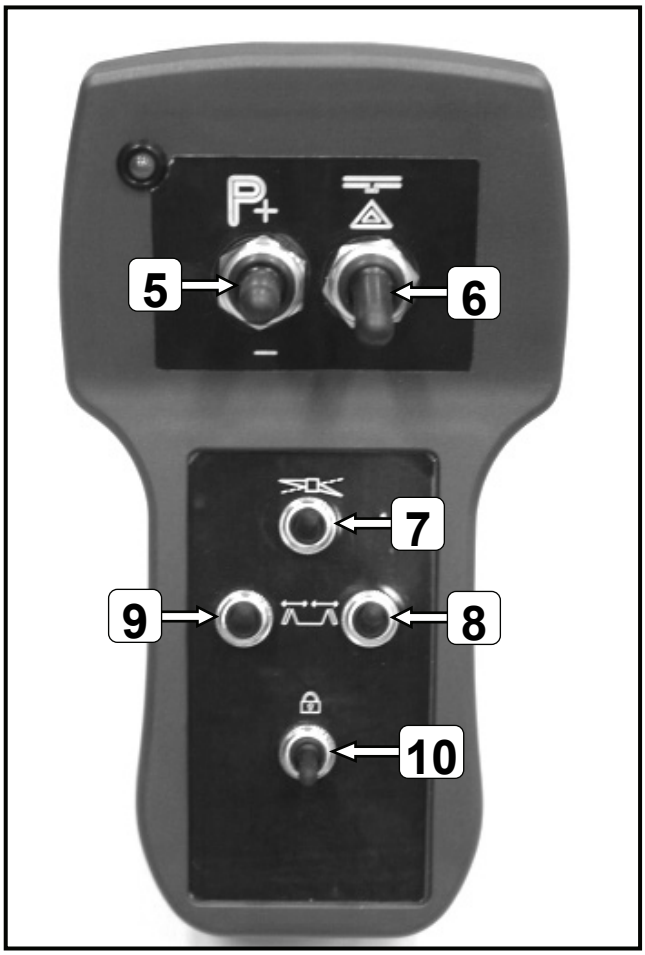


Fig. 6

Notes

Flowmate Control FMC/EC/GZD-EC

01001 ≥**Mach ID**

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