

PNEUMATIC SEEDER

PS 120 M1 – PS 500 M2

OPERATING MANUAL



PLEASE READ CAREFULLY BEFORE START-UP!

Translation of the original operating manual

Version: 5.0 EN-US; item number: 00602-3-579



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1 GENERAL INFORMATION

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

1.1 ABOUT THIS OPERATING MANUAL

Validity and purpose

This operating manual is valid for seeders manufactured by APV with the type designations PS 120 M1 to PS 500 M2.

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

- Installation
- Commissioning
- Operation
- Maintenance
- Repair
- Decommissioning, dismantling, recommissioning, storage, and disposal

Target group

This operating manual is intended for all persons who handle the seeder:

- Personnel who transport the seeder
- Assembly personnel
- Operating personnel
- Maintenance and repair personnel

Parts of the document that must always be read

To prevent injuries and damage to the implement, it is absolutely necessary to have read and understood the **Basic safety instructions** on page 9 before handling the implement.

Copyright

The copyright for this operating manual remains with the manufacturer:

APV - Technische Produkte GmbH

Headquarters: Dallein 15

3753 Hötzelndorf

AUSTRIA

This operating manual contains instructions and drawings of a technical nature that must not, either in whole or in part, be reproduced, disseminated, used for competitive purposes or communicated to others, without authorization.

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Information on manufacturer liability

The manufacturer is not liable for damage and malfunctions resulting from failure to comply with this operating manual.

1.2 IDENTIFICATION OF THE IMPLEMENT

Unique identification

The implement can be uniquely identified through the following information on the type plate:

- Designation
- Model
- Production number

Position of the type plate

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

Sample type plate

The depiction below shows the structure of the type plate:



The information on the type plate has the following meaning:

No.	Meaning
1	Designation
2	Model
3	Product number / serial number
4	Weight
5	Year of manufacture

1.3 SERVICE

Service

Contact us at our Service address in the following cases:

- If after reading the information in this operating manual, you still have questions concerning the handling of the seeder
- To order spare parts
- To commission service and maintenance tasks

Service address

APV - Technische Produkte GmbH
Headquarters: Dallein 15
3753 Hötzelndorf
AUSTRIA
Telephone: +43 (0) 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
Headquarters: Dallein 15
3753 Hötzelndorf
AUSTRIA

Implement

This Declaration of Conformity is valid for the following implements:

Pneumatic seeder, 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

Conformance with directives

The implements and the optional devices meet the requirements stipulated in 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 have been 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 to prevent hazard zones being reached by upper and lower limbs.

2 DESCRIPTION

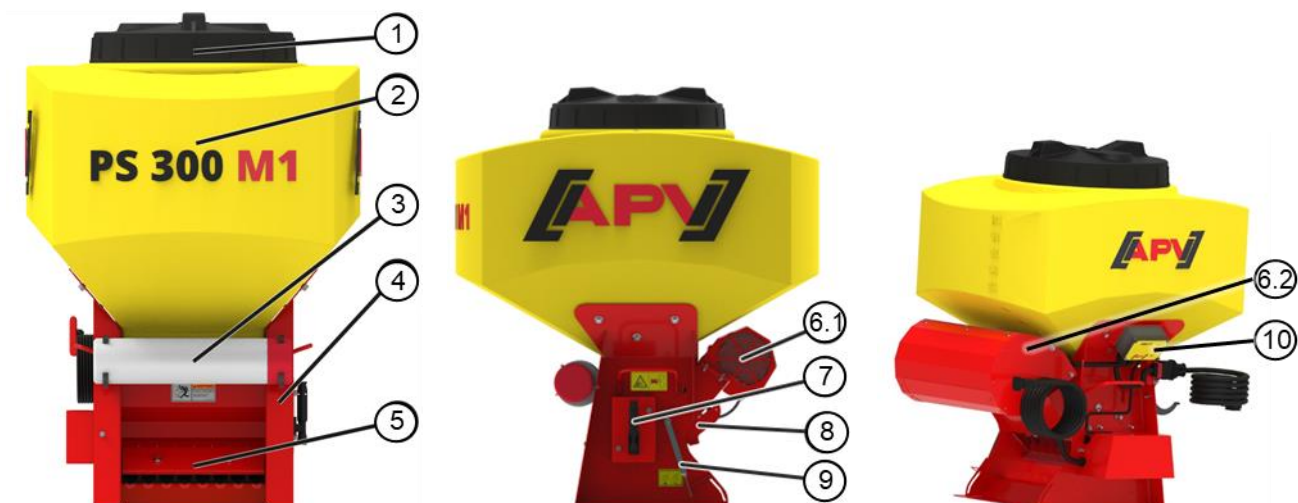
This section provides an overview of the technical characteristics of the seeder.

2.1 STRUCTURE AND FUNCTION OF THE SEEDER

The seeders PS 120 M1 to PS 500 M2

The seeders with the type designations PS 120 M1 to PS 500 M2 are pneumatic seeders with an electric seeding shaft drive. They are used to spread seed on grassland and cropland.

Structure of the seeder



No.	Designation	Function
1	Lid of the seed hopper	<ul style="list-style-type: none"> • Covers the seed hopper. • Protects seed from moisture and foreign substances.
2	Seed hopper	<ul style="list-style-type: none"> • Accommodates seed. • Conveys seed to the agitator and to the seeding shaft.

No.	Designation	Function
3	Operating manual tube	<ul style="list-style-type: none"> For stowing the operating manual
4	Steel rack	<ul style="list-style-type: none"> For hanging up and connecting seeder components.
5	Hose clamp plate	<ul style="list-style-type: none"> Clamps the seed hoses on the steel rack.
6.1	Electric fan	<ul style="list-style-type: none"> Provides compressed for feeding the seed.
6.2	Electric fan PLUS	<ul style="list-style-type: none"> Provides compressed for feeding the seed.
7.1	Bearing cover	<ul style="list-style-type: none"> Covers access to the agitator and to the seeding shaft.
7.2	Hexagon wrench	<ul style="list-style-type: none"> Tool for use on the implement
8	Calibration slide	<ul style="list-style-type: none"> The seed flows from the seeding shaft through the calibration slide into the calibration bag.
9	Brush adjustment lever	<ul style="list-style-type: none"> Presses the brush more or less onto the seeding shaft.
10	Motor module	<ul style="list-style-type: none"> Direct supply for electric fan PLUS

Functionality of the seeder

To spread seeds, the following process is executed:

Phase	Description
1	The operator sets up the implement for operation and fills the seed hopper with seed.
2	<p>The operator activates the seeder via the controller.</p> <p>Result:</p> <ul style="list-style-type: none"> The seeding shaft rotates. The agitator rotates. The fan generates compressed air.
3	The seed flows from the seed hopper through the seeding shaft and is transported by compressed air through the hoses to the dispersion plates.
4	The seed is spread.

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

Task

The hydraulic fan generates the compressed air for feeding the seed.

Structure of the fan



No.	Designation	Function
1	Speed sensor	<ul style="list-style-type: none"> Monitors the fan speed
2	Hydraulic block	<ul style="list-style-type: none"> Adjustment/limitation of the oil flow to the hydraulic motor.
3	Hydraulic motor	<ul style="list-style-type: none"> Drives the fan.
4	Temperature measuring strip	<ul style="list-style-type: none"> Shows the temperature of the hydraulic motor.

Functionality of the sensors

The speed sensor monitors the speed of the hydraulic fan.

As soon as one of the sensors outputs a fault, the message "Fan fault" appears on the Control Box.

Functionality 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 destroy the gaskets in the hydraulic motor.

2.3 SCOPE OF DELIVERY

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

Item	Quantity	Designation
1	1	Basic implement
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 and fastening material
4	4	Hexagonal bar
5	1	Hose reel (25 m)
6	1	Calibration bag
7	1	Calibration scale
8	1	Hexagon wrench (fastened on the steel rack)

The pneumatic seeder (PS) is available in different variants. These variants differ in capacity of the seed hopper (120 l, 200 l, 300 l, 500 l) and in the possible types of spreading material (seed, fertilizer (D for Dünger, the German word for fertilizer), and micro granules (MG)).

The following variants 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 variant	Size	Value
PS 120 M1 (D/MG)	Max. hopper content	120 l
	Weight	45 kg
	Dimensions (H x W x D in cm)	90 x 60 x 80
PS 200 M1 (D/MG)	Max. hopper content	200 l
	Weight	60 kg
	Dimensions (H x W x D in cm)	100 x 70 x 90
PS 300 M1 (D/MG)	Max. hopper content	300 l
	Weight	70 kg
	Dimensions (H x W x D in cm)	110 x 80 x 100

Implement variant	Size	Value
PS 500 M2 (D/MG)	Max. hopper content	500 l
	Weight	93 kg
	Dimensions (H x W x D in cm)	125 x 80 x 120

Implement variant	Size	Value
Hydraulic fan (HG)	Weight	23 kg
	Dimensions (H x W x D in cm)	27 x 46 x 40

Implement variant	Size	Value
Hydraulic lines	Length of the pressure line	6 m
	Length of the motor line	< 1 m
	Length of the hopper line	6 m

Electrical data

Values for supply via the electric fan:

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

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

The motor module is internally fused with a 40 A safety fuse. When replacing, an equivalent fuse must be used; do not under any circumstances use a fuse that has a higher tripping current.

Hydraulic data

Values for supply via the hydraulic fan:

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

Spreading widths

Recommended spreading width: 1 to 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 fan	12 m (with 16 outlets)

Mounting categories

CAT I to III (only with three-point mounting bracket)

3 SAFETY

This section specifies all requirements and measures that ensure safe operation of the seeder.

3.1 SAFETY NOTICES IN THIS DOCUMENT

What are safety notices?



Safety notices are information notices that are designed to prevent injury. Safety notices show the following information:

Type of danger

Possible consequences if the notice is not complied with

Measures to avoid injury

3.2 BASIC SAFETY INSTRUCTIONS

Target group for these instructions

These instructions are intended for all persons who handle the seeder.

Purpose of these instructions

These instructions are intended to ensure that all persons who handle the seeder are thoroughly informed of the dangers and safety measures and comply with the safety notices in the operating manual and on the seeder. If you do not follow these instructions, you are at risk of injury and of causing material damage.

Handling the operating manual

Follow the instructions below:

- Completely read through the Safety section and the section relating to your specific activity. You must have understood this content.
- Always keep the operating manual in the vicinity of the seeder for reference. A container for this purpose is installed on the seeder.
- When passing on the seeder, always pass on the operating manual.

Handling the seeder

Follow the instructions below:

- Only persons who meet the requirements specified in this operating manual are allowed to handle the seeder.
- Do not use the implement if you are tired or under the influence of drugs, alcohol or medications.
- Only use the seeder for its intended purpose.
- Do not, under any circumstances, use the seeder for other purposes, even for purposes that may seem similar.
- Implement all safety measures that are specified in this operating manual and on the seeder.
- Do not make any modifications to the seeder; for example, removing parts or mounting unauthorized parts.
- When replacing defective parts, only use original spare parts or standard parts approved by the manufacturer.

Owner obligations relative to personnel

As the owner you must ensure the following:

- That personnel meet the respective requirements for their activity.
- That personnel have read and understood this operating manual before they handle the seeder.
- That the applicable occupational health and safety regulations in your country are complied with.

Procedure in case of accident

The seeder is designed and built such that personnel can work with it without risk. However, in spite of all precautions, unforeseeable accidents may still occur under unforeseeable circumstances.

Always comply with your company's guidelines concerning accidents.

Additional information on

- **Intended use of the seeder on page 11**
- **Requirements imposed on personnel on page 11**
- **Dangers and safety measures on page 14**

3.3 INTENDED USE

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

The implements are designed exclusively for customary use in agricultural tasks. Only seeds of the grain varieties that are intended by the manufacturer and listed in the operating manual may be used. Different seeding shafts are designed for and must be used for the different grain varieties; these different seeding shafts must be swapped out if necessary. A special version of the seeder protected against corrosion can also be used to spread fertilizer with a seeding shaft designed for this purpose (intended use).

Any use that extends beyond the specified intended use is considered non-intended use. The manufacturer shall not be liable for damage that is incurred through non-intended use; the user alone bears the associated risk.

Intended use also includes compliance with the operation, service and maintenance conditions that are prescribed by the manufacturer.

The applicable accident prevention regulations as well as the occupational health and safety regulations must also be complied with.

Unauthorized changes to the implement exclude any and all liability on the part of the manufacturer for the resulting damage.

3.4 REQUIREMENTS IMPOSED ON PERSONNEL

The owner must ensure that the implement is only used, maintained, and repaired by personnel who are familiar with the implement and who have been instructed concerning the hazards. The owner must verify this at regular intervals.

Please pass on all safety instructions to other users as well.

Qualifications

Personnel who handle the seeder must meet the following requirements:

Personnel	Activities	Required qualifications
Personnel who transport the seeder	<ul style="list-style-type: none"> Transport of the seeder from one farm to another 	<ul style="list-style-type: none"> Experience in transport of machinery Qualifications of a transport specialist for machinery
Personnel who transport the seeder	<ul style="list-style-type: none"> Transport of the implement within the farm area 	<ul style="list-style-type: none"> Forklift driver Experience in handling suitable lifting gear
Installer	<ul style="list-style-type: none"> Installation and commissioning of the seeder 	<ul style="list-style-type: none"> Trained mechanic
Setter	<ul style="list-style-type: none"> Setting up the seeder 	<ul style="list-style-type: none"> Experience in the agricultural environment Experience in handling the seeder
Operator	<ul style="list-style-type: none"> Operating the seeder on the farm Cleaning the seeder 	<ul style="list-style-type: none"> Trained assistant Appropriate driver license
Maintenance personnel	<ul style="list-style-type: none"> Performing maintenance tasks Performing repair tasks 	<ul style="list-style-type: none"> Trained mechanic
Disposal personnel	<ul style="list-style-type: none"> Disposal of the seeder 	<ul style="list-style-type: none"> Disposal specialist

3.5 PERSONAL PROTECTIVE EQUIPMENT

Personnel must be equipped with the following personal protective equipment and they must wear it as needed:

- Hearing protection

- Face mask
- Safety footwear with non-slip soles

3.6 SAFETY DEVICES

Meaning of the safety devices

The seeder has safety devices that protect the user from hazards. Each time before operation, all safety devices must always be checked for presence and function.

Position of the safety devices

The graphic shows the position of the safety devices:



Function of the safety devices

The safety devices have the following function:

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





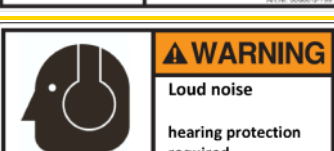
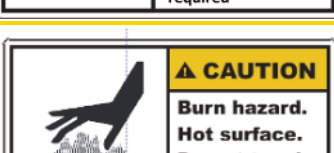




Purpose

Warning signs on the seeder warn of danger points. The warning signs must always be present and easily legible.

Overview

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

Appearance of the sign	Meaning of the sign
	<p>Risk of injury due to ejected parts! Maintain a safe distance from the implement in operation.</p>
	<p>Risk of injury due to moving parts! Only work with the covers mounted.</p>
	<p>Risk of injury due to rotating parts! Only operate the implement with the cover mounted.</p>

Appearance of the sign	Meaning of the sign
	<p>Read and comply with the operating manual before start-up!</p>
	<p>Read and comply with the operating manual before working with the implement! Operating errors can result in serious injuries.</p>
	<p>Risk of injury due to rotating parts! Do not reach into rotating parts. For tasks on the implement, switch it off and disconnect it from the power supply.</p>
	<p>Be careful if high-pressure fluid escapes!</p>
	<p>Use hearing protection!</p>
	<p>Hot surface! Do not touch!</p>
	<p>Maintain a safe distance from hot surfaces!</p>
	<p>Risk of injury due to rotating parts! Maintain a safe distance from rotating parts.</p>
	<p>Risk of injury due to rotating parts! When the implement is running, keep the protective devices closed.</p>
	<p>Use hearing protection!</p>

3.7 DANGERS AND SAFETY MEASURES

Overview

The seeder is designed such that the user is protected from all dangers that can be avoided with reasonable design measures. However, due to the purpose of the seeder, there are residual risks that require implementation of precautionary measures, to be avoided.

The nature of these residual risks and their effects are described below.

Transport

Danger	Where and in what 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 what 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, and only 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	Tasks must be performed on stable steps; wear non-slip safety footwear.

Set-up

Danger	Where and in what 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 precisely as specified in the operating manual, and only by trained personnel.
Risk of injury due to moving parts when the implement is unintentionally switched on	At activation of the agitator, which must be done with the seeding shaft cover removed	Always de-energize the implement to prevent sudden start-up of the implement.
Danger due to defective implement parts	When operating the implement	Each time before operating the implement, check for fractures, cracks, chafe marks, leaks, loose bolts, vibration, noises, and function. Regularly maintain the implement.
Risk of injury due to escaping oil	When commissioning the hydraulic fan	When commissioning ensure that no one is in the danger zone. Use protective equipment.

Operation

Danger	Where and in what situations does the danger occur?	Countermeasure
Risk of injury due to rotating parts	When handling the implement during its operation	Always keep the covers for the agitator closed in operation.

Danger	Where and in what situations does the danger occur?	Countermeasure
Risk of injury due to ejected seed	While spreading seed.	Always ensure that no one is in the spreading range of the implement.
Risk of slipping, stumbling, and falling	When handling the implement during its operation	Only enter the implement area via dry, stable steps, and with non-slip safety footwear. Do not use the implement in rain or thunderstorm conditions.
Hearing damage due to implement noise	When operating the implement	Use hearing protection.
Danger of poisoning or suffocation due to toxic seed types	While spreading seed.	Wear mouth/nose protection when handling toxic seeds.

Cleaning

Danger	Where and in what situations does the danger occur?	Countermeasure
Risk of suffocation or poisoning with toxic seed types	When cleaning the implement with compressed air	Wear mouth/nose protection when handling toxic seeds.

Maintenance and repair

Danger	Where and in what situations does the danger occur?	Countermeasure
Incorrectly or inadequately performed maintenance tasks 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 the work steps that must be performed for the installation and commissioning of the seeder, and what must be done and what to be aware of.

4.1 FASTENING THE SEEDER ON A SOIL TILLAGE IMPLEMENT

Purpose

For deployment on the field, the seeder can be fastened on a soil tillage implement, such as a cultivator or a harrow. The fastening element must be attached individually.

Prerequisites

The following prerequisite must be met for this work step:

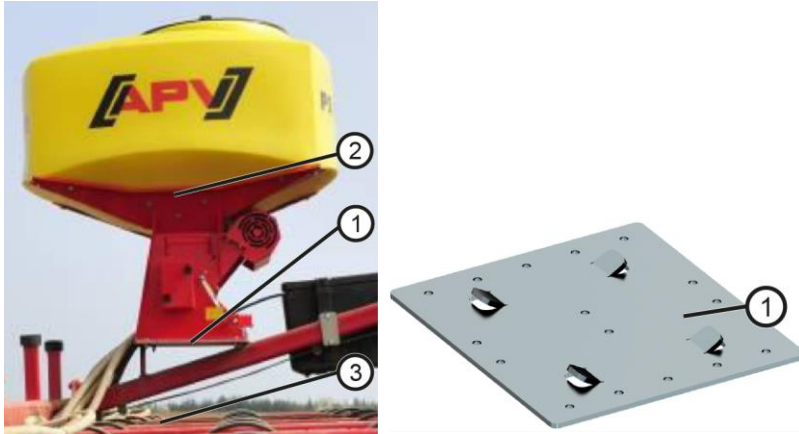
- The implement must be de-energized, see **De-energizing the seeder** on page 33.
- The soil tillage implement is designed for attachment of the seeder – contact the manufacturer of the soil tillage implement for information in this regard.

Required components, tools, and materials

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

- Counter plate
- Bolts $\varnothing > 10$ mm, strength class 8.8 or higher
- Self-locking fastenings (nuts)
- Lifting gear that is suitable for the mass of the respective implement variant, see **Technical Data** on page 8 for more information.

Overview



No.	Designation
1	Counter plate
2	Seeder
3	Soil tillage implement

Procedure

This is how to fasten the seeder 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 work position.
2	Use the lifting gear to place the seeder (2) on the counter plate (1).
3	Fasten the seeder (2) on the counter plate (3) with bolts and nuts.

4.2 FASTENING THE SEEDER ON A TRACTOR

Purpose

For field deployment, the seeder can be fastened directly on a tractor.

Prerequisites

The following prerequisite must be met for this work step:

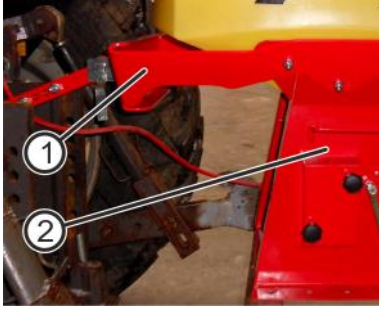
- The implement must be de-energized, see **De-energizing the seeder** on page 33.
- The tractor must be configured for attachment of the seeder – contact the tractor manufacturer for information in this regard.

Required components, tools, and materials

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

- Suitable component for fastening (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 variant, see **Technical Data** on page 8 for more information in this regard

Overview



No.	Designation
1	Top link mounting kit
2	Seeder

Procedure

This is how to fasten the seeder on a tractor using the top link mounting kit:

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

4.3 MOUNTING DISPERSION PLATES ON THE SOIL TILLAGE IMPLEMENT

Purpose

The dispersion plates are used to fix the hoses, through which the spreading material flows, in place at the proper location, and to distribute the seed.

Prerequisites

The following prerequisite must be met for this work step:

None

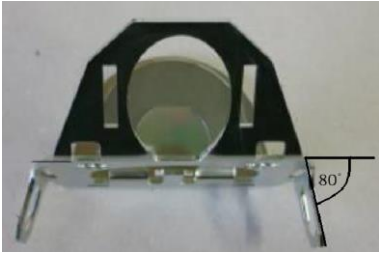

Required components, tools, and materials

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

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

Procedure for mounting with hexagon shaft

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

Step	Description	Explanation/illustration
1	Use the pliers to bend down the tabs on the sides of the dispersion plates by 80°.	Result: 
2	Distribute the dispersion plates uniformly across the entire working width of the soil tillage implement. Maximum spacing of the dispersion plates: 75 cm	
3	Slide the hexagon shaft through the two hexagon holes in the lateral tabs of the dispersion plates 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 fitted 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 18 for more information.	

4.4 CONNECTING HOSES

Purpose

The hoses convey the seed from the seeder onto the field. Before initial commissioning, the hoses must be cut to the required length and mounted on dispersion plates and seeder.

Prerequisites

The following prerequisite must be met 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 wrench or Torx screwdriver

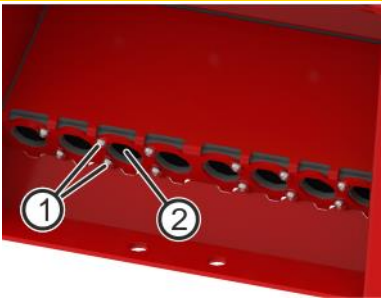
Procedure

This is how to connect the hoses on the seeder:

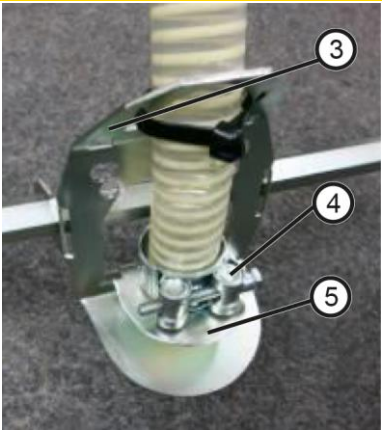
Variant 1 (Standard PS and MG):

Step	Description	Illustration
1	Use the cutting tool to cut off eight hose sections from the hose roll, each in the suitable length.	
2	Use a hexagon wrench AF17 to slightly unscrew the clamping screws (1) on the clamping plate.	
3	Introduce the ends of the hoses into the transition pieces (2) to the stop.	
4	Tighten the clamping screws (1).	

Version 2 (fertilizer, 16 outlets):

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

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

Step	Description	Illustration
1	Guide the end of the hose through the aperture in the large tab (3) of the dispersion plate and slide the fastening clip (4) onto the hose.	
2	Slide the end of the hose through the aperture in the small tab (5) of the dispersion plate.	
3	Attach the fastening clip (4) on the dispersion plate (5). In doing so, install the fastening clip such that <ul style="list-style-type: none"> the holding finger rests between hose and fastening clip. that it is fixed in place 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. For 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.

Prerequisites

The following prerequisites must be met for this work step:

The implement must be de-energized, see *De-energizing the seeder* on page 33.


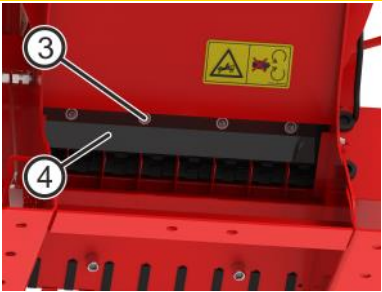
Required components, tools, and materials

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

- Hexagon wrench
- Torx screwdriver TX 30

Procedure

This is how to remove the swell air plate:

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

4.6 CONNECTING THE HYDRAULIC FAN (HG)

Purpose

The hydraulic fan is used for deployment with working widths up to 12 m or for higher spread rates of wheat, for example.

Prerequisites

The following prerequisite must be met for this work step:

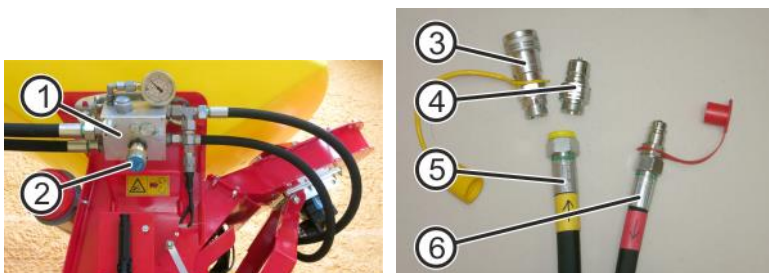
The hydraulic system must be depressurized both on the tractor side and the implement side.

Required components, tools, and materials

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

Coupling connector or coupling sleeve (at initial commissioning)

Overview



No.	Designation
1	Hydraulic block

No.	Designation
2	Flow control valve
3	Coupling sleeve (alternative)
4	Coupling connector
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 reducer, to the return flow connection of the tractor hydraulic system. At initial commissioning: Remove the plastic plug on the return line and connect the coupling plug (4) or the coupling sleeve (3) to the return line.
3	Connect the pressure line (6) (marked in red, BG3) to a pressure connection of the tractor hydraulic system.

4.7 CONNECTING THE ELECTRIC FAN PLUS

Purpose

Use the electric fan PLUS for deployment with working widths up to 12 m or for higher spread rates of wheat, for example.

Prerequisites

The following prerequisites must be met for this work step:


- Use the electric fan PLUS with a 5.2 controller (hardware version: 14.2 or higher, software version: 1.28 or higher) or an ISOBUS (hardware version: CC16WP or higher, software version: V3.0.0 or higher).
- The electrical supply must be disconnected.


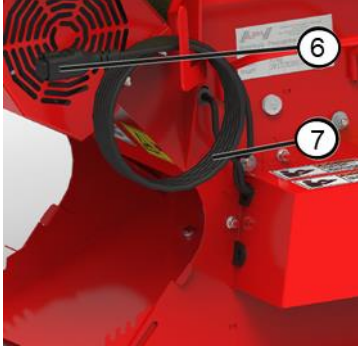
Required components, tools, and materials

For this work step, the following components, tools, and materials are required:
Tractor cable set, implement cable

Procedure

This is how to connect the motor module of the electric fan PLUS:

Step	Description	Explanation
1	Use the retaining plate to mount the tractor cable set (1) in the vicinity of the rear hydraulic connections.	
2	Connect the red cable end (2) on the plus pole of the tractor battery.	
3	Connect the black cable end (3) on the minus pole 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 the Control Box (7).	
6.1	5.2 Controller: Select <i>Electric PLUS</i> in the menu 1. <i>Motor fan</i> .	
6.2	ISOBUS: Select <i>Electric fan PLUS</i> in the menu <i>PS fan</i> .	

5 OPERATION

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

5.1 ADJUSTING THE HYDRAULIC FAN (HG)

Purpose

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

Prerequisites

The following prerequisite must be met for this work step:

The hydraulic fan must be connected, see also **Connecting the hydraulic fan (HG)** on page 20.

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 adjust the hydraulic fan:

Variant 1 (fixed displacement pump – oil quantity cannot be adjusted 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.

Variant 2 (variable pump - oil quantity can be adjusted 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 it up to the desired fan speed (slowly increase the oil quantity).

Setting table for the flow control valve

(valid at approx. 50°C oil temperature)

Working width 3 m			
Seed	Quantity	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	Quantity	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	Quantity	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	Quantity	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 seeder during the seeding process, has a crucial effect on the seeding results.

Prerequisites

The following prerequisite must be met 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 24 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 25 for more information in this regard. Selection of the brush pressure, see Setting the brush pressure on page 29 for more information in this regard. Adjustment of the working width, see Mounting dispersion plates on the soil tillage implement on page 17 for more information in this regard. Adjusting the tractor speed.

Calculating the spread rate

The spread rate can be calculated using the following formula:

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

StM: Spread rate in kg/min

m(gew): Desired spread rate in kg/ha

v(Traktor): Tractor speed in km/h

b(Arbeit): Working width in m

5.3 REGULATING THE SEED FLOW RATE (CALIBRATION TEST)

Purpose

With the calibration test, the seed quantity for a specific area is determined.

Prerequisites

The following prerequisite must be met for this work step:

The implement must be de-energized, see **De-energizing the seeder** on page 33.

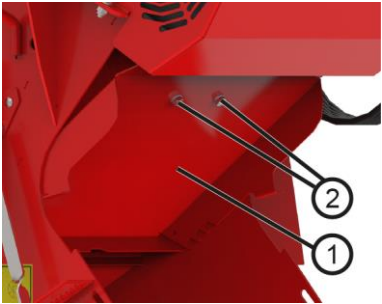

Required components, tools, and materials

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

- Calibration bag
- Hexagon wrench

Procedure

This is how to perform a calibration test:

Step	Description	Explanation
1	Unscrew the hexagon 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 in the calibration bag on the calibration slide.	
5	Select a suitable brush pressure, see Setting the brush pressure on page 29.	
6	Switch on the Control Box.	
7	Start the calibration program of the seeder; refer to the Control Box operating manual for more information in this regard.	

5.4 SELECTING A SUITABLE SEEDING SHAFT

Purpose

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

Prerequisites

The following prerequisite must be met for this work step:

None

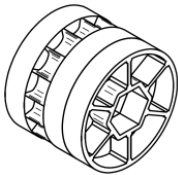
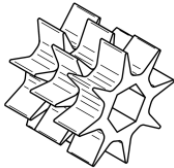
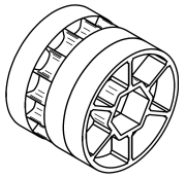
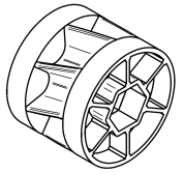
Required components, tools, and materials

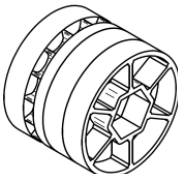
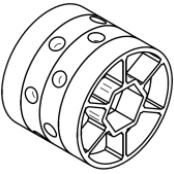
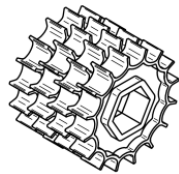
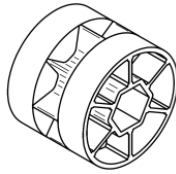
For this work step, the following components, tools, and materials are required:

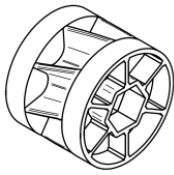
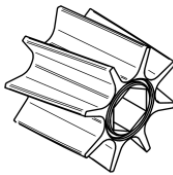
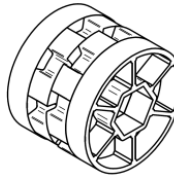
None

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
<ul style="list-style-type: none"> • White mustard • Phacelia 	<ul style="list-style-type: none"> • Grass • Cereals 	<ul style="list-style-type: none"> • Micro granule fertilizer • White mustard • Phacelia 	<ul style="list-style-type: none"> • Micro granule fertilizer • Peas • Beans

Available as an option			
			
fb-fb-ef-eb-fb	fb-efv-efv-fb	ffff	GB-G-GB
<ul style="list-style-type: none"> • Poppy 	<ul style="list-style-type: none"> • Canola 	<ul style="list-style-type: none"> • Buckwheat • White mustard • Cress 	<ul style="list-style-type: none"> • Buckwheat • Fodder radish

Available as an option		
		
fb-Flex20-fb	Flex40	fb-fv-fv-fb
<ul style="list-style-type: none"> • Peas • Beans • Lupin • Vetch • Fertilizer 	<ul style="list-style-type: none"> • Peas • Beans • Lupin • Vetch • Fertilizer 	<ul style="list-style-type: none"> • 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 suitable seeding shaft, the seeding results are significantly improved.

Prerequisites

The following prerequisites must be met for this work step:

- The implement must be de-energized, see **De-energizing the seeder** on page 33.

- The seed hopper must be empty, see **Emptying the seed hopper** on page 34 for more information in this regard.
- The suitable seeding shaft must have been selected and must be ready, see **Selecting the right seeding shaft** on page 25 for more information in this regard.

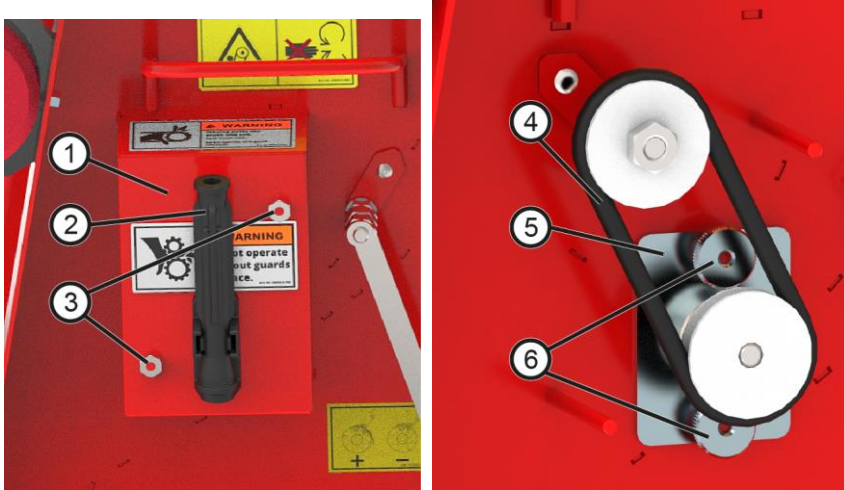
Required components, tools, and materials

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

- Hexagon wrench

Overview

Access to the agitator drive and the required tool:


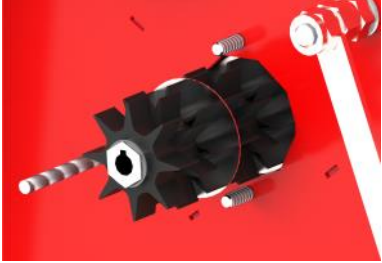


No.	Designation
1	Bearing cover
2	Hexagon wrench holder
3	Cover nuts
4	Drive belt
5	Bearing flange
6	Knurled nuts

Procedure

This is how to change the seeding shaft:

Step	Description	Explanation
1	Take the hexagon wrench out of the holder (2).	
2	Unscrew the cover nuts (3) on the bearing cover (1).	
3	Take off the bearing cover (1).	
4	Remove the drive belt (4).	
5	Unscrew the knurled nuts (6).	

Step	Description	Explanation
6	Take off the bearing flange (5).	Result: 
7	Take out the seeding shaft. NOTE: Residual seed can fall out in this process.	
8	Introduce the new seeding shaft with the free journal forward into the steel frame.	
9	Turn the seeding shaft until the feather key of the gear motor engages in the groove of the seeding shaft.	
10	Fit the bearing flange with its feather key into the fitting 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 2 threaded rods and tighten the cover nuts with the hexagon wrench.	
14	Check the seeding shaft for ease of movement, see Checking the ease of movement of the shaft on page 28 for more information.	

5.6 CHECKING THE EASE OF MOVEMENT OF THE SEEDING SHAFT

Purpose

Each time after installing or changing the seeding shaft, it must be checked for ease of movement. This check is a noise check.

Prerequisites

The following prerequisite must be met for this work step:

The seed hopper must be empty, see **Emptying the seed hopper** on page 34 for more information in this regard.

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 movement of the seeding shaft:

Step	Description
1	Switch on the seeder.
2	Perform the noise check.
3	If the sound of the running seeding shaft is noticeably loud or irregular, contact the maintenance and repair service, see Commissioning the Service organization on page 5 for more information in this regard.

5.7 SETTING THE BRUSH PRESSURE

Purpose

Use the brush adjustment lever to set the brush pressure on the seeding shaft.

Prerequisites

The following prerequisite must be met for this work step:

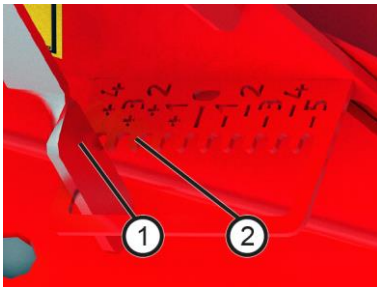
None

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	Adjustment scale

Procedure

This is how to set the brush pressure:

Step	Description
1	Pull the brush adjustment lever (1) out of the adjustment scale.
2	Move the brush lever to the desired position and place it in the appropriate notch of the adjustment scale. The following orientation rules apply in this regard: <ul style="list-style-type: none">• For fine seed, increase the brush pressure to -5.• For coarse seed, reduce the brush pressure to +4.

5.8 FILLING THE SEED HOPPER

Purpose

The seed hopper stores the seed to be spread.

Prerequisites

The following prerequisite must be met for this work step:

The implement must be de-energized, see **De-energizing the seeder** on page 33.

Required components, tools, and materials

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

- Seed

Overview



No.	Designation
1	Lid of the seed hopper
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 to form bridges or for very light seed (e.g. for grasses).

Prerequisites

The following prerequisites must be met for this work step:

The implement must be de-energized, see **De-energizing the seeder** on page 33.

Required components, tools, and materials

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

- Hexagon wrench
- Drive belt

Overview



No.	Designation
1	Bearing cover
2	Hexagon wrench holder
3	Cover 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 this, unscrew the cover nuts (3) with the hexagon wrench.	
2	Detach the drive belt (7) from the seeding shaft driving wheel (8) and the agitator driving wheel (6) and put it in a safe place.	
3	Close the bearing cover (1).	

5.10 DISPLAY ON THE MOTOR MODULE

Purpose

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

Prerequisites

The following prerequisites must be met 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 a 5.2 controller or ISOBUS

Overview



No.	Designation	Meaning
1	Indicator light <i>Fan overloaded</i>	The LED lights up red, if one of the motors is under load too long in the limit range.
2	Indicator light <i>Blower not connected</i>	If the cabling is faulty the indicator light lights up red. If only one fan is operated, both connecting lines must be connected to this fan.
3	Fan status light	LED lights up green when the voltage supply is established.

Procedure

This is how to use the motor module:

Step	Description
1	The Control Box outputs the fault message <i>Fault (fan)!</i> .
2	Check the display on the motor module.
3	Rectify the fault as described in point 6.

6 FAULTS

In this section, you will find information for rectifying faults that can occur during operation.

6.1 FAULT OVERVIEW

Problem	Cause	Rectification
The seeding shaft does not rotate when the drive shaft of the gear motor is rotating.	Feather key has fallen out of the drive shaft.	Glue in a new feather key.
Seed hoses clog	Fan speed too low.	Check fan speed and increase it if necessary.
Output fault message <i>Fault (fan)!</i> on the Control Box on the motor module indicator light <i>E01 (Fan overloaded)</i> lights up red.	One of the motors, or both has/have run for too long in the limit range.	<ul style="list-style-type: none"> • Check or mount the calibration lid. • Check whether all seeding hoses are mounted. • Remove any foreign objects or similar obstructions from the fan. • Check the fan for ease of movement.

Problem	Cause	Rectification
Output fault message <i>Fault (fan)!</i> on the Control Box, on the motor module indicator light <i>E02 (Fan not connected)</i> lights up red.	Faulty cabling.	<ul style="list-style-type: none"> • Check cabling. • If only one fan is operated, both connecting lines must be connected to this fan.

Information on other faults is provided in the operating manual for the respective Control Box. If the problem could not be rectified, please contact the manufacturer. Information in this regard is provided in **Commissioning the Service organization** on page 5.

7 CLEANING, MAINTENANCE, AND REPAIR

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

7.1 DE-ENERGIZING THE SEEDER

Purpose

Any opening of the hopper lid requires disconnection from the electrical supply or hydraulic supply. Fault rectification, set-up and maintenance tasks often require that the seeder be de-energized.

Prerequisites

The following prerequisites must be met 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 connector of the motor module (only for electric fan PLUS)

Procedure

This is how to de-energize the seeder:

Step	Description
1.1	5.2 controller: Unplug the power supply plug from the Control Box and For the electric fan PLUS, in addition, unplug the power supply plug of the motor module on the seeder.
1.2	ISOBUS: Disconnect the plug to the tractor electrical outlet.

7.2 EMPTYING THE SEED HOPPER

Purpose

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

Prerequisites

The following prerequisite must be met for this work step:

The implement must be de-energized, see **De-energizing the seeder** on page 33.

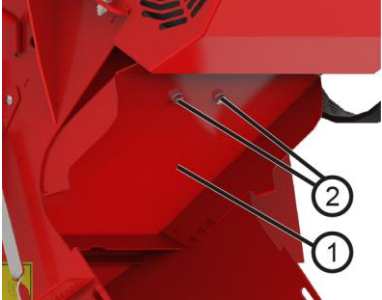
Required components, tools, and materials

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	Unscrew the hexagon bolt (2) on the calibration slide (1). NOTE: The bolts are connected to the calibration slide via circlips.	
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 SEEDER

Purpose

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

Prerequisites

The following prerequisites must be met for this work step:

The implement must be de-energized, see **De-energizing the seeder** on page 33.

Required components, tools, and materials

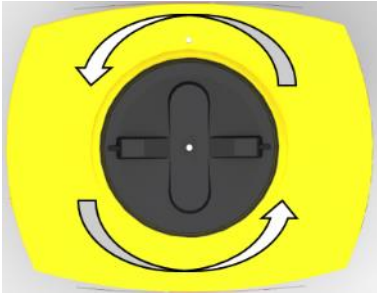
For this work step, the following components, tools, and materials are required:

Air compressor

Damp cloth

Procedure

This is how to clean the implement:

Step	Description	Explanation
1	Empty the seed hopper, see Emptying the seed hopper on page 34 for more information in this regard.	
2	Remove the seeding shaft, see Changing the seeding shaft for more information in this regard.	
3	Turn the seed hopper cover counterclockwise to open it.	
4	Clean the inside of the seeder and the seed paths with compressed air.	
5	Clean the outside of the seeder with a damp cloth.	

7.4 CHECKING THE HYDRAULIC HOSES

Have the hydraulic hoses checked annually by a competent specialist. The inspection intervals that must be complied with may be specified by regional laws and regulations.

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

7.5 REPAIR AND CORRECTIVE MAINTENANCE

Contact the manufacturer in the event of seeder failure or damage. Information in this regard is provided in **Commissioning the service organization** on page 5.

8 DECOMMISSIONING, STORAGE, AND DISPOSAL

In this section, you will learn how to take the seeder out of service (decommission), store it for a longer period of time, and dispose of it.

8.1 TAKING THE SEEDER OUT OF SERVICE

Purpose

To ensure that the seeder remains fully functional even if it has been taken out of service for a longer period of time, it is important to take precautions for storage.

Procedure

This is how to prepare the seeder for storage:

Step	Description
1	Completely remove all seed from the seeder.
2	Clean the seeder inside and out, see Cleaning the seeder on page 34 for more information in this regard.
3	Place the brush adjustment lever in position "+4".
4	Store the seeder in a dry location to prevent the formation of germs inside the implement.

8.2 STORING THE SEEDER

When storing the seeder, comply with the following instructions:

- The implement must be stored in a dry and weather-protected location, on level and paved ground so that it does not lose its functionality, even during a longer storage period.
- Secure the implement such that it is stable and cannot fall over or roll.
- Do not place or store anything on the implement.
- The implement must always be parked and stored in a secure area, to prevent unauthorized operation.

8.3 DISPOSAL

Disposal of the seeder must be undertaken in accordance with the local disposal regulations for machines.

9 APPENDIX

9.1 ACCESSORIES

9.1.1 FILL LEVEL SENSOR

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

The prerequisite is 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 by means of the small slotted screw on 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 that is 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 PS120-500

With the top link mounting kit (three-point mounting bracket), you can attach the PS120/200/300 M1, PS500M2 to a CAT1 to CAT3 three-point hitch.

Order number:

Item no.: 04000-2-114



9.1.4 RETROFIT KIT FOR ELECTRIC FAN PLUS

With this retrofit kit, you can convert the electric fan or hydraulic fan of a pneumatic seeder to an electric fan PLUS.

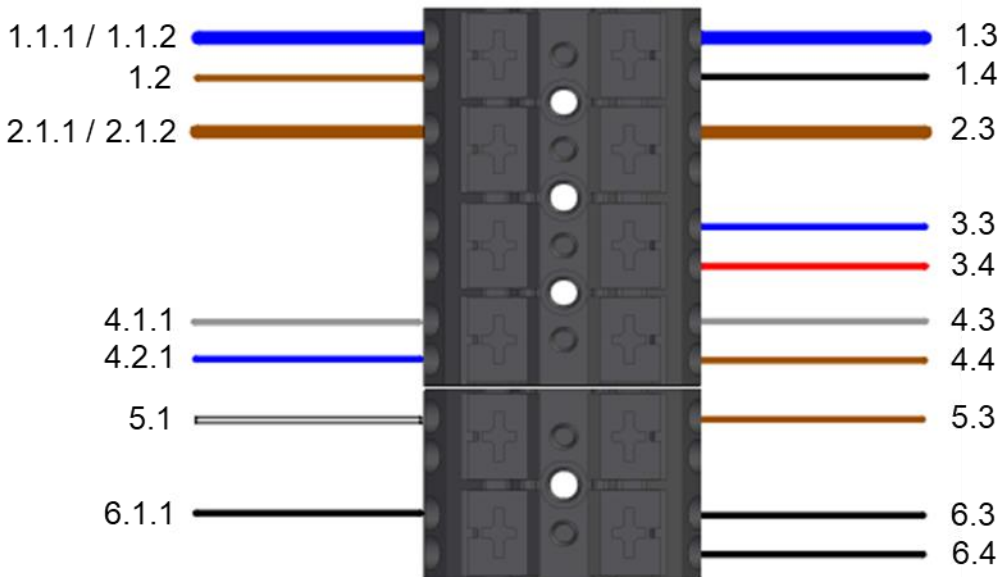
Order number:
Item no.: 04000-2-882



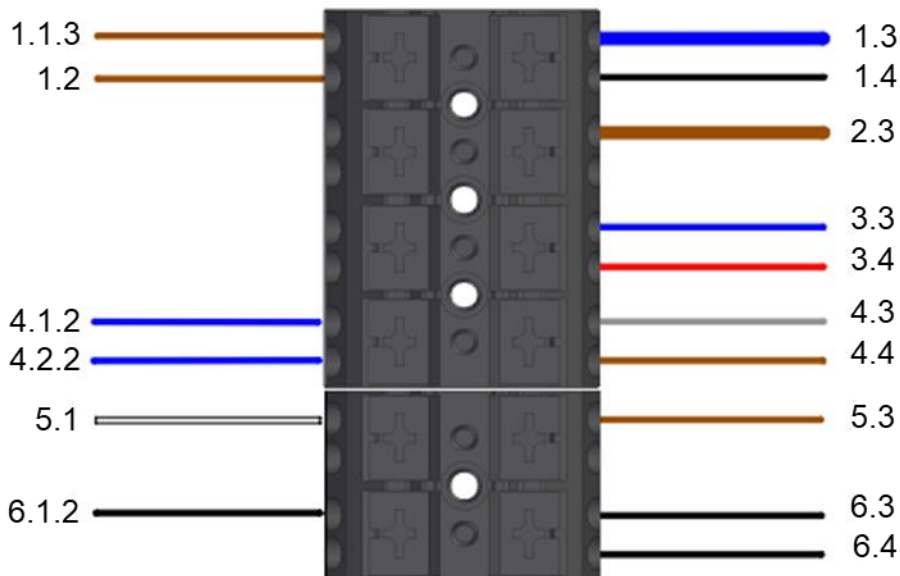
9.2 CONNECTION DIAGRAM

9.2.1 GENERAL

Electric fan:



Hydraulic fan:





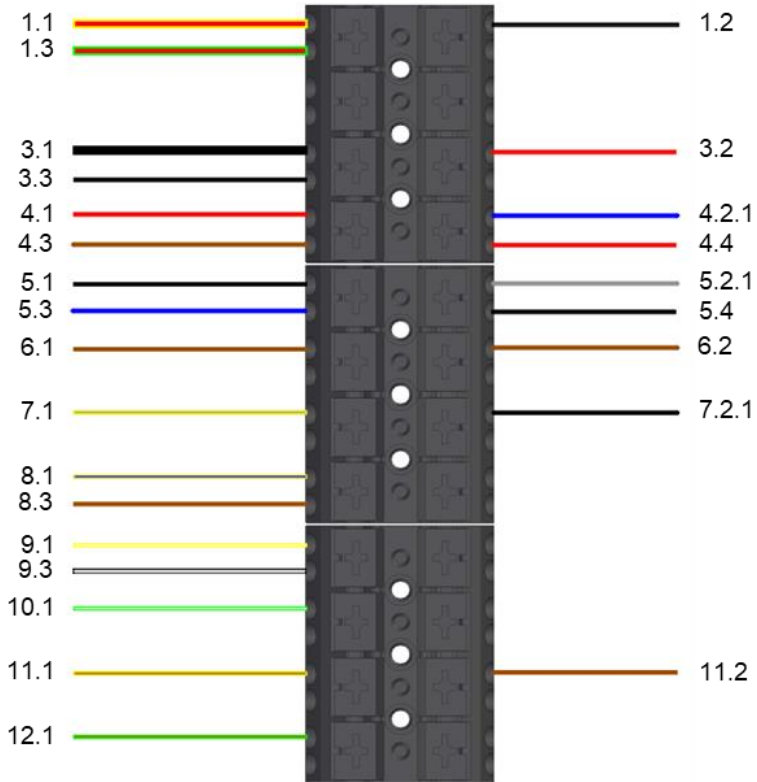
Pin	Number	Description	Color	Cross-section (mm ²)
1	1.1.1	Fan	Blue	4
	1.1.2	Fan PLUS	Blue	0.5
	1.1.3	Fan speed sensor	Brown	0.34
	1.2	Fill level sensor	Brown	0.34
	1.3	Implement cable	Blue	4
	1.4	Seeding shaft motor	Black	1.5
2	2.1.1	Fan	Brown	4
	2.1.2	Fan PLUS	Brown	0.5
	2.3	Implement cable	Brown	4
3	3.3	Implement cable	Blue	2.5
	3.4	Seeding shaft motor	Red	1.5
4	4.1.1	Fan PLUS	Gray	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	Gray	0.75
	4.4	Calibration switch	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 switch	Black	0.75

Stripping length: 10 mm!

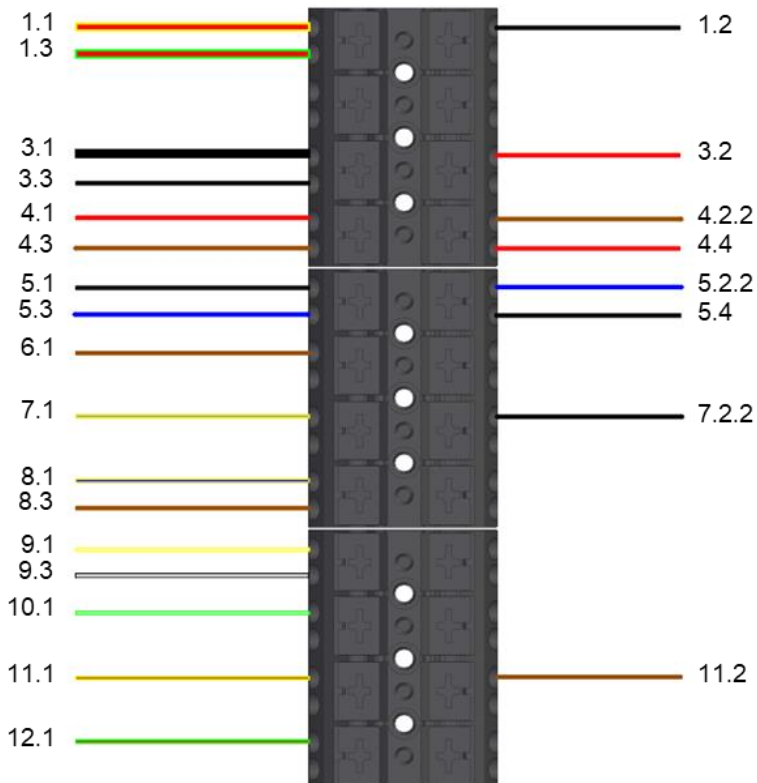


9.2.2 PS WITH ISOBUS

Electric fan:



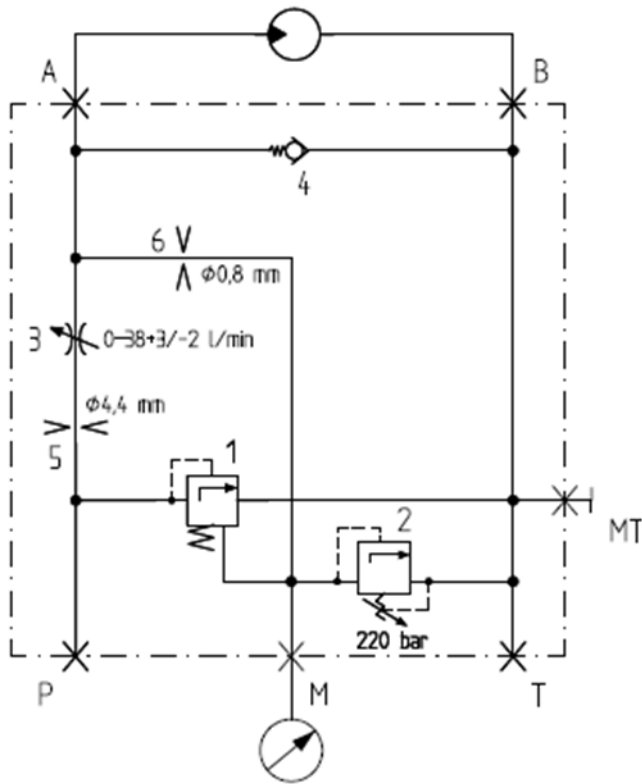
Hydraulic fan:



Number	Description	Color	Cross-section (mm ²)	Function
1.1	Implement cable	Red-yellow	2.5	PWM seeding shaft
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	
5.1	Implement cable	Black	0.75	Sensor ground
5.2.1	Motor module	Gray	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	
6.1	Implement cable	Brown	0.75	PWM electric fan
6.2	Motor module	Brown	0.5	
7.1	Implement cable	Gray-yellow	0.75	Fan status input
7.2.1	Motor module	Black	0.5	
7.2.2	Fan speed sensor	Black	0.34	
8.1	Implement cable	Blue-yellow	0.75	Calibration button input
8.3	Calibration button	Brown	0.75	
9.1	Implement cable	White-yellow	0.75	Fill level sensor input
9.3	Fill level sensor I	White	0.34	
10.1	Implement cable	White-green	0.75	Spare
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 SYSTEM DIAGRAM



Item	Description
A	G ½" (threaded fitting XGE 15 LR-ED) Hose length max. 1 m Motor-side connection B
B	G ½" (threaded fitting XGE 15 LR-ED) Hose length max. 1 m Motor-side connection A
P	G ½" (threaded fitting XGE 18 LR-ED) Hose length max. 6 m Coupling connector BG3 Marked in red Flow rate, max. 80 l/min Pressure, max. 220 bar
T	G ¾" (threaded fitting XGE 22 LR-ED) Hose length max. 6 m Coupling connector (or coupling sleeve) BG4 Marked in yellow

9.4 TORQUES

Comply with the following torques without lubrication:

	Dimensions	Pre-load force F_u (N)			Tightening torque M_A (Nm)		
Coefficient of friction $\mu_{rot} = 0.20$	-	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

Quantity	Wheat Triticum				Grass Lolium perenne		
	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

Quantity	Buckwheat Fagopyrum				Canola Brassica Napus		
	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

	Oats Avena		Barley Hordeum		Radish 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	fff	GGG	fff	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 angustifolius
Quantity	kg/min	kg/min	kg/min	kg/min	kg/min	kg/min	kg/min
Seeding shaft	fb-f-fb-fb	fff	fb-f-fb-fb	fff	fb-f-fb-fb	fff	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
Quantity	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-Flex20-fb	Flex40	fb-fb-ef-eb-fb
2	0.04	0.56	0.14	0.34	0.46	0.95	0.03
5	0.15	1.37	0.31	0.77	0.67	1.45	0.05
10	0.33	2.72	0.61	1.49	1.02	2.29	0.08
20	0.70	5.41	1.19	2.94	1.72	3.96	0.15
30	1.06	6.99	1.52		2.42	5.63	0.26
40	1.41	7.45	1.59		3.12	7.30	0.41
50	1.76	7.91	1.66		3.83	8.98	0.57
60	1.87	8.36	1.85		4.53	10.65	0.64
70	1.98	8.82	2.04		5.23	12.32	0.71
80	2.09	9.28	2.23		5.93	13.99	0.78
90	2.20	9.74	2.42		6.64	15.67	0.86
95	2.33	10.34	2.52		6.99	16.50	0.90
100	2.46	10.94	2.62		7.34	17.34	0.94

	Horse gram Macrotyloma uniflorum		Chia WHITE		Florex	Force	NACKAS bulk
Quantity	kg/min	kg/min	kg/min	kg/min	kg/min	kg/min	kg/min
Seeding shaft	fb-Flex20-fb	Flex40	fb-f-fb-fb	fb-fb-ef-eb-fb	fb-f-fb-fb	fb-fv-fv-fb	GGG
2	0.46	1.02	0.05	0.03	0.00	0.12	1.27
5	0.66	1.57	0.12	0.05	0.08	0.19	2.25
10	1.00	2.49	0.24	0.08	0.21	0.30	3.67
20	1.68	4.32	0.47	0.15	0.46	0.54	6.73
30	2.36	6.15		0.25	0.72	0.77	9.54
40	3.04	7.98		0.38	0.98	1.00	11.95
50	3.71	9.81		0.52	1.23	1.23	14.80
60	4.39	11.64		0.58	1.49	1.46	17.46
70	5.07	13.47		0.65	1.75	1.69	19.78
80	5.75	15.30		0.71	2.00	1.93	20.99
90	6.43	17.13		0.78	2.26	2.16	21.90
95	6.77	18.05		0.79	2.39	2.27	22.31
100	7.11	18.96		0.80	2.52	2.35	22.72



	DC25 bulk	DC37 bulk			PHYSIOSTART		
Quantity	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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