

TINED WEEDER PRO

VS 1360 | VS 1520 | VS 1630

OPERATOR MANUAL



PLEASE READ CAREFULLY BEFORE INITIAL OPERATION

Translation of the original operating manual

Version: 1.0 EN; item number: 00603-3-389



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EC Declaration of Conformity

Manufacturer: **APV – Technische Produkte GmbH**
Dallein 62
AT - 3753 Hötzelstdorf

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

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

Name of the mounted implement series: **Tined Weeder Pro**
VS 1360 | VS 1520 | VS 1630
Electric control

Year of manufacture: from 2026

Serial number: Starting from 07025-01000 | 07024-01000 | 07029-01000

Relevant Directives: 2006/42/EC EC Machinery Directive
2014/30/EU EMC Directive
2014/68/EU Pressure Equipment Directive

For the planing, design, construction and marketing of the implement, the following harmonised European standards were applied:

EN ISO 12100:2010	Safety of machinery – General principles for design; risk assessment and risk reduction
EN ISO 4254-1:2015	Safety requirements for agricultural machinery – Part 1: General requirements
EN ISO 13854:2019	Safety of machinery – Minimum gaps to avoid crushing of parts of the human body
EN ISO 13857:2019	Safety of machinery - Safety distances to prevent hazard zones being reached by upper and lower limbs
EN 60204-1:2018	Safety of machinery – Electrical equipment of machines – Part 1: General requirements
EN ISO 14982:2009	Agricultural and forestry machinery – Electromagnetic compatibility – Test methods and acceptance criteria

The special technical documents belonging to the implement in accordance with Appendix VII, Part A have been prepared.

Responsible for the technical documentation: APV - Technische Produkte GmbH

Dallein / Hötzelstdorf, 02/2026



In. Karl Heinz Steindl
Managing Director (authorised person in der EU)

1 IDENTIFICATION OF THE IMPLEMENT

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

- Designation
- Model
- Production number

Position of the type plate

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



Figure 1

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

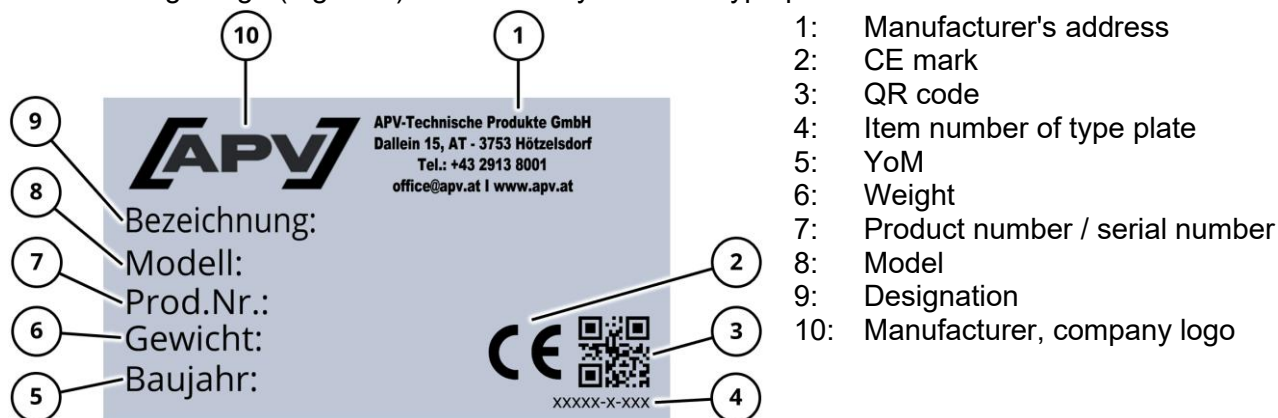


Figure 2



NOTE!

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

2 SERVICE

Please contact our service address in the following cases:

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

Service address:

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

Telephone: +43 2913 8001-5500
Fax: +43 2913 8002
E-mail: service@apv.at
Web: www.apv.at

3 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 3.1), 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.

3.1 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.

4 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.

4.1 INTENDED USE

The Tined Weeder Pro VS 1360 | VS 1520 | VS 1630 is used for mechanical tillage of the top layer of soil and weed control on agricultural fields.

Any use beyond that is deemed to be improper. The manufacturer is not liable for any resulting damage, the operator alone bears the associated risk.

Examples of non-intended use include:

- The implement may not be used on grassland, it is only designed for use on fields within the specified framework conditions.
- The maximum working speed is 12 km/h.
- Driving in curves is not permitted.
- The VS may not be pushed back when in working position. Rolling back must also absolutely be avoided when starting to drive.
- Attention must be paid that the side frames do not hit the ground when turning at the headlands.
- Before parking the implement on the ground, it must be ensured that the tines are in transport position and that the implement is aligned parallel to the ground (top link).

- The implement may not be set down on the ground at a standstill when the tines are pre-tensioned in working position. Setting down on the ground is only permitted while driving forward.
- The implement may not be folded when the tines are pre-tensioned.
- When the tines are set down on the ground, the pre-tension may not be reduced when the implement is at a standstill. This is not a problem while driving forwards.

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. Be sure to hand over the safety instructions 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. This causes the declaration of conformity to lose its validity.

4.2 GENERAL SAFETY-RELATED INSTRUCTIONS AND ACCIDENT PREVENTION REGULATIONS

- **The operator has read and understood this operating manual before handling the implement.**
- **The operator must train and instruct their personnel. The personnel must have read and understood this operating manual before handling the implement.**
- Always keep the operating manual close to the implement for reference purposes.
- When passing on the implement, 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 (e.g. defective parts, connections, hoses, protective equipment, etc.)!**
- **Before each use, check the folding device and its securing elements (transport lock, locked with sensors) for proper function and effect.**
- 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 for the respective country!
- The implement may only be used by persons who are informed of the hazards and who know the regulations for transport on public roads.
- The warning and information signs applied to the implement provide important instructions for safe operation. These may not be removed in any case, observe them for the sake of your own safety!
- Observe the respective country-specific road traffic 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!
- Always secure the parked implement against unintentional rolling.
- 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 may only be climbed onto when a platform kit is installed.
- When using the platform kit, it must be ensured that the implement is at a standstill, is unfolded, and lowered onto the ground.
- It is forbidden to transport working materials on the implement!
- 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 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 (pay attention to the minimum turning curve)!
- 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!
- On implements with manual folding, always ensure that the implement is stable!
- For implements that are driven rapidly 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!
- Folded frames and lifting devices must be locked in transport position!
- Packer hooks 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 (see point 7). The procedure in maintenance manual must be observed and protective equipment must be used.
- Working under the implement is forbidden – especially when it is lifted.
- 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.
- It must be ensured that the hydraulic couplings are not soiled.
- When performing the work passes, the tractor's speed must be maintained as specified in the operating instructions. This can be between 1 and 12 km/h.
- Additional lighting (e.g., flashlight) should be used for repair or maintenance work if necessary.
- When implement parts are moving (e.g. during the folding or pre-tensioning procedure) it must be ensured that there is no one standing in the danger zone of the implement – there is a risk of crushing.
- When driving through low or narrow obstacles (e.g. power lines, underpasses, etc.), attention must be paid to the height and width of the implement to avoid collisions.
- In case of loss or breakage of implement parts, they must be immediately replaced with original parts by trained specialist personnel.

4.3 MOUNTED IMPLEMENTS

- Before mounting and dismounting implements on the three-point linkage, the operating devices must be moved into the correct 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 implement, the operator must ensure that there is a metallic connection (ensured by the lower link) made to the tractor.
- The operator must ensure that no one is standing close to the implement when it or its components are being moved by the tractor hydraulic system or when the side wings are being lifted or lowered. Visual check by the driver!
- When driving on roads, it must be ensured that the transport lock is properly engaged. This can be accomplished with a visual check and by looking at the position sensor display on the control terminal.
- Mounting of any sort of accessories onto the implement must be performed according to standards. The maximum permitted total weight may not be exceeded.
- Only APV implements and accessories may be mounted on the implement.
- Accessories must be mounted in compliance with the standards by qualified specialist personnel from an authorised company.

4.4 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**!
- 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!

4.5 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 and the implement is uncoupled from the towing vehicle! 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.
- If repair or maintenance work is required on the implement, this work must be identified by a clearly visible information sign "Caution: 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 against lowering through suitable support elements!
- When changing working tools with sharp edges, always use suitable tools and cut-resistant gloves!
- Replacing components that cannot be removed with tools such as a screwdriver or wrench may only be replaced by qualified specialist personnel from an appropriately authorised company or by APV Customer Service.
- Dispose of oils, greases and filters according to the national regulations!
- 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!
- Always cut the power supply when working on the electrical system!
- Cleaning must be performed with water and/or compressed air. Cleaning must only be carried with the implement lowered, shut down and secured to prevent it being switched on again.
- Make sure that water cannot enter the electrical, electronic or hydraulic components.

4.6 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 tyre pressure regularly. Observe the prescribed inflation pressure (2.1 bar)!
- When the machine is decommissioned or parked for longer periods of time, it must be set on the parking supports to relieve the tyres.



CAUTION!

Misprints, errors and omissions excepted.

5 INFORMATION SIGNS / HAZARD LABELS

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

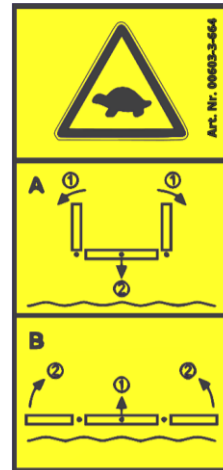
5.1 INFORMATION SIGNS



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



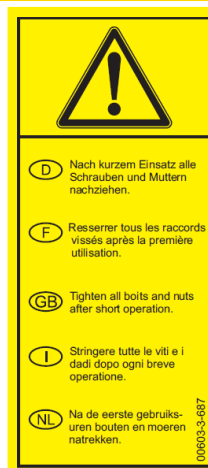
Do not stand on the implement while driving!



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

5.2 HAZARD LABELS



Caution, crushing area!
Never reach into the
crushing danger zone as
long as the parts can
still move!

6 OPERATING INSTRUCTIONS

6.1 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 struts 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).

Connection of the hydraulic lines

- 1: Size 4 socket, tank line
- 2: Size 3 socket, control unit supply line
- 3: Size 2 socket, load sensing



Figure 3

6.2 SAFE PARKING

- 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.
- To ensure safe parking of the implement, lower the support legs at the rear and front of the harrow.
- Make sure that the tines do not touch the ground in the process to prevent damage to the tines or the tine mounts.
- The stand must be secured with a spring cotter on the pin to prevent accidental loosening.
- The transport lock (1) must be engaged. (see Figure 5).
- Then the hydraulic hoses to the tractor must be depressurised and uncoupled.

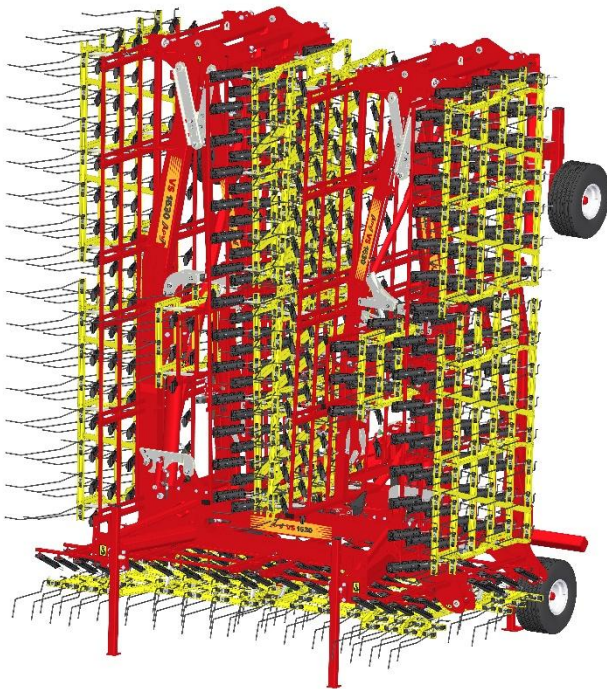


Figure 4

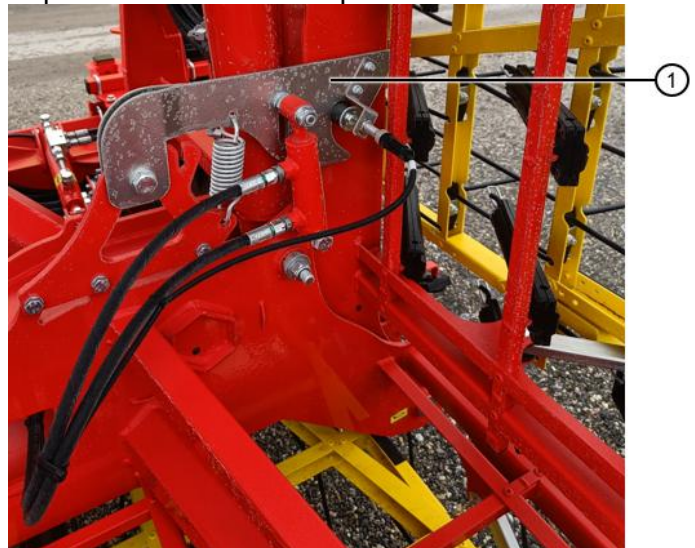


Figure 5: transport lock engaged

6.3 SECURING THE TOP LINK PIN

When the Tined Weeder Pro is mounted on the tractor, the washer marked in Figure 6 must always be placed on the spring cotter on the top link! Otherwise, the implement can be released from the tractor.

CAUTION!

The elongated slot must only be used for field operation!
For road transport, the round hole underneath must be used.



Figure 6

6.4 FOLDING THE TINED WEEDER PRO

1. The implement can only be folded when it is raised from the ground.
2. Ensure that no one is standing in the danger area!
3. Couple the hydraulic line plugs (ensure that they are always kept clean!).
4. Then start folding the implement, see Chapter 8.2.2 Work menu for more information.

5. **When folding** into transport position, the implement must also be lifted from the ground and the **harrow tines must be folded up** (pre-tensioning -3).
6. When folding, move the feeler wheels on the side frames into transport position (see Figure 7).



Figure 7: feeler wheels on the side frames in transport position

CAUTION!

The tines may be pre-tensioned only when the Tined Weeder Pro is unfolded.

During the folding procedure, first the outer side frame is folded by 180° onto the inner frame, which is then folded up by 90°.

CAUTION!

To ensure a transport width of max. 3 m, the feeler wheels on the side frames must be removed and inserted and secured in the feeler wheel bracket intended for this purpose.

6.5 WORKING POSITION AND SETTING THE WORKING DEPTH

The harrow intensity is set with the pre-tensioning of the spring pack. The adjustment is electro-hydraulic, see Chapter 8.2.2 Work menu. On the scale (see Figure 8), 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 1 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 8

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 on all of the feeler wheels.



Figure 9: Working position



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.



NOTE!

Ideally, there should almost be a right angle (90° - 100°) between the wearing end of the tine and the soil (see Figure 10 - centre). Because of the pre-tensioning, this angle is only reached while driving.

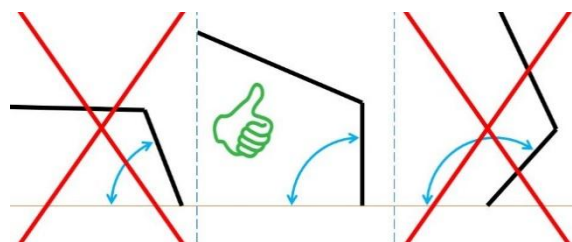


Figure 10: An angle of 90° - 100° is ideal

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, it is forbidden to drive in reverse or roll back with the tractor; otherwise, the tines and bearing points can be damaged.



CAUTION!

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



CAUTION!

The working speed may not exceed 12 km/h.

6.6 HYDRAULIC TINE ADJUSTMENT

Tine adjustment is accomplished via a supply line (ring line) and electromagnetic valves. The position is monitored with a turning angle sensor. The preload is adjusted on the control terminal in the towing vehicle, see Chapter 8.2.2 Work menu.



Figure 11: hydraulic cylinder and electromagnetic valve

6.7 ADJUSTING THE FEELER WHEEL TRACK

To set the desired track width for the feeler wheels, the nuts on the U brackets of the feeler wheel brackets must be loosened. Then the feeler wheel bracket and the section are pushed into the desired position and the nuts are retightened.



Figure 12: adjusting the feeler wheel track



CAUTION!

The nuts on the U brackets of all feeler wheel brackets on the Tined Weeder Pro may only be tightened to a maximum of 25 Nm to avoid damage to the U bracket.

7 MAINTENANCE AND CARE

7.1 GENERAL MAINTENANCE INSTRUCTIONS

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

- In Point 4, you will find some basic safety regulations for maintenance work.
- Original parts and accessories are designed especially for the machines or implements.
- Please note that original spare parts and original accessories not supplied by us have also not been tested and approved by us.
- The installation 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 to the implement and the use of components and auxiliary parts on the implement that were not purchased from APV.
- **Before every commissioning, check the hydraulic hose lines for wear, damage and ageing. Damaged or faulty parts must be immediately replaced.**
- When replacing the hydraulic hose lines, original spare parts 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 corrosion 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.**
- Hydraulically as well as mechanically folded implement must only be parked in a folded state.
- The hydraulic system must be inspected at least once a year by specialist personnel.

7.2 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, hoses and couplings as well as 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.

**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.

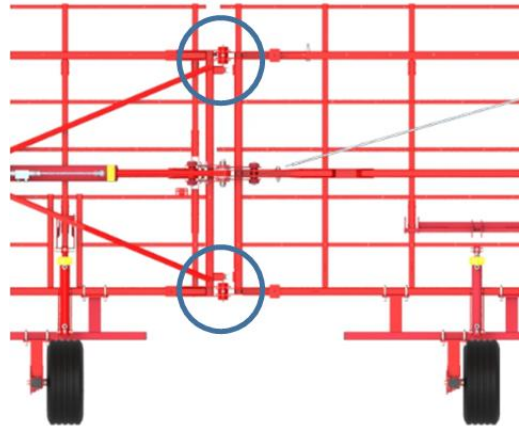


Figure 13

7.3 CHANGING THE TINES

To change broken or worn tines:

Loosen the nut (1) on the plastic piece (2).

Pull the bearing unit (bolt + nut + bearing shell) and the tines out of the frame.

Assembly is performed in the reverse sequence.

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.

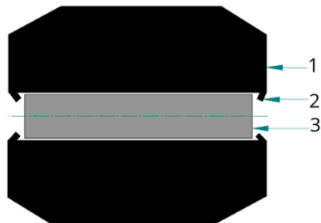


Figure 14: 1 = nut, 2 = plastic piece

7.4 CHANGING THE SPRING ASSEMBLY

7.4.1 SPRING ASSEMBLY WITHOUT BOLTED FASTENING

Diagram of the spring fastening:



- 1: Spring assembly plastic shell
- 2: Snap-fit
- 3: Fastening bolt

Figure 15

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 16 – until the pins touch. As a result, the snap-fits on one side are unlocked.

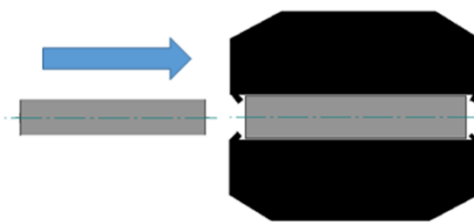


Figure 16: Step 1

2. 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 17.

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).

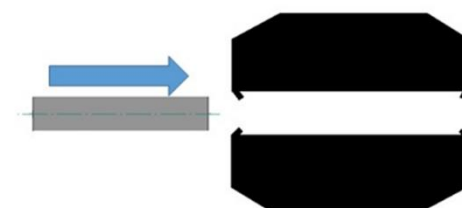
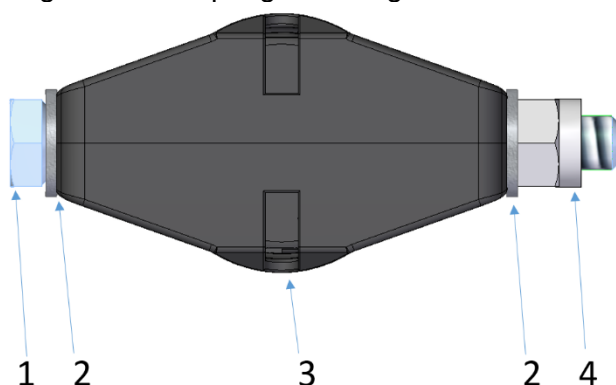


Figure 17: Step 3

7.4.2 SPRING ASSEMBLY WITH BOLTED FASTENING

Diagram of the spring fastening:



- 1: Bolt M8x85
- 2: Washer M8
- 3: Spring assembly plastic shell
- 4: Lock nut M8

Figure 18

- Loosen the lock nut (4) with a wrench (width across flats 13).
- Pull the bolt (1) out of the spring assembly.
- Pull the spring assembly (3) out of the tine and replace it with a new one.
- Insert the bolt (1) through the new spring assembly (3) and retighten the nut (3).

CAUTION!

Only tighten the nut far enough so that the washers are resting on the spring assembly. In no case should a gap be produced between the half shells due to excessive tightening.

7.5 REPAIRS AND SERVICE

In case of failure or damage to the implement, please contact the manufacturer. The contact data can be found in chapter 2.

8 ELECTRONIC CONTROL BOX

8.1 INITIAL OPERATION

8.1.1 UPLOADING THE OBJECT POOL (IOP)

The first terminal onto which the object pool (IOP) is uploaded is stored as the preferred terminal. If the implement is connected once again, the control box will be immediately displayed. If the implement is connected to a different towing vehicle / terminal, it takes approx. 20 s until the control box is displayed on the terminal.

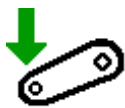
8.1.2 STATUS BAR

The status bar is located in the upper area of the display, which is shown in every menu:



Description of the display elements

- 1** On the left in the status bar, the current menu is shown. In this case, it is the Work menu.
- 2** The corresponding icon for road mode and for active and inactive working mode are also on the left side.
- 3** In the middle of the status bar, there is the APV logo. In case of errors, the logo is replaced by the corresponding error or warning message.
- 4** On the right side of the status bar, there is the symbol for the current working position or the current position of the mounted implement. The Task Controller status display is beside it. It provides information on which Task Controller function is currently activated.



The mounted implement is in working position.



The mounted implement is not in working position.



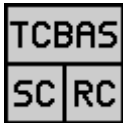
When this icon is displayed, the implement is in road transport mode and is therefore folded and locked.



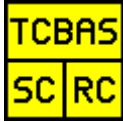
When this icon is displayed, the implement is in working mode and is therefore not completely folded and locked.



When this icon is displayed, the implement is in working mode and the tine section regulation is active.

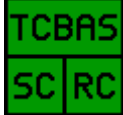


The Task Controller status display provides information about which task function is currently activated on the ISOBUS. This field has different colours, depending on the activated function.



TC-BAS:

With this function, jobs can be simply documented. The values that are relevant for this are provided to the tractor.



TC-SC:

With this function, part-width sections can be automatically switched.

TC-RC:

With this function, harrowing can be performed with variable tine pressure.

When working with multiple part-width sections, the RC display also turns green as soon as one part-width section is working with variable spread rates.

Grey:

- The Task Controller is not connected.
- The towing vehicle does not support this ISOBUS function.
- This ISOBUS function is not activated on the towing vehicle.

Yellow:

- The Task Controller is connected, but it is not activated.

Green:

- The respective function is active.

Section 8.2.3.3 describes how the position or the utilised signal of the working position is changed.

8.1.3 STOP BUTTON

The STOP button can be found in every menu. This button executes a general STOP of all processes.



Description of the button functions

STOP

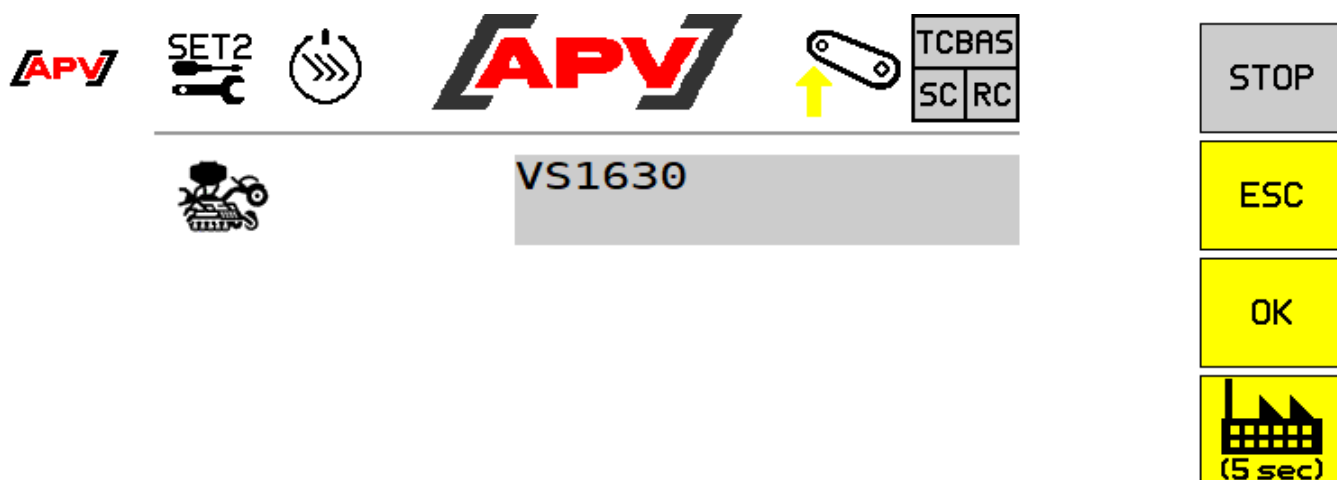
Grey: no actuators are switched on.

STOP

Red: actuators are switched on and can be stopped with this button.

8.1.4 BASIC SETTINGS MENU

For initial operation or when pressing and holding the Set button in the Start menu for five seconds (see also Point 8.2.1), the basic settings for the utilised harrow must be entered (e.g. implement type, working width, etc.).



Description of the button functions

ESC

With the ESC button, you go back one menu level without saving the changed settings, in this case, to the Start menu.

OK

The Basic settings menu is exited and the modified settings are saved. When the settings have been changed, the control box is restarted.



By pressing and holding this button for 5 seconds, a factory reset is performed, i.e. all of the settings are reset and the Basic settings menu is called up again. The corresponding implement must then be set there again.



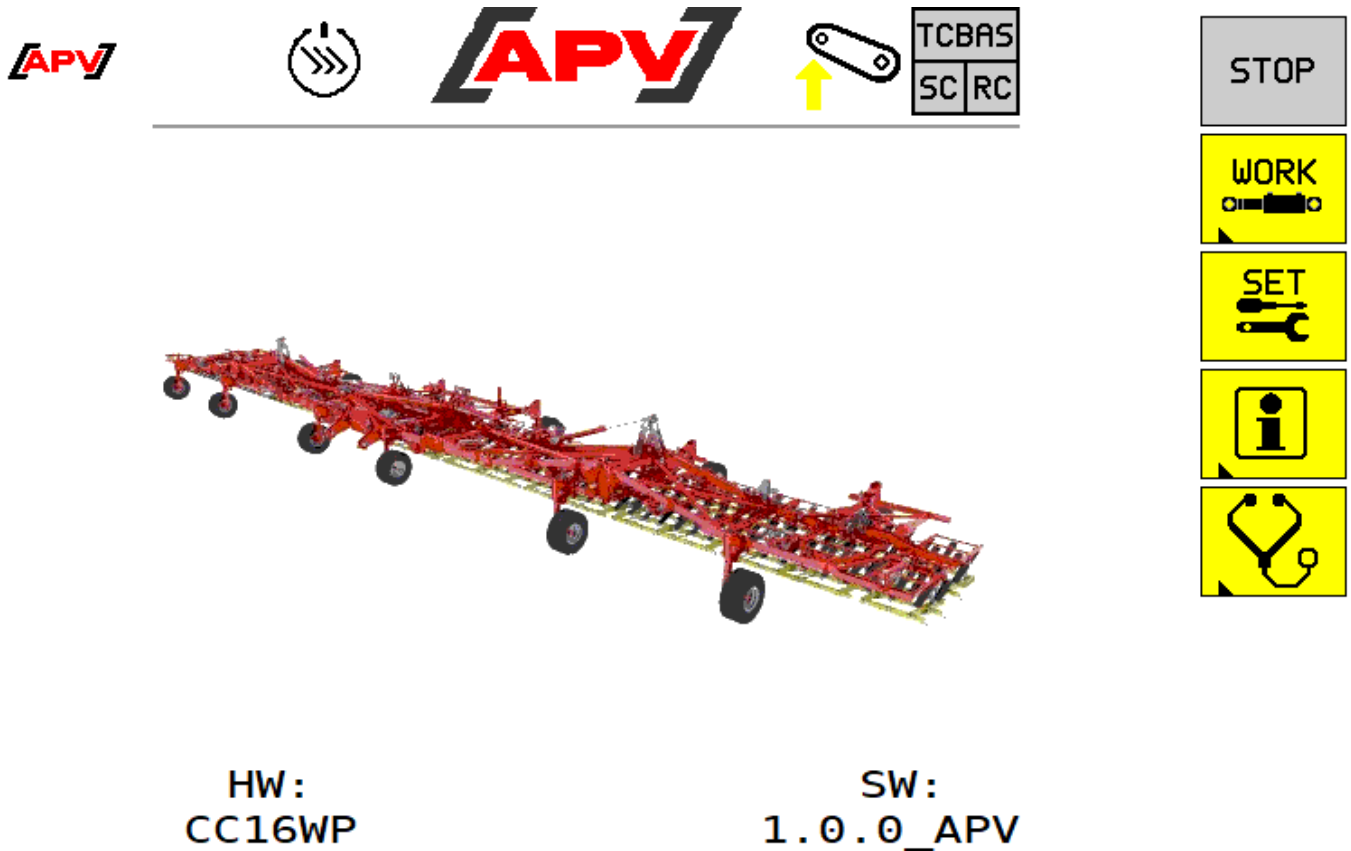
NOTE!

When opening the Basic settings menu, all actuators are switched off.

8.2 MENU STRUCTURE

8.2.1 START MENU

This screen appears after the control box has started up. From here, the different menus can be called up.



Description of the button functions



In the Work menu, all of the important information for operating the implement is displayed. Here, the implement can be folded, put in working mode and various functions can be activated. In addition, information such as the forward speed, working position, and total counters is displayed. The Work menu is described in more detail under Point 8.2.2.



The implement settings are entered in the Set menu. Here, the implement is calibrated, headland management is selected, tractor settings are made or the Task Controller settings are defined. The Set menu is described in more detail under Point 8.2.3.

If the button is pressed and held for 5 seconds, the Basic settings menu is called up. Here, basic settings can be entered (e.g. implement type). The Basic settings menu is described in more detail under Point 8.1.4.



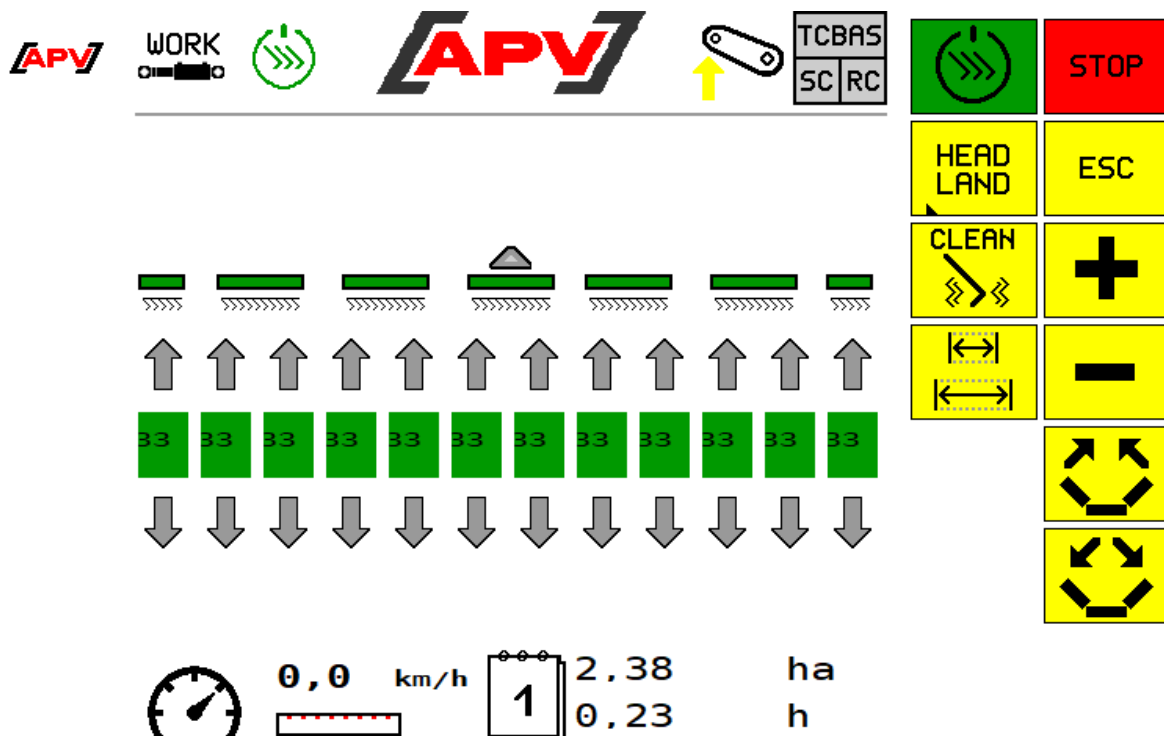
In the Info menu, the area and hour counters are displayed. The Info menu is described in more detail under Point 8.2.4.



In the Diagnosis menu, all of the utilised control units and their characteristics are listed. In addition, all sensor values of the implement are shown there. The Diagnostic menu is described in more detail under Point 8.2.5.

8.2.2 WORK MENU

On this screen, all of the work settings that are required for working with the harrow are entered.



Description of the user interface



Button for increasing the preload value for a specific tine section.



Button for reducing the preload value for a specific tine section.



Display of the currently set preload value in % for a specific tine section.



By pressing the button, the corresponding tine section is deactivated and is therefore shown in grey.



With this button, the sections of the implement can be manually activated or deactivated for folding. If a section is red, it is deactivated.



If a section on the implement is coloured green, it is activated and can be folded or unfolded.

Description of the button functions



With this button, the individual tine section regulation is activated. All of the tine sections are moved to the set values and can then be activated.



If the individual tine section regulation is active, the button is displayed with a green background. Activation is only possible when the implement is unfolded.



With the headland button, the headland management is manually activated or automatically activated with the linkage signal. By pressing the button, the set values (see point 8.2.3.2) are executed.



If the headland function is active or in operation, it is coloured green.



If the headland function is deactivated in the corresponding Set menu, it is coloured grey.



If this button is pressed and held when the linkage is lifted, all of the tine sections are extended for cleaning. In doing so, 2 tine sections respectively are cleaned in parallel from the outside in.

ESC

With the ESC button, you go back one menu level, in this case, to the Start menu.



When this button is pressed, the values for the preload of the tine sections are increased. Pressing and holding the button accelerates the increasing of the value.



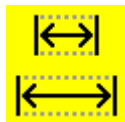
When this button is pressed, the values for the preload of the tine sections are reduced. Pressing and holding the button accelerates the reducing of the value.



By pressing and holding this button, the selected sections of the implement are folded.



By pressing and holding this button, the selected sections of the implement are unfolded.



By pressing this button, the different widths of the implement are selected, which ultimately should be folded and unfolded.

Description of the display elements



Display of the trip counter.



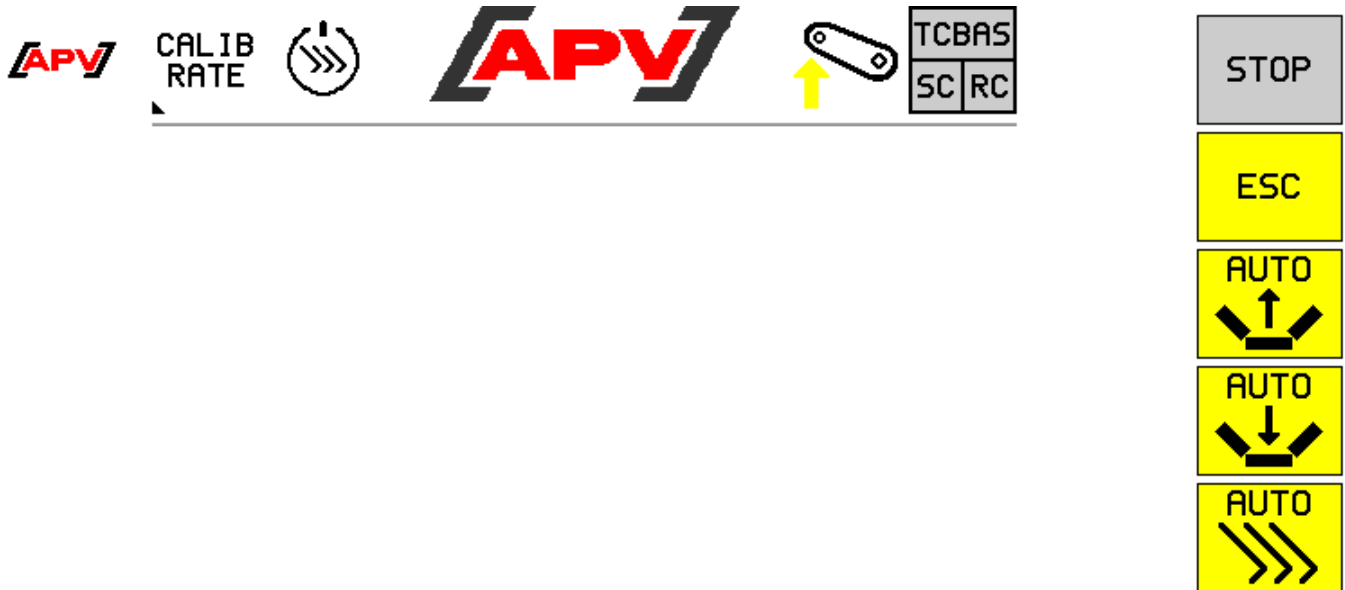
Display of the current forward speed.
The black mark shows the forward speed set during the calibration test

8.2.3 SET MENU

On this screen, all of the work settings that are required for working with the harrow are entered.

8.2.3.1 CALIBRATION MENU

In this view, all of the calibration settings that are required to put the implement into operation are made. If a sensor is replaced, the corresponding mechanism can be recalibrated here.

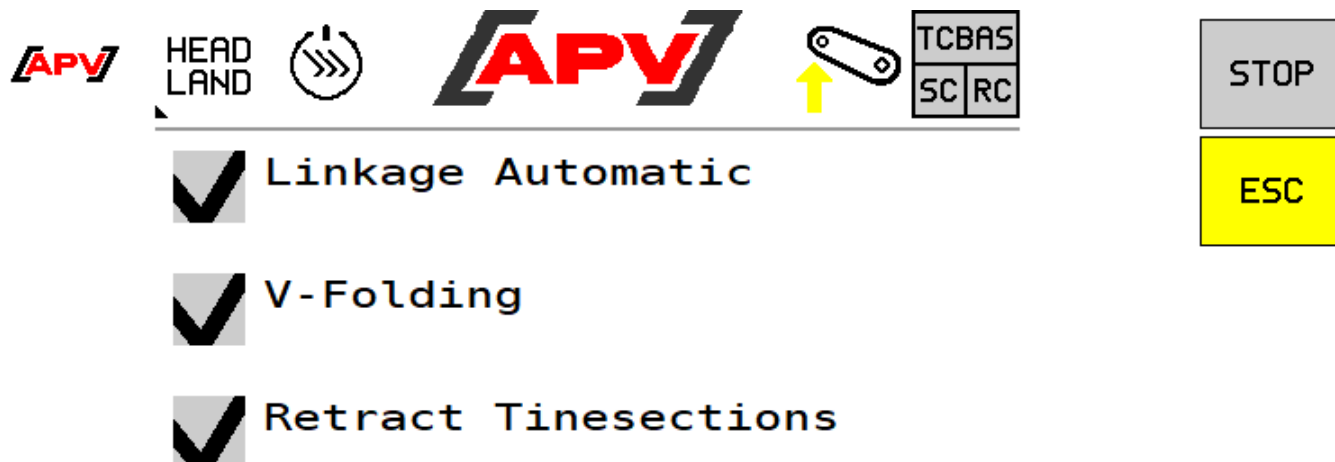


Description of the button functions

	With the ESC button, you go back one menu level, in this case, to the Settings menu.
	Pressing and holding this button starts the automatic calibration of the sensors for folding. After completing the calibration, the implement is in a folded state.
	Pressing and holding this button starts the automatic calibration of the sensors for folding. After completing the calibration, the implement is in an unfolded state.
	Pressing and holding this button starts the automatic calibration of the sensors for the tine sections.

8.2.3.2 HEADLAND MENU

On this screen, the exact settings for the headland function can be selected.



Description of the button functions

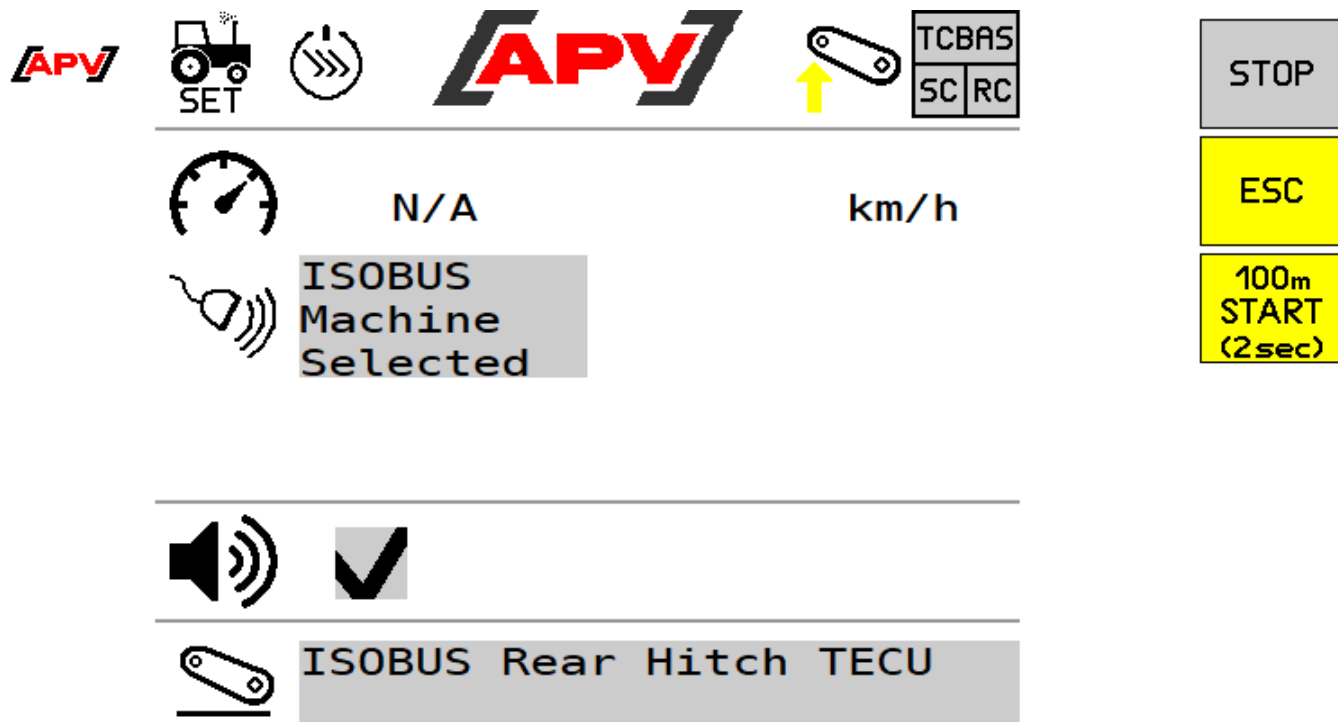
	With the ESC button, you go back one menu level, in this case, to the Settings menu.
--	--

Description of the display elements

Automatic linkage	When this display field is activated, the headland function starts automatically with the linkage signal.
V-folding	When this display field is activated, the inner folding cylinders are folded accordingly when the headland function is activated.
Folding the tine sections	When this display field is activated, all tine sections are retracted when the headland function is activated.

8.2.3.3 TRACTOR SETTINGS MENU

On this screen, the exact settings for mounting on the tractor can be selected.



In this menu, the source for the forward speed and the working position signal can be set. Likewise, external speed sensors (wheel, radar, GPS sensor) can be calibrated. When using a speed sensor, it is necessary to calibrate the forward speed (except with the GPS sensor).

CAUTION!

It must be noted that not all tractors provide all speed or linkage signals on the ISOBUS!

Description of the button functions

ESC

With the ESC button, you go back one menu level. In this case, to the Set menu.

**100m
START
(2sec)**

By pressing and holding this button (for 2 seconds), the 100-meter calibration test is started. The following INFO appears: "Drive for 100 m, then press 100 m STOP". This button only appears when the speed source is set to external radar/GPS or external wheel.

**100m
STOP
(2sec)**

The 100 m Stop button appears as soon as the calibration test was started. By pressing this button (for 2 seconds), the 100-metre calibration test is terminated and the value is saved. If the value is admissible, the message "Calibration successful, value accepted" appears, otherwise, the message "Calibration invalid, original value restored" appears.

Description of the display elements



Displays the currently measured forward speed.
If "N/A" is displayed, the selected speed signal is not available.



Displays the currently set speed source. The following parameters can be set:

ISOBUS Machine Selected: the speed is adopted from the tractor. Here, the signals are queried in the following sequence and the most accurate available signal will automatically be selected (the sequence corresponds to the signal accuracy): ISOBUS Ground Based, ISOBUS Wheel Based and ISOBUS GNSS Based.

- ISOBUS Ground Based: the speed is adopted from the tractor. The actual speed is used for this, usually from a radar sensor.
- ISOBUS Wheel Based: the speed is adopted from the tractor. The theoretical speed from the gearbox is used for this.
- NMEA2000: the speed is adopted from the tractor. The speed determined from a GNSS signal is used for this.
- External radar/GPS: the speed is taken from a radar or GPS sensor for this, which is installed on the implement.
- External wheel: the speed is taken from a wheel sensor for this, which is installed on the implement.
- Simulated: the speed is adopted from the speed set in the calibration test.
- J1939: the speed from an external GPS system or steering system is used.



Displays the current calibration value for the wheel, radar or GPS sensor. This symbol only appears when the speed source is set to external radar/GPS or external wheel.



Shows whether an acoustic signal is activated or not when the working position is changed.



Shows the current working position source. The following parameters can be set:

- ISOBUS rear linkage: The tractor sends a signal with the current lifting height of the linkage. With the "Linkage limit", you can set the height above which the mounted implement is in working position.
- ISOBUS rear linkage TECU: Binary rear linkage signal – in this case, the towing vehicle decides whether the implement is in working position or not.
- ISOBUS front linkage: The tractor sends a signal with the current lifting height of the linkage. With the "Linkage limit", you can set the height above which the mounted implement is in working position.
- ISOBUS front linkage TECU: Binary front linkage signal – in this case, the towing vehicle decides whether the implement is in working position or not.
- External: The working position signal is taken from a working position sensor that is installed on the implement.
- External inverted: The working position signal is taken from a working position sensor that is installed on the implement. In doing so, the input is inverted.
- External PNP: the working position signal is taken from a working position sensor that is installed on the implement.
- External PNP inverted: the working position signal is taken from a working position sensor that is installed on the implement. In doing so, the input is inverted.
- Not available / OFF: a working position signal is not available. The working position is always assumed to be "In operation".

Hitch limit

50 %

Here, you can set the linkage position above which the mounted implement is switched to "Working position" or "Lifted".

This display only appears if the working position source is set to "ISOBUS rear linkage" or "ISOBUS front linkage".

PERFORMING THE CALIBRATION TEST

There are two methods for calibrating the speed signal of the sensors:

- Manual calibration.
- Automatic calibration over a travelled distance of 100 metres.

Manual calibration

If the pulses per 100 metres for the respective sensor are known, this value can be directly entered under the calibration value symbol.



Figure 19: calibration value

Automatic calibration

With automatic calibration, the calibration value is determined automatically while driving a distance of 100 metres.

The procedure is as follows:

1. A straight distance of 100 metres is measured. The beginning and end of this distance are marked.
2. The tractor is positioned precisely at the beginning mark, e.g. front axle exactly over the mark.
3. The Tractor settings menu is selected.
4. The 100 m Start button is pressed and held for 2 seconds.
5. As soon as the message "Drive 100 m, then press 100 m STOP" appears, start driving. The control box now counts the pulses coming from the sensor.
6. Drive the tractor to the end mark, e.g. once more precisely with the front axle over the mark.
7. As soon as the tractor comes to a stop, the 100 m Stop button is pressed and held for 2 seconds.

If the calibration was successful, the message "Calibration successful, value accepted" will be displayed. The calibration value is now saved.

If the calibration was not successful, the message "Calibration invalid, original value restored" is shown and the original value is set.

8. The calibration must be tested by driving the tractor over a distance and comparing the speed displayed on the Control Box with that of the tractor.
If the speeds do not match, the calibration test must be repeated.



Figure 20: Tractor settings menu



Figure 21: 100 m Start button



Figure 22: 100 m stop button

8.2.4 INFO MENU

In this menu, 3 different trip counters and a total counter are displayed. The trip counters can be reset individually.

						
						
	2,38	ha				
	0,24	h				
	9,87	ha/h				
	2,38	ha				
	0,24	h				
	9,87	ha/h				
	2,38	ha				
	0,24	h				
	9,87	ha/h				
	2,38	ha				
	0,24	h				
	9,87	ha/h				

Description of the button functions

ESC

With the ESC button, you go back one menu level; in this case, to the Start menu.



By pressing and holding the Delete button for 2 seconds, the respective day counter is reset to 0.

Description of the display elements



The trip counters show the worked area, the operating hours, and the area output since the last reset.



The total counter shows the total worked area, the total operating hours, and the average area output of the control box.



TIP!

The trip counters can be used e.g. for the respective field or day or the respective year.

8.2.5 DIAGNOSTIC MENU

In this menu, important information for customer service is displayed. This includes a listing of all modules, their voltages, sum currents, voltage values and software versions.

TCBAS
SC RC

STOP

SW:

 I	13,4 V 13,1 Vmin	8,2 A	1.0.0_AP V	
 II	15,4 V 14,8 Vmin	20,2 A	11,3 V	1.0
 III	15,1 V 14,8 Vmin	20,4 A	9,3 V	1.0
 IV	15,1 V 14,8 Vmin	20,3 A	7,3 V	1.0
 V	15,1 V 14,8 Vmin	20,4 A	5,2 V	1.0
 VI	15,1 V 14,8 Vmin	20,4 A	3,2 V	1.0

Description of the button functions

ESC	With the ESC button, you go back one menu level; in this case, to the Start menu.
	With the sensor button, you go to the sensor menu sub-level.

Description of the display elements



This symbol reflects an ECU module in the system as well as its state.



Here, the supply voltages measured on the modules and their minimum supply voltages since the start are shown.



Here, the current sum currents measured on the modules are shown.



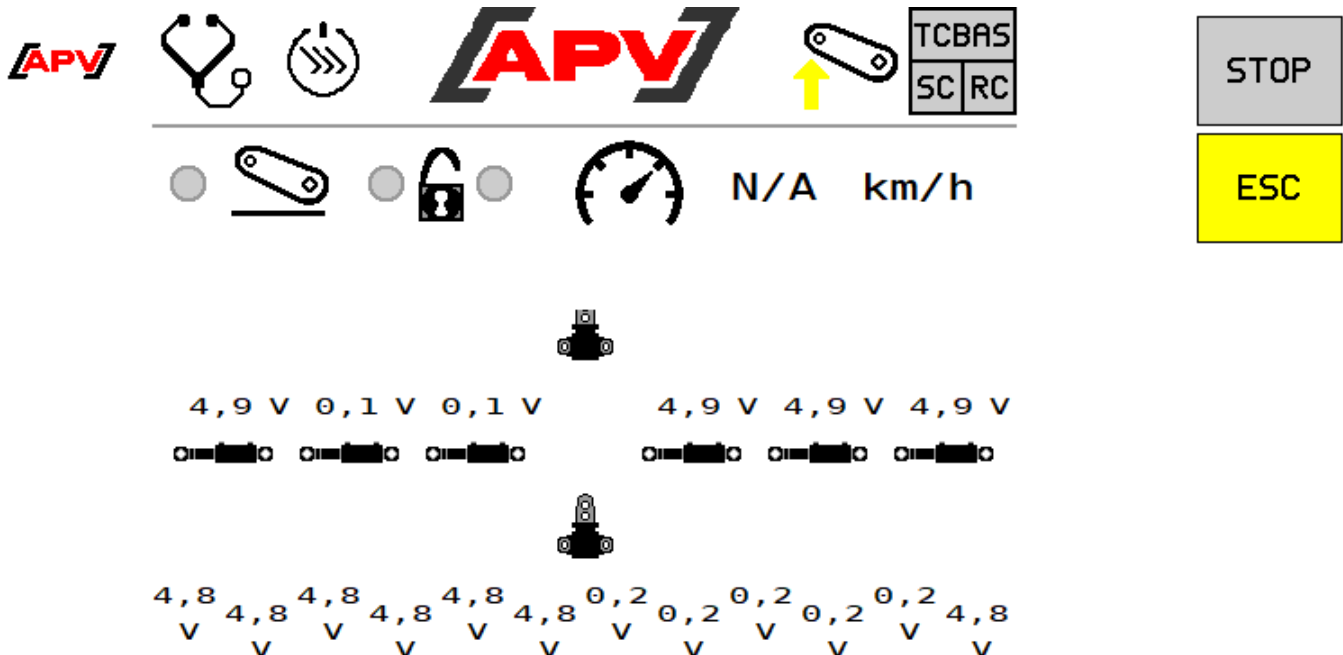
Here, the voltage values measured on the slave modules are shown for addressing.

SW:

Here, the current software versions on the modules are listed.

8.2.5.1 SENSOR MENU

In this menu, important information for customer service is displayed. The voltage values for all sensors, switching values for the locking mechanism as well as the travel speed are shown underneath.



Description of the button functions

ESC

With the ESC button, you go back one menu level; in this case, to the Start menu.

Description of the display elements



Switching state of the linkage sensor input.



Current forward speed.
If "N/A" is displayed, the selected speed signal is not available.



Switching state of the input of both locking sensors.



This symbol reflects the angle sensor that is used for the tine sections as well as folding.



This symbol reflects a folding cylinder on the implement.

8.3 CONTROLLER MESSAGES

8.3.1 SUPPRESSING / ACKNOWLEDGING MESSAGES

An acknowledgement button appears simultaneously with a message, which can be used to suppress messages for a specific period of time:

OK

By pressing the OK button, messages are acknowledged/deleted as soon as the error has been rectified.



By pressing the Snooze button, the messages are suppressed. But they are still shown in the status bar.
The Snooze button is not available for all messages, because a STOP of all actuators is performed in case of critical errors.

8.3.2 WARNINGS

Display	Cause	Solution
Battery voltage too low!	The supply voltage is below 10 V.	• Minimise consumers (e.g. work floodlights). • Check the battery. • Check the cabling. • Check the plugs. • Check the alternator.
Battery voltage too high!	The supply voltage is too high.	• Check the alternator.
ISOBUS working position signal not available!	The tractor is not providing a valid working position signal on the ISOBUS.	• Check whether the signal is deactivated in the tractor settings. • Use a different working position signal. • Consult with the tractor manufacturer customer service.
Implement is not in working position!	The implement is only partially folded and the speed is above 10 km/h.	• Completely unfold the inner folding cylinder. • Finish folding the implement. • Reduce speed.
Tractor speed too high!	The speed is above 7.5 km/h and an attempt was made to unfold the folded implement.	• Reduce the forward speed or come to a stop.
Sensor + sensor name not in the control range	The sensor value is outside of the calibrated control range.	• Check the sensor for possible mechanical damage. • Replace the sensor
Folding not calibrated!	Folding is activated although it was not calibrated yet.	• Calibrate the folding
Tine sections not calibrated!	A tine section control is activated, although the tine sections were not calibrated yet	• Calibrate the tine sections

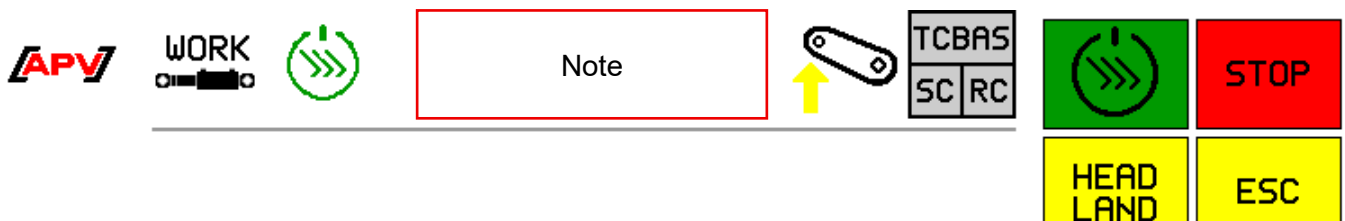
8.3.3 ERRORS

Display	Cause	Solution
Operating voltage not OK!	- The supply voltage is below 8 V. - Excessive voltage fluctuations.	- Minimise consumers (e.g. switch off the work floodlights). - Check the battery. - Check the cabling. - Check the plugs. - Check the alternator.
Slave addressing error	The implement type does not match the number of connected ECU modules	- Correct the implement type - Check the cabling
Communication sensor + sensor name	No signal is received from the sensor	Check the cabling and sensor for possible damage.
Folding locking mechanism	- The implement has been folded, but it is not or not completely locked. - The implement is unfolded, but the locking mechanism remains active	- Continue folding or unfolding the implement - Check the position switch - Check the cabling
Valve + valve name not controllable	No connection to the valve or defective valve	- Check the cabling - Check the valve for proper function
STOP button	The STOP button has been pressed	Acknowledge the warning

8.3.4 INSTRUCTIONS

Notification messages do not appear like warning or error messages directly on the screen, they are rather shown in the status bar instead of the APV logo.

These messages do not represent problems, but rather provide additional information for operation.



Note	Display reason
Calibration of the folding procedure...	Is shown during the calibration process of the folding procedure.
Calibration of the folding procedure successful	Is shown after successful calibration of the folding procedure.

Note	Display reason
Calibration of the tine sections ...	Is shown during the calibration process of the tine sections.
Calibration of the tine sections successful	Is shown after successful calibration of the tine sections.
Cleaning ...	Is shown during the cleaning process, when the CLEAN button is pressed.
Cleaning successful	Is shown after the cleaning process.
Linkage not raised	Is shown when the CLEAN button is pressed but the linkage signal is not up.
Folding ...	Is shown during the folding procedure by one or two folding cylinders.
Unfolding ...	Is shown during the unfolding procedure by one or two folding cylinders.
Folding successful	Is shown after successful folding.

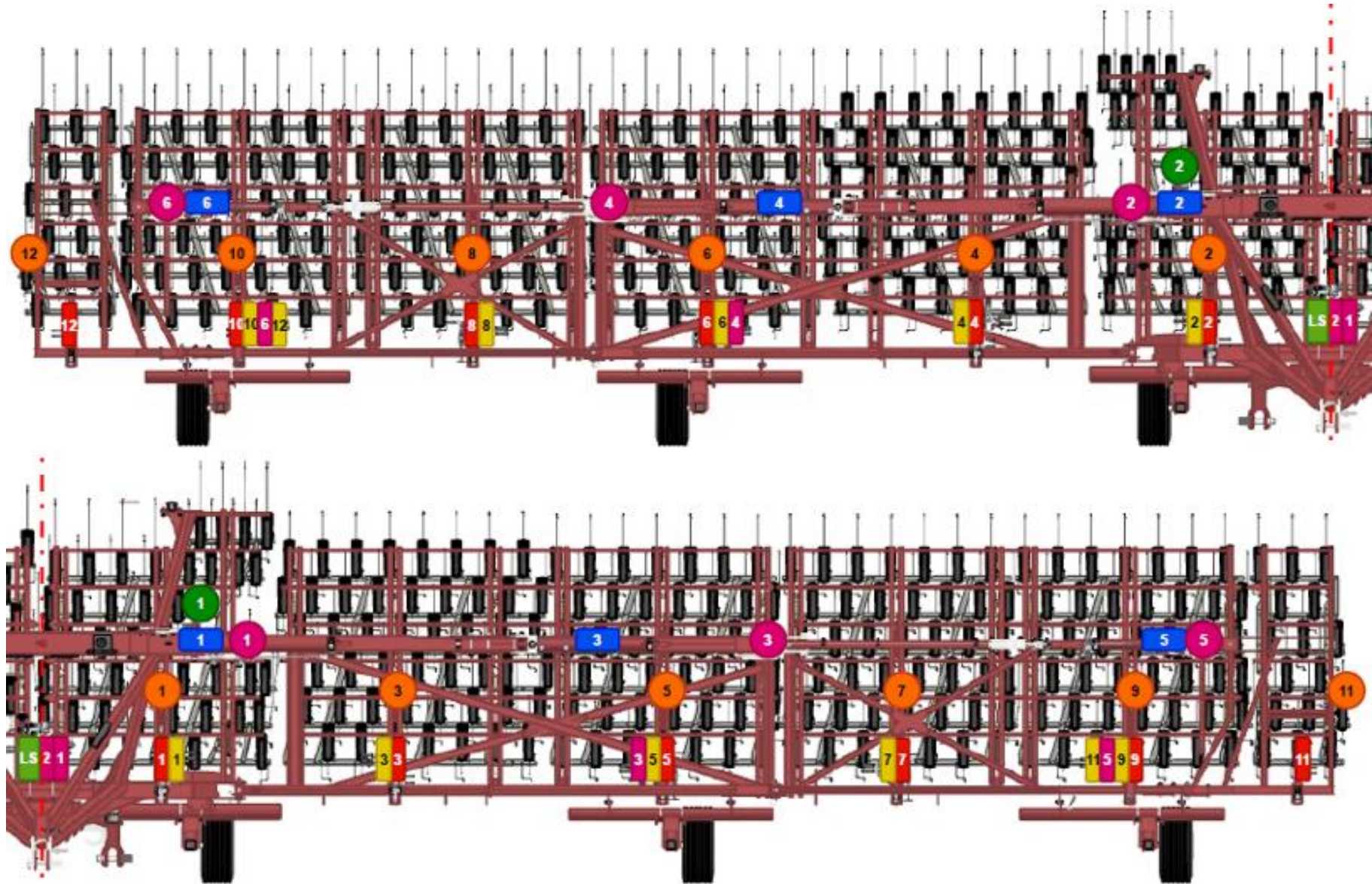
8.4 PROBLEM SOLVING

Problem	Cause	Solution
No speed signal!	- Speed signal is not available on the ISOBUS. - Wrong speed signal was selected.	- Select a different speed signal - Check the settings for the speed sensor (see Point 8.2.3.3)
No linkage signal!	- Linkage sensor was not detected. - There is no linkage signal issued on the ISOBUS.	- Check the signal source and change if necessary. - If external linkage sensors are equipped, check them. - Magnet sensor: The sensor and magnet must be precisely opposite each other in working position or in lifted position.
A forward speed of "0.0 km/h" is displayed / forward speed keeps changing to "0.0 km/h"	Wrong or non-existing speed signal was selected.	Check the speed settings (see Point 8.2.3.3)

8.5 SOFTWARE UPDATE

For a software update, please contact Service at APV, the contact data can be found under Point 2.

9 CONTROL DIAGRAM

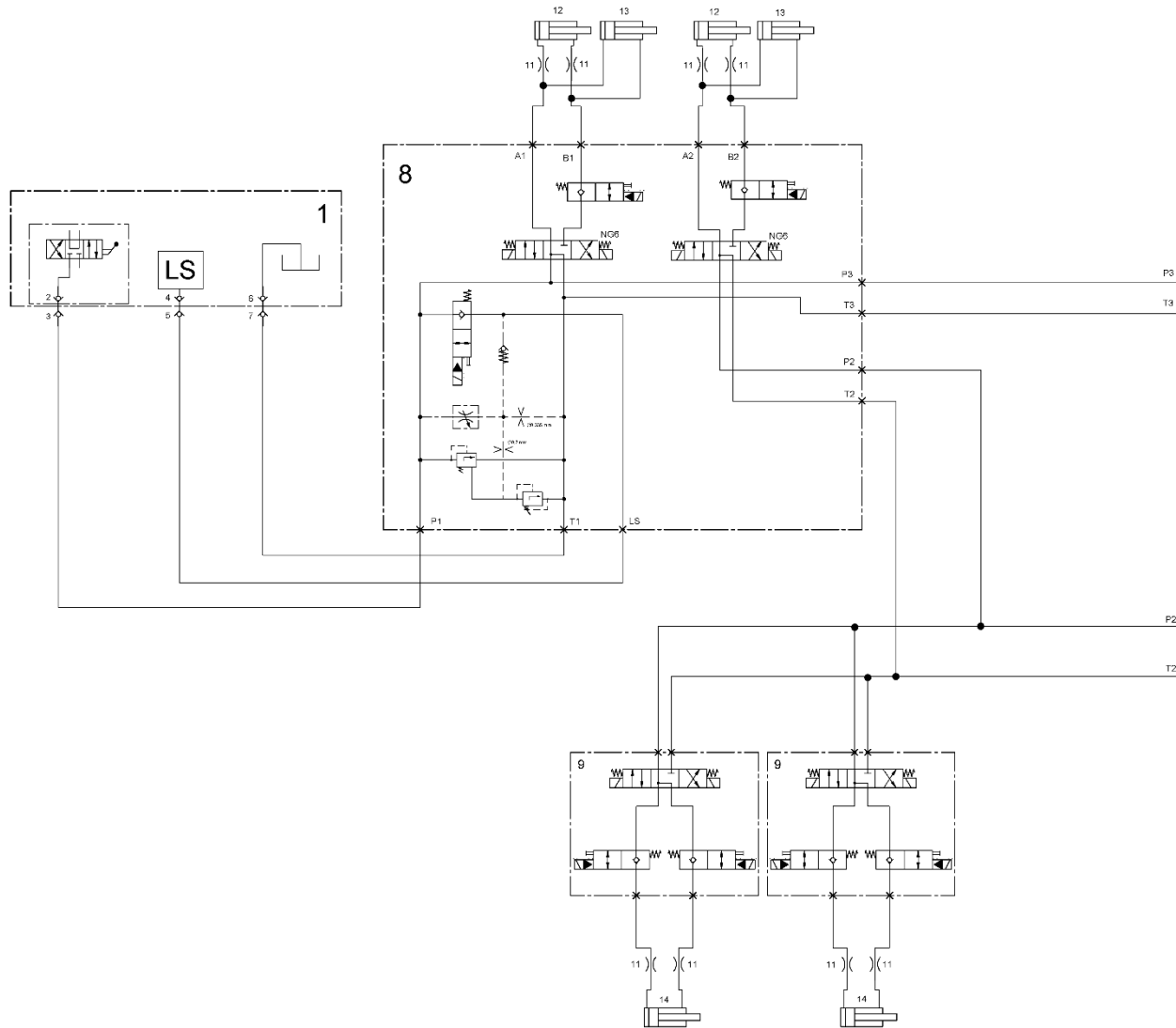


The schematic representation of the VS 1630 serves to illustrate the positions of actuators, valves and sensor components.

Symbol	Meaning
	Transport lock sensor
	Load sensing valve
	Hydraulic cylinder for tine section preloading
	Valve for tine section preloading
	Sensor for tine section preloading
	Folding hydraulic cylinder
	Folding valve
	Folding sensor

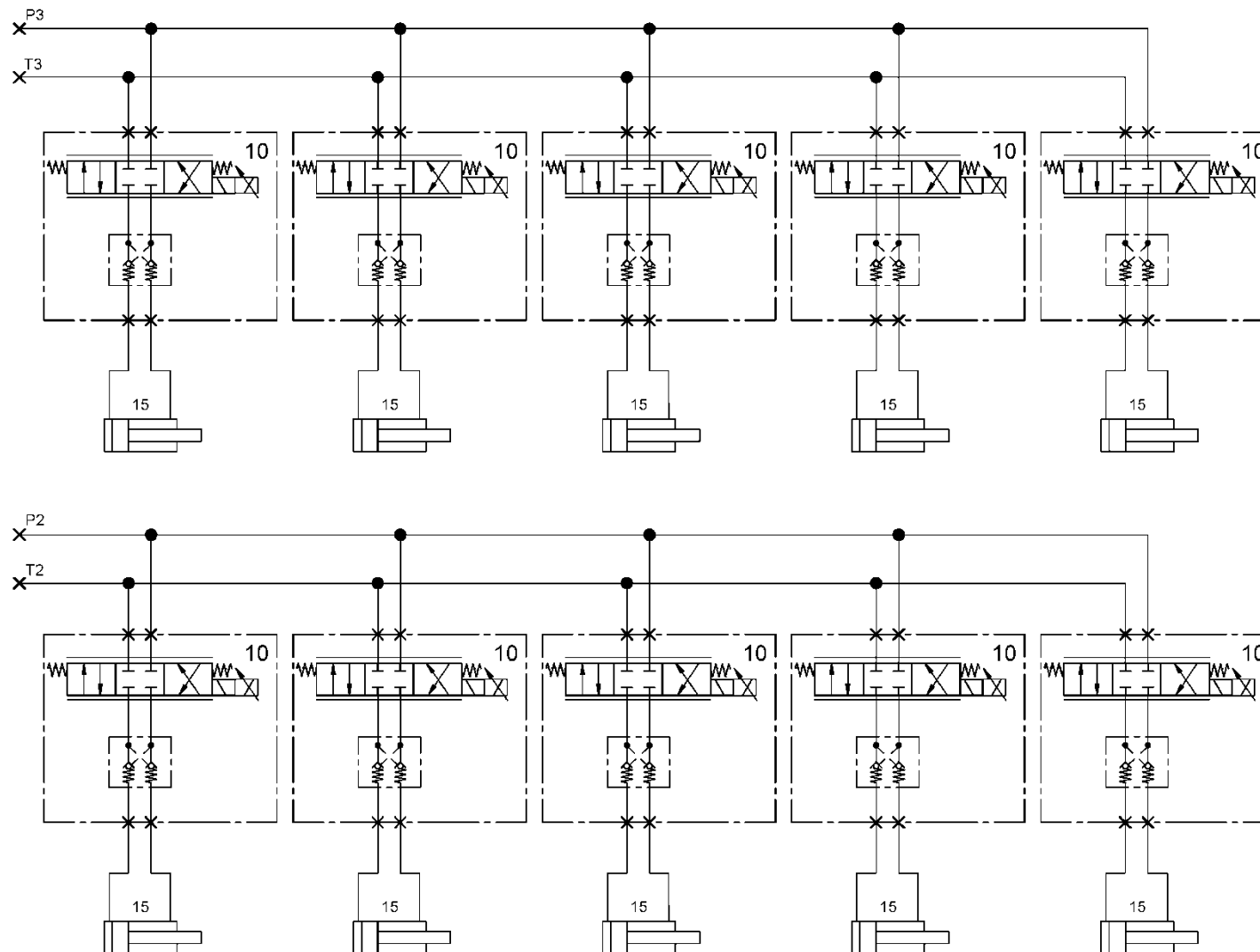
10 HYDRAULICDIAGRAM

VS 1360 | VS 1520 Part 1

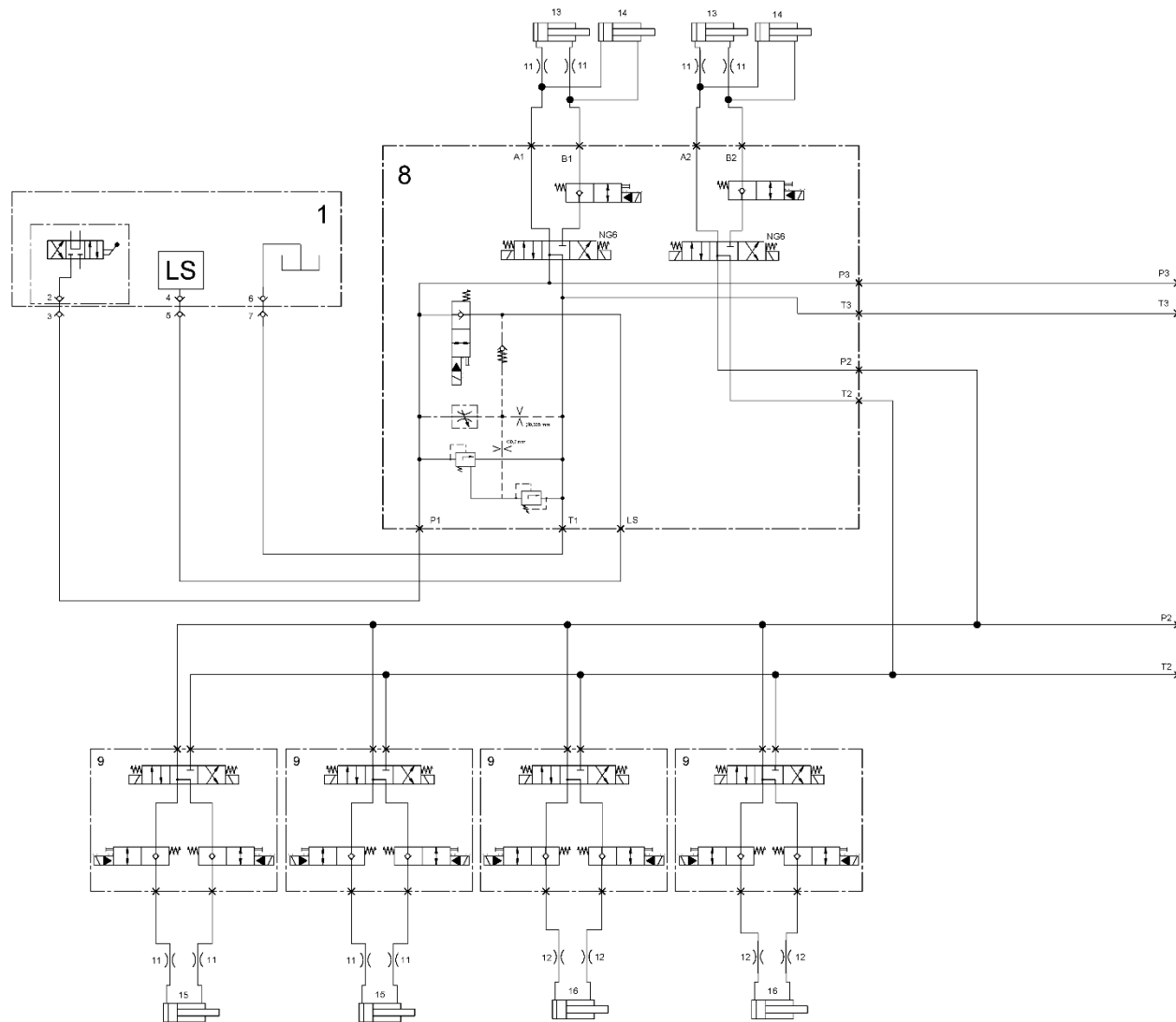


1	Tractor
2	Coupling socket size 3
3	Coupling plug size 3
4	Coupling socket size 2
5	Coupling plug size 2
6	Coupling plug size 4
7	Coupling socket size 4
8	Load sensing block incl. 2x 4/3-way valve incl. electrically unlockable locking blocks
9	4/3-way valve incl. electrically unlockable locking blocks
10	4/3-way valve, proportional incl. hydraulically unlockable locking blocks
11	Throttle disc diameter 1.0
12	Double-acting cylinder for folding 1st side frame
13	Double-acting cylinder for folding lock
14	Double-acting cylinder for folding 2nd side frame
15	Double-acting cylinder for Preloading

VS 1360 | VS 1520 Part 2

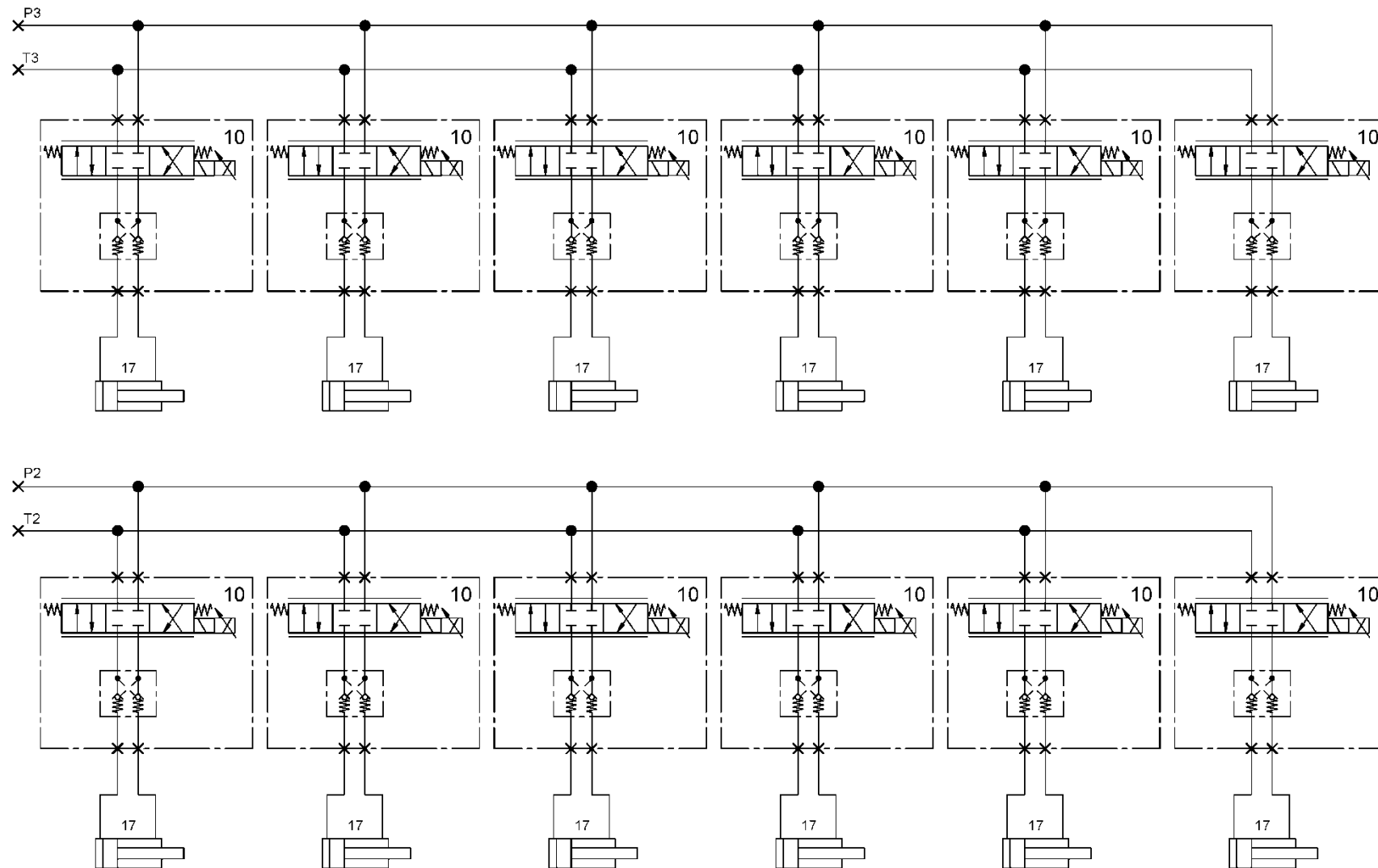


VS 1630 Part 1



1	Tractor
2	Coupling socket size 3
3	Coupling plug size 3
4	Coupling socket size 2
5	Coupling plug size 2
6	Coupling plug size 4
7	Coupling socket size 4
8	Load sensing block incl. 2x 4/3-way valve incl. electrically unlockable locking blocks
9	4/3-way valve incl. electrically unlockable locking blocks
10	4/3-way valve, proportional incl. hydraulically unlockable locking blocks
11	Throttle disc diameter 1.0
12	Throttle disc diameter 0.8
13	Double-acting cylinder for folding 1st side frame
14	Double-acting cylinder for folding lock
15	Double-acting cylinder for folding 2nd side frame
16	Double-acting cylinder for folding 3rd side frame
17	Double-acting cylinder for Preloading

VS 1630 Part 2



11 TECHNICAL DATA

Type designation	VS 1360	VS 1520	VS 1630
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 [m]	13.6	15.2	16.3
Transport dimensions, folded [H x W x D in m]	3.75 x 3.00 x 2.70	3.75 x 3.00 x 2.70	3.75 x 3.00 x 2.70
Working depth	0-30 mm (depending on the soil conditions)		
Number of tines [units]	392	436	470
Tine diameter [mm]	8		
Tine length [mm]	520		
Line distance [mm]	35		
Mounting/hitch	Mounting – CAT 2 with CAT 3 bolt		
Feeler wheels, standard equipment [unit] (18.0x9.5-8" tyres)	6	6	6
Net weight [kg]	2250	2450	2550
Parking supports	4 tines		
Working tools	Cranked tines with a diameter of 8 mm		
Ground adaptation	Is achieved through the unique tine spring system		
Minimum tractor performance [kW/HP]	74/100	88/120	102/140

12 ROAD TRANSPORT

12.1 TRANSPORT ON PUBLIC ROADS (GENERAL INFORMATION)

- When driving on roads after field operation, the tine sections should be cleaned of harrowing residues (soil, grass, etc.).
- Comply with the road traffic regulations of your country's legislation.
- The mounted implement must be identified with country-specific warning signs or stickers with red and white slanted lines (according to DIN, ÖNORM or the respective country-specific STANDARDS).
- Lighting equipment of 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 16 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).
- Make sure that the transport lock is engaged.

- Only relieve the hydraulic hoses shortly before uncoupling the tractor by putting the tractor control unit into float position.
- Check that none of the safety cotter pins were lost during operation.



CAUTION!

The Tined Weeder Pro may not be transported when the top link pin is in the elongated slot! For road transport, the bolt must be installed in the round hole (underneath the elongated slot) and secured against loss with a cotter pin.



Figure 23



Figure 24

12.2 CALCULATION OF THE WEIGHT RATIOS FOR AXLE LOADS ON THE TRACTOR AND BALLAST WEIGHTS

If you want to drive with an implement that is attached to the 3-point linkage, you must ensure that you do not exceed the tractor's maximum permissible total weight, the permissible axle loads and tyre load capacities with the mounted implement.

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:

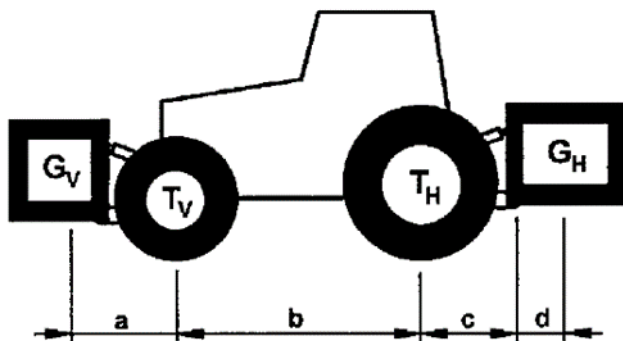


Figure 25

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 cm)

WEIGHT CALCULATIONS

1. **Calculating the minimum front ballasting on 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 under Point 12.3.

2. **Calculation of the minimum rear ballasting 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 under Point 12.3.

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

If the required minimum front ballasting ($G_{V \min}$) 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 ballasting!

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

Now enter the calculated actual front axle load and the permissible front axle load specified in the tractor operating manual in the table under Point 12.3.

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

If the required minimum rear ballasting (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 ballasting!

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

Now enter the calculated total weight and the permissible total weight specified in the tractor operating manual in the table under Point 12.3.

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

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

Now enter the calculated actual rear axle load and the permissible rear axle load specified in the tractor operating manual in the table under Point 12.3.

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 under Point 12.3.



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!

12.3 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

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 LIGHTING CIRCUIT DIAGRAM

Legend:

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

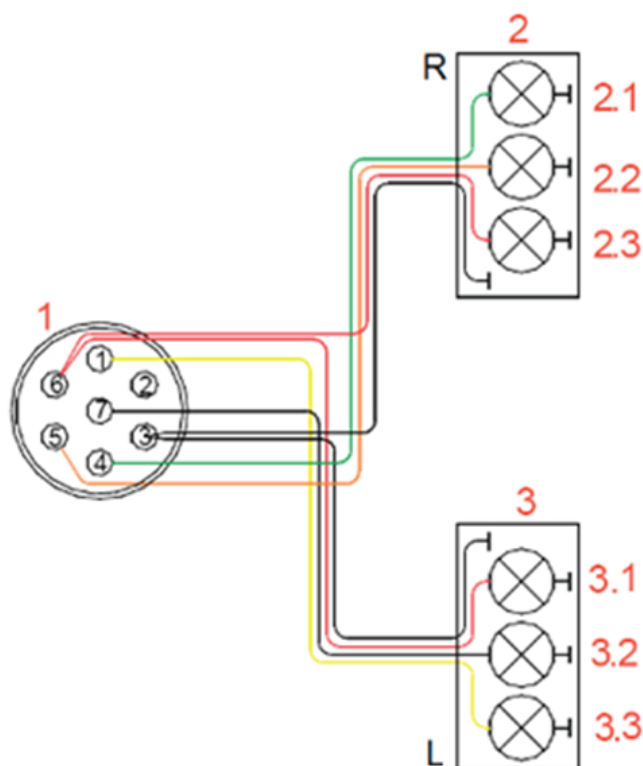


Figure 26: Circuit diagram

14 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 implement should not penetrate into the field 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 implement 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.

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 6.2.

15.2 STORAGE OF THE IMPLEMENT

- The implement must be stored in a dry place protected from weather conditions to ensure that it remains functional even if it is stored for a longer period of time.
- The implement must be parked in compliance with Point 6.2.
- Secure the implement against unintentional rolling away.
- Nothing may be deposited or stored on the implement.
- The implement must always be parked and stored in a secure area, to prevent unauthorised operation.

15.3 DISPOSAL

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

16 ACCESSORIES

The accessories must be mounted by qualified specialist personnel or a specialist workshop. The customer/dealer must ensure that the accessories are properly mounted.

16.1 WARNING SIGNS AND LIGHTING

For the Tined Weeder Pro, warning signs with lighting are also available as an accessory. These are required when you want to drive with the Tined Weeder Pro on public roads.

Order number:

- 07029-2-001016: LED lighting VS rear
- 07024-2-257: LED lighting VS front + rear

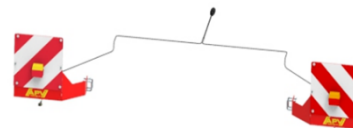


Figure 27

16.2 LINKAGE SENSOR TOP LINK ACCESSORIES KIT MX

In combination with a pneumatic seeder, this sensor can be used to automatically stop the seeding shaft when lifting the implement at the headlands.

Order number:

00410-2-169



Figure 28

16.3 TINED WEEDER PRO WHEEL SENSOR MOUNTING KIT

In combination with a pneumatic seeder, this sensor can be used for speed-dependent seed application or to stop the seeding shaft of a pneumatic seeder when lifting the implement at the headlands.

Order number:

07000-2-059



Figure 29

16.4 REAR FEELER WHEELS

In order to improve the guidance of the harrow along the ground, height-adjustable feeler wheels can be used at the rear. The feeler wheels are mounted on a crossbeam and can therefore be infinitely variably adjusted to the track width.

Please note: the feeler wheels must be moved to transport position before road transport!

Order number:

- 07029-2-103: accessories kit for rear feeler wheels, centre frame
- 07014-2-565: accessories kit for rear feeler wheels, 1st side frame
- 07014-2-566: accessories kit for rear feeler wheels, 2nd side frame



Figure 30

16.5 MANUAL TINE LIFTING

With the manual tine lifting, individual tines can be lifted (see Figure 31), 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 or any number of tine lifting mechanisms can be selected. To actuate the tine lifting mechanism, lift the tine and simply push the plate towards the tine.

Order number:

- 07025-2-001015: tine lifting accessories kit for VS 1360
- 07024-2-001002: tine lifting accessories kit for VS 1520
- 07029-2-001020: tine lifting accessories kit for VS 1630



Figure 31

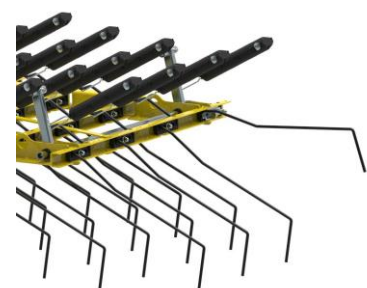


Figure 32

17 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 2 for contact data) is also happy to assist you.



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NOTES

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