



BelMix FEEDER WAGON

OPERATING INSTRUCTIONS

YEAR OF ISSUE: AUGUST 2013



IMPORTANT

The latest operating manuals and parts catalogues are available on our website: <http://www.metalfach.com.pl/en/materialy-do-pobrania>

FEEDER WAGON DATA

Vehicle type:		BelMix feeder wagon
Commercial designation:		T659
Type designation:		
Feeder wagon identification number ^{1/}:		.....
Feeder wagon manufacturer:		"METAL-FACH" Sp. z o. o. 16-100 Sokółka, Poland ul. Kresowa 62 Tel. no. +48 85 711 98 40 Fax: +48 85 711 90 65
Sold by:	Address:	..... .....
	Tel./Fax	..........
Date of delivery		.....
Owner / User	Full name	.....
	Address	...............
	Tel./Fax	..........



HINT

Hint: Please note down the feeder type and serial number — it will be required for contact with your authorised dealership.

^{1/}The data can be found on the feeder wagon nameplate located on the trailer chassis front crosspiece

*delete as applicable

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1. INTRODUCTION

These Operating Instructions are intended to provide the product user with information concerning operation, servicing and maintenance of the machine. They contain operating performance data and the requirements for safe and professional operation of the machine which enable the best use of the product with the maximum operating life and reliability. They also contain information about ordering spare parts. Thorough understanding of the Operating Instructions will help the user prevent accidents, operate the machine efficiently and keep the warranty valid.

Unauthorised modification of the feeder wagon design release the manufacturer from liability for resulting damage and loss.

METAL-FACH Sp. z o. o. reserves the right to introduce changes without prior notice and without assuming any obligations resulting from those changes.

ALL OPERATORS OF THIS FEEDER WAGON MUST FAMILIARISE THEMSELVES WITH THE CONTENTS OF THE OPERATING INSTRUCTIONS BEFORE COMMENCING WORKS. THE OPERATING INSTRUCTIONS ARE AN ESSENTIAL PART OF T659 FEEDER WAGONS.

This is intended to maintain proper operation of the feeder wagon, safety of use and maximum operating life. This is also the condition which ensures that your warranty rights are maintained.

1.1. INTENDED USES

The feeder wagon is intended for preparation, transport and dosing of feed directly to feeding stations of cattle. The dimensions and good steering performance make the BelMix feeder wagon especially useful for farms with cowsheds with narrow feeding passages and low entrance doors.

The BelMix feeder wagon can be coupled with tractors with the minimum power output of 60 kW (see details in table in section 3.1) with two operable sockets of the external hydraulic system, a brake system connector, the 12V electrical system connector and upper transport hitch or an agricultural hitch able to withstand the minimum vertical load of 30 kN. The feeder wagon has a torsion rod with a dia. 45 mm ring. With a two-gear transmission, the minimum tractor power output is 40 kW.

Front or telescopic loaders shall be used to load bulky feed in bales (grass silage, silage, hay, straw) into the feeder wagon tank.

1.2. EQUIPMENT

The basic equipment of each feeder wagon includes:

1. Operating Instructions manual and Parts Catalogue
2. Warranty card
3. Telescopic jointed shaft (coupling with the tractor):
 - with shear pin clutch (standard)
6R-605-7-BA-K601- 680 Nm 540 RPM (SIPMA)
 - with friction clutch (applies to trailers w/o the 2-gear transmission, over 10m³) 6R-602-7-BA-C601 - 630 Nm, 540 RPM (SIPMA)
4. Telescopic jointed shaft (intermediate — for the planetary gear)
 - w/o the 2-gear transmission
V601410ENC17115 - 880 Nm 540 RPM (COMER)
 - with the 2-gear transmission
V601410ENC15115 - 880 Nm 540 RPM (COMER)



WARNING!

Using shafts with other parameters may result in a failure which will make the product warranty void and null.



CE DECLARATION OF CONFORMITY



FOR THE MACHINE

METAL-FACH Sp. z o. o.
ul. Kresowa 62
16-100 SOKÓŁKA

which acts as the manufacturer

declares under sole responsibility that the following machine:

BelMix FEEDER WAGON
type/model: T659
serial number:
year of manufacture:.....

this declaration concerns, meets the following requirements:

- **Directive 2006/42/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL** dated May 17th 2006 on machines and the **Resolution of the Minister of Economy** of October 21st 2008 concerning general requirements for machinery (Journal of Laws, no. 199 item 1228);

The following harmonised standards were used for compliance evaluation:

PN-EN 1853+A1:2009E	PN-EN ISO 13857:2010P
PN-EN ISO 4254-1:2009E	PN-EN ISO 12100:2012P
PN-EN 703+A1 2009	

- and the following standards: PN-ISO 3600:1998, PN-ISO 11684:1998; and the Resolution of the Ministry of Infrastructure of 31 December 2002 on technical requirements for vehicles and the scope of their necessary equipment (Journal of Laws 2003 no. 32 item 262 as amended).

Safety Test Report No. LBC/65/12

Unit responsible for engineering documentation: METAL-FACH Engineering Department

This Declaration of Conformity becomes void and null if the machine design is changed or modified in any manner without prior consent from the manufacturer.

Sokolka,

Chairman of the Board

Jacek Marek Kucharewicz

1.3. MACHINE IDENTIFICATION

The information of the feeder wagon is presented on the nameplate (Fig. 2) attached to the main frame (Fig. 1). When purchasing the product, check the serial number entered in the Operating Instructions and the warranty sheet against the serial number stamped on the nameplate.

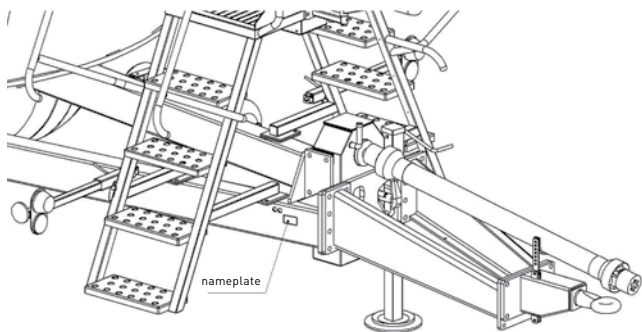


Fig. 1. Location of the nameplate on the BelMix T659 feeder wagon



Fig. 2 Nameplate

2. GENERAL SAFETY RULES


2.1. GENERAL GUIDELINES, SYMBOLS AND NOMENCLATURE

 IMPORTANT	Failure to comply with these guidelines may result in damage of equipment or its components.
 CAUTION!	This warning sign in the operating instructions means that special caution shall be exercised due to hazards to persons and potential damage to the product.
 WARNING!	It is important to carefully follow these notes or guidelines.

1. Only operators who have read and understood the Operating Instructions and have a valid tractor driving licence can operate the feeder wagon.
2. The user of this machine must follow the guidelines included in these Operating Instructions, and the warning signs and inscriptions placed on the machine. The meaning of the warning signs is explained in chapter 2.1.
3. When operating and repairing the machine, follow the Regulation of the Minister of Agriculture and Food Economy of 12 January 1998 on occupational hygiene and safety in agriculture [Journal of Laws No. 12/98 item 51].

4. Prior to starting the feeder wagon operation make sure that:
 - the wagon and the tractor are working correctly;
 - the tractor is equipped with side mirrors which ensure visibility on both sides of the machine;
 - all guards are functional, especially the guards on the telescopic jointed shaft;
 - no other persons are present within the work zone;
 - the visibility in the danger zone is sufficient.
5. Load the feeder wagon only with the tractor coupled and its engine running. The mixing screw must be running during loading.
6. Stop the wagon with the parking brake before loading on a level horizontal surface.
7. Be very careful during unloading in sheltered rooms. The rooms shall have adequate ventilation and restrict the operation of the tractor to minimum so that the operator is not exposed to hazardous effects of engine exhaust gases.
8. Before operating the feeder wagon make sure that no persons or foreign objects that would obstruct operation are present in the tank.
9. Repairs, lubrication, cleaning, and replacement of blades must be performed with the tractor engine off, the ignition key removed and the parking brake engaged.
10. Before exiting the tractor, always turn off the engine, remove the ignition key and engage the parking brake.
11. Exercise extreme caution when coupling/decoupling the feeder wagon with/from the tractor. Couple the machine with tractors of proper class and engine power only.
12. Use a telescopic jointed shaft only with complete and unscathed guards to drive the wagon.
13. Operation of the feeder wagon must be controlled only from the tractor driver's seat.
14. Enter the platform of the machine or its tank only when the machine has completely stopped and with the tractor's engine off.

15. Be extremely careful when replacing the blades; wear protective garment and safety shoes.
16. Follow the traffic code regulations when taking the feeder wagon on public roads. Always adapt your driving speed to the conditions on the road and do not exceed 25 km/h.
17. Park and store the feeder wagon on a level and paved/solid ground. During storage the machine shall rest on its support, and be secured by the parking brake or by chocking the wheels to prevent accidental movement.
18. It is recommended to use suitable PPE equipment intended for tractor drivers and shoes with anti-slip soles, e.g. as described below:
 - Personal protective equipment according to PN-EN 340:2006.
 - Safety footwear (boots) with metal anti-puncture sole pad and metal toe acc. to EN 345-1.
 The boots must also provide secure grip around the ankles, which are the most frequently traumatized part of the body, especially when getting out of the tractor.

	<p>DO NOT:</p> <ul style="list-style-type: none"> • use a malfunctioning feeder wagon or tractor; • use a wagon with defective guards of moving parts; • perform any servicing when the engine is running; • allow any persons to stay in the feeder wagon tank during operation or transport; • start the machine if there are other persons, especially children, present in the feed loading/unloading zone!
<p>WARNING!</p>	

	<p>DO NOT:</p> <ul style="list-style-type: none"> • remain between the tractor and the machine when the tractor engine is running; • stand on the tank edge, enter the tank or reach into the tank when the mixer is running; • remain on the silo or heap during (manual) loading of feed into the tank of the wagon; • travel on public roads when the signalling equipment and/or brakes do not function properly; • leave the feeder wagon on slopes without engaging the parking brake or chocking the wheels; • wear loose clothes during servicing and repairs of the feeder wagon.
WARNING!	

	Do not operate the feeder wagon near any persons
WARNING!	

	It is strictly forbidden to operate the feeder wagon by persons intoxicated by alcohol.
WARNING!	






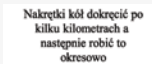

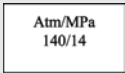






The warning signs and inscriptions on the feeder wagon inform the user about hazards and their prevention during the machine operation. The user must keep the adhesive labels with warning signs and inscriptions clean and legible.

Immediately replace all illegible, damaged or lost labels. New labels can be purchased from the manufacturer of the feeder wagon.

	The user must keep all warning symbols on the machine clean and legible.
WARNING!	

Item	Safety symbol (sign)	Meaning of the symbol (sign) or text	Location on the feeder wagon
1.		Read the operating instructions	On the front part of hitch
2.		Turn off the engine and remove the ignition key before servicing or repairs.	On the front part of hitch
3.		Do not stand near the lift links when the feeder wagon is working.	On the front part of hitch
4.		Do not touch any parts of the machine until all of its units have stopped.	PIC guard

GENERAL SAFETY RULES

5.		Warning label.	On the front part of hitch	13.		Counterblade control Feet (toes) crushing hazard. Force applied from above	On the tank sides
6.		PIC sense of rotation and RPM.	Platform console	14.		Coupling with the tractor	The machine tow bar
7.		Air pressure in tyres.	On the tank sides over the wheels	15.		Information label	On the tank sides over the wheels
8.		No persons are allowed to remain near the working machine.	On the tank, at the openings	16.		Information label	Over the discharge opening
9.		Warning label.	At the front part of the tank top	17.		Falling from platform	At the front part of the tank top
10.		Warning label.	At the front part of the tank top	18.		Beware of the power take-off shaft.	Platform
11.		Attach lifting slings here.	On the top tank part sides, the hitch ring and the machine back				
12.		Lubrication point.	Hydraulic actuators				

19.		Hand pinch hazard.	Next to the discharge opening
20.		Finger amputation hazard	Next to the discharge opening
21.	<p>Ubrania się przebywania na pomoce podczas pracy i transportu wozu pasoweg</p>	Warning label.	At the front part of the tank top
18.	<p>Pojemność 2000kg</p>	Information label	At the front part of the tank top

2.1.1. LOCATIONS OF SYMBOLS ON THE FEEDER WAGON

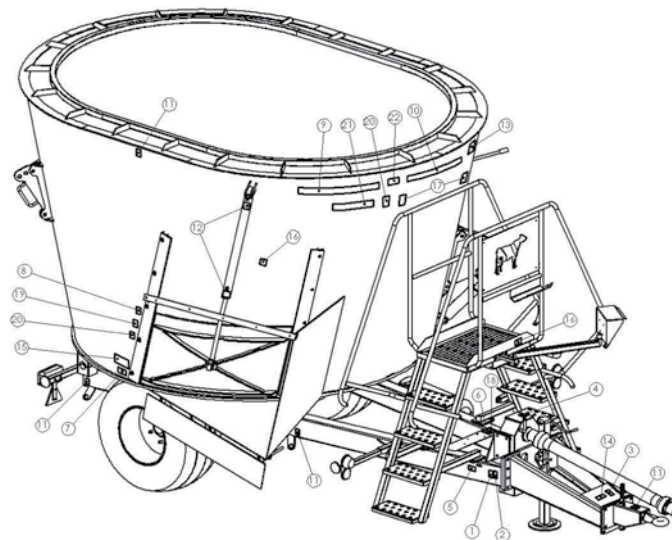



Fig. 3 Locations of symbols on the machine (right side view).

 WARNING!	<p>The user of a feeder wagon is required to keep the warning symbols and text on the wagon legible during its entire operating life. If damaged or destroyed, replace with new ones.</p>
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3. TECHNICAL CHARACTERISTICS, GENERAL DATA

3.1. GENERAL DATA

Item	Description	Unit of Measure	Value
1.	2.	3.	4.
1.	Machine Type	-	hitched, mono-axial
2.	Model	-	BelMix
3.	Machine code	-	T659
	Goods and Materials Code (KTM)	-	0826-299-765-901
	Code of the Polish Classification of Goods and Services (PKWiU)	-	29.32.34-75.00
4.	Service/transport speed	[km/h]	5/25
5.	Tractor hydraulic system pressure	[Atm/ MPa]	140/14
6.	Pump output	[l/min]	40
7.	Coupling with tractor:	[mm]	45 tractor upper (transport) hitch / lower (agricultural) hitch
	- tow bar hitch-ring diameter - tractor hitch		
8.	Number of operators	-	1 (tractor driver)
9.	Mixing and cutting unit:	-	- vertical worm screw - mechanical
	- type - drive type		
10.	Unloading unit:	-	- discharge openings, belt feeder - mechanical
	- feed discharge method - drive type		

11.	Tyre pressure	[bar/kPa]	3.5/350
12.	Braking system - parking brake:		
	- type	-	- pneumatic, single-line
	- control	-	- from tractor
	parking brake:		
	- type	-	- pneumatic, single-line
	- control	-	- from tractor
13.	Electrical system	[V]	12
14.	Lighting	-	acc. to the Traffic Code



WARNING!

- The manufacturer reserves the right to change the vehicle technical parameters without notice.
- Vehicle kerb weight with +/-2% tolerance (the value is within the tank height)

3.2. DETAILED DATA

Item	Description	Measure unit	Value						
			5	6	7	8 standard	8 raised and rolled	8 rolled	9 standard
1.	Capacity	m ³							
2.	Machine code	-	T659/9	T659/3	T659/11	T659/7	T659/18	T659/5	T659/1
3.	Dimensions:								
	- length	[mm]	4890	4970	4490	5050	5520	5520	5430
	- width	[mm]	2200	2200	2200	2300	2200	2200	2500
	- height	[mm]	2350	2470	2600	2520	2350	2200	2520
4.	Weight	[kg]	3050	3100	3200	3800	3820	3800	3835
	Permissible load capacity	[kg]	1800	2000	2200	2400	2400	2400	2600
5.	- minimum tractor power output	[kW]	60	60	60	60	60	60	60
	- two-gear transmission version	[kW]	40	40	40	40	40	40	40
6.	Hitch load	[kN]	7.8	8.5	9.2	9.8	10.2	14	10.5
7.	No. of screw blades	pcs.	8	8	8	8	10	10	8
8.	Tyres	-	10.0/75-15.3 18 PR	10.0/75-15.3 18 PR	10.0/75-15.3 18 PR	400/60-15.3 14 PR	10.0/75-15.3 18 PR	10.0/75-15.3 18 PR	400/60-15.3 14 PR

Item	Description	Measure unit	Value						
			9 rolled	10	11	12	13	14	18
1.	Capacity	m ³							
2.	Machine code	-	T659/6	T659/12	T659	T659/13	T659/2	T659/15	T659/18
3.	Dimensions:								
	- length	[mm]	5540	5375	5480	5500	5555	7110	7110
	- width	[mm]	2300	2500	2500	2500	2500	2400	2330-2450
	- height	[mm]	2300	2620	2710	2880	3030	2400	3040
4.	Weight	[kg]	3835	3900	3970	4020	4080	5600	5900
	Permissible load capacity	[kg]	2600	2800	3000	3200	3400	4500	6500
5.	- minimum tractor power output	[kW]	60	60	60	60	60	60	60
	- two-gear transmission version	[kW]	40	40	40	40	40	40	40
6.	Hitch load	[kN]	15	11.2	12	12.7	13.3	14.1	14.8
7.	No. of screw blades	pcs.	10	8	8	8	8	8	8
8.	Tyres	-	10.0/75-15.3 18 PR	400/60-15.3 14 PR	400/60-15.3 14 PR	400/60-15.3 14 PR	400/60-15.3 14 PR	400/60-15.3 14 PR	400/60-15.3 14 PR

4. DESIGN AND OPERATING PRINCIPLE OF THE FEEDER WAGON

The schematic drawing of the feeder wagon is shown in Fig. 4.

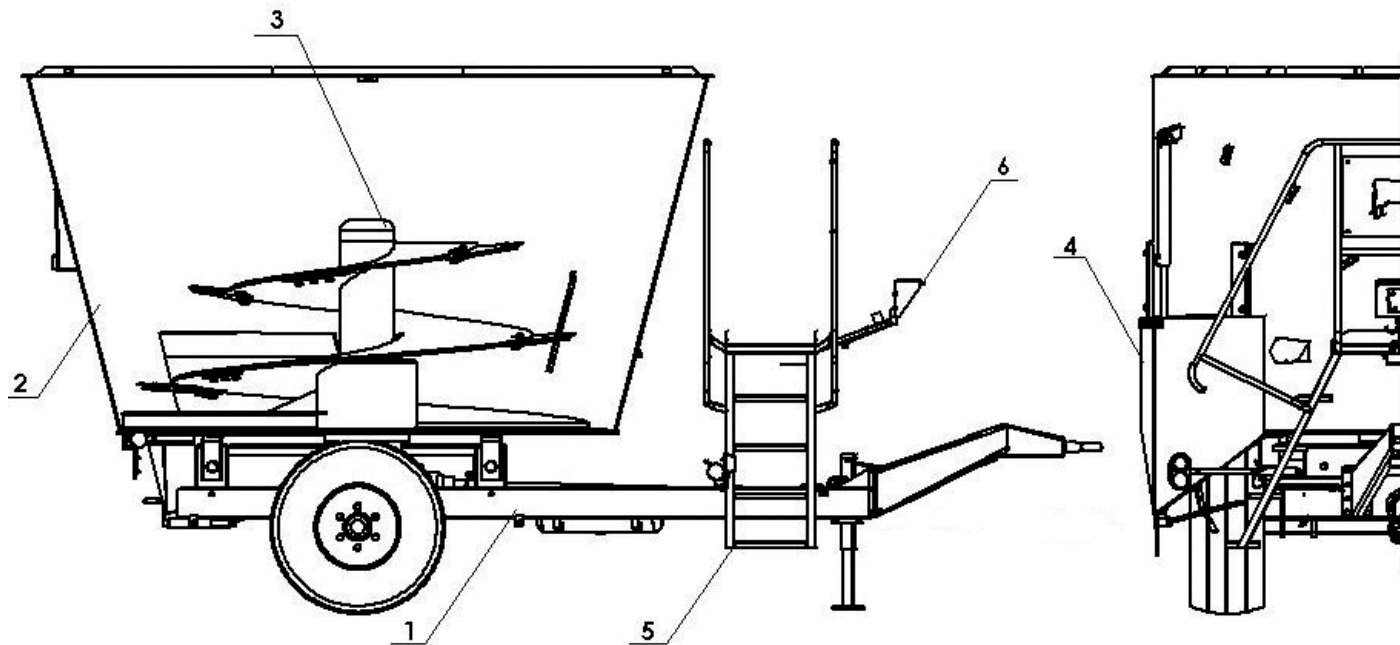


Fig. 4 T659 feeder wagon:

1 – chassis, 2 – tank, 3 – mixer, 4 – discharge, 5 – platform with stairs, 6 – scales

The feeder wagon consists of the following main assemblies:


- chassis (frame, axle and two driving wheels, tow bar, tow bar support);
- pneumatic brake system;
- drive unit (telescopic jointed shaft I, intermediate shaft or 2-gear transmission, telescopic jointed shaft II, intersecting axis gear transmission);
- mixing and cutting unit (tank and worm screw mixer with blades driven by an intersecting axis gear transmission);
- discharge unit (gate with a hydraulic actuator, discharge openings);
- weighing system;
- lighting equipment for travelling on public roads.

The feed components charged to the tank are cut by the mixer blades and mixed together, and then discharged through the discharge openings into the trough or to the feeding passage. The cutting and mixing process is visually inspected from the service platform which is also used for manual loading of bulk feed. There is a retaining ring at the top of the feeder wagon's tank which prevents from falling out of the feed with a high content of straw, hay or silage of grass. The tank bottom deviates from flat by 10 mm due to design and processing concerns.

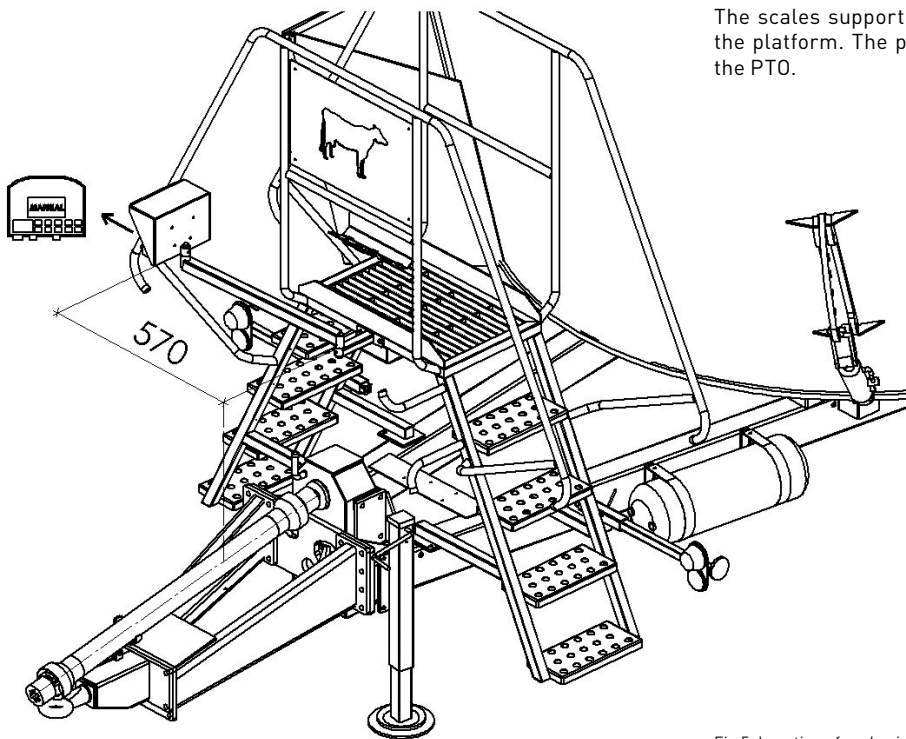
4.1. WEIGHING SYSTEM

4.1.1. WEIGHING SYSTEM

The feeder wagons come with an electronic weighing system with four independent weighing sensors and 50 programmable feed recipes. Up to 30 different ingredients or components of specific weight can be entered for each programmable recipe. The total weight of components is displayed on the screen when the ingredients are charged to the tank. The weighing system allows keeping the exact proportions of components according to the recipe.

	<p>Detailed information about operation of the weighing system can be found in the operating manual issued by the device manufacturer. The manual is enclosed with the present Operating Instructions.</p>
<p>IMPORTANT</p>	

4.1.2. LOCATION OF THE WEIGHING SYSTEM IN RELATION TO PTO



The scales support rotates by 180 degrees on an arm at the front of the platform. The panel is placed at a safe distance of 570 mm from the PTO.

Fig 5. Location of scales in relation to the PTO

5. INFORMATION ON THE OPERATION OF FEEDER WAGON

5.1. TOW BAR SUPPORT OF THE POWER TAKE-OFF SHAFT

The PTO rests on a support installed on the tow bar. In case of the upper tow bar the PTO support is installed on the opposite side and suspended under the hitch.

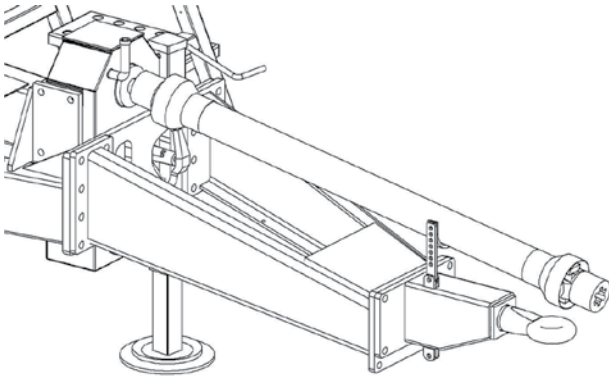


Fig. 6 Support of the power take-off shaft

5.2. TOW BAR POSITION CHANGE WITHOUT THE TWO-GEAR TRANSMISSION

The feeder wagon may require changing the tow bar position to adjust it to the tractor hitch. The tow bar should be in the top position for coupling with the upper hitch and in the bottom position for coupling with the agricultural hitch.

The tow bar hitch-ring height is:

- 54 to 100 cm in the top position;
- 20 to 67 cm in the bottom position.

The tow bar is fastened to the frame with sixteen M16x50 bolts (8.8). The tow bar position is changed by removing the bolts, turning the tow bar and reinstalling the bolts. Tighten to the torque of 210 Nm. Exercise caution during this task – there is a risk of crushing of legs. Two persons should carry out the tow bar position change due to the large weight of the element. Before changing the tow bar position, park the feeder wagon on a level and solid ground, rest it on the support and engage the parking brake.

5.3. SUPPORT FOOT

The support foot is located in the front frame section directly behind the tow bar. The bottom plate of the foot is 220 mm in diameter. The surface area has been chosen to prevent sinking into loose (non-compacted) soil.

5.4. COUPLING WITH THE TRACTOR

The feeder wagon can only be operated with tractors in a good working order and the minimum power output of 60 kW (see details in table in section 3.1) which have two sockets for the external hydraulic system and a hitch (top or bottom transport) which can withstand the maximum vertical load of 30 kN. To couple the feeder trailer to the tractor, it is required to perform the following actions:

- approach the machine with the tractor so that the tow bar hitch-ring is placed between the tractor hitch fork;
- turn off the tractor's engine, remove the ignition key and engage the parking brake;
- couple the tow bar hitch-ring with the hitch by inserting the bolt and secure the joint with the safety pin;
- couple the telescopic jointed shaft with the PIC of the trailer and the PTO of the tractor; check the snap-on locks and install the guard chains;

- connect the hydraulic lines of the trailer to the external hydraulic system sockets on the tractor;
- connect the brake line of the tractor to the brake system socket on the tractor;
- connect the trailer weighing/lighting system plug to the electrical outlet on the tractor.

After completing the tasks, do a functional test by starting the feeder wagon systems in succession: the mixing screw, the discharge opening gate and the conveyor belt (optional).

5.5. ATTACHMENT OF HYDRAULIC, PNEUMATIC AND ELECTRICAL LINES

The hydraulic, pneumatic and electrical lines are installed using two tubes to the braid and then fixed to the mounting on the top section of the platform.

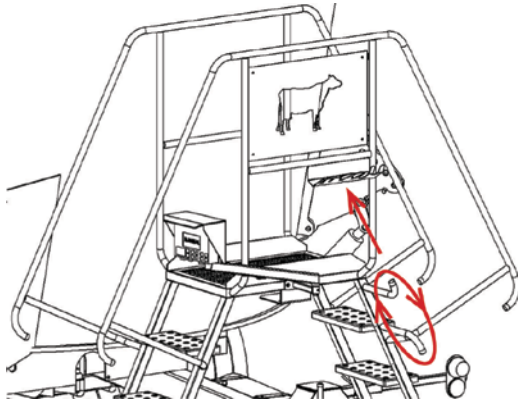


Fig. 7 Attaching lines to the console

5.6. DISCHARGE OPENINGS — SAFETY ZONE

5.6.1. PVC GUARD AT THE DISCHARGE OPENINGS

The PVC guard completely covers the two discharge openings on standard versions of the feeder trailer. The guard is also located on both sides of the feeder, at the feed discharge points. The PVC plastic point pressure resistance is 50 kg.

5.6.2. STANDARD DISCHARGE OPENINGS

The safety zone is located 870 mm away from the mixing screw. The minimum required distance of 850 mm is kept. The user is unable to reach the tank interior that houses the mixing screw.

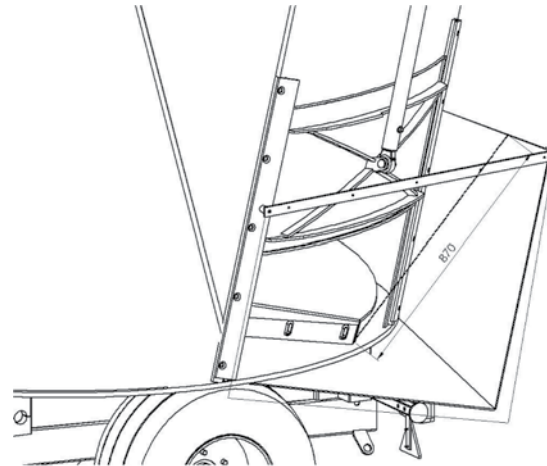


Fig. 8 Safe distance at the discharge opening

5.6.3. DISCHARGE OPENINGS AT THE FEEDER

There are two discharge openings on the front feeder, one on the left side and the other on the right side. The safe distance acc. to PN-EN 703:20004E is kept. The safety distance range is 850 to 920 mm for the feeder wagon width range from 2200 to 2500 mm.

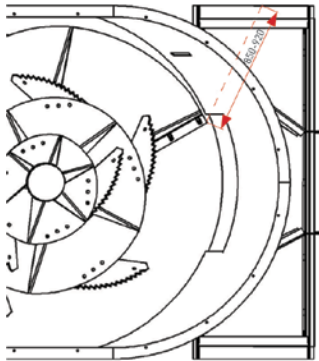


Fig. 9 The safe distance on the front feeder (top view)

5.7. CONTROL

The hydraulic, pneumatic and lighting systems are generally controlled from the tractor cab. The hydraulic system is controlled with a lever that allows opening the side gates and move the hydraulic counter blade. The pneumatic brake is operated with a foot pedal placed at the bottom of the cab. The feeder wagon's lights are switched on and off from the cab provided that they have been connected to the electrical outlet on the tractor.

5.7.1. CONTROLLING THE GATES FROM THE TRACTOR CAB

The gates are controlled with the two levers bolted to the assembly plate. The control assembly plate shall be installed in the tractor cab. The levers can operate the gate height, i.e. its top-bottom position. Adjust the feeder quantity discharge height as necessary and adjust it to the feeder wagon's travelling speed.

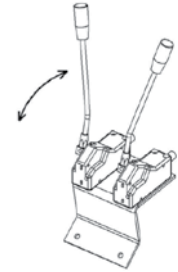


Fig. 10 The control levers with assembly plates installed inside of the tractor cab

5.7.2. HYDRAULIC COUNTER BLADE CONTROL FROM THE PLATFORM

The hydraulic counter blade is controlled from the outside of the tractor's cabin with a lever accessible to the user standing on the working platform.

- moving the lever outward (away from the trailer) moves the counter blade to the outside of the tank;
- moving the lever inward (to the wagon) moves the counter blade to the inside of the tank.

Safe operation of the hydraulic control lever requires you to check before extending/retracting if the counter blade is not damaged and if

it is free of contaminants which might result in faults or other hazards. Proper operation of the lever requires the operator to stand with both feet on the platform and hold the platform railing with the other hand.

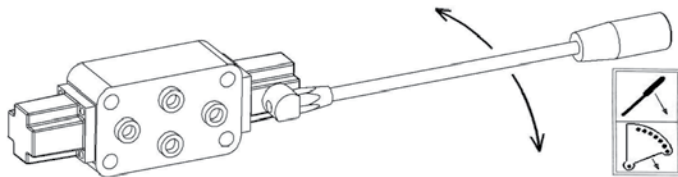


Fig. 11 Hydraulic counter blade control lever

5.8. LOADING, CUTTING, MIXING AND UNLOADING OF FEED

Front (e.g. T 229) or telescopic loaders shall be used for loading bulky feed in bales (grass silage, silage, hay, straw) into the feeder wagon's tank.

Start the mixer drive before loading the feed.

Charge the baled feed gradually, i.e. load the next bale once the previous one has been shredded and start loading with the lightest bales (straw, hay, grass silage, silage). The shredding level depends on the time and cutting length adjusted by the counter blades.

	There is a risk of lifting the tow bar when loading the first bales of grass silage (to the back of the tank) – the tractor hitch must withstand the upward and downward vertical load of the tow bar!
WARNING!	

After cutting and mixing bulk feeds, start loading the nutritive feeds. Charge nutritive feeds into the tank by hand while standing on the service platform. Use rigid containers, e.g. buckets, to charge the feeds.

	Only the tractor driver/operator can enter the service platform (to check the shredding/mixing or to charge nutritive feeds) and only when the tractor motor has been turned off and the ignition key removed!
WARNING!	

Once the feed has been cut and mixed, discharge the mix via the side openings (closed by gates) on the left or right side of the feeder trailer. The gates are opened and closed from the tractor's cab. If the feeder wagon is equipped with a conveyor belt, unload from the tank front opening (closed with the gate) to the conveyor belt and further to the left/right side of the trailer. The hydraulically driven gates move up or down by moving the applicable DCV lever on the tractor. Open the gate at the appropriate height to discharge the feed. Once the wagon has been emptied, close the left/right gate hydraulically. Increase the tractor's engine speed at the final unloading stage to empty the tank completely. Once the unloading has been completed, turn off the conveyor belt drive and close the tank opening gate.

Clean the gate guides of all dirt to keep the gates functioning properly. If the guides are not cleaned, the gate may malfunction leading to an accelerated wear or failure.

	Make sure that there are no persons near the conveyor belt before unloading the feed.
WARNING!	

5.9. CLEANING

After the feed discharge run, thoroughly clean the feeder trailer of feed residues inside and at the gate guides. Use pressure cleaners. Dry the trailer in winter in a sheltered room above zero Celsius. Frozen water may damage the paint coat or machine components. Failure to follow the cleaning instructions may result in bacterial contamination hazards that cause illness of animals.

5.9.1. MACHINE CLEANING INSTRUCTION

Before cleaning the feeder wagon, do the following:

- turn off the tractor's engine and remove the ignition key;
- secure the feeder wagon and the tractor against movement with the parking brake;
- decouple the PTO drive-shaft from the tractor;
- fully open the gates on the feeder wagon;
- secure the tractor against unauthorised access;
- wear protective clothing;
- wash the trailer thoroughly with strong water jet from a pressure cleaner and leave to dry.

5.9.2. REMOVAL OF CLOGS

When unloading light feed components (hay, straw), the feed may stop moving to the discharge. In order to remove clogs during mixing, add other components (e.g. water) to force the movement of the entire mixture mass.

If a clog occurs during unloading and cannot be removed by full opening of the gate, the operator must intervene manually. Stop the tractor engine, remove the ignition key, enter the service platform and use a fork to move the feed clog away from the discharge opening.


5.10. TRAVELLING ON PUBLIC ROADS

Before entering a public road:

- connect the trailer lighting system plug to the tractor and do a functional test of the lamps;
- check the condition and pressure of the tyres;
- check the condition and performance of the trailer pneumatic brake;
- check the tightening and safety of all nuts, bolts, joints and clamps;
- clean the machine;
- install the slow-moving vehicle warning triangle in the grip (at the trailer tank back).

When travelling on public roads:

- follow the traffic regulations;
- exercise extreme caution on sharp corners and bends;
- adapt your driving speed to the traffic.

	<p>Do not carry persons, animals or other objects in the feeder wagon's tank. Do not exceed 25 km/h when driving on public roads.</p>
<p>WARNING!</p>	

6. PERIODIC MAINTENANCE

6.1. LUBRICATION AND MAINTENANCE

After finishing the daily work with the feeder wagon, inspect the machine, replace all damaged parts (if any), and use the LT-43 grease to lubricate:

- both grease nipples on the telescopic jointed shaft which couples the main transmission with the PIC of the machine;
- points on the telescopic jointed shaft which couples the tractor PTO with the machine PIC according to the manual supplied with the shaft;
- both grease nipples of the PIC bearing mounting on the machine end;
- both grease nipples of the discharge gate hydraulic cylinder.

These points of the machine are marked with symbol no. 12. Check the oil level of the main transmission of the vertical mixer drive. Do this by checking the oil level in the surge tank attached to the mixing tank on the right side of the machine. The correct oil level is between the MIN and MAX marks on the surge tank. Use mineral transmission oils with the viscosity range from 100 to 320 cST at 40°C (quantity: approx. 15 litres). Change the oil by draining the used oil by unscrewing the drain valve at the transmission case bottom. Add fresh oil to the system through the surge tank. Clean the entire machine, repair all paint coat defects (if any) and remove all corrosion points. Repair or replace illegible warning and information labels. Protect the hydraulic lines against direct exposure to sunlight. Store the feeder trailer in a sheltered location.

6.2. MAINTENANCE AND SERVICING

Regularly inspect the technical condition of the feeder wagon by checking the guards (on the telescopic jointed shafts), hydraulic lines and mixer blades. If damage is found, replace the parts with new ones. If a hydraulic line is damaged, replace it with a new one. Replace all hydraulic lines every 3 years, starting from the date of its manufacture stamped on the clamping bush. Before replacing the lines, you must drain all oil from the feeder trailer hydraulic system. To do it, first turn off the tractor engine, remove the ignition key and engage the parking brake of the tractor. Operate each control lever back and forth as during normal work of the machine. It will reduce oil pressure in the machine lines to the minimum and drive most of the oil from the feeder trailer system to the tractor system. Next, open the hydraulic line ends from the external outputs on the tractor and place the lines in the storage position. When replacing a line, it is required to wear impermeable protective clothing and safety gloves suitable for contact with oil-based products. Before opening a hydraulic line, cover the end to be opened with a rag impermeable to oil to protect the body and the eyes from uncontrolled escape of oil from the system. After replacing the line with a new one, vent the hydraulic system of the feeder trailer. To do it, couple the feeder wagon's hydraulic terminals with the external hydraulic outputs on the tractor. Then smoothly operate the level of the DCV section where the hydraulic line has been replaced, without starting the hydraulic system. Do this just as if working normally with the trailer. It will feed the oil from the feeder trailer to the tractor and eliminate air bubbles from the system. Select the new hydraulic lines according to the diagram and designations shown in the Parts Catalogue. The feeder wagon's hydraulic system cannot overheat the oil due to intermitted operation of each DCV section.

6.3. REPLACEMENT OF MIXER BLADES


Visually inspect the blades (for chipping, bends and cracks) from the service platform. Sharpen blunt blades on your own; immediately replace all damaged blades (worn-out blades are not covered by the warranty). Periodically enter the feeder wagon tank to inspect the tightening of the blade fastening nuts on the mixer. Tighten (and loosen) the nuts with a box wrench (size 30); counter the bolt with Allen key size 12. Tighten the nuts to 425 Nm. If the cutting performance is reduced or the feed cutting time is significantly longer, the blades are blunt and must be replaced. Two persons are necessary for blade replacement: one person holds the blade while the other tightens/removes the bolts. Use two ladders to enter the feeder wagon's tank. Insert the taller ladder (with hooks located at 140 cm) into the eyes on the platform and hook it on the tank rim. Rest the other ladder inside the tank and hook in on the inner ring. Use the ladder end over the tank rim as a support when moving between the ladders.


	<p>The new blades should be secured with plastic covers that are removed once all blades have been secured on the mixer</p>
<p>WARNING!</p>	<p>Carry the blades in metal buckets.</p>


	<p>Before entering the feeder wagon's tank to inspect and retighten the nuts or to replace the blades:</p>
<p>WARNING!</p>	<ul style="list-style-type: none"> • park the machine on a level and solid ground away from overhead power lines; • turn off the tractor engine, remove the ignition key, and engage the parking brake on the tractor and the machine; • decouple the telescopic jointed shaft from the tractor and from the feeder trailer; • turn the PIC by hand to move the mixer in order to expose the tank bottom part on which the ladder will stand; • set up the ladders as explained above.


	<p>Exercise extreme caution when replacing the blades (and retightening the nuts) – there is a risk of cutting or crushing the handling person's body between the blade/mixer and the tank wall.</p>
<p>WARNING!</p>	


	<p>Use the following equipment to replace the blades (and retighten the nuts):</p>
<p>WARNING!</p>	<ul style="list-style-type: none"> • robust (leather) work gloves; • farming working garment; • shoes with anti-slip soles and steel toes.


	Use strong (and preferably steel) ladders in a good condition and with catch hooks (round, dia. 50 mm) to enter the feeder trailer tank:
WARNING!	<ul style="list-style-type: none"> • the platform ladder – 230-300 cm long with hooks at 140 cm; • the tank ladder – 190-220 cm long with hooks at 190 cm;

	Do not use damaged ladders with missing or cracked steps, damaged rails and without safety elements (hooks and anti-slip feet).
WARNING!	Always keep the ladder steps clean (free of mud, grease or feed).

	Use ladders with extreme caution near overhead power lines.
WARNING!	

	Exercise extreme caution near overhead power lines when loading feed into the tank.
WARNING!	

	Always clean the steps and the platform of mud (i.e. the platform with the ladder).
WARNING!	

	DO NOT: Enter the tank top edge or the mixing tank when the feeder wagon is working.
CAUTION!	

6.4. INSPECTION OF TYRES

1. When working with the machine wheels (e.g. wheel change, pressure check, tightening), remember to secure the machine against unintended movement – use wheel chocks.
2. Installation of tires and wheels requires adequate knowledge of regulation-compliant tools.
3. All repairs of tires and wheels must be performed by the operators and with the use of proper tools.
4. After each installation of the wheels, re-tighten their bolts after the first 10 operating hours. Wheel nuts or bolts, then check the tightening torque after every next 50 operating hours.
5. Regularly check the tyre pressure. Follow the recommended pressure values.

6.5. BRAKING SYSTEM

The T659 feeder wagon is equipped with a single-line braking system:

- Service brake: pneumatically actuated, operates the axle wheels; controlled from the driver's seat by pressing the tractor's brake lever;

- Parking brake: hand mechanical control via a crank lever mechanism and a screw gear, located on the right side of the machine and operating the axle wheels.

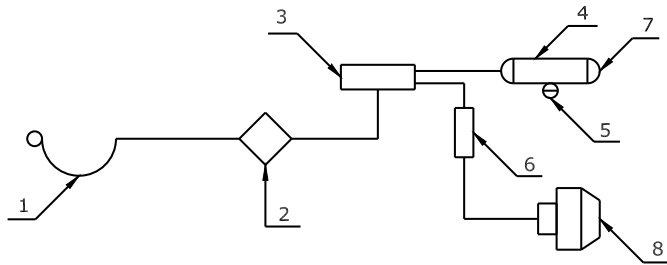


Fig. 12 Single line pneumatic system diagram
 1 - pneumatic connector plug for coupling with the tractor; 2 - air filter; 3 - control valve;
 4 - air tank; 5 - water drain valve; 6 - manual braking force control; 7 - check connector; 8 -
 pneumatic membrane actuator.

6.5.1. SERVICING THE BRAKE PNEUMATIC SYSTEM

When servicing the feeder wagon, check the tightness and the condition of parts and connections of the braking system, and periodically drain the water condensate from the air tank. Check the leak tightness of the system at the rated pressure of approx. 600 kPa for the single-line system. Leaks are detected by a distinct hiss or air bubbles (after coating with soapy water) at the points of air escape from the system. If the leaks are caused by damaged seals, lines or other parts (valves, actuators, etc.), replace them with new parts. Drain the water from the air tank by tilting the drain valve stem to the side when the tank is pressurised; the drain valve must also be unscrewed from the tank and cleaned of accumulated dirt once a year, before the winter season.

6.5.2. ADJUSTMENT OF THE BRAKING SYSTEM COMPONENTS

When servicing the feeder wagon, check the condition of parts and connections of the braking system, and periodically inspect the lubrication of control elements.

Adjust the brakes when the following occurs:

- there is excessive clearance between the shoes and the drum from the brake shoe pad wear, resulting in decreased braking performance;
- the wheel brakes work unevenly and out of sync.

With the properly adjusted brakes, the braking force (i.e. the total of braking forces at the circumference of the wheels) shall be at least 30% of the permissible total weight of the feeder wagon when decelerating with the service brake; the braking force (i.e. the total of braking forces at the circumference of the wheels) when actuating the parking brake shall be at least 16% of the permissible total weight of the trailer. Both wheels of the same axle should be braked evenly; the brake force differential between the left and right side of the feeder trailer side shall not exceed 30%, with 100% being the higher force.

Adjust the brakes by changing the expander lever position against the expander shaft. To do this, jack up the wheel and while turning the wheel, realign the expander lever against the shaft (on the comb) to feel that the brake shoes slightly rub against the drum. After a correct adjustment of friction components, the wheel should rotate smoothly, without cogging or evident resistance (not caused by rubbing of the brake shoes against the drum). Slight rub of the shoes against the drum, especially on a brand new feeder trailer or following replacement of the shoes is normal.

After completing the adjustment, check and adjust the parking brake. The parking brake is adjusted by setting the cable length that couples the expander shaft lever with the engaging mechanism. The required

sum of braking forces should be produced at the maximum force applied to the hand crank of 40 daN (at an approximately right angle between the cable and the expander shaft lever).

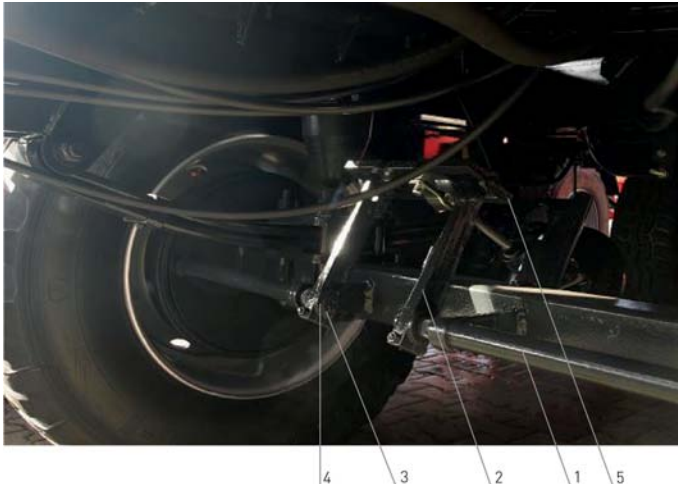


Fig. 13. Braking system components:
 1 - brake shoe expander shaft; 2 - expander shaft lever (arm); 3 - arm adjusting comb on the expander shaft; 4 - lever adjustment nut on the expander shaft; 5 - the link (follower) that couples the pneumatic actuator rod with the expander shaft lever.

7. DISMANTLING AND DISPOSAL

Use jacks and lifts to disassemble the machine into parts. Damaged or worn out parts must be stored in a designated location and delivered to a scrap collection point. If disposing of the feeder wagon on your own, segregate all dismantled components in accordance to the material type. Store the used oil in sealed vessels and dispose of it at petrol stations or other points which collect such material. Recycle the parts which remain from repairs or have become obsolete.

8. RESIDUAL RISKS


8.1. DESCRIPTION OF RESIDUAL RISKS

The T659 feeder wagon has been designed and produced in accordance with the state of technology and safety requirements valid before the current year of issue. The manufacturer of this feeder wagon took every effort in its design, production and labelling to eliminate all hazards related to operation, servicing and maintenance. However, there are specific unavoidable risks present.

Residual risk results from incorrect or improper conduct of the operating personnel. The greatest hazards occur during the following forbidden actions:

- remaining in the feeder wagon's tank during operation or transport;
- using the machine for purposes other than its intended use defined in the operating instructions;
- cleaning, maintenance and technical inspection of the feeder wagon;
- remaining on the feeder wagon when the machine is working or in transit;
- remaining near the conveyor belt during operation and unloading of feed;
- remaining between the tractor and the machine when they are working;
- remaining between the machine and the tractor with the engine running;
- using faulty PTO drive-shafts;
- operation of the feeder wagon by persons who are unfamiliar with these operating instructions.

Compliance with the guidelines and prohibitions in section 2.1 can eliminate the residual risks to persons and the environment during operation of the feeder wagon.

	<p>The residual risks are present when the aforementioned guidelines and prohibitions are not followed.</p>
<p>WARNING!</p>	

8.2. EVALUATION OF THE RESIDUAL RISK

Follow these guidelines:

- always follow the safety regulations described in the operating instructions (read the manual thoroughly);
- keep your hands out of hazardous spaces;
- do not operate the machine in the presence of bystanders and children in particular;
- maintenance and repair of the feeder wagon may only be performed by trained personnel.

9. WARRANTY CONDITIONS

1. The manufacturer provides a feeder wagon designed and built in compliance with the current standards. The manufacturer guarantees that the supplied feeder wagon is free of manufacturing defects.
2. Metal-Fach Sp. z o.o. provides warranty service for 12 months starting from the date of first sale, provided the machine is used for its intended purpose and the recommendations contained in the manual are followed.
3. The warranty card properly filled in at the Dealership is the confirmation of the manufacturer's warranty; the acceptance of the warranty conditions must be confirmed by the customer's signature.

4. The quality warranty covers the machine defects caused by defective manufacturing, material defects and latent defects.
5. The warranty does not cover the assemblies and parts which are subject to normal wear and tear.
6. The warranty does not cover any mechanical damage or other damage resulting from improper use, improper maintenance or improper adjustment of the feeder wagon.
7. The warranty does not cover any damage resulting from improper storage of the machine.
8. Any unauthorised modifications in the construction of the machine introduced by the user will result in automatic termination of the warranty.
9. The manufacturer shall not be held responsible for any loss, damage or destruction of a product resulting from causes other than defects of the supplied machine.
10. During the warranty period the manufacturer will repair any defects which occurred as a result of the manufacturer's negligence.
11. The warranty repair shall be made within 14 working days of the notification/supply of the machine to the designated service station or at another time agreed upon by the parties.
12. The warranty is extended by the time required to complete the repair.
13. During the warranty period all repairs which are not covered by the warranty are performed by authorised service stations at a full cost chargeable to the user. Before such repairs, the service station will inform the user of the suggested cost, time and scope of the repair.
14. The decision whether to commence a chargeable repair of the feeder trailer with a warranty valid at the time of repair is made by the customer.

	<p>Current information about the products is available at www.metalfach.com.pl</p>
<p>WARNING!</p>	

METAL-FACH

16-100 SOKÓŁKA, POLAND

UL. KRESOWA 62

WARRANTY CARD

BeIMix FEEDER WAGON

T659

The warranty service is provided on behalf of the manufacturer by:

filled out by the seller

Date of manufacture	.....	Date of sale	.....
Serial number	Dealer's signature
Customer's name and surname		
Address		
		

NOTES

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