



FREDERICK CROWTHER AND SON LTD

CROMAR

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Swarf Management and Coolant Filtration Systems

Operation & Maintenance Manual

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Health and Safety

This manual contains instructions intended for the user's daily work with the equipment.

This manual must always be available to the individual or individuals working with the equipment.

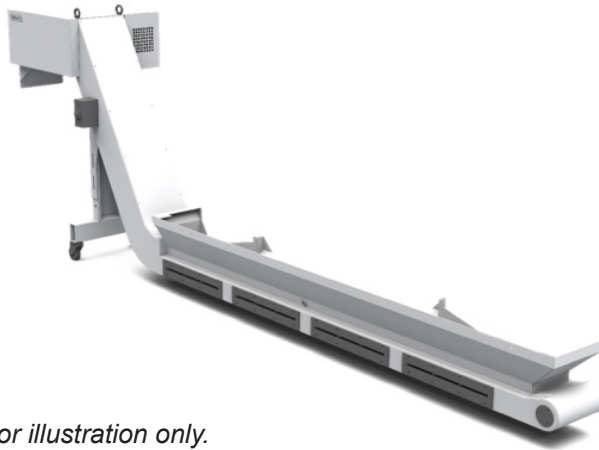
It is important to ensure that:

- The manual and other applicable documents are retained for the entire service life of the equipment
- The manual and other applicable documents are included as part of the equipment
- This manual is passed on to other users of the equipment
- This manual is updated if any supplements or amendments to the equipment take place
- This manual describes the methods applied when using the equipment.

Safety code

- Before you start using the equipment and carrying out maintenance or servicing on this equipment, please read through the applicable parts of the instruction
- Assume all electrical equipment is live
- Assume all hoses and pipelines are pressurised
- When servicing and maintaining the equipment/machine, ensure that the electrical supply is disconnected and the pressure in pipes and hoses is released in a controlled manner
- Servicing and maintenance must be carried out by authorised service and maintenance staff only
- Use only spare parts approved by Frederick Crowther & Son Ltd
- Make sure that the machine is securely mounted and installed in accordance with instructions before starting it
- Use the machine only for the intended use
- In the event of abnormal vibration or noise – stop the machine and consult the manual
- Electrical installation must be carried out by an authorised electrician only
- Tanks must be drained of cutting fluids before any lifting operations are carried out.

6. Combi 500



For illustration only.

6.1 Transportation

General

Swarf conveyors should only be moved by trained personnel, competent in Fork Lift Truck and crane operation.

Do not stand under the moving unit! The illustrations on this page are to be seen as examples. Always use the equipment included for lifting and transport.

6.1.1 With Fork Lift Truck

Transport only on the original wooden pallet supplied. Ensure equipment is secured against falling or slipping.

6.1.2 With Crane

Lift using existing lifting points.

NOTE!

The net weight is displayed on the name plate located on the conveyor hood.

6.1.3 Where applicable, conveyors are fitted with castors to assist with final positioning.

6.2 Installation

Potential Hazards

6.2.1 Conveyor Discharge Area

This area is a designated danger zone, on no account should hands be placed into the discharge aperture. Should it be necessary to access this area, ensure the conveyor is stopped, electrically isolated by a switch adjacent to the motor, or by disconnecting at the plug, and ensure it cannot be accidentally re-started until the cover is re-positioned. Only qualified personnel should access this electrical equipment.

6.2.2 Standing on the conveyor belt is not recommended. For emergency access it is possible to stand on the conveyor, provided the conveyor is stopped, electrically isolated and cannot be accidentally re-started.

6.2.3 Do not allow – bar ends, components, tooling equipment or hand tools to fall into the conveyor. These could cause serious damage to the conveyor belt and casing. If one of the above does fall into the conveyor casing – stop the conveyor and machine, and remove immediately.

6.2.4 Swarf Discharge

Do not operate without a collecting container in position to receive swarf. Do not allow container to overfill so that swarf can be carried back into the conveyor. Where end user conditions are such that hot swarf can be discharged from the conveyor, the operator should be made aware of this hazard.

6.2.5 Return end

For maintenance purposes it is possible to run the conveyor in reverse. In this mode it is a dangerous condition between the conveyor belt and the casing aperture.

6.2.6 Controls

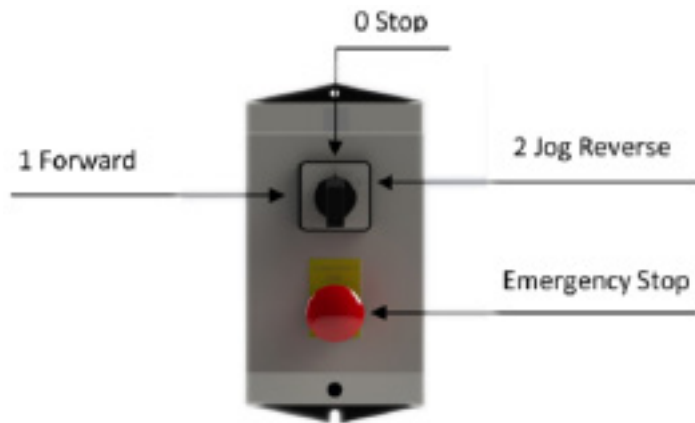
Incorporated in Parent Machine Controls.

The conveyor should always be running, during all cutting operations. If automatically stopped by interlocks etc. for safety reasons the conveyor must be restarted when cutting recommences. It is essential that the conveyor motor can be isolated either using a multi-pin plug and socket or an isolator in the motor supply cable.

6.2.7 Control of the Conveyor

Select 'Forward' 1, to run the conveyor in the 'Operational Mode'.

It is recommended that the conveyor be continuously run throughout a shift period and be allowed to clear all swarf before stopping.

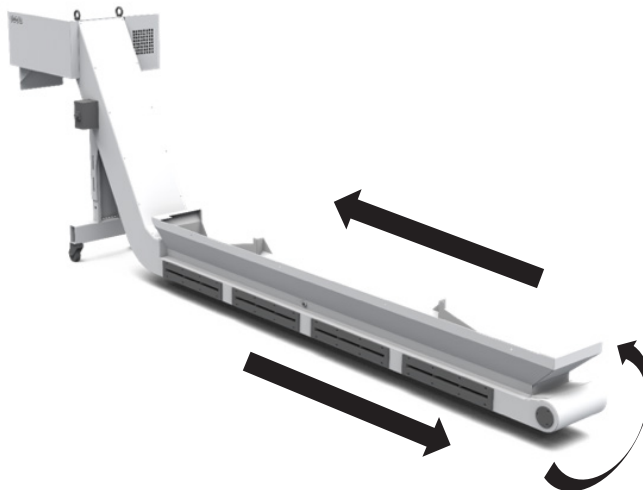


To stop the conveyor, select '0

To reverse the direction of the conveyor, use the Hold to Run, Jog Reverse Control 2, to run the conveyor in the opposite direction. This mode should only be used in the event of jamming or for maintenance purposes.

To re-set the conveyor after an emergency stop. Unlatch the 'Emergency Stop Button'.

6.2.8 Direction of Operational Mode



6.2.9 Operation – Swarf Applications.

Type of swarf – It is recommended that wherever possible swarf be produced in chip form. Bushy or curly swarf is to be avoided as it is difficult to convey and causes blockages in the conveyor. Chip breakers in the tooling or a 'pecking' motion in the CNC program can be employed to prevent this occurring in most applications.

Swarf Handling Capabilities

Combi 500

Material	Steel				Cast Iron		Aluminium		Brass	
Conveyor Type	S	M	L	Bushy	S	M	S	M	S	M
Slat	✓	✓	✓	✓	X	✓	✓	✓	✓	✓

Small chips up to 5mm. Medium chips up to 15mm. Large chips above 15mm.

6.2.10 Conveyors located in coolant tanks do not have a sealed casing but contain drain slots, generally located in case sides, to allow separation of coolant from swarf and re-circulation into the storage tank.

6.2.11 Conveyors used as an integral coolant tank have a leak proof casing to contain the coolant. A drain boss is incorporated to facilitate emptying.

6.2.12 Where coolant pumps are fitted, these are protected by a mesh filter screens or baskets to minimize ingress of solids into the pump impeller.

6.2.13 Any coolant medium is the sole responsibility of the end user and not the conveyor supplier, and all references should be made to the coolant supplier's material safety data sheets.

6.3 Mechanical

The conveyor should be maneuvered into the operating position and fastened to the machine body when appropriate. The screws or castors located at the base of the legs, should be adjusted to support the conveyor, in the operating position.

Where loose swarf chutes are supplied, these should be fitted within the machine to maximise swarf collection onto the conveyor belt.

6.4 Electrical

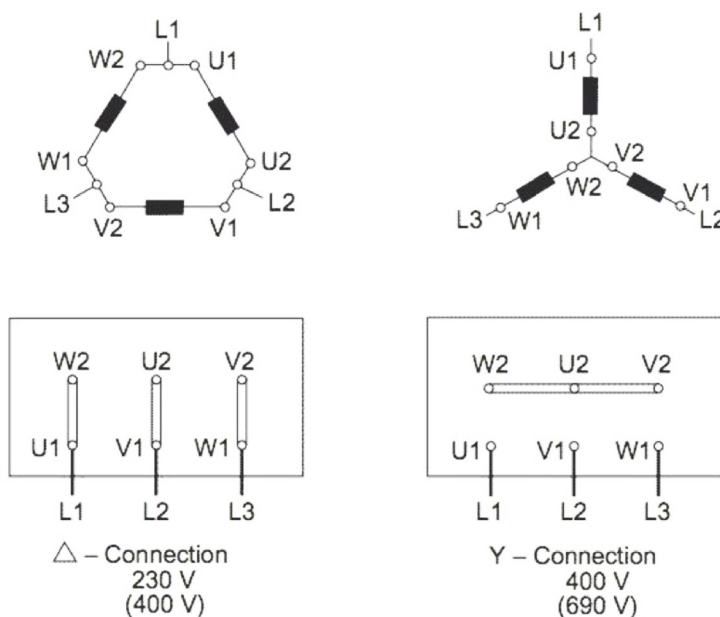
Conveyors Supplied With Controls.

Where controls are fitted, these are normally found mounted on the incline section of the conveyor case and consist of a '3 Position Rotary Selector Switch', incorporating 'Centre off', 'Forward' Run & 'Jog Reverse', functions and also a separate 'Emergency Stop Locking Button' if specified.

Note: Rear exit conveyors only are additionally fitted with start warning buzzer and delayed start-up of conveyor.

The motor is also pre-wired to the control box, in accordance with Fig. 2 and a 4 core flying lead (3 phase and earth), of appropriate length, is attached to the control box for connecting to the machine supply. A plug is fitted to suit specific requirements. Additional wiring may be incorporated to comply with specific requirements. IN ALL INSTANCES refer to the wiring diagram and ensure the conveyor supplied is compatible with the electrical supply required.

Fig 2.



Conveyors Supplied Without Controls.

The conveyor drive motor should be wired from the appropriate parent machine controls, using 4 core wire of a size compatible with the current rating. The 3 phase is connected to terminal U1, V1, and W1 in the motor terminal box in the alternative configurations as indicated above in Fig. 2 and the earth to the earth terminal. The machine controls should include the following basic functions: Forward 'start' and 'stop' controls. 'Hold' to run 'Reverse' control and complete with contactors and overloads, of compatible current rating.

Interlocking with the machine access door stops the conveyor when the door is opened. All wiring should conform to the latest harmonized European standards or IEE regulations.

6.5 Maintenance

A nameplate incorporating model number, order number, serial number, part number and unit weight is attached to the conveyor casing.

Noise level: Not exceeding 60 Dba at 1 M

- 6.5.1** An inspection every 3 months is recommended. Prompt replacement of worn or damaged parts will extend the life of the conveyor.
- 6.5.2** Before proceeding with any maintenance on the swarf conveyor, it is necessary to isolate the source of electrical supply by either disconnecting at the plug and socket, or by separate isolator. Ensure during maintenance, power cannot be accidentally restored.
- 6.5.3** The conveyor belt tension and chain drive tension, are all factory set and should be checked after approximately 200 hours running, and if necessary, re- set in accordance with Section 1.5.11.
- 6.5.4** Any loose or adjustable chutes, within the swarf collecting area, should be fitted and set to close gaps, with the adjacent machine walls and then secured in position.
- 6.5.5** Ensure overload in machine electrical cabinet is rated and set to suit full load current of the conveyor motor.
- 6.5.6** Spare parts. Should there be any doubt, contact Frederick Crowther & Son Ltd., quoting serial number and part number, from the nameplate on the conveyor casing.

6.5.7 We advise maintenance of the filter box every 3 months at 24/7 usage. Additional maintenance may be required when cutting fines.

6.5.8 Gearbox

Each unit is filled with the correct amount and type of oil and should require no further attention

6.5.9 Shaft bearings

Drive shaft take up bearings and return shaft bearings, are sealed for life and should require no further attention.

6.5.10 Belt

The belt slats are lubricated during manufacture and normal cutting oils will maintain adequate lubrication. When dry machining for long periods, the use of a light machine oil is recommended by brush application and should be applied approximately every 200 hours of running time.

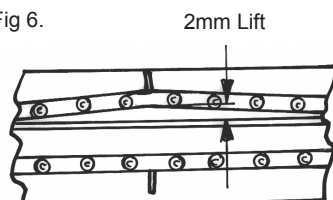
6.5.11 Chain drives

A light lubricant oil, sufficient to penetrate the chain joints, (SAE 20/50), should be applied with a brush or oil can, every 100 running hours. Aerosol lubricants may also be used.

6.5.12 Conveyor Belt

The conveyor belt is correctly tensioned prior to dispatch. After running for approximately 200 hours, recheck the tension. The belt tension is adjusted using the studs attached to the take up bearings, usually located at the drive end. Ensure each side of the belt is adjusted evenly. Correct tension is indicated by 2mm of lift of the belt in the open horizontal section (as per fig. 6)

Fig 6.



6.5.13 Conveyor Belt Removal

Combi 500

The conveyor chains are jointed where indicated in Fig 7. i.e. Three welds on the slat.

To remove from the casing the belt should be split at this chain link.

It is necessary to align this link with the tensioning slot at the drive end (Fig. 8a) or where a loose end cap is fitted at the return end. (Fig. 8b).

Procedure for splitting belt is as follows (see Fig. 9)

1. Remove all tension of belt.
2. Grind welds off retaining washers at the drive side of the conveyor (some special conveyors are fitted with loose washers and split pins).
3. Retract the pins from the non-drive side and remove loose slats.
4. Remove outer link from chain at each side (push fit on hollow bearing pins).
5. Lift chains out of tooth engagement and remove inner links complete with hollow bearing pins towards the centre of the belt. The belt and chains are now split for removal.
6. Replace pins in ends of open links to retain the chain side plates.

Fig. 7

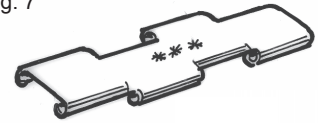


Fig. 8A

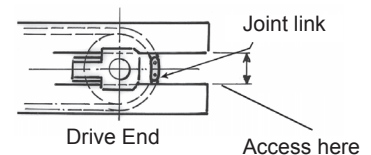


Fig. 8b

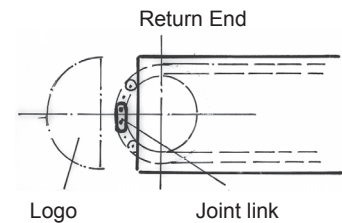
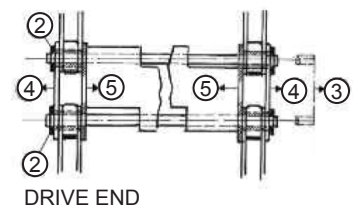
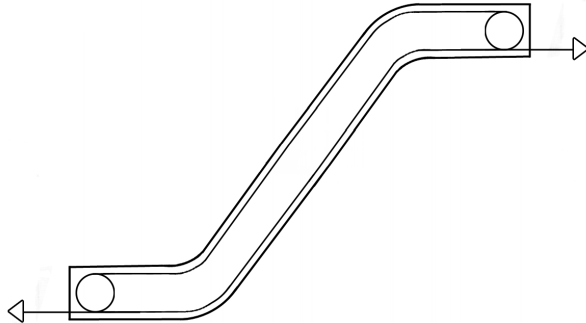


Fig. 9



To remove the belt from the casing. Withdraw the belt, in the direction as indicated in Fig. 10.

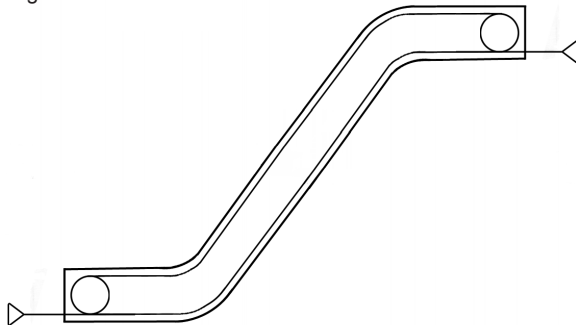
Fig 10.



6.5.14 Conveyor Belt Replacement.

Thread the length of the belt into the underside of the sprocket and into the case on the guide bars, as shown in Fig 11.

Fig 11.



Re-direct over the sprockets at the other end and onto the guide bars and push the belt back to the start point.

Re-join. Reverse the instructions in 1.5.12 and re-tension the belt in accordance with 1.5.11.

6.5.15 Conveyor Belt Removal - if Belt is Jammed.

In the event of a conveyor belt being jammed and access is not possible to the jointing link, it is necessary to split at one of the access points, by removing the pins as in 1.5.12, pins 2 and 3 and cut through the chain links at both sides of the belt.

To re-join the chains, two new connecting links will be required and are obtainable from Frederick Crowther & Son Ltd.

Proceed then as 1.5.13.

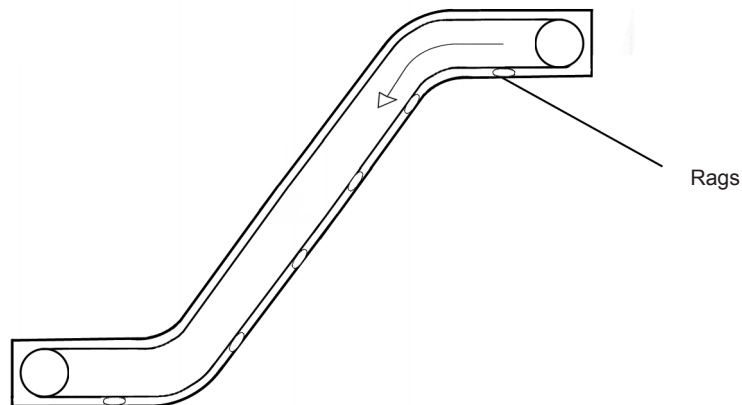
6.5.16 Conveyor Cleaning

To prolong the life of the conveyor belt and casing, where there is a coolant presence, and excessive coolant contamination, it is essential to clean out the conveyor case at regular intervals, to prevent swarf build up, which will eventually clog up the casing. It is essential when cleaning conveyors or handling swarf, that suitable gloves are worn at all times.

To clean the conveyor, the conveyor should be stopped and isolated. Rags should be compacted into the gap between the conveyor case and the belt, below the discharge, where the belt re-enters the case. See Fig. 14

Start the conveyor in the forward run direction thus allowing the conveyor cross flights to push the rags into the casing. Run until the rags and accumulated swarf, are ejected at the discharge.

Fig 14.



6.5.17 Combi Brush replacement

Brushes may wear out as a result of prolonged/high-intense usage. In this case, brushes will need to be replaced.

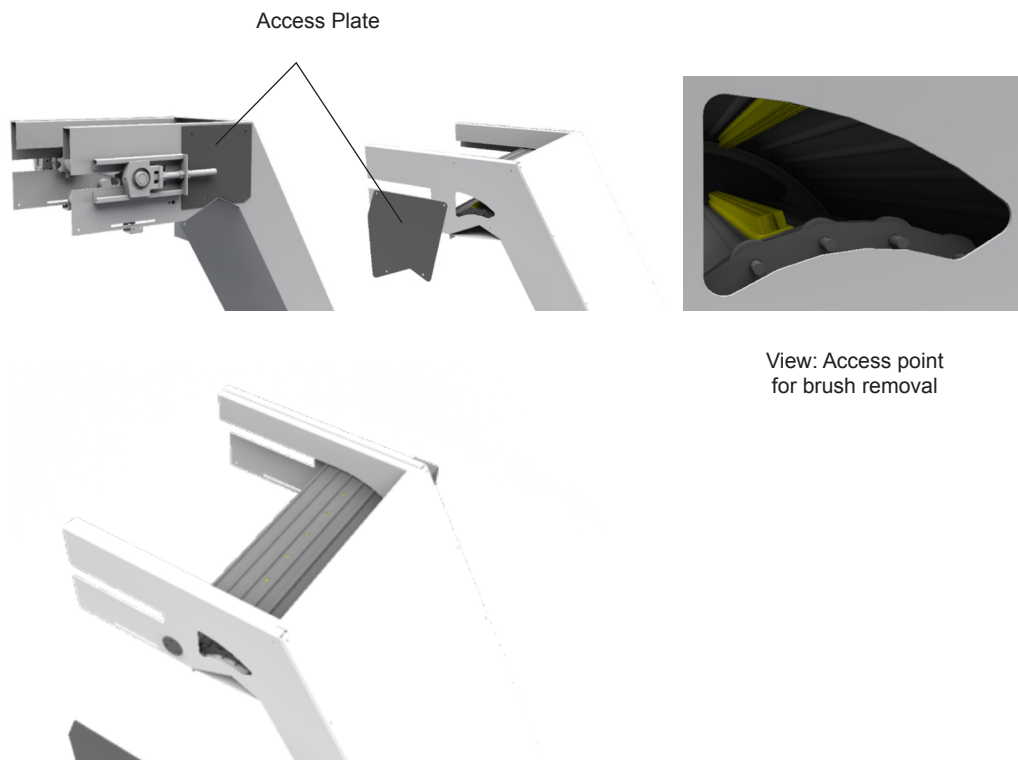
First, removal of the hood is required. For brush replacement there are two access points, LH & RH of the conveyor top section. The belt will need to be joggled forward until the brush is within the access point.

Removal of the access plate now allows access to the brushes. After brush screws are removed from on top of the belt, the brush can be extracted.

WARNING!

Keep clear of moving parts when joggling the belt forward.

DO NOT insert hands into access points when power is on. Before any maintenance, please read safety sections.

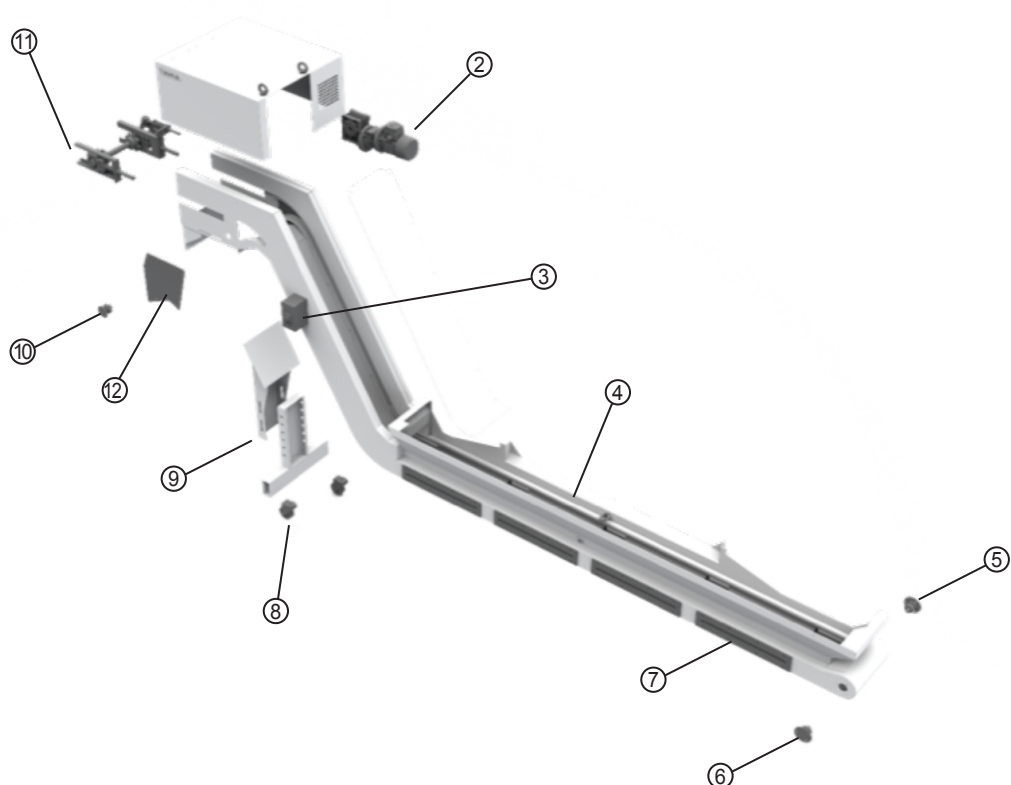


Removal of screws will release the brush. This can now be removed and replaced with a new brush.

NOTE!

During this operation, the brush can fall into the incline section causing the conveyor to jam. Make sure the brush is held when loosening screws.

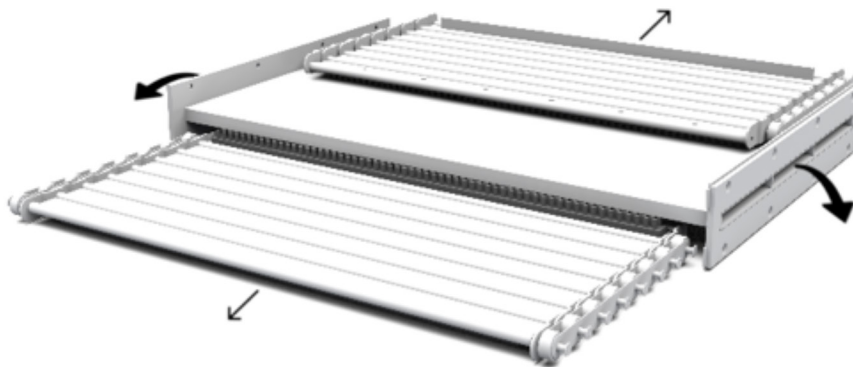
Combi 500 Type - Side Drive



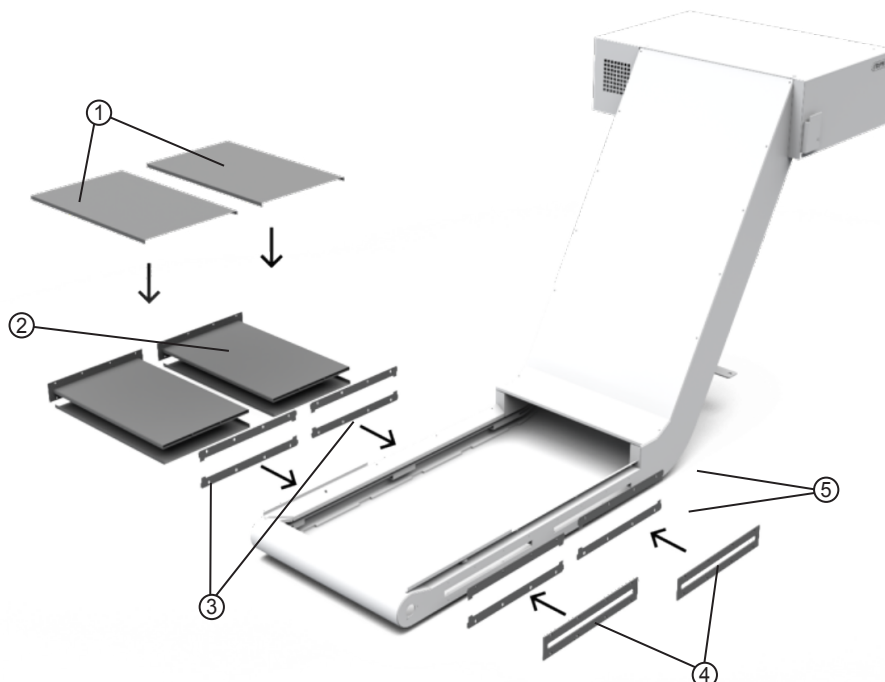
Item Number	Description
1	HOOD
2	MOTOR
3	SWITCH
4	CASE
5	RETURN END ASSEMBLY
6	RETURN END ASSEMBLY
7	FILTER BOX
8	CASTOR
9	CONVEYOR LEG
10	UPPER SECTION ASSEMBLY
11	DRIVE ASSEMBLY
12	ACCESS PLATE

6.5.18 Filter box

The combi 500 separates impurities in the coolant up to 500 microns. This is achieved with the filter box system. As coolant flows through the filter box media, swarf collects on the filter surface. The swarf is removed by passing bristles from the brush attached to the belt.



The filter box can be removed for maintenance. Fine swarf can build up over time resulting in reduced flow. Filter box components shown below.



6.5.18.1 Filter box removal and Cleaning

This may require complete or partially removal of the conveyor, from the tank. Ensure the filter box is accessible on both sides of the conveyor.

NOTE!

Ensure the filter media is handled with care. Damage to the filter box will compromise the level of filtration.

WARNING!

Before any maintenance, please read safety sections.

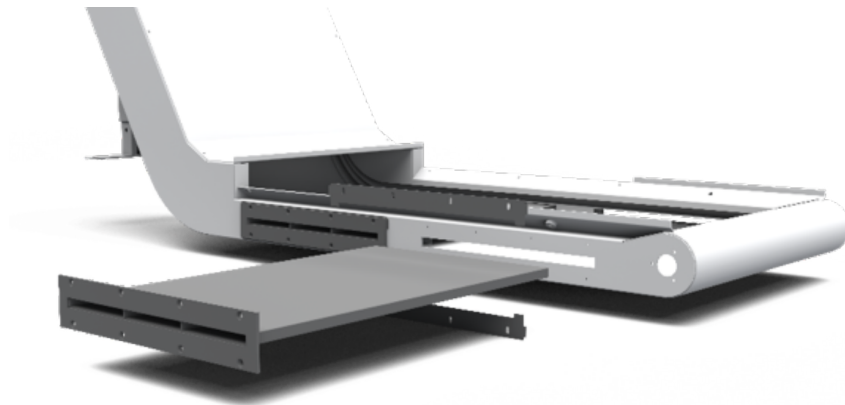
Step 1

Remove the screws to release the Clamp Plate and Filter Box Clamping Plates.



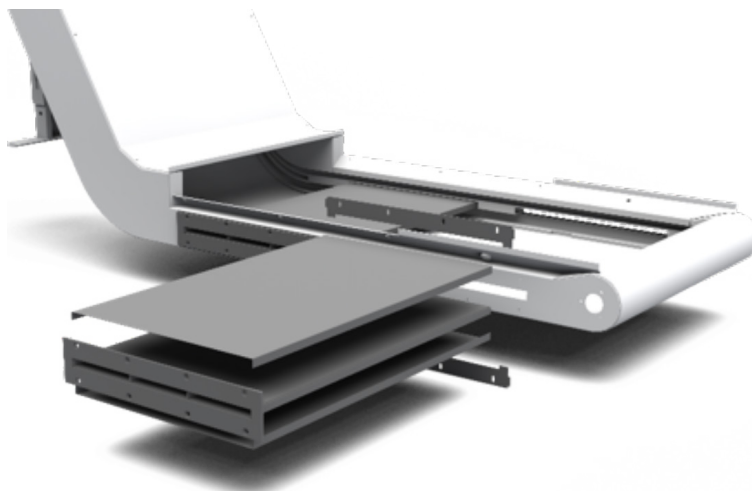
Step 2

Remove screws to eject the Filter Box. This will also release the clamp Plates.



Step 3

Only if required, Filter Mesh can be removed for cleaning by removing screws either side of the filter box.



Step 4

Inspect the internals of the filter box, ensure the outlets are clear.

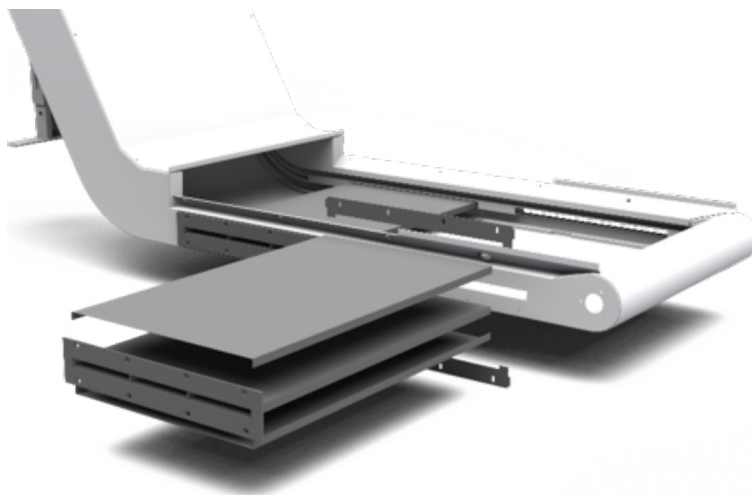


6.5.18.2 Filter Box Assembly

Assembly/inserting the filter box into the conveyor. Please ensure conveyor belt brushes do not obstruct the filter box. Brushes can make re-inserting the filter box difficult if they impede access. Joggle the belt forward until brushes are clear of the outlet.

Step 1

Re assemble the filter box mesh with screws.



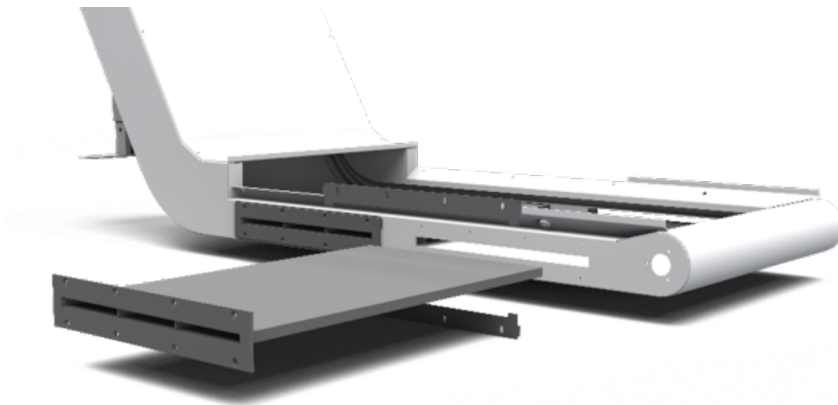
Step 2

Insert the filter box into the conveyor case with the clamping plates in place.

NOTE!

One side of the conveyor case has a smaller outlet.

Insert the filter box into the smaller outlet. Once inserted, fix in place with screws.



Step 3

Once the filter box is fully inserted into the conveyor case, loosely fix the clamping plates and flange into place with screws.



Step 4

Next, squeeze the filter box with the clamping plates. Use the tabs provided as contact points to apply force with a hammer and screwdriver.



6.6 Trouble Shooting

WARNING!

Conveyor to be shut down and electrically isolated prior to any corrective actions.

Electrical maintenance and repairs to be carried out by suitably qualified electrical personnel only.

Problem	Symptoms	Action
6.6.1 Conveyor does not start.	Loose wire. Overload trip. Conveyor jammed. Isolator switch to 'off'.	Check all wiring contacts. Reset overload. Clear congestion. Turn switch to 'on' position.
6.6.2 Conveyor motor starts, belt does not run.	Conveyor jammed.	Clear congestion.
6.6.3 Conveyor intermittently jams or slips.	Belt overload – excessive swarf buildup, or solid foreign body between belt and case.	Clear congested area.
6.6.4 Motor overheats.	Conveyor jammed or overloaded. Overload setting. Motor with a phase out.	Clean congested area. (Reversing the conveyor may clear the jamming). Check setting of overload to suit motor current rating. Check wiring for loose connection.