



Operators Manual

DSX 40/48/50/60/64/72/75

Keep Operations Manual In A Safe Place

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

DSX DISC DRILL

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

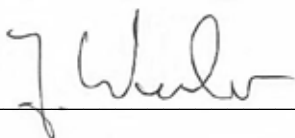
For that, the following standards have been taken into account:

Directive / Standard:
EN ISO 4254-1:2013 Agricultural machinery - Safety - Part 1
EN ISO 4254-9: 2018 Agricultural machinery - Safety - Part 9: Seed drills (ISO 4254-9: 2018)
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, 11/03/2021

(signature)

Contents

1.0 - User Information	4	6.1.4 - Braking Systems	34
1.1 - Preface	4	6.2 - Wings	35
1.2 - Customer Service & Warranty	5	6.2.1 - Unfolding	35
1.3 - Liability	5	6.2.2 - Folding	36
2.0 - General Safety Information	6	6.3 - Tanks	36
2.1 - Intended Use	6	6.3.1 - Accessing the tank	36
2.2 - Spare Parts	6	6.3.2 - Opening the hopper lid	38
2.3 - Safety Symbol Representation	7	6.3.3 - Closing the hopper lid	38
2.4 - Warning Decals	8	6.3.4 - Adjusting the hopper lid	39
2.4.1 - Location of Warning Decals	8	6.3.5 - Loading the hoppers	39
2.4.2 - Content of Warning Decals	9	6.3.5 - Unloading the Hoppers	40
2.5 - Danger Area & Danger Points	10	6.3.6 - Pressure Monitoring	41
2.6 - Personnel Training	10	6.3.6 - Pressure Monitoring	42
2.7 - Personal Protective Equipment	11	6.4 - Pneumatic Seed Transport System	42
2.8 - Safety In Traffic	11	6.4.1 - Fan	42
2.9 - Operational Safety	12	6.4.2 - Fan Speed	43
2.9.1 - Commissioning	12	6.4.3 - Injector Box Assembly	43
2.9.2 - Damage to the Implement	12	6.4.4 - Fan Checks & Maintenance	45
2.9.3 - Hitching/Unhitching	12	6.5 - Metering	45
2.9.4 - Hydraulic System	12	6.5.1 - Metering Overview	46
2.9.5 - Pneumatic System	13	6.5.2 - Rubber Scraper	46
2.9.6 - Pressure Accumulators	14	6.5.3 - Guillotine	48
2.9.7 - Braking System	14	6.5.4 - Rotors	49
2.9.8 - Obstructions & Overhead Power Lines	14	6.5.5 - Calibration	50
2.9.9 - Field Use	14	6.6 - Coulter	52
2.9.10 - Technical Limitations	15	6.6.1 - Depth Settings	52
2.10 - Dressed Seed & Fertiliser	15	6.6.2 - Downforce	52
2.11 - Environmental Protection	15	6.6.3 - Closing Wheel Pressure	54
2.12 - Care & Maintenance	15	6.6.4 - Closing Wheel Angle	54
2.14 - Modification & Conversions	16	6.6.5 - Closing Wheel Types	55
3.0 - Technical Data	17	6.6.6 - Adjusting the side wheel	56
3.1 - Machine Specifications	17	6.6.7 - Adjusting the Seed Boot	57
3.1.1 - DSX 40-XX	18	6.6.8 - Opening Discs	58
3.1.2 - DSX 50-XX	18	7.0 - Optional Equipment	59
3.1.3 - DSX 60-XX	19	7.1 - Row Cleaners	59
3.1.4 - DSX 75-XX	19	7.2 - In Tank Cameras	60
3.2 - Serial Number Plate	20	7.3 - Reversing Camera	60
3.3 - Tractor Requirements	21	7.4 - Compressor	60
3.3.1 - Implement Attachment	21	7.5 - Liquid Fertiliser System	61
3.3.2 - Power Requirements	21	7.5.1 - In Furrow Outlets	61
3.3.3 - Electrical Systems	21	7.5.2 - Wilger Flow Manifolds	61
3.3.4 - Hydraulic Systems	21	7.5.3 - Pump and tank	62
3.3.5 - Brake Connections	21	7.6 - Hydraulic Oil Cooler	62
3.4 - Ballasting Requirements	22	8.0 - Field Usage	63
3.4.1 - Data Required	22	8.1 - Frame Settings	63
3.4.2 - Calculating Ballasting Requirements	23	8.1 - Performance Checks	63
4.0 - Machine Commissioning	24	9.0 - Machine Maintenance & Care	64
4.1 - Machine Delivery	24	9.1 - Cleaning & Lubrication	64
4.1.1 - Unloading the implement	24	9.1.1 - Cleaning	64
4.1.2 - Loading the implement	25	9.1.2 - Lubrication	65
4.2 - Machine Transport	25	9.2 - Storage	66
4.2 - Machine Transport	25	Appendix	67
5.0 - Product Description	26	Metric Screw Torques	67
5.1 - Main Assembly Groups	26	Hydraulic Fitting Torques	67
5.2 - Coulter Overview	27	Imperial Screw Torques	68
5.3 - Hydraulic Connections	28	DSX Electrical Systems Arrangement	69
5.4 - Electrical Connections	29	DSX Hydraulic Systems Arrangement	70
5.5 - Pneumatic Connections	30	DSX Metering Rollers	71
6.0 - Operations	31		
6.1 - Machine Coupling & Parking	31		
6.1.1 - Hitching	31		
6.1.2 - Transport Position	32		
6.1.3 - Parking	33		

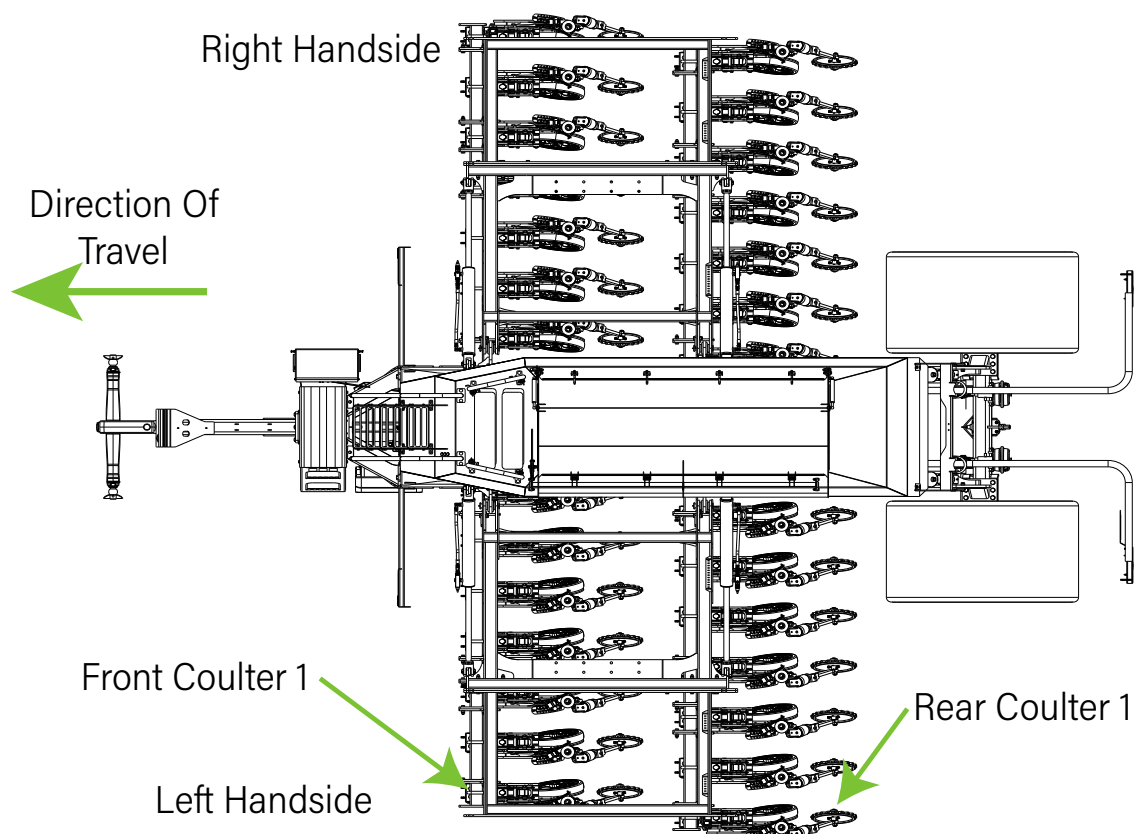
1.0 - User Information

1.1 - Preface

This operators manual covers trailed Horizon DSX Drills between 4 and 7.5m wide. 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. Coulter 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 DSX drills 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

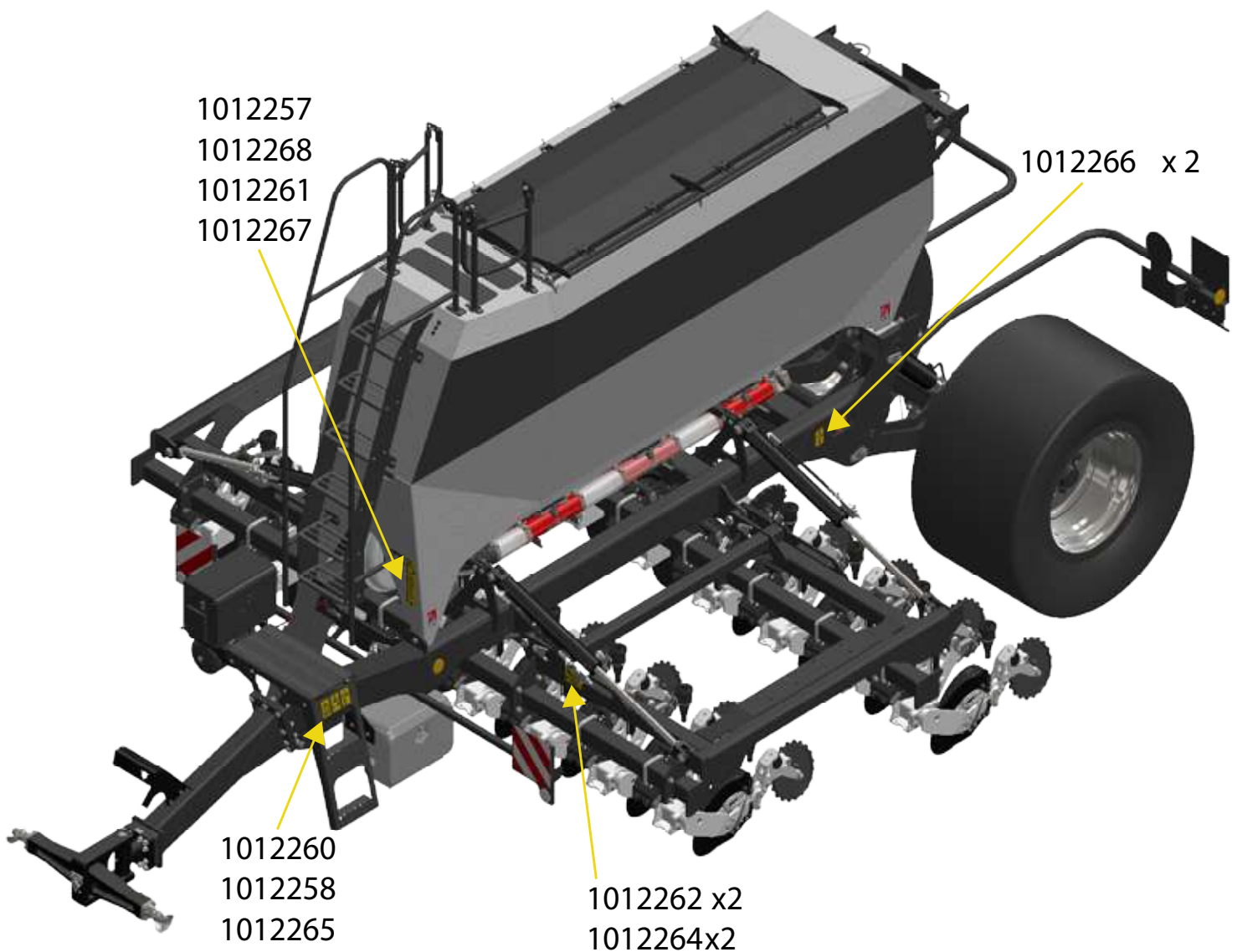
Procedural Instructions

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



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 DSX 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 - Braking System

The implement is equipped with either a Pneumatically or Hydraulically actuated braking system as standard. The braking system must always be connected and operating effectively when the tractor is in use particularly when travelling on public roads this also includes the usage of the breakaway valve system if fitted (Applicable to hydraulically operated brakes) see section 6.1.4. Once the brake coupling has been made but prior to transport operations beginning the implement and tractor must be checked for effective operation. Prior to any machine movements the parking brake should be released. The implement should be secured with the parking brake prior to any uncoupling operations commencing.

2.9.8 - 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.

2.9.9 - 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.

2.9.10 - 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 Ltd. 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

DSX	DSX 40-XX	DSX 50-XX	DSX 60-XX	DSX 75-XX
Working Width (m)	4	5	6	7.5
Transport Width (m)	2.97			
Transport Height (m)	3.5	3.5	3.5	3.9
Length (m)	7.44			
Permissible Axle Load	See Rating Plate			
Weight* (Unladen) Kg	4870	5430	6165	7150
Hopper Opening	2.05m x 0.7m - This opening is then split depending upon 2/3 Tank option			
Hopper Opening Height (m)	2.95			
Hopper Capacity (2 Tank)	2640:1760			
Hopper Capacity (3 Tank)	2640:440:1320			
Row Spacings (cm)	16.7, 18.75, 20, 25			
Working Speed (kph)	8-12			
Transport Speed	Refer to Tractor Manufacturers Manual for details on tire pressures & speeds.			

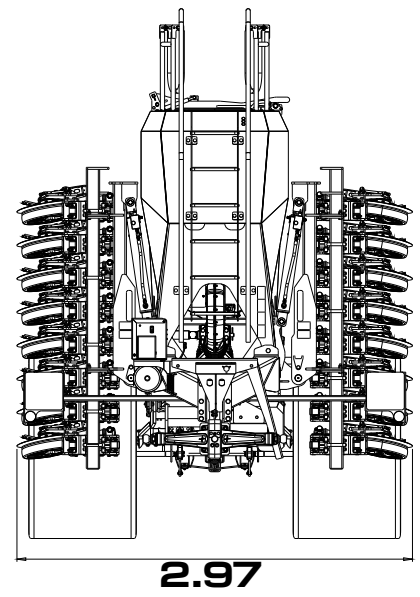
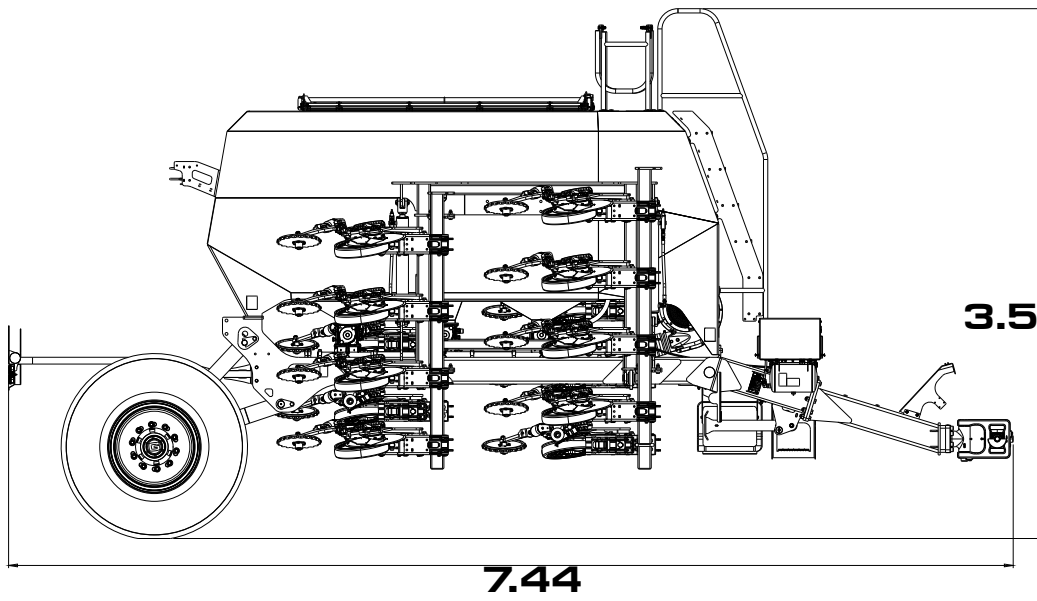
* - Unladen weights are based on a minimum equipment specification (Widest row spacing (25cm), 2 tanks and no optional extras.

Exemption Notice:

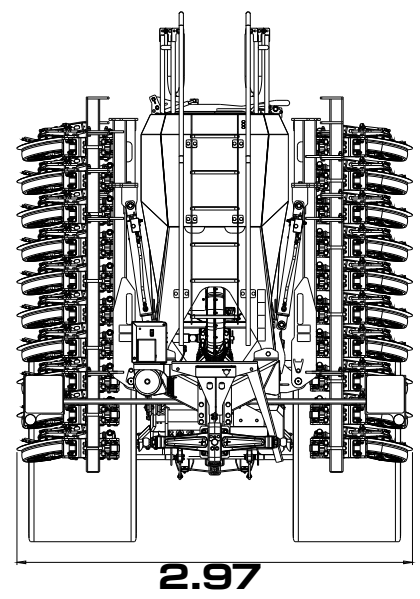
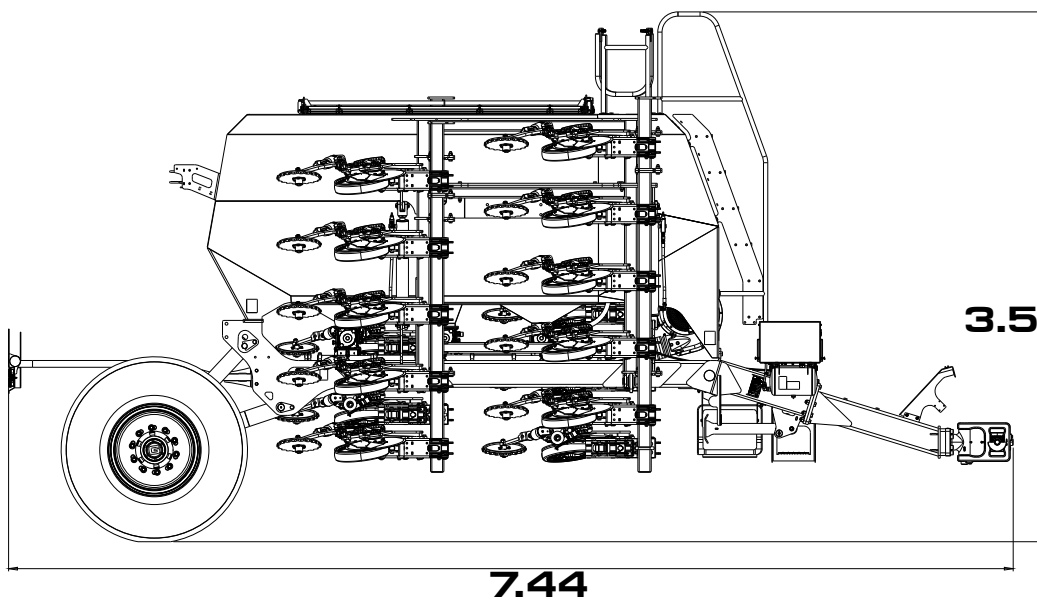
Horizon Agricultural Machinery Ltd. reserve the right to change the above specifications due to technical improvements & developments.

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

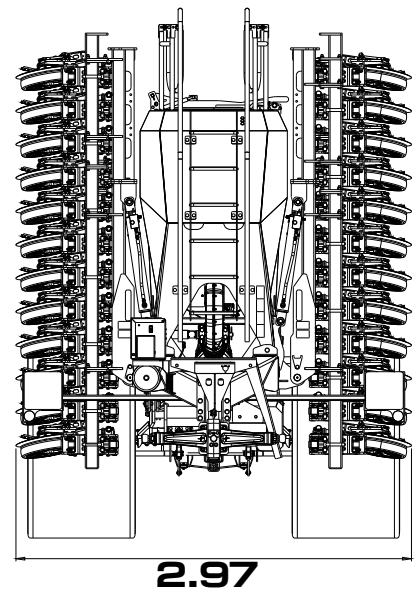
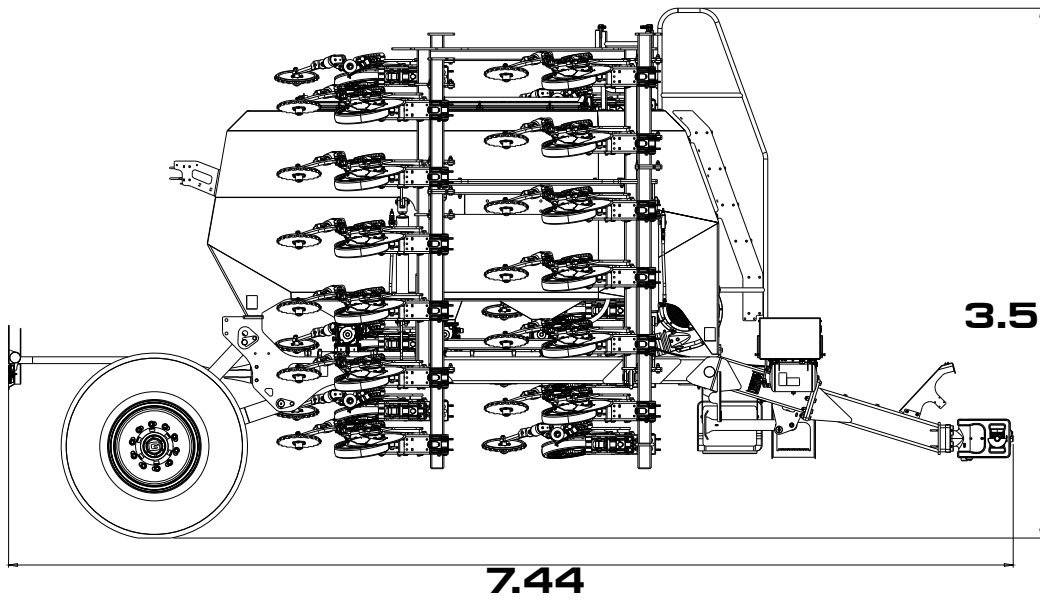
3.1.1 - DSX 40-XX



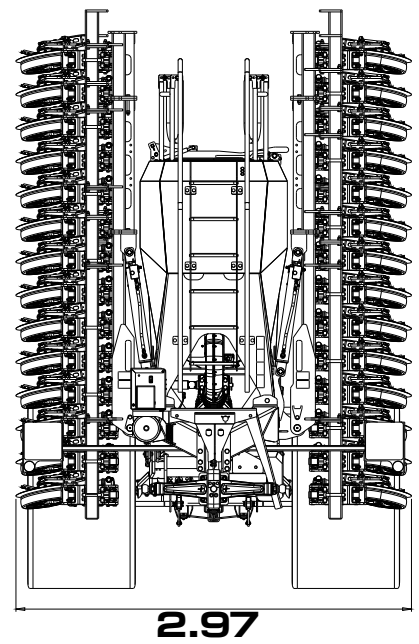
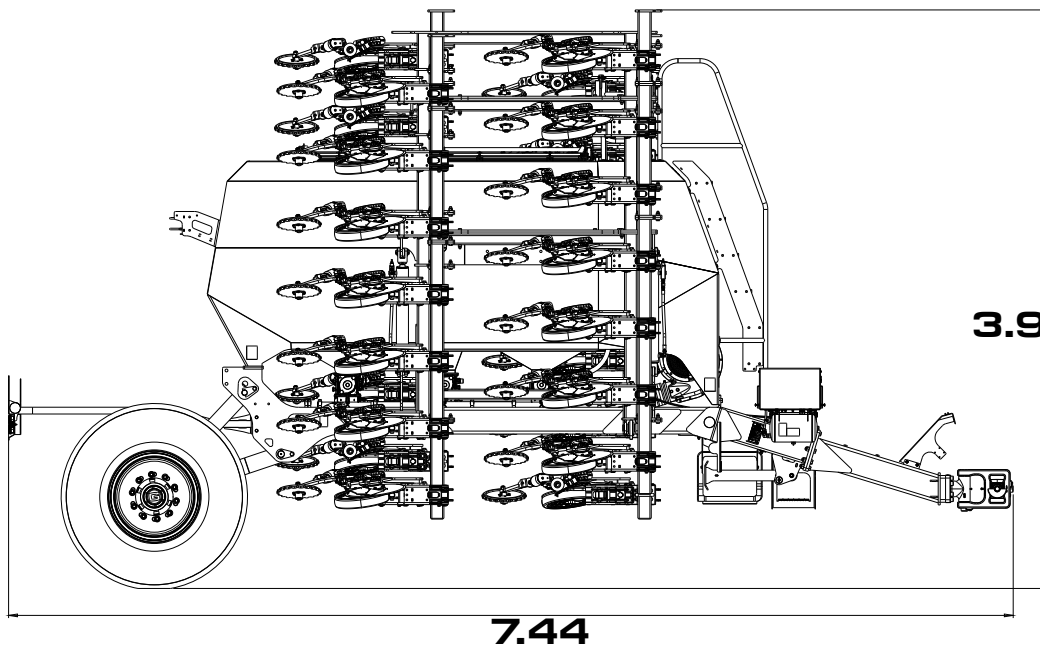
3.1.2 - DSX 50-XX



3.1.3 - DSX 60-XX

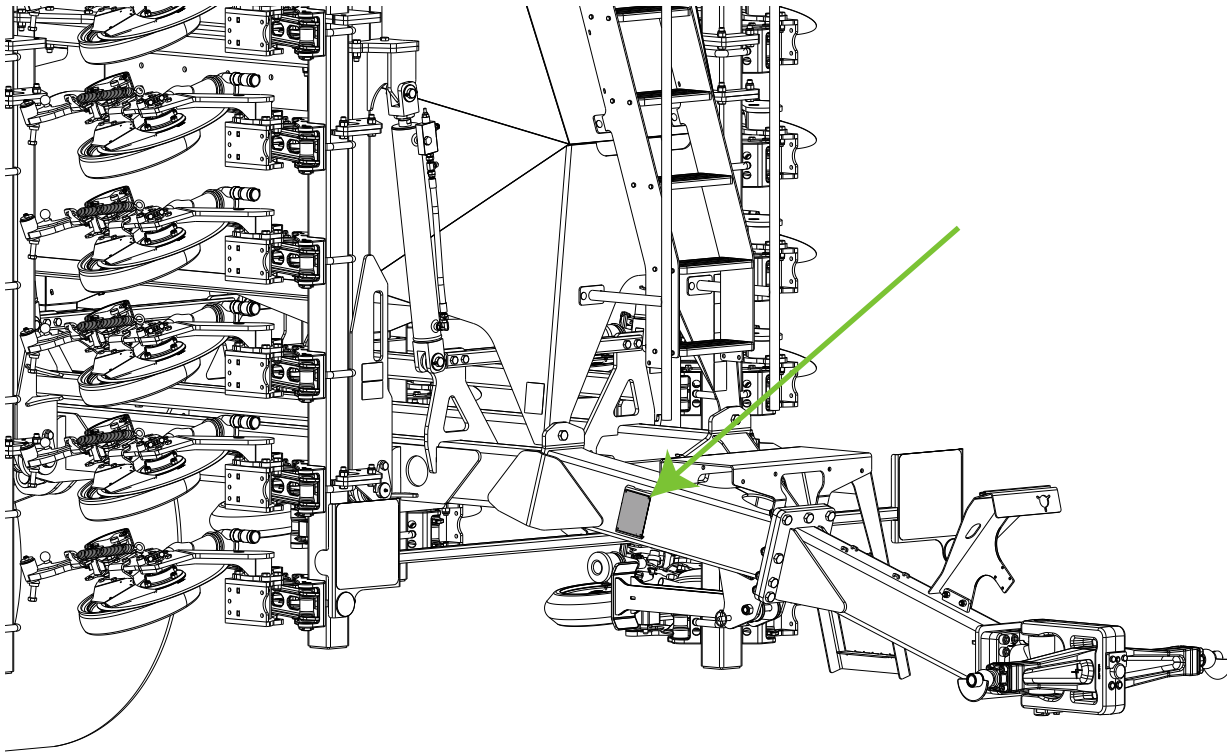


3.1.4 - DSX 75-XX



3.2 - Serial Number Plate

The machines serial numbering plate along with its CE mark is located on the right-hand side machine chassis under the stairs as shown below.



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	████████████████████
Serial No.	████████████████████
Total Weight	████████████████████
Drawbar Load	████████████████████
Axle Load	████████████████████
Type	████████████████████
Build Date	████████████████████
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
-------------------	----------

Implement attachment tractor link arm: III: Cat. III Pin Cat. III Ball

3.3.2 - Power Requirements

DSX	40	50	60	75
Power Requirement (HP)	130-160	150-180	180-220	210-260

3.3.3 - Electrical Systems

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

3.3.4 - Hydraulic Systems

Maximum System Pressure	210 Bar
Oil Grade	Mineral Hydraulic Oil
Delivery Rate	
Number of Dual Action Controls	3 Minimum
Pressureless Return Flow (Maximum Pressure)	3 Bar

3.3.5 - Brake Connections

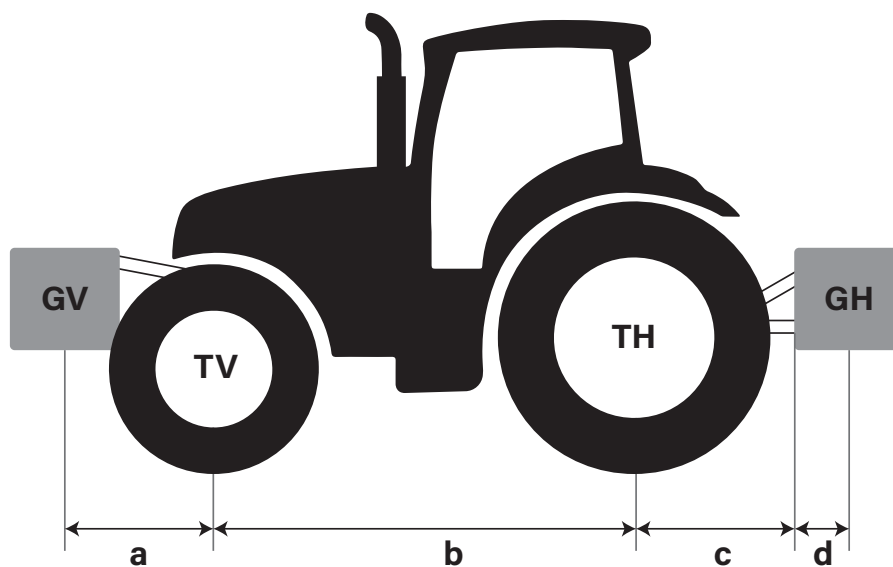
Pneumatic Brakes	Palm/"C" type Supply Line Connection
	Palm/"C" type Emergency Line Connection
Hydraulic Brakes	ISO 5676 1/2" BSP

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 DSX 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, Hitching/Unhitching, Hydraulic connections & Transport) When unloading it is not necessary to connect the drill control terminal however all hydraulic connections bar the fan and pressureless free flow return should be attached, and the braking system must also be connected.

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 and the brakes connected as detailed in 6.1.4.
2. Transport lashings should be removed from the implement in preparation for unloading
3. The machine should be raised from the chock/Stowage leg. If secured on the stowage leg lift and fold as shown in section 6.1.1
4. The machines parking brake should be released as shown in section 6.1.4
5. Using the running gear it may be necessary to raise/Lower the machine to avoid a collision with the flat bed as the machine is carefully pulled off the transport. Use the chassis lifting and lowering controls for this.
6. Once removed from the flat bed park the machine as shown in section 6.1.3

7. Apply the parking brake as shown in section 6.1.3 and secure the implement and tractor (If still connected)

4.1.2 - Loading the implement

1. Connect the implement to the tractor as per section 6.1.1 connecting hydraulic services and brakes as per section 5.3 and 6.1.4 respectively.
2. Prepare the implement for loading by placing it into its transport position as detailed in 6.1.2. Remove the parking brake if applied.
3. It is recommended that a banksman (Assistant) is used during this operation. Carefully load the implement onto the machine by pushing backwards. The chassis 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. (Depending upon local regulations the implement may need to be chocked rather than using the stowage leg to reduce the height for transportation or some other components such as hand rails may also need to be removed)
5. Parking brake on the machine should be applied as shown in section 6.1.4
6. The implement should be secured using appropriate lashings to prevent movement during transport operations
7. The tractor 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 flat bed trailer. Some components may need to be removed on the machine to comply with these transport regulations.

If towing 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

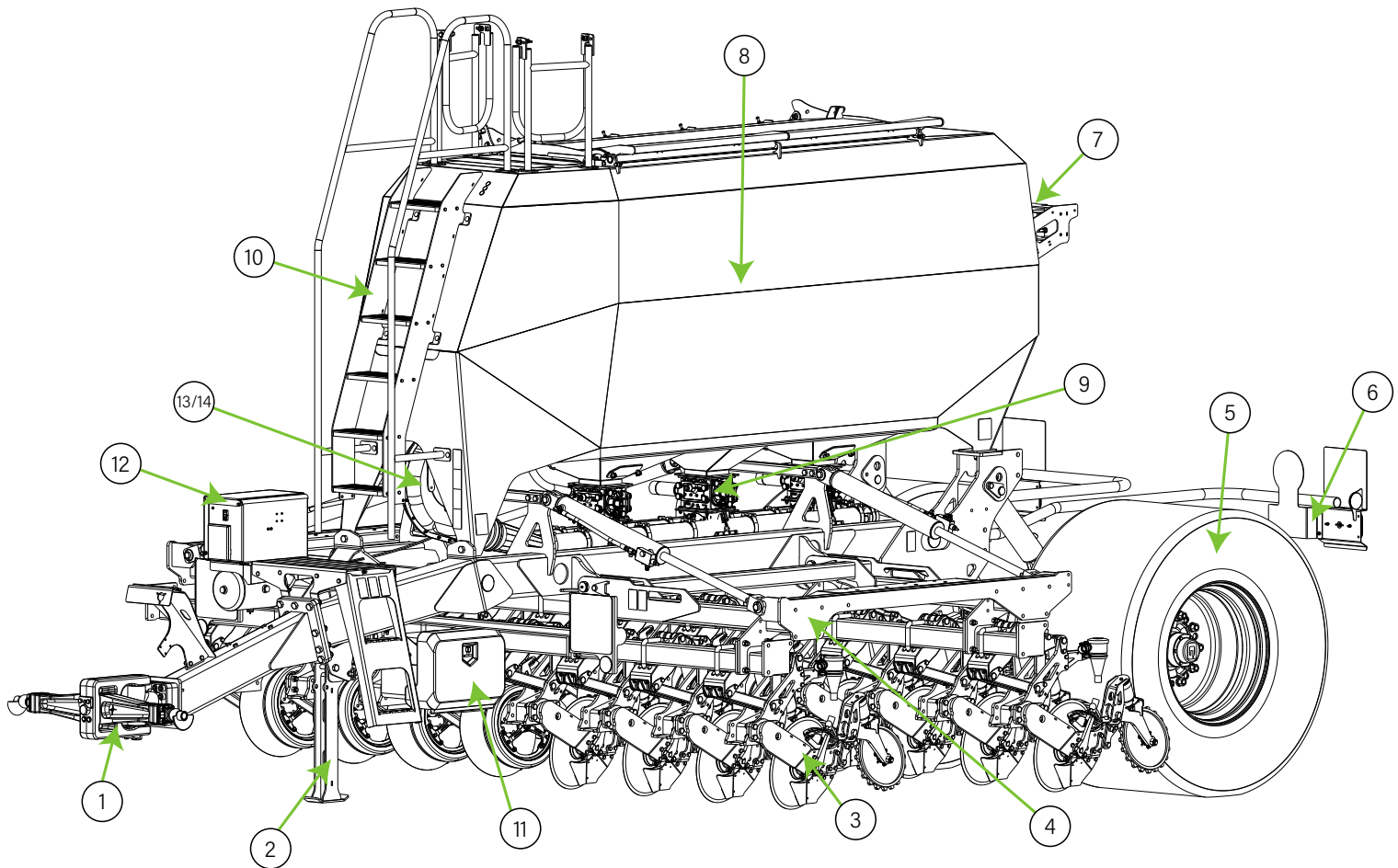
If transporting on a low loader the equipment must be securely lashed with the appropriate restraining devices.

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.

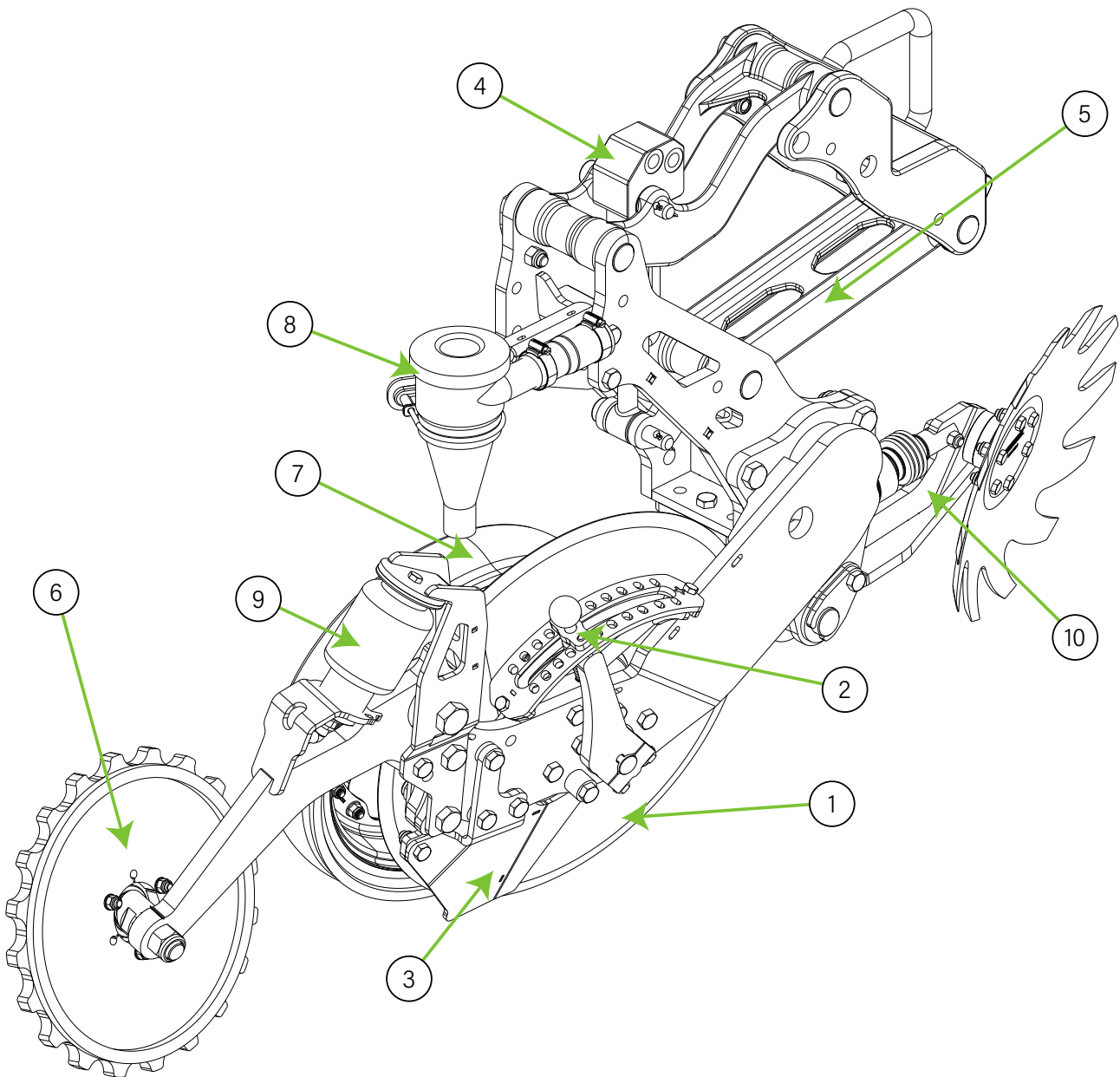
5.0 - Product Description

5.1 - Main Assembly Groups



1. Hitch
2. Support Leg
3. Coulter
4. Wings
5. Wheels
6. Lighting
7. Distribution Head
8. Tank
9. Metering Units
10. Access Ladder
11. Toolbox
12. Optional Compressor
13. Fan
14. Artemis Control box

5.2 - Coulter Overview



- | | |
|------------------------|-------------------------------------|
| 1. Opening Disc | 6. Packing Wheel |
| 2. Depth Control Lever | 7. Side Gauge Wheel |
| 3. Seed Boot | 8. D-cup Diffuser |
| 4. Downforce Ram | 9. Air bag (Closing wheel Pressure) |
| 5. Parallelogram | 10. Optional Row Cleaner |

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		
Green	+	Chassis Lift & Lower	Lift	Double Action	Active While Button Pressed
	-		Lower		
Red	+	Coulter Lift & Down Pressure	Lower/Increase downpressure	Double Action	Constant Flow
	-		Lift/Decrease Down pressure		



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

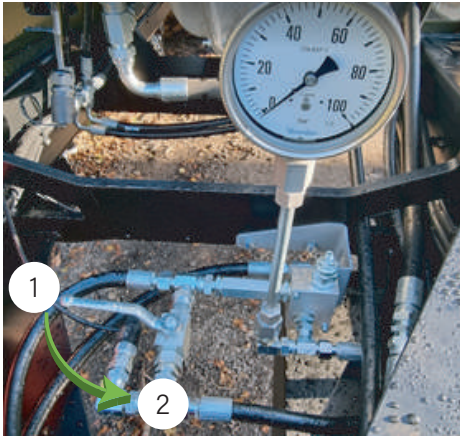
1. Connect the Black Terminal (Free flow return)
2. Connect the Blue terminal (Fan Supply)
3. Connect the yellow terminals
4. Connect the Green Terminals
5. Connect the Red terminals

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

Hydraulic schematics can be found in the appendix at the back of the operator's manual on page 70



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



Transport Lock

The transport valve isolates the row unit hydraulics. It is used to keep the row units from moving when in the transport position. After unfolding the wings, turn the handle 90° anti-clockwise in the "Work" position (1).

Once the rows have been raised, turn the handle 90° clockwise in the "Transport" position (2) prior to folding the wings.

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.

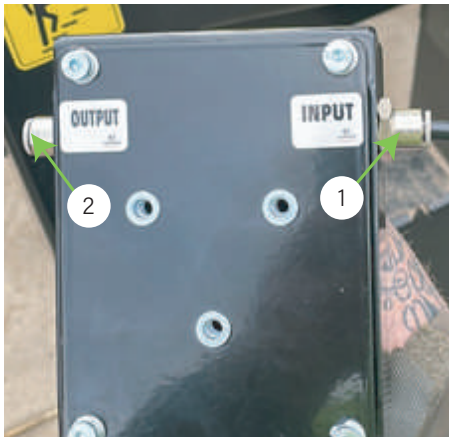
Electrical Connection Type		Function	Current Rating/Fuse
Anderson Connector		Powering the RDS Control system & optional Liquid pump	2x 60 Amp
7 Pin Lighting Connector		Road Lighting Equipment	See Tractor Manual
ISOBUS/ISOCAN Control connector		Powers the ISOCAN Display	10 Amp

Electrical schematics can be found in the appendix at the back of the operator's manual on page 69

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 and some optional equipment such as row cleaners.

To connect the closing wheel control box:



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 RED connection at the rear of the tractor.
4. Connect the other end to the "Input" port of the closing wheel control box.
5. "Output" is the regulated air OUT to the closing wheel airbags.

Optional Drill 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.
4. "Output" is the regulated air OUT to the closing wheel airbags.

Row Cleaner Control Box:

If the optional row cleaner control box is fitted, installation 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 drill 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 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



DANGER: Failure road with an empty liquid or hopper tanks can affect the machine damage, possible causing accidents, property damage, serious injury or even death.



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

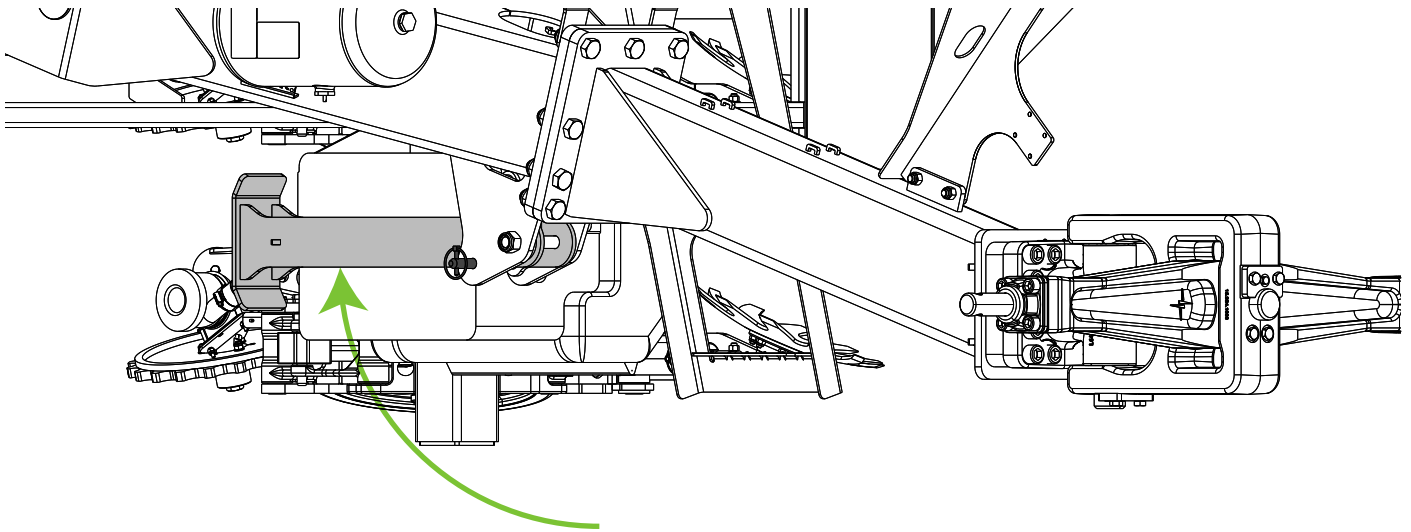


DANGER: Breakaway valves must be used to reduce the risk from machine rollaway. When connecting Pneumatic braking systems always connect the yellow line first. Hydraulic Braking system requires the accumulator to be properly charged for functional usage.

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. Attach the machine to the tractor
 - Ensure the locks on the lifting arms are closed
 - Stabilisers on the lifting arms should be adjusted to avoid lateral movements
4. Connect brake connections between the tractor and machine
5. Connect all hydraulic and electrical connections between the implement and machine (As shown in sections 5.3 and 5.4 respectively)
6. Raise the lift arms until the chassis is in the horizontal position, and the parking stand is no longer supporting the machine.

7. Remove the Lynch pin and withdraw the securing pin from the parking stand then raise the parking stand. Reinserting the Securing pin and lynch pin as shown overleaf to lock the parking stand in the raised position



8. Remove wheel chocks from beneath the wheels.
9. Release parking brake by rotating the handle clockwise. For further details see section 6.1.
10. The pneumatic braking system on the DSX includes an emergency valve as such once the pneumatic lines are securely connected or the drill becomes detached from the tractor the brakes will be applied. On hydraulically braked implements there is a separate valve that required connection prior to movements attach the cable to the rear of the tractor. Please ensure that the valve is only actuated in an emergency and not actuated by the pin being removed in normal operation. For further details refer to section 6.1.4
11. 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. Coulters must be raised and locked as shown below. Parking brakes should be released and the implements braking functionality checked and hitching elements such be secure and free from wear



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 drill should have its chassis lowered to ensure machine stability and its wings folded. Prior to folding the coulters 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 coulters 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 can either be parked in its folded or unfolded state.



DANGER: Severe accidents can be caused by implements rolling. Prior to disconnecting the implement from the tractor. The parking brake should be applied to the implement. If disconnecting Pneumatic braking systems always disconnect the red supply line first

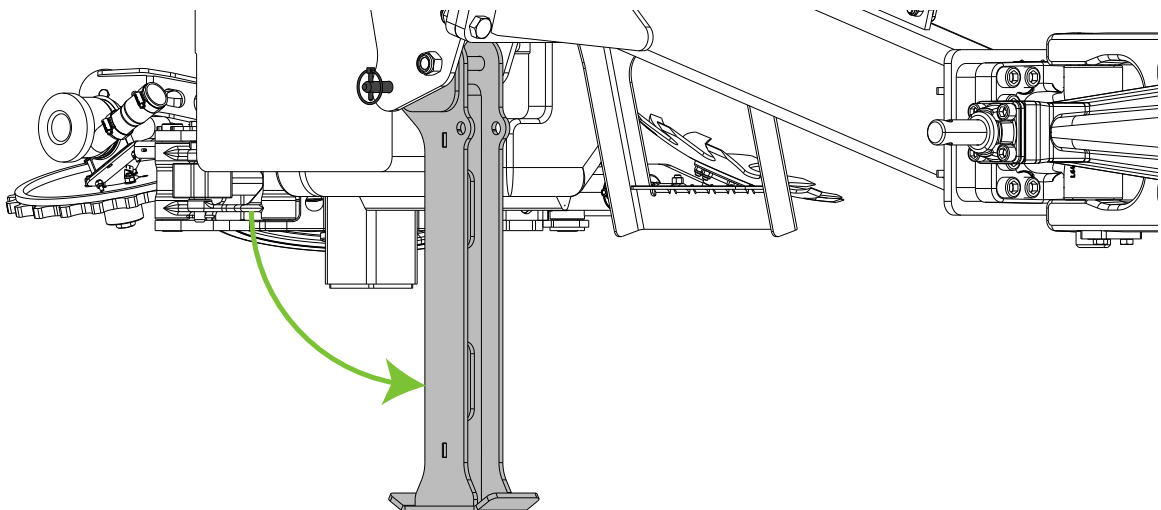


WARNING: Machine must only be folded/unfolded on firm and level surfaces. Failure to do so could cause the machine to roll over due to instability.



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 pin and withdraw the securing pin from the parking stand then lower the parking stand. Reinserting the Securing pin and lynch pin as shown below to lock the Parking stand into position.
4. Lower the machine onto the parking stand by lowering the lift arms and chassis lift rams





5. Uncouple the brake lines between the implement and tractor, and remove the breakaway valve connection if fitted.
6. Apply the implements parking brake by rotating the handle anticlockwise and secure the wheels with wheel chocks to prevent rolling away. Chocks should be placed under tyres on the side of the tyres pointing downhill.
7. Lower coulters if the machine is being parked unfolded.

8. Unplug all electrical connections and secure on the machine.
9. Depressurise the hydraulic lines and disconnect hydraulic lines as per section 5.3 securing them on the machine.
10. 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.
11. Unhitch the machine by releasing securing hooks on the lift arms and lowering the tractor link arms
12. Manoeuvre the tractor away from the implement

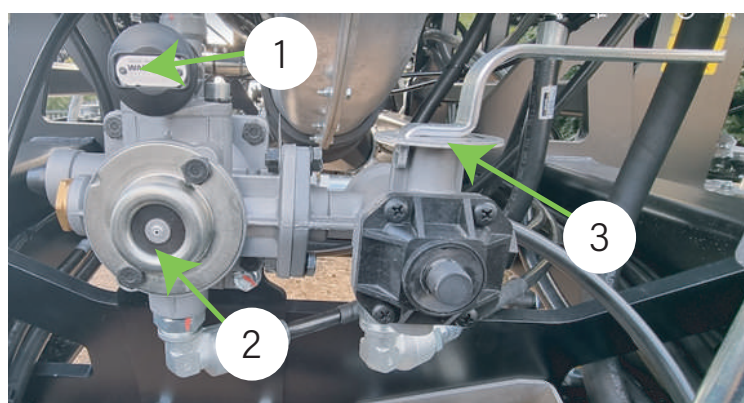
6.1.4 - Braking Systems

Horizon DSX drills are equipped with either Pneumatically or Hydraulically actuated brakes as standard. Please see the sections below for the specifics in relation to your machine. Application & removal of the parking brake is the same for both systems.

Pneumatic Braking Systems:

Connector	Identification
Palm	
"C" Type	

The pneumatic brake system uses a two-line system where Red is the emergency line and yellow the service line. The system itself can be fitted with "C" type or Palm connectors. Integrated into the system is a trailer release (1) and emergency valve system (2) as well as a manual load sensing valve (3) to adjust braking performance depending upon the machines weight. These are typically set at the factory and should not need adjusting. The valve is adjusted by turning the handle to adjust the braking performance.




1. Trailer Release Valve 2. Relay Emergency Valve
3. Manual Load Sensing Valve

The Trailer Release Valve is a two-position valve. It is used to manually direct air stored in the reservoir to the brake chambers on the rear axle. The valve should be operated as follows

1. Pull the plunger out for normal operations
2. Push the plunger in to release the brake.

Hydraulic Braking Systems:

Hydraulic brakes are operated with a single line connected to the rear of the tractor.

Coupler	Identification
1/2" BSP Female ISO 56767	

To connect, pull the knurled outer sleeve rearward. Push the coupler on the mating part. Release the sleeve and verify that it is fully pushed forward.

To disconnect, pull the knurled outer sleeve rearward. Pull the coupler from the mating part. Release the sleeve. Place the hose on the storage bracket.

Breakaway Valve:

If the tractor is separated from the implement, the emergency breakaway valve will be activated.

The wire cable must be attached to the rear of the tractor, with the other end secured to the release pin.

Once the cable is pulled tight, the valve spindle is turned and pressure oil stored in the accumulator, is used to apply the brakes. The pin will release from the spindle to prevent component damage.

To reset the valve, reinsert the pin and turn to the original position. The system will be charged once the brake line is reconnected.

6.2 - Wings



WARNING: Actuation of the wings can cause severe 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 chassis is lifted to allow for clearance as the wings articulate

2. Operate service to unfold the drill, 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 chassis 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 - Tanks

DSX Drills are equipped with 2 or 3 hopper tanks. There is a metering unit under each chamber to dose product. The hoppers can be accessed to fill through the hatch at the top of the Drill. Whilst the fan is running pressure will build up in the hopper and related systems. The hard lid has a seal running around the edge to ensure the tank remains pressure tight for more accurate metering. Allocation of products to each hopper goes to the user according to the convenience of use.



WARNING: Hands and fingers must be kept clear of the hopper lid when opening & closing due to the risk of entrapment. Gas struts must be replaced once weakened

6.3.1 - Accessing the tank

The hopper tanks should be accessed by using the ladder and steps located at the front of the DSX drill.

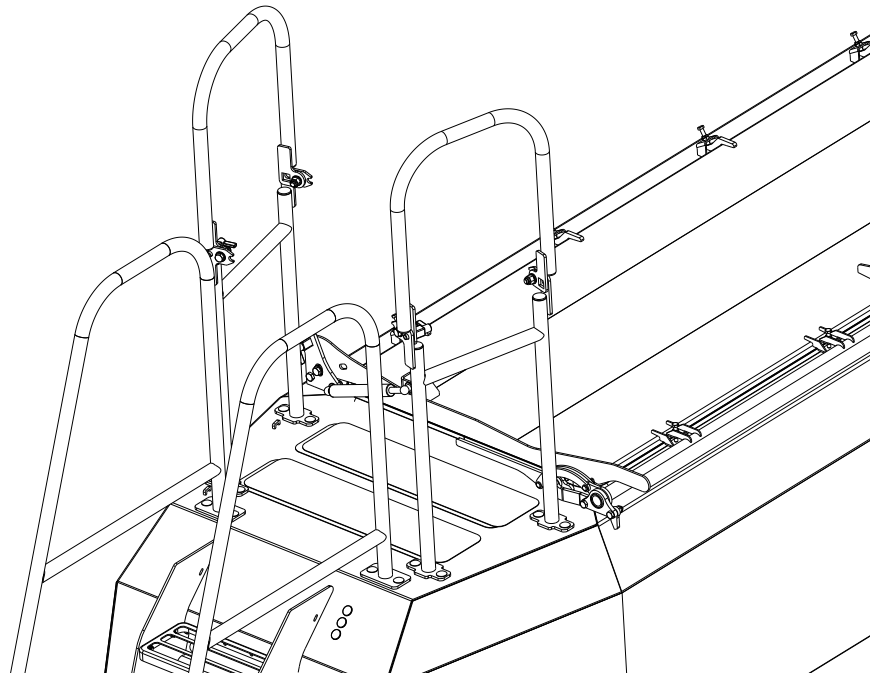


DANGER: Operators are working at height when accessing the hopper, slips and falls can result in serious injuries. Operators should use the supplied hand rails when accessing the top of the hopper, never standing or walking on top of a closed lid

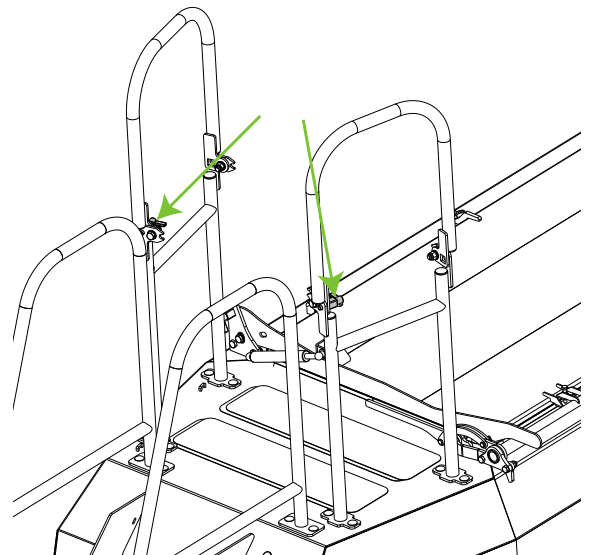


CAUTION: DO NOT open the hopper lid whilst the fan is running. Hoppers are pressurised

1. Fan must be switched off and the user must ensure the pressure differential gauge is at 0 prior to climbing the steps.
2. When accessing the top of the seed tank, it is required that both folding handrails are unfolded and locked into position prior to accessing the top of the hopper or opening the lid. ALWAYS Ensure 3 points of contact between yourself and the access ladder as these rails are unfolded.

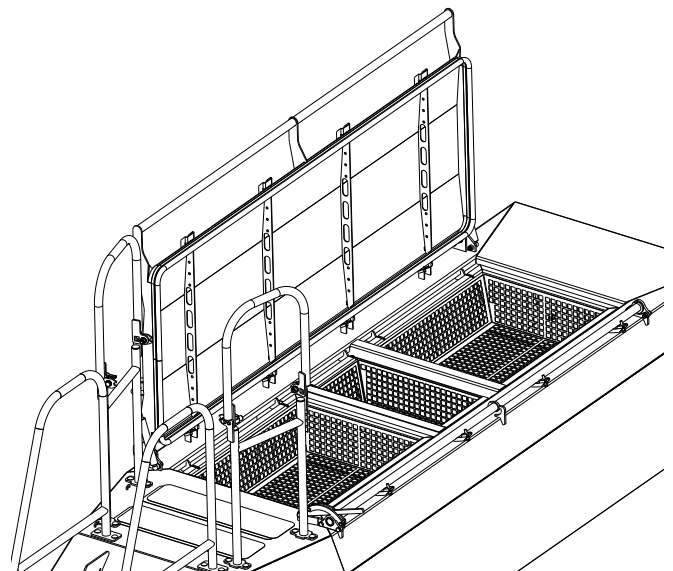


3. To unfold the collapsible handrails, pull the highlighted pin out. This pin is fitted with a cam lock to secure it in the withdrawn position whilst the user rotates the handrail up into position. Once in the raised position release the cam Lock, reinserting the pin into the securing hole.



IMPORTANT: Users should ensure the handrails are correctly secured using the pin to prevent accidental folding.

Whenever crossing the hopper top, the hopper lid should ALWAYS be opened see section 6.3.2. This Lid forms part of the handrail for the user to access or cross the hopper. If the user is to traverse the hopper (For example to fill the rear most tank, the user must ensure the sieves are free of any material. Never climb onto a sieve if the material stored in the hopper covers the sieve. Doing so increases the risks of the user slipping and falling along with associated injuries

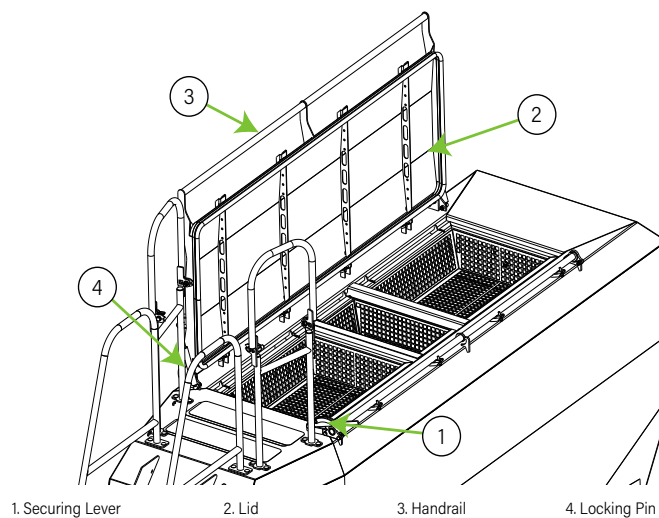


6.3.2 - Opening the hopper lid



CAUTION: Do not open the hopper lid when the fan is running. Hoppers are pressurised.

1. Rotate the securing lever clockwise (1) to unlock lid (2).
2. Open the lid using the integrated handle (3).
3. Secure the lid using the spring-loaded locking pin (4). Ensure the Pin is properly engaged with the hole in the plate. The lid is part of the safety handrailing for the DSX.

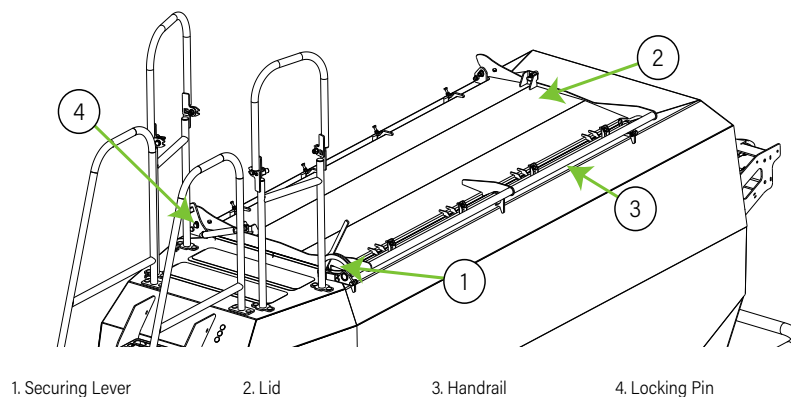


6.3.3 - Closing the hopper lid



IMPORTANT: The hopper must be airtight once closed. Ensure any product stuck to the air seal, or surrounding area is removed. Failure to do so can cause premature wear or damage to the seal or create a tank pressure leak

1. Pull and twist the locking pin (4) rearward to release it from the locking plate.
2. Carefully close the tank lid (2) using the handrail (3)
3. Rotate the securing lever (1) anti-clockwise to lock the lid.



6.3.4 - Adjusting the hopper lid

The Hopper lid is adjustable and **MUST** be checked regularly to ensure there is no air escaping when the fan is operating.



DANGER: Operators are working at height when accessing the hopper, slips and falls can result in serious injuries. Operators should use the supplied hand rails when accessing the top of the hopper, never standing or walking on top of a closed lid

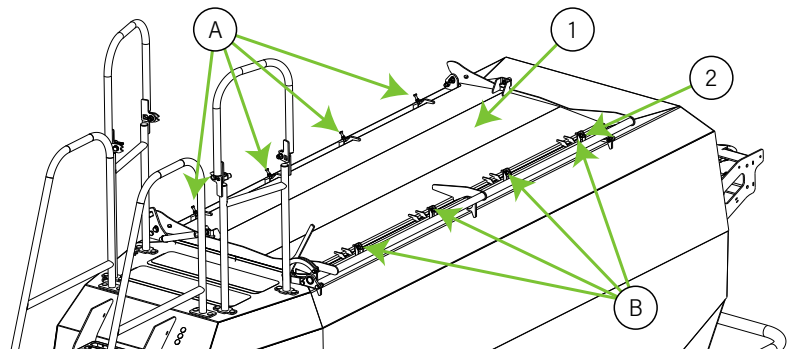


WARNING: Never walk on the closed lid. Only move forward and rearward on the hands and knees, directly down the middle of the lid.



WARNING: The lid **MUST** be free of moisture before attempting to complete any lid adjustments, due to the risk of slipping.

1. Close and lock the lid (1).
2. Loosen the M8 lock nut (2) on the all the M8 adjusting bolts (A) and (B)
3. Rotate each adjusting bolt ½ a turn until properly adjusted.
4. Tighten the lock nuts.



1. Lid 2. M8 Lock Nut A. Right Adjusting Bolts B. Left Adjusting Bolts

6.3.5 - Loading the hoppers



DANGER: Operators are working at height when accessing the hopper, slips and falls can result in serious injuries. Operators should use the supplied hand rails when accessing the top of the hopper, never standing or walking on top of a closed lid



DANGER: Do not stand under big bags. Operators should also not stand on top of the tank whilst the big bag is lifted into position

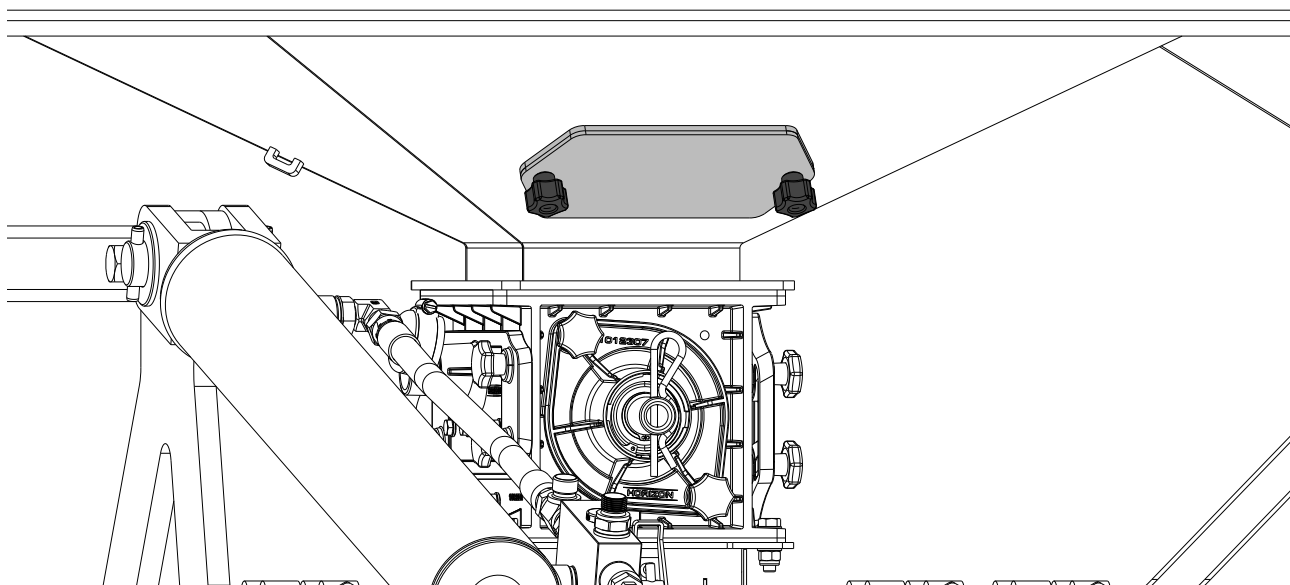


WARNING: Wear manufacturers recommended PPE when working with dressed seed.

1. The Implement should be unfolded as per section 6.2.1
2. Tractor should be turned off with the parking brake applied and the ignition key removed.
3. User should access hopper lid and open as shown above in section 6.3.1 and 6.3.2 respectively
4. Hopper should be filled appropriately (Using goods supplied from big bags, filling augers, or bagged goods from a supply vehicle.) Pay attention to the fill rate and product passing through the sieve. Larger products such as beans can bridge the sieve gaps therefore causing product to heap, if unnoticed product can then spill out of the tank
5. Prior to closing hopper lid ensure no product has been spilt onto the seal around the tank lid (Failure to remove this can lead to premature seal failure and/or a loss of air pressure)
6. Close and latch shut the hopper lid as shown in section 6.3.3

6.3.5 - Unloading the Hoppers

1. The implement should be in the transport position with the wings folded
2. The implement should be placed over a big bag, seed sock or other suitable catchment container. Ensure catchment container is under the hopper drain door and the injector box assembly.
3. The drain door on the side of the hopper must be opened Remove the mounting bolt from one side after loosening the other side. Rotate the door open
4. Allow the hopper to empty via the drain door



5. Open the flap at the bottom of the injector box assembly under the meter.
6. Manually operate the meter to remove the last of the product from the hopper
7. Close the flap in the injector box assembly and the inspection drain door
8. Move the catchment container from under the machine prior to moving the implement

6.3.6 - Pressure Monitoring

When the fan is in operation, a high volume of air flows under the metering units, to the distribution heads then on to the D-cups. At the same time, air is directed through the metering units (front and rear only) and out inside the tank. This creates equal air pressure above and below the metering units, therefore product can easily flow out of the rotors.

If there was a loss of pressure in the tank (lid left open/ incorrectly adjusted lid), the pressure differential above and below the metering units will not be equal. As a result, product will not easily flow out of the rotors.

An air pressure gauge is mounted to the front of the machine to monitor air pressure.

Normal operation the gauge should read 0 – 5 mbar.

If the air differential exceeds this value, please check the system for leaks as shown in chapter 6.3.5



Fan Speed	No Air Leaks	Meter Unit Hose Removed	Tank Lid Unlocked
2900 RPM			
3800 RPM			

6.3.6 - Pressure Monitoring

The DSX hopper tanks have 2 seed level sensors per tank fitted as standard.

6.4 - Pneumatic Seed Transport System



WARNING: Wear manufacturers recommended PPE when working with dressed seed.

6.4.1 - Fan



CAUTION: Risk of burns on the fan drive system. Hydraulic components can become hot during operation.

The DSX uses a hydraulically driven fan to generate an airflow to convey the product from the metering unit to the coulter. This fan is driven by the hydraulic supply from the tractor. The tractor must also be equipped with a free flow return with a maximum back pressure of 3 Bar.



IMPORTANT: The free flow return must be connected prior to any other hydraulic connection being made. (MAXIMUM 3 BAR OF BACK PRESSURE) Failure to follow this procedure could cause damage to the motor and other hydraulic components



IMPORTANT: If airflow is too slow product flow will stagnate and remain in the hoses. This in turn can cause blockages. If the airflow is too fast product will not be distributed evenly or be blown into the seed trench



IMPORTANT: Fan speed, Product conveyance and delivery to all coulters must be checked when sowing begins & at regular intervals when covering large areas



IMPORTANT: The fan motor oil supply **MUST** come from a "pressure & flow" compensated tractor spool or set the spool to "Priority" if the tractor is capable of this option. Motors driven from a non-priority spool will suffer from speed fluctuations.



IMPORTANT: The fan intake guard must be regularly cleaned and remain free of debris. If the fan becomes obstructed by debris the air intake is restricted which can lead to blockages occurring in the pipes due to a reduction of airflow. Deposits must be regularly cleaned from the impeller to reduce imbalance risks. If not maintained the bearing can become damaged by impeller imbalance and overloading

6.4.2 - Fan Speed

The fan has a maximum speed of 4000RPM, any overrun of this can damage the motor.

To switch on the fan, adjust the flow rate to the minimum setting, engage the corresponding hydraulic service and place it into continuous pumping mode. Adjust the service's flow rate to adjust the fan to the desired operating speed.

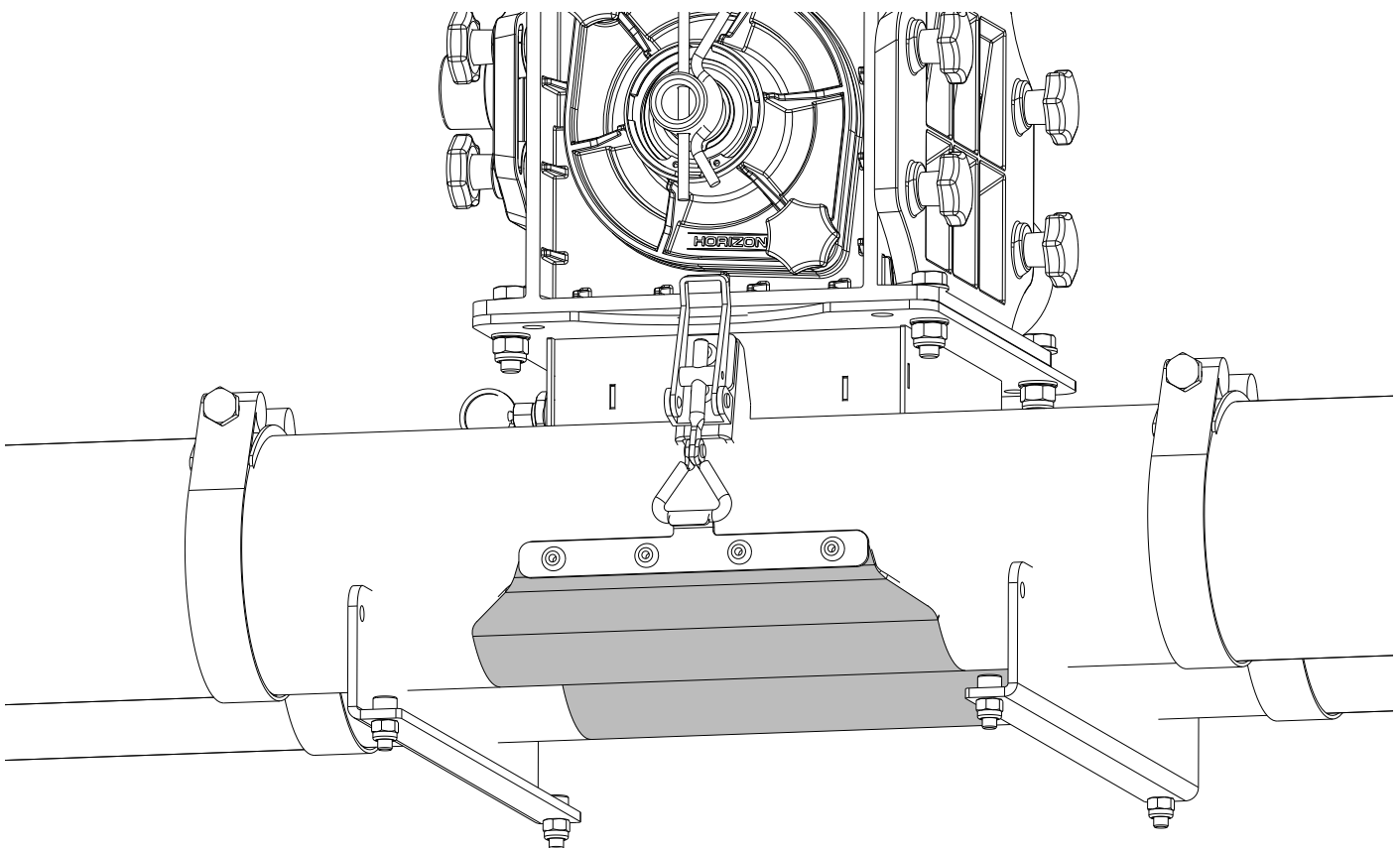
The fan speed is adjusted according to the product and its application rate alongside the machines working speed. Due to this there is therefore no adjustment table with recommended values.

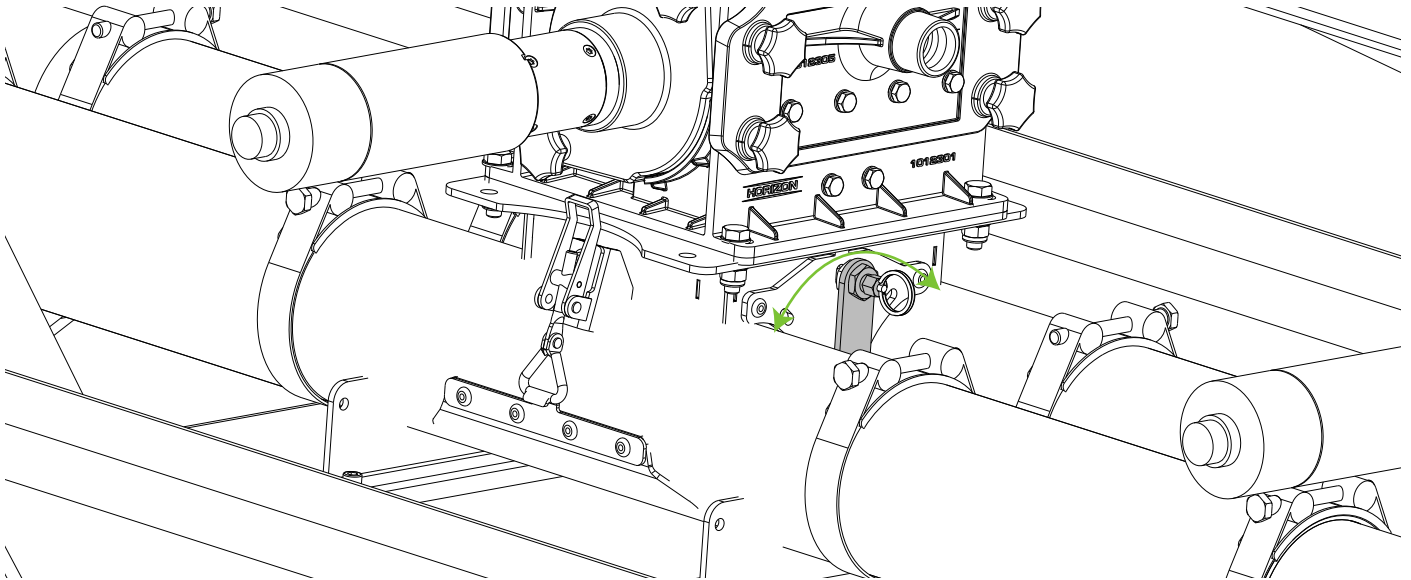
The typical usage range is between 2500 Rpm & 4000 Rpm. To determine the correct speed for the operator's application, there should be no product accumulation in the feed hoses for the distribution heads. Smaller product (Small seeds in particular) requires less air to be transported needing a lower RPM than large seeds.

6.4.3 - Injector Box Assembly

At the bottom of the metering unit is an injector box assembly. Seed metered by the metering unit assembly is picked up by the airflow from the fan and carried back to the distribution heads at the rear of the machine.

When calibrating the seed is taken out through an opening at the bottom of the injector box assembly without the fan running. Once calibration is completed this opening must be closed tightly again. This is covered by a polyurethane flap designed to seal the injector box and allow for the seed to be picked up by the airflow for distribution. Once the flap has been used for either calibration or emptying the meter/Hopper of product the flap must be resealed tightly

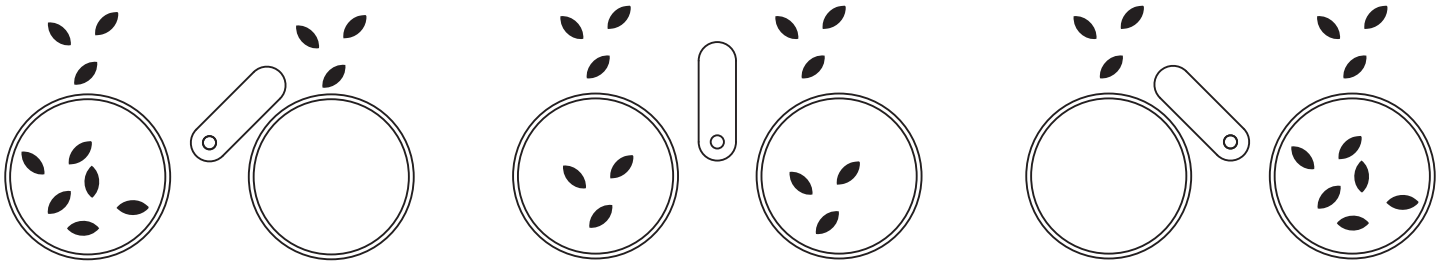




Each meter injector box assembly is also equipped with a shut off lever. This lever can be adjusted to control the distribution of product on the drill.

When the lever is in the centred position product flows into both distribution heads. When being used in this application the metering rotors must be symmetrical to allow for accurate rate application.

With the lever adjusted to one side the product will be introduced to the airflow on the side opposite of the lever. For example, with the lever to the right of the machine product will be distributed to the left-hand tube



The distribution heads can be plumbed in 2 differing ways. Most DSX implements are plumbed for selective seeding. This means the right distribution head feeds to all of the rear coulters whilst the left-hand distribution head feeds the front coulters. In this configuration the levers can be used to selectively route the product located in each hopper to the correct distributor head and therefore coulters placement.

Certain machines are plumbed without selective seeding (Typically at customers request). In this application each distributor tower feeds one side of the machine's coulters. Using the lever to adjust

the seed flow therefore allows for half the machine to be shut off. Please note for half machine shut off the application rate would need to be halved whilst the levers are in this position to maintain the required application rate. The levers are also manually activated, and therefore must be readjusted and the rate reset if returning to full width applications.

6.4.4 - Fan Checks & Maintenance



WARNING – Risk of Injury from the running fan – NEVER run the fan without the protective shroud installed. Only dismantle the protective grille when the fan is stopped and isolated from restarting.

Clean the protective grille regularly to prevent debris build up that would lead to a restriction in airflow and possible blockage. Using compressed air for this purpose is recommended

Clean any deposits and dirt from the fan blades to prevent imbalance and damage to the impeller and bearings. Most soiling should be easily removed with compressed air (If the material is dry) for more stubborn soiling of the fan guard it is recommended to utilise a high-pressure water cleaner and allow the drill and distribution piping to dry prior to usage.

6.5 - Metering

The metering unit system and guillotine is positioned under the hopper. The guillotine is used to contain product in the tank if the metering rollers need to be removed for calibration.

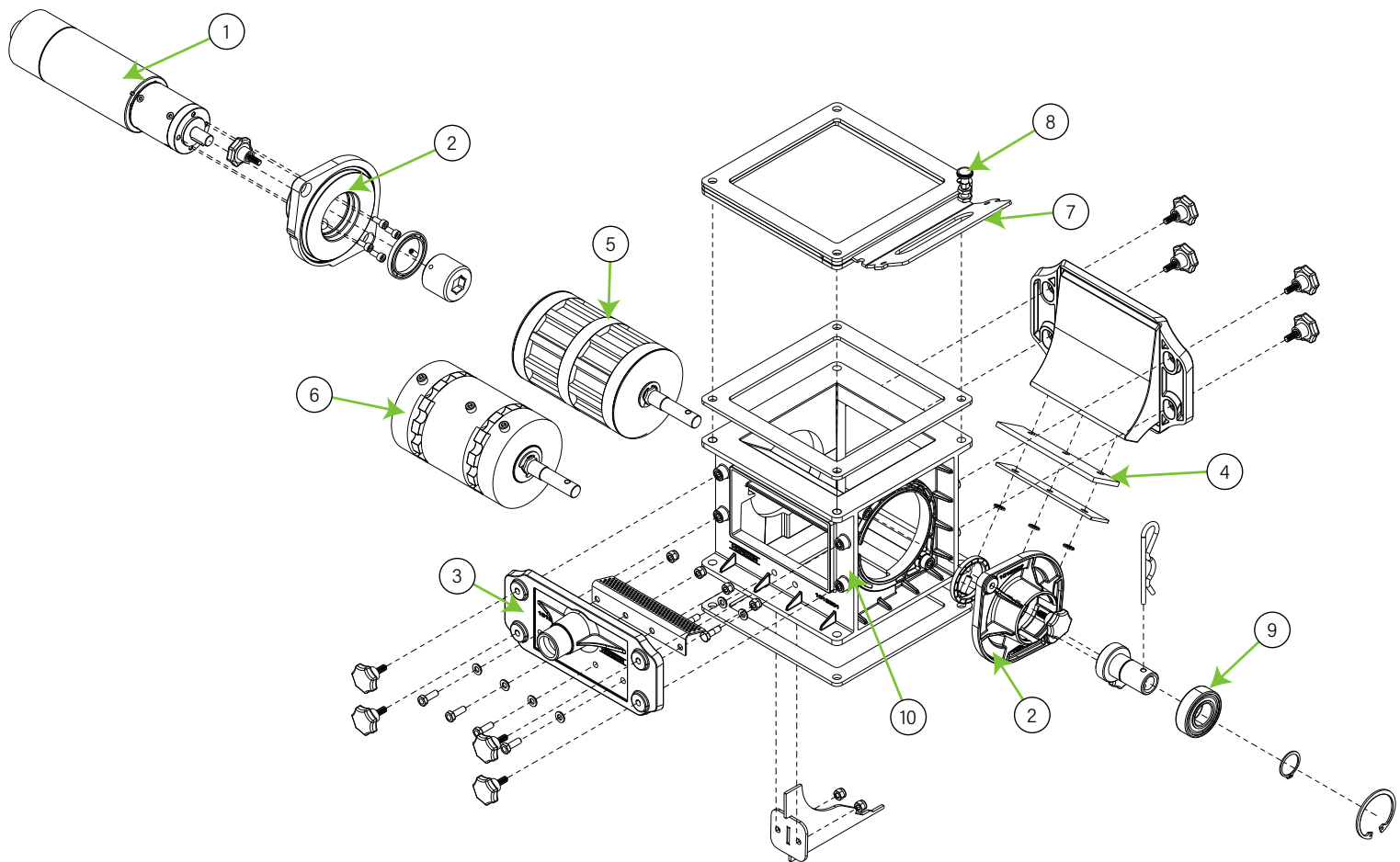
The drive motor turns the rotor and meters product out of the tank and into the airstream provided by the fan.

Rotors can be changed to use different sized flutes depending on seed size and rates.

A micro rotor is supplied with the 3rd tank option for fine seeds and low rates.

The rubber scraper prevents excessive seed from passing the rotor. The scraper requires adjustment when changing from small/ medium to large seed size.

6.5.1 - Metering Overview



- | | |
|------------------------------------|--------------------------------|
| 1. Drive Motor | 6. Small Seed Metering Rollers |
| 2. Front and Rear Bearing Housings | 7. Guillotine |
| 3. Vent Chamber | 8. Plunger |
| 4. Rubber Scraper | 9. Bearing |
| 5. Metering Rollers | 10. Meter Housing |

6.5.2 - Rubber Scraper

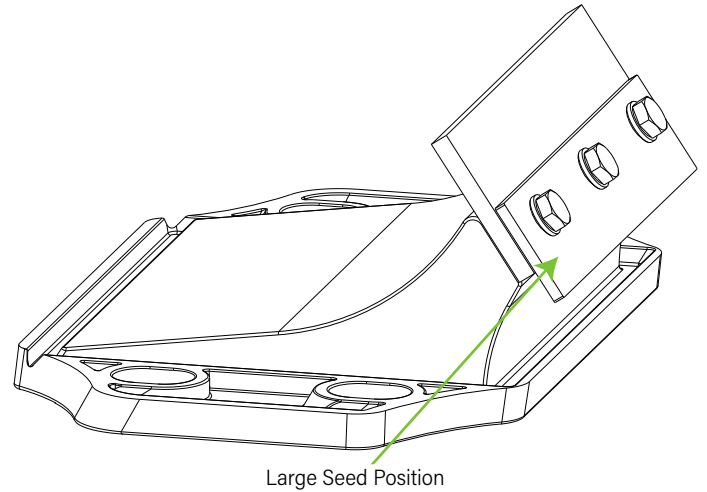
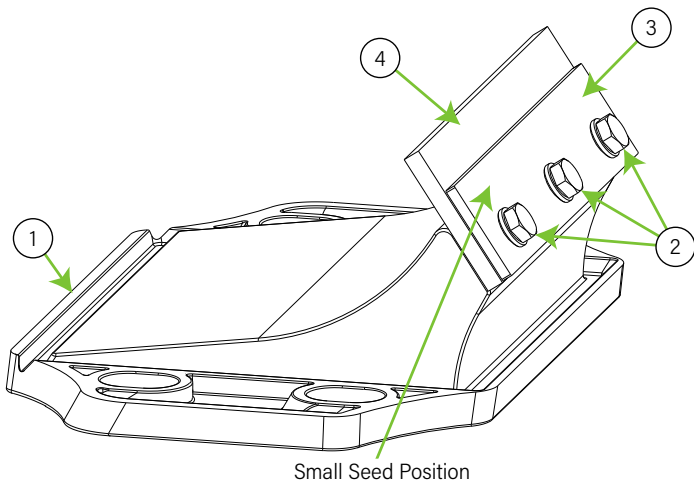
The rubber scraper in the metering unit has 2 positions depending upon the type of seed being used. One position is for smaller seed and granular products, whilst the other is for larger seeds. The position of the clamping plate determines which format the scraper is in.



IMPORTANT: The scraper is a wearing item and must be regularly checks and periodically replaced. Best practice is to inspect prior to the start of each drilling season.



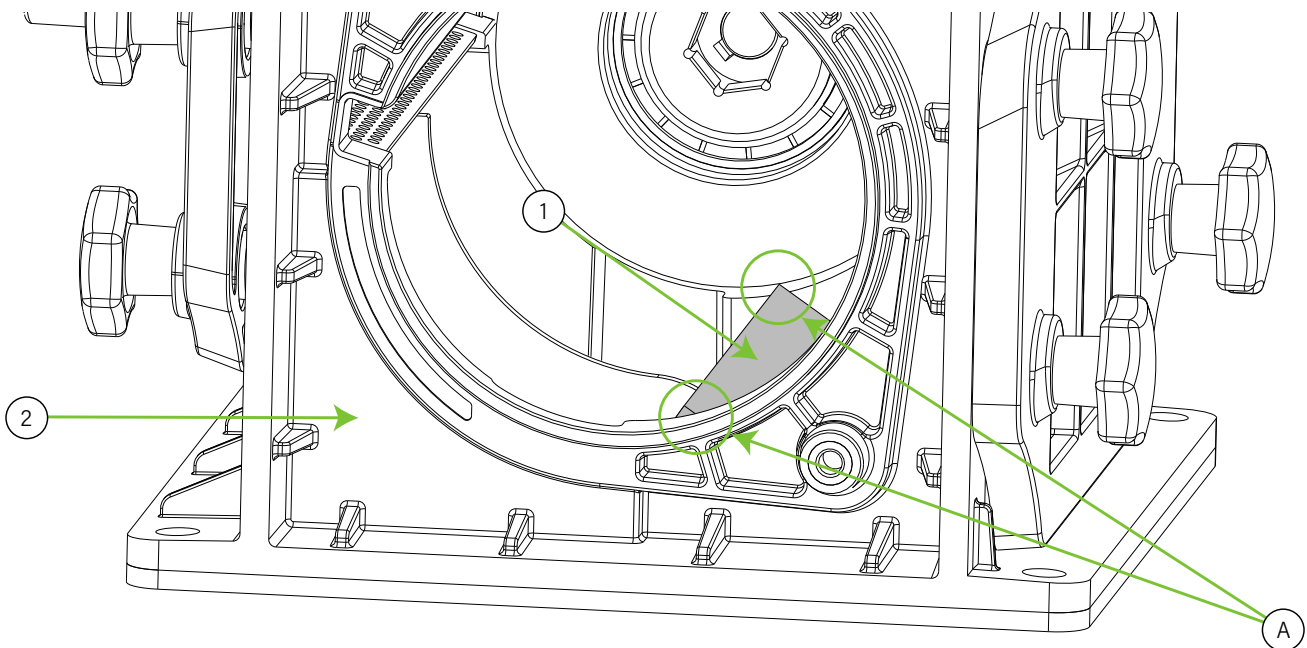
IMPORTANT: Incorrect fitment or adjustment of the rubber scraper can cause high motor loading (Producing error codes or incorrect seeding rates)



- | | |
|-----------------|-------------------|
| 1. Scraper Door | 3. Plate |
| 2. Bolts | 4. Rubber scraper |

Adjusting the scraper:

1. Remove rotor from housing.
2. Remove the 4 x thumb screws and scraper door (1) from the housing
3. Remove the 3 x bolts (2) and flip the plate (3) 180° to expose more or less of the rubber (4).
4. Install the scraper door into the meter housing.



1. Rubber Scraper

2. Meter Housing

A. 1mm Above Meter Housing

5. Adjust the rubber so it extends 1mm into the rotor cavity.
6. Remove the scraper door and tighten the bolts to 2-3Nm
7. Verify the rubber is even across the width.
8. Replace scraper door and insert rotor.

6.5.3 - Guillotine

As part of the metering assembly above the rotor chamber there is a stainless steel guillotine door. It has 2 positions:

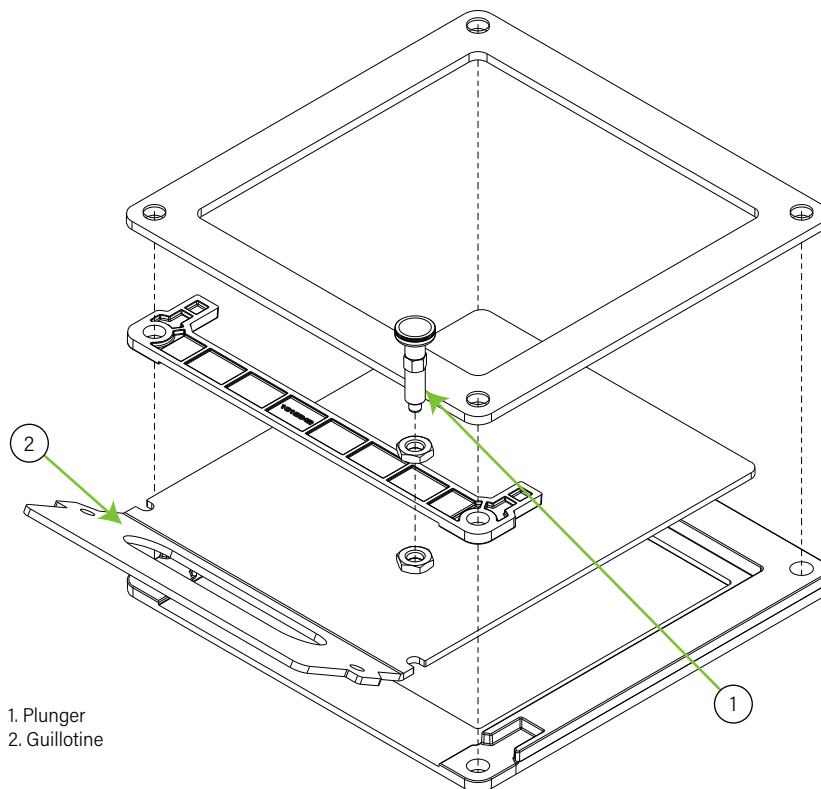
1. Work - Guillotine is in the outward position allowing product to flow to the metering housing
2. Maintenance position - Guillotine is in the Inward position stopping the flow of product to the metering assembly to allow for easier maintenance work to be undertaken



IMPORTANT: The door must always be in one of the 2 positions listed above. If removed completely during work there will be a loss of tank pressure, resulting in poor metering performance

Working Position.

1. Pull plunger (1) to release the lock and slide the door rearward and remove the door from the housing
2. Rotate 180° so the short edge engages with the opening
3. Lift Plunger (1) and slide the door into position until aligned with the locking plunger



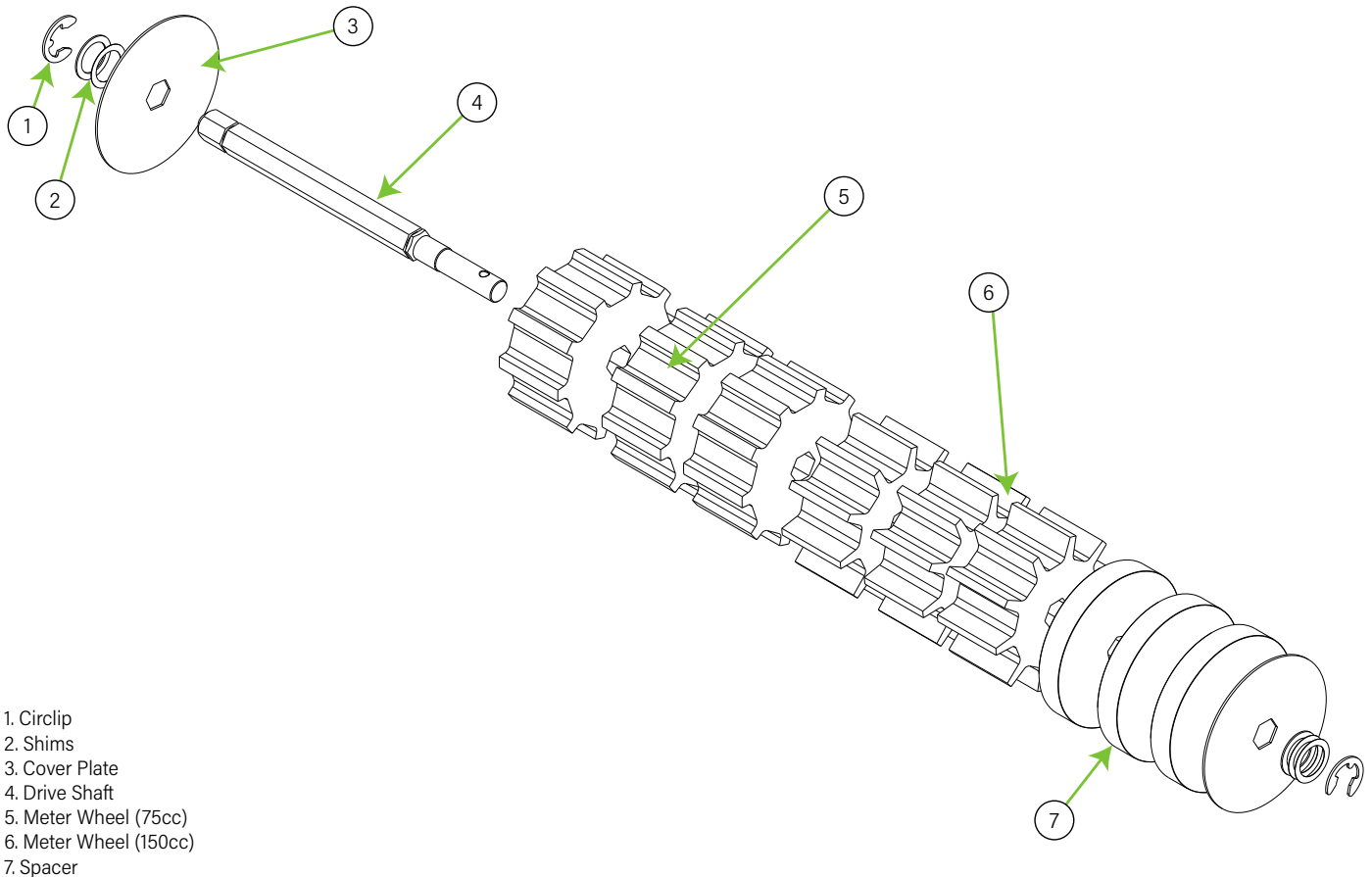
Maintenance Position

1. Pull plunger (1) to release the lock and slide the door rearward and remove the door from the housing
2. Rotate 180° so the long edge engages with the opening
3. Lift Plunger (1) and slide the door into position until aligned with the locking plunger. Once fully engaged it is possible to remove the rollers with product still in the tank.

6.5.4 - Rotors

As part of the metering assembly above the rotor chamber there is a stainless steel guillotine door. All meters are supplied with 6 x 75cc and 6 x 150cc metering wheels and 6 x spacer wheels as standard. This combination will allow for common seed rates and speed options.

The 75cc meter wheels are used for small grains (Wheat, barley, Oats etc). The 150 cc are used for large grains (peas, beans etc). The metering roller variants can be found in the appendix on pg 71.



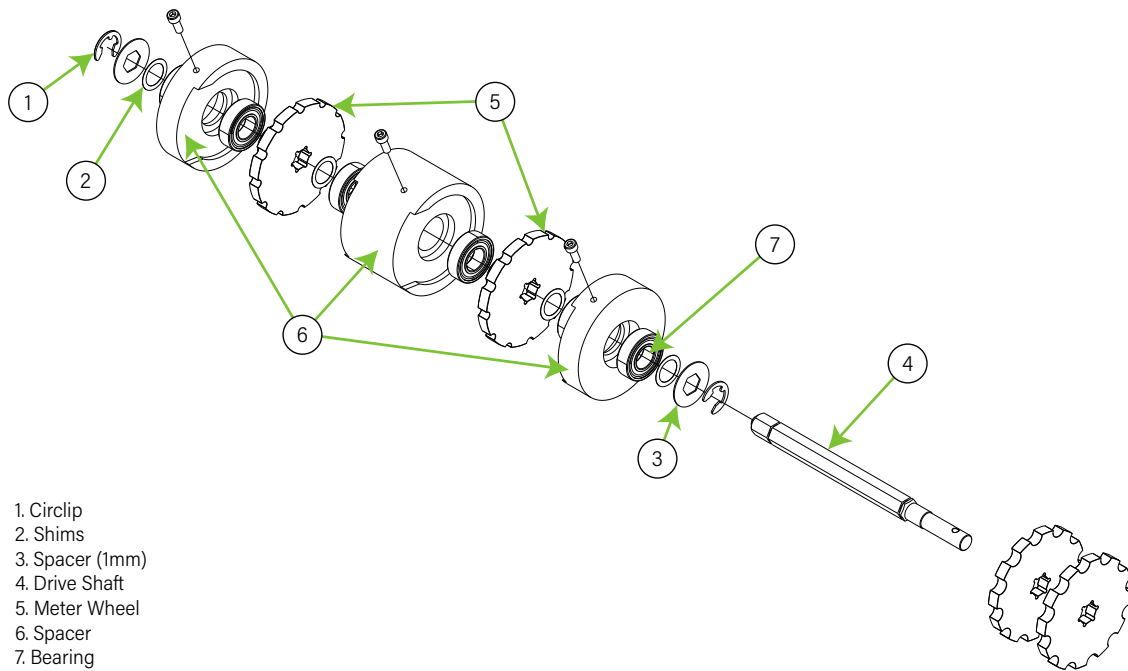
1. Circlip
2. Shims
3. Cover Plate
4. Drive Shaft
5. Meter Wheel (75cc)
6. Meter Wheel (150cc)
7. Spacer

Adjusting the metering rollers.

1. Slide guillotine to close tank outlet if tank contains product. (See section 6.5.3)
2. Remove rotor from meter housing.
3. Carefully remove the circlip (1) and shims (2) using a flat blade screwdriver.
4. Remove the stainless-steel cover disc (3) and meter wheels off the drive shaft (4).
5. Replace the meter wheels (5) with the desired size.
6. If using two meter wheels instead of all three, use 3 x spacers in the centre position.
7. Install the cover plate (3) and enough shims (2) to ensure the circlip (1) is a tight fit.
8. Insert rotor into meter housing and secure with the two thumb screws.
9. Complete calibration (see calibration)

Fine Seed Rotor.

For fine seeds and low rates, an optional rotor is available. Available rotors are 5cc, 10cc, 15cc & 30cc. They are installed in the same way as the standard plastic meter wheels.



1. Circlip
2. Shims
3. Spacer (1mm)
4. Drive Shaft
5. Meter Wheel
6. Spacer
7. Bearing

6.5.5 - Calibration

For detailed information please refer to Section 5 - Product Calibration of the supplementary Operators Manual - Calibration and Operation.



CAUTION: Rotating parts can catch on loose clothing and inflict injury.



CAUTION: Wear safety equipment to protect from seed dressing, dust and foreign material entering eyes, ears, and airways as per manufacturers instructions.



CAUTION: Implement must be in the lowered position and wings unfolded to prevent a risk of crushing.



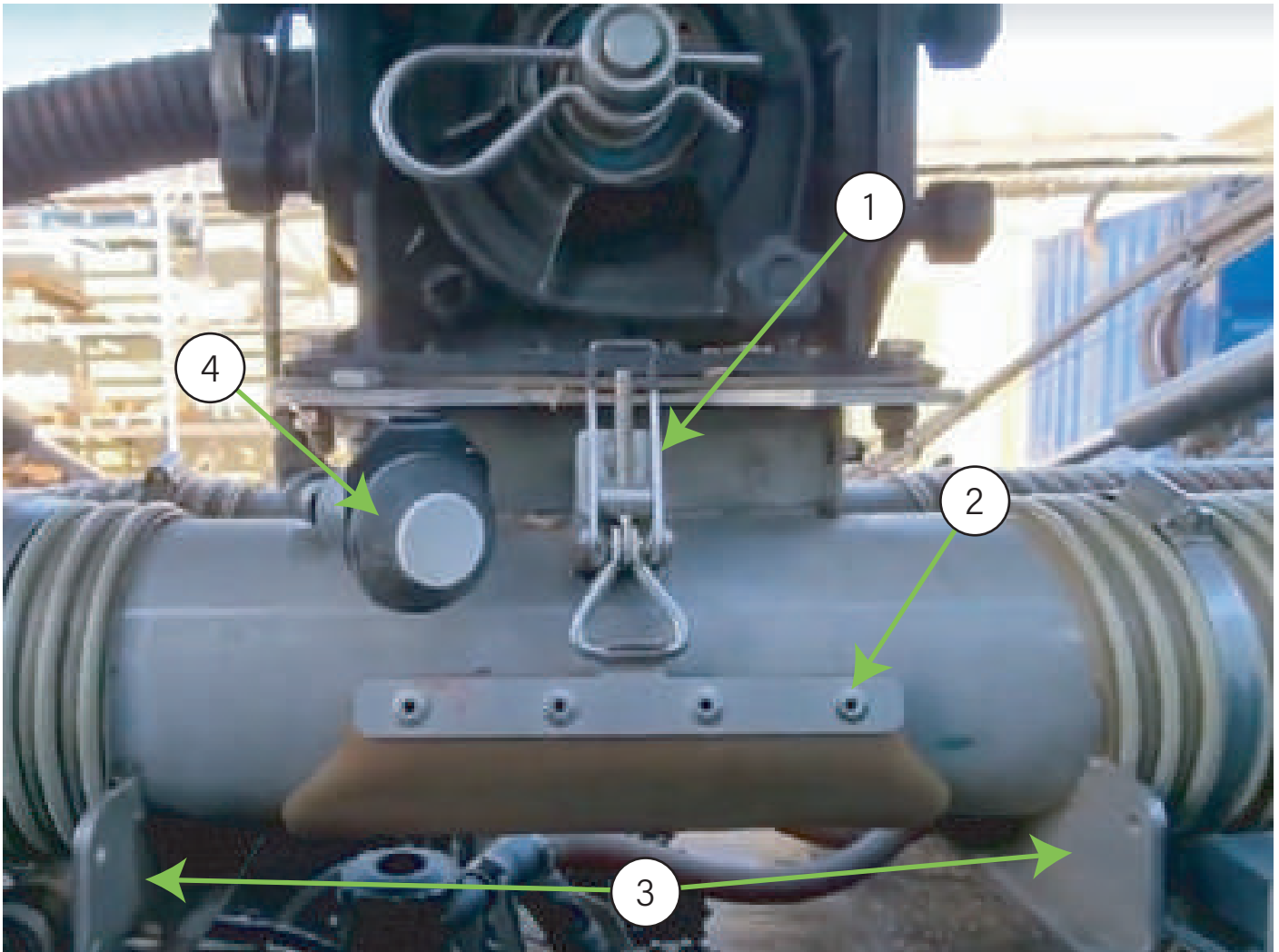
IMPORTANT: It is not necessary for the tractor to be running to complete calibration.



IMPORTANT: Some types of seed dressing can coat components in residue, which can affect calibration and meter performance.



IMPORTANT: Seed that has not been cleaned contains small lengths of straw, chaff, and other residue. This can cause metering issues and blockages in the distribution head and coulters.



Prepare for calibration

1. Park the tractor and drill on level ground and apply the park brake.
2. Pull the over-centre clamps (1) to open the rubber covers (2) on either side of the injector box.
3. Place the calibration bag under the injector box outlets using the side rails (3).
4. Follow RDS calibration procedure
 - Press calibration switch (4) for 1 second to start and stop motor.
5. Adjust metering rotor as required.
6. After a successful calibration, lock the rubber covers (2) into position.

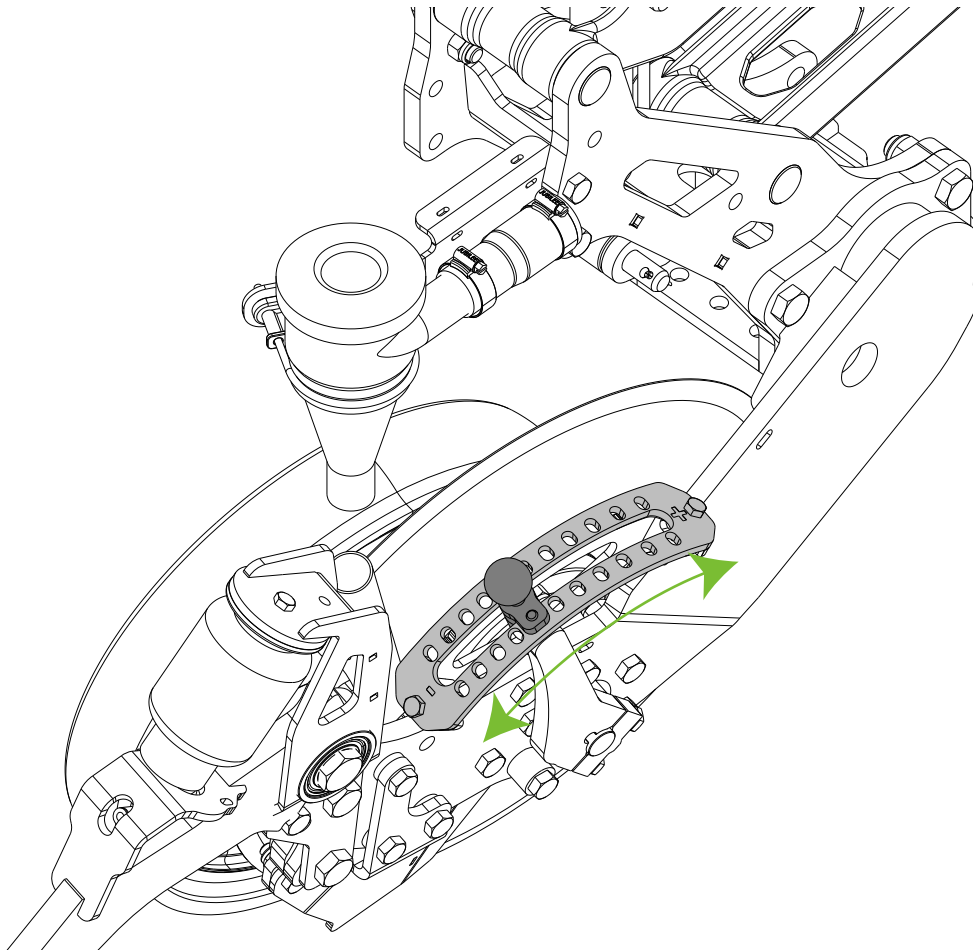
6.6 - Coulter

6.6.1 - Depth Settings

The depth of each individual row can be easily controlled and adjusted with the depth control lever and the notches.

The DSX is capable of 100mm (4") as the maximum depth of placement.

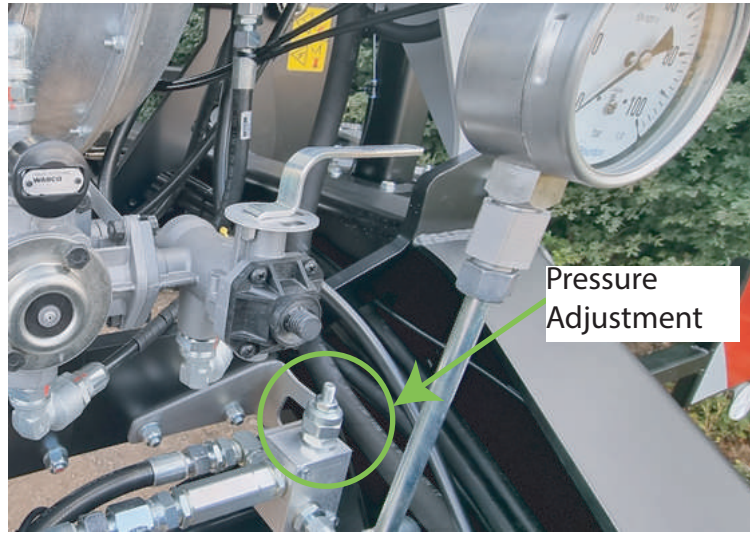
To increase the seed boot depth move the notch in the direction of the '+' symbol etched into the mounting plate, to decrease the depth of seed placement move the lever in the '-' symbol. Each full step changes the seeding depth by 12mm.



6.6.2 - Downforce

Each row unit is equipped with a hydraulic cylinder applying downforce to the unit. This allows for consistent seeding at the desired depth and good quality furrow closure. After adjustment of the sowing 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.



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.

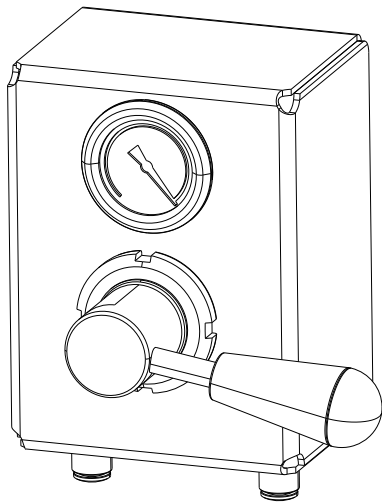


IMPORTANT: Usage of excessive down pressure will unnecessarily accelerate the mechanical wear rates of some components, as well as having a detrimental impact on the quality of the seeding furrow (Excessive compaction upon closing)

Down Force					
Bar	Weight (Kg)	Soil Firmness	Soil Moisture	Soil Type	Season
20	135	Loose	Wet	Light	Spring/Autumn
30	165				
40	195				
50	231				
60	255				
		Hard	Dry	Heavy	Summer/Autumn

6.6.3 - Closing Wheel Pressure

Each row is equipped with a pneumatic air bag to control the closing pressure on the slot. The closing 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. An adjustment of 1 Bar (14.7 psi) in pressure will adjust the closing pressure by approximately 10Kg



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.

Closing Pressure					
Bar	Weight (Kg)	Soil Firmness	Soil Moisture	Soil Type	Season
0	10	Loose	Wet	Light	Spring/Autumn
2	30	↓	↓	↓	↓
4	50				
6	70				
8	90				

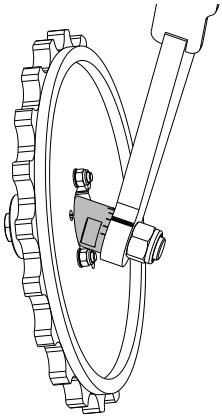
6.6.4 - Closing Wheel Angle

The angle of the rear packing wheel can be adjusted relative to the slot to adjust the interaction between the wheel and the soil of the slot affecting the closing of the seed furrow.

The spindle at the rear of the machine retaining the hub for the packing wheel has several machined marks. The packing arm also has a mark in the rear housing as shown overleaf.



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

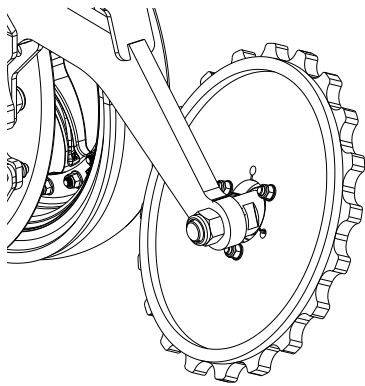


To Adjust the closing wheel angle:

1. Loosen the retaining nut (1)
2. With the retaining nut loosened twist the spindle (2) using the flats on the spindle and a 32mm Spanner to adjust the marks (3) accordingly. Rotating the axle forward leads to a more aggressive closing setting. Rotating the axle backwards leads to a less aggressive closing setting.
3. Re torque the retaining nut (214Nm) – Holding the spindle in place as you do so to prevent movement for the desired setting.

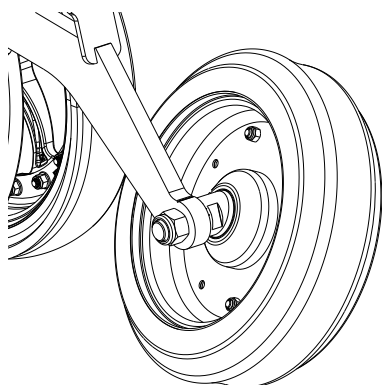
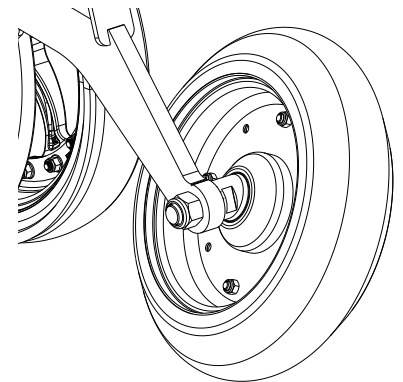
6.6.5 - Closing Wheel Types

The DSX can be equipped with 3 differing types of closing wheel depending upon soil conditions. As Standard the DSX is fitted with a Notched closing Wheel



The 'Notched' type closing wheel is suitable for use on most soils (Except very light soils). The profile of the wheel helps to remove the localised compaction caused by the side gauge wheel, by crumbling the edge of the slot, and the profile helps to close and firm the slot.

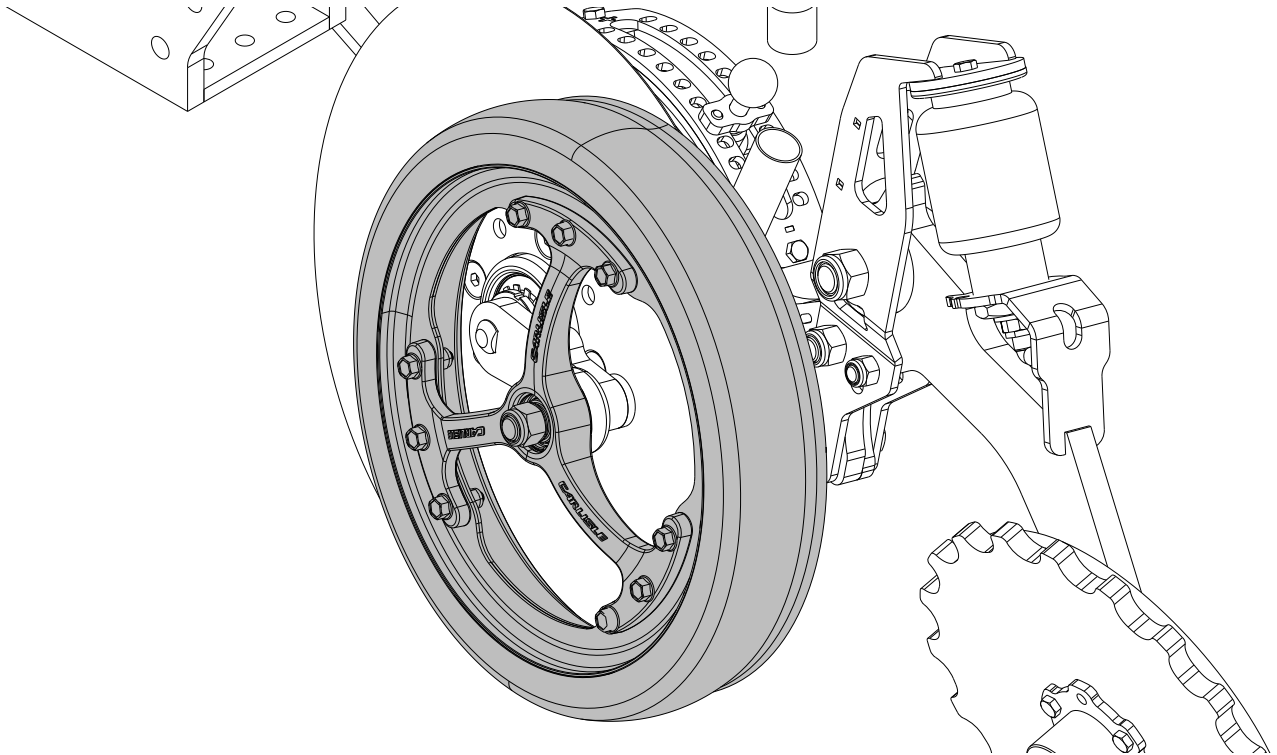
The 'V' type closing wheel is for usage in heavy soils in no till or shallow tillage conditions



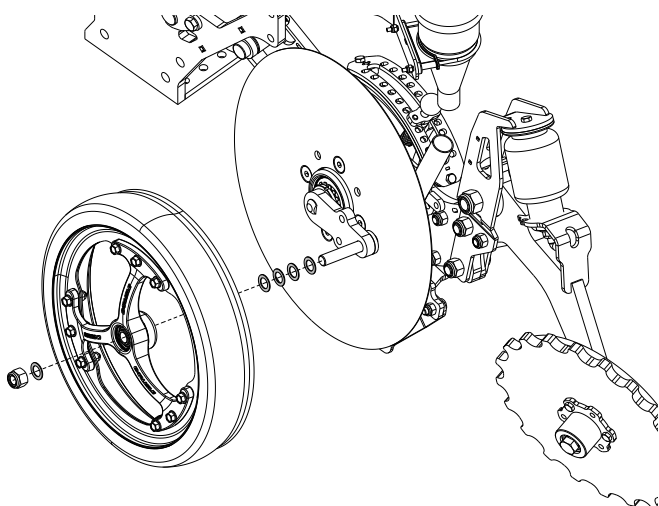
The 'W' type closing wheel is suitable for usage on light to medium soils in min till/ no till applications and is suited to most conditions

6.6.6 - Adjusting the side wheel

The DSX Coulter is fitted with a side wheel to limit disc depth & maintain the volume of ground moved by the disc. This wheel also cleans the disc of earth and debris accumulations whilst in operation (Therefore the wheel must be aligned against the disc without restricting the movement)



CAUTION: Never work under a raised implement. Always support raised implements with appropriate stands.



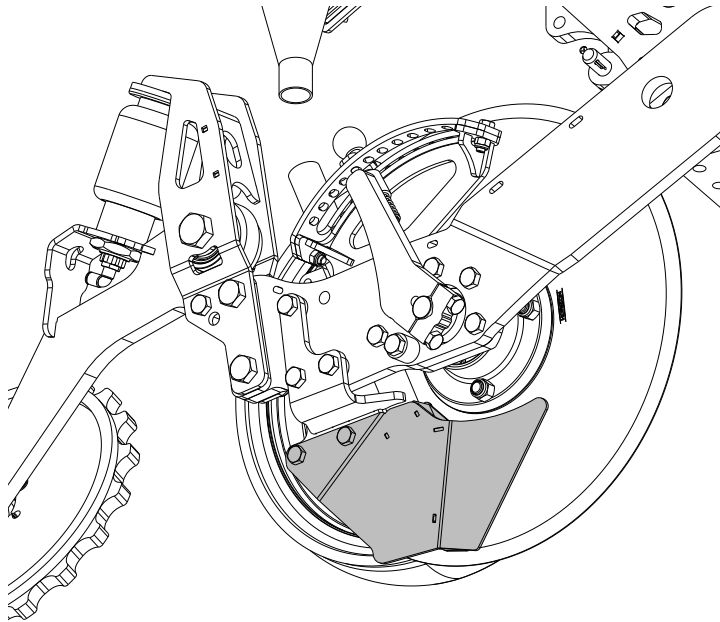
To adjust the side gauge wheels the coulter must be in the raised position to allow for the side gauge wheels and discs to be rotated.

1. Loosen the retaining nut with a 24mm wrench.
2. Move the shims to the inside/outside to adjust the wheels setting relative to the disc.
3. Retighten the retaining nut to the appropriate torque (210Nm)
4. Ensure the side wheel can still be freely rotated against the disc by hand.
5. If the side wheel is unable to be rotated freely, repeat steps 1-4 to readjust shim settings. If problems persist, additional spacers can be installed to the gauge wheel. Extra shims will be required to move the gauge wheel away from the disc.

6.6.7 - Adjusting the Seed Boot

Seed boots should be regularly checked for wear, and be appropriately adjusted if required

The DSX drill mounts the seed boot on deformable rubber washers to allow for precise adjustment. Before making any adjustments to the seed boot the coulter unit must not be in contact with the ground.



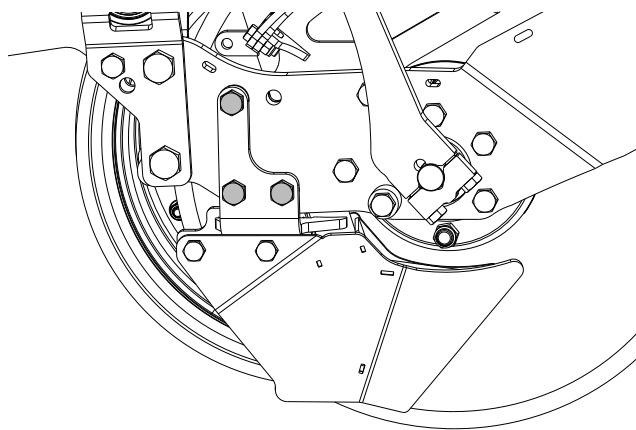
IMPORTANT: The seed boot must be parallel to the disc and be as close as possible to the disc (Without impacting on the discs rotation) to prevent debris from becoming lodged between the boot and the disc



IMPORTANT: Correctly adjusted discs can be rotated using only your thumb and forefinger. High resistance could indicate poor adjustment, bearing failure or debris wrapped around the disc hub



CAUTION: Never work under a raised implement. Always support raised implements with appropriate stands.



To adjust the seed boot the coulter must be in the raised position and not in contact with the ground.

1. Using a 19mm wrench tighten or loosen the 3 mounting bolts highlighted to reach the optimum boot position.
2. The upper front point of the seed boot should lightly touch the disc and conform as closely as possible to the hub shape.
3. The lower front corner of the seed boot should be offset from the discs surface by 1mm (max) to allow for flexing and movement of the disc whilst in operation
4. The rear of the seed boot should be angled 2-3mm from the front of the boot
5. The disc must be able to turn freely by hand once boot position is set, if this is not possible readjust the boot position repeating steps 1 through 4



6.6.8 - Opening Discs

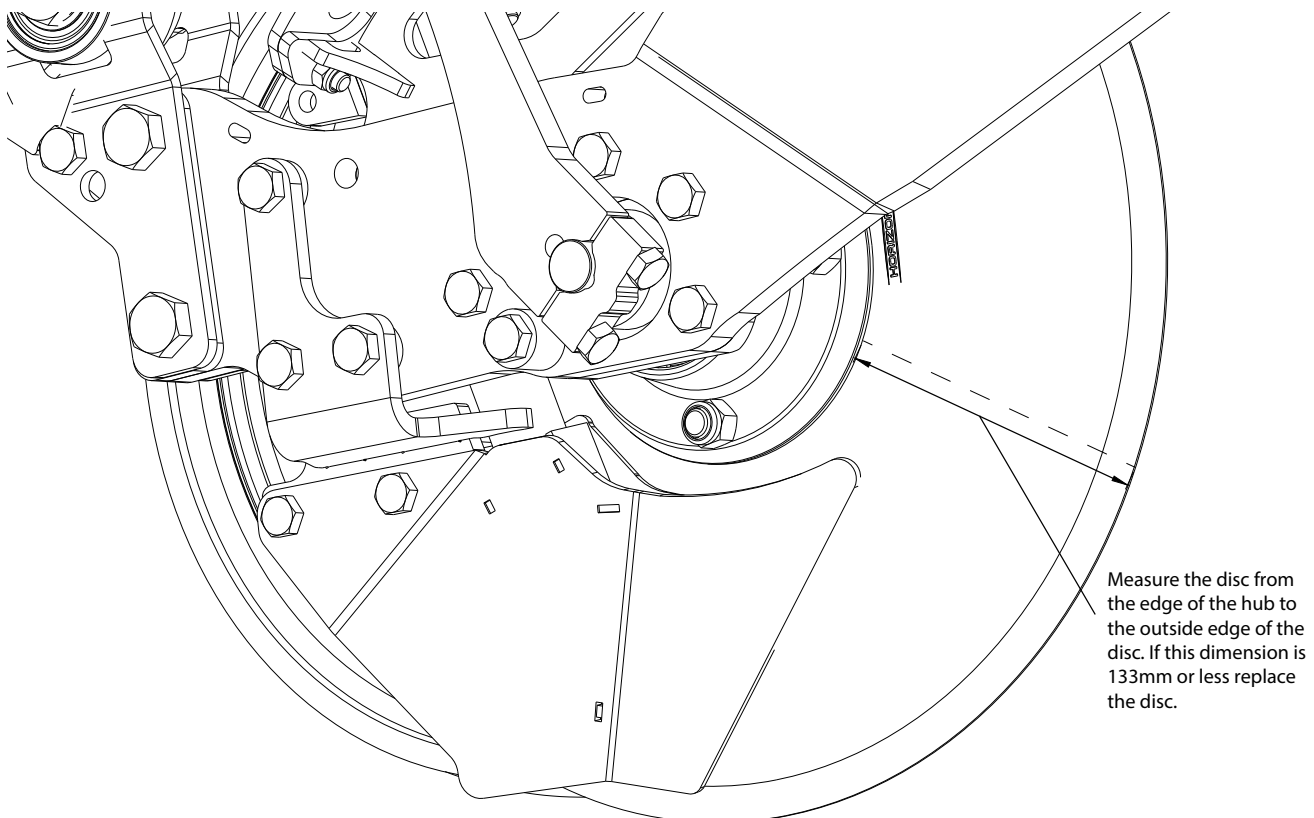
The DSX is equipped with an opening disc that has a diameter of 18" (457mm) when new. The bevel on the edge of the disc aids penetration of the disc into the soil, and the cutting of straw and cover crops reducing the phenomenon of hair pinning.



IMPORTANT: Progressive wear of the disc means that the sowing depth will need to be adjusted accordingly over its lifespan to maintain the desired depth

Discs must be replaced once they reach a minimum diameter of 425mm in order to prolong the life of the sowing unit and maintain a consistent sowing depth. Typically, at this diameter the bevel is worn, increasing the risk of hair pinning. When the disc has a diameter of 425mm or less the seed boot is no longer in the shadow of the disc, consequentially increasing the wear rate.

To check your disc wear measure from the edge of the hub to the edge of the disc radially as shown below. If this is measured at 133mm or less replace the discs.



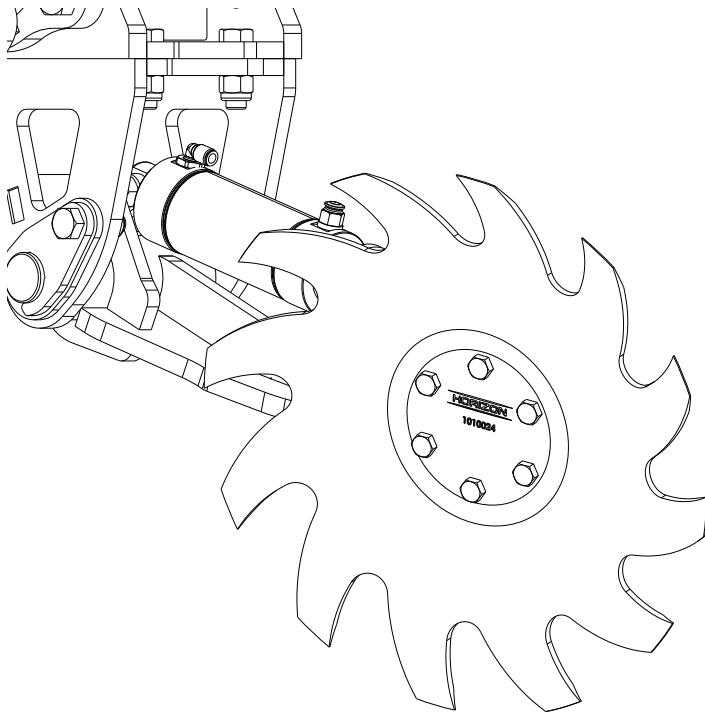
7.0 - Optional Equipment

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 - Row Cleaners

The DSX can be equipped with row cleaners and an in-cab control box, which regulates the amount of force applied to the row cleaning system. The row cleaning system requires 120 PSI+ of air supply to run effectively. The limitations for this systems operation are between 0-8Bar of pressure.

The trash wheels are designed to move residue in front of the disc to reduce the likelihood of hair pinning and ensure quality slot closure.



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.



7.2 - In Tank Cameras

In tank cameras are fitted to monitor the fill status of the hoppers and check for product bridging. These cameras can be accessed via the supplied tablet control screen.



IMPORTANT: Whilst product is flowing via the metering system and the hoppers are emptying it is still highly recommended that the operator checks the seed placement regularly.

7.3 - Reversing Camera

Reversing cameras are fitted to assist the operator in the manoeuvring of the implement. These cameras can be accessed via the supplied tablet control screen.



DANGER: All personnel should be kept clear of the vehicle and implement whilst manoeuvring



DANGER: Reversing cameras should not be used to exclusively manoeuvre the implement and tractor. Failure by the operator to observe the surroundings appropriately or local applicable traffic regulations can result in serious injuries and possible fatalities

7.4 - Compressor

The DSX can be equipped with a compressor to supply air to the pneumatically actuated closing system and trash wheels if fitted. 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

7.5 - 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

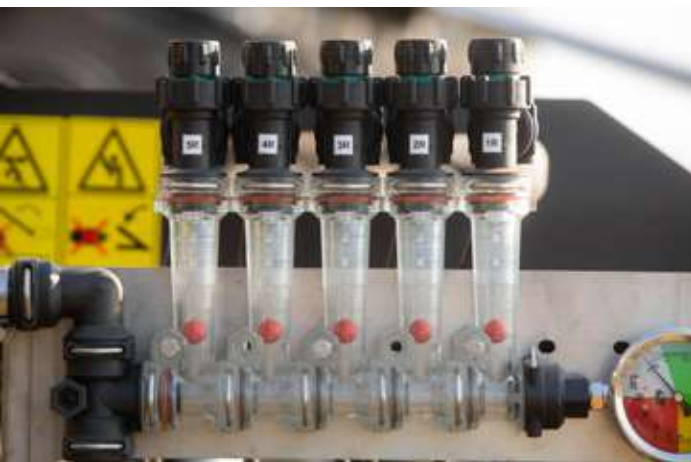
The fertiliser system comprises of 3 parts. The in-furrow outlet tubes, Wilger Manifold & Fertiliser tank with control system. The fertiliser system can therefore be specified according to the operator's needs.

7.5.1 - In Furrow Outlets



The DSX Incorporates a mount into the rear of the seed boot to allow for accurate liquid placement inside the seeding trench. The in-furrow kit incorporates a plastic tube to deliver the liquid and a stainless-steel mounting bracket through which the delivery tube passes.

7.5.2 - Wilger Flow Manifolds



Wilger flow indicator manifolds allow the user to visualise the flow of product to each individual coultter 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)

7.5.3 - 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.

7.6 - Hydraulic Oil Cooler



CAUTION: Risk of burns on the fan drive system. Hydraulic components can become hot during operation.



The DSX can be equipped with an optional oil cooler the cooler attaches to the fan housing as shown below.

To ensure the cooling capacity of the cooler, clean the spaces between the fins daily with compressed air. With intensive usage (Soiling) the cooler may need to be cleaned several times a day. Please also note that the intake should be cleaned of any debris also to ensure adequate air intake and cooling capacity.

8.0 - Field Usage

8.1 - Frame Settings

Upon delivery of the drill and prior to any drilling commencing the operator should configure the drill so the underside of the toolbar is 62cm from ground level as shown in the diagram below. This allows for appropriate parallelogram travel. The Parallelograms positioning to allow for suitable travel is more important than the guideline number given above due to the number of variables involved.

To configure the above setting the user should lower the chassis until this value is achieved. Once achieved they should fit the appropriate stroke limiters to the rear lift rams. These limiters prevent the chassis from being lowered lower than required. The DSX is supplied with a number of these stroke limiters to allow the user to configure their required setting



8.1 - Performance Checks

It is recommended that the operator check the machines output at regular intervals when drilling once the machine is configured to the product. To initially configure the machine Horizon Agricultural Machinery Ltd. recommend drilling a short distance (100m) and ensure the products are placed at the correct depths with appropriate slot closure, adjusting if required and drilling 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 work 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. Sluices under the meter should be opened so any entered water can flow out.

Inside of the metering unit can be cleaned using compressed air – Wear appropriate PPE as per manufacturer's instructions as the meter will be contaminated with seed dressings/fertiliser

Coulters, hoppers, and distribution lines can also be cleaned with compressed air – Wear appropriate PPE as per manufacturer's recommendations

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)

9.2 - Storage

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

1. Hoppers should be emptied of any product (See section 6.3.5)
2. Machine should be cleaned and lubricated as per section 9.1 following all steps
3. If using a corrosion prevention agent on the machine, ensure any spray coating used is biodegradable
4. Hydraulic piston rods on the cylinders should be protected against corrosion
5. Park the machine as per section 6.1.3 ideally under a roof
6. 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 and airbrake tanks)



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

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	

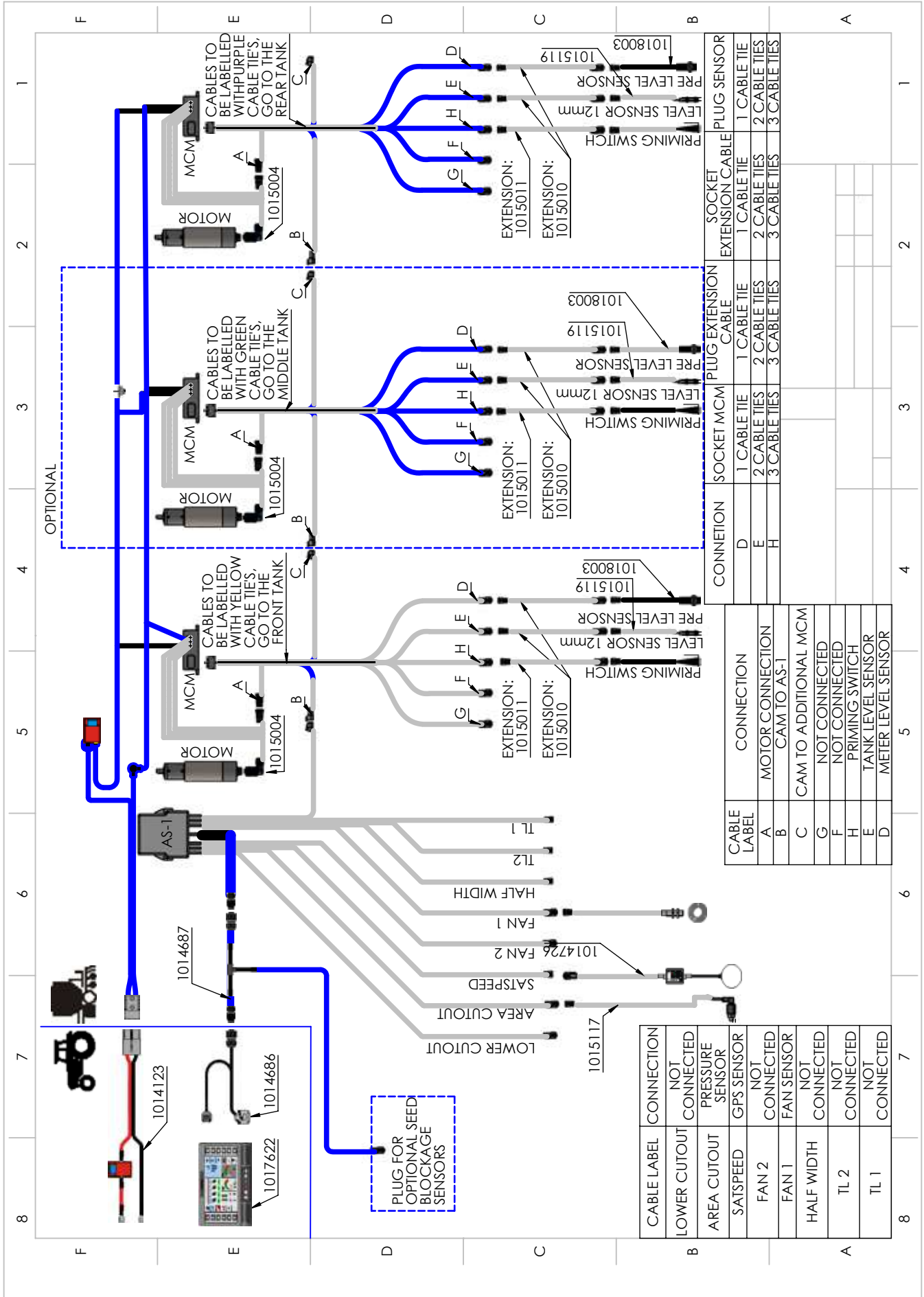
Hydraulic Fitting Torques

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

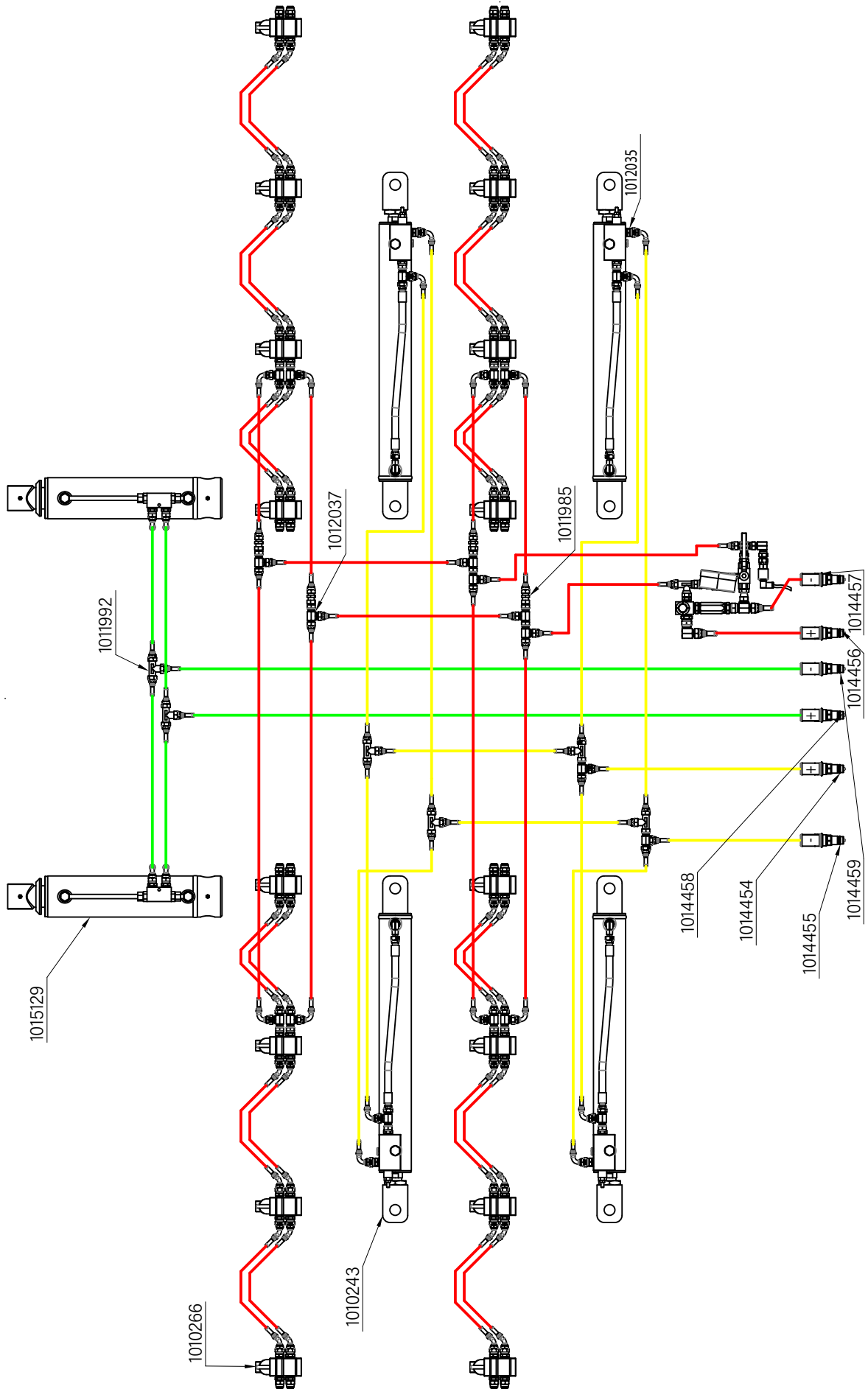
Imperial Screw Torques

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

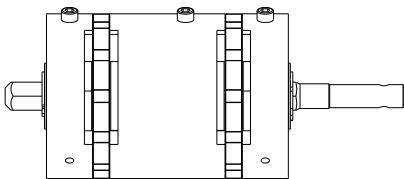
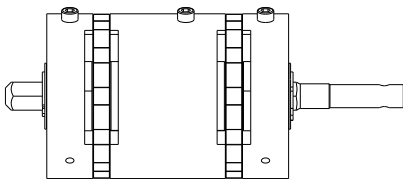
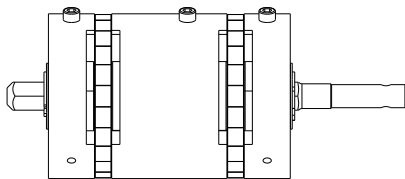
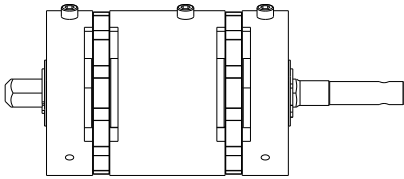
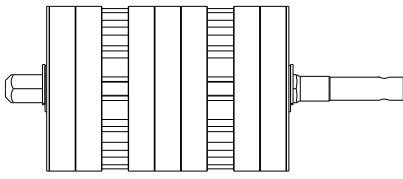
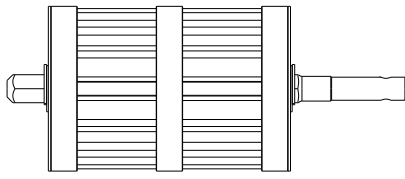
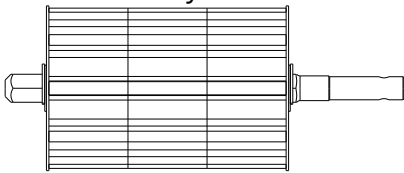
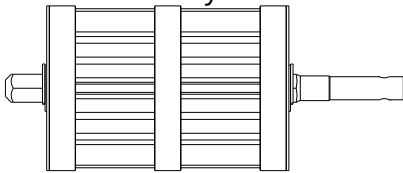
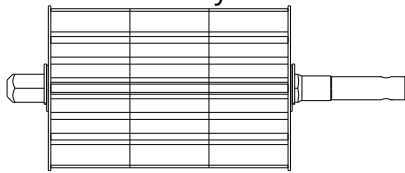
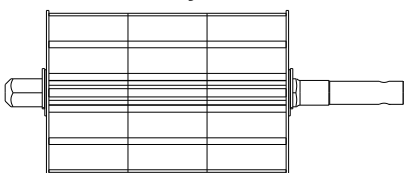
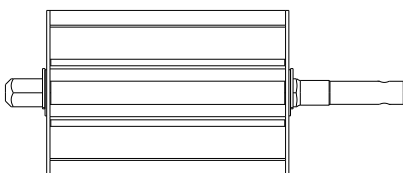
DSX Electrical Systems Arrangement



DSX Hydraulic Systems Arrangement



DSX Metering Rollers

<p>1014350 Rotor Assembly 5cc A2</p> 	<p>1014351 Rotor Assembly 10cc A2</p> 	<p>1014352 Rotor Assembly 15cc A2</p> 
<p>1017875 Rotor Assembly 30cc A2</p> 	<p>1017555 Rotor Assembly 50cc Plastic</p> 	<p>1014249 Rotor Assembly 150cc Plastic</p> 
<p>1014250 Rotor Assembly 225cc Plastic</p> 	<p>1014251 Rotor Assembly 300cc Plastic</p> 	<p>1014252 Rotor Assembly 450cc Plastic</p> 
<p>1014253 Rotor Assembly 600cc Plastic</p> 	<p>1017795 Rotor Assembly 825cc A2</p> 	



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