BAUER

FOR A GREEN WORLD

OPERATING MANUAL

for

RAINSTAR

Series TX *Plus*

RAINSTAR TX 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 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 TX *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
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: January 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.

Index

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!

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 65/75/85/90 TX *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 capable 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 RAINSTAR according to our General Terms of Sale.

3 SAFETY PRECAUTIONS FOR RAINSTAR TX *PLUS*

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 gear shift 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 sprinkler's water jet does not hit public roads.
10. The RAINSTAR is 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 irrigating seedbed and garden crops, park areas and horticultural plantations 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 special PE-pipe, the multifunctional compact gearbox with TX20 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 turbine. It is a full-flow turbine mounted in a flow-promoting position directly on the reel. This turbine is nearly insensitive to soiled water and offers maximum efficiency. The drive shaft is made of stainless steel. The regulating cam 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.

The cart retraction speed is infinitely variable. It is adjusted by means of the ECOSTAR 4300 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 the gear wheels in the oil-filled change-speed gearbox act like a brake and prevent the PE-pipe windings on the reel from loosening during pipe pull-off.

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).

A winding carriage moved by a helically grooved spindle ensures that the PE-pipe is wound up properly on all layers.

ECOSTAR 4300 keeps the retraction speed constant on all layers independent of the pipe length still lying on the field.

Mechanical control option: In order to ensure that the retraction speed remains constant on all layers independent of the length of PE-pipe still lying on the ground, RAINSTAR machines with this option are equipped with a special layering mechanism. This compensating mechanism is activated by the speed compensating bar of the shut-off frame that fits closely on the pipe on all layers and activates the regulating cam of the turbine through the regulating rod.

At the end of the irrigation strip the cart is automatically lifted into the transport position. Thereby the automatic drive shut-off is activated by rods. After being lifted automatically the cart is locked in the transport position.

If the machine is equipped with a shut-off flap (ECOSTAR) or a shut-off valve (mechanical speed regulation) the water supply to the machine is shut off simultaneously.

After shut-off the RAINSTAR can be transported to its next setting-up position immediately. Then the PE-pipe can be pulled or laid down again, the water supply connected, 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 and locked. 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 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 PERFORMED ONCE OR AS REQUIRED

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. Two weights will do for nozzle diameters from 14 to 24 mm. For diameters larger than 24 mm two additional weights should be placed on the pendulum when the smallest track width setting is used.

Nozzle DIA	Track 1500
14 - 24 mm	2 weights
from 25 mm	4 weights

If the asymmetric cart design is used, the cart pendulum must be loaded with two weights and the opposite cart wheel with two additional weights.
Set the part circle on the wide-range sprinkler (approx. 220° for full strip width). Confer to separate sprinkler manual for detailed sprinkler instructions. Adjust the WINDGUN to prevailing wind conditions by adjustment of the trajectory angle.

5.2 OPERATING MODE I: PE-PIPE PULL-OFF

5.2.1 Machine transport 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 withdrawn. 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 about level with the jack.

When you position 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.

Remove transport lock bolts from support legs.

WARNING! Machine supports slide to the ground automatically.

Drive the supports into the ground with the detachable hand wheel ...

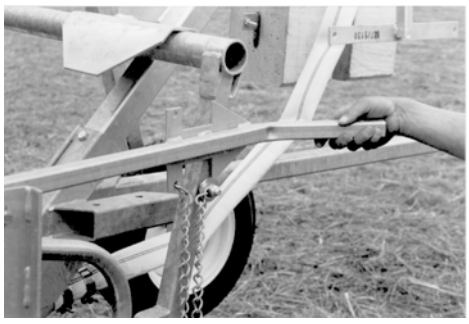
..... and secure the supports with lock bolts.

If your RAINSTAR 90 TX *Plus* is equipped with the „hydraulic machine supports“ option, couple both hydraulic hoses with the tractor’s hydraulic system and extend the supports.

WARNING! The standard RAINSTAR equipment does not include a control unit (Optional). Therefore the tractor’s hydraulic system must be switched over accordingly after the hoses have been coupled. If this is not possible exchange the two hoses.

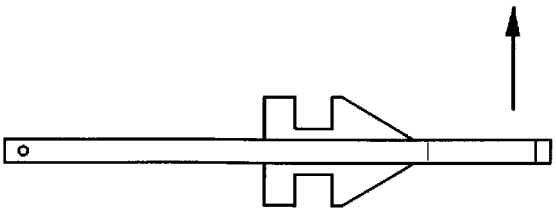
On very hard soil the machine supports must be lowered or extended into the holes dug into the ground for this purpose.
Machine supports are equipped with a spike which penetrates the soil very easily with the „hydraulic supports“ option.

5.2.2 LOWERING THE CART

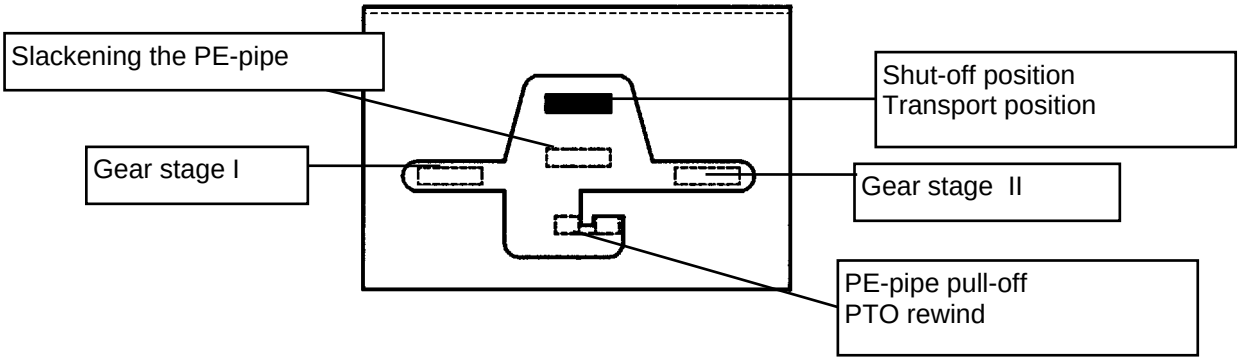


Disengage the mechanical locking of the cart in the operating position.

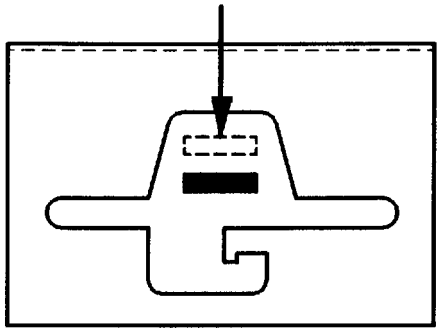
WARNING! In doing so the operator's position should be outside of the machine supports.



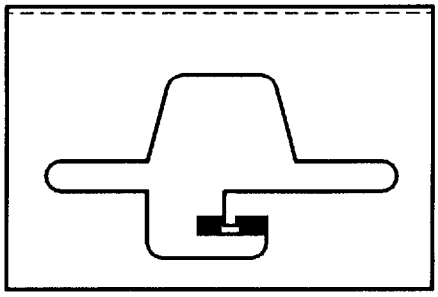
POSITIONS OF THE GEAR SHIFT LEVER



Push the gear shift lever downward carefully - the carts moves down slowly.

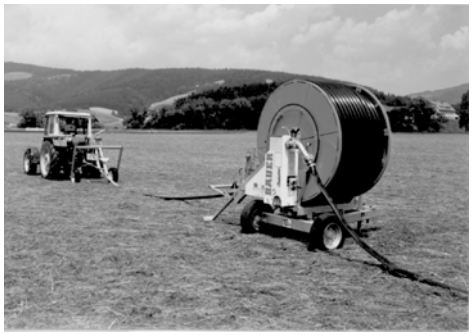


Move the gear-shift lever to the „PE-pipe pull-off“ position. A spring presses the lever up and locks it.



5.2.3 PE-PIPE PULL-OFF

Pick up the draw-out hook with the toolbar and start pulling the cart .



The standard wheel cart or the asymmetric wheel cart need not be hoisted (therefore 1 draw-out hook is sufficient).
Pull-off speed: do not exceed 5 km/h!

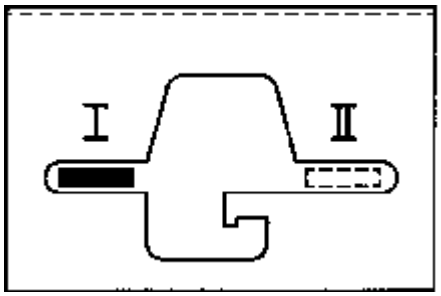
Do not stop abruptly. Always slow down gradually at an intermediate stop in the field or at the end of the pull-off. Stop pulling off the pipe when the white marking line becomes visible on the reel.

WARNING!

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

Couple the pressure hose. Open the water supply.

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.



Position I slow retraction
Position II fast retraction

I f a w r o n g p o s i t i o n h a s b e e n s e l e c t e d :

WARNING! CAUTION WHEN CHANGING GEARS: never change gears when the PE-pipe is stretched!

Procedure

I - O - slackening the PE-pipe - II
II - O - slackening the PE-pipe - I

Slackening the PE-pipe – see „Proper procedure" on following page.
Shifting into gears I and II is only possible when the cart is lowered and the turbine rotating!

CAUTION!

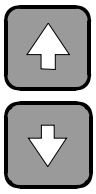
When the cart is lifted in the shut-off position the gear-shift lever is held in the 0 position and shifting is not allowed!

The reel starts pulling in the PE-pipe .

5.2.4 SPEED CONTROL WITH ECOSTAR 4300

CAUTION!	Do not set the speed until half a PE-pipe winding has been wound up on the reel and the pipe is already stretched.

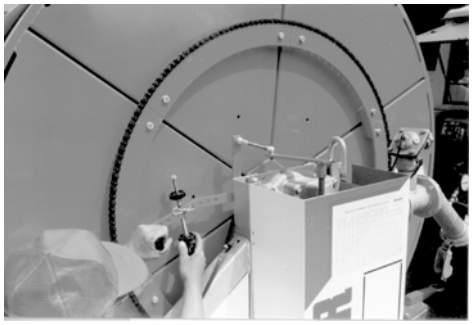
Set the required retraction speed with the arrow keys in the operating mode of ECOSTAR 4300.
You can readjust the speed any time while the machine is operating.



See Retraction speed control with ECOSTAR

5.2.5 SPEED ADJUSTMENT with mechanical regulation (Optional)

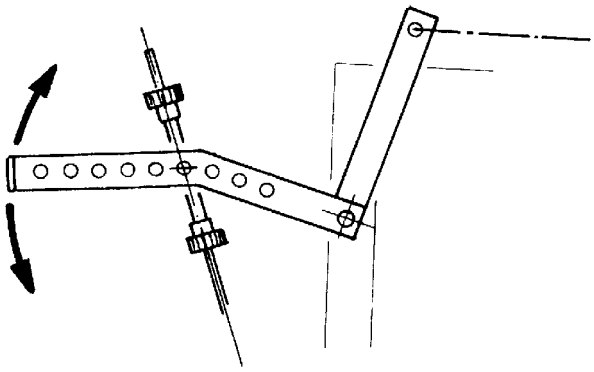
CAUTION!	Do not set the speed until half a PE-pipe winding has been wound up on the reel and the pipe is already stretched.



Loosen the knurled nuts that secure the adjusting lever. Set the desired retraction speed with the adjusting lever – the speed is indicated on the tachometer (optional equipment). Afterwards secure the adjusting lever again with the knurled nuts.

Lever up = slower

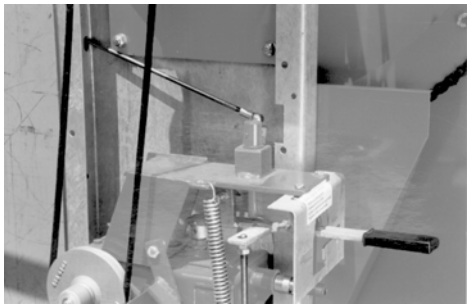
Lever down = faster



WARNING!	The drive has four speed ranges (see Functional Description on page 16).

Therefore the speed reading on the tachometer (optional) must be applied to the appropriate chart.

At the end of the run the cart is lifted automatically and the drive is shut off through shut-off rods.



The water supply is stopped by means of the „overpressure shut-off valve“ option, or the pumping unit is shut down by the „low-pressure shut-off valve“ option in combination with a pressure switch in the supply line.

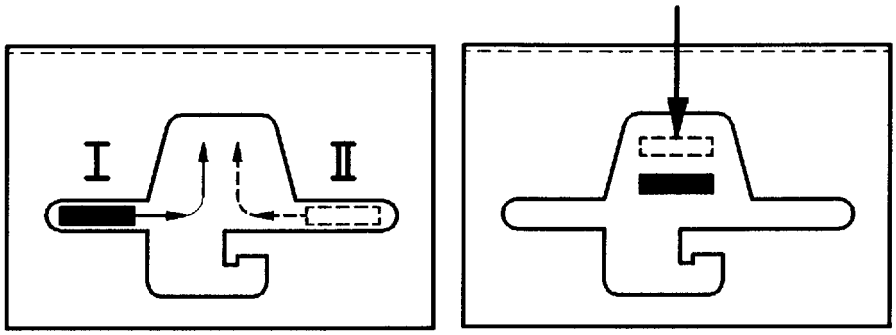
When the pipe has been fully rewound, relieve the machine supports with the hand wheel, move them into the transport position and secure them with the locking bolts.

If the RAINSTAR becomes misaligned or pulled aslant during the irrigation run, it must be realigned. For this purpose you have to slacken the PE-pipe first.

Proper procedure:

1. Shut off water supply to the RAINSTAR. The PE-pipe slackens only slightly through the turbine acting as a hydraulic brake.

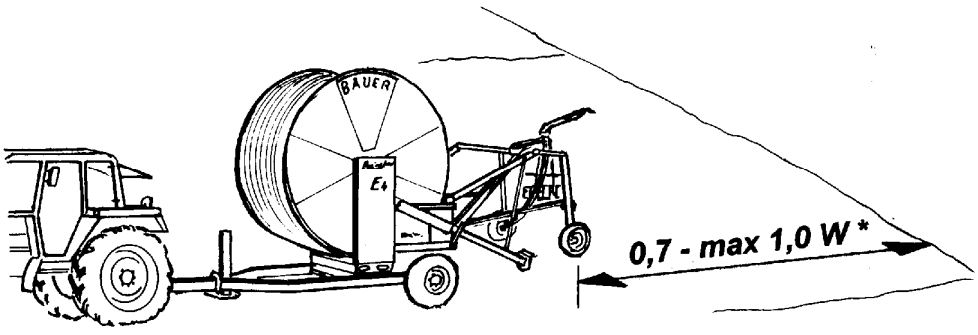
2. Move gear shift lever to the middle position and slacken the pipe by pushing the lever down slowly and carefully.



3. Realign the machine and support it adequately.
4. Open the water supply again. PE-pipe retraction continues.
5. Put the gear shift lever into the desired position.

5.3 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 the RAINSTAR into the field allowing for the sprinkler's distance of throw.

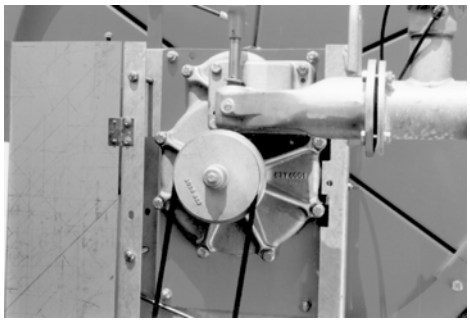
*) W = distance of through of the sprinkler

Lower the cart as described in Operating mode I, chapter “Lowering the cart” and anchor it slightly. Now drive over the field with the machine.

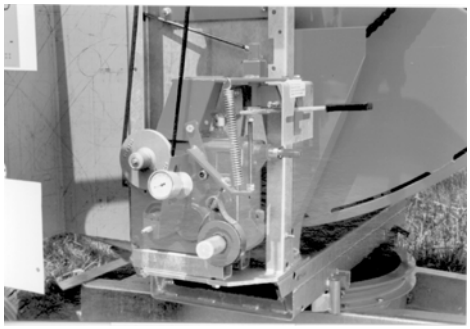
Carry out all other steps as described before.

5.3.1 FUNCTIONAL DESCRIPTION OF THE MAIN COMPONETNS

5.3.1.1 MACHINE DRIVE - FULL-FLOW TURBINE

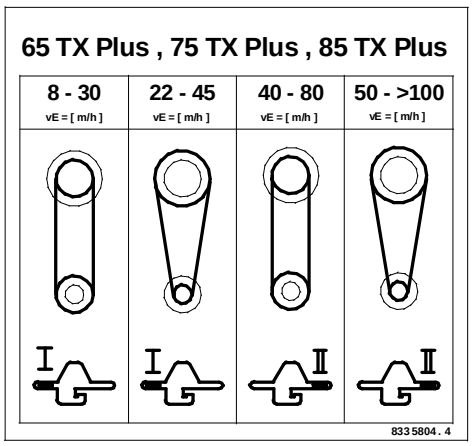


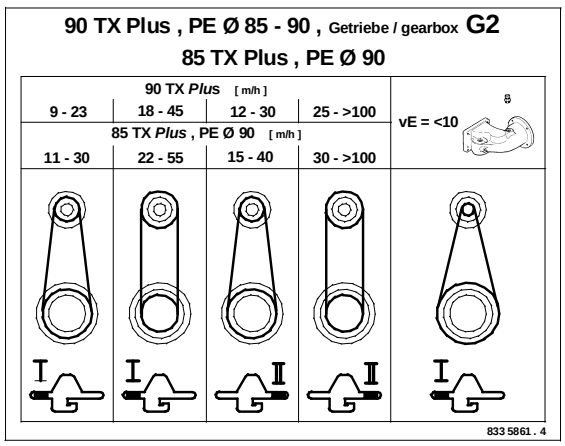
TX20 full-flow turbine is a specifically designed turbine with large cross sections and minimum pressure loss. Therefore it can reach high retraction speeds also at very low flow rate. It features a highly flow-promoting design and is mounted directly on the reel shaft. The turbine provides the energy needed for PE-pipe retraction. Speed is taken directly off the impeller shaft and transmitted over a two-stage (three-stage) V-belt drive to the change-speed gearbox.



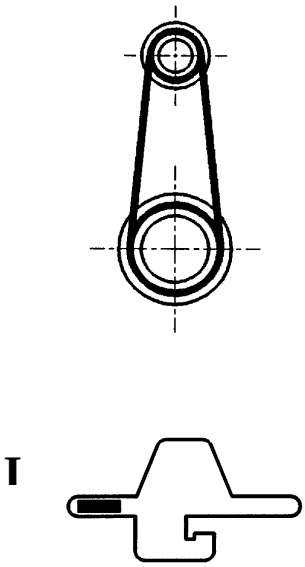
The change-speed gearbox contains gear wheels which reduce the turbine’s speed accordingly. The gearbox features two speeds. Reel drive stop at the end of the irrigation strip is achieved by disengagement of the toothed clutch.

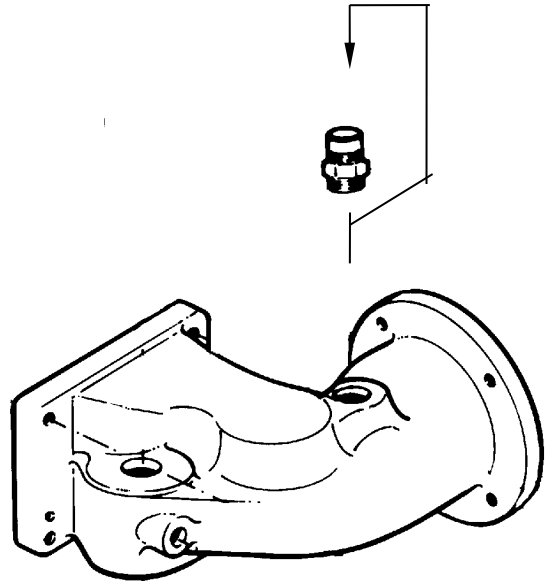
In combination with the two belt stages the two-speed gearbox allows precise adaptation to existing operating conditions. As a result, the following retraction speeds (m/h) can be reached:





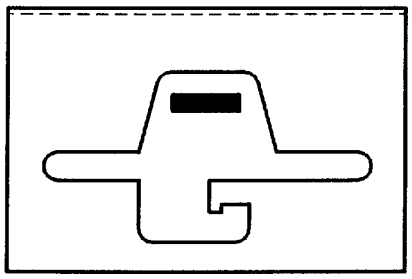
On RAINSTAR models with 90 mm PE-pipe diameter (basic units 85 TX and 90 TX) the turbine is fitted with a special connecting bend as well as a three-stage V-belt drive.
This design allows low retraction speeds and as a result precipitation rates of up to 50 mm, even in case of large flow rates (up to nozzle dia. 30 mm).
For this purpose you screw out the regulating screw (1) which is easily accessible, and screw it back into the hole after turning it around 180° with the sealing cone side pointing outward.
As a result, part of the water flow is redirected above the turbine's impeller.
This reduces the output of the turbine and consequently also the retraction speed.
Moreover, the 3-grooved V-belt pulley provides an additional reduction stage so that the low retraction speed required for such extreme conditions can be reached (for 50 mm precipitation height).





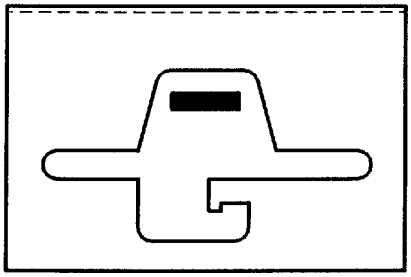
WARNING!

Never remove the drive cover for service work or change of the transmission unless the PE-pipe has been completely slackened! Put the gear shift lever into the shut-off position! This shut-off position applies also for transporting the machine on streets and roads!

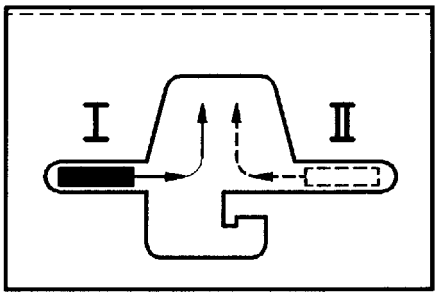


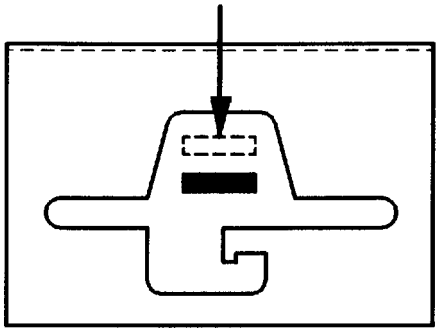
Switching from I to II or the other way round is easy to do with the gear shift lever when the cart is lowered and the turbine rotating.

But note:
When the cart is lifted and in the shut-off position, the gear-shift lever is held in “0” position and shifting is impossible! If the PE-pipe is stretched you have to slacken it first, before engaging the next gear



Move the gear shift lever from a gear stage to the middle position. A spring presses the gear shift lever up and prevents fast reversing of the reel and PE-pipe by means of the band brake. By pushing the gear shift lever down very slowly you release the brake and slacken the PE-pipe.





Afterwards you can change into the required gear.

PTO DRIVE

If required, you can rewind the PE-pipe with the tractor and a PTO shaft. Move the gear shift lever to zero position. A spring presses the gear shift lever into the locking recess. In this position the band brake is released. This gear shift lever position serves also for PE-pipe pull-off.

Rewinding the PE-pipe with the PTO shaft becomes necessary if irrigation is no longer necessary due to natural rainfall or if the PE-pipe has been pulled off to drain the machine for winterization

WARNING!

- Rewind at lowest possible PTO speed – start slowly and smoothly – always avoid jerky start-up.
- **Maximum PTO speed = 540 rpm**
- Avoid extra strain by smallest possible PTO shaft articulation.
- If the PE-pipe is covered with mud it should be loosened and set free before the rewind operation to reduce the pulling forces.
- If the soil is deep and heavy the rewind must be carried out at a lower speed in order to ensure that the permissible loads and pulling forces for PE-pipe and RAINSTAR are not exceeded.
- If you disengage the tractor's PTO during PE-pipe rewind the reel must stand absolutely still when the PTO shaft is re-engaged. Double motion may cause severe damage.

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

6 ECOSTAR 4300

ReTRACTION SPEED CONTROL

6.1 General

The **BAUER *ECOSTAR 4300*** allows you to operate your irrigation machine with ease at the touch of a button.

An illuminated four-line display offers you comprehensive indication of the machine's current operational status.

Through permanent comparison of set-point and actual value of the retraction speed you can administer the precipitation rate you need.

The *ECOSTAR 4300* consists of the electronic box, a cable harness with the connected sensors for the PE- pipe length retraction speed and shut-off as well as connections for battery, solar panel and the turbine regulation motor.
Connections are also provided for installing a pressure switch and an electric shut-off valve (both optional).

The electronic system of the ECOSTAR *4300* is rigidly built and has been tested under different climatic conditions. If problems still occur it is advisable to exchange the complete electronic box. If a sensor is defective it is possible to exchange only the sensor, too.

6.2 DISPLAY WINDOWS AND MENU OVERVIEW

```
SPEED                30.0m/h
DOSE        22 mm
TIME        14:10    STOP    7:43
STATUS Operation
```

Standard display

```
ZONE               1  30.0m/h
DOSE        22 mm
TIME     14:10     STOP     7:43
STATUS Operation
```

Standard display, Zone active

```
DISTANCE         123m
BATTERY         12.8V
CHARGE ON      0.231A
PRE-  0:45 NACH- 0:45
```

Press button **MENU** one time, in order to get to the display of menu 2.

```
PRESSURE SENSOR        ▉

STOP SENSOR          ▉
SPEED SENSOR       ▉ ▉
MOT1 0.0A MOT2  1.8A
```

Press button **MENU** two times, in order to get the display of menu 3.

```
ACT. SPEED   22m/h
START            0:00

OPERATING HOURS   123h
```

Press button **MENU** three times, in order to get to display of menu 4.

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

Press button **MENU** four times, in order to get to display of menu 5.

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

Press the button **MENU** five times, in order to get to display of menu 6.
(Only if GSM has been selected)

When the sign ▉ appears on the display, it means that the respective function is turned on.

Standard MENU:

```
SPEED         30.0m/h
DOSE            22 mm
TIME     14:10     STOP     7:43
STATUS operation
```

Standard display

SPEED

Speed can be changed at any time during the irrigation, using the keys „+“ und „ –“.

ZONE

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

DOSE

The precipitation rate is calculated by means of constants, and shows the current mm for irrigation. If the **SPEED** increases, the **DOSE** decreases. (constant 11 and 12)

TIME

To set the time: first set the speed to 11,1 m/h, and then press the ***PROG***- button 3 times to get to <**CONST 1 TIME**>. The time can be set with the buttons „**+“** and „ **–“**. When the battery has been removed the time is 00:00, and remains zero until it is set.

STOP

Time when the irrigation is finished incl. pre- and post irrigation.

STATUS

Irrigation status:

```
<Stop sensor  >
<Running      >
<PRE Irrigate >
<POST Irrigate>
<LOW Pressure >
```

Explanation see STATUS chapter

If the display shows **LOW BATTERY instead of SPPED**, the voltage in the battery is less than 11,8 V and the battery needs to be charged.

MENU 2

```
DISTANCE        123m
BATTERY        12.8V
CHARGE ON     0.231A
PRE-  0:45 POST- 0:45
```

DISTANCE

The remaining length of the pipe. Distance can be changed immediately after pressing PROG three times, then it can be changed with keys „+“ and„ –“.

BATTERY

Battery voltage.

CHARGE ON

Shows if the battery is charged from the solar panel. The battery is charged when the voltage is below 14,0 volt.

PRE-

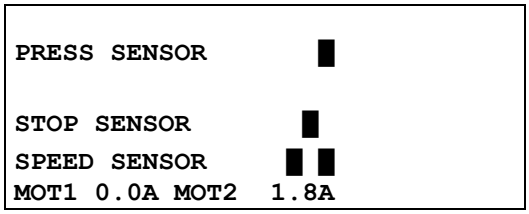
Current pre irrigation time.

POST-

Current post irrigation time.

Pre- and post irrigation time can be changed immediately after pressing ***PRE***- or ***POST*** – with keys „**+“** and „**–“**.

MENU 3



PRESS SENSOR

Shows if the pressure is high.The marker is on when the water pressure is high.
The machine can only work when the pressure is high.

STOP SENSOR

Shows if the stop switch is activated. The marker is on when the stop switch is on.
The machine can only work when the stop switch is on.
The stop switch has three functions:

1: Resets the distance counter
2: Post-irrigation
3: Inhibits the pulses to the regulating motor.

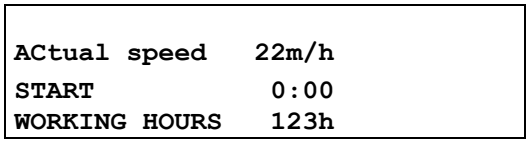
SPEED SENSOR

Test speed sensor. The marker is on when the magnates activate the speed sensor.

MOT1, MOT2

Shows the current power consumption of the motor. The motor is stopped when the power consumption exceeds 4,5 A. If the power consumption exceeds 4,5 A, and the motor has not reached its end position the shut off valve is blocked.

MENU 4



ACTUAL SPEED

Shows the current speed of the machine. Furthermore, the maximum running speed of the machine can be checked if the *ECOSTAR 4300* is set to a much higher speed than the machine can run.
The current speed can differ from the set speed, especially at the start. This is not an error because the *ECOSTAR 4300* ensures that the medium speed over a distance of 10 m is correct.

START

With this function the starting time of the machine can be delayed for up to 24 hours.
To set the start time press „PROG“-key three times and the time can be set with the keys „**+“** and „**–“**.

WORKING HOURS

The total working hour since the electronic was started for the first time.

MENU 5

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

In this menu the irrigation can be set and four different retraction speeds are possible.
Press the „PROG“ key three times.
Further details see below.

MENU 6

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

SIGNAL GSM-signal strength
NETWORK GSM-Network type
A: First phone number on the SMS-list
B: Second phone number on the SMS-list.

Detailed description in the chapter GSM.

START:
The turbine can only start if the magnet activates the stop sensor (or stop sensors), see Menu 3 for controlling the function of the stop sensor. When the ***„START*** key is pressed the shut-off valve opens. Next the by-pass valve closes (the turbine starts). If the magnet does not activate the stop sensor only the shut-off valve opens. This is used if the pressure should be released before disconnecting the hose at the hydrant.

DELAYED START TIME OF IRRIGATION:
First press ***„STOP“***-key for closing the inlet of water. Next press ***„MENU“***-key 3 times (Menu 4), ***„PROG“***-key 3 times and you can start time. Finally, pre- and post- irrigation can be selected.

STOP:
When the magnet is removed from the stop sensor, the turbine stops and the shut-off valve over-pressure closes (or if available the shut-off valve low-pressure opens).
If post-irrigation is chosen, the turbine stops and after the post-irrigation time the shut-off valve closes. If the key ***„STOP“*** is pressed, the turbine stops and the shut-off valve closes, regardless if post-irrigation was selected.

SUPERVISON:
The ECOSTAR 4300 has an integrated supervison system. SUPERVISON is activated if for some reason the machine irrigates at the same place longer than a specified time. This time is factory adjusted to 20 minutes, see programming for changing this time. If it set to 0 there is no supervison.

SPEED :
The speed is set with keys „**+“** and „ **–“**, at first the speed changes step by step 0,1 m/h, after 10 steps for 1,0 m/h. The speed can be changed at any time, even while the machine is running. If the time is checked it shows the new time for the remaining irrigation.

PRE-IRRIGATION:
Pressing the key ***PRE-*** can activate pre-irrigation. The time for pre-irrigation is calculated by the *ECOSTAR 4300* as 8 x the time for running 1 meter with the current speed.
The constant „8“ (constant no. 2) can be changed, see programming. If the pre-irrigation is on the machine starts and runs 1/2 pm enter and then it stops for the pre-irrigation time. By pressing the key ***„START“*** the pre-irrigation is cancelled. The magnet at the stop sensor should be in place, before activating the pre-irrigation.

POST-IRRIGATION:
The post-irrigation can be activated by pressing the key ***„POST-“***. The time for post-irrigation is calculated by the *ECOSTAR 4300* as 8 x the time for running 1 meter the current speed. The constant „8“ (constant no.3) can be changed, see programming. The post-irrigation starts to count down when the magnet is removed from the stop sensor. When the magnet is removed, the motor for speed regulation stops the turbine. After the post-irrigation time the shut-off valve closes (or opens, is available, the valve low pressure) At machines with only one motor for speed regulation the turbine starts after the post-irrigation. By pressing the key ***„START“*** the post irrigation is cancelled. The magnet at the stop sensor should be in place before activating the post-irrigation. If the constant no.8 “early stop” is selected, this function is activated. The machine shuts down if the distance is reached.

6.3 PROGRAMMING OF 4 DIFFERENT SPEEDS

Display must show menu 5.
The pipe should be pulled out before programming, so the computer can calculate the distance of the field to be irrigated.
In the following example the length of the field to be irrigated is 400 m.
Press the ***„PR0G“-Key*** 3 x. The display shows.

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

The desired speed can now be set, here 25,0 m/h. Then press the ***„PROG“***-key 1 x. The display shows:

```
400m     25.0m/h   0m
  0m     30.0m/h   0m
  0m     30.0m/h   0m
  0m     30.0m/h   0m
```

The desired distance can now be set, here 300 m. Then press the ***„PROG“***-key 1 x. The display shows:

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

Now the first zone is programmed and the procedure is continued for all 4 zones.
Zone 4 automatically ends at 000m.
When zone 4 is programmed press again the ***„PROG“***-key. The display shows:

```
DLETE MENU PRESS
SAVE   PROG PRESS
```

By pressing the key “***PROG“***- the program is saved and the irrigation is carried out according to the program. By pressing the key ***„MENU“***-the program is deleted and the speed stays the same for the whole field.

6.4 STATUS DISPLAY

STATUS: Status messages in display

EMERGENCY: machine has not been started, speed impulses, however, are being received and it is trying to maintain the speed requested.

RUNNING: Machine is irrigating, everything is working properly.

LOW PRESSURE: Water pressure is below pressure switch threshold. Machine acts depending on machine data.

START: Operator has pressed ***„START“***-button and the start sequence is in progress

START REMOTE: Machine is starting due to an ***SMS.***

START DELAY : Machine is waiting for start delay to elapse (see menu 4).

START PRESSURE : Machine has started due to pressure rise. Machine uses pressure level to start 2nd machine on string.

START DENIED: Operator is holding ***„STOP“***-button to prevent ***PRESSURE***- and ***REMOTE*** start zu verhindern.

STOP USER: Machine has stopped due to operator ***STOP***.

STOP REMOTE: Machine has stopped due to an ***SMS***.

STOP SENSOR: Machine has reached end and is stopped by ***STOP SENSOR.***

STOP DISTANCE: Machine has reached distance for stop (see constant No. 8 for early stop).

STOP DELAY: Machine has reached stop but waits nn seconds to proceed stop sequence..

STOP DENIED: Operator is pressing ***„START“***-button to prevent REMOTE stop.

SUPERVISION TIME: Machine has stopped due to supervision time is elapsed. Machine has not moved in nn minutes (see constant for supervision time)

FORCE LOW PRESSURE: Machine opens shut-off valve to force pressure drop in order to stop the pump. After 2 minutes valve closes to prevent draining of pipe.

PRE IRRIGATION: Machine is performing pre irrigation.

POST IRRIGATION: Machine is performing post irrigation.

There are different constants that can be set by the user.
These constants will be saved for years even if the battery is disconnected.

6.5 The MOST COMMON COMBINATION OF DIFFERENT CONSTANTS

The machine will always run with the constants adjusted in the factory. But there are different conditions from farm to farm and farmers also have different requirements. Therefore, some constants can be adjusted to the local wishes.

1. Slow start of turbine. Machine data no.13. Adjust the value to 4sec to start.
Now the valve for control of speed will close about half and continue to close stepwise until the adjusted speed is reached. Correct adjustment is: Continuously closing of the valve until the turbine starts running and stepwise until adjusted speed is reached.

2. Slow opening for the inlet of water. Machine data No. 17 . Set the value to 1. =
The opening is done stepwise.

3. Only 1 motor for speed regulation. Machine data no. 12. Value 0
Post-irrigation must take place as follow: when the stop sensor is activated only the retraction stops. When the post-irrigation is finished the machine starts again and runs to the mechanic stop.

4. Start of the 2nd machine when the 1st machine has reached stop.
Machine data No. 14. value 2.
The machine must be equipped with an adjustable pressure switch. Adjust the pressure switch to a point between the normal pressure and the pressure when the pump will stop. Example: the normal pressure is 7 bar, the pressure for pump stop 9 bar. Adjust the pressure switch to 8 bar on both machines. Start the 1st machine by pressing start. Adjust the 2nd machine, but press stop. When the first machine is ready the second machine starts as soon as its pressure has reached 8. Please note: 10 m of height difference make a pressure of 1 bar.

5. Stop of the machine when pressure is low and a pressure switch is mounted. Constant no.6 = value 1
Machine data No. 12 must be adjusted to a value of 2. Now the shut-off motor turns into the opposite direction. This means that when the cable connection stays the same the shut-off valve opens. After two minutes the shut-off valve closes again.
Only the combination of stop sensor, stop button and supervision can open the shut-off valve. The pressure switch, however, cannot open the valve.

6. Pre-irrigation before machine reaches the stop
Constant No. 9 can be set to the meter number where the post-irrigation should take place.

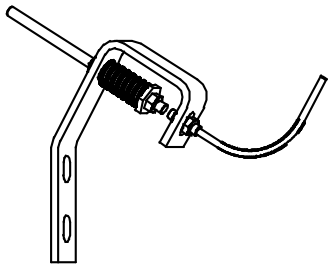
ATTENTION!	Open the front plate very carefully. In order to ensure moisture protection by the cover gasket also the cover must be closed carefully!

ATTENTION!	Welding – and repair works at the RAINSTAR should only be done when the battery is disconnected!

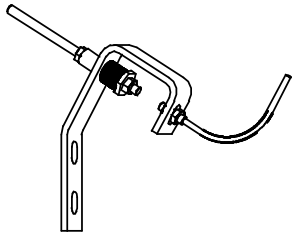
6.6 STOP - SENSOR

The machine can only work if the stop sensor is activated or in 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* is shut-off.
   In the standard program the post-irrigation is activated 8m before the irrigation ends.
3. Prevents pulses to the regulating motor.
   After the stop sensor is activated, no pulses are passed on to the regulating motor.

Press the key **MENU** 2 x, to get to the display of menu 3. Her it shows if the speed sensors are working . The sign ■■ shows if a magnet activated the two speed sensors.

Line four shows if motors 1 and 2 are switched off after they have reached their mechanical stop.
If sign ■ shows and one motor has not
reached its end position there is a blockage on the inside of the turbine (MOTOR 1) or the valve(MOTOR 2).
The motor switches off when the power consumption exceeds 4,7 ampere and ■ appears on the display.

If the display shows a flashing MOTOR 1 it means that the motor is running

```
SPEED      30.0m/h
DOSE      22 mm
TIME        14:10   STOP   7:43
STATUS MOTOR 1
```

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

```
SPEED      30.0m/h
DOSE      22 mm
TIME       14:10    STOP    7:43
STATUS MOTOR 2
```

By pressing the key PROG/POWER ON 

or the PE-Pipe is laid out, the electronics is activated again.

The battery is charged only if the electronics is activated. There is no charging when in standby.

6.7 Operation of the BAUER ECOSTAR 4300

Summary:

- Pull off or lay down the PE – pipe
- Connect water supply
- Engage gearbox

ECOSTAR: make settings only in the standard menu:

Take over retraction speed from the last retraction or set again.

Press "START-RESET“ 

key

Activate pre-irrigation if required
Activate post-irrigation if required
Open water inlet
Irrigation runs automatically

FURTHER OPERATING INSTRUCTIONS

After a longer standstill the electronic system of the *ECOSTAR 4300* is on standby.
Pulling off or laying down the PE – pipe activates the electronic system and the length of the pulled off or laid down pipe is metered.

For display of laid out PE-pipe, press key Menu 1 x:

```
DISTANCE         123m
BATTERY         12.8V
CHARGE ON      0.231A
PRE-  0:45 POST- 0:45
```

6.7.1 SPEED ADJUSTMENT

The pre-adjusted speed of 30 m/h can be increases or decreased with the arrow keys

At first the speed changes step by step for 0,1 m/h, then after ten steps there is a change of 1,0 m/h.
The speed can be changed at anytime while the machine is running.
The remaining time until the end of irrigation is also changed.
The speed cannot be changed while one of the servo motor for the turbine regulation or shut-off valve is running.
The display shows MOTOR 1 or MOTOR 2.
When changing the speed also the corresponding time changes.

```
SPEED       30.0m/h
DOSE       22 mm
TIME        14:10     STOP     7:43
STATUS OPERATION
```

Important!	When setting the speed it is necessary to check on the speed that is actually possible according to the test window (press menu key 3 x). In case of variation the set speed must be reduced to the speed that is actually possible.

6.7.2 PRE – OR POST IRRIGATION

With the keys PRE – or. POST IRRIGATION 

these functions can be activated.

The time for the pre- and post is pre-programmed and is calculated by the *ECOSTAR 4300* as 8 times the time for covering a distance of 1 meter with the actual speed.

e.g: for vE = 20 m/h there is a time of 3 min for 1 m retraction
This makes a pre-irrigation time of 8 x 3 min = 24 min
and a post irrigation time of also 8 x 3 min = 24 min

This value “8” can be changed in the program (program constant No 2 and No 3) –
See parameter sheet 1: constants.
If the pre irrigation function is activated, the machine runs approx. ½ meter after the start and then stands still for the pre irrigation time.

When pressing the button “START-RESET” 

, during pre-irrigation the pre-irrigation function is deleted.

Before activating the pre-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.
If the post-irrigation mode is activated the machine stops 8m 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.9, see parameter sheet 1: constants.

If you press the key “START-RESET” 

, the post irrigation is cancelled.

6.7.3 START

If the PE – pipe has been pulled off and the desired speed has been set you can start the irrigation with the “START–RESET“ 

key.

If pre- or post- irrigation is required, press the following keys 

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 tooth segment on the regulating motor rotates to the limiting bolt head and the shut-off valve (if existing-optional) opens.

6.7.4 MONITORING

The program has a built-in monitoring system.
It only works in connection with the shut-off valve- overpressure.

The standard factory setting of the monitoring is 20min. (parameter sheet 1, machine data 4).
In this mode monitoring will start if the RAINSTAR does not reach the set speed within the programmed monitoring time. After this time the shut-off valve is closed and the machine stops.
In most cases the reasons are excessively high retraction speeds or a blocked regulation flap etc.

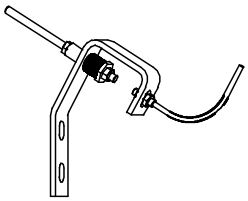
In order to ensure that the set retraction speed is actually reached and the system is not switched off after the monitoring time, it is necessary to check the retraction speed that is actually possible by pressing the menu key three times.

If the system is equipped with a pressure switch the machine will start when a preset minimum pressure is reached, or it stops irrigating when water pressure is too low. As soon as the pressure returns to normal level, irrigation is continued.

6.7.5 STOP

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

Sensor in shut-off position



As a result the turbine stops and the shut-off valve overpressure closes slowly and remains in this position until the next operation.

If the RAINSTAR is connected to a hydrant you can release the water pressure which is remaining in the line after closing the hydrant by pushing the „START-RESET“ 

key.

The shut-off valve opens and pressure is released through the PE-pipe.
If a low-pressure shut-off valve is mounted, it opens quickly.
It closes again after approx. 15 min.

By pressing the key „STOP“ 

the irrigation process can be stopped at any time.

The turbine flap opens (the turbine stops), the over-pressure shut-off valve closes, the low-pressure shut-off valve opens.
The laid down PE – pipe length remains saved. It is set to 000 only when the shut-off sensor is actuated (shut-off position).

ATTENTION !
If the „STOP“ key is used while retraction on a machine without shut-off valve the retraction stops but the sprinkler is still in operation. In order to prevent “over irrigation” around the sprinkler the machine should only work for a limited period of time without retraction. Then start the machine again by pressing the„START“ key!!

ATTENTION !
With machine data adjustments Pos. 12, adjustment „0“, the retraction stops only for a short period of time when pressing „STOP“ key. After a few seconds the retraction starts again automatically.
ATTENTION: when working on the machine the whole drive needs to be switched off!!

STOPPING THE CONTROL FUNCTIONS,

By pressing the keys „STOP“ and „PROG.“ at the same time all functions of the ECOSTAR stop, this means that the regulating motors of the turbine and the shut-off valve remain in their current position. With this combination of keys the turbine regulation is stopped when the turbine rotation speed is low in order to change gears.

6.8 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 normal the irrigation is continued.

IMPORTANT:	the pressure switch should only be used together with a shut-off valve over pressure!!

6.9 ERROR DESCRIPTION – ECO STAR 4300

Error	Cause	Remedy
Battery is not charging	Solar panel dirty	clean
	Solar panel defective	Leave machine in the sun Change solar panel
	Battery defective	Charge, exchange
Electronic system defective	Electronic error	Cover solar panel, Disconnect battery and connect it again.(reset) Call customer service, exchange E-Box
Device switches off early	Overwinding fault	Turn off water supply Slacken PE–Pipe Readjust machine
	Shut-off frame has been activated unintentionally	Put shut-off frame into the operating position, enter laid-down pipe length and press „START“
Retraction speed is not reached	Net or pump station does not have enough pressure	Increase pressure or enter retraction speed according to the performance chart
	Incorrect gear ratio	Change ratio
	Blocked turbine regulation	Remove foreign object

6.10 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:
In order to reach the constants the speed must be set at 11,1 m/h or 11f/h

Immediately press the “PROGRAMM”-key 

three times in order to get to program constant 0 (see parameter sheet No. 1)

By pressing the “PROGRAM”-key again shortly to select constant numbers 01 – 12 see parameter sheet No. 1.

With the arrow keys  the values can be changed according to the requirements.

If you press the “MENU” 

key the changed constants are saved and the program returns to the standard display.
If you <u>do not</u> press “MENU” the changes **<u>are not saved</u>** and the program returns to the standard display after one minute.
The constants remain saved, even if the battery is disconnected for a longer time. The program constant 0 with the value 111 gives access to the machine data.

By pressing the key PROGRAM 

you can access the machine data mode.
See parameter sheet No. 2

By pressing the “PROGRAMM”-key again the machine data numbers 0 – 19 are selected.

With the arrow keys the values can be changed according to the requirements.

By pressing the key “MENU” the program returns to the standard display and saves the changed machine data.

If the key **„**MENU**“** is not pressed the *ECOSTAR 4300* returns to normal mode after one minute and the adjustments of the constants are not saved.

CONSTANTS

Konst. Nr.	Anm.	Werks einstel lung	Min. value	Max. value	Description
0		100	-	-	111 code for reaching the machine data
1		00:00	00:00	24:00	Time
2		8	1	15	Pre-irrigation
3		8	1	15	Post-irrigation
4		20	0	99	Monitoring time [Minutes] 0 = without shut-off valve , 20 = with shut-off valve
5		1	1	15	1 English, 2 Danish, 3 German, 4 French, 5 Dutch, 6 Swedish 7 Spanish, 8 Italian, 9 Polish, 10 Japanese
6		0	0	2	0 = slow shut-off, for option shut-off valve-over pressure 1 = fast switch off, for option shut-off valve low-pressure (shut-off valve opens and closes again after 3 minutes) 2 = without option shut-off valve
7		-	0	1000	input of the laid down pipe [m]
8		0	0	1000	Early stop [m] (* is carried out when post-irrigation has been selected*)
9		0	0	1000	Distance to post-irrigation [m]
10		0	0	1000	input PE-pipe length for alarm [m]
11		40	5	120	Amount of water [m3/h]
12		60	5	100	Distance between irrigation width [m]

The constant No. 0 (Code) must be set to 111 to get access to the machine data.
When pressing the key „PROG“-you get the machine data are shown.

ATTENTION!

If the water amount (according to performance chart) constant 11 and the distance between the irrigation tracks (strip width according to performance chart)

constant 12 is not entered the dose indicated on the display is not correct.

MACHINE DATA

Machine.Dat.	Anm.	Factory settings	Min. value	Max. value	Description
0		600	0	1000	Pipe length [m]
1		125	40	200	Pipe diameter [mm]
2		1850	500	3000	Reel diameter [mm]
3		11,27	5,00	30,00	Windings per layer
4		240	50	1000	Big chain wheel
5		9	5	40	Small chain wheel
6		4	1	20	Number of magnets
7		0,89	0,70	1,00	Pipe ovality
8		3	0	45	First impulse to the switch-off motor [Sec.]
9		160	0	300	Short impulses to the shut-off motor [msec]
10		3	1	5	Time between short impulses [Sec.]
11		100	0	250	Number of short impulses
12		0 1	0	1	Shut –off system 0 = only regulating motor turbine (without shut-off valve) 1 = both regulating motors (with shut-off valve)
13		8,2 4,1	1	25	Impulses to close the regulating valve [Sec] TX60 , TX100 - 8,2 sec. TX20 , TVR 20 , TVR 60, F 30, F 40 - 4,1 sec.
14		0 1	0	2	Pressure switch 0 = Pressure switch not in function 1 = Pressure switch in function 2 = Pressure switch only for start
15		0	0	160.0	62,5 Distance of the impulses with roll Ø 80 at the PE-pipe [mm] 0 = works with formula (Machine. Dat. 0 to 7)
16		1	0	1	Length sensor 0 = Round sensor for roll 1 = Double sensor
17		0 1	0	1	Open shut-off valve 0 = shut off valve opens with one impulse (12 sec.) –low pressure 1 = shut-off valve opens with the same impulses as it closes - overpressure
18		0 1	0	1	Pressure switch 0 = shut-off valve open when pressure is too low offen (low pressure) 1 = shut-off valve closes if pressure is too low (overpressure)
19		8	0	200	Time delay shut-off gear to shut-off valve [Sec].
20		0 1	0	1	Speed monitoring 0 = Monitoring off 1 = Monitoring on
21		0 1	0	1	Unit view 0 = metric units [m] 1 = US –unit [ft.]
30		0	0	1	0 = GSM-Modem not active 1 = GSM-Modem 2 = GSM-Modem, only numbers on the SMS-list
31		-	-	-	First telephone number to call „A“
31		-	-	-	Second telephone number to call „B“

6.11 BATTERY

In the factory a battery of 12 V and 6,5 ampere hours is mounted.

Charging the battery with a standard solar panel during the irrigation season is not necessary. Basically, the battery should be charged all 6 month with a charging current of max. 2 ampere. (Please note the maintenance and operating manual).

If the battery is connected the display shows for a short time e.g. “VERSION 4.1”, and then goes over to standard display again.

In order to ensure a long lifespan of the dry battery of the ECOSTAR (LC-R 127R2PG 7,2 Ah/20 HR), it is important to follow certain guidelines when storing and charging the device.
During operation of the battery on the ECOSTAR no special precautions need to be taken as the solar panel permanently charges the battery.

1. Every new RAINSTAR irrigation machine delivered by BAUER, which is equipped with an ECOSTAR is also equipped with a fully charged and ready to use battery.
   The solar panel,however, is covered and not connected to the battery. If there is a longer period of time between delivery and first operation the battery needs to be maintained. (see following points)
   The same applies for spare part batteries and batteries which were held on stock for a longer period of time.
2. If the RAINSTAR is not in operation for a longer period of time, e.g off season, the battery should be disconnected from the ECOSTAR and dismounted.
3. The accumulator battery should be stored fully charged, separate of conductive materials and out of the sun.
   If the accumulator battery is stored in an uncharged condition for a longer period of time the full capacity cannot be reached again after charging.
4. The optimum storage temperature lies between 0° and +25°.
   Also during storage the battery underlies self-discharge and needs to be charged in the following intervals:

Storage temperature:	*Interval for charging:*
Less than +20°C	9 month
+20°C to +30°C	6 month
+30°C to +40°C	3 month

5. The humidity in the storage room needs to be low (55%+/- 30%) in order to prevent that the poles corrode.
6. A complete discharge of the battery should be prevented (deep discharge). The battery can be charged and reach its full capacity again but a repeated deep discharge the lifespan of the battery is reduced.
7. The accumulator batteries should be kept clean. For cleaning a dry cloth can be used, if required soaked in water or alcohol.
   Under no circumstances use oil, petrol or diluents.
8. Accumulator batteries must not be disassembled as they contain acid which can cause strong chemical burns.
9. Accumulator batteries must not be hot-wired as they could be damaged.
10. Charging the battery should be done with a voltage of max. 2,0 A. If the battery is fully discharged the battery needs approx. 7 hours until is is fully charged.
    Devices which check the capacity of the battery, as well as devices with an intelligent (self-regulating) charging function, enable an exact analysis as well as a controlled charging of the battery.

6.11.1 SOLAR PANEL

In the factory a solar panel is mounted which is maintenance free.

1. In order to ensure optimal performance the surface should be cleaned from time to time with a soft cloth and household cleaning agent (no scrubbing agent).
2. For operation the solar panel is unfolded and blocked. The solar radiation on the panel is more intensive. For transport of the RAINSTAR the panel is folded again. It is lifted and pressed to the machine and can be brought into its initial position where it is protected against damage.

3. In order to prevent over charging of the accumulator battery and a disturbance of the ECOSTAR, the electronic interrupts the charging process if the „STOP“ key is pressed or the accumulator battery is connected (When the machine is delivered the clamps are removed)

6.11.2 CHECKING THE CONNECTIONS

Press „START“ key. 

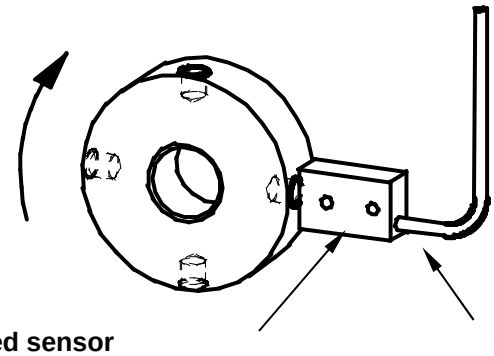
The regulating motor closes(the segment turns to the limiting bolt)
The shut-off valve overpressure opens.
The shut-off valve low pressure remains closed.

Press „STOP“ key 

The regulating motor opens the turbine (the segment turns away from the limiting bolt)
The shut-off valve overpressure closes
The shut-off valve low pressure opens

6.11.3 CHECKING THE LENGTH SENSOR

The magnet disc with 4 magnets is mounted on the drive shaft of the gear and rotates clockwise during retraction. By rotating the magnet disc clockwise the display for the laid down pipe needs to count from 0 m upwards.
If the distance counter counts into the opposite direction then the speed sensor must be turned around in order that the cable connection is on top. Distance 1 - 3 mm between double sensor and magnet disc.



Speed sensor

Cable connection at the bottom

6.11.4 LIMIT STOP FOR TURBINES – REGULATING VALVE WITH ECOSTAR 4300

See point 6.5. The regulating area of the regulating valve of the turbine needs to be adjusted to the respective delivery rate. If the limit stop is not adjusted correctly it might happen that the turbine cannot be regulated, this means that the PE-pipe retraction happens with maximum speed.

If the flow rate is reduced significantly the limiting bolt head needs to be adjusted again, as otherwise the retraction speed listed on the performance chart cannot be reached.

You can see the required delivery rate on the performance chart fixed on the machine below the nozzle sizes.

6.11.5 SHORT CHECKLIST fOR ECOSTAR 4300

1. **Check battery voltage (should be 12 V minimum)**
   a) Cover solar panel completely
   b) See battery voltage In test menu 1 (press MENU key once)
   c) If there is no or not enough power available (below 12 V), check battery, cable connections or fuses inside the electronic box.

2. **Check function of the sensors**
   a) Set test menu 2 (press MENU key twice)
   b) The display show indications for function control of the installed sensors , Motor 1 -Motor 2

3. **Check length indicator of the laid down PE-pipe** (press MENU key once)
   a) Read out the pipe length of the laid down PE-pipe on the standard display and compare with the engraved length indication on the PE-pipe.
   b) If it shows 000 m, or significpless than the length of the laid out pipe, you need to make settings.

4. **Check of the mechanic transmission to the stop sensor.**

5. **Adjustment of the limiting bolt for the tooth segment of the regulating valve according to the chart fixed on the machine.**

7 OPTION - SMS

The ECOSTAR 4300 can be operated with an external MC52i-GSM-Modem by Cinterion.

By sending an SMS the RAINSTAR can be started or stopped and the status can be requested.

Commands

Start	Starts the machine.
Stop	Stops the machine.
Speed ###	set the ***speed*** between 3 and 400 m/h., e.g.: ***speed 24***
Status	Shows the current status of the machine.

SMS can be typed in both upper- or lower case or mix .

If you call the modem from a GSM-telephone you will receive an SMS with the ***Status***.

If the machine is operated by keyboard (display is lighted) the SMS-function is deactivated in order to prevent multiple sms and to block remote operating. When receiving an SMS **`User active`** is sent retun.

Status

```
SPEED          30.0m/h
DOSE            22 mm
TIME          14:10     STOP18:16
STATUS OPERATION

DISTANCE          123m
BATTERY          12.8V
CHARGE ON       0.231A
```

SMS, sent by PR10-12, contains information about irrigation.

The following messages are sent by SMS:

PRESSURE LOW:	Start pump, to get pressure on the machine.
STOP SENSOR:	The machine can be moved to a new field
STOP REMOTE:	The machine was stopped by an SMS,
STOP DISTANCE:	The machine has reached stop point (constant 8)
MONITORING TIME:	The machine has not moved for nn minutes (Constant 4) due to a malfunction. Check the machine before continuing.

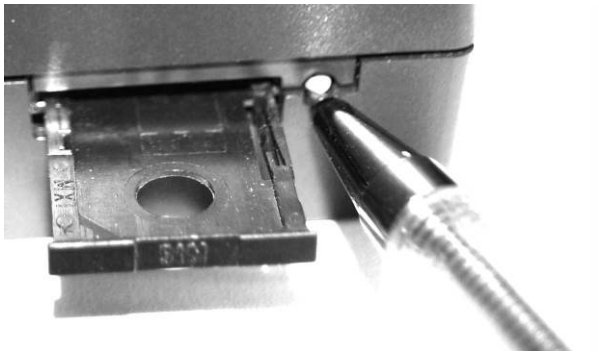
How to get started:

Disconnect electronic from battery.

Out the SIM-card unit an ordinary mobile phone and change the pin code to 1111.
Try to send and receive an SMS in order to test SIM-card and to check if everything is working properly.

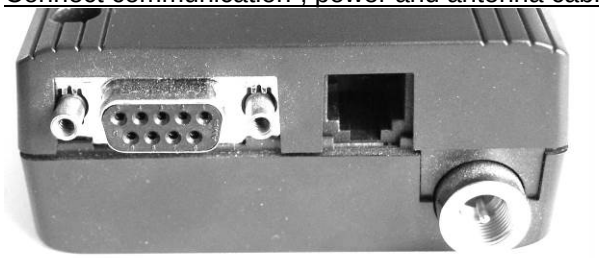
Insert the SIM-card into the modem.

Operate the eject mechanism (yellow button next to the card holder) to open the card holder by pressing it down with a pen, for example.



Insert SIM-card in the in den SIM-cardholder and push it back into the housing.

Connect communication-, power and antenna cable.



Connect the power and set machine data No.30

0 = GSM disabled
1 = GSM enabled, all telephone numbers are allowed, no ***Speed*** change possible.
2 = GSM enabled, only telephone numbers on sms list allowed -***Speed*** change possible.

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

To change machine data see operating manual.

If selected numbers are used they show on the display of the PR10-12, when receiving SMS from a phone. The number should always be entered in the same format e.g. +44213 ... 0044213 ... 213...

```
SPEED          11.1m/h
DOSE            22 mm
TIME     14:10      STOP      7:43
A:    +45123456
```

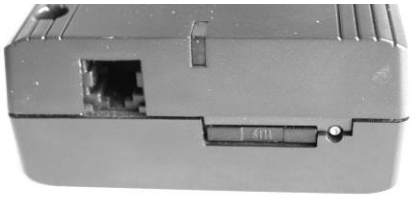
To change machine data see operating manual.

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

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

Signal strength 0 – 31 and network should show up in display menu 6.
For trouble free operation a signal strength of 10 or higher is required.
A signal strength of 99 indicates a signal error.

Modem has a LED showing status.



Operating states	LED
Off	Off
– Network search or –no SIM-card is inserted – no PIN is entered – no GSM-network is available	Flashes rapidly
STANDBY (registered in the network)	Flashes slowly
Connection (TALK)	On

When a SMS is received, following is showed on display:

```
Receiving SMS
#: +45123456
Status
```

Receiving SMS, incoming phone number and 40 characters of a message. Any SMS can be received, but only known commands are accepted.

When a SMS is received, following is shown on the display:

```
Sending SMS
#: +45123456

Status Running
```

Sending SMS, outgoing phone number and current machine status.

8 CABLE CONNECTIONS –CONNECTION DIAGRAM

ECOSTAR 4300 18-Pol-Stecker		
Cable connection.	**Version n.n1**	
1 + Battery	brown	12 V
2 - Battey	blue	
3 + Solar panel	blue	
4 - Solar panel	blue	
5 Motor 1	regulating motor	
6 Motor 1	regulating motor	
7 Speed sensor 1 *	blue	
8 Speed sensor 1 *	black	
9 Speed sensor 2 *	yellow/green	
10 Speed sensor 2 *	brown	
11 Stop sensor	blue or brown	
12 Stop sensor	blue or brown	
13 Motor 2	shut-off motor	
14 Motor 2	shut-off motor	
15 Pressure sensor	blue or brown	
16 Pressure sensor	blue or brown	
17 - BIP		
18 + BIP		
Cable connections for SMS		
19 + Battery	bown	+12 V
20 - Battery	blue	
21 Not occupied		
22 Not occupied		
23 Not occupied		
24 Not occupied		

* if the distance counter counts into the wrong direction the speed sensor must be turned around.

ATTENTION!

Attention: Power for modem only available if machine constant 30 is on 1 or 2 !!!

COMMUNICATION

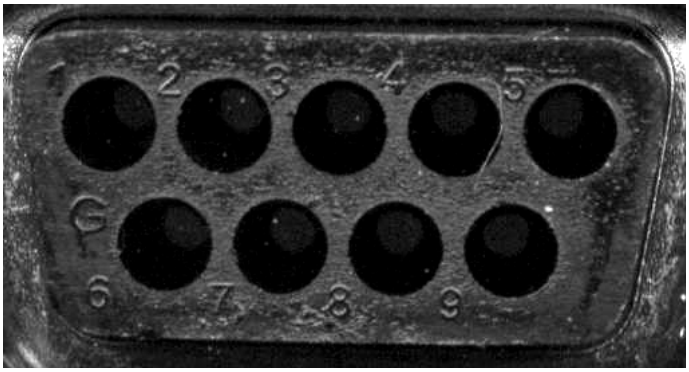
Communication between ECOSTAR 4300 and GSM modem

!!! Do not put pins into the coupler strip before the cable on the

ECOSTAR 4300 box is mounted!!!

1	not used	
2	data reception	brown
3	data transmission	white
4	not used	
5	mass	yellow
6	not used	
7	not used	
8	not used	
9	not used	

View of connector holes for pin insertion (shows pin numbers)



Antenna

The antenna providing signal for GSM modem, should be placed in a way it provides good signal under all conditions.

8.1 Checklist fOR ECOSTAR 4300

During the first run at the start of the season, but also during normal operation, there can occur problems with the ECOSTAR, like negative reports, malfunction in connection with the electronics or the connected sensors, as well as problems due to operating errors.
A systematic check of the system according to the checklist below can help to identify and solve the problem quickly.
This checklist serves as an additional help to the detailed operating manual of the ECOSTAR 4300.
After checking the device according to the SHORT-CHECKLIST, handling instructions are in the list below.

Pos.	Error	Check and find cause	Remedy
1.	**Wrong or incomplete display signal**	**Check battery voltage!** 1. The solar panel has to be covered completely and after 2-3 min the battery voltage can be checked on the display of the first menu window. (Press menu key 1x) **Note !** • If the solar panel is not covered even an empty battery can show voltage on the display, or when the sun is shining a sufficient operating voltage is simulated. The power supply, however, is not sufficient for the system operation. 2. If the voltage of the battery (not influenced by the covered solar panel) is below 12V, the power supply for the operation of the system is not sufficient.	Charge or renew battery
2.	**Display not working**	**Check battery, cable connections and fuse!** 1. Check battery voltage, battery is empty 2. The connection cables between battery and ECOSTAR are not connected or without contact. 3. The fuse is defective. The fuse is inside the electronic box where you can find a replacement fuse. **Note !** • When checking the connections it is important that the cables are connected correctly: „+“ clamp = brown wire, „-“ clamp = blue wire. • While disconnecting and connecting the battery and while the battery is disconnected the solar panel should also be covered, as an indication error is possible. • The saved machine data remain saved when the battery remains connected. • When connecting the battery again you must not mistake the „Plus“ and „Minus“ clamps, as a short circuit is possible and the fuse falls, or the electronic system can be damaged.	Charge or renew battery; check connections and contacts Renew fuse

3.	**Battery voltage permanently low**	**Check battery!** 1. If the battery voltage remains low, although the solar panel is charging, check battery, charge battery or exchange it.	Check battery/charge or exchange.
4.	**Charging error due to solar panel**	**Check solar panel!** **Notes !** • The normal charging function of the solar panel works as follows: when the battery voltage is 14,0 V or more the charging function switches off. On the display of the first menu window the sign „OFF“ appears when „charging with solar panel“ (1x MENU key) • If the battery voltage is 13,9 V or less, the charging function switches on and on the display appears „ON“ in the same menu window. • If the solar panel does not charge the battery although the voltage is 13,9 V or less, on the display „OFF“, the reasons are as follows: 1. There is not enough light and charging is not possible. 2. The „ + / - “ phases of the solar panel are reversed. The polarity should be measured. 3. The solar panel is defective. Determination by measurement at the exit of the panel.	Correct polarity Change panel
5.	**Unreadable notifications on the display**	**System voltage / start-up error** 1. Low voltage may be the reason for unreadable notifications on the display . 2. This can also happen after first putting the device into operation or after connecting the battery again (even if sufficient voltage is available) **Note !** Disconnect battery and solar panel, connect „+/-„of the ECOSTAR cables (neutralize), after approx. 1 min. connect battery and solar panel again. Pay attention to the polarity of the cables!	Check battery voltage , charge battery Bring electronics in voltage-free state for approx. 1min.
6.	**No length specification on the display**	**Shut-off sensor / loose PE-pipe windings** 1. The PE-Rohr is completely pulled off, but the display shows 000 m. **Notes !** a) In this case the shut-off frame on the RAINSTAR, or rather the shut-off sensor was activated and the pipe length display switches to 000 m and the ECOSTAR stops the operation of the RAINSTAR. The shut-off frame could also have been activated manually due to a loose **PE-pipe- winding**. b) The shut-off frame, or rather the shut-off sensor could also have been activated while pulling down the PE-pipe. In this case the length of the laid down pipe is shown, the shown value, however, is smaller than the actual length of the pulled off pipe. The value must be entered again as described below. c) If the length is not counted when pulling off the pipe the value cannot be corrected and the RAINSTAR does not start. In this case the shut-off sensor is not adjusted correctly (distance too short, see operating manual) **PE-pipe length specification at the ECOSTAR** Proceed as follows (see also operating manual) a) Set retraction speed to 11,1 m/h b) Press the key PROGRAM 3x, this way parameter sheet no.1 shows, by pressing the key PROGRAM again you get to constant 7.	Set PE Pipe-Length on the ECOSTAR again

		c) In this position the value of the constants can be adjusted to the laid down PE-PIPE length by pressing the arrow keys. The actual length of the laid down pipe is imprinted on the PE-pipe on the RAINSTAR. d) With the key TEST the set value can be saved and the display goes back to standard again. The RAINSTAR can be started again.	adjust shot off sensor correctly or change
7.	**No length shown on the display or length is counted incorrectly**	**Length sensor** 1. If the length is not counted when the PE-pipe is pulled off or the indication is wrong (indicated length increases instead of decreases) the length sensor is mounted incorrectly (see instructions with drawing in the operating manual)	Mount length sensor correctly
8.	**Length indicated on the display does not match with the actual length of the laid down PE-pipe**	**PE-pipe ovality** 1. The length of the laid down PE-Pipe and the value shown on the display always show the same percentage share of difference. I this case the ovality of the pipe does not accord with the set value and must be corrected. **Correction of the ovality constant** a) To correct it go to parameter sheet no.1 like described under pos.6, press the PROGRAM key until constant 0, if you enter the value 111 in this constant you get to parameter sheet no.2, to the machine data. Under machine constant 7 the ovality value can be corrected. . b) If the length indicated on the display is always higher as the actual length of the laid down pipe, the ovality is higher than programmed The factor needs to be corrected from 0,89 to 00,88 or 0,87. c) If the length indicated on the display, however, is always lower than the actual length of the laid down pipe, the ovality is lower than programmed. The factor has to be corrected from 0,89 to 0,90 or 0,91. **Length sensor / Magnet disc** 2. The length of the laid down PE-pipe and the value shown on the display always differ significantly. **Note !** a) On the magnet disc there are missing one or more magnets. The magnet discs are equipped with 4 magnets, this applies to all ECOSTAR models. b) One or more magnets are no longer active. If the magnets move past the length sensor on the display in the menu window there is no signal for one or more magnets on the display (2xMENU key) (■) c) In the machine data the number of magnets is programmed with a different number than 4. On the parameter sheet no.2, the factor 6 needs to be corrected to 4 (see exact procedure in operating manual) On the display there is no signal at all (■). The length sensor is defective.	Correct ovality factor Reduce ovality factor Increase ovality factor Complete magnets Exchange inactive magnets Correct machine data, exchange length sensor?
9.	**Electric shut-off valve does not close**	**Shut-off sensor** 1. If the electronic shut-off valve (overpressure shut-off) does not close at the end of the irrigation strip (open in case of low pressure shut-off) the shut-off sensor is not adjusted correctly (Sensor distance too small). In the menu window the sensor signal does not go away (■).	Adjust shut-off sensor

10.	**Electric shut-off valve does not close or open**	**Programm constant** 1. The ECOSTAR is not programmed for a shut-off valve. On the parameter sheet no.1.under program constant 6 appears setting „2“. The constant needs to be corrected to „0“ (with shut-off valve overpressure) Furthermore on the parameter sheet no.2 under machine „12“ the following value must be entered: „1“ for both regulating motors (with shut-off valve) **Pressure switch** 2. If a pressure switch for a shut-off when pressure is low is installed the reasons could be the following: a) Not enough pressure for operating, the pressure is below the value which was adjusted at the pressure switch RAINSTAR. b) Pressure switch dirty or defective. In order to check the function of the pressure switch, the pressure switch can be put out of operation in the program parameter sheet no.2, constant 14, with adjustment „0”. **Dirt / Foreign bodies / Connections** 3. The shut-off valve is mechanically blocked by foreign bodies. 4. The electronic connections of the shut-off valve are defective or not correctly installed. Motor for valve (Motor 2) defective	Correct adjustments Increase pressure Clean switch / change Clean flap Check connections Check motor/ change
11.	**Turbine regulation does not work, valve remains open or closed**	1. Limiting bolt for the adjustment of the regulating valve is not adjusted correctly, valve is closed too much and cannot be opened by the motor. (See adjusting table for turbines TVR 60, the adjustment depends on the discharge flow) 2. Electronic connections to the motor (Motor 1) are defective or not correctly installed. 3. **Motor** for regulation valve (Motor 1) defective 4. **Foreign bodies disturb** the function of the regulation valve.	Adjustments of the bolt according to table Check connections/ change Remove foreign body
12.	**Machine stops during operation**	1. If the machine is equipped with a pressure switch, the machine can stop if the inlet pressure is too low. If the operation of the machine should be continued, the function of the pressure switch can be switched off. 2. If the required (set) retraction speed is too high and the machine can not reach it, for a period of 20min, the machine switches off as well. This function, however, can be switched off: Machine data, parameter sheet no.1, constant 4 (monitoring of correct speed) Adjustment e.g „20“ monitoring switched on Adjustment „0“ monitoring switched off	Increase connection pressure, switch off pressure switch Reduce retraction speed Switch-off monitoring
13.	**Further open questions**	If further problems with the display, accuracy or other functions should occur the set data of the ECOSTAR according to the constants of parameter sheet no.1 and the machine data of parameter sheet no.2 need to be checked. If necessary please contact our customer service.	

8.2 TABLE FOR PRE-AND POST-IRRIGATION

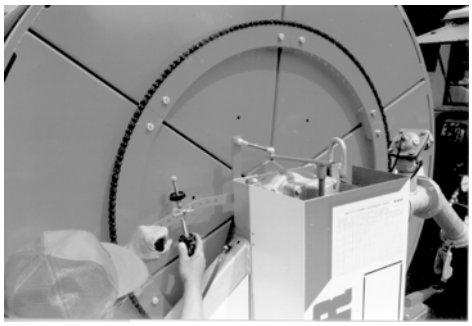
In order to correct irregularities at the beginning or at the end of the irrigation strip the ECOSTAR has the function pre- and post-irrigation. The precipitation height at the beginning of the strip (pre-irrigation) and at the end of the strip (post-irrigation) is reached by short interruptions of the cart retraction. The downtime for the pre- and post-irrigation is adjusted at the ECOSTAR with the program constant 2 and 3 on the parameter sheet no.1. The program constant 8 was pre-set in the factory.

This factor links the retraction speed of the sprinkler with the pre- and post-irrigation time. The adjusted factor can be changed, whereby pre- and post-irrigation changes.

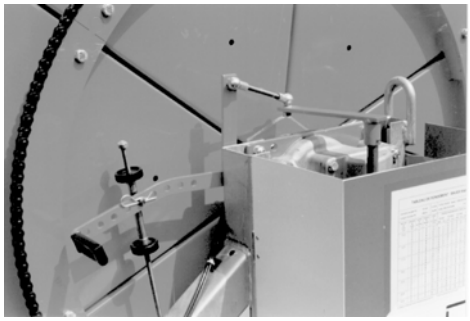
The following table shows the pre-and post-irrigation times in minutes (rounded) at different adjustment factors:

Program constant	**Retraction speed in m/h Pre-and post-irrigation time in min.**									
	10 m/h	**20 m/h**	**30 m/h**	**40 m/h**	**50 m/h**	**60 m/h**	**70 m/h**	**80 m/h**	**90 m/h**	**100 m/h**
1	6,0	3,0	2,0	1,5	1,2	1,0	0,9	0,8	0,7	0,6
2	12,0	6,0	4,0	3,0	2,4	2,0	1,7	1,5	1,3	1,2
3	18,0	9,0	6,0	4,5	3,6	3,0	2,6	2,3	2,0	1,8
4	24,0	12,0	8,0	6,0	4,8	4,0	3,4	3,0	2,7	2,4
5	30,0	15,0	10,0	7,5	6,0	5,0	4,3	3,8	3,3	3,0
6	36,0	18,0	12,0	9,0	7,2	6,0	5,1	4,5	4,0	3,6
7	42,0	21,0	14,0	10,5	8,4	7,0	6,0	5,3	4,7	4,2
8	**48,0**	**24,0**	**16,0**	**12,0**	**9,6**	**8,0**	**6,9**	**6,0**	**5,3**	**4,8**
9	54,0	27,0	18,0	13,5	10,8	9,0	7,7	6,8	6,0	5,4
10	60,0	30,0	20,0	15,0	12,0	10,0	8,6	7,5	6,7	6,0
11	66,0	33,0	22,0	16,5	13,2	11,0	9,4	8,3	7,3	6,6
12	72,0	36,0	24,0	18,0	14,4	12,0	10,3	9,0	8,0	7,2
13	78,0	39,0	26,0	19,5	15,6	13,0	11,1	9,8	8,7	7,8
14	84,0	42,0	28,0	21,0	16,8	14,0	12,0	10,5	9,3	8,4
15	90,0	45,0	30,0	22,5	18,0	15,0	12,9	11,3	10,0	9,0

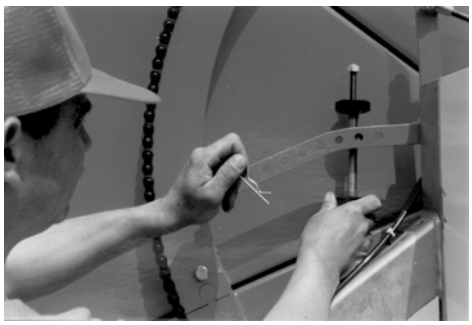
9 Mechanical CONTROL



The retraction speed is infinitely variable with the speed regulating lever which is secured with the knurled nuts after the setting. It remains next to constant from the first to the last layer and on each individual layer. This is achieved by readjustment of the turbine speed through the speed compensation bar fitting closely on every PE-pipe layer during the run ...



... and the regulating rods which actuate the regulating flap located directly on the turbine.

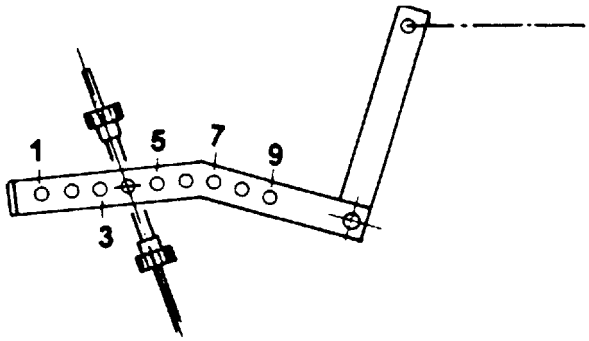


Varying soil conditions and low flow rates may cause uneven retraction speeds in spite of the layering mechanism. If retraction speeds up or slows down, the regulating rod must therefore be hooked up in the next suitable hole.

Proper speed control adjustment depends also on the PE-pipe diameter and differs for pipe dimensions 65 - 90 mm.

MECHANICAL SPEED CONTROL SETTING ON TX RAINSTARS

Wassermenge Water flow Débit m³/h	Einzugsgeschwindigkeit Retraction speed Vitesse d'enroulement m/h	Loch/Hole/Trou			
		65 TX *Plus*	**75 TX *Plus***	**85 TX *Plus***	**90 TX *Plus***
13	10	5	6	3	-
	25	1	6	1	-
20	10	8	6	7	9
	20	7	6	5	1
	35	8	6	6	1
26	10	8	6	5	7
	25	7	6	7	6
	45	8	7	7	6
32	12	9	7	7	7
	25	8	6	8	7
	55	9	6	7	7
52	15	-	-	9	9
	25	-	-	9	9
	60	-	-	9	9



9.1 TACHOMETER (OPTIONAL)

The retraction speed of RAINSTAR with mechanical speed regulation can be read from BAUER ***SPEEDOMETER*** .

Operating instructions: *SPEEDOMETER*

Description :
With this novel tachometer design you can read the sprinkler retraction speed comfortably from the large LCD display. To show the retraction speed precisely in metres per hour on the display, use the keys of the keypad to enter the gear at which the machine is currently running and the respective PE-pipe layer.

By means of measuring pulses, the precise retraction speed at the given operating data is computed in the electronic box. Pick-up of measuring pulses is contact-less by magnet sensors on the gearbox input. The machine data are stored permanently in the electronic box, therefore they only need to be entered once when the device is installed. However, if required, these data can always be reprogrammed to fit other models.

Technical data:

Power supply	9 Volt battery (type PP3) suitable for 1.000 speed readings of 4 minutes each.
Housing:	plastic, dimensions 82 mm x 80 mm x 50 mm
Sensor:	permanent magnet insert and magnet sensor on the input shaft

Operating steps:

1. Press the ON key to switch on the display.
   Note! The display is switched off automatically after 4 minutes.
2. Press the LAYER key until the current pipe layer is displayed.
3. Press the GEAR key until the current gear is displayed.
4. Immediately the retraction speed in m/h is displayed on the right of the display.
5. While you hold the ON key depressed, the display shows the revolutions per minute at the gearbox input.
6. A blinking **Lo** on the display indicates low battery voltage (lower than 7.5 Volt) – the battery must be replaced!

Programming the machine data

The tachometer is supplied with standard factory setting according to the table below. In order to ensure that your machine displays the precise and valid retraction speed, the specific parameters of your machine must be programmed.

Constant no.	Description	Possible setting range	Standard setting
1	Pulses per meter in gear step 1	100-4000	1000
2	Pulses per meter in gear step 2	100-4000	900
3	Pulses per meter in gear step 3	100-4000	800
4	Pulses per meter in gear step 3	100-4000	700
5	Pulses per meter in gear step 3	100-4000	600
6	Pulses per meter in gear step 3	100-4000	500
7	Inner reel drum diameter (in mm)	500-3000	1400
8	PE-pipe diameter (in mm)	40-200	100
9	Number of pipe layers	1-9	5
A	Number of gear stages	1-6	3
b	Data are saved by pressing the "ON" key .		

Please take specific machine data of the individual models from the table.

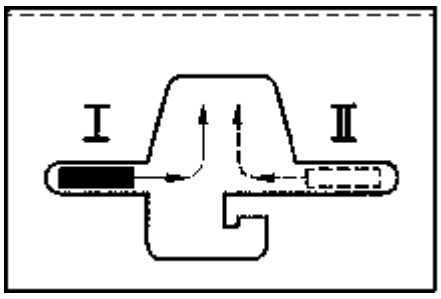
Procedure for data input:

1. Press the following 3 keys simultaneously LAYER GEAR ON for at least 3 seconds. The number 1 (constant no. 1) appears blinking on the display – enter the pulses per metre according to sheet 1 or 2.
2. Press the ON key to increase the value, and the GEAR key to reduce the numerical value.
3. Push the LAYER key to proceed to the next following constant. The data input corresponds to the step described above. Enter the data up to the constant "A" or keep the LAYER key depressed until "b" appears.
4. When “b” appears on the display, push the ON key to save the machine data. . Thereby the machine data are saved permanently and they remain stored in the electronic system even if the battery is replaced.
5. Checking the version number of the electronic system: Press the LAYER key first and then the ON key - the version number appears on the display.

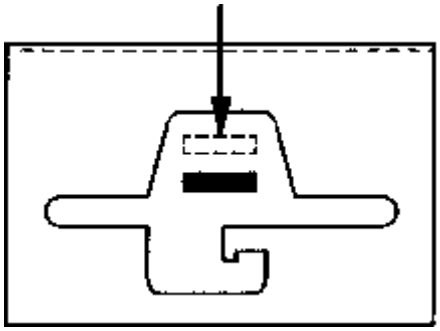
WARNING! The speed indicated on the tachometer applies only to innermost PE-pipe layer (depending on the respective transmission). For 2nd, 3rd and 4th layer you have to take the retraction speed from the diagram. The radial lines on the diagram stickers symbolise the individual PE-pipe layers.

10 EMERGENCY SHUT-OFF

If something unforeseen happens you can interrupt pipe retraction. Pull or push the gear shift lever with your open hand from gear position I or II into the middle position. (Do not operate the lever with your hand closed, or let it go immediately). The gearbox is disengaged, 0 position. A spring presses the lever up (shut-off position) and prevents fast reversing of PE-pipe or reel.



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



11 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. This step is essential for trouble-free operation of the winding mechanism.

12 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 gear shift 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, shut-off is also activated by the shut-off frame when faulty pipe windings build up on the reel.

13 CART

High construction of both symmetric and asymmetric wheel carts provides maximum crop protection (asymmetric wheel cart OPTIONAL). With infinitely variable track width you can adapt the carts to any crop row spacing. Easier pulling of the cart is ensured by the drawing-out hook.

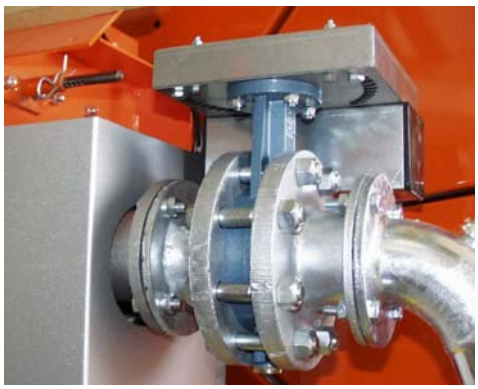
You pick up this hook with the tractor's toolbar and pull the cart across the field.
For turning the pipe reel and placing the RAINSTAR in a new setting-up position, the cart must be in its end position.

Depending on the type of sprinkler used, the nozzle height of the mounted sprinkler ranges between

approx. 1800 - 1960 on 65/75/85 TX Plus
approx. 1960 - 2120 on 90 TX *Plus*

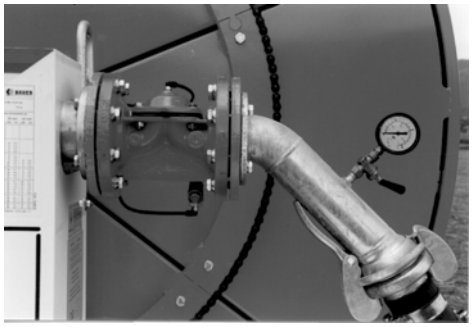
At the end of retraction the cart is lifted automatically. Owing to its pendulous mounting the sprinkler is not tilted but always remains in the optimum position regarding distance of throw and distribution uniformity. This pendulous mounting assembly compensates also slopes in the terrain in longitudinal direction.

14 OVERPRESSURE SHUT-OFF VALVE (OPTIONAL on ECOSTAR Star 4300)



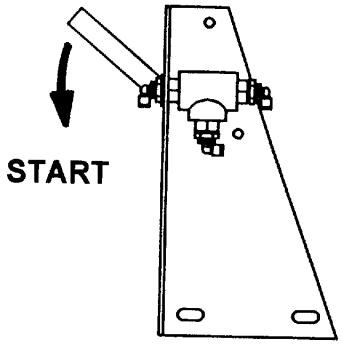
With the overpressure shut-off valve, water supply to the machine is turned off completely at the end of the irrigation run. When the valve closes, pressure rises in the supply line.

15 OVERPRESSURE SHUT-OFF VALVE (OPTIONAL with mechanical speed control)



With the overpressure shut-off valve, 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.

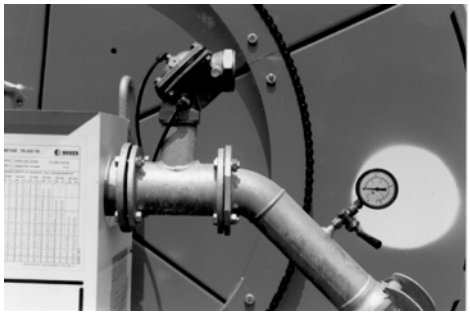
Therefore this valve can only be used in combination with an automatic pump shut-off device or in a line network supplying several machines. Before starting up with water again the hand lever must be shifted to the START position (downward) - the shut-off valve is relieved and opens.



16 LOW-PRESSURE OR UNDERPRESSURE SHUT-OFF VALVE (OPTIONAL with ECOSTAR 4300)

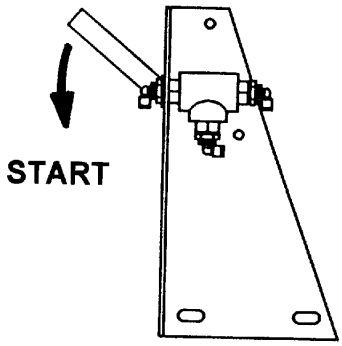
With the low pressure shut-off valve option, a diaphragm valve is opened quickly at the end of the irrigation run, releasing a big water stream into the open. This causes sudden pressure decrease in the supply line (to about half the original pressure). Through this drop in pressure a pressure switch 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.

17 LOW-PRESSURE OR UNDERPRESSURE SHUT-OFF VALVE (OPTIONAL with mechanical speed control)



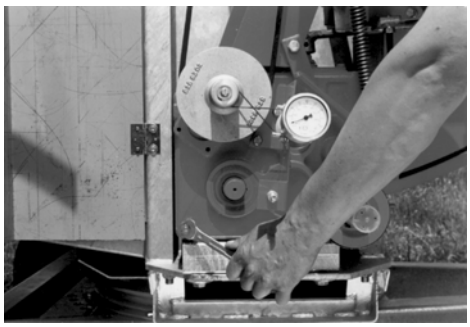
With the low pressure shut-off valve option, a diaphragm valve is opened quickly at the end of the irrigation run, releasing a big water stream into the open. This causes sudden pressure decrease in the supply line (to about half the original pressure). Through this drop in pressure a pressure switch 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.

Before starting up with water again the hand lever of the three-way cock must be shifted to the START position (downward) - the shut-off valve is relieved and opens.



18 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. Otherwise, winding up the pressureless PE-pipe would cause extreme ovality and proper winding would become impossible.
Before the blow-out procedure, turn out the nozzle of the wide-range sprinkler or uncouple the sprinkler connecting hose. The small amount of water remaining in the PE-pipe after the draining will not do any harm.
Turn out the drain plug at the bottom of the TX 20 turbine. We recommend to turn this plug in again only when you start up the machine 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. Store the machine, preferably in a roofed shelter where it is protected from direct exposure to the weather.



Drain screw for gear oil.

Oil or grease the jack.

19 SETTING INSTRUCTIONS FOR RAINSTAR TX with gearbox G2

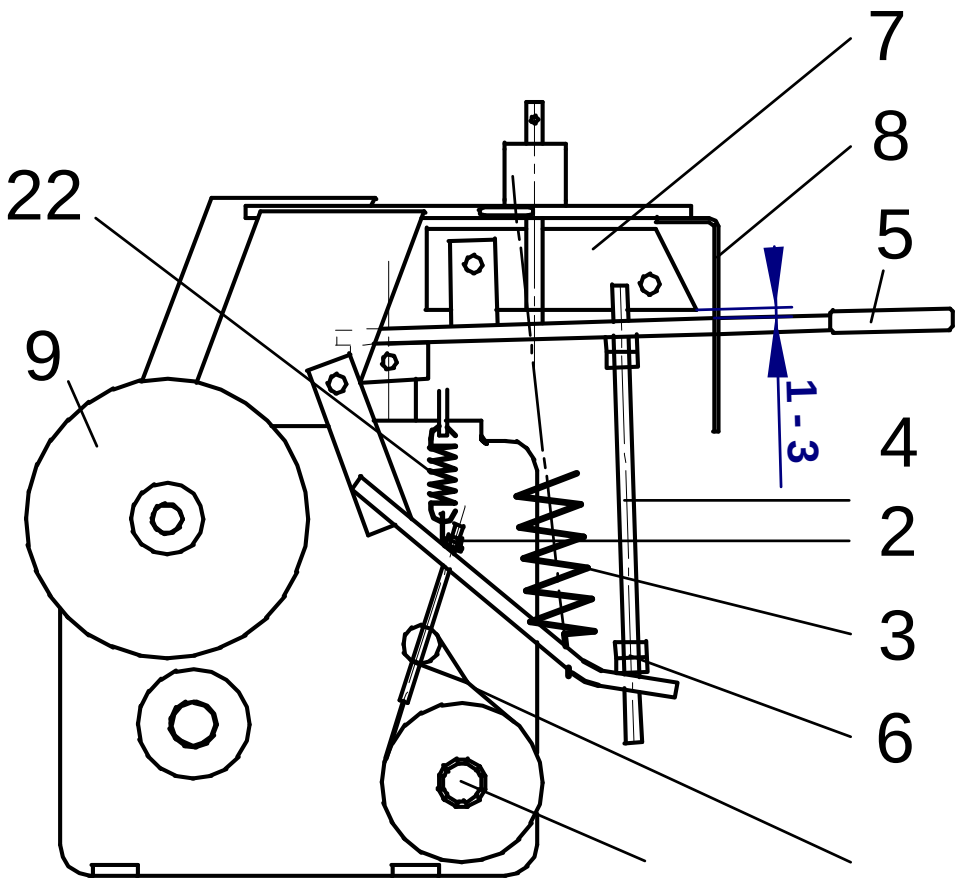
19.1 SETTING THE BAND BRAKE (1)

Tighten the hex. nut (2) of the band brake with the spring (3) hooked up, until spring length A = 265 – 267 mm.

19.2 SETTING THE THREADED ROD (4)

Shift the shut-off lever (5) to the shut-off position = gear stage „0“.

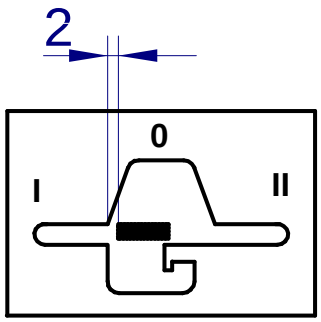
Turn the hex. nuts (6) on threaded rod (4) apart until a spacing of 2 - 3 mm results between the shut-off lever (5) and the gear shift lever (7).
Then lock the hex. nuts (6).



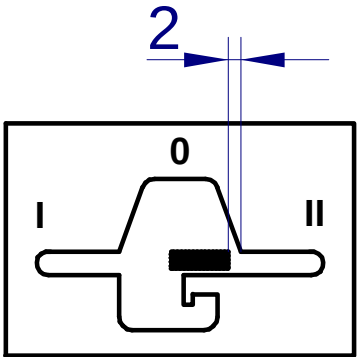
19.3 SETTING THE SHIFTING GATE (8)

The shifting gate (8) must be set symmetrically to the gearbox shut-off range.

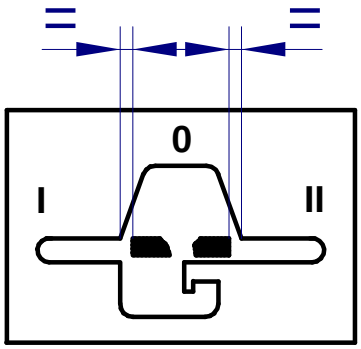
Procedure:
Switch into 1st gear (position “I”). Turn the V-belt pulley (9) - die the PTO shaft (10) will rotate, too!“ Slowly shift the gear shift lever (5) towards „0“. The shut-off point is reached when the PTO shaft no longer turns along. Set the shifting gate in this position according to the drawing (1 - 2 mm)!



Switch into 2nd gear (position “II“). Proceed as described above.

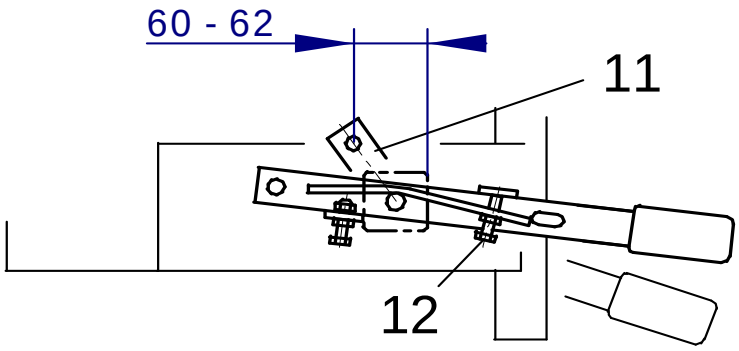


If the spacing is smaller than 1 mm or large than 3 mm, the difference must be split up equally on both sides!



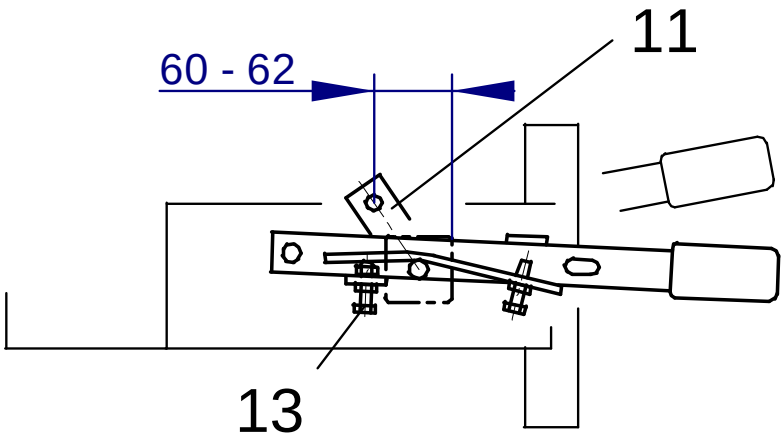
19.4 SETTING 1st GEAR SHUT-OFF

Fix the shut-off lever (11) in the shut-off position (60 - 62 mm).
Switch into 1st gear (position "I").
Screw down the setscrew (12) to the gear shift lever (7) and turn it in until the shut-off point (see above) is reached! Lock the setscrew (12).



19.5 SETTING 2nd GEAR SHUT-OFF

The shut-off lever (11) remains fixed in the shut-off position (60 - 62 mm). Switch into 2nd gear (position "II"). Screw down the setscrew (13) with the cap nut to the shut-off lever (7) and turn it in until the shut-off point is reached (see above). Lock the setscrew (13).

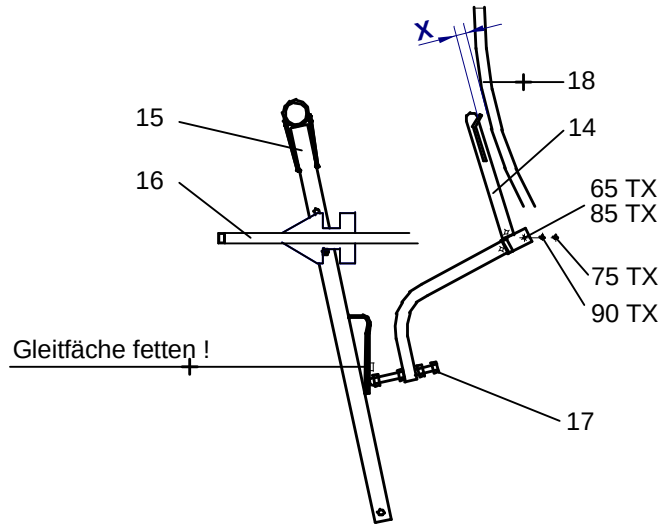


19.6 SHUT-OFF FRAME (14) ADJUSTMENT

In the **operating position** the distance between shut-off frame (14) and reel (18) X = 10 mm.

Shut-of position:
Hook up the cart lift bracket (15) with the locking hook (16). Screw down the setscrew (17) to the cart lift bracket (15) and turn it in until a spacing “X“ (see chart) results between the shut-off frame (14) and the outer reel diameter (18). Screw down the second setscrew (17) to the cart lift bracket. Lock the setscrews (17).

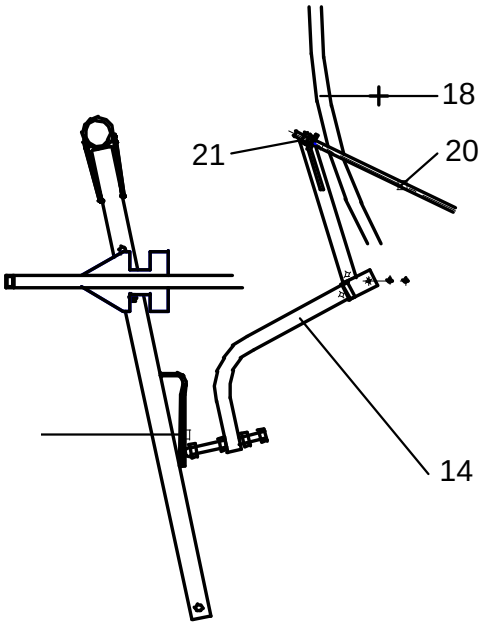
Basic unit	X
65 TX *Plus*	**35**
75 TX *Plus*	**40**
85 TX *Plus*	**45**
90 TX *Plus*	**45**



Grease gliding planes!

19.7 SHUT-OFF ROD ADJUSTMENT (20)

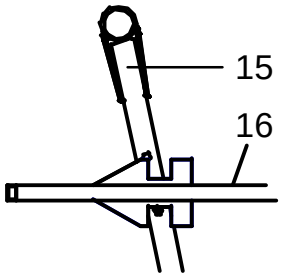
Switch into 1st gear. (Position “I). Screw down the adjusting nuts (21) to the shut-off frame (14) and turn them in until shut-off is actuated. Lock the adjusting nuts (21)!



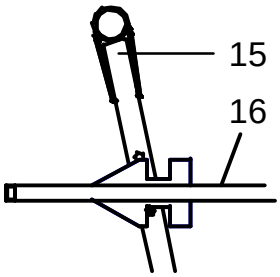
Grease gliding planes!

19.8 TESTING 2nd GEAR SHUT-OFF

Put cart lift into operating position.
Switch into 2nd gear (Position “II”). Move the cart lift towards the shut-off position. Shut-off must be actuated 5 mm after locking of the cart lift. .

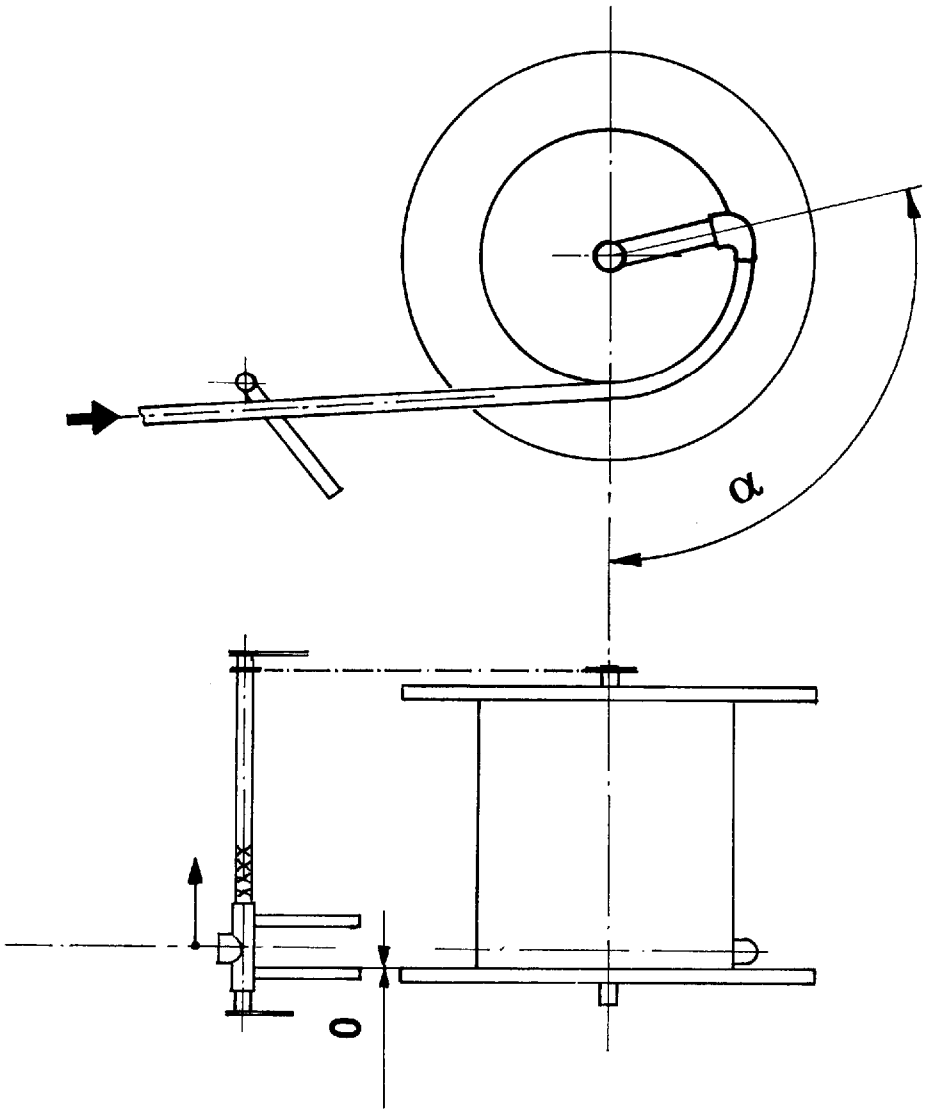


If shut-off is not actuated, proceed as follows: Hook up the cart lift bracket (15) with the locking hook (16).
Turn in the setscrew (17) on the shut-off frame (14) – see above – further until shut-off is actuated! Lock setscrew!



20 WINDING MECHANISM - STARTING POSITION

65 TX *Plus*	**a = 0°**
75 TX *Plus*	**a = 0°**
85 TX *Plus*	**a = 0°**
90 TX *Plus*	**a = 0°**
90 TX *Plus* Ø 85	**a = 105°**



21 90 TX Plus with G4 gearbox PUTTING INTO OPERATION

see page 12

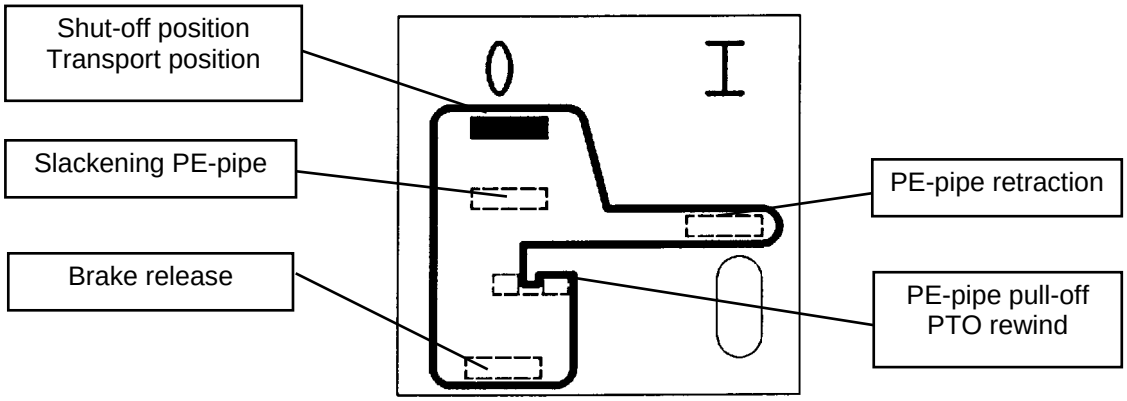
21.1 OPERATING MODE I: PE-PIPE PULL-OFF

see page 12

21.2 LOWERING THE CART

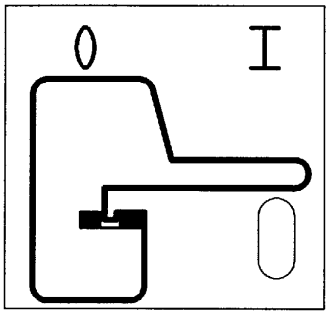
see page 13

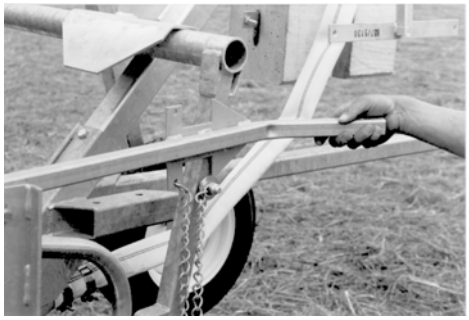
21.3 POSITIONS OF THE SHUT-OFF LEVER



21.4 PE-PIPE PULL-OFF

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





Pick up the draw-out hook with the toolbar and pull off the cart.

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.

WARNING! 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.

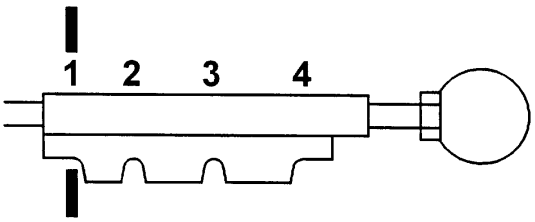
Warning! If the PE-pipe has been exposed to the sun for a longer period or if its surface temperature rises above 35 °C for some other reason, you must let water run through the pipe to cool it off before the unwinding or retraction procedure.

Couple the pressure hose. Open water supply.

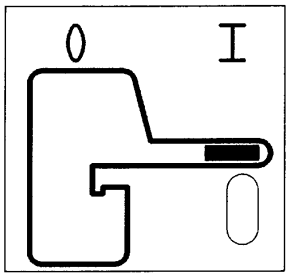
Put the gear shift lever into the correct position.

TX 20

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 only 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.



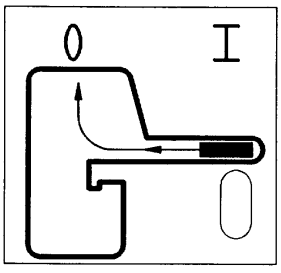
If a wrong gear was selected:

WARNING!

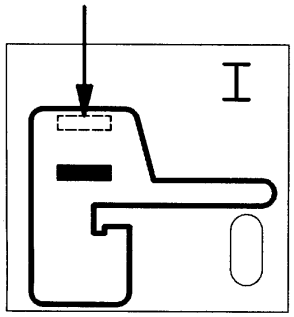
BE CAREFUL WHEN SHIFTING:
If the PE-pipe is stretched .. SLACKEN IT!

PROPER PROCEDURE:

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



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



CAUTION!

Switching into gears1 to 4 is only possible when the turbine is rotating!

Shift gear shift lever into the desired position and return the shut-off lever to the “PE-pipe retraction” position.

The reel starts to wind up the PE-pipe.

21.4.1 SPEED ADJUSTMENT

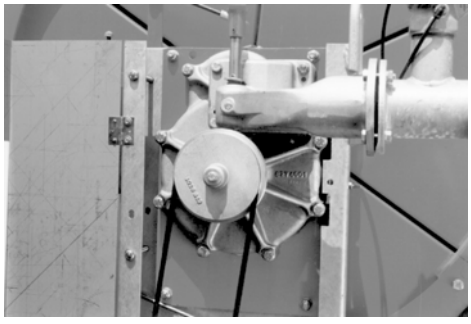
With ECOSTAR 4300 - see page 16
With mechanical speed control - see page 34

21.5 OPERATING MODE II: LAYING DOWN THE PE-PIPE

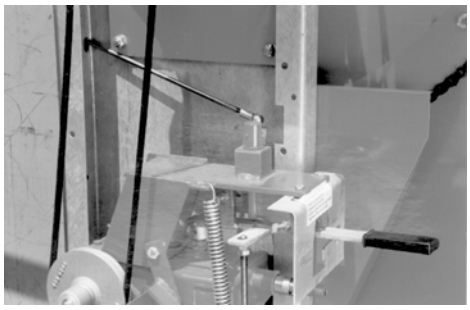
see page 17

21.5.1 FUNCTIONAL DESCRIPTION OF THE MAIN COMPONENTS

21.5.1.1 MACHINE DRIVE – FULL-FLOW TURBINE



The TX20 full-flow turbine is a specifically designed turbine model with large cross sections and minimum pressure loss. Therefore it is also suited for high retraction speeds at very low flow rates. This turbine features a highly flow-promoting design and is mounted directly on the reel shaft. It provides the energy needed for PE-pipe retraction. The turbine speed is taken directly off the impeller shaft and transmitted over a V-belt drive to BAUER change-speed gearbox.



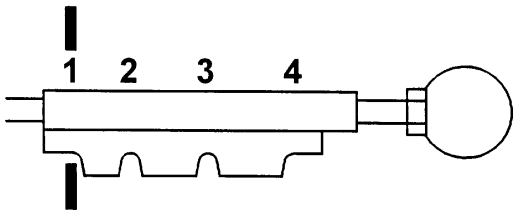
BAUER change-speed gearbox reduces the turbine speed according to the set retraction speed. The gearbox incorporates four gears. Reel drive stop at the end of the irrigation strip is ensured by disengagement of the tooth clutch.

The four-speed gearbox allows you to adapt the system precisely to existing operating conditions. As a result the following retraction speeds [m/h] can be reached:

GEAR SELECTION

TX 20

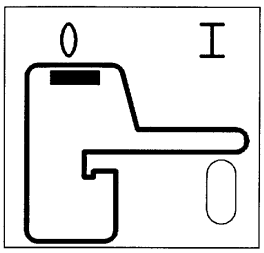
1	**8**	--	**20**	m / h
2	**16**	--	**32**	m / h
3	**28**	--	**50**	m / h
4		**> 45**		m / h



WARNING!

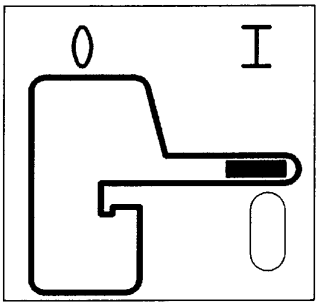
Removal of the drive cover for service is only permitted when the PE-pipe is completely slack and the water supply turned off !

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 !

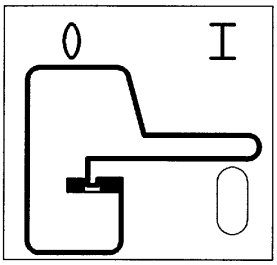


Changing between gears 1 to 4 is very easy with the gear shift lever when the turbine is rotating.

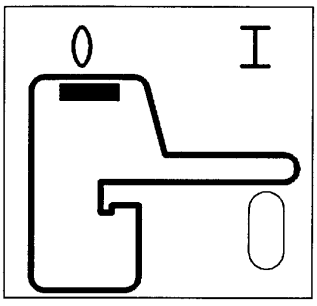
Note also the following:
If the shut-off lever is in the “PE-pipe retraction“ position, the gear shift lever is locked and cannot be shifted.



If the shut-off lever is in the “PE-pipe pull-off” position ..



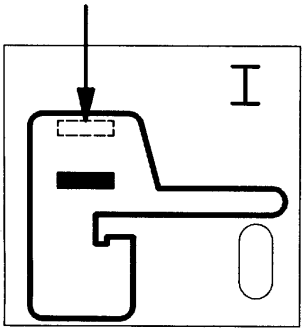
or in the shut-off position,



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

WARNING!	Before shifting gears - slacken the PE-pipe!

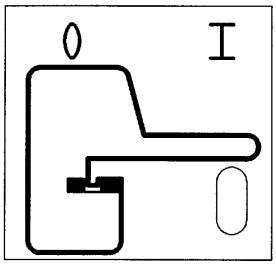
If the shut-off lever is in the shut-off position, press the lever down slowly and carefully so that the band brake is released and the PE-pipe slackens (see also page 15).



21.5.2 PTO REWIND:

If required, you can rewind the PE-pipe also with the tractor's PTO system.

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 braking 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.
- **Max. PTO speed = 540 rpm**
- 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.

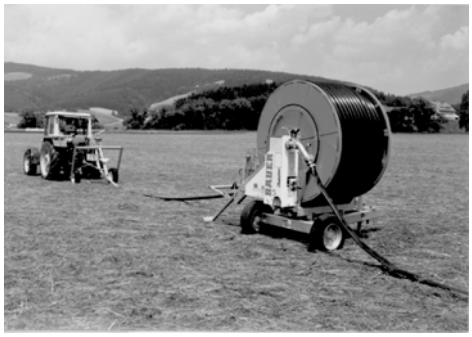
21.6 SPEED CONTROL

Speed control with ECOSTAR - see page 18
Mechanical speed control - see page 34

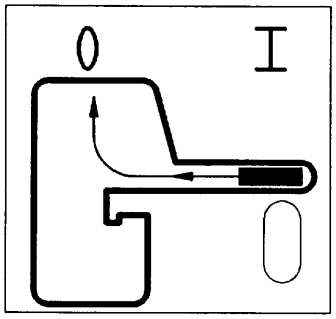
21.7 TACHOMETER

Optional equipment for systems with mechanical speed control – see page 12

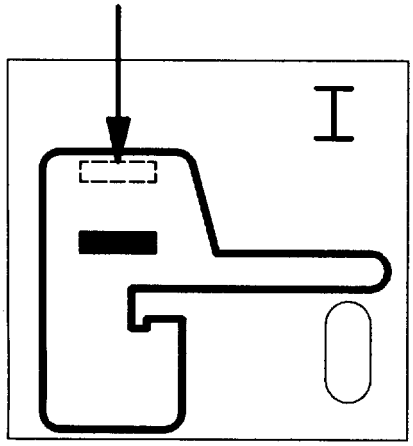
21.8 EMERGENCY SHUT-OFF



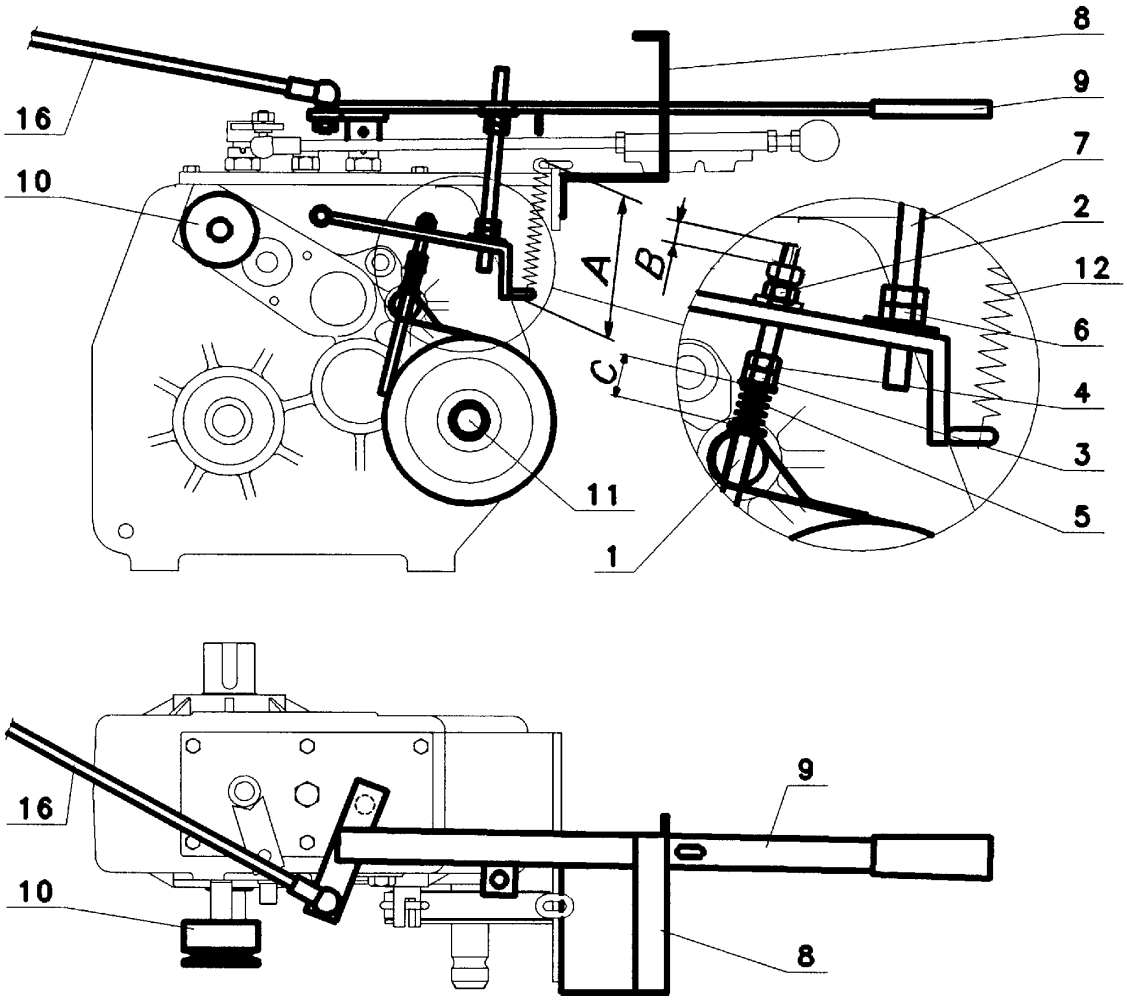
If something unforeseen happens, pipe retraction can be interrupted by means of the emergency stop device. Pull the gear shift lever with the open hand from “PE-pipe retraction“ to the shut-off position (Do not operate the lever with the closed hand, or release it immediately!). The gearbox is disengaged.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



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



22 SETTING INSTRUCTIONS FOR RAINSTAR TX with G4 gearbox

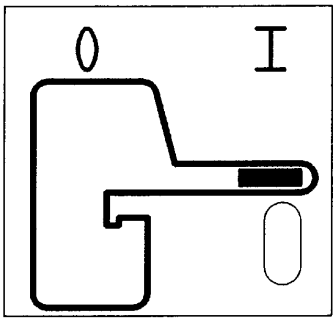


22.1 SETTING THE SHIFTING GATE

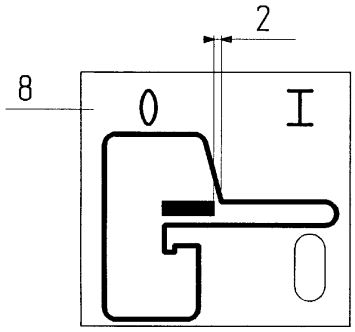
The shifting gate (8) must be adjusted to the gearbox shut-off point.

Procedure:

Shift the shut-off lever (9) into “PE-pipe retraction” position.



Turn the V-belt pulley (10) – the PTO shaft (11) rotates too.
Slowly shift the shut-off lever (9) to “0” position.



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

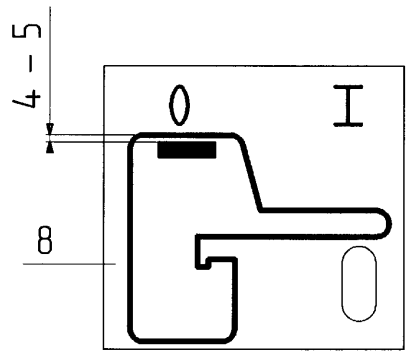
The spring (12) presses the shut-off lever (9) upward along the incline of the shifting gate and thus also into the recess provided in the gearbox.

22.2 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 length of the stretched spring (12) **A = 144 - 148 mm**. Then lock the hex. nuts (2).
Tighten the hex. nut (3) until the spring (5) is pretensioned **C = 22mm**, lock with nut (4).

22.3 SETTING THE THREADED ROD

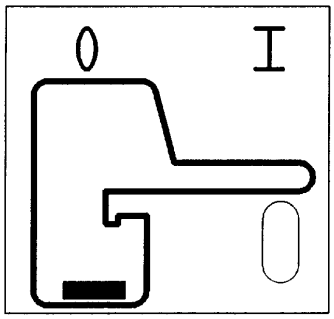
Shift the shut-off lever into the shut-off position.



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

22.4 TESTING THE BAND BRAKE for release of the brake band

Move shut-off lever (9) to “release” position.



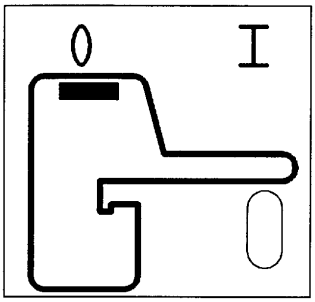
In this position the brake band must be lifted slightly off the brake disc. This prevents the brake band from sticking to the brake disc!

WARNING!	The brake band may stick tight after a longer standstill or after the winter season. In such case it must be loosened before you operate the system the next time. For this purpose turn the PTO shaft shortly to the right and to the left with the hand wheel. If you do not observe this the gearbox may break!

22.5 SETTING THE GEARBOX SHUT-OFF

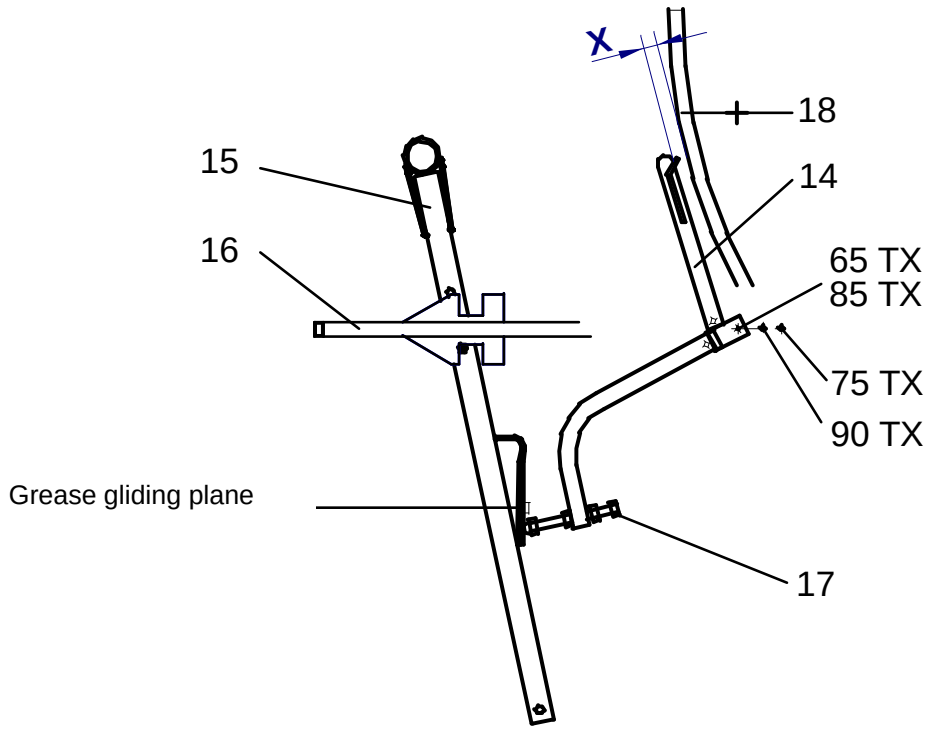
Set the speed compensating bar (13) at the distance **X** mm from the reel (17) (see chart)

Move the shut-off lever (9) into the shut-off position.

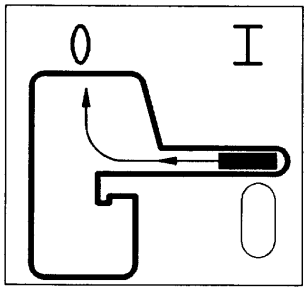


Screw the hex. nut (15) on the control rod (16) down to the lever (14) of the shut-off frame.
Lock the nut.

Basic unit	X mm
90 TX *Plus*	**45**



22.6 TESTING THE SHUT-OFF



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

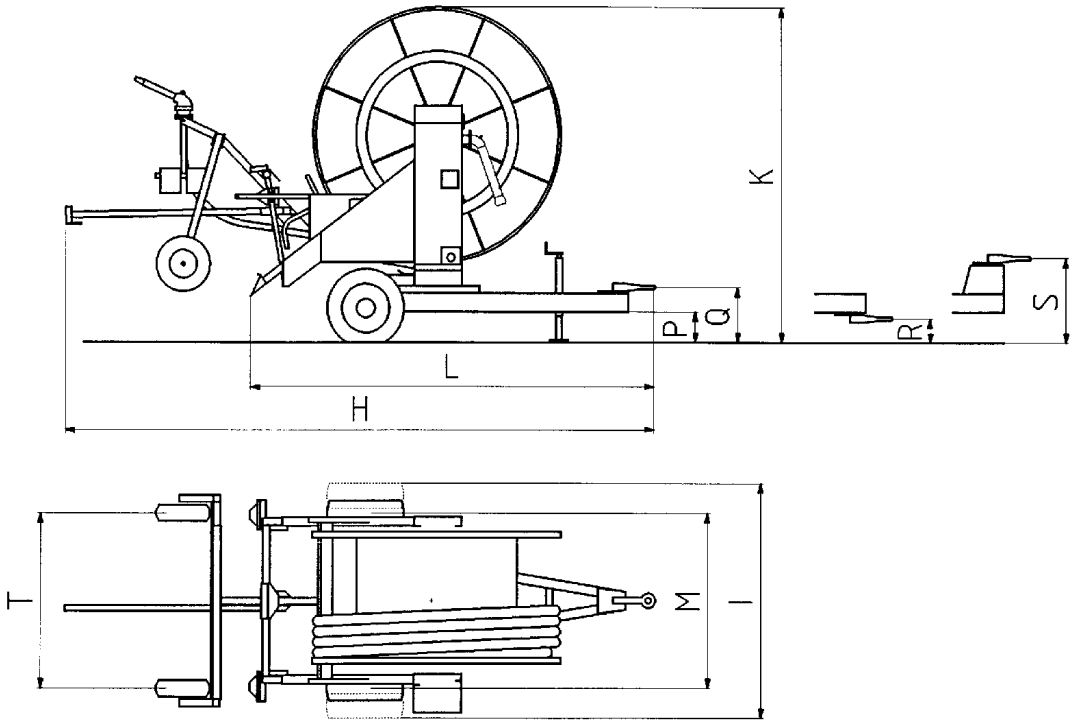
23 SERVICE AND MAINTENANCE

We cannot emphasise often enough that proper service 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 re-greased 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	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	as required	Alvania Grease 3
5. Change-speed gearbox	Change oil for first time after 500 service hours and then every 500 to 800 hours or at least once a year	6,0 l oil SAE 90 EP
6. Ball race	every 500 hours	through grease nipple Alvania Grease 3
7. Jack	as required	Oil SAE 20,Alvania Grease3 through grease nipple
8. Shut-off point on the cart lift bracket (see page 32,point 7)	as required	Alvania Grease 3
9. Screwed joints		Tightening torques
Turntable side frame		210 Nm
Ball race on turntable and undercarriage		85 Nm
Trailer coupling		210 Nm

24 TROUBLESHOOTING

FAULT	CAUSE	REMEDY
PE-pipe cannot be pulled off.	Gear shift lever in wrong position	Move to pull-off position.
	Brake bank sticking on the brake drum.	Loosen brake band.
PE-pipe retraction stops before final shut-off activated.	Turbine blocked by foreign object.	Remove foreign object.
	Pressure drop in supply line.	Check pumping station and water connection at the hydrant.
	Overwinding PE-pipe actuates the safety shut-off.	Adjust the winding mechanism.
		Repair broken winding chain.
Final shut-off activated but the shut-off valve does not close.	Values set for shut-off valve actuation are not correct.	Adjust setting according to instructions.
	Thin plastic hose of shut-off valve is blocked up or broken.	Replace the plastic hose.
The reel overwinds during pull-off or the PE-pipe windings become loose.	Tractor stopped abruptly.	Slow down gradually.
	No oil in the change-speed gearbox.	Refill oil.
Retraction speed varies from one PE-pipe layer to the next.	Varying ground conditions.	Adjust speed control system to the ground conditions (Change rod position on the lever of the layering mechanism.)
The desired retraction speed is not reached.	Incorrect transmission.	Select correct V-belt and transmission.
	Sprinkler nozzle blocked.	Remove foreign object.
	General: compare connecting pressure and water flow with performance chart values.	
Cart is not lifted	Wrong gearbox transmission	Select correct V-belt and drive transmission.



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

Model		65 TX *Plus*				75 TX *Plus*				
		65-220	65-250	65-300	75-200	65-340	75-250	75-270	75-300	85-200
A	mm x m	65x220	65x250	65x300	75x200	65x340	75x250	75x270	75x300	85x200
B	m	260	290	340	250	275	300	315	345	250
C	m3 / h	13 - 32			13-52	13-28	13-52	13-45	13-38	13-60
D	bar	3,5 - 10				3,5 - 10				
E	mm	14 - 22			14-28	14-20	14-28	14-26	14-24	14-30
F	kg	1790	1890	2050	1940	2340	2320	2400	2540	2350
G	kg	1270	1300	1350	1330	1570	1530	1550	1600	1550
H	mm	4700				5300				
I	mm	1900				2050				
K	mm	2320				2660				
L	mm	3000				3650				
M	mm	1500				1500 - 1800				
N		185 / 70 R13				195 / R14 C				
O	bar	2,7				3,5				
P	mm	240				280				
Q	mm	460				500				
R	mm	235				235				
S	mm	710				750				
T	mm	1500 - 2800				1500 - 2800				
U		165 / 70 R 13								
V	bar	1,3								

Model		85 TX *Plus*								
		75-320	75-350	75-400	85-300	85-320	90-230	90-250	90-280	90-300
A	mm x m	75x320	75x350	75x400	85x300	85x320	90x230	90x250	90x280	90x300
B	m	365	390	435	340	360	280	300	320	340
C	m3 / h	13 - 38	13 - 32	13 - 28	13 - 52		17 - 65			
D	bar	3,5 - 10								
E	mm	14 - 24	14 - 22	14 - 20	14 - 28	14 - 26	16 - 30			
F	kg	2780	2910	3130	3020	3180	3830	2950	3150	3270
G	kg	1740	1780	1880	1800	1860	1740	1770	1820	1850
H	mm	5350								
I	mm	2050								
K	mm	3060								
L	mm	3700								
M	mm	1500 - 1800								
N		205 / R14 C								
O	bar	3,5								
P	mm	290								
Q	mm	500								
R	mm	235								
S	mm	750								
T	mm	1500 - 2800								
U		165 / 75 R 13								
V	bar	1,3								

Model		90 TX *Plus*								
		85-350	**85-370**	**85-400**	**85 - 450**	**90-330**	**90-350**	**90-380**	**90-400**	**100-310**
A	mm x m	85x350	85x370	85x400	85x450	90x330	90x350	90x380	90x400	100x310
B	m	395	415	440	490	380	400	415	435	360
C	m3 / h	17 - 50	17 - 48	17 - 46	17 - 44	17 - 63	17 - 56	17 - 52	17 - 48	17 - 72
D	bar	3,5 - 10								
E	mm	16 - 26			16 - 24	16 - 30	16 - 28	16 - 26		16 - 32
F	kg	3650	3770	3940	4220	3770	3900	4090	4220	4100
G	kg	2220	2270	2340	2490	2250	2290	2370	2430	2390
H	mm	6470								
I	mm	2150								
K	mm	3180								
L	mm	4320								
M	mm	1500 - 1800								
N		10,0 / 75 – 15,3								
O	bar	5,0								
P	mm	305								
Q	mm	530								
R	mm	265								
S	mm	780								
T	mm	1500 - 2800								
U		165 / 70 R 13								
V	bar	1,3								

25 Conformity certificate

EC Declaration of Conformity

According to EC Directive 2006/42/EG

The manufacturer

Röhren- und Pumpenwerk BAUER Gesellschaft m.b.H.
Kowaldstraße 2, 8570 Voitsberg, Austria
Tel: +43 3142 200-0; Fax: +43 3142 200-320/-340

herewith confirms that the machine component mentioned below

Designation of machine	RAINSTAR
Machine type / basic units	65 TX Plus - 90 TX Plus
Consists of	Irrigation machine with drum cart

Corresponds analogously to the requirements of the Machinery Directive 2006/42/EC.

In case of a modification of the machine not accorded with BAUER GmbH, this declaration will cease to be valid.

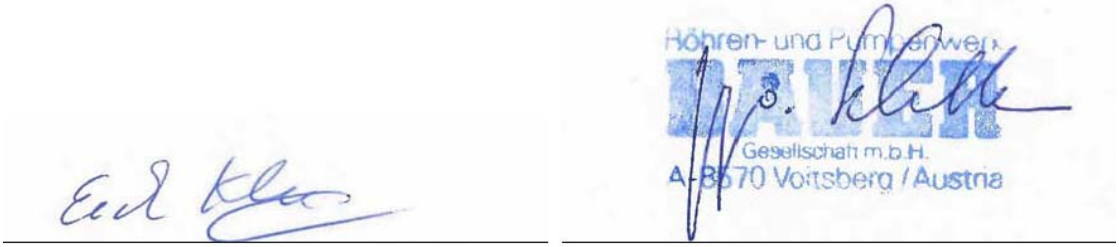
The following standards as amended have been applied analogously:

DIN EN 12100-1	Safety of machines – Basic concepts, general principles for design, Part 1: Basic terminology, metodology
DIN EN 12100-2	Safety of machines – Basic concepts, general principles for design, Part 2: Technical principles and specfications
DIN EN 60204-1	Safety of machines - Electrical equipment of machines, Part 1: General requirements
EN ISO 14121-1	Safety of machines – Risk assessment

Norms relevant for the product

DIN EN 908 Irrigation machines with drum

Person in charge of documentation**: Thomas Theissl, Kowaldstraße 2, 8570 Voitsberg, Austria**



Technical Designer in Charge | Commercial Manager

Voitsberg, 17.6.2013