



Version: 1.1 EN
Item no.: 00602-3-205

Operating manual for the Tined Weeder Pro VS 150 M1, VS 300 M1

Please read carefully before initial operation!

TRANSLATION OF THE ORIGINAL OPERATING MANUAL

APV
www.apv.at®

Contents

1	EC Declaration of Conformity	4
2	UK Conformity Assessed	5
3	Identification of the implement.....	6
4	Service	6
5	Warranty.....	7
5.1	Warranty activation	7
6	Safety information.....	7
6.1	Intended use	7
6.2	General safety-related instructions and accident prevention regulations	8
6.3	Mounted implements.....	9
6.4	Hydraulic system.....	9
6.5	Maintenance	10
6.6	Tyres.....	10
6.7	Mounted seeders	10
6.7.1	Filling the seeder.....	10
7	Information signs / hazard labels	11
7.1	Information signs.....	11
7.2	Hazard labels.....	12
8	Operating instructions for the Tined Weeder Pro	12
8.1	Mounting on the tractor	12
8.2	Safe parking.....	13
8.3	Securing the top link pin.....	13
8.4	Working position and setting the working depth	13
8.5	Hydraulic tine adjustment.....	15
8.6	Conversion to front mounting	15
9	Maintenance and care	16
9.1	General maintenance instructions	16
9.2	Regular maintenance instructions	17
9.3	Tine change	17
9.4	Changing the springs	18
9.5	Repairs and service	18
10	Information on nature conservation and environmental protection.....	19
11	Technical data	19
11.1	Harrow array widths	20
11.2	Combination options for the Tined Weeder Pro with pneumatic seeders/ Multi-Metering System	21
12	Hydraulic diagram	22
13	Road transport of the Tined Weeder Pro	23
13.1	Transport on public roads (in general).....	23
13.2	Calculation of the weight ratios for axle loads on the tractor and ballast weights.....	24
13.3	Table for the weight ratios	25
14	Lighting circuit diagram.....	26
15	Decommissioning, storage and disposal	26
15.1	Decommissioning the implement	26

15.2	Storage of the implement	26
15.3	Disposal	26
16	Cropping tips for using the Tined Weeder Pro.....	27
17	Accessories	28
18	Spare parts	30
19	Index.....	30

1 EC Declaration of Conformity

according to Machinery Directive 2006/42/EC



APV-Technische Produkte GmbH
Dallein 62
A-3753 Hötzelstdorf

hereby declares that the mounted implement model series described in the following comply with the applicable basic safety and health requirements of the above-mentioned Directive in terms of their concept and design as well as the versions put on the market.

This declaration loses its validity if there are any changes to the mounted implement that are not approved by **APV-Technische Produkte GmbH**.

Designation of the mounted implement model series:

Tined Weeder Pro VS 150 M1
Tined Weeder Pro VS 300 M1

Year of manufacture: as of **2020**

Serial number(s): as of 07027-01000 (VS 150 M1)

Serial number(s): as of 07028-01000 (VS 300 M1)

Relevant EC Directives:

Directive for machinery – Machinery Directive 2006/42/EC

For the planing, design, construction and marketing of the mounted implements, the following harmonised European standards were applied in addition to the Directives, in particular:

EN ISO 12100:2010 – Safety of machinery, general principles for risk assessment
EN ISO 13857:2020 – Safety distances to prevent hazard zone being reached by upper and lower limbs
EN ISO 13849-1:2015 – Safety of machinery - Safety-related parts of control systems

Responsible for the technical documentation: Planing and Design department, Dallein 62

A handwritten signature in black ink, appearing to read 'Jürgen Schöls', is positioned above the printed name and title of the Managing Director.

Ing. Jürgen Schöls
Managing Director
(authorised person in the EU)

Dallein/Hötzelstdorf, on 11/2022

2 UK Conformity Assessed

according to Machinery Directive 2006/42/EC



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Dallein 62
A-3753 Hötzelstdorf

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Managing Director
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Dallein/Hötzelstdorf, on 11/2022

3 Identification of the implement

The Tined Weeder Pro can be clearly identified by the following information on the type plate.

- Name
- Model
- Production number

Position of the type plate

The type plate can be found on the inside of the main frame on the left in the direction of travel, on the front hollow profile (see Figure 1).

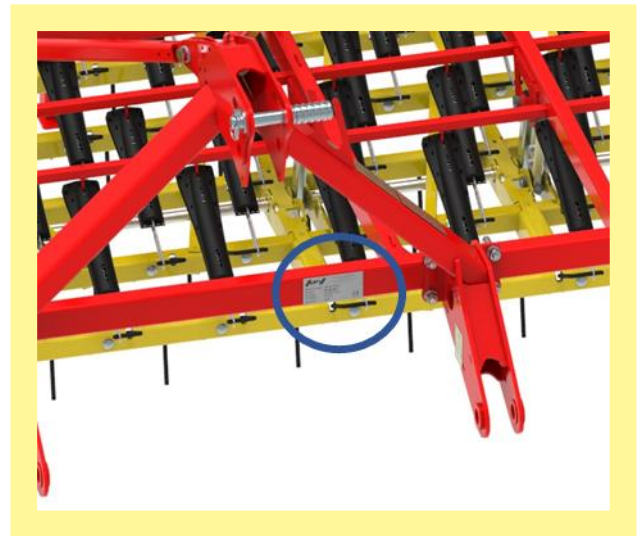


Figure 1: Location of the type plate

The following image (Figure 2) shows the layout of the type plate:



Figure 2: Layout of the type plate

The data on the type plate have the following meaning:

- 1: Designation
- 2: Model
- 3: Production number / serial number
- 4: Weight
- 5: Year of manufacture



PLEASE NOTE!

In cases of inquiries or warranty claims, please tell us the production number / serial number of your implement.

4 Service

Please contact our service address in the following cases:

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

Service address:

APV - Technische Produkte GmbH
ZENTRALE
Dallein 62
AT-3753 Hötelsdorf
AUSTRIA

Telephone: +43 (0) 2913 8001-5500
Fax: +43 (0) 2913 8002
Email: service@apv.at
Web: www.apv.at

5 Warranty

Please check the implement for any transport damage immediately upon receipt. Later claims regarding transport damage can no longer be considered.

Based on a warranty activation (see Point 5.1), we grant a six-month factory warranty starting on the date of initial operation (your invoice is the warranty certificate).

This warranty is applicable for cases of material or construction faults and does not include parts that are damaged by normal or excessive wear.

The warranty expires

- if damage is caused by external forces.
- in cases of operating errors.
- if the kW/HP limits are significantly exceeded.
- if the implement is modified, expanded or equipped with third-party spare parts without our permission.

5.1 Warranty activation

Every APV implement must be registered immediately after delivery. The registration activates the claim for warranty services and APV can guarantee the best service.

To activate the warranty for your implement, simply scan the QR code with your smartphone - you will then be taken directly to the service area on our website.

Of course, you can also activate the warranty through our website www.apv.at in the service area.



6 Safety information

This chapter contains general rules of conduct for the intended use of the implement and safety-related information that should always be observed for your safety.

The list is very extensive, and some of the information does not apply exclusively to the delivered implement. However, the summary of the information often reminds you of unconsciously neglected safety regulations for the everyday operation of machines and implements.

6.1 Intended use

The Tined Weeder Pro VS 150 M1 or VS 300 M1 is designed and built for use in agricultural operations.

Its tines penetrate in the soil and loosen it, and where applicable, remove any existing weeds.

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

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

The implement may only be used, maintained and repaired by persons who have relevant experience and were instructed on the risks. The safety instructions must also be handed over to other users.

The applicable, country-specific accident prevention regulations as well as the other generally safety-related, occupational health and road traffic regulations must also be observed.

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

The Tined Weeder Pro is intended for outdoor operation in dry weather, within a temperature range from +5 °C to 40 °C. Water ingress must be prevented. Do not use the Tined Weeder Pro in rainy conditions!

6.2 General safety-related instructions and accident prevention regulations

- **The operator must read and understand this operating manual before using the harrow.**
- **The operator must train and instruct their personnel if necessary. The personnel must have read and understood the operating manual before using the harrow.**
- Always keep the operating manual close to the harrow for reference purposes.
- When passing on the harrow, be sure to pass on the operating manual.
- Do not use the implement if you are tired or under the influence of drugs, alcohol or medication.
- **Check the implement and the tractor for road and operational safety before every use!**
- Inspections before and during operation as well as regular care and maintenance of the implement must be performed.
- Observe the generally applicable safety and accident prevention regulations!
- The warning and information signs applied to the implement provide important instructions for safe operation, observe them for the sake of your own safety!
- Observe the respective regulations when using public roads!
- **Before starting work, get to know all of the equipment and operating elements as well as their functions. It is too late to do so during operation!**
- The user should wear close-fitting clothing. Avoid wearing loose clothes!
- Keep the implements clean to reduce the risk of fire!
- Check the surrounding area before starting up and operating the implement! (Children!) Ensure sufficient visibility!
- It is not allowed to carry passengers on the implement during operation and transport!
- The implement must be coupled according to the instructions and only onto the specified devices!
- Special care must be taken when coupling and uncoupling implement to and from the tractor!
- When mounting and dismounting, put the support devices in their respective positions! (Stability)
- Always attach ballast weights at the intended attachment points according to the specifications!
- Observe the permissible axle load, total weight and transport dimensions!
- Transport equipment - e.g. lighting, warning signs and any protective equipment, must be checked and mounted!
- Never leave the driver's platform while driving!
- The driving behaviour, steering and braking capacity are also affected by mounted or towed implements and ballast weights. For this reason, always ensure sufficient steering and braking capacity!
- When driving in curves, take account of the wide radius and/or the centrifugal mass of the implement!
- The implement may only be operated when all of the protective devices are installed and in safety position!
- It is forbidden to stand in the working area of the implement!
- Do not stand near rotating and swivelling parts of the implement!
- Hydraulic folding frames may only be actuated when nobody is standing in the swivelling range.
- There are pinch and shear points on externally powered (e.g. hydraulic) parts!
- For parts that are adjusted manually, always ensure that the implement is stable!
- For implements that are driven at high speeds with soil-driven tools - Danger after lifting due to the still rotating centrifugal mass! Only approach the implement when it has come to a standstill!
- Before exiting the tractor, lower the implement onto the ground, switch off the motor and remove the ignition key!
- Standing between the tractor and the implement is forbidden unless the vehicle is secured against rolling away using the parking brake and/or with wheel chocks!
- Packer catch arms must be swivelled in and locked before road transport!
- Lock the track markers in transport position!

- The view on the mounted harrow and the hazardous movement area must be clear (to check the procedure).
- Cleaning is recommended as specified in the maintenance instructions. The procedure in maintenance instruction must be observed and protective equipment must be used.
- Working under the implement is forbidden.
- The implements must be checked regularly by the operator (before every use) for any fractures and cracks, chafe marks, leaks, loose bolts and connections, vibrations, unusual sounds, and to ensure they function correctly.
- Safety glasses and hearing protection should be used.
- During assembly, the operator must ensure that the requirements for the tractor in terms of the power, axle loads and weight distribution as specified in the operating manual are met and that the connections specified in the operating instructions are made correctly.
- When mounting the implement, the operator must ensure that connections to the tractor hydraulic system are clean and carefully connected.
- When performing the work passes, the tractor's speed must be maintained as specified in the operating instructions. This can be between 4 and 12 km/h.
- Additional lighting (e.g., flashlight) should be used for repair or maintenance work if necessary.

6.3 Mounted implements

- Before mounting and dismounting implements on the three-point linkage, move the operating devices into the position that excludes unintentional lifting or lowering!
- For three-point mounting, the mounting categories of the tractor and the implement must match or be adapted!
- There is a risk of injury due to crushing and shearing points in the area of the three-point linkage!
- Do not stand between the tractor and the implement when actuating the external controls for the three-point mounting!
- When the implement is in transport position, always ensure that the tractor three-point linkage is sufficiently locked to the sides!
- When driving on roads with the implement lifted, the operating lever must be locked against lowering!
- When mounting the harrow, the operator must ensure that there is a metallic connection made to the tractor.
- The operator must ensure that no one is in the vicinity of the harrow when it or its components are being moved by the tractor's hydraulic system. The driver must perform a visual inspection!

6.4 Hydraulic system

- **Inspect the hydraulic hose lines at regular intervals and replace in case of damage or wear! The replacement lines must comply with the technical requirements of the implement manufacturer!**
- The hydraulic system is under high pressure!
- When connecting hydraulic cylinders and motors, the specified connection of the hydraulic hoses must be observed!
- When connecting the hydraulic hoses to the tractor hydraulic system, make sure that the hydraulic system on the tractor and implement side is unpressurised!
- For hydraulic function connections between the tractor and the implement, coupling sleeves and connectors should be marked to rule out operating errors! If the connections are interchanged, the function will be inverted (e.g. lifting/lowering)! – Danger of accident!
- Due to the risk of injury, use suitable tools when searching for leaks!
- Liquids escaping under high pressure (hydraulic oil) can penetrate skin and cause serious injuries! Consult a doctor immediately in case of injury! (Risk of infection!)
- Before working on the hydraulic system, park the implement, depressurize the system and switch off the motor!

6.5 Maintenance

- Maintenance, repair, and cleaning work as well as the elimination of malfunctions should always be performed when the drive is switched off and the motor is at a standstill! – Remove the ignition key!
- The maintenance work itself may only be performed by trained specialist personnel and may never be performed alone. Extreme caution must be taken when changing defective components or tools.
- To reduce the risk of injuries, a clearly visible and legible sign "Caution: Maintenance work" must be placed during maintenance work.
- Check the nuts and bolts regularly for tight fit and retighten if necessary!
- When performing maintenance on the lifted implement, always ensure safety through suitable support elements!
- When changing work tools with sharp edges, always use suitable tools and gloves!
- Properly dispose of oils, grease and filters!
- Always cut the power supply when working on the electrical system!
- When performing electrical welding work on the tractor and mounted implement, disconnect the cable on the generator and the battery!
- Spare parts must at least comply with the technical requirements specified by the implement manufacturer! This is ensured with original parts!
- Cleaning must be performed with water or compressed air. Cleaning must be carried with the implement lowered, shut down and secured to prevent it being switched on again.

6.6 Tyres

- When working on the tyres, it must be ensured that the implement is safely parked and secured against rolling away (wheel chocks).
- The mounting of wheels and tyres requires sufficient knowledge and proper installation tools.
- Repair work on the tyres may only be performed by specialists and with suitable installation tools.
- Check the inflation pressure regularly. Observe the prescribed inflation pressure (2.1 bar)!

6.7 Mounted seeders

- When using a seeder, all of the specifications of the implement manufacturer must be observed.
- The seeder can be easily reached with using a ladder and platform. They must be clean and dry during use.
- It is strictly forbidden to stand on the platform or its access ladder while driving.
- When not in use, the ladder must be folded up and secured.

6.7.1 Filling the seeder

- The seeder is filled using a supply vehicle.
- The platform kit may not be used to fill the seeder or as a storage area for objects or seed. When filling the seeder, never stand under a suspended load!
- When driving up to the implement with seed, nobody may be standing on or around the implement.
- The platform kit may only be accessed to open the seed sacks when the load has been stabilised above the opening of the seed hopper.
- During the loading procedure, avoid any contact with the treated seed and wear gloves, a dust mask and safety glasses.

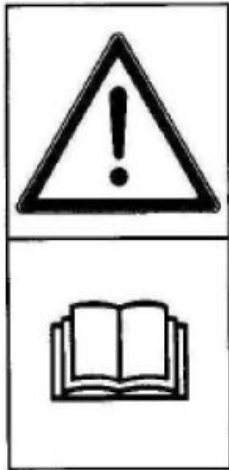


CAUTION!
Misprints, errors and omissions excepted.

7 Information signs / hazard labels

Pay special attention to the stickers on the implement, as they warn you of specific dangers!

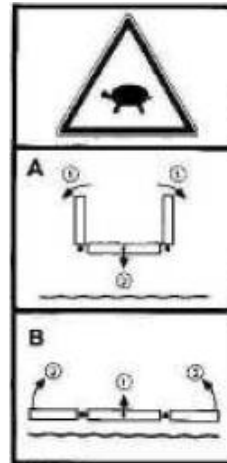
7.1 Information signs



Read and observe the operating manual before operating the implement!



Standing in the danger zone (swivelling range) is forbidden!



Always lift the implement slowly off the ground



Do not stand on the implement while driving!



Loading hooks.
When loading the implement, attach the ropes or chains to these points!



Always switch off the engine and remove the key before maintenance work!



After a short period of operation, re-tighten all bolts and nuts.



Labelling of the grease nipple position

7.2 Hazard labels

			
Be careful with escaping high-pressure liquids! Observe the instructions in the operating manual!	Do not stand between the machines when connecting the implements and actuating the hydraulic system!	Do not climb onto rotating parts, use the intended access ladders!	Caution, crushing area! Never reach into the crushing danger zone as long as the parts could still move!

8 Operating instructions for the Tined Weeder Pro

8.1 Mounting on the tractor

Under difficult operating conditions, additional wheel weights can be useful. Please also refer to the operating manual from the tractor manufacturer.

The tractor should be equipped with sufficient ballast weight at the front to ensure the steering and braking capacity. At least 20% of the empty vehicle weight is required on the front axle.

The lifting links must be adjusted to the same height on the left and on the right. The implement must be mounted on the 3-point linkage of the tractor.

Mount the top link so that it slants down towards the tractor during operation (observe the specifications from the tractor manufacturer).

To ensure correct connection of the hydraulic hoses for the tine pre-tensioning, the hoses are labelled as follows:

- 1 red cable tie: return flow (A)
- 2 red cable ties: supply (B)

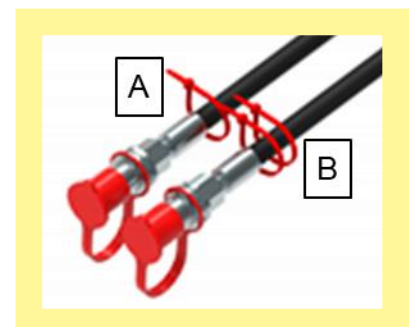


Figure 3

8.2 Safe parking

- 1st The parking surface must be suitable for parking the implement. The ground must be firm and level, so that the stands do not sink in and the harrow does not roll away.
- 2nd To ensure safe parking of the implement, lower the stands at the rear of the harrow.
- 3rd Make sure that the tines do not touch the ground in the process to prevent damage to the tines.
- 4th The stand must be secured with a spring cotter on the pin to prevent accidental loosening.
- 5th Then the hydraulic hoses to the tractor must be depressurised and uncoupled.

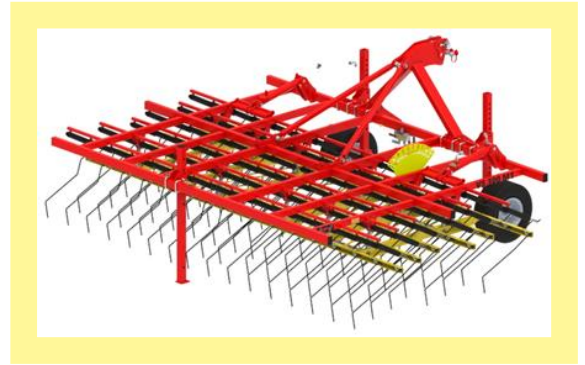


Figure 4



PLEASE NOTE!

When uncoupling the hydraulic hoses for the tine pre-tensioning under pressure, first close the stop tap, and only then unplug the hydraulic hoses. By doing so, the tines remain in the desired position, even when the harrow is parked.

8.3 Securing the top link pin

When the Tined Weeder Pro is mounted on the tractor, the washer marked in Figure 5 must always be placed on the spring cotter on the top link! Otherwise, the implement can be released from the tractor.



Figure 5

8.4 Working position and setting the working depth

The harrow intensity is set with the pre-tensioning of the spring pack. The pre-setting is made hydraulically and comfortably from the tractor seat. On the scale (see Figure 6), the driver can read the level that is currently set. Here, the springs are not pre-tensioned at positions -3 to 0. Pre-tensioning begins at 0, and the full pre-tension is reached at position 6. At position -3, the tines are folded up, which means that the tines are in transport position.

The working speed has a significant effect on the intensity of harrowing. The normal speed range is between 4 and 12 km/h, depending on the crop sensitivity and growth stage.

The feeler wheels can be moved on the frame to the desired track width. The clearance and the tine angle can be adjusted using the pattern of holes in the feeler wheels.



Figure 6

The higher the feeler wheels are moved up in the frame, the smaller the distance between the frame and the ground and the steeper the position of the tine ends relative to the ground.

To set all of the feeler wheels, including those at the rear, to the same height, the same number of holes must be visible above the bracket.



Figure 7: Working position



PLEASE NOTE!

When the feeler wheels are moved further down, the clearance is increased and the tine angle becomes steeper, and therefore more aggressive. The tine pressure remains the same.



PLEASE NOTE!

Ideally, there should almost be a right angle ($90^\circ - 100^\circ$) between the wearing end of the tine and the soil (see Figure 8 - centre). Because of the pre-tensioning, this angle is only reached while driving.

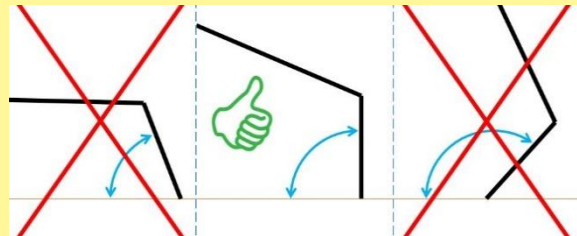


Figure 8: An angle of $90^\circ - 100^\circ$ is ideal

All of the tine rows should penetrate the soil at the same depth (working depth), i.e. the frame must run parallel to the ground.

To achieve this, the extension of the top link must also be adjusted. The parallelism of the frame to the ground can be read on the spirit level on the centre frame, provided that you are on a horizontal plane.



CAUTION!

Only set the harrow with pre-tensioned springs on the ground when the vehicle is already in motion. If the harrow is set down on the ground too rapidly at a standstill, there can be damage to the implement.



CAUTION!

When the harrow is lowered, do not allow it to push or roll back with the tractor; otherwise, the tines and bearing points can be damaged.



CAUTION!

After longer stretches of road transport or standstill, there can be differences in the pre-tension in the hoses due to a change in temperature of the oil. For this reason, pre-tension the tines completely and then loosen them again completely two times. Then you can set the desired pre-tension (e.g. Level 2). This has to be done when the implement is lowered onto the ground.



CAUTION!

Driving in curves is not permitted. If there is no other option, these curves must be driven in a very large radius.

8.5 Hydraulic tine adjustment

The tines are adjusted with one hydraulic cylinder (VS 150 M1) or with two hydraulic cylinders connected in parallel (VS 300 M1). This allows the tine pre-tension to be changed while driving.

All of the hydraulic cylinders (Figure 9) are connected by an oil circuit. Adjustments are made using a double-acting control unit and the flow divider on the centre frame.



Figure 9

8.6 Conversion to front mounting

VS 150 M1 and VS 300 M1 can be used both as a front-mounted and rear-mounted implement.

To change from rear mounting to front mounting, the following steps must be observed:

- 1) The implement must be raised as far as it goes on the tractor lifting unit.
- 2) All feeler wheels must be removed downwards out of the brackets.

The following must be observed for feeler wheels that are used for front mounting:

- Only rotating feeler wheels may be used.
- Two or four rotating feeler wheels should be used:

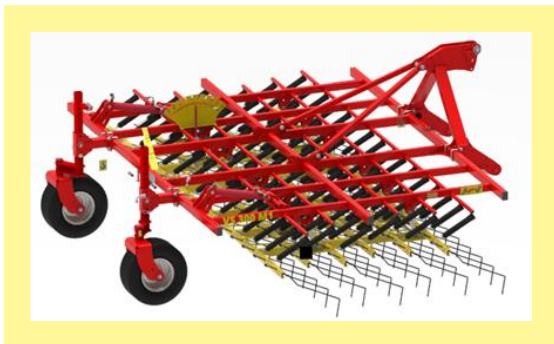


Figure 10: Front mounting with 2 feeler wheels



Figure 11: Front mounting with 4 feeler wheels

- Rotating feeler wheels that are already used for rear mounting can also be used for front mounting.

- 3) All of the brackets to be used are rotated as follows:
 - Remove the bolts on the wheel mount marked in Figure 12.
 - Rotate the wheel mount by 180° as shown in Figure 12. This ensures that there is enough clearance between the tyres and the tines.



Figure 12: Rotating the bracket

- 4) The rotating feeler wheels to be used are inserted in the brackets.
- 5) When all of the rotating feeler wheels are installed at the desired positions, the Tined Weeder Pro is safely parked and uncoupled from the tractor according to 8.2.
- 6) In the next step, the headstock is dismantled. To do so, the bolted connections marked in Figure 13 must be unscrewed on both sides.
- 7) The headstock and the tension struts must now be installed on the rear side of the Tined Weeder Pro, as shown in Figure 14. The tightening torques are
 - M12 U-bracket: 87 Nm
 - M16 bolts: 210 Nm.

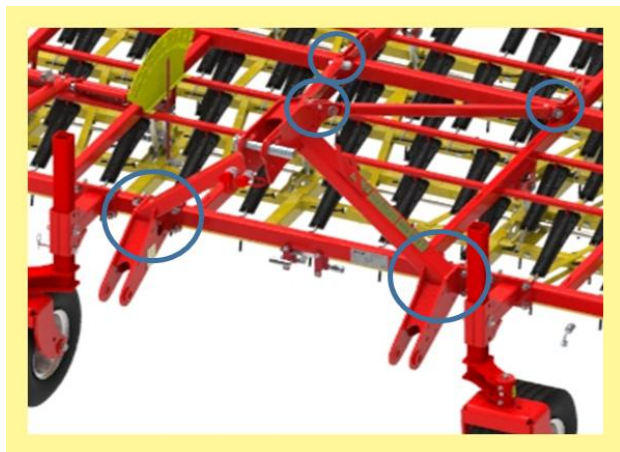


Figure 13: Dismounting the headstock

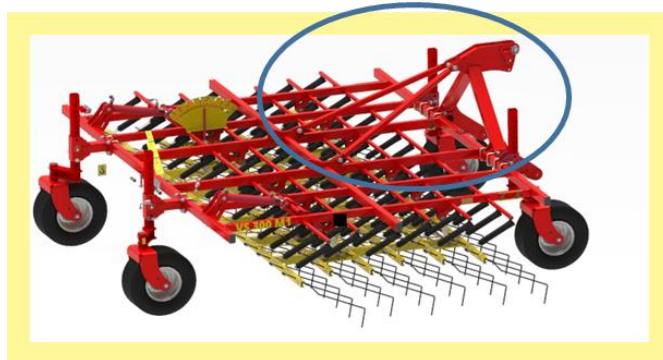


Figure 14: Installation of the headstock and the tension struts

The conversion is now complete. If the Tined Weeder Pro should be converted from front mounting to rear mounting, the steps must be performed in the reverse order.

9 Maintenance and care

9.1 General maintenance instructions

To maintain the implement in good condition even after a long service life, the following instructions must be observed:

- Original parts and accessories are designed especially for the machines or implements.
- Please note that parts and accessories not supplied by us have also not been tested and approved by us.
- The installation and/or use of such products can therefore possibly negatively change or impede the constructional properties of your implement. The manufacturer rules out any liability for damages resulting from the use of non-original parts and accessories.
- The manufacturer is not liable for any unauthorised modifications and the use of components and mounted parts on the implement.
- **Before every operation, check the hydraulic hose lines for wear, damage and ageing.**
- When replacing the hydraulic hose lines, lines must be used that comply with the technical requirements of the implement manufacturer.
- Caution! Liquids escaping under high pressure can penetrate the skin. For this reason, a physician must be consulted immediately in case of accident!
- After cleaning, lubricate all of the grease points and distribute the grease evenly in the bearing points (e.g. perform a short test run).
- Do not use a high pressure cleaner to clean bearing and hydraulic parts.
- The paint can be damaged by cleaning with excessive pressure.
- During the winter, the implement should be protected against rust with an environmentally-friendly product.
- Park the implement protected from weather conditions.
- Put down the implement in a way that the tines are not needlessly strained.

- Hydraulic hose lines must be replaced at the latest 6 years after their manufacturing date. The manufacturing date of the hydraulic hose lines is specified on the fittings.

9.2 Regular maintenance instructions

- All bolted connections should be re-tightened at the latest after 3 operating hours and again after 20 hours, and then checked regularly. Loose bolts can cause significant consequential damage, which is not covered by the warranty.
- The grease points on the joints and bearings must be lubricated regularly (approx. every 10 operating hours with universal grease).
- After the first 10 operating hours and subsequently every 50 operating hours, the hydraulic units and tube lines must be checked for leaks and the bolted connections must be tightened if necessary.
- Occasionally check the tyre inflation pressure (2.1 bar).
- The platform kit and its access ladder must be visually inspected on a regular basis.
- The rubber for fastening the access ladder of the platform kit must be checked regularly for wear and replaced if necessary. It should only be replaced by trained specialist personnel and with original parts.



PLEASE NOTE!

When the implement is lifted off of the ground, the two side wings of the frame should be pointing slightly down. If this is not the case or if the wings are pointing down too much, the stop bolts on the joint must be adjusted.

9.3 Tine change

To change broken or worn tines:

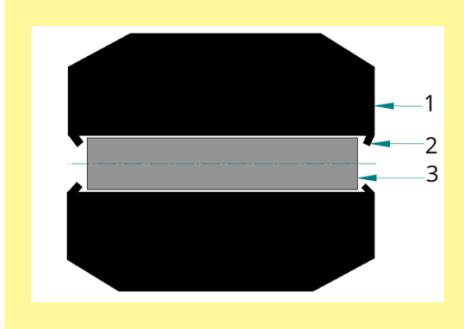
1. Loosen the nut (1) on the plastic piece (2).
2. Pull the bearing unit (bolt + nut + bearing shell) and the tines out of the frame.
3. Reverse procedure for assembly.
4. The recommended tightening torque for the nut is of 3 Nm. Ensure that the nut is not tightened too much, so that the tine can fall downward with its net weight. If this is not the case, the tine cannot work properly when the pre-tension is low.



Figure 15: 1 = nut, 2 = plastic piece

9.4 Changing the springs

Overview: Diagram of the spring attachment



- 1: Plastic shell
- 2: Snap-fit
- 3: Fastening bolt

Figure 16: Diagram of the spring attachment

1. Step

Unlock the snap-fits on one side of the spring assembly. To do so, press from the side in the hole in the spring assembly with a bolt or a pin (8 mm diameter) – as shown in Figure 17 – until the pins touch. As a result, the snap-fits on one side are pressed open.

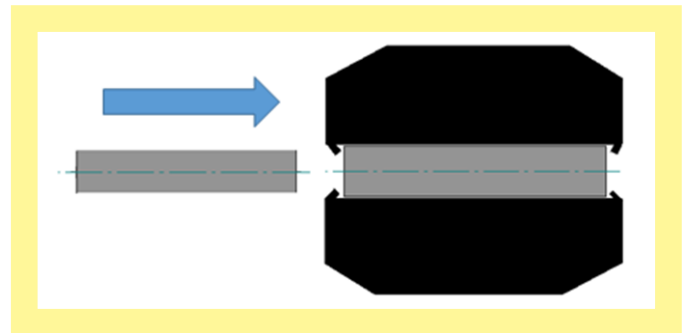


Figure 17: Step 1

2. Step

Push the pin out of the spring assembly. To do so, press with a bolt or a pin (8 mm diameter) into the hole in the spring assembly on the opposite side. Now all of the pins can be pulled out of the spring assembly, and the entire spring assembly is released from the frame.

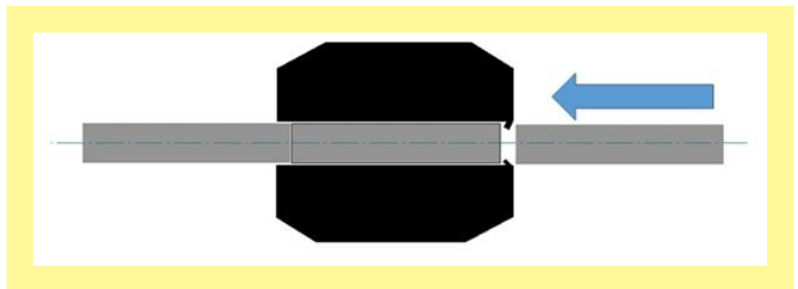


Figure 18: Step 2

3. Step

To install the new spring assembly, it must first be put in position.

Then the fastening bolt is pressed into the hole in the spring assembly as shown in Figure 19.

Ensure that all of the snap-fits are locked again. This is the case when the fastening bolt is pressed far enough into the hole. It may be necessary to press it in further using a bolt or a pin (8 mm diameter).

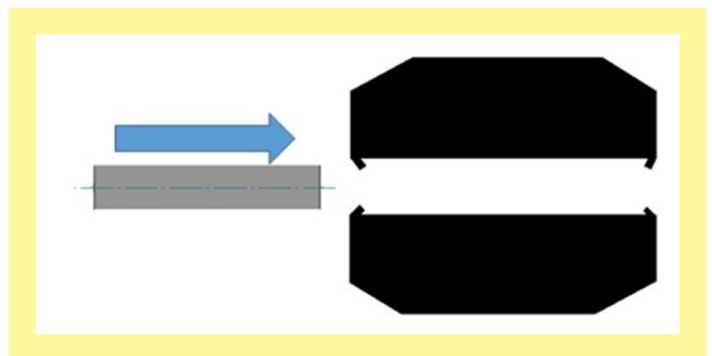


Figure 19: Step 3

9.5 Repairs and service

In case of failure or damage to the Tined Weeder Pro, please contact the manufacturer. The contact data can be found in chapter 4.

10 Information on nature conservation and environmental protection

Reduction of noise pollution during use

Any loose parts (e.g. chains) should be attached to prevent unnecessary noise.

Energy-efficient use

The tines of the Tined Weeder Pro should not penetrate into the soil deeper than necessary. By doing so, the towing vehicle is not unnecessarily strained and fuel can be saved.

Recyclable raw materials during disposal

Many parts of the Tined Weeder Pro are made of steel or spring steel (such as the centre frame, side frame, tine section, tines, ...) and can be accepted and recycled by a waste disposal plant.

11 Technical data

Type designation:	VS 150 M1	VS 300 M1
Mode of operation:	With its unique tine spring system, the Tined Weeder Pro is a crop cultivation implement that adapts precisely to the ground. The harrow tines can be lifted and are pivot-mounted, so that the harrow can only deflect up and down, not to the left and right.	
Working width:	1.7	3.2 m
Transport dimensions (depending on the accessories and the settings) (L x W x H in m):	2.36 x 1.82 x 1.25	2.36 x 3.29 x 1.25
Working depth:	All models: 0-30 mm (depending on the soil conditions)	
Number of tines:	50 tines	218 tines
Tine diameter:	All models: 8 mm	
Tine length:	All models: 520 mm	
Line distance:	All models: 35 mm	
Mounting/hitch (three-point, ...):	Mounting – CAT 1/2	
Feeler wheels	2 tines	2 tines
Net weight:	250 kg	370 kg
Parking supports:	All models: 2 supports, if no feeler wheels are used at the rear	
Working tools:	Cranced tines with a diameter of 8 mm	
Ground adaptation:	Is achieved through the unique tine spring system	
Minimum tractor performance:	11 kW / 15 HP	22 kW / 30 HP
Accessories: (see page 28)	• Mounting option for PS120 M1, PS 200 M1 and MDP 100 M1 • Warning sign with lighting (only VS300) • Warning sign with lighting for front mounting (only VS300) • Platform kit for PS120 M1, PS 200 M1 • Platform kit for MDP 100 M1 • Dispersion plate installation for PS120 M1, PS 200 M1 • Dispersion plate installation for MDP 100 M1 • Rear feeler wheels • Front headstock • Hydraulic hose extension for front mounting • Feeler wheels for front mounting • Top link sensor • Wheel sensor • GPSa sensor • Carbide tines • Manual tine lifting	

Can be equipped with:

- PS 120 M1 – PS 200 M1
- MDP 100 M1



CAUTION!

The VS300 is more than 3 metres wide! When driving on public roads, the applicable country-specific regulations must be observed.

11.1 Harrow array widths

VS 150 M1:

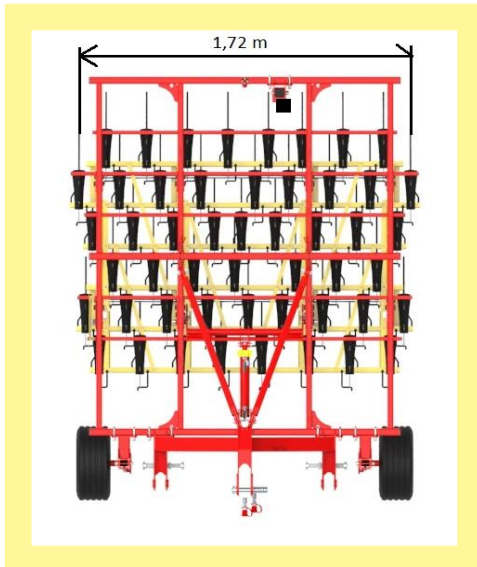


Figure 20: Tine section width VS 150 M1

VS 300 M1:

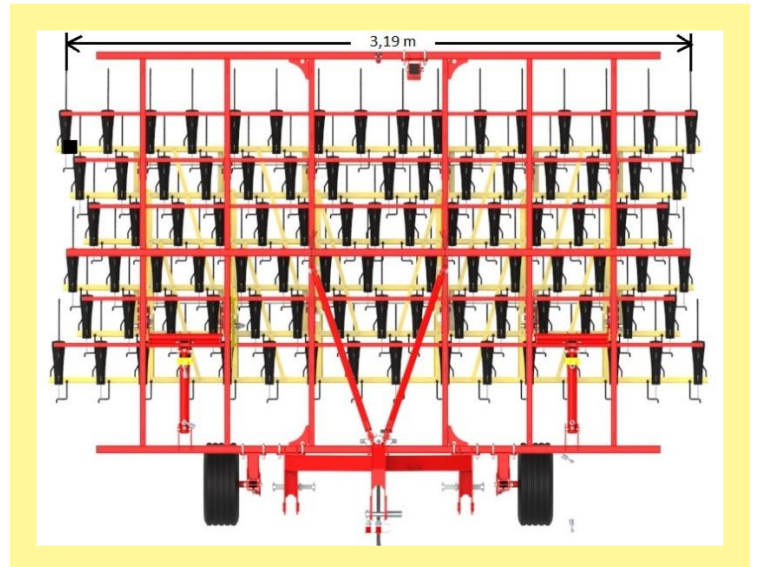


Figure 21: Tine section width VS 300 M1

11.2 Combination options for the Tined Weeder Pro with pneumatic seeders/ Multi-Metering System

PS	PS 120 E	PS 200 E	PS 200 H	PS 300 E	PS 300 H	PS 500 E	PS 500 H	MDP 100	
Dimensions PS HxWxD [cm]	90x60x80	100x70x90	100x70x110	110x80x100	110x80x115	125x80x120	125x80x125	105x55x55	Parts for mounting
Weight [kg]	45	60	83	70	93	93	116	30	
VS	Combined state: Dimensions WxDxH [cm] and weight [kg]								
VS 150 M1 (250 kg)	165x182x236	175x182x236	175x182x236	NO	NO	NO	NO	180x182x236	Mounting kits for PS see Point 17
	295	310	233					280	
VS 300 M1 (370 kg)	165x329x236	175x329x236	175x329x236	NO	NO	NO	NO	180x329x236	Mounting kits for PS see Point 17
	415	430	453					400	

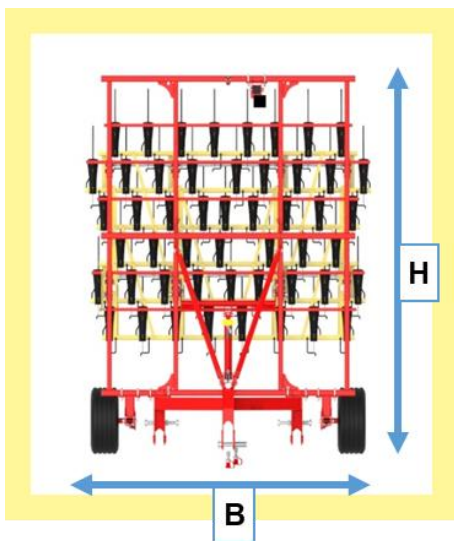


Figure 22: Tined Weeder Pro - Top view in transport position

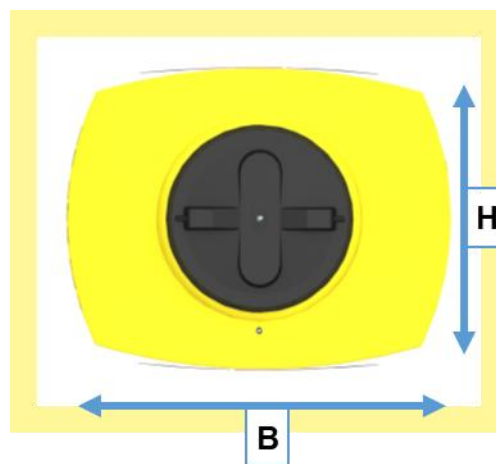


Figure 23: Pneumatic seeder - Top view

W: Width
D: Depth

12 Hydraulic diagram

VS 150 M1

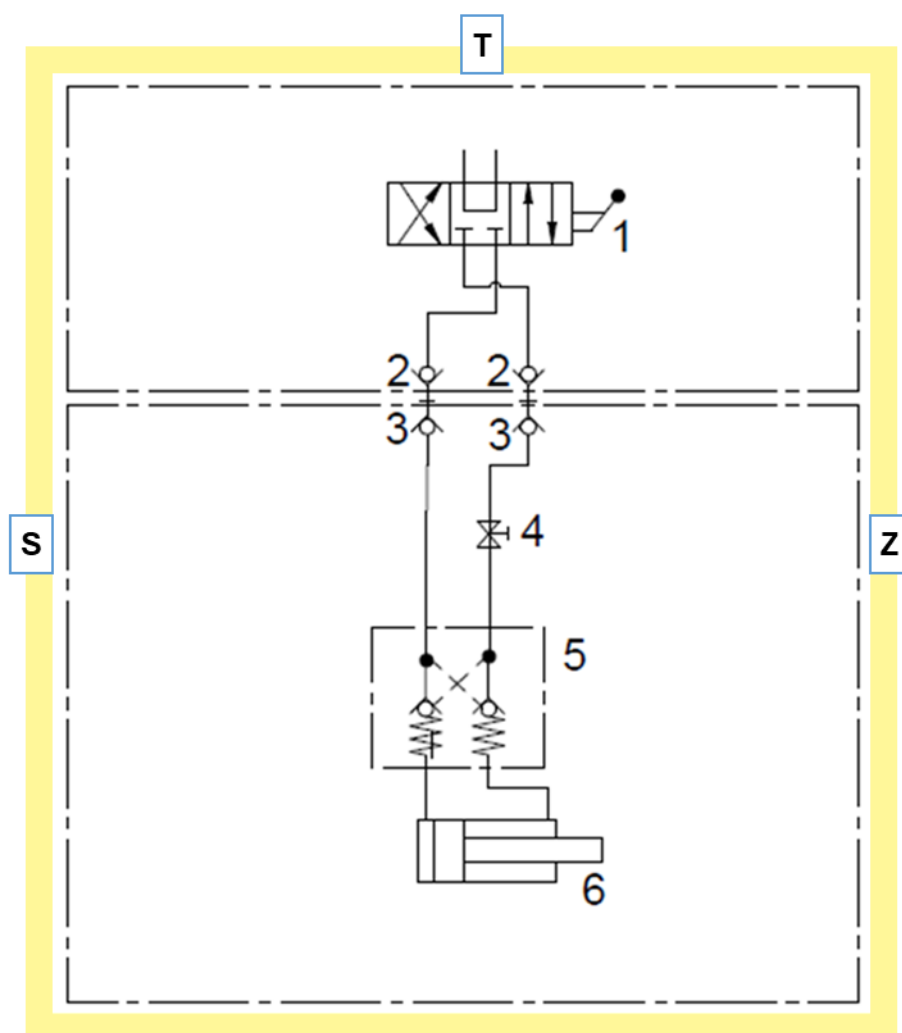


Figure 24 :Hydraulic diagram VS 150 M1

T	Tractor-side	3	Coupling plug BG 2
S	Harrow-side	4	Stop tap
Z	Tine adjustment	5	locking block
1	Control unit	6	Double-acting cylinder for tine adjustment
2	Coupling sleeve BG 2		

VS 300 M1

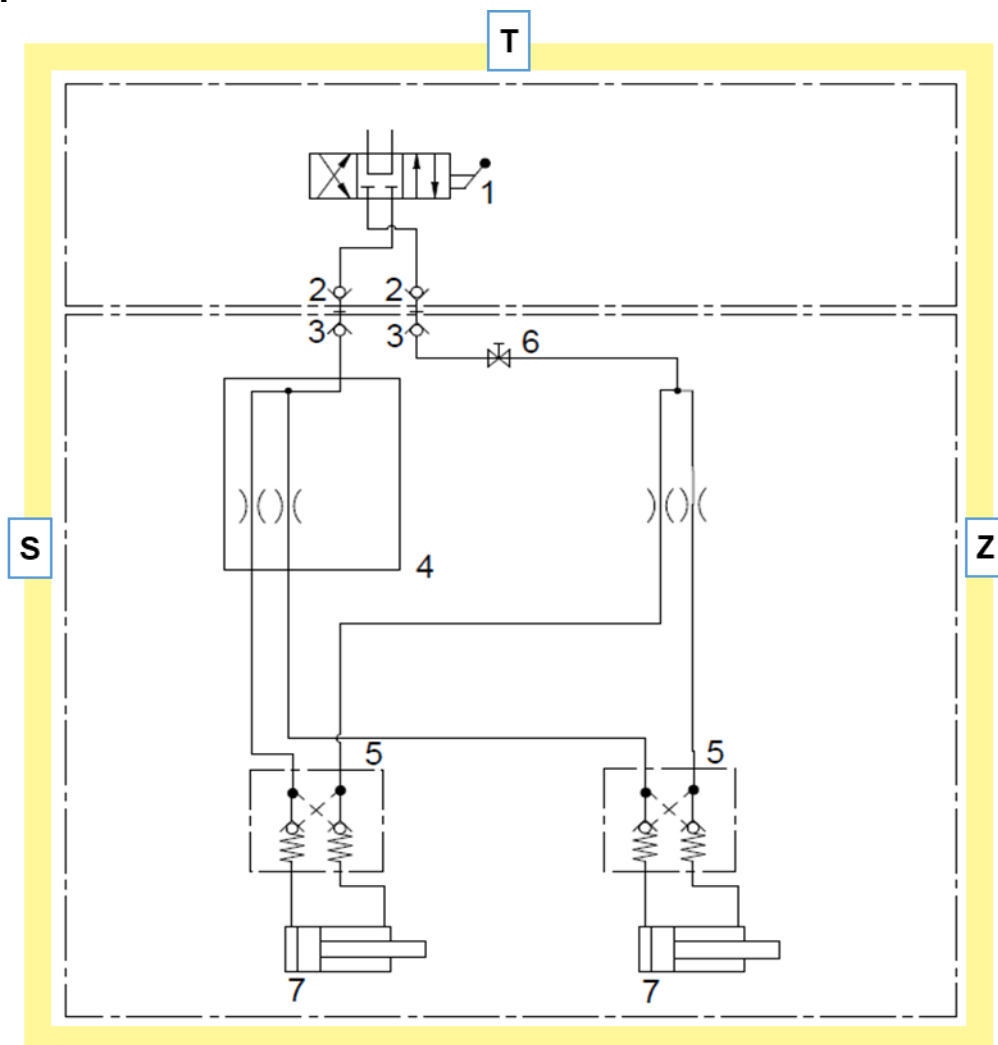


Figure 25: Hydraulic diagram VS 300 M1

T	Tractor-side	3	Coupling plug BG 2
S	Harrow-side	4	2-way flow divider
Z	Tine adjustment	5	locking block
1	Control unit	6	Stop tap
2	Coupling sleeve BG 2	7	Double-acting cylinder for tine adjustment

13 Road transport of the Tined Weeder Pro

13.1 Transport on public roads (in general)

- When driving on roads after field operation, the tine sections should be cleaned of harrowing residues (soil, grass, etc.).
- Comply with the regulations of your country's legislation.
- The mounted implement must be identified with warning signs or stickers with red and white slanted lines (according to DIN, ÖNORM or respective STANDARDS) according to the regulations of the specific country.
- Any part posing a traffic hazard or dangerous parts (tines) must be covered and identified.
- Lighting equipment on the towing vehicle may not be hidden by the implement, otherwise they must be installed on the mounted implement.

- Warning signs or stickers should be visible at a height of max. 150 cm above the road when driving.
- The bracket for the warning signs (additional equipment) is mounted on the centre frame (see section 17 Accessories).
- The axle load and the total weight of the towing vehicle may not be exceeded.
- The steering capacity of the tractor must not be impeded or reduced by the mounted implement!
- Semi-mounted implements may only be towed on public roads with an operating permit.
- Hydraulic implements must be folded in transport position (tine pre-tensioning).
- Ensure that the stop tap (if equipped) is closed or the securing chains are hooked.
- Only relieve the hydraulic hoses shortly before uncoupling the tractor by putting the tractor control unit into float position.
- Only relieve the hydraulic hose at home by putting the tractor control unit into float position.
- Also ensure that none of the safety splints were lost during operation.

13.2 Calculation of the weight ratios for axle loads on the tractor and ballast weights

Implements mounted on the 3-point hitch change the total weight and the axle loads of the tractor. These values may not exceed the permissible measures. The load-bearing capacity of the tyres must also be observed.

The front axle of the tractor must be loaded with at least 20 % of the net weight of the tractor.

The necessary ballast weight as well as the actual axle loads can be determined using the following formulas:

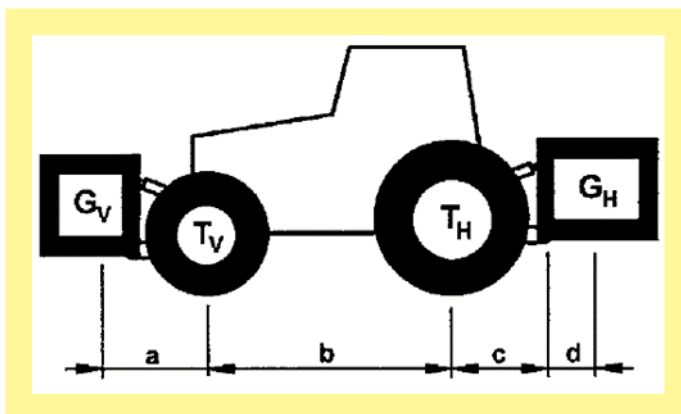


Figure 26

Specifications:

T_L Tractor net weight

T_V Front axle load of the empty tractor

T_H Rear axle load of the empty tractor

G_H Total weight of the rear-mounted implement

G_V Total weight of the front-mounted implement

a Distance from the centre of gravity of the front-mounted implement to the centre of the front axle

b Wheelbase of the tractor

c Distance from the centre of the rear axle to the centre of the lower link ball

d Distance from the centre of the lower link ball to the centre of gravity of the rear-mounted implement
($d = 97 \text{ cm}$)

Weight calculations

1. Calculation of the minimum front ballast for rear-mounted implements $G_{V \min}$:

$$G_{V \min} = \frac{G_H \cdot (c + d) - T_V \cdot b + 0,2 \cdot T_L \cdot b}{a + b}$$

This result is entered in the table on the next page.

2. **Calculation of the minimum rear ballast for front-mounted implements $G_{H \min}$:**

$$G_{H \min} = \frac{G_V \cdot a - T_H \cdot b + 0,45 \cdot T_L \cdot b}{b + c + d}$$

This result is also entered in the table on the next page.

3. **Calculation of the actual front axle load $T_{V \text{tat}}$:**

If the required minimum front ballast ($G_{V \min}$) is not reached with the front-mounted implement (G_V), the weight of the front-mounted implement must be increased to the weight of the minimum front ballast!

$$T_{V \text{tat}} = \frac{G_V \cdot (a + b) + T_V \cdot b - G_H \cdot (c + d)}{b}$$

Now enter the calculated actual front axle load and the permissible front axle load specified in the tractor operating manual in the table on the following page.

4. **Calculation of the actual total weight G_{tat} :**

If the required minimum rear ballast (G_H) is not reached with the rear-mounted implement ($G_H \min$), the weight of the rear-mounted implement must be increased to the weight of the minimum rear ballast!

$$G_{\text{tat}} = G_V + T_L + G_H$$

Now enter the calculated total weight and the permissible total weight specified in the tractor operating manual in the table.

5. **Calculation of the actual rear axle load $T_{H \text{tat}}$:**

$$T_{H \text{tat}} = G_{\text{tat}} - T_{V \text{tat}}$$

Enter the calculated actual rear axle load and the permissible rear axle load specified in the tractor operating manual in the table.

6. **Tyre load capacity:**

Enter the doubled value (two tyres) for the permissible tyre load capacity (see e.g. tyre manufacturer documents) in the table.



CAUTION!

The minimum ballast must be attached to the tractor as a mounted implement or ballast weight!

The calculated values may not be higher than the permissible values!

13.3 Table for the weight ratios

	Actual value acc. to calculation		Permissible value acc. to operating manual		Double the permissible tyre load capacity (2 tyres)
Minimum ballast front/rear	kg				
Total weight	kg	≤	kg	≤	kg
Front axle load	kg	≤	kg	≤	kg
Rear axle load	kg	≤	kg	≤	kg

14 Lighting circuit diagram

R	Right
1	12 V plug, 7-pin
2	Rear light, right
2.1	Turn signal
2.2	Rear light
2.3	Brake light
L	Left
3	Rear light, left
3.1	Brake light
3.2	Rear light
3.3	Turn signal

Plug and cable assignment:

No.	Desig.	Colour	Function
1	L	Yellow	Turn signal, left
2	54g	---	---
3	31	White	Earth
4	R	Green	Turn signal, right
5	58R	Brown	Rear light, right
6	54	Red	Brake light
7	58L	Black	Rear light, left

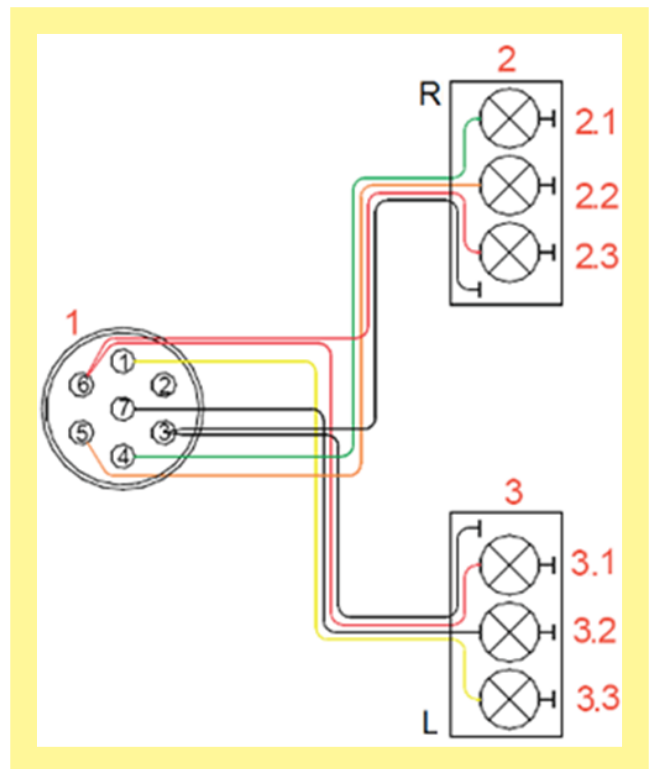


Figure 27: Circuit diagram

15 Decommissioning, storage and disposal

15.1 Decommissioning the implement

To ensure that the implement remains fully functional, even if it is out of operation for longer periods of time, it is important to take precautions for storage: To do so, observe Point 15.2.

15.2 Storage of the implement

- The implement must be stored in a dry and weather-protected location, so that it does not lose its functionality, even during a longer storage period.
- The implement must be parked as specified in 8.2.
- Prevent the implement from rolling off unintentionally.
- Do not place or store anything on the implement.
- The implement must always be parked and stored in a secure area. An unauthorized operation has to be prevented.

15.3 Disposal

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

16 Cropping tips for using the Tined Weeder Pro

The Tined Weeder Pro's mode of action mainly consists of burying and uprooting the weeds and crumbling the soil surface. It also stimulates tillering in cereals. Compared to hoeing machines, the Tined Weeder Pro has two major benefits: It operates in a row-independent manner and has a comparatively high area efficiency.

The seed rate and surface structure of the seedbed are very closely related to the success of harrowing against weeds. Whereby shallow seeding excludes any pre-emergence harrowing. When the plants are firmly rooted in the soil later on, harrowing can be performed again. At seeding depths of 3-4 cm, pre-emergence harrowing is possible when the working width of the harrow is shallower. However, the germinating seed may not be touched by the harrow tines during operation.

In general, the objective is to control weeds by harrowing at the root hair or cotyledon stage during the growing season while protecting the crops as much as possible. The optimal mode of operation to achieve this strongly depends on the soil, crop, and weather conditions. The optimal site-dependent mode of operation can be found fastest by adjusting the working depth and varying the working speed. As a basic setting on the harrow, the tips of the tines should be about vertical to the soil surface (see chapter 8.4 Working position and setting the working depth).

Warnings against excessive harrowing intensity are an increased number of uprooted, buried or bent plants. Low crop losses can be compensated in advance through a slight increase in the seed rate of about +10%. After finishing all field passes, the final crop density should not drop below the cropping-related required values.

Other effects of tilling your fields with the Tined Weeder Pro, such as

- Soil aeration,
- Regulation of the water balance,
- Incorporation of the seed for nurse crops and
- Promoting tillering in cereals

make a significant contribution to the formation of good crops.

Summary for efficient and effective harrowing:

- Important prerequisites are a level seedbed, sufficiently deep seed placement, uniform germination, loose soil surface, few tracks, and dry weather.
- A missed harrowing pass can NOT be performed at a later date.
- Harrowing does not have a lasting effect => several consecutive work passes must be coordinated.
- Optimal harrowing takes place at the limit of crop tolerance, in case of doubt, enumerate the crop plant losses.
- When seeding, account for crop plant losses.
- The weed-controlling effect of the harrow is sometimes already achieved at low forward speeds (above approx. 2 km/h).
- Optimal adjustment of the harrow can take a lot of time.

Only the potential of harrowing is described here! Ultimately, harrowing success depends on the skill and experience of the operator.

17 Accessories

- **Tines with carbide coating**

To reduce tine wear, the VS 150 M1 / VS 300 M1 can be equipped with tines with carbide soldered on. Endurance tests show that these tines are worn much more slowly. This extends the service life of the tines until they need to be replaced considerably. The soldered carbide platelet is 60 mm long.

Carbide tine item no.:

07027-2-016: carbide tine accessories kit for VS 150 M1

07028-2-012: carbide tine accessories kit for VS 300 M1



Figure 28

- **Warning signs and lighting**

Warning signs with lighting are also available as an accessory for the VS 300 M1. Please always specify your serial number for retrofits!

Please note that separate warning signs with lighting are available for front mounting operation of the VS 300 M1.

Item no.:

07028-2-024: warning sign + lighting VS 300 M1

07028-2-025: warning sign + lighting VS 300 M1 front



Figure 29

- **Feeler wheels accessories kit**

The rear-mounted VS 150 M1 / VS 300 M1 can be equipped with rotating feeler wheels. For front mounting, only rotating feeler wheels should be used.

All feeler wheel brackets can be shifted in the width as required to adjust the track width.

Item no.:

07027-2-018: Rear feeler wheel accessories kit for VS 150 - 300 M1

07027-2-022: Front feeler wheel accessories kit for VS 150 - 300 M1



Figure 30

- **Pneumatic Seeder or Multi-Metering System bracket accessories kit**

This bracket is used to mount a pneumatic seeder PS 120 - 200 M1 or multi-metering system MDP 100 M1 on the VS. Please note that it must be mounted in compliance with ISO 4254-1.

Item no.:

07027-2-019: pneumatic Seeder bracket accessories kit

07027-2-032: multi-Metering System bracket accessories kit



Figure 31

- **Platform kit accessories kit**

For easier maintenance of the pneumatic seeder PS 120 - 200 M1 and multi-metering system MDP 100 M1, a suitable platform kit is available as an accessory. Please note that it must be mounted in compliance with ISO 4254-1.

Item no.:

07027-2-017: platform kit accessories kit VS 150 M1

07028-2-013: platform kit accessories kit VS 300 M1



Figure 32

- **Dispersion plate installation**

When a seeder is mounted on the VS 150 M1 / VS 300 M1, brackets are required for the dispersion plates. The dispersion plates are positioned in front of the tine section as a standard. Everything is already installed ex-factory.

Note: 8 dispersion plates are required when using a Pneumatic Seeder PS. When using a Multi-Metering System MDP, 6 dispersion plates are required.

Item no.:

07027-2-020: dispersion plate installation accessories kit 8 outlets for VS 150 M1 (for Pneumatic Seeder PS)

07027-2-021: dispersion plate installation accessories kit 6 outlets for VS 150 M1 (for MDP)

07028-2-014: dispersion plate installation accessories kit 8 outlets for VS 300 M1 (for Pneumatic Seeder PS)

07028-2-015: dispersion plate installation accessories kit 6 outlets for VS 300 M1 (for MDP)

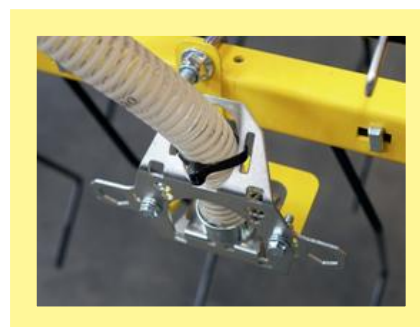


Figure 33

- **Manual tine lifting**

With the manual tine lifting, individual tines can be lifted, e.g. to avoid working in rows where the plants are already taller. As a result, the harrow can be optimally adjusted for crops grown on beds.

Either the entire harrow can be equipped with manual tine lifting or any number of tine lifting mechanisms can be selected. To actuate the tine lifting mechanism, the plate is simply pushed towards the tine.

Item no.:

07027-2-024: tine lifting accessories kit for VS 150 M1

07028-2-019: tine lifting accessories kit for VS 300 M1

07014-2-351: individual tine lifting



Figure 34

- **Front headstock accessories kit**

An additional headstock can be installed on the VS 150 M1 & VS 300 M1 to operate the harrow at the front and rear.

Item no.:

07027-2-008: front headstock accessories kit for VS 150 - 300 M1

07027-2-025: hydraulic hose extension accessories kit for VS 150 - 300 M1



Figure 35

18 Spare parts

You have the option to order your required spare parts directly through our online spare parts catalogue. To do so, scan the QR code with your smartphone - you will be taken directly to our online spare parts catalogue. Please keep your product number / serial number at hand.



You can also view our online spare parts catalogue on our website www.apv.at in the Service area.

If you have any questions regarding spare parts or your order, our Customer Service (see point 4 for contact data) is also happy to assist you.

19 Index

Accessories	28	Mounted implements.....	9
Accident prevention regulations.....	8	Mounting on the tractor	12
Calculation of the weight ratios	24	Nature conservation and environmental	
Changing the springs.....	17	protection	18
Changing the tines	17	Parking	13
circuit diagram	26	Pattern of holes.....	13
Combination options.....	21	Plug and cable assignment	26
Conformity	4	Pre-tensioning.....	13
Cropping tips	27	Production number.....	6
Decommissioning	26	Recyclable raw materials	19
disposal	19, 26	Reduction of noise pollution	18
Driving in curves	14	Repairs and service	18
Energy-efficient use.....	19	Road transport	23
Feeler wheels	14	Safety information	7
Flow divider	15	Safety-related instructions.....	8
front mounting	15	seeders	10
Harrow array widths.....	20	Service.....	6
Harrow intensity.....	13	Setting the working depth.....	13
hazard labels	11	Snap-fit	18
Hydraulic cylinder	15	spare parts.....	6, 7, 30
Hydraulic diagram	22	storage.....	26
Hydraulic system	9	Technical data	19
Hydraulic tine adjustment	15	Track width	13
Identification of the implement	6	Transport position	13
Information signs	11	Type plate	6
Intended use	7	Tyres.....	10
Lighting.....	26	Warranty	7
Maintenance.....	10	Weight calculations	24
Maintenance and care	16	Working depth.....	14
Maintenance and repair work	6	Working position	13, 27
Minimum ballast	24	Working speed	13

Notes

Qualität für Profis

- seit 1997 -



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