Landtechnik
Agricultural Engineering

Operation & Maintenance

Hop-Picking System

WSZ Picker **- SP STAR**PICKER© **- WBC Wind** Belt Cleaner©

WOLF

Content

1. Intended Use

This concerns a hop-picking system to be installed in a building. Protect the machine, mounted electrical components, control devices and mechanically rotating components from any effects of weather.

- Place the hop-picking system on level ground and make sure it is stable. The condition of the ground must be such that no damage can occur in the long term (even in case of vibrations that can emanate from the machine).
- Position the hop-picking system so that there is adequate safety clearance (escape route) to walls, partitions, driveways and the like.
- Do not modify the hop-picking system or its mounted parts. Modifications will render the manufacturer's declaration or Declaration of Conformity and any warranty claim null and void.
- The hop-picking system is only suitable for picking freshly harvested leaf hops.
- Only expert personnel fully trained in the operation may operate the hop-picking system.
- The hop-picking system can be used to pick the hop varieties currently found on the international market. However, machine performance depends on the individual varieties, quality (growth) of the plant, weather and the plant's ripening time. Machine performance therefore can vary. No guarantee of a specific bine output per hour can be given.
- Any accessories and mounted parts of the hop-picking system (conveyor belts, chopper, cleaning fan, etc.) must only be used for the hop harvest.
- Only trained adult personnel with no physical disability (fully competent persons) may operate the hop-picking system.
- The attributes guaranteed in the delivery kit refer only to the specified operating purpose. Do not remove or otherwise bypass components designed for the protection of persons and animals.
- Do not clean the hop-picking system when it is wet or with aggressive chemical agents

At the time of its development and manufacturing the hop-picking system was built in accordance with applicable engineering practices. It is considered to be operationally safe. However, there are hazards associated with the operation of the hop-picking system if it is not used properly by trained personnel. As a consequence, every person who is assigned to work on or with the hop-picking system must be properly trained in the state of operation of the equipment and must have read and understood the operator's manual prior to commencing work on or with the hop-picking system.

⚠WARNING **Risk resulting from improper use**
Any use deviating from the use described in this operator's manual is considered improper.WOLF cannot be held liable for any resulting damage or injury. The user/operator carries the risk resulting from improper use. Any improper use, misoperation and abuse can cause life-threatening injuries or death.

2. Instructions and Regulations for the User

This operator's manual describes the safe and efficient handling of the hop-picking system. A copy of the operator's manual must be stored near the equipment in a way that allows the user/operator to refer to it at any time. Users/operators must carefully read the operator's manual before commencing work and must be capable of following the instructions and heeding the warnings in the manual. All safety notes, warnings and instructions must strictly be complied with. The local accident prevention guidelines and any applicable state and federal safety laws and regulations as well as any other pertinent state and federal laws, regulations and guidelines apply.

Qualified personnel delegated with

- installation
- commissioning
- operation
- maintenance
- troubleshooting
- decommissioning

must be instructed to follow the operating manual before starting work.

⚠WARNING **Risk due to unqualified personnel**
Only trained expert personnel of legal age without any physical limitations (fully competent persons) are allowed to operate the hop-picking system. The operators must be instructed at least once every six months about accident prevention regulations, the correct operation of the machine, any possible health hazards, the course of action if there is danger of fire, the operation of fire extinguishing equipment, etc. Each individual who is assigned to do work on or with the equipment must be properly trained in the state of operation and must have read and understood the operator's manual prior to commencing work on or with the equipment.

⚠WARNING **Danger if personal protective equipment is not worn**
Persons who monitor, operate, clean,maintain, transport, etc. the hop-picking system must always wear the necessary personal protective equipment. Protective equipment guards against physical injury and death in hazardous areas.

02.01 Hazard Analysis

⚠WARNING The operator of the hop-picking system must carry out a risk assessment and take the resulting appropriate work safety measures. In case of ambiguities please contact the responsible state and federal safety authorities.

02.02 Safety Devices

⚠WARNING **Risk due to deactivation of safety devices**
Do not remove or deactivate safety devices, barriers, limit switches and the like.

02.03 Lingering

⚠WARNING **Risk due to remaining in danger area**
Only trained operators are allowed to remain in the vicinity of the hop-picking system while it is operating.
All other persons are strictly prohibited from remaining in the danger area. Failure to follow these instructions may result in severe injury or death.

02.04 Machine Inspection

⚠WARNING The picking machine must be under control at all times. Check several times a day whether the picking units, conveyor belts and drive rollers have accumulated dirt and debris and clean them if necessary. When working, performing inspections or cleaning the machine, switch off the mains isolator of the hop-picking system and secure it against restarting.

⚠WARNING **Risk due to accidental reactivation**
Unauthorized or unintentional reactivation of the hop-picking system could result in serious injury or death.
- Secure the hop-picking system against reactivation.
- Cordon off the danger area and mark it with warning signs.

⚠WARNING After the end of working hours, a responsible person must perform an inspection run to check whether there are any unsafe conditions in or around the picking machine.

02.05 Fire Hazard Instructions

⚠WARNING The hop-picking system usually does not generate any fire hazard. Nevertheless, overheating of electric drive motors can lead to smoldering fires. Regular preventive cleaning of the electric motors is thereby absolutely essential.

The operator must register the system in the fire prevention record and take preventive fire protection measures accordingly.

02.06 Fire Extinguishing Equipment

Place an adequate number of suitable, officially authorized handheld fire extinguishers in the vicinity of the hop-picking system in quickly accessible, less hazardous and visible locations.

02.07 Processing Materials

The machine may only be used to pick freshly harvested green hops.

02.08 Reference to Regulations

The owners and operators are responsible for knowing and adhering to all applicable laws, regulations, rules, and ordinances regarding accident prevention and occupational safety in industry and agriculture.

3. General Safety - Accident Prevention

WARNING Failure to observe the operating and maintenance manual can jeopardize persons appointed to do work and can lead to malfunctions in the hop-picking system. Persons appointed to do work on the system must have demonstrated technical qualifications to do the job. The accident prevention rules and regulations must be followed at all times. Appointed persons must use the personal protective equipment needed for the task.

WARNING Activities on the hop-picking system may only be carried out if the following functions are ensured:

- Mains isolator on the switch cabinet switched off and secured with a padlock to prevent restarting
- Power supply disconnected across all poles
- Stoppage of rotating parts
- Equipment components cooled down to standard ambient temperature (room temperature)

NON-COMPLIANCE MAY RESULT IN INJURY OR DEATH

After work is completed, restart the system according to the commissioning procedure

WARNING Only qualified expert personnel may be assigned to work on electrical components. Follow local power utility regulations, all state and federal laws, regulations, rules and ordinances.

03.01 Symbols

Warnings Insert
This is the safety alert symbol. It is used to alert you to potential death and physical injury hazards. Youmust strictly obey all safety messages that follow this symbol to avoid injury or death.

Warnings in this operator's manual are marked by signal word boxes. The signal words indicate the level of danger. You must always comply with the warnings and act with care in order to avoid fatal accidents, injury and damage to property:

DANGER Death or severe injury will result if the corresponding precautionary measures are not taken.

WARNING Death or severe injurymay result if the corresponding precautionary measures are not taken.

CAUTION Indicates a potentially dangerous situation that may result in minor to medium-severe injuries if it is not avoided.

NOTICE Indicates a potentially dangerous situation that may result in property damage if it is not avoided.

You will find the adjoining symbol in the operating and maintenance manual in case of crushing hazard.

You will find the adjoining symbol in the operating and maintenance manual in case of danger due to suspended loads.

You will find the adjoining symbol in the operating and maintenance manual in case of danger due to falling.

You will find the adjoining symbol in the operating and maintenance manual in case of danger due to stumbling.

You will find the adjoining symbol in the operating and maintenance manual in case of danger due to slipping.

You will find the adjoining symbol in the operating and maintenance manual in case of danger due to unintentional entry.

You will find the adjoining symbol in the operating and maintenance manual in case of danger due to fire.

You will find the adjoining symbol everywhere in the operating and maintenance manual where grounding is urgently needed.

You will find the adjoining symbol in the operating and maintenance manual in case of danger due to electrical components.

The adjoining symbol points to information in the operating and maintenance manual where trained personnel must be deployed.

You will find the adjoining symbol in the operating and maintenance manual in case of danger due to noise.

You will find the adjoining symbol in the operating and maintenance manual in case of risk of eye injury.

You will find the adjoining symbol in the operating and maintenance manual in case of risk to respiratory organs.

You will find the adjoining symbol in the operating and maintenance manual in case of risk of head injuries.

The adjoining symbol points to guidelines or cross-references in the operating and maintenance manual that are important for the operation of the machine.

The adjoining symbol refers to information or application tips in the operating and maintenance manual.

03.02 General Information

03.02.01 Area of Application

Please refer to the order confirmation (especially the technical specifications) and the specifications on the machine's nameplate for the area of application of the delivered system.

03.02.02 Safety-Related Components

The hop-picking system and parts of the controller are equipped with safety-related components. Electrical components are subject to a limited operating life. After this period expires, these components must be replaced. Make sure that the same components or the types specified for them are used as replacements. For the service life of parts please refer to the section **Safety-Related Components and Monitoring Equipment.**

WARNING

Risk associated with non-original replacement parts
The use of non-original replacement parts that have not been approved is strictly prohibited.
Non-compliance may result in severe injury or death.
- Only use original replacement parts or replacement parts approved by WOLF.

03.03 Regulations for the User

In general, the instructions in the section entitled "Instructions and Regulations for the User" shall apply. Furthermore, trained and certified personnel must carry out full inspection and maintenance on the entire hop-picking system at least once a year. This inspection should adhere to manufacturer's instructions and the current safety requirement standards of the institution(s) for statutory accident insurance and prevention.

Always have a trained and certified technician perform these tasks!

03.04 Safety instructions – accident prevention

WARNING

- The operator of a machine is responsible for ensuring that all federal and state-specific accident prevention regulations are noted and followed during operation.
- Operators may only execute the work expressly assigned to them.
- No children may work on the hop-picking system or accessories.
- Operators must not wear flapping clothes or have long hair loose.
- Any type of repair, cleaning, lubrication (greasing) and the like is prohibited during operation.
- Only the responsible machine operator may start up the hop-picking system. This person is responsible for ensuring that no one can be injured when the machine starts up.
- Operators hanging bines on the suspension device must receive special instructions:
  a. Make sure that only the bine tips are inserted in the suspension device.
  b. Note that it is expressly forbidden to reach into the suspension device and into other rotating machine parts.
  c. If the bine is not pulled in, under no circumstances should you grab it (to help it along) with your fingers or hand.
  d. Make sure that no one in the hanging area can get entangled with bines and be dragged along.
  e. Do no step on or grab hold of bines as they are pulled into the hop-picking system.
  f. Bines can slip out and fall from the suspension device.
  g. Do not step on the elevator belt (at the front of the hop-picking system)!!!

  Stepping on it entails risk of fatal injury (caution: rotating parts inside the machine).

WARNING

Risks from moving parts
Contact with the moving parts of the hop-picking system, in particular the rotating parts inside the machine, can seriously injure persons or cause death.
- Exercise extreme caution when performing tasks involving the moving parts of the hop-picking system.
- Coordinate work with all persons involved and instruct them accordingly.
- Make sure that nobody comes into contact with moving parts.
- Every person working with the hop-picking system must wear the appropriate safety equipment.

WARNING

Failure to observe safety instructions, regulations and measures
There is an enormous risk of injury or death in the machine area if anyone is careless or does not observe safety instructions, and all applicable state and federal accident prevention laws, regulations, and measures. You must always mark the danger zones appropriately and provide employees with continuous instruction (at least once daily).

- The sound level in the vicinity of the hop-picking system is above 70 dB(A). Mark this area accordingly.
- When the hop-picking system is running, hearing protection as well as other protective equipment such as safety shoes, safety goggles, head protection (helmet), safety clothing, etc. must be worn.
- Align the duct of the chopper conveyor fan so that shredded waste does not cause any kind of danger.

WARNING

The hop-picking system has a safety fence that protects against unauthorized and unintentional access. There must be no one inside this safety fence when the hop-picking system is running. Opening a door automatically switches off the hop-picking system (emergency stop status) and the machine comes to a standstill. Do not remove, modify or bypass the safety devices mounted on the doors.

NON-COMPLIANCE MAY RESULT IN INJURY OR DEALTH.

WARNING

For adjusting and entering the machine in operation, a door in the protective fence is equipped with a lock. By unlocking the safety lock, the authorized person can open the door and enter the danger zone for a short time. The key of the lock has to be removed immediately after entering the danger zone; otherwise, the machine is switched of automatically. The control person must not grasp into the machine or protective devices, but only check and adjust by the mobile switching panel. The protective door in the chopper range is not switched free for this controlled access to the danger zone. When opening the door, the machine is switched off. PLEASE NOTE once more that full responsibility for handing out the key and instructing the authorized person lies with the machine operator. The danger zone is left in reverse order.

WARNING

Entering is allowed only with personal protective equipment (helmet, glasses, ear protectors, safety clothes etc.).

Maintenance and repair work must be done only when machine and all moving parts are standing still and when all drives are switched dead. The main switch must be locked (padlock) in order to avoid switching on by mistake !

WARNING

Risks from moving parts

Contact with the moving parts of the hop-picking system, in particular the rotating parts inside the machine, can seriously injure persons or cause death.
- Exercise extreme caution when performing tasks involving the moving parts of the hop-picking system.
- Coordinate work with all persons involved and instruct them accordingly.
- Make sure that nobody comes into contact with moving parts.
- Every person working with the hop-picking system must wear the appropriate safety equipment.

All inspection openings and protective devices must be opened / removed only when machine is switched off (dead and secured against reconnection!

When repairing failures, please note that all (even covered) turning machine elements can go on running although machine is standing still and that live parts can suddenly move.

WARNING

Risk due to accidental reactivation
Unauthorized or unintentional reactivation of the conveyor hop-picking system could result in serious injury or death.
- Secure the hop-picking system against reactivation.
- Cordon off the danger area and mark it with warning signs.

The access to the switchboard must be secured by locking the door(s). It must be accessible only to persons charged in writing by the operator. These instructed persons are responsible for no persons being in dangerous zones, both when machine is standing still and when it is starting again or in operation.

The keys for inspection openings, protective devices and switchboard doors must not be accessible to unauthorized persons. They must always be kept safely by the person instructed by the operator.

The operator resp. the person instructed by him is responsible for the general key being kept safely and carefully. The machine must be started only by persons instructed in writing by the operator of the plant.

WARNING

In order to exclude any risks of a possible danger - due to the installation situation on site -, the operator as responsible person must do an annual danger evaluation and take necessary measures.

All instructions, directions, evaluations etc. must basically be done in writing, also to secure the operator.

The operator must draw up operating instruction for his staff and must instruct them. The operating staff is to be instructed in their language.

03.05 Protective Measures Taken

WARNING

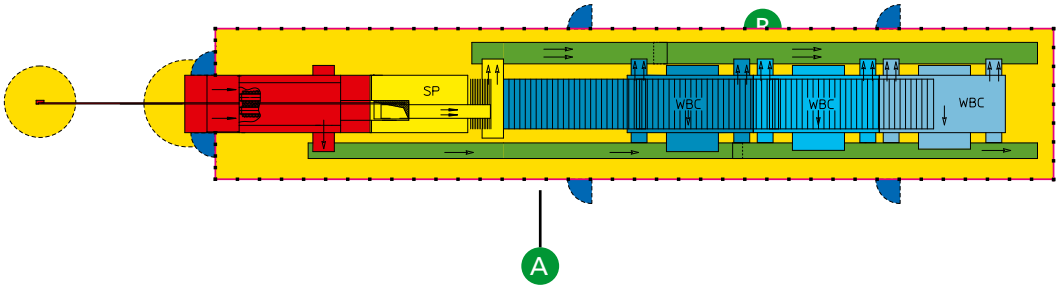
The hop-picking system is equipped with safety devices. The relevant standards (see Declaration of Conformity) were taken into consideration during engineering, design and system execution.

Access points to inspection doors and covers behind which there is a hazard may only be opened with a tool. Switch off the machine beforehand and provide a safeguard to prevent unintentional restarting.

WARNING

Risk due to accidental reactivation
Unauthorized or unintentional reactivation of the hop-picking system could result in serious injury or death.
- Secure the hop-picking system against reactivation.
- Cordon off the danger area and mark it with warning signs.

03.05.01 Complete, Standardized Machine with Safety Zones



WARNING

Separated Danger Zone
Acc. to CE-Directives, a protective fence shall / must be installed around danger zone of the machine.

Protective Fence - Barrier

Doors 1-5 with safety switch. When opening the door, the machine is switched off. It cannot start automatically again. Door 3 with additional key switch for an instructed person entitled to access.

A Hop exit belt can be placed left or right hand.

B Rubber belt can be placed left or right hand.

Open part - danger zone with protective claddings directly on the machine.
Remark: The operating staff must be instructed. Unauthorized access **of third persons** is not allowed.

03.06 Noise

Hop-picking systems are designed according to customer-specific requirements. There is therefore no uniform noise data. During engineering and design, define and implement the necessary measures to satisfy the noise level specifications laid down in the order.

Regardless of the noise reduction measures, wear hearing protection when the machine is running!

03.07 Lightning Protection and Grounding

The hop-picking system and all mounted parts (safety fence, conveyor belts, chopper, air hoses, etc.) must be fitted with appropriate lightning protection pursuant to VDE 0185 T1.

Execution lies within the system operator's scope of responsibility.

4. System Data

See nameplate on the system.

5. Storage, Transport and Installation

05.01 Goods Acceptance, Damage in Transit

Unpack the machine and machine parts in the presence of the carrier and check for completeness and damage using the delivery note.
The carrier must acknowledge damage in transit (date and signature)!
The freight carrier's insurer will reject any subsequent complaints.

05.02 Disposable Packaging Information

The delivery package is purely for transport use. It was quantitatively reduced to the absolute minimum so that high grade parts can be transported and unloaded without being damaged. The material is fully recyclable and can therefore be consigned to a recycling scheme. The recipient of the goods bears the disposal costs.

Alternatively, it is also possible to return the packaging material to us. The contracting body of the goods will bear the costs of the return transport. Please note that the packaging material must not be contaminated and must be delivered separately according to groups.

05.03 Storage and Functional Integrity

If parts are packed in sheets, remove them immediately after delivery. Sheets promote condensation formation and thereby oxidation, especially on galvanized material.

All equipment components and parts must be stored so as to rule out the possibility of spoilage, damage due to soiling, condensation, weather conditions and external influence.

Release the tension from the belts on any belt-driven components during storage, delayed commissioning or idle periods (stoppages longer than 3 months). Move and rotate any parts that turn or rotate such as fans, motors and actuators once a month.

As a fundamental principle, proceed as follows:

- Remove sheets
- Store devices, switch cabinets, drive motors, frequency converters and other electrical components temporarily in a dry and dust-free place protected from the effects of weather.
- Prevent condensation formation on the machine and components, especially in the switch cabinet and terminal boxes
- Ensure the functional integrity of components and mounted parts
- Follow additional operating and maintenance instructions of component manufacturers.
- Protect components and devices from soiling even when assembling the system.
- Protect the switch cabinet from moisture even during machine downtimes (after a harvest until the next harvest).
- Preprogrammed data can be lost in case of longer downtimes (≥ 12 months) when there is no voltage on the CPU, controllers and frequency converters. Reprogramming must be performed when commissioning or restarting. It is therefore advisable that you do not switch off the control voltage or that you apply voltage to the switch cabinet for a brief time (around 1 hour) once every three months.

05.04 Transport of the Machine, Assemblies and Dismantling Parts to the Building Site

NOTICE

Machine components may only be transported to the installation location. Do not overturn or rotate them on the longitudinal axis since this can cause damage to the components.

WARNING

Risk when transporting the equipment
Suspended loads can tip over or fall. Tipping or falling loads can cause severe injury or death.
- Always move the equipment with great care and caution.
- When transporting any equipment with a forklift, make sure that the fork length reaches beyond the full load range.
- Never position yourself or anybody else under suspended loads.
- A complete hop-picking system or machine parts may only be transported with low-loader trailers/transport axles and moved to the place of operation with castors under the base frame.
- Keep unauthorized persons out of the danger area.
- Ensure the area is well lit.
- Only move loads under supervision.

05.05 Foundation

Correct assembly of the system and devices requires a level horizontal ground. The foundation must undergo structural calculation and be executed accordingly.

05.06 Space Requirement for Operation and Maintenance

WARNING

There must be appropriate space available for the hop-picking system.

If there are no official specifications for maintenance intervals, the required space must be a free distance of 2.0 m between the hop-picking system and the adjoining obstacle (wall, partition, etc.).

Make sure that escape routes and maintenance openings are unobstructed when laying supply lines and cables (electrical, compressed air, etc.).

05.07 Equipotential Bonding

WARNING

- Do not remove pre-assembled equipotential bonding.
- To prevent electrostatic charging and electrocution, bypass all electrically non-conductive connection points with equipotential bonding.
- Local equipotential bonding measures must include all metal parts of the hop-picking system.
- Ground the switch cabinet, the hop-picking system, all mounted parts and work and maintenance platforms according to the latest engineering standards (equipotential bonding/foundation earth terminal).

05.08 Fans

WARNING

Especially selected (and to some extent project-related) fans are used for the hop-picking system. Do not carry out any modifications on the fan inlet. Regular checks, cleaning and maintenance need to be performed here.

Do not make any changes!!!

05.09 Switch Cabinet

The switch cabinet or switch cabinets are fabricated according to customer-specific and system-specific data and tested internally. Mounted parts are fully operational.

WARNING

Switch cabinet risks
Ensure that sensitive mounted parts are not exposed to vibrations,moisture or humidity during transport, storage or installation. Install the switch cabinet in an area protected from weather.When doing so make sure that there is a solid and sturdy subgrade for fastening.

The controller (CPU) with the control software was developed by WOLF and is the intellectual property of WOLF. Copyright infringements will be prosecuted.

The software is protected against third-party interference. Disregarding the protection and modifying the controller invalidate any warranty claim and the Declaration of Conformity.

05.10 Electrical Connection

05.10.01 General Information

DANGER

Risk of death from electrical current
Contact with live components and any exposure to electrical currents possesses a risk of death. Electric components that are switched on can move uncontrollably. Serious injury and death are a result.
- Work on the electrical system may only be performed by authorized qualified electricians.
- Before beginning to work on the electrical system, switch off the electrical power supply and secure it against being switched on.
- Cordon off the danger area and mark it with warning signs.

Important!
Please refer the electrician performing work to this operating and maintenance manual.

NOTICE

When connecting the machine to the power grid, be absolutely sure that the direction of rotation indicated on the drive elements is observed!

Carry out the first operational check only in manual mode! Even a few motor rotations in the opposite direction will cause damage!

WARNING

Prior to commissioning the machine, attach all safety devices correctly and lock them with the special key (square key). A specialist company (dealer) must install as well as test and pass (acceptance report) the machine according to safety requirements.

WARNING

Retighten all screw clamping points of the electrical system during commissioning and maintenance.

05.10.02 Standard Motors

Safety instructions

WARNING

Electric motors are equipment with hazardous, live and rotating parts during operation. Physical injury and property damage can therefore be caused in case of incorrect operation, incorrect application or inadequate maintenance.

- For this reason, only electricians may work on electric motors!
- Perform all work on electric motors only in the de-energized state!
- Secure electric motors to prevent accidental restarting and spontaneous start-up!

Follow safety instructions!

Always use suitable cable entries that must correspond at least to protection class IP 54. Protect motor terminals from water penetration. Open the terminal box cover only when wiring the connecting cable!

On-site requirements

a. Electrical supply cable pursuant to applicable state and federal laws, regulations and standards and regulations of the responsible power utility. Execute and confirm professional electrical installation pursuant to applicable state and federal laws and regulations.
- Connection of the power cable must be carried out carefully by an expert.
- Adjust the supply cable cross-sections to the rated current.
- Provide strain relief fittings for the connecting cables.
- Cable entries must correspond to at least protection class IP 54.
- It is essential to connect earth conductors to the marked grounding screw according to VDE 0100.
- Use the original gasket when closing the terminal box.
- Close unneeded entries so that they are dust-proof and watertight (minimum IP 54).

b. The voltage indicated on the nameplate and in circuit diagrams must be present on the switch cabinet infeed. Voltage deviations greater than +/- 6 % lead to malfunctions. Three-phase AC motors can be used in the range of 400 V + 6 % / -10 % in accordance with DIN/EC 38.

c. Prior to commissioning, carry out the tests specified in DIN VDE 0100 part 610, DIN VDE 0105, DIN VDE 0800-1, DGUV Regulation 3.

Commissioning the fan motor:

1. Implement fuse protection correctly (VDE 100).
2. Measure motor current consumption (ampere).
3. Install motor protection. The setting value must be under the rated current consumption indicated on the nameplate.

NOTICE

Do not use overloaded motors! Disregarding this can lead to damage and will invalidate warranty services.

05.11 Safety-Related Components and Monitoring Equipment

The device and the system have safety-related components that make a significant contribution to the system's safety. Some of them must be installed during installation or by the operator. These components are subject to deterioration and must be replaced after a given time. The following components must be listed here:

05.11.01 Switch Cabinet

WARNING

Safety-related components are built into the switch cabinet. These must undergo a preventive replacement cycle. Replace the CPU after 20 years at the latest (even in case of correct operation).

Replace the associated relays, contactors and emergency stop/trigger unit after 10 years.

WARNING

Risk associated with non-original replacement parts
The use of non-original replacement parts that have not been approved is strictly prohibited. Non-compliance may result in severe injury or death.
- Only use original replacement parts or replacement parts approved by WOLF.

05.11.02 Controller (CPU)

The control software is the intellectual property of WOLF. Copyright infringements will be prosecuted.

WARNING

The software is protected against third-party interference. Disregarding the protection and modifying the controller invalidate any warranty claim and the Declaration of Conformity.

Replace the CPU after 20 years at the latest (even in case of correct operation).
Replace the associated relays and contactors after 10 years.

05.11.03 Frequency Converter (Option)

WARNING

Replace the frequency converter after 15 years at the latest (even if it is in good condition).

05.11.04 Tamper-Proof Limit Switches

WARNING

The tamper-proof limit switch interrupts the mains voltage when opening a door or flap and the hop-picking system switches off. The component is exposed to certain operating frequencies and dust. For this reason, carry out regular operational checks. Replace the limit switch every 10 years even if only very low operating frequencies occur.

05.11.05 Emergency Stop Buttons and Control Gear

WARNING

Install the emergency stop buttons in the specified areas that are hazardous for the operator.

We recommend that the frost protection thermostat be replaced every 10 years. Carry out regular operational checks. Replace the switching element every 10 years even if only very low operating frequencies occur.

6. Before Commissioning

Please read these instructions carefully before first commissioning of the machine

⚠ WARNING The executing electrician must be informed of these operating and maintenance instructions.

NOTICE When connecting the machine to the power network, in any case pay attention to the right turning direction which is indicated at the driving elements !
Do first functional control in manual operation only.

Already few revolutions into the opposite direction will cause damages !

⚠ WARNING **Before** commissioning of the machine, all safety devices must be attached properly and locked with the special key (square key). The machine must be installed acc. to safety requirements by the special company (dealer) and accepted (acceptance minutes).

No foreign bodies **must be inside the machine.**

⚠ WARNING **Before** operating the main switch on the switchboard, the operating staff must be warned by a by a warning signal that the machine is going to be put into operation.

The **switchboard** must **only be opened with the main switch being in position "0".**

Only **a qualified electrician is** allowed **to open the switchboard.**
cf: Switchboard

⚠ WARNING

- **Adjustments at the operating elements with running machine**
  - must be done only by the machine operator !

- **Maintenance and cleaning:**
  - Maintenance and cleaning work must be done only when machine and all moving parts are at still stand and when all drives are powered off;
  - Lock main switch (padlock) in order to prevent a switching on by mistake !

The switchboard has to be secured from unauthorized access by a padlock at the main switch.

⚠ WARNING The commissioning of hop-picking systems may only be carried out by authorized, trained and expert persons with a professional qualification in electrical engineering/mechatronics.

During commissioning, check the:

- Correct setup of the hop-picking system
- Correct installation of the insertion device (insertion arm)
- Correct installation of the conveyor belts
- Correct installation of the bine chopper and cleaning fan
- Clean condition of the hop-picking system, ensuring that no objects have been left on or inside it.
- Availability of electrical equipotential bonding
- Condition and execution of electrical wiring
- Controller and control commands
- Setting of operating parameters
- Comparison and recording of the drive power of motors using a test record
- Availability of nameplates.

As a rule, commissioning is carried out by an employee of the dealer (contracting partner) or, depending on the order situation, by WOLF Anlagen-Technik GmbH & Co. KG.

7. Training of Operators

The operator of the hop-picking system must select suitable personnel for training and ensure they are available. **Training must be carried out in the local language** of the operator. **Untrained personnel** must not operate or **start up** the system.

WARNING

Risk due to unqualified personnel
Only trained expert personnel of legal age without any physical limitations (fully competent persons) are allowed to operate the hop-picking system. The operators must be instructed at least once every six months about accident prevention regulations, the correct operation of the machine, any possible health hazards, the course of action if there is danger of fire, the operation of fire extinguishing equipment, etc. Each individual who is assigned to do work on or with the equipment must be properly trained in the state of operation and must have read and understood the operator's manual prior to commencing work on or with the equipment.

Persons present during training must be entered and documented by name in a list.

8. Operating Information

08.01 Emergency Stop Switch (Option)

WARNING

Activate the emergency stop button only in extreme emergencies.

Do not use this safety switching device to stop the hop-picking system under normal circumstances. The entire system is isolated from the power grid when the system is shut down through the emergency stop button. Only a safety technician may restart the machine! As an option, emergency stop buttons can be equipped with a locking key. The key needed to unlock the emergency stop lock must likewise be kept only by the safety technician.

WARNING

The emergency stop buttons are located in positions specified by the operator.
There must always be emergency stop buttons in the following locations:

- On the suspension device of the hop-picking system
- On the control panel
- On the switch cabinet
- On every door equipped with a key switch.

08.02 Procedures

- Only adults without any physical limitations and who have been thoroughly trained by the machine operator verbally and in writing may start the machine. It is absolutely necessary that training also includes current accident prevention regulations.
- The operator must draw up a relevant instruction manual for operators. Operators must be trained in their local language.
- Carry out all instructions, assignments, assessments, etc. in writing at all times; this also serves to protect the operator.
- The hop-picking system may only be switched on if it is ensured that there is no one in the danger zone. There must be no crops in the machine during a standard start.
- The hop bine is hung up in the holding fixture of the insertion device. At a rule, only one bine is hung up on the device at any time.
- Take the bines from the stack so that the hop bines are not tied down or bunched up.
- Loose hop stalks and hop cones are conducted through the feeding belt during the standard picking process of the machine.
- Adjust the picking output to the hop varieties, condition of the bine (strong/weak) and degree of ripeness of the hops.
- The hop-picking system may only be switched off if it is ensured that there are no crops in the machine.
- Keep the work environment clean at all times! Hop stalks and waste lying around prevent a stable situation and lead to accidents. Furthermore, they lead to unnecessary crop waste.

You will find more information under "Operation".

WARNING

To rule out residual risk of danger due to the setup situation on site or modifications, the operator is responsible for carrying out an annual risk assessment and taking the necessary measures to prevent accidents.

08.03 Accessing the Danger Zone of the Hop-picking system

⚠WARNING

There is a door in the safety fence with a lock to allow access to the machine and for adjustment work. The authorized person can open the door and enter the danger zone for a brief period by unlocking the safety lock. The key for the lock must be removed immediately after entering the danger zone. The control person must **not reach into the machine** or remove safety devices. Only observations and settings may be carried out via the mobile control panel. The safety doors in the chopper area are not unlocked during this controlled entry to the danger zone. When the doors open the machine switches off and enters the emergency stop function.

It is explicitly pointed out here again that the hop-picking system operator is fully responsible for handing over the key and training the authorized person. Follow the steps to exit the danger zone in reverse order to entering.

⚠WARNING

Maintenance and repair work may **only be carried out when the machine, all movable parts and de-energized drives are at a standstill**. The mains isolator must be locked (padlock) to prevent inadvertent activation!

All inspection openings and safety devices may only be opened or removed in the de-energized state and when the machine is secure against restarting!

⚠WARNING

Remember that in case of malfunctions and troubleshooting, all machine parts, even those that rotate and are concealed, can continue to run or parts can still be live and can trigger jerky movements despite the fact that the machine is at a standstill.

⚠WARNING

Secure the access point to the control box area by locking the doors(s). This access point is only accessible to persons who have been appointed in writing by the operator. These trained persons are responsible for ensuring that there are no unauthorized individuals in the danger zone, even when the machine is at a standstill, and when the machine is restarting and operating.

The keys for the inspection openings, safety devices and the doors of the control box area must not fall in the hands of unauthorized individuals. The safekeeping obligation and duty of care for the general key fall within the responsibility of the operator or the machine operator/trained person.

9. Commissioning

09.01 Safety Indications

- During the fist commissioning, check turning of the motors in manual mode (see manual mode).
- Work on driving motors and operating plants must be done by a qualified electrician, only, acc. to the valid local regulations (Germany: acc. to VBG 4).
- Electric motors are operating plants with dangerous, live and rotating parts during operation. In case of wrong operation, improper use and insufficient maintenance, they can cause health or material damages.
- Before each maintenance work, switch off main switch and secure it against reconnection.

09.02 Switchboard

WARNING The wiring of the machine must be done **by a qualified electrician, only !**

The switchboard must be protected from humidity, especially also when machine is standing still (after the harvest until next season) !

DANGER **Risk of death from electrical current**
Contact with live components and any exposure to electrical currents possesses a risk of death. Electric components that are switched on can move uncontrollably. Serious injury and death are a result.
- Work on the electrical system may only be performed by authorized qualified electricians.
- Before beginning to work on the electrical system, switch off the electrical power supply and secure it against being switched on.
- Cordon off the danger area and mark it with warning signs.

09.03 Overview Touch Panel

09.04 Initial Commissioning

- Initial commissioning must be carried out by a WOLF service technician

09.05 Basic Functions

- After turning on the main switch, the touch panel requires about one minute for a self-test.
- After a successful self-test of the touch panel, the start menu will appear.

09.06 Switching on

Switch the main switch on the switchboard to position "1" and release the emergency stop system and close all protective screen doors. The device must always be stressed sufficiently.

09.07 System Auto - Automatic Mode System

WARNING

The hop-picking system operator must ascertain before switching on the machine that there are no persons, animals or other objects in the protected area. During operation only trained persons are permitted to linger in the protected area, provided all safety precautions are respected. For more information, please refer to the separate clarifications in "Safety Fence"! Failure to follow these instructions could result in serious injury or death.

Fig. 1 - "release" Button

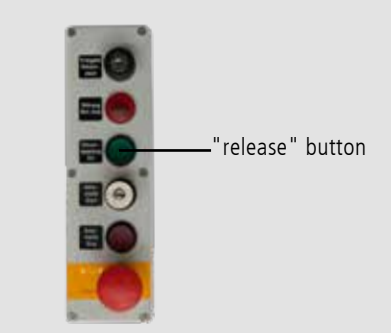
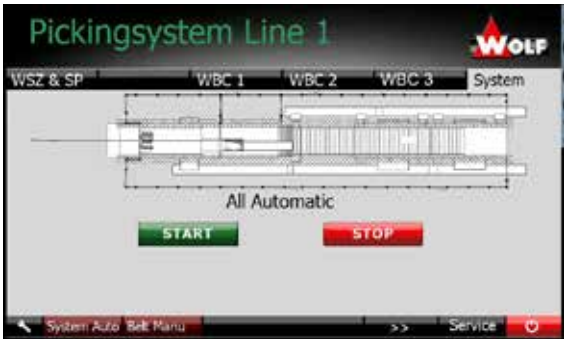


Fig. 2 - "System Auto" menu



In the "System Auto" menu the system is started fully automated.

To get into the menu, press System .

- **Starting**:

  Press START in the touch panel and the green "release" button (see Fig. 1) at the same time

  or:

  Press System Auto at the bottom of the display in the touch panel and the green "release" button (see Fig. 1) at the same time.

  The machine starts automatically after a warning-signal and the button in the touch panel turns red.

- **Stopping**:

  By pressing on STOP or ⏻ in the touch panel, the system is switched off again.

  (Caution the machine runs for a set time so that it can empty itself.)

09.08 System Auto Manu - Manual Automatic Mode System

WARNING

The hop-picking system operator must ascertain before switching on the machine that there are no persons, animals or other objects in the protected area. During operation only trained persons are permitted to linger in the protected area, provided all safety precautions are respected. For more information, please refer to the separate clarifications in "Safety Fence"! Failure to follow these instructions could result in serious injury or death.

Figure 1 - "release" button

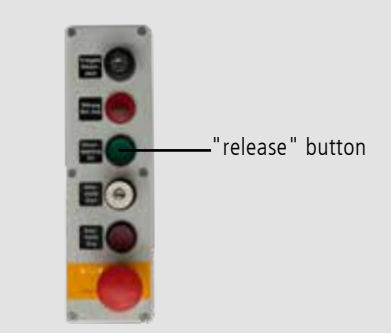
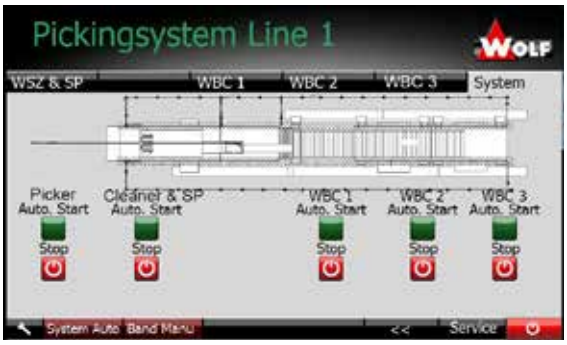


Figure 2 - "System Auto Manu" menu



In the "System Auto Manu" menu single system parts are started or stopped automatically.

To get into the menu, press first System , then >> .

- **Starting**:

  Press  in the touch panel at the desired system part and the green "release" button (see Fig. 2) at the same time

  The machine starts automatically after a warning-signal.

- **Stopping**:

  By pressing on  the desired system part is switched off again.

  (Caution the machine runs for a set time so that it can empty itself.)

Stopping all Automatic Operations simultaneously

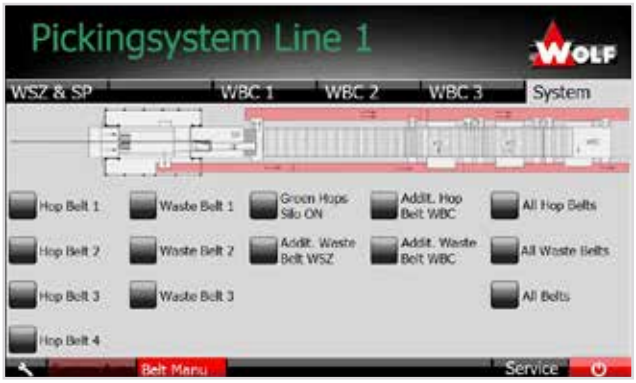
By pressing on  all automatic and manual operations are stopped.

(Caution the machine runs for a set time so that it can empty itself.)

09.09 Belt Manu - Manual Mode for Belts

WARNING

The hop-picking system operator must ascertain before switching on the machine that there are no persons, animals or other objects in the protected area. During operation only trained persons are permitted to linger in the protected area, provided all safety precautions are respected. For more information, please refer to the separate clarifications in "Safety Fence"! Failure to follow these instructions could result in serious injury or death.



In the "Belt Manu" menu single conveyor belts of the system are controlled.

To get into the menu, press first System , then Belt Manu , the button turns red.

- **Starting/Stopping**:

  Press and hold in the touch panel at the desired system part, the respective belt starts.

  By releasing the button, the belt stops again (tipping mode).

  By pressing on Belt Manu you get back in the "System Auto" menu.

09.10 SP Auto - Automatic Mode STARPICKER

WARNING

The hop-picking system operator must ascertain before switching on the machine that there are no persons, animals or other objects in the protected area. During operation only trained persons are permitted to linger in the protected area, provided all safety precautions are respected. For more information, please refer to the separate clarifications in "Safety Fence"! Failure to follow these instructions could result in serious injury or death.

Figure 1 - "release" button

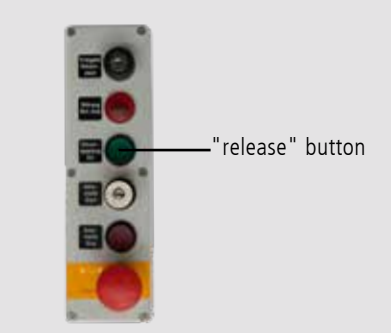
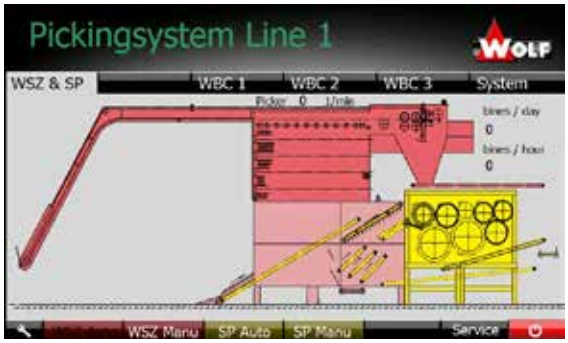


Figure 2 - "WSZ & SP" menu



In the "WSZ & SP" menu the STARPICKER is started fully automated.

To get into the menu, press WSZ & SP .

- **Starting**:

  Press SP Auto at the bottom of the display in the touch panel and the green "release" button (see Fig. 1) at the same time.

  The machine starts automatically after a warning-signal and the button in the touch panel turns yellow.

- **Stopping**:

  By pressing on SP Auto the machine is switched off again.

  By pressing on all automatic and manual operations are stopped.

  (Caution the machine runs for a set time so that it can empty itself.)

09.11 SP Manu - Manual Mode STARPICKER

WARNING

The hop-picking system operator must ascertain before switching on the machine that there are no persons, animals or other objects in the protected area. During operation only trained persons are permitted to linger in the protected area, provided all safety precautions are respected. For more information, please refer to the separate clarifications in "Safety Fence"! Failure to follow these instructions could result in serious injury or death.

Figure 1 - "WSZ Manu 1" menu

Figure 2 - "SP Manu" menu

In the "SP Manu" menu single parts of the STARPICKER SP are controlled.

To get into the menu, press first WSZ & SP , then SP Manu

and then >> , the button "SP Manu" turns yellow.

Forward / Reverse Operation

- **Starting / Stopping**:

  Press and hold in the touch panel at the desired system part, the respective part starts.

  By releasing the button, the part stops again (tipping mode).

Continuous Forward

- **Starting**:

  Press in the touch panel at the desired system part, the respective part starts.

- **Stopping**:

  Press in the touch panel at the desired system part, the respective part stops.

  By pressing on all automatic and manual operations are stopped.

By pressing on << you get in the "WSZ Manu 1" menu.

By pressing on SP Manu or you get back in the "WSZ & SP" menu.

09.12 WSZ Auto - Automatic Mode WSZ Picker

WARNING

The hop-picking system operator must ascertain before switching on the machine that there are no persons, animals or other objects in the protected area. During operation only trained persons are permitted to linger in the protected area, provided all safety precautions are respected. For more information, please refer to the separate clarifications in “Safety Fence”! Failure to follow these instructions could result in serious injury or death.

Figure 1 - "release" button

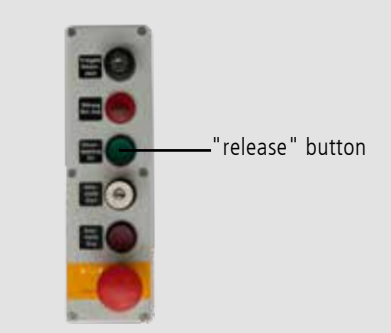
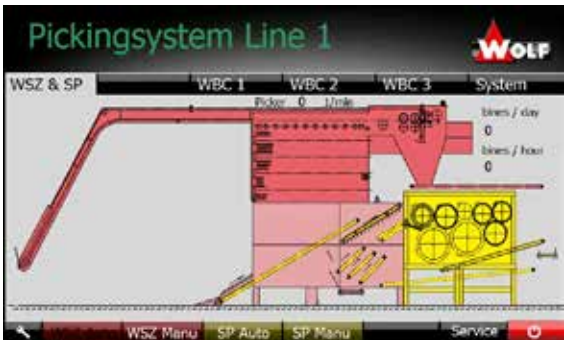


Figure 2 - "WSZ & SP" menu



In the "WSZ & SP" menu the WSZ Picker is started fully automated.

To get into the menu, press WSZ & SP .

- **Starting**:

  The "SP Auto - Automatic mode STARPICKER" (see item 3.11) has to run first, to start the "WSZ Auto - Automatic mode WSZ Picker".

  Press WSZ Auto at the bottom of the display in the touch panel and the green "release" button (see Fig. 1) at the same time.

  The machine starts automatically after a warning-signal and the button in the touch panel turns red.

- **Stopping**:

  By pressing on WSZ Auto the machine is switched off again.

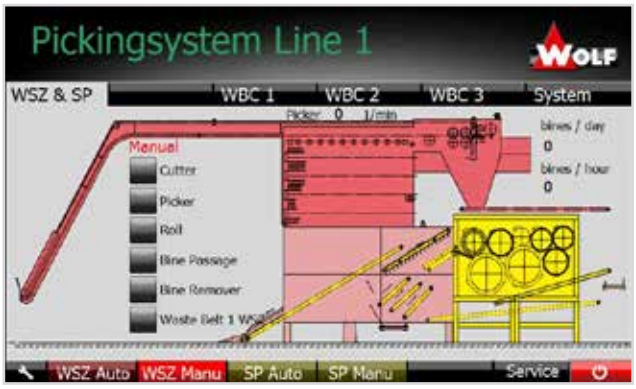
  By pressing on all automatic and manual operations are stopped.

  (Caution the machine runs for a set time so that it can empty itself.)

09.13 WSZ Manu - Manual Mode WSZ Picker

WARNING

The hop-picking system operator must ascertain before switching on the machine that there are no persons, animals or other objects in the protected area. During operation only trained persons are permitted to linger in the protected area, provided all safety precautions are respected. For more information, please refer to the separate clarifications in "Safety Fence"! Failure to follow these instructions could result in serious injury or death.



In the "WSZ Manu 2" menu single parts of the WSZ Picker are controlled

(also possible in the " WSZ Manu 1" menu, see item 3.12).

To get into the menu, press first WSZ & SP , then WSZ Manu ,

the button turns red.

- **Starting / Stopping**:

  Press and hold in the touch panel at the desired system part, the respective part starts.

  By releasing the button, the part stops again (tipping mode).

By pressing on WSZ Manu you get back in the "WSZ & SP" menu.

09.14 WBC Auto - Automatic Mode Wind Belt Cleaner

WARNING

The hop-picking system operator must ascertain before switching on the machine that there are no persons, animals or other objects in the protected area. During operation only trained persons are permitted to linger in the protected area, provided all safety precautions are respected. For more information, please refer to the separate clarifications in “Safety Fence”! Failure to follow these instructions could result in serious injury or death.

Figure 1 - "release" button

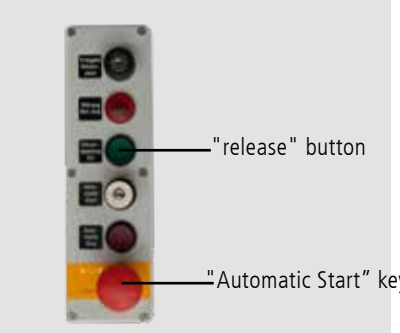
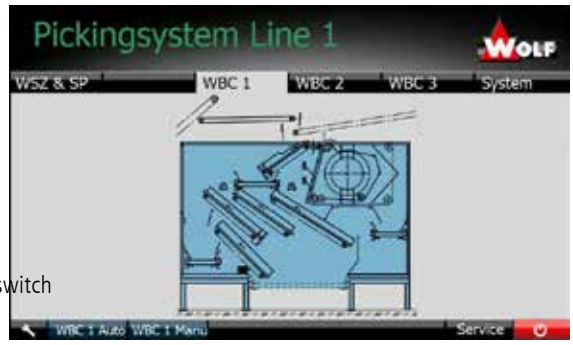


Figure 2 - "WBC1" menu



In the "WBC 1" menu the wind belt cleaner WBC 1 is started fully automated.
In the "WBC 2" menu the Wind belt cleaner WBC 2 is started fully automated.
In the "WBC 3" menu the Wind belt cleaner WBC 3 is started fully automated.

Example "WBC 1 Auto - Automatic Mode Wind belt cleaner 1"

To get into the menu, press WBC 1 .

- **Starting**:

  Press WBC 1 Auto at the bottom of the display in the touch panel and the green "release" button (see Fig. 1) at the same time.

  The machine starts automatically after a warning-signal and the button in the touch panel turns blue.

- **Stopping**:

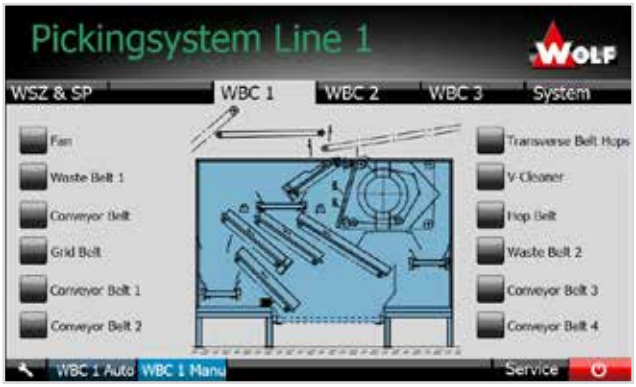
  By pressing on WBC 1 Auto the machine is switched off again.

  By pressing on all automatic and manual operations are stopped.
  (Caution the machine runs for a set time so that it can empty itself.)

09.15 WBC Manu - Manual Mode Wind belt cleaner

WARNING

The hop-picking system operator must ascertain before switching on the machine that there are no persons, animals or other objects in the protected area. During operation only trained persons are permitted to linger in the protected area, provided all safety precautions are respected. For more information, please refer to the separate clarifications in "Safety Fence"! Failure to follow these instructions could result in serious injury or death.



In the "WBC 1 Manu" menu single parts of the Wind belt cleaner WBC 1 are controlled.

In the "WBC 2 Manu" menu single parts of the Wind belt cleaner WBC 2 are controlled.

In the "WBC 3 Manu" menu single parts of the Wind belt cleaner WBC 3 are controlled.

Example "WBC 1 Manu - Manual Mode Wind belt cleaner 1"

To get into the menu, press first WBC 1 , then WBC 1 Manu ,

the button turns blue.

- **Starting/Stopping**:

  Press and hold on the touch panel at the desired system part; the respective part starts.

  By releasing the button, the part stops again (tipping mode).

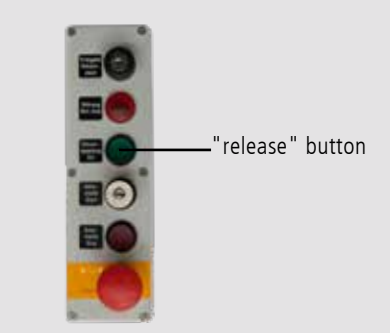
By pressing on WBC 1 Manu you get back in the "WBC 1" menu.

09.16 Emergency Operation Mode

WARNING

The hop-picking system operator must ascertain before switching on the machine that there are no persons, animals or other objects in the protected area. During operation only trained persons are permitted to linger in the protected area, provided all safety precautions are respected. For more information, please refer to the separate clarifications in “Safety Fence”! Failure to follow these instructions could result in serious injury or death.

Figure 1 - "release" button



- **Starting**:

  In the switchboard, hold down the green "release" button and, at the same time, press the key switch "Automatic Start" in position 1.

  (Warning the machine is operated in emergency mode, no speed change possible. All engines run at the previously set speed)

- **Stopping**:

  By re-pressing the key switch "Automatic Start" in position 0, emergency mode is switched off.

  (Caution the machine runs for a set time so that it can empty itself.)

09.17 Opening Safety Fence Doors with Associated Key Switch

WARNING

The function of the safety fence is to shield persons from sources of danger. The safety fence has integrated gates for setting, cleaning and inspection work. These access gates are equipped with tamper-proof limit switches to keep unauthorized persons out; some have a key switch as well.

WARNING

When entering settings and making adjustments on the hop-picking system it is necessary to enter the danger zone.

CAUTION: RISK TO LIFE!!!

Access may only be permitted to persons who are especially trained for these jobs, are familiar with the dangers and have received special safety instruction for this.

09.17.01 Entering the Danger Zone

WARNING

- Place the key switch in the lock, turn to the right (timer starts) and unlock the safety doors.
- Open the safety doors and pass through.

  CAUTION! Make sure that no one is following the authorized person.
- Close the safety doors immediately after entering, lock them and pull out the key.

The authorized person must carry the key on his or her person whilst in the danger zone and must not give it to a third party.

Caution: if the doors are open for longer than 10 seconds, the machine switches automatically to emergency stop mode.

09.17.02 Exiting the Danger Zone

WARNING

- Place the key switch in the lock, turn to the right (timer starts) and unlock the safety doors.
- Open the safety doors and pass through. CAUTION! Make sure that no one enters the danger zone.
- Close the safety doors immediately after exiting, lock them and pull out the key.

Caution!
If the doors are open for longer than 10 seconds, the machine switches automatically to emergency stop mode.

09.18 Switching off

1. Switch off the system by pressing  in the touch panel or turning key switch clockwise and wait until all drives have come to a standstill.
2. After ensuring that all drives have stopped switch the main switch, located in the switching cabinet, to "0".

09.19 Switching off with Emergency-off Switch

3 emergency stop switches are installed in the complete system, one on the switchboard, one on the touch panel and one at the front of the bine feeder head. These are to be used in emergencies not for switching off the machine normally.

All electric current in the system is immediately cut off by pressing the emergency stop switch.

WARNING

Caution the overrun times of the various belts are not maintained, as the machine is switched off immediately. Danger rotating parts can still present a risk.

WARNING

Risks from moving parts
Contact with the moving parts of the hop-picking system, in particular the rotating parts inside the machine, can seriously injure persons or cause death.
- Exercise extreme caution when performing tasks involving the moving parts of the hop-picking system.
- Coordinate work with all persons involved and instruct them accordingly.
- Make sure that nobody comes into contact with moving parts.
- Every person working with the hop-picking system must wear the appropriate safety equipment.

WARNING

Risk due to accidental reactivation
Unauthorized or unintentional reactivation of the conveyor hop-picking system could result in serious injury or death.
- Secure the hop-picking system against reactivation.
- Cordon off the danger area and mark it with warning signs.

10. Settings Controls

- By pressing the  button the machine's settings menu is opened.
  The button turns red when the settings menu is opened.
- By re-pressing the  or the  button the machine's settings menu is closed.
- By pressing the  button the preset speed of the corresponding engine can be reduced down to the specified minimum speed.
- By pressing the  button the preset speed of the corresponding engine can be increased up to the specified maximum speed.
- The Bine Remover can be turned on via the  button and turned off via the  button. When the Bine Remover is turned off, a flashing message appears in the touch panel, which denotes that the Bine Remover is deactivated ("Bine Remover off").
- If the numbers become yellow or red, they lie outside of the allowable setting range.
- "Typ" shows the factory setting ("Typical WOLF setting").

- Pressing the arrow button and opens the different settings windows.
- Pressing the numbers display (0) the number pad opens, allowing speed settings to be changed directly.

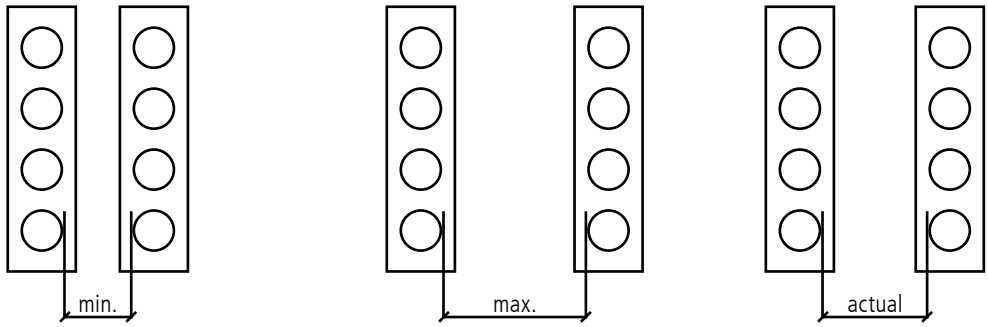
The values can be entered directly via the number pad.

- Apply the changes and return to the main menu by pressing the button.
- By pressing the button incorrect entries can be corrected.
- By pressing the Esc or buttons you can leave the number pad without making changes.

Bine passage settings

- By pressing START, the motor goes to the lowest measured value
- By pressing START, the motor goes to the highest measured value
- After the respective mode (bines/h) is counted out, the minimum and maximum number of bines per hour can be entered.

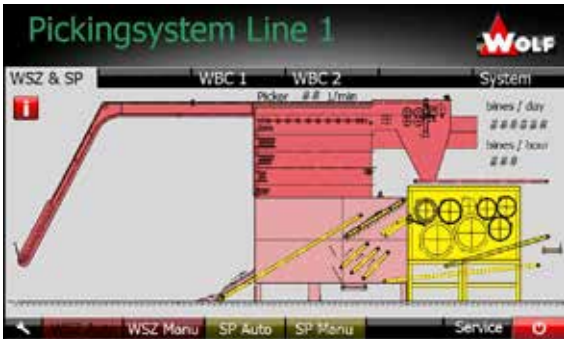
Picking drum position setting



- Go to the minimal distance between the drums
- Go to the maximal distance between the drums
  Enter each measured distance at the minimal, maximal and actual opening between the drums in the control system

11. Service Controls

11.01 Operation Hours / Bine Counter



- The machine's service window is opened by pressing the  button.
  The button turns red when the service window is active.

- The machine's service window is closed by pressing the  or the  button.

11.02 Starting Time

- The machine's service window is opened by pressing the  button.

  The button turns red when the service window is active.

- The machine's service window is closed by re-pressing the  or the button.

- Pressing the arrow button  and  opens the different settings windows.

Here, the starting times for automatic operation of the machine are set in seconds.

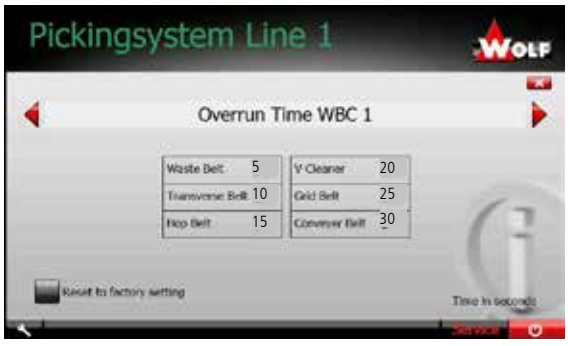
e.g.
Hop Belt runs for 5 sec. -> Rubber Belt runs for 6 sec. -> Hinged Belt runs for 7 sec. -> Belt 1 runs for 8 sec.

- Pressing the numbers display () the number pad opens, allowing time settings to be changed directly.

The values can be entered directly via the number pad.

- Apply the changes and return to the main menu by pressing the  button.
- By pressing the  button incorrect entries can be corrected.
- By pressing the  or  buttons you can leave the number pad without making changes.

11.03 Overrun Time



- The machine's service window is opened by pressing the  button.
  The button turns red when the service window is active.
- The machine's service window is closed by re-pressing the  or the button.
- Pressing the arrow button  opens the different settings windows.

Here, the Overrun Times for automatic operation of the machine are set in seconds.

e.g.

Press  -> after 10 sec. Overrun Time -> Hop Belt stops

after 12 sec. Overrun Time -> Rubber Belt stops

after 15 sec. Overrun Time -> Hinged Belt stops

- Pressing the numbers display () the number pad opens, allowing time settings to be changed directly.

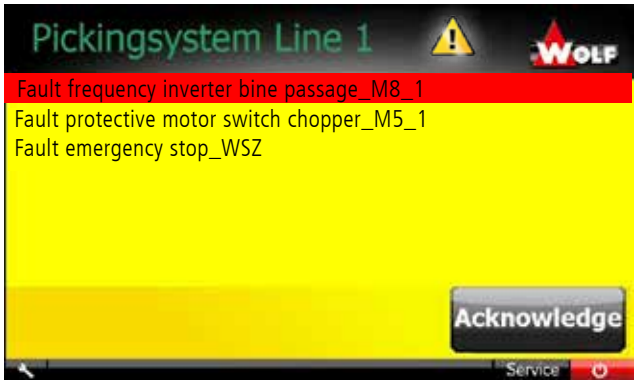
The values can be entered directly via the number pad.

- Apply the changes and return to the main menu by pressing the  button.

- By pressing the  button incorrect entries can be corrected.

- By pressing the  or  buttons you can leave the number pad without making changes.

12. Error alert controls



- If the touch panel shows a  , then a system malfunction has occurred.
- Pressing on the icon opens a new window.
- New alerts are stored in red and old entries are pushed further down.
  All electrical faults are displayed here (motor protection, frequency inverter FU, emergency stop, etc.).
- Troubleshoot machine errors (e.g. fault safety door opened emergency stop) and/or control panel and in the touch panel press the

  Acknowledge button.
- Delete non-pending alerts and close the alert window by pressing the Acknowledge button.

13. Operating Personnel

The number of operating staff depends on the required bine capacity of the machine per hour.

- For a picking capacity **from 600 bines** an hour on, **3 persons** are required at the bine insertion.

WARNING

1 person must be present at the machine as machine operator, as long as the machine is running. The person must be responsible and careful, checking regularly the operation of the picking machine, and **instructed about the rules for accident prevention**.

14. Working Process

The bine is 1.1 pinched into the bine feeder hook. The "transporter" 1.2 at the rotating chain (infinitely adjustable) pulls the bine via the guide pulleys 2.1 through the main picking drum 2.3. It is taken by exit rolls 3.1 and transported into the bine chopper 3.2. The cut bines fall onto the waste belt 3.5 3.6 and are brought outside.

The picking drums separate cones from the bine. These picked pieces fall onto a conveyor belt 4.1, from this onto a folding belt 4.3. Umbels, leaves and stalks fall through the folding belt and onto the rubber belt below. The bulk of the umbels are pre-collected via the rubber belts and run via a conveyor belt directly to the silo. Unseparated material from the rubber belts is transported by a conveyor belt for cleaning. The folding belt transports large stems, leaves and bunches to the Starpicker. This material is placed on a rubber belt which acts as a feeder for the Starpicker. The material is pulled between the rollers 5.1 and 5.2 slowly into the machine. All the material passes through the picking device. The star roller 5.2 must always run 30% faster than the star rollers 5.3, 5.4. The material is held by the stars and 5.7 5.8 harvested by the high-speed picking drums. The cleaner star roller 5.6 cleans the star roller. 5.3 5.4 This stripped stem waste material falls on the pipe belt 5.9 and is transported to the waste belt. Loose umbels, leaves and stems fall on the conveyor belt 4.6 and are transported for the cleaning.

After the Starpicker the materials gets into the band cleaner BC. Here only cones are collected, the residual material is transported to the wind belt cleaner WBC, the cones directly to the silo. The setting of the inclination of the belts decides, how many cones are collected. Depending on the kind of hops the angle of the belts has to be set.

The picked hop is first transported by a conveyor belt to the cleaner. The bulk of the cones are now transported before the cleaning fan for taking care at the green hop pre-separation by conveyor belts out of the machine to the silo. For an optimal separation of single cones and cones with leaves, the pre-separation inclined belts must be adjusted / re-adjusted exactly at the beginning of the harvest, during the harvest and each time the kind of hop is changed.

The hop with a remaining cone proportion of less than 50 % is then roughly separated above the cleaning fan by a pipe belt. The larger leaves and lateral sprouts are led to the top of the grid belt before cleaning and from there to the waste. Cones and small parts fall through the pipe belt to the cleaning fan.

At the inclined suction side of the rotating grid belt of the cleaning fan unit the cones and stem parts roll downwards. By the suction of the fans, the leaves are separated from the cones and brought via grid belt to the waste. The small petals are sucked through the meshes of the grid belt and transported into the worm conveyor .

Remaining pieces of harvest are transported further along the cleaning belts. Here they are cleaned once again, sorted and then passed on depending on their degree of purity.
Already clean cones are given to the hop transport belt and taken by the belt which leads to the kiln.

Pieces without cones come onto the transverse waste belt.

The collected waste from all transverse waste belts of the machine is transported by the outside waste belt into the collection waste belt.

15. Bine Supply

1. The transport cars have to be loaded in the hop garden in a way so that the bines will not get entangled when unloading them.
2. Avoid long waiting periods during the transport of the bines.
   The harvest carriage must not stand in the sun too long.
3. Mostly, the bines are laid on both sides parallel to the insertion arm from the loading car. Avoid that the bines get entangled.
4. Projecting wire ends must be wound around the bine.
5. Thin bine ends must be bent before pinching them.
6. The bine end fed into the bine insertion must not protrude by more than a hand´s breadth to the right side. If several bines are hung at the same time, this will cause disturbances.
7. The bines must be brought into the picker separately and not together with other bines.
   If bines fall down in front of the picker, they must immediately be led back to the bine insertion and inserted once again.
   Avoid inserting complete bines onto belt 4.1. Insert any small pieces collected in front of the picker only from time to time and not in big quantities.

15.01 Maintenance

NOTICE

The **bine insertion arm** 1 is a very stressed part of the machine and must **particularly be taken care of**.

1) The insertion chain is kept stressed by an automatic stressing device.
   In order to assure the function of the stressing device, the sliding plate must be lubricated sufficiently.
   The device must always be stressed sufficiently. If necessary, shorten the chain.

2) Lubricate every day the course of the chain as well as the course of the insertion bows.

3) The profile track with chain drive for the guide pulleys 2.1 has to be greased daily days during the harvest.

4) The exit rolls 3.1 and the worm 3.7 installed in front of them as well as the bine ends remover 3.3 must be checked several times a day and entangled: branches, string and wire must be removed.

The crack between the upper and lower exit rollers 3.1 must be opened approx. 6 mm. Towards the left side, the crack is reduced to 0 and is kept in this way by means of spring pressure.
The left side of the roll has a spring bearing. The guidance must be greased sufficiently. The roll must be movable.
Pay attention that both thin and thick bines are transported further by the exit rolls. The adjustment of the crack between the drums must be adapted to the thickness of the bines. Thus, bines are prevented from being pulled out of the rolls by the picker. Pulled back bines would cause disturbances both in the picker and in the subsequent picker.

Please find enclosed the manufacturer's operating and maintenance instructions for the installed regulating gear.

16. Main Picker

With the right adjustment of the picking drums to each other and the right rotational speed of the picking drums, you can contribute a lot to a harvest without disturbances and to a good harvest quality. The adjustment must be done according to the kind of hop and the weather; mostly, it is necessary several times a day.

Rule of thumb: Open the distance between the drums as far as necessary (manual adjustment 2.3); Reduce the rotational speed of the drums as far as possible (variator 2.4) "As far as necessary" means: Hardly any umbels remain on bines however most of the branches and a large part of the leaves remain.

For further information: (cf: Failure / Repair)

NOTICE

An adjustment is necessary in the following cases:

a) The crack is too **narrow**: The bines leave the machine naked or torn up without lateral sprouts and leaves.
b) The crack is too **wide**: There are still many cones at the bine.

The main drive of the picker is equipped 2.4 with "Variator"-discs . According to the kind of hop, the rotational speed of the picking drums can be adjusted between 100 and 150 rpm Experience shows that easily splintering kinds (for instance "Pearl") or overripe kinds can tolerate only low rotational speeds.

The bine passage through the main picker must be checked. The main picker must be fed evenly with bines on its whole length.

16.01 Adjustment

In order to feed the main picker evenly, the speed of the guide pulleys must be adjusted so that when passing the last roll, a bine piece of about 0,5 m is still in the picking range.

The drive is equipped with a regulating motor, so that it can be adjusted easily.

16.02 Maintenance

NOTICE

Each picking drum has got picking profiles. These are equipped with picking fingers.

They must be **replaced** in case of **damage** by hard things (foreign bodies).

NOTICE

So-called **entanglement** can also occur e.g. due to protruding wire. This is caught in the picking fingers and is wound around these by the rotation of the drum thereby reducing picking performance. **Entanglement of the picking drum by wire or bine pieces must be removed immediately, since otherwise the umbels will be damaged, causing a higher umbel-leaf proportion.** Remove fibre knots from the top of the picking fingers

17. STARPICKER

The material is pulled between the rollers 5.1 and 5.2 slowly into the machine. All the material passes through the picking device. The star roller 5.2 must always run 30% faster than the star rollers 5.3, 5.4. The material is held by the stars and 5.7 5.8 harvested by the high-speed picking drums. The cleaner star roller 5.6 cleans the star roller 5.4 . This stripped stem waste material falls on the pipe belt 5.10 and is transported to the waste belt. Loose umbels, leaves and stems fall on the conveyor belt 4.6 and are transported for the cleaning.

17.01 Maintenance

NOTICE

Each picking drum has got picking profiles. These are equipped with picking fingers.

They must be **replaced** in case of **damage** by hard things (foreign bodies).

NOTICE

So-called **entanglement** can also occur e.g. due to protruding wire. This is caught in the picking fingers and is wound around these by the rotation of the drum thereby reducing picking performance. **Entanglement of the picking drum by wire or bine pieces must be removed immediately since otherwise the umbels will be damaged causing a higher umbel-leaf proportion.** Remove fibre knots from the top of the picking fingers. The star rollers must be checked daily for bine parts and cleaned as required. The chains must be lubricated daily and their tension must be checked.

18. Chopper

The chopper comminutes the picked bines to a length of approx. 5 cm.
A chopper knife has 4 edges, so that the knives can be turned if they are worn out. (Not for sickle-knife chopper)

18.01 Adjustment and Maintenance

If wire and bines are not cut exactly any more, the knives must be re-adjusted.
We recommend to do this once a day.

NOTICE

Before tightening the adjusting screws, the bearing screws must be opened, so that the bearing does not break due to the stress. Re-adjust carefully; often, only 1/4 revolution of the adjusting screw is necessary. **The knives are adjusted correctly, if they touch each other quite slightly.** (not for sickle-knife chopper**; sickle-knife chopper knives must not touch each other!)**

NOTICE

If there are already grooves in the knife edges, grinding or replacing is absolutely necessary.

Failure to observe a/m points (even during the warranty period) will void any warranty.

The shafts of the cutting drum as well as the bine ends remover, which is behind the chopper, must be kept free from branches, string or wire.

WARNING

If a training material other than wire is used, such as PVC string, string made of natural fibers, etc., this will need cleaning several times a day!

CAUTION: FIRE HAZARD!

NOTICE

For installed sickle-knife chopper:

The knives are correctly adjusted when the chopper only makes air noise in idle motion. When the chopper knives are adjusted too tight (beating noise), the knives can break.

When the knife edges have already got grooves, they must definitely be ground or replaced,

otherwise no warranty will be granted (even during warranty period).

The whole chopper skid must be kept free from wound bine parts, string or wire.

When using different training material instead of wire (for example PVC-string), it must be cleaned several times a day!

For adjusting, loosen fixing screws M20. Readjust the knife by the 2 locking screws M10.

NOTICE

For all choppers: Retighten fixing screws after 2 hours working time and check them daily!

WARNING

Do not overlubricate bearings. Carefully remove any excess grease oozing out of the bearing plate. Grease residues/lubricants must not reach the crop.

19. Cleaning WBC

WARNING **Always wear goggles in the cleaning area!**

The pieces transported by the picker on belt are transported to the distribution device .

The cleaning consists of 4 function units:
1) **Pre-separation in front of Cleaning Fan**
2) **Cleaning fan with Petal Saver**
3) **Pre-separation in front of Cleaning Belt**
4) **Cleaning Belt with Stem and Leaves Separator**

These 4 units have the task to separate the cones from leaves and stem parts.
The pure cones as final product are brought out via the transverse hop belts.
Leaves, stems and dirt are transported via the circular grid belt and the cleaning belt to the waste.

19.01 Function Unit 1 – Pre-separation before Cleaning Fan

19.01.01 Adjustment

Depending on kind of hop and weather, the adjustment has to be done several times a day. The belts must be inclined so that possibly all single cones can roll down and cones with stem and leaves are transported further on.

WARNING Crushing hazard when adjusting the wire to tilt the rubber belts.

19.02 Function Unit 2 – Cleaning Fan

19.02.01 Cleaning fan

The cleaning fan is removing loose leaves between the cones. A rake with adjustable inclination and a guide plate at the rotating grid belt have the task to bring the hop to the suction surface in order to prevent it from sliding off too fast. Cones fall onto the belts of the pre-separation . The leaves which are held tight at the grid by the suction are transported upwards by the grid belt and come to the waste via the transport belt .

19.02.02 Air Flow Settings

In the fan connection piece, a damper for regulating the suction capacity is installed. For light (dry) hop, less air is required; therefore close air flap.
For wet hop, more air is required; therefore open air flap. Adjust the rake and the guide plate into the right inclination, so that on the one hand, the hop does not fall directly downwards and on the other hand, there is no congestion. The adjustment depends on the hop quality.

NOTICE **Attention suction cleaner with frequency converter!**
This model has no air cover, the air flow is set in the touch panel.
(Air flow 0 to max 100 % of speed of the fan wings)

WARNING The exhaust air pipes must not be longer than 10 m. For PVC pipes: Lay lower max. length and without kink.
Indication: The exhaust pipes must be aligned so that no harvested material, fine parts or lupulin dust escapes from the picking area of the machine into the environment or in the neighborhood.

19.02.03 Maintenance

NOTICE Because of danger of unbalance, the fan blades shall only be cleaned if they are very dirty. In this case, each fan blade must be cleaned absolutely carefully.
However, the "pipe" in which the fan is running, must be cleaned regularly in order to prevent the fan blade from striking against it.
Daily checks are necessary.

NOTICE Deposits in the "tube" increase the fan resistance and reduce the fan capacity.

In an extreme case, this can cause motor damages.
The grid belt must be cleaned, if very dirty, and its correct stress must be checked.

WARNING Wear goggles when performing adjustment and maintenance

WARNING Do this work only when machine stands still!
Switch off main switch and secure it against reconnection!

WARNING **Risk due to accidental reactivation**
Unauthorized or unintentional reactivation of the hop-picking system could result in serious injury or death.
- Secure the hop-picking system against reactivation.
- Cordon off the danger area and mark it with warning signs.

20. Conveyor Belts

All transport belts consist of weather-proof plastic. They have wooden laths at certain intervals.
The thickness of the wooden laths corresponds exactly to the respective requirement.

20.01 Adjustment and Maintenance

NOTICE One of the both transport rolls of a belt (the one which is not propelled) can be adjusted for determining the belt length and for exact running alignment.
The belts must not be stressed too tightly, in order to avoid damages.

NOTICE Only if they "slip through" or are too slack at the side, they must be reclamped. For this, the bearing stressing angles at the drums which are not propelled are loosened and the locking screws are turned, until the belt is running correctly. **After adjusting, tighten the bearing stressing angles again firmly.**

Daily lubrication of wood slats.

21. Chains

The chains on our machines are roller chains. There are rollers between the individual chain links that move over guide rails when powering the chain wheels and when sliding. These must be lubricated (oiled) regularly.

The chain was sized to the right length. Nonetheless, during commissioning pay attention to the correct chain length and chain tension.

21.01 Maintenance

NOTICE
1. Lubricate the chains during the harvest as required.
2. Remove heavy lupulin dust on the chains.
3. The chains must be kept correctly stressed. Rules:
   - **The chain must be tensioned so that the skipping of teeth on the drive wheels is avoided.**
   - Tensioning is performed - **when the machine is at still stand** - either by tightening the locking screws or by re-adjusting the wooden chain tensioning device.
   - All chains must be lubricated daily
4. After the harvest is completed, clean the chains with a chain cleansing agent and relubricate.

22. V-Belts

Each drive unit is matched to its appropriate components. Always use the V-belt types that match the V-pulley design. The use of different types is not allowed.

NOTICE

IMPORTANT! V-belts must be inspected and retensioned after the first 30 operating hours. Prior to commissioning, ensure that all screws on the clamping device are tightened.

V-belts and V-pulleys must not come into contact with oil, grease or other lubricants.

CAUTION! Do not touch with oily hands!

22.01 Adjustment Instructions

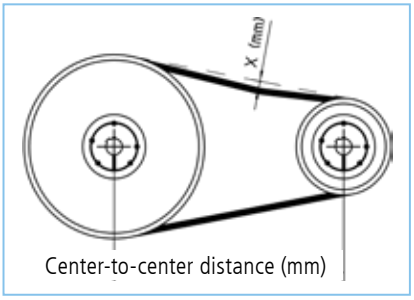
NOTICE

To avoid unnecessary loading of V-pulleys, bearings and the overheating of V-belts, execute faultless alignment and V-belt tensioning!

Attention must be paid to the following:

- The alignment can be changed by modifying the position of V-pulleys on the shaft as well as on the motor carriage.
- The V-belt tensioning can be set by making changes on the motor carriage and/or on the clamping device. Tension V-belts just enough so that no slippage occurs when they start up. It must still be possible to push through the V-belt (variable "x")

Rule of thumb: $x = \frac{\text{Center-to-center distance d (mm)}}{100}$



V-belt profile	Bearing strength per belt in N	Smallest pulley diameter		Indentation depth per 100 mm of axial distance
SPZ	25	>71 >90 >125	>90 >125	2.20 2.05 1.90
SPA	50	>100 >140 >200	>140 >200	2.75 2.55 2.45
SPB	75	>112 >160 >224	>160 >224 >355	3.00 2.55 2.22

22.02 Installation Instructions for Taper Clamping Bushes

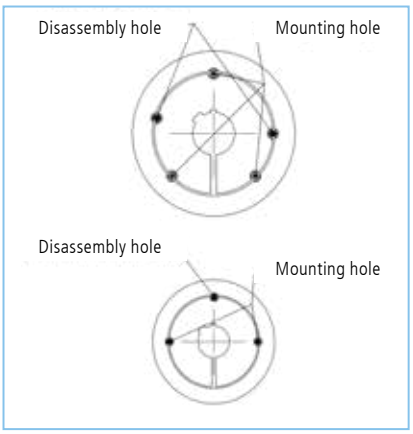
The V-pulleys are partially attached to the shaft with taper clamping bushes. Installation and disassembly may only be performed by specialist personnel especially trained for this purpose.

1. Disassembly

- Unfasten all screws. Depending on the bush size, unscrew one or two screws completely, lubricate with oil and insert into the set bores (disassembly hole).
- Tighten the screw(s) uniformly until the bush eases out of the hub and the V-pulley or the impeller can move freely on the shaft.
- Remove the V-pulley or the impeller with bush from the shaft.

2. Installation

- Clean and degrease all bare surfaces such as boreholes and the cone envelope of the taper clamping bush as well as the boreholes of the V-pulley or the impeller. Insert the clamping bush in the hub and bring all connecting bores (mounting hole) to the cover (half tapped holes must line up with half smooth boreholes)
- Lightly lubricate grub screw (size 1008 - 3030) or cylinder head screws (size 3535 -5050) and insert. Do not yet tighten the screws.
- Clean and degrease the shaft. Push the V-pulley or impeller until the required position on the shaft is reached.
- If using a feather key, place this first in the groove of the shaft. There should be some clearance between the feather key and the keyway in the bore.
- Using a DIN 911 screwdriver, tighten the set screws or cylinder head screws evenly to the torques indicated in the table.
- After a brief period of operation (30 minutes to 1 hour), check the torque of the screws and correct if necessary.



Bush type	Screws		
	Torque [Nm]	Quantity [pieces]	Size [inches]
1008 - 1108	5.7	2	1/4"
1210 - 1615	20	2	3/8"
2012	31	2	7/16"
2517 - 2525	49	2	1/2"
3020 - 3030	92	2	5/8"
3535	115	3	1/2"
4040	172	3	5/8"
4545	195	3	3/4"
5050	275	3	7/8"

22.03 Maintenance Instructions

NOTICE

The V-belt tension must be checked regularly. Replace damaged (torn, frayed, hardened) V-belts immediately. In drives with several V-belts, use only bundled V-belts made by the same manufacturer. Never place old and new V-belts together. If necessary, always replace the complete set! Adjust the tension and alignment as described.

NOTICE

V-belts must be inspected and retensioned after the first 30 operating hours. Prior to commissioning, ensure that all screws on the clamping device are tightened.

23. Ball Bearings

NOTICE

We mostly use ball bearings in the housing.
Normally, the ball bearings must be lubricated after one year of operation. Except bearing points where bine parts gather and where the bine juice penetrates into the bearings.

These points must be lubricated every day.

After commissioning and when changing bearings, relubricate the bearings after 30 operating hours!

NOTICE

Too much grease damages the bearings since overheating can occur. Ensure that used grease can escape freely.

23.01 Maintenance

NOTICE

1. All slowly running bearings (transport belts, passage chains, grid belts, cleaning fan) must be lubricated once a year after the harvest.
2. Faster running bearings (picking drums, subsequent picking drums and shafts) should be lubricated also during the harvest.
3. The ball bearings must be lubricated with **ball bearing grease**, only.

24. Drive Motors

NOTICE

The motors are maintenance-free. They should be freed of dust accumulation only at specific time intervals.
Keep the intake grille of motors on the motor fan side free of deposits.

- Check the direction of rotation.
- Direction of rotation label still readable?
- Check the switching sequence of the motors in case of Y Δ startup.

During commissioning and before each annual start of picking, the power consumption should be measured and compared with data on the nameplate as well as the values on the overcurrent tripping units.

25. Frequency Converter

WARNING

Note! Frequency converters are safety-related components and must be checked regularly, at least once a year during the inspection. Replace the frequency converter every 20 years as a preventive measure!!!

Pay particular attention to the cooling fan of the frequency converters. Check them annually and replace every 5 – 7 years as a preventive measure.

WARNING

The frequency converter(s) is/are parameterized and preset at the factory. Do not modify these settings. The adjustments may only be performed by trained specialist personnel with an electrical engineering qualification, who have relevant knowledge of the operating modes of hop-picking systems and have been trained in how they work. This is usually the WOLF technician and certified partner.

Unauthorized changes to the parameterization and settings can lead to hazards and damage. If applicable, the Declaration of Conformity can also become null and void.

For this reason, third-party changes are not allowed.

Furthermore, follow the special user guide from the manufacturer.

26. Switch Cabinet

The software is protected against third-party interference. Disregarding the protection and modifying the controller invalidate any warranty claim and the Declaration of Conformity.

Make sure there is no condensation in the switch cabinet.

26.01 Maintenance Work in the Switch Cabinet and on Electrical Components

WARNING

Only specialist personnel may carry out work on electrical equipment!

Retighten all terminal screws in the switch cabinet during annual maintenance. Replace relays with a frequent switching operation.

Check the switching functions. Proceed with care since damage to the device can occur in case of careless handling.

27. Maintenance

27.01 Warranty – Maintenance Intervals of Safety Devices

Our warranty obligations are voided if damage appears due to incorrect handling and/or inadequate maintenance.

Deficient maintenance can cause significant defects to the picking machine.

Obey all applicable laws and regulations regarding maintenance intervals for safety devices.

WARNING

Only specialist personnel may carry out examinations of safety devices.

Particular prudence is necessary during maintenance work. Wear personal protective equipment during such work.

WARNING

Maintenance and repair work may only be performed when the hop-picking system, all movable parts and de-energized drives are at a standstill. Lock the mains isolator of the power cable with a padlock to prevent inadvertent activation of the machine. The person responsible for maintenance must safeguard the key during the maintenance period.

WARNING

Risk due to accidental reactivation
Unauthorized or unintentional reactivation of the conveyor hop-picking system could result in serious injury or death.
- Secure the hop-picking system against reactivation.
- Cordon off the danger area and mark it with warning signs.

WARNING

Ensure that all lubricants, oils and greases are food-safe.

27.02 Maintenance Intervals of System Components

NOTICE

The maintenance time for the subsequent points cannot be determined precisely. The periodic maintenance and cleaning of the system depends on the throughput, loading and degree of contamination of the hop-picking system. Always ensure that the machine is in good overall condition.

Timely maintenance prevents system components from damage.

27.02.01 Maintenance Checklist

(Recommendations without guarantee of completeness) This should be amended by the hop-picking system operator pursuant to operational experience and the machine's operating time.

1. Daily checks

- Multiple appraisals of the entire hop-picking system and mounted parts.
- The **bine insertion arm** 1 is a heavily stressed part of the machine and therefore requires particular attention. Sufficiently lubricate the self-clamping mechanism of the insertion chain and the sliding plate (daily).
- Daily lubrication of the **chain track**
- Daily lubrication of the track for the **insertion bracket**
- Lubricate the **profile track** with **chain drive** for the guide pulleys 2.1 daily.
- Check the **exit rollers** 3.1,
- **screw conveyor** 3.6 and **bine remainder removing device** 3.3 several times and remove any entanglements (twigs, bine fibers, string, wire, etc.).
- Check the **picking fingers** several times. Remove fibers on the picking fingers immediately. Replace damaged or broken picking fingers.
- Check the **picking drums** several times and remove entanglements (wire, string, bines, etc.).
- Check the **wind belt cleaners (fans)** 6.8 at least twice daily and clean if necessary.
- **Starpicker:**
  Check the **star rollers** daily for dirt accumulation from bines and clean.
  Lubricate the **chains** daily and check the tension.
- **Chopper:**
  - Check and clean the **feeder shaft** several times.
  - Check and clean the **cleaning fan** several times.
  - Check and clean the cleaning fan **pipe** several times.
  - Readjust the **chopper blade**.
  - Retighten the **fastening screws**
- Apply food-grade lubricants to the wooden slats of the conveyor belts on the supporting surfaces on a daily basis.
- Drive chains:
  - check several times for voltage and abrasion
  - lubricate or apply oil as required
  - lubricate clamping device (wooden clamping block)
- Check the condition and tension of V-belts daily.
- Check the ball bearings daily for dirt and possible entanglements with wire, string and hop bines, and clean.
- Check the drive motors for dirt accumulation.
- Check the dust filters in the frequency converters.
- Check the dust filters in the electrical switch cabinets (aeration and ventilation) and clean if necessary.

2. Weekly checks

- Relubricate the high speed ball bearings and ball bearings exposed to humidity and moisture.
- Replace or turn the chopper blades.
- Check the drive motors (cooling fins) for dirt accumulation and remove the deposits if necessary.
- Clean the dust filters of frequency converters.

3. Annual checks/work

- Thoroughly clean the **entire hop-picking system** (the best time is immediately after harvest).
- Replace defective **picking fingers** and/or **picking drums**.
- Clean the **choppers** thoroughly.
- Replace the **chopper blades**.
- Thoroughly clean the **cleaning fan**.
- Thoroughly clean all **drive motors** (cooling fins).
- Thoroughly clean the **cleaning fan**.
- Thoroughly clean the **pipe** of the cleaning fan.
- After the harvest is completed, clean the **chains** with a chain cleansing agent and relubricate.
- Relubricate all **ball bearings**. Remove surplus oil residues.
- Inspect the **switch cabinet**. Replace relays and contactors with frequent switching cycles. Check all cable clamps for tight fit and retighten.
- Clean the interior of the **frequency converter** and **cooling fan**.
- Replace the **dust filters** in the frequency converters.

28. Cleaning and Care

NOTICE

Every machine needs proper care in order to run without malfunctioning and achieve an appropriate service life.

Cleaning and maintenance must only be performed when the machine and de-energized drives are at a standstill!

Wear personal protective equipment when carrying out cleaning work!

WARNING

Before opening the safety fence or the safety covers, ensure that all moving and rotating parts are at a standstill (e.g. chopper, fan, etc.). Secure the machine against restarting by locking the mains isolator on the switch cabinet with a padlock.

WARNING

Risk due to accidental reactivation
Unauthorized or unintentional reactivation of the conveyor hop-picking machine could result in serious injury or death.
- Secure the hop-picking machine against reactivation.
- Cordon off the danger area and mark it with warning signs.

28.01 During the Harvest

NOTICE

- Grid cylinder and …
- fan elbow pipe must be cleaned daily.
- Picking drums, …
- subsequent pickers,
- choppers and …
- conveyor rollers must be cleaned during every picking break.
- Clean picking drums daily of bine residues
- Clean suction air cleaners (fan and pipe) daily.

28.02 After the Harvest

NOTICE

1. **Clean the whole machine immediately.** Remove leaves, lupulin dust and branches.
   Brush small grid belt. Remove leaves out of the cleaning fan. Clean worm.
2. Check **all picking drums**. Clean picking finger tips. Replace damaged picking fingers by new ones.
3. Clean **all chains** with thinly liquid oil. Remove dirt and lupulin dust.
   After cleaning, lubricate well again. Do not loosen chains.
4. Clean the surface of the electric motors from dust.
   Motors with air cooling: Remove dirt and dust from the air suction sieve.
5. Lubricate all points which have lubrication nipples.
   Remove old grease !
6. Brush properly the grid cylinders (inside and outside).
7. Clean fan pipes.
8. Clean transport belts some weeks after the harvest. Put machine into operation so that dry dirt falls off by itself.
9. Have cutting knives ground, if necessary, and then adjust them again.
10. Remove the pipes of the chopper, so that no rain water can run into the fan of the chopper.

29. Failure / Repair

Faults	Possible Causes	Measures of Remedy
Badly picked bines. The hop is not yet ripe.	(The cones are not firm enough.) Do not harvest unripe bines.	Wait at least until the cones get "closed". The cones are only insufficiently removed.
The crack between the drums is too wide, picking fingers are bent or obstructed, bines are wound.	The rotational speed of the picking drums is too low. Reduce the crack between the picking drums (lower upper picking drum).	Clean the picking fingers. Remove wound bines and above all wound wire or string; replace damaged picking fingers by new ones. Reduce the quantity of bines. Increase moderately the rotational speed of the drums.
The bines leave the machine without lateral sprouts. The cleaning is overloaded	The crack between lower and upper picking drums is too narrow. Lateral sprouts are dragged along and come into the subsequent picker and into the cleaning	Increase the crack between the picking drums (lift upper picking drums). The bines must not leave the machine "naked". They should have as many lateral sprouts as possible, in order to relieve the cleaning. Reduce the rotational speed of drums.
Too many bine parts and stems come on the belt which leads to the kiln	The cleaning belt does not work properly or too many particles get into the cleaning due to a too "sharp" picking (crack to narrow) or due to a too "sharp" adjustment of the subsequent picker.	Incline the cleaning belt a little bit flatter. Check correct adjustment. Adjust correctly the crack. Adjust the subsequent picker less "sharp". Incline the stem separator belt flatter.
The picked cones are too damaged.	The crack between the picking drums is too small or the subsequent picker is adjusted too strongly. Picking fingers are bent or damaged. The hop of already overripe and sheds the leaves.	Clean the picking fingers. Replace damaged fingers by new ones. Adjust correctly the main picker and the subsequent picker. In case of overripe hop, there are less possibilities of remedy, since the petals also defoliate in case of a very "soft" picking.
Too many leaves come on the belt which leads to the kiln	The cleaning fan does not work properly. The air flap is too closed. Exhaust air pipes are too long or PVC-pipes cause too much resistance	The error should only be searched for on the suction cleaner. Adjust the rake and the guide plate at the cleaning fan correctly; open the air hatch; clean the grids.
There is too much hop in the waste.	Either the cleaning fan sucks too much air and thus also too many cones, • or the cleaning belt has been set too flat • or the rake at the cleaning fan is congested with branches.	Close the air flaps at the cleaning fan in order to reduce the suction at the suction surface. Incline the rake at the cleaning fan steeper. Of course, **first** observe the functioning of the cleaning fan and the cleaning belt **before adjusting.**

Our machines are subject to a continuous development. Constructional modifications are reserved. We expressly advise that the different picking machine models, frequent construction modifications and many special models can lead to deviations in the operating instructions.

In case of doubt, please contact the factory.

30. Dismantling and Disposal

Most materials used are fully recyclable and can be consigned to a recycling scheme. Prepare a dismantling plan even before the start of dismantling.

WARNING Dismantling must be carried out by qualified persons in compliance with occupational safety law and whilst wearing personal protective equipment.

30.01 Dismantling and Disassembly

Before the start of disassembly, de-energize the entire system and the units inside it. Have an expert electrician remove all live connection cables.

DANGER **Risk of death from electrical current**
Contact with live components and any exposure to electrical currents possesses a risk of death. Electric components that are switched on can move uncontrollably. Serious injury and death are a result.
- Work on the electrical system may only be performed by authorized qualified electricians.
- Before beginning to work on the electrical system, switch off the electrical power supply and secure it against being switched on.
- Cordon off the danger area and mark it with warning signs.

Furthermore, have an expert shut off all components that carry media and power.

The professional disposal of

- lubricants,
- plastics
- metals

should be carried out by a specialist company!

The system can then be disassembled on site into its individual modules or parts. This should likewise be performed by a specialist company that has expertise in the environmentally responsible disposal of individual parts.

WARNING **Wear suitable protective equipment and a breathing mask when handling dusty and dirty components!**

30.02 Disposal

Our devices (units) use the following materials:

- Housing – frame sections, cladding panels, mounted parts > coated steel
- Air ducts, conveyor belts > galvanized steel plate
- Motors > cast iron, copper, steel

All metals can be recycled as special waste.

- Conveyor belts: > PVC, rubber
- Sealants > polyurethane - waste code no. 55980, 080404

All materials can be disposed of via special waste landfill or, depending on their condition (pursuant to current provisions), via the standard construction waste site.

NOTICE Before disposing of any waste, contact the appropriate community and/or disposal company and discuss the situation!

31. Emergency telephone number (US) 911

The hop-picking system operator must place the customary emergency telephone number in a visible place in the work area!

31.01 Firefighting

WARNING

The hop-picking system does not generate any direct fire hazard. External factors can cause the built-in synthetic materials and rubber belts, which exist only in low quantities, to burn off.

In case a fire occurs, place the emergency telephone number in a visible location beside the extinguishing agents and provide suitable extinguishing devices for firefighting. In the event of fire, de-energize the system/picking machine.

The following are suitable extinguishing agents:

- water spray jet
- fire extinguishing foam
- fire extinguishing powder

31.02 Escape/Leakage of Harmful Substances

WARNING

Since the system only contains small quantities of flammable materials, they would only produce small quantities of harmful substances in the event of fire. Based on the materials used, these substances are nitrogen oxides, carbon oxides, carbon monoxide and hydrogen chloride.

In the event of fire, substances can escape from bine residues. The hop-picking system operator determines the extent to which these are classified as harmful.

Our devices are constantly being enhanced. We reserve the right to make structural changes. We would like to expressly point out that there could be deviations in the instruction manual due to the different designs of machines, frequent structural changes and due to the many special-purpose designs we produce.

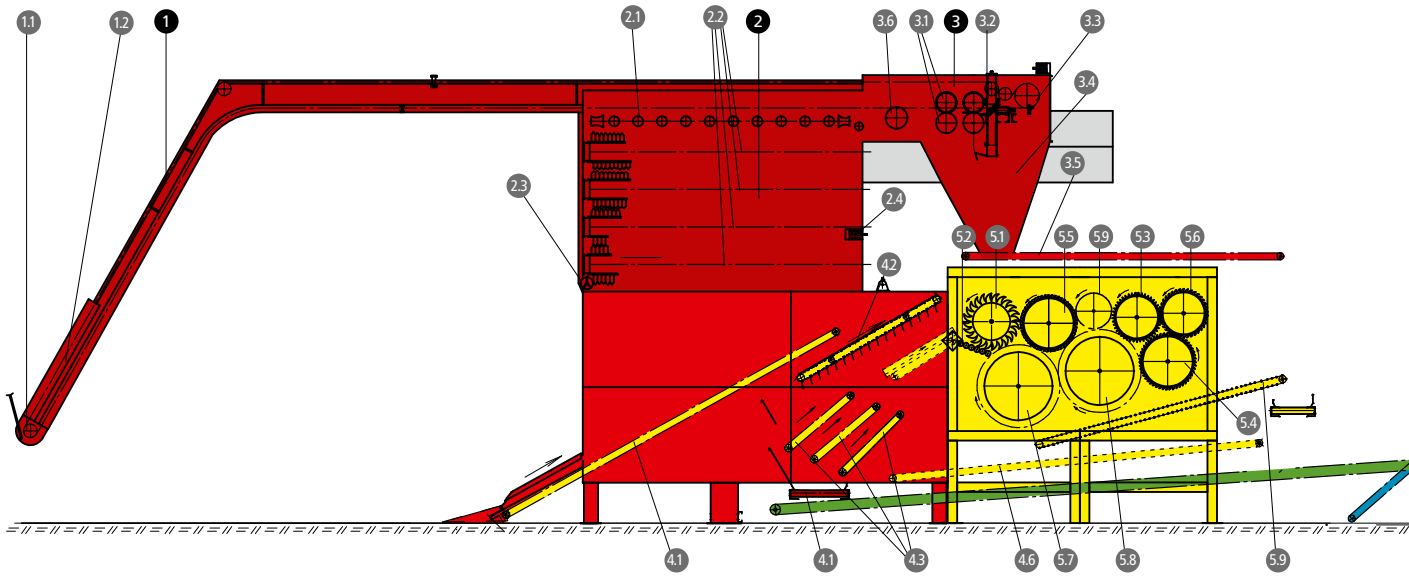
If in doubt, please contact us.

WOLF Anlagen-Technik GmbH & Co. KG
Geschäftsbereich Landtechnik
Münchener Str. 54
85290 Geisenfeld, GERMANY
Telefon +49 (0)8452 99-0
Fax +49 (0)8452 8410
E-mail info.lt@wolf-geisenfeld.de
Website www.wolf-geisenfeld.de

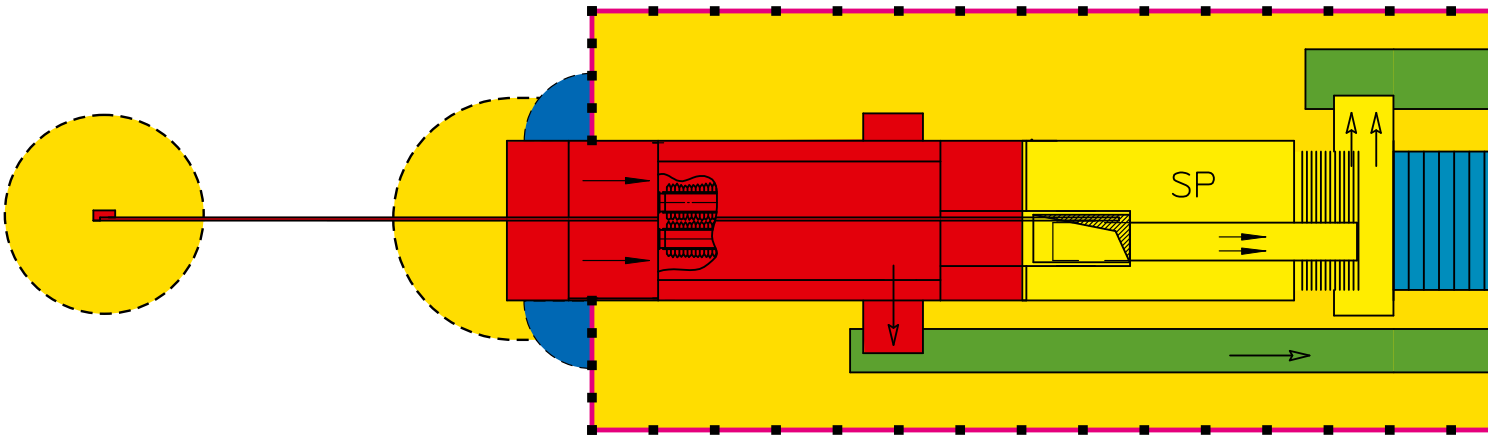
32. Inspection Checklist

Name	Inspection date	Bine insertion arm	Chain track	Insertion bracket	Exit rollers	Screw conveyor	Bine remainder removing device	Picking drum	Picking finger	Chopper	Starpicker	Drive chains	Frequency Converter

33. Sketch of Hop-Picking System



WSZ STARPICKER SP



Legend

WSZ

- 1 **Bine Insertion Arm**
- 1.1 Bine Feeder Hook
- 1.2 Transporter

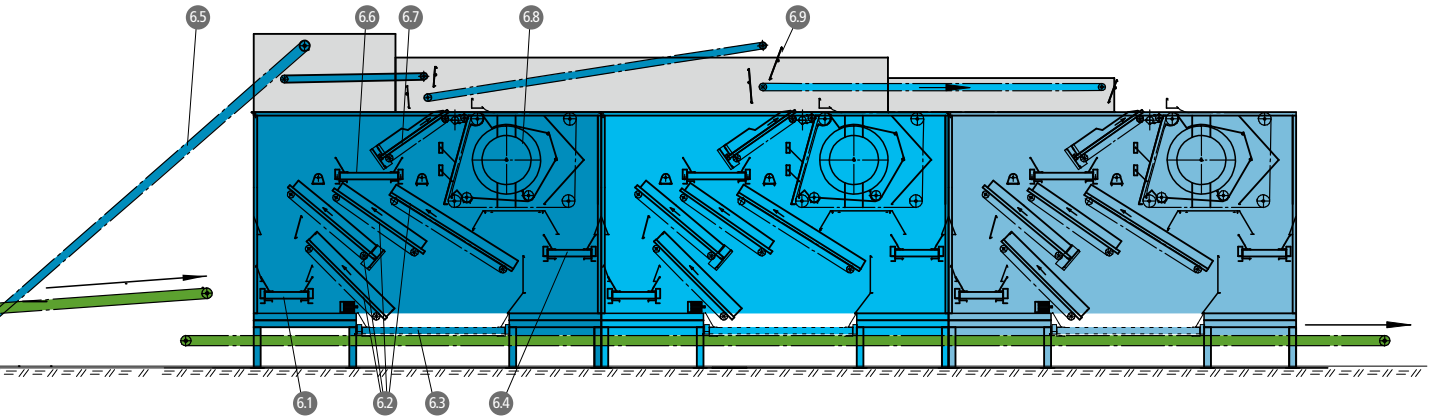
- 2 Main Picker
- 2.1 Guide Pulleys
- 2.2 Main Picking Drums
- 2.3 Manual Wheel Adjustment
- 2.4 Variator

- 3 Chopper
- 3.1 Exit Rolls
- 3.2 Bine Chopper
- 3.3 Bine Ends Remover
- 3.4 Chopper Hopper
- 3.5 Waste Belt
- 3.6 Worm

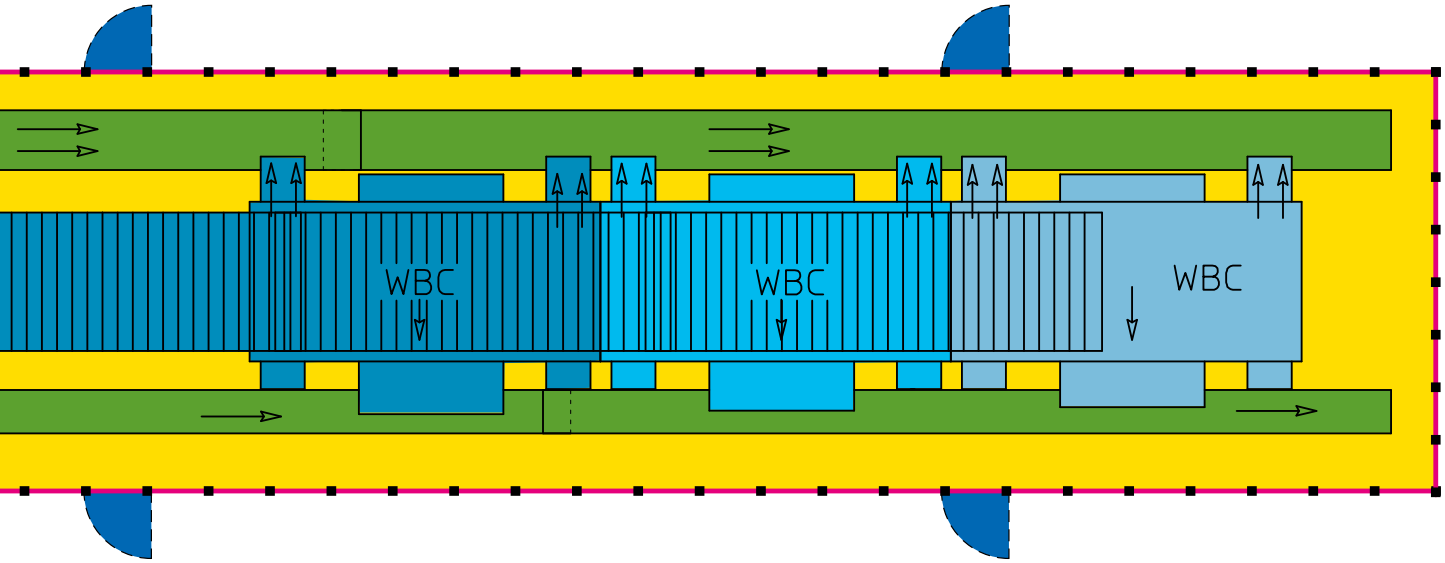
- 4.1 Transport Belt
- 4.2 Hinged Belt
- 4.3 Rubber Belt

STARPICKER SP

- 5.1 Rolls
- 5.2 Star Roller 1
- 5.3 Star Roller 2
- 5.4 Star Roller 3
- 5.5 Star Roller 4
- 5.6 Cleaning Star Roller
- 5.7 Picking Drum 1
- 5.8 Picking Drum 2
- 5.9 Pipe Belt



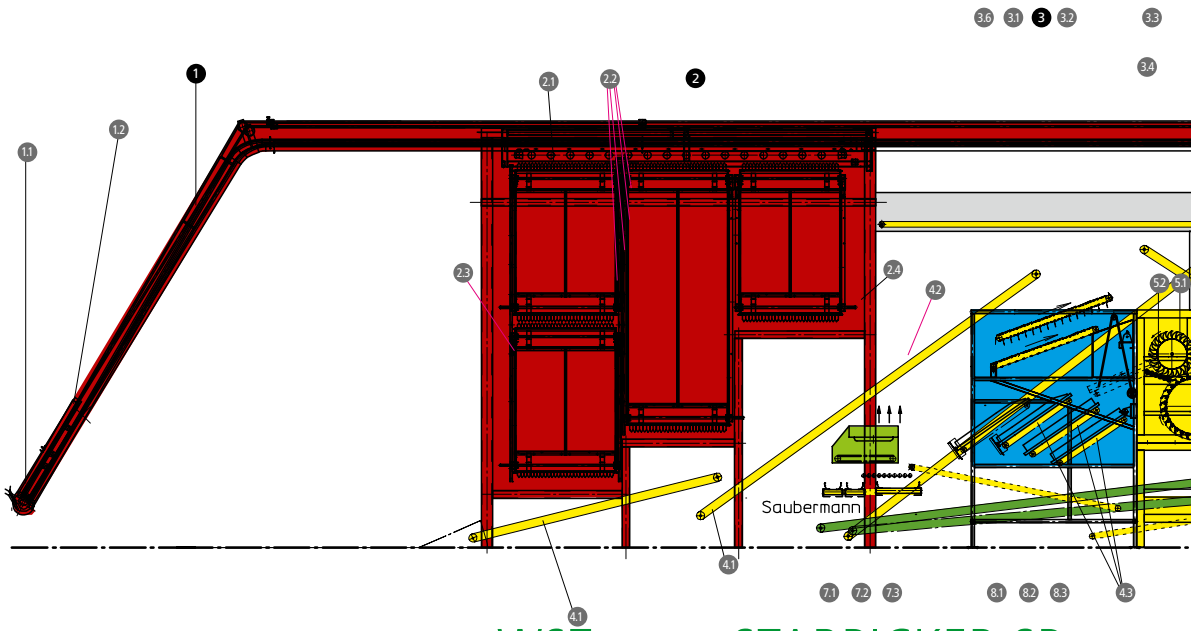
WBC 1 WBC 2 WBC 3



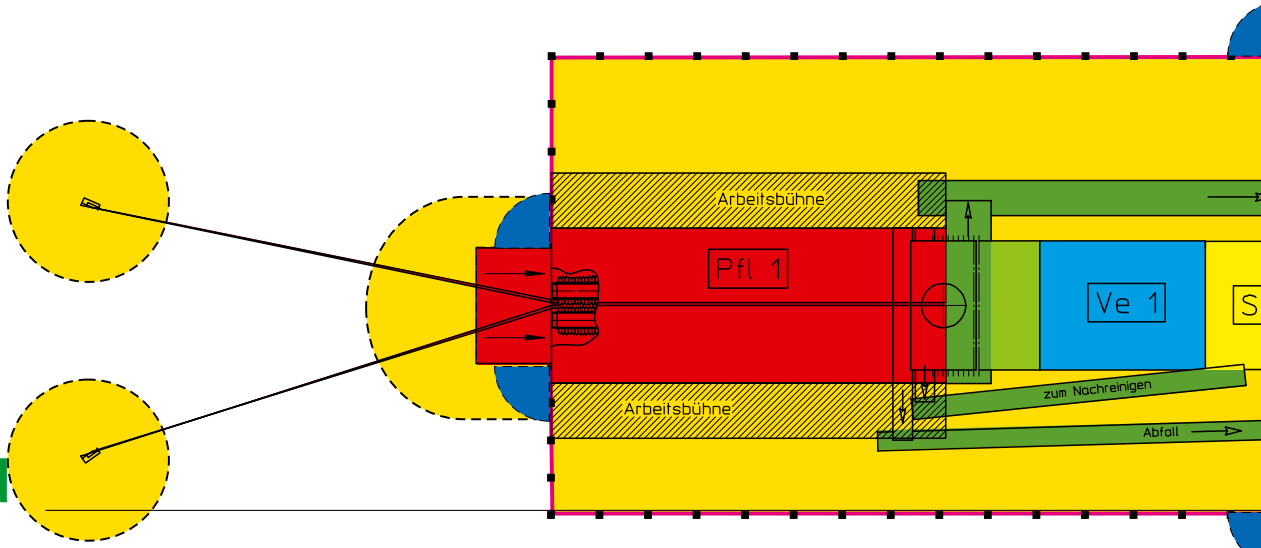
WBC

6.1 Waste Belt
6.2 Cleaning Belts
6.3 Hop Belt
6.4 Waste Belt
6.5 Feeding Hop Belt
6.6 Hop Belt
6.7 Pre-Collection
6.8 Cleaning Fan
6.9 Hop Distribution

1. Sketch of Hop-Picking System



WSZ STARPICKER SP



Legend

WSZ

- **1 Bine Insertion Arm**
- 1.1 Bine Feeder Hook
- 1.2 Transporter
- **2** Main Picker
- 2.1 Guide Pulleys
- 2.2 Main Picking Drums
- 2.3 Manual Wheel Adjustment
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- 3.1 Exit Rolls
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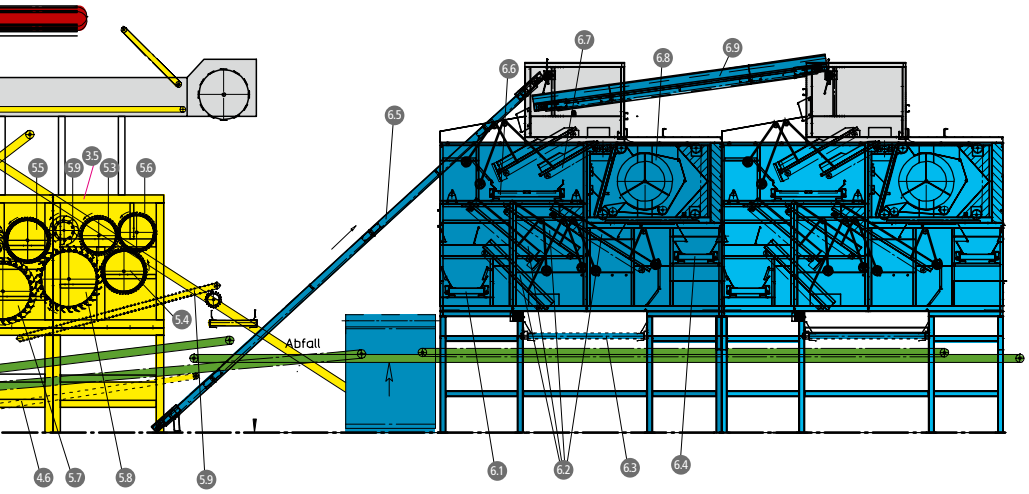
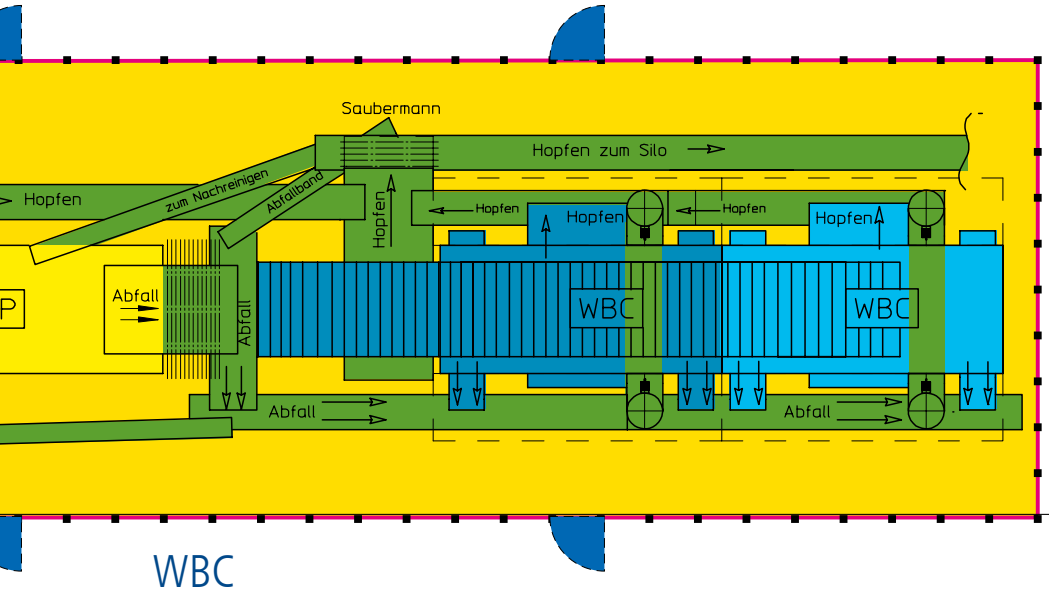


WBC 1 WBC 2 WBC 3



WBC

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- 6.6 Hop Belt
- 6.7 Pre-Collection
- 6.8 Cleaning Fan
- 6.9 Hop Distribution

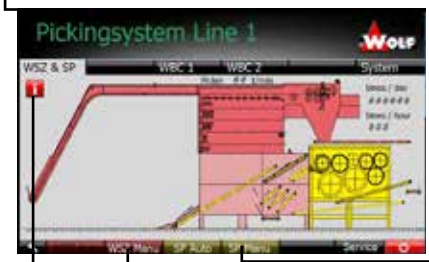
34. Overview ControlsÜbersicht Steuerung

System Auto

System Auto Manu

Band Manu

WSZ & SP



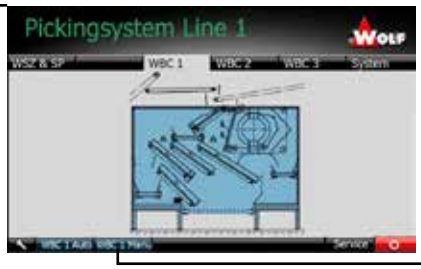
WSZ Manu 1

SP Manu

WSZ Manu 2

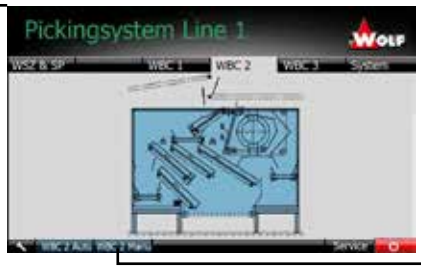
Operation Hours / Bine Counter

WBC 1



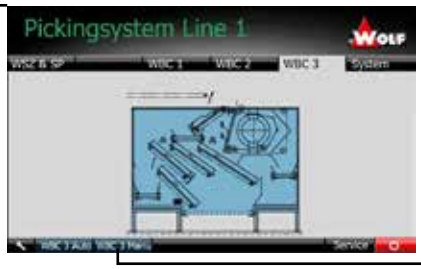
WBC 1 Manu

WBC 2



WBC 2 Manu

WBC 3

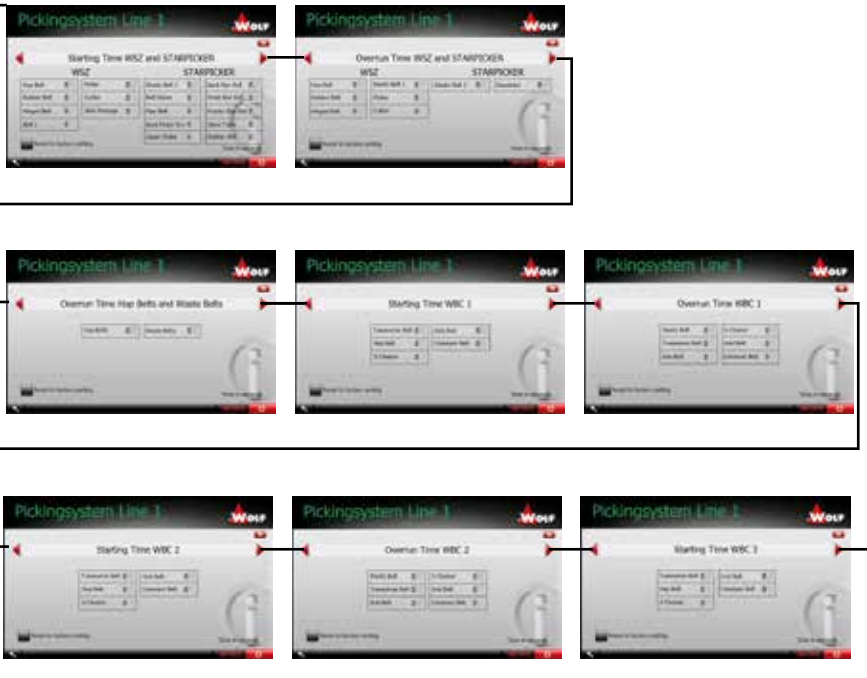


WBC 3 Manu

Error alert

Settings

Service



The latest version of the operating and maintenance instructions can be found at:
www.wolf-geisenfeld.de/downloads

WOLF Anlagen-Technik GmbH & Co. KG
Business Division Agricultural Engineering
Münchener Str. 54
85290 Geisenfeld, GERMANY
Telephone +49 (8452) 990
Fax +49 (0)8452 8410
E-mail info.lt@wolf-geisenfeld.de
Website www.wolf-geisenfeld.de

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