



IRRIGATION

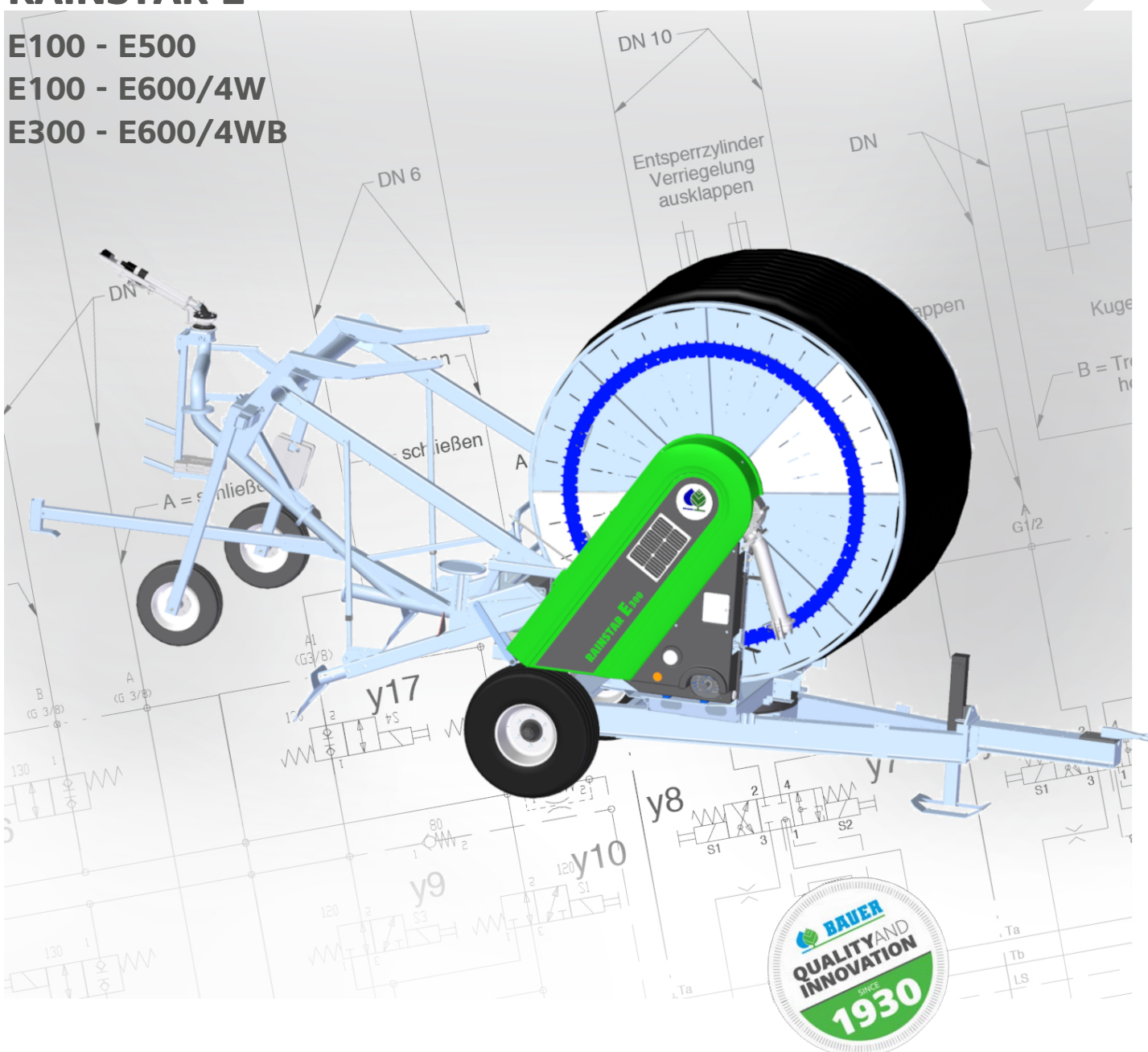
OPERATING MANUAL

RAINSTAR E

E100 - E500

E100 - E600/4W

E300 - E600/4WB



Original language: German

Table of contents

1	General information	9
1.1	Purchase	9
1.2	Information about this operating manual.....	10
1.3	Copyright protection	11
1.4	Statutory warranty and manufacturer guarantee.....	11
1.5	Product details	12
1.6	Publishing information	13
1.7	End of the product life cycle.....	14
2	Safety	15
2.1	General information about the safety instructions.....	15
2.2	Intended use.....	15
2.3	Foreseeable improper uses.....	15
2.4	Warnings and hazard symbols	17
2.5	Safety marking	18
2.6	Notice, warning and prohibition signs	20
2.7	Residual risks	21
2.8	General danger sources.....	21
2.9	Safe distance from power lines	27
2.10	Safety equipment.....	29
2.11	User roles	29
2.12	Areas of activity	30
2.13	Personal protective equipment.....	31
2.14	Environmental protection.....	31
3	Technical data	33
3.1	RAINSTAR E100 – E500.....	33
3.1.1	Data – RAINSTAR E100.....	34
3.1.2	Data – RAINSTAR E200.....	35
3.1.3	Data – RAINSTAR E300.....	36
3.1.4	Data – RAINSTAR E400.....	37
3.1.5	Data – RAINSTAR E500.....	38
3.2	RAINSTAR E100 – E600/4W	39
3.2.1	Data – RAINSTAR E100/4W	40
3.2.2	Data – RAINSTAR E200/4W	41
3.2.3	Data – RAINSTAR E300/4W	42
3.2.4	Data – RAINSTAR E400/4W	43
3.2.5	Data – RAINSTAR E500/4W	44
3.2.6	Data – RAINSTAR E600/4W	45
3.3	RAINSTAR E300 – E600/4WB.....	47
3.3.1	Data – RAINSTAR E300/4WB	48
3.3.2	Data – RAINSTAR E400/4WB	49
3.3.3	Data – RAINSTAR E500/4WB	50

3.3.4	Data – RAINSTAR E600/4WB	51
4	Design and function	53
4.1	Function description.....	53
5	Putting into operation	55
5.1	Steps to be carried out once or from time to time	55
5.2	Balancing weights for symmetric carts.....	58
5.3	Mounting the machine supports	59
5.4	Mounting and adjusting the cart lift	60
5.5	Operating mode 1: PE pipe pull-off	62
5.5.1	Transporting the machine to the set-up location.....	62
5.5.2	Lowering the cart.....	64
5.5.3	Checking the shut-off function	64
5.5.4	PE pipe pull-off.....	65
5.5.5	Limiter for regulation of the TVR60 turbine.....	67
5.5.6	Speed adjustment with ECOSTAR.....	69
5.6	Operating mode 2: Laying down the PE pipe.....	70
5.6.1	Functional description of the main components.....	71
5.6.2	Driving the reel with an articulated shaft.....	74
6	Operation.....	77
6.1	Emergency shut-off.....	77
6.2	Winding mechanism.....	78
6.3	Shut-off and safety equipment	78
6.4	Cart.....	79
6.5	Shut-off valves	80
6.6	Winterization / draining the RAINSTAR	82
6.6.1	Draining the PE pipe.....	83
6.7	Troubleshooting.....	88
6.8	RAINSTAR adjustment instructions.....	89
6.8.1	Adjusting the shifting gate	90
6.8.2	Adjusting the band brake on the gearbox	91
6.8.3	Adjusting the threaded rod.....	91
6.8.4	Inspecting the band brake for releasing the brake band	91
6.8.5	Adjusting the gearbox shut-off.....	93
6.8.6	Testing the shut-off	94
6.8.7	Adjusting the winding mechanism	95
6.8.8	Description of the hydraulic system.....	98
7	ECOSTAR 4300	101
7.1	General information.....	101
7.2	Display windows and menu overview.....	102
7.3	Programming the 4 different speeds.....	106
7.4	Status displays.....	107
7.5	The most frequent combination of different constants:	108
7.6	Stop sensor.....	109

7.7	Operation of the BAUER ECOSTAR 4300	110
7.7.1	Speed adjustment	111
7.7.2	Pre- / post-irrigation	112
7.7.3	Start	113
7.7.4	Monitoring	113
7.7.5	Stop	114
7.8	Pressure switch	115
7.9	Troubleshooting the ECOSTAR 4300	116
7.10	Programming procedure	117
7.11	Battery	120
7.11.1	Solar panel	121
7.11.2	Checking the connections	121
7.11.3	Checking the length sensor	122
7.11.4	Limit stop for turbines – regulating valve with ECOSTAR 4300	122
7.11.5	Short checklist for ECOSTAR 4300	122
7.12	Cable connections	123
7.13	Checklist for the ECOSTAR 4300	124
7.14	Table for pre- and post-irrigation	130
8	Appendix	131
8.1	Conformity declaration	131
9	Tyre table	133

List of figures

Fig. 1	Prohibition signs.....	18
Fig. 2	Mandatory signs.....	18
Fig. 3	Warning signs	19
Fig. 4	Safe distances from power lines.....	27
Fig. 5	Dimensions E100 – E500	33
Fig. 6	Dimensions E100 – E600/4W	39
Fig. 7	Dimensions E300 – E600/4WB.....	47
Fig. 8	Symmetric cart.....	55
Fig. 9	Asymmetric cart.....	55
Fig. 10	Sprinkler fastening	56
Fig. 11	Setting track widths	56
Fig. 12	Weights.....	56
Fig. 13	Wheelbases.....	57
Fig. 14	Balancing weights for symmetric carts	58
Fig. 15	Mounting the anchoring shields	59
Fig. 16	Mounting the extended anchoring shields	59
Fig. 17	Mounting and adjusting the cart lift.....	60
Fig. 18	Mounting and adjusting the cart lift.....	60
Fig. 19	Transporting the RAINSTAR.....	62
Fig. 20	Adjusting the RAINSTAR	62
Fig. 21	Adjusting the RAINSTAR – turning.....	63
Fig. 22	Adjusting the RAINSTAR – hydraulic connections.....	63
Fig. 23	Switching positions of the shut-off lever.....	64
Fig. 24	Checking the shut-off function	64
Fig. 25	PE pipe pull-off.....	65
Fig. 26	Attaching the tractor drawbar.....	65
Fig. 27	Connecting the pressure hose.....	66
Fig. 28	Turbine control range.....	67
Fig. 29	Gear shift position for PE pipe retraction	67
Fig. 30	Moving the shut-off lever to the shut-off position.....	68
Fig. 31	Slackening the PE pipe	68
Fig. 32	Sprinkler throwing distance.....	70
Fig. 33	Full-flow turbine	71
Fig. 34	Variable-speed gearbox	71
Fig. 35	PE pipe retraction.....	72
Fig. 36	Driving with an articulated shaft	74
Fig. 37	“PE pipe pull-off” position.....	74
Fig. 38	Emergency shut-off	77

Fig. 39	Slackening the PE pipe	77
Fig. 40	Winding mechanism	78
Fig. 41	Shut-off and safety equipment	78
Fig. 42	Cart	79
Fig. 43	Cart – transport hook	79
Fig. 44	Draining the PE pipe	84
Fig. 45	Lubricating the reel seal	86
Fig. 46	Adjusting the turbine brake wedge	87
Fig. 47	Adjustments on the RAINSTAR	89
Fig. 48	PE pipe retraction	90
Fig. 49	Adjusting the shifting gate	90
Fig. 50	Adjusting the threaded rod	91
Fig. 51	Releasing the brake band	91
Fig. 52	Adjusting the gearbox shut-off	93
Fig. 53	Adjusting the gearbox shut-off	93
Fig. 54	Testing the shut-off	94
Fig. 55	Adjusting the winding mechanism	95
Fig. 56	Adjusting the winding mechanism	96
Fig. 57	Adjusting the winding mechanism	97
Fig. 58	Adjusting the winding mechanism	97
Fig. 59	Control valve blocks	98
Fig. 60	Hydraulics diagram “Standard”	98
Fig. 61	Hydraulics diagram “Control valve block – support” (option)	99
Fig. 62	Hydraulics diagram “Control valve block – support + drawbar support foot” (option)	99
Fig. 63	Hydraulics diagram “Control valve block – support + swivel mechanism” (option)	99
Fig. 64	Hydraulics diagram “Control valve block – support + drawbar support foot + swivel mechanism” (option)	100
Fig. 65	Stop sensor	109
Fig. 66	Checking the length sensor	122

1 General information

1.1 Purchase

Thank you for buying a BAUER RAINSTAR!

The operating manual for the machine is an important document that describes the operation and maintenance of the BAUER RAINSTAR.

All information contained in this manual is based on the latest product details available at the time of printing. If you still need more information, please contact your dealer or contact BAUER in Voitsberg, Austria, directly.

The BAUER RAINSTAR is designed for safe and reliable operation provided it is operated in accordance with this operating manual.

Study this manual thoroughly before putting your BAUER RAINSTAR into operation! Strictly observe all instructions pertaining to handling, operation and service!

If these conditions are ensured, the BAUER RAINSTAR will operate to your complete satisfaction for many years to come.

The content of this operating manual is the intellectual property of the company BAUER and/or its supplier companies. The available information may only be used in connection with the creation of specification-compliant documents in the course of an order from the BAUER company. Without express written permission from the BAUER company, no reproduction or sharing of this operating manual is permitted, even in excerpts.

The BAUER company reserves the right to make changes at any time without notice and without assuming any liability!

State the type and serial number of your BAUER RAINSTAR in all inquiries, correspondence, warranty problems or parts orders. You will find this information on the type plate affixed to the machine.

We wish you great success with your BAUER RAINSTAR!

1.2 Information about this operating manual

Using the operating manual

This operating manual was created in accordance with the EC Machinery Directive 2006/42/EC and satisfies the requirements of ISO standard 3600:2015.

This operating manual enables the safe and efficient use of the machine.

The following is essential for ensuring safety:

This operating manual must be read carefully and completely before starting any work. The operator must understand all of its content.

WARNING



Intentional ignoring of safety instructions and regulations

Accidents with severe or fatal consequences may result.

- a) Commissioning and operating the RAINSTAR is only permitted if the operator has completely read and understood the operating manual.
- b) The safety instructions and applicable regulations must be complied with.
- c) If the operator still has any doubts after reading the entire operating manual, customer service should be contacted.

Document management system

The technical documentation for this product is archived in the internal document management system.

Third-party equipment

Many assemblies, components or devices come from other manufacturers and have their own safety instructions. These safety instructions can be found in the respective operating manuals.

Manual location

This manual is considered part of the machine, and it must be kept in the immediate vicinity of the machine and be accessible to the user at all times.

Duty to furnish information

If the customer passes on the machine to a new owner later-on, the customer is obliged to also pass on the operating manual to the new owner. The recipient of the machine must be instructed with reference to the mentioned regulations. It is recommended to document that the operating manual has been passed on.

Accident prevention regulations

In addition to the information in this operating manual, the local accident prevention regulations and the national occupational safety regulations apply.

Design as described

This operating manual describes the machine in its standard version. Optional equipment is described separately and always designated as optional or special equipment.

Legal effectiveness

The information in this operating manual has no effect on:

- Earlier or existing agreements, promises or legal relationships
- Statutory warranty provisions
- Obligations of the manufacturer

Note the purchase agreement and general terms of business.

Updates

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

It is recommended to regularly check the internet or consult the dealer with regard to new information, changes and new publications.

(See: > Copyright protection [► 11] and Publishing information [► 13])

1.3 Copyright protection

Copyright protection

Copyright © 2023 Röhren- und Pumpenwerk BAUER GmbH. All rights reserved. Unauthorized duplication, even in part, is not permitted.

Technical changes

This document is only valid for the types listed on the title page and is not subject to any change service. In the event of conversions, additions or changes, the operator must keep the document up to date himself.

The laws, regulations, standards etc. listed correspond to the status at the time these operating and maintenance instructions were created.

Suggestions for improvement

Did you notice something or do you have an idea how to present or explain something more understandably? Please inform our customer service about this!

1.4 Statutory warranty and manufacturer guarantee

Inspect the machine immediately after delivery to identify any transport damage and confirm a complete delivery.

General terms of business

Information on the current warranty and guarantee terms can be found in the general terms of business.

See: > <https://www.bauer-at.com/de/services/agb-und-ekb>

1.5 Product details

Type designation	RAINSTAR
Type number:	Series E100 – E600
Serial number ¹⁾ :	
Year of manufacture:	
Shipping date:	

1) Please provide the serial number in every contact with your dealer or the manufacturer.

Dealer responsible for guarantee issues:

Name:

Address:

Tel:

Email:

Owner:

Name:

Address:

Tel:

Email:

1.6 Publishing information

Manufacturer address



Röhren- und Pumpenwerk BAUER GmbH

Kowaldstraße 2

A-8570 Voitsberg/Austria

Tel: +43/3142/200-0

Fax: +43/3142/200-205

bauer@bauer-at.com

<https://www.bauer-at.com/>

Customer ser- vice



Röhren- und Pumpenwerk BAUER GmbH

Kowaldstraße 2

A-8570 Voitsberg/Austria

Tel: +43/3142/200-444

service@bauer-at.com

1.7 End of the product life cycle

End of the product life cycle

Product variation

BAUER products are long-lasting technical assets.

Over time, they are upgraded with new features and technical improvements.

Material groups

When disposing of the machine, separate the material groups and send them to appropriate companies for recycling, scrapping or disposal. Observe the national disposal regulations.

Plastics

Plastic parts of the following materials are used:

- Polyethylene (PE)
- Polyamide (PA)
- Polypropylene (PP)
- Polyurethane (PU/PUR)
- Polyvinyl chloride (PVC)
- Polyethylene-terephthalate (PET)
- Styrene-butadiene rubber (SBR)
- Nitrile-butadiene rubber (NBR)
- Ethylene-propylene-diene rubber (EPDM)

Metals

Metal parts of the following materials are used:

- Steel, hot-dip galvanised
- Steel, electro-galvanised
- Gray cast iron
- Aluminium, anodised
- Stainless steel
- Brass

Organic substances

The following organic materials are used:

- Vulcanised natural rubber (NR)
- Vulcanised rubber (ebonite)
- Silicone acetate

Lubricants and operating media

The following lubricants and operating media are used:

- Mineral oils
- Synthetic oils
- Multigrade oils
- Hydraulic fluids (collection category 4)
- Lubrication greases

Electrical parts and cables

Electronic components and cables can be disposed of as electrical scrap and cable scrap.

2 Safety

2.1 General information about the safety instructions

The safety chapter contains general safety instructions that must always be observed when working with/on the machine.

In addition to this, there are additional safety instructions for individual activities in the chapters of the operating instructions. These are set apart from the text by special warnings.

All safety instructions must be observed and followed. Non-observance of the safety instructions can endanger the life and health of persons, damage to the environment and/or damage to property.

ATTENTION: The machine must be checked for operational safety before each start-up!

2.2 Intended use

The BAUER RAINSTAR is built exclusively for use in agricultural work.

- Intended use includes compliance with the manufacturer's operating, maintenance and service instructions.
- The BAUER RAINSTAR may be used and operated only by persons who are familiar with the machine and aware of the hazards involved.
- All relevant rules for accident prevention as well as any other generally accepted rules and regulations relating to safety, occupational medicine and traffic laws must be strictly observed.
- Unauthorized modifications to the machine release the manufacturer from liability for damage resulting from such modifications.
- Any use of the machine beyond this intended 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 lies with the user.

2.3 Foreseeable improper uses

The vehicle is intended exclusively for the specified intended use.

Any other use is considered non-conforming, unless approved in writing by the manufacturer.

Foreseeable improper uses:

- Filling, transporting and spreading aggressive media such as acids and alkali solutions.
- Filling, transporting and spreading fluids with a density $> 1,000 \text{ kg/m}^3$.
- Use in the food industry without evaluating whether the vehicle meets the specific hygiene requirements.
- Storing of fermenting or outgassing liquids, such as slurry, in the tank.
- Use in areas at risk of explosion.
- Modifying or altering the vehicle without prior approval from customer service.
- Use of the vehicle by persons with insufficient capabilities or experience.

- Using the RAINSTAR on rolled sod increases the stresses on the PE pipe. Be sure to indicate this when ordering the RAINSTAR since this application requires a reinforced PE pipe.

2.4 Warnings and hazard symbols

Structure of the safety instructions

Safety instructions are structured as follows:

Symbol	symbol and signal word
	nature and source of the hazard
	Consequences of disregarding the warning and safety instructions
	– escape from danger

Safety instructions used

The following safety instructions are used in the operating instructions:

DANGER



Danger

"Danger" warns of a hazardous situation that could result in serious injury or death.

WARNING



Warning

"Warning" warns of dangerous situations that can result in serious injuries.

CAUTION



Caution

"Caution" warns of dangerous situations that could result in damage to people and machines.

NOTICE



Notice

"Notice" provides recommendations for action. Failure to do so will not result in personal injury. Follow recommended actions to avoid property damage and problems.

2.5 Safety marking

Safety markings used

Prohibition signs according to ISO 7010 and ISO 4844



Fig. 1: Prohibition signs

Mandatory sign according to ISO 7010



Fig. 2: Mandatory signs

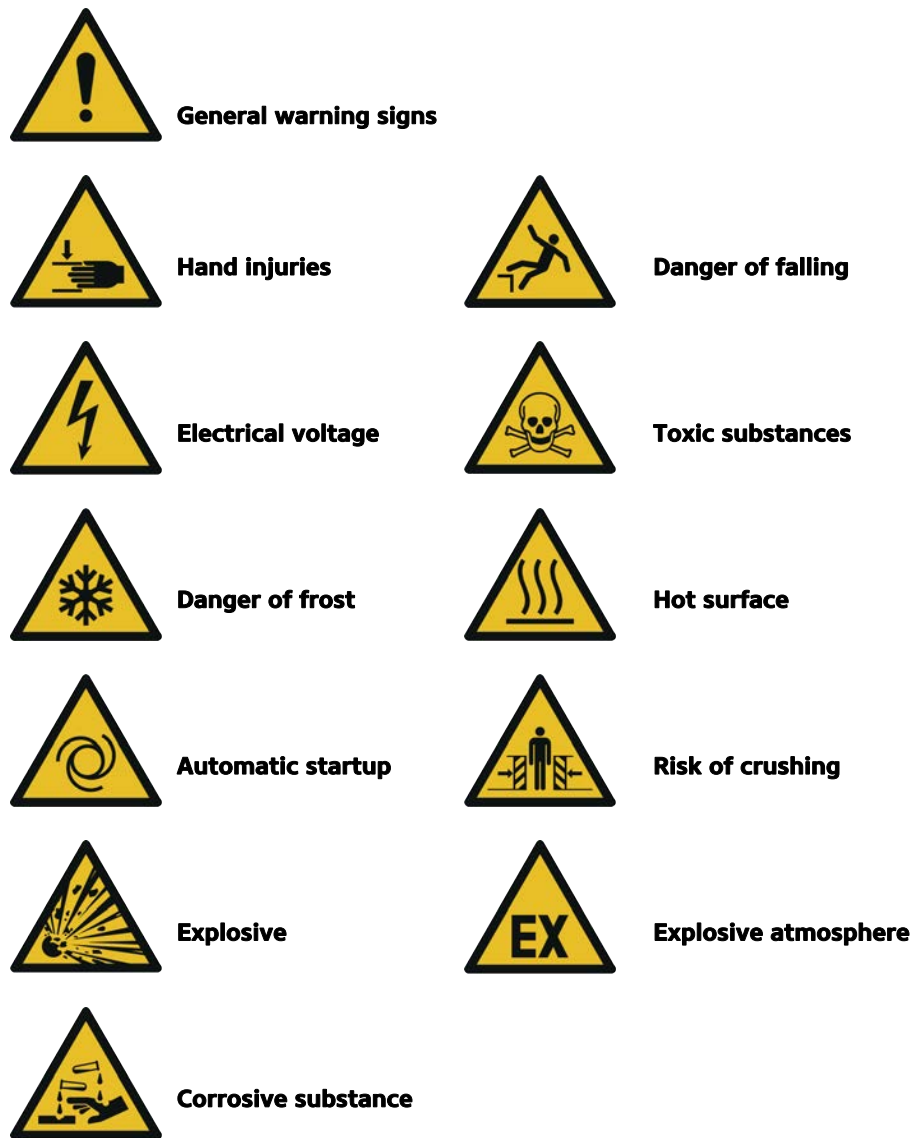





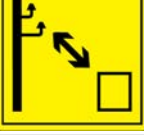




Fig. 3: Warning signs

2.6 Notice, warning and prohibition signs

Notice, warning and prohibition signs must be observed and obeyed. These must be inspected at regular intervals to ensure they are readable and complete. They may not be removed or covered up.

The following notice, warning and prohibition signs are affixed to the machine:

Name	Symbol
Study and observe the manual and all safety instructions before you put the system into operation.	 
Never open or remove safeguards while the engine is running.	 
Keep a sufficient distance from high-voltage power lines.	 
Stay well out of the swivel range of the machine.	 

2.7 Residual risks

Residual risks

The machine was designed and built with the necessary precautions to ensure the safety of all persons involved. However, residual risks remain due to incorrect or improper conduct or use by the operating personnel. For this reason, signs and danger symbols may be affixed in dangerous areas and on attachments where operating personnel must enter into these dangerous areas for the purpose of adjustment, operation, cleaning or maintenance. These procedures must be carried out with the greatest possible caution.

2.8 General danger sources

DANGER



General dangers

Death or severe injuries can result.

- a) The operator must ensure that all regulations and safety instructions are known to all personnel.
- b) Only authorize vehicle operation when all operating and service personnel have been trained in handling the vehicle and all safety devices are functioning. Pay attention to sufficient lighting.
- c) The generally applicable safety and accident prevention regulations must always be observed. The vehicle must always be used as intended. Nobody is allowed to stay in the working area during the work assignment!
- d) The operator must not operate the vehicle if they feel unwell or are in poor physical condition.

WARNING



Improper driving

Improper driving can lead to accidents. There is a risk of serious injury or death.

- a) While driving, always consider the size, width, height and high weight of the vehicle. Other drivers on the road rarely encounter vehicles of this size. Expect other drivers to make mistakes. Maintaining an appropriate speed and exercising increased caution can help to identify dangerous situations in advance and prevent them.
- b) Ensure sufficient steering and braking ability. Driving performance, steering and braking are affected by attached or towed equipment and ballast weights.
- c) Consider the space needed to take curves!
- d) Consider the available headroom!
- e) Consider whether the vehicle is able or permitted to take the planned route! Backing up the vehicle can lead to dangerous situations.
- f) Consider the elevated centre of gravity when additional equipment is attached.
- g) Do not exceed the maximum permitted speed!
- h) Riding on attachments or trailers is prohibited!

⚠ CAUTION



Unsuitable climbing aids

Serious injuries from falling can result.

- a) Use only designated climbing aids for work on the vehicle.
- b) Do not climb onto the vehicle over the drawbar, drive shaft or mudguard!

⚠ DANGER



Pressurized liquids (hydraulic system)

When working on the hydraulic system, spraying liquids can cause injuries.

- a) When connecting hydraulic cylinders and motors as well as hydraulic control systems, make certain that the hydraulic lines are connected as specified.
- b) When connecting the hydraulic hoses to the tractor hydraulics, make certain that the hydraulics are unpressurised on the tractor and equipment sides.
- c) Regularly inspect hydraulic lines.
- d) Replace hydraulic lines if damaged or if signs of ageing are detected.
- e) Only use hydraulic lines that meet the technical requirements of the manufacturer.

⚠ WARNING



Coupling equipment

Coupling poses serious risks, such as the crushing of body parts or damage to property.

- a) Only connect the equipment to the prescribed fixtures.
- b) Only use a tractor with properly designed trailer coupling.
- c) Only use a tractor with a sufficiently powerful engine.
- d) Do not exceed the permissible tongue load of the tractor-trailer coupling. The permissible tongue loads of the trailer couplings depend on the driving speed.
- e) Bring the support element to a position adapted to the underlying ground.
- f) Secure the vehicle with the parking brake to prevent rolling.
- g) Only release the parking brake after the coupling bolt (or ball hitch) is securely positioned in the coupling mechanism of the tractor.
- h) Additionally use wheel chocks if the parking surface is not level and horizontal.
- i) Always ensure that no one is present in the space between the tractor and trailer!

NOTICE



Power take-off operation

Improper operation of power take-off shafts with articulated shaft can result in damage to the machine.

- a) Before switching on the power take-off shaft, ensure that the selected power take-off speed and direction of the tractor matches the permissible rotating speed and direction of the machine.
- b) Never switch on the power take-off shaft while the engine is off.
- c) Repair any damage before starting up the machine.
- d) Only use the articulated shafts specified by the manufacturer.
- e) Attach and remove the articulated shaft only while the power take-off shaft is switched off, the engine is off and the ignition key has been removed.
- f) Ensure correct installation and securing of the articulated shaft.
- g) The protective tube and protective cone of the articulated shaft as well as the power take-off shaft must be in place (including on the machine side) and must be in proper condition.
- h) For articulated shafts, ensure that the required tube coverings are in place in the transport and operating positions.
- i) Secure the articulated shaft guards from turning along by hanging the chains.
- j) Hang or rest the disconnected articulated shaft in the holder.
- k) After removal of the articulated shaft, affix the protective cover to the end of the power take-off shaft.
- l) Carry out any adjustment or maintenance work on the machine driven by the power take-off shaft or on the articulated shaft only while the machine is out of operation.

WARNING



Presence of persons between the tractor and trailer

If persons are present between the tractor and trailer, this can result in death or severe injuries.

The following must be ensured before all work between the tractor and trailer:

- a) Park the tractor and trailer on a level and stable surface.
- b) Switch off the engine of the tractor and secure it against restarting.
- c) Lock the cabin of the tractor, if possible.
- d) The parking brake of the tractor must be engaged.
- e) The parking brake of the trailer must be engaged.

⚠ WARNING



Insufficient securing of the vehicle against rolling

Insufficient measures to prevent the vehicle from rolling during coupling/uncoupling and when parked can result in injuries. There is a risk of serious injury or death.

- a) Secure the machine and tractor against rolling by setting the parking brake and placing wheel chocks!
- b) Ensure that the parking surface is level and stable!

⚠ CAUTION



Failure to heed regulations and markings

Injuries and property damage may result.

- a) Observe the generally applicable safety and accident prevention regulations.
- b) Observe the instructions in the operating manual.
- c) Observe the warning and notice signs.
- d) Observe the national regulations.

⚠ WARNING



Converted machine

Subsequent conversions or extensions to the machine by the operator without the manufacturer's approval can lead to property damage and injuries.

- a) Approvals/releases from the manufacturer must be obtained before the start of a planned conversion.
- b) Follow the manufacturer's instructions for any expansion or modification of the machine.
- c) In the event of non-compliance, warranty and material defect liability claims are void!

NOTICE



Improper handling of hand-operated gate valves

Property damage may result.

- a) Always run pipelines with a sufficient incline.
- b) Select the closing sequence of the gate valves such that the lines can drain empty.
- c) Secure gate valves against unauthorised operation.
- d) If the gate valve jams, do not use force.
- e) Only use operating levers supplied by the manufacturer.
- f) Observe the permissible operating pressure of gate valves and lines when using pumps.

CAUTION



Insufficient monitoring of operating safety

Injuries and property damage may result.

- a) Check the machine for operating safety before starting it up each time.
- b) All safeguards must be in place and in the protective position.
- c) Acquaint yourself with all system components and controls as well as their respective functions before you start to work.

DANGER



Third parties in the danger area

Death or severe injuries can result.

- a) Before starting up, check that there are no external persons in the vicinity.
- b) Pay attention to sufficient lighting.
- c) Nobody is allowed to stay in the working area during the work assignment!

Betriebsanweisung
nach GefStoffV u. VSG 4.5

Betrieb: ...

Arbeitsplatz/Tätigkeitsbereich: Gülle rühren/ Güllekanäle spülen / in Güllegruben einsteigen

GEFAHRSTOFFBEZEICHNUNG

Gülle / Flüssigmist

(Gasgemisch aus Schwefelwasserstoff, Kohlendioxid, Methan u. Ammoniak / Gülleflüssigkeit)

GEFAHREN FÜR MENSCH UND UMWELT



- Lebensgefahr durch Vergiftung mit Schwefelwasserstoff (H₂S)! (Gas schwerer als Luft)
- Erstickungsgefahr durch Kohlendioxid (CO₂) (Gas schwerer als Luft)
- Explosionsgefahr durch Methan (CH₄) (Gas leichter als Luft)
- Gesundheitsgefahren durch Ammoniak (NH₃) (Gas leichter als Luft)
- **Erstickungs-, Vergiftungs- und Explosionsgefahr in Güllegruben u. Güllebehältern!**
- Gülle/ Flüssigmist können Stoffe wie z.B. Schimmelpilze, Bakterien u. Viren enthalten, die allergische Reaktionen oder Infektionskrankheiten verursachen können.



SCHUTZMASSNAHMEN UND VERHALTENSREGELN



Schutzmaßnahmen und Verhaltensregeln richten sich grundsätzlich nach den spezifischen Gegebenheiten am Arbeitsort und nach der Art und Ausführung der Handhabung der Gülle.

- Bei der Arbeit nicht essen, trinken, rauchen. Beschmutzte Kleidung wechseln. Vor den Pausen sowie bei Arbeitsende Hände u. verschmutzte Körperteile waschen.



Beim Freisetzen von GÜLLEGASEN durch RÜHREN oder PUMPEN der GÜLLE:

- Stallung gut be- u. entlüften. Fenster u. Türen öffnen. Ventilatoren auf Höchstleistung stellen.
- Zündquellen vermeiden: Kein Rauchen oder offenes Feuer. Keine elektrischen Zündquellen. Gasstrahler ausschalten. Keine Schweiß- oder Schneidearbeiten durchführen. Keine Lichtprobe!
- Stallungen während Rühr- bzw. Spülvorgang nicht betreten.



Bei Kontakt mit der Gülleflüssigkeit:

- Handschutz: Chemikalienbeständige Schutzhandschuhe tragen.
- Augenschutz: Schutzbrille benutzen.
- Körperschutz: Gummischürze, geschlossene Schutzkleidung u. Gummistiefel verwenden.



Zusätzlich beim Einsteigen in Gruben und Behälter:

- **Atemschutz:** Umgebungsluftunabhängiges Frischluftdruckschlauchgerät verwenden.
- **Personensicherung:** Auffanggurt mit Dreibock und Winde benutzen. Sicherung des Einsteigenden durch zweite Person gewährleisten.



VERHALTEN BEI UNFÄLLEN

- Unbeteiligte warnen, Vorgesetzte informieren.
- Wenn ohne Risiken möglich: Rührwerke und Pumpen abschalten.
- Gruben, Kanäle und Gebäude zur Rettung von Verletzten und Tieren nur mit Umgebungsluft unabhängigem Atemschutz betreten und zuvor genannte Maßnahmen einhalten.
- Für ausreichend Frischluftzufuhr sorgen. Vor ungeschütztem Betreten: Freimessen!

ERSTE HILFE



- Bei jeder Maßnahme Selbstschutz beachten.
- **Nach Einatmen:** Frischluft! Bei Bewusstlosigkeit Atemwege freihalten. Sofort Arzt hinzuziehen. Arzt auf mögliche Vergiftung durch Schwefelwasserstoff hinweisen.
- **Nach Augenkontakt:** Einige Minuten behutsam mit Wasser spülen.
- **Nach Hautkontakt:** Verunreinigte Kleidung sofort ausziehen, Haut mit Wasser abwaschen.
- **Nach Verschlucken:** Mund ausspülen. Reichlich Wasser trinken.
- Ersthelfer: Arzt:



Giftinformationszentrum: 0228/ 19240 Notruf: 112

SACHGERECHTE ENTSORGUNG

Verunreinigte Einrichtungen säubern. Gülle entsprechend der gesetzlichen Vorschriften lagern, befördern u. ausbringen.

Datum: 202...

Unterschrift des Unternehmers:

2.9 Safe distance from power lines

The safe distance when passing beneath a power line is considered to be met if the distances according to the table are observed as described. The liquid stream must not contact the conductor cable or extend over the conductor cable.

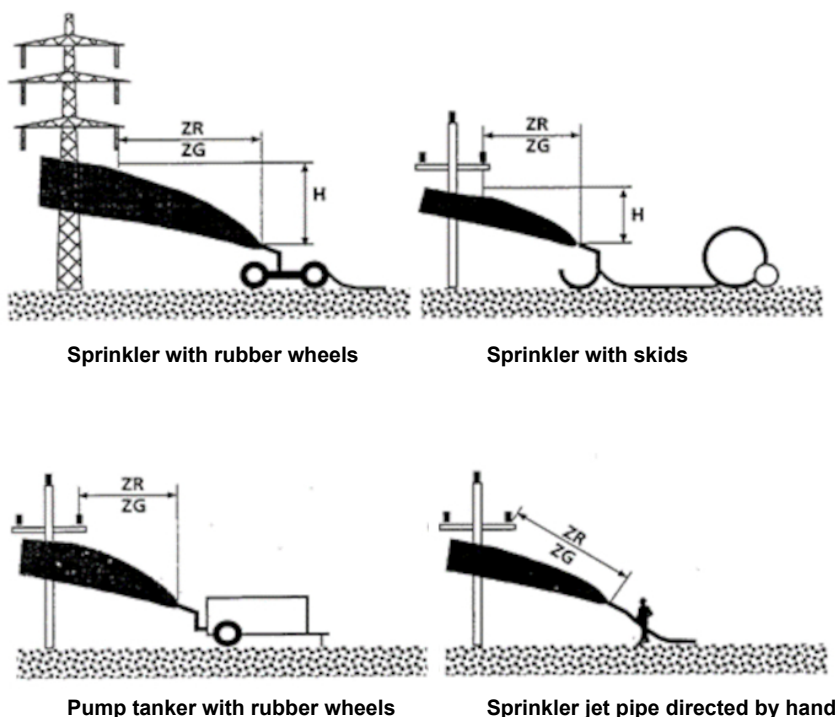


Fig. 4: Safe distances from power lines

ZR = Irrigation (with drinking water, groundwater or from flowing bodies of water)

ZG = Fertilizing (with liquid manure or slurry)

Type and operation of the sprinkler		With rubber wheels or directed by hand with metal or plastic pipes				With skids or installed as stationary with metal cart and metal pipes			
		Nozzle diameter in mm and 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 h	Spray	Full	Spray	Full
1000 V		1	5	1	5	1	5	1	5
1 m		1	8	1	8	1	8	1	8
30000 V		3	9	5	21	3	7	4	9
2.5 m		5	11	7	23	5	9	6	11
110000 V		3	12	5	24	3	9	4	15
3 m		5	14	7	26	5	11	6	17
222000 V		4	14	6	26	4	12	6	22
4 m		6	16	8	26	5	14	8	24
380000 V		5	16	7	26	5	14	6	22
		7	18	6	28	7	16	8	24

5 m										
-----	--	--	--	--	--	--	--	--	--	--

Tab. 1: Safe distance Z [m] – measured on the ground

The safe distances specified in the table apply to:

- Nozzle diameter of 26 mm or 36 mm
- Operating pressure up to 5 bar

For higher operating pressures, the safe distances have to be increased by 2 m. The safe distances are not valid for the use of normed jet pipes as used by fire brigades.

NOTICE



Electrical power supply failure due to slurry sprinkling

Dirty water or slurry forms conductive deposits on the insulators. Flashovers and damage to insulators can cause electrical power failure.

- a) Do not slurry insulators and masts.
- b) Maintain safe distances from electrical lines.

⚠ CAUTION



Contact voltage with high-voltage lines

When metal sprinkler pipes are run in parallel with high-voltage power lines, electrical interactions can result in a contact voltage capable of causing serious injuries.

- a) Only transport pipe elements horizontally in the area of high-voltage lines.
- b) Keep vertical metal pipes as short as possible.
- c) Use plastic pipes.

2.10 Safety equipment

Maintenance and servicing

Safety equipment may only be removed, opened or disabled for maintenance and servicing by trained and authorized personnel. Safety equipment must also be inspected regularly for proper function.

All supply connections must be disconnected and the drive system switched off during maintenance and repair work. The articulated shaft connection must be disconnected.

2.11 User roles

Operator

- The operator must confirm to the distributor that training in the safe use of the vehicle has been provided.
- The operator must become familiar with the content of the operating and maintenance manual of the vehicle and comply with the instructions contained in this manual.
- The operator plans and is responsible for use of the vehicle within the scope of the intended use. The operator must clearly regulate and define the responsibilities for transport, assembly, start-up, operation, maintenance, repair, rescue, cleaning, identifying faults and eliminating faults, taking out of operation and disposal.
- The operator is responsible for inspecting the safe and usable condition of the vehicle.
- The operator must ensure that the vehicle is only operated by persons who are mentally and physically fit to do so and who have read and understood the operating manual.
- The operator is responsible for ensuring that operating personnel regularly participate in training measures.
- The operator must prohibit unauthorized modifications and must obtain the approval of the manufacturer before any modifications. The operator is responsible for complying with the instructions of the manufacturer.
- The operator must inform the manufacturer if any safety defects arise on the machine.
- If the operating manual or safety labels are lost (peeled or illegible pictograms), the operator must order a replacement from the manufacturer promptly.

Operating personnel

- The operator must provide personal protective equipment and ensure that it is worn.
- The operating person must satisfy the statutory requirements for operating the machine.
- The operating person was assigned by the operator and/or entrusted with responsibilities relating to the vehicle.
- The operating person has been trained by the operator or the manufacturer in the safe use of the machine.
- The operating person may also be a service technician if appropriately authorized and qualified.
- The operating person must comply with the instructions and operating manual of the manufacturer and follow the instructions of the operator.
- The operating person must check that the machine is in a safe operating condition every time before starting it up. Defects or damage must be reported to the operator.
- The operating person must be aware of the proper operating practices.
- The operating person may only use the machine as intended by the manufacturer.

See: > Intended use

Service technician

- The service technician is authorized by the operator to carry out service and special maintenance work on the vehicle.

- The service technician should carry out the necessary work that is not described in the operating manual.
- The service technician has the necessary technical education, knowledge and experience as well as knowledge of the relevant regulations to carry out the assigned work and to independently identify and avoid dangers.

2.12 Areas of activity

General activities

The activities described in these operating instructions can be carried out by the operator and operating personnel unless special qualifications or authorization are specifically indicated.

Special activities

If activities are to be carried out exclusively by qualified personnel, this is clearly indicated in these operating instructions. Safety devices may only be activated and checked by qualified personnel. Electrical work and work on the electrical system may only be carried out by qualified electricians.






Training courses

Training documents for the specific activities described in these operating instructions can be obtained from customer service on request.

2.13 Personal protective equipment

Personal protective equipment is used to protect health and physical integrity.

The following protective equipment must be used when operating the machine:

	Safety goggles are used to protect against whirled up or ejected material and from splashes of stuff.
	Hearing protection is used to protect against noise.
	Gloves serve to protect against burns and dirt as well as to protect against mechanical hazards (rubbing, abrasions, etc.).
	Workwear is close-fitting and robust. In addition to wearing comfort, attention should also be paid to water impermeability. Ideally also equipped with reflective strips.
	Safety shoes with non-slip soles serve to protect the feet from falling objects and provide support on slippery or greasy surfaces.

2.14 Environmental protection

Slurry / fertilizer

Despite being worked into the ground, slurry or fertilizer can have an impact on the environment, such as on animals, plants, soil, water and air, as a result of erosion and out-gassing.

- While spreading, observe the national regulations for the spreading of fertilizer.
- While cleaning the vehicle, make certain that contaminated cleaning water is not allowed to enter bodies of water or seep into the ground.

Operating media / hazardous substances

Disposing of waste materials without regard for environmental protection puts a strain on nature and the environment and therefore on our own habitat. Potential pollutants such as gear oil, lubricants and hydraulic fluid (operating media) are used in the operation of the vehicle.

- Operating media and hazardous substances must not seep into the ground or enter into sewer systems.
- Always dispose of lubricants, oils and other operating media in designated, clearly marked containers.
- At the end of its service life, the vehicle (and its components) must be disposed of according to the national environmental regulations and laws.

3 Technical data

3.1 RAINSTAR E100 – E500

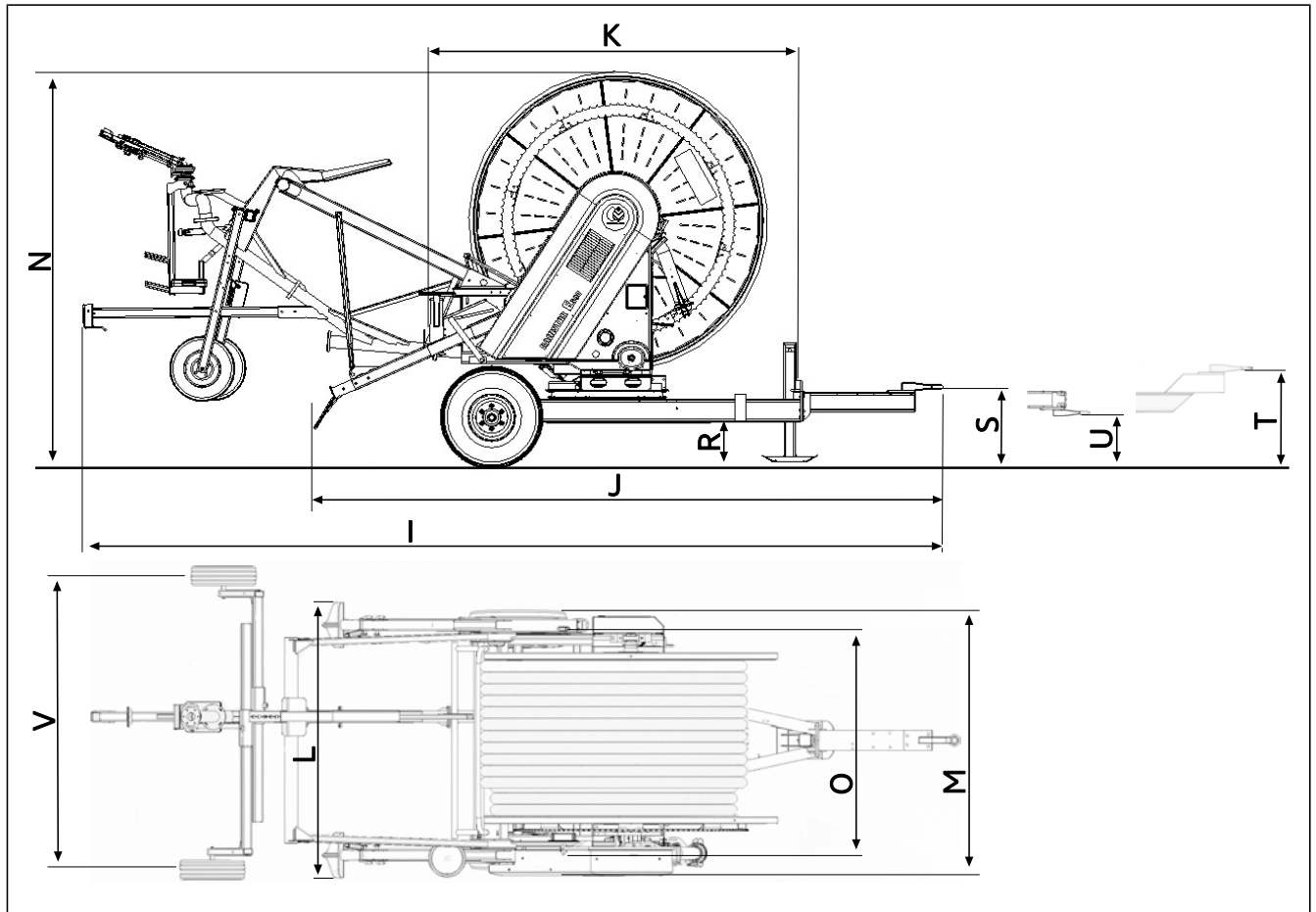


Fig. 5: Dimensions E100 – E500

A	PE pipe – DM x length	N	Total height
B	Max. strip length	O	Undercarriage track width
C	Turbine	P	Undercarriage tyres
E	Connection pressure	Q	Undercarriage tyre pressure
G	Weight with PE pipe with water *	R	Height clearance
H	Weight with PE pipe without water *	S	Height of eye hitch – standard
I	Total length with cart	T	Height of eye hitch – with riser
J	Total length without cart	U	Height of eye hitch – bottom hitching
K	Shipping length	V	Cart track width
L	Max. width	W	Cart tyres
M	Shipping width	X	Cart tyre pressure

* Total weight with cart, sprinkler and 4 cart weights.

3.1.1 Data – RAINSTAR E100

E100								
Type		E90 – 480	E100 – 350	E100 – 380	E100 – 400	E110 – 300	E110 – 330	E110 – 350
A	[mm x m]	90 x 480	100 x 350	100 x 380	100 x 400	110 x 300	110 x 330	110 x 350
B	[m]	530	400	430	450	350	380	400
C	TVR60							
E	[bar]	4.5 – 11						
G	[kg]	5600	5290	5530	5690	5400	5680	5870
H	[kg]	3550	3310	3400	3520	3350	3450	3510
I	[mm]	7700						
J	[mm]	5650						
K	[mm]	3250						
L	[mm]	2440						
M	[mm]	2140						
N	[mm]	3480						
O	[mm]	1800 – 2250						
P		See Tyre table [► 133]						
Q		See Tyre table [► 133]						
R	[mm]	340						
S	[mm]	660						
T	[mm]	830						
U	[mm]	380						
V	[mm]	1500 – 3000						
W		165 / 70 R13						
X		See Tyre table [► 133]						

3.1.2 Data – RAINSTAR E200

E200								
Type		E100 – 430	E100 – 450	E110 – 350	E110 – 380	E110 – 400	E110 – 420	E120 – 300
A	[mm x m]	100 x 430	100 x 450	110 x 350	110 x 380	110 x 400	110 x 420	120 x 300
B	[m]	480	500	400	430	450	470	350
C	TVR60							
E	[bar]	4.5 – 11						
G	[kg]	6160	6320	6110	6390	6580	6770	6120
H	[kg]	3880	3940	3750	3860	3950	4030	3820
I	[mm]	7730						
J	[mm]	5650						
K	[mm]	3250						
L	[mm]	2620						
M	[mm]	2330						
N	[mm]	3480						
O	[mm]	1800 – 2250						
P		See Tyre table [► 133]						
Q		See Tyre table [► 133]						
R	[mm]	340						
S	[mm]	660						
T	[mm]	830						
U	[mm]	380						
V	[mm]	1500 – 3000						
W		165 / 70 R13						
X		See Tyre table [► 133]						

3.1.3 Data – RAINSTAR E300

E300									
Type		E100 – 480	E100 – 500	E100 – 520	E110 – 450	E110 – 470	E110 – 490	E125 – 310	E125 – 350
A	[mm x m]	100 x 480	100 x 500	100 x 520	110 x 450	110 x 470	110 x 490	125 x 310	125 x 350
B	[m]	530	550	570	500	520	540	360	400
C	TVR60								
E	[bar]	4.5 – 11							
G	[kg]	6650	6810	6970	7160	7350	7540	6690	7180
H	[kg]	4220	4280	4400	4340	4400	4490	4190	4360
I	[mm]	7730							
J	[mm]	5650							
K	[mm]	3250							
L	[mm]	2620							
M	[mm]	2330							
N	[mm]	3530							
O	[mm]	1800 – 2250							
P		See Tyre table [► 133]							
Q		See Tyre table [► 133]							
R	[mm]	340							
S	[mm]	660							
T	[mm]	830							
U	[mm]	380							
V	[mm]	1500 – 3000							
W		165 / 70 R13							
X		See Tyre table [► 133]							

3.1.4 Date – RAINSTAR E400

E400												
Type		E100 – 550	E100 – 590	E110 – 500	E110 – 520	E110 – 550	E120 – 420	E120 – 450	E120 – 480	E125 – 370	E125 – 400	E140 – 340
A	[mm x m]	100 x 550	100 x 590	110 x 500	110 x 520	110 x 550	120 x 420	120 x 450	120 x 480	125 x 370	125 x 400	140 x 340
B	[m]	600	640	550	570	600	470	500	530	420	450	390
C	TVR60											
E	[bar]	4.5 – 11										
G	[kg]	7790	8101	8220	8410	8700	8220	8560	8900	8010	8380	8860
H	[kg]	5100	5250	5220	5290	5460	5050	5160	5340	4890	5010	5310
I	[mm]	8120										
J	[mm]	6160										
K	[mm]	3670										
L	[mm]	2700										
M	[mm]	2410										
N	[mm]	3790										
O	[mm]	1800 – 2250										
P		See Tyre table [► 133]										
Q		See Tyre table [► 133]										
R	[mm]	350										
S	[mm]	700										
T	[mm]	870										
U	[mm]	420										
V	[mm]	1500 – 3000										
W		165 / 70 R13										
X		See Tyre table [► 133]										

3.1.5 Data – RAINSTAR E500

E500											
Type		E110 – 590	E110 – 620	E110 – 650	E120 – 530	E120 – 550	E120 – 570	E120 – 600	E125 – 450	E125 – 500	E140 – 400
A	[mm x m]	110 x 590	110 x 620	110 x 650	120 x 530	120 x 550	120 x 570	120 x 600	125 x 450	125 x 500	140 x 400
B	[m]	640	670	700	580	600	620	650	500	550	450
C		TVR60									
E	[bar]	4.5 – 11									
G	[kg]	8990	9270	9560	9370	9600	9830	10160	8900	9520	9540
H	[kg]	5560	5700	5900	5540	5710	5840	6050	5170	5480	5600
I	[mm]	8200									
J	[mm]	6230									
K	[mm]	3740									
L	[mm]	2700									
M	[mm]	2400									
N	[mm]	4030									
O	[mm]	1800 – 2250									
P		See Tyre table [► 133]									
Q		See Tyre table [► 133]									
R	[mm]	350									
S	[mm]	700									
T	[mm]	870									
U	[mm]	420									
V	[mm]	1500 – 3000									
W		165 / 70 R13									
X		See Tyre table [► 133]									

3.2 RAINSTAR E100 – E600/4W

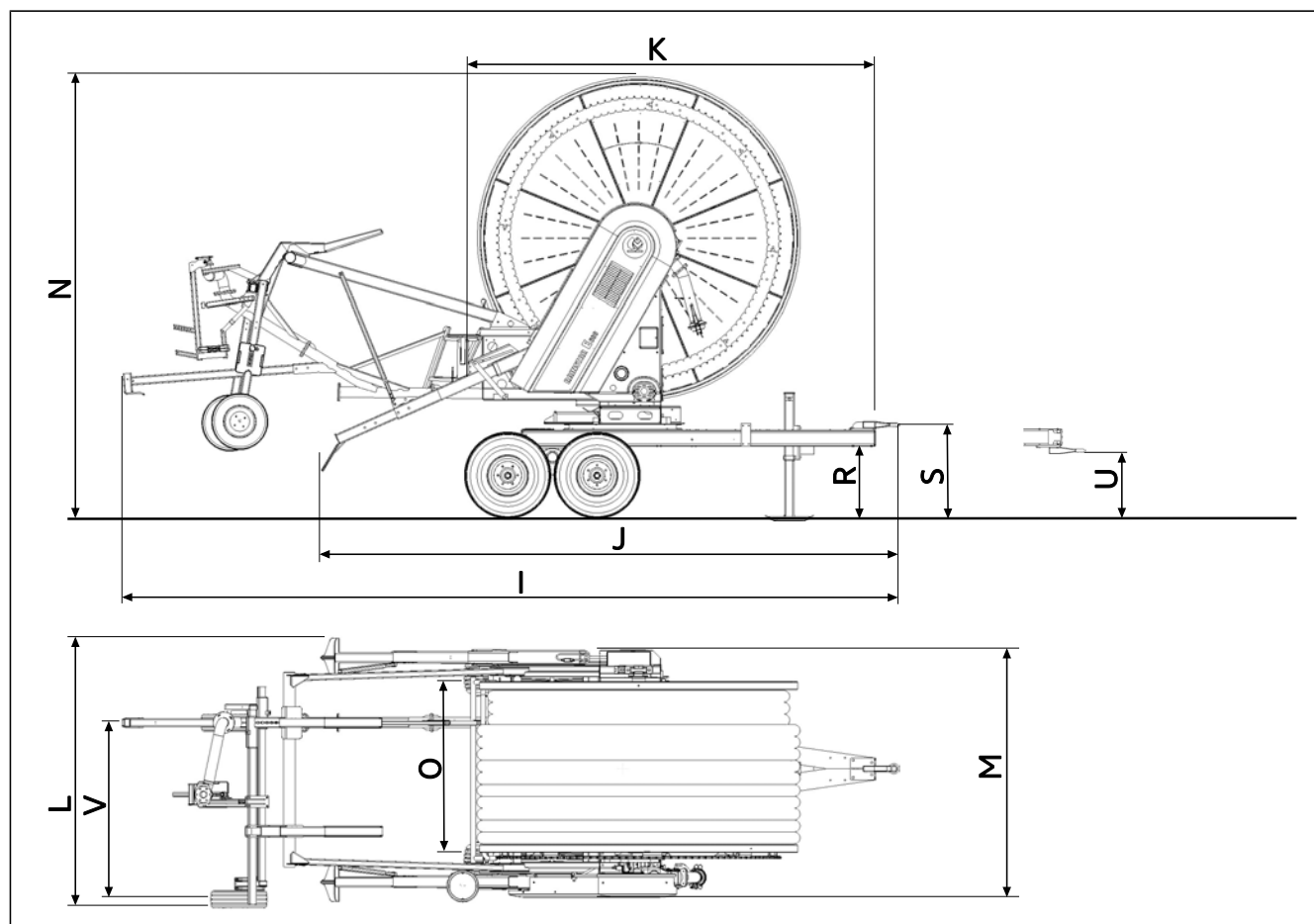


Fig. 6: Dimensions E100 – E600/4W

A	PE pipe – DM x length	N	Total height
B	Max. strip length	O	Undercarriage track width
C	Turbine	P	Undercarriage tyres
E	Connection pressure	Q	Undercarriage tyre pressure
G	Weight with PE pipe with water *	R	Height clearance
H	Weight with PE pipe without water *	S	Height of eye hitch – standard
I	Total length with cart	T	Height of eye hitch – with riser
J	Total length without cart	U	Height of eye hitch – bottom hitching
K	Shipping length	V	Cart track width
L	Max. width	W	Cart tyres
M	Shipping width	X	Cart tyre pressure

* Total weight with cart, sprinkler and 4 cart weights.

3.2.1 Data – RAINSTAR E100/4W

E100/4W								
Type		E90 – 480	E100 – 350	E100 – 380	E100 – 400	E110 – 300	E110 – 330	E110 – 350
A	[mm x m]	90 x 480	100 x 350	100 x 380	100 x 400	110 x 300	110 x 330	110 x 350
B	[m]	530	400	430	450	350	380	400
C	TVR60							
E	[bar]	4.5 – 11						
G	[kg]	5960	5650	5890	6050	5760	6040	6230
H	[kg]	3910	3670	3750	3880	3710	3810	3870
I	[mm]	7930						
J	[mm]	5820						
K	[mm]	4100						
L	[mm]	2440						
M	[mm]	2170						
N	[mm]	3790						
O	[mm]	1800 – 2250						
P		See Tyre table [► 133]						
Q		See Tyre table [► 133]						
R	[mm]	470						
S	[mm]	900						
U	[mm]	600						
V	[mm]	1500 – 3000						
W		165 / 70 R13						
X		See Tyre table [► 133]						

3.2.2 Data – RAINSTAR E200/4W

E200/4W								
Type		E100 – 430	E100 – 450	E110 – 350	E110 – 380	E110 – 400	E110 – 420	E120 – 300
A	[mm x m]	100 x 430	100 x 450	110 x 350	110 x 380	110 x 400	110 x 420	120 x 300
B	[m]	480	500	400	430	450	470	350
C	TVR60							
E	[bar]	4.5 – 11						
G	[kg]	6620	6680	6470	6750	6940	7130	6480
H	[kg]	4240	4300	4110	4220	4310	4390	4180
I	[mm]	7950						
J	[mm]	5820						
K	[mm]	4100						
L	[mm]	2620						
M	[mm]	2330						
N	[mm]	3790						
O	[mm]	1800 – 2250						
P		See Tyre table [► 133]						
Q		See Tyre table [► 133]						
R	[mm]	470						
S	[mm]	900						
U	[mm]	600						
V	[mm]	1500 – 3000						
W		165 / 70 R13						
X		See Tyre table [► 133]						

3.2.3 Data – RAINSTAR E300/4W

E300/4W									
Type		E100 – 480	E100 – 500	E100 – 520	E110 – 450	E110 – 470	E110 – 490	E125 – 310	E125 – 350
A	[mm x m]	100 x 480	100 x 500	100 x 520	110 x 450	110 x 470	110 x 490	125 x 310	125 x 350
B	[m]	530	550	570	500	520	540	360	400
C	TVR60								
E	[bar]	4.5 – 11							
G	[kg]	7010	7170	7330	7520	7710	7900	7050	7540
H	[kg]	4580	4640	4760	4700	4760	4850	4550	4720
I	[mm]	7950							
J	[mm]	5820							
K	[mm]	4100							
L	[mm]	2620							
M	[mm]	2330							
N	[mm]	3790							
O	[mm]	1800 – 2250							
P		See Tyre table [► 133]							
Q		See Tyre table [► 133]							
R	[mm]	470							
S	[mm]	900							
U	[mm]	600							
V	[mm]	1500 – 3000							
W		165 / 70 R13							
X		See Tyre table [► 133]							

3.2.4 Data – RAINSTAR E400/4W

E400/4W												
Type		E100 – 550	E100 – 590	E110 – 500	E110 – 520	E110 – 550	E120 – 420	E120 – 450	E120 – 480	E125 – 370	E125 – 400	E140 – 340
A	[mm x m]	100 x 550	100 x 590	110 x 500	110 x 520	110 x 550	120 x 420	120 x 450	120 x 480	125 x 370	125 x 400	140x 340
B	[m]	600	640	550	570	600	470	500	530	420	450	390
C		TVR60										
E	[bar]	4.5 – 11										
G	[kg]	8150	8570	8580	8770	9054	8580	8920	9100	8370	8740	9220
H	[kg]	5460	5610	5580	5650	5820	5410	5520	5700	5250	5370	5670
I	[mm]	7940										
J	[mm]	5890										
K	[mm]	4110										
L	[mm]	2700										
M	[mm]	2410										
N	[mm]	3980										
O	[mm]	1800 – 2250										
P		See Tyre table [► 133]										
Q		See Tyre table [► 133]										
R	[mm]	480										
S	[mm]	870										
U	[mm]	590										
V	[mm]	1500 – 3000										
W		165 / 70 R13										
X		See Tyre table [► 133]										

3.2.5 Data – RAINSTAR E500/4W

E500/4W											
Type		E110 – 590	E110 – 620	E110 – 650	E120 – 530	E120 – 550	E120 – 570	E120 – 600	E125 – 450	E125 – 500	E140 – 400
A	[mm x m]	110 x 590	110 x 620	110 x 650	120 x 530	120 x 550	120 x 570	120 x 600	125 x 450	125 x 500	140 x 400
B	[m]	640	670	700	580	600	620	630	500	550	450
C		TVR60									
E	[bar]	4.5 – 11									
G	[kg]	9350	9630	9920	9730	9960	10190	10520	9260	9880	9900
H	[kg]	5920	6060	6260	5900	6070	6200	6410	5530	5840	5960
I	[mm]	7980									
J	[mm]	5950									
K	[mm]	4180									
L	[mm]	2700									
M	[mm]	2410									
N	[mm]	4260									
O	[mm]	1800 – 2250									
P		See Tyre table [► 133]									
Q		See Tyre table [► 133]									
R	[mm]	480									
S	[mm]	870									
U	[mm]	590									
V	[mm]	1500 – 3000									
W		165 / 70 R13									
X		See Tyre table [► 133]									

3.2.6 Data – RAINSTAR E600/4W

E600/4W											
Type		E110 – 670	E110 – 700	E120 – 630	E120 – 650	E125 – 560	E125 – 580	E125 – 600	E125 – 620	E140 – 430	E140 – 460
A	[mm x m]	110 x 670	110 x 700	120 x 630	120 x 650	125 x 560	125 x 580	125 x 600	125 x 620	140 x 430	140 x 460
B	[m]	670	700	630	650	560	580	600	620	430	460
C	TVR60										
E	[bar]	5 – 11									
G	[kg]	11000	11280	11750	11970	11560	11550	11560	11820	10940	10880
H	[kg]	7320	7420	7410	7480	7160	7000	7010	7110	6600	6250
I	[mm]	7990									
J	[mm]	5950									
K	[mm]	4160									
L	[mm]	2700									
M	[mm]	2410									
N	[mm]	4470									
O	[mm]	1800 – 2250									
P		See Tyre table [► 133]									
Q		See Tyre table [► 133]									
R	[mm]	480									
S	[mm]	670									
U	[mm]	590									
V	[mm]	1500 – 3000									
W		165 / 70 R13									
X		See Tyre table [► 133]									

3.3 RAINSTAR E300 – E600/4WB

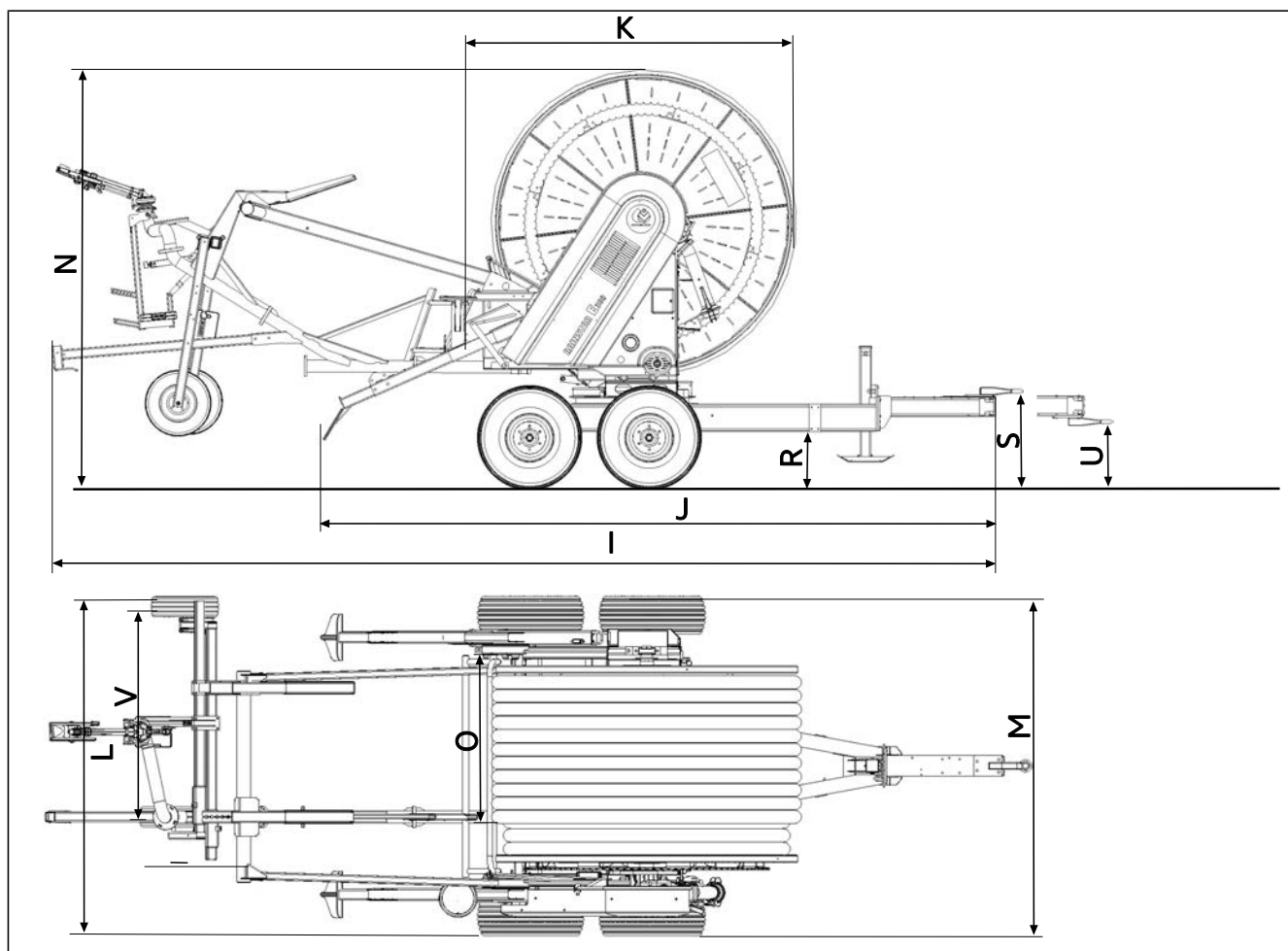


Fig. 7: Dimensions E300 – E600/4WB

A	PE pipe – DM x length	N	Total height
B	Max. strip length	O	Undercarriage track width
C	Turbine	P	Undercarriage tyres
E	Connection pressure	Q	Undercarriage tyre pressure
G	Weight with PE pipe with water *	R	Height clearance
H	Weight with PE pipe without water *	S	Height of eye hitch – standard
I	Total length with cart	T	Height of eye hitch – with riser
J	Total length without cart	U	Height of eye hitch – bottom hitching
K	Shipping length	V	Cart track width
L	Max. width	W	Cart tyres
M	Shipping width	X	Cart tyre pressure

* Total weight with cart, sprinkler and 4 cart weights.

3.3.1 Data – RAINSTAR E300/4WB

E300/4WB									
Type		E100 – 480	E100 – 500	E100 – 520	E110 – 450	E110 – 470	E110 – 490	E125 – 310	E125 – 350
A	[mm x m]	100 x 480	100 x 500	100 x 520	110 x 450	110 x 470	110 x 490	125 x 310	125 x 350
B	[m]	530	550	570	500	520	540	360	400
C	TVR60								
E	[bar]	4.5 – 11							
G	[kg]	6930	7090	7250	7440	7630	7820	6970	7460
H	[kg]	4580	4560	4680	4620	4680	4770	4470	4640
I	[mm]	8510							
J	[mm]	6140							
K	[mm]	3655							
L	[mm]	2620							
M	[mm]	2330							
N	[mm]	3600							
O	[mm]	2600							
P		See Tyre table [► 133]							
Q		See Tyre table [► 133]							
R	[mm]	320							
S	[mm]	780							
T	[mm]	950							
U	[mm]	500							
V	[mm]	1500 – 3000							
W		165 / 70 R13							
X		See Tyre table [► 133]							

3.3.2 Data – RAINSTAR E400/4WB

E400/4WB												
Type		E100 – 550	E100 – 590	E110 – 500	E110 – 520	E110 – 550	E120 – 420	E120 – 450	E120 – 480	E125 – 370	E125 – 400	E140 – 340
A	[mm x m]	100 x 550	100 x 590	110 x 500	110 x 520	110 x 550	120 x 420	120 x 450	120 x 480	125 x 370	125 x 400	140 x 340
B	[m]	600	640	550	570	600	470	500	530	420	450	390
C		TVR60										
E	[bar]	4.5 – 11										
G	[kg]	8070	8390	8500	8690	8980	8500	8840	9020	8290	8660	9140
H	[kg]	5380	5530	5500	5570	5740	5330	5440	5620	5170	5290	5590
I	[mm]	8520										
J	[mm]	6310										
K	[mm]	3670										
L	[mm]	2700										
M	[mm]	2410										
N	[mm]	3880										
O	[mm]	2600										
P		See Tyre table [► 133]										
Q		See Tyre table [► 133]										
R	[mm]	340										
S	[mm]	800										
T	[mm]	970										
U	[mm]	520										
V	[mm]	1500 – 3000										
W		165 / 70 R13										
X		See Tyre table [► 133]										

3.3.3 Data – RAINSTAR E500/4WB

E500/4WB											
Type		E110 – 590	E110 – 620	E110 – 650	E120 – 530	E120 – 550	E120 – 570	E120 – 600	E125 – 450	E125 – 500	E140 – 400
A	[mm x m]	110 x 590	110 x 620	110 x 650	120 x 530	120 x 550	120 x 570	120 x 600	125 x 450	125 x 500	140 x 400
B	[m]	640	670	700	580	600	620	650	500	550	450
C		TVR60									
E	[bar]	4.5 – 11									
G	[kg]	9270	9550	9840	9650	9880	10110	10440	9180	9800	9820
H	[kg]	5840	5980	6180	5820	5990	6120	6070	5450	5760	5880
I	[mm]	8550									
J	[mm]	6370									
K	[mm]	3740									
L	[mm]	2700									
M	[mm]	2410									
N	[mm]	4120									
O	[mm]	2600									
P		See Tyre table [► 133]									
Q		See Tyre table [► 133]									
R	[mm]	340									
S	[mm]	800									
T	[mm]	970									
U	[mm]	520									
V	[mm]	1500 – 3000									
W		165 / 70 R13									
X		See Tyre table [► 133]									

3.3.4 Data – RAINSTAR E600/4WB

E600/4WB											
Type		E110 – 670	E110 – 700	E120 – 630	E120 – 650	E125 – 560	E125 – 580	E125 – 600	E125 – 620	E140 – 430	E140 – 460
A	[mm x m]	110 x 670	110 x 700	120 x 630	120 x 650	125 x 560	125 x 580	125 x 600	125 x 620	140 x 430	140 x 460
B	[m]	670	700	630	650	560	580	600	620	430	460
C		TVR60									
E	[bar]	5 – 11									
G	[kg]	11000	11280	11750	11970	11560	11550	11560	11820	10940	10880
H	[kg]	7220	7420	7410	7480	7160	7000	7010	7110	6600	6250
I	[mm]	8570									
J	[mm]	6260									
K	[mm]	3720									
L	[mm]	2700									
M	[mm]	2410									
N	[mm]	4320									
O	[mm]	2600									
P		See Tyre table [► 133]									
Q		See Tyre table [► 133]									
R	[mm]	340									
S	[mm]	800									
T	[mm]	970									
U	[mm]	520									
V	[mm]	1500 – 3000									
W		165 / 70 R13									
X		See Tyre table [► 133]									

4 Design and function

4.1 Function description

The RAINSTAR is designed for universal use on fields with various lengths or widths. It is excellently suited to the irrigation of cereals, field crops, root crops and vegetable plantations as well as green fields of all kinds.

It consists largely of the two-wheeled undercarriage, the turntable, which can swivel by 270°, and the reel with the special PE tube, the multifunctional compact gearbox, the TVR 60 turbine and the wheeled cart with the BAUER long-range sprinkler, which is especially suited to tall crops.

The PE pipe is made from state-of-the-art material. One end of the pipe is attached to the reel drum and connected to the water supply via the reel drum axle. The other end is connected to the wheeled cart. The track width of the cart can be adjusted freely. (See: > Technical data [► 33])

The core of the RAINSTAR is the TVR 60 turbine. This is a full-flow turbine, flow-optimized, attached directly to the reel and largely insensitive to contaminated water. It has been optimized for high efficiency. The drive shaft is made of non-rusting material. The regulating cam inside the turbine is covered in a wear-resistant rubber lining.

The turbine shaft bearing is sealed with a maintenance-free slide ring seal.

The TVR 60 turbine is suitable for water volumes from 20 to over 120 m³/h and features a large control range. The impeller speed ranges between 150 and 650 rpm.

The retraction speed can be freely adjusted. This is set with the ECOSTAR. The speed can be read from the display and ranges between 8 and 150 m/h, depending on the water volume and connection pressure. The machine connection pressure may not exceed 11 bar.

Power is transmitted from the turbine directly to the variable-speed gearbox as well as the chain drive of the reel. The band brake prevents fast reverse turning of the reel in the shut-off position when the PE pipe is under tension.

The band brake and the gear wheels in the oil-filled gearbox act as brakes and prevent the PE pipe from becoming loose during the process of pulling off.

For safety reasons, the drive is equipped with an emergency stop mechanism as well as a holding brake. The entire drive system can be interrupted manually with the emergency stop mechanism.

The tension on a PE pipe can be relieved by carefully pushing down the gear shift lever (see: > Emergency shut-off [► 77])

A guide carriage moved by the spiral groove spindle ensures smooth winding of the PE pipe over the entire range of layers. To ensure that the retraction speed remains constant over all layers and regardless of the length of the PE pipe still extended, the RAINSTAR is equipped with the ECOSTAR.

The drive is switched off automatically by a rod linkage at the end of the irrigation strip. If a “high-pressure shut-off valve” is fitted, the water supply is cut off at the same time and the pump unit is switched off. If a “low-pressure shut-off valve” is fitted, the pump unit is switched off. After the shut-off, the rear supports can be hydraulically retracted, which automatically lifts up the cart and brings it into transport position. The RAINSTAR is then

ready to be immediately moved into operating position, the PE pipe can be pulled off or laid down, the water supply can be connected, and the machine can be put into operation.

During transport on public routes and roads, the reel must be turned into the driving direction and secured with the linchpin. The PE pipe must be fully reeled in and lifted onto the cart. Bring the drawbar support foot and the two rear frame supports to the uppermost position.

On public roads, the drawbar must be attached to the trailer hitch of the traction vehicle. The travel speed may not exceed 10 km/h. To prevent tipping over on curves, it is recommended to set the track width to the maximum value.

On the field, the machine can be transported from hydrant to hydrant with the wheeled cart raised up to the side. In this transport position, the driving speed must be adapted to the conditions and may not exceed 5 km/h. Also note that a wider driving lane is required for transporting the machine in this way.

5 Putting into operation

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

Re-tighten the wheel nuts before the first start-up. Check that the tyres are inflated to the specified pressure (see: > Tyre table [► 133]).

Also re-tighten the connecting bolts of the turntable side frame on the lower section, the ball race on the undercarriage and the fastening of the eye hitch. (See: > Service and maintenance [► 85])

5.1 Steps to be carried out once or from time to time

Assembly – symmetric cart

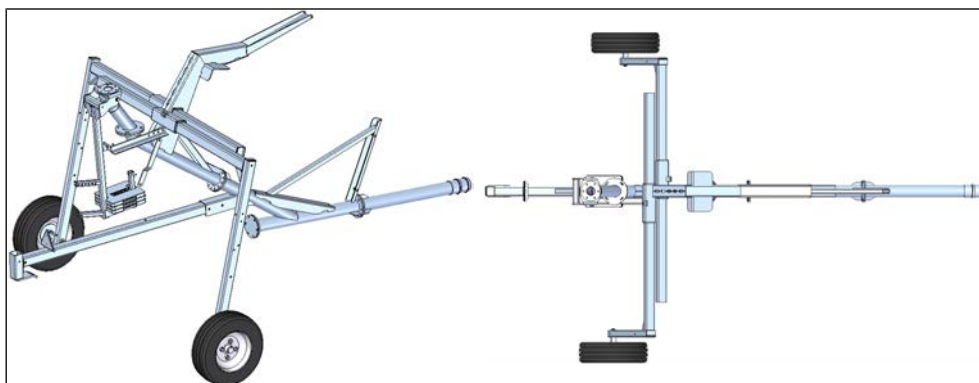


Fig. 8: Symmetric cart

Assembly – asymmetric cart

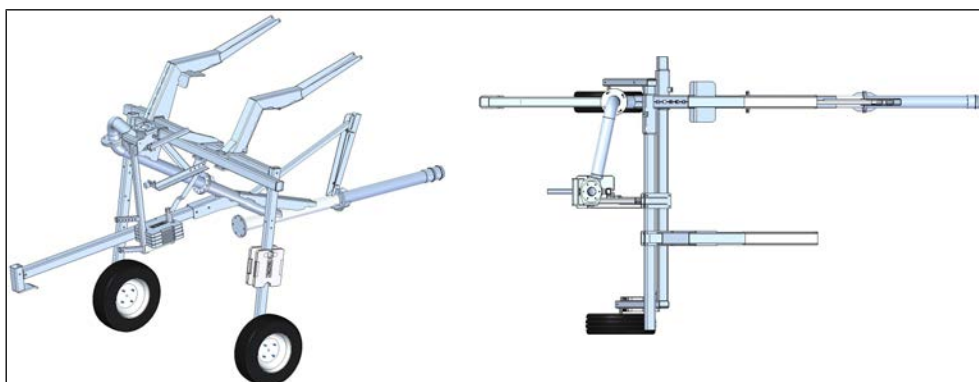


Fig. 9: Asymmetric cart

Sprinkler fastening

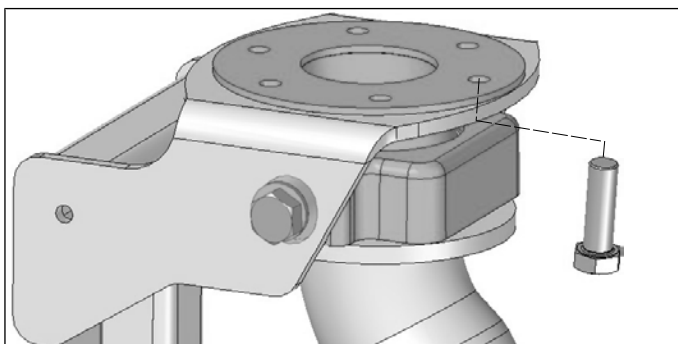


Fig. 10: Sprinkler fastening

WARNING: The front bolt for fastening the sprinkler must be installed from below!

Track widths

Depending on the crop, the required track width can be set on the cart and undercarriage.

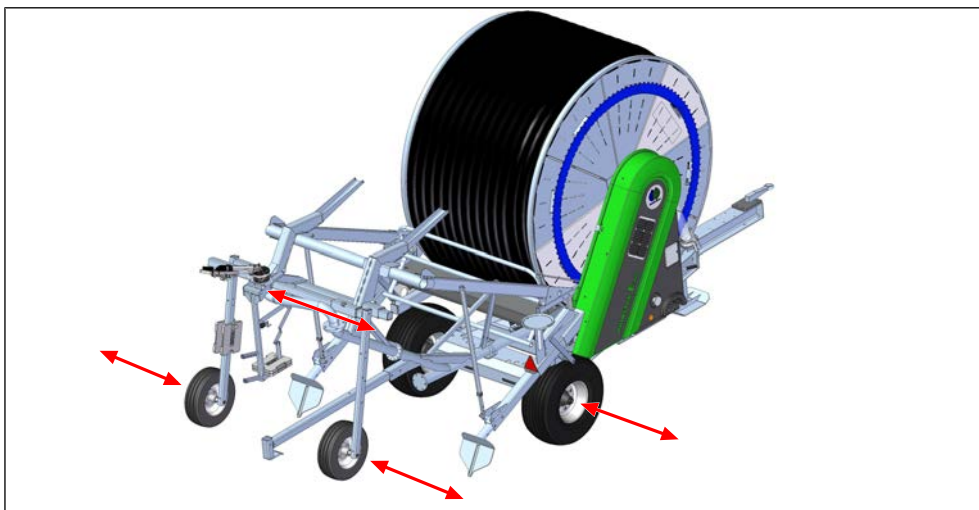


Fig. 11: Setting track widths

Attaching weights to the balancing pendulum

The balancing pendulum must be weighted with the required number of weights.

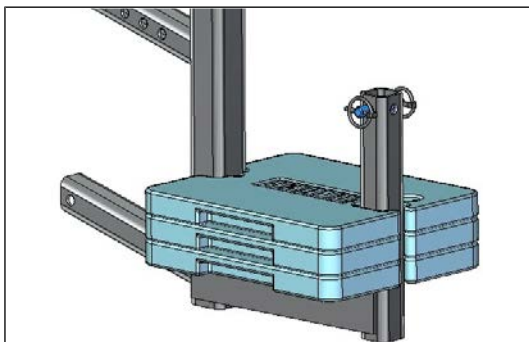


Fig. 12: Weights

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

(See: > Balancing weights for symmetric carts [► 58])

Options for different wheelbases

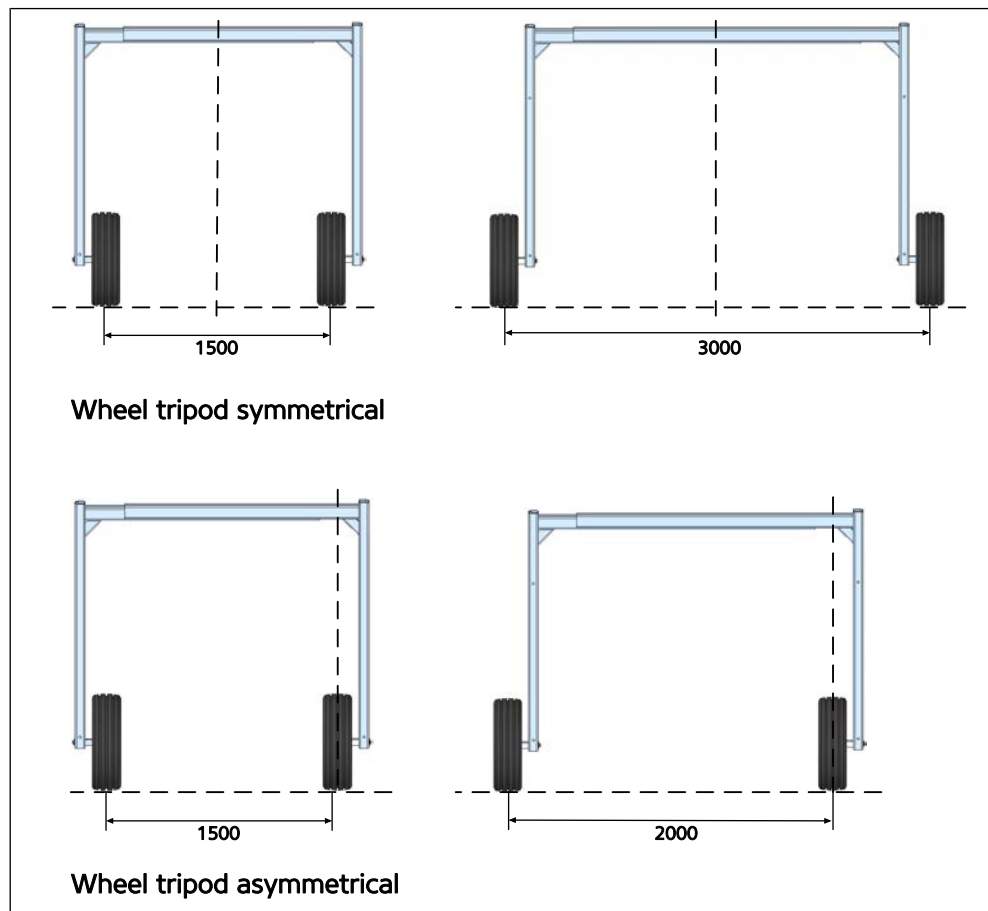


Fig. 13: Wheelbases

5.2 Balancing weights for symmetric carts

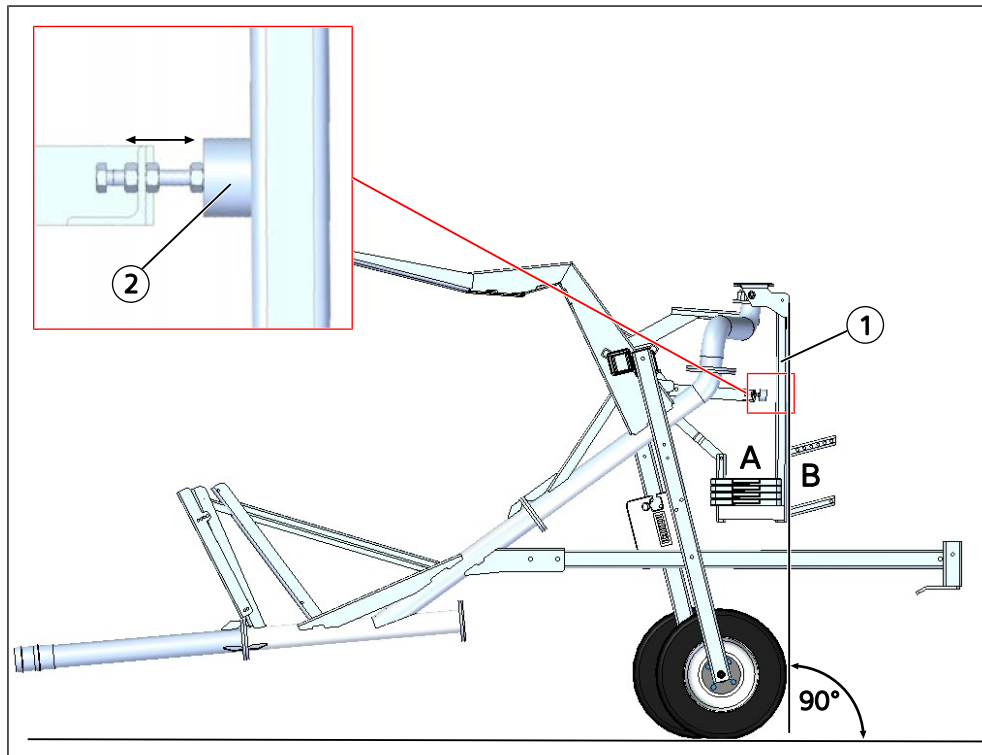


Fig. 14: Balancing weights for symmetric carts

After adding the weights (A and B), the pendulum (1) must be set to an angle of 90° by repositioning the rubber spacer (2).

		Nozzle pressure in bar							
		3.0		4.0		5.0		6.0	
Position		A	B	A	B	A	B	A	B
Nozzle pressure in mm	26	3	1	3	1	3	1	3	2
	28	3	1	3	1	3	2	3	2
	30	3	1	3	1	3	2	3	3
	32	3	1	3	2	3	3	3	3
	34	3	2	3	2	3	3	3	4
	36	3	2	3	3	3	4	3	4

Warning: The number of required weights applies only for track widths from 1500 to 3000 mm!

WARNING: When using an asymmetric cart, two additional weights must be placed on the wheel carrier opposite the inlet (PE pipe) in addition to the weights specified above!

Set the sector on the long-range sprinkler (approx. 220° for the full strip width). For more information, see the separate operating manual for the sprinkler. The VARI-ANGLE can be adjusted to the existing wind conditions by adapting the spray trajectory angle.

5.3 Mounting the machine supports

Set up the RAINSTAR on flat ground such that it is level on all sides.

The right and left supports are delivered in a single packaging unit.

Assembly

- a) Slide the anchoring shields (1) into the support (A).
 - b) Secure the anchoring shields (1) with the lock bolts (3) and linchpins (3a).
 - ⇒ Note: The anchoring shields are not included in the packaging unit.
 - c) Fasten the lower support brace (4) to the support with the bolt (2) and nut (2a).
- Warning: The parts must continue to be movable!

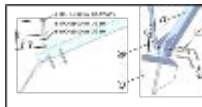


Fig. 15: Mounting the anchoring shields

For special cases, such as when the RAINSTAR is standing on a slightly ascending path, the anchoring shield can be mounted with an extension of 120 mm.

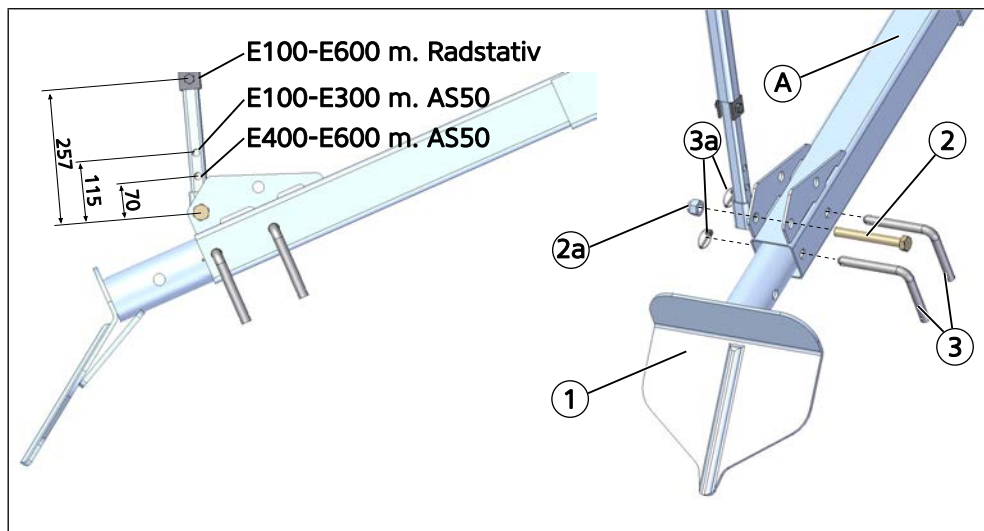


Fig. 16: Mounting the extended anchoring shields

The anchoring shield (1) can be turned by 180 degrees by removing the linchpin (3). This results in greater ground clearance for transport.

The cover (15) must be removed before mounting the right support. Engage the pre-mounted "right support" with the guide (5) (as shown in the drawing), and fasten it to the turntable side frame (7) with the bolt (6).

Mount the support lift (8) in the turntable side frame with the bolt, turn up the fork and secure it with the bolt (9). Proceed the same way with the left machine support.

(See figure: > Mounting and adjusting the cart lift ► 60)

5.4 Mounting and adjusting the cart lift

Assembly

- a) Mount the cart lift (10).
- The stop brackets (10A) must point upward.
- a) Bring the cart lift to height “X”.
- b) Position the set screws (11) on the beam and secure them with a locknut.
- c) Mount the two square washers (12) on the lower braces (4).
- d) Slide the upper braces (13) over the lower braces (4).
- e) Lift the cart lift bracket (10).
- f) Bolt the cart lift bracket (10) to the braces.
- g) It must be possible for the assembly to swivel between the cart lift bracket and the braces.

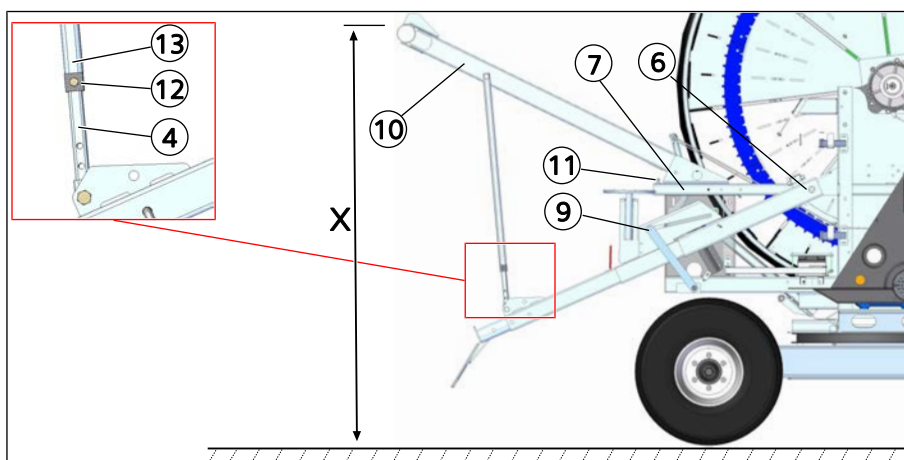


Fig. 17: Mounting and adjusting the cart lift

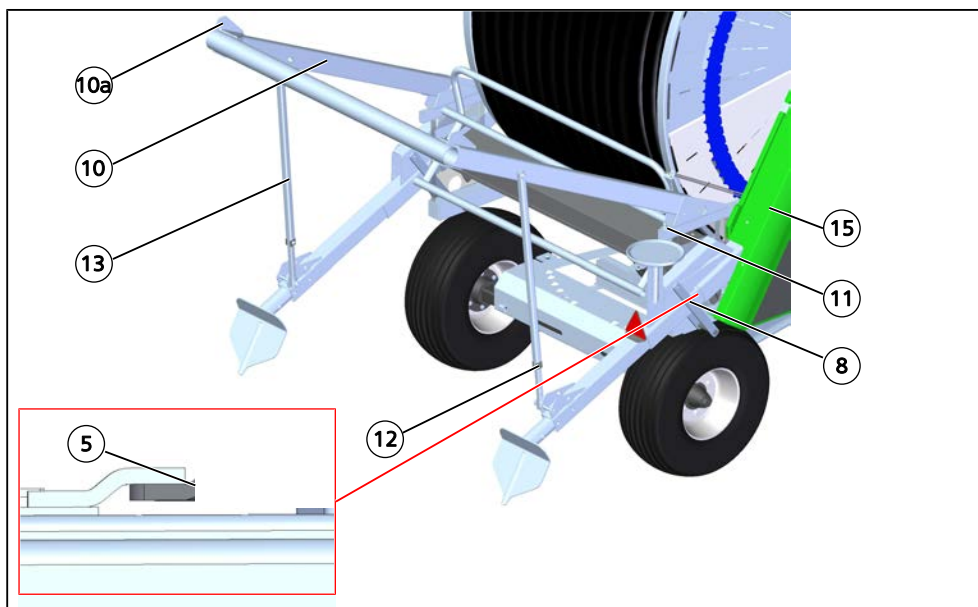


Fig. 18: Mounting and adjusting the cart lift

X with AS 50	X with wheeled cart	Type
1550	1750	E100-E500
1700	1850	E100-E600 4 W
1650	1850	E300-E600 4 WB

NOTE: Check the setting dimension of the cart lift bracket every time the machine is set up.

5.5 Operating mode 1: PE pipe pull-off

5.5.1 Transporting the machine to the set-up location

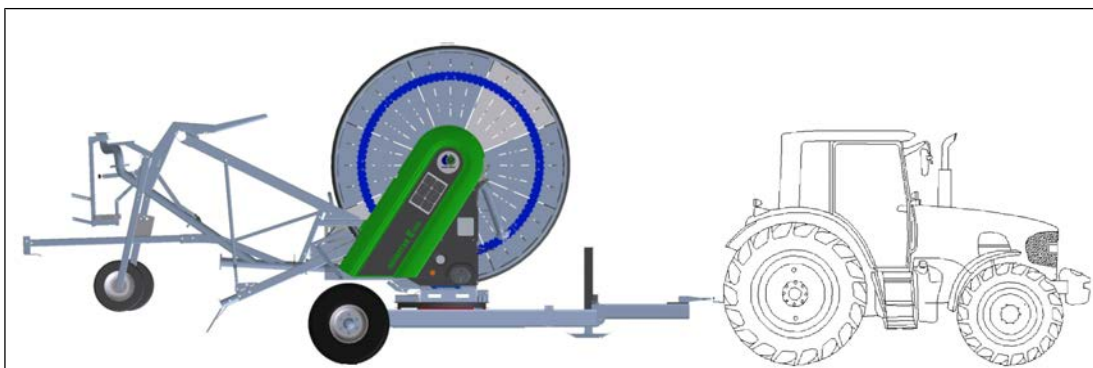


Fig. 19: Transporting the RAINSTAR

During transport, the reel should be turned into the driving direction and secured with the lock bolt. The cart, the drawbar support foot and the two rear supports must be raised up or retracted.

For pulling off the PE pipe to the side, position the RAINSTAR on the headland at a right angle to the planned irrigation strip and detach it from the tractor.

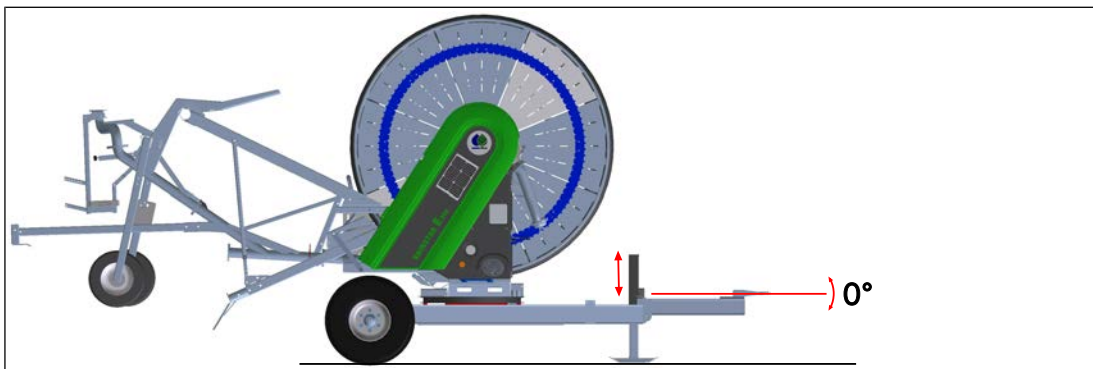


Fig. 20: Adjusting the RAINSTAR

Position the drawbar support foot to make the undercarriage level.

NOTE: When positioning the RAINSTAR, make sure that the machine's vertical axis of rotation is in the middle of the irrigation lane or centred between two crop rows.

For pulling off the PE pipe to the side, pull out the linchpin, turn the reel to face the irrigation lane and secure it again with the linchpin.

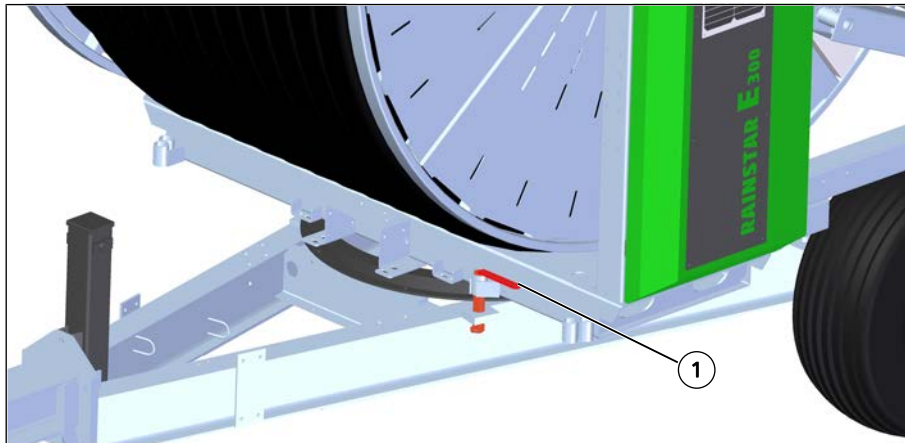


Fig. 21: Adjusting the RAINSTAR – turning

NOTE: When the wide tyres are installed (option), not all pinning positions are possible for pulling off the PE pipe to the side.

Connect both hydraulic hoses to the hydraulic system on the tractor and extend the supports.

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



Fig. 22: Adjusting the RAINSTAR – hydraulic connections

NOTE: The standard RAINSTAR equipment does not include a control unit (option). After connecting the hoses, the tractor's hydraulic system must be switched over accordingly for retracting or extending the supports. If this is not possible, the two hoses must be swapped.

DANGER



Third parties in the area of the tripod and the supports

Death or severe injuries can result.

- a) Before operating the hydraulics, check that there are no persons in the area of movement of the tripod and supports, as this area cannot be seen from the control panel!

5.5.2 Lowering the cart

When the supports are extended, the cart is automatically lowered into the “PE pipe pull-off” position.

After lowering: Depressurize the tractor’s hydraulic system, and disconnect the hydraulic hoses.

Switching positions of the shut-off lever

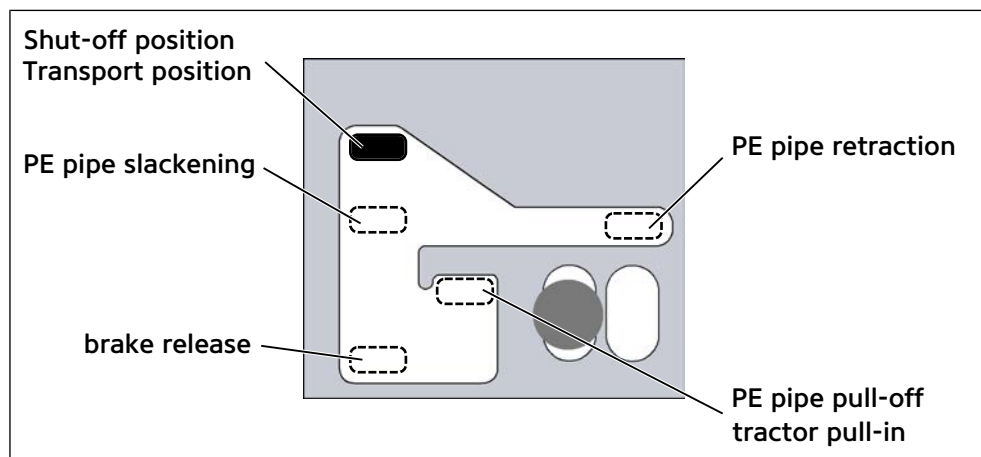


Fig. 23: Switching positions of the shut-off lever

5.5.3 Checking the shut-off function

Before putting the machine into operation (turbine motionless) – after the cart has been lowered and the PE pipe has been pulled off at least 1 metre – put the gear shift lever into the position “PE pipe retraction”, position “1”.

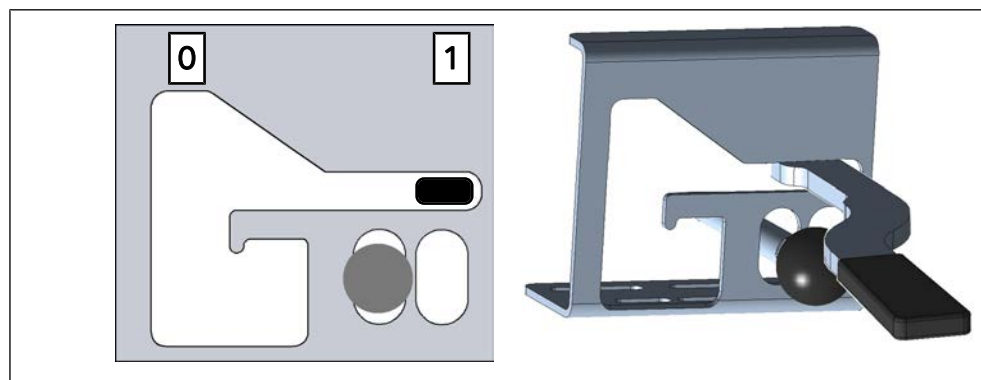


Fig. 24: Checking the shut-off function

Manually actuate the shut-off frame on the retraction side of the RAINSTAR until the machine shuts off. The gear shift lever must be moved out of the operating position and then be allowed to spring into position “0”. If this does not happen, the shut-off must be adjusted. See the separate section for adjusting instructions.

WARNING: The final shut-off function must be checked before the first use and at the start of every season!

5.5.4 PE pipe pull-off

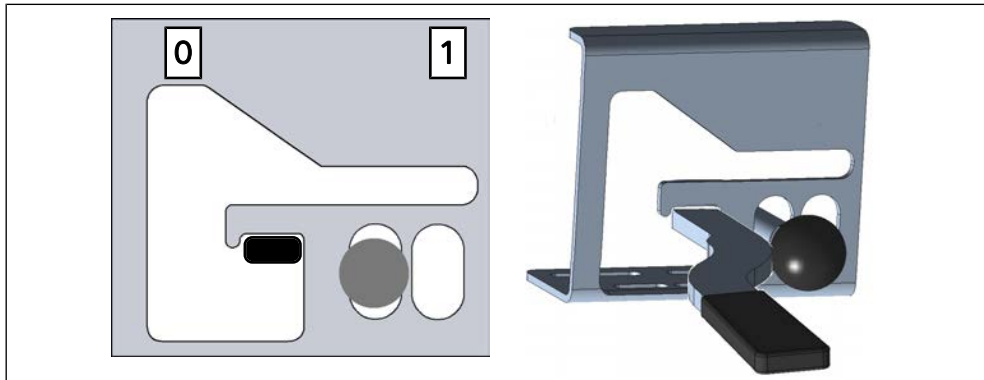


Fig. 25: PE pipe pull-off

Move the gear shift lever into the “PE pipe pull-off” position. The lever is pushed up by a spring, moving it securely into position.

If the pipe is loosely wound (during the first operation or after transporting the unit with an incorrect shut-off lever setting – not in the transport position “0”), it is important not to allow the pipe to wind over itself during the pull-off procedure. If necessary, the loose pipe windings must be pressed into the correct position relative to the winding carriage using a tool! The PE pipe must be pulled off carefully and slowly while being kept in the correct position.

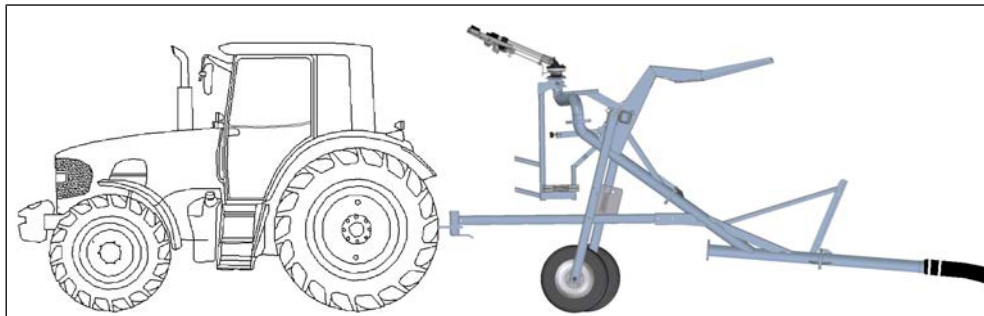


Fig. 26: Attaching the tractor drawbar

Attach the tractor drawbar to the pull-off hook, and pull out the cart.

The standard wheel cart or an asymmetric wheeled cart does not need to be lifted.

Pull-off speed: Do not exceed 5 km/h!

WARNING: Do not stop suddenly! When making intermediate stops or at the end of the pull-off procedure, reduce speed slowly.

NOTE: If the PE pipe is to be pulled off in a wide bow, make sure that it is pulled in a straight line (90° to the reel) for about 80 – 100 m first. Then it can be pulled off in a wide bow.

WARNING: If the pipe has been exposed to the sun for a prolonged period or if its surface temperature rises above 35 °C, it must be cooled by running water through it before it is pulled off or retracted.

Connect the pressure hose. Open the water supply.



Fig. 27: Connecting the pressure hose

Move the gear shift lever into the correct position.

(See: > Selecting the gear shift positions [► 72])

5.5.5 Limiter for regulation of the TVR60 turbine

Before starting up the machine for the first time, the control range of the TVR 60 turbine must be limited according to the table below.

The discharge rate (Q) and the retraction speed (V) can be found in the performance table.

Q	V	visible	V	visible
m ³ /h	m/h	(hole)	m/h	(hole)
22 - 40	9 - 30	4	30 - 60	6
40 - 50	9 - 35	3	35 - 70	5
50 - 60	9 - 40	2	40 - 80	4 ½
60 - 75	9 - 45	2	45 - 90	4
75 - 90	9 - 50	1	50 - 100	3
90 - 105	9 - 55	0	55 - 110	2
> 105	9 - 60	0	60 - 120	1

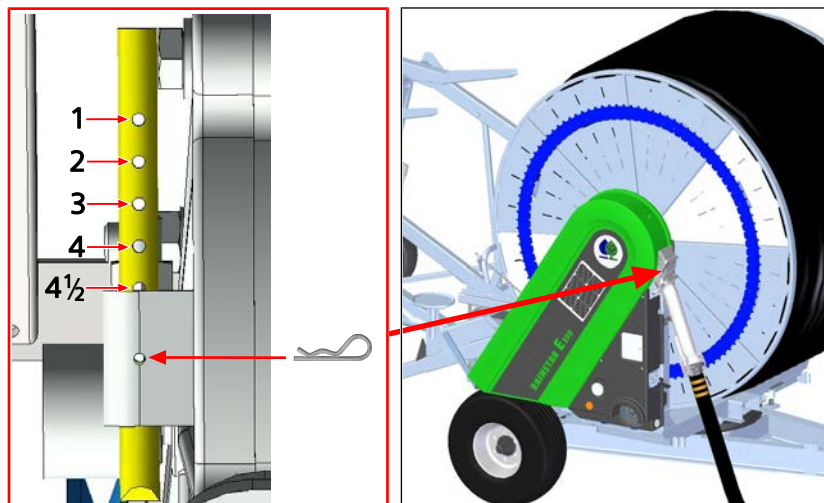


Fig. 28: Turbine control range

If the flow rate or retraction speed change significantly, the limiting bolt must be repositioned.

Secure it with a spring clip after adjusting the setting.

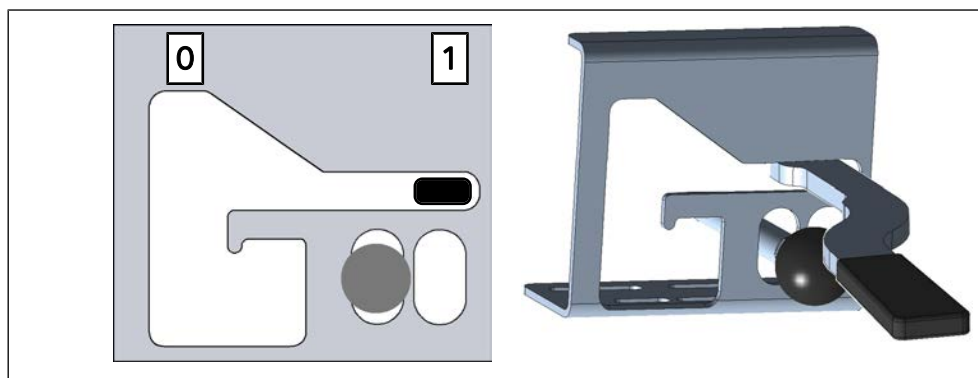


Fig. 29: Gear shift position for PE pipe retraction

When the operating pressure has been reached and only clear water emerges from the long-range sprinkler in a full jet without air bubbles, move the gear shift lever to the “PE pipe retraction” position.

NOTE: Only shift at a low turbine speed, and do not apply force to the lever!

If the PE pipe is under tension:

- a) Move the shut-off lever to the shut-off position.

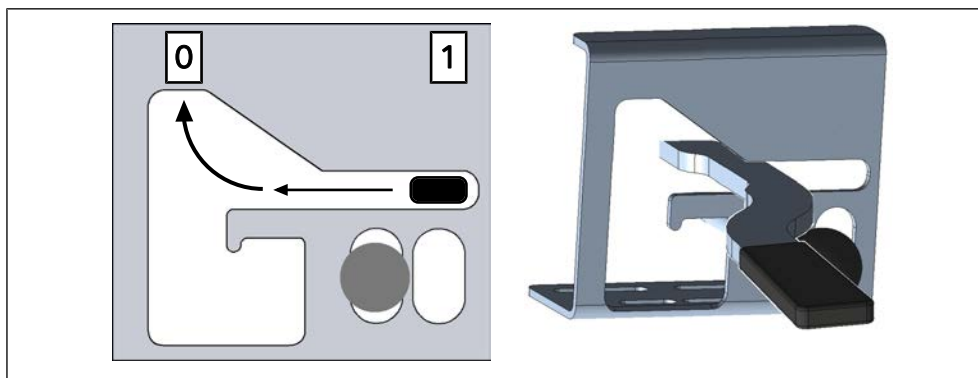


Fig. 30: Moving the shut-off lever to the shut-off position

- b) Slacken the PE pipe by carefully and gradually pressing the shut-off lever downward.

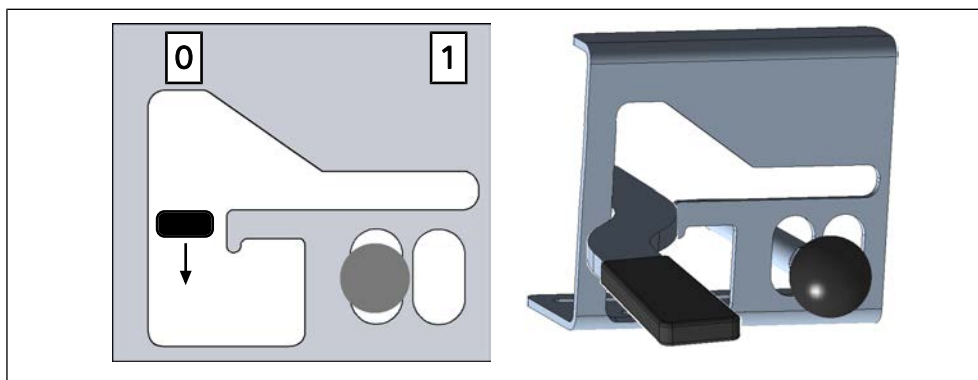


Fig. 31: Slackening the PE pipe

NOTE: Gear speeds 1 to 4 can only be engaged while the turbine is spinning!

NOTE: Move the gear shift lever into the desired position and set the shut-off lever back to the "PE pipe retraction" position.

- a) The reel starts to pull in the PE pipe.

5.5.6 Speed adjustment with ECOSTAR



Set the required retraction speed with the buttons while the ECOSTAR is in operating mode.

You can adjust the retraction speed again at any time while the machine is running. (See: > Speed adjustment [► 111])

End of the irrigation process

At the end of the irrigation process, the drive is shut off by a rod linkage.

After the pipe has been retracted, the supports can be carefully retracted using the tractor's hydraulic system. This automatically lifts up the cart and moves it into the transport position.

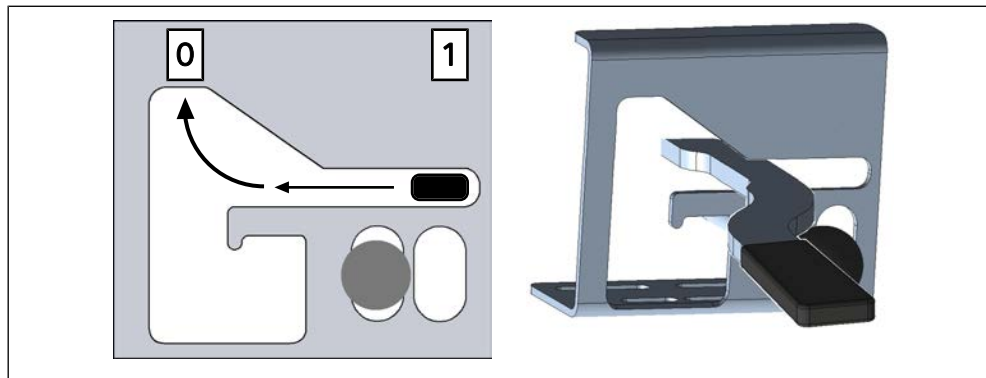
Readjusting the RAINSTAR after a position change

If the RAINSTAR becomes misaligned or is pulled aslant during retraction of the PE pipe, it has to be readjusted.

This requires that PE pipe be slackened first.

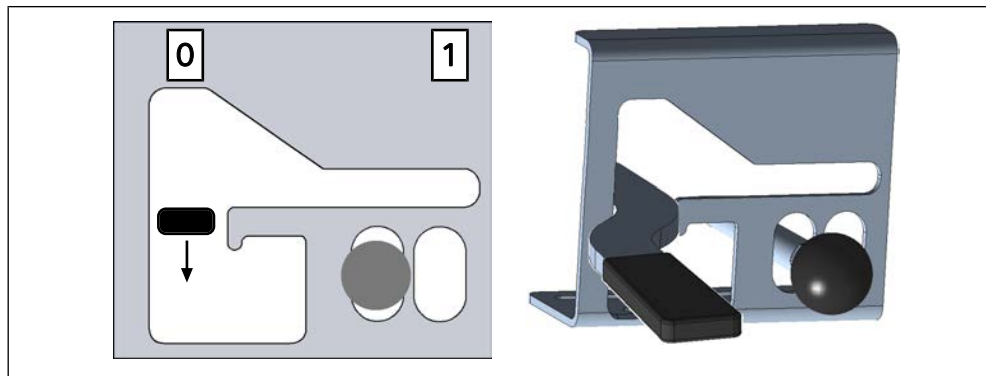
a) Switch off the water supply to the RAINSTAR.

⇒ The PE pipe is only partially slackened by the turbine, which acts as a hydraulic brake.



b) Move the shut-off lever to the shut-off position.

c) Carefully and slowly move the shut-off lever down to slacken the PE pipe.



d) Readjust the machine and prop it up adequately.

- e) Open the water supply again.
- f) Move the gear shift lever into the desired position.
- g) The PE pipe retraction is continued.

5.6 Operating mode 2: 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 length of the RAINSTAR's PE pipe. The laying down method allows the use of smaller tractors because no pulling force is applied to the pipe.

Drive into the field with the RAINSTAR, taking the throwing distance of the sprinkler into consideration:

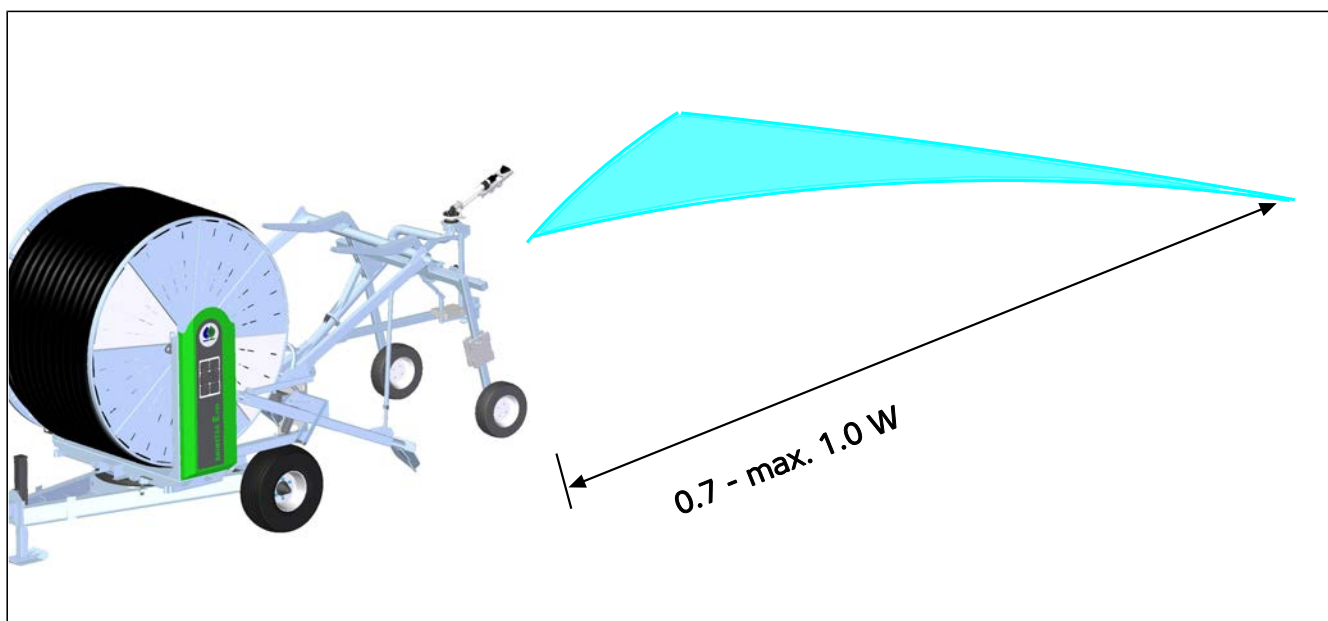


Fig. 32: Sprinkler throwing distance

“W” = Sprinkler throwing distance

Laying down the PE pipe

- a) Lower the cart and anchor it lightly. (See: > Lowering the cart [► 64])
- b) Now move forward with the machine another 2 – 3 m.
- c) Retract the supports and continue driving across the field.
- d) Extending and retracting the machine supports is made much easier with the “control valve block – support” option.
- e) If using a pipe guiding device, drive another 10 – 20 m after lowering the cart.
- f) Take the guide arms from the transport brackets and run out the guide arm with the roller.
- g) Place the PE pipe in the roller guide and close the side part of the pipe guide box.
- h) Take the supporting guide arm from the mounting and hook it up to the guide arm with the roller.
- i) Place the PE pipe in the machine's wheel track or in the desired position, then secure the supporting guide arm by inserting the lock bolt into the appropriate hole.

- j) Hook up the chain to the “keyhole bracket”.
- k) Withdraw the hydraulic support legs. The cart lift raises up the pipe guiding device and the PE pipe with the attached chain.
- l) The PE pipe can now be laid down in a straight line between crop rows, such as in the machine's wheel track.
- m) Carry out all other steps according to the procedure described above.

5.6.1 Functional description of the main components

5.6.1.1 Machine drive – full-flow turbine

The full-flow turbine TVR 60 is a specially designed model with large cross-sections and low pressure losses. This makes it possible to achieve high retraction speeds at very low rates of flow. The turbine is optimized for superior flow and is mounted directly to the reel shaft. It supplies the energy needed for retracting the PE pipe. The turbine speed is measured directly from the impeller shaft and transmitted to the BAUER variable-speed gearbox by means of a V-belt drive.

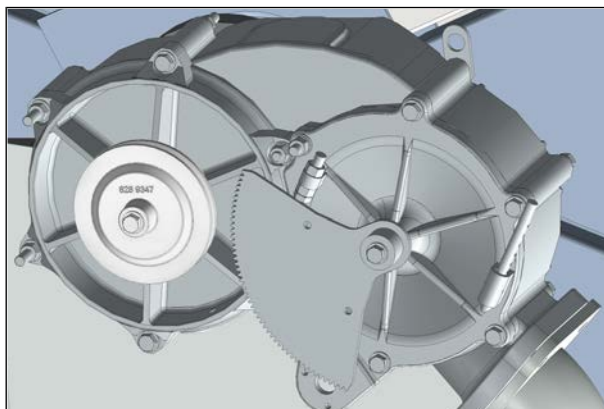


Fig. 33: Full-flow turbine

The BAUER variable-speed gearbox reduces the turbine speed in line with the set retraction speed. The gearbox incorporates four gears. The stopping of the reel drive at the end of an irrigation strip is ensured by disengaging of the tooth clutch.

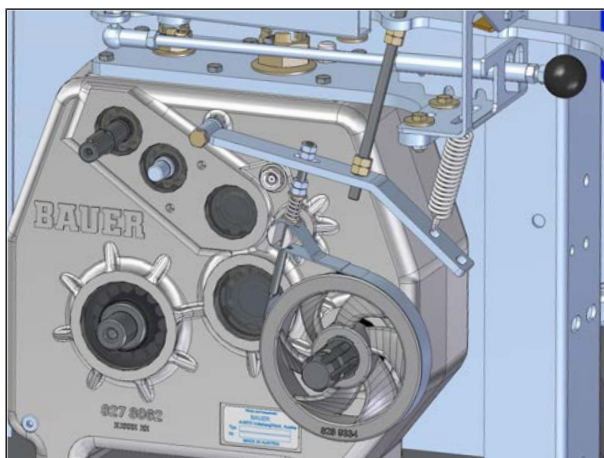
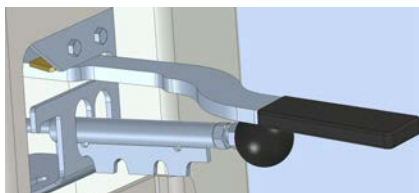


Fig. 34: Variable-speed gearbox

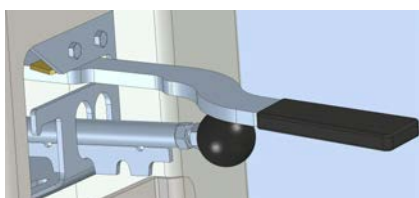
5.6.1.2 Selecting the gear shift positions

The 4-speed gearbox enables precise adaptation to the usage conditions. The following retraction speeds can be achieved:

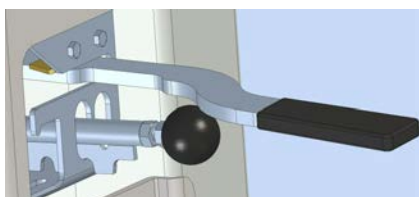
TVR60	
1st gear	8 – 20 m/h
2nd gear	16 – 32 m/h
3rd gear	28 – 50 m/h
4th gear	> 45 m/h



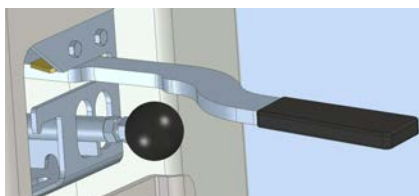
Shift lever position 1st gear



Shift lever position 2nd gear



Shift lever position 3rd gear



Shift lever position 4th gear

NOTE: Only shift at a low turbine speed, and do not apply force to the lever!

Gear locking

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

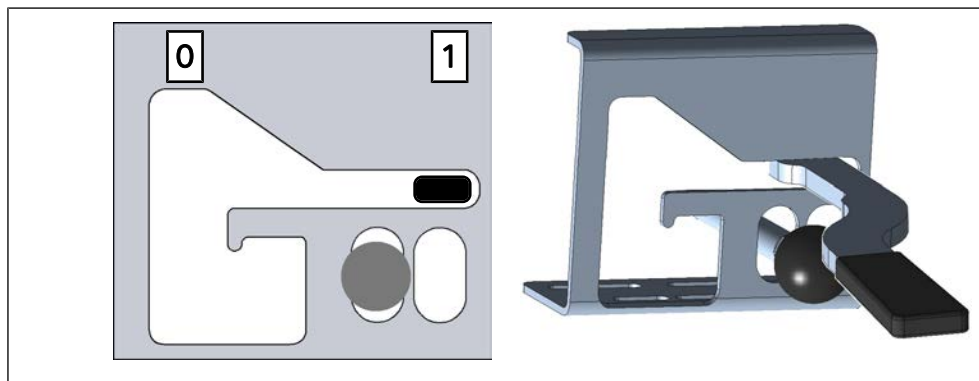
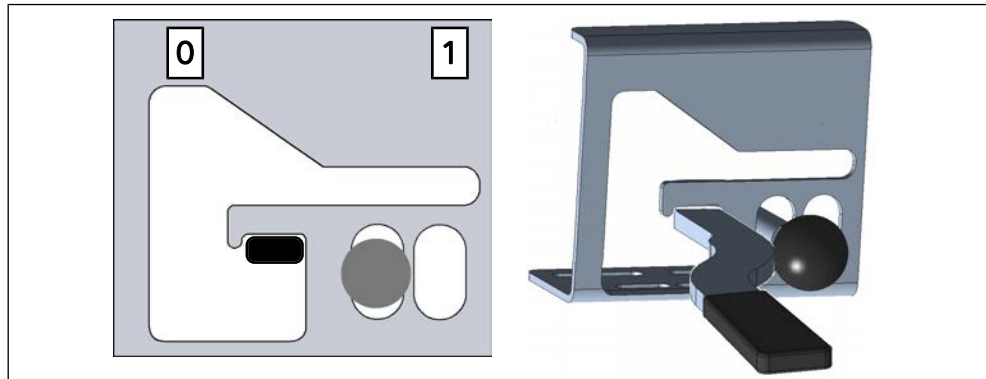


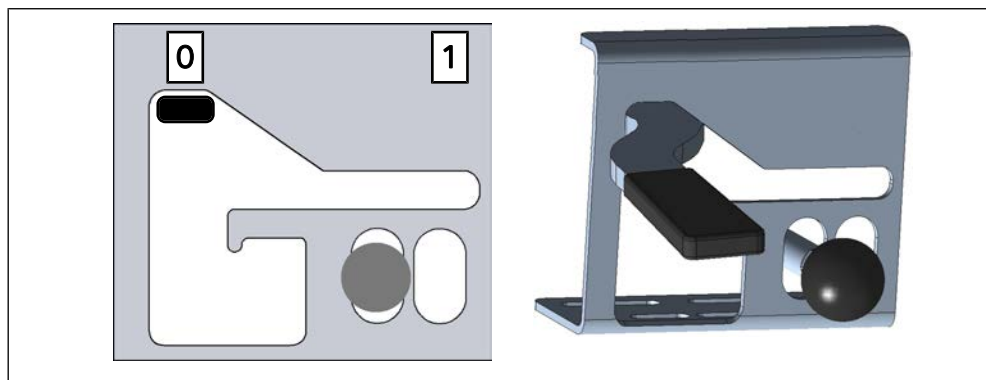
Fig. 35: PE pipe retraction

Selectable gears

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

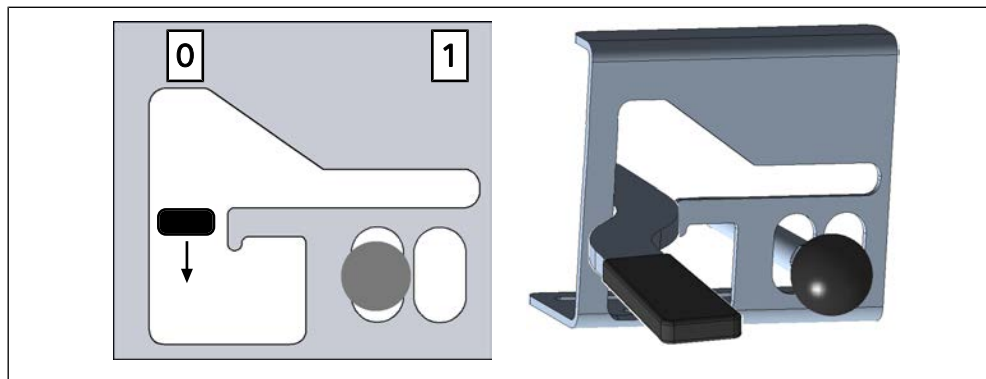


... or in the shut-off position...



... shifting to gears 1 – 4 is possible.

If the shut-off lever is in the shut-off position, pressing it down carefully will release the band brake and slacken the PE pipe.



5.6.2 Driving the reel with an articulated shaft

The PE pipe can be reeled in with an articulated shaft via power take-off.

- a) Reeling in is only permitted at a water pressure of > 4.5 bar; otherwise, there will be problems with the winding mechanism.
- b) The speed of the power take-off shaft may not exceed **540 rpm**.

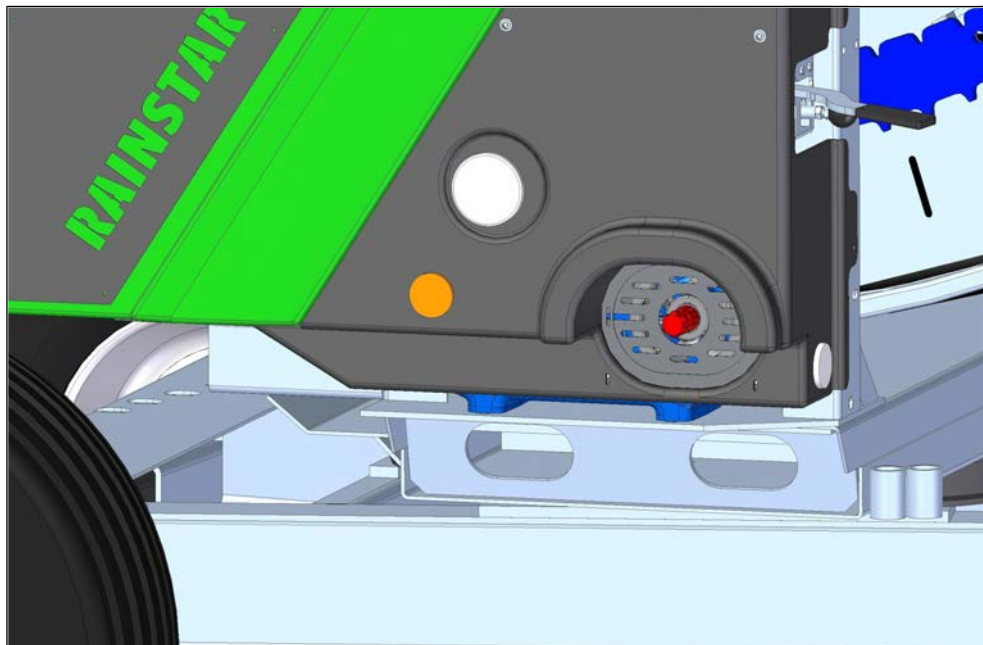


Fig. 36: Driving with an articulated shaft

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

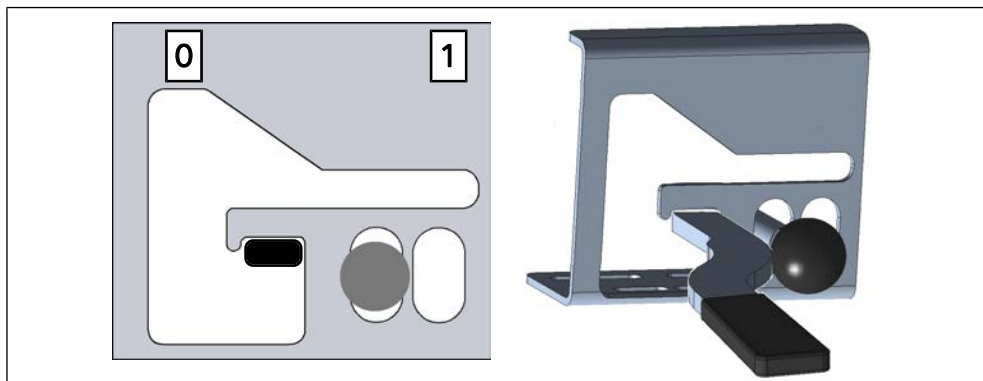


Fig. 37: “PE pipe pull-off” position

A spring presses the shift lever into the locking recess. The band brake is slightly loose in this position and exerts no braking force during the process of reeling in the pipe.

Reeling in with an articulated shaft is necessary when continued irrigation is no longer required due to natural rainfall.

NOTICE



Power take-off operation

Improper operation of power take-off shafts with articulated shaft can result in damage to the machine.

- a) Before switching on the power take-off shaft, ensure that the selected power take-off speed and direction of the tractor matches the permissible rotating speed and direction of the machine.
- b) Never switch on the power take-off shaft while the engine is off.
- c) Repair any damage before starting up the machine.
- d) Only use the articulated shafts specified by the manufacturer.
- e) Attach and remove the articulated shaft only while the power take-off shaft is switched off, the engine is off and the ignition key has been removed.
- f) Ensure correct installation and securing of the articulated shaft.
- g) The protective tube and protective cone of the articulated shaft as well as the power take-off shaft must be in place (including on the machine side) and must be in proper condition.
- h) For articulated shafts, ensure that the required tube coverings are in place in the transport and operating positions.
- i) Secure the articulated shaft guards from turning along by hanging the chains.
- j) Hang or rest the disconnected articulated shaft in the holder.
- k) After removal of the articulated shaft, affix the protective cover to the end of the power take-off shaft.
- l) Carry out any adjustment or maintenance work on the machine driven by the power take-off shaft or on the articulated shaft only while the machine is out of operation.

NOTICE



Power take-off operation

Improper operation of power take-off shafts can result in damage to the machine.

Additional information about power take-off operation with the RAINSTAR

- a) Start the retraction process at the lowest possible speed.
- b) The PTO speed may not exceed 540 rpm.
- c) Absolutely avoid any jerky starts.
- d) If the PE pipe is covered with mud, the pipe must be loosened or lifted off the ground before reeling in.
- e) A rope can be slung around the PE pipe and then slid along its length to lift it up or free it from the ground.
- f) If the soil is deep and heavy, the PE pipe must be reeled in more slowly to avoid exceeding the maximum loads on the PE pipe and the machine.
- g) If the power take-off shaft is disengaged during retraction, make sure that reel is standing still when the PTO is re-engaged (slacken the PE pipe!).
- h) **WARNING: Opposing movements can result in severe damage!**
- i) **WARNING: When driving the reel with an articulated shaft, the automatic shut-off function is inactive.** The power take-off shaft must therefore be stopped in time, and the last pipe section must be reeled in manually with the hand wheel. **Failure to do this could result in severe damage to the cart, shut-off mechanism and gearbox!**

DANGER



Defective articulated shaft guard

If the articulated shaft guard is defective or turns along with the shaft, this could lead to severe injuries or death.

- a) Check the condition and proper attachment of the protective cone and the articulated shaft guard.
- b) Affix the retaining chains of the articulated shaft guard in a way that prevents the articulated shaft from turning along.
- c) When attaching the retaining chains, ensure that the articulated shaft has sufficient room to move.
- d) Observe the information in the operating manual of the articulated shaft for length reduction or maintenance work.

CAUTION



Missing drive guard

Injuries and property damage may result.

- a) The drive guard may only be removed after:
 - ⇒ The water supply to the machine has been switched off.
 - ⇒ The PE pipe has been slackened to remove any tension.

6 Operation

6.1 Emergency shut-off

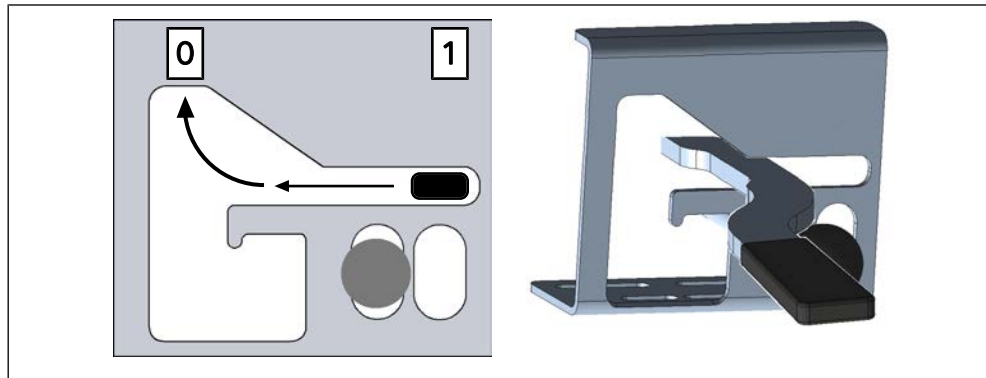


Fig. 38: Emergency shut-off

If something unforeseen happens, the pipe retraction can be interrupted with the emergency shut-off. Pull the shut-off lever with an open hand from the “PE pipe retraction” position to the shut-off position (Do not operate the shut-off lever with a closed hand, and do not release it immediately!). This will disengage the gearbox. A spring presses the lever up with some force (shut-off position), and the band brake prevents fast reversing of the PE pipe and the reel.

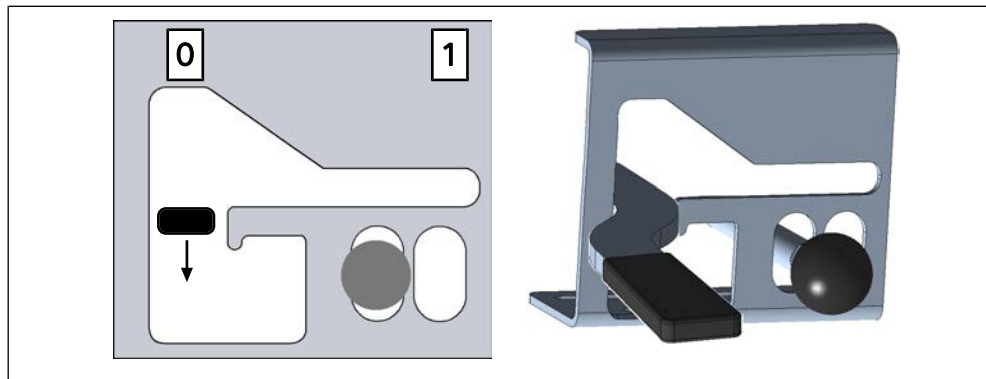


Fig. 39: Slackening the PE pipe

Slacken the PE pipe by carefully and gradually pressing down the gear shift lever.

6.2 Winding mechanism

The winding mechanism operates synchronously with the winding or unwinding of the PE pipe. It is driven by the reel by means of a chain and the spiral grooved spindle, which moves the guide carriage for the PE pipe.

The winding mechanism ensures that the pipe is guided properly during winding. When putting 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.

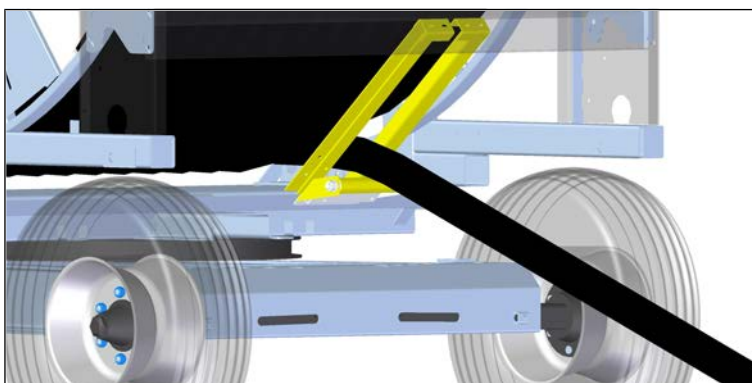


Fig. 40: Winding mechanism

6.3 Shut-off and safety equipment

Unattended irrigation is made possible by a final shut-off and a safety shut-off. The final shut-off is activated when the sprinkler cart pushes against the shut-off frame, which in turn operates the shut-off lever by means of a rod linkage. This stops the drive to prevent troubles caused by faulty winding of the PE pipe.

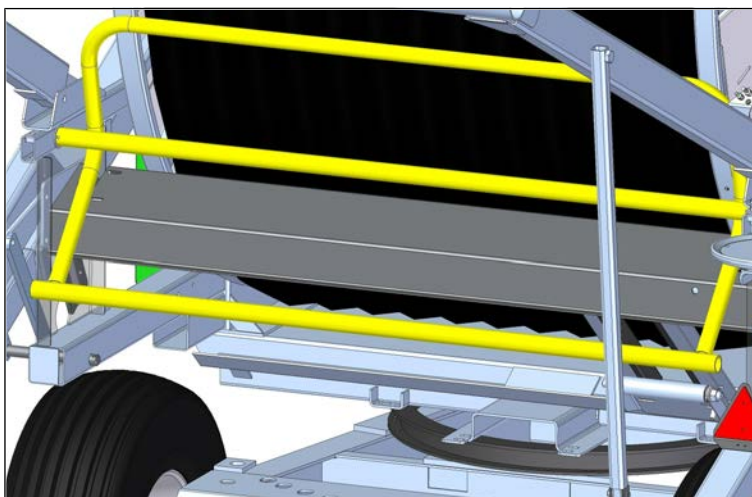


Fig. 41: Shut-off and safety equipment

6.4 Cart

The tall design of both the symmetric and asymmetric wheeled carts provides maximum crop protection (the asymmetric wheeled cart is available as an option). Thanks to the freely adjustable track width, the cart adapts to any crop row spacing. The width is symmetrically adjusted with the frame support.



Fig. 42: Cart

For easier PE pipe pull-off, the carts are equipped with a pull-off hook. This can be hooked on the drawbar of the tractor to pull off the PE pipe. To turn the pipe reel or to re-position the RAINSTAR at a new set-up position, the cart must be pulled back into its end position on the RAINSTAR.

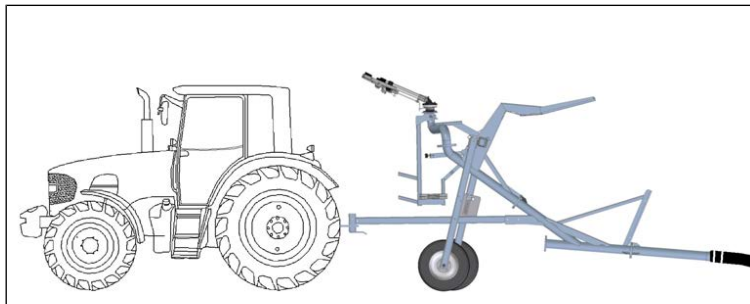
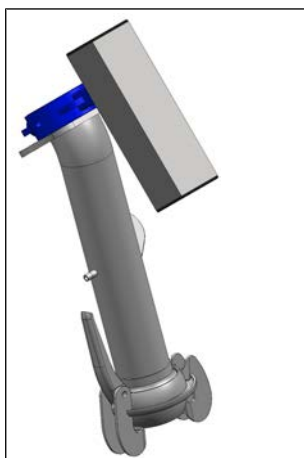


Fig. 43: Cart – transport hook

Depending on the type of sprinkler used, the nozzle height of the mounted sprinkler ranges between 1960 and 2120 mm. When pulling in the cart, it is lifted up partly on the side of the PE pipe. Owing to its pendulous mounting (self-balancing assembly), the sprinkler is not tilted and always remains in the optimal position with regard to throwing distance and uniform distribution. The pendulous mounting assembly also compensates for slopes parallel to the direction of retraction.

6.5 Shut-off valves

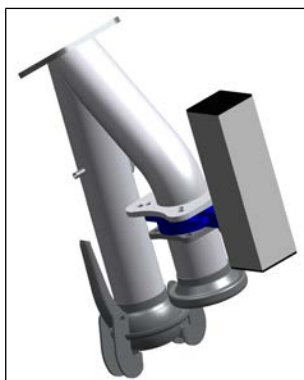
Shut-off valve – high-pressure (option)



The “high-pressure shut-off valve” interrupts the entire supply of water at the end of the irrigation process. When the valve closes, the pressure rises in the supply line.

This valve can therefore 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.

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 process, releasing a very large stream of water.

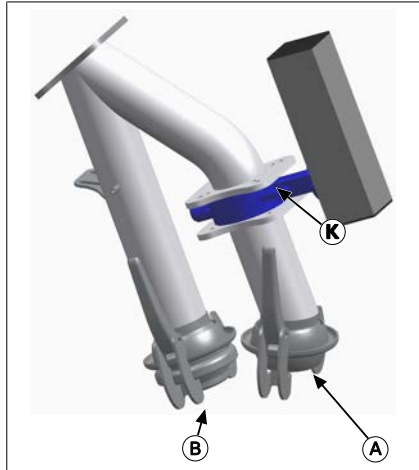
This reduces the pressure in the line considerably (by about half). The pressure drop causes a pressure switch to turn off the pump unit, stopping the water supply. This valve can therefore only be used in combination with a pressure switch for automatically shutting off the pump.

NOTE: The “low-pressure shut-off valve” can only be used if just a single irrigation machine is supplied by the pump unit. If several machines are supplied simultaneously by one pump unit, the low-pressure shut-off valve cannot be used!

Combined shut-off system

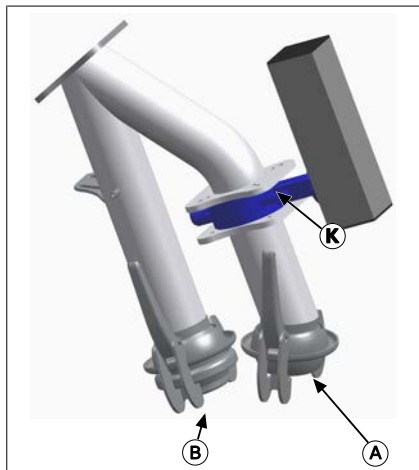
The combined shut-off system combines the high-pressure and low-pressure shut-off into a single system. The double supply line allows both a high-pressure shut-off and a low-pressure shut-off at the end of the irrigation strip.

High-pressure shut-off



- a) Supply through connection "A"
- b) Connection "B" is closed with an end cap.
- c) The ECOSTAR is programmed for high-pressure shut-off.
 - Parameter sheet no.1, progr. const. 6, setting value "0"
 - Parameter sheet no. 2, machine data 17, setting value "1"
- a) The shut-off valve (K) is opened during operation.
- b) During shut-off, the shut-off valve (K) closes slowly. The pressure rises in the supply line. The pump must be shut down automatically by means of the pressure switch (or flow monitor).

Low-pressure shut-off



- a) Supply through connection "B"
- b) Connection "A" remains open.
- c) The ECOSTAR is programmed for low-pressure shut-off.
 - Parameter sheet no.1, progr. const. 6, setting value "1"
 - Parameter sheet no. 2, machine data 17, setting value "0"
- a) The shut-off valve (K) is closed during operation.
- b) During shut-off, the shut-off valve (K) opens quickly. The pressure drops in the supply line. The pump must be shut down automatically by means of the pressure switch.

6.6 Winterization / draining the RAINSTAR

In regions where freezing temperatures are likely in winter outside the irrigation season, the machine must be drained in time.

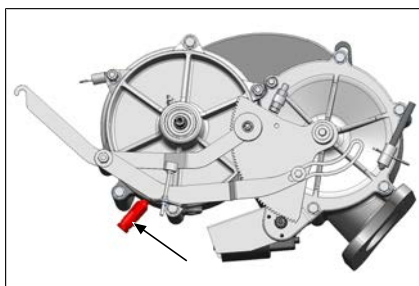
This requires a compressor with an air capacity of at least 8000 litres at 3 bar overpressure. Connect the compressor to the inlet of the machine to drain it for winter. For blowing out the water, the PE pipe should not be pulled off. It can stay on the reel.

In most cases, rolling up an empty PE pipe after draining will cause extreme ovality and faulty winding.

The small amount of water remaining in the PE pipe after draining (approx. 30 – 50% of the volume) will not do any harm.

The ball valve on the underside of the TVR 60 turbine must be opened. We recommend leaving the ball valve open until the machine is started up again in the following year.

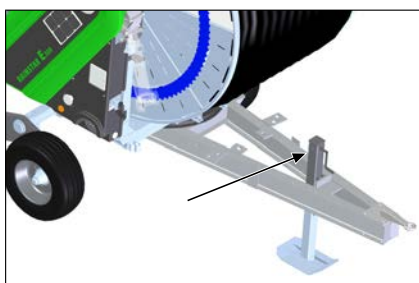
Clean the RAINSTAR and apply fresh grease at all lubrication points. The machine should preferably be stored in a roofed shelter where it is protected from direct exposure to the weather.



Drain valve on the turbine



Gear oil drain screw



Lubrication point on the support foot
(crank drive design)

6.6.1 Draining the PE pipe

Draining the PE pipe with the BAUER blow-out unit with compressor.

Technical requirements on the compressor:

- Operating pressure: 3 bar
- Air capacity: at least 8000 litres (at 3 bar)

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

- The blow-out must be performed before further transport of the machine to ensure that no water drains out during transport.

WARNING: If parts of the PE pipe have run empty, creating air bubbles in the PE pipe, the blow-out will not work!

- If you use an electric shut-off valve, press the menu button “START” to open the valve.
- When connecting the machine, attach a drain line for the water already in the PE pipe to avoid soaking the machine’s standing position.

WARNING: If you use the supply hose (7) for draining, make sure that the hose is not kinked and the water can run off freely.

Prerequisites

- With the PE pipe wound up on the reel and the cart just before the shut-off position, remove the end cap (with hole and baffle plate) from the “garage” (1).
- Use your hand or a piece of wood to press the rubber ball in the “garage” far enough in that it comes to rest in the straight horizontal pipe (2) behind the outlet to the sprinkler.

Procedure

- a) Close the shut-off valve (3) to the sprinkler.
- b) Connect the pipe bend 90° (4) to the “garage” connection (1).
- c) Connect the compressor hose (5) to the pipe bend (4) and the compressor (6).

The PE pipe can now be drained with the help of the compressor.

It does not take more than 5 to 8 minutes to drain the PE pipe. If the blow-out takes longer, this is because there are already air bubbles in the pipe that prevent further draining.

WARNING: After the blow-out and before disconnecting anything, open the valve (3) so that the pressure in the PE pipe can escape!

- a) Remove the connected fittings and hose.
- b) Install the end cap with the baffle plate.

The blow-out ball is in the inlet bend to the reel, and the water will carry it back to the “garage” (at the end of the horizontal pipe) when you resume irrigation.

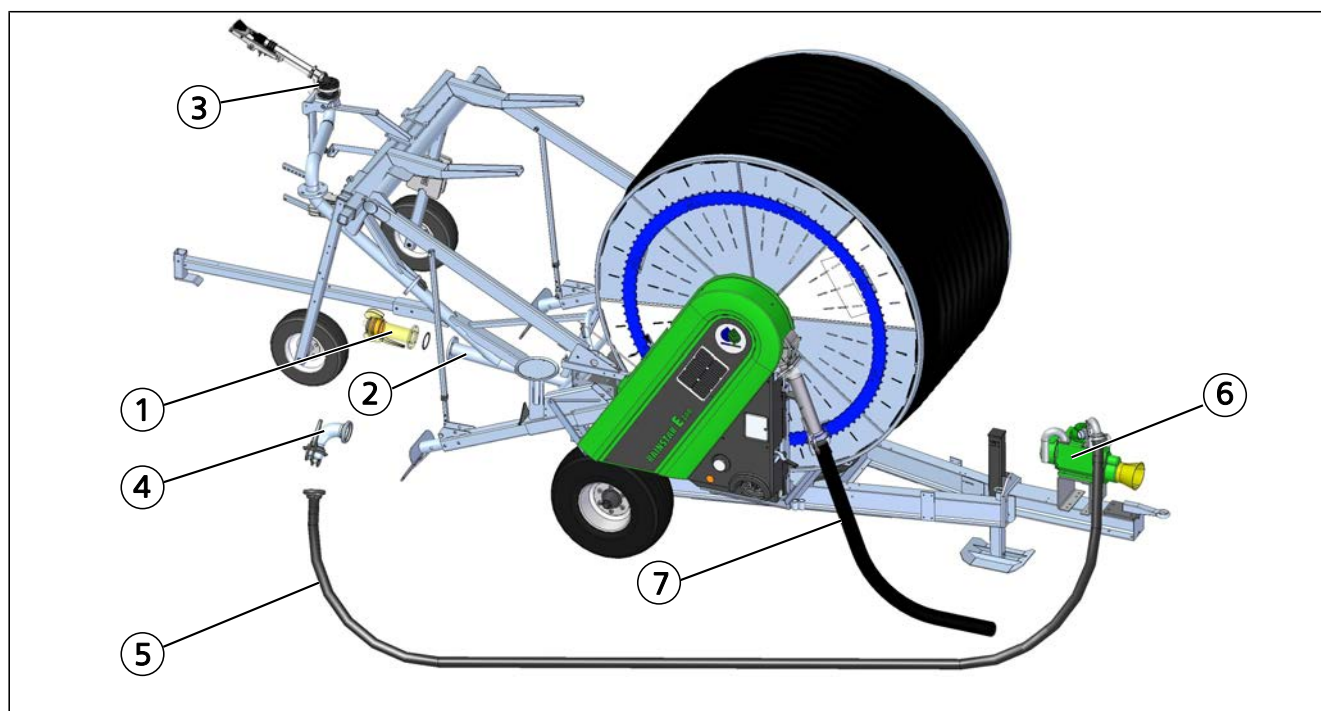


Fig. 44: Draining the PE pipe

6.6.1.1 Possible faults during PE pipe blow-out with compressor

Fault cause	Remedy
PE pipe has run empty	Put the irrigation machine under pressure again until a full jet without air bubbles is discharged at the sprinkler.
Kink in the drain hose from the turbine	Lay the hose straight without kinks or connect a rigid pipe.
Shut-off valves not opened	Open the shut-off valves.
Rubber ball not in the correct position	Push the rubber ball in far enough to place it past the outlet to the sprinkler.
Incorrect rubber ball diameter	Required diameter <ul style="list-style-type: none"> – PE pipe 100 mm >> 100 mm ball – PE pipe 110 mm >> 100 mm ball – PE pipe 120 mm >> 110 mm ball – PE pipe 125 mm >> 125 mm ball – PE pipe 140 mm >> 125 mm ball
Rubber ball damaged	The ball must be round and undamaged.
Insufficient compressor output	Check the performance data of the compressor. Check the safety valve.

WARNING: The end cap on the branch pipe of the horizontal pipe (“garage” for the rubber ball) must have a vent hole through which the branch pipe is vented when the ball is pressed to the cart by the water pressure from the turbine side. The rubber ball will then park itself in the “garage” during irrigation. If this vent hole is missing, the rubber ball will remain in the area of the horizontal pipe during irrigation and may cause considerable pressure loss due to the reduced cross-section.

6.6.1.2 Service and maintenance

Service and maintenance are critical factors for ensuring the operational reliability and long service life of a machine.

The RAINSTAR must be thoroughly inspected, cleaned and lubricated at the end of each irrigation season.

Component	Interval	Lubricant
Spiral groove spindle of the winding mechanism	250 h	Multi-purpose grease (Gadus S2)
Drive chain of the winding mechanism	250 h or as required	Multi-purpose grease (Gadus S2)
Driver (spindle nut) of the winding mechanism	250 h Replacement recommendation: 2500 h	Multi-purpose grease (Gadus S2)
Drive chain	250 h or as required	Multi-purpose grease (Gadus S2)

Turbine (see separate information)	250 h	Multi-purpose grease (Gadus S2)
Variable-speed gearbox	First oil change after 500 h, then every 500 – 800 h or 1x per year	Gear lubrication oil CLP – DIN 51517 – part 3, ISO VG 220 – 11.3 L
Ball race	500 h	Multi-purpose grease (Gadus S2)
Drawbar support foot	As required	Multi-purpose grease (Gadus S2)
Machine supports (sliding parts)	As required	Multi-purpose grease (Gadus S2)

Bolt or screw joint	Interval	Tightening torque
Wheel nuts	Before initial start-up After 50 operating hours	300 Nm
Turntable side frame		210 Nm
Ball race on turntable and undercarriage		E100 – E400: 85 Nm E500: 200 Nm
Drawbar on undercarriage		240 Nm
Eye hitch		200 Nm

6.6.1.3 Lubricating the reel seal

Push the lever (3) all the way to the inside during lubrication.

Lubricate at both lubrication nipples (S).

Then pull out the lever (3) again for irrigation.

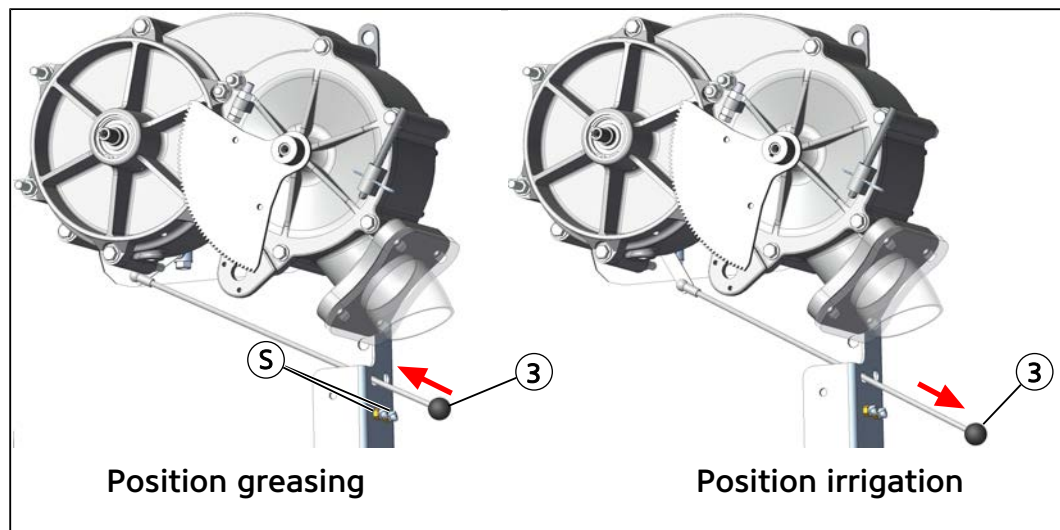


Fig. 45: Lubricating the reel seal

6.6.1.4 Adjusting the turbine brake wedge

- a) Insert 5 mm spacer (A).
- b) ECOSTAR: Press the "STOP" button (segment valve open).
- c) Loosen nuts (3) and (4).
- d) Press the brake wedge (1) against the belt pulley (2).
- e) Ensure spacing "0".
- f) Lock nuts (3) and (4).
- g) Remove the spacer.

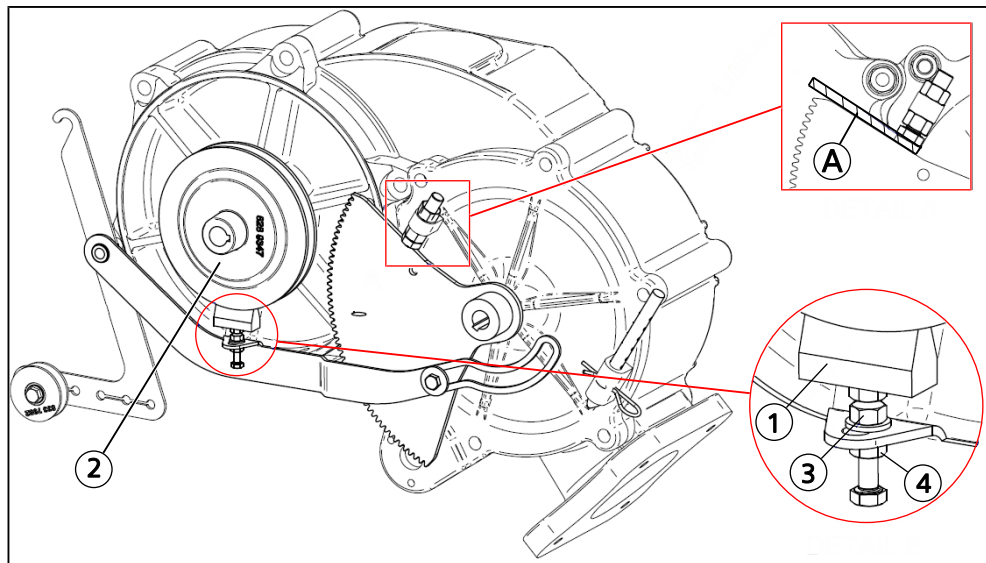


Fig. 46: Adjusting the turbine brake wedge

6.7 Troubleshooting

Fault	Cause	Remedy
PE pipe cannot be pulled off	Gear shift lever in wrong position	Move to 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 object	Remove the foreign object
	Pressure drop in the supply line	Check pump station and hydrant connection
	Overwinding of the PE pipe activates the safety shut-off	Check the adjustment of the winding mechanism Winding chain broken – repair it
Final shut-off is activated but the shut-off valve does not close	Incorrect shut-off settings	Re-adjust the settings according to the manual
Reel turns ahead during PE pipe pull-off or PE pipe windings become loose	Tractor stopped too abruptly	Slow down gradually
	Low oil in the gearbox	Add oil; correct the cause of the oil loss
Selected retraction speed not reached	Incorrect drive gearing	Select the proper drive gearing
	Blocked sprinkler nozzle	Remove the foreign object
	Compare the connection pressure and flow rate with the values in the performance table	

6.8 RAINSTAR adjustment instructions

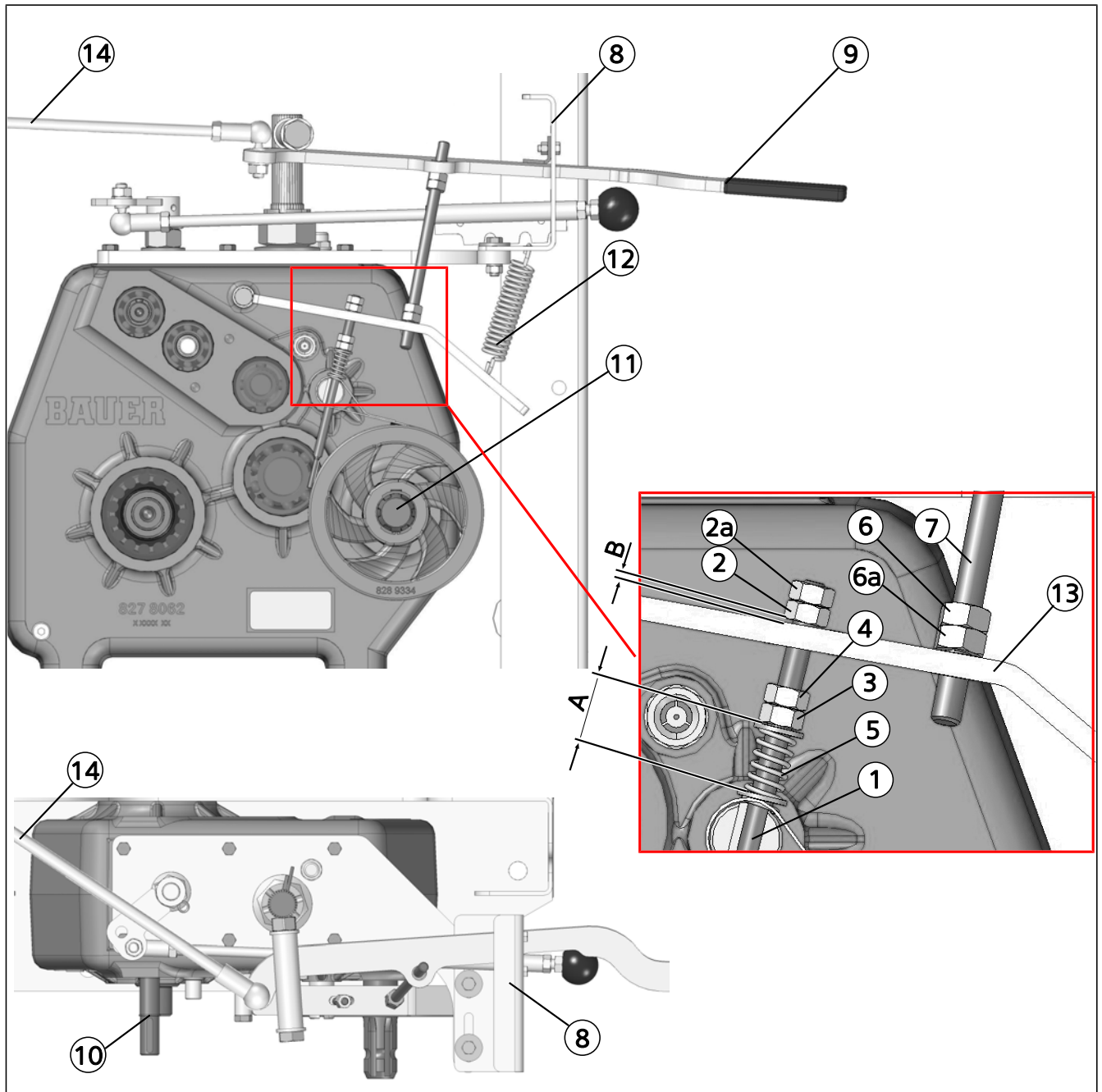


Fig. 47: Adjustments on the RAINSTAR

6.8.1 Adjusting the shifting gate

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

Procedure

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

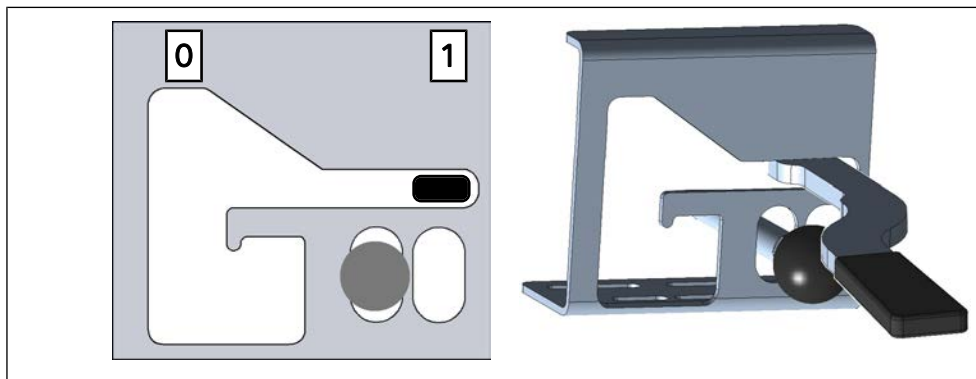


Fig. 48: PE pipe retraction

- b) Turn the input shaft (10) – the PTO shaft (11) turns as well.
c) Slowly move the shut-off lever (9) towards the “0” position.

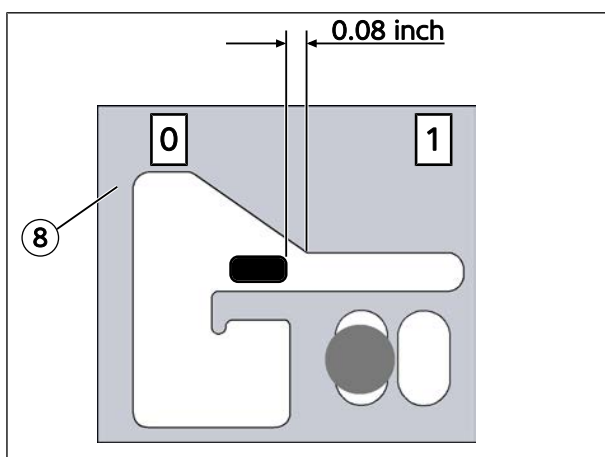


Fig. 49: Adjusting the shifting gate

⇒ The shut-off point is reached when the PTO shaft no longer turns.

- d) Adjust the shifting gate (8) in this position according to the drawing (2 mm / 0.08 inch).

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

6.8.2 Adjusting the band brake on the gearbox

Procedure

- Adjust the band brake while the gearbox is engaged by turning the nuts (2, 2a) to (1)
B = 1 mm / 0.04 inch.
- Lock nut (2) with nut (2a).
- Tighten nut (3) until the spring (5) is pre-tensioned at "A" (22 mm / 0.86 inch).
- Lock with nut (4).

See: > RAINSTAR adjustment instructions [► 89]

6.8.3 Adjusting the threaded rod

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

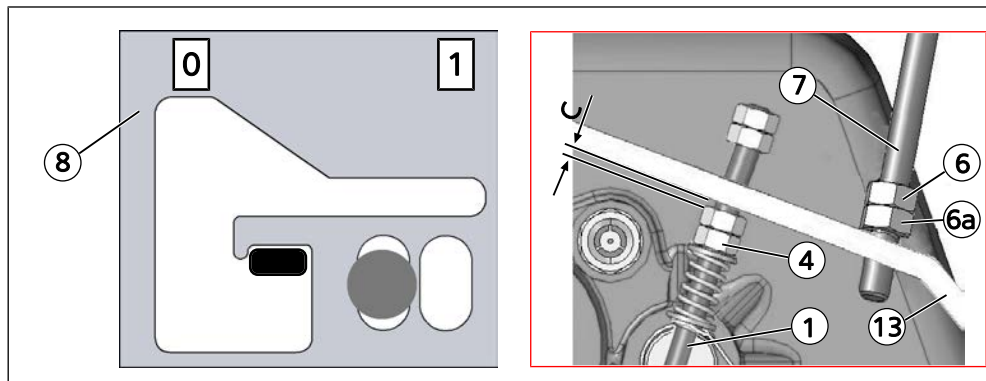


Fig. 50: Adjusting the threaded rod

Procedure

- Loosen nuts (6, 6a).
- Turn nuts (6, 6a) on the threaded rod (7) until the spacing between the brake lever (13) and nut (4) is equal to "C" (2 mm / 0.08 inch).
- Lock nuts (6, 6a).

6.8.4 Inspecting the band brake for releasing the brake band

Move the shut-off lever (9) to the "release" position.

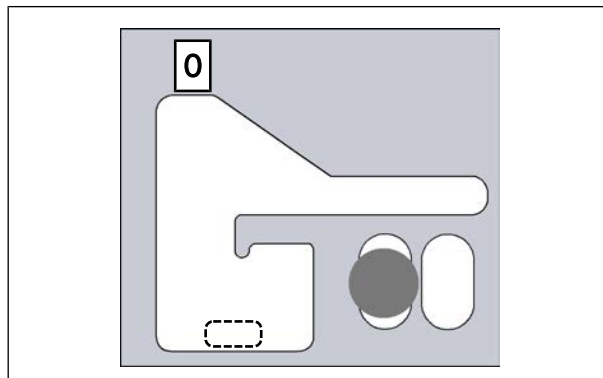


Fig. 51: Releasing the brake band

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

NOTICE



Sticking brake band

Possible damage to the gearbox parts.

- a) The brake band may stick after longer periods of disuse or after the winter period.
- b) A stuck brake band must be loosened before the machine is started again.
- c) Do this by turning the PTO shaft a small distance right and left using the hand wheel.
- d) Failure to do this may result in damage to the gearbox!

6.8.5 Adjusting the gearbox shut-off

In the operating position, the spacing between the shut-off frame (13) and reel (17) is “X” (25 mm / 1 inch).

Set the shut-off frame (13) in the shut-off position to have spacing “X” to the reel (17) (see table).

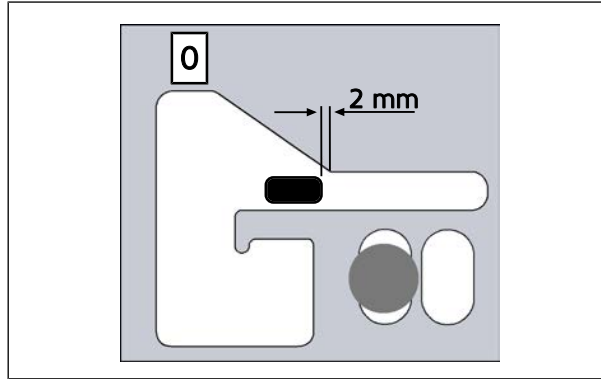


Fig. 52: Adjusting the gearbox shut-off

Procedure

- Move the shut-off lever (9) to the shut-off position.
- Loosen nuts (15, 15a) of the control lever (14).
- Move nut (15) of the control lever (14) to rest against the lever arm (13) of the shut-off frame.
- Ensure dimension “X”!
- Lock nut (15) with nut (15a).

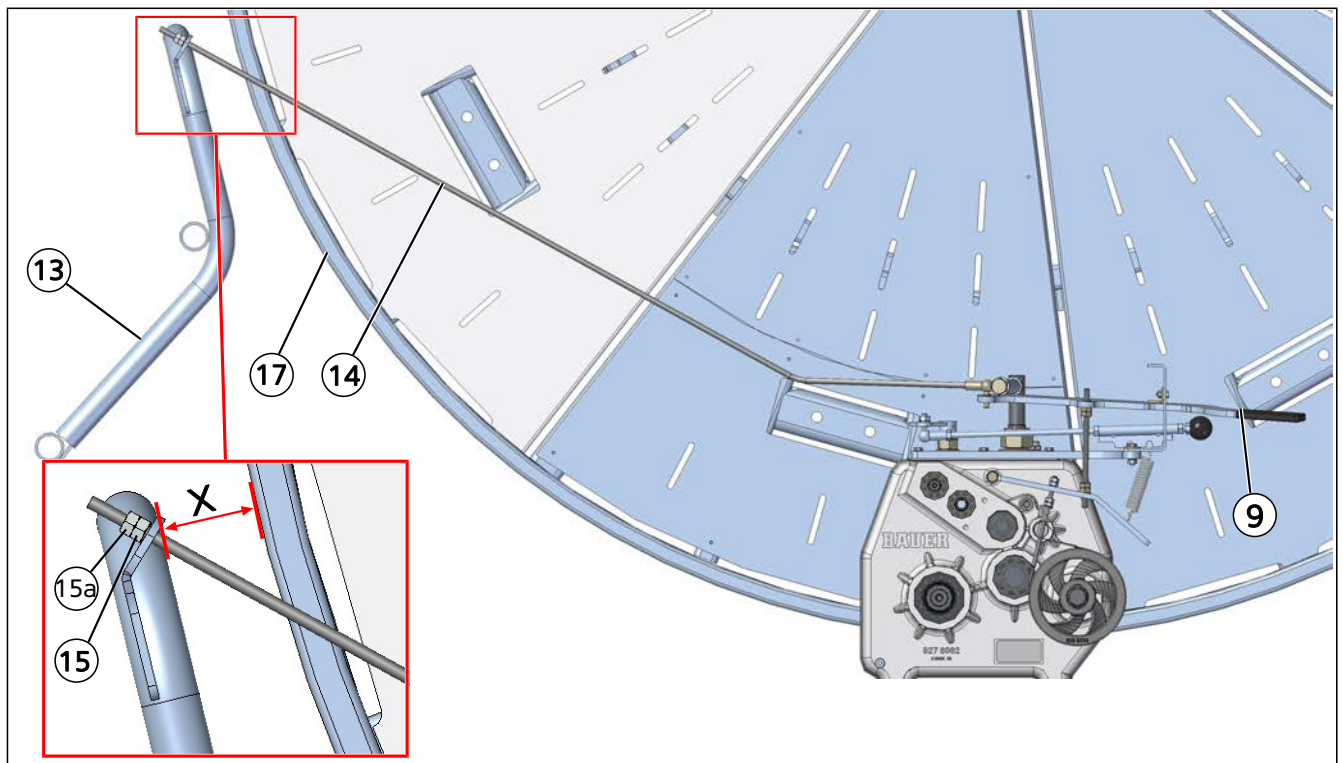


Fig. 53: Adjusting the gearbox shut-off

Pipe diameter	Spacing "X"
90	70 mm / 2.8 inch
100	70 mm / 2.8 inch
110	70 mm / 2.8 inch
120	70 mm / 2.8 inch
125	70 mm / 2.8 inch

6.8.6 Testing the shut-off

Move the shut-off frame into the operating position ($X = 25 \text{ mm} / 1 \text{ inch}$).

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

Procedure

a) Pull the shut-off frame (13) into the shut-off position ("X" mm from the reel).

⇒ The shut-off lever must jump to the shut-off position!

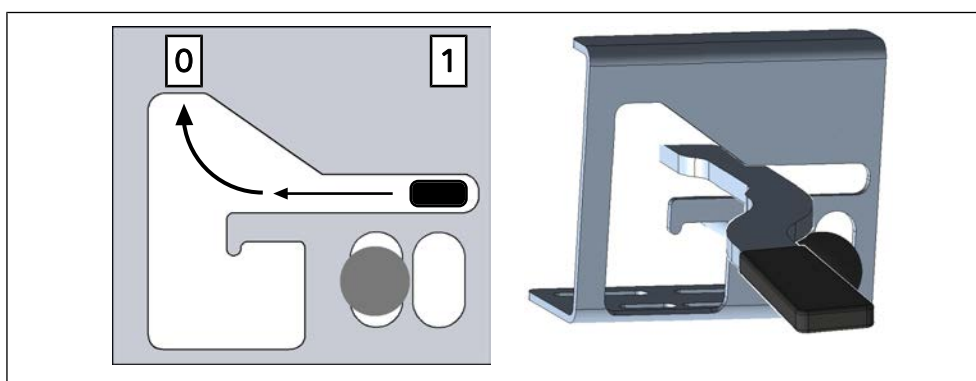


Fig. 54: Testing the shut-off

6.8.7 Adjusting the winding mechanism

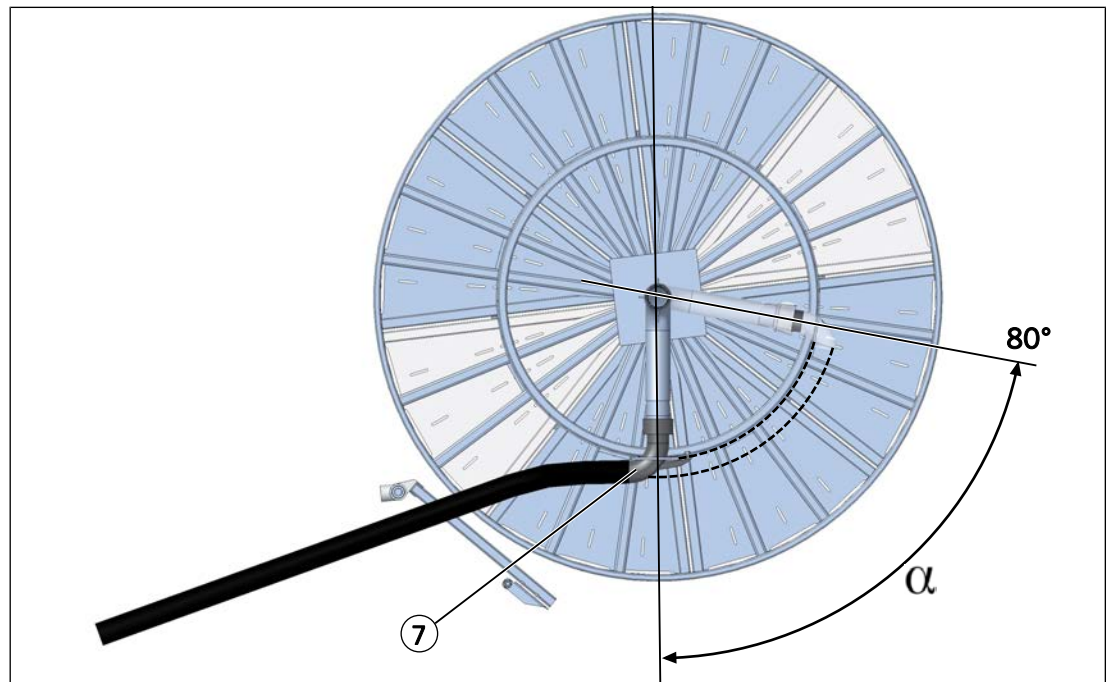


Fig. 55: Adjusting the winding mechanism

Procedure

- a) Pull off the PE pipe.
- b) Move the connecting bend (7) to a vertical position pointing down.
 ⇒ E600: PE pipe \varnothing 125, $\alpha = 45^\circ$
- c) Loosen the winding chain (1) between the reel and spiral groove spindle (2).
- d) Fasten the guide bars (4, 5) symmetrically at a distance of "X 2" from the guide element (3).
- e) Install the roller bracket (6) with the roller.
- f) Move the guide part (3) of the winding carriage to the right outermost reversing point of the groove by turning the spiral groove spindle (2).
- g) Loosen both pillow blocks (M12 screws).
- h) Check the connection between the pillow blocks and the spiral groove spindle to ensure that the locking screws (grub screws) are tightened.
- i) The pillow blocks must rest against the shaft shoulder of the spiral groove spindle (2).
- j) Shift the bearing and spiral groove spindle (2) until reaching the value "X 1".
- k) Fix the right pillow block in place.

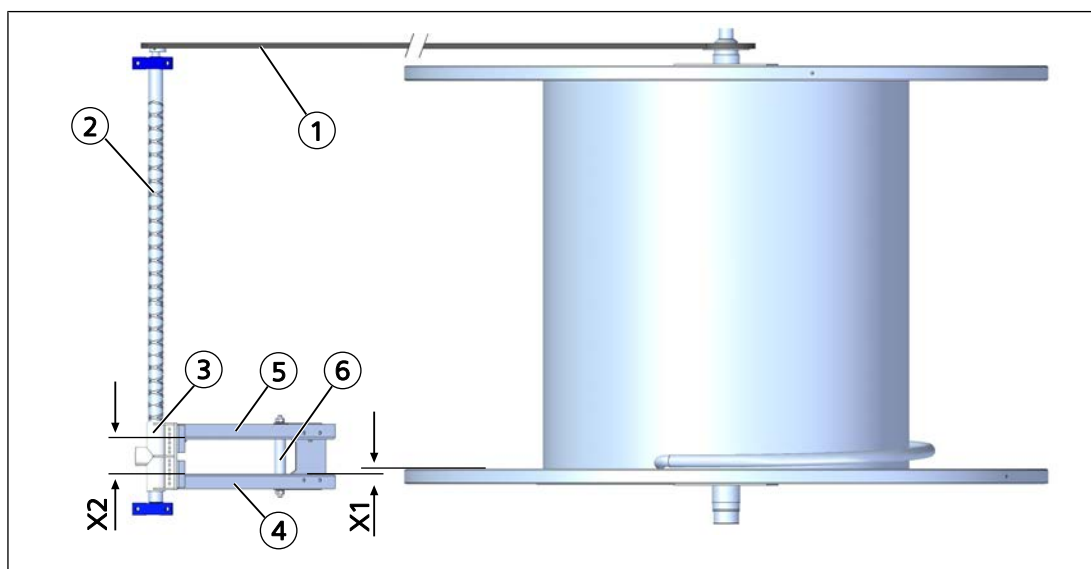


Fig. 56: Adjusting the winding mechanism

PE pipe diameter	Variant	Dimension "X1"	Dimension "X2"
90	E100	10 mm / 0.39 inch	110 mm / 4.33 inch
100	E100, E200; E300; E400	17 mm / 0.66 inch	126 mm / 4.96 inch
110	E100	14 mm / 0.55 inch	140 mm / 5.5 inch
110	E200; E300	20 mm / 0.78 inch	140 mm / 5.5 inch
110	E400	24 mm / 0.94 inch	146 mm / 5.74 inch
110	E500	28 mm / 1.1 inch	146 mm / 5.74 inch
110	E600	22 mm / 0.87 inch	146 mm / 5.74 inch
120	E200, E400, E500, E600	28 mm / 1.1 inch	150 mm / 5.9 inch
125	E300, E400	24 mm / 0.94 inch	160 mm / 6.3 inch
125	E500, E600	30 mm / 1.18 inch	165 mm / 6.5 inch
140	E400, E500	20 mm / 0.78 inch	170 mm / 6.7 inch
140	E600	26 mm / 0.78 inch	170 mm / 6.7 inch

WARNING: When using a PE pipe repair coupling, the guide width "X 2" must be symmetrically increased by 15 – 20 mm / 0.59 – 0.79 inch!

- Set the right guide bar to X 3 by turning the spiral groove spindle towards the inner side wall of the reel. (See table)

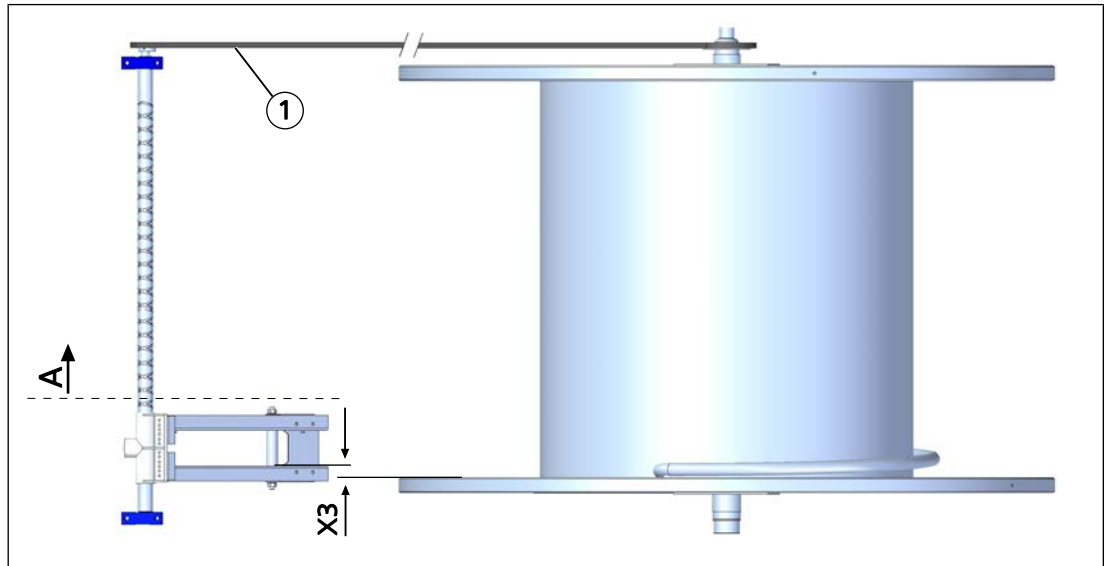


Fig. 57: Adjusting the winding mechanism

PE pipe diameter	Variant	X3	α
90	E100	0	0°
100	E100, E200; E300; E400	0	0°
110	E100 – E600	0	0°
120	E200, E400, E500, E600	0	0°
125	E300, E400, E500	0	0°
125	E600	0	45°
140	E400, E500, E600	0	0°

NOTE: The spindle must be turned in the wind-up direction (anti-clockwise, see drawing).

At this point, the winding carriage moves from the reversing point to the left (direction A).

- Mount the winding chain (1). Leave the reel unchanged with the inlet bend pointing down.
- Fasten the left pillow block of the spiral groove spindle.
- At the same time, tension the winding chain (1).

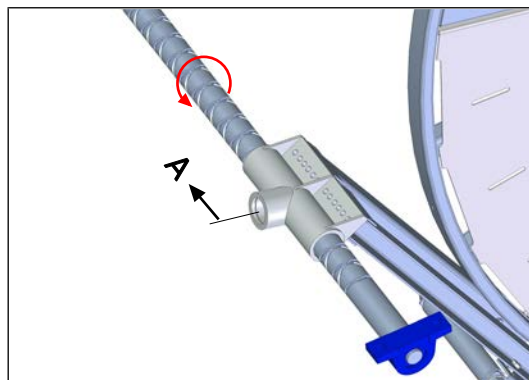


Fig. 58: Adjusting the winding mechanism

6.8.8 Description of the hydraulic system

The hydraulic hoses are now connected to the non-return valve blocks.

If a subsequent inspection of the hydraulic system reveals opposite cylinder movements, the hydraulic hoses must be swapped!

This is also necessary when the moving directions do not correspond to the predefined switching diagrams when the control valve blocks (option) are installed.

Control valve blocks

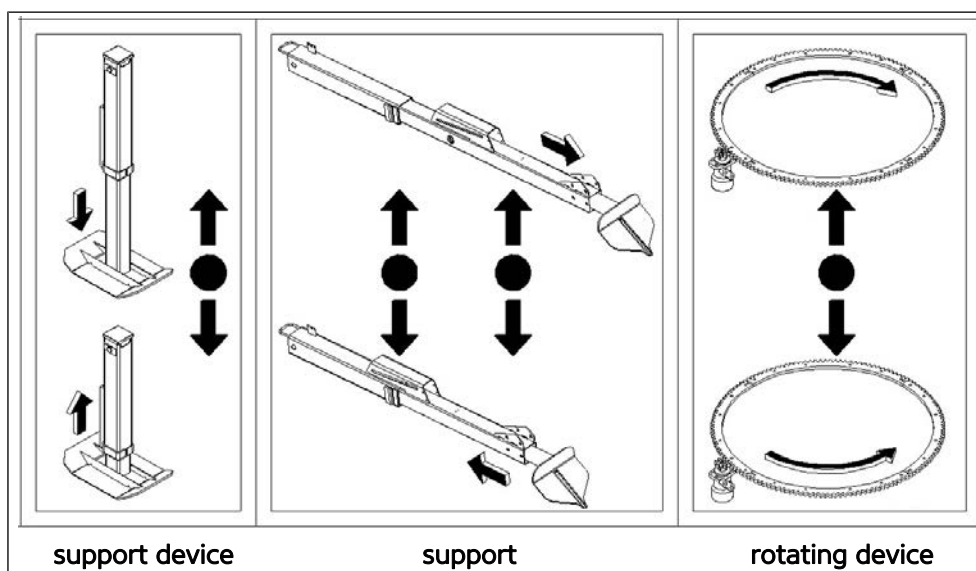


Fig. 59: Control valve blocks

In the standard configuration, the RAINSTAR is fitted with a hydraulic support without a control valve block.

Hydraulics diagram “Standard”:

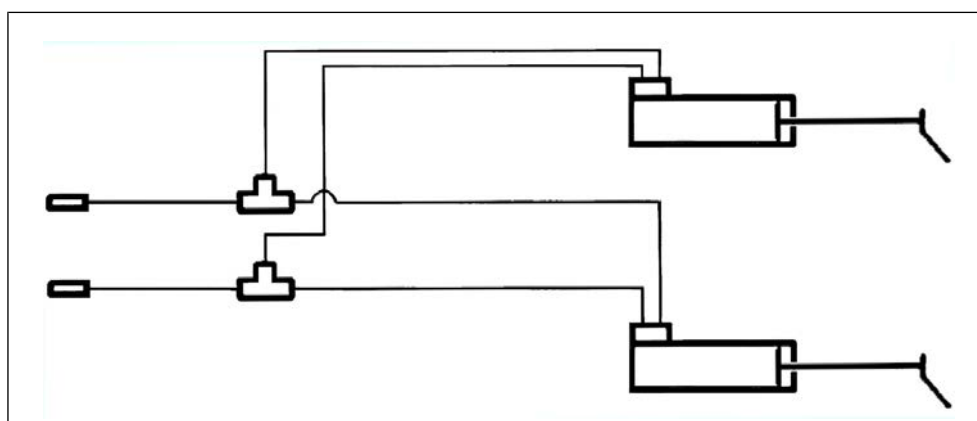


Fig. 60: Hydraulics diagram “Standard”

Hydraulics diagram “Control valve block – support” (OPTION)

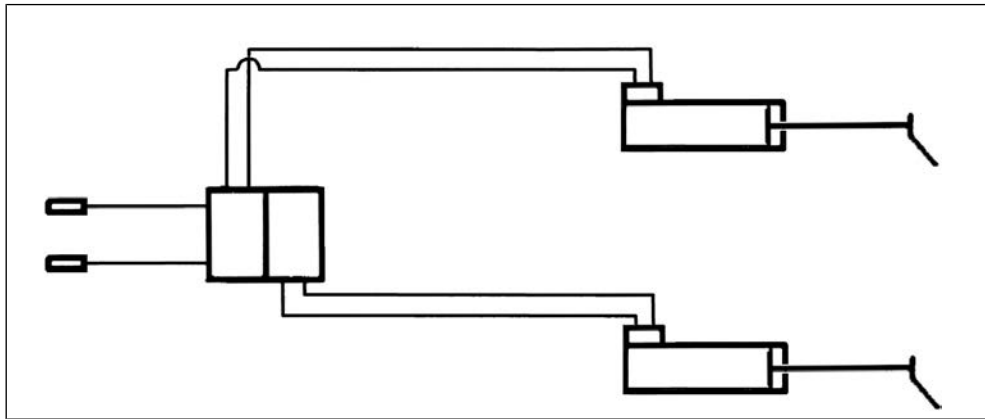


Fig. 61: Hydraulics diagram “Control valve block – support” (option)

Hydraulics diagram “Control valve block – support + drawbar support foot” (OPTION)

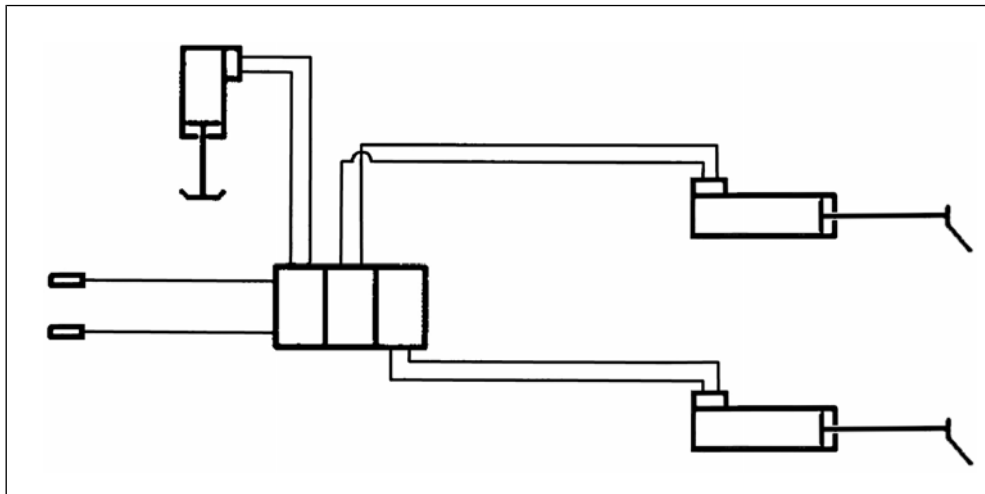


Fig. 62: Hydraulics diagram “Control valve block – support + drawbar support foot” (option)

Hydraulics diagram “Control valve block – support + swivel mechanism” (OPTION)

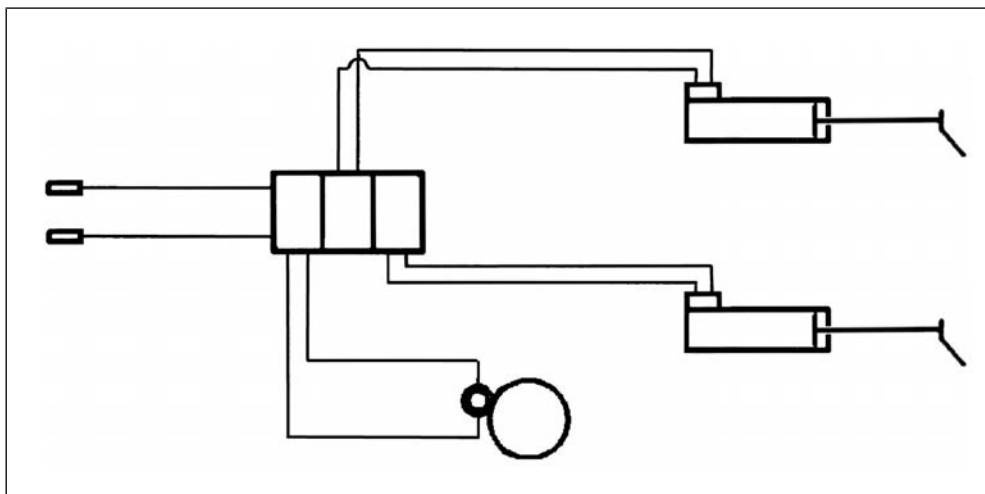


Fig. 63: Hydraulics diagram “Control valve block – support + swivel mechanism” (option)

Hydraulics diagram “Control valve block – support + drawbar support foot + swivel mechanism” (OPTION)

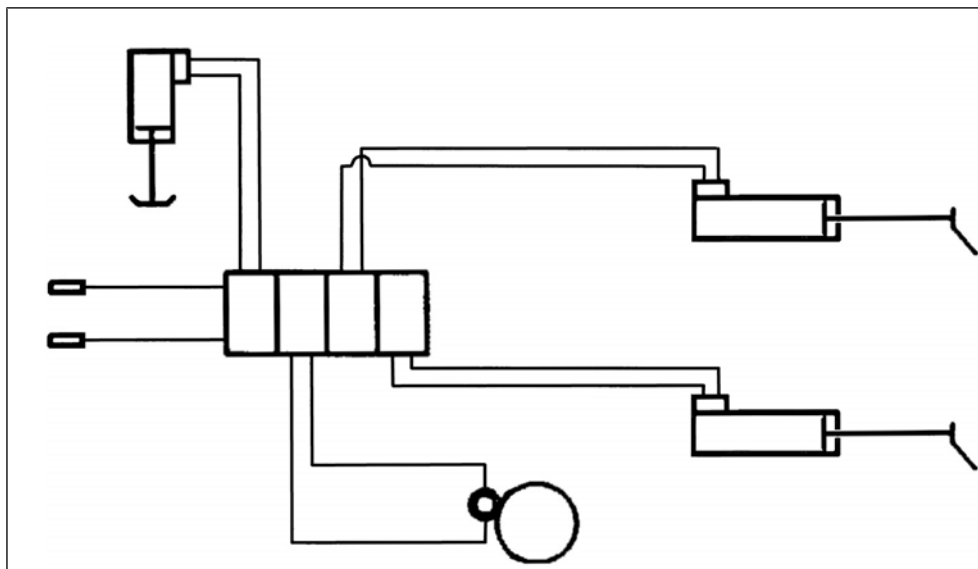


Fig. 64: Hydraulics diagram “Control valve block – support + drawbar support foot + swivel mechanism” (option)

DANGER



Third parties in the area of the tripod and the supports

Death or severe injuries can result.

- a) Before operating the hydraulics, check that there are no persons in the area of movement of the tripod and supports, as this area cannot be seen from the control panel!

DANGER

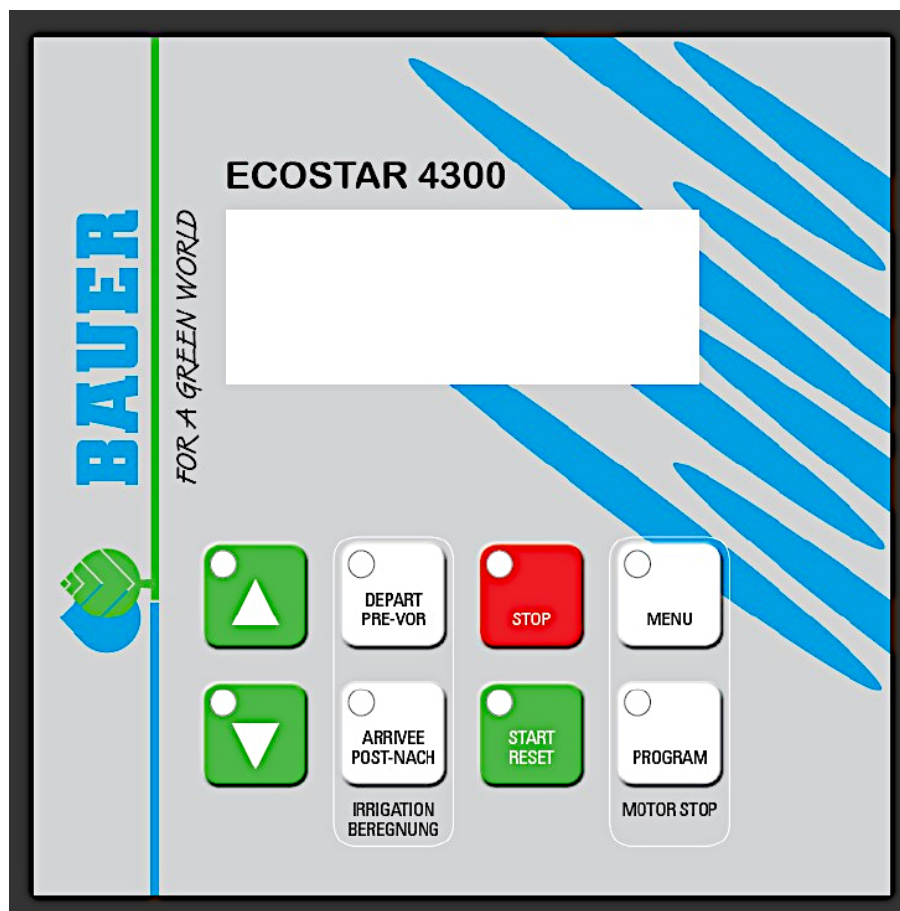


Pressurized liquids (hydraulic system)

When working on the hydraulic system, spraying liquids can cause injuries.

- a) When connecting hydraulic cylinders and motors as well as hydraulic control systems, make certain that the hydraulic lines are connected as specified.
- b) When connecting the hydraulic hoses to the tractor hydraulics, make certain that the hydraulics are unpressurised on the tractor and equipment sides.
- c) Regularly inspect hydraulic lines.
- d) Replace hydraulic lines if damaged or if signs of ageing are detected.
- e) Only use hydraulic lines that meet the technical requirements of the manufacturer.

7 ECOSTAR 4300



7.1 General information

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

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

Continuous comparison of the set value versus the actual retraction speed enables precise irrigation rates.

The ECOSTAR 4300 consists of the electronics box, a cable harness with the connected sensors for the PE pipe retraction speed and shut-off as well as connections for a battery, a solar panel and the turbine regulation motor.

Connections are also provided for installing a shut-off valve and a pressure switch (both optional).

The electronic system of the ECOSTAR 4300 is very robust and has been tested under diverse climate conditions. If problems still occur, it is advisable to replace the entire electronics box. If a sensor is defective, it is also possible to exchange only the sensor.

7.2 Display windows and menu overview

GESCHWINDIGKEIT	30.0m/h
NIEDERSCHLAG	22 mm
ZEIT	14:10 STOP 7:43
STATUS	Betrieb

Standard display

ZONE	1	30.0m/h	
NIEDERSCHLAG		22 mm	
ZEIT	14:10	STOP	7:43
STATUS	Betrieb		

Standard display, active zone.

DISTANZ	123M	
BATTERIE	12.8V	
LADEN ON	0.231A	
VOR-	0:45 NACH-	0:45

Press the MENU button 1x to show menu 2.

DRUCKSENSOR	■		
STOPSENSOR	■		
GESCHWINDIGKEITSENSOR		■	■
MOT1	0.0A	MOT2	1.8A

Press the MENU button 2x to show menu 3.

AKT. GESCHWINDIGKEIT	22M/H
START	0:00
BETRIEBSSTUNDEN	123h

Press the MENU button 3x to show menu 4.

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

Press the MENU button 4x to show menu 5.

If the symbol ■ appears on the display, this means that the respective function is turned on.

STANDARD MENU:

GESCHWINDIGKEIT	30.0m/h
NIEDERSCHLAG	22 mm
ZEIT	14:10 STOP 7:43
STATUS	Betrieb

SPEED

The speed can be changed at any time during irrigation using the “+” and “-” buttons.

ZONE

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

DOSE

The irrigation dose is calculated with the configured constants, and the current irrigation amount is displayed in mm. As the SPEED increases, the DOSE decreases accordingly. (Constants 11 and 12)

TIME

Setting the time: First set the speed to 11.1 m/h, then press the PROG button 3x to reach the display <CONST 1 TIME>. The time can be set with the “+” and “-” buttons. If the battery has been removed, the time display remains at 00:00 until the time is set again.

STOP

Time when the irrigation will be ended, including pre- and post-irrigation.

STATUS

Irrigation status:

<Stop sensor>

<Running>

<PRE Irrigate>

<POST Irrigate>

<LOW Pressure>

(See: > Status displays [► 107])

If the display shows LOW BATTERY instead of SPEED, the battery voltage is lower than 11.8 V. The battery needs to be charged.

MENU 2

| | |
|----------------------|--------|
| DISTANZ | 123M |
| BATTERIE | 12.8V |
| LADEN ON | 0.231A |
| VOR- 0:45 NACH- 0:45 | |

DISTANCE

Remaining pipe length. - Press the PROG button 3x, then change the distance with the “+” and “-” buttons.

BATTERY

Shows the battery voltage.

CHARGE ON

Indicates if the battery is being charged by the solar panel.

The battery is charged when the voltage is below 14.0 V.

PRE-

Current pre-irrigation time.

POST-

Current post-irrigation time.

After pressing the buttons PRE- and POST-, the pre- and post-irrigation times can be changed with the “+” and “-” buttons.

MENU 3

| | |
|------------------------|-----|
| DRUCKSENSOR | ■ |
| STOPPSENSOR | ■ |
| GESCHWINDIGKEITSSENSOR | ■ ■ |
| MOT1 0.0A MOT2 1.8A | |

PRESS SENSOR

Pressure display. The symbol appears if the water pressure is sufficiently high.

The machine only functions if the pressure is sufficiently high!

STOP SENSOR

Stop sensor indicator. The symbol appears if the stop sensor is activated.

The machine only functions if the stop sensor is activated.

The stop sensor has three functions:

- Resets the distance counter.
- Post-irrigation.
- Inhibits the pulses to the regulating motor.

SPEED SENSOR

Test speed sensor. The symbol appears when the magnets activate the speed sensor.

MOT1, MOT2

The current power consumption of the motor. The motor is stopped when the power consumption exceeds 4.5 A. If the motor has not yet reached its end position when this occurs, the shut-off valve is blocked.

MENU 4

| | |
|-----------------------------|---------------|
| AKT. GESCHWINDIGKEIT | 22M/H |
| START | 0 : 00 |
| BETRIEBSSTUNDEN | 123h |

ACTUAL SPEED

Shows the current speed of the machine. This can also be used to check the maximum operating speed of the machine if the ECOSTAR 4300 has been set to a much higher speed than the machine can run at.

The actual speed can differ from the set speed, especially at the start. This is not an error because the ECOSTAR 4300 ensures that the average speed is correct over a distance of 10 m.

START

This function allows the starting time of the machine to be delayed by up to 24 hours.

To set the start time, press the "PROG" button 3x, then set the time with the "+" and "-" buttons.

OPERATING HOURS

Shows the total operating hours since the electronics were started up for the first time.

MENU 5

| | | |
|----|-----------|----|
| 0m | 30 . 0m/h | 0m |
| 0m | 30 . 0m/h | 0m |
| 0m | 30 . 0m/h | 0m |
| 0m | 30 . 0m/h | 0m |

Irrigation settings

Four different retraction speeds for the irrigation can be set in this menu. To program the zones, press the "PROG" button 3x.

START:

The turbine can only start if the magnet activates the stop sensor (or stop sensors). To check the function of the stop sensor, see Menu 3. When the "START" button is pressed, the shut-off valve opens. Then the regulating valve closes (turbine starts). If the magnet does not activate the stop sensor, only the shut-off valve opens. This happens when the pressure must be released before disconnecting the hose at the hydrant.

DELAYED START TIME OF IRRIGATION

First press the "STOP" button to stop the water supply. Next press the "MENU" button 3x (Menu 4), then press the "PROG" button 3x and set the start time. Finally, you can select the pre- and post-irrigation.

STOP:

When the magnet is removed from the stop sensor, the turbine stops and the high-pressure shut-off valve closes (if present, the low-pressure shut-off valve opens).

If post-irrigation is selected, the turbine stops and the shut-off valve closes after the post-irrigation is finished. If the "STOP" button is pressed, the turbine stops and the shut-off valve closes regardless of whether post-irrigation is selected.

MONITORING:

The ECOSTAR 4300 has an integrated monitoring system. The monitoring is activated if, for some reason, the machine irrigates at the same location for longer than a specified time. The factory setting for this time is 20 minutes. (For setting this time, see: > Programming procedure [► 117]). If this is set to 0, the monitoring function is disabled.

SPEED:

The speed is set with the “+” and “-” buttons. At first it changes in steps of 0.1 m/h. After 10 steps, it changes in steps of 1.0 m/h. The speed can be changed at any time, even while the machine is running. When the time setting is checked, it displays the currently remaining irrigation time.

PRE-IRRIGATION:

The pre-irrigation function can be activated with the “PRE-” button. The duration of the pre-irrigation is calculated by the ECOSTAR 4300 as 8x the time to travel 1 metre at the current speed.

The value “8” (constant no. 2) can be changed (see: > Programming procedure [► 117]). If the pre-irrigation function is activated, the machine runs for 0.5 m after starting and then remains here for the pre-irrigation time.

Pressing the “START” button cancels the pre-irrigation. The pre-irrigation can only be activated if the magnet is positioned at the stop sensor.

POST-IRRIGATION:

The post-irrigation function can be activated with the “POST-” button. The duration of the post-irrigation is calculated by the ECOSTAR 4300 as 8x the time to travel 1 metre at the current speed. The value “8” (constant no. 3) can be changed (see: > Programming procedure [► 117]). The post-irrigation counter begins to count down once the magnet is removed from the stop sensor. When the magnet is removed, the motor for speed regulation stops the turbine. After the post-irrigation is finished, the shut-off valve closes (if present, the low-pressure valve opens). On machines that only have one motor for regulating the speed, the turbine starts after the post-irrigation is finished. Pressing the “START” button cancels the post-irrigation. The post-irrigation can only be activated if the magnet is positioned at the stop sensor.

If constant no. 8 “Early stop” is selected, this function is activated. The machine switches off when the distance has been reached.

7.3 Programming the 4 different speeds

Menu 5 must be showing on the display.

The pipe must be laid out before the programming so that the computer can calculate the total length of the irrigation strip.

In the following example, the length of the irrigation strip is 400 m.

| | | |
|------|---------|----|
| 400m | 30.0m/h | 0m |
| 0m | 30.0m/h | 0m |
| 0m | 30.0m/h | 0m |
| 0m | 30.0m/h | 0m |

Press the "PROG" button 3x. The display shows:

| | | |
|------|---------|----|
| 400m | 25.0m/h | 0m |
| 0m | 30.0m/h | 0m |
| 0m | 30.0m/h | 0m |
| 0m | 30.0m/h | 0m |

The desired speed can now be set. In this case: 25.0 m/h. Then press the "PROG" button 1x. The display shows:

| | | |
|------|---------|------|
| 400m | 25.0m/h | 300m |
| 300m | 30.0m/h | 0m |
| 0m | 30.0m/h | 0m |
| 0m | 30.0m/h | 0m |

The desired distance can now be set. In this case: 300 m. Then press the "PROG" button 1x. The display shows:

The first zone has now been programmed. Continue following this procedure for all 4 zones.

Zone 4 automatically ends at 000 m.

| | | |
|-----------|------|---------|
| LÖSCHEN | MENÜ | DRÜCKEN |
| SPEICHERN | | PROG |
| DRÜCKEN | | |

When zone 4 has been programmed, press the "PROG" button. The display shows:

Pressing the "PROG" button saves the program, and the irrigation will be carried out as programmed.

Pressing the "MENU" button will clear the program, and the speed will then remain constant over the entire irrigation strip.

7.4 Status displays

| | |
|----------------------------|--|
| STATUS: | Status messages on the display |
| EMERGENCY: | The machine has not been started. Speed pulses are nevertheless being received, and the system is attempting to maintain the set speed. |
| RUNNING: | The machine is irrigating. Everything is working properly. |
| LOW PRES-SURE: | The water pressure is below the pressure switch threshold. The machine operates only based on the machine data. |
| START: | The operator has pressed the "START" button. The start sequence is in progress. |
| START REMOTE: | The machine is starting due to an SMS. |
| START DELAY: | The machine is waiting for the start delay to elapse (see Menu 4). |
| START PRES-SURE: | The machine has started due to a pressure increase. The machine uses the pressure level to start the second machine in a line. |
| START DENIED: | The operator is holding the "STOP" button pressed to prevent a PRESSURE or REMOTE start. |
| STOP USER: | The machine has stopped due to a STOP command from the operator. |
| STOP REMOTE: | The machine has stopped due to an SMS. |
| STOP SENSOR: | The machine has reached the end of the irrigation strip and has been stopped by the stop sensor. |
| STOP DISTANCE: | The machine has reached the stop distance (see constant no. 8 for early stop). |
| STOP DELAY: | The machine has reached a stop point but is waiting for nn seconds to continue the stop sequence. |
| STOP DENIED: | The operator is holding the "START" button pressed to prevent a REMOTE stop. |
| MONITORING TIME: | The machine has stopped because the monitoring time has elapsed. The machine has not moved in nn minutes (see constant for monitoring time). |
| FORCE LOW PRESSURE: | The machine opens the shut-off valve to force a pressure drop and stop the pump. After 2 minutes, the shut-off valve closes to prevent draining of the pipe. |
| PRE-IRRIGATION: | The machine is performing the pre-irrigation. |
| POST-IRRIGATION: | <p>The machine is performing the post-irrigation.</p> <p>There are various constants that can be set by the user.</p> <p>These constants remain saved for years even if the battery is removed from the ECOSTAR for a long time.</p> |

7.5 The most frequent combination of different constants:

The machine can always be run without problems using the factory-set constants. However, conditions vary from farm to farm, and operators also have different requirements. For this reason, it is possible to modify various constants to adapt them to local conditions and needs.

1. Slow turbine start. Machine data no. 13. First set the value to start in 4 seconds.

To regulate the speed, the shut-off valve will now initially close about halfway and then continue closing in steps until the set speed is reached. Correct the setting as follows:

Continuously close the shut-off valve until the turbine starts. Then continue closing in steps until the set speed is reached.

2. Slow opening of the water supply. Set machine data no. 17 to the value 1.

The valve opens in steps.

3. Only one motor for speed regulation. Machine data no. 12. Value 0.

The post-irrigation now takes place as follows: When the stop sensor is activated, the retraction stops. When the post-irrigation time has elapsed, the machine starts again and runs until reaching the mechanical stop.

4. Start the second machine when the first machine has reached its end point. Machine data no. 14. Value 2.

The machine must be equipped with an adjustable pressure switch. Set the pressure switch such that the value lies between the normal pressure and the shut-off pressure of the pump.

Example: The normal operating pressure is 7 bar, and the shut-off pressure is 9 bar. The pressure switch must be set to 8 bar on both machines. Start the first machine as usual by pressing the "Start" button. Adjust the second machine, but press the "Stop" button. When the first machine comes to a stop, the second machine will start as soon as the pressure has risen to 8 bar.

Please note: A height difference of 10 m produces a pressure difference of 1 bar.

5. Stop the machine when pressure is low and a pressure switch is installed. Constant no. 6 = value 1. Machine data no. 12. must be set to the value 2.

The shut-off motor now turns in the opposite direction. This means that the shut-off valve opens instead of closes, as long as the cable connection remains unchanged. After two minutes, the shut-off valve closes again.

Only the combination of stop sensor, stop button and monitoring can open the shut-off valve. The pressure switch cannot open it.

6. Post-irrigation before the machine has reached the end point.

Constant no. 9 can be set to the number of metres at which the post-irrigation should take place.

⚠ CAUTION



Entry of moisture at the front panel

Property damage may result.

- a) Open the front panel very carefully!
- b) To ensure that the cover seal provides reliable protection against moisture, the front panel must also be closed with care!

⚠ CAUTION



Improper welding and repair work

Property damage may result.

- a) Welding and repair work on the RAINSTAR may only take place while the battery is disconnected!

7.6 Stop sensor

The machine can only operate when the stop sensor is switched on, in other words in the operating position.

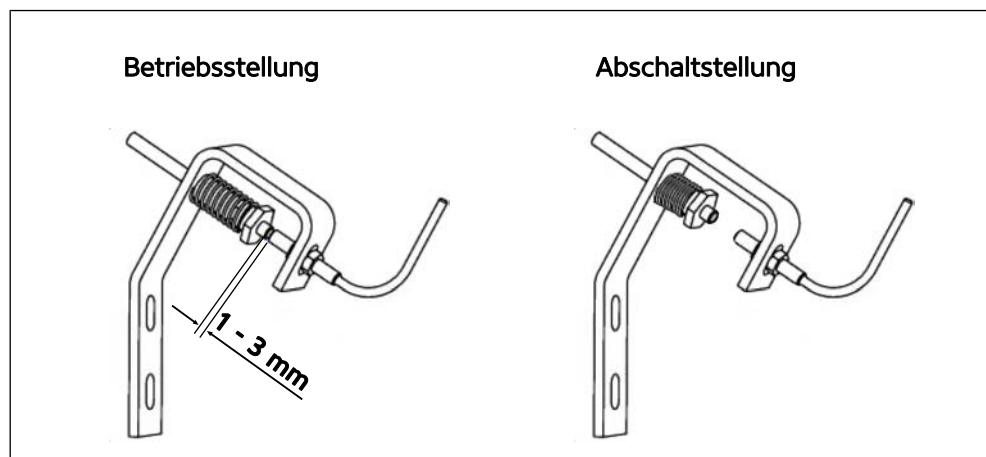


Fig. 65: Stop sensor

The stop sensor has three functions:

- a) Reset for the laid-down PE pipe length: When actuated, the laid-down pipe length is set to zero.
- b) Post-irrigation: If the post-irrigation is performed at the end of the irrigation (0 m laid-down PE pipe length), the post-irrigation is activated first, followed by the ECOSTAR shut-down. In the standard program, the post-irrigation is activated 8 m before the end of irrigation.
- c) Inhibits the pulses to the regulating motor: After actuation of the stop sensor, no further pulses are sent to the regulating motor.

Press the MENU button 2x to show Menu 3. You can see here whether the speed sensors are functioning. The symbol appears when a magnet activates the two speed sensors as the magnet disc turns.

The fourth line shows whether motors 1 and 2 have switched off after reaching their mechanical stop.

If the symbol appears and one of the motors has not reached its end position, there is a blockage inside the turbine (MOTOR 1) or the shut-off valve (MOTOR 2).

The motor switches off when the power consumption exceeds 4.7 A.

If the display shows a flashing MOTOR 1, this means that the regulating motor is currently running.

| | |
|-----------------------|---------|
| GESCHWINDIGKEIT | 30.0m/h |
| NIEDERSCHLAG | 22 mm |
| ZEIT | 14:10 |
| STOP | 7:43 |
| STATUS MOTOR 1 | |

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

| | |
|-----------------------|---------|
| GESCHWINDIGKEIT | 30.0m/h |
| NIEDERSCHLAG | 22 mm |
| ZEIT | 14:10 |
| STOP | 7:43 |
| STATUS MOTOR 2 | |



If the PROG/POWER ON button is pressed or the PE pipe is being pulled off, the electronics are re-activated.

The battery is only charged while the electronics are active. No charging takes place in standby mode.

7.7 Operation of the BAUER ECOSTAR 4300

Summary:

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

ECOSTAR: Enter settings only in the standard menu:

Accept the retraction speed from the last retraction or set a new one.



Press the "START-RESET" button .

Activate pre-irrigation if required

Activate post-irrigation if required

Open the water supply

The irrigation process runs automatically.

Additional operating instructions

The electronics of the ECOSTAR 4300 switch to standby mode when the machine stands idle for some time.

The electronics are re-activated by pulling off or laying down the PE pipe, and the length of the pulled-off or laid-down pipe is measured.

To display the length of the laid-down PE pipe, press the Menu button 1x:

| | |
|------------------|-------------------|
| DISTANZ | 123M |
| BATTERIE | 12.8V |
| LADEN ON | 0.231A |
| VOR- 0:45 | NACH- 0:45 |

7.7.1 Speed adjustment

The default speed is 30 m/h. Use the following buttons to

increase  or

decrease  the speed.

The speed initially changes in steps of 0.1 m/h. After ten steps, it changes in steps of 1.0 m/h.

The speed can be changed at any time, even while the machine is running.

This also changes the remaining time until the end of irrigation.

The speed cannot be changed while one of the regulating motors for turbine regulation or the shut-off valve is running. This is indicated on the display as MOTOR 1 or MOTOR 2.

Changing the speed also changes the associated time.

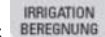
| | |
|------------------------|------------------|
| GESCHWINDIGKEIT | 30.0m/h |
| NIEDERSCHLAG | 22 mm |
| ZEIT 14:10 | STOP 7:43 |
| STATUS Betrieb | |

WARNING: When setting the speed, it is necessary to check the actually achievable speed according to the test window (press the Menu button 3x).

In case of a deviation, reduce the set speed to the actually achievable speed.

7.7.2 Pre- / post-irrigation



The PRE- and POST-IRRIGATION buttons  can be used to activate these functions.

The time for the pre-irrigation and post-irrigation is pre-programmed and is calculated by the ECOSTAR 4300 as 8x the time for travelling 1 metre at the actual speed.

Example:

If $v_R = 20 \text{ m/h}$, the time to retract by 1 metre is 3 minutes.

This results in a pre-irrigation time of $8 \times 3 \text{ min.} = 24 \text{ min.}$

The post-irrigation time is also $8 \times 3 \text{ min.} = 24 \text{ min.}$

This value of “8” can be changed in the program (program constants no. 2 and no. 3). See parameter sheet 1: Constants.

If the pre-irrigation function is activated, the machine runs about half a metre after starting, then remains there for the pre-irrigation time.

During pre-irrigation mode, pressing the “START-RESET” button  will cancel the pre-irrigation.

The PE pipe must be pulled off before activating the pre- or post-irrigation function (the shut-off frame and therefore the shut-off sensor should be in the operating position), and the “START-RESET” button must be pressed.

If the post-irrigation function is activated, the machine will come to a stop with 8 m left and remain there until the end of the post-irrigation time. This value is preset and can be changed in program constant no. 9 – see parameter sheet 1: Constants.

During post-irrigation mode, pressing the “START-RESET” button  will cancel the post-irrigation.

7.7.3 Start

If the PE pipe has been pulled off and the desired speed has been entered, press to start the irrigation.



If pre- or post-irrigation is desired, the corresponding button must be pressed.

The turbine can only start when the shut-off frame and therefore the shut-off sensor is in the operating position (PE pipe is pulled off).

When the “START-RESET” button is pressed, the turbine valve closes, the tooth segment on the regulating motor turns up to the limiting bolt and the shut-off valve opens (if present – option).

7.7.4 Monitoring

The program has a built-in monitoring system.

This functions only in connection with a high-pressure shut-off valve.

The factory setting for the monitoring function is 20 minutes (parameter sheet 1, machine data 4).

In this mode, the monitoring is activated if the RAINSTAR does not reach the set speed within the programmed monitoring time. After this time, the shut-off valve is closed and the machine is switched off.

This typically occurs because the retraction speeds are set too high or the regulating valves are blocked.

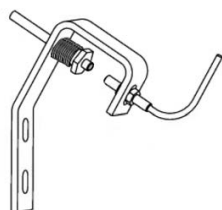
To ensure that the set retraction speed can be achieved and prevent shutdown after the monitoring time has elapsed, the actually achievable retraction speed must be checked by pressing the “Menu” button 3x.

If a pressure switch is installed, the machine starts upon reaching a set minimum pressure and the irrigation is interrupted when the water pressure is too low. When the pressure increases again to the normal level, the irrigation is continued.

7.7.5

Stop

At the end of the irrigation process, the shut-off sensor is actuated by the shut-off frame and the switching rods.



Sensor in shut-off position

This stops the turbine, and the “high pressure shut-off valve” is slowly closed. It then remains in this position until the next use of the machine.

If the RAINSTAR is connected to a hydrant, the remaining water pressure after closing



the hydrant can be released by pressing the “START-RESET” button.

The shut-off valve opens, and the pressure can escape through the PE pipe.

If the “low-pressure shut-off valve” is present, this will open quickly.

It will then close again after about 15 minutes.



The irrigation process can be ended at any time by pressing the “STOP” button.

The turbine valve opens (the turbine remains stationary), the high-pressure shut-off valve closes or the “low-pressure shut-off valve” opens.

The laid-down length of the PE pipe is retained. This is only set to 000 when the shut-off sensor is actuated (shut-off position).

NOTICE



Over-irrigation

If the retraction comes to a stop, this can result in over-irrigation.

- If the “STOP” button is pressed during retraction on a machine that does not have a shut-off valve, the retraction stops but the sprinkler remains in operation. To avoid local over-irrigation, the machine should only be operated without retraction for short periods. Operation must then be resumed with the “START” button.

CAUTION



Active drive system

Injuries and property damage may result.

- If machine data no. 12 is set to “0”, the retraction remains paused only for a short time after the “STOP” button is pressed. After a few seconds, the retraction starts again automatically.
- When working on the RAINSTAR, the entire drive system must always be switched off!

Stopping the regulating functions

Simultaneously pressing the “STOP” and “PROG.” buttons stops all functions of the ECO-STAR. In other words, the regulating motors of the turbine and shut-off valve remain in their current position.

For example, this button combination can be used to stop the turbine regulation at a low turbine speed in order to change gears.

7.8 Pressure switch

If you want your RAINSTAR to start up only after pressure has built up in the supply line (pressure start) even though it is already in the operating position, a pressure switch is required.

If this is present, the monitoring function will also interrupt the irrigation if the water pressure is too low. When the pressure increases again to the normal level, the irrigation is continued.

NOTE: The pressure switch must always be used together with a high-pressure shut-off valve!

7.9 Troubleshooting the ECOSTAR 4300

| Fault | Cause | Remedy |
|---------------------------------|---|---|
| Battery is not charging | Solar panel is dirty | Clean |
| | Solar panel is not charging or defective | Leave the machine in the sun
Replace the solar panel |
| | Battery defective | Replace the battery |
| Electronics are not functioning | Electronics error | Reset the system:
– Cover the solar panel, disconnect then reconnect the battery
Call customer service
Replace the electronics box |
| Machine switches off early | Machine over-wound | Switch off the water supply
Slacken the PE pipe
Reconfigure the machine |
| | Shut-off frame has been activated unintentionally | Bring the frame to the operating position, enter the laid-down pipe length, press "START" |
| Retraction speed is not reached | Water network or pump station has insufficient pressure | Increase pressure or enter a retraction speed according to the performance table |
| | Incorrect gear ratio | Change the ratio |
| | Turbine regulation blocked | Remove the foreign object |

7.10 Programming procedure

The electronic system is pre-programmed at the factory.

However, if the site conditions require settings that deviate from these data, the program constants and machine data can be modified accordingly.

Proceed as follows:

In order to access the constants, the speed must be set to 11.1 m/h.



Immediately press the “PROGRAM” button 3x to access program constant 0 (see parameter sheet no. 1).

Pressing the “PROGRAMM” button again will select constants 01 – 12, see parameter sheet no. 1.



The arrow buttons can now be used to change the values as needed.



Pressing the button saves the constants and returns you to the standard display.

If the “MENU” button is not pressed, the changes will not be saved and the program will return to the standard display after one minute.

The constants remain saved even if the battery is disconnected for a prolonged period.

The machine data can be accessed in the program constant 0 with the value 111.



Pressing the PROGRAM button will take you to the machine data mode. See parameter sheet no. 2.

Press the “PROGRAM” button again briefly to select the machine data numbers 0 – 19.

The arrow buttons can now be used to change the values as needed.

Pressing the “MENU” button will take you back to the standard display and save the changed machine data.

If the “MENU” button is not pressed, the ECOSTAR 4300 will return to normal mode after one minute, and any changes to the constants will not be saved.

Constants

| Con-
stant
no. | Note | Fact-
ory
set-
ting | Min.
value | Max.
value | Description |
|----------------------|------|------------------------------|---------------|---------------|-------------------------------------|
| 0 | | 100 | - | - | 111 Code to access the machine data |
| 1 | | 00:00 | 00:00 | 24:00 | Time |
| 2 | | 8 | 1 | 15 | Pre-irrigation |
| 3 | | 8 | 1 | 15 | Post-irrigation |

| | | | | | |
|----|--|----|---|------|---|
| 4 | | 20 | 0 | 99 | Monitoring time [minutes]
0 = without shut-off valve, 20 = with shut-off valve |
| 5 | | 1 | 1 | 15 | 1 English, 2 Danish, 3 German, 4 French, 5 Dutch, 6 Swedish, 7 Spanish, 8 Italian, 9 Polish, 10 Japanese |
| 6 | | 0 | 0 | 2 | 0 = slow shut-down, for high-pressure shut-off valve option
1 = fast shut-down, for low-pressure shut-off valve option
(shut-off valve opens and closes again after 3 minutes)
2 = without shut-off valve option |
| 7 | | - | 0 | 1000 | Entry of the laid-down pipe length [m] |
| 8 | | 0 | 0 | 1000 | Early stop [m]
(* Only executed if post-irrigation was selected) |
| 9 | | 0 | 0 | 1000 | Distance to post-irrigation [m] |
| 10 | | 0 | 0 | 1000 | Entry of the PE pipe length for the alarm [m] |
| 11 | | 40 | 5 | 120 | Water flow rate [m ³ /h] |
| 12 | | 60 | 5 | 100 | Distance between irrigation lanes [m] |

The constant no. 0 (code) must be set to 111 to access the machine data.

After doing this, pressing the “PROG” button will display the machine data.

NOTICE



Incorrect programming of the ECOSTAR

Incorrect programming can cause the RAINSTAR to malfunction.

- If the water flow rate (constant 11, as per performance table) and the distance between the irrigation lanes (constant 12, strip width as per performance table) are not entered, the amount of irrigation indicated on the display will not be correct.
- In the event of malfunctions, correct the corresponding parameters.

Machine data

| Con-
stant
no. | Fact-
ory
set-
ting | Min.
value | Max.
value | Description |
|----------------------|------------------------------|---------------|---------------|---|
| 0 | 600 | 0 | 1000 | Pipe length [m] |
| 1 | 125 | 40 | 200 | Pipe diameter [mm] |
| 2 | 1850 | 500 | 3000 | Reel diameter [mm] |
| 3 | 11.27 | 5.00 | 30.00 | Windings per layer |
| 4 | 240 | 50 | 1000 | Large chain wheel |
| 5 | 9 | 5 | 40 | Small chain wheel |
| 6 | 4 | 1 | 20 | Number of magnets |
| 7 | 0.89 | 0.70 | 1.00 | Pipe ovality |
| 8 | 3 | 0 | 45 | First pulse to the shut-down motor [s] |
| 9 | 160 | 0 | 300 | Short pulse to the shut-down motor [ms] |
| 10 | 3 | 1 | 5 | Time between short pulses [s] |
| 11 | 100 | 0 | 250 | Number of short pulses |
| 12 | 01 | 0 | 1 | Shut-off system
0 = only turbine regulating motor (without shut-off valve) |

| | | | | |
|----|------------|---|-----|--|
| | | | | 1 = both regulating motors (with shut-off valve) |
| 13 | 8.2
4.1 | 1 | 25 | Pulses for closing the regulating valve [s]
TX60, TX100 – 8.2 s
TX20 , TVR 20 , TVR 60, F 30, F 40 – 4.1 s |
| 14 | 01 | 0 | 2 | Pressure switch
0 = pressure switch not active
1 = pressure switch active
2 = pressure switch for start only |
| 15 | 0 | 0 | 160 | 62.5 Spacing of pulses for roll diameter 80 on PE pipe [mm]
0 = based on formula (machine data 0 to 7) |
| 16 | 1 | 0 | 1 | Length sensor
0 = Roundness sensor for roller
1 = Double sensor |
| 17 | 01 | 0 | 1 | Opening of the shut-off valve
0 = shut-off valve opens with one pulse (12 s) – low pressure
1 = shut-off valve opens with the same pulses as for closing – high pressure |
| 18 | 01 | 0 | 1 | Pressure switch
0 = open shut-off valve when pressure too low (low pressure)
1 = close shut-off valve when pressure too low (high pressure) |
| 19 | 8 | 0 | 200 | Time delay between gearbox shut-off and valve shut-off [s]. |
| 20 | 01 | 0 | 1 | Speed monitoring
0 = Monitoring off
1 = Monitoring on (50% of the selected speed) |
| 21 | 01 | 0 | 1 | Display of dimensional units
0 = metric units [m]
1 = US units [ft] |

7.11 Battery

The capacity of the factory-installed battery is 12 V / 7.2 Ah.

Thanks to the solar panel included as a standard feature, charging the battery is unnecessary during the irrigation season.

In general, the battery should be recharged every 6 months with a charging current of max. 2 A. (Please observe the enclosed maintenance and operating instructions.)

When the battery is connected, the display briefly shows the version, e.g. "VERSION 4.1" and then switches to the standard display.

To ensure a long service life for the dry cell battery installed in the ECOSTAR (LC-R 127R2PG 7.2 Ah/20 HR), it is important to follow certain guidelines when storing for a prolonged period and during recharging.

No special precautions required during use of the ECOSTAR battery since the battery is continuously charged by the solar panel.

1. Every new RAINSTAR irrigation machine shipped by BAUER that is equipped with the ECOSTAR electronic control unit is delivered with a fully charged battery that is ready for immediate use. However, the solar panel is covered and not connected to the battery. If a long time has passed since the initial start-up of the machine, the battery must be maintained. (See the information below.) This also applies to batteries kept in storage as spares for a prolonged period.

2. If the RAINSTAR is not used for a prolonged period, e.g. outside of the irrigation season, the ECOSTAR battery must always be disconnected and removed.

3. The battery should be stored fully charged in a location with sufficient distance from conductive materials and without exposure to sunlight.

If the battery is stored for a prolonged period in a discharged state, it will no longer be able to reach its full capacity when charged.

4. The optimal storage temperature is between 0 and +25 °C.

The battery will experience self-discharging even during storage, and it must be recharged at the following intervals:

| Storage temperature | Interval for recharging |
|---------------------|-------------------------|
| Less than +20 °C | 9 months |
| +20 to +30 °C | 6 months |
| +30 to +40 °C | 3 months |

5. The humidity in the storage room should be low (55% +/- 30%) to prevent corrosion of the poles.

6. Avoid fully discharging the battery (deep discharging). It will still be possible to charge the battery to its full capacity, but repeated deep discharging will shorten its lifespan.

7. Batteries should be kept clean. Use a dry cloth to clean the battery. If necessary, moisten it with water or alcohol.

Never use oil, gasoline or thinning agents.

8. Batteries must never be disassembled because they contain acid that can cause severe chemical burns.

9. Batteries must never be short-circuited as this will destroy the battery.

10. The battery should be charged with a charging current of max. 2.0 A. A discharged battery requires about 7 hours to recharge to full capacity.

Instruments for precise inspection of the available capacity as well as chargers with intelligent (self-regulating) charging function allow you to carefully check the battery and charge it in a controlled fashion.

7.11.1 Solar panel

The solar panel installed at the factory requires no maintenance.

1. To ensure an optimal supply of power, the surface should be cleaned from time to time with a soft cloth and household cleaning agent (do not use abrasive cleaners!).

2. The solar panel is folded out and locked in place for operation. This ensures that the panel is optimally exposed to sunlight.

The panel must be folded in when transporting the RAINSTAR. To do this, lift it up slightly, press it toward the machine and return it to its original position, where it is protected against damage.

3. To prevent overcharging of the battery or malfunctioning of the ECOSTAR, the electronic system interrupts the charging when the "STOP" button is pressed or the battery is disconnected. (The terminals are disconnected on delivery.)

When the "START" button is pressed or the PE pipe is pulled off, the charging process is reactivated.

7.11.2 Checking the connections



Press the "START" button .

The regulating motor closes (the segment rotates up to the limiting bolt).

The high-pressure shut-off valve is opened.

The low-pressure shut-off valve remains closed.



Press the "STOP" button .

The regulating motor opens the turbine (the segment rotates away from the limiting bolt).

The high-pressure shut-off valve is closed.

The low-pressure shut-off valve is opened.

7.11.3 Checking the length sensor

The magnet disc with 4 magnets is mounted to the drive shaft of the gearbox and rotates clockwise during the pull-off process.

As the magnet disc turns clockwise, the display of the laid-down pipe must count upwards from 0 m.

If the distance counter counts in the opposite direction, the speed sensor (G) is not mounted correctly. In this case, the sensor must be turned by 180° and remounted.

The cable connection (K) is at the bottom when installed correctly.

The distance "A" between the double sensor and the magnet disc must be 1 – 3 mm.

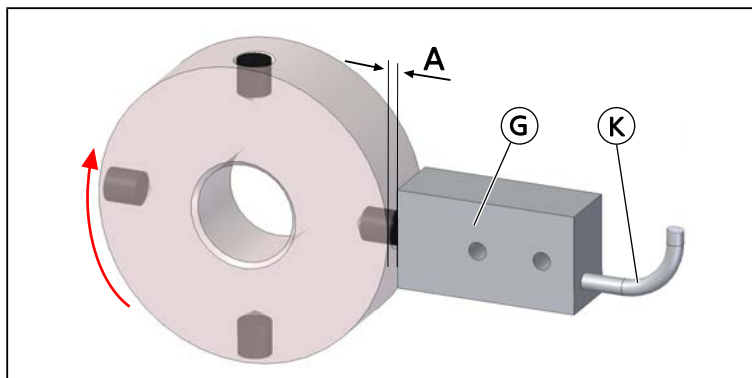


Fig. 66: Checking the length sensor

7.11.4 Limit stop for turbines – regulating valve with ECOSTAR 4300

The range of action of the turbine regulating valve must be adapted to the respective rate of flow. If the stop is set incorrectly, regulation of the turbine may be impossible. In other words, the PE pipe retraction will take place at maximum speed.

If the rate of flow decreases significantly, the limiting bolt must be adjusted; otherwise, the retraction speeds indicated in the performance table cannot be achieved.

The rate of flow can be found by referencing the nozzle size in the performance table, which is affixed to the machine.

(See: > The most frequent combination of different constants: ► 108])

7.11.5 Short checklist for ECOSTAR 4300

1. Check the battery voltage (should be at least 12 V)
 - a) Completely cover the solar panel.
 - b) Read the battery voltage from test menu 1 (press MENU button 1x).
 - c) If the voltage is too low (below 12 V) or absent, the battery, the cable connections and the fuse in the electronics box must be checked.
2. Check the function of the sensors
 - a) Open test menu 2 (press MENU button 2x).
 - b) Indicators appear on the display to check the function of the installed sensors, motor 1 and motor 2.

3. Check the indicated length of the pulled-off PE pipe (press MENU button 1x)
 - a) Read the laid-down PE pipe length in the standard display and compare it to the length stamped on the PE pipe.
 - b) If the display shows 000 m or significantly less than the length of the pulled-off pipe, an adjustment is required.
4. Check the mechanical transmission to the stop sensor.
5. Set the limiting bolt for the tooth segment of the regulating valve based on the table affixed to the machine.

7.12 Cable connections

| ECOSTAR 4300 – 18-pin plug | | |
|--------------------------------|------------------|------------------|
| Cable connections version n.n1 | | |
| Number | Name | Colour |
| 1 | + Battery (12 V) | Brown |
| 2 | - Battery | Blue |
| 3 | + Solar panel | Brown |
| 4 | - Solar panel | Blue |
| 5 | Motor 1 | Regulating motor |
| 6 | Motor 1 | Regulating motor |
| 7 | Speed sensor 1* | Blue |
| 8 | Speed sensor 1* | Black |
| 9 | Speed sensor 2* | Yellow / green |
| 10 | Speed sensor 2* | Brown |
| 11 | Stop sensor | Blue or brown |
| 12 | Stop sensor | Blue or brown |
| 13 | Motor 2 | Shut-off motor |
| 14 | Motor 2 | Shut-off motor |
| 15 | Pressure sensor | Blue or brown |
| 16 | Pressure sensor | Blue or brown |
| 17 | - BIP | |
| 18 | + BIP | |

*Note: If the ECOSTAR measures the pipe length incorrectly (negative values), the speed sensor must be turned around. (See: > Checking the length sensor [► 122])

7.13 Checklist for the ECOSTAR 4300

During the first start-up as well as during operation, problems can arise with the displayed information or functions of the ECOSTAR that relate to the electronics or the connected sensors. Problems can also arise due to operating errors.

In most cases, a systematic check of the system based on the following checklist will help you quickly identify the cause and find the solution.

This checklist provides additional help alongside the detailed operating manual of the ECOSTAR 4300.

After checking the system based on the separate SHORT CHECKLIST, the list below can be consulted for recommended actions.

| Item | Fault | Check and diagnosis | Remedy |
|------|---|---|---|
| 1 | Incorrect or incomplete display of information | <p>Check the battery voltage.</p> <ul style="list-style-type: none"> – Cover the solar panel with an opaque material, wait 2 to 3 minutes, then check the battery voltage indicated in the first menu on the display. (Press MENU button 1x) <p>NOTE:</p> <p>If the solar panel is not covered, the display may indicate a voltage even if the battery is empty. Sunlight on the panel may also cause an adequate voltage to be mistakenly detected. In this case, however, the available power is not sufficient to operate the system.</p> <ul style="list-style-type: none"> – If the battery voltage (now no longer influenced by the covered solar panel) is below 12 V, the power supply is not sufficient to operate the system. | Charge or replace the battery. |
| 2 | Display is blank | <p>Check the battery, cable connections and fuse.</p> <ul style="list-style-type: none"> – Check battery voltage > battery empty. – The connection cables between the battery and ECOSTAR are not connected or not contacting properly. – The fuse is defective. <ul style="list-style-type: none"> – The fuse is located inside the electronics box. The box also contains a spare fuse. <p>NOTES:</p> <p>When checking the contacts, it is important that the cable is connected correctly: “+” terminal = brown wire, “-” terminal = blue wire.</p> <p>The solar panel should also be covered when connecting and disconnecting the terminals of the battery as well as when the battery is disconnected; otherwise, incorrect values may be displayed.</p> | <p>Charge or replace the battery.</p> <p>Check the connections and contacts.</p> <p>Replace the fuse.</p> |

| | | | |
|---|---|--|--|
| | | <p>Saved data will not be lost when the battery is disconnected.</p> <p>When reconnecting the battery, take care not to swap the “plus” and “minus” terminals. This would produce a short-circuit and trip the fuse or potentially damage the electronics.</p> | |
| 3 | Battery voltage continuously too low | <p>Check the battery.</p> <p>If the battery voltage remains too low despite continuous charging by the solar panel, check the battery, charge it or replace it, if necessary.</p> | Check / charge or replace the battery. |
| 4 | Charging error due to solar panel | <p>Check the solar panel.</p> <p>NOTES:</p> <p>The normal charging function via the solar panel switches off the charging when the battery voltage is 14.0 V or higher. “OFF” appears in the first menu next to “Charging with solar panel” (press MENU button 1x)</p> <p>The charging function switches on at a battery voltage of 13.9 V or less. “ON” appears in the same menu.</p> <p>If the battery is not charged by the solar panel at a battery voltage of 13.9 V or less and “OFF” is shown on the display, this could be due to the following reasons:</p> <ol style="list-style-type: none"> 1. There is not enough sunlight to charge the battery. 2. The “+ / -” phases of the solar panel are reversed. Check the polarity. 3. The solar panel is defective. Check this by measuring the voltage on the panel. | <p>Correct the polarity.</p> <p>Replace the panel.</p> |
| 5 | Unreadable text in the display | <p>System voltage / start-up error</p> <ol style="list-style-type: none"> 1. Unreadable or unclear text in the display may be due to insufficient voltage. 2. This can also happen during the first start-up or after connecting the battery again later (even if sufficient voltage is present). <p>NOTE:</p> <p>Disconnect the battery and the solar panel, touch the +/- poles of the ECOSTAR cable together (potential equalisation). Reconnect the battery and the solar panel after about 1 minute. Note the polarity of the cables!</p> | <p>Check battery voltage, charge the battery.</p> <p>De-energise the electronics for about 1 minute.</p> |
| 6 | No length shown in the display | <p>Shut-off sensor / loose PE pipe windings</p> <ol style="list-style-type: none"> 1. The PE pipe is pulled off, but the display shows 000 m. <p>NOTES:</p> <ol style="list-style-type: none"> a) In this case, the shut-off frame on the RAINSTAR or the shut-off sensor was activated, setting the pipe length display to 000 m and causing the ECOSTAR to stop the | Enter new value for the pulled-off PE pipe length on the ECOSTAR. |

| | | | |
|---|--|--|--|
| | | <p>RAINSTAR. The shut-off frame may have been activated by a loose PE pipe winding or by hand.</p> <p>b) The shut-off frame or the shut-off sensor may also have been activated as the PE pipe was being pulled off. In this case, a pulled-off pipe length is indicated, but the displayed value is lower than the actual pulled-off length. The value must be set again as described below.</p> <p>c) If the length is not measured as the PE pipe is pulled off, this value cannot be corrected and the RAINSTAR will not start. In this case, the shut-off sensor has been configured incorrectly (insufficient distance, see operating manual) or is defective.</p> <p>Entering the PE pipe length on the ECOSTAR
Procedure (see also the operating manual)</p> <p>a) Set the retraction speed to 11.1 m/h.</p> <p>b) Press the PROGRAM button 3x to display parameter sheet no. 1. Press the PROGRAM button again to reach constant 7.</p> <p>c) In this position, you can use the arrow buttons to set the constant value equal to the length of the pulled-off PE pipe. The actually pulled-off length can be read directly from the RAINSTAR by checking the value stamped onto the PE pipe.</p> <p>d) Pressing the TEST button will save the entered value, then the standard display will be shown again. The RAINSTAR can be started again.</p> | Correctly adjust or replace the shut-off sensor. |
| 7 | No length shown in the display or reversed measuring of the length | <p>Length sensor</p> <p>1. If the length is not measured as the PE pipe is pulled off and if the length is measured in reverse during retraction of the pipe (the displayed length increases instead of decreases), the length sensor is installed backwards. (See instructions and drawing in the operating manual)</p> | Install the length sensor correctly. |
| 8 | The length value on the display does not match the actual pulled-off pipe length. | <p>PE pipe ovality</p> <p>1. The pulled-off PE pipe length and the value shown on the display always differ by a consistent percentage. In this case, the ovality of the pipe does not match the programmed value and must be corrected.</p> <p>Correction of the ovality constant</p> <p>a) To correct the value, locate parameter sheet no. 1 as described in item 6, then press the PROGRAM button until reaching</p> | Correct the ovality factor |

| | | | |
|----|---|---|---|
| | | <p>constant 0. Enter the value 111 in this constant and continue to parameter sheet no. 2 to access the machine data. The ovality value can be corrected in machine constant 7.</p> <p>b) If the length value shown on the display is always higher than the actually pulled-off pipe length, the ovality is larger than programmed. Correct the configured factor from 0.89 to 0.88 or 0.87.</p> <p>c) However, if the length value shown on the display is always lower than the actually pulled-off pipe length, the ovality is lower than programmed. Correct the configured factor from 0.89 to 0.90 or 0.91.</p> <p>Length sensor / magnet disc</p> <p>2. The pulled-off PE pipe length and the value shown on the display always differ by large amounts.</p> <p>NOTES:</p> <p>a) One or more magnets are missing from the magnet disc. The magnet discs on all ECOSTAR models are fitted with 4 magnets.</p> <p>b) One or more magnets are no longer active. When the magnets move past the length sensor, the menu in the display (press MENU button 2x) shows nothing for one or more magnets (■).</p> <p>c) The number of magnets is programmed in the machine data with a number other than 4. This must be corrected to 4 in parameter sheet no. 2, factor 6. (See the operating manual for the exact procedure.)</p> <p>Nothing at all appears on the display (■). The length sensor is defective.</p> | <p>Decrease the ovality factor.</p> <p>Increase the ovality factor.</p> <p>Add magnets.</p> <p>Replace inactive magnets.</p> <p>Correct the machine data.</p> <p>Replace the length sensor.</p> |
| 9 | Electric shut-off valve does not close | <p>Shut-off sensor</p> <p>1. If the electric shut-off valve (high-pressure shut-off) does not close at the end of the irrigation strip (or open for low-pressure shut-off), the shut-off sensor is configured incorrectly (sensor distance too small). The sensor signal (■) does not disappear from the menu.</p> | Adjust the shut-off sensor. |
| 10 | Electric shut-off valve does not close or open | <p>Program constant</p> <p>1. The ECOSTAR is not programmed for a shut-off valve.</p> <p>The setting "2" appears in parameter sheet no. 1, under program constant 6.</p> <p>This constant must be corrected to "0" (with high-pressure shut-off valve).</p> | Correct the setting. |

| | | | |
|----|---|--|--|
| | | <p>In addition, the following value must be set in parameter sheet no. 2, under machine data "12":</p> <p>"1" for both regulating motors (with shut-off valve)</p> <p>Pressure switch</p> <p>2. If a pressure switch is installed for the low-pressure shut-off, the following causes may apply:</p> <p>a) Insufficient pressure to operate the RAIN-STAR. The supply pressure is below the value set on the pressure switch. Increase the supply pressure.</p> <p>b) Pressure switch dirty or defective.</p> <p>To check the function of the pressure switch, the pressure switch can be disabled in parameter sheet no. 2, constant 14, by setting this to "0".</p> <p>Soiling / foreign object / connections</p> <p>3. The shut-off valve is physically blocked by a foreign object.</p> <p>4. The electrical connections to the shut-off valve are defective or not connected properly. Valve motor (motor 2) defective.</p> | <p>Increase the supply pressure.</p> <p>Clean / replace the switch.</p> <p>Clean the valve.</p> <p>Check the connections. Check / replace the motor.</p> |
| 11 | Turbine regulation does not function, valve remains open or closed | <p>1. Limiting bolt for limiting the position of the regulating valve not set correctly. Valve is closed too far and can no longer be opened by the motor. (See the enclosed settings table for the TVR 60 turbine; the setting depends on the rate of flow.)</p> <p>2. Electrical connections to the motor (motor 1) are defective or not connected properly.</p> <p>3. Motor for regulating valve (motor 1) defective</p> <p>4. Foreign objects impair the functioning of the regulating valve.</p> | <p>Check the setting of the bolt according to the table</p> <p>Check connections</p> <p>Check / replace</p> <p>Remove foreign object</p> |
| 12 | Machine stops moving during operation | <p>1. If the machine is equipped with a pressure switch, the machine may be switched off when the connection pressure is too low.</p> <p>If you wish to continue operation anyway, the pressure switch function can be disabled.</p> <p>2. If the desired (entered) retraction speed is too high and the machine cannot reach this speed during a period of 20 minutes, the machine will also switch off.</p> <p>However, this function can be disabled as follows:</p> <p>Machine data, parameter sheet no. 1, constant 4 (monitoring of the correct speed)</p> <p>Non-zero setting, e.g. "20": Monitoring enabled</p> <p>Setting "0": Monitoring disabled</p> | <p>Increase connection pressure, disable pressure switch.</p> <p>Decrease retraction speed.</p> <p>Disable monitoring.</p> |
| 13 | Other issues | <p>If other problems arise relating to the display, the precision or other functions, the data configured in the ECOSTAR must be checked based on the constants in parameter sheet no. 1 and the machine data in parameter sheet no. 2.</p> | |

| | | | |
|--|--|--|--|
| | | If necessary, contact our customer service department. | |
|--|--|--|--|

7.14 Table for pre- and post-irrigation

To correct irregularities in the irrigation at the start or end of the irrigation strip, the ECOSTAR has the pre- and post-irrigation functions. The desired amount of irrigation at the start of the strip (pre-irrigation) and the end of the strip (post-irrigation) is achieved by interrupting the cart retraction. The stationary time for the pre- and post-irrigation can be set on the ECOSTAR with program constants 2 and 3 in parameter sheet no. 1. The factory preset value is 8.

This factor establishes a relationship between the sprinkler retraction speed and the pre- / post-irrigation time. The configured factor can be changed, which changes the pre- and post-irrigation time.

The table below shows the pre- and post-irrigation times in minutes (rounded) for various configured factors:

| Factor | Retraction speed in m/h | | | | | | | | | |
|----------|---------------------------------------|-------------|-------------|-------------|------------|------------|------------|------------|------------|------------|
| | Pre- and post-irrigation time in min. | | | | | | | | | |
| | 10 m/h | 20 m/h | 30 m/h | 40 m/h | 50 m/h | 60 m/h | 70 m/h | 80 m/h | 90 m/h | 100 m/h |
| 1 | 6.0 | 3.0 | 2.0 | 1.5 | 1.2 | 1.0 | 0.9 | 0.8 | 0.7 | 0.6 |
| 2 | 12.0 | 6.0 | 4.0 | 3.0 | 2.4 | 2.0 | 1.7 | 1.5 | 1.3 | 1.2 |
| 3 | 18.0 | 9.0 | 6.0 | 4.5 | 3.6 | 3.0 | 2.6 | 2.3 | 2.0 | 1.8 |
| 4 | 24.0 | 12.0 | 8.0 | 6.0 | 4.8 | 4.0 | 3.4 | 3.0 | 2.7 | 2.4 |
| 5 | 30.0 | 15.0 | 10.0 | 7.5 | 6.0 | 5.0 | 4.3 | 3.8 | 3.3 | 3.0 |
| 6 | 36.0 | 18.0 | 12.0 | 9.0 | 7.2 | 6.0 | 5.1 | 4.5 | 4.0 | 3.6 |
| 7 | 42.0 | 21.0 | 14.0 | 10.5 | 8.4 | 7.0 | 6.0 | 5.3 | 4.7 | 4.2 |
| 8 | 48.0 | 24.0 | 16.0 | 12.0 | 9.6 | 8.0 | 6.9 | 6.0 | 5.3 | 4.8 |
| 9 | 54.0 | 27.0 | 18.0 | 13.5 | 10.8 | 9.0 | 7.7 | 6.8 | 6.0 | 5.4 |
| 10 | 60.0 | 30.0 | 20.0 | 15.0 | 12.0 | 10.0 | 8.6 | 7.5 | 6.7 | 6.0 |
| 11 | 66.0 | 33.0 | 22.0 | 16.5 | 13.2 | 11.0 | 9.4 | 8.3 | 7.3 | 6.6 |
| 12 | 72.0 | 36.0 | 24.0 | 18.0 | 14.4 | 12.0 | 10.3 | 9.0 | 8.0 | 7.2 |
| 13 | 78.0 | 39.0 | 26.0 | 19.5 | 15.6 | 13.0 | 11.1 | 9.8 | 8.7 | 7.8 |
| 14 | 84.0 | 42.0 | 28.0 | 21.0 | 16.8 | 14.0 | 12.0 | 10.5 | 9.3 | 8.4 |
| 15 | 90.0 | 45.0 | 30.0 | 22.5 | 18.0 | 15.0 | 12.9 | 11.3 | 10.0 | 9.0 |

8 Appenix

8.1 Conformity declaration

9 Tyre table

To ensure a long lifespan for the tyres and safe transport of the RAINSTAR, always ensure that the tyre pressure is correct!

Standard tyres RAINSTAR E100 – E500

| Model | Tyre dimension | Tyre pressure |
|-------------|-------------------------|---------------|
| E100, E200 | 11.5/80 – 15.3 – 14 ply | 5.5 bar |
| E300 – E500 | 12.5/80 – 15.3 – 14 ply | 5.5 bar |

Standard tyres RAINSTAR E300 – E600/4WB

| Model | Tyre dimension | Tyre pressure |
|---------------------|-------------------------|---------------|
| E300/4WB | 11.5/80 – 15.3 – 14 ply | 5.5 bar |
| E400/4WB – E600/4WB | 12.5/80 – 15.3 – 14 ply | 5.5 bar |

Standard tyres RAINSTAR E100 – E600/4W

| Model | Tyre dimension | Tyre pressure |
|---------------|-------------------------|---------------|
| E100 – 600/4W | 10.0/75 – 15.3 – 14 ply | 6.0 bar |

Special tyres RAINSTAR E (option)

| Model | Tyre dimension | Tyre pressure |
|------------|------------------------|---------------|
| E100 | 15.0/55 – 17 – 10 ply | 3.5 bar |
| E200, E300 | 400/60 – 15.5 – 18 ply | 4.5 bar |
| E400, E500 | 400/60 – 15.5 – 18 ply | 4.5 bar |

Special tyres RAINSTAR E 100 – E600/4W (op- tion)

| Model | Tyre dimension | Tyre pressure |
|-------------------|-------------------------|---------------|
| E100/4W | 15.0/55 – 17 – 10 ply | 3.5 bar |
| E200/4W – E500/4W | 400/60 – 15.5 – 18 ply | 4.5 bar |
| E600/4W | 11.5/80 – 15.3 – 14 ply | 5.5 bar |

Special tyres RAINSTAR E 300 – E600/4WB (option)

| Model | Tyre dimension | Tyre pressure |
|--------------------|------------------------|---------------|
| E300/4WB, E600/4WB | 400/60 – 15.5 – 18 ply | 4.5 bar |

Standard tyres on cart RAIN- STAR E100 – E600

| Model | Tyre dimension | Tyre pressure |
|------------|----------------|---------------|
| E100 – 600 | 165/70 R13 | 1.3 bar |

Special tyres on cart RAINSTAR E100 – E600

| Model | Tyre dimension | Tyre pressure |
|------------|----------------|---------------|
| E100 – 600 | 185/70 R13 | 1.3 bar |



Röhren- und Pumpenwerk BAUER GmbH
Kowaldstraße 2, 8570 Voitsberg/Austria

T +43 3142 200-0 **F** +43 3142 200-320/-340
M sales@bauer-at.com **W** www.bauer-at.com