BAUER

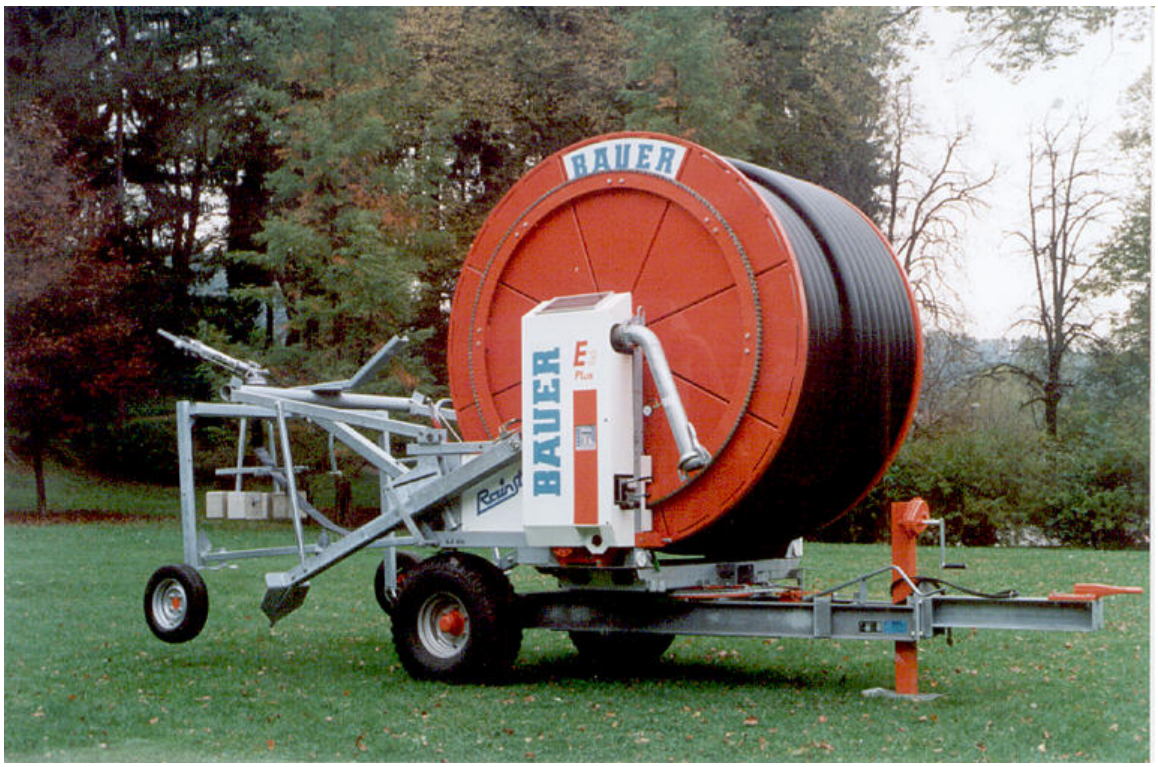
FOR A GREEN WORLD

OPERATING MANUAL

for

Rainstar

Series E1 *Plus* – E5 *Plus*



Rainstar E PLUS
E

Introduction

Thank you very much for purchasing a BAUER Rainstar!

We have pleasure to present to you the **BAUER Rainstar,** an irrigation machine that features state-of-art technology and top quality. This manual describes how to assemble, operate and service your **BAUER Rainstar**. For reasons of clearness and because of the many possibilities this manual does not cover every information down into detail. In particular, it cannot possibly deal with every conceivable aspect of operation and maintenance.
If you need further information or if you are faced with any special problem for which this manual does not offer sufficient details, please do not hesitate to contact **BAUER** company at Kowaldstraße 2, A-8570 Voitsberg in Austria for the information you need.

We should also like to emphasise that the contents of this operating manual neither form part of or alter in any way, previous or existing agreements, promises, or legal relationships. Any commitment on the part of **BAUER** is based solely on the respective purchase contract, which also contains the complete and only valid warranty arrangement. The contents of the present operating manual neither extend nor limit said contractual terms of warranty.
All information contained in the present manual is based on the latest product details available at the time of printing.
BAUER company reserves the right to change without notice, without assuming any liability!
BAUER Rainstar is designed for safe and dependable performance provided it is operated according to the present instruction manual. Therefore, in spite of the simplicity of the Rainstar, we request that you read this manual carefully before putting your **BAUER Rainstar** into operation! All instructions given for handling, operating and servicing the machine must be strictly observed. On condition that these instructions are followed your BAUER Rainstar will operate trouble-free to your full satisfaction for many years!
Non-observance of these instructions may cause personal injury or damage the equipment!

This operating manual is considered an integral part of the Rainstar. Suppliers of new and used Rainstar machines of the E series are advised to put down in writing that this manual was handed over together with the device.

Please make this manual available to your staff. You are kindly requested to state Rainstar type and serial number in all inquiries, correspondence, warranty problems or parts orders. These details are specified on the nameplate.

We wish you success and hope you will enjoy working with your BAUER Rainstar!

Product details

Type designation: Rainstar

Type number: Series E *Plus*

Serial number[1]**:** _____

Dealer: Name: _____

Address: _____

_____

Tel./Fax: _____

Date of shipment: _____

Manufacturer:

Röhren- und Pumpenwerk **BAUER** Ges.m.b.H.
Kowaldstr. 2
A - 8570 Voitsberg, Austria
Tel.: +43 / 3142 / 200 - 0
Fax: +43 / 3142 / 23 0 95

Owner or operator: Name: _____

Address: _____

_____

Tel. / Fax: _____

Note: Please make a note of the type and serial number of your Rainstar and accessories. Be sure to specify these details every time you contact your dealer.

Printing date / revised: February 1999 / 00

[1]In all warranty claims and correspondence relating to this machine it is essential to specify the full serial number group including all letters. This applies to both the machine and the components concerned. We cannot emphasise this point often enough.

General Safety Instructions

Symbols and terms

The CE symbol that has to be affixed on the machine by the manufacturer outwardly demonstrates compliance of the machine with the directives for machines and other relevant EU directives.

WARNING!	This "Warning" symbol refers to important safety instructions in this manual. Whenever you see this symbol be aware of possible injury hazards. Read the note following the symbol very carefully and inform the other operators accordingly.

CAUTION	Non-observance of this instruction may cause damage to or destroy the machine or individual components.

NOTE	It is very important to observe this note or condition!

Qualified operators are persons who on account of their training, experience and instruction as well as their knowledge of relevant standards, rules, precautions to be taken for accident prevention, and prevailing operating conditions, have been authorised by the person in charge of plant safety to perform the respective tasks required, and in doing so are able to recognise and avoid potential hazards. Among other things, knowledge of first-aid procedures is also required.

Product liability

As defined by the product liability law every farmer is also an entrepreneur!
According to §9 PHG (Product Liability Law), liability for damage to corporeal things caused by defective products is expressly excluded. This exclusion of liability also applies to parts not manufactured by BAUER itself but purchased from external suppliers.

Duty to furnish information

Even if the customer passes on the machine later-on he is obliged to hand the operating manual on to the new receiver, too. The receiver of the machine must be instructed with reference to the mentioned regulations.

Intended use

- BAUER Rainstar is built exclusively for normal agricultural applications (intended use).
- Any use beyond this normal use is considered non-conforming. Manufacturer is not liable for damage resulting from such non-conforming use, the sole liability for damage from non-conforming use is with the user.
- Intended use also includes compliance with the manufacturer's operating, maintenance and service instructions.
- The BAUER Rainstar may be used and operated only by persons who are familiar with the device and aware of the hazards involved.
- All rules for accident prevention as well as any other generally valid specifications and regulations relating to safety, work medicine and traffic law must be strictly observed.
- Unauthorised modifications on the machine release the manufacturer from liability for damage resulting therefrom.

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1 GENERAL INSTRUCTIONS FOR SAFETY AND ACCIDENT PREVENTION

CHECK THE OPERATIONAL SAFETY OF THE MACHINE BEFORE EVERY START-UP.

1. In addition to the instructions contained in this manual, all specifications generally valid for safety and accident prevention must be observed!
2. The warning and instruction signs affixed to the machine give very important instructions for safe operation. Observing them serves your own personal safety!
3. Never put the machine into operation unless all guards and safety devices are completely mounted and in their proper working position!
4. Acquaint yourself with all equipment components and controls as well as their respective functions before starting to work. It is too late when the device is already running!
5. The operator's clothes should fit tightly. Avoid wearing loose clothes!
6. When handling slurry always keep in mind that the gasses produced are highly toxic and extremely explosive in combination with oxygen. Therefore, open fires, light tests, sparking and smoking are strictly forbidden!
7. Utmost care is required with regard to gasses in slurry and dung channels at open valves to the preliminary pit, before the main pit, or at cross channels. The same applies to mixing and withdrawal points when mixers or pumps are running!
8. When handling slurry always ensure sufficient ventilation!
9. Keep the machine clean to avoid fire hazards!

TRACTOR-DRIVEN MACHINES

1. Before starting inspect the area around the machine (Children) ! Make sure your view is unrestricted!
2. Riding on the machine during transport is forbidden!
3. Couple the machine according to instructions and fasten it only at the specified points!
4. Be especially careful when coupling the machine to the tractor or uncoupling it!
5. Always adjust the supports in the proper position when coupling or uncoupling the machine (stability)!
6. Always mount balancing weights properly at the points provided!
7. Observe restrictions pertaining to axle load, total weight, and transport dimensions!
8. Inspect and mount all items required for transport such as lighting, warning signals and possible safety devices!
9. Mounted or trailed machines as well as balancing weights influence road behaviour, steering and braking capacity. Therefore make sure that proper steering and braking are possible!
10. Consider the projection and/or centrifugal mass of the machine when driving in curves!
11. It is forbidden to stay in the working range of the machine while it is operating !
12. Keep out of the turning and swivelling range of the machine!
13. Only operate hinged hydraulic frames when nobody is in the swivel range!
14. Externally powered machines (e.g. hydraulic) bear a crushing and shearing hazard!
15. Nobody is allowed between the tractor and the implement unless the tractor is secured by the parking brake and /or wedges under the wheels!
16. Hinged supports must always be folded up and secured before driving away!
17. Secure the machine and the tractor against rolling!

TRACTOR-MOUNTED MACHINES:

1. Before a machine is linked to or detached from the three-point linkage, the control device must be shifted to a position in which unintentional lifting or lowering is impossible!
2. When using the three-point linkage the linkage parameters of both tractor and attached machine must correspond, if not, they have to be matched accordingly!
3. The three-point linkage bears crushing and shearing hazards!
4. When operating the external control of the three-point linkage never step in-between tractor and the machine!
5. When the machine is in the transport position make sure that the tractor's links are always properly secured on the sides.
6. When driving on the road with the machine lifted the control lever must be locked against lowering!

TRAILED MACHINES

1. When a machine is coupled to the drawbar make sure that the coupling point provides sufficient flexibility!

Power take-off (applies only to PTO driven machines)

1. It is not allowed to use any other types of PTO drive shafts except the ones prescribed by the manufacturer!
2. Drive-shaft guard tube and guard cone as well as the PTO guard – also on the machine side - must be mounted and in good working order!
3. When using a PTO drive shaft always observe the specified overlap in transport and working position!
4. Never connect or disconnect the PTO drive shaft unless the PTO is stopped, the engine turned off, and the ignition key pulled out!
5. Make sure the drive shaft is always connected and secured properly!
6. Attach the safety chain to keep the drive shaft guard from rotating with the shaft!
7. Before you turn on the PTO make sure that the selected tractor PTO speed corresponds with the permissible implement speed!
8. Before starting the PTO make sure that nobody is standing in the danger zone of the machine!
9. Never turn on the PTO when the engine is turned off or during a transport drive!
10. When working with the PTO nobody is allowed near the turning PTO or drive shaft!
11. Warning! The PTO shaft may continue turning due to its centrifugal mass after the PTO has been turned off! Keep clear of the machine during this time and do not touch until the PTO shaft stands absolutely still!
12. For cleaning, greasing, or adjusting the PTO driven implement or drive shaft, PTO and engine must be switched off and the ignition key pulled out!
13. Place the disconnected drive shaft on the provided support!
14. When drive shaft has been removed put the guard on the PTO shaft!
15. If a defect occurs repair it immediately before starting to work with the machine!

HYDRAULIC SYSTEM

1. Hydraulic system is under high pressure!
2. When connecting hydraulic cylinders and motors, make sure the hydraulic hoses are connected as specified!
3. Before coupling the hydraulic hoses with the tractor's hydraulic system make sure that the entire hydraulic system is pressureless both on the tractor and implement side !
4. Inspect the hydraulic lines at regular intervals and replace them immediately in case of defects or ageing. Replaced hoses must comply with the technical specifications of the implement manufacturer!
5. When looking for leaks use only suitable equipment because of the injury hazard involved!
6. Liquids emerging under high pressure (hydraulic oil) may penetrate the skin and cause serious injuries! An injured person must see a doctor immediately! Danger of infection!
7. Before working on the hydraulic system the machine must be lowered, the system depressurised and the engine turned off!

ELECTRIC-DRIVEN IMPLEMENTS

1. All work beyond normal maintenance of the implement should be performed only by a professional electrician!
2. Defective or broken plugs and sockets must be replaced by a professional electrician!
3. Never pull a plug out of the socket at the flexible electric cord!
4. Extension cables for power supply should be used only temporarily! Never use such lines permanently as a substitute for the required fixed installations!
5. Flexible lines laid across traffic areas on the farm must have at least 5 m ground clearance!
6. Always turn off the power supply before you do any work on the machine!
7. Check all electric lines for visible defects before you put the machine into operation! Replace defective cables and do not start the machine before that!
8. Never use electric-driven implements in damp situations or locations exposed to fire hazard unless they are adequately protected against moisture and dust!
9. Covering electric motors may cause heat concentration with high temperatures which could destroy the operating equipment and cause fires!

HAND-OPERATED DEVICES (VALVES)

1. Because of the slurry gasses produced in the lines, no slurry is allowed to remain in closed pipelines – bursting hazard!
2. Lay the pipelines with sufficient inclination and make sure that the selected closing order of valves allows all lines to be drained completely!
3. Protect the valves against unauthorised handling!
4. If a valve gets jammed do not apply force! Use only the operating levers supplied with the implement!
5. Observe the permissible maximum operating pressure of valves and pipelines when pumps are operated!
6. Service only when the tanks are empty!

MAINTENANCE

1. Never perform any maintenance, service or cleaning work or fault elimination steps unless the drive is turned off and the engine is standing still!
2. Check proper fit of all nuts and bolts regularly and tighten them, if necessary.
3. If maintenance work is required on the lifted machine always secure it by means of appropriate supports!
4. When exchanging tools with cutting edges always use proper tools and wear safe protective gloves.
5. Dispose of oil, grease and filters according to local laws and regulations!
6. Always turn off power before working on the electric system!
7. Before electric welding on the tractor and mounted machines the generator and battery cables must be disconnected!
8. Spare parts must meet manufacturer's minimum technical specifications! This is the case for instance with original spare parts for instance!

2 GENERAL

BAUER products are designed and manufactured carefully, subject to a system of continuous quality control. BAUER Rainstar models E1 *Plus* and E2 *Plus* as well as E3 *Plus*, E4 *Plus* and E5 *Plus*, are turbine-driven machines designed for fully mechanised and labour-saving irrigation. Individual pipe sets are no longer laid down by hand; system set-up, repositioning, and operation are all done with the tractor only.

BAUER Rainstar is a universal machine suitable of covering fields of varying lengths and widths. There is no need for supervision while the system is operating.

Strict observance of all operating and service instructions in this manual is the basic prerequisite for many years of trouble-free operation. Therefore please make sure that all operators on your staff are familiar with the instructions given in this manual.

The model number as well as the serial number (Vehicle identification number) are stamped into the nameplate. In addition, the serial number is stamped into the frame of the undercarriage. Please state these data in all your inquiries, correspondence, warranty matters and parts orders.

We warrant for this pump according to our General Terms of Sale.

3 SAFETY PRECAUTIONS FOR RAINSTARS E *Plus* SERIES

1. Read this manual before you put the system into operation for the first time.
2. Never handle the PE-pipe near the device or the device itself during pull-off or retraction.
3. During PE-pipe rewind with the tractor's PTO or during pipe pull-off, always make sure that the shifting lever is in the proper position. Moreover, the maximum permissible speed must not be exceeded.

WARNING! Danger by improper handling!

4. Never service or set any part of the system while it is operating.
5. Keep clear of all moving parts.
6. Never expose any moving parts by removing protective elements.
7. Keep a safe distance from the sprinkler during operation.
8. Be careful in case of high connecting pressure!
9. Make sure that the water jet from spray nozzles does not hit public roads.
10. The Rainstar licensed for transport in agricultural operation only. For transportation on public roads all applicable traffic requirements must be strictly adhered to.

WARNING! For safety reasons it is not allowed to transport the Rainstar by pulling it with a fork-type drawbar (OPTIONAL) and the toolbar!

11. When loading the machine on a trailer note that the water remaining in the pipe shifts the system's centre of gravity upward.
12. When driving in curves with the Rainstar loaded on a trailer the permissible maximum driving speed is considerably reduced dependent on the position of the Rainstar's centre of gravity!
13. Always ensure that the locks and stops are secured according to the machine's general conditions for transport.
14. Before starting to irrigate near electric power lines you should contact your local power supply company regarding safe distances that have to be allowed.
15. Maximum permissible speed: 10 km/h

4 DESCRIPTION

The Rainstar is a universal irrigation machine for varying lengths and widths of fields and best suited for sprinkling cereal crops, field crops, root crops, and horticultures as well as any kind of grassland.

The main components of the Rainstar are a two-wheel undercarriage on which is mounted the turntable swivelling through 270°, and the reel with the spec ial PE-pipe, the multifunctional compact gearbox and the TX20 or TX60 or TX 100 turbine, and the high-rise cart that is ideal particularly for high crops, with the BAUER wide-range gun.

The material of the PE-pipe corresponds to the latest findings of the art. One end of the pipe connects to the reel drum and to the water supply through its axle. The other end of the pipe is coupled with the high-rise cart. The cart's track width is infinitely adjustable (See Technical Data).

The heart of the Rainstar is the TX 20, TX 60 or TX 100 turbine. All three models are full-flow turbines mounted in a flow-promoting position directly on the reel. They are nearly insensitive to soiled water and offer maximum efficiency. The drive shaft is made of stainless steel. The regulating flap inside the turbine is coated with a wear-proof rubber lining.

The lifetime lubricated drive shaft bearing is sealed by a maintenance-free mechanical seal.

TX 20 turbine is designed for water flow rates from 13 to over 60 m³/h and features a wide control range. Impeller speeds range from 200 to 800 rpm.

TX 60 turbine is designed for water flow rates from 25 to over 100 m³/h and has also a wide control range. Impeller speeds range from 100 to 500 rpm.

TX 100 turbine is suitable for water flow rates from 35 to 120 m³/h and over, and has a wide control range, too.. Impeller speeds range from 100 to 500 rpm.

The cart retraction speed is infinitely variable. It is adjusted by means of the ECOSTAR and can be read from the display. Depending on the available water flow and connecting pressure, it may vary between 8 and 150 m/h. The connecting pressure at the machine should not exceed 11 bar.

Power is directly transmitted from the turbine to the change-speed gearbox and the chain drive onto the reel. A band brake prevents fast reverse rotation of the reel in the final shut-off position, when the PE-pipe is stretched.

The band brake as well as gearwheels in the oil-filled change-speed gearbox act as a brake and prevent the PE-pipe windings on the reel from loosening during pipe pull-out.

For safety reasons the drive is fitted with an emergency stop and a reversing stop as well. With this emergency stop device the drive can be stopped immediately by hand.

WARNING! Never remove the drive cover before you have turned off the water supply to the machine and slackened the stretched PE-pipe.

To slacken the stretched PE-pipe move the gear shift lever downward carefully (see proper procedure on page 15).

A winding carriage moved by a helically grooved spindle ensures that the PE-pipe is wound up properly on all layers. To keep the retraction speed constant on all layers independent of the pipe length still lying on the field, the Rainstar is equipped with an ECOSTAR 4000 S.

At the end of the irrigation strip the automatic drive shut-off is actuated by rods.

If the machine is equipped with an overpressure-actuated shut-off valve the water supply to the machine is shut off simultaneously.

If a low-pressure operated shut-off valve is mounted, the pumping unit is shut off.

After shut-off the rear hydraulic machine supports can be withdrawn. In doing so the cart is raised automatically into the transport position. Without any further preparations the Rainstar can be transported to its next setting-up position immediately. Pull off or lay down the PE-pipe again, connect the water supply, and the machine is ready for the next run.

When driving on public roads the reel must be turned into the driving direction and secured with the lock bolt. The PE-pipe must be fully wound up on the reel and the cart lifted. The jack and both rear machine supports must be withdrawn to their uppermost position.

On public roads the drawbar and coupling ring must be hitched to the tractor's yoke and secured with the pin.. The maximum permissible driving speed of 10 km/h must be observed. For increased safety against overturning in curves we recommend to set the maximum possible track width.

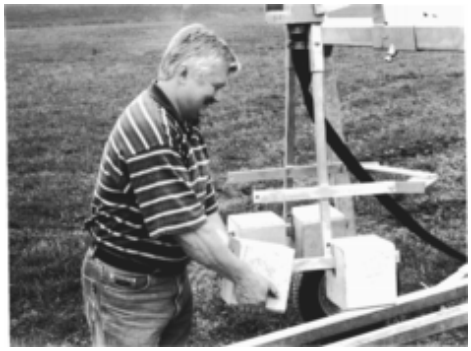
On principle, it is possible to transport the machine between hydrants in the field with the cart lifted on the side. In this configuration the driving speed must always be adapted to the existing conditions and should never exceed 5 km/h. You must also take into consideration that this type of transport requires a wider driving lane.

5 PUTTING INTO OPERATION

Before and during the first start-up grease all bearings, chains and guide parts of the winding mechanism. Use normal ball bearing grease for all bearing assemblies with grease nipples, and a viscous and durable type of grease for chains, guide rods and joints.
Tighten the wheel nuts before the first operation and check the tires for the specified pressure (see Technical Data).
Tighten also the connecting bolts, the connection of the turntable side member on the undercarriage, the ball race on the undercarriage, and the fastening of the hitch eye, according to the “Service and Maintenance“ table.

5.1. STEPS TO BE CARRIED OUT ONCE OR FROM TIME TO TIME

Set the required track width on high-rise cart and Rainstar undercarriage, depending on the existing type of crop.



Place the appropriate number of balancing weights on the balancing pendulum of the cart.

The number of weights required depends on cart track width setting, nozzle diameter, and nozzle pressure.

5.2. TABLE FOR CONCRETE WEIGHTS REQUIRED ON SYMMETRIC CARTS

	Cart track in mm																			
	1500				1800				2000				2400				2800			
Nozzle dia.	Nozzle pressure in bar																			
in mm	3,0	4,0	5,0	6,0	3,0	4,0	5,0	6,0	3,0	4,0	5,0	6,0	3,0	4,0	5,0	6,0	3,0	4,0	5,0	6,0
26	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
28	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
30	2	2	2	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
32	2	2	4	6	2	2	2	4	2	2	2	2	2	2	2	2	2	2	2	2
34	2	2	4	6	2	2	4	4	2	2	2	4	2	2	2	2	2	2	2	2
36	2	2	6	6	2	2	4	6	2	2	2	4	2	2	2	2	2	2	2	2

Set the part circle on the wide-range gun (approx. 220 °for full strip width). For detailed instructions see separate sprinkler manual. The WINDGUN can be adjusted to the prevailing wind conditions by readjusting the trajectory angle.

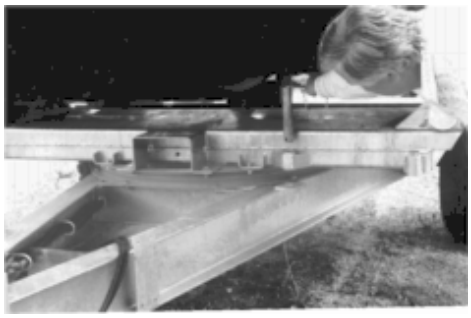
5.3. OPERATING MODE I: PE-PIPE PULL-OFF

5.3.1. TRANSPORT OF MACHINE TO SET-UP POSITION

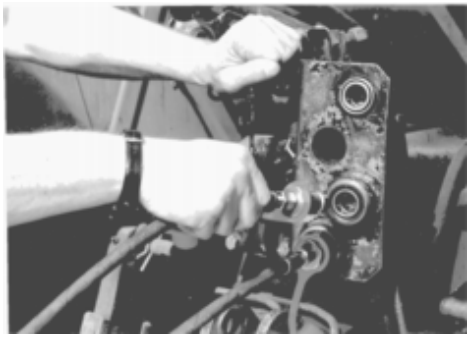
During transport the reel should be turned into the driving direction and secured with the lock bolt. Cart, jack, and both rear support legs must be lifted or retracted. For lateral PE-pipe pull-off, set up the Rainstar on the headland at right angles to the selected irrigation strip and detach it from the tractor.

Adjust the undercarriage in a level position with the jack.

When positioning the Rainstar make sure that the machine's vertical axis of rotation is in the middle of the driving lane or centred between two crop rows.



For lateral pull-off remove the lock bolt, turn the reel into the direction of the driving lane and secure it again with the lock bolt.



Couple both hydraulic hoses with the hydraulic system on the tractor and extend the supports.

WARNING! The standard Rainstar equipment does not include a control unit (Optional). After coupling the hoses the tractor's hydraulic system for extending or retracting the supports must therefore be changed over accordingly. If this is not possible, you have to exchange the two hoses.

For maximum stability the machine supports should be fully extended to their end position.

WARNING! During this procedure the operator's position should be outside the supports.

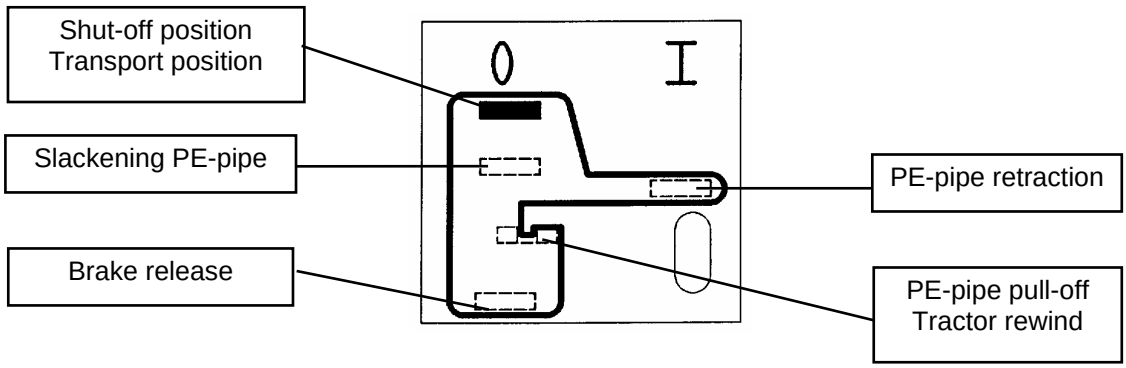
On very hard soil the supports have to be lowered or extended into holes dug into the ground for this purpose.

5.3.2. LOWERING THE CART

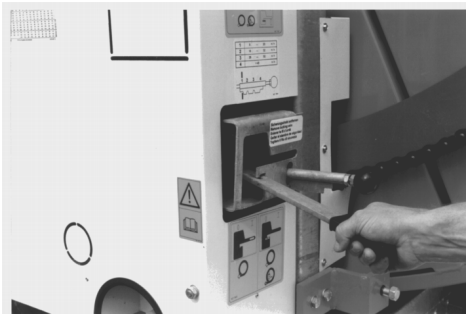
When the supports are being extended the cart is automatically lowered into the "PE-pipe pull-off "position.

Then depressurise the tractor's hydraulic system and uncouple the hydraulic hoses.

SWITCHING POSITIONS OF THE SHUT-OFF LEVER

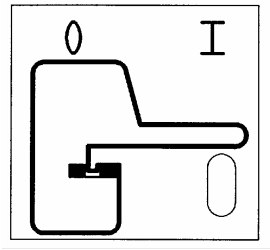


5.3.3. PE-PIPE PULL-OFF



Move gear shift lever into the “PE-pipe pull-off“ position. A spring presses the lever up and locks it.

Selection lever in „pull-out position“ . A spring pushes the selection lever up where it clicks in.
In case of loose pipe winding (first operation or unit transport with lever in wrong shut-off position – not in transport position 0) be sure to avoid overwinding. In case of an emergency, the loose pipe windings have to be pushed into the correct position to the winding mechanism with the command devices. It is necessary to carefully and slowly pull out the PE pipe while at the same time position the PE pipe correctly.



Pick up the double draw-out hook with the toolbar and pull the cart into the field.

The standard wheel cart or the asymmetric wheel cart need not be lifted.
Pull-off speed: Do not exceed 5 km/h !

Do not stop abruptly. Always slow down gradually at an intermediate stop in the field or at the end of the pull-off. Stop pulling off the pipe when the white marking line becomes visible on the reel.

CAUTION!	If the PE-pipe is to be pulled off in a wide bow, make sure that it is pulled in a straight line of about 80 to 100 m first (90° angle to the reel) and then in a wide bow.

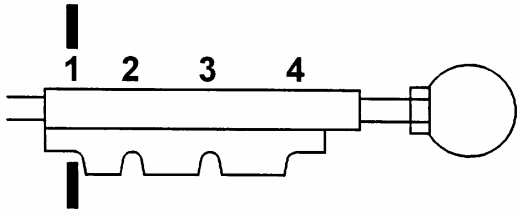
WARNING!	If the PE-pipe has been exposed to the sun for a longer period or if its surface temperature rises above 35 °C you must let water run through the pipe to cool it off before the unwinding or retraction procedure.

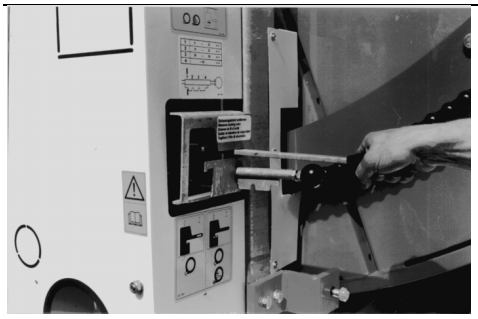
Couple the pressure hose, open water supply.

Move the gear shift lever into the correct position.

TX 20 - T 60

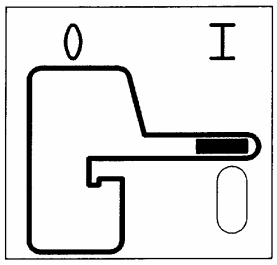
1	**8**	--	**20**	m / h
2	**16**	--	**32**	m / h
3	**28**	--	**50**	m / h
4		**> 45**		m / h





When the full operating pressure has been reached and clear water is discharged at the sprinkler's nozzle in a full jet without air bubbles, push the gear shift lever to the "PE-pipe retraction" position.

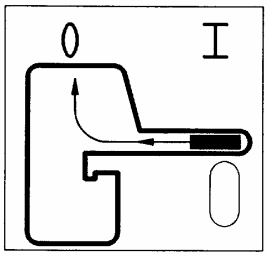
Shifting should be done at low turbine speed!



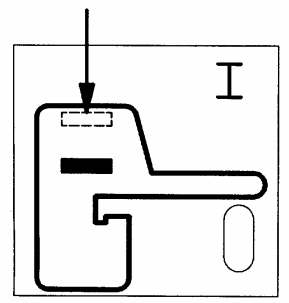
WARNING! If the PE-pipe is stretched – SLACKEN IT!

Proper procedure:

Pull the shut-off lever into the shut-off position ....



... and slacken the PE-pipe by carefully pressing the shut-off lever downward.



CAUTION!	Switching into the gear speeds 1 to 4 is only possible when the turbine is rotating!

CAUTION!	Move the gear shift lever into the desired position and set back the shut-off lever to the “PE-pipe retraction“ position.

The reel starts to rewind the PE-pipe.

5.3.4. SPEED ADJUSTMENT WITH ECOSTAR 4000 S

Set the required retraction speed with the keys
in the operating mode of ECOSTAR4000 S.
You can readjust the retraction speed any time while the machine is operating.
See Retraction Speed Control with ECOSTAR

Further procedure:
At the end of the irrigation run the drive is shut off by rods.

Water supply is stopped by the “overpressure shut-off valve“ option or the pumping unit is shut off by means of the “low-pressure shut-off valve“ in combination with a pressure switch.

After retraction of the PE-pipe the machine supports can be carefully withdrawn with the tractor’s hydraulic system. In doing so the cart is lifted into the transport position automatically.

In case the Rainstar gets misaligned or pulled aslant during PE-pipe rewind it has to be realigned. For this purpose you need to slacken the PE-pipe first.

Proper procedure:
1. Close the water supply to the Rainstar. The PE-pipe slackens only partially by the turbine that acts like a hydraulic brake

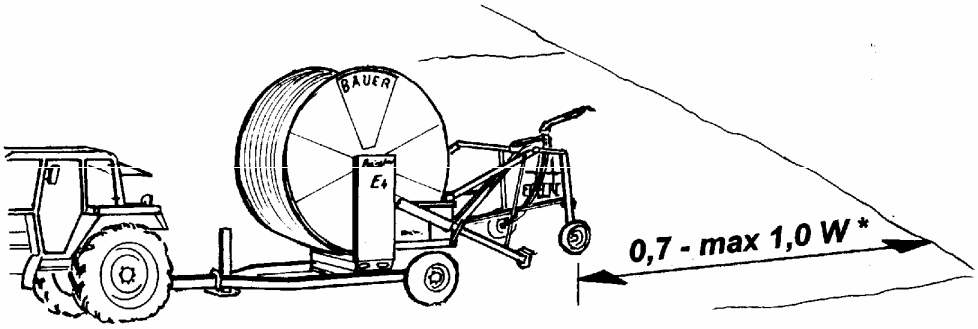
2. Pull the shut-off lever into the shut-off position and push it downward slowly and carefully...

... to **slacken the PE-pipe** (see also page 15 “proper procedure”).

3. Readjust the machine and prop it up adequately.
4. Open the water supply again.
5. Move gear shift lever into the desired position.
6. PE-pipe rewind continues.

5.4. OPERATING MODE II: LAYING DOWN THE PE-PIPE

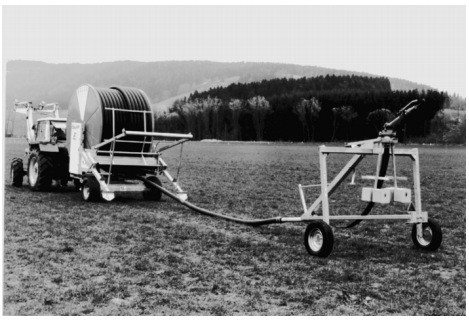
In addition to the pull-off method the PE-pipe can also be laid down on the ground while the machine is hauled over the field. This method is mostly used in situations where heavy soil makes it impossible to pull the cart across the field or where the field is longer than one or two times the PE-pipe length. Moreover, the laying down method allows using smaller tractors because no pulling forces are applied on the pipe.



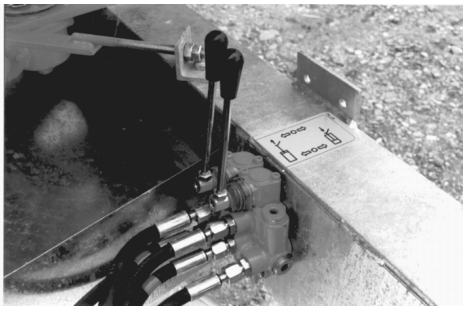
Drive into the field with the Rainstar allowing for the sprinkler’s distance of throw.

*) W = distance of throw of the sprinkler

Lower the cart as described under Operating mode I, “Lowering the cart” and anchor it slightly.



Now move forward with the machine for about 2 to 3 metres, retract the machine supports and continue across the field.

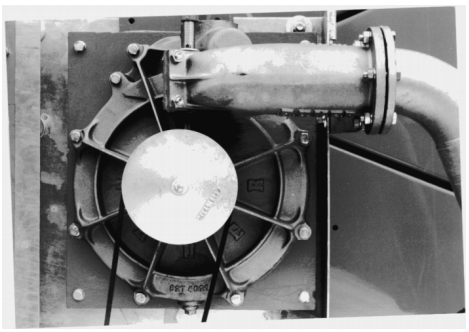


Extending and retracting of the machine support is made much easier with the “control valve block - supports” option.

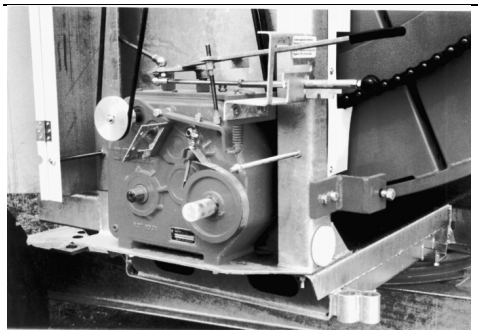
- If you are using a pipe guiding device, drive on about 10 to 20 metres after lowering the cart.
- Take the guide arms from the transport brackets and telescope the guide arm with the roller.
- Place the PE-pipe in the roller guide and close the side part of the pipe guide box.
- Take the supporting guide arm from the mounting and hook it up to the guide arm with the roller.
- Place the PE-pipe in the machine’s wheel track or in the desired position between plant rows and secure the supporting guide arm with the lock pin in the appropriate hole.
- Hook up the chain to the “keyhole bracket“.
- Withdraw the hydraulic support legs. The cart lift slightly hoists the pipe guiding device with the PE-pipe through the hooked up chain.
- Now the PE-pipe can be laid down in a perfectly straight line between plant rows, for instance in the machine’s wheel track.
- Carry out all other steps according to the procedure described above.

5.4.1 FUNCTIONAL DESCRIPTION OF THE MAIN COMPONENTS

Machine drive – full-flow turbine



TX20, TX 60, and TX 100 full-flow turbines are specifically designed turbine models with large cross sections and minimum pressure loss. Therefore they are also suited for high retraction speeds at very low flow rates. These turbines feature a very flow-promoting design and they are mounted directly on the reel shaft. They provide the energy needed for the PE-pipe retraction. The turbine speed is taken directly off the impeller shaft and transmitted over a V-belt drive to the BAUER change-speed gearbox.



BAUER change-speed gearbox reduces the turbine speed according to the set retraction speed. The gearbox incorporates four gears. Reel drive stop at the end of the irrigation strip is ensured by disengagement of the tooth clutch.

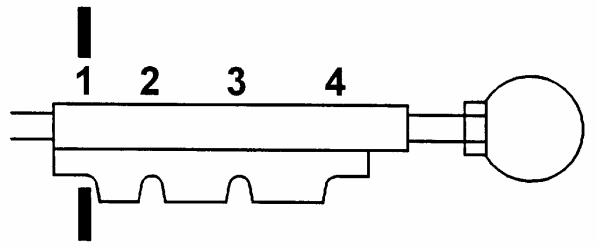
The four-speed gearbox adapts perfectly to existing operating conditions. As a result the following retraction speeds [m/h] can be reached:

GEAR SPEED SELECTION

Shifting should be done at low turbine speed!

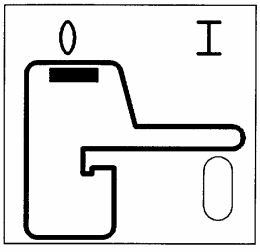
TX 20 , TX 60 , TX 100

1	**8**	--	**20**	m / h
2	**16**	--	**32**	m / h
3	**28**	--	**50**	m / h
4		**> 45**		m / h



WARNING!

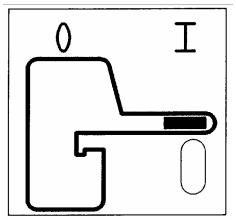
Removal of the drive cover for service is only permitted when the PE-pipe is completely slack and the water supply turned off !
The gear shift lever must be moved to the shut-off position ! This shut-off position must also be used for transporting the machine on the road !



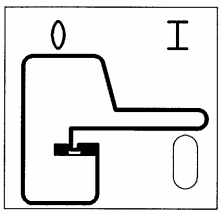
Changing between gears 1 to 4 is very easy with the gear shift lever when the turbine is rotating.

Shifting should be done at low turbine speed.

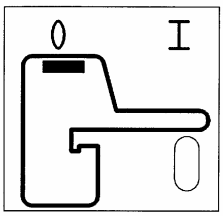
Note also the following:
If the shut-off lever is in the “PE-pipe retraction“ position, the gear shift lever is locked and cannot be shifted.



If the shut-off lever is in the PE-pipe pull-off



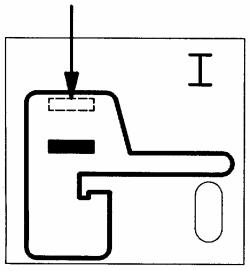
or shut-off position



you can shift it to the required gears 1 to 4.

⚠	**WARNING!**	Before shifting gears – slacken the PE-pipe ! Always shift gears at low turbine speed!

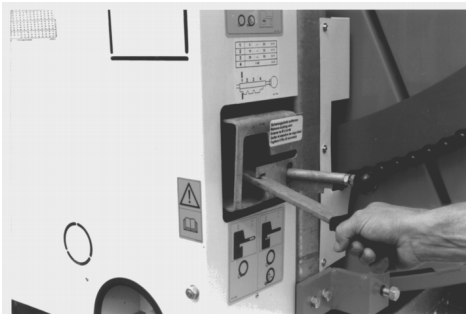
⚠	**WARNING!**	If the shut-off lever is in the shut-off position, press the lever down slowly and carefully so that the band brake is released and the PE-pipe slackens (see also page 15).



5.4.2 PTO REWIND

If required, you can rewind the PE-pipe also with the tractors PTO system.

PTO speed = max. **540** rpm



Shift the shut-off lever to the PE-pipe pull-off position.

A spring presses the gear shift lever into a locking recess. In this position the band brake is slightly loosened and does not have any brake action during the wind-up.

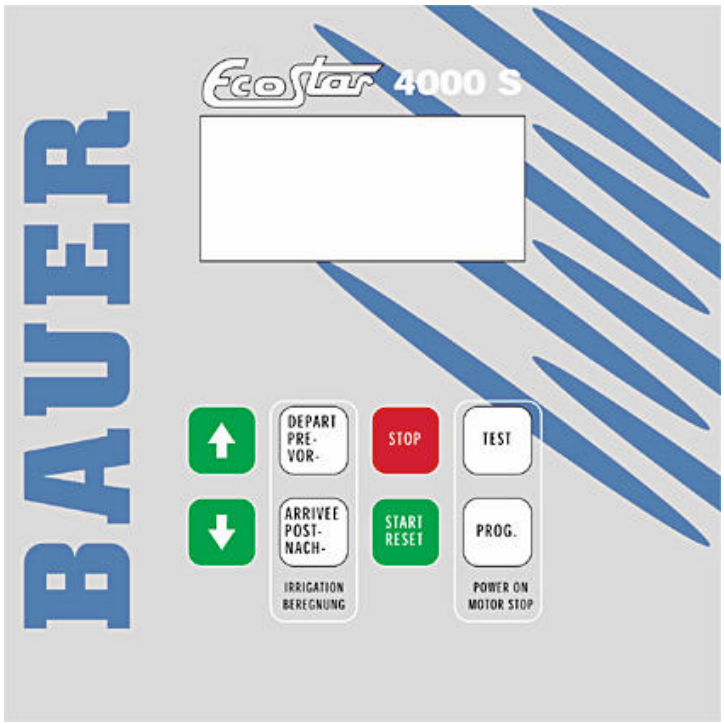
Winding up the PE-pipe with the PTO will become necessary if there is no need to continue irrigating due to natural rainfall, or if the PE-pipe was pulled off the reel for winterization.

WARNING!

- Retract the pipe at the lowest possible PTO speed - start slowly and smoothly and avoid jerks.
- Avoid strain by excessive articulation of the PTO shaft.
- If the PE-pipe is covered with mud it should be loosened and set free to reduce the tension load before rewinding it.
- You can release the PE-pipe and lift it off the ground by tying around a hemp rope or a fabric belt and pulling it along the pipe.
- If the soil is deep and heavy the PE-pipe must be wound up more slowly to make sure that the permissible loads on PE-pipe and RAINSTAR are not exceeded.
- If you disengage the PTO shaft during PE-pipe retraction, make sure that the pipe reel stands still when you re-engage the PTO shaft.(Slacken the PE-pipe). Double motion may cause severe damage!

When driving the reel with the PTO the automatic shut-off system is inactive. Therefore you must stop the PTO shaft in time and wind up the end of the PE-pipe with the hand wheel. This will prevent damage to cart, shut-off system, gearbox, etc.

6 SPEED CONTROL WITH *ECOSTAR 4000 S*



BAUER *ECOSTAR 4000 S* allows you to operate your irrigation machine with ease at the touch of a button.
An illuminated four-line display provides comprehensive indication of the machine's operational status.
Through permanent comparison of set-point and actual value of the retraction speed you can administer your crops precisely the precipitation they need.
ECOSTAR 4000 S consists of the electronic box, a cable harness with the connected sensors for PE-pipe length, retraction speed and shut-off as well as connections for battery, solar panel, and turbine regulating motor. Connections are also provided for installing both a shut-off valve and a pressure switch (both optional equipment).
The electronic system of ECOSTAR 4000 S is rigidly built and has been tested under different climatic conditions.
If problems still occur it is advisable to exchange the complete electronic box.

WARNING!	The front panel must be opened very carefully! To guarantee that the cover sealing provides proper protection against moisture the cover must be closed very carefully, too!

WARNING!	Always disconnect the battery before carrying out welding work and repairs on the Rainstar!

Because of the standard solar panel it is not necessary to charge the battery during the irrigation season. If you have to charge it nevertheless, the maximum charging current should not exceed 2 amperes.
ECOSTAR 4000 S keeps the pre-selected retraction speed on a constant level throughout the pipe retraction.
Due to simple key assignment, operator control requirements are very low.
Normally, ECOSTAR 4000 S is in the energy-saving mode without displaying information.
Simply press the “POWER ON“ or “PE-pipe retraction” key to activate the electronic system and turn on the background illumination with the standard display.

Display windows

Display windows

Standard display (operational status)

Preset speed	30.0 m/h
Remaining irrigation time	00 : 00
Laid down PE-pipe length	000 m
Pre-irrigation 0 0 min	Post-irrigation 0 0 min

The first line indicates the desired retraction speed; it can be altered any time also while the system is irrigating (pre-setting 30 m/h).

The second line indicates the time (in hours and minutes) remaining until the irrigation run is finished, including pre and post irrigation. This time setting can be read off any time during the irrigation run.

The third line shows the length of PE-pipe laid down on the ground.
It is possible to enter this length by hand, for instance after a metering error (locate the cause and exchange the length sensor for instance) – for this purpose see Parameter Sheet no. 1, program constant no. 07.

The fourth line shows pre and post irrigation time in minutes. If the number is blinking, it means that the system is currently running on pre or post irrigation.

If the display shows LOW BAT instead of the speed the battery voltage is lower than 11.8 V. Charge the battery with a power supply unit or exchange the battery. (Check if solar panel charges properly, see 4th line of test menu).

Press the „TEST“ button once (1 x) 

to get to the

1st Test menu (performance test)

Test 1	
Current speed	030 m/h
Battery voltage	12.3 V
Charging by solar panel	ON

The first line shows the menu status „Test 1“

The second line indicates the actual speed at which the machine is currently running.

This display information is needed to be able to check the maximum possible retraction speed of the machine in case the ECOSTAR 4000 S is set at a speed much higher than possible on account of the connected loads.
The actual speed may deviate from the pre-set speed, for instance after the start when the PE-pipe is not yet stretched.
The average running speed of ECOSTAR 4000S is precise within 10 m retraction and corresponds exactly with the desired pre-set speed (in the standard menu).
The third line indicates the battery voltage.
The fourth line shows if the battery is being charged by the solar panel. The battery is charged when voltage drops below 14.0 volts.

Press the „TEST“ button twice (2 x) TEST to display the

2nd Test menu (performance test)

Test 2	Pressure switch ■
Stop - sensor	■
Speed – sensor	■ ■
MOTOR 1 ■	MOTOR 2 ■

If the symbol ■ appears on the display it means that this function is switched on.

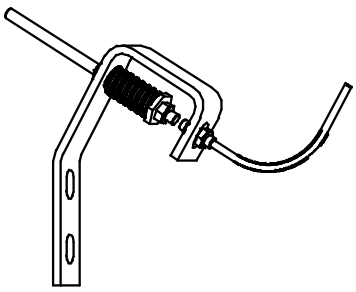
The first line on the left indicates the menu status „Test 2“

The first line on the right shows if - with a pressure sensor mounted - the pressure at the machine is sufficient.
The symbol ■ appears when pressure rises above the minimum pressure at which the pressure switch is set.
The machine will operate only with sufficient pressure or stop in case the pressure is lower than the set minimum pressure.

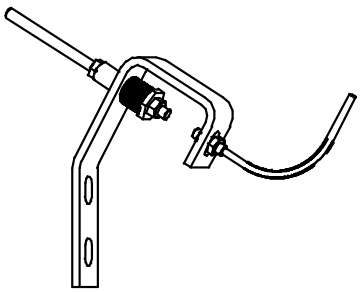
The second line shows if the stop sensor is activated, the symbol ■ is displayed if the stop sensor is activated (operating position, the magnet sits 2 – 3 mm close to the sensor)

The machine can only operate if the stop sensor is switched on and in the operating position.

Operating position



Shut-off position



The stop sensor has three functions:

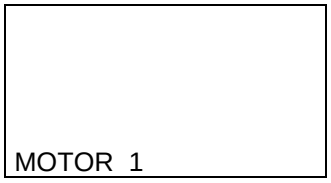
1) Reset for the laid-down PE-pipe length:
   When operated the laid-down pipe length is set to zero.
2) Post irrigation:
   If the post-irrigation procedure is carried out at the end of the run (0 m laid-down PE-pipe length) the post-irrigation function is activated first and then the ECOSTAR shut-off.
   In the standard program, post-irrigation is activated 8 m before the end of the run.
3) Prevents pulses to the regulating motor.
   After the stop sensor is activated, no pulses are passed on to the regulating motor.

The third line shows if the speed sensors are in proper working order. The symbol ■ ■ appears when a magnet activates the two speed sensors at the turning of the magnet disk.

The fourth line shows if the motors 1 and 2 have been switched off after having reached their mechanical stop.

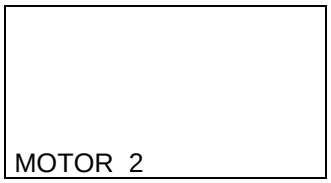
If the ■ symbol appears and one motor has not reached its end position there is a blockage inside the turbine (MOTOR 1) or the shut-off valve (MOTOR 2).
The motor is turned off when the current input rises above 4.7 amperes, the symbol appears.

If the display shows MOTOR 1 blinking, it means that the regulating motor is currently running.



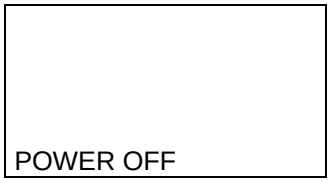
During this motor running time (max. 26 sec.) it is impossible to make entries on the keyboard.

If the display shows a blinking MOTOR 2 it means that the shut-off motor for the shut-off valve is currently running.



It is impossible to activate keys on the display while the motor is running. The motor runs for max. 26 seconds.

If the STOP button is pushed while the shut-off sensor is in the shut-off mode (end of irrigation, the magnet does not sit close on the shut-off sensor), the display shows POWER OFF for 2 seconds.
Then the electronic system is in the stand-by mode.



The electronic system is activated again when the PROG/POWER ON key 

is pressed or the PE-pipe pulled off.

The battery is only charged while the electronic system is active. No charging takes place in the stand-by mode.

HOW TO OPERATE BAUER ECOSTAR 4000 *S*

SHORT INSTRUCTION:

Pull off or lay down the PE-pipe
Couple the water supply.
Engage the gearbox

ECOSTAR : Make entries only in the standard menu:

Take over the retraction speed from the previous run or make a new entry.

Push START-RESET button 

Activate pre-irrigation, if required.
Activate post-irrigation, if required.
Open the water supply.
The irrigation cycle runs automatically.

FURTHER INSTRUCTIONS

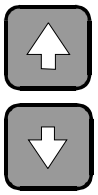
After a longer standstill the electronic system of ECOSTAR 4000 S is in the stand-by mode.
Pulling off or laying down of the PE-pipe activates the electronic system and the length of the pulled off or laid down pipe is counted.

Example for standard display:

SPEED		30.0 m/h	
TIME		10 : 00	
LENGTH		300 m	
PRE	00 min	POST	00 min

SPEED ADJUSTMENT

The pre-set speed of 30 m/h can be increased or reduced by means of the keys



First the speed changes by 0.1 m/h step by step, than the speed changes by 1.0 m in steps of 10. The speed can be changed at any time while the machine is running. The time remaining until the end of the run is always adjusted automatically, too.

It is impossible to change the speed while a turbine regulating or shut-off valve motor is operating. The display shows MOTOR 1 or MOTOR 2.

Along with the speed change, the time pertaining to the speed setting it is also changed.

SPEED		20.0 m/h	
TIME		15 : 00	
LENGTH		300 m	
PRE	00 min	POST	00 min

Caution!	When setting the speed you must check on the speed that can actually be reached according to the test window (push test key once). In case of deviation you have to reduce the set speed to the speed actually possible.

PRE AND POST IRRIGATION

Use PRE and POST IRRIGATION keys to 

activate these functions.

Pre and post irrigation time are pre-programmed. ECOSTAR 4000 S calculates them as being 8 times the time required for covering 1 m at the actual speed.

Example: at vE = 20 m/h the time for retracting 1 m is 3 minutes.
The resulting pre irrigation time amounts to 8 x 3 min = 24 min
The post irrigation time is also 8 x 3 min = 24 min

Example on standard display:

SPEED		20.0 m/h	
TIME		15 : 48	
LENGTH		300 m	
PRE	24 min	POST	24 min

This value “8” can be changed in the program (program constants no. 1 and no. 2) - see Parameter Sheet 1: Constants
If the pre-irrigation mode is activated the machine runs for about half a meter after the start and then it stops for the pre-irrigation time.

If you press the START-RESET 

key in the pre-irrigation mode, the pre-irrigation function is cancelled.

Before activating the pre- irrigation mode the PE-pipe should be pulled off (the shut-off frame and thus the shut-off sensor should be in the operating state) and the START-RESET button should have been pressed.

If the post-irrigation mode is activated the machine stops 8 m before the end of the run for the post-irrigation time. This value is pre-adjusted and can be changed in the program constant no. 6 – see Parameter Sheet 1 : Constants.

If the post-irrigation mode is activated the machine stops 8 m before the end of the run for the post-irrigation time. This value is pre-adjusted and can be changed in the program constant no. 6 – see Parameter Sheet 1 : Constants.

If you push START – RESET 

in the post irrigation mode, the post irrigation function is cancelled.

Before activating the post- irrigation mode the PE-pipe should be pulled off (the shut-off frame and thus also the shut-off sensor should be in the operating status) and the START-RESET key should have been pressed.

3.3 START

When the PE-pipe is pulled off and the desired speed is set on the device, push the 

button to start irrigating.

If pre or post irrigation are required, push 

the appropriate key.

The turbine can only start if the shut-off frame and thus also the shut-off sensor are in the operating state (PE-pipe pulled off).

If the START–RESET key is pressed the turbine flap closes, the toothed segment on the regulating motor turns away from the reel and the shut-off valve (if mounted - optional) opens.

MONITORING

The program has a built-in monitoring system.
This systems will work only in combination with a shut-off valve - overpressure.
In the factory setting, this monitoring is deactivated (Parameter sheet 2, machine data 17, value set to “0” – monitoring off).

If system is set according to parameter sheet 2, machine data 17 at value “1”, the monitoring function is activated.
In this mode the monitoring function starts to work when the RAINSTAR **fails** to reach the set speed within the programmed monitoring time (according to parameter sheet 1, program constant 03). In the factory setting the program constant 03 is set at 20 minutes. After this time the shut-off valve is closed and the machine stops.
Mostly the reason is that the retraction speed setting is too high, or the regulating flap is blocked etc.

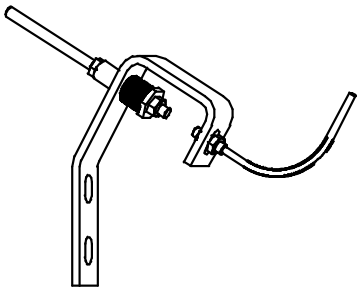
In order to ensure that the set retraction speed is really reached and the system is not shut off after the monitoring time, check up on the retraction speed that can actually be reached by pressing the TEST key once.

If a pressure switch is mounted the machine will start operating when a certain pre-set minimum pressure is reached, or irrigation is stopped at low pressure. Irrigation is resumed as soon as pressure returns to standard.

STOP

At the end of the run the shut-off sensor is activated through shut-off frame and shut-off rods.

Sensor in shut-off position



That way the turbine stops and the shut-off valve - overpressure - slowly closes and remains in this position until the next run.

If the Rainstar is connected to a hydrant the water pressure existing after closing of the hydrant can be released by pressing the START-RESET key.

The shut-off valve opens and pressure is released through he PE-pipe.

If a low-pressure shut-off valve is mounted it opens very quickly.
It closes again after about 15 minutes.

The irrigation cycle can be stopped at any time by pressing the STOP key. 

The turbine flap opens (the turbine stops), the overpressure shut-off valve closes or the low-pressure shut-off valve opens.
Thereby the laid-down PE-pipe length remains saved in the system. It is only reset to 000 if the shut-off sensor (shut-off position) is activated.

3.6 PRESSURE SWITCH (OPTIONAL EQUIPMENT)

If the Rainstar, after having been positioned for the run, is supposed to start-up only after the required pressure has built up in the supply line (pressure start), a pressure switch must be installed.

If such a switch is available, the monitoring system will also interrupt the irrigation cycle in case of low water pressure. As soon as the pressure returns to standard the run is continued.

FAULT DESCRIPTION – ECO STAR 4000 S

FAULT	CAUSE	REMEDY
The battery is not being charged.	Solar panel soiled.	Clean
	Solar panel defective.	Leave the machine in the sun. Exchange the solar panel.
	Battery defective.	Charge. Exchange.
Electronic system defective.	Electronic fault.	Cover solar panel, disconnect the battery and hook it up again (Reset). Call customer service.
		Exchange the electronic box
Premature machine shut-off	Overwinding fault.	Turn off water supply. Slacken PE-pipe. Readjust the machine.
	Shut-off frame has been activated unintentionally.	Put the shut-off frame into the operating position and press “START”
The retraction speed is not reached.	Low pressure in supply line or pump station	Increase pressure or enter retraction speed according to the performance chart
	Incorrect gear ratio	Change ratio
	Blocked turbine regulation.	Remove foreign object.

PROGRAMMING PROCEDURE

The electronic system is factory-programmed.

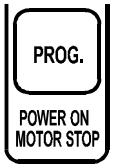
However, if site conditions require settings which deviate from these data it is possible to modify the program constants and machine data accordingly.

Proceed as follows:

The speed must be set at 11.1 m/h or 11 f/h in order to reach the constants.

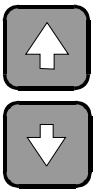
WARNING! If the setting is in US units you have to enter 11 [f/h] instead of 11,1 [m/h].

Immediately press the "PROGRAM" key 01 (see Parameter sheet no. 1).



3 x (three times) in order to get access to program constant

Press the PROGRAM key for a short while again to select the program constants 01 to 09 – see parameter sheet no.1.

Use the cursor keys  to change the values of the constants as required.

If you press the TEST key the program returns to the standard display and the changed constants are saved.

If the TEST key is not pressed the program will return to the standard display after 1 minute and the changes are **not** saved.

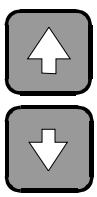
The constants remain saved even if the battery is disconnected for a longer period of time.

In the program constant 09 with the value 111 you have access to the machine data.

By pressing the PROGRAM key you enter the machine data mode. 

.
See Parameter Sheet No. 2.

Press the PROGRAM key for a short while again to select machine data numbers 00 – 17 .

Now you can use the cursor keys  to change values according to actual requirements.

If you press the TEST key 

the program returns to the standard display and the changed machine data

are saved.

PARAMETER SHEETS No. 1 and No. 2 Example

Constants: Parameter sheet no. 1					
Program version : 4,1 (3.11)					
Prog. const.	**Setting value**	lowest value	highest value	Description	
01	**8**	1	15	pre irrigation	[m]
02	**8**	1	15	post irrigation	[m]
03	**20**	0	99	monitoring time	[min.]
04	**1** **2** **3** **4** **5** **6** **7**	1	7	1 = English 2 = Danish 3 = German 4= = French 5 = Dutch 6 = Swedish 7 = Spanish (Finnish for version 3.11)	
05	**0** **1** **2**	0	1	0 = slow shut-off, for overpressure shut-off valve option 1 = fast shut-off, for low-pressure shut-off valve option 2 = without shut-off valve option	
06	**8**	0	15	distance to post irrigation	[m]
07	**0**	0	1000	input of laid down PE-pipe if shut-off sensor defective or removed	[m]
08	**0**	0	0	Not used	
09	**111**	-	-	Code for access to machine data (Parameter sheet 2)	

Machine data: Parameter sheet no. 2

Program version : 4,1 (3.11)

Machine data	Setting value	lowest value	highest value	description	
00	**420**	0	1000	pipe length	[m]
01	**90**	40	200	pipe diameter	[mm]
02	**1650**	500	3000	reel diameter	[mm]
03	**13,30**	5,00	30,00	windings per layer	
04	**256**	50	1000	large chain wheel (reel sprocket) number of teeth x 2	
05	**13**	5	40	small chain wheel (driving pinion) number of teeth	
06	**4**	1	20	number of magnets	
07	**0,89**	0,70	1,0	pipe ovality	[%]
08	**3**	0	45	first pulse to shut-off motor	[sec]
09	**160**	0	300	short pulses to shut-off motor	[msec]
10	**3**	1	5	time between pulses	[sec]
11	**100**	0	250	number of short pulses	
12	**1**	0	2	shut-off system 0 = no shut-off valve 1 = shut-off system with overpressure shut-off valve 2 = shut-off valve with low-pressure shut-off valve	
13	 **8,20** **4,20**	0,90	26,10	pulses for closing the regulating flap TX60 TX20	[sec] [sec] [sec]
14	**0**	0	2	0 = pressure switch out of operation 1 = pressure switch operating	
15	**0**	0	160	0.0 = length sensor on gearbox (System BAUER)	
16	**0**	0	1	0 = shut-off valve opens with one pulse (12 sec.) 1 = shut-off valve opens with the same pulses as the ones for closing	
17	**1**	0	1	monitoring correct speed 1 = monitoring on 0 = monitoring off	
18	**0**	0	1	Display of units of measurement: (not available for version 3.11) 0 = metric [m] 1 = US units [ft]	

Caution: If US units are set, enter 11/f/h to select the programming mode.
Then the program constants are entered in US units, machine data in metric units.

BATTERY

The standard factory equipment includes a battery with 12 volts and 6.5 ampere-hours.
Due to the standard solar panel it is not necessary to charge the battery during the irrigation season. The battery should be newly charged every 6 months at a charging voltage of max.
2 amperes. (Please observe the enclosed service and maintenance instructions).
When you connect the battery the display shortly shows VERSION 4.1 and then the standard display comes up.

SOLAR PANEL

The standard factory equipment includes a 12 V/4 W solar panel.
The solar panel is maintenance-free.
In order to ensure optimum output the surface should be cleaned with a soft cloth and a household detergent (no abrasives), from time to time.
In order to avoid overloading of battery or error of ECOSTAR the electronic system will discontinue loading when the STOP key is pushed or the battery is being connected. (The machine is supplied with the terminals detached).
The loading procedure is resumed when the START button is pressed or during PE-pipe pull-off.

CABLE CONNECTIONS – WIRING DIAGRAM:

Wiring diagram ECO – Star 4000 S			
Terminal no.	**Designation of device**	**Core Colour**	
1 2	Battery **+** 12 V Battery **–** 12 V Solar module **–**	brown blue	
3 4	Solar module **+** Solar module **–**	brown blue	
5 6	Motor 1 Motor 1		Regulating motor Regulating motor
7 8	Speed sensor 1 Speed sensor 1	blue black	
9 10	Speed sensor 2 Speed sensor 2	yellow / green brown	
11 12	Stop sensor Stop sensor	blue or brown blue or brown	
13 14	Motor 2 Motor 2		shut-off motor shut-off motor
15 16	Pressure sensor Pressure sensor	blue or brown blue or brown	
17			free
18			free

CHECK-UP OF CONNECTIONS:

Press START key. START RESET

The regulating motor closes (the segment turns away from the reel).
The overpressure shut-off valve is opened.
The low-pressure shut-off valve remains closed.

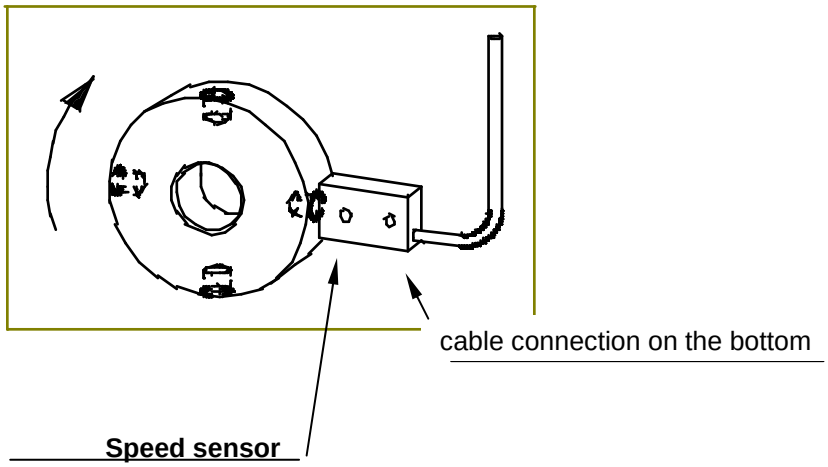
Press STOP key STOP

The regulating motor opens the turbine (the segment turns towards the reel).
The overpressure shut-off valve is closed.
The low-pressure shut-off valve is opened.

CHECK-UP OF LENGTH SENSOR:

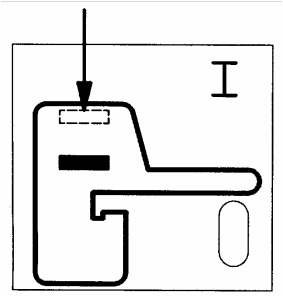
The magnet disk with 4 magnets is mounted on the input shaft of the gearbox and turns clockwise during pull-off.

When turning of the magnet disk in clockwise direction, the display of the laid-down PE-pipe must count from 0 up.
If the distance meter counts into the opposite direction the speed sensor must be turned around so that the cable connection is in the upper position. Distance 2 – 5 mm between doble sensor and magnetic disc.



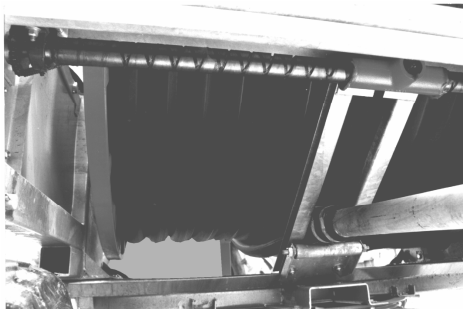
7 EMERGENCY SHUT-OFF

If something unforeseen happens, the pipe retraction can be interrupted by means of the emergency stop device. Pull the gear shift lever with the open hand from the “PE-pipe retraction“ position to the shut-off position (Do not operate the lever with the closed hand or release it immediately !). The gearbox is disengaged.
A spring snubs the lever up (shut-off position) and the band brake prevents fast reversing of the
PE-pipe and the reel.



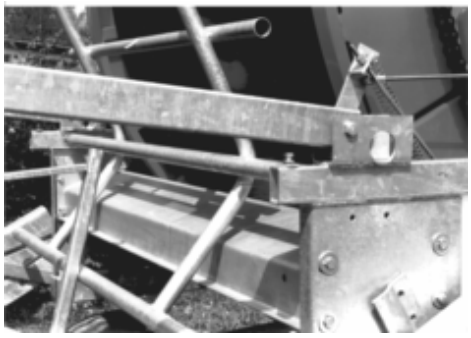
Slacken the PE-pipe by pushing down the gear shift lever carefully.

8 WINDING MECHANISM



The winding mechanism operates synchronously with the winding or unwinding of the PE-pipe. Starting from the reel it is operated through a chain and the helically grooved spindle transporting the winding carriage of the PE-pipe. The winding mechanism ensures that the PE-pipe is properly guided winding for winding. When you put the machine into operation for the first time, pull off the full length of the PE-pipe to let it take a circular shape under pressure and eliminate ovality. This step is essential for trouble-free operation of the winding mechanism.

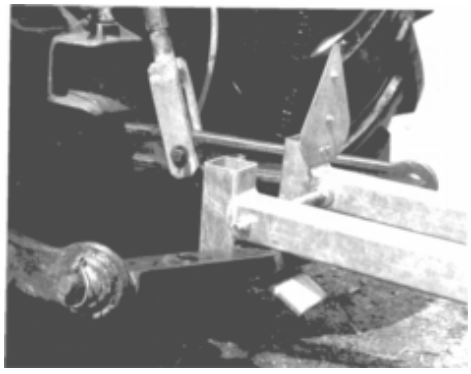
9 SHUT-OFF AND SAFETY EQUIPMENT



Unattended performance of the Rainstar is made possible by a final and safety shut-off. The final shut-off is actuated when the sprinkler cart presses against the shut-off frame, which in turn operates the shut-off lever through a system of rods. This way the drive is stopped.
To avoid troubles caused by faulty windings of the PE-pipe on the reel, the shut-off is also activated by the shut-off frame when faulty pipe windings build up on the reel.

10 CART

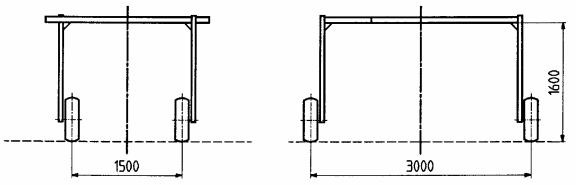
The high construction of both symmetric and asymmetric wheel carts provides maximum crop protection (Asymmetric wheel cart OPTIONAL). With infinitely variable track width the carts adapt to any crop row spacing. The width is symmetrically adjusted by means of the frame support member.



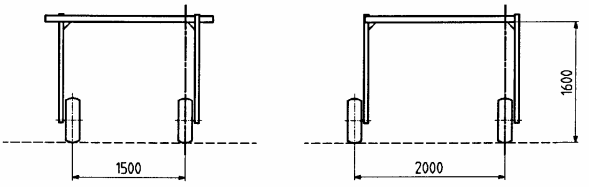
For easier PE-pipe pull-off the carts are equipped with a double draw-out hook. You pick up this hook with the tractor's toolbar and pull the cart across the field.
If you are using a sled, it is lifted and the pipe pulled off the reel.
For turning the pipe reel and placing the Rainstar in a new setting-up position, the cart must be withdrawn to its end position by the Rainstar.

Depending on the type of sprinkler used, the nozzle height of the mounted sprinkler ranges between 1960 and 2120 mm.
At the end of the retraction, when the cart moves up to the machine it is slightly hoisted on the PE-pipe side. Owing to its pendulous mounting (self-balancing assembly) the sprinkler is not tilted and always remains in the optimum position regarding distance of throw and distribution uniformity. This pendulous mounting assembly compensates also slopes in the terrain in longitudinal direction.

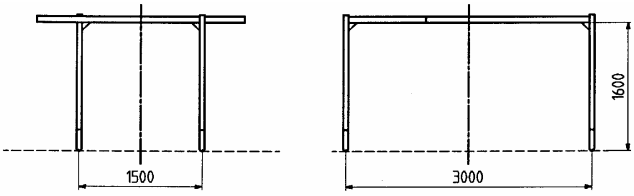
Wheel cart symmetric



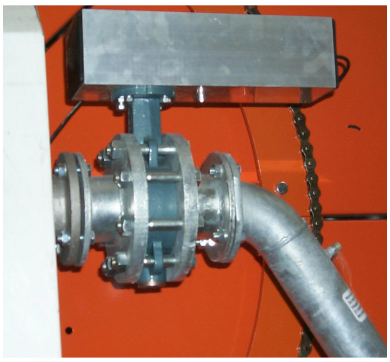
Wheel cart asymmetric



Sled



11 SHUT-OFF VALVE – OVERPRESSURE (OPTION)



With an overpressure shut-off valve, the water supply to the machine is turned off completely at the end of the irrigation run. When the valve closes, pressure rises in the supply line.

Therefore this valve can only be used in combination with an automatic pump shut-off device or in a line network supplying several machines. Before starting up again the valve is opened again by the electronic system.

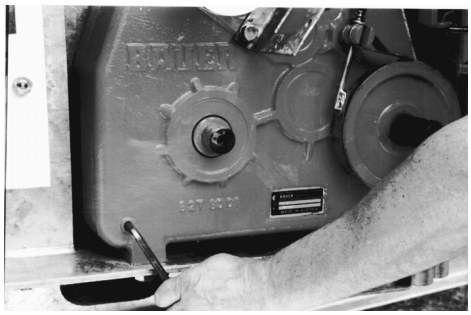
12 SHUT-OFF VALVE - LOW-PRESSURE (OPTION)

With the low pressure shut-off valve option, a shut-off valve is opened quickly at the end of the irrigation run, releasing quite a big water stream into the open. This causes a sudden pressure decrease in the supply line (to about half the original pressure). Through this drop in pressure a pressure switch shuts off the pumping unit and thus also the water supply. Therefore this valve can only be used in combination with an automatic pump shut-off device.

CAUTION!	The low pressure shut-off valve option can only be used if only one irrigation machine is fed by the pumping unit. If several machines are fed simultaneously by one pumping unit this low-pressure or underpressure shut-off valve cannot be used !

13 WINTERIZATION - DRAINING

In areas where frost is likely in winter after the irrigation season, the machine must be drained in time. A compressor with a minimum air capacity of 800 l/min at 2.5 bar overpressure is best suited for this purpose. Connect the compressor to the inlet of the machine For blowing out the water the PE-pipe should not be pulled off. It can stay on the reel.
In most cases, winding up the empty PE-pipe after the draining will cause extreme ovality and faulty winding. Before the blow-out procedure, uncouple the connecting hose at the sprinkler balancing assembly. The small amount of water remaining in the PE-pipe after the draining (approx. 30 to 50 % of the volume) will not do any harm.
Turn out the drain plug on the bottom of the TX 20, TX 60 or TX 100 turbine. We recommend to turn it in again only when you start up the machine again at the beginning of the next season. If a shut-off valve is mounted the connecting hoses also have to be drained by opening the screwed joints. Clean the Rainstar and regrease all appropriate points. The machine should preferably be stored in a roofed shelter where it is protected from direct exposure to the weather.



Drain screw for gear oil.

Oil or grease the jack.

13.1. DRAINING THE PE-PIPE

WITH THE BAUER BLOW-OUT AND COMPRESSOR UNIT

(Optional on E3 *Plus* and E4 *Plus*)

Note the following instructions to ensure proper function of the blow-out unit:

1. The blow-out must be performed immediately after the shut-down of the machine to ensure that no water is drained from the PE-pipe. After a longer standstill (from 5 to about 10 minutes) you must pressurise the RAINSTAR again before the blow-out procedure.

CAUTION!	If parts of the PE-pipe have run empty and air bubbles are enclosed in the pipe, the blow-out will not work !

2. If a shut-off valve is mounted, open it:
   If you have an overpressure or low pressure shut-off valve, shift the three-way ball cock to the start position. If you have an electric shut-off, press the START key in order that the valve opens .

3. Connect a drain pipe at the inlet of the machine to avoid soaking the machine's standing position.

CAUTION!	If you use the supply hose (8) for draining, make sure that the hose is not kinked and the water is allowed to run off freely.

PROCEDURE:

The PE-pipe is wound up on the reel, the cart is standing just before the shut-off position.

CAUTION!	If system is equipped with a shut-off valve: it must be possible to shift the three-way cock to the start position!

Take off the end cap (with bore and baffle plate) from the "Garage" (1).
Press the plastic ball in the "garage" down by hand or with a piece of wood until the ball gets to lie in the straight horizontal pipe (2).

Disconnect the sprinkler connection hose (3) and connect the end ball with the valve (4) at this coupling.

Connect the 90° bend (5) to the "Garage" coupling - and the compressor hose (6) to the bend and to the compressor (7).

Now the PE-pipe can be drained with the use of the compressor.
Compressor specifications:

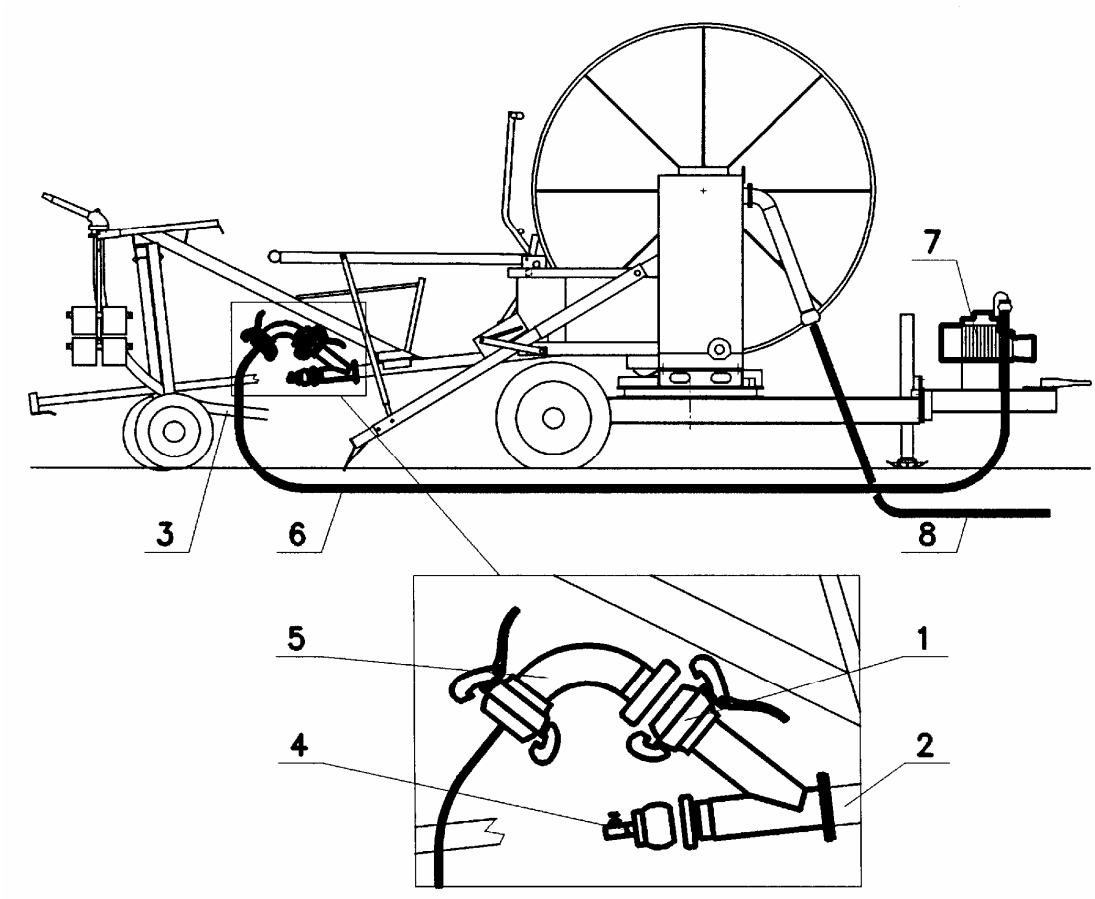
- Operating pressure: 1.5 bar sufficient
- Air capacity: minimum 5000 litres at 1.5 bar

It does not take more than 5 to 8 minutes to drain the PE-pipe. If the blow-out takes longer there will be air bubbles in the pipe that prevent further draining.

WARNING! In order that the pressure in the PE-pipe can escape!

After the blow-out procedure is finished and before you open the couplings: the valve must be opened!

Remove the fittings with the hose and couple the end cap with the baffle plate as well as the sprinkler connecting hose to the Rainstar.
The blow-out ball is located in the reel inlet bend. When you start irrigating the water carries the ball back into the “garage” (at the end of the horizontal pipe).



13.1.1. POSSIBLE FAULTS DURING PE-PIPE BLOW-OUT WITH COMPRESSOR

FAULT	REMEDY
PE-pipe has run empty.	Put the irrigation machine under pressure again until a full jet without air bubbles is discharged at the sprinkler.
Kink in the drain hose from the turbine.	Lay the hose straight without kinks or connect a rigid pipe.
Shut-off valves not opened.	Open shut-off valves.
Plastic ball not in the correct position.	Push down the plastic ball far enough to place it in the straight horizontal pipe.
Incorrect plastic ball diameter.	Required ball diameter: PE-pipe dia. 100 mm : Ball dia. : 100 mm 110 mm : : 100 mm 120 mm : : 110 mm 125 mm : : 120 mm
Plastic ball damaged.	The ball must be round and faultless.
Insufficient compressor output.	Check compressor performance data and safety valve.

CAUTION!	The end cap on the branch pipe of the horizontal pipe („“Garage“ of the plastic ball) must have a vent bore through which the branch pipe is deaerated when the ball is pressed to the cart by the water pressure from the turbine side. Then the plastic ball will park properly in the „“garage“ during irrigation. If this vent bore is missing, the plastic ball remains in the area of the horizontal pipe during irrigation and may cause considerable pressure loss on account of the reduced cross section.

13.1.2. SERVICE AND MAINTENANCE

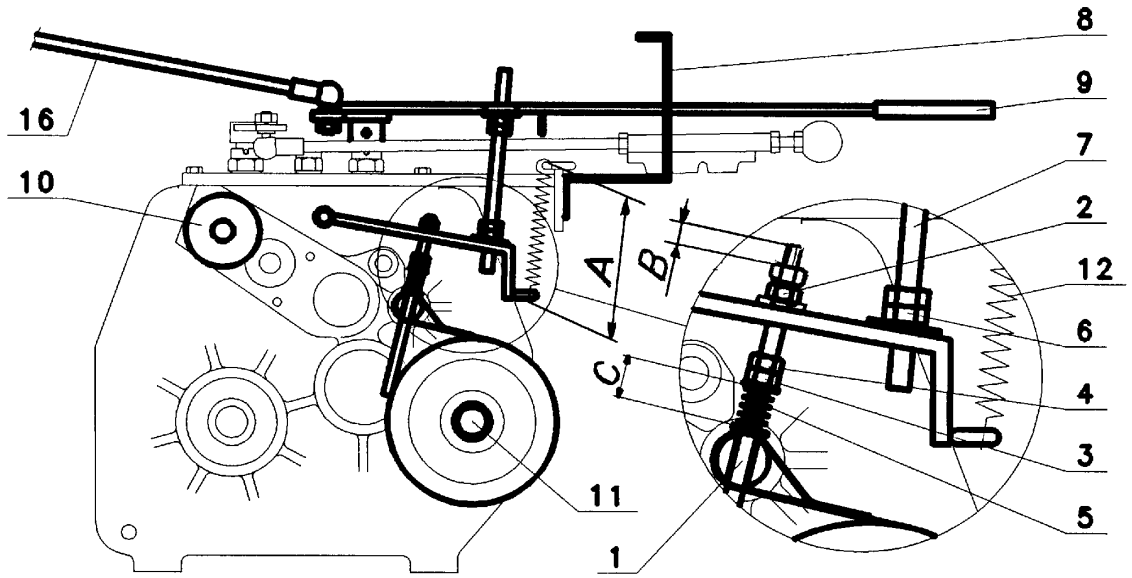
We cannot emphasise often enough that proper service at the right time is essential for the operating reliability and service life of a machine. At the end of every irrigation season the Rainstar should be thoroughly checked and cleaned, and all parts regreased carefully.

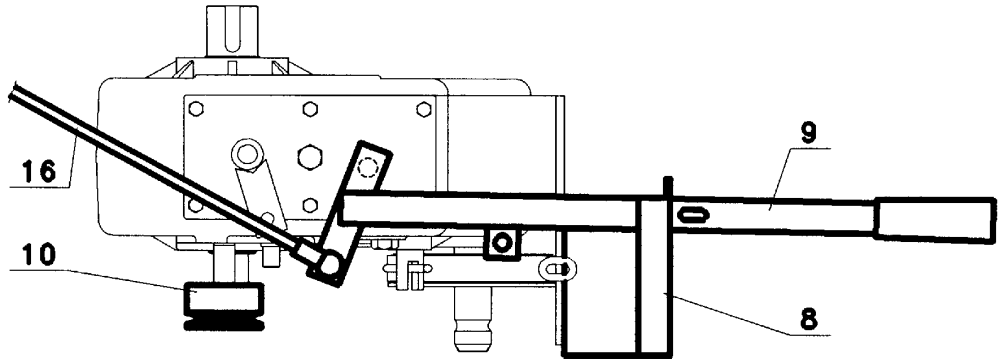
Machine part	**Service interval**	**Lubricant, grease, oil**
1. Helically grooved spindle of the winding mechanism	every 250 hours	Alvania Grease 3
2. Drive chain of winding mechanism	every 250 hours or as required	Alvania Grease 3
3. Driver (spindle nut) of winding mechanism	every 250 hours, change recommended after 2500 service hours	Alvania Grease 3
4. Driving chain	every 250 hours or as required	Alvania Grease 3
5. Turbine	every 500 to 800 service hours	Alvania Grease 3
6. Change-speed gear	Change oil for first time after 500 service hours and then every 500 to 800 hours or at least once a year	11,3 l oil SAE 90 EP
7. Ball race	every 500 hours	through grease nipple Alvania Grease 3
8. Jack	as required	Oil SAE 20,Alvania Grease3 through grease nipple
9. Machine supports (sliding parts)	as required	Alvania Grease
10. Screwed joints	before putting into operation after 50 hours of operation	Tightening torques
Wheel nuts		300 Nm
Turntable side frame		210 Nm
Ball race on turntable and undercarriage		E1 - E4 = 85 Nm
Drawbar on undercarriage		240 Nm
Hitch eye		210 Nm

14 FAULT FINDING

FAULT	CAUSE	REMEDY
The PE-pipe cannot be pulled off.	Incorrect gear shift lever position.	Put it into the pull-off position.
	Brake band sticks to the brake drum.	Loosen the brake band.
PE-pipe retraction stops before the final shut-off is actuated	Turbine blocked by a foreign body.	Remove the foreign body.
	Pressure drop in supply line.	Check pumping station and hydrant connections.
	Overwinding of PE-pipe activates the safety shut-off.	Adjust the winding mechanism.
		Repair broken winding chain.
The final shut-off is activated but the shut-off valve does not close.	Values for shut-off valve activation are not set correctly.	Adjust the settings according to the manual.
	Thin plastic hose of shut-off valve blocked or broken.	Replace plastic hose.
The reel overwinds or the windings become loose when the PE-pipe is pulled off.	Tractor stopped abruptly.	Slow down gradually.
	No oil in the change-speed gear.	Refill oil.
The retraction speed varies from one PE-pipe layer to the next.	Varying ground conditions.	Adjust speed control to existing ground conditions (readjust rods on the lever of the layering mechanism).
The selected retraction speed is not reached.	Incorrect drive transmission.	Select proper V-belt and gear transmission.
	Blocked sprinkler nozzle.	Remove blockage.
	General: Compare connecting pressure and water flow with performance chart values.	

15 SETTING INSTRUCTIONS FOR RAINSTAR E *Plus*



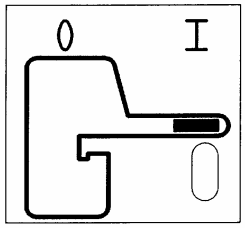


15.1. SETTING THE BAND BRAKE

Tighten the hex. nuts (2) of the band brake until the bolt thread of the brake band (1) projects **B = 13 mm**. At that the tensioned spring length of spring (12) is **A = 144 - 148 mm**. then lock the hex. nuts (2).
Hex. nut (3) is tightened until the spring (5) is pretensioned with **C = 22mm** , lock with nut (4).

15.2. SETTING THE SHIFTING GATE

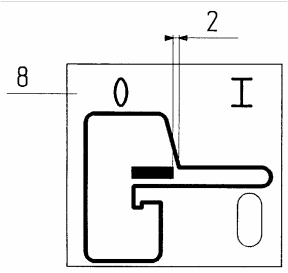
The shifting gate (8) must be adjusted to the shut-off point of the gearbox.



Procedure:

Move the shut-off lever (9) to the “PE-pipe retraction“ position.

Turn the V-belt pulley (10) - the PTO shaft (11) rotates too!.
Shift the shut-off lever (9) slowly to the “0“ position.

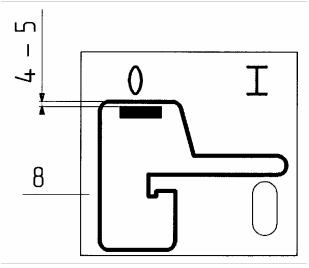


The shut-off point is reached when the PTO shaft no longer rotates.
Adjust the shifting gate (8) in this position according to the drawing (2 mm)!

The spring (12) presses the shut-off lever (9) upward along the incline of the shifting gate and thus into the recess in the gearbox.

15.3. SETTING THE THREADED ROD

Shift the shut-off lever to the shut-off position.

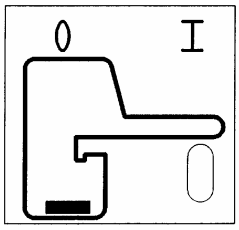


Turn the hex. nuts (6) on the threaded rod (7) apart until the spacing between the shifting gate (8) and the shut-off lever (9) is about 4 to 5 mm.
Secure the hex. nuts (6).

15.4. INSPECTING THE BAND BRAKE FOR RELEASE OF THE BRAKE BAND

Move shut-off lever (9) to the “Release“ position.

In this position the brake band must be slightly lifted off the brake disk. This prevents the brake band from sticking to the brake disk.

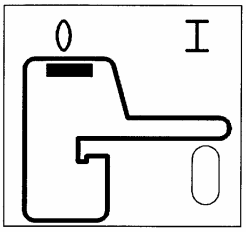


CAUTION!	The brake band may stick after a longer standstill or after the winter period. It must be loosened before putting the machine into operation again !!! Do this by shortly turning the PTO shaft right and left with the hand wheel. If you do not observe this the gearbox may break !!!

15.5. SETTING THE GEARBOX SHUT-OFF

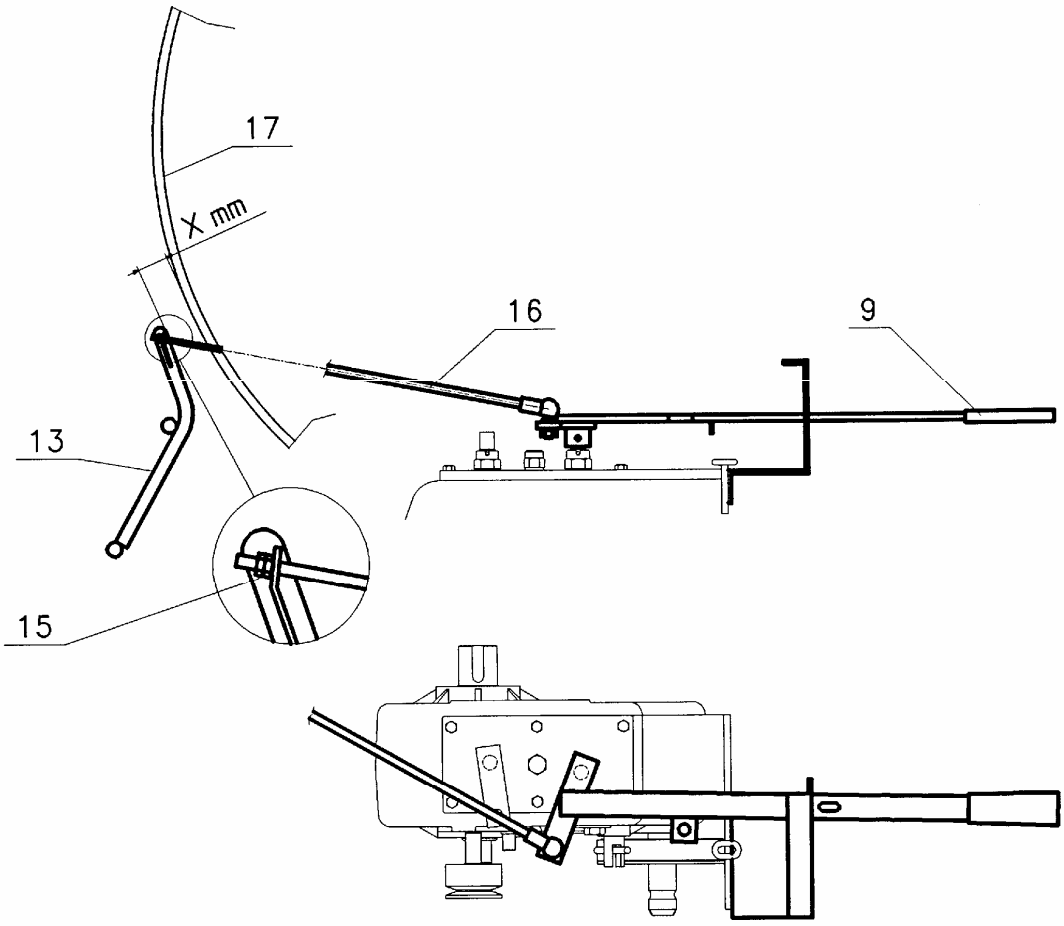
In the **operating position** the spacing between the shut-off frame (13) and the reel (17) is x = 25 mm.

Set the shut-off frame (13) in the **shut-off position** at **X** mm from the reel (17) (see chart). Put the shut-off lever (9) into the shut-off position.

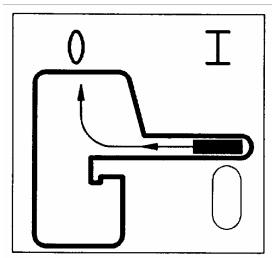


Adjust the hex. nut (15) on the control lever (16) to the bracket (14) of the shut-off frame.
Secure the nut.

Pipe dia.	X mm
90	70
100	70
110	70
120	70
125	70



15.6. TESTING THE SHUT-OFF:



Put the shut-off frame (13) to the PE-pipe (last pipe layer).
Move the shut-off lever (9) to the “PE-pipe retraction“ position.
Pull the shut-off frame (13) to the shut-off position (= **X** mm from the reel) by hand The shut-off lever must jump into the shut-off position!

15.7. ADJUSTING THE WINDING MECHANISM

Take off the drive chain of the winding mechanism (1) between the reel and the helically grooved spindle.

Shift the helically grooved spindle (2) with the pillow blocks completely to the left in the mounting holes of the connecting bracket (7) (looking into the driving direction from the rear) and fasten it again.

PE-PIPE DIA. 110 / E 4: Shift the helically grooved spindle (2) with the pillow blocks completely to the **right** in the mounting holes of the connecting bracket (7) (looking into the driving direction from the rear) and fasten it again.

Move the guide block (3) of the winding carriage to the outermost reversing point on the right by turning the helically grooved spindle.

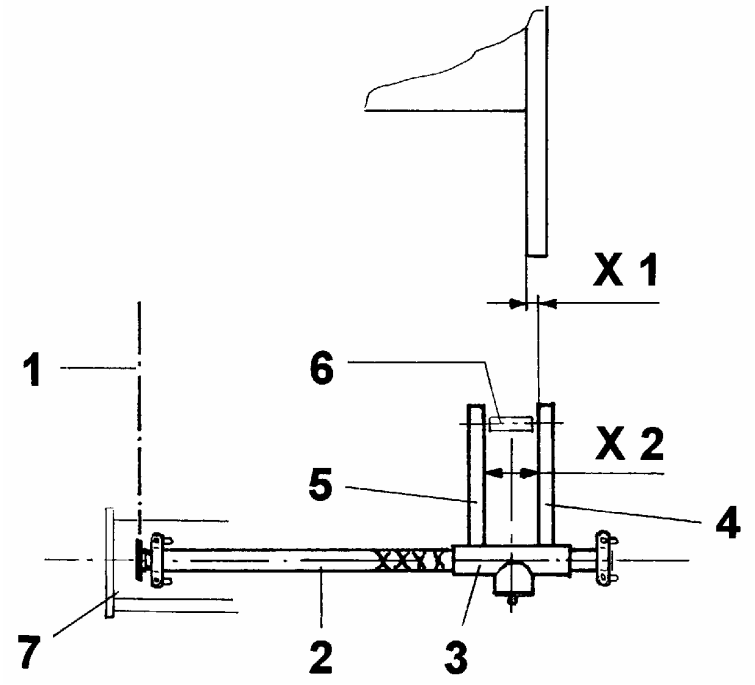
Align the right guide bar (4) of the winding carriage with the inner reel side wall at the measure **X 1** according to the drawing and fasten it on the guide part (3).

PE – pipe dia.		**X 1**	**X 2**
90	E1 *Plus , E2 Plus*	0	110
100	E1 *Plus* - E4 *Plus*	17	126
110	E1 *Plus*	14	140
110	E2 *Plus* , E3 Plus	20	140
110	E4 *Plus* , E5 *Plus*	18	146
120	E4 Plus, E5 *Plus*	18	150
125	E 3 Plus, E4 Plus, E5 *Plus*	24	160
140	E4 *Plus* , E5 *Plus*	20	170

Align the left guide bar (5) according to the guiding width **X 2** and fasten it.

WARNING! When using a PE-pipe repair coupling you must increase the spacing **X 2** symmetrically by 15 to 20 mm !

Mount the roller bracket (6) with the roller.

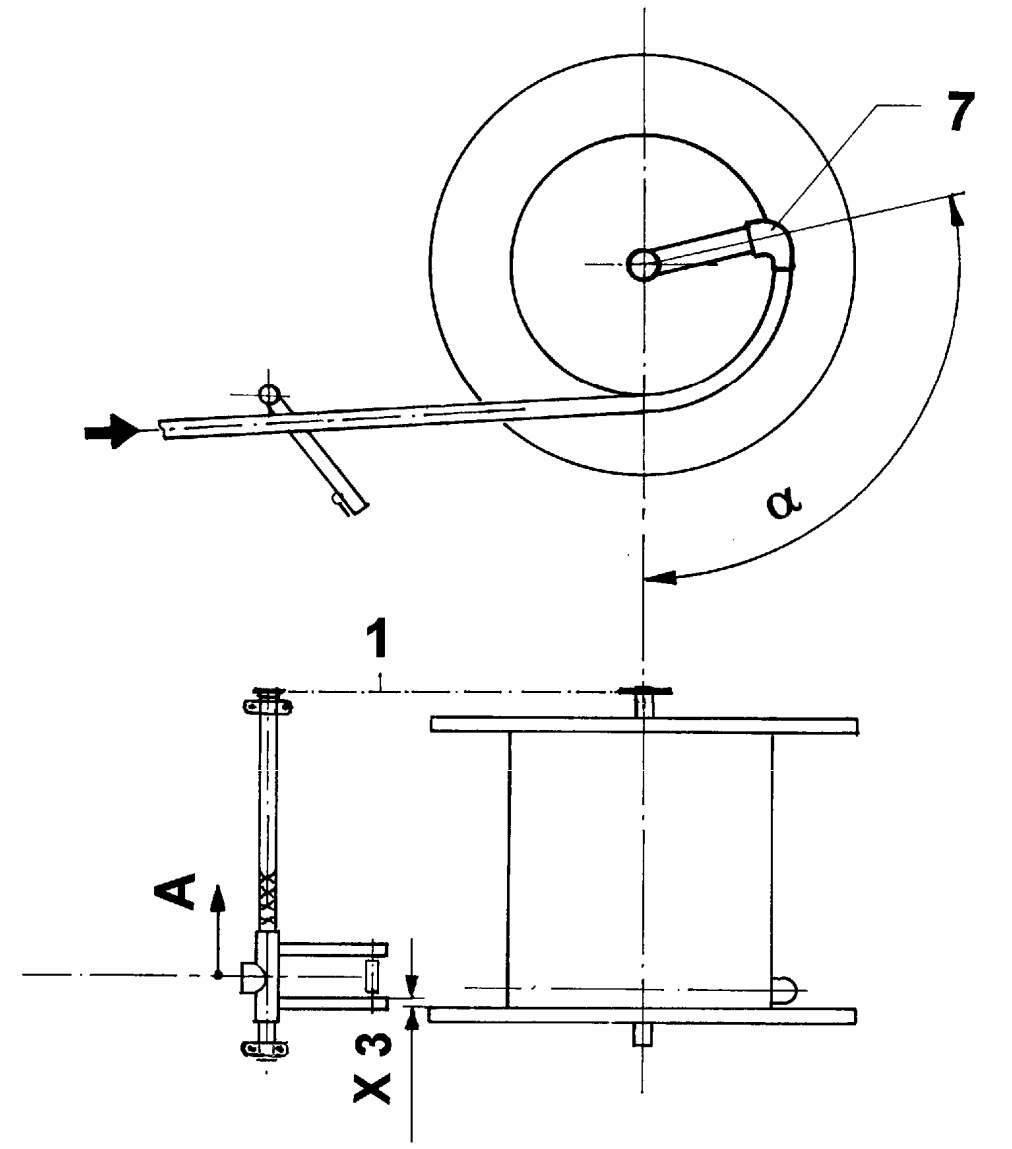


15.8. SETTING THE START POSITION

Set the reel with the inlet bend (7) according to the angle **α**.

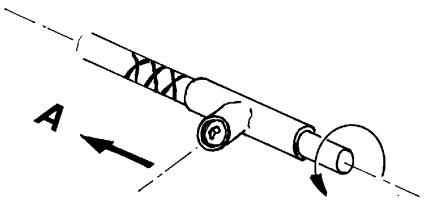
PE – pipe dia.		X3	α
90	E1 – E2 *Plus*	0	0
100	E1 - E4 *Plus*	0	0
110	E1 *Plus*	35	0
110	E2 , E3 *Plus*	0	0
110	E4 , E5 *Plus*	0	0
120	E5 *Plus*	0	0
125	E5 *Plus*	0	0
140	E4 , E5 *Plus*	0	0
125	E3 Plus , E4 Plus	60	0
120	E4 Plus , E5 Plus	60	0

Turn the helically grooved spindle and adjust the right guide bar to the reel side wall at **X 3.** (See above chart)



CAUTION! In doing so, the spindle must be turned according to the wind-up (counter-clockwise)
Thereby the winding carriage moves left from the reversing point (direction A).

Put on the driving chain (1) of the winding mechanism again.



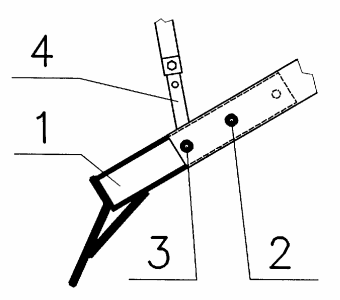
15.9. MOUNTING THE MACHINE SUPPORTS

Set up the Rainstar on level ground in an all-round horizontal position.

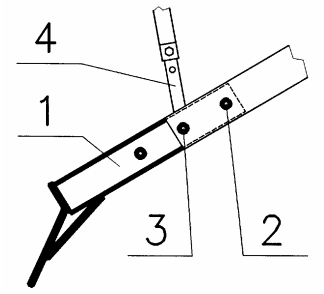
The right and left machine supports are shipped in a wooden crate.

Mount the supports on the machine as described below:

Mount the anchoring shields (1) (shipped loose) on both support legs according to the drawing.
Tighten bolt (2) firmly.
Tighten the bolt (3) with the lower support brace (4) only slightly to allow the support brace to swivel.



In special situations, if the path on which the Rainstar is standing is slightly inclined, the anchoring shield can be mounted in a 120 mm extended position.



Put the right support leg into engagement with the guide (5) (according to the drawing) and bolt it to the turntable side frame (7) with bolt (6).

Mount the support lift (8) in the turntable side frame with the bolt, turn up the fork and screw it with bolt (9).

Repeat this procedure for the left machine support.

15.10. MOUNTING AND ADJUSTING THE CART LIFT

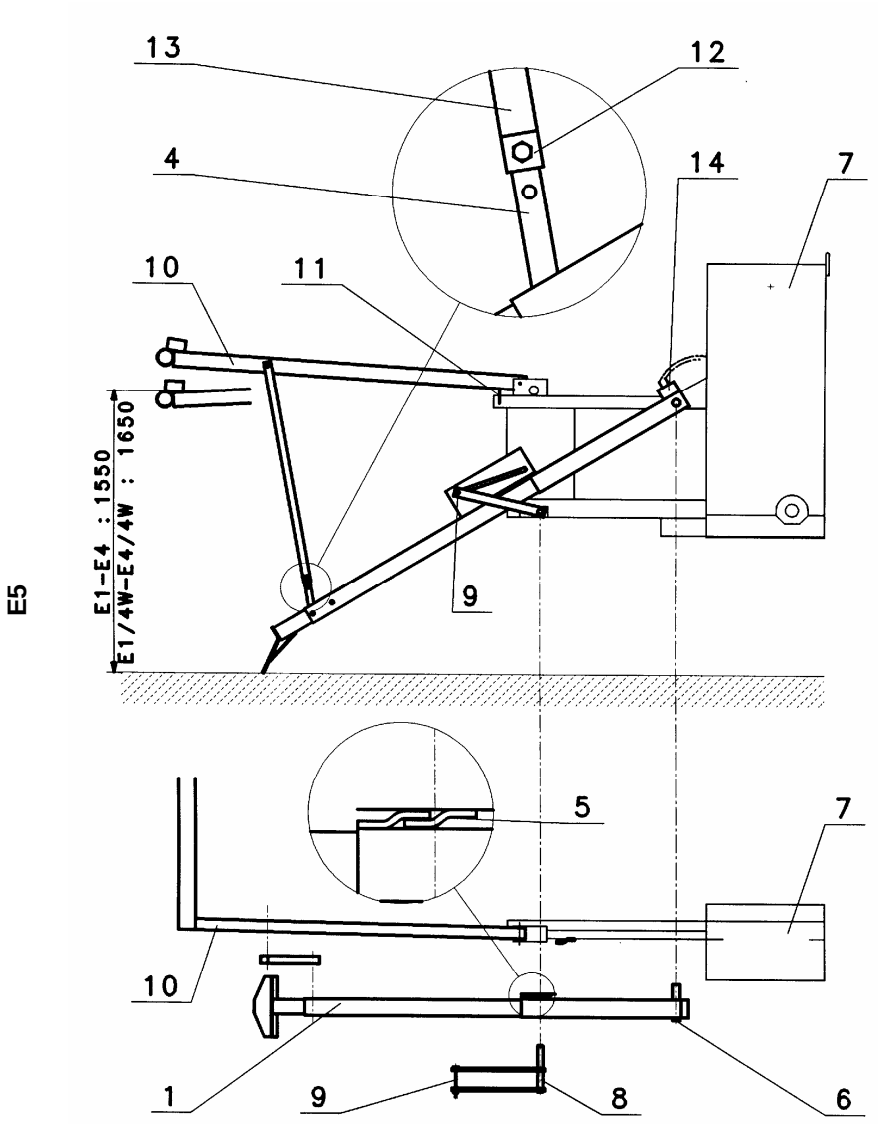
Mount the cart lift bracket (10) according to the drawing. (Stop brackets pointing upward).

Move the cross beam to 1550 mm height, adjust the setscrews (11) and secure them.

Mount both square washers (12) on the lower braces (4).

CAUTION!	The upper bore hole for E1 , E2 , E3 ; the lower bore hole for E4 , E5

Push the upper brace (13) over the lower brace (4).
Lift up the cart lift bracket (10) and screw it with the braces in such a way that it can swivel.

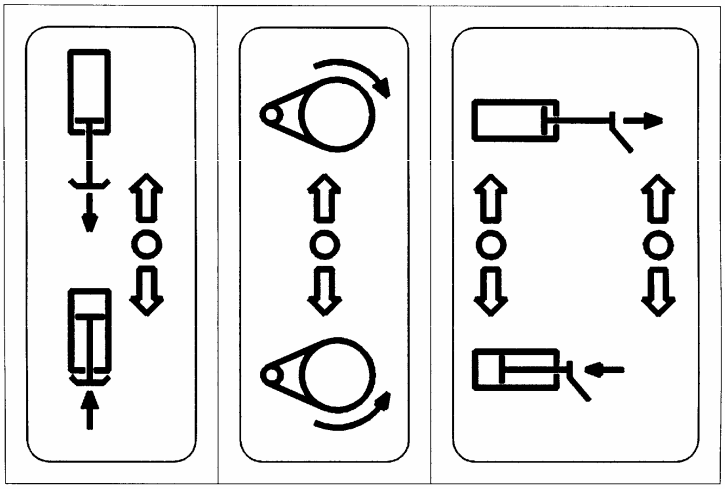


15.11. DESCRIPTION OF THE HYDRAULIC SYSTEM:

Now the hydraulic hoses are coupled with the non-return valve blocks (14).

If the inspection of the hydraulic system shows that the cylinder movements are wrong you must exchange the hydraulic hoses !

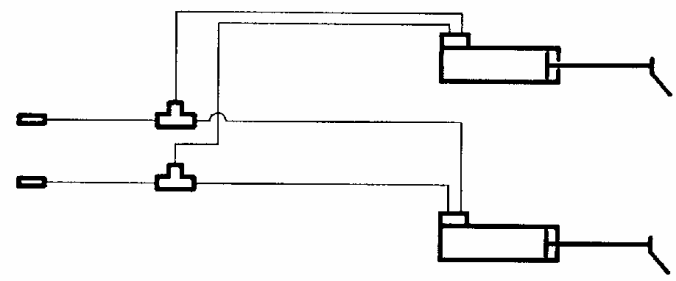
This is also necessary when the moving directions with mounted control valve options do not correspond with the predefined switching diagrams.



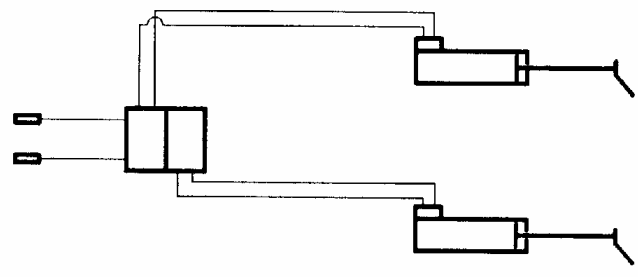
Jack **Swivel aid** **Machine supports**

The standard Rainstar outfit includes hydraulic machine supports without a control valve block.

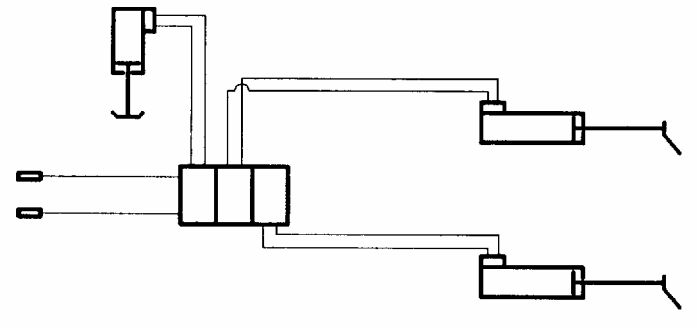
Standard“ hydraulic diagram:



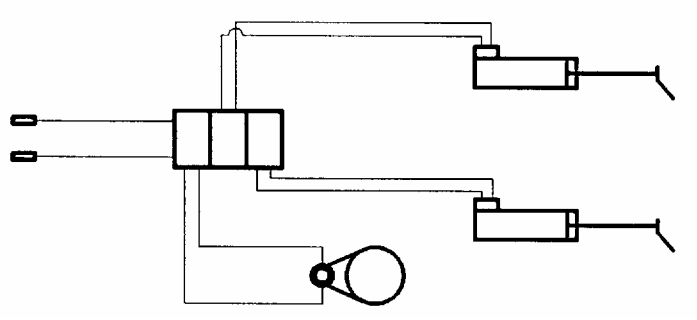
Hydraulic diagram “Control valve block - machine supports“ (OPTION)



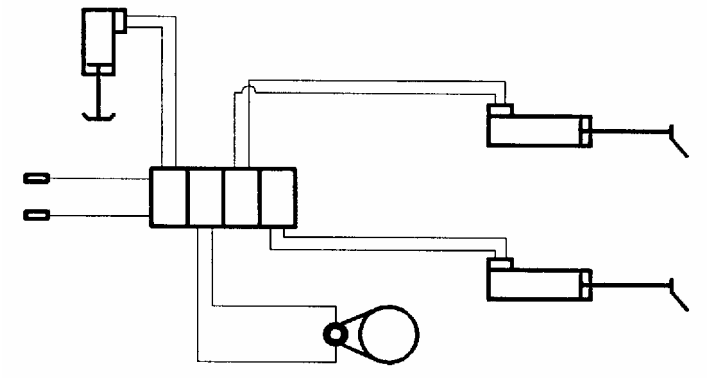
Hydraulic diagram “Control valve block - Machine supports + jack“ (OPTION)



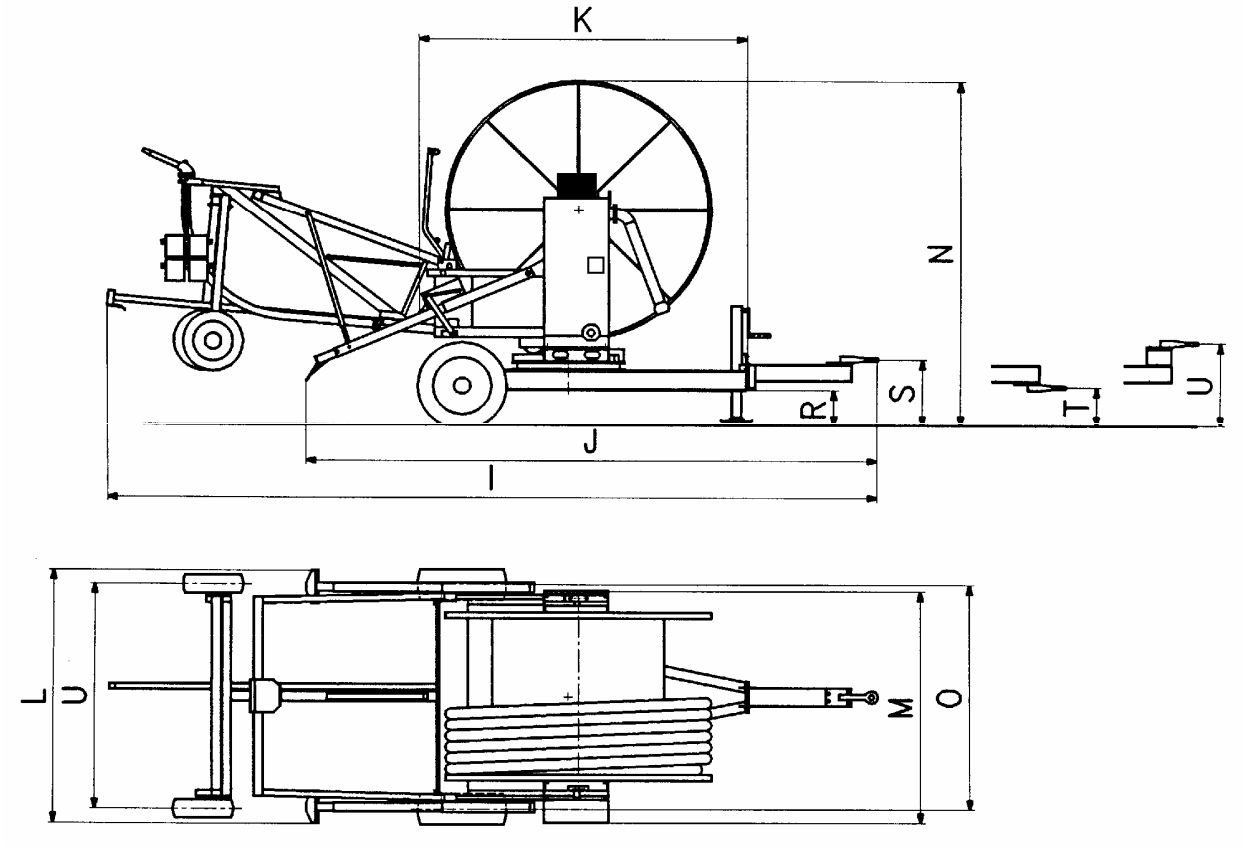
Hydraulic diagram “Control valve block - machine supports + swivel aid “ (OPTION)



Hydraulic diagram “Control valve block – machine supports + jack + swivel aid” (OPTION)



CAUTION!	For safety reasons you must handle the hydraulic system with utmost care. The rear right support and the cart area are not directly visible from the operator’s po Therefore no other person is allowed in the immediate vicinity of the machine !



A	PE-pipe dia. x length	**M**	Shipping width
B	Max. strip length	**N**	Overall height
C	Turbine	**O**	Track width of undercarriage
D	Discharge capacity	**P**	Tires - undercarriage
E	Connecting pressure	**Q**	Tire pressure - undercarriage
F	Nozzle range	**R**	Ground clearance
G	Weight incl. PE-pipe with water *	**S**	Hitch height - standard
H	Weight incl. empty PE-pipe *	**T**	Hitch height - below PTO
I	Overall length incl. cart	**U**	Hitch height - w. height increase
J	Overall length without cart	**V**	Cart track width
K	Shipping length	**W**	Cart tires
L	Max. width	**X**	Cart tire pressure

* Total weight including cart, sprinkler, and 4 sprinkler cart balancing weights.

Typ		E 1 *Plus*									E 2 *Plus*							
		90-420	**90-450**	**90-480**	**90-510**	**100-300**	**100-330**	**100-350**	**100-380**	**110-300**	**100-400**	**100-430**	**100-450**	**110-350**	**110-380**	**110-400**	**110-420**	**120-300**
A	mm x m	90x420	90x450	90x480	90x510	100x300	100x330	100x350	100x380	110x300	100x400	100x430	100x450	110x350	110x380	110x400	110x420	120x300
B	m	470	500	530	560	350	380	400	430	350	450	480	500	400	430	450	470	350
C		TX 20				TX 60					TX 60		TX 20	TX 60				
D	m3 / h																	
E	bar	3,5 - 11									3,5 - 11							
F	mm	16 - 24			16 - 22	16 - 30	16 - 28			24 - 36	16 - 28		16 - 26	24 - 34			24 - 32	24 - 36
G	kg	5069	5255	5440	5625	4794	5025	5178	5409	5282	5812	6042	6195	5997	6277	6462	6647	6008
H	kg	3265	3355	3480	3615	3050	3165	3240	3335	3180	3665	3800	3890	3665	3780	3875	3990	3650
I	mm	7400									7530							
J	mm	5450									5580							
K	mm	3160									3210							
L	mm	2530									2560							
M	mm	2170									2330							
N	mm	3380									3440							
O	mm	1800 - 2250									1800 - 2250							
P	mm	11,5 / 80 - 15,3 , 12 PLY									11,5 / 80 - 15,3 , 12 PLY							
Q	bar	6,0									5,5							
R	mm	280									340							
S	mm	620									660							
T	mm	340									380							
U	mm	790									830							
V	mm	1500 - 3000									1500 - 3000							
W	bar	165 / 70 R 13									165 / 70 R13							
X	bar	2,2									2,2							

Typ		E 3 *Plus*						E 4 *Plus*								E 5 *Plus*					
		100-480	100-500	110-450	110-470	125-310	125-350	100-520	100-550	110-500	110-520	120-420	125-370	125-400	140-350	110-570	110-620	110-650	120-520	125-450	125-500
A	mm x m	100x480	100x500	110x450	110x470	125x310	125x350	100x520	100x550	110x500	110x520	120x420	125x370	125x400	114x350	110x570	110x620	110x650	120x520	125x450	125x500
B	m	530	550	500	520	360	400	570	600	550	570	470	420	450	400	620	670	700	570	500	550
C		TX 20		TX 60				TX 20		TX 60						TX 20			TX 60		
D	m3 / h																				
E	bar	3,5 - 11						3,5 - 11								3,5 - 11					
F	mm	16 - 26		18 - 30		24 - 36		16 - 26		18 - 30		24 - 36				18 - 28	18 - 26		24 - 34	24 - 36	
G	kg	6523	6677	7023	7210	6563	7046	7381	7609	8037	8222	8115	7843	8203	8700	8930	9410	9690	9400	9040	9650
H	kg	4155	4235	4290	4365	4040	4195	4855	5005	5090	5210	4979	4710	4895	5380	5360	5620	5810	5370	5080	5400
I	mm	7530						7920								8000					
J	mm	5580						6160								6230					
K	mm	3210						3670								3740					
L	mm	2560						2670								2670					
M	mm	2330						2410								2410					
N	mm	3530						3660								4010					
O	mm	1800 - 2250						1800 - 2250								1800 - 2250					
P	mm	12,5 / 80 - 15,3 , 12 PLY						12,5 / 80 - 15,3 , 12 PLY								12,5 / 80 - 15,3 , 12 PLY					
Q	bar	5,5						5,5								5,5					
R	mm	340						340								360					
S	mm	660						680								710					
T	mm	380						400								430					
U	mm	830						850								880					
V	mm	1500 - 3000						1500 - 3000								1500 - 3000					
W	bar	165 / 70 R13						165 / 70 R13								165 / 70 R13					
X	bar	2,2						2,2								2,2					

16 CONFORMITY CERTIFICATE

EU Declaration of Conformity

in accordance with the General EU Practices for Machinery 89/392/EWG, Annex II A

We,

Röhren- und Pumpenwerk BAUER Gesellschaft m.b.H.
Kowaldstraße 2, A - 8570 Voitsberg - Austria
Tel. +43 / 3142 / 200 - 0, Telefax: +43 / 3142 / 23 0 95

herewith declare that in respect of its conception and design and in the types and styles which we market the machine mentioned below fully corresponds with the relevant fundamental provisions for safety and health stipulated in the General EU Practices for machinery.
This declaration becomes null and void should any modification be made on the machine without our prior consent

Designation: **BAUER Rainstar**

Basic models: **Series E1, E2, E3, E4, E5 Plus**

This range of machines has been developed and manufactured according to the standard:

EN 908 – June 1994

which also contains normative reference to

EN 292-1 - 1991, EN 292-2 – 1991 and EN 294 – 1992.

Voitsberg, 01.10.1999

Johann Langmann

Technical Director