



Operators Manual

SPX

Keep Operations Manual In A Safe Place

Ensure Operating Instructions Are Read Prior To Starting Up
ISSUE: V1.0 - March 2022

HORIZON

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We, Horizon Agriculture, Cliftons Bridge, Fishergate, Sutton St James, Spalding, Lincolnshire, PE12 0EZ, United Kingdom.

Declare that the product

SPX STRIP-TILL CULTIVATOR

to which this declaration relates, meets the relevant health and safety requirements stipulated in the EC Directive 2006/42/EC.

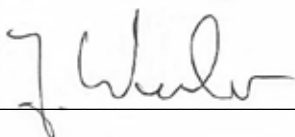
For that, the following standards have been taken into account:

Directive / Standard:
EN ISO 4254-1:2013 Agricultural machinery - Safety - Part 1
ISO 12100-1:2003 Safety of machinery - Basic concepts, general principles for design - Part 1
ISO 12100-2:2003 Safety of machinery - Basic concepts, general principles for design - Part 2

Declaration of Conformity states that all provisions of Directive 2006/42 / EC, relating to the Machinery Directive have been complied with.

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Sutton St James, 12/09/2021

(signature)

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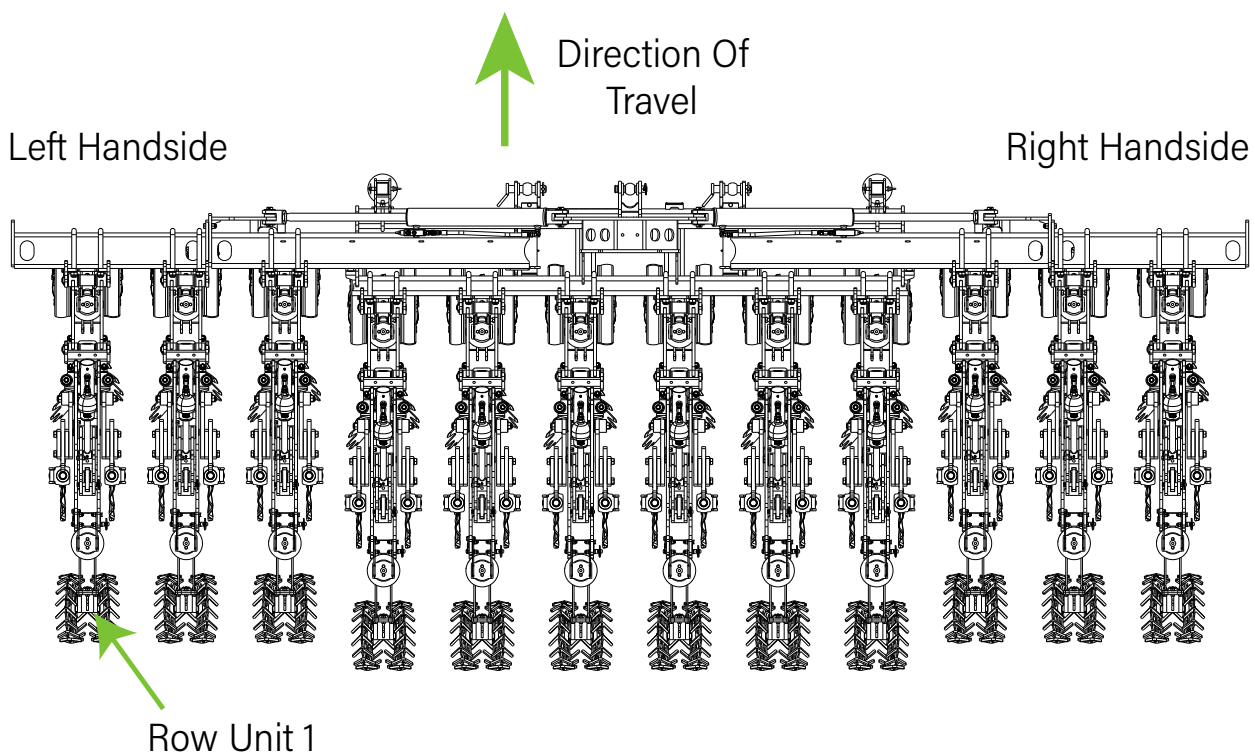
1.0 - User Information

1.1 - Preface

This operators manual covers mounted SPX implements on both rigid and folding frames. Before commissioning and use of the implement, read, and comply with the operating instructions within this manual. Please also observe the safety notes and instructions as indicated and retain this document for future reference. All persons working on the machine such as operators, maintenance personnel and transport operative must read and adhere to the instructions and information contained within this manual. By doing all the above the risk and hazards personnel will be exposed to will be reduced and decrease the likelihood of accidents & downtime. The operator's manual will also assist in the development of the operator's knowledge of the implement and its intended purpose, allowing for the safe and effective operation of the implement within the ideal performance window.

All information contained within this manual represents HORIZON AGRICULTURAL MACHINERY LTD's knowledge at the date of publication. Due to the ongoing developmental and improvement process differences between the implement and this operator's manual may occur. If this is the case, please contact your local dealer or Horizon Agricultural Machinery Ltd. directly for assistance or more detailed information. Technical data, weights, illustrations, and instructions may be altered to improve the operation of the implement or its representation within this manual. Furthermore, your implement may differ to the one featured in manual illustrations due to the fitting of optional equipment, the model or product updates have been fitted. Consequentially some of the manual contents may not be relevant for the operator's equipment.

All directions contained within this operating manual are always viewed in the direction of travel. Row unit numbering is counted from left to right across the machine.



1.2 - Customer Service & Warranty

Horizon Agricultural Machinery Ltd. wants you to be completely satisfied with your machine and the services we provide. Occasionally problems can occur, most commonly encountered problems and their solutions are contained within this operator's manual. However, if the fault is not rectified by following the contained procedures, or is not discussed in this manual, your local dealer/Horizon Agricultural Machinery Ltd. will be available to assist you.

Horizon SPX come with a 12 month* warranty as standard.

*Please refer to the Warranty Administration Manual (WAM) for details on how to process claims:
<https://www.horizonagriculture.com/dealer-support>

1.3 - Liability

This machine was carefully manufactured by Horizon Agricultural Machinery Ltd. However occasionally small anomalies can occur even during intended usage. These anomalies can cause deviations in placing quantities of product up to total implement shutdown/failure. These anomalies can be caused by excessive part wear, missing or damaged equipment, incorrect settings, working rates, travel speeds or a lack of maintenance and its poor execution amongst other things.

Therefore prior to and during use of the implement it is essential to check for its correct function and operation.

2.0 - General Safety Information

Horizon Agricultural Machinery Ltd. have built this implement in accordance with the latest technical standards and safety regulations. The risks of injury/death to the operator, third parties or damage to the implement or other material assets can still occur during use.

Please read and comply with all information contained within this manual PRIOR to usage of the implement.

2.1 - Intended Use

This implement is intended to be used to meter and place product (Seed & Fertiliser) into the field in a single pass with or without previous cultivation to the soil, in agricultural applications when attached to a suitable agricultural tractor. The operator must also observe warnings, instructions, notes, and maintenance schedule detailed throughout this owner's manual as well as the implements technical limitations. If any safety defects are detected whilst in operation, they should be immediately addressed.

When transporting the machine on public roads the operator must obey the traffic laws of their country and ensure the implement fulfils any national regulations as applicable. The implement should always be transported whilst empty and lowered into its transporting position detailed in section 6.1.2.

Any kind of usage contradicting the above is considered as unintended use and can result in serious bodily harm, death, injuries, and material damages. Horizon Agricultural Machinery Ltd. does not assume any responsibility for the consequences of using the implement in an unintended way.

2.2 - Spare Parts

Any worn or damaged parts should be replaced as soon as possible. If safety decals are fitted to the components being replaced, the stickers should be ordered alongside the replacement part and affixed to the component as it is replaced.

Genuine spare parts and accessories have been designed by Horizon Agricultural Machinery Ltd. specifically for this implement. The use or assembly of Non-original Horizon Agricultural Machinery Ltd. parts may in some cases have a detrimental effect on the machines originally designed performance and safety standards.

Horizon Agricultural Machinery Ltd. will not assume any liability for damage caused by the use of non-original parts and accessories

2.3 - Safety Symbol Representation

This operating manual highlights certain warnings and safety information as shown below. They are categorised based upon the severity of risk (Danger, Warning, Caution) They appear as follows:



DANGER

Indicates a danger with high risk that will result in death or serious bodily harm (Such as loss of limb or long term harm) if not avoided



WARNING

Indicates a danger with medium risk that may result in death or serious bodily harm if not avoided



CAUTION

Indicates a danger with low risk that will result in injuries if not avoided

Also included are some supplemental markers such as:



IMPORTANT

This marker denotes important information in relation to the implement and highlights this to the user

Procedural Instructions

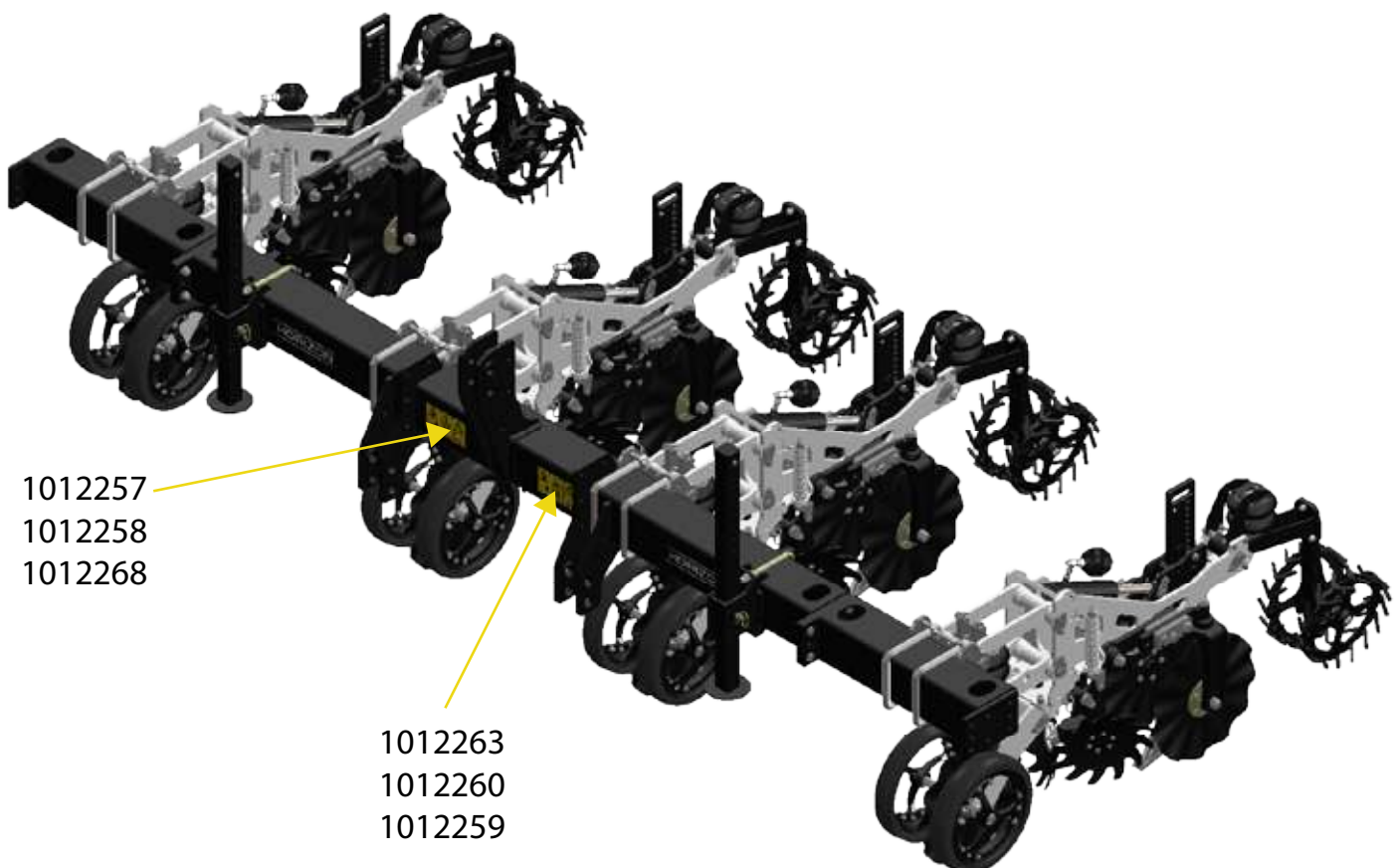
All procedures throughout the book are numbered consecutively to allow users to easily follow the steps required for maintenance and other tasks.

2.4 - Warning Decals

Warning decals are affixed to the implement to warn of hazards and residual dangers and are an essential part of the safety equipment required for safe implement operation. Stickers must be kept clean, with any damaged or illegible stickers being immediately replaced. If the operator is replacing a component that has a safety sticker fitted, the warning sticker must also be ordered alongside the part and fitted to the component prior to its fitment to the implement. Missing, illegible or dirty warning decals can significantly increase the risk of severe or even fatal injuries occurring.

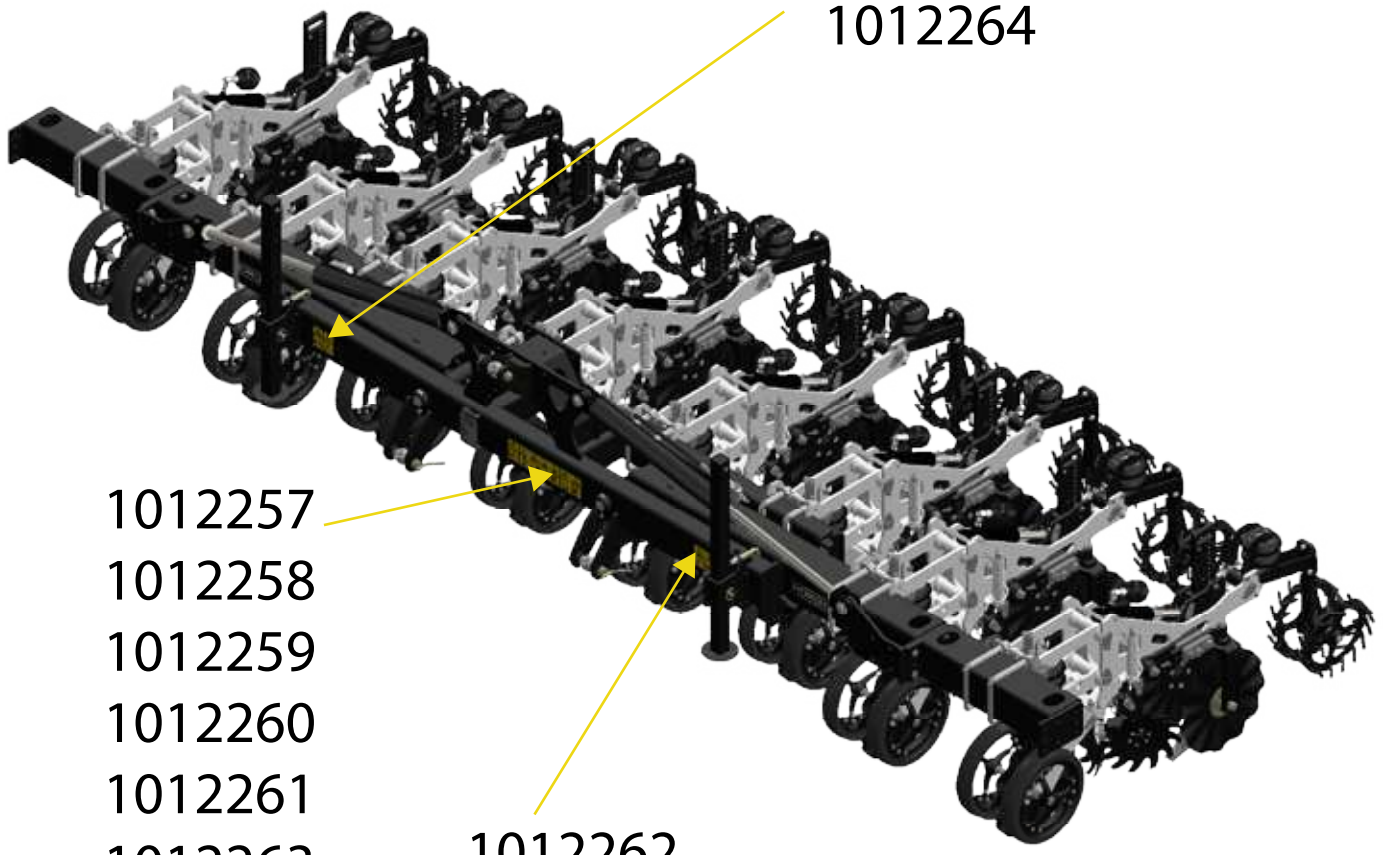
2.4.1 - Location of Warning Decals

Rigid Frames



Folding Frames

1012262
1012264



1012257
1012258
1012259
1012260
1012261
1012263
1012268

1012262
1012264

2.4.2 - Content of Warning Decals

Part Number	Image	Description
1012257		The contents of the user manual should be read prior to machine use to allow for safe operation.
1012259		Pressure accumulators are charged with oil and gas pressure. Dismantle and repair only in accordance with the technical manual instructions
1012261		Maintain distance between implement and overhead lines to reduce likelihood of electrical discharge
1012264		Do not reach into crush risk areas whilst parts can still move.
1012266		No passengers are allowed to ride on this machine

Part Number	Image	Description
1012258		Do not stand between the tractor and implement when the tractor is moving for hitching operations.
1012260		Risks of hydraulic fluids spraying out under high pressure. Follow the advice contained within the operating instruction manual
1012262		Folding parts can move unexpectedly. Stay clear of their operating range. This applies to both folding and unfolding actuations
1012265		Do not climb on moving or rotatable parts. Use the provided access steps for this purpose
1012268		Isolate the equipment prior to and maintenance or inspection work by stopping the vehicle and removing the key

2.5 - Danger Area & Danger Points

The area immediately surrounding the implement and tractor is hazardous to personnel. Whilst within this zone all personnel should pay attention to the machine status and if parts can move, failure to pay adequate attention can result in serious injury or even death. The operator must therefore ensure no personnel are in this zone prior to machine movements or component actuation (Such as unfolding the wings) Components of the machine can actuate unexpectedly impacting personnel causing serious injuries especially if unsighted by the operator. Lifted loads and components should be lowered to the ground to reduce the risk of injury and hydraulically lifted components can slowly lower over time causing crushing injuries. It is therefore highly recommended if any work is being carried out the tractor is prevented from restarting even for short term inspections, or if personnel are in the danger area they are advised to move, and the operator ceases work until this is the case. If carrying out maintenance and service work under actuated or lifted components, please see section 2.12 in relation to the measures that must be undertaken to ensure safety.

Warning stickers are fitted in key areas to highlight dangers applicable in this area. Some components such as hydraulic or pneumatic systems can store residual energy even if the tractor is isolated from restarting. Therefore, information regarding the removal of the residual energy is detailed in the systems or components relevant chapter.

Please note however Hydraulic accumulators such as those utilised on the hydraulic braking system will always have some residual energy stored within see section 2.9.6 in relation to these components. Some components and systems such as the distribution fan are fitted with a guard to reduce the likelihood of injuries. Such guards should always be fitted whilst the implement is in operation and should only be removed when all components have come to rest, and the machine is secured against unexpected start up.

2.6 - Personnel Training

Misuse of the machine can cause accidents with severe injuries, property damage or fatalities as outcomes. Consequentially only personnel trained and instructed on this implement may work on or with it. This training must occur under the instruction of an experienced operator.

	Personnel Specially trained for the activity	Trained Operators	Personnel with specialist training
Loading/Transport	X	X	X
Initial Operations/Set up			X
Operations		X	
Maintenance			X
Troubleshooting		X	X
Disposal	X		

Personnel specially trained for the activity – Personnel trained to carry out the required tasks or operations (Such as loading/unloading on behalf of a company for example)

Trained Operators – Personnel trained in the risks of their assigned task/s and can use the required PPE and follow the preventative measures included in this manual to avoid incidents. These Personnel can be trained by the implement owner (Assuming they are adequately qualified) or other experienced personnel

Personnel with specialist training – These personnel typically have a qualification or relevant experience to understand the risks and dangers posed by their assigned task. Furthermore, they can apply the knowledge of appropriate regulations to their working practices. These personnel can also carry out the procedures requiring specialised tooling or equipment (Indicated by Workshop Maintenance later in the manual)

All personnel must be able to operate the implement in accordance with this owner's manual and be able to appropriately apply the information to their working procedures. Any apprentices or untrained personnel must be closely supervised by an experienced person. Operators must know road traffic regulations applicable to their country and hold a valid licence when moving the implement and tractor on a public highway. Additionally, operators must be aware of machine functionality and operation to avoid specific dangers relating to the work being undertaken.

Implement owners must make this operator's manual available to all personnel operating or working on this implement, ensuring all personnel are trained and instructed as required.

2.7 - Personal Protective Equipment

Incomplete or missing Personal Protective Equipment (PPE) can increase the risk of health damage. PPE includes but is not limited to:

- Protective clothing/Tight fitting clothes
- Safety shoes
- Safety gloves
- Eye protection (Safety goggles/Glasses)
- PPE appropriate to the handling of dressed seed or fertiliser & Liquid fertiliser products (PPE equipment appropriate to the manufacturer's instructions e.g. Respirator, safety gloves and eye protection)
- Removal of rings or loose jewellery items as well as securing long hair from entrapment (Such as with a hair net)

PPE should be effective and in proper working condition prior to usage as well as appropriate for the task being undertaken by the operator. PPE should not hinder the operator's effectiveness to work where such PPE is required.

2.8 - Safety In Traffic

The operator must comply with all applicable height, width and weight restrictions whilst transporting the implement. The tractor should be ballasted accordingly (as shown in section 3.4) to maintain steering and braking capacity. Maximum permissible total weights, axle loads or tyre load bearing capacities must not be exceeded.

The implement must also be folded and placed in the transport position as shown in chapter 6.1.2. Before travel mud and dirt should be removed from the implement, lighting and signalling equipment should be checked for functionality. Whilst transporting the implement the operator must consider the effects local weather and road conditions will have on the tractor and implement as well as implement overhangs, dimensions, and the inertial mass of the machine when cornering or braking, they should also consider local regulations and any applicable height width or weight restrictions along the planned route. For transport on public roads the hoppers must be emptied of any product. Failure to do so invalidates the type approval and places the operator, other personnel and property at greater risk of injury, death or material damages.

2.9 - Operational Safety

2.9.1 - Commissioning

The implement should be properly commissioned prior to first usage, failure to do so can impact on the operational safety of the implement placing the operator, other personnel, and property at risk of severe damage, injuries or even fatalities. Tyre pressures should be checked and nuts and bolts checked for tight fitment. In particular wheel nuts and any fixings securing the cultivation equipment should be checked. Loose fixings can cause components to detach impacting on the operational safety.

2.9.2 - Damage to the Implement

Any damage to the implement can impact on the operational safety of the equipment. Some components are critical to the operational safety of the equipment and therefore any damage to these must be remedied immediately. Hydraulic systems, braking systems, the hitching elements, any connections between the implement and tractor and the signalling equipment should be checked prior to all machine operations due to their impact on the operational safety if damaged. Coulter elements should also be regularly checked for damage and wear prior to usage to ensure accurate product distribution.

2.9.3 - Hitching/Unhitching

Failure to correctly connect the implement to the tractor can result in severe accidents or property damage. Connecting and disconnecting the implement to the tractor can be found in section 6.1, however there are still several risks when performing this procedure. When making any connections/disconnections between the implement and the tractor all systems should be depressurised and personnel should never enter the space between the implement and machine. If a single operator is performing this procedure external lift controls should be utilised if fitted. All parts (Implement and Tractor) should be on stable flat surfaces and secured against rolling away or becoming unstable. Braking connections must also be performed prior to releasing the parking brake to ensure control.

2.9.4 - Hydraulic System

The hydraulic systems on the implement operate under high pressure. Escaping hydraulic fluid

can penetrate the skin causing serious injuries or death. If injured by escaping hydraulic fluid immediately contact your local doctor. The hydraulic system of the implement has several functions. Incorrect operation of this system can cause serious injury or death to personnel and/or material damages. Hydraulic systems should only be operated at their recommended pressures to prolong the service life of components.

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To reduce the risks of injury and damages occurring the operator must connect/disconnect hoses between the implement and tractor only when the system is depressurised. The connections between implement and tractor are marked as shown in section 5.3 to reduce handling errors and ensure proper connection order. Connections, hydraulic lines, and hoses should be regularly checked for leaks, signs of external damage and wear. When checking for hydraulic leaks only use appropriate means of checking the system. If any damage is found the components should be replaced as soon as possible due to the increased risk from oil sprays causing injuries and fires. With the component replace any spilled hydraulic oil should also be cleaned from the machine. Hydraulic hoses should be replaced every 6 years due to fatiguing as the components age. Prior to any work being undertaken on the machine the control unit must be locked and secured and any hydraulically raised components must be lowered to the ground or supported prior to working underneath. If working on the hydraulic systems, the hydraulics must be depressurised.

2.9.5 - Pneumatic System

The pneumatic systems on the implement operates under high pressure. The pneumatic system on the implement has several functions. Incorrect operation of the pneumatic systems can cause serious injuries or death to personnel and/or material damages. Pneumatic systems must only be operated within their recommended pressures to prolong the service life of components.

To reduce the risks of injury and damages occurring the operator must connect/disconnect hoses between the implement and tractor only when the system is depressurised, prior to connecting the hose the operator must ensure both the tractor connection and the hose is clean and free from any debris. The connections between implement and tractor are marked as shown in section 5.5 to reduce handling errors and ensure proper connection. Connections, Pneumatic lines, and hoses should be regularly checked for signs of external wear or damage. The system can also be pressurised to check for leaks.

Damaged components or leaks should be replaced/ fixed as soon as possible to reduce stresses placed upon other components. Prior to any work being undertaken on the machine the control unit must be locked and secured and any Pneumatically raised components must be lowered to

the ground or supported prior to working underneath. If working on the Pneumatic systems, the pneumatics must be depressurised.

2.9.6 - Pressure Accumulators

The hydraulic system on the SPX is equipped with pressurised accumulators. Even when the hydraulic system is depressurised the accumulators contain a high gas pressure. Consequentially they should never be drilled or welded even with the hydraulic system depressurised. The hydraulic circuit must be depressurised prior to any maintenance or disassembly work being undertaken. The accumulators are pre-charged with nitrogen gas. If this gas is released in confined spaces, it is an asphyxiation hazard.

2.9.7 - Obstructions & Overhead Power Lines

The operator must pay attention to surrounding obstructions and overhead powerlines, particularly when the implement is in transport configuration, or when folding/unfolding the wings. All these states pose the greatest risk of reaching overhead powerlines causing a voltage flashover or hitting surrounding obstructions and causing damage to the implement. Voltage flashovers pose a risk of fatal electrical shock or fire and as such the operator must keep a safe distance from any overhead power lines when folding/unfolding or travelling under. The distance varies based upon the powerline voltage. Wings should never be folded or unfolded, or the top of the machine accessed whilst the machine is under a powerline. The operator should move the implement and tractor a safe distance away to actuate the wings or refill the hoppers.

2.9.8 - Field Use

The implements condition and connections should be checked prior to undertaking any field work. Damaged or worn components should be replaced. While working it is essential the operator checks the surroundings for any persons entering the danger area, or for personnel standing in the actuation path of hydraulically actuated components. No machine movements or actuations should take place if personnel are in the danger area or path of these components. The implement and tractor must never travel backwards whilst the coulters are engaged in the ground. Doing so risks damaging and blocking the implement. The operator should check after an initial pass and at regular intervals throughout work that the product is being applied at the correct depth and rate required.

2.9.9 - Technical Limitations

Failure to follow the implements technical limitations can endanger the operators and other personnel's safety and risk material damages.

The technical limitations for this machine are as follows:

Along the contours:	10% left and right
Along the gradients;	10% up and down the slope
Operational Speeds:	≤12 Kph
Transporting Speeds:	Refer to Tractor Manufacturers Manual for details on tire pressures & speeds.

The implement must be empty prior to any road transport operations.

2.10 - Dressed Seed & Fertiliser

Failure to properly handle fertiliser and dressed seed can cause poisoning and even death. Fertiliser and dressed seed should be stored as per the manufacturer's instructions when not in use. All information and instructions on the product manufacturers safety data sheet should be followed, asking the supplier/manufacturer for a copy if necessary. The appropriate PPE can then be determined for usage whilst handling the product.

2.11 - Environmental Protection

Consumables such as Hydraulic oil, lubricants and other products can be hazardous to personnel health and damaging to the environment. These consumables must not spill or drain out into the environment. Should these products spill into the environment they must be recovered using absorbent materials or sand. These contaminated absorbent materials should then be disposed of in accordance with local regulations.

2.12 - Care & Maintenance

Unsuitable or inadequate care and maintenance can reduce the operational effectiveness and safety of the implement, therefore increasing the risk of accidents with serious bodily injuries, property damage or even fatalities as an outcome. Consequently, it is highly recommended the operator follows the maintenance plan found in section 9.0 to service the machine at the recommended intervals. Advice for how the work is undertaken on commonly replaced components is included throughout this manual, for components not covered within this document it is recommended to contact Horizon Agricultural Machinery in case there are specific handling procedures or risks posed through this component's replacement. As such this service work must only be carried out by an authorised workshop or operator trained by Horizon Agricultural Machinery Ltd. for this purpose. The machine should be appropriately secured on firm and level ground with all hydraulic and pneumatic systems depressurised, and electrical connections

isolated prior to any work being undertaken. Raised components should be lowered or secured prior to work being undertaken underneath them.

When utilising a high-pressure cleaner areas around hydraulic seals, electrical components, bearings seals or the fan should be avoided. It is also recommended that the nozzle outlet maintains at least 50cm clearance from the machine during cleaning operations. Seed dressings and fertilisers can Contaminate surfaces and components (Seed boots, hoppers, and the metering system) Therefore it is recommended to use the manufacturers recommended PPE whilst working or cleaning these areas.

2.14 - Modification & Conversions

Any structural changes, modifications or conversions require the written approval of Horizon Agricultural Machinery Ltd. Structural changes may affect the function and operational safety of the implement. Any modifications made without the prior written approval will void any warranty claim. Horizon Agricultural Machinery Ltd. will not assume any liability for damages caused by unapproved changes, modifications, or conversions. Any modifications approved by Horizon Agricultural Machinery Ltd. must be performed at an authorised workshop, or by an operator trained by Horizon Agricultural Machinery Ltd.

Where these modifications affect the weight, its distribution or the implement size regulations must be checked regarding towing, support and axle loads as well as transport dimensions. Failure to check these regulations can cause injuries and/or material damages. Ballasting requirements as per section 3.4 must be recalculated, failure to do so may be detrimental to the tractors handling characteristics. Modifications can also affect the implements homologation approval. New homologation plates must be fitted accordingly with the updated data.

3.0 - Technical Data

3.1 - Machine Specifications

SPX	6R-50	5R-75	12R-50
Frame	Rigid	Folding	Folding
Rows	6	5	12
Spacing (cm)	50	75	50
Working Width (m)	3	3.75	6
Frame Width (m)	2.9	4.3	6.3
Transport Height (m)	1.5	2.5	3.8
Transport Width (m)	2.9	2.9	2.9
Transport Length (m)	2.3	2.55	2.55
Weight (kg)	2100	2150	4400

* - Weights are based on a minimum equipment specification (No optional extras).

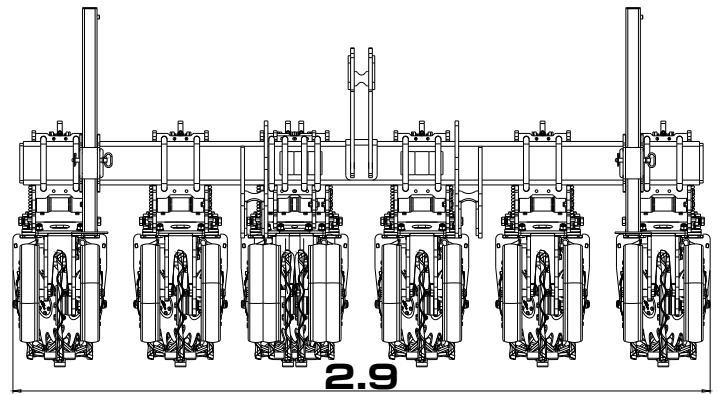
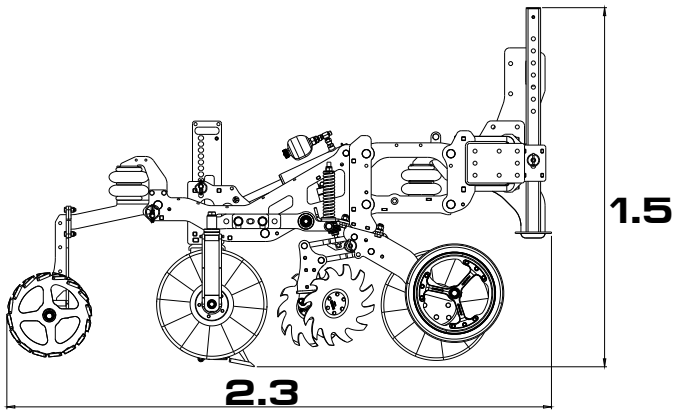
Please Note: The above listed weights and dimensions are to give representative values for SPX implements. Not all dimensions are covered.

Exemption Notice:

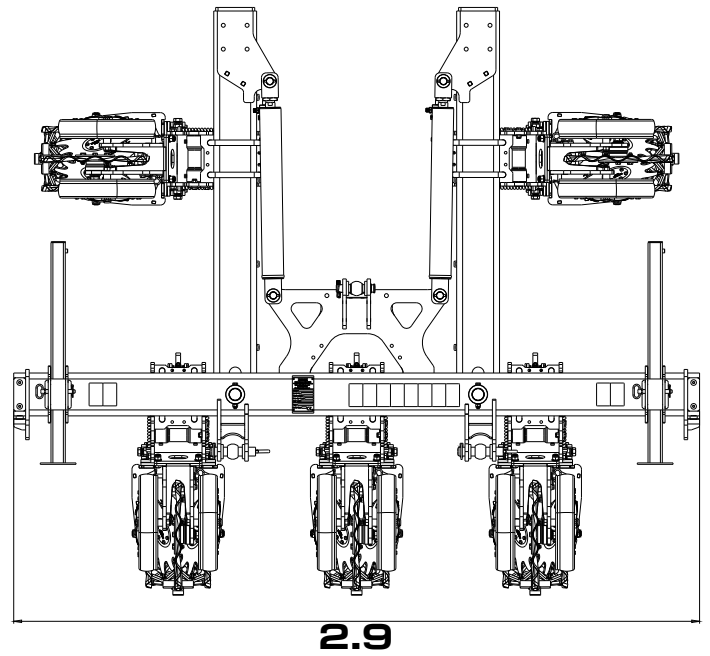
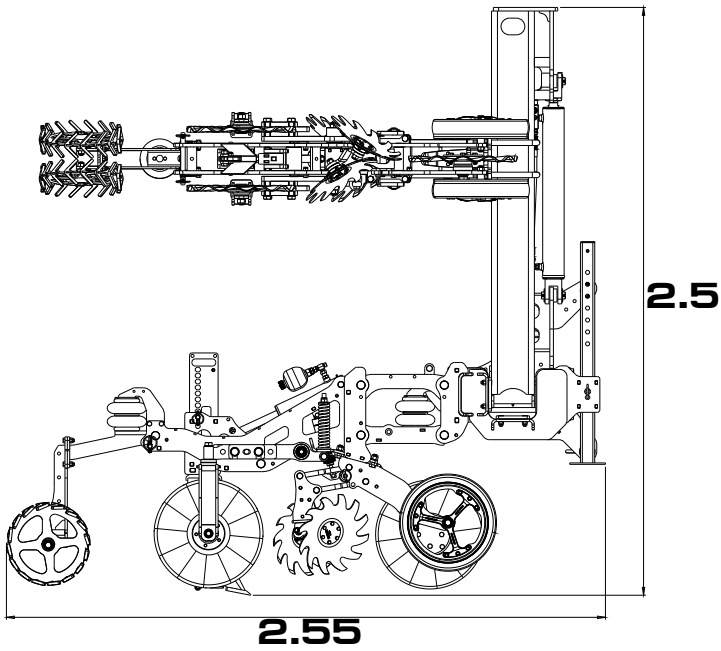
Horizon Agricultural Machinery Ltd. reserve the right to change the above specifications due to technical improvements & developments.

Transport regulations for height, width and weights for road traffic vary between countries. Therefore, users must ensure compliance with their national regulations

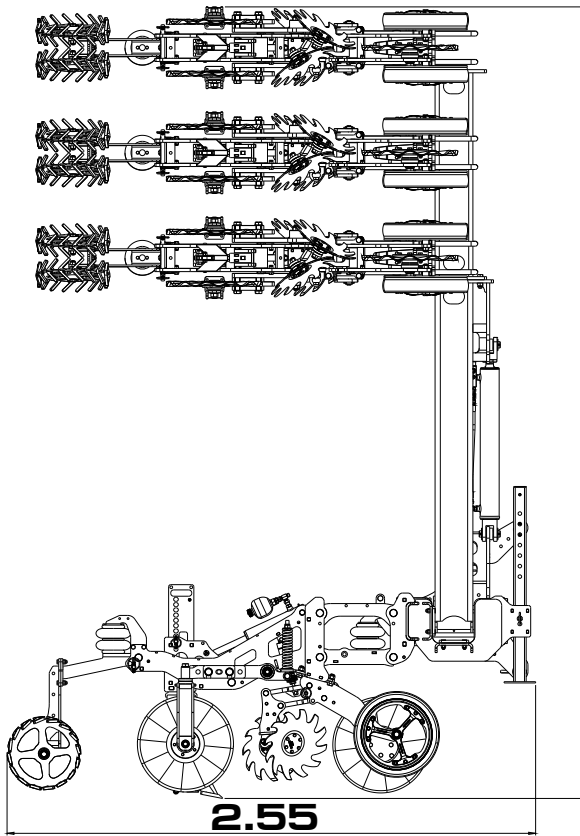
3.1.1 - SPX 6R-50



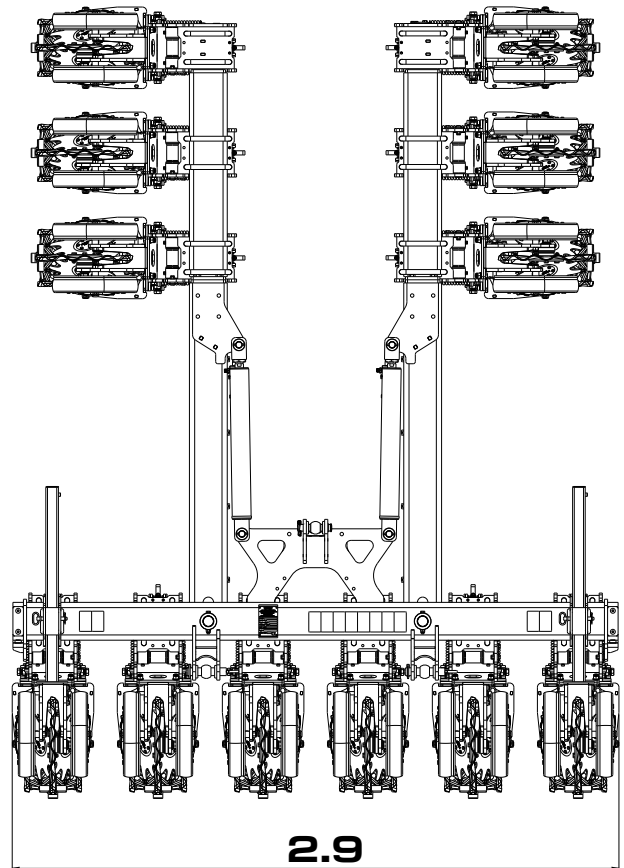
3.1.2 - SPX 5R-75



3.1.3 - SPX 12R-50

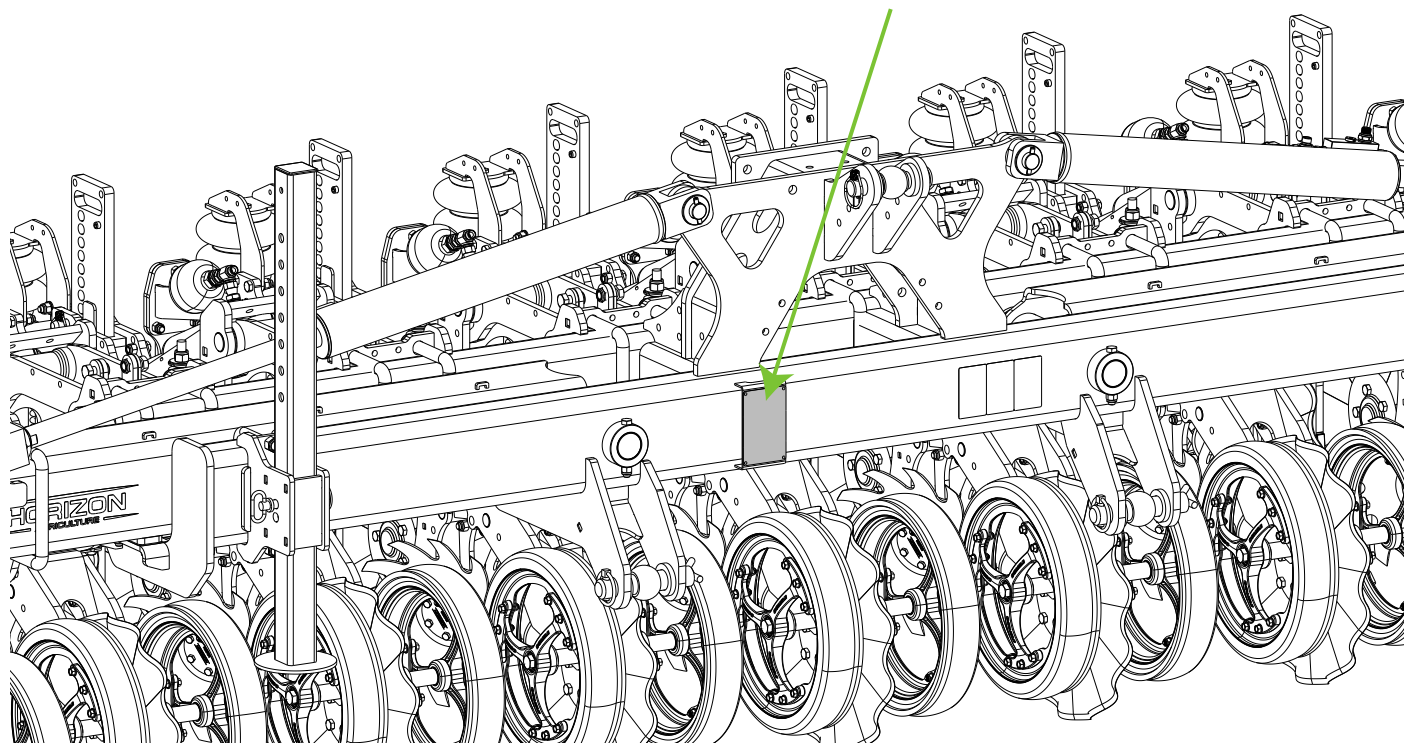


3.8



3.2 - Serial Number Plate

The machines serial numbering plate along with its CE mark is located on the right-hand side of the machine close to the hitch.



The following information as shown below is shown on the plate

HORIZON

Horizon Agriculture, Cliftons Bridge,
Fishergate, Sutton St James, PE12 0EZ, UK.

www.horizonagriculture.com
 +44 (0)1945 440999
info@horizonagriculture.com

Model [REDACTED]

Serial No. [REDACTED]

Total Weight [REDACTED]

Drawbar Load [REDACTED]

Axle Load [REDACTED]

Type [REDACTED]

Build Date [REDACTED] **CE**

3.3 - Tractor Requirements



WARNING: The tractor MUST meet the requirements outlined below to be able to use the machine as intended. Also observe the maximum permissible axle, total weight and tyre loadbearing capacities for the tractor. Failure to do so may cause a severe accident due to insufficient stability, braking power, tractor steering capacity. Tractors should be checked for suitability prior to any connections being made, and the front axle MUST remain loaded with 20% of the tractors tare weight

3.3.1 - Implement Attachment

Tractor Link Arms	Cat. III Cat. III/IV		
Implement Attachment Tractor Link Arm:	III:	Cat. III Pin	Cat. III Ball
	IV:	Cat. III Pin	Cat. IV Ball

3.3.2 - Power Requirements

SPX Number of Rows	4	6	8	12
Power Requirement (HP)	120-160	108-240	240-320	360-480

3.3.3 - Electrical Systems

Electrical Power Supply	12V Anderson Connector
Road Lighting Equipment	7 pin Socket
Control Systems	Air valve control and/or ISOBUS/Artemis ISOCAN Connection

3.3.4 - Hydraulic Systems

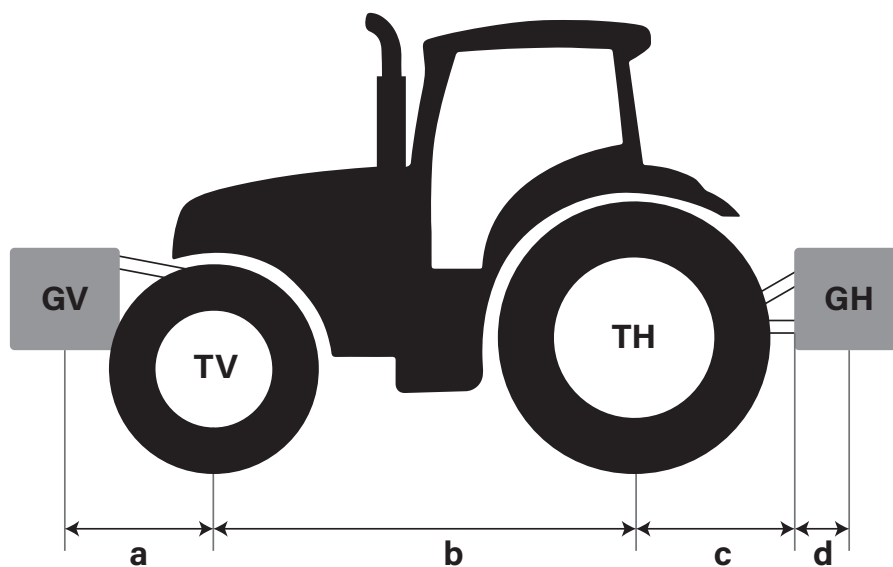
Maximum System Pressure	210 Bar
Oil Grade	Mineral Hydraulic Oil
Delivery Rate	35l/m without Fan fitted
Number of Dual Action Controls	3 Minimum
Pressureless Return Flow (Maximum Pressure)	3 Bar

3.4 - Ballasting Requirements

Before transportation on public roads the tractor must not be overloaded and meet the requirements laid out in section 3.3 to be suitable for this implement. The load bearing capacity of the tyres, maximum permissible weights and axle loads must not be exceeded when the implement is hitched or mounted to the tractor. The front axle must be loaded with at least 20% of the curb weight to maintain sufficient steering capabilities.

Due to the differing variants, equipment specifications and modular nature of the equipment the implement should be weighed separately to determine its weight prior to the calculations below being undertaken.

3.4.1 - Data Required



TL	Tractor curb weight	See tractor operating manual
TV	Front axle load of unladen tractor	
TH	Rear axle load of unladen tractor	
GH	Total weight of rear implement - For trailed machinery it is the maximum permissible drawbar load for road transport	See section 3.1 or weigh the implement.
GV	Front Weight	See technical data for front weight or weigh
a	Distance between centre of gravity for front ballast to the centre of the front axle	See the technical data for the tractor and front weight or measure
b	Tractor wheelbase	See tractor operating manual or measure
c	Distance from the centre of the rear axle to the middle of the tractor link arm ball	See Tractor operating manual or measure
d	Distance from the middle of the tractor lift arm balls to centre of gravity for rear mounted implements. For Towed machinery d=0	

3.4.2 - Calculating Ballasting Requirements

Minimum Front Ballasting Requirements with rear implement

$$GV_{min} = \frac{GH \times (c + d) - TV \times b + 0.2 \times TL \times b}{a + b}$$

Enter the calculated result into the table

Calculation of the front axle load of the tractor

$$TV_{TOTAL} = \frac{GV \times a + b + TV \times b - GH \times (c + d)}{b}$$

Enter the calculated result into the table and the permissible value from the tractors operating instructions

Calculation of the total combined weight (Implement+ Tractor)

$$G_{TOTAL} = G_V + T_L + G_H$$

Enter the calculated result into the table and the permissible value from the tractors operating instructions

Calculation of the rear axle load

$$TH_{TOTAL} = G_{TOTAL} - TV_{TOTAL}$$

Check the calculated values additionally by weighing the following:

The front and rear axle load on the entire tractor with implement and ballast and compare against the permissible values

Permissible total weight

Maximum front axle load (20% of tractor deadweight)

	Actual Value as calculated		Permissible values from the tractor operating instructions		Double the permissible tyre load bearing capacity (2 Tyres)
Minimum Front Ballasting (With Rear Implement)	GVmin= kg		x		x
Total Weight	Gtotal= kg	≤	kg		x
Front Axle Load	TVtotal= kg	≤	kg	≤	kg
Rear Axle Load	THtotal= kg	≤	kg	≤	kg

4.0 - Machine Commissioning



IMPORTANT: Loading and unloading operations should only be carried out by specially trained personnel



DANGER: Increased danger of accidents during commissioning and unloading of the machine

Observe all safety notes from the safety chapter

4.1 - Machine Delivery

The SPX is typically delivered on a flatbed trailer. Some parts may be disassembled from the machine for transport purposes and will need to be reassembled locally after unloading. The easiest way to unload is to typically attach the implement to a suitable tractor (See chapter 3) If an alternate method of unloading is required (such as lifting with a crane) please consult Horizon Agricultural Machinery Ltd. for advice and only use lifting equipment with the appropriate lifting capacities and approvals.



IMPORTANT: Pay attention to all local regulations in relation to transport dimensions when loading or unloading the machine from a flat bed trailer. Some components may need to be removed from the implement to comply.

4.1.1 - Unloading the implement

When attaching the implement to the tractor for unloading pay attention to the following sections (Tractor requirements(3.3), Tractor Ballasting (3.4), Machine Coupling & Parking (6.1), Hydraulic connections (5.3) & Transport) When unloading it is not necessary to connect the drill control terminal (if fitted) however all hydraulic connections bar the fan and pressureless free flow return should be attached.

1. The tractor must be coupled to the machine using its lift arms as shown in section 6.1.1. The hydraulic connections should be made as shown in 5.3.
2. Transport lashings should be removed from the implement in preparation for unloading
3. The machine should be raised from the packing legs either by raising the lift arms or the 3 point frame.
4. The implement should be removed from the flat bed and then parked as per section 6.1.3.

4.1.2 - Loading the implement

1. Connect the implement to the tractor as per section 6.1.1 connecting hydraulic services and as per section 5.13. The implement can also be lifted using a 3 Point hitch frame and a telehandler.
2. Prepare the implement for loading by placing it into its transport position.
3. It is recommended that a banksman (Assistant) is used during this operation. Carefully load the implement onto the machine by pushing backwards. The implement may need to be lifted/ lowered to avoid obstructions as it is loaded onto the transport vehicle.
4. Lower the implement fully into its transport position once the implement is in place on the transport vehicle and should be lowered onto its storage legs. (Depending upon local regulations the implement may need to be loaded onto the flatbed trailer unfolded (It is highly recommended to use a 3 Point hitch and telehandler frame for this operation)
5. The implement should be secured using appropriate lashings to prevent movement during transport operations
6. The tractor/Hitch frame can be unhitched from the implement and removed.

4.2 - Machine Transport

Country specific regulations regarding transport height and width must be adhered to for transporting the implement on public roads. This applies whilst the tractor is connected to the implement, or whilst it is being transported on a flatbed trailer. Some components may need to be removed on the machine to comply with these transport regulations.

If transporting with a tractor it must be suitable and have sufficient steering and braking capacity (With ballasting) for the implement – This is discussed in depth throughout chapter 3

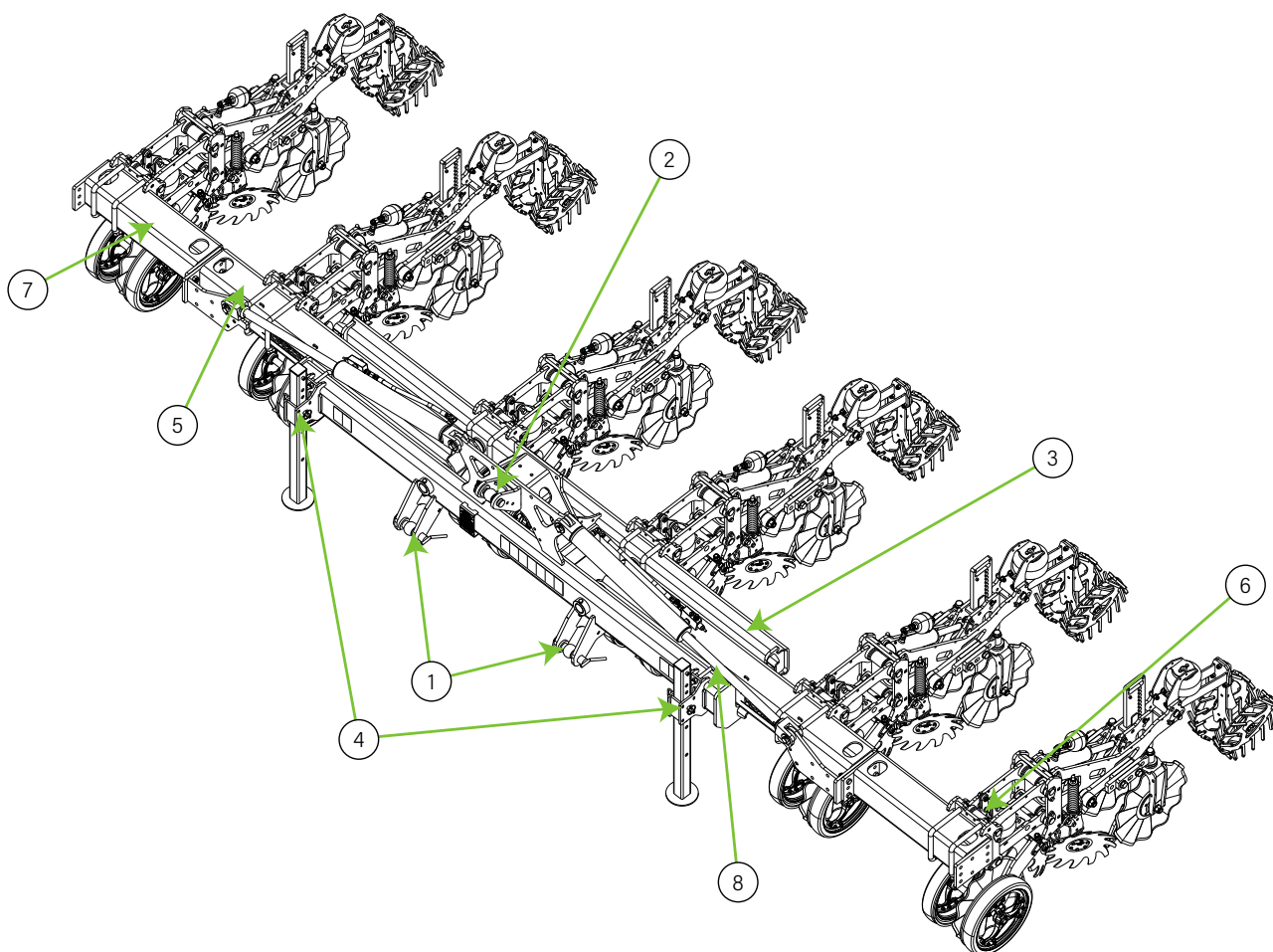
If transporting on a low loader the equipment must be securely lashed with the appropriate restraining devices.

4.3 - Machine Installation

Machine operation must only occur after the operator has read the operating instructions and the machine is commissioned appropriately. Any parts removed for delivery/transportation purposes must be refitted and appropriately checked.

5.0 - Product Description

5.1 - Main Assembly Groups

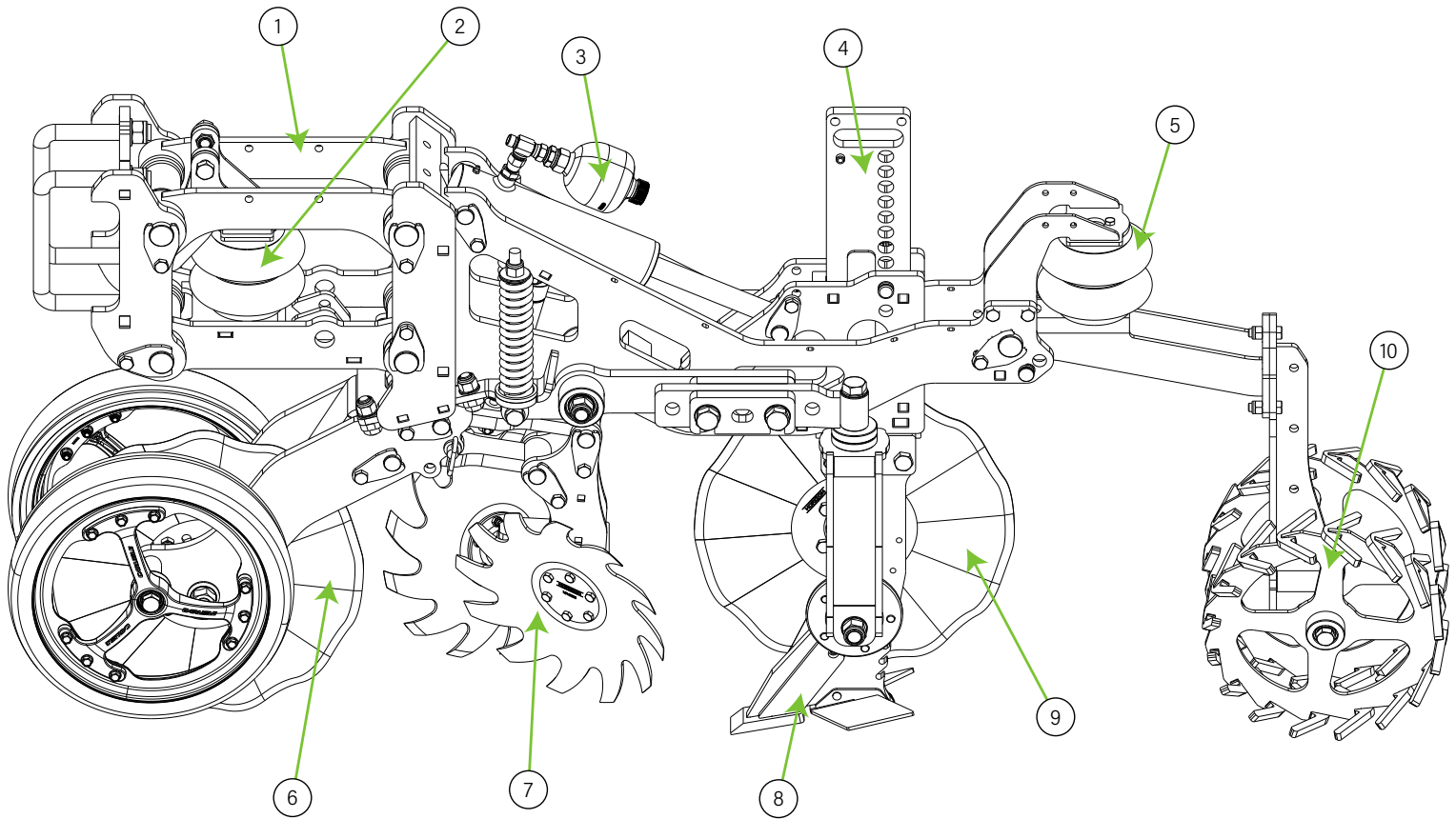


- 1. Lower Hitch Pins
- 2. Upper Hitch Pin
- 3. Frame
- 4. Parking Stands

- 5. Wings
- 6. Row Unit
- 7. Wing Extensions
- 8. Folding Cylinder*

*Folding Cylinders are only fitted to SPX folding frames

5.2 - Row Unit Overview



- | | |
|---------------------------------|------------------------|
| 1. Parallelogram | 6. Opening Disc |
| 2. Down Force Airbag* | 7. Trash Wheels |
| 3. Auto-Reset Accumulator** | 8. Shank, Point & Wing |
| 4. Adjustable Depth Control Leg | 9. Burm Building Discs |
| 5. Packing Wheel Air Bag | 10. Packing Wheels |

* Optional Hydraulic Downforce control can be fitted (Airbag is standard)

**Optional Hydraulically controlled auto-reset. (Mechanical shear bolt is standard.)

5.3 - Hydraulic Connections

Check the service pressure of the tractor's hydraulic system. Max. pressure: 200 bar / 20 MPa. When connecting, ensure that the hydraulic couplings are correctly positioned to avoid any risk of hydraulic fluid escaping.

Hydraulic lines have coloured fittings along with a +/- sign for dual action controls) so the user can easily connect these to the spool valves on the tractor.

Hydraulic Hoses		Function		Connection Mode	
Black*		Free Flow Return - This line MUST always be connected to the tractor			
Blue*		Fan Switching	Switching On/Off	Single Action	Latched
Yellow	+	Wing Fold & Unfold	Unfold	Double Action	Active While Button Pressed
	-		Fold		
Red	+	Coulter Lift & Down Pressure	Lower/Increase downpressure	Double Action	Constant Flow
	-		Lift/Decrease Down pressure		

*Fan is optionally fitted for seeding



Hydraulics should be connected in the order outlined below and disconnected in the opposite order - Failure to do so may damage the motor and other components. **FREE FLOW RETURN MUST ALWAYS BE THE FIRST HOSE CONNECTED AND LAST ONE DISCONNECTED**

1. Connect the Black Terminal (Free flow return)
2. Connect the Blue terminal (Fan Supply)
3. Connect the yellow terminals
4. Connect the Red terminals

All hydraulic connections are required for the correct functioning of the implement.



The fan must be supplied with "priority" oil from the tractor. Failure to supply the fan with Oil priority will result in erratic fan speeds operation & possible motor failure

5.4 - Electrical Connections

There are 3 types of electrical connections between the implement and tractor as shown below. All connections are required for the proper functioning of the implement.

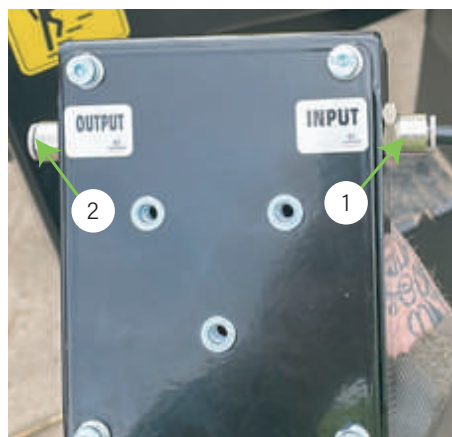
Electrical Connection Type		Function	Current Rating/Fuse
Anderson Connector*		Powering the RDS Control system & optional Liquid pump	2x 60 Amp
7 Pin Lighting Connector		Road Lighting Equipment	See Tractor Manual
ISOBUS/ISOCAN Control connector*		Powers the ISOCAN Display	10 Amp

* For optional seeding system or mounted compressor

5.5 - Pneumatic Connections

The air for the pneumatic system is supplied from the tractor or the optional on-board compressor. This air supply is required to adjust the closing wheel pressure, row cleaners and pneumatic downforce.

To connect the closing wheel/ downforce control boxes:



1. Supply Pressure - In 2. Regulated Pressure - Out

Tractor Supplied Air:

1. Switch off the tractor engine.
2. Drain the air from the reservoir (Refer to tractor manual)
3. Connect the supplied coiled air line to the "Input" port of the pneumatic control box.*
4. "Output" is the regulated air OUT to the closing wheel airbags. If Downforce is fitted the output from the other control box connects to this system

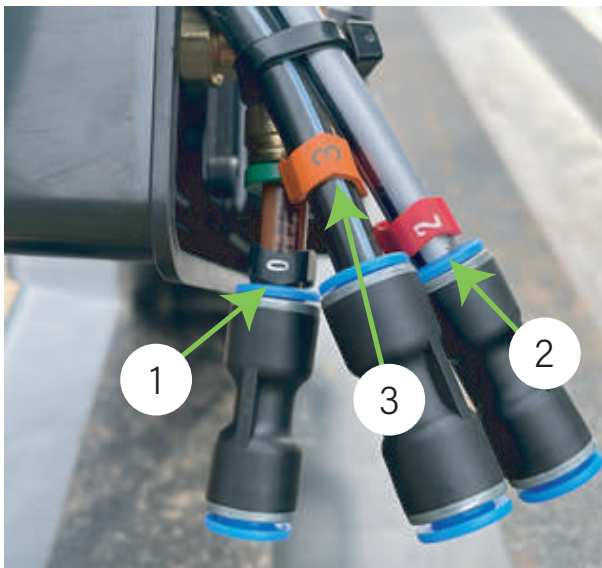
*Please note if fitted with Cab Adjustment system there is a control box for each system (I.E. closing wheel pressure & Downforce) Input line from the tractor will connect to a T to split to the boxes and Output lines must be connected to the correct systems on the implement

Optional Implement Mounted Compressor:

1. Disconnect the Anderson connector to stop the compressor.
2. Drain the air from the reservoir by pulling the valve down.
3. Connect the other end to the "Input" port of the closing wheel control box. As described previously the input from the compressor may connect to a T piece depending upon the options fitted
4. "Output" is the regulated air OUT to the closing wheel airbags. If Downforce is fitted the other output connects to this system

Row Cleaner Control Box:

Installation of this system is as follows:



1. Supply Pressure - "0"
2. Row Cleaner Raise - "2"
3. Row Cleaner Lower - "3"

1. Connect a Tee fitting to the pressure IN (1) port "0" of the closing wheel control box.
2. Connect an airline from the "Input" port of the closing wheel control box to the Supply pressure (1) port "0".
3. Route the airline from the implement to the control box in the cab.
4. Connect the airlines to the corresponding colour coded tags on the row cleaner control box.

6.0 - Operations

Whenever working on or using the implement pay attention to the warning instructions

6.1 - Machine Coupling & Parking



DANGER: Personnel must keep clear of the area between hitch and the implement whenever the tractor is moving. Failure to do so means personnel can become trapped between the 2 and severely injured



DANGER: Accidents can occur with tractor and implement movements. Personnel should be kept clear of the machines manoeuvres and operators should observe their surroundings



WARNING: Escaping hydraulic oil can cause serious and potentially deadly injuries. Hydraulic hoses should only be connected or disconnected when depressurised. Connections should be correctly positioned to reduce risk

6.1.1 - Hitching

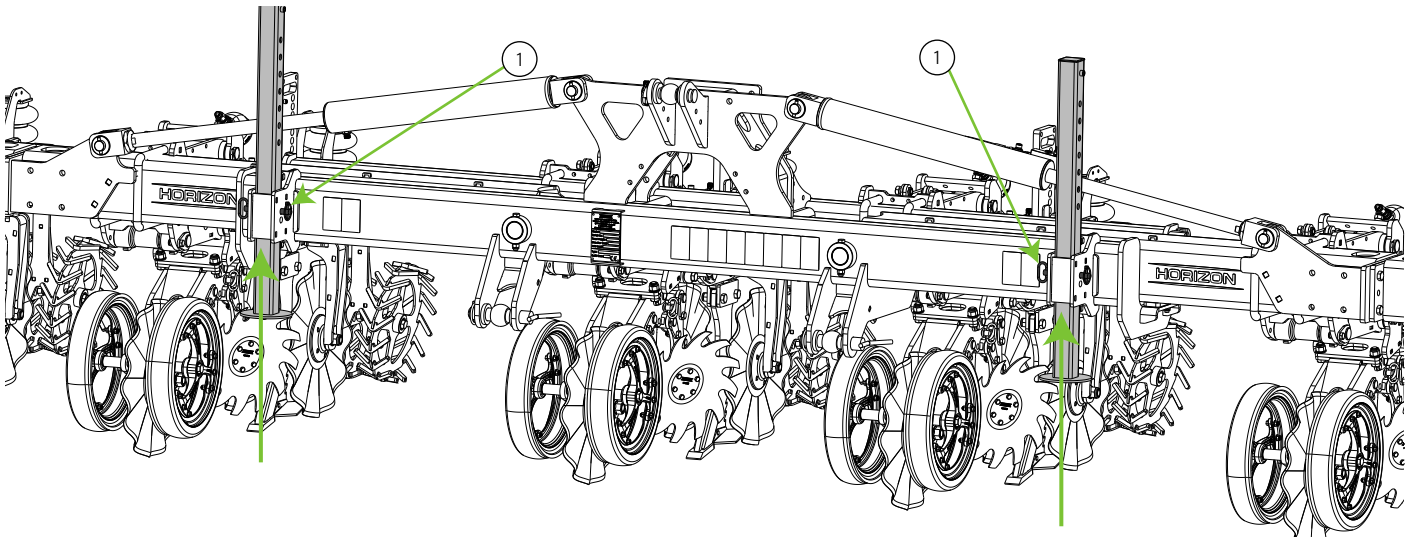
The machine must be properly connected to a tractor prior to any machine movements

1. Check the machine and tractor couplings for cleanliness and wear
2. Manoeuvre the tractor to the machine and set the parking brake
3. Stabilisers on the lifting arms should be adjusted to avoid excessive lateral movements.



IMPORTANT: A small amount of lateral movement is permitted, especially when using auto-steer systems. If the stabilisers are tight, then any steering adjustment will negatively affect the position of the implement.

4. Adjust the stabiliser arms so the linkarms are equal distance from the center line of the tractor
5. Adjust the tractor link arms so they are parallel to the ground. Check using a spirit level or measure the distance to the ground when parked on a firm level surface.
6. Attach the top link, ensuring the threaded eyes are of equal distance.
7. Connect all hydraulic and electrical connections between the implement and machine (As shown in sections 5.2 and 5.3 respectively)
8. Raise the lift arms until the frame is in the horizontal position, and the parking stands are no longer supporting the machine.



9. Remove the lynch pins and withdraw the securing pins (1) from the parking stands, raise the parking stands. Reinserting the securing pin and lynch pin as shown below to lock the parking stands in the raised position
10. Prior to any machine movements check for secure connections between the implement and tractor

6.1.2 - Transport Position



DANGER: Failure to correctly configure or secure the implement prior to road transport can cause a road accident. Hitching elements such be secure and free from wear, and the implement should be free from mud.



IMPORTANT: Operators must conform to local road traffic regulations and only transport the implement unladen with no product in the tanks

Prior to any road transport operations the implement should have its wings folded. Prior to folding the coulter should be raised and locked into the transport position as per section 5.3. The implement should also be folded up as per section 6.2.2. Once the wings are folded and the coulter raised the operator should then lower the chassis by operating the chassis lift Hydraulic service.

6.1.3 - Parking

It is recommended the machine is parked under cover or in a hall. The machine should be parked in its unfolded state.



DANGER: Severe accidents can be caused by implements movement. Prior to disconnecting the implement from the tractor. The implement should be lowered and secure on the parking stands prior to disconnecting the hitch. It is highly recommended that this is done on a firm level surface (i.e. Hard standings)



DANGER: Accidents can occur with tractor and implement movements. Personnel should be kept clear of the machines manoeuvres and operators should observe their surroundings

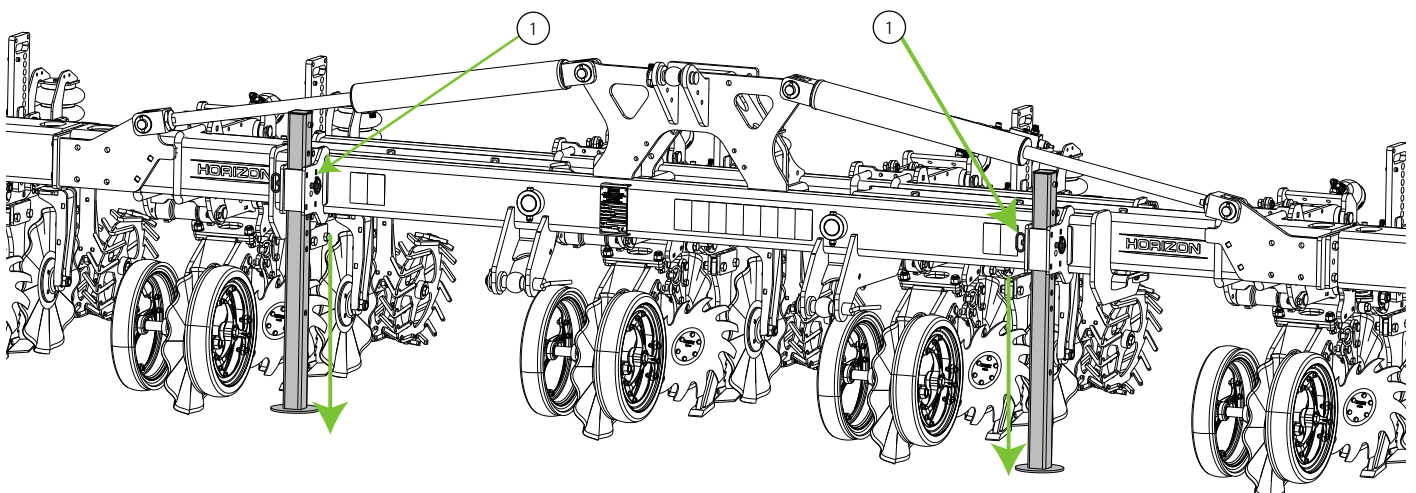


WARNING: Machine must only be folded/unfolded on firm and level surfaces. Failure to do so could cause the machine to roll over due to instability.



IMPORTANT: If the machine is being parked for long term storage please see section 9 for cleaning and storage recommendations prior to parking the implement.

1. Position the machine in a suitable location and secure the tractor with the parking brake.
2. If storing the machine unfolded, unfold the machine completely as shown in chapter 6.2.1
3. Remove the Lynch pins (1) and lower the parking stands. Please ensure the parking stands are level on both sides of the machine. Reinsert the lynch pins to secure the leg in positions as shown below.



4. Lower the machine onto the parking stand and row units by lowering the lift arms.
5. Unplug all electrical connections and secure on the machine.
6. Depressurise the hydraulic lines (by activating the "float" function on the tractor spool) and disconnect hydraulic lines as per section 5.3 securing them on the machine.
7. Depressurise the pneumatic connections and Pneumatic reservoirs such as Brake air reservoir and Compressor storage tank must be drained of pressure) and secure the connections on the machine.
8. Unhitch the machine by releasing the top link and lower securing hooks on the lift arms, prior to lowering the tractor link arms.
9. Manoeuvre the tractor away from the implement

6.2 - Wings



WARNING: Actuation of the wings can cause sever crushing injuries and possibly death. Ensure no personnel are in the danger area and never move under raised components



WARNING: Machine must only be folded/unfolded on firm and level surfaces. Failure to do so could cause the machine to roll over due to instability.



CAUTION: Risk of machine damage whilst actuating the wings. Operators must monitor the wings movement

6.2.1 - Unfolding

Ensure no one is in the danger area of the machine when operating the folding/ Unfolding actuation

1. Ensure adequate clearance from any obstructions or hazards such as overhead powerlines or branches and that the danger area is clear of any persons. Please also ensure the frame is lifted to allow for clearance as the wings articulate
2. Operate service to unfold the implement, whilst ensuring the clearances are maintained and no users enter the area whilst actuating

6.2.2 - Folding

Ensure no one is in the danger area of the machine when operating the folding/ Unfolding actuation

1. Ensure adequate clearance from any obstructions or hazards such as overhead powerlines or branches and that the danger area is clear of any persons. Please also ensure the frame is lifted to allow for clearance as the wings articulate
2. Operate service to folding the drill, whilst ensuring the clearances are maintained and no users enter the area whilst actuating

6.3 - Row Unit

There are several systems and components with differing functionality incorporated into the SPX row unit. Some parts are optional, so not all information contained within this section is relevant to your machine. This section will however cover the entire SPX row unit.

6.3.1 - Pneumatic Downforce (Manual)



WARNING: Eye protection must always be worn



WARNING: Never overinflate the airbag as this may result in component failure and injury.



CAUTION: Keep a safe distance from the airbag whilst inflating/deflating - 1 meter minimum



IMPORTANT: A manual tire inflation gauge can also be used if an automatic inflator system is not available. Both should be monitored throughout the inflation procedure

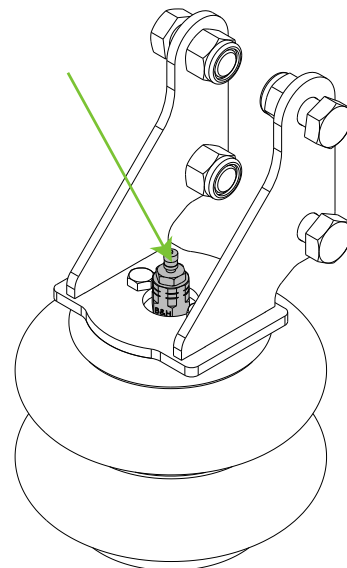
All rows are equipped with a pneumatic air bag to control the downforce.

The recommended working range is between 1 and 8 Bar of pressure (14.7 – 116 psi)

8 Bar is the maximum pressure for this system. It is recommended that the pneumatic downforce system is operated at around 2 Bar of air pressure

To adjust downforce pressure:

1. Position the row unit at the working height
2. Turn off the tractor and remove the ignition key.
3. Remove the protective cap from the Schrader valve.
4. Connect the air pressure gauge and set to the new pressure setting.
5. Keep a minimum of 1 meter distance during adjustment.
6. Reinstall protective cap.

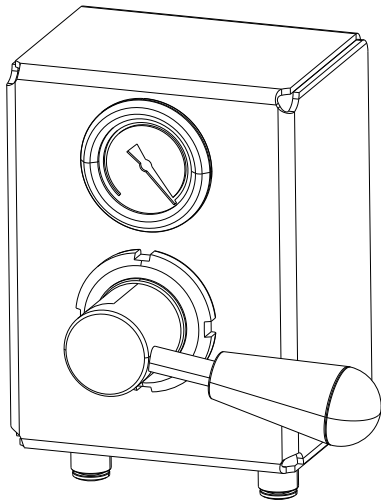


6.3.2 - Pneumatic Downforce (Cab Controlled)

Each row is equipped with a pneumatic air bag to control the downforce on the unit. The downforce pressure can be controlled via the supplied box from the tractor cab. The recommended working range is between 1 and 8 Bar of pressure. 8 Bar is the maximum pressure for this system. All rows operate at the same pressure. It is recommended that the pneumatic downforce system is operated at around 2 Bar of air pressure.



IMPORTANT: All rows are automatically set to the same pressure.



To adjust downforce pressure:

1. Position the row unit at the working height.
2. Turn the lever clockwise to increase down force pressure.
3. Turn the lever anti-clockwise to decrease down force pressure.

6.3.3 - Hydraulic Downforce (Optional)

Each row unit is equipped with a hydraulic cylinder applying downforce to the unit. This allows for consistent tillage. After adjustment of the leg depth, the hydraulic pressure should be adjusted accordingly

Located at the front of the chassis is a pressure gauge. The working range is between 15 and 60 bar of pressure. It is recommended that the hydraulic downforce system is operated between 25 and 30 Bar of pressure



IMPORTANT: All rows are automatically set to the same pressure.

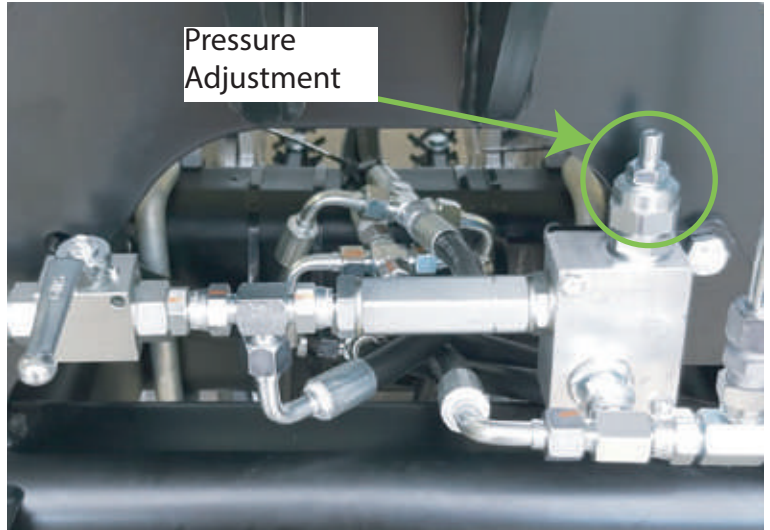
1. Connect all hydraulic and electrical connections between the implement and machine as shown in sections 5.3 and 5.4 .
2. Loosen the back-up nut & turn the down force valve anti-clockwise, until no spring pressure is felt (5mm Allen key & 17mm spanner required)
3. Start the tractor and set the engine rpm to operating speed.
4. Adjust the oil flow that will supply the down force circuit to the minimum value.
5. Engage the hydraulic spool (tractor) in to "Constant Pump", slowly increase the flow control until the Down Force gauge shows 15 bars.
6. To increase the downforce, turn the valve clockwise to the desired pressure, lock the valve in position with the back-up nut.



IMPORTANT: The usage of high downforce pressure can change the sowing depth of the machine, therefore it may be necessary to readjust the depth settings.



IMPORTANT: Usage of excessive down pressure will unnecessarily accelerate the mechanical wear rates of some components, as well as having a detrimental impact on the quality of the seeding furrow (Excessive compaction upon closing)



6.3.4 - Cutting Disc

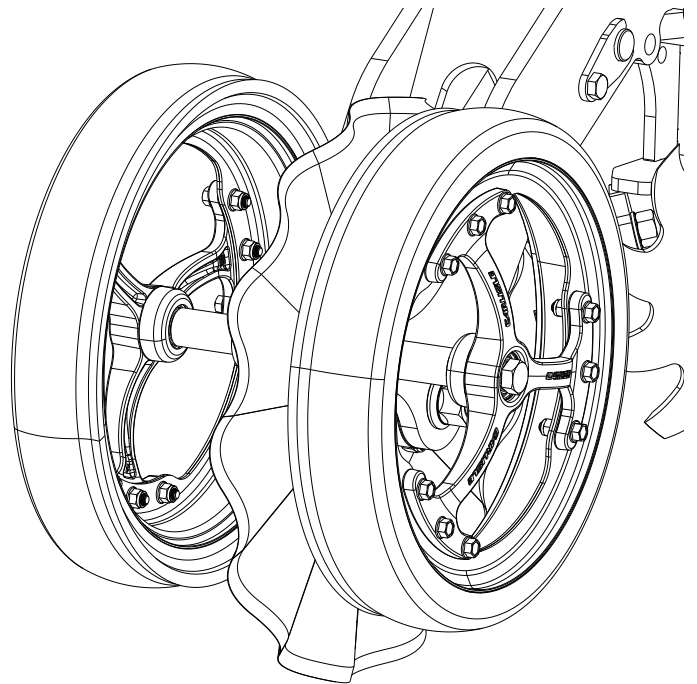
The side wheels and disc opener are not adjustable.

The side wheels have the following functions:

- Set and maintain the row working height.
- Manage contour following of ground conditions.
- Keep hold of residue for the disc opener.

The purpose of the disc opener is to cut through any residue and to open the seeding line.

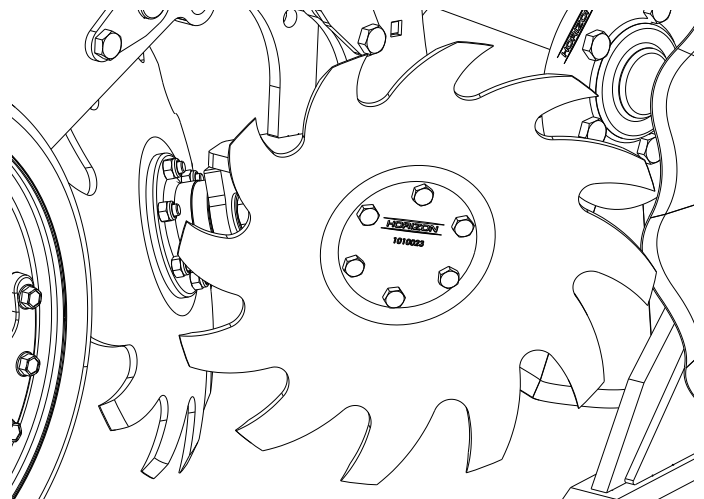
By cutting the residue, it helps the row cleaners to clear a path for the sub soil leg and burm discs.



6.3.5 - Trash Wheels

Each row is equipped with a pneumatic cylinder to control the trash wheel operation. The trash wheel pressure can be controlled via the supplied box from the tractor cab. The row cleaning system requires 120 PSI+ of air supply to run effectively. The recommended working range is between 1 and 8 Bar of pressure. 8 Bar is the maximum pressure for this system.

The trash wheels are designed to move residue in front of the burm discs and subsoil leg.



How To adjust:

1. Turn the lever clockwise to lower the trash wheels.
2. Turn the lever anti-clockwise to raise the trash wheels.



IMPORTANT: It is important that the trash wheels do not operate directly on the ground as this will create a tillage effect resulting in excessive soil movement and high component wear rates.



IMPORTANT: When unhooking the air supply line from the vehicle, it is recommended that the lines are plugged to prevent dirt and debris from entering the pneumatic system.

To increase the aggressiveness of the row cleaners the control lever should be moved to the right increasing pressure in the down gauge increasing the force applied to the row cleaners

To reduce the aggressiveness of the row cleaners the lever should be moved to the left putting more pressure in the lift gauge removing force from the row cleaners

To lift the row cleaners out of operation the lever should be turned all the way to the left. This reduces the force applied and lifts the row cleaners out of operation.

The required pressures used will depend upon the row cleaners and field conditions, as such there is no recommended pressures for the systems operation (So long as they lie between the system limitations) All rows are operated at the same pressure.

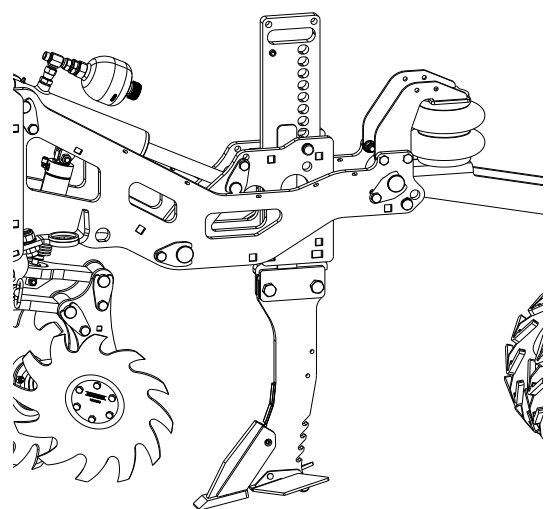


6.3.6 - Tine

The tine assembly consists of the leg, shank, point and wing.

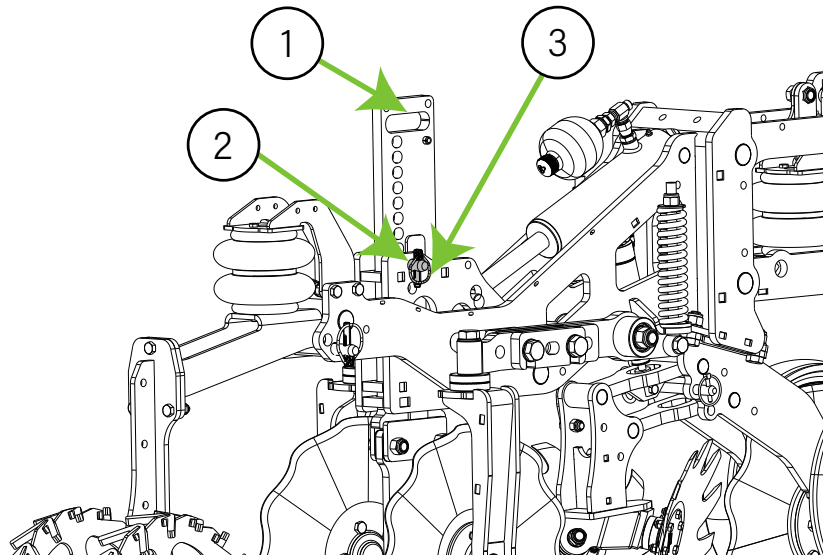
Its purpose is to remove any compaction layers, move & fracture the soil, and to place fertiliser accurately in the seeding line. Low and high disturbance points, along with a small and medium wings are available to manage soil movement.

*Please Note: Berm builder arms and discs have been removed to provide a clearer view of the tine assembly.

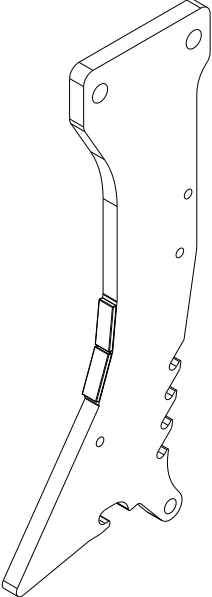
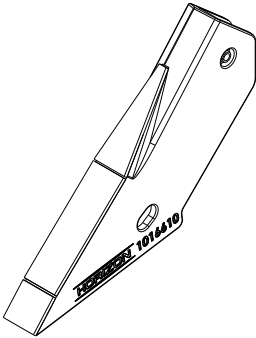
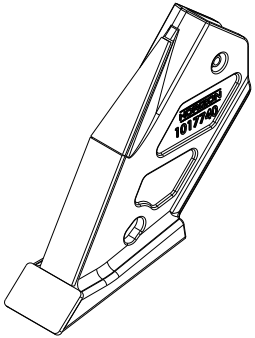
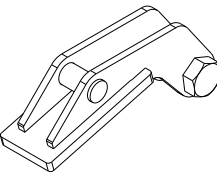
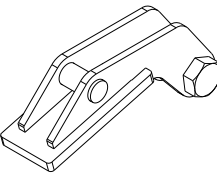
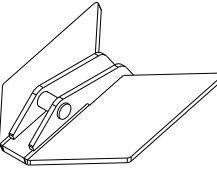
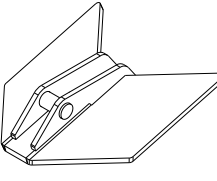


6.3.7 - Tine Adjustment

1. Raise the implement so it is off the ground.
2. Remove retaining clip (3)
3. Hold leg (1) by the handle.
4. Remove the pin.
5. Raise or lower the tine as required.
6. Refit pin (2) and retaining clip (3).
7. Set all additional rows to the same position.



6.3.8 - Tine Table

Part Description	Image			
Shank				
Point				
Wings	Low Disturbance		High Disturbance	
				
	35mm		35mm	
		135mm		135mm



IMPORTANT: The shank MUST have a point and wing installed or excessive wear will occur!



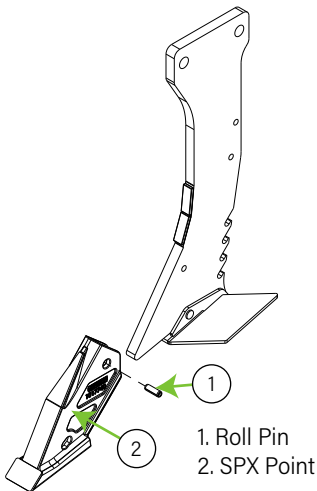
6.3.9 - Replacing Point, Wing & Injector



WARNING: Never work under a unsecured raised implement. Danger of severe injury or death

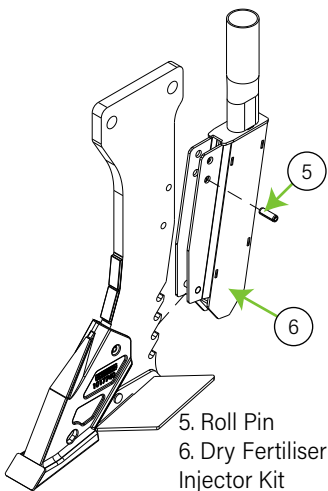
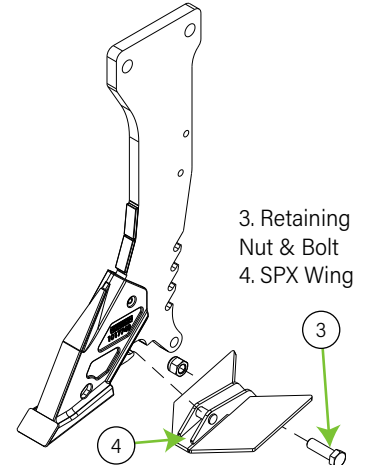


WARNING: Always wear safety goggles when using striking tools.



1. Lower the tine to the deepest setting (see tine adjustment)
2. Drive out the roll pin (1) using a hammer and 8 mm punch.
3. Pull the point (2) forward and away from the shank.
4. Install new point in reverse order.
5. Install new roll pin.
6. Set the tine to its original depth setting

1. Remove the wing securing nut and bolt (3).
2. Push the wing (4) down and rearward from the shank.
3. Install in reverse order.
4. Install new nut and bolt.
5. Set the tine to the original depth setting.



The Dry fertiliser injector is height adjustable on the rear of the tine to allow the operator to modify the placement depth of product.

1. Lower the tine to the deepest setting (See tine adjustment)
2. Drive out the rollpin (5) using a hammer and 8mm punch
3. With the roll pin removed pull the injector tube up and rearwards from the shank.
4. Install in reverse order
5. Install a new roll pin
6. Set tine to the original depth setting

6.3.10 - Tine Obstacle Reset System



IMPORTANT: Working pressure is between 50 – 70 bars.



WARNING: Escaping hydraulic oil can cause serious and potentially deadly injuries. Hydraulic hoses should only be connected or disconnected when depressurised. Connections should be correctly positioned to reduce risk

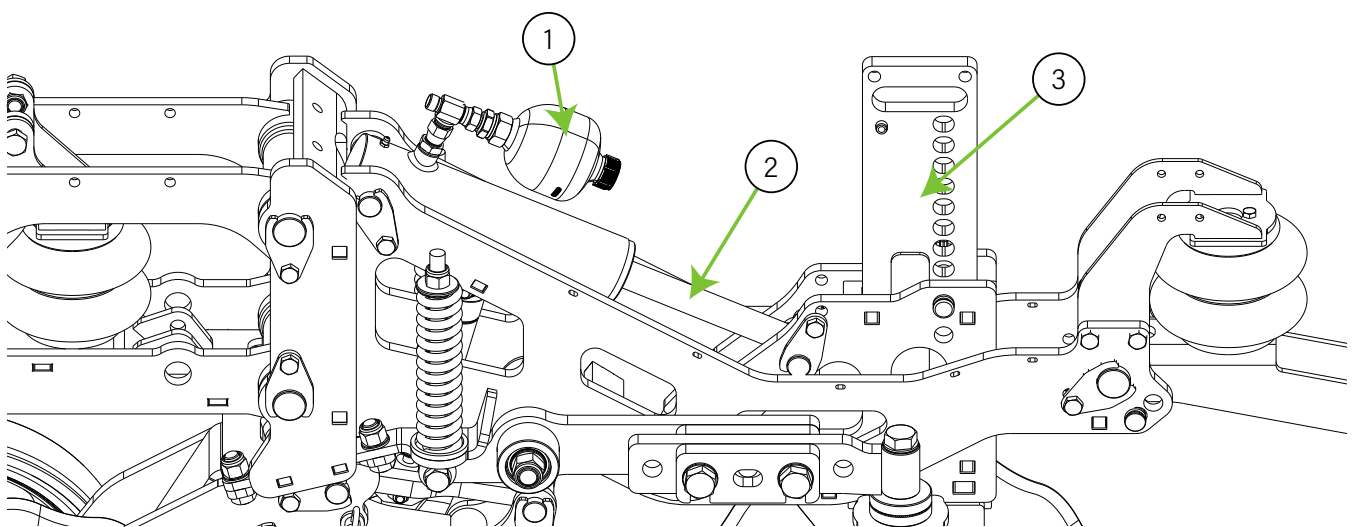
The tine is protected against infield obstacles or excessive forces by an automatic hydraulic reset system. This is a closed, self-contained circuit.

The working pressure can be adjusted depending on the following factors:

- Ground conditions
- Tine depth
- Forward speed

When the system activates against an obstacle, the oil in the hydraulic cylinder (2) retracts by overcoming the pressure set in the circuit. As the tine (3) pivots backwards the displaced oil is contained by the accumulator (1). The system pressure is now higher than the pre-set value.

Once the obstacle has cleared, the tine (3) moves back to the working position by means of the stored pressure oil in the accumulator (1). The working pressures returns to the original setting.



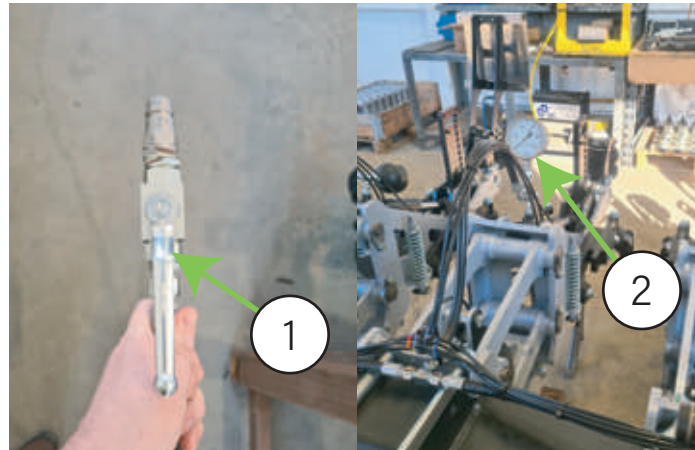
6.3.11 - Adjusting Tine Obstacle Reset System

Increase Pressure:

1. Lower the SPX to the ground.
2. Open manual valve (1)
3. Operate the tractor spool to increase system pressure as measured on the gauge (2)
4. Close the manual valve once the desired pressure has been established.

Decrease Pressure:

1. Lower the SPX to the ground.
2. Place the tractor spool in to "float" position.
3. Slowly open manual valve (1)
4. Decrease system pressure as measured on the gauge (2) to the desired value.
5. Close the manual valve once the desired pressure has been established.

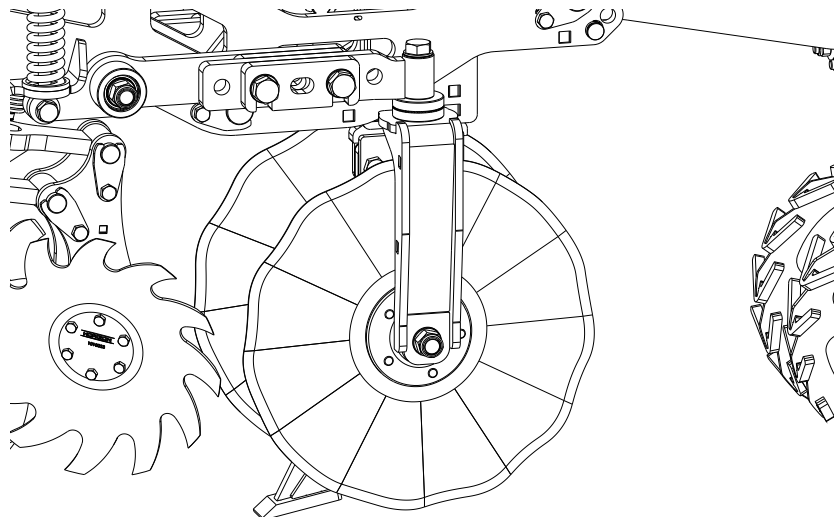


1. Manual Valve (Fitted inline on hose)
2. Gauge (Fited to Row Unit)

6.3.12 - Berm Building Discs

The Berm Discs manage the strip width and structure, by containing the soil brought up from the subsoil leg & wing.

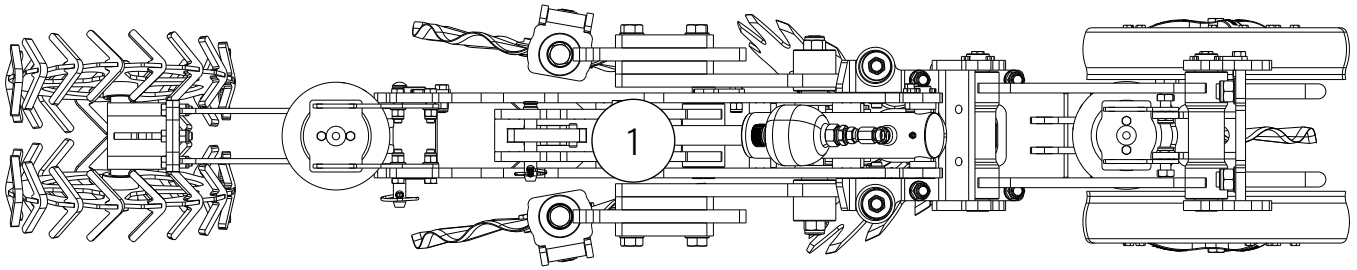
Toe, width and lateral adjustments can be made to find the optimal set up.



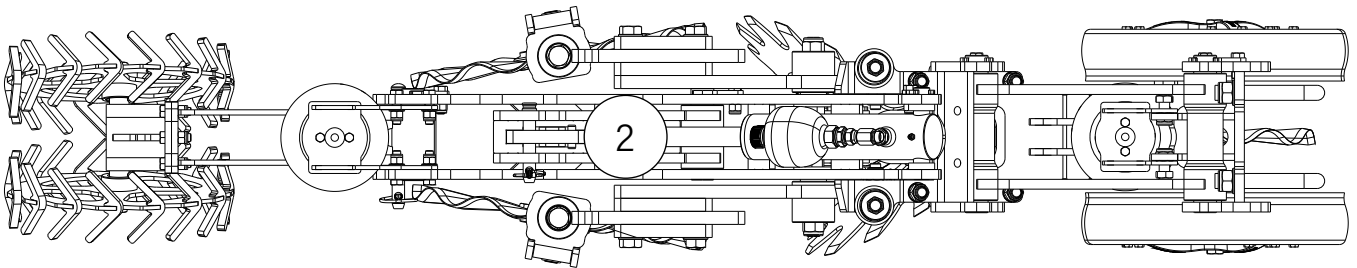
6.3.13 - Berm Discs: Toe Adjustment

Toe-In: Allows the soil to flow easily out of the berm discs. This will create a shallow/ lower strip.

Toe-Out: Slows the soil from passing through the berm discs. This will create a wider/ higher strip.

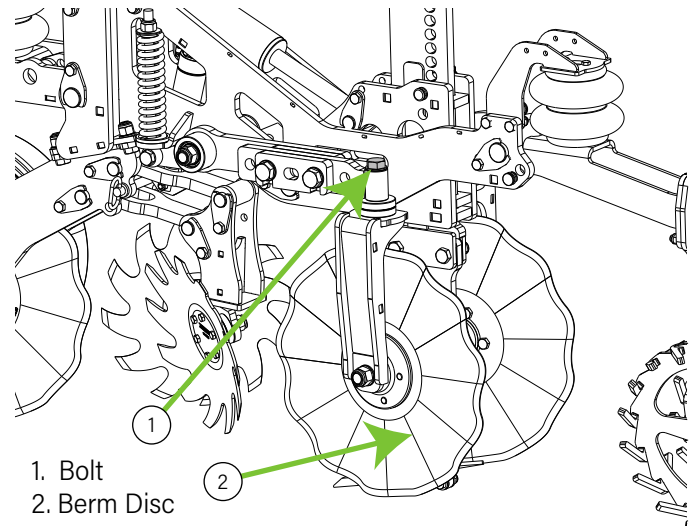


- 1. Toe In Position
- 2. Toe Out Position



Adjusting Berm disc Toe Angle

1. Raise the SPX so the discs are off the ground.
2. Turn off tractor.
3. Loosen the M20 bolt (1)
4. Rotate the disc (2) to the new position.
5. Tighten M20 bolt (1) to 432Nm (318 ft-lb)
6. Confirm adjustments are correct (operational test)
7. Set all additional rows to the same position.



6.3.14 - Berm Discs: Width Adjustment

A narrow disc setting will increase the residue flow between the row units. It will contain soil between the discs and produce a more pronounced strip.

A wide disc setting will decrease residue flow between the row units. It will allow more soil to pass between the discs and produce a less pronounced strip.

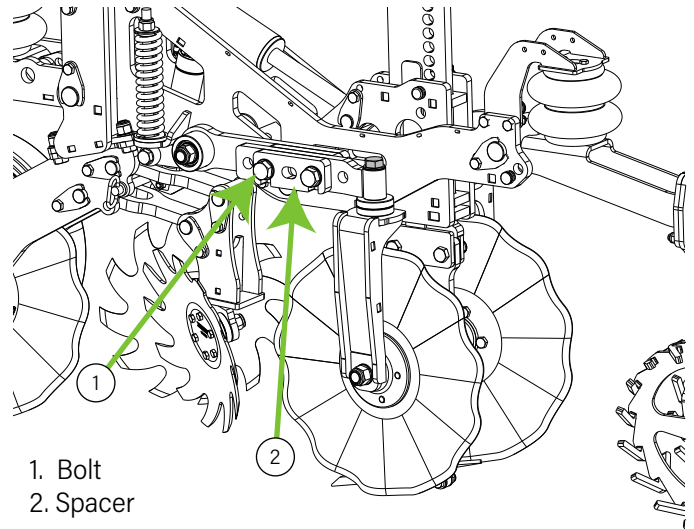


CAUTION: Loosen M20 Bolts but do not remove them whilst following the procedure outlined below. Berm Builder discs are heavy and may fall unexpectedly if bolts are removed or loosened too far.

Adjusting Berm Disc Width

1. Raise the SPX so the discs are off the ground.
2. Turn off tractor.

3. Loosen but DO NOT remove the two M20 bolts (1)
4. Lift the spacer out (2) and reposition on the inside or outside of the berm arm.
5. Tighten M20 bolts (1) to 432Nm (318 ft-lb)
6. Confirm adjustments are correct (operational test)
7. Set all additional rows to the same position.



6.3.15 - Berm Discs: Fore/Aft Adjustment

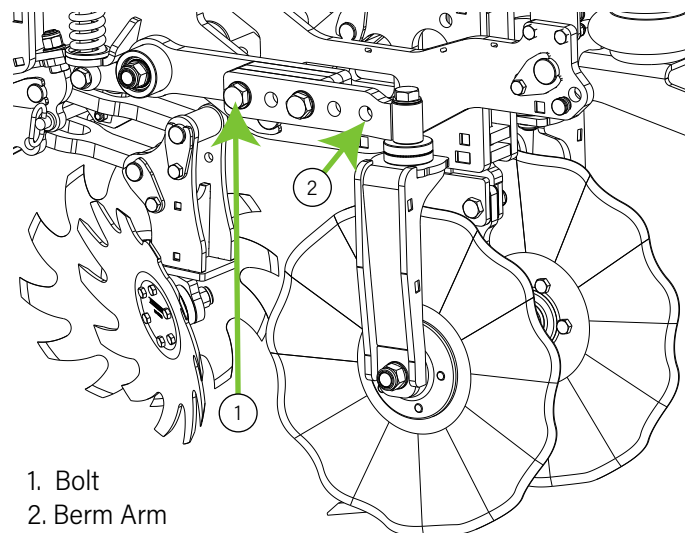
The Berm discs position can be adjusted forward and backwards to determine strip width & structure. Move the discs forward to increase the amount of escaping soil. Move the discs rearwards to reduce the amount of escaping soil. A higher tilled strip will be built with the berm builders in a reward position.



WARNING: Berm builder discs are heavy. Ensure that the row units are in the lowered position before removing the retaining bolts.

How To Adjust

1. Raise the SPX so the discs are just off the ground.
2. Turn off tractor.
3. Loosen and remove the spacer plates. Place these to one side for reinstallation.
4. Remove the two M20 bolts (1)
5. Reposition the bracket (2) either forward, rearward or in a staggered manner with one side further back or forward relative to the arm on the opposite side of the row unit.
6. Reinstall the side spacers
7. Tighten M20 bolts (1) to 432Nm (318 ft-lb)
8. Confirm adjustments are correct (operational test)
9. Set all additional rows to the same position.

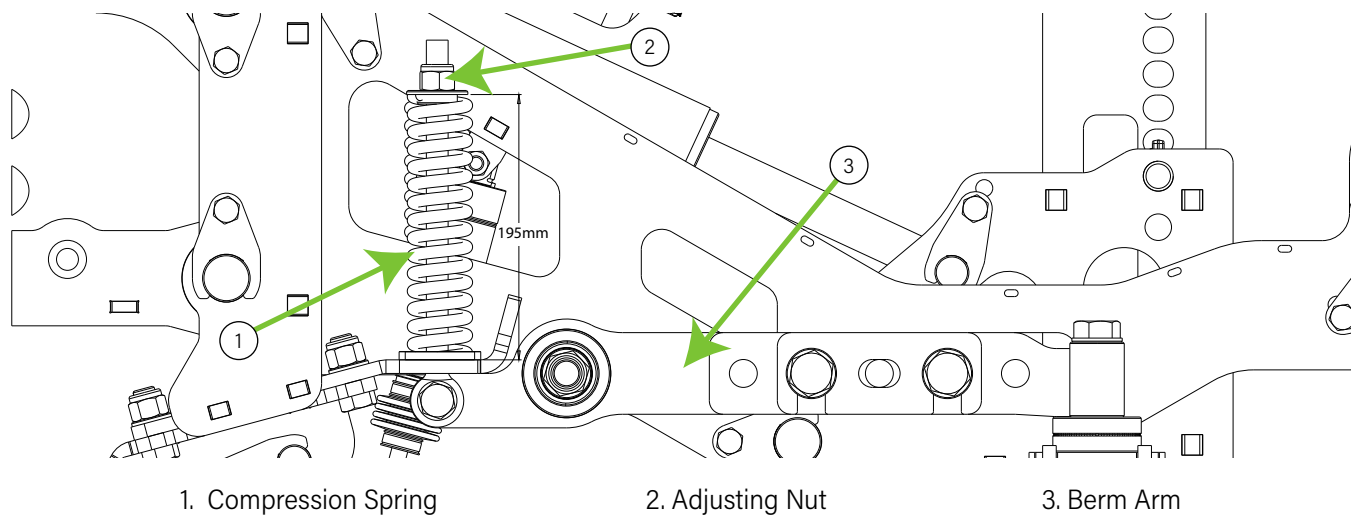


6.3.16 - Berm Discs: Spring

Each Berm disc arm is held in place by a compression spring.

The spring has two functions:

1. Allow the disc to ride over obstacles and to prevent component damage.
2. Enables the disc to cut into the soil and assist in building the strip structure.



Adjusting Berm Disc Spring

1. Measure the length of the spring.
2. To increase spring force, turn the M12 nut clockwise to shorten the spring length.
3. To decrease spring force, turn the M12 nut anti-clockwise to lengthen the spring length.
4. Confirm adjustments are correct (operational test)
5. Set all additional rows to the same position.



IMPORTANT: Any adjustments should be made in 5mm Increments



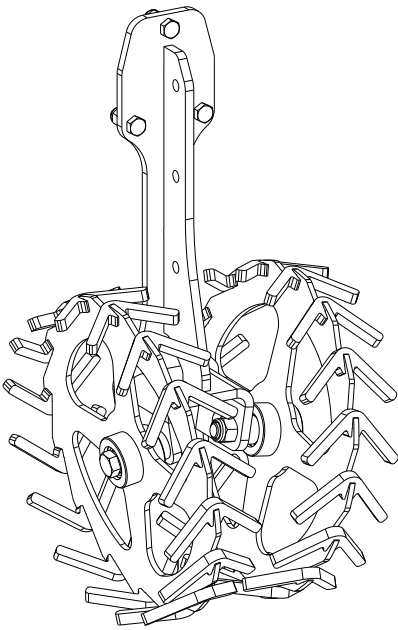
IMPORTANT: Maximum compression length of 35mm. This has a minimum measurement length of 160mm



IMPORTANT: An excessively aggressive setting will create unnecessary mechanical stresses on the row unit

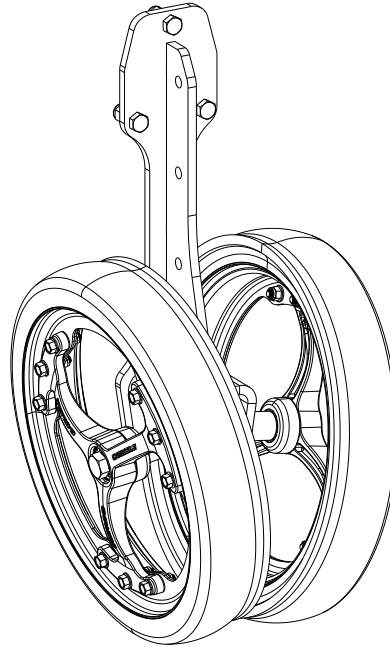
6.3.17 - Packing Wheel Type

The SPX can be equipped with 3 differing types of packing wheel to firm the strips, depending upon soil type, condition, and desired finish.



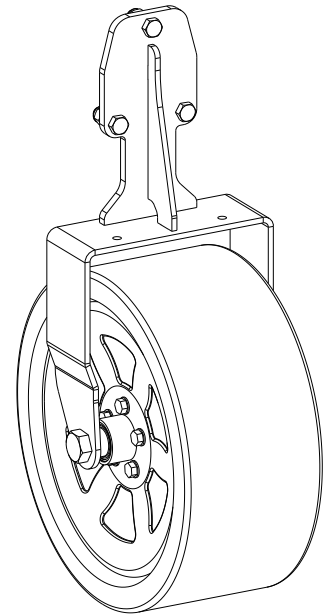
Finger wheel (STANDARD)

- The finger type packing wheel is for usage in heavy soils and will create a finished tilth.



2 Rubber Wheels

- These 2 wheels are utilised in light soils and leave a firm finish to aid moisture retention without over firming the centre of the strip



165mm Wide Packing Wheel

- The wide type packing wheel is suitable for use on light soils and will leave a firm finish to aid moisture retention.

6.3.18 - Packing Wheel Pressures

Each row is equipped with a pneumatic air bag to control the closing wheel pressure on the unit. The closing pressure can be controlled via the supplied box from the tractor cab, or manually with the fitted schrader valves. See section 6.3.1 and section 6.3.2 for how to adjust the system.

The recommended working range is between 1 and 8 Bar of pressure. 8 Bar is the maximum pressure for this system. All rows operate at the same pressure when cab controls are fitted.

6.3.19 - Packing Wheel Position

The packing wheels can be mechanically locked in the raised position for the following reasons:

- Damp soil conditions.
- Strips do not require any firming.



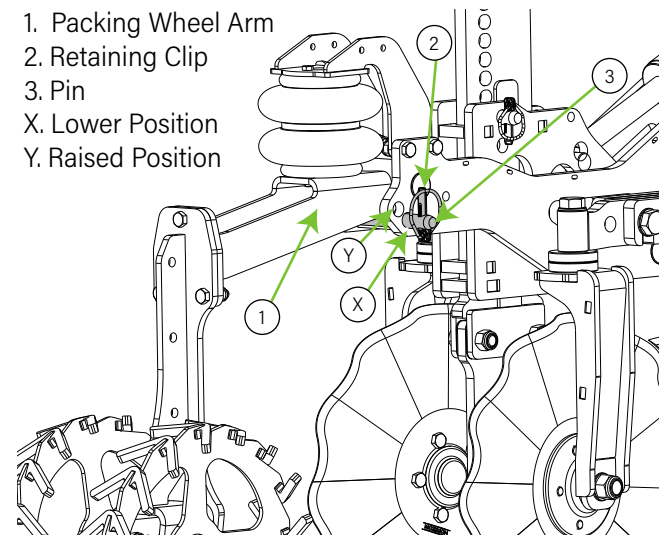
IMPORTANT: Add a small amount of air pressure (0.25 – 1.0 bars (4 – 14.5 psi)) in the airbags to prevent the packing wheels from “jumping” during work.



WARNING: Packing wheels are heavy. Users must deflate the airbags prior to attempting to move them and exercise caution when doing so.

To adjust the Packing wheel position.

1. Deflate the airbags (see section 6.3.1 & 6.3.2).
2. Remove the retaining clip (2).
3. Lift and hold the packing wheel arm (1) up.
4. Remove the retaining pin (3) from the lowered position (X).
5. Reinsert the retaining pin (3) to the raised position (Y)
6. Install the retaining clip (2)
7. Set all additional rows to the same position.



7.0 - Optional Equipment

Some Equipment is provided by Horizon Agricultural Machinery Ltd. as an optional extra. Elements in this section may or may not be fitted to your equipment or have been added retroactively after the machine left the factory. Information listed below is provided as a reference.

7.1 - Compressor

The SPX can be equipped with a compressor to supply air to the pneumatically actuated closing system, trash wheels and downforce airbags if fitted (Cab Controlled Option). The system is equipped with an automatic cut off pressure regulator, to control the pressure in the storage tank, this requires no maintenance or adjustment. The compressor itself is an oilless maintenance free compressor, fitted with an auto draining water trap. It is recommended the operator check the water trap regularly to ensure it is still correctly functioning. The system is powered by an Anderson connector shown in section 5.4, The system is connected to the pneumatic control systems by a 6mm Pneumatic hose directly from the compressor.



DANGER: Operators should NEVER drill, weld, or modify the storage tank in anyway. Failure to do so can modify the structural integrity of the pressure vessel and can consequently cause serious injuries



IMPORTANT: It is recommended operators drain the compressor air reservoir. A reminder sticker is fitted to the tank itself to indicate the drainage location

7.2 - Liquid Fertiliser System



WARNING: Operators must wear appropriate and suitable PPE when working on the liquid fertiliser systems. This PPE should be in accordance to the manufacturers regulations

The fertiliser system comprises of 3 parts. The in-furrow outlet tubes, Wilger Manifold & Fertiliser tank with control system. The fertiliser system can therefore be specified according to the operator's needs.

7.2.1 - Wilger Flow Manifolds



Wilger flow indicator manifolds allow the user to visualise the flow of product to each individual coulter outlet. The balls are positioned in the sight glass depending upon the flow conditions experience. If the ball is resting at the bottom or is lowly suspended it indicates there is a blockage between the indicator and the outlet. If the ball is suspended

in the middle of the tube it indicates the optimum flow rate of product. If the ball is suspended higher, it indicates excessive flow or a possible leak. Visualisation balls are changed depending upon the Specific gravity of the product being applied. The pressure gauge indicates the optimal working pressures of the unit (Between 1 and 8 bar)

7.2.2 - Pump and tank

The Control system is wirelessly controlled from a tablet in the Tractor cab and utilises a GPS Speed sensor for rate control to reduce the wiring required. They can either be mounted on the front tractor hitch via a 3 Point linkage or incorporated into the implement itself mounted at the rear of the machine. If the tank is rear mounted on the implement it must be transported empty.

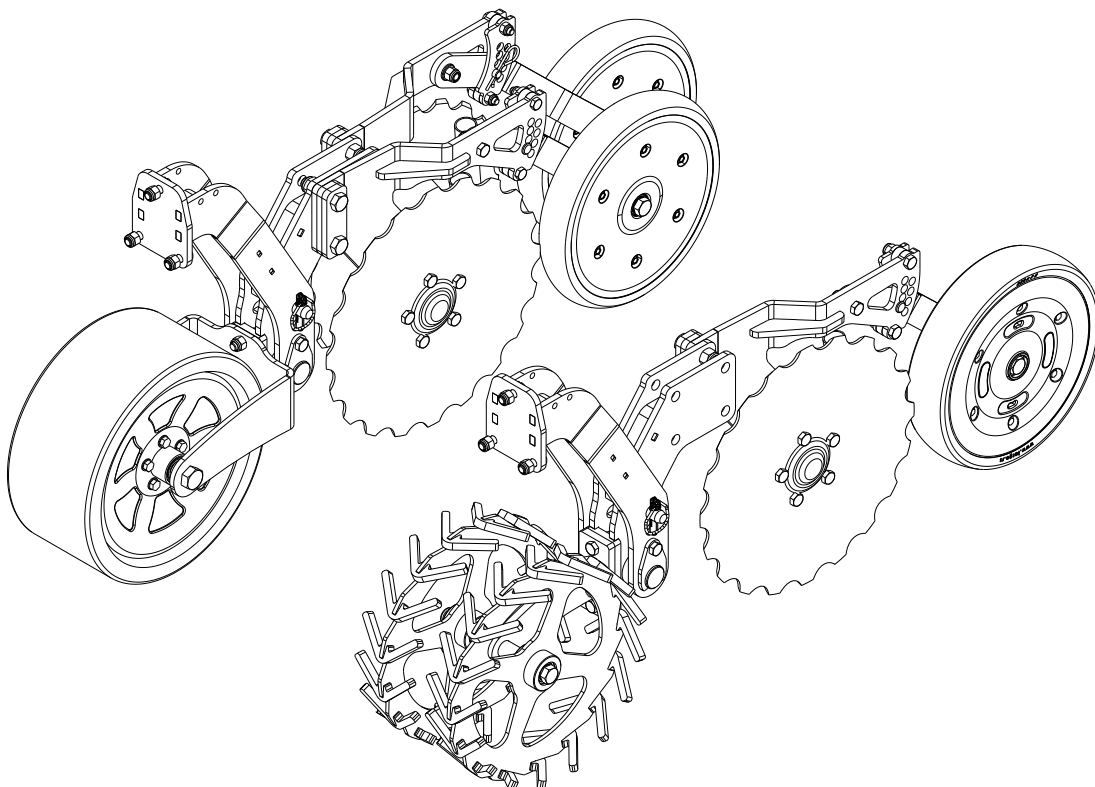


DANGER: Failure road with an empty liquid tank can affect the machines stability. This can lead to machine damage, accidents, property damage, serious injury or even death.

7.3 - Rear Seeding Elements

The SPX can be equipped with an integrated seeding element. This allows for the placement of seed post tillage. The element is equipped with a seed boot and disc to place the seed and a rear packing wheel for slot closure. Seed placement depth is adjusted using the pin on the rear packing wheel arm of the element.

The unit itself is available in single and double row configurations, both of which mount onto the rear packing arm of the SPX Row instead of the packing wheels. The unit has a choice of packing wheels available for firm the tilled strip prior to seed placement & for closure of the slot post drilling. Each element is also equipped with spacers to adjust the placement of the product relative to the slot itself.



8.0 - Field Usage

8.1 - Frame Settings

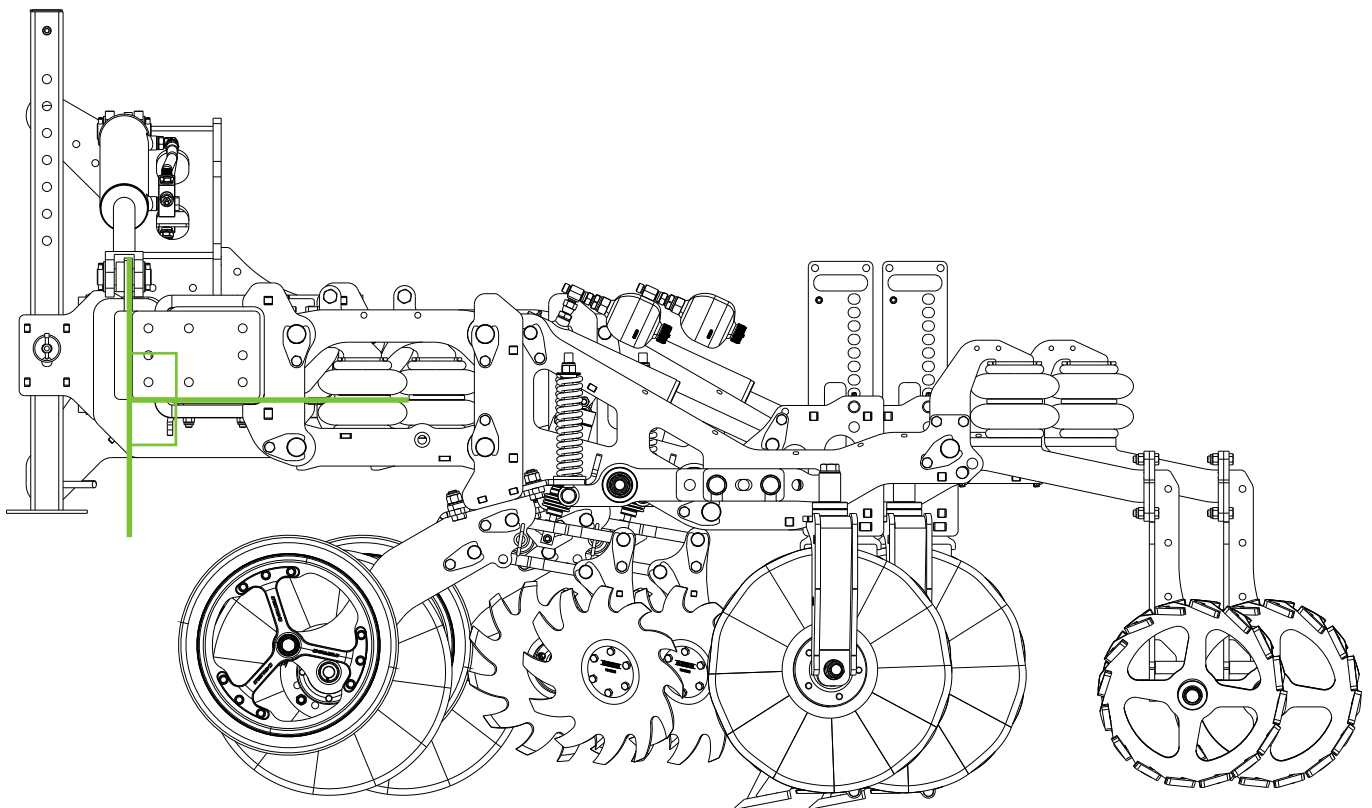
Upon delivery of the implement and prior to any work being undertaken the operator should configure the implement and the alignment of the SPX.



IMPORTANT: High pressure cleaning jets should not be directed at electrical components, fan, hydraulic cylinders, or bearings. These components and their housings are not waterproof under high pressure

To configure this the operator should follow the steps outlined below:

1. Lower the frame so the top link can be adjusted.
2. Adjust the top link until the beam is at 90 ° to the ground.
3. Fully lower the SPX to the ground.
4. Adjust the down force (Pneumatic or Hydraulic) to the preferred working pressure for the field conditions.
5. Slowly drive forward and adjust the tractor linkage until the parallelogram linkage is horizontal to the ground.



8.2 - Performance Checks

Review the following checks prior to field use:

1. Tractor ballast
2. Tractor tire pressures.
3. Toolbar height to ground & SPX Alignment.
4. Top link length.
5. Lower check chains.
6. Downforce pressure.
7. Trash wheel height.
8. Tine depth and wing setting.
9. Packing wheel pressure.
10. Forward speed.

It is recommended that the operator check the implement output and conditions at regular intervals while in use. To initially configure the machine Horizon Agricultural Machinery Ltd. recommend drilling a short distance (100m) and ensure the operator is satisfied with the outcome. If adjustments are required the operator should make the required modifications and perform another small test to confirm adjustments.

9.0 - Machine Maintenance & Care



WARNING: It is highly recommended that the implement is parked on a hard standing prior to any maintenance working being undertaken. The implement and tractor should be secured from restarting. Any lifted components should be lowered or secured prior to work being undertaken in this area.

9.1 - Cleaning & Lubrication

9.1.1 - Cleaning

Clean the machine thoroughly at regular intervals throughout the sowing season and after the end of the sowing season.



IMPORTANT: High pressure cleaning jets should not be directed at electrical components, fan, hydraulic cylinders, or bearings. These components and their housings are not waterproof under high pressure

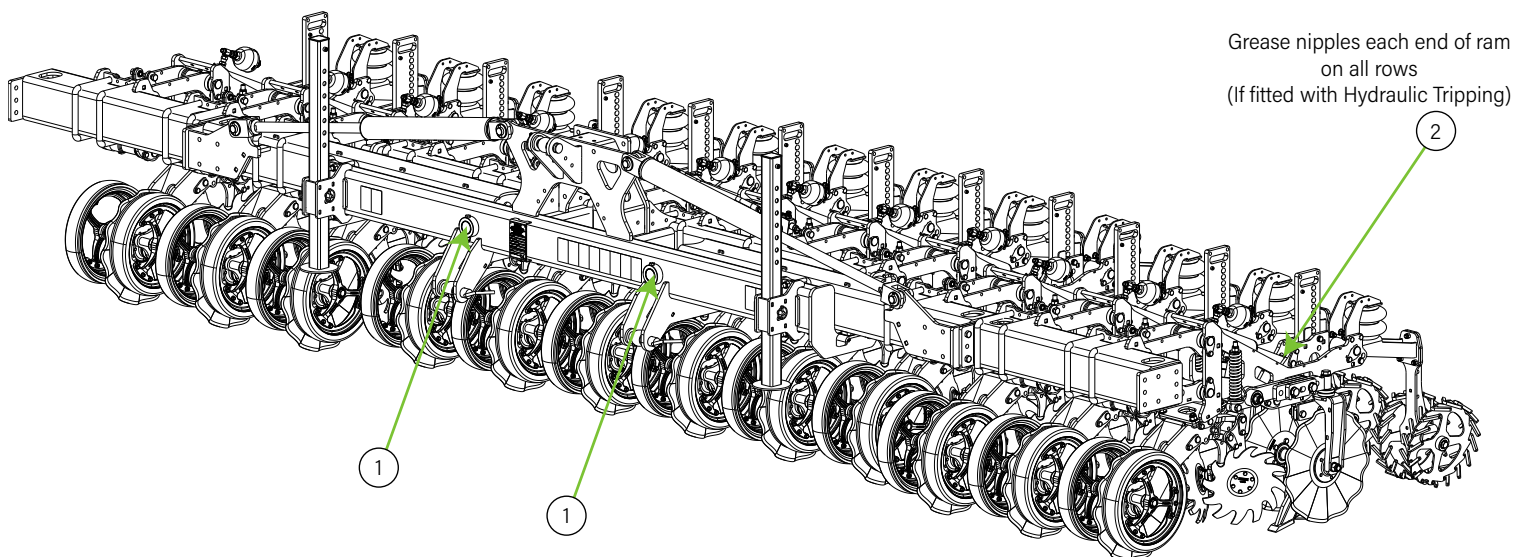
The outside of the machine should be cleaned with water.

When using fertiliser components should be cleaned and rinsed thoroughly. Fertilisers are aggressive and can cause corrosion on your machine

After cleaning with a pressure cleaner, the implement should be lubricated to prolong its life (As shown in section 9.1.2)

9.1.2 - Lubrication

The machine should be lubricated at regular intervals throughout the sowing season. It is recommended these coincide with the cleaning schedule to reduce the likelihood of contamination as well as reducing the risk of corrosion post cleaning



9.2 - Storage

If the machine is to be stored for a prolonged period – Such as between sowing seasons, follow the instructions listed below

1. Machine should be cleaned and lubricated as per section 9.1 following all steps
2. If using a corrosion prevention agent on the machine, ensure any spray coating used is biodegradable
3. Hydraulic piston rods on the cylinders should be protected against corrosion
4. Park the machine as per section 6.1.3 ideally under a roof
5. Pneumatic systems should be relieved of any stored pressure, and compressed air tanks must be drained in preparation for storage to prevent corrosion or a risk of freezing (Optional compressor tank)



IMPORTANT: DO NOT apply corrosion protection agents or oils to any plastic or rubber components on the drill. These components can be affected by these products becoming brittle or breaking

9.3 - Maintenance

9.3.1 - Maintenance Intervals

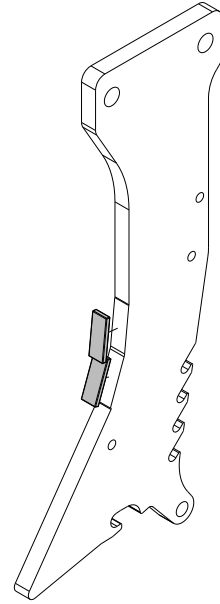
The machine should be lubricated at regular intervals throughout the sowing season. It is recommended these coincide with the cleaning schedule to reduce the likelihood of contamination as well as reducing the risk of corrosion post cleaning

Area	Interval	
	Daily	Weekly
Auto-reset Cylinder Pivots	X	
Wing Pivots		X

9.3.2 -Replacing Carbide Wear Plates

The shank is fitted with replaceable carbide plates to increase wear resistance.

1. Remove shank from leg. With the shank removed the point and wings should be removed as per section 6.3.10 to allow for easier welding.
2. Grind off weld to remove worn plate and clean area for new plate.
3. Only MIG/stick weld. Do not exceed 120 amps.
4. Clamp tile down flat against the front edge of the shank.
5. Tack centre of tile edge and weld outward from the centre.
6. Avoid excessive heat input into tile by using quick weld passes
7. Do not quench after welding.



IMPORTANT: It is required that any welding is completed by a professional company that adheres to ALL welding safety obligations.

Appendix

Metric Screw Torques

Metric Screw Tightening Torques - Nm							
Size Ø (mm)	Pitch (mm)	Bolt Class					Wheel Nuts
		4.8	5.8	8.8	10.9	12.9	
3	0.5	0.9	1.1	1.8	2.6	3.0	
4	0.7	1.6	2.0	3.1	4.5	5.3	
5	0.8	3.2	4.0	6.1	8.9	10.4	
6	1.0	5.5	6.8	10.4	15.3	17.9	
7	1.0	9.3	11.5	17.2	25	30	
8	1.25	13.6	16.8	25	37	44	
8	1.0	14.5	18	27	40	47	
10	1.5	26.6	33	50	73	86	
10	1.25	28	35	53	78	91	
12	1.75	46	56	86	127	148	
12	1.25	50	62	95	139	163	
14	2.0	73	90	137	201	235	
14	1.5	79	96	150	220	257	
16	2	113	141	214	314	369	
16	1.5	121	150	229	336	393	
18	2.5	157	194	306	435	509	
18	1.5	178	220	345	491	575	300
20	2.5	222	275	432	615	719	
20	1.5	248	307	482	687	804	
22	2.5	305	376	502	843	987	
22	1.5	337	416	654	932	1090	510
24	3.0	383	474	744	1080	1240	
24	2.0	420	519	814	1160	1360	
27	3.0	568	703	1000	1570	1840	
27	2.0	615	760	1200	1700	1990	
30	3.50	772	995	1500	2130	2500	
30	2.0	850	1060	1670	2370	2380	

Hydraulic Fitting Torques

Hydraulic Fitting Tightening Torques	
Size Ø (Inches)	Torque (Nm)
3/8	47
1/2	100
3/4	150

Imperial Screw Torques

Imperial Screw Tightening Torques - Nm							
Size Ø (mm)		Strength 2		Strength 5		Strength 8	
		No Marks on head		3 Marks on head		6 Marks on head	
Inches	mm	Coarse Thread	Fine Thread	Coarse Thread	Fine Thread	Coarse Thread	Fine Thread
1/4	6.4	5.6	6.3	8.6	9.8	12.2	13.5
5/16	7.9	10.8	12.2	17.6	19.0	24.4	27.1
3/8	9.5	20.3	23.0	31.2	35.2	44.7	50.2
7/16	11.1	33.9	36.6	50.2	55.6	70.5	78.6
1/2	12.7	47.5	54.2	77.3	86.8	108.5	122.0
9/16	14.3	67.8	81.3	108.5	122	156	176.3
5/8	15.9	95	108.5	149.1	169.5	216	244
3/4	19.1	169.5	189.8	271.1	298.3	380	427
7/8	22.2	176.3	196.6	433.9	474.5	610	678
1	25.4	257.6	278	650.8	718.6	915.2	1017
1 1/8	28.6	359.3	406.8	813.5	908.4	1302	1458
1 1/4	31.8	508.8	562.7	1139	1261	1844	2034
1 3/8	34.9	664.4	759.3	1491	1695	2414	2753
1 1/2	38.1	881.3	989.8	1966	2237	3128	3602



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