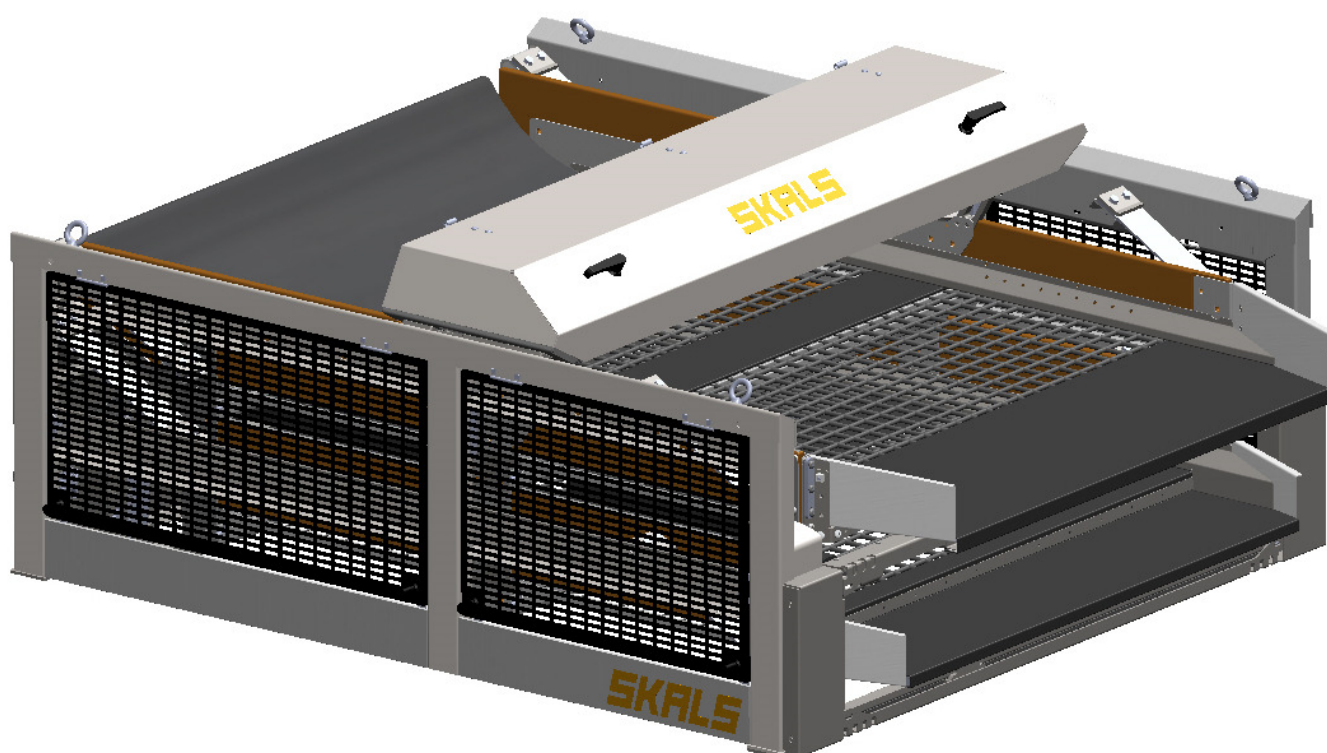


Manual

SKALS Dynamic Sorting machines



SDe1000 / SDe1400 / SDe1800

Document rev. 00

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2 General description

Skals Dynamic sorting machines, hereafter referred to as SDe sorters, are a new generation of sorting machines based on established sorting principles, but developed using modern, tried- and-tested technology.

The SDe sorter is designed for a very precise and accurate size sorting, with a high capacity.

The SDe sorting machine is a hop-sorter that sorts on riddles. Hop-sorting undoubtedly provides the most accurate sorting compared to other mechanical sorting machines. The riddles ensure a high degree of flexibility with regard to sorted sizes and SDe is designed for rapid changes between riddle sizes.

SKALS Dynamic is easy to integrate into the rest of the product program and provides a simple possibility for sorting into sacks or boxes, or for further processing via a conveyor belts. The design focuses on achieving a machine that runs at low noise levels and which is simple to operate and easy to maintain.

The SDe machine is constructed in modules. A module consists of a riddle case and two riddle levels. A module can be used to pre-sort or size-sort to 3 sizes. Two modules are used for 4 or 5 sizes.

2.1 Variants

This manual covers standard machines of type SDe1000, SDe1400 and SD1800 for 3 sizes and combined machines that are combined for 4 or 5 sizes respectively.

Fig. 1 shows a standard machine for 3 sizes, indicated by L (large), M (medium) and S (Small) respectively.

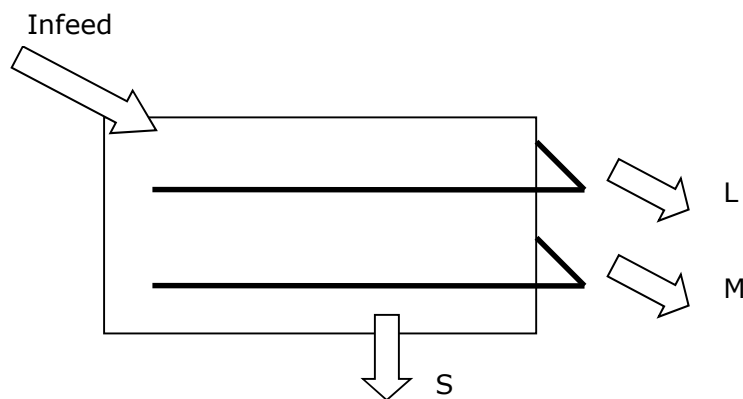


Fig. 2 shows a combined machine of 2 modules for sorting of 4 sizes

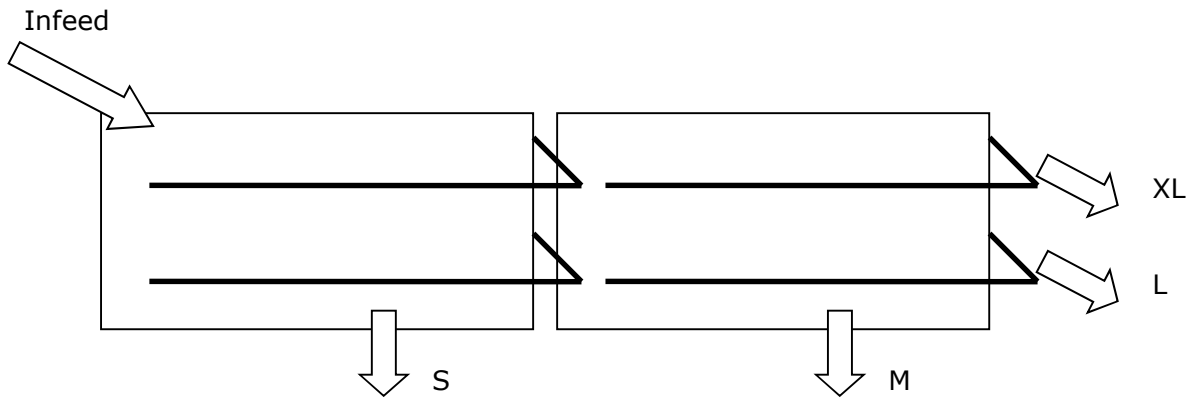
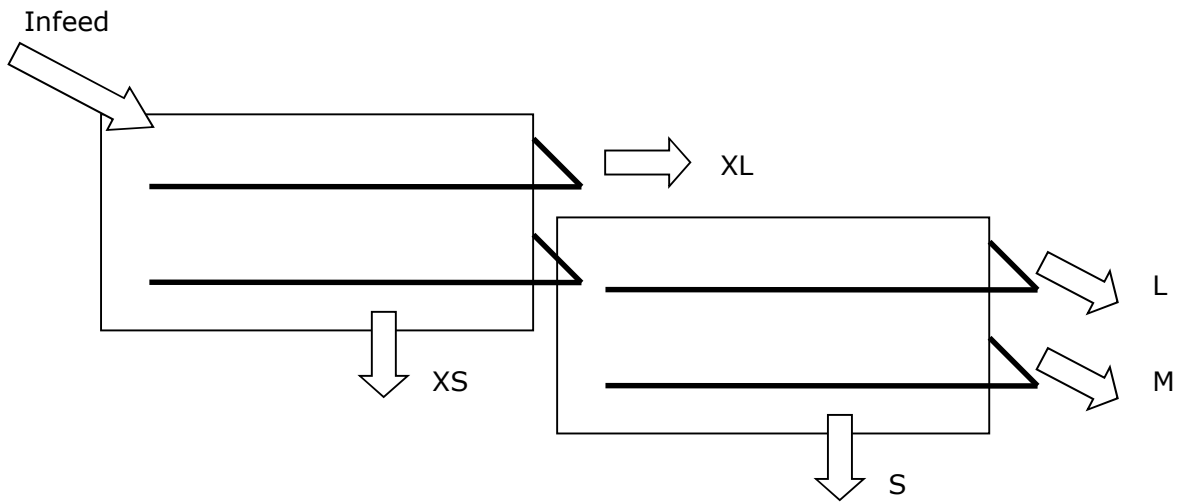


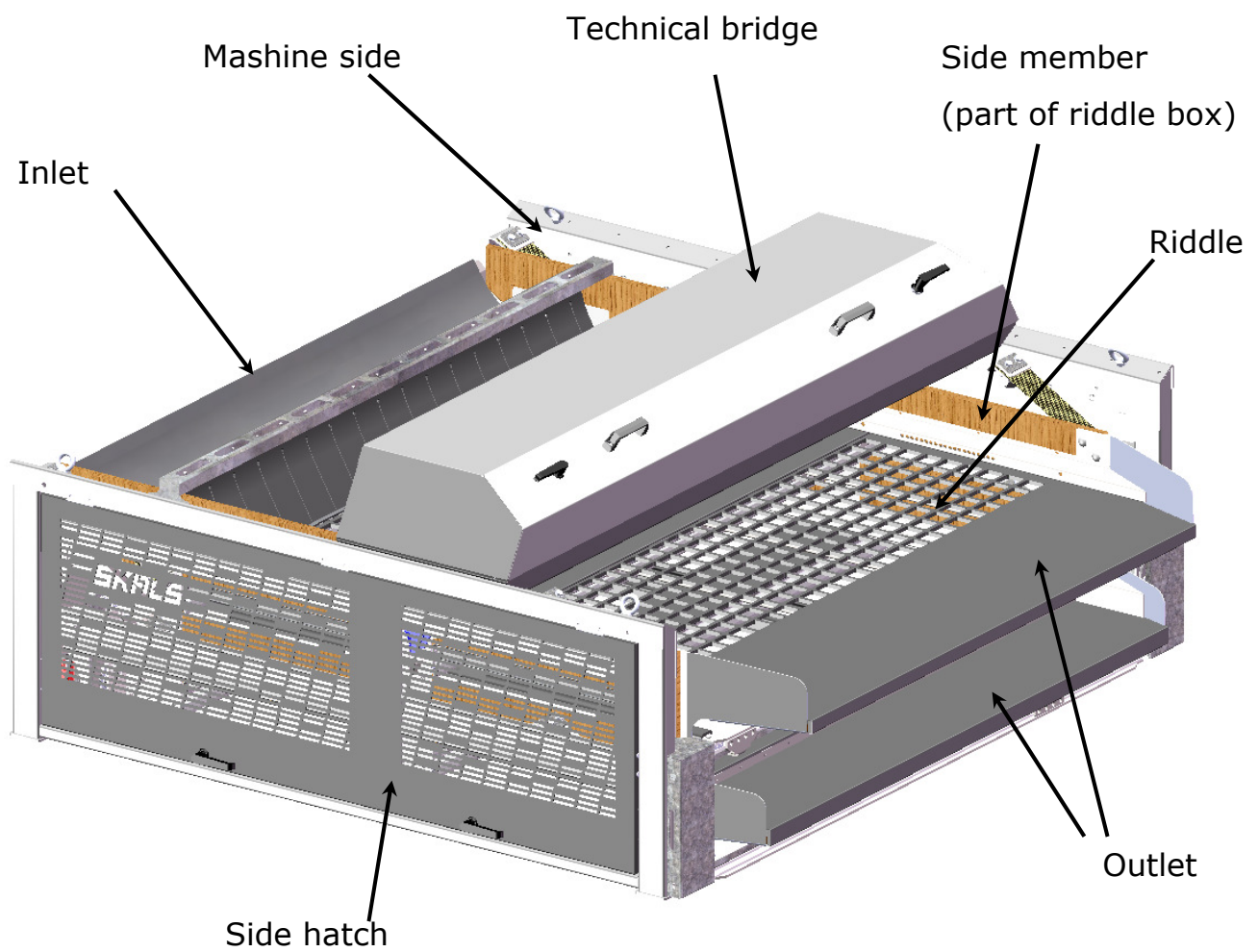
Fig. 3 shows a combined machine of 2 modules for sorting of 5 sizes:



3 Machine description and technical data

3.1 Names of machine parts

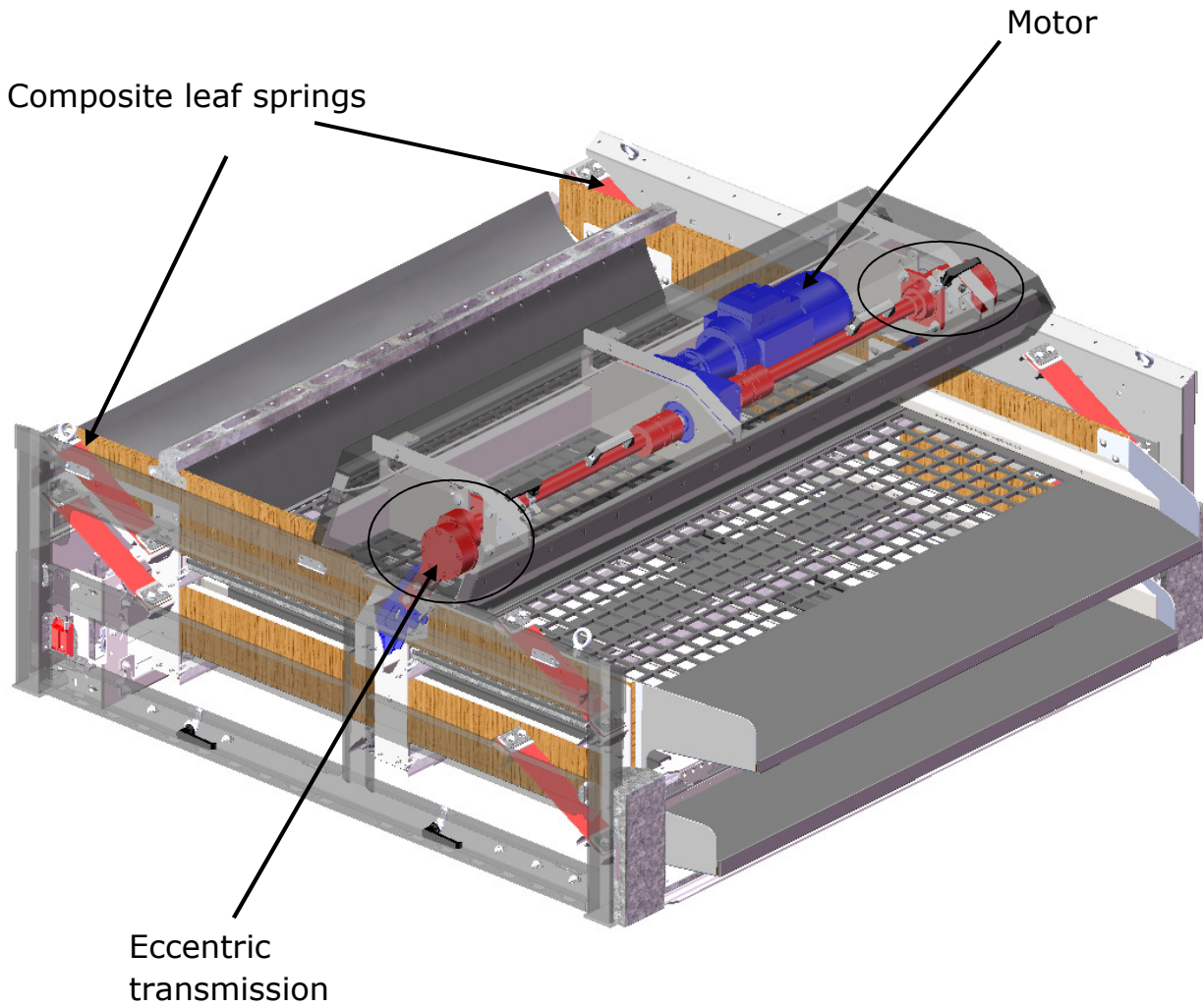
Fig. 4 shows an overview with the names of the machines' main parts.



3.2 *Sorting mechanism*

The sorting mechanism is based on an advanced frequency controller paired with an asynchronous motor. The riddle case is a light and rigid construction that is supported from 8 composite feather springs. The sorting movement is achieved by controlling the motor speed and transfer it to a linear movement through an eccentric transmission.

Fig. 5: Red and blue components illustrates the position of composite leaf springs and the electromechanical transmission.

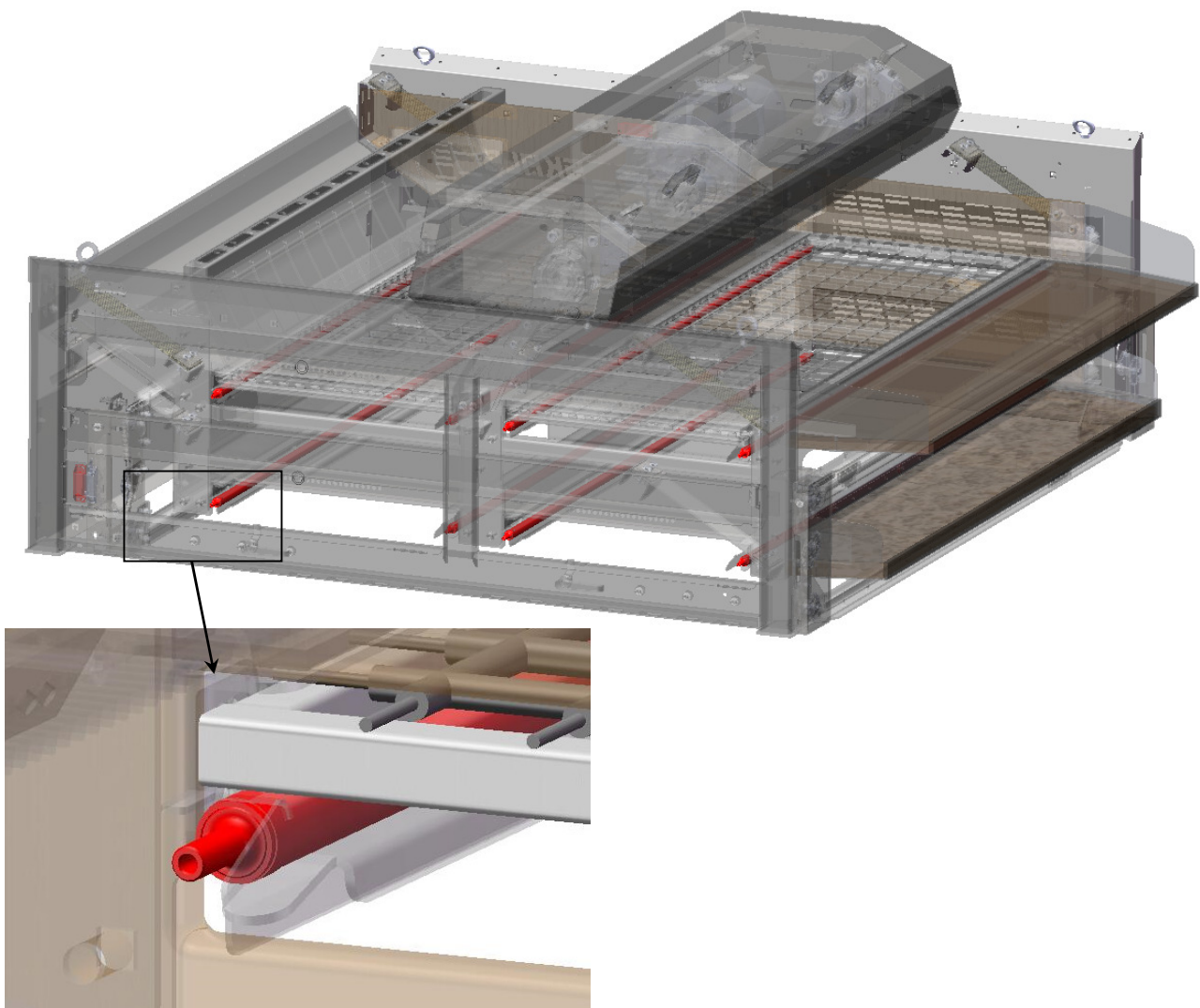


3.3 Riddle clamping system

The purpose of the riddle clamping system is to hold the riddles when the machine is operating and to ensure that the riddles can be replaced quickly and easily.

The riddle clamps are pneumatic and are operated from the control panel. The actuators are a simple system of 'fire hoses' that are inflated to hold the riddles steady.

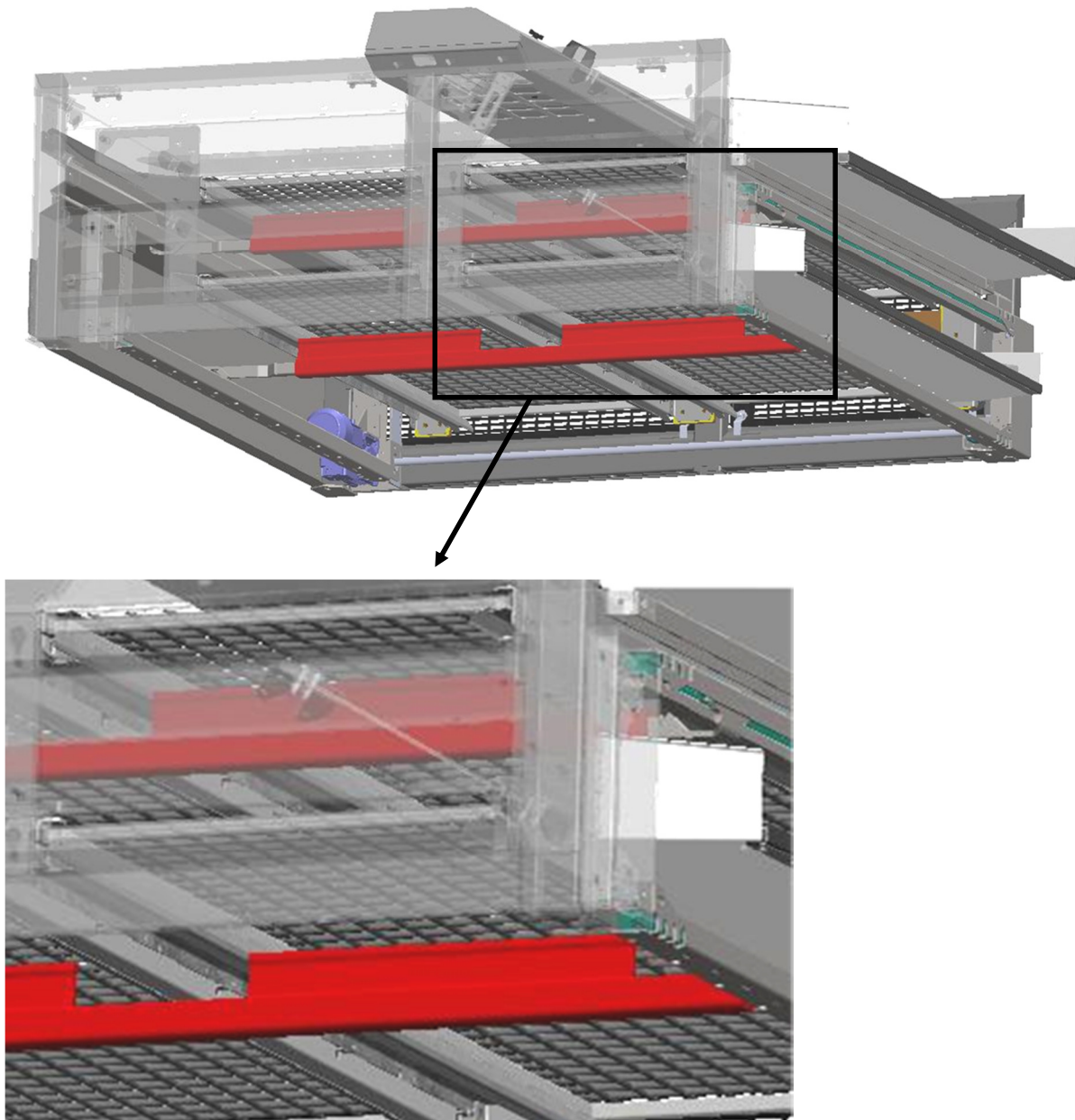
Figure 6 shows the placing of the 'fire hoses' that hold the riddles in the riddle case.



3.4 Riddle cleaner

The machine is equipped with a riddle cleaner. The riddle cleaner is powered by an electric motor and the operating interval can be configured from the control panel. The riddle cleaner consists of a riddle cleaner profile made of rubber that ensures that any root vegetables that get stuck are pushed back onto the riddle.

Figure 7 shows the riddle cleaners. The red elements are the rubber profile that pushes the root vegetables that are stuck, out of the riddle.



3.5 Technical data

	SDe1000	SDe1400	SDe1800
Riddle area	1000x1200	1400 x 1200	1800 x 1200
Capacity* up to:	15 t/h	22,5 t/h	30 t/h
Power consumption (guidance)	1.5kW	1.75kW	2kW
Electrical supply	3x400V+N+J Peak current up to 13 Amp Must be protected by leakage circuit breaker Type B AC/DC 300mAmp		
Net-weight	450kg	500 kg	580 kg
Outer dimensions LxBxH	2075 x 1325 x 855	2075 x 1725 x 855	2075 x 2125 x 855

Capacity*

The capacity is defined as a maximum capacity depending on the following parameters:

Potato type/shape (round, round/oval, oval, long, overlong)

There is a great difference between sorting uniformly round potatoes and a type that is very long and with non-uniform shape. The hop-sorting machine is generally the best for the long varieties of potatoes, compared with shaker whereas the round varieties can be sorted on most types of machines.

The size distribution in the consignment of potatoes

It can be determinative for the capacity if, e.g. a consignment of <35, 35-50 and 50+ is being sorted and 90% of the potatoes are in the interval 35-50. This will mean a major riddle load on the 35 mm riddle and will determine the capacity.

Requirement for accuracy

The requirement for accuracy is critical for the capacity of the machine. The SDe sorter can sort the majority of potato types with a high level of accuracy. However, it is vital that the riddle load is not too great during the sorting process.

In the technical data, the machine's capacity is indicated for round/oval potato varieties with uniform size distribution, such that the two riddle levels are equally loaded. The width distribution for the machine must be uniform so that the entire width of the riddle is utilised and the riddle cleaner is used to keep the riddle free of products that become stuck.

4 The machine's area of application

SDe sorting machines are designed for size sorting of potatoes and onions. The machine can be used at temperatures from 0°C to +50°C.

Note that the riddles can be covered with PVC for the sorting of food products that are used directly without further processing, washing or peeling.

5 Fitting, installation, connection

5.1 5.1 Lifting points

The machine can be handled following ways for loading and unloading and for feeding.

- Chains/straps attached with hooks or shackles to 4 eye bolts fitted to the sides of the machine. (Applies to a standard module).
- The machine can be lifted with a fork-lift with long forks transversely to the machine.

5.2 Attaching the chassis

The machine must be bolted securely to a suitable chassis with 4 M12 steel bolts. Damping machine shoes may be used between sorters and chassis, or between the chassis and the floor.

The chassis is attached to the floor with 4 expansion bolts or concrete anchors.

5.3 Interface with other machines

The vibrations of the sorter machine when running means that special care is required when it is installed with other machinery.

When conveyors, trolleys, roller washers etc. are used to feed the machine's intake, these machines should not have mechanical connection to the sorting machine. Conveyors for the unsorted sizes can be attached directly to the chassis of the sorting machine or with rubber dampers/machine shoes between the chassis and the conveyor. Any machines placed immediately before or after the sorting machine should be placed with a distance of at least 20 mm between their chassis.

5.4 Electricity connection and consumption

The sorting machine must be connected to 3x400V +N+PE. The fuse for the machine should be 16A. (Two modules must have 25Amp) The electric consumption is oscillating with max. current of 13Amp per installed module.

Current leakage breaker type B AC/DC 300mAmp must be used as protection.

5.5 Connection to pressurised air and air consumption

The riddle spanner system requires an air-reservoir of minimum 5 litres at 8 bars.

The consumption is minimal. The systems consumes only when activated.

6 Start-up and operation

6.1 Before start-up

Check the following before using the SD-sorter:

1. Check air-pressure – the compressor must deliver minimum 4 bar.
2. Turn the main circuit breaker to On (on the left side of the panel)
3. Before start-up, place riddles in all 4 positions.
4. Close all side covers.
5. Reset the safety circuit (the safety circuit breaks when side covers are opened for riddle replacement).
6. Press on "Riddle clamp". The riddle clamp closes and the indicator lamp lights green.
7. START – Press Manuel Start and the machine starts normal operation i manual mode.
8. Adjust hop-speed on the slider "Speed" 4-5 is normal.
9. Adjust hop-height to desired intensity.
10. Adjust riddle cleaner interval on "Riddle cleaner". The pause can be adjusted from continously operation to 240min pause.

6.2 Fitting and replacement of riddles

When replacing riddles, the machine must be stopped and the riddles released on the operating panel BEFORE the side covers are opened.

If the side covers are opened when the machine is running, the machine will stop immediately! The riddles are released, but cannot be extracted from the machine because of the riddle cleaners.

In the correct order, release the riddle and lift the riddle case so that the riddles can be pulled free of the machine.

Push the new riddle fully down before closing the side covers. Then activate the riddle clamp on the control panel. Now pressurise the air hoses in the riddle tensioned system. The riddle case lowers and the machine is again ready for operation.

If the machine is to be used without a riddle in order to sort the consignment of only one size, stretcher frames must be used as replacements for the removed riddle. THE RIDDLE CLAMPS MAY BE DAMAGED IF THE MACHINE IS USED WITHOUT RIDDLES/STRETCHER FRAMES.

6.3 Operation and settings

The control panel is a 3.6" touchscreen.

Individual menus are used to operate the machine.

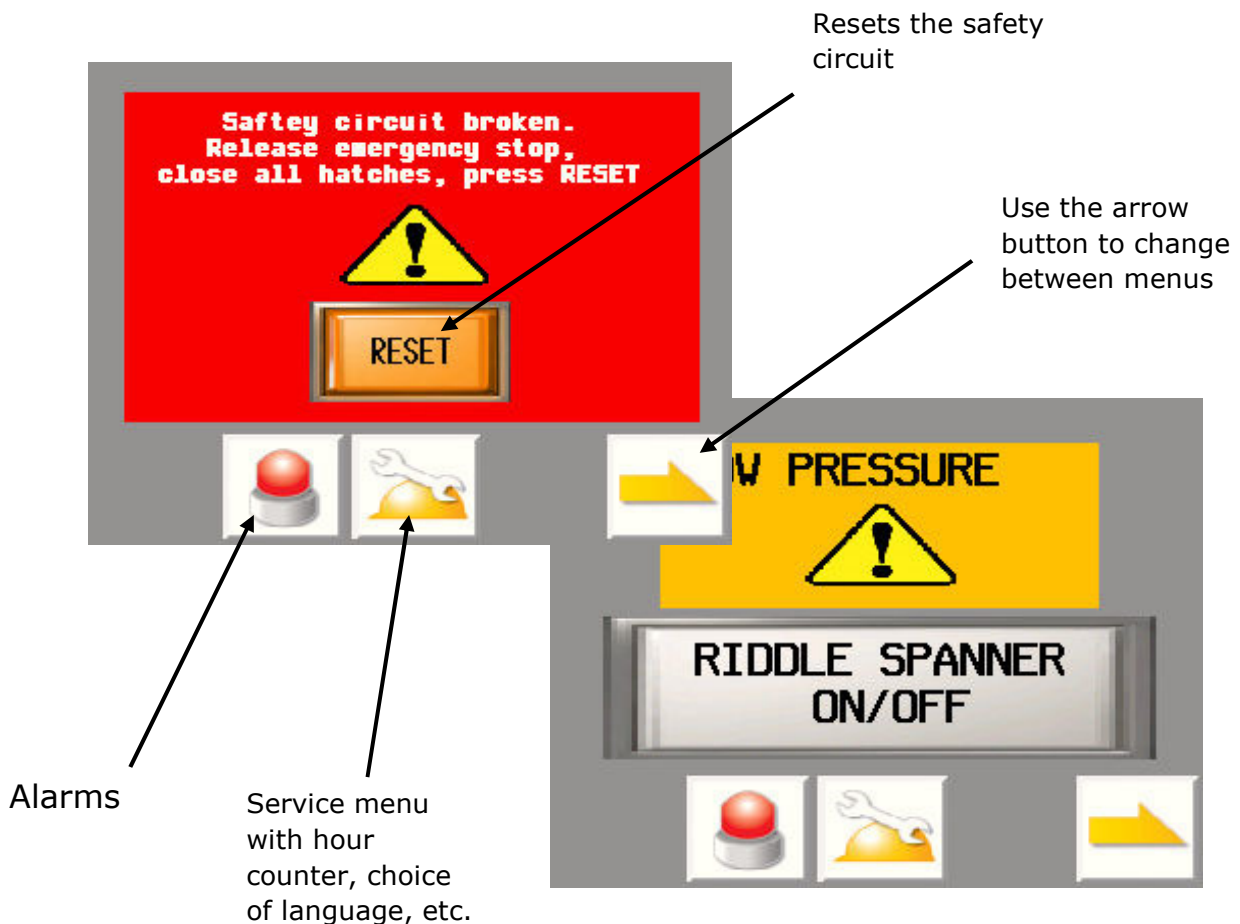
Start-up menu:

This menu is displayed when the machine is restarted. The screens must always be secure before start-up, this is why this menu is displayed before the screen automatically changes to start-up.

In the case of a re-start, the safety circuit has been tripped. The same applies in the case of an emergency stop or after a screen has been replaced. If a hatch is opened, the safety switches will trip the safety circuit and the control panel will show the screen shown below.

If the safety circuit is tripped, close all hatches. Ensure that the emergency stop is released by turning it anti-clockwise.

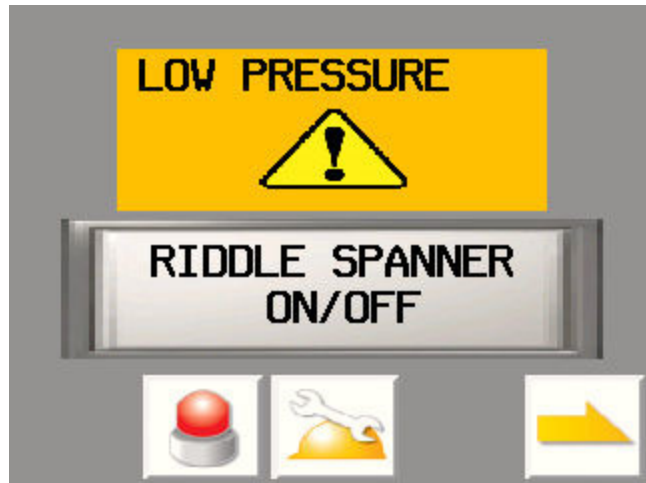
Next, press the "RESET" button. The safety circuit has now re-engaged and the machine is ready to operate again.



Screen Spanner

By activating the Screen Spanner, air is fed into the screen spanner's pressurised air circuit. If there is insufficient pressure (approx. 3 bar) a low-pressure error message will be displayed.

Once pressure is sufficient, the display changes automatically to the operation menu.



Operation menu

Using the operation menu, the machine can be set to operate automatically. An external signal is required to start the machine automatically.

If the machine is required to be started manually, press the "MANUALLY ON/OFF" button, after which the machine starts.

There is a free choice as to whether the screen cleaner shall be active or passive during operation.

During automatic operation a normal display will clearly show the selected operation settings.

To stop the machine normally, press the "AUTO ON/OFF" button or the "MANUALLY ON/OFF" button if this has been active.



Settings

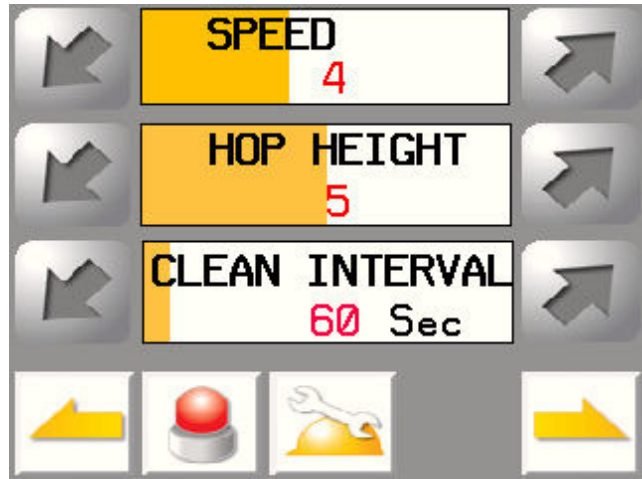
Press the right arrow button to access the machine settings.

Machine speed and hop height can be set here.

The speed can be set in the range 60–100 hops/second (0–10)

The hop height can be set in the range 0–10 and regulates the intensity of movement of the grader.

The length of time the screen cleaner pauses can be set in the range 0–900 seconds.



Manual menu

The manual menu is the last menu that can be accessed using the arrow buttons.

The screen cleaner can be manually activated in both directions in this menu. When the screen cleaner encounters an end stop at both ends, it stops automatically and shows that an inductive sensor has been activated.

The menu is not used under normal operations.



Alarms

To see the alarm display, press the alarm button.



If there are active alarms, the alarm icon looks like this:



The most recent activated or deactivated alarms are shown.

Shows when the alarm was triggered and when it was reset.

To return to the previous menu, press the return button.



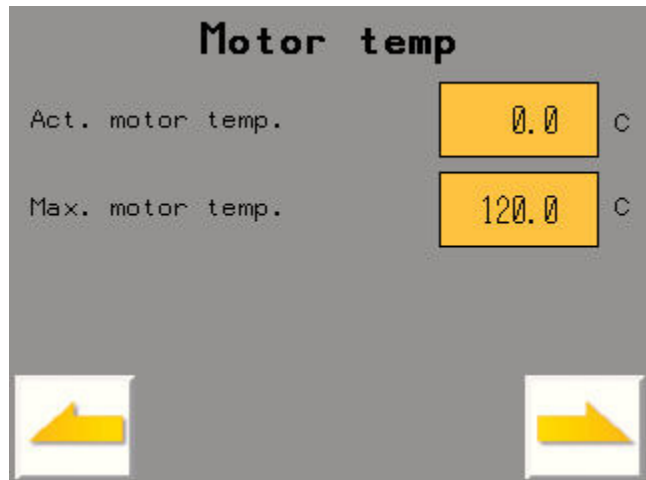
Service menu

To access press the service menu button:



The first window shows the motor temperature and the set max. motor temperature.

If the motor temperature exceeds 120 °C, the machine will stop.



Language setting

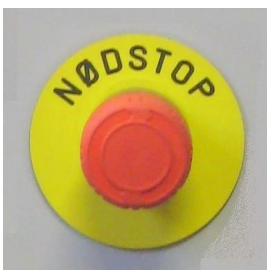
Press the relevant country flag icon to select the respective language.

The hour counter registers the number of hours the machine has operated in manual or automatic mode.

To return to the previous menu, press the return button.



Emergency stop and isolation switch



The emergency stop switch should only be used in case of an emergency. It must not be used to stop the machine under normal operation.

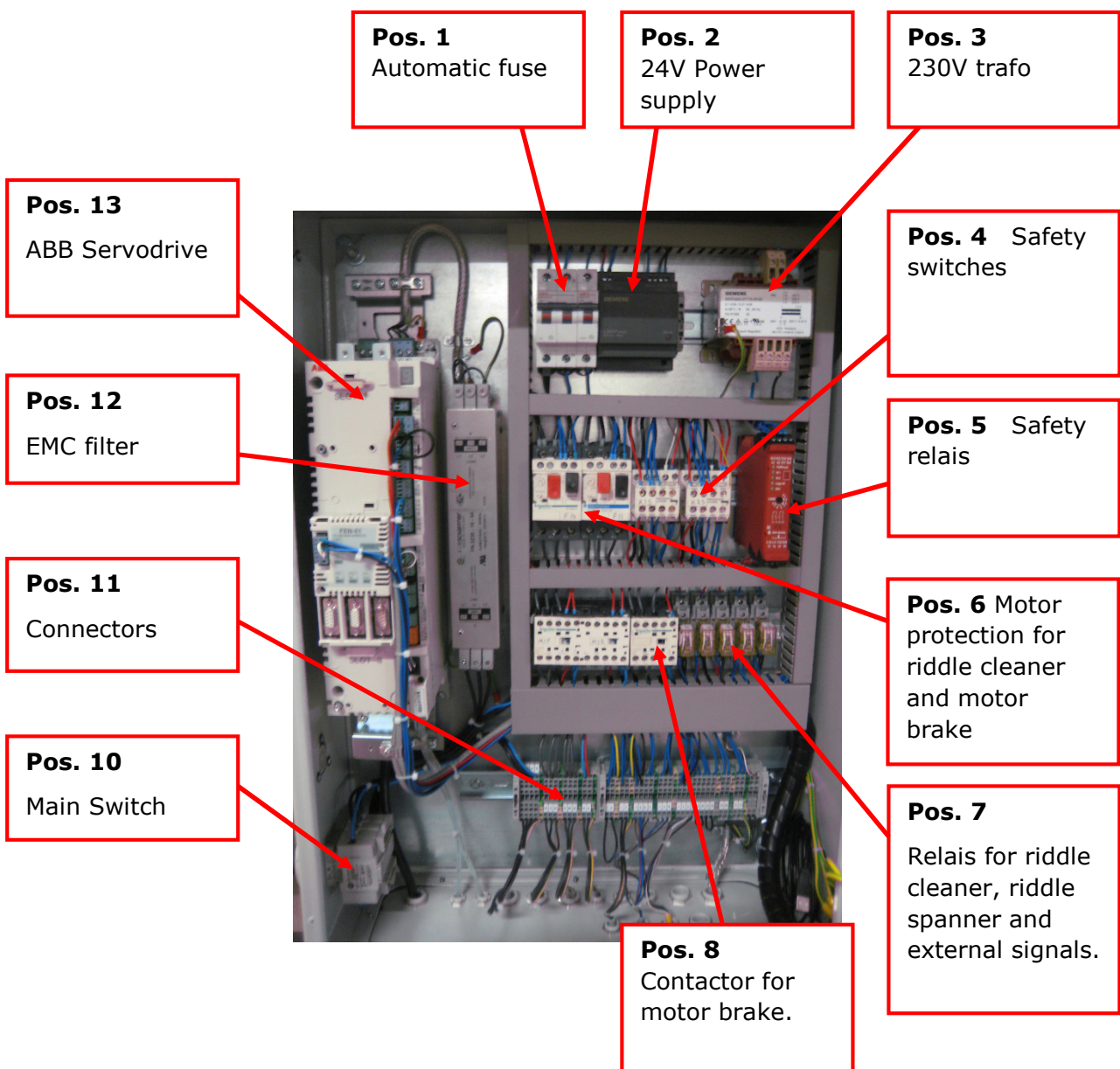
NB: In case of repair, the machine must be switched off using the isolation switch on the left side of the control panel and this must be locked.

7 Control and electrical system

SDe-control cabinet is designed to work as stand alone or to be integrated with a line with SKALS decentral control cabinets or a central control. The machine can be controlled with a remote signal from a central PLC, and the SDe control gives feedback to the central control.

Control cabinets are only to be maintained by skilled electrical workers.

Below gives placement of main components in the cabinet. Electrical wiring is given in the diagram attached as appendix.



8 Known faults and how to repair

Fault	Symptoms	Reason	Solution
Machine does not start.	Machine is ready for operation but does not start.	Fault on ABB drive	Check the error code on the ABB drive in the panel. Try to reset by turning off the main switch and wait 30 sec. before turning back on. By continuously fault see ABB manual for the drive.

9 Service and maintenance

9.1 Tightening

Because of the hop movements, the machine will vibrate. This means that the machine's bolted joints will need to be tightened after approx. 100 hours of operation, equivalent to a 2-3 week period of operating 8 hours a day.

General tightening

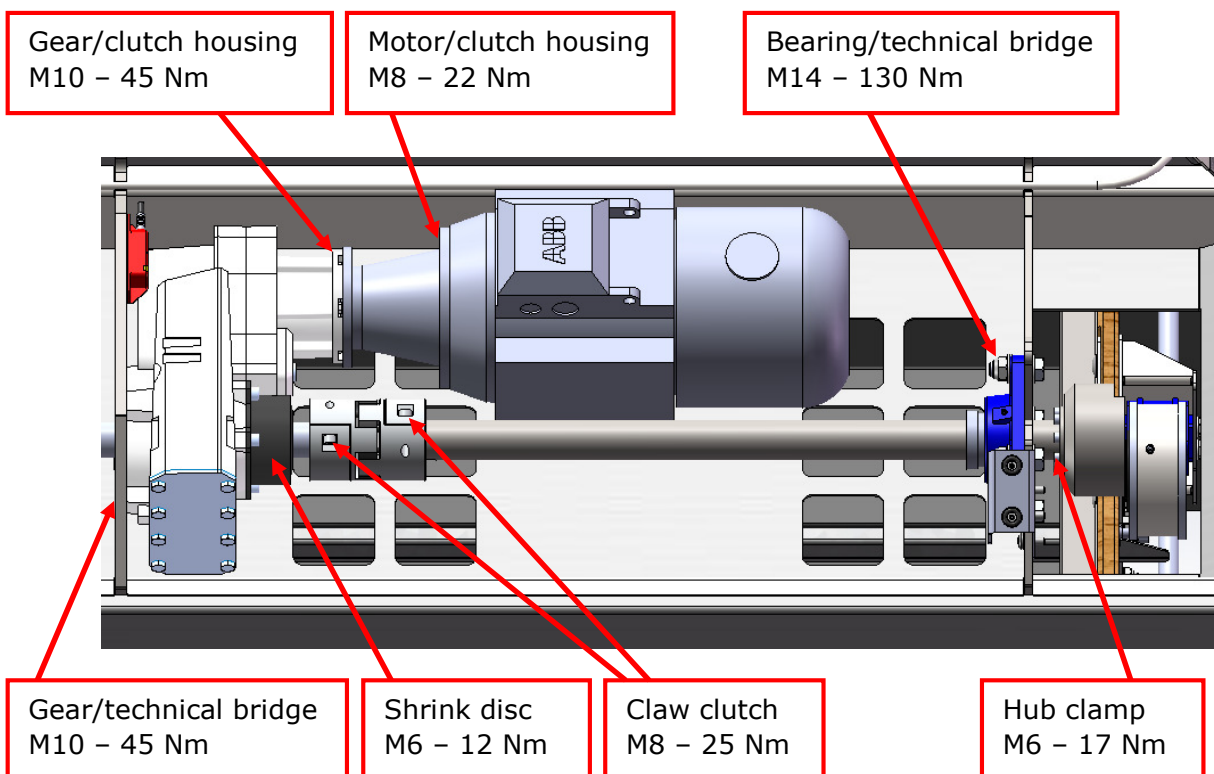
Stop the machine and remove the screens. Ensure the bolted joints are securely tightened. All bolts/nuts must be tightened. There is no general requirement to how much the bolts should be tightened, but if you use a torque wrench, use the following torque settings:

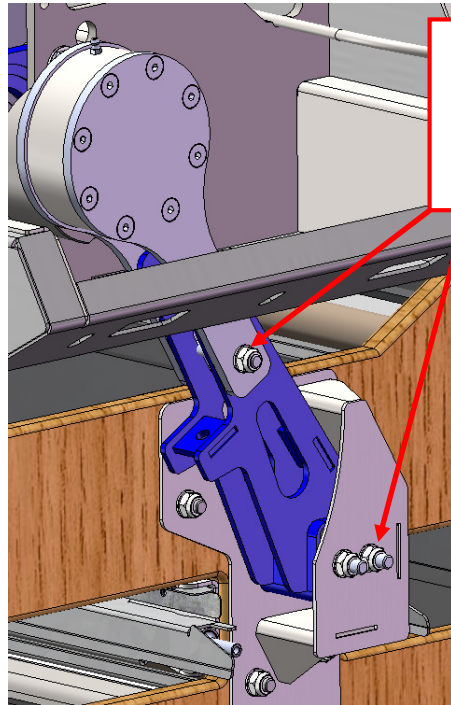
Tighten M8 bolts/nuts to 22 Nm

Tighten M10 bolts/nuts to 45 Nm

Tighten M12 bolts/nuts to 80 Nm

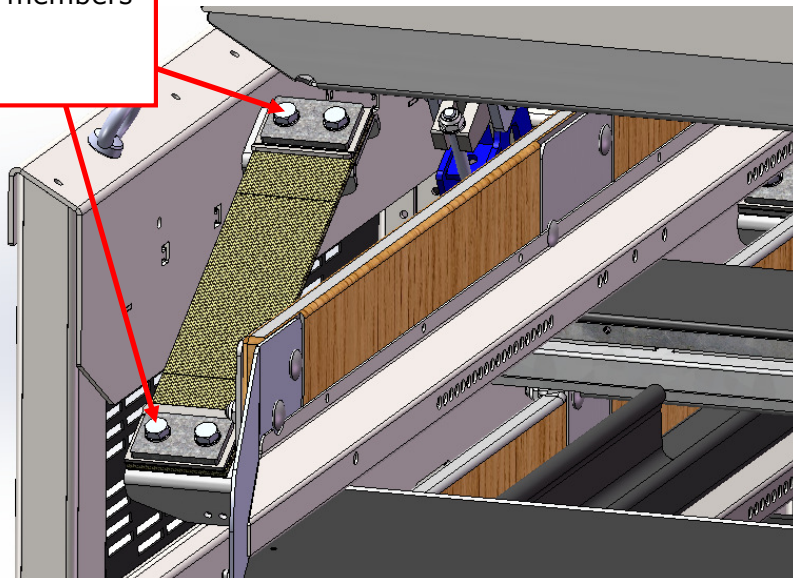
Specific tightening of transmission and mounting fixture.





Connecting rod/Rosta
Rosta/screen box
M10 – 45 Nm

Composite leaf spring/
screen box/side members
M10 – 35 Nm



9.2 Lubrication

Eccentric bearings and main shaft bearings must be lubricated regularly.

Lubricate every 500 hours.

Lubricate using one of the lubricants stated below.

Use 4 g grease per bearing when lubricating, equivalent to 2 presses using a standard grease pump.

One of the following types of lubricant that are approved for these bearings **MUST** be used:

DO NOT USE ORDINARY UNIVERSAL GREASE!!

SKF LGEP2

Shell Retinax LC2

Mobil Grease XHP 222

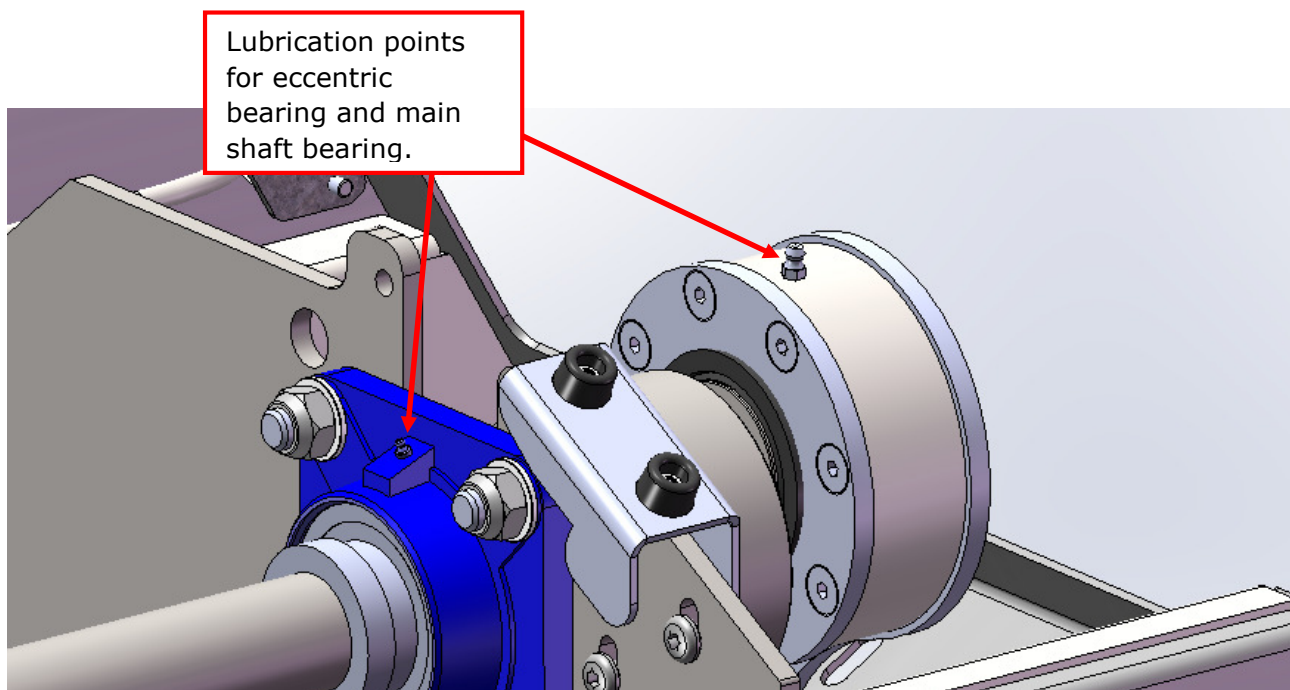
Castrol LMX

Shell Abida LC2

Texaco Starplex 2

Mobil Unirex EP2

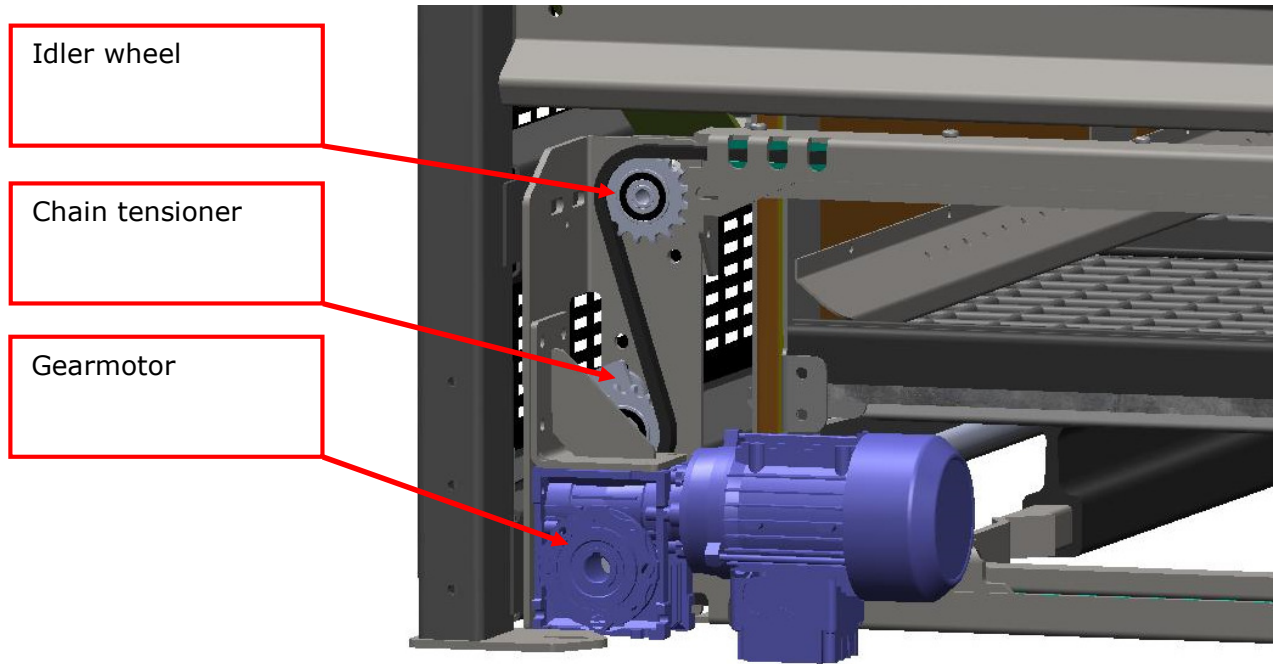
Recommended that bearings are lubricated every 500 hours. Used 4 g grease per bearing. This is equivalent to approx. 2 presses using a standard grease pump.



9.3 Service on the riddle cleaner system

The riddle cleaner system consists of an electrical gearmotor driving the riddle cleaners via an axle and two synchrone chain drives.

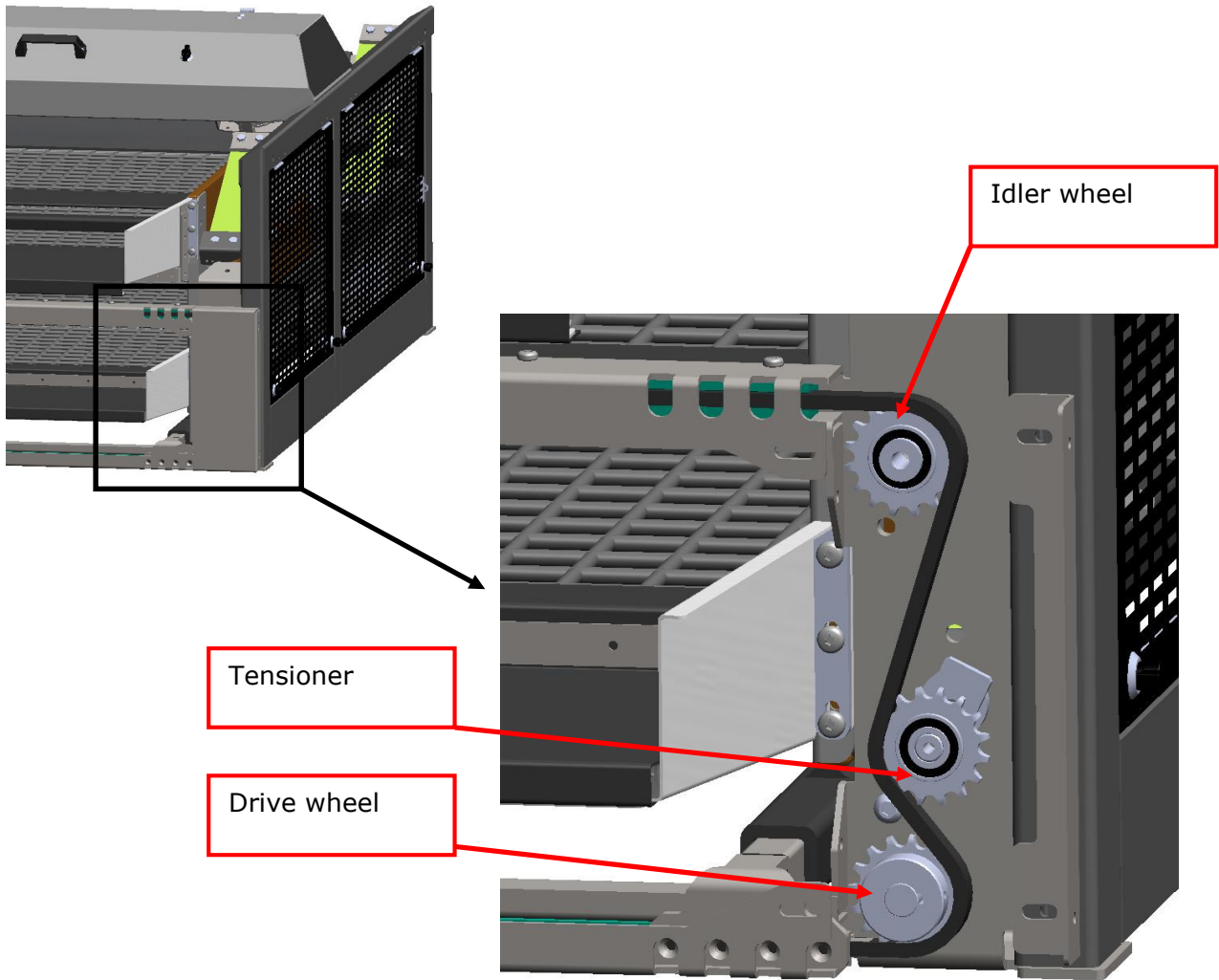
CHAIN, SPROCKETS AND SLIDES ARE NOT TO BE LUBRICATED.



Adjusting the chain tensioner is performed by loosening the tensioner and turn the tensioner with a tool.

ATTENTION! Right and left tensioner must be turned equally so their relative position is equal. The chain must be without slack.

The front chain drive is tensioned according to the same principals.



10 Wear parts and spare parts

10.1 Wear parts

The defined wear parts are the composite leaf springs and machine bearings.

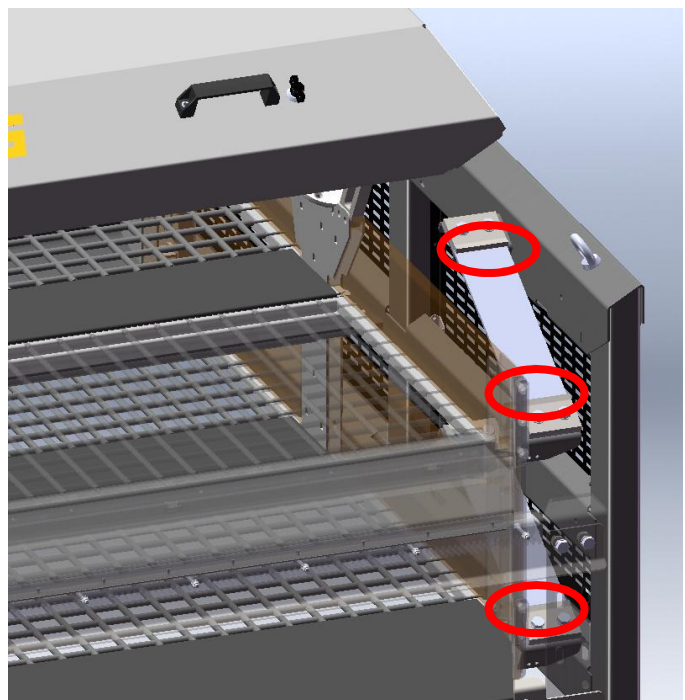
All wear parts are dimensioned according to the application, but has a given lifetime at the corresponding use.

Leaf springs are exposed to fatigue loads and a continuous operation will eventually lead to damage.

Therefore it is important to inspect the leaf springs on regular basis.

Look after delamination at the marked areas.

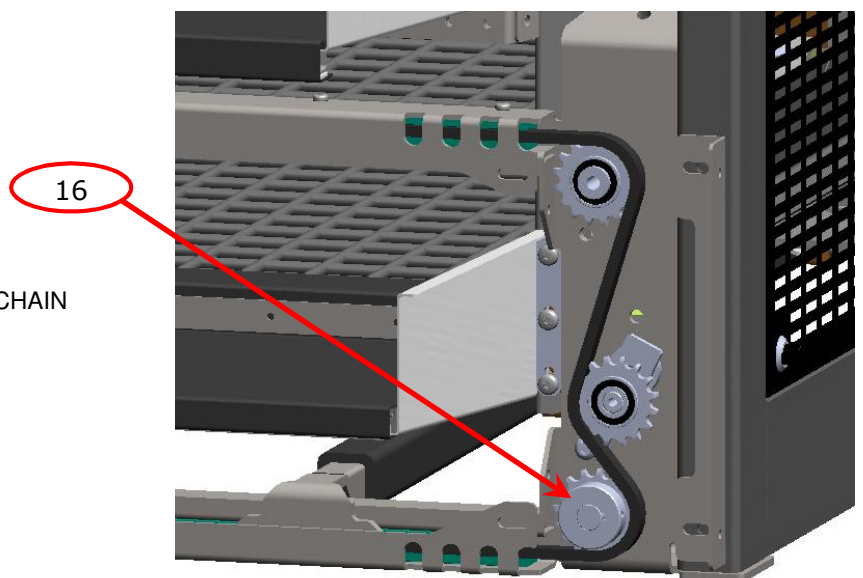
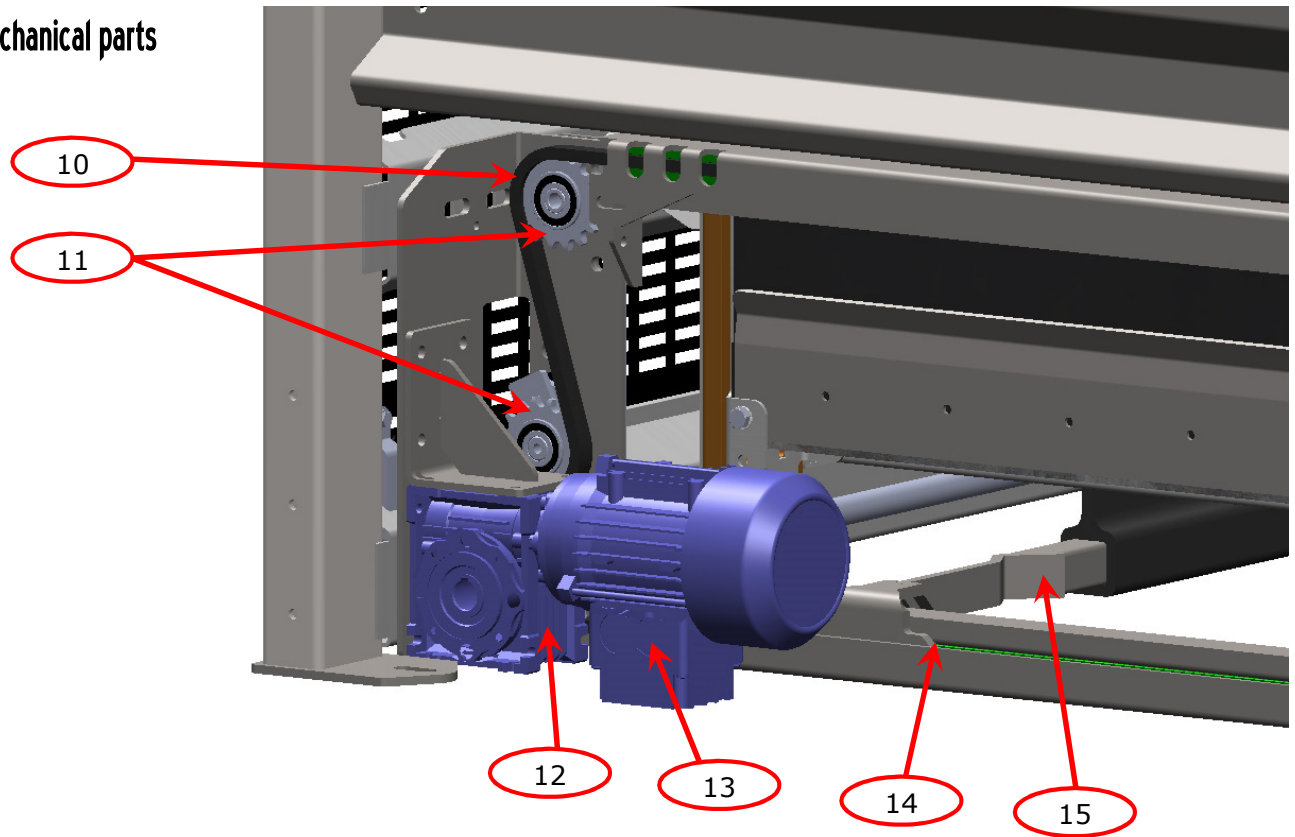
If damage occur the leaf springs must be replaced before a break down.



10.2 Spare parts

Other machine parts are classified as spare parts and most important spareparts are on lists below.

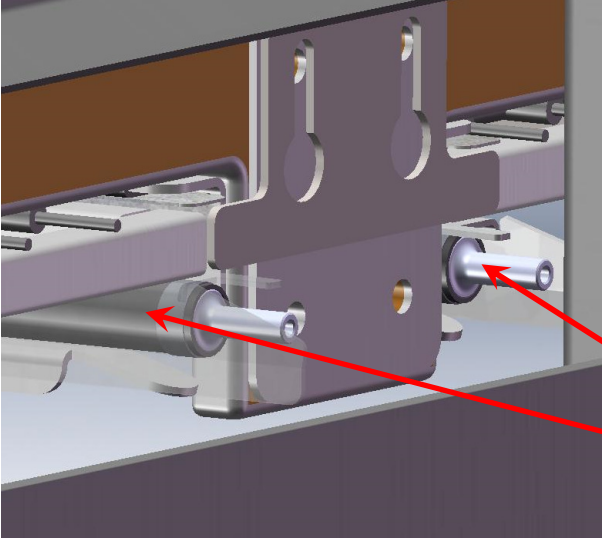
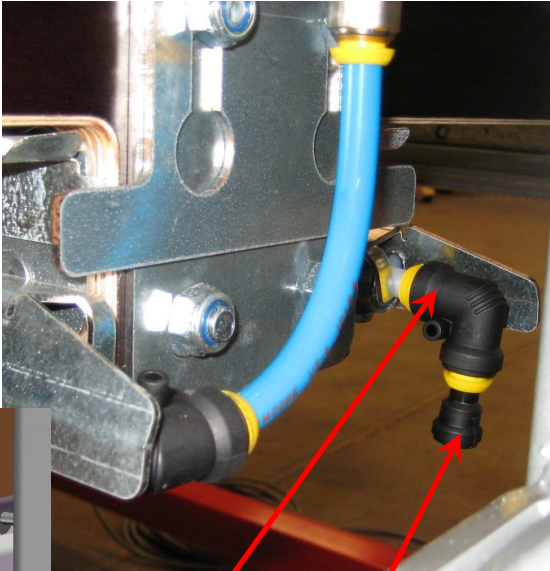
Mechanical parts



- 10 5/8" SIMPLEX MARATHON CHAIN
- 11 IDLER WHEEL
- 12 GEAR NMRV040 1:100
- 13 MOTOR 1.2KW 1400rpm.
- 14 STAINLESS SLIDE
- 15 RIDDLE CLEANER
- 16 DRIVE SPROCKET

Pneumatik (Riddle spanner)

- 38 ANGLE PRESTOLOK 10MM
- 39 END PRESTOLOK 10MM
- 40 RIDDLE SPANNER HOSE



38

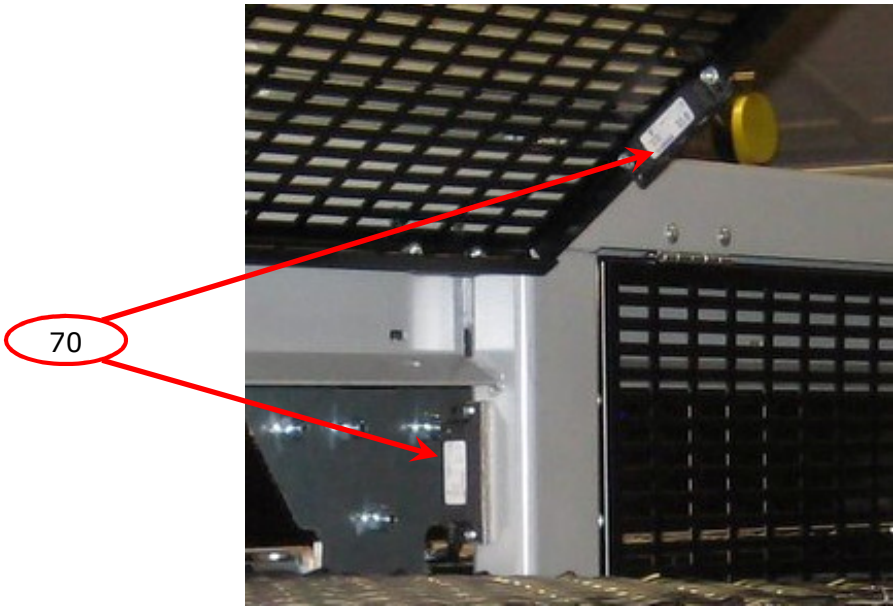
39

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Electrical spareparts (Control cabinet)

Electrical spareparts (Exsternal)

70 MAGNETIC SWITCH



11 Attachments

Attachment 1

Declaration of conformity

Attachment 2

Electrical wiring diagram

1. EC Declaration of Conformity



Manufacturer:	
Company name:	A/S Skals Maskinfabrik
Address:	Hovedgaden 56
	DK-8832 Skals
Telephone:	+45 87256200

Hereby declares that

Machine:	Weighing Platform
Type:	AP50
Type, serial no., year:	

Has been manufactured in conformity with the:

2. Machinery Directive 2006/42/EC
3. Low Voltage Directive (LVD) 2006/95/EC
4. Electromagnetic Compatibility (EMC) Directive 89/336/EEC and the amended 93/68/EEC.

Title:	Production Manager
Name:	Søren Lund Madsen
Company:	A/S Skals Maskinfabrik

Date _____ Signature