

PNEUMATIC SEEDER

PS 120 M1 – PS 500 M2

OPERATING MANUAL



PLEASE READ CAREFULLY BEFORE INITIAL OPERATION!

Translation of the original operating instructions

Version: 5.0 EN; item number: 00602-3-578





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1 GENERAL

This section contains information on your seed drill and about this operating manual.

1.1 ABOUT THIS OPERATING MANUAL

Validity and purpose

This operating manual is valid for seed drills manufactured by APV with the type designations PS 120 M1 – PS 500 M2.

This operating manual provides anyone who will be handling the seed drill with the required information to be able to perform the following tasks properly and safely:

- Installation
- Initial operation
- Operation
- Maintenance
- Service
- Decommissioning, dismantling, recommissioning, storage and disposal

Target group

This operating manual is aimed at all those who will be handling the seed drill:

- Transporter
- Assembly personnel
- Operating personnel
- Maintenance and repair personnel

Parts of the document that must absolutely be read

To prevent injuries and damage to the implement, it is absolutely necessary to have read and understood the **Basic safety instructions** section on page 10 before handling the implement.

Copyright

The copyright for this operating manual remains with the manufacturer:

APV - Technische Produkte GmbH

Zentrale: Dallein 62

A-3753 Hötzelndorf

AUSTRIA

This operating manual contains regulations and technical drawings that may not, as a whole or in part, be reproduced, distributed or used in any unauthorised way for competitive purposes or passed on to others. Passing on or reproduction of this operating manual, evaluation and communication of its contents are not authorised unless explicitly agreed. Contraventions shall result in an obligation to provide compensation for damages.

Information on manufacturer liability

The manufacturer is not liable for damage and malfunctions resulting from non-compliance with this operating manual.

1.2 IDENTIFICATION OF THE IMPLEMENT

Clear identification

The seed drill can be clearly identified by the following information on the type plate:

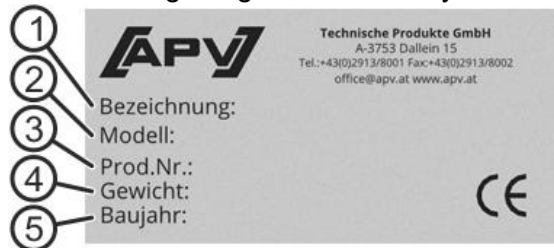
- Designation
- Model
- Production number

Position of the type plate

The type plate is located on the steel rack on the left side, near the handle over the motor cover.

Figure with the type plate

The following image shows the layout of the type plate:



The data on the type plate have the following meaning:

No.	Meaning
1	Designation
2	Model
3	Product number / serial number
4	Weight
5	YoM

1.3 SERVICE

Service

Please contact our service address in the following cases:

- If you still have questions regarding the handling of the seed drill despite the information provided in this operating manual
- For spare parts orders
- To order maintenance and repair work

Service address

APV - Technische Produkte GmbH
Zentrale: Dallein 62
A-3753 Hötzelstdorf
AUSTRIA
Telephone: +43 2913 8001
Fax: +43 2913 8002
Email: service@apv.at
Web: www.apv.at

1.4 EC DECLARATION OF CONFORMITY

Manufacturer

APV - Technische Produkte GmbH
Zentrale: Dallein 62
A-3753 Hötzelstdorf
AUSTRIA

Implement

This Declaration of Conformity is valid for the following implements:

Pneumatic seeder of type

- PS 120 M1, PS 120 M1 D, PS 120 M1 MG

- PS 200 M1, PS 200 M1 D, PS 200 M1 MG
- PS 300 M1, PS 300 M1 D, PS 300 M1 MG
- PS 500 M2, PS 500 M2 D, PS 500 M2 MG, HG 300 M1

Observed guidelines

The implements and the optional devices fulfil the requirements of the following European Directives:
 2006/42/EC Machinery Directive
 2014/30/EU EMC Directive
 2014/35/EU Low Voltage Directive

Applied standards

The following standards were applied:

EN 14018 Agricultural and forestry machinery – Seeders – Safety

EN 349 Safety of machinery – Minimum gaps to avoid crushing of parts of the human body

EN 60204-1 Safety of machinery – Electrical equipment

EN 953 Safety of machinery – Guards

ISO 12100 Safety of machinery; General principles for design; Risk assessment and risk reduction

ISO 13857 Safety of machinery – Safety distances

2 DESCRIPTION

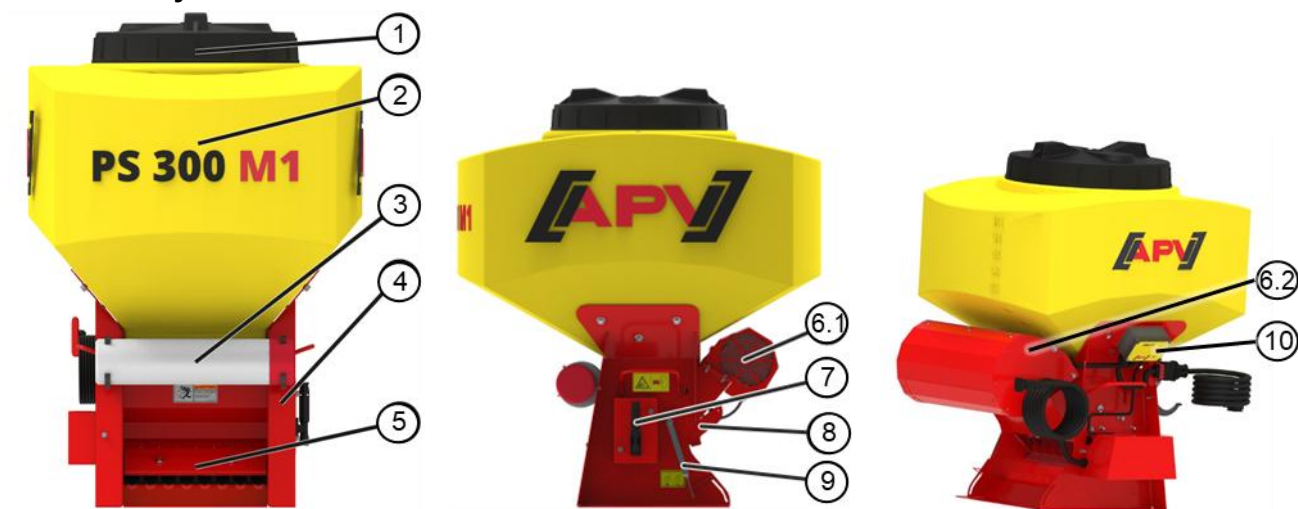
This section provides an overview of the technical characteristics of the seed drill.

2.1 LAYOUT AND FUNCTIONING OF THE SEED DRILL

The seed drill PS 120 M1 - PS 500 M2

The seeder with the type designations PS 120 M1 - PS 500 M2 is a pneumatic seeder with electric seeding shaft drive. It is used to spread seed on grassland and cropland.

Seed drill layout



No.	Designation	Function
1	Seed hopper lid	• Covering the seed hopper. • Protecting the seed from moisture and foreign objects.
2	Seed hopper	• Carrying the seed. • Conveying the seed to the agitator and seeding shaft.
3	Operating manual tube	• Storing the operating manual

No.	Designation	Function
4	Steel rack	Hanging and connecting components of the seed drill.
5	Hose clamping plate	Clamping the seed tube hoses onto the steel rack.
6.1	Electric fan	Producing compressed air for conveying the seed.
6.2	Electric fan PLUS	Producing compressed air for conveying the seed.
7.1	Bearing cover	Covering the access to the agitator and seeding shaft.
7.2	Hexagon key	Tool for use on the implement
8	Calibration slide	The seed flows from the seeding shaft through the calibration slide into the calibration bag.
9	Brush adjustment lever	Pressing the brush more or less onto the seeding shaft.
10	Motor module	Direct supply for the electric fan PLUS

Mode of operation of the seed drill

For the spreading of seeds, the following process takes place:

Phase	Description
1	The operator sets the implement up for operation and fills the seed hopper with seed.
2	The operator activates the seed drill using the controls. Result: - The seeding shaft rotates. - The agitator rotates. - The fan produces compressed air.
3	The seed flows from the seed hopper through the seeding shaft and is transported with compressed air through the hoses to the dispersion plates.
4	The seed is spread.

2.2 LAYOUT AND FUNCTION OF THE HYDRAULIC FAN (HG 300 M1)

Task

The hydraulic fan serves to produce compressed air for conveying the seed.

Layout of the fan



No.	Designation	Function
1	Speed sensor	Monitoring of the fan speed
2	Hydraulic block	Setting/limiting of the oil quantity to the hydraulic motor.
3	Hydraulic motor	Driving the fan.
4	Temperature measuring strips	Displaying the temperature of the hydraulic motor.

Mode of operation of the sensors

The fan speed sensor monitors the speed of the hydraulic fan.
As soon as the sensor reports an error, the message "Fan error" appears on the Control Box.

Functioning of the temperature measuring strip

The segments of the temperature measuring strip turn black when the respective temperature range has been reached or exceeded.

Temperatures above 80°C cause destruction of the gaskets in the hydraulic motor.

2.3 SCOPE OF DELIVERY

The scope of delivery includes all assembly groups and components that are delivered as a standard by APV - Technische Produkte GmbH.

Pos.	Rate	Designation
1	1	Basic machine
1.1	1	Steel rack
1.2	1	Seed hopper
1.3	1	Extra seeding shaft (standard accessory)
2	1	Counter plate
3	8	Dispersion plate along with fastening material
4	4	Hexagonal bar
5	1	Hose roll (25 m)
6	1	Calibration bag
7	1	Calibration scale
8	1	Hexagon key (fastened on the steel rack)

The pneumatic seeder (PS) is available in different versions. These differ in terms of the capacity of the seed hopper (120 l, 200 l, 300 l, 500 l) and the possible types of spreading material (seed, fertilizer (D), micropellets (MG)).

The following versions of the pneumatic seeder are available:

- PS 120 M1, PS 120 M1 D, PS 120 M1 MG
- PS 200 M1, PS 200 M1 D, PS 200 M1 MG
- PS 300 M1, PS 300 M1 D, PS 300 M1 MG
- PS 500 M2, PS 500 M2 D, PS 500 M2 MG
- HG 300 M1

2.4 TECHNICAL DATA

Mechanical data

Implement version	Size	Value
PS 120 M1 (D/MG)	Max. hopper content	120 l
	Weight	45 kg
	Dimensions (H × W × D in cm)	90 x 60 x 80
PS 200 M1 (D/MG)	Max. hopper content	200 l
	Weight	60 kg
	Dimensions (H × W × D in cm)	100 × 70 × 90
PS 300 M1 (D/MG)	Max. hopper content	300 l
	Weight	70 kg
	Dimensions (H × W × D in cm)	110 × 80 × 100
PS 500 M2 (D/MG)	Max. hopper content	500 l

Implement version	Size	Value
	Weight	93 kg
	Dimensions (H × W × D in cm)	125 × 80 × 120

Implement version	Size	Value
Hydraulic Fan (HG)	Weight	23 kg
	Dimensions (H × W × D in cm)	27 × 46 × 40

Implement version	Size	Value
Hydraulic lines	Length of the pressure line	6 m
	Length of the motor line	< 1 m
	Length of the tank line	6 m

Electrical data

Values for supply from the electric fan:

Size	Value	
	Electric fan	Electric fan PLUS
Power data	12 V, 25 A	12 V, 40 A

The battery cable of the motor module equipped with a 40 A fuse.

The motor module is internally protected with a 40 A safety fuse. In case of replacement, an equivalent fuse must be used; under no circumstances may it have a higher tripping current.

Hydraulic data

Values for supply from the hydraulic fan:

Size	Value
Maximum pressure	180 bar
Maximum oil quantity	38 l/min

Spreading widths

Recommended spreading width: 1 - 6 m

Maximum spreading widths:

Drive type	Maximum spreading width
Electric fan	6 m
Electric fan PLUS	12 m (with 16 outlets)
Hydraulic fan	12 m (with 16 outlets)
PTO shaft blower fan	12 m (with 16 outlets)

Mount categories

CAT I – III (only with three-point linkage)

3 SAFETY

This section contains all requirements and measures that ensure safe operation of the seed drill.

3.1 SAFETY INSTRUCTIONS IN THIS DOCUMENT

What are safety instructions?



Safety instructions are information that serve to prevent personal injuries. Safety instructions contain the following information:

Type of danger

Possible consequences in case of non-compliance with the instructions

Measures to prevent personal injury

3.2 BASIC SAFETY REGULATIONS

Target group for these regulations

These regulations are aimed at all those who will be handling the seed drill.

Purpose of these regulations

These regulations aim to ensure that all persons who will be handling the seed drill are thoroughly informed about the dangers and safety measures and observe the safety instructions in the operating manual and on the seed drill. If you do not follow these regulations, you are at risk of injury and material damage.

Handling the operating manual

Observe the following regulations:

- Read the Safety section and the section relating to your work completely. You must understand these contents.
- Always keep the operating manual close to the seed drill for reference purposes. There is a container for this installed on the seed drill.
- When passing on the seed drill, be sure to pass on the operating manual.

Handling the seed drill

Observe the following regulations:

- Only persons who fulfil the requirements defined in this operating manual may handle the seed drill.
- Do not use the implement if you are tired or under the influence of drugs, alcohol or medication.
- Only use the seed drill for the intended purpose.
- Never use the seed drill for other purposes that may seem similar.
- Observe all of the safety measures that are indicated in this operating manual and on the seed drill.
- Do not make any modifications to the seed drill, e.g. by removing parts or mounting unauthorised parts.
- When replacing defective parts, only use original spare parts or standard parts approved by the manufacturer.

Operator obligations toward the personnel

As the operator, you have to ensure the following:

- The personnel fulfils the requirements corresponding to his work.
- The personnel has read and understood this operating manual before handling the seed drill.
- The regulations applicable in your country for safety at work are being observed.

Procedure in case of accident

The seed drill is designed and built so that the personnel can work without risk. Despite all precautions, however, unforeseeable accidents can still occur under unfavourable circumstances.

Always observe your company's guidelines regarding accidents.

More information on the subject of

- **Intended use of the seed drill on page 12**
- **Personnel requirements on page 12**
- **Dangers and safety measures on page 14**

3.3 INTENDED USE

The pneumatic seeders of types PS 120 to PS 500 serve to spread seed with different properties and grain sizes on open fields.

The implements are designed solely for normal use in agricultural operations. Only cereal varieties that are intended by the manufacturer and listed in the operating manual may be used. Different seeding shafts are designed for the different cereal varieties, which must be used and replaced if necessary. A special version of the seed drill protected against corrosion can also be used for spreading fertiliser with a seeding shaft designed for this purpose (intended use).

Any other use is considered to be non-intended. The manufacturer is not liable for any resulting damage, the operator alone bears the associated risk.

Intended use also includes compliance with the conditions for operation, maintenance, and repairs prescribed by the manufacturer.

The applicable accident prevention regulations as well as the other general safety-related and occupational health regulations must also be observed.

The manufacturer is not liable for any damage resulting from unauthorised modifications and the use of components and auxiliary parts.

3.4 PERSONNEL REQUIREMENTS

The owner is responsible for ensuring that the implement only be used, maintained and repaired by persons who have relevant experience and were instructed on the risks. This must be verified by the owner at regular intervals.

The safety instructions must also be handed over to other users.

Qualification

Persons who will be handling the seed drill must fulfil the following requirements:

Personnel	Activities	Required qualification
Forwarder	Transport of the seed drill from one business to another	- Experience with transport of machinery - Qualification of a transport specialist for machinery
Transporter	Transport of the implement within the farm	- Forklift driver - Experience with handling the suitable lifting gear
Installer	Installation and commissioning of the seed drill	Trained mechanic
Setter	Setting up the seed drill	- Experience in the agricultural field - Experience with handling the seed drill
Operator	- Operating the seed drill on the farm - Cleaning the seed drill	- Trained assistant - Suitable driving license
Maintenance personnel	- Performing maintenance work - Performing repair work	Trained mechanic
Disposer	Disposal of the seed drill	Disposal specialist

3.5 PERSONAL PROTECTIVE EQUIPMENT

The personnel must be equipped with the following personal protective equipment and wear it if necessary:

- Hearing protection
- Mask
- Safety shoes with non-slip soles

3.6 SAFETY DEVICES

Meaning of the safety devices

The seed drill has safety devices that protect the user from danger. It is mandatory to check that all safety devices are equipped and functional each time the seed drill is used.

Location of the guards

The picture shows the location of the safety devices:



Function of the safety devices

The safety devices have the following function:

No.	Designation	Function
1	Bearing cover	Protection against reaching into the running agitator.

Purpose

Warning signs on the seed drill warn about danger points. The warning signs must always be present and legible.

Overview

The table shows all warning signs that are installed on the seed drill and their meaning.

Appearance of the sign	Meaning of the sign
 ⚠ WARNING Thrown or flying objects keep safe distance while the engine is running	Risk of injury due to thrown parts! Maintain a safe distance from the implement during operation.
 ⚠ WARNING Moving parts can crush and cut. Keep hands clear. Do not operate with guard removed.	Risk of injury due to moving parts! Only work with mounted covers.
 ⚠ WARNING Do not operate without guards in place	Risk of injury due to rotating parts! Only operate the implement when the cover is installed.
 ⚠ WARNING Do not start, operate or service machine until you read and understood operator's manual.	Read and observe the operating manual before operating the implement!

Appearance of the sign	Meaning of the sign
	Read and observe the operating manual before working with the implement! Operating errors can lead to serious injuries.
	Risk of injury due to rotating parts! Do not reach into rotating parts. When working on the implement, switch these off and disconnect from the power supply.
	Be careful with escaping high-pressure liquids!
	Use hearing protection!
	Hot surface! Do not touch!
	Maintain a safe distance from hot surfaces!
	Risk of injury due to rotating parts! Maintain a safe distance from rotating parts.
	Risk of injury due to rotating parts! When the implement is running, keep the guards closed.
	Use hearing protection!

3.7 DANGERS AND SAFETY MEASURES

Overview

The seed drill is designed such that the user is protected from all avoidable dangers that are practical in design terms. Due to the purpose of the seed drill, however, there are residual dangers that require precautionary measures to be avoided.

In the following, you will be informed about the types of these residual dangers and their effects.

Transport

Danger	Where and in which situations does the danger occur?	Countermeasure
Risk of crushing due to the weight of the implement	When lifting and lowering the implement	The implement may only be transported by personnel trained for this task.

Installation

Danger	Where and in which situations does the danger occur?	Countermeasure
Risk of crushing due to the weight of the implement	When lifting and lowering the implement	The implement may only be transported with a forklift or lift truck by personnel trained for this task.
Risk of slipping, stumbling and falling	When mounting the implement on a soil tillage implement or on the tractor	Work must be performed on sturdy steps with non-slip safety shoes.

Set-up

Danger	Where and in which situations does the danger occur?	Countermeasure
Risk of injury due to moving parts	When setting the spread rate, which must be done with the seeding shaft cover removed	The spread rate may only be adjusted exactly according to the operating manual by trained personnel.
Risk of injury due to moving parts when the implement is accidentally switched on	When the agitator is activated, which must be done with the seeding shaft cover removed	Make sure that the implement is disconnected from the power supply to prevent sudden start-up of the implement.
Danger due to defective implement parts	When operating the implement	Before operating the implement, always check for fractures, cracks, chafe marks, leaks, loose bolts, vibrations, sounds and function. Service the implement regularly.
Risk of injury due to oil leaks	When starting up the hydraulic fan	Nobody may be standing in the danger zone during start-up. Wear protective equipment.

Operation

Danger	Where and in which situations does the danger occur?	Countermeasure
Risk of injury due to rotating parts	When handling the implement during operation	Make sure that the covers for the agitator are closed during operation.
Risk of injury due to seed being thrown out	While spreading seed.	Always ensure that there is nobody standing in the spreading range of the implement.
Risk of slipping, stumbling and falling	When handling the implement during operation	Only enter the implement area using dry, sturdy steps with non-slip safety shoes. The implement may not be used in the rain or in a thunderstorm.

Danger	Where and in which situations does the danger occur?	Countermeasure
Hearing damage due to implement noise	When operating the implement	Use hearing protection.
Risk of poisoning or suffocation due to poisonous seed types	While spreading seed.	Wear a face mask when handling toxic seed types.

Cleaning

Danger	Where and in which situations does the danger occur?	Countermeasure
Risk of suffocation or poisoning with toxic seed types	When cleaning the implement with compressed air	Wear a face mask when handling toxic seed types.

Maintenance and repairs

Danger	Where and in which situations does the danger occur?	Countermeasure
Incorrectly or inadequately performed maintenance work with limited visibility	Under poor light conditions	If necessary, maintenance must be performed with additional lighting.

4 TRANSPORT, INSTALLATION AND COMMISSIONING

In this section, you will learn which work steps must be performed for the installation and commissioning of the seed drill, and what must be done and observed.

4.1 ATTACHING THE SEED DRILL TO A SOIL TILLAGE IMPLEMENT

Purpose

For operation on the field, the seed drill can be attached to a soil tillage implement, such as a cultivator or a harrow. The attachment must be installed individually.

Requirements

The following requirement must be fulfilled for this work step:

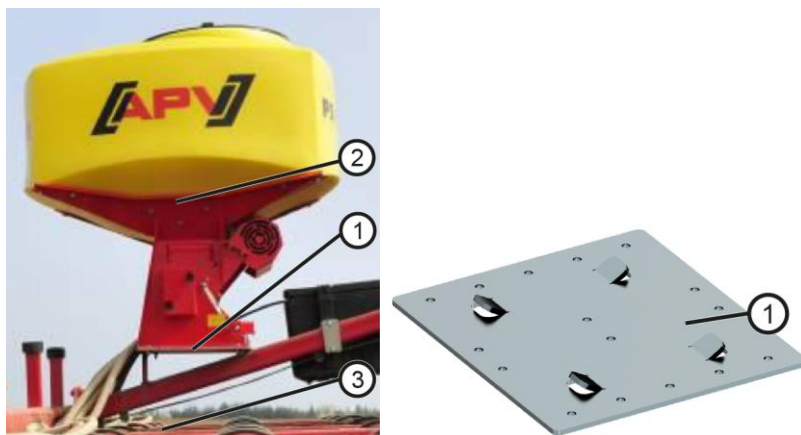
- The implement is disconnected from the power source, see **Disconnecting the seed drill from the power source** on page 34 for more information.
- The soil tillage implement is designed for mounting of the seed drill – information for this can be obtained from the soil tillage implement manufacturer.

Required components, tools and materials

For this work step, the following components, tools and materials are required:

- Counter plate
- Bolts with $\varnothing > 10$ mm, strength class 8.8 or higher
- Self-locking fastenings (nuts)
- Lifting gear that is suitable for the mass of the respective implement version, see **Technical Data** on page 9 for more information.

Overview



No.	Designation
1	Counter plate
2	Seed drill
3	Soil tillage implement

Procedure

To attach the seed drill on a soil tillage implement:

Step	Description
1	Fasten the counter plate (1) on the soil tillage implement (3). The counter plate must be parallel to the ground when the soil tillage implement is in working position.
2	Use the lifting gear to place the seeder (2) on the counter plate (1).
3	Fasten the seeder (2) with bolts and nuts on the counter plate (3).

4.2 ATTACHING THE SEED DRILL TO A TRACTOR

Purpose

For operation on the field, the seed drill can be attached directly to a tractor.

Requirements

The following requirement must be fulfilled for this work step:

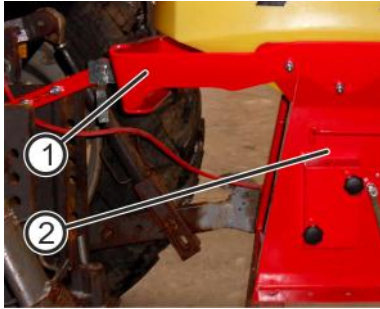
- The implement is disconnected from the power source, see **Disconnecting the seed drill from the power source** on page 34 for more information.
- The tractor is designed for mounting of the seed drill – information on this can be obtained from the tractor manufacturer.

Required components, tools and materials

For this work step, the following components, tools and materials are required:

- Suitable component for attachment (e.g. top link mounting kit or three-point loader)
- Bolts M 12, strength class 8.8 or higher
- Self-locking fastenings (nuts)
- Lifting gear that is suitable for the mass of the respective implement version, see **Technical Data** on page 9 for more information

Overview



No.	Designation
1	Top link mounting kit
2	Seed drill

Procedure

To attach the seed drill to a tractor using the top link mounting kit:

Step	Description
1	Fasten the top link mounting kit (1) with bolts and nuts onto the seed drill (2).
2	Fasten the top link (1) with the bolts onto the tractor.
3	Using lifting gear, move the seed drill (2) close to the tractor and mount the top link in the top link bracket. Using the counter plate, clamp the seeder onto the tractor linkage drawbar.

4.3 INSTALLING THE DISPERSION PLATES ON THE SOIL TILLAGE IMPLEMENT

Purpose

The dispersion plates serve to fix the hoses, through which the spreading material flows, at the right spot and spread the seed.

Requirements

The following requirement must be fulfilled for this work step:

None

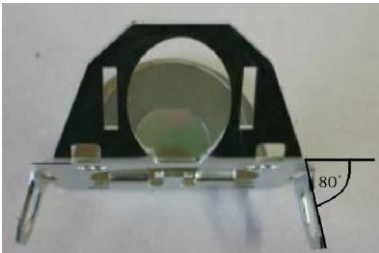
Required components, tools and materials

For this work step, the following components, tools and materials are required:

- Dispersion plates
- Hexagonal shaft
- Bolts
- Washers
- Pliers
- Hexagon key

Procedure for mounting with hexagon shaft

This is how to install the dispersion plates on the soil tillage implement.

Step	Description	Explanation/illustration
1	Using the pliers, bend the tabs on the sides of the dispersion plates down by 80°.	Result: 
2	Distribute the dispersion plates evenly across the entire working width of the soil tillage implement. Maximum spacing of the dispersion plates: 75 cm	
3	Push the hexagon shaft through the two hexagonal holes in the tabs on the sides of the dispersion plate intended for this purpose.	
4	Using the supplied bolts and washers, fasten the dispersion plates onto the hexagon shaft.	Result: 
5	Fasten the hexagon shaft equipped with the dispersion plates onto the soil tillage implement at a distance of 40 cm from the ground.	
6	Connect the hoses to the dispersion plates, see Connecting the hoses on page 19 for more information.	

4.4 CONNECTING THE HOSES

Purpose

The hoses convey the seed from the seed drill onto the field. Before initial operation, the hoses have to be cut to the required length and installed on the dispersion plates and the seed drill.

Requirements

The following requirement must be fulfilled for this work step:

None

Required components, tools and materials

For this work step, the following components, tools and materials are required:

- Hose roll
- Cutting tool
- Hexagon key or Torx screwdriver

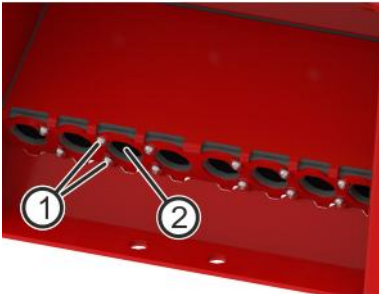
Procedure

This is how you connect the hoses to the seed drill:

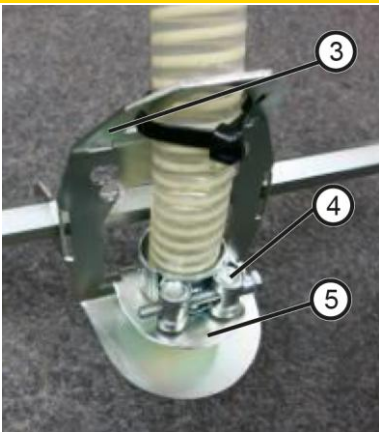
Version 1 (Standard PS and MG):

Step	Description	Illustration
1	Using the cutting tool, cut eight pieces from the hose roll in the respectively required lengths.	
2	Slightly loosen the clamping screws (1) on the clamping plate with a WAF17 hexagon key.	
3	Insert the ends of the hoses into the transition pieces (2) up to the stop.	
4	Tighten the clamping screws (1).	

Version 2 (fertilizer, 16 outlets):

Step	Description	Illustration
1	Using the cutting tool, cut off pieces from the hose roll in the required length for each transition piece.	
2	Slightly loosen the clamping screws (1) on the clamping plate using a Torx screwdriver.	
3	Insert the ends of the hoses into the transition pieces (2) up to the stop.	
4	Tighten the clamping screws (1).	

This is how to connect the hoses to the soil tillage implement and dispersion plates:

Step	Description	Illustration
1	Insert the ends of the hose through the openings in the large tab (3) of the dispersion plate and slide the fastening clip (4) onto the hose.	
2	Push the end of the hose through the opening in the small tab (5) on the dispersion plate.	
3	Install the fastening clip (4) on the dispersion plate (5). In doing so, install the fastening clip so that - the holding finger is positioned between the hose and the fastening clip. - it is fixed by the hooks on the holding finger.	

4.5 REMOVING THE SWELL AIR PLATE

Purpose

The swell air plate guides the air from the fan over the seeding shaft. With coarse seed types such as vetch, peas or horse gram, the swell air plate must be removed to prevent damage to the seeding shaft. In addition, a flex seeding shaft must be used for coarse seed types to prevent damage to the seeding shaft or the seed.

Requirements

The following requirements must be fulfilled for this work step:

The implement is disconnected from the power source, see **Disconnecting the seed drill from the power source** on page 34 for more information.

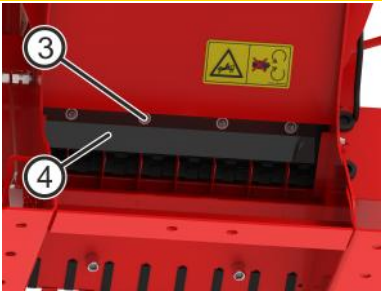
Required components, tools and materials

For this work step, the following components, tools and materials are required:

- Hexagon key
- Torx screwdriver TX 30

Procedure

This is how you remove the swell air plate:

Step	Description	Explanation
1	Loosen the hexagonal bolt (2) on the calibration slide (1).	
2	Remove the calibration slide.	
3	Loosen the Torx screws (3) and remove the swell air plate (4).	

4.6 CONNECTING THE HYDRAULIC FAN (HF)

Purpose

The hydraulic fan is used for operation with working widths up to 12 m or for higher spread rates of e.g. wheat.

Requirements

The following requirement must be fulfilled for this work step:

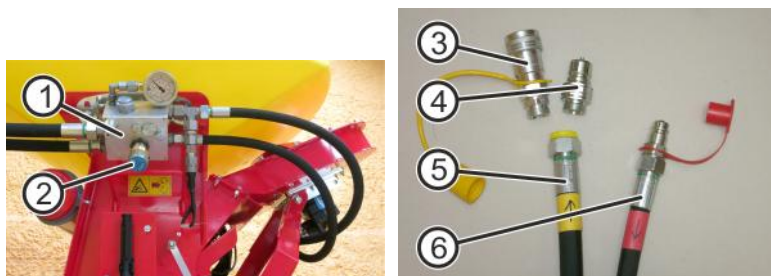
The hydraulic system is depressurized both on the tractor and implement side.

Required components, tools and materials

For this work step, the following components, tools and materials are required:

Coupling connector or coupling sleeve (for initial operation)

Overview



No.	Designation
1	Hydraulic block

No.	Designation
2	Flow control valve
3	Coupling sleeve (alternative)
4	Coupler plug
5	Return line
6	Pressure line

Procedure

This is how to connect the hydraulic fan:

Step	Description
1	Completely close the flow control valve (2) on the hydraulic block (1).
2	Connect the return line (5) (marked in yellow, BG4) without reduction to the return flow connection of the tractor hydraulic system. For initial operation: Remove the plastic plug on the return line and connect the coupling plug (4) or the coupling sleeve (3) with the return line.
3	Connect the pressure line (6) (marked in red, BG3) with a pressure connection of the tractor hydraulic system.

4.7 CONNECTING THE ELECTRIC FAN PLUS

Purpose

The electric fan PLUS is used for operation with working widths up to 12 m or for higher spread rates of e.g. wheat.

Requirements

The following requirements must be fulfilled for this work step:

- Use of the electric fan PLUS with a 5.2 Control Box (hardware version: as of 14.2, software version: as of 1.28) or an ISOBUS (hardware version: as of CC16WP, software version: as of V3.0.0).
- The electrical supply is disconnected.

Required components, tools and materials

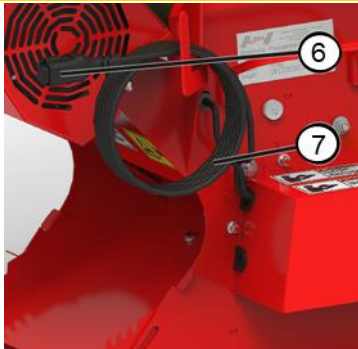
For this work step, the following components, tools and materials are required:

Tractor cable set, implement cable

Procedure

To connect the motor module of the electric fan PLUS:

Step	Description	Explanation
1	Install the tractor cable set (1) close to the rear hydraulic connections using the holding plate.	
2	Connect the red end of the cable (2) to the positive terminal of the tractor battery.	
3	Connect the black end of the cable (3) to the negative terminal of the tractor battery.	

Step	Description	Explanation
4	Connect the power supply cable (5) between the motor module (4) and the tractor cable set (1).	
5	Connect the implement cable (6) to Control Box (7).	
6.1	5.2 Control Box: Select <i>Electric PLUS</i> in the 1. <i>Fan motor</i> menu.	
6.2	ISOBUS: Select <i>Electric fan PLUS</i> in the <i>PS fan</i> menu.	

5 OPERATION

In this section, you will learn how to properly configure the seed drill and the seed flow rate, and how to adjust it during operation.

5.1 SETTING THE HYDRAULIC FAN (HF)

Purpose

The hydraulic fan produces an air current that carries the seed through the hoses to the dispersion plates. The required air pressure and air quantity depend strongly on the seed (type and weight), the spread rate, working width and speed. For this reason, it is not possible to give precise specifications for the correct fan settings, it must be determined in field trials! Reference values for the fan setting can be found in the setting table for the flow control valve.

Requirements

The following requirement must be fulfilled for this work step:

The hydraulic fan is connected, see also **Connecting the hydraulic fan (HF)** on page 21.

Required components, tools and materials

For this work step, the following components, tools and materials are required:

None

Overview



No.	Designation
1	Hydraulic block
2	Flow control valve

Procedure

This is how to set the hydraulic fan:

Version 1 (Constant pressure pump – non-adjustable oil quantity on the tractor)

Step	Description
1	Completely close the flow control valve (2) on the hydraulic block (1).
2	Start up the blower fan (tractor engine speed as in field operation).
3	Adjust the fan speed using the flow control valve (2) on the control block.

Version 2 (Variable pump - oil quantity adjustable on the tractor):

Step	Description
1	Completely open the flow control valve (2) on the hydraulic block (1).
2	Completely close the flow control valve on the tractor (set the oil quantity to zero).
3	Start up the fan and run up to the desired fan speed (slowly increase the oil quantity).

Setting table for the flow control valve

(valid for approx. 50°C oil temperature)

Working width 3 m			
Seed	Rate	Pressure	Speed
Fine seed	5 kg/ha	5 bar	1400 rpm
Fine seed	30 kg/ha	15 bar	2900 rpm
Coarse seed	50 kg/ha	18 bar	3000 rpm
Coarse seed	100 kg/ha	19 bar	3100 rpm

Working width 6 m			
Seed	Rate	Pressure	Speed
Fine seed	5 kg/ha	8 bar	1550 rpm
Fine seed	30 kg/ha	20 bar	3300 rpm
Coarse seed	50 kg/ha	21 bar	3400 rpm
Coarse seed	100 kg/ha	22 bar	3500 rpm

Working width 12 m			
Seed	Rate	Pressure	Speed
Fine seed	5 kg/ha	10 bar	1650 rpm
Fine seed	30 kg/ha	35 bar	4000 rpm
Coarse seed	50 kg/ha	39 bar	4200 rpm

Working width 12 m

Seed	Rate	Pressure	Speed
Coarse seed	100 kg/ha	41 bar	4300 rpm

5.2 SETTING AND ADJUSTING THE SPREAD RATE

Purpose

The setting for the spread rate, which is spread by the seed drill during the seeding process, has a significant effect on the seeding results.

Requirements

The following requirement must be fulfilled for this work step:

None

Procedure

This is how to set and adjust the spread rate:

Step	Description
1	Perform a calibration test to determine the current spread rate, see Performing a calibration test on page 25 for more information.
2	If necessary, take measures to adjust the spread rate. Suitable measures are: Selection of the seeding shaft, see Selecting the right seeding shaft on page 26 for more information. Selection of the brush pressure, see Setting the brush pressure on page 30 for more information. Adjustment of the working width, see Installing dispersion plates on the soil tillage implement on page 18 for more information. Adjusting the tractor speed.

Calculating the spread rate

The spread rate can be calculated using the following formula:

$$StM = \frac{m_{gew} \times v_{Traktor} \times b_{Arbeit}}{600}$$

SpR: Spread rate in kg/min

r(req): Required spread rate in kg/ha

v(tractor): Speed of the tractor in km/h

w(working): Working width in m

5.3 REGULATING THE SEED FLOW RATE (CALIBRATION TEST)

Purpose

During the calibration test, the seed quantity for a specific area is defined.

Requirements

The following requirement must be fulfilled for this work step:

The implement is disconnected from the power source, see **Disconnecting the seed drill from the power source** on page 34 for more information.

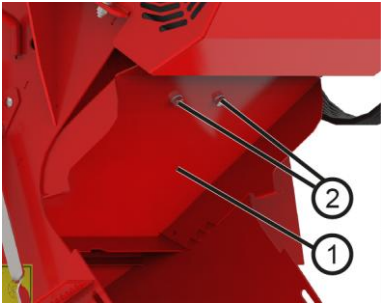
Required components, tools and materials

For this work step, the following components, tools and materials are required:

- Calibration bag
- Hexagon key

Procedure

This is how to perform a calibration test:

Step	Description	Explanation
1	Loosen the hexagonal bolt (2) on the calibration slide (1).	
2	Take the calibration slide out of the anchoring and turn it by 180°.	
3	Attach the rotated calibration slide back onto the seeder.	Result: 
4	Hook the calibration bag onto the calibration slide.	
5	Select the suitable brush pressure, see Setting the brush pressure on page 30.	
6	Switch on the control box.	
7	Start the calibration program of the seed drill, refer to the control box operating manual for more information.	

5.4 SELECTING THE RIGHT SEEDING SHAFT

Purpose

By selecting the right seeding shaft, which is suitable for the seed type, the seeding results are significantly improved.

Requirements

The following requirement must be fulfilled for this work step:

None

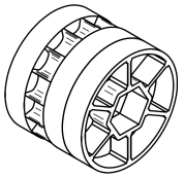
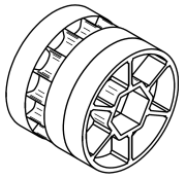
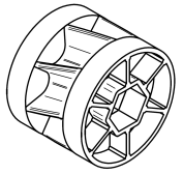
Required components, tools and materials

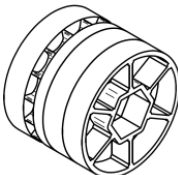
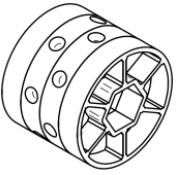
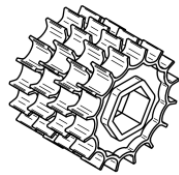
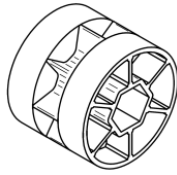
For this work step, the following components, tools and materials are required:

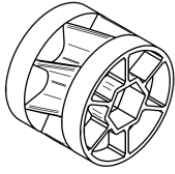
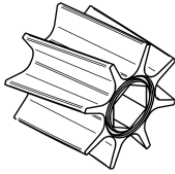
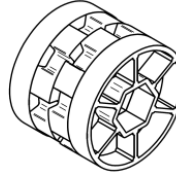
None

Table of available seeding shafts

From the following tables, select the seeding shaft that is suitable for your purposes:

Standard equipment		D series standard equipment	
			
fb-f-fb-fb	GGG	fb-f-fb-fb	fb-Flex20-fb
• White mustard • Phacelia	• Grass • Cereals	• Micro granules fertiliser • White mustard • Phacelia	• Micro granules fertiliser • Peas • Beans

Available as an option			
			
fb-fb-ef-eb-fb	fb-efv-efv-fb	ffff	GB-G-GB
• Poppy	• Canola	• Buckwheat • White mustard • Cress	• Buckwheat • Fodder radish

Available as an option		
		
fb-Flex20-fb	Flex40	fb-fv-fv-fb
• Peas • Beans • Lupines • Vetch • Fertilizer	• Peas • Beans • Lupines • Vetch • Fertilizer	• Clover • Cress

CAUTION! It is important to select the combination of seed wheels such that the seeding shaft settings on the control box are ideally between 20 % and 80 %. This ensures good regulation and homogeneous delivery of the seed even with ground speed related spreading at very low or high speeds!

5.5 CHANGING THE SEEDING SHAFT

Purpose

By installing the right seeding shaft, the seeding results are significantly improved.

Requirements

The following requirements must be fulfilled for this work step:

- The implement is disconnected from the power source, see **Disconnecting the seed drill from the power source** on page 34 for more information.

- The seed hopper is empty, see **Emptying the seed hopper** on page 35 for more information.
- The right seeding shaft is selected and ready, see **Selecting the right seeding shaft** on page 26 for more information.

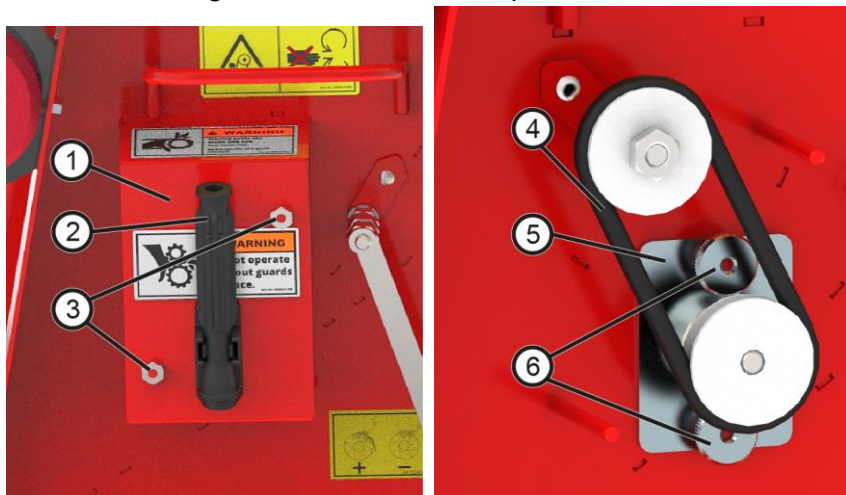
Required components, tools and materials

For this work step, the following components, tools and materials are required:

- Hexagon key

Overview

Access to the agitator drive and the required tool:



No.	Designation
1	Bearing cover
2	Hexagon key holder
3	Lid nuts
4	Drive belt
5	Bearing flange
6	Knurled nuts

Procedure

This is how to change the seeding shaft:

Step	Description	Explanation
1	Take the hexagon key from the holder (2).	
2	Loosen the lid nuts (3) on the bearing cover (1).	
3	Remove the bearing cover (1).	
4	Remove the drive belt (4).	
5	Loosen the knurled nuts (6).	

Step	Description	Explanation
6	Remove the bearing flange (5).	Result: 
7	Take out the seeding shaft. NOTE: Residual seed can fall out in the process.	
8	Insert the new seeding shaft with the free journal forwards into the steel rack.	
9	Turn the seeding shaft until the fitted key of the gearbox motor engages in the groove of the seeding shaft.	
10	Fit the bearing flange with its fitted key into the fitted groove of the seeding shaft.	
11	Hand-tighten the knurled nuts on the bearing flange.	
12	Place the drive belt over the two gear wheels.	
13	Fit the bearing cover on the two threaded rods and tighten the lid nuts with the hexagon key.	
14	Check the seeding shaft for ease of motion, see Checking the ease of motion of the shaft on page 29 for more information.	

5.6 CHECKING THE EASE OF MOTION OF THE SEEDING SHAFT

Purpose

Each time the seeding shaft is installed or replaced, it must be checked for ease of motion. This check is performed by a hearing test.

Requirements

The following requirement must be fulfilled for this work step:

The seed hopper is empty, see **Emptying the seed hopper** on page 35 for more information.

Required components, tools and materials

For this work step, the following components, tools and materials are required:

- None

Procedure

This is how to check the ease of motion of the seeding shaft:

Step	Description
1	Switch on the seed drill.
2	Perform the hearing test.
3	If the sound of the running seeding shaft is noticeably loud or irregular, contact the maintenance and repair service, see Contact service on page 6 for more information.

5.7 SETTING THE BRUSH PRESSURE

Purpose

The brush pressure on the seeding shaft is regulated using the brush adjustment lever.

Requirements

The following requirement must be fulfilled for this work step:

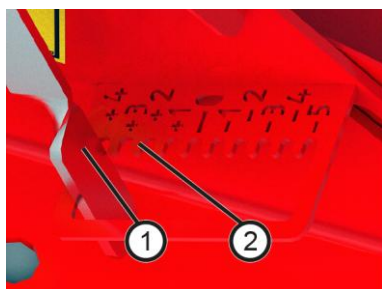
None

Required components, tools and materials

For this work step, you need the following components, tools and materials:

None

Overview



No.	Designation
1	Brush adjustment lever
2	Setting scale

Procedure

This is how to set the brush pressure:

Step	Description
1	Pull the brush adjustment lever (1) out of the setting scale.
2	Move the brush lever to the desired position and engage it in the appropriate notch of the setting scale. The following orientation rules apply here: - For fine seed, increase the brush pressure up to -5. - For coarse seed, reduce the brush pressure up to +4.

5.8 FILLING THE SEED HOPPER

Purpose

The seed hopper stores the seed to be spread.

Requirements

The following requirement must be fulfilled for this work step:

The implement is disconnected from the power source, see **Disconnecting the seed drill from the power source** on page 34 for more information.

Required components, tools and materials

For this work step, the following components, tools and materials are required:

- Seed

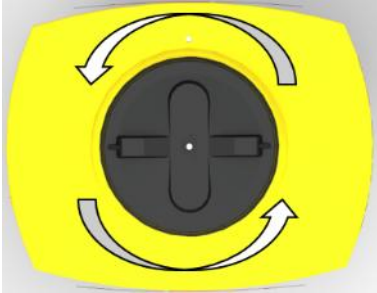
Overview



No.	Designation
1	Seed hopper lid
2	Seed hopper

Procedure

This is how to fill the seed hopper:

Step	Description	Explanation
1	To open the seed hopper, turn the lid (1) counterclockwise.	
2	Fill the seed into the seed hopper (2).	
3	To close the seed hopper, turn the lid (1) clockwise.	

5.9 DEACTIVATING THE AGITATOR

Purpose

Use of the agitator is only required for seed types that tend towards bridging or for very light seed (e.g. for grasses).

Requirements

The following requirements must be fulfilled for this work step:

The implement is disconnected from the power source, see **Disconnecting the seed drill from the power source** on page 34 for more information.

Required components, tools and materials

For this work step, the following components, tools and materials are required:

- Hexagon key
- Drive belt

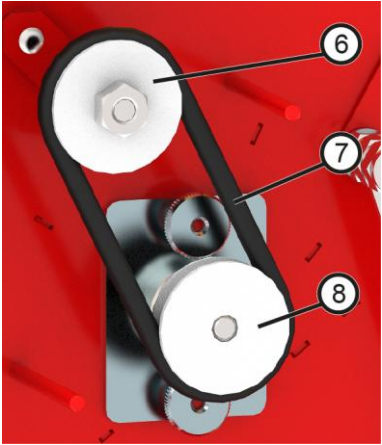
Overview



No.	Designation
1	Bearing cover
2	Hexagon key holder
3	Lid nuts
4	Agitator
5	Seeding shaft

Procedure

This is how to deactivate the agitator:

Step	Description	Explanation
1	Open the bearing cover (1). To do so, loosen the cover nuts (3) with the hexagon key.	
2	Release the drive belt (7) from the seeding shaft driving wheel (8) and the agitator driving wheel (6) and put it aside.	
3	Close the bearing cover (1).	

5.10 DISPLAY ON THE MOTOR MODULE

Purpose

The status of the fan is displayed on the motor module.

Requirements

The following requirements must be fulfilled for this work step:

None

Required components, tools and materials

For this work step, the following components, tools and materials are required:

Use of the electric fan PLUS with 5.2 Control Box or ISOBUS

Overview



No.	Designation	Meaning
1	<i>Fan overload</i> control lamp	The LED lights up red if one of the motors is strained at its limits for too long.
2	<i>Fan not connected</i> control lamp	The LED lights up red if the cabling is faulty. If only one fan is running, both connection lines must be connected to this fan.
3	Fan status lamp	The LED lights up green when the voltage supply is established.

Procedure

To use the motor module:

Step	Description
1	The Control Box issues the <i>Error (fan)!</i> error message.
2	Check the display on the motor module.
3	Eliminate the respective fault according to Point 6.

6 FAULT INDICATIONS

In this section, you will find information for eliminating faults that may occur during operation.

6.1 FAULT OVERVIEW

Problem	Cause	Remedy
The seeding shaft does not rotate when the drive shaft of the gearbox motor is rotating.	The fitted key fell out of the drive shaft.	Stick on a new fitted key.
The seed hoses get clogged	Fan speed too low.	Check the fan speed and increase if necessary.
Control Box issues error message <i>Error (fan)!</i> , control lamp <i>E01 (Fan overload)</i> lights up red on the motor module.	One or both of the motors ran in the limit range for too long.	• Check or install the calibration lid. • Check whether all of the seeding hoses are installed. • Remove any foreign objects or similar from the fan. • Check the fan for smooth running.

Problem	Cause	Remedy
Control Box issues error message <i>Error (fan)!</i> , control lamp <i>E02 (Fan not connected)</i> lights up red on the motor module.	Faulty cabling.	• Check the cabling. • If only one fan is running, both connection lines must be connected to this fan.

You can find more information on other faults in the operating manuals for the respective control boxes. If the problem could not be fixed, please contact the manufacturer. You can find information for this under **Contact Service** on page 6.

7 CLEANING, MAINTENANCE, AND REPAIRS

In this section, you will learn how to clean and maintain the seed drill, and what to do in case of damage or failure of the implement.

7.1 DISCONNECTING THE SEED DRILL FROM THE POWER SUPPLY

Purpose

Any opening of the hopper lid requires disconnection from the electric or hydraulic supply. Error correction, setup and maintenance work often require that the seed drill is disconnected from the power supply.

Requirements

The following requirements must be fulfilled for this work step:
None

Required components, tools and materials

For this work step, the following components, tools and materials are required:
None

Overview



No.	Designation
1	Power supply plug of the motor module (only for electric fan PLUS)

Procedure

This is how to disconnect the seed drill from the power supply:

Step	Description
1.1	5.2 Control Box: Pull out the power supply plug from the Control Box and For the electric fan PLUS, also pull out the power supply plug for the motor modules from the seeder.
1.2	ISOBUS: Disconnect the plug from the tractor socket.

7.2 EMPTYING THE SEED HOPPER

Purpose

Before cleaning or decommissioning, the seed remaining in the seeder must be removed from the seed hopper.

Requirements

The following requirement must be fulfilled for this work step:

The implement is disconnected from the power source, see **Disconnecting the seed drill from the power source** on page 34 for more information.

Required components, tools and materials

For this work step, the following components, tools and materials are required:

None

Procedure

This is how to empty the seed hopper:

Step	Description	Explanation
1	Loosen the hexagonal bolt (2) on the calibration slide (1). NOTE: The bolts are connected to the calibration slide with the locking rings.	
2	Take the calibration slide out of the anchoring and turn it by 180°.	
3	Attach the rotated calibration slide back onto the seeder.	
4	Start the emptying program of the control box, refer to the control box operating manual for more information.	

7.3 CLEANING THE SEED DRILL

Purpose

The seed drill must be cleaned inside and out on a regular basis to ensure long-term proper functioning. If not cleaned properly, germs can form inside the seed drill due to seed residues.

Requirements

The following requirements must be fulfilled for this work step:

The implement is disconnected from the power source, see **Disconnecting the seed drill from the power source** on page 34 for more information.

Required components, tools and materials

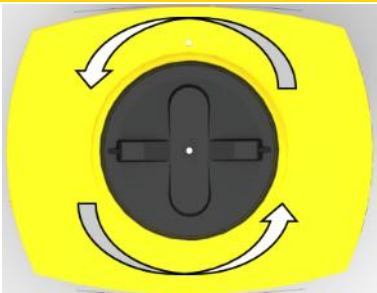
For this work step, the following components, tools and materials are required:

Air compressor

Moist cloth

Procedure

To clean the seed drill:

Step	Description	Explanation
1	Empty the seed hopper, see Emptying the seed hopper on page 35 for more information.	
2	Remove the seeding shaft, see Changing the seeding shaft for more information.	
3	Turn the seed hopper lid counterclockwise to open it.	
4	Clean the inside of the seed drill and the seed paths with compressed air.	
5	Clean the outside of the seed drill with a moist cloth.	

7.4 CHECKING THE HYDRAULIC HOSES

Have the hydraulic hoses checked annually by a qualified technician. The inspection intervals to be observed may be regulated by regional laws and regulations.

According to DIN 20066, all hydraulic hoses must be replaced after 6 years at the latest.

7.5 REPAIRS AND SERVICE

In case of failure or damage to the seed drill, please contact the manufacturer. You can find information for this under **Contact Service** on page 6.

8 DECOMMISSIONING, STORAGE AND DISPOSAL

In this section, you will learn how to decommission the seed drill, store it for longer periods of time, and dispose of it.

8.1 DECOMMISSIONING THE SEED DRILL

Purpose

To ensure that the seed drill remains fully functional even if it is out of operation for longer periods of time, it is important to take precautions for storage.

Procedure

This is how to prepare the seed drill for storage:

Step	Description
1	Completely remove all seed from the seed drill.
2	Clean the seed drill inside and out, see Cleaning the seed drill on page 35 for more information.

Step	Description
3	Set the brush adjustment lever to Position "+4".
4	Store the seed drill in a dry place to prevent the formation of germs inside the implement.

8.2 STORAGE OF THE SEED DRILL

For storage of the spreader, observe the following:

- The implement must be stored in a dry place protected from weather conditions on level and solid ground to ensure that it remains functional even if it is stored for a longer period of time.
- Secure the implement against falling over or rolling away.
- Nothing may be deposited or stored on the implement.
- The implement must always be parked and stored in a secure area, to prevent unauthorised operation.

8.3 DISPOSAL

Disposal of the seed drill must be performed according to the local disposal regulations for machines.

9 APPENDIX

9.1 ACCESSORIES

9.1.1 FILLING LEVEL SENSOR

This sensor can be retrofitted on the PS 120/200/300 M1.

Operation with a control box 1.2, 5.2 or 6.2 is required.

It measures how much seed is still left in the hopper, and triggers an alarm on the control box when there is not enough seed in the hopper. The intensity of the sensor can also be adjusted for the respective seed type. It is adjusted using the small slotted screw at the rear of the sensor.

Order number:

Item no. 04000-2-269



9.1.2 CABLE EXTENSION (6-PIN)

If the standard 6 m implement cable fitted is too short due to the length of the soil tillage implement and/or the implement structure, or if the cable cannot be routed practically, this 2 m or 5 m extension cable can be ordered as an accessory.

Order number:

2 m: item no. 00410-2-148

5 m: item no. 00410-2-149



9.1.3 TOP LINK MOUNTING KIT FOR PS 120-500

With the top link mounting kit (three-point mounting bracket), you can attach the PS 120/200/300 M1, PS 500 M2 to a CAT 1 – CAT 3 three-point hitch.

Order number:

Item no.: 04000-2-114



9.1.4 ELECTRIC FAN PLUS CONVERSION KIT

With this conversion kit, you can convert the electric or hydraulic fan on a PS to an electric fan PLUS.

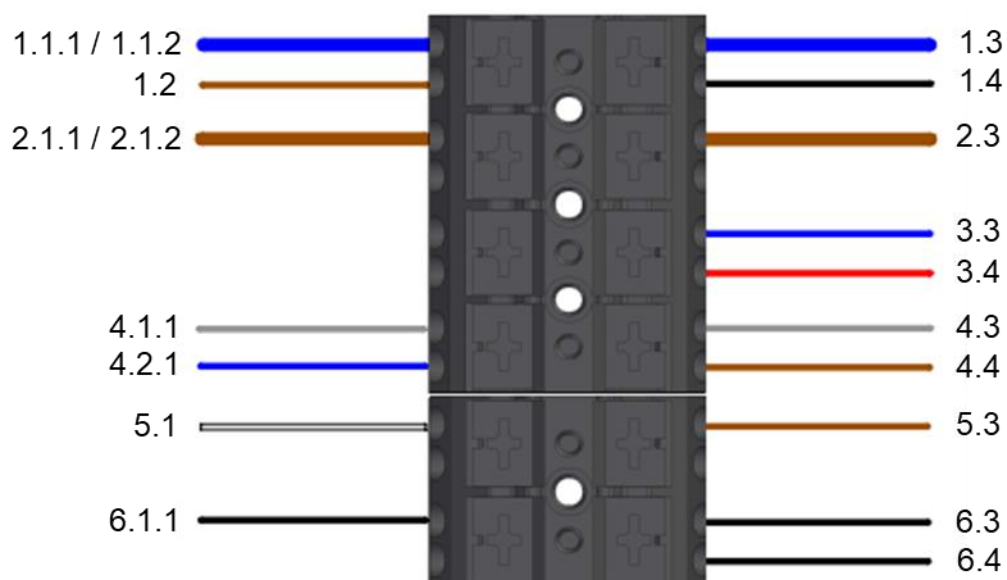
Order number:
Item no.: 04000-2-882



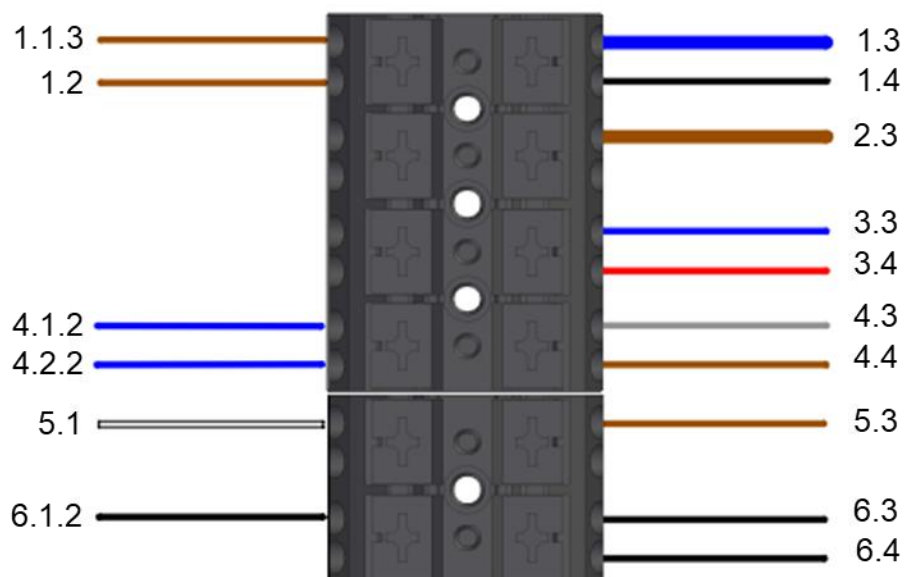
9.2 CONNECTION DIAGRAM

9.2.1 GENERAL

Electric fan:



Hydraulic fan:

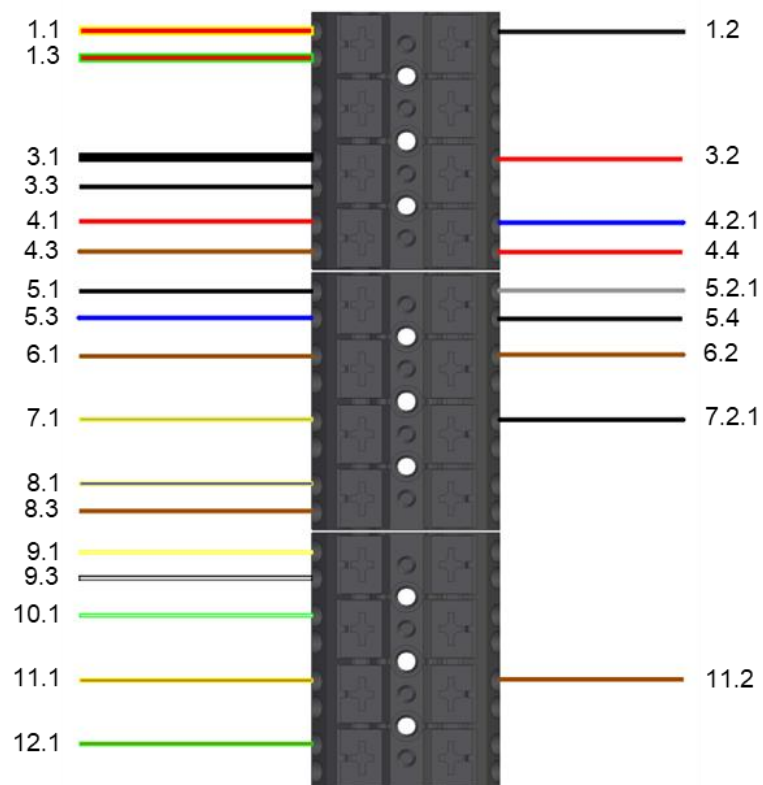


Pin	Number	Description	Colour	Cross-section (mm ²)
1	1.1.1	Fan	Blue	4
	1.1.2	Fan PLUS	Blue	0.5
	1.1.3	Fan speed sensor	Brown	0.34
	1.2	Fill level sensor	Brown	0.34
	1.3	Implement cable	Blue	4
	1.4	Seeding shaft motor	Black	1.5
2	2.1.1	Fan	Brown	4
	2.1.2	Fan PLUS	Brown	0.5
	2.3	Implement cable	Brown	4
3	3.3	Implement cable	Blue	2.5
	3.4	Seeding shaft motor	Red	1.5
4	4.1.1	Fan PLUS	Grey	0.5
	4.1.2	Fill level sensor	Blue	0.34
	4.2.1	Fill level sensor	Blue	0.34
	4.2.2	Fan speed sensor	Blue	0.34
	4.3	Implement cable	Grey	0.75
	4.4	Calibration button	Brown	0.75
5	5.1	Fill level sensor	White	0.34
	5.3	Implement cable	Brown	0.75
6	6.1.1	Fan PLUS	Black	0.5
	6.1.2	Fan speed sensor	Black	0.34
	6.3	Implement cable	Black	0.75
	6.4	Calibration button	Black	0.75

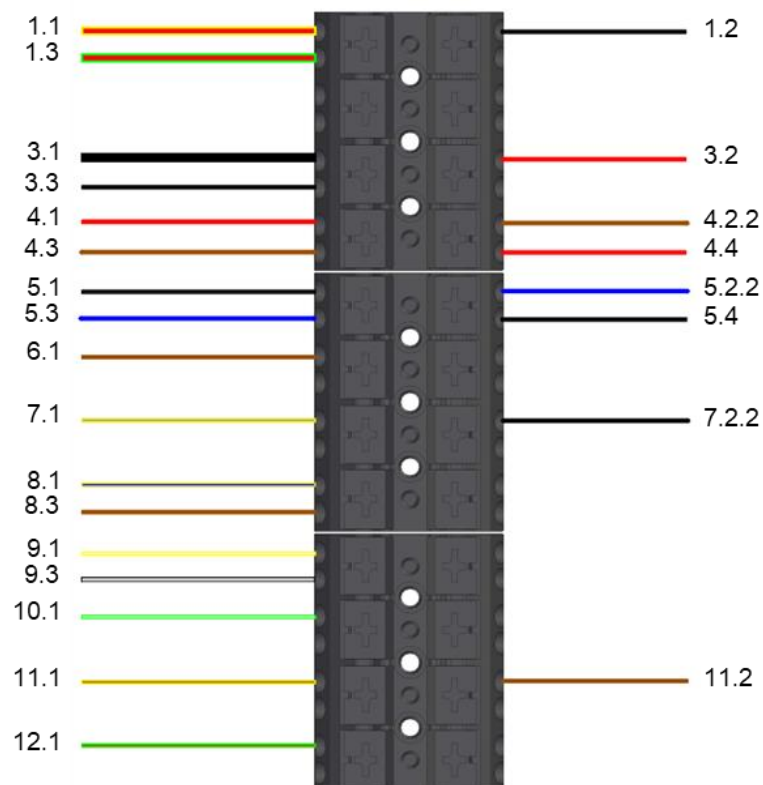
Stripping length 10 mm!

9.2.2 PS WITH ISOBUS

Electric fan:



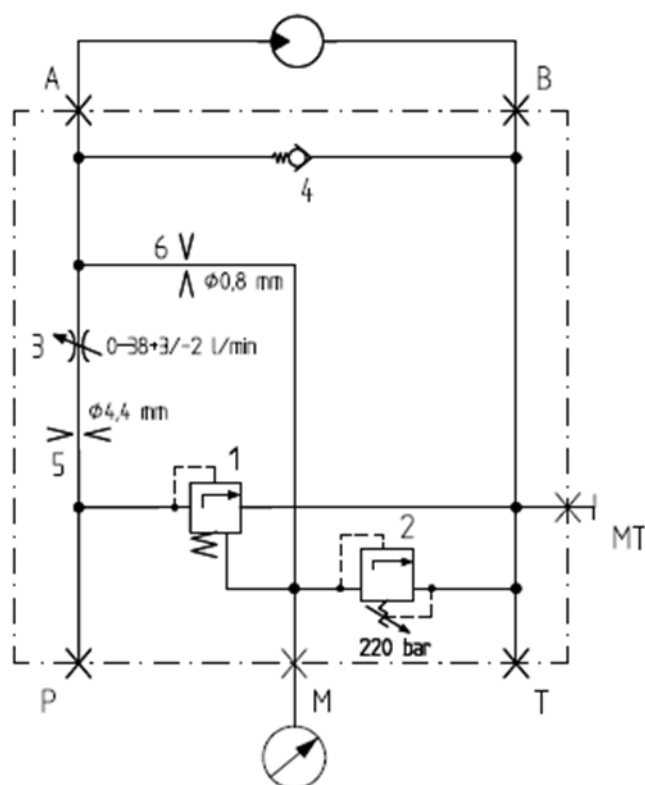
Hydraulic fan:



Number	Description	Colour	Cross-section (mm ²)	Function
1.1	Implement cable	Red-yellow	2.5	Seeding shaft PWM
1.2	Seeding shaft motor	Black	1.5	
1.3	Implement cable	Red-green	2.5	
3.1	Implement cable	Black	2.5	Ground
3.2	Seeding shaft motor	Red	1.5	
3.3	Calibration button	Black	0.75	
4.1	Implement cable	Red	0.75	+12 V sensor supply
4.2.1	Motor module	Blue	0.5	
4.2.2	Fan speed sensor	Brown	0.34	
4.3	Fill level sensor	Brown	0.34	
4.4	Encoder	Red	0.34	Sensor ground
5.1	Implement cable	Black	0.75	
5.2.1	Motor module	Grey	0.5	
5.2.2	Fan speed sensor	Blue	0.34	
5.3	Fill level sensor	Blue	0.34	
5.4	Encoder	Black	0.34	Electric fan PWM
6.1	Implement cable	Brown	0.75	
6.2	Motor module	Brown	0.5	Fan status input
7.1	Implement cable	Grey-yellow	0.75	
7.2.1	Motor module	Black	0.5	
7.2.2	Fan speed sensor	Black	0.34	Calibration button input
8.1	Implement cable	Blue-yellow	0.75	
8.3	Calibration button	Brown	0.75	Fill level sensor input
9.1	Implement cable	White-yellow	0.75	
9.3	Fill level sensor I	White	0.34	Spare
10.1	Implement cable	White-green	0.75	
11.1	Implement cable	Brown-yellow	0.75	Seeding shaft speed input
11.2	Encoder	Brown	0.34	
12.1	Implement cable	Brown-green	0.75	Spare

Stripping length: 10 mm

9.3 HYDRAULIC DIAGRAM



Pos.	Description
A	G ½" (bolted connection XGE 15 LR-ED) Max. hose length 1 m Motor-side connection B
B	G ½" (bolted connection XGE 15 LR-ED) Max. hose length 1 m Motor-side connection A
P	G ½" (bolted connection XGE 18 LR-ED) Max. hose length 6 m Coupling connector BG3 Marked in red Max. flow rate 80 l/min Max. pressure 220 bar
T	G ¾" (bolted connection XGE 22 LR-ED) Max. hose length 6 m Coupling connector (or coupling sleeve) BG4 Marked in yellow

9.4 TORQUES

The following torques must be observed without lubrication:

	Dimensions	Preload force F_u (N)			Tightening torque M_A (Nm)		
Coefficient of friction $\mu_{tot} = 0.20$	-	8.8	10.9	12.9	8.8	10.9	12.9
	M 4	3450	5050	5900	3.6	5.3	6.1
	M 5	5650	8250	9650	7.1	10.0	12.0
	M 6	7950	11700	13600	12.0	18.0	21.0
	M 8	14600	21400	25100	30.0	44.0	52.0
	M 10	23200	34100	39900	60.0	87.0	100.0
	M 12	33900	49800	58000	105.0	151.0	177.0
	M 14	46500	68500	80000	165.0	240.0	285.0
	M 16	64000	94000	110000	260.0	380.0	445.0
	M 18	80500	114000	134000	635.0	520.0	610.0
	M 20	103000	147000	172000	520.0	740.0	870.0
	M 22	129000	184000	216000	710.0	1000.0	1200.0
	M 24	149000	212000	248000	890.0	1250.0	1500.0
	M 27	196000	279000	327000	1350.0	1900.0	2200.0
	M 30	238000	339000	397000	1800.0	2550.0	3000.0

9.5 SEEDING TABLES

	Weizen Triticum				Grass Lolium perenne		
Rate	kg/min	kg/min	kg/min	kg/min	kg/min	kg/min	kg/min
Seeding shaft	ffff	GGG	fb-Flex20-fb	Flex40	ffff	BG-G-BG	GGG
2	0.13	0.52	0.34	0.48	0.06	0.26	0.27
5	0.16	1.18	0.58	1.03	0.22	0.45	0.61
10	0.20	2.30	0.99	1.95	0.49	0.76	1.17
20	0.28	4.52	1.79	3.78	1.03	1.39	2.30
30	1.58	6.70	2.59	5.61	1.38	1.98	3.42
40	4.11	8.82	3.39	7.44	1.55	2.54	4.55
50	6.63	10.94	4.19	9.27	1.72	3.11	5.67
60	7.28	11.48	4.99	11.10	1.93	3.50	6.79
70	7.93	12.03	5.80	12.93	2.13	3.89	7.92
80	8.58	12.57	6.60	14.76	2.34	4.28	9.05
90	9.23	13.12	7.40	16.59	2.54	4.67	10.17
95	9.86	13.93	7.80	17.51	2.67		10.73
100	10.48	14.75	8.20	18.42	2.81		11.30

	Buckwheat Fagopyrum				Canola Brassica Napus		
Rate	kg/min	kg/min	kg/min	kg/min	kg/min	kg/min	kg/min
Seeding shaft	ffff	GGG	fb-Flex20-fb	Flex40	fb-f-fb-fb	fb-fb-ef-eb-fb	fb-efv-efv-fb
2	0.09	0.54	0.33	0.27	0.11	0.04	0.01
5	0.39	0.99	0.50	0.70	0.21	0.06	0.02
10	0.90	1.74	0.78	1.40	0.38	0.10	0.05
20	1.92	3.24	1.35	2.82	0.72	0.18	0.10
30	2.86	4.68	1.92	4.23	1.03	0.29	0.16
40	3.74	6.07	2.49	5.65	1.32	0.45	0.22
50	4.62	7.45	3.07	7.07	1.62	0.60	0.27
60	5.06		3.64	8.48	1.75	0.67	0.33
70	5.50		4.21	9.90	1.89	0.73	0.38
80	5.94		4.78	11.31	2.03	0.80	0.44
90	6.38		5.35	12.73	2.17	0.86	0.50
95			5.63	13.44	2.30	0.91	0.52
100			5.92	14.14	2.44	0.95	0.55



	Hafer Avena		Barley Hordeum		Rettich Raphanus raphanistrum		Perennial rye Secale cereale
Quantity	kg/min	kg/min	kg/min	kg/min	kg/min	kg/min	kg/min
Seeding shaft	fb-f-fb-fb	GGG	ffff	GGG	ffff	GGG	GGG
2	0.01	0.15	0.18	0.54	0.24	0.66	0.46
5	0.02	0.46	0.48	0.87	0.62	1.18	0.99
10	0.04	0.98	0.97	1.41	1.27	2.05	1.87
20	0.07	2.02	1.96	2.51	2.55	3.79	3.62
30	0.12	3.03	2.95	3.61	3.60		5.33
40	0.17	4.01	3.94	4.71	4.98		6.98
50	0.22	4.99	4.93	5.81			8.64
60	0.24	5.85	5.12	7.59			10.27
70	0.26	6.72	5.32	9.38			11.89
80	0.27	7.58	5.51	11.16			13.44
90	0.27	8.45	5.71	12.95			14.92
95	0.28	8.73	5.80	13.84			15.14
100	0.31	10.23	5.90	14.73			18.10

	Vetch Vicia		White mustard Sinapis Alba		Lucerne Medicago Sativa		Blue lupine Lupinus angutifolius
Rate	kg/min	kg/min	kg/min	kg/min	kg/min	kg/min	kg/min
Seeding shaft	fb-f-fb-fb	ffff	fb-f-fb-fb	ffff	fb-f-fb-fb	ffff	GGG
2	0.76	3.37	0.04	0.33	0.10	0.30	0.42
5	1.42	3.89	0.15	0.75	0.21	0.70	1.11
10	2.51	4.75	0.33	1.74	0.40	1.38	2.26
20	4.71	6.48	0.68	2.86	0.79	2.73	4.56
30		8.00	1.00	4.23	1.15	4.05	6.87
40			1.29	5.56	1.49	5.36	9.19
50			1.58	6.89	1.82	6.67	11.51
60			1.72	7.61	1.90	7.40	13.44
70			1.86	8.33	1.97	8.14	15.37
80			2.00	9.05	2.04	8.87	17.30
90			2.14	9.77	2.12	9.61	19.23
95			2.31	10.35	2.24	10.33	21.71
100			2.48	10.92	2.36	11.06	24.20

	Red clover Trifolium		Phacelia Phacelia tanacetigolia		Pea Pisum sativum		Poppy Papaver
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	DC25 bulk	DC37 bulk			PHYSIOSTART		
Rate	kg/min	kg/min	kg/min	kg/min	kg/min	kg/min	kg/min
Seeding shaft	GGG	fb-Flex20-fb	Flex40	GGG	fb-fv-fv-fb	fb-f-fb-fb	fb-Flex20-fb
2	0.90	0.62	1.38	0.60	0.16	0.21	0.61
5	1.81	0.93	2.04	1.64	0.25	0.30	0.93
10	3.82	1.43	3.15	3.05	0.41	0.46	1.45
20	6.90	2.45	5.35	6.25	0.71	0.78	2.51
30	10.08	3.46	7.55	9.16	1.02	1.10	3.56
40	13.11	4.48	9.75	12.02	1.32	1.41	4.61
50	16.15	5.49	11.95	14.67	1.63	1.73	5.66
60	18.85	6.51	14.15	16.99	1.93	2.05	6.72
70	22.08	7.52	16.35	19.68	2.24	2.36	7.77
80	23.91	8.46	18.41	21.73	2.56	2.65	8.83
90	25.41	8.93	19.18	22.84	2.82	2.79	9.60
95	26.15	9.16	19.56	23.26	2.96	2.87	9.98
100	26.90	9.39	19.54	23.51	3.21	2.99	10.52

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NOTES



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