



Horstine MicroBand Air Applicator

Operator Manual & Parts List

Part No. H032514 - Issue 1

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1. Warranty Statement

Machines manufactured by Horstine Farmery are warranted to be free of defects in workmanship and materials for 12 months from the date as specified on the notice of delivery. This warranty applies to the first purchaser of the machine only.

Within the above stated period Horstine Farmery will replace and/or repair, at the option of Horstine Farmery, any part or component that, upon examination by Horstine Farmery or an authorised Horstine Farmery agent, is found to be defective in workmanship or materials. Any other responsibility/obligation for different expenses, damages and direct/indirect losses deriving from the machines use or from both the total or partial impossibility of use is excluded.

The repair or replacement of any component will not extend or renew the warranty period. Direct labour required to make repairs or to replace components found to be defective in materials or workmanship will be completed at no cost to the end user, however Horstine Farmery ask that any warranty work requiring less than 2 hours or labour are carried out by the owner of the machine. Horstine Farmery is not responsible for costs of transportation of the machine or components requiring repair or for service supplies such as lubricating oils or filters.

Horstine Farmery warranty obligations will be invalidated if a Horstine applicator:

- Is not used as specified in the Installation, operating and Maintenance manual delivered with the unit.
- Is not serviced and maintained according to the Installation, Operating and Maintenance manual.
- Is not maintained at the recommended service intervals.
- Has been modified, repaired, disassembled or had additions made by persons other than specified Horstine Farmery engineers without written approval.

All warranty problems should be reported directly to Horstine Farmery on 01427 838383. Horstine Farmery will authorise your local field service engineer to carry out the work required.

2. Introduction

Fig. 1

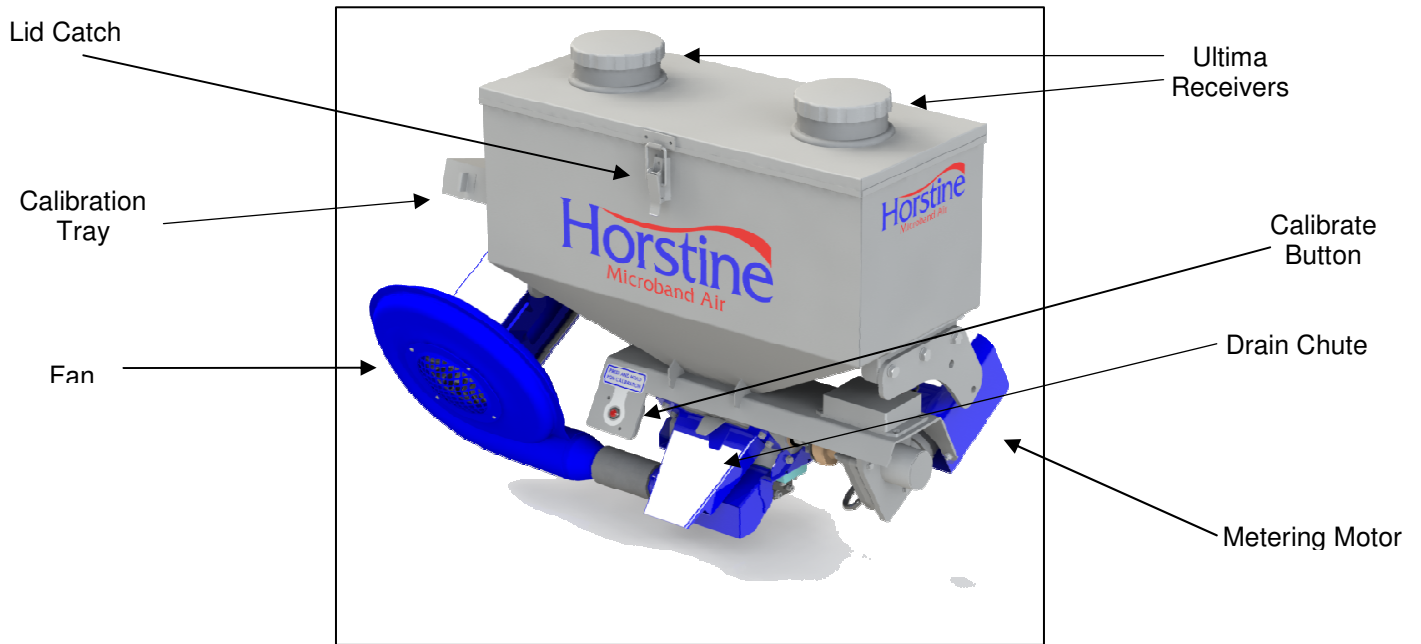
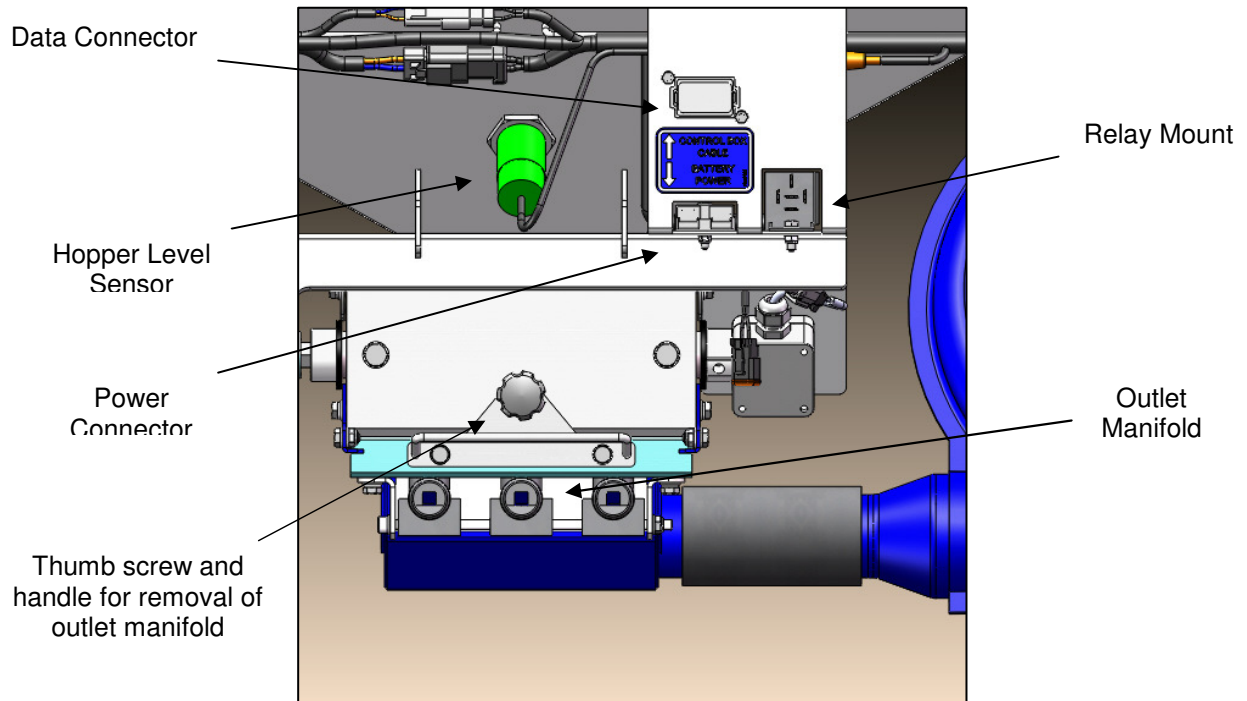


Fig. 2



This manual applies to the Horstine Microband Air applicator.

Whilst we take every precaution in selecting materials and components used in the manufacture of our machines to ensure maximum resistance to corrosion, we cannot accept liability for such damage to machines, or resulting loss of efficiency, due to neglect, improper use, or the use of unsuitable materials by the operator.

Neither can we accept any liability for damage to our machines resulting from misuse or third party negligence, or from the employment of procedures different from those specified or implied in this manual.

Our policy is to improve our products continuously and we therefore reserve the right to discontinue or change specifications, models or designs without notice or obligation.

2.1. Equipment Variants and Options

Component	Standard	Option
Hopper	70l	
Rate Controller	RDS Wizard	RDS Apollo
Delivery Equipment	10cm Fishtails	
Outlets		Two Three
Mounting Kits		Grimme GL32B/GB215/GB330 Structural PM20 Standen Pearson 2 Row
Other		Radar Speed Sensor

Optional equipment and systems manufactured by Horstine Farmery are dealt with in this manual. For equipment manufactured by other companies and fitted to the Horstine equipment please refer to the appropriate manufacturer's information supplied.

2.2. Limitations on the Use of the Machine

The machine must only be used for the application of micro-granular chemical products. Misuse or modification of the machine can cause injury, property damage or mechanical breakdown for which Horstine Farmery cannot be held responsible.

2.3. Personal Protective Equipment

Different agricultural products require differing levels of Personal Protective Equipment. If you are unsure about the level of protection required, seek further advice from the supplier of the product, or from the local office of the Health and Safety Executive.

Read product labels carefully and follow the guidance given.

2.4. Environmental

Be vigilant when working near watercourses, ditches, houses and gardens. Never leave a full or part-loaded machine parked near a watercourse.

Make sure any product spillages are cleared immediately and adhere to local regulations.

2.5. Operator's Responsibilities

The operator is responsible for ensuring that the machine is clean and fit for use, and that it is properly calibrated. The operator is responsible for the machine and any personnel within the machine's operating range. The operator must make sure that all guards are correctly fitted and in good condition, machinery that is not properly guarded must not be used.

2.6. Maintenance

Check all functions regularly (see Maintenance section) and take any remedial action immediately.

3. Fitting Instructions

3.1. Mounting the Applicator

Consult the parts book for detailed assembly drawings showing how to mount the applicator to various planting equipment.

3.1.1. Mounting Considerations

- Be sure to mount the applicator in such a position to avoid damage from moving parts or excessive vibration
- Consider the routing of the outlet hoses and wiring looms when mounting the applicator; avoid trapping points and leave slack if the machine is likely to lift or lower
- Use bolts of sufficient length and tensile strength (recommended 8.8) to ensure secure and safe mounting. If the applicator will remain mounted for a long time, lubricate bolts to avoid seizure
- The holes on the applicator's various (depending on planter) mounting brackets are slotted. With the bolts loosely in place, adjust the angle of the applicator so that it sits level when the planter is in its working position before tightening the bolts

3.2. Connecting the Power and Data Looms

3.2.1. Connecting the Power Loom

Route the power cable directly from the applicator and connect to the tractor battery loom (H206825, supplied), being sure not to impede vision or use of the controls in any way and to miss any trapping points. Leave slack on the loom to allow for the planter's movement when in use. If necessary use an extension loom (available from Horstine).

3.2.2. Connecting the Data Loom

Route the loom out of the cab without impeding vision or use of the controls in any way. Avoid trapping the cable behind or underneath any other objects in the cab. Route the cable around the planter in such a way to avoid trapping points or any moving parts. Leave some slack to allow for the planter's movement when in use. If necessary use an extension loom (available from Horstine). The 12 pin connector is designed so that it can only be inserted one way into its receptacle mounted on the machine (see fig. 2, page 5).

3.3. Headland Lift Switch

A headland lift switch can be used to automatically engage/dis-engage the applicator when the planter is lifted/lowered in to or out of its working position, without the need for the operator to use the product switch box.

The switch is wired N/O (normally open) as standard, meaning when the switch is activated it makes the circuit, thus turning the applicator off. Any position away from centre activates the switch.

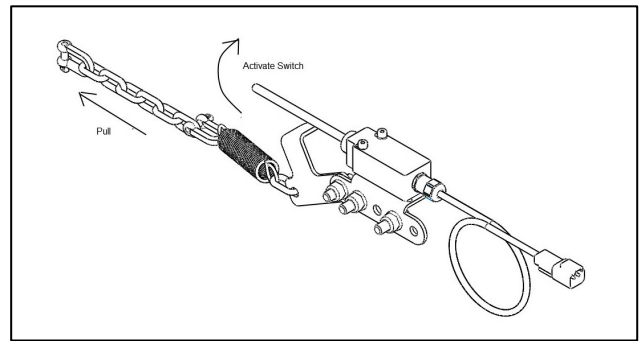
The switch can be wired to operate as a N/C (normally closed) circuit which is the opposite of the above. To do this, wiring instructions are printed on the switch's cover.

The switch connects to a 2-pin electrical connector on the applicator's wiring loom. See overleaf for instructions on fitting the headland lift switch.

3.3.1. 3 Point Linkage Mounted Implement

Fig. 3

For a 3 point linkage mounted attachment the switch should be mounted on the implement, with the chain attached to the tractor linkage. The length of the chain needs to be set, so that when the implement is in work, the chain is tensioned, activating the switch. For this application the wires would need to be swapped so the switch operates as an N/O circuit



3.3.2. Drawbar or Trailed Implement

The photo below shows one example of how the switch can be mounted to a trailed machine. For this application the switch could be wired in either N/O or N/C depending on your requirements.

Fig. 4

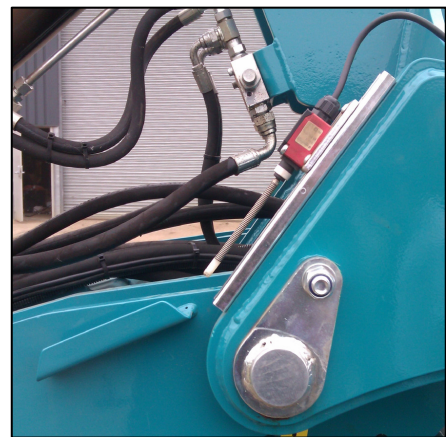
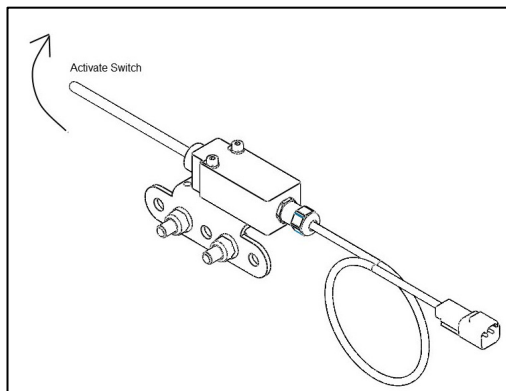


Fig. 5

3.4. Fitting the Head Unit

Both of the Microband Air head units come supplied with suction cups to attach them to the offside cab window. It must be mounted in such a way as to not restrict the view from the cab nor impede the use of any of the controls. The head unit is fitted with a 1 metre length of loom fitted with a 12 pin electrical connector that is connected to the machine's wiring loom when the machine is in use (for an image showing the location of the mating connector; see Fig. 2, page 5). Extension looms are provided. If there is a need for further extension, additional looms are available from Horstine.

3.5. Speed Sensor

The Microband Air comes supplied as standard with a GPS speed sensor, with the option of upgrading this to a radar ground speed sensor. The latter should be specified if the common operating speed of the applicator will be 2 KpH or less.

3.5.1. Fitting the GPS Speed Sensor

The speed sensor kit consists of 2 parts:

- Antenna
- GPS Speed Sensor Unit

Antenna Mounting Considerations

The following considerations must be made when mounting the GPS antenna to the cab roof:

- The antenna must be located in a place with a clear view of the sky and mounted at the highest point of the vehicle in the centre of the roof
- If the vehicle roof is non-metallic, attach the metal mounting plate via the Velcro straps. Place the antenna on the metal plate
- Avoid overhead metal objects that could interfere with satellite signals
- Avoid mounting in areas that receive excessive vibration
- Mount antenna away from sources of electromagnetic output such as radio antennas and electric motors
- Make sure the antenna's cable can be safely routed to the cab from the mounting position

GPS Speed Sensor Installation

- Place the speed sensor in a position inside the cab that is easily visible while driving
- Mount the sensor using 2 screws or Velcro
- Connect the sensor cable to the Deutsch connector on the head unit loom
- Connect the antenna cable to the SMA connector on the rear of the sensor

GPS Speed Sensor Operation

The speed sensor inside the cab has a 3 LED display. The LED's display the following:

- The top (or left) LED shows a tractor and directional arrow; when a speed signal is present the LED will blink
- The middle LED shows that a GPS signal is detected. The light will blink consistently when the vehicle moves. If the vehicle is stationary the LED will blink irregularly
- The bottom (or right) LED will be lit when power is present

3.5.2. Fitting the Radar Speed Sensor

For fitment instructions for the radar speed sensor, please refer to the manufacturer information provided with the sensor.

4. Machine Set Up

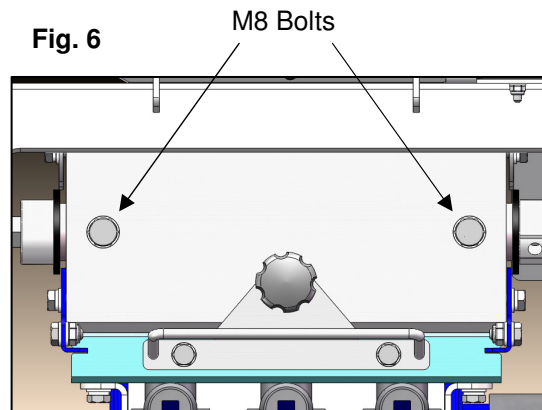
4.1. Mounting and Routing the Outlets

- Mount the outlets behind the planter tine using the brackets provided (refer to parts book)
- Route hose from the applicator outlet(s) to its desired position and cut to length. Try to ensure that the hose is always on a downward gradient away from the applicator when in its working position. Failure to do so may result in failure to achieve target application rate
- Attach hose to outlet and secure with Jubilee clip (provided)
- When routing the hose ensure that their route avoids snagging and catching on the ground or any moving parts. Keep the length of the hose such that it remains taut and avoid excessive bends or curves to achieve good flow of product

4.2. Changing the Number of Outlets

Due to the Microband Air's capability to fit to a variety of different planters, there may be a need to change the number of outlets from 3 to 2, or vice versa. This can be done without the need for additional parts.

- Remove the R clip located at the motor end of the shaft and remove the drive motor coupling
- Remove both of the M8 bolts located above the outlet manifold (see Fig. 6)
- Slide the metering cassette assembly out of the housing towards the fan end
- Rotate the entire assembly 180°
- Slide the entire metering cassette assembly back into the housing
- Replace drive motor coupling, R clip and M8 bolts



4.3. Changing Rotors

If the desired rates cannot be achieved by adjusting the rotor setup currently fitted to the Microband Air, rotors of differing outputs can be sourced from Horstine. Horstine can advise you as to which rotors you require. When calling to enquire about the possibility of fitting different rotors, it is useful to know the following:

- Required rate (kg/ha)
- Preferred forward speed (km/h)
- Number of outlets
- Row spacing / spread width (m)
- Current rotors fitted (see parts book)

Refer to section 4.2 for instructions on removing and disassembling the metering shaft assembly. Refer to parts book for information on re-assembling the metering shaft with new rotors.

5. Controller Overview

The Horstine Wizard applicator control system enables fully automatic control of the output rate of Horstine applicators.

The Wizard automatically maintains a preset application rate as forward speed varies, with on-the-go adjustment of rate. The instrument measures and indicates:

- Forward speed (km/h)
- Part and total worked areas (ha)
- Product application rate (kg/ha)
- Low hopper level

There are also audible and display alarms for:

- Minimum/maximum forward speed (beyond which the programmed product rate cannot be maintained)
- Feed motor stopped (no feedback)

The head unit is powered on and off via a toggle switch on the rear of the instrument.

Area totals and all calibration data are automatically stored in memory when the instrument is powered off.

The system must be initially calibrated for the product being applied. Product calibration is very simple to undertake via a calibration switch mounted to the machine.

5.1. Changing Settings

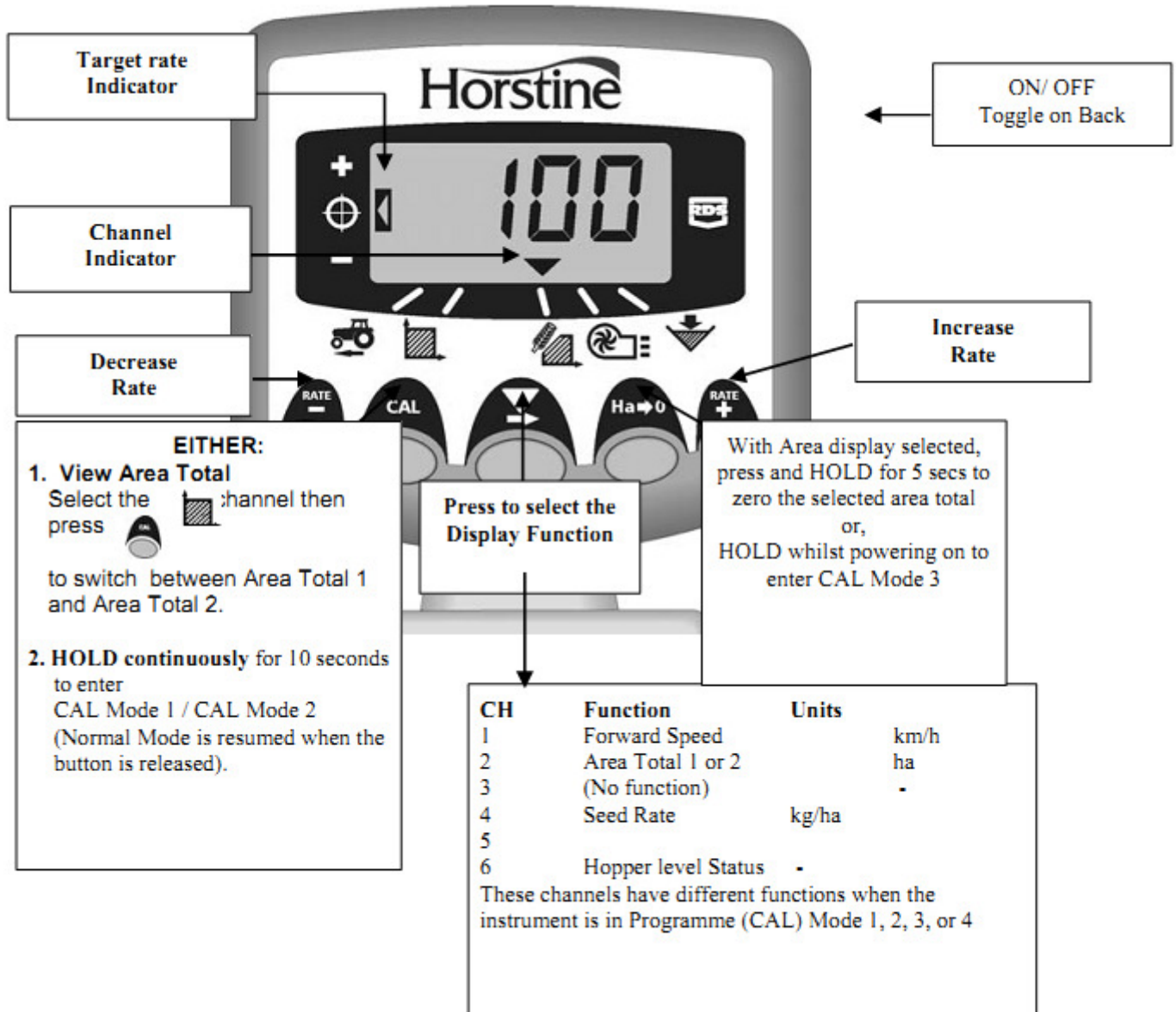
Refer to section 5.3. (Programme Functions and Fault Diagnosis) for a guide to inputting figures required.

There are 4 programming modes with various calibration factors and default settings. Access to the programming modes is required for some settings that may be changed as part of the normal operating procedure. Changing these settings is described with the operation instructions.

5.2. Normal Operating Mode

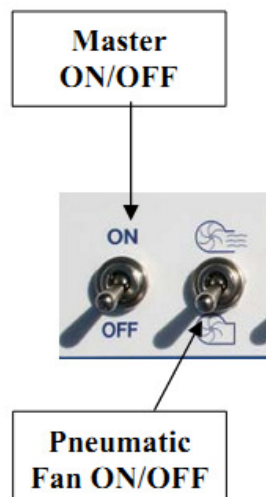
5.2.1. Head Unit Layout

Fig. 7



5.2.2. Switch Box Layout

Fig. 8



5.2.3. Power On/Off


Switch the head unit on via the toggle switch on the rear of the instrument.

This instrument should power up and display the software version installed (e.g. 'A.604' then 'E.001' then 'R.002'). It then enters its normal operating mode and displays the forward speed channel.

Select any other channel by pressing the  button once or more.

When the drill is out of work, the instrument will continue to display the selected channel.

5.2.4. Work Status Indicator

The  chevron indicator along the bottom of the screen is used to indicate the channel to which the information on the display relates. It also shows the working status of the drill. If the cursor is flashing then the drill is out of work, if the cursor is on continuously then the drill is in work.

5.2.5. Starting and Stopping the Applicator

The Master on/off switch is used to manually switch the feed motor on and off when the applicator is in work. The applicator can also be fitted with a Headland Cut- off Switch, to automatically turn the stop the product when the machine implement is raised on the headland.

5.2.6. Pre-Start Function

In certain applications there can be a delay in the dispensing of product caused by the speed sensor not functioning accurately below 0.5 km/h. On commencing a bout, the product motor only starts as you begin moving off. However, it takes a short period for the product to traverse the pipe to the outlet. The result is an unapplied area at the beginning of a bout.

To counteract this there are two functions of Automatic Pre-start Function:

When Function is ON (Mode 2, Ch 4):

When the Master is switched ON, either on the master switch or by the headland cut-off activation, the rotors will turn for the Pre-Start Time at the "Motor Calibration Speed".

Pre-start Time (Mode 2, Ch 6)

This is the time that the metering will operate for at the "Motor Calibration Speed" when the pre-start is initiated. If after this time period the forward speed is greater than 0.5 km/h then normal motor control will resume. If the forward speed is below 0.5 km/h then motor operation will be inhibited and the low forward speed alarm will be triggered.

When Function is OFF (Mode 2, Ch 4):

Press and hold "RATE +" when the implement is stationary on the headland. As the vehicle moves off the rotor will being to turn.

The pre-start function is timed to run the motor at the calibration speed for a number of seconds equal to the applicator width in metres (e.g. 4m drill = 4 seconds pre-start). After this time and when the applicator is moving forwards, the system reverts to normal proportional control for the seed rate set. However, if after this time the applicator is still stationary, the metering unit will automatically switch off.

5.2.7. Cut-out Alarm

If the forward speed exceeds 2km/h with the machine 'out of work', the instrument will alarm by beeping and flashing 'C.out' every 5 seconds. The alarm will continue until the applicator is lowered into work.

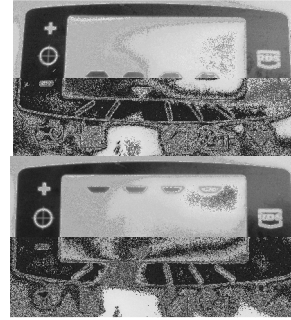
5.2.8. Units

The units can be changed between metric and imperial. The four dashes at the top indicate metric, and at the bottom indicate Imperial.

(Mode 2, Ch 3)

See Section 4.4 – Units

Fig. 9

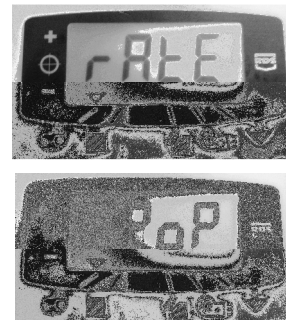


5.2.9. Rate Selection

The display will show 'rAtE' indicating that the units are either Kg/Ha (metric) or lb/Acre (imperial). Using the chevron this can be changed to show 'PoP' indicating that the units are seed population i.e. seeds/m² (metric) or seeds/yard² (imperial)

(Mode 3, Ch 1)

Fig. 10



5.2.10. Thousand Grain Weight

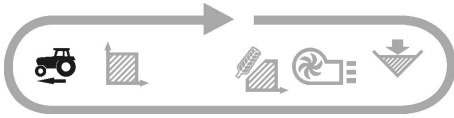
This value is the 'Thousand Grain Weight' (T.G.W) in grams, this being used to enable the instrument to show a seeding population (seeds/m² or seeds/yard² depending upon units).

If units are set to imperial, the weight is shown/ programmed in ounces.

(Mode 3, Ch 2)

5.2.11. Forward Speed Display

View Forward Speed



The forward speed is derived from a GPS sensor fitted either to the applicator, or the tractor, depending on your particular installation.

Fig. 11



Minimum Speed Alarm

As part of product calibration, based on the resulting calibration factor, the instrument automatically calculates the minimum forward speed below which the system cannot maintain the programmed application rate.

With the applicator in work, if the forward speed goes below this threshold the instrument display defaults to channel 1, flashes the actual speed and beeps continuously. The alarm will continue until speed is increased above the threshold. It may be cancelled temporarily by selecting another channel but will revert to channel 1 and repeat the alarm after 30 seconds until speed is increased.

NOTE: The application rate will not remain proportional below the minimum speed threshold. The feed motor cannot run below 3 rpm, resulting in over-application.

5.2.12. Speed Sensor Calibration

The Horstine Wizard kit comes as standard with a GPS speed sensor. This requires no calibration. However if another speed sensor is used, e.g. Radar, then the following calibration procedure applies.

The forward speed is derived from the speed sensor factor (SSF) – the distance travelled in millimetres per pulse received from the radar speed sensor. The default factor is 7.8mm per pulse from the sensor. This will only result in a correctly displayed speed if the sensor is fitted facing the ground at the correct angle.

Failure to programme the correct speed sensor factor will result in the drilling rate being displayed incorrectly. Auto-calibration is likely to be more accurate than manual calibration and therefore it is recommended to perform an 'Autocal' routine (see overleaf).


5.2.13. 'Autocal' Speed Calibration

Auto-calibrate in field conditions for maximum accuracy.

Fig. 12

1. Place two markers 100 metres apart and position some reference point on the tractor (e.g. the cab step), opposite the first marker.

2. Select the forward speed channel.


3. Press and hold the  button until the cal factor appears on the display.

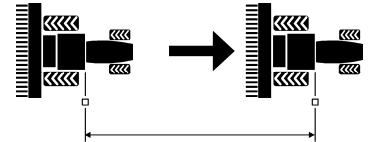
4. Continue holding the  button and press the  button.

The display will show "AUtO" ready to start the test run.

5. Drive up to the second marker and stop exactly opposite the marker. The instrument counts and displays the pulses received from the speed sensor over the measured distance.

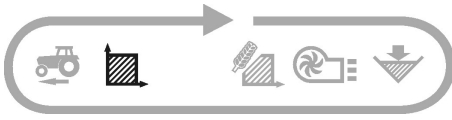
NOTE: The instrument only displays up to 9999. Beyond this number of pulses it displays the first 4 digits of a five-digit number, however the pulses are still being counted internally.

6. Press the  button. The calibration factor is automatically calculated and stored in memory. The instrument then returns to the normal display mode.




5.2.14. Area Display

View Area Totals



The area display is derived from the forward speed input and the programmed implement width.

There are two area registers. Each can be independently reset to zero.

Press  to toggle between the two area registers 'tot.1' and 'tot.2'.

The display then shows the area accumulated since that total was last reset.

Zero Area Totals

1. Select the total 1 or total 2 and release.

2. HOLD  for 5 seconds.

The display flashes and the instrument sounds 5 beeps, before the total resets to zero.

Fig. 13



5.2.15. Set Implement Width

1. Select the Area Total channel ()


Fig. 14

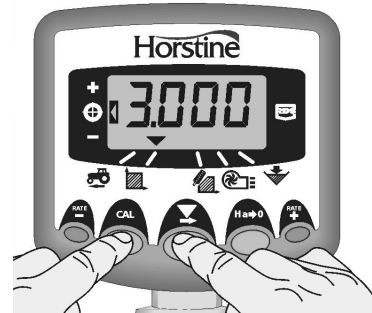
2. Press and hold the  button for 5 seconds. The display will flash "tot.1", then "tot.2" then show the programmed implement width.

Default width = 4 metres.

3. Continue holding the  button and PRESS  to select the digit/decimal point to

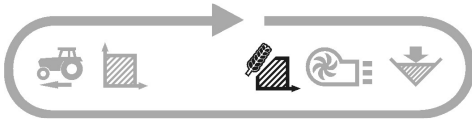
4. HOLD  to change the digit (or move the

5. Release the  button to return to the normal display mode.



5.2.16. Drilling Rate Functions

View Drilling Rate





This channel displays the current drilling rate in Kg/Ha only.

The resolution for Kg/Ha units is:

0 to 24.9	0.1 Kg
25 to 250	1 Kg
250 to 9995	5 Kg

Adjusting the Drilling Rate

Press the **RATE**  button to decrease the drilling rate.

Press the **RATE**  button to increase the drilling rate.

The rate adjusts by the % step programmed in programme mode 3, i.e. 5%, 10%, 15%, 20% or 25% of the programmed target or base drilling rate.

Drilling Rate Indicator

The left indicator is used to remind the operator of his drilling rate.

When the indicator is in position 2, then the drill is operating at the target rate.

If the indicator is in position 1 then the actual rate is increased from the target rate.

If the indicator is in position 3 then the actual rate is decreased from the target rate.

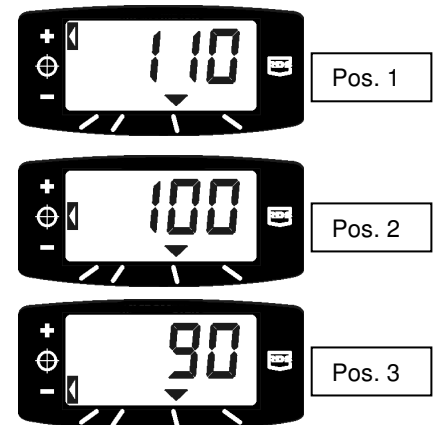
If within the operating mode the seeding rate is not at the target (left indicator is in either position 1 or 3), then after pressing and holding the 'CAL' switch the number displayed begins to flash (after 5 seconds). This number will now become the new target seeding rate (left indicator moves to position 2). On releasing the 'CAL' switch the instrument will revert to normal operating mode.

If in the operating mode the seeding rate is at the target (left indicator is in position 2), then after the 'CAL' switch is pressed and held for 5 seconds the number will flash (whilst the 'CAL' switch is pressed and held the instrument will indicate the currently selected units, as per section H.2.1). When the number is flashing the 'CAL' switch can then be released. Whilst the number is flashing the '-' & '+' switch's can be used to change the value. The longer the switch is held, the faster the number is cycled. When the desired number is shown, press and hold the 'CAL' switch for 3 seconds to revert back to normal operating mode.

Fig. 15



Fig. 16



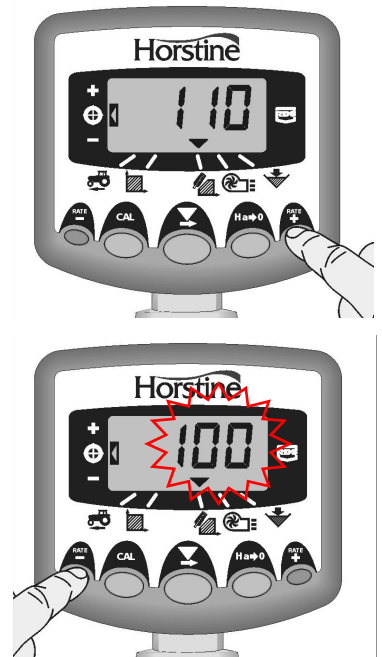
5.2.17. Changing the Target Rate

If the drilling rate is currently at the target rate (the rate indicator at position 2), then:-

1. With the rate display selected, press and hold either the ^{RATE} + button or the ^{RATE} - button for 5 seconds, then release the button. The display will flash.
2. Press and hold either the ^{RATE} + button to increase the target rate, or the ^{RATE} - button to decrease the target rate. The longer the switch is held, the faster the number changes.
3. When the desired target rate is displayed, press and hold the ▼ button.



The instrument will beep 5 times and the display will alternate between the set rate and the calculated minimum forward speed for that rate. After 5 seconds the instrument will display 'done' after which the button can be released to return to normal operating mode.

Fig. 17



5.2.18. Set % Step for Rate Offset

This sets the amount by which the rate is adjusted away from the target rate when you press the ^{RATE} + or ^{RATE} - buttons.

1. Press and hold the  button as you switch the instrument on. The instrument is then in programme mode 3 on channel 1.
2. Press  to select channel 3. The display will show a number indicating the % step (5 - 25% in 5% increments).
3. PRESS ▼ to select the required % step.

Switch off and on again to resume normal operating mode.

Fig. 18



5.2.19. Hopper Level Alarm



When the hopper level sensor is uncovered, the instrument defaults to the hopper level channel (▼), beeps 5 times and flashes 'ALAR' every 30 seconds.

The alarm can be cancelled temporarily by selecting another channel, but will revert to the hopper level display and repeat the alarm after 30 seconds until the hopper is refilled.

5.3. Programme Functions

Programme (CAL) modes 1-4

Some settings do not need to be accessed during normal operation, unless the system is transferred to another implement. Those settings that need to be accessed during normal operation are explained in the operators' section (sections 3 - 7) of the manual.

	Mode 1	Mode 2	Mode 3 (Product calibration)	Mode 4
Mode Entry	From normal display mode, select channel and hold CAL button continuously	Press and hold CAL button for 10 seconds while switching instrument on	Press and hold HA-0 button while switching instrument on	Press and hold RATE+ button for 10 seconds while switching instrument on
Channel selection	-	Press CAL button	Press HA-0 button	Press RATE+ button
Channel 1	Speed Sensor Factor [7.69 mm/pulse] (see section 3)	Simulated Speed [10 km/h]	Rate Selection (RATE)	Pulses/metering unit rev. (see table 7.1)
Channel 2	Implement Width [4.0 m] (see section 4)	Grand Total Area [ha]	Thousand Grain Weight (45.0g)	Response *[300]*
Channel 3	-----	Units (Metric – Top)	Rate - % Step [5%] (see section 5)	Maximum Metering Speed (70 rpm)
Channel 4	Seed calibration factor [0.5 kg/rev]	Automatic Pre-Start Function (OFF)	Expected Weight (0-9999 grams) (see section 5)	Motor Calibration Speed [35 rpm]
Channel 5	Fan Low Speed Alarm [2700]	Fan High Speed Alarm [4500]	Minimum Fwd speed (nc) (see section 5)	Fan PPR [0.000]
Channel 6	Hopper Level Alarm On / Off [On]	Pre-Start Time (4.0s)	Maximum Fwd Speed (nc) (see section 5)	Minimum Metering Speed [3.500 rpm]

* If while operating at low forward speeds and rates, the motor operates intermittently/stalls increase this figure to 500. If higher rates are used and the controller does not get to the desired rate quick enough, increase this figure to 1000.

nc – non-changeable

Pulses per Metering Unit Revolution (Table 7.1)

Drive type	Pulses / Rev
Hydraulic general	30
MICROBAND	200
MICROBAND AIR – 2 OUTLET - Dunkermoteren	432
3 OUTLET - NBC motor	200
As above but RDS Motor	600
PROSEED	368

5.4. Units

Function	Channel	Mode	Metric	Imperial
Forward Speed	1	Operating	Km/h	Mph
Area	2	Operating	Hectares	Acres
Rate1	4	Operating	Kg/Ha	lb/acre
Rate2	4	Operating	Seeds/M ²	Seeds/yd ²
Speed Sensor Factor	1	1	mm/pulse	Inch/pulse
Width	2	1	Metres	Inches
Calibration Factor	4	1	Kg/Rev	lb/rev
Simulated Speed	1	2	Km/h	Mph
Thousand Grain Weight	2	3	Grammes	Ounces
Calibration Weight Entry	4	3	Grammes	Ounces

5.5. Fault Diagnosis

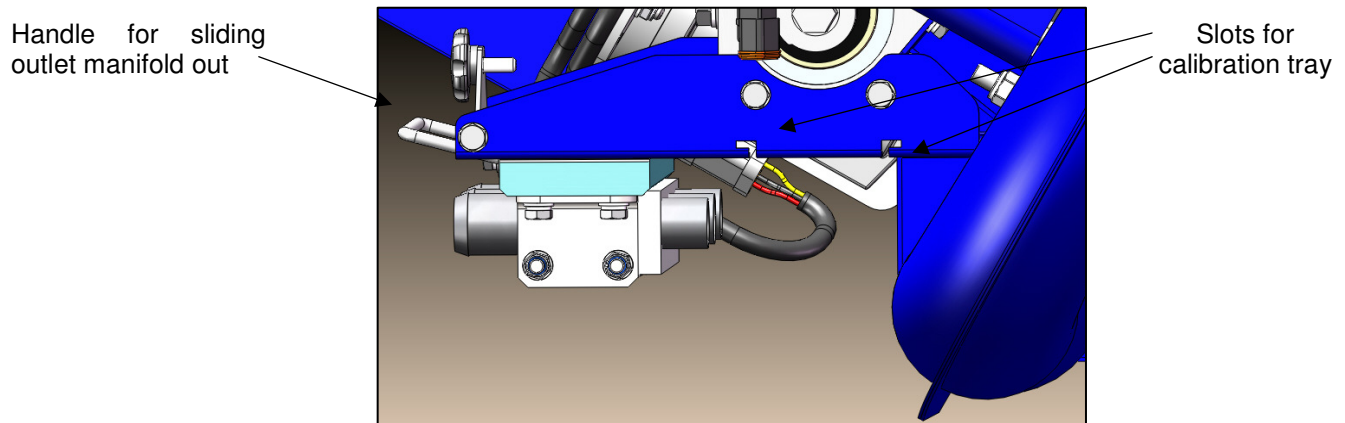
Condition	Possible reasons
When in work and moving the Instrument displays 'C.out' and beeps every 5 seconds	The forward speed is above 2km/h while the drill is out of work. The cut-out switch is not operating correctly when the drill is lifted or lowered.
When in work the instrument flashes 'AL Ar' and beeps.	Hopper level is low.
When in work the instrument defaults to the rate channel, displays 'StAL' and beeps every 30 seconds. The metering roll does not turn.	The metering motor has stalled. It is automatically stopped to prevent further damage. Investigate the metering mechanism.
When in work the instrument defaults to the application rate channel, flashes a rate lower than the target and beeps continuously.	The application rate is low because the forward speed is too high and the target motor speed cannot be achieved. Reduce your speed or change the metering rotors and recalibrate.
When in work the instrument defaults to the forward speed channel, the speeds display flashes and beeps continuously.	Forward speed is too low. The metering unit is at its minimum possible rpm. Increase your speed, or if this would be too fast, change the metering and recalibrate.
	<i>If you find that the minimum forward speed is too high at low application rates you should change the feed roll to a lower volume roll and redo the product calibration.</i>

6. Calibration

6.1. Preparing the Machine for Calibration

- Undo the thumb screw located above the outlet manifold (see fig. 2, page 5) and using the handle, slide the entire manifold away from the base of the machine
- Remove the calibration tray from the side of the hopper (see fig. 1, page 5)
- Slide the calibration tray into the slots underneath the metering unit (see fig. 19)

Fig. 19





- When calibration is complete, replace the calibration tray on the side of the hopper and slide the outlet manifold back underneath the metering unit. Re-tighten the thumb screw to secure manifold in place.


See overleaf for details on performing a product calibration.


6.2. Performing a Product Calibration


1. Ensure the rotors in the cassette assembly are appropriate for the intended product type, application rate and forward speed range for application (see section 4.2)
2. Ensure your desired Application Rate is entered into the Wizard controller (see section 5.2.17).
3. Place the calibration tray in position to collect product from underneath the metering unit (see section 6.1).
4. The master on/off switch should be in the off position. On pneumatic applicators the following instructions apply:
Collecting the product at outlet – ensure the fan is switched ON
Collecting product underneath the metering unit – ensure the fan is switch OFF
5. To start the calibration process press and hold the calibration button. This button is located on the frame of the machine (see fig. 1, page 5).
6. The instrument automatically switches to the programme mode, and the display will count up the theoretical weight (in grams) of product, based on the calibration factor. The rotors will turn at the Motor Calibration Speed (see section 5.3).
7. Once you have dispensed sufficient product, release the calibration button and weigh the product metered out from all the outlets. The theoretical weight will remain flashing on the display.

NOTE: If the calibration switch is held for long enough to exceed 9999 grams then the instrument will simply show 'HiGh'. The procedure should be started again.

8. Adjust the displayed weight to match the measured weight using the  and  buttons.

9. Press the  button once to display the calculated Minimum Forward speed (see note).

10. Press the  button once to display the calculated Maximum Forward speed (see note).

11. Press the  button again to save the new calibration factor. The instrument displays 'done' to indicate the new factor is now stored. After 3 seconds the instrument reverts back to the normal operating mode.

NOTE :If you find that you cannot achieve your desired field speed, firstly check you entered the correct application rate. If so then you will be required to re-configure the rotors so you can achieve the desired application rate at that speed. E.g. if the maximum speed is too low, you will require higher capacity rotors, and vice-versa.

7. Pre-Operation Checklist

- Ensure rotors are correct for desired application. You can refer to the rotor calculation chart on the website; www.horstinefarmery.com
- Check that the outlet configuration in the metering unit is correct for the desired application (see section 4)
- Ensure all power and data connections to the machine and in the cab are connected correctly
- Ensure that the speed sensor is fitted and properly calibrated if required (see 5.2.12, 5.2.13)
- Ensure that the outlets are all fitted securely and hoses are routed 'out of harm's way'
- Check settings of the Pre-Start function on the RDS Wizard box (see 5.2.6)
- Ensure that the applicator has been properly calibrated for the product being used (see section 6)

8. Maintenance

8.1. Daily Maintenance

- Empty the hopper of any left over product using the drain chute (see fig. 1, page 5), catching product in a suitable container. Refer to advice supplied with product for information on storing product and PPE required for handling
- Remove outlet manifold from underside of metering housing and allow any excess granules to fall out. Brush out any excess granules/dust. Leave the manifold off to prevent build up of moisture/condensation

8.2. Weekly Maintenance

- Perform usual daily maintenance checks as listed above
- Check for any chipped paint and touch up as necessary
- Remove the rotor assembly from the metering unit housing. Check for wear of components and use a soft brush to remove any excess granules or dust

8.3. At the End of the Season

- Perform all other checks as described above
- Remove both the inlet and outlet manifolds and upturn so that any debris inside the hoses falls out
- Remove the outlet manifold from the underside of the machine. Remove the rotor assembly from the metering unit housing. Thoroughly check all components of the metering unit and rotor assembly for wear of components and replace if necessary. Leave unit disassembled to prevent any seizure of moving parts while in storage
- Clean the machine using a dry cloth or brush. Horstine advise you not to pressure wash machines that are used with chemical products as water can become contaminated and affect the environment
- Thoroughly inspect paintwork. Touch up any chips
- Blow the machine with an airline to remove excess dust etc.
- Prop the lid slightly open in preparation for storage. This will prevent build up of condensation
- Store in a dry place. Cover if possible

9. Legal Documentation

CHAFER MACHINERY LIMITED
Standard terms and conditions of sale

1. GENERAL

1.1 In these terms and conditions the following expressions shall have the following meanings:

- 1.1.1 "Seller" means Chafér Machinery Limited; "Buyer" means the party contracting with the seller as buyer of the equipment or spares;
- 1.1.2 "Contract" means the contract for the seller to supply the equipment or spares to the buyer, such contract shall comprise the Sales Order (for Equipment purchases) or Parts Note (for Spares purchases) and these terms and conditions. In the case of any conflict between these terms and conditions and the Sales Order or Parts Note, these terms and conditions shall prevail;
- 1.1.3 "Equipment" or "Used Equipment" means machinery, apparatus and equipment of all kinds or their constituent parts, which are to be supplied by the Seller to the Buyer pursuant to the Contract together with manuals ("the Manuals") sufficient to enable the Buyer to operate the Equipment;
- 1.1.4 "Spares" means approved replacement parts for equipment supplied by the seller;
- 1.1.5 "Quotation" means the Seller's quotation to supply the Buyer with the Equipment;
- 1.1.6 "Sales Order" means the Buyer's order, prepared by the Seller, for the Seller to supply the Equipment and "Sales Order Amendment" shall mean any subsequent revision of such Sales Order. In the event of any conflict between the Sales Order and the Quotation, the Sales Order shall prevail.
- 1.1.7 "Parts Note" means the Seller's parts note.
- 1.2 Sales Orders or Parts Note are accepted and Equipment or Spares supplied by the Seller only under the Contract, which contains the entire terms and conditions relating to the sale of the Equipment or Spares. They override and exclude any other terms and conditions including the Buyer's standard or printed terms and a condition of purchase and the buyer understands that such terms and conditions of purchase if printed on orders or other documentation shall have no contractual effect. No alteration, amendment or modification shall be valid unless recorded in writing and signed by duly authorised representatives of both parties.

2. OFFERS AND ACCEPTANCE

2.1 The Contract shall only come into existence once the Seller has received and accepted, by signing, the Sales Order. The Sales Order must be returned unamended and signed by the Buyer within 30 days of the date of its issue and until signature by the Seller the Seller shall be under no obligation to the Buyer. It is the Buyer's responsibility to ensure that the details on the Sales Order are accurate. The Seller may withdraw any Quotation and Sales Order at any time prior to acceptance.

2.2 The issue of a Parts Note by the Seller shall signify the acceptance of the Buyer's order. Until such Parts Note has been issued the Seller shall be under no obligation to the Buyer. The Seller may withdraw any Quotation at any time prior to acceptance.

3. PRICES, PAYMENTS AND PART EXCHANGE

3.1 The price for the Equipment or Spares is set out in the Sales Order or Parts Note (the "Price") and may be subject to amendment by the issue by the Seller of a Sales Order Amendment or Parts Note amendment any time prior to Delivery. The Price is, unless otherwise indicated, inclusive of delivery for Equipment within the mainland UK but exclusive for Parts. All prices are exclusive of value added tax, which the Buyer shall be additionally liable to pay to the Seller. The Seller will endeavour to maintain, but may alter, the Price without notice both before and after acceptance thereof to take account of changes in the Seller's costs.

3.2 The Seller shall, in particular, have the right to increase the Price to reflect any increase in its costs resulting from:

- 3.2.1 any alteration in or addition to the Buyer's requirements;
- 3.2.2 the Buyer's instructions or lack of instructions;
- 3.2.3 any interruptions, delays, additional or overtime work arising from causes for which the Seller is not directly responsible; and/or
- 3.2.4 any increase in (or new) tax, duties or levies (including VAT) imposed on the Equipment.

3.3 For Equipment sales the payment date for cash settlement is on or before the date of Delivery unless otherwise stated.

3.4 For Spares sales the payment date is 30 days following the date of Delivery unless otherwise stated.

3.5 Interest on all sums due from the Buyer but not paid on or before the due date shall accrue and be paid by the Buyer at the rate of 1% per calendar month or part calendar month until payment is received by the Seller after as well as before any judgement.

3.6 Neither party is entitled to deduct or set off any sums against invoiced amounts.

3.7 Where the Sales Order includes the part exchange by the Buyer of equipment owned by the Seller together with all relevant manuals (the "Used Equipment") the following provisions shall apply:

- 3.7.1 the Sales Order shall give details of the Used Equipment and the price to be paid by the Buyer for the Used Equipment excluding VAT;
- 3.7.2 the Buyer warrants that the Used Equipment is sold by it with full title guarantee and free and clear from all liens, charges and encumbrances and that the Used Equipment is of satisfactory quality and is fit for the purpose for which it is transferred to the Seller;
- 3.7.3 the Buyer warrants that the Used Equipment is in good working order and has been thoroughly cleaned and flushed using an appropriate cleaning agent and that it has notified the Seller in writing of any defects of which it is aware in the Used Equipment and/or its operation;
- 3.7.4 legal and beneficial ownership of and property and risk in the Used Equipment shall pass to the Seller on Delivery;
- 3.7.5 the Buyer shall provide to the Seller a VAT invoice in respect of the Used Equipment, dated on or after the date of delivery complying with all relevant UK laws and regulations;
- 3.7.6 the Used Equipment shall be made available for collection by the Seller at the time of Delivery of the Equipment, or where the Equipment is to be collected by the Buyer, the Used Equipment shall be delivered to the Seller's premises by and at the cost of the Buyer at such time as is agreed by the Seller;
- 3.7.7 the Seller shall pay for the Used Equipment on the 30th day of the month following the month of receipt of the VAT invoice provided by the Buyer under 3.6.5 above; The Buyer shall fully and effectively indemnify the Seller in respect of the breach of any of the warranties given in this Clause 3.7.

4. DELIVERY/COLLECTION

4.1 Dates and times given for completion or delivery of the Equipment or of any stage or process are given as estimates only and shall not constitute a term or condition of the Contract. Time shall not be of the essence. In no circumstances shall the Seller be liable to compensate the Buyer for non or late delivery of the Equipment or Spares or from any consequential or other losses arising therefrom. While the Seller will use all reasonable endeavours to meet any time estimate it reserves the right to amend any estimate without notification. The Seller may use any route and means it may select for the delivery of the Equipment.

4.2 The Seller shall be entitled to deliver the Equipment or Spares in one or more consignments. The Seller shall be entitled to render its invoice for such Equipment as has been so delivered and to receive payment thereof in accordance with the Contract notwithstanding that the remainder of the Equipment or Spares has not been so delivered.

4.3 Delivery of Equipment ("Delivery") shall be completed when, if the Equipment is delivered by the Seller, it is unloaded from the delivery vehicle or, if collected by the Buyer, when the Buyer has signed for the Equipment. Where Used Equipment is to be part exchanged it is a condition of completion of Delivery of the Equipment by the Seller that the Used Equipment is made available to the Buyer.

4.4 Delivery of Spares ("Delivery") shall be completed when, if the Spares are delivered by the Seller, they are unloaded from the delivery vehicle or, if posted, when the Spares are posted, or, if collected by the Buyer, when the Buyer has signed for the Spares.

4.5 If the Buyer refuses (other than for reasons specified in Clause 8) to take delivery of the Equipment or Spares the Seller may arrange for storage of the Equipment or Spares on the Buyer's behalf but without liability for any loss or damage occurring after the attempted delivery date. The Buyer shall, in addition to the Price, pay on demand all reasonable storage, insurance and transport costs occasioned by its failure to take delivery and, in the case of Used Equipment to be collected by the Buyer, any additional transport costs incurred in respect of the collection of the Used Equipment.

5. PROPERTY AND RISK

5.1 Risk of loss or damage to the Equipment or Spares shall pass to the Buyer upon Delivery.

5.2 Legal and beneficial ownership of and property in the Equipment or Spares shall not pass to the Buyer until all sums payable in respect of all the Equipment or Spares (the "Full Price") have been received in cleared funds by the Seller and until such receipt the Buyer shall hold the Equipment or Spares as bailee for the Seller and the following provisions of this Clause 5 shall apply.

5.3 The Buyer shall (so far as is reasonably practicable) store the Equipment or Spares separately from Equipment or Spares of any third party and clearly identify the Equipment or Spares as the Equipment or Spares of the Seller.

5.4 All payments shall be applied to and deemed to be made in respect of invoices in the order in which they were issued and to Equipment or Spares in the order in which it is listed in invoices.

5.5 The Buyer shall not sell or dispose of any Equipment or Spares (or documents of title thereto, or any interest therein) except in the ordinary course of business and then as fiduciary agent for the Seller. The Buyer shall hold the proceeds of sale on trust in a separate bank account for the Seller and pay to the Seller the full proceeds of sale forthwith upon demand by the Seller.

5.6 The Buyer shall not:

- 5.6.1 pledge any Equipment or Spares or documents of title thereto or allow any lien to arise thereon; or
- 5.6.2 use or process any Equipment or Spares other than in the ordinary course of the Buyer's business.

5.7 If:

- 5.7.1 payment for any Equipment or Spares is overdue in whole or in part; or
- 5.7.2 the Buyer becomes insolvent or bankrupt, or enters into liquidation (otherwise than for the purposes of amalgamation or reconstruction), or passes a resolution for winding up or has a receiver, administrative receiver or manager appointed, or enters into any composition or arrangement with its creditors or suffers any similar action in consequence of debt; or
- 5.7.3 in the reasonable opinion of the Seller the Buyer is or is likely to become unable to pay its debts, or the financial stability of the Buyer is otherwise unsatisfactory, then the Seller shall be entitled to the immediate return of all the Equipment or Spares sold by the Seller to the Buyer in which property has not passed to the Buyer. The Buyer hereby authorises the Seller to recover such Equipment or Spares and hereby grants to the Seller an irrevocable licence to enter any premises of or under the control of the Buyer for that purpose. Such authorisation and licence shall be unaffected by the appointment of any receiver, manager, administrator or liquidator in relation to the Buyer. Demand for or recovery of any Equipment or Spares by the Seller shall not of itself discharge either the Buyer's liability to pay the Full Price and take delivery of such Equipment or Spares or the Seller's right to sue for any sum due.

6. START UP

- 6.1 The Buyer shall, at an agreed time after Delivery, permit the Seller's authorised representative to attend the Buyer's premises for the purposes of testing the Equipment and instructing the operator of the Equipment in its use ("Start Up"). Start Up shall be completed upon the signature by the Seller and/or Buyer (or operator) of the Seller's training form.
- 6.2 The Buyer shall have no responsibility to the Seller in the event the Seller uses the Equipment prior to Start Up.
- 6.3 The Seller shall if requested by the Buyer provide training, in addition to that provided on Start Up, to the Buyer's staff on the use of the Equipment at the Seller's charges then current.

7. LIABILITY

- 7.1 Information and/or advice given orally or contained in the Seller's publicity material, advertisements and catalogues and in correspondence between the Buyer and the Seller before the date of the Contract is given gratuitously and without responsibility on the part of the Seller and shall not form part of the Contract.
- 7.2 The usage or application of the Equipment or Spares shall be entirely the responsibility of the Buyer without reliance on any statement of the Seller.
- 7.3 The Buyer shall inspect the Equipment or Spares on Delivery and unless the Seller is notified in writing within 7 working days of Delivery that the Equipment or Spares is not in accordance with the Contract, it shall be deemed to be accepted by the Buyer. The Seller warrants to the Buyer that subject to the limitations set out in Clauses 7.4, 7.6 and 7.7 the Seller will make good, in accordance with Clause 7.5 defects which under proper use appear in the Equipment or Spares and arise solely from faulty materials or workmanship. The warranty period shall be 6 months for Spares 12 months for trailed and mounted Equipment or, for self propelled Equipment, 12 months or 1000 hours use whichever occurs sooner. This warranty is non transferable.
- 7.4 The Seller shall have no liability whatsoever in respect of:
- 7.4.1 any defect or lack of fitness if the Seller has either produced the Equipment or Spares in accordance with the Buyer's own specification or the specification is incorrect wholly or partly because it was produced on the basis of information provided by the Buyer and such defect arises wholly or partly therefrom; or
- 7.4.2 any defect or lack of fitness arising from the manner in which the Equipment or Spares is used, applied or incorporated into other equipment by the Buyer or a third party; or
- 7.4.3 use or maintenance of the Equipment other than with reasonable care and in accordance with the Equipment Manuals;
- 7.4.4 any claim or part thereof relating to unauthorised repairs, modification or maintenance of the Equipment or Spares;
- 7.4.5 any use of the Equipment prior to the Start Up;
- 7.4.6 fair wear and tear of the Equipment or Spares;
- 7.4.7 any claim or part thereof relating to use of the Equipment or Spares by the Buyer after the Buyer has (or ought reasonably to have) become aware of the defect or alleged defect.
- 7.5 Where any valid claim is made in respect of any of the Equipment or Spares in accordance with these terms and conditions the Seller shall be entitled to replace or repair the Equipment (or the part in question) or Spares free of charge or, at the Seller's sole discretion, refund to the Buyer the Price of the Equipment (or a proportionate part thereof) or Spares and the Seller shall have no further liability to the Buyer. All replacement parts shall become the property of the Buyer on an exchange basis. Any defective parts shall on replacement become the Seller's property free of any third party, lien, charge or encumbrance.
- 7.6 Subject to the provisions of this Clause 7 the Seller shall not be liable to the Buyer for any loss, expense or damage of any kind (direct, indirect, financial or consequential and whether arising from negligence or otherwise) resulting from the supply, purported supply failure to supply, use, possession or resale of the Equipment or Spares.
- 7.7 The Seller's liability for personal injury or death to any person as a result of the Seller's negligence shall be unlimited.
- 7.8 This Contract set out the Seller's entire liability in respect of the Equipment or Spares, which shall exclude all other warranties, conditions, terms and liabilities express or implied statutory or otherwise in respect of the quality or fitness for any particular purpose of any Equipment or Spares or otherwise howsoever except any implied by law or statute and which by law or statute cannot be excluded. The Buyer acknowledges that the price of the Equipment or Spares reflects the limitations contained in this Clause 7.
- 7.9 In the case of equipment and parts supplied originally by AGCO Limited the terms and conditions of supply that apply will be the current terms and conditions of supply of AGCO Limited. A copy of these is available on request.

8. FORCE MAJEURE

- 8.1 Neither party shall be liable for any loss, damage or injury occasioned to the other party by default in the performance of any obligation under this Contract (other than the obligation to make any payment or deliver any Used Equipment or Spares in part exchange for the Equipment or Spares) if the default is caused by any occurrence whatsoever which is not within the control of the defaulting party including but not limited to industrial action, accident, power failure, breakdown of plant or machinery, order of any government authority (whether local, national or international) and shortage or delay of supplies required for or in connection with the manufacture of the Equipment or Spares. The defaulting party will give the other party written notice of the occurrence at the earliest opportunity. Refusal by the Buyer to accept Delivery does not in itself constitute force majeure.
- 8.2 If as a result of an occurrence covered by Clause 8.1 the Seller is delayed in or prevented from delivering the Equipment or Spares or parts thereof at the due time or times the Seller may on giving the Buyer at the earliest opportunity written notice of that fact withhold, suspend or reduce or cancel delivery to such extent as the Seller in its discretion thinks fit.

9. TERMINATION AND WITHHOLDING OF SUPPLIES

- 9.1 If at any time any of the circumstances set out in sub-clauses 5.7.1-5.7.3 apply, or there is a change of control (as defined in section 840 of the Income and Corporation Taxes Act 1988) of the Buyer or the Buyer shall unjustifiably refuse to take Delivery of any Equipment or Spares then the Seller shall be entitled forthwith to withhold all Deliveries, stop any Equipment or Spares in transit and terminate all agreements between it and the Buyer for the supply of any Equipment or Spares.
- 9.2 Either party may terminate this Contract forthwith by written notice if the other commits a breach of this Agreement which (if capable of remedy) is not remedied within 30 days of written notice requiring it to be remedied. The non-defaulting party may (without prejudice to any other rights available to it) pending remedy or termination forthwith withhold all deliveries, pending or in progress (or refuse to take deliveries as the case may be), and terminate all agreements between the parties for the supply of any Equipment or Spares.
- 9.3 Any waiver of, or failure to enforce any right or entitlement hereunder, by either party, shall not operate as a waiver of any other or future such entitlement. Any termination hereunder shall be without prejudice to any accrued rights of either party.

10. BUYER'S UNDERTAKINGS

- 10.1 The Buyer hereby undertakes to the Seller to:
- 10.1.1 use the Equipment or Spares, in all respects, in accordance with the Manuals;
- 10.1.2 comply with all relevant UK laws, regulations and guidance issued by appropriate governmental and regulatory bodies in its use of the Equipment or Spares; and
- 10.1.3 ensure that the Equipment or Spares is used only in conjunction with products and application techniques approved by the Seller.
- 10.2 The Buyer hereby undertakes fully to indemnify the Seller on demand against all claims, losses, charges, costs and expenses which the Seller may suffer or incur in connection with any claim by any third party alleging facts which if established would indicate a breach of any undertaking given by the Buyer pursuant to this Clause 10.

11. PROPRIETARY RIGHTS

- 11.1 All copyright, patent, trade marks, trade secrets and other proprietary and intellectual property rights in the Equipment or Spares and the Manuals, and ownership of all information which the Seller may provide to the Buyer or its agents shall at all times remain vested in the Seller. The Buyer shall not acquire any intellectual property rights or licence relating to the Equipment or Spares and the Manuals and may not copy or imitate the Equipment or Spares and/or the Manuals.
- 11.2 The Buyer shall not alter, remove or obliterate any of the Seller's markings, notices or means of identification which are affixed to the Equipment or Spares.
- 11.3 These provisions shall survive the termination of this Contract.

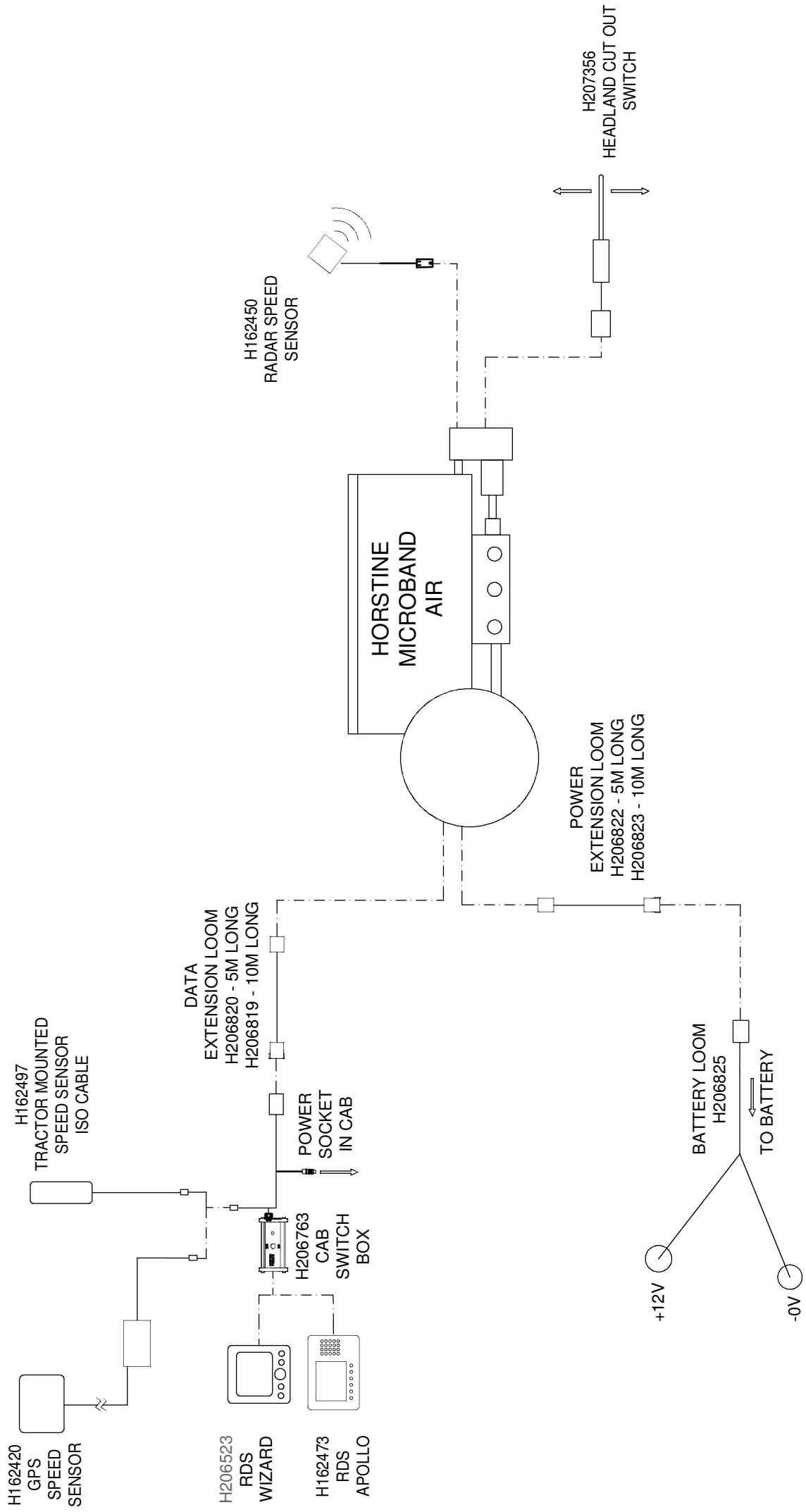
12. SEVERANCE

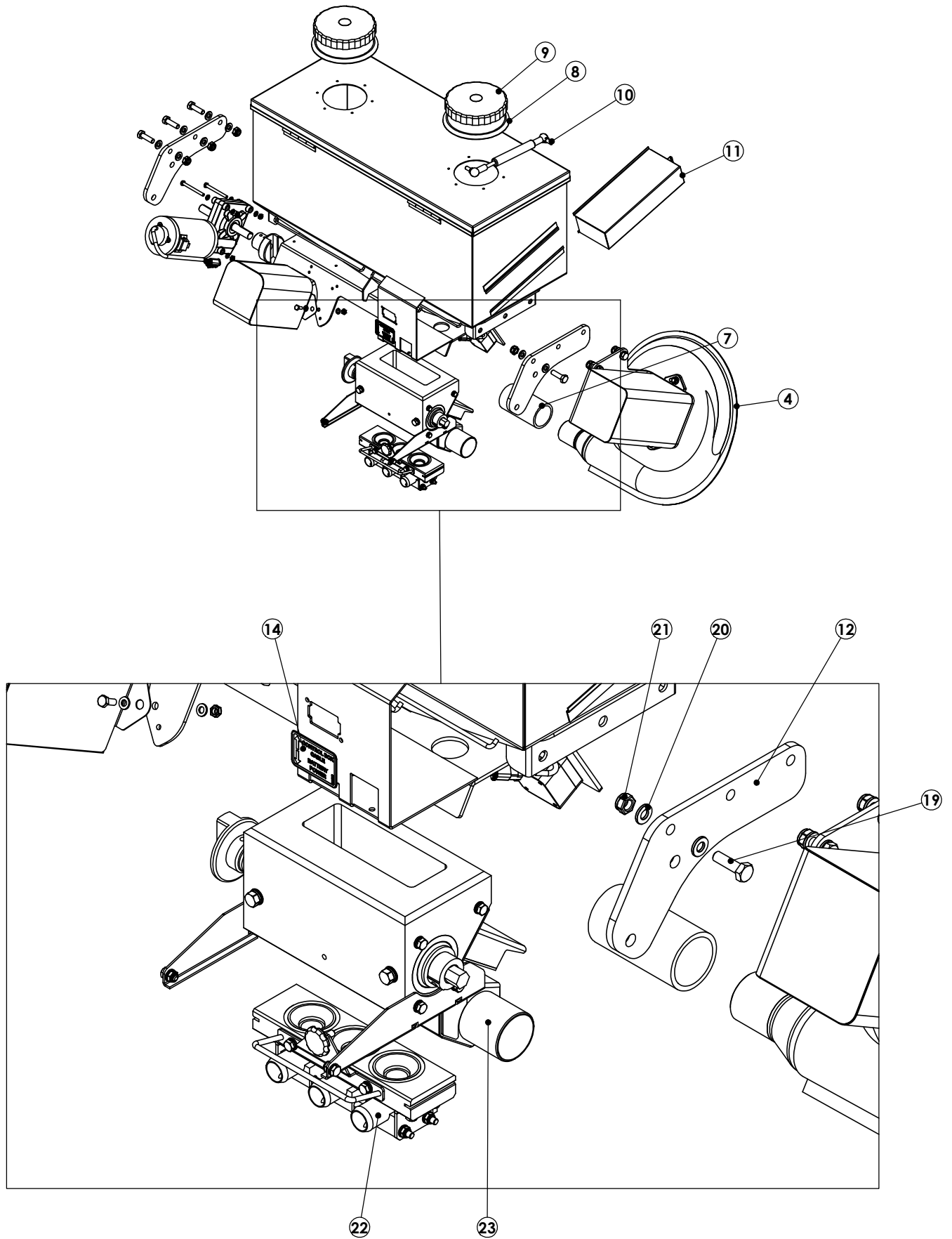
- 12.1 These terms and conditions apply in so far as they are held to be lawful, valid and enforceable. If any clause or subclause shall be held to be unlawful, invalid or unenforceable these terms and conditions shall be read and construed as if such clause or subclause were omitted.

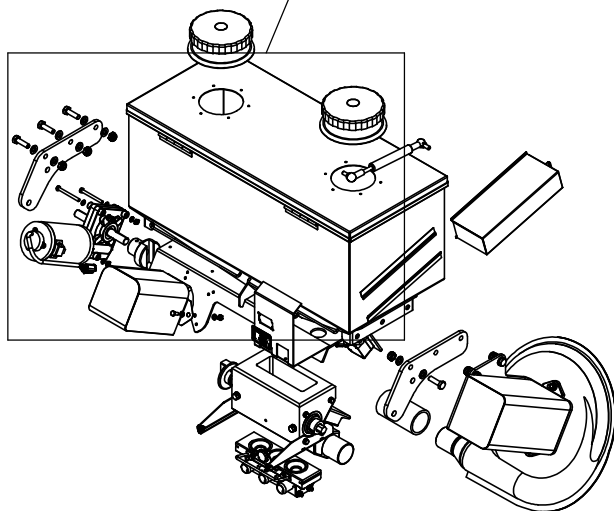
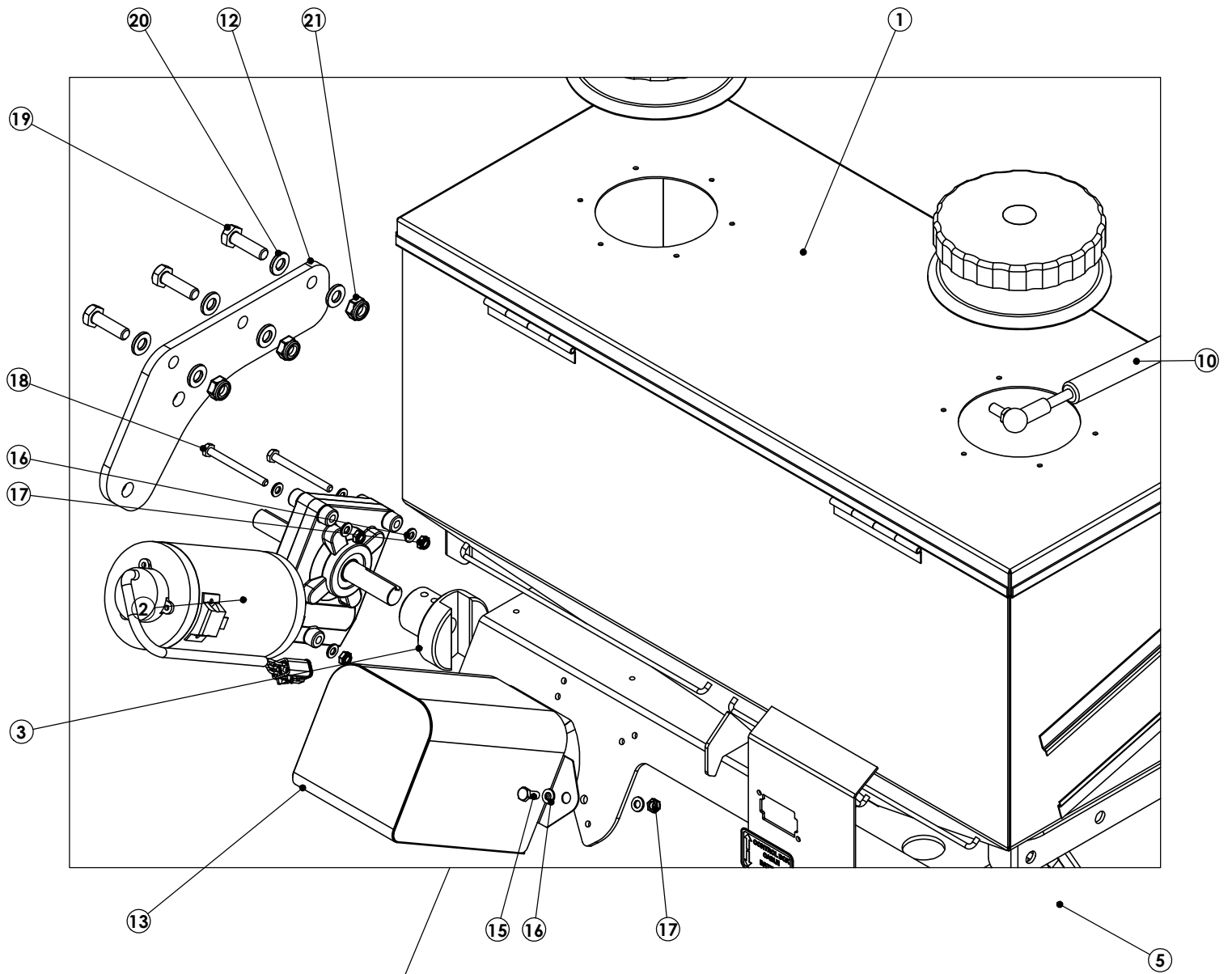
13. ARBITRATION AND APPLICABLE LAW

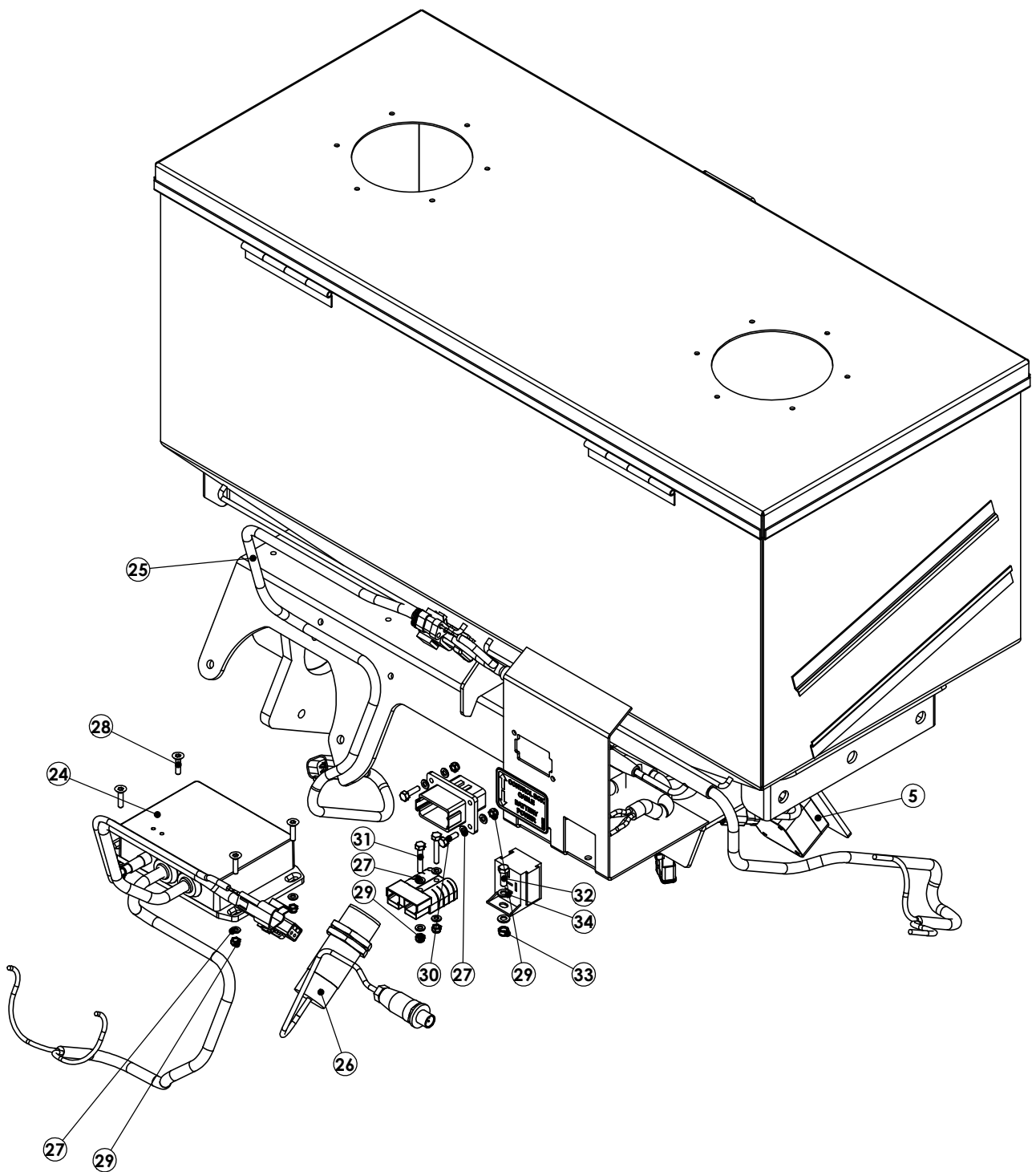
- 13.1 This Contract shall be governed by English Law.
- 13.2 Any dispute or difference arising out of this Contract which cannot be resolved through the good offices of the respective agricultural trade associations shall be submitted to a single arbitrator, to be appointed, in default of agreement between the parties, by the Chartered Institute of Arbitrators for arbitration under the Arbitration Act 1996.

Chafer Machinery Limited
Registered in England 4055546.
Registered office:
Number One, Railway Court, Ten Pound Walk, Doncaster. UK DN4 5FB
[February 2010]



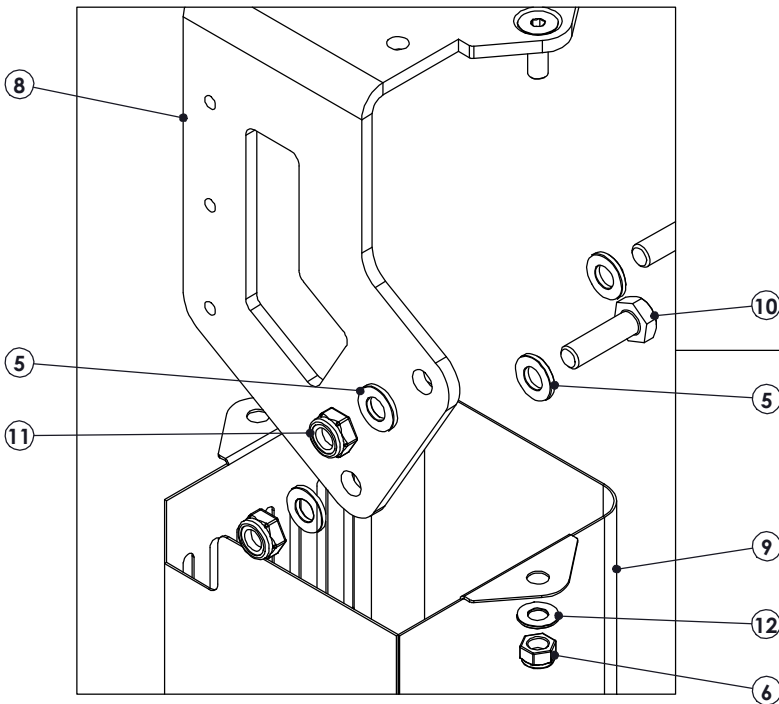
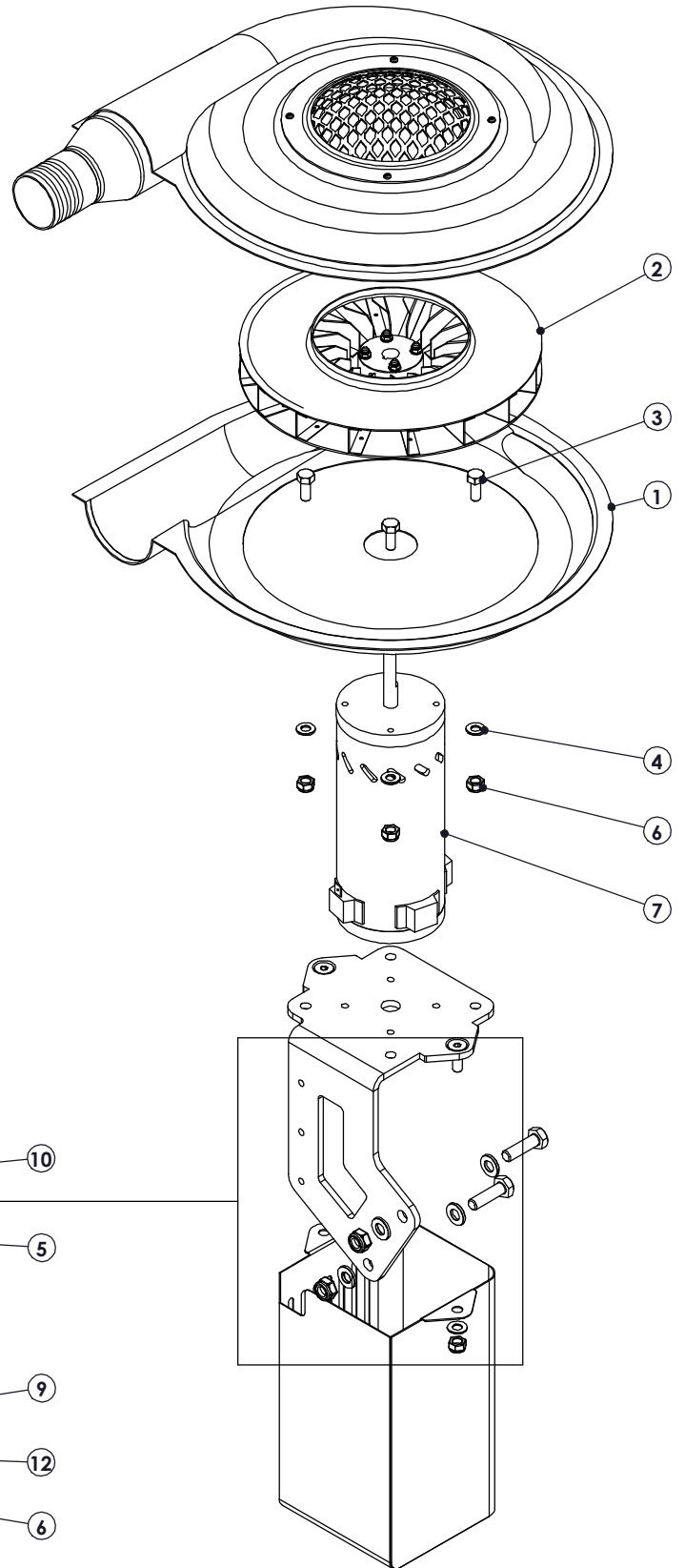




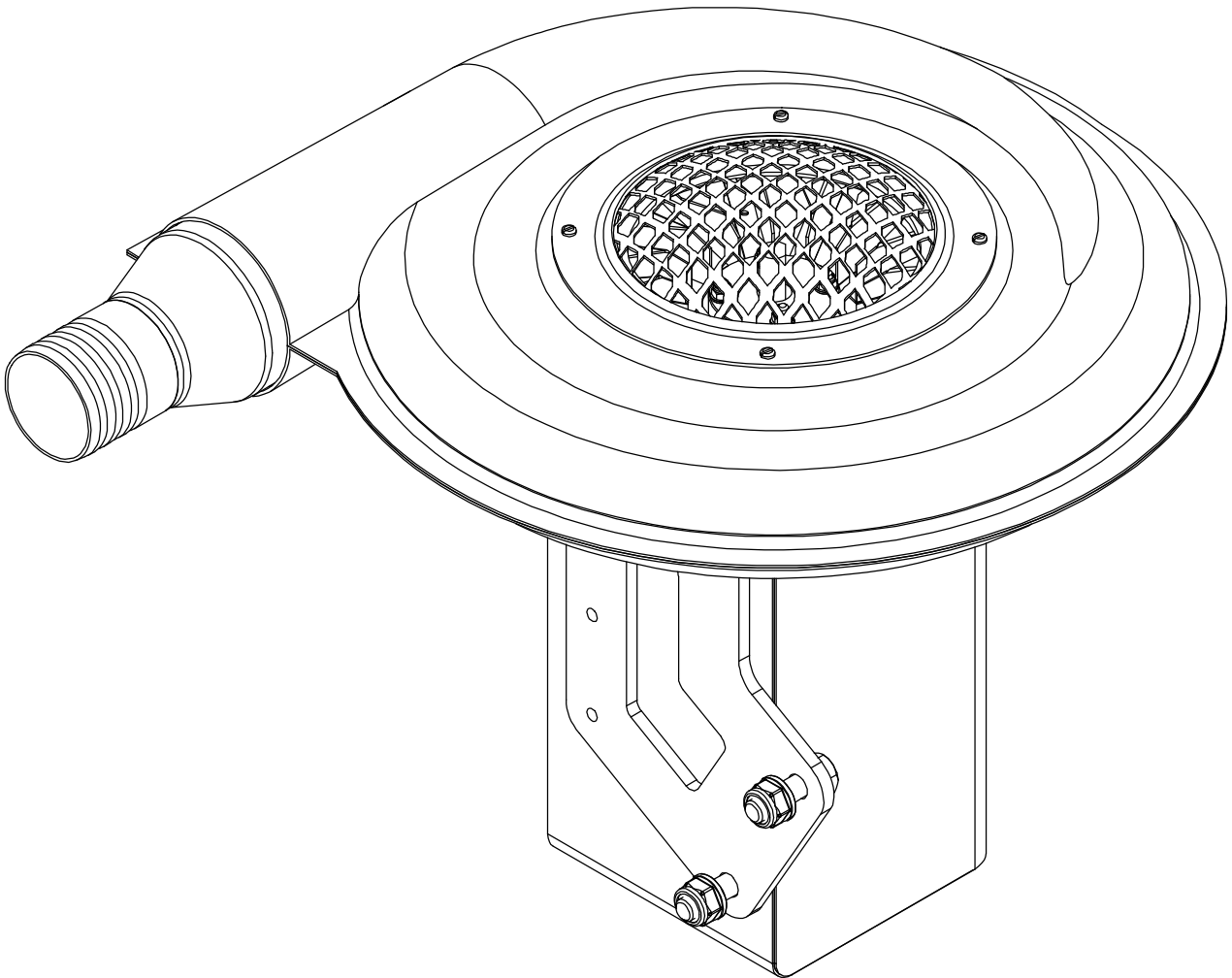


ITEM NO.	PART NUMBER	DESCRIPTION	full/QTY.
1	H660003	MICROBAND HOPPER	1
2	H051042	12V DC GEARED MOTOR + SPEED SENSOR	1
3	H207100	COUPLING ELECTRIC MOTOR	1
4	H660026	AIR FAN ASSY	1
5	H207513	CALIBRATION SWITCH AND BOX ASSY	1
6	H207510	CALIBRATION TRANSFER	1
7	H660008	RUBBER TUBE	1
8	H206304	ULTIMA TRANSFER BASE	2
9	H206305	ULTIMA TRANSFER CAP	2
10	H206638	GAS STRUT 1245/7421	1
11	H660013	MICROBAND CALIBRATION TRAY	1
12	H206672	MOUNTING PLATE	2
13	H660024	MICROBAND AIR METERING MOTOR COVER	1
14	H660021	TRANSFER	1
15	H301032	M6X16 SS SET SCREW	2
16	H321018	M6 SS HG PLAIN WASHER	10
17	H311014	M6 SS NYLOC	5
18	H301076	M6 x 65 SS HEAX BOLT	3
19	H303032	M10X35 SS SET SCREW	4
20	H323018	M10 SS HG PLAIN WASHER	8
21	H313014	M10 SS NYLOCK NUT	4
22	H660036	VENTURI ASSY	1
23	H660037	HOUSING ASSY	1
24	H206733	HIGH CURRENT MOTOR DRIVE INTERFACE	1
25	H660022	MAIN LOOM	1
26	H206794	LOW LEVEL SENSOR ASSY	1
27	H320031	M4 SS PLAIN WASHER	12
28	H300031	M4 x 15 CSK HD SCREW 8.8	4
29	H310029	M4 SS NYLOC	8
30	H300044	M4 X 15 HEX BOLT 8.8	2
31	H300020	M4X25 SS HEX HEAD SCREW	2
32	H300053	M5 X 40 ZP BOLT 8.8	1
33	H310034	M5 SS A2 NYLOCK NUT	1
34	H320037	M5 SS A2 PLAIN WASHER	2

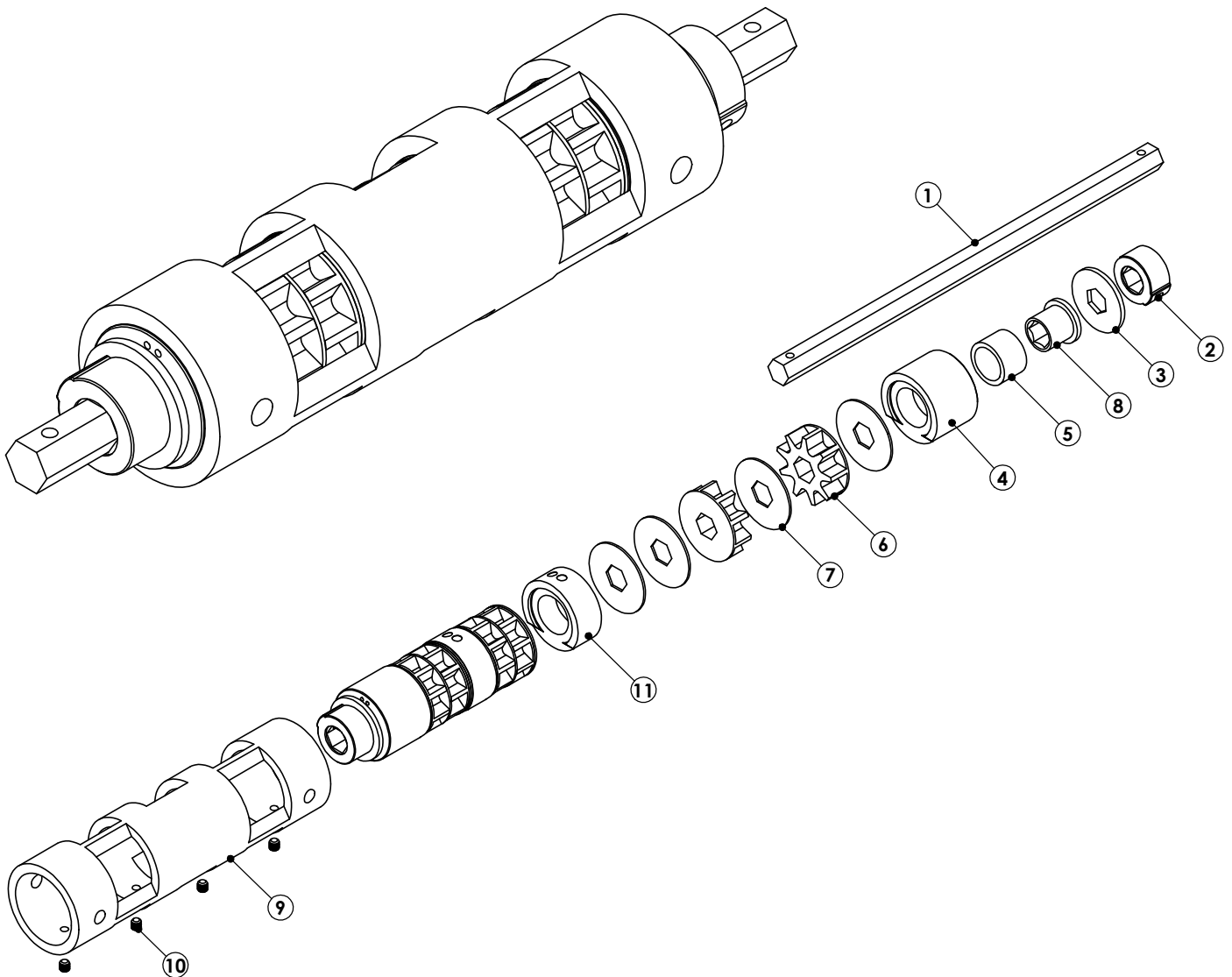
NOTE:
H051033 - END MOTOR BRUSH (TAG REMOVED)
H051034 - END MOTOR BRUSH (WITH TAG)



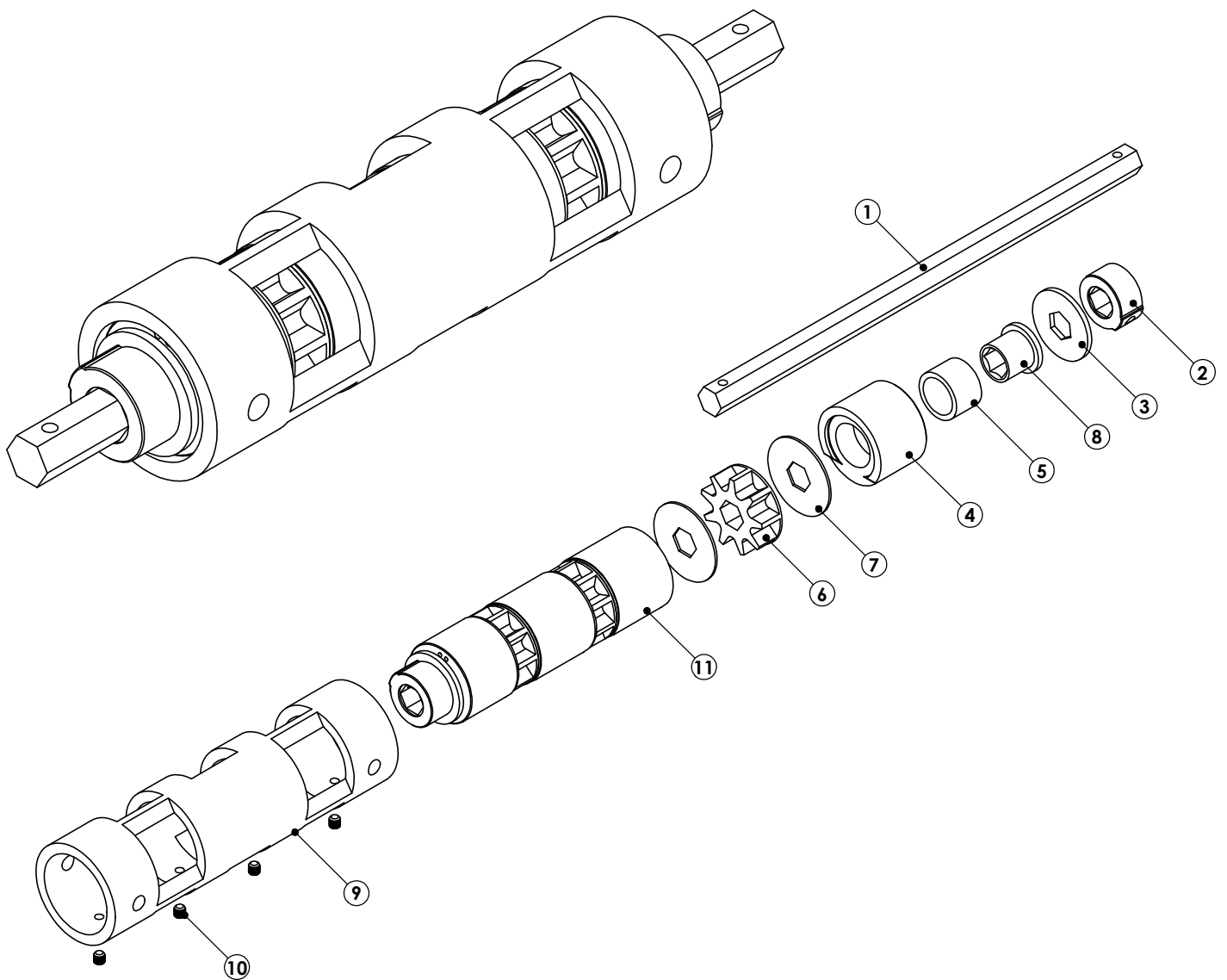
ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	H206855	PNEUMATIC FAN CASEING ASSY	1
2	H206646	FAN ASSY	1
3	H302028	M8 X 20 HEX SET SCREW ZP	4
4	H322017	M8 ZP HG PLAIN WASHER	4
5	H323018	M10 SS HG PLAIN WASHER	4
6	H312014	M8 SS NYLOCK NUT	6
7	H051045	EMD ELECTRIC MOTOR	1
8	H660009	FAN MOUNT BRACKET	1
9	H660023	MOTOR COVER	1
10	H303032	M10X35 SS SET SCREW	2
11	H313014	M10 SS NYLOCK NUT	2
12	H322018	M8 SS HG PLAIN WASHER	2



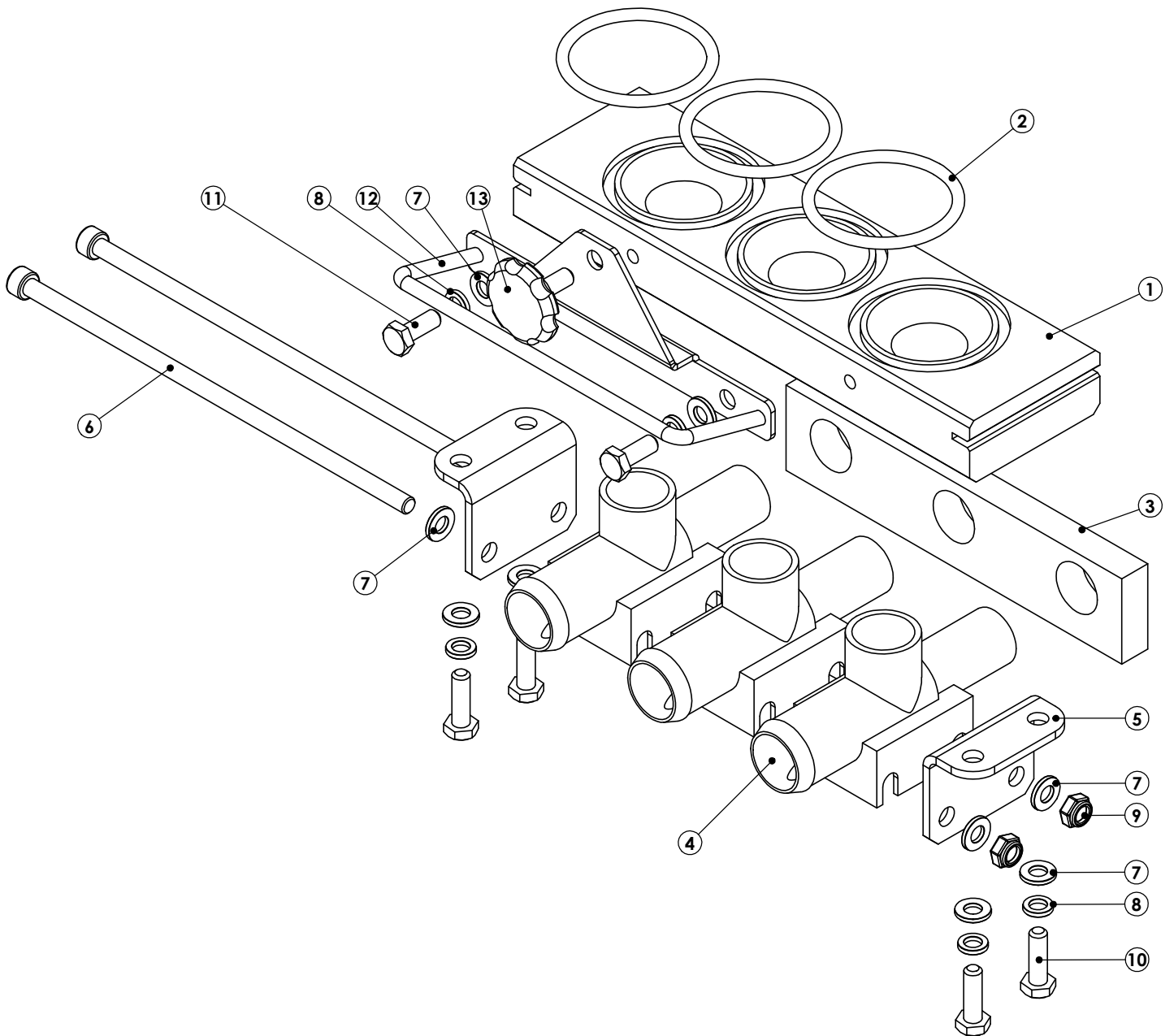
ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	H660028	METERING DRIVESHAFT	1
2	H160011	HEX SHAFT COLLAR M8	2
3	H018028	RUBBER WASHER	2
4	H003015H	END BUSH CASE HARDENED	2
5	H038004	OILITE BEARING BUSH	2
6	H094018	14mm ROTOR-DEEP FLUTED	6
7	H018026	ROTOR FACING WASHER	11
8	H004001	HEXAGON ADAPTOR BUSH	2
9	H660033	2 1/2" CASSETTE BODY 3 OUTLET	1
10	H301011	M6 X 6 GRUB SCREW S/S	4
11	H006114H	12mm STEEL SPACER HARDENED	2

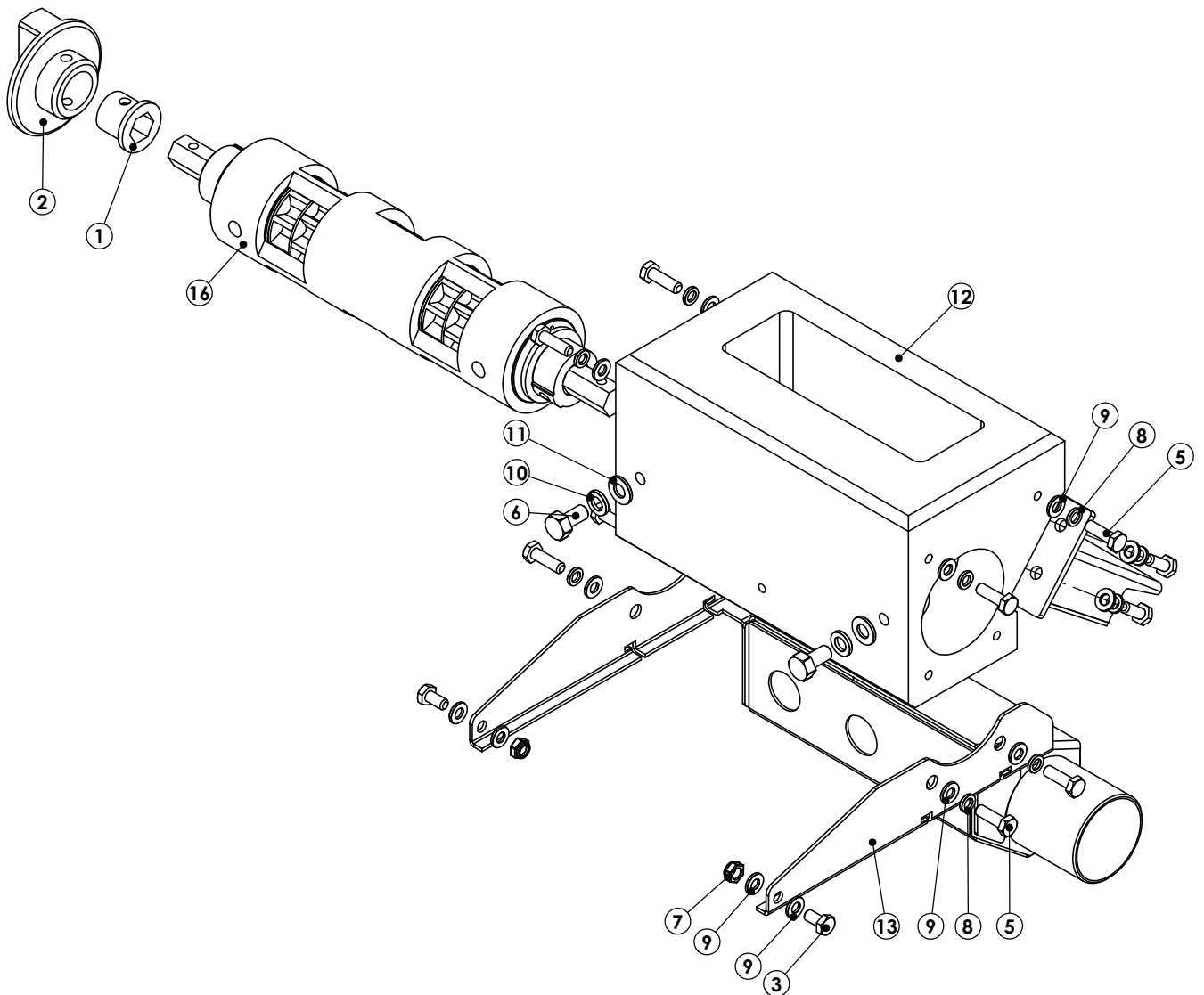


ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	H660028	METERING DRIVESHAFT	1
2	H160011	HEX SHAFT COLLAR M8	2
3	H018028	RUBBER WASHER	2
4	H003015H	END BUSH CASE HARDENED	2
5	H038004	OILITE BEARING BUSH	2
6	H094018	14mm ROTOR-DEEP FLUTED	3
7	H018026	ROTOR FACING WASHER	6
8	H004001	HEXAGON ADAPTOR BUSH	2
9	H660033	2 1/2" CASSETTE BODY 3 OUTLET	1
10	H301011	M6 X 6 GRUB SCREW S/S	4
11	H006028	41 mm SPACER	2

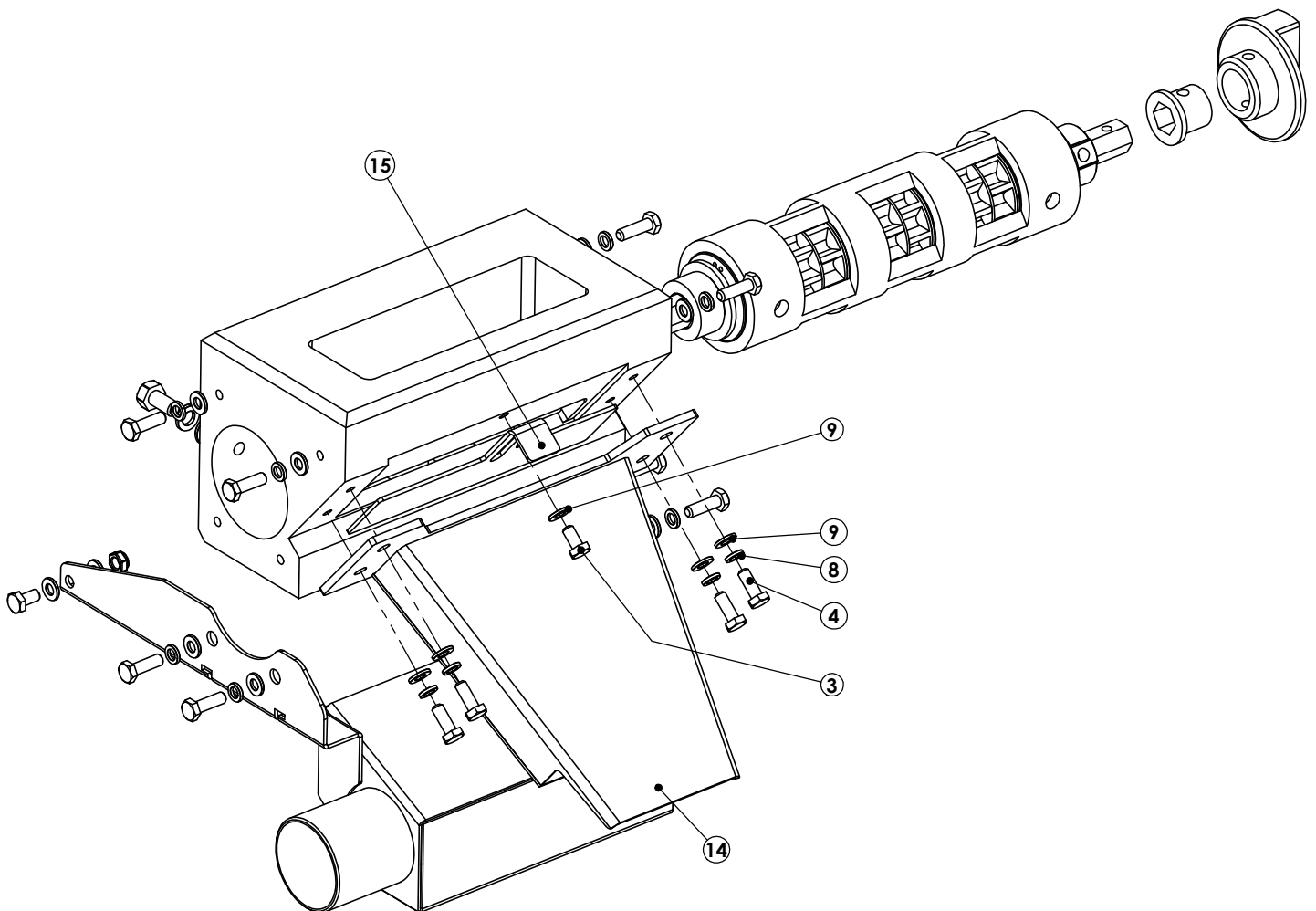


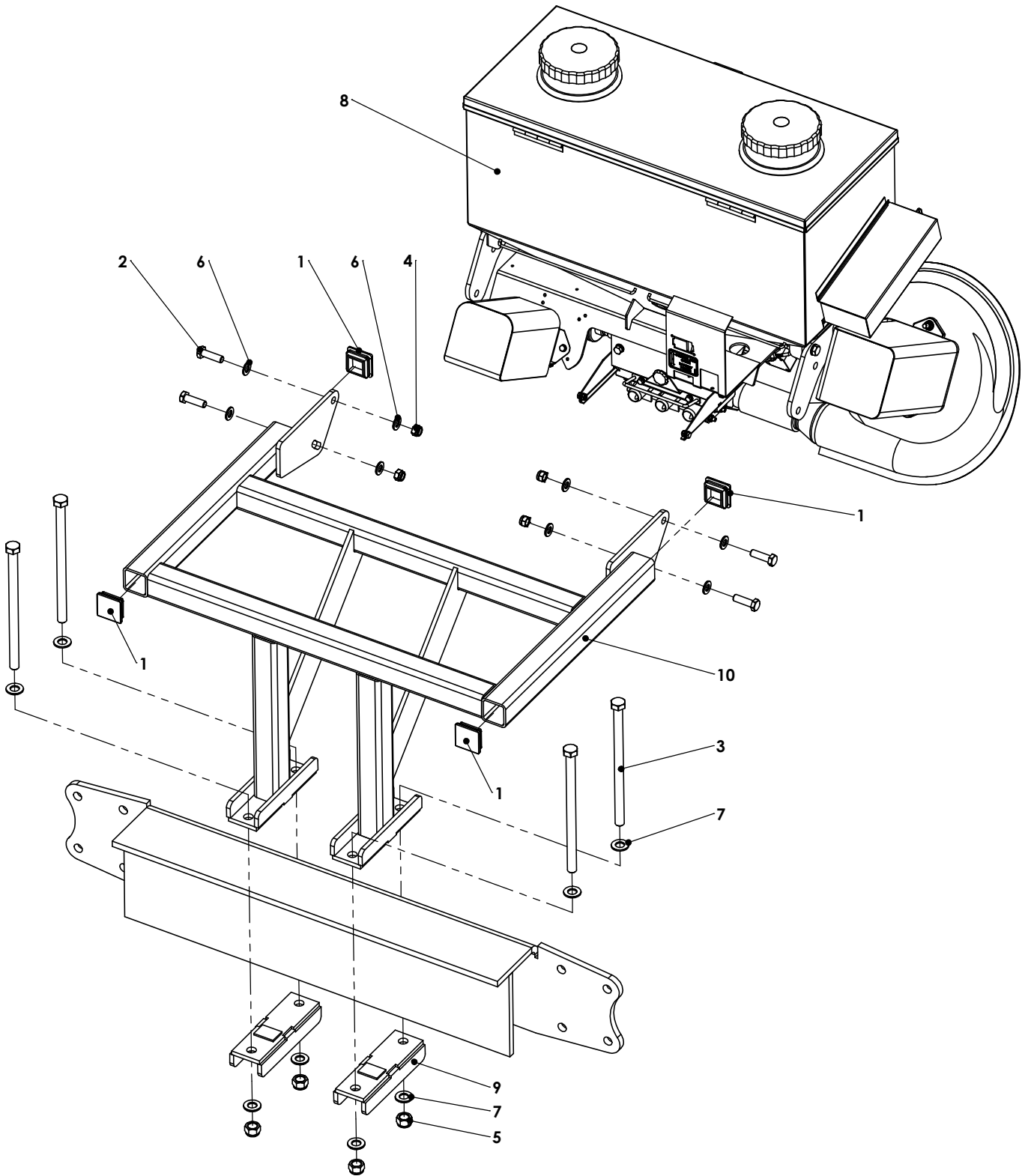
ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	H660002	3 OUTLET VENTURI MOUNT SLIDER	1
2	H660029	O RING	3
3	H660005	SEAL	1
4	H023009	PLASTIC VENTURI	3
5	H660025	FOLDED PLATE	2
6	H301094	M6X180 SS CAP HEAD BOLT	2
7	H321018	M6 SS HG PLAIN WASHER	10
8	H321012	M6 SS SPRING WASHER	6
9	H311014	M6 SS NYLOC	2
10	H301039	M6 x 20 SS SET	4
11	H301032	M6X16 SS SET SCREW	2
12	H660006	SPRING CLIP AND HANDLE	1
13	010702	GRIPSCREW M6x15mm	1



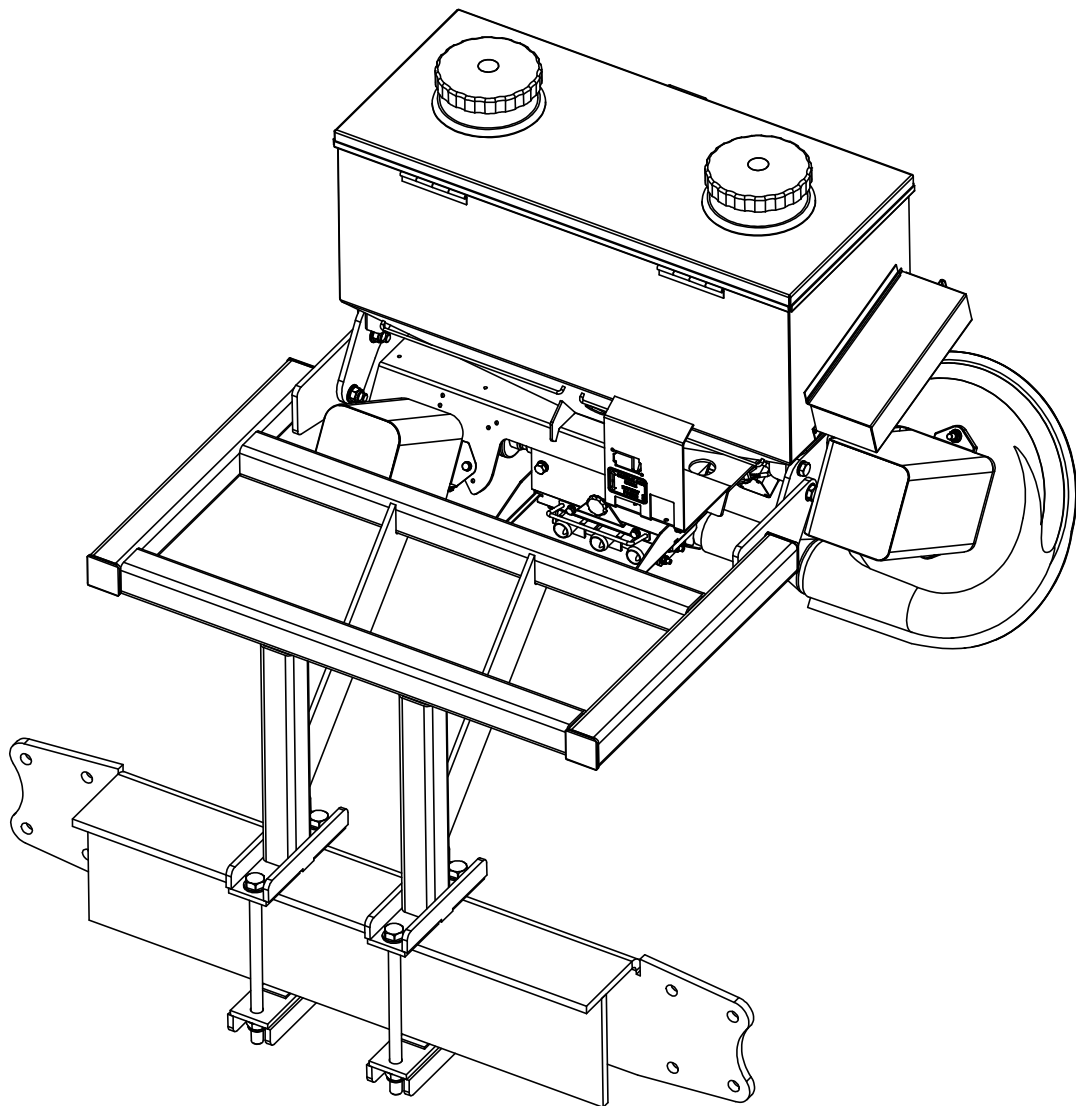


ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	H206505	HEXAGON ADAPTOR BUSH	1
2	H206507	COUPLING MALE	1
3	H301020	M6X12 ZP SET SCREW	3
4	H301031	M6X16 ZP SET SCREW	4
5	H301038	M6X20 ZP SET SCREW	8
6	H302022	M8 X 16 HEX SET SCREW ZP	2
7	H311012	M6 NYLOCK NUT	2
8	H321011	M6 ZP SPRING WASHER	12
9	H321017	M6 ZP HG PLAIN WASHER	17
10	H322011	M8 ZP SPRING WASHER	2
11	H322017	M8 ZP HG PLAIN WASHER	2
12	H660001	2 1/2" CARTRIDGE HOUSING 3 OUTLET	1
13	H660010	AIR INLET MANIFOLD	1
14	H660011	DRAIN CHUTE	1
15	H660014	DRAIN SLIDE PLATE	1
16	H660027	MICROBAND AIR 3 ROW CASSETTE ASSY	1

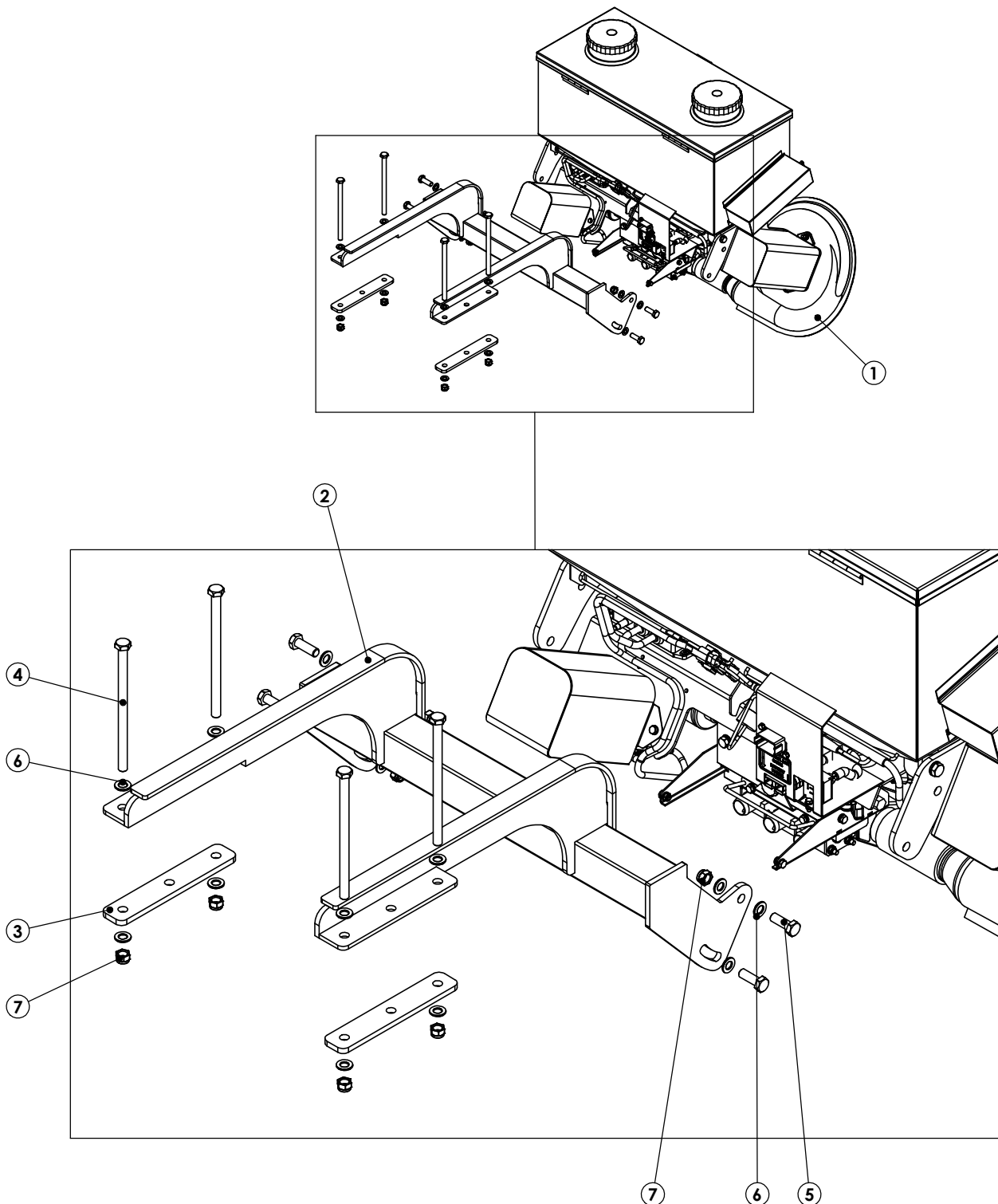




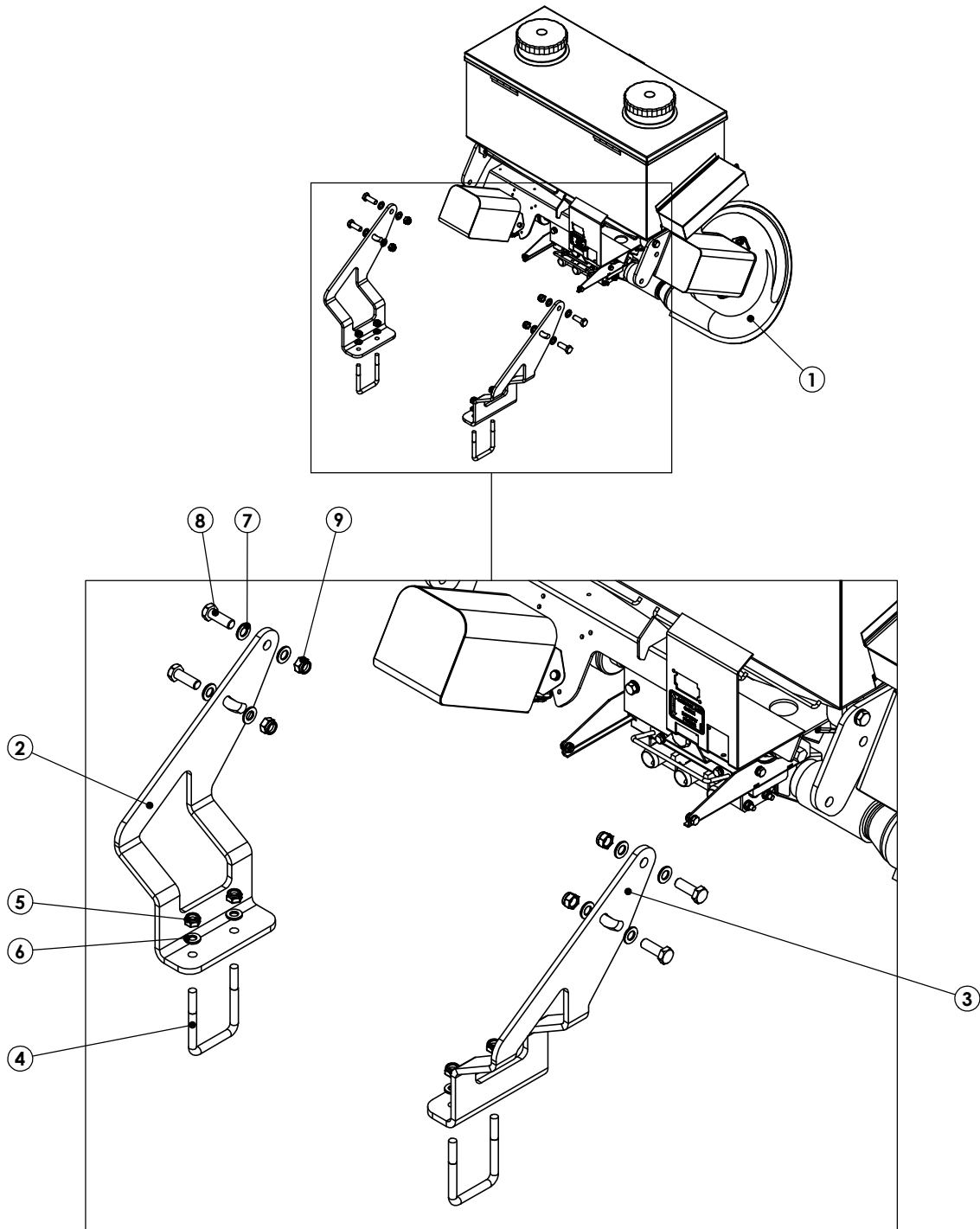
ITEM NO.	PART NUMBER	Description	QTY
1	H075013	50MM X 50MM PLASTIC END CAP 3.2/5MM WALL	4
2	H304041	BOLT M12 8.8 X 40 LG EZP	4
3	H305085	BOLT M16 X 260 LG EZP	4
4	H314012	M12 NYLOC NUT	4
5	H315012	NYLOK NUT M16	4
6	H324017	M12 ZP HG PLAIN WASHER	8
7	H325017	M16 ZP HG PLAIN WASHER	8
8	H660000	MICROBAND AIR ASSY	1
9	H660045	CLAMP BRKT - GRIMME GB330	2
10	H660046	MICROBAND AIR MTG FRAME	1



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	H660000	MICROBAND ASSY	1
2	H660017	MICROBAND GRIMME GB215 MOUNT BRACKET	1
3	H207130	PLATE	2
4	H304107	M12 X 200 ZP 8.8 BOLT	4
5	H304034	M12 X 35 ZP 8.8 SET SCREW	4
6	H324012	M12 SS SPRING WASHER	16
7	H314012	M12 NYLOC NUT	8

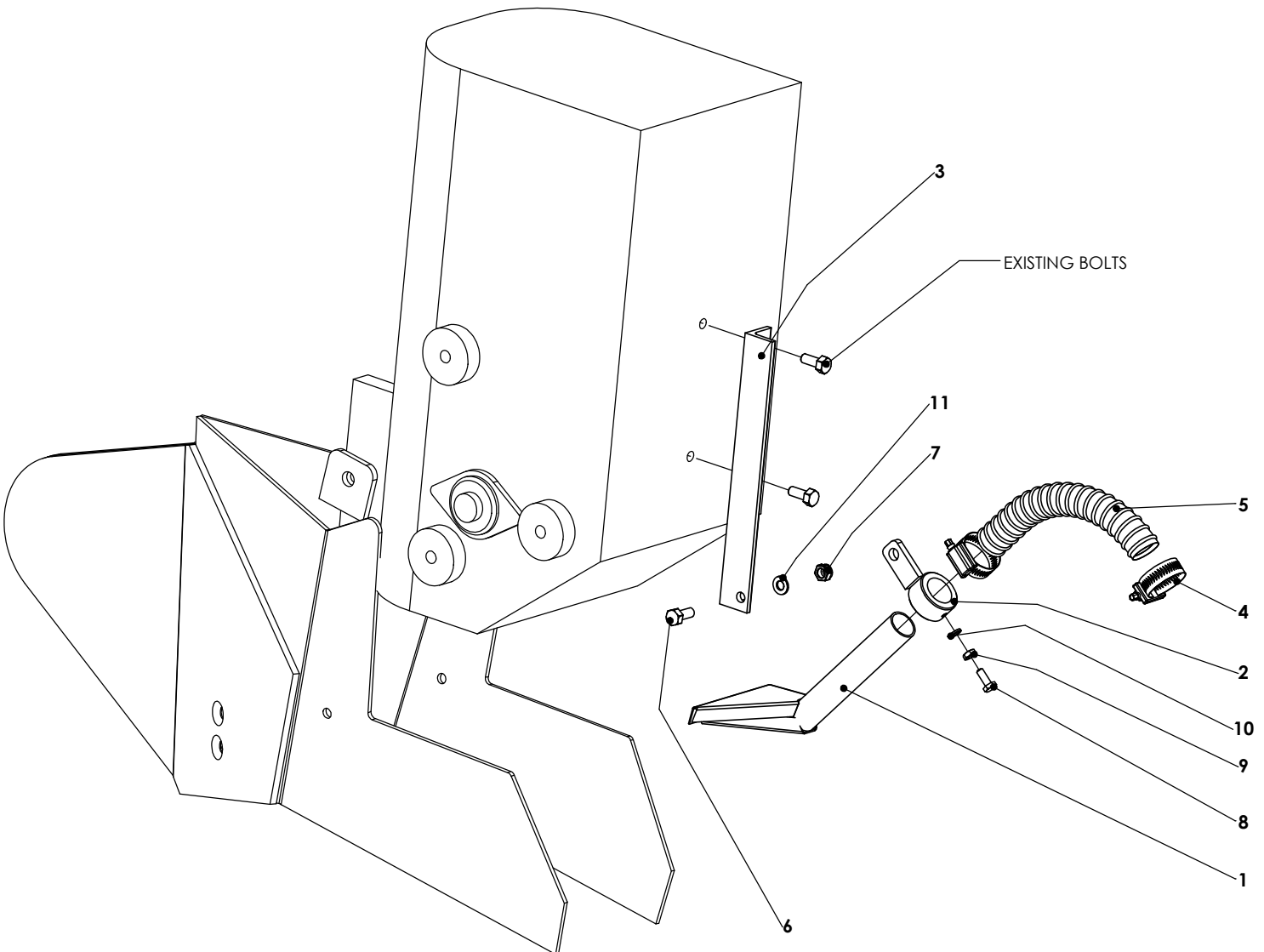


ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	H660000	MICROBAND AIR ASSY	1
2	H660015	MICROBAND GRIMME 32B N/S BRACKET	1
3	H660016	MICROBAND GRIMME 32B O/S BRACKET	1
4	H206941	U BOLT 60x60 RHS	2
5	H313014	M10 SS NYLOCK NUT	4
6	H323018	M10 SS HG PLAIN WASHER	4
7	H324012	M12 SS SPRING WASHER	8
8	H304034	M12 X 35 ZP 8.8 SET SCREW	4
9	H314012	M12 NYLOC NUT	4

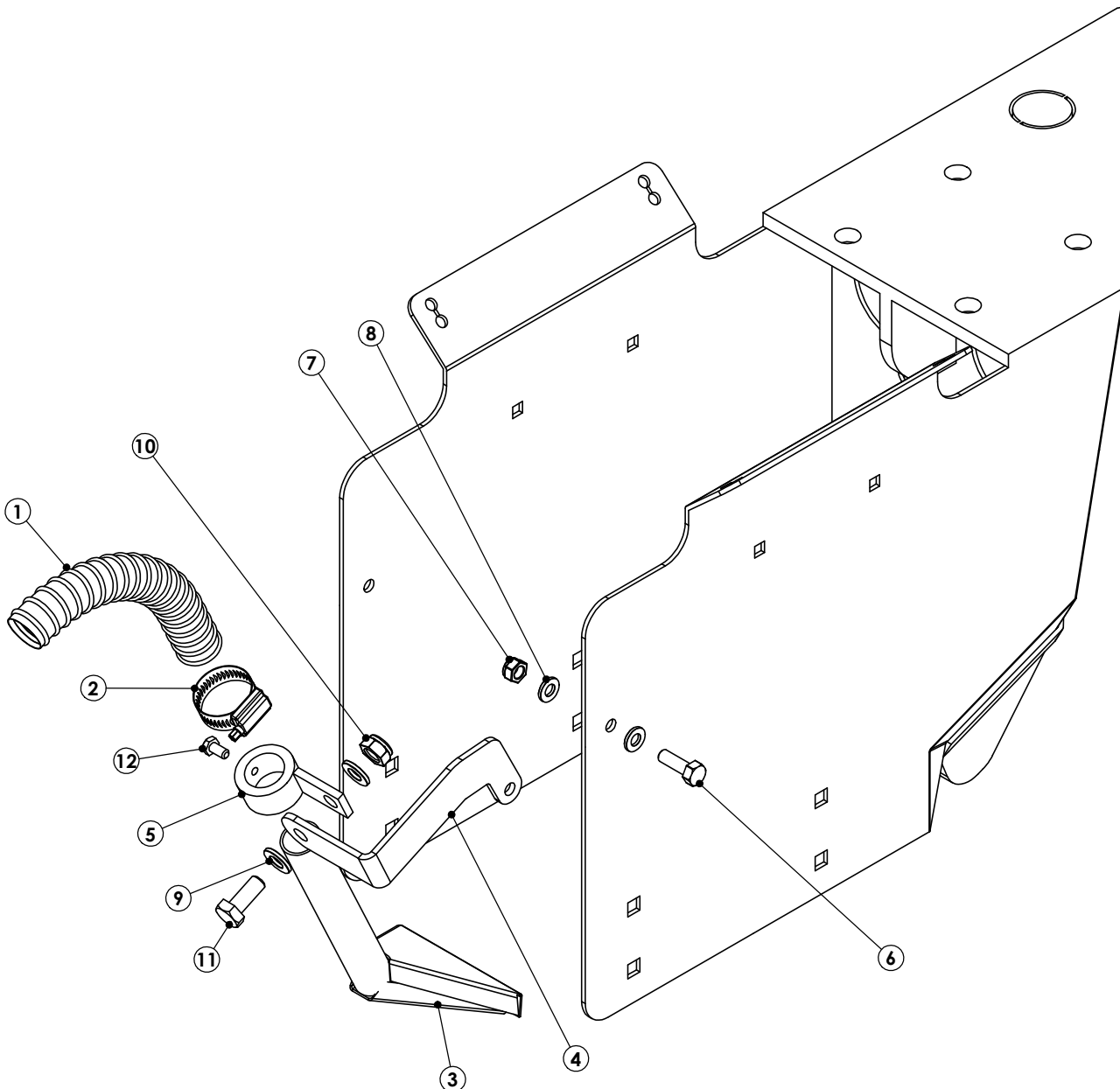


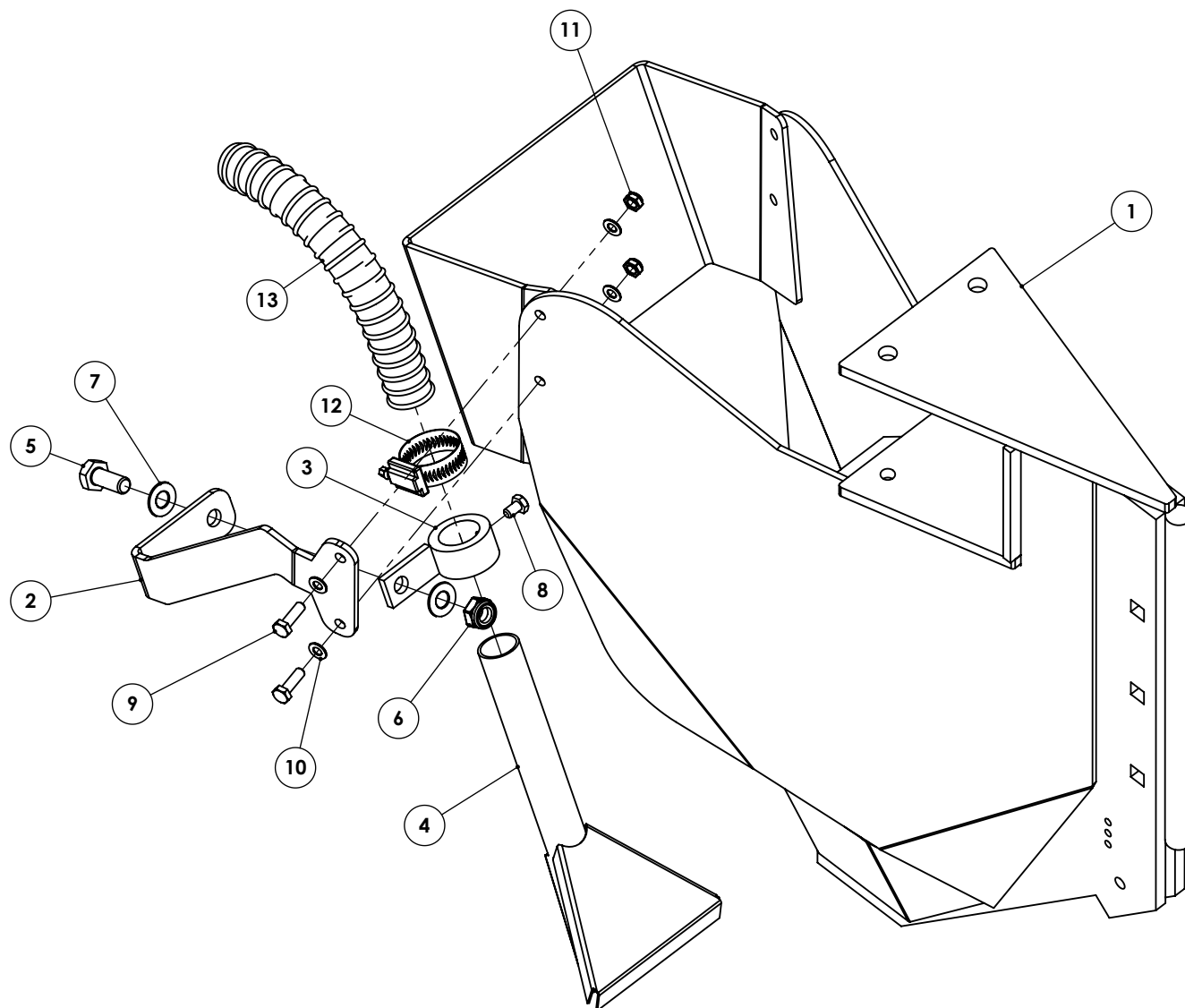
ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	H205585	FISHTAIL 10cm SPREAD 45 DEG.	1
2	H205597	SPOUT BRACKET DART 785-WA	1
3	H206691	FISHTAIL MTG ANGLE GRIMME GL32B	1
4	H330013	No 1 HOSE CLIP	2
5	H462030	25mm FLEXIBLE HOSE	1
6	H302028	M8 BOLT	1
7	H312012	M8 NYLOCK NUT	1
8	H301031	BOLT M6 SS A2	1
9	H311011	M6 ZP PLAIN NUT	1
10	H321011	M6 ZP SPRING WASHER	1
11	H322017	M8 ZP HG PLAIN WASHER	1

**NOTE
DOUBLE QUANTITIES FOR 2 ROW MACHINE**

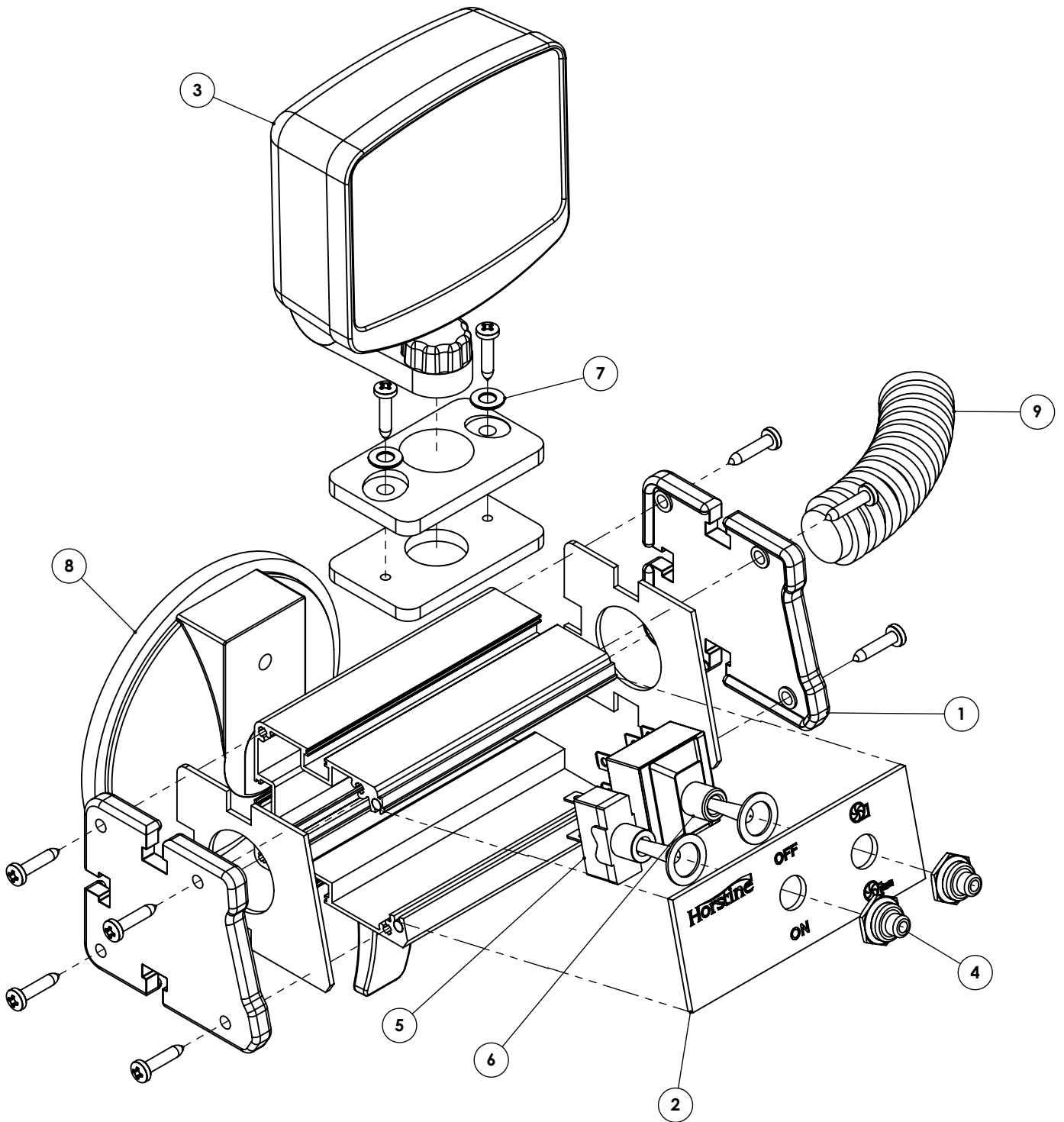


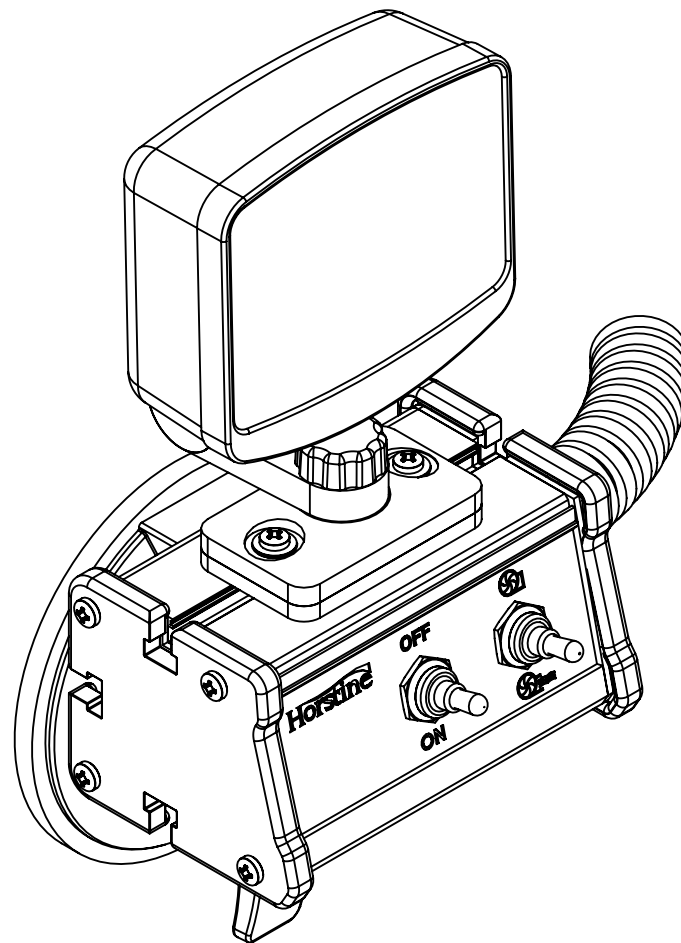
ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	H462030	25mm FLEXIBLE HOSE	1
2	H330013	No 1 HOSE CLIP	1
3	H205585	FISHTAIL 10cm SPREAD 45 DEG.	1
4	H207208	FISH TAIL BRACKET	1
5	H205597	SPOUT BRACKET	1
6	H302033	M8 BOLT	1
7	H312014	M8 SS NYLOCK NUT	1
8	H322018	M8 SS HG PLAIN WASHER	2
9	H323018	M10 SS HG PLAIN WASHER	2
10	H313012	M10 LOCKNUT	1
11	H303019	X25 SS SET	1
12	H301021	M6X12 SS SET SCREW	1





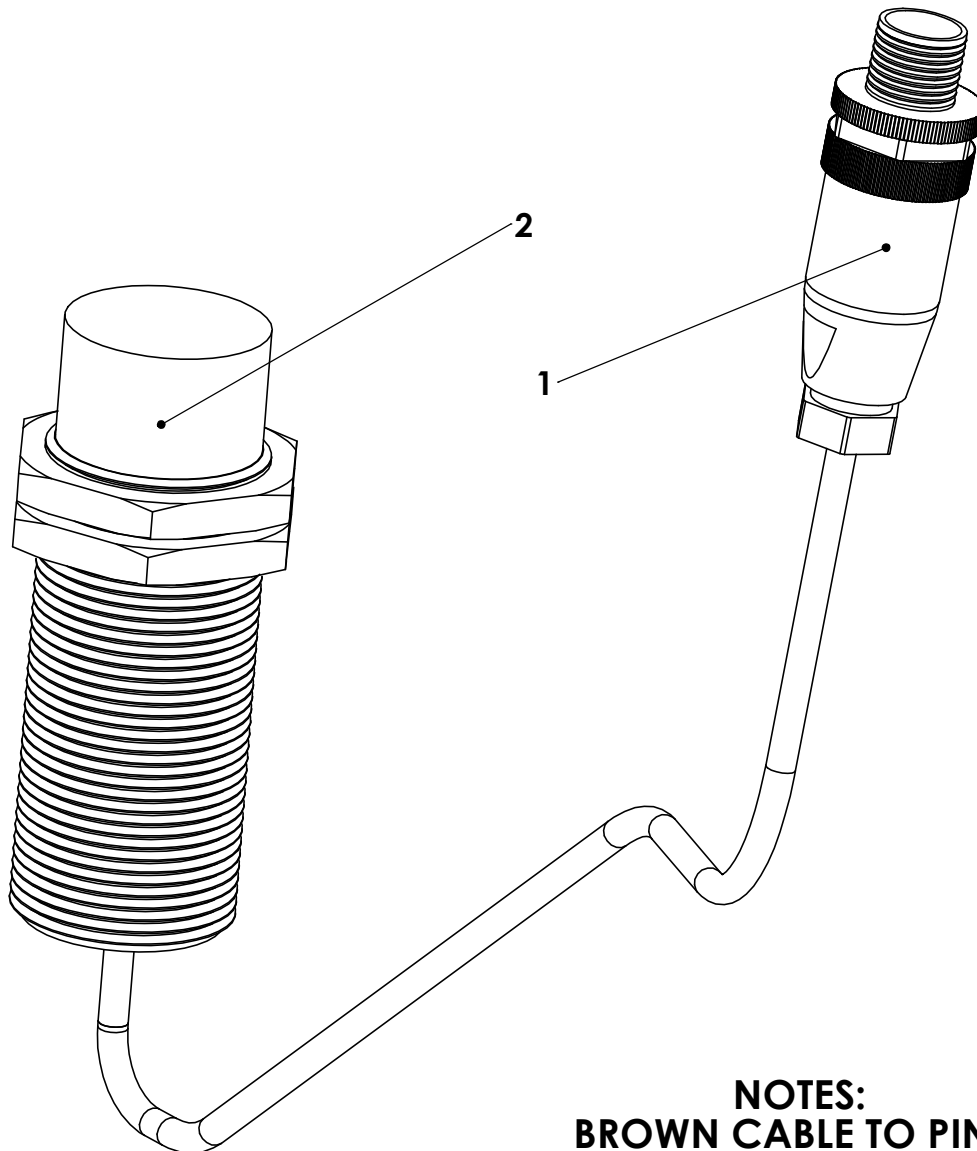
ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	STRUCTURAL TINE		1
2	H207111	FISH TAIL BRACKET	1
3	H205597	SPOUT BRACKET	1
4	H205585	FISHTAIL 10cm SPREAD 45 DEG.	1
5	B10025A2	M10 SS A2 HEX BOLT	1
6	NN10A2	M10 SS NYLOC	1
7	PW10A2	M10 SS PLAIN WASHER	2
8	B05010A2	M6 SS A2 HEX BOLT	1
9	B06020A2	M6 SS A2 HEX BOLT	2
10	PW06A2	M6 SS PLAIN WASHER	4
11	NN06A2	M6 SS NYLOC	2
12	H330013	No 1 HOSE CLIP	1
13	H462030	25mm FLEXIBLE HOSE - 3M LENGTH	1





ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	H206793	CONTROL EXTRUSION	1
2	H206796	SWITCH BOX PLATE	1
3	H206523	RDS WIZARD POD	1
4	H162441	RUBBER SWITCH COVER	2
5	h162440	SINGLE POLE SWITCH	1
6	H162442	3 POLE SWITCH	1
7	PW06A2	M6 SS PLAIN WASHER	2
8	H206586	SUCTION PAD	1
9	H206763	UNIVERSAL SWITCH BOX LOOM	1

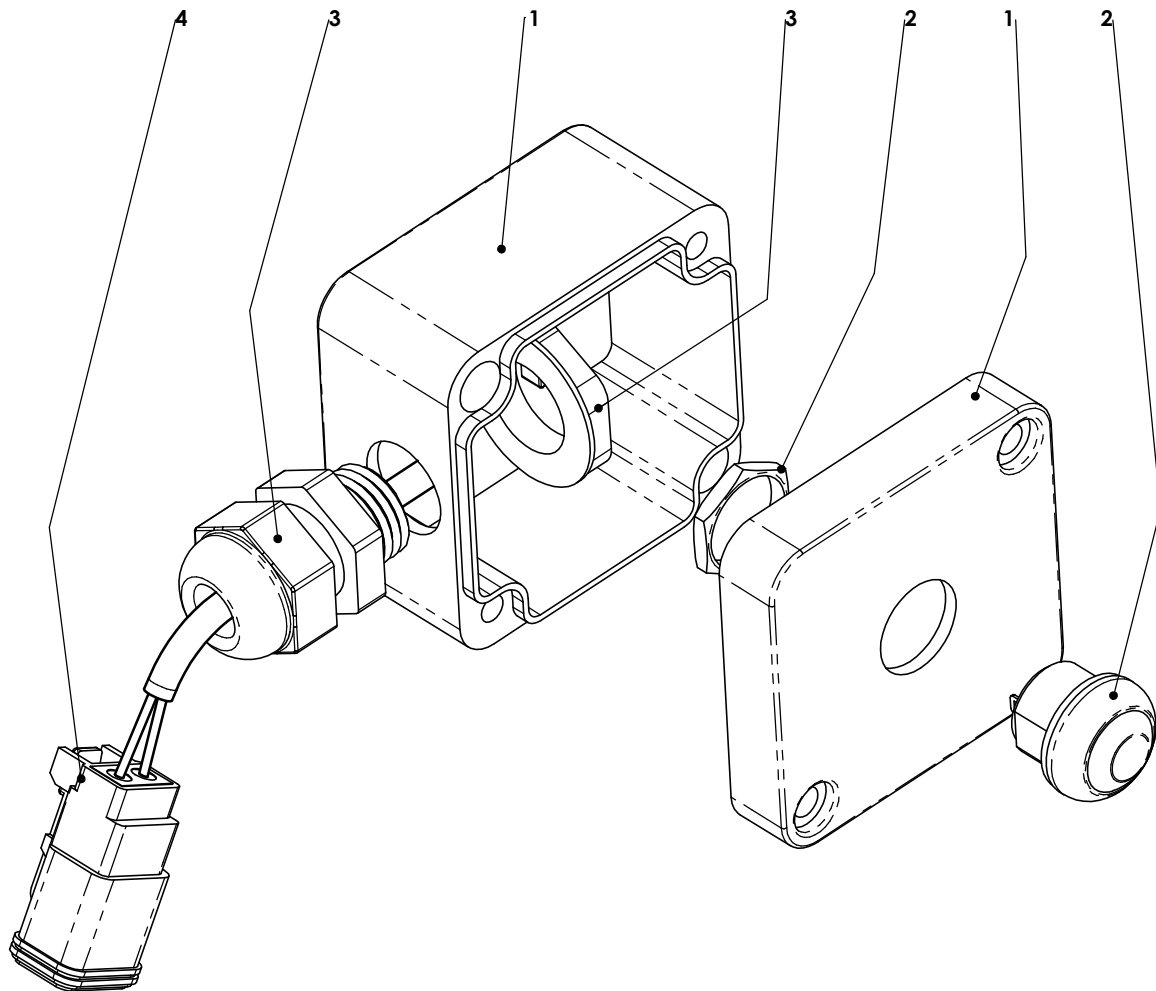
ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	H162438	4 WAY IP67 M12 STRT. CONNECTOR	1
2	H162427	TANK LEVEL GAUGE	1



NOTES:
BROWN CABLE TO PIN 1
BLUE CABLE TO PIN 3
BLACK CABLE TO PIN 4

NOTE
CUT CABLE TO 330mm LONG

ITEM NO.	PART NUMBER	DESCRIPTION	Default/QTY.
1	H207512	POLYCARBONATE CASE RS 222-137	1
2	H207511	PUSH SWITCH RS 702-3592	1
3	V27	GLAND	1
4	H162443	DEUTCH 2 PIN FEMALE PLUG	1



CABLE LENGTH FROM EDGE OF BOX TO BACK OF PLUG 105mm.
TO WIRE CONNECT PIN 1 IN DEUTSCH PLUG TO LEFT HAND SIDE OF SWITCH.
PIN 2 TO RIGHT HAND SIDE OF SWITCH.

NOTE LOCATION OF GLAND ON BOX IN RELATION TO FACE!