User Manual

Hi-X evo Compactor

Rev.Hi-X evo.UM.1A.EN

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Orkel AS
Johan Gjønnes' veg 25
7320 Fannrem, Norway

Valid from serial number: 20427005

Orkel part number: 16806

orkel.no/qr/hi-x evo

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1 General

1.1 INTRODUCTION

1.1.1 Foreword

The products from Orkel AS are well known for their high quality, reliability and strength. We will therefore congratulate you, choosing one of our products.

To fulfill our own goals, regarding quality and strength, Orkel AS has implemented a continuing product-developing process. All compactors undergo a thorough quality control before leaving the factory.

Read thoroughly, and familiarize yourself with our recommendations, regarding machine - safety, use and maintenance. Make daily maintenance a routine. By doing this, the machine will be safe to operate, and you will contribute to a longer machine lifespan and an effective utilization of the machine.

With regards

Orkel AS

1.1.2 Disclaimer

The original parts used in an Orkel® machine are designed and built to provide optimal fit, function, safety, and structural integrity. For this reason, Orkel® **DOES NOT** in any circumstance approve of the use of after-market, gray market, or imitation parts.

The information provided by Orkel® hereunder is provided “as is, where is” and with all faults, and the entire risk associated with such information is entirely with the Buyer.

Orkel® does not grant, explicitly or implicitly, to any party any patent rights, licenses, or any other IP rights, whether with regard to such information itself or anything described by such information.

Information provided in this document is proprietary to Orkel®, and Orkel® reserves the right, at its sole discretion, to make any changes or modification to the information in this document or to any products and services at any time without notice.

Orkel® does not assume responsibility for any damages associated with the machine or failure caused by incorrect use of the machine. Neither do we assume responsibility for any changes to the product made after initial delivery.

1.1.3 Range of use

The Hi-X evo compactor is designed for compressing fine waste material as compost, RDF or bin waste to bales wrapped in plastic film for storage or transport. The compactor must only be used for this purpose.

NOTE: Other materials can also be compressed, but have to be confirmed by Orkel AS in each case. This due to warranty legislations.

1.2 CONTROL BEFORE DELIVERY

This machine is tested, controlled and has passed final inspection, before leaving the factory.

1.2.1 Preparation at customer location

Orkel AS will set-up the machine for the customer if requested/agreed. An introduction course, both in handling and operating the compactor will be held at site if requested/agreed. During commissioning and start-up period, we're offering our technical assistance and answering all questions regarding the compactor start-up.

NOTE: Please see the delivery - warranty formula included with the user manual.

1.3 IDENTIFICATION OF THE MACHINE

A sticker describing the serial number is located on the right side of the machine. In addition, the number is also imprinted on top of the frame. See Figure 1.1.

The serial number must always be provided when contacting your dealer, either it's for ordering parts or technical assistance.

The serial number is the safest way to identify your machine. Do not remove or change the serial number.

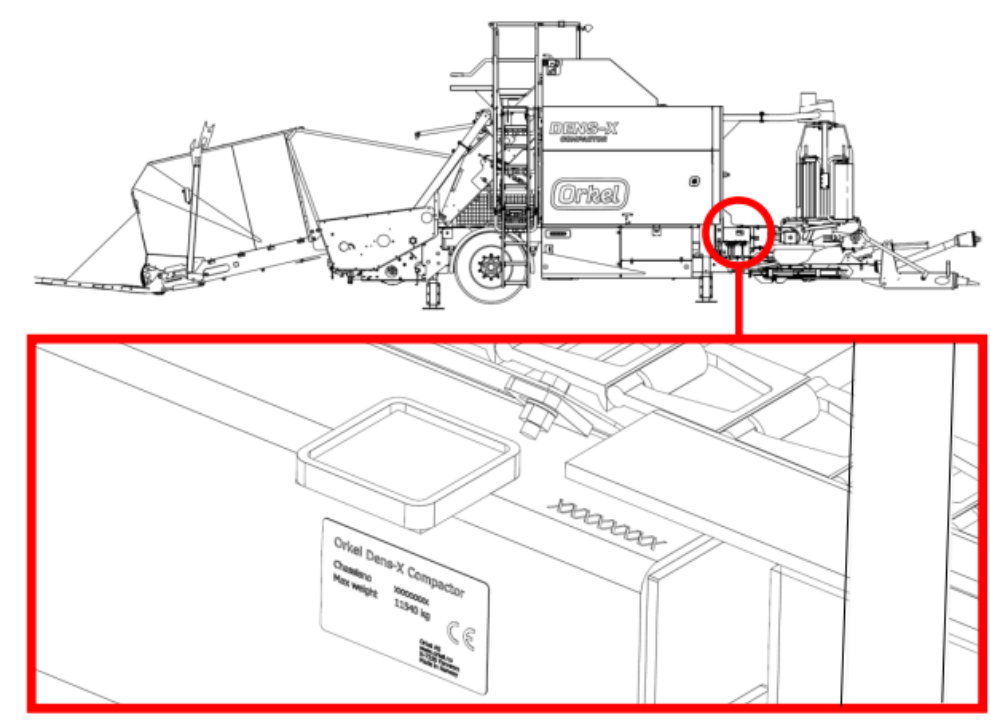

Figure 1.1 : *Serial number location*

1.4 THE OPERATORS MANUAL

1.4.1 How to use this manual

This manual is organized after the «see—think—use»-principle. The content and explanations are arranged in smaller sequential operations, and the main chapters are arranged according to the normal use of the machine (Example: Setup —> Operation —> Maintenance).

Chapter overview:

1. **GENERAL** This chapter contains some of the formularities associated with a new compactor. Quality control, identification the machine, and copies of the delivery and warranty forms.
2. **SAFETY** This chapter consist of the general safety measures one have to consider at all times when dealing with the machinery. More specific safety measures and warnings are listed and explained when relevant.
3. **SETTINGS AND HYDRAULIC ADJUSTMENTS** An introduction to the functionality of the machine. Furthermore, it explains how and where one can adjust the hydraulics to achieve the wanted functionality. Topics organized and gathered for every machine module. Same order as in chapter 7 "Maintenance and mechanical adjustments".
4. **OPERATION** Describes the rig up process, what to consider prior to and during operation. It also specifies the running in period.
5. **TRANSPORT** States all the safety measures and preparations necessary for successful and safe transport of the compactor.
6. **CONTROL SYSTEM** Gives a detailed overview of the control system and its functions.
7. **MAINTENANCE AND MECHANICAL ADJUSTMENTS** A detailed overview of the necessary maintenance and procedures for mechanical adjustments. Topics organized and gathered for every machine module. Same order as in chapter 3 "Settings and hydraulic adjustments".
8. **LUBRICATION** Explains oil and grease lubrication functionality, settings, troubleshooting and shows detailed lubrication charts for manual lubrication.
9. **PRESERVATION** Washing, and other preparations prior to and during long time storage.
10. **ELECTRICS** Electric schematics.
11. **HYDRAULICS** Hydraulic diagrams.
12. **SPECIFICATIONS** An overview over the general machine capacities and performances.

1.5 WARRANTY

Orkel AS recommends that you study the document «Warranty conditions» for detailed information regarding warranty terms and conditions. This document can be found enclosed in the binder delivered with the compactor. You can also contact our after sales department.

1.6 DECLARATION OF CONFORMITY

EC DECLARATION OF CONFORMITY

Manufacturer:
ORKEL AS

Address:
Johan Gjønnes Veg 25
N-7320 Fannrem Norway
Phone: + 47 72 48 80 00

Product description:
Agricultural/Industrial - multi compactor

Model: ORKEL DENS - X

Type: 204
From serial number: 20420001

Orkel AS hereby declare, that the identified product above is conform to the requirements of:
Directive on machinery – 2006/42/EC - Electromagnetic compatibility Directive -2004/108/EC and EN ISO 12100/EN ISO 4413/EN ISO 13850/EN 349+A1/EN ISO 13857

Person in EC authorized to compile technical files:

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London W5 2BS

Fannrem, 27 August 2015

Leif Haugum (sign)
Technical director

Date of shipment:

Per Helge Weiseth (sign)

2 Safety

2.1 INTRODUCTION

This operator's safety manual is made to describe safe and good routines when operating the compactor. On the other hand, it is not possible to describe every operational and safety matters that may arise. Carefully consider all your actions, if it is posing a safety hazard to you, or others close to the compactor! · Accidents may kill you or make you disabled. · Accidents can be avoided.

2.2 SYMBOLS

This symbol means:

- **ATTENTION!**
- **BE CAUTIOUS!**
- **CONSERN FOR YOUR PERSONAL SAFETY!**

When you see this symbol in the operator's manual, be aware that violation of instructions given, can cause you or others in the working area of the machine, being injured or killed.

2.2.1 Warning, danger and caution

Each time you see the words and symbols as shown below, please note the different directions they symbolize. The pictograms are used in this manual or/and on the machine.

The symbol and the word DANGER, state a direct or immediate dangerous situation that will cause DEATH OR SERIOUS INJURY if not avoided.

The symbol and the word WARNING, indicates a potentially hazardous situation. If you fail to comply with instructions given it could result in personal injury or loss of life.

Do not start operating the machine until you have read and understood the safety precautions.

Always stop the tractor engine or external power unit before; lubricating, adjusting, maintaining or repairing the machine. Also, remove the ignition key to prevent accidental start.

Ensure that there are no people between tractor and machine during connecting and disconnecting.

Never allow children to stay near the machine during operation. Young children can do unpredictable things

Danger rotating parts. Keep clear of moving/rotating parts in chamber.

Operator or others close to the machine must be aware when the bale is unloaded from the wrapper table. Bales dropped may roll more than 10 m, or even dropped prematurely.

Always use the hydraulic securing valves on the chamber door lifting cylinders, to ensure that the chamber door stays in open position during maintenance or repair.

The net or widefilm is cut with a sharp knife. Be careful when loading a new roller, or if any adjustment is done to the knife system.

All parking of the machine must be on a firm levelled ground, and secured with wheel chocks.

Unauthorized personell are not allowed closer than 5 meters, when the machine is operating or when maneuvering.

Danger. Film holder/cutter has a sharp knife and there is a risk of cutting/crushing injury. Always keep closed when the machine is not operating.

Keep clear! Do not enter below bunker or frame when operating the compactor.

Noise zone. Use ear protection.

Stairway. Access only for operators or mechanics.

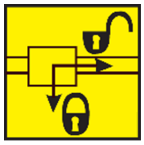
Make sure the transmission is running with the correct speed and direction. Wrong speed and/or direction can damage machinery and may cause great danger to persons nearby. The machine is designed for a PTO-speed of 850 rpm.

Stay clear, rotating machinery.

Strapping point.

Lifting point.

Jacking point.



Hydraulics securing valves, locking the tailgate lifting cylinders.

Between the tractor and the machine, there is a rotating PTO-shaft. No one is allowed to stand between the tractor and the machine while the engine is running. Do not wear loose clothes, scarfs etc.

Warning signs, indicating danger or warning attached to the machine, must not be removed or painted over. Unreadable signs shall be replaced by new ones. These can be ordered from Orkel AS.

2.3 EMERGENCY STOP

The machine is equipped with 5 manual emergency stop buttons. Four are accessible from ground level and one on top of the machine as indicated on Figure 2.1.

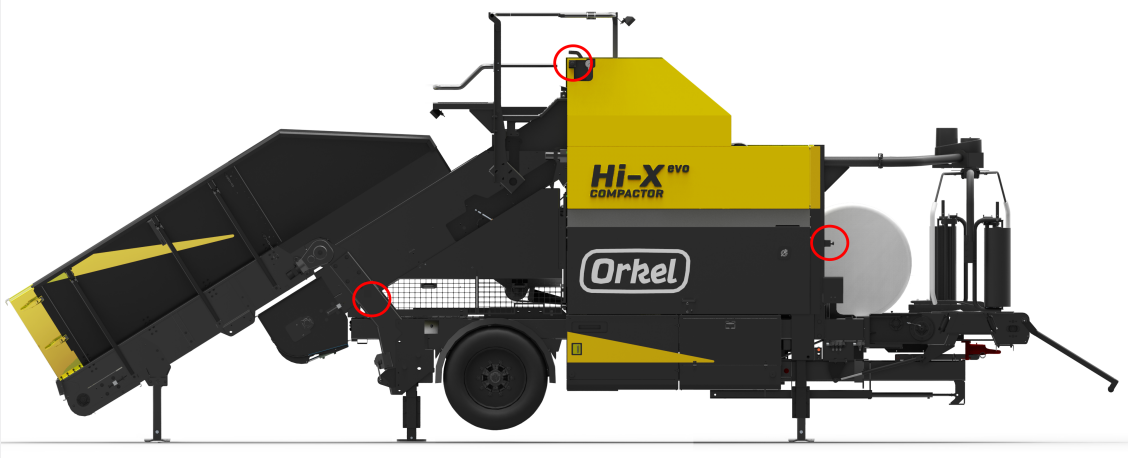


Figure 2.1 : *Red circles indicates emergency stop locations. Two more buttons are located on the opposite side, ground level.*

When an emergency stop button has been triggered, the emergency stop button has to be reset so that the machine can be started from the control panel.

Figure 2.2 : *Mushroom head type emergency stop button. Twist the head to reset.*

2.4 TO THE OPERATOR

2.4.1 Exercise of security

- As operator, it is your responsibility that you read and understand the safety instructions given in this operator's safety manual.
- These instructions must be followed without exception. The operator is the key to safety on this machine, not only for you, but also for others in the compactors working area.
- Follow the safety instructions, and you will experience the compactor as a safe and secure place to work.

2.4.2 Personal protection

The Compactor might generate a lot of dust and noise, depending on which material being compressed. For your own health, we recommend that operators use personal protective equipment, such as safety goggles, dust/filter mask, and ear-protection during operation.

2.4.3 Personal safety

Use all available protective and safety equipment. Provide good lighting in the area where the machine is positioned. All covers must remain intact and attached during operation. If pressing of flammable materials, a fire extinguisher must be in close proximity.

2.4.4 Safe operation

Persons under 16 years of age should under no circumstances operate this machine.

Personnel under influence of alcohol or other drugs must not operate this machine.

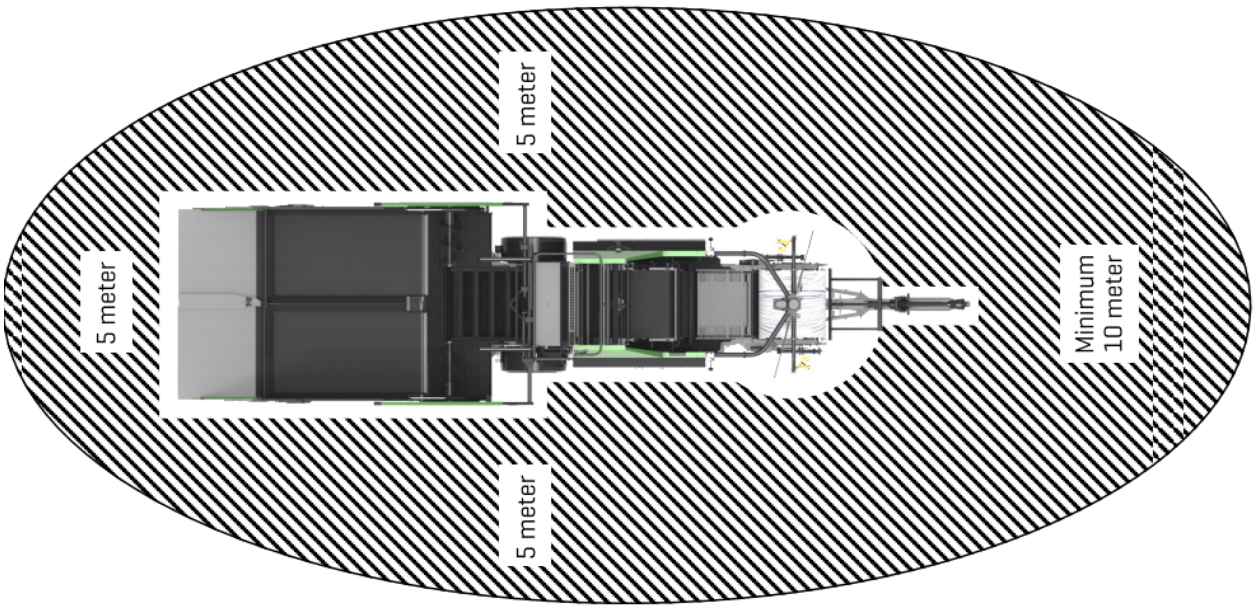
2.4.5 Important issues

Be aware of children and other unauthorized persons in close proximity to the machine. Never allow unqualified persons to operate this machine.

2.4.6 Danger zones

Only operators and maintenance personnel are allowed “inside” the danger zone! All others must be turned away, due to their own safety!

The entire left side of the compactor is a blind spot for the operator.



2.5 PRECAUTIONS

2.5.1 Know your machine

Know your machine. Learn all the functions and actuating mechanisms, and familiarize where the emergency stop switches are located. Learn the machines capacity and limitations, to avoid unnecessary downtime and mechanical break-down.

IMPORTANT: If any dangerous situations occur, shut down the power take off (PTO) right away.

2.5.2 Equipment control

Before starting up, make sure that the machine and its equipment is in place and in good working order! See chapter 7 "Maintenance and mechanical adjustments".

2.5.3 Cleaning

A good cleaning of the machine increases durability and safety. Therefore, keep all surfaces clean, remove dirt, oil-spills and other remains.

2.5.4 Environmental protection

Hazardous waste, such as rubber, oil and other materials that could harm the environment, must be disposed at approved disposal centres.

2.6 BREAK-IN PERIOD

Check	Check points
	Do not run compactor at maximum capacity the first 25 hours of operation
	Be observant – monitor that functions are working correctly.
	Check for abnormal sounds from the machinery
	Fine tune the process to be carried out so that the compactor can reach maximum capacity, based on material being baled.

Check	Check points
	All bearings have a visible grease collar. Figure 2.3
	No visible grease on the relief valve on the grease pump.

Precautions: A new compactor must go through a break-in in period. It shouldn't be run at maximum capacity at the first 25 hours of operation. The operator must be observant, monitoring that all functions are working correctly, and being aware of abnormal sounds from the machinery. Fine tuning of the process must be carried out, until the compactor has reached its optimum capacity, based on the material being baled.

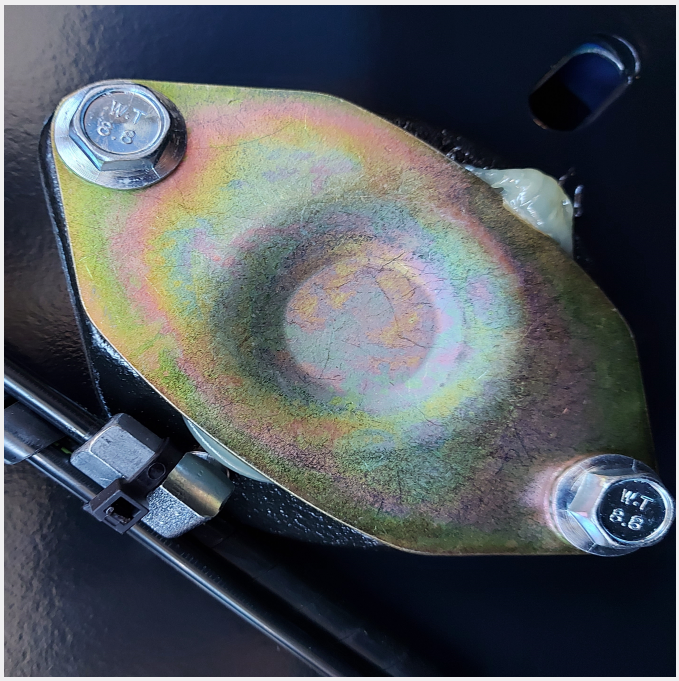


Figure 2.3 : *Grease collar on bearings/bushings*

NOTE: Slide bearing clearance is tight when the machine is new, and could lead to increased temperature in the bearings. The slide bearings must be checked frequently during the break-in period. If the temperature is rising in some of the bearings, activate the manual greaser from the control panel to increase the amount of grease supplied to bearings.

3 Settings and hydraulic adjustments

3.1 MAIN PARTS

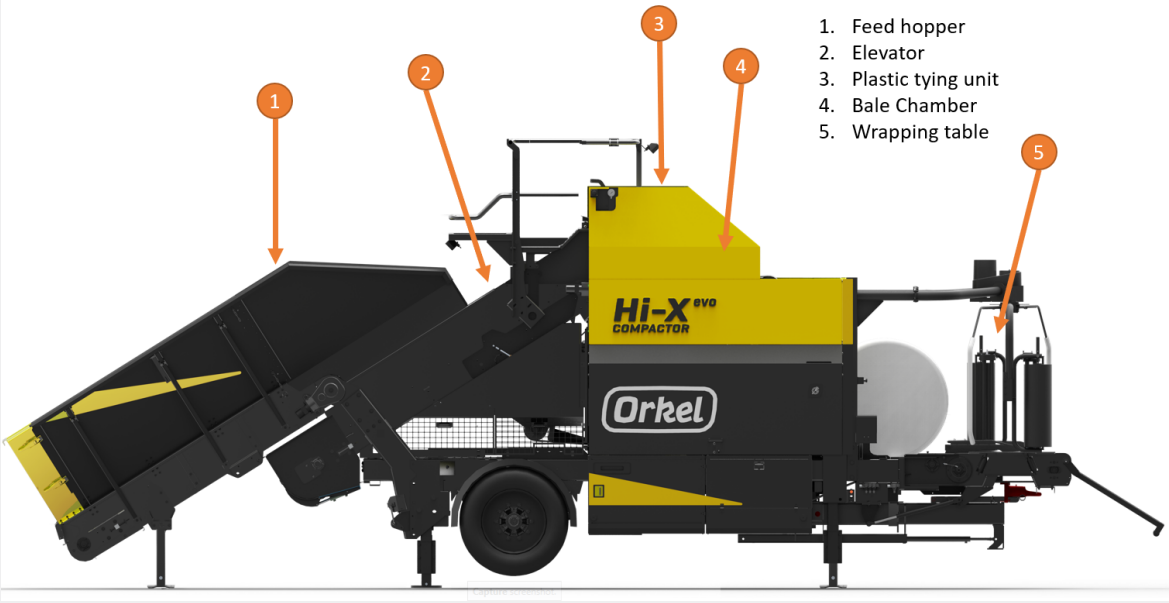


Figure 3.1 : *The compactor main parts*

3.1.1 Principle of operation

The material is loaded into the feed hopper using a wheel loader, or directly by a conveyor belt. The material is then transported by the elevator into the chamber. The amount and speed is controlled by an ultrasonic sensor as well as settings in the display unit. All functions and settings may be adjusted depending on the characteristics of the material being baled.

When the material has been shaped to a compact bale, several layers of net or film is laid on the bale by the net/film system. The net/film ensures that the bale maintains its shape during the transport to the wrapper. The chamber door is opened automatically and the bale is transported to the wrapper by the sub conveyor. The chamber door closes and the baling immediately resumes. If there is any spillage, this will be recycled back to the elevator by the sub conveyor.

The wrapping starts as soon as the bale is detected on the wrapping table. Parameters such as chamber pressure and the number of layers of film may be set on the display unit. During normal operation, the machine runs on the automatic sequence. The operator(s) main task is to ensure that there is a sufficient amount of material in the hopper and that the finished bales are moved away from the bale drop zone. The operator shall also check for leaks and listen for unusual sounds while performing tasks as refilling the plastic magazine.

3.2 HYDRAULICS

WARNING

The compactors hydraulic system operates with high pressure. Check all hoses and connections for damage. Replace damaged parts immediately. When adjusting the machines hydraulic valves, being within the wrappers area of movement is not allowed. Take cautions when adjusting the valves, as the wrapper arms speed may change rapidly. Make yourself familiar with all the functions of the machine.

The default setting of the machine is done during the test run at the factory. Before performing any changes or testing on the machine, the hydraulic oil must have reached normal work temperature. This is because certain functions are affected by the oils viscosity and may respond differently if the oil is cold.

For recommended oil types to be used, see section 8.6.1 "Hydraulics" . In the description of how to adjust the machines hydraulic valves, the valves are referred to by valve numbers. See overview in section 11.2 "Valve overview".

3.2.1 Guidelines for hydraulic adjustments

Specific instructions regarding hydraulic settings are listed and explained for each individual component chapter.

NOTE: All references to valves found in this sub chapter can be found in the hydraulic schematic and valve overview in chapter 11 "Hydraulics"

IMPORTANT: All hydraulic adjustments: Start at low speed and increase the speed gradually. The oil must have reached operating temperature when the adjustment is performed.

RULE OF THUMB FOR K1, B1, P2, P3, P4 AND P5: Turning the valve clockwise decreases the speed. Turning the valve counterclockwise increases the speed.

RULE OF THUMB FOR P1 AND M1: Turning the valve clockwise increases the speed. Turning the valve counterclockwise decreases the speed.

3.2.2 Tank valves Hi-X evo

The Hi-X evo compactor got five tank valves: T1, T2, T3, T4 and T5.

3.3 FEED HOPPER

NOTE: All references to valves found in this sub chapter can be found in the hydraulic schematic and valve overview in chapter 11 "Hydraulics"

3.3.1 Control panel

NOTE: The functionality is described in section 4.2.3 "Lever list".

The levers are explained in detail in section 4.2.2 "Lever/Controls overview" and activate functions as described.

No.	Description	Action/Movement
1.	Left support leg, rear	Up / down
2.	Right support leg, rear	Up / down
3.	Feed hopper	Up / down

3.3.2 Settings

Adjusting the feed hopper speed is done by turning the M1 valve (Figure 3.2). Clockwise increases the speed. Counterclockwise decreases the speed. See section 11.2.1 "Valve chart" for placement of the M1 valve.

Default settings: Close the valve and then open two turns.

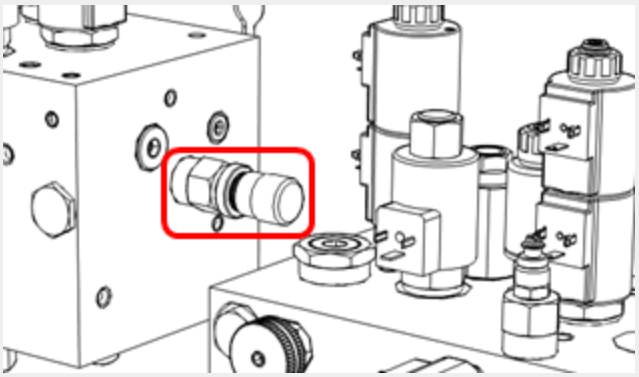


Figure 3.2 : *The red box indicates the M1 valve*

3.4 ELEVATOR AND SUB CONVEYOR

3.4.1 Settings

The speed of the elevator belt and the sub conveyor may be changed from the display unit, on the machine settings page.

The Hi-X evo compactor is capable of reversing the direction of the belts. This function is meant for dislodging materials within the machine. The reversing option is available from the display unit. See section 6.1.6 "Manual controls" for overview of the icons.

WARNING

Reversing the belt direction is only meant to be used for short intervals of 2 seconds. Excessive or prolonged use of this function may damage the machine. Use with caution!

3.5 CHAMBER

The bale chamber can handle high loads, but the set chamber pressure and the resulting bale density must be considered and possibly limited according to type of material. When baling certain material, too high chamber pressures may reduce the bale chamber life time. See section 6.1.7 "Machine settings" and section 6.1.17 "Settings and explanations" for how to set the chamber pressure.

NOTE: All references to valves found in this sub chapter can be found in the hydraulic schematic and valve overview in chapter 11 "Hydraulics"

3.5.1 Opening speed settings

Closing speed: Adjusting the bale chamber closing speed is done by turning the K1 valve. Clockwise decreases the speed. Counterclockwise increases the speed.

Default setting: Close the valve and then open 1/2 turn.

3.5.2 Chamber pressure settings

The chamber pressure settings is set on the display unit. When the baling starts, the elevator will run at its higher set speed. When the chamber pressure surpasses the elevator slow threshold, the speed is reduced in order to allow a higher bale density. The bale is done when set maximum chamber pressure is reached. The plastic tying unit will then start.

Parameters that may be set on the display unit are:

Chamber max pressure: 100 - 280 bar

Elevator slow threshold: 30 - 100% of set pressure

Example:

Material: Wood chips

Set chamber pressure: 180 bar

Chamber slow threshold: 75 %

When the chamber pressure sensor registers a pressure of 135 bar (75 % of 180 bar) , the elevator speed is reduced. The elevator will maintain the low speed until a chamber pressure of 180 bar is reached. Then the plastic tying starts automatically.

IMPORTANT: The chamber pressure must never exceed 280 bar!

3.6 PLASTIC TYING UNIT

3.6.1 Principle of operation

Laying net or film on the bale in the chamber is done by the plastic tying unit on the top of the machine.

When set maximum chamber pressure is reached, a set amount of net/film is fed into the chamber by the feed rollers in the plastic tying unit. When the “tail” is long enough, it is grabbed by the bale and pulled. The feed rollers stop and open, so that the net/film spreads on the bale. The feed rollers allow the net/film to spread over the whole width of the bale. The brake engages and puts tension on the net/film. The bale is now laid with a predefined number of layers of net/film. Afterwards, the feed rollers close again and the net/film is cut by the knife. Finally, the chamber door opens and the bale is transported to the wrapper by the sub conveyor. The chamber closes again and the baling resumes while the wrapper starts.

When loading the system with a new roller of net/film, shut down the machine and thread the net/film as shown on the illustration below. In order to ease the handling of the net/film, the brake should be released. The brake automatically disengages when opening the rollers. If this for some reason doesn't happen, this may be done from the display unit [section 6.1.6 "Manual controls"] or the remote control [section 3.6.4 "Remote control"] on the platform.

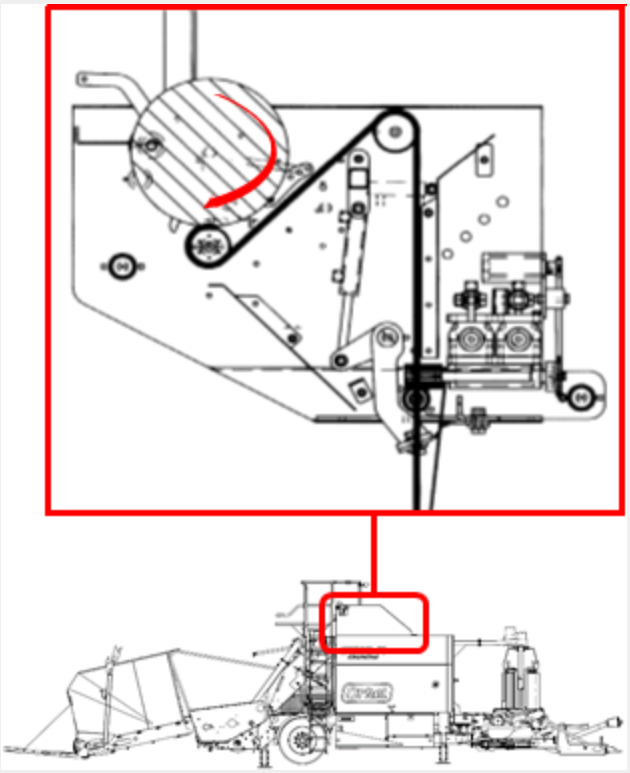


Figure 3.3 : *Plastic tying unit*

3.6.2 Brake and feed speed

The speed should be set so that the net/film is fed at a slightly higher speed than the bale's peripheral speed. Depending on whether net or film is used, and what material is being baled, the brake force must be set accordingly. In general, it is desirable to keep the brake force as high as possible in order to maintain a high density bale. The brake force should be set when net/film is pulled during the automatic net/film sequence. The brake force is shown on the brake pressure gauge. The valve for the brake pressure is adjusted consecutively until the appropriate brake force is reached. Start the adjustment with a low brake force, and increase it. If the brake force is too high, this might damage or even rupture the net or film.

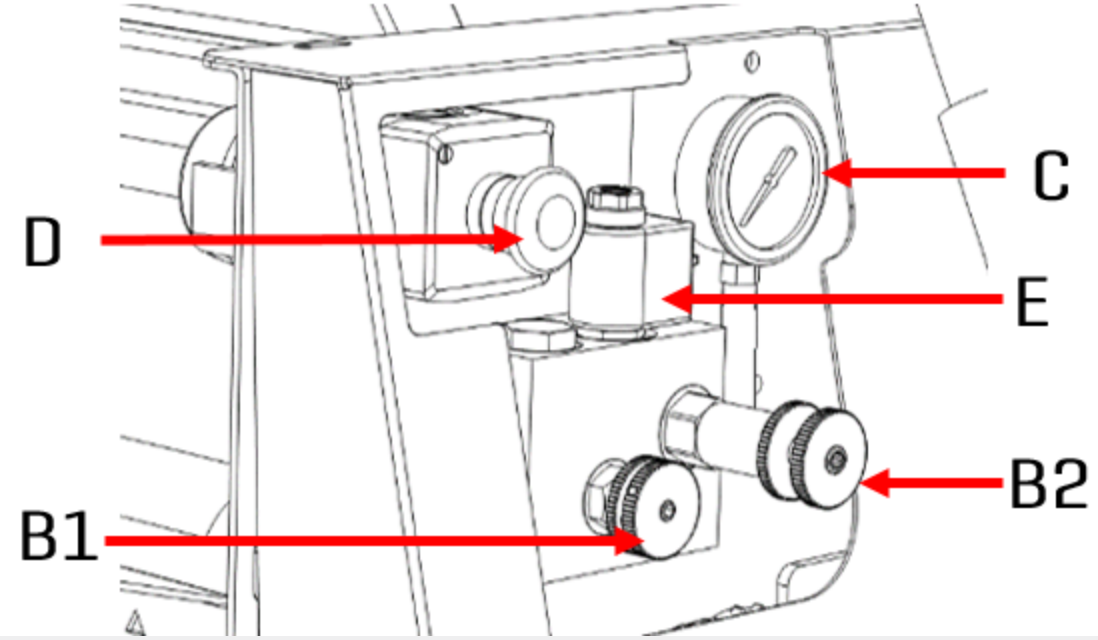


Figure 3.4 : *Brake and feed speed controls*

B1 Valve for feed speed

B2 Valve for brake force

C Gauge

D Emergency stop switch

E Electrical valve for brake release/engagement

3.6.3 Settings

Feed speed: Adjusting the feed speed is done by turning the B1 valve. Clockwise decreases the speed. Counterclockwise increases the speed.

Default setting: Close the valve and then open 3/4 turn.

Brake force: In order to maintain tension, the film roller is slowed down when being laid on the bale. Adjusting this brake force is done by turning the B2 valve. Clockwise increases the brake force. Counterclockwise decreases the brake force.

Default setting: Increase the pressure and notice the pressure on the manometer when the film breaks. Then slightly decrease the pressure.

NOTE: When starting the machine cold, the brake pressure might be higher. Therefore, set the pressure by cold oil or readjust when the oil temperature has increased.

Brake release valve: The brake is controlled electrically from the display unit or from the remote control on the platform. See section 6.1.6 "Manual controls" and section 3.6.4 "Remote control"

3.6.4 Remote control

The plastic tying unit may be operated from the platform using the remote control. Each button activates a programmed sequence, including several functions running in order:

Open film system:	Press and hold red and blue buttons until the sequence is finished (knife and feed rollers open).

Close film system:	Press and hold red and yellow buttons until the sequence is finished (feed rollers and knife close).
Start net/film system	Press and hold green button for at least 2 seconds until the net/film system starts
Release brake:	Press and hold red button and shortly tap blue button.
Engage brake:	Press and hold red button and shortly tap yellow button.

The brake will automatically release and engage when the opening and closing sequences are engaged.

NOTE: When the net/film system is started from the remote control, the machine will continue in auto mode when the sequence is completed.

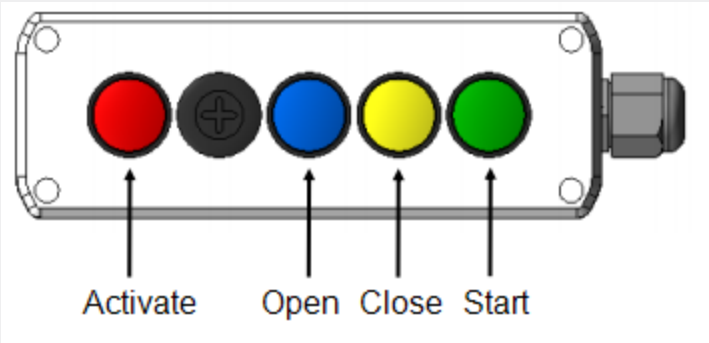


Figure 3.5 : *Plastic tying unit control*

3.7 WRAPPING TABLE

3.7.1 Wrapping settings

Wrapping arms, high speed: Valve P1 regulates the oil flow to the wrapping arms. Turning it clockwise increases the speed. Counterclockwise decreases the speed. Recommended wrapping arms speed is 27-28 rpm.

Perform adjustment as follows: Open valve P1 completely. Then close valve P1 gradually until the correct speed is achieved. Check and reset the settings on the display unit in order to maintain the appropriate wrapping belt rotation and hence wrap film overlap.

Wrapping arms, low speed: When the wrapping arms high speed is set, the low speed may be set using valve P2. The low speed may not exceed 10 rpm.

NOTE: The wrapping arms low speed needs to be set correctly in order to ensure the correct orientation to the film cutters. The wrapping arm speed may increase when the oil is warm. Therefore, closely monitor the wrapping arm slow speed and readjust if needed. The position of sensor S5 may also need to be readjusted.

3.7.2 Film cutter settings

The opening and closing speed of the film cutters must be set correctly. If their speed is too high, the wrapping film might be damaged instead of neatly cut when the wrapping arms stop. The film cutters speed, left (valve P4) and right (valve P5), may be reduced by turning the valve clockwise. Both cutters should be equally set. The cutters should move softly.

Default setting: Close the valve and then open 1/2 turn.

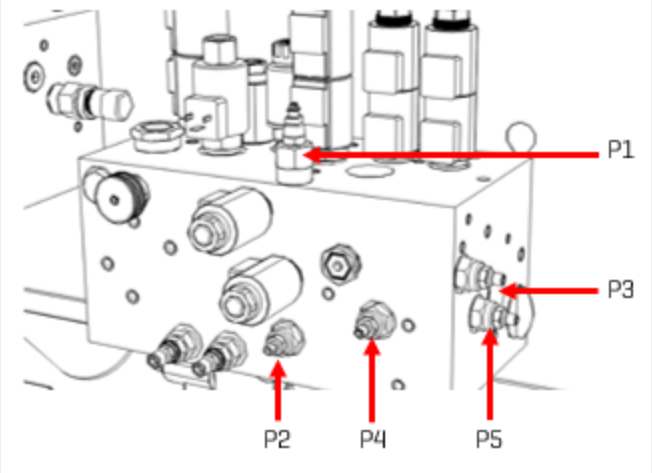


Figure 3.6 : *Film cutter valves*

Setting the speed: Turning the valve clockwise decreases the speed. Turning the valve counterclockwise increases the speed. Adjusting the height of the cutters is normally not necessary. The film should lay on the middle of the cutter when cut.

Film cutter rollers: Film cutter, upper position: Both rollers must roll freely. Film cutter, lower position: The outer roller should be kept locked. This is in order to hold the film so that it is cut, not ripped. Make sure that the knife is centred between the two rollers. Straighten the knife, if necessary. See Figure 3.7

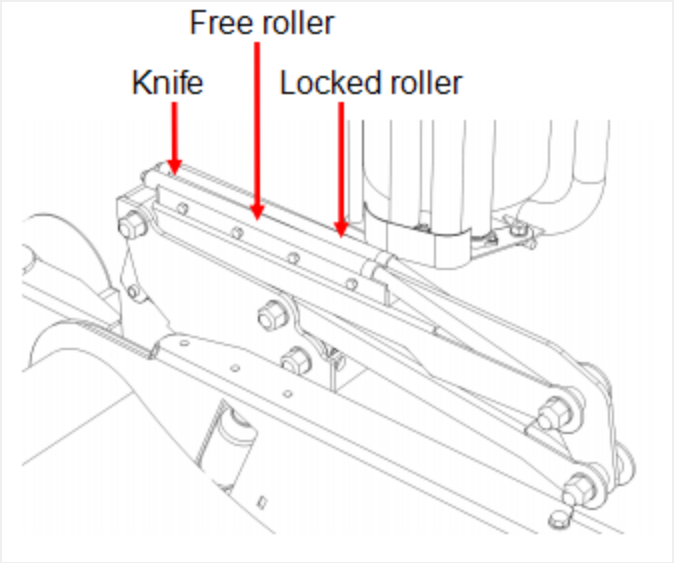


Figure 3.7 : *Film cutter rollers*

3.7.3 Wrapping table tilt speed

Adjusting the wrapping table tilt speed may affect the speed of the bale when rolling off the wrapping table during bale drop. Adjusting the wrapping table tilt speed is done by turning valve P3. Clockwise decreases the speed. Counterclockwise increases the speed. Default setting: Close the valve and then open 3/4 turn.

NOTE: Do not set the speed too high as this might cause the bale to roll off the table uncontrollably.

Bales dropped from the wrapping table may roll more than 10 m.

3.7.4 Wrapping table ultrasonic sensor

The wrapping table ultrasonic sensor detects the bale when transported from the chamber, so that the table accepts the bale by moving to the middle position.

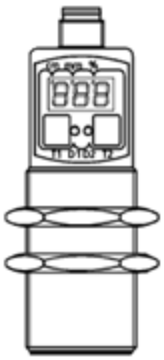
3.7.5 Microsonic sensor (S1)

This type shows the read distance on an LCD. The sensor detects bales on the table.

Resetting the trigger distance and mode:

1. Press both buttons simultaneously for at least three seconds until the text "Pro" is shown on the LCD.
2. Press both buttons once more. The current trigger distance setting is now shown.
3. Adjust to 70 cm. (distance below 1 m shown in mm, distance above 1 m shown in cm).
4. When the desired distance is set, press both buttons simultaneously two more times and make sure the output mode is set to "Normally closed" (symbol shown below). If not, press up or down to change.
5. Then press both buttons simultaneously one more time until the LCD blinks "End".
6. Press both buttons one last time.

The sensor shows its state in its right LED. If the sensor is OK and reads nothing the LED will shine green. If the sensor detects an object the LED will shine yellow.



3.8 DRAWBAR

3.8.1 Telescopic drawbar

To be able to extract the telescopic drawbar, pull and hold the transport safety lock pull cord while engaging the hydraulic cylinder (lever 6).

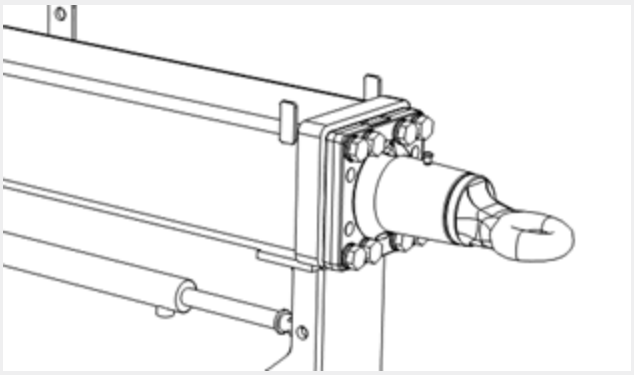


Figure 3.8 : *Telescopic drawbar*

The safety lock pull cord is located in close proximity to the hydraulic levers.

4 Operation

4.1 SAFETY

IMPORTANT: If any dangerous situations occur, shut down the PTO right away.

4.1.1 Safe work routine

This machine must under no circumstances be used for any other purpose than the intended one. Operate in daylight conditions only. Install additional worksite lighting if necessary. If the operator have to leave the site, the tractor or any other power supply must be turned off and key removed to avoid unattended start. Do not use loose or baggy clothing, due to many rotating parts in the machine. Long hair must be tied up to avoid possible entanglement in rotating parts.

4.1.2 Operator safety

If you fail to comply with instructions given it could result in personal injury or loss of life.

- be cautious and extra observant during mounting new plastic film in the plastic tying unit.
- be cautious and stay focused on all danger zones during operation.
- be cautious when entering the stairs.
- check all danger zones before startup and during operation to avoid dangerous situations.
- pay attention to every potential danger caused by the machines automatic systems.
- carry out a test on emergency stop switches, and sensors on a regular basis, to ensure they are in good working order.
- shut down the machine before any work is done to the plastic tying unit, due to danger of getting fingers or hands cut/amputated.
- pay attention to fire hazard from overheated bearings, especially when pressing very dry materials.
- know the localization of the fire extinguisher. Keep it close!
- pay attention to the risk of unauthorised people entering the machine's stairway (risk of falling into feed hopper or elevator). The stairway is for authorized personnel only.

Shut down the machine when loading the tying unit with a new net/film roller.

4.1.3 Other people's safety

The machine has multiple automatic functions, which start and stop without any warning. No unauthorized personnel must be located in the danger zone during operation. The danger zone should be marked with flags or fences if possible.

4.1.4 Assembly on site

The operator must be aware of hazards during alignment and when assembling the machine.

- Make a visual control of the complete machine to detect any transport damages.
- Ensure that the machine is standing on a firm surface before aligning and levelling. The support legs may sink into the ground during alignment or assembling the machine.

Take care when assembling/mounting the compactor. Squeezing of body parts and injuries from falling can occur when maneuvering the wrapping table.

Max. height in operation position: 4110 mm

4.1.5 Elements of hazard during operation

If you fail to comply with instructions given it could result in personal injury or loss of life.

Pay attention to the risk of:

- squeezing/crushing/cutting of fingers or hands near the knife for plastic tying unit.
- squeezing/crushing of fingers or hands between conveyor belts and sprockets.
- squeezing/crushing of fingers or hands between belt and roller, and under the wrapping table.
- squeezing/crushing of body and feet when bale is dropped from the wrapping table.
- squeezing/crushing of fingers or hands between wrapping arms and frame.
- impact from rotating wrapping arms.
- sensor on wrapping table might fail, causing a too early bale drop.
- a burst in a hydraulic line/hose with high pressure- and heated oil can cause severe injury to eyes and skin.

4.1.6 Danger zones during operation

The left side of the compactor is a blind spot. The operator must always be sure there's no one present in this area, before start up and during operation.

Maintain the boundaries of the danger zone as described in section 2.4.6 "Danger zones".

4.1.7 Risk of overturning

The operator must take precautions to avoid risk of overturning. Both during rigging, set-up and when operating the machine.

4.1.8 Leaving the machine

Before leaving the machine, the operator must turn off the engine (tractor) or any other power source. Remove key or secure the power source to avoid unattended start.

4.2 CONNECTION AND SETTING UP THE MACHINE

4.2.1 Rig up

IMPORTANT: Be aware of the danger of tipping when rigging up.

1. Park the compactor on an even and solid surface.
2. Disconnect cables for lighting, hoses for brakes and hydraulics, as well as the drawbar.
3. Move and park the tractor on the left side of the compactor, perpendicular to the compactor's longitudinal axis, and aligned with the input shaft on the hydraulic pump's gearbox.
4. Connect the hydraulic hoses to the tractor's hydraulic take outs.

5. Start levelling the machine with the hydraulic jack stands, left- and right rear (lever 1 and 2).
6. Continue levelling the machine with hydraulic jack stand, left- and right front (lever 5 and 6).
7. Fold down the wrapping table belt tensioner.
8. Pull and hold the transport safety lock pull cord while retracting the drawbar using lever 7.
9. Open the safety valves on the hopper lifting cylinders and lower the hopper to the appropriate height (lever 3) (see chapter 4.2.2 "Lever/Controls overview").
10. Fold out the hopper covers between the hopper and the elevator.

Be careful not to position yourself between the foldable covers and the sidewall when folding out the covers, as this may lead to serious injury or death if the covers swings inwards.

11. Fold down the stairs (see chapter 4.2.11 "Stairs")
12. Ensure that the tank valves are all open (T1-T5). See section 11.2.1 "Valve chart"
13. Connect the PTO drive shaft according to manufacturer directions. The PTO drive shaft protection shall be intact and secured in both ends. Read the safety guidelines enclosed with the PTO drive shaft.
14. Start the PTO.

IMPORTANT: Check the rotational direction of the PTO (see chapter 4.2.6 "Power take off")

15. Run the PTO at about 300 RPM.
16. Maintain this speed until the oil has reached the appropriate operating temperature. See chapter 4.2.10 "Oil temperature".
17. Increase the PTO speed to 850 rpm.
18. Fold down the bale bridge. Perform a function test of all the emergency stop switches before starting baling.

Perform a function test of all the emergency stop switches before starting baling.

4.2.2 Lever/Controls overview

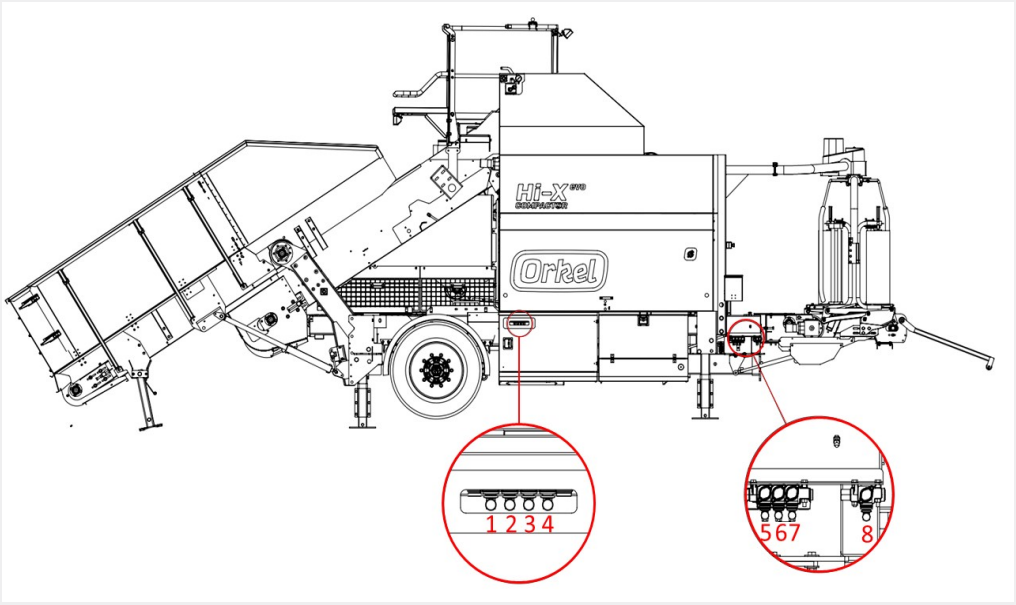


Figure 4.1 : *Lever/Controls overview Hi-X evo*

See section 3.3.1 "Control panel" for descriptions of the levers/controls regarding the feed hopper.

4.2.3 Lever list

Telescopic drawbar and feed hopper

Lever no:		Valve function
1	Left support leg, rear	Up / down
2	Right support leg, rear	Up / down
3	Feed hopper	Up / down
4	Elevator hatchet	Up / down
5	Left support leg, front	Up / down
6	Right support leg, front	Up / down
7	Drawbar	In / out
8R	Film storage (right side)	In / out
9L	Film storage (left side)	In / out

4.2.4 Leveling the machine

1. Ensure that the feed hopper is raised clear of the ground when leveling the machine. The feed hopper may be lowered onto the ground only when the machine is properly leveled.
2. Operate the valves for the hydraulic jack stands until the machine is properly leveled (See section 4.2.2 "Lever/Controls overview")
3. Use the "spirit levels" on the frame during the leveling.

NOTE: The leveling of the compactor may change during time if the surface is not entirely solid. Therefore,

check the leveling regularly. Incorrect leveling may cause machine errors and uneven wear or damage to the chamber belts.

4.2.5 Placing the tractor with telescopic drawbar

The tractor should be placed on the left side of the machine when connecting the PTO drive shaft. The drive shaft should be horizontal and parallel to the input shaft on the gearbox. When disconnecting the drive shaft from the power supply/tractor, the drive shaft must be secured to the machine without disconnecting it from the input shaft. This is to avoid that the drive shaft falls off the machine during transport.

4.2.6 Power take off

The PTO drive shaft is delivered with its own user manual from the manufacturer. Assemble the shaft accordingly. Maintain and lubricate the PTO-shaft according to instructions given in the PTO-manual. Power requirement:

120hp / 90 kW (diesel engine)

90hp / 75 kW (electric motor)

IMPORTANT: If any dangerous situations occur, shut down the PTO right away.

4.2.7 PTO Speed

The machine is designed for a PTO speed of 850 rpm. Ensure that the PTO speed and rotational direction is correct (counter clockwise rotation when viewed from the tractor is correct).

NOTE: It is important for the machine performance (the hydraulic system) that the PTO speed is steady.

4.2.8 Electrical power source

The machine is equipped with a 24V electrical power system, and is self-supplied through an integrated generator and a battery pack. The main power switch separates the battery pack from the rest of the system, and must always be turned off whenever the machine is parked and during transportation.

4.2.9 Hydraulic connections

The machine has two separate hydraulic systems: The main system includes oil tank, pumps and valves, and is powered by the PTO drive shaft via the gearbox. This system powers all functions used during baling and are controlled either automatically or manually from the display unit.

The auxiliary system is connected to the tractors hydraulic system and is powered by this.

- Feed hopper lifting cylinders, jack stands, film roller storage, and drawbar.

All functions are operated through manual levers on the machine. See section 4.2.2 "Lever/Controls overview"

IMPORTANT: Check that all the valves between the oil tank and hydraulic pumps are opened before the PTO is started.

NOTE: For energy preservation flow rate from tractor should be set no higher than 30 l/min. Oil port should be turned off when not in use.

4.2.10 Oil temperature

The oil temperature is shown in the top left corner on the display unit main page. If the oil is too cold, run the PTO at maximum 300 rpm until the minimum start temperature is reached. See temperature values below.

IMPORTANT: Starting the PTO drive shaft with full speed at a too low temperature may harm the hydraulic system.

Heating the oil may take up to 25 minutes. A sticker on the oil tank indicates the applied oil type.

IMPORTANT: Run the PTO at 300 rpm until the minimum start temperature is reached.

Titan Transway WB: Minimum start temperature: 5°C / 50°F When the minimum start temperature is reached, increase the PTO speed to 850 rpm.

4.2.11 Stairs

Unfold: The compactor is equipped with foldable stairs. The stair may be unfolded to working position as follows:

1. Pull the lever towards you and pull the stairs out from the machine until the support is fully extended.
2. Push the lever away from yourself and carefully unfold the lower part of the stairs outwards and down.

Fold: The stair may be folded back into transport position as follows:

1. Carefully fold the lower part of the stairs upwards and in. Ensure that the lock engages.
2. Hold the upper stair segment and fold the middle of the support upwards and in. Ensure that the lock engages.

Ensure that the stairs are properly locked before transporting the machine.

4.3 DAILY CHECKLIST

4.3.1 Daily checklist prior to startup

No	Checkpoint prior to startup
1	Ensure that the drawbar is fully retracted.
2	Check that all main valves are open.
3	Check chain oil and grease level.
4	Check if grease comes out from the pressure relief valve on the grease pump unit (indicates blocking of pipe).
5	Check the tension of chains, carrier belts, and chamber belts.
6	Check wrapping table sensors and table movement.
7	Leave the wrapping table in its middle position.
8	Look for oil leaks.
9	Check the oil temperature.
10	Check the levelling of the machine.

4.3.2 Checkpoints while baling

No	Checkpoint prior to baling
1	Continuously observe all moving parts and functions.
2	Check the tracking of both chamber belts (leveling will affect the tracking).
3	Check the greasing pump function.
4	Check the chain lubrication system (Dry chains?).
5	Check the condition and cleaning of chamber rollers. Too much material on the rollers will affect the tracking of the chamber belts.
6	Avoid overfilling of the space between the elevator and sub conveyor. (Easily avoided by controlling the material amount fed into the elevator).

4.4 BREAK-IN PERIOD

The first 50 hours of operation are considered to be the break-in period.

NOTE: Before the compactor is shipped from the factory, Orkel has performed a thorough quality control and made a test run. The test run is done without any material. The need of some adjustments during first start up is to be expected, depending on the material being baled.

4.4.1 Precautions during the break-in period

When the compactor is brand new, there are a couple of things that need special attention from the operator. The tensioning of the elevator chain must be checked and, if necessary, readjusted during the first three hours of operation. Also remember to check wheel nut tightness after 10 km of road transport, and retighten if necessary.

4.4.2 After the first 50 hours of operation

Change the oil, and all oil filters.

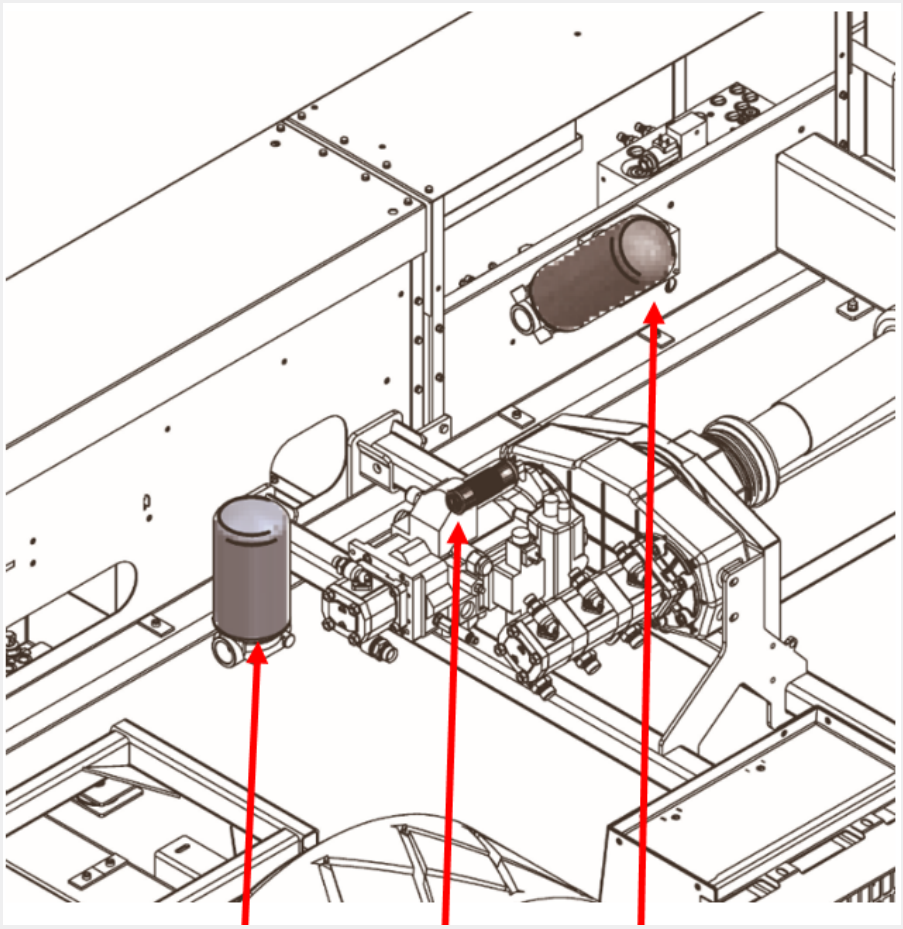


Figure 4.2 : *Filters*

IMPORTANT:

Orkel recommends that the operator regularly performs visual controls of the compactor as well as active listening for abnormal noises. Perform adjustments as soon as there is a need. A problem that is not immediately rectified may cause further problems, and in worst case lead to mechanical breakdown.

No	Checkpoints during and after break-in period
1	Grease collar. Check that all bearings have grease collar.
2	Perform visual control of the compactor – before, during and after use.
3	Grease pump. Check pressure relief valve, no visible grease shall be present.
4	Elevator chain. Check tension after 1-3 hours of operation
5	Check and adjust elevator and sensor.
6	Replace filters after the first 50 hours of operation.
7	Change hydraulic oil after 50 hours of operation.
8	Listen for abnormal noises.

4.5 AUTOMATIC OPERATION

IMPORTANT: If the tank valves are closed when the PTO is started, there is a high risk of damaging the hydraulic system. Before starting, please make sure that all tank valves are open. See section 11.2 "Valve

overview"

When pressing the start icon on the display unit, the following will happen:

The chamber starts, the elevator starts, the sub conveyor and hopper start. Material is fed into the bale chamber. The feed amount is controlled by the ultrasonic sensor S29.

When set chamber pressure is reached (elevator slow threshold) the elevator slows down in order to reduce the material flow into the chamber until the bale is finished.

Then, the net/film knife opens and the feed rollers start feeding the net/film into the chamber. A predefined number of layers of net/film is laid on the bale, and the knife cuts the net/film.

The chamber opens and the bale is transported to the wrapper by the sub conveyor. The ultrasonic sensor above the wrapping table detects the bale. Then the wrapping table receives the bale and tilts to its middle position. The chamber door closes.

When the chamber door is closed, a new baling cycle starts. At the same time, the wrapping starts on the wrapping table; the wrapping arms start and the film cutters release the film. The wrapping arms lay film on the bale until a predefined number of revolutions is reached, before the film cutters cut the film.

The finished bale is then dropped from the wrapping table, either manually from the display unit, or automatically if the automatic bale drop is activated.

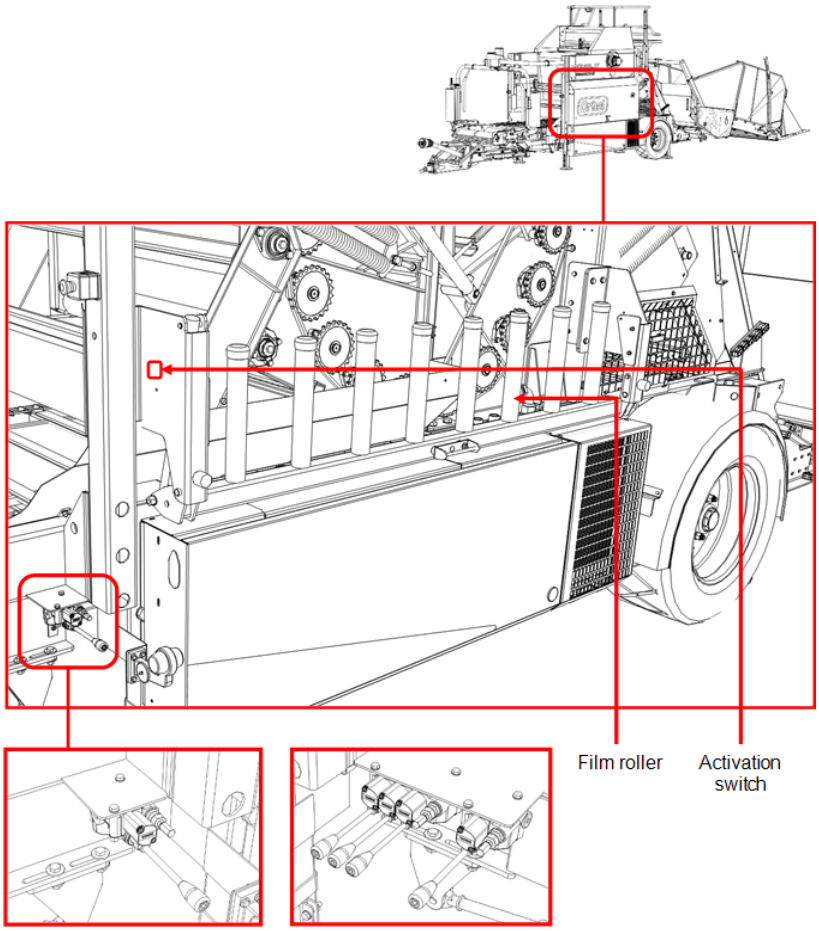
There are several conditions that determine the desirable number of layers with wrapping film; type of material, type of film and storage conditions and duration are especially important. Please read the manual enclosed with the film.

NOTE: 14 turns/laps of the wrapping arm equals approximately 6 layers of film on the bale.

4.6 FILM ROLLER STORAGE

The compactor is equipped with two hydraulically operated film storages, one on each side behind the side panels. Press and hold the activation switch and operate the lever up or down to raise or lower the stor-

age. In order to operate the storages the machine must be connected to the tractor's hydraulic system, with the oil flow activated. The total capacity is 15 film rollers.



NOTE: 14 turns/laps of the wrapping arm equals approximately 6 layers of film on the bale.

4.7 WRAPPING ARMS

4.7.1 Wrapping arm emergency stop

The compactors wrapping arms are equipped with safety guards that stop the wrappers movement if obstructed while wrapping. If the safety guards are triggered, there will be a popup message on the display unit. The safety guards must be manually cleared from any obstruction. The machine will not start until activated by a new command from the display unit.

4.7.2 Installing a new film roller in the wrapper

1. Grab the tensioner on the stretcher and pull it to the right.
2. Open the lock lever, lift the centering cone and lock it in its upper position.
3. Replace the empty film roller.
4. Align the film roller with the centering cone, drop and lock the cone.
5. Thread the film as shown on Figure 4.5 and swing back the tensioner onto the film roller.
6. Fasten the film on the bale or the film cutter. Wrapping may now continue.

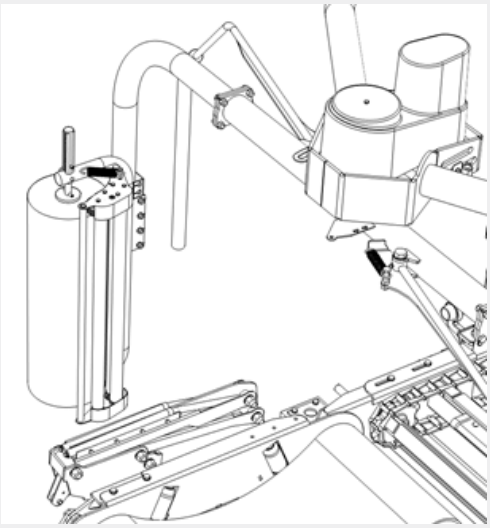


Figure 4.3 : *Film stretcher with tensioner*

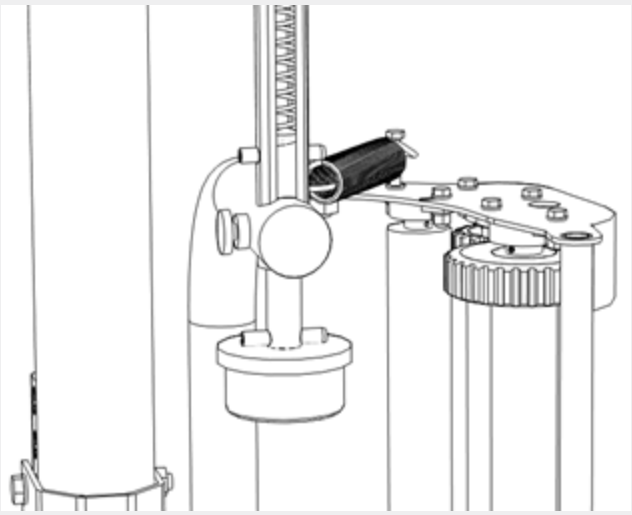


Figure 4.4 : *Empty film strecher*

Threading of the film shall be done as illustrated in the principle drawing

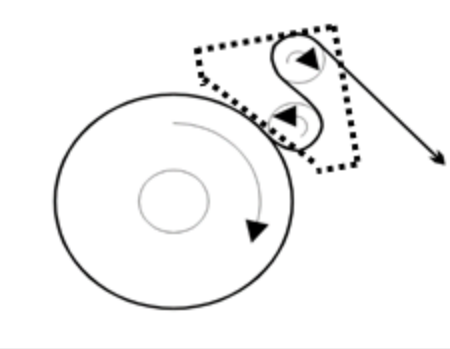


Figure 4.5 : *Film in the film stretcher seen from above.*

User resources for installing new film rollers may be found at www.orkel.com/qr

4.8 PARKING BRAKE

The parking brake is located near the right side wheel [Figure 4.6]. Rotate clockwise to engage, and counter clockwise to disengage

NOTE: Always make sure the parking brake is disengaged before moving the compactor.

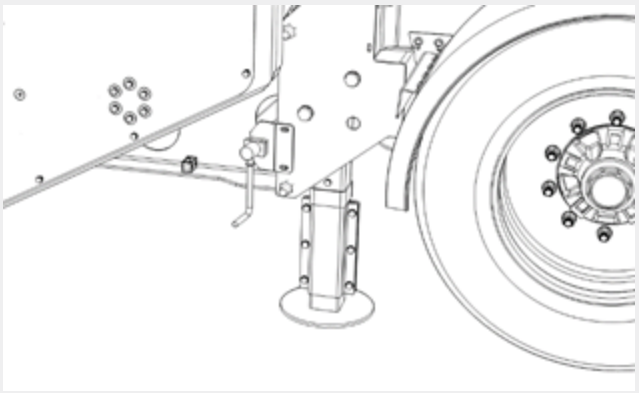


Figure 4.6 : *Parking brake*

4.9 OPERATORS PLATFORM

The operator's platform is a safe station for the operator when changing net/film rollers in the tying unit. It keeps the operator away from all moving parts and makes the process safer. It also contains extra room for additional net/film rollers.

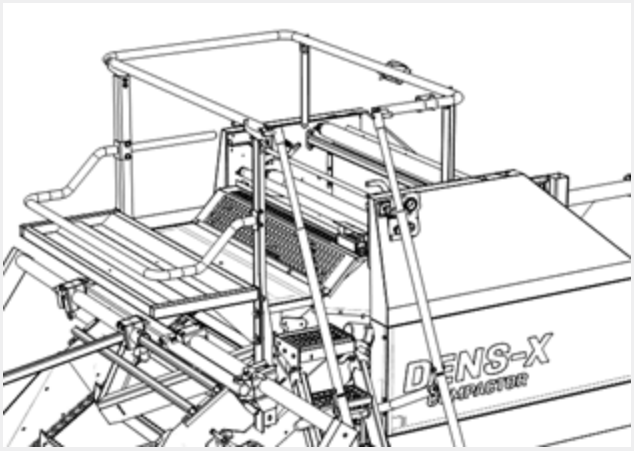


Figure 4.7 : *Operator's platform*

Standing on the platform may give a better overview of the work site and danger zones.

4.10 COMPRESSED AIR CLEANER SYSTEM

The compressed air cleaner system is an automatically triggered cleaning system that uses compressed air to maintain clean and dry component surfaces critical for continous operation.

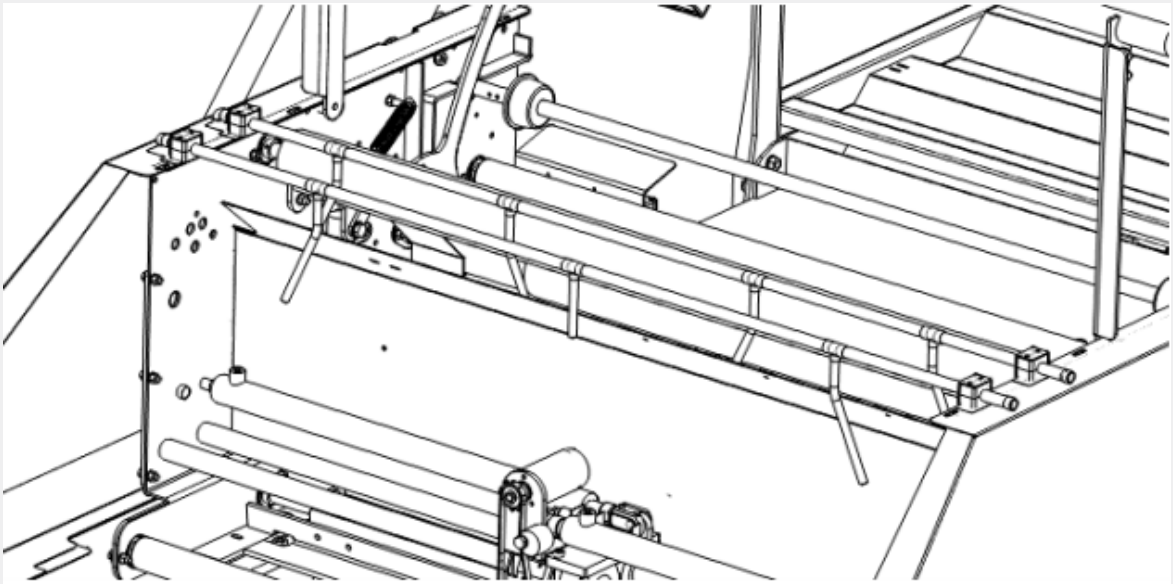


Figure 4.8 : *Compressed air cleaner system on the plastic tying unit*

4.10.1 Mode of operation

The three different cleaning processes are triggered by specific signal sequences.

1. **Chamber door**
   Cleans the chamber door contact surfaces when the bale is transported towards the wrapping table. Triggered by running sub-conveyer.
2. **Feed roller**
   Keeps the feed rollers and their surrounding environment clean from dust and dirt.
   Triggered by feed rollers moving to open position.
3. **Feed roller slide shafts**
   Cleans the feed rollers slide shafts located on the plastic tying unit. This enables the wide film to spread over the entire bale width without any obstructions from the feed rollers due to dirty slide shafts. Triggered by wrapping table in upper and lower position.

4.10.2 Recommendations

Minimum pressure:	8 bar
Maximum pressure:	12 bar
Number of valves:	3 pcs.

All valves with accompanying filters.

Filter changed when/if necessary.

The valves are located behind the film roller storage. Filters are mounted on the valves rear side.

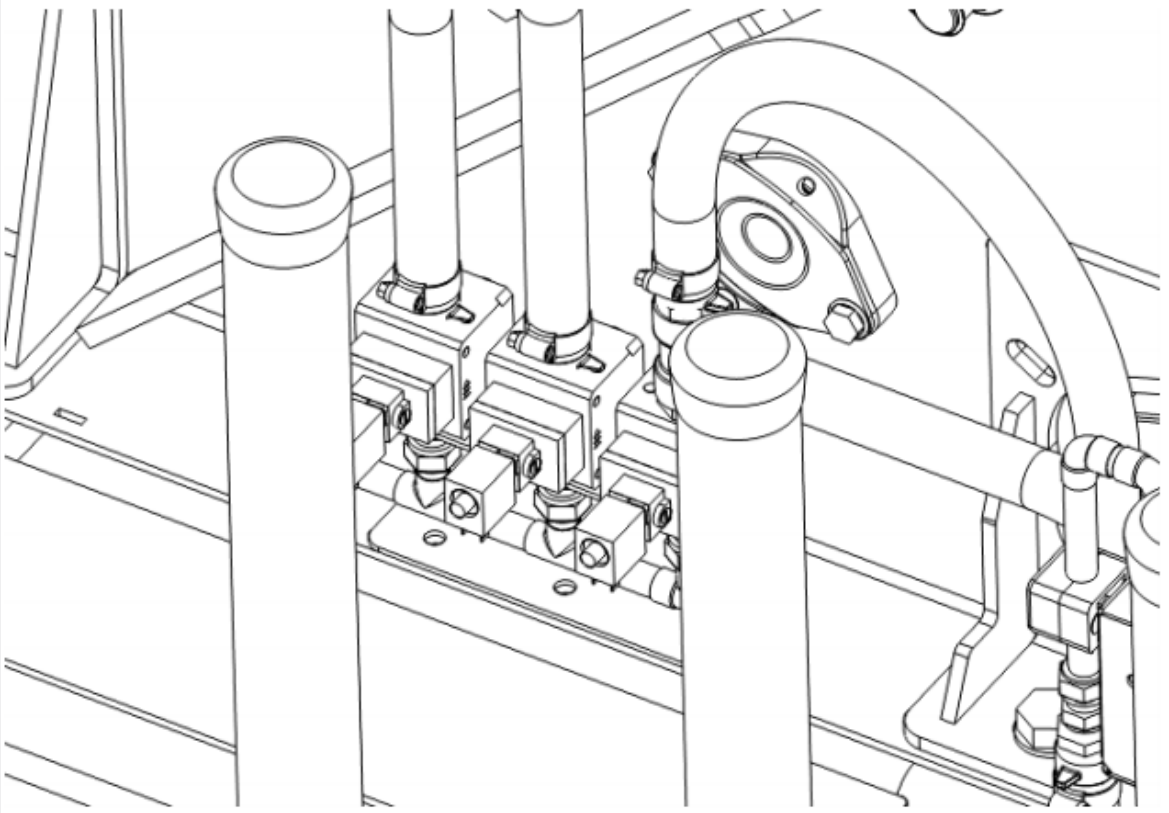


Figure 4.9 : *Valve and filter, location*

It is recommended to use an external compressor, located outside the polluted area of operation.

IMPORTANT: To use the tractors compressor is not recommended due to insufficient compressor capacity.

5 Transport

5.1 TRANSPORT OF EVO

If the EVO compactor is to be transported over larger distances, the feed hopper must be disconnected from the compactor, as this feed hopper is not designed to be felled up as on other models. Always consult local laws and restrictions of allowed overhang on machinery like the compactor.

For shorter distances, typically moving on the work site, the feed hopper may be lifted up to a horizontal level using the hydraulic pistons, ensuring ground clearance of 30-40 cm. Transporting on anything but level surfaces is strongly discouraged.

5.2 TRANSPORT SAFETY

Be aware of the danger of tipping when driving off road.

5.2.1 Speed limit

Km/h

mph

5.2.2 On road preparation

The Hi-X evo is not approved/designed for transport on roads or highways. Towing by the drawbar should only be done for moving the compactor on the work site. For longer distances, the compactor should be transported by container or by truck bed. Before transporting the machine the operator must ensure that all covers and hatches are closed and secured. If chosen to be towed by the drawbar, the feed hopper must be disconnected first by detaching the following points on both sides. [see Figure 5.1]

NOTE: Weight on draw bar: 1640 Kg - 3600Lb.

IMPORTANT: Always check local legislations and regulations for allowed overhang on machinery like the compactor, before towing.

IMPORTANT: Be aware of the height of the machine during transport!

Height: 4110 mm

Before set-up and mounting of machine (after transportation), always carry out a visual control of the machine, to reveal any transport damages.

DANGER

Be aware of danger of overturning during transport. Do not exceed recommended speed limits!

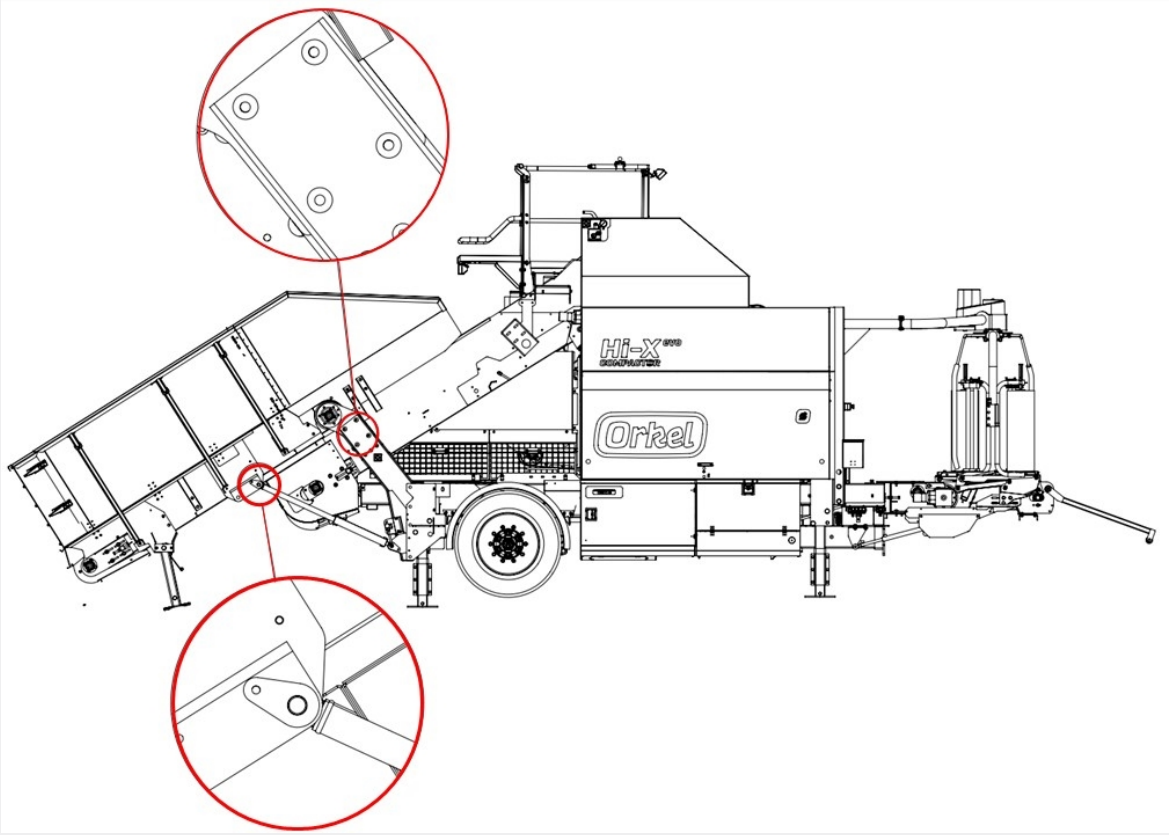


Figure 5.1 : *Feed hopper connection points*

5.2.3 Lifting points

Net weight of the machine is 10160 kg. - 25400Lb.

All lifting of machine must be performed as shown in the illustration.

Front: Use a nylon strap to make a loop around the front crossbeam (Beam Dim: 100 x 100mm).

Rear: Use lifting points on the hydraulic jack stands

NOTE: Use only certified lifting gear with sufficient lifting capacity.

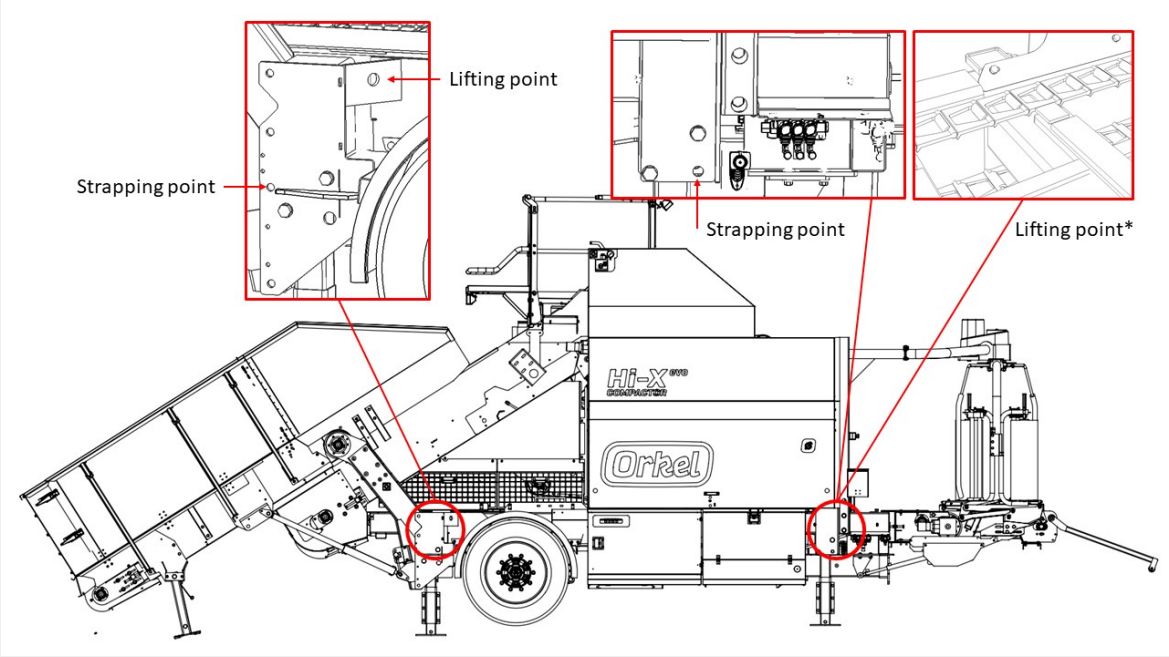


Figure 5.2 : *Lifting and strapping points*

5.2.4 Strapping and tie down

Secure the machine from moving if transported by lorry, train or boat. Only use approved securing straps or chains, designed for this purpose. There are four points designed for strapping. One on each hydraulic jack stand.

5.2.5 Dismantling the machine

WARNING

General safety precautions must be taken when stripping down the machine. Center of gravity might change during dismantling. Secure large parts to reduce the risk of injury. Be aware of overturning.

Hazardous waste like: Oil, plastic and so on, must be stored in an environmentally safe way, or delivered at a certified waste-disposal plant.

WARNING

Be aware of overhanging power lines.

Max height in transport position: 4110 mm

5.3 HIGHWAY USE

The Hi-X evo is not approved for transport on highways or by road in general. The compactor should be transported by container or by truck. Before transporting the machine the operator must ensure that all covers and hatches are closed and secured.

Be aware of overhanging power lines. Max. height in transport position: 4110 mm

6 Control system

6.1 USER INTERFACE

This section provides a brief introduction to the user interface, so that you quickly can get started using the machine.

NOTE: Software reviewed by this chapter is 0.17.03. Variations from the illustrations may occur.

The display unit is connected to the machine through its own cable from the machine's electro cabinet. The display unit is normally mounted on a ball joint. The mount may be opened so that the display unit can be brought around the machine. The display unit should be stored indoors when not in use. Keep the connectors dry and clean at all time.

6.1.1 Main page

When the main power switch is turned on, the display will boot. After a few seconds, the main page will appear.

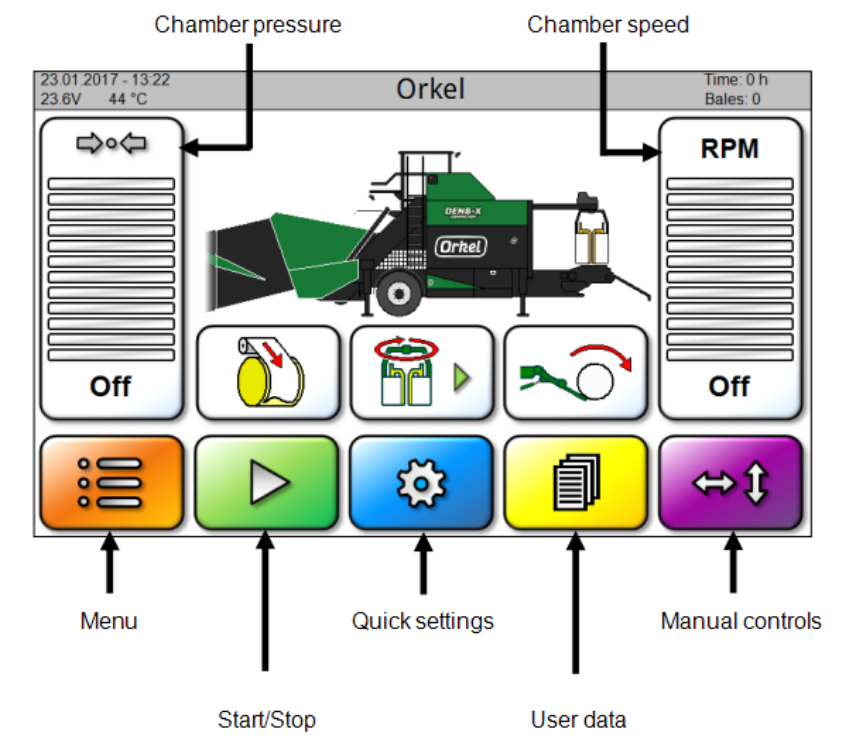


Figure 6.1 : *Main page with icon names*

6.1.2 Icons for starting program sequences

Start auto mode / stop

This icon starts the machine in automatic mode. The machine can be stopped by pressing the icon again (red symbol).

Start net/film system

This icon starts a complete sequence in which the net/film system lays net or film on the bale in the chamber. Afterwards, the machine continues in auto mode.

Start wrapping

This icon starts a complete sequence in which the bale is wrapped.

Start bale drop

This icon starts a complete sequence in which the bale is loaded off the table. The sequence can be cancelled by pressing the icon again. Afterwards, automatic bale drop can be activated in a popup window.

6.1.3 Menu

Pressing the Menu button on the front screen will display the Menu, see Figure 6.2

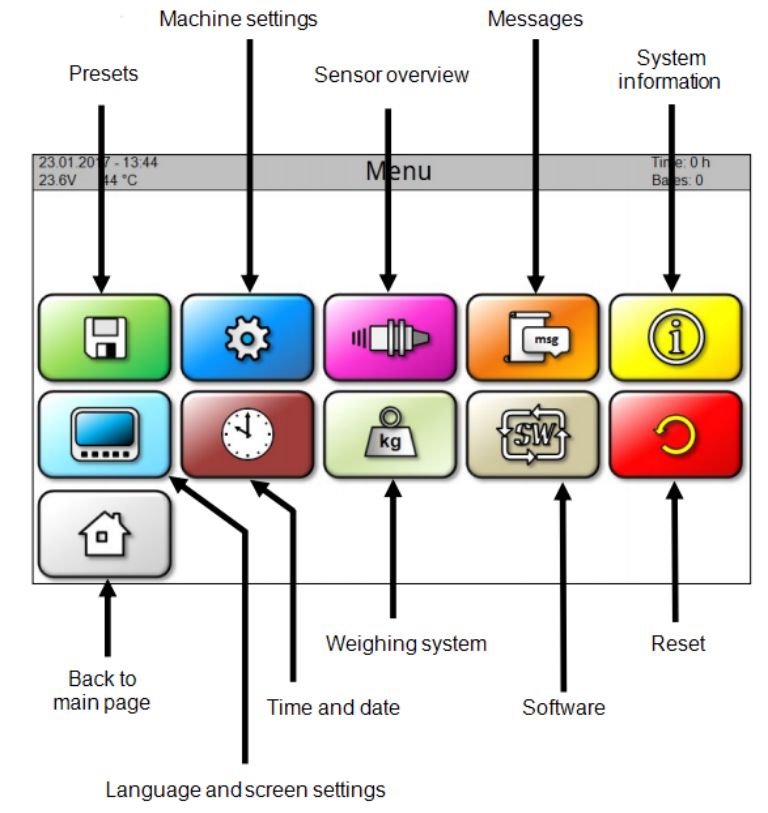


Figure 6.2 : *Menu screen*

6.1.4 User settings [Language and screen]

From main page; press menu and then the icon for Language and screen settings.

Choose the desired language. The system will remember which language is chosen and use it as default. The screen's brightness as well as key tone volume may also be set from this page.

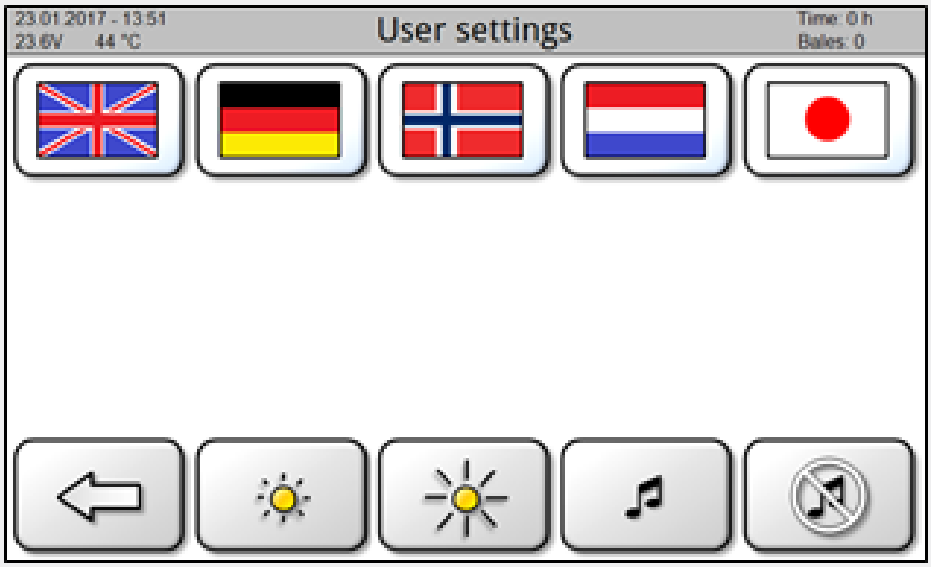


Figure 6.3 : *Language and screen settings page*

6.1.5 System information

From main page; press menu and then the icon for System information

This page shows information about the installed software (SW), voltage and logged data.

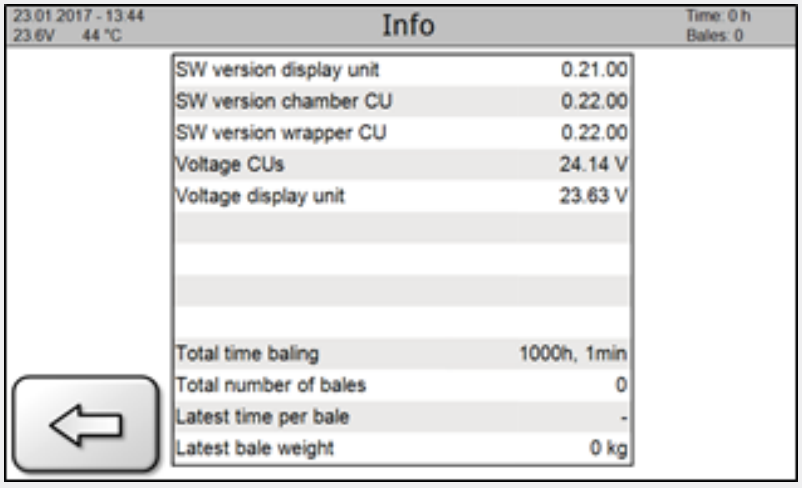


Figure 6.4 : *System information screen*

6.1.6 Manual controls

From these pages the machine's various functions may be operated manually by pressing and holding the respective icon.

Page 1

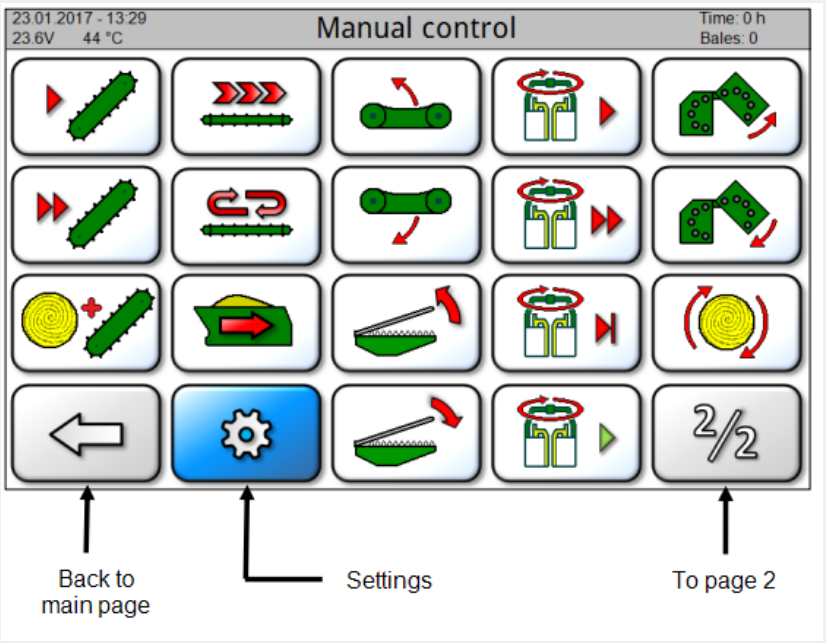


Figure 6.5 : *Manual control, page 1*

Page 2

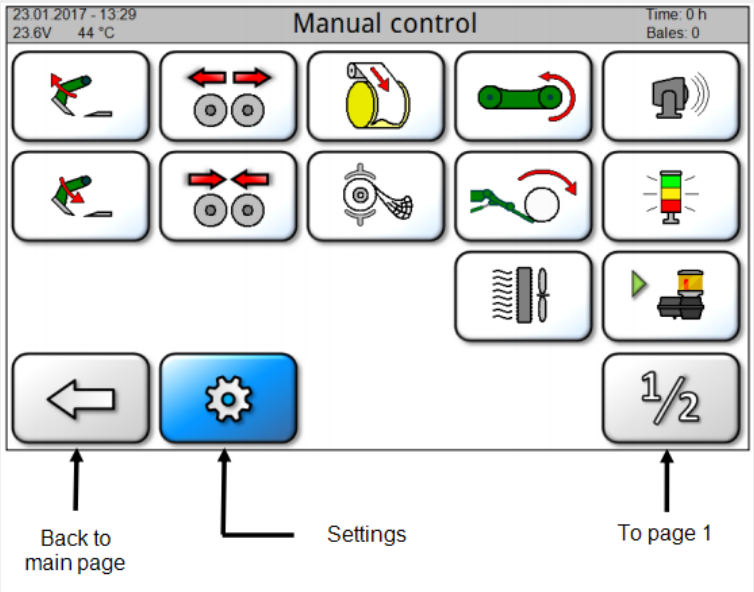


Figure 6.6 : *Manual control, page 2*

 Run elevator, low speed

 Run elevator, high speed

 Run elevator and chamber

 Run sub-conveyor, transport speed

 Run sub-conveyor, recycling speed

 Run hopper

 Raise wrapping table

 Lower wrapping table

 Open film cutters

 Close film cutters

 Run wrapper, low speed

 Run wrapper, high speed

 Run wrapper to home position

 Run wrapper, complete sequence

 Open chamber door

 Close chamber door

 Run chamber

 Shortcut to machine settings (applies to both page 1 and page 2)

 Open net/film knife

 Close net/film knife

 Open feed rollers

 Close feed rollers

 Start net/film sequence

 Net/film brake off/on

 Run wrapping table belt

 Start bale drop

 Reverse cooler fan (self cleaning)

 Sound warning siren

 Flash signal tower

 Run grease pump

 Reversing belts, inactive

 Reversing belts, active

6.1.7 Machine settings

 From main page; press Menu and then the icon for Machine settings. This page allows you to change settings that determines the machine behaviour during operation.

For more information of each setting and what it is used for, see section 6.1.17 "Settings and explanations"

NOTE: The machine settings cannot be viewed or changed if one or more of the emergency stop switches are triggered, or if the machine is running in auto mode.

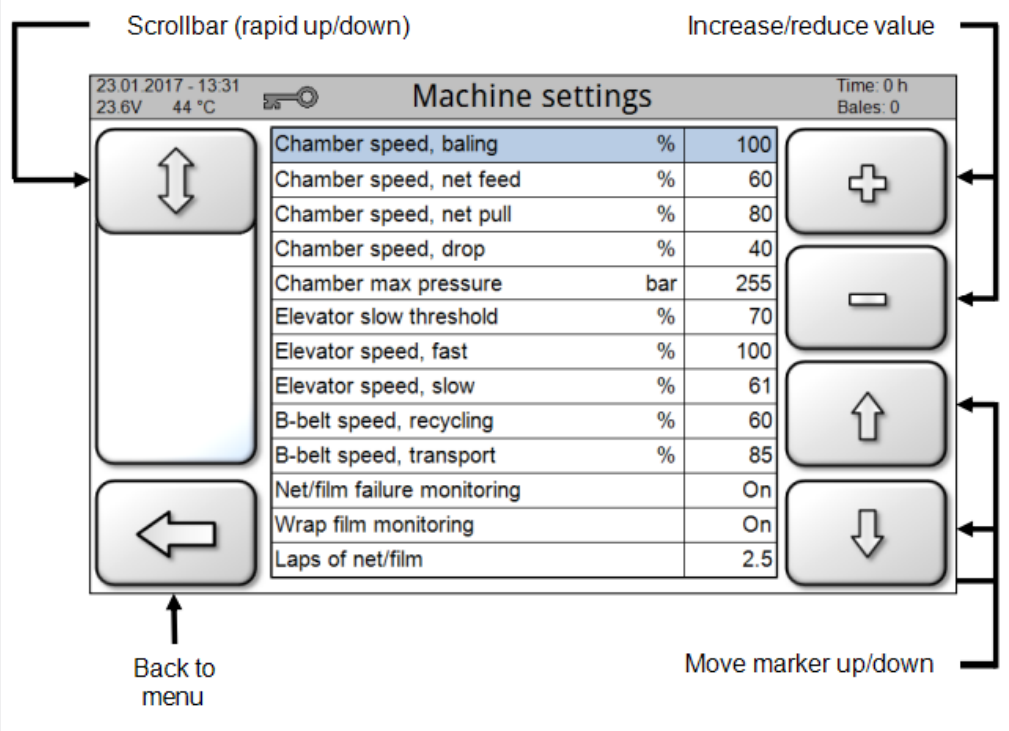


Figure 6.7 : *Machine settings screen*

6.1.8 Quick settings

Figure 6.8 : *Quick settings*

Certain machine settings can also be accessed from the main page, also when the machine is running in auto mode.

6.1.9 Presets

From main page; press menu and then the icon for Presets.

This page (see 6.1.9) allows the operator to create and activate complete setups of machine settings. A setup is loaded by moving the marker to the chosen setup and clicking the activation icon. Subsequent changes to the settings will be stored automatically in the selected setup.

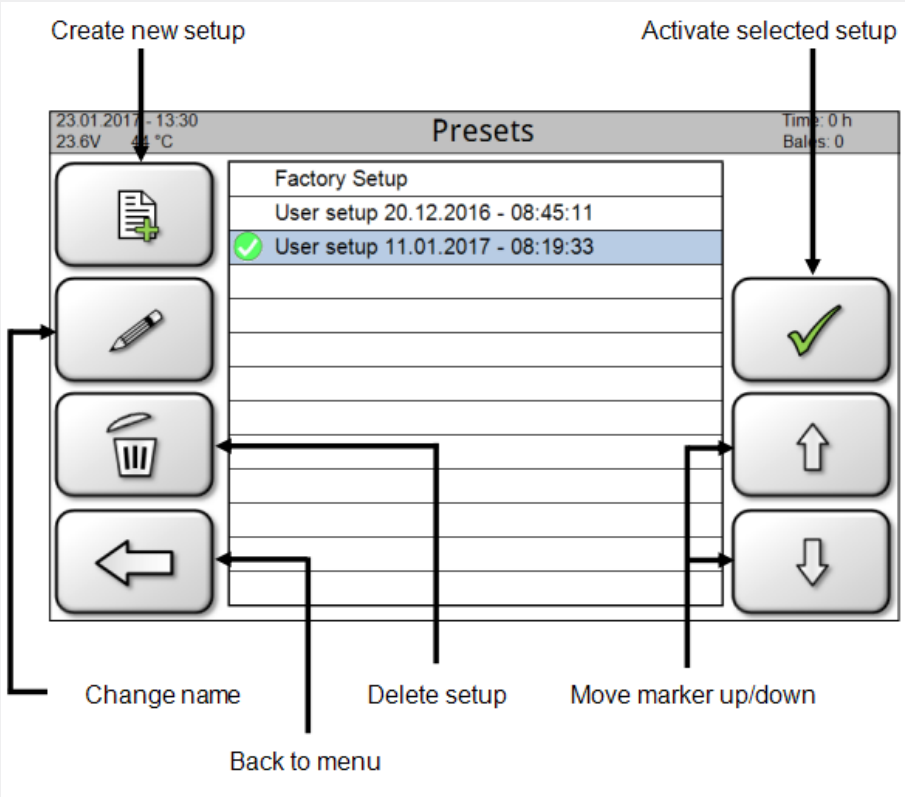


Figure 6.9 : *Presets*

The top of the list contains presets (predefined factory setups) from Orkel for several different materials. These cannot be changed. If the machine settings are changed when such a preset is activated, a new setup will automatically be created and activated.

6.1.10 Sensors

From main page; press menu and then the icon for Sensors. This page shows all the sensors' locations as well as their current state.

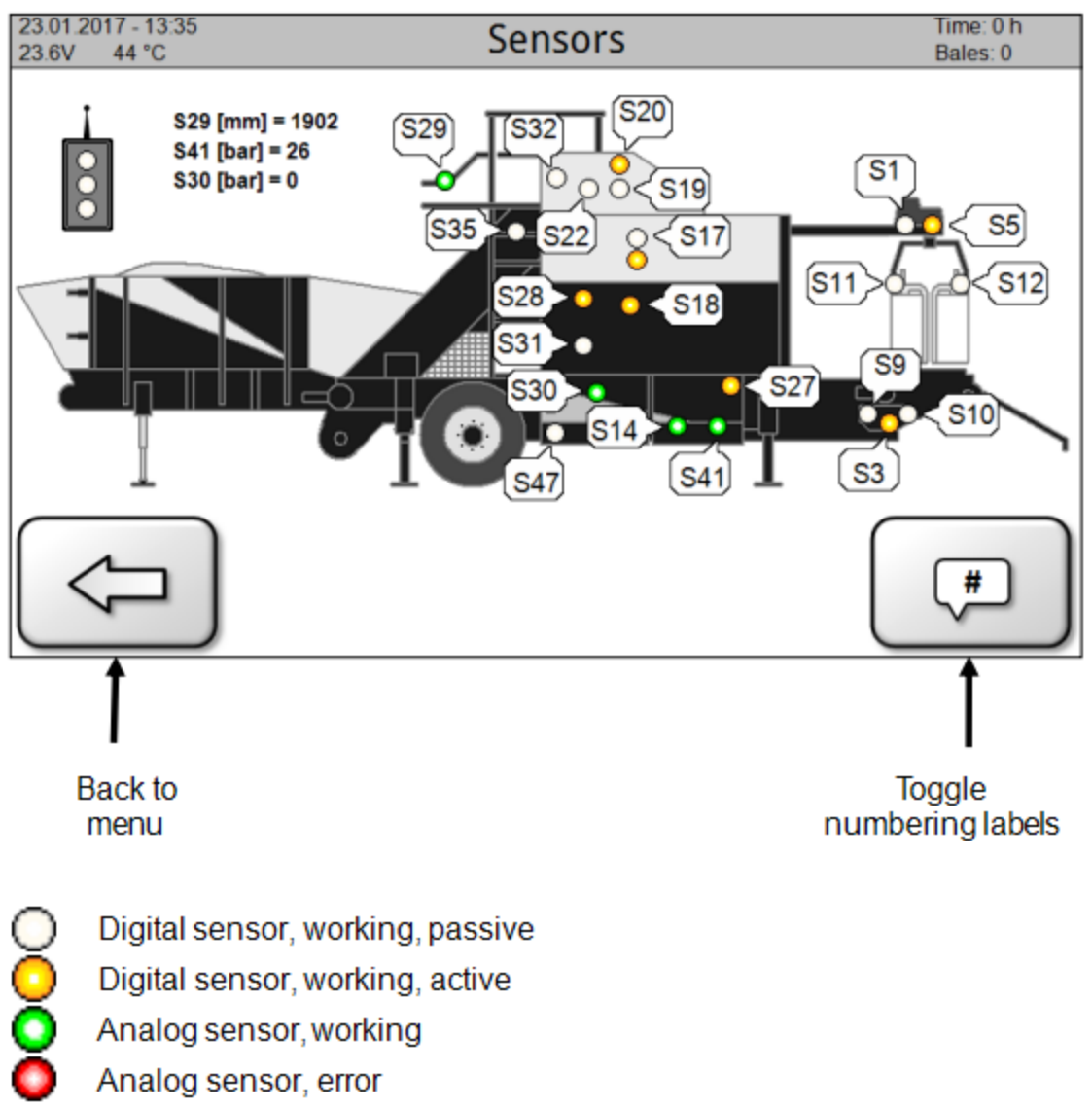


Figure 6.10 : *Sensor overview with status*

6.1.11 Messages

From main page; press menu and then the icon for Messages.

This page shows a list containing the previous 100 operational messages, including error messages.

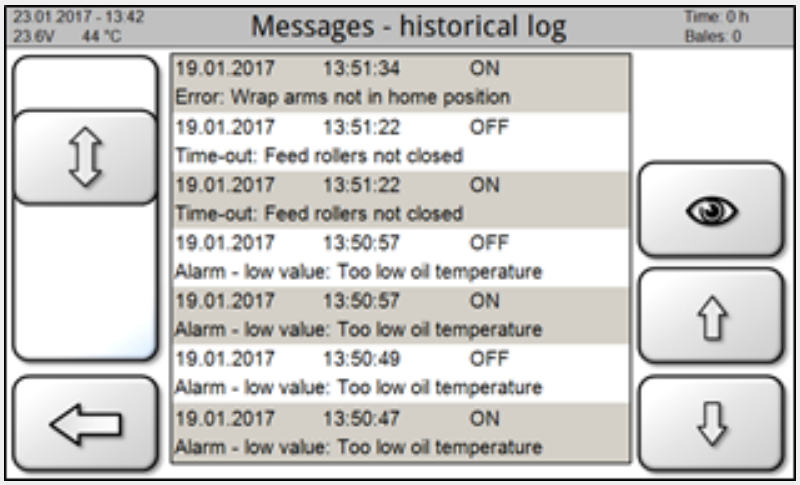


Figure 6.11 : *Message screen*

6.1.12 Time and date

From main page; press menu and then the icon for Time and date settings.

The values can be changed up and down by pressing the arrows on the right hand side and left hand side respectively.

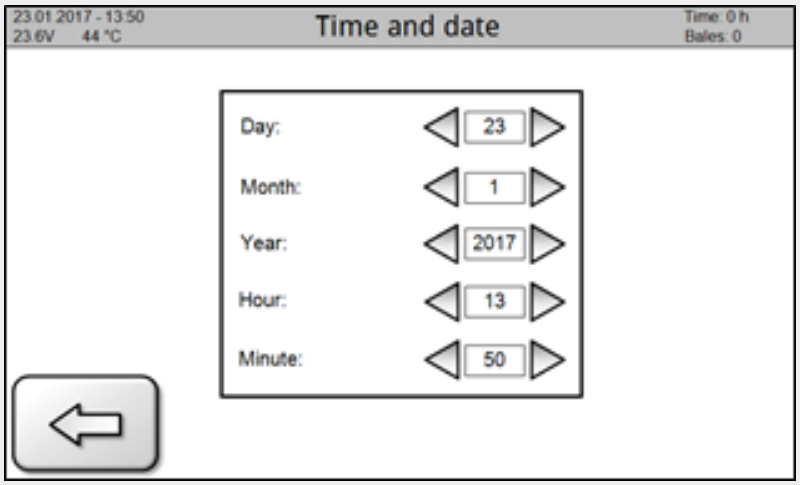


Figure 6.12 : *Time and date screen*

6.1.13 User data

From main page; press menu and then the icon for User data. This page shows data from the baling process that automatically are stored to the activated database. This may be per job, per customer or any other desired time interval.

The icon to the right, at the top, deletes all the data stored to the activated database.

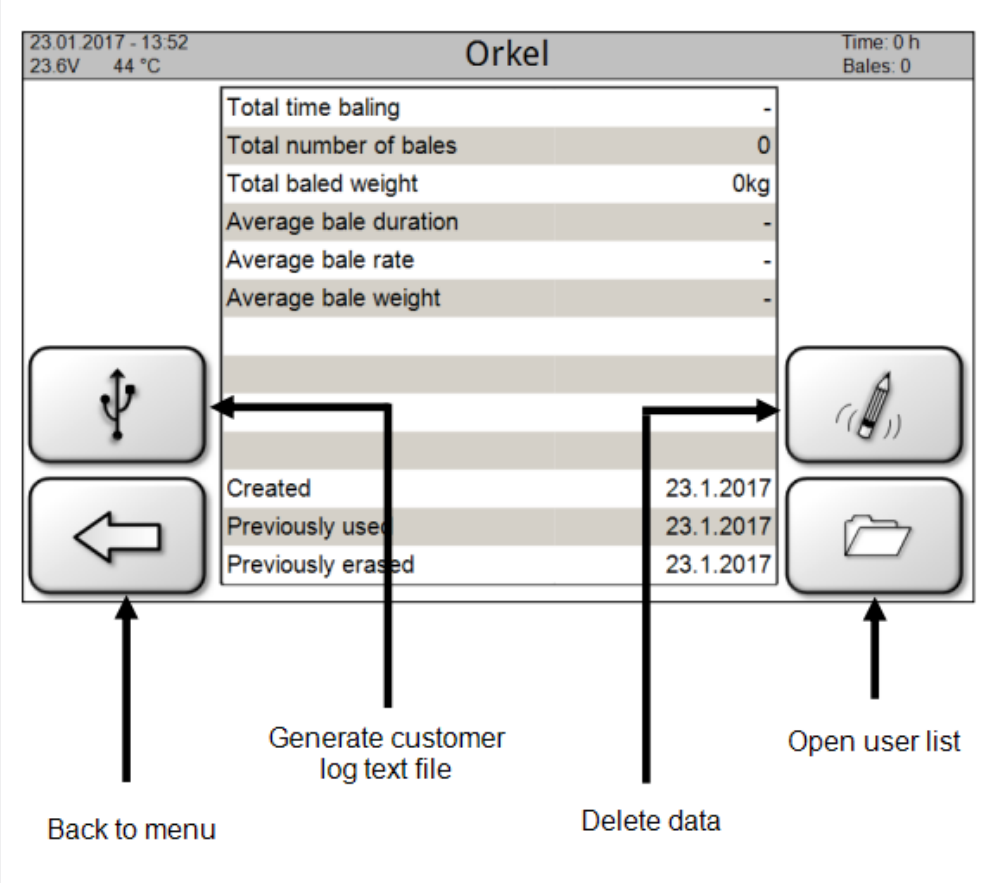


Figure 6.13 : *User data page*

When pressing the upper left icon, the control unit generates a printable text file containing the customer log.

NOTE: Insert the mini-USB-USB-adapter and flash drive into the control unit. The text file prints directly on the flash drive when pressing the «generate»-button.

The icon in the lower right corner opens the user list, where customer databases can be created, activated and deleted. The selected database can be activated by moving the marker to the desired database and pressing the upper right icon.

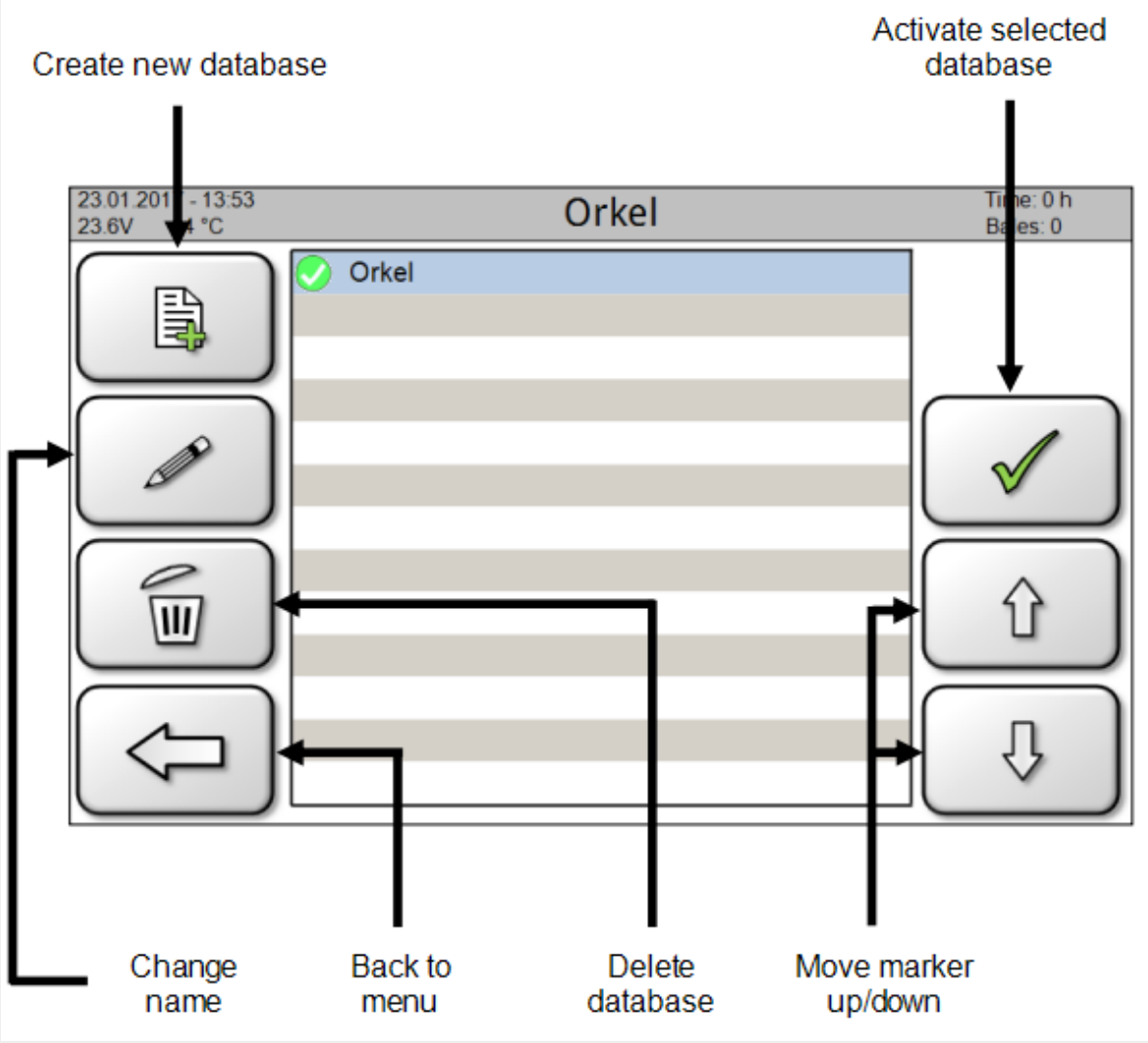


Figure 6.14 : *User list*

6.1.14 Weighing system

Weighing system is not supported by the software version described in this document.

6.1.15 Reset

From main page; press menu and then the icon for Reset. The reset icon resets the baling process, so that this starts from the beginning when the machine is put in auto mode. The reset does not affect the settings, nor the stored user data.

6.1.16 Software

From main page; press menu and then the icon for Reset. The reset icon resets the baling process, so that this starts from the beginning when the machine is put in auto mode. The reset does not affect the settings, nor the stored user data.

Before the software update, the new software must be copied onto the display unit by the following steps:

- Place the software (zip archive) on an empty USB stick and insert the stick in the USB port on the back of the display. Use a mini-USB-USB-adapter. The USB port is behind the black cap to the far left.
- Reboot the display unit by turning off the main power breaker at least 3 seconds. When the Orkel logo shows, press and hold the lower right corner until "Application Loader" is shown.
- Press "Update Software", choose the software from the list and press "Copy to Display". Wait until the status line shows "Done".
- Press "Run current Software".

Tick off the boxes as shown to the right, and then click on the icon to start the update. When both green progress bars show 100 %, restart the system by turning off the main power switch for at least 3 seconds.

The installation is now complete.

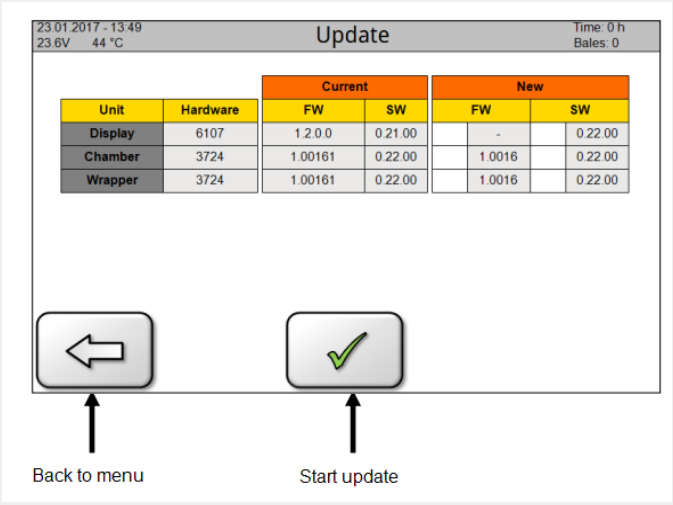


Figure 6.15 : *Software screen*

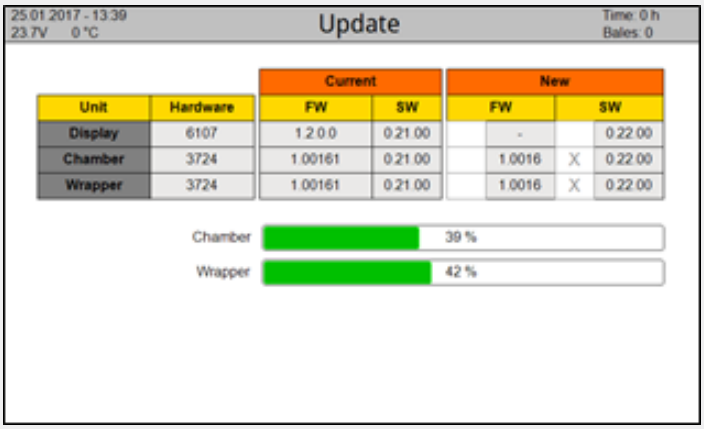


Figure 6.16 : *Software screen. The green bars show that update is installing*

6.1.17 Settings and explanations

Settings	Explanation
Chamber speed, baling	Chamber speed during baling
Chamber speed, net feed	Chamber speed during net/film feed
Chamber speed, net pull	Chamber speed when net/film is put on the bale
Chamber speed, drop	Chamber speed when bale is ejected from the chamber. Important in context of both stiction and loss
Chamber max pressure	Pressure limit at which the net/film sequence starts (maximum chamber pressure)
Elevator slow threshold	Pressure limit at which the elevator slows down
Elevator speed, fast	Elevator speed when material is fed into the chamber, high level (before Elevator slow threshold is reached)
Elevator speed, slow	Elevator speed when Elevator slow threshold is reached
B-belt speed, recycling	Sub conveyor speed when recycling (baling)
B-belt speed, transport	Sub conveyor speed when transporting the bale from chamber to wrapping table. Low speed normally reduces material loss
Net/film failure monitoring	Defines whether the system stops upon failure of net/film system sequence (known as Net control)
Laps of net/film	Defines the number of rounds of net/film in the net/film sequence. Counted from completed feeding
Laps of wrapping film	Defines whether the system stops upon failure of wrapping sequence (known as Film control)
US trigger distance	Defines the number of rounds of film in the wrapping sequence. Note: not number of layers
Bale-on-table-delay	Delay before the table moves to its middle position after detecting bale. Should be set shorter at higher transport speed on sub conveyor
Net/film tying start delay	Delay before the net/film system starts when the maximum chamber pressure is reached
Elevator stop delay	Delay before the elevator stops when the maximum chamber pressure is reached
Net/film feed duration	Defines the duration of net/film feed when the net/film sequence starts
Wrapping table speed, two rollers	Defines the wrapping table belt speed when wrapping with two rollers. Determines the net/film overlap
Wrapping table speed, one roller	Defines the wrapping table belt speed when wrapping with one roller. Determines the net/film overlap
Elevator overfeed protection	Activates automatic stop of the hopper if the pressure exceeds the set maximum pressure.
Elevator overfeed limit	Defines the maximum pressure in the elevator, that is, the threshold at which the hopper stops
Film release, 1st	Defines at which of the wrapper rounds the cutters releases the film, first time

Settings	Explanation
Film release, 2nd	Defines at which of the wrapper rounds the cutters releases the film, second time
Film release, 3rd	Defines at which of the wrapper rounds the cutters releases the film, third time
Film release duration	Defines the duration of the cutter film release. Should be adjusted in context of the cutters speed (manual valve)
Bale drop dwell time	Defines the wrapping tables dwell in lower position during bale drop. Chosen based on material weight and firmness, as well as whether the belt rotates
Auto continuation, one roller	Activates automatic reset of the wrapping table belt speed when wrapping with one roller. Used to maintain the correct overlap when one roller empties
Feed rollers rotate @ closing	Defines whether the feed rollers rotate during closing. Used to protect the net/film
Wrapping table run during drop	Defines whether the wrapping table belts rotates during the bale drop. If activated, the bale may roll further away from the machine
Bale eject additional rotation	Defines an additional rotation of the bale when ejected from the chamber. Used to place the net/film "tale" on top of the bale
Hopper run during transport	Defines whether the feed hopper runs when the bale is being transported to the wrapper. May be used to prefill the elevator before the next bale
Grease amount	Defines the amount of grease pumped to the lubrication points
Delayed hopper start	Defines a delayed start of the hopper after the elevator has started
Wrapping table run before drop	Defines whether the wrapping table rotates in order to squeeze the film before bale drop
F25: Augers low speed run	Defines whether the augers rotates then the elevator runs at low speed
F25: Hopper full flow	Defines whether the hopper runs at full speed at all (both pumps connected)
F25: Hopper full flow delay	Defines a delay before the hopper runs at full speed

7 Maintenance and mechanical adjustments

7.1 SAFETY

7.1.1 Before maintenance

Before any maintenance or adjustments are performed on the machine, we recommend you to make a conference call to your local dealer or Orkel AS. All repair work shall be carried out by a skilled mechanic.

7.1.2 Safety precautions during maintenance and mechanical adjustments

NOTE: Due to your own safety, Orkel AS recommends that all repair- and maintenance work on the machine is done in daylight conditions or equivalent.

If you fail to comply with instructions given it could result in personal injury or loss of life.

- The PTO/Tractor must be stopped before any repair work or maintenance is carried out.
- The hydraulic safety valves on the chamber door lifting cylinders [K2 and K3], must be closed before anyone enters the chamber.
- Be cautious when cleaning belts and rollers to avoid crushing or squeezing of body parts.
- Use proper shoes and work wear to avoid slipping and other injuries when working on the machine.

7.1.3 Elements of hazard during maintenance

If you fail to comply with instructions given it could result in personal injury or loss of life

- Squeezing/crushing of fingers and hands near chains and sprockets
- Squeezing/crushing of finger and hands during cleaning of conveyor belts and rollers.
- Getting entangled into PTO axle. Do not stay in PTO area.
- Slipping and falling while entering the stairs or when working on the machine.
- Getting moderate burns. The oil is approximately 70°C - 158°F.

IMPORTANT: Safeguard can only be dismounted when the machine is stopped.

7.1.4 Control after repair or maintenance

Check that all tools are stowed away and that all covers are mounted correctly and in place.

Shut down the machine and disconnect the PTO-shaft prior to every machine inspection.

Be extra careful when performing function control on running machinery.

IMPORTANT: Inspections, simple repairs and adjustments mentioned in this manual may be performed by operators who have undergone training in the use and maintenance of this machine. More advanced repairs must be performed by skilled technicians.

NOTE: Maintenance should begin with a thorough cleaning in order to avoid dirt penetrating unwanted areas/-components.

7.2 ELECTRICS

- Visually, check the cables for damages and proper placement.
- Check all cable connections
- Check the road lights and work lights
- Check the emergency buttons for malfunction.

7.2.1 Fuses

The machine is equipped with one fuse unit inside the electrical cabinet. See section 10.2 "Electrical cabinet power supply rail"

7.3 WHEELS

Check the condition of the tires, they should have sufficient pattern depth and be without excessive wear. Control the tire inflation and wheel nut torque before transport to a new location. See section 12.5 "Wheels and tyres"

7.4 CHAINS

The chamber chains, and chain tensioner A, B and C, must be controlled for sufficient lubrication and correct tension. Look for abnormal wear and tear on sprockets and chains. Replace worn out parts if needed.

Contact your local supplier or Orkel AS directly if you have any doubts about parts that must be replaced.

7.4.1 Chain tensioner A

Basic setting:

Adjust the chamber drive chain tensioner bolt until the chain play is approximately 3 mm.

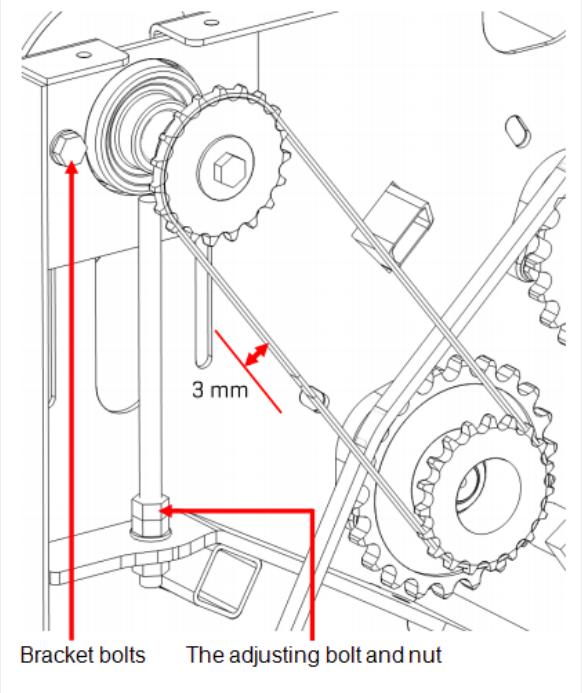


Figure 7.1 : *Chain tensioner A*

Implications during adjustment:

When adjusting either the left side (drive chain tension) or the right side (belt tracking) of this roller, these adjustments influence each other. Hence, you have to adjust both sides multiple times, until you achieve the ultimate chain tension and belt tracking combination.

Adjustment:

1. Untighten the two bolts holding the adjustable bracket.
2. Adjust the chain tension by turning the nut on the bolt.
3. Tighten the bolts holding the adjustable bracket when the chain-tension is OK.
4. Readjust the right side to find the optimal lining of the belt.
5. Repeat if necessary.

NOTE: Right side adjustment (belt tracking) is done by following the same general steps as described above.

IMPORTANT: Check the chain tension after adjusting the belt tracking.

7.4.2 Chain tensioner B and C

Control:

The length of the spring should be between 130 - 140mm.

Adjustment:

Increase the chain tension by tightening the nut on the bolt.

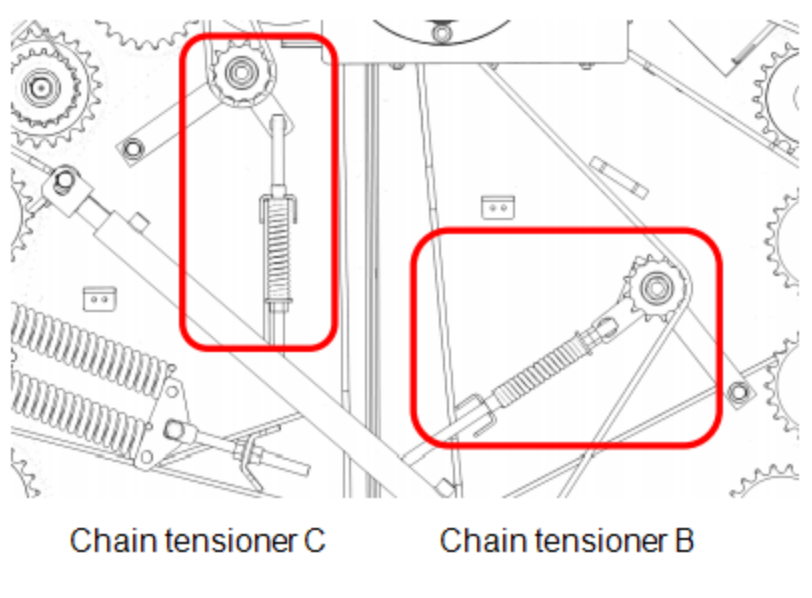


Figure 7.2 : *Chain tensioner B and C*

7.5 FEED HOPPER

7.5.1 Tightening the feed hopper belts

This belt is of chain type with welded carriers. Check the belt tensioning and look for uneven wear.

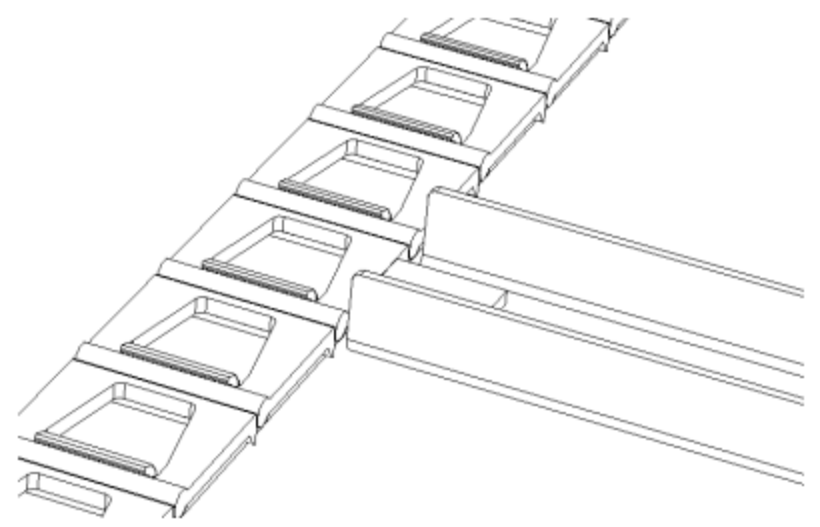


Figure 7.3 : *Feed hopper conveyor*

Procedure:

- Loosen the four bolts holding the bracket.
- Untighten the counter nut and tighten the bolt on the chain tensioner until correct belt tension is achieved.
- Adjust both sides equally.
- Tighten the counter nut and the attaching bolts on the bracket.

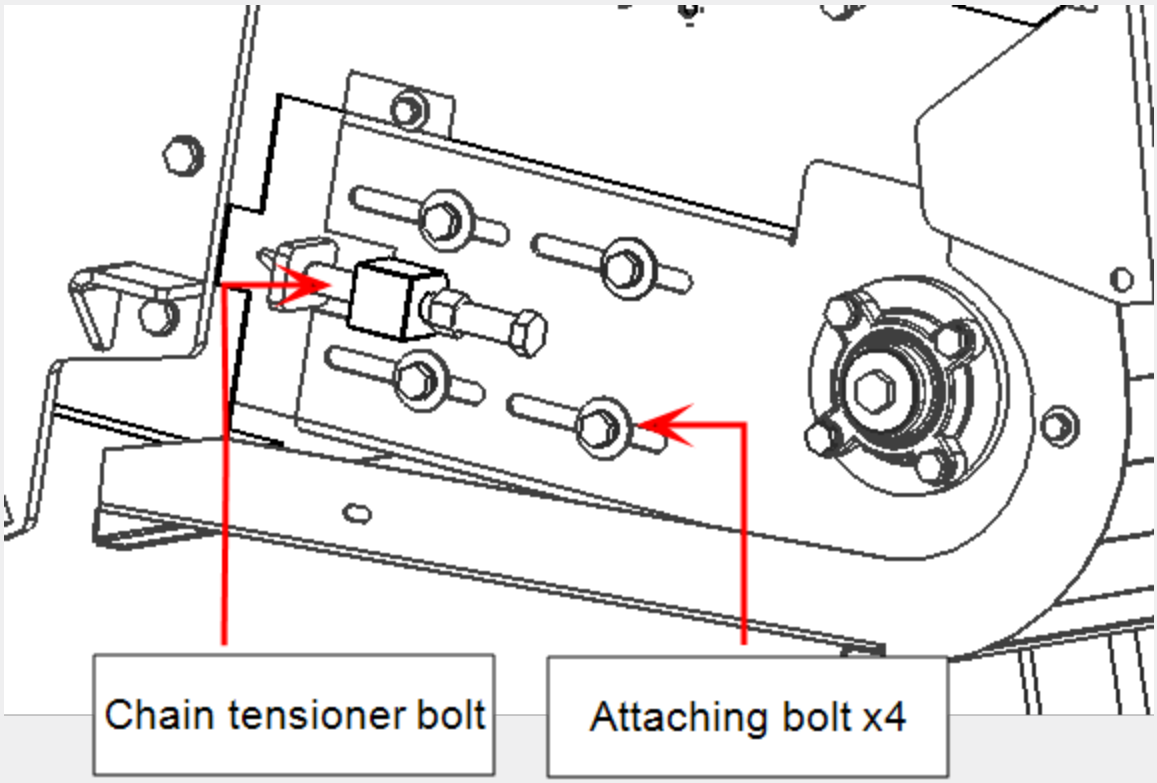


Figure 7.4 : *Chain tensioner, feed hopper*

7.5.2 Ball bearings

The rollers in the feed hopper should be without deformations and cracks. Check the bearing clearances without belt tension. Replace worn bearings.

7.6 ELEVATOR AND SUB CONVEYOR

7.6.1 Conveyor belts and feeder carrier

Sub conveyor and elevator.

The sub conveyor and elevator are of chain type with welded carriers. Check the chain tensioning and look for uneven wear.

7.6.2 Adjusting the conveyor chains

Same procedure on both chains. Tighten the chain tensioner, until all play is gone. Adjust equally on both sides, and check that the tracking of the chain is centered. If the wear in the chain links is too large to achieve proper chain tension, one link can be removed.

Figure 7.5 : *Elevator conveyor chain*

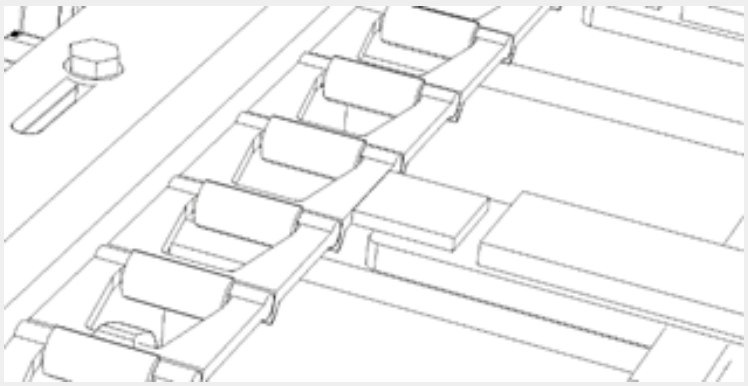


Figure 7.6 : *Sub conveyor*

Procedure

- Loosen the four bolts holding the bracket.
- Untighten the counter nut and tighten the bolt on the chain tensioner until correct chain-tension is achieved.
- Adjust both sides equally.
- Tighten the counter nut and the attaching bolts on bracket.

7.6.3 Chain tensioner, sub conveyor

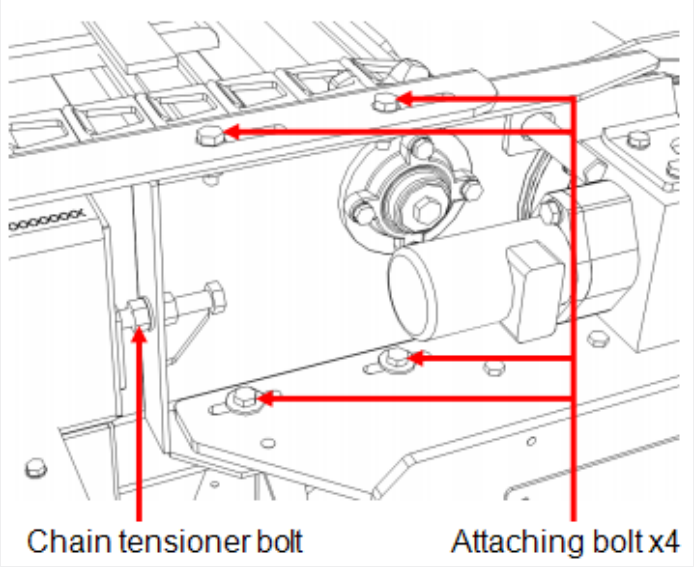


Figure 7.7 : *Chain tensioner sub conveyor*

7.6.4 Chain tensioner, elevator

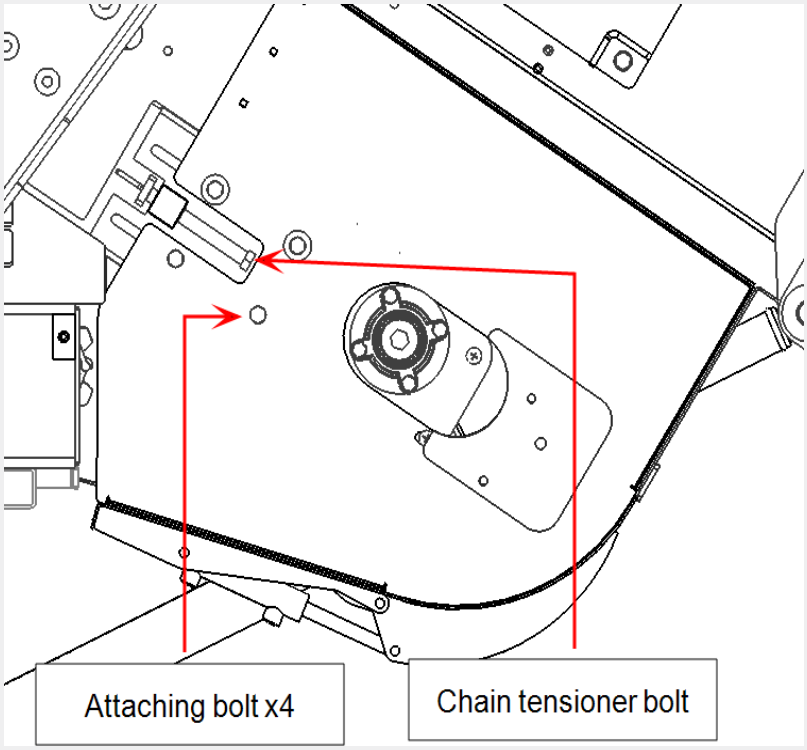


Figure 7.8 : *Chain tensioner elevator*

7.6.5 Ball bearings elevator

The rollers in the elevator and belt under should be without deformations and cracks. Check the bearing clearances without belt tension. Replace worn bearings.

7.7 BALING CHAMBER

All repair and maintenance work inside the chamber is associated with great danger. Secure the chamber door lifting cylinders, by closing the securing valves on both sides. The machine must be stopped and PTO disconnected.

7.7.1 Inspection

Chamber - rollers - bearings - belts

The bale chamber must be checked frequently. Before performing a control, the chamber must be properly cleaned, preferable using a high pressure washer. Check the tracking of the chamber belts and adjust if needed.

Look for wear on the chamber sidewalls and check the condition of the rollers and rubber belts. The grade of wear and tear are varying, depending on which material being baled.

Replace damaged rollers and belts if excessively worn. If there is excessive wear on the chamber sidewalls, Hardox wear plates can be retrofitted on the chamber walls. Contact Orkel AS if relevant.

NOTE: The play in the slide bearings is at the smallest when the compactor is brand new. This may result in increased temperature in the bearings. The bearings should therefore be checked as they might require additional lubrication.

During control and manual greasing of bearings and bushings the tractor/motor shall not be running.

NOTE: In extreme cases of heating, a special filler nipple may be used (force lubricate) after removing the hose from the bearing. Please contact Orkel if this is necessary.

7.7.2 Adjusting the front chamber belt

All adjustment of the belt tracking is done on the right side of the chamber (upper front roller). See Figure 7.10. The belt tracking should not touch the chamber side walls.

If the belt is tracking towards **B** (Figure 7.9), the distance **C** (Figure 7.10) must be increased. If the belt is tracking against **A** (Figure 7.9) the distance C (Figure 7.10) must be reduced.

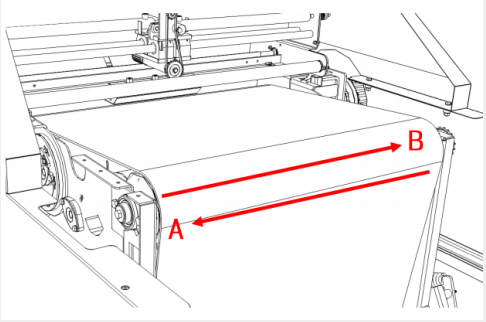


Figure 7.9 : *Front chamber belt is tracking towards A/B*

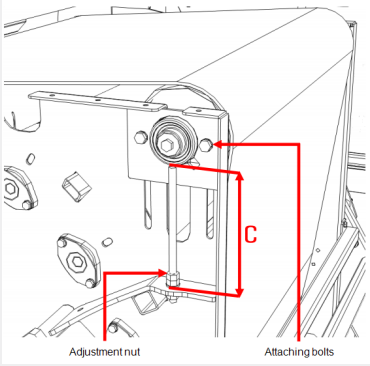


Figure 7.10 : *Front chamber distance C*

Loosen the attaching bolts, to allow a movement of the bracket. Loosen the counter nut and adjust the distance **C** by turning on the adjustment nut.

Tighten the counter nut and the attaching bolts of the bracket when the belt has a correct tracking.

7.7.3 Adjusting the rear chamber belt

The adjustments of the rear chamber belt is done preferably from the right side of the machine. Dismount the cover and safety net [Figure 7.11] to get access to the adjusting bracket and bolts seen in Figure 7.14.

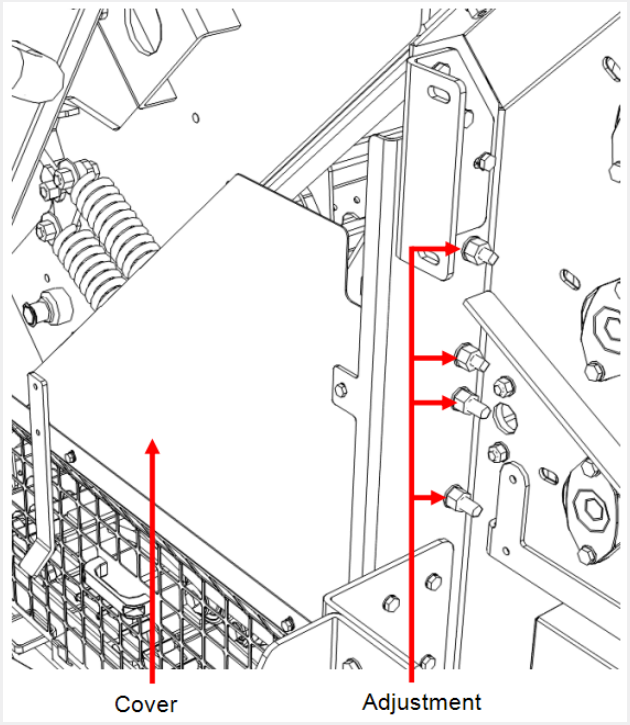


Figure 7.11 : *Rear chamber adjustments*

Rear tension roller

Adjusting the belt tracking is done by changing the distance C on the rollers bearing point D [Figure 7.13]

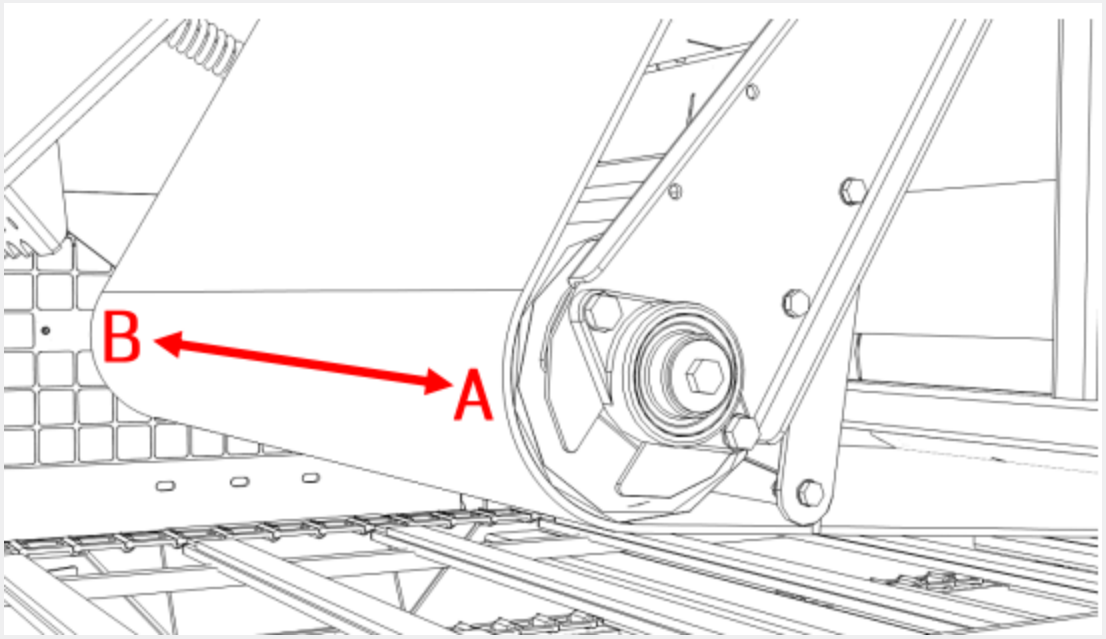


Figure 7.12 : *Tension roller*

By increasing the distance **C**, the belt tracking will go towards **B** (Figure 7.12). When decreasing the distance **C**, the belt tracking will go towards **A**.

If the belt still goes towards one of the sides, this operation must be carried out on the left side bearings, but in reverse order. If reducing the distance **C**, the belt tracking will enter towards **B**.

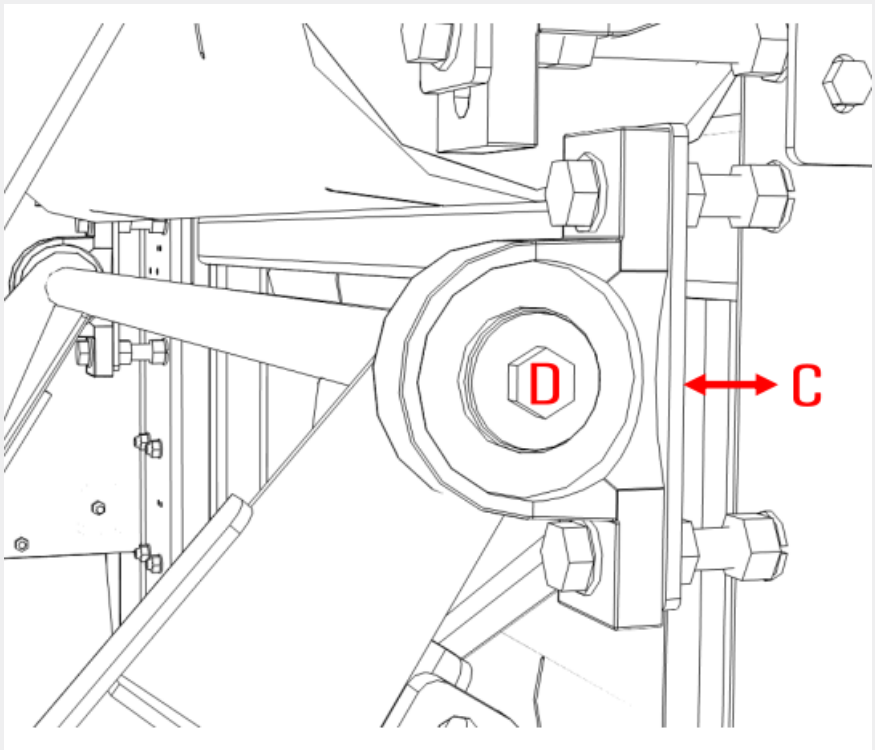


Figure 7.13 : *Bearing point (D), tension roller*

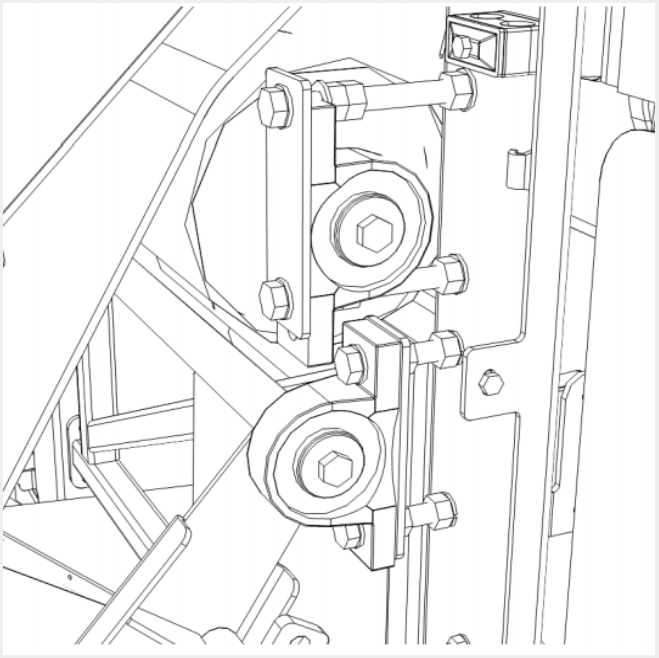


Figure 7.14 : *Adjusting brackets, rear chamber belt*

Upper adjustment roller C

Prior to this adjustment it´s very important to ensure that the machine is levelled.

Adjusting the belt tracking is performed by changing the distance **D** on the roller **C** (Figure 7.15). Preferably on the right side bracket.

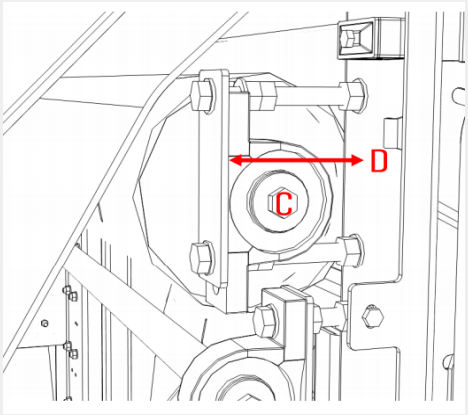


Figure 7.15 : *Bracket, upper adjustment roller*

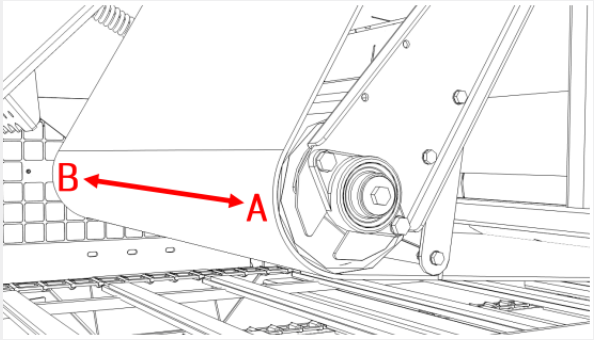


Figure 7.16 : *Tension roller*

By increasing the distance **D**, the belt will go towards **A** (Figure 7.16) in the chamber. If decreasing the distance the belt will go towards **B** (Figure 7.16) in the chamber.

If the tracking of the belt still goes towards one of the sides, this operation must be carried out on the left side, but in reverse order.

If increasing the distance **D** (Figure 7.15), the belt tracking will enter towards **B** (Figure 7.16).

The belt must run freely between the chamber walls.

7.7.4 Adjusting the chamber belt tensioner

The tension of the belts is under the influence of the force from the twin springs on both sides of the chamber.

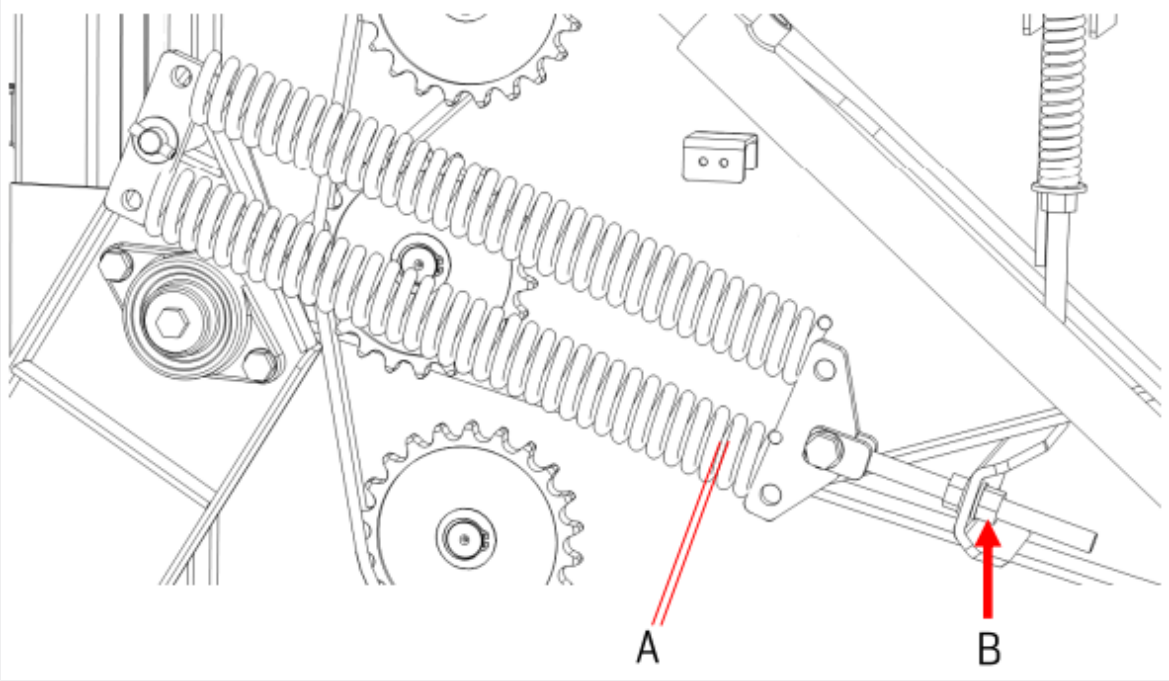


Figure 7.17 : *Belt tensioner, right side*

Basic settings:

Turn the nut **B**, until there's a clearance **A** of 1 mm between the coils [Figure 7.17].

NOTE: When pressing very light and dry materials, such as hay and wooden chips, the material might have some problems to start rotating. If such problem occurs, the clearance must be reduced. A = 0 - 1mm.

7.7.5 Replacing chamber belt

Clean the chamber. Use a high pressure washer.

Remember to secure the chamber door lifting cylinders before entering the chamber

Remove the damaged belt using a knife and cut the belt crosswise. Be observant of the rotation direction. Hook the new belt to the old one and use the chamber motor to pull the belt into place. Use caution when using the chamber motor. De-tension the belt before replacing belts. Fit the new belt and insert the locking rod as shown. Secure the locking rod by mounting the two washers, one on each side [Figure 7.18].

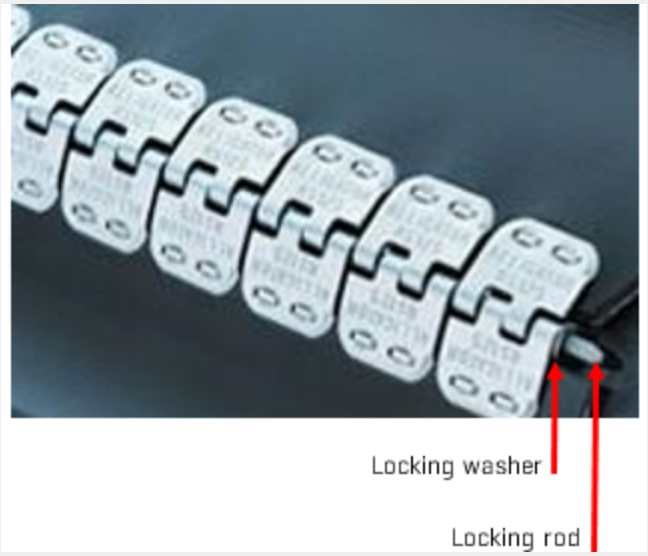


Figure 7.18 : *Belt with locking rod and washer*

7.8 PLASTIC TYING UNIT

The tying unit, containing wide film or net is located on top of the chamber.

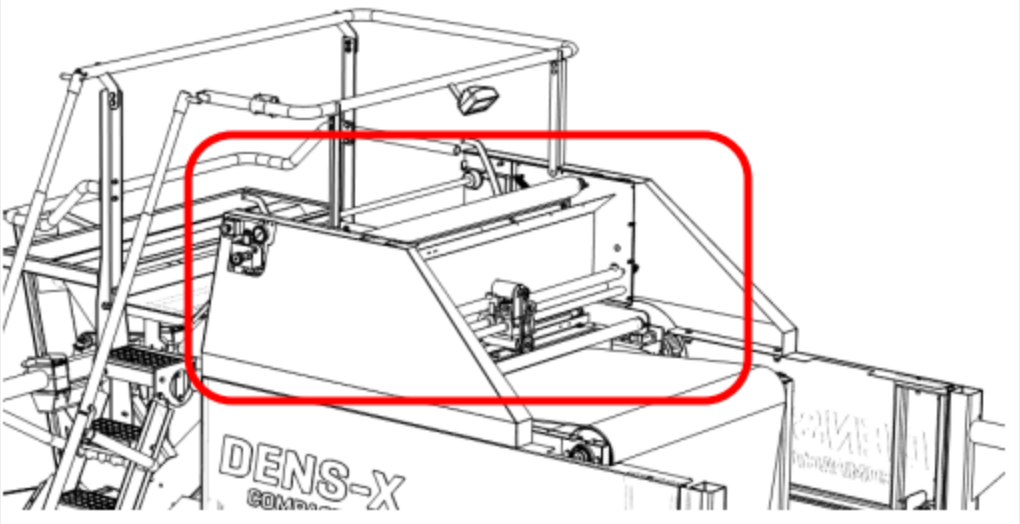


Figure 7.19 : *Plastic tying unit, location*

7.8.1 Control and maintenance

1. Clean and lubricate the slides for feed rollers.
2. Check the chain tension and the chain condition.(SeeFigure 7.20) Adjust the tension by loosening the bolt and turn the nylon eccentric to add more tension to the chain. Then retighten the bolt.
3. Check all movable parts and bearings in the tying unit.
4. Check the condition of the hydraulic hoses and couplings. Examine the unit for any leakages.
5. Control the free wheel function (feed rollers).

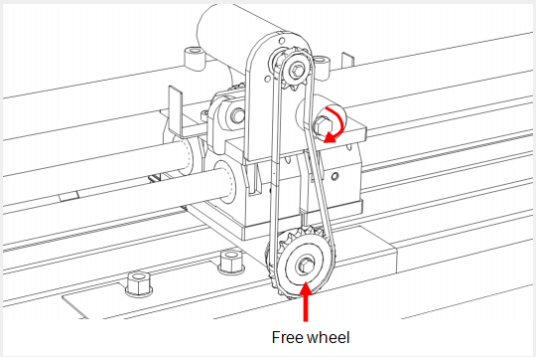


Figure 7.20 : *Free wheel, seen from wrapping table*

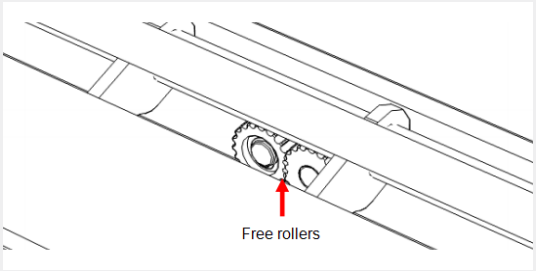


Figure 7.21 : *Feed rollers, seen from operator's platform*

7.9 WRAPPING TABLE

7.9.1 Inspection

Check the function of both emergency stop handles. Tighten the hinge bolts so that the handles barely returns to the start position. If the hinge bolts are too loose, the emergency stop handles may be triggered unnecessary. Also check that the wrapping film crosses the film cutter in the center of the knife bed. See Figure 7.23.

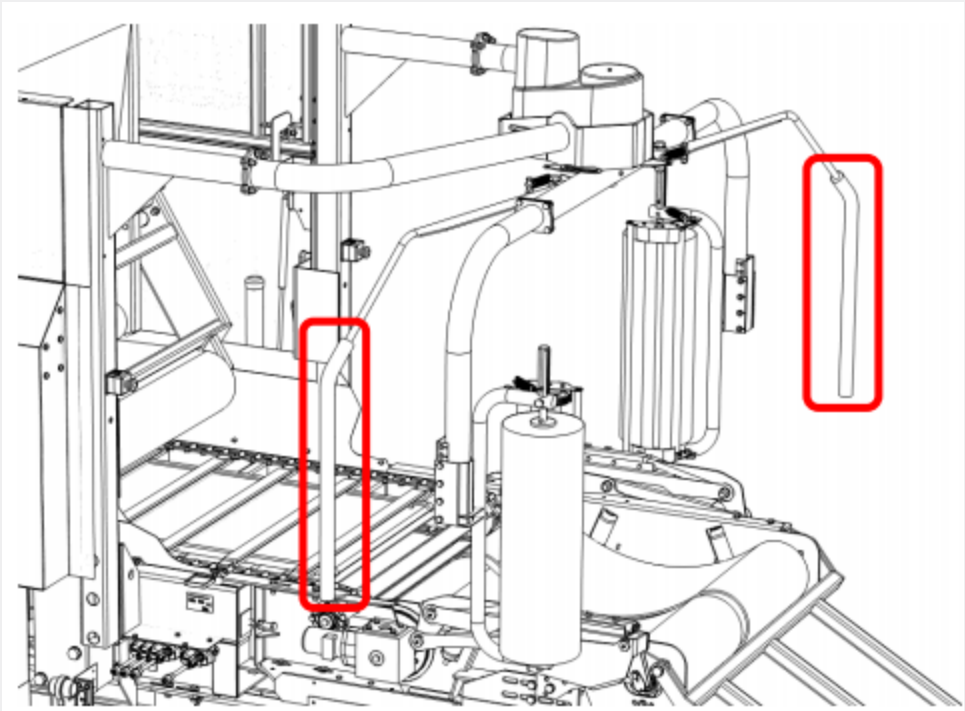


Figure 7.22 : *Wrapping table, emergency stop handles*

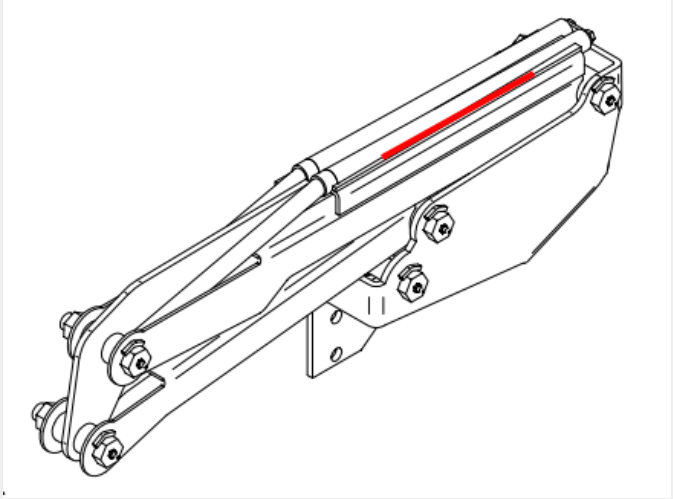


Figure 7.23 : *Knife bed*

7.9.2 Adjusting the wrapping table belt

The tension of the wrapping table belt must be adjusted as shown in Figure 7.24.

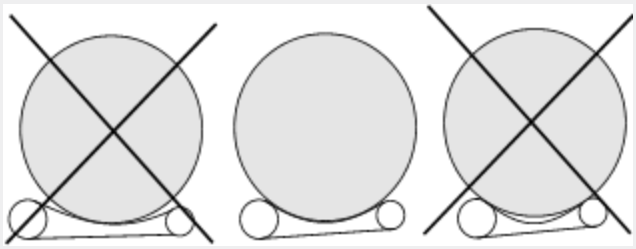


Figure 7.24 : *Correct belt tension, wrapping table*

The belt tension can be changed by relocating the roller. There are six alternative holes to mount the roller support (Figure 7.25)

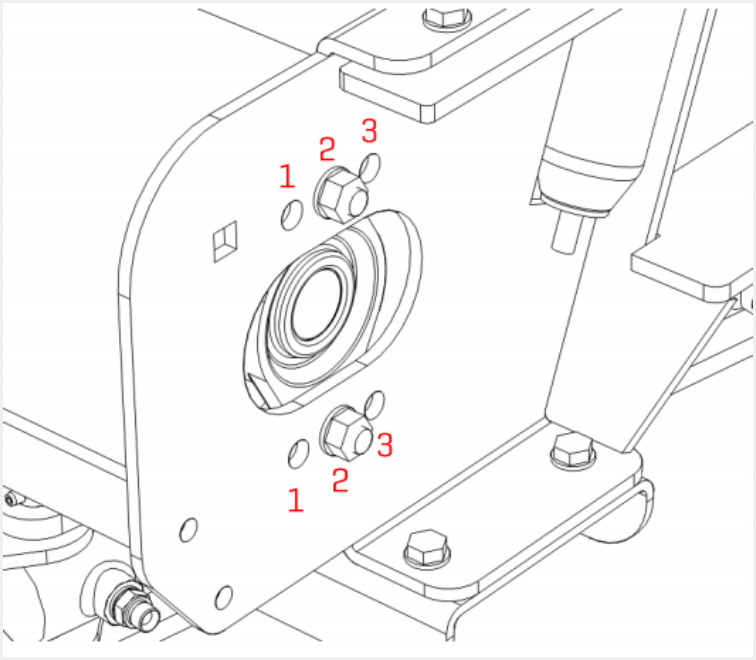


Figure 7.25 : *Holes for roller support*

Loosen the upper bolt to allow some movement on the bearing housing. Dismount the lower bolt and pull the roller to a suitable position. Insert the bolt in a suitable hole. Both sides must be equally mounted.

If the belt tracking is incorrect, try to change location (side) of the belts.

For wrapping tables with a weighing cell the front belt tension can be adjusted within the slot (arrow 1) by turning the adjustment bolt (arrow 2), see Figure 7.26. Because of this the mounting holes are not in use. Adjust belt tension by loosening the bearing (red circles) and adjust the screw to achieve optimal tension. Re-tighten the bearing afterwards.

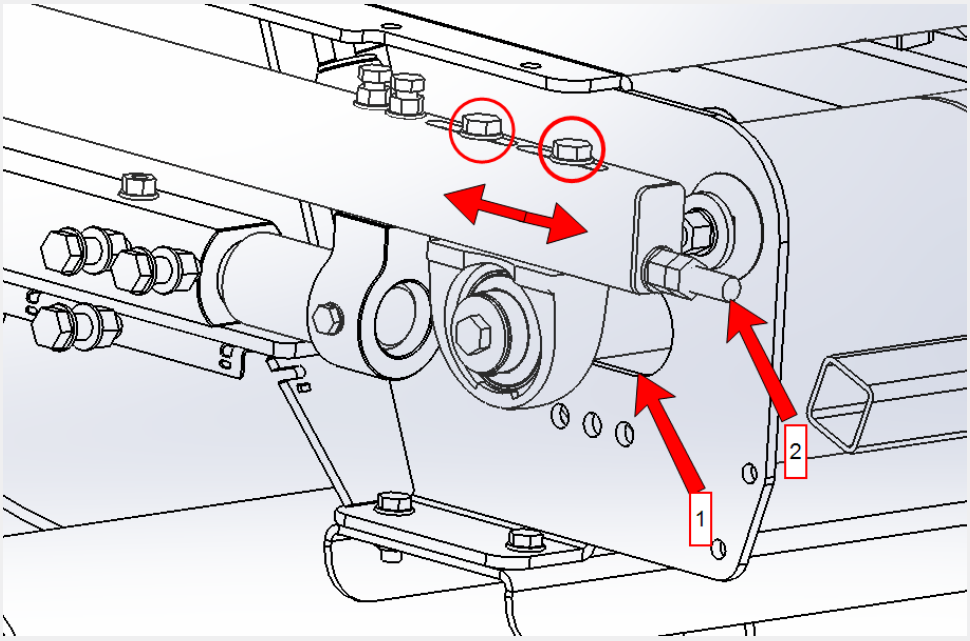


Figure 7.26 : *Adjusting belt tension on wrapping table with weighing cell*

7.10 FRAME, DRAWBAR, ATTACHMENTS

7.10.1 Frame

Check the welding for cracks or deformations once a month.

7.10.2 Main components, fastening points

Check all major bolt connections and re-tighten if necessary.

- Drawbar—frame
- Drawbar—eye
- Chamber—frame
- Feed hopper—frame
- Elevator—frame

Pay extra attention to the bolts fixing the draw bar and eye. (574 Nm)

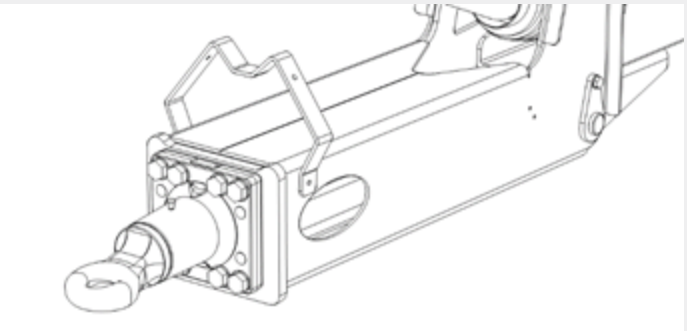


Figure 7.27 : *Fixing bolts for drawbar eye*

7.11 CHAMBER ROLLER BUSHINGS

IMPORTANT: The bushings must be controlled every 5000 bales produced, or when 1000 hours of operation are reached. Whatever comes first.

IMPORTANT: The distributed load to the bearings will not be even, and therefore the wear is not evenly distributed inside the bearing.

7.11.1 Wear inspection

A quick control of the degree of wear (clearance) might be done with a crowbar and a dial gauge. If no excessive wear is found, there's no need for further dismantling of the bushings.

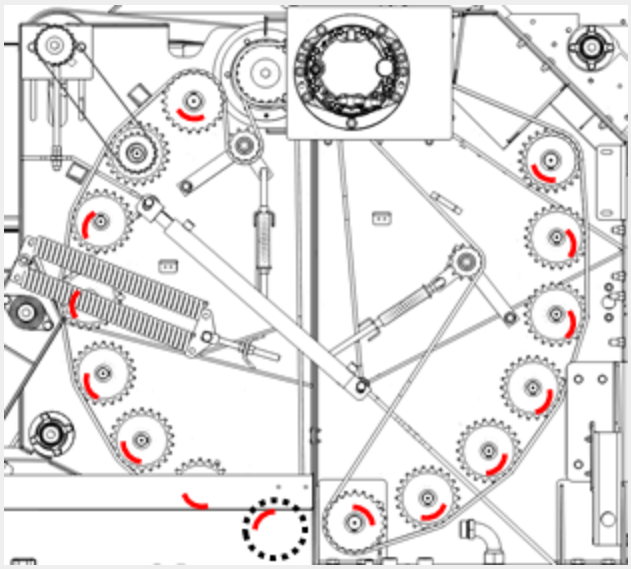


Figure 7.28 : *Check for play in the bushings. Red markings indicate areas on the bushings.*

There are two typical conditions of a worn out bushing, depending on where the bushing is located on the machine. Read the description and see Figure 7.28.

1. **Bale pressure**

This is the most typical condition. These bushings are worn the most when the chamber is «full», and the bale pressure forces the rollers outwards. Thus the most wear on the bushings will be on the outer side.

2. **Drive chain**

This condition occurs on the bushings that are affected by the drive chain direction. A turning point is shown in Figure 7.29. The wear is also influenced by the chamber pressure. But not as excessive as for condition 1. Thus the most wear in these conditions are located on the opposite side of the chain contact side.

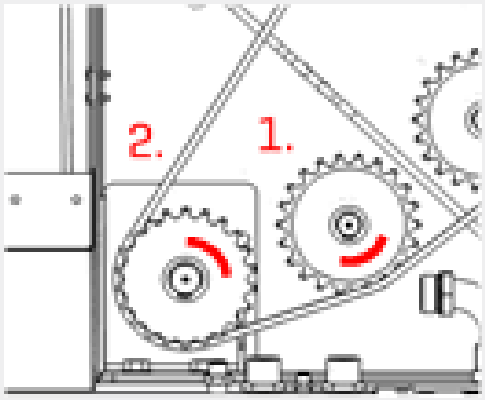


Figure 7.29 : *Bushings*

Inspection

Use a crowbar and inspect each bushing from multiple angles. The worn out areas might be located at different possitions according to how the machine has been used, and which material has been baled.

7.11.2 Permissible wear

Small type, 40 mm

New bearing: 40 mm inside diameter, 44mm outside diameter.

Defect bearing: ≥ 42,2 mm inside diameter.

Measure the diameter several places to get the correct impression of the bearing ovality.

Large type, 50 mm

New bearing: 50 mm inside diameter, 55 mm outside diameter

Defect bearing: ≥ 52,7 mm inside diameter.

Measure the diameter several places to get the correct impression of the bearing ovality. The material thickness in bearings must under no circumstances be **≤ 0,2 mm. If so, the bearing is defect and must be replaced immediately.** The reason is to avoid serious damage to the rollers axle, and potential mechanical breakdown.

Figure 7.30 : *Example picture of plain bearing. New bearing to the left, and worn out/defect bearing to the right.*

NOTE: Good practice is to change the bearings before reaching the maximum degree of wear.

7.11.3 Remove sprockets

The sprockets are fastened to the axle with an eccentric connection. Follow this procedure to loosen the sprockets.

1. Make an indication mark across both the sprocket and axle (red line) that indicates movement between the axle and the sprocket.
2. Set a solid steel bar on one of the sprocket teeth, and hit it with a hammer (opposite of the sprocket working direction).
3. Remove the sprocket, when the indication mark has shifted.

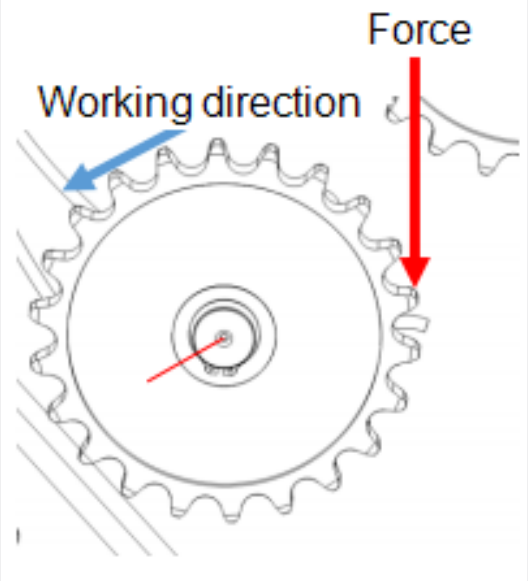


Figure 7.31 : *Sprocket removal*

7.12 HYDRAULICS

7.12.1 Hydraulics oil

The oil level is monitored by the control unit. An alarm stating “oil level - low” is displayed in the control unit. Top up if necessary. The oil level can also be visually checked through an oil glass placed in/on the oil tank.

Check the oil-condition: Minimum once a year.

Change oil: Minimum every third year. See specifications in section 8.6.1 "Hydraulics"

Oil-filter: 3 pcs, must be changed minimum once a year and after the first 50 hours of operation (break-in period).

7.12.2 Hoses and connections

Check the hydraulic system for any leakages, and that no hoses are rubbing against sharp edges on the machine.

NOTE: The hydraulic hoses have a limited life time. We recommend to change the hydraulic hoses every six years.

7.12.3 Hydraulic pump, gearbox

Check the input shaft and its splines. Check the bolts holding the gearbox, and retighten if necessary. Check the oil level in gearbox, with the dipstick.

Figure 7.32 : *Dipstick with max and min level indicators*

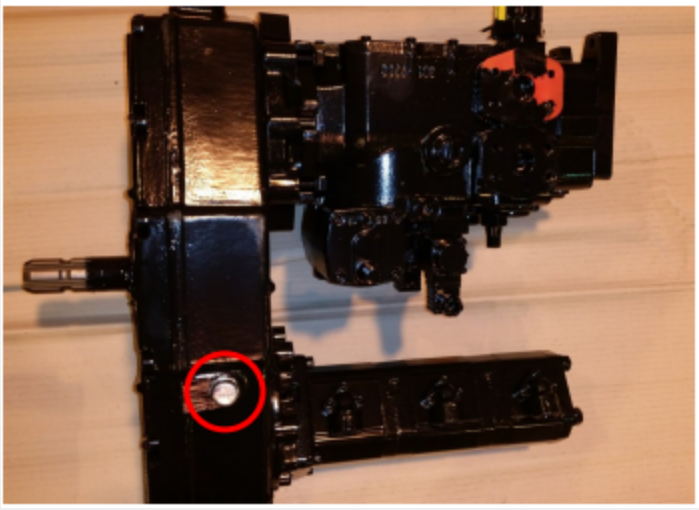


Figure 7.33 : *Location dipstick*

The oil level must be between max and min on the level indicator. Top up if necessary.

The gear oil must be changed minimum once a year, or when needed. See approved lubricants in section 8.6.4 "Gearbox and gears for hydraulic motors"

NOTE: When changing gear oil, the magnet plug must be cleaned. Inspect the amount of metal shavings on the magnetic plug. If there's a lot of shavings present, it's indicating excessive wear in the gear box.

7.12.4 Heat exchanger

Perform daily inspections of the cooling element on the heat exchanger. Look for dirt and other unwanted contamination. Clean if necessary.

7.13 OIL CHANGE AND OIL FILTER

Hydraulic oil is injurious to your health. Avoid contaminating bare skin. Avoid inhaling oil mist or vapor. Take environmental considerations, collect the old oil and recycle.

Oils can be hot.

Some pressure can remain in the hydraulic system/hoses/pipes, even though the machine is shut down.

IMPORTANT: Always change filters when changing the hydraulic oil!

7.13.1 Changing oil and filter

Hydraulic oil

1. Heat the oil up to about 30°C.
2. Slightly tilt the compactor towards the drain plug. The plug is placed on the underside of the tank.
3. Shut down the machine and disconnect the PTO.
4. Place an empty container beneath the drain hole.
5. Remove the drain plug.
6. Drain until empty. Approximately 130 L of oil.
7. Clean up the oil spill.
8. Reinsert the drain plug (replace sealing if necessary).
9. Change the oil filter according to the “Filter”-procedure below.
10. Drain the oil and remove the oil filter on the collector according to the “Collector and cooler”-procedure.
11. Refill. A sticker on the oil tank indicates the applied oil type.
12. Check the oil level.
13. Run the compactor for a while, top up if necessary.
14. Dispose with the old oil according to environmental regulations.

Collector and cooler

1. Place an empty container beneath the drain hole.
2. Remove the drain plug.
3. Drain until empty. Approximately 10 L of oil.
4. Clean up the oil spill.
5. Reinsert the drain plug (replace sealing if necessary).
6. Change the oil filter according to the “Filter”-procedure.

Changing filter

1. Locate the desired filter to be replaced.
2. Place an empty container beneath the filter insert.
3. Remove the filter.

4. Drain until empty.
5. Clean the oil spill.
6. Mount the new filter.
7. Dispose with the old filter according to environmental regulations.

IMPORTANT: Always use original parts when changing filter.

Changing gear oil

For main gear, feed hopper, elevator and wrapping table:

1. Place an empty container beneath the drain hole.
2. Remove the drain plug.
3. Drain until empty.
4. Clean the plug.
5. Clean up the oil spill.
6. Reinsert the plug (replace sealing if necessary).
7. Refill with Shell Omala S2 220.
8. Check the oil level.

Sub-conveyor gear

1. Remove the gear from the compactor.
2. Rotate (drain plug down).
3. Place an empty container beneath the drain hole.
4. Remove the drain plug.
5. Drain until empty.
6. Clean the magnetic plug.
7. Mount the gear in its original position.
8. Refill with Shell Omala S2 220.
9. Reinsert the plug.

7.14 WELDING AND GRINDING

DISCLAIMER: Changes made to the frame may invalidate warranty and homologation standards. By doing so you may forfeit warranty claims. Any changes to the frame or machine should be avoided if possible.

All welding, drilling and other work done on the frame, must be carried out with great caution.

7.14.1 Precautions when welding

IMPORTANT: The control unit must be disconnected before welding.

Place the ground connector as close to the welding point as possible. Observe excessive temperatures.

NOTE: After grinding/cutting/welding, repaint the areas in order to avoid corrosion.

Always use goggles, gloves, and suitable working clothes.

Always keep a fire extinguisher available.

7.15 SERVICE HISTORY

We recommend to fill in all service/maintenance work in this table

Date/year	Service/maintenance/major repair	Performed by; Name/company

8 Lubrication

8.1 LUBRICATION SYSTEM, BEKA MAX EP 1

The compactor is equipped with a fully automatic lubrication system. It lubricates the chamber roller bushings (grease) and the chains (oil).

8.1.1 Oil lubrication, mode of operation

A single piston pump driven by the hydraulic pressure, supplies oil to the chains through brushes which are mounted on strategic locations. Each time the chamber door opens, the piston is activated and supplies a fixed amount of oil to the chains.

8.1.2 Grease lubrication, mode of operation

An electrical motor runs an eccentric disc. The eccentric disc drives two single working pistons which push a fixed amount of grease through a pressure relief valve, and further on to a main distributor. The main distributor supplies grease to sub-distributors, which deliver the correct amount of grease to each bearing.

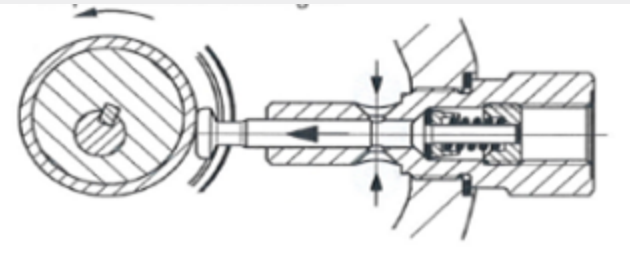


Figure 8.1 : *Pump element, suction phase*

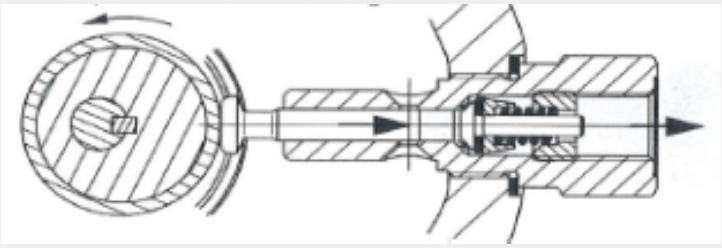


Figure 8.2 : *Pump element, pressure phase*

The grease lubrication system is a progressive system. It operates all types of grease of NLGI kl. 2 type. See recommended lubricants in section 8.6.3 "Greasing".

A progressive lubrication system, means that all the bearings are lubricated one by one. This progressive system makes the lubrication system easily monitored trough a high pressure relief valve (nr.9, section 8.1.3 "Beka max grease lubrication system"). If a lubrication line to a bearing is clogged, the pressure will increase (**280 bar**) and visible grease appears on the relief valve.

Please check the pressure relief valve on a regular basis. If visual grease is present, a line or a distributor is clogged. Another malfunction could be that a line is broken, but then there's no visual grease on the relief valve.

NOTE: New machine: In the first weeks of operation, the system must be checked frequently. Check that there's a visual grease collar on all lubrication points. This indicates all the bearings are being lubricated. Keep track of the grease consumption. Be aware if the daily grease consumption changes. This might indicate that something is wrong.

8.1.3 Beka max grease lubrication system

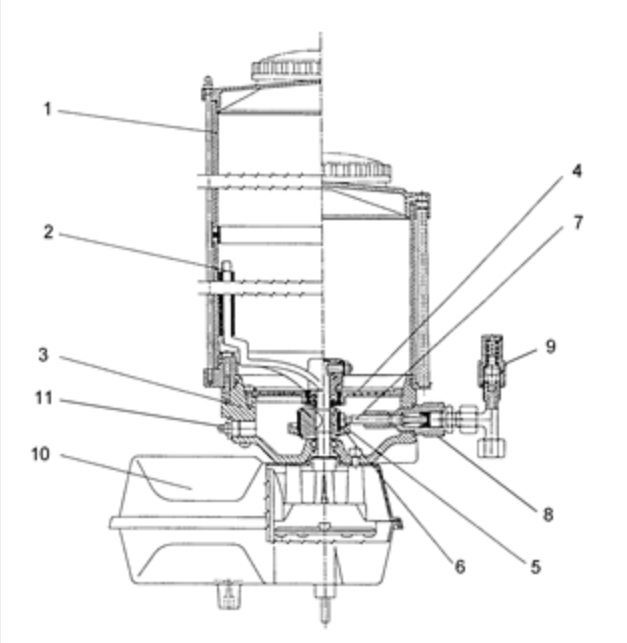


Figure 8.3 : *Beka Max grease lubrication pump system, exploded view with description on major parts.*

1. Reservoir, transparent
2. Stirrer scrape
3. Suction area, pump
4. Screen
5. Eccentric cam
6. Pressure ring
7. Delivery piston
8. Non return valve
9. Pressure relief valve
10. Motor (24V DC)
11. Refill nipple, male sleeve

NOTE: The plain bearings on chamber rollers are under huge stress and force during operation. It is of great importance that the lubrication system is in good working order.

IMPORTANT: Do not operate the compactor without a proper functioning lubrication system.

NOTE: This lubrication system has a grease level monitor that shut down the machine if the grease level is too low.

8.2 REFILLING LUBRICANTS

Make sure the level of lubricants is always between maximum and minimum in the reservoir (oil and grease). Check the level on a daily basis, before start-up.

8.2.1 Refilling the oil reservoir

The grease lubrication system is sensitive to the influence of external contamination, such as dust and dirt. Keep the cap on and refill through the male sleeve nipple (no. 11, section 8.1.3 "Beka max grease lubrication system") when refilling grease.

NOTE: Always keep the reservoir, male sleeve nipple and pump clean.

NOTE: We recommend that you purchase grease in larger containers. Pails of 20 litres/16kg's in combination with air or electrical operated tools for refilling. Standard grease gun with 0,5 litres cartridges might also be used.

A grease gun for cartridges, with special nipple might be ordered as an option. Part number: 58086

8.2.2 Adjusting the amount of grease

The grease lubrication system is set to a maximum delivery of 0,29cm³/rev. However one of the pumps is adjustable (PE120V).

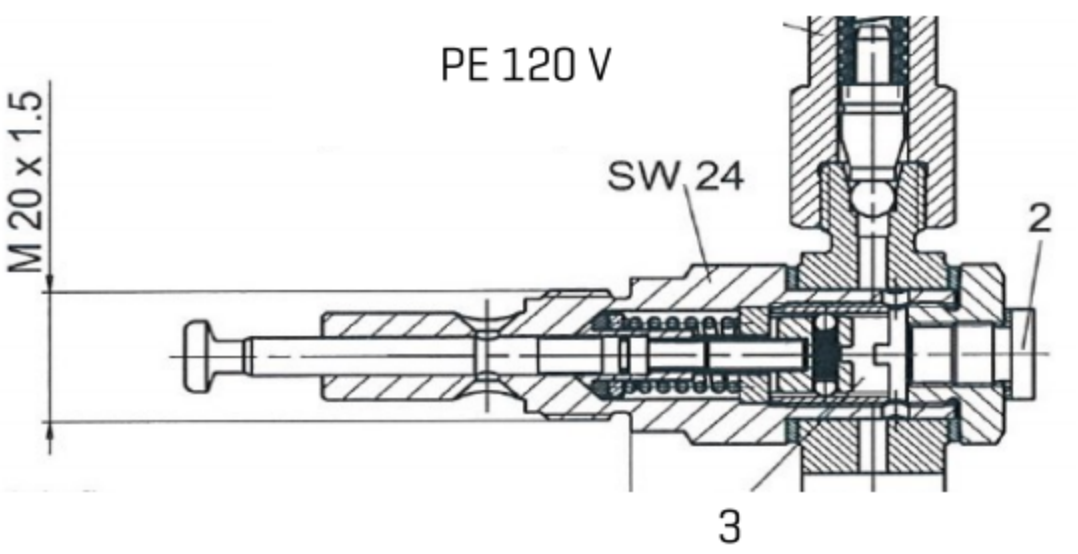


Figure 8.4 : *Grease pump adjustment*

Remove plug (item 2, Figure 8.4) to get access to adjusting screw (3). By turning the screw clockwise, the amount is reduced. 1/2 turn on the adjusting screw reduces the grease added by 0,013cm³. Please contact Orkel Compaction if you have any questions.

It is also possible to regulate the grease amount for the control unit. Adjustable from 100% down to 40%.

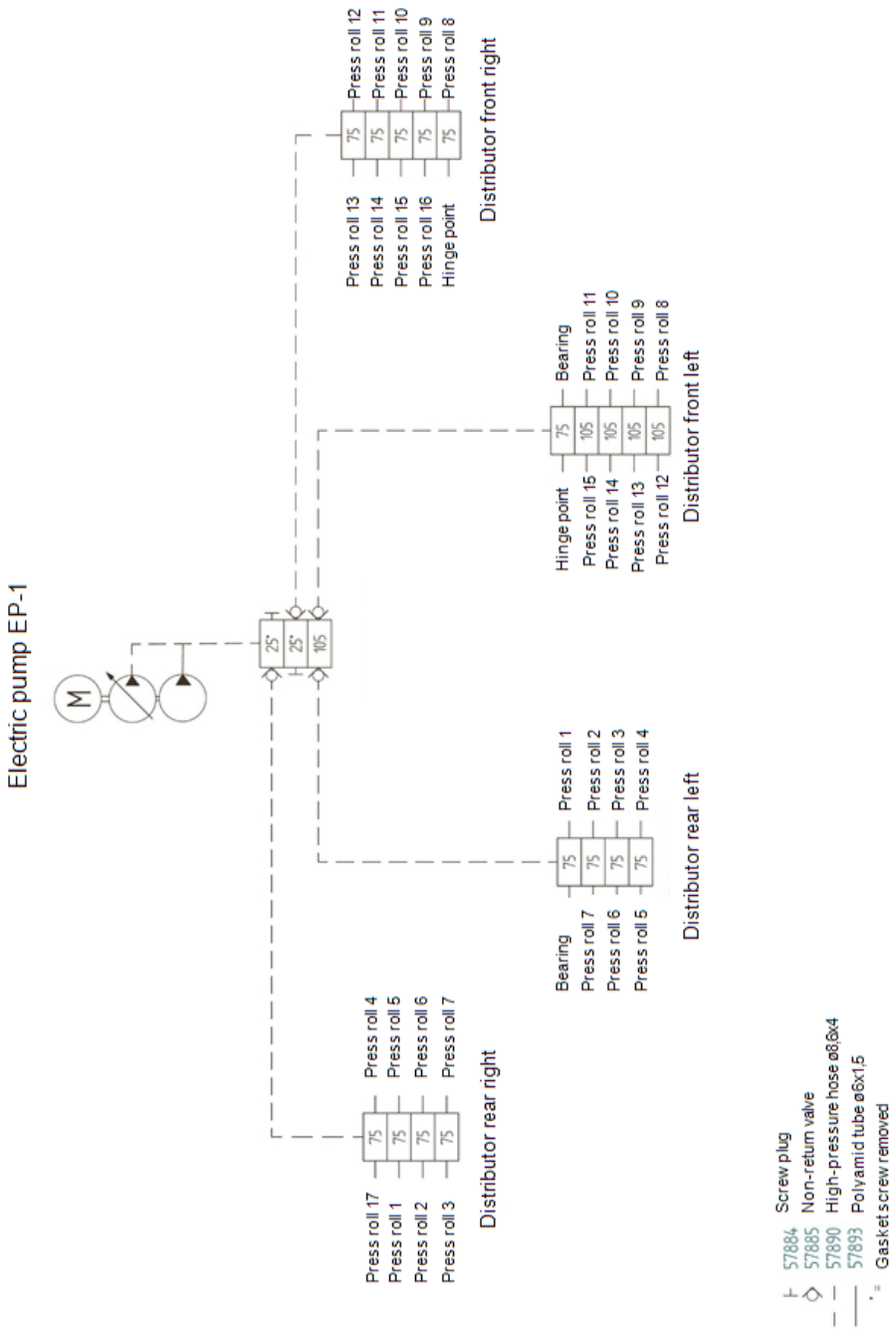
8.2.3 Bleeding the grease system

If the level in the reservoir is too low, it can be necessary to bleed the system after refilling.

1. Disconnect the plastic tube, mounted under the pressure relief valve on the pump.
2. Activate the function greaser in the control box, until there is a smooth and constant flow from the outlet.
3. Reconnect the plastic tube to its original position.

4. Activate the function greaser from the control box once more (the pump will run as long as the button on the control box is activated).
5. Disconnect the tube from the first distributor block and activate the pump until you have a constant flow from this outlet.

8.3 ELECTRIC PUMP AND MAIN DISTRIBUTOR



8.4 TROUBLESHOOTING FOR BEKA MAX

Problems	Cause	Remedy
Pump does not work	Fuse defective	Replace fuse
	Problem with the power supply	Replace electrical cable
	Problem with pump motor	Replace pump motor

Problems	Cause	Remedy
		NOTE: Correct motor mounting
Pump is working but does not supply grease	Air pocket in pump Level in reservoir is too low Pump element not building up pressure (no air pocket)	Bleed the pump Refill the reservoir Replace the pump element
No grease collar at all points of lubrication	Pump does not work Clogging somewhere in the system	Refer to pump not working above. See if grease is present on pressure relief valve
No grease collar on multiple bearings	A primary hose between main distributor and sub distributor is broken Leakage in fittings	Replace hoses Retighten fittings or replace
No grease collar on one bearing	The hose serving the bearing is defective Leakage in the fitting	Replace hose Retighten fittings or replace
Reduced pump speed	High pressure in the system Low ambient temperature	Conduct a complete system check Run greaser manually for one minute (1 or 2 times) to lubricate the system. Then restart machine and verify that the greasing system operates as intended.
Grease on pressure relief valve	System pressure too high Main distributor clogged or system clogged Valve relief spring defective	Check the system Replace the distributor Repair clogged bearing (housing) Replace valve

8.5 OIL TEMPERATURE

ISO-VG system (International Standardization Organization - Viscosity Grade)

ISO standard 3448 splits industrial lubricants in ISO-VG classes. The standard tells which viscocity is good for different temperatures. Lowest ISO-class equals thinnest oil.

NOTE: The temperature limitations is depending on the applied oil type.

8.6 APPROVED LUBRICANTS

8.6.1 Hydraulics

Recommended:

Titan Transway WB

8.6.2 Chain lubrication

Chain lubrication: Titan Transway WB

8.6.3 Greasing

Greasing: Use grease grade NLGI 2 with high pressure additives EP (Extreme pressure)
Shell GADUS S3 V220C 2

Recommended grease: Statoil seway CAH 92

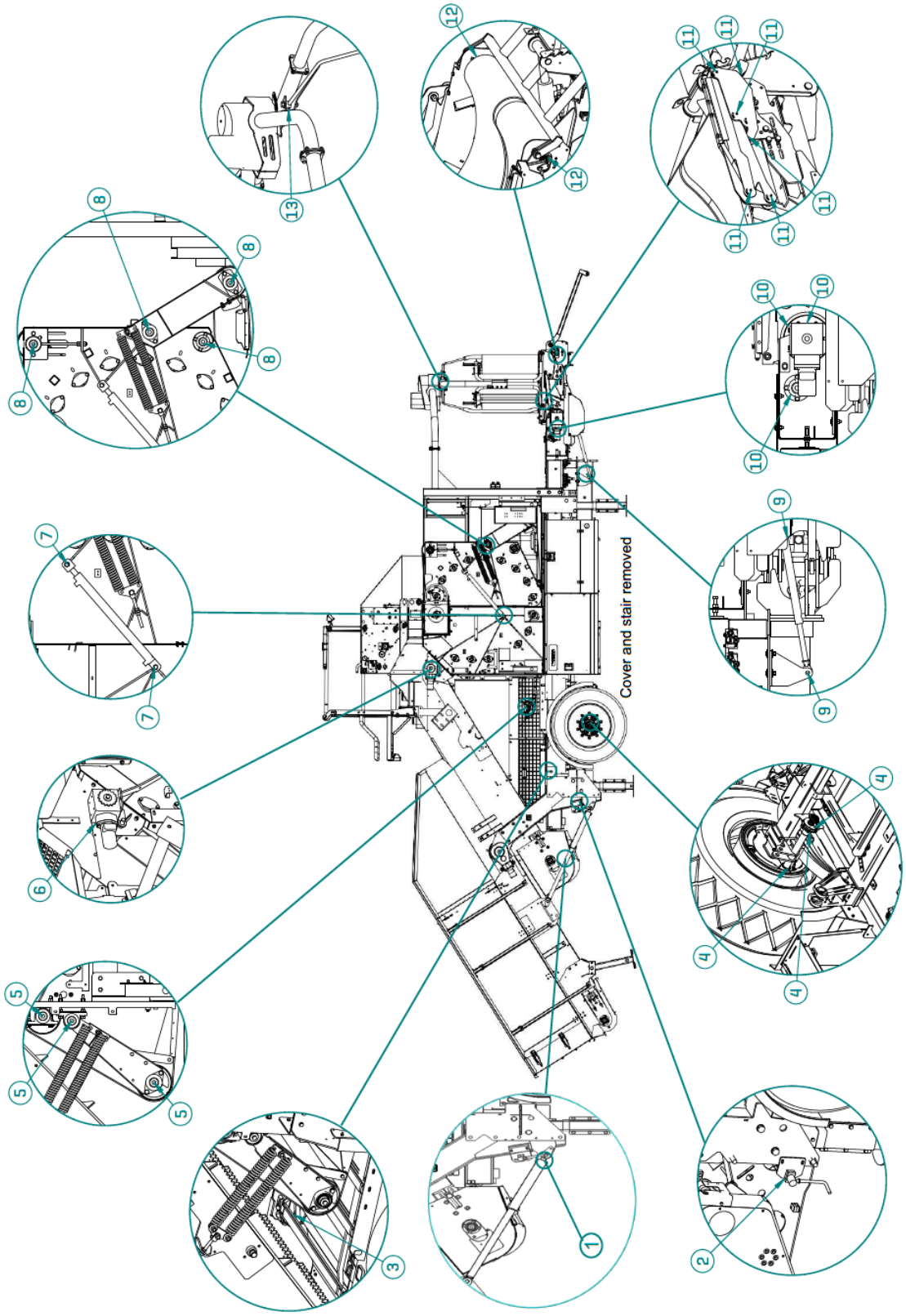
UNO X Multifak EP 2

8.6.4 Gearbox and gears for hydraulic motors

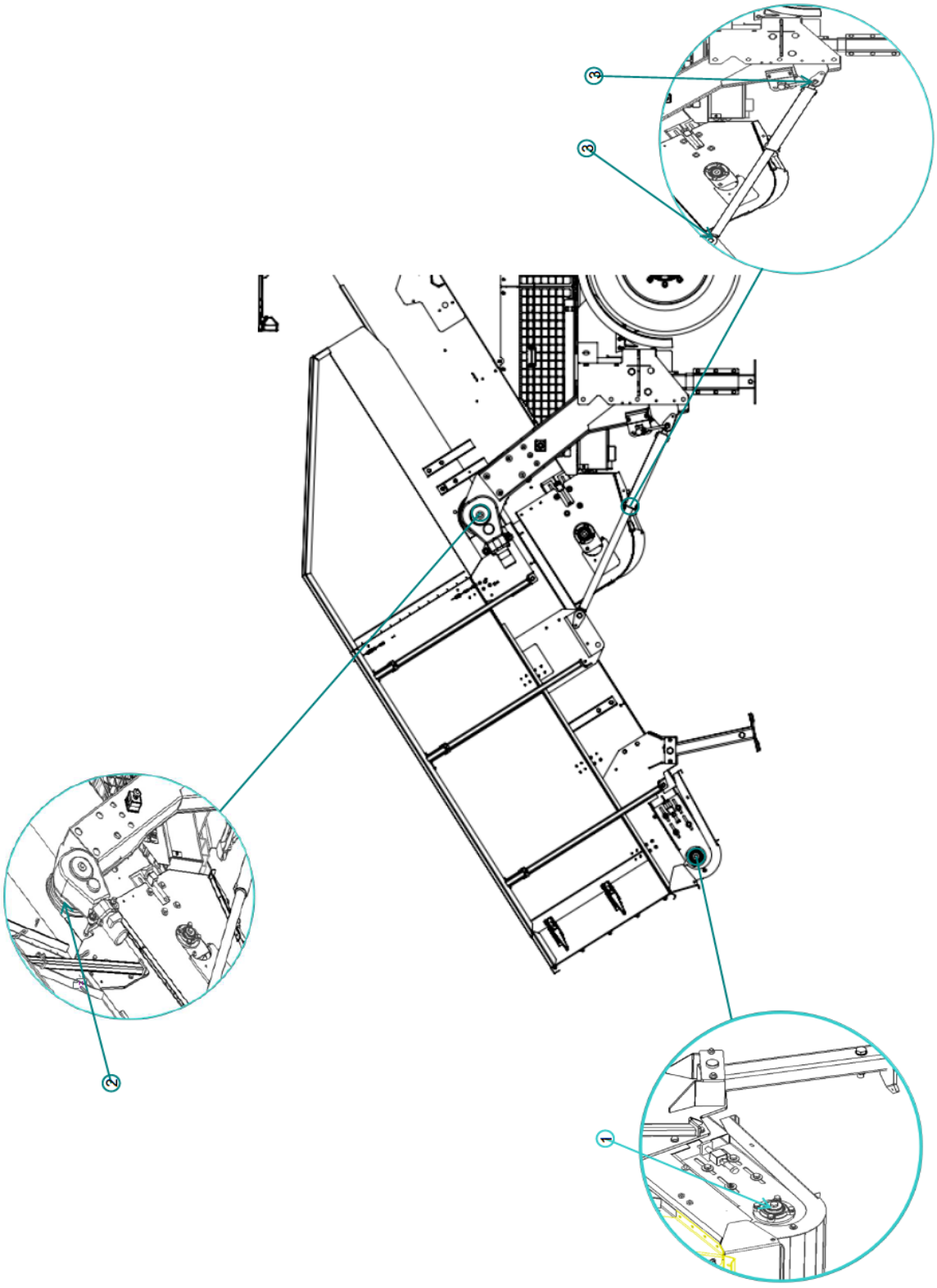
Gear oil:	Renolin unisyn CLP 220N

8.7 MANUAL LUBRICATION CHARTS

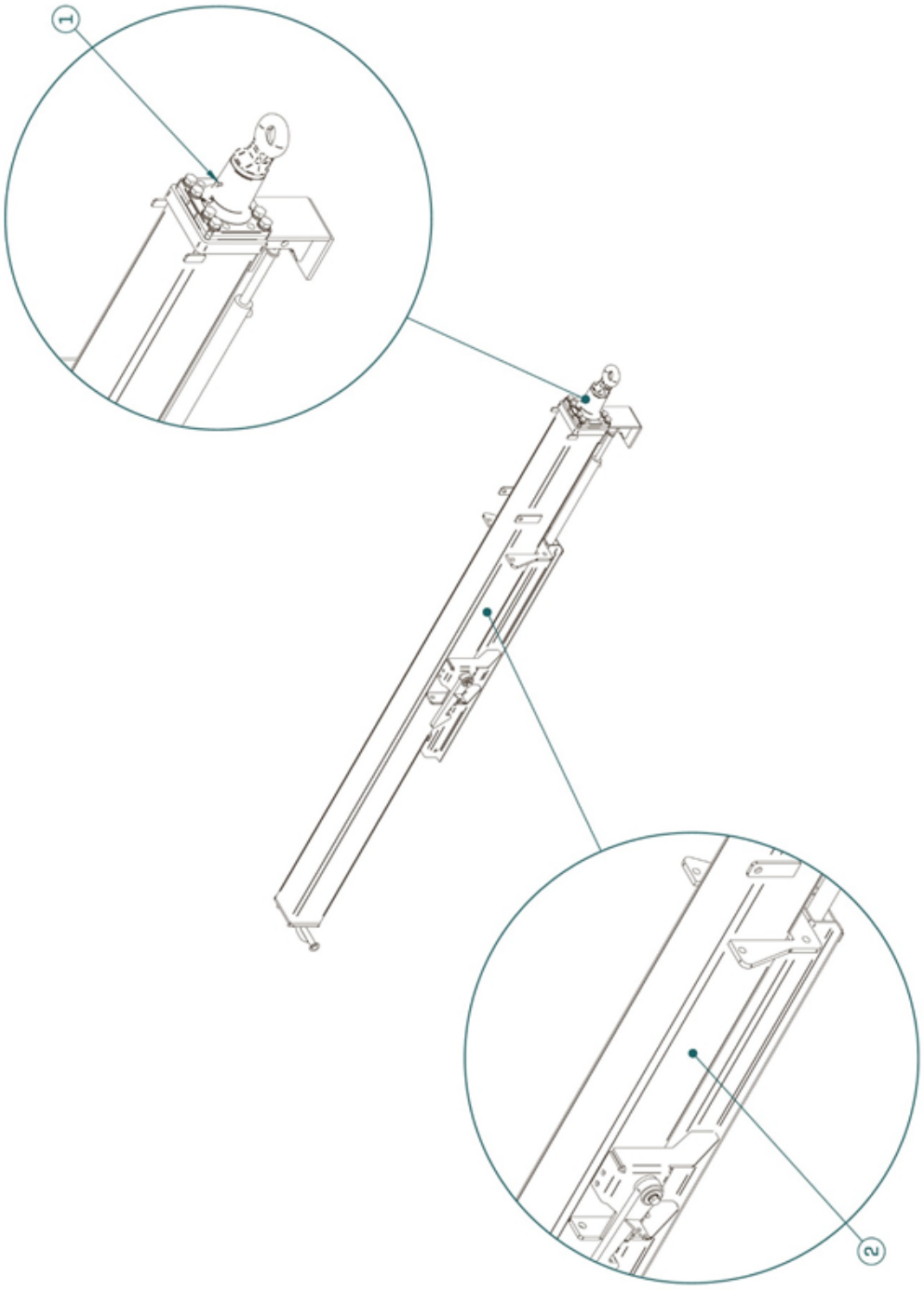
8.7.1 The compactor



8.7.2 Feed hopper



8.7.3 Telescopic drawbar



8.8 LUBRICATION LIST - MANUAL GREASING POINTS

Hi-X evo:

No:	Description:	Qty on each side:	Location:	Total	Intervall
1	Feed hopper cylinder	1	Left and right	2	D
2	Handbrake	1	Right	1	M
3	Sub conveyor, elevator side	1	Left and right	2	W
4	Brake shaft, support	3	Left and right	6	M
5	Under elevator, bearings on rollers	3	Left and right	6	W
6	Elevator, upper	1	Left and right	2	W
7	Chamber cylinder	2	Left and right	4	W
8	Chamber and bearings on rollers	4	Left and right	8	W
9	Cylinder, wrapping table	2	Left and right	4	W
10	Wrapping table	3	Left and right	6	W
11	Knife arms, wrapping table	6	Left and right	12	W
12	Wrapping table, support roller	1	Left and right	2	W
13	Emergency stop arm, wrapper	1	Left and right	2	M

Feed hopper:

No:	Description:	Qty on each side:	Location:	Total	Intervall
1	Bearing	2	Left and right	2	M
2	Gear box bearing	1	Left and right	4	W
3	Cylinder	1	Left and right	4	M

Telescopic drawbar:

No:	Description:	Qty on each side:	Location:	Total	Intervall
1	Drawbar eye	1		1	W
2	Side of drawbar	1	Left and right	2	W

9 Preservation

9.1 CLEANING

9.1.1 Using high pressure washer

The compactor can be cleaned with a high pressure washer. Avoid directing the beam towards any electrical connections and components.

IMPORTANT: Use hearing protection when cleaning the compactor with a high pressure washer.

9.2 STORAGE

A thorough cleaning and a complete lubrication is recommended prior to long term storage. The control unit must be kept warm and dry to ensure functionality. The control unit may be detached from the compactor and stored inside during the storage period. Touch-up paint is recommended to avoid corrosion.

9.2.1 Long time storage

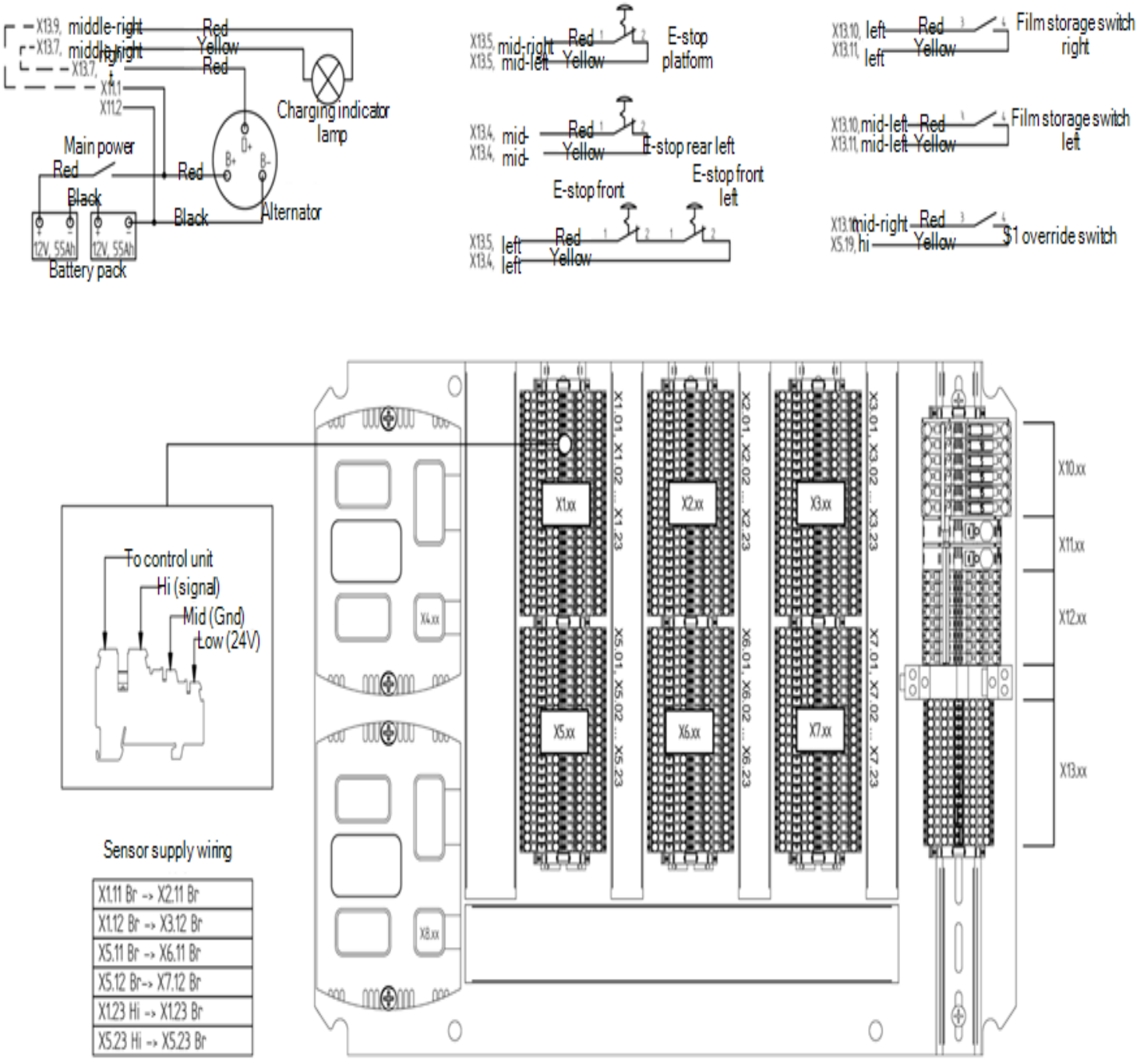
If you're using grease of NLGI class 2 with EP additives (extreme pressure) there's no need for special precautions to be made regarding long time or winter storage. Perform a complete lubrication service on the machine before storage. If you're using a grease type according to lubrication standards, but not having the anti-corrosion effect, the system must be filled up with anti-corrosive oil. Regular motor oil is sufficient.

9.2.2 Oil filling in the grease lubrication storage

This operation is easily done with an empty grease gun filled up with motor oil. Remove the piston and the coil spring in the gun. Insert an empty grease cartridge and fill the grease gun while holding it vertically. Attach the gun at the inlet on the main distributor and empty the gun into the system (1/2 litre).

10 Electrics

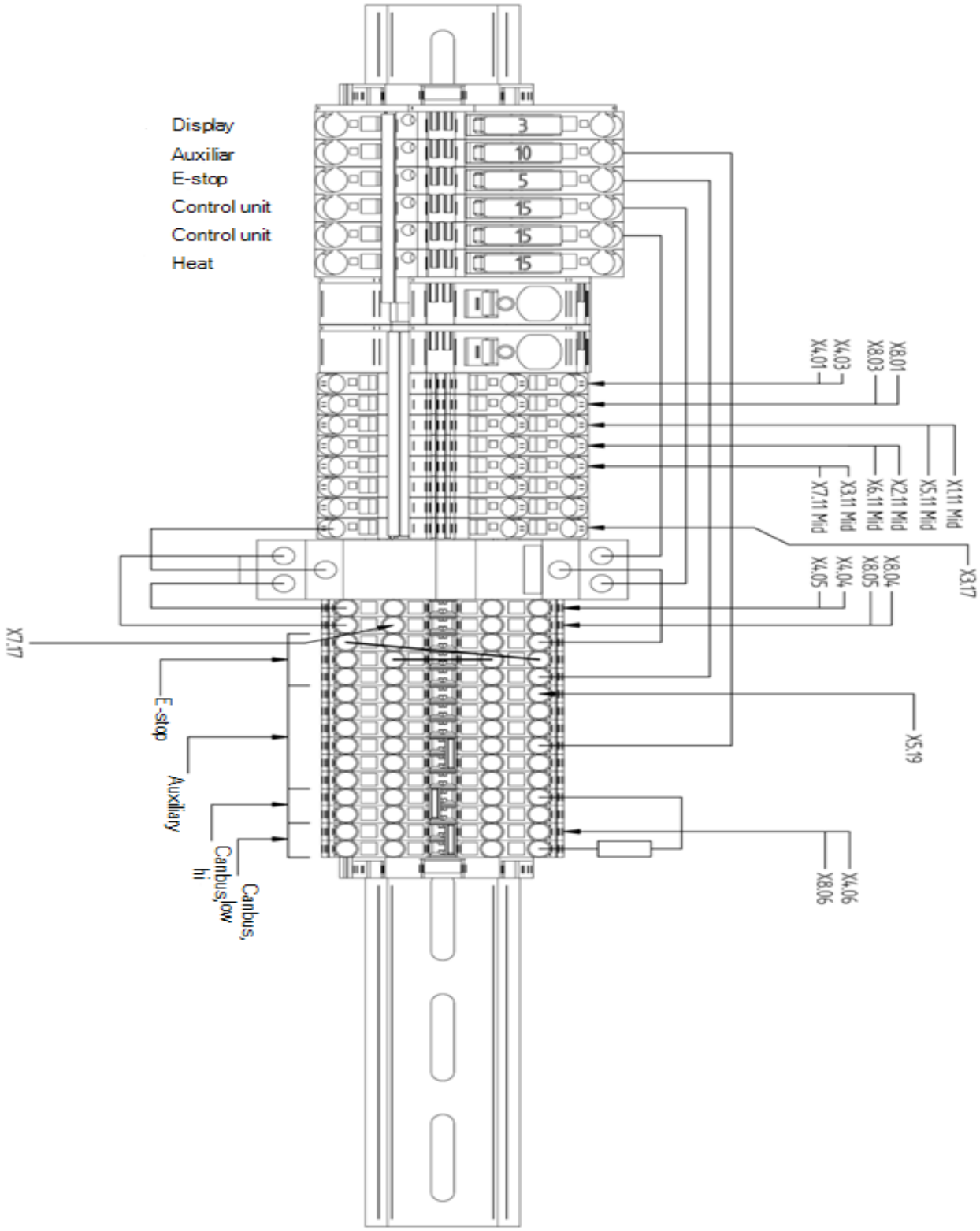
10.1 MAIN POWER SUPPLY, E-STOP SWITCHES AND ELECTRICAL CABINET



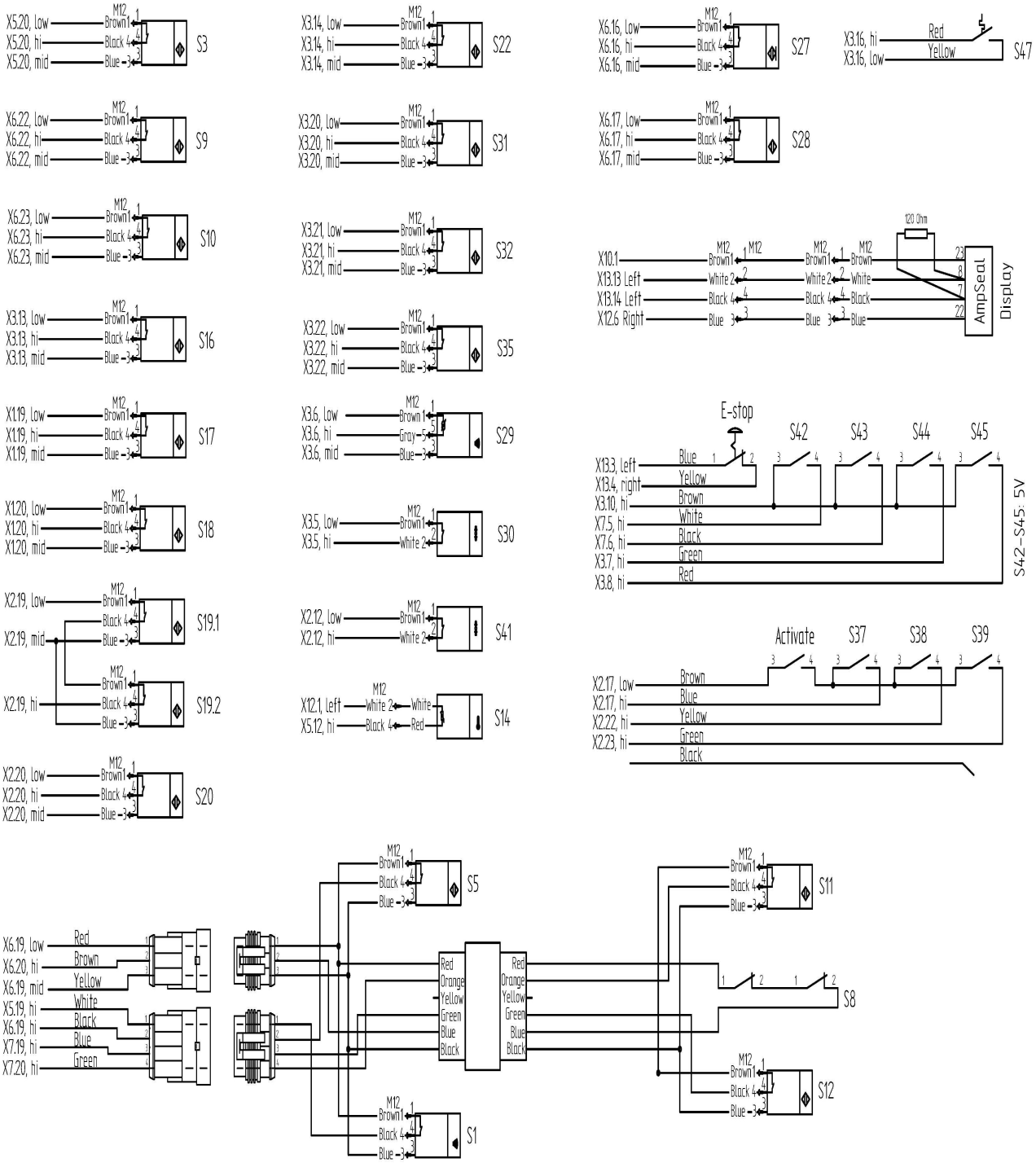
Sensor supply wiring

X1.11 Br -> X2.11 Br
X1.12 Br -> X3.12 Br
X5.11 Br -> X6.11 Br
X5.12 Br-> X7.12 Br
X1.23 Hi -> X1.23 Br
X5.23 Hi -> X5.23 Br

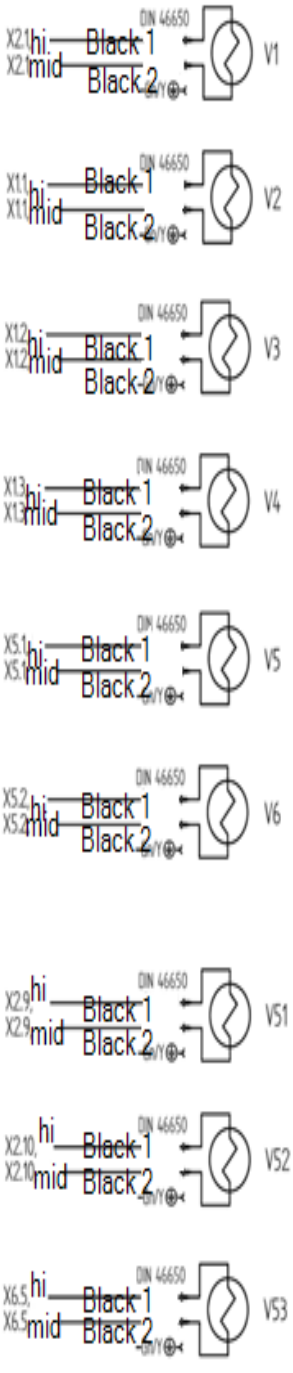
10.2 ELECTRICAL CABINET POWER SUPPLY RAIL



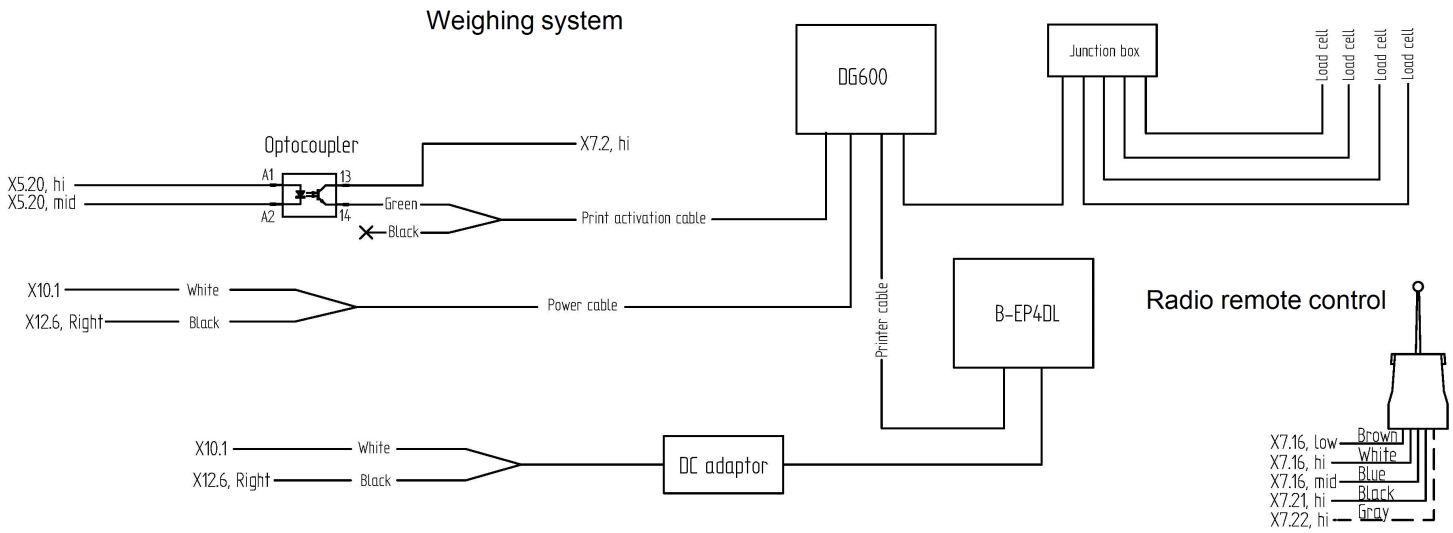
10.3 SENSORS AND MANUAL CONTROLS



10.4 VALVES, FAN MOTORS AND PUMPS



10.5 OPTIONALS (WEIGHING SYSTEM, RADIO REMOTE CONTROL)



10.6 INPUTS AND OUTPUTS

10.6.1 IO block 1

Loc.	ID	Description	Type	Hi	Mid	Low
X1.1	V02	Chamber open	DO	·1	·2	
X1.2	V03	Chamber close	DO	·1	·2	
X1.3	V04	Wrapper bypass off	DO	·1	·2	
X1.4	---------- NOT IN USE ----------					
X1.5	---------- NOT IN USE ----------					
X1.6	V36	Elevator & door speed FB	FB	·2		
X1.7	V36	Elevator & door speed	PWM	·1		
X1.8	V40	Net brake release	DO	·1	·2	
X1.9	---------- NOT IN USE ----------					
X1.10	---------- NOT IN USE ----------					
X1.11	---------- NOT IN USE ----------					
X1.12	---------- NOT IN USE ----------					
X1.13	---------- NOT IN USE ----------					
X1.14	V08	Net knife cut	DO	·1	·2	
X1.15	V17	Net feed rollers open	DO	·1	·2	
X1.16	V18	Net feed rollers close	DO	·1	·2	
X1.17	V19	Net feed motor	DO	·1	·2	
X1.18	V35	Air cleaning, door (OPT)	DO	·1		·2
X1.19	S17	Chamber opened	DI	Bk	Bl	Br
X1.20	S18	Chamber closed	DI	Bk	Bl	Br
X1.21	---------- NOT IN USE ----------					
X1.22	---------- NOT IN USE ----------					
X1.23		Sensor supply	DO	X <----> X		

10.6.2 IO block 2

Loc.	ID	Description	Type	Hi	Mid	Low
X2.1	V01	Sub conveyor bypass	DO	·1	·2	
X2.2	V37	S.conveyor & F.hopper speed	PWM	·1		
X2.3	V37	S.conveyor & F.hopper speed FB	FB	·2		
X2.4	V32	Chamber speed FB	FB	·2		
X2.5	V32	Chamber speed	PWM	·1		
X2.6	V25	Feed hopper on	DO	·1	·2	
X2.7	V39	Elevator bypass	DO	·1	·2	
X2.8	V24	Sub conveyor on	DO	·1	·2	
X2.9	V51	Run Feed hopper	DO	·1	·2	
X2.10	V52	Run flip	DO	·1	·2	
X2.11	---------- NOT IN USE ----------					
X2.12	S41	Elevator load (pressure)	AI	Wh		Br
X2.13	---------- NOT IN USE ----------					
X2.14	---------- NOT IN USE ----------					
X2.15	---------- NOT IN USE ----------					
X2.16	S07	E-Stop redundancy input	DI	X13.3		
X2.17	S37	Remote open feed rollers	DI	B.Bl		B.Br
X2.18	V33	Cooler fan run (suck)	DO	Bk		
X2.19	S19	Feed rollers opened	DI	Bk	Bl	Br
X2.20	S20	Feed rollers closed	DI	Bk	Bl	Br
X2.21	V34	Cooler fan reverse (blow)	DO	Bk		
X2.22	S38	Remote close feed rollers	DI	B.Y		
X2.23	S39	Remote start net	DI	B.Gn		

10.6.3 IO block 3

Loc.	ID	Description	Type	Hi	Mid	Low
X3.1	---------- NOT IN USE ----------					
X3.2	---------- NOT IN USE ----------					
X3.3	---------- NOT IN USE ----------					
X3.4	---------- NOT IN USE ----------					
X3.5	S30	Chamber pressure	AI	Wh		Br
X3.6	S29	Feed hopper US-sensor	AI	Gy	Bl	Br
X3.7	S44	Feed hopper start	DI	C.Gn		
X3.8	S45	Feed hopper stop	DI	C.R		
X3.9	---------- NOT IN USE ----------					
X3.10	-	F25 control supply (5V)	REF	C.Br		
X3.11	---------- NOT IN USE ----------					
X3.12	---------- NOT IN USE ----------					
X3.13	S16	Chamber dampening	DI	Bk	Bl	Br
X3.14	S22	Net knife closed	DI	Bk	Bl	Br
X3.15	---------- NOT IN USE ----------					

Loc.	ID	Description	Type	Hi	Mid	Low
X3.16	S47	Thermo switch	DI	R		Y
X3.17		Cable detection	DI	X12.8		
X3.18	---------- NOT IN USE ----------					
X3.19	---------- NOT IN USE ----------					
X3.20	S31	Chamber speed	PI	Bk	Bl	Br
X3.21	S32	Net control	PI	Bk	Bl	Br
X3.22	S35	Elevator speed	PI	Bk	Bl	Br
X3.23	---------- NOT IN USE ----------					

10.6.4 IO block 5

Loc.	ID	Description	Type	Hi	Mid	Low
X5.1	V05	Table up	DO	·1	·2	
X5.2	V06	Table down	DO	·1	·2	
X5.3	V07	Run wrapping table	DO	·1	·2	
X5.4	V13	Grease pump	DO	Bl		
X5.5	V13	Grease pump FB	FB	Br		
X5.6	---------- NOT IN USE ----------					
X5.7	V09	Wrapping arm slow	DO	·1	·2	
X5.8	V10	Wrapping arm fast	DO	·1	·2	
X5.9	---------- NOT IN USE ----------					
X5.10	---------- NOT IN USE ----------					
X5.11	---------- NOT IN USE ----------					
X5.12	S14	Oil temperature	AI	Bk		
X5.13	---------- NOT IN USE ----------					
X5.14	V11	Film knife open	DO	·1	·2	
X5.15	V12	Film knife close	DO	·1	·2	
X5.16	V56	Auger bypass	DO	·1	·2	
X5.17	V31	Bale drop warning buzzer	DO	R	Y	
X5.18	---------- NOT IN USE ----------					
X5.19	S01	Bale on wrapping table	DI	A.Wh		
X5.20	S03	Table middle position	DI	Bk	Bl	Br
X5.21	---------- NOT IN USE ----------					
X5.22	---------- NOT IN USE ----------					
X5.23		Sensor supply	DO	X <---------> X		

10.6.5 IO block 6

Loc.	ID	Description	Type	Hi	Mid	Low
X6.1	V30	Wrapper speed	PWM	·1		
X6.2	---------- NOT IN USE ----------					
X6.3	V30	Wrapper speed FB	FB	·2		
X6.4	---------- NOT IN USE ----------					
X6.5	V53	Flip change direction	DO	·1	·2	
X6.6	V54	Flip check right	DO	·1	·2	

Loc.	ID	Description	Type	Hi	Mid	Low
X6.7	V55	Flip check left	DO	·1	·2	
X6.8	---------- NOT IN USE ----------					
X6.9	---------- NOT IN USE ----------					
X6.10	---------- NOT IN USE ----------					
X6.11	---------- NOT IN USE ----------					
X6.12	---------- NOT IN USE ----------					
X6.13	---------- NOT IN USE ----------					
X6.14	---------- NOT IN USE ----------					
X6.15	---------- NOT IN USE ----------					
X6.16	S27	Oil level	DI	Bk	Bl	Br
X6.17	S28	Grease level	DI	Bk	Bl	Br
X6.18	---------- NOT IN USE ----------					
X6.19	S05	Wrapping arm home position	DI	A.Bk	A.Y	A.R
X6.20	S08	Wrapping arm stop	DI	A.Br		
X6.21	---------- NOT IN USE ----------					
X6.22	S09	Table lower position	DI	Bk	Bl	Br
X6.23	S10	Table upper position	DI	Bk	Bl	Br

10.6.6 IO block 7

Loc.	ID	Description	Type	Hi	Mid	Low
X7.1	---------- NOT IN USE ----------					
X7.2	-	V5 reference voltage				
X7.3	---------- NOT IN USE ----------					
X7.4	---------- NOT IN USE ----------					
X7.5	S42	Flip up	DI	C.Wh		
X7.6	S43	Flip down	DI	C.Bk		
X7.7	---------- NOT IN USE ----------					
X7.8	---------- NOT IN USE ----------					
X7.9	---------- NOT IN USE ----------					
X7.10	---------- NOT IN USE ----------					
X7.11	---------- NOT IN USE ----------					
X7.12	---------- NOT IN USE ----------					
X7.13	---------- NOT IN USE ----------					
X7.14	---------- NOT IN USE ----------					
X7.15	---------- NOT IN USE ----------					
X7.16	S33	RF remote ctrl. Stop (OPT)	DI	Wh		
X7.17		Cable detection	DI	X13.2		
X7.18	---------- NOT IN USE ----------					
X7.19	S11	Film sensor 1	PI	A.Bl		
X7.20	S12	Film sensor 2	PI	A.Gn		
X7.21	S34	RF remote ctrl. Drop (OPT)	DI	Bk		
X7.22	S46	RF remote ctrl. Aux (OPT)	DI	Gy		
X7.23	---------- NOT IN USE ----------					

10.7 POWER SUPPLY

10.7.1 Supply block 1

Loc.	Terminal block function	Comment
X10.0	Fuse - wrapper guard valve	3 A
X10.1	Fuse - display unit	3 A
X10.2	Fuse - lights, alternator	10 A
X10.3	Fuse - Emergency stop circuit	5 A
X10.4	Fuse - cooler fan	15 A
X10.5	Fuse - CU1 (chamber)	15 A
X10.6	Fuse - CU2 (wrapper)	15 A
X11.1	Main power, positive, 24 Vdc	
X11.2	Main power, negative, GND	
X12.1	GND - Chamber	
X12.2	GND - Wrapper	
X12.3	GND - I/O	
X12.4	GND - I/O	
X12.5	GND - I/O	
X12.6	GND	
X12.7	GND	
X12.8	GND	
X13.1	Supply - CU1	870-831
X13.2	Supply - CU2	870-831
X13.3	E-stop relay	870-831
X13.4	E-Stop circuit	870-826
X13.5	E-Stop circuit	870-826
X13.6	Various	870-826
X13.7	Various	870-826
X13.8	LED lamps	870-831
X13.9	Lights, alternator, auxiliary	870-831
X13.10	Lights, alternator, auxiliary	870-831
X13.11	Film storage	870-831
X13.12	CANbus, high	870-831
X13.13	CANbus, high	870-831
X13.14	CANbus, low	870-831
X13.15	CANbus, low	870-831

10.7.2 Supply block 2

Left	Middle-left	Middle	Middle-right	Right	Left
	-				W. guard valve
	-				Display unit [Br]
	-				To X13.9

Left	Middle-left	Middle	Middle-right	Right	Left
	-				To X13.5
	-				Cooler fan [R]
	-				E-stop relay, 1
	-				E-stop relay, 3
-	-				Battery, positive
-	-				Battery, negative
Sensor S14 [Wh]	Chamber CU 4.1				Chamber CU 4.3
Cooler fan [Bk]	Wrapper CU 4.1				Wrapper CU 4.3
LED lamp [y]	To X1.11				To X5.11
LED lamp [y]	To X2.11				To X6.11
LED lamp [y]	To X3.11				To X7.11
Check valve [2]	F.storage valve [2]				Display unit [Bl]
E-stop relay, A2					To X3.17 (Ca.de.)
E-stop relay, 2	Cooler fan relays p85			Chamber CU 4.4	Chamber CU 4.5
E-stop relay, 4	To X7.17 (Ca.de.)			Wrapper CU 4.4	Wrapper CU 4.5
E-stop 4 [Bl]	-			To X2.16 (E-stop)	E-stop relay, A1
E-stop 2 [Y]	E-stop 3 [R]			E-stop 3 [Y]	E-stop 4 [Y]
E-stop 2 [R]	E-stop 1 [Y]			E-stop 1 [R]	To X10.3
	-			S1 override switch [Y]	To X5.19
Check valve [1]	Hopper switch [Y]			Charge lamp [Y]	Alternator [R]
LED lamp switch [Y]	LED lamp [R]			LED lamp [R]	LED lamp [R]
LED lamp switch [R]	Hopper switch [R]		Jumper	Charge lamp [R]	To X10.2
F.storage switch 1 [R]	F.storage switch 2 [R]			S1 override switch [R]	
F.storage switch 1 [Y]	F.storage switch 2 [Y]			F.storage valve [1]	
Prog. cable [Y]	-	Jumper		-	Resistor 120 Ohm
Display unit [Wh]	-			Chamber CU 4.2	Wrapper CU 4.2
Display unit [Bk]	-		Jumper	Chamber CU 4.6	Wrapper CU 4.6
Prog. cable [R]	-			-	Resistor 120 Ohm

10.8 INPUTS AND OUTPUTS SORTED BY NUMBER

10.8.1 IO list 1

All sensors						
ID	Description	Loc.	Type	Hi	Mid	Low
S01	Bale on wrapping table	X5.19	DI	A.Wh		
S03	Table middle position	X5.20	DI	Bk	Bl	Br
S05	Wrapping arm home position	X6.19	DI	A.Bk	A.Y	A.R
S07	E-Stop redundancy input	X2.16	DI	X13.3		

All sensors						
ID	Description	Loc.	Type	Hi	Mid	Low
S08	Wrapping arm stop	X6.20	DI	A.Br		
S09	Table lower position	X6.22	DI	Bk	Bl	Br
S10	Table upper position	X6.23	DI	Bk	Bl	Br
S11	Film sensor 1	X7.19	PI	A.Bl		
S12	Film sensor 2	X7.20	PI	A.Gn		
S14	Oil temperature	X5.12	AI	Bk		
S16	Chamber dampening	X3.13	DI	Bk	Bl	Br
S17	Chamber opened	X1.19	DI	Bk	Bl	Br
S18	Chamber closed	X1.20	DI	Bk	Bl	Br
S19	Feed rollers opened	X2.19	DI	Bk	Bl	Br
S20	Feed rollers closed	X2.20	DI	Bk	Bl	Br
S22	Net knife closed	X3.14	DI	Bk	Bl	Br
S27	Oil level	X6.16	DI	Bk	Bl	Br
S28	Grease level	X6.17	DI	Bk	Bl	Br
S29	Feed hopper US-sensor	X3.6	AI	Gy	Bl	Br
S30	Chamber pressure	X3.5	AI	Wh		Br
S31	Chamber speed	X3.20	PI	Bk	Bl	Br
S32	Net control	X3.21	PI	Bk	Bl	Br
S33	RF remote ctrl. Stop (OPT)	X7.16	DI	Wh		
S34	RF remote ctrl. Drop (OPT)	X7.21	DI	Bk		
S35	Elevator speed	X3.22	PI	Bk	Bl	Br
S37	Remote open feed rollers	X2.17	DI	B.Bl		B.Br
S38	Remote close feed rollers	X2.22	DI	B.Y		
S39	Remote start net	X2.23	DI	B.Gn		
S41	Elevator load (pressure)	X2.12	AI	Wh		Br
S42	Flip up	X7.5	DI	C.Wh		
S43	Flip down	X7.6	DI	C.Bk		
S44	Feed hopper start	X3.7	DI	C.Gn		
S45	Feed hopper stop	X3.8	DI	C.R		
S46	RF remote ctrl. Aux (OPT)	X7.22	DI	Gy		
S47	Thermo switch	X3.16	DI	R		Y

10.8.2 IO list 2

Valves, HIC1, HIC2 and HIC3						
ID	Description	Loc.	Type	Hi	Mid	Low
V01	Sub conveyor bypass	X2.1	DO	-1	-2	
V02	Chamber open	X1.1	DO	-1	-2	
V03	Chamber close	X1.2	DO	-1	-2	
V04	Wrapper bypass off	X1.3	DO	-1	-2	
V05	Table up	X5.1	DO	-1	-2	
V06	Table down	X5.2	DO	-1	-2	
V07	Run wrapping table	X5.3	DO	-1	-2	
V08	Net knife cut	X1.14	DO	-1	-2	

Valves, HIC1, HIC2 and HIC3						
ID	Description	Loc.	Type	Hi	Mid	Low
V09	Wrapping arm slow	X5.7	DO	·1	·2	
V10	Wrapping arm fast	X5.8	DO	·1	·2	
V11	Film knife open	X5.14	DO	·1	·2	
V12	Film knife close	X5.15	DO	·1	·2	
V13	Grease pump	X5.4	DO	Bl		
V13	Grease pump FB	X5.5	DO	Br		
V17	Net feed rollers open	X1.15	DO	·1	·2	
V18	Net feed rollers close	X1.16	DO	·1	·2	
V19	Net feed motor	X1.17	DO	·1	·2	
V24	Sub conveyor on	X2.8	DO	·1	·2	
V25	Feed hopper on	X2.6	DO	·1	·2	
V30	Wrapper speed	X6.1	PWM	·1		
V30	Wrapper speed FB	X6.3	FB	·2		
V31	Bale drop warning buzzer	X5.17	DO	R	Y	
V32	Chamber speed	X2.5	PWM	·1		
V32	Chamber speed FB	X2.4	FB	·2		
V33	Cooler fan run (suck)	X2.18	DO	Bk		
V34	Cooler fan reverse (blow)	X2.21	DO	Bk		
V35	Air cleaning, door (OPT)	X1.18	DO	·1		·2
V36	Elevator and ch. door speed	X1.7	PWM	·1		
V36	Elevator and ch. door speed FB	X1.6	FB	·2		
V37	S.conveyor & F.hopper speed	X2.2	PWM	·1		
V37	S.conveyor & F.hopper speed FB	X2.3	FB	·2		
V39	Elevator bypass	X2.7	DO	·1	·2	
V40	Net brake release	X1.8	DO	·1	·2	

10.8.3 IO list 3

Valves, HIC4 (F25)						
ID	Description	Loc.	Type	Hi	Mid	Low
V51	Run feed hopper	X2.9	DO	·1	·2	
V52	Run flip	X2.10	DO	·1	·2	
V53	Flip change direction	X6.5	DO	·1	·2	
V54	Flip check right	X6.6	DO	·1	·2	
V55	Flip check left	X6.7	DO	·1	·2	
V56	Auger bypass	X5.16	DO	·1	·2	

10.9 INPUTS AND OUTPUTS SORTED BY TYPE

10.9.1 Inductive sensors

Inductive sensors					
ID	Description	Loc.	Hi	Mid	Low
S03	Table middle position	X5.20	Bk	Bl	Br

Inductive sensors					
ID	Description	Loc.	Hi	Mid	Low
S05	Wrapping arm home position	X6.19	A.Bk	A.Y	A.R
S08	Wrapping arm stop	X6.20	A.Br		
S09	Table lower position	X6.22	Bk	Bl	Br
S10	Table upper position	X6.23	Bk	Bl	Br
S11	Film sensor 1	X7.19	A.Bl		
S12	Film sensor 2	X7.20	A.Gn		
S16	Chamber dampening	X3.13	Bk	Bl	Br
S17	Chamber opened	X1.19	Bk	Bl	Br
S18	Chamber closed	X1.20	Bk	Bl	Br
S19	Feed rollers opened	X2.19	Bk	Bl	Br
S20	Feed rollers closed	X2.20	Bk	Bl	Br
S22	Net knife closed	X3.14	Bk	Bl	Br
S31	Chamber speed	X3.20	Bk	Bl	Br
S32	Net control	X3.21	Bk	Bl	Br
S35	Elevator speed	X3.22	Bk	Bl	Br

10.9.2 Other sensors and switches

Other sensors and switches					
ID	Description	Loc.	Hi	Mid	Low
S01	Bale on wrapping table	X5.19	A.Wh		
S29	Feed hopper US-sensor	X3.6	Gy	Bl	Br
S14	Oil temperature	X5.12	Bk		
S27	Oil level	X6.16	Bk	Bl	Br
S28	Grease level	X6.17	Bk	Bl	Br
S30	Chamber pressure	X3.5	Wh		Br
S41	Elevator load (pressure)	X2.12	Wh		Br
S07	E-Stop redundancy input	X2.16	X13.3		
S47	Thermo switch	X3.16	R		Y

10.9.3 Directional valves

Directional valves and check valves, HIC1, HIC2 and HIC3					
ID	Description	Loc.	Hi	Mid	Low
V01	Sub conveyor bypass	X2.1	·1	·2	
V02	Chamber open	X1.1	·1	·2	
V03	Chamber close	X1.2	·1	·2	
V04	Wrapper bypass off	X1.3	·1	·2	
V05	Table up	X5.1	·1	·2	
V06	Table down	X5.2	·1	·2	
V07	Run wrapping table	X5.3	·1	·2	
V08	Net knife cut	X1.14	·1	·2	
V09	Wrapping arm slow	X5.7	·1	·2	
V10	Wrapping arm fast	X5.8	·1	·2	

Directional valves and check valves, HIC1, HIC2 and HIC3					
ID	Description	Loc.	Hi	Mid	Low
V11	Film knife open	X5.14	·1	·2	
V12	Film knife close	X5.15	·1	·2	
V17	Net feed rollers open	X1.15	·1	·2	
V18	Net feed rollers close	X1.16	·1	·2	
V19	Net feed motor	X1.17	·1	·2	
V24	Sub conveyor on	X2.8	·1	·2	
V25	Feed hopper on	X2.6	·1	·2	
V31	Bale drop warning buzzer	X5.17	R	Y	
V33	Cooler fan run (suck)	X2.18	Bk		
V34	Cooler fan reverse (blow)	X2.21	Bk		
V35	Air cleaning, door (OPT)	X1.18	·1		·2
V39	Elevator bypass	X2.7	·1	·2	
V40	Net brake release	X1.8	·1	·2	

10.9.4 Sensors, 7-lead cable

Sensors, 7-lead cable from wrapper					
ID	Description	Loc.	Hi	Mid	Low
S01	Bale on wrapping table	X5.19	A.Wh		
S05	Wrapping arm home position	X6.19	A.Bk	A.Y	A.R
S08	Wrapping arm stop	X6.20	A.Br		
S11	Film sensor 1	X7.19	A.Bl		
S12	Film sensor 2	X7.20	A.Gn		

10.9.5 Film system remote control

Film system remote control					
ID	Description	Loc.	Hi	Mid	Low
S37	Remote open feed rollers	X2.17	B.Bl		B.Br
S38	Remote close feed rollers	X2.22	B.Y		
S39	Remote start film system	X2.23	B.Gn		

10.9.6 Radio remote control

Radio remote control					
ID	Description	Loc.	Hi	Mid	Low
S33	RF remote ctrl. Stop (OPT)	X7.16	Wh		
S34	RF remote ctrl. Drop (OPT)	X7.21	Bk		
S46	RF remote ctrl. Aux (OPT)	X7.22	Gy		

10.9.7 Proportional valves

Proportional valves, pump servo and grease pump (PWM)					
ID	Description	Loc.	Hi	Mid	Low
V13	Grease pump	X5.4	Bl		
V13	Grease pump FB	X5.5	Br		
V30	Wrapper speed	X6.1	·1		
V30	Wrapper speed FB	X6.3	·2		
V32	Chamber speed pump	X2.5	·1		
V32	Chamber speed pump FB	X2.4	·2		
V36	Elevator and ch. door speed	X1.7	·1		
V36	Elevator and ch. door speed FB	X1.6	·2		
V37	S.conveyor & F.hopper speed	X2.2	·1		
V37	S.conveyor & F.hopper speed FB	X2.3	·2		

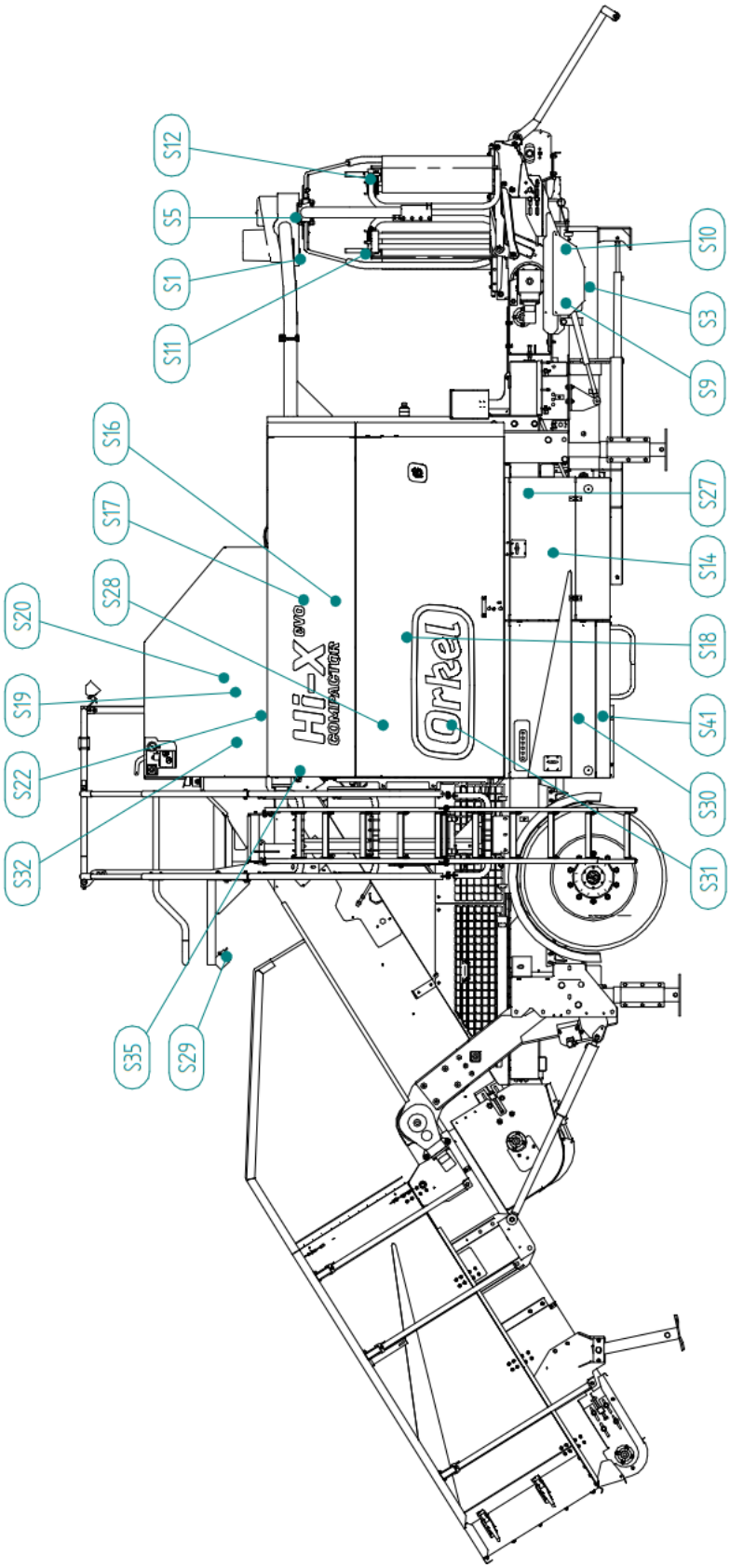
10.9.8 Valves

Valves, HIC4 (F25)					
ID	Description	Loc.	Hi	Mid	Low
V51	Run feed hopper	X2.9	·1	·2	
V52	Run flip	X2.10	·1	·2	
V53	Flip change direction	X6.5	·1	·2	
V54	Flip check right	X6.6	·1	·2	
V55	Flip check left	X6.7	·1	·2	
V56	Auger bypass	X5.16	·1	·2	

10.9.9 Cable detection

Cable detection (Automatic controller identification)					
ID	Description	Loc.	Hi	Mid	Low
	Cable detection	X3.17	X12.8		
	Cable detection	X7.17	X13.2		

10.10 SENSOR OVERVIEW



10.11 SENSOR LIST AND FUNCTION

Inputs on controllers for standard system					
No.	**Description**	**Type**	**Brand & type**	**Range**	**Comment**
S1	Bale on table ultrasound	Digital ultrasound	Microsonic mic+130/D/TC	100...2000 mm	Default 70 cm
S3	Table in middle position	Inductive PNP	Pepperl&Fuchs NBB8-18GM50-E2-V1	3...8 mm	
S5	Wrapping arm in home position	Inductive PNP	Pepperl&Fuchs NBB8-18GM50-E2-V1	3...8 mm	
S7	E-stop redundancy input	Switch NC			
S8	Wrapping arm collision stop	Switch NC			
S9	Table in low position	Inductive PNP	Pepperl&Fuchs NBB8-18GM50-E2-V1	3...8 mm	
S10	Table in high position	Inductive PNP	Pepperl&Fuchs NBB8-18GM50-E2-V1	3...8 mm	
S11	Wrapper film roller 1	Inductive PNP	Pepperl&Fuchs NBB8-18GM50-E2-V1	3...8 mm	
S12	Wrapper film roller 2	Inductive PNP	Pepperl&Fuchs NBB8-18GM50-E2-V1	3...8 mm	
S14	Oil temperature	Analogue PT1000	Fuehler Systeme EF5/E-20/5 PT1000	1573...803°, -50..150 °C	
S16	Chamber dampening	Inductive PNP	Pepperl&Fuchs NBB8-18GM50-E2-V1	3...8 mm	
S17	Chamber open position	Inductive PNP	Pepperl&Fuchs NBB8-18GM50-E2-V1	3...8 mm	
S18	Chamber closed position	Inductive PNP	Pepperl&Fuchs NBB8-18GM50-E2-V1	3...8 mm	
S19	Feed rollers open position	Inductive PNP	Pepperl&Fuchs NBB8-18GM50-E2-V1	3...8 mm	2 sensors in series
S20	Feed rollers closed position	Inductive PNP	Pepperl&Fuchs NBB8-18GM50-E2-V1	3...8 mm	
S22	net knife in closed position	Inductive PNP	Pepperl&Fuchs NBB8-18GM50-E2-V1	3...8 mm	
S27	Hydraulic oil level	Photoelectric level PNP	Carlo Gavazzi VP04EP		
S28	Grease level	Switch NC (at full level)			
S29	Hopper ultrasound	Analogue ultrasound	Pepperl&Fuchs UC2000-30GM70-IE2R2-V15	4 - 20mA, 100...2000 mm	
S30	Chamber pressure	Analogue pressure		4 - 20mA, 0...600 bar	
S31	Chamber speed	Inductive PNP (pulse)		3...8 mm	
S32	Net/film failure detection	Inductive PNP (pulse)		3...8 mm	Optional
S33	RF Remote control - stop machine	Switch NO			Optional
S34	RF Remote control - bale drop	Switch NO			
S35	Elevator speed	Inductive PNP (pulse)	Pepperl&Fuchs NBB8-18GM50-E2-V1	3...8 mm	
S37	Remote control - feed rollers open	Switch NO			
S38	Remote control - feed rollers close	Switch NO			
S39	Remote control - start film/net	Switch NO			
S41	Elevator pressure sensor	Analogue	IFM PT5401	4 - 20 mA, 0...250 bar	

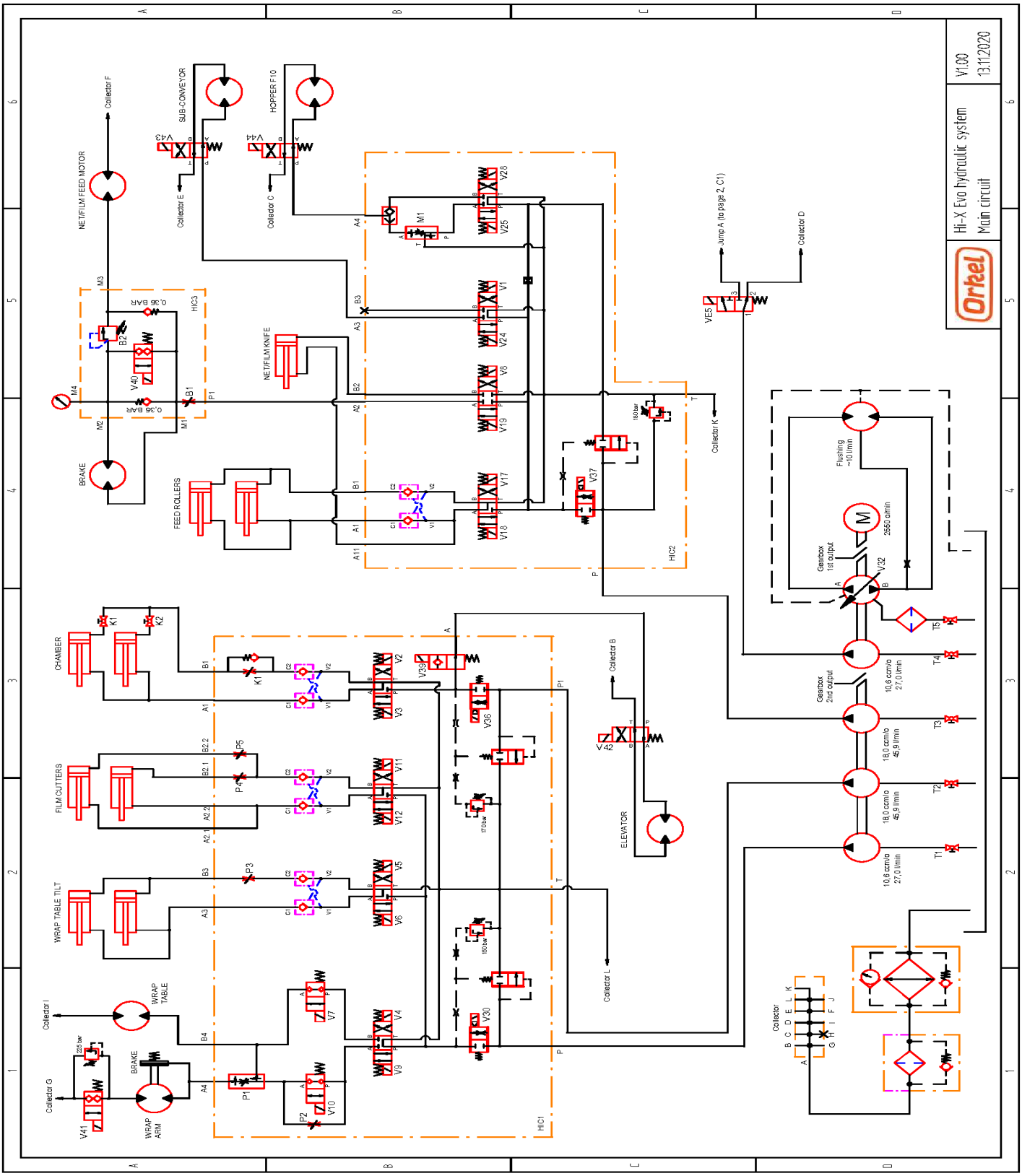
Inputs on controllers for standard system					
No.	**Description**	**Type**	**Brand & type**	**Range**	**Comment**
		pressure			
S42	Remote control - flip up	Switch NO			F25 only
S43	Remote control - flip down	Switch NO			F25 only
S44	Remote control - hopper start	Switch NO			F25 only
S45	Remote control - hopper stop	Switch NO			F25 only
S46	RF Remote control - aux input	Switch NO			Optional
S47	Thermo switch	Switch NO	Thermostatic switch		

11 Hydraulics

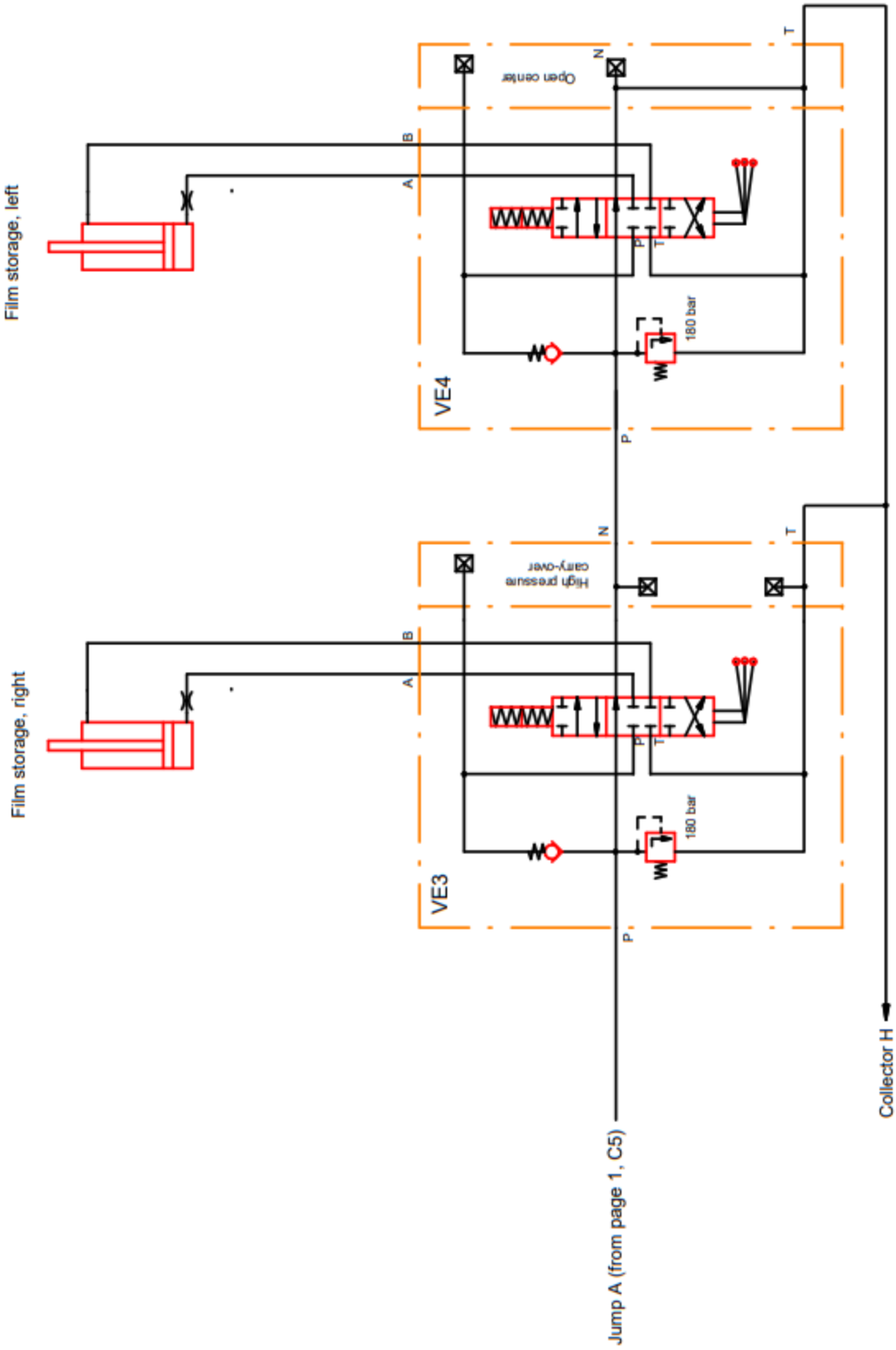
11.1 HYDRAULIC DIAGRAM

Please refer to section 11.1.1 "Main circuit" and section 11.1.4 "Hydraulic diagram list" for the Hydraulic diagram list with components.

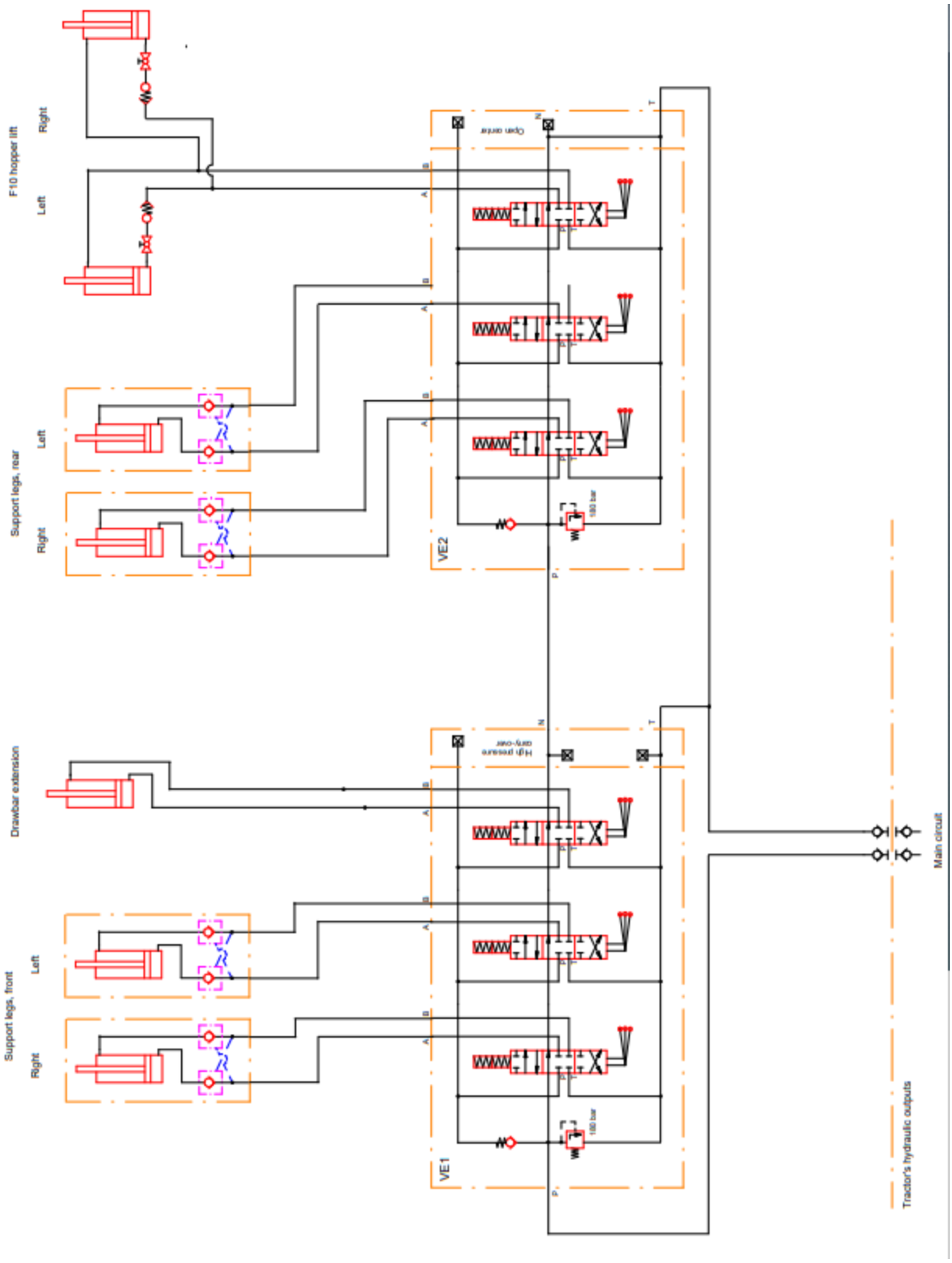
11.1.1 Main circuit



11.1.2 Film storage circuit



11.1.3 External hydraulics

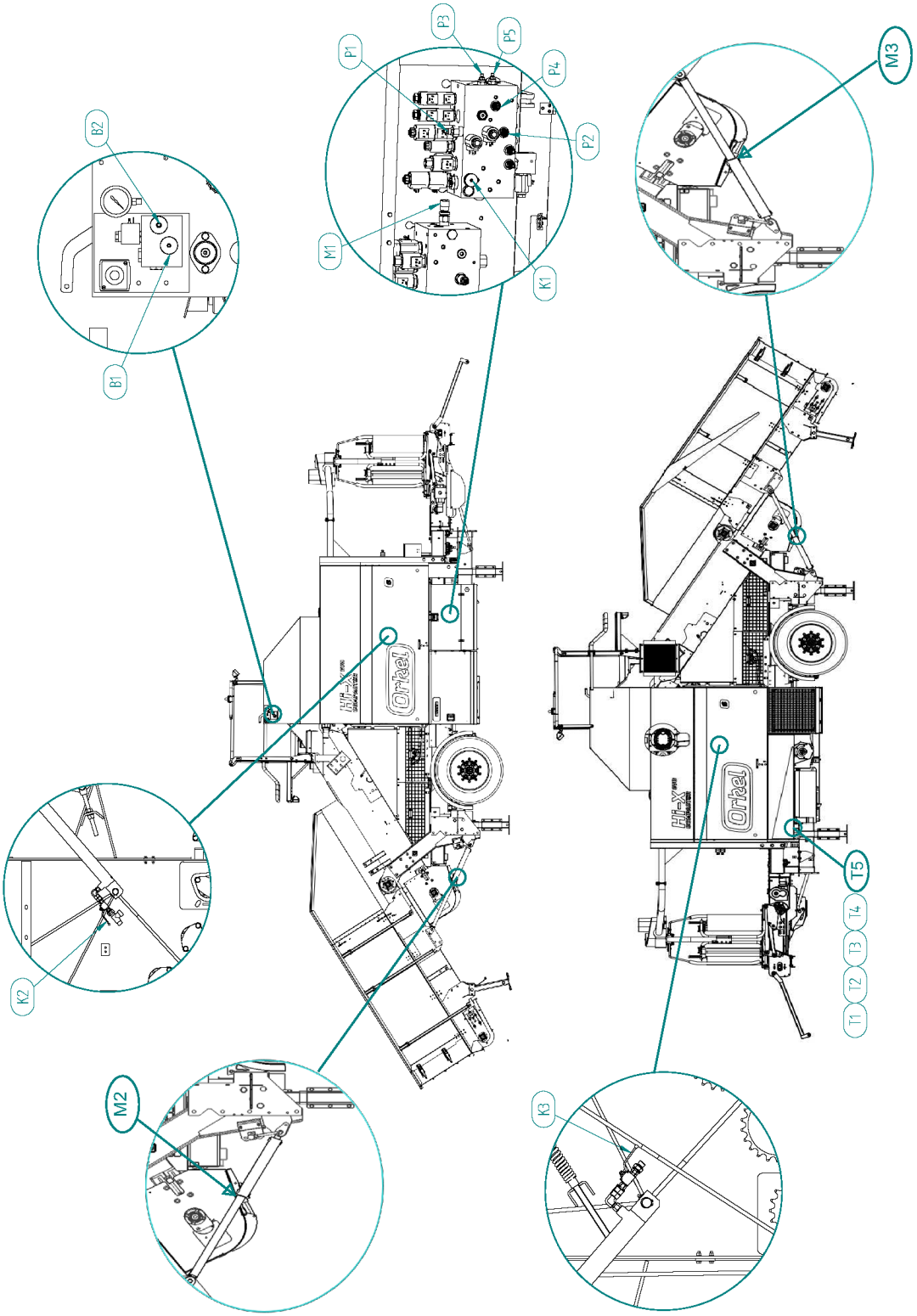


11.1.4 Hydraulic diagram list

Outputs on controllers for standard system					
No.	**Type**	**Brand & type**	**Current drawn @ 24Vdc**	**Resistance in Ohms**	**Comment**
V1	Digital valve	Comatrol SV-15-34-04	1,38 A	17	
V2	Digital valve	Comatrol SV-15-34-05	1,38 A	17	
V3	Digital valve	Comatrol SV-15-34-05	1,38 A	17	
V4	Digital valve	Comatrol SV-15-34-04	1,38 A	17	
V5	Digital valve	Comatrol SV-15-34-05	1,1 A	22	
V6	Digital valve	Comatrol SV-15-34-05	1,1 A	22	
V7	Digital	Comatrol EVK 06/C5	1,1 A	22	
V8	Digital valve	Comatrol SV-15-34-02	1,38 A	17	
V9	Digital valve	Comatrol SV-15-34-04	1,38 A	17	
V10	Digital valve	Comatrol EVK 06/C5	1,1 A	22	
V11	Digital valve	Comatrol SV-15-34-05	1,1 A	22	
V12	Digital valve	Comatrol SV-15-34-05	1,1 A	22	
V13	Electric motor	Bekamax EP-1	1,1 A at full load, 3A fuse		
V17	Digital valve	Comatrol SV-15-34-05	1,38 A	17	
V18	Digital valve	Comatrol SV-15-34-05	1,38 A	17	
V19	Digital valve	Comatrol SV-15-34-02	1,38 A	17	
V24	Digital valve	Comatrol SV-15-34-04	1,38 A	17	
V25	Digital valve	Comatrol SV-15-34-04	1,38 A	17	
V30	Proportional valve	Comatrol PSV10-NC	0,9 A (200 mA min)	16	
V31	Buzzer	Fulleon ROLP/SV/W/S	32 mA		
V32	Servo solenoid	Samhydraulik SH6V	0,68 A (230 mA min)	24,6	
V33	Relay	Bosch 0 332 209 206 896	0,1 A	215	Sinking output
V34	Relay	Bosch 0 332 209 206 896	0,1 A	215	Sinking output
V35	Digital valve	Camozzi U77	0,15 A	160	Sinking output
V36	Proportional valve	Comatrol PSV1-NC	0,9 A (250 mA min)	17	
V37	Proportional valve	Comatrol PSV1-NC	0,9 A (250 mA min)	17	
V39	Digital valve	Comatrol SVP10-NOR	1,1 A	22	
V40	Digital valve	Comatrol SVP10-NOR	1,1 A	22	
V41	Digital Valve	Hydac			
V51	Digital valve	Comatrol SV-15-34-03	1,38 A	17	F25 only
V52	Digital valve	Comatrol SV-15-34-03	1,38 A	17	F25 only
V53	Digital valve	Comatrol SV-15-34-01	1,1 A	22	F25 only
V54	Digital valve	Comatrol SVP08-NCR	1,38 A	17	F25 only
V55	Digital valve	Comatrol SVP08-NCR	1,38 A	17	F25 only
V56	Digital valve	Comatrol EVK 06/C5	1,1 A	22	F25 only

11.2 VALVE OVERVIEW

11.2.1 Valve chart



11.2.2 Valve list

Valve number	Description	Location
K1	Chamber, closing speed	In cabinet, on valve block
K2	Safety valve, chamber door cylinder	Chamber, cylinder, right hand side
K3	Safety valve, chamber door cylinder	Chamber, cylinder, left hand side
B1	Plastic tying unit, feed speed	Plastic tying unit
B2	Plastic tying unit, brake force	Plastic tying unit
M1	Feed hopper, speed	In cabinet, on valve block
M2	Feed hopper, transport safety valve	Feed hopper, cylinder, right hand side
M3	Feed hopper, transport safety valve	Feed hopper, cylinder, left hand side
P1	Wrapper, speed, high	In cabinet, on valve block
P2	Wrapper, speed, low	In cabinet, on valve block
P3	Wrapping table, tilt speed	In cabinet, on valve block
P4	Film cutter, left, speed	In cabinet, on valve block
P5	Film cutter, right, speed	In cabinet, on valve block
T1	Tank valve	Under, on tank
T2	Tank valve	Under, on tank
T3	Tank valve	Under, on tank
T4	Tank valve	Under, on tank
T5	Tank valve	Under, on tank

12 Specifications

12.1 ELECTRICAL SYSTEM

Power supply: 24 Vdc with alternator located by the pump unit and dual 12 V 55 Ah lead acid batteries in series.

Sensors:

Position detected	Inductive	Pepperl+Fuchs NBB8-18GM50-E2-V1
Feed hopper:	Ultrasonic, analogue	Pepperl+Fuchs UC2000-30GM70-IE2R2-V15
Wrapping table:	Ultrasonic, digital (70 cm def.)	Microsonic mic+130/D/TC
Oil temperature:	PT1000	FuehlerSysteme EF5/E-20/5
Oil level:	Photoelectric lever	Carlo Gavazzi VP04EP
Chamber pressure:	Pressure, 0-600 bar	IFM PT5460
Elevator pressure:	Pressure 0-250 bar	IFM PT5401

12.2 POWER TAKE OFF

Maximum torque:	2900 Nm
Speed:	850 RPM

12.3 LUBRICATION SYSTEM BEKA-MAX

Grease system:

Voltage	24 Vdc
Maximum current	1,1 A
Pump capacity each revolution	Pump 1 (fixed amount) 0,17 cm^3 Pump 2 (adjustable) 0,04 - 0,12 cm^3
Pump capacity each minute	4,3 cm^3/minute
Maximum pressure	280 bar
Grease type	EP 2 NLGI-2
Volume reservoir	4,0 l

Chain lubrication:

Oil type	Motor oil SAE 10W - 30, 15W - 40
Oil consumption	6ml each bale on the table. 0.3 l/h (@ 50 bales/h)
Volume container	4,2 l

12.4 HYDRAULIC SYSTEM

Chamber drive:	280/340 bar (SW/relief valve)
Sub-conveyer, feed hopper and film system:	180 bar
Elevator and chamber door:	170 bar
Wrapper	150 bar
F25 additional pump (flip and feed hopper):	190 bar

12.5 WHEELS AND TYRES

Tyre dimension:	385/65 R 22,5
Rim dimension:	11,75 x 22,5, 10-bolt
Inflation pressure: 8,0 bar / 800 kPa / 116 psi (lb/in²) Wheel nuts torque:	8,0 bar / 800 kPa / 116 psi (lb/in²)
Wheel nuts torque:	450 Nm

12.6 DIMENSIONS AND WEIGHT

12.6.1 Measurements

Net weight	10160 kg
Allowed total weight:	12500 kg
Allowed vertical load on drawbar:	2500 kg

	Operation mode	Transport mode
Height	4110 mm	4110 mm
Length	10880 mm	11470 mm
Width	3860 mm	2870 mm

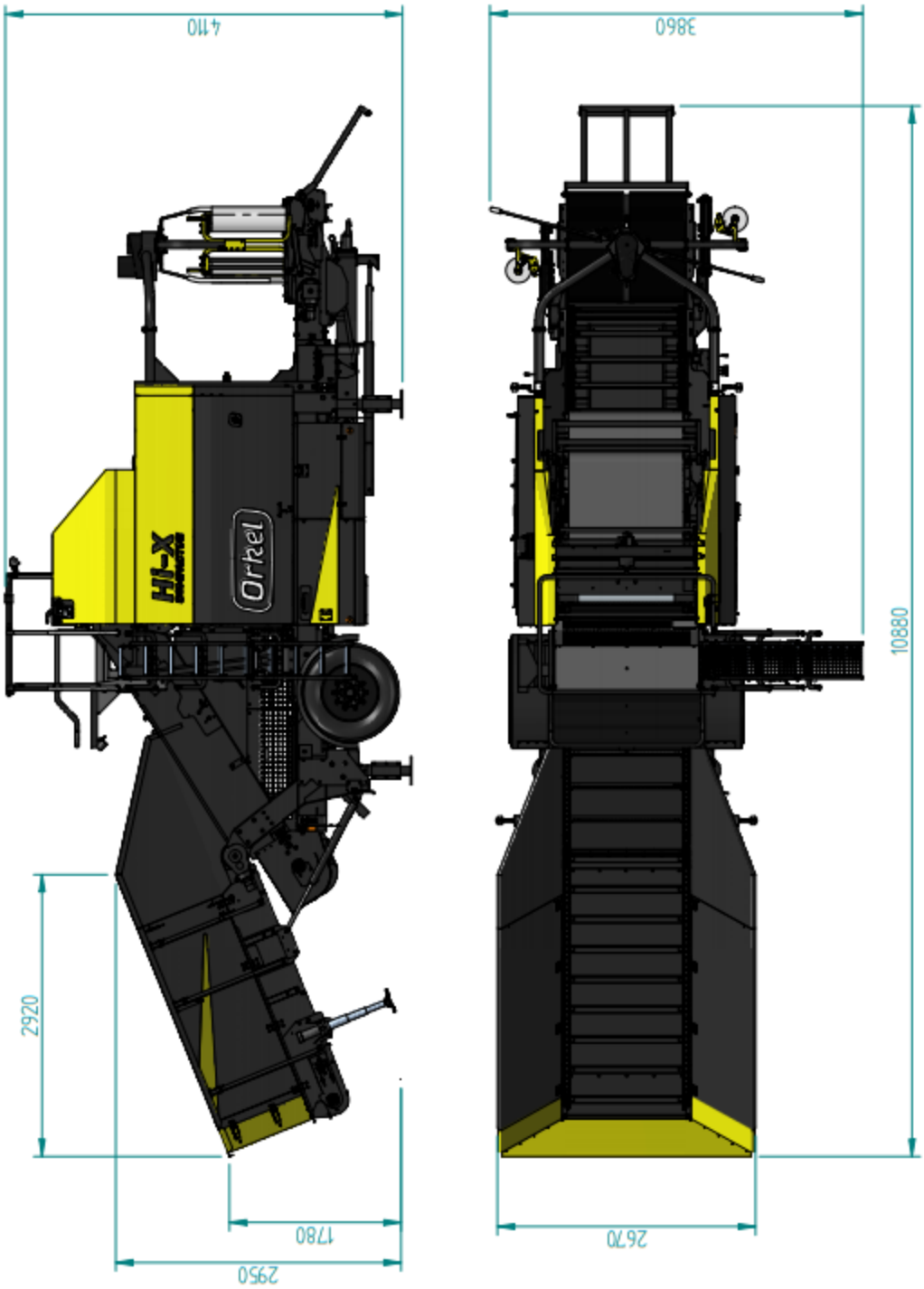
Chamber size:	Width 1200 mm x Diameter 1150 mm
Bale volume	1,25 m³
Feed hopper volume:	10 m³

12.6.2 Power requirements

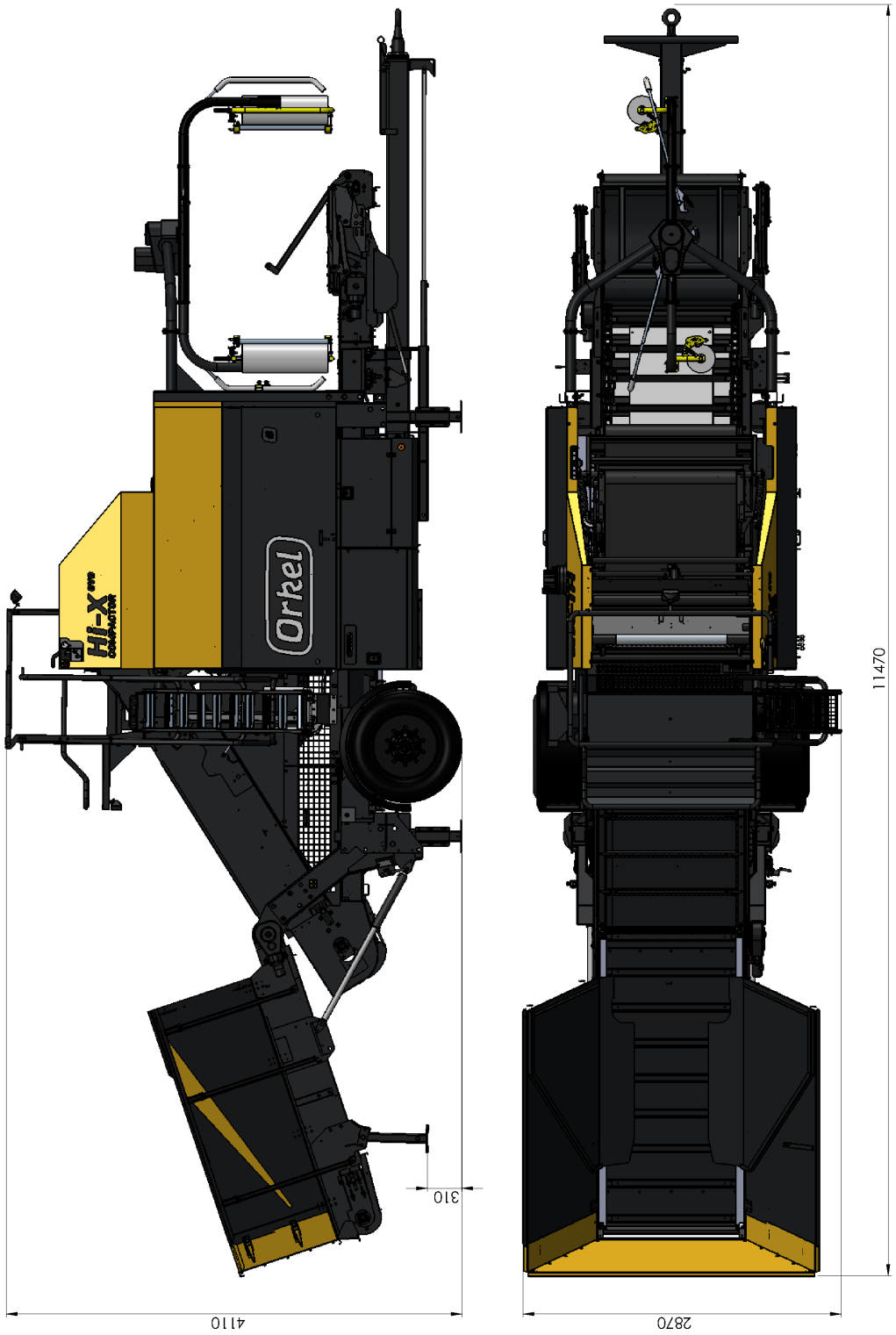
120hp / 90 kW (diesel engine)

90hp / 75 kW (electric motor)

12.6.3 Dimensional sketch operating mode



12.6.4 Dimensional sketch transport mode



Glossary

B

Bale chamber

The material is transported into the chamber and shaped into a compact bale. After shaping the material, several layers of net/film is laid on the bale by the net/film system ensuring that the bale maintains its shape during the transport to the wrapping table. Usually referred to as "the chamber".

E

Elevator

Transfers the material from the feed hopper to the chamber.

F

Feed hopper

The feed hopper is made for loading material into, which is fed into the chamber via the elevator. It is mounted at the back of the compactor, and comes in several types; F5, F10, F25. The number indicates the loading capabilities of the hopper in m^3.

P

Plastic tying unit

Placed on top of the chamber, responsible for feeding film into the chamber so that the bale is partially wrapped and contains its form.

S

Serial number

Identification number for each indiviual machine, also referred to as "Chassis Number".

Sub conveyor

Conveyor belt placed along the frame under the chamber, for transporting the bale from the chamber to the wrapping table, as well as transporting material spillage back to the elevator.

W

Wrapping arms

Wraps the bale with film while it lays on the wrapping table by rotating the arms around the bale. Safety features are mounted on the arms so that the emergency stop is triggered if something hits the safety features.

Wrapping table

The wrapping table is placed at the front of the compactor, and retains the bale while it is being wrapped in film by the wrapping arms. After this process is completed the wrapping table tilts forward so that the bale rolls off and onto the ground.

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M