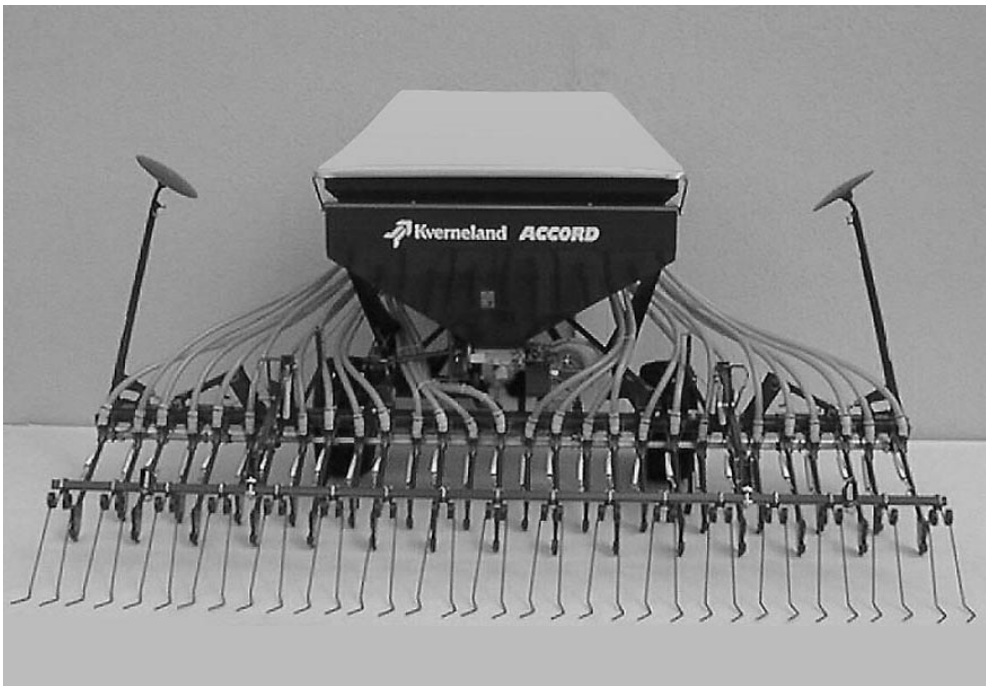
Kverneland

Operating Manual

PNEUMATIC

Pneumatic
Seed Drills
DL, DT, DA, DA-S, DE-S,
DV, DF, DG, DC

Order No. 754042 - 12.98 GB



Please read carefully prior to operation!

EC Declaration of

Conformity according to Directives 89/392/EEC
and 89/336/EEC

We

Kverneland Soest GmbH
Coesterweg 42, D-59494 Soest

declare under our sole responsibility that the product

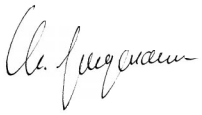
PNEUMATIC seed drills and accessories

to which this declaration relates corresponds to the relevant basic safety and health requirements of the Directives 89/392/EEC and 89/336/EEC.

For the relevant implementation of the safety and health requirements mentioned in the Directives, the following standards have been respected:

EN 292-1;2 (11.1991); EN 294 (06.1992);

Kverneland Soest GmbH



Christian Jungmann Soest, 02.01.2000

Introduction

Introduction

Foreword

Please read and observe these instructions very carefully before you proceed to operate the seed drill. In this way you will avoid accidents, reduce repair costs and downtimes and increase the reliability and service life of your seed drill. Pay particular attention to the safety instructions! Kverneland Soest cannot assume any liability for damage or malfunctions caused by a failure to observe the instructions contained in this operating manual.

The purpose of this operating manual is to enable you to familiarise yourself with the working of your seed drill and to make full use of the many possibilities of application which it affords. The manual will first of all explain the seed drill in general and then proceed to describe the special features of the different models. The chapters entitled “Additional Accessories”, “Care and Maintenance” and “Troubleshooting” apply to all seed drill models.

The terms “right”, “left”, “front” and “back” are used here for when sitting in the tractor seat looking forward.

This operating manual must be read and used by all persons who are required to carry out work either on or with the seed drill, e.g.,

- Operation (including preparatory work, troubleshooting during operation, care)
- Maintenance (servicing, inspection)
- Transporting.

Enclosed with this operating manual is a registration card. Your dealer will instruct you on the operation and care of your seed drill. After this has been done, return the registration card to Kverneland Soest. This will confirm your acquisition of the seed drill. The period of guarantee commences on the date of of delivery.

We reserve the right to make changes to the illustrations and data on specifications and weights contained in this operating manual if we make any improvements to the seed drills.

Seed drill identification

Once you have accepted delivery of the seed drill, please enter the following data:

Serial No.:	...
Seed drill model:	...
Working width:	...
Number of coulters:	...
P.t.o. shaft speed:	...
Accessories:	...
	...
	...
	...
	...

Date of issue of Operating Manual: August 1997

Dealer's address:	Name	...
	Street/Road	...
	Town/city	...
	Tel.	...

Kverneland Soest address:

Kverneland Soest GmbH
59494 Soest, Coesterweg 42
59483 Soest, Postfach 2352

Tel.	02921/974-0
Fax	02921/77346
Telex	84328 acco d

Guarantee Guidelines

1. Our products are guaranteed for a period of **12 months** commencing on the date of delivery to the user.
   The guarantee does not cover the replacement of parts subject to wear.
2. Guarantee claims must be submitted on special Kverneland Soest guarantee claim forms to Kverneland Soest's After Sales Service Department in Soest.
   Claims cannot be considered unless the claim form has been completed in full and submitted not later than 3 months after the occurrence of the damage or defect giving rise to the guarantee claim.
3. Parts replaced under the terms of the guarantee will first of all be charged to the customer pending a decision by Kverneland Soest's After Sales Service Department as to whether or not the guarantee claim is justified.
   Parts replaced under the guarantee must therefore be returned to our works for inspection.
4. Once the guarantee claim has been acknowledged, a credit note will be issued on the basis of the prices ruling on the date on which the guarantee claim was received and in accordance with Kverneland Soest's general terms of delivery and payment.
5. Our works must in all cases be consulted where replacements under guarantee exceed a value of DM 300.

Safety

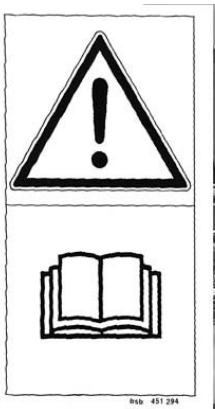
Safety

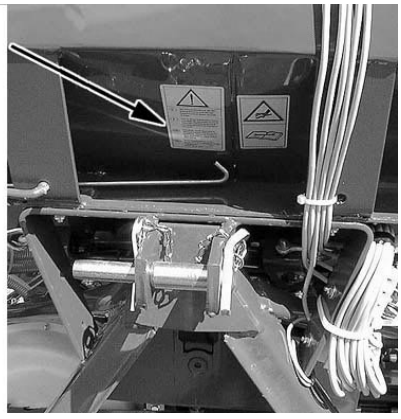
The following safety instructions are applicable for all chapters of this operating manual.

Danger symbols

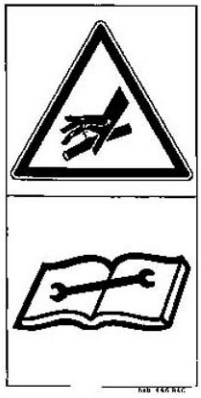
On the machine

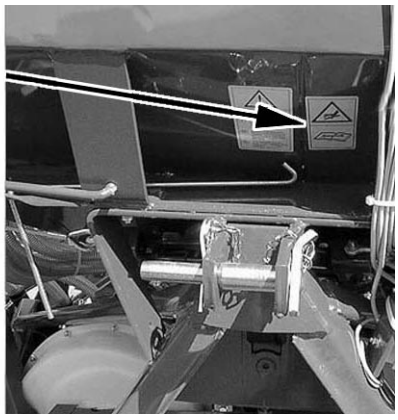
Carefully read the operating manual before handling the machine!



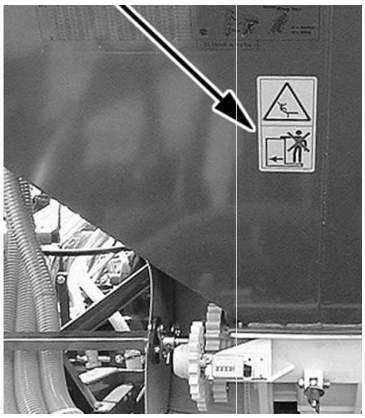


Avoid fluid escaping under pressure. Consult operating manual for service procedures.

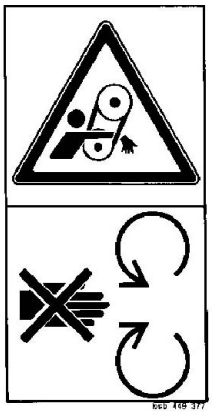


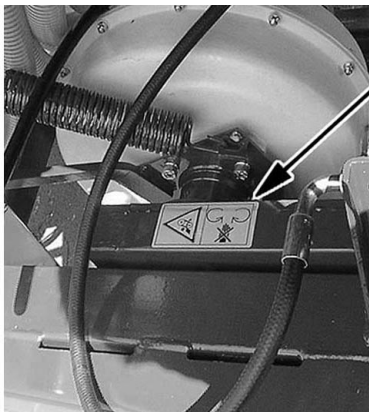


Do not ride on the seed drill!

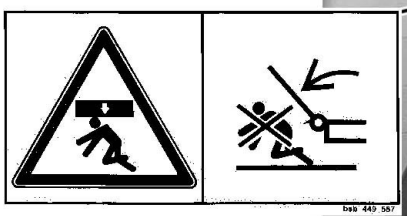


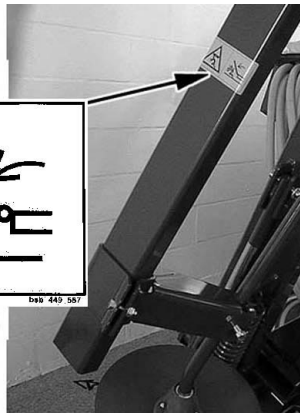
Do not open or remove safety shields while engine is running!



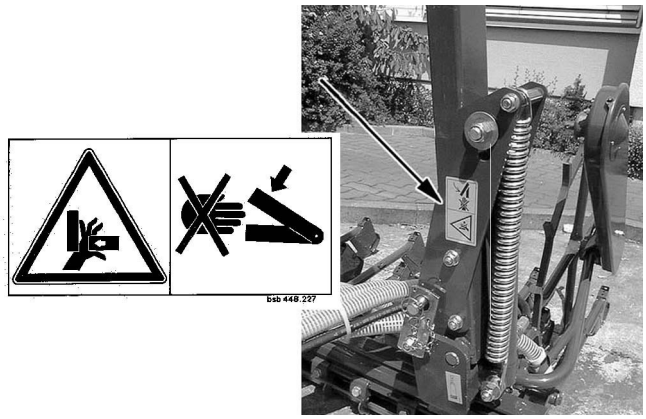


Stay clear of swinging area of folding parts of the machine!





Never reach into the crushing danger area as parts may be moving there.



In this operating manual

This operating manual defines three risk or safety categories. The following symbols are used.

This symbol points to instructions which facilitate operation of the seed drill

This symbol warns of the risk of damage

This symbol warns of the risk of injury

Please read all safety instructions contained in this operating manual with the utmost care and also observe all warning signs attached to the seed drill. These warning signs must be kept in a legible condition and must be replaced if missing or damaged. This is especially the case when whole sections are replaced when making repairs. Warning signs are available from your dealer or importer.

Follow these instructions to prevent accidents. These instructions must also be made available to all other users. You are advised to refrain from any working methods which may be hazardous.

Proper use

Accord seed drills are based on state-of-the-art technology and are manufactured in accordance with recognized safety requirements. Nevertheless, the use of these seed drills does not preclude the risk of injury to the user or third parties and/or the risk of damage to the seed drill itself or to other materials or items of equipment.

Always make sure that the seed drill is in a technically perfect condition and that it is used properly and for its intended purpose and entirely in accordance with the instructions given in this manual! Any malfunctions or defects which might affect the safe operation of the seed drill must be immediately eliminated.

The seed drill may be used, maintained and repaired only by persons who are familiar with its working and have been made fully conversant with the risks involved.

OEM replacement parts and accessories from Kverneland Soest have been specially designed for use with Kverneland Soest seed drills. Any replacement parts and accessories not supplied by Kverneland Soest have not been tested or approved by us. The installation and/or the use of non-Accord products may under certain circumstances have a negative influence on the given design features of your seed drill and may therefore adversely affect its safe and reliable operation and your safety. Kverneland Soest cannot therefore be held liable for damage or injury caused by the use of non-OEM replacement parts or accessories.

Kverneland Soest seed drills are intended for seeding (sowing) and fertilising (DF1, DF2 and DC only). Any uses other than those for which the seed drills are intended, such as transportation, will automatically exempt Kverneland Soest or the supplier from its/his liability in respect of ensuing damage. Such cases of improper use will therefore be entirely at the user's own risk.

All relevant accident prevention regulations, as well as other generally acknowledged safety and health regulations and road traffic regulations, must be strictly observed.

Improper use also comprises failure to observe the instructions given in this operating manual and the manufacturer's maintenance and servicing requirements.

Operational safety

The seed drill must not be put into operation until the user has been given proper initial instruction either by the dealer or by one of Kverneland Soest's representatives or employees. Completed registration cards are to be sent to Kverneland Soest.

The seed drill may be used only if all safety devices, e.g. detachable guards, are fitted and in proper working order.

Nuts and bolts should be checked at regular intervals and tightened if necessary.

Tyre pressures must also be checked regularly.

In the event of a malfunction, immediately cease operation and secure the seed drill in its stationary position. Malfunctions must be eliminated immediately.

No liability for consequential damage

Even though your Kverneland Soest seed drill has been manufactured with the utmost care and you are using it properly, fluctuations and interruptions in seed delivery may still occur, the possible causes being:

- differences in composition of the seed or fertiliser (grain size, density, shape, dressing, treatment)
- clogging or bridging (e.g. through foreign bodies, glumaceous seed, sticky dressing agents, moist fertilisers)
- worn parts (e.g. metering device, V-belt)
- damage through external influences
- incorrect drive speeds and forward speeds
- incorrect setting of seed drill (wrongly mounted, failure to observe calibration charts)
- incorrect connection or operation of the electronic seed drill drive or an error in the tractor's electric installation.

It is therefore advisable, both before and during use, to check that the seed drill is functioning properly and delivering the seed with the required accuracy (see p. 4-21). Such deviations in the delivery rate are only partially detectable by the electronic seed drill control and the monitor of the electronic seed drill drive!

Any claims for damages not directly incurred by the seed drill cannot be accepted. By the same token, Kverneland Soest cannot be held liable for any consequential damage resulting from incorrect metering or distribution.

Road safety

Road traffic regulations must be observed when towing the seed drill on roads, paths and other public places. The seed drill must be in a road-worthy condition!

Observe the maximum permissible width for road transport and fit all necessary rear lights, warning signs and guards. Disconnect the electrical supply when fitting.

Fold up the side sections, track markers, etc. and secure them in the transport position. When transporting the seed drill on the road, lock the control valve in the tractor cabin in order to prevent the coulter bar from being opened out accidentally. In addition close the ball valve in the hydraulic hose.

Trip ropes for quick-release couplings must hang loose and must not, when in their lowered position, release the couplings of their own accord.

Observe maximum permissible axle loads, the load-bearing capacity of the tyres and the maximum total weights in order to ensure adequate steering and braking. The behaviour of the tractor is also influenced by attached implements. Take the width and balancing weight of the seed drill into consideration, especially on sharp bends.

No persons may be allowed to ride on the seed drill.

Accident prevention

Careful heed must be paid not only to the safety instructions contained in this operating manual but also to the accident prevention regulations governing the operation of agricultural machinery.

You could injure yourself on those edges of the seed drill which need to be sharp.

When coupling seed drill to tractor

The work of coupling and uncoupling the seed drill (using the three point linkage) involves a high risk of injury. The following instructions must therefore be carefully observed:

- Secure the tractor in such a way that it cannot roll forwards or backwards.
- Slowly and carefully actuate the three-point power lift system.
- Be extremely careful when working with a three-point linkage. Always be aware of the shearing hazard between the tractor and the seed drill.
- Position the seed drill with its support legs on firm, level ground.

The tractor and the seed drill must be equipped with the same category of three-point linkage.

Avoid accidents by using the Kverneland Soest triangle coupler.

When using p.t.o. shaft

See operating instructions for universal joint shaft!

Use only the universal joint shaft which is intended for use with your seed drill and make sure that it is fitted with the prescribed protective equipment (protective tube and funnel-shaped p.t.o. shaft guard must be fitted). Make sure that the tractor engine and the p.t.o. shaft are switched off before proceeding to fit the universal joint shaft.

Make sure that the tubes overlap by the prescribed distance in both transport and operating position and are secured in such a way that they cannot rotate with the shaft.

Be absolutely sure that there is nobody standing in dangerous proximity to the seed drill when you switch on the p.t.o. shaft.

The p.t.o. shaft speed of the tractor must correspond with the maximum permissible rotational speed of the seed drill. The angle of attachment will depend on the type of p.t.o. shaft (see operating instructions for p.t.o shaft). Always switch off the p.t.o. shaft if the angle of divergence is excessive or whenever the p.t.o. shaft is not required.

When using the hydraulic system

Do not connect the hydraulic hoses to the tractor's hydraulic system until you have made sure that the system is at zero pressure on both the tractor and the equipment side.

The hydraulic system generates extremely high pressures. All piping, hoses and connections must therefore be checked regularly for leakage and visible external damage! Use a proper and thorough means of searching for leakage and repair all damage immediately! Spurting hydraulic oil can cause injuries and fires. Call a doctor immediately in the event of injury!

In order to exclude the possibility of incorrect connection, all mating plugs and sockets belonging to the hydraulic connections between the tractor and the seed drill should be marked with matching colours.

When operating the seed drill

Prior to start-up and operation, make sure that nobody is standing in dangerous proximity to the seed drill (especially children).

No persons may ride on the seed drill during operation.

None of the prescribed guards supplied with the seed drill may be removed during operation.

No persons may be allowed to stand within the working area of the pre-emergence markers or the (hydraulically) folding track markers.

Care and maintenance

Observe all generally or specifically prescribed intervals for maintenance checks and inspections which have to be carried out regularly.

Before carrying out any care or maintenance work, always de-pressurize the hydraulic system and switch off the p.t.o. shaft and the tractor engine. Uncouple the seed drill from the tractor.

Make sure, prior to carrying out any care or maintenance work, that the seed drill is standing on firm, level ground and cannot roll away or tip over (support legs). Do not make use of any parts of the seed drill as steps or footholds. Use a proper and safe means of gaining access to the parts of the seed drill which require care or maintenance.

Prior to washing the seed drill with water or a steam jet (high-pressure cleaner) or with any other suitable cleansing agents, use protective coverings to seal off all openings which, for safety or functional reasons, must be protected against ingress of water, steam or cleansing agent. These are, for example, the bearings, the fan, the signal distributor and the electric plug-type connectors. These protective coverings must be completely removed after the washing operation.

All hydraulic lines must now be checked for leakage, looseness, abrasion and damage. All defects and damage must be immediately rectified!

Prior to carrying out maintenance and repair work on the electrical system, disconnect it from the power supply.

When carrying out electric welding on the tractor-mounted seed drill, disconnect the cables from the tractor's generator and battery.

All screw connections which had been slackened or unscrewed for maintenance and repair purposes must now be refitted and properly tightened.

Description and technical data

Description and technical data

This chapter contains general information on our seed drills, including a description of their mode of operation, their range of application and their technical specifications.

Description of seed drill

The following description will enable you to familiarise yourself fully with the working of the seed drill.

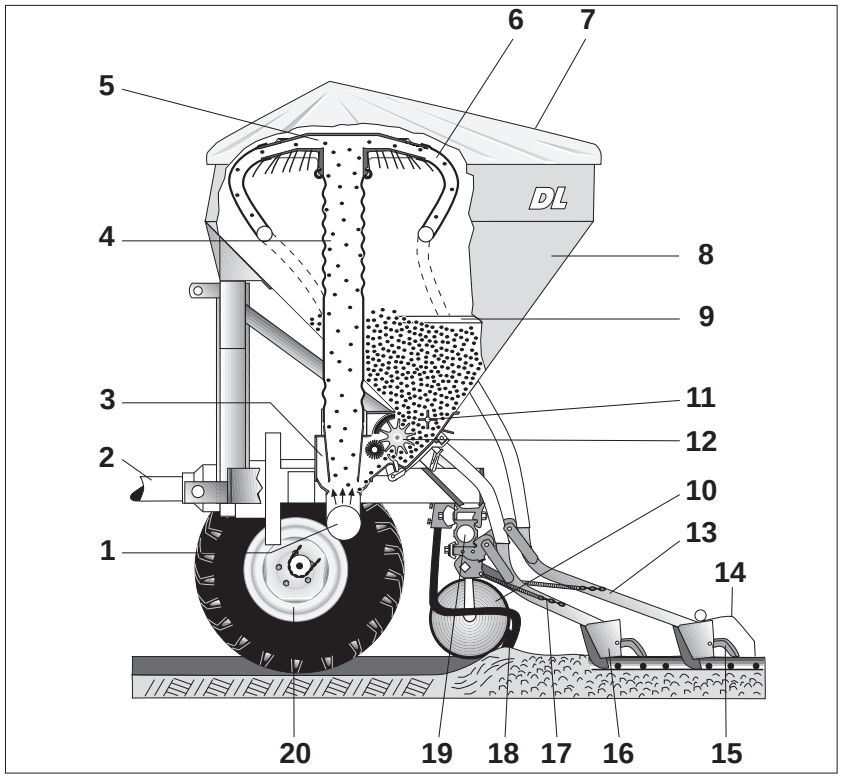


Fig. 3-1 Schematic diagram of seed drill

1 Manifold with fan (hidden from view)
2 P.t.o. shaft
3 Venturi cone
4 Diffuser tube
5 Distributor
6 Seed delivery tube
7 Hinged hopper cover
8 Seed hopper
9 Removable sieve
10 Track marker
11 Agitator shaft
12 Metering device
13 Long coulter
14 Covering tines
15 Coulter stop
16 Short coulter
17 Coulter spring
18 Track eradicator
19 Coulter bar
20 Drive wheel

The cell wheel metering device is chain driven from the drive wheel of the seed drill. With electronic seed drill drives (optional) the metering device is driven by an electric motor which is itself controlled by the drive wheel. If the setting of the metering device and the travelling distance are correct, the metering device will convey the correct seed rate from the hopper into the venturi cone. The air stream from the fan transports the seed via the diffuser tube and the distributor to the delivery tubes, which then convey the seed to the coulters.

The seed drills can be used in conjunction with all standard tractors (from 37 kW upwards, depending on seed drill model). Depending on the model, the tractors must be equipped with either a three-point linkage or a tractor triangle. For a mechanical fan drive a p.t.o. shaft connection (either 540 or 1000 r.p.m.) is also needed.

If the machine is equipped with a hydraulic drive, the tractor has to fulfil the requirements in the checklist on p. 23-4.

The seed drills can be operated at forward speeds of *between 5 and 12 k.p.h.*, depending both on the nature and surface of the soil and on the user's required degree of sowing accuracy. Please consult Kverneland Soest if you wish to work at other forward speeds.

The seed drills can be used for sowing seeds of all grain sizes *between 2 and 10 mm* (not single seed drilling).

Cereals:	Wheat, barley, oats, rye, triticale, sorghum, rice
Coarse seed:	Maize, peas, beans, soya beans
Fine seed:	Grass, clover, rape

Pneumatic seed drills can be equipped with the following types of coulter:

• Standard coulter	(sowing width 1-2 cm):	for sowing in ploughed land with few plant residues
• Band coulter	(sowing width 5-8 cm):	for a wider distribution in ploughed land with few plant residues
• CX coulter	(sowing width : approx. 2 cm) :	for universal use, for sowing both in plant residues (mulching, not direct drilling) and in ploughed land.

A well crumbled seedbed is a prerequisite for optimum sowing with the band coulter. On heavy, sticky soils the band coulter shoe should be removed. This is done by slackening the clamping screw.

Type	DL			DT				
Working width [m]	3	4	4.5	5	6	6.66	8	9
Number of rows	20 (15.0)	24 (16.7)	29 (15.5)	40 (12.5)	40 (15.0)	58 (11.5)	64 (12.5)	64 (14.1)
(Row width [cm])	24 (12.5)	29 (13.8)	32 (14.0)		48 (12.5)	64 (10.4)	80 (10.0)	80 (11.2)
	29 (10.3)	32 (12.5)	40 (11.2)		58 (10.3)			
	32 (9.4)	40 (10.0)			64 (9.4)			
Transport width [m]	2.95			2.15 (2.30 with tyres 31 x 15.50 - 15)			2.50	
Shipping dimensions, height x depth [m]	1.50 x 1.70			1.40 x 2.55	1.40 x 2.55	1.40 x 2.55	1.80 x 1.75	1.80 x 1.75
Track gauge [m]	1.65 - 2.10					4.25 or 4.50		5.50
Hopper capacity (approx) [l]	750 (1000 with 40 coulters)					2000		
with hopper extension	1000					-		
Filling level [cm] without hopper extension	150					166		
Tyres	7-12 or 26 x 12.00					7.5 - 16 or 31 x 15.50 - 15		31 x 15.50-15
Weight empty [kg]	435 - 490	460 - 550	500 - 560	1000	1020 - 1150	1100 - 1200	1700 - 1800	1750 - 1850
Noise level	98 dB(A)*					98 dB(A)*		

* Seed drill driven by electric motor and measured at rated speed: maximum value on envelope curve at distance of one metre from seed drill

Type	DA		DA-S				DE-S		
Working width [m]	2.5	3	3	4	4.5	5	2.5	3	4
Number of rows	20 (12.5)	20 (15.0)	20 (15.0)	24 (16.7)	40 (11.3)	40 (12.5)	20 (12.5)	24 (12.5)	32 (12.5)
(Row width [cm])	24 (10.4)	24 (12.5)	24 (12.5)	29 (13.8)			Broadcast seed		
		29 (10.3)	29 (10.3)	32 (12.5)			in earth current		
		32 (9.4)	32 (9.4)	40 (10.0)					
Transport width [m]	2.45	2.95	2.95	3.95*	4.45*	4.95*	2.45	2.95	3.95*
Shipping dimensions, height x depth [m]	1.80 x 1.75		1.80 x 1.75				1.50 x 1.15		
Track gauge [m]	—		—				depends on tillage implement		
Hopper capacity (approx.) [l]	750		750 (1000 with 40 coulters)				750		
with hopper extension	—		1000				1000		
Filling level [cm] without hopper extension	approx. 160		approx. 174				from 174 upwards		
Tyres	without wheels		without wheels				without wheels		
Weight empty [kg]	445 - 455	450 - 470	495 - 530	520 - 570	595	615	200	205	210
Noise level	98 dB(A)**		98 dB(A)**				98 dB(A)**		

* Seed drill driven by electric motor and measured at rated speed: maximum value on envelope curve at distance of one metre from the seed drill

** See p. 3-5

Type	DF1***		DF2 rigid***			DF2 folding***	
Working width [m]	3	4	4.5	5	6	5	6
Number of rows	24 (12.5)	29 (13.8)	40 (11.2)	48 (10.4)	48 (12.5)	48 (10.4)	48 (12.5)
(Row width [cm])	29 (10.3)	32 (12.5)			58 (10.3)		58 (10.3)
	32 (9.4)	40 (10.0)			64 (9.4)		64 (9.4)
Transport width [m]	2.95	3.95*	4.45*	4.95*	5.95*	max. 3.00	
Shipping dimensions, height x depth [m]	1.85 x 1.35			1.85 x 1.35			
Track gauge [m]	–			–		–	
Hopper capacity (approx.) [l]	750			1650		1650	
with hopper extension	–			–		–	
Filling level [cm] without hopper extension	124			168		168	
Tyres	without wheels			without wheels		without wheels	
Weight empty [kg]	–			–		–	
Front	250	250	300	300	300	300	300
Rear	300 - 340	340 - 390	450	570	600 - 665	800	830 - 895
Noise level	98 dB(A)**			98 dB(A)**		98 dB(A)**	

* Does not conform with German motor vehicle construction and use regulations (StVZO); ** see p. 3-5;
*** without packer roller

Type	DV				DG		DC		
Working width [m]	5	6	6.66	8	6	8	3	4	4,5
Number of rows	40 (12.5)	48 (12.5)	58 (11.5)	64 (12.5)	48 (12.5)	64 (12.5)	32 (9.4)	32 (12.5)	32 (14.0)
(Row width [cm])	48 (10.4)	58 (10.3)			58 (10.3)				
		64 (9.4)			64 (9.4)				
Transport width [m]	max. 3.00				max. 3.00		2.95		
Shipping dimensions, height x depth [m]	2.57 x 2.70				2.90 x 7.50	3.80 x 7.50	2.10 x 1.70		
Track gauge [m]	2.60				1.95; Width of one track: 0.97 m		1.80		
Hopper capacity (approx.) [l]	1650				3500		500 (600)		
with hopper extension	2000				–		620 (730)		
Filling level [cm] without hopper extension	171				250		168		
Tyres	31 x 15.50 - 15				4 tyres 31 x 13.50 - 15		31.5 x 15.50 - 15		
Weight empty [kg]	1370 - 1420	1450 - 1550	1560	1620	2830 - 2930	3000	780		
Noise level	98 dB(A)**				98 dB(A)**		98 dB(A)**		

** see p. 3-5

Setting and using the seed drill

Setting and using the seed drill

This chapter contains general information on the use of your seed drill. The special features of the individual seed drill models are dealt with in the subsequent chapters.

Road transport

Fit warning signs and the necessary lighting and guards for road transport.

Make sure the seed hopper is empty before you proceed to transport your seed drill on the road.

The maximum speed at which the seed drill may be transported on the road is 25 k.p.h.

All seed drills with a transport width of up to 3 metres may be towed on the road.

- The **DT** model must be transported lengthwise.

Take care not to injure yourself when converting your seed drill for road transport. Avoid contact with sharp edges.

- On **DL and DC** seed drills having **a width of over 3 metres:** fold up the coulter bar and lock it in position and fold up and secure the S-type covering tines.
- On **DA or DA-S seed drills having a width of less than 3 metres:** retract the drive wheel and lock it in position.
- **On seed drills with hydraulic folding coulter bars:** Lock the control valve in the tractor cabin in order to prevent the coulter bar from being opened out accidentally. In addition close the ball valve in the hydraulic hose.
- **If your seed drill has the corresponding equipment:**
  - Fold up the track markers and lock them in position.
  - Fold up the hopper access steps.
  - Remove the pre-emergence marker from its square-section tubular mounting, turn it through an angle of 180° and reinsert it as far as it will go.
  - Fold up and secure the pre-emergence marker.

Prior to sowing

Coupling the seed drill to the tractor

When coupling the seed drill to the tractor, make sure that there are no persons standing between the tractor and the seed drill.

The seed drills can be coupled to the tractor as follows:

- by means of the **three-point linkage or the tractor triangle**: DL, DC and DV seed drills; DF2 front tank hopper; DF1 coulter bars; DF2 non-folding rigid coulter bars
- by means of the **tractor triangle** only:
  DA, DA-S, DE-S and DT seed drills and DF1 front seed hopper
- by means of the **three-point linkage** only:
  DF2 hydraulic folding coulter bars
- by means of the **cross shaft on the draft links** of the power lift system: DG.

If you are using a tractor triangle to couple the seed drill to the tractor, first couple the tractor triangle to the tractor then read and observe the instructions in the “Triangle coupler” operating manual. Finally couple the seed drill with the tractor triangle. Pay particular attention to the following:

- When coupling, the locking pawl of the tractor triangle must be engaged above the implement triangle's locking plate.
- The locking pawl of the tractor triangle must be secured by means of a spring pin.

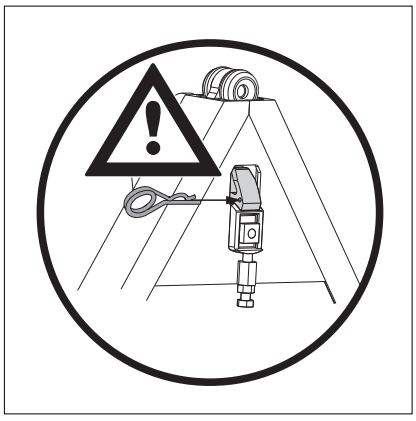


Fig. 4-1
Securing the locking pawl of the tractor triangle

Observe the following when coupling the seed drill:

- Set the tractor's draft links in such a way that the seed drill can swing sideways only very slightly.
- The tractor's primary top link should be positioned as high as possible so that the seed drill is parallel with the ground when raised.
- The seed drill's implement triangle must be in a vertical operating position. (Change the length of the primary top link for this.)

Make sure the tractor engine and the p.t.o. shaft are switched off before you proceed to fit the universal joint shaft.

The universal joint shaft supplied with your seed drill must first be adapted to the tractor before it is fitted.

Observe the special operating instructions for the universal joint shaft.

In the case of some tractor models, the universal joint shaft must be cut to the correct length. This must be done in such a way that power transmission is not adversely affected. After shortening the shaft, cut the PTO drive shaft guard to size at both ends and then deburr, clean and grease the protective tubes and the special section tubes.

After it has been adapted fit the universal joint shaft.

The p.t.o. shaft speed of the tractor must correspond with the maximum permissible rotational speed of the seed drill.

Setting the track markers

The length of the track markers is determined by the working width of the seed drill (A), the track gauge of the front wheels of the tractor (S) and the width of the row (R). It is calculated as follows:

Length of track marker **M = (A - S + R) / 2**

Example: 4 m DL with 32 coulters

Working width (A) = 400 cm; Track gauge (S) = 180 cm
Row width (R) = 12.5 cm

Length of track marker (M) = (400 - 180 + 12.5) / 2 = 116.25 cm.

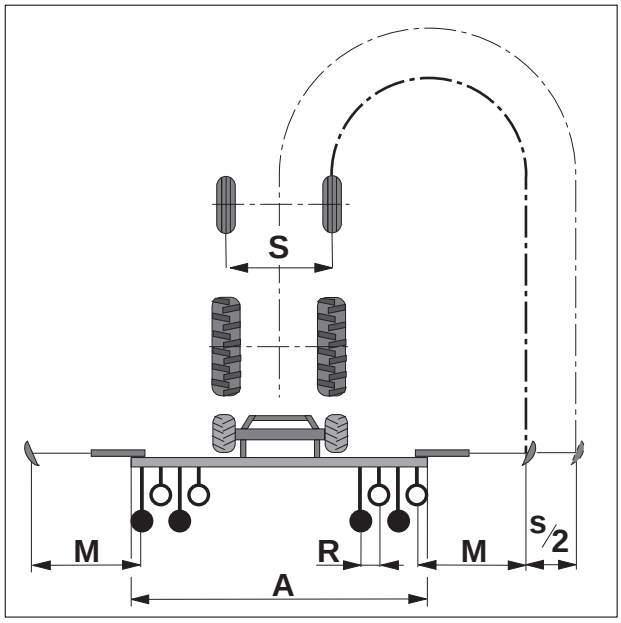


Fig. 4-2
Setting the track markers

Set the track marker to the calculated setting. Check the setting whilst driving forwards with the track markers in their lowered position.

For centre marking, increase the length of the track marker (M) by half the tractor gauge (S/2).

Even when working on heavy soil, an optimum marking can still be obtained by adjusting the incline of the track marker discs and by using additional weights.

Raising the track marker (fig. 4-3) makes sure there is sufficient ground clearance for the track marker arms. They are standard equipment with some types of seed drill.

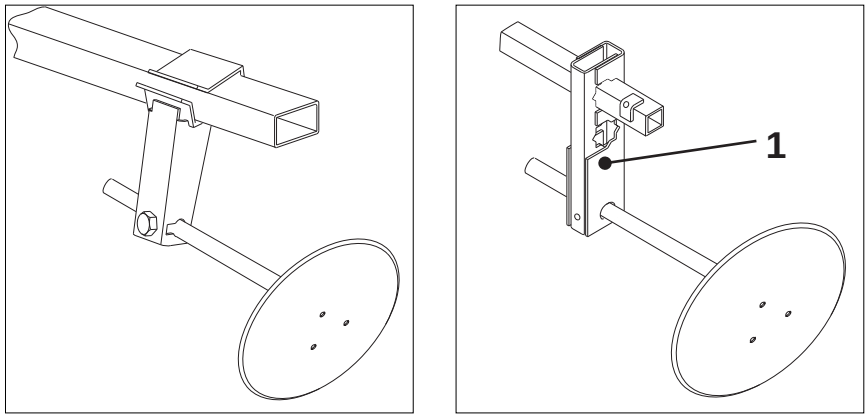


Fig. 4-3
Setting the track markers to a higher position

Setting the sowing depth

The sowing depth can be adapted to the soil conditions by adjusting the coulter pressure.

The crank handle (Fig. 4-4) serves as a means of adjusting the coulter pressure centrally over the entire length of the coulter bar. It is also possible to adjust the coulter pressures individually by attaching chain links to the coulter springs with the aid of the hook supplied (Fig. 4-5) or by fitting stronger coulter springs. The approximate coulter pressure for the different possible chain lengths and coulter springs is shown in Fig. 4-6.

It is advisable not to place the front coulters under too high a pressure in cases where seed is being sown in loose soil, in narrow rows and at high speed, as these rows will also be covered with soil by the rear coulters.

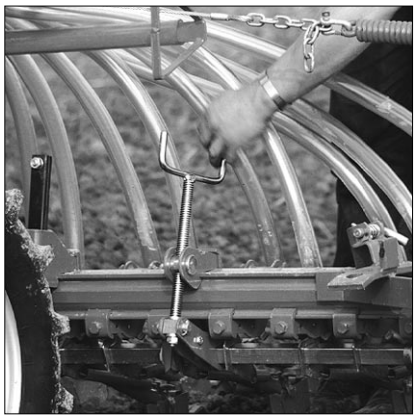


Fig. 4-4 Adjusting the coulter pressure centrally

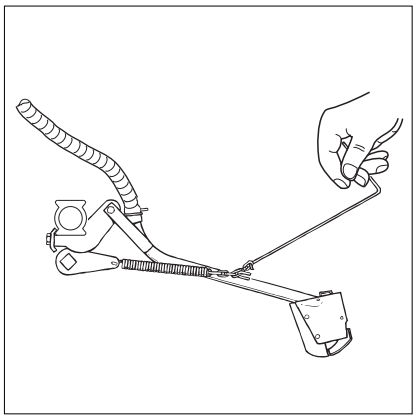


Fig. 4-5 Adjusting coulter pressure individually

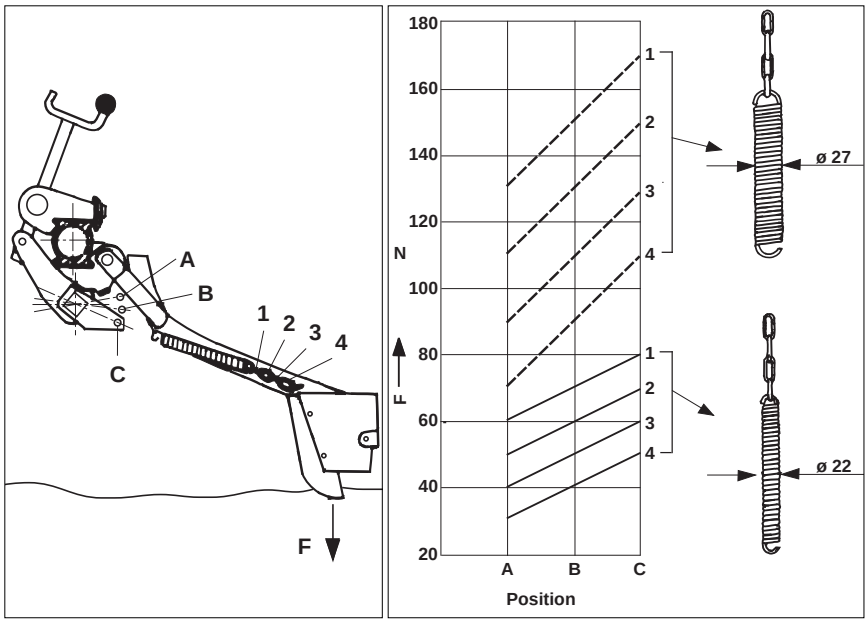


Fig. 4-6 Coulter pressure diagram

Reading calibrating settings

If you want to calibrate a seed drill with an electronic seed drill drive ESA, first read Chapter 22. After receiving the input data the computer will give the calibrating setting automatically.

The values given in the calibration chart serve only as a guide because the specific gravity and the grain size of the seed can often differ considerably. The correct setting must be obtained by calibrating. The measured quantity of seed thus obtained will then always be delivered at the same constant rate as long as you continue to use the same kind of seed.

In cases where the seed drill is equipped with two metering devices, each device must deliver the seed at the desired rate (kg/hectare). The readings shown by the hectaremeter correspond to the area covered by half the width of the seed drill.

If the desired seed rate cannot be obtained at the largest setting (e.g. when sowing very low density seeds), have the transmission ratio adapted by our after-sales service engineer.

Calibrating

Observe the following instructions before you start calibrating.

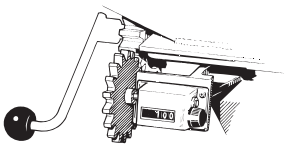
- Use the micrometering system when sowing small quantities of seed (see the calibration chart on page 4-9). Switching on the micrometering system is described in the section starting on p. 4-13.
- Read the chapter “Electronic seed drill control” if you wish to calibrate with the ESC’s metering device monitoring system.
- Read the chapter “Drilling” (from p. 10-8 onwards) prior to calibrating the DF seed drill.
- Read the chapter “Seed quantity calibrating” (from page 19-3 onwards) prior to calibrating the DC seed.

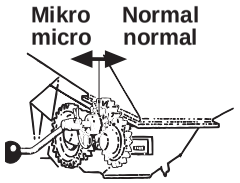
The seed drill should be calibrated only in its lowered, stationary position. The tractor engine and the p.t.o. shaft must be switched off.
The DC seed drill has to be lifted for calibration to enable the drive wheels to rotate easily.

Table 4 -1 Calibration chart (guidlines) for pneumatic seed drills

Seed	Wheat	Rye	Barley	Oats	Beans	Peas	Lupins	Sweet peas	Maize	Grass
Spec. Gravity [Kg/l]	0.77	0.74	0.68	0.5	0.85	0.81	0.76	0.83	0.79	0.36
Setting	**Normal seed kg/hect. (Butterfly valve N)**									
10*	34	33	32	24	23	21	28	32	8	-
15*	51	49	48	35	42	40	45	51	24	18
20*	69	66	64	47	61	59	62	70	47	26
25*	86	83	79	59	79	78	79	89	70	34
30	104	100	95	71	98	97	96	108	92	42
35	122	117	111	82	116	117	113	127	115	50
40	140	134	127	94	135	136	130	146	137	-
45	157	151	143	106	154	155	147	165	156	-
50	174	168	159	118	172	174	164	184	175	-
55	192	184	174	130	191	194	181	203	194	-
60	210	200	190	141	209	213	198	222	212	-
65	228	217	206	153	228	232	216	241	231	-
70	246	235	222	165	246	251	234	260	249	-
75	264	252	238	177	265	270	251	279	267	-
80	281	269	253	189	283	289	268	298	285	-
85	298	286	268	200	302	309	285	317	304	-
90	316	302	284	212	320	328	302	336	323	-
95	335	319	300	224	338	347	320	355	342	-
100	352	337	316	236	356	366	337	374	361	-
105	370	354	332	248	374	385	354	393	380	-
110	387	371	348	260	393	404	371	412	398	-

Seed	Rape		Red clover		Grass			Forage beet
Spec. Gravity [Kg/l]	0.65		0.77		0.39		0.7	
Setting	**Fine seed kg/hect. (Butterfly valve F)**							
2.5	2.2	1.1	2.3	1.15	-	-	2.5	1.25
5	4.6	2.3	5.3	2.65	-	-	5	2.5
7.5	6.8	3.4	8.6	4.3	2.8	1.4	7.5	3.75
10	9.1	4.55	12	6	5.2	2.6	10	5
12.5	11.4	5.7	15.3	7.65	7.2	3.6	12.5	6.25
15	13.7	6.85	18	9	9.2	4.6	15	7.5
17.5	15.9	7.95	21.3	10.65	11.2	5.6	17.5	8.75
20	18.2	9.1	24	12	13.2	6.6	20	10
22.5	20.5	10.25	26.6	13.3	15	7.5	21.5	10.75
25	22.8	11.4	27.5	13.75	16.2	8.1	23	11.5
	N	M	N	M	N	M	N	M
N = Normal speed, M = Micrometering								





* In cases where normal seeds (cereals and coarse seed) are to be sown and the quantities are extremely small (cell width ≤ 25 mm) it may be possible to achieve a more uniform delivery rate with the aid of the micrometering system (see p. 4-13).

Now adjust the desired seed rate:

1. Do you intend to calibrate with normal or fine seed? For details on this see the calibration chart on p. 4-9.

2a. For **normal seed:**
- Set the red change-over switch (3; fig. 4-7) to position N.
- Set the butterfly valve:
  for **DA; DA-S; DE-S; DL; DT up to 6.66 m; DF1, DC:**
  set the spring clip on the butterfly valve (8) to position N;
  for **DT 8 - 9 m; DF2; DV; DG:**
  Open butterfly valve (fig. 4-8, position 5).

2b. 

There is a risk of damaging the metering device when adjusting the seed rate to a lower setting. Do this only when the metering device is rotating or the seed hopper is empty.

For fine seed:
- Turn the spindle (4) until the metering scale (2) is in position 0.
- Turn the red change-over switch clockwise until it engages in the groove in the hexagonal shaft. The letter F on the red change-over switch will now be visible.
- Depending on fan type:
  Either set the spring clip on the butterfly valve (8) to position F
  or close the butterfly valve (position 1).

The butterfly valves on the DF seed drills must remain open, even when sowing fine seed (DF1: position N, DF2: position 5 or “open”) if the overall length of the spiral hoses and the PVC pipe (items 3 and 11 in Fig. 10-1) exceeds 5 metres. Otherwise close the butterfly valve when sowing fine seed.

3. Now refer to the calibration chart and read off the setting which corresponds to the desired seed rate.

4. The metering scale (2) can be set to any position from 0 to 110 (only up to 25 in the case of fine seed). Turn the spindle (4) until the desired setting is visible at the edge of the housing.
   In the case of DV seed drills, the metering scales and the spindles for both metering devices are situated at the right hand side of the machine (see fig. 4-9). If your machine is fitted with an electronic seed rate adjustment device, the maximum setting for normal seed is 90 - 95. Please refer to page 21-23.

1 Housing
2 Metering scale
3 Red change-over switch
N = Normal seed
F = Fine seed
4 Spindle
5 Hopper trap-door
6 Rotary slide valve (not fitted on all machines)
7 Manifold
8 Spring clip – butterfly valve
F = Fine seed
N = Normal seed

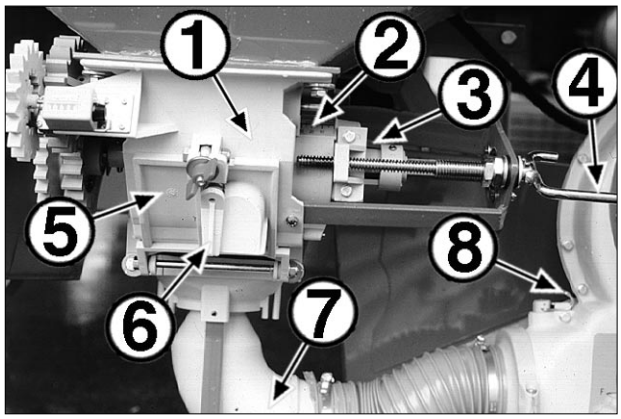


Fig. 4-7 Metering device and fan on DA; DA-S; DE-S; DL; DT up to 6.66 m; DF1

Scale of positions of the butterfly valve:
1 = “closed”; 5 = “open”

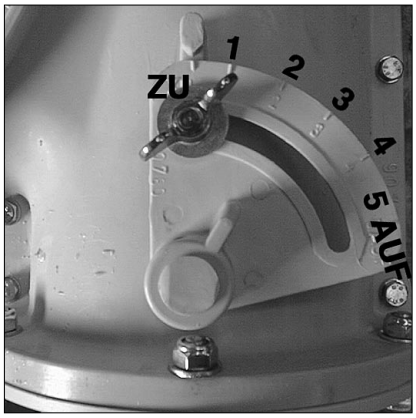


Fig. 4-8
Regulating air volume on DT 8 - 9 m; DF2; DV; DG

5. Close the hopper trap-door (5).

Make sure that there are no foreign bodies in the seed hopper.

6. Fill the seed hopper with seed.

7. Open the venturi cone:
   - with **vertical** venturi cones (Fig. 4-7): Remove the manifold (7) by unscrewing the wing nut.

- **with horizontal** venturi cones (Fig. 4-9): Pull the bolt (1) and open the trap-door (2).

1 Bolt
2 Trap-door

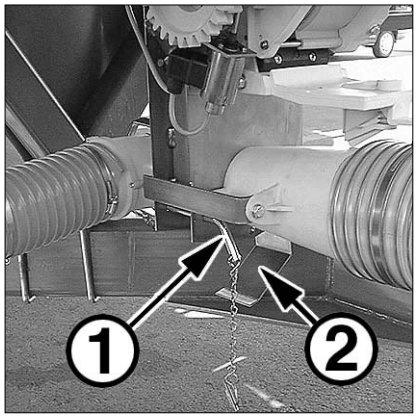
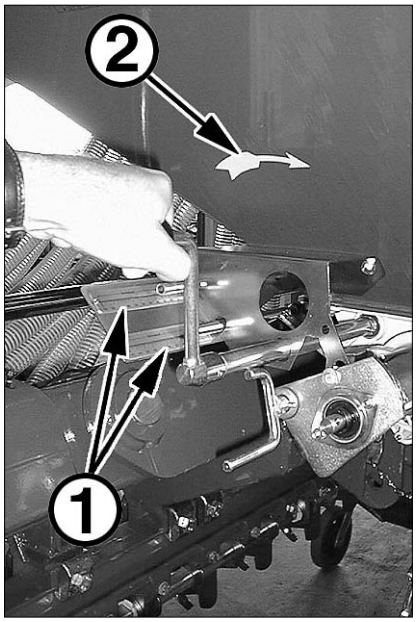


Fig. 4-9
opening a horizontal venturi cone

8. Place a bucket or the calibrating tub under the venturi cone outlet in order to collect the seed (Fig. 4-11).



1 Metering scales;
2 Rotational direction when calibrating

Fig. 4-10 Calibrating DV seed drills

Fig. 4-11 Calibrating other models

9. Remove the spring pin and pull off the drive shaft. Attach the calibrating handle to the drive shaft. In the case of DV seed drills, attach the calibrating handle to the right-hand metering device, see Fig. 4-10.
10. Turn the calibrating handle 85 times in the direction indicated by the arrow at a rate of approximately one revolution per second. The hectaremeter will now indicate 100. The quantity of seed collected in the bucket corresponds to 1/10 hectare (see example). In cases where the seed drill is equipped with two metering devices, each device will have metered seed for 1/10 hectare.
11. Weigh the seed collected.
12. If necessary change the setting of the metering device (see example).
13. Replace the manifold (7) between the venturi cone and the fan.
14. Replace the drive shaft and secure by means of the spring pin.

The seed drill has now been calibrated.

Example:

You wish to sow wheat at a rate of 210 kg/hectare:
- Normal seed
- Setting according to calibration chart = 60
- Initial calibration results, for example, in a quantity of 19 kg per 1/10 hectare
- That is approximately 10 % less than the required quantity of 21 kg per 1/10 hectare
- Increase the setting by 10 % to 66
- The second calibration results in a quantity of 21 kg per 1/10 hectare.

Calibrating with the micrometering system

The micrometering system serves as a means of metering fine seed and extremely small quantities of seed per hectare. The advantage of the micrometering system over the standard system when handling fine seed is that the cell is twice as wide for the same seed rate. This considerably enhances the self-cleaning properties of the cells.

Pull out the red gearwheel until it engages in position **A** (see fig. 4-12). The micrometering system is now switched on. The settings are given in the calibration chart for fine seed **(M = Micrometering).**

1 Red gearwheel
A: Micrometering
B: Standard system

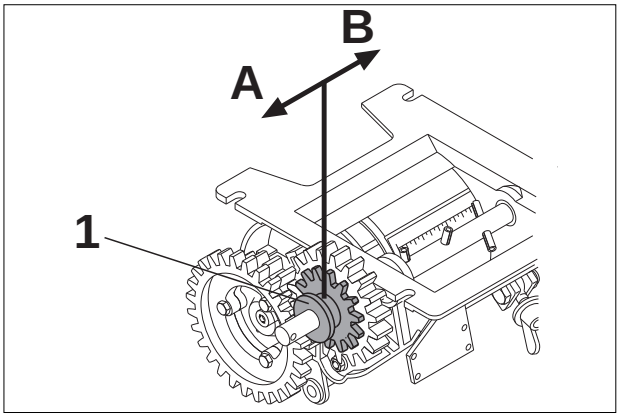


Abb. 4-12
Micrometering

Installed on the inside of the metering device housing is a cleaning brush for the fine seed cells. The brush prevents the cells from becoming clogged with seed which has been treated, for example, with a sticky dressing. It is located underneath the cover plate of the venturi cone, behind the gear wheels (fig. 4-13).

Check the cleaning brush before sowing with fine seed.

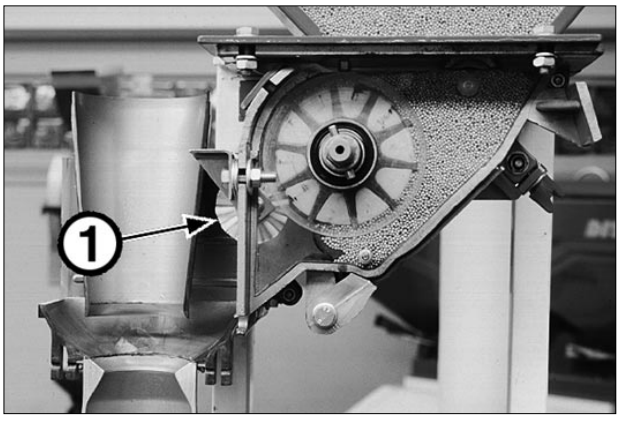


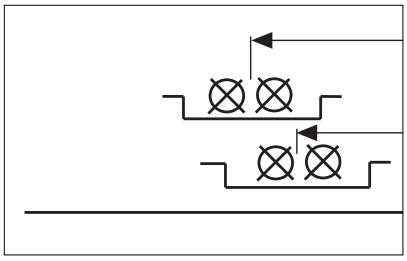
Fig. 4-13
Cleaning brush (1)

When used in conjunction with the micrometering system, the mechanical hectaremeter indicates the sown area; with seed drills with two metering devices it indicates the area for only one device.

Tramlining

Tramlining is performed automatically by means of the electronic tramlining control system (FGS) and the electronic seed drill control (ESC).

Tramlines are produced by closing the corresponding solenoid valves in the seed delivery hoses. The track gauge of the tractor used for subsequent spraying and fertilising determines which coulters have to be shut off (fig. 4-14).



Row width [cm]	Seed drill width [m] (number of coulters)	Track width of spraying/fertilizing tractor [m]						
		X1	X2	X3	X4	X5	X6	X7
9.4	6 (64); 3 (32)	1.41	1.50	1.59	1.69	1.78	1.88	1.97
10	4(40)	1.50	1.60	1.70	1.80	1.90	2.00	
10.3	3 (29)	1.45	1.55	1.65	1.75	1.86	1.96	2.06
	6 (58)	1.34	1.45	1.55	1.65	1.75	1.86	1.96
10.4	2.5 (24); 5 (48); 6.66 (64)	1.35	1.46	1.56	1.67	1.77	1.87	1.98
11.2	4.5 (40); 9 (80)	1.47	1.58	1.69	1.80	1.91	2.02	
11.5	6.66 (58)		1.38	1.49	1.61	1.72	1.84	1.95
12.5	2.5 (20); 3 (24); 4 (32); 5 (40); 6 (48); 8 (64)	1.38	1.50	1.63	1.75	1.88	2.00	
13.8	4 (29) even rhythm	1.38	1.52	1.66	1.80	1.93	2.07	
	Uodd rhythm and S rhythm		1.38	1.52	1.66	1.80	1.93	2.07
14	4.5 (32); 9 (64)		1.40	1.54	1.68	1.82	1.96	2.10
15	3 (20); 6 (40)	1.35	1.50	1.65	1.80	1.95	2.10	
15.5	4.50 (29) even rhythm	1.40	1.55	1.71	1.86	2.02		
	Uodd rhythm and S rhythm		1.40	1.55	1.71	1.86	2.02	
16.7	4 (24);		1.34	1.50	1.67	1.84	2.00	

Fig. 4-14 Table showing correlation of row widths with track widths of spraying/fertilising tractor

If the spraying/fertilising tractor is equipped with broad tyres, several adjoining coulters must be shut off.

The spacing of the tramlines is determined by a given rhythm.

$$\frac{\text{Working width of sprayer/fertiliser}}{\text{Working width of seed drill}} = \textbf{Tramline rhythm}$$

- Example: You have a seed drill which is 4 metres wide and a crop sprayer with a working width of 20 metres.

$$\frac{20\text{ m}}{4\text{ m}} = \mathbf{5 = Tramline\ rhythm}$$

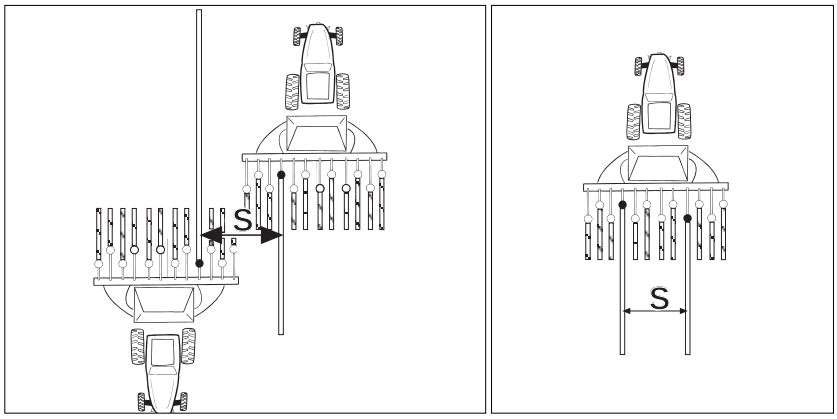
The following table shows the most common combinations of seed drill and crop sprayer for tramlining:

Table 4-2 Tramline rhythms

		Working width of the seed drill [m]							
		2.5	**3**	**4**	**4.5**	**5**	**6**	**8**	**9**
Working width of the sprayer/fertiliser, e.g. field sprayer, fertilising machine [m]	**9**	-	3	-	2*	-	-	-	-
	10	4	3.3*	-		-	-	-	-
	12	-	4	3	-	-	2*	-	-
	15	6	5	-	-	3	2.5*	-	-
	16	-	-	4	-	-	-	2*	-
	18	-	6	4.5*	4	-	3	-	2*
	20	8	-	5	-	4	3.3*	2.5*	-
	21	-	7	-	-	-	3.5*	-	-
	24	-	8	6	5.3*	-	4	3	-
	27	-	9	-	6	-	4.5*	-	3
	28	-	-	7	-	-	-	3.5*	-
	30	12*	10*	7.5*	-	6	5	-	-
	32	-	-	8	-	-	-	4	-
	36	-	12*	9	8	-	6	-	4

*** with ESC only**

The rhythm may be based on either an even or an odd number or on a number plus remainder (see fig. 4-15). Each different rhythm necessitates a different tramlining procedure.



Even-numbered rhythm Odd-numbered rhythm

Fig. 4-15 Even-numbered and odd-numbered tramlining rhythm

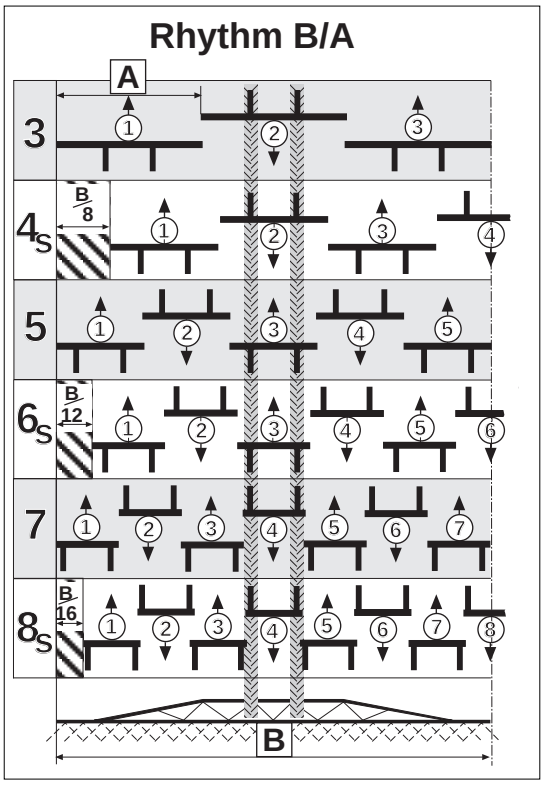
Tramlining rhythms based on an even number necessitate both forward and return travel of the seed drill. Rhythms requiring travel in only one direction are however more accurate than those requiring travel in both directions. A recommended solution is the use of even-numbered symmetrical “S-rhythms” (e.g. 4S, 6S etc.) which can be used to produce tramlines in just one direction, see fig. 4-16. In this case you must commence by sowing with just half of the working width of the seed drill or you must shut off the corresponding partial width of the crop sprayer or fertiliser spreader. Then proceed as though you were working with an odd-numbered rhythm.

Tramlining with an odd-numbered rhythm (e. g. 3, 5, 7 etc.) necessitates travel in only one direction.

Wiht DC seed drills only odd numbered rhythmus and even numbered symmetrical S-rhythms can be produced.

Rhythms 2, 10, 12 or any rhythm with a remainder can be produced only with the aid of the ESC electronic seed drill control (see chapter 21).

Prior to initial operation, check to ensure that the tramlines are produced in the desired track gauge. When tramlining, the corresponding coulters must not deliver seed.



A sowing
B spraying, fertilising

Fig. 4-16
Examples of possible tramlining rhythms

Checking the seed drill

Before you tow the seed drill from the farmyard onto the field check to ensure:

- that the seed drill has been properly converted for road transport and has the correct warning signs and lights
- that the seed drill has been properly coupled to the tractor
- that the venturi cone is sealed: the manifold is in the proper position or the trap-door is properly closed and secured.
- that the tramlining rhythm has been properly set
- that the FGS, ESC or ESA opens and closes the solenoid valves
- that the FGS, ESC or ESA functions properly when changing track markers

- Sowing with all coulters
  1. Switch off the tractor and fill the seed hopper with seed.
  2. If you have an **implement-mounted** seed drill with a mechanical metering device drive you must, for safety reasons, do the following:
     - Switch off the fan drive and then lift up the combination so that the drive wheel is off the ground.

Only approach the machine once you have turned off the engine, taken out the ignition key and applied the hand brake and all rotating parts and the universal joint shaft have completely stopped.

     - Turn the **drive wheel** approximately 180° to get seed in the manifold.
     - Turn on the fan, let it run briefly at a nominal speed, **and then switch it off again.**

You must not get out of the tractor when the engine is still running.

     - Check that each coulter has delivered seed.
  3. If you have a non-mounted seed drill with a mechanical metering device:
     - Turn on the fan.
     - Turn the metering device **a few** times with the **calibrating handle.**
  4. If you **have an electric metering device drive (ESA):**
     Briefly switch on the electric drive engines using “system – test output” (see p. 31-13).

  Check that each coulter has delivered seed.

- that the red change-over switch on the metering device and the butterfly valve on the fan are both set to the required position
- if the micrometering system is switched on or off
- the reduction head in the main distributor
- that the drive shaft has been properly fitted
- that the hopper trap-door is properly closed
- that the removable sieve in the seed hopper is free of blockages
- check the transmission ratio in the chain box (according to the sticker)

In the field

Making the seed drill ready for use in the field

The seed drill must now be converted from transport mode to operating mode so that it can be used in the field.

Couple the seed drill to the tractor if you have not already done so.

Do the following before lowering the seed drill:

- **DT** seed drill models: see chapter 6;
- Seed drills **with hydraulic folding coulter bars**:
  Open out the coulter bars;
- **DL and DC model seed drills with manually folding coulter bars**:
  - Fold out the end sections and bolt them in place
  - lift the lever underneath the coulter bar until the coupling of the two square-section shafts engages (see fig. 4-17).

1 Lever
2 Locking bolt

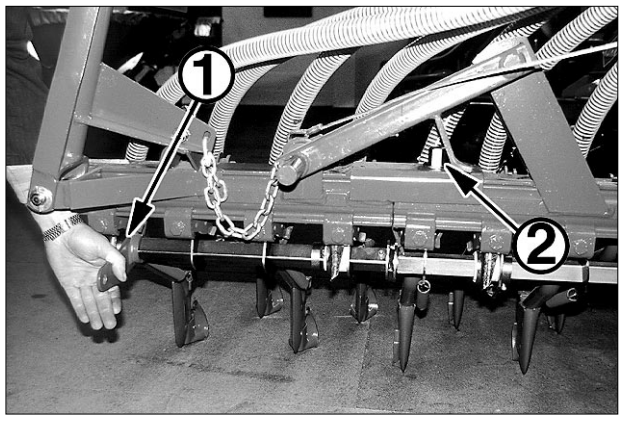


Fig. 4-17
Locking the DL's manually folding coulter bars

Now lower the seed drill and carry out the following preparatory work:

1. Lift off the lamp holders and warning signs and disconnect them from their respective supply leads.
2. Couple up the p.t.o. shaft and set it to the correct speed.
3. Extend the track markers (and/or pre-emergence markers) and secure them in the required position.

Never stand underneath a raised track marker.

4. Fill the seed hopper with seed

Do not use the hopper access steps or the platform as steps or footholds. Beware of obstacles (coulters, covering tines etc.).

Are there no foreign bodies or other kinds of seed in the seed hopper? Is the hopper trap-door closed? Is there no water in the manifold?

In the case of some types of seed (e.g. grass, rape) fill the seed hopper only up to the underside of the removable sieve to ensure a smoother flow of seed.

5. Set the track eradicators (max. depth 5 cm)
6. Swing the drive wheel (DA, DA-S, DE-S, DF1 and DG) into its operating position and secure it
7. Set the hectaremeter to zero
8. Fold up the hopper access steps
9. Fold out the S-type covering tines, if required
10. Couple the seed drill to the hydraulic system and open the taps, if required
11. Couple up the FGS, ESC or ESA systems, if fitted.

Operating the track marker

Track marker with hydraulic changeover mechanism for single-action control valve

The track markers are operated from the tractor seat by means of a single-action control valve.

1. Disengage the transport safety device on the track markers.
2. Switch the control valve to “raise” until both track marker arms are raised.
3. Switch the single-action control valve to “lower”; one track marker arm will be lowered. In order to change the operating position repeat steps 2 and 3.

Hydraulic folding track markers

The track markers are operated from the tractor seat by means of a single-action control valve.

Put the track markers in their operating position.

1. Switch the single-action control valve to “lift” until the track marker’s hydraulic cylinders have been filled with oil. This will prevent the track markers opening out by themselves during step 2.
2. Put the single-action control valve in “Neutral” and disengage the transport safety device on the track markers.
3. Switch the single-action control valve to “lower”; one of the two track markers will be lowered.

No persons may be allowed to stand within the working area of the track markers.

Changing the operating position

4. Switch the single-action control valve to “lift” until the track marker which is in its operating position is folded up as far as it can go. The control block will thus automatically be switched to the other track marker.
5. Switch the single-action control valve to “lower”; the other track marker, which will still be folded up, will now be lowered into its operating position.

Transporting the seed drill on the road:

6. Fold up the track markers and put the single-action control valve in “neutral”.
7. Secure the track markers with the transport lock.

Checking the sowing operation

The operation of the seed drill should be checked carefully in order to ensure perfect sowing. Check operation after only a few metres of forward travel and also at regular intervals if you are sowing relatively large areas of the field.

1. Are the seed delivery hoses sagging?
2. Is the sowing depth and the coverage of the seed adequate? (Compare front and rear rows of coulters).
3. Are the coulters drilling the calibrated quantities of seed (particularly when sowing fine seed?)
4. Does the seed flow freely through the solenoid valves?
5. Are the coulters blocked?
6. Are the coulters being obstructed by plant residues etc.?
7. Have the track markers and the track eradicators been set properly?
8. Are the solenoid valves switching correctly (tramlines)?
9. Are the solenoid valves firmly seated on the distributor?
10. Does the p.t.o. shaft speed remain constant during the sowing operation?
11. Is the seed (esp. glumaceous seed) in the seed hopper prone to bridging?
12. Does the drive wheel rotate smoothly and evenly?

If you have been forced to stop in the middle of the field on account of a blockage or similar malfunction:

- Prior to continuing raise the seed drill.
- Move it backwards by a distance of approximately 1 metre (with DG models by 2 metres and with the DF1 and DF2 models by approximately 3 metres). This will ensure that no patches are left unsown.
- Adjust the position of the tramlining control system if you have raised the track markers.

Adapting forward speed - maintaining p.t.o. shaft speed

Forward speed may be anything between 5 and 12 k.p.h. depending on the type of soil and the way it has been prepared for sowing. The speed must be reduced if ground conditions are difficult. If the soil is loose and your speed is too high, the rows sown by the front coulters will be covered with too much soil by the rear coulters. In such cases it is necessary to lengthen the chain links on the front coulters and reduce forward speed.

The p.t.o. shaft must operate at a constant speed. Speeds below the minimum speed may adversely affect the distributing accuracy of the seed drill. The seed delivery tubes may also become blocked in cases where the seed drill is operating at a high seed rate.

The DA-S and DE-S seed drills are equipped with a centrifugal clutch. They may be operated only with a 1000 r.p.m. drive. The speed of the p.t.o. shaft must be **at least 650 r.p.m** so that the torque is transferred properly.

A seed drill with a 540 r.p.m. drive must not be operated with a 1000 r.p.m. power take-off shaft at a correspondingly lower speed. This may cause damage to the fan.

Turning with the seed drill - preventing patches

Just before reaching the edge of the field or headland, raise the seed drill clear of the ground whilst still moving forward and reduce engine speed.

After turning, move the seed drill at corresponding engine and p.t.o. shaft speeds before the point at which sowing is intended to commence:

- DL; DT; DA; DA-S; DE-S; DC; DV: approx. **1 metre;**
- DG: **approx. 2 metres**
- DF1 and DF2: approx. **3 metres.**

You will prevent patches by doing this as the seed needs a little time to make its way from the metering device to the coulters.

After sowing

Emptying seed hopper and metering device

Make sure that the tractor is standing on firm, level ground and then lower the seed drill. Secure the tractor in such a way that it cannot roll forwards or backwards. Switch off the tractor engine and the p.t.o. shaft.

After sowing, the seed hopper and the metering device must be completely emptied:

1. Remove the square shaft of the electrically operated seed rate adjustment mechanism if this is preventing the opening of the hopper trap-door.
2. If there is still a large quantity of seed left in the hopper, this can be discharged in small portions at a time by way of the rotary slide valve on the hopper trap-door (see fig. 4-7). If the seed hopper is almost empty, place a container underneath the hopper and then open the trap-door.
3. Turn the cell wheel with the calibrating handle in order to remove the last of the seed.
4. It may be necessary to use a brush to remove contaminants and deposits.

Leave the hopper trap-door open (see fig. 4-18) in order to avoid possible damage by rodents.

Fig. 4-18
Emptying the seed

When hopper not in use

The seed drill must be laid upon firm, level ground.

- Make sure that it is properly supported by its support legs before uncoupling it from the tractor. It may be necessary to raise the track eradicators clear of the ground.
- The model DT is best left in its transport position.
- Folding type coulter bars should be opened out and secured with the support legs. This will prevent possible damage to the seed delivery hoses and also reduce the risk of accident.
- Unplug the hydraulic and electrical (FGS, ESC, ESA etc.) connections and then disconnect the p.t.o. shaft.

Refer to chapter “Uncoupling seed drill equipped with ESC” on p. 21-26. Take care to ensure that the contacts in the plug-and-socket connection do not get damaged or dirty.

Dressing seed

Pay heed to the dressing agent manufacturer’s safety instructions when working with treated seed.

Kverneland Soest recommends the use of seed treated with adhesives. Never dress the seed in the hopper mechanically or manually, as this cannot give adequate results and can endanger health. Do not use sticky dressing agents for fine seed (e.g. rape), as this would have an adverse effect on metering accuracy.

Special features of the DL

Special features of the DL

The DL is a tractor-mounted seed drill. Its design is described on p. 3-2.

- Check and tighten up the screw connections on a regular basis.
- For safety reasons the DL should be equipped with a hopper access step.

Adapting the track gauge

Before sowing, the track gauge of the seed drill must be adapted to the tractor track width:

1. Raise the seed drill slightly by means of the tractor's power lift system.
2. Unscrew the locking screws (fig. 5-1).
3. Move the seed drill wheel
   possible track gauges: 1.65 - 2.10 metres with 7.00 - 12 AS tyres;
   1.68 - 2.13 metres with 26 x 12.00 tyres.
4. Screw the locking screws back in.

Fig. 5-1
Locking screws for adapting the track gauge of the DL

Setting the track eradicators

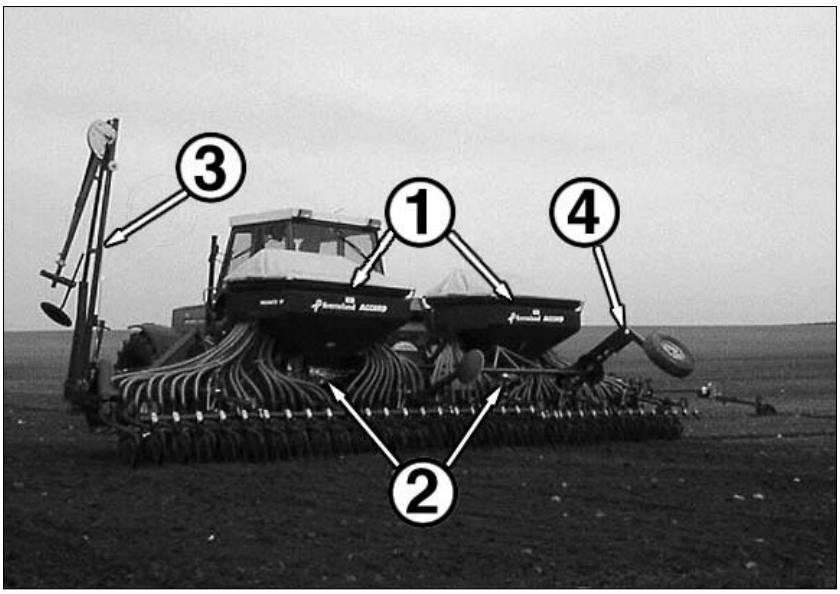
The four track eradicators are bolted onto the coulter bar. Once the track gauge has been adapted, fit the track eradicators in such a way that they run along the outer edges of the tractor track. Set the track eradicators to as shallow a depth as possible (max. 5 cm).

Special features of the DT

Special features of the DT

Constructional features

The DT is a tractor-mounted seed drill designed for large working widths. It has two seed hoppers and an integrated transport device.



1 two seed hoppers
2 two metering devices
3 two hydraulic folding track markers
4 integrated transport device

Fig. 6-1 The DT seed drill with a working width of 8 metres.

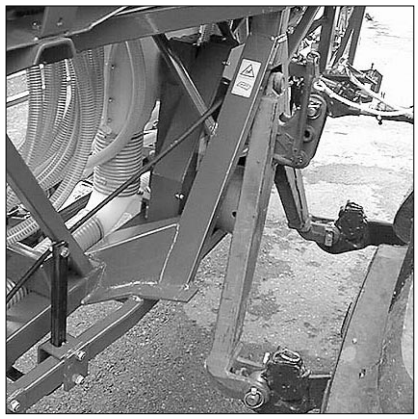
- Check and tighten up the screw connections on a regular basis.
- For safety reasons the DT should be equipped with a hopper access step.

Converting from transport position to operating position

Do not exceed a speed of 25 k.p.h. when transporting your seed drill on the road. Also make sure that the seed hoppers are empty before transporting your seed drill.

DT models with a working width of up to 6 metres

1. Uncouple machine.



2. Couple up machine in working position and then lift it.

3. Unlock and remove right transport wheel

4. Unlock and remove left transport wheel.

5. Unlock wheel axle, lift it up, then lock it again.

6. Unlock and remove drawbar.

7. Insert wheels on both sides and then lock them in place

8. Connect the drive shaft with the chain box and secure it in place with the spring pin.

DT seed drills with CX coulters and press wheels:
In order to avoid damage when transporting the seed drill on the road, turn forward those press wheels on the long coulters in the area of the transport wheel (see p. 24-26).

DT models with a working width of more than 6 metres

In order to prevent the transport wheels being damaged when coupling machines with working widths of 8 and 9 metres in operating position, Kverneland Soest recommends the use of a hydraulic primary top link.

1. Put the parking leg on the transport tow linkage in its lowest position.
2. Uncouple the machine.

3. Couple the machine in its working position and then lift it. Secure the tractor triangle's locking pawl in place by using the spring pin.

4. Move the right transport wheel to the upper position and lock it in place with the bolt.

5. Remove the brace on the left transport wheel, lift the wheel up and lock the brace back in place with the bolt.

6. Move the parking leg on the transport tow linkage to the upper position.
7. Move the transport tow linkage back and lock it in place again with the bolt.

Always secure the bolts with spring pins.

DT seed drills with CX coulters and press wheels:
In order to avoid damage when transporting the seed drill on the road, turn forward those press wheels on the long coulters in the area of the transport wheel (see p. 24-26).

Setting the track eradicators

Four track eradicators (for the tractor tracks) are bolted to the frame and two (for the seed drill tracks) are bolted to the coulter bar.

Setting the track eradicators

- Depth: As shallow as possible (max. 5 cm)
- Setting in the wheel tracks:
  - along the outer edges of the tractor tracks;
  - in the middle of the seed drill tracks.

Calibrating with two metering devices

Read the chapter “Electronic seed drill control” if you wish to calibrate with the ESC's metering device monitoring system.

Observe the instructions in the chapter “Electronic seed drill drive” if your machine is equipped with the ESA.

For fine seed (e.g. rape) you must calibrate the two metering devices separately, as inaccuracies could otherwise occur. Proceed as described in the chapter “Calibrating” (p. 4-8).

The mechanical hectaremeter indicates only the area for one metering device.

When not in use

The seed drill must be laid upon firm, level ground.

The DT model seed drills with a working width of up to 6 metres can be left either in their transport position or in their operating position.

Fig. 6-2
6 metre DT laid up in transport position

If the DT (up to 6 metres) is to be laid up in its operating position, the support leg on the wheel axle must be lowered (see fig. 6-3) and secured in its vertical position with the bolt.

Fig. 6-3
Lowering the DT (6 metre) support leg to a vertical position.

Fig. 6-4
DT (6 metre) laid up in operating position.

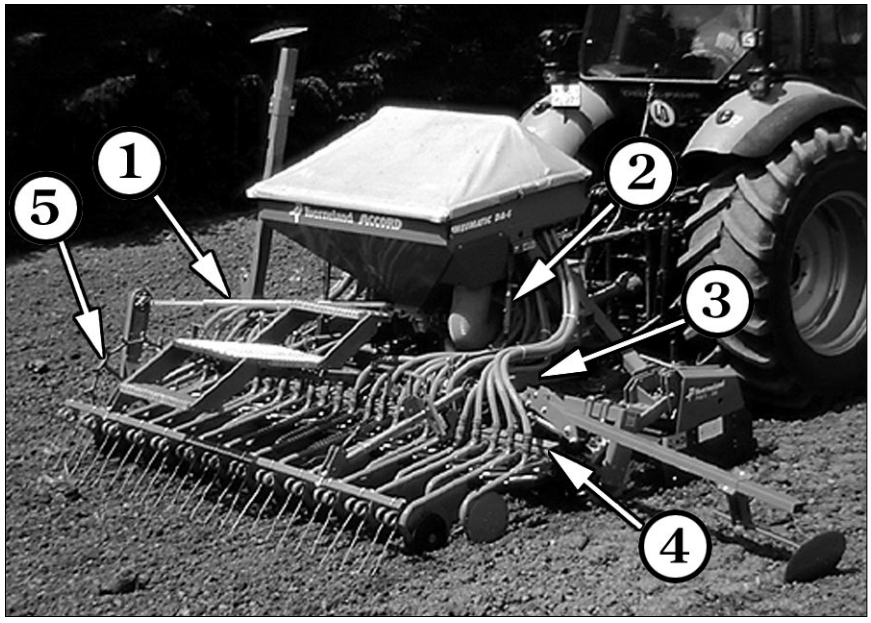
DT model seed > 6 m working width can be laid up only in transport position

Special features of the DA, DA-S

Special features of the DA, DA-S

Constructional features

The DA seed drill is a semi-mounted seed drill without its own travelling gear. With an integrated Accord implement triangle the seed drill can be mounted on almost all tillage implements.



1 Drive shaft
2 Turnbuckle, right-hand side
3 Parallelogram suspension
4 Coulter bar
5 Drive wheel

Fig. 7-1 The DA-S seed drill

- Check and tighten up screw connections on a regular basis.
- For safety reasons the DA, DA-S seed drills should be equipped with a hopper access step and an extension step or special third step.

Mounting seed drill on tillage equipment

Using the saddle triangle, the DA and DA-S seed drills can be mounted on almost all power harrows, cultivators and tine rotors. These machines must be equipped with a power take-off connection if the seed drill is to be operated mechanically.

Observe the manufacturer's mounting instructions in the case of special tillage equipment.

The p.t.o. shaft speed of the seed drill must match that of the tillage implement. The DA and DA-S seed drills are designed as standard for a speed o*f 1000 r.p.m*.

The maximum permissible angle of operation for the universal joint shaft on mounted seed drills must not be exceeded (see the operating instructions regarding the universal joint shaft.)

The speed of DA-S seed drills must be 1000 r.p.m. DA seed drills may run also at a speed of 540 r.p.m. There is a conversion kit for this (see p. 24-13).

The combined seed drill and tillage implement must be mounted on the tractor in such a way that the top link and the draft links are approximately parallel.

Mounting the seed drill on a power harrow

Before you can mount the seed drill on your power harrow, the latter must be fitted with the necessary saddle triangle by your dealer. You can then proceed to fit the necessary V-belt pulley to the power harrow's p.t.o shaft stub. This process will be described in the following pages.

The tractor and seed drill must stand on firm, level ground. The seed drill must be supported by means of the support legs. Make sure that you use a tractor with a power lift system which is adequately rated.

Removing the V-belt guard

Remove the V-belt guard prior to mounting the seed drill, as this is more difficult to do once the seed drill has been mounted (see fig. 7-2).

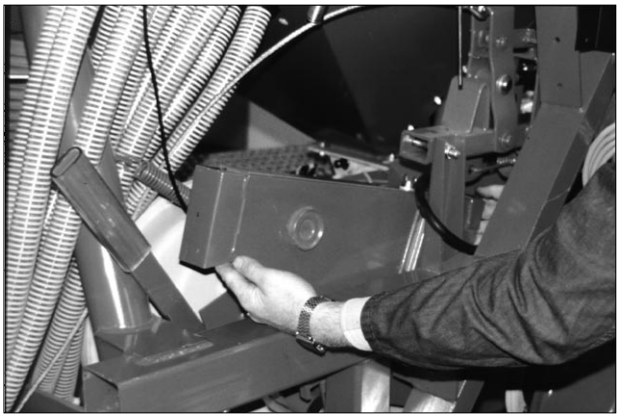


Fig. 7-2 Removing and fitting the V-belt guard on the DA and DA-S

Fitting the pulley flange

The pulley flange and V-belt pulley (plastic) may be used only in conjunction with a p.t.o. shaft which has a drive speed of 1000 r.p.m.

1 long screw
2 taper-lock sleeve
3 nut
4 pulley flange
5 bush
6 V-belt pulley
7 washer
8 short screw
9 p.t.o. shaft
10 gearbox

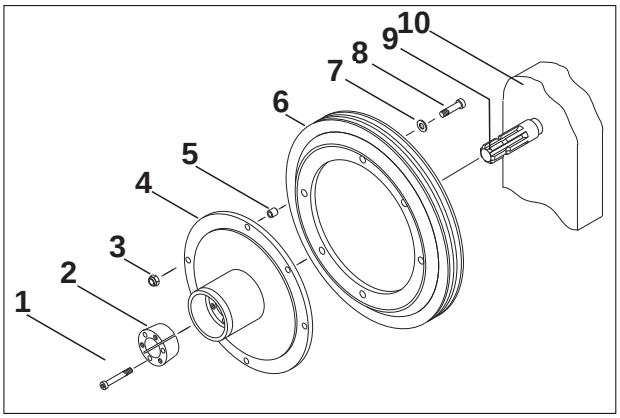


Fig. 7-3
Pulley flange components

1. Screw the V-belt pulley to the pulley flange, using the six short screws (washers, bushes) and tightening them securely. The following illustration shows four possible fitting positions.

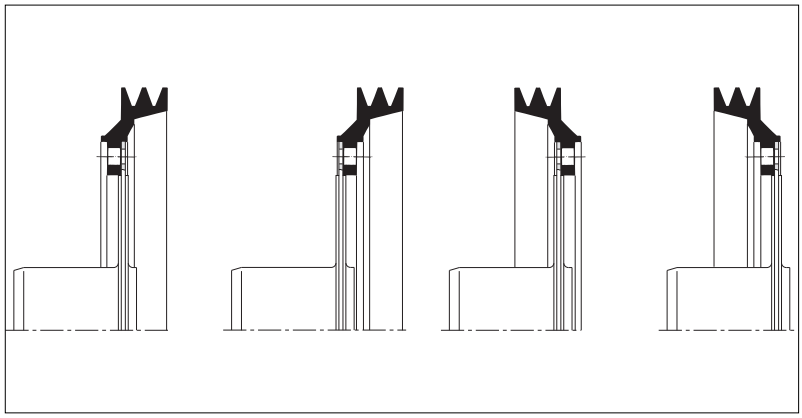


Fig 7-4 Four possible ways of fitting the V-belt pulley and the pulley flange

A further four fittings are possible by turning the pulley flange 180°. Select the position which gives a distance of exactly 137 mm between the rear pulley and the rear face of the saddle triangle (see fig. 7-5).

1 Saddle triangle

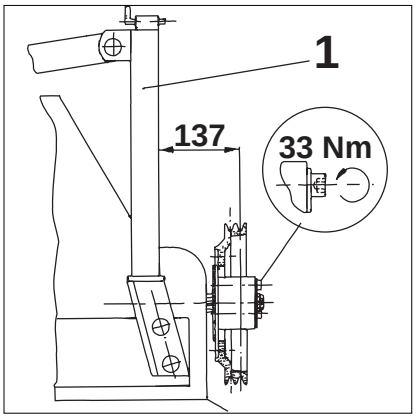


Fig. 7-5
Required distance between V-belt pulley and saddle triangle

The mating surfaces of the flange hub and the p.t.o shaft must overlap by a distance of at least *15 mm* (see fig. 7-6). The entire length of the taper-lock sleeve (2) must be on the mating surface of the p.t.o. shaft.

1 gearbox
2 taper-lock sleeve

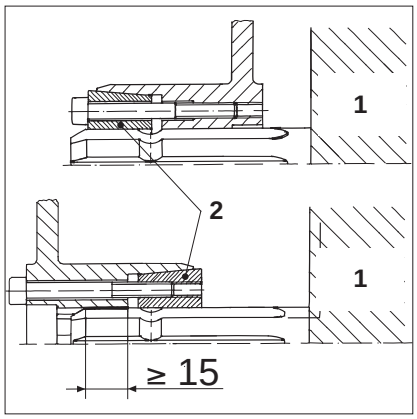


Fig. 7-6
Two possible ways of tightening the taper-lock sleeve

2. Mark the selected position on the p.t.o. shaft.
3. Slide the completely assembled pulley flange, V-belt pulley and taper-lock sleeve onto the marked p.t.o. shaft.
4. Tighten the three long screws, but only slightly.
5. Fit the V-belt and check the alignment (see p. 7-7). Now tighten the three long screws in alternating sequence with a torque of *33 Nm*.

Check the screws for tightness after a few hours' operation.

Coupling power harrow to the seed drill

No persons must be standing between the tractor, the power harrow and the seed drill during the manoeuvring and mounting operation.

6. Mount the power harrow on the tractor and then manoeuvre it slowly underneath the seed drill, making sure that it is positioned centrally.
7. Carefully raise the harrow until the triangular coupling bracket engages with the implement triangle. Check the safety lever (1; fig. 7-7) on the saddle triangle. This must be properly engaged.
8. Raise the support legs clear of the ground.

1 Safety lever

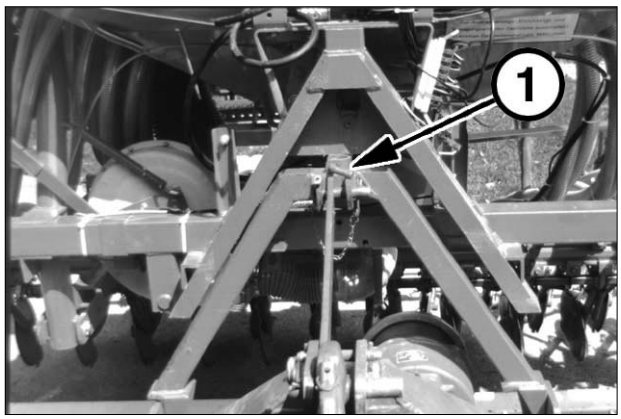


Fig. 7-7
Mounting the seed drill

Fitting and aligning the V-belt

Do not place your hand in the space between the pulley and the V-belt. Risk of injury!

9. Swing the fan towards the pulley and fit the V-belt. The fan must not rest against the stopper. If it does, change the length of the belt.

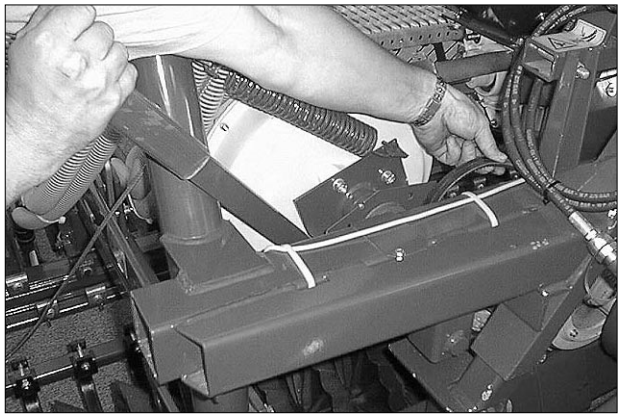


Fig.7-8
Fitting the V-belt on the DA and DA-S

Only proprietary SPZ-profiled V-belts may be used. Belts for a 540 r.p.m. drive must be of the raw-edged, moulded notched type.

Belts must be purchased and replaced in sets.

10. Check the alignment of the pulleys and their shafts. The maximum permissible displacement (not angular displacement) is *0.5 mm per 100 mm centre distance*. For example, displacement may not exceed 2.5 mm where the distance between the centres of the pulleys is 500 mm. The more accurate the alignment of the pulleys, the more smoothly the belt will run and the longer its service life will be.
11. Refit the V-belt guard (see p. 7-4). The V-belt guard must at all events be fitted, as the V-belt could otherwise be damaged through the ingress of dirt, dust and stones.

Mounting the seed drill on a tine rotor

In cases where the DA and DA-S seed drills are used with certain types of tine rotor, the parallelogram suspension is often not long enough to leave adequate space between the coulter bar and the packer roller. For such cases special parallelogram extensions are available.

Even in cases where parallelogram extensions are used, the seed delivery hoses are still long enough. The seed delivery hoses must hang taut if the coulters are resting on the lower stoppers.

Before you mount the seed drill on the tine rotor, read the chapter “Mounting the seed drill on a power harrow” (p. 7-3) and proceed in the manner and sequence described!.

DA-S seed drills permit even better adaptation of the coulter bar to the position of the packer roller. To do this, reposition and fasten the coulter bar fastenings (see 1, fig. 7-9) on the parallelogram.

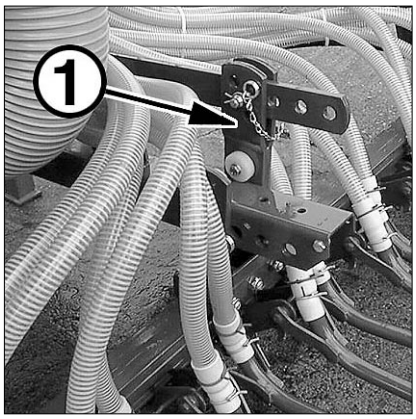


Fig. 7-9
Repositioning the coulter b ar on the DA-S

Adapt the length of the seed delivery tubes. They must not sag or kink (see p. 7-10).

Mounting the seed drill on an implement not driven from a p.t.o. shaft

Before you mount the seed drill, e.g. on a cultivator, read the chapter “Mounting the seed drill on a power harrow (p. 7-3) and proceed in the manner and sequence described!

The following steps are also necessary:

1. Bolt the bearing pedestal for the universal joint shaft onto the frame of the cultivator. It must be positioned centrally, underneath the implement headstock.
2. Couple the front side of the bearing pedestal to the tractor p.t.o. shaft.
3. Fit the reverse side with the pulley flange and V-belt pulley.

The universal joint shaft supplied may be extended to a maximum length of 850 mm. If this is too short, replacement shafts are available in lengths of up to 1455 mm.

If the space between the tractor and the seed drill is too large for the longest available shaft or the p.t.o. shaft’s angle of operation in operating position exceeds 20°, you will have to do something such as fitting an intermediate bearing to the cultivator.

Shortening the seed delivery hoses

The length of the parallelogram suspension arms can be readily adapted by means of the adjusting holes to the actual tillage implement on which the seed drill is mounted. After adjustment, shorten the hoses so that they hang taut. Make allowance for the fact that the bottom edge of the coulter bar must be positioned at a height of *30 - 35 cm* above the ground (see the section entitled “Setting the coulter bar in the field”).

1. Use a pair of pliers to slacken the upper hose clip and then pull the hose out of the hose union.
2. Use a knife to shorten the hose to the required length.

When cutting the hose you could injure yourself. The hoses are strengthened by using spirals made from tough material.

3. Reinsert the hose into the union and secure it by means of the hose clip (see fig. 7-10).

The hoses must be pushed into the hose unions as far as they will go!

The seed delivery hoses must hang taut if the coulters are resting on the lower stoppers.

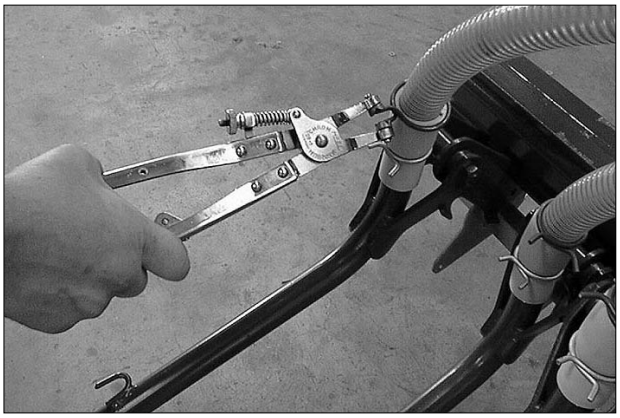


Fig. 7-10
Fitting the seed delivery hoses

Setting the coulter bar in the field

There must be adequate clearance between the coulter bar/parallelogram linkage and the packer roller.

With DA-S seed drills the coulter bar supports can be raised up to 4.5 metres if the packer rollers either have a diameter greater than 0.5 metres or if there is a stripper beam installed above the packer roller. This ensures adequate clearance between the parallelogram and the packer roller if the coulter bar levels have been set correctly.

An intermediate bearing with the the metering device drive's drive shaft is supplied with the extended supports.

- Adjust the coulter bar in a downwards direction by means of the turnbuckles until there is a clearance of *30 to 35 cm* between the bottom edge of the coulter bar and the ground. The coulters will not then be resting on the coulter stops during operation.

The ground clearance of the coulter bar will change in the event of any further adjustments being made to the tillage implement.

Seed drills with working widths of over 3 metres can also be equipped with a hydraulic coulter bar lifting device (optional extra). This enables independent operation of the tillage implement without any need to remove the seed drill. The coulters and the drive wheel are raised clear of the ground via the coulter bar.

Set the required coulter bar ground clearance (30 to 35 cm):

1 Chain for rough setting
2 Turn buckle for fine setting

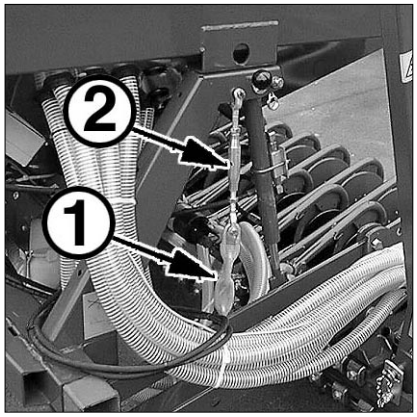


Fig. 7-11
Hydraulic coulter bar lift and setting coulter bar levels

Turning with the implement-mounted seed drill

1. When turning at the edge of the field, reduce engine speed and then raise the cultivating/sowing combination clear of the ground.
2. Switch off the p.t.o. shaft when the combination is half raised.
3. Repeat this switching operation when lowering the combination again after turning. The engine speed should not be increased to full speed until the combination has been fully lowered into its working position.

This avoids high inrush loads and reduces the strain on the fan drive. During operation always keep the p.t.o. shaft operating at its rated speed to ensure optimum seed delivery.

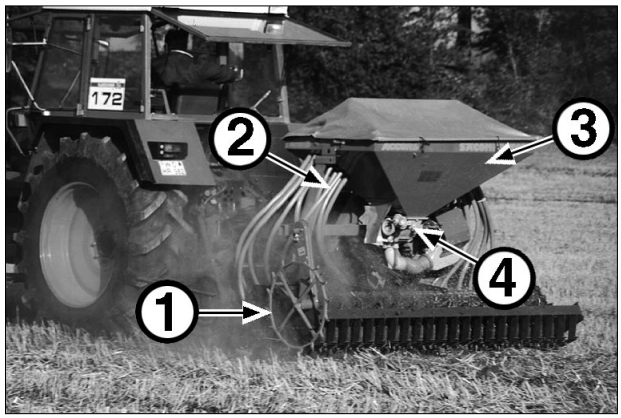
The DA-S and DE-S seed drills are equipped with a centrifugal clutch. They may be operated only with a 1000 r.p.m. drive. The speed of the p.t.o. shaft **must be at least 650 r.p.m.** so that the torque is transferred properly.

Special features of the DE-S

Special features of the DE-S

Constructional features

The DE-S is basically a DA-S without coulter bar, track marker and parallelogram and is designed for the sowing of cereals into the churned up soil before it settles. The ends of the hoses are without coulters.



1 Drive wheel
2 Hoses
3 Seed hopper
4 Metering device

Fig. 8-1 The DE-S seed drill

Check and tighten up the screw connections on a regular basis.

There is no hopper access step from Kverneland Soest for the DE-S. You will have to find your own way of safely accessing (for checking purposes) and filling the seed hopper.

Mounting seed drill on tillage equipment

Using the saddle triangle, the DE-S seed drills can be mounted on all power harrows, cultivators, tine rotors and rotary hoes. These machines must be equipped with a power take-off connection if the seed drill is to be operated mechanically.

The p.t.o. shaft speed of the seed drill must match that of the tillage implement.

The DE-S seed drill is designed as standard for a speed of *1000 r.p.m*.

The speed of DA-S seed drills must be 1000 r.p.m.

The combined seed drill and tillage implement must be mounted on the tractor in such a way that the top link and the draft links are approximately parallel.

Necessary assembly work after delivery

The DE-S seed drill is delivered to you or your dealer on a pallet. The seed delivery hose is supplied in a single coil. There are no support legs. Before the seed drill is mounted on the tillage implement, it is necessary to carry out the following assembly work:

1. The saddle triangle must be fitted to the tillage implement

Observe the manufacturer's mounting instructions in the case of special tillage equipment!

2. The prescribed V-belt pulley must be fitted to the p.t.o. connection of the tillage implement (see p. 7-4)

Mounting the seed drill

Once you or your dealer have fitted the saddle triangle to the tillage implement, you can proceed to mount the seed drill:

1. Remove the V-belt drive (see p. 7-4).
2. Fit the pulley flange and the V-belt pulley (see p. 7-4).

Make sure that the seed drill is securely seated on the lifting equipment. Only use approved and secure stoppers!

3. Use the front loader or a crane to lift the seed drill onto the tillage implement.

When lowering the seed drill onto the tillage implement make sure nobody is under the seed drill or on the tillage implement.

4. Lower the seed drill onto the tillage implement. Make sure that the implement triangle of the seed drill engages properly with the triangular coupling bracket and is vertical to the ground.
5. Lock the implement triangle with the safety lever.
6. Fit and align the V-belt (see p. 7-7).
7. Refit the V-belt guard.

Fitting the hoses

The hoses can be made more flexible by immersing them in hot water. Greasing the rubber grommets in the seed hopper will facilitate insertion of the hoses.

The hose is supplied in one complete coil. To fit the hoses proceed as follows:

1. Put the complete (coiled) hose on the ground behind the machine.

Each hose is allocated a hole in the seed hopper and a connection piece on the distributor (see fig. 8-2). Follow this diagram when inserting the hoses in order to prevent clogging and to get an even seed distribution.

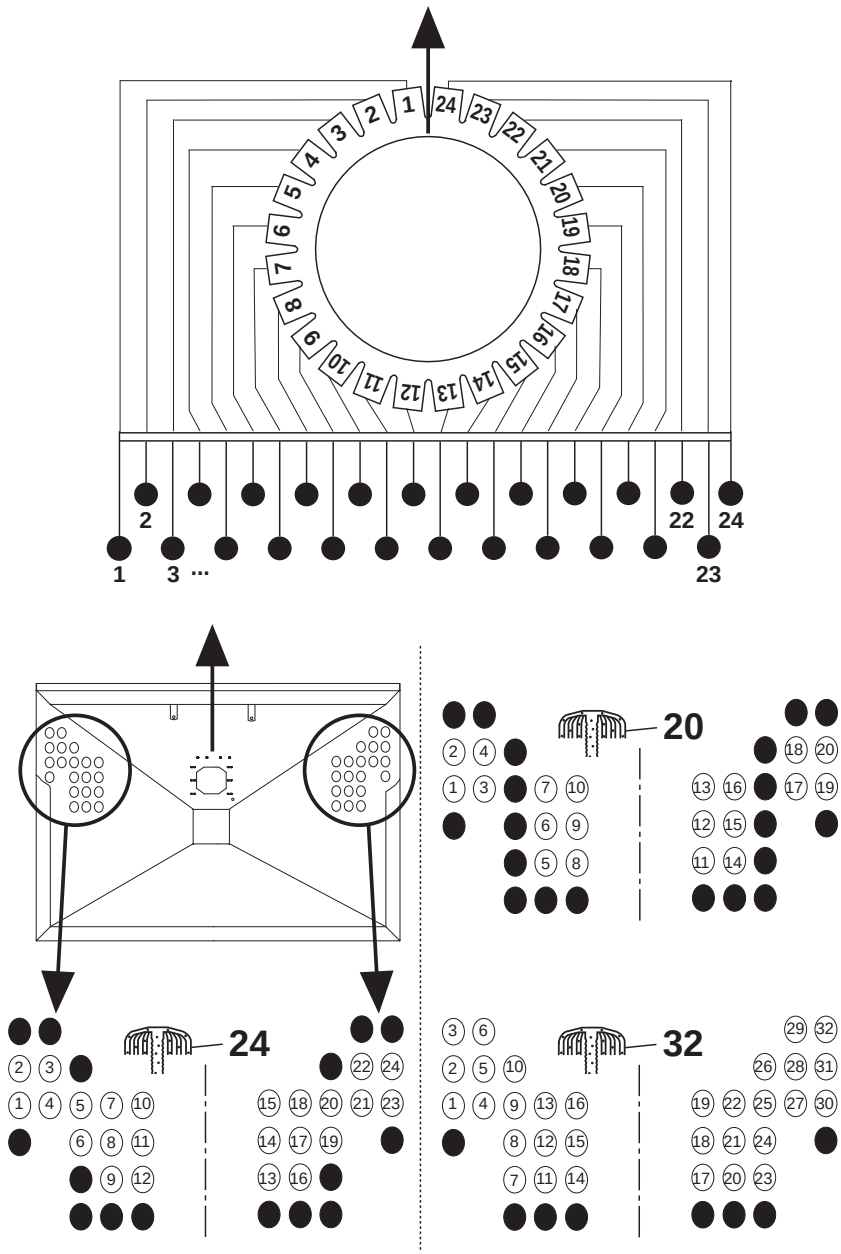


Fig. 8-2 Arrangement of the hoses: on a distributor for 24 coulters (top diagram); Inserting the hoses in the seed hopper (bottom diagram)

2. According to the relevant seed coulter pass one end of the hose through the rubber grommet in the seed hopper (see fig. 8-2).
3. Expand the end of the hose. Insert it in the distributor outlet (see fig. 8-2) and secure it with a hose clip.
4. Now cut the hoses to the required length.

The hoses must hang taut in order to avoid clogging. They must not sag or kink.

5. Secure the other hoses in the same manner.
6. Tie the hoses together by means of the enclosed cable ties.
7. Fit plastic sealing caps to all remaining holes in the seed hopper which are not fitted with hoses.

Fitting the drive wheel

You yourself must fit the support for the drive wheel and the drive shaft. Make sure there is sufficient swinging movement. It can be fitted either to the seed drill or to the tillage equipment, depending on your actual requirements. The permitted transport width (3 m) must not be exceeded when transporting the seed drill by road.

Turning with the implement-mounted seed drill

1. When turning at the edge of the field, reduce engine speed and then raise the cultivating/sowing combination clear of the ground.
2. Switch off the p.t.o. shaft when the combination is half raised.
3. Repeat this switching operation when lowering the combination again after turning. The engine speed should not be increased to full speed until the combination has been fully lowered into its working position.

This avoids high inrush loads and reduces the strain on the fan drive. During operation always keep the p.t.o. shaft operating at its rated speed in order to ensure optimum seed delivery.

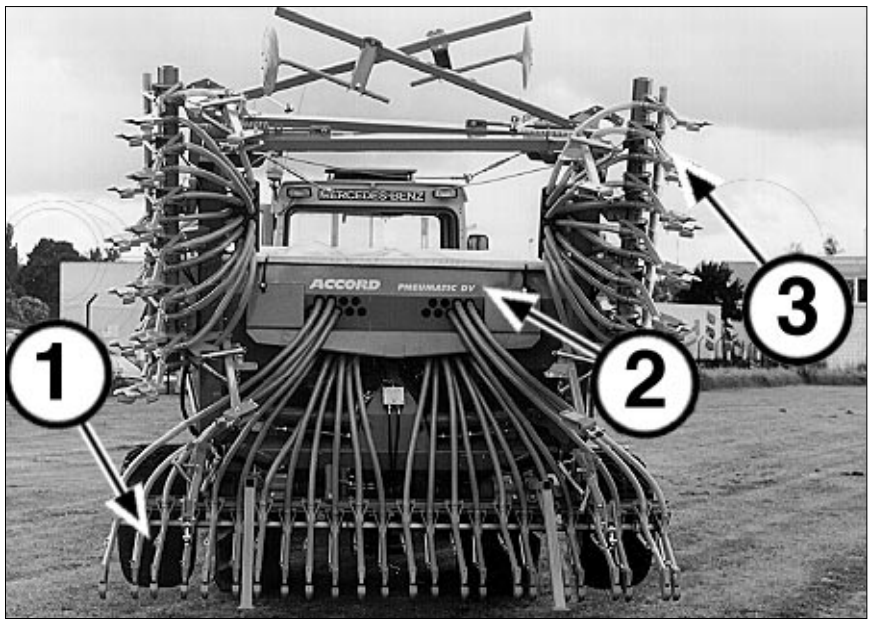
The DA-S and DE-S seed drills are equipped with a centrifugal clutch. They may be operated only with a 1000 r.p.m. drive. The speed of the p.t.o. shaft **must be at least 650 r.p.m.** so that the torque is transferred properly.

Special features of the DV

Special features of the DV

Constructional features

The DV seed drill is a tractor-mounted seed drill designed for large working widths and is equipped with a hydraulic folding coulter bar.



1 Drive wheel
2 Seed hopper with two overflow outlets, two metering devices, two diffuser tubes and two distributors
3 Hydraulically folding side section

Fig. 9-1 DV seed drill

- Check and tighten up the screw connections on a regular basis.
- Make sure that the hoses are not kinked during the opening-out or folding-up operations.
- For safety reasons the DV seed drills should be equipped with a hopper access step and an extension step.

Mounting instructions

The tractor and seed drill must stand on firm, level ground. When coupling the seed drill to the tractor, make sure that there are no persons standing between the tractor and the seed drill.

1. Couple the seed drill to the tractor via the three-point linkage or the tractor triangle.
2. The hydraulic lines for the track marker changeover mechanism should be coupled to one of the single-acting control valves of the tractor's hydraulic system.
   The lines for the hydraulic coulter bar folding system should be coupled to a double-acting control valve.

Required pressure for folding operation: 120 bar. The coulter bar will remain automatically locked in its open or closed position as long as the control valve is not actuated.

When transporting the seed drill on the road, lock the control valve in the tractor cabin in order to prevent the coulter bar from being opened out accidentally. In addition close the ball valve in the hydraulic hose.

When not in use

The seed drill must be laid upon firm, level ground.

Make sure that the seed drill is properly supported by its support legs before uncoupling it from the tractor.

If you want to leave the DV unused for a long time you must leave it in its opened-out state to prevent any possible damage to the hoses.

If you want to leave the seed drill laid up in its folded-up state for a short time you will have to fit the long support legs (1; fig. 9-2).

1 long support legs

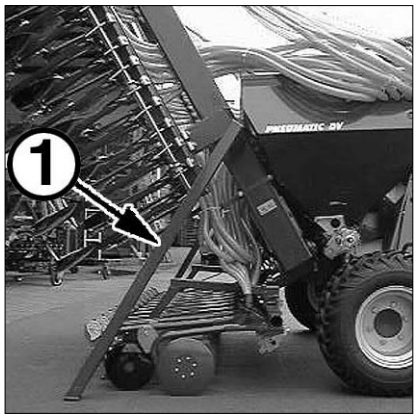


Fig. 9-2
The DV in its folded-up state

Special features of the DF1 und DF2

Special features of the DF1 and DF2

Check and tighten up screw connections on a regular basis.

Constructional features of the DF seed drill

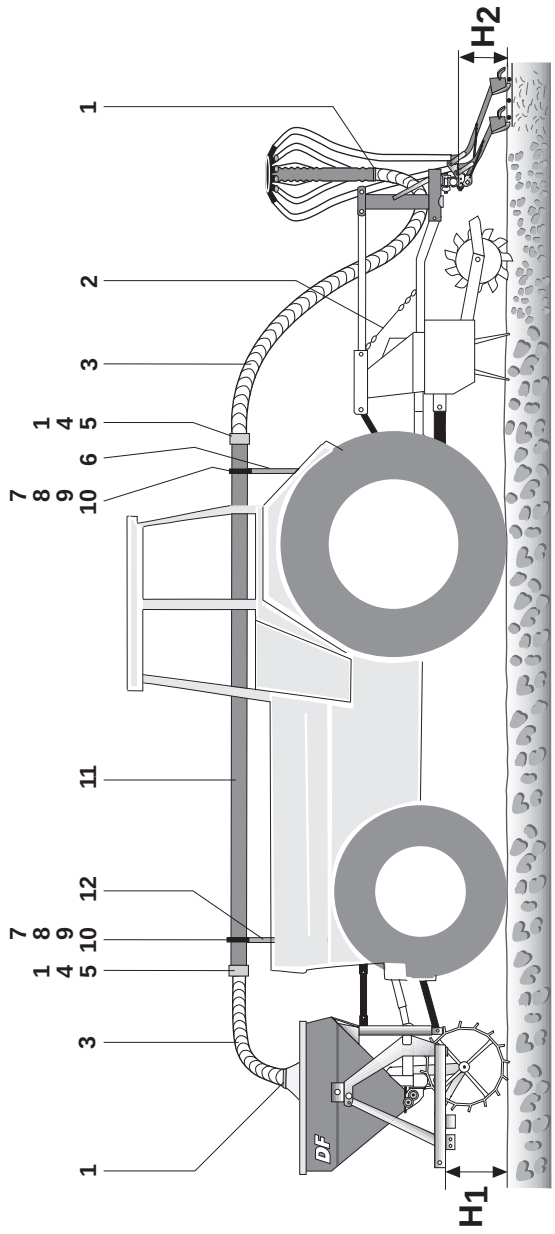
The DF seed drill is distinguished by the separate arrangement of the seed hopper and the coulter bar. The DF2 differs from the DF1 in that it has:

- two metering devices and two distributor systems
- larger working widths
- a larger hopper capacity
- a more powerful fan

The distance between the front end of the front-mounted implement and the centre of the tractor steering wheel must not exceed 3.5 m (Section 32 of German Vehicle Registration Regulations (STVZO)). You must also use appropriate aids when transporting the seed drill by road, e.g. mirrors, spotter.

Mounting instructions

The tractor, front seed hopper and coulter bar must stand on firm, level ground. The seed hopper and the coulter bar must be standing on their support legs.



1 hose clip
2 bracing, e.g. chain, turnbuckle
3 spiral hose (adjust length)
4 quick-release hose clip
5 quick-release coupling
6 supporting brackets (fitted by user)
7 pipe bracket half
8 hexagon screw M6x35
9 spring ring B6
10 hexagon nut M6
11 PVC-pipe (adjust length)
12 supporting bracket (fitted by user)
H_1 distance between front seed hopper and ground *at least 47.5 cm*
H_2 distance between coulter bar and ground *30 bis 35 cm*

Fig. 10-1 The DF1 seed drill

Fitting the front seed hopper and front PTO shaft

The following possibilities exist for coupling the front seed hopper:

- DF1 seed hopper: with the tractor triangle
- DF2 seed hopper: either with the three-point linkage or the tractor triangle

To couple the seed hopper directly to the tractor, the tractor must be equipped with a 1000 r.p.m. front p.t.o. shaft (with the DF1 540 r.p.m. is also a possibility) and a front power lift system.

During the coupling operation make sure that there are no persons standing between the tractor and the seed hopper.

When coupling with the tractor triangle observe the following:

- The locking pawl of the tractor triangle must be engaged.
- Set the primary top link so that the implement triangle is vertical.

Check to make sure the tractor triangle's safety lever is in the correct position. Lock it with a spring pin (see p. 4-3).

The fan drive is supplied as standard with a reversing gear. The front p.t.o. shaft of the tractor must rotate in an anticlockwise direction (looking forward from the end of the p.t.o. shaft). If this is not the case, your dealer must replace the reversing gear with a normal bearing pedestal.

After coupling, do the following:

1. Fit the universal joint shaft between the seed hopper and the tractor. If the shaft has to be shortened, proceed as described on page 4-4.
2. Raise the front seed hopper and remove the support legs.

3. With the coupling bracket exactly vertical, set the ground clearance H_1 (see fig. 10-1) to at least 47.5 cm. This ground clearance must be maintained at all times, for example by a chain which limits the downward movement of the front power lift.

If this ground clearance is not maintained, large stones etc. could cause damage to the underside of the seed hopper.

If you are also using a packer roller and are running it underneath the seed hopper, then the required ground clearance will be maintained automatically. Do not allow the tractor to apply any additional downward pressure to the seed hopper, as this will cause the packer roller to sink too deeply into the soil.

Fitting the coulter bar

The following possibilities exist for coupling the coulter bar:

- non-folding coulter bar: either with the three-point linkage or the tractor triangle
- folding coulter bar: with the three-point linkage only

During the coupling operation make sure that there are no persons standing between the tractor and coulter bar.

- When coupling, the locking pawl of the tractor triangle must be engaged.

Check to make sure the tractor triangle's safety lever is in the correct position. Lock it with a spring pin (see p. 4-3).

- Set the primary top link so that the implement triangle is vertical.

The three-point linkage required for mounting on a tillage implement will be delivered by the implement manufacturer.

After coupling, the following needs to be done:

1. The coulter bar must be raised slightly and the support legs removed.

2. The coulter bar must be supported by the tractor or tillage equipment at a height H_2 of 30 to 35 cm above the ground (see Fig. 10-1).

   A means of limiting the **downward movement of the coulter bar** should at all events be fitted **(e.g. a chain)**. Too low a coulter bar would make shallow sowing difficult; too high a coulter bar would restrict the swinging movement of the coulters.
3. With **folding coulter bars:** The lines for the hydraulic folding mechanism must be coupled up to a double-acting control valve on the tractor. The necessary operating pressure for the folding mechanism is **120 bar.**

The coulter bar will remain automatically locked in its open or closed position as long as the control valve is not actuated.

When transporting the seed drill on the road, lock the control valve in the tractor cabin in order to prevent the coulter bar from being opened out accidentally. In addition close the ball valve in the hydraulic hose.

Make sure that the hoses are not kinked during the opening-out or folding-up operations. If you want to leave folding coulter bars unused for a long time you must leave them opened out to prevent possible damage to the hoses.

If you want to leave the folding coulter bars folded up for a short time you will have to fit the long support legs (1; fig. 10-2).

1 long support legs

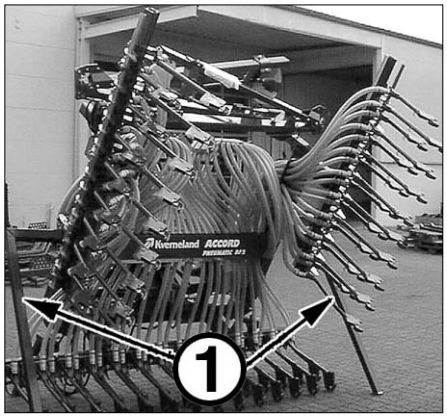


Fig. 10-2
Folded-up hydraulic folding coulter bars

Provided the DF1's working width does not exceed 3 metres and the DF2 's folding coulter bar is folded up, both are suitable for road transport. All other DF seed drills must be transported on a trailer!

Fitting the feed pipe and hoses

1. Fit supporting brackets of your own choice to the tractor (see fig. 10-1).
2. Fasten the PVC pipe to the supporting brackets by means of two pipe clamps. The PVC pipe must not have any gradient in the direction of seed delivery.
3. The length of the spiral hoses supplied with the seed drill must be adapted to the installed positions of the seed hopper and the coulter bar. Use a saw to cut the hoses to the required length.
4. Insert a quick-release coupling into the end of each hose and secure by means of a hose clip.
5. Attach the hose couplings to the ends of the PVC pipe and secure by means of the quick-release hose clip.
6. The other ends of the spiral hoses must be pushed onto the diffuser tube and hopper outlet tube respectively and secured by means of hose clips. Make sure that the spiral hoses do not sag or kink and that they cannot become trapped by any moving parts (e.g. when operating the power lift).

Coat the ends of the hoses on the inside with grease. They can then be fitted more easily.

The quick-release clips permit fast connection and disconnection of the spiral hoses.

Special features of the DF2 track marker

The DF2 coulter bars are equipped with hydraulically folding track markers. They must be coupled to a single-acting control valve.

Fit track marker bracing cable (non-folding DF2 only)

A bracing cable must be fitted to the long track marker arms of the DF2 (not the folding-type DF2) in order to ensure that they are not subjected to excessive strain during operation.

1. Fit the connecting lug (1, fig. 10-3) to the tillage implement. It must be positioned higher than the coulter bar so that the cable is slack when the track marker is raised out of its working position.
2. Attach one end of the cable (3) to the connecting lug (1) and the other end to the connecting lug (2) on the track marker arm, using the shackles provided. The bracing cable must not impede the track marker during operation.

1 Connecting lug
2 Connecting lug
3 Cable

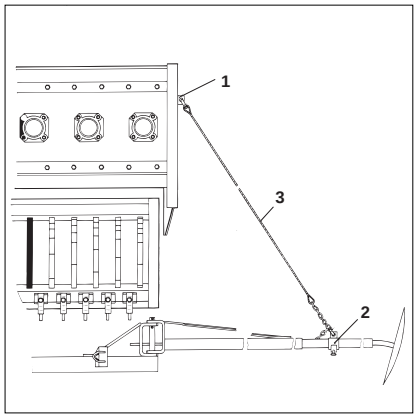


Fig. 10-3
Track marker bracing cable

DF2 track marker (DF2 with folding coulter bar)

The hydraulic gull wing markers are suitable for both track and centre setting. See page 4-5 for calculating the track marker setting. Shorten the track marker arm if it collides with any other seed drill components after setting.

Set the track marker in such a way that, when the coulter bar is folded up, the max. permissible transport width is not exceeded.

Close the ball valve in the hydraulic hose when uncoupling the seed drill from the tractor.

Drilling

Calculating the seed rate

The maximum seed rate is dependent on the forward speed and working width of the seed drill. See fig. 10-4 for details. The graph tells you whether or not selected seed rates and forward speeds are possible.

- If coordinates intersect either **below** or **on** the boundary line for the respective working width, the selected rate is possible.
- If coordinates intersect **above** the boundary line, the selected seed rate and/or forward speed must be reduced until the point of intersection is below the boundary line.

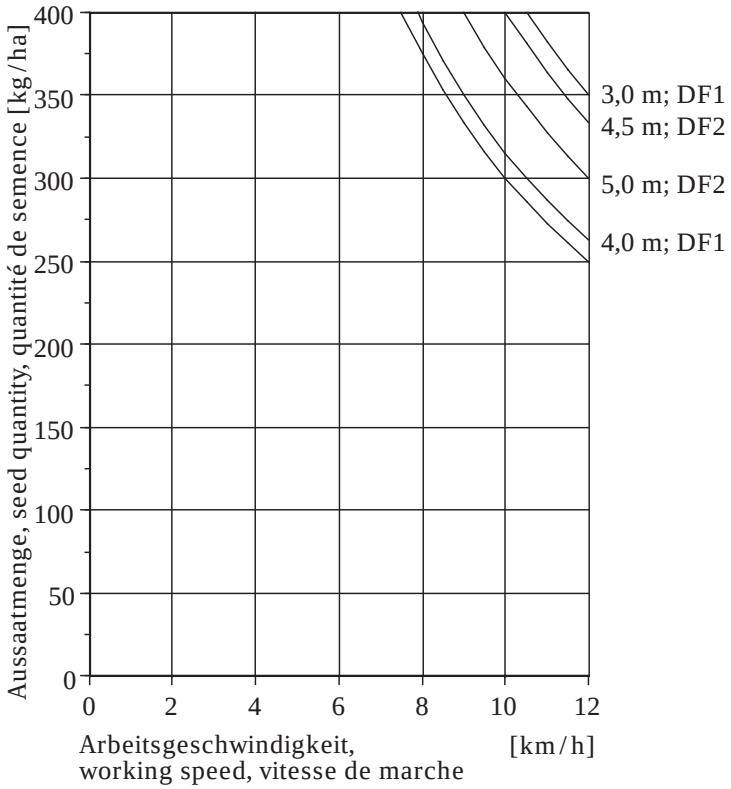


Fig. 10-4 Graph showing max. possible seed rates for DF seed drills

The following formulae will enable you to calculate the seed rate exactly:

DF1: $\text{kg/hectare} = \frac{12600}{V \times B}$ DF2: $\text{kg/hectare} = \frac{18000}{V \times B}$

where

V = forward speed [k.p.h]; B = working width [metres]
12600 and 18000 are constants.

The figures calculated with the aid of the above formulae represent the maximum seed rates possible with the respective seed drills. Higher seed rates cannot be handled by the fan and will cause clogging of the venturi cone. In the case of the D2, each of the two metering devices must be set according to the calibration chart on page 4-9. See also the chapter "Calibrating with two metering devices" on page 6-7.

The butterfly valves on the DF seed drills must remain open, even when sowing fine seed (DF1: position N, DF2: position 5 or "open") if the overall length of the spiral hoses and PVC pipe (items 3 and 11 in fig. 10-1) exceeds 5 metres. Otherwise close the butterfly valve when sowing fine seed.

Always drive at full p.t.o shaft speed. A slower speed may cause clogging of the system.

Selecting the gear ratio

The gear ratio for drilling applications must be selected according to the working width of the seed drill (see Table 10-1). The article numbers are given in the replacement parts list.

Table 10-1 DF gear ratio for drilling applications

	DF1			DF2		
Working width [m]	2.5	3	4	4.5	5	6
Chain wheel (top)	25	21	17	28	25	21
Chain wheel bottom	12	12	13	12	12	12

Fertilising

The changes which have been made to the DF seed drill for fertilising applications are shown in fig. 10-6.

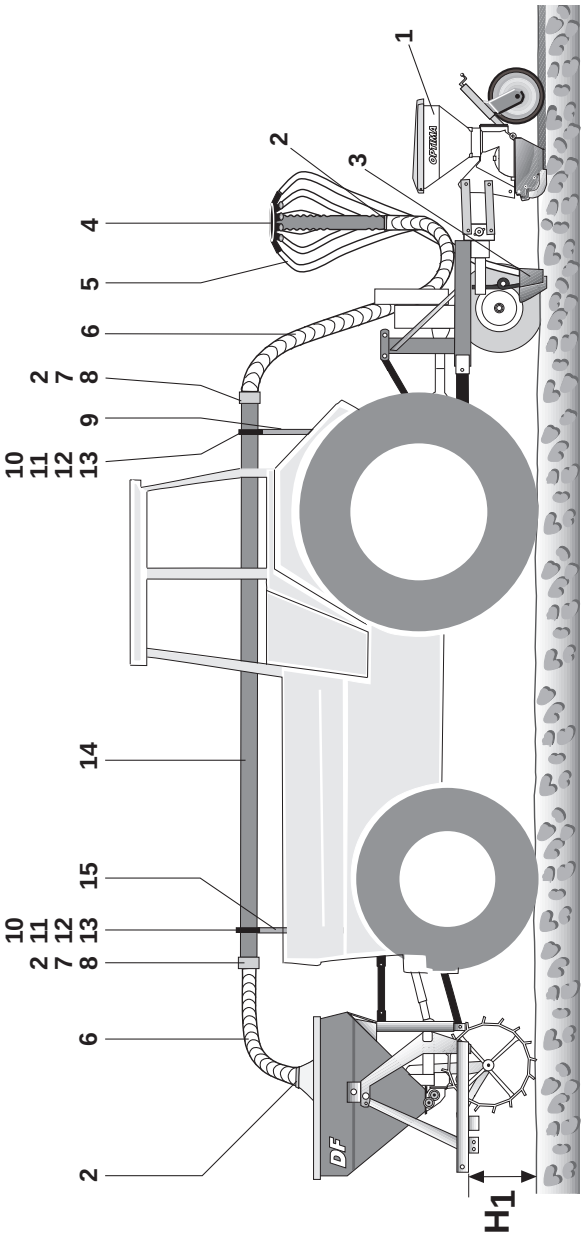
Fitting for fertilising

1. The fertiliser distribution head with hoses and diffuser tube must be mounted as centrally as possible on the single seed drill. In their operating position, the hoses must slope downwards, even when working on steep hillsides. Make sure the hoses cannot sag or kink and cannot be trapped by moving parts.

The twelve-row fertiliser system of the DF2 comprises two six-row fertiliser distributors.

Fig. 10-5
The DF1 seed drill with the Optima

2. Push the ends of the hoses onto the distributor and the fertiliser coulters and secure by means of hose clips. If the outer diameter of the tube on the fertiliser coulter is larger than the inner diameter of the hose, cut a V-shaped notch into the end of the hose and then push the hose onto the tube and secure it by means of a hose clip (see fig. 10-7).
3. Fit the front seed hopper, the front p.t.o. shaft and the feed pipe and hoses in exactly the same way as described on page 10-4.



1 single seed drill
2 hose clip
3 fertiliser coulter
4 fertiliser distributor (DF1: 6 or 8; DF2: 12 (row))
5 spiral hose, ø 55 mm
6 spiral hose (adjust length)
7 quick-release hose clip
8 quick-release coupling
9 supporting brackets (fitted by user)
10 pipe bracket half
11 hexagon screw M6x35
12 spring ring B6
13 hexagon nut M6
14 PVC-pipe (adjust length)
15 supporting brackets (fitted by user)

Fig. 10-6 The DF1 seed drill converted or fertilising

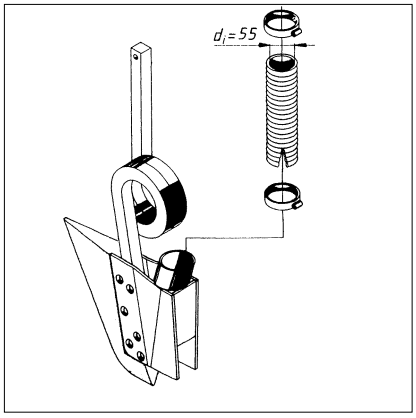


Fig. 10-7
Attaching the hose to the fertiliser coulter

Calibrating fertiliser delivery rate

The DF seed drill may be used only with nitrogenous/phosphatic fertilisers (not lime or potash). Otherwise components will corrode.

Prior to calibrating the delivery rate, check the metering device for wear. It is not advisable to use the same metering device both for fertilising and for the drilling of fine seed (e.g. rape), as the abrasive action of sharp-edged fertiliser granules can affect the accuracy of the metering device. We therefore recommend exchanging the metering device prior to calibrating. The metering device for fertilisers has a red shell.

The maximum fertiliser delivery rate (for nitrogenous/phosphatic fertilisers) is contingent on the forward speed and the working width of the seed drill. See the graph in fig. 10-8 for details. The explanation already given on page 10-4 tells you how to use the graph.

The following formulae will enable you to calculate the fertiliser delivery rate exactly:

$$\text{DF1:}\quad \text{kg/hectare} = \frac{12600}{V \times B} \qquad \text{DF2:}\quad \text{kg/hectare} = \frac{14100}{V \times B}$$

where V = forward speed [k.p.h]; B = working width [metres]
12600 and 14100 are constants.

The figures calculated with the aid of the above formulae represent the maximum fertiliser delivery rates possible with the respective seed drills. Higher delivery rates cannot be handled by the fan and will cause clogging of the venturi cone.

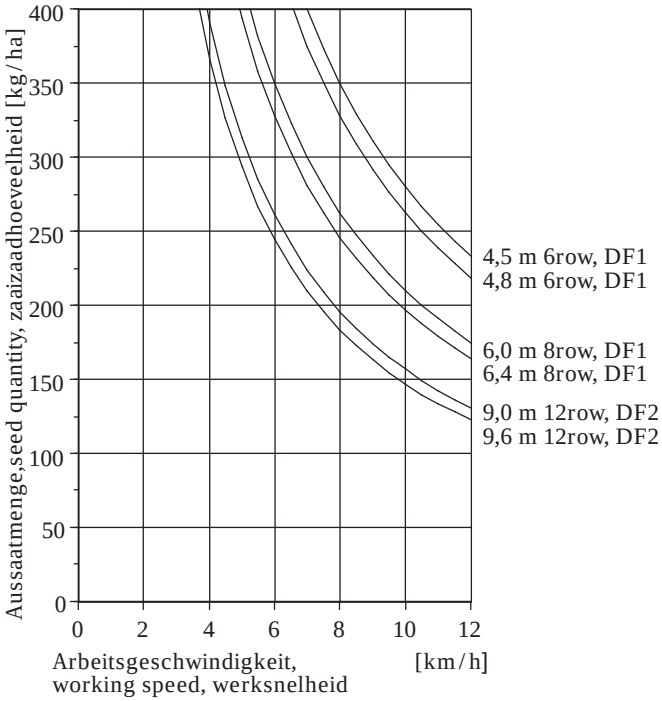


Fig. 10-8 Graph showing max. possible fertiliser delivery rates for DF seed drills.

- Open butterfly valve:
  DF1: position “N”; DF2: position 5 or “open”
- Set the red change-over switch to position N.

The delivery rate for nitrogenous/phosphatic fertiliser is set according to the following calibration chart (Table 10-2) for the DF1 and DF2. The metering device settings shown for diammonium phosphate can be used as a basic guide for other types of fertiliser. Your own settings obtained with other nitrogenous/phosphatic fertilisers can be entered in the table. The calibrating procedure is the same as that described for normal seed (see p. 4-10).

Table 10-2 Calibration chart (DF1 and DF2) for nitrogenous/phosphatic fertilisers (approximate values)

		Enter your own values for other types of fertiliser			
specific gravity [kg/dm^{-3}] / Fertiliser	Diammonium phosphat				
	1.03				
Setting	Normal seed kg/hectare (butterfly valve set to position N)				
10	39				
15	58				
20	77				
25	97				
30	116				
35	135				
40	155				
45	174				
50	193				
55	213				
60	232				
65	251				
70	270				
75	290				
80	309				
85	328				
90	348				
95	367				
100	386				
105	406				
110	425				

After calibrating, check the quantities delivered through each distributor outlet. If some outlets deliver more than others, turn the regulating plate on the fertiliser distributor (1, fig. 10-9) towards these outlets until delivery is uniform.

In the case of the DF2, which is equipped with two metering devices, each device must deliver the seed at the same desired rate, exactly in accordance with the settings given in the table. Remember that the readings shown by each hectaremeter correspond to the area covered by only half the width of the seed drill.

Make sure that the hoses do not sag or kink as this would cause a clogging of the delivery system.

1 Regulating plate

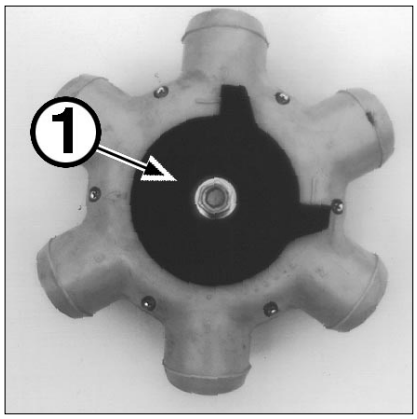


Fig. 10-9 Six-row fertiliser distribution head

Selecting the gear ratio

The gear ratio for fertilising applications must be selected according to the working width of the single seed drill (see table 10-3). The article numbers are given in the replacement parts list.

Table 10-3 DF gear ratio for fertilising applications

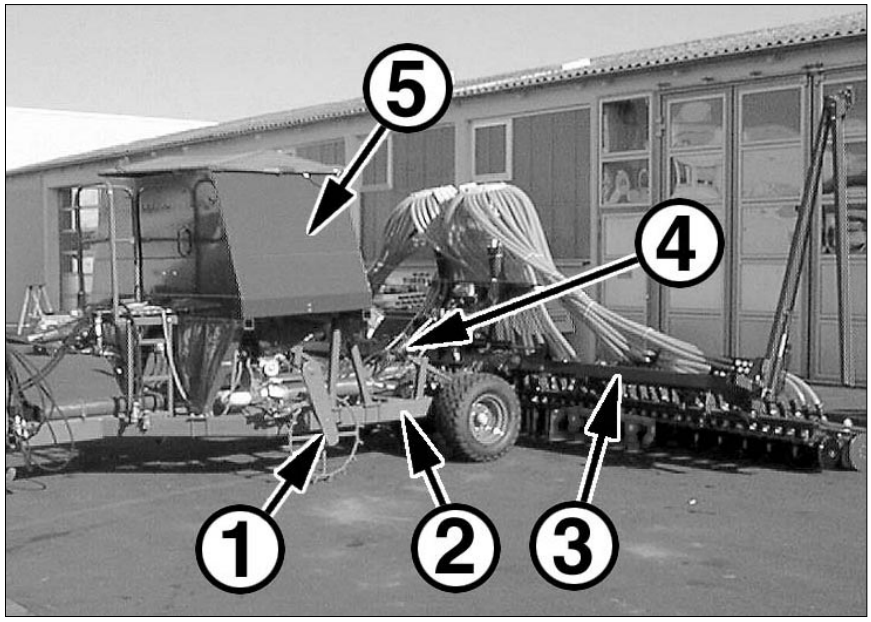
	DF1					DF2	
Working width [m]	4.5	4.8	5	6	6.4	9	9.6
Chain wheel (top)	15	12	12	13	12	15	12
Chain wheel (bottom)	13	11	12	15	15	13	11

Special features of the DG

Special features of the DG

Constructional features

The DG seed drill is a towed seed drill designed for large working widths and is equipped with a hydraulically folding coulter bar. The base frame with the large seed hopper has its own travelling gear with dual wide base tyres.



1 hydraulically liftable drive wheel
2 travelling gear
3 hydraulically folding side section
4 hydraulic primary top link
5 seed hopper

Fig. 11-1 DG seed drill

- Check and tighten up the screw connections on a regular basis.
- Make sure that the hoses are not kinked during the opening-out or folding-up operations.

Do not exceed a speed of 25 k.p.h. when transporting your seed drill on the road. Also make sure that the seed hoppers are empty before transporting your seed drill.

Mounting instructions

The tractor and seed drill must stand on firm, level ground. When coupling the seed drill to the tractor, make sure that there are no persons standing between the tractor and the seed drill.

1. Couple the seed drill to the tractor by means of the cross shaft on the power lift system's draft links (category 2). Secure the bolts with linch pins.
2. Couple the hydraulic connections:
   - operating the track marker: single-acting control valve,
   - hydraulic primary top link and drive wheel lift: double-acting control valve
   - folding the coulter bar hydraulically: double-acting control valve.

The coulter bar may be opened out and folded up only in its raised state.

Required pressure for folding operation: 120 bar. The coulter bar will remain automatically locked in its open or closed position as long as the control valve is not actuated.

When transporting the seed drill on the road, lock the control valves and the hydraulic primary top link in the tractor cabin in order to prevent the coulter bar from being opened out or lowered accidentally. In addition close the ball valves in the hydraulic hoses.

3. Couple up the brake's hydraulic or pneumatic connections.

4. Fit lights.
5. Raise the machine slightly by means of the power lift system.
6. Unlock the parking leg on the drawbar, reposition it and then lock it in its working position.

Setting the coulter bar in the field

Set the power lift system so that if the primary top link is in an extended position, the bottom edge of the coulter bar is positioned at a height of 30 - 35 cm above the ground. The frame must be parallel to the ground.

Turning with the towed seed drill

1. Reduce engine speed when turning at the edge of the field.
2. Switch the control valve which changes the track markers to “lift” until both track marker arms are folded up.
3. Lift the drive wheel and coulter bar by means of the control valve. The drive wheel will be raised first, then the coulter bar.

After turning proceed in the reverse order.

When not in use

The seed drill must be laid upon firm, level ground.

If you want to leave the DG unused for a long time you must leave it in its opened-out state to prevent any possible damage to the hoses.

Do the following before you uncouple the machine:

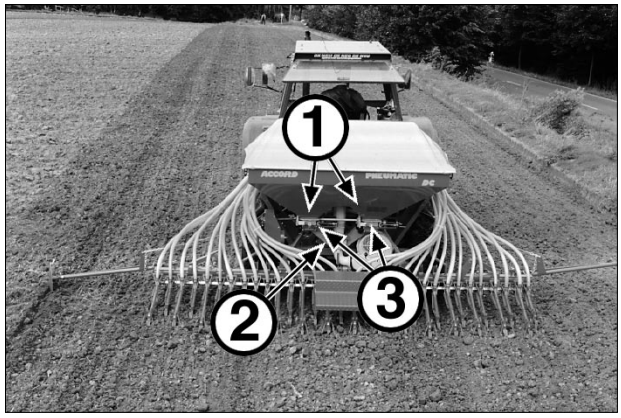
- open out the coulter bar
- Secure the machine in such a way that it cannot roll forwards or backwards. Use the wheel chocks and apply the brake with the calibrating handle.
- lower the parking leg and lock it in place.
- remove electric, hydraulic and pneumatic connections

Special features of the DC

Special features of the DC

Constructional features of seed drill

With the DC (Combine Drill) has been created the possibility to pneumatically sow and apply fertiliser in one process or to sow two different types of seed simultaneously.



1 Separated hopper
2 Delivery chute
3 Two metering devices

Fig. 19-1 The DC seed drill

Operation

Fertiliser and seed or seeds A and B are filled next to each other into the hopper spaciously separated. The bigger left half (in driving direction) is to be used for fertiliser. One metering device is fitted under each hopper half, which lead fertiliser and seed to a common delivery tube.

From there the transport is made by the airstream, mixing fertiliser and seed, distributing them evenly to the individual coulters and depositing them in the seed furrow.

Possibilities for operation

1. Seed and fertiliser

Fertiliser may only be metered with the left hand (in driving direction) metering device!

Quality of fertiliser: granulated and crystalline Phosphate and potash sown in combination with the seed can improve crop establishment on certain soil types, however nitrogenious fertiliser can cause germination damage.

2. Different seeds

The hopper sieve for fertiliser has to be exchanged against the one for seed. This sieve is delivered extra with the machine.

3. Equal seeds

Rape should be drilled only with one metering device in order to obtain the largest possible cell volume.

Seed quantity, Calibrating

Each metering device is appropriate for the total working width of the machine and meters according to the calibration chart on page 4-9.

If only one type of seed is sown with both metering devices, the calibration of the metering devices has to be divided, as otherwise double the quantity per hectare would be drilled.

Examples for seed quantity calibration

- Fertiliser and seed:
  requested: 213 kg/hectare Diammoniumphosphate,
  140 hg/hectare wheat.
  calibration of left hand metering device for fertiliser: position 55 according to calibration chart (page 19-4)
  calibration of right hand metering device for seed: position 40 according to calibration chart (page 4-9)
- One type of seed with both metering devices:
  requested: 200 kg/hectare rye
  calibration: 100 kg/hectare for each metering device; calibration position for both metering devices: position 30 according to calibration chart (page 4-9)

Maximum application rate of fertiliser and seed together: approx. 630 kg/hectare at forward speed of 10 km/h.

Table 19-1 Calibration chart (DC) for fertilisers (approximate values)

		Enter your own values for other types of fertiliser			
Fertiliser / Specific gravity [kg/dm3]	Diammonium phosphate				
	1,03				
Setting	Normal seed kg/hectare (butterfly valve set to position N)				
10	39				
15	58				
20	77				
25	97				
30	116				
35	135				
40	155				
45	174				
50	193				
55	213				
60	232				
65	251				
70	270				
75	290				
80	309				
85	328				
90	348				
95	367				
100	386				
105	406				
110	425				

Additional directions

- regularly check the delivery chute between the left hand metering device and the venturi cone whether fertiliser granules have deposited there. Clean if required.
- A carefully cleaning of the DC seed drill is recommended after operation. Remainders of fertiliser and residues, which remain in the hopper for a longer time, can build deposits and incrustrations which affect the operation and function of the metering system or even destroy it.
- A machine which was cleaned with water should only be operated again with dry metering system.
- It is not advisable to use the same metering device both for fertilising and for the drilling of fine seed (e.g. rape), as the abrasive action of sharp-edged fertiliser granules can affect the accuracy of the metering device. We therefore recommend exchanging the metering device prior to calibrating. The metering device for fertilisers has a red shell.
- If necessary, remove the air injection tubes when sowing fine seeds.

Space for your own notes

Electronic tramlining control system (FGS)

Electronic tramlining control system (FGS)

The electronic tramlining control is an accessory. Two types are available:

- Type A for tramlining rhythms 4 - 9
- Type B for tramlining rhythms 3; 4S; 5; 6S; 7; 8S

Both types feature the same mode of operation.

Safety

The electronic tramlining control (FGS) is intended for use with only DL, DT, DA, DA-S, DE-S, DF1, DF2, DV, DC and DG seed drills. It may not be used for any purpose other than that for which it is intended.
Read chapter 2 (“Safety”) very carefully.

Component parts of the FGS electronic tramlining control

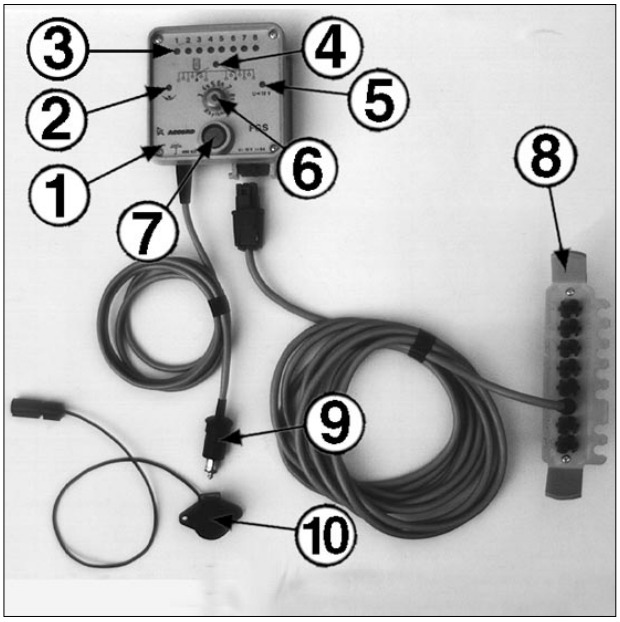


Fig. 20-1 Switch box and multiple socket (FGS Type A)

Switch box
2 Pilot lamp for hopper reserve gauge and V-belt monitoring system (DA and DA-S only)
3 Green pilot lamps for tramlining rhythm
4 Red pilot lamp for lights up during tramlining (solenoid valves are shut)
5 Rhythm 9 (Type A) or voltage monitor lamp (Type B)
6 Switch for rhythm selection
7 Pushbutton switch
8 Multiple socket
9 Round two-pole plug
10 12V socket

Installation

The illustration of the FGS electronic tramlining control in the replacement parts list shows how all the individual components are connected with one another.

1. Install the mounting plate in a readily visible and accessible position inside the driver's cabin. If the tractor does not have a cabin, fit the mounting plate in an inclined position.
2. Clip the switch box onto the mounting plate.

Always keep the switch box dry.

3. Insert the round two-pole plug into the 12V socket of the tractor. If there is no socket available on the tractor, install the 8A fused socket supplied.

If the socket is to be connected directly to the battery, connect the lead with the in-line fuse to the positive terminal of the battery and the external pole to the negative terminal. Make sure that the contacts are clean and tight.

4. Screw the multiple socket to one of the frame struts adjacent to the implement triangle.

Keep the socket protected against ingress of dirt and moisture, as this would adversely affect conductivity and eventually cause corrosion of the contacts.

5. Connect the multiple socket to the switch box by means of the connection lead supplied.
6. The individual units to be controlled by the electronic tramlining control system should now be connected to the multiple socket. The multiple socket has provision for the operation of four solenoid shut-off valves. If more than four shut-off valves are required, Y-pieces must be used. The fifth, sixth and seventh socket outlets are for the pre-emergence marker, the solenoid switch for the track markers and the hopper reserve gauge respectively.
7. Mount the solenoid switch on the hydraulic cylinder of the track marker changeover mechanism.
8. Attach the hopper reserve gauge to the diffuser tube by means of a pipe clamp. It must be fitted just below the corrugated section of the tube (see p. 24-23). Use two hopper reserve gauges on the DT, DF2, DV, DC and the DG.
9. Install the solenoid shut-off valves (see description on p. 24-16).
10. Connect the pre-emergence marker to the multiple socket. The socket on the end of the cable should be connected to the plug on the solenoid valve of the pre-emergence marker.

Description

The tramlining control system produces tramlining patterns for you. As soon as the track marker is lowered into its working position at the start of the sowing operation, the solenoid switch on the track marker changeover mechanism transmits a control impulse to the switch box which initiates the tramlining operation and ensures that it continues in accordance with the set rhythm. Tramlines are produced by closing the respective solenoid shut-off valves (red pilot lamp lights up).

The system can also monitor the level of the seed in the hopper and the voltage supply. When the hopper reserve gauge is connected to the control system, the pilot lamp will light up when the seed hopper is almost empty. In the case of the DA and DA-S seed drills with V-monitoring systems, the pilot lamp of the hopper reserve gauge will light up also if the V-belt develops a fault. The voltage lamp (Type B) lights up if the voltage supply is insufficient.

Operation

Check the connections of the FGS electronic tramlining control system at regular intervals.

Before you start the sowing operation, set the desired rhythm by means of the switch (see table 4-2 on page 4-16). Now depress the pushbutton switch repeatedly until you obtain the correct position for the start. As you continue to depress the pushbutton switch, the green lamps will light up consecutively, e.g. lamps 1, 2 and 3 when the control is set to tramlining rhythm 3. When lamp 2 lights up, the red pilot lamp in the middle will light up simultaneously, i.e. the solenoid shut-off valves cut off the supply of seed to the coulters.

Operate the track marker at the edge of the field, making sure it is lowered on the correct side. Now depress the pushbutton switch repeatedly until the first green lamp lights up.

The switching of the rhythm with the pushbutton only works if the track marker arms are folded out and the control valve for track markers is set to “lower”.

In the case of all odd-numbered and S-rhythms it does not matter whether you commence at the right-hand or left-hand edge of the field. Sowing with rhythms 4 and 8 on the other hand, must be commenced on the side of the field corresponding to the side of the seed drill on which the shut-off coulter with the solenoid shut-off valve is located. If rhythm 6 is selected, you must commence sowing on the left-hand edge of the field if the shut-off coulter is on the right-hand side of the seed drill.

Check before using for the first time:

- the required track gauge of the tramlines (see chapter “Tramlining” on page 4-14).
- the working of the solenoid shut-off valves (check air draught under each coulter; audible valve response).

Under certain circumstances the FGS electronic tramlining control system may switch to the next setting if the connection lead is unplugged from the switch box and then reinserted. It is therefore imperative to check and correct the tramline setting before recommencing operation.

Uncoupling the seed drill

Before you proceed to uncouple the seed drill from the tractor, unplug the FGS tramlining control system from the switch box and wind the connecting lead around the multiple socket. Take care to ensure that the plug cannot become damaged or dirty.

At the end of the sowing season, remove the switch box and store it in a safe and dry place.

Electronic seed drill control (ESC)

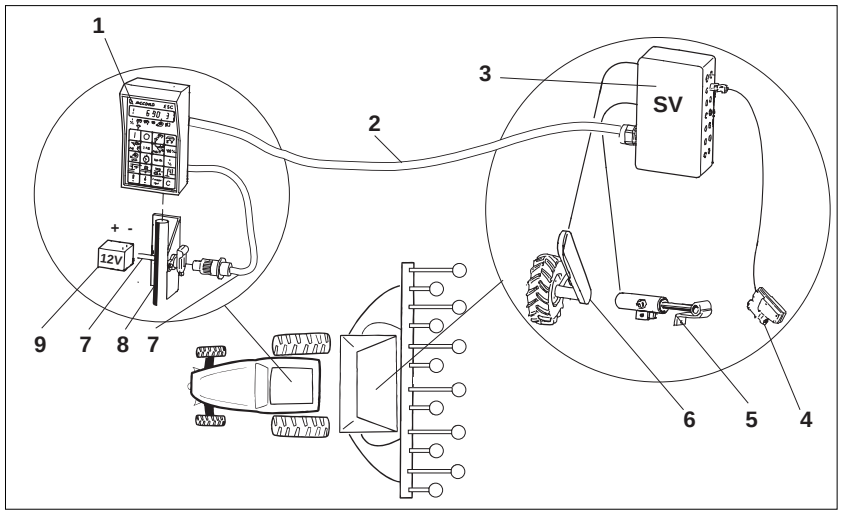
Electronic seed drill control

Safety

The electronic seed drill control (ESC) is intended for use with only DL, DT, DA, DA-S, DE-S, DF1, DF2, DV, DC and DG seed drills. It may not be used for any purpose other than that for which it is intended.
Read chapter 2 (“Safety”) very carefully.

Component parts of the ESC

The ESC consists essentially of the computer, the signal distribution box, the sensors and the actuators, see Fig. 21-1.



1 Computer
2 Connecting lead with plug
3 Signal distribution box (SV)
4 Solenoid shut-off valve
5 Track marker changeover mechanism with sensor
6 Drive wheel with sensor
7 Battery lead
8 Mounting bracket
9 Battery

Fig. 21-1 Basic layout of ESC with selected examples of actuators and sensors

Technical data

The ESC can be connected to the following sensors and actuators:

- 2 hopper reserve gauge
- 1 fan rev counter
- 1 tramline control with/without track marker changeover mechanism
- 1 drive wheel monitoring device
- 2 metering device monitoring systems
- 8 solenoid shut-off valves
- 2 pre-emergence markers
- 1 full-width shut-off device
- 1 half-width shut-off device
- 1 seed rate adjusting device

- supply voltage 12 V (no display below 10.5 V)
- fuse 16 A
- temperature range: minus 10 °C to plus 60 °C.
- Inputted data will remain stored until cancelled.

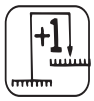
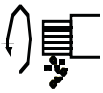
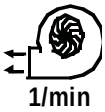
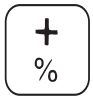
A forward speed of **at least 3 k.p.h**. is required for the correct functioning of the display (3.5 k.p.h. in the case of machines with working widths of 2.5 or 5 m).

Function

Computer

The computer is equipped with a microprocessor which processes the data inputted by the user and the signals transmitted by the sensors. These data and signals are converted into:

- **control si**gnals for the operation of the actuators (solenoid shut-off valves, solenoid switches on the full-width/half-width shut-off devices, seed rate adjusting motor)
- **alarm sign**als indicating malfunctions within the monitored system (metering device and fan speed, seed hopper reserve) and
- **information** on current machine status (e.g. tramlining position) and operating data (e.g. worked area in hectares/hour). This information is indicated in the display.

Alarm functions	Control functions
 Hopper reserve gauge[1)]	 Solenoid valves / tramline adjustment
 Metering device monitoring system[1)]	 Full-width / half-width shut off
 Fan speed[1)]	 Seed rate adjustment
 Drive wheel[2)]	 Programmed tramline rhythmus 0; 2; 3; 4 ...14; 2S ... 12S 10m / 3m 18m / 4m 30m / 4m 24m / 4,5m 15m / 6m 20m / 6m 21m / 6m 27m / 6m 20m / 8m 28m / 8m 18m / 12m
Supply voltage	

Information function

- Area work
- Total area
- Area performance (per hour)
- Forward speed
- Operating houres
- Current fan speed
- Inputted tramline-rhythmus
- Activity: half-width / full-width shut off
- Activity: Seed rate adjustment
- Hopper content / reserve
- Operating state

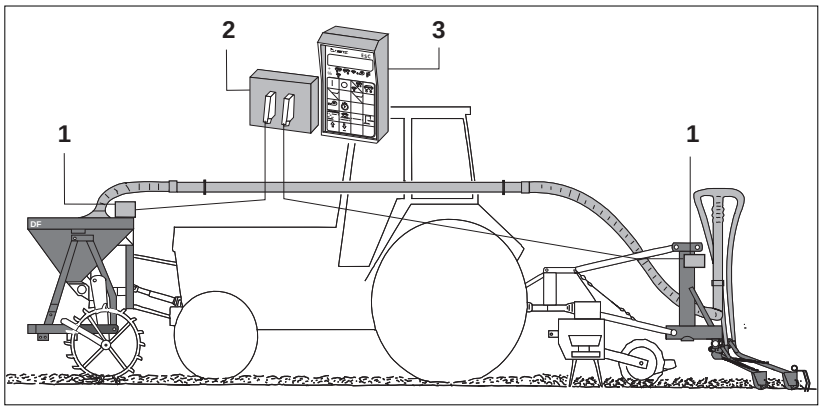
1) not standard; **2)** sensor supplied as standard

The computer features a touch-sensitive keypad for the inputting of machine data, the retrieval of operating data and the transmission of control commands to the seed drill.

Signal distribution box and signal collector

The signal distribution box forms the link between the electronic console and the individual sensors (e.g. drive wheel, metering device monitoring system) and actuators (e.g. solenoid shut-off valves, seed rate adjusting motor). It is connected via a connecting lead and central plug to the computer in the tractor cabin.

In the case of DF seed drills, the separate arrangement of the seed hopper and the coulter bar necessitates the use of two signal distribution boxes. This in turn necessitates the installation of a signal collector in the tractor cabin for the two connecting leads (see Fig. 21-2).



1 Signal distribution box 2 Signal collector 3 Computer

Fig. 21-2 Positions of signal distributors and signal collector on the DF

Installation

The computer, mounting bracket and battery connecting lead for the computer are packed in the seed hopper. The connecting lead for the computer is wound around the signal distribution box (SV).

1. The mounting bracket for the computer must be mounted in a readily visible and accessible position on the cabin frame, whereby it is essential to ensure that the connection with the frame is conductive (see fig. 21-3). Connect to the power supply with the three-pole standard plug. The computer must be located at least 1 m away from radio equipment and aerials.

If the cabin is insulated from the tractor chassis, effect a conductive connection between the cabin (not the bracket) and the tractor chassis, using a length of cable with a cross-section of 2.5 mm^2.

Fig. 21-3 Electronic console installed in tractor cabin.

2. If the seed drill is of the DF type, mount the signal collector on the mounting bracket as well (fig. 21-4).
3. Connect the 12 V socket supplied with the ESC directly to the tractor battery.

The socket must always be connected to the positive terminal of the battery via the 16 A fuse in the brown lead's cable connector. No other appliances may be connected to this socket. The negative terminal of the battery must always be connected to earth (frame, chassis).

Colour of leads : **brown + 12 Volt; blue - earth**

Fig. 21-4
Signal collectors and computer installed in tractor cabin

4. Couple the seed drill to the tractor and then lay the connecting lead from the computer to the signal distribution box, making sure that the lead is not damaged when raising and lowering the seed drill.
   - If the signal distribution box is inside the seed hopper, screw the strain relief cleat to the top edge of the seed hopper (see fig. 21-5).
   - The short length of PVC hose supplied with the ESC should be used to prevent the connecting lead from kinking and to make for a better clamping of the lead in the strain relief cleat.
   - Insert the plug of the connecting lead into the computer.

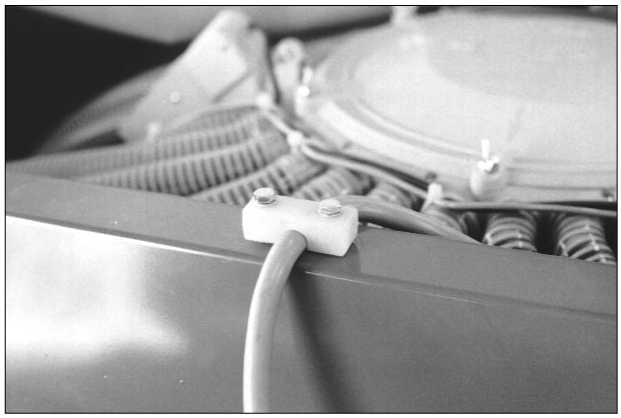


Fig. 21-5
Strain relief cleat for connecting lead

5. Effect the connection between the drive wheel sensor and the signal distribution box. The sensor lead is ducted to the outside through the chain box and the SV lead is laid as far as the coulter. Connect the plug-and-socket connectors of the leads.

   If the ESC is to be used in conjunction with
   a DA or DA-S seed drill:
   - Fit the drive wheel and bring it into its transport position.
   - Connect the sensor leads from the chain box and the signal distribution box.
   - Use a PVC hose strap to fasten the end of the sensor lead to the spiral seed delivery hose (fig. 21-6).

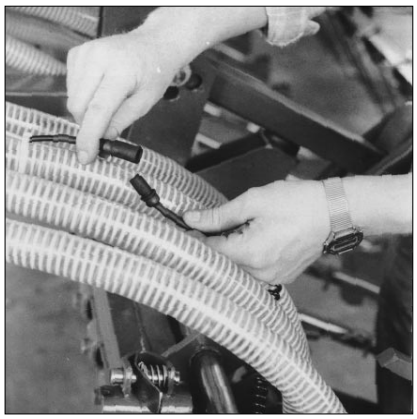


Fig. 21-6
Laying the sensor lead from the drive wheel

6. Effect the connection between the pre-emergence marker and the signal distribution box. The lead has already been laid along the seed delivery hose as far as the coulter and its square socket must now be connected to the plug on the solenoid valve of the pre-emergence marker. Use the square seal supplied when fitting the socket.

7. **DF seed drills only:**
   - Couple the DF seed drill to the tractor and connect the spiral hoses to the front and rear ends of the PVC feed pipe (see section 10).
   - Lay the connecting leads from the two signal distribution boxes (one installed in the front-mounted seed hopper, the other installed at the rear on the hose bracket on the coulter bar) to the signal collector in the tractor cabin. The connecting leads are wound around the signal distribution boxes when delivered. When fastening the connecting leads to the PVC feed pipe, first tie the

metal mounting plates to the pipe by means of PVC hose straps, spacing them equal distances apart. Now attach the self-adhesive cable clips to the metal mounting plates (see Fig. 21-7). Make sure when laying the connecting leads that they are not damaged when the seed drill is being raised and lowered. Once the connecting leads have been laid properly, press the clips to close them.

- Insert the plugs of the connecting leads into the DF signal collector.
- If required, attach an earthing cable to the tractor frame in order to eliminate static charges.

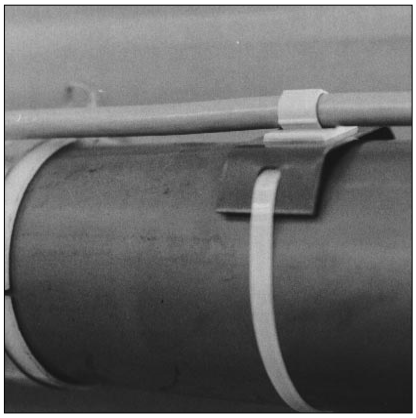


Fig. 21-7
Laying the connecting leads along the DF feed pipe

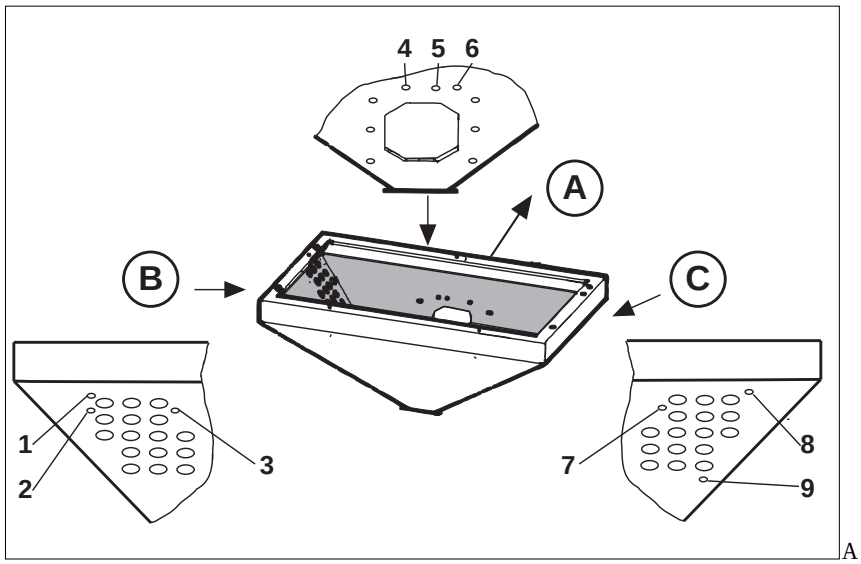
Retrofitment

In the event of any items of equipment being subsequently supplied and fitted, e.g. hopper reserve gauge, solenoid shut-off valves, pre-emergence markers, the connecting leads must be connected to the terminal block in the signal distribution box.

Before proceeding to open the lid of the signal distribution box, make sure that the insides of the hopper and the hopper cover are clean and dust-free. Disconnect the computer from the power supply.

Wiring

The connecting leads from the signal distribution box to items of equipment located **on the outside of the seed hopper** (e.g. pre-emergence marker, fan rev counter, seed rate adjusting device) must be fed through the holes in the wall of the hopper (see Fig. 21-8). Make sure that the connecting lead for the fan rev counter is **sufficiently slack** to allow for the pendulum movement of the fan.



A Direction of travel

B Left side view
C Right side view
1/8 Sensor for DT track marker changeover mechanism
2 Sensor for drive wheel
3/7 pre-emergence marker
4 Seed rate adjusting device; metering device monitoring system
5 Sensor for DL; DA, DA-S; DE-S track marker changeover mechanism
6 Full-width shut-off/half-width shut-off
9 Sensor for fan rev counter

Fig. 21-8 Holes in hopper wall for laying connecting leads

Replace the sealing plugs with grommets before threading the wire through, see fig. 21-9.

Fig. 21-9 Grommet

The connecting leads for items located inside the seed hopper (e.g. hopper reserve gauge, solenoid shut-off valves) can be laid and connected directly to the signal distribution box. Fasten the leads to the seed delivery hoses, using the PVC cable ties supplied. Make sure that the leads do not become looped.

Connecting leads in the signal distribution box

The wiring diagram showing the terminals for the various connecting leads is printed on the inside of the signal distribution box cover and also on the printed circuit board.

The two-core sensor cable from the track marker changeover mechanism must be connected to the terminal block in such a way that the terminal marked “br” is left free. In the case of hydraulically folding marker arms equipped with two sensors, the two blue leads must be connected together.

Remove the sealing plug from the side of the signal distribution box and replace it with a cable gland. Use the seal from the sealing plug. Feed the connecting leads through the cable gland and connect the coloured ends of the leads to the corresponding terminals and then screw them in place.

Cable glands and sealing plugs in the signal distribution boxes must be screwed tightly for strain relief and to protect against dust and moisture.

Carefully replace the cover and tighten the screws.

Operation and description of keypad

General description of keypad

For optimum user-friendliness, the keys on the ESC computer touch-sensitive keypad are coloured differently according to function, fig. 21-10:

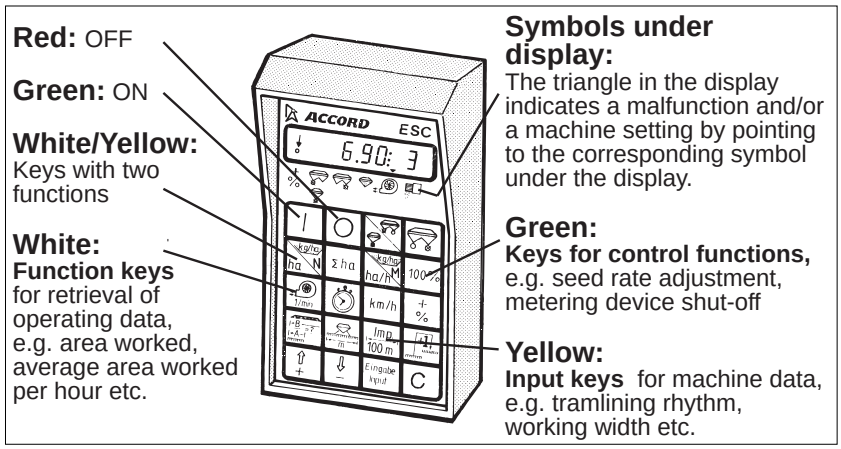


Fig. 21-10 Layout of the ESC computer keypad

Alarm signals

- Hopper reserve low: a short hooting signal, approx. 2 seconds long; a triangle flashes above the “low level sensor” symbol in the display.
- Fan speed has dropped by >10 %: intermittent hooting signal approx. every second; triangle flashes above the “fan” symbol.
- Metering device drive has been interrupted: intermittent hooting signal every 5 seconds; a triangle flashes above the “metering device” symbol in the display.

Initial operation

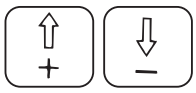
The computer is switched on and off by the keys “I” and “O” respectively.

There is a short hooting signal each time a key is pressed.

Enter the following machine data prior to initial operation:

- working width of the seed drill,
- drive wheel impulses per 100 m,
- tramline rhythm,
- if equipped with fan speed monitoring device: nominal fan speed

Inputting and changing data



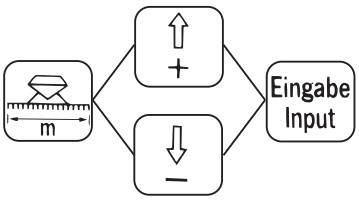
Adjusting keys “+/-”

Initial actuation of the “+” or “-” key will cause the displayed values to increase or decrease by one unit in the desired direction.

Subsequent actuation of the same key will continue to increase or decrease the displayed value until the key is released.

The new value can now be stored by actuating the “Input” key.

Working width



Key actuating sequence when setting working width.

Drive wheel impulses per 100 m

Key for setting “Impulses / 100 m”

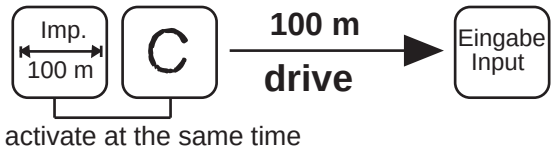
When the key is actuated, the display indicates the number of impulses per 100 m travel transmitted by the drive wheel sensor to the computer. This value must be corrected only if the area actually worked differs considerably from the indicated area.

The number of impulses to be stored depends on the diameter of the drive wheel and is given in the following table:

Table 21-1 Stored impulses / 100 m for the various types and sizes of drive wheel

Drive wheel	Impulses / 100 m
DA / DA-S / DE-S / DF / DG	42
7.00-12 (DL)	50
26.00-12.00 (DL)	49
7.50-16 (DT)	41
31-15.50 (DT / DV / DC)	43

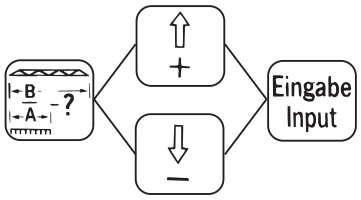
If you find that the actual value differs considerably from the indicated value, proceed as follows:



The display will first of all indicate the number of impulses stored hitherto. After driving a measured distance of 100 m, the display will indicate the new, corrected value which can now be stored by actuating the “input” key.

The impulses / 100 m setting can likewise be corrected by means of the “+” and “-” keys.

Tramlining rhythm



Key actuating sequence when setting the tramlining rhythm

The numbers allocated to the tramlining rhythms in Table 21-2 can be selected by means of the “+” or “-” key. During operation of the seed drill, the actual position reached within the selected rhythm cycle will appear automatically on the right-hand side of the display, see page 21-25. If the tramline is marked (i.e. solenoid shut-off valve is closed), then the figure indicated in the display will also flash as an additional visual signal.

With DC seed drills only odd numbered rhythms and even - numbered S - rhythms can be produced

The rhythm position is not indicated when one of the function keys “ha” (hectare), “∑ha” or “time” has been actuated.

No.	Rhythm	No.	Rhythm	No.	Rhythm
0	no tramlines	8	8	2 - 5	2-S
2	2	9	9	4 - 5	4-S
3	3	10	10	6 - 5	6-S
4	4	11	11	8 - 5	8-S
5	5	12	12	10 - 5	10-S
6	6	14	14	12 - 5	12-S
7	7				
Rhythms with remainder					
15	**15 m/6m and 20m/8m**	starting from right			
16	**15m/6m and 20m/8m**	starting from left			
18	**18m/4m**	starting from left			
19	**18m/4m**	starting from right			
20	**20m/6m and 10m/3m***	starting from left			
21	**20m/6m and 10m/3m***	starting from right			
22*[3]	**18 m /12 m**	starting from left			
23*[3]	**18 m/12 m**	starting from right			
24*[3]	**24 m/4.5 m**	starting from left			
25*[3]	**24 m/4.5 m**	starting from right			
26*[2]	**27m/6m**	starting from left			
27*[2]	**27m/6m**	starting from right			
28*[2]	**28m/8m and 21m/6m**	starting from left			
29*[2]	**28m/8m and 21m/6m**	starting from right			
30*[4]	**30m/4m**	starting from left			
31*[4]	**30m/4m**	starting from right			

*[1] max. track gauge of tractor used for subsequent fertilising and spraying: 1.75 m;
*[2] Electronic consoles from Serial No. 294404 onwards have provision for these rhythms;
*[3] Electronic consoles from Serial No. C 11 448 onwards have provision for these rhythms;
*[4] Electronic consoles from Serial No. E 14342 onwards have provision for these rhythms.

Table 21-2 Allocation of tramlining rhythms to the numbers indicated on the ESC display

The numbers for even S-rhythms (2 - 5; 4 - 5 etc.) are stored following the numbers for rhythms with remainder.

Fig. 21-11 shows an example of a tramlining rhythm with remainder.

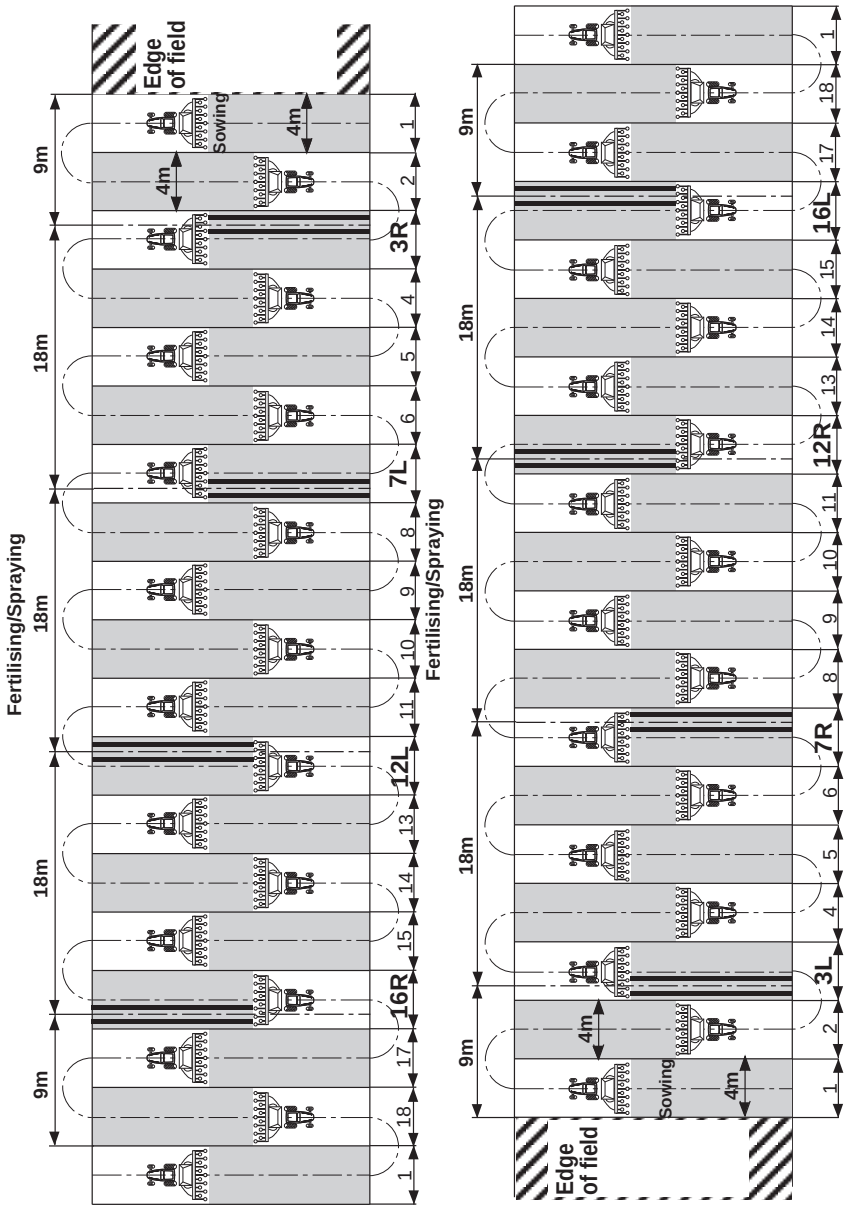
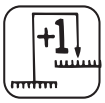


Fig. 21-11
System diagram for a rythm with remainder: 18 m fertilising / spraying, 4 m drilling starting from the right or left.

Manual correction of tramlining rhythm



This key serves to move the position actually reached within the rhythm cycle forward by one step.

Tramlining

1. Operate the track marker at the edge of the field, making sure it is lowered on the correct side.
2. Set the tramlining rhythm.
3. Press the “+1” key repeatedly until the figure “1” appears on the right-hand side of the display.

When working with an S-rhythm, do not switch to “1” until you commence operation with the **full width of the seed drill,** cf. fig. 4-15.

In the case of all odd-numbered and S-rhythms it does not matter whether you commence at the right-hand or left-hand edge of the field. Sowing with rhythms 4, 8, 12 etc., on the other hand, must be commenced on the side of the field corresponding to the side of the seed drill on which the shut-off coulter with the solenoid shut-off valve is located. If rhythm 6, 10, 14 etc. is selected, you must commence sowing on the left-hand edge of the field if the shut-off coulter is on the right-hand side of the seed drill.

If you are working with a rhythm which has a remainder (see Table 21-2), you must first of all decide whether you wish to start from the left or from the right.

Example:

- Working width of the seed drill: 4m; working width of sprayer: 18m
  - Select No. 18 if starting from the left.

At the end of the field, the ESC automatically switches to the next position within the selected tramlining rhythm when the track marker changeover mechanism is actuated. This position will also remain stored when the power supply to the ESC is disconnected, which means that you can continue drilling with the same rhythm immediately after the power supply is restored.

Check before using for the first time:

- the required track gauge of the tramlines (see chapter “Tramlining” on page 4-14).
- the working of the solenoid shut-valves (check air draught under each coulter, audible valve response).

Fan speed

Maximum permissible fan speed: **5000 r.p.m.**

After you have set the p.t.o. shaft speed or the oil flow (see page 23-9) exactly, the following fan speeds should be obtained:

Table 21-3 Nominal fan speeds

Type	Working width [m]	Fan speed [r.p.m.]
DL; DC	all	4150
DA; DA-S	2.5 - 4	4200
DE-S	4.5	4400
DA-S	5	4400
DT	to 6.66	4150
	8	4600
	9	4500
DF1	all	4350
DF2	all	4500
DV	all	4500
DG	all	4500

In cases where the DA is driven at a p.t.o. shaft speed of 540 r.p.m., the nominal speed of the fan is 3600 r.p.m.

The nominal speeds are the same for both types of fan drive (mechanical or hydraulic).

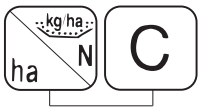
The nominal fan speed is keyed into the ESC as follows:

1. Drive the seed drill at its nominal p.t.o. shaft speed of 1000 or 540 r.p.m.
2. Press the fan speed key ("1/min" = "r.p.m."). The actual fan speed will now be indicated in the display.
3. Press the "Input" key. The indicated speed is now stored as the nominal fan speed.

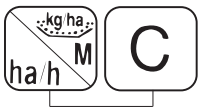
Key actuating sequence when setting nominal fan speed

If the fan speed drops by more than 10% of the stored value, the computer will give an intermittent hooting signal. The triangle will flash above the "fan" symbol.

Calibrating with the ESC (only if equipped with metering device monitoring system)



Simultaneous actuation of these two keys will initiate the calibrating operation for 1/10 hectare (**normal metering**).



Simultaneous actuation of these two keys will initiate the calibrating operation for 1/10 hectare (**micrometering**).

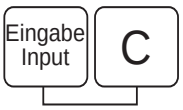
After 85 turns of the calibrating handle on the metering device the computer will give a hooting signal for the duration of approx. 5 seconds. **If you are using the micrometering system, give the calibrating handle one more turn.** The quantity of seed collected corresponds to the quantity sown per 1/10 hectare.

Metering device monitoring system

This auxiliary piece of equipment monitors the speed of each cell wheel via sensors. Any interruption in one of the metering device drives, e.g. when a chain breaks, is indicated by an intermittent hooting signal from the computer. The triangle in the display also flashes above the "metering device" symbol.

Further function keys

Starting function



Prior to the commencement of the sowing operation it is necessary to initiate the start function by simultaneously actuating the “input” and “C” keys.

This resets the memories for “area worked” and “time worked” to zero. The tramlining position is not affected by this start function.

When beginning with a new plot or field, the selected tramlining rhythm must be set to the starting position “1”, see “Tramlining” on page 21-16.

“*Area worked (ha)” key*

This key serves to indicate the area which has been worked since the start function was initiated. Measurement is interrupted as soon as impulses cease to be transmitted from the drive wheel sensor to the computer.

“*Area worked per hour” key*

his key serves to indicate the area worked in hectares per hour (ha/h).

“*Total area” key*

This key serves to indicate the total area worked during the season. At the start of the season, the reading is reset to zero by actuating the keys “Total area” and “C” simultaneously.

“*Time” key*

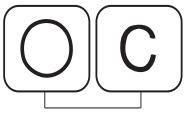
This key serves to indicate the working time which has elapsed since the start function was initiated (see page 21-20).

If the computer is switched off when the tractor is not in use, the time recording function will be interrupted. It will be resumed as soon as the computer is switched on again. The time recording function can also be stopped during operation. Once the “Time” key has been pressed, pressing it again will stop the time recording function. Depress a further time to resume.

“Speed” key

This key serves to indicate the actual working speed in k.p.h.

“Cancel all stored data” key



Simultaneous actuation of the keys “0” and “C” will cancel all stored data, including the impulses / 100 m and the tramlining rhythm.

Control keys

“Full width shut-off/left-hand metering device” key

This key serves to switch the metering device on and off. If there are two metering devices, it is the left-hand one which is operated (half-width shut-off mode). Shut-off is indicated by a flashing triangle in the display, cf. page 21-25. The operation of the hectaremeter is discontinued accordingly.

If the metering device drive is interrupted for longer than approx. 5 seconds while the seed drill is switched to full-width or half-width shut-off mode (e.g. at the end of the field), the ESC will give 5 hooting signals when work is restarted. The triangle above the respective symbol will flash at the same time. This operating mode is not changed automatically.

“Half-width shut-off right-hand” key

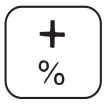
This key serves to switch the right-hand metering device on and off. This function is possible only if the seed drill has provision for left-hand and right-hand shut-off mode. If there is only one metering device (DL, DA, DA-S, DE-S, DF1), then this key has no function.

"Electrical seed rate adjustment" key

The electrically operated seed rate adjustment mechanism enables you to change the seed rate from the tractor cabin when working on fields with changing ground conditions.

Actuation of the corresponding keys on the ESC computer causes the electric motor on the metering device to increase or decrease the cell width by a certain value (limited by an adjustable stop).

The electrically operated seed rate adjustment mechanism is not intended for use when sowing fine seeds.



When the "+%" key is actuated, the seed rate is increased by a pre-set value. This status is indicated by a triangle in the display, see page 21-25.

When this key is actuated, the seed rate is reset to 100%. This resetting function is **only possible when the drive wheel is rotating!**

A period of **at least 10 seconds** must elapse between actuation of the "+%" key (seed rate increase) and subsequent resetting ("100%" key).

Setting seed rate increase

The cell width for the basic seed rate (see page 4-10 for settings) can be increased by a maximum of 20 mm. The maximum cell width of 110 mm must not be exceeded when sowing normal seed:

Basic setting + seed rate increase ≤ max. cell width

- Actuate the "100%" key before you proceed to fill the seed hopper. The ESC is now switched to the basic seed rate.
- Set the metering device to the basic seed rate and then calibrate the seed drill (see page 4-10).

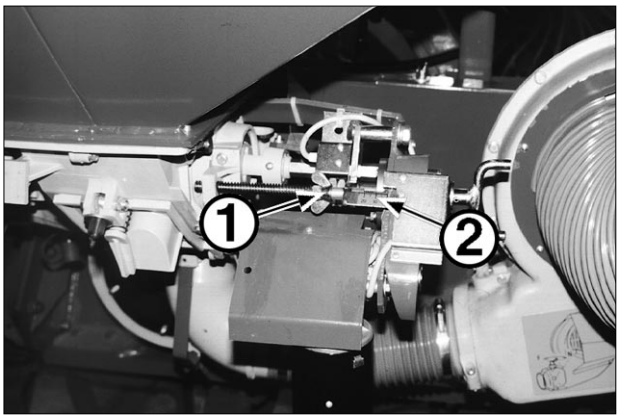


Fig. 21- 12
Setting screw and scale for electrically operated seed rate adjustment mechanism

- Adjust the setting screw “1” until the desired increased seed rate setting is indicated on scale “2”.

Example: Basic setting: 50 mm (corresponds to approx. 174 kg/ha wheat)

Desired seed rate increase: 10 %
Increase setting on scale “2”:

50 mm x 10 % / 100 % = 5 mm

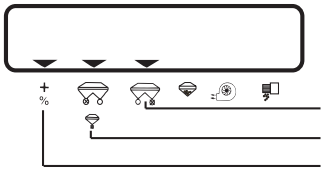
- Use the “+%” key to set the seed rate increase and then check the setting against a sample quantity obtained by calibrating.

For the sowing of normal seed, the basic seed rate settings are limited to a maximum of 90 - 95 mm. If you require a larger cell width, this must be obtained by increasing the setting on the scale of the seed rate adjustment mechanism by the required additional value.

Display data

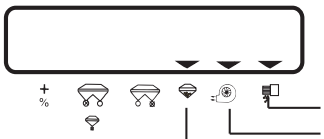
Arrow:
ESC is in operating state
Flashing wheel:
Drive wheel is rotating,
machine is in working position

Left-hand side of display:
Operating data "r.p.m."; "ha (hect.)";
"k.p.h."; "ha(hect.)/hr"
Machine data "rhythm"; "Working width",
"Impulses/100m"
Right-hand side of display:
Current position within tramlining rhythm. Figure flashes when tramline is being produced.



Triangle:
Indicates current machine setting:

The right-hand metering device is switched off.
The left-hand metering device is switched off.
The seed rate adjustment mechanism is switched to seed rate increase.



Flashing triangle:
Visual warning of malfunction and/or hazardous operating state:

Metering device drive interrupted
Fan speed has dropped by more than10%
Contents of seed hopper have dropped below hopper reserve level

Uncoupling the seed drill

1. Switch off the computer (“0” key) prior to uncoupling the seed drill from the tractor.

- **DL, DA, DA-S, DE-S, DV, DC and DG:**
  2. Unplug the connecting lead from the computer.
  3. Wind the connecting lead around the signal distribution box and insert the plug into the receptacle provided on the seed drill.
- **DF:**
  2. Unplug both connecting leads from the signal collector in the tractor cabin.
  3. Remove the connecting leads at the front and the back from the cable clips on the feed pipes.
  4. Wind the connecting leads around the signal distribution box and insert the plugs into the receptacles provided on the seed drill.
- **DT:**
  2. Unplug the connecting lead between the drive wheel sensor and the signal distribution box.
  3. Unplug the connecting lead from the computer.
  4. Wind the connecting lead around the signal distribution box and insert the plug into the receptacle provided on the seed drill.

Take care to ensure that the contacts in the plug do not become damaged or dirty.

Electronic seed drill drive (ESA)

Electronic seed drill drive (ESA)

Safety

The electronic seed drill drive (ESA) is intended for use with only DL, DT, DA, DA-S, DE-S, DF1, DF2, DV and DG seed drills. It may not be used for any purpose other than that for which it is intended. Read Chapter B “Safety” very carefully. ESA is not available for DC seed drills.

Component parts of the ESA

The ESA consists essentially of the computer, the signal distribution box, the sensors, the electric motor(s) for driving the metering device and the actuators, see Fig. 22 - 1.

Legend for Fig. 22 - 1:

1 Tractor battery
2 12 V Socket
3 Computer
4 Support with voltage supply and switch for computer
5 22-pole connecting lead from signal distribution box to computer
6 Track marker changeover mechanism with sensor
7 Solenoid shut-off valve
8 Signal distribution box 2
9 Pre-emergence marker
10 Central seed flow control (accessory)
11 Electric drive motor of the metering device with sensor
12 Signal distribution box 1
13 Drive wheel with sensor
14 Fan with sensor

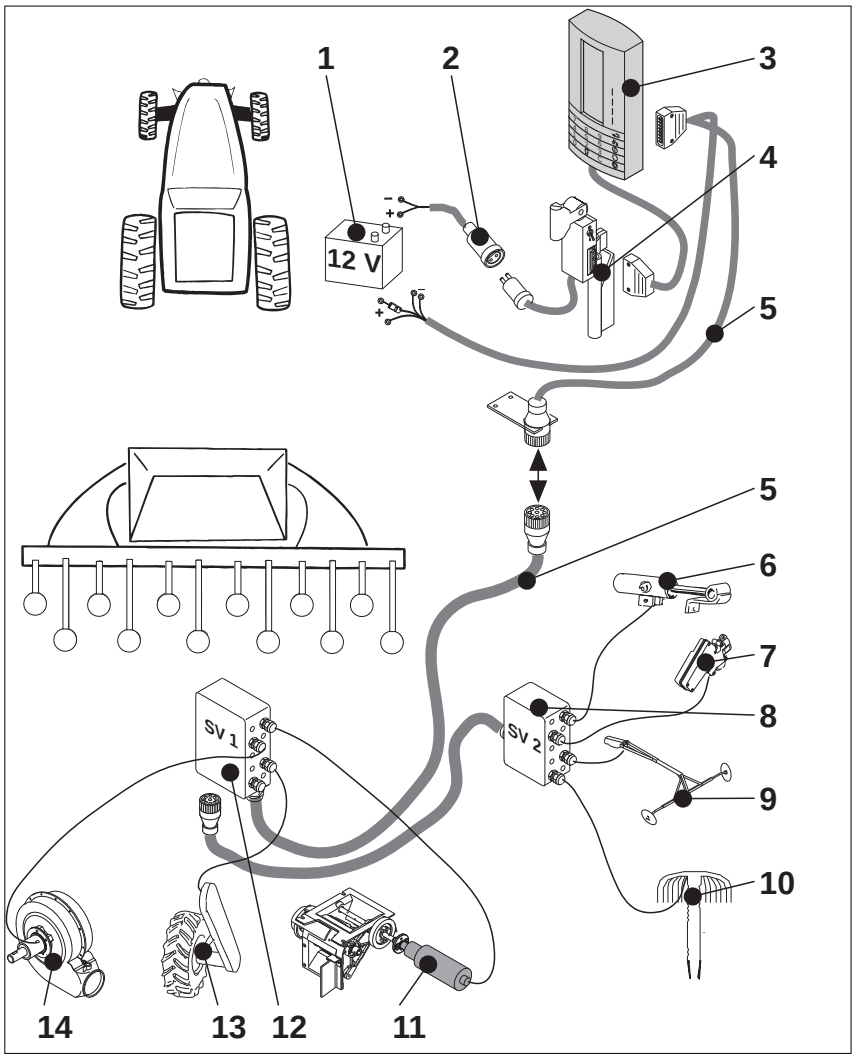


Fig. 22 - 1 Component parts of the ESA

Technical data

The following sensors and actuators can be connected to the ESA:

- 2 hopper reserve gauges
- 2 electric motors for driving the metering device
- 8 solenoid shut-off valves
- 2 pre-emergence markers
- 1 fan sensor
- 1 drive wheel or radar sensor
- 1 full-width or half-width shut-off device
- 1 tramline control with /
  without track marker changeover mechanism
- 2 metering device monitoring systems
- 1 seed rate adjusting device

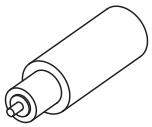
- supply voltage 12 Volt DC (no display under 10.5 Volt).
- temperature range: minus 10 °C to plus 60 °C.
- inputted data will remain stored until next entry.

A forward speed **of at least 3 k.p.h.** is required for the correct functioning of the display (**3.5 k.p.h.** in the case of machines with **working widths of 5 m and with two metering devices).**

Function

The computer is equipped with a microprocessor which processes the data inputted by the user and the signals transmitted by the sensors. It regulates, controls and monitors all important seed drill functions, see Fig. 22 -2.

Once the machine data (e.g. working width, number of coulters) and the job-related data (e.g sowing quantity, type of seed) has been entered, carry out a computer-controlled calibration test. When you are drilling, the computer regulates the speed of the metering shaft according to the working speed. In normal operation impulses are required from the seed drill drive wheel, the fan and the sensor on the track marker changeover mechanism or the tractor three point linkage in order to drive the metering device.



Adjusting functions

Adjusting the path and speed of the metering device drive

Alarm functions

kg — Remainder in hopper (calculated)

Hopper reserve gauge[1)]

Metering device monitoring system

1/min — Fan speed

Central seed flow control in the diffuser tube[1)]

km/h — Forward speed

Control functions

+1 — Solenoid valves / tramline adjustment

Full-width / half-width shut-off

+ % — Seed rate adjustment

B =? A — Programmed tramline rhythm

0; 2; 3; 4 ...14; 2S ... 12S

10m / 3m	18m / 4m
30m / 4m	15m / 6m
20m / 6m	21m / 6m
27m / 6m	20m / 8m
28m / 8m	

Information functions

- Drilled seed rate
- Remainder in seed hopper
- Speed of metering shaft
- Seed rate adjustment
- Fan speed
- Metering device(s) on / off

- Forward speed
- Distance travelled
- Supply voltage

- Worked area in hectares / hour.
- Area worked
- Remaining area

- Stop watch
- End point
- Time, date

Service function

- Test inputs: sensors
- Test outputs: motors, solenoid, valves

Fig 22 -2 ESA - functions

[1)] accessory

The metering device drive is interrupted when turning at the end of the field. This is done by raising the track marker or the power lift system or manually by pressing a key on the computer. After turning, the metering device drive starts again as soon as the track marker or power lift system has been lowered and the computer receives travelling speed signals. The computer processes travelling speed signals from the drive wheel sensor or from the tractor's signal socket in accordance with DIN9684 and ISO 11786, see Fig. 22-7. You can also start the metering device drive manually to prevent patches in corners or when there are narrow headlands. This can be done with the "Manual start" function, see page 22 - 36.

Tramlining is done automatically. The computer calculates the tramlining rhythm using the data for the working width of the seed drill, working width of the sprayer/fertiliser and the position of the shut-off coulter on the seed drill. Fig. 22 - 2 will provide you with an overview of the possible tramlining rhythms.

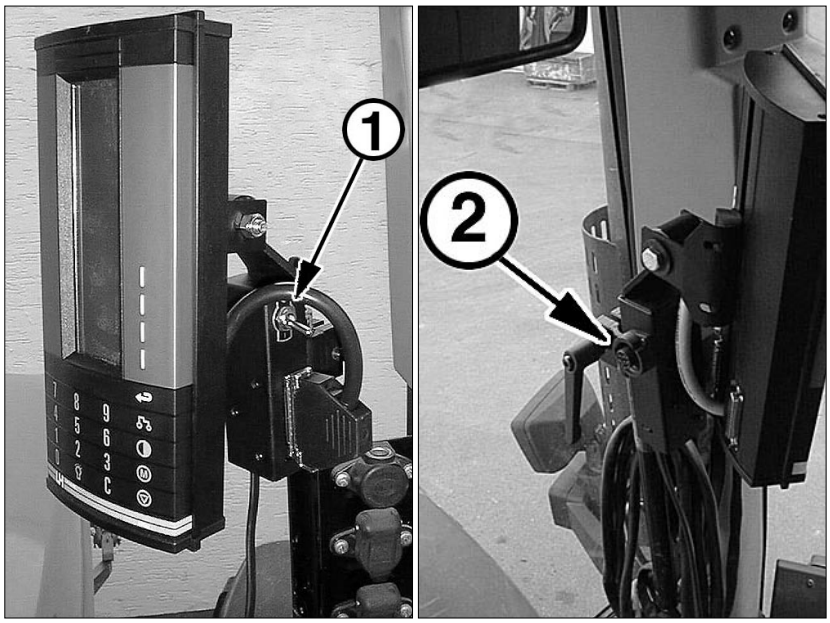
Installation

The computer and all necessary fastening parts and electric connecting leads, fuses etc. are packed in the seed hopper.

1. The mounting bracket for the computer must be mounted in a readily visible and accessible position on the cabin frame, whereby it is essential to ensure that the connection with the frame is conductive, see Fig. 22 - 3. Connect to the power supply with the three-pole standard plug.
2. Connect the 12 V socket supplied for the computer power supply (1, Fig. 22 - 4) directly to the tractor battery.

The socket must always be connected to the positive terminal of the battery via the 25 A fuse in the brown lead's cable connector, see Fig. 22 - 4. No other appliances may be connected to this socket. The negative terminal of the battery must always be connected to earth (to the frame or chassis).

Colour of leads: brown + 12 Volt; blue - earth



1 Switch on / off;

2 Socket for DIN/ISO intermediate cable. With this the computer can be connected to the tractor signal socket in accordance with DIN9684-1 or to sensors on the tractor, e.g. radar.

Fig. 22 - 3 Mounting with switch for the computer in the tractor cabin

1 12 V socket
2 25-pole right-angled plug

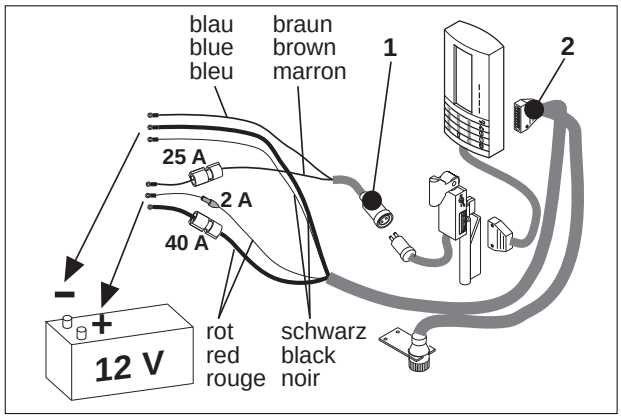


Fig. 22 - 4
ESA electrical connections

3. Install the plug bracket (1; Fig. 22 - 5) for the 22-pole connecting lead between the signal distribution box and the computer in a suitable place (if possible in the tractor cabin).

It should not be possible for the 22-pole connecting lead from the signal distribution box on the seed drill to become damaged at any point when the seed drill is coupled.

4. Screw the plug (2) to the plug bracket using 4 screws.

1 Plug bracket
2 22-pole circular plug
3 Connecting lead to the computer and tractor battery

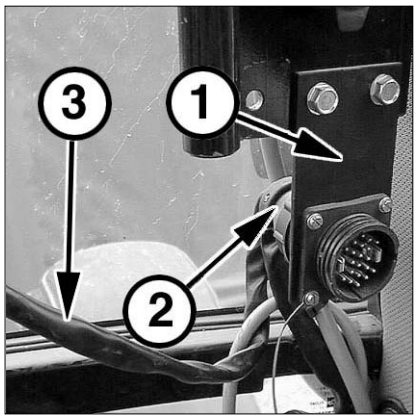


Fig. 22 - 5
Installing the plug holder and 22-pole circular plug

5. Connect both ends of the 22 pole connecting lead (3) to the computer and the 12 V battery:

   - Insert the right-angled plug (2, Fig. 22 - 4) into the computer.
   - Secure 25 A fuse on the red cable end and connect to the positive terminal of the battery (+12 V), see Fig. 22 - 4.
   - connect the black cable end to the battery's negative terminal.

   These cables provide the power supply for the metering device's drive motors (larger cross-section) and the shut-off valves (smaller cross-section).

6. Couple the seed drill to the tractor and then lay the connecting lead from signal distribution box 1 to the computer.

Signal distribution box 1 is in the front seed hopper of DF seed drills.

Make sure the lead cannot be damaged when raising and lowering the seed drill. Screw the plug in the socket (see Fig. 22 - 6).

Fig. 22 - 6
Screwing the 22-pole connecting lead from signal distribution box 1 in the socket

7. This point is not applicable if you are using a radar sensor. Connect the drive wheel sensor with signal distribution box 1. The sensor lead is ducted to the outside through the chain box. The lead to the signal distribution box has already been laid as far as the connector and ends with a square socket. Use the square seal supplied when fitting the socket.

   With **DA and DA-S seed drills:**
   - Fit the drive wheel and bring it into its transport position.
   - Connect the sensor leads in the chain box and the signal distribution box.
   - Use a PVC hose strap to fasten the end of the sensor lead to the seed delivery hose.

8. Effect the connection between the pre-emergence marker and signal distribution box 2. The lead has already been laid along the seed delivery hose as far as the coulter and its square socket must now be connected to the plug on the solenoid valve of the pre-emergence marker. Use the square seal supplied when fitting the socket.

9. **DF seed drills only:**
   - Couple the seed drill to the tractor
   - Connect the spiral hoses to the front and rear ends of the PVC feed pipe (see section 10).
   - Lay the connecting leads between the two signal distribution boxes (one installed in the front-mounted seed hopper, the other at the rear on the coulter bar). Make sure the leads cannot be damaged when raising and lowering the seed drill.

10. Connect the signal sockets on the tractor and the computer's supporting section with the DIN/ISO intermediate cable (accessory equipment). The signal socket on your tractor must be in accordance with DIN 9684-1 / ISO 11786, see Fig. 22-7. Ask your tractor dealer about this.

1 Actual forward speed (radar)
2 Theoretical forward speed (gearbox)
3 Speed of rear PTO shaft
4 Working position of the rear three-point linkage on/off
5 Position of the rear three-point linkage
6 Power supply +12 V
7 0 V / earth

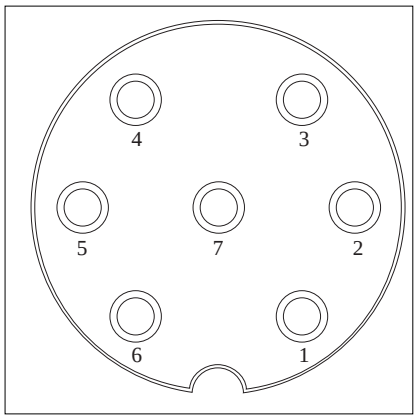


Fig. 22 - 7
Signal socket in accordance with DIN 9684 and ISO 11786

11. If your tractor is not equipped with a DIN/ISO socket, you can connect the following sensors on the tractor with the DIN/ISO intermediate cable on the computer. Cut off a plug and connect the cable as in Fig. 22 - 8:

- Radar sensor as path sensor
- Sensor on three-point linkage as operation sensor

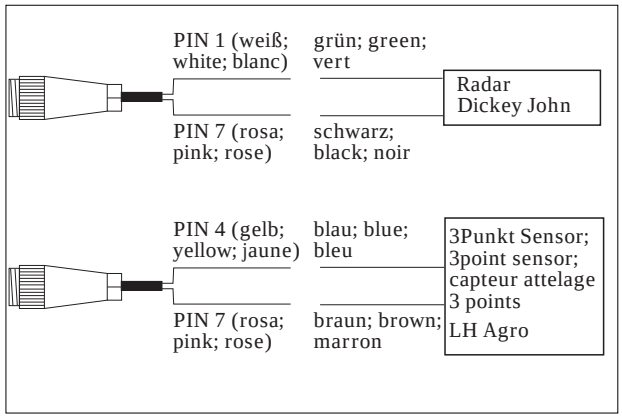


Fig. 22 - 8
Connecting radar or three-point sensor

Operation and description of keypad

The areas of the diagrams marked “XXX” in this chapter signify a selectable function. Here, therefore, there are no fixed values.

General description of keypad

1 Function keys for setting a selectable function
2 Return key
3 Keys with a single function

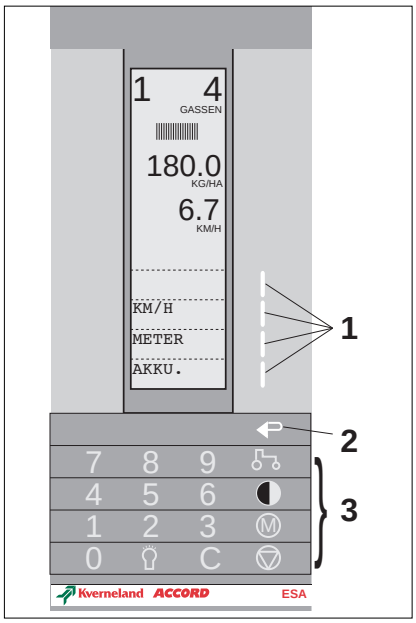


Fig. 22 - 9 Keyboard of the ESA computer

The computer has five keys:

- four function keys, see Fig. 22 - 9. Their function at any particular time is displayed in the lower section of the screen.
- The return key to return to the previous menu. This key is used to “return” to the previous screen from all positions in the program. In some cases it is used also to confirm the data you enter.

The computer also has keys with a single function. You can use these anywhere in the program.

Tractor - Information:

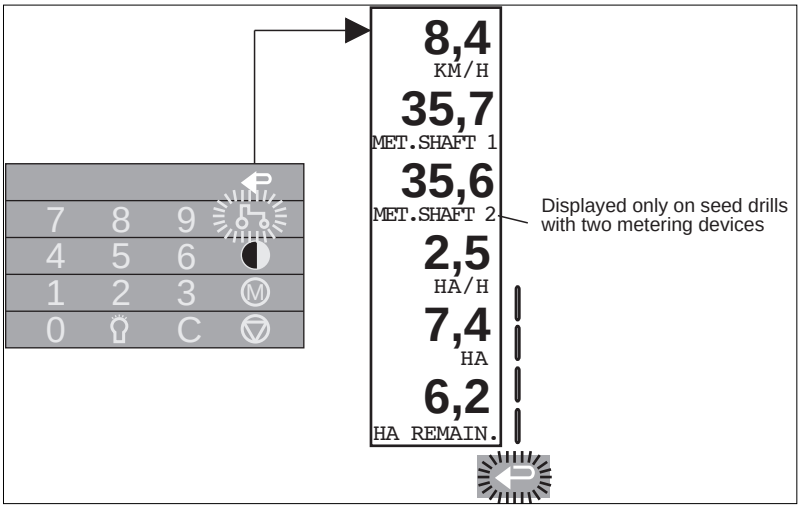


Fig. 22 - 10 Selecting tractor information

Press the return key to return to the previous screen.

Contrast:

Press this key if you want to change the contrast of your screen. Adjustments can thus be made to make the screen easier to read during different levels of brightness outside.

When it is extremely cold or extremely hot, the screen may be black at first. Press the “Contrast” key to get a good display.

The selected contrast level can be seen at the top of the screen. Normal contrast is 40 - 50.

Contrast + = darker screen
Contrast - = brighter screen

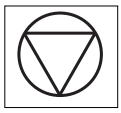
Press the “C” key to return to normal contrast.

Store key:

The store key works like a bookmark:

- press the store key when you are on a page of a menu which you want to quickly find again later.
- turn to another page of the menu.
- press the store key again. The page you selected will appear again.

In order to prevent any unintentional wrong entries you are not able to access menu pages in the “system” function again with this key.



Stop key:

The function of this key depends on the chosen operation sensor, see p. 22 - 28:

- operation sensor “seed drill”:
  the tramline sequence stops being counted and the metering device drive stops when the track marker is activated.
- operation sensor “none”:
  the tramline sequence stops being counted and the metering device drive continues when the track marker is activated.

As long as this function is activated, “Stop” flashes at the bottom of the screen.

Press the Stop key again to switch off this function.

Delete key:

For deleting inputted and accumulated data.

Screen lighting:

This key switches the screen lighting on and off. This can also be done in the “Contrast” menu (see p. 22 - 12).

0-9 Numeric keys:

These are for inputting values.

Initial operation

To switch on the computer activate the toggle switch on the computer's support (in the tractor cabin). There will be a brief greeting and then you will see the operating menu:

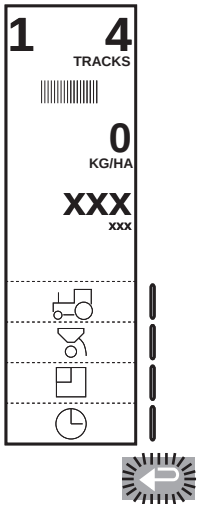


Fig. 22 - 11 The display on the screen when you switch on the computer

Press the return key to access the basic menu. In the basic menu you will find the following functions, see Fig. 22 - 12:

- Operation: This function gives you all the information you need when sowing;
- Input: for inputting and changing data;
- Order: for saving, displaying and printing up to 35 different orders.
- Data/Delete: for displaying and deleting field and total counters
- System: for selecting desired language, activating either one or two metering devices and testing the system.

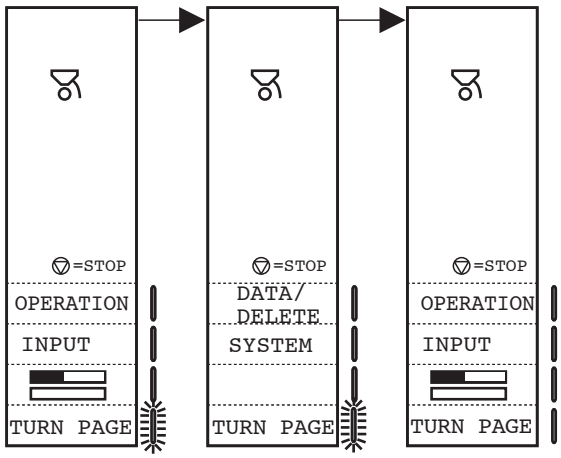


Fig. 22 - 12 Basic menu

Change the screen display to your country's language if the basic menu is written in another language.

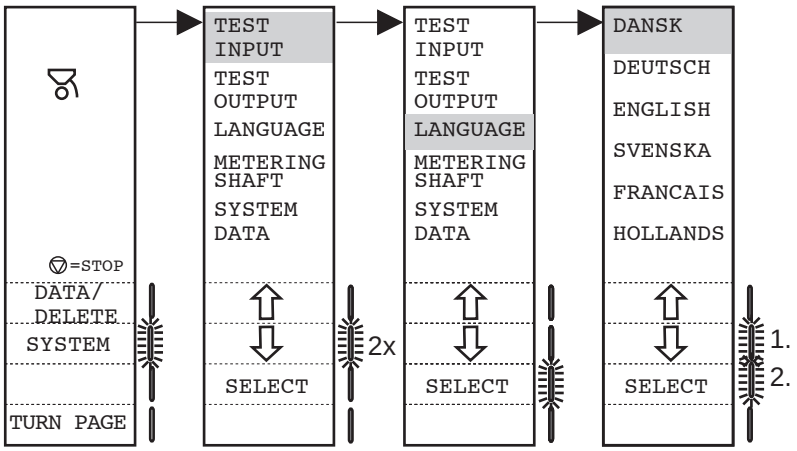


Fig. 22 - 13 Key sequence for selecting a language

You have to input some data before you can use the computer. Return to the basic menu:

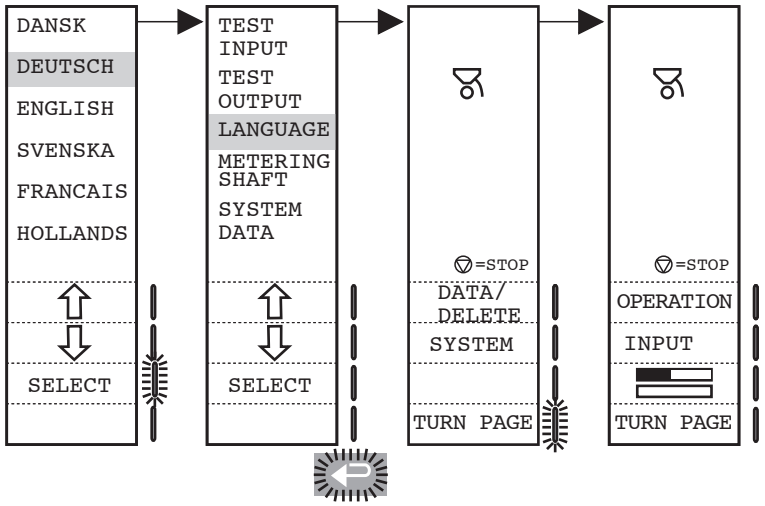


Fig. 22 - 14 Returning to the basic menu

Inputting and changing data

In the “Inputting” menu enter the data needed for operating the metering device drive. To do this proceed as follows:

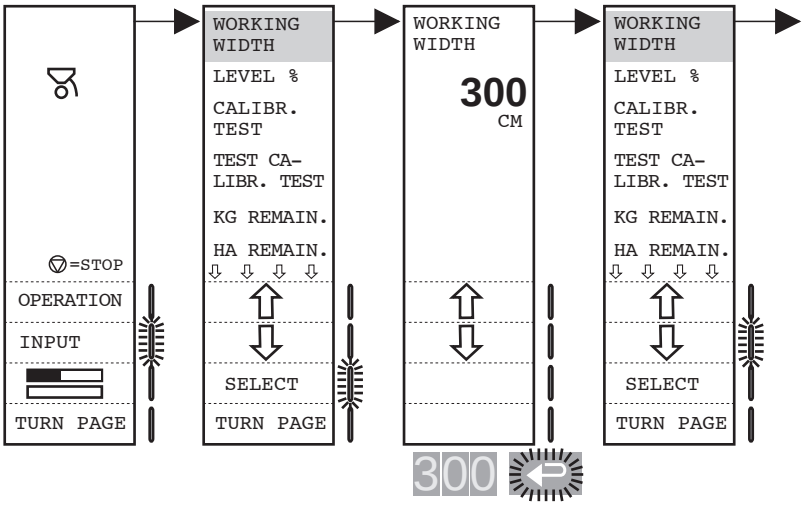


Fig. 22 - 15 Inputting data

The data will be stored when you press the return key.

Check the inputted data before seeding.

The following diagrams show all the data you need to input.

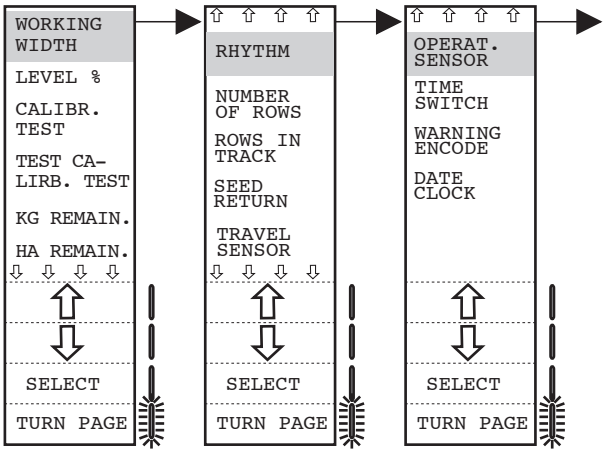


Fig. 22 - 16 Data you need to input

Working width

Input the working width of the seed drill (in cm).

Setting level increase/decrease %

Insert here the desired change in seed rate (%). This value is the same for "+" and "-". The maximum value depends on the seed rate.

Calibration test

Before you start the calibration test you have to input the working width.

1. Depending on which seed drill model you have switch the second metering shaft either on or off, see fig. 22 - 17:
   for seed drills with one metering device: the second metering shaft should be "not active";
   for seed drills with two metering devices: the second metering shaft should be "on".

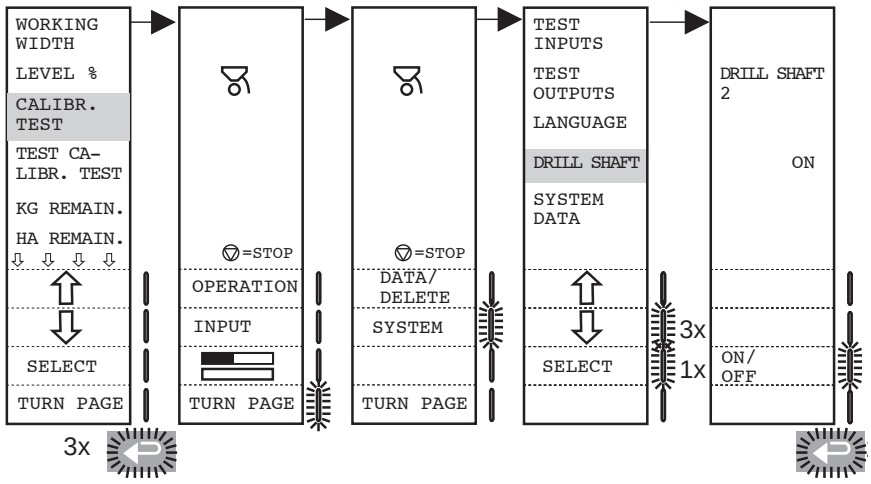


Fig. 22 - 17 Activating the second metering device

You must carry out a separate calibration test for each metering device. Otherwise there could be inaccuracies.

2. Select the “Calibration test” menu on the computer.

The micrometering systems of those seed drills equipped with the ESA are **switched on** when the seed drills are delivered to you. You will only have to change this in exceptional cases. If you do switch it off, the message “MICROMET OFF” will appear on the screen.

If you have already carried out calibration tests and have stored them, you can select and use one of them. Another calibration test would be unnecessary in this case.

If you change models, we recommend that you carry out a new calibration test.

Follow the instructions on the screen to insert cell width, whether you are dealing with fine or normal seed and if the micrometering system is switched on or off on the metering devices. Check the position of the butterfly valve on the fan, see p. 4 - 10.

Press one of the two arrow keys to see the calibration values of the stored calibration tests:

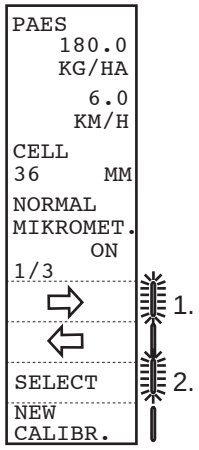


Fig. 22 - 18 Retrieving a stored calibration test

If you are working with the values of a calibration test which has already been carried out and want to change only the seed rate, enter the changed seed rate in the menu “Operation of seed drill seed rate”, see p. 22 - 35. Recalibration is not necessary here

Press the return key if you do not wish to use any of the stored settings. The computer will return to the start of the calibration test programme and you can carry out a new calibration test.
Input all required data:

- seed rate: in kg/ha;
- Working speed: in k.p.h.
  Example: From experience you reckon the speed is between 7.5 and 8.5 k.p.h. Input 8.0 k.p.h.
- Seed: Use the function keys to select your desired kind of crop.

If the desired crop is not in the “Seed” menu, choose a crop with similar attributes, e.g. thousand grain weight, calibre.

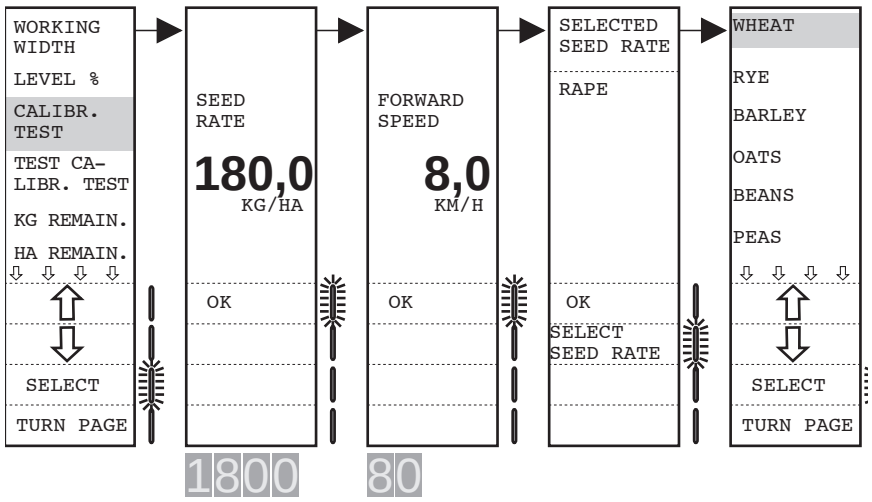


Fig. 22 - 19 Inputting data for the calibration test

After you have pressed the OK key, all settings which you need for the metering device will appear:
- Normal or fine seed,
- data on the metering scale and
- whether the micrometering system is on or off.

3. Input these values for your metering device. The steps you need to take for this are in the section on seed rate on page 4 - 8, Pos. 1 to 2b and 4 to 8.

   The micrometering systems of those seed drills equipped with the ESA are **switched on** when the drills are delivered. In the case of some seed drills, the micrometering system is hard to access and should therefore be altered only in exceptional cases. If the message “MICROMET OFF” appears on the screen we recommend the following:
   - Leave the micrometering system switched on.
   - Set a greater setting on the metering device than the one already set.
   - Carry out one or more calibration tests (points 4 - 7). If the rate is over 15% less than the desired seed rate and the metering device was fully open, switch off the micrometering system.

4. Check there is enough seed in the hopper and that there is a receptacle under each metering device.
   Press the “fill cells” key (see Fig. 22 - 20). The cell wheel will briefly turn until the cells are full.

   In the case of seed drills with two metering devices, the calibration test will begin on the device on the left-hand side.

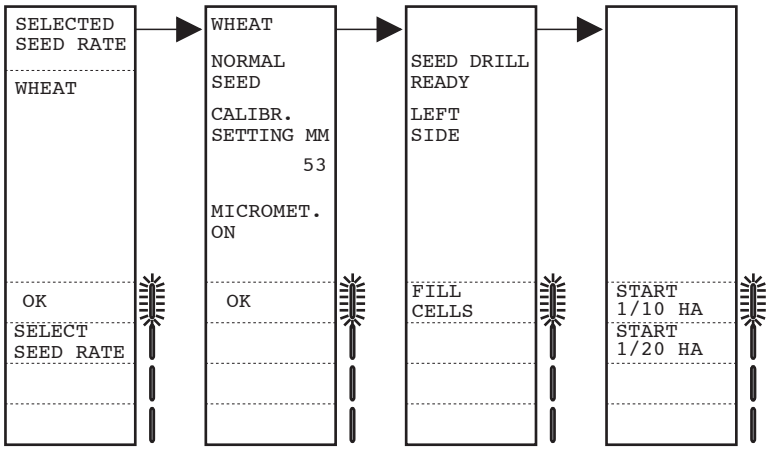


Fig. 22 - 20 Carrying out a calibration test

5. Empty the receptacles.
6. Press the “Start 1/10 ha” or “Start 1/20 ha” key.

   Carry out the calibration test for 1/10 ha for a higher level of accuracy. Select 1/20 ha only for large seed rates.

   The cell wheel turns at the later working speed. A display flashes on the screen until the calibration test has finished.

   You can stop the calibration test with “Pause” and continue it with “Continue”.

7. Weigh the seed collected.

   The weight of this seed rate may be different from the set value for 1/10 or 1/20 ha. This difference is corrected automatically by the computer.

8. Enter this weight in grams into the computer.
(e.g. 17.5 kg = 17500 g).

9. Press the “calculate” key.

10. If your seed drill has two metering devices repeat the calibration test with the metering device on the right hand. On the screen you will now see the range of speeds at which the desired seed rate can be metered, see Fig. 22 - 21. The computer will give off an alarm if the actual speed when sowing is outside this range.

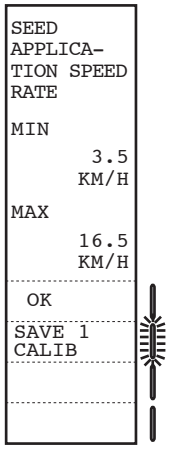


Fig. 22 - 21
Saving the results of a calibration test as “calibration test 1”

You can adjust the speed limits by changing the setting of the metering device:

- Metering device(s) more open: speed range adjusts upwards, you can drive more quickly.
- Metering device(s) more closed: speed range adjusts downwards, you can drive more slowly.

In this case you must repeat the calibration test.

11. Press “OK” if you want to work with the inserted settings without saving them for re-use at a later date.

You can save the results of up to three calibration tests for later use, see Fig. 22 - 21:

Calibration test

Use this function to check if the calibrated seed rate is actually drilled.

- Lower one track marker arm.
- Place a receptacle under the open metering device.
- Fill the seed hopper with seed.
- Enter the area for the test, e.g. 0.1 ha, see Fig. 22-22.

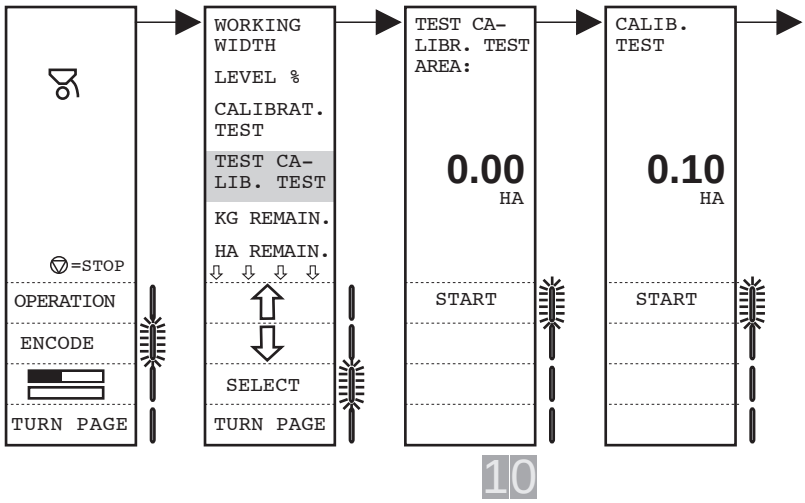


Fig. 22 - 22 Calibration test for 0.1 ha

The test is more accurate if you enter a larger area. Make sure you use a big enough receptacle!

- Start the test.

You can interrupt the test with “Pause” and continue it with “Continue”.

- Weigh the seed collected. Use this to work out the seed rate per hectare. In the event of large differences, first repeat the test and, if necessary, the calibration test.

Remainder (kg)

While working you can establish how much seed is left in the hopper.
For this, you must input the quantity of seed poured in (in kg).

If the seed hopper is not empty when you are refilling it, add the remainder in the hopper to the amount just poured in:

remainder + amount added = total hopper volume (kg)

Such an entry is also important so that the computer can give off an alarm signal when there is too little seed remaining in the hopper.

Hectares remaining

Input here the area of your field in hectares. With this you can check at any time how much of the field still has to be sown.

Rhythm

The computer needs the working width of the seed drill so that it can calculate the rhythm.

Input the working width of the sprayer/fertiliser in cm. Enter “0” when you do not want tramlines.

The calculated rhythm will appear on the screen. If this combination is not possible, you will be informed that there is an error.

Read the section starting on page 4 -14 to find out about possible tramline rhythms.

- If there is an **odd-numbered** rhythm:
  You do not need to input anything else as odd-numbered rhythms are always symmetrical and you can begin sowing on either the left or the right side of the field.
- If there is an highlighted-**numbered** rhythm:
  Input whether the shut-off coulters are symmetrical or not and whether they are mounted on the right or left side of your seed drill, see Fig. 22 - 23.

You will then be told on which side of the field you must begin sowing. If the shut-off coulters are arranged symmetrically, you must begin with half the working width, see p. 22 - 32.

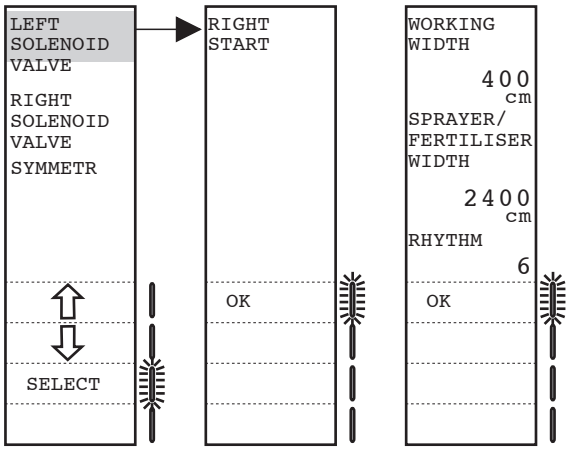


Fig. 22 - 23 Example of an highlighted-numbered rhythm

- If there is a **special rhythm:**
  Input whether you want to start sowing on the left or right side of the field, see Fig. 22 - 24.

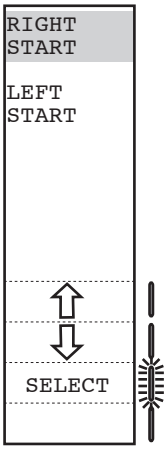


Fig. 22 - 24 Example of a special rhythm

Number of coulters

Input here the number of coulters on your seed drill. This is necessary so that you can correct the seed rate correspondingly when tramlining.

Coulters in tramline

Input here the number of shut-off coulters per track when tramlining.

- Example: Rhythm 3, 2 shut-off valves on both right and left
  Input: “2”
  Rhythm 4, 3 shut-off coulters on the left side of the seed drill
  Input: “3”

Return:

Input whether the solenoid valves are equipped with seed return or not. The selected information will appear in the information section of the screen.

Insert “without return” if your seed drill has solenoid valves both with and without seed return. In this case the displayed amount for “kg remainder” will be less than the quantity of seed still in the hopper.

Path sensor

The path is measured by a sensor on the seed drill's drive wheel or a radar sensor on the tractor. Select a sensor.

Calibrate the path sensor:

- Mark the start and end points of a distance of 100 m and drive to the starting point.
- Press the “calibrate” key twice. This screen will appear:

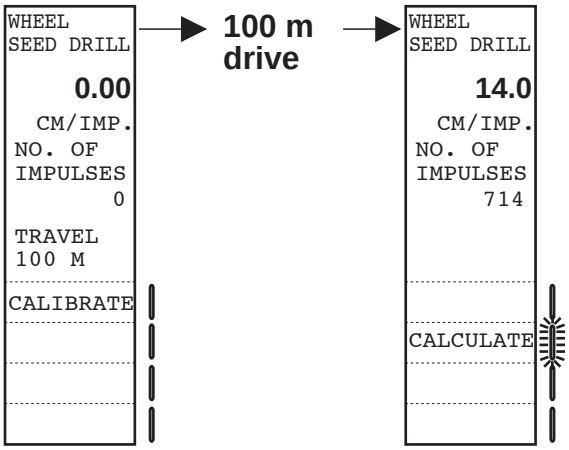


Fig. 22 - 25 Calibrating the path sensor

- Travel the 100 metres. Stop exactly at the end point.
- If the computer has received enough impulses, the “calculate” function key will flash, see Fig. 22 - 25. Press this key and the calibrating will end. The calculated data will appear on the screen.
  The following table contains estimates of the data which will appear after you have calibrated. The figures depend on soil conditions so can vary. This does not apply for radar sensors.

Table 22 - 1 Stored values cm/imp for the various types and sizes of drive wheel

Drive wheel	Value [cm/imp] (approx.)	Number of impulses after travelling 100 m (approx.)
DA/DA-S/DE-S/DF/DG	14.0	714
7.00-12 (DL)	11.8	850
26.00-12.00 (DL)	12.0	833
7.50-16 (DT)	14.3	697
31-15.50 (DT/DV/DC)	13.7	731

You can input the value “cm / imp” directly when the menu seen in Fig. 22 - 25 appears. This, however, can lead to inaccuracies.

Operation sensor

Choose which sensor you want to use to switch on and off the electric metering device drive, the hectaremeter and the timer:

- 3 point DIN/ISO: The listed functions are controlled from the tractor via the signal socket signals.
- 3 point external: Sensor on the tractor's three-point linkage (accessory). This sensor is necessary if your machine does not have a track marker and there is no signal from the signal socket.
- Seed drill: Sensor on the seed drill's track marker changeover mechanism (standard equipment).
- None: If there is no sensor on the track marker changeover mechanism or the three point linkage, select “none”. In this case you will have to switch the position of the tramlining control system by hand, see “rhythm +1 / rhythm -1” on page 22 - 37.

If you selected “none” but there is a sensor on the track marker changeover system, the tramline sequence is recounted automatically when the track markers are changed. In this case the metering device drive will be affected by the drive wheel only (not by the position of the track marker)

“None” can not be selected at the same time as “Radar”. If “None” is selected and then “Radar”, “None” changes automatically to “Seed drill”.

The selected sensor will appear in the information section of the screen.

Timing device

Choose whether the timer is to be started/stopped manually or with an operation sensor.

Alarm

Here you can choose which critical operating states should be indicated by an alarm signal in the tractor cabin.

- k.p.h.: Alarm on/off; Upper and lower working speed limits.
- kg remainder: alarm on/off; lower limit of the remainder in the seed hopper.
- metering shaft: alarm on/off.
- hopper: alarm on/off; hopper reserve level too low. The low level sensor will give this signal. (accessory)
- r.p.m.: alarm on/off; Upper and lower fan speed limits.

Always have the “r.p.m.” fan speed limit alarm switched on when sowing. If this is not the case, the metering device drive can start when the fan is switched off.

- Seed alarm: alarm on/off; the seed flow in the diffuser tube is observed (accessory).

Date/time

Enter here: hours - minutes - seconds - year - month - day.

Status screens

The status screens show all inputted data.

The status screens appear automatically when changes have been made to the “input” and you have pressed the return key. Check here again that all inputted data is correct.

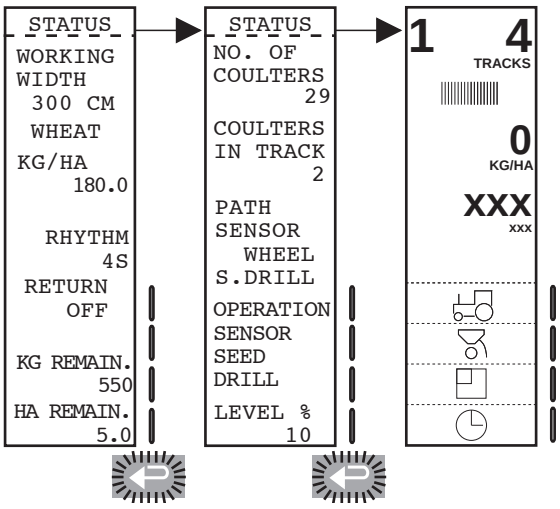


Fig. 22 - 26 Status screens

The operating menu will appear when you confirm the status screens with the return key.

Operation

1. Select the operating menu, see p. 22 - 27:
   - if the computer is switched off: Switch the computer on with the toggle switch on the support (in the tractor cabin).
   - if the computer is already on: Confirm the status screens with the return key or select the function “Operating” in the basic menu, see Fig. 22 - 12.

Always keep the r.p.m. alarm on when sowing, see page 22 - 29. If this is not the case, the metering device drive can start when the fan is switched off.

Before you start work in a new field delete these “field data”: working time, worked areas and metered seed rate, see p. 22 - 39. If you do this you can start recording data again at the beginning of a field.

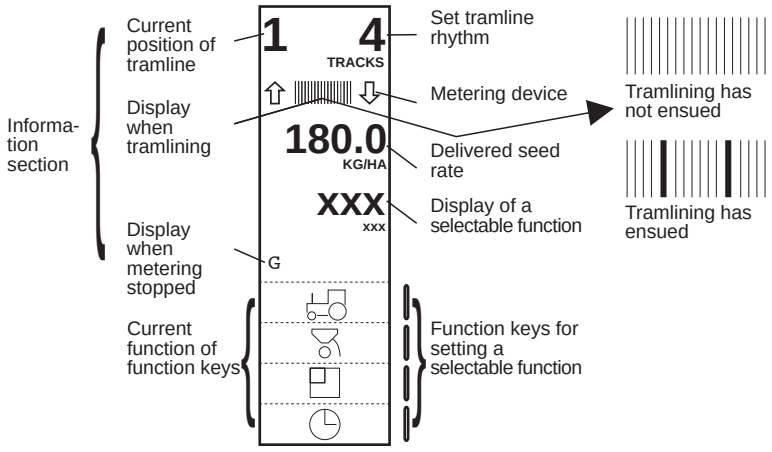


Fig. 22 - 27 Screen displays during operation (operating menu)

During operation, you will see information on the operation of the metering device, tramlining and the seed rate in the upper part of the information section. A “G” will appear in the bottom left corner when the metering stops, e.g. when the track marker arms have folded up on the edge of the field. You cannot change this display.

In the lower part of the information section the display of the function that you have selected with a function key appears. These functions are described in the section starting on p. 22 - 34.

The respective functions of the four function keys appear on the screen next to the relevant key.

2. Operate the track marker on the edge of the field, making sure it is lowered on the correct side.

The following step (step 3) is to be observed only if you want an even numbered S-rhythm, e.g. 4S; 6S. For all other rhythms, e.g. 4; 5 or 6, follow step 4.

3. **(Only necessary when you are beginning a new field and want an even-numbered S-rhythm, e.g. 4S; 6S)**
   - For when you commence operation and your seed drill has only one metering device, input the value of half of the working width, see p. 22 - 16. If your seed drill has two metering devices switch one side off, see Fig. 22 - 28. The measured area and the metered amount will be halved automatically.

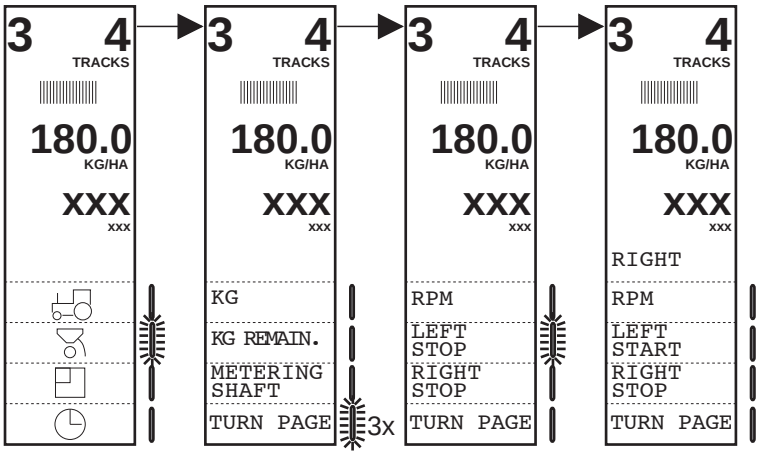


Fig. 22 - 28 switching off the left side

   - Sow once with half the working width.

Before commencing operation with full working width do the following:

- enter the value for the full working width again.
- set the actual tramline to “1”, see Fig. 22 - 29.

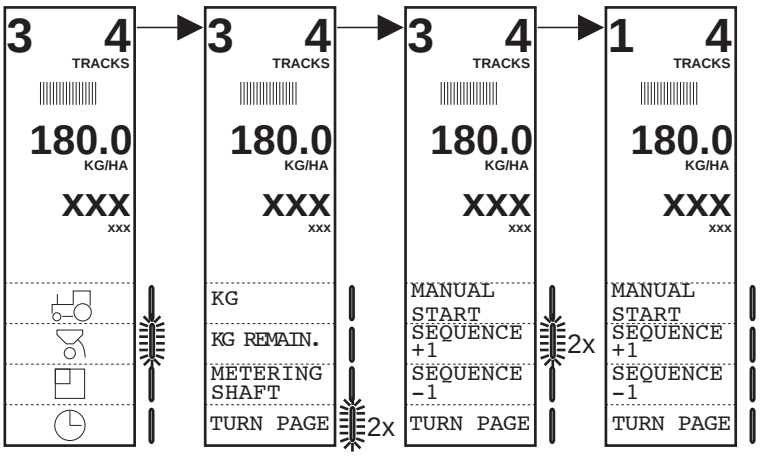


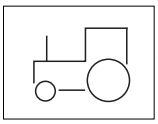
Fig. 22 - 29 setting the tramline sequence to “1”

4. Switch the current position of the tramline to “1” at the beginning of the field or to another value if you want your work to be interrupted, see Fig. 22 - 29.
5. Switch on the fan and start sowing. As soon as the metering device starts to be driven, a flashing arrow will appear on the screen as an optical check. The rate of seed being metered (kg/ha) will be shown.
6. Shortly before you reach the end of the field activate the track markers. The metering device will stop as soon as both track markers raised. There will now be a short hooting tone.

Selectable functions

You can choose four functions with the function keys. These are:

- Tractor functions
- Seed drill functions
- Area functions
- Time functions



Tractor functions:

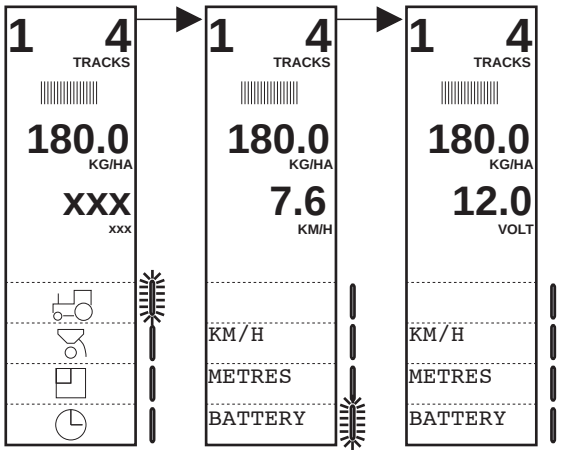
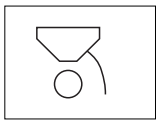


Fig. 22 - 30 The displays for selectable functions (here = tractor functions)

- *k.p.h:*
  The working speed is displayed.
- *meters:*
  The distance travelled in metres is displayed. The distance is measured by the selected path sensor, see p. 22 - 26.
- *Battery:*
  Supply voltage to the computer.



Seed drill functions:

- *kg:*
  Sown seed (in kg) since setting at zero. If you have deleted by using the data/delete function, see p. 22 - 39. Using the data/delete function you can read the total counter, see p. 22 - 39.
- *kg remainder:*
  amount left in seed hopper. requires the input of the amount poured in before work begins, see p. 22 - 23.
- *Speed of metering shaft:*
  This can be equipped with a warning signal. This is set using the “alarm” option under “input”, see p. 22 - 29.

Press the “scroll” key to get the following functions:

- *+xx% / -xx%:*
  gradual increase or reduction of the inputted seed rate (as a percentage). The entire amount of adjustment is displayed as a flashing number on the screen.
  A warning appears on the screen if the seed rate is increased or decreased by too much. If this is the case, enter into “input - setting level increase/decrease %” a smaller increase/decrease, see p. 22 - 17. The setting levels are the same for increasing and reducing the seed rate.
- *Normal:*

  This function appears only when the seed rate has been changed more than +xx% or -xx%.

  Press this key to return to the seed rate set in “input” (=100 %). It does not matter how much you changed the seed rate.

- *Seed rate:*

  This function appears only when the seed rate has been changed not more than +xx% or -xx%.

  Select this function to change the basic setting of the seed rate.

• Example:

- current setting: 180 kg/ha wheat
- desired setting (e.g. for another field): 190 kg/ha

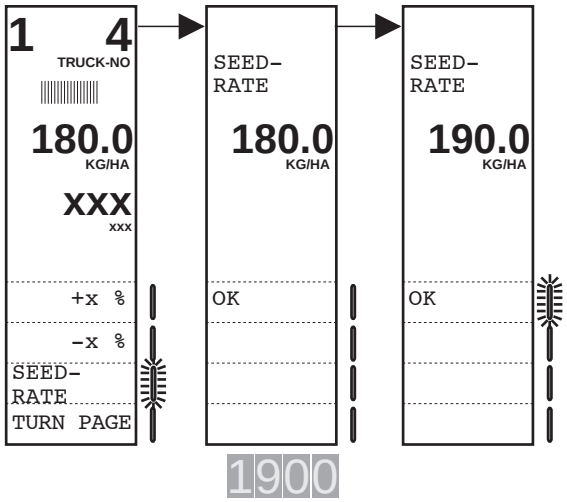


Fig. 22 - 31 Changing the basic setting of the seed rate

Use this function only if you want to continue sowing with the same sort! Otherwise you need to carry out a new calibration test or go back to an already saved calibration test.

The changed speed range appears for checking purposes. Carry out a new calibration test if you can not work in this range.

Press the “turn page” key to get the following functions:

- *Manual start (special function)*:
  With this function you can start sowing exactly even if you are not able to start up the seed drill a few metres before the start of the sowing operation because of, for example, tight corners or obstacles.
  - Before starting up on the edge of a field press the “manual start” key. The metering device will begin to meter seed.
  - Wait a few seconds for the the seed to reach the coulters.

If you do not start-up within 20 s, the metering device drive will stop again when this time has elapsed.

- Start sowing as soon as the computer receives travelling speed signals, the automatic adjustment begins. The screen display will now read “manual stop”.

- *Manual stop (special function):*
  This function stops the metering device drive without a signal from the operation sensor, i.e. without the track markers being changed or the seed drill being lifted.

  A signal from the operation sensor is needed before the metering device can start again. Depending on the operation sensor you have, you will have to either activate the track marker or lift the seed drill.

- *Rhythm +1 / Rhythm - 1:*
  With this key the tramline is increased or decreased by a rhythm of one. This is necessary in two particular cases:
  - For setting the correct starting position
  - after incorrect counting during the operation. This can happen if, for example, the track markers are lifted unintentionally.

  There is an acoustic warning with each automatic counting.

Press the “turn page” key to get the following functions:

- *r.p.m.*:
  Fan speed per minute. This can be equipped with a warning signal. This is set with the “alarm” option under “input” (see p. 22 - 27).

- *half-width shut off (1/2 width left/ right):*
  This function enables half-width shut off for seed drills with 2 metering devices. See Fig. 22 - 25.
  - Press “left stop” to turn off the metering device on the left hand side. The following message appears on the screen: “right”. The metering device on the right hand side is turned off when you press “right stop”.

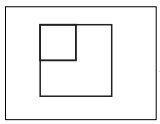
  If you have turned off both sides inadvertently, “all off” will be displayed.

Press the “turn page” key to get the following functions:

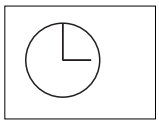
- *Further sowing:*
  If you have to raise the track markers prematurely, e.g. because of an obstacle, the metering device in normal operation will be stopped automatically by a signal from the operation sensor.If you press the “further sowing” key before the track markers are raised, the metering device will still be driven and the tramline rhythm will not be changed even if the track markers are raised. The screen display will change to “Normal sowing” and “Stop” will flash in the lower part of the screen.

  The flashing “Stop” does not refer to the metering device drive but to the counting of the tramline rhythm.

  Press “Normal sowing” to turn this function off again.


Area functions:

- *ha/h:*
  Displays area worked (hectares per hour). The area worked per hour with the particular working speed is displayed.
- *ha:*
  The area worked in hectares (since the field data was last deleted) is displayed. You can delete field data in the “Data/delete” menu at the start of the field, see p. 22 - 39. The total area can be read only in this menu.
- *ha remaining:*
  Displays the area not yet worked. This display is only possible if you input the field size before you start sowing (“Input” menu, ha remaining, see p. 22 - 24).



Time functions:

- *Time:*
  The stopwatch is started and stopped manually. A colon flashes when the stop watch is running. The display is h : min. Delete the time in the “Data/delete” menu, see p. 22 - 39. The total time can be read only in this menu.
- *End time:*
  When the current work is expected to end. The basic values used to calculate this are the current work rate and the inputted remaining area.
- *Timer: Hour*
  s: Minutes. Set the time under “Input”, see p. 22 - 29.
- *Date:*
  Day: Month: Year. Set the date under “Input”, see p. 22 - 29.

Order management

With the computer you can save the time, area and drilled seed rate field data for up to 35 orders. With the appropriate accessories this data can be printed and/or transferred to a PC.

Select the order menu if you want to work with orders, see Fig. 22-32:

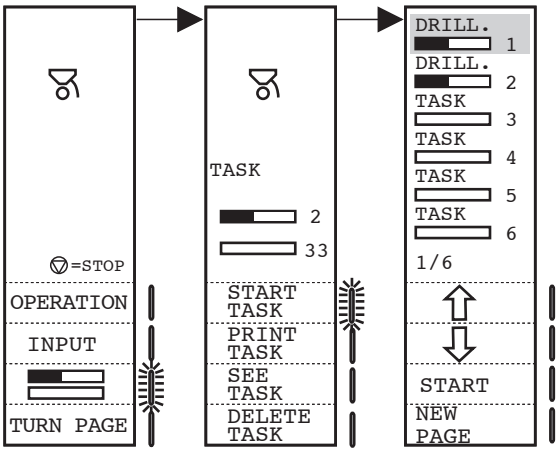


Fig. 22 - 32 Selecting order menu

The first menu screen shows the number of orders which have already been registered (▬) and the storage locations still available (▭).

Start order

- Press “Start order”, see Fig. 22-32.
- For processing select either an order which has previously been saved or a new order, see Fig. 22-33.
  If you open an already available order and continue to sow with this, the stored field data for time, area and drilled seed rate is still counted.

Previously stored orders can be recognized by the description “Seed drill” and the sign ▬ .

The field data is deleted when you start a new order. Counting starts at zero.

- Press “Start”. The order starts from this point. A menu with four points appears, see Fig. 22 - 33. If you do not want to make any more entries, confirm with the return key. You access the basic menu. The symbol in the basic and operating menus indicates that an order is running. Now start the drilling work.

1. Enter ID no., see Fig. 22-33: Here you can enter a number as additional information for the order, e.g. the telephone number of the customer or an employee ID. You can enter the ID no. at any time when the order has been started. The “C” key cancels this.

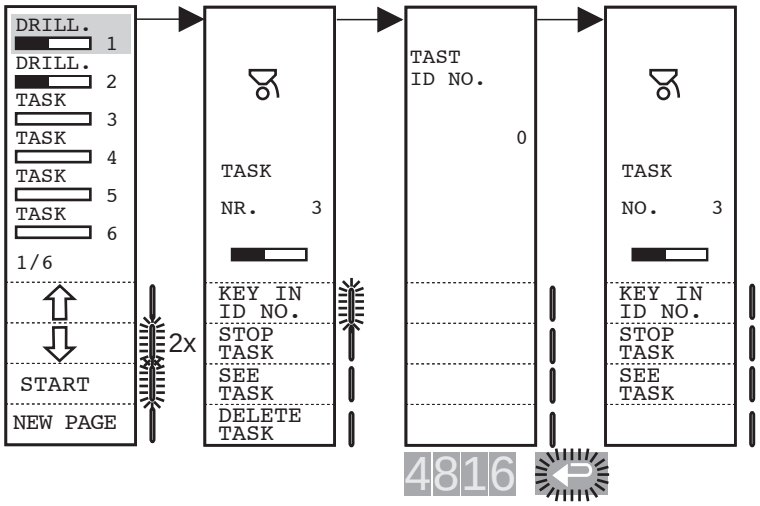


Fig. 22 - 33 Entering ID number

2. End order: The current order is stopped by this function key. An order can be reopened at any time provided it is stored on the computer.
3. See order: With this you can display the field data for an order on the screen without starting this order.
4. Delete order: Use the arrow keys to select the order to be deleted. Press “Delete” to delete the selected order.

Print order

You can print out the data of a particular order or all stored orders together, see Fig. 22-34.

Here you need the following accessory equipment:

- print: 12 V printer with adapter cable, LH Agro No. 905-242
- store: Power supply and PC adapter cable, LH Agro No. 905-168; PC with Windows 3.x or higher. Transfer the data to your PC as a text file via Windows program “Terminal” (Windows 3.x) or “Hyper Terminal” (Windows 95). Then, using standard software such as Microsoft Word or Excel, you can further process the data or print it out on your office printer.

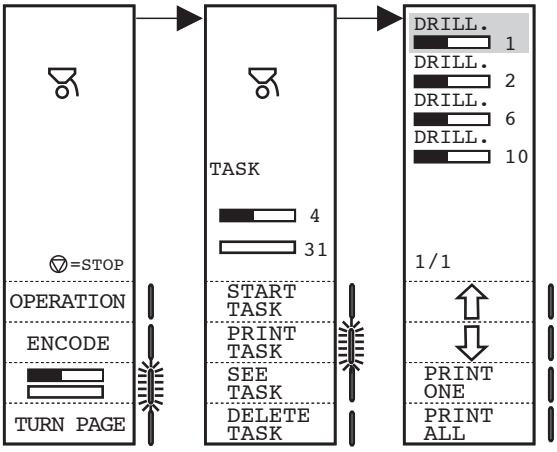


Fig. 22 - 34 Printing order data

The “Data/delete” function

You can do the following with this function:

- Display the total counters. This is possible only under the “Data/delete” function.
- Display the following field data: time, area and metered seed rate. If the field data was set at zero (deleted) at the start of operation it refers to the field just worked.

- Deleting: Total counters can be deleted only individually, see fig. 22 - 32. Field data can be deleted in one step with the “Delete field data” key.

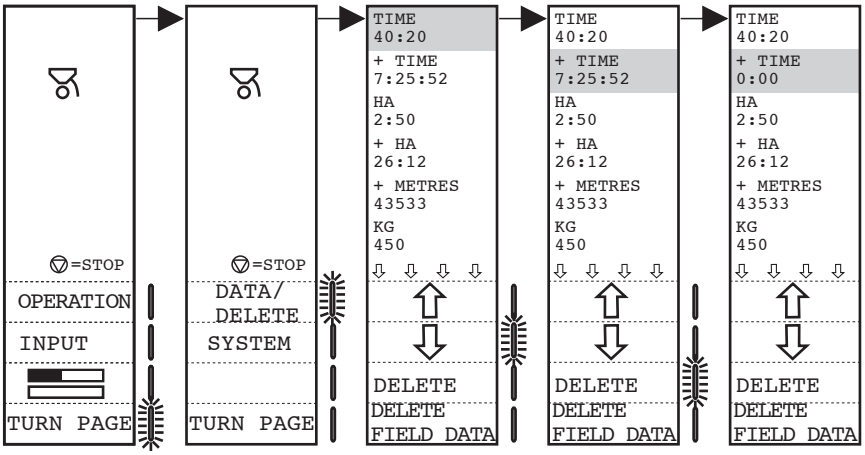


Fig. 22 - 33 Selecting the Data/delete function and deleting the total counter for working time

Description of the displayed data:

Time	Field data for time worked since the setting was put to zero
+ Time	Total time worked since the setting was put to zero
ha	field data for areas worked since the setting was put to zero
+ ha	total areas worked since the setting was put to zero
+ Meters	distance travelled in meters since the setting was put to zero. This is deleted like a total counter
kg	field data for seed rate metered since the setting was put to zero
+ kg	total seed metered since the setting was put to zero

The counters “time +”, “ha +” and ”kg” + are only in the Data/delete menu.
They cannot be selected under “Operation”.

Space for your own notes

Hydraulic fan drive

Hydraulic fan drive

Safety

The hydraulic fan drive is intended for use with only DL, DT, DA, DA-S, DE-S, DF1, DF2, DV, DC and DG seed drills. It may not be used for any purpose other than that for which it is intended. Improper use shall be at the user's own risk and Kverneland Soest cannot be held liable for any damage resulting therefrom. Similarly, liability cannot be assumed by Kverneland Soest for any damage to the tractor caused by improper connection.

The hydraulic fan drive may be used, maintained and repaired only by persons who are familiar with its working and have been made fully conversant with the risks involved.

Make sure that the hydraulic system is at zero pressure on both the tractor and equipment side when uncoupling.

Read chapter 2 (“Safety”) very carefully.

Technical data

Table 23-1 Technical data of the hydraulic fan drive

Type	Working width	Hydraulic motor		Oil supply			Fan speed [1]
		Absorption capa	citySpeed [1]	minimum feed line pressure [2]	maximum return line pressure [3]	Flow rate	
	[m]	[cm³]	[r.p.m]	[bar]	[bar]	[l/min]	[r.p.m.]
DL/DC	**all**	22.5	1000	160	10	30	4150
DT	**up to 6.66**	8	4150	130	10	40	4150
	8	8	4600	160	10	43.5	4600
	9	8	4500	160	10	43.5	4500
DA/DA-S	**2.5 - 4**	8	4200	130	10	40	4200
DE-S	**4.5**	8	4400	130	10	43.5	4400
DA-S	**5**	8	4400	160	10	43.5	4400
DF1	**all**	8	4350	130	10	43.5	4350
DF2	**all**	8	4500	160	10	43.5	4500
DV	**all**	8	4500	160	10	43.5	4500
DG	**all**	8	4500	160	10	43.5	4500

1) All speeds ± 50 r.p.m. once hydraulic motor has settled down to a constant speed at a constant oil temperature.
2) Dimensions:nominal diameter at least 10 mm, i.e 12 mm o.d., 9 mm i.d.
3) Dimensions: nominal diameter at least 12 mm, i.e 15 mm o.d., 12 mm i.d.

Prerequisites for the fitment of hydraulic fan drive

The tractor must have the following:

1. **Adequate oil feed**
   As specified in Table 23-1
2. **Parallel operation**
   In the case of seed drills with certain special control functions (e.g. coulter pressure adjustment) parallel actuation of the control valves is necessary. The oil supply to the fan drive can be briefly interrupted for the lifting operation.
3. **Oil cooler**
   If an oil cooler has not already been fitted as standard, either an oil cooler must be retrofitted or the oil reserve must be increased by means of an additional reservoir (the ratio of oil delivery rate per minute to the volume of oil contained in the reservoir should be 1:2). This is necessary only if the required minimum oil flow rate is exceeded by more than 20%.
4. **Number of control units**
   Suitable control units must be available for the selected hydraulic functions, whereby it may be possible to couple similar functions together. Priority must be given to the oil supply for the hydraulic fan drive.
5. **Special requirements for certain tractors:**
   - A conversion plate (Article No. 498853) must be fitted in the case of all John Deere tractor models up to and including Series 50.
   - If a Ford tractor is to be used, please contact the manufacturer or distributor.

Connection to tractor

Check your tractor (see check list) and have any necessary modifications carried out by your tractor dealer.

Functional description

The hydraulic fan drives for the various

Kverneland Soest seed drill models are all based on the same circuit diagram (fig. 23-1).

1 Hydraulic motor
2 Three-way flow control valve
3 Return valve
4 Quick-release coupling for pressure line (nom. dia. of pipe 10 mm, o.d. 12 mm)
5 Quick-release coupling for pressureless return line (nom. dia. of pipe 12 mm, o.d. 15 mm)
5a Quick-release coupling socket (nom. dia. of pipe 12 mm), standard.
6 Hydraulic pump
7 Pressure relief valve
8 Auxiliary control valve (double or single acting possible)
9 Filter
10 Connection point for pressureless return line
11 Reservoir
12 Rev counter
13 Connection point for pressure relief valve
14 Conversion plate (Article No. 498 853)

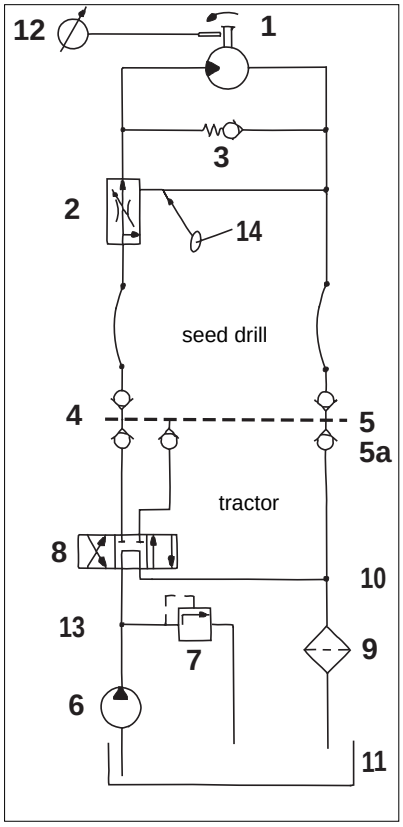


Fig. 23-1
Circuit diagram for hydraulic fan drive

The oil flows from the auxiliary control valve via the quick-release couplings to the three-way flow control valve. The three-way control valve serves to control the flow rate which in turn determines the speed of the hydraulic motor. The resultant fan speed is indicated on the rev counter. The fan speeds for the various seed drill models are given in Table 23-1. The built-in return valve permits the fan to slow down gradually when the hydraulic system is switched off.

Laying the hydraulic lines

The hydraulic system generates extremely high pressures. Spurting hydraulic oil can penetrate the skin and cause serious injury. Call a doctor immediately in the event of injury. Risk of infection! Never install hydraulic components inside the tractor cabin!

When laying the hydraulic lines, make sure that they cannot be damaged or subjected to abrasion when the seed drill lifting mechanism is operated.

Pressure line

For normal operation, the tractor must be equipped with a single-acting or double-acting auxiliary control valve for the pressure line (fig. 23-1).

For parallel operation, the tractor must be equipped with a flow divider (e.g. a three-way flow control valve) between the connecting point for the pressure relief valve and the auxiliary control valve of the tractor (not shown in the circuit diagram). This will then permit parallel operation of the rear power lift system (auxiliary control valve) and the hydraulic fan drive, though the lifting movement of the power lift will now be performed more slowly. Make sure that the prescribed oil flow rate (see check list) is available.

The quick-release couplings of the tractor for the pressure line connection may be used for both normal and parallel operation.

If it is not possible to obtain the required flow rate for normal or parallel operation, an additional hydraulic circuit (hydraulic pump, pressure relief valve, directional valve, and possibly an additional reservoir) must be installed. So as not to increase the pressure in the pressure line unnecessarily, make sure that the hydraulic lines are constructed from rigid piping

(dimensions at least 12 x 1.5 mm). Consult your tractor manufacturer or dealer.

If the tractor is equipped with a variable displacement pump and a built-in flow control valve (closed hydraulic system), set the required flow rate at the tractor and fully open the three-way flow control valve (see fig. 23-1).

If the tractor is equipped with a variable displacement pump but not a standard flow control valve (closed hydraulic system), it will be necessary to convert the existing three-way flow control valve into a two-way valve by means of the conversion plate (Article No. 498853), see Figs. 23-1 / 23-2. This modification is necessary, for example, on all John Deere tractor models up to and including Series 50.

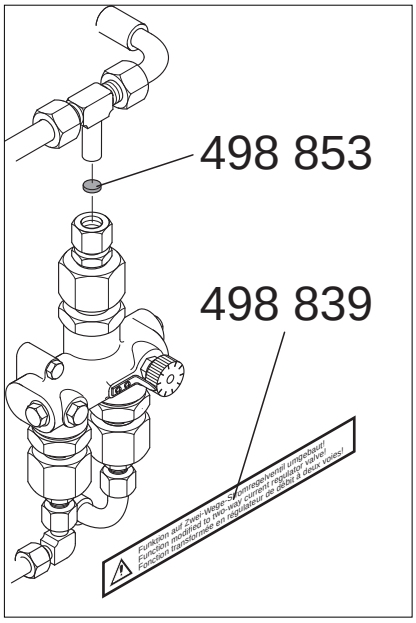


Fig. 23-2 Installing conversion plate 498 853

- Attach sticker 498 839 to a place where you can easily see it. With this you will prevent faults when the seed drill is coupled to different tractors.
- If a tractor without a variable displacement pump is used, the conversion plate 498 853 must be removed.

Depressurised return line

The return line must be pressureless so that the hydraulic motor does not sustain damage.

The maximum permissible return line pressure is 15 bar. Too high a pressure will force the shaft seal out of its seating.

Use 12 mm nom. dia. piping (15 x 1.5 mm) for the return lines. The quick-release coupling socket (fig. 23-1) must be mounted on the tractor. When selecting the point at which the pressureless return line is connected back into the tractor's hydraulic system, give consideration to the following points:

- The returning oil must pass through the hydraulic oil filter
- The returning oil must not pass through any control valves (e.g. the auxiliary control valve), as this would cause an excessive increase in the return line pressure.
- Any gearbox lubricating system connected to the hydraulic system must not be allowed to run dry.
- The oil must return along the shortest route possible (i.e. not through the gearbox), as the hydraulic pump could otherwise run dry and sustain damage.

Your tractor manufacturer will provide you with any further information you may require.

Oil cooler

If you find that the oil becomes overheated, either because the delivery rate is excessively high or the oil reserve is too small, instruct your dealer to fit an oil cooler to the tractor. If the installation of an oil cooler is not possible, the problem can be remedied by fitting an oil reservoir with as large a surface as possible. **The ratio of oil delivery rate per minute to the volume of oil contained in the reservoir should be 1:2**. In the case of the older Ford tractors it is necessary to install an oil cooler with a recooling capacity of 5 kW.

Operation

The maximum permissible fan speed is 5000 r.p.m.!
Make sure that the hydraulic couplings are properly connected.

- Connect all hydraulic couplings together.

  In the case of the DF1 and DF2 the pneumatic system must also be coupled. Secure the manifold to the venturi cone.

- Adjust the fan speed (see Table 23-1 showing the fan speeds for the various seed drill models) by means of the three-way flow control valve located either on the seed drill or on the tractor (see fig. 23-1).

Initial operation

When operating the hydraulic fan drive for the very first time, you must continue to adjust the fan speed until the hydraulic oil reaches its operating temperature and no further changes in speed occur.

In the case of all subsequent start-ups with cold oil and the same setting of the three-way flow control valve (fig. 23-1), the fan will rotate slightly faster during the warming-up phase and then quickly slow down to the speed setting obtained during initial operation.

Use with different tractors

Any inadmissible mixing of different hydraulic oils may cause irreparable damage to tractor components.

If several tractors are to be used in conjunction with the hydraulic fan drive, then you must adjust the setting of the three-way flow control valve (fig. 23-1) for each tractor.

Simultaneous operation of two hydraulic motors

In cases where two hydraulic motors are operated simultaneously, the oil feed from the tractor hydraulic system must be sufficient to enable both motors to achieve their prescribed speeds. The motors should be connected in parallel. Connection in series (normal operation) results in too high a pressure in the return line from the first motor and, in most cases, in failure on the part of the tractor hydraulic system to generate the required total pressure.

Installation and setting of rev counter

The rev counter must be installed in a clearly visible position in the tractor cabin.

1. Insert the plug into the power supply socket (12V) of the tractor. If there is no socket available, then install the socket supplied with the rev counter:
   - bolt the socket to the tractor chassis (earth connection).
   - Connect the cable with the 8A fuse to the +12 V.
2. Couple the sensor to the rev counter by means of the plug-and-socket connector.

1 Rev counter
2 12 V socket
3 Plug for 12 V supply
4 Sensor
5 Socket
6 Plug

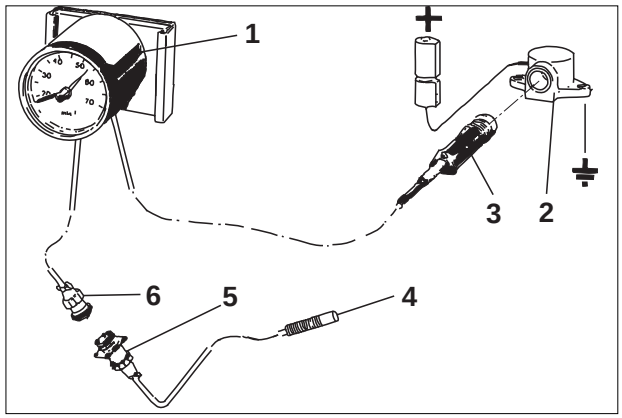


Fig. 23-3
Rev counter and accessories

Read the chapter “Fan speed” on p. 21-18 if the rev counter is to be used in conjunction with the ESC.

The sensor measures the rotational speed of the fan. It receives two impulses per revolution from the impulse transmitter and conveys them to the rev counter. The fan speed must be selected to suit the type and working width of the seed drill (see table 23-1).

The maximum permissible fan speed is 5000 r.p.m.!

Should the rev counter show any signs of malfunction, check and adjust the clearance between the sensor and the cam of the impulse transmitter.

Fitting and adjusting the sensor:

1. Unscrew and remove the plug from the fan shaft bearing.
2. Screw the sensor into the fan shaft bearing until it just touches one of the cams and then screw it back by half a turn (max. clearance 1.5 mm), see fig. 23-4.

1 Fan shaft bearing
2 Impulse transmitter
3 Cam of impulse transmitter
4 Sensor
5 LED
6 Nut
7 Copper washer for DA, DA-S, DF1 sleeve for DL, DT, DV, DF2, DC and DG

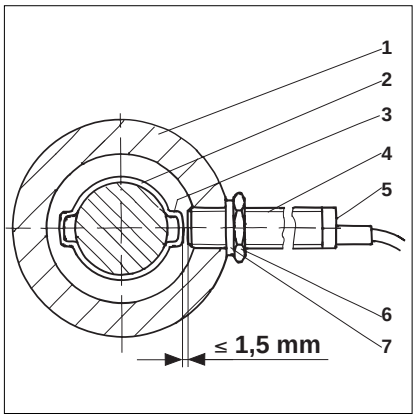


Fig. 23-4 Fitting and adjusting the sensor

3. Check to ensure that the rotational movement of the cams is not impeded by the sensor and that the impulse transmitter generates two impulses per revolution. This is done by rotating the fan manually with the current supply switched on. The LED on the sensor will light up each time an impulse is generated.
4. Fix the sensor in position by means of the locknuts.

5. If you are using the rev counter in conjunction with the ESC, pass the sensor lead through the hole provided in the side wall of the hopper, see fig. 21-8. To do this, remove the plug from the corresponding hole and insert one of the grommets provided.

Additional accessories

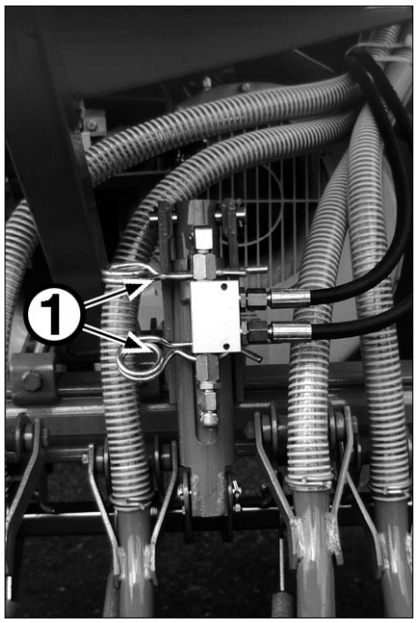
Additional accessories

Hydraulic coulter pressure adjustment

A double-acting control valve is required for the hydraulic coulter pressure adjusting mechanism.

The hydraulic coulter pressure adjusting mechanism enables you to alter the sowing depth in two steps whilst working. The maximum and minimum sowing depth is obtained by inserting two spring pins (1 in fig. 24-1) into the corresponding holes in the adjusting mechanism. The hole positions are shown in fig. 24-2, the possible coulter pressure settings are given in the diagram on p. 4-7.

If you are working in heavy soil, the coulter pressure can be additionally increased by using stronger coulter springs. These are standard with CX coulters.



1 Spring pins

Fig. 24 - 1 Coulter pressure adjustment

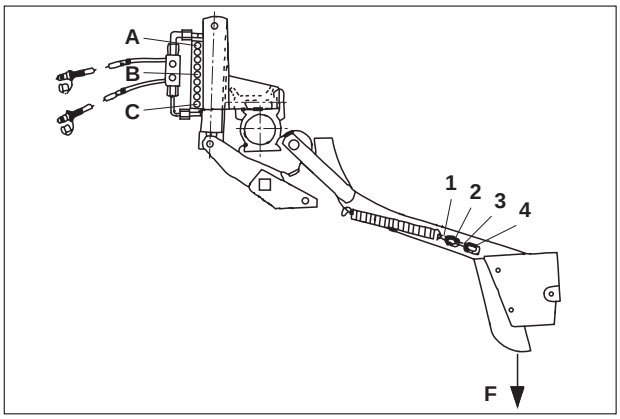


Fig. 24-2
Coulter pressure, coulter springs

Depth skids for standard coulters

The depth skids are attached to the ends of the seed delivery tubes of standard coulters. The depth skids help to maintain an optimum sowing depth where constantly changing ground conditions prevail.

Fig. 24-3 Depth skid

Single coverers

The single coverers are intended for mounting on normal and band sowing coulters. Single coverers may not be used with CX coulters or S-type covering tines. Bolt the single coverers to all long coulters and the short outer coulter

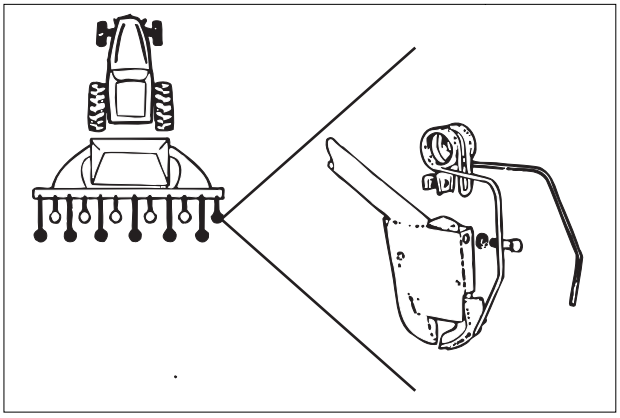


Fig. 24-4
Single coverers

S-type covering tines

S-type covering tines with a working width of more than 3 metres must be folded up and locked in position when transporting the seed drill on the road.

The S-type covering tines serve to provide the seed with an even covering of soil in ground containing a large proportion of plant residues.

Installation

1. Bolt the holders for the S-covering tines to the coulter bar (see replacement parts list). The actual position of the holders on the coulter bar will depend on the coulter clearance and the available space for the mounting of ancillary equipment. When fitted, the S-type covering tines must not interfere with the working of any other items of equipment.

In the case of the DA and DA-S seed drills, fit the holders when the drive wheel is in its raised position for road transport.

For use with the DT seed drill, the S-covering tines are provided with a folding section which provides clearance for the wheels of the transport device.

2. Install the supporting tubes and removable tubes (see replacement parts list).

Setting

- Tine pressure: With the tension spring (2, fig. 24-5).
- Available space: Set the length of the removable tubes (5) in accordance with the coulters. When fitted, the S-type covering tines must not interfere with the working of the coulters.

You can shorten the length of the removable tubes if your machine is equipped with standard coulters.

- Tine setting: The working angle of the tines can be adapted to actual ground conditions by means of the adjusting plates (1 and 4) and the rubber buffer (3):
  When working in light soil, position the holder so that it rests on the rubber buffer and, if necessary, change the hole setting of the adjusting plate. The S-type covering tines will then not penetrate the soil too deeply. When working in soils containing no plant residues, set the tines to their steepest position.

1 Adjusting plate
2 Tension spring
3 Rubber buffer
4 Adjusting plate
5 Removable tube

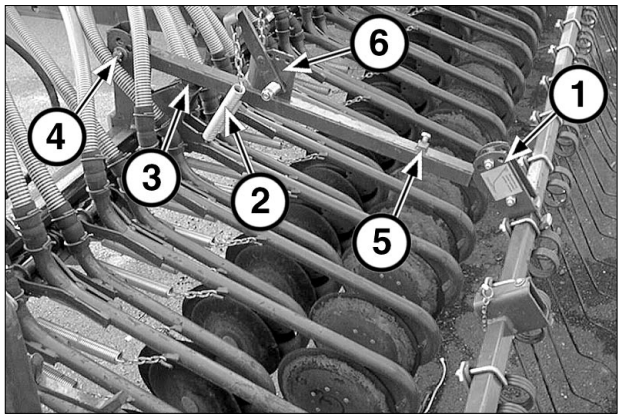


Fig. 24-5
S-type covering tines

Pre-emergence markers

Prior to transporting the seed drill on the road, withdraw the marker arm and discs from the square-section tube, turn through an angle of 180 degrees, reinsert and lock in position. Fold up and secure the pre-emergence marker.

The pre-emergence marker serves to mark the tramlines for pre-emergence spraying. The hydraulic cylinder is controlled via the FGS, ESC or ESA. The marker arm automatically lowers itself into its working position as soon as the coulters are shut off for the tramlining operation.

The manual version is intended only for rhythm 2 tramlining and marks the tramline continuously. It is brought into its working position manually and locked by means of the hand lever.

The pre-emergence marker equ*ipped* with two discs (1, fig. 24-6) is intended for the production of both tramlines in just one direction of travel (odd-numbered and S-rhythms).

The *pre-e*mergence marker equipped with just one disc is intended for the production of tramlines necessitating both forward and return travel (even-numbered rhythms). The single-disc pre-emergence marker can also be used for other rhythms, though here it marks just a single line, which means that care must be taken to ensure that the pre-emergence spraying/fertilising tractor travels on the correct side of the track.

The pre-emergence marker is bolted to the coulter bar (see replacement parts list).

If you have a seed drill with separate coulter bars (DL, DT, DF2, DV, DG) never mount the pre-emergence marker exactly at the point where two coulter bar sections are hinged together.

In order to connect up the hydraulic hose, screw the T-shaped connector straight onto the cylinder of the hydraulic track marker changeover mechanism. If the seed drill is equipped with hydraulically folding markers, fit the T-shaped connector between the hydraulic line from the tractor and the change-over valve.

Make the electrical connection. The connection to the FGS, ESC and ESA is described on pages 20-4, 21-8 and 22-9 respectively.
If the pre-emergence marker is to be retrofitted, the electrical wiring should be laid along one of the seed delivery hoses and tied by means of cable fasteners.

Make sure when laying hydraulic hoses and electrical leads that they are not squeezed or subjected to abrasion.

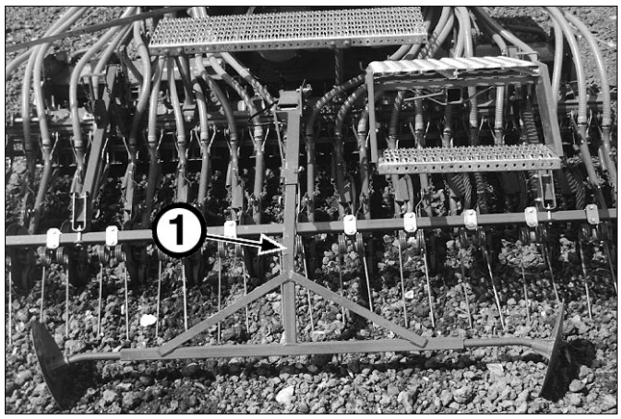


Fig. 24-6 Pre-emergence marker

The discs of the pre-emergence marker must run directly behind the shut-off coulters. They must be fitted in such a way that they do not impede the operation of the single coverers or the S-type covering tines. The length of the pre-emergence marker can be adjusted by shortening or lengthening the telescopic square-section tube.

Hopper access steps

No persons may be allowed to ride on the hopper access steps or the platform.
No other component parts may be used for the purpose of climbing onto or descending from the seed drill.

The hopper access steps for the DL, DA, DA-S and DT seed drills facilitate the filling of the seed hopper. The DA, DA-S and DV seed drills can be additionally equipped with a step extension and a platform.

1 Folding pl atform (see p. 24-9)
2 Hopper access steps

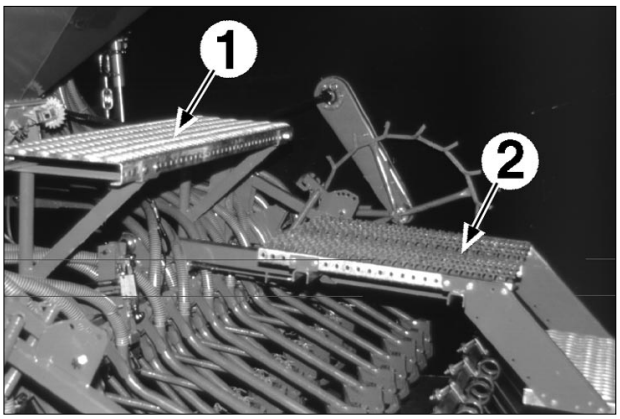


Fig. 24-7
Hopper access steps and platfom on the DA

When fitting the hopper access steps and the platform, make sure that they do not interfere with the operation of other seed drill parts, e.g. the pre-emergence marker.

The hopper access steps are provided with a longitudinal supporting member which must be securely bolted to the coulter bar (see replacement parts list). If the seed drill is to be filled from a trailer, the rear step (4 in fig. 24-8) should be mounted on the same level as the main step. The step extension (2 in fig. 24-8) may be used either as a horizontal extension of the main step or as a further step upwards.

1 Coulter bar
2 Extension step
3 Hopper access step
4 Rear step

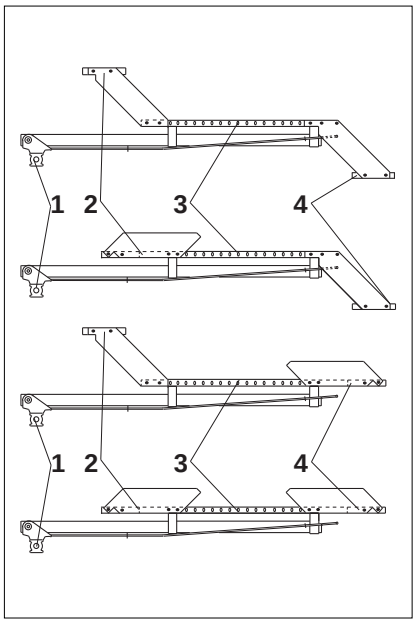


Fig. 24-8
Different possible ways of fitting rear step and step extension.

Prior to drilling, fold up the hopper access steps by means of the hand lever and lock in position. This ensures that the hopper access steps cannot interfere with the operation of the coulters and the S-type covering tines.

Platform

The folding platform is supplied disassembled and must be fitted to the coulter bar as follows:

1. Choose two free areas on the coulter bar for mounting the platform support brackets (1, fig. 24-9). The support brackets should be spaced as far apart as possible.
2. Bolt the platform support brackets to the coulter bar.

3. Now fit the hinge plates (3) and the footplate end sections (4) to the safety grating (5) using the nuts and bolts supplied (M 8x25). The distance between the left-hand and right-hand hinge plates and the end sections must correspond exactly to the distance between the platform support brackets.

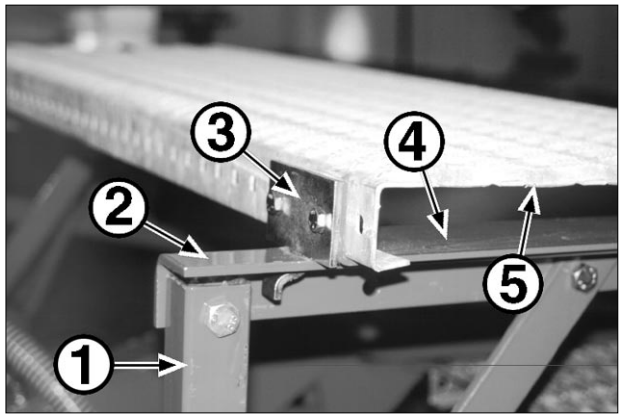


Fig. 24-9
Fitting the hinge plates and end sections

4. Insert the hinge plates into the oblong holes of the angle sections (2) of the supporting brackets. The clearance “b” between the front edge of the platform and the hopper **must not exceed 100 mm** (see fig. 24-10). The safety grating and the angle sections may also be fitted further forward in the direction of travel (see dotted lines in fig. 24-10) provided that the remaining depth of the platform (dimension “c”) measures **at least 400 mm.**

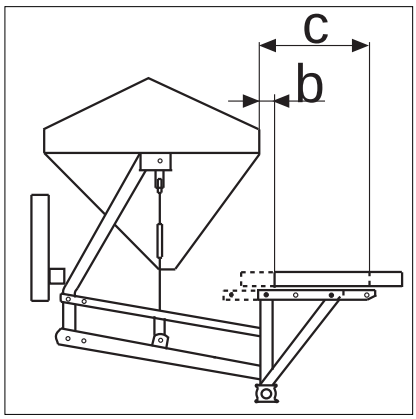


Fig. 24-10
Safety grating clearances

5. Fix a screw (M 12x60, 1 in fig. 24-11) to one of the angle sections, securing it with the aid of two nuts. This screw serves as a means of attaching the rubber tensioning strap (2).
6. Insert the two hinge plates into the oblong holes of the angle sections. Now fold up the safety grating. This will make the hinge plates go deeper into the oblong holes.
7. Thread the rubber tensioning strap through the safety grating and attach it to the screw. The tensioning strap must be taut when the platform is in its lowered position.
8. Attach the plastic slide (3) to the safety grating in such a way that, when the pre-emergence marker (4) is raised out of its working position, the marker arm strikes the plastic slide and raises the platform (see fig. 24-11).

The safety grating can be removed when calibrating the seed drill.

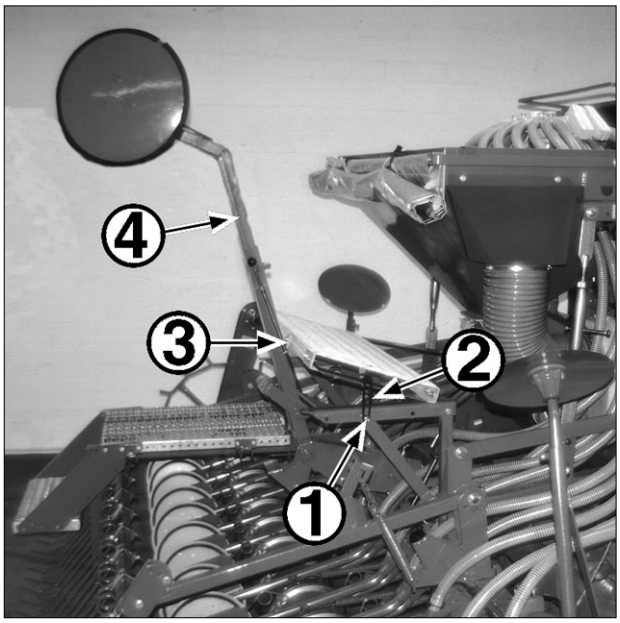


Fig. 24-11
Plastic slide when platform is in raised position

Hopper extensions

Hopper extensions are supplied disassembled by Kverneland Soest. To mount the extensions on the seed hopper:

1. Cut the self-adhesive foam rubber strip (7, fig. 24-12) to the length of the angle brackets (8). Affix it to the 4 angle brackets to seal the corners.
2. Bolt the angle brackets and the fronts and sides (1; 9) together, using the M 6x16 saucer-head screws (10), the U-shaped washers (3) and the M6 nuts (2) (4 of each per corner).

1 Side wall
2 Spring-action locknut 6 mm
3 U-shaped washer 6.4 mm
4 Spring action lo cknut 8 mm
5 U-shaped washer 8.4 mm
6 Hexagon sc rew 8 x 20 mm
7 Self-adhesive foam rubber strip 9x3 mm
8 Angle bracket
9 Front and rear wall
10 Saucer-head screw 6 x 16 mm

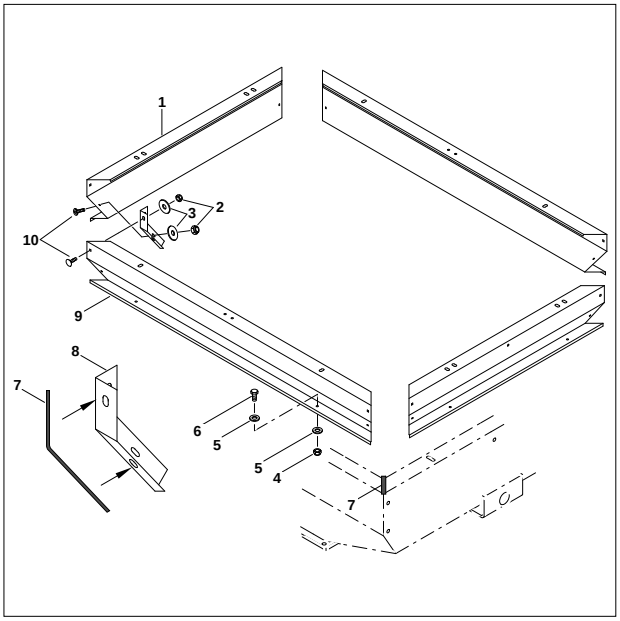


Fig. 24-12 Mounting hopper extension for 750 litre seed hoppers

3. Remove the hinged cover from the existing hopper.
4. Affix foam rubber strip to the corners of the hopper.
5. Place the hopper extension on the existing hopper, position it accurately and screw in place.
6. Screw the hinged hopper cover onto the hopper extension.

P.t.o. shaft conversion kit for DA

DA seed drills are equipped as standard for a p.t.o. shaft speed of 1000 r.p.m.

In cases where the tractor has a p.t.o. shaft speed of only 540 r.p.m., DA seed drills can be converted to a drive speed of 540 r.p.m.

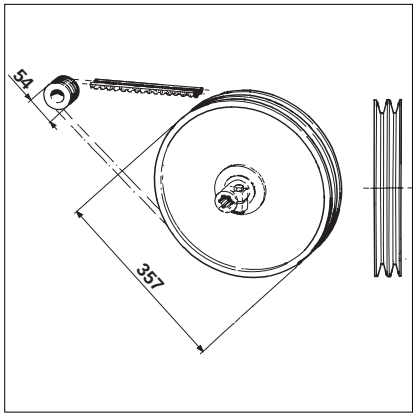


Fig. 24-13
Conversion kit for DA p.t.o shaft drive

1. Screw the pulley flange to the large V-belt pulley using the six screws.
2. Replace the small pulley on the seed drill with the one supplied.
3. Slide the large V-belt pulley onto the p.t.o. shaft and then tighten the pulley flange, after first having made sure that the distance between the pulley and the rear face of the saddle triangle measures exactly 137 mm (see fig. 7-5). The mating surfaces of the flange hub and the p.t.o. shaft must overlap by a distance of at least 15 mm (see fig. 7-6).
4. Fit the belt and check the alignment (see the chapter “Fitting and aligning the V-belt” on p. 7-7).

Check the screws for tightness after a few hours’ operation. Belts for a 540 r.p.m. drive must be of the raw-edged, moulded notched type.

5. Stick the sticker with the correct p.t.o. shaft speed on the hopper.

If you want to convert from a 540 to a 1000 r.p.m. p.t.o. shaft drive fit the complete V-belt pulley for the 1000 r.p.m. drive (see p. 7-4 “Fitting the pulley flange”). You must also replace the small pulley on the seed drill with the one supplied.

Reduction heads

In cases where larger row spacings are required, the distributor can be fitted with a reduction head which replaces the plain cover. In the relevant Kverneland-Soest price list you will find an overview of the reduction heads which can be used for different types of seed drill and which we can deliver.

If the DC seed drill is equipped wiht FGS or ESC, reductions heads may not to be used.

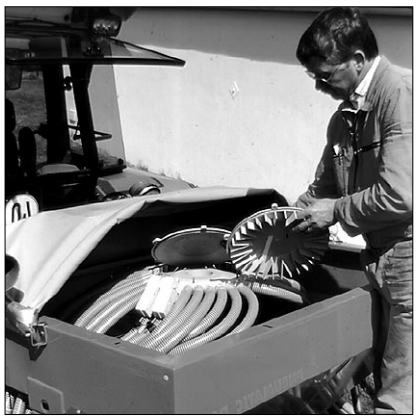


Fig. 24-14 Fitting a reduction head

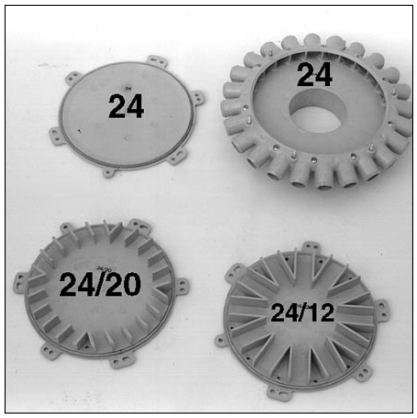


Fig. 24-15
Distributor (24 outlets) with covers for 24 (plain cover), 20 and 12 coulters

Fit the selected reduction head in such a way that the arrow on the cover is pointing in the direction of forward travel. The reduction heads 40/20 offer a choice of two possible settings:

- if the arrow on the reduction head points in the direction of forward travel, only the long coulters deliver seed, see fig. 24-16
- if the arrow on the reduction head points away from centre, only the short coulters deliver seed, see fig. 24-17.

A Direction of travel

• Coulters deliver seed:

O Coulters shut off

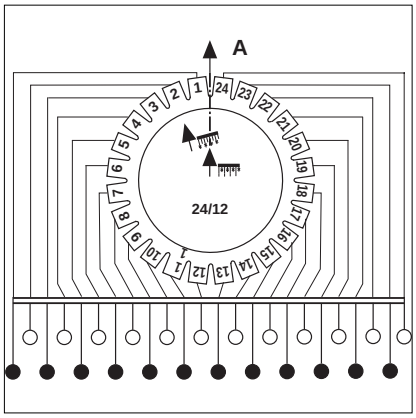


Fig. 24-16
Only the long coulters deliver seed

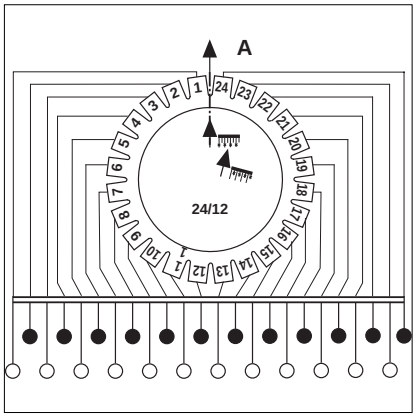


Fig. 24-17
Only the short coulters deliver seed

Change the setting of the track markers when you fit reduction heads.

Manual, solenoid and combination shut-off valves

Manual shut-off valves

Mechanical manual shut-off valves serve as a means of either shutting off the supply of seed to individual coulters or reducing the working width of the seed drill. When pulled up into their top position the seed flows back into the hopper (see fig. 24-18). Fill the hopper up only with enough seed so that an unhindered return flow is possible. The number of built-in shut-off valves must be taken into account when calibrating the seed drill.

1 When the manual shut-off valves are pulled up into their top position the seed flows back into the hopper.

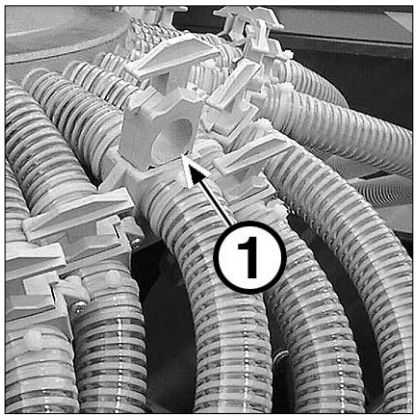


Fig. 24-18
Manual shut-off valves mounted on distributor

Use cable fasteners to secure the manual shut-off valves to the seed delivery tubes of those seed coulters which are to be shut off, see fig. 24-18. Ensure you use the correct installation procedure, see fig. 24-19:

a flat side, mount towards coulter
b depressed side, mount towards distributor

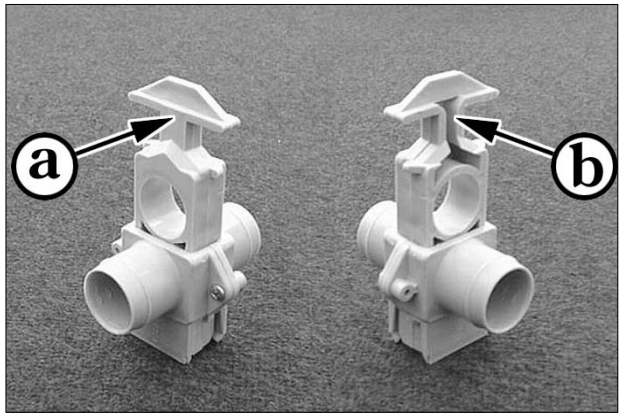


Fig. 24-19
Mounting procedure for manual shut-off valves

Solenoid shut-off valves

The solenoid shut-off valves are required for tramlining. The seed from the shut-off delivery tube is sent to the adjoining rows.

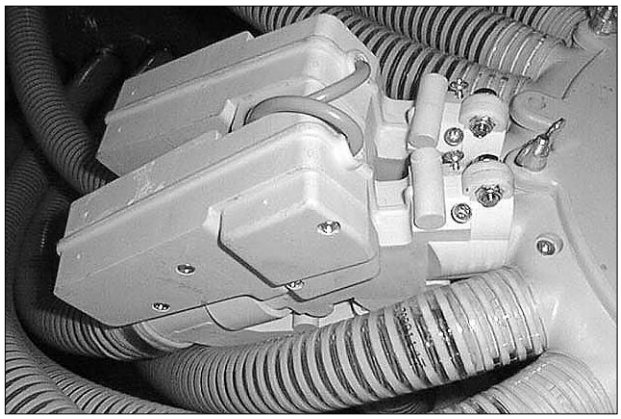


Fig. 24-20
A solenoid shut-off valve mounted on the distributor

Make sure that the seeds can flow through the solenoid valves without any obstruction.

The solenoid valve is fitted to the distributor as follows (see also fig. 24-21):

1. After you have decided which coulter is to be used for tramlining, disconnect the respective hose from the distributor.
2. Screw the two screws into the holes provided in the valve housing. They must not protrude on the inside.
3. Depending on the type of distributor, select the correct clamping piece and place it on top of the distributor outlet in such a way that its groove mates with the raised lip of the outlet. Now slide the solenoid valve onto the outlet as far as it will go.
4. Tighten the two screws, but not too tightly. It must still be possible to move the valve slightly.
5. Check to ensure that the valve housing is properly seated on the distributor outlet.
6. Push the end of the hose onto the valve outlet and secure with the hose clip.

7. Connect the solenoid shut-off valve to the multiple socket or signal distribution box (see chapter 20, 21 or 22).
8. Check to ensure that the solenoid shut-off valve functions properly. It may be necessary to shorten the hose (see p. 7-10).
9. After the first few hours of operation, check to ensure that the solenoid shut-off valves are still firmly seated. Check the track gauge.

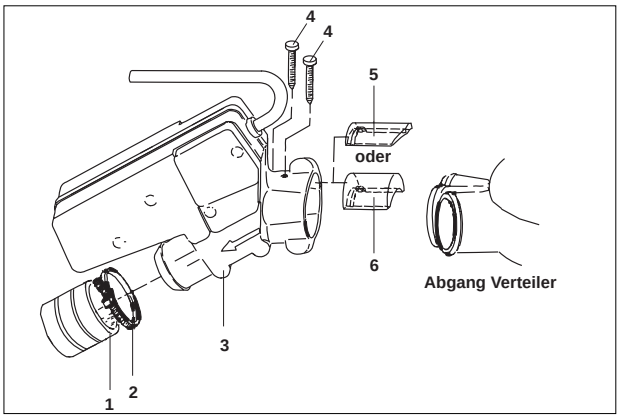


Fig. 24-21
Clamping pieces for installation of solenoid shut-off valve

1 Seed delivery hose
2 Hose clip
3 Solenoid valve housing
4 Screw
5 Clamping piece for 32 and 40 outlet distributor
6 Clamping piece for 24, 25 or 29 outlet distributor

Combination shut-off valves

Combination shut-off valves may not be used with those seed drills which have a distributor outside the seed hopper.

With combination shut-off valves (1, fig. 24-22) you can tramline as with solenoid shut-off valves. Combination shut-off valves differ from solenoid shut-off valves in that they enable the seed of the shut-off delivery tube to be either delivered to the adjoining rows or sent back to the seed hopper. In the case of seed return, the seed goes via return tubes (2) to a collector (4) above the metering device.

1 Combination shut-off valve
2 Return tube
3 Distributor
4 Collector

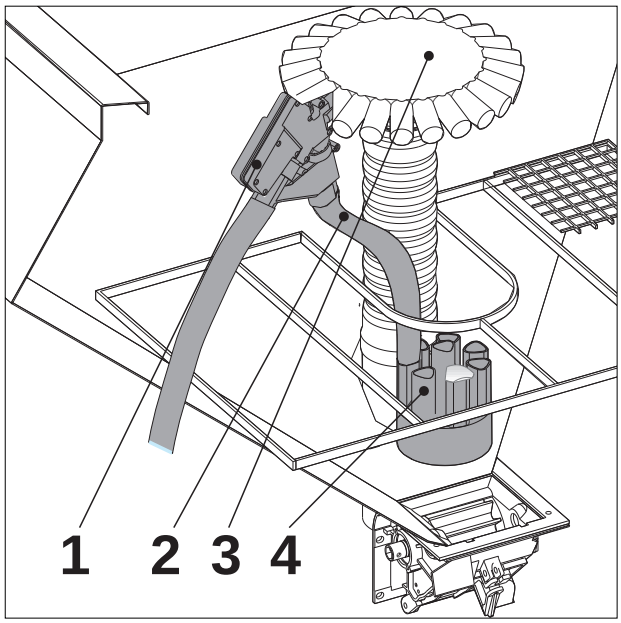
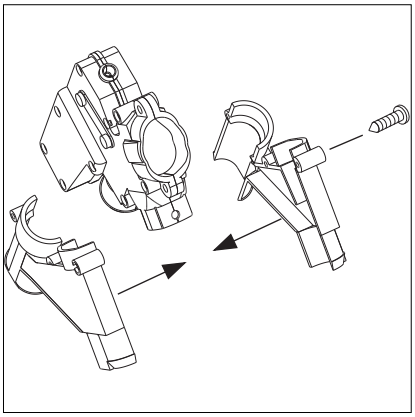


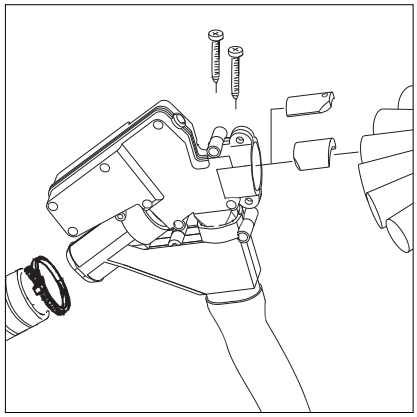
Fig. 24-22
Combination shut-off valve mounted on the distributor

Installation

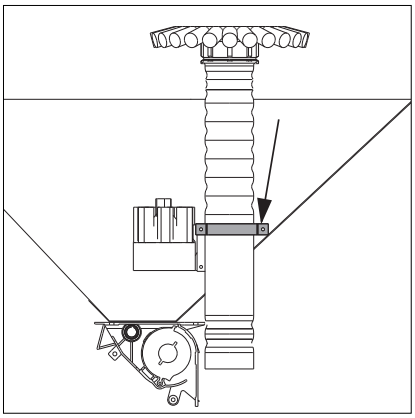
Make sure that the seed can flow through the combination shut-off valves without any obstruction.

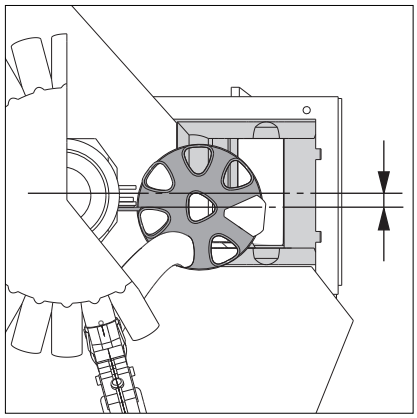


1. all models

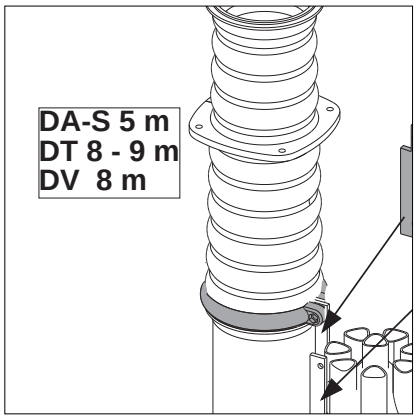


2. all models

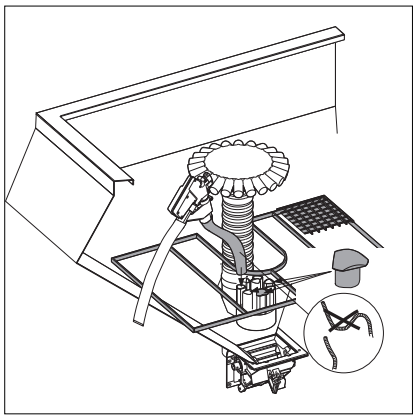




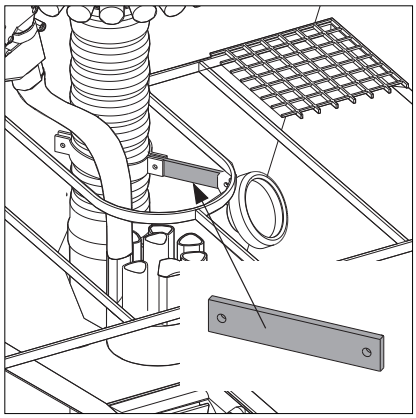
3. all models except DA-S 5m; DT 8-9 m; DV 8m



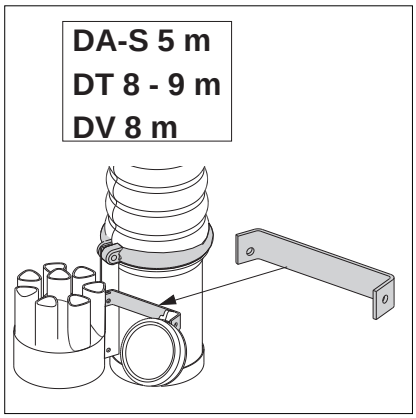
3. only DA-S 5m; DT 8-9 m; DV 8m



4. all models



5. all models except DA-S 5m; DT 8-9 m; DV 8m



5. only DA-S 5m; DT 8-9 m; DV 8m

If the seed from the shut-off delivery tube does not return to the hopper, you will need to convert the combination shut-off valve:

1. Disconnect the return tube (1, fig. 24-23) and seed delivery tube (2) from the combination shut-off valve.
2. Disconnect the return tube from the collector and then insert the sealing plug in the collector, see fig. on p. 24-21.
3. Unscrew the air-bleeding housing (3).
4. Insert the cover (4).
5. Secure the seed delivery tube to the solenoid shut-off valve housing and lock in place by means of the hose clip.

1 Return tube
2 Seed delivery tube
3 Air-bleeding housing
4 Cover for the combination shut-off valve

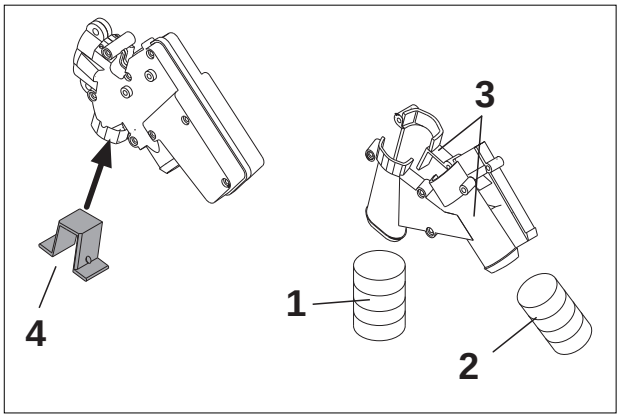


Fig. 24-23
Installing the cover for the combination shut-off valve

Hopper reserve gauge

A hopper reserve gauge is required for each hopper, so DT, DF2, DV, DC and DG seed drills need two hopper reserve gauges.

1. Attach the hopper reserve gauge to the underside of the diffuser tube by means of a pipe clamp, see fig. 24-24.

   Hopper reserve gauges with combination shut-off valves are attached differently. See p. 24-20.

2. Connect the cable to the multiple socket of the FGS or to the signal distributor of the ESC or ESA, see chapters 20, 21 or 22.

Hopper reserve gauges can also be use without the FGS or ESC. In such cases indication is by means of a magnetic lamp which is connected directly to the socket (12V) in the tractor cabin, see fig. 24-24.

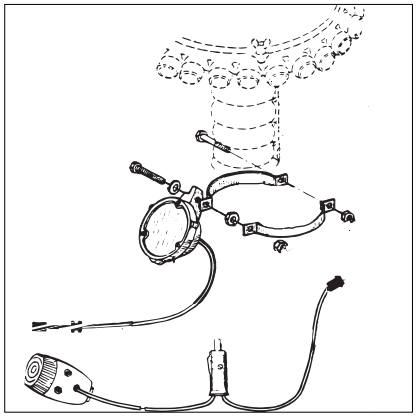


Fig. 24-24
Hopper reserve gauge with magnetic lamp

Rev counter

The rev counter can be used without the ESC and independently of the hydraulic fan drive. The installation and setting of the rev counter is described on p. 23-10.

Warning signs with lamp holders

Road safety regulations must be observed when towing the seed drill on the road. The seed drill therefore must be properly secured. The two warning signs and lamp holders must be mounted on the left and right hand ends of the coulter bar (see replacement parts list) or, in the case of the DT when transported lengthwise, on the rear end of the coulter bar. Lighting equipment, including the wiring, is not supplied by Kverneland Soest. The responsibility for proper lighting therefore rests with the user.

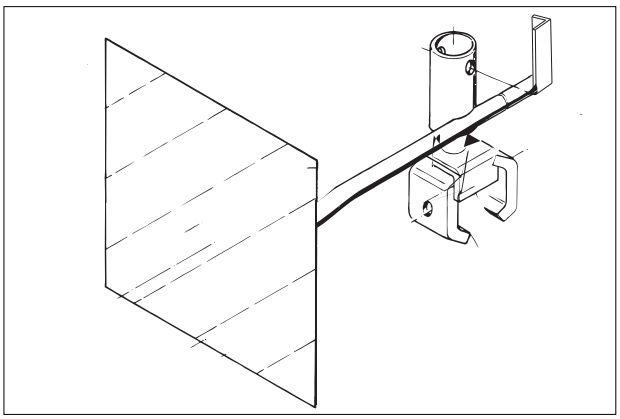


Fig. 24-25
Warning sign with lamp holder

Press wheels for CX disc coulters

CX disc coulters can be equipped with a press wheel. These are fitted as follows:

1. Remove the steel disc of the CX coulter (1, fig. 24-26)
2. Fasten the retaining sheet (2) to the CX coulter by means of two saucer-head screws (3)

The retaining sheets are different for long and short CX coulters.

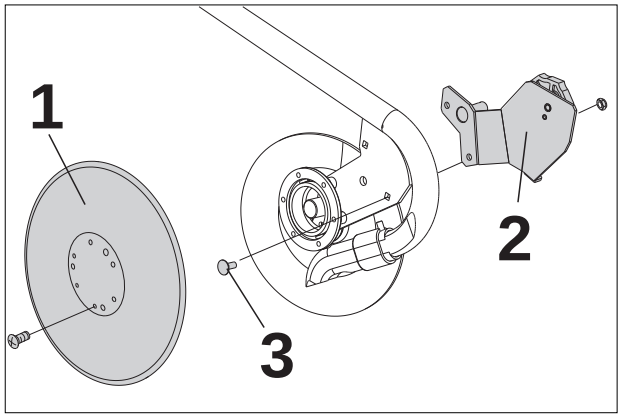


Fig. 24-26
Fitting retaining sheet for press wheel

3. Slide the arm (4) on to the bolt of the retaining sheet and lock it in place with the washer (5) and linch pin (6).

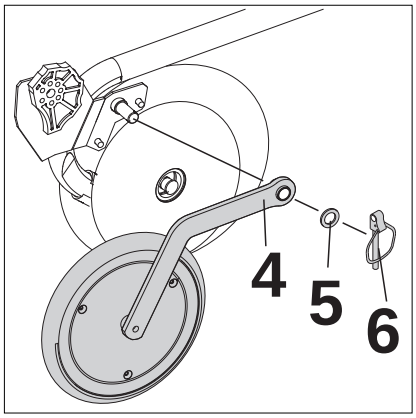


Fig. 24-27
Fitting a press wheel

4. Put back the steel disc of the CX coulter.

You can change the depth of CX coulters by turning the eccentric piece (1, fig. 24-28) in 7 mm steps.

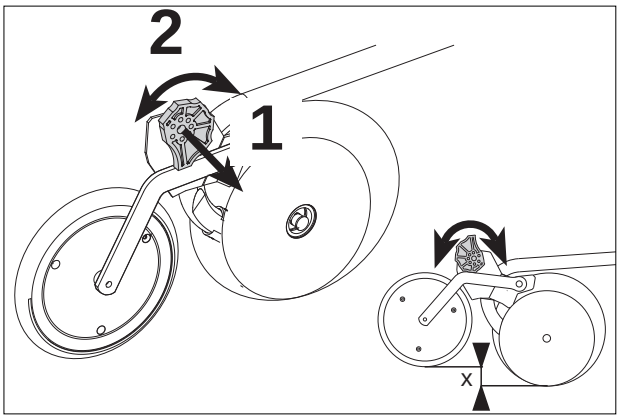


Fig. 24-28
Changing depth of CX coulter

With DT seed drills, the long CX coulter's press wheel can interfere with the transport device if the machine is in transport position. If this happens, fold the press wheel forward (see fig. 24-29).

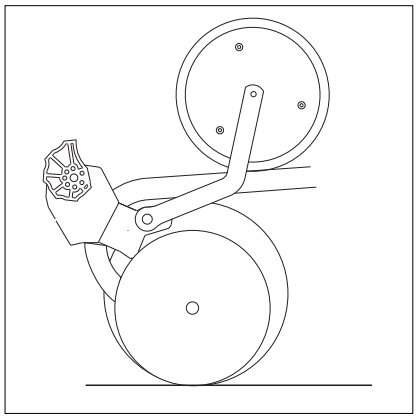


Fig. 24-29
Press wheel in forward position

Hydraulic drive wheel lift for DF models with front seed hoppers

When transporting the seed drill by road, lock the drive wheel in its raised position with the chain and relieve the hydraulic cylinder.

With the aid of a hydraulic cylinder you can lift the drive wheel of the DF seed drill off the ground in headlands. By doing this you will avoid damaging the drive wheel when turning. In operating position the hydraulic cylinder is held by the extension spring so that the drive wheel can swing freely.

If the front seed hopper is built on the tractor without a front power lift system, the ground clearance H_1 must stay at 475 mm (see p. 10-3).

Couple the hydraulic cylinder to a single-acting control unit of the tractor.

If you have coupled a hydraulic fan drive to a double-acting control unit, you can use the free connection for the drive wheel lift.

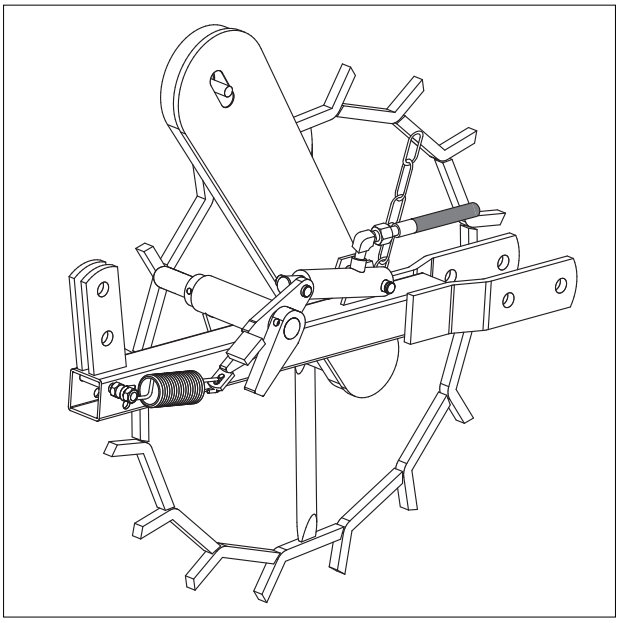


Fig. 24-30
Lifting the drive wheel hydraulically

Space for your own notes

Care and maintenance

Care and maintenance

Pay heed to the safety instructions relating specifically to care and maintenance on page 2-10.

Care

Cleaning

The seed drill must be cleaned at regular intervals in order to ensure optimum serviceability and performance at all times.

Never use a high-pressure cleaner or hosepipe to clean the housings of the FGS, ESC or ESA. The housings, signal distribution boxes, electric drive motors, screw connections and ball bearings are not watertight.

- Wash the outside of the seed drill with water. Drain off any water which enters the seed drill by removing the manifold from the venturi cone.
- Clean off any rust, dirt and burrs which may have collected on the V-belt pulleys.
- Clean the cell wheel in the metering device with a narrow brush.
- Use compressed air to clean the coulter, the seed delivery hoses, the seed hopper, the metering device and the fan.
- Remove the chain box cover and clean the inside.

Preserving

If the seed drill is to be laid up for a considerable length of time, observe the following instructions in addition to those given on page 4-26 “When not in use”:

- The seed drill should be laid up under cover and supported by its support legs.
- The seed hopper must be emptied completely.
- Leave the trap-door open (to prevent possible damage by rodents).
- Cover the seed hopper with a tarpaulin.
- Disconnect and remove the switch box of the FGS, ESC or ESA and store it in a dry place. The inputted values will not be deleted

.

- Remove the V-belt.
- Protect the seed drill against rust. If you wish to spray it with oil, use only a type of oil which is readily decomposable, e.g. rapeseed oil.
- Open out the side sections.

Maintenance

Regular maintenance and the use of OEM replacement parts from Soest are a prerequisite for the trouble-free operation and prolonged service life of your seed drill. The following maintenance chart is valid for DL, DT, DA, DA-S, DE-S, DF1, DF2, DV, DC and DG seed drills and their accessories and indicates the intervals at which maintenance work must be carried out.

Always disconnect the battery when carrying out welding work on the tractor or the seed drill.

Maintenance chart			
Description	Remarks	Carried out by?	Page
After first hours of operation			
Check all screws for tightness	-	User	-
Check the three screws on the pulley flange	Applies to DA, DA-S and DE-S only. Tighten to 33 Nm	User	7-4
Daily before using			
Grease the seed drill	See Lubrication chart on p. 30 - 7	User	30-7
Check tension of chains and V-belts	Replace V-belt if necessary; do not tighten chain too tautly	User/workshop	7-7
Grease p.t.o. shaft	See operating instructions for p.t.o. shaft	User	-
Check coulters for clogging	-	User	-
Check cleaning brush in metering device	When using micrometering system and sowing fine seed	User	4-14
Check V-belt pulleys (V profile)	It must be free from rust, dirt and burrs	User	-
Check fitted reduction head		User	24-14

Maintenance chart

Description	Remarks	Carried out by?	Page
Once a year (before sowing season commences)			
Check drive chain tension	Increase tension if necessary	User/workshop	-
Check chain casing	On all seed drills	User	-
Check hose connections	On fan, distributor and coulters	User	-
Change sealing lip on metering device	Only if worn	User/workshop	-
Check cleaning brush in metering device	If using micrometering system; replace if necessary	User	4-14
Check hectaremeter	-	User	-
Check sealing lip and brush	On metering device; replace if necessary	User	-
Check reduction head for wear	Replace if necessary	User	24-13
Check tyre pressure check	DL 7.00x12 2.0 bar DL 26x12.00 1.4 bar DT 7.50x16 2.8 bar DT; DV, DC 31x15.5 1.4 bar DG 31x13.5 1.9 bar	User	-
Oil chain of metering device drive	-	User	-
Oil ratchet mechanism of automatic track marker changeover mechanism	-	User	-
Grease the drive shaft	-	User	-
Relieve tension of the two hydraulic folding track marker arms' bracing cables.	When folded up, the marker disc must not interfere with any other components.	User	

Maintenance chart			
Description	Remarks	Carried out by?	Page
Once per year (after sowing season)			
Relieve tension on V-belt	-	User	-
Store electrical parts in a dry place at room temperature	FGS switch boxes, ESC or ESA computer	User	20-6/ 21-26
After a total worked area of 500 to 800 hectares			
Check seed drill	-	Workshop	-
After 3 to 5 years			
Change hydraulic hoses	-	User/workshop	-
As required			
Check tyre pressure check	DL 7.00x12 2.0 bar DL 26x12.00 1.4 bar DT 7.50x16 2.8 bar DT; DV, DC 31x15.5 1.4 bar DG 31x13.5 1.9 bar	User	-
Tighten all nuts and bolts	-	User	-

When carrying out those maintenance jobs which are necessary only at relatively long intervals, always make a point of doing the other, more frequently required maintenance jobs at the same time.

Lubrication chart

1x before the season

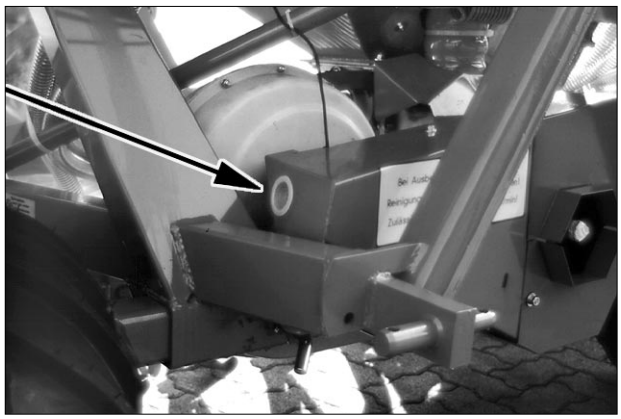


Fig. 30-1 Tensioning rocker arm for the fan drive of DL (shown here), DV, DT and DF2

1x before the season

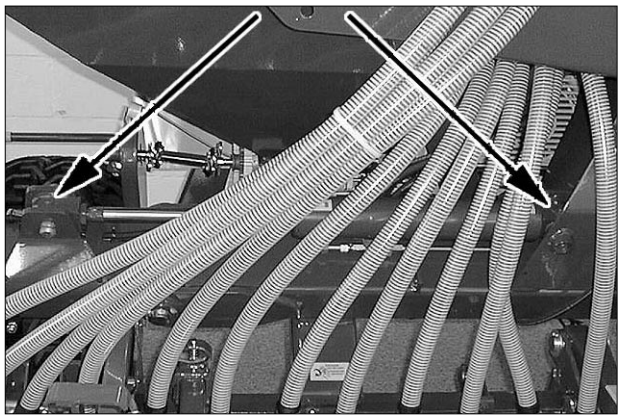


Fig. 30-2
Hydraulic cylinders of the hydraulic folding coulter bars DF2, DV and DG

1x before the season

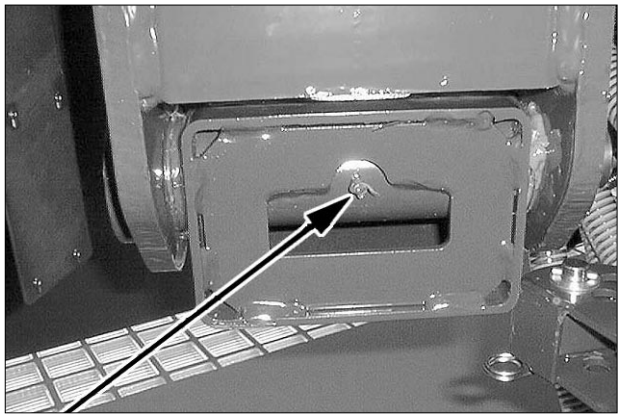


Fig. 30-3
Joints of folding coulter bars

DF2, DV and DG

1x daily

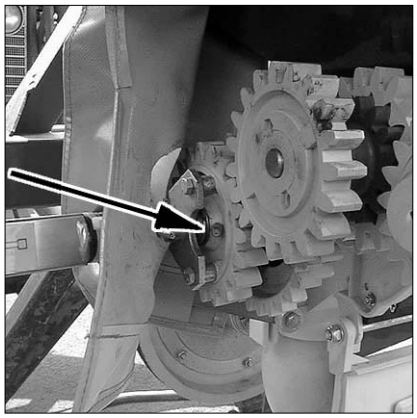


Fig. 30-4
Gearwheel on metering device drive DF1 and DF2

Follow the instructions of the p.t.o. shaft manufacturer

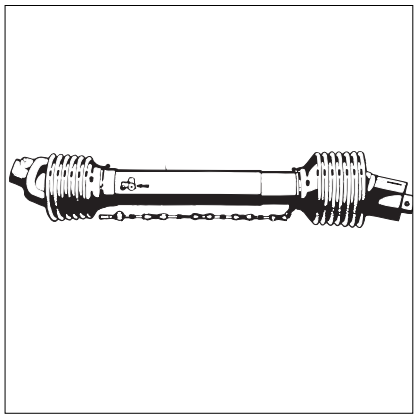


Fig. 30-5
p.t.o. shaft

1x daily

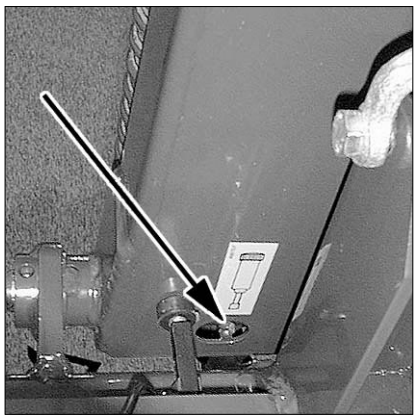


Fig. 30-6
Joints of hydraulic folding track marker, not rigid on DF2

Troubleshooting

Troubleshooting

Pay heed to the safety instructions in chapter 2.

The following troubleshooting chart is intended to provide rapid assistance in identifying and eliminating faults and malfunctions. If the chart cannot help you remedy the trouble, consult your dealer or our After Sales Service Department. You will find the addresses in the introduction of this manual.

Seed drills

Fault	Possible cause	Remedy	Page
Cracking noises coming from metering device	Excessively large seed e.g. when sowing beans	Remove roll pins from agitator shaft	-
Seed rate changes of its own accord	Seed has absorbed moisture	Do not leave seed in hopper overnight	
	Spindle turns too freely	Tighten nuts on crank handle	4-11
	Cell wheel is clogged	Clean cell wheel; check cleaning brush and replace if worn	4-14
	Red gearwheel (for fine seed) not engaged	Engage red gearwheel	4-13

Fault	Possible cause	Remedy	Page
When sowing fine seed: not possible to obtain a seed rate below 4-5 kg/hectare despite using micrometering system	Sealing lip in metering device housing damaged by rodents	Fit new sealing lip	-
	Sealing lip not resting up against the cell wheel properly	Adjust setting of sealing lip	-
Seed delivery is too high	Crank handle turned too quickly when calibrating	Only one revolution per second	4-12
	Fine seed: Red gearwheel not engaged	Switch on micro-metering system	4-13
Seed delivery is too high or too low	Wrong gear ratio between drive wheel and metering mechanism	Check number of teeth (see replace-ment parts list).	-
	Wrong setting	Correct the setting	4-9
	Seed incorrectly weighed	Check scales	-
Seed delivery is too low	Micrometering system is switched on	Switch off micro-metering system	4-13
	Fine seed: Cells clogged; cleaning brush jammed		4-14
Every other row takes longer to emerge	Rear coulters have sown too deeply	Increase pressure on front coulters; reduce coulter pressure centrally	4-6 24-2
None of the coulters delivered seed	Venturi cone clogged, drive shaft not fitted	Make sure engine speed is correct; fit drive shaft	-
	Tractor p.t.o. shaft off	Switch on tractor p. t.o. shaft	-

Fault	Possible cause	Remedy	Page
Hose clogged up with seed	Coulters clogged, e.g. with soil	Clean clogged coulters	-
	When sowing normal seed: butterfly valve set to fine seed	Set butterfly valve to normal seed	4 -10
	Hose forms an elbow, sags or is kinked	Check hoses inside and outside hopper; shorten if necessary	7-10
	Fan speed too low	Check it is at the correct speed when turning on	4-23
S-type covering tines working too deep		Reduce pressure on coulters	4-6 24-2
	Wrong working angle	Correct working angle by selecting a different hole setting	24-4
S-type covering tines clogged up	Working angle too steep	Select a working angle which is less steep	24-4
Track marker arm opens out/folds up too quickly, too slowly or not at all	No throttle valve in hydraulic coupling	Fit a throttle valve	-
	Throttle valve in hydraulic coupling clogged	Clean throttle valve	
Hydraulic folding track markers open out simultaneously	Defective change-over valve	Fit a new change-over valve	-
When folded up marker discs of both hydraulic folding track markers interfere with other components	Both hydraulic folding track marker arms' bracing cables too loose	Increase tension of bracing cables	-
Triangular coupling refuses to engage with implement headstock when coupling the tractor to seed drill	Locking plate is set too high	Set locking plate to a lower position	4-3

Electronic tramlining control system FGS

Fault	Possible cause	Remedy	Page
Tramlining system fails to operate	Insufficient voltage at plug-and-socket connection	Check plug and socket for corrosion	-
	Solenoid shut-off valve defective	Fit new solenoid shut-off valve	24-17
Tramlining coulter remains constantly shut off	Solenoid shut-off valve jammed	Clean solenoid shut-off valve	-
	Foreign bodies in distributor	Remove foreign bodies	-
Pre-emergence marker does not move	No current reaching solenoid valve	Check cable and connections	20-4
Pilot lamp for hopper reserve gauge lights up	Insufficient seed in hopper, or torn V-belt (DA)	Replenish seed hopper; change V-belt	7-7
Green pilot lamps on FGS switch box light up but the track marker changeover mechanism does not operate	Solenoid switch not plugged into multiple socket	Plug in solenoid switch; fit new switch if necessary	20-4
The red pilot lamp light on the FGS switch box lights up but solenoid shut-off valves do not close	Either solenoid valves are jammed or the coil is defective	Check plug-and-socket connections; clean solenoid shut-off valves or, if necessary, replace them	20-4 24-17
Return hoses clogged when using combination shut-off valves	Collector is installed too high over the metering device	Move collector as far down as possible	24-20
The green pilot lamps on the FGS switch box light up according to set rhythm, but the red pilot lamp does not	Defective switch box	Replace completely	-
The pilot lamps light up haphazardly	Loose contact; water has entered switch box	Install new switch box	-
	Water has entered the multiple socket	Dry out, repair or replace	

Electronic seed drill control ESC

Your dealer or our After Sales Service Department can check by means of a diagnostics device whether there is a defect in the sensors, actuators or computer. If the computer is defective, it must be returned to us for repair or replacement.

Fault	Possible cause	Remedy	Page
Display indicates HALP 00 or 88	Memory malfunction	Return device for repair	-
Electronic console does not switch on	Interruption in voltage supply	Check battery connecting lead; check battery terminals and 16 A fuse	21-6
	Poles reveresed	Check polarity	21-6
	Total failure	Return device for repair	-
Electronic console displays impossible values or loses machine data	Memory in electronic console falsified by voltage peaks	Connect battery lead supplied directly to battery	21-6
		Make sure electronic console mounting bracket is connected conductively to tractor chassis; if necessary, effect conductive connection between cabin and chassis	21-6
		Lay earth lead from distributor to seed drill frame	-
	Loose contact in plug-and-socket connection to battery cable	Slightly squeeze socket together to ensure tighter contact	-

Fault	Possible cause	Remedy	Page
Forward speed is not indicated*	30 pole plug of signal distribution box is not connected to the electronic console	Connect plug with console	21-7
	Value "Impulses/100 m" has not been entered	Enter value "Impulses/100 m"	21-14
	Wheel sensor not transmitting impulses to electronic console, symbol does not flash in display during forward travel	Set clearance between wheel sensor and the bar magnets to 3 mm	-
		Magnetic south of magnet must point towards sensor	-
		Examine cable and 3 pin plug for damge; replace if necessary	-
		Check connections in signal distribution box: br (brown) = +12 volts sw (black) = signal bl (blue) = earth	21-11
		Defective sensor, replace	-
Area is not indicated	Value "working width" has not been entered	Enter value	21-14
	"Full width shut-off" has been actuated		21-22
Fan speed is not indicated*	Fan sensor not transmitting impulses to electronic console	Set clearance between fan sensor and shaft to approx. 1.5 mm	23-11
		Defective sensor, replace	-

Fault	Possible cause	Remedy	Page
		Check connections in signal distribution box: br (brown) = +12 volts sw (black) = signal bl (blue) = earth	21-11
No alarm signal when fan speed drops by more than 10 % of rated speed	Rated speed has not been entered	Enter rated speed	21-19
Alarm signal - sowing shaft alarm*	Sowing shaft not transmitting impulses to electronic console	Set clearance between sowing shaft and magnet to approx. 2 mm	-
		Check chain/ drive shaft	-
		Defective sensor, replace	-
		Check connection in signal distribution box: gnge (green-yellow) = signal	21-11
	Speed drops below minimum number of sowing shaft impulses	This can happen when sowing fine seeds at a low speed. No defect, drive quicker	21-3
Tramline numbers in display do not move on in sequence, not even when "+1" key is actuated	Tramlining rhythm not entered	Enter rhythm	21-15
	Electronic console defective	Replace electronic console	-
Tramline numbers in display do not move on when turning at end of field*	Sensor on track marker change-over mechanism not transmitting impulse to electronic console	Set clearance between sensor and magnet to approx. 2 mm	-

Fault	Possible cause	Remedy	Page
		Sensor defective, replace	-
		Check connection in signal distribution box	21-11
Tramlining system fails to operate despite flashing figure in display*	Solenoid shut-off valves not closing; either jammed or coil is defective	Replace solenoid shut-off valves	24-17
		Check connection in signal distribution box	21-11
Continuous alarm - hopper reserve gauge*	Hopper reserve gauge not transmitting signal to electronic console	Replenish hopper with seed	-
	Hopper reserve gauge defective	Replace hopper reserve gauge	-
Metering device refuses to switch off (on seed drills with just one metering mechanism).*	Solenoid not working	Replace solenoid	-
		Check connection in signal distribution box (left-hand shut off)	21-11
		Check wrap-spring clutch	-
Half-width shut-off device does not operate (on seed drills with 2 metering devices). No triangle appears in display when key for right-hand metering device is actuated	Bridge "B" in signal distribution box not plugged in	Plug in bridge	-
Half-width shut-off device does not operate (on seed drills with 2 metering devices). Right-hand metering device refuses to switch off*	Solenoid not working	Replace solenoid	-

Fault	Possible cause	Remedy	Page
Seed rate adjusting mechanism not working*	"100 %" re-setting is possible only during forward travel	Check operation with agitator shaft rotating	-
	There must be a minimum of 10 seconds between increasing the seed rate ("+%" key) and the subsequent return ("100%" key).	Wait for 10 seconds	-
	Servo motor not responding.	Check connections, replace servo motor if defective	-

* These faults / malfunctions may also be ascribable to:
- Damaged cables. Check and replace if necessary.
- Defective computer. Replace.
- Defective signal distribution box. Replace.

Hydraulic fan drive

Fault	Possible cause	Remedy	Page
Shaft seal on hydraulic motor has been forced out of its seating	Return pressure too high; pressure and return lines inadvertently interchanged	Return line pressure max. 15 bar; connect up hydraulic couplings correct	23-8
Return line pressure is too high	Unfavourably routed oil return line; cross-section too small	Re-route the return line in the tractor; use larger-diameter return line couplings	23-8
Oil leaking from the hydraulic motor	Shaft seal either worn or fitted wrong way round	Fit new shaft seal	-
Insufficient speed	Three way flow control valve set incorrectly, tractor not supplying sufficient volume of oil or not generating required operating pressure	Check three-way flow control valve, hydraulic pump and pressure relief valve	23-9
Hydraulic motor cuts out for short periods at a time	Unfavourably routed oil return line; insufficient oil in reservoir; oil returning via auxiliary control valve	Select a different connecting point for the pressureless return line; larger oil reservoir	-
Pressure peaks in pressure line	Drive output of pneumatic system too high	Connect up all hose lines belonging to the pneumatic system of the seed drill (DF!)	10-7
Valve lever jumps out of its engaged position	Pressure peaks in pressure line, cutting-off pressure too low; pressure in pressure line too high	Check setting, use pipe	23-8

Fault	Possible cause	Remedy	Page
Hydraulic oil overheating	High delivery rate	Install additional oil cooler	23-8
	Delivery rate too high (with closed hydraulic system	Remedy problem via variable displacement pump; install or convert three-way flow control valve	-

Rev Counter

Fault	Possible cause	Remedy	Page
Drop in speed	Worn V-belt	Replace V-belt	7-7
Increasing speed drops to approx. half speed	Impulse transmitted by only one cam	Correct setting of sensor	23-11
Only half speed indicated	Impulse transmitted by only one cam	Correct setting of sensor	23-11
No speed indicated	No current	Check electrical wiring and fuses	23-10
	No impulse	Correct setting of sensor	23-11
	Defective sensor	Check sensor; replace if defective	23-11

Electronic seed drill drive

You can use the functions “Test input” and “Test output” in the basic menu “System” to discover faults on sensors and actuators.

By changing “HI” and “LO” and counting the impulses, “Test input” shows the number of impulses if the relevant sensor has received any.

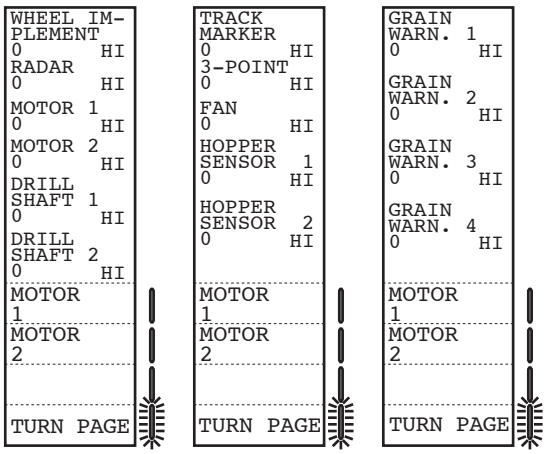


Fig. 31 - 1 Diagnostic screens “Test entries”

With “Motor 1” and “Motor 2” you can check the drive motors and their transducers.

If you suspect a fault on the solenoid shut-off valve or the metering devices' drive motors, select “Test output”. Press the function keys to check solenoid shut-off valves and motors:

- LO: there is no voltage; motor off; solenoid shut-off valve open
- HI: there is voltage; motor is running; solenoid shut-off valve closed

With a running motor the number under “OFF 2“ or “OFF 4“ has to continually change. If this is not the case the transducer is defective.

OFF 1 shut-off valve(s) on the left
OFF 2 motor on the left
OFF 3 shut-off valve(s) on the right
OFF 4 motor on the right

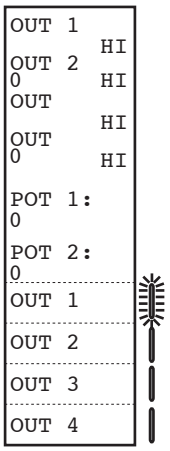


Fig. 31 - 2
“Test Output” diagnosis screen;
testing the shut-off valves on the left

Index

H

L

M

N

O

P

R

S

T

V

W