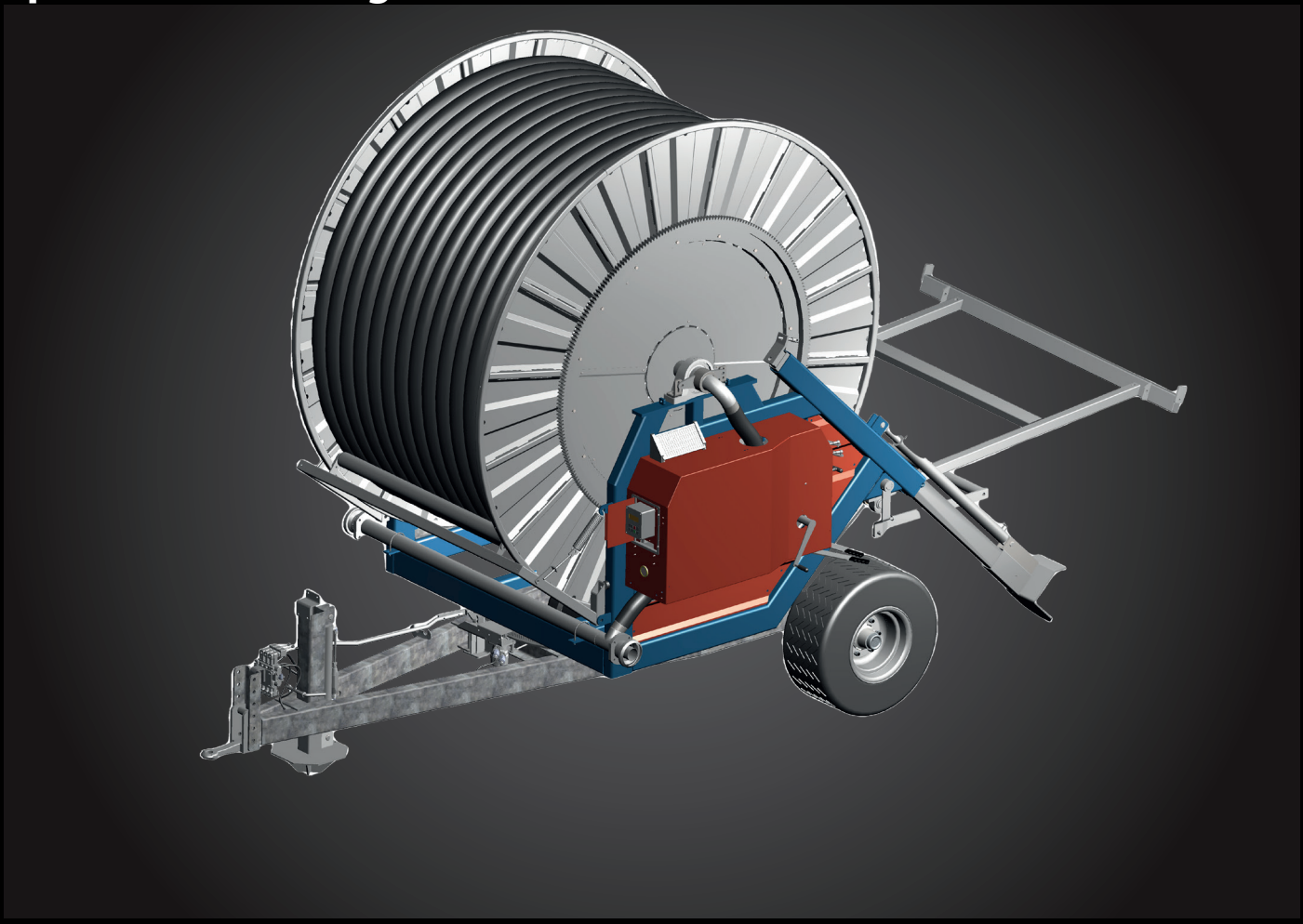
FASTERHOLT

User Manual &
Spare Parts Catalogue

(EN) 22-05-2024



Irrigator
GT12

CE

Fasterholt Maskinfabrik A/S
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Contents

EEC Declaration of conformity

Manufacture (name and address):

Fasterholt Maskinfabrik A/S

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Hereby is certified that the following product:

Description, ID/mark, type: Irrigator GT 12

Serial No. if any:

Notified body if any:

EEC-type certificate if any:

Harmonised standards if any: EN 908:1999+A1:2009.
DS/EN/ISO 12100:2011.
DS/EN/ISO 14120:2015.

Is made according to the announcement no.693 of 10. Jun 2013 that implements the DIRECTIV 2006/42/EC.

Name, title and signature of manufacture:

Date

Signature

IMPORTANT!

Read this manual carefully before using your irrigator!

Operating Instructions & Information

Your new Fasterholt irrigator is a high quality, Danish built machine, but even the best machines only deliver top results when they are properly handled and maintained.

To ensure that the machine complies with the EU Machinery Directive, only original spare parts may be used. Otherwise, compliance will be lost and safety will be entirely at your own risk.

The irrigator is only suitable for irrigation with clean water from a drilled well or a watercourse.

We must point out that any damage caused by incorrect operation and/or negligence is not covered by the warranty. Fasterholt Maskinfabrik A/S only guarantees new machines sold through an authorised Fasterholt dealer. Any modifications made to the design of the irrigator shall exclude Fasterholt Maskinfabrik A/S of any liability and shall void the warranty.

The Fasterholt FM GT12 is a stationary type irrigator with a hose drum (rewind machine). The hose drum is mounted on a turntable and equipped with a gun trailer lift, so the unwind direction can be changed without having to move the machine. A turbine is used to power the machine and rewind stops automatically when the gun trailer reaches the machine.

The machine is available with an underpressure stop or an overpressure stop. With the overpressure stop function, make sure that the pump is either switched off via a pressostat or can dispose of water by other means when the machine stops irrigation. With the underpressure stop function, the pump must be stopped via a pressostat.

The machine must be supplied with a maximum pump pressure of 12 bar. The recommended pressure 7-9 bar.

Safety instructions/warnings

If the machine is to be moved via a public road, the machine must first be emptied of water.

As this machine is used for field irrigation involving high water pressure, there is a risk of injury if the machine is used inappropriately. The warnings and safety instructions given here must therefore be respected and followed precisely.

- It is forbidden to stand on the machine during irrigation and transport. **(risk of fatal injury)**

- The guards are fitted for your own safety - please leave them in place

- Remember to tighten the wheel bolts

- During transport on uneven roads/fields, move VERY carefully according to the conditions.

- **DANGER!** Avoid welding in the paint layer! Before welding, remove all paint from the welding area

- Only one person (the operator) should be in the vicinity of the machine during transport, setup and dismantling

WARNING: If the machine is stopped during rewind, the hose is in tension and the drum may run backwards when the clutch lever is released.

Product labelling

Symbols used in this product

The following symbols are used in this product and the following documentation.

WARNING Indicates a potentially dangerous situation which, if not prevented, could result in death or serious injury.

LUBRICATION Indicates lubrication is required as per the service description

SERVICE WARNING Indicates a service hazard

1. Select the nozzle size that best suits your application and install it. Performance data for the different sizes are shown in the table below.

2. Adjust the stop on the part circle to obtain the desired irrigation angle.

Adjustment:

The only thing you can adjust is the counterweight on the drive arm. By moving the counterweight forward, the gun will slowly irrigate from side to side. If you move the counterweight back, the gun will irrigate quickly. If it does not irrigate quickly enough, you can remove the brake springs in pairs. (Contact the service department).

WARNING: DO NOT ADJUST WHEN THE GUN IS IRRIGATING!
HIGH WATER PRESSURE – STAY CLEAR!

Dysetabel for Nelson SR150 kanon, 21°:

Tryk (Bar)	18mm		19mm		20mm		21mm		22mm		23mm		24mm	
	m³/h	Rad.(m)	m³/h	Rad.(m)	m³/h	Rad.(m)	m³/h	Rad.(m)	m³/h	Rad.(m)	m³/h	Rad.(m)	m³/h	Rad.(m)
3,5	20,2	36,5	22,7	38,0	25,4	39,0	28,0	4,0	30,9	41,5	34,1	42,5	37,5	44,0
4,0	21,6	38,0	24,3	39,0	27,1	40,5	29,9	41,5	33,0	43,0	36,4	44,0	40,1	45,5
4,5	22,9	39,0	25,7	40,5	28,7	41,5	31,7	43,0	35,0	44,5	38,6	46,0	42,5	47,0
5,0	24,2	40,0	27,1	41,5	30,3	43,0	33,4	44,5	36,9	46,0	40,7	47,0	44,8	48,5
5,5	25,3	41,5	28,5	43,0	31,7	44,0	35,1	45,5	38,7	47,0	42,6	48,5	47,0	50,0
6,0	26,5	42,5	29,8	44,0	33,1	45,5	36,6	47,0	40,4	48,5	44,5	50,0	49,0	51,5

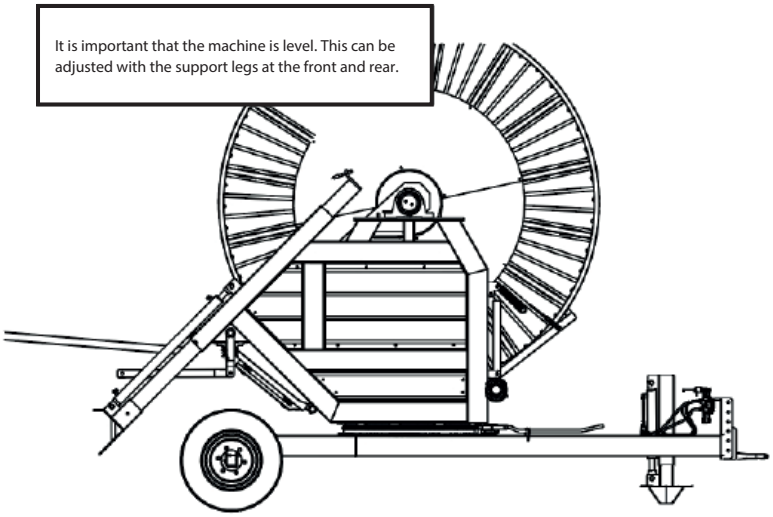
Tryk (Bar)	25mm		26mm		27mm		28mm		29mm		30mm		31mm	
	m³/h	Rad.(m)	m³/h	Rad.(m)	m³/h	Rad.(m)	m³/h	Rad.(m)	m³/h	Rad.(m)	m³/h	Rad.(m)	m³/h	Rad.(m)
3,5	41,0	45,0	44,8	46,0	49,0	47,5	53,3	48,5	57,9	50,0	62,8	51,0	67,8	52,0
4,0	43,8	46,5	47,8	48,0	52,3	49,0	57,0	50,5	61,9	52,0	67,1	53,0	72,5	54,0
4,5	46,5	48,5	50,7	49,5	55,5	51,0	60,5	52,0	65,7	53,5	71,2	54,5	76,9	56,0
5,0	49,0	50,0	53,5	51,0	58,5	52,5	63,8	54,0	69,2	55,0	75,1	56,5	81,1	57,5
5,5	51,4	51,0	56,1	52,5	61,4	54,0	66,9	55,5	72,6	57,0	78,7	58,0	85,0	59,5
6,0	53,7	52,5	58,6	54,0	64,1	55,5	69,9	56,5	75,8	58,0	82,2	59,5	88,8	61,0

Tryk (Bar)	32mm		33mm		34mm	
	m³/h	Rad.(m)	m³/h	Rad.(m)	m³/h	Rad.(m)
3,5	73,1	53,0	78,7	54,0	84,5	55,0
4,0	78,1	55,0	84,2	56,0	90,3	57,0
4,5	82,9	57,0	89,3	58,0	95,8	59,0
5,0	87,4	59,0	94,1	60,0	101,0	60,5
5,5	91,6	60,5	97,8	61,5	105,9	62,5
6,0	95,7	62,0	103,0	63,0	110,6	64,0

NELSON

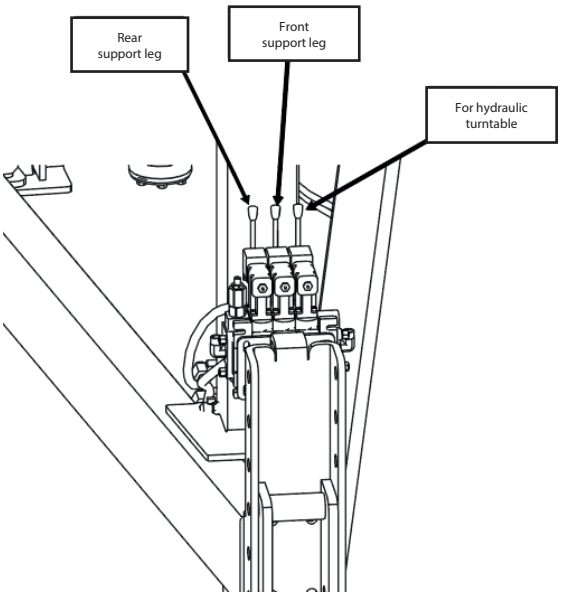
Starting your irrigator

1. Position the machine horizontally in line with the unwind direction.



2. The ground must be level for the first 10 m of the unwind direction.

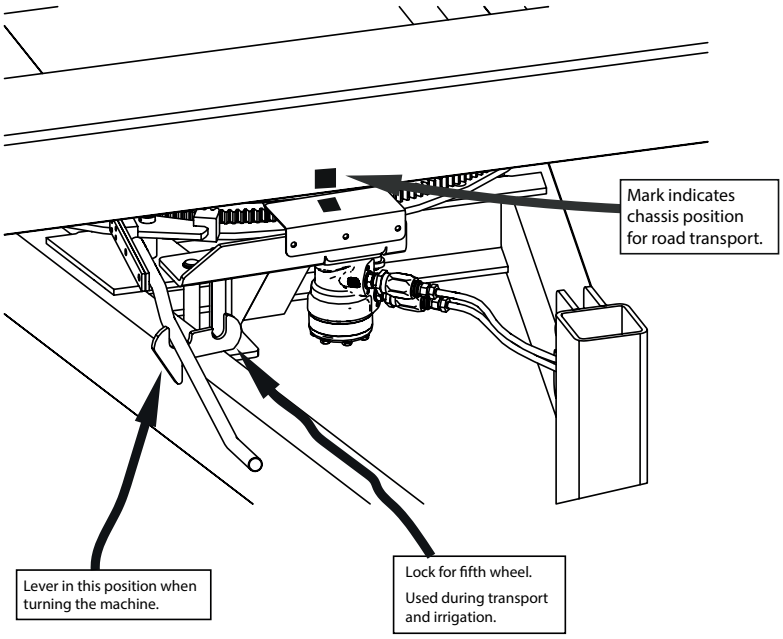
3. Connect the two hydraulic hoses to the tractor.



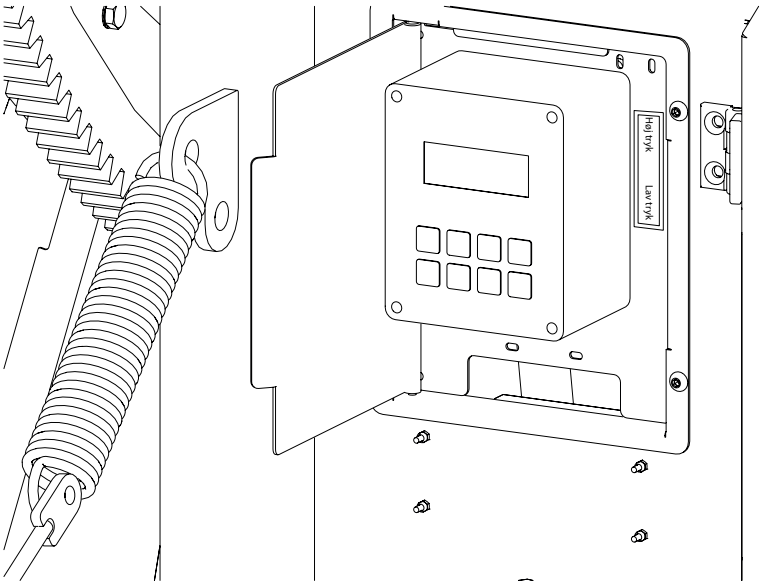
4. Rotate the drum in the desired direction.

5. Lower the two hydraulic support legs to the ground so they are firmly engaged. If the ground is very hard, it may be necessary to move them up and down a few times. **(Warning!! The support legs must not raise the wheels of the machine from the ground.)**

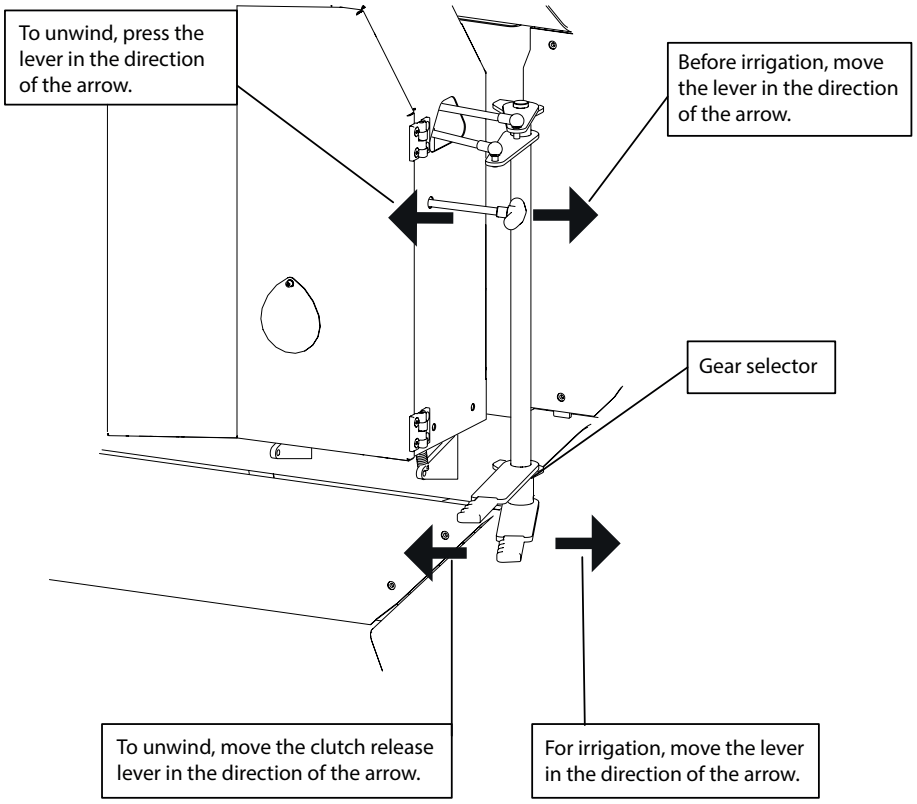
6. The gun trailer lowers automatically when the support legs are lowered.



7. If the machine is equipped with a high pressure/low pressure function, ALWAYS REMEMBER to press start before flicking the toggle switch to the desired stop function.



Move the lever on the left hand side to unwind. See the photo below.
Open the slide valve on the gun trailer to allow the water to flow freely from the hose during unwinding. It is important that the feed hose is not connected to the machine until the hose is fully unwound.



Setting up the Gun trailer

REMEMBER when unwinding the hose to ensure that the gun trailer lift is adjusted correctly. And remember to make sure the machine is standing on firm ground, otherwise damage may occur to the gun trailer lift and machine.

Connect the gun trailer to the tractor and start unwinding the hose. The unwinding speed must not exceed 3 km/h.

If the water has not started to flow out of the machine after about 10 metres, it may be beneficial to stop unwinding for a moment and start again.

It is important that the gun trailer is unwound in line with the machine for the first 10 metres of unwinding, as excessive movements may prevent the gun trailer from entering the gun trailer lift.

WARNING: Never unwind the hose too far – always ensure that there are at least 2 hose turns left on the drum, otherwise the hose coupling will be damaged when the hose is rewound. Driving on hilly terrain may therefore require an assistant or a warning lamp, which can be purchased separately.

WARNING: If the hose temperature exceeds 30 degrees, e.g. due to the machine being in sunlight, cool it by flushing water through the hose before unwinding it, to avoid damage to the hose. Unwind the machine 2-5 metres to activate the limit stop sensor. This to stop water from passing through.

When unwinding the hose, it is important to avoid suddenly braking/stopping the tractor, as the hose may tangle on the drum. Instead, slow down gently and stop.

If the hose becomes loose on the drum during unwinding, adjust the drum brake. If the hose is loose on the drum when fully unwound, tighten it with the PTO crank handle. **REMEMBER** to remove the PTO crank handle after tightening. Never place the crank handle on the machine's PTO input during unwinding or operation. Never release/put the clutch lever in neutral position when the crank handle is on the machine's PTO input and the hose is in tension.

When the hose is fully unwound, close the slide valve of the gun trailer again.

1. Enter the rewind speed on the computer using the arrow keys.
2. Select the gear according to the table below. (Table is also in the machine cabinet)

Gear	Speed	m/h
1	7	20
2	15	45
3	25	65
4	40	200

1. For pre-irrigation, press "PRE" (highlighted in display). For post-irrigation, press "POST" (highlighted in display).
2. Connect the feed hose.
3. Press "START".
4. Open the hydrant and start the water supply pump. The water must not be fed too quickly into the machine to prevent air in the machine, hose and pipe. This can cause pressure surge and kickback in the system.

WARNING:

- **If the hose is in tension when uncoupling, the drum can run back with great force.**
- **All other adjustments to the machine, gun trailer and gun should only be made when the machine is not in operation.**

Automatic and manual stop

Rewind stops automatically when the gun trailer is wound back into the machine, thereby affecting the stop bracket. The machine stops due to either overpressure or underpressure. The machine can also be stopped either at the pump or by pressing "STOP" on the computer.

Emergency stop and safety stop

The safety cable ensures that the machine will stop in case of computer failure.

The machine is equipped with a rewind error bracket that stops rewind if the hose guide should come out of alignment, causing the hose to tangle. The rewind error bracket will activate the stop bracket when the reel comes off the edge of the drum.
REMEMBER when starting for the first time, to check that the rewind error bracket and cable are adjusted correctly.

Gun trailer and hose guide

The gun trailer can be adjusted with different track widths. This is done by loosening the locking bolts on the chassis and extending the legs to the desired track width.

If the gun trailer does not follow the same track during rewind as during unwind, loosen the centre bolt on the steering wheel and move the wheel axle back and forth on one side by turning the steering wheel.

The hose guide ensures that the hose is wound properly on the drum. If the hose does not wind properly on the drum, the hose guide should be adjusted. The hose must be unwound until there are two to three turns left on the drum. Remove the hose guide chains and adjust the hose guide so the hose passing through the hose guide is against the hose already on the drum. (Contact the service department at Fasterholt Maskinfabrik A/S)

Maintenance

After winding for the first time, you should:

1. Retighten the machine.

Weekly:

1. Lubricate the sliding bushing on the drum inlet pipe. Stop lubricating the sliding bushing in the inlet bend of the hose drum when there is a slight increase in pressure in the grease gun.
2. Lubricate the main bearing on the drum.
3. Lubricate the slide for the hose guide. The axle must never be dry.
4. Lubricate the floor reel for the hose guide.
5. Lubricate the wheels on the gun trailer.
6. Lubricate the turntable.
7. Grease the gear wheel on the drum.

Annually:
In addition to the above, the following should be performed annually:

1. Check the oil level in the reduction gear after every 200 hours of operation. If necessary, top up with type 80/90 gear oil or equivalent.
2. Check the air pressure in the wheels.
   On machine: 40psi (2.7 bar)
   On gun trailer: 45psi (3.3 bar)

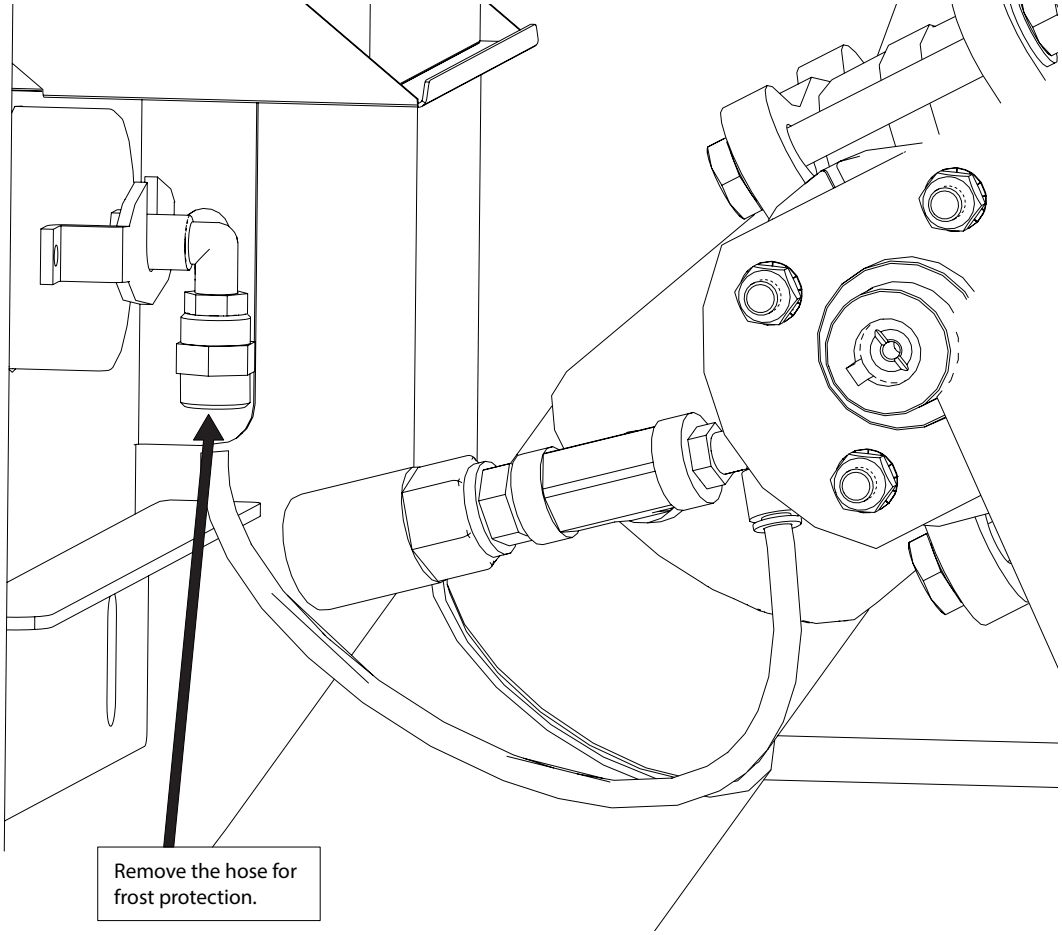
Preparation for winter

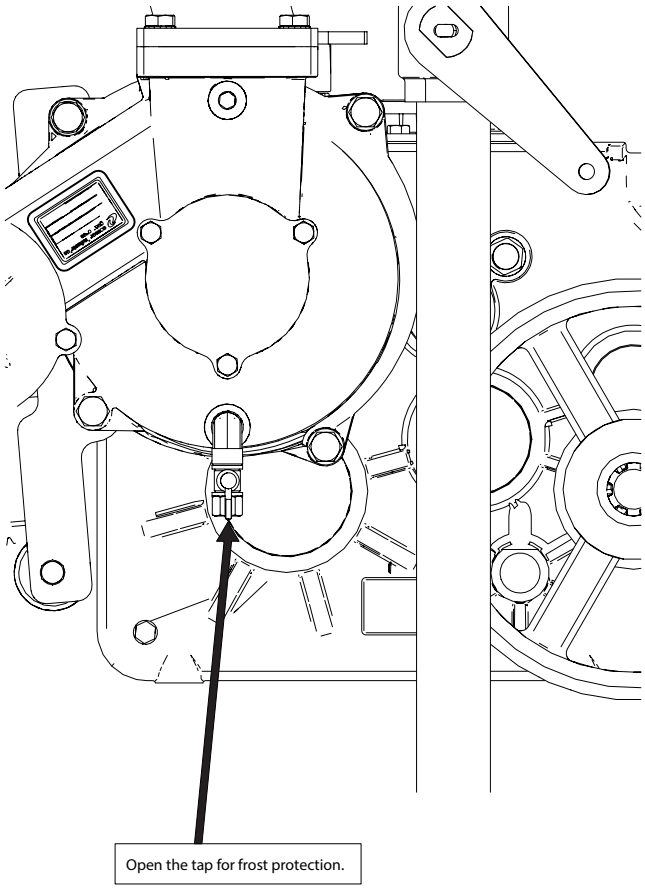
Before the frost sets in, prepare the machine for winter. Contact Fasterholt Maskinfabrik A/S for a winter service inspection. This avoids unnecessary downtime during the season.

Preparation includes the following points:

1. Drain water from the machine and hose with compressed air. Open the slide valve on the gun trailer. Note: Butterfly valve MUST be open.
2. Grease the slide shafts on the hose guide.
3. Clean the gun and inject acid-free oil.
4. Check the air pressure in the wheels.
5. Lubricate all moving parts with anti-corrosion oil.
6. Remove the battery and store it fully charged in a dry, frost-free environment.

See the photos on the following page for frost protection.


Remove the hose for frost protection.


Open the tap for frost protection.

Hose PEMD 110 mm:
Capacity up to 75 m³ - hose length from 400 to 550 m.

Wheel size:

Rear wheels : 14.00/65/16»x14 ply - air pressure 34,8 psi/2,4 bar

Speed at 35 m³ and above:
15-30 metres per hour

Weight of GT12 standard

Weight with water with 550 m/110 mm hose:	8389 kg.
Weight without water with 550 m/110 mm hose:	4729 kg.
Track width (Standard)	2050 mm.
Gun :	Nelson SR 150
Oil in Multigear:	12 liter 80/90 gear oil
Hydraulic oil... :	5 liter STATOIL Hvxa 46
Grease for lubrication:	FUCHS Greaseway CAH 92 or equivalent.
Width	270 cm.
Total length	765 cm.
Length without Gun	615 cm.
Height	390 cm.

Changing the Oil	First Use	Use Routine Maintenance
Axle oil change	200 H	Seasonal/every. 1000 H (1)
Cleaning of magnetic oil drain plug	At first oil change	At each oil change
Check and refill oil	100 H	Monthly/every 300 H (1)
Cleaning of oil vent	400 H	Monthly/every 300 H (1)
Lubrication (where intended)	200 H (2)	Weekly/every 200 H (1)(2)

(1) = Which of the two conditions occurs first
(2) = 50 Hours in case of hard work
H = Hours

Contact the Sales Department at Fasterholt Maskinfabrik A/S if there are any questions.

Troubleshooting table

Error	Cause	Solution
Drum stop	Foreign object in turbine	Remove front cover and clean turbine. Turbine must never be turned forcibly
	Clutch lever not engaged	Engage lever
	Computer failure	Check computer
	3-way valve is stuck	Check 3-way valve
Computer error	Battery flat	Charge or replace
	Stop sensor on stop bracket activated	Adjust or replace
	Fuse in computer	Replace fuse
	Control error	Contact dealer or Fasterholt Maskinfabrik A/S
Rewinding error	Hose guide out of alignment	Adjust the hose guide
	Too much hose on drum	Check hose length
Unwinding error (loose hose)	Brake loose	Adjust brake
	Stops too quickly when unwinding	Reduce speed over a longer distance
Gun does not work	Pressure too low	Increase pressure or switch to smaller nozzle
	Sector guide damaged	Replace/Repair stop trigger

Functions:	Pressure sensor
Speed regulator	Stop sensor
Pre- and Post-irrigation	Speed sensor
4 different speeds on sections of the lane	Motor 1, regulating motor
Clock	Motor 2, stop motor
Setting the start time	Slow start of turbine
Stop time is shown on the display	Slow opening of inlet
Length of hose	Water volume + spreading width
Current speed	**Accessories:**
Battery volts	GSM, SMS messages for remote control.
Charge regulator	Analogue pressure sensor.

Short instructions for use

Speed	30.0m/h		
Dose	22 mm		
Time	7:28	STOP	7:28
STATUS STOP Sensor			

Speed	30.0m/h		
Dose	22 mm		
Time	7:56	STOP	17:16
STATUS STOP Sensor			

Speed	25.0m/h		
Dose	26 mm		
Time	7:58	STOP	17:58
STATUS STOP Sensor			

Speed	25.0m/h		
Dose	26 mm		
Time	7:58	STOP	17:58
STATUS STOP Sensor			

Speed	25.0m/h		
Dose	26 mm		
Time	8:00	STOP	18:38
STATUS Running			

Speed	25.0m/h		
Dose	26 mm		
Time	8:02	STOP	18:38
STATUS PRE Irri.			

Speed	25.0m/h		
Dose	26 mm		
Time	18:20	STOP	18:38
STATUS POST Irri.			

Speed	25.0m/h		
Dose	26 mm		
Time	18:38	STOP	18:38
STATUS STOP Sensor			

Place Machine:
Move machine to a new lane. Display shows start and stop time. Pull hose out to end of the lane. (e.g. 250 m)

Select Speed:
Display now shows stop after 9h 20m. Press the "+" or "-" key to set the speed. Speed can be adjusted during irrigation.

SPEED has decreased, DOSE has increased and STOP time is later.

Start Irrigate, Select PRE- and POST Irrigation:
Press START to start. Press PRE and POST for pre- and post-irrigation respectively. STOP time will be later when PRE and POST irrigation are selected.

Starting
The turbine will start when the water pressure increases. After a short period, the regulator finds the correct speed. Irrigation continues until STOP SENSOR is activated at the end of the lane.

PRE Irrigation:
If pre-irrigation is selected, the turbine stops immediately after performing a start and pre-irrigation. When the pre-irrigation time has elapsed, the turbine starts and the machine changes status to Irrigating.

POST Irrigation:
If post-irrigation is selected, the turbine stops at the end of the lane when the stop sensor is activated. Post-irrigation then starts.

Stop:
Stop sensor is activated, turbine and water are shut off. The machine is now ready to be moved to a new lane.

General instructions for use

SPEED 30.0m/h DOSE 22 mm TIME 7:28 STOP 7:28 STATUS Running	Standard display
ZONE 1 30.0m/h DOSE 22 mm TIME 7:56 STOP 17:16 STATUS Running	Standard display, ZONE irrigation is selected.
DISTANCE 123m DOSE 12.8V CHARGE ON 0.231A PRE 0:45 POST 0:45	Press the **MENU key 1 time to display menu 2**
PRESS SENSOR ■ STOP SENSOR ■ SPEED. SENSOR ■■ MOT1 0.0A MOT2 1.8A	Press the **MENU key 2 times to display menu 3**
A.SPEED 22m/t START 0:00 STOP 7:43 WORKING HOURS 123t	Press the **MENU key 3 times to display menu 4**
0m 30.0m/h 0m 0m 30.0m/h 0m 0m 30.0m/h 0m 0m 30.0m/h 0m	Press the **MENU key 4 times to display menu 5**
SIGNAL 23 NETWORK HOME A: +45123456 B: +45123456	Press the **MENU key 5 times to display menu 6 (Only if GSM is selected)**

When ■ appears in the display, this indicates that the relevant function is ON.

Standard menu:

SPEED	30.0m/h		
DOSE	22 mm		
TIME	14:10	STOP	7:28
STATUS	Running		

SPEED — Speed. Can be changed at any time during irrigation using the "+" and "-" keys.

ZONE — Current zone 1...4, with corresponding speed. The speed cannot be changed. (Zone active)

DOSE — The dose is calculated from the speed and constants and shows the current number of mm for irrigation. As SPEED increases, DOSE decreases. (Constants 11 and 12)

TIME — To set the time: Set SPEED to 11.1 m/h and press the **PROG** key 3 + 1 times until the display shows <CONST 1 TIME>. The time can then be set with the "+" and "-" keys. When the battery has been disconnected, the clock will show 0:00 until it is set again.

STOP — The time that irrigation is completed, incl. pre- and post-irrigation. If the clock is not set and shows 0:00, the total irrigation time is displayed..

STATUS — Irrigation status, e.g.:

< Stop Sensor >
< Irrigating >
< Pre-irrigating >
< Post-irrigating >
< LOW pressure >

See explanation in STATUS chapter.

If the display shows: **LOW BATTERY** instead of SPEED, the battery voltage is below 11.8 V and the battery needs to be charged.

MENU 2

DISTANCE		123m	
DOSE	12.8V		
CHARGE	ON	0.231A	
PRE	0:45	POST	0:45

DISTANCE — Length of the unwound hose. The length can be changed immediately after pressing the **PROG** key 3 times, using the "+" and "-" keys.

BATTERY — Battery voltage.

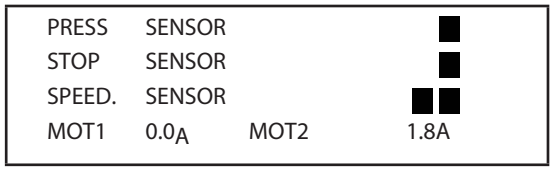
CHARGE ON — Shows when the battery is being charged by a solar cell. The battery is charged when the voltage is below 14.0 volts.

PRE — Shows the pre-irrigation time.

POST — Shows the post-irrigation time.

The pre- and post-irrigation times can be changed immediately after pressing the PRE- or **POST**- keys, using the "+" and "-" keys.

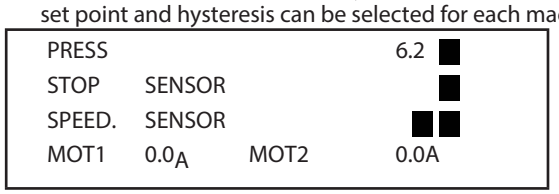
MENU 3



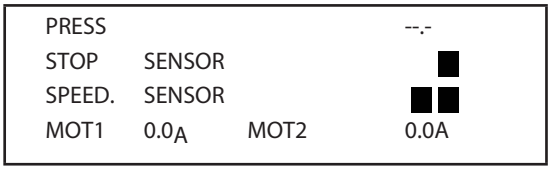
PRESSURE SENSOR

Shows that the pressure is high when block is lit. **The machine can only move when the pressure is high.** If no pressure sensor is fitted (machine data 14 = 0), the machine will move regardless of pressure status.

The machine can be fitted with analogue pressure sensors. Sensors must be connected according to the diagram. Pressure sensor functions, except for pressure display, are the same as for digital pressure sensors. There are constants for the pressure sensor type. Similarly, set point and hysteresis can be selected for each machine.



Shows pressure in [BAR] (00.0) or [PSI] (000). Pressure is high when ■ is lit.
The machine can only move when the pressure is high.
If no pressure sensor is fitted (machine data 14 = 0), the machine will operate regardless of pressure status.



STOP SENSOR

Shows that the magnet is aligned with the stop sensor when block is lit.
The machine can only start when the magnet is aligned with the stop sensor.
The stop sensor has 3 functions:

1. Reset distance.
2. Post-irrigation.
3. Stop pulses to the regulator motor.

SPEED SENSOR

For the speed sensor test, block is only lit when the magnet passes the sensor.

MOT1, MOT2

Displays the current motor current. When the current exceeds 4.5 A, the motor stops.
If the current exceeds 4.5 A and the valve is not in the outer position, there may be a blockage in the valve.

MENU 4

ACTUAL SPEED	22m/h
START	0:00
STOP	7:43
WORKING HOURS	123t

CURR. SPEED — Shows the current speed. That is, the speed at which the machine is moving now. This can be used to find how fast the machine can move. The current speed may differ slightly from the set speed, especially at the start. This does not matter, as regulation ensures that the average speed within 10 metres is correct.

START — Start machine delay. The machine start time can be delayed by up to 24 hours. To set the start time, press the **PROG** key 3 times, then set the time using the "+" and "-" keys.

STOP — The time that irrigation is completed with a delayed start.

OPERATING HOURS — Shows how many hours the machine has been running since the electronics started for the first time.

MENU 5

0m	30.0m/h	0m
0m	30.0m/h	0m
0m	30.0m/h	0m
0m	30.0m/h	0m

This menu is for irrigation at different speeds in zones of the lane.
Press the **PROG key 3 times to program the zones.**
See later chapter for details.

MENU 5

SIGNAL 23	
NETWORK HOME	
A:	+45123456
B:	+45123456

SIGNAL GSM signal strength.
NETWORK GSM network
A: First number on "SMS" list.
B: Second number on "SMS" list.

See GSM chapter for details.

START:

The turbine can only start if the magnet is aligned with the end stop sensor (or end stop sensors). See menu 3 for control of the STOP SENSOR. Press the **START** key to turn on the water. The regulator valve for bypass around the turbine then closes. (Turbine starts). If the end stop sensor is not in place, only the main valve can be opened, which then immediately closes again. Used to relieve pressure before removing charge hose from hydrant.

DEFERRAL OF START TIME

First press the **STOP** key to shut off the water. Then press the **MENU** key 3 times and **PROG** 3 times. The start time can be set using the "+" and "-" keys. Finally, select pre- and post-irrigation. To exit, press **MENU.** Info: The clock can only be set forwards.

STOP:

When the magnet is removed from the end stop sensor, the turbine stops and the main valve shuts off the water (turns on the water at negative pressure). If post-irrigation is selected, rewinding stops when the magnet is removed from the sensor. When the post-irrigation time has elapsed, the main valve closes. When the **STOP** key is pressed, the turbine stops immediately and the main valve shuts off the water, regardless of whether post-irrigation is selected.

SUPERVISION:

Program Rain has a built-in supervision system. The supervision system will be activated if for any reason the machine has water in the same location for longer than a specified time. This time is factory-set to 20 minutes. If the time is set to 0, there is no supervision. (See constants on page 17 for setting the supervision time.) If speed supervision less than 50 % of pre-selection is required, select speed supervision together with the above time.

SPEED:

The speed is set using the "+" and "-" keys. First count up in steps of 0.1 m/h. After 10 steps, count up in steps of 1 m/h. The speed can be changed at any time during irrigation. If the speed changes during irrigation, the dose and time for the remaining irrigation will be calculated immediately based on the new speed.

PRE-IRRIGATION:

If pre-irrigation is required, press the **PRE**- key. The pre-irrigation time is calculated as 8 x the time to move 1 m at the current speed. The constant can be changed individually for pre- and post-irrigation. (See constants). If pre-irrigation is selected, the machine will move forward approx. ½ m, after which the machine will stop and stand still for as long as pre-irrigation is performed. Menu 2 shows the number of minutes remaining of the pre-irrigation time. If you want to cancel pre-irrigation, press the **START** key. This will cancel both pre- and post-irrigation and the turbine will start.

POST-IRRIGATION:

If post-irrigation is required, press the POST- key. The post-irrigation time is calculated as 8 x the time to move 1 m at the current speed. The constant "8" can be changed individually for pre- and post-irrigation. (See constants on page 16). Post-irrigation starts counting down when the magnet is removed from the stop sensor. When the stop sensor is activated, the turbine stops and post-irrigation starts counting down (see menu 2). When the post-irrigation time has elapsed, the main valve closes. (Opens in installations with negative pressure stops). For machines with mechanical end stops: The turbine stops when the stop sensor is activated. When the post-irrigation time has elapsed, the turbine starts and the machine moves to the mechanical end stop. Press START to cancel post-irrigation. If constant "8" (early stop) is selected, the machine will stop when it reaches the selected distance.

PROGRAMMING 4 DIFFERENT SPEEDS:

The hose must be unwound before programming, so the computer knows the number of metres in the irrigation lane. The following example assumes that the unwound hose is 400 m. Press the **PROG** key 3 times and the display will show:

400m	30.0m/h	0m
0m	30.0m/h	0m
0m	30.0m/h	0m
0m	30.0m/h	0m

The desired speed can now be selected, in this case 25.0 m/h. Press the **PROG** key and the display will show::

400m	25.0m/t	0m
0m	30.0m/h	0m
0m	30.0m/h	0m
0m	30.0m/h	0m

The desired distance can now be selected, in this case 300 m. Press the **PROG** key and the display will show:

400m	25.0m/t	300m
300m	30.0m/h	0m
0m	30.0m/h	0m
0m	30.0m/h	0m

Now that the first zone is programmed, apply the same procedure to all 4 zones. Zone 4 automatically ends at 0. When zone 4 is programmed, press the **PROG** key again and the display will show:

DELETE	PRESS	MENU
SAVE	PRESS	PROG

If **PROG** is pressed, the program is stored and irrigation will be performed according to this program.
If **MENU** is pressed, the program is deleted and the speed is the same for the entire irrigation lane.

STATUS	Status messages in display
****RUNNING****	Machine has not been started, anyway speed pulses is received and it is trying to maintain the speed requested.
RUNNING:	The machine is irrigating, and everything is working properly.
LOW PRESSURE:	Water pressure is below pressure switch treshold. Machine acts depending on Machine data.
STARTING:	Operator has pressed **START** key, and start sequens is in process.
START REMOTE:	Machine is starting due to an **SMS**.
START DELAY:	Machine is waiting for start delay to elapse. (See menu 4).
START PRESSURE:	Machine has started due to pressure rise. Machine is using pressure level, to start 2'nd machine on string.
START DENIED:	Operator is holding **STOP** key to prevent **PRESSURE** and **REMOTE** start.
STOP USER:	Machine has stopped due to operator **STOP**.
STOP REMOTE:	Machine has stopped due to an **SMS**.
STOP SENSOR:	Machine has reached end and is stopped by **STOP SENSOR**.
STOP DISTANCE:	Machine has reached distance for stop. (See constant for early stop).
STOP DELAY:	Machine has reached stop but waits nn Seconds to proceed stop sequence.
STOP DENIED:	Operator is pressing **START** key, preventing **REMOTE** stop.
SUPERVISION TIME:	Machine has stopped due to supervision time is elapsed. Machine has not moved in nn minutes. (See constant for supervision time).
FORCE LOW PRES:	Machine opens valve, to force pressure drop, to stop main pumpe. After 2 minutes, valve closes to prevent draining of pipes.
PRE IRRIGATION:	Machine is performing pre irrigation
POST IRRIGATION:	Machine is performing post irrigation

There are a variety of constants that can be modified by the user.
These constants will be stored for many years, even if the battery is removed.

Programming procedure:
Adjust the speed to 11.1 m/h to access the constants.
Press the **PROG** key 3 times in quick succession to access and change the constants.
Press the **PROG** key again to count forward to the constant you wish to change.
Press "+" and "-" to adjust the value of the constant.
Press the **MENU** key to save the change and the display will return to normal.
If the **MENU** key is not pressed, the display will return to normal after 1 minute and the change will not be saved.

CONSTANTS

Cons no.	Note	Fact. Adj.	Min. Value	Max. Value	Description
0		100	-	-	Enter 111 to reach machine data
1		00:00	00:00	23:59	Time in line 2 is set
2		8	1	15	Pre irrigation
3		8	1	15	Pre irrigation
4		20	0	99	Supervision time [minutes]
5		1	1	15	1 English, 2 Danish, 3 German, 4 French, 5, Dutch 6 Swedish, 7 Spanish, 8 Italian, 9 Polish, 10 Japanese 11 Hungarian
6		0	0	2	0 = Stop for high pressure slow shutdown 1 = Stop for low pressure. valve opens and close again after 3 minutes 2 = Motor for stop disconnected
7		-	0	1000	Actual distance, can be set by the keyboard [m]
8		0	0	1000	Early stop [m] (* Is only performed when Post Irrigation is selected *)
9		0	0	1000	Post irrigation before stop [m]
10		0	0	1000	Distance for alarm [m] (* Disabled if Machine data 22. Sprinkler, is selected *)
11		40	5	120	Water flow [m3/h]
12		60	5	100	Spacing between irrigation lanes [m]

Set Constant no. 0 to 111 to set the machine data.
Then press **PROG** to display the machine data.

Machine data Number of flashing digits		Possible setting	Factory settings
0	Hose length	0 - 1,000m	Not used
1	Hose diameter	40 - 200 mm	Not used
2	Hose drum int. Diameter	500 - 3,000 mm	Not used
3	Number of hose turns per layer	5.00 - 30.00	Not used
4	Large gear on hose drum	50 - 1000	Not used
5	Small gear on gearbox	5 - 40	Not used
6	Number of magnets	1 - 20	Not used
7	Ovality compared to 100 %	0.70 - 1.00	Not used
8	Length of first pulse to stop valve	0 - 45 sec.	3
9	Length of subsequent short pulses to stop valve	0 - 300 m/sec.	160
10	Time between short pulses to stop valve	1 - 5 sec.	2
11	Number of short pulses to stop valve	0 - 250	100
12	Mechanical stop (with only 1 motor) Electrical stop (closed low pressure) even if the pressostat registers low pressure	0 1	1
13	Length of pulse to regulator motor at start-up (Oil pump Motor 1)	26.1 - 0.9 sec.	4.5
14	Pressostat not connected Pressostat connected (to start/stop) or Radio start Pressostat installed: (can be used (for start only) for 2 machines on the same system, Autostart with special pressostat.)	0 1 2	1
15	Length machine moves per pulse: 0 = Moves according to formula FM4300 & FM4300H = 73.5 mm (2 magnets) FM4300 & FM4300H = 38.8 mm (4 magnets) FM4400 & FM4400H = 46.2 mm (4 magnets) Old Rear axle assembly FM4400 & FM4400H = 46.0 mm (4 magnets) New Rear axle assembly FM4500 & FM4500H = 85.0 mm (2 magnets) FM4500 & FM4500H = 42.5 mm (4 magnets) FM4550 & FM4550H = 46.2 mm (4 magnets) Old Rear axle assembly FM4550 & FM4550H = 46.0 mm (4 magnets) New Rear axle assembly FM4800H = 43.3 mm (4 magnets) Old Rear axle assembly FM4800H = 46.0 mm (4 magnets) New Rear axle assembly FM4900H = 103.0 mm (2 magnets) FM4900H = 51.5 mm (4 magnets) FM4900H = 46.8 mm (4 magnets) New Rear axle assembly FM5500H = 47.0 mm (4 magnets) FM5500H = 47.0 mm (4 magnets) New Rear axle assembly 62.5 = When moving with roller Ø80 [mm] 0 = Moves according to formula (with data number 0 to 7)	0 - 160.0 mm	
16	Speed sensor 0 = Round sensor for roller 1 = Double sensor	0 1	1
17	Opening of inlet valve 0 = Quick opening 1 = Slow opening	0 1	0
18	Pressostat 0 = Inlet remains open at low pressure 1 = inlet closes at low pressure	0 1	0
19	Delay from stop sensor to turbine stopping (sec)	0	0

Cons no.	Note	Fact. Adj.	Min. Value	Max. Value	Description
40		0	0	2	Analog Pressure gauge 0 = Digital Switch 1 = Analog Pressure gauge - Display units [BAR] 2 = Analog Pressure gauge - Display units [PSI]
41		0.50	0.10	5	Voltage Offset [V]
42		0.20	0.05	5	Voltage gain [V]
43		3.5	0.0	25.0	Pressure setpoint 0.0 - 25.0 [BAR] Pressure level for Off - On
44		0.2	0.2	25.0	Pressure hysteresis 0.2 - 25.0 [BAR] * Setpoint - 0.5 * hysteresis for Off Setpoint + 0.5 * hysteresis for On Default Settings 0.2 • 3.4 BAR = Off • 3.6 BAR = On

Program Rain can be set to 2 different types of sensors.

See Machine Data #16 Sensor

One is a round sensor with 4 built-in sensors and can only be used for rollers with 1 magnet. When the battery is connected, the display shows the following for 2 seconds: **VERSION n.n0.**

The other is a rectangular sensor with 2 built-in sensors (double sensor). This is used for scanning on rollers with more than 1 magnet and for discs with from 1 to 20 magnets. When the battery is connected, the display shows the following for 2 seconds: **VERSION n.n1.**

Cable connection

Program Rain 10 version n.n1 = double sensor
Cable connection

1	+ Battery	Brown 12V	
2	- Battery	Blue	
3	+ Solar panel	Brown	
4	- Solar panel	Blue	
5	Motor 1	Speed Regulation	
6	Motor 1	Speed Regulation	
7	Speed sensor 1	Blue *	
8	Speed sensor 1	Black *	
9	Speed sensor 2	Yellow/Green *	
10	Speed sensor 2	Brown	
11	Stop sensor	Blue eller Brown	
12	Stop sensor	Blue eller Brown	
13	Motor 2	Stopmotor	
14	Motor 2	Stopmotor	
15	Pressure	Blue eller Brown	
16	Pressure	Blue eller Brown	
17	BIP - Motor 3	Brown	Sprinkler
18	BIP + Motor 3	Blue	Sprinkler

* If the distance counter count the wrong way, the speed sensor should be turned.

Program Rain 10 version n.n0 = round sensor
Cable connection

1	+ Battery	Brown 12V	
2	- Battery	Blue	
3	+ Solar panel	Brown	
4	- Solar panel	Blue	
5	Motor 1	Speed Regulation	
6	Motor 1	Speed Regulation	
7	Speed sensor 1	Blue *	
8	Speed sensor 1	Black *	
9	Speed sensor 2	Yellow/Green *	
10	Speed sensor 2	Brown	
11	Stop sensor	Blue eller Brown	
12	Stop sensor	Blue eller Brown	
13	Motor 2	Stopmotor	
14	Motor 2	Stopmotor	
15	Pressure	Blue eller Brown	
16	Pressure	Blue eller Brown	
17	BIP - Motor 3	Brown	Sprinkler
18	BIP + Motor 3	Blue	Sprinkler

* If the distance counter count the wrong way, the cable on the terminal 8 and 9 must be interchange

Program Rain 10		**6 Pol Connector**	
19	+ GSM	Brown	+12 V
20	- GSM	Blue (Green)	
21			
22			
23	+ Pressure	Brown	12 V
24	Pressure signal	White	0-5 V

Technical data

Dimension (h*w*d)	170*140*100 [mm]
Voltage	10-15V DC
Current	6 mA (Rest) 30 mA (with GSM) 80 mA (with light) 5A motor max. current
Fuse	5A Fixed

Troubleshooting:

?

The turbine does not start when the **START** key is pressed.

Answer:
The magnet at the stop sensor is not in position or the sensor or sensor cable is damaged.
Stop sensor: The mark ■ must be on when the magnet is in position and off when the magnet is removed. See Menu 3.
A damaged cable can be assembled in an epoxy moulded assembly or with shrinkable tubing and glue.
However, since the sensors are more sensitive than telephone cables in the ground, cable assembly must be seen as an emergency solution.

If a pressostat is installed, the water must be pressurized. The mark ■ must be on when there is pressure.

?

No numbers in the display.

Answer:
Battery disconnected. Fuse inside the box may have blown. The fuse will blow if the battery is wrongly connected.
An additional fuse is available from the factory on a single fuse terminal on the circuit board.
Fuse 5A. Battery voltage 12V. See Menu 2.

?

Clock is set to 00:00

Answer:
If the power is interrupted, the clock is reset. The end time is then the number of hours and minutes until irrigation is complete.
See page 15 for setting the clock.

?

The number of metres is not counted correctly and the speed is not correct.

Answer:
If the speed is measured with a roller running on the hose, check whether the roller is running smoothly or if it is not installed properly on the hose. You will also need to check that the roller sensor with cable is functioning properly. See Menu 3 Speed sensor.
The 2 marks ■ ■ must light up in the following order from the right during unwinding: The first one turns on, then the second one turns on, the first one turns off, then the second one turns off. During rewind, this happens in reverse order.

?

Only half or perhaps 2/3 of the actual length has been counted.

Answer:
The stop bracket with magnet for the stop sensor may have jumped, so the magnet has been removed temporarily from the stop sensor. This will reset the counter. Or a hose turn has been so loose that it has impacted the miswinding bracket.
This is usually the same as the impact on the stop bracket and has the same result.

Even if the metres are not saved in the memory, irrigation will still continue at the selected speed and the machine will stop as normal. However, there will be deviations if the speed is measured on a gear disc and the calculation is based on formulas entered in MACHINE DATA. This is because the electronics do not know which hose layer the machine is running on. Finally, the metres can be entered manually.

Combining the various constants:
The machine will always be able to run with the factory-set constants. However, there will be different conditions from farm to farm and from machine to machine. Many requests can be met by changing the constants.

1. **Slow start-up of turbine.** **Set machine data no. 13 initially to approx. 2-4.**
This causes the speed regulator valve to close only about halfway, after which continued closing is performed in steps until the rewind speed reaches the set speed. The valve can then be fine-tuned to close first to the point where the turbine starts running and then to close in steps until the set speed is achieved.

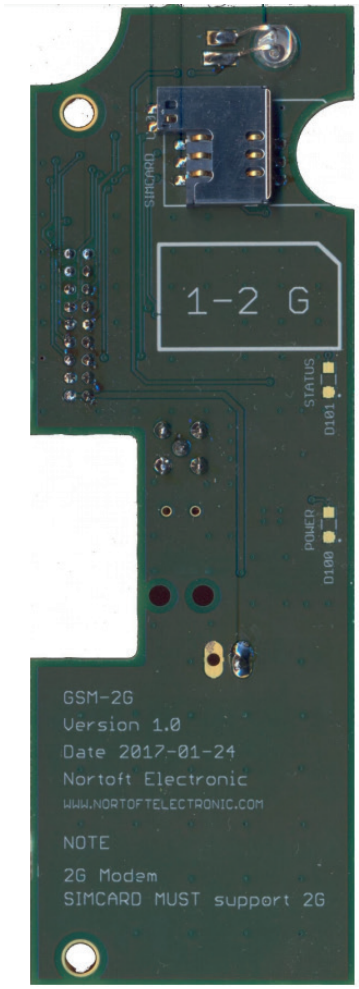
2. **Slow opening of inlet.** **Set machine data no. 17 to 1.**
Opening for the water is then performed in steps.

3. **Only one motor for speed regulation.** **Set machine data no. 12 to 0.**
Post-irrigation starts once the turbine stops, when the magnet at the stop sensor is affected. After the post-irrigation time has elapsed, the machine will restart and move to the mechanical stop.

4. **Start up no. 2 machine when no. 1 stops.** **Set machine data no. 12 to 0.**
With a pressostat installed on both machines, set the pressostats between the machine's operating pressure and the pump pressostat's stop pressure. For example, the operating pressure may be 6 bar and the pump stop 9 bar. Set the pressostats on the machines to 7.5 bar. No. 2 machine will then start up when the slow closing of the first machine reaches the point where the pressure in the ground line reaches 7.5 bar. Be aware that if the height difference of the fields is too great, the required pressure differentials that the pressostat must be set to may be too great.

5. **The machine should stop due to low pressure and with a pressostat installed. Set constant no. 6 to 1 and set machine data no. 12 to 2.**
This means that the stop valve opens instead of closing if the line connection to the stop valve is the same. After 2 minutes, close it again, otherwise you will not be able to obtain pressure at start-up. When machine data 12 is set to 2, the valve can only be opened with the stop sensor, stop button and monitoring. But not when the pressostat is switched off.

GSM-2G



Functions	Modem
Easy installation on PR10-12 Low power consumption Total 10 mA consumption, PR10-12 and GSM-2G Visible status LED Supplied with Antenna with 2 metre cable Mounting accessories	• Dual band 850/900/1800/1900 MHz • GPRS multi slot class 12/10 • GPRS mobile station class B • Compliant to GSM phase 2/2+ - Class 4 (2 W @850/900 MHz) - Class 1 (1 W @1800/1900MHz) • Temperature range: -40 °C ~ 85 °C

GSM

GSM-2G is a GSM modem made for PR10-12.
The machine can be started, stopped or queried about status by sending an SMS.

Commands

Start	Starts the machine.
Stop	Stops the machine
Speed ##	Set the desired speed 3 to 400 m/h
Status	Returns the current machine status.

SMS can be written in small, large or mixed characters.

If you call the modem from a GSM phone, you will receive an SMS with ***Status***

Status

SPEED		30.0m/H	
DOSE		22 mm	
TIME	14:10	STOP	18:16
STATUS IRRIGATING			
DISTANCE		123m	
BATTERY		12.8V	
CHARGE ON	0.231A		

SMS, sent from machine contains miscellaneous information.

SMS is sent at:

LOW PRESSURE	The machine has stopped due to a lack of water pressure.
STOP SENSOR:	The machine has reached the end and is ready for a new lane.
STOP TELE:	Machine is stopped via an **SMS**
STOP DIST:	The machine has reached the stopping distance. (Constant 8)
STOP MONITOR:	Monitoring has stopped the machine. The machine has not moved for xx minutes. (See constant for monitoring)..

How to start the system:

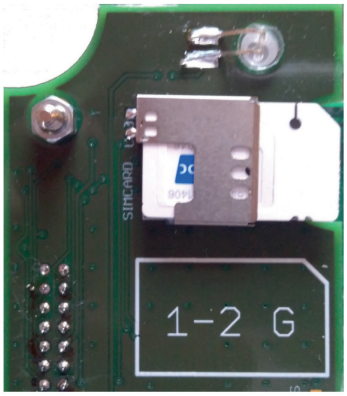
Disconnect the battery fromthe electronics.

Insert the SIM card in a regular mobile phone and change the pin code to 1111**.**
Try sending and receiving an SMS to see whether the SIM and account work as intended.

Note that SIM card MUST support 2G. Some operators do not support 2G.

Install the modem using the supplied threaded rods.

Insert the SIM card in the modem device.



Connect the battery and set machine data #30
= 0 No GSM
= 1 Use GSM, all tele numbers can be used, no speed setting
= 2 Use GSM, only the numbers created in the SMS list can be used.

SPEED		**11.1m/h**	
DOSE		**22 mm**	
TIME	**14:10**	**Stop**	**7:43**
M.DATA	**30**	**1**	

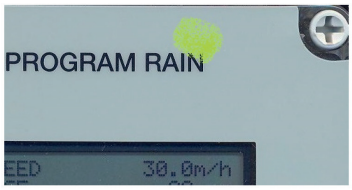
See chapter for setting up data.

After approx. 30-45 seconds, the modem should be connected to the GSM network.

SIGNAL 23
NETWORK HOME
A: +45123456
B: +45234567

Signal strength, 0 - 31 and the network is then displayed in menu #6
Signal strength of 10 or above is a stable connection.
Signal strength of 99 indicates no signal.
-Missing antenna
-Very poor signal

Modem has LED to indicate status.



Green	LED
Switched off	Off
- Searching the network - No SIM card in modem - Incorrect PIN code - No GSM network available	Flashes quickly
STANDBY (registered on network)	Flashes slowly
Connection(TALKING)	On

When an SMS is received, the display shows:

Receiving SMS **#: +45123456** **Status**

Receiving an SMS, sender's phone number and 40 characters of message. All SMS can be received, but only known commands are accepted.

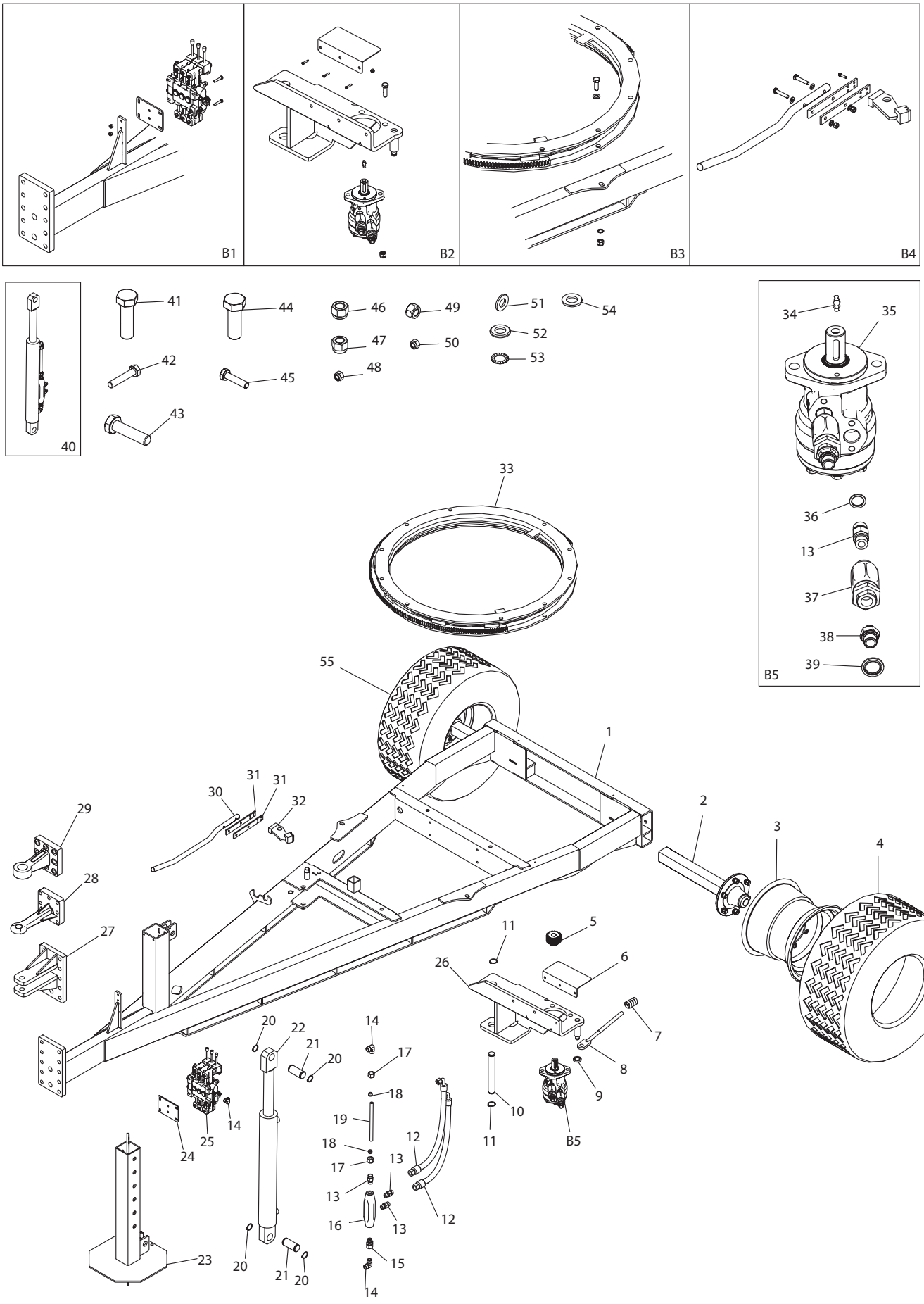
When an SMS is sent, the display shows:

Sending SMS **#: +45123456** **Status Running**

Sending an SMS, receiver's phone number and machine status.

Guarantee and complaints

For all products manufactured by Fasterholt Maskinfabrik A/S, Fasterholt Maskinfabrik A/S provides a guarantee for 24 months from the delivery date as regards errors in the processing and materials that are not due to ordinary wear and tear. The guarantee only applies provided that the product has been correctly installed, that only original spare parts have been used, and that such use is in accordance with Fasterholt Maskinfabrik's instructions and generally known practice.
As regards third-party goods that are part of the delivery, e.g. electronic equipment etc., the same guarantee is provided as the one provided to Fasterholt Maskinfabrik A/S by the sub-supplier.
If any errors are demonstrated in our products during the guarantee period, Fasterholt Maskinfabrik A/S will make cost-free repairs and renewals to the required extent as soon as possible within normal working hours.
If the goods for which a complaint has been made are to be replaced by new goods, such goods are sent including a new invoice. The goods for which a complaint has been made, incl. documentation about what is wrong and which machine number it is about, must be returned to Fasterholt Maskinfabrik A/S at the latest 14 days after the complaint was made for the purpose of crediting.
Only when we have received all necessary material will a warranty case be created. If the part is too large to send, Fasterholt Maskinfabrik must be contacted for another agreement. Photographic documentation will always be required in this context.
Fasterholt Maskinfabrik A/S is not liable for operating losses, loss of time, loss of profits or similar.


B1
B2
B3
B4
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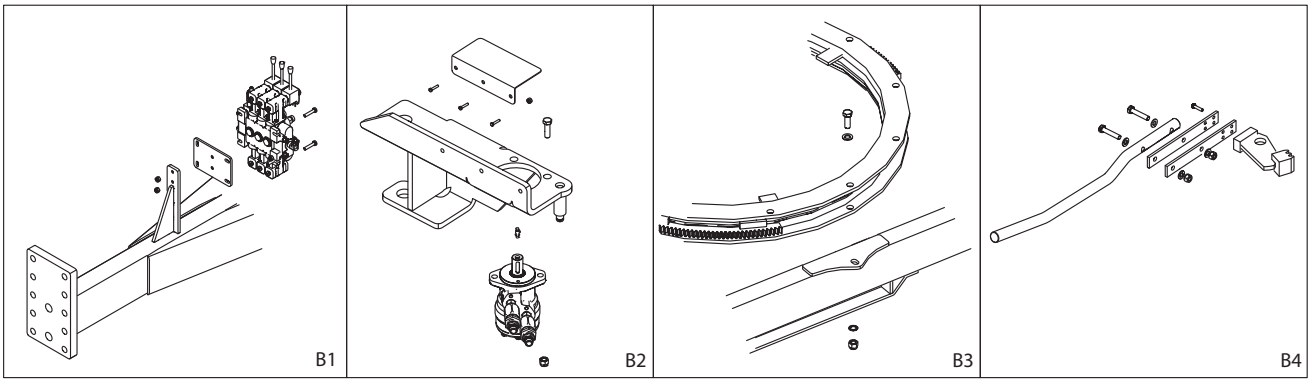
Item No.	Part No.	Qty	Description	Comments
1	2011232	1	Chassis GT12	
1	2010164	1	Old Chassis GT12 up to 2020	
2	2009045	2	Wheel shaft	
3	872905	2	Rim	
4	890800-1	2	Tyres	
5	31000079	1	Gear	
6	2010192	1	Cover plate for gear	
7	662565	1	Spring	
8	31000050	1	Threaded rod for yaw gear	
9	1007186	1	Clamping ring	
10	31000016	1	Shaft	
11	700025	2	Retaining ring Ø25 Ext.	
12	556005	2	Hose 3/8	550 mm
13	1007724	5	Nipple	
14	1007544	4	Angle	
15	890414	1	Nipple	
16	551009	1	Throttle valve	
17	1007505	1	12 mm union nut	
18	1007497	2	12 mm Cutting ring	
19	026152098	1	Hydraulic pipe	250 mm
20	700030	4	Retaining ring Ø30 Ext.	
21	04000880	2	Pin for support leg	
22	550002	1	Hyd. Cylinder	
23	11000000	1	Support leg	
24	2009495	1	Clamping plate	
25	551015	1	Manoeuvring valve	
26	2009449	1	Bracket for motor	
27	2012915	1	Fork hitch	
27	11000003	1	Old Fork hitch up to 2020	
28	2011810	1	Drawbar eye hitch	
29	2012617	1	Drawbar eye hitch	
30	31000236	1	Locking lever for turntable	
31	31000218	2	Spring bracket for locking lever	
32	2010134	1	Locking bracket with teeth	
33	2003502	1	Turntable	
34	761286-1	1	Grease nipple	
35	1007440-2	1	Oil motor	
36	552025	2	Gasket	
37	551013	2	Check/Throttle valve	
38	1007538	2	Nipple	
39	552024	2	Gasket	
40	98000245	1	Complete Cylinder	
41	022216045	6	M16 x 45 Set bolt	B3
42	021008040	4	M8 x 40 Steel bolt	B1
43	021010050	2	M10 x 50 Steel bolt	B4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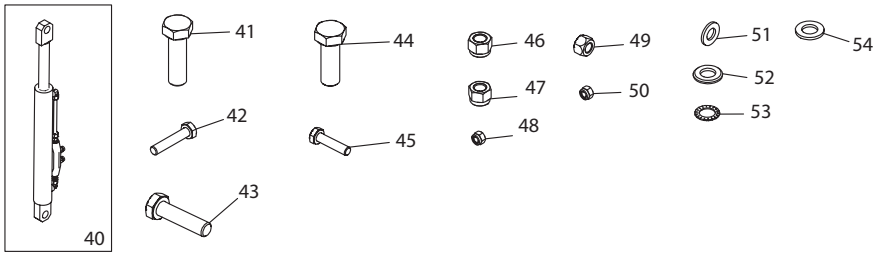
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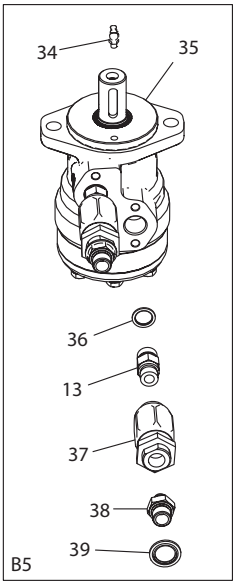
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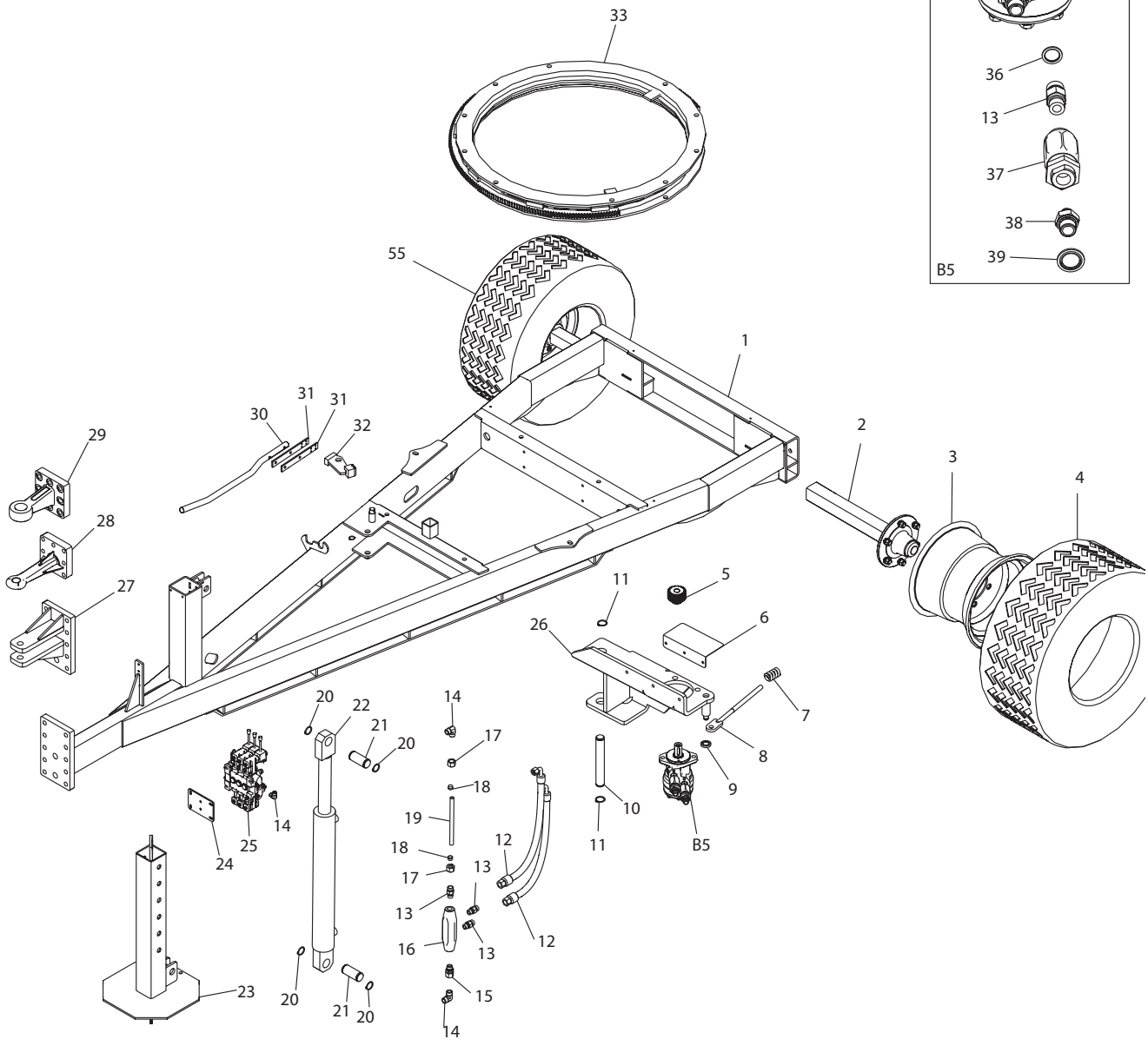
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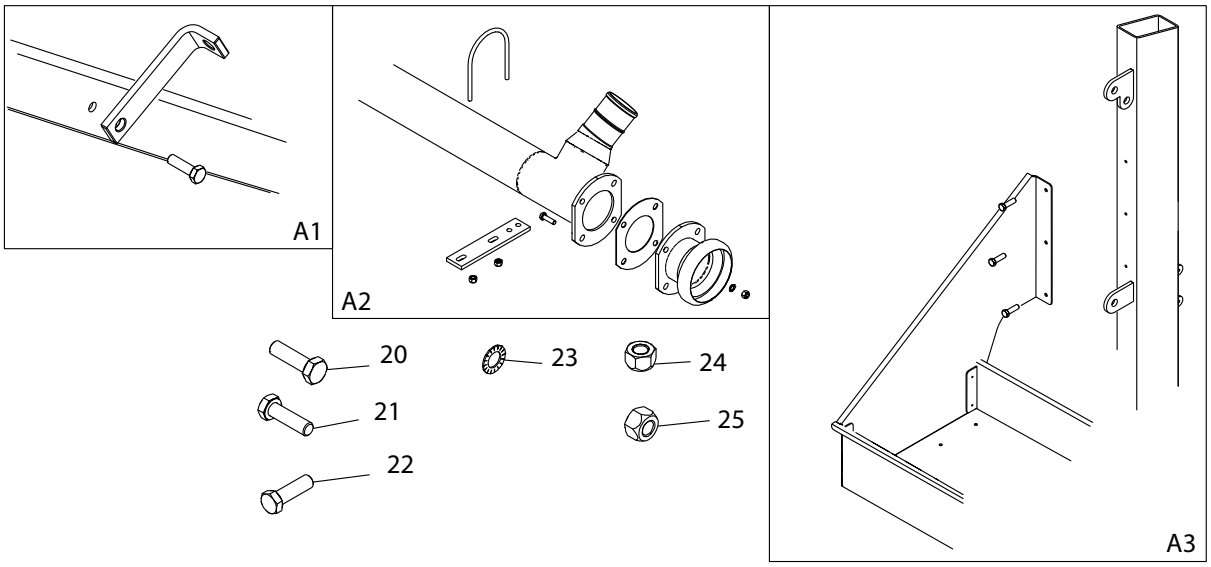
Item No.	Part No.	Qty	Description	Comments
44	022212040	2	M12 x 40 Set bolt	B2
45	022206025	7	M6 x 25 Set bolt	B4 & B2
46	044016	6	M16 Lock nut	B3
47	044008	4	M8 Lock nut	B1
48	040410	2	M10 Steel nut	B4
49	044012	2	M12 Lock nut	B2
50	044006	3	M6 Lock nut	B2
51	050316	6	M16 Plain washer	B3
52	050312	4	M12 Plain washer	B2
53	763916	6	M16 Riplock	B3
54	051010	4	M10 Plain washer	B4
55	890800	2	Complete wheel	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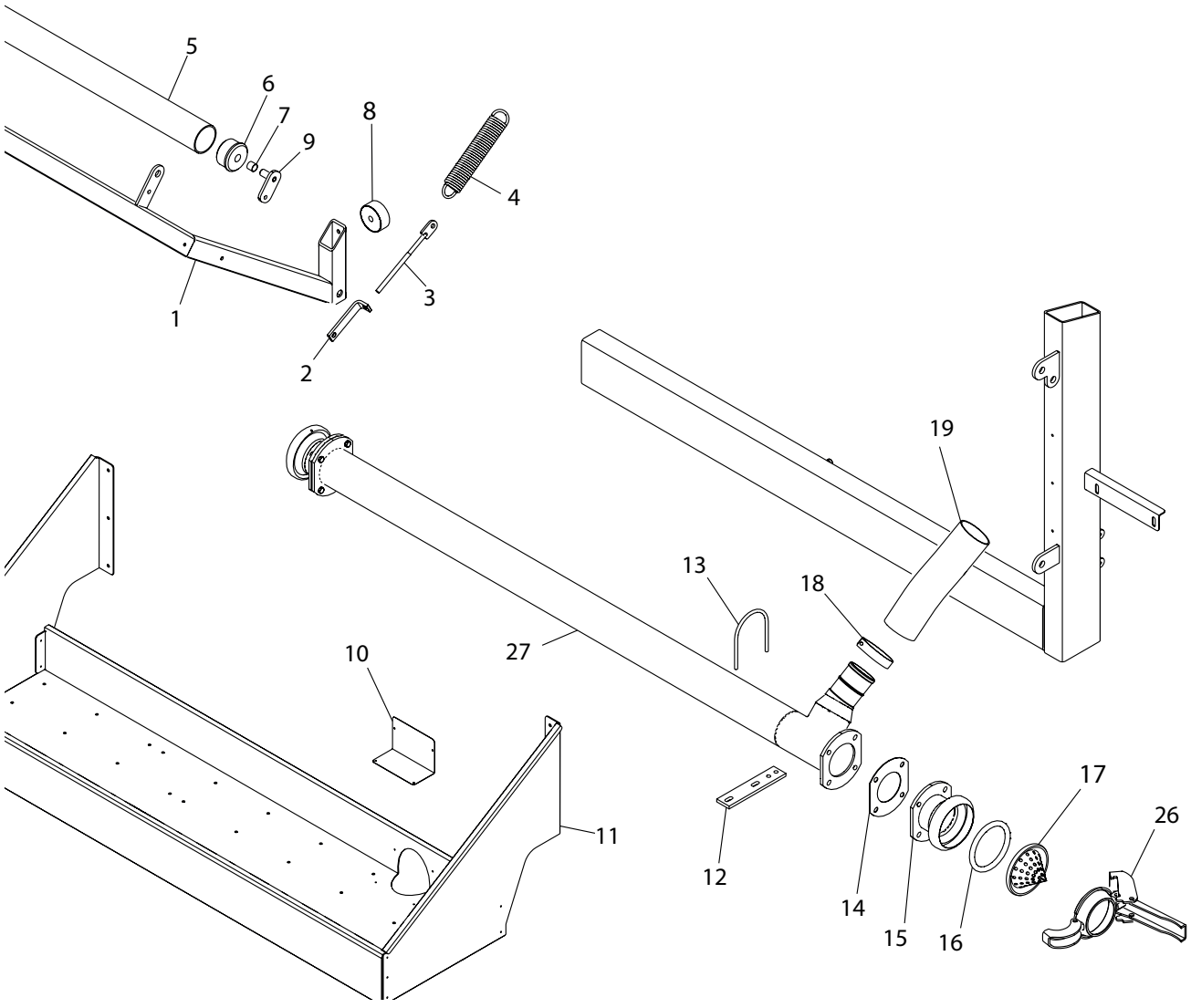
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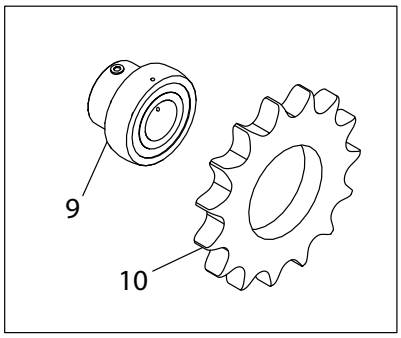
Item No.	Part No.	Qty	Description	Comments
1	2008441	1	Retaining bar	
2	2009284	2	Angle Tension bracket	
3	31000050	2	Threaded rod Fault bar	
4	661545	2	Drawbar spring	
5	2008443	1	Roller for retaining bar	
6	35000207	2	End plug for roller	
7	538119	2	Bushing	
8	GD5020	2	Rubber damper	
9	15000106	2	Pin for roller on miswinder	
10	2011823	1	Blanking plate for toolbox	
11	2011604	1	Toolbox	
12	2011749-1	2	Bracket for Feed pipe	
13	1160300102	2	U-bar 3"	
13	2011110	2	U-bar 4"	
14	631109	2	Flange gasket	
15	1009328	2	Flange with HK Cup	
16	14050043	2	O-ring	
17	545252	1	Ball filter	
18	16200726	2	Hose clamp no. 90	
19	16050210	1	Hose	900 mm
20	022210030	2	M10 x 30 Set bolt	A1
21	022210035	8	M10 x 35 Set bolt	A2
22	022208016	6	M8 x 16 Set bolt	A3
23	763910	8	M10 Riplock	A2
24	044008	4	M8 Lock nut	A2
25	044010	8	M10 Lock nut	A2
26	921248	1	Aperture ball	
27	2011043	1	Feed pipe 4"	
27	2008537	1	Feed pipe 3"	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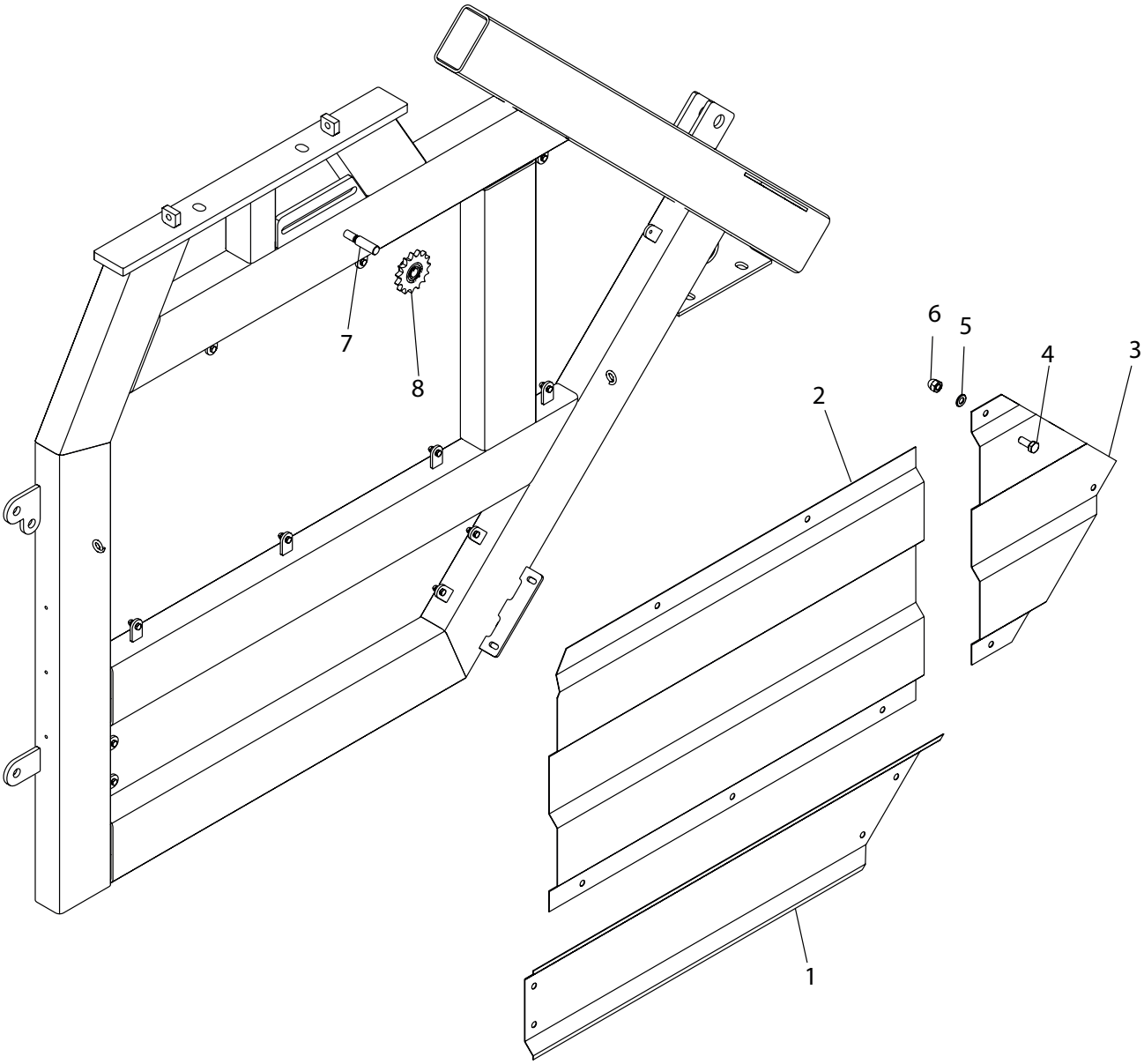
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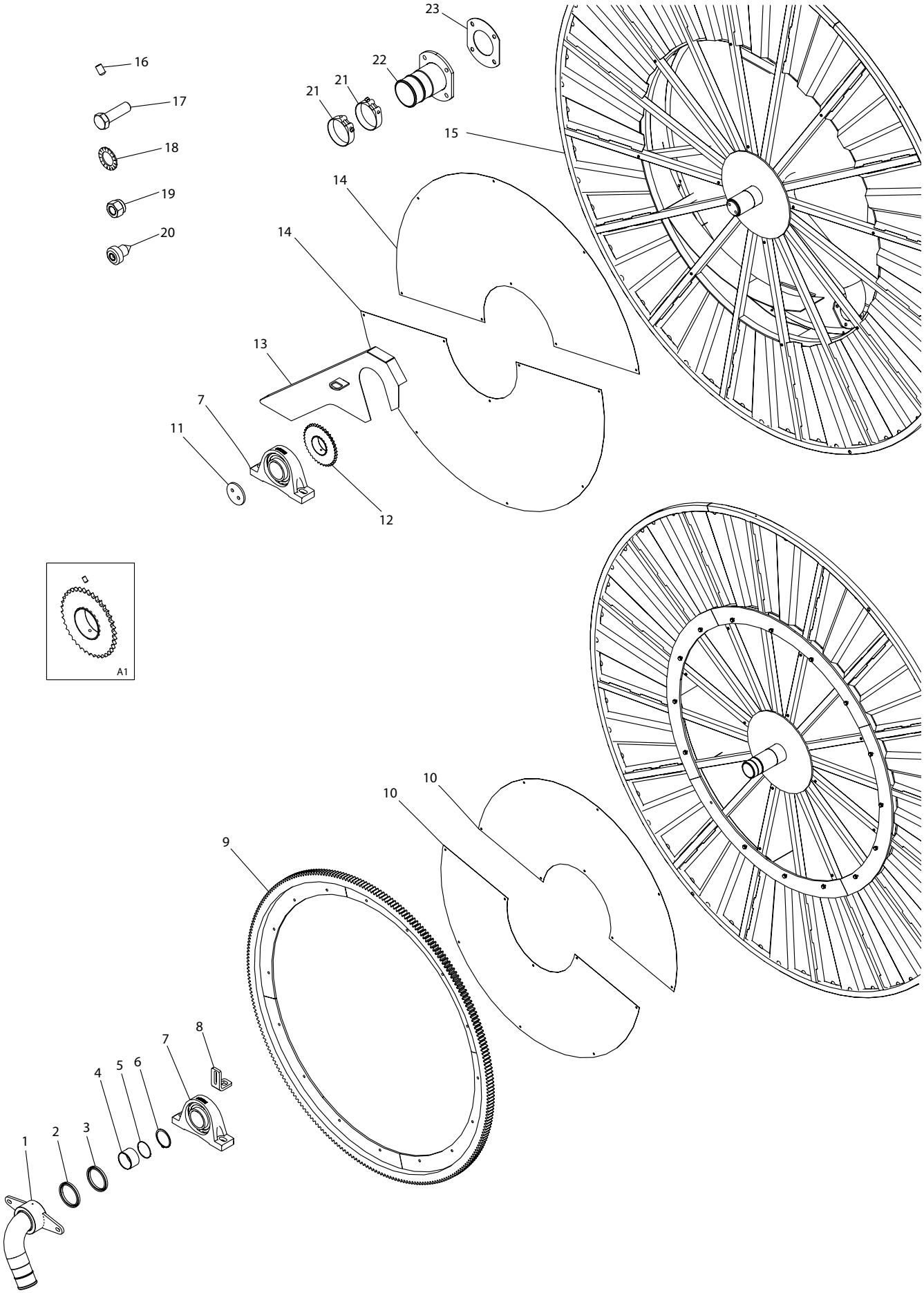
Item No.	Part No.	Qty	Description	Comments
1	2008141	2	Lower guard	
2	2009543-1	1	Large guard	
3	2008140-1	2	Rear side guard	
4	022208020	19	M8 x 20 Set bolt	
5	050208	19	M8 Plain washer	
6	763930	19	M8 Cap nut	
7	761275	1	Shaft	
8	2351278	1	Sprocket Complete	
9	761276	1	Bearing	
10	311215	1	Sprocket	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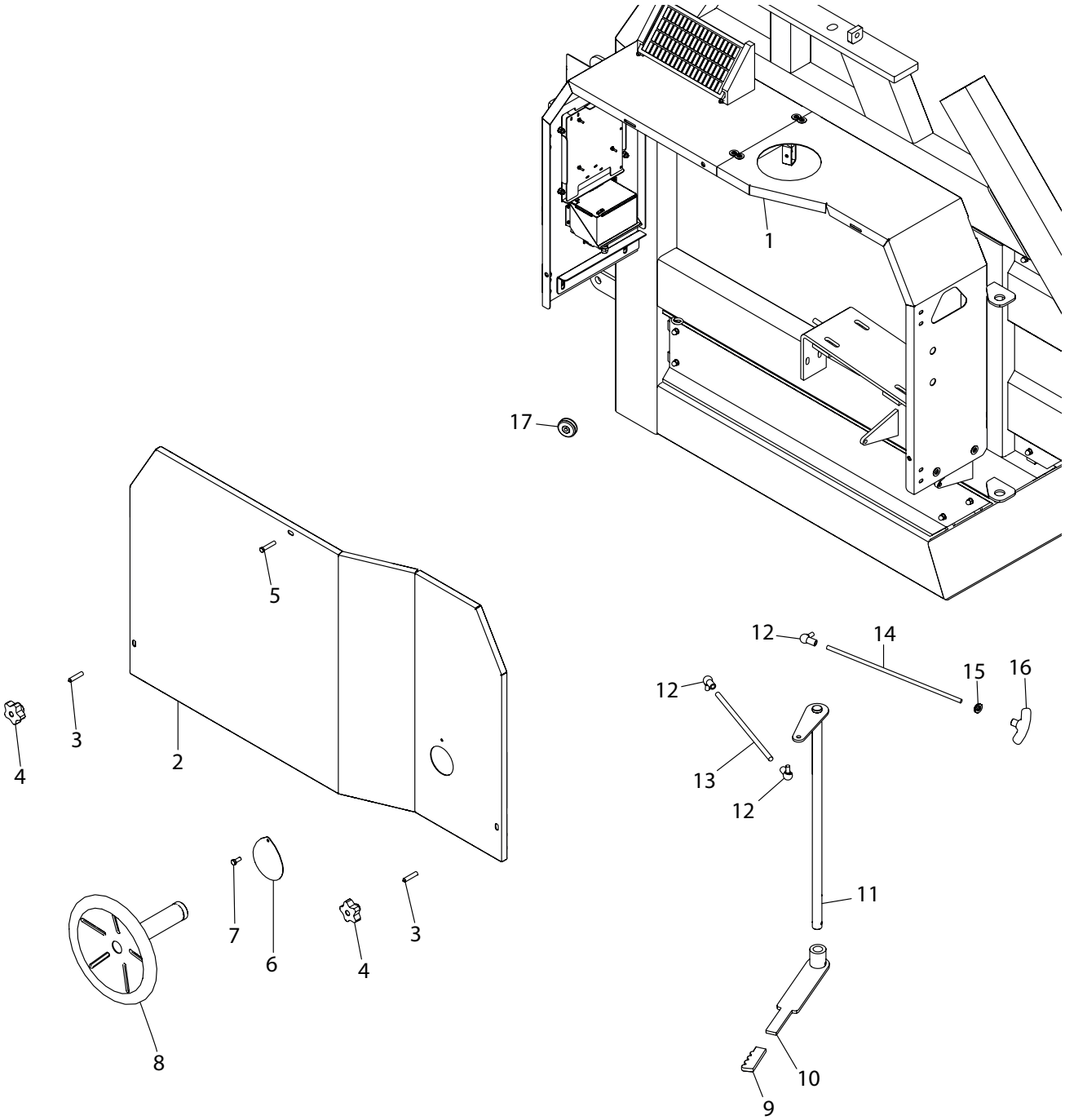
Item No.	Part No.	Qty	Description	Comments
1	2007179	1	Bend water inlet	
2	630100	1	Nut ring Soft	
3	630101	1	Nut ring Hard	
4	36000151	1	Stainless bushing	
5	624101	1	O-ring for stainless bushing	
6	1115150100	1	Retaining ring Ext. Ø100	
7	1010490-2	2	Bearing for 100 mm centre pipe	
8	2001491	2	Bracket for Bend for water inlet	
9	2012501-1	1	Gear hose drum	
10	2008565	2	Drum guard	
11	2007108	1	Clamping plate	
12	2008333	1	Gear	
13	2010788	1	Chain guard	
14	16000025	2	Drum guard (with bend)	
15	2008433	1	Hose drum	
16	030516030	2	Int. hex 16x30	A1
17	022212040	16	M12x40 Set bolt	
18	763912	32	M12 Riplock	
19	044012	16	M12 Lock nut	
20	067263019	49	Self-drilling screw 6.3x19 mm	
21	16200360	2	Hose clamp no.130	
21	16200350	2	Hose clamp no.110	
22	15000127	1	Hose connector Ø101 mm with flange	For Ø125 Hose
22	15000165	1	Hose connector Ø105 mm with flange	For Ø125 Hose
22	15000121	1	Hose connector Ø93.2 mm with flange	For Ø110 Hose
22	15000120	1	Hose connector Ø89 mm with flange	For Ø110 Hose
23	631109	1	Flange gasket	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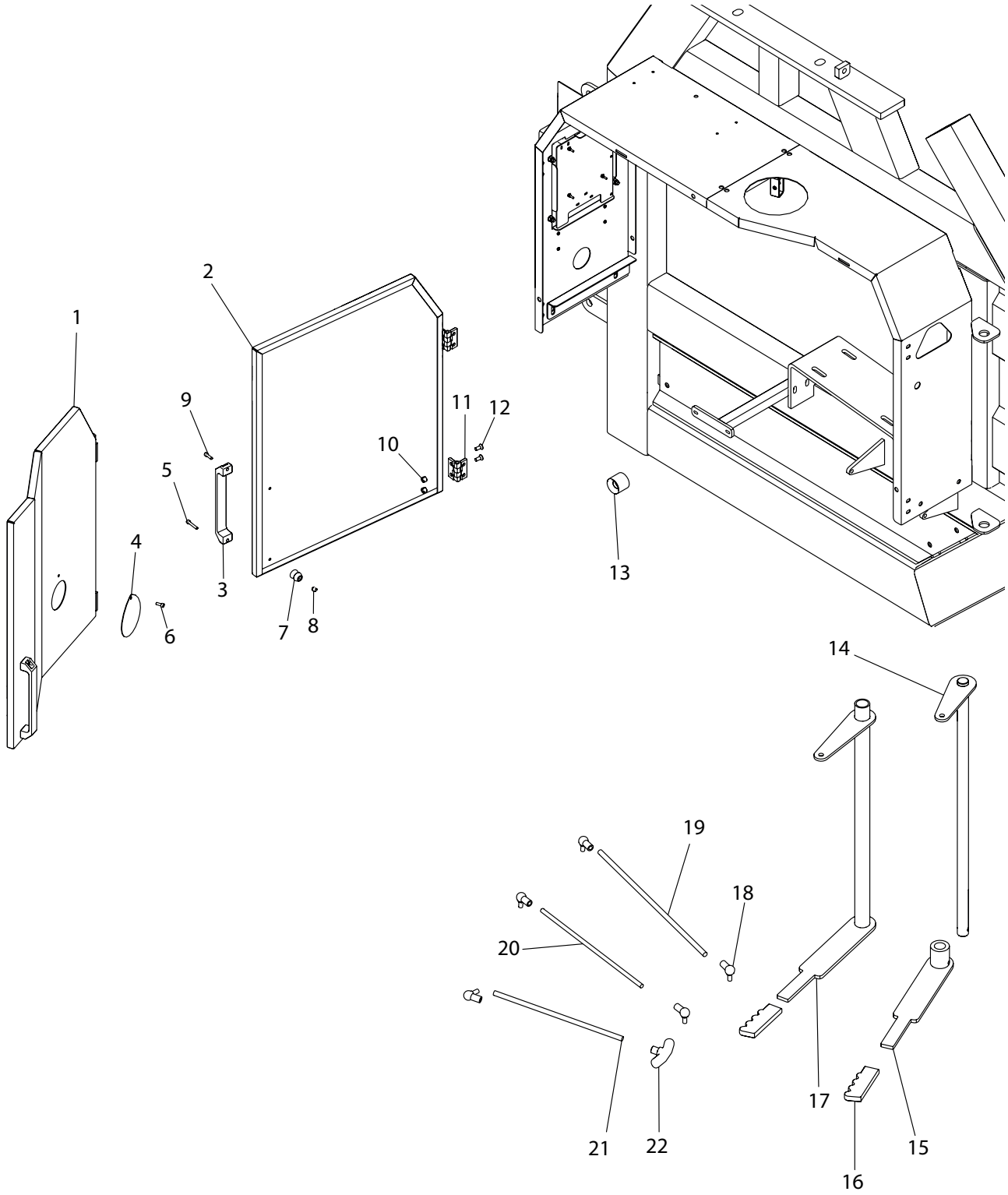
Item No.	Part No.	Qty	Description	Comments
1	2011269	1	Rear guard above turbine	
2	2011130-1	1	Front guard for cabinet	
3	033010050-1	2	M10 x 50 Stop screw	
4	517542	2	Operating lever	
5	072210050	1	M10 x 50 Stainless bolt	
6	2008743	1	Cover plate for gear wheel	
7	030506016	1	M6 x 16 Int. hex	
8	2011698	1	Hand wheel	
9	680006	1	Rubber grip	
10	2008478	1	Lever for decoupling	
11	2008476	1	Decoupling arm	
12	1100151608	3	Angle joint	
13	2008482	1	Threaded rod for decoupling	350 mm
14	2008501	1	Threaded rod for T-grip	400 mm
15	13345	1	Rubber bushing	
16	680001	1	T-Grip for slide valve	
17	761015-15	1	Cable roller Loose	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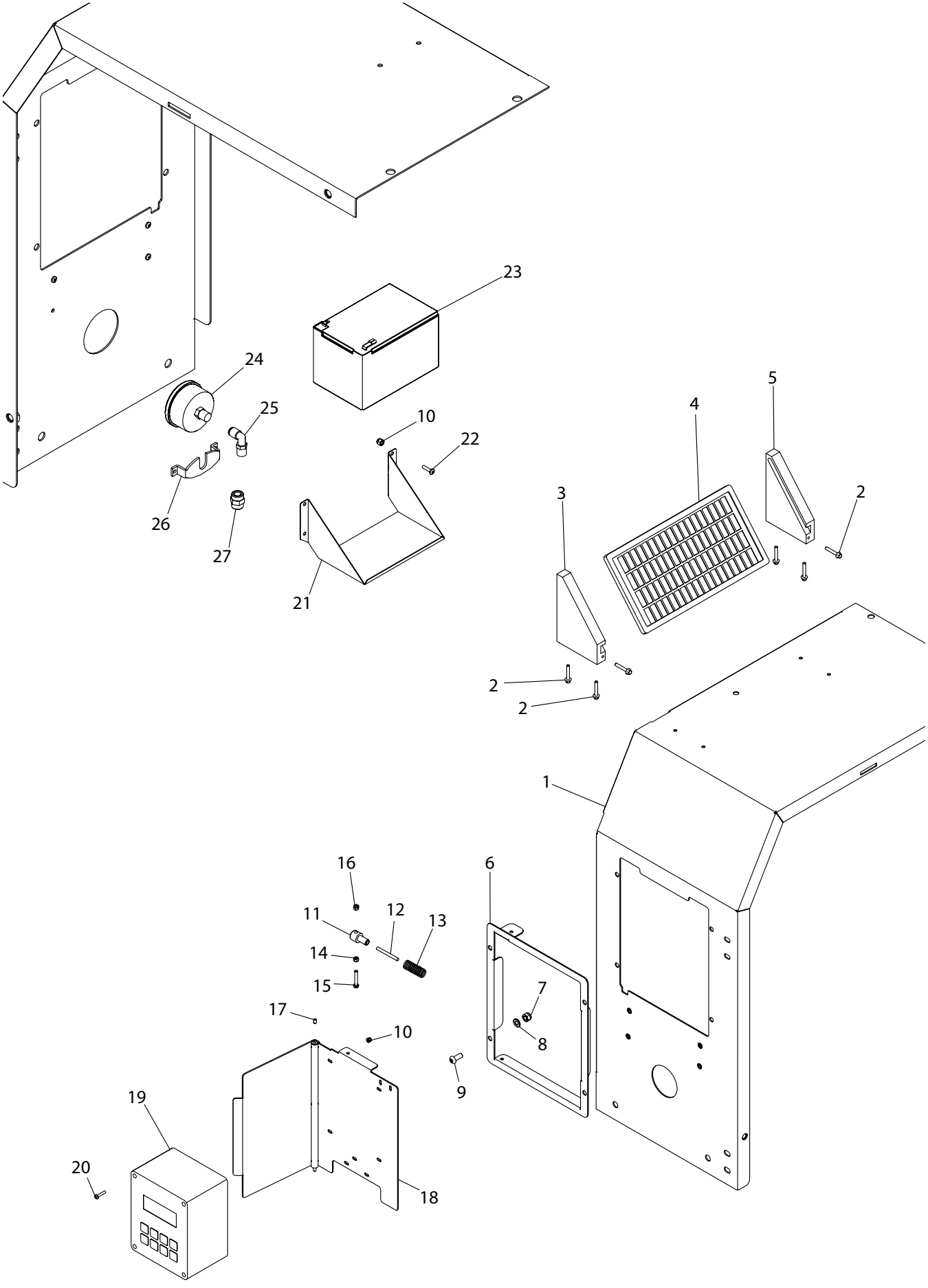
Item No.	Part No.	Qty	Description	Comments
1	2008445-1	1	Cover for guard	
2	2008446-1	1	Front guard for cabinet	
3	662647	2	Handle for cover	
4	2008743	1	Guard for gear wheel	
5	030506035	2	M6 x 35 Int. hex	
6	030506016	1	M6 x 16 Int. hex	
7	1327102021	2	Door holder Male	
8	044006	2	M6 Lock nut	
9	030506020	2	M6 x 20 Int. hex	
10	044008	8	M8 Lock nut	
11	2008465	4	Hinge	
12	031608020	8	M8 x 20 Int. hex	
13	1327102020	2	Door holder Female	
14	2008476	1	Decoupling arm	
15	2008478	1	Lever for decoupling	
16	680006	2	Rubber grip	
17	2009364	1	Gear arm	
18	1100151608	5	Angle joint	
19	2008463	1	Threaded rod for gear shifter	400 mm
20	2008501	1	Threaded rod for gear shifter	490 mm
21	2008482	1	Threaded rod	350 mm
22	680001	1	T-Grip for slide valve	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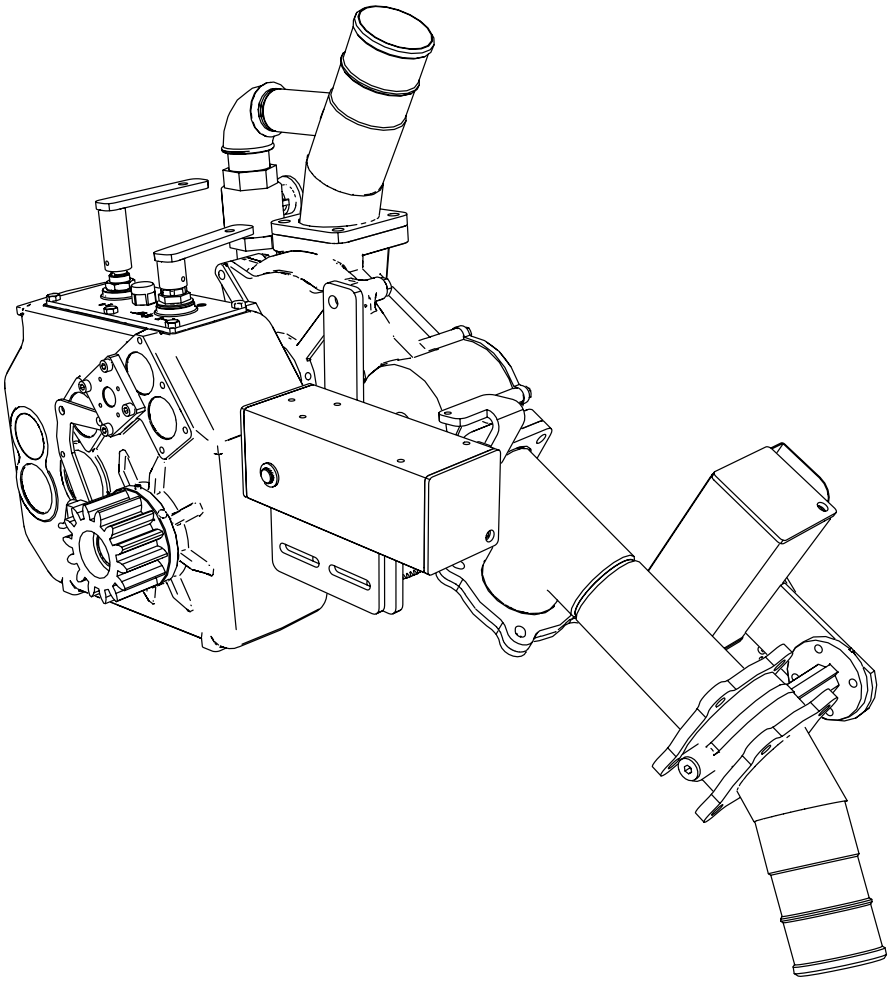
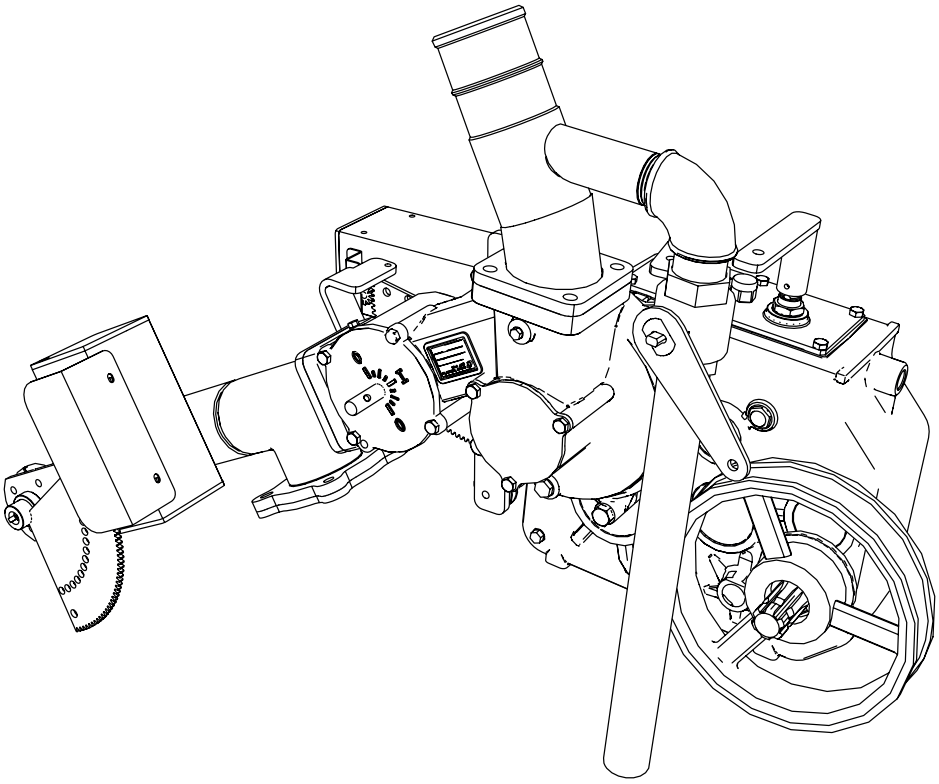
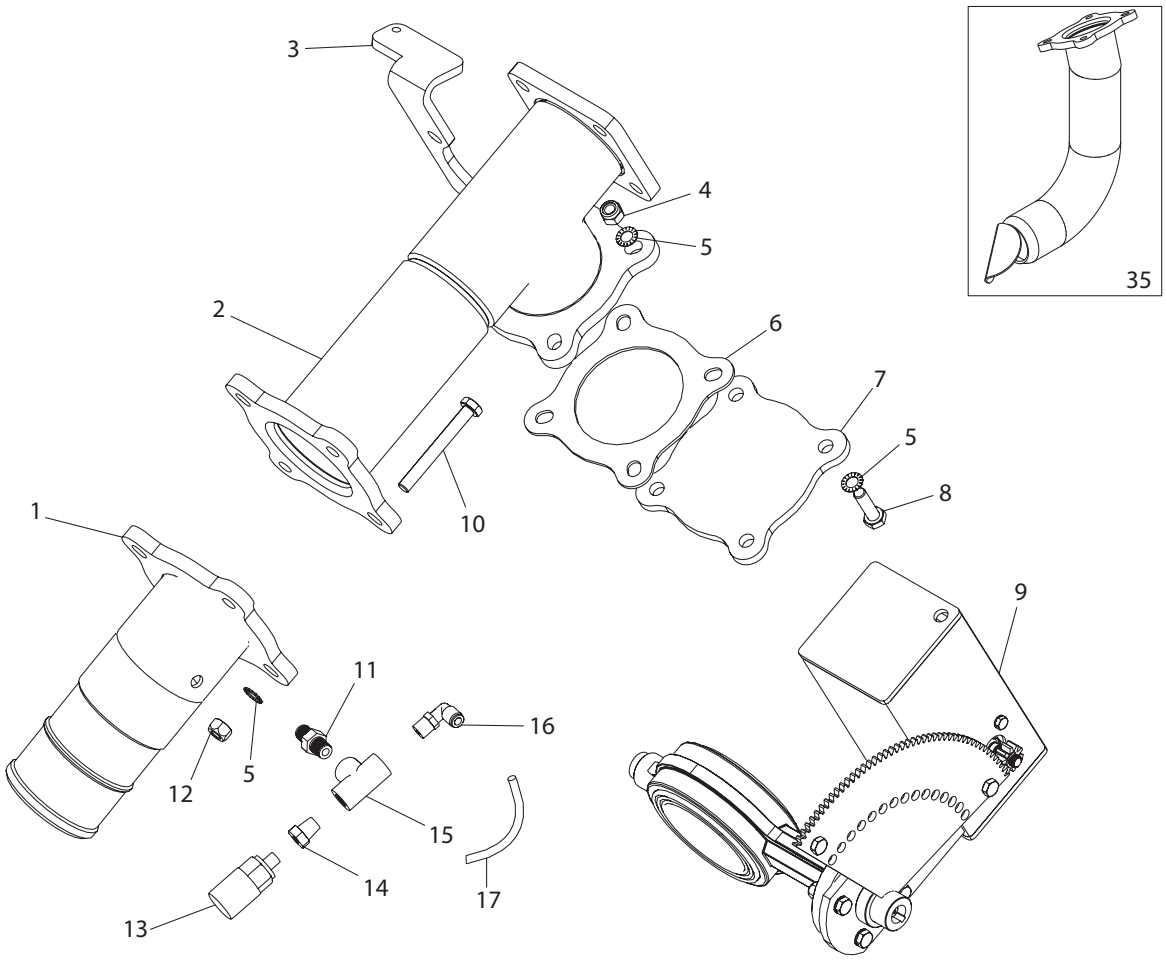
Item No.	Part No.	Qty	Description	Comments
1	2011267	1	Front guard	
2	510555	6	M5 x 30 Self-tapping	
3	2001260	1	Holder for solar cell Left	
4	1005523	1	Solar cell	
5	2001259	1	Holder for solar cell Right	
6	35000361	1	Hinge plate for computer	
7	044008	4	M8 Lock nut	
8	050208	8	M8 Plain washer	
9	095008020	4	M8 x 20 Round head int. hex	
10	044004	8	M4 Lock nut	
11	15000145	2	Holder for spring	
12	15000146	1	Shaft for Holder	
13	662280	1	Spring	
14	040405	2	M5 Steel nut	
15	021005030	2	M5 x 30 Steel bolt	
16	044005	2	M5 Lock nut	
17	033005010	1	5 x 10 Int. hex	
18	2008515	1	Angle cover for computer	
19	1007549-2	1	Prog. Rain Version 12	
20	034604020	4	M4 x 20 Crosshead	
21	1007590	1	Bracket for battery	
22	763510	4	M4 x 16 Crosshead	
23	1005521	1	Battery	
24	949575	1	Manometer	
25	591197	1	Nipple	
26	761163-8	1	Bracket for manometer	
27	1916650202B	1	Sleeve	



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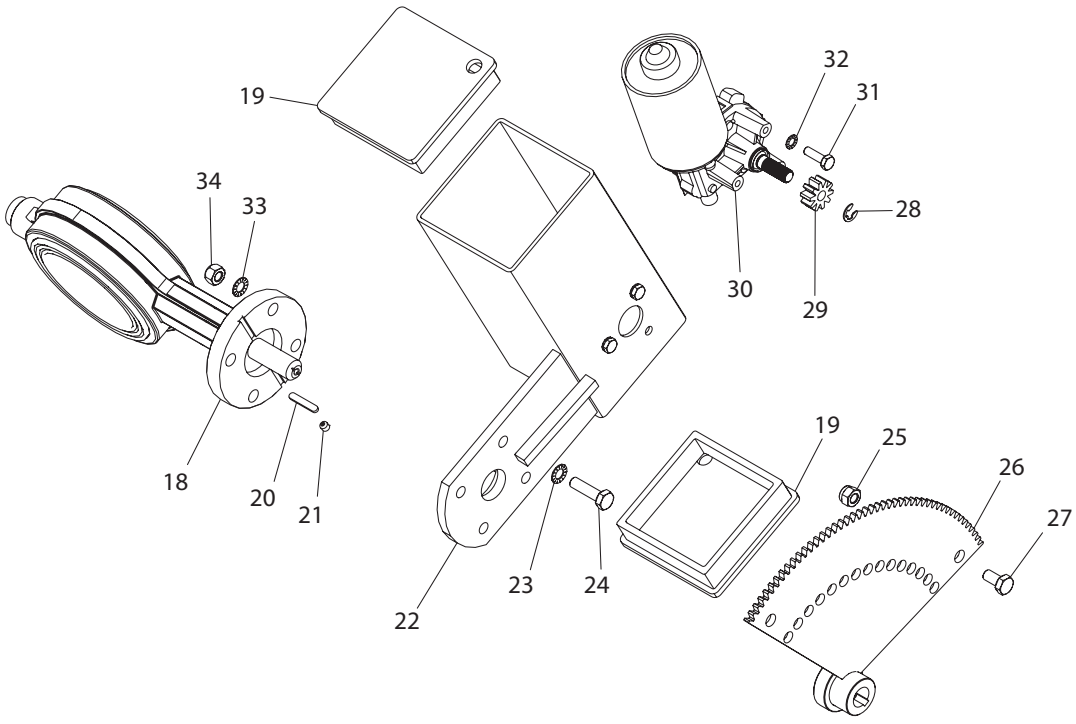
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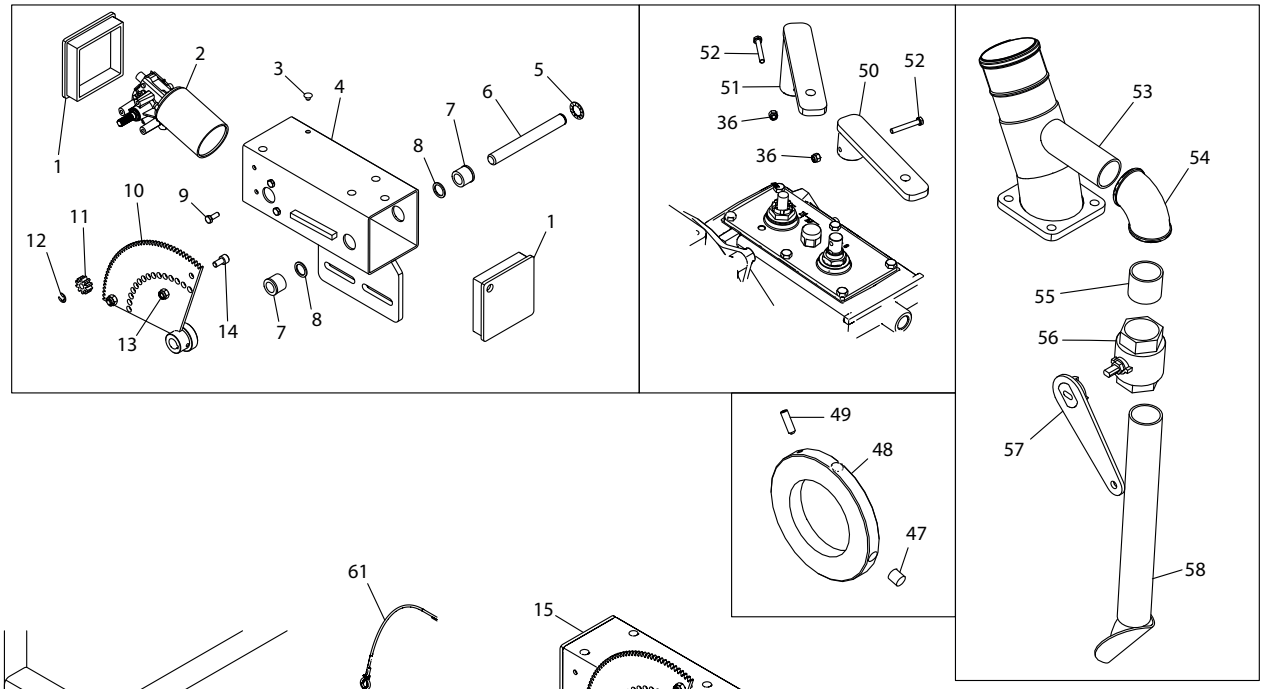
Item No.	Part No.	Qty	Description	Comments
1	2008168	1	Flange with hose connector	
2	2008169	1	Tee with Turbine and valve	
3	2009301	1	Holder for stop turbine	
4	044010	4	M10 Lock nut	
5	763910	16	M10 Riplock	
6	631112	1	Flange gasket	
7	1007098	1	Flange	
8	022210035	4	M10 x 35 Set bolt	
9	1007230	1	Comp. Motor valve	
10	021010085	4	M10 x 85 Steel bolt	
11	000280402	1	Nipple	
12	040410	4	M10 Steel nut	
13	1007545	1	Pressostat 2 bar	
14	000241420	1	Nipple sleeve G1/4 - 1/8	
15	000130402	1	Tee G1/4	
16	591197	1	Swivel angle 1/4 x 8/6 hose	
17	1013860	1	Air hose	340 mm
18	1007250	1	Butterfly valve	
19	1007175	2	End plug for motor valve	
20	641528	1	Key	
21	033006006	1	M6 x 6 Int. hex stop screw	
22	1007171	1	Housing for motor	
23	763908	4	M8 Riplock	
24	022208030	4	M(x 30 Set bolt	
25	044008	2	M8 Lock nut	
26	1007195	1	Gear for valve	
27	022208016	2	M8 x 16 Set bolt	
28	1007184-1	1	Horseshoe	
29	1007190	1	Gear	
30	1007180	1	Motor	
31	022206020	3	M6 x 20 Set bolt	
32	763906	3	M6 Riplock	
33	763908	4	M8 Riplock	
34	040408	4	M8 Steel nut	
35	2008487	1	Spreader for low pressure	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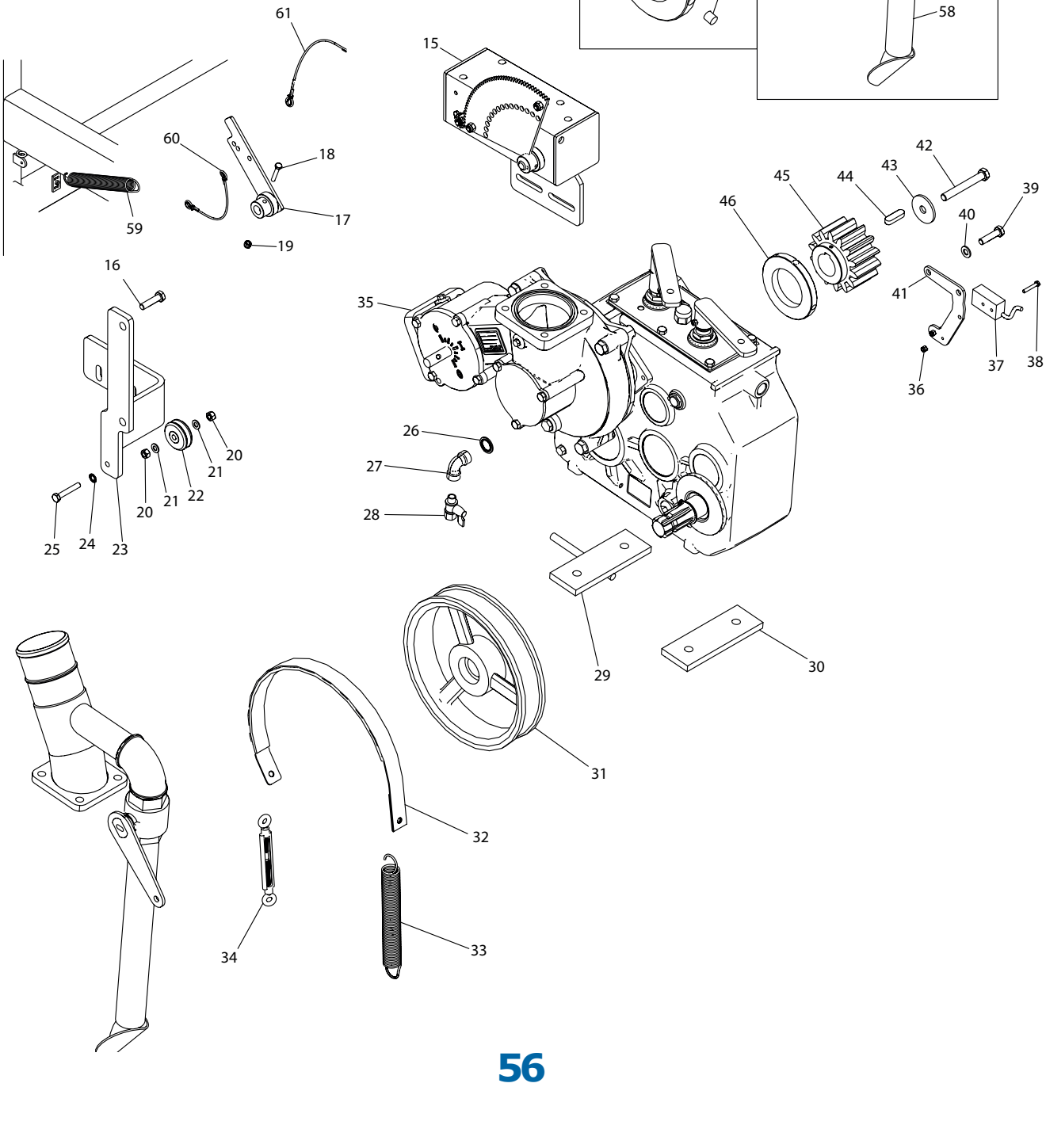
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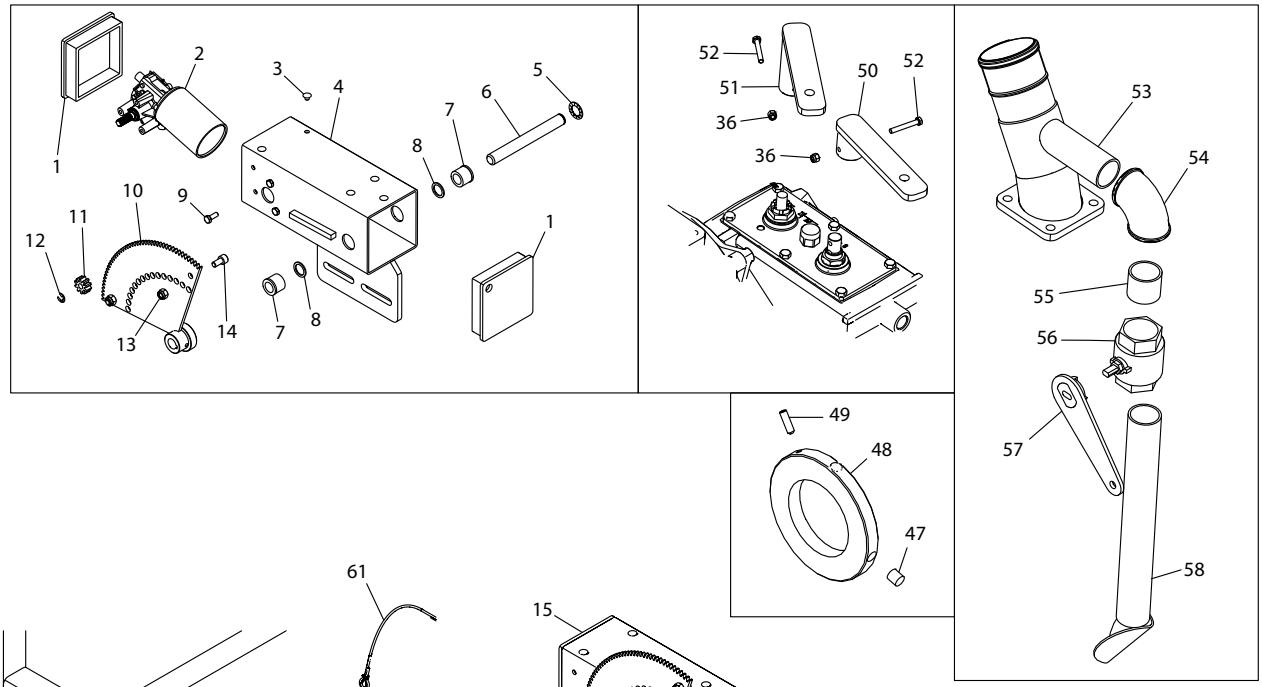
Item No.	Part No.	Qty	Description	Comments
1	1007175	2	End plug for motor valve	
2	1007180	1	Motor	
3	1008918	5	Plug for closing	
4	1008905	1	Housing for motor valve	
5	1008919	1	Lock washer	
6	1008920	1	Shaft	
7	1008921	2	Bushing	
8	1130172315	2	Copper ring	
9	022206016	3	M6 x 16 Set bolt	
10	1007195	1	Gear for valve	
11	1007190	1	Gear	
12	1007184-1	1	Horseshoe	
13	044008	2	M8 Lock nut	
14	030508016	2	M8 x 16 Int. hex Round head	
15	1008906	1	Complete Motor housing w/relay comp	
16	022212030	2	M12 x 30 Set bolt	
17	2008358	1	Arm for turbine	
18	022206035	1	M6 x 35 Set bolt	
19	044006	1	M6 Lock nut	
20	040408	2	M8 Steel nut	
21	051008	2	M8 Plain washer	
22	761015-15	1	Cable roller	
23	2008354	1	Bracket for console	
24	763908	1	M8 Riplock	
25	021008050	1	M8 x 50 Steel bolt	
26	BS20	1	Gasket	
27	000092402	1	Angle	
28	195010	1	Ball valve	
29	2008409	1	Bracket for gear	
30	2008407-1	1	Bracket	
31	2009686-1	1	Brake wheel	
32	18000419	1	Brake strap	
33	2009210	1	Spring	
34	643608	1	Turnbuckle	
35	821305-50	1	Gear	
36	044005	4	M5 Lock nut	
37	1007561	1	Sensor	
38	021005030	2	M5 x 30 Steel bolt	
39	022210040	2	M10 x 40 Set bolt	
40	051010	2	M10 Plain washer	
41	2008787	1	Bracket for sensor	
42	022212090	1	M12 x 90 Set bolt	
43	05401250	1	M12 Round washer	
44	641840	1	Key	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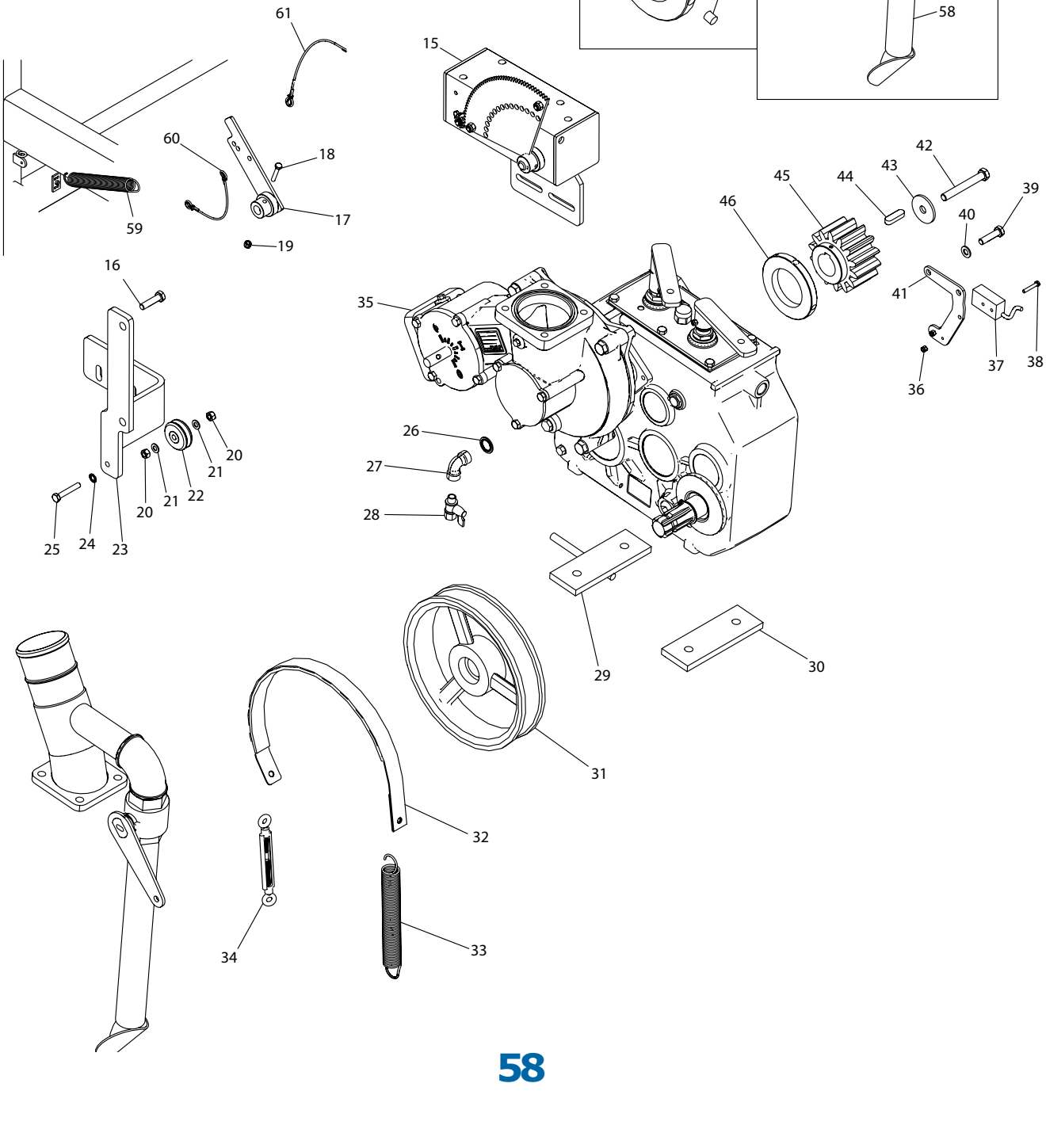
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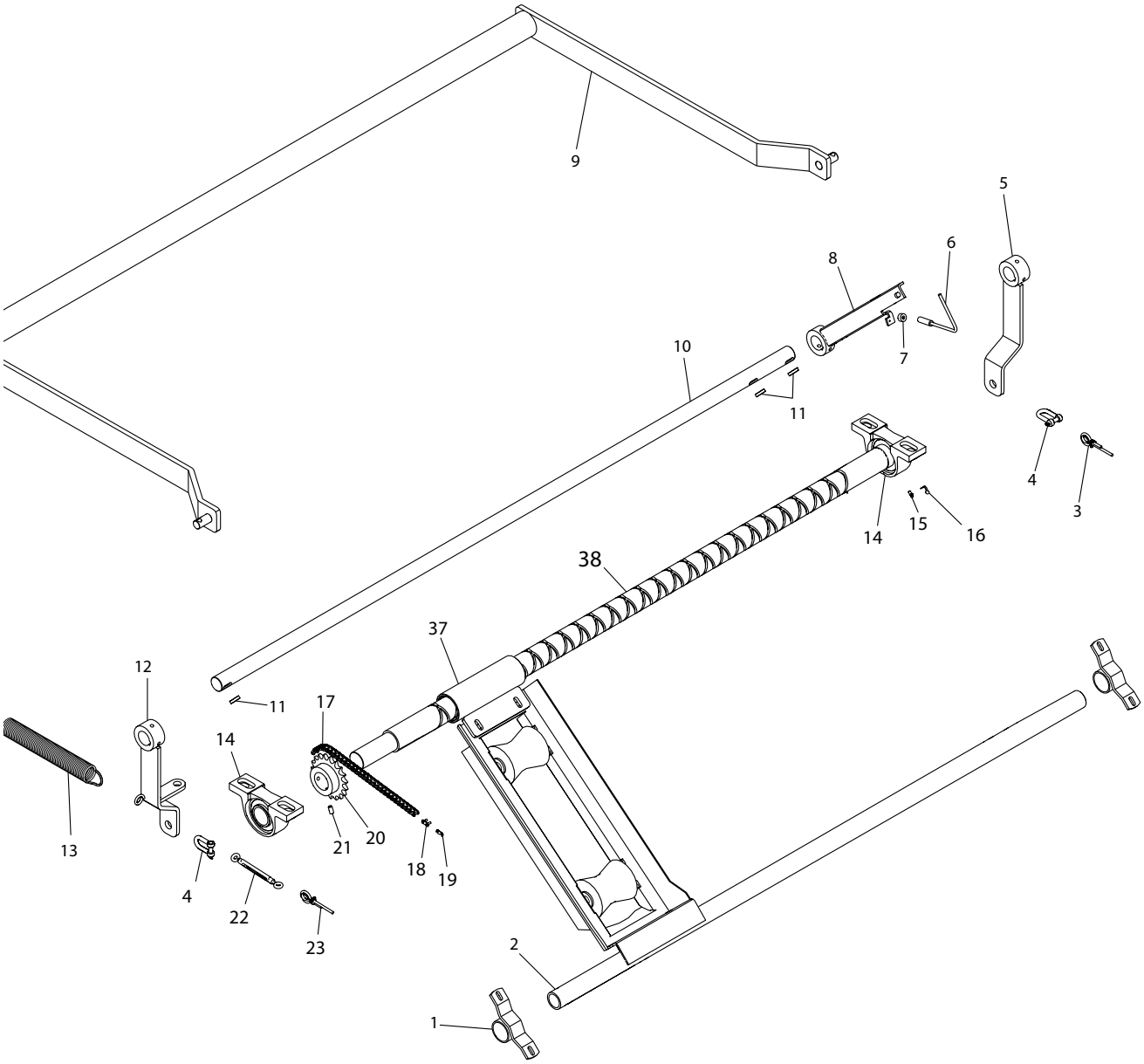
Item No.	Part No.	Qty	Description	Comments
45	2007181-1	1	Gear	
46	2008786	1	Magnet wheel comp	
47	1007570	4	Magnet	
48	2008759	1	Magnetic roller	
49	033006016	1	M6 x 16 Int. hex	
50	2008455	1	Arm for gear short	
51	2008479	1	Arm for gear long	
52	021005035	2	M5 x 35 Set bolt	
53	2007180	1	Output from gear/turbine	
54	000090411	1	Angle G1 1/2	
55	012001411	1	Nipple pipe G1 1/2	
56	540112	1	Ball valve without lever	
57	2008500	1	Lever for ball valve	
58	2011660	1	Relief pipe	
59	661323	1	Spring	
60	2009239	1	Cable for Motor tensioner	
61	2009237	1	Cable for stop	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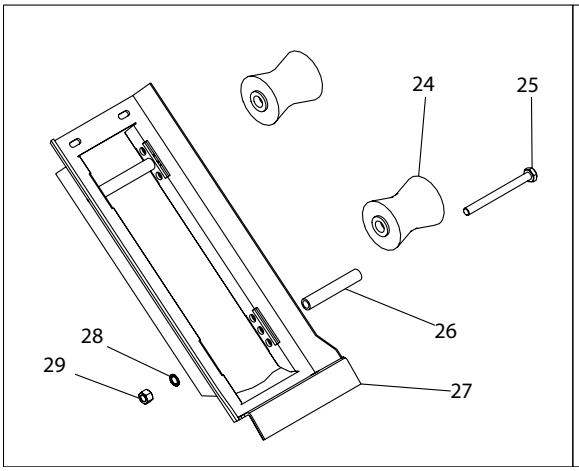
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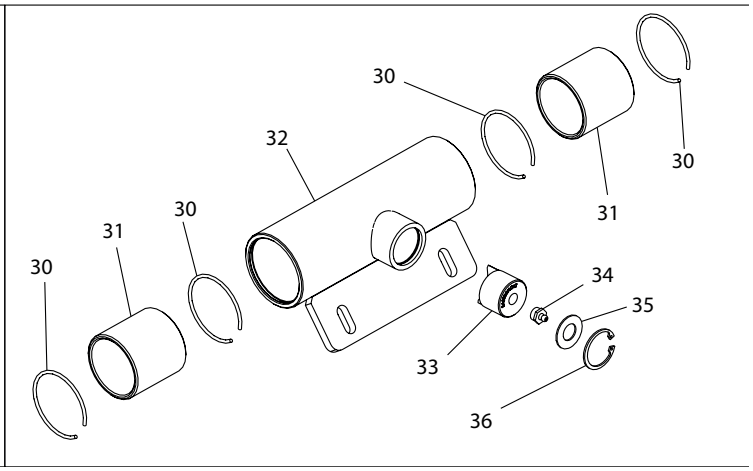
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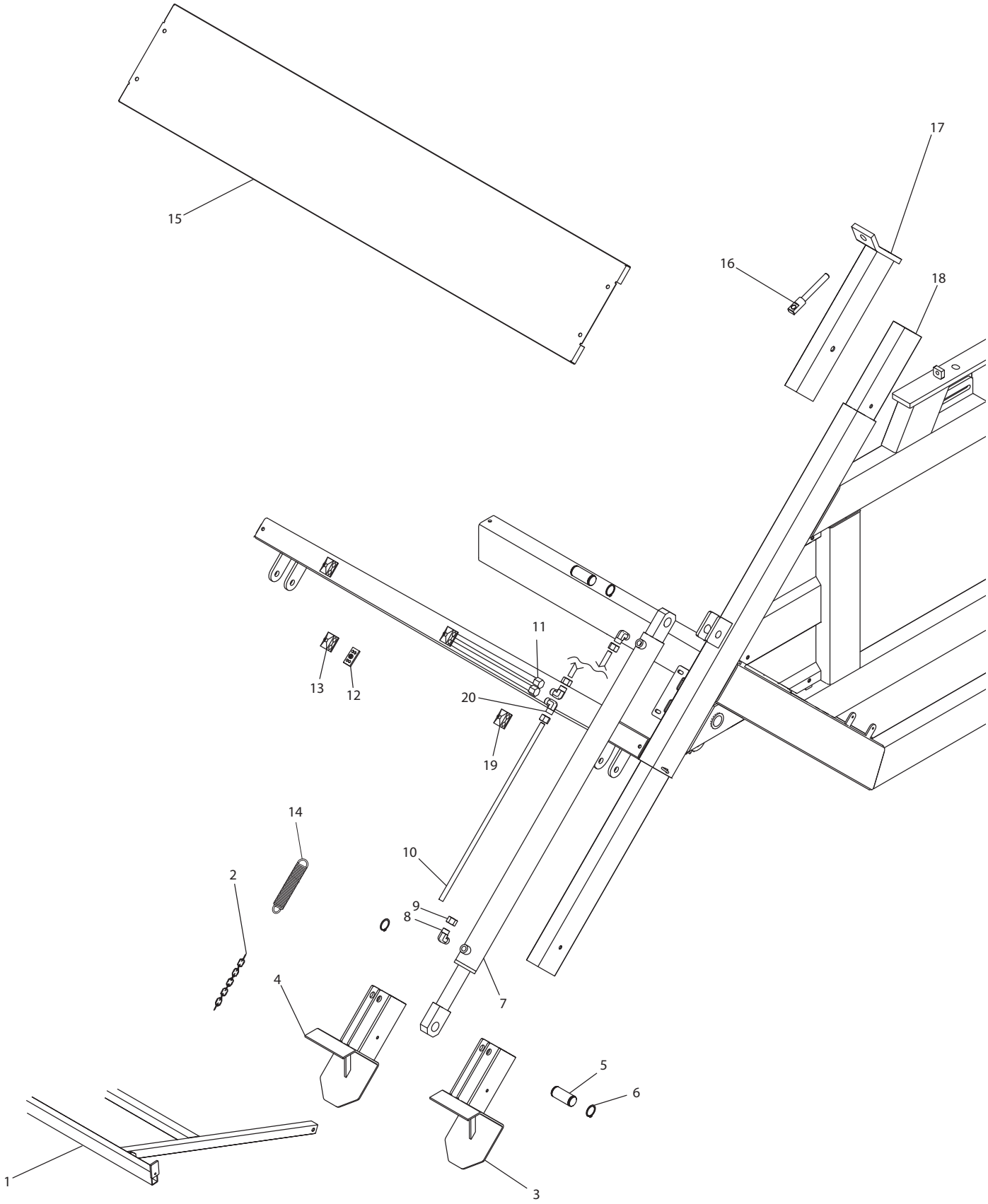
Item No.	Part No.	Qty	Description	Comments
1	1008485	2	Holder for support pipe	
2	2008427	1	Support pipe for carriage	
3	2009237	1	Cable for stop	
4	643210	2	Shackle	
5	2009540	1	Stop arm complete L	
6	1007560	1	Sensor	
7	1005530	1	Magnet	
8	2008897	1	Arm for stop arm and magnet	
9	2008414	1	Stop bracket	
10	2008398	1	Shaft for stop bracket arms	
11	641830	3	Key	
12	2009542	1	Stop arm complete R	
13	661323	2	Spring	
14	761289-1	2	Pillow block	
15	761286	2	Grease nipple	
16	761286-2	1	Cap for lubrication nipple	
17	2009234	1	Chain	
18	761056	1	Split link	
19	761058	1	Split link offset	
20	1001290-1	1	Gear	Ø110 mm
20	761290	1	Gear	Ø125 mm
20	1001290	1	Gear	Ø120 mm
21	033010020	2	M10 x 20 Int. hex	
22	643608	1	Turnbuckle	
23	2009236	2	Cable for miswinder	
24	34000055	2	Floor roller	
25	021016180	2	M16 x 180 Steel bolt	
26	34000047	1	Bushing for support roller	
27	2009592	2	Main plate	
28	763916	2	M16 Riplock	
29	040416	4	M16 Steel nut	
30	1115100070-1	2	Retaining ring Int. Ø60	
31	34000009	1	Bushing	
32	1009875	1	Guide sleeve without bushings	
33	761283	1	Guide shaft (pin)	
34	2008560	1	Grease nipple	
35	761284	1	Plain washer	
36	761285	1	Retaining ring Int. Ø40	
37	1009875-5	1	Complete guide sleeve	
38	2008431	1	Cross track shaft	Ø110 mm
38	2011312	1	Cross track shaft	Ø120/125 mm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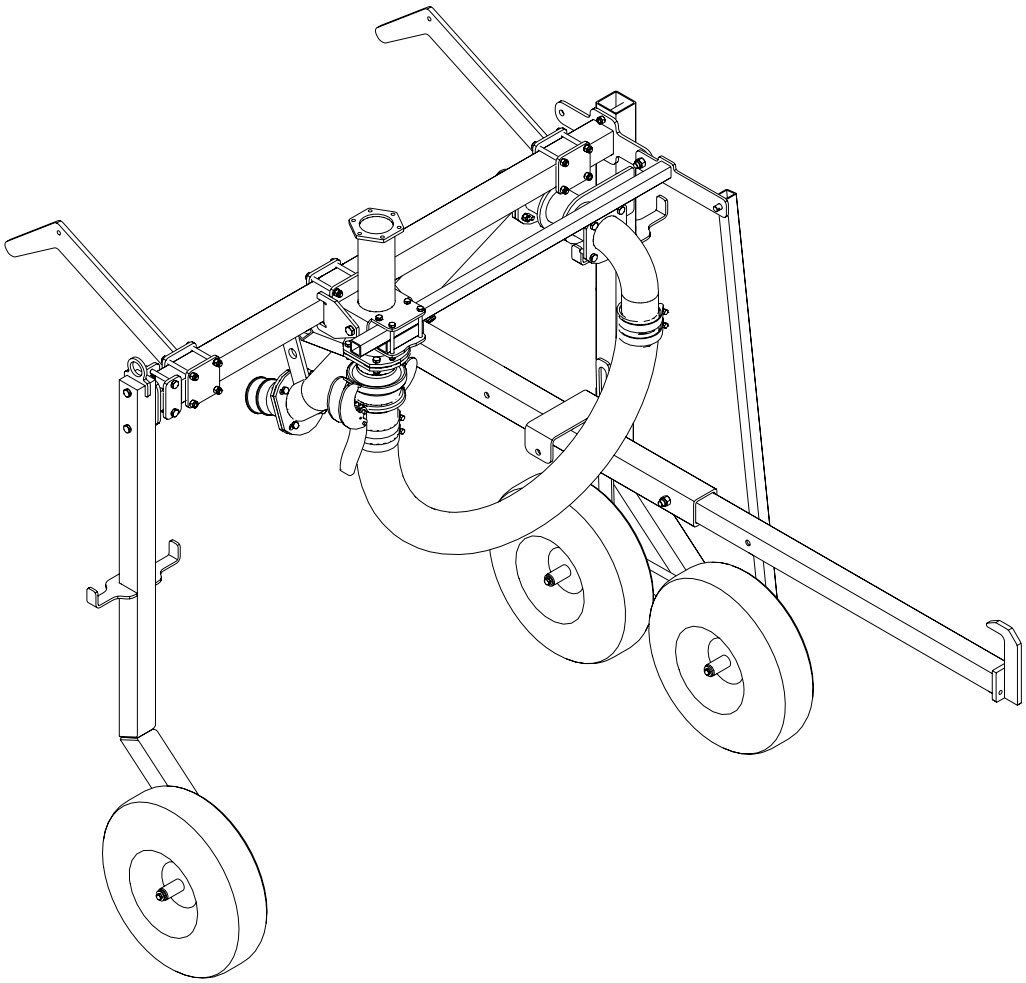
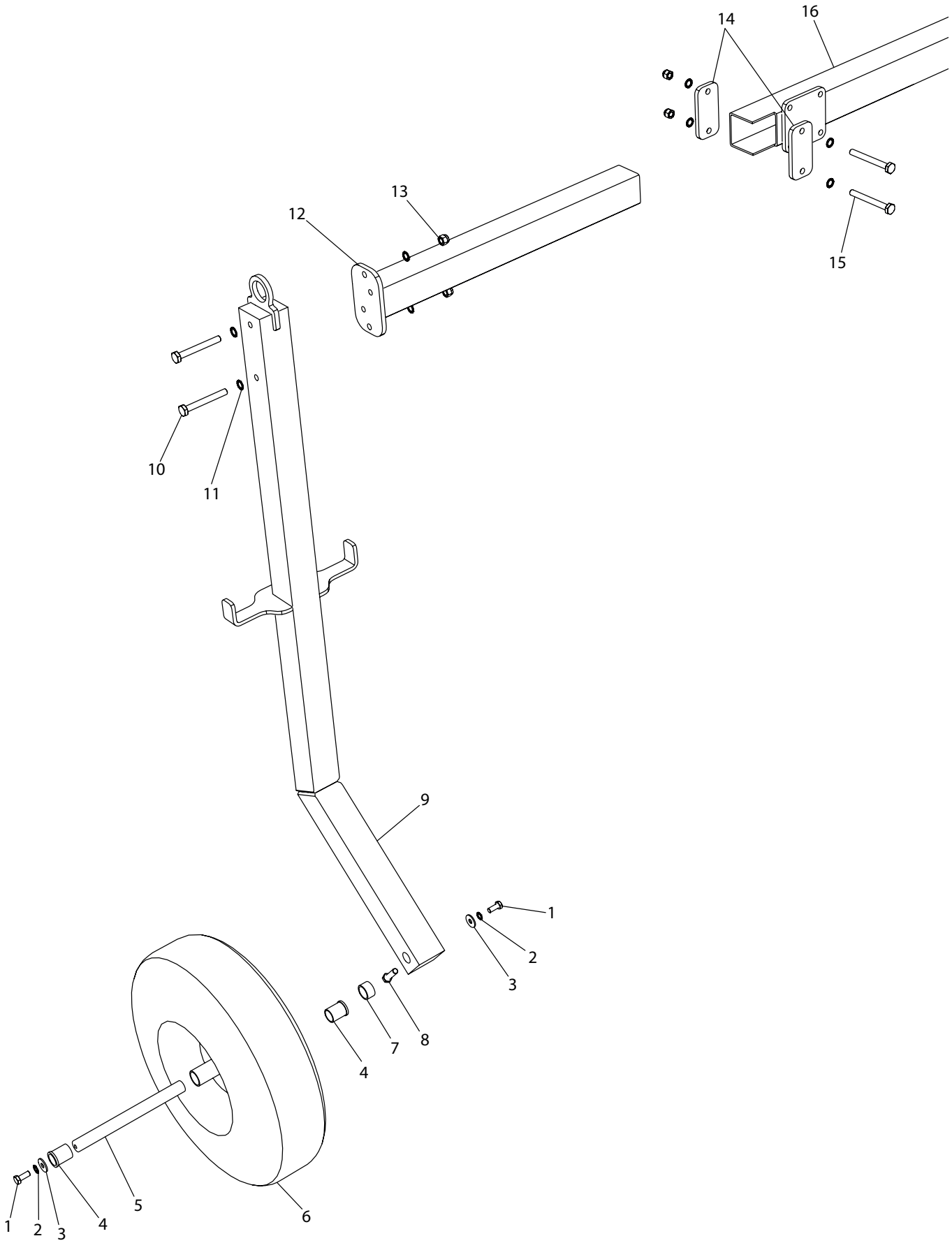
Item No.	Part No.	Qty	Description	Comments
1	2011663	1	Lift	
1	2008418	1	Old Lift up to 2020	
2	35000140	2	Chain for lift	
3	2000577	1	Foot for support leg Right	
4	2000408	1	Foot for support leg Left	
5	04000880	4	Shaft for cylinder	
6	700030	8	Retaining ring ext. Ø30	
7	550000	2	Cylinder Short 1280 mm	Year 2020
7	2011735	2	Cylinder Long 1780 mm	Year 2021 and later
8	1007544	4	Angle 3/8	
9	1007505	8	12 mm union nut	
10	026152098	4	Hydraulic pipe Same part no. Just different lengths	2 lengths 1050 mm 392 mm
11	2009229	2	Hyd. Hose	1925 mm
12	1007514-1	3	Welding plate for hose holder	
13	1007514	3	Hose clamp Ø16x16	
14	661545	2	Drawbar spring	
15	2008447	1	Cover plate for cross track shaft	
16	40000870	2	Tension spindle	
17	40000665	2	Telescope for long support legs	
18	2011655	2	Long support leg	
19	552037	2	Double pipe holder Ø18xØ18	
20	890625	2	Angle	

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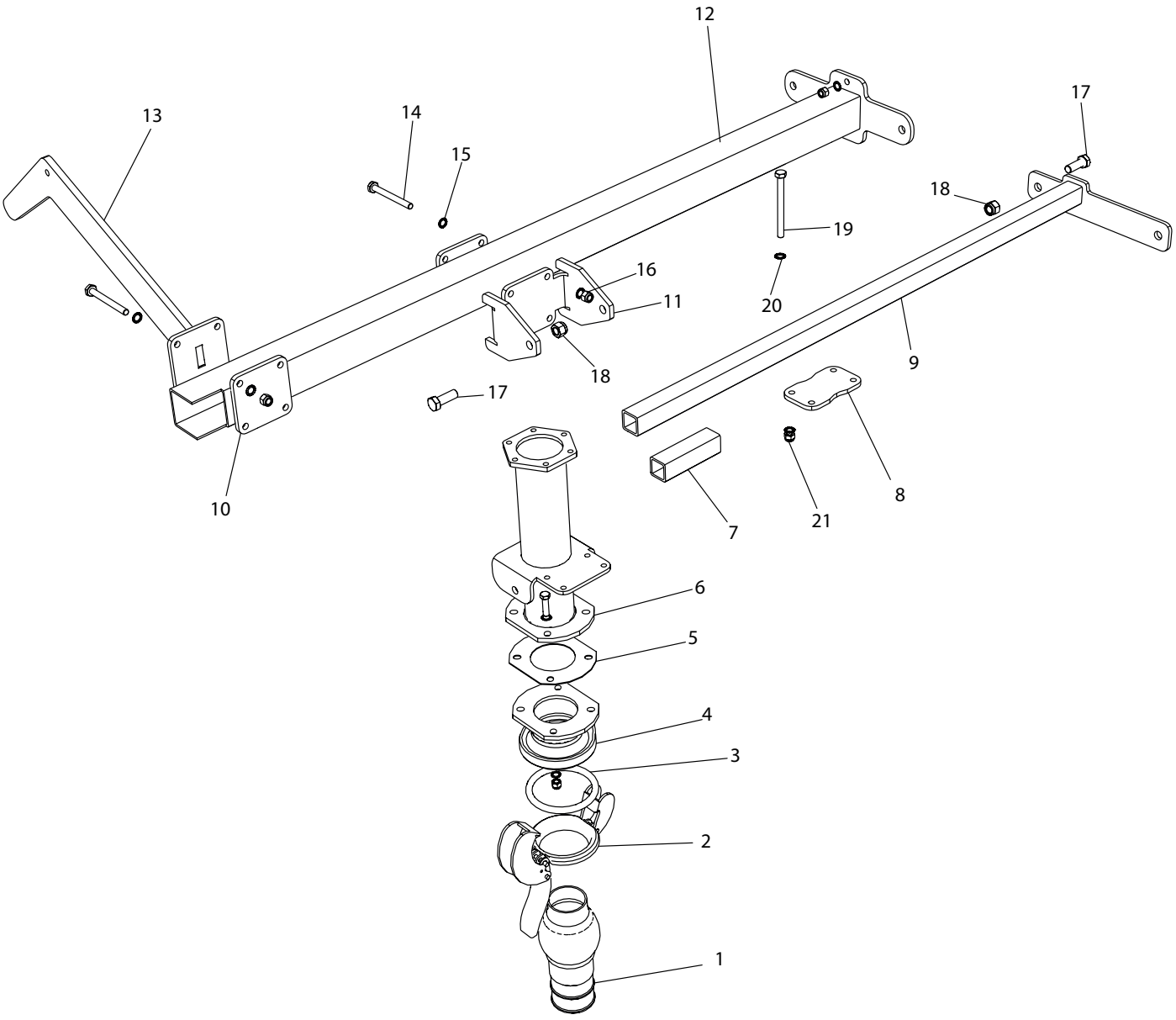
Item No.	Part No.	Qty	Description	Comments
1	022210025	2	M10x25 Steel set bolt	
2	763910	2	M10 Riplock	
3	051010	2	M10 Plain washer	
4	37000100	2	Bushing Gun trailer	
5	2010417	1	Wheel shaft for gun trailer	
6	830600	1	Wheel	
7	37000066	1	Bushing Front wheel	
8	022212050	1	M12x50 Steel set bolt	
9	2010217	1	Single-wheel leg Gun trailer	
10	021012100	2	M12x100 Steel bolt	
11	763912	8	M12 Riplock	
12	2010220	1	Unwinding bar	
13	044012	4	M12 Lock nut	
14	2010438	2	Clamping bracket for gun trailer	
15	021012110	2	M12x110 Steel bolt	
16	2010222	1	Cross bar	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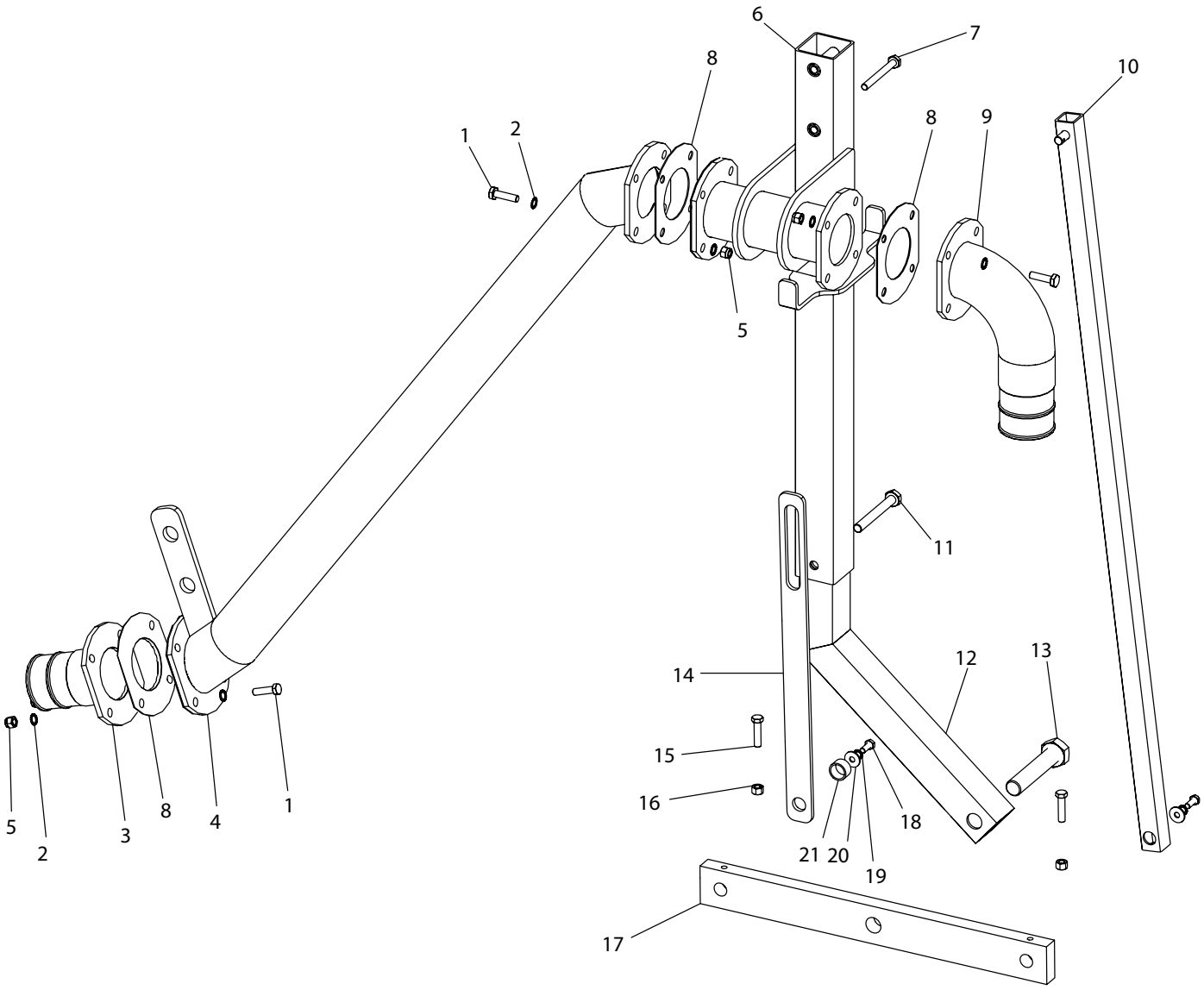
Item No.	Part No.	Qty	Description	Comments
1	14050386	1	HK 108 Ball with hose connector	
2	14050013	1	Galv. Locking ring	
3	14050043	1	Rubber ring	
4	1009328	1	Flange with HK Cup	
5	631109	1	Gasket	
6	2010257	1	Holder for gun pipe	
7	2011381	1	Spacer profile	
8	2010264	1	Clamping plate for profile gun trailer	
9	2010267	1	Adjustment plate	
10	2011124	2	Clamping plate gun trailer	
11	2010250	1	Clamping plate for gun	
12	2010222	1	Cross bar	
13	2010282	2	Support arm	
14	021012120	4	M12x120 Steel bolt	
15	763912	8	M12 Riplock	
16	044012	4	M12 Lock nut	
17	022216045	4	M16x45 Steel set bolt	
18	044016	4	M16 Lock nut	
19	021010110	12	M10x110 Steel bolt	
20	763910	24	M10 Riplock	
21	044010	12	M10 Lock nut	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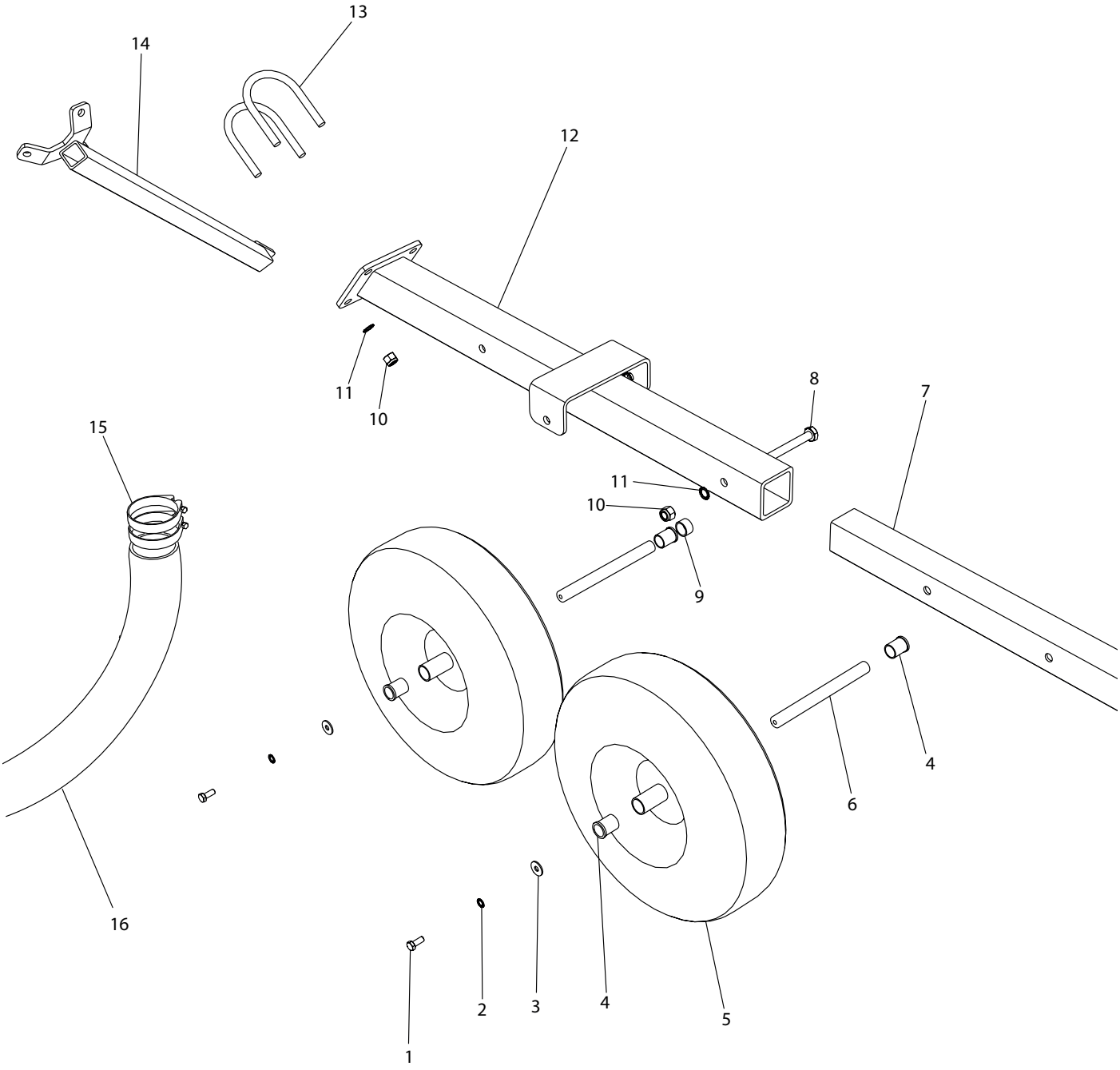
Item No.	Part No.	Qty	Description	Comments
1	021012045	12	M12x45 Steel bolt	
2	763912	24	M12 Riplock	
3	15000127	1	Hose connector with flange	Ø125 mm
3	15000121	1	Hose connector with flange	Ø110 mm
4	2010242	1	Feed pipe	
5	044012	12	M12 Lock nut	
6	2010226	1	Stand Gun trailer	
7	021012110	2	M12x110 Steel bolt	
8	631109	3	Gasket	
9	2010248	1	Bend Gun trailer	
10	2010374	1	Control arm	
11	021016130	1	M16x130 Steel bolt	
12	2010231	1	Stand Gun trailer	
13	021030160	1	M30x160 Steel bolt	
14	2010277	1	Control bracket	
15	022212050	2	M12x50 Steel set bolt	
16	040412	2	M12 Steel nut	
17	2010888	1	Bogie for right wheel	
18	022210025	2	M10x25 Steel set bolt	
19	763910	2	M10 Riplock	
20	051010	2	M10 Plain washer	
21	37000066	1	Bushing Front wheel	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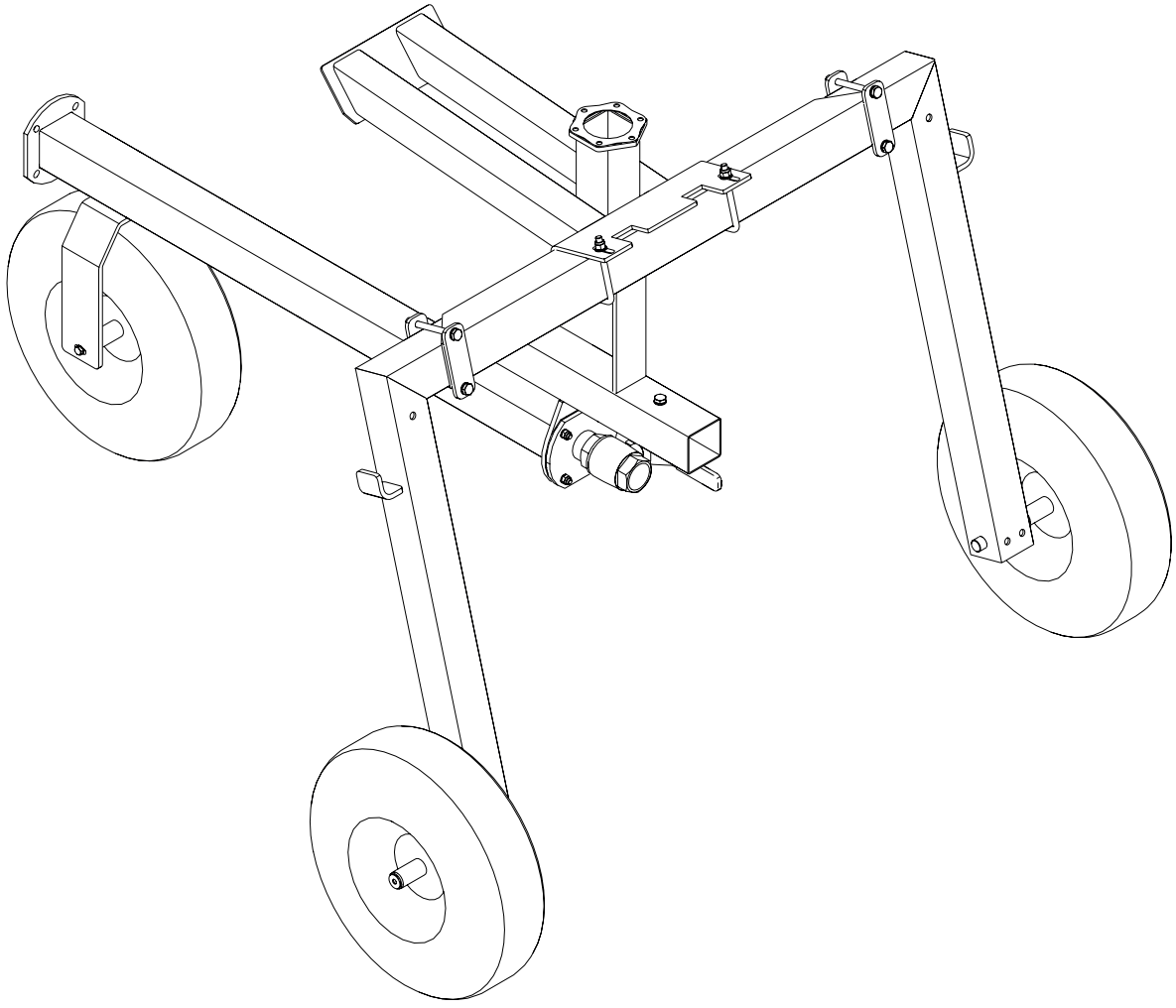
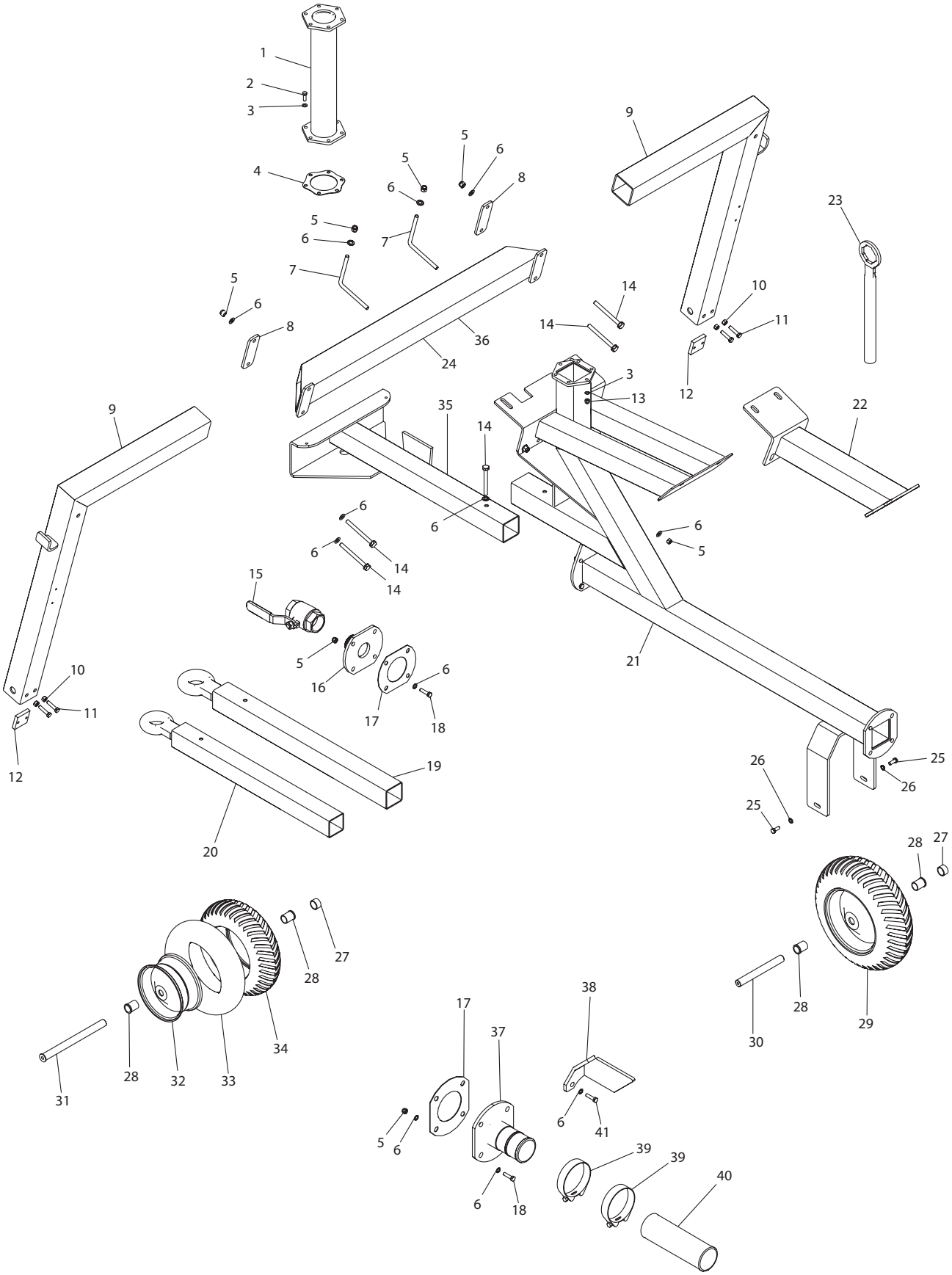
Item No.	Part No.	Qty	Description	Comments
1	022210025	2	M10x25 Steel set bolt	
2	763910	2	M10 Riplock	
3	051010	2	M10 Plain washer	
4	37000100	4	Bushing Gun trailer	
5	830600	2	Wheel	
6	2010417	2	Wheel shaft	
7	2010053	1	Hitch hook	
8	021016120	2	M16x120 Steel bolt	
9	37000066	1	Bushing Front wheel	
10	044016	6	M16 Lock nut	
11	763916	6	M16 Riplock	
12	2010271	1	Drawbar profile	
13	2003693	2	U-bar	
14	2010281	1	Brace	
15	16200350	4	Hose clamp	
16	SL509102	1	Lightflex Hose	

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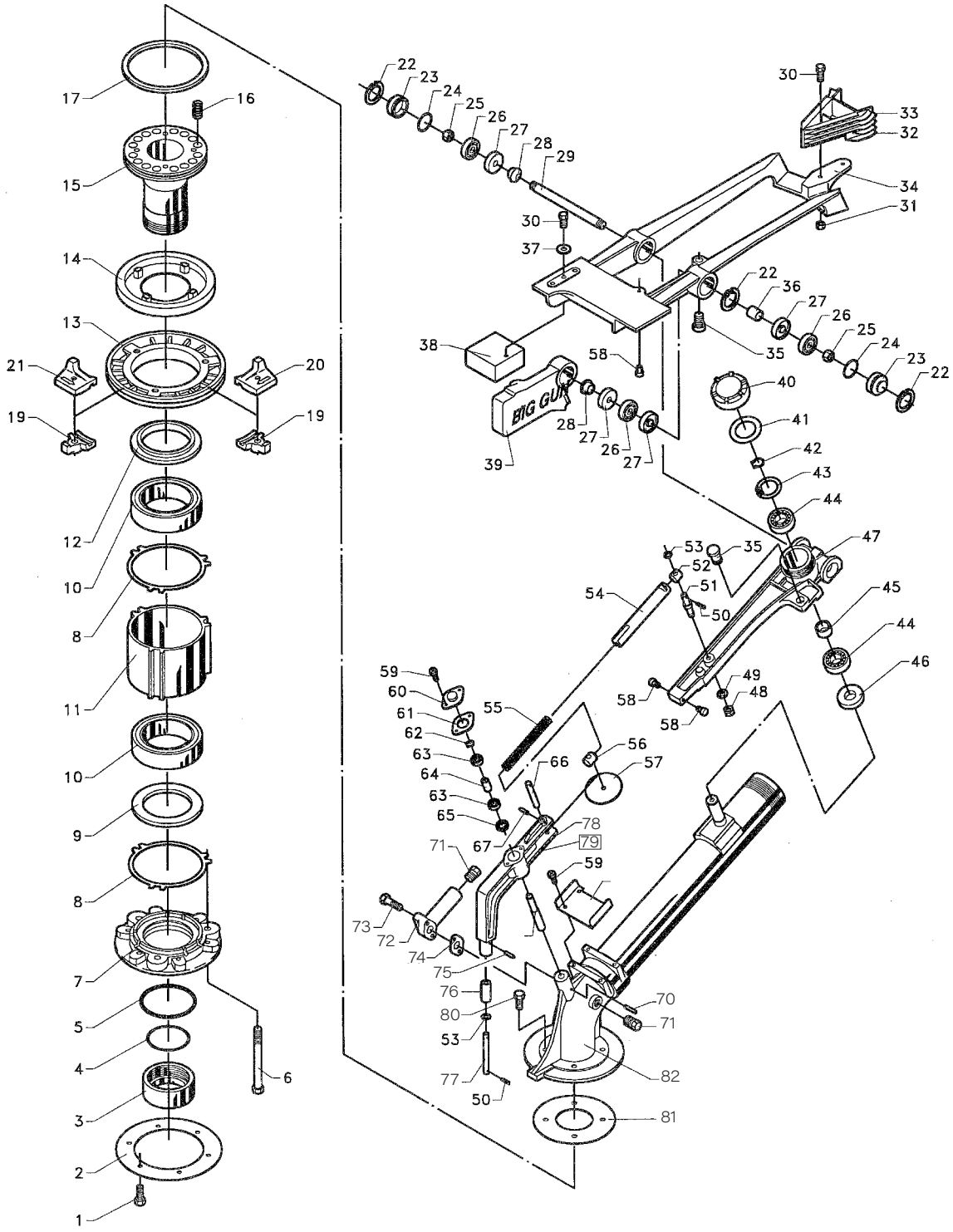
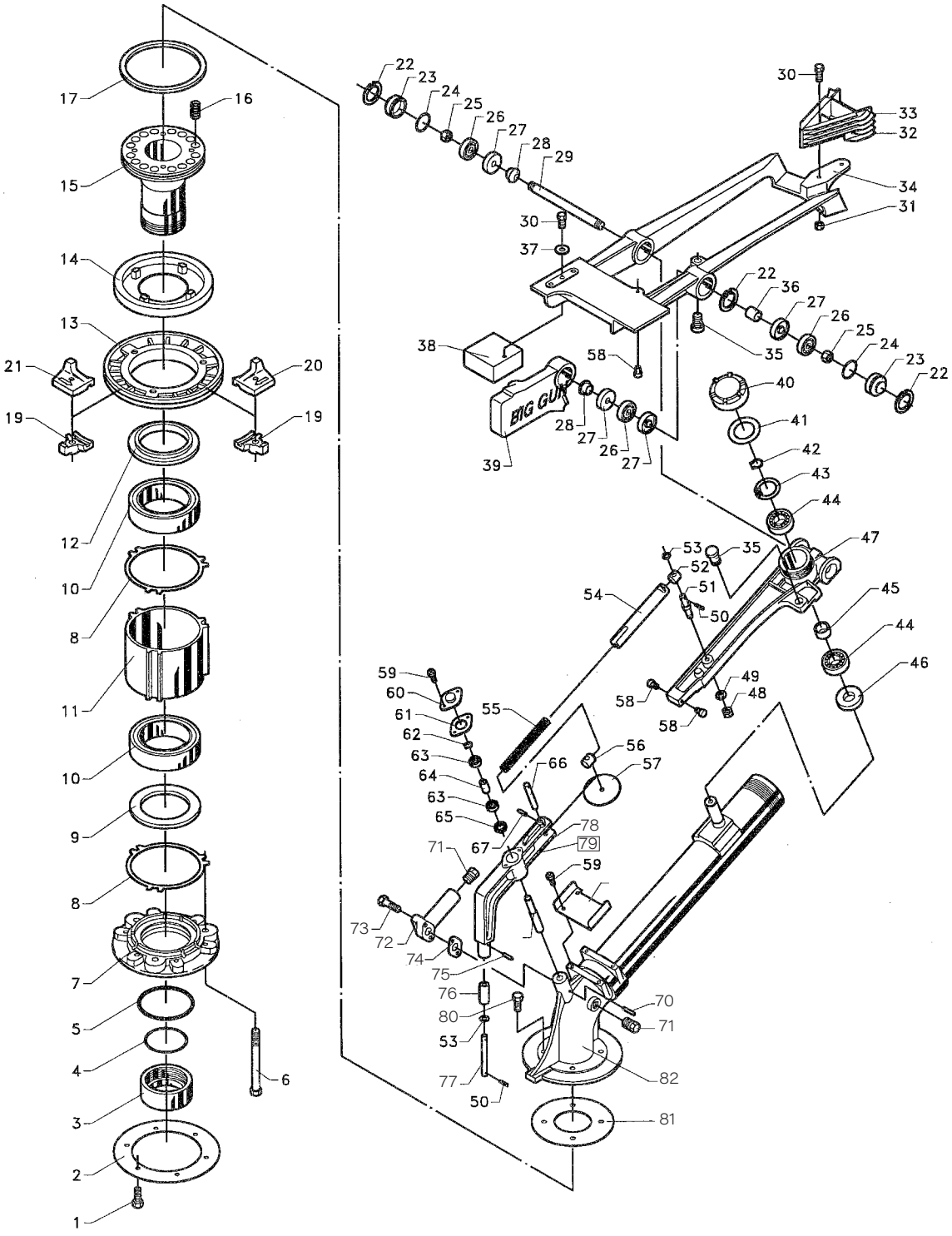
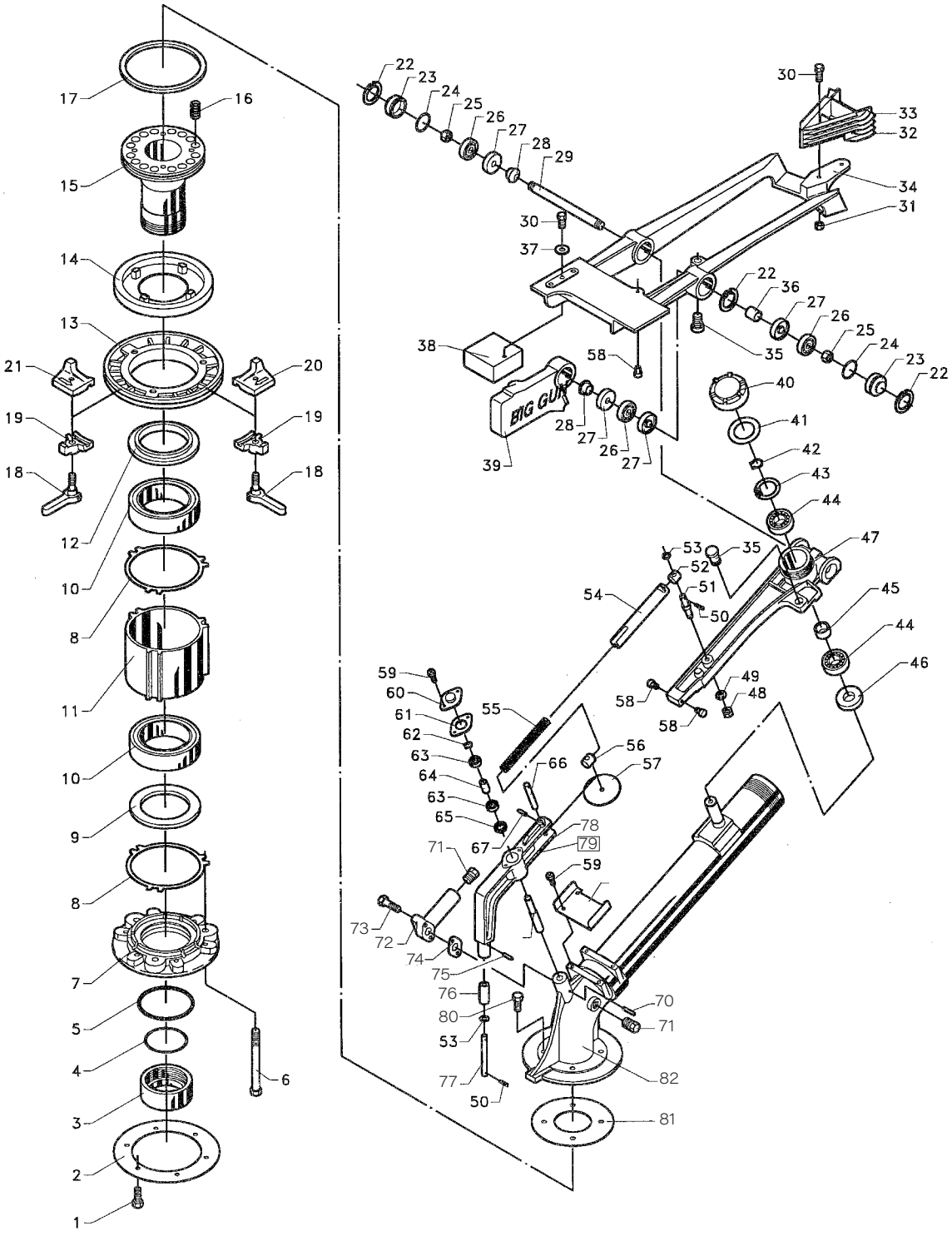
Item No.	Part No.	Qty	Description	Comments
1	762006	1	Height extender pipe for gun	500 mm
1	762005	1	Height extender pipe for gun	250 mm
2	021010040	6	M10 x 40 Steel bolt	
3	050310	12	M10 Plain washer	
4	761614	1	Flange gasket	
5	044012	16	M12 Lock nut	
6	050312	32	M12 Plain washer	
7	37000064	4	Tension bar	
8	37000062-3	2	Clamping plate for gun trailer	
9	17000017	2	Leg for gun trailer	
10	040410	4	M10 Steel nut	
11	022210035	4	M10 x 35 Set bolt	
12	37000036	2	Thread plate for wheel leg	
13	044010	6	M10 Lock nut	
14	021012120	5	M12 x 120 Steel bolt	
15	540116	1	Ball valve	
16	2007223	1	Flange for ball valve	
17	631109	2	Gasket	
18	021012045	4	M12 x 45 Steel bolt	
19	17000043	1	Unwinding hook Ø50 Drawbar eye	
20	17000039	1	Unwinding hook Ø40 Drawbar eye	
21	2009243	1	Gun trailer body	
22	17000024	1	Additional lifting arm	For wide model
23	761295	1	Nozzle key	
24	17000037	1	Overhanging 3m width	
24	17000037-1	1	Overhanging 2 m width	
25	022210020	2	M10 x 20 Set bolt	
26	050320	2	M20 Plain washer	
27	37000066	2	Bushing Front wheel	
28	37000100	2	Bushing gun trailer	
29	830600	3	Comp wheel	
30	37000065	1	Wheel shaft	
31	17000019	2	Wheel shaft	
32	830602	3	Rim	
33	830604	3	Hose	
34	830606	3	Wheel	
35	17000020	1	Unwinding hook	
36	17000018	1	Overhanging for gun trailer	
36	2014095	1	Overhanging for gun trailer wide model	Drives wheel/wheels
37	15000037 15000120 15000127	1	Hose connector Ø100 Hose connector Ø110 Hose connector Ø125	
38	35000153	4	Stop buffer	
39	16200730 16200732 16200735	2	Hose clamp Ø100 Hose clamp Ø110 Hose clamp Ø125	
40			Hose	
41	021012065	1	M12 x 65 Steel bolt	


BIG GUN

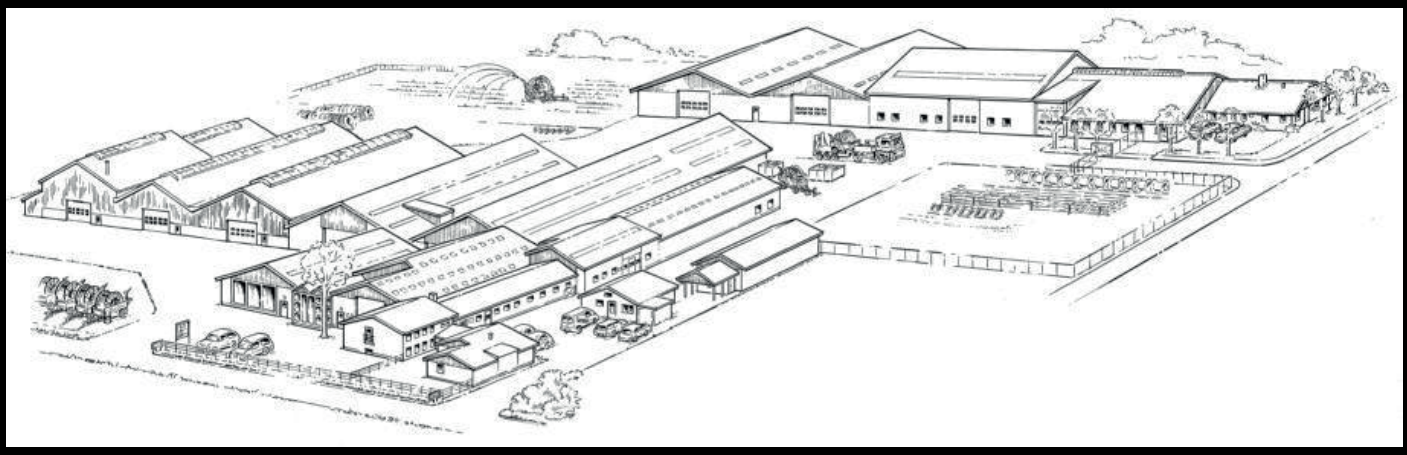
Item No.	Part No.	Qty	Description	Comments
1	022208025	1	Bolt	
2	761614	1	Flange gasket for gun	
3	778402	1	Lock nut	
4	776548	1	O-ring	
5	778475	1	O-ring	
6	778462	3	Bolt	
7	778401	1	Base piece	
8	778461	2	Gasket	
9	778373	1	Sealing ring	
10	776253	2	Ball bearing	
11	778405	1	Bearing housing	
12	778372	1	Sealing ring	
13	778400	1	Brake disc	
14	778371	1	Brake lining	
15	778459	1	Bearing pipe	
16	778474	12	Spring	
17	778473	1	Sealing ring	
18	776849	2	Bolt	
19	776371	2	Bracket	
20	778432	1	Wheel chock Left	
21	778431	1	Wheel chock Right	
22	776565	3	Retaining ring	
23	776602	2	End cover	
24	776563	2	O-ring	
25	776603	2	Nut	
26	776598	3	Ball bearing	
27	776600	4	Sealing ring	
28	776607	2	Spacer pipe	
29	778465	1	Shaft	
30	776818	2	Bolt	
31	776060	2	Nut	
32	778354	1	Drive blade	
34	778364	1	Drive arm	
35	778139	2	Rubber stop	
36	778327	1	Spacer pipe	
37	776070	1	Flat washer	
38	778433	1	Weight block	
39	778366	1	Counterweight	
40	778233	1	Cover	
41	778272	1	Gasket	


BIG GUN

Item No.	Part No.	Qty	Description	Comments
42	778323-017	1	Retaining ring	
43	776045	1	Retaining ring	
44	776054	2	Ball bearing	
45	778326	1	Spacer pipe	
46	776048	1	Oil seal ring	
47	778394	1	Switch lever	
48	776064	1	Nut	
49	777029	1	Washer	
50	776714	2	Split pin	
51	778197	1	Bolt	
52	778282	1	Shaft	
53	778409	2	Flat washer	
54	778446	1	Pipe	
55	778470	1	Spring	
56	778417	1	Shaft	
57	778336	1	Washer	
58	776580	3	Stop pin	
59	778311	4	Screw	
60	778263	1	Cover	
61	778265	1	Gasket	
62	778323-004	1	Retaining ring	
63	778321	2	Bearing	
64	778281	1	Spacer pipe	
65	778317	1	Seal	
66	778193	1	Pin	
67	778320	1	Split pin	
68	778448	1	Plate	
69	778274	1	Shaft	
70	776931	1	Locking pin	
71	776089	2	Plug	
72	778497	1	Nozzle pipe	
73	776059	2	Bolt	
74	778511	1	Gasket	
75	778322	1	Split pin	
76	778277	1	Roller	
77	778276	1	Shaft	
78	778410	1	Arm trip lever	
79	778451	1	Complete switch	
80	778408	4	Bolt	
81	778460	1	Gasket	
82	778587	1	Jet pipe	


BIG GUN

Item No.	Part No.	Qty	Description	Comments
83	770145	1	Gun	
84	7712781	1	150Tr Plastic body	
85	7712785	1	O-ring	
86	7712467	1	150Tr Plastic cap	
87	7712468-018	1	18 mm 150 tr plastic nozzle	
87	7712468-019	1	19 mm 150 tr plastic nozzle	
87	7712468-020	1	20 mm 150 tr plastic nozzle	
87	7712468-021	1	21 mm 150 tr plastic nozzle	
87	7712468-022	1	22 mm 150 tr plastic nozzle	
87	7712468-023	1	23 mm 150 tr plastic nozzle	
87	7712468-024	1	24 mm 150 tr plastic nozzle	
87	7712468-025	1	25 mm 150 tr plastic nozzle	
87	7712468-026	1	26 mm 150 tr plastic nozzle	
87	7712468-027	1	27 mm 150 tr plastic nozzle	
87	7712468-028	1	28 mm 150 tr plastic nozzle	
87	7712468-029	1	29 mm 150 tr plastic nozzle	
87	7712468-030	1	30 mm 150 tr plastic nozzle	
87	7712468-031	1	31 mm 150 tr plastic nozzle	
87	7712468-032	1	32 mm 150 tr plastic nozzle	
87	7712468-033	1	33 mm 150 tr plastic nozzle	
87	7712468-034	1	34 mm 150 tr plastic nozzle	
88	7712701	1	Complete nozzle	



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