Operating Manual

AMAZONE

Catch crop seed drill

GreenDrill 200-E

GreenDrill 500-H

Please read and observe this operating manual before commissioning!
Keep it in a safe place for future use.

MG4167
BAH0054-7 12.14

en

Manufacturer's address

AMAZONEN-WERKE
H. DREYER GmbH & Co. KG
Postfach 51
D-49202 Hasbergen

Tel.: 49 (0) 5405 50 1-0

Fax.: 49 (0) 5405 501-234

E-mail: amazone@amazone.de

Spare part orders

Spare parts lists are freely accessible in the spare parts portal at www.amazone.de.

Please send orders to your AMAZONE dealer.

Formalities of the operating manual

Type: ---------- GreenDrill

Document number: ---------- MG4167

Compilation date: ---------- 12.14

1 General Safety Instructions

This section contains supplementary information on the safety advice in the operating manual to ensure safe operation of the implement.

1.1 Obligations and liability

Comply with the instructions in the operating manual

Knowledge of the basic safety information and safety regulations is a basic requirement for safe handling and fault-free implement operation.

Obligations of the operator

The operator is obliged only to let those people work with/on the implement who

- are aware of the basic workplace safety information and accident prevention regulations.
- have been instructed in working with/on the implement.
- have read and understood this operating manual.

The operator is obliged

- to keep all the warning symbols on the implement in a legible state.
- to replace damaged warning symbols.

If you still have queries, please contact the manufacturer.

Obligations of the user

Before starting work, anyone charged with working with/on the implement is obliged

- to comply with the basic workplace safety instructions and accident prevention regulations.
- To read and understand the section "General safety information" of this operating manual.
- To read the section "Warning symbols and other labels on the machine" in this operating manual and to follow the safety instructions represented by the warning symbols when operating the machine.
- To get to know the implement.
- To read the sections of this operating manual, important for carrying out your work.

If the user discovers that a function is not working properly, then they must eliminate this fault immediately. If this is not the task of the user or if the user does not possess the appropriate technical knowledge, then they should report this fault to their superior (operator).

Risks in handling the implement

The implement has been constructed to the state-of-the art and the recognised rules of safety. However, operating the implement may cause risks and restrictions to

- the health and safety of the user or third parties,
- the implement,
- other property.

Only use the implement

- for the purpose for which it was intended.
- in a perfect state of repair.

Eliminate any faults immediately which could impair safety.

Guarantee and liability

Our "General conditions of sales and delivery" are always applicable. These shall be available to the operator, at the latest on conclusion of the contract. Guarantee and liability claims for damage to people or property will be excluded if they can be traced back to one or more of the following causes:

- Improper use of the implement.
- Improper installation, commissioning, operation and maintenance of the implement.
- Operation of the implement with defective safety equipment or improperly attached or non-functioning safety equipment.
- Non-compliance with the instructions in the operating manual regarding commissioning, operation and maintenance.
- Unauthorised design changes to the implement.
- Insufficient monitoring of implement parts which are subject to wear.
- Improperly executed repairs.
- Disasters due to the effects of foreign objects and force majeure.

1.2 Representation of safety symbols

Safety instructions are indicated by the triangular safety symbol and the highlighted signal word. The signal word (danger, warning, caution) describes the severity of the risk, and carries the following meaning:

DANGER

Indicates an immediate high risk which will result in death or serious physical injury (loss of body parts or long term damage) if not avoided.

If the instructions are not followed, then this will result in immediate death or serious physical injury.

WARNING

Indicates a medium risk, which could result in death or (serious) physical injury if not avoided.

If the instructions are not followed, then this may result in death or serious physical injury.

CAUTION

Indicates a low risk which could cause minor or medium level physical injury or damage to property if not avoided.

IMPORTANT

Indicates an obligation to special behaviour or an activity required for proper implement handling.

Non-compliance with these instructions can cause faults on the implement or disturbance to the environment.

NOTE

Indicates handling tips and particularly useful information.

These instructions will help you to use all the functions of your implement in the best way possible.

1.3 Organisational measures

The operator must provide the necessary personal protective equipment as per the information provided by the manufacturer of the crop protection agent to be used, such as:

- Safety glasses
- Protective shoes
- Chemical-resistant overalls
- Skin protection agents etc.

The operation manual

- Must always be kept at the place at which the machine is operated.
- must always be easily accessible for the user and maintenance personnel.

Check all the available safety equipment regularly.

1.4 Safety and protection equipment

Before starting up the implement each time, all the safety and protection equipment must be properly attached and fully functional. Check all safety and protection equipment regularly.

Faulty safety equipment

Faulty or disassembled safety and protection equipment can lead to dangerous situations.

1.5 Informal safety measures

As well as all the safety information in this operating manual, comply with the general, national regulations pertaining to accident prevention and environmental protection.

When driving on public roads and routes you should comply with the statutory road traffic regulations.

1.6 User training

Only those people who have been trained and instructed may work with/on the implement. The operator must clearly specify the responsibilities of the people charged with operation and maintenance work.

People being trained may only work with/on the implement under the supervision of an experienced person.

Person / Activity	Person specially trained for the activity [1]	Trained person [2]	Persons with specialist training (specialist workshop) [3]
Loading/Transport	X	X	X
Start-up	—	X	—
Set-up, tool installation	—	—	X
Operation	—	X	—
Maintenance	—	—	X
Troubleshooting and fault elimination	—	X	X
Disposal	X	—	—

Legend: X..permitted —..not permitted

1) A person who can assume a specific task and who can carry out this task for an appropriately qualified company.

2) Instructed persons are those who have been instructed in their assigned tasks and in the possible risks in the case of improper behaviour, have been trained if necessary, and have been informed about the necessary protective equipment and measures.

3) People with specialist technical training shall be considered as a specialist. Due to their specialist training and their knowledge of the appropriate regulations, they can evaluate the work with which they have been charged and detect possible dangers.

Comment:

A qualification equivalent to specialist training can be obtained from several years' experience in the relevant field.

Only a specialist workshop may carry out maintenance and repair work on the implement, if such work is additionally marked "Workshop". The personnel of a specialist workshop shall possess the appropriate knowledge and suitable aids (tools, lifting and support equipment) for carrying out the maintenance and repair work on the implement in a way which is both appropriate and safe.

1.7 Safety measures in normal operation

Only operate the implement if all the safety and protection equipment is fully functional.

Check the implement at least once a day for visible damage and check the function of the safety and protection equipment.

1.8 Danger from residual energy

Note that there may be residual mechanical, hydraulic, pneumatic and electrical/electronic energy on the implement.

Use appropriate measures to inform the operating personnel. You can find detailed information in the relevant sections of this operating manual.

1.9 Maintenance and repair work, fault elimination

Carry out prescribed setting, maintenance and inspection work in good time.

Secure all media such as compressed air and the hydraulic system against unintentional start-up.

Carefully fix and secure larger assemblies to lifting gear when carrying out replacement work.

Check all the screw connections for firm seating. On completion of the maintenance work, check the function of the safety devices.

1.10 Design changes

You may make no changes, expansions or modifications to the implement without the authorisation of AMAZONEN-WERKE. This also applies when welding support parts.

Any expansion or modification work shall require the written approval of AMAZONEN-WERKE. Only use modification and accessory parts approved by AMAZONEN-WERKE so that the type approval, for example, remains valid in accordance with national and international regulations.

Vehicles with an official type approval or with equipment connected to a vehicle with a valid type approval or approval for road transport according to the German road traffic regulations must be in the state specified by the approval.

WARNING

Risk of crushing, cutting, being trapped or drawn in, or impact through the failure of support parts.

It is strictly forbidden to

- drill holes in the frame or on the running gear.
- increase the size of existing holes on the frame or the running gear.
- weld support parts.

1.10.1 Spare and wear parts and aids

Immediately replace any implement parts which are not in a perfect state.

Use only genuine AMAZONE spare and wear parts or the parts cleared by AMAZONEN-WERKE so that the operating permit retains its validity in accordance with national and international regulations. If you use wear and spare parts from third parties, there is no guarantee that they have been designed and manufactured in such a way as to meet the requirements placed on them.

AMAZONEN-WERKE shall accept no liability for damage caused by the use of non-approved spare and wear parts or aids.

1.11 Cleaning and disposal

Handle and dispose of any materials used carefully, in particular

- when carrying out work on lubrication systems and equipment and
- when cleaning using solvents.

1.12 User workstation

The implement may be operated by only one person sitting in the driver's seat of the tractor.

1.13 Warning symbols and other labels on the implement

Always keep all the warning symbols of the implement clean and in a legible state. Replace illegible warning symbols. You can obtain the warning symbols from your dealer using the order number (e.g. MD 075).

Warning symbols – structure

Warning symbols indicate danger areas on the implement and warn against residual dangers. At these points, there are permanent or unexpected dangers.

A warning symbol consists of two fields:

Field 1

is a symbol describing the danger, surrounded by triangular safety symbol.

Field 2

is a symbol showing how to avoid the danger.

Warning symbols – explanation

The column **Order number and explanation** provides an explanation of the neighbouring warning symbol. The description of the warning symbols is always the same and specifies, in the following order:

1. A description of the danger.

   For example: risk of cutting
2. The consequence of non-compliance with the risk avoidance instructions.

   For example: causes serious injuries to fingers or hands.
3. Risk avoidance instructions.

   For example: only touch implement parts when they have come to a complete standstill.

Order number and explanation

Warning symbols

MD 076

Risk of drawing-in/entrapment for hand or arm due to moving force-transmission parts!

This hazard can cause extremely serious injuries resulting in the loss of limbs.

Never open or remove protective equipment,

- while the tractor engine is running with the universal joint shaft or hydraulic/electronic system connected.
- if the ground wheel drive is moving.

MD 082

Risk of falling when riding the implement on treads or platforms!

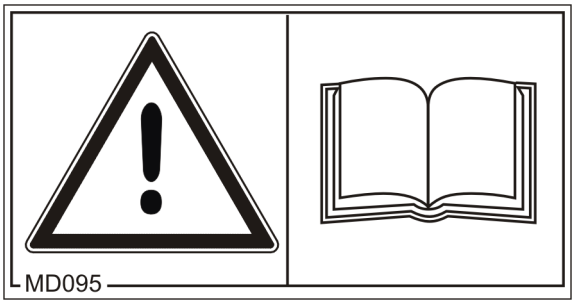
Causes serious, potentially fatal injuries anywhere on the body.

It is forbidden to ride on the implement or climb the implement when it is running. This prohibition also applies to implements with step surfaces or platforms.

Make sure that nobody is riding on the implement.

MD 095

Read and follow the operating manual and safety information before starting up the implement!

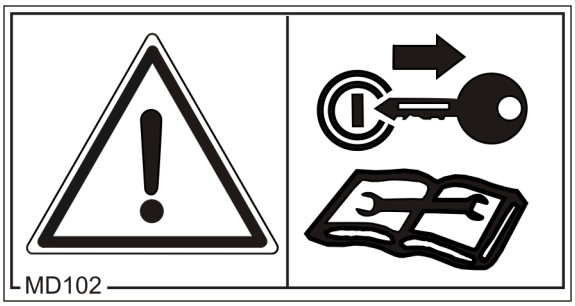


MD 102

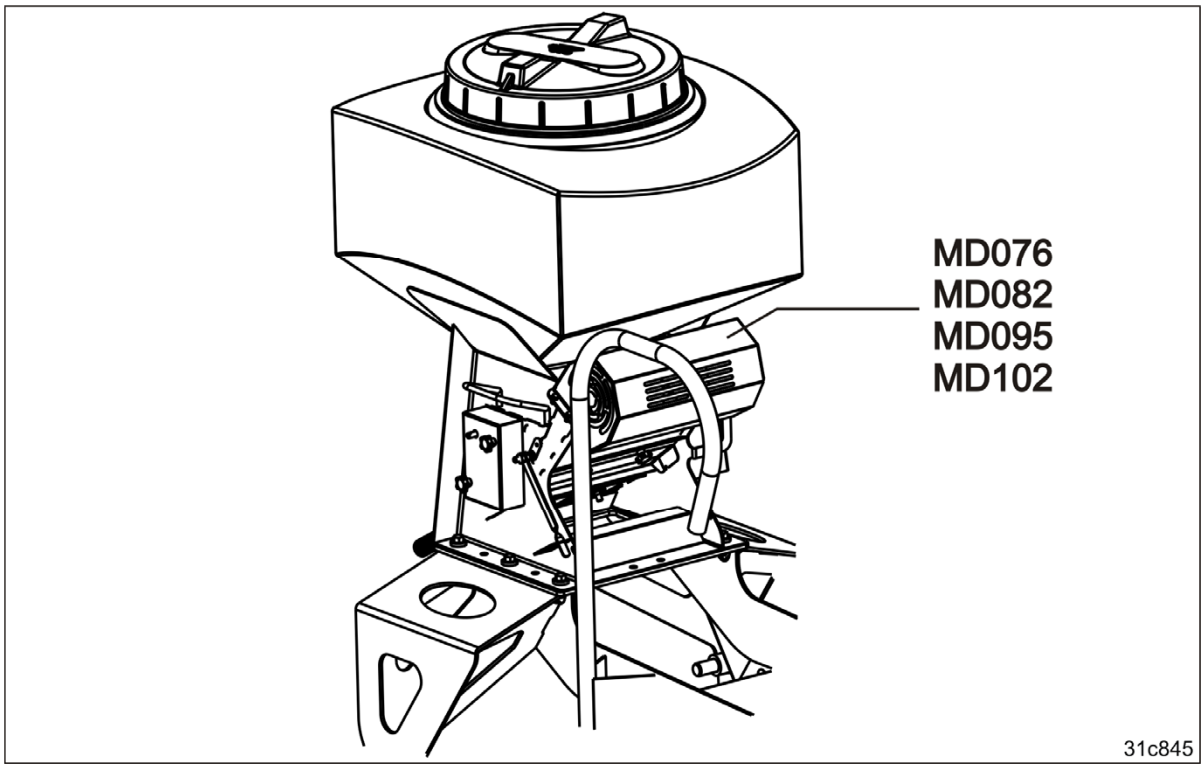
Danger from intervention in the implement, e.g. installation, adjusting, troubleshooting, cleaning, maintaining and repairing, due to the tractor and the implement being started unintentionally and rolling.

These dangers can cause extremely serious and potentially fatal injuries.

- Secure the tractor and the implement against unintentional start-up and rolling before any intervention in the implement.
- Depending on the type of intervention, read and understand the information in the relevant sections of the operating manual.



1.13.1 Positions of warning symbols and other labels



1.14 Safety information for users

Switch off the control terminal

- before road transport.
- before adjustment, maintenance and repair work.

Risk of accident due to unintended movements of the metering unit or other implement components.

1.14.1 General safety instructions and accident prevention instructions

- In addition to these instructions, also comply with the generally valid national and safety and accident prevention regulations!
- The warning and information signs attached on the implement provide important instructions for safe operation of the implement. Compliance with these instructions is essential for your safety!
- Before moving off and starting up the implement, check the immediate area of the implement (children). Ensure that you can see clearly.
- It is forbidden to ride on the implement or use it as a means of transport!
- Drive in such a way that you always have full control over the tractor with the attached implement.

  In so doing, take your personal abilities into account, as well as the road, traffic, visibility and weather conditions, the driving characteristics of the tractor and the connected or coupled implement.

Use of the implement

- Before starting work, ensure that you understand all the equipment and actuation elements of the implement and their function. There is no time for this when the implement is already in operation!
- Wear tight-fitting clothing! There is an increased risk of loose clothing getting caught or entangled on drive shafts!
- Only place the implement in service after all protective devices have been attached and are in protective position!
- Comply with the maximum load of the connected implement and the approved axle and support loads of the tractor. If necessary, drive only with a partially filled tank.
- It is forbidden to stand in the working area of the implement.
- It is forbidden to stand in the turning and swivel range of the implement.
- There are crushing and shearing hazards on implement parts actuated by external force (e.g. hydraulically)!
- Only actuate implement parts actuated by external force if personal are maintaining an adequate safety distance to the implement!
- Secure the tractor against unintentional start-up and rolling, before you leave the tractor.

  For this:
  - o Lower the implement onto the ground.
  - o Apply the parking brake
  - .o Switch off the tractor engine.
  - o Remove the ignition key.

1.14.2 Hydraulic system

- The hydraulic system is under a high pressure.
- Ensure that the hydraulic hose lines are connected correctly.
- When connecting the hydraulic hose lines, ensure that the hydraulic system is depressurised on both the implement and tractor sides.
- It is forbidden to block the operator controls on the tractor which are used for hydraulic and electrical movements of components, e.g. folding, swivelling and pushing movements. The movement must stop automatically when you release the appropriate control. This does not apply to equipment movements that:
  - are continuous or
  - are automatically locked or
  - require a float position or pressure position due to their function.
- Before working on the hydraulic system,
  - lower the implement.
  - depressurise the hydraulic system.
  - Switch off the tractor engine.
  - apply the tractor parking brake.
  - take out the ignition key.
- Have the hydraulic hose lines checked at least once a year by a specialist for proper functioning.
- Replace the hydraulic hose lines if they are damaged or worn. Only use our original AMAZONE hydraulic hose lines.
- The hydraulic hose lines should not be used for longer than six years, including any storage time of maximum two years. Even with proper storage and approved use, hoses and hose connections are subject to natural aging, thus limiting the length of use. However, it may be possible to specify the length of use from experience values, in particular when taking the risk potential into account. In the case of hoses and hose lines made of thermoplastics, other guide values may be decisive.
- Never attempt to plug leaks in hydraulic hose lines using your hand or fingers.

  Escaping high pressure fluid (hydraulic fluid) may pass through the skin and ingress into the body, causing serious injuries!

  If you are injured by hydraulic fluid, contact a doctor immediately. Risk of infection.
- When searching for leakage points, use suitable aids, to avoid the serious risk of infection.

1.14.3 Electrical system

- When working on the electrical system, always disconnect the battery (negative terminal).
- Only use the prescribed fuses. If fuses are used that are too highly rated, the electrical system will be destroyed – risk of fire.
- Ensure that the battery is connected correctly – firstly connect the positive terminal and then connect the negative terminal. When disconnecting the battery, disconnect the negative terminal first, followed by the positive terminal.
- Always place the appropriate cover over the positive battery terminal. If there is accidental earth contact, there is a danger of explosion!
- Risk of explosion. Avoid sparking and naked flames in the area of the battery.
- The implement may be equipped with electronic components whose function is influenced by electromagnetic interference from other units. Such interference can pose risks to people, if the following safety information is not followed.
  - In the case of retrofitting electrical units and/or components on the implement, with a connection to the on-board power supply, the operator is responsible for checking whether the installation might cause faults on the vehicle electronics or other components.
  - Ensure that the retrofitted electrical and electronic components comply with the EMC directive 89/336/EEC in the appropriate version and carry the CE mark.

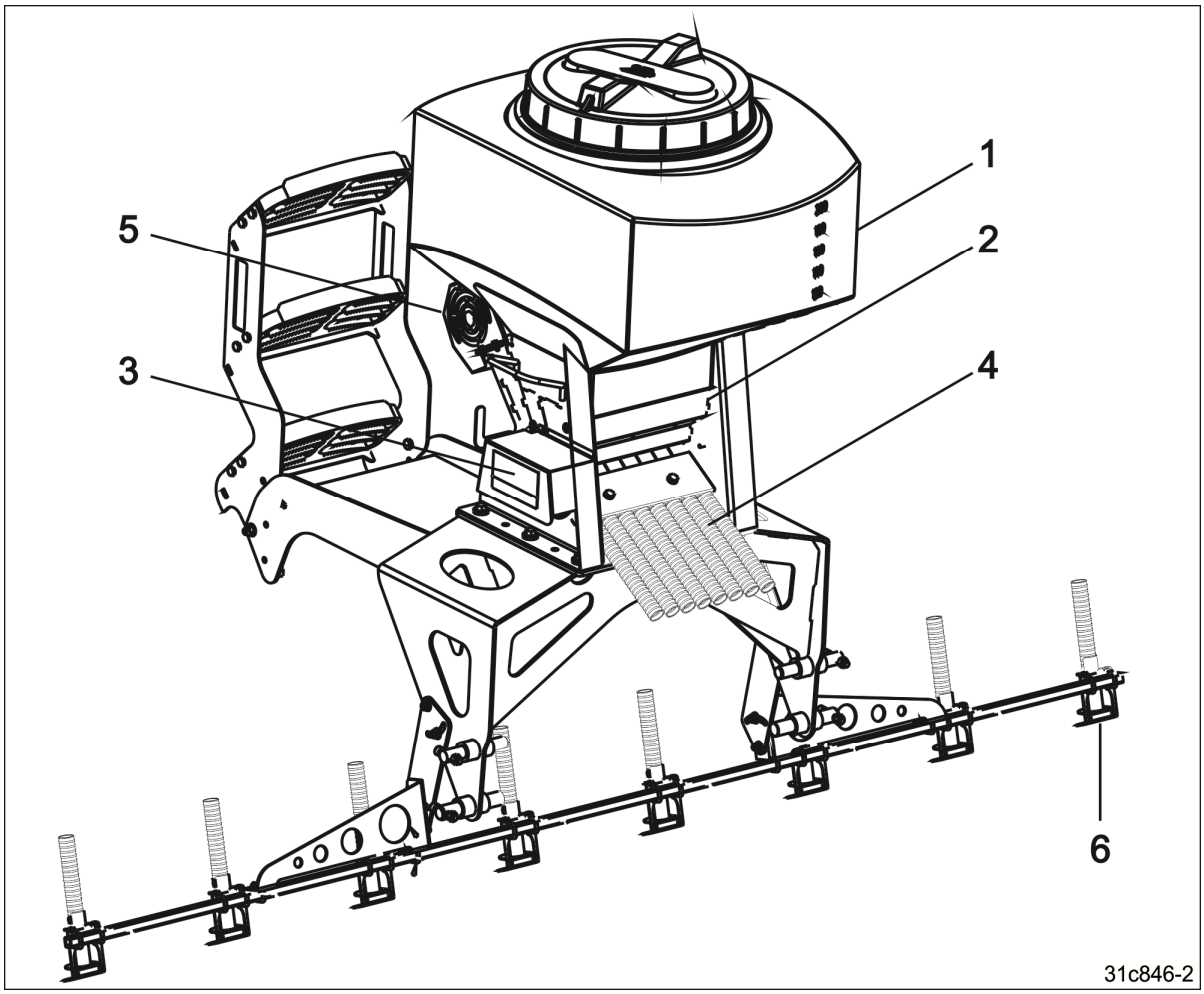
1.14.4 Operation of the seed drill

- Observe the permissible fill levels of the seed box (capacity of the seed box).
- Only use the steps and the platform when filling the seed box.
  It is forbidden to ride on the implement during operation.
- During the calibration test, note the danger points from rotating and oscillating implement parts.
- Before transportation, remove the thrust collars of the tramline marker.
- Do not place any parts in the seed box.
- Lock the track marker (construction-dependent) in the transport position before transportation.

1.14.5 Cleaning, maintenance and repair

- Only carry out cleaning, maintenance and repair work on the implement when:
  - The drive is switched off.
  - The tractor engine is at a standstill
  - The ignition key has been removed.
  - The implement's connector has been disconnected from the on-board computer!
- Regularly check the nuts and bolts for a firm seat and retighten them as necessary.
- Secure the raised implement and/or raised implement parts against unintentional lowering before performing any cleaning, maintenance or repair work on the implement!
- When replacing work tools with blades, use suitable tools and gloves.
- Dispose of oils, greases and filters in the appropriate way.
- Disconnect the cable to the tractor generator and battery, before carrying out electrical welding work on the tractor and on attached implements.
- Spare parts must meet at least the specified technical requirements of AMAZONEN-WERKE! This is ensured through the use of original AMAZONE spare parts.

2 Product description



(1) Seed hopper
(2) Dosing unit with sowing shaft
(3) Electric motor for sowing shaft drive
(4) Seed delivery hose
(5) Blower fan
(6) Baffle plate

2.1 Intended use

The GreenDrill catch crop seed drill is intended for conventional use in farming and serves for metering and spreading of seeds.

The following table contains the implements that can be combined with the AMAZONE GreenDrill 200-E and AMAZONE GreenDrill 500-H.

AMAZONE							
GreenDrill 200-E	Catros	3001	3501	4001	4001-2	5001-2	6001-2
	Catros+	3001	3501	4001	4001-2	5001-2	6001-2
	Cenius	3002	3502	4002	-	-	-
	KE	3000	3500	4000	-	-	-
	KX	3000	-	-	-	-	-
	KG	3000	3500	4000	-	-	-
	D9-60						
	D9-6000 TC						
GreenDrill 500-H	Catros	4001-2TS		5001-2TS		6001-2TS	
	Catros^{+}	4001-2TS		5001-2TS		6001-2TS	
	Cenius	4002-2T		-		-	

Any use other than those listed above, especially mounting the GreenDrill on machines from other manufacturers or AMAZONE machines not listed here, is considered as non-intended.

Mounting the GreenDrill using the assembly parts that are not intended for the respective machine is also considered non-intended use.

AMAZONEN-WERKE is not liable for any damage resulting from non-intended use, the operator bears the sole responsibility.

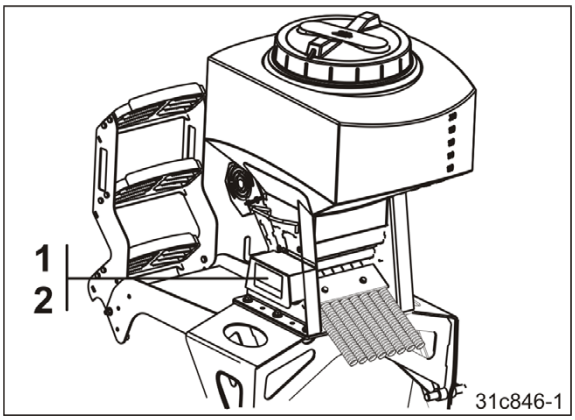
2.2 Technical data

Catch crop seed drill	GreenDrill 200-E	GreenDrill 500-H
Seed hopper volume [l]	200	500
Outlets [number]	8	8
Blower fan drive	Electric	hydraulic
Metering	Metering with electrical metering motor	
Automatic seed rate control when changing speed (optional)	Only possible with GreenDrill control terminal 5.2. A connection of the metering motor to the 7-pin signal socket of the tractor is required.	
Seed placement	via baffle plate	

2.3 Rating plate and CE mark

The figure shows the arrangement of the rating plate (1) and the CE mark (2) on the implement.

The CE marking on the indicates compliance with the stipulations of the valid EU directives.



The following information is specified on the rating plate and the CE mark:

(1) Machine ID no.

(2) Type

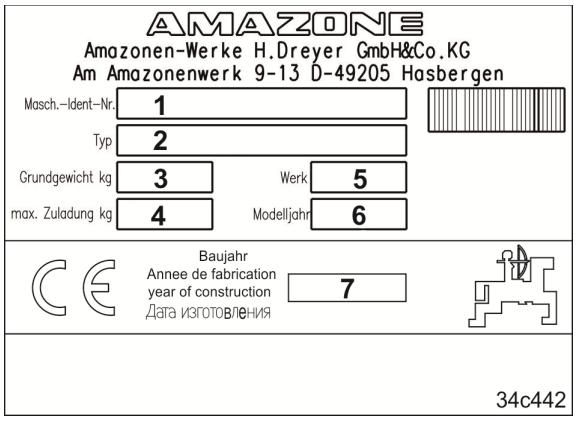
(3) Basic weight kg

(4) max. payload kg

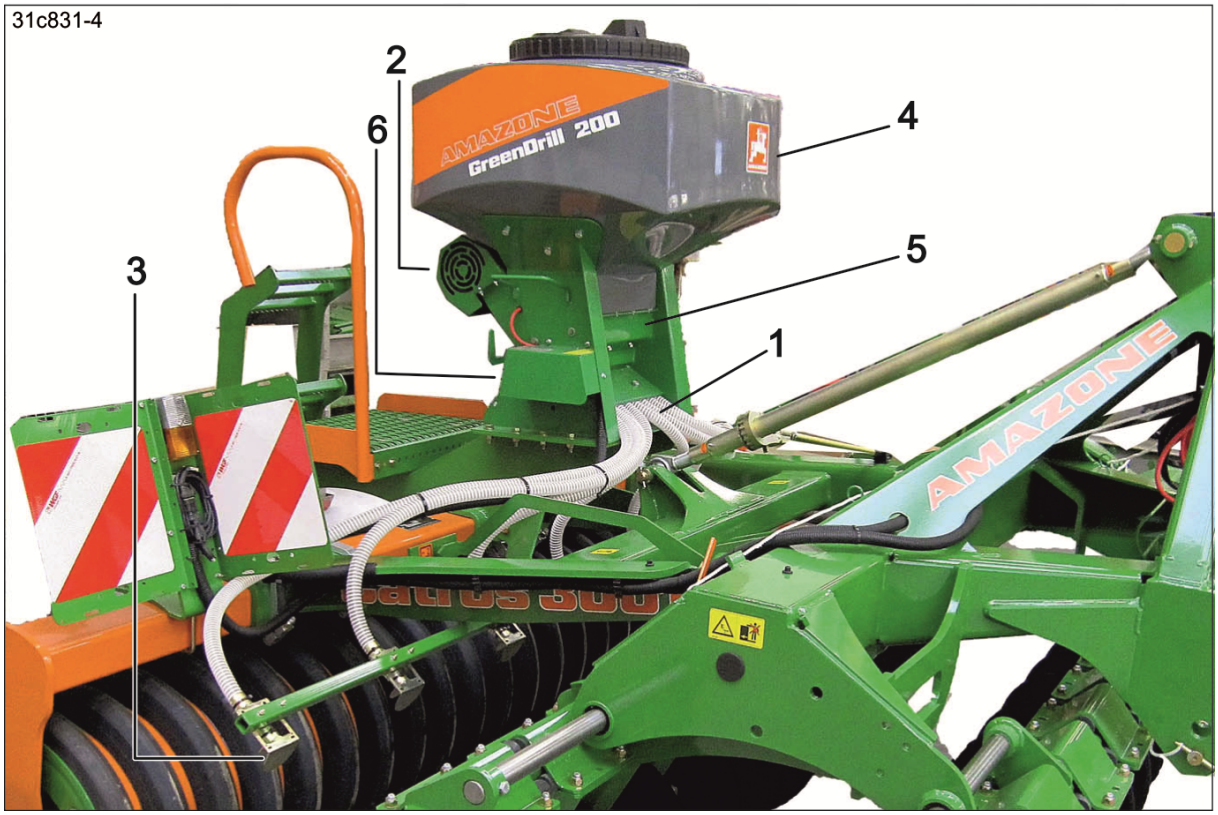
(5) Factory

(6) Model year

(7) Year of manufacture



3 Structure and function



The GreenDrill is used for spreading catch crops and re-seeding grass.

The seed dosed by the seeding wheels is conveyed into the seed hoses (1).

An electrically or hydraulically driven blower fan (2) produces the air flow to deliver the seed. The seed is spread using baffle plates (3) in the operating area of the tillage implement tools working in the soil.

The seed hopper (4) has a volume of 200 or 500 litres, depending on the version. The seed hopper and metering unit form a sealed pressurised system.

Dosing is carried out by a sowing shaft equipped with seed wheels, located in the dosing housing (5). A 12V electric drive motor (6) drives the sowing shaft.

The GreenDrill control terminal is available in two versions and is operated from the driver's seat in the tractor cab.

The control terminal 3.2
serves to switch the seeding shaft and the blower fan on and off. The speed of the seeding shaft can be adjusted.

The control terminal 5.2
has a selection menu, e.g., for calibration test assistance.

The control terminal 5.2 must be connected to the 7-pin signal socket of the tractor to display the forward speed, the worked area and the working hours.

The control terminal then shows the forward speed [km/h] and adjusts the seeding shaft speed according to the changing forward speed. The sowing rate remains unchanged even at varying tractor speeds. If it is set correctly, speed differences of 50% are adjusted up and down. Even turning at the end of the field is automatic.

3.1 Metering

Seed metering wheels

Each seed wheel is made up of several smaller units.

The fine seed metering wheel consists of

- one fine seed metering wheel (f)
- three blind seed metering wheels (fb)
  (blind seed metering wheels do not meter any seed)

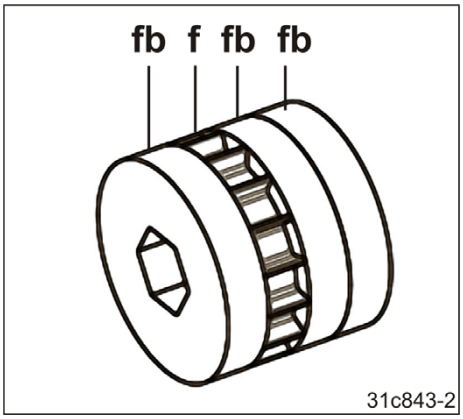
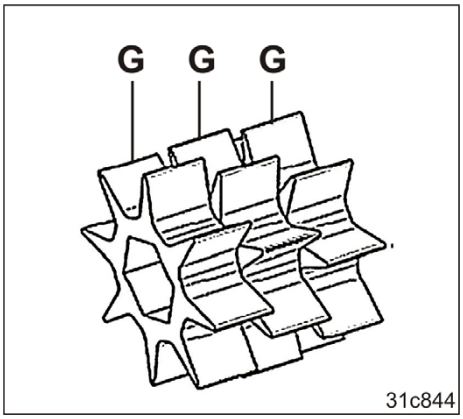
In this combination, the seed wheel has the designation "fb-f-fb-fb".

The coarse seed metering wheel consists of

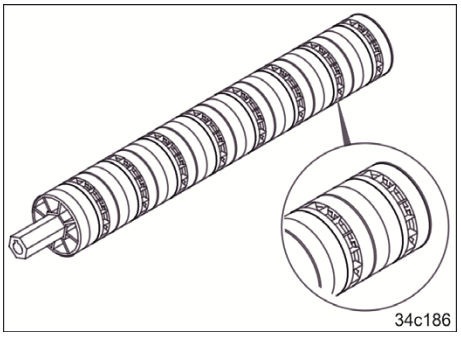
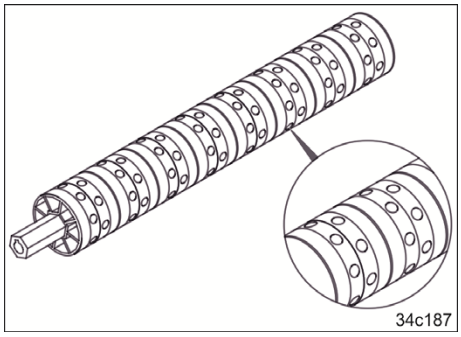
three coarse seed metering wheels (G)

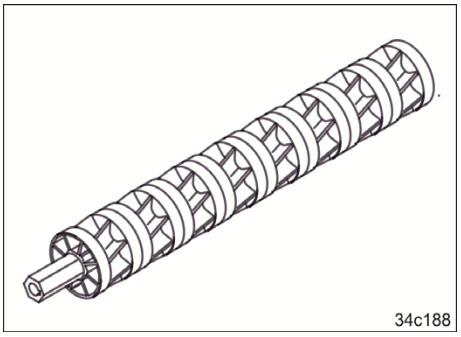
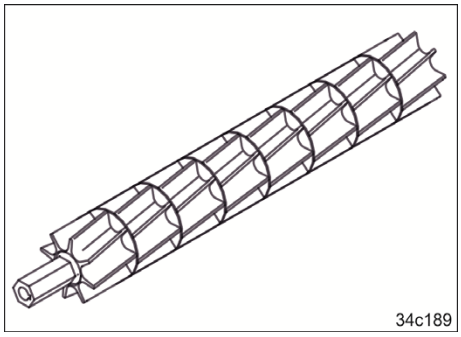
In this combination, the seed wheel has the designation "G-G-G".

The seed wheel selection depends on the seed type and can be found in the sowing table (see Appendix).

		
Seed wheel	fb-f-fb-fb	GGG
Components	Fine blind seed metering wheel (fb) Fine seed metering wheel (f) Fine blind seed metering wheel (fb) Fine blind seed metering wheel (fb)	Coarse seed metering wheel (G) Coarse seed metering wheel (G) Coarse seed metering wheel (G)
Field of application:	For seeds • with small grain size • with low spread rates e.g.,, mustard and buckwheat	For seeds • with large grain size • with high spread rates e.g., grasses and cereals

Seed metering wheels (optional)

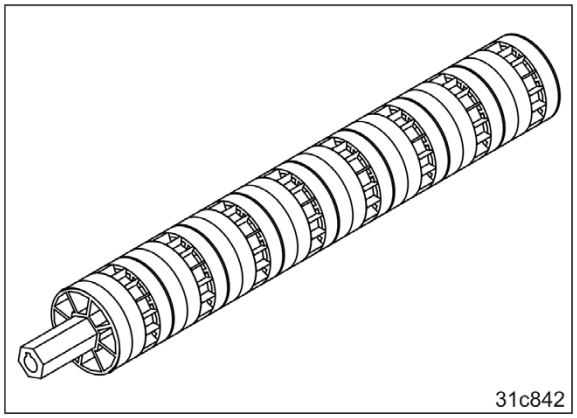
	 34c186	 34c187
Seed wheel	fb-fb-ef-eb-fb	fb-efv-efv-fb
Seed	Clover and poppy	Rapeseed and mustard

	 34c188	 34c189
Seed wheel	fb-Flex20-fb	Flex40
Seed	Peas and beans	Peas and beans

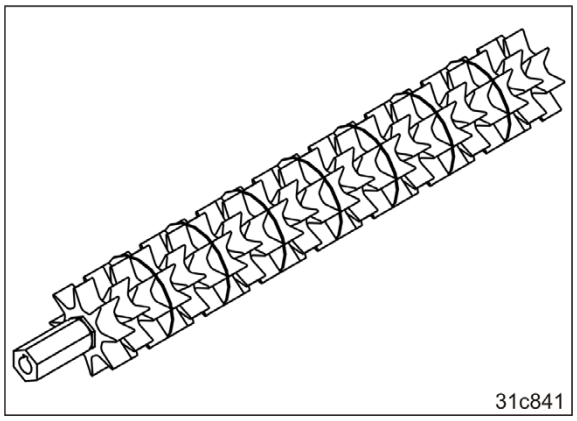
Seeding shaft

The sowing shaft is made up of several identical seed wheels.

The seeding shaft for fine seeds consists of 8 seed metering wheels (fb-f-fb-fb).



The seeding shaft for normal seeds consists of 8 seed metering wheels (GGG).



sowing shaft speed

Control terminal 3.2

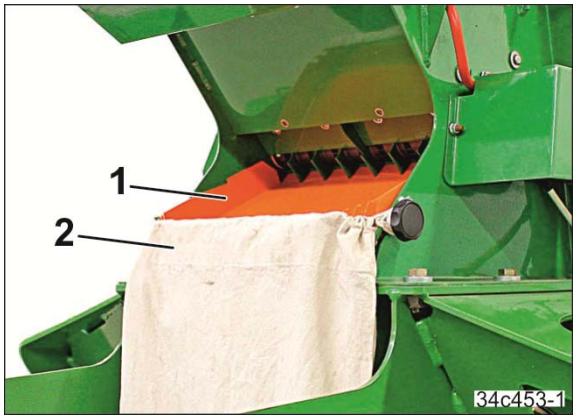
An electric motor drives the sowing shaft. The working speed selected for the calibration test must always be maintained, as the speed of the sowing shaft determined with the calibration test does not change.

Control terminal 5.2

An electric motor drives the sowing shaft. If the control terminal is connected to the 7-pin tractor signal socket with speed sensor or the implement is equipped with a radar or GPS, the speed of the seeding shaft is automatically adjusted for the working speed. The seeding rate always remains the same even at different working speeds.

Calibration test

For the calibration test and when emptying the seed hopper, the seed drops into the collection bag (2) over the chute (1).



Always carry out a calibration test

- during the initial operation
- when changing the sort
- if the same sort is used, but of a different quality and specific weight
- after changing the sowing shaft
- if the seed hopper is emptied faster / slower than expected. In this case, the actual application rate does not match the application quantity determined in the calibration test.
- if the working speed changes. (not required when connected to signal socket).

3.1.1 Scraper lever position

An adjustable scraper is attached above the sowing shaft.

The scraper can be adjusted using a lever (1) on a scale of +4 to -5. Adjusting the lever allows finer dosing of the seed spread rate.

Scale values -1 to -5:
The scraper is pressed against the sowing shaft using the lever. The spread rate decreases slightly.

Scale values +1 to +4:
The scraper is lifted off the sowing shaft using the lever. The spread rate increases slightly.

The scale values are recommendations.

For free-flowing fine seeds, set the lever slightly to a minus position on the scale.
For large seeds, set the lever slightly to a plus position on the scale.

The seeding table values (see section "Sowing tables", Seite 95) were determined at lever position "0".

3.2 Blower fan

The blower fan generates a flow of air that conveys the metered material to the baffle plates.

The blower fan of the GreenDrill 200-E is electrically driven.

The blower fan of the GreenDrill 500-H is hydraulically driven.

3.2.1 Electric blower fan drive

The blower fan of the GreenDrill 200-E is electrically driven.

The control terminal 3.2 and the control terminal 5.2 serve to switch the electric blower fan drive on and off. The blower fan speed does not change.

3.2.2 Hydraulic blower fan drive

The blower fan of the GreenDrill 500-H is hydraulically driven.

The blower fan hydraulic motor is connected together with the control valve of the GreenDrill to a single-acting tractor control unit. The tractor control unit serves to switch the blower fan on and off.

The blower fan speed is adjusted using the flow control valve of the tractor. If the tractor does not have a flow control valve, the control valve of the GreenDrill serves to adjust the blower fan speed.

The blower fan speed determines the air volume of the air current. The higher the blower fan speed, the greater is the air volume generated.

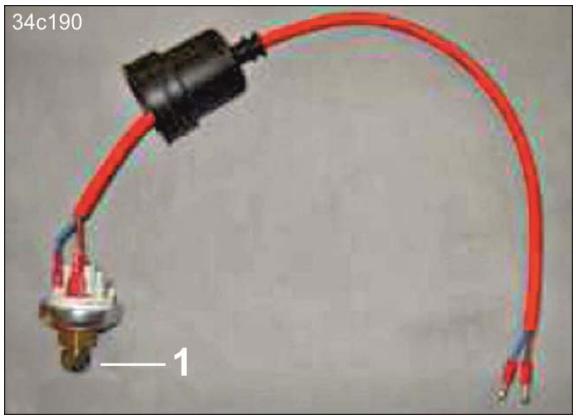
As an option, the hydraulic blower fan drive has a pressure sensor (1).

With a pressure sensor, the control terminals 3.2 and 5.2 show whether the blower fan is switched on or off.

The red control lamp above the button is illuminated when the blower fan is switched on.

The button has no function with a hydraulic drive.

Connect the pressure sensor to the implement cable (see section "Implement cable connection diagram", page 86).



The required air quantity depends on the

- seed (grain size and weight)
- application rate
- working width
- working speed

The values in the blower fan speed table are recommendations. Set the correct blower fan speed for the required air volume according to the spread pattern on the field.

Blower fan speed table			
Working width	3 m	6 m	12 m
Normal seed	2000-2600 [rpm]	2600-3400 [rpm]	3400-5000 [rpm]
Fine seed	1200-2000 [rpm]	2000-2600 [rpm]	2600-3400 [rpm]

A strong flow of air is required for optimal distribution of the seed. If the air flow is too strong, the seed can be damaged on the baffle plates. If the air flow is too weak, there may be blockage in the seed tube hoses.

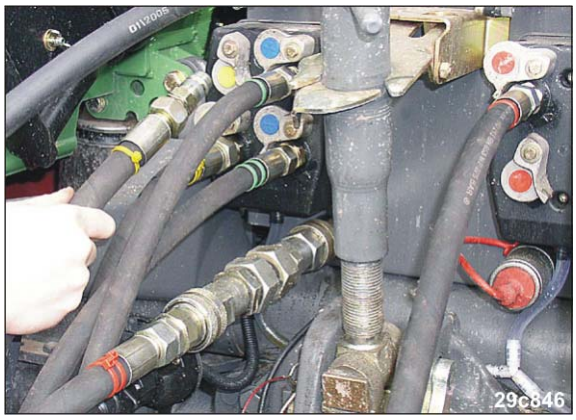
Keep the blower fan speed constant during operation to prevent uneven seeding.

When the blower fan of the GreenDrill is hydraulically driven, ensure that the programming menu is correctly set:

- section 6.18.2, page 88
- section 6.18.10, page 91
- section 6.18.11, page 91

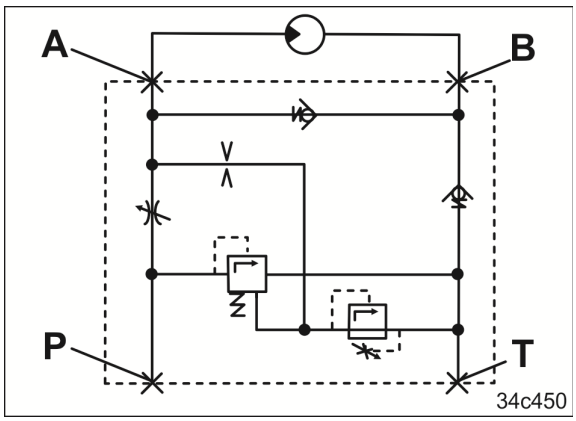
3.2.2.1 Connecting the hydraulic hose lines to the tractor

Connect the hydraulic hose lines of the blower fan hydraulic motor to the tractor hydraulic system as follows.



Hydraulic hose line labelling GreenDrill		Connection to the tractor	Function
P	Red	Single-acting tractor control unit	Blower fan hydraulic motor drive
T	Yellow	Pressure-free return flow	

Blower fan drive hydraulic diagram	
A	Maximum hose length: 1m
B	Maximum hose length: 1m
P	Single-acting tractor control unit (marked red)
T	Pressure-free return flow[1)] (marked in yellow)

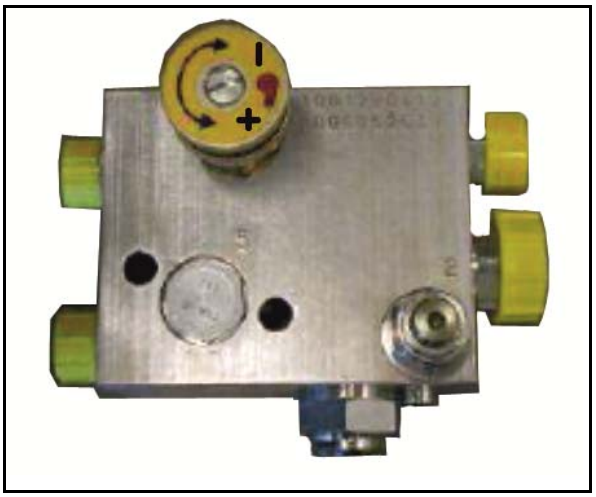


1) The maximum permissible pressure in the oil return is 10 bar. Do not connect the oil return to the tractor control unit, but rather on a pressure-free oil return with a large plug coupling. Only use DN16 lines for the oil return and select short return paths.

3.2.2.2 Setting the blower fan speed on tractors with flow control valve

1. Close the flow control valve of the tractor (set oil quantity to 0).
2. Screw the GreenDrill control valve (+-) out completely (plus).
3. Run the tractor engine up to operating speed.
4. Set the blower fan to the desired blower fan speed.

   → Actuate the flow control valve of the tractor and slowly increase the oil quantity.

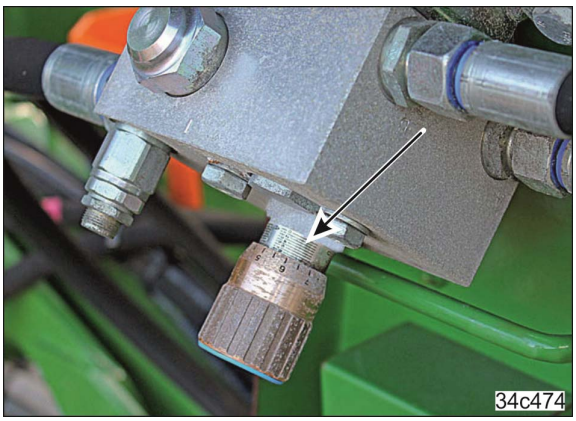


3.2.2.3 Setting the blower fan speed on tractors without flow control valve

1. Screw the GreenDrill control valve (+-) in completely (minus).
2. Run the tractor engine up to operating speed.
3. Switch on the blower fan.

   → Actuate the tractor control unit.
4. Set the blower fan speed.

   → Actuate the control valve (+-) of the GreenDrill.
   The required scale value can be found in the following table. The scale values are recommendations.



Working width	3m	6m	12m
	Scale		
Normal seed	3	4	max.
Fine seed	2	3	4

Close the control valve (+-) of the GreenDrill before actuating the tractor control unit to prevent damage when the blower fan over-revs.

3.2.2.4 Warming of the hydraulic fluid

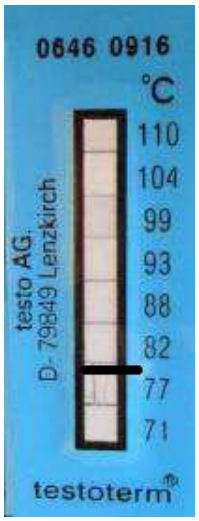
The hydraulic fluid must not overheat. High oil flow rates in conjunction with small oil tanks encourage rapid heating-up of the hydraulic fluid. The capacity of the tractor's oil tank should be at least twice the oil flow rate.

A measurement strip with a scale [C] shows the housing temperature of the hydraulic motor of the GreenDrill.

With increasing temperature (from 71 to 110 C), the scale becomes black.

The oil temperature may not exceed 80 C.

High oil flow rates can cause overheating. The maximum oil flow rate is 80 l/min.



4 Settings before commissioning

DANGER

Before working on the implement

- **Position the combination on a firm, horizontal surface.**
- **Unfold the combination (if necessary)**
- **Switch off the tractor's universal joint shaft, apply the parking brake, shut down the tractor engine and remove the ignition key**
- **Wait until the tines of the rotary harrow (rotary cultivator) have come to a standstill**
- **Switch off the control terminal.**

DANGER

Risk of crushing, cutting, being trapped or drawn in, or impact through inadequate roadworthiness and operational safety.

Before starting up the machine and tractor, always check their roadworthiness and operational safety.

WARNING

When using the machine, observe the safety instructions

- **in this operating manual**
- **in the operating manual of the base machine.**

DANGER

Before filling the seed hopper, couple und unfold the base machine to the tractor (if possible). Position the mounted base machine on a firm, horizontal surface.

Apply the tractor parking brake, switch off the engine and remove the ignition key.

CAUTION

The seed hopper and metering unit form a sealed pressurised system.

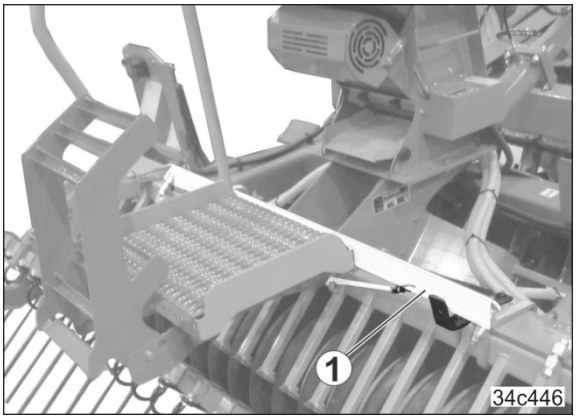
Never open the seed hopper cover or metering unit cover with the blower fan running. Seed escapes uncontrollably.

Leaks in the sealed system may affect the spread rate.

4.1 Transport safety bar in parking position

Put transport safety bars in parking position elsewhere if the mounting of the GreenDrill requires the dismounting of the standard brackets for the transport safety bar.

The parking position of the transport safety bars (1) on the rigid implements Cenius and Catros in combination with the GreenDrill.

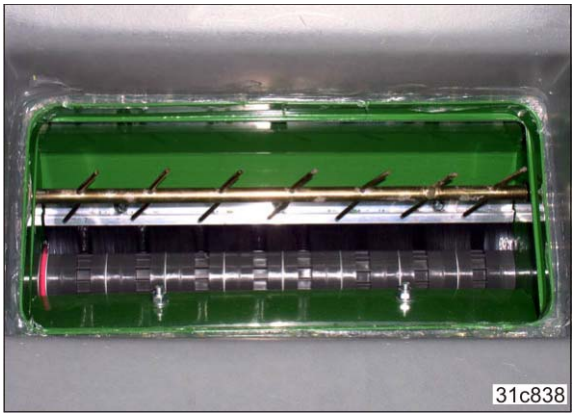


4.2 Switching off the agitator shaft drive

The agitator shaft should be running when using seeds that

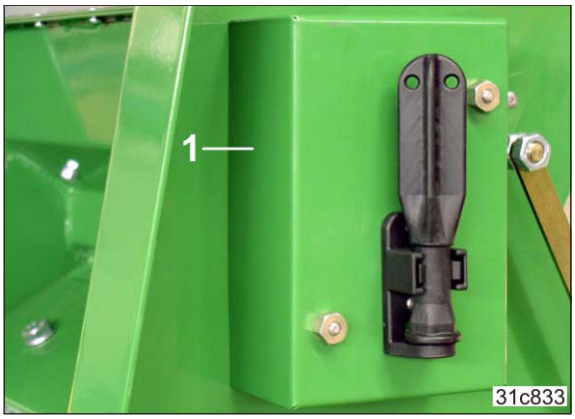
- tend towards bridging
- are very light, e.g. grass.

The agitator shaft drive can be switched off when the seed flows down well.

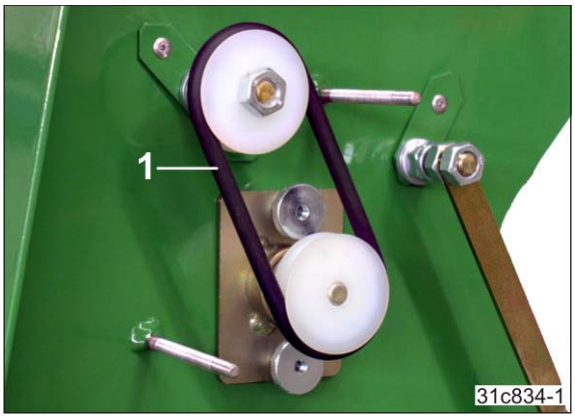


Switching off the agitator shaft drive

1. Remove the cover (1).

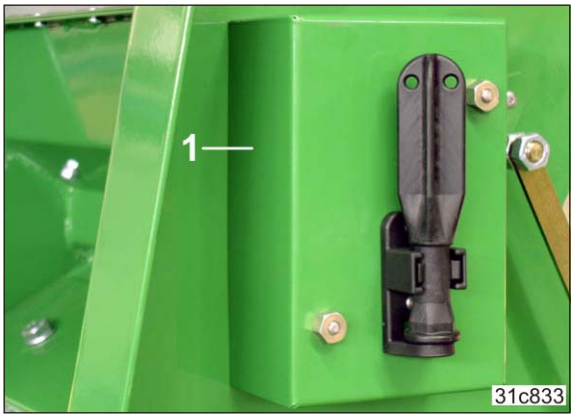


2. Remove the round belt (1).
   The agitator shaft is driven by the seeding shaft via the round belt.
3. Install the cover.

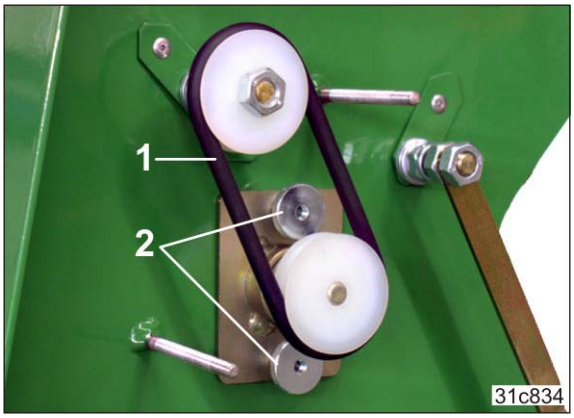


4.3 Replacing the seeding shaft

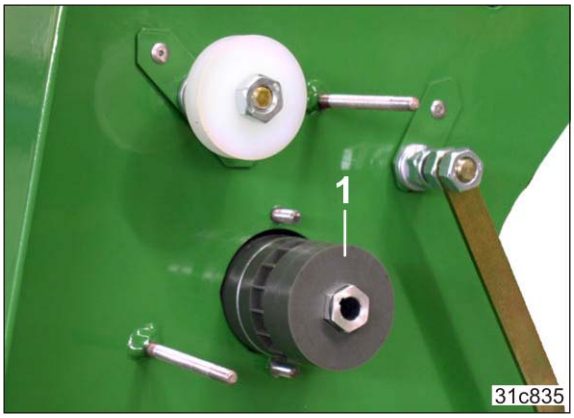
1. Empty the seed hopper.
2. Remove the cover (1).



3. Remove the round belt (1).
4. Release the knurled nuts (2).



5. Remove the cover and pull out the sowing shaft (1).
6. Refer to the sowing table for the required sowing shaft and install in the reverse order.



4.4 Fill the seed hopper

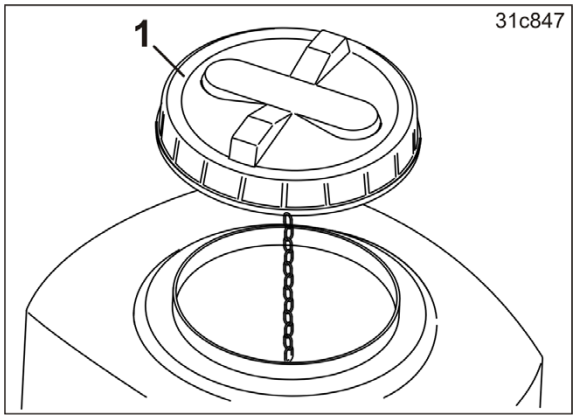
Before climbing onto the loading board

- Switch off the tractor's universal joint shaft, apply the parking brake, shut down the tractor engine and remove the ignition key
- Wait until the tines of the rotary harrow (rotary cultivator) have come to a standstill.
- Switch off the control terminal.

The seed hopper cover (1) has a threaded seal.

Open the seed hopper cover and slowly fill the seed hopper. Do not exceed the nominal volume.

Screw on the seed hopper cover so that the seed hopper is closed air-tight.



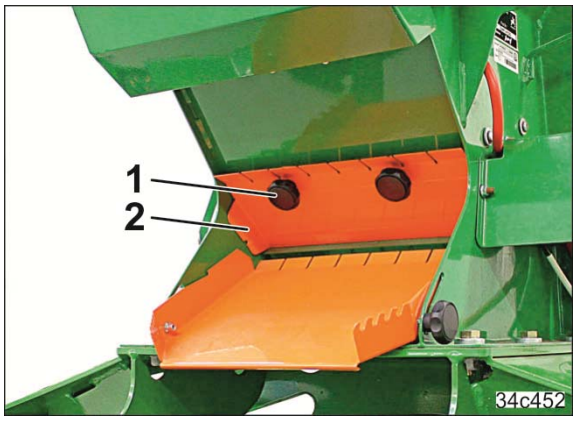
4.4.1 Filling level sensor

With the control terminal 5.2, the seed level in the seed hopper can be monitored.

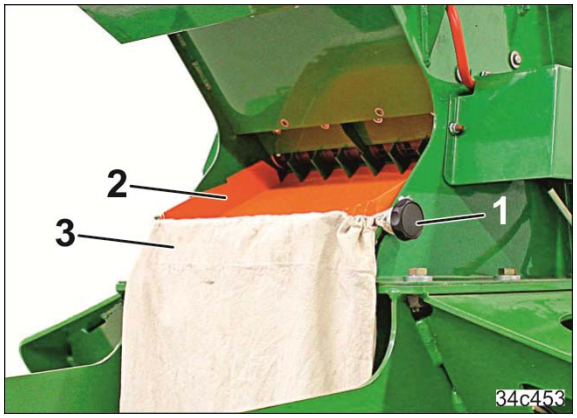
When the seed level reaches the filling level sensor, the control terminal issues a warning message. This alarm signal is intended to remind the tractor driver to fill up the seeds again.

4.5 Preparing the implement for for a calibration test or for emptying the seed hopper

1. Release the star handles (1) and remove the calibration plate (2).



2. Release the star handle (1), push up the chute (2) and re-fasten.
3. Fasten the collection bag (3) on the chute to collect the seed.



4. Perform the calibration test as described, see section
   - o Control terminal 3.2 (Calibration test)
   - o Control terminal 5.2 (Calibration test).
5. Empty the seed hopper as described, see section
   - o Control terminal 3.2 (Emptying the seed hopper)
   - o Control terminal 5.2 (Emptying the seed hopper)
6. The chute and the calibration tray are reassembled in the reverse order.

5 GreenDrill control terminal 3.2

5.1 Contents list

(1) GreenDrill control terminal 3.2

(2) Bracket for control terminal

(3) Power cable

(3.1) for 3-pin tractor standard socket
(see section "Power cable - Connection to the 3-pin tractor standard socket", page 52)

( ) for the battery connection (optional)
(see section "Battery cable with 3-pin standard socket", page 52).

5.2 Housing components

(1) Plug (3-pin) for power supply

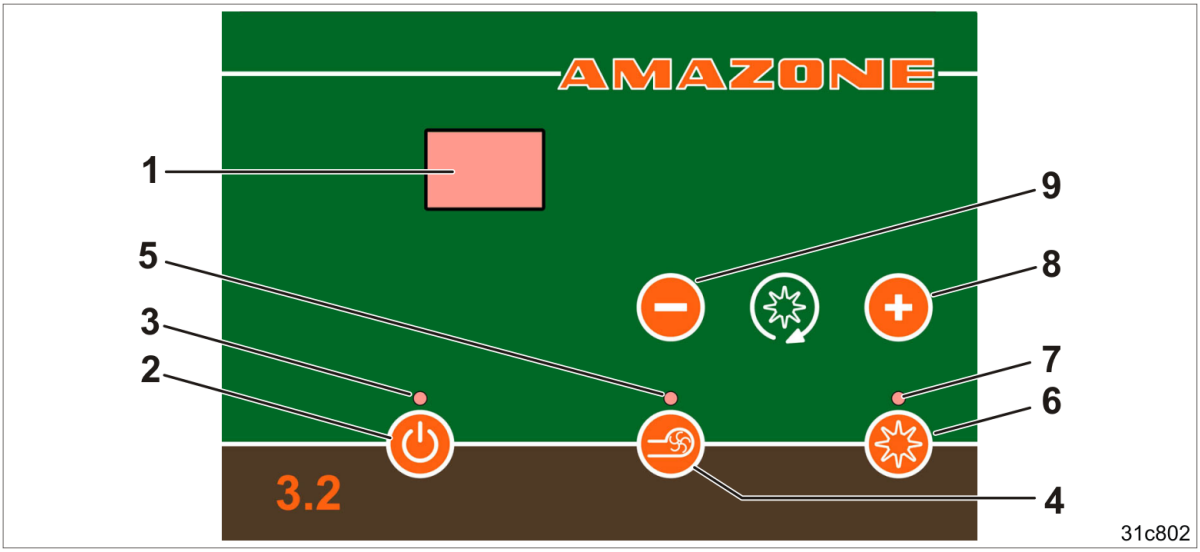
(2) Signal connector (6-pin).

A 6 m-long implement cable connects the control terminal with the GreenDrill.

As an option, the implement cable can be extended with a 5 m-long cable.

(3) 30A fuse

5.3 Operating elements



(1) Display

(2) On/Off button

(3) The control lamp is illuminated when the control terminal is switched on

(4) Switch the electric blower fan drive on and off

The button is without function with hydraulic blower fan drive

(5) The red control lamp is illuminated when the blower fan is switched on.

With hydraulic blower fan drive, an optional pressure sensor is required, see section "Hydraulic blower fan drive", page 31

(6) Switch sowing shaft on/off

(7) The control lamp is illuminated when the seeding shaft is running

(8) Increase sowing shaft speed

(9) Reduce the seeding shaft speed.

5.4 Control terminal 3.2 start-up

5.4.1 Switching on the control terminal

1. Instruct any people in the area to stand at a minimum distance of 10 m from the implement.
2. Press the  button
   → The control lamp above the button is illuminated
   → The control terminal is switched on
   → The two-part display shows
   - the device version
   - then the last set seeding shaft speed, e.g., 50%

The sowing shaft motor and blower fan motor do not rotate.

The control terminal is switched off after 1.5 hours if no button has been pressed in this time and the seeding shaft is switched off.

5.4.2 Switching off the control terminal

1. Press the  button
   → the control lamp above the button is turned off
   → the control terminal is switched off.
2. Pull the power supply plug out of the control terminal.

When work is completed, first switch off the seeding shaft, then the blower fan and finally the control terminal.

After switching off the control terminal, pull the power supply plug out of the control terminal.

5.5 Determining the sowing shaft speed for the first calibration test

Read the seeding shaft speed for the first calibration test from the sowing table (see Appendix). In the seeding table, the desired spread rate is specified in [kg/min]. This value indicates the weight [kg] of the seed that is spread per minute [min.].

Use the following formula to convert the desired spread rate [kg/ha] into spread rate [kg/min.].

$$\text{spread rate [kg/min.]} = \frac{\text{spread rate [kg/ha]} \times \text{tractor speed [km/h]} \times \text{working width [m]}}{600}$$

Example:

Seed: ..... Rape

Required spread rate 20.2..... [kg/ha]

Tractor speed .....12.0 [km/h]

Working width.....4.0 [m]

$$\text{spread rate [kg/min.]} = \frac{20.2 \text{ [kg/ha]} \times 12.0 \text{ [km/h]} \times 4.0 \text{ [m]}}{600} = 1.62 \text{ [kg/min.]}$$

Refer to the sowing table for the sowing shaft speed for the first calibration test.

Seed: ..... Rape

Sowing shaft with seed wheels: ..... fb-f-fb-fb

Application rate..... 1.617 [kg/min]

Seeding shaft speed ..... 50 [%]

The sowing table values are guide values which may change due to grain shape, grain size, thousand-seed weight and dressing. The exact sowing shaft speed for the required spread rate is derived from the values of the calibration tests.

5.6 Calibration test

Switch off the blower fan motor and sowing shaft motor.

1. Prepare the implement for the calibration test (see section 4.5, page 41).
2. Check that the correct sowing shaft has been fitted.
3. Fill the seed hopper.
4. The blower fan cannot be switched on during the calibration test.
5. Determine the seeding shaft speed for the first calibration test (see section 5.5, page 45).
6. Switch on the control terminal.
7. Enter the determined seed shaft speed (e.g. 50 [%], see example, section 5.5, page 45) using the buttons on the control terminal.
8. Start the calibration test:
   Press the button, hold, and press the button
   → the sowing shaft rotates for precisely one minute.
9. Weigh the calibrated, collected seed quantity [kg/min.] and compare with the required seed quantity.
   Example:
   - required spread rate: 1.62 kg/min.
   - Actual spread rate: 1.46 kg/min. at sowing shaft speed 50.

   The actual spread rate differs from the required spread rate by 10%.
10. Change the sowing shaft speed in percentages
    (see example: increase by 10% to 55).
    A small change in the spread rate can also be achieved by adjusting the scraper lever.
11. Repeat the calibration test until the desired spread rate is achieved.

The calibration test can be terminated early by pressing one of the buttons and .

5.7 Starting work at the beginning of the field

Do not switch off the blower fan during use.

Before starting work

1. Close the seed hopper cover.
2. Check that the baffle plates are evenly distributed over the working width
3. Check that the seed delivery hoses drop downwards along the entire length.

Work commencement

1. Instruct any people in the area to stand at a minimum distance of 10 m from the implement.
2. Start the tractor.
3. Press the button
   → The green control lamp above the button is illuminated.
   → The control terminal is switched on
   → The two-part display shows
      → the implement version,
      → and then the seeding shaft speed [speed in %].
4. Press the button
   → The red control lamp above the button is flashing
   → The blower fan begins to rotate
   → When the blower fan nominal speed is reached, the control lamp stops flashing and is constantly illuminated. With electric blower fan drive, the blower fan speed cannot be changed.
5. Press the button
   → The green control lamp above the button is illuminated.
   → The seeding shaft rotates with the nominal speed.
   → the seed is dosed.

5.8 Turning at end of the field

1. Press the button
   → the green control lamp above the button is turned off
   → the sowing shaft stops
   → the blower fan continues to run.
2. Lift the base machine and turn.
3. When beginning a new pass on the field, press the button
   → the control lamp is illuminated
   → the seed is dosed.

5.9 Emptying the seed hopper

1. Prepare the implement for emptying the seed hopper (see section 4.5, page 41)
2. Switch on the control terminal
3. Do not switch on the blower fan.
4. Press the button, hold it and press the button
   → The seeding shaft rotates at maximum speed
5. Press the button
   as soon as the seed hopper is empty and the seed metering wheels no longer convey seed.
   → The seeding shaft stops.

The seeding shaft drive can be switched off at any time by pressing the button.

5.10 Messages

WARNING

Danger of crushing, shearing, cutting, being caught or drawn in, winding and knocks through:

- **unintentional falling of the implement raised using the tractor's three-point hydraulic system.**
- **unintentional lowering of raised, unsecured implement parts.**
- **unintentional start-up and rolling of the tractor-implement combination.**

Secure the tractor and the machine against unintentional start-up and rolling before eliminating any faults on the machine.

Wait for the machine to stop before entering the danger area of the machine.

Fault

No display on the screen after switching on the control terminal.	**Test points:** • Is the power cable attached correctly o to the control terminal o in the tractor socket • Check the fuse in the control terminal • Check the cable connections to the battery poles when the standard socket is connected to the tractor battery.

Fault messages

If there is a fault, the control terminal displays the error along with an acoustic signal.

The control terminal shows the fault message in a coded form (see Table, unterhalb) alternately with the letter "E".

Fault message	Cause	Troubleshooting
01	Operating voltage is too low	Reduce consumer Check the battery and cables Check the alternator
02	Operating voltage is too high	Check the alternator
03	Internal control voltage is too low	Contact customer services
04	The sowing shaft is blocked	Switch off the control terminal Remove any foreign objects from the seeding and agitator shaft.
05	The seeding shaft motor is without current.	Check the connector and cable
06	The seeding shaft motor is not rotating. · with proper connection · without being blocked.	Contact customer services
07	The blower fan motor is blocked	Switch off the control terminal Remove any foreign objects from the blower fan area.
08	The wiring is incorrect or not even connected	Check the wiring and connector.
09	The blower fan motor is not rotating. • with proper connection • without being blocked.	Contact customer services

In case of a fault

- Switch off the control terminal
- Switch off the tractor's universal joint shaft, apply the parking brake, shut down the tractor engine and remove the ignition key
- Eliminate the fault using the Table (see oben).

5.11 Installations and connections - Control terminal 3.2

5.11.1 Installation of control terminal 3.2

Fasten the bracket (1) in the tractor cab with two screws.

Bend the bracket so as to provide optimum reading of the display.

Insert the control terminal on the bracket in the tractor cab.

5.11.2 Implement cables – Connection of GreenDrill and control terminal

The implement cable connects the control terminal with the GreenDrill.

Connect the implement cable to the 6-pin signal socket (1) of the control terminal.

Store the spare cable in the cab.
Do not coil up the cable.

5.11.3 Power cable - Connection to the 3-pin tractor standard socket

Connect the power cable (1)

- to the control terminal and
- to the 3-pin standard socket in the tractor cab.

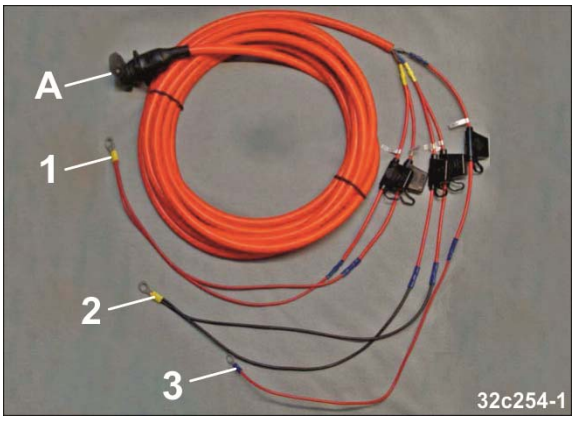
Never connect the 12 volt power supply to the cigarette lighter socket.

5.11.3.1 Battery cable with 3-pin standard socket (optional)

If the tractor does not have a 3-pin standard socket, the control terminal can be connected to a 3-pin standard socket (A, optional) that is directly connected to the tractor battery with a cable set.

Connect the cable ends to the poles of the 12-volt battery.

Nr.	Colour	Battery connection
1	Red	Positive pole
2	Black	Negative pole
3	Red	Positive pole (ignition positive)



When not in use, disconnect the control terminal from the power supply.

Pull the plug of the control terminal out of the standard socket (A) of the cable set.

Never run a battery charging device together with the control terminal.

5.12 Customer services

The following settings on the control terminal should only be performed by customer service.

Before making any settings, switch off the blower fan motor and seeding shaft motor.

5.12.1 Blower fan drive - Electric or hydraulic

Enter the drive type for the blower fan:

Setting with electric drive:..... ON

Setting with hydraulic drive:..... OFF

1. Switch the control terminal off and then back on again (see page 44).
2. Press and hold the button when switching on and then also press the button.
   The programming menu is opened when the buttons are released.
3. Press the button repeatedly until the desired setting (ON or OFF) appears on the display.
4. Confirm the programming with the or button and exit the programming menu.

5.12.2 Seeding shaft motor - 8 or 16 outlets

Setting the type designation of the seeding shaft drive motor:

- Display 8 for GreenDrill with 8 outlets
- Display 16 for GreenDrill with 16 outlets.

1. Switch the control terminal off and then back on again (see page 44).
2. Press and hold the button when switching on and then also press the button.
   The programming menu is opened when the buttons are released.
3. Press the button repeatedly until the desired setting (8 or 16) appears on the display.
4. Confirm the programming with the or button and exit the programming menu.

6 GreenDrill control terminal 5.2

6.1 Contents list

(1) GreenDrill control terminal 5.2

(2) Bracket for control terminal

(3) Power cable

(3.1) for 3-pin tractor standard socket
(see section "Power cable - Connection to the 3-pin tractor standard socket", page 80)

( ) for the battery connection (optional)
(see section "Battery cable with 3-pin standard socket", page 80).

6.2 Housing components

(1) Socket (3-pin) for power supply

(2) Signal socket (6-pin).

A 6 m-long implement cable connects the control terminal with the GreenDrill.

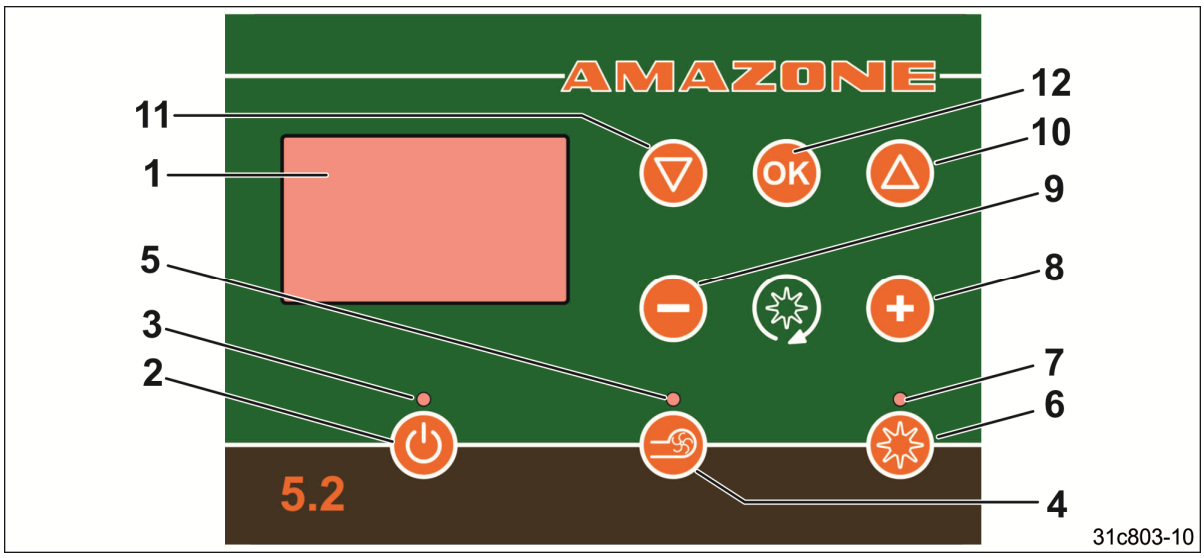
As an option, the implement cable can be extended with a 5 m-long cable.

(3) 30A fuse

(4) Signal socket (12-pin) for connection

- o to the 7-pin tractor signal socket or
- o to a splitter or
- o to the GPS sensor.

6.3 Operating elements



(1) Graphic display

(2) On/Off button

(3) The control lamp is illuminated when the control terminal is switched on

(4) Switch the electric blower fan drive on and off

The button is without function with hydraulic blower fan drive

(5) The red control lamp is illuminated when the blower fan is switched on.

With hydraulic blower fan drive, an optional pressure sensor is required, see section "Hydraulic blower fan drive", page 31

(6) Switch sowing shaft on/off

(7) The control lamp is illuminated when the seeding shaft is running

(8) Increase sowing shaft speed

(9) Decrease sowing shaft speed

(10) Move cursor up

(11) Move cursor down

(12) Button for confirming the selection

The cursor buttons are used to move around within the menu.

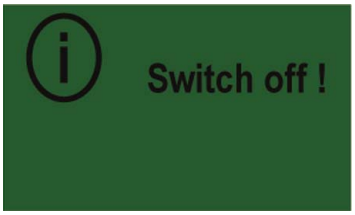
6.4 Control terminal 5.2 start-up

6.4.1 Switching on the control terminal

1. Instruct any people in the area to stand at a minimum distance of 10 m from the implement.
2. Press the button
   → The control lamp above the button is illuminated
   → The control terminal is switched on
   → The implement type and the software version appear on the display.
   → The display switches to the main menu.

The control terminal is switched off after 1.5 hours if no button has been pressed in this time and the seeding shaft is switched off.

6.4.2 Switching off the control terminal



1. Press the button
   → Brief display before switching off the control terminal
   → The control lamp above the button is turned off
   → The control terminal is switched off.
2. Pull the power supply plug out of the control terminal

When work is completed, first switch off the seeding shaft, then the blower fan and finally the control terminal.

After switching off the control terminal, pull the power supply plug out of the control terminal.

6.5 Main menu

6.5.1 Without speed sensor - Display during work

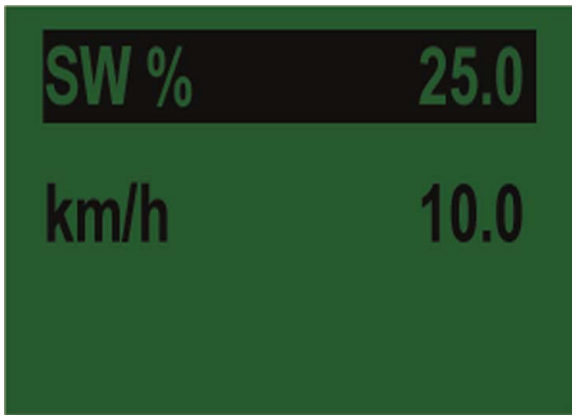
Line 1 in the main menu shows:

The seeding shaft speed [%] set during the calibration test

Line 2 in the main menu shows:

The forward speed [km/h] set during the calibration test.

The seeding shaft speed is not adjusted for changing forward speeds. Always maintain the indicated forward speed [km/h] during operation.



6.5.2 With speed sensor - Display during work

Line 1 in the main menu shows the seeding shaft speed [%]

Set value 50%

Actual value 25 %

Line 2 in the main menu shows the forward speed [km/h]

Set value 20 km/h

Actual value 10 km/h

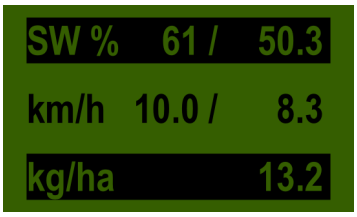
Display	Set value	Actual value
Seeding shaft speed [%]	The set seeding shaft speed is calculated during the calibration test	The actual seeding shaft speed is calculated according to the forward speed and is shown in the main menu.
Tractor speed [km/h]	The set forward speed is adjusted in the calibration test submenu	The actual forward speed [km/h] is measured using the speed sensor and is shown in the main menu.

6.5.3 Pre-metering

If the seeding shaft rotates before beginning the field pass or when standing still on the field, press the OK button. The blower fan starts running and after a few seconds, the seeding shaft begins to rotate with the speed determined during the calibration test. As soon as the button is released, the seeding shaft speed is adapted to the forward speed.

If the control terminal is connected to the 7-pin signal socket on the tractor or if the lifting gear sensor is active, the base machine must be in working position.

6.5.4 Changing the spread rate during operation



In the main menu, the seeding shaft speed and therefore the spread rate can be changed in 1%-steps during operation.

The spread rate is

- increased by pressing the + button
- reduced by pressing the − button.

6.6 Submenus

With the  buttons, the following sub-menus can be called up from the main menu:

1. Languages
2. Operating voltage
3. Hectare counter
4. Working hour counter
5. Emptying the seed hopper
6. Calibration test
7. Calibration (pulses/100 m)
8. Adjusting the blower fan speed

After about 15 seconds, the main menu is displayed if no button is pressed.

6.7 Set the language

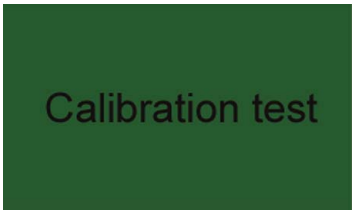
1. Call up the submenu from the main menu using the  buttons.
2. Confirm the selection with the  button.
3. Select the desired language with the  buttons.
4. Confirm the selection with the  button.
5. Back to the main menu with the  buttons.

6.8 Calibration test [kg/ha] or [grains/m²]

The calibration test can be terminated at any time by pressing the button or button.

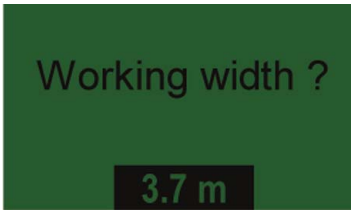
1. Prepare the implement for the calibration test (see section 4.5, Seite 41).
2. Check that the correct sowing shaft has been fitted.
3. The seed hopper must be filled at least half full (correspondingly less with fine seeds).
4. The blower fan cannot be switched on during the calibration test.

1. Call up the submenu from the main menu using the buttons.
2. Confirm the selection with the OK button.



3. Select the display with the buttons.
4. Confirm the selection with the OK button.

5. Select the display with the buttons.
6. Confirm the selection with the OK button.
7. Enter the working width with the buttons (e.g., 3.7 m).
8. Confirm the entry with the OK button.

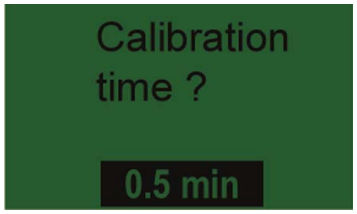


9. Select the display with the buttons.
10. Confirm the selection with the OK button.
11. Enter the forward speed with the buttons (e.g., 12.5 km/h).
12. Confirm the entry with the OK button.

13. Select the desired calibration test with the buttons.
    - o Calibration test [kg/ha] or
    - o Calibration test [grains/m²].

6.8.1 Calibration test [kg/ha]

1. Select the display with the ▽△ buttons.
2. Confirm the selection with the OK button.
3. Enter the desired spread rate with the ▽△ buttons (e.g., 12.3 kg/ha).
4. Confirm the entry with the OK button.
5. Select the display with the ▽△ buttons.
6. Confirm the selection with the OK button.
7. Enter the desired duration[1)2)] of the calibration test with the ▽△ buttons (e.g., 2.0 min).
8. Confirm the entry with the OK button.



1) Calibrate for 0.5 minutes
for seeds, e.g., wheat, barley, peas and large spread rates

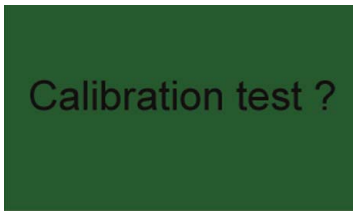
Calibrate for 1.0 minute
for all seeds (standard)

Calibrate for 2.0 minutes
for fine seeds, e.g., rapeseed, phacelia, poppy.

2) The "Enter calibration test duration" does not appear when

- the GreenDrill has a calibration button and
- the "Calibration button available" menu item was answered with "YES".

9. Select the display with the ▽△ buttons.
10. Confirm the selection with the OK button.



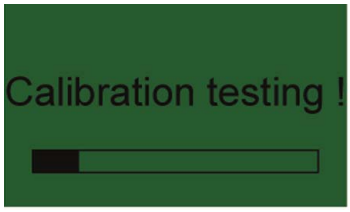
The calibration test begins.

→ The sowing shaft begins to rotate (without blower fan).

→ The seeding shaft stops automatically after the set time has elapsed.

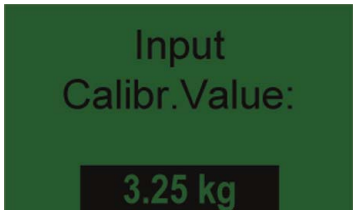
→ If a calibration button is available, press and hold the calibration button for the duration of the calibration test. The seeding shaft stops after the button is released.

Do not select a shorter duration for the calibration test than specified above (see Point 7).



11. Select the display with the ▽△ buttons.
12. Confirm the selection with the OK button.
13. Weigh the calibrated seed
14. Enter the value [kg] into the control terminal with the ▽△ button.
15. Confirm the entry with the OK button.

→ The required sowing shaft speed is calculated automatically.



If this changes the sowing shaft speed by more than 3%

- the adjacent display appears
- the calibration test has to be repeated.

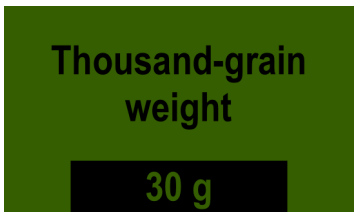
Display after correctly terminated calibration test

→ After about 5 seconds, the main menu is displayed if no button is pressed (see section "Main menu", page 58).

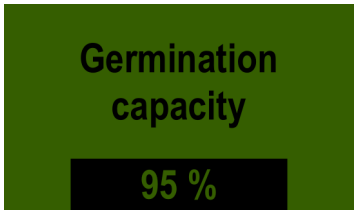
6.8.2 Calibration test [grains/m²]

1. Select the display with the ▽△ buttons.
2. Confirm the selection with the OK button.
3. Enter the desired spread rate with the ▽△ buttons (e.g., 100 G/m²).
4. Confirm the entry with the OK button.

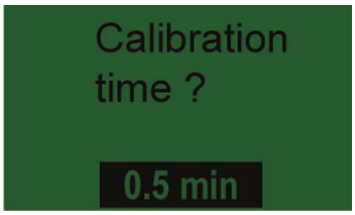
5. Select the display with the ▽△ buttons.
6. Confirm the selection with the OK button.
7. Enter the 1000-grain weight with the ▽△ buttons (e.g., 30 g).
8. Confirm the entry with the OK button.



9. Select the display with the ▽△ buttons.
10. Confirm the selection with the OK button.
11. Enter the germination capacity of the seed with the ▽△ buttons (e.g., 95%).
12. Confirm the entry with the OK button.



13. Select the display with the ▽△ buttons.
14. Confirm the selection with the OK button.
15. Enter the desired duration[1)2)] of the calibration test with the ▽△ buttons (e.g., 2.0 min).
16. Confirm the entry with the OK button.



1) Calibrate for 0.5 minutes
for seeds, e.g., wheat, barley, peas and large spread rates

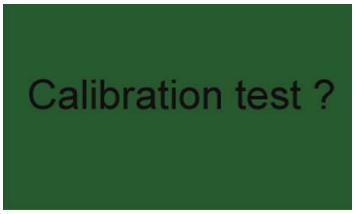
Calibrate for 1.0 minute
for all seeds (standard)

Calibrate for 2.0 minutes
for fine seeds, e.g., rapeseed, phacelia, poppy.

2) The "Enter calibration test duration" does not appear when

- the GreenDrill has a calibration button and
- the "Calibration button available" menu item was answered with "YES".

17. Select the display with the ▽△ buttons.
18. Confirm the selection with the OK button.



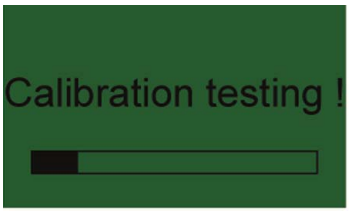
The calibration test begins.

→ The sowing shaft begins to rotate (without blower fan).

→ The seeding shaft stops automatically after the set time has elapsed.

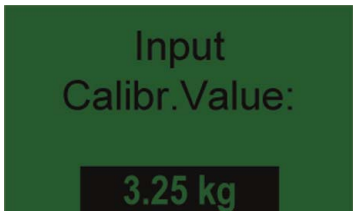
→ If a calibration button is available, press and hold the calibration button for the duration of the calibration test. The seeding shaft stops after the button is released.

Do not select a shorter duration for the calibration test than specified above (see Point 15).



19. Select the display with the ▽△ buttons.
20. Confirm the selection with the OK button.
21. Weigh the calibrated seed
22. Enter the value [kg] into the control terminal with the ▽△ button.
23. Confirm the entry with the OK button.

    → The required sowing shaft speed is calculated automatically.



If this changes the sowing shaft speed by more than 3%

- the adjacent display appears
- the calibration test has to be repeated.

Display after correctly terminated calibration test

→ After about 5 seconds, the main menu is displayed if no button is pressed (see section "Main menu", page 58).

Conversion of the seeding rate [grains/m²] in [kg/ha]

$$\text{Seeding rate [kg/ha]} = \frac{\text{TGW [g] x grains/m}^2}{\text{Germination capacity [\%]}}$$

6.9 Calibration (pulses/100 m)

The calculation requires the "pulses/100 m" calibration value

- the travel speed [km/h]
- the worked area [ha]
- the seeding shaft speed.

If the calibration value is not known, it must be determined by means of a "Pulses per 100 m" calibration run. The calibration value must be determined under the predominating operating conditions on the field.

If the "Pulses per 100 m" calibration value is known, it can be entered manually.

Determine the calibration value

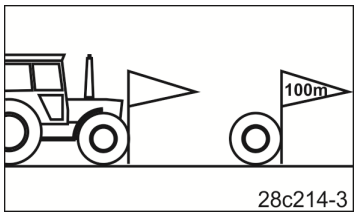
- before initial use
- when changing from heavy to light soil and vice versa.

  On different soils, the calibration value (pulses/100 m) can change due to

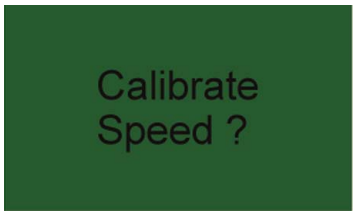
  - slippage of the measuring or drive wheel
  - change in the number of pulses from the radar.
- if there are differences between the indicated and actual forward speed
- if there are differences between the measured and actual worked area.

6.9.1 Calibration by driving a calibration distance

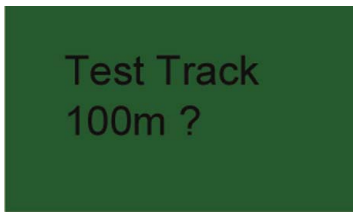
1. On the field, measure out a calibration distance of exactly 100 m.
   Mark the start and end point of the calibration distance.
2. Drive the tractor to the starting position and put the base machine into working position.



3. Select the submenu from the main menu using the ▽△ buttons.
4. Confirm the selection with the OK button.



5. Confirm the display with the OK button.

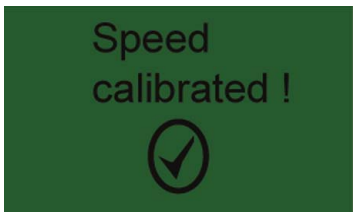


6. Actuate the OK button and drive exactly the calibration distance.

7. Stop after exactly 100 m and press the OK button.

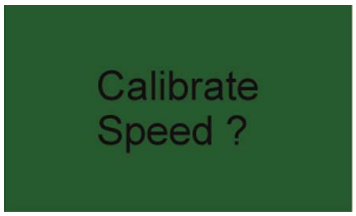
→ Display when the calibration is complete

After about 5 seconds, the main menu is displayed if no button is pressed.



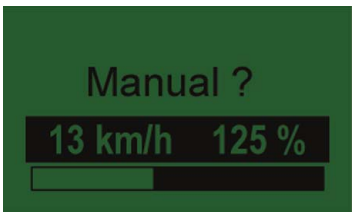
6.9.2 Calibration by comparing the speedometer

1. Select the submenu from the main menu using the buttons.
2. Confirm the selection with the OK button.



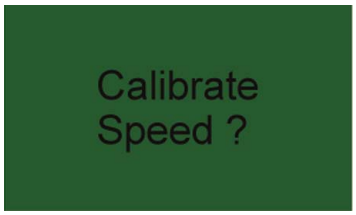
3. Select the display with the buttons.
4. Confirm the display with the OK button.

5. Start the tractor for the calibration run.
   During the calibration run, compare the speeds shown on the display with those on the tractor's speedometer.
   Correct the value using the OK buttons, until both values are the same.

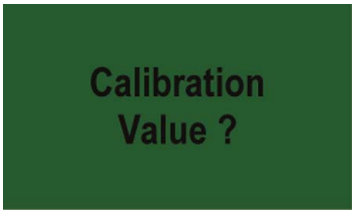


6.9.3 Enter the calibration value manually

1. Select the submenu from the main menu using the buttons.
2. Confirm the selection with the OK button.



3. Select the display with the buttons.
4. Confirm the display with the OK button.

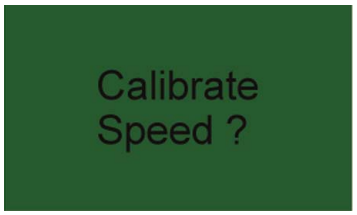


5. If known, enter the calibration value with the buttons, e.g., "13000" for 13000 [pulses/100 m].

6.9.4 Calibration reset (factory settings)

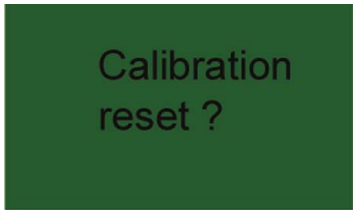
"Reset" sets the calibration value back to the factory setting.

1. Select the submenu from the main menu using the buttons.
2. Confirm the selection with the OK button.



3. Select the display with the buttons.
4. Confirm the display with the OK button.

   → The factory-set calibration value is set.



Display after the reset is finished

After about 5 seconds, the main menu is displayed if no button is pressed.

6.10 Hectare counter

Area calculation

- is carried out using the "actual" forward speed values.

  Connection to the control terminal is required.

  - to the 7-pin tractor signal socket (see section "6.16.4", page 81) or
  - to the radar sensor or
  - to the GPS sensor.
- begins as soon as the seeding shaft starts rotating and the tractor starts moving.

1. Select the display from the main menu using the buttons.
2. Confirm the selection with the OK button.

   The following are displayed

   - the total area [ha]
   - the part area [ha]
3. Press the OK button for 5 seconds to set the part area to zero.
   The total area cannot be changed.

6.11 Adjusting the blower fan speed

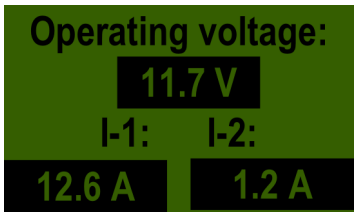
If the full air volume is not required during operation, the blower fan speed can be changed.

1. Select the display from the main menu using the buttons.
2. Confirm the selection with the OK button.
3. Select the display with the buttons.
4. Confirm the selection with the OK button.
5. Enter the desired blower fan speed with the buttons (e.g., 100 %).
6. Confirm the entry with the OK button.

After about 5 seconds, the main menu is displayed if no button is pressed.

6.12 Operating voltage

1. Select the display from the main menu using the buttons.
2. Confirm the selection with the OK button.



The operating voltage is shown.

I-1 Shows the current consumption [amps] of the blower fan motor.

I-2 Shows the current consumption [amps] of the electrically driven seeding shaft motor.

If there are large fluctuations in the operating voltage during operation, there may be errors in the seeding rate.

6.13 Working hour meter

The working hour meter measures the run time of the sowing shaft.

1. Select the display from the main menu using the buttons.
2. Confirm the selection with the OK button.

   The following are displayed

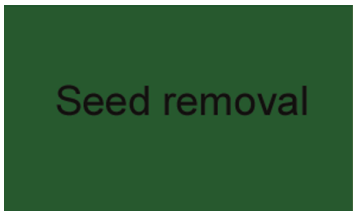
   - the total hours [h]
   - the daily hours [h]
3. Press the OK button for 5 seconds to set the daily hours to zero.
   The total hours cannot be changed.

6.14 Emptying the seed hopper

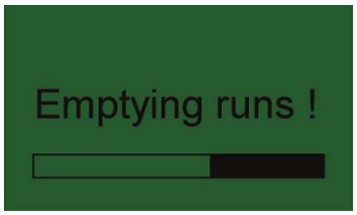
1. Prepare the implement for emptying the seed hopper (see section 4.5, page 41).
2. Empty the seed hopper through the menu controls or using the calibration button (optional).

Emptying the seed hopper through the menu

1. Select the display from the main menu using the buttons.
2. Confirm the selection with the OK button.



→ The seeding shaft motor is rotating at maximum speed
The blower fan can not be switched on.



The process can be terminated at any time by pressing the buttons or buttons.

The display then returns to the main menu.

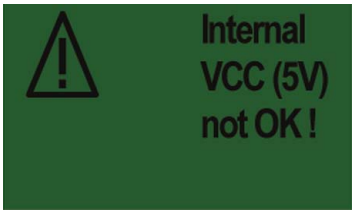
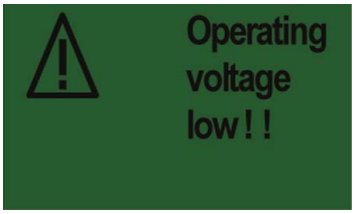
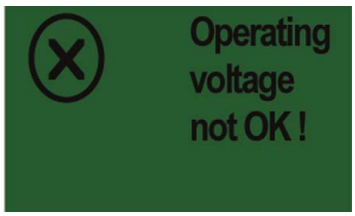
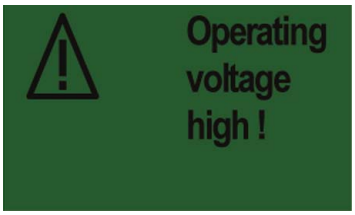
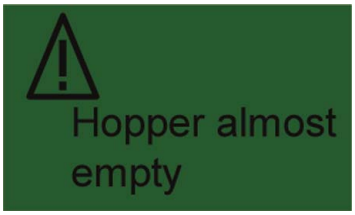
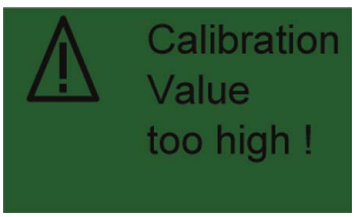
Emptying the seed hopper using the calibration button (optional).

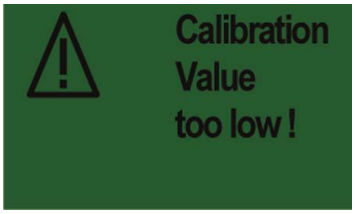
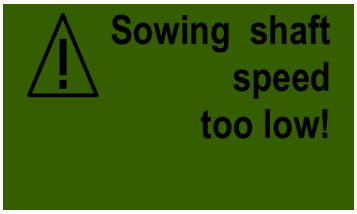
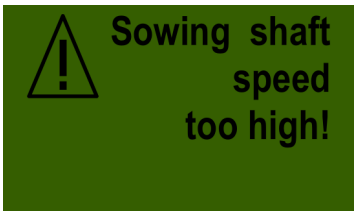
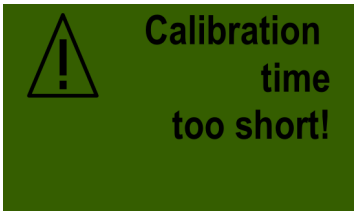
Emptying the seed hopper using the calibration button (1) requires that the menu item "Calibration button available" was answered with "YES".

Press the calibration button to empty the seed hopper.
The seeding shaft rotates at maximum speed as long as the calibration button is kept pressed.
Do not switch on the blower fan.

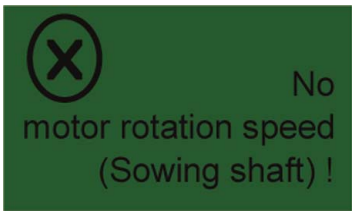
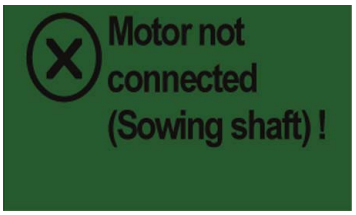
6.15 Messages

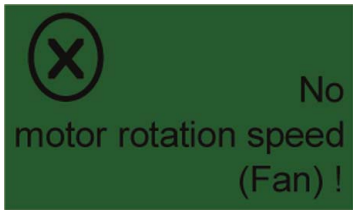
6.15.1 Control messages

Control message	Description	Remedial action
	The internal control voltage is below a minimum value	Contact customer services
	The operating voltage is too low. The required operating voltage may not exceed 10 volts, see section "Operating voltage", page 72.	· Minimise the consumers · Check the battery · Check the alternator · Check the wiring
	If there are large voltage fluctuations or if the minimum operating voltage is not reached	· Minimise the consumers · Check the battery · Check the alternator · Check the wiring
	The operating voltage is too high.	Check the alternator
	The filling level sensor is not covered with seed for longer than 30 seconds.	Refill the seed
	Calibration value is too high	Repeat the calibration, see section "Calibration (pulses/100 m)", page 67

Control message	Description	Remedial action
	The travelled distance during calibration was too short.	Repeat the calibration, see section "Calibration (pulses/100 m)", page 67)
	Display during the calibration test: the seeding shaft speed is too low	Use a seeding shaft with finer, smaller or fewer seed metering wheels
	Display during the calibration test: the seeding shaft speed is too high	Use a seeding shaft with larger or more seed metering wheels
	Display when using the calibration button	Press and hold the calibration button during the calibration test for at least 30 seconds
	The forward speed is too high.	Compare the displayed speed with the actual driven speed. • Reduce the forward speed or • Use larger seed metering wheels
	The forward speed is too low.	Compare the displayed speed with the actual driven speed. • Increase the forward speed or • Use smaller seed metering wheels

6.15.2 Error messages

Fault message	Description	Remedial action
	The sowing shaft does not rotate.	Switch off the control terminal. Check whether any solid material is hindering the rotation of the seeding shaft or agitator shaft.
	The seeding shaft motor • is connected • is not overloaded • is not rotating.	Switch off the control terminal. Contact the Service Department.
	Displayed when there is unconnected or faulty cabling.	Check the cables and plug connections to the seeding shaft motor.

Fault message	Description	Remedial action
	The hydraulically driven blower fan with pressure sensor is not rotating.	Switch on the blower fan. The control lamp is illuminated when the blower fan is running
	The blower fan is not rotating.	Switch off the control terminal. Check • whether solid material is hindering the rotation of the blower fan • whether the calibration plate (see section 4.5, page 41) is installed.
	The blower fan motor • is connected • is not overloaded • is not rotating.	Switch off the control terminal. Contact the Service Department.
	Display when there is unconnected or faulty cabling.	Check the cables and plug connections to the blower fan motor.

6.16 Installations and connections - Control terminal 5.2

6.16.1 Installation of control terminal 5.2

Fasten the bracket (1) in the tractor cab with two screws.

Bend the bracket so as to provide optimum reading of the display.

Insert the control terminal on the bracket in the tractor cab.

6.16.2 Implement cables – Connection of GreenDrill and control terminal

The implement cable connects the control terminal with the GreenDrill.

Connect the implement cable to the 6-pin signal socket (1) of the control terminal.

Store the spare cable in the cab.
Do not coil up the cable.

6.16.3 Power cable - Connection to the 3-pin tractor standard socket

Connect the power cable (1)

- to the control terminal
- to the 3-pin standard socket in the tractor cab.

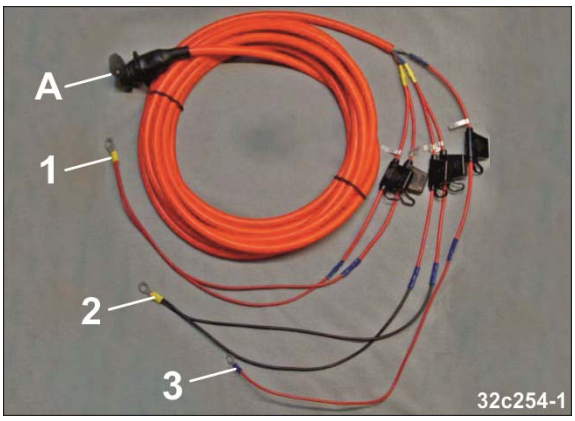
Never connect the 12 volt power supply to the cigarette lighter socket.

6.16.3.1 Battery cable with 3-pin standard socket (optional)

If the tractor does not have a 3-pin standard socket, the control terminal can be connected to a 3-pin standard socket (A, optional) that is directly connected to the battery with a cable set.

Connect the cable ends to the poles of the 12-volt battery.

Nr.	Colour	Battery connection
1	Red	Positive pole
2	Black	Negative pole
3	Red	Positive pole (ignition positive)



When not in use, disconnect the control terminal from the power supply.

Pull the plug of the control terminal out of the standard socket (A) of the cable set.

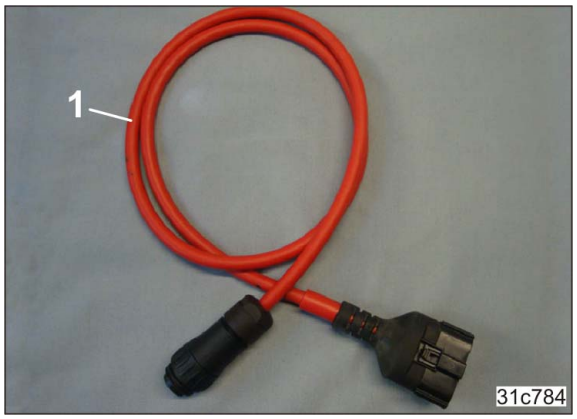
Never run a battery charging device together with the control terminal.

6.16.4 Cable connection to the 7-pin tractor signal socket

The control terminal 5.2 requires 3 signals (see also section "Signals", page 89)

- Actual forward speed [km/h]
- The implement is in working position (lifting gear signal from the tractor)
- The implement is in transport position (lifting gear signal from the tractor).

The signal cable (1) transmits the 3 signals from the 7-pin tractor signal socket to the control terminal.



Connect the signal cable to the 12-pin signal socket (1) of the control terminal.

The control terminal shows the forward speed [km/h] and adjusts the seeding shaft speed according to the changing forward speed. The sowing rate remains unchanged even at varying tractor speeds. If it is set correctly, speed differences of 50% are adjusted up or down.

When the implement is raised, e.g., when turning at the end of the field, the seeding shaft remains still. Manual operation of the control terminal by the tractor driver is not required. When the implement is lowered to the working position after turning, the seeding shaft automatically starts rotating again.

On some tractors, the lifting gear signal is inverted. The lifting gear signal can, when required, be turned around in the control terminal (see section "Lifting gear sensor", page 90).

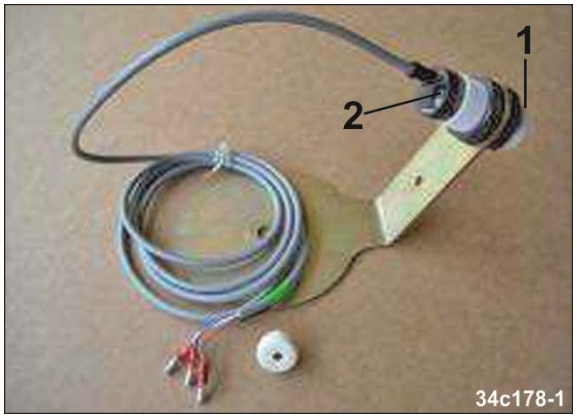
6.17 Accessories

6.17.1 Filling level sensor (optional)

The GreenDrill GD500-H with control terminal 5.2 equipped with a filling level sensor (1) as a standard.

The intensity of the sensor can be changed with the small sensor bolt (2).

Connect the filling level sensor to the implement cable (see section "Implement cable connection diagram", page 86).



6.17.2 Calibration button (optional)

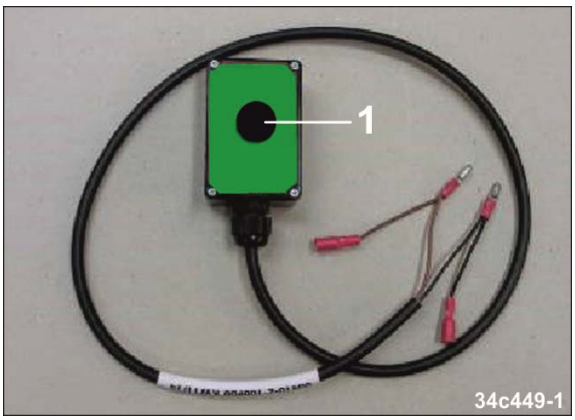
The calibration button serves for starting the calibration test and for emptying the seed hopper.

Attach the calibration button to the implements using the built-in magnets.

The seeding shaft starts rotating when the calibration button (1) is pressed. The seeding shaft rotates until the calibration button is released again.

During the calibration test, the running time of the seeding shaft is automatically included in the calculation of the required spread rate.

Connect the calibration button to the implement cable (see section "Implement cable connection diagram", page 86).



6.17.3 Working position sensor (optional) on the lifting gear

The working position sensor (1) is used when the tractor has a 7-pin signal socket that does not emit a "Working position" signal (see section "Cable connection to the 7-pin tractor signal socket", page 81).

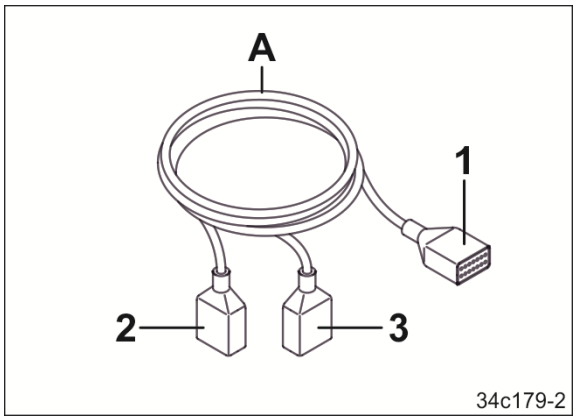
Attach the working position sensor (1) on the tractor three-point or on the swivelling running gear of the base machine.

The working position sensor transmits the current position of the GreenDrill to the control terminal:

- The implement is in working position
- The implement is in transport position.

The splitter (A) has 3 connections:

- Connection (1): control terminal
- Connection (2): 7-pin tractor socket.
  The connection transmits the forward speed [km/h].
- Connection (3): working position sensor.



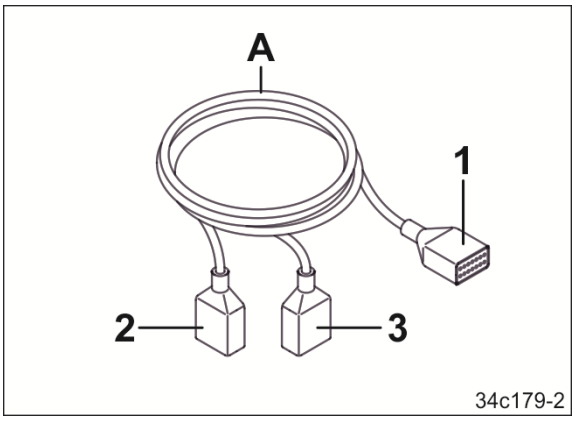
6.17.4 Radar sensor (optional)

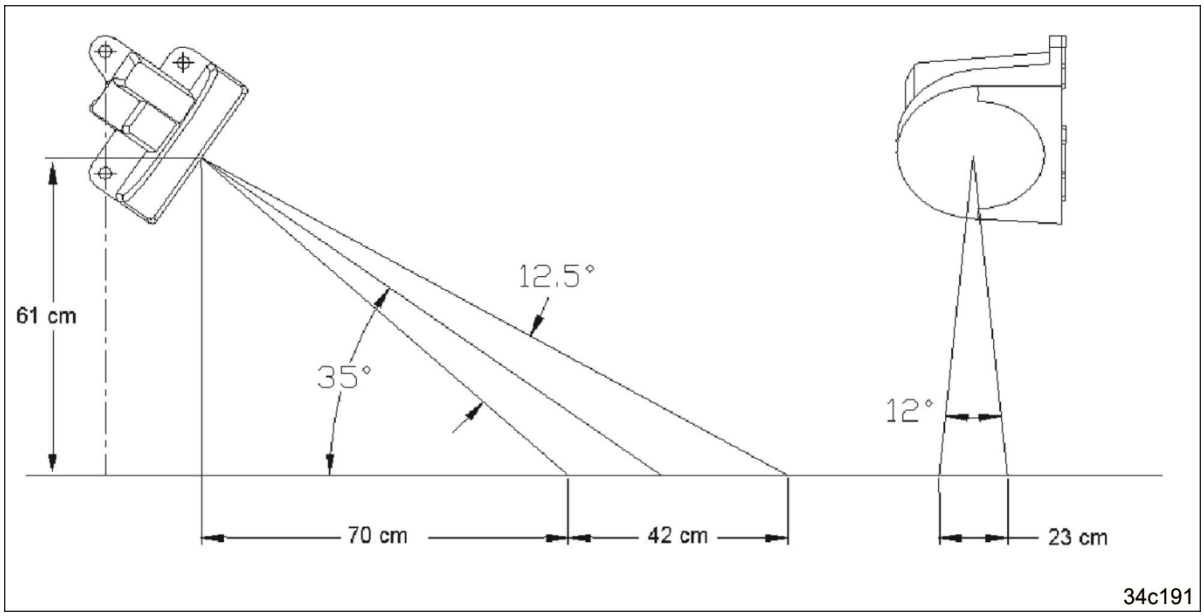
If the tractor does not have a 7-pin signal socket, you must install

- the working position sensor on the tractor three-point or on the swivelling running gear of the base machine (see section "Working position sensor (optional) on the lifting gear", page 83). The working position sensor transmits the current position of the implement (working or transport position).
- the radar sensor (for the forward speed [km/h]
  The radar sensor transmits the forward speed [km/h].

The splitter (A) has 3 connections:

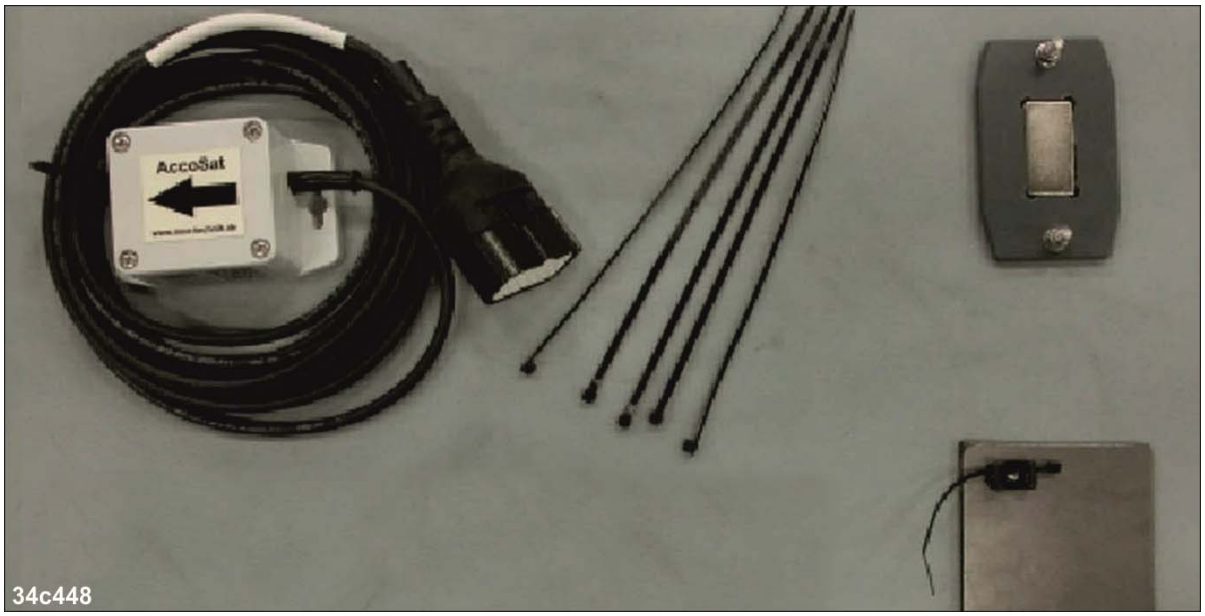
- Connection (1): control terminal
- Connection (2): Working position sensor
- Connection (3): radar sensor.





Adjust the radar based on the diagram.

6.17.5 GPS sensor (optional)

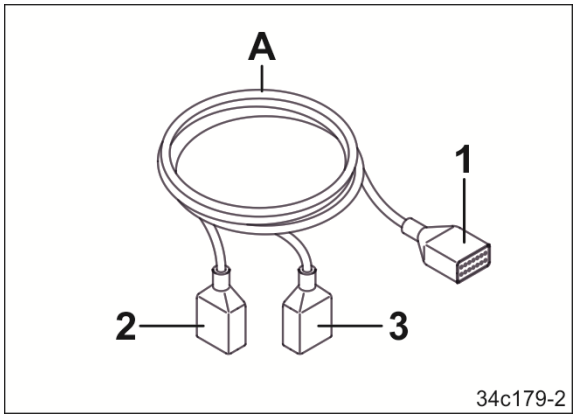


The horizontally installed GPS sensor transmits the current forward speed to the control terminal. The current forward speed is measured using the combination of a GPS and a 3D acceleration sensor.

The GPS sensor can be connected with a splitter (A) to control terminal 5.2.

The splitter (A) has 3 connections.

- Connection (1): control terminal
- Connection (2): GPS sensor
- Connection (3): working position sensor.

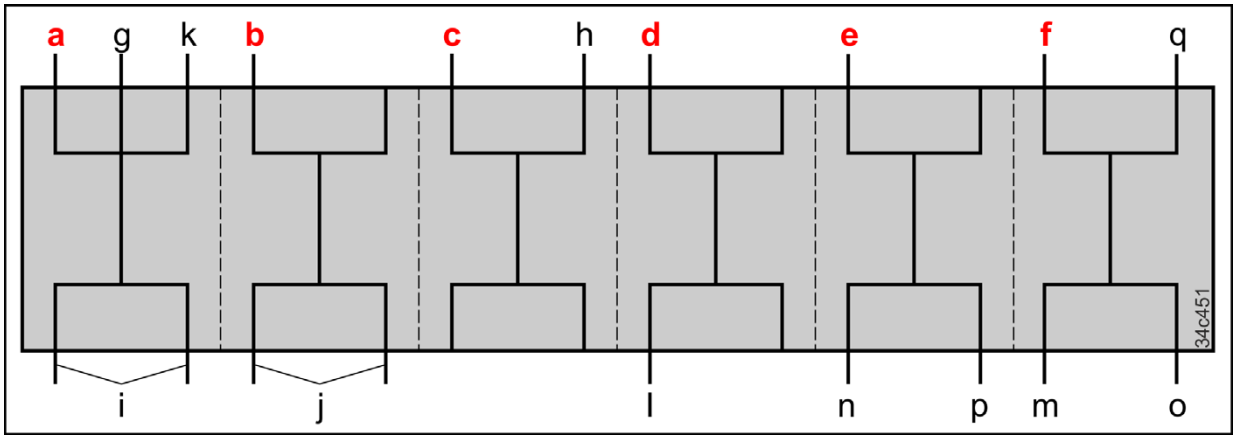


The operating and installation instructions are included with the GPS sensor.

The following are not required

- Calibration of the system
- Connection of the control terminal to the 7-pin tractor signal socket
- Connection of the control terminal to the radar sensor.

6.17.5.1 Implement cable connection diagram



Connect the implement cable to the 6-pin signal socket of the control terminal		Cable seeding shaft gearbox motor		Cable blower fan motor		Cable filling level sensor (optional)		Cable for pressure sensor on the hydraulic blower fan (optional)		Cable calibration button (optional)	
a	Blue 4 mm²	**g**	Black 1.5 mm²	**i**	Red Blue 2.5 mm²	**k**	Brown 0.75 mm²				
b	Brown 4 mm²			**j**	Black Brown 2.5 mm²						
c	Blue 1.5 mm²	**h**	Red 1.5 mm²								
d	Brown 1.5 mm²					**l**	White 0.75 mm²				
e	Black 1.5 mm²							**n**	Blue 1.5 mm²	**p**	Black 0.75 mm²
f	Grey 1.5 mm²					**m**	Blue 0.75 mm²	**o**	Brown 1.5 mm²	**q**	Brown 0.75 mm²

6.18 Customer services

The following settings on the control terminal should only be performed by customer service.

Before making any settings, switch off the blower fan motor and seeding shaft motor.

6.18.1 Opening the programming menu

1. Switch the control terminal off and then back on again (see page 57).
2. When switching on, press and hold the  button and also press the  button until the programming menu is opened.

The  and  buttons are used to move around in the programming menu.

Change the parameters using the  buttons.

Confirm the programming with the  button and exit the programming menu.

If "AUTO" is selected in the following menus, the system detects sending sensors.

6.18.2 Blower fan drive

Enter the drive type for the blower fan.

Setting with electric drive: ..... YES

Setting with hydraulic drive: ..... NO

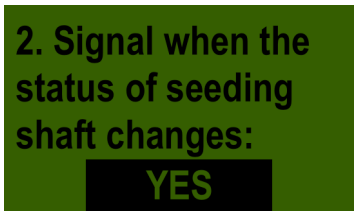
Make settings with the buttons.

6.18.3 Seeding shaft warning tone

Set whether a warning tone should be issued when the seeding shaft is switched on and off:

YES or NO

Make settings with the buttons.



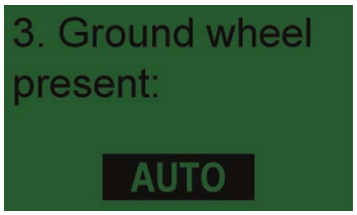
6.18.4 Ground wheel

Set whether the ground wheel is being used:

YES, NO or AUTO

To automatically detect whether or not the ground wheel is being used, set the control terminal to AUTO.

Make settings with the buttons.



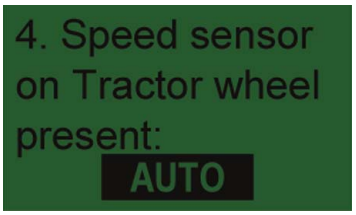
6.18.5 Speed sensor on the tractor wheel

Set whether the speed sensor on the tractor wheel is being used:

YES, NO or AUTO

To automatically detect whether or not the speed sensor of the tractor is being used, set the control terminal to AUTO.

Make settings with the buttons.



6.18.6 Signals

The control terminal requires 3 signals

- Forward speed [km/h]
- The implement is in working position
- The implement is in transport position.

Actual speed (from radar, wheel sensor or inductive sensor).

The control terminal receives a speed signal

e.g., from the radar, wheel sensor or inductive sensor through the 7-pin tractor signal socket.

YES, NO or AUTO

Make settings with the buttons.

Theoretical speed

The control terminal receives a theoretical speed signal
e.g., from the gearbox

YES, NO or AUTO

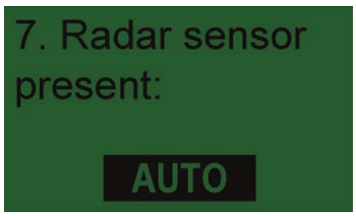
Make settings with the buttons.

6.18.7 Radar

The control terminal is connected to a radar sensor:

YES, NO or AUTO

Make settings with the buttons.

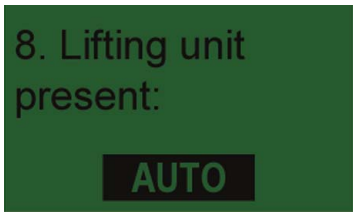


6.18.8 Lifting gear sensor

The control terminal is connected to a lifting gear sensor:

YES, NO or AUTO

Make settings with the buttons.

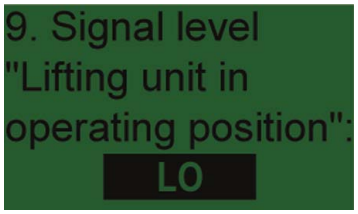


During work, the lifting gear sensor works in sensor position

HI or LO

Make adjustments with the buttons

Change the setting if the GreenDrill, e.g., is seeding in transport position.



6.18.9 Warning tone for fault message

Set whether the warning buzzer (e.g. for fault messages) should be switched on or off during work:

- EIN (on)
- AUS (off)

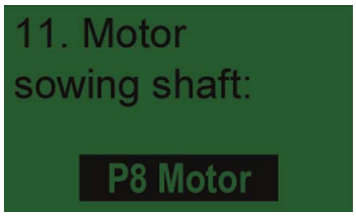
Make settings with the buttons.

6.18.10 Seeding shaft gearbox motor selection

Set which seeding shaft gearbox motor is connected:

- P8 motor (for GreenDrill with 8 outlets)
- P16 motor (for GreenDrill with 16 outlets).

Make settings with the buttons.



6.18.11 Pressure sensor

Set whether the hydraulically driven blower fan is equipped with a pressure sensor which measures the air current:

- JA (yes)
- NEIN (no)

Make settings with the buttons.

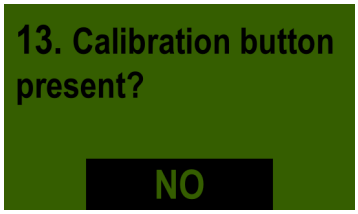
6.18.12 Calibration button

The calibration button (1) serves to manually switch the seeding shaft on and off during the calibration test.

Set whether the GreenDrill has a calibration button:

- JA (yes)
- NEIN (no)

Make settings with the buttons.



6.18.13 Measuring units

Two systems of units can be set in the control terminal:

- Metric system .....(m, ha, km/h, kg)
- Anglo-American system .....(ft, ac, mph, lb)

Make settings with the buttons.

6.18.14 Restore factory settings

When restoring the control terminal to the factory settings, the following are maintained

- the set language
- the total hours
- the total area.

YES: the factory setting will be restored

NO: the current settings will be maintained.

Make settings with the buttons.

7 Cleaning, maintenance and repairs

WARNING

Danger of crushing, shearing, cutting, being caught or drawn in, winding and knocks through:

- **unintentional falling of the implement raised using the tractor's three-point hydraulic system.**
- **unintentional lowering of raised, unsecured implement parts.**
- **unintentional start-up and rolling of the tractor-implement combination.**

Secure the tractor and the machine against unintentional start-up and rolling before eliminating any faults on the machine.

Wait for the machine to stop before entering the danger area of the machine.

WARNING

Risk of crushing, shearing, cutting, being caught and/or drawn in, or impact through unprotected danger points.

- Mount protective equipment, which you removed when cleaning, maintaining and repairing the implement.
- Replace defective protective equipment with new equipment.
- Never crawl under a raised, unsecured implement.

Before charging the tractor battery with a charger, remove the cable from the control terminal. Otherwise, voltage peaks may damage the control terminal.

7.1 First operation

Tighten all bolted connections after approx. 20 operating hours, then check these connections every 250 operating hours.

7.2 Cleaning

1. Empty the seed hopper and metering unit.
2. Dismantle the sowing shaft to enable intensive cleaning of the dosing unit.
3. Blow out the seed hopper and metering unit with compressed air or dry clean it with a paintbrush.
4. Clean only the outside of the seed hopper with water or a high-pressure cleaner.

DANGER

Dressing dust is toxic and must not be inhaled or come into contact with the body.

When emptying the machine and removing dressing dust, e.g. with compressed air, wear a protective suit, face mask, safety goggles and gloves.

Blow out the seed hopper or metering unit with compressed air. No water must enter the seed hopper or the metering unit.

Empty and clean the metering unit after use!

In metering units that are neither emptied nor cleaned,

- a viscous to solid mass may form there is water enters under the metering roller. The metering roller is braked strongly and deviations may occur between the preset and actual sowing rates.
- seed residues and fertiliser may swell or germinate in the metering units. As a result, rotation of the metering rollers is blocked and damage can be caused to the drive!

Always observe the following points when using a high-pressure cleaner/steam cleaner:

- Do not clean any electrical components.
- Always maintain a minimum jet distance of 300 mm between the high pressure cleaning or steam jet cleaning nozzle and the implement.
- Comply with safety regulations when working with high pressure cleaners.

8 Sowing tables

Forage rye	Application rate	
Seeding shaft speed [%]	kg/min.	
2	0.46	
5	0.99	
10	1.87	
15	2.74	
20	3.62	
25	4.50	
30	5.33	
35	6.16	
40	6.98	
45	7.81	
50	8.64	
55	9.45	
60	10.27	
65	11.08	
70	11.89	
75	12.71	
80	13.44	
85	14.18	
90	14.92	
95	15.14	
100	18.10	
Seeding shaft	G-G-G	

Barley	Application rate	
Seeding shaft speed [%]	kg/min.	kg/min.
2	0.18	0.54
5	0.48	0.87
10	0.97	1.41
15	1.47	1.96
20	1.96	2.51
25	2.45	3.06
30	2.95	3.61
35	3.44	4.16
40	3.94	4.71
45	4.43	5.26
50	4.93	5.81
55	5.02	6.70
60	5.12	7.59
65	5.22	8.48
70	5.32	9.38
75	5.41	10.27
80	5.51	11.16
85	5.61	12.05
90	5.71	12.95
95	5.80	13.84
100	5.90	14.73
Seeding shaft	f-f-f-f	G-G-G

Wheat	Application rate	
Seeding shaft speed [%]	kg/min.	kg/min.
2	0.13	2
5	0.16	5
10	0.20	10
15	0.24	15
20	0.28	20
25	0.32	25
30	1.58	30
35	2.85	35
40	4.11	40
45	5.37	45
50	6.63	50
55	6.96	55
60	7.28	60
65	7.61	65
70	7.93	70
75	8.26	75
80	8.58	80
85	8.91	85
90	9.23	90
95	9.86	95
100	10.48	100
Seeding shaft	f-f-f-f	G-G-G

Buckwheat	Application rate	
Seeding shaft speed [%]	kg/min.	kg/min.
2	0.09	0.54
5	0.39	0.99
10	0.90	1.74
15	1.41	2.49
20	1.92	3.24
25	2.43	3.99
30	2.86	4.68
35	3.30	5.38
40	3.74	6.07
45	4.18	6.76
50	4.62	7.45
55	4.84	
60	5.06	
65	5.28	
70	5.50	
75	5.72	
80	5.94	
85	6.16	
90	6.38	
95		
100		
Seeding shaft	f-f-f-f	G-G-G

Oats	Application rate	
Seeding shaft speed [%]	kg/min.	kg/min.
2	0.01	0.15
5	0.02	0.46
10	0.04	0.98
15	0.06	1.50
20	0.07	2.02
25	0.09	2.54
30	0.12	3.03
35	0.14	3.52
40	0.17	4.01
45	0.19	4.50
50	0.22	4.99
55	0.23	5.42
60	0.24	5.85
65	0.25	6.29
70	0.26	6.72
75	0.27	7.15
80	0.27	7.58
85	0.27	8.02
90	0.27	8.45
95	0.28	8.73
100	0.31	10.23
Seeding shaft	fb-f-fb-fb	G-G-G

Rape	Application rate	
Seeding shaft speed [%]	kg/min.	kg/min.
2	0.180	0.110
5	0.588	0.211
10	1.269	0.380
15	1.949	0.548
20	2.630	0.717
25	3.310	0.885
30	4.947	1.031
35	6.583	1.178
40	8.220	1.324
45		1.470
50		1.617
55		1.685
60		1.754
65		1.823
70		1.892
75		1.960
80		2.029
85		2.098
90		2.167
95		2.303
100		2.440
Seeding shaft	f-f-f-f	fb-f-fb-fb

Mustard	Application rate	
Seeding shaft speed [%]	kg/min.	kg/min.
2	0.04	0.33
5	0.15	0.75
10	0.33	1.45
15	0.50	2.15
20	0.68	2.86
25	0.86	3.56
30	1.00	4.23
35	1.15	4.89
40	1.29	5.56
45	1.43	6.22
50	1.58	6.89
55	1.65	7.25
60	1.72	7.61
65	1.79	7.97
70	1.86	8.33
75	1.93	8.69
80	2.00	9.05
85	2.07	9.41
90	2.14	9.77
95	2.31	10.35
100	2.48	10.92
Seeding shaft	fb-f-fb-fb	f-f-f-f

Fodder radish	Application rate	
Seeding shaft speed [%]	kg/min.	kg/min.
2	0.24	0.66
5	0.62	1.18
10	1.27	2.05
15	1.91	2.92
20	2.55	3.79
25	3.19	4.66
30	3.60	
35	4.29	
40	4.98	
45		
50		
55		
60		
65		
70		
75		
80		
85		
90		
95		
100		
Seeding shaft	f-f-f-f	G-G-G

Phacelia	Application rate	
Seeding shaft speed [%]	kg/min.	kg/min.
2	0.14	0.34
5	0.31	0.77
10	0.61	1.49
15	0.90	2.22
20	1.19	2.94
25	1.49	3.66
30	1.52	
35	1.56	
40	1.59	
45	1.63	
50	1.66	
55	1.75	
60	1.85	
65	1.94	
70	2.04	
75	2.13	
80	2.23	
85	2.32	
90	2.42	
95	2.52	
100	2.62	
Seeding shaft	fb-f-fb-fb	f-f-f-f

Grass	Application rate	
Seeding shaft speed [%]	kg/min.	kg/min.
2	0.06	0.27
5	0.22	0.61
10	0.49	1.17
15	0.76	1.73
20	1.03	2.30
25	1.3	2.86
30	1.38	3.42
35	1.47	3.98
40	1.55	4.55
45	1.64	5.11
50	1.72	5.67
55	1.82	6.23
60	1.93	6.79
65	2.03	7.36
70	2.13	7.92
75	2.23	8.48
80	2.34	9.05
85	2.44	9.61
90	2.54	10.17
95	2.67	10.73
100	2.81	11.30
Seeding shaft	f-f-f-f	G-G-G

Lupins	Application rate	
Seeding shaft speed [%]	kg/min.	
2	0.42	
5	1.11	
10	2.26	
15	3.41	
20	4.56	
25	5.71	
30	6.87	
35	8.03	
40	9.19	
45	10.35	
50	11.51	
55	12.48	
60	13.44	
65	14.41	
70	15.37	
75	16.33	
80	17.30	
85	18.26	
90	19.23	
95	21.71	
100	24.20	
Seeding shaft	G-G-G	

Alfalfa	Application rate	
Seeding shaft speed [%]	kg/min.	kg/min.
2	0.10	0.30
5	0.21	0.70
10	0.40	1.38
15	0.60	2.05
20	0.79	2.73
25	0.98	3.40
30	1.15	4.05
35	1.32	4.71
40	1.49	5.36
45	1.65	6.01
50	1.82	6.67
55	1.86	7.03
60	1.90	7.40
65	1.93	7.77
70	1.97	8.14
75	2.01	8.50
80	2.04	8.87
85	2.08	9.24
90	2.12	9.61
95	2.24	10.33
100	2.36	11.06
Seeding shaft	fb-f-fb-fb	f-f-f-f

Red clover	Application rate	
Seeding shaft speed [%]	kg/min.	kg/min.
2	0.04	0.56
5	0.15	1.37
10	0.33	2.72
15	0.51	4.06
20	0.70	5.41
25	0.88	6.76
30	1.06	6.99
35	1.23	7.22
40	1.41	7.45
45	1.58	7.68
50	1.76	7.91
55	1.82	8.14
60	1.87	8.36
65	1.93	8.59
70	1.98	8.82
75	2.04	9.05
80	2.09	9.28
85	2.15	9.51
90	2.20	9.74
95	2.33	10.34
100	2.46	10.94
Seeding shaft	fb-f-fb-fb	f-f-f-f

Vetches	Application rate	
Seeding shaft speed [%]	kg/min.	kg/min.
2	0.76	3.37
5	1.42	3.89
10	2.51	4.75
15	3.61	5.61
20	4.71	6.48
25	5.81	7.34
30		8.00
35		
40		
45		
50		
55		
60		
65		
70		
75		
80		
85		
90		
95		
100		
Seeding shaft	fb-f-fb-fb	f-f-f-f

Poppy seed	Application rate	
Seeding shaft speed [%]	kg/min.	
2	0.029	
5	0.049	
10	0.083	
15	0.116	
20	0.150	
25	0.183	
30	0.260	
35	0.336	
40	0.412	
45	0.489	
50	0.565	
55	0.602	
60	0.638	
65	0.675	
70	0.711	
75	0.748	
80	0.784	
85	0.821	
90	0.857	
95	0.900	
100	0.942	
Seeding shaft	fb-fb-ef-eb-fb	

AMAZONEN-WERKE

H. DREYER GmbH & Co. KG

Postfach 51
D-49202 Hasbergen-Gaste
Germany

Tel: +49 (5405) 501-0
Fax: +49 (5405) 501-234
E-mail: amazone@amazone.de
http:// www.amazone.de

Plants: D-27794 Hude • D-04249 Leipzig • F-57602 Forbach
Branches in England and France

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