BAUER

FOR A GREEN WORLD

OPERATING MANUAL

for

PRORAIN

Series *F30* and *F40*

VERSION APRIL 2007

PRO RAIN
F 30 and F 40
E

Introduction

Thank you for buying BAUER PRORAIN!

The present **manual** is a very important document that describes operation and maintenance of the ProRAIN F30 and F40.

This manual describes the system as detailed as possible. If you still need more information, please contact your dealer or turn directly to **BAUER** in Voitsberg/Austria.

Please note that the content of this manual neither constitutes part of nor alters in any way any previous or existing agreement, promise or legal relationship. **BAUER**'s commitment is based solely on the respective purchase contract which also contains the complete and only valid warranty agreement. Said contractual warranty is neither extended nor limited by the content of this manual.

All information contained in the present manual is based on the latest product details available at the time of printing.

BAUER reserves the right to make changes without previous notice and without assuming any liability!

The **PRORAIN** is designed for highest performance, safety and reliability provided it is operated in accordance with the present operating instructions.
Therefore you should study this manual thoroughly before starting your **PRORAIN F30 or F40!**
Strictly observe all instructions pertaining to system handling, operation and service!
On this condition, **PRORAIN** will operate to your satisfaction for many years!

	Non-observance of this manual may cause personal injury or damage the equipment!

This manual is to be considered an integral part of **PRORAIN F**. Suppliers of both new and used systems are advised to put down in writing that they delivered the manual together with the system.

Please make this manual available to your staff. State the pump type and serial number of your **PRORAIN F** in all inquiries, correspondence, warranty problems or parts orders.

We wish you a lot of success with your PRORAIN!

Product details

Type designation: PRORAIN

Type number: Series F 30, F 40

Serial number[1]: _____

Dealer: Name: _____

Address: _____

_____

Phone/fax: _____

Date of shipment: _____

Manufacturer:

Röhren- und Pumpenwerk **BAUER** Ges.m.b.H.
Kowaldstr. 2
A - 8570 Voitsberg/Austria
Tel.: +43 3142 200 – 0
Fax: +43 3142 200 –320 /-340
www.bauer-at.com
e-mail: sales@bauer-at.com

Owner or operator: Name: _____

Address: _____

_____

Phone/Fax: _____

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

[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 PRORAIN is built exclusively for normal agricultural applications (intended use).
- Any use beyond this normal use is considered non-conforming. The 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 PRORAIN 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 thereof.

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!

Tractor-driven machines

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

Tractor-mounted machines

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

Trailed machines

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

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

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

Hydraulic system

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

Electric-driven implements

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

Hand-operated devices (valves)

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

Maintenance

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

2 GENERAL

BAUER products are designed and manufactured carefully, subject to a system of continuous quality control. BAUER PRORAIN of type F30, F 40 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.

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

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

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

We warrant according to our General Terms of Sale.

3 SAFETY PRECAUTIONS FOR PRORAIN

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

WARNING! Danger by improper handling!

4. Never service or set any part of the system (except speed settings) while it is operating.
5. Keep clear of all moving parts.
6. Never expose any moving parts by removing protective elements.
7. Keep a safe distance from the sprinkler during operation.
8. Be careful in case of high connecting pressure!
9. Make sure that the water jet from spray nozzles does not hit public roads.
10. The PRORAIN 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 PRORAIN 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 PRORAIN loaded on a trailer the permissible maximum driving speed is considerably reduced dependent on the position of the PRORAIN'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

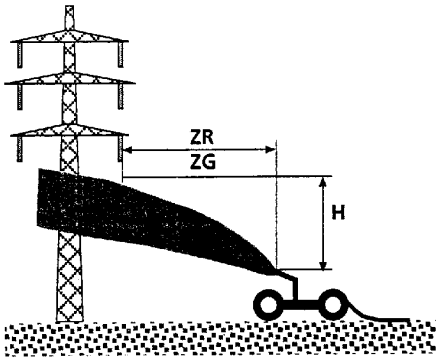
Safety distances Z from electric lines at:

IRrigation = ZR e. g.: with drinking water, ground water (e. g. well) or running water (e.g. stream)

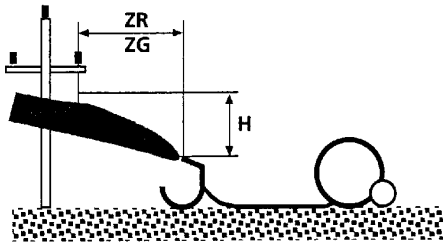
SlurryG = ZG e.g.: with liquid manure or slurry

H = minimum distance between sprinkler upper edge and conductor cable when crossing beneath an electric line

The safety distance, when crossing an electric line, is reached, if the distances per the below chart are kept. The water beam may touch the conductor cable, but may not be higher than the conductor cable.

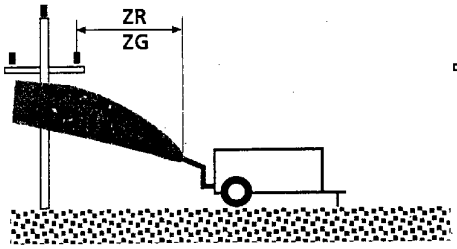


Sprinkler with rubber wheels

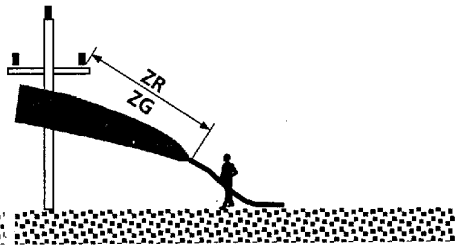


Sprinkler with skids

Running direction



Pump tanker on rubber wheels



Sprinkler-jet pipe directed by hand

Attention: Do not spray slurry on insulators and masts!

Type and operation mode of the sprinkler		Safety distance Z in m, measured on the ground							
		With rubber wheels or directed by hand With metal or synthetic pipes				With skids or stationary/fixed With metal cart and metal pipes			
		Nozzle diameter in mm or. Flow in m^3/h							
		26 mm ≙ 50 m^3/h		36 mm ≙ 100 m^3/h		26 mm ≙ 50 m^3/h		36 mm ≙ 100 m^3/h	
Jet type		Spray	Full	Spray	Full	Spray	Fulll	Spray	Full
Up to 1.000 V H = 1 m	ZR	1	5	1	5	1	5	1	5
	ZG	1	8	1	8	1	8	1	8
Up to 30.000 V H = 2,5 m	ZR	3	9	5	21	3	7	4	9
	ZG	5	11	7	23	5	9	6	11
Up to 110.000 V H = 3 m	ZR	3	12	5	24	3	9	4	15
	ZG	5	14	7	26	5	11	6	17
Up to 220.000 V H = 4 m	ZR	4	14	6	26	4	12	6	22
	ZG	6	16	8	28	6	14	8	24
Up to 380.000 V H = 5 m	ZR	5	16	7	26	5	14	6	22
	ZG	7	18	9	28	7	16	8	24

The indicated safety distances in the above chart are valid for a nozzle diameter of 26 mm or 36 mm at an operating pressure of 5 bar. **For higher operating pressures the safety distances have to be increased by 2 m.** The safety distances are not valid when normed jet pipes, like they are used by fire brigades, are being used.

When applying polluted water or slurry, note that a conductive layer can build up on the insulators. **Therefore do not spray on the insulators!** Flashovers and insulator damage can otherwise cause power failure.

If metal sprinkler pipes are laid parallel to a high voltage power line, this can lead, even without irrigating, to a perceptible contact voltage because of the electric influence. Touching the pipes is not dangerous, but can be unpleasant and painful. This is why it should be avoided to lay metal pipes parallel to high voltage lines or only over the shortest distances possible. When using synthetic pipes, you will not encounter any of these problems.

Note ! Do not put pipe line pieces into a vertical position in the range of high voltage lines ! Only transport them horizontally

3 DESCRIPTION

The PRORAIN is a universal irrigation machine for varying lengths and widths of fields and best suited for sprinkling cereal crops, field crops, root crops, and horticultures as well as any kind of grassland.
The main components of the PRORAIN 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 and the TVR 60 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 PRORAIN is the turbine. It is equipped with a regulating flap and with two changeable working nozzles. The cart retraction speed is controlled via de regulating flap. The working nozzles allow for adaptation of the turbine to very low quantity of water and cart retraction speeds. The lifetime lubricated drive shaft bearing is sealed by a maintenance-free floating ring seal.
The TVR 60 turbine is designed for water flow rates from 20 to over 120 m³/h.
The cart retraction speed is infinitely variable. It is adjusted by means of the ECOSTAR and can be read from the display. Depending on the available water flow and connecting pressure, it may vary between 8 and 120 m/h. The connecting pressure at the machine should not exceed 11 bar.
Power is directly transmitted from the turbine to the change-speed gearbox and the chain drive onto the reel. A band brake prevents fast reverse rotation of the reel in the final shut-off position, when the PE-pipe is stretched.
The band brake as well as gearwheels in the oil-filled change-speed gearbox act as a brake and prevent the PE-pipe windings on the reel from loosening during pipe pull-out.
For safety reasons the drive is fitted with an emergency stop and a reversing stop as well. With this emergency stop device the drive can be stopped immediately by hand.

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

To slacken the stretched PE-pipe move the gear shift lever downward carefully (see proper procedure on page13).
A winding carriage moved by a helically grooved spindle ensures that the PE-pipe is wound up properly on all layers. To keep the retraction speed constant on all layers independent of the pipe length still lying on the field, the PRORAIN is equipped with an ECOSTAR 4000 S.

Shut-off
At the end of the irrigation strip, the wheel cart is lifted automatically to transport position. Simultaneously the drive is shut-off automatically by means of rods.
If the machine is equipped with an overpressure-actuated shut-off valve, the water supply to the machine is shut off simultaneously.
If a low-pressure operated shut-off valve is mounted, the pumping unit is shut off.
After shut-off the rear hydraulic machine supports can be withdrawn. Without any further preparations the PRORAIN can be transported to its next setting-up position immediately. Pull off or lay down the PE-pipe again, connect the water supply, and the machine is ready for the next run.
When driving on public roads the reel must be turned into the driving direction and secured with the lock bolt. The PE-pipe must be fully wound up on the reel and the cart lifted. The jack and both rear machine supports must be withdrawn to their uppermost position.

On public roads the drawbar and coupling ring must be hitched to the tractor's yoke and secured with the pin. The maximum permissible driving speed of 10 km/h must be observed. For increased safety against overturning in curves, we recommend to set the maximum possible track width.
On principle, it is possible to transport the machine between hydrants in the field with the cart lifted on the side. In this configuration the driving speed must always be adapted to the existing conditions and should never exceed 5 km/h. You must also take into consideration that this type of transport requires a wider driving lane.

4 PUTTING INTO OPERATION

Before and during the first start-up grease all bearings, chains and guide parts of the winding mechanism. Use normal ball bearing grease for all bearing assemblies with grease nipples, and a viscous and durable type of grease for chains, guide rods and joints.

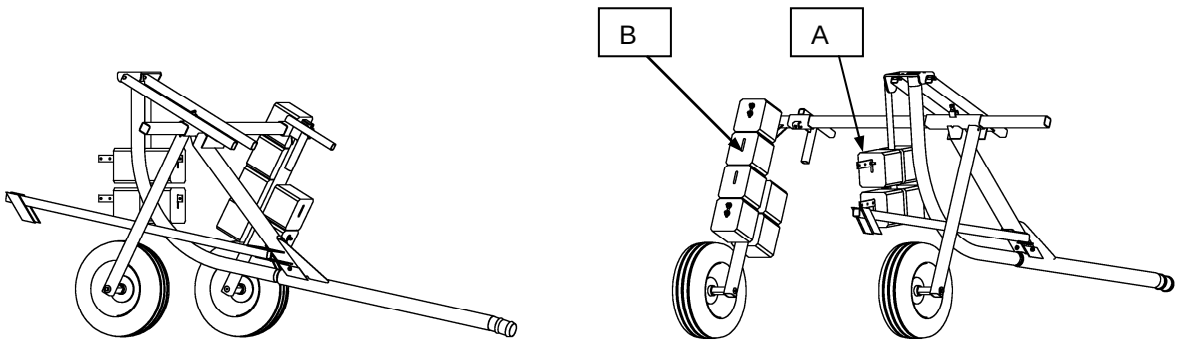
Tighten the wheel nuts before the first operation and check the tires for the specified pressure (see Technical Data).

Tighten also the connecting bolts, the ball race of the turntable, the ball race on the undercarriage, and the fastening of the hitch eye, according to the “Service and Maintenance“ table.

4.1 STEPS TO BE CARRIED OUT ONCE OR FROM TIME TO TIME

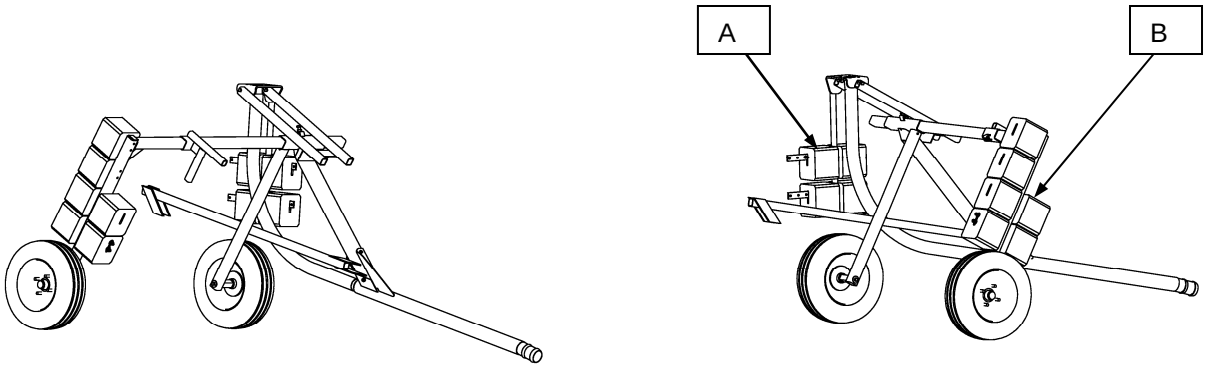
4.1.1 ASYMMETRIC WHEEL CART RIGHT SIDE

With this variant, assembly as per sketch is done when the PE-pipe ends on the **right** side of the reel (seen from rear).



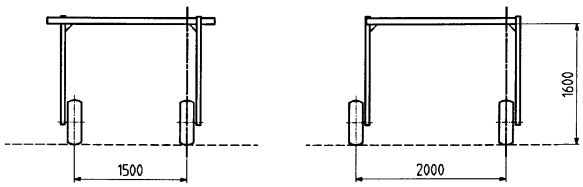
4.1.2 ASYMMETRIC WHEEL CART LEFT SIDE

With this variant, assembly as per sketch is done when the PE-pipe ends on the **left** side of the reel (seen from rear).



Set the requested track width of the wheel cart according to the type of crop.
Place the appropriate number of balancing weights on the balancing pendulum of the cart.
The number of weights required depends on cart track width setting, nozzle diameter, and nozzle pressure.

Adjusting range for cart track width



4.2 TABLE FOR CONCRETE WEIGHTS REQUIRED

Number of required weights is given for tracks of 1500 to 1800 mm

		Nozzle pressure in bar							
		3,0		4,0		5,0		6,0	
Position		**A**	**B**	**A**	**B**	**A**	**B**	**A**	**B**
Nozzle Ø	**20**	2	2	2	3	2	3	2	4
in mm	**22**	2	2	2	3	2	4	2	4
	24	2	3	2	3	2	4	2	5
	26	2	3	2	4	4	4	4	5
	28	2	4	4	4	4	5	4	6
	30	4	4	4	5	4	6		

Number of required weights is given for tracks of 1800 to 2000 mm

		Nozzle pressure in bar							
		3,0		4,0		5,0		6,0	
Position		**A**	**B**	**A**	**B**	**A**	**B**	**A**	**B**
Nozzle Ø	**20**	2	2	2	2	2	3	2	3
in mm	**22**	2	2	2	2	2	3	2	3
	24	2	2	2	3	2	3	2	4
	26	2	3	2	3	4	4	4	5
	28	2	3	4	4	4	5	4	5
	30	4	4	4	4	4	5	4	6

Set the sector on the wide-range sprinkler (ar. 220° for full track width). Further instructions see in manual for sprinkler. The VARI-ANGLE can be adjusted to the existing wind conditions by adapting the trajectory angle.

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

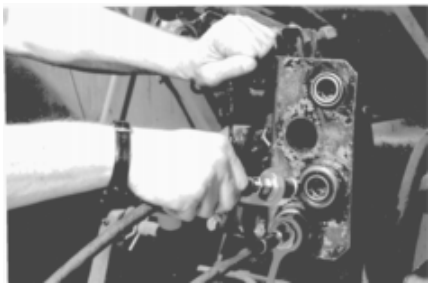
5.3.1. TRANSPORT OF MACHINE TO SET-UP POSITION

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

Adjust the undercarriage in a level position with the jack. The hitch is lifted by means of the toolbar.

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

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



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

WARNING!

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

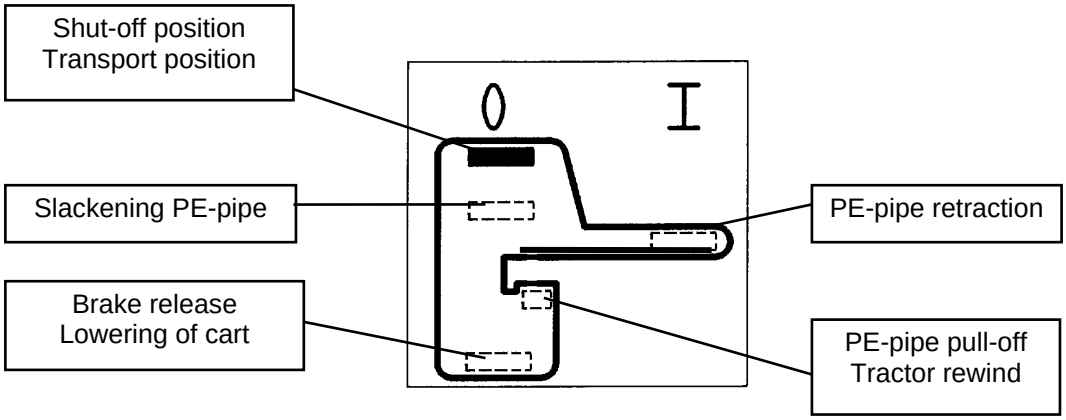
4.2.1 **LOWERING THE CART**

Before lowering the cart, the supports are extended hydraulically.
The cart lifting protection is lifted.
The cart is lowered by pressing slowly downward the shut-off lever towards “Brake release”.

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

WARNING! During this procedure the operator’s position should be outside the supports. Nobody must stay within the traveling range of the cart and of the supports.

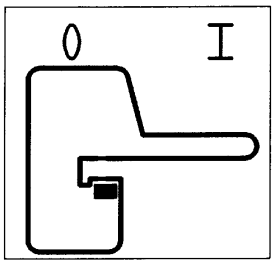
SWITCHING POSITIONS OF THE SHUT-OFF LEVER



4.2.2 **PE-PIPE PULL-OFF**

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

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



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

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

Do not stop abruptly, but slow down gradually at an intermediate stop or at the end of the pull-off.

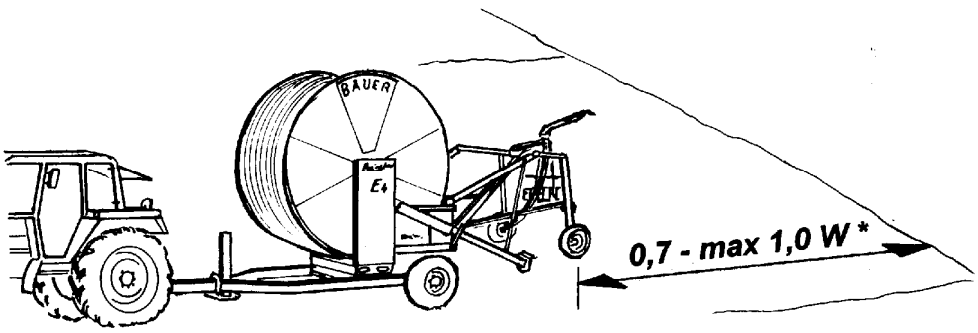
CAUTION!	If the PE-pipe is to be pulled off in a wide bow, make sure that it is pulled in a straight line of about 80 to 100 m first (90° angle to the reel) and then in a wide bow.

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

Couple the pressure hose, open water supply.

4.3 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. This method is mostly used in situations where heavy soil makes it impossible to pull the cart across the field or where the field is longer than one or two times the PE-pipe length. Moreover, the laying down method allows using smaller tractors because no pulling forces are applied on the pipe.
Drive into the field with the PRORAIN allowing for the sprinkler's distance of throw.



*) W = distance of throw of the sprinkler

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

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

4.4 PE-PIPE RETRACTION

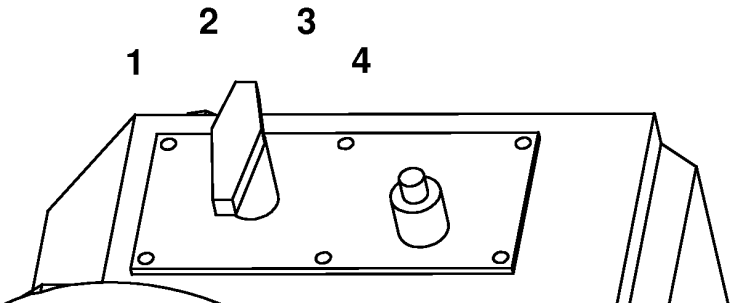
4.4.1 **GEAR SHIFTING**

Put the gear shift lever into the correct shifting position:

F 30, F 40

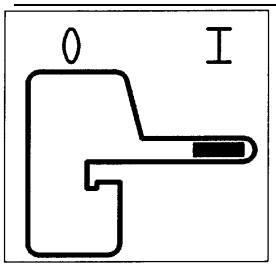
1	**bis**	--	**25**	m / h
2	**10**	--	**45**	m / h
3	**22**	--	**65**	m / h
4		**> 35**		m / h

The gear is selected according to the requested retraction speed.

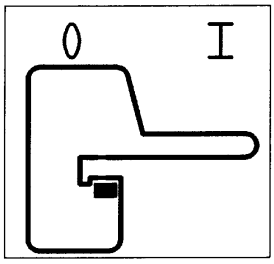


4.4.2 **GEAR SHIFTING:**

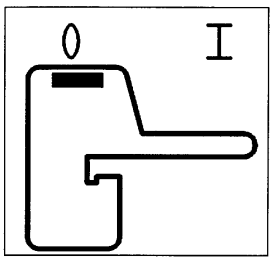
The four-speed gearbox adapts perfectly to existing operating conditions.
Switching should be done at low turbine speed! This can be done best when the water supply is being opened or stopped. When the water already flows through the turbine, gear shifting should be done by pressing the ECO-Star stop button, shifting the gear whilst turbine speed decreases and pressing the start button then.



. When the shut-off lever is in the "PE-pipe retraction" position, it is not allowed to shift gears



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



or shut-off position,

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

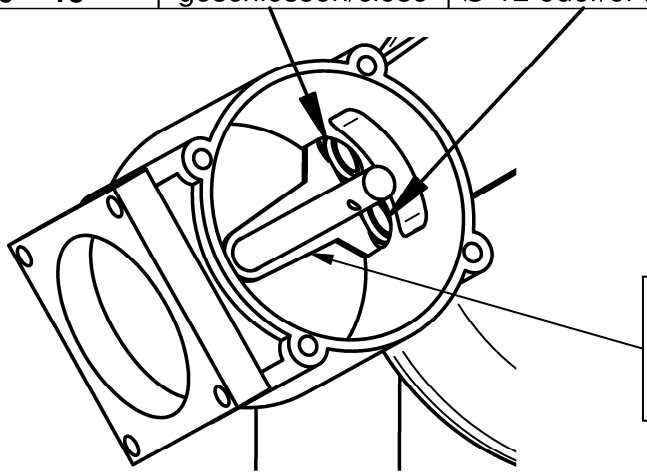
WARNING! Before shifting gears – slacken the PE-pipe !
Always shift gears at low turbine speed!

WARNING! If the shut-off lever is in the shut-off position, press the lever down slowly and carefully so that the band brake is released and the PE-pipe slackens (see item 5.5.6).

4.4.3 **SELECTING THE TURBINE WORKING NOZZLES**

Before connecting the water supply, check in which output range the machine shall work. The required water quantity can be seen from the output table. The below chart shows which nozzles are required in the turbine.

m^3/h		Düse/nozzle
> 36	offen/open	offen/open
27 - 36	geschlossen/close	Ø 20
18 - 27	geschlossen/close	Ø 16 oder/or Ø 18
9 - 18	geschlossen/close	Ø 12 oder/or Ø 14



Safety device for nozzles and closing cap

4.4.4 LIMITING BOLT FOR TURBINE CONTROL

With a pressure difference of 4 bar in front of and behind the turbine, the control flap cannot be moved anymore electrically. In normal operation such a high pressure difference is not reached by far. This only arrives when either a wrong gear has been chosen or too small nozzles are mounted in the turbine or an excessive speed is demanded. If the control motor cannot move the control flap anymore, the water supply must be reduced so that the pressure difference in the turbine decreases.

In case of needing extremely high retraction speeds (depending on the nozzle), the turbine may be working at its limits. In this case, the travel of the control flap can be limited by means of a stop. It always must be found out by testing in which hole the bolt is to be plugged.

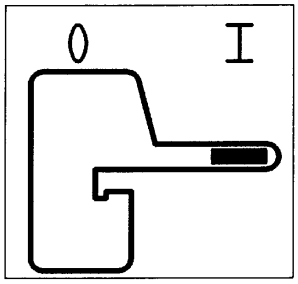
Adjustable stop:
With a few exceptions, the stop bolt is plugged in the topmost hole.

4.4.5 **STARTING RETRACTION**

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

Shifting should be done at low turbine speed!

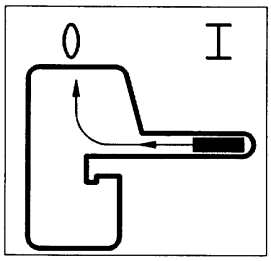
DO NOT USE FORCE



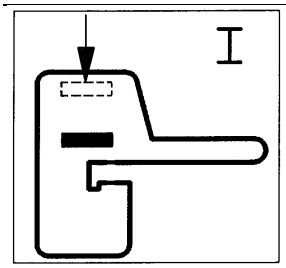
WARNING! If the PE-pipe is stretched, slacken it before coupling!

4.4.6 **SLACKENING OF PE-PIPE**

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

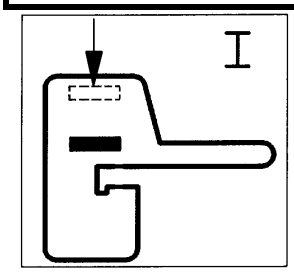


... and slacken the PE-pipe by carefully pressing the shut-off lever downward.



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

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



WARNING!	Service jobs only may be carried out when the PE-pipe has been slackened completely and the water supply has been shut off! Put the shut-off lever to shut-off position! This shut-off position also is required for transport on ways and roads.

The reel starts to rewind the PE-pipe.

5.6 SHUT-OFF

At the end of the irrigation run, the drive is shut off via rods.

At the end of the pipe retraction, the cart will be lifted automatically to transport position. Then the reel drive is stopped automatically.

4.5 CORRECTION OF SET-UP POSITION

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

Proper procedure:

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

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

... to **slacken the PE-pipe** (see item 5.5.6).

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

4.5.1 PTO REWIND:

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

Rewind only under water pressure (oval PE-pipe)

PTO speed = max. **540** rpm

The shut-off lever must be brought to PE-pipe pull-off" position.

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

Winding up the PE-pipe with the PTO will become necessary if there is no need to continue irrigating due to natural rainfall.

WARNING!

- Retract the pipe at the lowest possible PTO speed - start slowly and smoothly and avoid jerks.
- Avoid strain by excessive articulation of the PTO shaft.
- If the PE-pipe is covered with mud it should be loosened and lifted off the ground 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 PRORAIN 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!

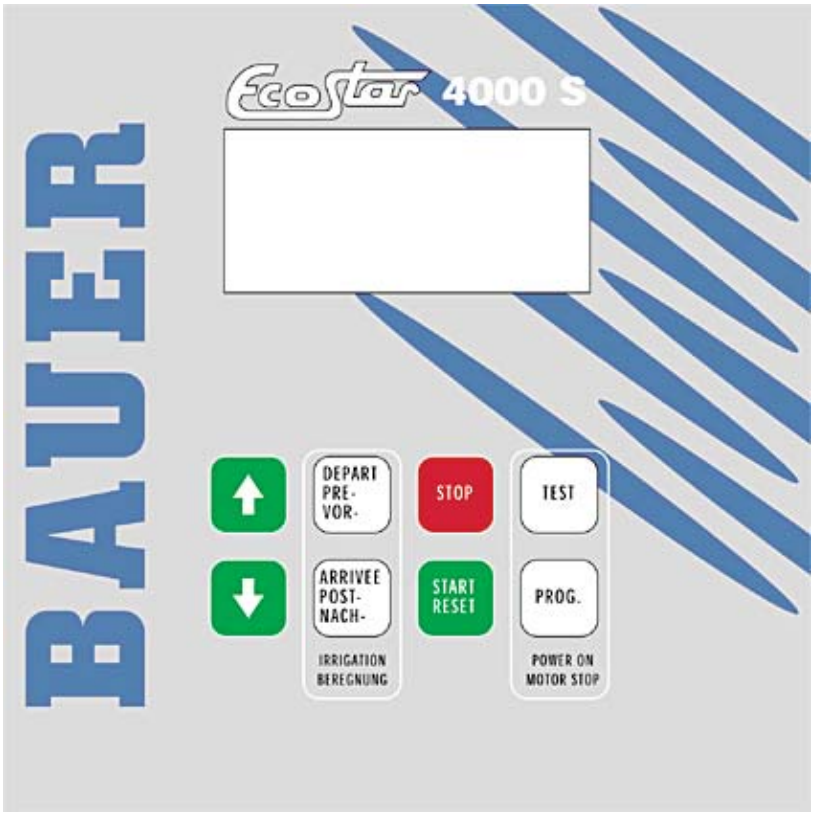
When driving the reel with the PTO the automatic shut-off system is inactive.

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.

5 ELECTRONIC CONTROL

BY MEANS OF

Ecostar 4000 S



5.1 GENERAL

BAUER *ECOSTAR 4000 S* allows you to operate your irrigation machine with ease at the touch of a button.

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

Through permanent comparison of set-point and actual value of the retraction speed you can administer your crops precisely the precipitation they need.

ECOSTAR 4000 S consists of the electronic box, a cable harness with the connected sensors for PE-pipe length, retraction speed and shut-off as well as connections for battery, solar panel, and turbine regulating motor. Connections are also provided for installing both a shut-off valve and a pressure switch (both optional equipment).

The electronic system of ECOSTAR 4000 S is rigidly built and has been tested under different climatic conditions. If problems still occur it is advisable to exchange the complete electronic box.
If a sensor is defective, you can replace the sensor only.

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

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

ECOSTAR 4000 S keeps the pre-selected retraction speed on a constant level throughout the pipe retraction.
Due to simple key assignment, operator control requirements are very low.
Normally, ECOSTAR 4000 S is in the energy-saving mode without displaying information.
Simply press the "POWER ON" or "PE-pipe retraction" key to activate the electronic system and turn on the background illumination with the standard display.

5.2 RECHARGING OF BATTERY

The battery must be recharged after 15 – 30 retractions and/or every 15 – 30 days depending on the pipe length and on the conditions of use. The battery charger shall supply 0,5 A – 1 Ampere (max. 2 A) at 12 V and it should switch off at 14 V. Under these conditions, the duration of charging will be 7 – 13 hours. Working with a higher charging current, reduces service life of the battery.

Optional solar panel:
When using the optional solar panel, the battery need not be recharged during the irrigation season. If recharging turns out to be necessary nevertheless, it should be done at a max. charing current of 2 A.

5.3 DISPLAY WINDOWS

The *ECOSTAR 4000 S* has 3 different display windows:

Standard display (operational status)

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

The first line indicates the desired retraction speed; it can be altered any time also while the system is irrigating (pre-setting 30 m/h).
The second line indicates the time (in hours and minutes) remaining until the irrigation run is finished, including pre- and post irrigation. This time setting can be read off any time during the irrigation run.
The third line shows the length of PE-pipe laid down on the ground.
It is possible to enter this length by hand, for instance after a metering error (locate the cause and exchange the length sensor for instance) – for this purpose see Parameter Sheet no. 1, program constant no. 07.
The fourth line shows pre and post irrigation time in minutes. If the number is blinking, it means that the system is currently running on pre or post irrigation.
If the display shows LOW BAT instead of the speed the battery voltage is lower than 11.8 V. Charge the battery with a power supply unit or exchange the battery. (Check if solar panel charges properly, see 4th line of test menu).

Press button „TEST“ TEST once to get to the

1st Test menu (performance test)

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

The first line shows the menu status „Test 1“.
The second line indicates the actual speed at which the machine is currently running.
This display information is needed to be able to check the maximum possible retraction speed of the machine in case the ECOSTAR 4000 S is set at a speed much higher than possible on account of the connected loads.
The actual speed may deviate from the pre-set speed, for instance after the start when the PE-pipe is not yet stretched.
The average running speed of ECOSTAR 4000S is precise within 10 m retraction and corresponds exactly with the desired pre-set speed (in the standard menu).
The third line indicates the battery voltage.
The fourth line shows if the battery is being charged by the solar panel. The battery is charged when voltage drops below 14,0 volts.

Press button „TEST“ TEST twice to display the

2nd Test menu (performance test)

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

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

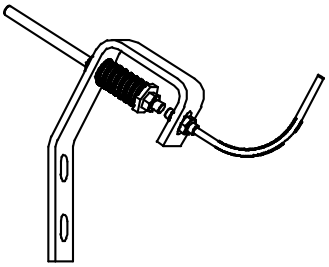
The first line on the left indicates the menu status „Test 2“.

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

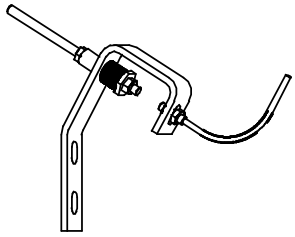
The second line shows if the stop sensor is activated, the symbol ■ is displayed if the stop sensor is activated (operating position, the magnet sits 2 – 5 mm close to the sensor).

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

Operating position



Shut-off position



The stop sensor has three functions:

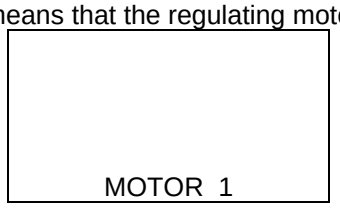
1) Reset for the laid-down PE-pipe length:
   When operated the laid-down pipe length is set to zero.
2) Post irrigation:
   If the post-irrigation procedure is carried out at the end of the run (0 m laid-down PE-pipe length) the post-irrigation function is activated first and then the ECOSTAR shut-off.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

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

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

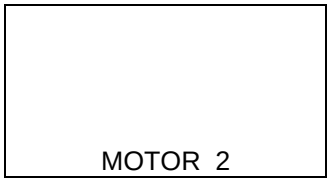
If the ▙ symbol appears and one motor has not reached its end position there is a blockage inside the turbine (MOTOR 1) or the shut-off valve (MOTOR 2).
The motor is turned off when the current input rises above 4.7 amperes, the symbol ■ appears.

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



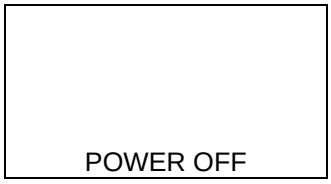
During this motor running time (max. 26 seconds), it is impossible to make entries on the keyboard.

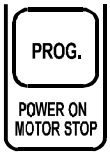
If the display shows a blinking MOTOR 2, it means that the shut-off motor for the shut-off valve is currently running.



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

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



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

is pressed or the PE-pipe is pulled off.

The battery is only charged by the solar panel while the electronic system is active. No charging takes place by the solar panel in the stand-by mode. With a mains unit, the battery is charged directly which is possible in stand-by mode as well.

5.4 HOW TO OPERATE THE BAUER ECOSTAR 4000 S

Summary:

- Pull off or lay down the PE pipe
- Couple the water supply
- Engage the gear box

ECOSTAR : Make entries only in the standard menu:

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

Press the "START-RESET“ key 

Activate pre-irrigation, if required.
Activate post-irrigation, if required.

Open the water supply.
The irrigation cycle runs automatically.

FURTHER INSTRUCTIONS

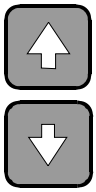
After a longer standstill the electronic system of ECOSTAR 4000 S is in the stand-by mode.
Pulling off or laying down of the PE-pipe activates the electronic system and the length of the pulled off or laid down pipe is counted.

Example for standard display:

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

6.3.1. SPEED ADJUSTMENTS

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



First the speed changes by 0.1 m/h step by step, than the speed changes by 1.0 m in steps of 10.
The speed can be changed at any time while the machine is running.
The time remaining until the end of the run is always adjusted automatically, too.
It is impossible to change the speed while a turbine regulating or shut-off valve motor is operating. The display shows MOTOR 1 or MOTOR 2.
Along with the speed change, the time pertaining to the speed setting it is also changed.

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

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

6.3.2. PRE AND POST IRRIGATION

Use PRE and POST IRRIGATION keys

to activate these functions.

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

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

Example on standard display:

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

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

If you press the “START-RESET” 

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

Before activating the pre or post irrigation mode the PE-pipe should be pulled off (the shut-off frame and thus the shut-off sensor should be in the operating mode) and the START-RESET button should have been pressed.
If the post-irrigation mode is activated the machine stops 8 m before the end of the run for the post-irrigation time. This value is pre-adjusted and can be changed in the program constant no. 6 – see Parameter Sheet 1 : Constants.

If you push START – RESET in the post irrigation mode, the post irrigation function is cancelled.

6.3.3. START

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

button to start irrigating.

If pre or post irrigation are required, push the appropriate key. 

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

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

6.3.4. MONITORING

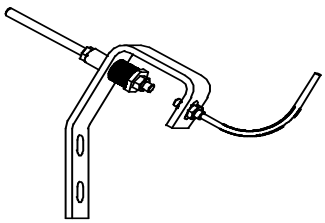
The program has a built-in monitoring system.
This systems will work only in combination with a shut-off valve - overpressure .

In the factory setting, this monitoring is deactivated (Parameter sheet 2, machine data 17, value set to “0” – monitoring off).
If system is set according to parameter sheet 2, machine data 17 at value “1”, the monitoring function is activated.
In this mode the monitoring function starts to work when the PRORAIN **fails** to reach the set speed within the programmed monitoring time (according to parameter sheet 1, program constant 03). In the factory setting the program constant 03 is set at 20 minutes. After this time the shut-off valve is closed and the machine stops.
Mostly the reason is that the retraction speed setting is too high, or the regulating flap is blocked etc.
In order to ensure that the set retraction speed is really reached and the system is not shut off after the monitoring time, check up on the retraction speed that can actually be reached by pressing the TEST key once.
If a pressure switch is mounted; the machine will start operating when a certain pre-set minimum pressure is reached, or irrigation is interrupted at low pressure. Irrigation is resumed as soon as pressure returns to standard.

6.3.5. STOP

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

Sensor in shut-off position



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

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

The shut-off valve opens and pressure is released through he PE-pipe.
If a low-pressure shut-off valve is mounted it opens very quickly.
It closes again after about 15 minutes.

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

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

WARNING !
If the „STOP“ button is actuated during the retraction on a machine, that does not have a shut-off valve, the retraction stops, the gun, though, continues operating. To prevent a local over-irrigation around the gun, the machine should operate only for a short period of time without retraction, if required, and then put into operation again by pressing the START button.**!!**

WARNING !
When the machine data at pos. 12 is set „0000“, the retraction stops only for a short period of time when actuating the „STOP“ button. After a few seconds the retraction starts automatically again.
WARNING: **When working on the machine always turn off the entire drive completely !!**

STOPPING the REGULATING FUNCTION

By pressing the „STOP“ and „PROG.“ button at the same time, all ECOSTAR functions are halted, i.e. the regulating motors of turbine and shut-off valve remain in the position, where they are.
By pressing these buttons the turbine regulation at a low turbine speed, for instance, can be stopped in order to change the gears.

6.3.6. PRESSURE SWITCH (OPTIONAL EQUIPMENT)

If the PRORAIN, after having been positioned for the run, is supposed to start-up only after the required pressure has built up in the supply line (pressure start), a pressure switch must be installed.
If such a switch is available, the monitoring system will also interrupt the irrigation cycle in case of low water pressure. As soon as the pressure returns to standard the run is continued.

CAUTION: The pressure switch always has to be used in connection with an **overpressure shut-off valve !!**

5.5 FAULT DESCRIPTION – ECO STAR 4000 S

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

5.6 PROGRAMMING PROCEDURE

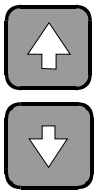
The electronic system is factory-programmed.
However, if site conditions require settings which deviate from these data it is possible to modify the program constants and machine data accordingly.
Proceed as follows:
The speed must be set at 11,1 m/h or 11 f/h in order to reach the constants.

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

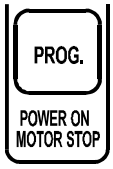
Immediately press the "PROGRAM" key 

3 x (three times) in order to get access to program constant 01 (see Parameter sheet no. 1).

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

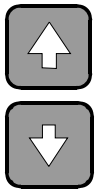
Use the cursor keys  to change the values of the constants as required.

If you press the TEST key the program returns to the standard display and the changed constants are saved.
If the TEST key is not pressed the program will return to the standard display after 1 minute and the changes are **not** saved.
The constants remain saved even if the battery is disconnected for a longer period of time.
In the program constant 09 with the value 111 you have access to the machine data.

By pressing the PROGRAM key 

you enter the machine data mode.
See Parameter Sheet No. 2.

Press the PROGRAM key for a short while again to select machine data numbers 00 – 18 .
.

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

If you press the TEST key 

the program returns to the standard display and the changed machine data are saved.

PARAMETER SHEETS no. 1 and no. 2 Example

Program version: 4,1 ; 4,5

Parameter sheet no. 1: Constants

Prog. const.	**Setting value**	lowest value	highest value	Description
01	**0008**	0001	0015	Pre-irrigation [m]
02	**0008**	0001	0015	Post irrigation [m]
03	**0000 or 0020**	0000	0099	Monitoring time [min] 0 = without shut-off valve 20= with shut-off valve
04	**0001** **0002** **0003** **0004** **0005** **0006** **0007**	0001	0007	0001 = English 0002 = Danish 0003 = German 0004 = French 0005 = Dutch 0006 = Swedish 0007 = Spanish
05	**0000** **0001** **0002**	0000	0001	0000 = slow shut-off, for option overpressure shut-off valve 0001 = fast shut-off, for option low-pressure shut-off valve 0002 = without shut-off valve option
06	**0008**	0000	0015	Distance to post irrigation [m]
07	**0000**	0000	1000	Input of laid-down PE-pipe length [m] if shut-off sensor is defective or removed
08	**0000**	0000	1000	not used
09	**0111**	-	-	Code for access to machine data; 11 = with setted US units

Program Version: 4,1 ; 4,5

Machine data: Parameter sheet no.. 2

Mach. data	**Setting value**	lowest value	highest value	Description
00	**0480**	0000	1000	Pipe length [m]
01	**0090**	0040	0200	Pipe diameter [mm]
02	**1680**	0500	3000	Reel diameter [mm]
03	**13,64**	05,00	30,00	Windings per layer
04	**0256**	0050	1000	Large chain wheel (reel sprocket) number of teeth x 2
05	**0013**	0005	0040	Small chain wheel (driving pinion) number of teeth
06	**0004**	0001	0020	Number of magnets
07	**0089**	0070	0100	Pipe ovality [%]
08	**0003**	0000	0045	First pulse to the shut-off motor [sec]
09	**0160**	0000	0300	Pulse length to shut-off motor [msec]
10	**0003**	0001	0005	Time between pulses [sec]
11	**0100**	0000	0250	Number of short pulses
12	**0003** **0003** **0004** **0001** **0001** **0002**	0000	0004	Shut-off system **From version 4,5** 0003= mechanical or no shut-off system 0003= shut-off systems closes when loosing pressure (overpressure shut-off) with 8 sec. delay 0004= shut-off system opens when loosing pressure (low pressure shut-off) with 8 sec. delay **till version 4,1** and for setting the shut-off from version 4,5: 0001= mechanical or no shut-off system 0001= shut-off system closes when loosing pressure (overpressure shut-off) without delay 0002= shut-off system opens when loosing pressure (low pressure shut-off) without delay
13	**008,2** **004,1**	000,9	026,1	Time for closing of the regulating flap [sec] TX60, TX100 [sec] TX20,TVR20,TVR60, F30, F40 [sec]
14	**0000** **0001**	0000	0002	0000 = pressure switch not in operation 0001 = pressure switch in operation
15	**000,0**	000,0	160,0	Length sensor 000,0 = length sensor on gearbox (System BAUER) 062,5 = length sensor with roll, diam. 80, distances of the pulses at the PE-pipe [mm]
16	**0000** **1**	0000	0001	0000 = shut-off valve opens with one pulse (12 sec.) 0001 = shut-off valve opens with the same pulses with which it closes
17	**0000**	0000	0001	Monitoring of the correct speed 0001 = monitoring ON 0000 = monitoring OFF
18	**0000** **0001**	0000	0001	Change over from metric to US units 0000 = metric units [m] 0001 = US units [ft]

Note : If US units are set, you get access to the programming mode by entering 11 f/h
Enter the program constants in US units, the machine data in metric units!

WARNING !
Shut-off system**
When „0 “ is set, the retraction only stops for a short period of time when pressing the STOP button. After a few seconds the retractions starts again automatically. **WARNING, when working on the machine, the entire drive has to be turned off completely !!**

6.5.1. BATTERY

The standard factory equipment includes a battery with 12 volts and 6,5 ampere-hours.
This battery must be recharged after 15 – 30 retractions (see item 6.2).

Recharging of the battery during the irrigation season is not necessary when using the optional solar panel. The battery should be newly charged every 6 months at a charging voltage of max. 2 Amperes. (Please observe the enclosed service and maintenance instructions).

When you connect the battery the display shortly shows VERSION 4.1 and then the standard display comes up.

To reach a long life of the dry battery (LC-R 127R2PG 7,2 Ah/20 HR) used on the ECOSTAR, it is important to follow certain guidelines when storing it for a longer period of time and when charging it.

1. Every PRORAIN irrigation machine delivered by BAUER, that is equipped with the electronic control ECOSTAR, comes with a fully charged battery, ready to be used.
   The solar panel, though, is covered and not hooked up to the battery. If there is a longer period of time between delivery and first operation, follow the maintenance steps (as pointed out below)
   This should also be observed, when a battery is stored for a longer period of time as a spare part.
2. If the PRORAIN is not operating for a longer period of time, e.g. out of the irrigation season, disconnect and take off the battery.
3. Store the battery fully charged, separate from any conducting material and unexposed to sun.
   If the battery is stored uncharged for a longer period of time, it will not reach its full capacity again when re-charging it.
4. The optimum storage temperature is between 0° and +25°.
   A stored battery discharges itself also. Therefore, re-charge at the following intervals:

Storage temperature:	*Interval to re-charge:*
less than +20°C	9 months
+20°C to +30°C	6 months
+30°C to +40°C	3 months

5. You will need a low humidity in the storage room (55%+/- 30%) to avoid a corrosion of the poles.
6. Avoid that the battery gets completely discharged. In that case, the battery can reach its full capacity again, but, if discharged completely repeatedly, its lifetime will be reduced.
7. Keep the batteries clean. To clean them, you can use a dry towel. If necessary, soak them in water or alcohol. Do not use oil, gas or dilutents.
8. In no case, you should take batteries apart, because they contain acid and can cause serious burns.
9. Do not short-circuit batteries, because this may damage them.
10. Charging the battery should be done with a charging current that does not exceed 2,0 A. If a battery is empty, it takes around 7 hours to re-charge it completely.
    Devices to monitor the battery capacity and chargers with intelligent (self-regulating) charging function, enable a precise analysis and a controlled charging of the battery.

5.7 SOLAR PANEL

Optional Equipment

The standard factory equipment includes a 12 V/4 W solar panel.
The solar panel is maintenance-free.

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1. In order to ensure optimum output the surface should be cleaned with a soft cloth and a household detergent (no abrasives), from time to time.

2. In order to avoid over-charging of the battery or a faulty functioning of the ECOSTAR, the electronic system interrupts the charging, when the STOP key is pushed or the battery gets disconnected. (The machine is delivered with the terminals detached).
   The charging procedure is resumed when the „START“ button is pressed or the PE pipe pulled off.

6.5.2. CABLE CONNECTIONS – WIRING DIAGRAM

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

6.5.3. CHECK-UP OF CONNECTIONS

Press „START“ key. 

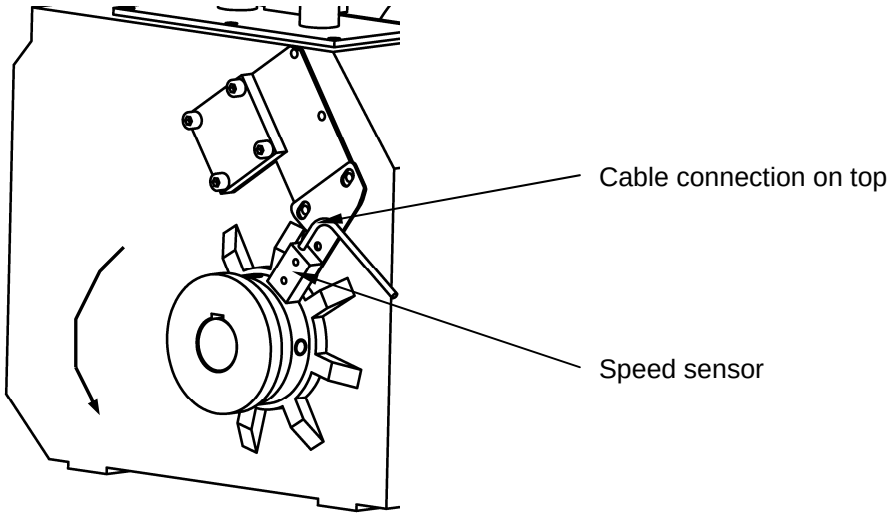
The regulating motor closes (the segment turns towards the limit bolt).
The overpressure shut-off valve is opened.
The low-pressure shut-off valve remains closed.

Press STOP key 

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

5.7.1 CHECK-UP OF LENGTH SENSOR

The plastic disk with 4 magnets is mounted at the driving chain wheel of the gearbox.
During pull-off (sense of rotation as indicated by the arrow), the display for the pipe laid down must count up starting at 0 m.
Distance of 2 – 5 mm between double sensor and magnet disk.



5.7.2 **LIMITER FOR TURBINE REGULATING FLAP**

See item 6.5. The regulating range of the turbine regulating flap has to be adjusted to the respective flow rate. If the limiter is not ajdusted correctly, the regulation at the turbine might not function anymore, i.e. that the PE pipe retraction is at a maximum speed.

If the flow rate is reduced considerably, the limiting bolt must be adjusted again because otherwise the retraction speeds according to the performance chart cannot be reached.

5.7.3 **SHORT CHECKLIST FOR ECOSTAR 4000S / 4200**

1. Checking the battery voltage (should be at least 12 V)
   a) Cover up the solar panel completely.
   b) Read battery voltage in Test Menu 1, (Press the TEST key once - ECOSTAR 4000 S, / MENU key once - ECOSTAR 4200)
   c) If voltage is too low (lower than 12 V) or no charge available at all, check battery and cables as well as the fuses inside the electronic box.

2. Checking the sensor function
   a) Set test menu 2 (press the TEST key twice - ECOSTAR 4000 S, / MENU key twice - ECOSTAR 4200)
   b) The installed sensors are displayed as the functional check-up, Motor 1 – Motor 2.

3. Checking the length indication of the pulled-off PE-pipe
   a) Read the pulled-off PE-pipe length on standard display screen and compare it with the length marking printed on the PE-pipe.
   b) If the display length is 000 m or much shorter than the pulled-off PE-pipe length, an adjustment must be made.

4. Checking the mechanical transmission to the stop sensor

5.7.4 **CHECKLIST FOR ECOSTAR 4000S / 4200**

During the first start-up and at the start of the season, but also during operation, error messages or maloperation may occur in connection with the electronic system or the sensors connected as well as problems resulting from wrong operation.
In most cases, the error can be detected and eliminated very quickly by a systematic system check-up on the basis of the following checklist.
This checklist serves as a supplement to the detailed operating manual for ECOSTAR 4000 S and 4200.
After checking up the device according to the separate SHORT CHECK-LIST the handling instructions can be taken from the table below.

Note: In some cases, operation differs due to different control keys of the models 4000 S and 4200. However, special reference is made at the respective points.

Pos.	Malfunction	Fault locating	Remedy
1.	**Wrong or incomplete display read-out**	**Check battery voltage !** 1. Cover up the solar panel completely and read battery voltage indication in the first menu window after 2 to 3 minutes. (press once the TEST key – ECOSTAR 4000 S, once the MENU key - ECOSTAR 4200) **Note !** • If the solar panel is not covered up, the display may show a voltage read-out even if the battery is empty, or it may even pretend sufficient battery charge in sunshine. The electric charge, however, is not sufficient for system operation under these circumstances! 2. If the battery voltage (now uninfluenced by the covered-up solar panel) is lower than 12 V, power supply is not sufficient for system operation.	Charge or replace the battery
2.	**No read-out on display**	**Check battery, cable connections, and fuse !** 1. Test battery voltage, battery is empty 2. The connecting cables between battery and ECOSTAR are not connected or do not make contact. 3. The fuse is defective. The fuse is located inside the electronic box where there is also a spare fuse. **Notes !** • When checking the contacts make sure that the cables are connected correctly: „+“ terminal = brown wire, „-“ terminal = blue wire. • The solar panel should be covered up also while connecting and disconnecting the battery, and as long as the battery is disconnected because otherwise the system could display errors. • The stored machine data are preserved when the battery is disconnected. • When re-connecting the battery, never confuse the “Plus” and “Minus” terminals because this would short-circuit the system and trip the fuse, or possibly damage the electronic system.	Charge or replace battery. Check connections and contacts. Replace fuse.

3.	**Permanently low battery voltage**	**Check battery !** 1. If battery voltage remains too low in spite of continuous charging by solar panel, the battery must be examined and recharged, or replaced, if necessary.	Check / charge or replace battery
4.	**Charging error due to solar panel**	**Check the solar panel !** **Notes !** • The normal charging function of the solar panel is designed to stop when the battery has reached a charge of 14.0 V or over. In the first menu window, "Charging by solar panel" is at "OFF" . (1xTEST key - ECOSTAR 4000 S, 1x MENU key – ECOSTAR 4200) • At 13.9 V or less battery voltage, the charging functions starts. "ON" appears in the same menu window. • If at 13.9 V or less battery voltage the battery is not charged by the solar panel, display at "OFF", the following reasons are possible: 1. Charging not possible due to insufficient light conditions. 2. The „ + / - " phases of the solar panel have been confused. Measure the polarity. 3. The solar panel is defective. Determine this by measuring at panel output.	Correct polarity. Replace panel.
5.	**Confused display read-out**	**System voltage / starting error** 1. A confused display may indicate low voltage. 2. It may also appear when the system is put into operation for the first time or after re-connection of the battery (even is voltage is sufficient) **Note !** Disconnect battery and solar panel. Make contact between the „+/-„ poles of the ECOSTAR cable (neutralise). Connect battery and solar panel again after about 1 minute. Pay attention to the polarity of the cables!	Test battery voltage, charge battery. De-energise the electronic system for about 1 minute.
6.	**No length indication on the display**	**Shut-off sensor / loose PE-pipe windings** 1. The PE-pipe is pulled off but the reading on the display shows only 000 m an. **Notes !** a) In this case, the shut-off frame on the PRORAIN and/or the shut-off sensor have been actuated, as a result the pipe length indication is reset to 000 m and the ECOSTAR stops the operation of the PRORAIN. The shut-off frame may have been actuated manually or by a **loose PE-pipe winding.** b) The shut-off frame and the shut-off sensor may also have been actuated accidentally during pipe pull-off. In this case the system indicates a pulled-off pipe length but this value is lower than the length actually pulled off. This value must also be newly adjusted as described in the next column. c) No length is counted during the PE-pipe pull-off, the value cannot be corrected and the PRORAIN does not start. In this case, the **shut-off sensor** setting is wrong (spacing too small, see operating manual). **Entry of PE-pipe length on the ECOSTAR** Procedure (confer also to manual) a) Set retraction speed at 11.1 m/h b) Push the PROGRAM key 3 times, the parameter sheet no. 1 appears, push PROGRAMM key again to get to the constant 07. c) In this position the value of the constant can be set at the pulled-off PE-pipe length by means of the arrow keys. The pipe length actually pulled-off can be taken from the imprint on the PE-pipe directly at the PRORAIN. d) Save the setting with the TEST key and the standard screen returns. You can start the PRORAIN again.	Enter the pulled-off PE-pipe length again on the ECOSTAR Set the shut-off sensor correctly or replace it.

7.	**No length indicated on the display or length counting is the wrong way round**	**Length sensor** 1. If the length is not counted during PE-pipe pull-off and runs the wrong way round during pipe retraction (indicated length increasing instead of decreasing), the length sensor is mounted the wrong way. (See instructions with drawing in the operating manual.)	Mount the length sensor correctly. .
8.	**Length on the display does not correspond with the pipe length actually pulled off.**	**PE-pipe ovality** 1. The percentile difference between the laid-down PE-pipe length and the value indicated on the display is always the same. In this case the ovality of the pipe does not correspond with the programmed value and must be corrected. **Correcting of the ovality constant** a) To correct this constant, go to parameter sheet no. 1, as described under item 6 above and press the PROGRAMM key up to constant 09. In this constant enter the value 0111 to open the parameter sheet 2, machine data. The ovality factor can be corrected under machine constant 07. b) If the displayed length is always longer than the pipe length actually pulled off, ovality is larger than programmed. The setting 0.89 must be corrected to 0.88 or 0.87. c) However, if the length on the display is always shorter than the PE-pipe actually pulled off, ovality is smaller than programmed. The factor must be corrected from 0089 to 0090 or 0091. **Length sensor / magnetic disk** 2. The pulled-off PE-pipe length and the value on the display always differ considerably. **Note !** a) One or several magnets are missing on the magnetic disk. Magnetic disks on all Ecostar models are equipped with 4 magnets. b) One or several magnets are no longer active. When the magnets move past the length sensor, one or several magnets produce no display (■) in the menu window (2 x TEST key 4000 S, 2 x MENU key 4200) . c) In the machine data the number of magnets programmed is different than 4. Correct the factor 06 to 0004 in parameter sheet no. 2. No display at all on the screen (■). Length sensor defective.	Correct the ovality factor. Reduce the ovality factor. Increase the ovality factor. Complete the magnets. Replace inactive magnets. Correct the machine data. Replace the length sensor.
9.	**The electric shut-off valve does not close.**	**Shut-off sensor** 1. If the electric shut-off valve (overpressure shut-off) does not close at the end of the irrigation strip (open with low-pressure shut-off), the shut-off sensor setting is wrong (sensor spacing too large) The sensor indication (■)does not disappear in the menu window.	Adjust shut-off sensor.

10.	**The electric shut-off valve does not close or open.**	**Program constant** 1. The ECOSTAR is not programmed for a shut-off valve. The parameter sheet no.1 - program constant 05 – shows the setting "0000". This constant must be corrected to "0002" (with shut-off valve). In addition, make the following entry in parameter sheet no. 2 under machine data "12": "0001" for overpressure shut-off valve, or "0002" for low-pressure shut-off valve **Pressure switch** 2. If a pressure switch for low-pressure shut-off is mounted, the reasons may be as follows: a) Available pressure insufficient for irrigation operation, the supply pressure is lower than the pressure setting of the pressure switch. b) The pressure switch is soiled or defective. To check the function of the pressure switch, the pressure switch can be deactivated in the program, parameter sheet no. 2, constant 12, by setting it at "0000". **Dirt / foreign objects / connections** 3. The shut-off flap is blocked by a foreign object. 4. The electrical connections of the shut-off valve are defective or not installed correctly. The motor of the valve (motor 2) is defective.	Correct the setting. Increase the supply pressure. Clean /replace the switch Clean the flap / inspect connections / check the motor / replace
11.	**The turbine regulation does not work, the flap remains open or closed.**	1. **Excessive pressure difference in front of and behind the regulating flap. Limiting bolt.** The flap is closed too far and can no longer be opened by the motor. By means of the limiting bolt, the regulating range is limited so as to ensure that the regulating motor will not be in the critical range. 2. **Electrical connections** of the motor (Motor 1) are defective or not installed properly. 3. **Motor** of regulating flap (Motor 1) is defective. 4. **Foreign objects** impair the function of the regulating flap.	Adjust the bolt accordingly. Check the connections Test / replace Remove foreign objects
12.	**The machine stops during the run.**	1. If the PRORAIN is equipped with a pressure switch, the machine may be stopped due to low supply pressure. If you still want to continue operating, the pressure switch can be deactivated (see Item 10/2.b). 2. The machine also stops if the desired (setting) retraction speed is too high and the machine cannot reach this speed within 20 minutes time. However, this function can be deactivated as follows: Machine data, parameter sheet no. 2, constant 17 (monitoring of proper speed):) Setting „0001" Monitoring on Setting „0000" Monitoring off	Increase the supply pressure, turn off the pressure switch. Reduce the retraction speed. Deactivate the monitoring function.
13.	**Further problems**	If problems still occur with regard to display and accuracy as well as other functions, the check the data entered in the ECOSTAR according to the constants in the parameter sheet no. 1 and the machine data in the parameter sheet no. 2. Contact BAUER service department, if needed.	

5.7.5 **PRE AND POST IRRIGATION CHART**

ECOSTAR 4000S / 4200 feature a pre and post irrigation function in order to correct uneven precipitation at the beginning and at the end of the field . The rain height at both the beginning (pre-irrigation) and end (post-irrigation) of the field is achieved by stopping the retraction of the sprinkler cart for a predetermined length of time The time of pre and post irrigation is set on the ECOSTAR by means of the program constants 01 and 02 in parameter sheet no. 1. The factory setting is program constant 08.

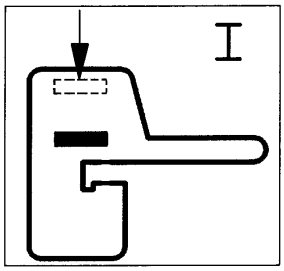
This factor establishes a relation between sprinkler retraction speed and pre- as well as post irrigation. The set factor can be changed – as a result pre- and post irrigation times change.

The table below shows pre- and post irrigation time in minutes (rounded) at various setting factors. .

Con-stant -	**Retraction speed in m/h Pre- and post irrigation time in minutes**									
	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

6 EMERGENCY SHUT-OFF

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



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

7 WINDING MECHANISM

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

8 SHUT-OFF AND SAFETY EQUIPMENT

Unattended operation of the PRORAIN is made possible by a final and safety shut-off. The final shut-off is actuated automatically as soon as the sprinkler cart has been lifted. This way the drive is stopped to avoid troubles caused by faulty windings of the PE-pipe on the reel.

9 CART

The high asymmetric construction of the wheel carts provides maximum crop protection.With infinitely variable track width, the carts adapt to any crop row spacing. The width is adjusted with the frame support member.

For easier PE-pipe pull-off, the cart is equipped with a double draw-out hook. You pick up this hook with the tractor's toolbar and pull off the PE pipe.
To turn the pipe reel and re-position the PRORAIN at its new set-up position, the cart must be pulled back into its end position at the PRORAIN.

Depending on the type of sprinkler used, the nozzle height of the mounted sprinkler ranges between 1900 and 2100 mm.
At the end of the retraction, when the cart moves up to the machine it is slightly hoisted on the PE-pipe side. Owing to its pendulous mounting (self-balancing assembly) the sprinkler is not tilted and always remains in the optimum position regarding distance of throw and distribution uniformity. This pendulous mounting assembly compensates also slopes in the terrain in longitudinal direction.

10 SHUT-OFF VALVE — OVERPRESSURE (OPTION)

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

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

11 SHUT-OFF VALVE — LOW PRESSURE (OPTION)

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

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

7. WINTERIZATION - DRAINING

In areas, where frost is likely in winter after the irrigation season, the machine must be drained in time. werden. A compressor with a minimum air capacity of 5000 l/min at 1,5 bar overpressure is best suited for this purpose. Connect the compressor to the inlet of the machine For blowing out the water the PE-pipe should not be pulled off. It can stay on the reel.
In most cases, winding up the empty PE-pipe after the draining will cause extreme ovality and faulty winding. The small amount of water remaining in the PE-pipe after the draining (approx. 30 to 50 % of the volume) will not do any harm.
Remove the drain plug at the turbine. We recommend you to turn in this drain plug when putting the PRORAIN into operation at the beginning of the next season. Clean the PRORAIN and regrease all appropriate points.
The machine should preferably be stored in a roofed shelter where it is protected from direct exposure to the weather..

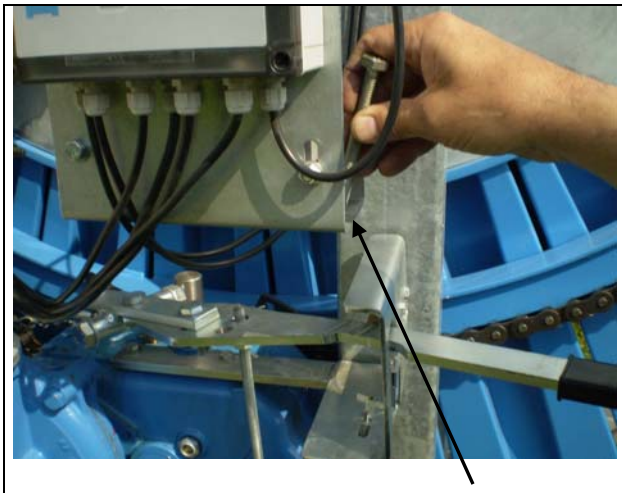
Remove the drain plug at the turbine

Drain screw for gear oil.

Lubricating the reel sealing

When lubricating, the screw (1) is mounted to the gear block (2).
When lubrication is completed, the screw (1) is in its place of deposit.

Screw in lubricating position



Screw in place of deposit

14.1.1. SERVICE AND MAINTENANCE

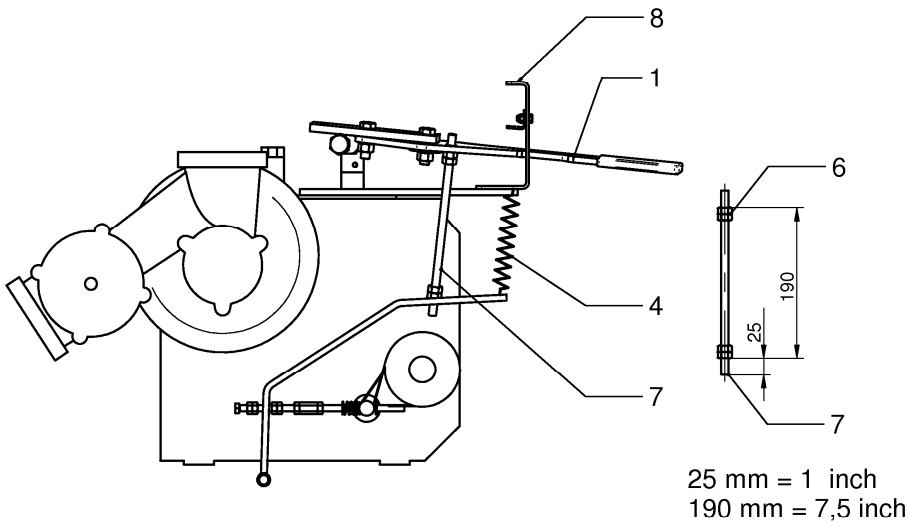
We cannot emphasise often enough that proper service at the right time is essential for the operating reliability and service life of a machine. At the end of every irrigation season the PRORAIN should be thoroughly checked and cleaned, and all parts greased carefully.

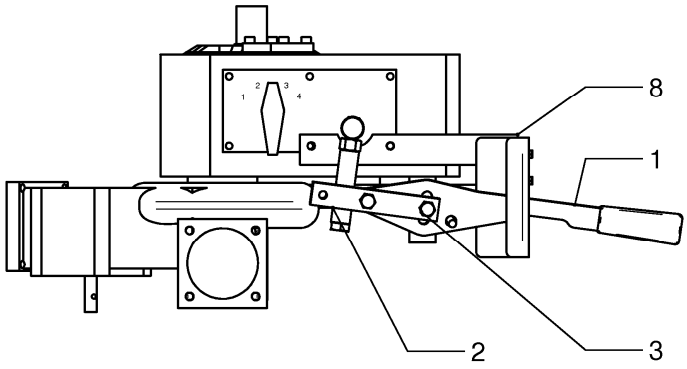
Machine part	Service interval	Lubricant, grease, oil
1. Helically grooved spindle of the winding mechanism	every 250 hours	multi-purpose grease (Alvania Grease)
2. Drive chain of winding mechanism	every 250 hours or as required	multi-purpose grease (Alvania Grease)
3. Driver (spindle nut) of winding mechanism	every 250 hours, replacement recommended after 2500 service hours	multi-purpose grease (Alvania Grease)
4. Driving chain	every 250 hours or as required	multi-purpose grease (Alvania Grease)
5. Water connection at reel's input	every 250 hours	multi-purpose grease (Alvania Grease)
6. Change-speed gear	Change oil for first time after 500 service hours and then every 500 to 800 hours or at least once a year	Gear lubricant oil CLP – DIN 51517 – part 3, ISO VG 220 - 11,3 l
7. Ball race	every 500 hours	through grease nipple multi-purpose grease (Alvania Grease)
8. Jack (option)	as required	multi-purpose grease (Alvania Grease) through grease nipple
9. Machine supports (sliding parts)	as required	multi-purpose grease (Alvania Grease)
10. Screwed joints	before putting into operation after 50 hours of operation	Tightening torques
Wheel nuts		300 Nm
Turntable side frame		210 Nm
Ball race on turntable and undercarriage		E11 - E41 = 85 Nm E 51 = 200 Nm
Hitch eye		200 Nm

15. FAULT FINDING

FAULT	CAUSE	REMEDY
The PE-pipe cannot be pulled off.	Incorrect gear shift lever position.	Put it into the pull-off position.
	Brake band sticks to the brake drum.	Loosen the brake band.
PE-pipe retraction stops before the final shut-off is actuated	Turbine blocked by a foreign body.	Remove the foreign body.
	Pressure drop in supply line.	Check pumping station and hydrant connections.
	Overwinding of PE-pipe activates the safety shut-off.	Adjust the winding mechanism.
		Repair broken winding chain.
The final shut-off is activated but the shut-off valve does not close.	Values for shut-off valve activation are not set correctly.	Adjust the settings according to the manual.
The reel overwinds or the windings become loose when the PE-pipe is pulled off.	Tractor stopped abruptly.	Slow down gradually.
	No oil in the change-speed gear.	Refill oil.
	Spring force onto band brake too low	Re-adjust band brake. – See setting instructions.
The selected retraction speed is not reached	Incorrect drive transmission.	Select proper gear transmission
	Blocked sprinkler nozzle.	Remove blockage.
	General: Compare connecting pressure and water flow with performance chart values.	

12 SETTING INSTRUCTIONS FOR PRORAIN F30 AND F40

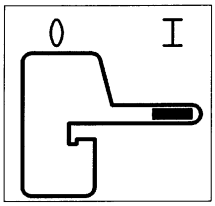




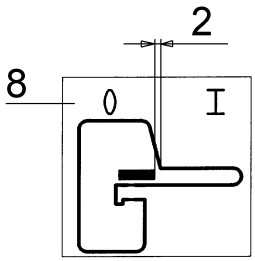
12.1 SETTING OF SHUT-OFF LEVER

The shut-off lever (1) must be adjusted to the shut-off point of the gearbox.

Procedure:
Join the bracket (2) with the shut-off lever (1) so that screw (3) is approximately at centers of the long hole in the shut-off lever.
Move the shut-off lever (1) to the “PE-pipe retraction“ position.



Turn the PTO shaft (9) by means of the hand wheel anti-clockwise.
Move the shut-off lever (1) slowly to “0“ position.



The shut-off point is reached when the hand wheel can be turned much more easily. At that point, the turbine and the top gear shafts are uncoupled and they are not moved any longer with the hand wheel. Loosen now screw (3) and turn the shut-off lever (1) with reference to the bracket (2) so that the shut-off point is reached when the edge of the shut-off lever is at a distance of 2 mm from the edge of the shifting gate (8). (See sketch, 2 mm = 0,08 inch). Whilst pulling the shut-off lever towards uncoupling, it must be pressed downward in order to continue pushing it through the inclined shifting gate.

12.2 SETTING THE THREADED ROD

The nuts (6) on the threaded rod (7) already are mounted at our factory according to the above sketch. This setting remains unchanged over the entire service life. Secure the hex. nuts (6) by means of counter nuts.

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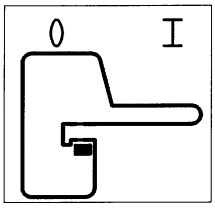
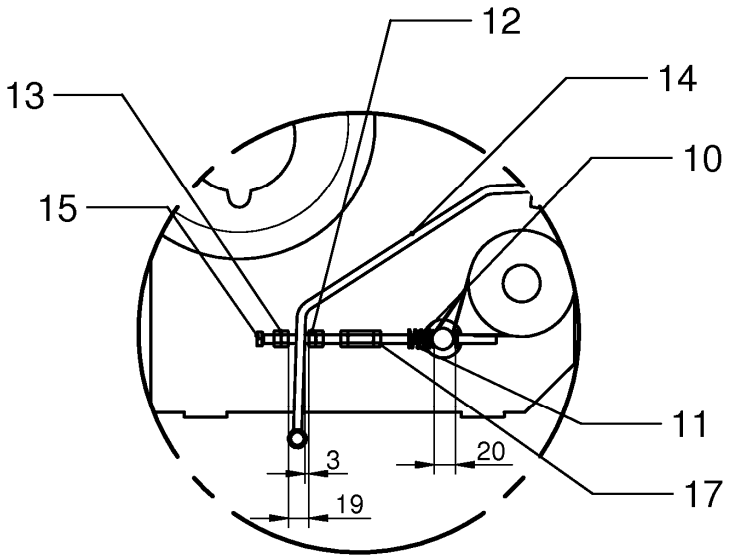
12.3 SETTING OF THE BAND BRAKE

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





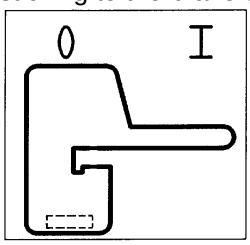
3 mm = 0,12 inch
19 mm = 0,75 inch
20 mm = 0,8 inch

The nuts (10) of the band brake are turned until the pressure spring (11) has got a length of 20 mm (0,8 inch). Be sure to avoid any contact of the nuts (12 and 13) with the brake lever (14) during this procedure. Then the nuts (10) are secured by means of counter nuts.
Now bring the shut-off lever to position "PE-pipe pull-off". Turn nut (12) until there is a spacing of 3 mm (0,12 inch) between nut (12) and the shut-off lever and secure the nut with a counter nut. Approach nut (13) at a spacing of 19 mm (0,75 inch) to nut (12) and secure the nuts with counter nuts as well.
On account of the wear of the band brake, the pretensioned length of pressure spring (11) will become longer and the spacing of nut (12) to the brake lever will become smaller. To re-adjust this length, nuts (10, 12, 13) must be re-adjusted.

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

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

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

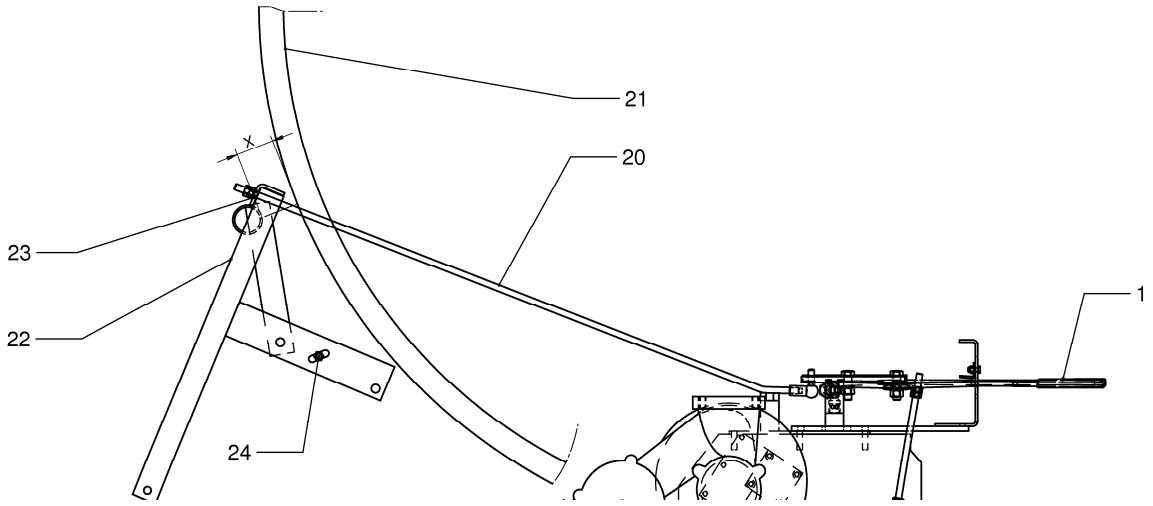


CAUTION!	The brake band may stick after a longer standstill or after the winter period. It must be loosened before putting the machine into operation again !!! Do this by shortly turning the PTO shaft right and left with the hand wheel. If you do not observe this, the gearbox may break !!!

15.2. SETTING THE GEARBOX SHUT-OFF

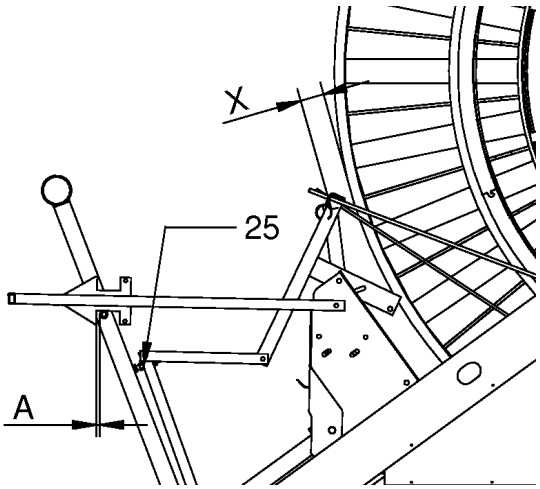
In the **operating position** the spacing between the shut-off frame (22) and the reel (21) is x = 25 mm /1 inch.
To set this spacing, screw (24) is loosened and shifted in the long hole.

Setting procedure:
Loosen nuts (23) and turn them to the outer end of the shut-off rod (20). The gear is engaged. Add a spacer (for instance a piece of wood) with a thickness of X according to the table between the reel and the shut-off frame. Now turn the setting nuts (23) onto the shut-off rod (20) until the shut-off lever (1) jumps to shut-off position. Then the nuts are secured by means of counter nuts without changing the shut-off position.



Pipe ∅	X
90	70mm / 2,8 inch
100	70mm / 2,8 inch
110	70mm / 2,8 inch
120	70mm / 2,8 inch
125	70mm / 2,8 inch

12.4 SETTING THE SHUT-OFF POINTS OF THE WHEEL CART

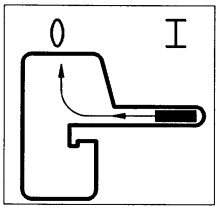


A = 5 mm

Between the reel's outer ring and the shut-off rod, a shim with a thickness of X (see above table) is added. An other shim with a thickness of A = 5 mm is added between the lifting hooks and the locking screw of the wheel cart. Now screw (25) is unscrewed from the nut towards the wheel cart until it is stopped by the wheel cart and there is no clearance anymore in the shut-off rods.

12.5 TESTING THE SHUT-OFF

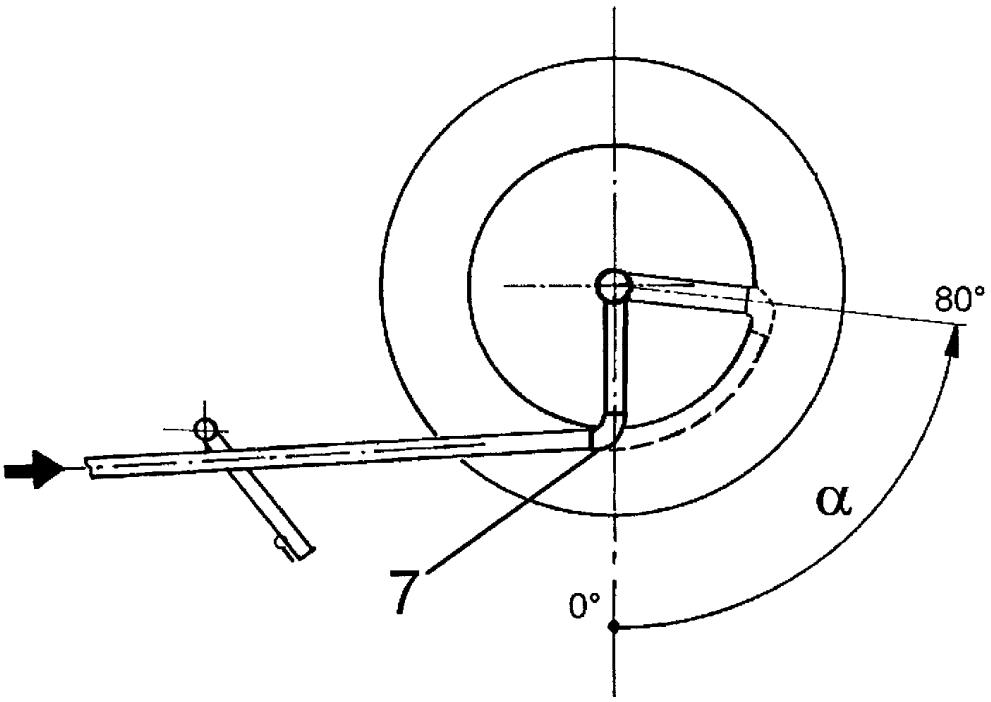
Shut-off with wheel cart:
Put the shut-off frame to operating position "Retraction".
Lift the wheel cart and press it towards the reel. The shut-off lever (1) must jump to shut-off position 5 mm (A) after engaging of the wheel cart.



Shut-off with winding protection:

Put the shut-off frame to operating position "Retraction".
Press the shut-off frame (22) towards the reel. At a spacing of X between the reel and the shut-off rod, the shut-off lever (1) must jump to shut-off position.

12.6 ADJUSTING THE WINDING MECHANISM

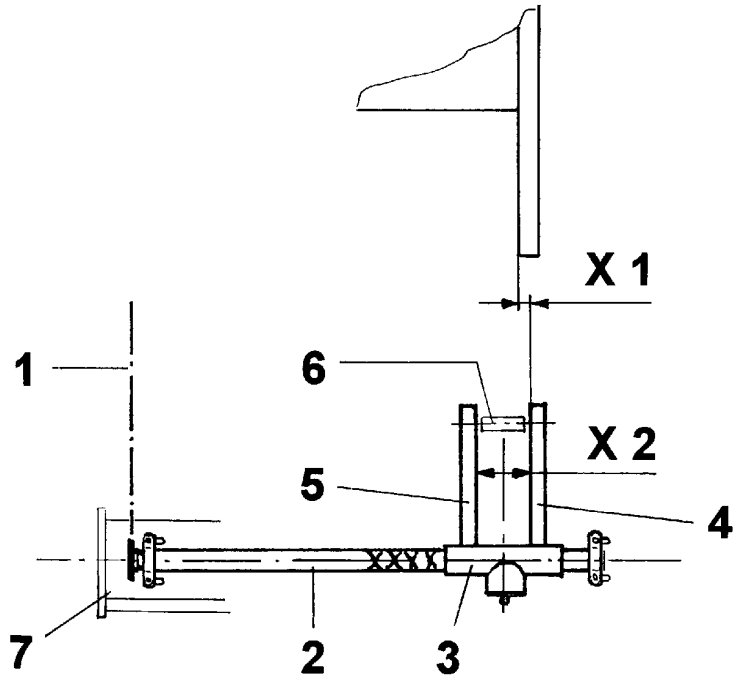


Step 1:
Pull off the PE pipe and adjust the connecting bend (7) in a vertical position pointing down.

Step 2:
Loosen the winding chain (1) between the reel and the helically grooved spindle (2).

Step 3:
Guide part (3) of the winding carriage is positioned at the right outermost reversing point of the groove by turning the helically grooved spindle (2).

Step 4:
Mount the right-hand guide bar (4) at a spacing of X1 in alignment with the reel's outer ring. Fasten by screws the left-hand guide bar (5) at a spacing of X2 to the right-hand guide bar.
Mount the roller bracket (6) with the roller.

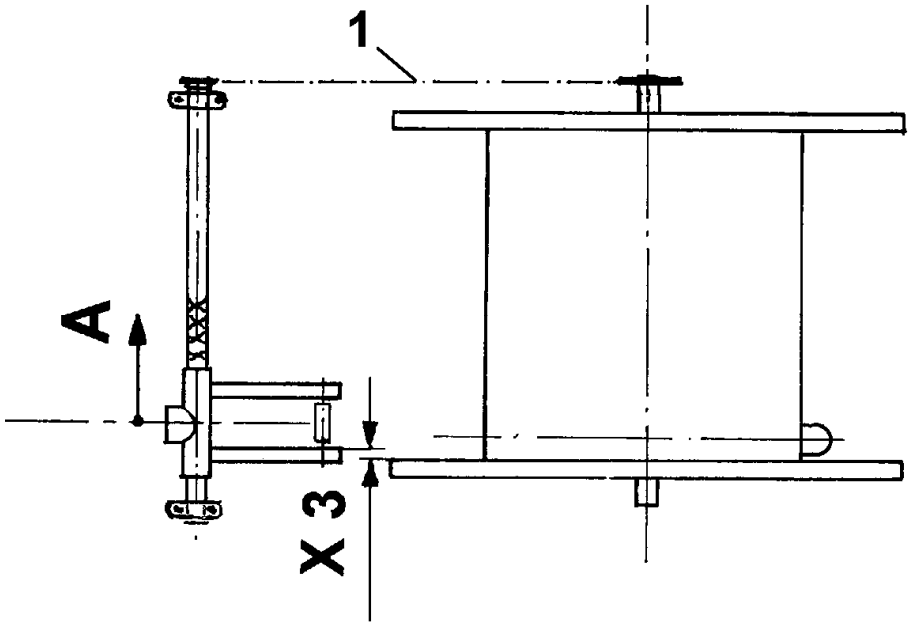


PE - Pipe ∅		X 1	X 2
90	F30	13 mm / 0,51 inch	110 mm / 4,33 inch
100	F 30, F 40	20 mm / 0,78 inch	126 mm / 4,96 inch
110	F 30, F 40	27 mm / 1,06 inch	140 mm / 5,5 inch
120	F 40	31 mm / 1,22 inch	150 mm / 5,9 inch

ATTENTION! When using a PE-pipe repair coupling you must increase the spacing **X 2** symmetrically by 15 - 20 mm / 0,59 – 0,79 inch!

Step 5:
Align the right guide bar by turning the helically grooved spindle to the inner reel side wall at value **X 3**. (see chart).

PE – Pipe ∅		X 3	α
90	F 30	0	0°
100	F 30	0	0°
110	F 30	0	0°
100	F 40	0	0°
110	F 40	0	0°
120	F 40	0	0°

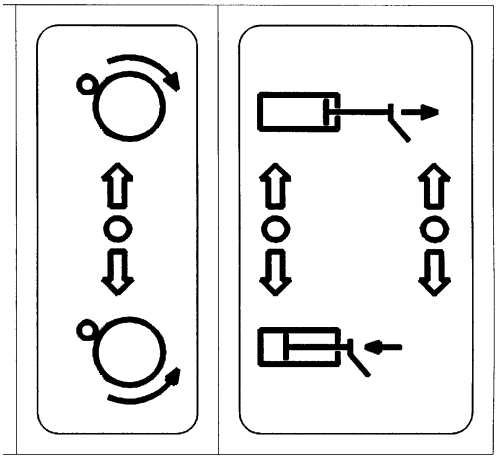


⚠	**ATTENTION**	In doing so, the spindle must be turned in wind-up direction (counter-clock-wise , see drawing). At this point, the winding carriage moves from the reversing point to the left (direction A).

Step 6:
Mount the winding chain (1), reel unchanged with inlet bend pointing down,
at the same time tighten the winding chain (1).

DESCRIPTION OF THE HYDRAULIC SYSTEM:

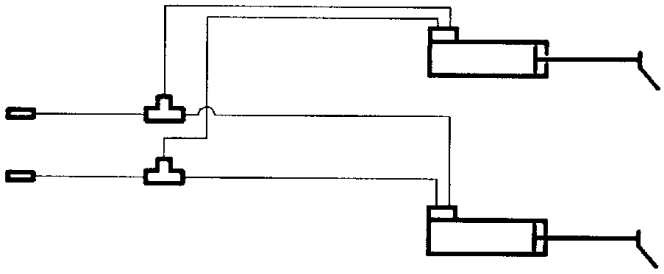
Now the hydraulic hoses are coupled with the non-return valve blocks (14).
If the inspection of the hydraulic system shows that the cylinder movements are wrong you must exchange the hydraulic hoses !
This is also necessary when the moving directions with mounted control valve options do not correspond with the predefined switching diagrams.



Swivel Aid **Machine Support**

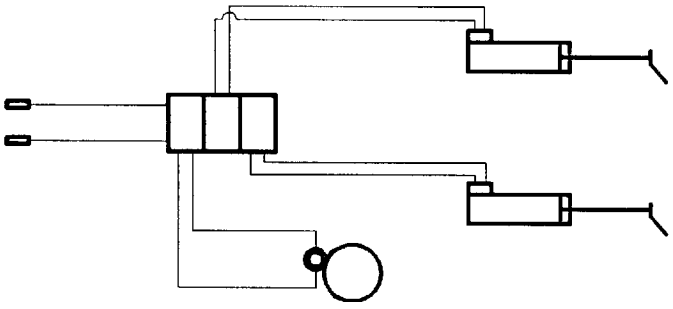
The standard PRORAIN outfit includes hydraulic machine supports without a control valve block.

"Standard“ hydraulic diagram:



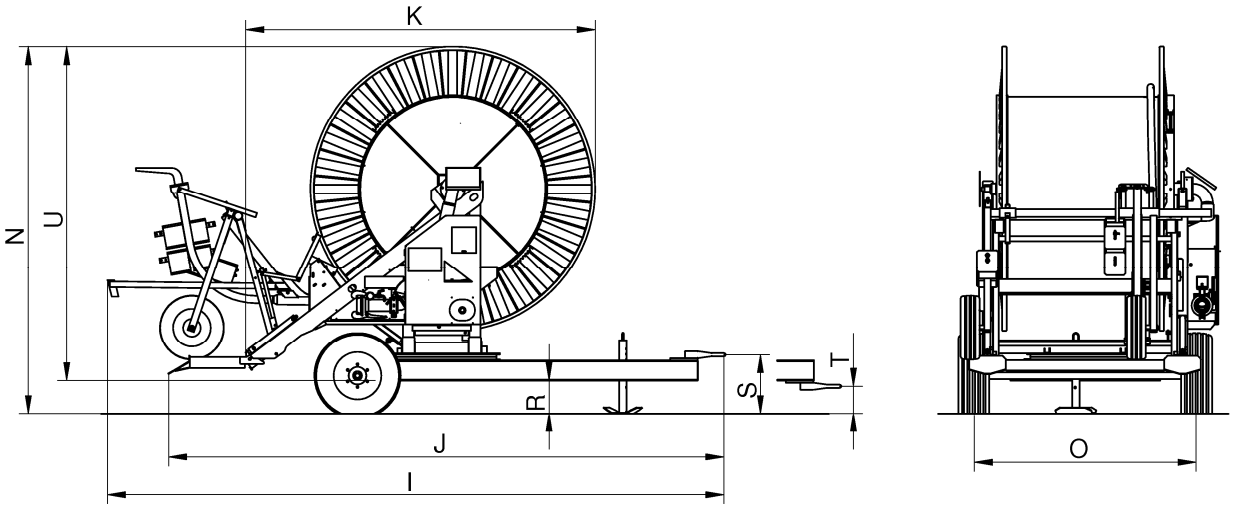
Hydraulic diagram “Control valve block - machine supports“ (OPTION)

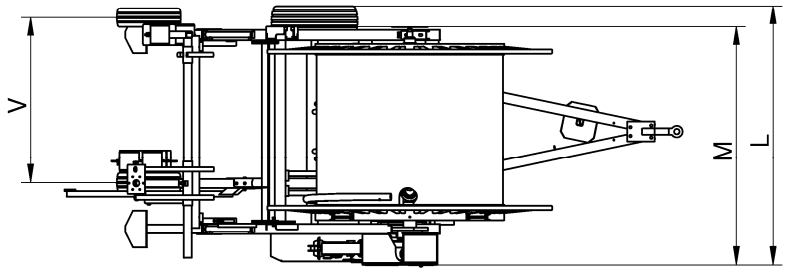
Hydraulic diagram “Control valve block - machine supports + swivel aid “ (OPTION)



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

MAIN DIMENSIONS





- **A** PE-pipe dia. x length
- **B** Max. strip length
- **C** Turbine
- **E** Connecting pressure
- **G** Weight incl. PE-pipe with water *
- **H** Weight incl. empty PE-pipe *
- **I** Overall length incl. cart
- **J** Overall length without cart
- **K** Shipping length with 2 machines nested into each other
- **L** Max. width
- **M** Shipping width
- **N** Overall height
- **O** Track width of undercarriage
- **P** Tires - undercarriage
- **Q** Tire pressure - undercarriage
- **R** Ground clearance
- **S** Hitch height - standard
- **T** Hitch height - below PTO
- **U** Shipping height
- **V** Cart track width
- **W** Cart tires
- **X** Cart tire pressure

* Total weight including cart, sprinkler, and 6 sprinkler cart balancing weights.

Typ		F 30			F 40		
		90-450	100-400	100-450	100-540	110-500	120-370
A	mm x m	90x450	100x400	100x450	100x540	110x500	120x370
B	m	500	450	500	590	550	420
C		DTU - 742 M			DTU - 742 M		
E	bar	6 - 11			6 - 11		
G	kg	4838	5117	5509	6485	6997	6430
H	kg	2851	2868	3047	3716	3812	3598
I	mm	5562			5700		
J	mm	5010			5144		
K	mm	2750 - 3153			2820 - 3221		
L	mm	2340			2540		
M	mm	2157			2372		
N	mm	3320			3442		
O	mm	2000			2200		
P	mm	10,0 / 75 - 15,3 , 12 PLY			11,5 / 80 - 15,3 , 12 PLY		
Q	bar	6,0			5,5		
R	mm	300			327		
S	mm	530			557		
T	mm	250			227		
U	mm	3020			3115		
V	mm	1500 - 2000			1500 - 2000		
W	bar	165 / 70 R 13			165 / 70 R13		
X	bar	1,3			1,3		

15.3. TIRE PRESSURE

Always ensure that tire pressure is correct in order to guarantee maximum tire life and safe transport of the PRORAIN!

16. CONFORMITY CERTIFICATE

EC Declaration of Conformity

according to EC Directive 2006/42/EC

The manufacturer

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

herewith confirms that the machine mentioned below

Designation of machine	**PRORAIN**
Machine type / basic units	**F 30, F 40**
Consists of	Irrigation machine with cart

corresponds analogously to the requirements of the Machinery Directive 2006/42/EC.
In case of a modification of the machine not accorded with FAN GmbH, this declaration will cease to be valid.

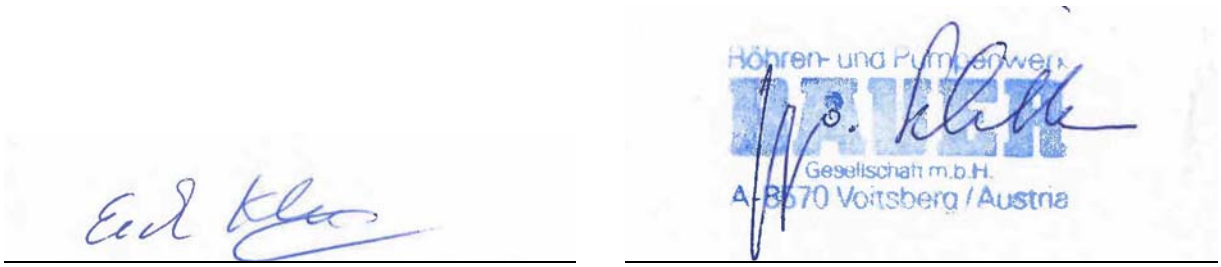
The following standards as amended have been applied analogously:

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 related to products

DIN EN 908	Irrigation machine with hard hose reel

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



Technical Designer in Charge | Commercial Manager

Voitsberg, 26.7.2010