

Metso

Lokotrack ST3.8

Instruction Manual

S/N 183101

General Documents

1

Instructions

Incl. General safety instructions

2

Diesel Engine

3

Commercial Components

4



GLOBAL PRODUCT SUPPORT CENTERS

Metso Finland Oy (Finland, Tampere)

Metso Finland Oy
Lokomonkatu 3
FI-33900 Tampere, FINLAND
Tel +358 20 48 4142

Metso France SAS (France, Mâcon)

Metso France SAS
41, rue de la République, CS 61609
71009 Mâcon, FRANCE
Tel +33 (0)3 85 39 62 00

Metso Outotec India Private Limited (India, Alwar)

Metso Outotec India Private Limited
Metso Park (Production unit)
SP1-1 to SP1-13, South East Zone, MIA
Alwar (Rajasthan) - 301030, INDIA
Tel +91 144 5167500 / 2887500

TECHNICAL SUPPORT CENTERS BY THE REGION

Metso USA Inc. (USA, Waukesha)

Metso USA Inc.
275 N Corporate Dr
Brookfield, WI 53045
Wisconsin, USA
Tel +1 262 717 2500

Metso Brasil Indústria e Comércio Ltda. (Brazil, Sorocaba)

Metso Brasil Indústria e Comércio Ltda.
Av. Independência, 2500 - Iporanga
18087-101 Sorocaba
Sao Paulo, BRAZIL
Tel +55 15 2102 1300 (Portaria) +55 15 2102 1700 (Vendas)

Metso International Trade (Tianjin) Co., Ltd Beijing Branch (China, Beijing)

Metso International Trade (Tianjin) Co., Ltd Beijing Branch
Level 11, China Youth Plaza
19 North Road, East 3rd Ring Road, Chaoyang District, 100020 Beijing
100022 Beijing, CHINA
Tel +86 10 6566 6600

For other technical support locations visit <https://www.metso.com/contact>

For other information: Minerals.Info.CSR@metso.com

DECLARATION OF THE MANUFACTURER

Metso Finland Oy
Lokomonkatu 3
FI-33900 TAMPERE
FINLAND

herewith declares that

Mobile Screen
Lokotrack ST 3.8
S/N 183101

is designed and manufactured by Metso. This product follows the provisions of the EU's Machinery Directive (Directive 2006/42/EC), as amended, and with national implementing legislation;

and furthermore declares that the following (parts/clauses of) harmonized standards have been applied:

EN ISO 12100: 2010
EN ISO 13857: 2019
EN ISO 13854: 2019
EN ISO 4413: 2010
EN ISO 13850: 2015
EN ISO 13732-1: 2008
EN 614-1: 2006 + A1: 2009
EN ISO 14123-1: 2015
EN ISO 14118: 2018
EN 60204-1: 2018
EN ISO 14120: 2015
EN 1005-2: 2003 + A1: 2008
EN ISO 2867: 2011

Tampere, Finland 2025-02-04



Marko Salonen
Product Manager

The person authorised to compile the technical file

www.metso.com

CERTIFICATE OF QUALITY AND QUANTITY & CERTIFICATE OF CONFORMITY

Metso Finland Oy
Lokomonkatu 3
FI-33900 TAMPERE
FINLAND

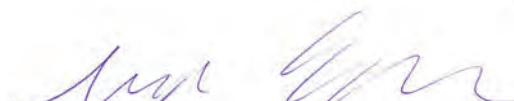
Hereby declares that the following equipment
Mobile Screen
Lokotrack ST 3.8
S/N 183101

is manufactured and/or inspected by Metso in accordance with the quality assurance system meeting the requirements set by international standard ISO 9001: 2015. All subcontracted components included have been manufactured by well-proven and reliable suppliers and tested according to their own test procedures.

We also declare that the equipment mentioned above have met the company's quality requirements in each stage of their production process.

Further, we declare that the equipment delivered is in accordance with the corresponding packing list.

Tampere 2025-02-04


Aapo Riponiemi

Factory test run in Metso Finland Oy

This document is only valid for products manufactured in Tampere, Finland.

The machine has been test-run – i.e., its operation has been checked and adjusted to meet the requirements of the product specifications.

During the test run, diesel fuel was used. This fuel may have in many countries a low-duty/tax or even duty/tax-free status and which may be categorised as red fuel in your country. There is this fuel left in the fuel tank and it may be subject to restrictions for use in certain countries.

WARRANTY CERTIFICATE FOR LOKOTRACK ST3.8 S/N 183101

Enclosed are the following documents that are necessary in order to activate the warranty of the above mentioned equipment:

- Commissioning and Warranty Registration (CWR)
- CWR Policy for New Equipment
- Standard Limited Warranty Conditions

Please complete the CWR document and follow the instructions outlined in the CWR Internal Policy for New Equipment.

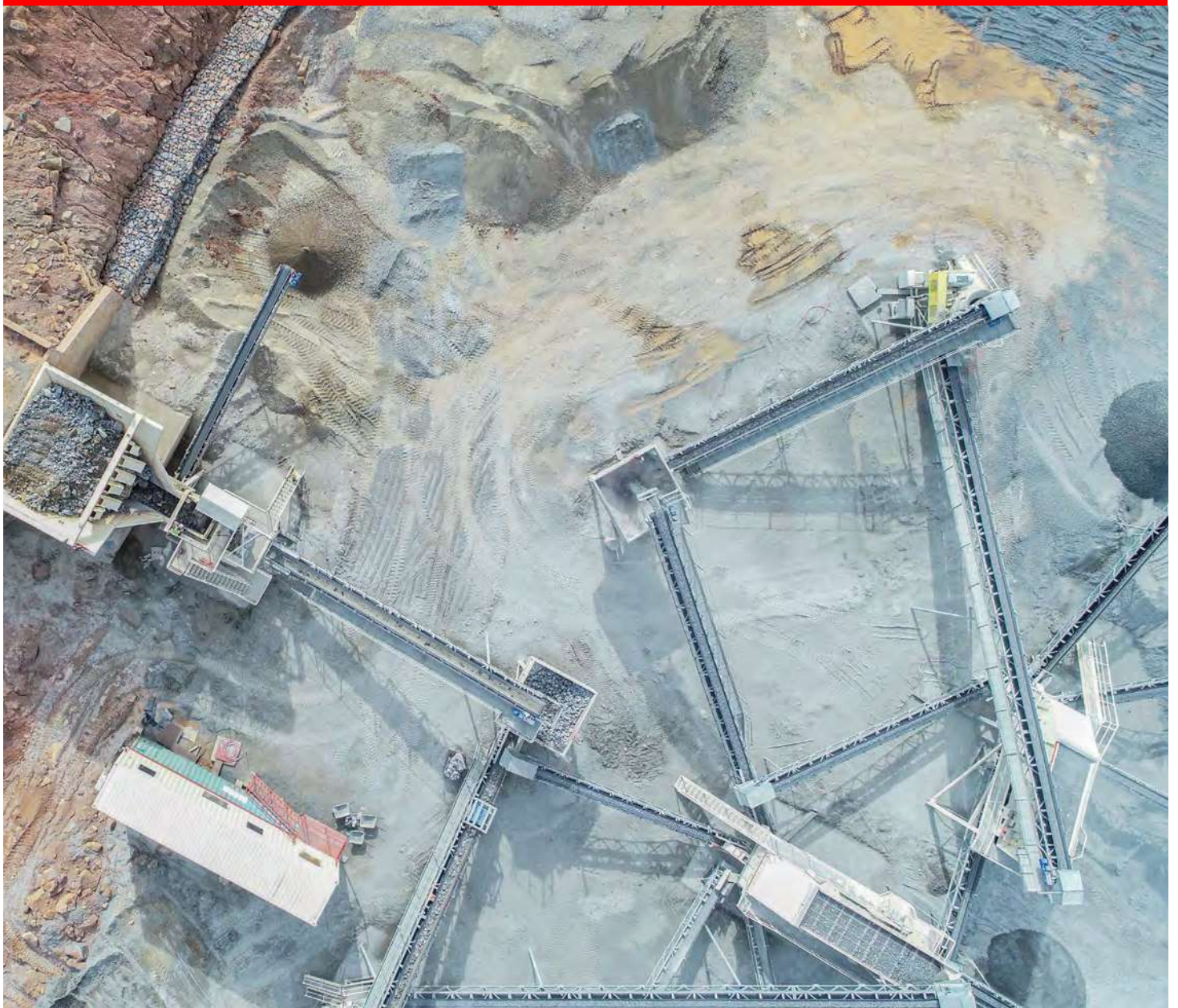
Metso

Commissioning & Warranty Registration (CWR)

Doc No. D100026783 Revision 0

Original instructions

INSTRUCTION MANUAL



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Metso

Address: PO Box 1220
FI-00101, Helsinki, Finland

Telephone: +358 20 484 100

Internet: www.metso.com

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1 Introduction

The purpose of this manual is to instruct the user in filling out the commissioning and warranty registration form and making sure the unit works properly.

In case electrical registration is not available, send a scanned copy of the CWR form to metso.cwr@mogroup.com.



NOTE: This manual does not replace the instruction manual of the machine. Read the instruction manual before operating the machine.

Project ID:	Plant Code:	Plant Unit Code:	Document Type:	Running No:	Revision: 0	Metso Document ID: D100026783
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2

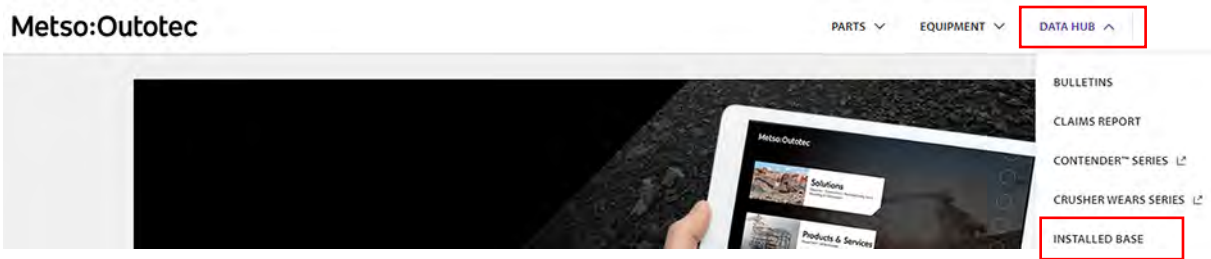
Retrieving PIN

Before you can access the CWR form, you need to retrieve the PIN code associated with the machine.
See [Retrieving the PIN from my.metso.com \(for distributors\)](#) or [Retrieving the PIN from Salesforce \(for internal users\)](#).

2.1

Retrieving the PIN from my.metso.com (for distributors)

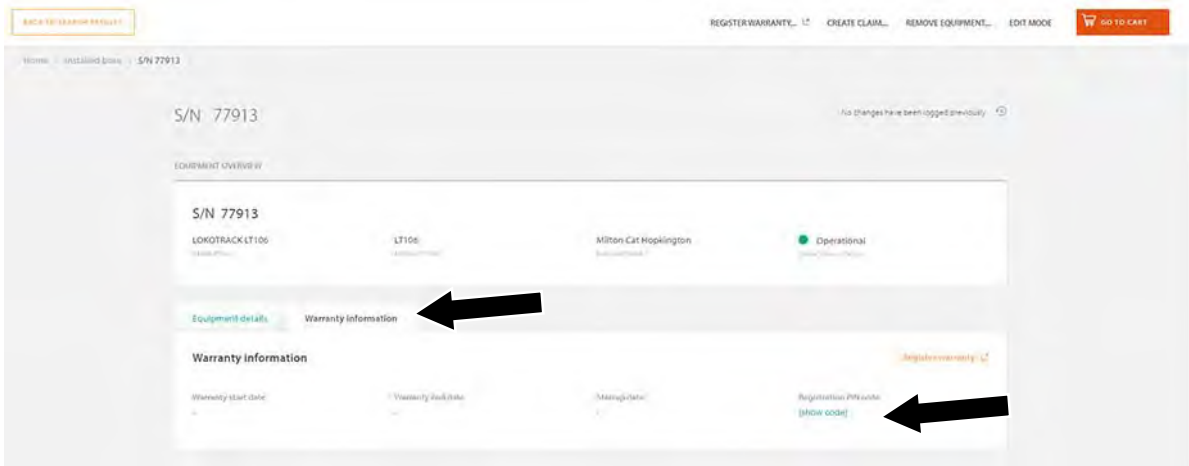
1.
- In my.metso.com, click the **Data Hub** menu.
2.
- Click **Installed Base**.



3.
- Enter the machine serial number in the **Serial number** field.
4.
- Click **Search equipment**.

A screenshot of the Metso:Outotec search results page. The 'SEARCH CRITERIA' section shows a search for '120026' in the 'Serial number' field. The 'Search results' section shows 1 - 20 of 191 equipment. The first result is 'BRITADOR HP200 - S/N 129626' with a green status icon. The table has columns for 'CLS', 'SERIAL NO', 'DESCRIPTION', 'PRODUCT TYPE', and 'END CUSTOMER'.

5.
- To select the correct machine from the search results, click the serial number.
The **Equipment overview** page is displayed.



6. On the **Equipment overview** page, in the **Warranty information** tab, click **Show code**.
The PIN code is displayed.



*NOTE: You can proceed to the Commissioning and Warranty Registration from this view by clicking **Register Warranty**. See chapter [Logging in](#) for more instructions*

2.2 Retrieving the PIN from Salesforce (for internal users)

1. In Salesforce, click the **Equipment** tab.
2. Enter the serial number of the unit in the search bar.
3. Press **Enter**.
4. In the search results, find the **Equipment** section.
5. Select the correct unit.
The equipment information is displayed: see the following figure.

Equipment

83458913

+ Remove

Edit

Account

Serial Number

79987

Change Indicator

Up-to-da...

Related

Details

Equipment Number ⓘ

83458913

Description

LOKOTRACK

Warranty Start Date

1.8.2018

Manufacturer

Metso

Start-up Date

1.8.2018

Commission Year ⓘ

2018

Parent Equipment

Serial Number

79987

Account

Warranty End Date

1.8.2019

Product Type

LOKOTRACK LT106

Product Line

Lokotrack

Product Group

CS_PO_LOKO_LT

EPF Plan Valid to Date

Operational Status Description

Ownership Status

End Customer

PIN

Equipment Category

Metso Minerals Equipment

6. You can find the PIN code in the equipment information.



NOTE: The PIN will be entered without the comma.

3 Logging in

There are three ways to access the CWR form:

- By reading the QR code (note that the QR code only applies to Metso LT and ST machinery) on the control center of the machine, see [Logging in by using the QR code](#).
- By going directly to <https://id.metso.com>, see [Logging in by using Direct access](#).
- Distributor users can access the CWR form through my.metso.com, see [Logging in through my.metso.com](#).

3.1 Logging in by using the QR code

1. Read the QR code located on the control center of the machine: see the following figure.



Figure 1. QR code location

2. Enter the PIN you have retrieved from Salesforce or my.metso.com.

3.2 Logging in by using Direct access

1. Go to <https://id.metso.com>.



NOTE: <https://id.metso.com> does not support Internet Explorer.

2. Enter the serial number.

- 3. Enter the material type (machine model, for example LT106).
- 4. Click **Confirm**.
- 5. Enter the PIN you have retrieved from Salesforce or my.metso.com.





[Scan the QR code](#)

or

CONFIRM



Figure 2. Log in view (note that the QR code only applies to Metso LT and ST machinery)



Serial number

76240

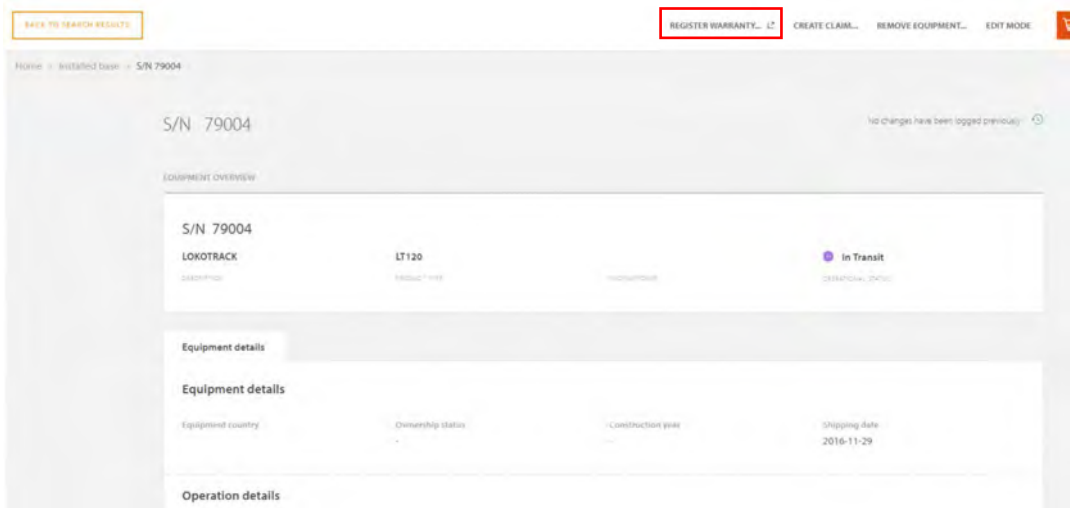
Enter PIN code



Figure 3. Enter PIN

3.3 Logging in through my.metso.com

1. On the **Equipment overview** page, click **Register warranty**: see the following picture.



The login view opens.

2. Enter the PIN you have retrieved from my.metso.com.

4

Filling the commissioning and warranty registration form



NOTE:

The warranty registration with the diesel engine manufacturer must be done before commissioning of the unit.



NOTE: *An incomplete commissioning form cannot be saved.*

1. After logging in, click **CWR & Commissioning**.
2. Fill in the applicable fields.



NOTE: *For some fields, answers are required. The required fields are marked with an asterisk (*).*

3. After each section, click **Next**.



NOTE: *If you want to return to a previous section of the form, click Previous.*

4. After you have filled in all the sections, click **Register warranty**.

Metso

Metso

PO Box 1220, FI-00101, Helsinki, Finland
Tel +358 20 484 100
www.metso.com

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Metso warranty starts on the day of this commissioning and warranty registration has taken place

CUSTOMER INFORMATION

Customer company name: _____ Phone: _____

Customer representative: _____ E-mail: _____

Address: _____

City / State / Zip: _____

METSO SALES UNIT / DISTRIBUTOR INFORMATION

Metso Sales Unit or distributor: _____

Representative: _____ Phone: _____

MAIN INFORMATION

Date of appointment: ____/____/____

Application: ☐ Manufactured sand ☐ Hard rock ☐ Sand & Gravel ☐ Soft rock (Cement)

☐ Recycled Aggregate ☐ Other (specify): _____

Estimated feed size ____mm / ____ inch

Screen stroke ____mm / ____in

Amb. temperature ____°C ____°F

Loading unit _____

Discharge unit _____

TRAINING INFORMATION (if no, please specify)		YES	NO
Instruction manuals available and received		☐	☐
Safety features presented and reviewed		☐	☐
Operating with unit		☐	☐
Maintenance training		☐	☐
Maintenance points and intervals		☐	☐
Metrics introduction and opportunities demo		☐	☐
Names of the qualified users:			
a)	b)		
c)	d)		

Metso warranty starts on the day of this commissioning and warranty registration has taken place

Before engine start (if NO, please specify)	Yes	No
Engine registration done *)	☐	☐
Hydraulic leakages (from fittings, hoses, tank, etc.) (if YES, please specify)	☐	☐
Check oil and liquid levels (engine, gearboxes, feeder, tank etc.)	☐	☐
V-belt tension checked (engine & crusher)	☐	☐
Check and adjust scrapers	☐	☐
Screen cloth tightening on screen unit	☐	☐
Shipping bracket removed	☐	☐
Add grease to screen unit main shaft	☐	☐
Pins are on operation position	☐	☐

*) www.cat.com (→ Engine warranty registration)

After engine start (if NO, please specify)	Yes	No
Process functioning	☐	☐
IC operation Ok?	☐	☐
Check tracking of conveyor belts	☐	☐
Check that safety functions are working (emergency stops, safety trip wires, etc.) and all safety equipment is installed (safety guards, covers, etc.)	☐	☐
Rotation direction check (belts, feeder, screen, crusher)	☐	☐
Screen cloth tightening on screen unit	☐	☐
Check max oil pressure and tank line	☐	☐
Check screen unit stroke	☐	☐

After material feed (if NO, please specify)	Yes	No
Process running	☐	☐
Check tracking of conveyor belts	☐	☐
Excessive material leakages (if YES, please specify)	☐	☐
Site photos available	☐	☐

Other inspections (skip question if option not available on machine) (if NO, please specify)	Yes	No
Foldable main conveyor operation	☐	☐
Screen unit operation	☐	☐
Side conveyor operation	☐	☐
Radio control operation	☐	☐

Other inspections (skip question if option not available on machine) (if NO, please specify)	Yes	No
Level detector operation	☐	☐
Hydraulic hammer operation	☐	☐
Hydraulic power take-off operation	☐	☐
Check functions of jaw adjust	☐	☐
Radio control operation	☐	☐

	Yes	No
How likely would you recommend Metso to a friend or a colleague from 1-10, (1 = would not recommend, 10 = would recommend)		
What suggestions, if any, do you have for improving our future deliveries? If the answer is YES, please write down in the notes.	☐	☐
Do you want Metso to contact you for additional services? (spare parts, equipment protection services...)	☐	☐

[illegible]

CUSTOMER:	METSO DISTRIBUTOR:	METSO SERVICE:
DATE:	DATE:	DATE:



METSO AGGREGATES EQUIPMENT, COMMISSIONING AND WARRANTY REGISTRATION (CWR) POLICY FOR NEW EQUIPMENT

The warranty is only valid after commissioning and warranty registration has been completed

1. POLICY. All new aggregates equipment must be commissioned in accordance to the guidelines provided in the equipment's CWR form. An electronic form must be followed and filled in during commissioning. Instructions for filling in the form will be provided with customer documentation.

2. WARRANTY ACTIVATION. The warranty for new equipment will begin immediately after the date of execution of the CWR form. The executed CWR form is the validation for equipment's warranty, and its conditions are as stated in "Standard Limited Warranty Conditions for Aggregates Equipment, Components, Parts and Services".

3. WARRANTY REGISTRATION. The executed CWR form must be registered electronically during the start-up and commissioning of the equipment. Electronic registration is to be done online using warranty registration functionality. Instructions for registering the warranty of the equipment are available in "Commissioning & Warranty Registration (CWR) Instruction Manual".

The electronic warranty registration must be done in English, and all relevant observations should be documented. In case electrical registration is not available, please send a scanned copy of the CWR form to metso.cwr@metso.com.

In case of any issues during the registration process, contact Metso warranty person immediately.

Effective with sales to the first user on or after March 1, 2019

CATERPILLAR LIMITED WARRANTY

New and Remanufactured 3000 Family, C0.5 through C4.4, and ACERT™ Engines Worldwide

Caterpillar Inc. or any of its subsidiaries ("Caterpillar") warrants new and remanufactured 3000 Family, C0.5 through C4.4, and ACERT industrial engines sold by it, to be free from defects in material and workmanship. ACERT industrial engines refer to the C6.6, C7, C7.1, C9, C9.3, C11, C13, C15, C18, C27, and C32 engine models.

This warranty does not apply to engines sold for use in marine, petroleum, electric power generation and on-highway vehicle applications, engines in machines manufactured by Caterpillar, or Cat® batteries. These products are covered by other Caterpillar warranties.

This warranty is subject to the following:

Warranty Period

The standard warranty period for new and remanufactured 3003, 3011, 3013, 3014, 3024, C0.5, C0.7, C1.1, C1.5, C1.6, C1.7, and C2.2 engines used in mobile agricultural, industrial and locomotive applications is 24 months or 2000 hours, whichever occurs first (with the first 12 months at unlimited hours) after the date of delivery to the first user.

The standard warranty period for new and remanufactured 3034, 3044, 3054, 3056, C2.8, C3.4, C3.6, C4.4, C6.6 and C7.1 engines used in mobile agricultural, industrial, and locomotive applications is 24 months or 3000 hours, whichever occurs first (with the first 12 months at unlimited hours) after the date of delivery to the first user.

For new and remanufactured 3034, 3044, 3054, 3056, C0.5, C0.7, C1.1, C1.5, C1.6, C1.7, C2.2, C2.8, C3.4, C3.6, C4.4, C6.6 and C7.1 engines:

- **Low Usage:** In cases where the engine use does not exceed 500 hours per year, the warranty period is extended for one additional year or until the engine use reaches a total of 1500 hours in the 3rd year of warranty, whichever occurs first, after the date of delivery to the first user.

The standard warranty period for new and remanufactured C7, C9, C9.3, C11, C13, C15, C18, C27, and C32 engines (i) for use in mobile agricultural applications, 24 months after the date of delivery to the first user and (ii) for industrial, and locomotive applications 24 months or 3000 hours, whichever occurs first (with the first 12 months at unlimited hours), after the date of delivery to the first user.

The standard warranty period for rotating electrics (i) used on new and remanufactured 3000 Family, C0.5 through C4.4, C6.6 and C7.1 engines is 12 months from the date of engine delivery to the first user, and (ii) used on new and remanufactured C7, C9, C9.3, C11, C13, C15, C18, C27, C32 engines is 24 months or 3000 hours, whichever occurs first (with the first 12 months at unlimited hours) after the date of engine delivery to the first user.

For all other applications the warranty period is 12 months after date of delivery to the first user.

Extended Warranty

For all new and remanufactured 3000 Family, C0.5 through C4.4, and ACERT engines:

- **Major Components:** A major components extended warranty applies solely to the following components: cylinder block casting, cylinder head casting, crankshaft (excluding bearings), camshaft, and connecting rods. These parts are warranted against defects in material and workmanship for 36 months after the date of delivery to the first user. This warranty runs concurrently with the standard warranty period.

Caterpillar Responsibilities

If a defect in material or workmanship is found during the standard warranty period or the extended warranty period, as applicable, Caterpillar will, during normal working hours and at a place of business of a Cat dealer or other source approved by Caterpillar:

- Provide (at Caterpillar's choice) new, remanufactured, or Caterpillar approved repaired parts or assembled components needed to correct the defect.

Note: New, remanufactured, or Caterpillar approved repaired parts or assembled components provided under the terms of this warranty are warranted for the remainder of the warranty period applicable to the product in which installed as if such parts were original components of that product. Items replaced under this warranty become the property of Caterpillar.

- Replace lubricating oil, filters, coolant, and other service items made unusable by the defect.

Provide reasonable and customary labor needed to correct the defect.

For new and remanufactured 3003, 3011, 3013, 3014, 3024, C0.5, C0.7, C1.1, C1.5, C1.6, C1.7, and C2.2 engines:

- A maximum of 10 hours of labor to disconnect and reconnect the product to its attached equipment, mounting, and support system

For new and remanufactured 3034, 3044, 3054, 3056, C2.8, C3.4, C3.6 C4.4, C6.6 and C7.1 engines:

- A maximum of 15 hours of labor to disconnect and reconnect the product to its attached equipment, mounting, and support system

For new and remanufactured 3000 Family and C0.5 through C7.1 engines:

- Provide travel labor, up to four hours round trip, if in the opinion of Caterpillar, the product cannot reasonably be transported to a place of business of a Cat dealer or other source approved by Caterpillar (travel labor in excess of four hours round trip, and any meals, mileage, lodging, etc. is the user's responsibility).

For new and remanufactured C9, C9.3, C11, C13, C15, C18, C27, and C32 engines:

- Provide reasonable travel expenses for authorized mechanics, including meals, mileage, and lodging when Caterpillar elects to make the repair on-site.

User Responsibilities

The user is responsible for:

- Providing proof of the delivery date to the first user.
- Labor costs, except as stated under "Caterpillar Responsibilities."
- Travel expenses not covered under "Caterpillar Responsibilities."
- All costs associated with transporting the product to and from the place of business of a Cat dealer or other source approved by Caterpillar.
- Premium or overtime labor costs.
- Parts shipping charges in excess of those that are usual and customary.
- Local taxes, if applicable.
- Costs to investigate complaints, unless the problem is caused by a defect in Caterpillar material or workmanship.
- Giving timely notice of a warrantable failure and promptly making the product available for repair.
- Performing all required maintenance (including use of proper fuel, oil, lubricants, and coolant) and items replaced due to normal wear and tear.
- Allowing Caterpillar access to all electronically stored data.

Limitations

Caterpillar is not responsible for:

- Failures resulting from any use or installation that Caterpillar judges improper.
- Failures resulting from attachments, accessory items, and parts not sold or approved by Caterpillar.
- Failures resulting from abuse, neglect, and/or improper repair.
- Failures resulting from user's delay in making the product available after being notified of a potential product problem.
- Failures resulting from unauthorized repair or adjustment, and unauthorized fuel-setting changes.
- Damage to parts, fixtures, housings, attachments, and accessory items, which are not part of the engine.

(Continued on reverse side...)

This warranty covers every major component of the products. Claims under this warranty should be limited to a place of business of a Cat dealer or other source approved by Caterpillar. For further information concerning either the location to submit claims or Caterpillar as the issuer of this warranty, write Caterpillar Inc., 100 N.E. Adams St., Peoria, IL USA 61629, telephone 1 (309) 675-1000, or go to URL, www.cat.com, Find Your Dealer.

Caterpillar's obligations under this Limited Warranty are subject to, and shall not apply in contravention of, the laws, rules, regulations, directives, ordinances, orders, or statutes of the United States, or of any other applicable jurisdiction, without recourse or liability with respect to Caterpillar.

A) For products operating outside of Australia, Fiji, Nauru, New Caledonia, New Zealand, Papua New Guinea, the Solomon Islands, and Tahiti, the following is applicable:

NEITHER THE FOREGOING EXPRESS WARRANTY NOR ANY OTHER WARRANTY BY CATERPILLAR, EXPRESS OR IMPLIED, IS APPLICABLE TO ANY ITEM CATERPILLAR SELLS THAT IS WARRANTED DIRECTLY TO THE USER BY ITS MANUFACTURER.

THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. REMEDIES UNDER THIS WARRANTY ARE LIMITED TO THE PROVISION OF MATERIAL AND SERVICES, AS SPECIFIED HEREIN.

CATERPILLAR IS NOT RESPONSIBLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

CATERPILLAR EXCLUDES ALL LIABILITY FOR OR ARISING FROM ANY NEGLIGENCE ON ITS PART OR ON THE PART OF ANY OF ITS EMPLOYEES, AGENTS, OR REPRESENTATIVES IN RESPECT OF THE MANUFACTURE OR SUPPLY OF GOODS OR THE PROVISION OF SERVICES RELATING TO THE GOODS.

IF OTHERWISE APPLICABLE, THE VIENNA CONVENTION ON CONTRACTS FOR THE INTERNATIONAL SALE OF GOODS IS EXCLUDED IN ITS ENTIRETY.

For personal or family use engines, or marine transmissions operating in the USA, its territories and its possessions, some states do not allow limitations on how long an implied warranty may last nor allow the exclusion or limitation of incidental or consequential damages. Therefore, the previously expressed exclusion may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights, which vary by jurisdiction. To find the location of the nearest Cat dealer or authorized repair facility, call (800) 447-4986. If you have questions concerning this warranty or its application, call or write: In USA and Canada: Caterpillar Inc, Engine Division, P. O. Box 610, Mossville, IL 61552-0610, Attention: Customer Service Manager (800) 447-4986. Outside the USA and Canada: Contact your Cat dealer.

B) For products operating in Australia, Fiji, Nauru, New Caledonia, New Zealand, Papua New Guinea, the Solomon Islands, and Tahiti, the following is applicable:

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THESE ARE METSO STANDARD LIMITED WARRANTY CONDITIONS FOR NEW AGGREGATES EQUIPMENT, COMPONENTS, PARTS AND SERVICES

1. Warranty. Metso warrants new aggregates equipment, as well as components and spare parts thereto ("Goods"), supplied by Metso under the contract between Metso and its Purchaser ("**Contract**"), to be free from defects in materials and workmanship in accordance with this Warranty. Subject to Clause 4.2 of this Warranty, wear parts and consumables are not warranted. This Warranty covers (i) the Purchaser; or, in case of distribution sales channel sales, (ii) the first purchaser purchasing from authorized distributor; or, in case of contractor or rental company, (iii) the contractor or rental company who rents equipment to third parties; (all referred to as "**User**") and is not transferable without Metso's prior written consent.

Metso has the right to review the Goods at any time agreed with the User during the warranty period though at the latest by the expiry date of the warranty.

2. Duration. Metso warrants that the Goods shall be free from defects in material and workmanship attributable to Metso, provided that any defect must be claimed in writing within the defects liability period of, unless otherwise specified in the Contract, the earliest of (i) twelve months from the first industrial use, 2,000 operating hours or eighteen months from Delivery for equipment and (ii) six months from the first industrial use, 1,000 operating hours or twelve months from Delivery for components and spare and wear parts.

In case of equipment, the electronic Commissioning and Warranty Registration (CWR) Form shall be filled during the commissioning or within 7 days from the CWR Inspection. Subject to applicable mandatory law, this Warranty becomes effective only if Metso receives the properly filled CWR Form.

If the equipment, components or spare parts are used more intensely than specified by Metso or against good industry practice, above periods of time shall be reduced proportionally as determined by Metso in good faith.

3. Remedy. Metso shall, at its option, either repair the defect or replace the defective equipment, component or part under this Warranty. Repair work shall be carried out by Metso or its authorized representative at the place decided by Metso.

The User may have the right to carry out the warranty repair or replacement only subject to Metso's prior consent or in case of urgency where no consent and service from Metso is available within reasonable time. In such event, Metso shall reimburse reasonable actual out-of-pocket costs incurred to the User in the necessary repair or replacement of the defective equipment, component or spare part. Costs resulting from preparatory work, auxiliaries or plant environment shall not be reimbursed. No compensation shall be paid by Metso for overtime, Sunday or other holiday work or for any removal or installation costs.

Unless otherwise agreed, transport from site to Metso (or other repair shop or replacement source) and to site in connection with remedying of defects under this Warranty shall be at the risk and expense of the User. The defect in question shall be clearly marked on the part, component or equipment, which must be packed properly and in such a way that Metso can carry out a defect or fault analysis reliably.

4. Exclusions. This Warranty does not cover:

4.1 ordinary wear and tear or deterioration of the equipment, components or parts, normal maintenance and service (such as engine tune-ups, adjustments, settings and inspections), normal ageing, normal replacement items (such as service filters), or any damage resulting therefore;

4.2 wear parts and wear components such as hoses, belts, rubber tyres, blades, linings, discs, batteries, nozzles, oil, fuel, fluids, grease, coolants or other materials or parts, which are considered within the industry as wear parts or consumables, except where defects in materials or workmanship are found, in Metso's judgement, to cause premature breakage or wear;

4.3 components, parts and work, if repair or correction requires only minor effort such as changing of seals, tightening, adjustment or settings;

4.4 any modifications or work if carried out by an unauthorized repairer or without Metso's prior consent;

4.5 carelessness of the operators or service men, incorrect operation, maintenance, service or storage, overloading, or any use, action or omission against Metso's manuals or instructions;

4.6 Force Majeure events or any other circumstances beyond the reasonable control of Metso (such as fire, lightning, flooding, earthquake, landslide, vandalism, labour dispute, war, riot, governmental action, utility shortage or excessive voltage fluctuation), or acts or omissions of the User or a third party;

4.7 parts, other than those approved by Metso, which have been used in earlier repair or maintenance work or are otherwise not of sufficient quality and design;

4.8 defects or faults that have no significance to the operation of the equipment or plant, such as dents or surface scratches;

4.9 defects or faults caused by materials or parts provided or designs or specifications specified by or on behalf of the User; and

4.10 any indirect or consequential damage or loss whatsoever, such as loss of profit, loss of production, down-time, business interruption, loss of business opportunity, capital costs, cost of substitute use, claims by third parties or loss of use.

5. Reporting. The User shall notify Metso in writing of any defect as soon as it becomes apparent or damage occurs and in no event later than 14 days after this Warranty expires in accordance with Clause 2 above.

6. Title to Replaced Parts. Parts, components and equipment replaced under this Warranty shall become the property of Metso upon Metso's request.

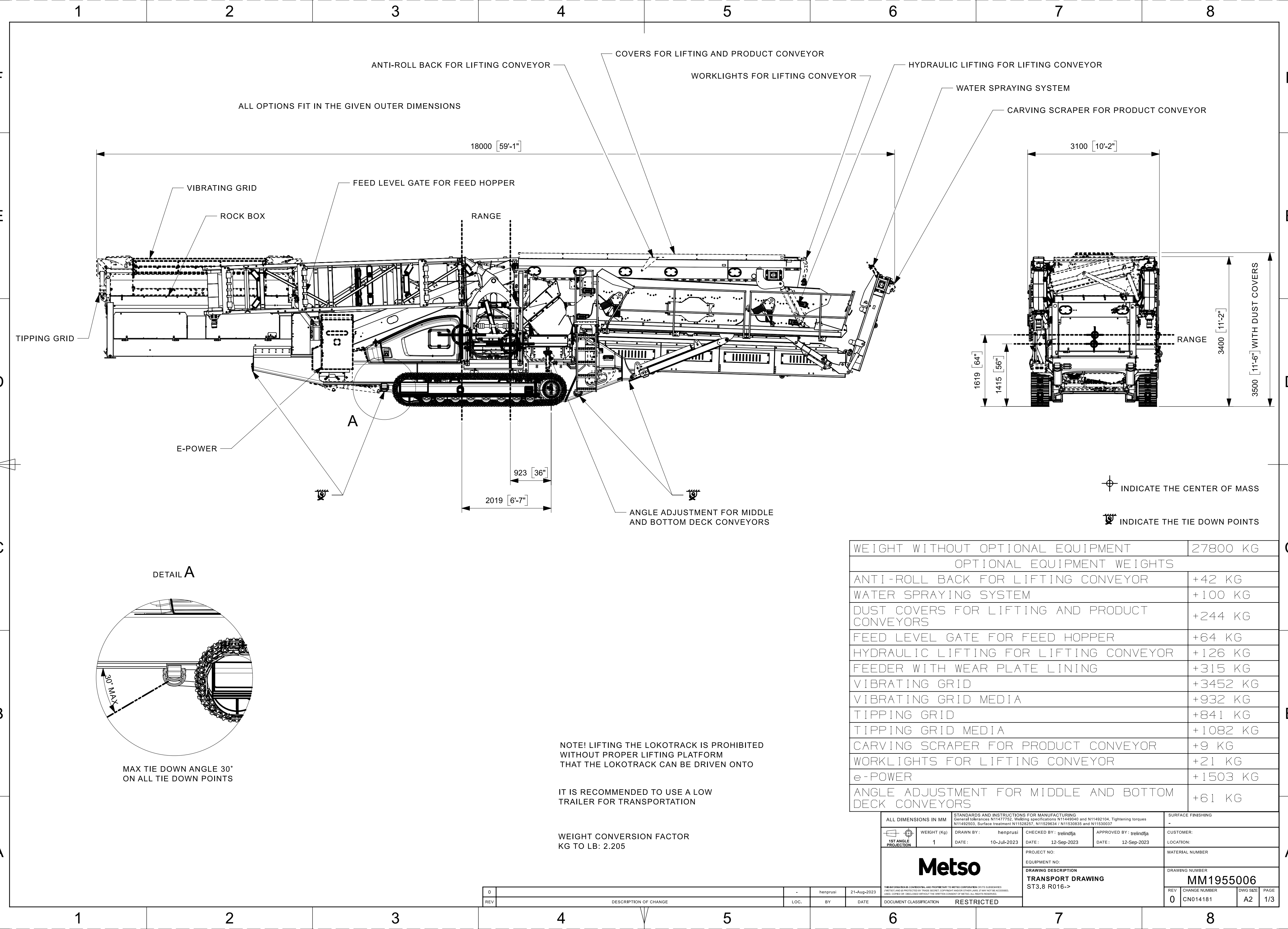
7. No Liability for Others' Work. Metso does not accept any liability for defects, faults or occurrences incurred as a result of any service, maintenance, repair or replacement carried out by others than Metso or its authorized representative.

8. Genuine Metso Parts Required. No claim will be considered and this Warranty will be null and void to the extent any defect, fault or occurrence has been caused as a result of the use of other than GENUINE METSO SPARE AND WEAR PARTS in the equipment or plant in question.

9. Services. Metso warrants that the services provided by Metso under the Contract shall be performed in a workmanlike manner. Unless otherwise agreed, no warranty of any kind is given by Metso as it comes to the outcome of the equipment, plant or system or other outcome of the services. Upon User's notification, Metso shall investigate the claimed defect in the services and shall, in its sole discretion, either carry out a defective part of the services again or reimburse the relevant portion of the price as User's entire and exclusive remedy.

10. Applicable Metso Companies and Products. This Warranty shall apply only to the Metso equipment, components, parts and services and Metso companies specified in the Contract.

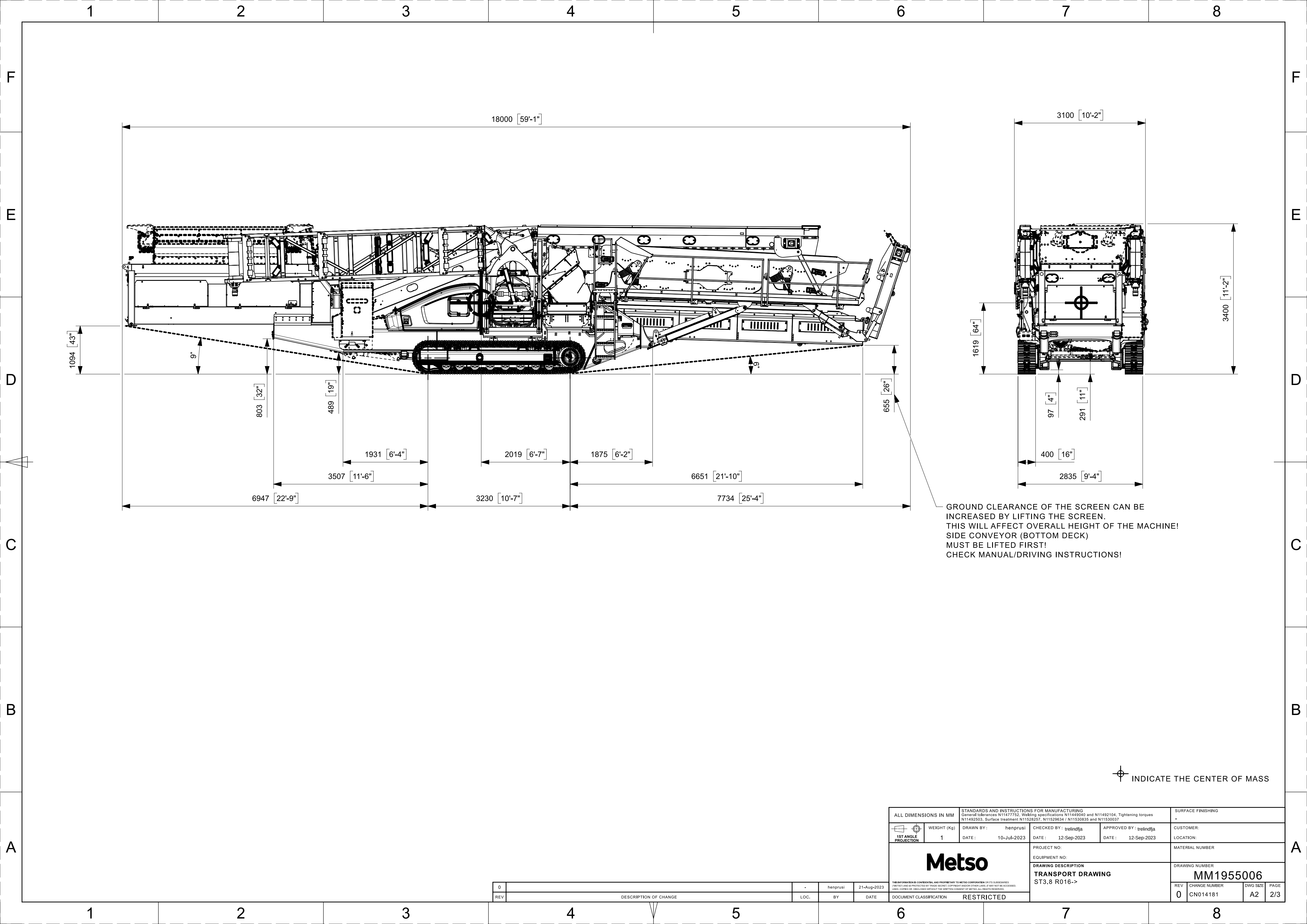
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WEIGHT WITHOUT OPTIONAL EQUIPMENT	27800 KG
OPTIONAL EQUIPMENT WEIGHTS	
ANTI-ROLL BACK FOR LIFTING CONVEYOR	+42 KG
WATER SPRAYING SYSTEM	+100 KG
DUST COVERS FOR LIFTING AND PRODUCT CONVEYORS	+244 KG
FEED LEVEL GATE FOR FEED HOPPER	+64 KG
HYDRAULIC LIFTING FOR LIFTING CONVEYOR	+126 KG
FEEDER WITH WEAR PLATE LINING	+315 KG
VIBRATING GRID	+3452 KG
VIBRATING GRID MEDIA	+932 KG
TIPPING GRID	+841 KG
TIPPING GRID MEDIA	+1082 KG
CARVING SCRAPER FOR PRODUCT CONVEYOR	+9 KG
WORKLIGHTS FOR LIFTING CONVEYOR	+21 KG
e-POWER	+1503 KG
ANGLE ADJUSTMENT FOR MIDDLE AND BOTTOM DECK CONVEYORS	+61 KG

ALL DIMENSIONS IN MM			STANDARDS AND INSTRUCTIONS FOR MANUFACTURING General tolerances N11477752, Welding specifications N11449040 and N11492104, Tightening torques N11492503, Surface treatment N11528257, N11529634 / N11530835 and N11530037			SURFACE FINISHING -		
	WEIGHT (Kg)	DRAWN BY: henprusi	CHECKED BY: trelindja	APPROVED BY: trelindja	CUSTOMER:			
1ST ANGLE PROJECTION	1	DATE: 10-Jul-2023	DATE: 12-Sep-2023	DATE: 12-Sep-2023	LOCATION:			
Metso				PROJECT NO:		MATERIAL NUMBER		
				EQUIPMENT NO:				
				DRAWING DESCRIPTION		DRAWING NUMBER		
				TRANSPORT DRAWING		MM1955006		
				ST3.8 R016->				
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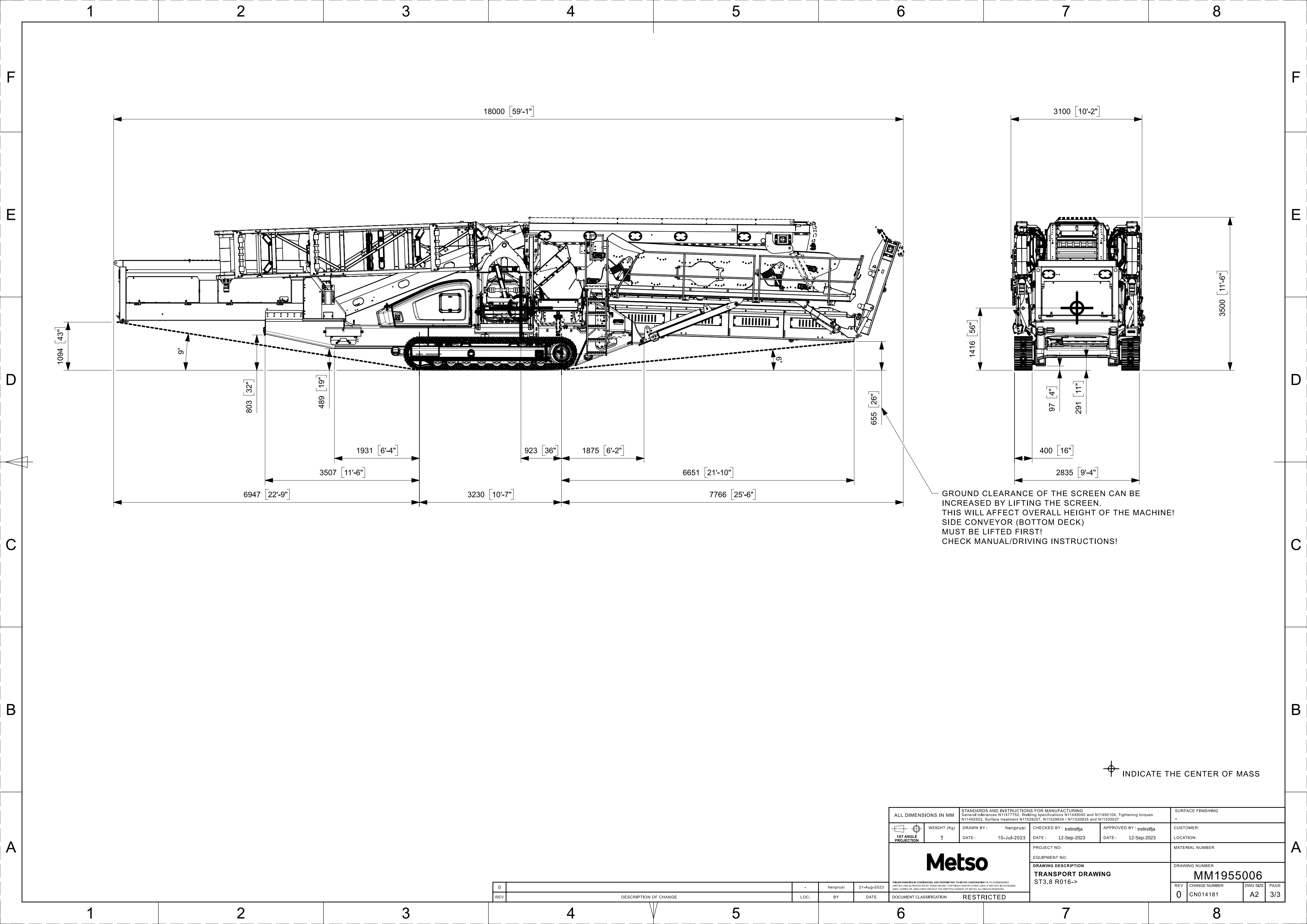
GROUND CLEARANCE OF THE SCREEN CAN BE INCREASED BY LIFTING THE SCREEN. THIS WILL AFFECT OVERALL HEIGHT OF THE MACHINE! SIDE CONVEYOR (BOTTOM DECK) MUST BE LIFTED FIRST! CHECK MANUAL/DRIVING INSTRUCTIONS!

⊕ INDICATE THE CENTER OF MASS

ALL DIMENSIONS IN MM		STANDARDS AND INSTRUCTIONS FOR MANUFACTURING General tolerances N11477752, Welding specifications N11449040 and N11492104, Tightening torques N11492503, Surface treatment N11528257, N11529634 / N11530635 and N11530037			SURFACE FINISHING -	
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Lokotrack ST3.8

Doc No. D100033106 Revision: 0 Product update R017-2

Original instructions

INSTRUCTION MANUAL



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Metso

Address: P.O. Box 1000
02231 Espoo, Finland

Telephone: +358 20 484 100

Internet: www.metso.com

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1

Preface

This instruction manual is intended to assist owners and users of Metso products in the proper use of the equipment.

It includes important references to safe, proper and economical operation of the equipment. Following these instructions will help to avoid possible danger, reduce repair costs and breakdowns and to increase the reliability and life of the equipment.

This manual must be complemented by those instructions necessary because of existing national mandatory rules relating to accident prevention and environmental protection.

A copy of this manual must be kept at the equipment's location and made available to the operators as required.

In addition to this manual and accident prevention regulations mandatory in the country of use and at the equipment's place of operation, generally recognized rules for safe and professional operation must be observed.

This instruction manual must be read and used by each person who works with the equipment, typically:

- operations, including installation, startup, operation, application engineering, materials handling, site labour, environmental engineering and safety departments.
- maintenance, including inspection and repair.
- transport, materials handling and rigging.

Note that this instruction manual contains information and instructions on alternative and optional equipment. Normally the machines have only some of them. Before maintaining and servicing, find out which alternative and optional equipment your machine has.

See separate instruction manuals for more detailed instructions when servicing the main components.

There may be optional equipment which have separate instruction manuals. Those manuals must be read and used by each person who works with the equipment.



NOTE: Because of the continuous development of the product, the manufacturer reserves a right to alter the technical specifications written in this manual, without any advance information. In case of conflicts between different language versions, the English version of this manual is the original and prevails.

2 Safety

2.1 General safety instructions

2.1.1 Introduction to general safety instructions

Safety can be summarized in three main themes:

- Machine knowledge
- Safe operation and maintenance
- Good housekeeping

All machines require human involvement. Like any other heavy machinery, a Material Processing Plant has inherent dangers that must be identified, understood and taken into account in order to avoid accidents and injuries. Metso, as the machinery manufacturer and supplier, is committed to promoting safety at the Material Processing Plant by providing safety devices and features, and by providing training, services, manuals and instructions.

This manual, together with specific instruction manuals for individual equipment, has been prepared by Metso to increase the knowledge and awareness of all persons involved in the operation, supervision, maintenance and service of crushing and screening equipment with regard to safety and operations. A copy of this manual must be provided to and studied by each person entering the machine areas of the Material Processing Plant, or otherwise involved in the operation of the Material Processing Plant. It is the responsibility of the Owner to always keep this manual and other written instructions either in the Material Processing Plant or nearby for Operator reference.

Read this manual carefully. Know its contents. If you have any questions, contact Metso without delay.

Keep in mind that there are different types of risks, hazards and injury types that are related to each other. Foresee and prevent such risks and hazards as well as resulting injuries and other consequences from occurring by all available means. When it comes to safety, do not compromise.

Metso regards safety as having the highest importance, and deems the following conditions as essential to the safe operation of the Material Processing Plant:

- That the Owner makes available this manual, before using the machinery, to each person involved with the operation, supervision, service, or maintenance of the Material Processing Plant.
- That the Owner mandates and supervises compliance with and adherence to this manual.
- That all personnel involved in the operation, supervision, service, or maintenance of the Material Processing Plant become familiar with the contents of this manual prior to such involvement.
- That every person involved in the operation, supervision, service, or maintenance of the Material Processing Plant be properly trained and have adequate professional skills and equipment as required for the performance of the respective tasks.
- That all visitors to the Material Processing Plant be properly informed of applicable safety precautions and risks, and that safety precautions be adequately maintained and in connection with any such visits, including, but not limited to, adherence to this manual.

No changes shall be made in the operation of the machinery supplied by Metso or the contents of this manual without express written approval of Metso. All operation, service, maintenance, handling, modifications, or other use of Material Processing Plant equipment and/or systems is the responsibility of the Owner. Metso shall not be liable for any injury, death, damage or cost caused by any act or omission on the part of the Owner, Operator or other personnel, agents, contractors, vendors, or others. All applicable safety rules, regulations, standards, instructions, and procedures must be complied with; as must be those of this manual as well as any other instructions, specifications, and recommendations by Metso.

This manual is based upon the safety laws, rules and regulations in effect on the date hereof. The Owner and Operator bear sole responsibility for complying with any amendments, additions or other changes to safety law, rules or regulations arising subsequent to the date on which this manual was drafted.

Although these instructions are intended to be as comprehensive as possible, there may be hazards that cannot be anticipated, hazards associated with a particular work-site or hazards covered by special company safety programs. The information provided in this manual may also not include all practices that must be observed, such as insurance requirements or governmental regulations.

If you have questions or concerns regarding safety aspects of machinery supplied by Metso, contact us before using, operating, servicing or repairing the machinery.

2.1.1.1 Objective

The objective of these instructions is to minimize risks and avoid or prevent accidents and injuries. Accidents are often caused by carelessness or disregard of important instructions.

By minimizing risks, the productivity and well-being of Operators can be increased.

Knowledge of the machine operation and continuous safety training are necessary for a safe working environment.

2.1.1.2 Terms

“Metso” means the Metso Aggregates Equipment business area selling the Equipment.

“Material Processing Plant” means a combination or part of various equipment, components, systems and parts for crushing and/or screening of rock, minerals, recycling or other crushable materials. For the purposes of this manual, the Material Processing Plant means also standalone crushing or screening equipment as applicable. Throughout this manual, words such as “machine”, “machinery”, “equipment” and “crusher” are used interchangeably to refer to the Material Processing Plant and its component parts.

“Owner” means the entities or individuals who own or lease the Material Processing Plant and/or the entities or individuals who are in charge of operating and/or servicing the Material Processing Plant.

“Operator” means the individuals who either operate the Material Processing Plant or perform actual maintenance, service, repairs, supervision or any other activity on or for it.

“This manual” means, as applicable, these general safety instructions, together with any specific instructions for individual equipment, as amended from time to time, provided by or on behalf of Metso.

2.1.1.3 Safety signs, labels, and symbols

The following symbols are used in this manual and on the machine to call attention to instructions that will help prevent machine-related injuries. When you see safety symbols in this manual or on your machine, be alert to the potential for personal injury, property or environmental damage.



Figure 1. Generic safety symbol

In some cases, specific symbols for different hazard types are used instead of or in addition to this generic safety symbol.

This manual uses the alert symbol, with signal words such as DANGER, WARNING or CAUTION, to alert you and other Material Processing Plant personnel of actions or conditions that pose a potential safety hazard, with a corresponding risk of death, personal injury or property damage. The machine also displays safety signs, labels, and tags at appropriate points to show any existing safety risks.



 **DANGER**

DANGER!
HAZARD TYPE
Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



 **WARNING**

WARNING!
HAZARD TYPE
Indicates a hazardous situation which, if not avoided, can result in death or serious injury.



 **CAUTION**

CAUTION!
HAZARD TYPE
Indicates a hazardous situation which, if not avoided, can result in moderate injury or property damage.

2.1.2 **Safety and you**

Safety is everyone's responsibility; safety is your responsibility. With your actions, you participate in establishing the safety of the working environment.

You are responsible not only for your own safety, but for the safety of those around you. When it comes to safety, do not compromise.

Metso products are designed and constructed with safety in mind. The machines incorporate safety features. To ensure safe operation, all personnel must be alert when operating or working on or around the machine. Be aware of real and potential hazards. Only properly trained personnel are allowed to operate, supervise, maintain, or service the machine. Statutory minimum age limits must be observed.

Do not consume any alcoholic beverages or other intoxicants before coming to work or while on the job. Do not operate the Material Processing Plant while intoxicated or after taking any medicines, tranquilizers or other drugs, which can impair the senses.

Personnel must carefully study all aspects of the specific machine, including the following:

- Operating instructions
- Service, troubleshooting and maintenance instructions
- Automated features and motions of the machine
- Specific safety features and instructions

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The Operator is responsible for using care and common sense at all times.



DANGER

GENERAL HAZARD

Will cause death or serious injury.

To avoid death or serious injury, observe the following:

If unsure of any procedure, check the operation manuals and/or contact your supervisor before proceeding.

Follow all lockout and tagout procedures before entering the machine.

Be constantly aware of the location of each worker on or around the machine.

Observe all safety instructions.

Do not remove or disable any guard, safety device, sign or warning.

2.1.3 Typical risks in a Material Processing Plant

Even though every Metso machine is designed with several safety features, it is impossible to design out all safety risks. There are potential hazards that must be recognized and avoided. In addition, there are some risks or hazards which cannot be completely guarded or avoided because of interference with machine operations. Accordingly, working on the Material Processing Plant requires constant alertness by all personnel in the area. Accidents happen unexpectedly. Below are some typical hazards and types of accidents that everyone working at, on or around the Material Processing plant should be aware of.



NOTE: To recognize and control site-specific risks, the plant owner must carry out a site-specific risk assessment.

2.1.3.1 Typical hazards

Be aware of these hazards. All personnel working on or around the machine must be properly trained in avoiding these hazards.



NOTE: This list is not all-inclusive.

Automatic functions and unexpected startups



WARNING

AUTOMATIC FUNCTION HAZARD

Disregard for the restricted areas can cause death or serious injury.

Do not enter restricted areas unless the machine has been properly safeguarded according to the Material Processing Plant lockout and tagout procedure and manufacturer's instructions. Many devices operate automatically, following certain sequences which have been programmed into the logic system (that is, programmable logic controller, micro controller, relay system or similar). A restricted area is any area within the confines of moving machine elements, feed material or beneath any objects being lifted.



⚠️ WARNING

UNEXPECTED MOVEMENT HAZARD
Unexpected movement of the machine can cause death or serious injury.
Lockout and tagout the machine controls before doing any maintenance or repair work to avoid unexpected movement of the machine. Do not tamper with limit switches or other safety devices included in the system.

Someone may accidentally start the machine from the control room or an unexpected occurrence may activate a control if the machine is not appropriately locked out and tagged. For example, a power surge may alter the logic of the control system status causing an unexpected machine movement or sequence. Before starting the machine, make sure that there are no persons in the area whose safety may be endangered. Walk around the machine and make sure that there is nobody on, by or below the machine. Warn everybody nearby before starting.

Important equipment safety considerations:

- Take care not to hit the display. Hitting the display with a sharp or hard object can easily cause damage.
- Use the display with bare fingers only.
- The automation system must be serviced by authorized maintenance personnel only. The warranty becomes void if the equipment is worked on by an unauthorized person.
- Careful operation and maintenance are required to ensure trouble-free and safe operation of the display. The warranty for the display becomes void if these instructions are not followed.
- High frequency radiation may cause the display to malfunction.
- Do not direct a jet of water onto the display when washing the equipment with a pressure washer.

Conveyors



⚠️ WARNING

PERSONAL INJURY HAZARD
Can cause death or serious injury.
Do not use conveyor belts as walkways. Do not climb on them. Do not attempt to stand on, walk on, or step across a conveyor.
Do not stand below a running conveyor. Stay away from any falling or dropping materials or components. Wear a safety helmet and any other appropriate personal safety equipment.
Do not wear loose clothing, neckties, necklaces or other loose items when you are near the conveyors or other moving or rotating equipment. Be careful around hazardous nip points.
Only use the emergency stops in emergency situations - do not use them for routine stopping of the conveyor.
Stop the conveyor and perform the lockout and tagout procedure before doing any maintenance or repair tasks.

Material Processing Plants use conveyors to move material in multiple directions. Stay away from the conveyor when the machine is operating, as material can fall from the system or part of the clothing, for example, can be entangled in a hazardous nip point.

Conveyors are equipped with parts that require adjustment and replacement of components. Regularly check the condition of the system and make adjustments if required. Do not try to carry out maintenance on moving conveyors.

The operator must be acquainted with the following:

- Structure and operation of the conveyor.
- Points of danger.
- Safe working and moving near the conveyor
- Emergency stop functions and the locations of the emergency stop switches.

The safety, operating, and maintenance instructions of the conveyor should always be easily available near the conveyor. Personnel are required to review and obey all safety instructions and warnings.

Use the conveyor only for its intended purpose: do not use it to carry persons. Unauthorized persons are not allowed to be near the conveyor.

No changes are allowed to be made on the conveyor without the manufacturer's written consent. In addition, no safety devices are allowed to be removed.

Anyone accessing the conveyor must use the marked walkways, service platforms, stairs, and ladders, and these must always be in good condition.

Points of danger include the drive end, tensioning end, material flow, electric equipment and cables, loading and discharging locations, as well as nip points of pulleys, idlers, hold down wheels.

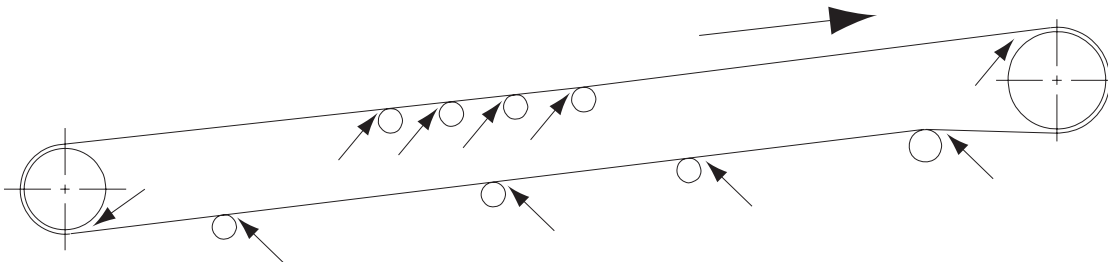


Figure 2. Conveyor danger points

Diesel exhaust fumes and particulates



 **WARNING**

DIESEL EXHAUST FUME AND PARTICULATE HAZARD

Can cause death or serious injury.

Breathing diesel engine exhaust exposes you to chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

Always start and operate the engine in a well-ventilated area.

If in an enclosed area, vent the exhaust to the outside.

Do not modify or tamper with the exhaust system.

Do not idle the engine except as necessary.

For more information, go to www.P65Warnings.ca.gov/diesel.



NOTE: *It is the responsibility of the Owner and Operator to determine the necessity and adequacy of control measures and protective devices and warnings, to provide them, and to make sure that they are used and followed.*

The above warning about diesel exhaust fume and particulate hazard is also valid outside the State of California.

Short term exposure to high concentrations of diesel exhaust fumes and diesel particulate matter can cause headaches, dizziness, and irritation of the eye, nose, and throat severe enough to distract or disable machine Operators and other workers.

Prolonged exposure to diesel exhaust fumes and diesel particulate matter can increase the risk of cardiovascular, cardiopulmonary and respiratory disease and lung cancer.

Machine operation controls should be implemented to minimize worker exposure to diesel exhaust fumes and diesel particulate matter. These controls can include, for example, the following:

- Performing routine preventive maintenance of diesel engines to minimize emissions.
- Using special fuels or fuel additives, such as biodiesel.
- Installing or upgrading main or auxiliary ventilation systems, such as exhaust vents to capture and remove emissions, when operating the machine in maintenance shops and other indoor locations.
- Limiting the number of machines operating in a given area.
- Making sure that the number of machines operating indoors or in enclosed area does not exceed the capacity of the ventilation system.
- Prohibiting or restricting unnecessary idling of machine's diesel engine.

For machine applications in underground metal/nonmetal mines and at underground coal mines, consult Mine Safety and Health Administration (MSHA) regulations governing exposure to diesel exhaust and diesel particulate matter.

Monitoring the components of diesel exhaust, including carbon monoxide, nitric oxide, and nitrogen dioxide, can indicate the presence of diesel exhaust. Monitoring can assist in evaluating the effectiveness of controls implemented to minimize the potential diesel exhaust exposure when working with or around the machine.



NOTE: *Metso highly recommends that protective devices such as an appropriate respirator be worn by anyone exposed to diesel exhaust fumes or diesel particulate matter to prevent its inhalation.*

Dust



⚠ WARNING

RESPIRATORY HAZARD

Can cause death or serious injury.

Breathing dust may be hazardous to the health of anyone working at, on, or around the Material Processing Plant. It can cause serious or fatal respiratory diseases including silicosis.

It is the responsibility of the Owner and Operator to determine the necessity and adequacy of protective devices and warnings, to provide them, and to make sure that they are used and followed.

By their nature, Material Processing Plant and auxiliary equipment, for example, chutes, transfer stations, and screens can create dust and, if not contained, the dust can escape into the air. In general, high levels of

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dust (particularly, respirable silica) in the air can create a hazard of lung disease, depending upon the concentrations of dust, the length of exposure, and the type of material being crushed. Dust protective devices and dust warnings may be required by OSHA, MSHA or local laws.

The Owner and Operator of the Material Processing Plant must identify the material being crushed and ascertain whether respirable dust from the application poses a health hazard to personnel near the Material Processing Plant. If the material presents such a hazard the Owner and Operator must take all necessary measures to ensure that personnel are protected from the dust. Such measures include, but are not limited to providing dust collection system, using water spray bars at the feed and discharge points, crusher transfer points and screens and providing adequate personal respiratory protection devices to workers.

Crushing with a choke level may also reduce the amount of dust issuing from the Material Processing Plant itself. Because the configuration of each rock crushing installation is different, Metso recommends that the Owner and Operator consult Metso or a dust consultant about possible alternative means of dust reduction.



NOTE: Metso highly recommends that anyone exposed to airborne dust wears dust protective devices such as an appropriate respirator to prevent inhalation of dust.

Ejection of objects from the Material Processing Plant



 WARNING

EJECTING OBJECT HAZARD
Can cause death or serious injury.
Never attempt to clear a jam on a feeder, crushing cavity or conveyor when the system is energized.

Ejected objects from the Material Processing Plant may cause bodily injury. For example, rock can be thrown several meters/yards into the air out of the crushing cavity during operation. Ejected materials may include rock, tramp metal, metal rods and work implements. Do not look into crushing cavity while crusher is in operation.

Electrical equipment



 DANGER

ELECTRICAL HAZARD
Electric shock will cause death or serious injury.
Disconnect all devices from electric power sources before starting any maintenance or repair work.
Perform the appropriate lockout and tagout procedure.

Be especially cautious when working with or near electrical equipment. An electric shock can be fatal. Material Processing Plant electrical outlets must be grounded and have ground fault interruption protection. Tools plugged into the outlets must be double insulated. Never expose electrical equipment to mechanical damage or humidity. Protect all electrical equipment from direct contact with water or high humidity.

Protect electrical devices that may move with the machine from dirt and mechanical damage. Regularly check the operability of these devices.

Maintenance, repair and installation of electrical equipment must only be done by properly trained and qualified personnel who are familiar with the machinery and equipment in question.

Follow proper procedures at all times. For information on the lockout and tagout procedure, see [2.1.6.1 Lockout and Tagout procedure](#).

Elevated or narrow working location



⚠ WARNING

FALLING HAZARD

Can cause death or serious injury.

Use a man lift and a safety harness to access high maintenance locations or when working outside the service platforms. Do not step on the handrails.

When working on an elevated surface be aware of machine movements and other activities in the area. Do not run on the walkways. Do not reach over or beyond walkway railings while the machine is running. Do not stand on railings or toe plates. Use a man lift or a safety harness when working outside service platforms or railed walkways.

There may be narrow access routes for maintenance purposes. Do not use these routes or enter any close quarters within the Material Processing Plant when the machine is operating.

Falling material from conveyors or loading, unloading, and feeding operations



⚠ WARNING

FALLING OBJECT HAZARD

Can cause death or serious injury.

Material may fall from the side of the conveyor. Never walk under any equipment included in loading, feeding, crushing, conveying, discharging or stockpiling material.

Rocks or other objects may fall, for example, from conveyors during loading, unloading and feeding operations. The impact of falling material may cause serious bodily injury. To make sure safe operation, all personnel must be alert when operating or working at or around the machine. Wear proper protective clothing (including a helmet) and protective devices. Keep all non-operating and non-trained personnel clear of the Material Processing Plant at all times.

Do not go under a suspended load or under any equipment included in loading, feeding, crushing, conveying, discharging or stockpiling material.

Fire hazards

Flammable materials, such as diesel fuel, are used at the Material Processing Plant. Avoid fire hazards by following these instructions:

- Do not smoke when refueling or handling fuel containers.
- Shut down the engine when refueling and use extra caution if the engine is hot.
- When pouring fuel into the tank, ground the funnel or spout against the filler neck to avoid static electric sparks.

- Do not use gasoline or diesel fuel for cleaning parts. Only appropriate commercial-grade, nonflammable solvents are allowed to be used.
- Do not smoke when using flammable cleaning solvents. Whenever possible, use non-flammable cleaning solvents.
- Do not let greasy, oily rags accumulate in a poorly ventilated area. Store oily rags and other combustible material in a safe place.
- Never use an open flame to check fuel, battery electrolyte or coolant levels, or to look for hydraulic leaks anywhere on the equipment. Use a flashlight. Be aware of the location of the fire extinguishers, how they operate, and for what type of fire. Check regularly, at least monthly, to be sure they are in the working area.
- Do not weld or cause open flame in the presence of flammable materials.
- In the event of a fire in or on the equipment, shut down the Material Processing Plant, hydraulic power unit, and lubrication system if this can be safely done. Warn other people in the area and start fire fighting activities according to applicable rules. It is the responsibility of the Owner to maintain proper training and instructions in these respects.
- In the event of a fire close to the equipment, drive the equipment away from the fire if this can be safely done.
- Observe good housekeeping and regular maintenance to prevent fires.

When in contact with hot temperatures, or when heated themselves, some hydraulic oils may ignite at around 200°C (392°F). Pay special attention to the condition of hydraulic hoses and couplings. Immediately remove oil spills from floor, walkways, and pits. Fix all sources of oil leaks and clean up spills.

In case of a fire, the machine must be equipped with a fire extinguisher or a fire extinguishing system, and marked according to the regulations. Purchasing the fire extinguisher is in the responsibility of the Operator or Owner of the machine. Legislation and regulations about suitable equipment may vary by country. Familiarize yourself with applicable standards. Personnel must also be trained properly to be able to use fire extinguishing equipment.

A trained person with sufficient fire extinguishing equipment must be present during welding maintenance work. Cold water on hot metal surfaces may cause a violent explosion. Monitoring after welding must be arranged as required by laws and regulations. If no other regulations apply, the minimum monitoring time is half an hour.

Heavy loads – lifting and shifting



WARNING

FALLING OBJECT HAZARD

Can cause death or serious injury.

Always use approved lifting equipment with adequate capacity. All lifting operations must be performed by professionals. Do not go under a suspended load.

Cranes

Material Processing Plants, like any other type of mechanical equipment, require regular periodic maintenance. One of the most dangerous Material Processing Plant safety violations is the use of inadequate and unsafe lifting equipment. Although a Material Processing Plant is a finely tuned piece of equipment, the internal parts of a Material Processing Plant should be assembled and disassembled with crane equipment that have the capability of gently and slowly lifting and lowering the various parts that make up a Material Processing Plant.

Before lifting, avoid side pull by making sure that the crane will lift the load vertically, not horizontally. Moreover, avoid fast and sudden crane movements and sudden braking. Both of those actions can cause

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overload and swing to the load. Overload and swinging load might lead to a risk of personal injury hazard and to a risk of property damage.

Do not use chain hoists (chain blocks) to assemble or disassemble a Material Processing Plant. These lifting devices lack the stability and robustness required in lifting and positioning heavy components. When possible, use only Metso lifting tool and lifting accessories with Metso products. For example, use the mantle nut lifting tool with cone crushers.

Do not use an impact hammer boom or any other equipment that is not designed for lifting, assembly or disassembly purposes. Know the weight limitations of lifting devices and their loads.

Always attach the load securely to its destination. Never detach a lifting device from a load until the load is stable and secured from unintended movement.



⚠ WARNING

FALLING OBJECT HAZARD

Can cause death or serious injury.

When using a crane, always operate within the rated capacity of the crane. The rated capacity includes the weight of the hook, block and any material handling devices, for example, cables, slings, and spreader bars. Subtract the weight of all these items from the rated capacity to find out the true weight of the load that can be handled safely. Always follow the crane manufacturer's operational and safety instructions.



NOTE: The weight indicated in a machine plate tells the weight of a standard configuration. In many cases, the actual weight may differ greatly from that indicated in the machine plate due to, for example, options or ancillary equipment. Before lifting, always verify the weight of the object you are lifting and operate within the rated capacity of the lifting equipment.

Mobile cranes

Safe ratings are based on operating the crane on firm, level ground; outriggers must be properly extended and/or lowered whenever required. Before lifting, avoid side pull by making sure that the crane will lift the load vertically, not horizontally. Moreover, avoid fast and sudden crane movements and sudden braking. Both of those actions can cause overload and swing to the load. Overload and swinging load might lead to a risk of personal injury hazard and to a risk of property damage. Do not handle large, heavy loads in strong winds. When moving your crane, check bridges before crossing, make sure they will support the total weight in question. Check clearances under bridges for overhead electrical lines and any overhead obstruction. Be sure your hitcher is clear before starting lift. Make sure the load is securely attached.



⚠ WARNING

FALLING OBJECT HAZARD

Can cause death or serious injury.

When using a mobile crane, always operate within the rated capacity of the machine to avoid buckling the boom or tipping.

Take the following precautions when lifting heavy loads:

- Follow all established Material Processing Plant procedures.
- Follow all instructions and safety procedures recommended by the crane manufacturer.
- Plan the lifting and maintenance procedures in advance. Read and understand specific instructions for proper use of lifting equipment prior to using them (for example, instructions on the machine and the lifting device as well as the local regulations).

- Clean the working environment beforehand to prevent slipping and tripping hazards.
- Make sure that the crane and other lifting devices such as chains and slings have sufficient capacity and are in good working order.
- Do not attempt to ride or sit on moving loads.
- Be sure that crane Operators, riggers and other personnel have been properly trained.
- Rig the load firmly to prevent any unintended movement and assure stable and accurate positioning.
- Make sure nobody is below or on the path of the load and that the transfer routes are clear and proper protective clothing and gear are used.

High-pressure equipment - hydraulic or pneumatic



WARNING

SKIN INJECTION HAZARD

Can cause death or serious injury.

Before restarting the machine, make sure the hydraulic system is ready for operation, and personnel are clear of affected areas. Wear all appropriate personal protective equipment, such as safety gloves and protective overalls, when handling hydraulic components. Poorly tightened or damaged hydraulic components may inject dangerous jets of fluid which can cause death or serious injury.

If you are injected with hydraulic oil or any other fluid, immediately seek treatment from a doctor trained in the treatment of penetrating fluid injuries.



WARNING

MOVING PARTS HAZARD

Machine parts may move unintentionally and can cause death or serious injury.

Before restarting the machine, make sure all personnel are clear of the affected areas where machine movement may occur.

High pressure oil can be dangerous. Relieve all pressure before opening or removing, for example, any hydraulic or air pressure lines, valves, or fittings. Do not touch pressurized components since the pressure from a pin hole leak is so strong that it can easily penetrate the skin or eyes. When checking a possible pressurized leak, use a sheet of paper or a suitable rigid plate. Always exercise caution when handling hydraulic devices.

Regularly check the condition of hoses, pipes, valves and various connections. Replace them if necessary.

Before starting any maintenance work, stop all hydraulic pumps, lock out pump motors, and depressurize the system, bringing all components to a zero energy state. Remember to also depressurize the accumulators through the bleed valve for each accumulator. Do not disconnect any hoses until the actuator has been brought to a zero energy state and properly secured.

Make sure no air enters the hydraulic system during refilling. Bleed the hydraulic system regularly to remove entrapped air that may interfere with normal expected machine operation or cause a hazard during maintenance.

Do not make any changes to the adjustable valves that are sealed. Ask the technical support of Metso if adjustments are required for example due to cold weather.

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Hot surfaces

**WARNING****HOT SURFACE HAZARD**

Can cause death or serious injury.

Wait for the machine to cool down before doing any maintenance or repair work.

There are hot surfaces on Material Processing Plants. Protective gloves and coveralls help protect against burns. Be aware of hydraulic system, hoses, fittings, and pipes. Regularly inspect and observe high temperature lines, and fluid lines for leaks or damage. On mobile equipment, be cautious around the engine because of exhaust gases.

Hot work

**DANGER****TOXIC GAS HAZARD**

Will cause death or serious injury.

There are components made of manganese steel and components covered with zinc. Welding, grinding, or flame cutting these components generates gas that is extremely hazardous to health and causes poisoning.

You must do this kind of work outdoors or in well-ventilated premises equipped with local exhaust ventilation. Also wear respiratory protection.

**WARNING****FIRE HAZARD**

Fire can cause death or serious injury.

Do not perform any welding, grinding, or flame cutting activities in the presence of flammable materials. Advise the personnel if there are hydraulic components near the area in which they are working.

Weld repairs must only be done by properly trained and qualified personnel. Welders and their helpers must wear protective clothing and equipment. Welding, grinding and flame cutting must only be conducted in parts of the machine that have been cleaned for that particular purpose.

Always take appropriate precautions when torch cutting and welding. Some metals pose health hazards during welding. Anyone performing these types of procedures must avoid breathing the fumes. Such procedures must be done outdoors or in a well ventilated area with either a separate clean air supply provided to the mechanic or with local exhaust of fumes. Refer to EU, OSHA, MSHA or other applicable standards as appropriate.

One of the most frequently used tools around the Material Processing Plant is the cutting torch. Any flammable components, such as conveyor belts, v-belts, cables and hoses, must be adequately covered with flameproof material. Make sure no sparks, weld spatter and similar cannot reach these components.

Hydraulic components must be depressurized as ruptured high pressure hydraulic lines will quickly vaporize the hydraulic fluid as it reaches the atmosphere. This vaporized fluid can quickly become a mass of flames, resulting in severe burns for personnel in the immediate area. Adequate precautions must be made to avoid contact with these components. Never perform welding or torch cutting activities in the presence of flammable materials.

Always take care to protect the control system when welding the unit.

- Stop the engine
- Disconnect the grounding cable from the batteries.
- Disconnect the engine wire harness sockets from the engine control board (refer to engine instructions).
- Fasten the grounding cable of the welding device as close to the part to be welded as possible. Make sure that no welding current passes through any bearings or electrical equipment.



 **WARNING**

GENERAL HAZARD

Can cause death or serious injury.

Contact Metso before any welding of major Material Processing Plant components, for example, the main frame, adjustment ring, or bowl. Performing welding on the Material Processing Plant components can be dangerous for machine operation. Before welding, always verify that the material is weldable. Failure to do so may result in a weldment failure and present a risk of injury and/or property damage.

Improper work methods

Improper work methods and motions may cause physical injuries. Use suitable tools, cranes or jacks for moving large and heavy objects. Overreaching and improper support for loads may lead to injuries to the back or other parts of the body. If you are unsure of proper work methods, contact your safety director or other person responsible for ensuring the safety at your work place.

When lifting equipment by hand, protect your back by lifting close to your body and using your legs without twisting. Use hoists whenever possible. Stand clear of hoisted loads and lifting cables.

Machine inertia

Due to the large inertial forces of the Material Processing Plant and Material Processing Plant components, the machine cannot be stopped abruptly. This is potentially hazardous to personnel. All personnel must stay clear of rotating elements and other moving parts until the machine has come to a complete stop and the lockout and tagout procedure has been carried out. Regularly inspect the structural elements to maintain safe operation.

Magnetic hazard



 **WARNING**

MAGNETIC HAZARD

The magnet can interfere with the functioning of pacemakers and can cause death or serious injury.

Do not go near a magnet if you have a pacemaker. The powerful magnet will damage and interfere with electronic devices, such as pacemakers, insulin pumps, laptop computers and mobile phones, as well as credit cards. Maintain a minimum safety distance of 5 m (17 ft).

Metso products can be equipped with magnetic separators to remove the metallic material from the system. Refer to the technical specification chapter to review if the machine is equipped with magnetic separator.

Nips, gaps, and pinch points



⚠️ WARNING

MOVING PARTS HAZARD

Can cause death or serious injury.

Usually nips, gaps, and pinch points are guarded by nip guards, railings, or location. Despite these precautions, take care to avoid any nips, gaps, and pinch points.

An ingoing nip is formed by drive devices such as belts and a pulleys, chains and sprockets or gears. Similarly, a pinch point may be formed by rotating or moving equipment.

Only perform maintenance or repair work after the lockout and tagout procedure is carried out.

Noise



⚠️ DANGER

NOISE HAZARD

Will cause permanent hearing damage.

The noise level near the machine exceeds 85 dB(A). Wear appropriate ear protection.

Material Processing Plant by its very nature is noisy and the auxiliary equipment found at, on or around the Material Processing Plant, for example, chutes, transfer stations, and screens can at times be noisier than the Material Processing Plant itself. A typical noise level at a Material Processing Plant during crushing ranges from 100 - 110 dB measured at 1 m (3 ft) from the Material Processing Plant.



NOTE: Noise emission is dependent, for example, on operating conditions and thus noise emission may change if process parameters are changed by the operator.

Metso recommends wearing ear protection at, on and around Material Processing Plant, particularly when the noise level exceeds 85 dB. It is recommended that the Owner develop a signaling communication system in noisy environments to reduce the risk of accidents.

Proper machine maintenance and the replacement of worn parts can help reduce noise.

The most commonly applied noise reduction procedures are the following:

- Use of isolation techniques
- Equipment enclosures
- Operator enclosures
- Silencers

Allowable noise levels and exposure limits are regulated by various agencies such as ISO, OSHA, MSHA. Refer to applicable safety regulations for permissible noise exposures, and take steps to make sure compliance with those regulations.

Poor housekeeping

Observe good housekeeping. Tidiness provides a safer working environment by preventing or reducing tripping, slipping, fire hazards or electrical shocks. It also makes the detection of damaged or loosened parts easier.

Keep the machine and the area around the machine clean, dry and free of debris, oil, grease, rags, cables, chains, buckets, rocks and other obstructions. Wet spots, especially near electrical equipment, are dangerous. Oily or wet machine environments, walkways, platforms, steps and hand rails are slippery. In cold weather, watch out for ice and snow. Wipe up any substance, such as spilled oil, grease, water or ice, which may cause a person to slip or fall.

Make sure there is a clear passage to all emergency stop buttons during operation and maintenance. Keep tools and loose parts in a toolbox and always return them to their proper place after use. Be aware of dust, smoke or fog, which may obscure your vision.

Rotating or moving equipment or components



 **WARNING**

MOVING COMPONENT HAZARD

Can cause death or serious injury.

Before doing any service or maintenance work, disconnect all devices from the electric and hydraulic power sources and follow the lockout and tagout procedure.

Rotating and moving components create pinch points, snagging risks and other potential hazards. Stay away from all moving parts until they come to a complete stop. Do not use any body part, tool or other foreign object to attempt to stop, adjust, clear, or clean any moving equipment such as vibrating feeders, conveyor belts, drives or other rotating parts of the crushing plant. Such activities can result in death or serious injury.

Crushers, designed to operate within a specific RPM range for maximum efficiency, are typically checked with a tachometer. Make sure that any access openings have a protective cover in place at all times except when RPM readings are being taken. Never change sheave combinations without first consulting Metso.

Sharp edges

Sharp edges may exist on any metal structures. Equipment damage or wear may create unexpected sharp edges. Sharp edges may inflict deep and serious cuts. Wear protective gloves when handling materials or parts with sharp edges. Repair or guard sharp edges immediately upon detection.

Chemicals

Before handling chemicals, carefully read the safety instructions from the supplier of the respective chemical, usually found in the form of Material Safety Data Sheet (MSDS). Chemicals may be hazardous and can present the risk of serious injury or death as a result of exposure.

Make sure you have correct procedures to safely handle hazardous chemicals. These procedures must define the correct identification, labelling, storage, use and disposal of hazardous chemicals. Refer to the MSDS of chemicals and Material Processing Plant procedures for handling of these materials.

Wear protective clothing, gloves, boots, glasses, and respirator when necessary. Avoid prolonged contact with fluids, such as gasoline, diesel fuel, hydraulic oil and cleaning solvents, which may cause skin irritation or other reactions. Store hazardous materials in restricted access areas and mark them clearly. Keep flammable substances, pressurized containers and aerosols away from hot environments and open flame.

Legislation concerning identification, labelling, storage, use and disposal of chemicals may vary in each country. Refer to REACH or similar legislation. All hazardous materials must be handled strictly in accordance with the manufacturers' instructions and all applicable regulations observed at all times.

For disposal of waste, machine components and the machine see [2.1.9 Disposal and environmental safety](#).

Backing materials

Many Material Processing Plants require some type of backing when replacing the crushing members. Epoxy resin backing compounds have almost completely eliminated the possibility of workers being accidentally burned due to molten zinc either spilling or exploding when it comes in contact with wet surfaces. When epoxy backings are used, care must also be taken when removing the liners with a cutting torch. Do not use molten zinc as backing material. Use epoxy only according to specific instructions from the manufacturer.

Vibration

The presence of an Operator is not normally allowed during the operation of mobile machinery. Typically, the whole body vibration in process condition as defined by standard ISO 2631-1, or similar current safety standard, may exceed 0.5 m/s^2 and thus the long-term exposure to vibration may result in detrimental health effects. In addition, there is an increased risk of falling on a vibrating platform. Avoid standing on a vibrating Operator's platform or walkway.

For machines equipped with an on-board control station or cabin, check the technical specification or contact Metso. Note also that the vibration levels are greatly influenced by the ground support, damping properties, machine support, leveling and the speed of components (especially crushers, screens and vibrating feeders).

Unexpected or excessive vibrations may indicate wear or other conditions that require maintenance actions. Excessive vibrations associated with a portable crushing or screening plant are frequently caused by improper cribbing.

It is recommended that the vibration levels of machine components are regularly monitored. Machine components include, but are not limited to, the following:

- Bearings
- Shafts
- Rollers
- Structural members (including, for example, conveyor frames, walkways, platforms, hoppers, and chutes)

2.1.3.2 Typical injury types

Burns and electrical shocks

Protective gloves and coveralls help protect against burns. Be cautious around and near hydraulic system hoses, fittings and pipes. Regularly inspect and repair leaking or damaged high temperature lines and fluid lines.

To avoid electrical shocks:

- Before you do any servicing or maintenance work, make sure that power is shut off and the machine is locked out and tagged out. Unplug or disconnect all auxiliary motors and equipment.
- Do not drill blindly into beams, electrical cabinets or other enclosures.

Avoid moisture or fluids contacting electrical equipment. Also avoid skin contact with toxic, corrosive and irritating agents.

Crushing



WARNING

CRUSHING HAZARD

Can cause death or serious injury.

Do not fold or unfold more than one hydraulic component, for example, a conveyor, at a time. Only one person is allowed to operate hydraulic components at a time.

In general, avoid areas where you may be exposed to expected or unexpected machine movement. Crushing injuries typically occur either between two rotating or moving parts, or between a moving component and a stationary object. Pay attention to the restricted areas during material processing.

Keep all body parts, clothing and tools away from areas where they may get trapped, pinched, or crushed, or otherwise come into contact with moving parts on the Material Processing Plant. When moving equipment, make sure the path is clear. Horns and lights, where provided, are for your safety to alert you of moving objects. Pay attention to all such devices.

Cutting

Do not reach in or enter the following places:

- Movement paths of cutting equipment
- Between moving machine components
- Between moving loads and machine structures

Entanglement



WARNING

GENERAL HAZARD

Can cause death or serious injury.

Keep safety gates, shrouds, guards, and other protective devices in place and in good working condition at all times. Test emergency stops, electrical interlocks, and related limit switches regularly.

Avoid wearing loose clothing that could be caught by rotating shafts, conveyors, or other moving parts and materials. Remove neckties, necklaces, rings, and other jewelry before performing work assignments. Also protect a long beard or hair from entanglement.

Keep clothing and all parts of the body away from nip points and rotating or moving equipment. Be especially alert to avoid contact with parts that move intermittently.

Do not touch a rotating roller, sheave, pulley, idler or moving conveyor belts with any body part or work implement, as you may become entangled and pulled into a hazardous area.

Never attempt to service, repair, or troubleshoot any moving part of the Material Processing Plant while it is energized or otherwise capable of movement.

Falling



 **WARNING**

FALLING HAZARD

Can cause death or serious injury.

Do not operate any equipment until all guard rails and safety devices have been installed or returned to their proper operating condition. If you need to work outside the guard rails, use appropriate fall protection.

Use only designated access routes, such as walkways and platforms when moving on or around the Material Processing Plant. Walkways and platforms are equipped with railings designed to meet applicable standards. If railings or platforms need to be temporarily shifted aside, make sure that there are special caution signs or temporary barriers, such as chains, to inform anyone working on the machine. Use personal fall protection gear, temporary barriers, interlocks, or other warning devices where appropriate. Never attempt to operate, service, or repair the Material Processing Plant without first utilizing proper fall protection measures. If guards are temporarily moved aside, make sure they are installed immediately after maintenance work and before the machine is returned to operation.

Keep the area clean. Never climb or stand on areas of the Material Processing Plant not specifically designated for that purpose. Do not overreach.

Impact from ejected materials



 **WARNING**

PERSONAL INJURY HAZARD

Can cause death or serious injury.

Do not look into the crushing cavity while a crusher is in operation. It is extremely dangerous to remove tramp iron jammed between the crushing members. Follow the instructions in the instruction manual.

There are several hazards related to falling, flying or otherwise ejected materials when the Material Processing Plant is being operated or serviced. For example, rocks can be thrown several meters/yards into the air out of the crushing cavity during operation. Ejected materials may include rock, tramp metal, metal rods and work implements. Keep the safety guard down during the operation. Wear proper protective clothing, such as a helmet and other protective devices. Always use properly maintained and approved tools and work methods. Stay clear from the path of ejected materials, also during lifting, assembly and disassembly operations.

Slipping, tripping, and bumping

Items such as hoses or tools, on walkways and Material Processing Plant floors impede movement and create a tripping and slipping hazard. Good housekeeping reduces these risks considerably.

A vibrating platform can affect the balance of the personnel. Avoid standing on a service platform when the machine is operating.

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Personnel must wear safety shoes that reduce the risk of slipping and provide protection against falling objects or crushing. Clean up spilled hydraulic oil immediately.

To help avoid injury, be aware of parts positioned close to the floor level or protruding machine components, changes in elevation of platforms, walkways, and narrow access points. It is recommended that safety shoes be worn at all times. Wear safety helmets and other safety equipment as appropriate.

2.1.4 Personal protective equipment

Personal protective equipment and clothing such as foot protection, helmet, hearing protection, dust protective devices, safety glasses or other personal protective clothing and equipment should be worn at all times. All equipment must be maintained in accordance with applicable standards. Respirators, goggles, protective masks, gloves, boots, and other such equipment must be cleaned and disinfected before being used by another employee. The Owner and Operator are responsible for making sure that all eye, head, respiratory, and ear protection conforms to applicable standards.



NOTE: Always use protective equipment that is properly sized. This helps avoid entanglement, for example.



NOTE: It is the responsibility of the Owner and Operator to determine the necessity and adequacy of control measures and protective devices and warnings, to provide them, and to make sure that they are used and followed.

2.1.4.1 Eye and face protection

The Owner should make sure that personnel for the machine area use appropriate eye or face protection when exposed to eye or face hazards such as flying material, molten metal, liquid chemicals, acids or caustic liquids, chemical gases or vapors. The Owner must make sure that affected personnel use eye protection that includes side protection from flying objects.

The Owner must make sure that affected personnel who wear prescription lenses while engaged in operations that involve possible eye hazards wear eye protection that incorporates the prescription in its design, or wear eye protection that can be worn over the prescription lenses without disturbing the proper position of the prescription lenses or the protective lenses.

2.1.4.2 Work clothing

The Owner must make sure that personnel wear properly sized and appropriate clothing to help protect against hazardous material and hot surfaces. Loose clothing can get caught in nips, shafts, or other moving machine components.

Work clothing must be easily perceptible and according to local legislation.

Clean work clothing frequently. Clothes stained by oil or grease catch fire easily.

2.1.4.3 Foot protection

The Owner must make sure that personnel use protective footwear when working in areas where there is a danger of foot injuries due to falling or rolling objects, or sharp objects piercing the sole and where feet are exposed to electrical or chemical hazards.

2.1.4.4 Hand protection

The Owner must make sure that personnel use properly sized appropriate hand protection when hands are exposed to hazards, such as those from skin absorption of harmful substances, cuts or lacerations,

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abrasions, punctures, chemical burns, thermal and electrical burns, and harmful temperature extremes. Loose clothing can get caught in nips, shafts, or other moving machine components.

2.1.4.5 Head protection

The Owner must make sure that personnel wear a protective helmet approved by OSHA, MSHA (or by other applicable authority) when working in areas where there is a potential for head injuries from falling objects or walking through areas with low head clearance.

The Owner must make sure that a protective helmet designed to reduce the hazard of an electrical shock is worn by personnel when near exposed electrical conductors which could contact the head.

2.1.4.6 Hearing protection



 **DANGER**

NOISE HAZARD

Will cause permanent hearing damage.

The noise level near the machine exceeds 85 dB(A). Wear appropriate ear protection.

Exposure to machinery operation without adequate hearing protection may lead to hearing loss. Therefore, users must be provided with appropriate hearing protection of the type and to the extent required by law.

2.1.4.7 Respiratory protection



 **WARNING**

RESPIRATORY HAZARD

Can cause death or serious injury.

Breathing dust may be hazardous to the health of anyone working at, on, or around the Material Processing Plant. Epoxy fumes can cause nausea or irritate the eyes and the skin.

When working near the Material Processing Plant, use respiratory protection. The working area must be well ventilated.

Respiratory protection is required when the air contains contamination such as harmful dusts, fogs, fumes, mists, gases, smokes, sprays, or vapors. The primary objective is to protect the health of workers.

The Owner must provide respiratory protection when such equipment is necessary to protect the health of personnel. The Owner must provide the respiratory protection and training programs which are applicable and suitable for the purpose intended and comply with the latest requirements and recommendations of health authorities and regulatory agencies.



NOTE: Traditionally molten zinc has been used for Material Processing Plant liner backing. Because modern plastic backing agents are extremely convenient and very safe, molten zinc is not typically used anymore.



NOTE: Metso highly recommends that anyone exposed to airborne dust wears dust protective devices such as an appropriate respirator to prevent inhalation of dust.

2.1.4.8 **Safety harnesses**

The Owner must make sure that any person working on elevated areas not protected by railings or on hazardous places uses suitable safety equipment, including safety harnesses, if there is a risk of falling. Confined spaces may also require safety harnesses.

2.1.4.9 **Safety locks and tags**





DANGER

ELECTRICAL HAZARD

Electric shock will cause death or serious injury.

Disconnect all devices from electric power sources before starting any maintenance or repair work. Perform the appropriate lockout and tagout procedure.





WARNING

UNEXPECTED MOVEMENT HAZARD

Unexpected movement can cause death or serious injury.

Bring all hydraulic systems or spring-loaded devices to a zero-energy state before starting any maintenance or repair work. Perform the appropriate lockout and tagout procedure.

The lockout and tagout procedure and the locks, tags and blocking/restraining devices provided are designed for Operator’s protection. It is the Operator’s responsibility to perform the lockout and tagout procedure and use the proper equipment. For more information, see [2.1.6.1 Lockout and Tagout procedure](#).

Remember the following:

- Follow procedures.
- Stay alert.
- Do not take anything for granted.
- Verify the lockout and tagout.
- The tag must identify the work being done and the person or persons who locked and tagged the control.
- After all work is completed, the tags must only be removed by the person or persons who locked and tagged the control.
- The locks and tags are changed after each shift.

Work to eliminate injury and death. Follow proper procedures at all times. Refer to appropriate standards and instructions provided by Metso.

2.1.4.10 Tools

The Owner must make sure that personnel use appropriate tools for the job. Use tools that are specially designed to break away or are easily released to help avoid certain accident situations such as unexpected movement at a nip point or a rotating shaft. The tools must never come into contact with moving parts while the Material Processing Plant is energized.

Store all detachable tools, such as mechanical supports or lifting tools, near the machine. In general, Metso products are equipped with storage location for these tools. When there is not dedicated storage location from the manufacturer, for example a tool box, the plant owner must dedicate a clear a storage position for these tools.

When working in humid or damp environments, use hydraulic tools or electrical tools that are suitably grounded, double insulated, or have ground fault interruption circuits.

Only use Metso manufactured tools with genuine Metso components.

2.1.5 Transportation safety

Observe the following precautions before transporting the Material Processing Plant:

- Securely block the chassis tires with wedges whenever connecting or disconnecting the chassis from a tractor or a dolly.
- Check the tire pressure. Use a protective cage or a clip-on type air chuck and a remote in-line valve and gauge when inflating tires. Never exceed the maximum inflation pressures of the tire or rim.
- Check the tightness of wheel lug nuts before transportation and check frequently during transportation.
- Make sure that the brake system operates correctly.
- Observe the maximum axle and tire loading capacities.
- Protect the components being transported using appropriate shipping braces and blocking material.
- Note that travel may be limited to daylight hours only, depending on your specific plant and applicable state regulations.
- Follow the recommended limits on towing speed.
- Make sure all lights are on and that they are operating correctly.
- Use traffic warning flags, signs and lights as required.
- Before moving the Material Processing Plant, check all roadways and bridges on the route for weight limits.
- Check the clearance of bridges, overhead lines and other overhead obstructions.
- Follow all applicable laws and regulations.

Extreme caution is required when transporting machinery on site. Soft or uneven ground may cause accidents. On sloping terrain, always adapt your travelling speed to the relevant ground conditions. Never change to a lower gear on a slope. Always change gear before reaching a slope.

If your machine comes into contact with a live wire during transportation:

- Warn others against approaching and touching the machine.
- Have the live wire de-energized.

2.1.5.1 Mobile equipment transportation

Use only appropriate transportation and lifting equipment with adequate capacity. Provide a supervisor to direct lifting operations. Follow all disassembly and assembly instructions carefully. Disconnect all external power supplies before moving any part of the equipment. Transport or hoist components and handle any parts in accordance with the instructions and advice provided. Fasten the lifting equipment only to the points

meant for lifting. Fasten the load carefully. Secure all component parts of the equipment immediately after loading to avoid any accidental shifting. Attach required warning signs to the load.

When moving the machinery, check bridges before crossing. Make sure they will support the weight of the machine. Check clearances under bridges, for overhead lines or any overhead obstruction. Never travel with near capacity loads. Check local laws, especially on weight limitations. When travelling on the highway make sure all headlights, clearance lights and tail lights are on, as applicable. Use proper traffic warning flags and signs.

Remove all shipping brackets before restarting the Material Processing Plant. Carefully assemble all of the parts previously disassembled. Perform any start up in accordance with the instruction manual.

After the system is running, check all gauges and instruments to see that they are working correctly. Check that all controls function normally and properly. Listen for unusual noises. Shut system down immediately if any component of the system does not operate normally.

2.1.5.2 Towing

Observe the following precautions before towing the Material Processing Plant or its components:

- Check if towing is allowed for each individual equipment.
- Make sure the towing machinery and tools are adequate for the towing operation.
- Fasten any moving or free components to make sure nothing falls during towing.
- Prepare the machine for transportation as instructed in the instruction manual.
- Before traveling on public roads, follow the instructions described in [2.1.5.1 Mobile equipment transportation](#).
- Make sure that the braking lights and tires are functional.

2.1.6 Machine safety

The machine system has several built-in safety features. Owners and Operators must make themselves familiar with the function and purpose of each feature and make sure all of the features are enabled. Owners and Operators must never attempt to defeat, bypass or disable any safety features. If any of the features are defeated or become disabled, the machine must not be operated until corrective action is taken and all safety features are restored.

Do not remove, cover or disable any installed safety devices, guards, warning signs or tags. They are attached to the equipment to warn personnel of possible danger and prevent injury. Use original equipment manufacturer (OEM) replacements if any safety devices, warning signs or tags become damaged or unreadable. Observe all instructions. Keep the safety labels and tags clean, visible and readable. The safety labels are listed and their locations described in the machine manual and Spare Parts Catalog.

Familiarize yourself with the safety signs on the Material Processing Plant. Never remove or damage any safety signs, nameplates or other safety related warnings, symbols or components. Replace them with OEM equipment if necessary. Do not paint over safety signs, nameplates or warnings.

Test the emergency stop buttons as well as the isolation switch and trap key interlock regularly for proper operation. Test also the electrical interlocks and related limit switches. If any defects in these safety features are detected, do not continue operation. Make sure that only properly trained personnel repairs, tests and certifies these safety features for appropriate operation.

Make sure that all required walkways, handrails, barriers, safety devices, and guards are in place before starting the machine. Do not use non-OEM walkways, handrails, barriers, safety devices or guards, when such items are available from OEM.

The equipment at the control panel must be handled with care. Do not place objects on the keyboard, color display or other equipment. All equipment can fail if put in contact with liquids, excessive heat or excessive

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humidity. Allow good air flow around the equipment at all times. Keep magnets away from computer components, particularly hard drives and PLC cabinets.

A knowledgeable and properly trained Operator familiar with this manual, safety requirements, and automatic operation of the machine must be stationed at the controls whenever the machine is operating.

2.1.6.1 Lockout and Tagout procedure



 **DANGER**

UNEXPECTED MOVEMENT HAZARD

Will cause death or serious injury.

Before starting any service, maintenance or repair work, make sure that the unit is stopped and locked out. Make sure that the unit is empty of material.

1. Stop the engine.
2. Switch off the control system.
3. LOCKOUT: Isolate the engine by turning the main switch to OFF position. Secure the switch lever to OFF position with a personal lock.
4. TAGOUT: Place the appropriate maintenance warning signs. The tag must identify the work being done and the person or persons who locked and tagged the control.
5. Release the pressure from the hydraulic system by opening the hand valves.
6. TRYOUT: Validate the lockout to be active by trying to start the machine. Expected result is that nothing happens.
7. Allow hot components to cool down.
8. After all work is completed, only the person or persons who locked and tagged the control are allowed to remove the tags. The locks and tags are changed after each shift.

For more detailed Lockout and Tagout instructions, also see Maintenance chapter.

2.1.6.2 Emergency stop

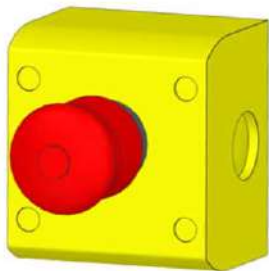


 **WARNING**

GENERAL HAZARD

Can cause death or serious injury.

On large complex systems, the emergency stop may control only those components that are in the immediate area.



In emergency stop situations, the objective is to stop the machine as soon as possible to minimize potential injuries while maintaining the structural integrity of the machine. Use the emergency stop when injury may occur or human life is in danger from continued operation of the machine. In this situation, the emergency stop is the quickest and the most effective way to stop the machine. Due to the large inertial forces of the Material Processing Plant and Material Processing Plant parts and components, the machine cannot be stopped abruptly.

Large red emergency stop buttons are typically located in control panels, service platforms or other easily accessible locations. Emergency stops can be, and often are, in the form of pull cords that run parallel to conveyors and surround hazards.

The location of local emergency stop buttons may vary on different machines. Verify the location of these buttons from the instruction and maintenance manuals specific to the equipment and/or from proper training.



CAUTION

GENERAL HAZARD

Can cause moderate injury or property damage.

The emergency stop stops the machine, but can also initiate other protective sequences. Do not use the emergency stops in daily operations.



NOTE: If the emergency stop has been used, you need to reset the emergency stop before operation can resume.

2.1.6.3 Safety interlocks

A safety interlock is a device that will interrupt the supply of electricity, hydraulic oil or compressed air to an actuator or motor. A machine already in operation may need to stop quickly due to Operator error, safety violations, or an unexpected machine event. For example, a safety gate may be interlocked to stop a machine if the gate is opened while the machine is running.

Interlocks can also be used to prevent sudden unexpected movement of a machine function or component.

During operation, the logic system (a programmable logic controller, micro controller, relay system or similar device) controls the functions of the machine.



NOTE: Interlocks built into the system employ limit switches and other sensors to help assure proper machine operation. Do not remove, modify or bypass the interlocking arrangements. Make sure they are correctly adjusted. Keep all limit switches and other sensors in good working order.

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Electric motors

Electric drives and motors may be controlled to stop or reduce speeds, as determined by the safety interlocks at a particular location.

Hydraulic system

Components that help protect the hydraulic system include certain valves, such as hose burst valves, pressure relief valves, counterbalance valves and pilot-controlled throttle valves as well as pressure transducers and drain valves for pressure accumulators. Metso uses these components where applicable in the hydraulic systems to minimize the potential for hazardous situations to occur.

A hose break valve functions to lock up if a fluid flow is discharged too rapidly from an actuating cylinder, as happens if a hose breaks and the loads react to gravity.

The pressure relief valve prevents the system pressure from rising beyond system capabilities. It helps protect the entire fluid system and any operators nearby from bursting hoses and components.

The pilot-controlled throttle valve helps prevent uncontrolled actuator movements.

Pressure transducers monitor the system pressure for information or control purposes.

Safety gates



⚠ WARNING

MOVING PARTS HAZARD

Moving parts can cause death or serious injury.

Do not open any safety gate during normal machine operation. Any exceptions to this rule are defined in the operating instructions.

Some safety gates are designed so that opening or closing of the gates will prevent or stop a specific machine function in that area. Hydraulic, pneumatic or electric limit interlock switches may cut off the drive or actuator power or initiate an emergency stop mode.

Safety gates may also be opened for maintenance purposes when the machine has been stopped. Follow all lockout procedures.

Cable switches

Cables or ropes connected to the electrical switches can also be used as interlocks. They may stop the machine function in areas where control panels cannot be closely located but where Operators may be working. Know the locations of emergency stop pull cords for conveyors.

2.1.6.4 Additional warning devices

Horns and lights

The machinery must be equipped with pre-start warning device, such as sound or light signaling, which must be used before starting the machine or machine function. The pre-start warning must give personnel sufficient time to move to a safe distance from the machine. It is the responsibility of the Owner to make sure that the Material Processing Plant is always equipped with required horns and lights.

Safety signs and labels

Obey all warning and safety signs on the machine and in the manual.

Safety signs and labels must not be removed. When required, use temporary safety signs and danger tags on the control panels to warn personnel of maintenance work and lockout situations.

Safety signs have colors to determine the degree of hazard in particular areas. The color of safety warnings is typically safety yellow.

2.1.6.5 Walkways, service platforms, ladders, and railings



⚠ WARNING

PERSONAL INJURY HAZARD
Can cause death or serious injury
It is strictly prohibited to stay on the service platform during the process.




⚠ CAUTION

SLIPPING AND TRIPPING HAZARD
Can cause moderate injury.
Be very careful when walking on machine walkways.

The design of walkways, ladders and railings follows standards and regulations for the application. The walkways provide access to the machine. Always follow safe operating procedures. Never stand, walk or climb in or on any area of the Material Processing Plant not designated for such activity. If an area of the Material Processing Plant must be accessed and cannot be reached by designated walkways, ladders, or platforms, the Owner and Operator must make all necessary arrangements for safe access to the area, including but not limited to use of safe lifting devices and fall protection.



NOTE: Regularly observe the condition of the walkways, ladders, and railings. Immediately inform your supervisor about possible damage.

2.1.7 Safety at the work site




⚠ WARNING

GENERAL HAZARD
Incorrect operation, maintenance and service can cause death or serious injury.
Only properly trained and qualified operators and service personnel are allowed to operate the machine or do service and maintenance tasks on the machine. Make sure there are no unauthorized personnel near the machine when it is operating or during service and maintenance tasks.

Safe workplace

Knowledge of the machines and the potential hazards they present are essential to a safe workplace. Knowledge of and compliance with all state, provincial, and federal safety laws, safety regulations, and Material Processing Plant safety procedures, warnings and instructions also are essential to a safe workplace. Failure to do so can result in serious injury or death.



NOTE: To recognize and control site-specific risks, the plant owner must carry out a site-specific risk assessment.

When in doubt about correct procedure, do not continue. Never bypass instructions or procedures to save time. Never place foreign items, tools, rods, or any part of your body into an operating machine. Never reach over, around or beyond safety devices. Never operate a machine if safety devices are missing or disabled. Never replace an OEM safety device with a non-OEM device. Never leave the machine unattended whilst it is in operation.

Always make sure that you and your colleagues use appropriate tools, work clothing and safety equipment when working at the Material Processing Plant. You are responsible not only for your own safety, but for the safety of those around you.

Precautions

Observe the following minimum precautions at the work site:

1. Know the locations of underground and overhead power lines and other potential hazards.
2. Select the work site with care. The ground must be firm, level and able to support the weight of the entire plant. Make sure there is enough space for all required activities, such as safe maneuvering of trucks and loaders, and for their equipment, such as loading ramps, loaders and conveyors.
3. Check that cribbing is secure and that plant has not shifted or sank.
4. Make sure that electrical cables are protected from wear and traffic.
5. Follow pre-operation checks and startup procedure covered in the individual manual supplied with your specific unit equipment.

Be aware that crushing itself and some other machine processes may momentarily obstruct the view of some machine parts.

Radioactivity

Radon is a radioactive gas that is naturally accumulated within ground and rocks. Long term breathing of radon gases may cause lung cancer.

The content of radon gases is influenced by several factors, such as mineral type, ventilation and using of binding substances, like water. Make sure appropriate personal protective equipment is worn and apply the correct safety measures that conform to your local and national regulations. The manufacturer disclaims any responsibility for the possible health risks caused by radon or any other harmful substances formed during the processing of minerals or other materials.

Keep watch

Never leave the machine unattended whilst it is in operation. Do not rely heavily on automated systems. Observe the Material Processing Plant equipment while the system is running. Pay attention to unauthorized persons approaching the site as well as any unusual behavior of the equipment, for example, uncommon noise, vibration, smell, or reduced output.

Clearing jammed or blocked equipment

The Material Processing Plant equipment can become blocked and stall because of power failures, surges of material or other unplanned events. Clearing blocked equipment is very hazardous. Shut down the system completely, and follow the lockout and tagout procedure and all instructions in the instruction manual for your specific equipment. Keep in mind that rock or uncrushable material in a stalled equipment can contain significant stored energy. Never use explosives to unblock any equipment.

Do not stand inside or under the machine while clearing a blockage. The sudden release of stored energy can cause the machine to move, potentially causing injury. In addition, be aware of possible rolling or falling material when clearing the blockage.

Make sure to follow the machine specific instructions, for example, for the crusher, when clearing the blockage. Lastly, make sure not to re-start the machine until all guards are properly installed and personnel are out of the restricted area.

2.1.7.1 Equipment mounted on trailers

If the Material Processing Plant includes portable equipment (crushing and screening equipment mounted on trailers), trailer footing or cribbing is extremely important for safe operation. Your machine must be on as solid and level footing as possible. If the ground is not naturally level, it must be leveled so that the unit will operate safely and effectively. The ground must support the weight of the entire unit and keep it from sinking or shifting. Use heavy timber mats as needed. Trailers must be raised so that trailer wheels do not touch the ground.

When preparing portable equipment for processing, do the following:

1. Place jacks at each corner of the trailer or as close to the corner as possible and to other suggested support points at mid-frame.
2. Make sure all corner jacks are at an equal distance from each end.
3. Adjust each jack until the unsupported portion of each trailer beam stops vibrating or until vibrations are reduced to a minimum.
4. If applicable, mechanically lock the jacks and adjustable support legs with locking pins.
5. Periodically recheck the trailer footing for stability.

2.1.7.2 Blasting

It is strictly forbidden to use the radio control device of the Material Processing Plant during blasting operations, as it may cause a premature explosion. Move the mobile Material Processing Plant away from the restricted area when blasting. Do not store or transport explosives on a mobile Material Processing Plant or let explosives enter a mobile Material Processing Plant.

2.1.8 Safety during maintenance and repair



DANGER

UNEXPECTED MOVEMENT HAZARD

Will cause death or serious injury.

Before starting any service, maintenance or repair work, make sure that the unit is stopped and locked out. Make sure that the unit is empty of material.



WARNING

GENERAL HAZARD

Can cause death or serious injury.

Only trained and competent personnel are allowed to operate, maintain or service the machine. If operating procedures are unclear, contact Metso for assistance before operating the machine.



NOTE: Do not compromise safety due to time pressures.



NOTE: Follow all Material Processing Plant safety and fire prevention procedures.

Before starting any repair, maintenance or troubleshooting work on the machine, follow these rules:

1. Never attempt to repair, maintain or troubleshoot any aspect of the Material Processing Plant unless you are properly trained and qualified for the activity and understand how to perform the activity in a safe manner.
2. During maintenance or service work, a minimum of two (2) persons should be present at all times. Never work alone.
3. Wear the required safety equipment, such as a helmet and a pair of safety goggles.
4. Make sure you coordinate all repair and maintenance work with other Material Processing Plant operations.
5. Follow the lockout and tagout procedure to inform others that maintenance and repair work is in progress. For more information, see [2.1.6.1 Lockout and Tagout procedure](#).
6. Transmit all knowledge of the maintenance work to the succeeding shift.
7. Know the whereabouts of all personnel in, on, at and around the machine.
8. Never service any machine or component without first referencing its maintenance manual.
9. Before handling chemicals, refer to the Material Safety Data Sheets (MSDS) and Material Processing Plant procedures for handling of these materials.

Do's and don'ts of the Material Processing Plant

- Do not perform any maintenance on moving machinery. This includes adding lubricating oil or greasing parts while the crusher is in operation.
- Never clear a jammed feeder, crushing cavity or conveyor when the system is energized. The machine must be locked out and tagged out, and all processes and components brought to a zero energy state before clearing a jam.
- Do not put your hands or feet on the release cylinders that protect the crusher from tramp iron overloads while the crusher is operating.
- Check the manufacturer's recommendations for periodic maintenance procedures. These maintenance procedures are designed to avoid harm to the Operator and damage to the equipment.
- Keep the machine and the area around it free from spillage that could cause people to trip and fall.
- Never look into the crushing cavity when the crusher is operating.
- When using a crane or other lifting device, keep all personnel clear of the area.

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If your daily check reveals something which attracts your attention - repairs, replacement or adjustment – report it immediately. Sometimes the smallest defect could cause serious problems if the machine is started.

Only carry out work which you are authorized to do. Do not try to carry out repairs for which you are not qualified. Only work on equipment that you are completely familiar with. A pressurised device could cause injury if inadvertently released.

Remember that you are responsible for the operation and maintenance of a very valuable machine - treat it as such.

2.1.8.1 Preventive maintenance

Preventive maintenance will both increase safety and be economically beneficial. It is safer and more economical to replace a worn part during a scheduled shut-down than to repair a broken device in the middle of a production cycle. A machine or device that is not in proper condition, and that has been left without regular maintenance and inspection, is a safety risk for its user. For example, a bearing may fail without lubrication, bringing a production line down. In addition, a hot bearing may present a fire hazard or cause skin burns.

Some preventive maintenance suggestions:

- Observe the maintenance and lubrication instructions of the machine and equipment suppliers.
- Keep the machine and the surrounding area clean and tidy.
- Monitor the vibration levels of the machine, also to help predict bearing failures.
- Monitor the power consumption of motors to help detect early failures.
- Repair all leaks as soon as possible to prevent more serious conditions that eventually may occur.
- Monitoring the condition of pipes and tubes enclosed in ducts; repairing possible leaks.
- All spare parts of whatever kind must always be of comparable size, type and quality with the part to be replaced.
- Use only genuine wear parts of Metso.

2.1.8.2 Inspection of the machine structures

Metso products are designed and manufactured for long use. During lifetime of the product, it will encounter several factors that can influence its lifetime. A few of these factors are vibration, misuse of the product and environmental factors, such as extreme temperatures or humidity. To keep the product operational and safe, regular inspections and maintenance are required.

Steel structures must be checked annually or before commissioning of long stored machinery. At least the following items must be inspected:

- loads and deviations from the designed use,
- joints (screw and welded locations),
- reinforcements and supports,
- wearing of items (corrosion, fractures, bends),
- similar points of interest.

Also refer to the inspection and maintenance table in the Maintenance chapter. Keep record of possible findings and completed maintenance tasks. When inspecting the structures, it is recommended to use the following items:

- records of previous findings and carried out maintenance tasks,
- man lift,
- additional lighting and camera,

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- spirit level and tape measure,
- wrench,
- feeler gauge and other welding gauges.

Welding inspector must be familiar with the equipment, and for some cases inspector must be authorized to review weld quality. In addition, depending on the service area, welders are required to have sufficient qualifications to carry out welding work.



⚠ WARNING

GENERAL HAZARD

Can cause death or serious injury.

Contact Metso before any welding of major Material Processing Plant components, for example, the main frame, adjustment ring, or bowl. Performing welding on the Material Processing Plant components can be dangerous for machine operation. Before welding, always verify that the material is weldable. Failure to do so may result in a weldment failure and present a risk of injury and/or property damage.

2.1.8.3 Electrical safety during maintenance and repair



⚠ DANGER

ELECTRICAL HAZARD

Electrical systems can be very dangerous. Will cause death or serious injury.

Only competent and qualified electricians are allowed to carry out electrical installation, maintenance or repair work.

Before working on electrical systems, make sure all components are brought to a zero energy state including capacitors and similar electrical devices.

Before maintenance work, do the following:

- Make sure all control power supplies are turned off and disconnected, and that the lockout and tagout procedure has been followed. For information on the lockout and tagout procedure, see [2.1.6.1 Lockout and Tagout procedure](#).
- Confirm that **ALL** power sources are disconnected. Some electrical devices may be supplied by more than one power source.
- Be aware that multiple voltage levels may exist in some junction boxes.
- For testing and troubleshooting, clear all personnel from the machine. Reactivate the necessary power supplies and perform the tests. Then again disconnect all power supplies and follow lockout instructions before doing any further maintenance work.
- Make sure electrical supply voltage is disconnected before drilling into any structural frame members. There may be electrical cables inside.

If unit batteries need to be charged, remove the + and - cables from the batteries during charging to avoid anomalous voltages and interference that may damage control system. Jump starting can be used for engine starting if the batteries of the unit are too weak to start the engine. Make sure that the voltage level of the auxiliary power source corresponds to the control system (24 VDC).

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 CAUTION

PROPERTY DAMAGE HAZARD

Can cause moderate injury or property damage.

Do not use quick chargers or start boosters. The voltage control and interference of these devices may damage the components of the control system.

Electrical fault situations

Electrical faults may be caused by component failures such as loose or damaged wiring. Diagnostics are provided through pilot lights, alarms, and help messages.

Electrical connections can and do loosen due to vibration in transit and thermal expansion of the wires and lugs in operation. This is especially true after initial delivery, break-in and after major relocation. Loose connections increase current draw, which can result in false trips, intermittent circuits, and burned-out components.

As part of the startup, check and retighten as necessary all electrical connections in the electrical enclosure. Repeat after the first 40–50 hours of operation. This work must be performed by properly trained and qualified electricians.

Program changes



 WARNING

UNEXPECTED MOVEMENT HAZARD

Can cause death or serious injury.

Do not make any changes to the control program. Only Metso personnel are allowed to make changes to the control program supplied by Metso. A faulty program code can cause the machine to behave unexpectedly. Metso needs to review and approve in writing any changes to the interlock circuitry before the changes are implemented. Make all changes with extreme caution.

An electric outlet may be supplied in the logic center and control cabinet for programming purposes only. Do not connect any electrical tools to this outlet. The tool may cause electrical disturbances in the machine control system. This could alter the machine control program and cause unpredictable machine operation.



NOTE: Do not use the logic center or control cabinet outlet for anything other than a programming device.

2.1.8.4 Fire safety during maintenance and repair

Observe all regulations on fire safety. Sources of fire include, but are not limited to the following:

- Sparks from grinding
- Flames and molten metal from welding or torching
- Electrical arcing

- Spontaneous combustion
- Smoking

Before starting any work, take the following steps to prevent a fire hazard:

1. Properly dispose of rags with combustible material to avoid spontaneous combustion.
2. Move flammable materials at least 10 m (33 ft) away from any fire hazard location.
3. Cover all of the flammable elements, which cannot be moved by using sealed protections, such as welding covers or corrugated sheets.
4. Clean up all debris.
5. Clean up all oil spills and leaks.
6. Remove any source of flammable gases, liquids or solids.
7. Use proper electrical grounding techniques for welding.
8. Provide adequate fire extinguishing equipment. Inspect such fire equipment regularly.
9. Arrange for qualified personnel to guard against fire during welding, cutting or heating operations, as well as a sufficient period of time after the work is completed.
10. Protect yourself and others from sparks with proper personal protective equipment and clothing.

2.1.8.5 Hydraulic safety during maintenance and repair



WARNING

PRESSURIZED COMPONENT HAZARD

Hydraulic systems are very dangerous when under pressure. Can cause death or serious injury.

Only competent and certified personnel with knowledge of hydraulic laws and the required safety precautions are allowed to do hydraulic maintenance or repair work.

Before doing any repair, maintenance or diagnostic procedures on the hydraulic system, bring all components to a zero energy state, including components such as cylinders, accumulators, spring loaded hydraulic devices, circuitry between valves and actuators.

- Mineral and other oils and additives can cause skin irritation. Inhaled oil mist can also cause internal irritation, headache or nausea. Avoid repeated exposure to these materials. Use appropriate personal protective equipment.
- Purge entrapped air from the hydraulic system. Entrapped air in the hydraulic system can cause erratic and unexpected movements.
- Oil mist in the work area or oil leaking onto floors and walkways will cause a serious risk of slipping. Clean up all spills and repair leaks immediately.
- Hydraulic oil temperature may be extremely high.

- If you are injected with hydraulic oil or any other fluid, immediately seek treatment from a doctor trained in the treatment of penetrating fluid injuries.
- A mixture of air and oil mist may explode at higher temperatures. Hydraulic oil spilled on hot machine surfaces may start a fire.
- Do not handle pressurized hydraulic hoses with bare hands since high-pressure leaks may easily penetrate the skin. Hydraulic fluid pressure in the hoses may exceed 210 bar/21 MPa/3000 PSI.



⚠ WARNING

HYDRAULIC PRESSURE HAZARD

Built-up pressure can cause death or serious injury.

Pressure can remain behind the hose burst and lock valves. Make sure all hydraulic components are brought to a zero-energy state before starting maintenance.



⚠ WARNING

SKIN INJECTION HAZARD

Can cause death or serious injury.

Before restarting the machine, make sure the hydraulic system is ready for operation, and personnel are clear of affected areas. Wear all appropriate personal protective equipment, such as safety gloves and protective overalls, when handling hydraulic components. Poorly tightened or damaged hydraulic components may inject dangerous jets of fluid which can cause death or serious injury.

If you are injected with hydraulic oil or any other fluid, immediately seek treatment from a doctor trained in the treatment of penetrating fluid injuries.

Hydraulic hoses are subject to wear and tear. Pressurized hoses tend to straighten up, bend or twist due to reaction forces. Replace all weakened or deteriorated hoses immediately. Keep hoses properly clamped and secured to help prevent being whipped by broken hoses.

- Avoid letting dirt and other impurities into the system while doing maintenance work. Use lint free cloths for cleaning the hydraulic components system.
- When changing a cylinder, or other hydraulic device, plug all open ports and hose ends. Catch spilled oil in a suitable storage device and avoid introducing dirt into the system. Dispose of all waste fluids as presented by law.
- Tighten disconnected pipe and hose couplings immediately after reinstallation. Before finishing the work, check all parts and connections that have been serviced or repaired.
- Before starting up the pumps, make sure that maintenance work is completely finished in all work areas. When starting up the pumps, stay at a distance from the areas which were repaired.
- Before opening the main valves, make sure that there is no one working between any parts of the machine, since pressurization of the system may cause machine motion.
- Once the system is in the pressurized state, test repaired system for proper operation before putting system back into production.

Check the system for possible leaks after repair. When checking a possible hydraulic leak, use a sheet of paper or a suitable rigid plate. Do not use your hand. Leaking fittings must not be tightened when under pressure. To seal threaded fittings, use appropriate sealing rings or a sealing compound suitable for hydraulics.

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2.1.8.6 Mechanical safety during maintenance and repair



NOTE: Follow the lockout and tagout procedure before doing maintenance or repair work.



NOTE: Block up and support parts as necessary to prevent any unexpected movement when performing maintenance.

Make sure all energized mechanical components (for example, all spring driven devices, cylinders, accumulators, drive shafts, pulleys, rollers, gears) are brought to a zero energy state before entering the machine and doing the work. Never do repair, maintenance, or troubleshooting work on or near energized mechanical components.

Confined spaces



DANGER

TOXIC GAS HAZARD

Will cause death or serious injury.

Confined spaces may contain high concentrations of gases which may cause death or serious injury. Follow all established safety procedures. Wear respiratory protection.

A confined space means a space that fulfills the following criteria:

- Large enough and so configured that a person can enter and perform assigned work.
- Has limited or restricted means for entry or exit (for example, the crushing cavity, tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry).
- Not designed for continuous employee occupancy.

Certain confined spaces may require an entry permit program to allow entry. Make sure that all applicable procedures are followed. If you have questions, contact your Material Processing Plant supervisor for more information.

2.1.9 Disposal and environmental safety

Improper disposing of waste, machine or machine components can cause hazard to people, property, animals or the environment. Follow instructions and refer to Material Safety Data Sheets (MSDS) when applicable. Follow all applicable local regulations regarding the disposal of waste. For more detailed disposal information, contact Metso's technical support for assistance.

Disposal of waste

During the lifetime of the machine waste material, such as oil, fuel, coolant, filters and batteries, may be generated.

Use leakproof containers when draining fluids. Do not use food or beverage containers, as these are not meant to be used as containers for hazardous chemicals, and may break or may mislead someone into

drinking from them. Some liquids, such as sulphuric acid found in batteries, can cause severe burns and produce explosive gases. Wear personal protective equipment and avoid contact with the skin, eyes or clothing when handling chemicals and chemical waste.

Do not pour waste onto the ground, down a drain or into any water source. Legislation concerning disposal of waste may vary in each country. Refer to the Material Safety Data Sheets (MSDS) and Material Processing Plant procedures for correct disposal of these materials.

Disposal of machine and components

Whenever a machine is taken out of use, being dismantled or disposed of, all hazardous materials, such as oils, battery acids, fuels, must be carefully removed first to eliminate any danger to life and the environment.

Some components are also known to contain hazardous materials. Make sure that these components are removed and handled separately.

All hazardous materials must be removed to a suitable waste collection plant for disposal or re-cycling. Dispose of the machine so that there is no danger to life or the environment. Legislation concerning disposal of waste may vary in each country.

Ensure that all consumables and replaced parts are disposed of safely and with minimum environmental impact.

California Proposition 65 Warning



⚠ WARNING

CHEMICAL HAZARD

Can cause death or serious injury.

Component of this machine can expose you to chemicals, including 1,3-butadiene, lead, and lead compounds, which are known to the State of California to cause cancer and birth defects or other reproductive harm.

For more information, go to www.P65Warnings.ca.gov.

The above warning is also valid outside the State of California.

1,3-butadiene can be found in conveyor belts. Lead and lead compounds can be found in some crusher components such as bearings. Normal handling of these components is not dangerous, but hazardous chemicals may be released into air, for example, when the parts are being cut or heated.

For more detailed disposal information, contact Metso's technical support for assistance.

2.2 Lokotrack ST safety instructions

2.2.1 Conveyor safety instructions

Guards and protection devices

- Belt drives are guarded.
- Conveyor head and tail drum nip points are guarded.
- Conveyors are equipped with emergency stop cables and safety switches or valves.
- Emergency stop buttons are provided on the remote control box and service platform and in the electrical center and cabin.



⚠️ WARNING

PERSONAL INJURY HAZARD

Can cause death or serious injury.

Do not use conveyor belts as walkways. Do not climb on them. Do not attempt to stand on, walk on, or step across a conveyor.

Do not stand below a running conveyor. Stay away from any falling or dropping materials or components. Wear a safety helmet and any other appropriate personal safety equipment.

Do not wear loose clothing, neckties, necklaces or other loose items when you are near the conveyors or other moving or rotating equipment. Be careful around hazardous nip points.

Only use the emergency stops in emergency situations - do not use them for routine stopping of the conveyor.

Stop the conveyor and perform the lockout and tagout procedure before doing any maintenance or repair tasks.



⚠️ DANGER

UNEXPECTED MOVEMENT HAZARD

Will cause death or serious injury.

Stopped equipment is not necessarily safe equipment. Stored energy can be released unintentionally or by incorrect maintenance procedures. Before maintenance, verify that target equipment is free of stored energy.





⚠ WARNING

MAGNETIC HAZARD

The magnet can interfere with the functioning of pacemakers and can cause death or serious injury.

Do not go near a magnet if you have a pacemaker. The powerful magnet will damage and interfere with electronic devices, such as pacemakers, insulin pumps, laptop computers and mobile phones, as well as credit cards. Maintain a minimum safety distance of 5 m (17 ft).

The operator must be acquainted with the following:

- Structure and operation of the conveyor
- Points of danger
- Safe working and moving near the conveyor
- Emergency stop functions and the locations of the emergency stop switches

The safety, operating, and maintenance instructions of the conveyor should always be easily available near the conveyor. Personnel are required to review and obey all safety instructions and warnings.

The conveyor should only be used for its intended purpose: do not use it to carry persons. Unauthorized persons are not allowed to be near the conveyor.

No changes are allowed to be made on the conveyor without the manufacturer's written consent. In addition, no safety devices are allowed to be removed.

All those moving near the conveyor must use the marked walkways, service platforms, stairs, and ladders, and these must always be kept clear.

POINTS OF DANGER

- Drive end
- Tensioning end
- Nip points of pulleys
- Nip points of idlers
- Nip points of hold down wheels
- Loading and discharging locations
- Material flow
- Electric equipment and cables
- Conveyor folding and raising mechanisms

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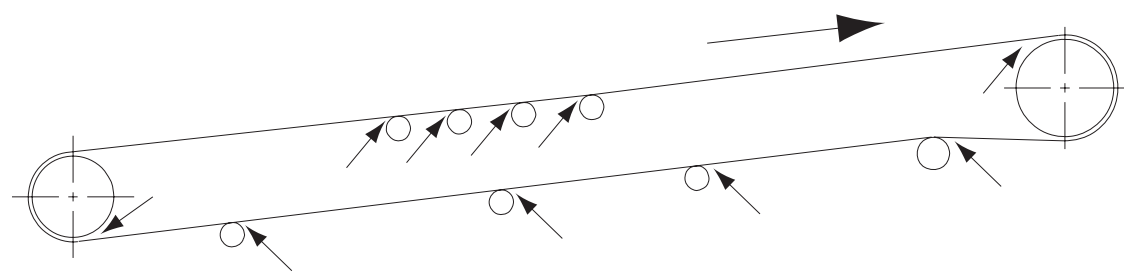


Figure 3. Nip points on conveyor

2.2.2 Automation system safety instructions

Equipment safety

Important equipment safety considerations:

- Take care not to hit the display. Hitting the display with a sharp or hard object can easily cause damage.
- Use the display with bare fingers only.
- The automation system must be serviced by authorized maintenance personnel only. The warranty becomes void if the equipment is worked on by an unauthorized person.
- Careful operation and maintenance are required to ensure trouble-free and safe operation of the display. The warranty for the display becomes void if these instructions are not followed.
- High frequency radiation may cause the display to malfunction.
- Do not direct a jet of water onto the display when washing the equipment with a pressure washer.

Control system and welding the unit

Always take care to protect the control system when welding the unit.

- Stop the engine
- Disconnect the grounding cable from the batteries.
- Disconnect the engine wire harness sockets from the engine control board (refer to engine instructions).
- Fasten the grounding cable of the welding device as close to the part to be welded as possible. Make sure that no welding current passes through any bearings or electrical equipment.

Battery charging and jump starting

If unit batteries need to be charged, remove the + and - cables from the batteries during charging to avoid anomalous voltages and interference that may damage control system.

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 CAUTION

PROPERTY DAMAGE HAZARD

Can cause moderate injury or property damage.

Do not use quick chargers or start boosters. The voltage control and interference of these devices may damage the components of the control system.

Jump starting can be used for engine starting if the batteries of the unit are too weak to start the engine. Make sure that the voltage level of the auxiliary power source corresponds to the control system (24 VDC).

2.2.3 Restricted area



 WARNING

PERSONAL INJURY HAZARD

Can cause death or serious injury.

Before starting the machine, make sure that there are no persons in the area whose safety may be endangered. Walk around the machine and make sure that there is nobody on, by or below the machine. Warn everybody nearby before starting.



 WARNING

PERSONAL INJURY HAZARD

Can cause death or serious injury

It is strictly prohibited to stay on the service platform during the process.



 WARNING

UNEXPECTED MOVEMENT HAZARD

Unexpected movement of the machine can cause death or serious injury.

Lockout and tagout the machine controls before doing any maintenance or repair work to avoid unexpected movement of the machine. Do not tamper with limit switches or other safety devices included in the system.



 WARNING

FALLING HAZARD

Can cause death or serious injury.

Use a man lift and a safety harness to access high maintenance locations or when working outside the service platforms. Do not step on the handrails.

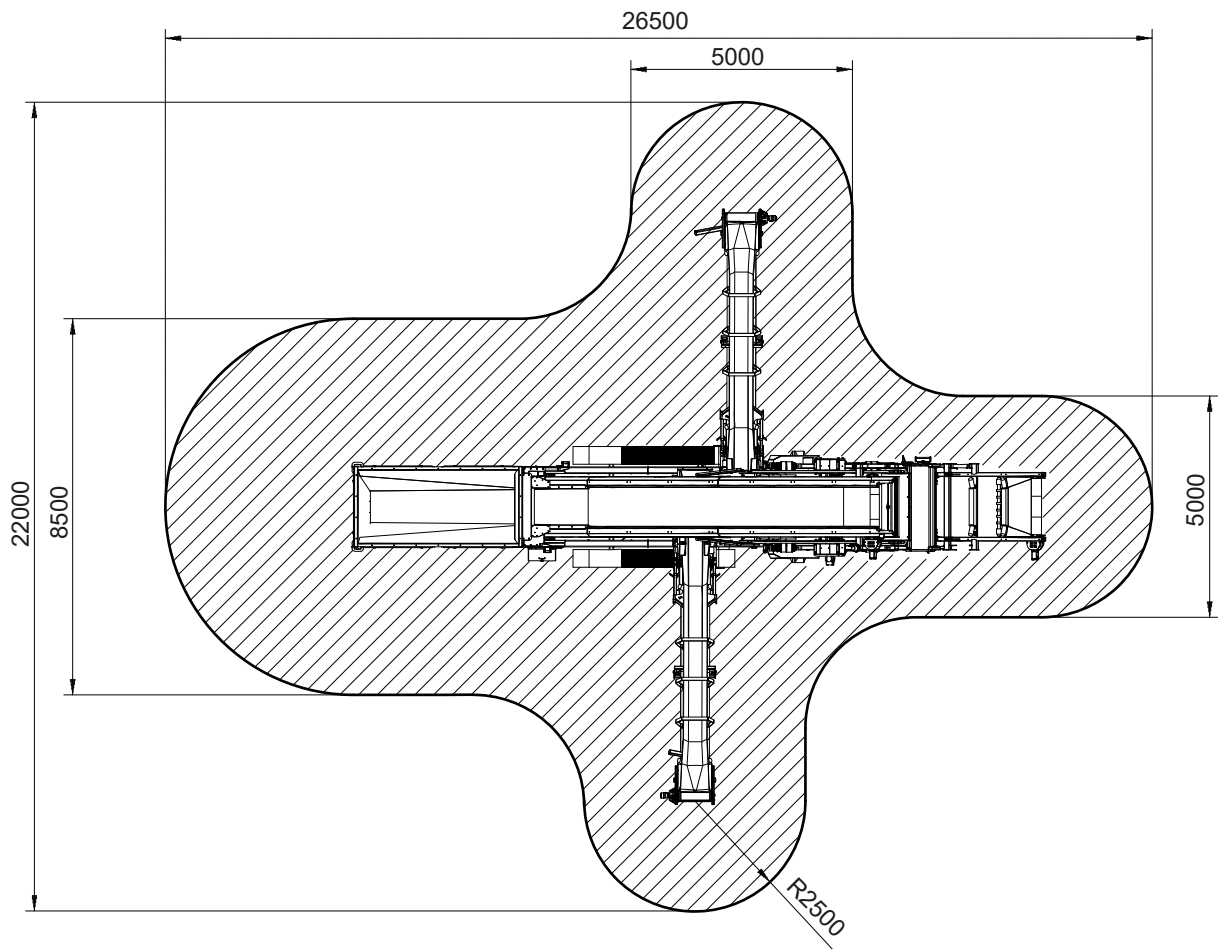


Figure 4. Restricted area during operation

2.2.4 Emergency stop

If a dangerous situation occurs, push the nearest emergency stop. The emergency stop is connected to the process control system and it stops the engine and the screening process after the safety function has been triggered by pressing the button.

To reset an emergency stop, pull the red button to its outer position. Before restarting the machine, make sure that the restricted area is clear of people and that no one will be endangered by your action.

WARNING

GENERAL HAZARD

Can cause death or serious injury.

Test the operation of the emergency stop buttons and other safety devices weekly.

The emergency stop buttons as well as the remote stop button stop the engine and cause all functions to cease and the system to shutdown. Do not stop the unit with the emergency stop or the remote stop in daily operations.

- 

NOTE: The buttons on the sides of the conveyors only stop the conveyor in question.
- 

NOTE: The emergency stop does not stop the other units even when they are connected with interlock cable. Other units have separate emergency stops.
- 

NOTE: To stop the engine with the remote stop button of the drive control device, the drive control device must be connected.
- 

NOTE: To stop the engine with the radio control remote stop, the radio transmitter has to be on and in operating range.

2.2.5 Emergency stop locations



 **DANGER**

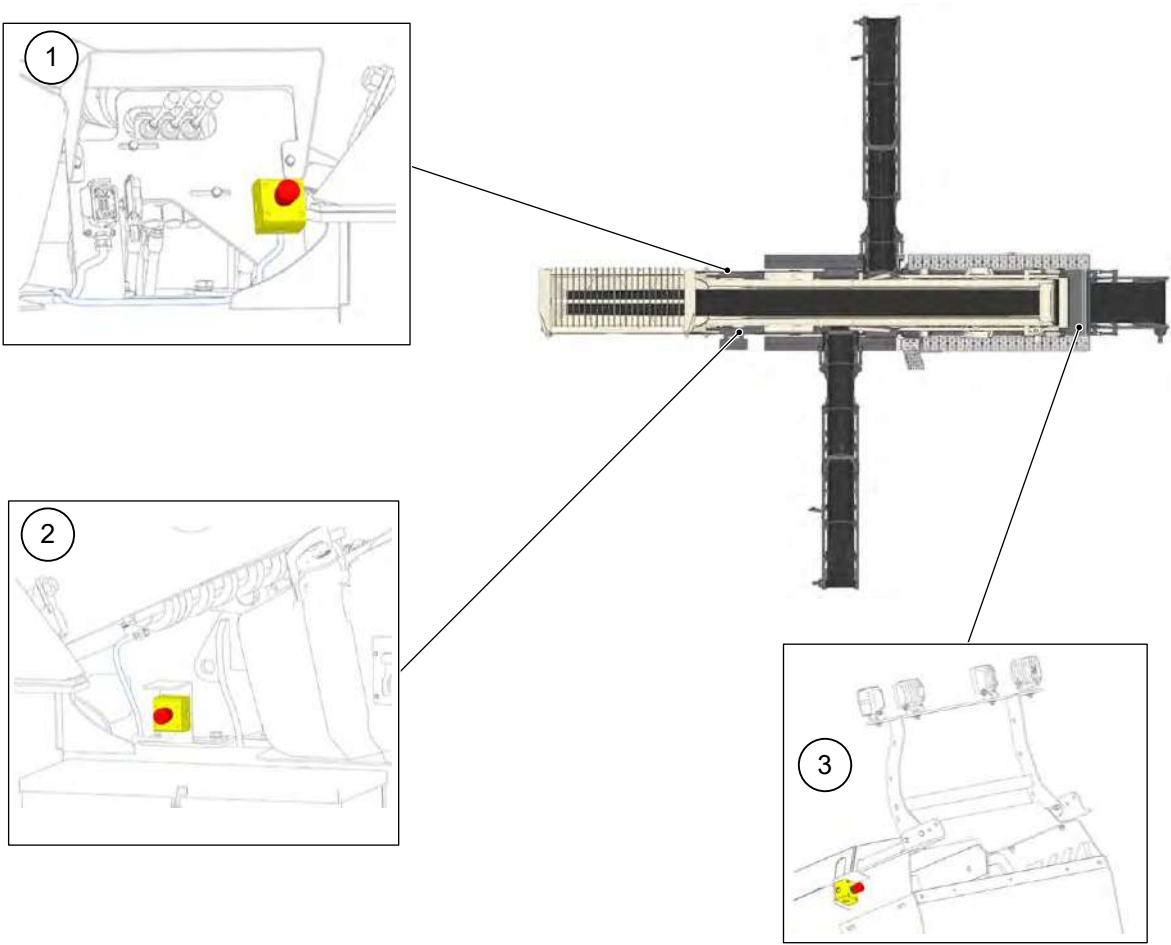
GENERAL HAZARD

Will cause death or serious injury.

In a dangerous situation, stop the machine with the emergency stop button, the key switch of the machine, or with the remote stop button (located on either the radio control box or the remote control box).



Figure 5. Emergency stop



Callout	Description
1	On the left side of the machine
2	On the right side of the machine
3	On the service platform

Figure 6. Locations of the Lokotrack ST3.8 emergency stop

2.2.6 Remote stop locations

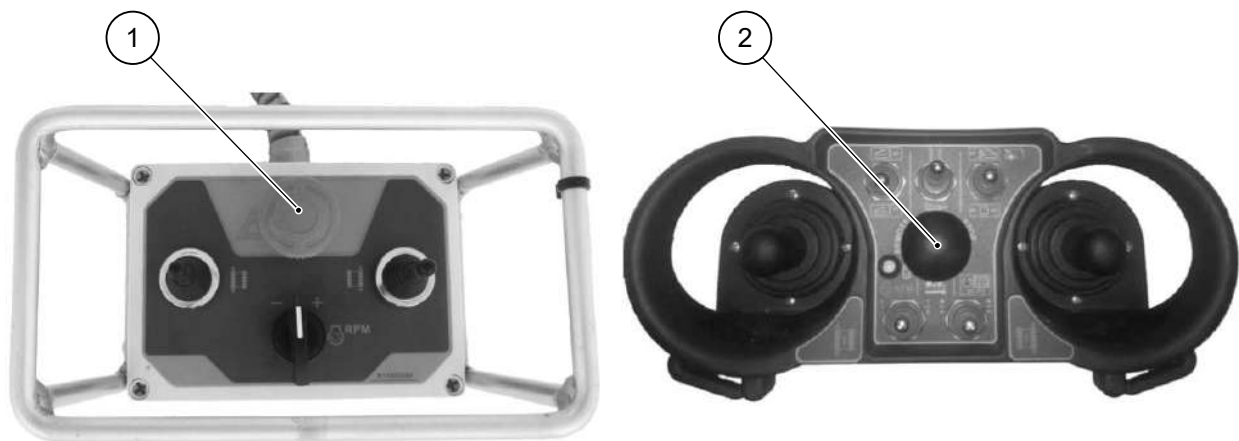



DANGER

GENERAL HAZARD

Will cause death or serious injury.

In a dangerous situation, stop the machine with the emergency stop button, the key switch of the machine, or with the remote stop button (located on either the radio control box or the remote control box).



Callout	Description
1	Remote stop button in drive control device
2	Remote stop button in radio control device

Figure 7. Locations of remote stop buttons

 **NOTE:** To stop the engine with the remote stop button of the drive control device, the drive control device must be connected.

 **NOTE:** To stop the engine with the radio control remote stop, the radio transmitter has to be on and in operating range.

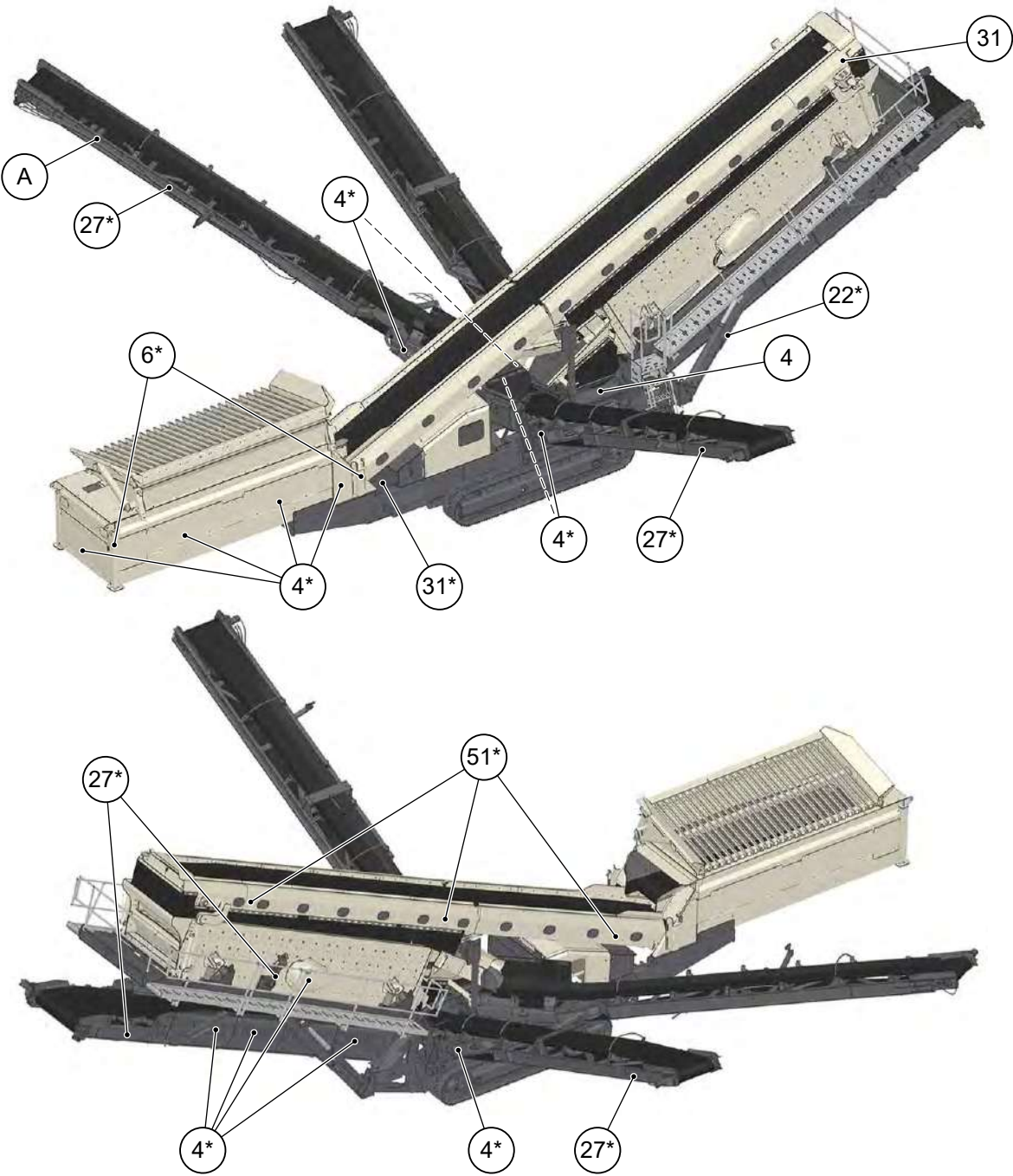
2.2.7 **Safety labels**

Safety labels which are attached to the equipment must always be kept readable and clean. Damaged or loose signs must be replaced at once. If a component of the machine with an attached a safety label is replaced, always make sure that the required safety labels are included with the new component.

 **NOTE:** There are two different sets of safety labels (ISO and ANSI) depending on the delivery country. You can check which set of safety labels is used on your machine from the side of the machine or the Spare Parts Catalog.

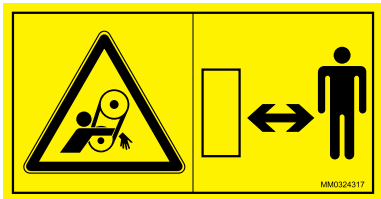
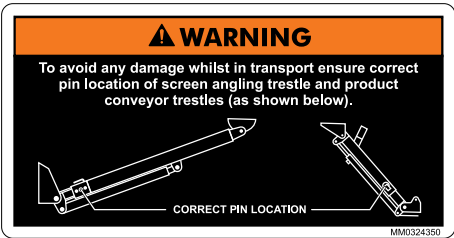
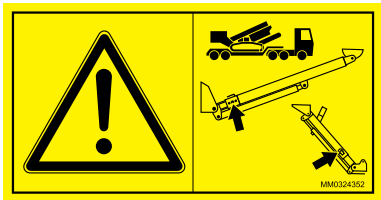
Safety label location picture can be found also from the spare part catalogue.

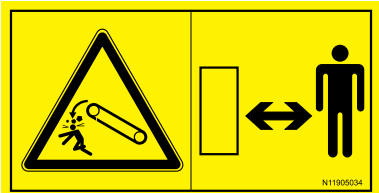
 **NOTE:** You must use Spare Parts Catalog for ordering spare parts.



An asterisk (*) indicates that the safety label is on both sides of the machine.
A: This side conveyor is included in ST4.8 only.

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Callout	ANSI	ISO
4	 MM0324330	 MM0324317
	WARNING: Exposed moving parts can cause severe injury. Lock out power before removing guard. Item: MM0324330	WARNING: Exposed moving parts can cause severe injury. Lock out power before removing guard. Item: MM0324317
6	 N11905110	 N11904865
	DANGER: Material can fall out. Watch out for material dropping from the bucket. Item: N11905110	DANGER: Material can fall out. Watch out for material dropping from the bucket. Item: N11904865
22	 MM0324350	 MM0324352
	WARNING: To avoid any damage whilst in transport ensure correct pin location of screen angling trestle and product conveyor trestles. MM0324350	WARNING: To avoid any damage whilst in transport ensure correct pin location of screen angling trestle and product conveyor trestles. MM0324352

Callout	ANSI	ISO
27		
	WARNING: Dropping material. Watch out for material dropping from the conveyor. Item: N11905121	WARNING: Dropping material. Watch out for material dropping from the conveyor. Item: N11905034
31		
	Emergency stop. Item: N11891135, B-319016	Emergency stop. Item: N11904932
51		
	WARNING: Fall hazard. Do not stand on the machine. Item: N11905102	WARNING: Fall hazard. Do not stand on the machine. N11904847

Project ID:	Plant Code:	Plant Unit Code:	Document Type:	Running No:	Revision: 0	Metso Document ID: D100033106
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2.2.8 Safety labels (engine module)



An asterisk (*) indicates that the safety label is on both sides of the machine.

A double asterisk (**) indicates that the safety label is behind the door of the engine module.

Dashed line indicates that the exact location of the safety label is not visible in the picture.

Callout	ANSI	ISO
4	A yellow triangular warning symbol with a black border, showing a person being struck by a rotating part. To the right of the symbol is a black rectangular box with white text: WARNING Exposed moving parts can cause serious injury. Keep away. Item: MM0324330	A yellow rectangular warning label. On the left is a yellow triangular warning symbol with a black border, showing a person being struck by a rotating part. To the right of the symbol is a black rectangular box with white text: WARNING Exposed moving parts can cause severe injury. Lock out power before removing guard. Item: MM0324317

Callout	ANSI	ISO
5		
	CAUTION: Hot surface. Contact with skin may cause burns. Do not touch. Item: N11905107	CAUTION: Hot surface. Contact with skin may cause burns. Do not touch. Item: N11904851
13		
	DANGER: Do not perform any maintenance, adjustment, or cleaning while the machine is operational. Item: MM0324302	DANGER: Do not perform any maintenance, adjustment, or cleaning while the machine is operational. Item: MM0336381

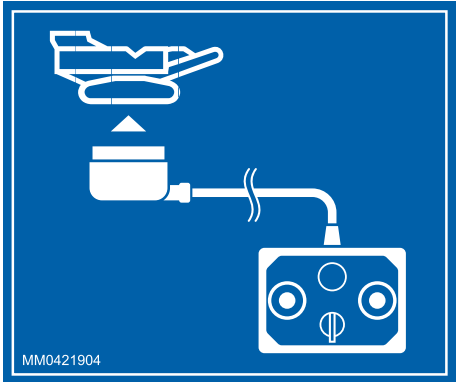
Callout	ANSI	ISO
25	 ⚠ WARNING Read and understand operating manual before using this machine. Failure to follow operating instructions may result in death or serious injury.  N11905118	  N11904863
	WARNING: Read and understand operating manual before using this machine. Failure to follow operating instructions may result in death or serious injury. Item: N11905118	WARNING: Read and understand operating manual before using this machine. Failure to follow operating instructions may result in death or serious injury. Item: N11904863
36	⚠ DANGER  Lung disease hazard. Dust protection required. ⚠ WARNING  Risk of eye injury. Use of eye protection required. ⚠ CAUTION  Risk of head injury. Use of a helmet required. ⚠ CAUTION  Hazardous noise level. Use of ear protection required. MM0345103	 MM0345066
	Use of the personal protectives required. Item: MM0345103	Use of the personal protectives required. Item: MM0345066

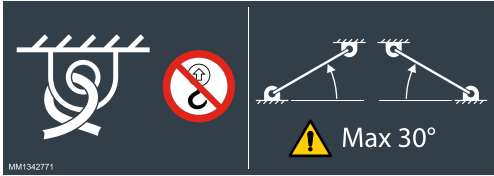
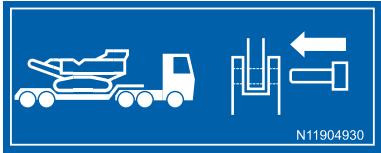
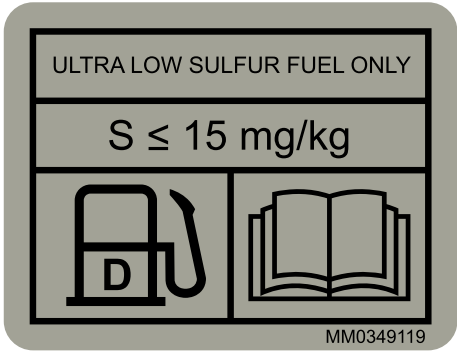
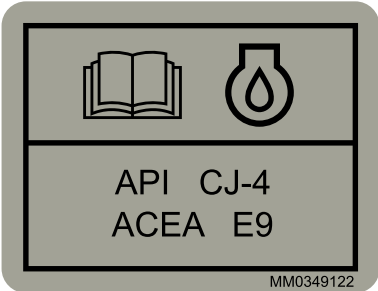
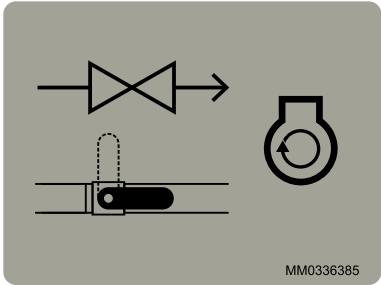
Callout	ANSI	ISO
43	 MM0367650	 MM0367651
	CAUTION: Lock out before servicing. Item: MM0367650	CAUTION: Lock out before servicing. Item: MM0367651
45	 N11905114	 N1190944
	DANGER: Explosion hazard. Switch off the radio control before blasting. Item: N11905114	DANGER: Explosion hazard. Switch off the radio control before blasting. Item: N1190944

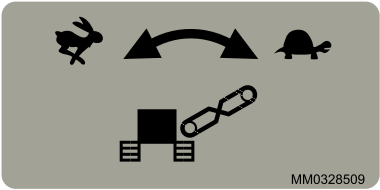
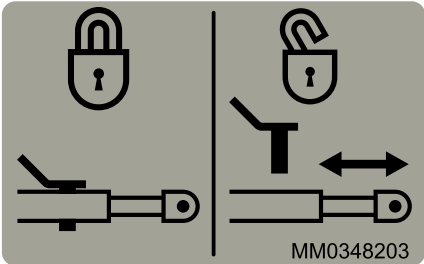
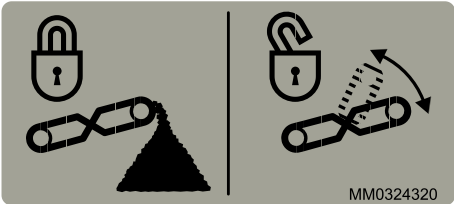
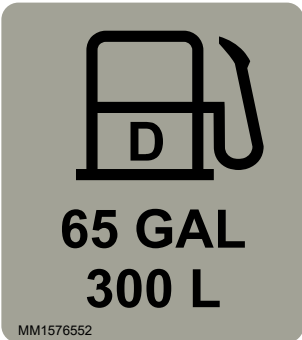
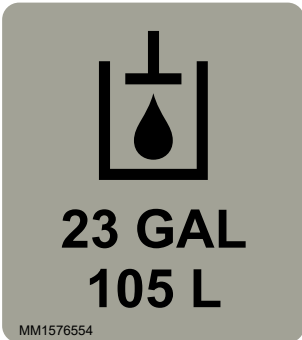
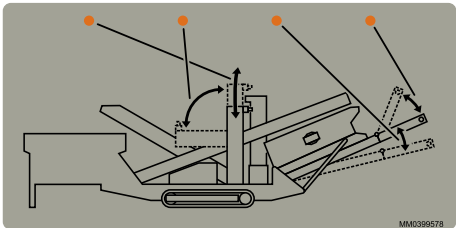
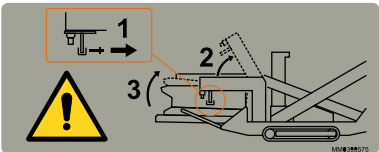
2.2.9 Instruction signs

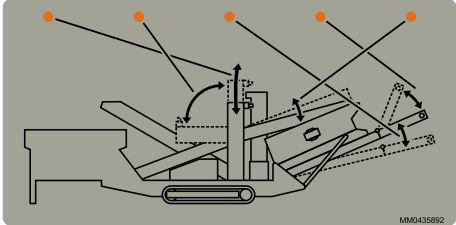
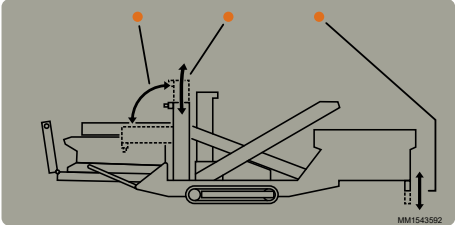
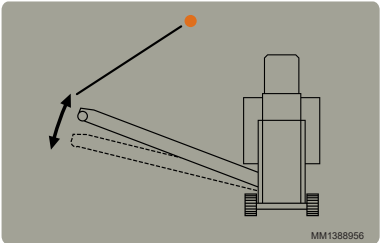
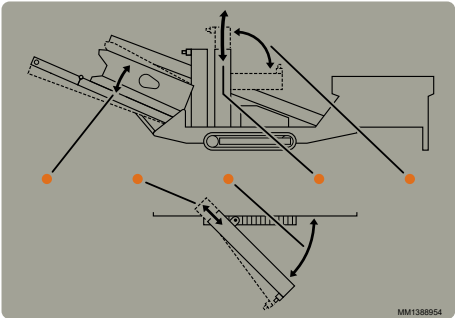
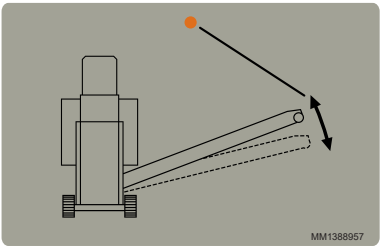


NOTE: You must use Spare Parts Catalog for ordering spare parts.

 MM0421904	 N11904928
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Controller connection Item: MM0421904	Greasing point Item: N11904928
	
Tie-down point. Do not use as lifting point. Maximum tie-down angle: 30 degrees Item: MM1342771	Locking pin and clip for transport Item: N11904930
	
Ultra low sulfur fuel only Item: MM0349119	AdBlue Item: MM0393101
	
Oil Item: MM0349122	Valve open Item: MM0336385

 MM0328509	 MM0454654
Side conveyor speed Item: MM0328509	Power switch off time Item: MM0454654
 MM0348203	 MM0324320
Hydraulic cylinder locking pin. Lock the cylinder with the pin when not in use. Detach the locking pin before operating the cylinder. Item: MM0348203	Conveyor locking pin. Conveyor is locked with the pin into the operating position. Detach the locking pin when folding or unfolding the conveyor. Item: MM0324320
 MM1576552	 MM1576554
Fuel tank capacity Item: MM1576552	Hydraulic oil tank capacity and recommended oil level Item: MM1576554
 MM0396578	 MM0458575

Manual valves ST4.8/ST4.10 Item: MM0399578	Screen lifting instruction for track driving, ST4.8/ST4.10 Item: MM0399575
	
Manual valves ST4.8/ST4.10. This label replaces the label MM0399578 if the lifting option of the lifting conveyor is installed. Item: MM0435892	Manual valves ST4.8/ST4.10 Item: MM1543592
	
Manual valve ST3.8, ST4.8, ST4.10. Side conveyor angle UP-DOWN (option) Item: MM1388956	Manual valve ST3.8, ST4.8, ST4.10. Side conveyor angle UP-DOWN (option) Item: MM1388954
	
Manual valve ST3.8, ST4.8, ST4.10. Side conveyor angle UP-DOWN (option) Item: MM1388957	

2.2.10 Noise emission information



 **DANGER**

NOISE HAZARD

Will cause permanent hearing damage.

The noise level near the machine exceeds 85 dB(A). Wear appropriate ear protection.

Declared noise emission values in accordance with EN ISO 4871:2009.

Machine type: Lokotrack ST3.8 with Tier IV/Stage V/China Stage IV engine.

Noise test code: ISO 21873–2:2019

Basic noise emission standard: EN ISO 3746:2010 and EN ISO 11202:2010 (grade 3)

Measurement uncertainty in decibels, all measurement points U = 5.0 dB(A)

Operating conditions: Fast Idle Mode. The machine was operated with all equipment running at maximum speed and without processed material.

- A-weighted sound power level (EN ISO 3746:2010) 114 dBA
- A-weighted sound pressure level at the operators position at 1.0 m distance from the machine and at 1.6 m from the ground LpA (EN ISO 11202:2010) 94 dBA

Estimated process noise emissions with hard rock material, maximum feed size 120 mm:

- A-weighted sound power level (EN ISO 3746:2010) 116 dBA
- A-weighted sound pressure level at the operators position at 1.0 m distance from the machine and at 1.6 m from the ground LpA (EN ISO 11202:2010) 99 dBA

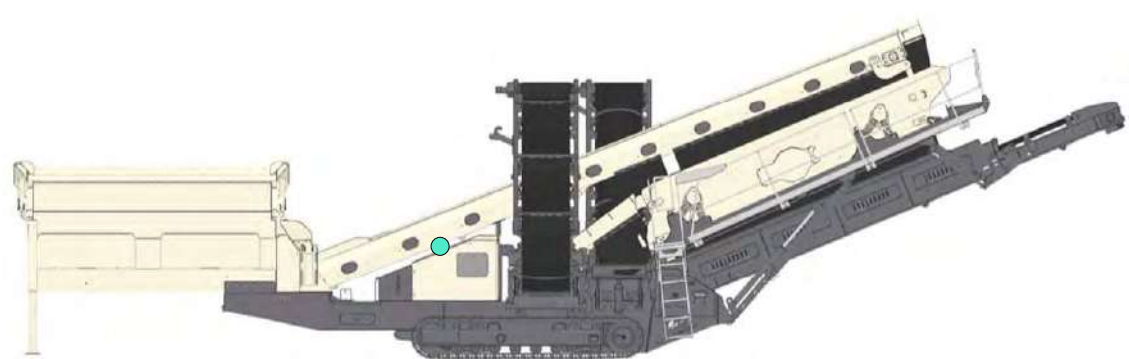


Figure 8. Lokotrack ST3.8 — A-weighted sounds pressure level measuring points at 1.0 m distance and 1.6 m height (marked in the image)



NOTE: Process noise is highly dependent on process parameters such as feed material, feed size, and screen media. Reproducibility is very poor.



NOTE: LpC peak may exceed 130 dB.

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3 Technical specification

3.1 Machine introduction

This Instruction manual is valid for Lokotrack ST3.8 screening unit manufactured by Metso.

The illustrations in this instruction may not fully correspond to your machine.

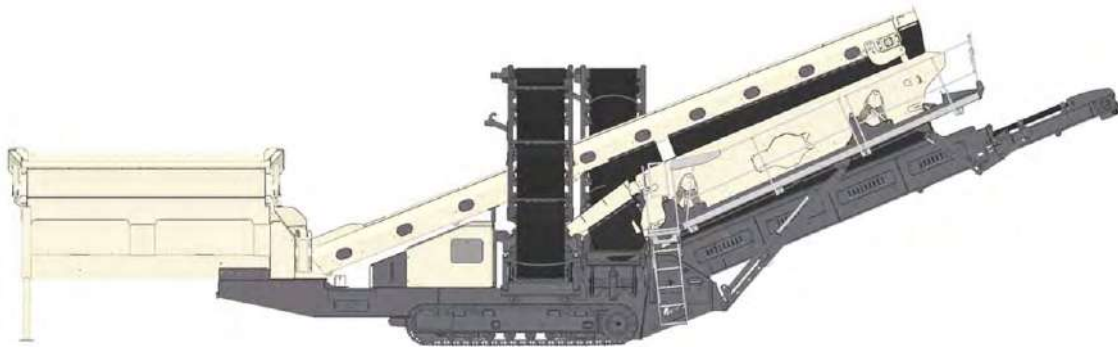


Figure 9. Lokotrack ST3.8

Lokotrack ST3.8

Lokotrack ST3.8 consists of the following:

- Hopper
 - Grid deck
 - Feed conveyor
- Lifting conveyor
- Screen
 - Two-deck screen
- Side conveyors
 - Top deck side conveyor
 - Bottom deck side conveyor
- Product conveyor
- Diesel engine Caterpillar C3.6 or C4.4 (depending on the emission class)
- Additional equipment:
 - Interlocking cable
 - Remote radio control

3.2 Intended use



 **WARNING**

MISUSE HAZARD

Using the machine for any purpose other than those specified can cause death or serious injury. This equipment must not be used in explosive duties or premises. It is highly forbidden to use explosive or flammable materials.



NOTE: The screening unit must not be used for any other purpose than those intended by the manufacturer. In particular, you must not:

- *Transport or haul persons or loads*
- *Pull or push the equipment with another machine*

The screening unit is a track-mounted, hydraulically operated and driven portable screening plant capable of producing a wide range of product sizes.

Raw material is fed onto a variable speed belt feeder through a tapered grid deck that rejects oversized material. The feeder belt delivers the material onto the lifting conveyor and then to the screen box where separation and sizing takes place.

The unit can be used for screening and sizing the following materials:

- Sand
- Gravel
- Granite
- Limestone
- Sandstone
- Coal
- Clay
- Iron ore
- Top soil
- Slag
- Concrete debris
- Grain

For screening requirements not listed, contact Metso.



NOTE: The performance of the unit can vary depending on the type and moisture content of the raw feed material. For more information on a specific application, contact Metso.

3.3 Machine plate position

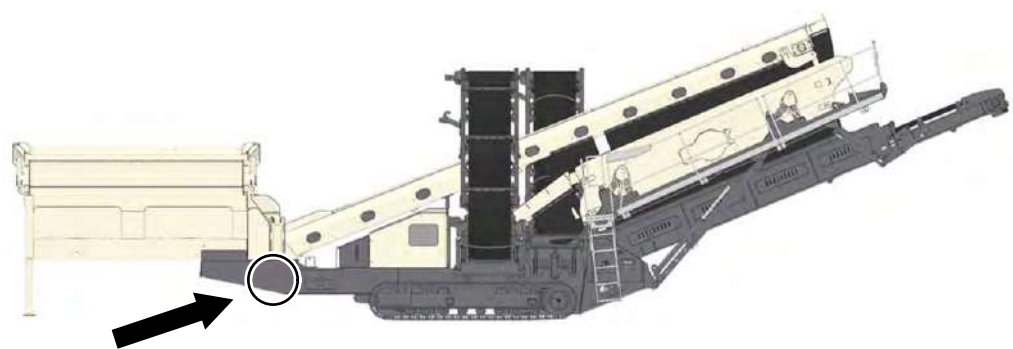


Figure 10. Machine plate position

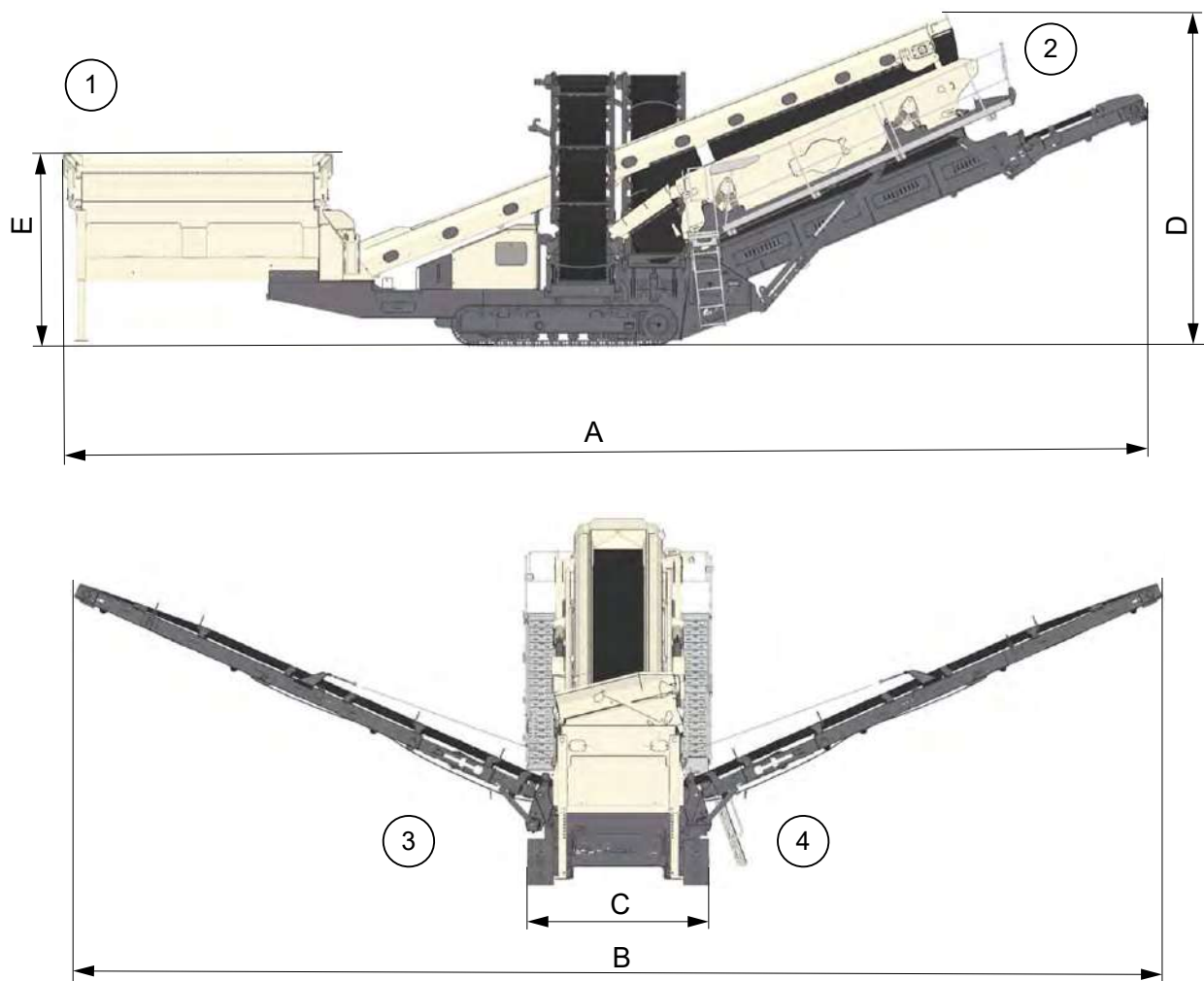
The weight indicated in the machine plate is the weight of a typical application. The actual weight of your machine can be found from the transport drawing.

 *NOTE: Do not remove or modify the machine plate.*

 *NOTE: Some Lokotrack ST components have their own machine plates attached. The machine plate indicated in the picture above is the machine plate of the Lokotrack ST3.8 unit.*

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3.4 Main dimensions



1	Feed end
2	Discharge end
3	Left side
4	Right side

Figure 11. Main dimensions in operating position (screen at 23 degrees)

Table 1: Main dimensions in operating position

Length A	18 800 mm
Width B	17 200 mm
Width C	2840 mm
Height D	6300 mm (screen at 23 degrees)

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Height E	3300 mm
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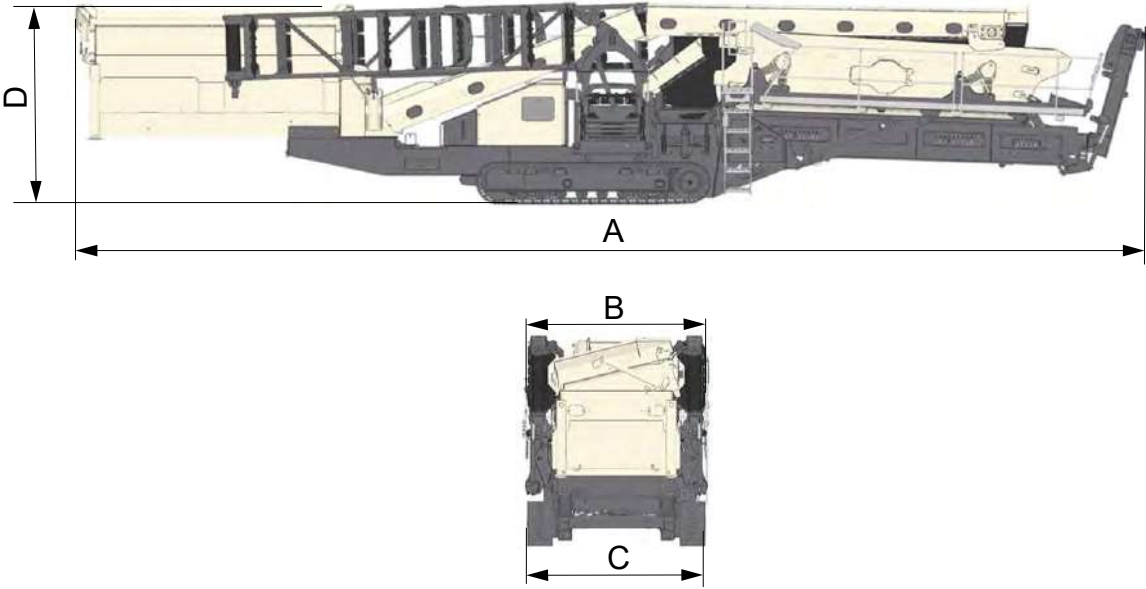


Figure 12. Lokotrack ST3.8 in transport position

Table 2: Main dimensions in transport position

Length A	18000 mm
Width B	3100 mm
Width C	2840 mm
Height D	3400 mm (3500 mm with dust encapsulation)
Weight	30 050 kg

3.5 Components

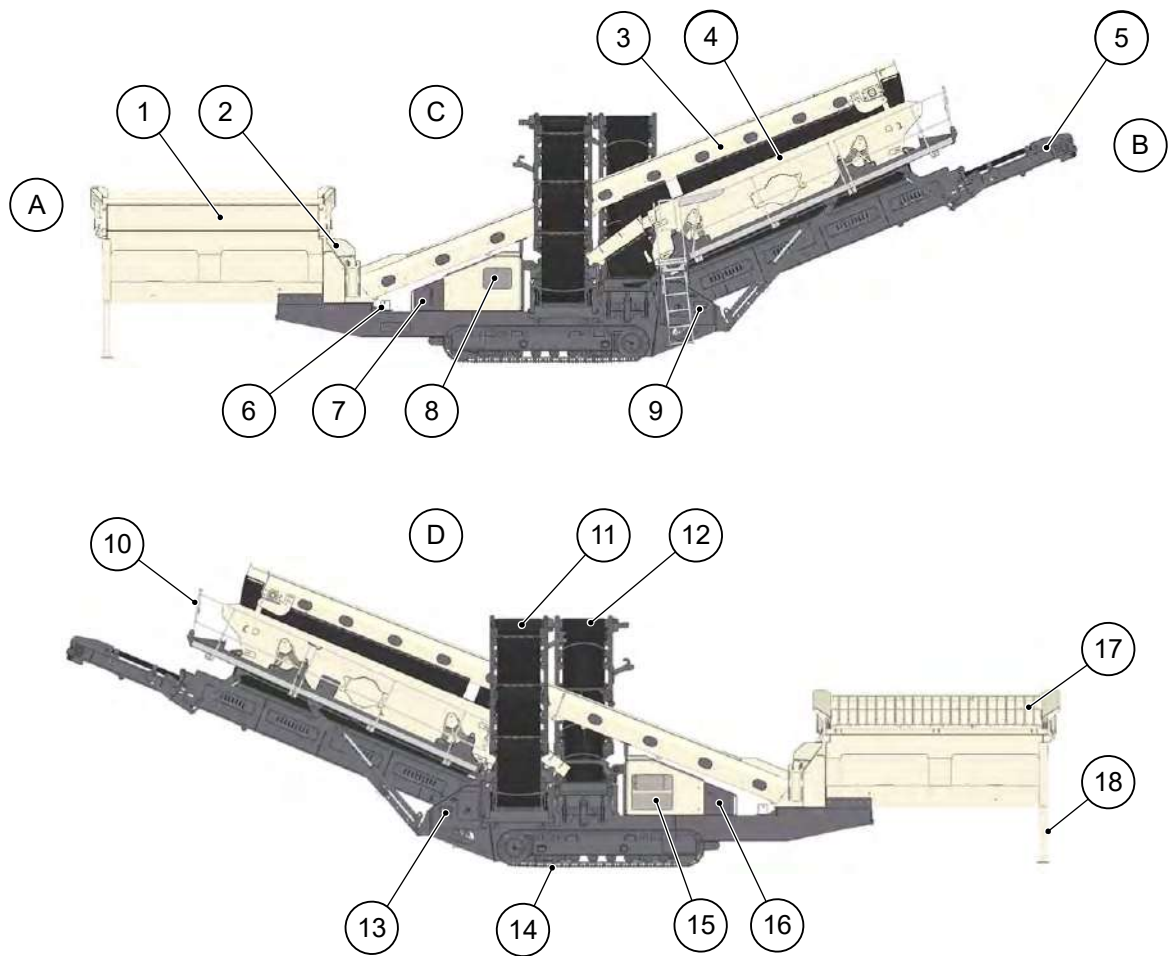


Figure 13. Lokotrack ST3.8 components

Callout	Description	Callout	Description
1	Feed hopper	10	Service platform
2	Feed conveyor	11	Bottom deck side conveyor
3	Lifting conveyor	12	Top deck side conveyor
4	Screen	13	Hand valves (screen UP-DOWN, bottom deck side conveyor maneuvering and speed control)
5	Product conveyor	14	Tracks
6	Hand valves (hopper support legs UP-DOWN)	15	Engine module
7	Hydraulic tank	16	Fuel tank
8	Main control panel	17	Grid deck
9	Hand valves (top deck side conveyor maneuvering and speed control, product conveyor maneuvering,	18	Hopper support legs

Callout	Description	Callout	Description
	lifting conveyor lifting (option)		
A	Feed end	B	Discharge end
C	Right side	D	Left side

3.5.1 Hopper

- Capacity: 7,5 m³ (9.8 yd³)
- Loading width: 4650 mm (15 ft 3 in)
- Loading height:
 - Without grid 2315 mm (7 ft 7 in)
 - With grid 3345 mm (11 ft)

3.5.2 Feed conveyor

- Belt width: 1050 mm (3 ft 5½ in)
- Conveyor length: 3075 mm (10 ft 1 in)

3.5.3 Screen

- Screen area: 7,9 m² (9.5 yd²) per deck
- Screen size: 5480 x 1524 mm (18 ft x 5 ft)
- Number of decks: 2
- Screen speed: 1050 rpm



NOTE: The speed of the screen is factory set. Do not change the speed. Changing the speed of screen leads to mechanical malfunction of the machine.

- Screen angle: 18°–29°

3.5.4 Product conveyor

- Belt width: 1200 mm (3 ft 11¼ in)
- Discharge height: 4300 mm (14 ft 1 in)

3.5.5 Side conveyors

- Top deck side conveyor
 - Angle adjustment: 22° or 24° (default)
 - Belt width: 800 mm (2 ft 7½ in)
 - Discharge height at 22°: 4165 mm (13 ft 8 in)
 - Discharge height at 24°: 4400 mm (14 ft 7 in)
- Bottom deck side conveyor
 - Belt width: 800 mm (2 ft 7 ½ in)
 - Angle adjustment: 16°, 19°, 22°, 24° (default)
 - Discharge height at 16°: 3400 mm (11 ft 1.9 in)
 - Discharge height at 19°: 3790 mm (12 ft 5.2 in)

- Discharge height at 22°: 4165 mm (13 ft 8 in)
- Discharge height at 24°: 4400 mm (14 ft 7 in)

3.5.6 Grid

- Grid area (incl. side walls): 9.25 m² (99.57 ft²)
- Grid spacing: 125 mm (5 in)
- Optional spacings available

3.5.7 Engine module

- Emission classes: Tier 3, Stage IIIA, Tier 4 Final/Stage V/China Stage IV
- Engine module is designed to run at 1800 rpm.
- Fixed displacement pumps (5 pcs)
- For more information, see the engine manual.

Engine type	Maximum output
CAT C3.6 Tier 3	90 kW/122 hp
CAT C3.6 Stage V	100 kW/136 hp
CAT C3.6 China Stage IV	82 kW/110 hp
CAT C4.4 CSE*	98 kW/133 hp
CAT C4.4 Tier 3	106 kW/144 hp

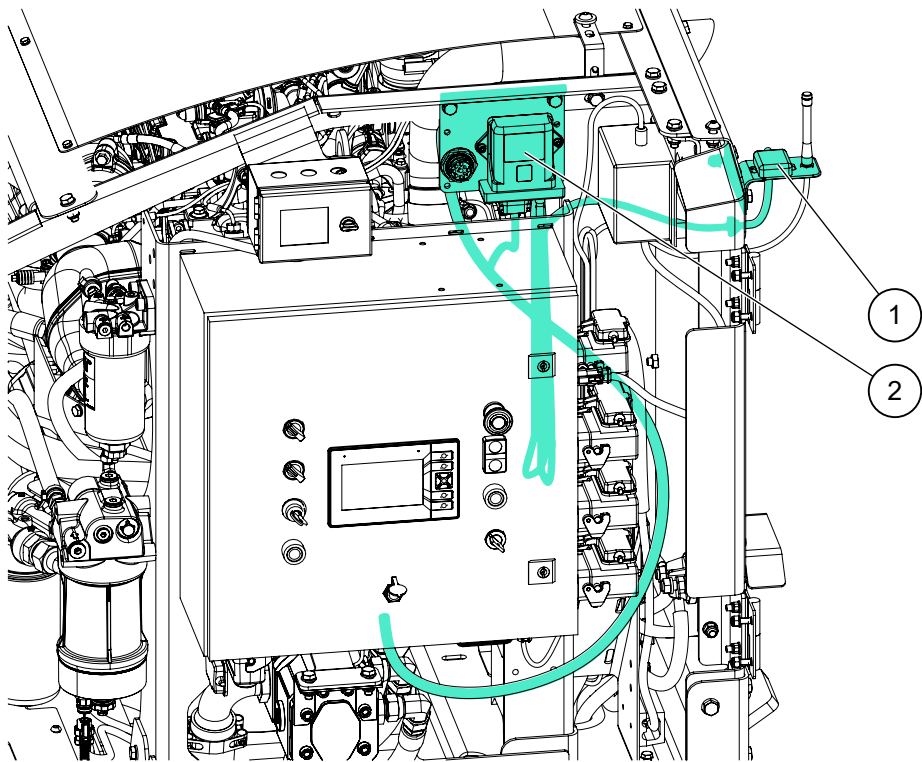
*CSE: Constant Speed Engine

3.5.7.1 Communication module (only in China Stage IV engine)

Lokotrack ST3.8 is equipped with a telecommunication module required by Chinese authorities. This applies only to China Stage IV engines.

China IV communication module cabling is equipped with SAE J1939-13 standard 9-pin diagnostic connector that can be used to connect to engine diagnostic interface.

If there are problems with the communication module, contact Metso support for help in the troubleshooting process.



1. Module antenna

2. Communication module and connector

Figure 14. Communication module components

The coloured LED indicators represent information according to the following tables:

Yellow LED (GSM indicator)	Explanation
LED is blinking slowly (200ms on, 2s off)	GSM is registered
LED is blinking fast (300ms on, 300ms off)	Networking in process
LED is constantly on	GSM network not found
LED is blinking 7 times	Receiving an ordinary text message

Green LED (GPRS indicator)	Explanation
LED is blinking slowly (200ms on, 2s off)	Connected to the platform
LED is blinking fast (300ms on, 300ms off)	Networking in process
LED is off	Unable to connect to the platform

Red LED (Positioning indicator)	Explanation
LED is blinking slowly (200ms on, 2s off)	Positioned
LED is blinking fast (300ms on, 300ms off)	Positioning in process

LED is constantly on	Antenna anomaly
LED is off	Location search exception

3.5.8 Tank module

- Fuel tank
- Hydraulic tank
- DEF tank (Tier 4 Final/Stage V engines)
- For information on the filling volumes, see [7.5 Filling volumes](#).

3.5.9 Tracks

- Width: 400 mm
- Travelling speed: 0.8 km/h

3.5.10 Metso Metrics

This unit is pre-fitted with Metso Metrics remote monitoring system (availability varies by country). With Metrics you can monitor your machine's operations remotely anytime and anywhere. You can access the Metso Metrics user interface with your browser at <https://metrics.metso.com/>.

Contact your local Metso dealer to activate your user account and to receive more information on Metso Metrics. Upon request, your Metso dealer can also deactivate the Metrics modem.



NOTE: When blasting, turn the main power key switch to OFF position and wait 3 minutes (180 seconds) to make sure that the Metrics modem and other radio devices are turned off.

Components

You can find the Metrics modem in a box (1) located inside the equipment cabin of the machine or on the machine frame. The modem box has a clear cover and there is a network cable (2) and an antenna cable (3) leading to the box. The modem also has an antenna (4) located on top of the machine.

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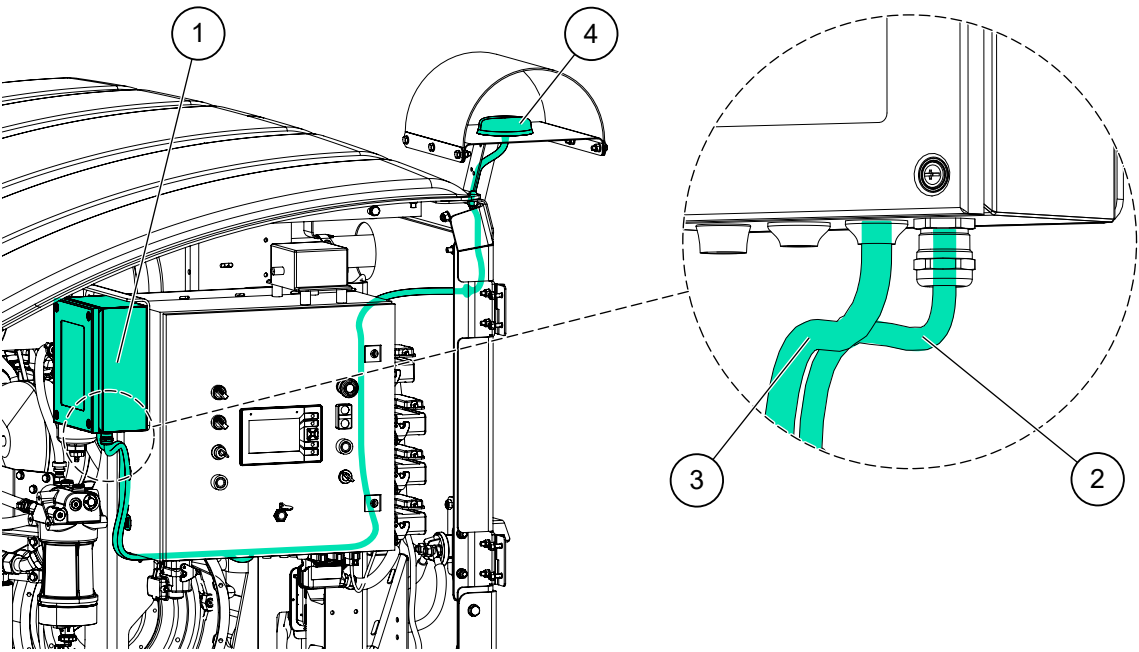


Figure 15. Metso Metrics components

Troubleshooting

If data from your machine is not updated to the Metrics, you can view Metrics gateway diagnostics from the automation system (see automation system chapter/manual for more information).

If viewing diagnostics from the automation system is not possible for your machine, you can check the LED indicators (see figure below) from the Metrics modem. Contact Metso support for help in the troubleshooting process.

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1. LED 1 (indicates gateway operating condition)

2. LED 2 (indicates automation system and data collection)
3. LED 3 (indicates Network, GPS and Cloud connection)

Figure 16. Metrics modem LED indicators

The coloured LED indicators represent information according to the following tables:

LED 1 (Gateway operating condition)	Explanation
LED is off	No supply voltage
Green LED is constantly on	Application stopped or update is in progress.
Green LED is blinking	Application is running.
Yellow LED is constantly on	System is starting up.
Yellow LED is blinking	There is no application or runtime. ApplicationLoader has nothing to start-up.
Green/Red LEDs blink alternately	Firmware update in progress
Red LED is constantly on	Supply voltage is on, software is not running/application exception, for example, division by zero.

LED 2 (Automation system and data collection)	Explanation
LED is off	No supply voltage
Green LED is blinking	Automation system connection OK, no problems detected

Yellow LED is constantly on	Booting up/unknown state
Yellow LED is blinking	Automation system connection OK, miss-configuration/ data collection problem
Blue LED is blinking	CAN bus nodeID scan ongoing
Red LED is blinking	No connection to the automation system

LED 3 (Network, GPS and Cloud status)	Explanation
LED is off	No supply voltage
Green LED is blinking	Internet, GPS and Cloud connections OK
Green/Blue LEDs blink alternately	Internet and Cloud connections OK, no GPS connection
Blue LED is blinking	Provisioning not done, GPS connection OK
Yellow LED is constantly on	Booting up/unknown state
Yellow LED is blinking	No Cloud connection/Cloud connection initialization ongoing, Internet and GPS connection OK
Red LED is blinking	No Internet connection, GPS connection OK

3.6 Lokotrack ST3.8 options

Notice that your machine may not have all of these options. If you are interested in having options installed in your machine afterwards, contact Metso. You should notice that some of the options may be difficult to install afterwards.

- Engine pre-heater
- Engine block heater
- Hydraulic oil tank heater
- Tipping grid
- Vibrating grid
- Radio remote control for tracks, feeder, grid and process
- e-Power - Electrical power package
- Interlocking cable
- Cold climate kit
- Hot climate kit
- Water spraying system
- Dust encapsulation
- Hydraulic Power Take Off (PTO)
- Work lights
- Feed level gate
- Main conveyor lifting
- Side conveyor angle adjustment
- Full wear covering for feed hopper
- Carving scraper
- Anti-rollback ports

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- Remote IC system
- Metso Metrics

3.6.1 e-Power (option)

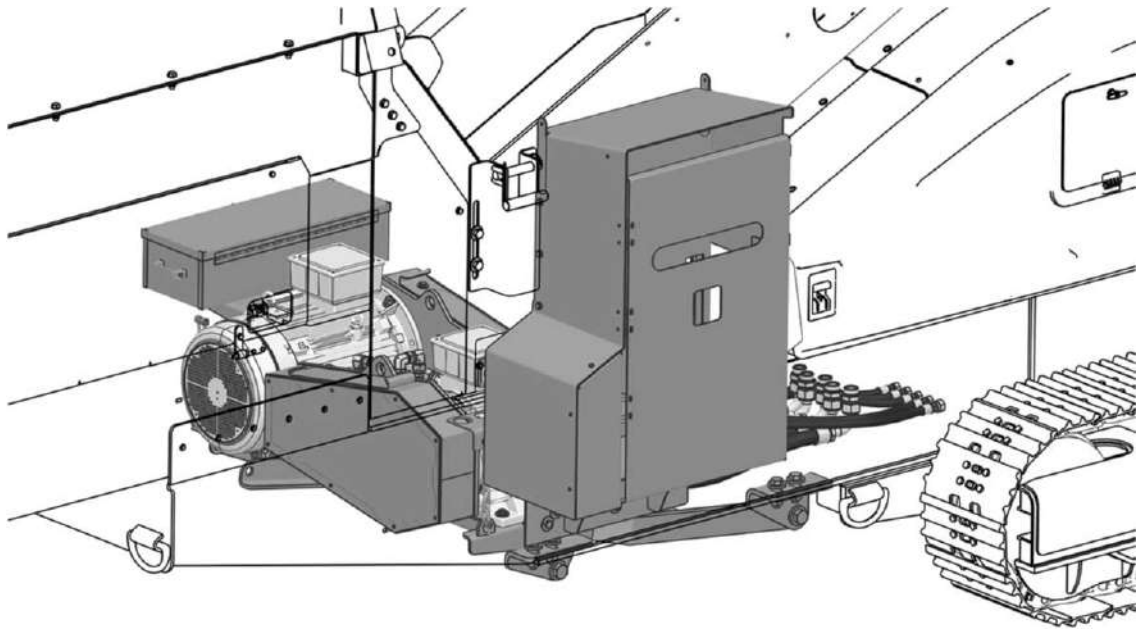


Figure 17. Lokotrack ST3.8 e-Power

The e-Power includes necessary equipment to run the process functions with an external power supply. Starting the diesel engine is prevented.

The main components are two electric motors, hydraulic pumps and the electrics.

The e-Power option for Lokotrack ST facilitates external power supply during process. There are two pump unit circuits driven by an electric motor, that produce hydraulic power, which in turn drives all process and cylinder functions.



NOTE: The track driving mode is possible only when the diesel engine is running.

All process options (for example hydraulic PTO, water pump, magnet) are available also with e-Power. The process mode (diesel or electric) can be selected from the electric center with a switch.



 **DANGER**

ELECTRICAL HAZARD

Will cause death or serious injury.

If the e-Power module (option) is installed, disconnect the feed cable before track driving the machine.

Make sure that the disconnected feed cable will not get under the moving tracks.

The e-Power is placed in front of the engine module at the center of the machine.

For operating instructions, see [6.7 Starting and stopping the screening process \(e-Power\)](#).
For maintenance instructions, see [7 Maintenance](#).

3.6.2 Engine pre-heater (option)

The machine can be equipped with a fuel-operated engine pre-heater. The pre-heater makes the startup of the engine easier and reduces wear. If the outside temperature is below +5°C (+41°F), the pre-heater should be used for at least 20 minutes. If the temperature is below -10°C (14°F), the heating period should be at least 40 minutes.

The pre-heater control panel is located in the equipment cabin on the right side of the machine, next to the main control panel.

For instructions, see [4.9 Using the engine pre-heater \(option\)](#).

3.6.3 Engine block heater (option)

The machine can be equipped with an electrical engine block heater with external power supply. The engine block heater makes the startup of the engine easier in cold conditions and reduces wear.

3.6.4 Hydraulic oil tank heater (option)

The machine can be equipped with a hydraulic oil tank heater with external power supply. The hydraulic oil tank heater is used for pre-heating hydraulic oil in cold conditions.

3.6.5 Vibrating grid (option)



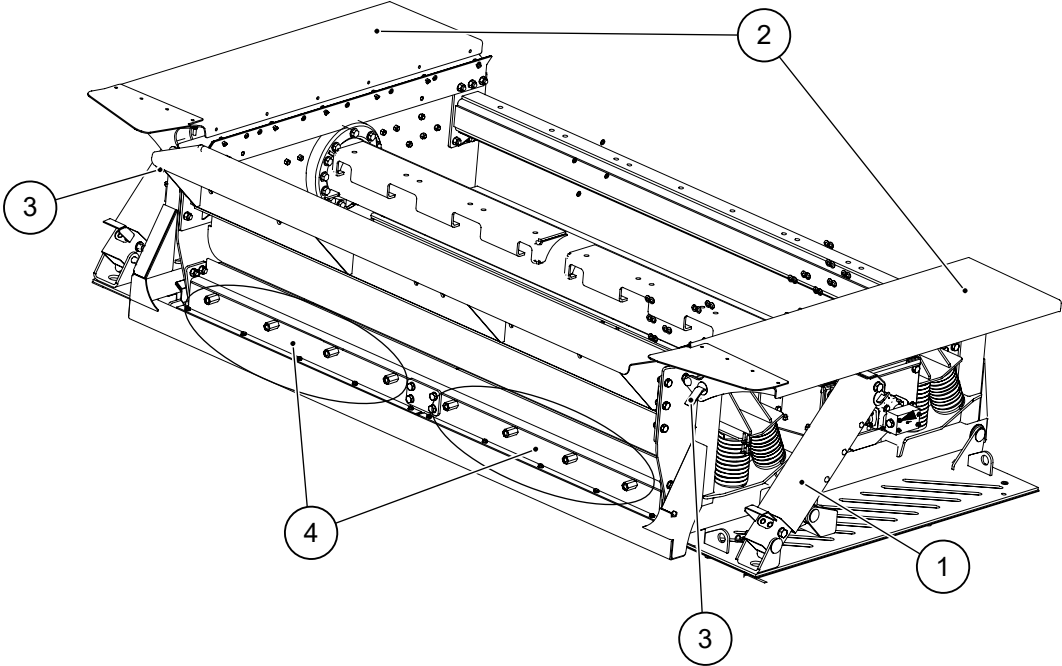
 **WARNING**

CRUSHING HAZARD

Can cause death or serious injury or property damage.

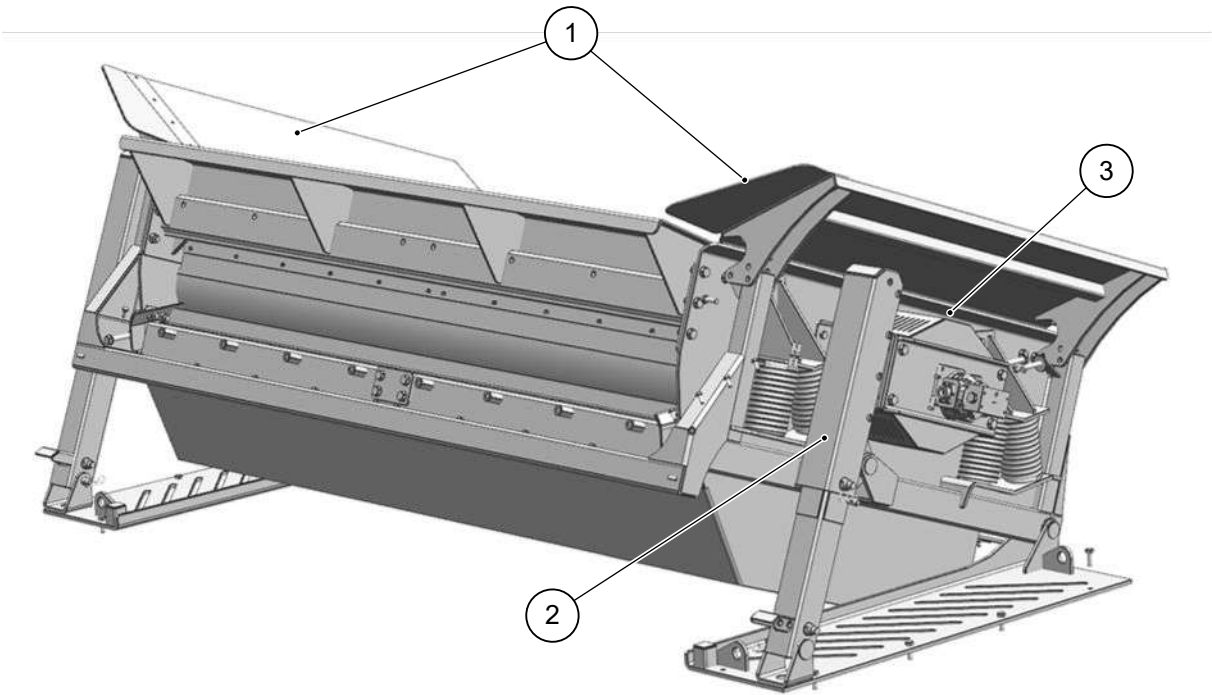
Do not remove the vibrating grid without contacting Metso first. Removing the vibrating grid affects the center of mass of the machine and may cause the machine to tilt forward.

If the vibrating grid is inactive, you have to activate it from the main control panel, see [3.7.4 Manual controls](#).
With a toggle switch, you can set the vibrating grid to activate automatically when the screening process is started. If the screening process has been stopped, the vibrating grid deactivates automatically even if it have been started manually from manual controls. For more information, see [3.7.5 Process options](#).
If you need to test the vibrating grid for example for troubleshooting, see [9.10 Testing unit functions](#).
Before using the vibrating grid, remove the possible lockings.



Callout	Description
1	Grid support
2	Side walls
3	Locking pins for the side walls
4	Bolts for tightening the meshes

Figure 18. Vibrating grid in transport position



Callout	Description
1	Side walls raised
2	Grid support adjusted
3	Lubrication point of the vibrating grid

Figure 19. Vibrating grid in operating position

There are two lubrication points, one at each end of the vibrating grid.

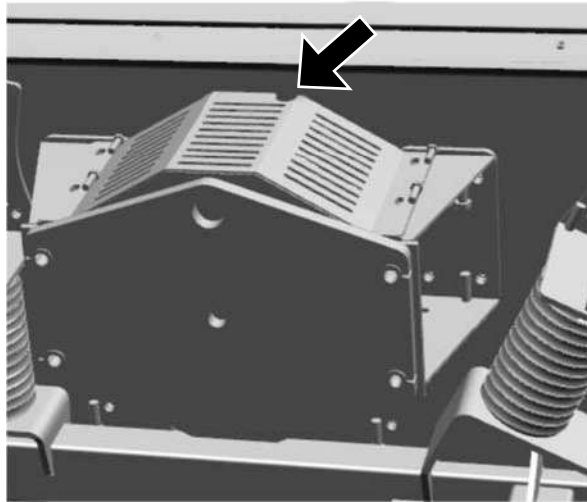


Figure 20. Lubrication point of the vibrating grid

3.6.6 Hydraulic power take off (option)



⚠ DANGER

PERSONAL INJURY HAZARD

Will cause death or serious injury.

If the Lokotrack ST unit is equipped with an accessory (for example, a sand trap or a pile conveyor), make sure that the nearest emergency stop is easy to access. Use the Lokotrack ST emergency stops to isolate the hydraulic energy of the power take off accessory.

Emergency stop

Because the function of the accessory is fully dependent on the emergency stop system of the Lokotrack ST unit, it stops only from the emergency stop in the Lokotrack ST unit. In case of an emergency, the Lokotrack ST emergency stop will stop both the Lokotrack ST unit and the power take off (PTO) accessory.

Manual use

If the hydraulic power take off (PTO) is inactive, you have to activate it manually from the main control panel. See [3.7.4 Manual controls](#).

Automatic use

With a toggle switch, you can set the hydraulic power take off to activate automatically when the screening process is started. If the screening process has been stopped, the hydraulic power take off deactivates automatically even if it has been started manually from the manual controls. For more information, see [3.7.5 Process options](#).



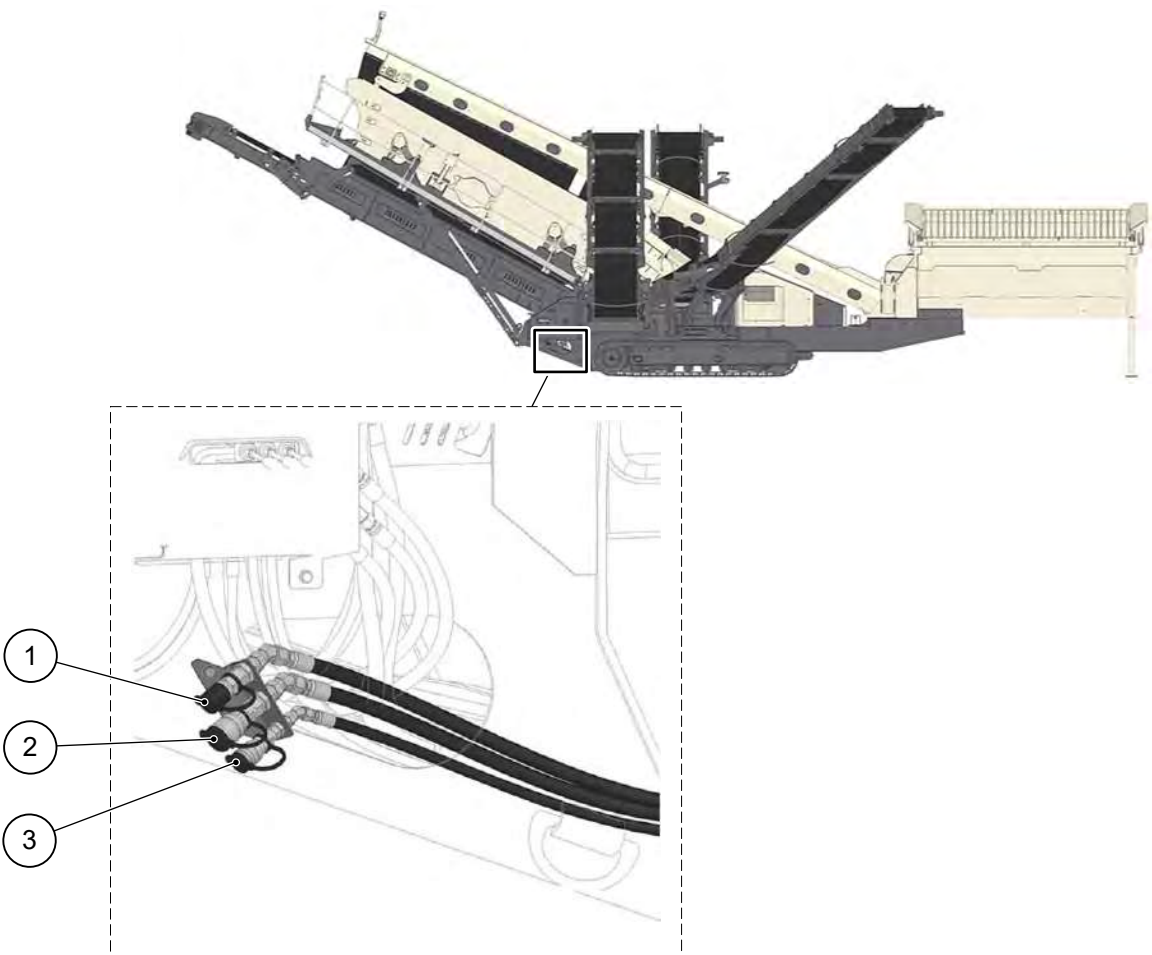
NOTE: If no external device has been connected to the hydraulic power take off, make sure from **Process options** view that hydraulic power take off is not selected to start with process..

Troubleshooting

If you need to test the hydraulic power take off, for example for troubleshooting, see [9.10 Testing unit functions](#).



NOTE: Connect the hydraulic power take off to the left side of the unit, as shown in the figure below.



Caption	Description
1	Pressure line
2	Return line
3	Drain

Figure 21. Hydraulic power take off (PTO) connectors

3.6.7 Feed level gate (option)

Feed level gate is located at the discharge end of feeder. The purpose of feed level gate is to adjust the thickness of material that comes out from the feeder.

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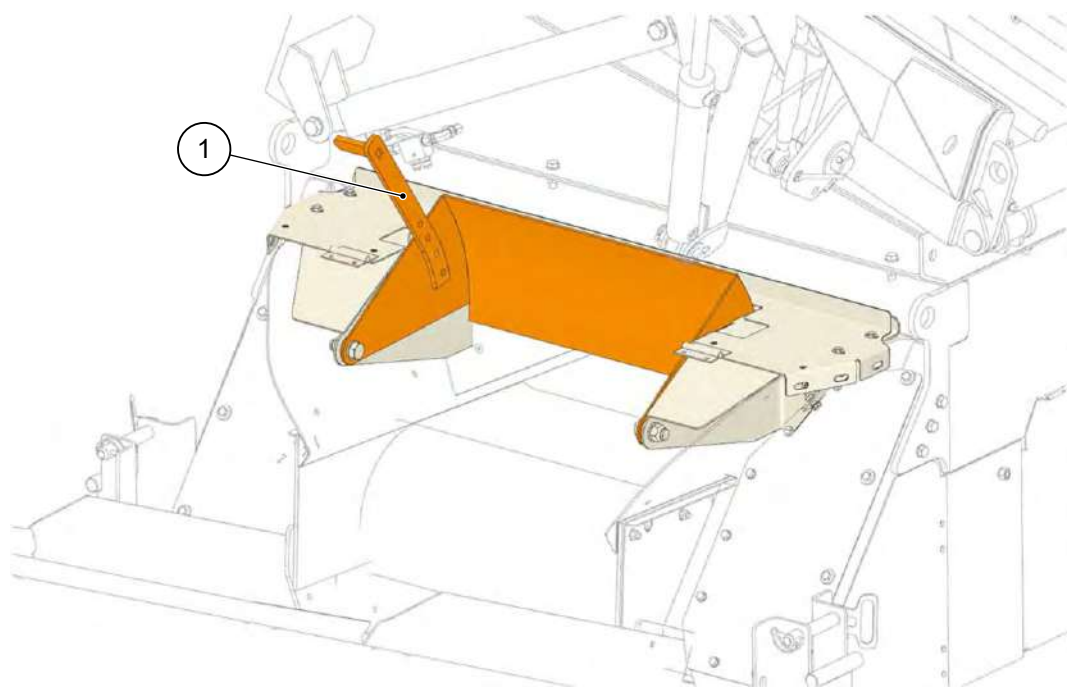


Figure 22. Feed level gate (1)

You can adjust the feed gate in several different operating positions according to the need of your process.

3.6.8 Dust encapsulation (option)

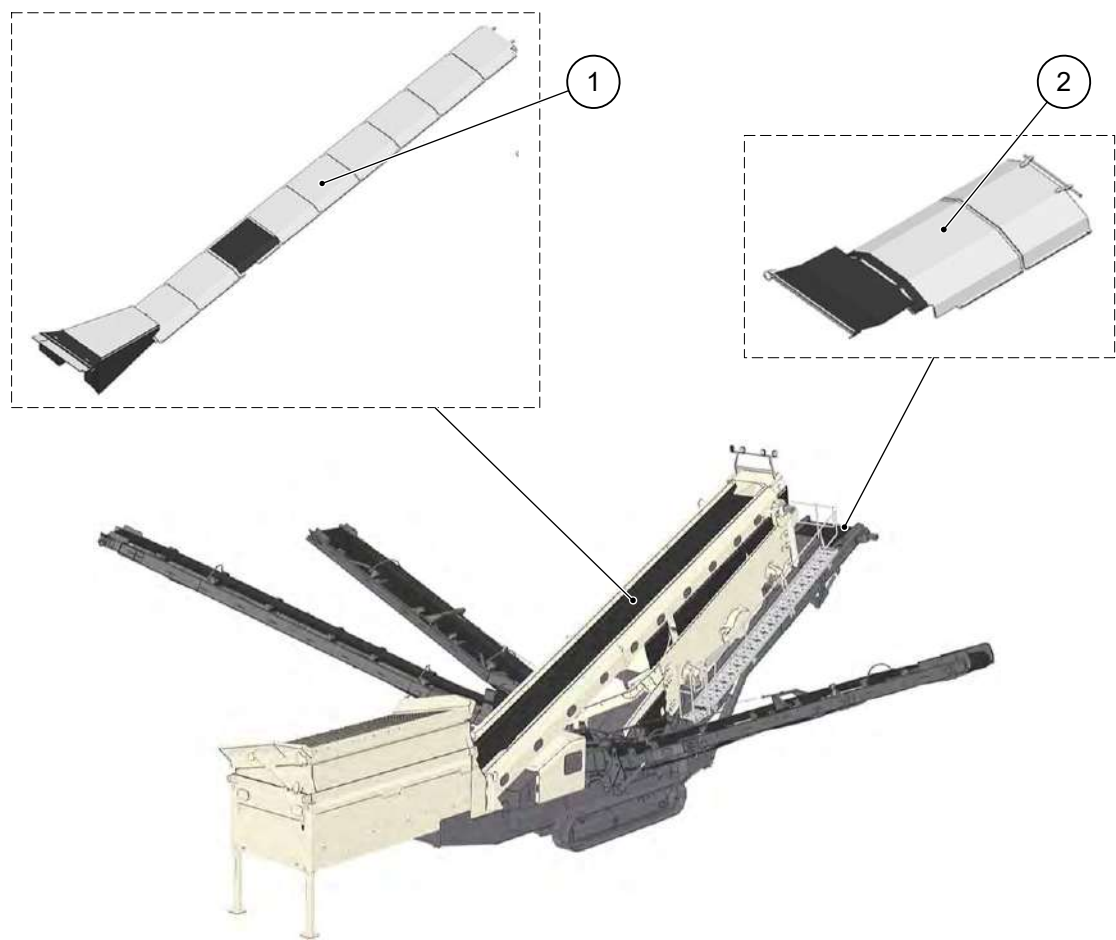
As an option, the lifting conveyor and product conveyor can be equipped with dust covers and a water spraying system.

Dust covers



NOTE: Dust covers may affect the transport dimensions.

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1. Dust cover of lifting conveyor

2. Dust cover of product conveyor

Figure 23. Dust covers of lifting conveyor and dust covers of product conveyor

Water spraying system

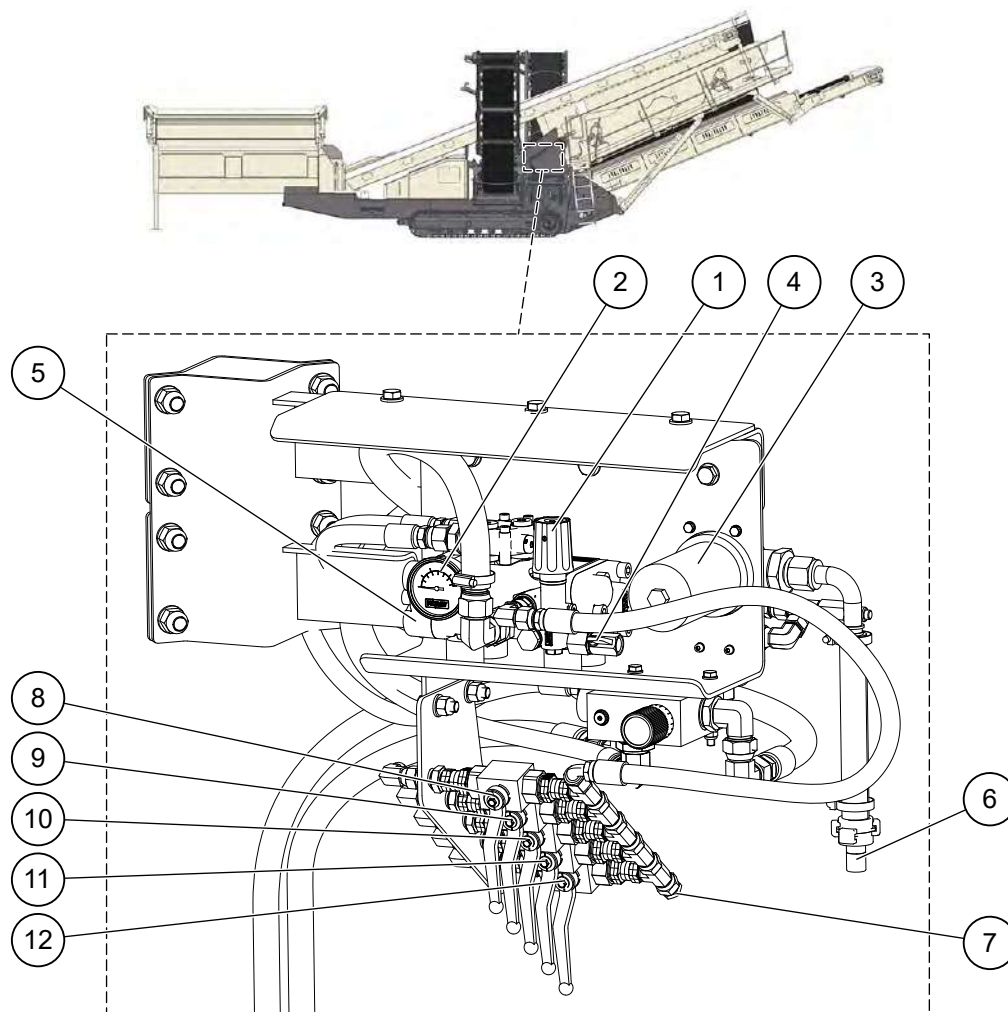
The high pressure water spraying system can be used for dust protection. High pressure water pump is installed into the hydraulics of the machine.

If the water spraying system is inactive, you have to activate it from the main control panel, see [3.7.4 Manual controls](#).

With a toggle switch, you can set the water spraying system to activate automatically when the screening process is started. If the screening process has been stopped, the water spraying system deactivates automatically even if it have been started manually from manual controls. For more information, see [3.7.5 Process options](#).

If you need to test the water spraying system for example for troubleshooting, see [9.10 Testing unit functions](#).

- Water connection is located on the right side of the machine.
- Nozzles of water spray are located at the discharge end of conveyors.
- This is a high pressure system. The delivery does not include water source pumps. Customer connects an own water hose to the water connection.



- | | |
|-------------------------------|--|
| 1. Pressure adjustment | 7. Drainage point for nozzles |
| 2. Outlet pressure gauge | 8. Nozzle valve of top deck side conveyor (not in ST3.8) |
| 3. Filter | 9. Nozzle valve of bottom deck side conveyor |
| 4. Drainage valve of the pump | 10. Nozzle valve of middle size side conveyor (In ST3.8: Nozzle valve of top deck side conveyor) |
| 5. High pressure pump | 11. Nozzle valve of product conveyor |
| 6. Water intake connection | 12. Nozzle valve of lifting conveyor |

Figure 24. Water spraying system of lifting conveyor and product conveyor

In the winter or when frost exist, open the drainage valve of the pump (4) to bleed the water out of the system together with the drainage point for nozzles (7). Frozen water in the water pump will damage the pump. Alternatively, pump 4 liters of windscreen washing fluid to prevent pump and hoses not to freeze.

The maximum outflow pressure from the pump can be adjusted with item (1), the maximum line pressure to the nozzles is 40 bar. The on line pressure can be seen from the gauge (2). Every individual water spray hose can be isolated from the valves (8), (9), (10), (11), and (12). If all spray hoses are closed, there is a possibility to use the pump as a pressure washer by increasing the pressure to 120 bar. (Metso will not supply the pressure washer handle).



⚠ CAUTION

PROPERTY DAMAGE HAZARD

Can cause moderate injury or property damage.

Before using a water spraying system as a pressure washer, always make sure that there are no people in the area. To avoid damaging the machine, do not point the water spray directly at electrical components, engine, or bearings. Use eye protection.

3.6.9 Anti-rollback ports (option)



⚠ WARNING

FALLING HAZARD

Can cause death or serious injury.

Use a man lift and a safety harness to access high maintenance locations or when working outside the service platforms. Do not step on the handrails.

The purpose of anti-rollback ports is to prevent material from rolling back on the lifting conveyor during the screening process.

Transport position

Before transporting the machine, you must turn the topmost port to horizontal position (A).

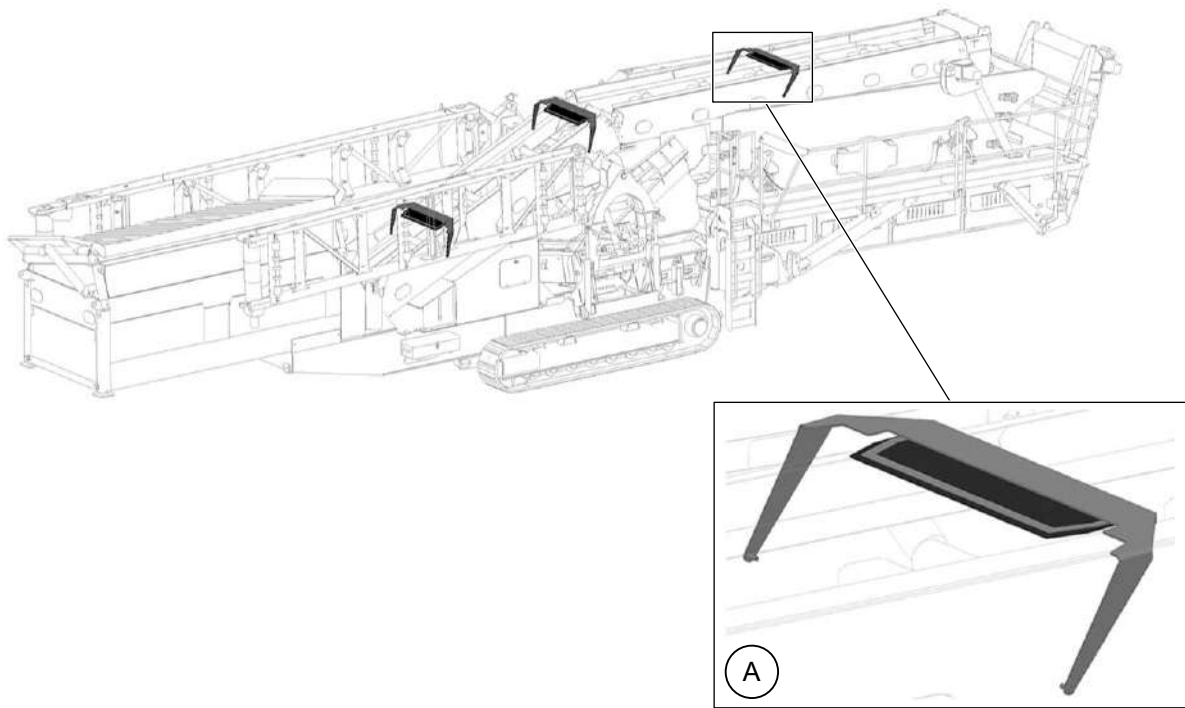


Figure 25. Anti-rollback ports in transport position

Operation position

Before starting the screening process, turn all 3 ports to vertical position (B).

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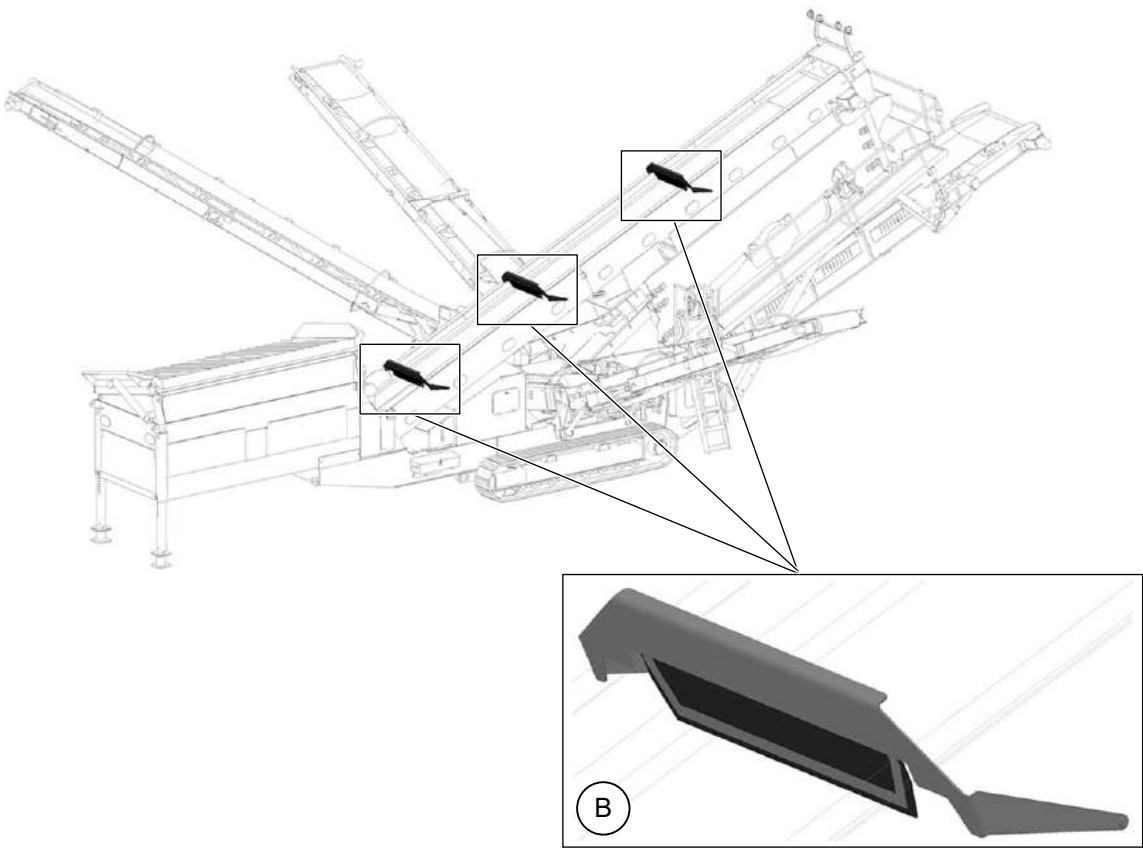


Figure 26. Anti-rollback ports in operating position

3.6.10 Carving scraper (option)

As an option, the product conveyor can be equipped with a carving scraper for better belt cleaning when screening sticky material.

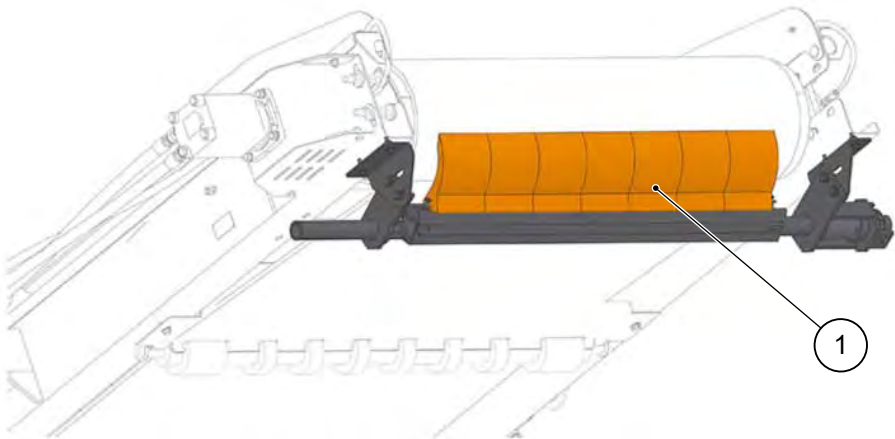
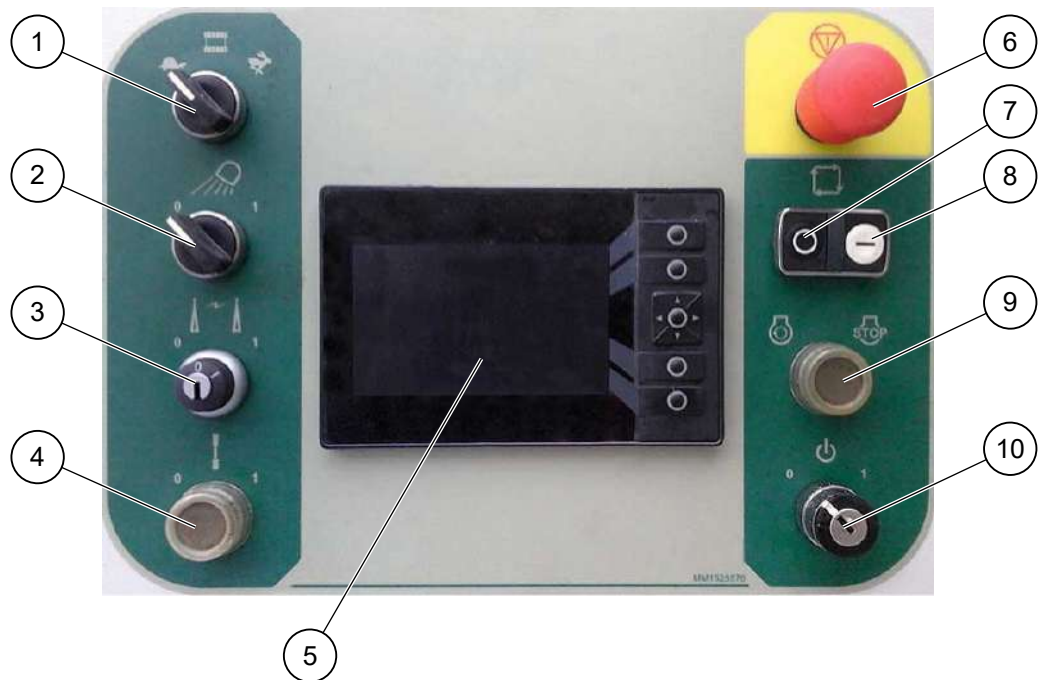


Figure 27. Carving scraper (1)

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3.7 Controls

3.7.1 Main control panel



Callout	Description
1*	Selector switch for track driving speed: SLOW “Turtle” / NORMAL “Rabbit” (only for machines with Constant Speed Engine (CSE))
2	Work lights ON/OFF: This function is optional.
3*	Radio control mode ON/OFF: ON position activates the radio control mode (and deactivates the drive control device).
4*	Manual valves ON/OFF: Activates and deactivates the hydraulic cylinder functions.
5*	Control display: Interface for the user to operate the control system.
6*	Emergency stop button: Shuts down all processes including the engine.
7	Process stop: Stops the screening process in sequence.
8	Process start: Starts the screening process in sequence.
9*	Engine start and stop: Push button for starting and stopping the engine.
10*	Key switch ON/OFF: Turns the control panel ON and OFF

Figure 28. Main control panel

3.7.1.1 Display

The automation system is operated with a color display.



NOTE: Do not use a screwdriver or other pointed objects to press the buttons or the display. It might damage the surface of the display or the buttons.

You can use the touch screen by tapping the icons with your finger or a stylus, or you can use the buttons beside the display.

Views

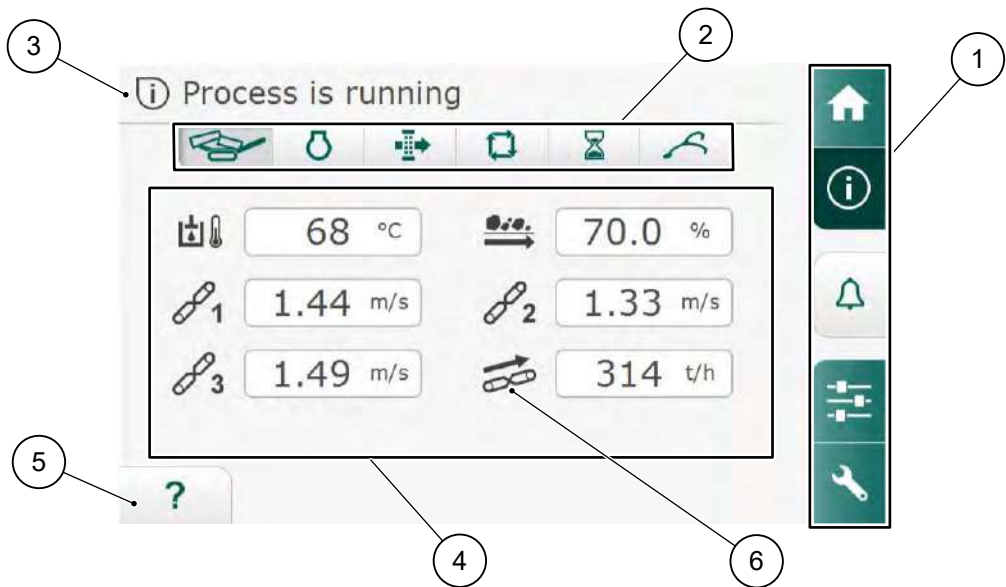


Figure 29. Descriptions of views

Callout	Description
1	Main navigation bar
2	Subview navigation bar (if main view has multiple subviews)
3	Message field shows machine information and user feedback (shown in every view).
4	View specific information/Controls
5	Help button shows view specific help (shown in every view).
6	Touching any icon shows icon description in message field.

Buttons



Figure 30. Descriptions of buttons

Callout	Description	Functionality
1-4	Function buttons 1-4	Navigate according to the symbols displayed under each button on the right edge of the display.
5	Four-way selection button	Adjust values (when editing a value) or navigate (for example left-right subview navigation, and up-down navigation inside a view).
6	Enter button	Open the alarm log and accept a value or selection when applicable.

3.7.2 Hydraulic controls



 **WARNING**

PERSONAL INJURY HAZARD

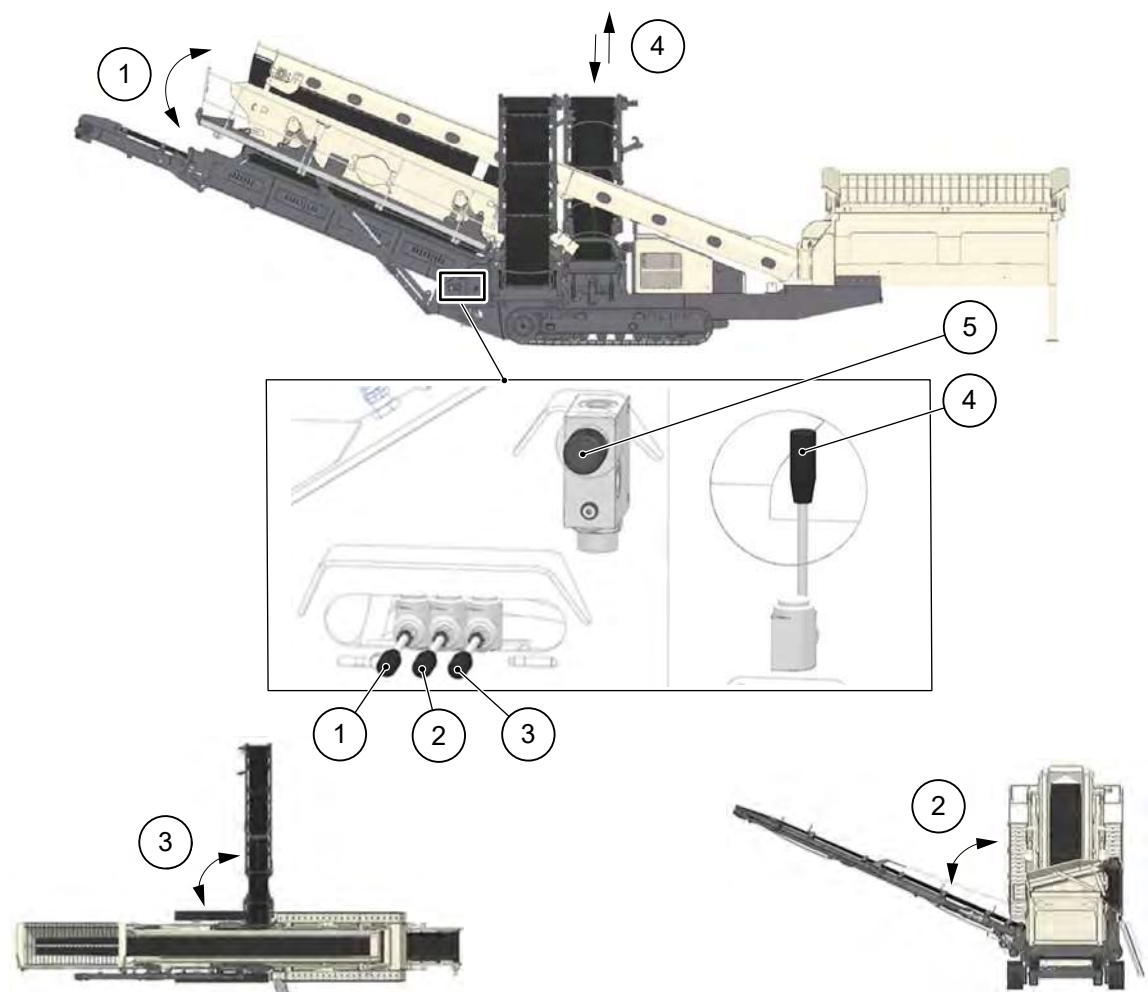
Can cause death or serious injury.

Make sure no one is near the unit before before actuating the hydraulic controls. Only one person is permitted to control the hydraulically foldable parts at a time. Activate only one hydraulic function at a time. Beware of moving parts and falling process material.

Hydraulic control levers are located on the left side and on the right side of the machine. You can activate the hydraulic control levers in the main control panel.

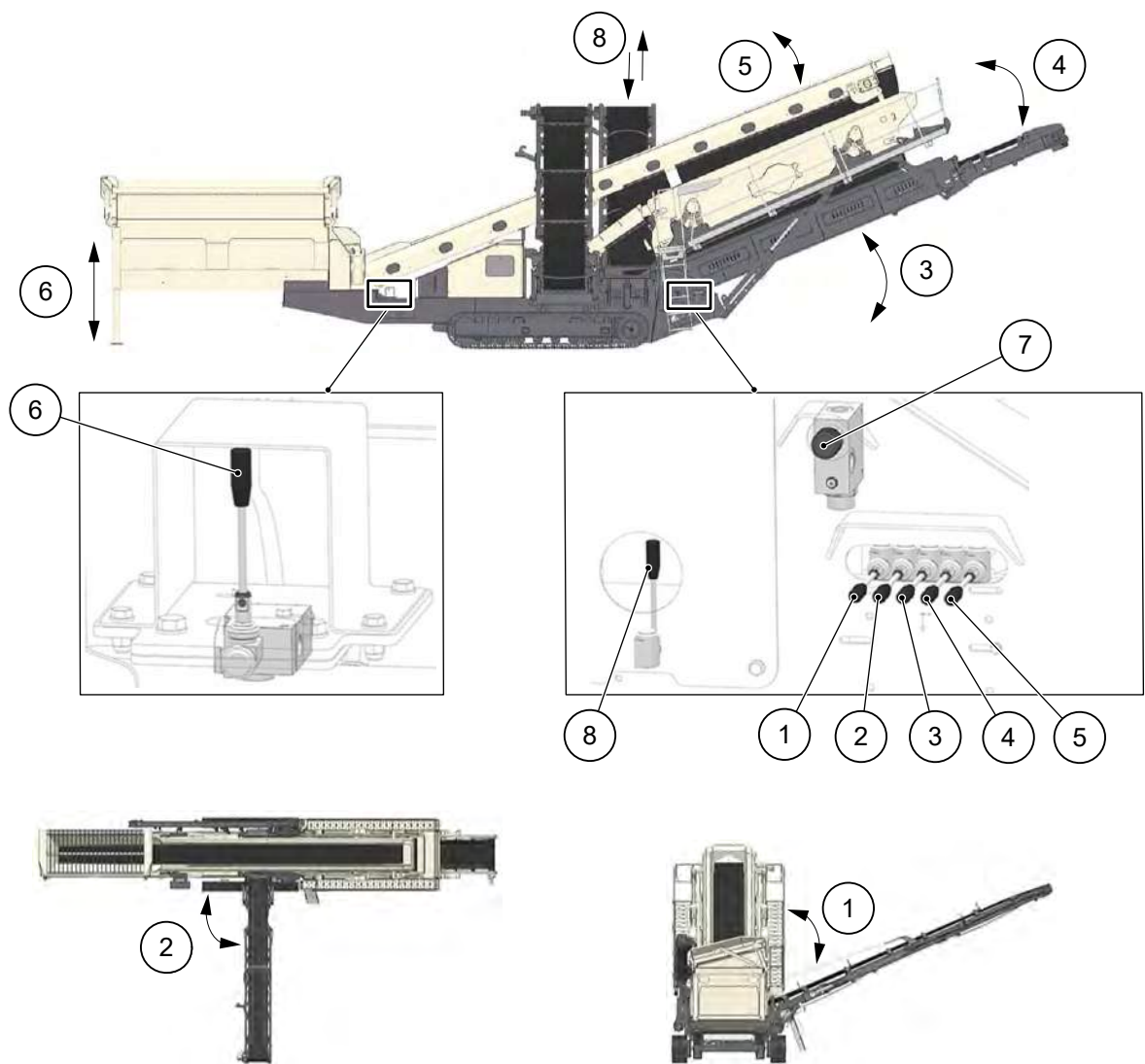
The hydraulic control levers are used for operating all the hydraulic cylinder functions of the machine. The hydraulic control levers cannot be operated when the screening process is running.

Left-side hand valves



Callout	Description	Callout	Description
1	Screen UP-DOWN	4	Top deck side conveyor angle UP-DOWN
2	Bottom deck side conveyor lifting	5	Bottom deck side conveyor speed control
3	Bottom deck side conveyor folding OUT-IN		

Right-side hand valves



Callout	Description	Callout	Description
1	Top deck side conveyor lifting	5	Lifting conveyor lifting (option)
2	Top deck side conveyor folding OUT-IN	6	Hopper support legs UP-DOWN
3	Product conveyor lifting and lowering	7	Top deck side conveyor speed control
4	Product conveyor folding OUT-IN	8	Bottom deck side conveyor angle UP-DOWN

3.7.3 Drive controls

3.7.3.1 Drive control device



 **WARNING**

UNEXPECTED MOVEMENT HAZARD

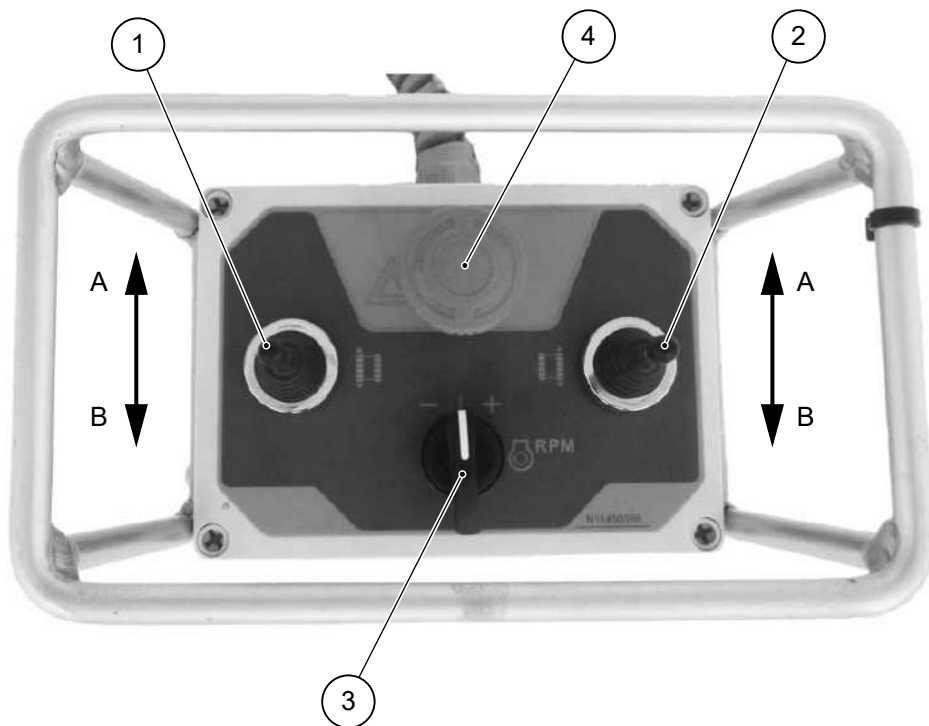
Can cause death or serious injury.

Make sure the cable of the drive control device does not get caught in the tracks or in any other moving part of the machine during driving.

You must disconnect the drive control device from the unit immediately after driving and store it in a safe place when not in use.

Only lift and hold the drive control device by its handles. Do not pull the drive control device from the cable.

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Callout	Description
1	Drive control lever, left track A = forward, B = backward
2	Drive control, right track A = forward, B = backward
3	Engine speed and track driving speed controller
4	Remote stop button

Figure 31. Drive control device

For more information about driving directions, see [3.7.3.3 Driving directions](#).



NOTE: Before taking the drive control device into use, visually check that the drive control device, cable, or plug are not damaged.



NOTE: Check that the connectors are clean and that there is no water in the plugs or connectors.



NOTE:
Make sure that the drive control device is stored properly to avoid damages, dirt, and water.



NOTE: Make sure that the plug covers in the Lokotrack are closed.



NOTE: For security reasons, only one drive control device is allowed to be used with Lokotrack ST3.8. If the original drive control device is replaced with a spare part control device, the original must be destroyed.



NOTE: The cable drive control device cannot be used with the radio control mode (optional) switched on.

3.7.3.2 Radio control device (optional)

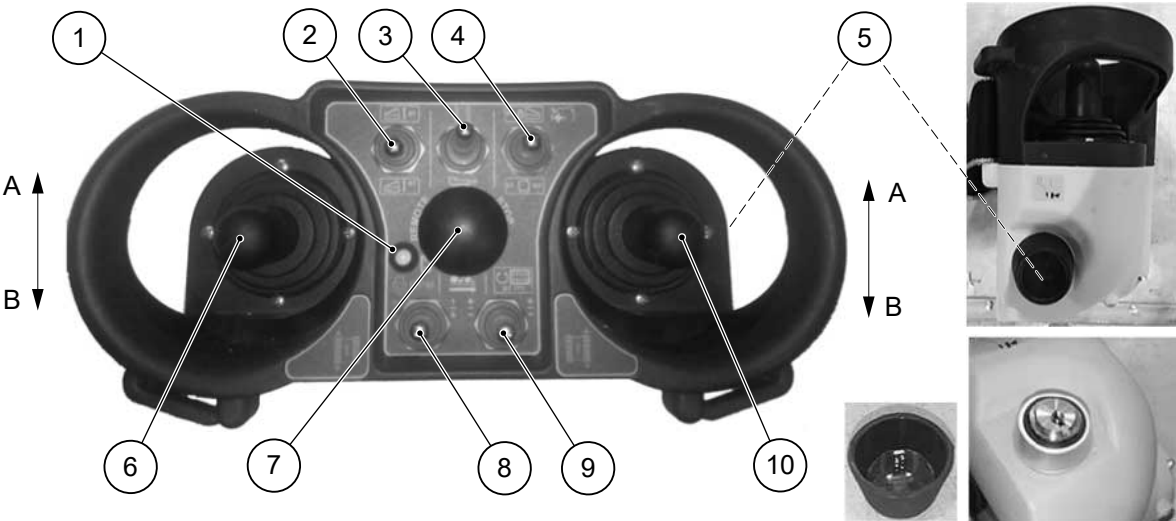


Figure 32. Radio control device

Callout	Description	Callout	Description
1	Status of the radio control device: • OFF: no light • ON: green light • Transmitting ON: green light blinking • Low battery: red light blinking	6	Radio control lever, left track A = forward, B = backward
2	Grid lifting (UP) (optional)	7	Remote stop (push and pull button)

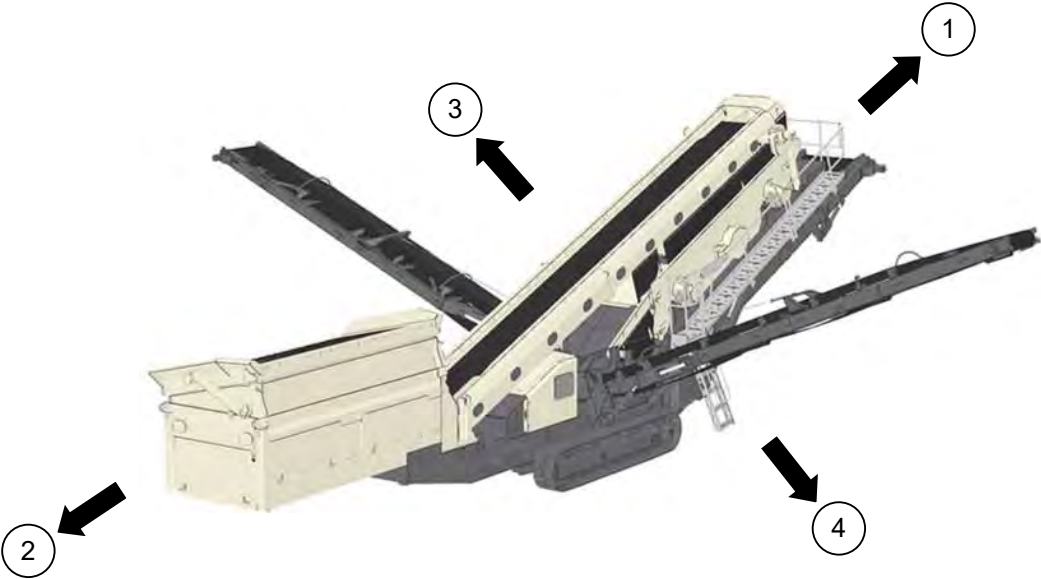
Callout	Description	Callout	Description
	Grid lowering (DOWN) (optional)		Crushing/screening, hydraulic operations, and the engine are stopped
3	Mode selection: - Track drive (UP) - Process (DOWN)	8	Track drive mode: - Increase engine rpm / track driving speed (UP) - Decrease engine rpm / track driving speed (DOWN) Process: - Start feed (UP) - Stop feed (DOWN)
4	Activate grid tilt sequence (UP) (optional) Stop process (DOWN)	9	Increase / decrease feed speed
5	Radio control device key: ON/OFF and horn	10	Radio control lever, right track A = forward, B = backward

For more information about driving directions, see [3.7.3.3 Driving directions](#).



NOTE: Make sure that the radio control device is stored properly to avoid damages, dirt, and water.

3.7.3.3 Driving directions



Callout	Description	Callout	Description
1	Forward	3	Left
2	Backward	4	Right

Figure 33. Lokotrack ST3.8 driving directions

3.7.4 Manual controls

With manual controls, the machine can be controlled independently when the engine is running.



NOTE: If the manual valves or track driving are activated, manual controls cannot be used.

To start the manual control functions, do the following:

1. From the main control panel display, tap **Process control views** (7), and then tap **Manual controls one view** (1). See the figure below.

Note that all machines do not have all options displayed in the figures below.

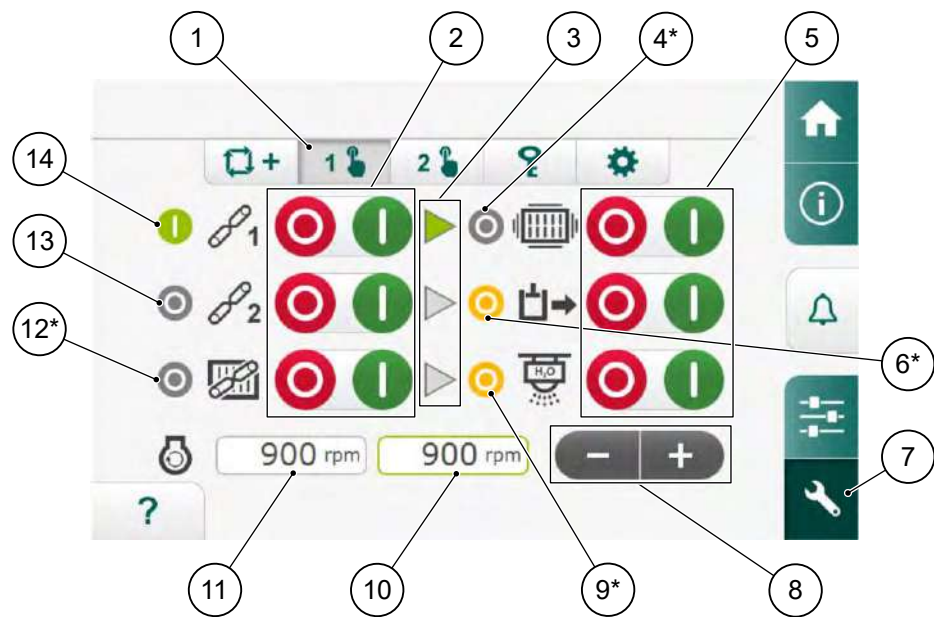
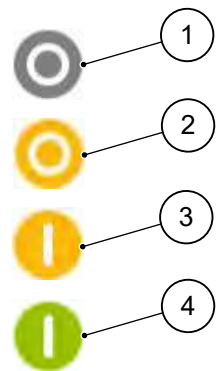


Figure 34. Manual controls - normal control

Callout	Description	Callout	Description
1	Manual controls one view	2	Start and stop buttons of main devices
3	Status indicator of optional devices Optional devices can only be used if the main device is running. • (Green) The use of optional device is allowed • (Grey) The use of optional device is not allowed	4*	Status indicator of vibrating grid (running/ stopped) Note: Running this optional device requires that the conveyor circuit 1 is running.
5	Start and stop buttons of optional devices	6*	Status indicator of hydraulic power take off (running/stopped) Note: Running this optional device requires that the conveyor circuit 2 is running.
7	Process control views	8	Engine speed adjustment increase (+), decrease (-)
9*	Status indicator of the high pressure water spray system (running/stopped)	10	Requested engine speed (rpm)

Callout	Description	Callout	Description
	Note: Running this optional device requires that the conveyor circuit 3 is running.		
11	Actual engine speed (rpm)	12*	Conveyor circuit 3: - ST4.8, ST4.10, ST3.8, ST3.5: Status indicator of lifting conveyor (running/stopped) - ST2.4, ST2.8: Status indicator of side conveyor, undersize (running/stopped)
13	Conveyor circuit 2: - ST4.8, ST4.10: Status indicator of bottom deck side conveyor and top deck side conveyor (running/stopped) - ST3.8, ST3.5: Status indicator of bottom deck side conveyor (running/stopped) - ST2.4, ST2.8: Status indicator of underscreen conveyor (running/stopped)	14	Conveyor circuit 1: - ST4.8, ST4.10: Status indicator of product conveyor and middle deck side conveyor (running/stopped) - ST3.8, ST3.5: Status indicator of product conveyor and top deck side conveyor (running/stopped) - ST2.4, ST2.8: Status indicator of top deck side conveyor and side conveyor, midsize (running/stopped)

See the figure below for status descriptions.

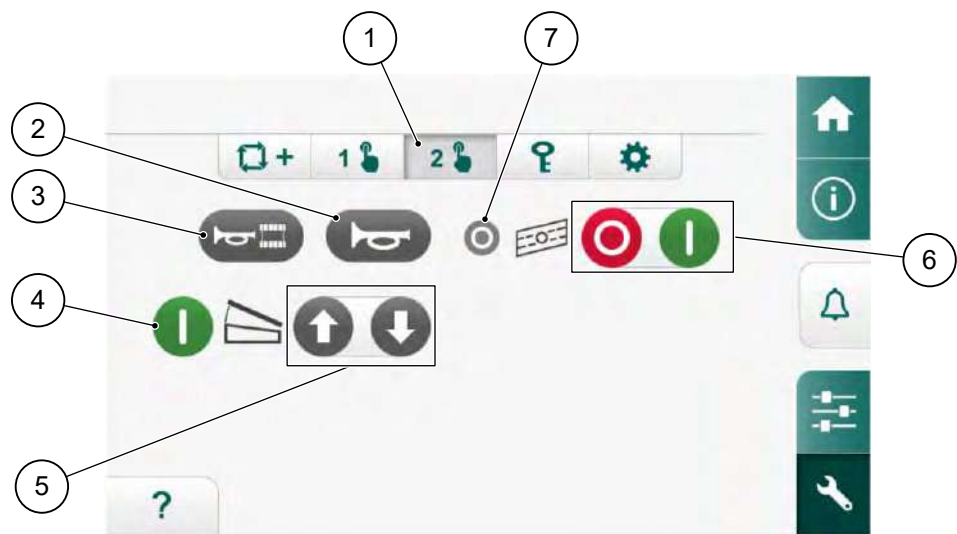


Callout	Description
1	(Grey) Device is stopped.
2	(Yellow) Device cannot be started because of a fault or machine start is prevented for some other reason.
3	(Yellow) The symbol is blinking. The device is about to start. An audible start alarm signal sounds or the running status of device is not on yet.
4	(Green) Device is running.

Figure 35. Status symbols (Start/Stop of screen/conveyor)

2. Tap **Manual controls two view** (1) for manual control functions of screen, grid, or horn.

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Callout	Description	Callout	Description
1	Manual controls two view	2	Horn (audible start alarm signal for starting the process)
3	Horn (audible start alarm signal for track driving)	4	Status indicator of vibrating grid (running/stopped) Note: Running this optional device requires that the conveyor 1 is running.
5	Grid tilt (lifting and lowering grid manually) Note: Using grid tilt requires that the feeder is running.	6	Start and stop buttons of screen
7	Status indicator of screen (running/stopped)		

Figure 36. Manual controls two view

3.7.5 Process options

In the process options view, you can select which optional devices are started with the process start sequence. This means that when the screening process is on, also the selected process devices are on. If you do not want to run some of the process devices during the screening process, you can stop them in the **process options view**. Running optional devices (6), (7), (8) requires that the corresponding conveyor (2), (3), (4) is running.

1. From the main control panel display, tap **Process control views** (9), and then tap **Process options view** (1).

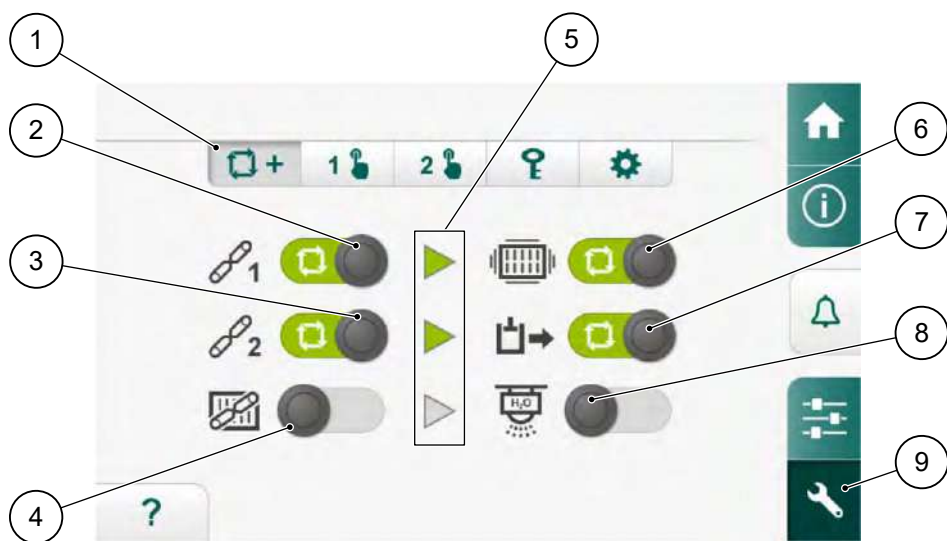


Figure 37. *Process options view*

Callout	Description	Callout	Description
1	Process options view	2	Conveyor circuit 1: - ST4.8, ST4.10: Process start selection of product conveyor and middle deck side conveyor (running/stopped) - ST3.8, ST3.5: Process start selection of product conveyor and top deck side conveyor (running/stopped) - ST2.4, ST2.8: Process start selection of top deck side conveyor and side conveyor, midsize (running/stopped)
3	Conveyor circuit 2: - ST4.8, ST4.10: Process start selection of bottom deck side conveyor and top deck side conveyor (running/stopped) - ST3.8, ST3.5: Process start selection of bottom deck side conveyor (running/ stopped) - ST2.4, ST2.8: Process start selection of underscreen conveyor (running/stopped)	4	Conveyor circuit 3: - ST4.8, ST4.10, ST3.8, ST3.5: Process start selection of lifting conveyor - ST2.4, ST2.8: Process start selection of side conveyor, undersize
5	Status indicator of the process start selection of optional devices Note: Optional devices can only be used if the main device is running. (Green) The use of optional device is allowed (Grey) The use of optional device is not allowed	6*	Process start selection of vibrating grid Note: Selecting this optional device requires that the conveyor 1 is running.

Callout	Description	Callout	Description
7*	Process start selection of hydraulic power take off Note: Selecting this optional device requires that the conveyor circuit 2 is running.	8*	Process start selection of the high pressure water spray system Note: Selecting this optional device requires that the conveyor circuit 3 is running.
9	Process control views		

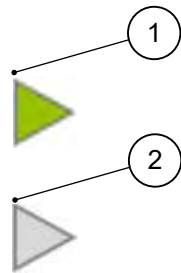


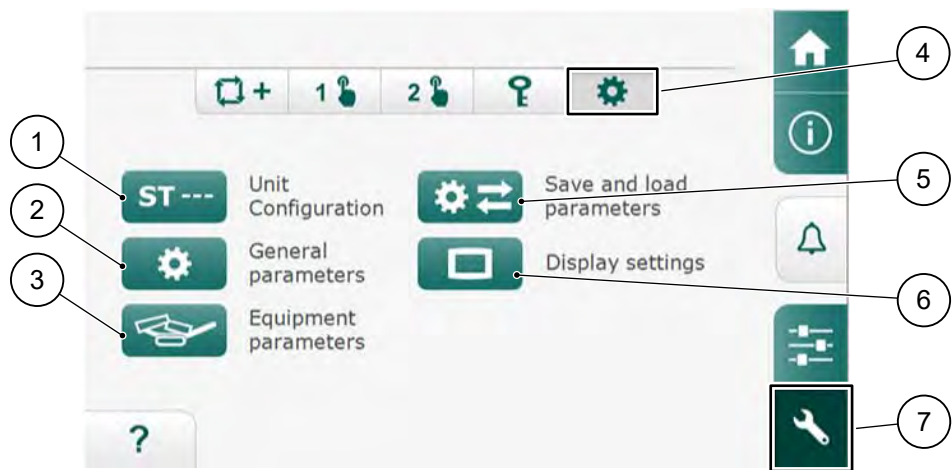
Figure 38. Status symbols of optional devices

- 1 (Green): The use of optional device is allowed.
- Optional devices can only be used if the main device is running
- 2 (Grey): The use of optional device is not allowed.
- Optional devices can only be used if the main device is running

3.7.6 **Adjusting parameters**

You can adjust parameters as follows:

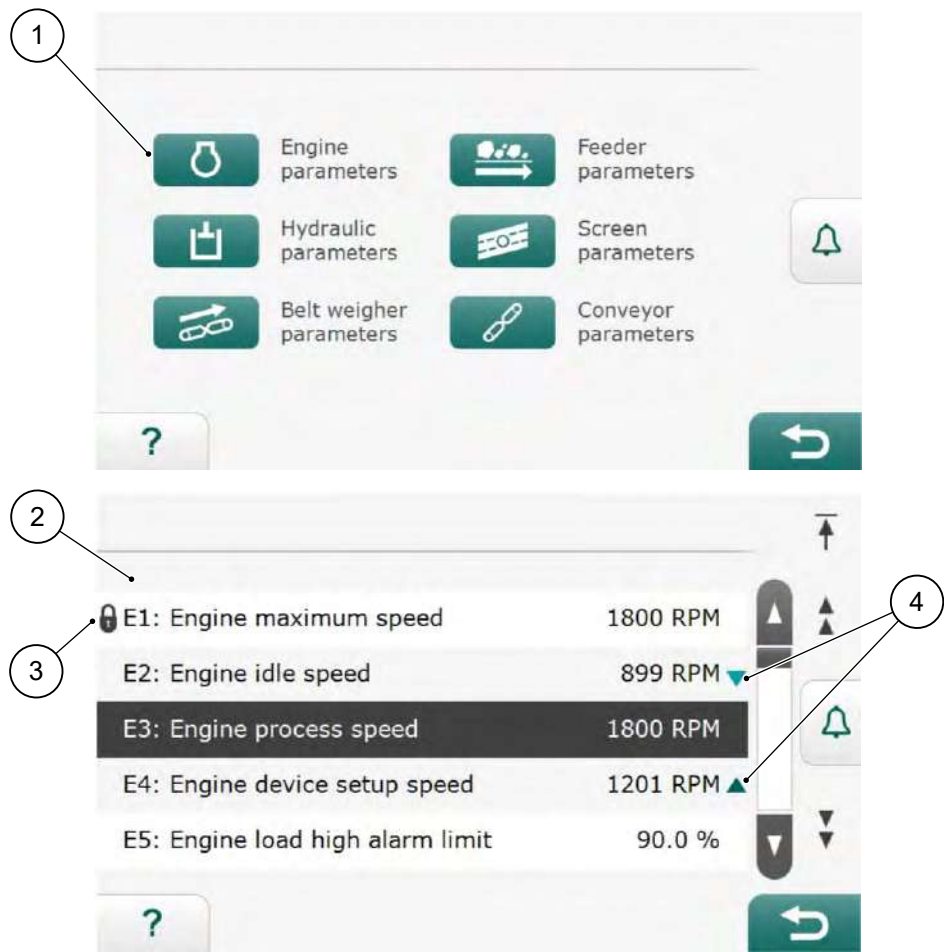
- From the **main view** of the control display, tap **Process control views** (7), and then tap **Settings view** (4).



Callout	Description	Callout	Description
1	Unit configuration	2	General parameters
3	Equipment parameters	4	Settings view
5	Save and load parameters	6	Display settings
7	Process control views		

Figure 39. Settings view

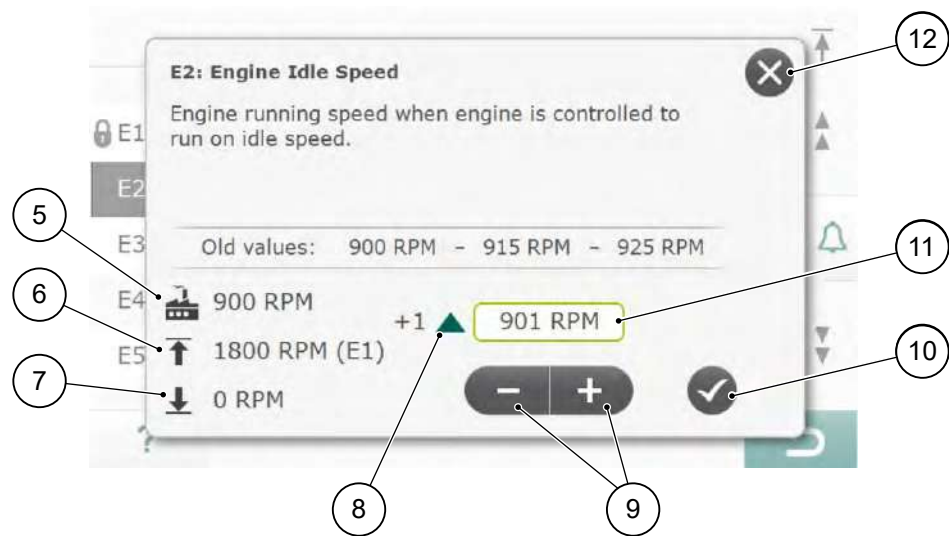
- 2. For example, if you want to check the possible minimum and maximum engine rpm speed, tap **Equipment parameters** (3), see the figure above.
- 3. Tap **Engine parameters** (1), see the figure below.



Callout	Description	Callout	Description
1	Parameter selection view	2	Parameter list view
3	User level symbol: lock symbol indicates service level parameters	4	Arrow up: - Value is higher than default value Arrow down: - Value is lower than default value

Figure 40. Settings view - equipment parameters

4. In the **parameter change view**, you can do the following:



Callout	Description	Callout	Description
5	Default value	6	High limit
7	Low limit	8	Arrow up: - Value is higher than default value Arrow down: - Value is lower than default value
9	Adjust value (increase with + and decrease with -)	10	Accept value change
11	Parameter value	12	Close editing

Figure 41. *Parameter change view*

5. When the parameter adjustment is ready, click Close editing (12).

4

Starting and stopping

4.1

Opening the doors of the engine module



 **WARNING**

CRUSHING HAZARD
Can cause death or serious injury.
Lock the hatches to open position during maintenance to disable sudden closure due to wind or slope in the ground. Make sure that nobody gets caught between the door and the machine when you close the door.

Always use the door hook when opening the engine module doors. The door can be locked at a 40 or a 90 degree angle. The doors can be opened for example for pre-startup checks and maintenance procedures.

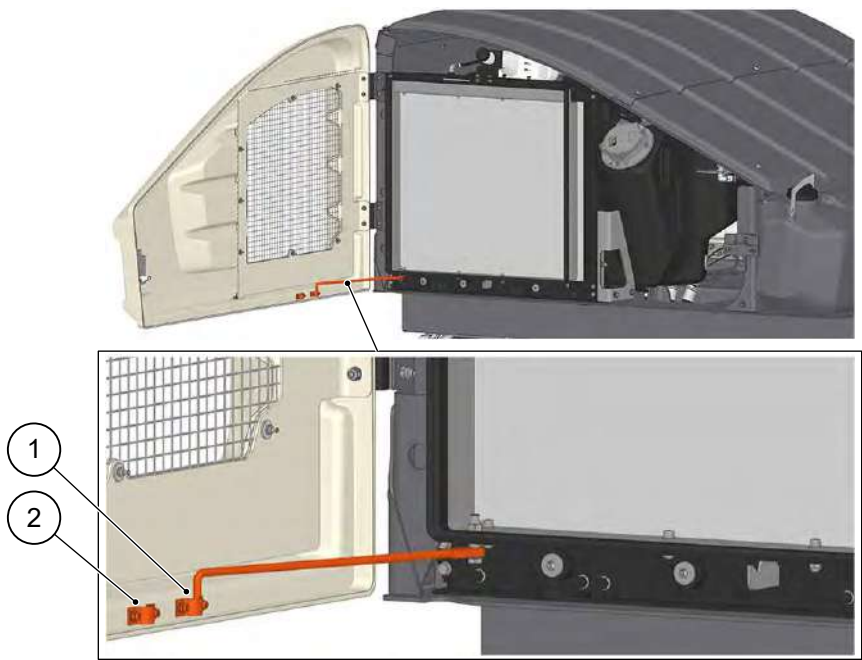


Figure 42. Using the door hook to lock the door at a 90 degree angle (1), or a 40 degree angle (2)

4.2

Before starting

Do this procedure before each time you start the engine.

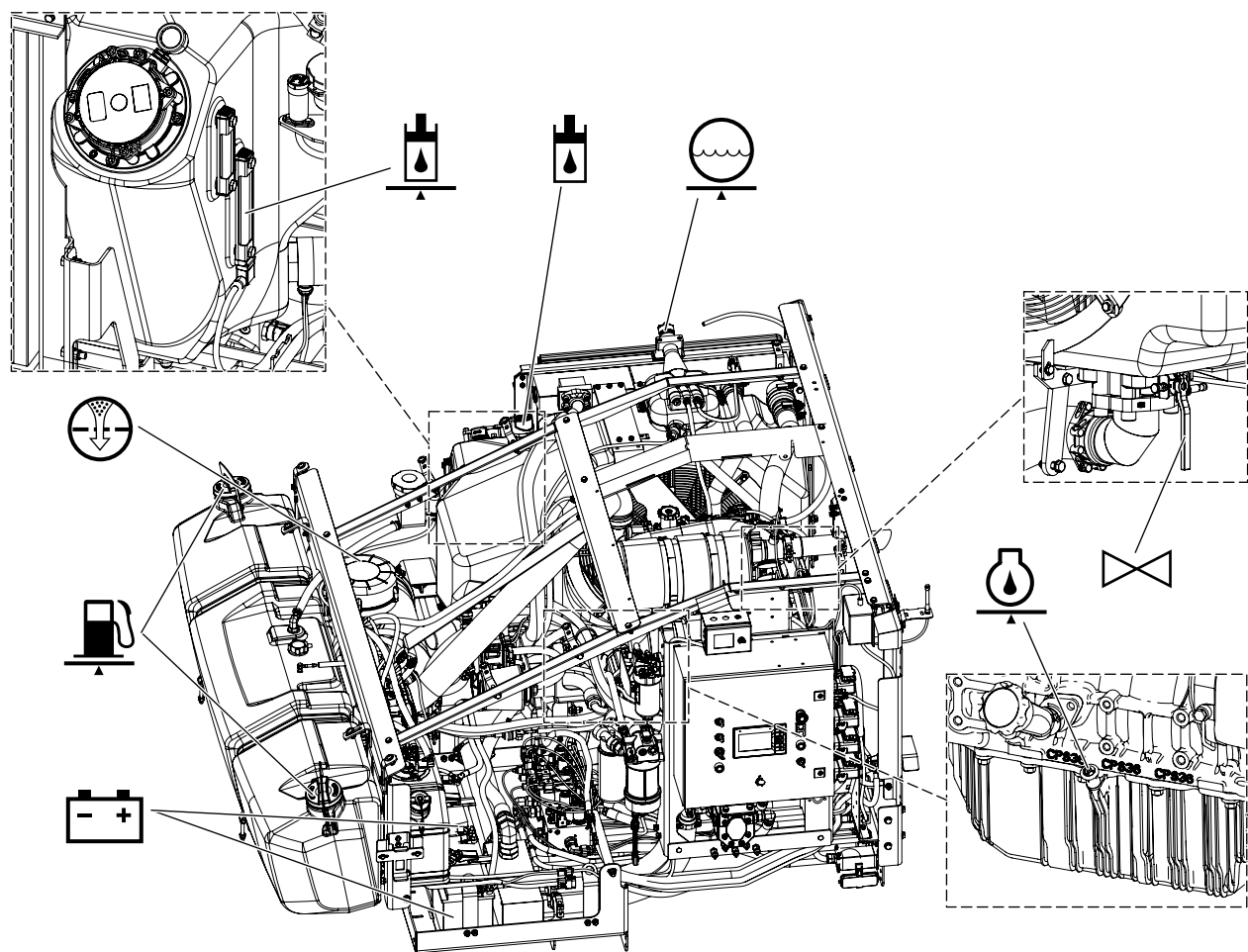


Figure 43. Measures to be taken before starting the engine

WARNING

GENERAL HAZARD

Can cause death or serious injury.

Only trained and competent personnel are allowed to operate, maintain or service the machine. If operating procedures are unclear, contact Metso for assistance before operating the machine.

 **NOTE:** Stop the process operations and remove the process material before making any adjustments, maintenance, or repair work.

1. Examine the condition of the engine air filter and the sealing of the housing. For more information and instructions, see [7.11.3 Air filter](#).

 **NOTE:** Check that the clamps on the pipe of the intake air filter are properly tightened. If the tightening is loosen or insufficient, the engine does not take air through the intake filter, which might damage the engine.

2. Make sure that the oil level of the engine is between the ADD and FULL marks on the dipstick. Add oil, if necessary.

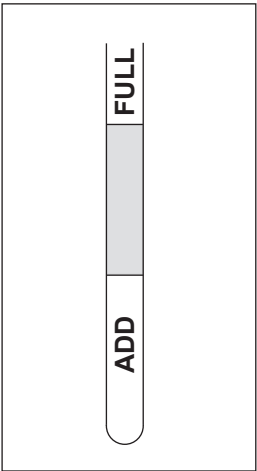


Figure 44. Engine oil dipstick

3. Make sure that coolant level is between the MIN and MAX markings. Add coolant, if necessary. Open the cap carefully if the engine is warm.



⚠ WARNING

HOT SURFACE HAZARD
Can cause death or serious injury.
Do not open the radiator cap when the engine is hot. Let the engine cool down before opening the cap.

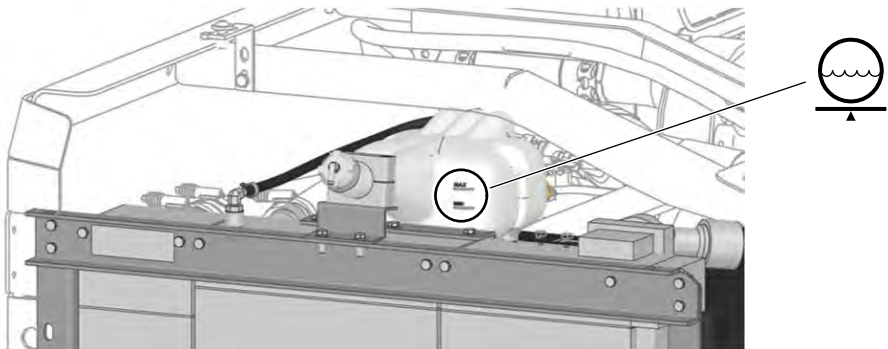


Figure 45. Engine coolant level

4. Examine the fuel level. Refill if necessary. Make sure that no dust or dirt enters the fuel tank through the refill opening. Clean the suction tube carefully before placing it into the fuel drum.
5. Make sure that the hydraulic shut-off valve is open.

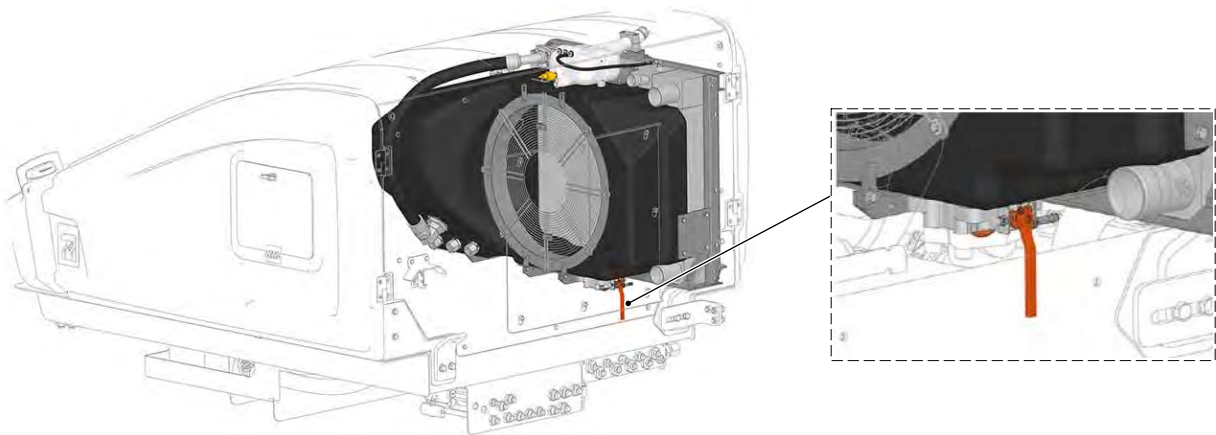
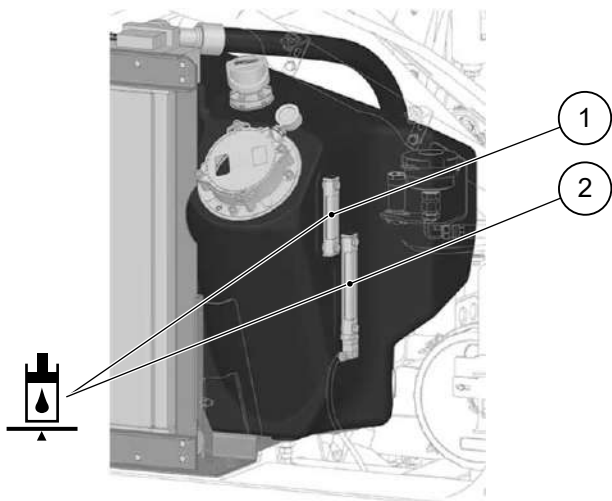


Figure 46. Make sure the shut-off valve of the hydraulic tank is fully open

- 6. Examine the hydraulic oil level from the sight glass. Add hydraulic oil, if necessary.



Callout	Description
1	Maximum level
2	Minimum level

Figure 47. Hydraulic oil level



NOTE: Make sure that there are no leaks in the hydraulic system.

**⚠ WARNING****PERSONAL INJURY HAZARD**

Can cause death or serious injury.

When checking a possible hydraulic leak, use paper or a suitable rigid plate. Do not use your hand.

If you start the engine when the machine is inside, make sure the ventilation is adequate for removing the exhaust gas. Also, make sure the diesel particulate filter regeneration is disabled.

Keep in mind that some solvents may cause a rash and some are highly flammable. Do not inhale solvent vapors. Use a respirator whenever necessary.

Keep the servicing site clean. Oil and water make the floor slippery and they are a risk when servicing the electrical system or using electric tools. Clothes stained by oil or grease catch fire easily.

Keep the machine and its equipment free of dirt and oil. Apart from reducing the risk of fire, it also makes the detection of damaged or loosened parts easier.

Check that the hydraulic hoses are free of abrasion damage.



NOTE: When checking the hydraulic oil level, make sure that all hydraulic cylinder functions are in.

7. Make sure the emergency stop buttons are not pushed down. If any of the buttons are in the down position, the engine cannot be started.

4.3 Starting the engine

Use an exhaust gas hose to direct exhaust gases from the engine outside if the engine is started in a closed space.

**⚠ DANGER****TOXIC GAS HAZARD**

Will cause death or serious injury.

Do not start the engine indoors or in a closed space without proper ventilation and exhaust gas suction system. Exhaust gases may concentrate to hazardous levels.

**⚠ WARNING****PERSONAL INJURY HAZARD**

Can cause death or serious injury.

Before starting the machine, make sure that there are no persons in the area whose safety may be endangered. Walk around the machine and make sure that there is nobody on, by or below the machine. Warn everybody nearby before starting.



 **CAUTION**

EXPLOSION HAZARD
Can cause moderate injury or property damage.
Never use startup spray or any other similar product to help the engine start. Startup sprays and similar products can cause a destructive explosion in the intake manifold.

For instructions on running-in period of the engine, see the instruction manual of the engine.

1. Make sure that the steps listed in [5.2 Preparing for driving](#) have been done.
2. Locate the main switch and turn it to ON position.

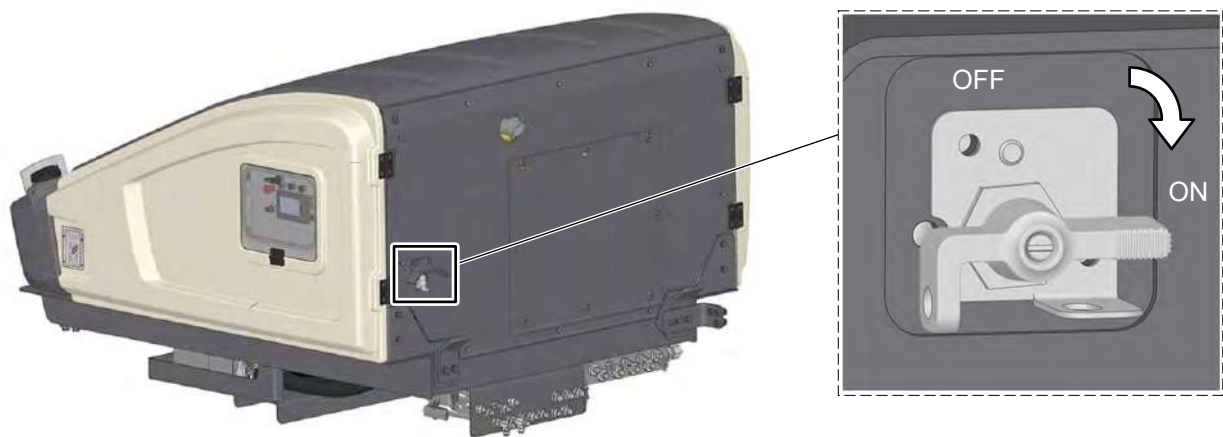


Figure 48. Main switch

3. Locate the main control panel.
4. Turn the control panel key switch clockwise to position 1 (ON).



Figure 49. Control panel key switch ON

- a) Wait for 45 seconds. The control system starts up and the display shows **‘Engine starting is enabled’**.
 - b) If the display shows alarms, see instructions from [9 Troubleshooting](#).
5. Check the fuel level from the **Message field (1)** of main control panel display. Another way is to tap **Information views (2)**, and then tap **Engine information (3)** and check the value (4).

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If there is no fuel, or the fuel level is very low, refill. Make sure that no dust or dirt enters the fuel tank through the refill opening.

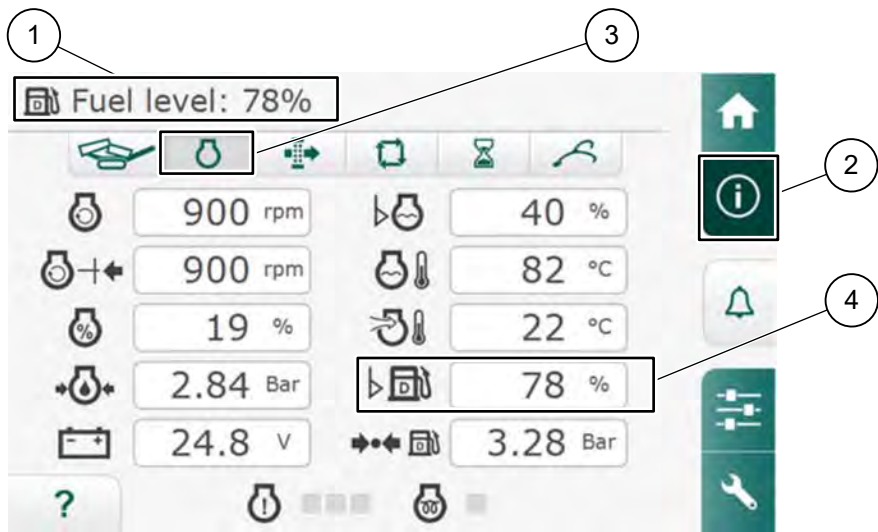


Figure 50. Fuel level

6. Start the engine by pressing and holding the engine start/stop button. The machine gives an acoustic warning signal before it starts. Release the engine start/stop button when the engine is running. If the engine does not start, see [9 Troubleshooting](#).



Figure 51. Engine start/stop button

7. Allow the engine to idle until it has warmed up.
8. Check around the engine compartment area for engine oil, fuel, coolant, or hydraulic fluid leaks.

4.4 Operating the radio control device (option)



Figure 52. Radio control device

NOTE:

Do not operate this transmitter unless you have been trained in the safe and proper operation of the radio control system and the machinery it is to control. Be alert to unsafe conditions and be aware that radio remote control commands can take place around obstacles and out of your direct sight.

Always confirm that the machine and remote control STOP functions work properly before beginning any machine operation.

Turn OFF the transmitter when not in use. Remove the key cap when the unit is placed any distance away from you.

BEFORE OPERATION

⚠ DANGER

GENERAL HAZARD
Will cause death or serious injury.
Test the stop function. Never operate the machine if the stop function does not work properly.

Check the condition of the transmitter once a day, before the start of an operation and at all shift changes:

- 1. Visually check the transmitter for any physical wear or damage.
- 2. Confirm that you can read and understand all of the safety labels.

⚠ DANGER

GENERAL HAZARD
Will cause death or serious injury.
If any of the machine functions operate with the stop push button pressed, stop immediately. Turn off the transmitter, remove the batteries and contact your supervisor.

HOLDING THE TRANSMITTER

Hold the transmitter upright with the front facing you. Confirm that you are able to easily read and understand all operation text and symbols.



NOTE: Holding the transmitter improperly while operating your machine could result in unexpected machine response.

The green Operation LED indicates the following operational condition and status:

- Steady Green - Transmitter is ON, but not yet operational.
- Flashing Green - Transmitter is operational.

4.4.1 Starting the transmitter

1. Insert the key cap into the radio control device.
2. Confirm that all equipment manufacturer safety measures have been followed.
3. Confirm batteries are fresh or fully-charged.
4. Make sure the STOP push button is not pressed.
5. Rotate the ON/OFF switch to the ON position.



NOTE: An audible start alarm signal sounds when the radio connection between the control device and the machine is established.



NOTE: If the ON/OFF switch fails to turn, confirm that the key cap is fully inserted. An audible start alarm signal sounds, then in about 3 seconds, a second alarm signal sounds. After a brief self-test, the green Operational LED flashes.



NOTE: The Operational LED is not shown here because the specific location varies per application.

6. Press the START/HORN push button (if equipped).
7. Push in the STOP push button and test the machine functions again to confirm that they DO NOT function.



DANGER

GENERAL HAZARD

Will cause death or serious injury.

If any of the machine functions operate with the stop push button pressed, stop immediately. Turn off the transmitter, remove the batteries and contact your supervisor.

8. Pull out the STOP push button. Do not twist.
9. Press the START/HORN push button (if equipped). Your system is ready for operation.

4.4.2 Stopping the transmitter

1. Rotate the ON/OFF switch to the OFF position.
2. Remove the key cap. Store the key cap in a safe place to prevent unauthorized use.

4.4.3 Remote stop

Press the STOP push button. Confirm that all dangerous situations are corrected before restarting the transmitter.



NOTE: To stop the engine with the radio control remote stop, the radio transmitter has to be on and in operating range.

4.4.4 Low battery alert

During operation, an audible alarm signal sounds to alert you to a low battery condition. For safety reasons, the transmitter automatically shuts down after 30 seconds. Use this time to place your machine in a safe position. To restart your transmitter, replace the discharged batteries, and see [4.4.1 Starting the transmitter](#) for next steps.

4.4.5 Changing the battery

1. Remove the discharged battery from the battery compartment.
2. Snap a fully-charged replacement battery into the battery compartment.



NOTE: Avoid delays. Ensure that the charging process has begun, always confirm that the battery charger is powered ON, and the proper CHARGE LED lights remain lit as noted in these instructions.

4.4.6 Fast charging

1. Insert the discharged battery into the battery compartment and snap into place. The CHARGE LED flashes for 2 seconds, then stays lit.
2. Press FAST CHARGE. The FAST CHARGE LED also lights up and stays lit. When the READY LED lights up and the CHARGE and FAST CHARGE LEDs turn OFF, your battery is fully charged.



NOTE: Charging time may take up to 5 hours depending on your battery condition.

4.4.7 Troubleshooting the radio control device

4.4.7.1 Batteries not charging

Remedy

1. No power to the Charger. Supply power.

4.4.7.2 System not initializing after normal START

Remedy

1. Disengage STOP push button.
2. Check batteries, replace if needed.
3. Confirm that the receiver is powered ON.

4.4.7.3 Transmitter is ON, but does not transmit (status light is not flashing green)

Remedy

1. Check batteries, replace if needed.
2. If batteries are fresh or fully charged, there may be an internal failure (see supervisor).

4.4.7.4 Unit is transmitting, but the machine not responding

Remedy

1. Out of range. Restart transmitter within range.
2. Confirm that the toggle switch is in the OFF position (this is normally the “center” position).
3. Receiver is not powered ON. Turn ON receiver.
4. Blown Fuse. Check and replace if needed.
5. Transmitter/receiver frequency channels do not match (see your supervisor).
6. Transmitter/receiver addresses do not match (see your supervisor).

4.4.7.5 All machine functions operate intermittently

Remedy

1. Receiver antenna connection or ground loose.
2. Interference.
3. Connector inside receiver is loose.

4.4.7.6 Some machine functions operate intermittently

Remedy

1. Machine motion wiring is loose. Check wiring from receiver to plug, from plug to actuator.
2. Connector inside receiver is loose.

4.5 Stopping the engine



NOTE: Only use the emergency stop in emergency situations - do not use it for routine stopping of the engine.

For locations of emergency stops, see [2.2.5 Emergency stop locations](#).



NOTE: Make sure there is no feed system running when approaching the machine.

1. Before stopping the engine, let the engine to idle (cool down) for approximately 5 minutes.
2. Shut down the engine: In the control panel, push the engine start/stop button.



Figure 53. Engine start/stop button

3. Turn the control panel key switch to OFF position.



NOTE: If the machine is to be shipped or stored, make sure that the main switch is left in OFF position. This is for preventing decrease in battery charge level.

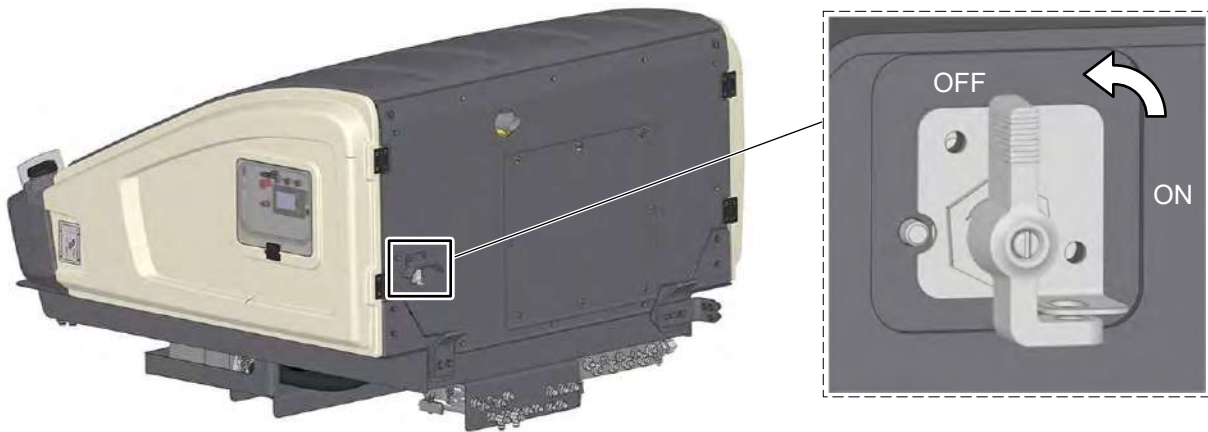


Figure 54. Lokotrack ST3.8 main switch in OFF position

4.6 Refueling



 WARNING

FIRE HAZARD
Can cause death or serious injury.
Do not smoke or light an open fire when refueling or when fuel is handled nearby.
Diesel fuel is a flammable liquid. Do not use it as a cleaning agent. Use approved solvents instead.
Make sure that the electric wires are free of abrasion damage which might cause a short circuit and fire.

- Shut down the engine or set it to idle while refueling.
- Only use clean Ultra Low Sulfur Diesel (ULSD) fuel that contains less than 15 ppm sulfur in U.S. EPA Tier 4 Final areas, and less than 10 ppm in European Stage V and China Stage IV areas.
- For the quality requirements for the fuel, see the instruction manual of the engine.
- In cold operating conditions, note the low temperature properties of the fuel.

- The fuel must be stored so that it cannot be contaminated by water or impurities.
- Replace the fuel filter frequently enough (see the service instructions). A clogged or damaged filter may reduce the engine capacity or damage the injection pump or injector nozzles.

Refueling through the filler cap

When adding fuel through the filler cap, be careful not to let any dirt enter the fuel tank through the opened cap. Clean the area around the cap before opening it.

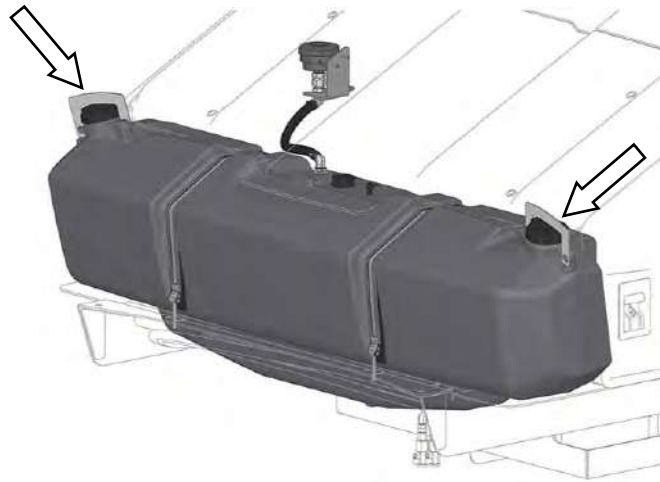


Figure 55. Fuel filler cap

Refueling with the filling pump (optional)



NOTE: If the selector switch is switched ON for the hydraulic operation, the process is not able to start. And vice versa, if the process is running, the hydraulic operations cannot be selected.



NOTE: Do not leave the fuel pump operating unattended.

1. Switch the ignition on but do not keep the engine running due to safety reasons.
2. Open the protective plug of the pipe fitting, clean the filling hose and the pipe fittings carefully and connect the charging pipe to the hand valve.
3. Open the hand valve. The refueling pump does not tolerate running dry.
4. Turn the switch to the right and turn on the refueling pump from the control switch. The pump stops automatically when the tank is full.
5. Turn the switch of the refueling pump and the switch to the "OFF" position.
6. Close the hand valve, remove the filling hose and install the shield plug of the pipe fitting.

If the fuel flows poorly when refueling, the pressure filter may be clogged. Replace the filter, if necessary.

4.6.1 Refilling the DEF tank (Tier 4 Final/Stage V)



 **WARNING**

PERSONAL INJURY HAZARD

Can cause death or serious injury.

The Diesel Exhaust Fluid (DEF) is irritating to the skin and eyes and corrosive to metals. Handle the diesel exhaust fluid with care. Avoid contact with skin and eyes, as well as with the metal parts of the machine. See the safety data sheet of the diesel exhaust fluid.

 *NOTE: Make sure that no oil or any other impurities enter the diesel exhaust fluid tank when refilling.*

 *NOTE: The fuel tank and DEF tank volumes are calculated as pairs. Make sure you refill both tanks at the same time.*

It is recommended that the diesel exhaust fluid is purchased in small canisters. In larger canisters, there is a risk of diesel exhaust fluid to lose its quality. Also the risk for impurities grows when the fluid is stored in opened canisters.

For use in Caterpillar engines, the diesel exhaust fluid must meet all the requirements defined by standard ISO 22241-1.

Do not use the diesel exhaust fluid filling equipment for any other fluids.

 *NOTE: If the diesel exhaust fluid level in the tank drops too low, the engine goes to the fault mode.*

For checking the diesel exhaust fluid level, do the following steps.

1. From the **main view** of the control panel display, tap **Information views** (1).
2. Tap **Aftertreatment view** (optional) (2).
3. See the diesel exhaust fluid level in percentage (3).

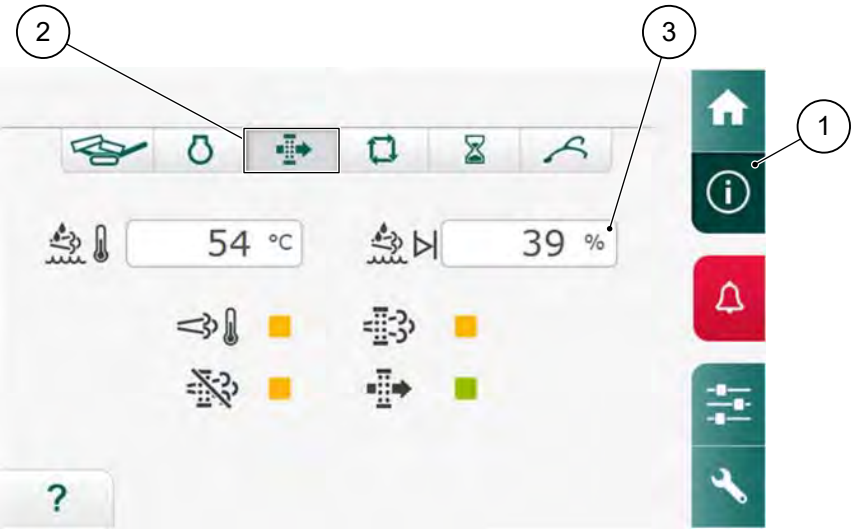


Figure 56. Diesel exhaust fluid level

4.7 Adjusting the diesel engine RPM speed

Familiarize yourself with the control display. For more information, see [3.7.1 Main control panel](#).



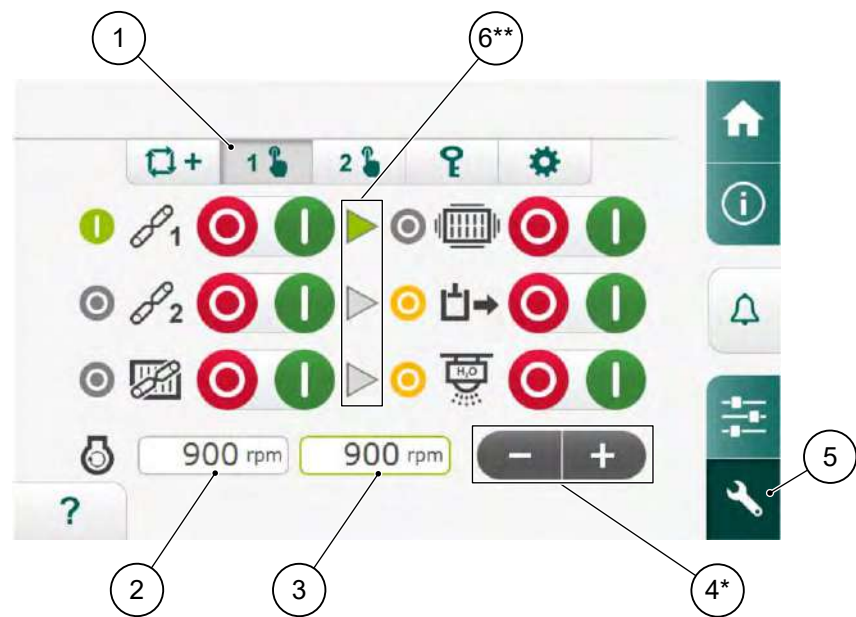
NOTE: The engine is running with a preset rpm speed when manual valves are used and when the screening process is running.

To manually control the engine speed, do the following:

1. With the engine running, from the **main view** of the control display, tap **Process control views** (5), and then tap **Manual controls one view** (1).
2. To change the engine speed, use the - or + buttons (4). To increase rpm, use (+), and to decrease rpm, use (-).

*Note that with Constant Speed Engine (CSE), you cannot adjust (increase/decrease) the engine rpm.

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Callout	Description	Callout	Description
1	Manual controls one view	2	Actual engine speed (rpm)
3	Requested engine speed (rpm)	4*	Engine speed adjustment, increase (+), decrease (-)
5	Process control views	6**	Status indicator of optional devices Optional devices can only be used if the main device is running. • (Green) The use of optional device is allowed • (Grey) The use of optional device is not allowed

Figure 57. Adjusting engine RPM

** Optional devices can only be used if the main device is running. For details, see [3.7.4 Manual controls](#).

4.8 Hand valve activation

 **NOTE:** Before activating the manual valves, make sure that the screening process is stopped.

1. From the main control panel, push the **Process stop** button.

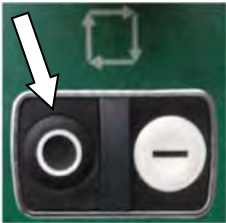


Figure 58. *Process stop button*

2. From the main control panel, activate the hand valves by pushing the **Manual valves ON/OFF button**. An audible start alarm signal sounds and the engine rpm raises to the required lever for using hand valves. Now you can use the hand valves.



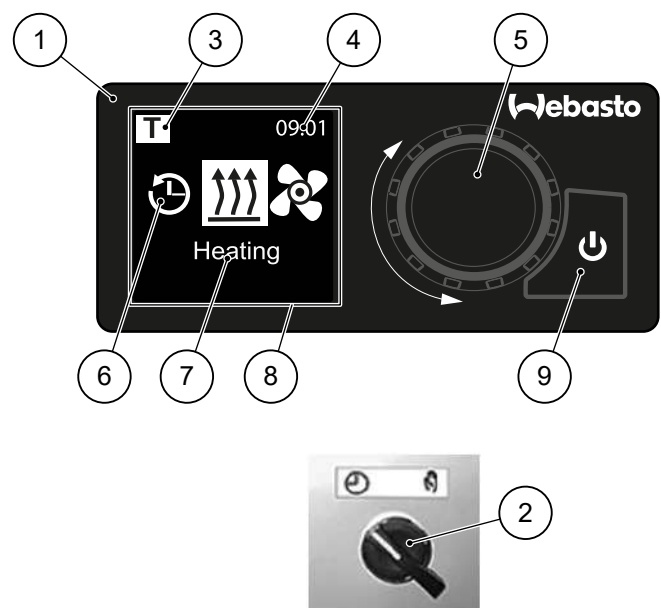
Figure 59. *Manual valves ON/OFF push button*

4.9 Using the engine pre-heater (option)



NOTE: Pre-heater use consumes battery power. If the pre-heater is used for long periods consecutively, battery charge level may weaken to such an extent that the charge is not sufficient for starting the engine.

4.9.1 Engine pre-heater control panel



1. Webasto panel

2. Selector switch (timer/forced start)

3. Activated time settings, ADR display*

4. Time

5. Control knob (turn/push button) for selecting the desired function
6. Symbol menu element

7. Menu name

8. Display

9. Quick start button with status display

Figure 60. Engine pre-heater control panel

*Optional

Keep the selector switch (2) in "timer" position and use the control panel of the pre-heater to turn it on. If the selector switch (2) is set to "forced start" position and electric power is cut off from the machine, the pre-heater could go to a fault state.

For more instructions on using the pre-heater, see the operating instructions of the pre-heater.

5 Transportation

5.1 General information about transportation

Because of the size and weight of the equipment, special attention must be paid when moving the machine. It is recommended that a banksman is used when the unit is moved.

Only use approved lifting equipment with adequate capacity when preparing for transportation.



WARNING

CRUSHING HAZARD

Can cause death or serious injury.

Do not drive the machine in locations where there is a risk of squeezing. If possible, drive the machine either from the feed end or discharge end. Make sure the cable of the drive control device does not get caught under the tracks.



WARNING

GENERAL HAZARD

Can cause death or serious injury

Make sure there is no one in the range of the hydraulic devices when operating.

Make sure the lighting is appropriate at the site and near the machine.

Make sure there is no one on top of or near the machine.

Be extremely cautious when driving in the cold temperatures. Response times of the Lokotrack ST controls might be longer than usual due to stiff hydraulic oil.



WARNING

PERSONAL INJURY HAZARD

Can cause death or serious injury.

Moving and especially turning the machine is stressful for the side conveyor frames. Do not move the machine when the side conveyors are in the operating position (unfolded). Turn the side conveyors to the transport position and lock them in place with the transport brackets before moving the machine. The operator must stand away from the machine while it is in motion or turning. Do not go under the conveyors.

NOTE:

Make sure the following:



- The process is set to OFF and it will not be started during transportation.
- The driving route is smooth enough.
- Differences in altitude or inclinations do not prevent driving.
- The lighting is appropriate at the site or near the machine.
- The driving surface is not icy or slippery. If needed, sprinkle sand on the surface.



⚠ WARNING

UNEXPECTED MOVEMENT HAZARD

A slippery or icy surface can cause the unit to move unexpectedly. Can cause death or serious injury.

Make sure the surface is not slippery or icy, for example, by sprinkling sand on the surface.



NOTE: Longer moves (more than 100 m) must be driven with the feeder end of the machine first, so that the driving gear comes after the track. In that case, the lower end of the track remains tight, because the ground supports the track and it does not bend down. This helps to prevent the chain from jumping over the driving wheel teeth.



NOTE: After driving with track drive continuously for 30 minutes: Stop and wait for 30 minutes, to allow the components to cool down before continuing the track drive.



NOTE: When driving on a sloping surface or onto a trailer truck, the automation system may stop the machine if the hydraulic fluid or coolant level is too low. If the machine stops unexpectedly, check the alarm from the display.



NOTE: The track drive does not function if the selector switch of the hand valves in the hydraulic cabin has been switched ON or if the safety switch is in the OFF position.



NOTE: Before taking the drive control device into use, visually check that the drive control device, cable, or plug are not damaged.



NOTE: The screening unit must not be used for any other purpose than those intended by the manufacturer. In particular, you must not:

- Transport or haul persons or loads
- Pull or push the equipment with another machine

5.2 Preparing for driving

1. Make sure that the process is set to STOP and it will not be started during transportation.
2. Visually inspect that there are no loose parts, and everything is secured in place.
3. Check the inclinations, approach angle, and departure angle of the machine.

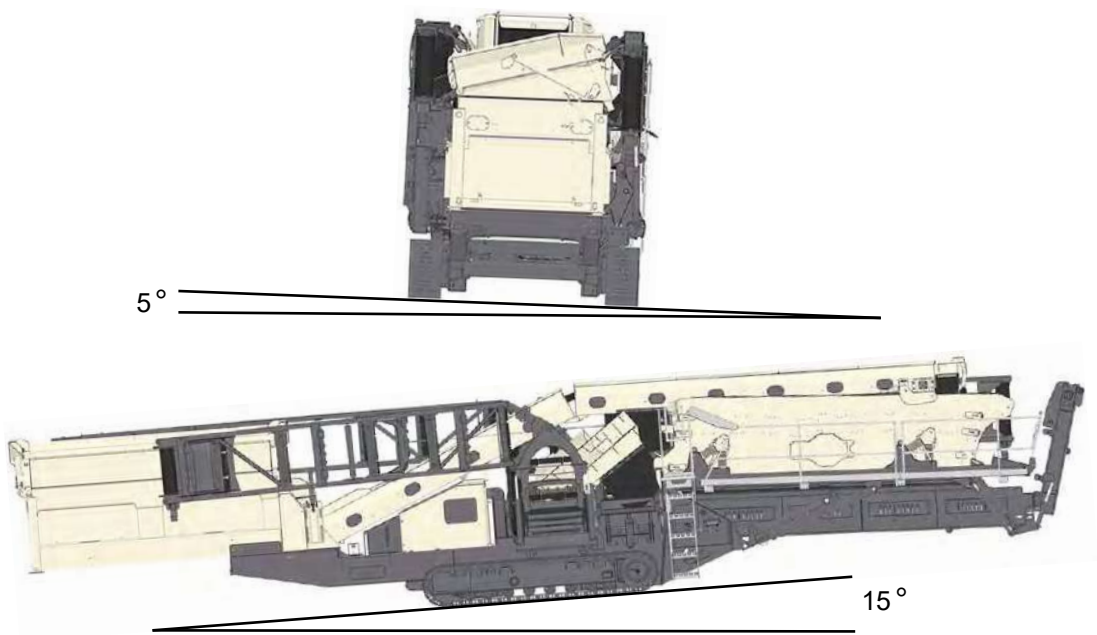


Figure 61. Maximum inclinations



NOTE: On steep slope, the back end/engine must be on the downhill side.

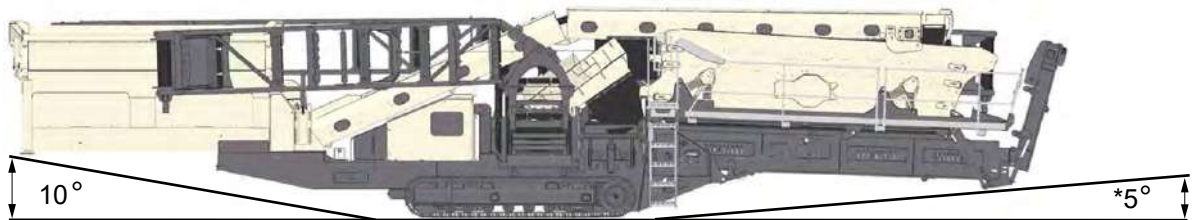


Figure 62. Maximum approach and departure angle

Check the current angle of the machine from the spirit levels and keep checking the angles during driving.

- 4. Open the door of main control center.

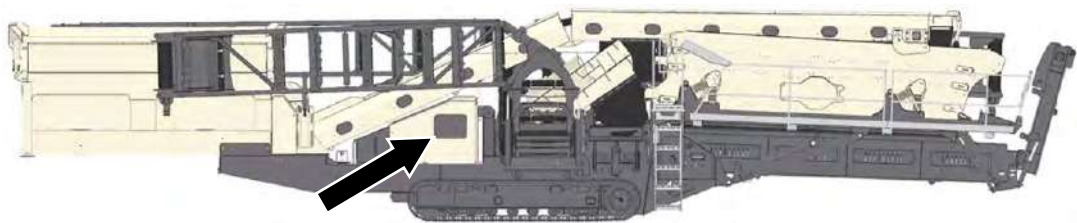


Figure 63. Main control panel location (on the right side of the machine)

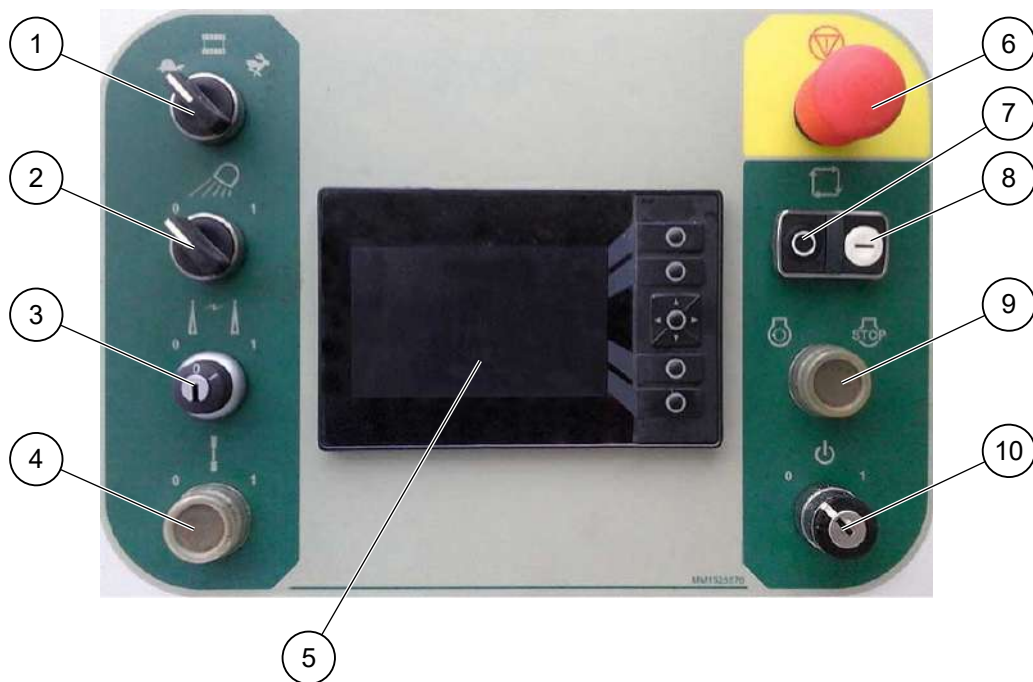


Figure 64. Main control panel

Callout	Description
1*	Selector switch for track driving speed: SLOW “Turtle” / NORMAL “Rabbit” (only for machines with Constant Speed Engine (CSE))
2	Work lights ON/OFF: This function is optional.
3*	Radio control mode ON/OFF: ON position activates the radio control mode (and deactivates the drive control device).
4*	Manual valves ON/OFF: Activates and deactivates the hydraulic cylinder functions.
5*	Control display: Interface for the user to operate the control system.
6*	Emergency stop button: Shuts down all processes including the engine.
7	Process stop: Stops the screening process in sequence.
8	Process start: Starts the screening process in sequence.
9*	Engine start and stop: Push button for starting and stopping the engine.
10*	Key switch ON/OFF: Turns the control panel ON and OFF

*Relevant for track driving.

5. Make sure that the emergency stop buttons are not pressed, and that the remote stop button is not pressed down.
6. Proceed to either of the two sections below depending on the control method you want to use:
 - [5.3.1 Connecting the drive control device](#)
 - [5.3.2 Connecting the radio control device](#)



NOTE: You must start the engine before connecting the drive control device or radio control device. Otherwise, you must reconnect/reactivate the control device.

5.2.1 Increasing the ground clearance

Prerequisites: The machine must be positioned on a level ground, with the engine running. To start the engine, see [4.3 Starting the engine](#).



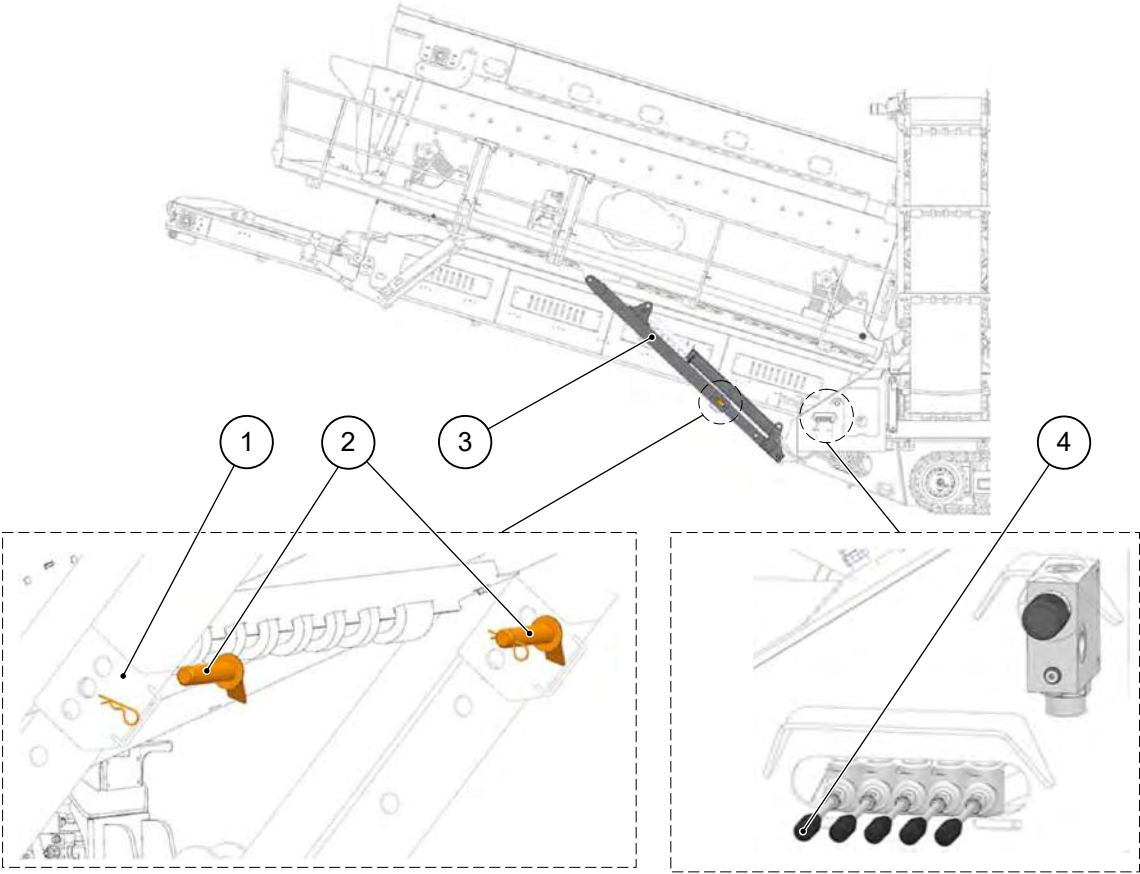
 WARNING

COLLISION HAZARD
Can cause death or serious injury.
Always drive the machine in transport position on flat surfaces. Right after the increased ground clearance is not needed anymore, lower the screen back to the transport position and attach the locking pins. Pay attention to the machine dimensions to avoid power lines, bridges, branches and other obstacles.

The need of increasing ground clearance can vary case-by-case. Increase the ground clearance according to need but pay attention to how much room there is on top of the machine.



NOTE: Increasing the ground clearance is allowed to temporary use only.



Callout	Description
1	Adjustment sleeves
2	Locking pins and clips
3	Screen angle trestle
4	Screen UP-DOWN

Figure 65. Raising the screen angle

1. From the main control panel, activate the manual valves by pushing the **Manual valves ON/OFF button**. An audible start alarm signal sounds and the engine rpm raises to the required lever for using manual valves. Now you can use the manual valves.



Figure 66. *Manual valves ON/OFF push button*

- Using the **Screen UP-DOWN control** (4), raise the screen angle slightly by moving the screen angle control to the RAISE position. Raise the screen angle enough to relieve the pressure on the adjustment sleeves (1) and locking pins (2).
- Remove the screen box angle adjusting clips and locking pins (2) from the adjustment sleeves (1).
- Using the **Screen UP-DOWN control** (4), raise the screen angle by moving the screen angle control to the RAISE position.
- Raise the screen angle trestle (3) slightly above the desired operating position.
- Move the adjustment sleeves (1) to the desired hole and replace the locking pins and clips (2) in the screen angle trestle (3).



NOTE: Make sure that both trestles are adjusted equally, failure to do so will damage the screen box assembly.

- Using the **Screen UP-DOWN control** (4), lower the screen angle trestle (3) by moving the **Screen UP-DOWN control** (4) to the LOWER position. Lower the screen angle trestle (3) so that it rests securely on the adjustment sleeves (1) and locking pins (2).
- Turn the switch for manual valves to OFF position. Otherwise, track driving is not possible.



Figure 67. *Manual valves ON/OFF push button*

5.3 Connecting the control device

Proceed to either of the two sections below depending on the control method you want to use:

- [5.3.1 Connecting the drive control device](#)
- [5.3.2 Connecting the radio control device](#)

5.3.1 Connecting the drive control device

- 1. Locate the drive control device.
You can find the drive control device in the tool box, or in the engine module of the machine.
- 2. Visually check that the drive control device or the cable is not damaged.
- 3. Connect the drive control device.



Figure 68. Driving socket location. There is one at the front of the machine (1), and the other one at the rear of the machine (2).

NOTE:



- If a fault is detected in the connection of the drive control device plug to the socket, an alarm is displayed on the control panel. To acknowledge the alarm, disconnect and reconnect the drive control device plug.
- The drive control device cannot be used if the radio control mode is switched on.

- 4. On the main control panel, make sure that the radio control mode ON/OFF switch is in position 0 (OFF).



Figure 69. Radio control mode ON/OFF switch in position 0 (OFF)

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5.3.2 Connecting the radio control device



NOTE: Before using the radio control device, check if the local laws and regulations allow the use of radio signals.

1. Activate the radio control device: On the main control panel, turn the radio control mode ON/OFF switch to position 1 (ON).



Figure 70. Radio control position 1 (ON)

5.4 Driving



 DANGER

ELECTRICAL HAZARD
Will cause death or serious injury.
If the e-Power module (option) is installed, disconnect the feed cable before track driving the machine.
Make sure that the disconnected feed cable will not get under the moving tracks.

5.4.1 Driving with drive control device



 CAUTION

PROPERTY DAMAGE HAZARD
Can cause moderate injury or property damage.
Be extremely cautious when driving the machine onto a ramp.
Make sure that the ramp is properly positioned, in perfect technical order and can support the weight of the machine.

To drive the machine straight, move both **drive control levers** simultaneously to the same direction. When turning the machine, use only one lever at a time.

Check the directions of **drive control levers** compared to the directions of the machine from [3.7.3.3 Driving directions](#).



NOTE: When turning, avoid driving tracks in opposite directions.

For description of the functions of drive control device, see [3.7.3.1 Drive control device](#).

1. **This step is only for machines with Constant Speed Engine (CSE):** From the main control panel, make sure that the **track speed selector switch** is in the “Slow” (Turtle) position before driving the machine.

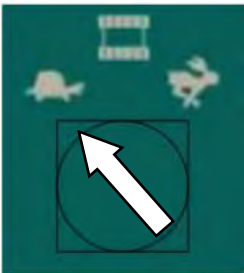


Figure 71. Track speed selector switch SLOW / RABBIT

With the **track speed selector switch**, you can select two different track driving speeds: Slow “Turtle” and Normal “Rabbit”. Use the “Normal” (Rabbit) position only if needed.

- To increase the track driving speed, turn the **speed controller** on the radio control device to the “increase” position for 2 seconds
 - To decrease the track driving speed, turn the speed controller to the “decrease” position for 2 seconds.
2. From the **radio control device ON/OFF switch**, turn the key switch clockwise for few seconds to activate the radio control device. Turn the **radio control device ON/OFF switch** clockwise once more.
 3. Move and release either joystick once to activate track driving.
After an audible start alarm signal, track driving is active and the machine can be driven.



NOTE:
You can change the driving speed by adjusting the engine speed.

4. From the radio control device, select the track drive mode, and then adjust the engine speed to around 1000 rpm to avoid stalling the engine.
5. To familiarize yourself with the drive controls, and to check that track drive works properly, use the radio control levers to drive the machine 0.5 m (20 in) straight and stop.



NOTE: Be aware of the driving conditions. Weather or ground conditions (firmness of the ground), can affect the traction. If driving on uneven ground, always note the ground clearance of the machine and the irregularities of the ground. In bad terrain, the machine might not move if the engine speed is too low.

Driving speed range	Engine speed
Slow driving	850..1200

Driving speed range	Engine speed
Normal driving	1200...max

6. Drive the machine to the desired location. Continuously pay attention to the machine and the surroundings while driving.



NOTE: After driving with track drive continuously for 30 minutes: Stop and wait for 30 minutes, to allow the components to cool down before continuing the track drive.



NOTE:
When track driving longer distances, make sure that you drive the feed end of the machine ahead.

7. After finishing the driving: On the main control panel, turn the **radio control mode ON/OFF switch** to position 0 (OFF).



Figure 72. Radio control switch in position 0 (OFF)

8. Turn the **radio control device ON/OFF switch** counterclockwise to position 0 (OFF) to deactivate the radio control device.

5.4.2 Driving with radio control device



 CAUTION

PROPERTY DAMAGE HAZARD
Can cause moderate injury or property damage.
Be extremely cautious when driving the machine onto a ramp.
Make sure that the ramp is properly positioned, in perfect technical order and can support the weight of the machine.

To drive the machine straight, move both **radio control levers** simultaneously to the same direction. When turning the machine, use only one lever at the time.

Check the directions of **radio control levers** compared to the directions of the machine from [3.7.3.3 Driving directions](#).



NOTE: When turning, avoid driving tracks in opposite directions.

For description of the functions of radio control device, see [3.7.3.2 Radio control device \(optional\)](#).

1. **This step is only for machines with Constant Speed Engine (CSE):** From the main control panel, make sure that the **track speed selector switch** is in the “Slow” (Turtle) position before driving the machine.

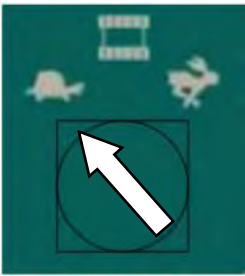


Figure 73. Track speed selector switch SLOW / RABBIT

With the **track speed selector switch**, you can select two different track driving speeds: Slow “Turtle” and Normal “Rabbit”. Use the “Normal” (Rabbit) position only if needed.

- To increase the track driving speed, turn the speed controller on the drive control device to the “increase” position for 2 seconds.
 - To decrease the track driving speed, turn the speed controller to the “decrease” position for 2 seconds.
2. From the **radio control device ON/OFF switch**, turn the key switch clockwise for few seconds to activate the radio control device. Turn the **radio control device ON/OFF switch** clockwise once more.
 3. Move and release either joystick once to activate track driving.
After an audible start alarm signal, track driving is active and the machine can be driven.



NOTE:
You can change the driving speed by adjusting the engine speed.

4. From the radio control device, select the track drive mode, and then adjust the engine speed to around 1000 rpm to avoid stalling the engine.
5. To familiarize yourself with the drive controls, and to check that track drive works properly, use the radio control levers to drive the machine 0.5 m (20 in) straight and stop.



NOTE: Be aware of the driving conditions. Weather or ground conditions (firmness of the ground), can affect the traction. If driving on uneven ground, always note the ground clearance of the machine and the irregularities of the ground. In bad terrain, the machine might not move if the engine speed is too low.

Driving speed range	Engine speed
Slow driving	850..1200

Driving speed range	Engine speed
Normal driving	1200...max

6. Drive the machine to the desired location. Continuously pay attention to the machine and the surroundings while driving.



NOTE: After driving with track drive continuously for 30 minutes: Stop and wait for 30 minutes, to allow the components to cool down before continuing the track drive.



NOTE:

When track driving longer distances, make sure that you drive the feed end of the machine ahead.

7. After finishing the driving: On the main control panel, turn the **radio control mode ON/OFF switch** to position 0 (OFF).



Figure 74. **Radio control mode ON/OFF switch** in position 0 (OFF)

8. Turn the **radio control device ON/OFF switch** counterclockwise to position 0 (OFF) to deactivate the radio control device.

5.4.3 Turning the machine

Some hints to make turning the machine easier:

- On hard ground, turning is easier than on soft ground.
- Always select an appropriate surface for turning the machine. Only attempt to turn the machine in a location where turning is easy.
- When turning on soft ground, change the direction gradually.
- Avoid turning the machine completely at one time, so that material does not accumulate on the sides of the tracks.
- If the machine cannot be turned when driving uphill, drive a short way downhill turning the machine at the same time.
- Increase the engine rpm.



NOTE: Avoid turning the machine in situations when the traction force is on the upper section of the chain track. The chain track may loosen as the tension spring inside the track frame can not hold the pressure any longer, which might cause the drive sprocket to jump over the track.



NOTE: After driving with track drive continuously for 30 minutes: Stop and wait for 30 minutes, to allow the components to cool down before continuing the track drive.



NOTE:

The hydraulic oil temperature must be observed during longer moves. The temperature may be a maximum of 90°C (194°F). Oil that is too hot might damage the sealings.

5.5 Transportation with a trailer truck

When the unit is transported on public roads, note that it is a special transport which may need transportation permits.

Check the local regulations as they vary in each country. Place the screen module, conveyors, light pole, stairs, etc. in their transport positions.

For detailed transport dimensions, see the transport drawing.

Transport equipment needed:

- a trailer truck for transporting the unit
- correctly dimensioned fastening equipment

Before the transport, make sure the following:

- The engine of the unit has been shut down.
- The components that exceed the free transport height and width have been removed.
- The load is appropriately fastened.
- All hatches and covers are locked.
- The components being transported are protected using appropriate shipping braces and blocking material.
- All the components are locked to transport position.
- All transport lockings are installed.
- The weight limits of all of the roadways and bridges on the intended route have been checked.
- The clearance of bridges, overhead lines and other overhead obstructions on the intended route have been checked.



NOTE: All applicable laws and regulations must be followed.

5.5.1 Preparing for transportation



WARNING

GENERAL HAZARD

Can cause death or serious injury.

Make sure that the process has stopped and that there is no material left in or on the machine.



⚠ WARNING

TRAFFIC ACCIDENT HAZARD

Can cause moderate injury or property damage.

Before transportation, make sure to:

- Remove all debris from the machine.
- Remove the components that exceed the free transport dimensions.
- Fasten the load appropriately.
- Lock the hatches and covers.
- Check all roadways and bridges on the route for weight limits and clearances.
- Follow all applicable laws and regulations.

Shut down the machine and perform Lock out and tag out procedure for the duration of the transportation.



⚠ WARNING

PERSONAL INJURY HAZARD

Can cause death or serious injury or property damage.

Only trained and competent personnel are allowed to operate, maintain and service the machine. If operating procedures are unclear, contact Metso for assistance prior to operating.

Stay away from a folding conveyor. Pay attention to obstacles and conveyor belt clearances when folding and unfolding conveyor.



⚠ WARNING

CRUSHING HAZARD

Can cause death or serious injury.

Do not fold or unfold more than one hydraulic component, for example, a conveyor, at a time. Only one person is allowed to operate hydraulic components at a time.



⚠ WARNING

PERSONAL INJURY HAZARD

Can cause death or serious injury.

Do not go under any conveyor module when raising or lowering the modules. Make sure the restricted area is clear of people when moving the conveyor modules.

Metso recommends cleaning the machine using a water pressure washer or a steam cleaner before transporting the machine on public roads.

1. Thoroughly clean the machine of debris and make sure that the joint areas with moving parts are clean and free of debris.


CAUTION
PROPERTY DAMAGE HAZARD

Can cause property damage.

Make sure that the conveyor forks always lay against the piston rods to avoid breaking of the fork.

2. Remove all debris from the screens.
3. Start the engine. See [4.3 Starting the engine](#) and “Adjusting the diesel engine rpm speed”/“Engine speed adjustment”.
4. Lower the grid deck to the lowest position and secure.
5. Lower the side walls of the vibrating grid (optional).
6. Raise the hopper support legs completely. The machine will not move if the hopper support legs are not completely raised.
7. Turn the light array support down (optional).
8. Turn the topmost anti-rollback port (optional) to horizontal position. For more information, see [3.6.9 Anti-rollback ports \(option\)](#).
9. Remove the screen angle trestle pins and position them in the second to last hole at the bottom of the trestles. Lower the screen angle to the trestle pins.
10. Remove the product conveyor head section locking pins. Fold the product conveyor by moving the product conveyor fold/unfold control lever to the “FOLD” position. Secure the head section in the folded position with the locking pin.
11. If fitted, fold the side walkways including the handrails, and secure with pins and straps.
12. Fold the side conveyors according to the instructions in this manual.

5.5.1.1 General sequence of folding for transport

1. Clear the machine of all debris and material.
2. Lower the product conveyor.
3. Lower the grid assembly.
4. Fold the product conveyor.
5. Fold and raise the top deck side conveyor.
6. Fold and raise the bottom deck side conveyor and the service platform handrail, if fitted.
7. Fold and raise the top deck side conveyor.
8. Raise the hopper support legs.

5.5.1.2 Service platforms

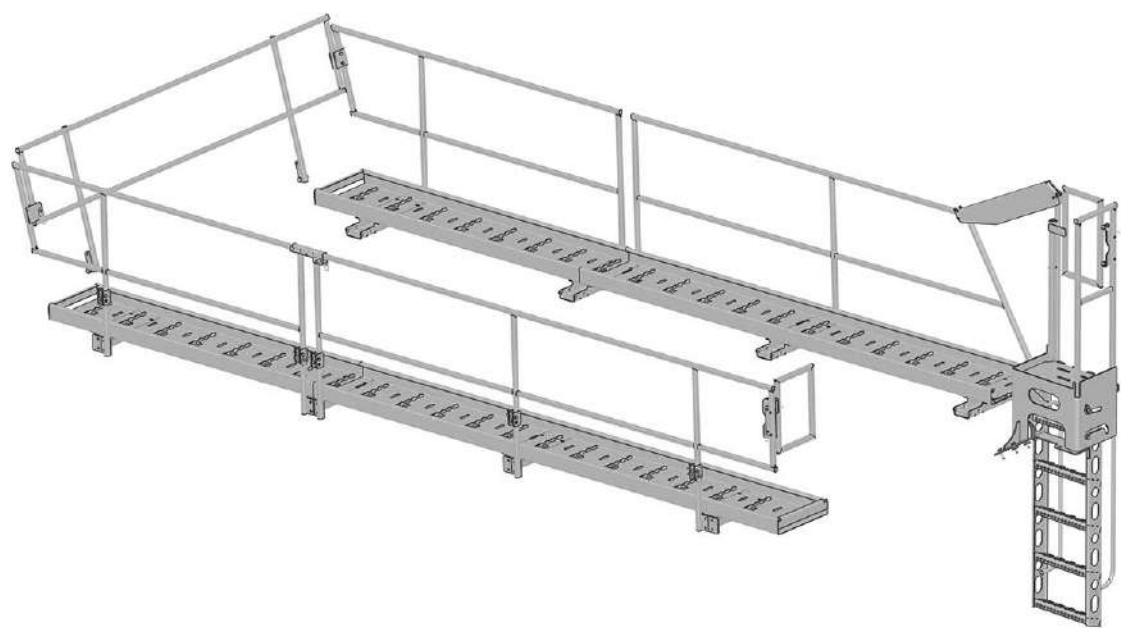
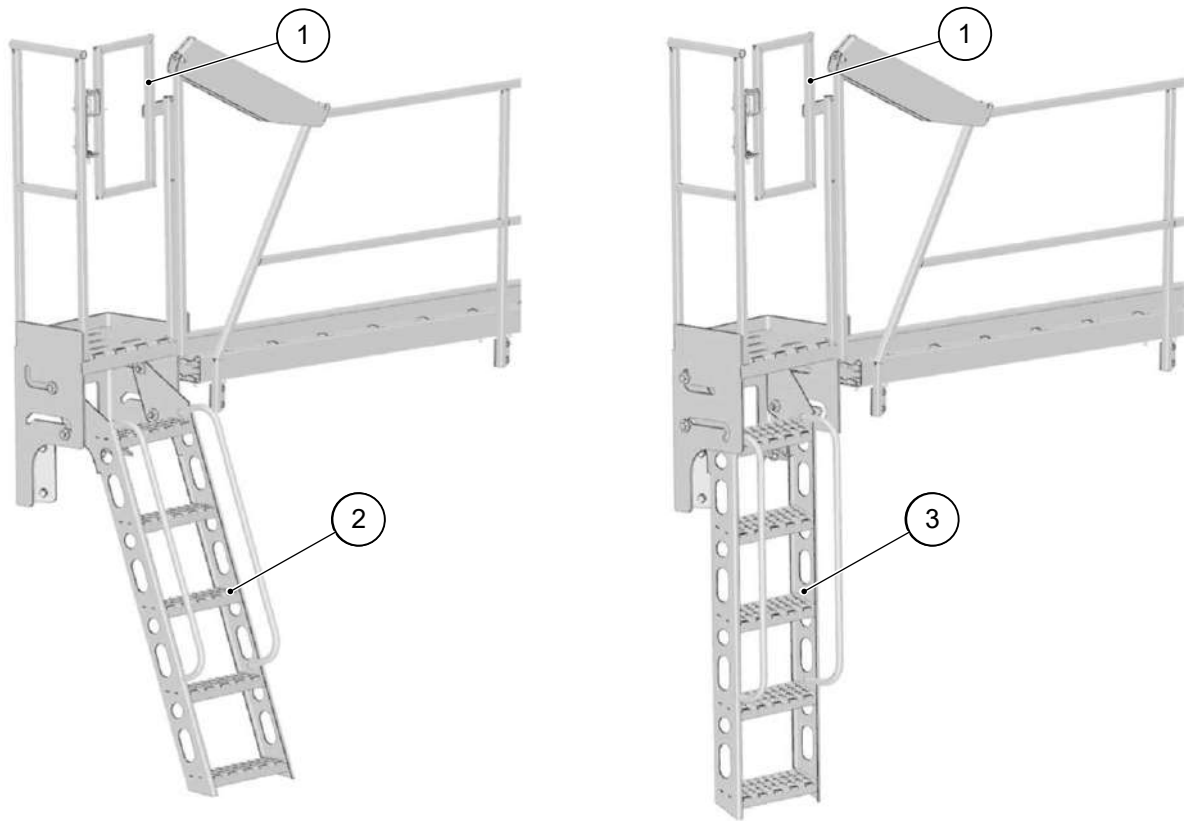


Figure 75. Service platforms

See the following figure about ladders.

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Callout	Description
1	Gate (spring-returned, no mechanical locking)
2	Ladders in operating position
3	Ladders in transport position

Figure 76. Ladders

5.5.1.3 Folding the product conveyor



WARNING

CRUSHING HAZARD
Can cause death or serious injury.

Only trained and competent personnel are allowed to operate, maintain and service the machine. If operating procedures are unclear, contact Metso for assistance prior to operating.

Stay away from the range of moving machine parts. Make sure that nobody is in the restricted area when operating hydraulic devices.

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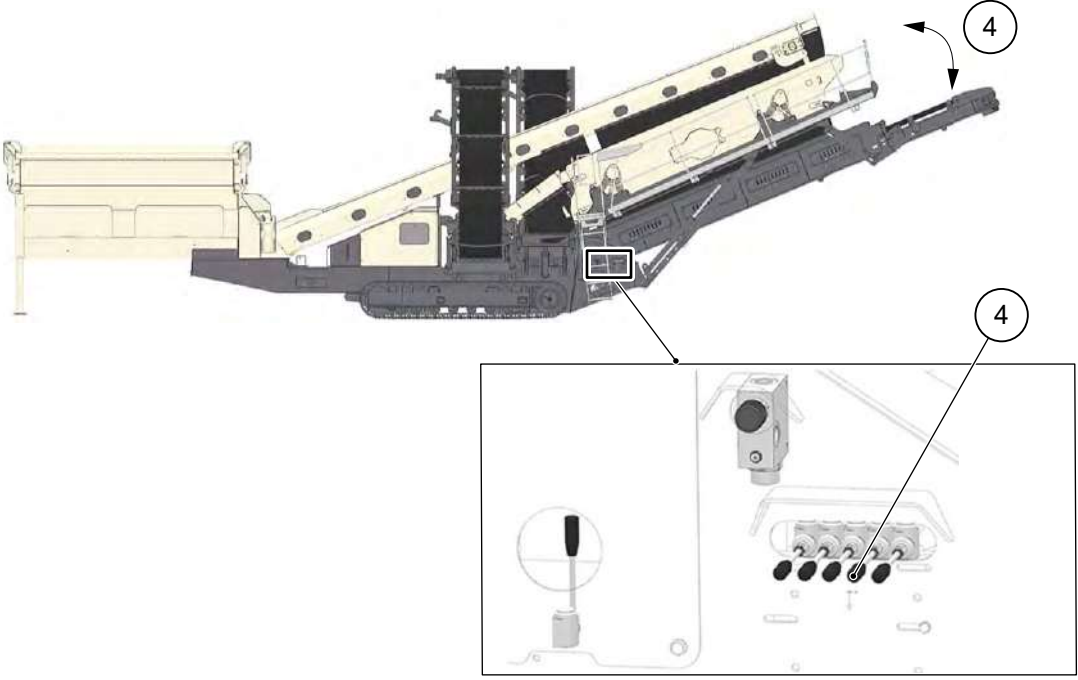


⚠ CAUTION

GENERAL HAZARD

Can cause moderate injury or property damage.

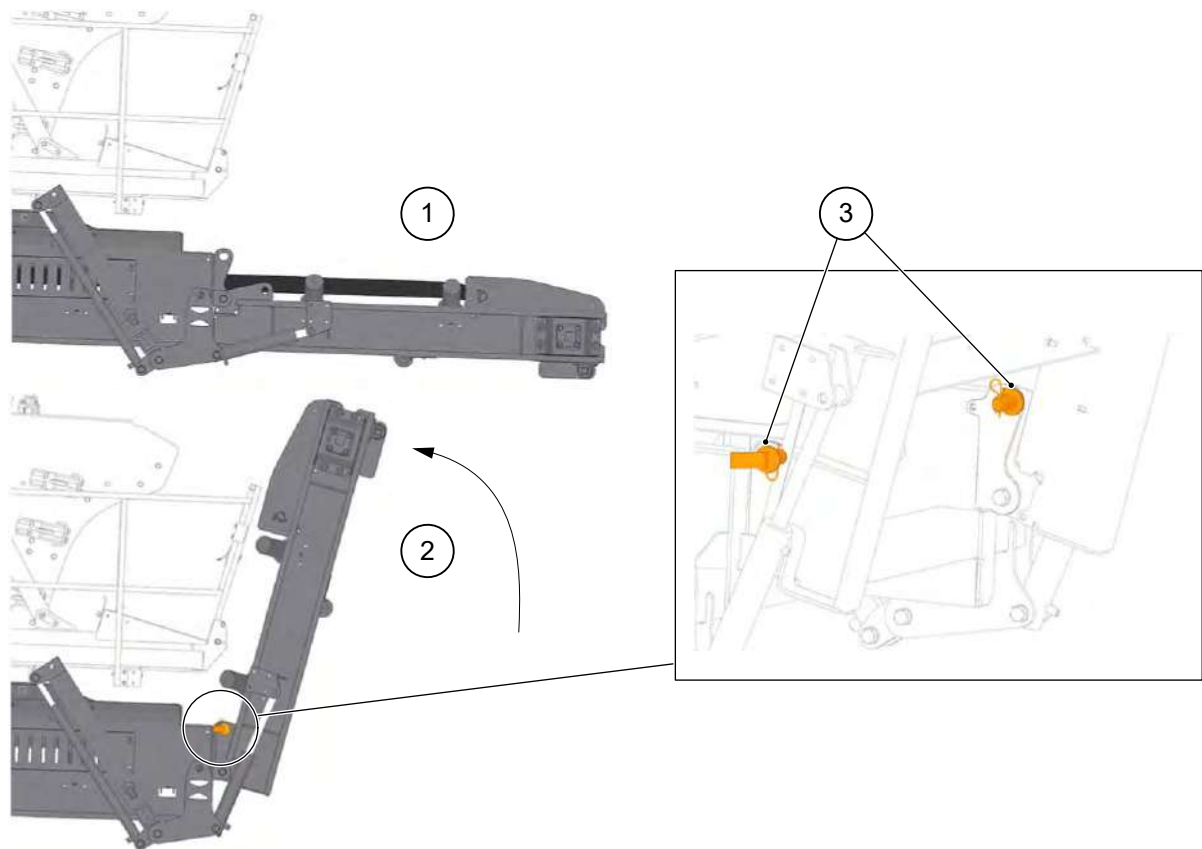
You must take extreme care when moving the machine. Make sure that there is adequate ground clearance for the product conveyor before moving. Refer to the driving instructions in this manual. Do not transport over the roadways with the screen raised.



Callout	Description
4	Product conveyor folding OUT-IN

Figure 77. Hand valve for folding the product conveyor

For descriptions of all hydraulic control levers of this machine, see [3.7.2 Hydraulic controls](#).



Callout	Description
1	Product conveyor in operating position
2	Product conveyor in transport position
3	Locking pins

Figure 78. Folding the product conveyor

Prerequisites for folding for transport:

1. Clear the machine of all debris and material.
2. Make sure that the hand valves are activated. For instructions, see [4.8 Hand valve activation](#).
3. Lower the product conveyor, see [7.8.10 Adjusting the angle of product conveyor](#).
4. Lower the grid, see [6.3.5.1 Setting the angle of the grid](#).

Folding for transport:

1. Raise the product conveyor head section to transport position using the **Product conveyor folding OUT-IN control** (4).
2. Bring the locking pins and clips (3) from the tool box.
3. Lock the transport position with the locking pins and clips (3) on both sides of the product conveyor.

5.5.1.4 Folding the top deck side conveyor

Stop all process operations and remove the process material before making any adjustments.

Prerequisites: The top deck side conveyor is in operating position.

- The machine is positioned on a level and prepared site, with the engine running.
- The top deck side conveyor is in operating position.

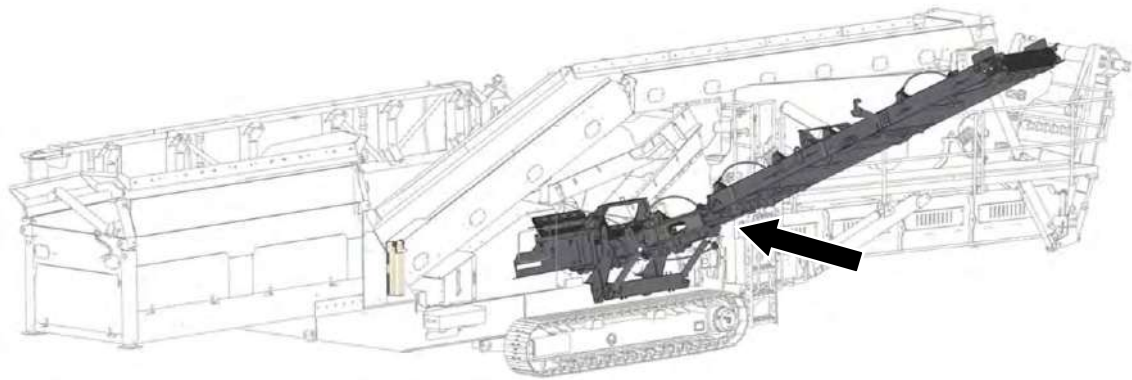
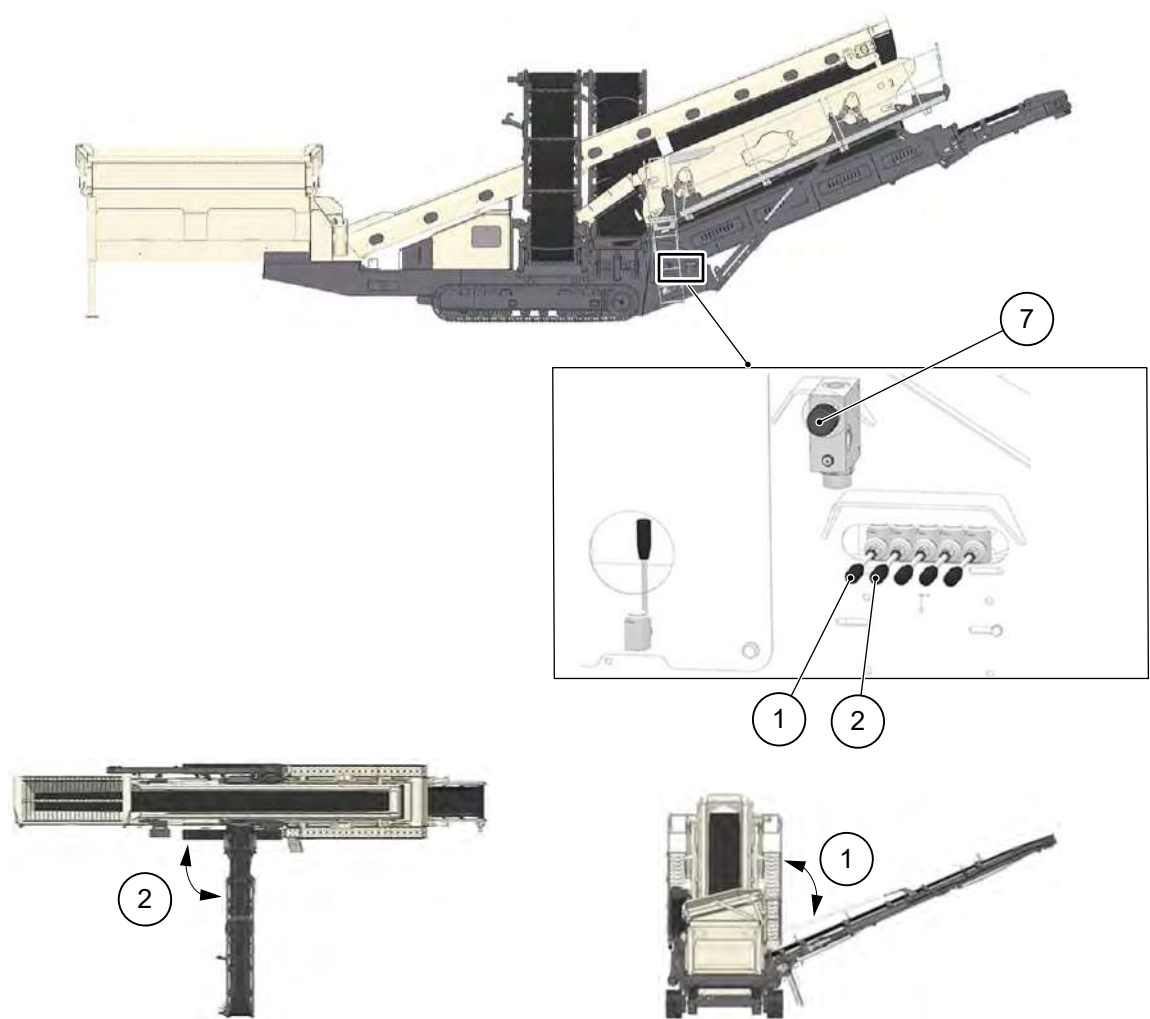


Figure 79. Top deck side conveyor in operating position

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Callout	Description
1	Top deck side conveyor lifting
2	Top deck side conveyor folding OUT-IN
7	Top deck side conveyor speed control

Figure 80. Hand valves for folding the top deck side conveyor

For descriptions of all hydraulic control levers of this machine, see [3.7.2 Hydraulic controls](#).

1. Make sure that the hand valves are activated. For instructions, see [4.8 Hand valve activation](#).
2. Unlock and detach the thrust arm of the locking of the top of the conveyor from its top end and leave it attached from its lower end.

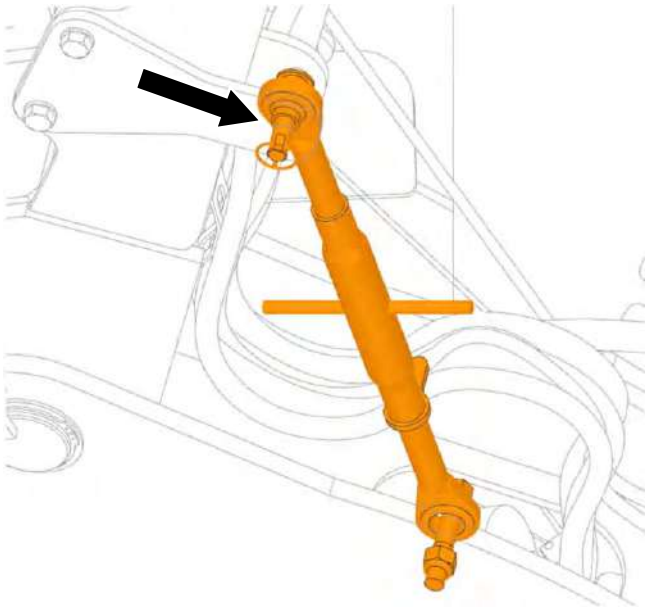


Figure 81. Thrust arm of the locking of the top of the conveyor



NOTE: Normally, the adjustment of thrust arm is not changed because it affects the alignment of conveyor belt.

- 3. The locking pins of the mid section of top deck side conveyor must be in the open position. Pull the locking pins (1) outwards and lock them to the open position (2).

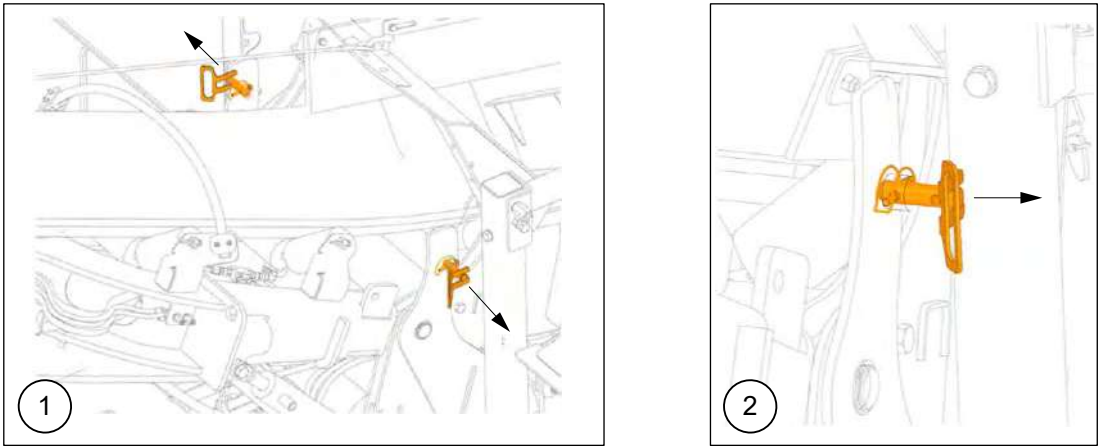


Figure 82. Locking pins of the mid section of top deck side conveyor

- 4. Use the **Top deck side conveyor lifting (1) control** and the **Top deck side conveyor folding OUT-IN (2) control** by turns for moving the conveyor to the transport position.

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NOTE: Follow the alignment of conveyor belt during the folding and lifting procedure.

5. Lock the conveyor. Attach the locking pin (1) and the locking pins of mid section (2) and push the locking pins to the locked position (3).
The locking pins have 2 positions (pulled out = open, and pushed in = locked).

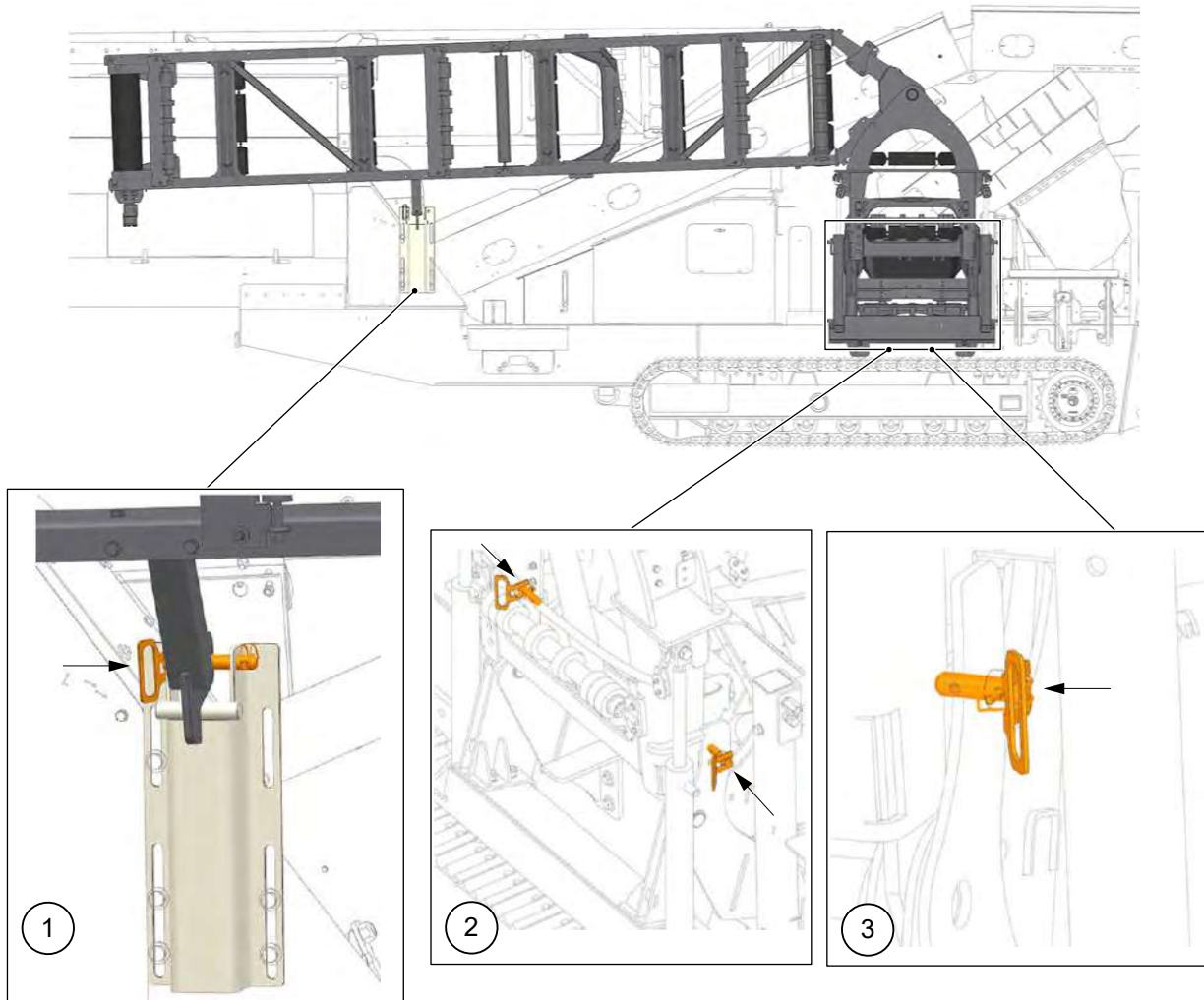


Figure 83. Mechanical locking of top deck side conveyor

5.5.1.5 Folding the bottom deck side conveyor

Prerequisites:

The machine must be positioned on a level and prepared site, with the engine running.

The bottom deck side conveyor must be in operating position.

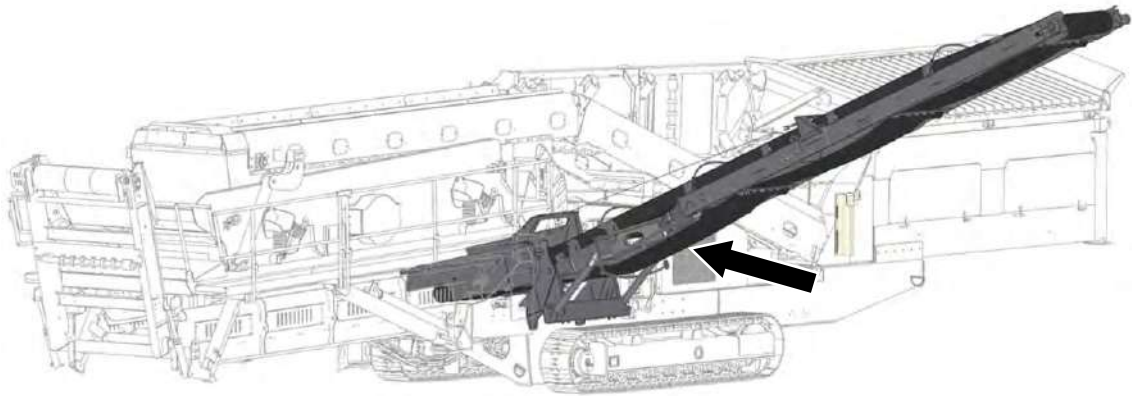
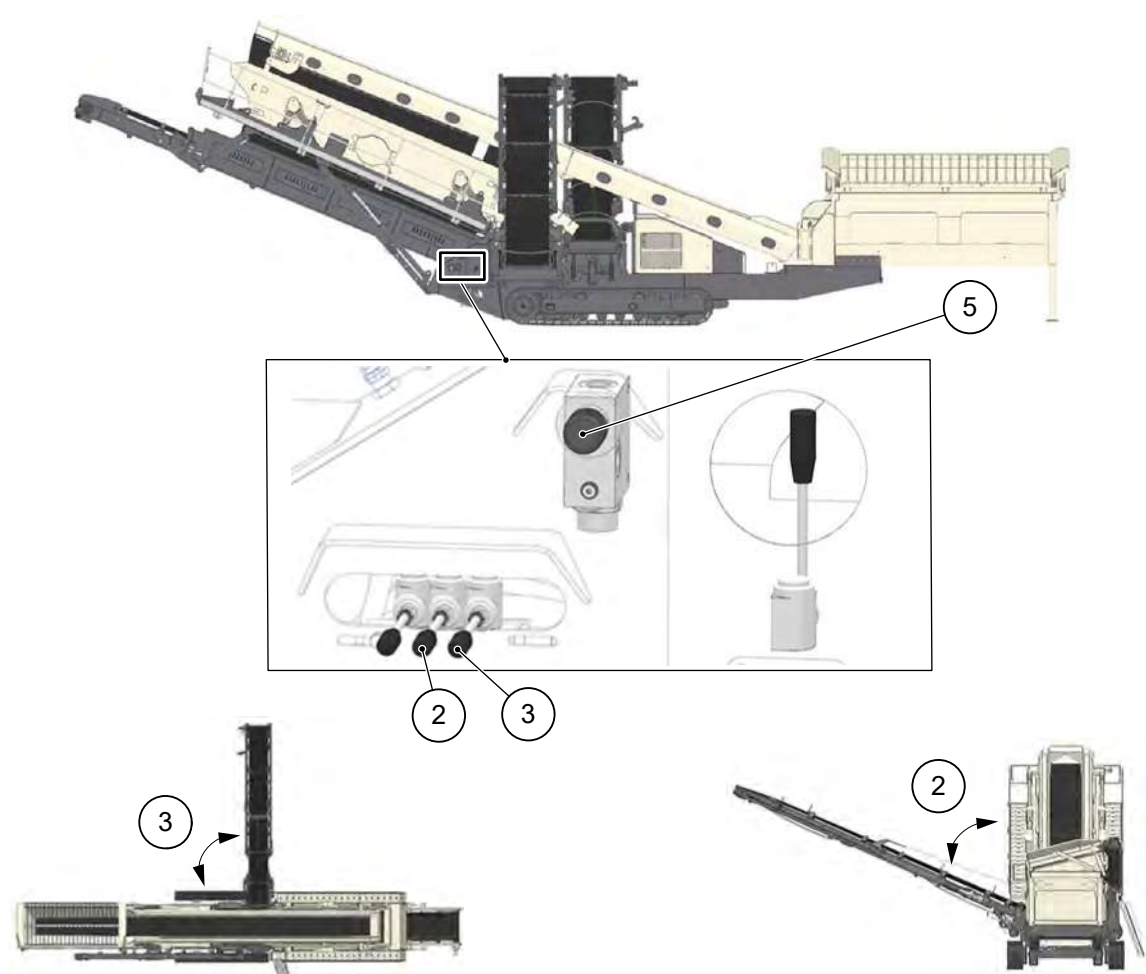


Figure 84. Bottom deck side conveyor in operating position

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Callout	Description
2	Bottom deck side conveyor lifting
3	Bottom deck side conveyor folding OUT-IN
5	Bottom deck side conveyor speed control

Figure 85. Hand valves for unfolding the bottom deck side conveyor

1. Make sure that the hand valves are activated. For instructions, see [4.8 Hand valve activation](#).
2. Unlock and detach the thrust arm of the locking of the top of the conveyor from its top end and leave it attached from its lower end.

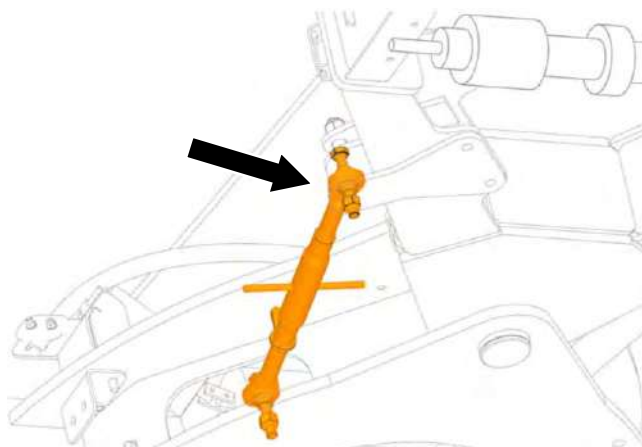


Figure 86. Thrust arm of the locking of the top of the conveyor

3. Lift the bottom deck side conveyor using the **Bottom deck side conveyor lifting control** (2), and fold out the conveyor using the **Bottom deck side conveyor folding OUT-IN control** (3).
4. Lock the conveyor. Attach the locking pin (1) and the locking pins of mid section (2) and push the locking pins to the locked position (3).
The locking pins have 2 positions (pulled out = open, and pushed in = locked).

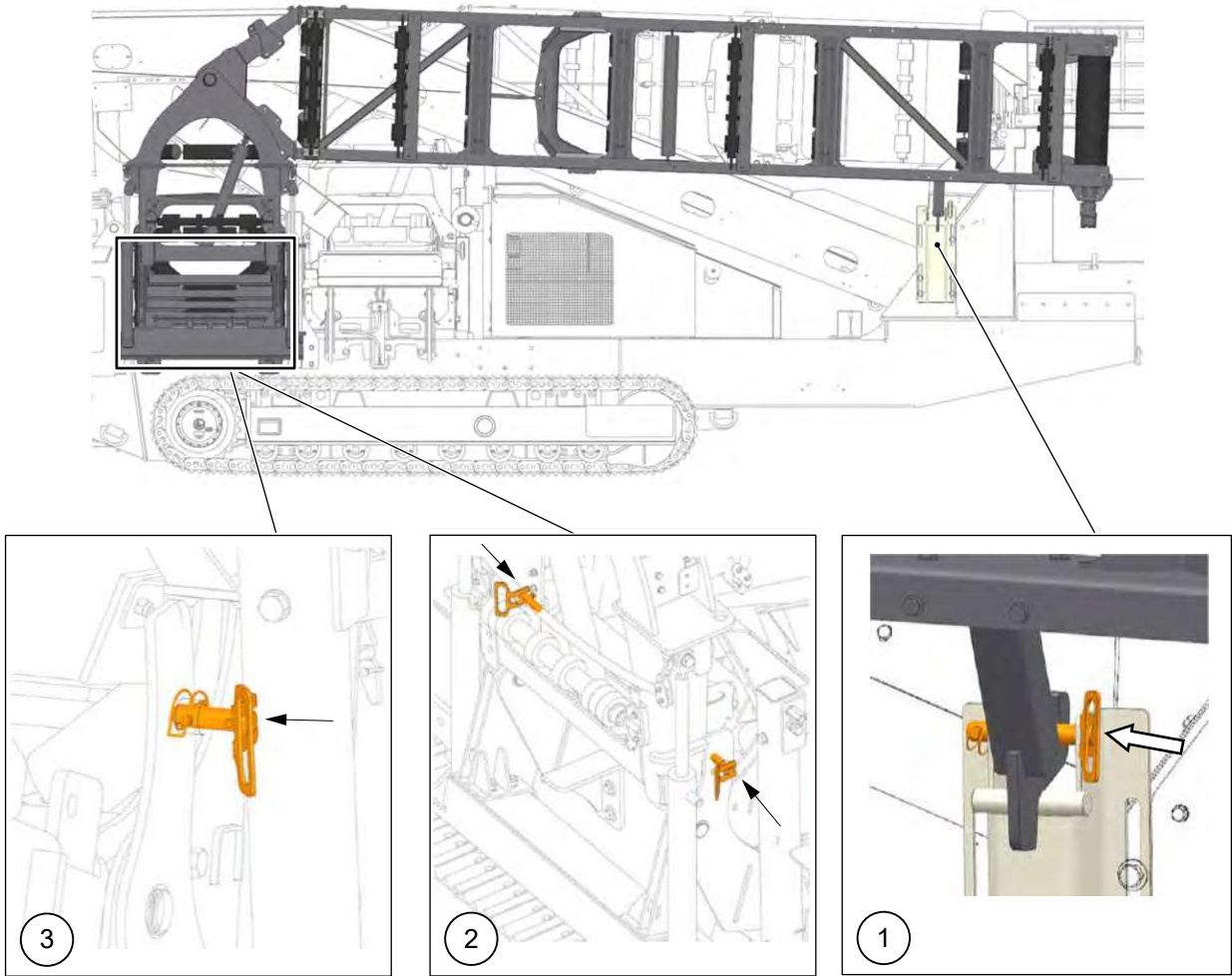


Figure 87. Mechanical locking of bottom deck side conveyor (left side of the machine)

5.5.1.6 Extending and retracting the hopper support legs



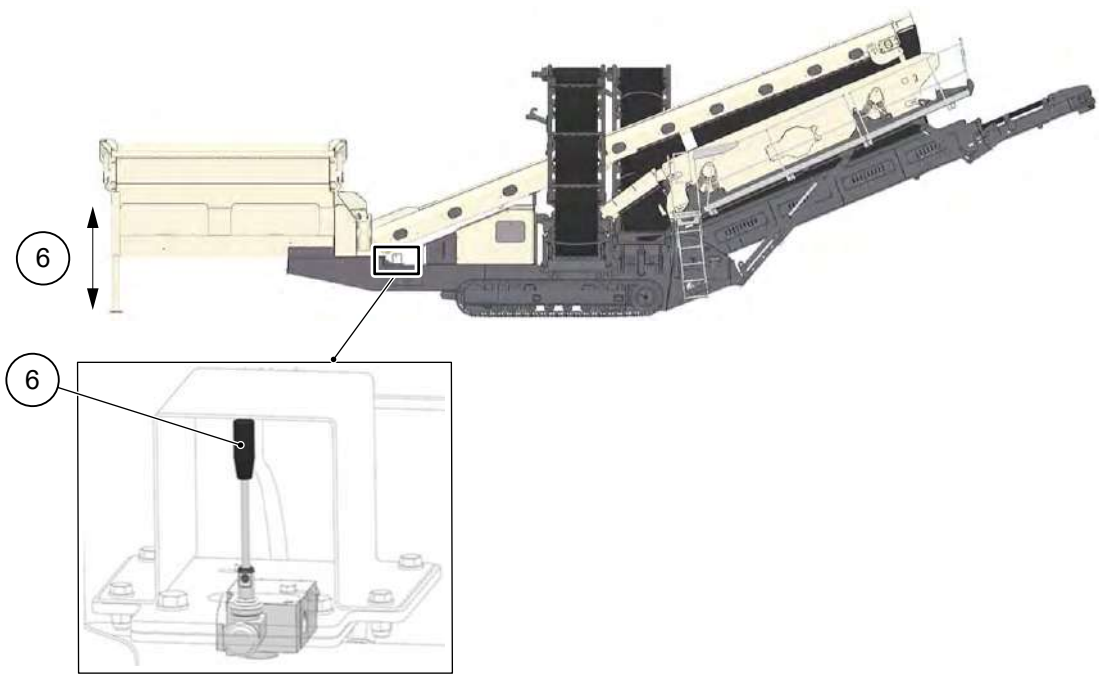
 **WARNING**

CRUSHING HAZARD
Can cause death or serious injury.
Risk of severe injury if person gets under the moving support legs. To prevent this, lower the support legs manually close to the ground before starting the process.

Function: To support a loaded hopper while in operation.

Location: Mounted on the chassis on the front of the hopper.

Description: Hydraulically operated support legs are raised and lowered by a hydraulic control on the right side of the machine. A single bank valve operates the raise and lower functions.



Callout	Description
6	Hopper support legs UP-DOWN

Figure 88. Hand valve for extending and retracting the hopper support legs



⚠ WARNING

CRUSHING HAZARD

Can cause death or serious injury.

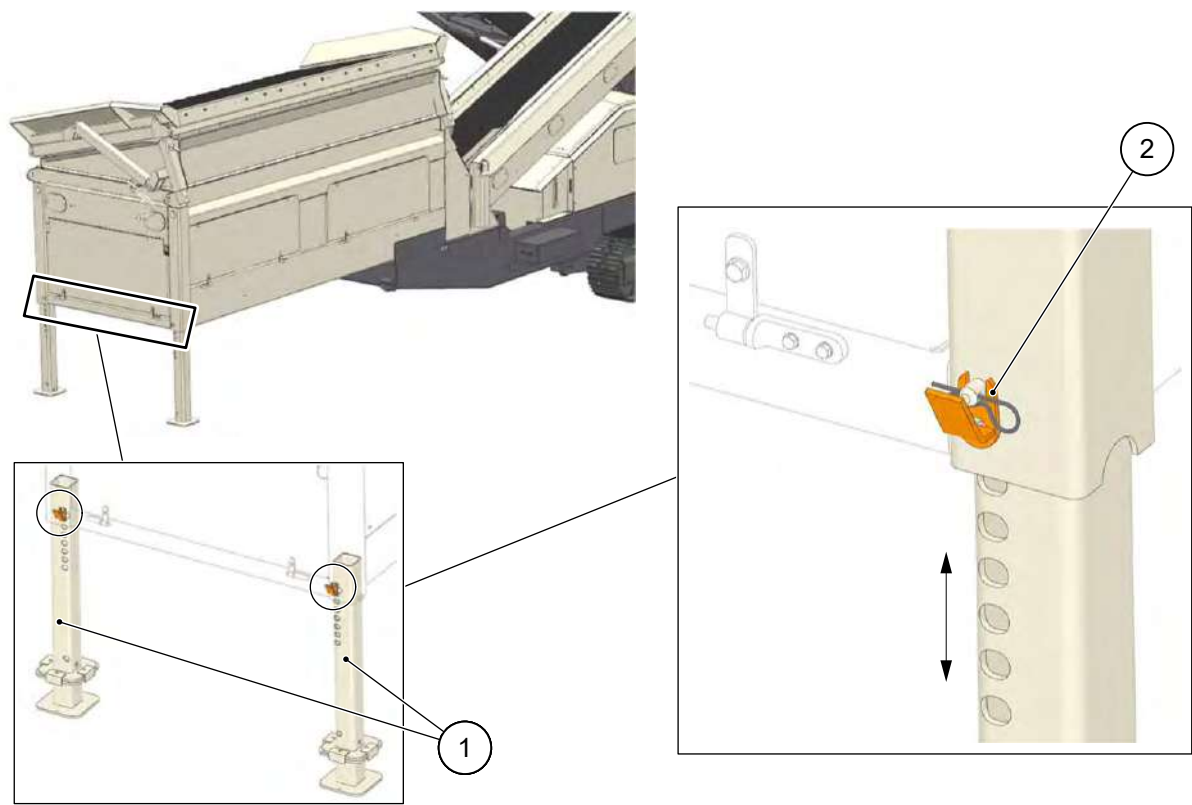
Only trained and competent personnel are allowed to operate, maintain and service the machine. If operating procedures are unclear, contact Metso for assistance prior to operating.

Stay away from the range of moving machine parts. Make sure that nobody is in the restricted area when operating hydraulic devices.



NOTE: Make sure that the support legs are fully retracted before moving the machine.

The following assumes that the hand valve switch on the main control panel is at position '1' to activate the hand valves (see [4.8 Hand valve activation](#)), and the engine speed is in “operation” speed.



Callout	Description
1	Hopper support legs
2	Locking pins and clips

Figure 89. Hopper support legs

Extending

To extend the hopper support legs (extending the hydraulic cylinder):

1. Remove the locking pins and clips (2) from the two hopper supports legs (1). You may have to move the support legs slightly to release the pins.
2. Move the **Hopper support legs UP-DOWN control** (6) to the **LOWER** position until slight pressure is applied to the support legs. Do not lift the hopper.
3. Reinstall the two locking pins and clips (2) into the hopper support legs when the proper support is achieved.



NOTE: Moving the hopper support legs may cause crushing of limbs. Watch out for your hands and fingers when installing the locking pins.



NOTE: The hopper support legs are designed only to support the hopper, do not use them for lifting.

Retracting



 WARNING

FALLING OBJECT HAZARD
Can cause death or serious injury.
Do not perform lifting of the hydraulic legs when there is material in the feed hopper.

To retract the hopper support legs (retracting the chassis hydraulic cylinder):

- 1. Remove the locking pins and clips (2) from the two hopper supports legs (1). You may have to move the support legs slightly to release the pins.
- 2. Move the **Hopper support legs UP-DOWN control** (6) to the RAISE position.
- 3. Reinstall the two locking pins and clips (2) into the hopper support legs (1) when fully retracted.



NOTE: Make sure that the support legs are fully retracted before moving the machine.



 CAUTION

PROPERTY DAMAGE HAZARD
Can cause moderate injury or property damage.
Always make sure you install the mechanical locking pins for the support legs before leaving the machine in the raised position.

5.5.2 Driving onto/off a trailer truck



 WARNING

GENERAL HAZARD
Can cause death or serious injury.
Only competent persons are allowed to drive the machine onto or off a trailer truck. The operator or driver is responsible for securing the load. Do not attempt to drive the machine onto of off a trailer truck if you are not the responsible operator or driver of the truck.



 WARNING

TRAFFIC ACCIDENT HAZARD
Can cause death or serious injury.
Drive the unit onto or off the truck trailer with great care. Make sure that there is nobody in the danger areas.

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CAUTION

PROPERTY DAMAGE HAZARD

Can cause moderate injury or property damage.

Be extremely cautious when driving the machine onto a ramp.

Make sure that the ramp is properly positioned, in perfect technical order and can support the weight of the machine.

When driving the unit onto/off the truck trailer, make sure no component of the machine hits the truck tractor. Also, make sure that the load is not on top of the truck tractor cabin and does not cause any danger to the driver of the trailer truck especially if the conveyor end is in front.

The ramp must have as low a gradient as possible (max. rise 1:10), when the machine is driven onto the truck trailer.



NOTE: You may need to adjust the bottom deck side conveyor and the screen angle to avoid damage to the machine during loading/unloading. Follow the instructions in this manual, if adjustments are necessary.



NOTE: When driving the machine onto/off the transport vehicle, be very careful. The machine will surge forward as the center of mass pass over an edge. Check the center of mass for your machine from the transport drawing.

1. Make sure the machine is in the transport position (or adjusted as necessary).
2. Carefully drive the machine onto or off the trailer truck, continuously checking the ground and overhead clearances.
3. When the machine has been driven into the correct position on the trailer truck, reduce the engine rpm to idling speed.
4. Deactivate the remote control by pressing the "0" button.
5. Stop the engine. See [4.5 Stopping the engine](#).



NOTE: Store the remote control transmitter in a safe place.

The approximate weight of the unit can be calculated by adding the weight of the optional equipment to the weight of the basic unit. Check the weight of the unit from the transport drawing.



NOTE: The weights are indicative. Actual weights may vary due to manufacturing tolerances.

5.5.3 Fastening points

Fasten the Lokotrack ST according to all laws and regulations. Use the Lokotrack ST fastening points.



NOTE: Always use all fastening points. Do not lift the machine from the fastening points.

There are 8 fastening points in total. 4 points on the left side of the machine and 4 fastening points on the right side of the machine.

An example of the location of the fastening points is shown in the following figure.

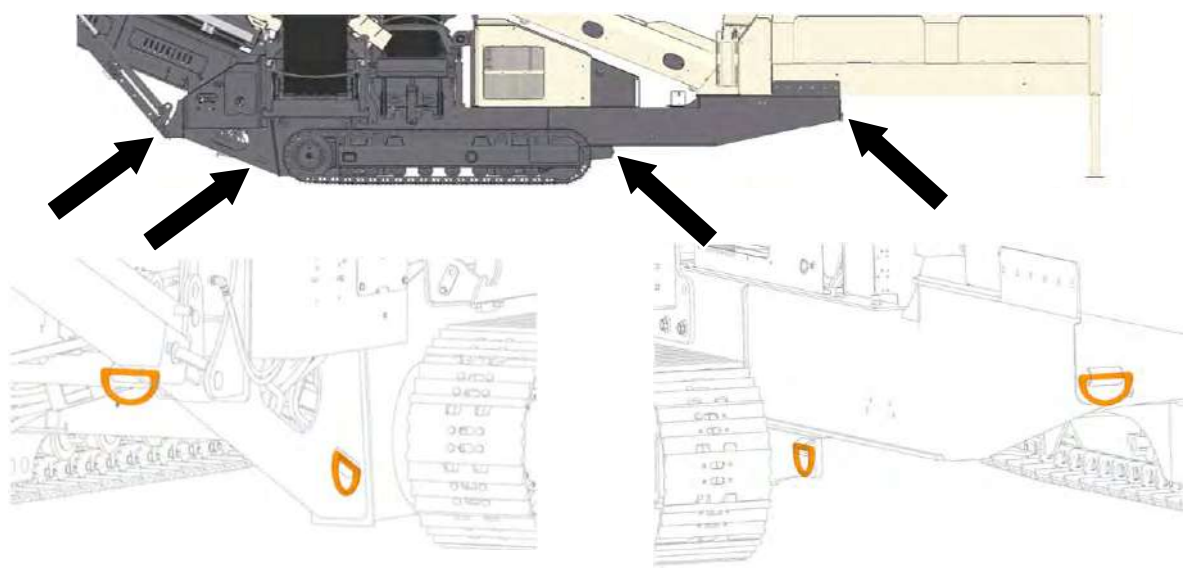


Figure 90. Lokotrack ST3.8 fastening points



5.5.3.1 Long-term storage



NOTE: Contact Metso if you plan to store the unit in an arctic or tropical environment.

When planning the storage placement, refer to section [5.5.3.1.1 Planning storage placement](#) for things to consider.

Perform the tasks listed in section [5.5.3.1.2 Measures before storing the unit](#) to prepare the unit correctly for storing.

During the storage, perform tasks listed in [5.5.3.1.3 Measures during storage](#) at specified intervals.

After the storage period, see [5.5.3.1.5 Measures before commissioning the unit after storage](#).

5.5.3.1.1 Planning storage placement

Correct way of storing the unit is important to maintain the unit in good operating condition. If you are about to store the unit for several weeks or several months, take the following into account when planning the storage placement:

- 1. Minimize UV-exposure. Store the unit, for example, on the northern side of a building or a forest area. See figure below.



Figure 91. Storage environment

- 2. Do not store the unit in a dusty environment or in an area where flooding is possible. Avoid storage in places with excessive vibration, for example, near rail roads or busy highways. Avoid storage near the sea where the machine is subject to salty water.
- 3. Store the unit on an even surface with enough support (see figure below). If you need additional support and/or the unit is stored on hot asphalt, use a wooden platform under the unit.



Figure 92. Storage surface

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4. When planning storage, take into consideration (for example, with fuel type) possible changes in environment and temperature that can happen during storage.

5.5.3.1.2 Measures before storing the unit

1. Check that the unit has no oil leakages. Repair any leaks before storing the unit.
2. Identify the instruction manual and control devices with the unit serial number and store them in a dry and warm place.
3. Run the conveyors so that all material exits the unit. Make sure that there are no stones wedged, for example, between the belts, and that there is no material in the surrounding structures to avoid falling hazards.
4. Put the unit into transport position, excluding:
 - Foldable conveyors, if possible. Metso recommends storing foldable conveyors in operation position to ensure the best conveyor belt condition.
5. Put hydraulic cylinders into transport position, if possible (pistons fully retracted).
6. Perform the lockout and tagout procedure as described in this manual.
7. Replace fluids if needed (fuel, for example).
8. Fill all possible tanks (fuel tank, for example.). Take into consideration local fire safety requirements.
9. If storage is in sub-zero temperatures:
 - Drain the dust suppression system or pump anti-freeze agent through the system.
 - Add diesel fuel anti-gelling agent or replace the fuel to suit the ambient temperature and replace fuel filters.
 - Pump in 4 liters of appropriate anti-freezing fluid into the water pump to prevent freezing.

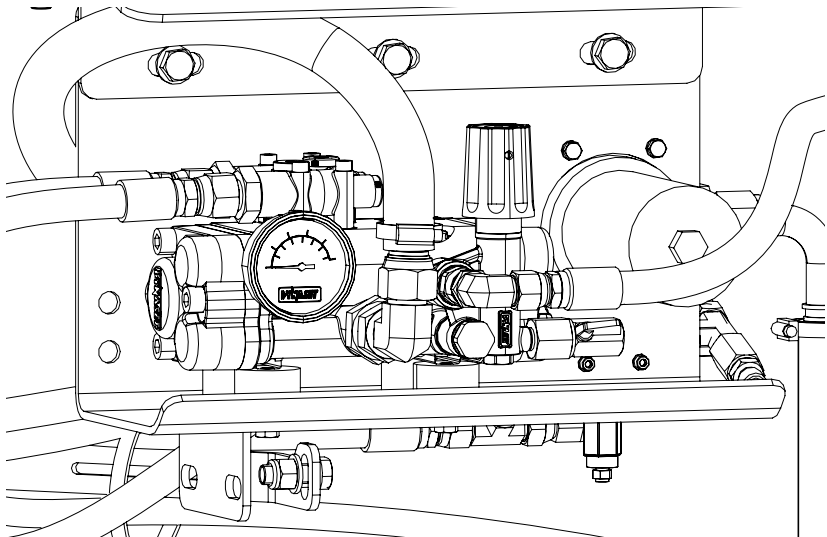


Figure 93. Water pump

10. If the unit is stored in an arctic or tropical environment, disconnect the batteries and store them in a warm, dry and properly ventilated place. Take into consideration local safety regulations when storing the batteries.
11. Check the battery voltages and charge if necessary.



NOTE: Make sure that your charging voltage is appropriate to the unit.

- 12. Close and lock all covers and hatches (see examples below), including electrical outlet covers, to prevent rainwater and dust etc. from entering the outlets. Make sure that rainwater cannot enter any exposed electrical sockets or connectors.

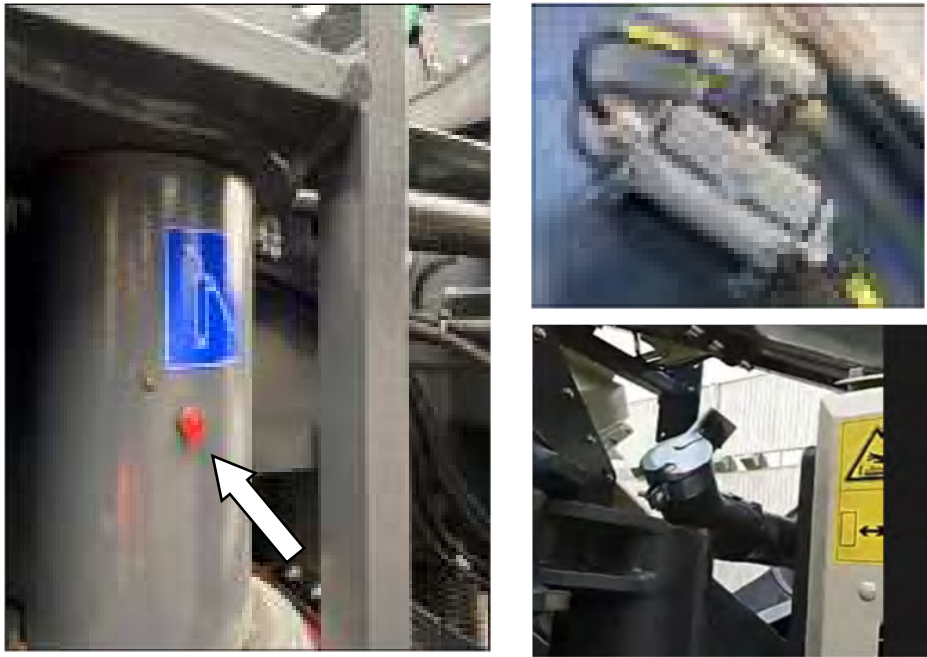


Figure 94. Examples of covers and hatches

- 13. Check that all piping is sealed with appropriate pipe plugs.
- 14. If the motor is stored separately, cover the motor, for example, with plywood. Do not wrap the motor completely.
- 15. Wash the unit. See separate washing instructions in the manual.
- 16. You can place a dehumidifier/VCI capsule in the electric center (see figure below).

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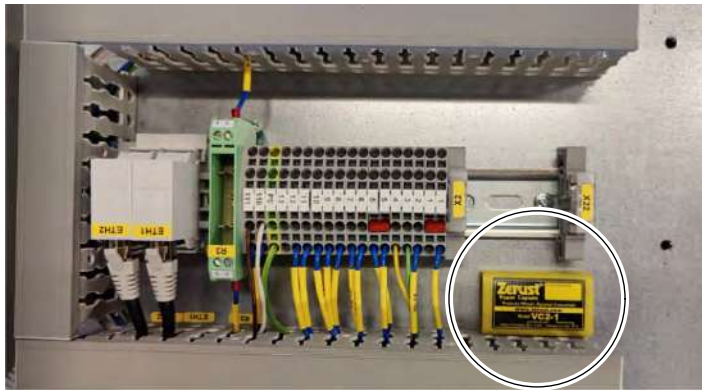


Figure 95. Dehumidifier in an electric center

17. Perform maintenance for the treated surfaces. See [5.5.3.1.4 Maintaining treated surfaces](#).

5.5.3.1.3 Measures during storage



NOTE: It is very important that the engine, crusher, feeder etc. are run according to the intervals specified below. For example the capacitors of the frequency converters fail if they are not used for a certain time period.

Perform the following measures at specified intervals during the storage period.

Measures every 2 months during storage

1. Perform the tasks listed in [5.5.3.1.5 Measures before commissioning the unit after storage](#).
2. Run the engine at least for 30 minutes and make sure that the batteries are charged.
3. Run the conveyor(s).
 - Lubricate the conveyor belt with tire mounting grease to decrease friction.
 - Make sure that the conveyor belt tracks correctly over the center of the pulleys and the belt runs smoothly without catching on anything.
4. Run the screening process and all other applicable devices like the feeder, conveyors, etc.
 - If you hear any abnormal sounds from the machinery, turn off the machinery and investigate the source.
5. Run the tracks.
6. Prepare the machine for continued storage period. See [5.5.3.1.2 Measures before storing the unit](#).

Additional measures every 6 months during storage

- Check the quality of the diesel exhaust fluid and refill the diesel exhaust fluid tank. If the fluid is cloudy or colored instead of clear, replace the fluid.
- Lubricate the bearings according to lubrication instructions in this manual.
- See [5.5.3.1.4 Maintaining treated surfaces](#).

Additional measures every 12 months during storage

- Change the track gear oil.

5.5.3.1.4 Maintaining treated surfaces

The maintenance measures in this section must be done before storing the unit and during storage every 6 months — once during autumn after defoliation and once during spring after the snow has melted. You should also perform the actions every time the unit surfaces get noticeably dirty or the surfaces have been exposed to impurities or fallouts.

In addition to tasks listed in [5.5.3.1.2 Measures before storing the unit](#), do the following maintenance for the treated surfaces:

1. Make sure the unit is washed.
2. Remove any traces of soot on the surfaces with a brush.
3. Check the unit's surfaces and repaint all possible damages in the paintwork. If you need assistance with paint availability or painting instructions, contact Metso.
4. Apply additional protection on machined surfaces and commercial components. For commercial components, use Tectyl Multipurpose Waterbased or a similar product: https://www.tectyleurope.com/wp-content/uploads/2018/11/PI_Tectyl-Multipurpose-Waterbased_TE109-01.pdf



Figure 96. Commercial components

5. When the unit is in storage, clean any visible hydraulic cylinder piston rods and protect them with Corshield 369 protective coating or a similar low viscosity protective coating: <https://www.cortecvci.com/products/vpci-eco-mro-products-repair-and-maintenance/corshield-vpci-369-wet-film-corrosion-inhibitor-and-lubricant/>.

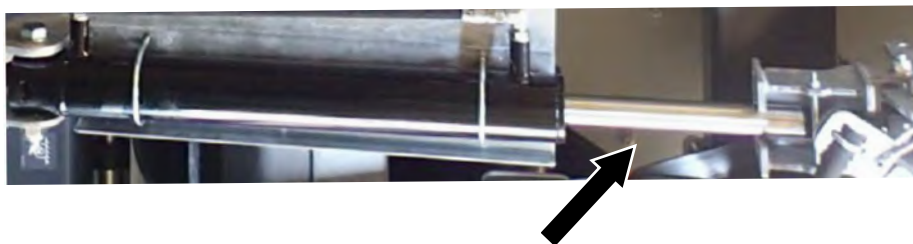


Figure 97. Visible piston rod

5.5.3.1.5 Measures before commissioning the unit after storage

- 1. Remove all plugs, covers etc. that were installed for storage.
- 2. Remove possible dehumidifiers from the electric centers.
- 3. Replace all damaged warning signs and stickers.
- 4. Follow the separate commissioning instructions in this manual.

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6

Operation



 **WARNING**

GENERAL HAZARD

Incorrect operation, maintenance and service can cause death or serious injury.

Only properly trained and qualified operators and service personnel are allowed to operate the machine or do service and maintenance tasks on the machine. Make sure there are no unauthorized personnel near the machine when it is operating or during service and maintenance tasks.

6.1

Preparing the screening site

The unit should be located near the material pile to make loading easy and quick. Shape the feed material pile with a wheel loader or excavator so that it is distributed over a small area and piled high enough for easy loading (see the following figure).

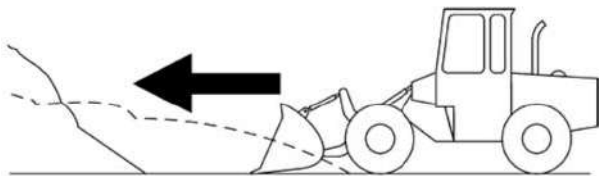


Figure 98. Shape the material pile

The location of the discharge pile must be chosen so that it does not cause any danger to workers or passers-by. Make sure that there is enough space for the discharge pile, the discharge machinery (wheel loader or excavator) and the lorry (see the following figure).

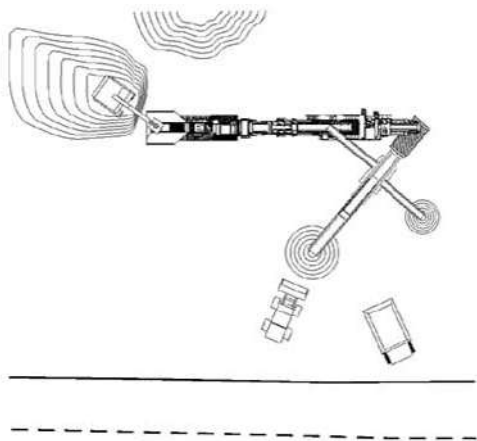


Figure 99. *Make sure there is enough space at the site*

The place where the screening unit is to be located must be even. The machine must not be allowed to sway. The surface below the screening unit must be levelled and evened out. Spread some fine-grained material on the ground, distributing it evenly (see the following figure).

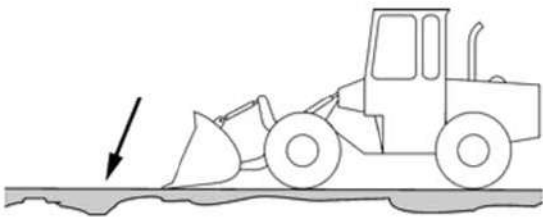


Figure 100. *Material spreading*

Next, harden the underlying ground by driving the unit back and forth over the site (see the following figure).

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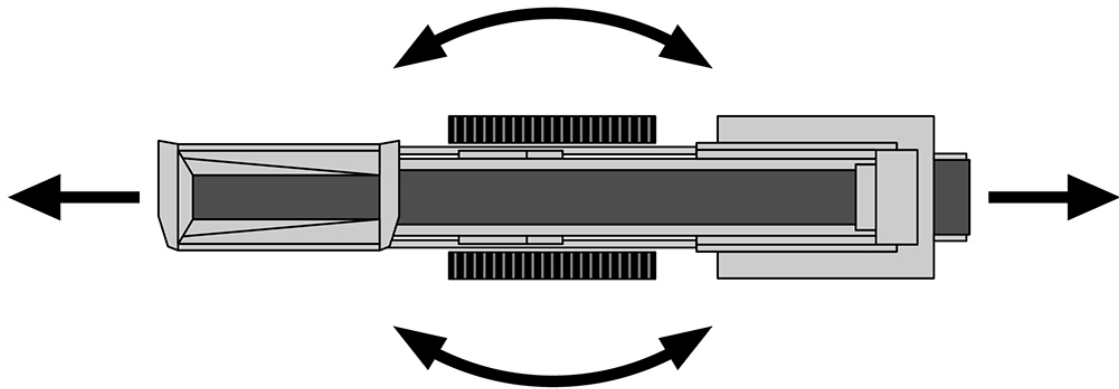


Figure 101. Strengthening the ground

During the screening process, make sure that the unit is in the horizontal position. The maximum inclination allowance is 1 degree in lateral and longitudinal direction (see the following figures). Note that the figures are examples and not necessarily from your machine.

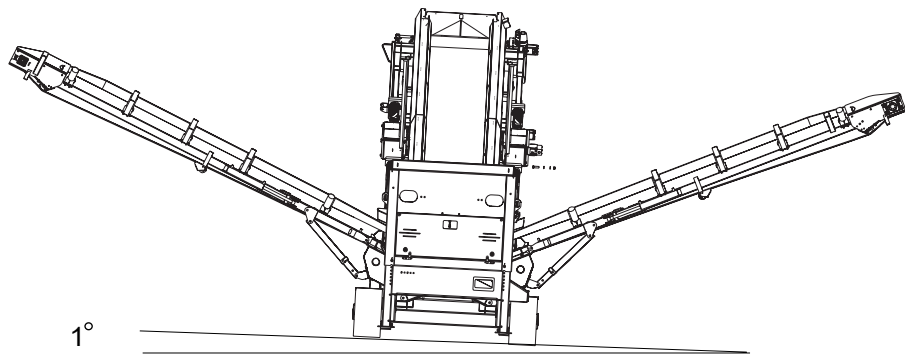


Figure 102. The maximum lateral inclination

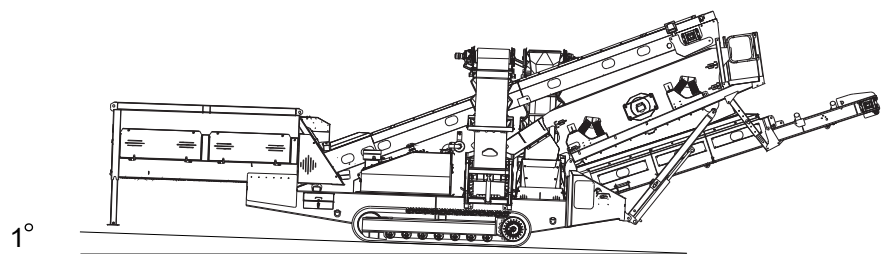


Figure 103. The maximum longitudinal inclination

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6.2 Measures before startup

6.2.1 Testing emergency and remote stops



⚠ WARNING

GENERAL HAZARD

Can cause death or serious injury.

Test the operation of the emergency stop buttons and other safety devices weekly.

All emergency and remote stops on the machine should be tested regularly. See [2.2.5 Emergency stop locations](#) and [2.2.6 Remote stop locations](#) for the stop locations.



NOTE: Make sure that the process and the engine are not running during testing.

1. Turn the Lokotrack ST main switch and the control panel key switch to ON position.
2. Press the emergency/remote stop.
3. Check that the main control panel display shows an alarm for pressed emergency/remote stop.

6.2.2 Setting up the unit for operation



⚠ WARNING

GENERAL HAZARD

Can cause death or serious injury.

Slewing the machine is stressful for the components and not recommended. Motion may be rapid, so make sure that all personnel stand away from machine. The operator must stand away from the machine when it is in motion or is turning. Make sure there are no obstacles in the path of the tail or head swing when turning.

The following is a brief summary of the conditions that are to be met before operating the machine.

1. Understand the control functions before proceeding.
2. Follow the start-up procedures.
3. Position the function key switches on the main control center to the appropriate functions.
 - Hand-valve activation.
 - Moving the machine
4. Fold/unfold, raise/lower procedures.
 - Hand-valve activation.
 - Increasing engine RPM manually / remote operation.
 - Sequence of set-up operations.
 - Tipping grid operation manually / remote operation.

6.2.3 Unfolding for operation



WARNING

CRUSHING HAZARD

Can cause death or serious injury.
Do not go under the conveyor.

1. Make sure that the joint areas with moving parts are clean and free of debris.



CAUTION

PROPERTY DAMAGE HAZARD

Can cause property damage.
Make sure that the conveyor forks always lay against the piston rods to avoid breaking of the fork.

2. Check and remove all loose items stored in the hopper or on the lifting conveyor.
3. Perform the engine pre-start checks.
4. Start the engine and run at idle.
5. Set the hopper support legs.
6. Unfold the side conveyors.
7. Unfold the product conveyor.
8. Unfold the side catwalks and platform, if fitted.
9. Set the desired screen angles.
10. Set the desired product conveyor angle.
11. Set up the hopper grid deck.
12. Perform the daily operational checks.

6.2.4 Process selections

Before starting the engine and process, there are a few adjustments and pre-selections to be made depending on the application.

6.2.4.1 Operating techniques

To achieve maximum efficiency and production from the machine, a number of factors should be considered:

- Screen media size and type
- Screen operating angle
- Feeder belt speed adjustment
- Lifting conveyor load sense device setting (IC-controlled version only)
- Screen speed and screen balance
- Conveyor operating angle
- Feed spreading plate adjustment
- Top deck side conveyor speed adjustment

6.2.4.2 Screen mesh selection

Selecting the proper screen media, type and aperture is the most important factor influencing production efficiency. Choosing the correct screen size can influence production output by as much as 50%.

If the majority of the product is sliding off the top deck, a larger top deck opening should be considered. This is especially true for sticky material such as clay and wet topsoil. However, a top deck screen size that is too large for the bottom deck size will cause a similar situation at the second deck where an excessive amount of desired product fails to pass through the bottom screen. The usual method of choosing screen sizes is to select the bottom screen opening based on the final size requirements and then choose a top screen that adequately protects the bottom deck while not allowing excessive runoff.

As a means of example refer to the following illustration.

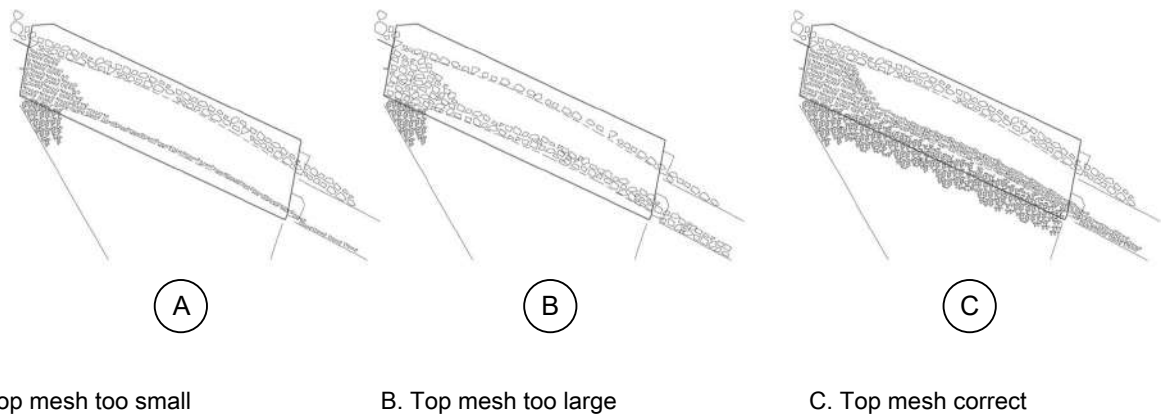


Figure 104. Screen mesh selection

If production problems are encountered and an alternate screen combination is believed to be required, contact your local authorized Metso distributor.

6.2.4.3 Screen speed

The screen speed of the machine is factory set. Do not change the speed of the screen. Changing the screen speed leads to the rejection of potential warranty.

CAUTION

PROPERTY DAMAGE HAZARD

Can cause property damage.

A faulty speed setup can cause structural fatigue and damage to the machine. If a change in the screen speed is noticed, the screen is likely to have a hydraulic or mechanical malfunction. Correct any detected malfunctions immediately.

6.2.4.4 Screen angle selection

Proper screen angle is determined by the nature of the material being screened and the size of the screens being used. Steeper screen angles minimize the amount of time the material spends on the screen. A material that requires more time on the screen to separate will require a shallower screen angle than a material, such as dry sand or loose gravel, which separates easily. Square mesh screens generally require a shallower screen angle than a slotted screen. A harp wire screen requires a very steep angle. Choosing the correct screen angle can greatly improve production.

The screen angle of the machine is adjustable between 18 and 29 degrees. As a general rule, the following screen angles are recommended for the listed square aperture size:

Aperture	Screen angle
up to 19 mm (up to ¾ in)	25°
19...76.2 mm (¾ in...3 in)	20°
50...76.2 mm (2 in...3 in)	15°

Slotted wire generally requires a steep screen angle (20 degrees or greater) depending on the nature of the material to be screened.

Harp wire requires a very steep angle, generally 25 degrees to achieve high production rates. Harp wire screens "cut" through material, acting more like knife-edges than a screen, hence the need for steep screen angles.



NOTE: Changing the screen angle requires removal of trestle pins and adjustment of trestles.

6.2.4.5 Adjusting the feed spreading plate

The purpose of adjusting the feed spreading plate is to get an even spread of material across the feed box just before it reaches the screen. This adjustment enables more effective screening because the material flow covers the full width of the screen box.

The feed spreading plate position requires checking when:

- The screen angle is adjusted
- Minor adjustments are made for improving the screening capacity

Whenever you adjust the screen angle or lifting conveyor angle, you should check the position of feed spreading plate, (3 possible positions are available). If you adjust the screen to a very low angle, it may be necessary to use the outermost position of feed spreading plate.



NOTE: Changing the screen angle requires checking the position of the feed spreading plate.



WARNING

FALLING HAZARD

Can cause death or serious injury.

Use a man lift and a safety harness to access high maintenance locations or when working outside the service platforms. Do not step on the handrails.



 **WARNING**

FALLING OBJECT HAZARD

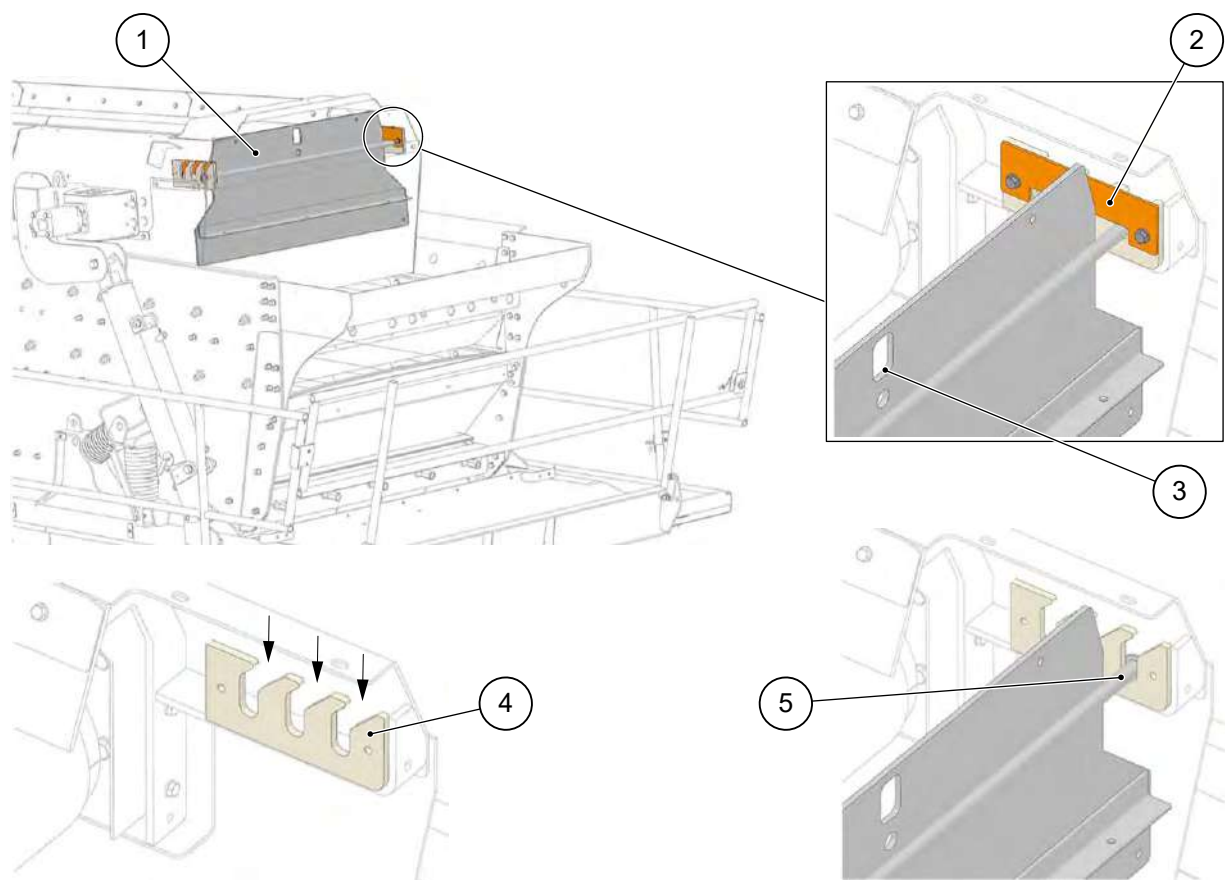
Can cause death or serious injury.

Always use approved lifting equipment with adequate capacity. All lifting operations must be performed by professionals. Do not go under a suspended load.

- Prerequisites:
- The machine is stopped and locked out. See [7.2 Lockout and tagout procedure](#).
 - The screen must be in the lowest position
 - Make sure that the screening unit is empty of material.



***NOTE:** The feed spreading plate is heavy, approximately 90 kg (198 lbs). You must not lift it by hand, and you must not lift it when the screen is raised in operating position.*



Callout	Description	Callout	Description
1	Feed spreading plate	4	Slots (3 different positions)
2	Locking plate	5	Bracket
3	Lifting point of the feed spreading plate		

Figure 105. Feed spreading plate

1. Before adjusting the feed spreading plate (1), you must lower the screen to its lowest position. For instructions, see [6.3.4 Adjusting the screen angle](#).
2. Remove the cover plate (A).
Removing the rubber curtain (B) is not obligatory.

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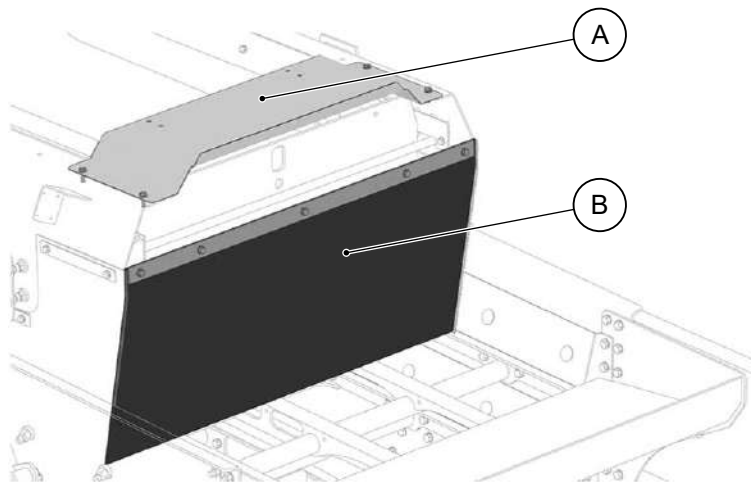


Figure 106. Cover plate (A), Rubber curtain (B)

3. Remove the locking plate (2) from both sides.
4. Attach the lifting equipment securely to the lifting point of the feed spreading plate (3).
5. With approved lifting equipment, lift the feed spreading plate slightly.
6. Lower the feed spreading plate to one of the three slots (4). Make sure that the bracket of the feed spreading plate (5) goes to the same slot position on both sides.



⚠ WARNING

CRUSHING HAZARD

Can cause death or serious injury.

Make sure that your fingers do not get between the feed spreading plate and the slots.

7. Re-attach the locking plate (2) on both sides.
8. Detach the lifting equipment from the lifting point.
9. Re-attach the cover plate.

6.2.5 Connecting several units

Consecutively operating Lokotrack crushing units can be interlocked with connection cables. In that case the interlocked Lokotracks are transmitting information between units. For example, an overload, a material level alarm, or a malfunction, stops the feeder of the previous Lokotrack (IC equipped machines).

The connection box for the primary unit is located under the feeder, and the connection box for the secondary unit at the front of the machine next to the drive control cable connector. Notice that the disconnection of secondary unit interlocking cable during operation causes the feeder of the primary unit to be stopped.

The primary unit feeder stop delay can be adjusted with parameter F1. By delaying the primary unit stop request the primary unit keeps feeding the secondary unit but with less tonnage as the feeder is set to its minimum speed when the secondary unit pause request is active. If the stop is delayed too much it might lead to overflow in the secondary crusher chamber.

6.3 Measures before screening

Screen box transport brackets

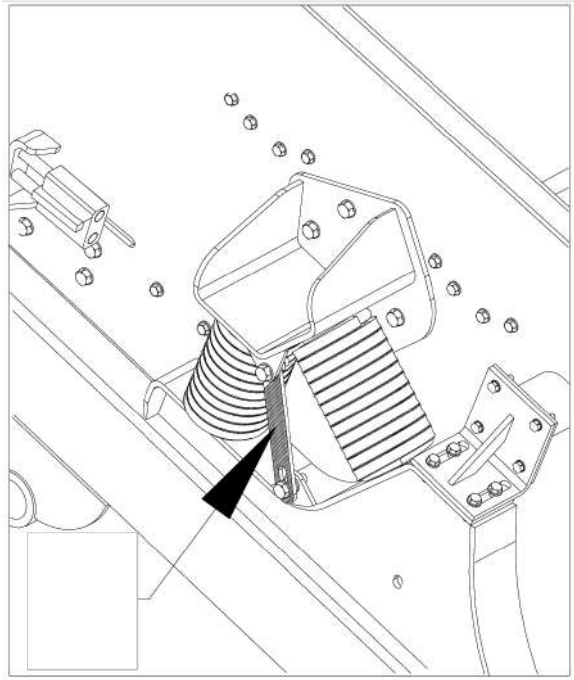


Figure 107. Screen box transport brackets

Before starting the screening process, make sure the screen box transport brackets (4 pcs) have been removed.

If the screen box transport brackets are still in place, remove them before starting the screening operations.



CAUTION

PROPERTY DAMAGE HAZARD

Can cause moderate injury or property damage.

Remove the screen box transport brackets before starting the screening process to avoid damage to the screen box assembly.



NOTE: Store the screen box transport brackets in the machine toolbox and reinstall if traveling long distances or if road transportation is needed.

Hopper support legs



⚠ WARNING

CRUSHING HAZARD

Can cause death or serious injury.

Risk of severe injury if person gets under the moving support legs. To prevent this, lower the support legs manually close to the ground before starting the process.

6.3.1 Preparing the equipment for screening

Make the following checks and adjustments in preparation for screening operations:

- Make sure all safe guards are in place and secured with bolts.
- Check to make sure the machine is fully assembled, components are resting on their support pins, clips are installed, and the hydraulic rams are not under pressure.
- Make sure the screen box transport bracket is removed.
- Check that the lifting conveyor and hopper are empty of screens or other accessories before start-up.
- Make sure the hopper support legs are lowered and set.
- Check to see if the proper screen selection is in the screen box.
- Check that the entire screen mounting hardware is tight.
- Perform the daily pre-start check. For start-up instructions and daily operational checks, see "Operation".
- Make sure the unit is located on a level base.
- Check the feeder belt speed and adjust if necessary. See [6.3.6 Checking the feeder belt speed](#).

The general nature of material screening can be considered by definition as occurring under extreme operating conditions. Therefore, extra care and concern should be placed on air circulation in the engine and hydraulic cooling radiators, on engine air filtration, engine fuel filtration, maintenance scheduling, and on material buildup around the head and tail drum areas.



NOTE: A cleaning and checking routine that fits the particular application will help reduce failures and unnecessary down time.

Due to vibration over time, components may become loose. Simple routine checks and corrections, such as checking and tightening the band clamps on the engine air intake tubes, screen tension clamps, bearing bolts etc., may reduce the chances of major damages.



NOTE: Turbo-charged engines will draw in air from even the slightest opening if the air filters become dirty/restricted. Routine checks of all tube connections and filter conditions are required.

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6.3.2 Side conveyor preparation



⚠ WARNING

UNEXPECTED MOVEMENT HAZARD
Can cause death or serious injury or property damage.
Any trapped air in the conveyor control circuit will cause the conveyor to drop. When a cylinder, hose or other component is replaced or damaged, the circuit must be bled to release the trapped air. Make sure no one is in the restricted area when a conveyor is maneuvered.



⚠ WARNING

PERSONAL INJURY HAZARD
Can cause death or serious injury or property damage.
Only trained and competent personnel are allowed to operate, maintain and service the machine. If operating procedures are unclear, contact Metso for assistance prior to operating.
Stay away from a folding conveyor. Pay attention to obstacles and conveyor belt clearances when folding and unfolding conveyor.



⚠ WARNING

PERSONAL INJURY HAZARD
Can cause death or serious injury.
Do not go under any conveyor module when raising or lowering the modules. Make sure the restricted area is clear of people when moving the conveyor modules.



⚠ WARNING

CRUSHING HAZARD
Can cause death or serious injury.
Do not fold or unfold more than one hydraulic component, for example, a conveyor, at a time. Only one person is allowed to operate hydraulic components at a time.



⚠ CAUTION

PROPERTY DAMAGE HAZARD
Can cause moderate injury or property damage.
Folding a conveyor without care will cause damage to the conveyor.

Top deck side conveyor = Standard folding conveyor

Bottom deck side conveyor = Standard folding conveyor

Function: Side conveyor fold hydraulics allows the side conveyors to be adjusted for transport, track driving, and storage.

Description: Hand valves (hydraulic control levers) are located on the screen support framework of the chassis at left and right side of the machine. For more information, see [3.7.2 Hydraulic controls](#).

The speed control valve for the top deck side conveyor is located on right side of the machine, and the speed control valve for the bottom deck side conveyor is located on the left side of the machine. For more information, see [3.7.2 Hydraulic controls](#).

For the first step in unfolding the side conveyors for operating position, see the next section.

6.3.2.1 Extending and retracting the hopper support legs



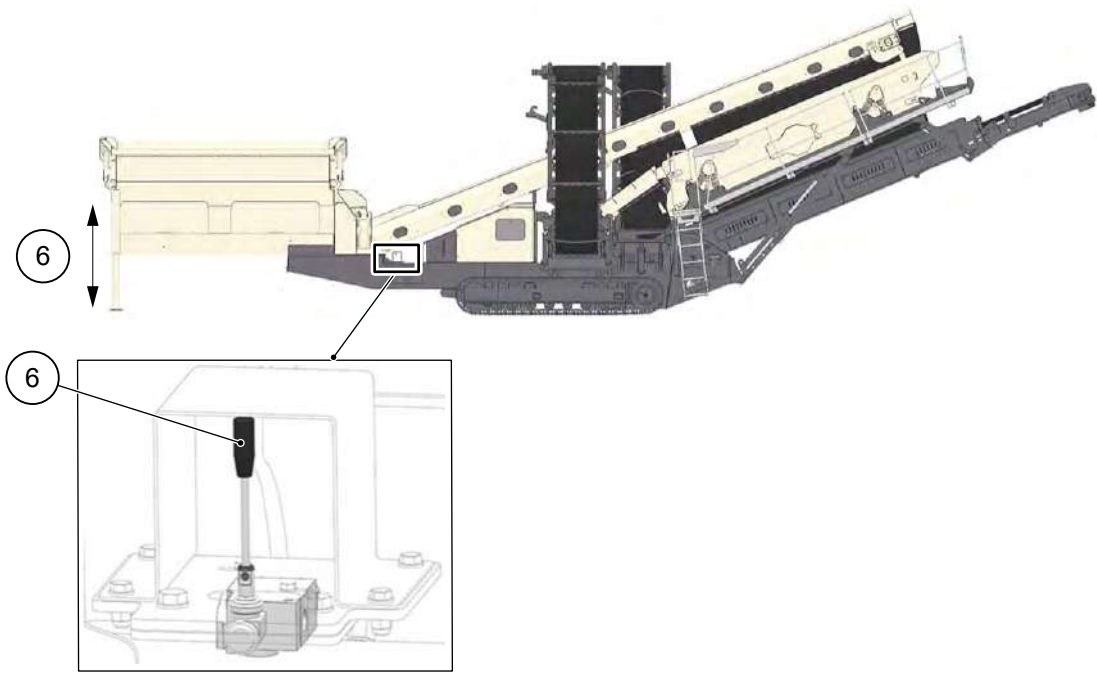
 **WARNING**

CRUSHING HAZARD
Can cause death or serious injury.
Risk of severe injury if person gets under the moving support legs. To prevent this, lower the support legs manually close to the ground before starting the process.

Function: To support a loaded hopper while in operation.

Location: Mounted on the chassis on the front of the hopper.

Description: Hydraulically operated support legs are raised and lowered by a hydraulic control on the right side of the machine. A single bank valve operates the raise and lower functions.



Callout	Description
6	Hopper support legs UP-DOWN

Figure 108. Hand valve for extending and retracting the hopper support legs



 **WARNING**

CRUSHING HAZARD

Can cause death or serious injury.

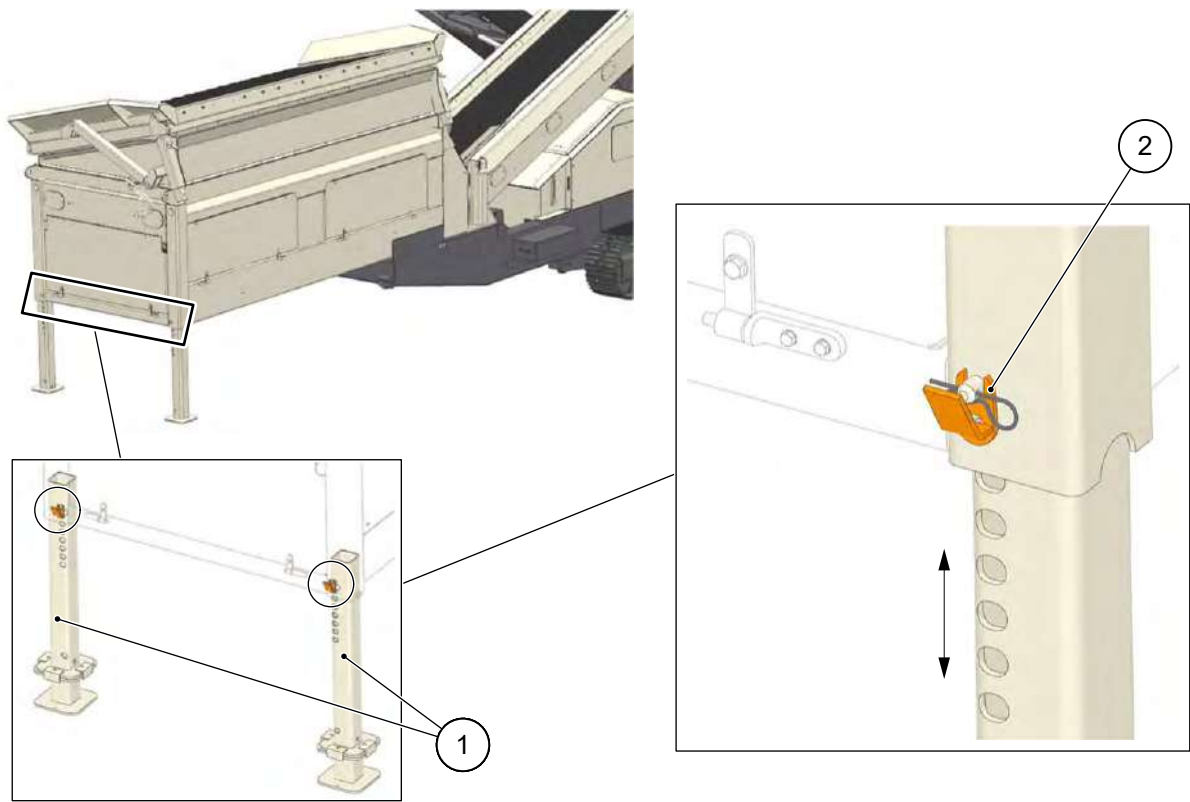
Only trained and competent personnel are allowed to operate, maintain and service the machine. If operating procedures are unclear, contact Metso for assistance prior to operating.

Stay away from the range of moving machine parts. Make sure that nobody is in the restricted area when operating hydraulic devices.



NOTE: Make sure that the support legs are fully retracted before moving the machine.

The following assumes that the hand valve switch on the main control panel is at position '1' to activate the hand valves (see [4.8 Hand valve activation](#)), and the engine speed is in “operation” speed.



Callout	Description
1	Hopper support legs
2	Locking pins and clips

Figure 109. Hopper support legs

Extending

To extend the hopper support legs (extending the hydraulic cylinder):

1. Remove the locking pins and clips (2) from the two hopper supports legs (1). You may have to move the support legs slightly to release the pins.
2. Move the **Hopper support legs UP-DOWN control** (6) to the LOWER position until slight pressure is applied to the support legs. Do not lift the hopper.
3. Reinstall the two locking pins and clips (2) into the hopper support legs when the proper support is achieved.



NOTE: Moving the hopper support legs may cause crushing of limbs. Watch out for your hands and fingers when installing the locking pins.



NOTE: The hopper support legs are designed only to support the hopper, do not use them for lifting.

Retracting



 WARNING

FALLING OBJECT HAZARD
Can cause death or serious injury.
Do not perform lifting of the hydraulic legs when there is material in the feed hopper.

To retract the hopper support legs (retracting the chassis hydraulic cylinder):

1. Remove the locking pins and clips (2) from the two hopper supports legs (1). You may have to move the support legs slightly to release the pins.
2. Move the **Hopper support legs UP-DOWN control** (6) to the RAISE position.
3. Reinstall the two locking pins and clips (2) into the hopper support legs (1) when fully retracted.



NOTE: Make sure that the support legs are fully retracted before moving the machine.



 CAUTION

PROPERTY DAMAGE HAZARD
Can cause moderate injury or property damage.
Always make sure you install the mechanical locking pins for the support legs before leaving the machine in the raised position.

6.3.2.2 **Unfolding the bottom deck side conveyor**

Prerequisite: The machine is positioned on a level and prepared site, with the engine running. All securing straps related to transportation are removed.

- 1. Open the lockings (1) and (2) from the left side of the machine. Detail (3) shows the locking pin in open position.

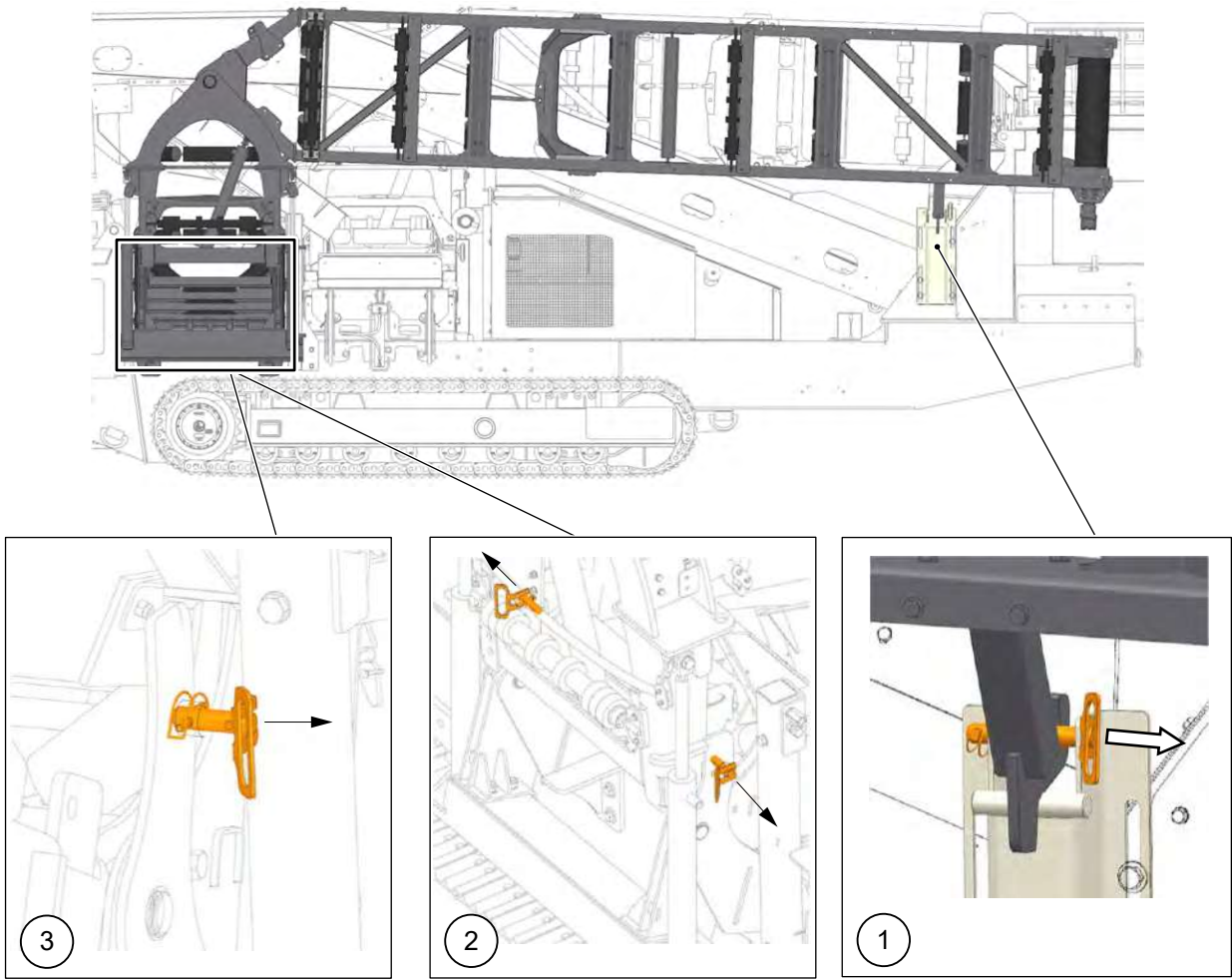
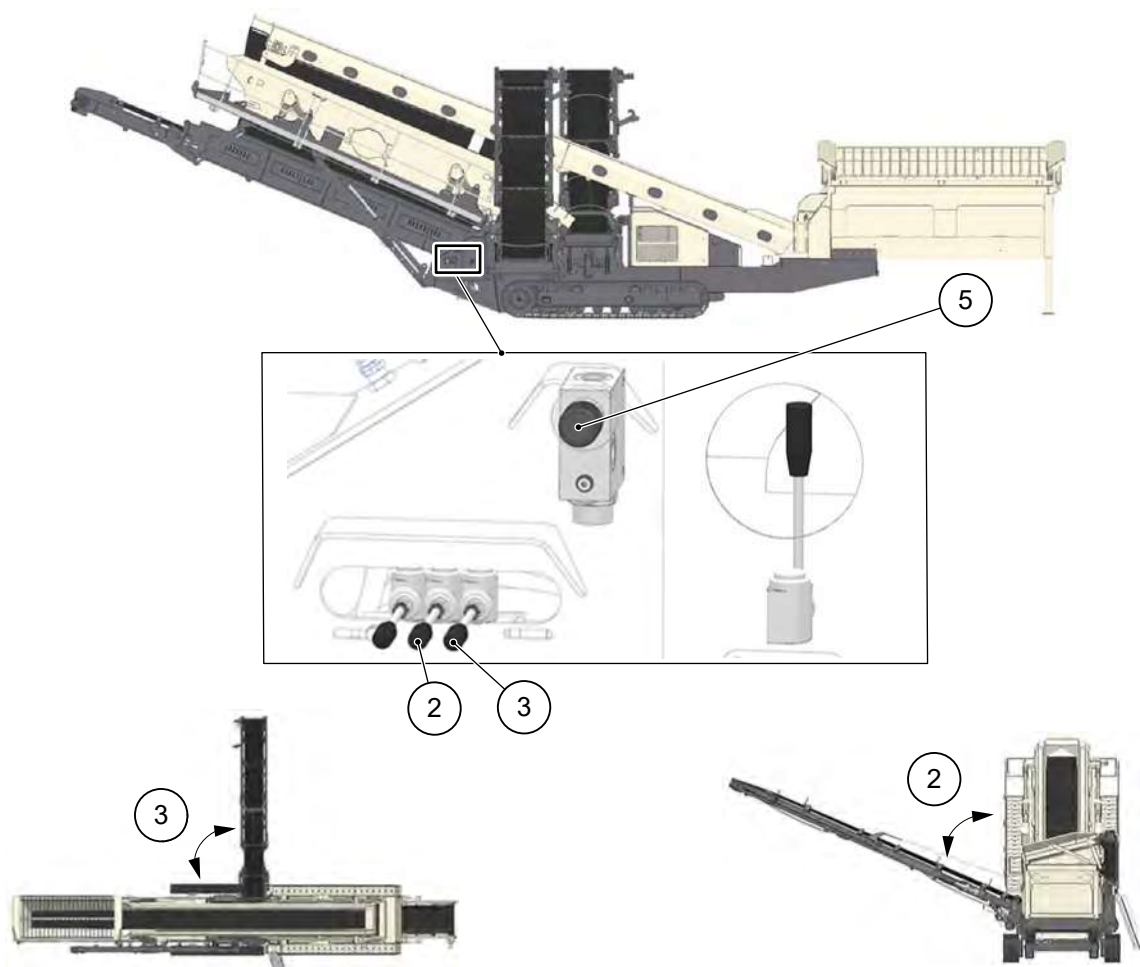


Figure 110. Mechanical locking of bottom deck side conveyor (left side of the machine)

- 2. Make sure that the hand valves are activated. For instructions, see [4.8 Hand valve activation](#).

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Callout	Description
2	Bottom deck side conveyor lifting
3	Bottom deck side conveyor folding OUT-IN
5	Bottom deck side conveyor speed control

Figure 111. Hand valves for unfolding the bottom deck side conveyor

For descriptions of all hydraulic control levers of this machine, see [3.7.2 Hydraulic controls](#).

3.
- Lower the bottom deck side conveyor using the **Bottom deck side conveyor lifting control** (2), and fold out the conveyor using the **Bottom deck side conveyor folding OUT-IN control** (3).

NOTE: Make sure that the conveyor belt and support wire align properly.

4.
- Unfold the bottom deck side conveyor to the operating position.

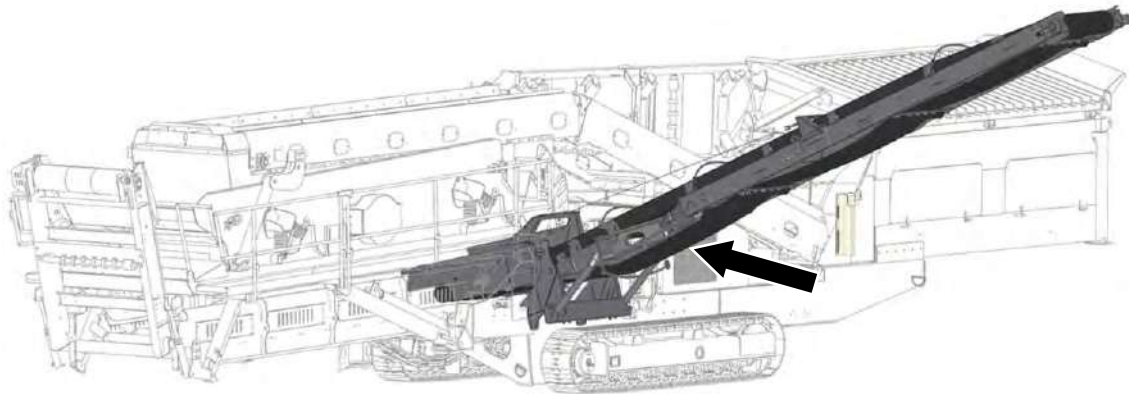


Figure 112. Bottom deck side conveyor in operating position

- 5. Attach the thrust arm of the locking of the top of the conveyor and tighten if needed.

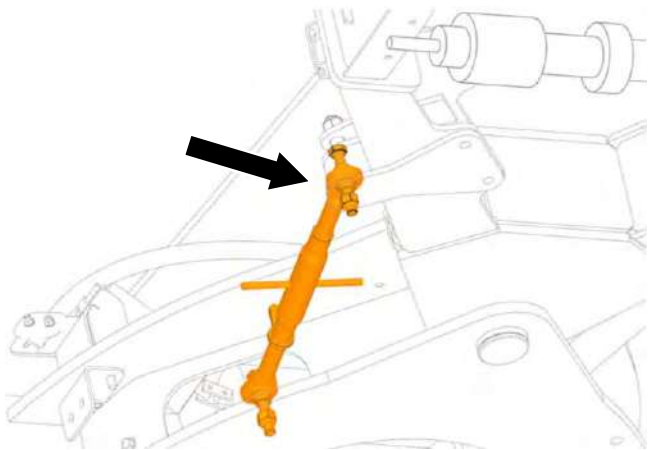


Figure 113. Thrust arm of the locking of the top of the conveyor



NOTE: Normally, the adjustment of thrust arm is not changed because it affects the alignment of conveyor belt.

6.3.2.3 Adjusting the elevation angle of the bottom deck side conveyor



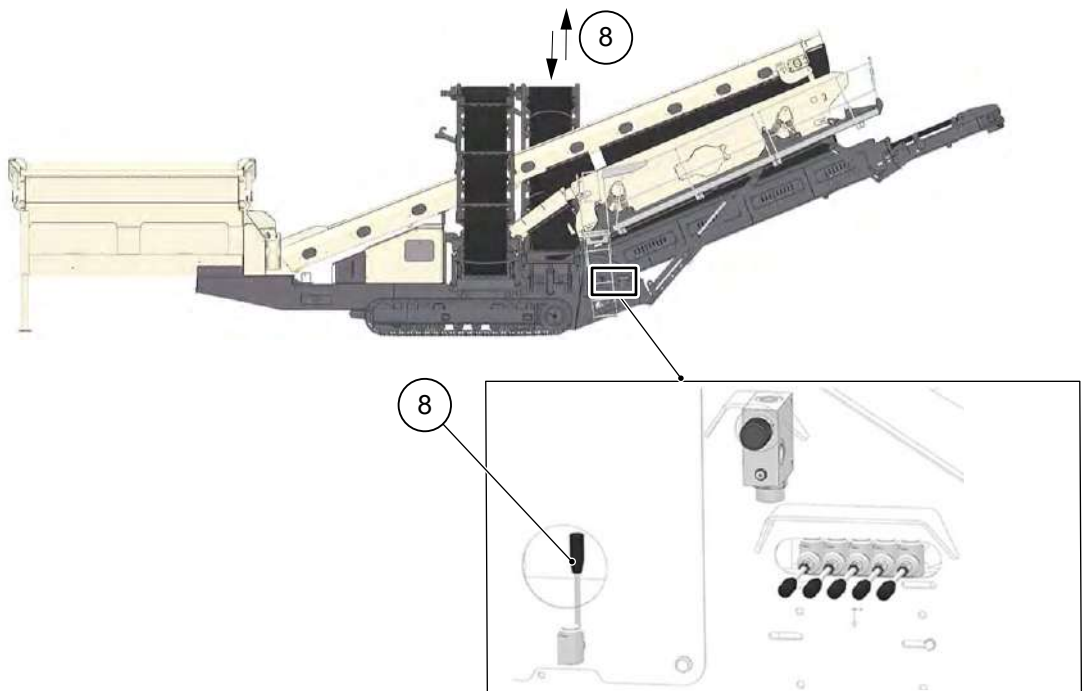
⚠ WARNING

CRUSHING HAZARD
Can cause death or serious injury.
Do not remove the locking pins of conveyor elevation angle without approved lifting equipment. Stay away from a moving machine.

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 *NOTE: Every time you adjust the elevation angle, the machine must be in operating position.*

 *NOTE: You can adjust the elevation angle also without the original hydraulics of Lokotrack.*



Callout	Description
8	Bottom deck side conveyor angle UP-DOWN (option)

Figure 114. Hand valve for adjusting the elevation angle of the bottom deck side conveyor

For descriptions of all hydraulic control levers of this machine, see [3.7.2 Hydraulic controls](#).

The elevation angle of bottom deck side conveyor can be adjusted in two ways:

- 1) With the hydraulics of Lokotrack ST (the recommended way)
- 2) If the machine does not have the optional hydraulics of Lokotrack ST, you must lift the conveyor from lifting points (2) with approved lifting equipment.

Phases for the elevation angle adjustment:

1. Make sure that the hand valves are activated. For instructions, see [4.8 Hand valve activation](#).
2. Open the whole machine to the operating position.
3. If the machine does not have the optional hydraulics of Lokotrack ST, lift the conveyor from lifting points (2) with approved lifting equipment.

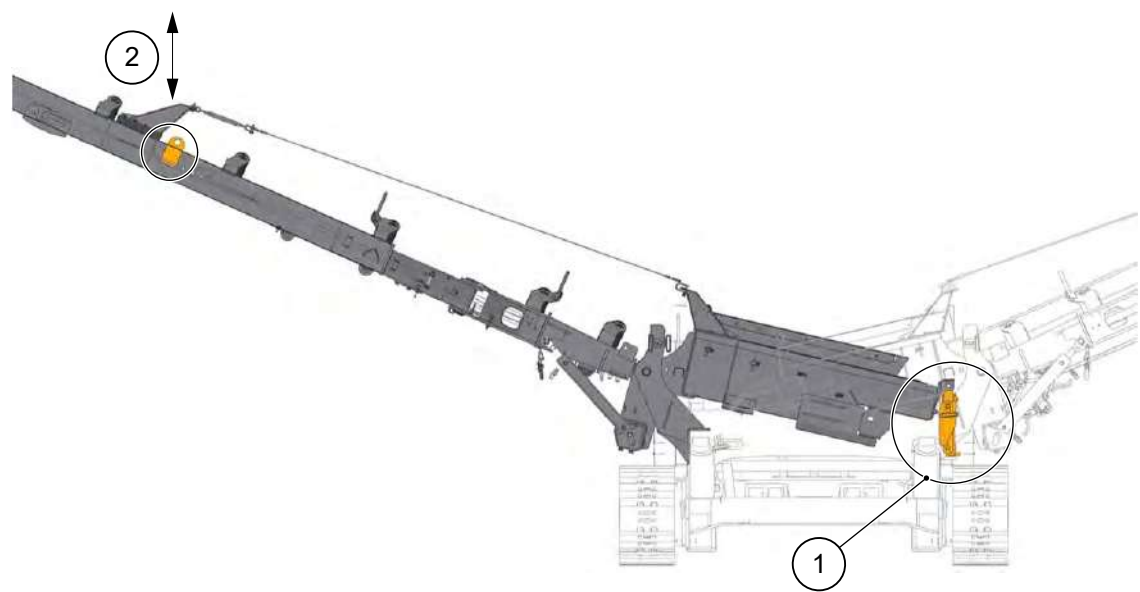


Figure 115. Position of locking pins and optional hydraulics of Lokotrack ST (1) and position of lifting points (2), (rear view of the machine)

4. After you have lessened the weight of the bottom deck side conveyor with approved lifting equipment or with the optional hydraulics of Lokotrack ST, remove both locking pins.

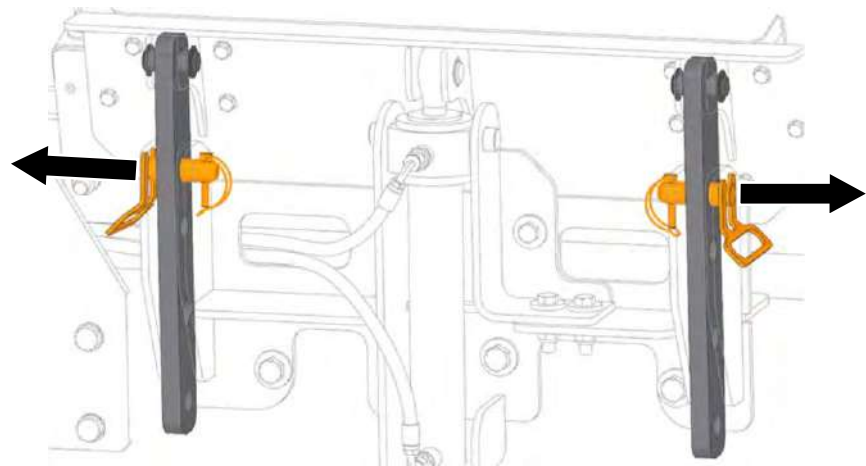


Figure 116. Removing the locking pins

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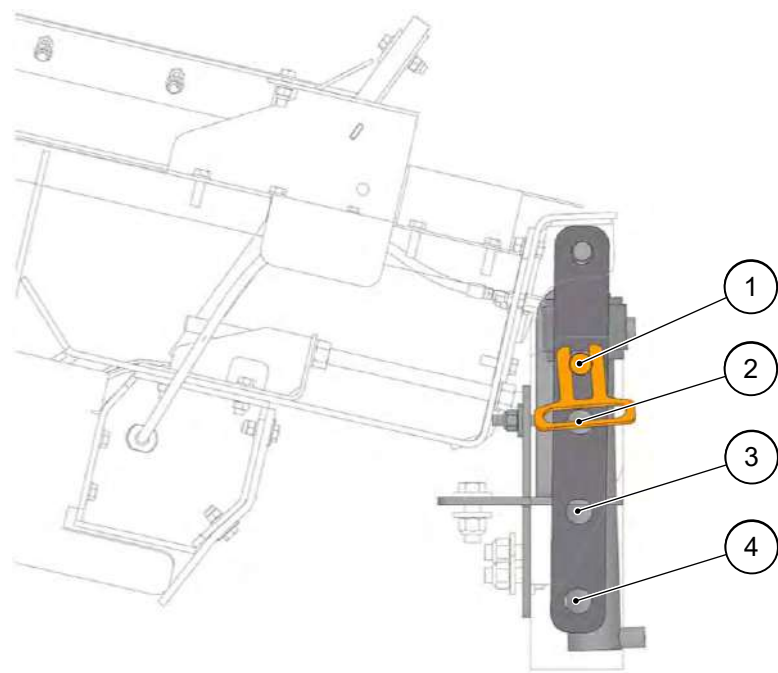


Figure 117. Possible angles (1): 24, (2): 22, (3): 19, (4): 16 degrees

5. After adjusting the elevation angle, install the locking pins.

6.3.2.4 **Unfolding the top deck side conveyor**

Prerequisites:

- The machine is positioned on a level and prepared site, with the engine running.
- All securing straps related to transportation are removed.
- The top deck side conveyor is in transport position.

1. Open the lockings (1) and (2) from the right-hand side of the machine. Detail (3) shows the locking pin in open position.

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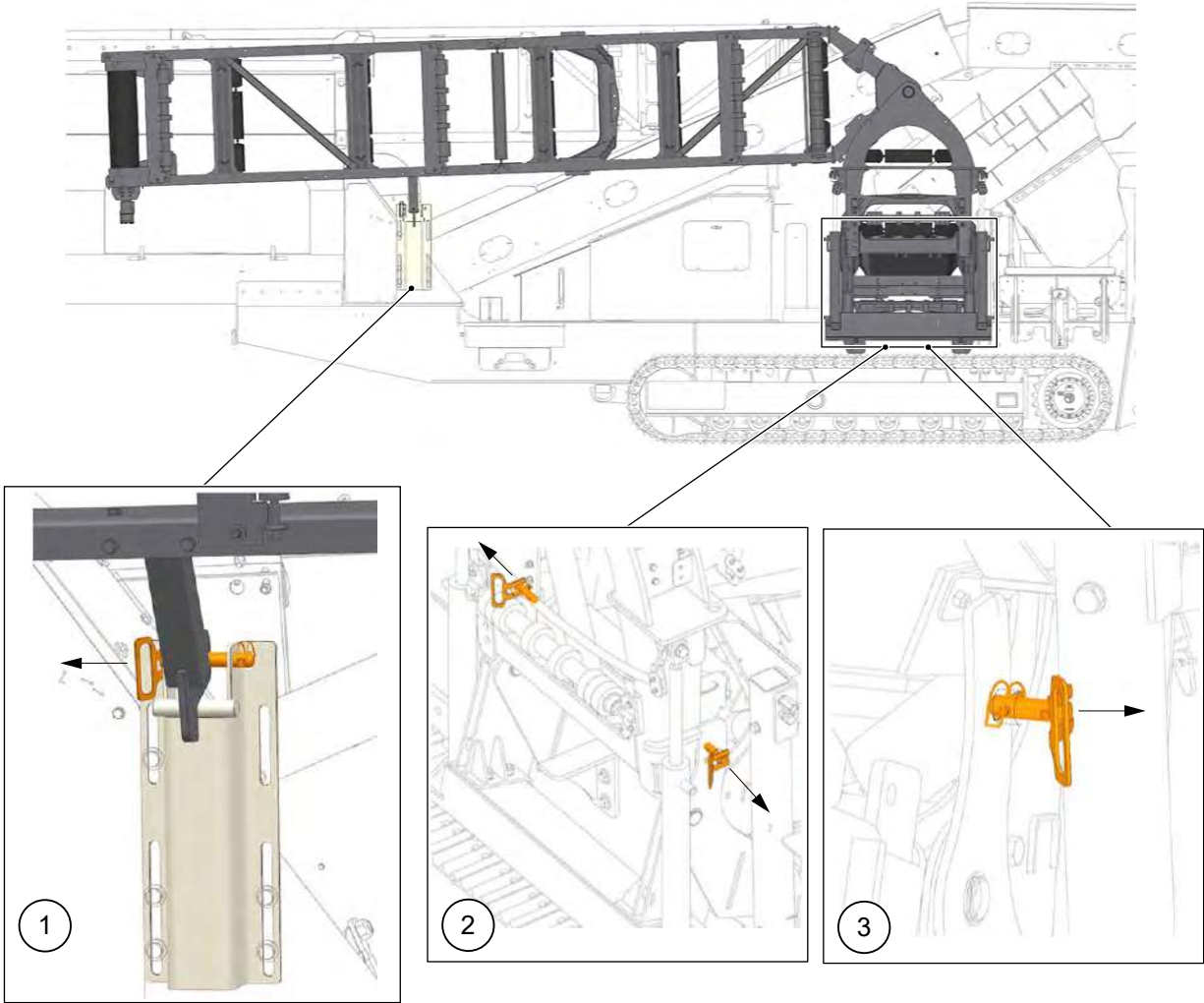
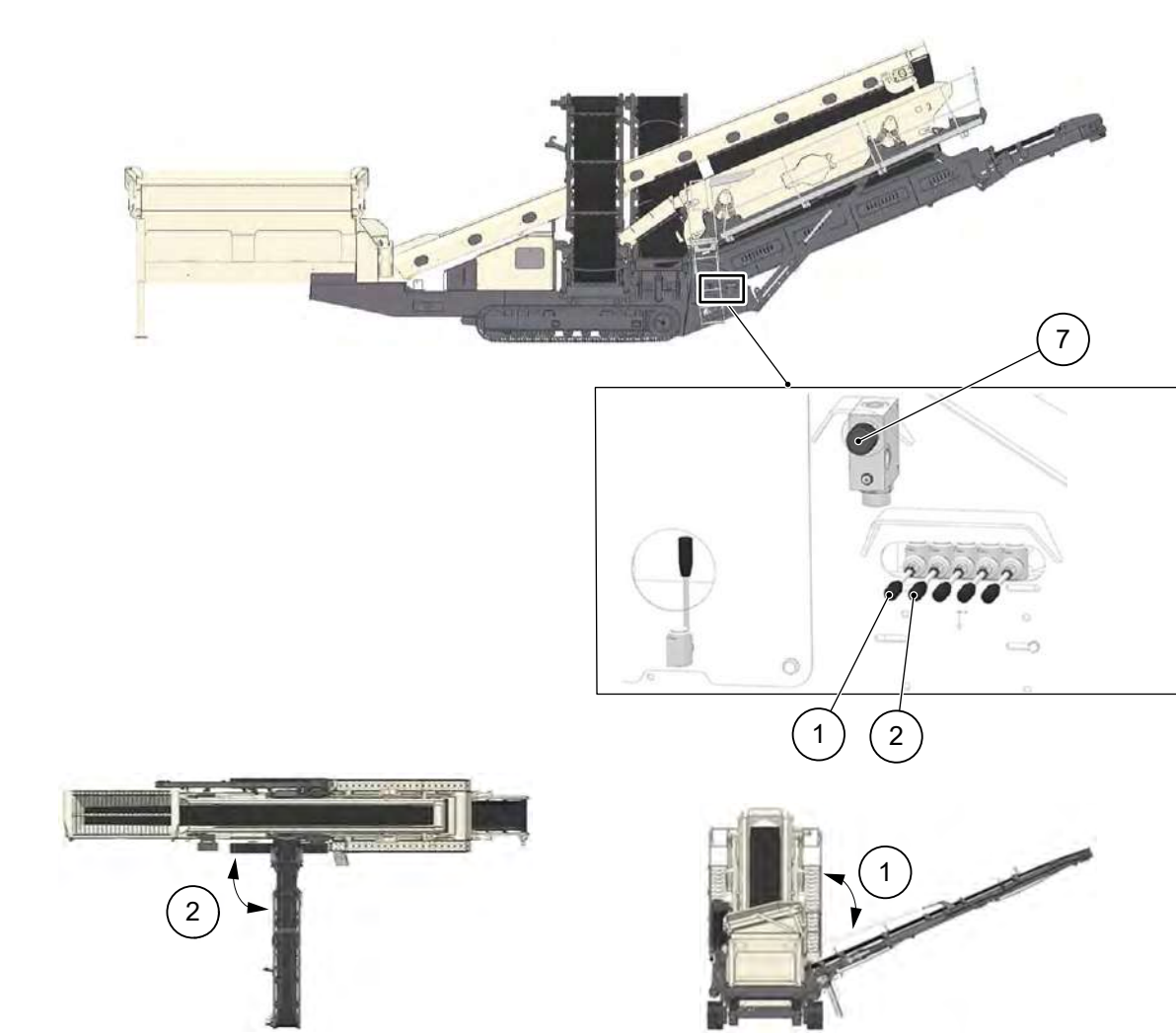


Figure 118. Mechanical locking of top deck side conveyor (right-hand side of the machine)

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Callout	Description
1	Top deck side conveyor lifting
2	Top deck side conveyor folding OUT-IN
7	Top deck side conveyor speed control

Figure 119. Hand valves for folding the top deck side conveyor

For descriptions of all hydraulic control levers of this machine, see [3.7.2 Hydraulic controls](#).

2.
- Make sure that the hand valves are activated. For instructions, see [4.8 Hand valve activation](#).
3.
- Lower the top deck side conveyor using the **Top deck side conveyor lifting control** (1), and fold out the conveyor using the **Top deck side conveyor folding OUT-IN control** (2).



NOTE: Follow the alignment of conveyor belt during the folding and lifting procedure.

4.
- Unfold the top deck side conveyor to the operating position.

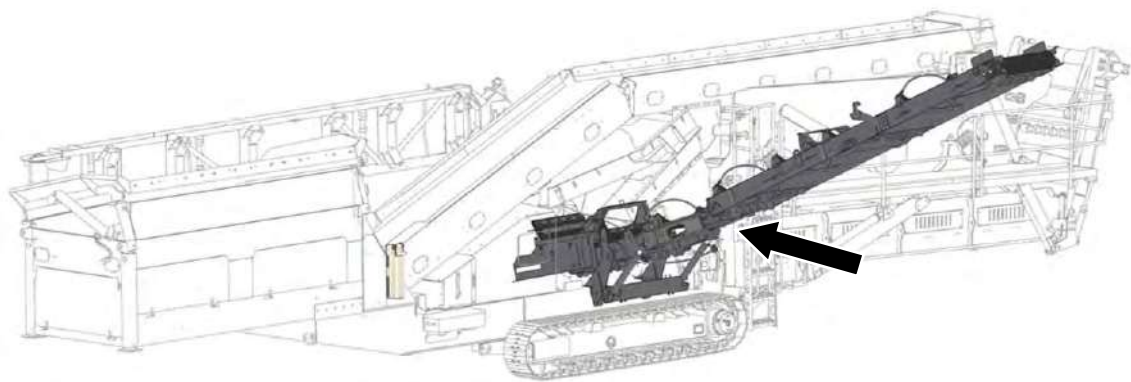


Figure 120. Top deck side conveyor in operating position

5. Attach the thrust arm of the locking of the top of the conveyor and tighten if needed.

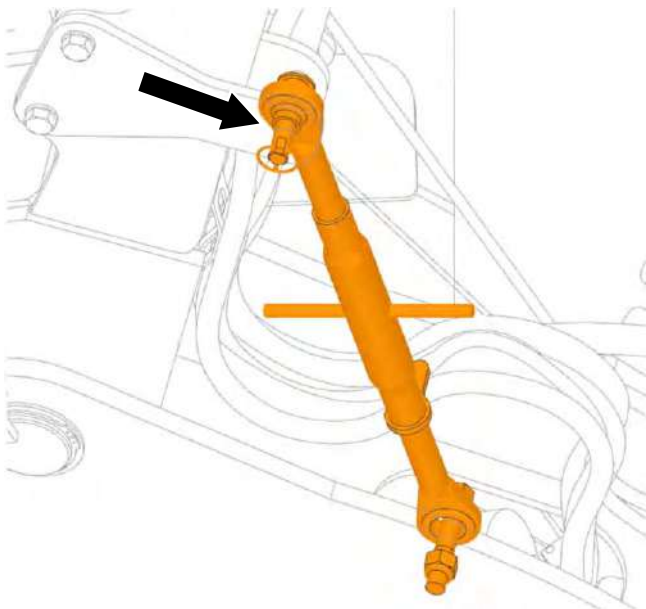


Figure 121. Thrust arm of the locking of the top of the conveyor



NOTE: Normally, the adjustment of thrust arm is not changed because it affects the alignment of conveyor belt.

6.3.2.5 **Adjusting the inclination of the chute**

The inclination of the chute must be adjusted if the loading section of the top deck side conveyor is lifted. The chute may obstruct the movement of the loading section if its inclination is not adjusted first.

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⚠ WARNING

GENERAL HAZARD
Can cause death or serious injury.
Make sure that the process has stopped and that there is no material left in or on the machine.



⚠ WARNING

FALLING HAZARD
Can cause death or serious injury.
Use a man lift and a safety harness to access high maintenance locations or when working outside the service platforms. Do not step on the handrails.



⚠ CAUTION

PROPERTY DAMAGE HAZARD
Can cause moderate injury or property damage.
Leave approximately 40 mm of clearance between the chute(s) and the discharge lip(s) of the screen when adjusting the inclination of the chutes.

- Prerequisites:
- The machine is stopped and locked out. See [7.2 Lockout and tagout procedure](#).
 - The whole machine is in operating position.
1. Loosen the chute's fastening bolts, but do not unscrew them completely.

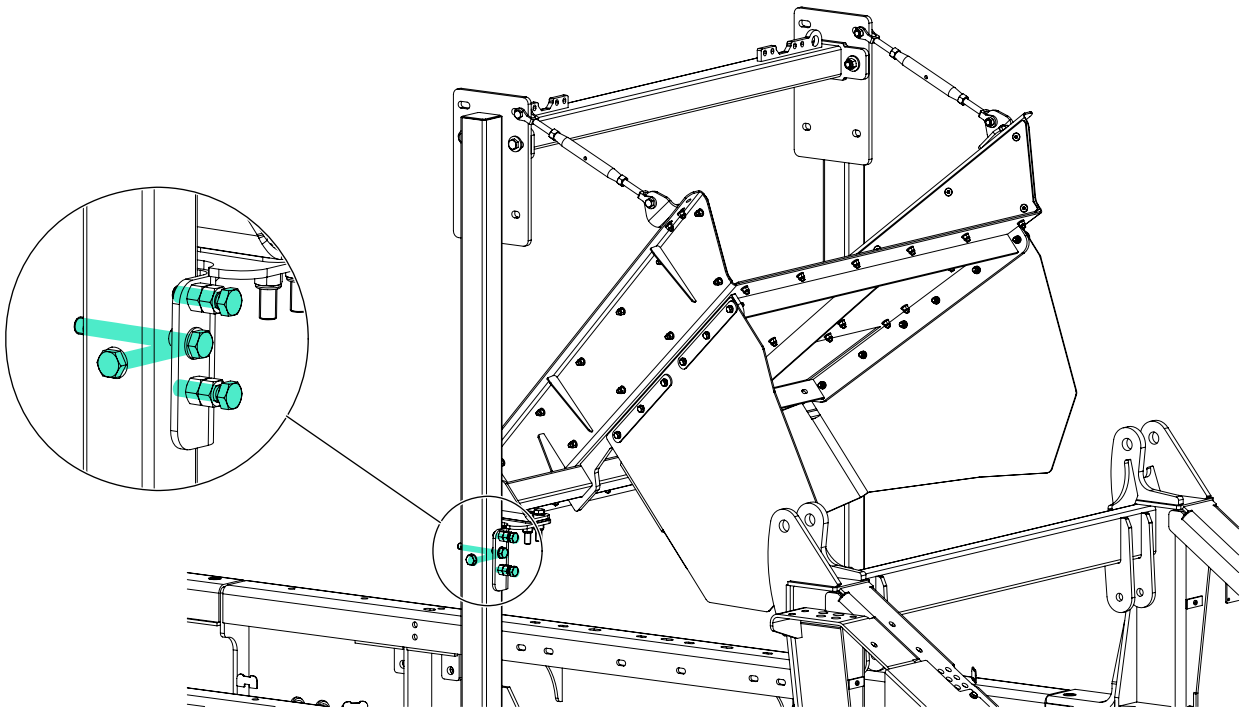


Figure 122. Chute fastening bolts

- 2. Loosen the nuts (1) locking the turnbuckle in position.

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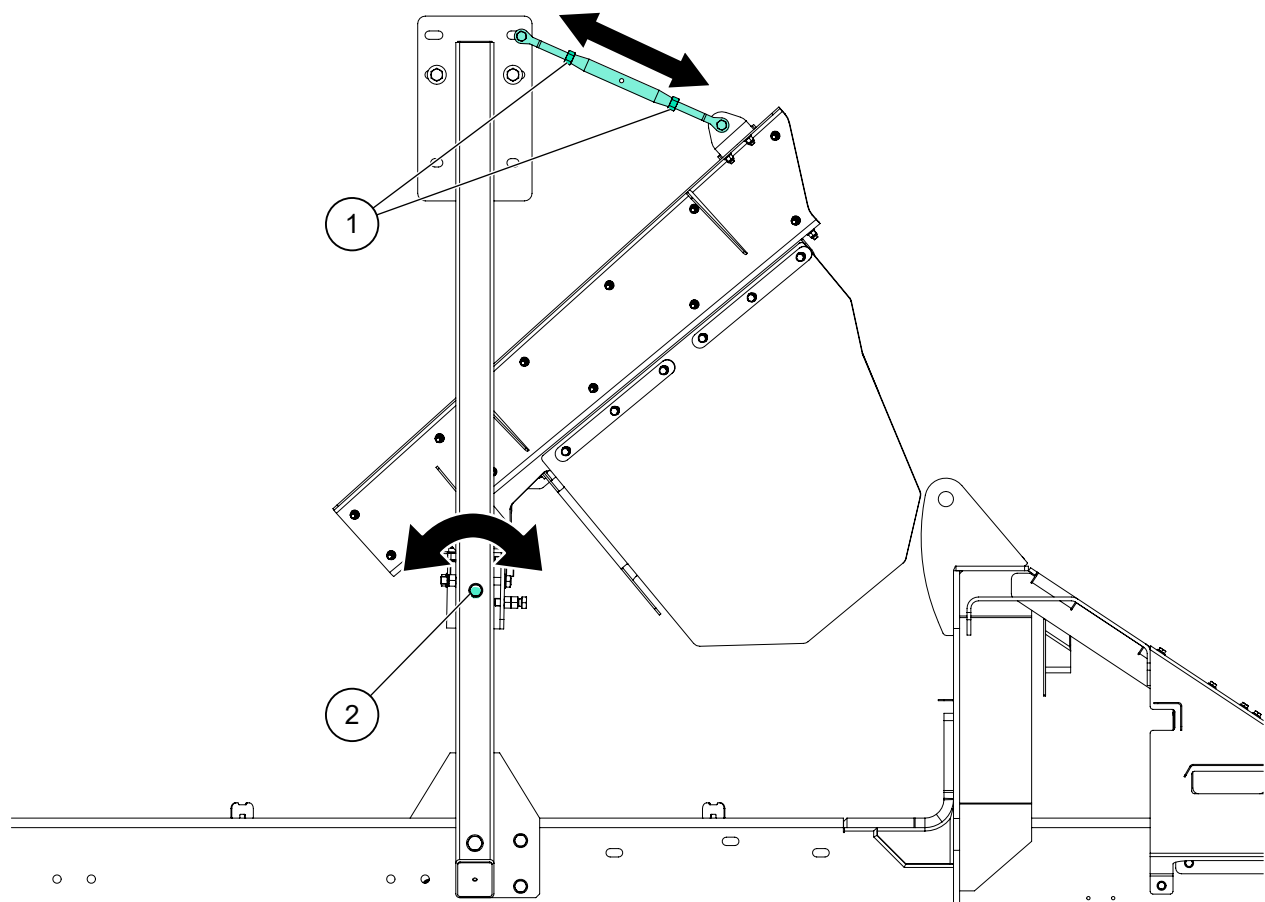


Figure 123. Chute adjustment bolts

- 3. Use the turnbuckle to adjust the inclination of the chute. The chute will turn around one of the fastening bolts (2).
- 4. When you have set the chute at the desired angle, tighten the fastening bolts and the turnbuckle locking nuts.

6.3.2.6 Adjusting the elevation angle of the top deck side conveyor



 **WARNING**

CRUSHING HAZARD
Can cause death or serious injury.
Do not remove the locking pins of conveyor elevation angle without approved lifting equipment. Stay away from a moving machine.

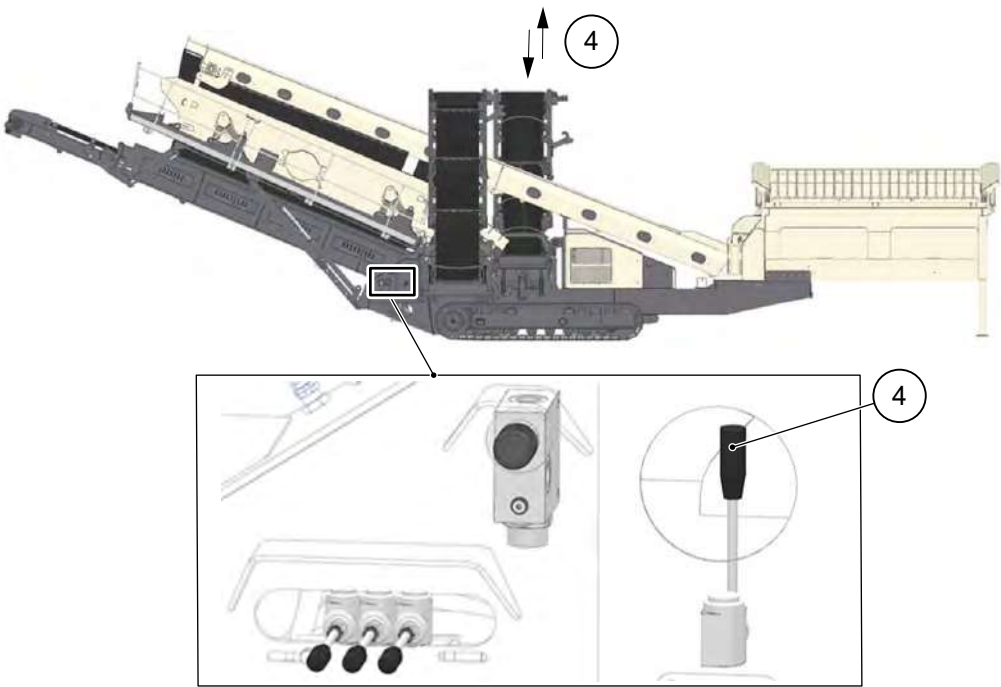


NOTE: Every time you adjust the elevation angle, the machine must be in operating position.

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NOTE: You can adjust the elevation angle also without the original hydraulics of Lokotrack.



Callout	Description
4	Top deck side conveyor angle UP-DOWN (option)

Figure 124. Hand valve for adjusting the elevation angle of the top deck side conveyor

The elevation angle of top deck side conveyor can be adjusted in two ways:

- 1) With the hydraulics of Lokotrack ST (the recommended way)
- 2) If the machine does not have the optional hydraulics of Lokotrack ST, you must lift the conveyor from lifting points (2) with approved lifting equipment.

Phases for the elevation angle adjustment:

1. Make sure that the hand valves are activated. For instructions, see [4.8 Hand valve activation](#).
2. Open the whole machine to the operating position.
3. If the machine does not have the optional hydraulics of Lokotrack ST, lift the conveyor from lifting points (2) with approved lifting equipment.
4. After you have lessened the weight of the top deck side conveyor with approved lifting equipment or with the optional hydraulics of Lokotrack ST, remove both locking pins.

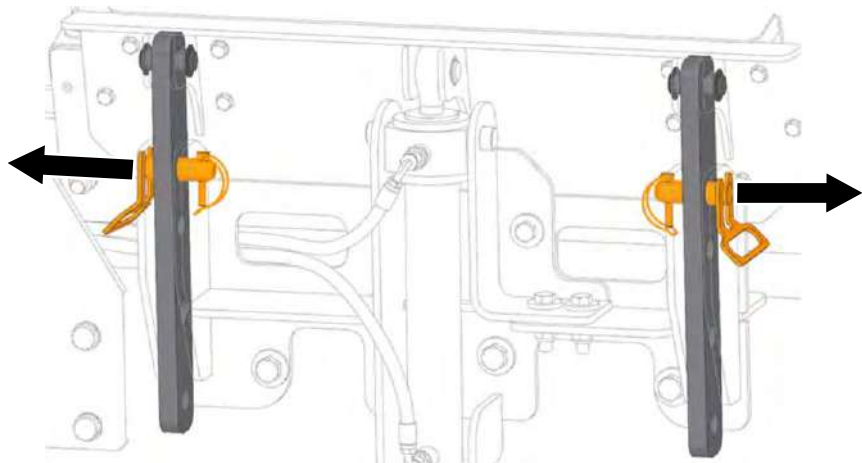


Figure 125. Removing the locking pins

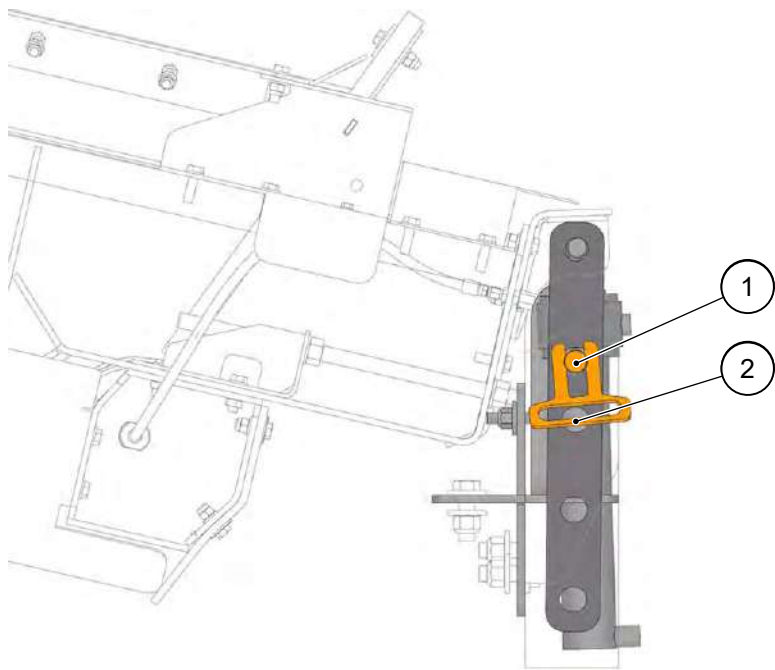


Figure 126. Possible angles (1): 24 degrees and (2): 22 degrees

5. After adjusting the elevation angle, install the locking pins.

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6.3.3 Product conveyor preparation



 **WARNING**

CRUSHING HAZARD

Can cause death or serious injury.

Only trained and competent personnel are allowed to operate, maintain and service the machine. If operating procedures are unclear, contact Metso for assistance prior to operating.

Stay away from the range of moving machine parts. Make sure that nobody is in the restricted area when operating hydraulic devices.



NOTE: Stop the process operations and remove the process material before making any adjustments, maintenance, or repair work.



 **CAUTION**

PROPERTY DAMAGE HAZARD

Can cause death or serious injury.

Lowering the screen angle without fully retracting the angle adjusting mechanism of the product conveyor will damage the machine.

Do not lower the screen angle if the angle adjusting mechanism of the product conveyor is not fully retracted.

For more information, see "Lowering the screen".

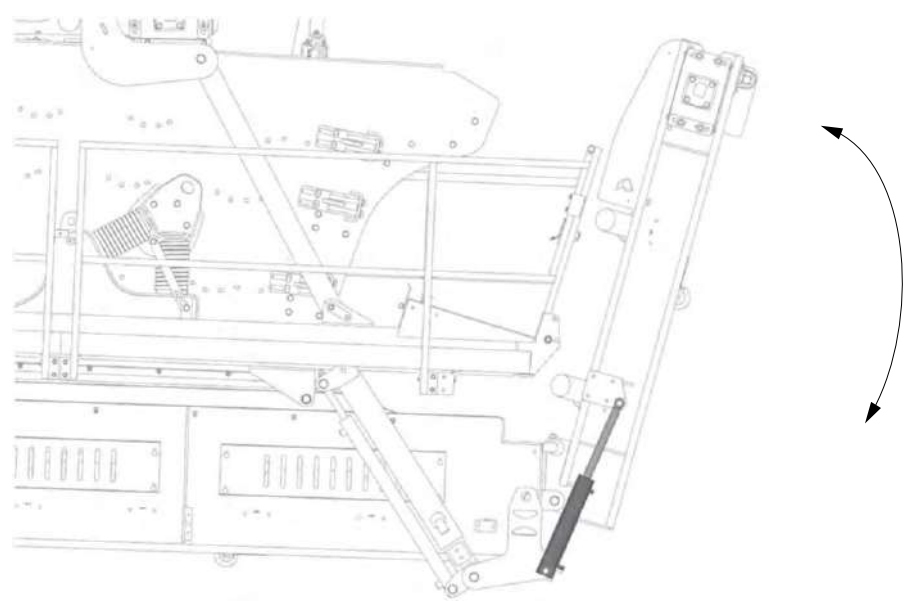


Figure 127. Product conveyor fold hydraulics

Function: Product conveyor fold hydraulics is used for extending or retracting the product conveyor for transport, operations, or moving.

Description: The product conveyor hand valve is located on the top deck side conveyor side of the machine. For more information, see "Unfolding the product conveyor".

6.3.3.1 Unfolding the product conveyor



⚠ WARNING

CRUSHING HAZARD

Can cause death or serious injury.

Only trained and competent personnel are allowed to operate, maintain and service the machine. If operating procedures are unclear, contact Metso for assistance prior to operating.

Stay away from the range of moving machine parts. Make sure that nobody is in the restricted area when operating hydraulic devices.

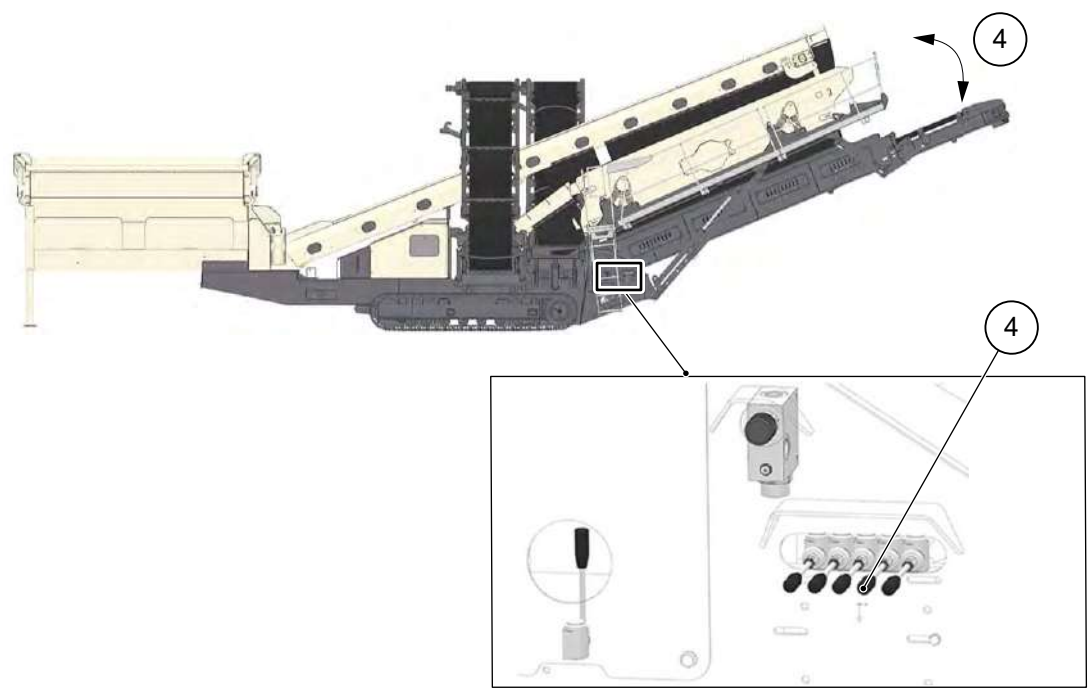


⚠ CAUTION

GENERAL HAZARD

Can cause moderate injury or property damage.

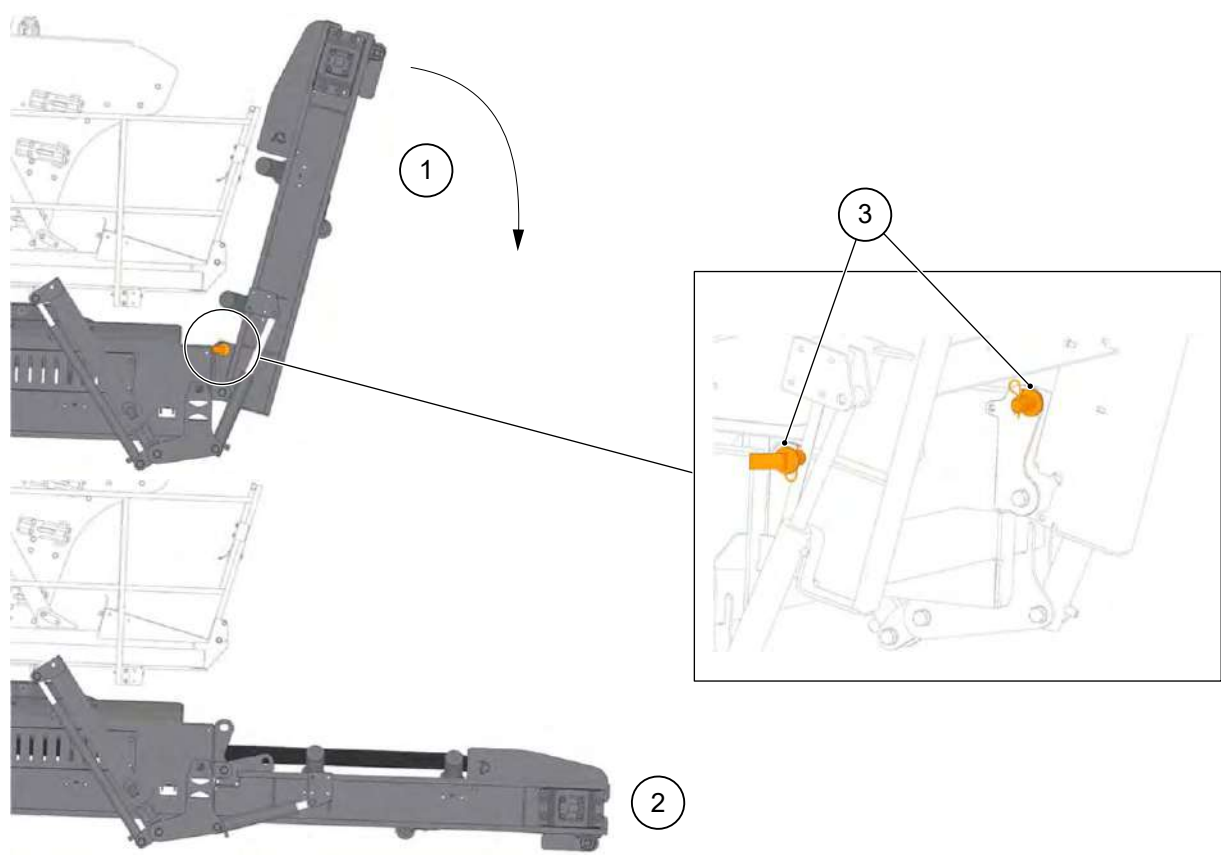
You must take extreme care when moving the machine. Make sure that there is adequate ground clearance for the product conveyor before moving. Refer to the driving instructions in this manual. Do not transport over the roadways with the screen raised.



Callout	Description
4	Product conveyor folding OUT-IN

Figure 128. Hand valve for unfolding the product conveyor

For descriptions of all hydraulic control levers of this machine, see [3.7.2 Hydraulic controls](#).



Callout	Description
1	Product conveyor in transport position
2	Product conveyor in operating position
3	Locking pins

Figure 129. Unfolding the product conveyor

1. Make sure that the hand valves are activated. For instructions, see [4.8 Hand valve activation](#).
2. Remove the locking pins and clips (3) on both sides of the product conveyor, and store the locking pins and clips in the tool box.
3. Lower the product conveyor head section to operating position using the **Product conveyor folding OUT-IN control** (4).

6.3.4 **Adjusting the screen angle**



***NOTE:** Stop the process operations and remove the process material before making any adjustments, maintenance, or repair work.*



 **WARNING**

PERSONAL INJURY HAZARD

Can cause death or serious injury.

Never go near the feeder or screen when the machine is running.



NOTE: You must slightly unfold the bottom deck side conveyor before you adjust the screen angle.

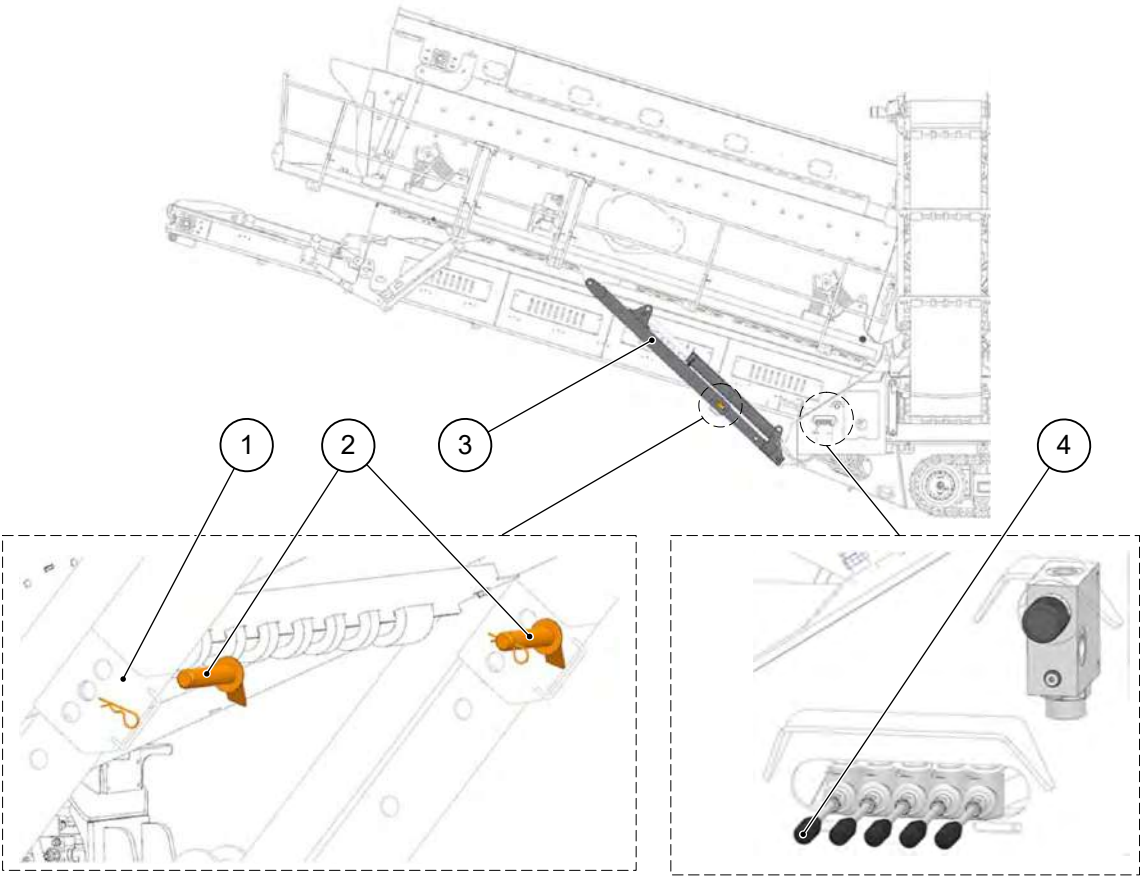
Before adjusting the screen angle:

1. Remove the transport lockings from the conveyor.
2. Lift the bottom deck side conveyor slightly.
3. Adjust the screen angle according to the instructions in this chapter.

Function: The screen angle hydraulics allow the screen box to be adjusted to change the screen media efficiency for existing conditions dependent on the application. The screen angle hydraulics also allows transport, track driving, and storage positions.

Description: The hand valves for the screen angle are located on the left side of the machine.

6.3.4.1 Raising the screen



Callout	Description
1	Adjustment sleeves
2	Locking pins and clips
3	Screen angle trestle
4	Screen UP-DOWN

Figure 130. Raising the screen angle

1. Using the **Screen UP-DOWN control** (4), raise the screen angle slightly by moving the screen angle control to the RAISE position. Raise the screen angle enough to relieve the pressure on the adjustment sleeves (1) and locking pins (2).
2. Remove the screen box angle adjusting clips and locking pins (2) from the adjustment sleeves (1).
3. Using the **Screen UP-DOWN control** (4), raise the screen angle by moving the screen angle control to the RAISE position.
4. Raise the screen angle trestle (3) slightly above the desired operating position.
5. Move the adjustment sleeves (1) to the desired hole and replace the locking pins and clips (2) in the screen angle trestle (3).

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NOTE: Make sure that both trestles are adjusted equally, failure to do so will damage the screen box assembly.

6. Using the **Screen UP-DOWN control** (4), lower the screen angle trestle (3) by moving the **Screen UP-DOWN control** (4) to the LOWER position. Lower the screen angle trestle (3) so that it rests securely on the adjustment sleeves (1) and locking pins (2).

6.3.4.2 Lowering the screen

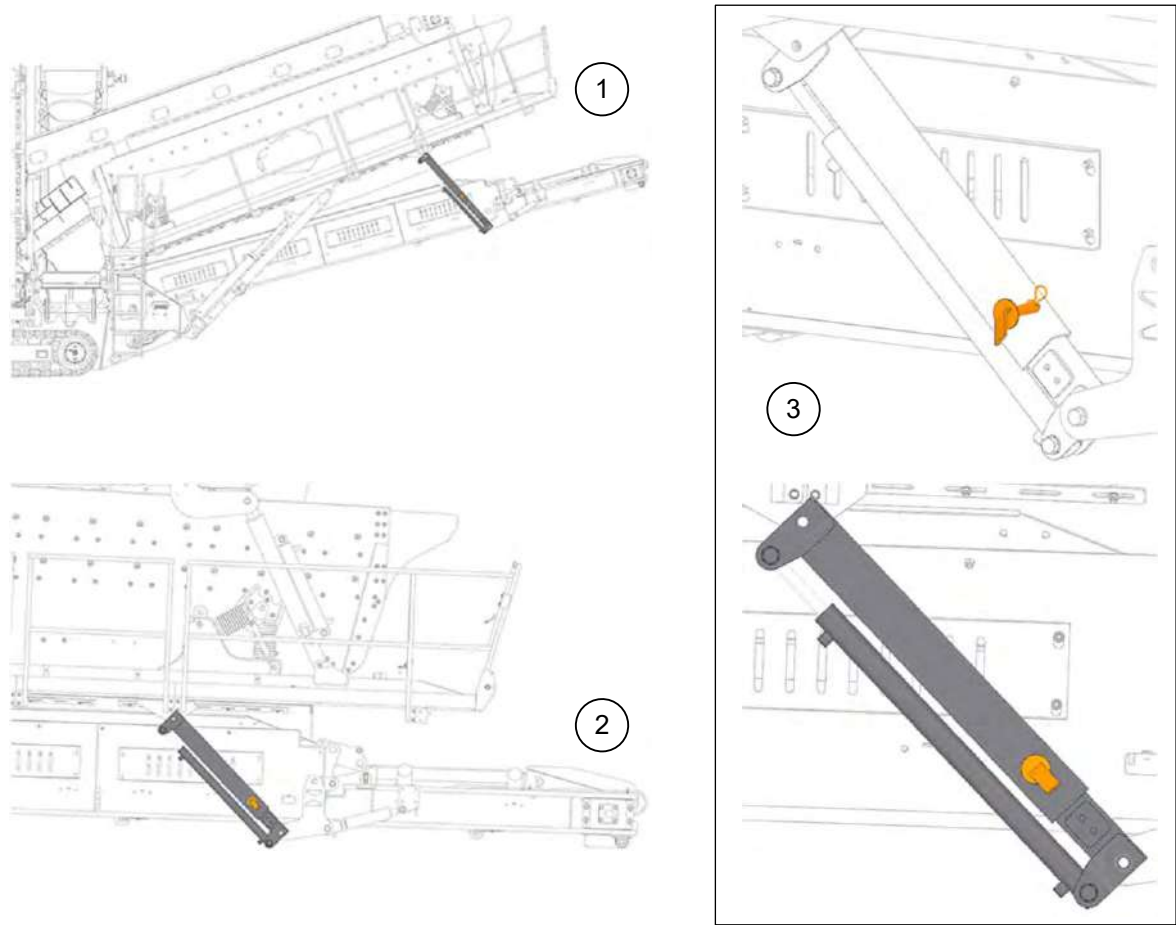


NOTE: These instructions are given with the assumption that the machine is in the operating position, that is, the side conveyors and the product conveyor are unfolded.



 CAUTION

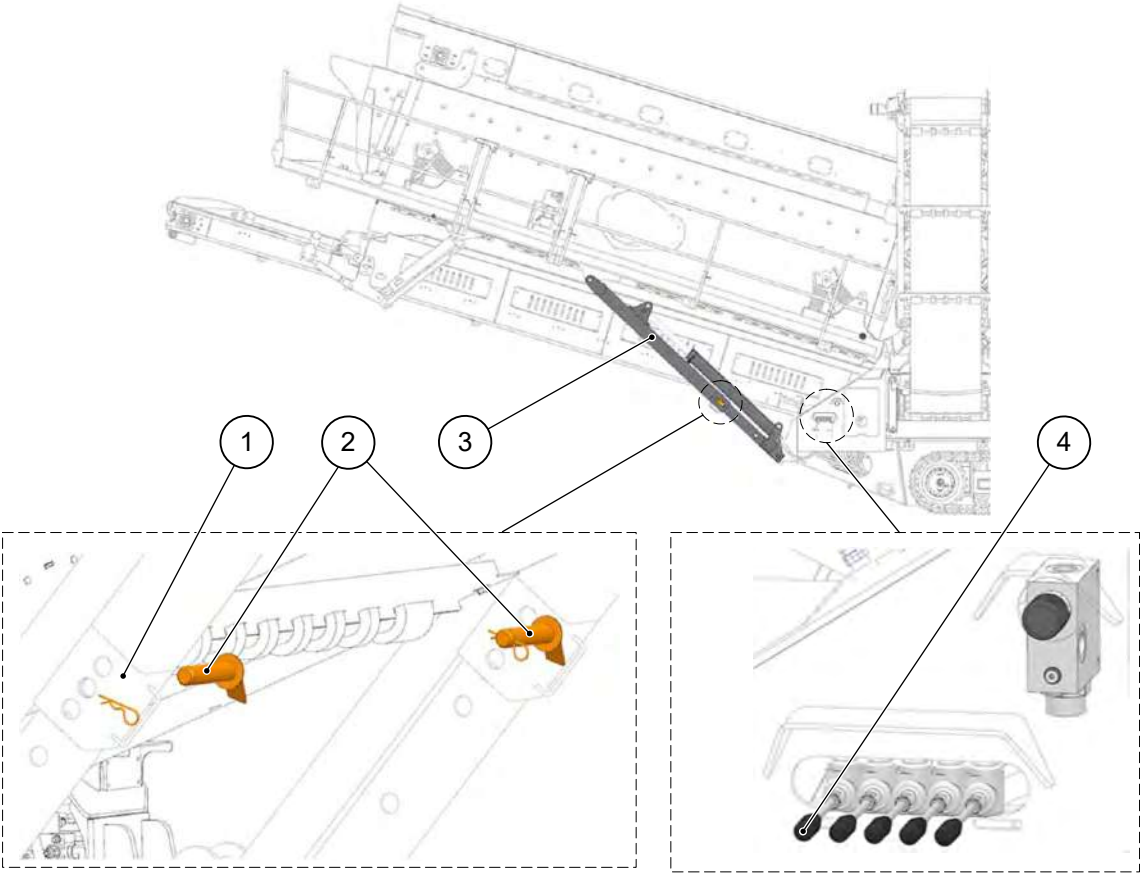
PROPERTY DAMAGE HAZARD
Can cause death or serious injury.
Lowering the screen angle without fully retracting the angle adjusting mechanism of the product conveyor will damage the machine.
Do not lower the screen angle if the angle adjusting mechanism of the product conveyor is not fully retracted.



Callout	Description
1	Product conveyor angle in working position
2	Product conveyor angle adjustment mechanism fully retracted
3	Product conveyor angle adjustment mechanism in the shortest position

Figure 131. Product conveyor angle adjustment mechanism

The angle adjusting mechanism of the product conveyor must be fully retracted (2), that is in the shortest position (3) before the screen angle can be lowered.



Callout	Description
1	Adjustment sleeves
2	Locking pins and clips
3	Screen angle trestle
4	Screen UP-DOWN

Figure 132. Lowering the screen angle

1. Using the **Screen UP-DOWN control** (4), raise the screen angle slightly by moving the screen angle control to the RAISE position. Raise the screen angle enough to relieve the pressure on the adjustment sleeves (1) and locking pins (2).
2. Remove the screen box angle adjusting clips and locking pins (2) from the adjustment sleeves (1).
3. Reposition the adjustment sleeve (1) to the desired position and replace the locking pins and clips (2) to the screen angle trestle (3).

 **NOTE:** Make sure that both trestles are adjusted equally, failure to do so will damage the screen box assembly.

4. Using the **Screen UP-DOWN control** (4), lower the screen angle slightly by moving the screen angle control lever to the LOWER position. Lower the screen angle until the screen angle trestle (3) rests securely on the adjustment sleeves (1) and locking pins (2).

6.3.5 **Setting up the grid**

The grid has three operational positions: 20°, 25° and 30°.

When the grid is in the lowest operational position, no adjustment is required.

1. To set the grid at the 25° and 30° angles, you need to manually adjust the two grid sub-frame supports to the desired position.

The grid supports are located at each side of the back of the hopper.

2. To adjust the supports, you need to manually operate the grid.



NOTE: Road transport requires that the grid is in the lowest position.

6.3.5.1 **Setting the angle of the grid**

The following assumes that the machine is running, the start-up procedure has been correctly followed, and that the engine speed is at or near idle speed. For instructions on the start-up procedure, see "Operation".



⚠ **WARNING**

GENERAL HAZARD
Can cause death or serious injury.
Make sure that there is sufficient clearance above the machine before proceeding.



⚠ **WARNING**

FALLING HAZARD
Can cause death or serious injury.
Use a man lift and a safety harness to access high maintenance locations or when working outside the service platforms. Do not step on the handrails.



⚠ **WARNING**

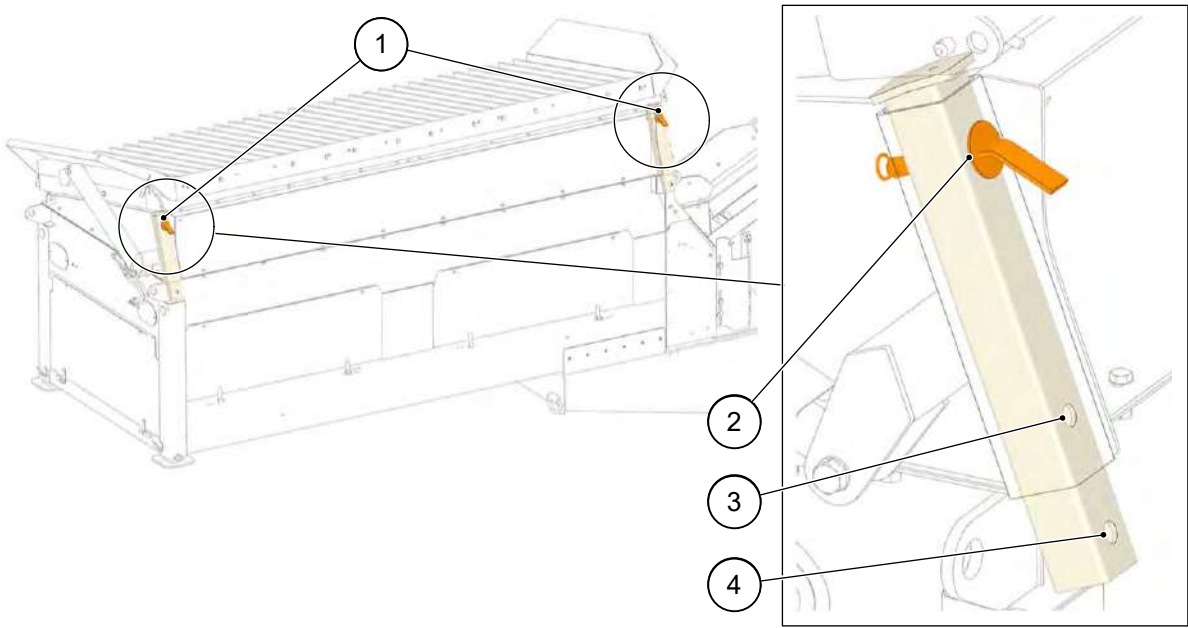
CRUSHING HAZARD
Can cause death or serious injury if a person gets under the moving tipping grid.
Before adjusting the grid supports, always secure the grid.

1. Raise the side walls if applicable.
2. Raise the grid deck 200 mm (7.9 in) to be able to set the grid supports to the desired position. For instructions on raising or lowering the grid, see [6.3.5.3 Manually operating the grid \(standard\)](#) or [6.3.5.4 Manually operating the grid \(multifunctional radio\)](#).
3. Before adjusting the grid supports, secure the grid deck by closing the grid safety hand valve located at the right-hand side of the feeder unit.



Figure 133. Grid safety hand valve

- 4. Remove the safety clips and grid support pins (1) from both of the grid supports.
- 5. Adjust the grid supports to the desired holes (2, 3, or 4).



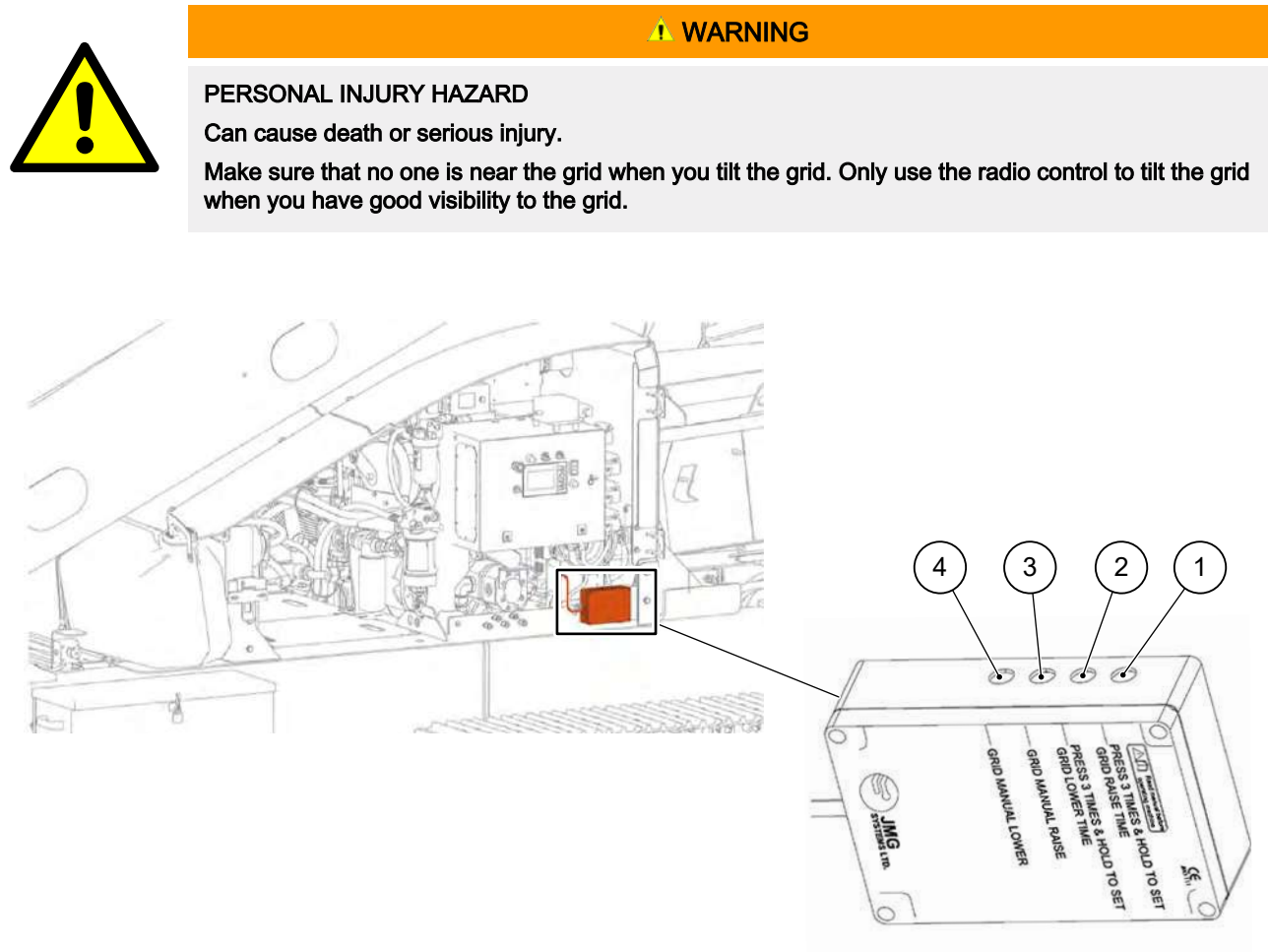
Callout	Description
1	Safety clips and grid support pins
2	20 degree angle, operation and transport position
3	25 degree angle, operation only
4	30 degree angle, operation only

Figure 134. Setting the angle of the grid

- 6. Install the grid support pins, and secure with the safety clips.
- 7. Open the grid safety hand valve.

8. Lower the grid deck to rest on the grid supports.

6.3.5.2 Tipping grid remote control (standard)



Callout	Description
1	Set the grid raise time
2	Set the grid lower time
3	Raise the grid manually
4	Lower the grid manually

Figure 135. The remote control receiver of the tipping grid

6.3.5.3 Manually operating the grid (standard)

This instruction is valid for machines with the standard tipping grid remote control.



NOTE: The grid does not work if the hand valves are activated.

1. Make sure that it is safe to operate the tipping grid.
2. Use **button 3** on remote control receiver of the tipping grid to raise the grid. See the figure in [6.3.5.2 Tipping grid remote control \(standard\)](#). The grid will retract when the button is released.

6.3.5.4 Manually operating the grid (multifunctional radio)

1. For machines with the multifunctional radio control device (optional), see [3.7.3.2 Radio control device \(optional\)](#).
2. For instructions on how to access the manual control view and how to manually operate the grid, see [3.7.4 Manual controls](#).

6.3.5.5 Setting the timed sequence (standard)

This instruction is valid for machines with the standard tipping grid remote control.

Before operating the grid with the remote control, set the timed sequence.



NOTE: Do not set excessive full-open or closed times. Excessive times, where the grid tilt circuit hydraulics are over the relief pressure, will heat the hydraulic oil and cause a power drain in the engine.

1. Make sure that it is safe to operate the tipping grid.
2. On the remote control receiver of the tipping grid, press and release the **button 1** twice. See the figure in [6.3.5.2 Tipping grid remote control \(standard\)](#). Press and hold the **button 1** a third time. The grid starts to rise.
3. When the grid reaches the desired height, release the button. The grid raise timed sequence is set.

6.3.5.6 Setting the timed sequence (multifunctional radio)

This instruction is valid for machines with the multifunctional radio control device (optional).

1. For more information, see [3.7.3.2 Radio control device \(optional\)](#).
2. See also [3.7.6 Adjusting parameters](#).

6.3.6 Checking the feeder belt speed



NOTE: Stop the process operations and remove the process material before making any adjustments, maintenance, or repair work.

Feeder should run on such a speed that the material does not pile up on the screen or conveyors. Feeder speed is managed according to feeder control method:

- Manual control: Feeder speed can be adjusted from tuning view.
- Automatic control: Feeder speed is adjusted automatically to achieve target engine load (maximum feeder speed can be set by the user).
- Remote control: Feeder speed can be adjusted from the remote IC system (additional feature – sold separately).

Observe the conveyors during screening.

Different feed materials screen differently depending on the following:

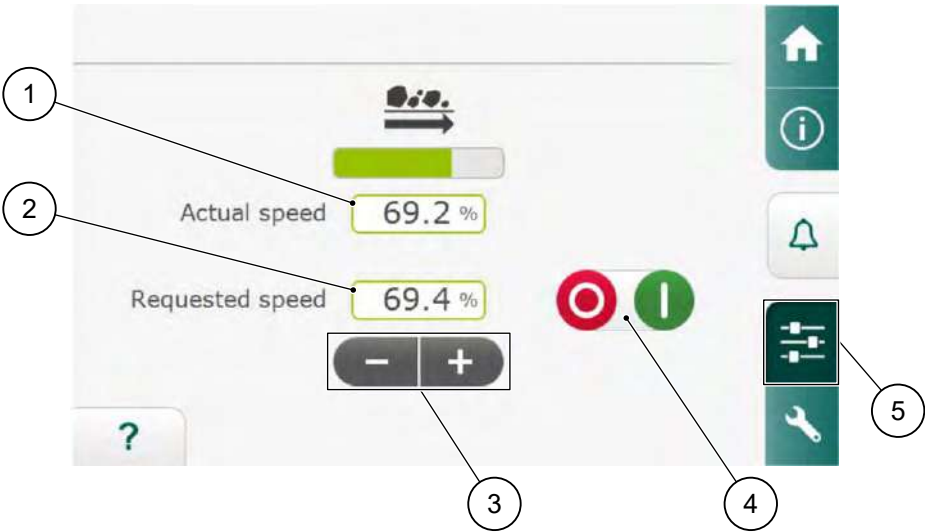
- Size and coarseness of the feed material
- Size of the screens

The speed of the belt feeder determines the volume fed to the screen.

Before adjusting the feeder belt speed, make sure that the machine is empty of material.

When starting the process for the first time with manual feeder control method, adjust the speed of the belt feeder to approximately 60% (or less) of the maximum speed. Observe the process when it is running, and make adjustments if needed. You can adjust the speed from the radio control device (optional), see [3.7.3.2 Radio control device \(optional\)](#) or from the control panel display, see the instructions below.

1. From the **main view** of the control display, navigate to the **tuning view** (5).



Callout	Description	Callout	Description
1	Actual speed of the feeder	4	Manual control for starting and stopping the feeder
2	Requested speed of the feeder	5	Navigation heading for tuning view
3	Buttons for adjusting feeder speed		

Figure 136. Checking the feeder belt speed

2. Check the feeder belt speed and adjust if necessary.

6.4 Starting the screening process



WARNING

PERSONAL INJURY HAZARD

Can cause death or serious injury.

Before starting the machine, make sure that there are no persons in the area whose safety may be endangered. Walk around the machine and make sure that there is nobody on, by or below the machine. Warn everybody nearby before starting.



WARNING

FALLING HAZARD

Can cause death or serious injury.

Use a man lift and a safety harness to access high maintenance locations or when working outside the service platforms. Do not step on the handrails.



WARNING

FALLING OBJECT HAZARD

Can cause death or serious injury.

Material may fall from the side of the conveyor. Never walk under any equipment included in loading, feeding, crushing, conveying, discharging or stockpiling material.

1. Complete the pre-start checks. See [6.2 Measures before startup](#).
2. Start the engine. For more information, see [4.3 Starting the engine](#).
3. From the control display, start the process by pushing the **Start process button**.



Figure 137. **Start process button**



NOTE: Make sure that there are no leaks in the hydraulic system.

4. Wait until the following functions have started.
 - a) Audible start alarm signal.
 - b) Engine rpm increases.
 - c) Product conveyors start.
 - d) Screen box starts.

- e) Feeder starts.
5. From the control display, check that there are no active alarms.
If there is an alarm or alarms, see [9 Troubleshooting](#).
6. After all functions mentioned above have started and there are no alarms, proceed to the next section.

6.5 Operating the unit during process

6.5.1 Loading the unit

There are a few considerations to keep in mind when feeding material onto the hopper/grid section of the machine.

To avoid damage to the hopper section, material should never be dropped from a high bucket angle onto the grid section. Material should be “rolled” onto the grid section from as low an angle as possible allowing the material to slide off the hopper feed plate and across the grid section for classification.

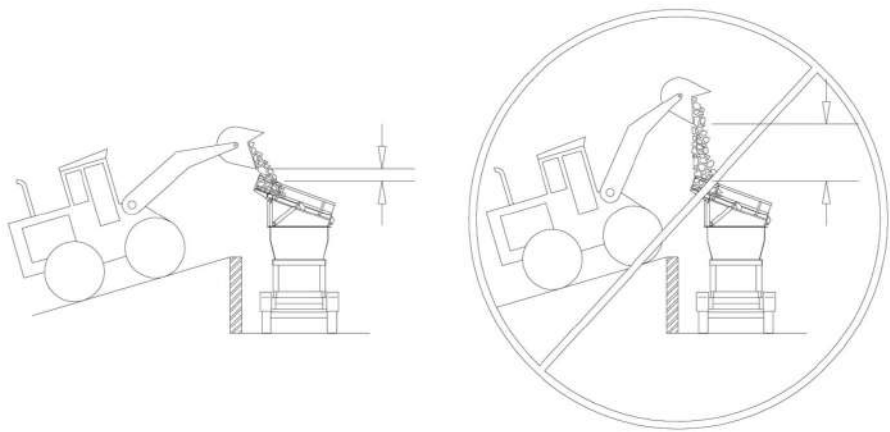


Figure 138. Efficient loading of the hopper/grid

Conveyor belt feed

When the machine is to be fed from a conveyor, remove the tipping grid deck. The material flow must be directed to the center of the feeder belt. The feeder belt must be adjusted to make sure that the feeder belt maintains an adequate bed of material to reduce wear and damage to the belt and hopper assembly.

Grid tailings

Oversized material from the grid bars should not be allowed to accumulate above the underside of the feeder belt guard doors. To remove, push the tailings with the loader by coming along side of the machine.



NOTE: Do not use the machine as a backstop for material. See the figure below.

Project ID:	Plant Code:	Plant Unit Code:	Document Type:	Running No:	Revision: 0	Metso Document ID: D100033106
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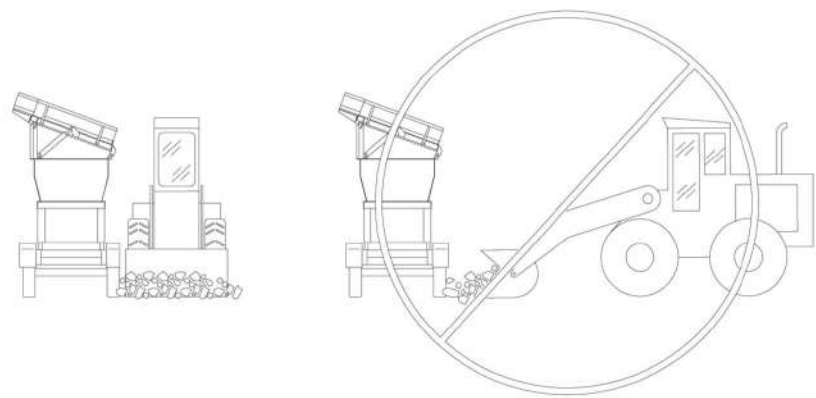


Figure 139. Grid tailings

6.5.2 Discharge arrangement

Lokotrack ST3.8 has three discharge conveyors:

- Two side conveyors on both sides for the oversize from the top and bottom decks respectively
- One product conveyor in the rear for the fine material from under the screen

Project ID:	Plant Code:	Plant Unit Code:	Document Type:	Running No:	Revision: 0	Metso Document ID: D100033106
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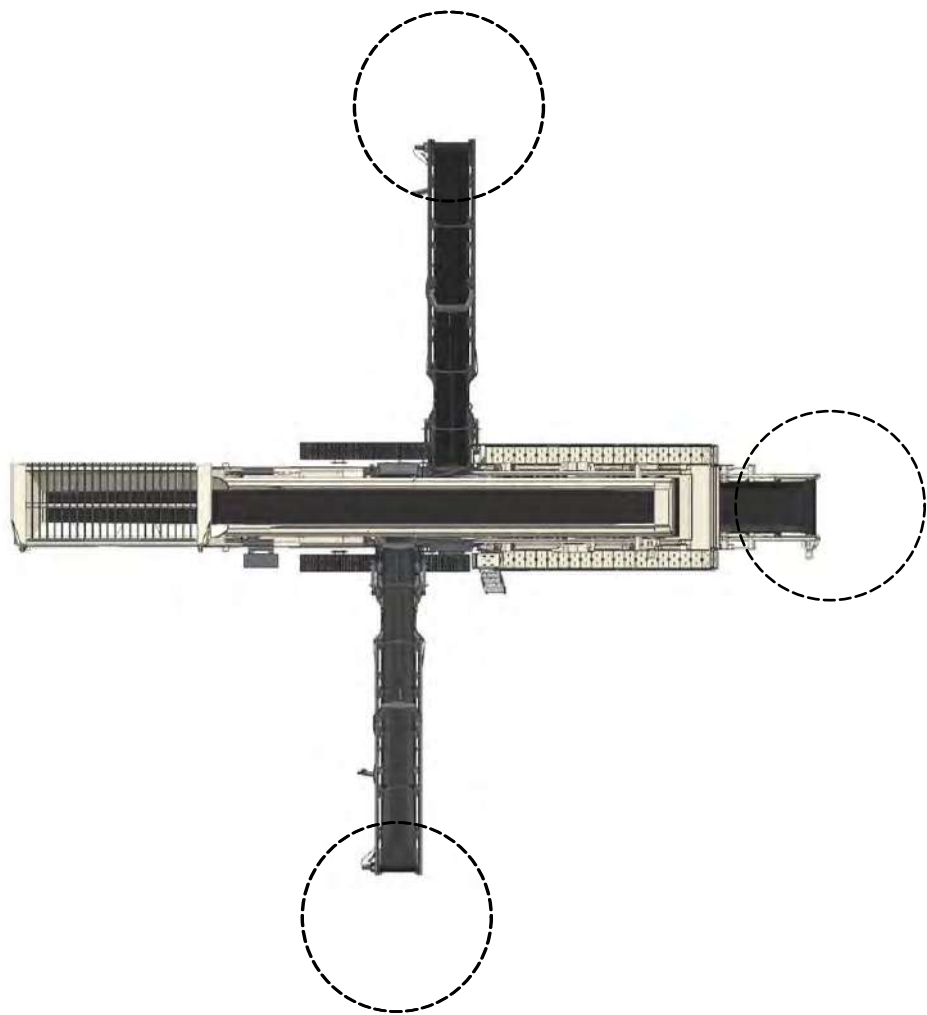


Figure 140. Discharge arrangement



NOTE: Before screening, secure the brackets and fastenings.



NOTE: Secure that the unit stands on an even surface of crushed material, levelled for example with a wheel loader. Check with a spirit level.

Check the height and volume of the discharge pile. Do not let the pile grow so high that it reaches the conveyor. The distance between the pile and the conveyor must always be at least 200 mm (8 in).



NOTE: The elevation angle of conveyors affect the height of discharge piles.

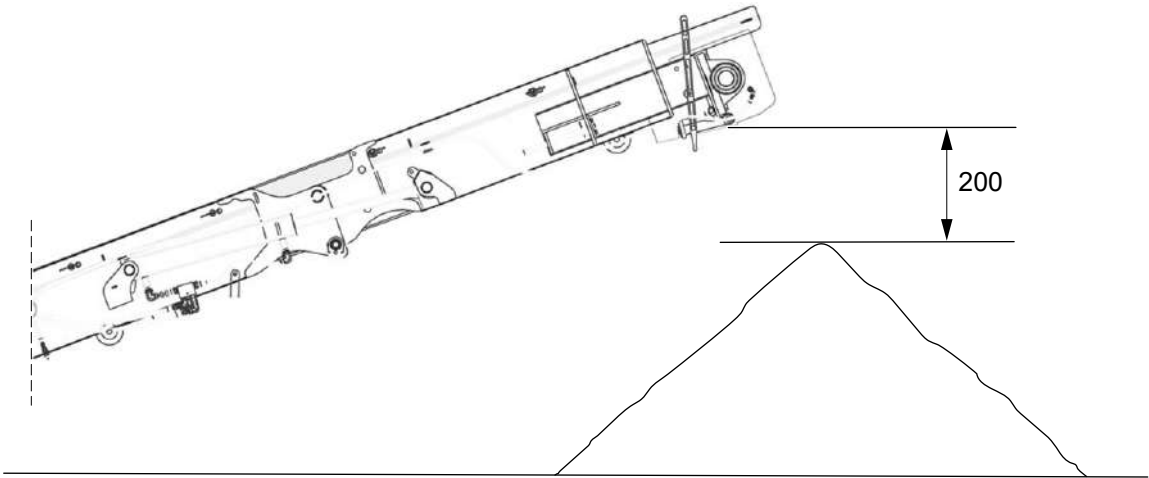


Figure 141. Distance from the discharge pile

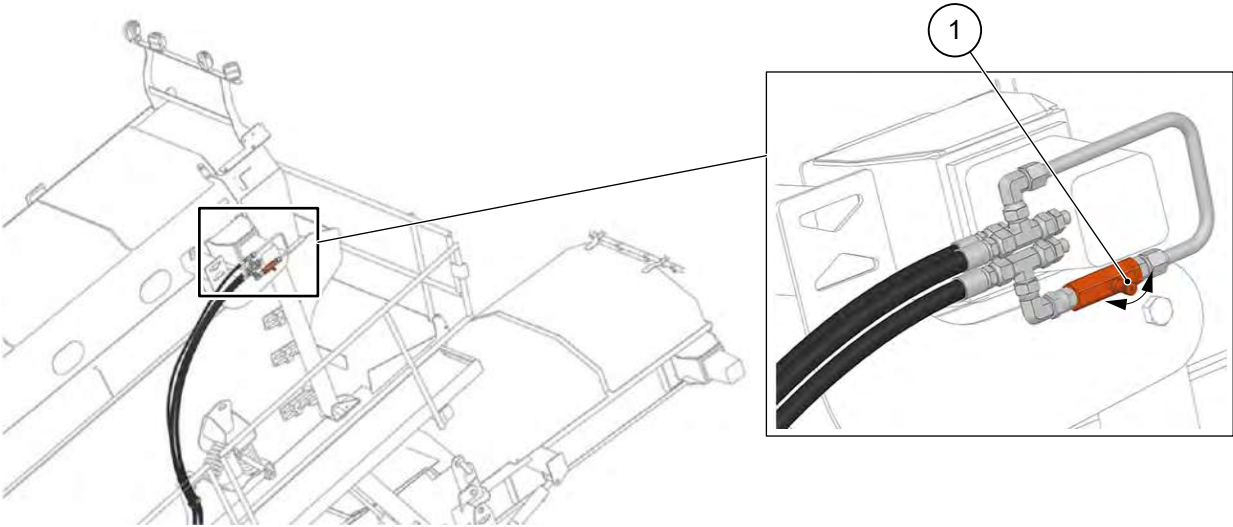


NOTE: When discharging with the help of a wheel loader, be careful not to damage the conveyor. Discharge from the side, do not push material under the unit.

6.5.3 **Adjusting the speed of lifting conveyor**

- 1. For increasing the speed of lifting conveyor, turn the knob (1) clockwise.
- 2. For decreasing the speed of lifting conveyor, turn the knob (1) counterclockwise.

Project ID:	Plant Code:	Plant Unit Code:	Document Type:	Running No:	Revision: 0	Metso Document ID: D100033106
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Callout	Description
1	Speed control of lifting conveyor

Figure 142. Speed control of lifting conveyor



NOTE: The speed of the screen is factory set. Do not change the speed. Changing the speed of screen leads to mechanical malfunction of the machine.

6.5.4 Operating the grid with the remote control (standard)



 WARNING

PERSONAL INJURY HAZARD
Can cause death or serious injury.
Make sure that no one is near the grid when you tilt the grid. Only use the radio control to tilt the grid when you have good visibility to the grid.

This instruction is valid for machines with the standard tipping grid remote control.



NOTE: Make sure the grid has been returned to its fully lowered position before operating the grid with the remote control.



NOTE: The grid does not work if the hand valves are activated.

Before operating the grid with the remote control, set the timed sequence. For instructions, see [6.3.5.5 Setting the timed sequence \(standard\)](#).

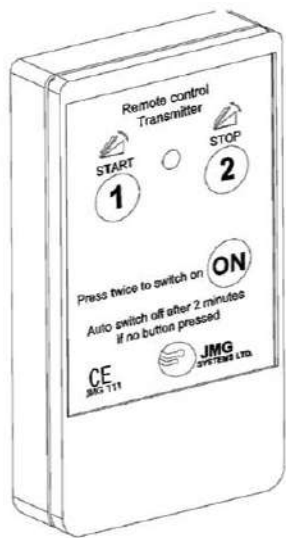


Figure 143. The remote control transmitter of the tipping grid

1. Make sure it is safe to operate the tipping grid.
2. Turn on the transmitter by pressing the **“ON” button** twice within two seconds. If the transmitter is not activated within two minutes, it will shut down and must be turned on again before activating the **function button**.
3. To start the pre-set timed sequence, press the **start button** (1). See the figure above.
 - Pressing the **stop button** (2) will halt the sequence.
 - Pressing the **start button** (1) again will restart the grid through the timed sequence.

Each operation of a function button will cause the LED on the transmitter to flash rapidly to confirm activation.

During the remote operation, if any function button on the receiver is pressed, the remote control function is aborted and the grid will be under manual control.

6.5.5 Operating the grid with the remote control (multifunctional radio)



 **WARNING**

PERSONAL INJURY HAZARD

Can cause death or serious injury.

Make sure that no one is near the grid when you tilt the grid. Only use the radio control to tilt the grid when you have good visibility to the grid.

This instruction is valid for machines with the multifunctional radio control device (optional).

1. Before operating the grid with the remote control, set the timed sequence. For instructions, see [3.7.3.2 Radio control device \(optional\)](#).

6.5.6 Using the top deck chute opening

It is possible to direct the material flow from top deck to bottom deck side conveyor by using wear plates in the top deck chute. It is possible to open either of the two wear plates or both wear plates to vertical position.



⚠ WARNING

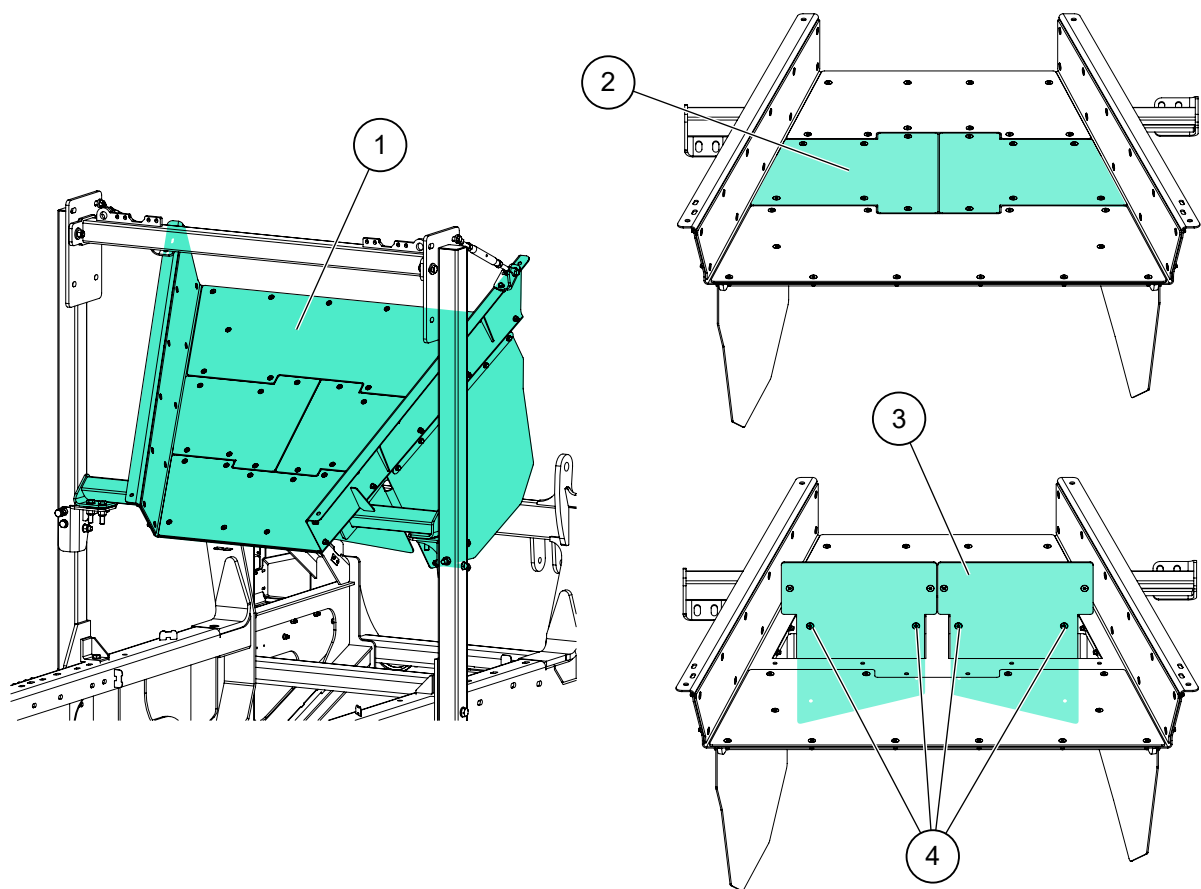
GENERAL HAZARD
Can cause death or serious injury.
Make sure that the process has stopped and that there is no material left in or on the machine.



⚠ WARNING

FALLING HAZARD
Can cause death or serious injury.
Use a man lift and a safety harness to access high maintenance locations or when working outside the service platforms. Do not step on the handrails.

- Prerequisites:
- The machine is stopped and locked out. See [7.2 Lockout and tagout procedure](#).
 - The whole machine is in operating position.
1. Remove one or both wear plates shown in the figure below.
 2. Bolt one or both wear plates to vertical position (3), as a back wall.



Callout	Description
1	Top deck chute
2	Wear plates closed
3	Wear plates open
4	Wear plate fastening bolts

Figure 144. Top deck chute and wear plates

6.6 Stopping the screening process



⚠ DANGER

GENERAL HAZARD

Will cause death or serious injury.

In a dangerous situation, stop the machine with the emergency stop button, the key switch of the machine, or with the remote stop button (located on either the radio control box or the remote control box).

The process stop sequence stops the devices of the unit in a specific order. The sequence ensures that the devices are stopped in the correct order.



NOTE: The termination of the screening process takes approximately 2 minutes.

The stop sequence is activated automatically, if running of the process is not possible. The automation system provides the necessary information in the message field of main control panel display or as an alarm related to the reasons for stopping the process. The system gives instructions on how to resolve the error.

After the screening process has been stopped, the engine keeps running at idle rpm.

There are two methods for stopping the screening process:

- A: From main control panel
- B: From radio control device

1. A: Press the process stop button on the main control panel.

Note that emergency stop terminates all functions by stopping the engine.



 CAUTION

GENERAL HAZARD
Can cause moderate injury or property damage.
The emergency stop stops the machine, but can also initiate other protective sequences. Do not use the emergency stops in daily operations.

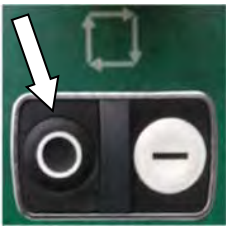


Figure 145. Process stop button

2. B: If you want to stop the process from the radio control device, do the following steps:
- a) Make sure that the mode selection switch (1) is in the DOWN position.
 - b) Push the switch (2) to DOWN position.

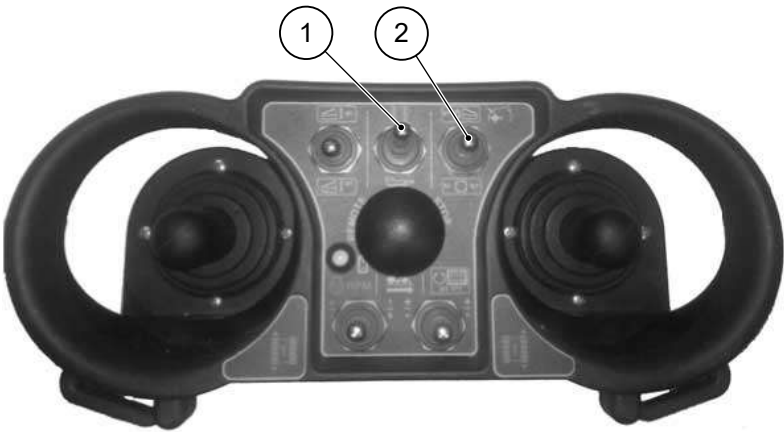


Figure 146. Stopping the process from radio control device

6.6.1 Performing emergency stop

- 1. You must use the emergency stop when there is an immediate risk of injury to a person or and immediate risk of mechanical damage to the equipment.

Emergency stop provides a mechanical means of quickly stopping all the equipment on the machine.

DANGER

GENERAL HAZARD

Will cause death or serious injury.

In a dangerous situation, stop the machine with the emergency stop button, the key switch of the machine, or with the remote stop button (located on either the radio control box or the remote control box).

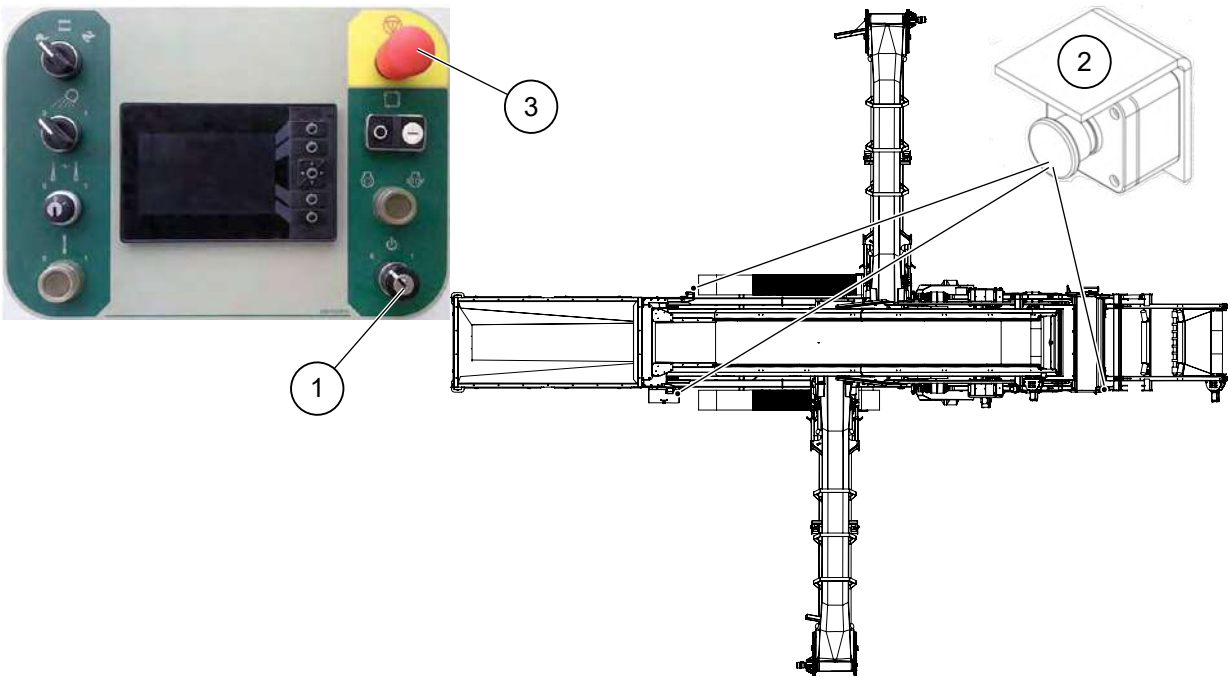


Figure 147. Emergency stop

The emergency stop causes all functions to cease and the system to shut down (including the main control panel).



NOTE: The emergency stop does not stop the other units even when they are connected with interlock cable. Other units have separate emergency stops.

Using the emergency stop can have consequences that can make starting the process again more difficult.

6.6.2 Performing remote stop



NOTE: The remote stop button on the radio remote control will only function if the radio remote control is in use (if applicable).

To perform a remote stop, press the remote stop button all the way down.

The unit has two possible remote stops. The remote stops are located in the following places:

- On the drive control device
- On the radio control device (if applicable)

The remote stop provides a means of quickly stopping all the equipment on the machine. The remote stop only stops the engine, not the logic modules.

Use the remote stop when there is a need to stop all the devices instantly.



NOTE: Using the remote stop has consequences and it may require additional actions before the process can be restarted. Do not stop the unit with the remote stop in daily operations.

6.6.3 Clearing a jammed conveyor



⚠️ **WARNING**

MISUSE HAZARD

Using the machine for any purpose other than those specified can cause death or serious injury. This equipment must not be used in explosive duties or premises. It is highly forbidden to use explosive or flammable materials.



⚠️ **CAUTION**

PROPERTY DAMAGE HAZARD

Can cause moderate injury or property damage. Never try to clear a blockage with an excavator or explosives.

- If a conveyor stops, do the following:
1. Stop the process immediately.
 2. Stop the engine. See [4.5 Stopping the engine](#).
 3. Carry out the lockout and tagout procedure as instructed in [7.2 Lockout and tagout procedure](#) .
 4. Manually clear the jammed conveyor as thoroughly as possible. If working in a high location, wear a safety harness to avoid falling.
 5. Visually check that the components are intact and the conveyor belt is free to move.
 6. When most of the material is removed, restart the engine.
 7. Start the conveyor from the control panel. For instructions, see [3.7.4 Manual controls](#).
 8. Observe that the conveyor starts normally. If not, repeat steps 1–5.
 9. After the conveyor is cleared, proceed with the normal operation.

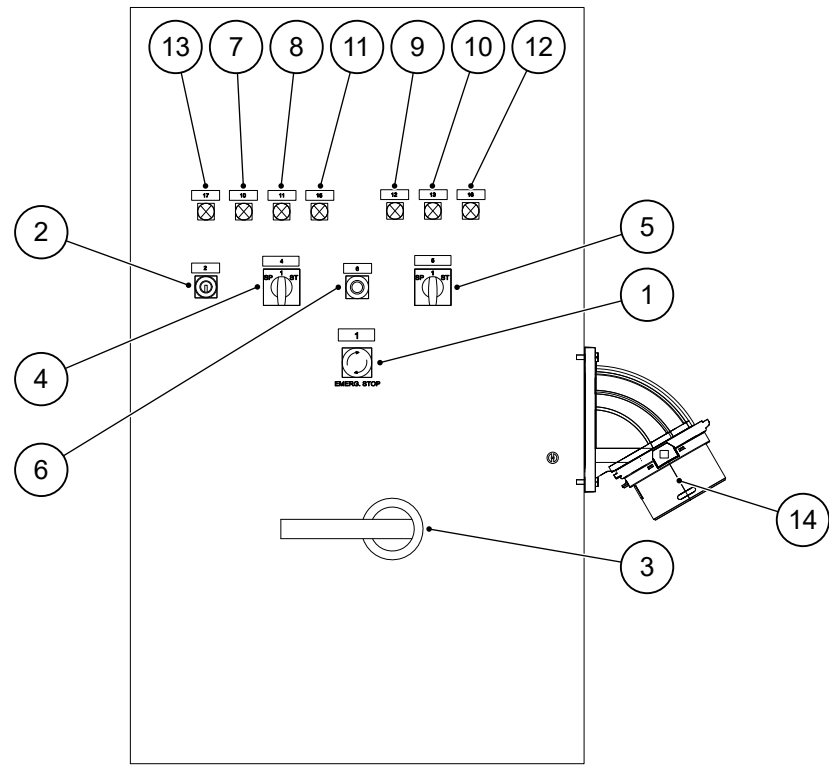
6.7 Starting and stopping the screening process (e-Power)

6.7.1 Measures before starting the process using e-Power

For measures before screening, please refer to chapter "Measures before screening".

The same preparatory actions are valid for the electric motor as well.

6.7.2 Using the e-Power module (option)



Callout	Description
1	Emergency stop
2	Electrical mode (key switch, ON / OFF)
3	Main switch (ON / OFF)
4	Pump circuit 1 (ON / OFF)
5	Pump circuit 2 (ON / OFF)
6	Starting alarm button
7	Circuit 1 not running (Signal light, yellow)
8	Circuit 1 running (Signal light, green)
9	Circuit 2 not running (Signal light, yellow)
10	Circuit 2 running (Signal light, green)
11	Circuit 1 overload (Signal light, red)
12	Circuit 2 overload (Signal light, red)
13	Phase order disturbance (Signal light, red)
14	Feed cable socket

Figure 148. e-Power control panel

Detailed information:

- Emergency stop: There is an emergency stop button on the cover of the e-Power electric center. The emergency stop button shuts down the electric motors.
- Signal lights: There are three signal lights above the electric motor selection switches (green = running, yellow = not running, and red = overload).

- Circuit overload alarm: A signal light (11, 12) indicates that the motor thermistor or the motor circuit breaker is triggered. Electric motors are shut down immediately. A malfunction in one motor will shut down both motors. In this case, only the signal light for the malfunctioned motor is on. After the alarm, wait for the motors to cool down and examine the cause for the malfunction. The e-Power can be restarted only when the cause of the malfunction has been detected, and the malfunction fixed.
- Phase order disturbance alarm: A signal light (13) indicates that the three-phase power of the feed cable has been connected incorrectly. The machine will not start before the feed power phases have been correctly connected. This makes sure that the machine will not be damaged by incorrect connections. The connections for the external power supply are the responsibility of the operator. Please adhere to all local laws and regulations concerning electrical work.



DANGER

ELECTRICAL HAZARD

Will cause death or serious injury.

Make sure the main switch is turned off and properly locked out when connecting the electrical cables.

Only properly trained and authorized persons may perform installation, maintenance or repair work on the electrical components.

- The process functions are operated from the display control panel. See the location of the display in [4.3 Starting the engine](#).
- The power for the control panels comes from the power source in the e-Power electric center, not from the batteries. The external feed power loads the batteries with a maintenance charger. The charging starts when the cord has been connected, the main switch (3) is turned to the ON position, and the key switch (2) is turned to select electrical use. The e-Power process does not drain the batteries.



NOTE: When the electric power is active, starting the diesel engine is prevented.



DANGER

ELECTRICAL HAZARD

Will cause death or serious injury.

Visually inspect the feed cable before connecting the cable. Use only intact feed cable.



DANGER

ELECTRICAL HAZARD

Will cause death or serious injury.

The feed cable do not withstand over driving. The cable must be well protected when preparing or operating the Lokotrack. The cable cannot cross a route without suitable protection covering.

6.7.3 Activating the e-Power module

To activate e-Power, refer to figure *e-Power control panel* in [6.7.2 Using the e-Power module \(option\)](#) and proceed as follows:

1. Locate the Lokotrack ST **main switch** and turn it to the ON position.
2. Turn on power from the display control panel. Make sure that there are no active alarms and that the diesel engine has been turned off.
3. Do not turn on the diesel engine.
4. Make sure the **e-Power main switch** is OFF.
5. Connect the external feed cable to the socket on the right side of the e-Power electric center.
6. Turn the **main switch** (3) in the e-Power electric center to the ON position.
7. Insert key to the **key switch** (2) and turn the switch to the ON position. Select electric use for the e-Power.
8. Push the **starting alarm button** (6). A 5-second alarm tone indicates that the start has been activated. You now have two minutes to activate the electric motor switches (4, 5). If this takes longer than two minutes, push the **starting alarm button** (6) again. Turn on the e-Power pumps. Turn on pump circuits 1 and 2 (4, 5). The pump lights change to indicate that the pumps have been activated.
9. Return to the display control panel to start the process.

6.7.4 Deactivating the e-Power module



NOTE: When the electric power is active, starting the diesel engine is prevented.

To deactivate e-Power, do the following:

1. Go to the display control panel to stop the process.
2. Turn off the e-Power pump circuits 1 and 2 (4,5). The pump lights change to indicate that the pumps have been deactivated.
3. Turn the **key switch** (2) to the OFF position.
4. Turn the **main switch** (3) in the e-Power electric center to the OFF position.
5. Disconnect the external feed cable from the socket if you are track driving the machine.
6. Turn off the display control panel and the Lokotrack **main switch** to the OFF position if you stop working.



NOTE: If you continue the e-Power process after taking a break, it is not necessary to disconnect the external feed cable from the socket.



 DANGER

ELECTRICAL HAZARD
Will cause death or serious injury.
If the e-Power module (option) is installed, disconnect the feed cable before track driving the machine.
Make sure that the disconnected feed cable will not get under the moving tracks.

6.7.5 e-Power operating hours



 **DANGER**

ELECTRICAL HAZARD

Will cause death or serious injury.

Fuses are located in the high voltage cabin and only authorized electricians are allowed to open the electric cabin.

Both electric motors are equipped with their own separate process hour counters. The counters collect data on the operating hours of the pump units. Check the location of the counters from the following figure. Turn the **main switch** (3) to the OFF position before opening the cabinet.



NOTE: Opening the cabinet should be avoided. Dust and moisture can damage the electrical components in the cabinet.



NOTE: Clean the e-Power module and electric motors monthly.

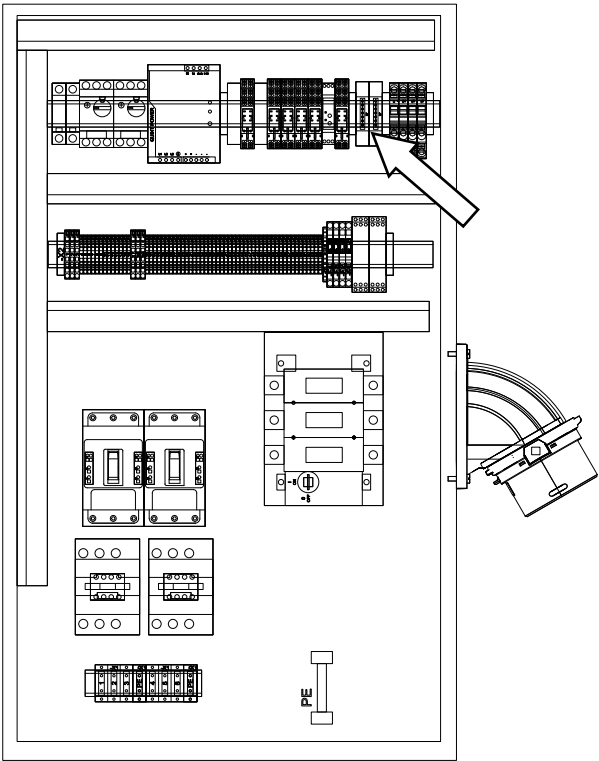


Figure 149. Location of the process hour counters

7

Maintenance

7.1

General about maintenance



 DANGER

GENERAL HAZARD

Will cause death or serious injury.

Read the safety section before working with the unit. Only competent and trained personnel are allowed to work with the unit.



 WARNING

PRESSURIZED COMPONENT HAZARD

Can cause death or serious injury.

After the engine has been stopped, some pressure can remain in the hydraulic system and in the cooling system of the engine. Let the machine cool down sufficiently before opening pressurized components. Always make sure that the system is pressure-free before doing any checks, maintenance, or repair work.



 WARNING

UNEXPECTED MOVEMENT HAZARD

Can cause death or serious injury.

Before starting any service, maintenance or repair work, make sure that the unit is stopped and locked out. Visually make sure that the unit is empty of material. Reserve a large security area around the machine. Refer to the instruction manual for the lockout and tagout procedure.



 WARNING

UNEXPECTED MOVEMENT HAZARD

Can cause death or serious injury or property damage.

Make sure no air enters the hydraulic system during refilling. Bleed the hydraulic system regularly to remove entrapped air. Always bleed the hydraulic system before use if the machine has not been used for a long period of time. Entrapped air may interfere with normal expected machine operation or cause a hazard during maintenance.



NOTE: Stop the process operations and remove the process material before making any adjustments, maintenance, or repair work.

Continuous and regular maintenance is one of the prerequisites for profitable operation.
With that in mind, the maintenance instructions have been grouped into different categories:

- preventive, daily maintenance and checking procedures
- running-in maintenance
- periodically performed servicing and inspection procedures



NOTE: Update maintenance log book daily.

If any deviation from the recommendations is detected during the check, necessary measures must be taken immediately. In the long run, this kind of procedure will produce the best results for all parties.

The equipment must be serviced and repaired by professional personnel that is adequately acquainted with the equipment.

The safety manual instructions, the startup and shutdown instructions in the instruction manual and all possible servicing instructions must be followed in all proceedings concerning the operations of the equipment and its safety devices, as well as inspecting, servicing and repairing the equipment.

7.2 Lockout and tagout procedure



⚠ DANGER

UNEXPECTED MOVEMENT HAZARD
Will cause death or serious injury.
Before starting any service, maintenance or repair work, make sure that the unit is stopped and locked out. Make sure that the unit is empty of material.

1. Stop the engine.
2. Switch off the control system.
3. LOCKOUT: Isolate the engine by turning the **main switch** counterclockwise to OFF position. Secure the switch lever to OFF position with a personal lock.

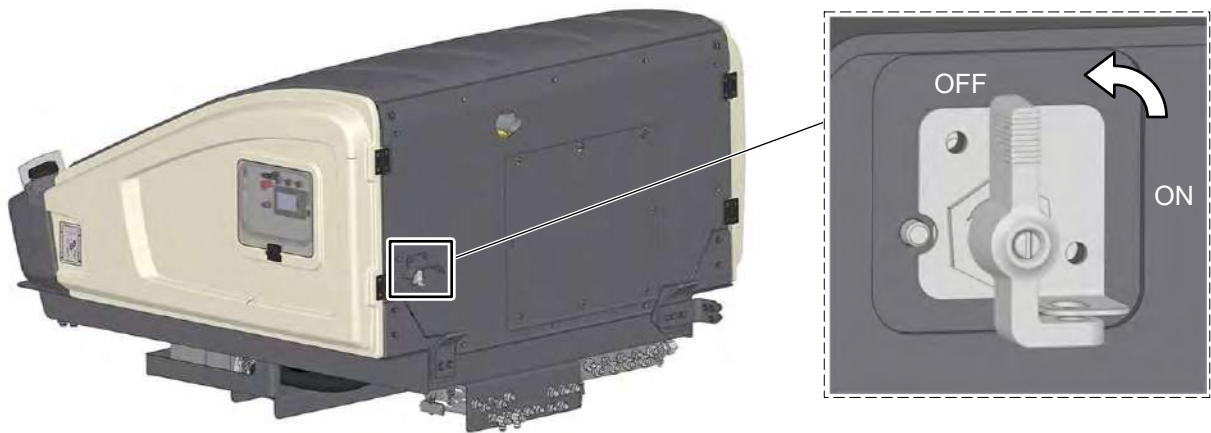


Figure 150. Main switch

4. TAGOUT: Place the appropriate maintenance warning signs. The tag must identify the work being done and the person or persons who locked and tagged the control.
5. Release the pressure from the hydraulic system by opening the hand valves.
6. TRYOUT: Validate the lockout to be active by trying to start the machine. Nothing should happen.
7. Allow hot components to cool down.
8. After all work is completed, the tags must only be removed by the person or persons who locked and tagged the control. The locks and tags are changed after each shift.



NOTE: Make sure that the main switch is free of foreign objects (for example, reinforcement bar or coal dust) that can prevent the operation of the isolation key.

7.3 Maintenance chart

Routine maintenance for the machine is scheduled based on the accumulated number of hours the machine has been operating or a specified elapsed time interval. Using the hour meter as a guide, perform the maintenance specified for that hourly interval shown on the required maintenance schedule chart. The chart indicates the item to be serviced and the frequency with which the maintenance should be performed.

Some maintenance procedures are beyond the scope of this manual as they require qualified service personnel.

ENGINE MODULE	Daily	Weekly / 50 h	250 h	500 h	1000 h	2000 h
Drain the water separator of the fuel filter	X					
Check the engine oil level	X					
Check the coolant level	X					
Check the air filter indicator. The old air filter element must be replaced with a new one immediately if the clogging indicator is showing red.	X					

Check/clean the air filter pre-cleaner. Check if the pre-cleaner rotates. If it does not rotate, the pre-cleaner must be replaced immediately.		X				
Check air intake clamps and tubes		X				
Replace the outer air filter element (replace the inner safety element in conjunction with every third replacement)  <i>NOTE: If the air filter clogging indicator alarms, the air filter must be replaced immediately.</i>			X			
Check the alternator belt for wear and cracks			X			
Check the fluid level and cleanliness of the batteries			X			
Replace the fuel pre-filter			X			
Replace the fine fuel filter				X		
Change the engine oil			X			
Replace the engine oil filter			X			
Check charge air cooler cleanliness (clean if necessary)			X			
Check the breather of the fuel tank. If the breather is wet, it must be replaced immediately.		X				
Replace the fuel tank breather					X	
Replace the crankcase breather element					X	
Replace/clean the Diesel Exhaust Fluid (DEF) filter (Tier 4 Final/Stage V)						X
Inspect/adjust engine valve lash (C4.4 Tier 3 engines only) *This procedure must be done by authorized CAT service				X*		



NOTE: Refer to the engine instruction manual for details.

CONVEYORS	Daily	Weekly/ 50 h	250 h	1000 h	2000 h
Check all conveyor belt alignments	X				

Check all conveyor belt tensions	X				
Inspect all conveyor roller stations	X				
Check feeder belt gear box oil level	X				
Check/adjust all conveyor scrapers	X		X		
Inspect/adjust skirting rubber		X			
Inspect all conveyor drive couplings			X		
Check pulley bearings			X		
Change feeder gear box oil				X	
Lubricate the bearings of the head and tail pulleys. See "Greasing the Lokotrack ST unit".		X			

SCREEN	Daily	Weekly/ 50 h	250 h	1000 h	2000 h
Check the screen balance.	X				
Check the tightening of the meshes.	X				
Grease the screen bearings. See "Greasing the Lokotrack ST unit".		X			
Check the screen box and subframe.		X			
Check the drive coupling.			X		
Visually check the V-belts and pulleys.			X		

HYDRAULICS	Daily	Weekly/ 50 h	250 h	1000 h	2000 h
Check the hydraulic oil level	X				
Check the oil lines and fittings	X				
Check the hydraulic oil cooler (clean if necessary)	X				
Replace the hydraulic oil filters				X	
Check the breather of the hydraulic oil tank		X			
Replace the breather of the hydraulic oil tank				X	
Change the hydraulic oil					X

TRACKS	Daily	Weekly/ 50 h	250 h	1000 h	2000 h
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Check the track tension. See 7.10.1 Track tension .		X			
Tighten the track shoe bolts.			X		
Check the track gear oil level.			X		
Check the track wear limits.				X	
Change the track gear oil.					X

FEEDER/HOPPER	Daily	Weekly/ 50 h	250 h	1000 h	2000 h
Check the belt tracking and tension of the belt.	X				
Check the feed hopper sealing rubber condition.	X				
Check the feed hopper wear liner condition.		X			
Check the condition of the scrapers and plough.		X			
Check the reduction gear oil level.		X			
Lubricate the bearings of the head and tail pulleys. See "Greasing the Lokotrack ST unit".		X			
Change the reduction gear oil.				X	
Inspect the hopper grid deck.				X	

ELECTRICAL EQUIPMENT	Daily	Weekly/ 50 h	250 h	1000 h	2000 h
Check the track drive (radio and cable) remote stop functions. See 6.2.1 Testing emergency and remote stops .		X			
Test the track drive functions of the radio and drive control device.			X		
Check the condition of the cables and connectors.			X		
Vacuum clean the electric cabinets.					X

Lokotrack ST3.8 UNIT	Daily	Weekly/ 50 h	250 h	1000 h	2000 h
Check the functioning of the emergency stops. See 6.2.1 Testing emergency and remote stops .		X			
Lubricate the hinges of the doors and lids.			X		
Lubricate the moving joints.			X		

Check the cleanness and condition of warning signs and labels.			X		
Check the condition of service platforms, ladders, rails and other protective elements.			X		
Check the frame condition (fractures, distortion, corrosion).				X	
VIBRATING GRID (OPTION)	Daily	Weekly/ 50 h	250 h	1000 h	2000 h
Check the tightening of the meshes.	X				
Retighten the meshes.		X			
Grease the screen bearings. See "Greasing the Lokotrack ST unit".		X			

7.4 Maintenance during running-in period



NOTE: Visually check the tightness of all nuts and bolts regularly to prevent premature stops. Visually check the hydraulic connections for leaks regularly.

8-16 h

- Lubricate the screen bearings.
- Check engine air filter tubes and clamps.
- Check feeder belt gear box oil level.

40-50 h

- Check air intake clamps and tubes.
- Check and tighten the screws and nuts of the feeders/screens.
- Check the fastening of the hydraulic pumps and motors.
- Lubricate the bearings of the drive drums and tail pulleys of the conveyors.
- Inspect/adjust conveyor skirting rubber
- Check the screen-box and sub-frame
- Check the track tension.

250 h

- Replace the outer air filter element
- Replace the fuel system pre-filter and the fine fuel filter(s)
- Replace the engine oil and engine oil filter.

7.5 Filling volumes

Track drive unit (per gear box)	4.0
---------------------------------	-----

Feed conveyor gear box	0.8
Hydraulics	105
Fuel tank	300
Engine oil (CAT C3.6)	9.4
Engine oil (CAT C4.4)	8.5
Engine coolant	Approximately 20

The filling volumes are indicated in liters. Conversion factor [l] → [gal] = 0.264 (liquid US).

Check the fluid levels from the respective indicator.

For lubricants, see [7.16 Lubricant recommendations](#).

7.6 Spare parts

A Spare Parts Catalog containing various assembly drawings pertaining to your machine will be sent immediately after the machine has been shipped. This catalog illustrates each and every part used in the assembly of the machine and is to be used when ordering spare or replacement parts.

Metso endeavors to carry an ample supply of parts in stock to provide prompt and efficient service on all orders for repairs and replacements.

To avoid delay and the possibility of incorrect parts being furnished, the following information should be given:

- The model and serial number of the machine which is stamped on the machine nameplate. The serial number is also on the cover of the spare parts catalogs.
- Complete name and part code number as shown in the Spare Parts Catalog.
- Exact quantity of each part ordered.
- Complete shipping instructions.



⚠ WARNING

GENERAL HAZARD

Can cause death or serious injury.

For proper operation, use only genuine factory parts. These are guaranteed as to accuracy, workmanship and material. Using pirate parts may put your safety and that of your crusher at risk. Make sure you completely understand your crusher's warranty conditions at all times.

7.7 Screen

7.7.1 Screen bearing lubrication

Grease type	Quantity	Greasing interval
SKF LGEP2	40 g	50 hours/weekly

Grease fittings are color-coded. Red – Grease weekly.

Remove the bearing caps, clean out and refill with grease once a year.



 CAUTION

PROPERTY DAMAGE HAZARD

Can cause moderate injury or property damage.

The bearing cap must be 30–50% full. Overfilling will cause overheating and bearing failure.

7.7.2 Screen angle

For more information about screen angle, see:

- [6.3.4 Adjusting the screen angle](#)
- [6.3.4.1 Raising the screen](#)
- [6.3.4.2 Lowering the screen](#)

7.7.3 Screen mesh replacement



 WARNING

PERSONAL INJURY HAZARD

Can cause death or serious injury.

Wear eye protection and protective gloves when handling screen meshes.



 WARNING

FALLING OBJECT HAZARD

Can cause death or serious injury.

Always use approved lifting equipment with adequate capacity. All lifting operations must be performed by professionals. Do not go under a suspended load.



 **WARNING**

FALLING HAZARD

Can cause death or serious injury.

Use a man lift and a safety harness to access high maintenance locations or when working outside the service platforms. Do not step on the handrails.

 *NOTE: Stop the process operations and remove the process material before making any adjustments, maintenance, or repair work.*

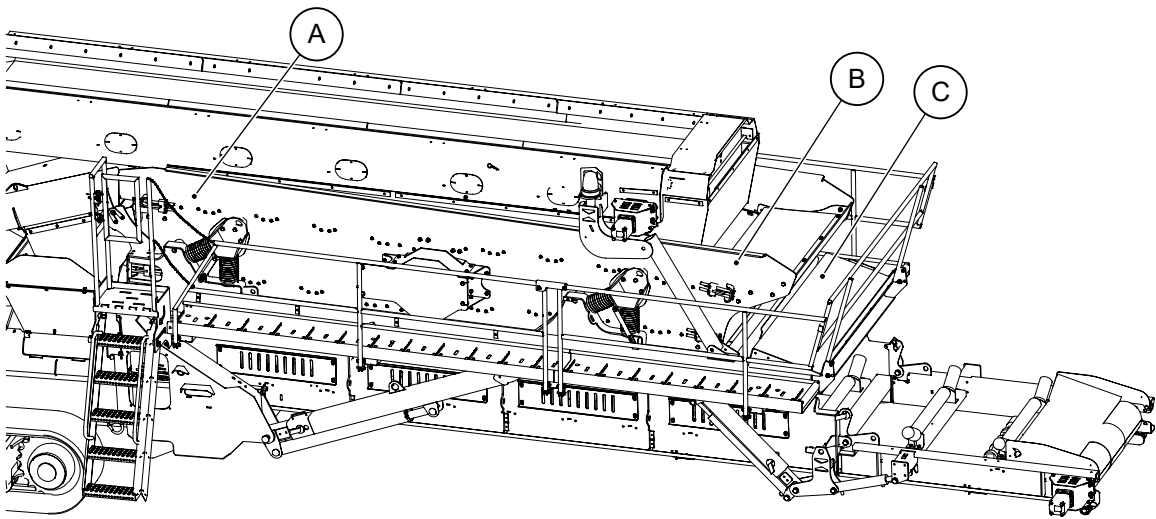
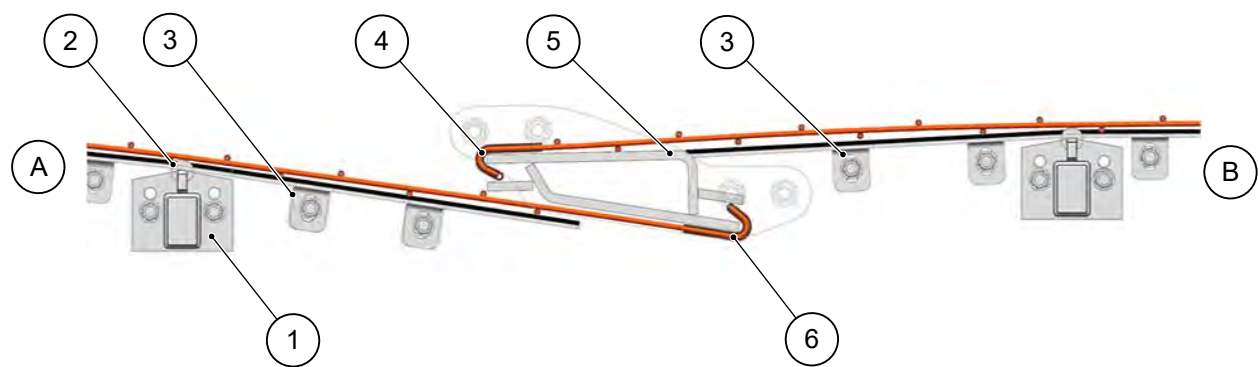


Figure 151. Screen discharge end (A), feed end (B) and rear service platform (C)



Callout	Description
A	Discharge end
B	Feed end
1	Screen support
2	Screen support rubber
3	Screen sealing strip
4	Screen mesh (feed end)
5	Center beam
6	Screen mesh (discharge end)

Figure 152. Screen meshes at the center beam

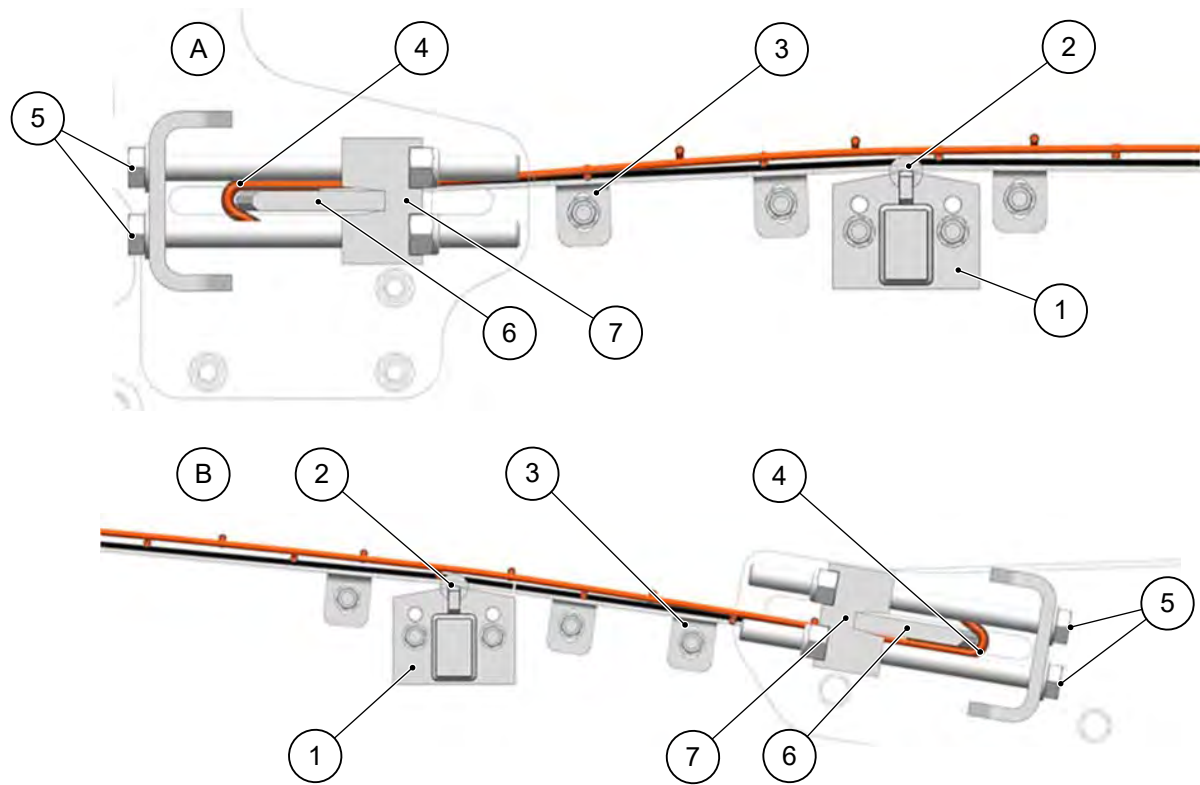


Figure 153. Screen mesh at the discharge end (A) and feed end (B)

Callout	Description
1	Screen support
2	Screen support rubber
3	Screen sealing strip
4	Screen mesh
5	Bolts
6	Tension plate
7	Tensioner

7.7.3.1 About handling screen meshes

Screen meshes are heavy and awkward to handle. Wherever possible, always use proper lifting equipment. Always adhere to the occupational health and safety regulations when lifting manually or mechanically. Watch out for your hands and fingers when handling meshes. Wire ends can be extremely sharp and there are many pinching points. Wear proper personal safety equipment, including protective gloves when handling screen meshes.

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NOTE: Never use fuel, gas or other cutting equipment on the machine. If replacement screen meshes require trimming because they have been supplied oversized, never cut them when they are inside or on the machine.



DANGER

TOXIC GAS HAZARD

Will cause death or serious injury.

There are components made of manganese steel. Welding or flame cutting these components generates gas that will cause death or serious injury. Only weld or flame cut the manganese steel components outdoors or in well-ventilated premises equipped with local exhaust ventilation. Also wear respiratory protection.



WARNING

FIRE HAZARD

Can cause death or serious injury.

Make sure a fire extinguisher is easily accessible at all times.

7.7.3.2 Tools and equipment required

- 2 x pry bars approximately 450 mm (18 in) long
- 1 x 30 mm combination spanner/wrench
- 1 x 30 mm ½ in drive socket
- 1 x ½ in drive socket wrench
- 1 x lump hammer
- Working lights for working inside the screen
- Gloves
- Personal safety equipment, including respiratory protection

7.7.3.3 Work sequence for screen mesh replacement

1. Prepare for mesh removal.
2. Remove the feed end mesh.
3. Remove the discharge end mesh.
4. Prepare for mesh installation.
5. Install the discharge end mesh.
6. Install the feed end mesh.
7. Retension the meshes.

For instructions, see the chapters below.

NOTE: For machines with three screen decks:



- To remove the top deck meshes, you do not need to remove the bottom deck meshes and vice versa.
- To remove the middle deck meshes, remove at least the feed end mesh of the bottom deck.

7.7.3.4 Preparing for screen mesh replacement



WARNING

FALLING HAZARD

Can cause death or serious injury.

Use a man lift and a safety harness to access high maintenance locations or when working outside the service platforms. Do not step on the handrails.



NOTE: Before starting the work, it is recommended that you make sure that the replacement mesh, the replacement support rubbers, and the cable ties are already on site.



NOTE: Measure and inspect the replacement mesh before starting.



NOTE: Always remove the feed end mesh first. After that, you have access to the discharge end mesh.

Start the engine and run it at idle speed to carry out the following steps:

1. Unfold all side conveyors to the operation position.
2. Remove all debris from the top deck mesh and any debris around the material distributor plate located at the end of the feed conveyor. Make sure that the service platform is clean of debris.
3. If the meshes are badly covered with sticky material:
 - a) It is recommended to run the screen box empty for at least 10 minutes.
 - b) After this, stop the engine, and make sure that the machine is stopped and locked out, see [7.2 Lockout and tagout procedure](#).
 - c) Inspect the meshes and if they are still badly covered, tap the meshes with a hammer to loosen the sticky material. Repeat these procedures until all the material is removed.
4. Start the engine, and run it at idle speed, and lower the screen to transport position.
5. Stop the engine, and make sure that the machine is stopped and locked out, see [7.2 Lockout and tagout procedure](#).
6. Prepare the screen platform step ladders and handrails to maintenance position.
7. If you climb above the service platform, use safety harness.
8. Before replacement, thoroughly clean the side plates of the screen box.
9. Remove all debris at the points where the screen mesh hooks into the cross beams.
10. Replace all damaged support rubbers and cable ties.

- 11. Replace any damaged bolts, nuts, and washers.
- 12. Replace or repair any damaged or worn screen sealing strips.
- 13. When the screen meshes are removed, inspect all screen cross members, fixings, and general screen structure for damage or wear. Repair or replace if needed.

7.7.3.5 Removing a feed end mesh

The same procedure applies for each deck.



 **WARNING**

PERSONAL INJURY HAZARD

Can cause death or serious injury.

Wear eye protection and protective gloves when handling screen meshes.

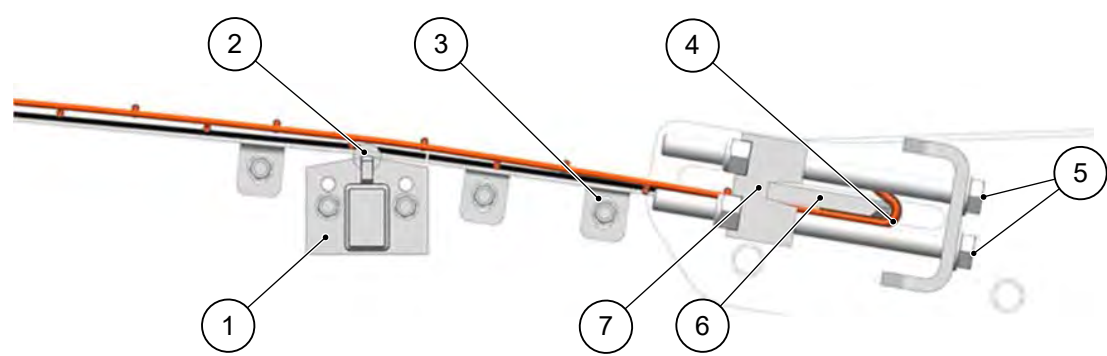
 *NOTE: Use an overhead crane where possible and avoid manual lifting.*

 *NOTE: Remove the feed end mesh first, before removing the discharge end mesh.*

All decks: You can access the tension plates of the feed end by standing on the rear service platform (See C in the figure in [7.7.3 Screen mesh replacement](#)).

Middle deck (if applicable): To remove the middle deck meshes, remove at least the feed end mesh of the bottom deck.

Bottom deck: Access the underside of the screen via the product conveyor.



Callout	Description
1	Screen support
2	Screen support rubber
3	Screen sealing strip
4	Screen mesh
5	Bolts
6	Tension plate
7	Tensioner

Figure 154. Screen mesh at the feed end

1. Make sure that you have done the preparations listed in [7.7.3.4 Preparing for screen mesh replacement](#).
2. Loosen the tensioners until the screen mesh is loose.
3. At the feed end, unhook the screen mesh from the tension plate. You may need to remove the tension plate through the slots in the side of the screen side plate. Use a tool to push or pull the tension plate.

CAUTION

PERSONAL INJURY HAZARD

Can cause moderate injury or material damage.

Do not use your hands or fingers to push or pull the screen tension plate until the screen tension plate is clearly out of the possible pinch point between the plate and the surrounding structures.

4. Unhook the feed end mesh (2) from the center beam (1): push the screen mesh up and away from the center beam.



5. When the mesh is free, carefully remove it through the feed end of the screen box, over the rear service platform. Slide the mesh through or over the handrail and onto the product conveyor. Store the used mesh away from the machine.



- The same procedure applies for each deck.



 **WARNING**

PERSONAL INJURY HAZARD
Can cause death or serious injury.
Wear eye protection and protective gloves when handling screen meshes.



NOTE: Use an overhead crane where possible and avoid manual lifting.

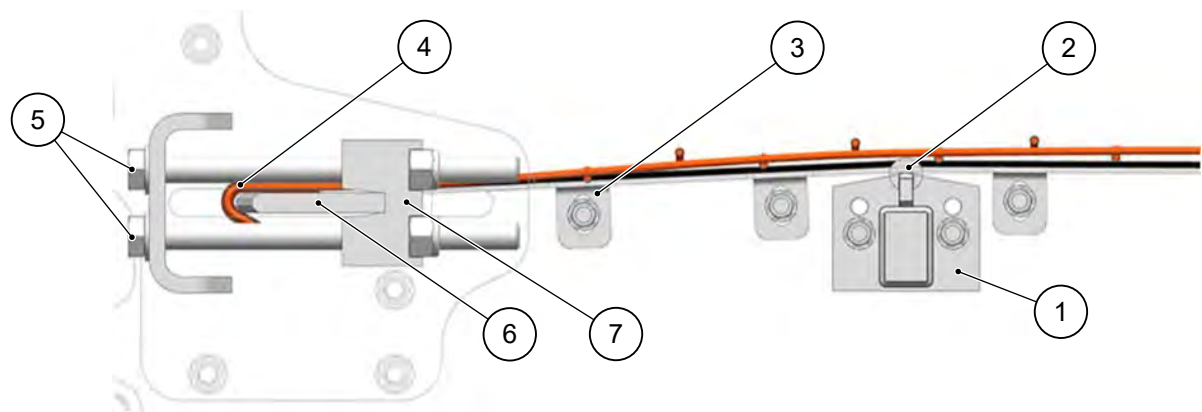
NOTE:



All decks: You can access the tension plates of the discharge end by standing on the side service platform.

Middle deck (if applicable): To remove the middle deck meshes, remove at least the feed end mesh of the bottom deck.

Bottom deck: Access the underside of the screen through the product conveyor.



Callout	Description
1	Screen support
2	Screen support rubber
3	Screen sealing strip
4	Discharge end mesh
5	Bolts
6	Tension plate
7	Tensioner

Figure 156. Screen mesh at discharge end

1. Make sure that you have done the preparations listed in [7.7.3.4 Preparing for screen mesh replacement](#).
2. Make sure that you have removed the feed end mesh first.
3. Loosen the tensioners (7) until the discharge end mesh (4) is loose.
4. At the discharge end, unhook the screen mesh from the tension plate. You may need to remove the tension plate through the slots in the side of the screen side plate. Use a tool to push or pull the tension plate.

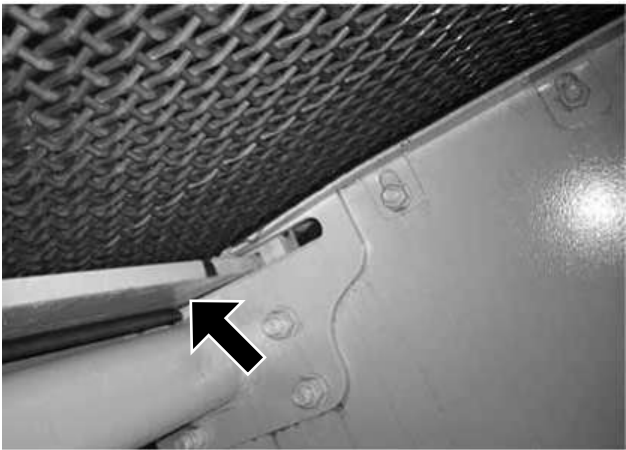


Figure 157. Tension plate



 CAUTION

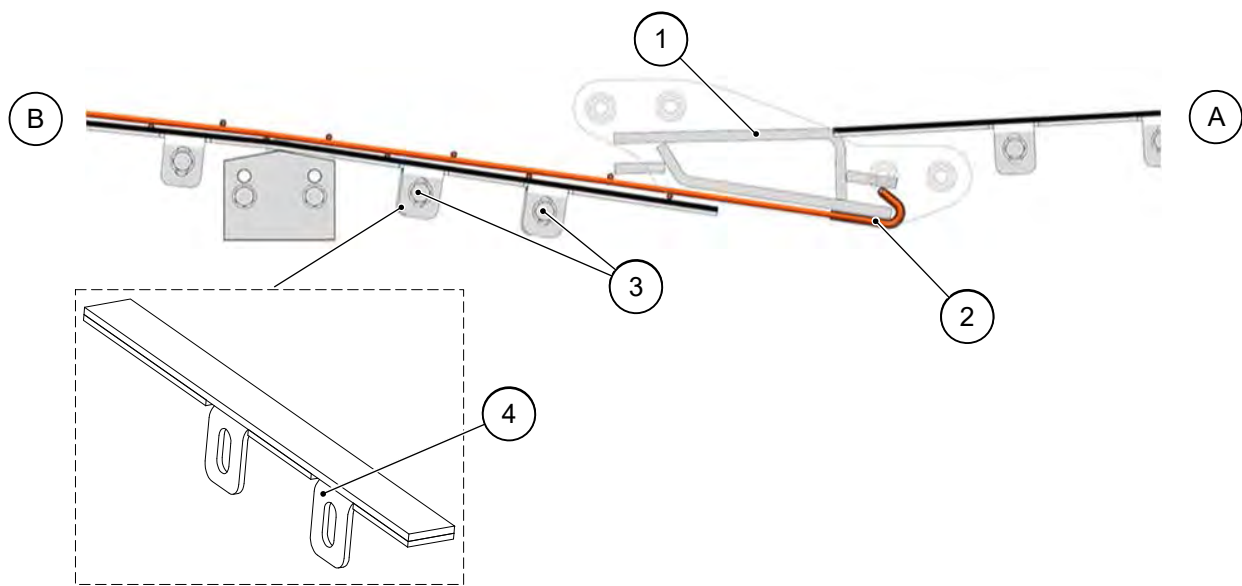
PERSONAL INJURY HAZARD

Can cause moderate injury or material damage.

Do not use your hands or fingers to push or pull the screen tension plate until the screen tension plate is clearly out of the possible pinch point between the plate and the surrounding structures.

- 5. Next to the center beam (1), remove the screen sealing strips (5): there is one strip located on each side of the screen box, held in place by two M12 x 40 bolts. Remove the bolts and the strips. See the figure below.

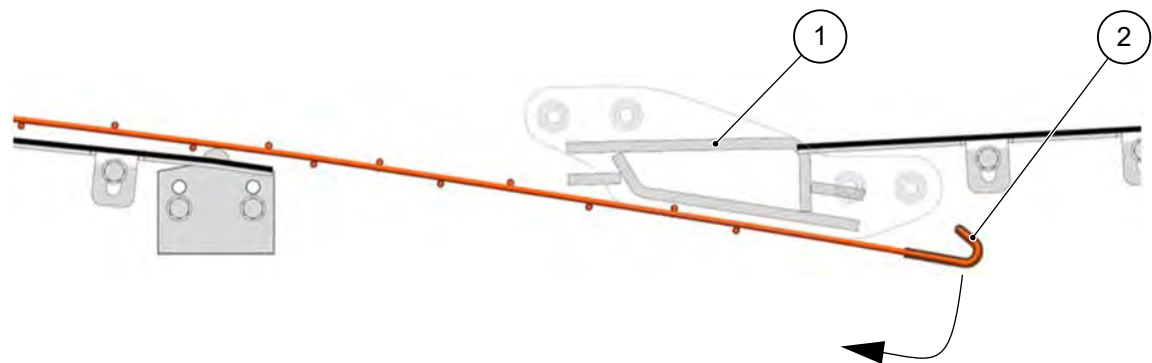
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Callout	Description
A	Feed end
B	Discharge end
1	Center beam
2	Discharge end mesh
3	Bolts
4	Screen sealing strip

Figure 158. Removing the sealing strip at the center beam

- 6. Unhook the discharge end mesh (2) from the center beam (1): push the screen mesh down and away from the center beam. You may need to knock the mesh loose near the center beam.



Callout	Description
1	Center beam
2	Discharge end mesh

Figure 159. Unhooking the discharge end mesh and removing direction

7. When the mesh is free, carefully remove it through the feed end of the screen box, over the center beam and the rear service platform. Slide the mesh through or over the handrail and onto the product conveyor. Store the used mesh away from the machine.



 **WARNING**

ENTANGLEMENT HAZARD
Can cause death or serious injury.
Do not wear loose clothing, hanging jewelry etc. that can get caught in the mesh.

8. Check the condition of all sealing strips and screen support rubbers, and replace or repair by adding glue if necessary.

7.7.3.7 Installing a discharge end mesh

The same procedure applies for each deck.



⚠️ WARNING

PERSONAL INJURY HAZARD

Can cause death or serious injury.

Wear eye protection and protective gloves when handling screen meshes.

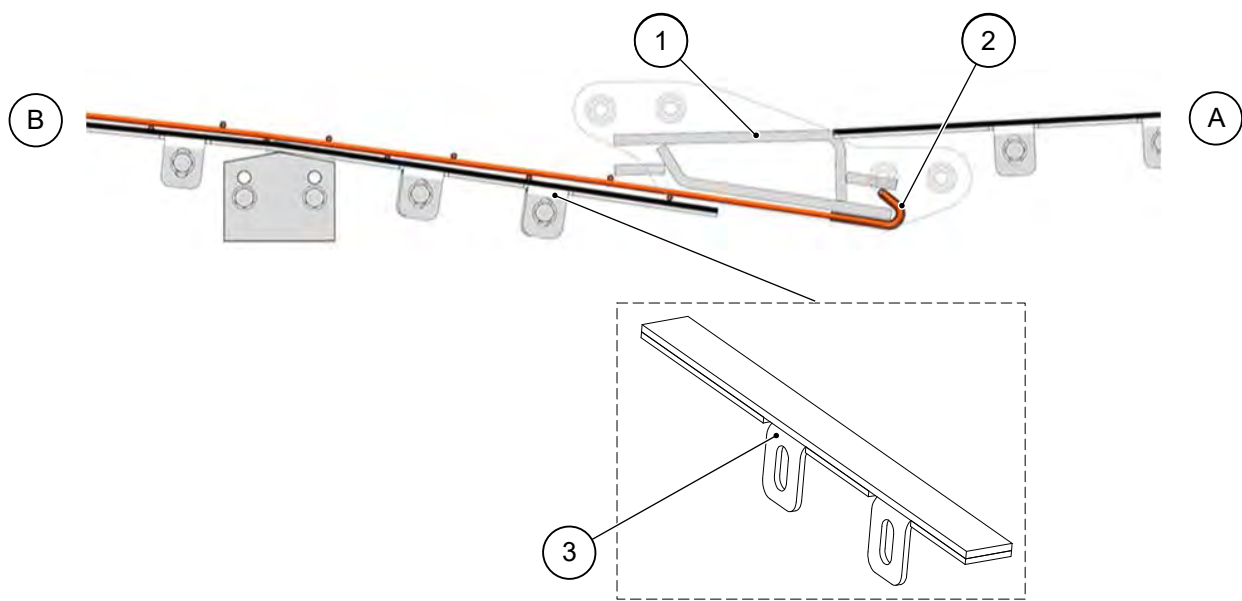


NOTE: Install the discharge end mesh first, before installing the feed end mesh.



NOTE: You can access the tension plates of the discharge end by standing on the side service platform.

1. Make that sure you have done the preparations listed in [7.7.3.4 Preparing for screen mesh replacement](#).
2. Lift the mesh on top of the screen deck.
3. Slide the mesh slowly forward and over the beam.
4. Fit the mesh hook (2) to the center beam (1). Make sure that the mesh hook is properly engaged to the center beam. See the figure below.
5. Install the screen sealing strips (4) that were removed earlier.



Callout	Description
A	Feed end
B	Discharge end
1	Center beam
2	Mesh hook
3	Screen sealing strip

Figure 160. Installing the sealing strips at the center beam

6. At the discharge end, fit the mesh hook over the tension plate. If the tension plate was removed, insert the tension plate into the slot. Use a tool to push or pull the tension plate.



NOTE: The tension plate is arched. The arched side of the plate must point outside.

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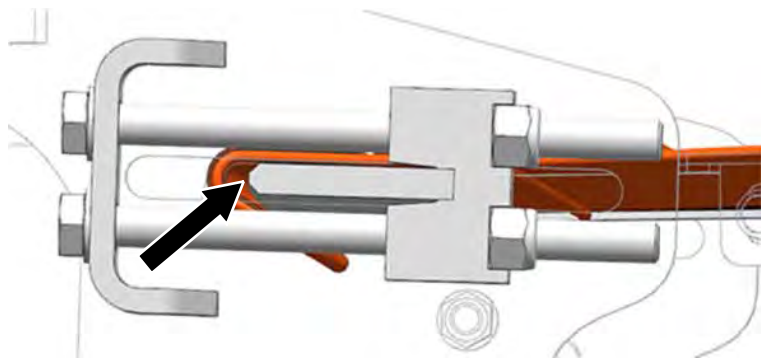


Figure 161. Tension plate

CAUTION
PERSONAL INJURY HAZARD
Can cause moderate injury or material damage.
Do not use your hands or fingers to push or pull the screen tension plate until the screen tension plate is clearly out of the possible pinch point between the plate and the surrounding structures.

7. Fit the tensioners to the tension plate and tighten the bolts slightly. Make sure the bolts are installed correctly.
8. Fit the end of the screen sealing strip (1) if it was adjusted downwards.

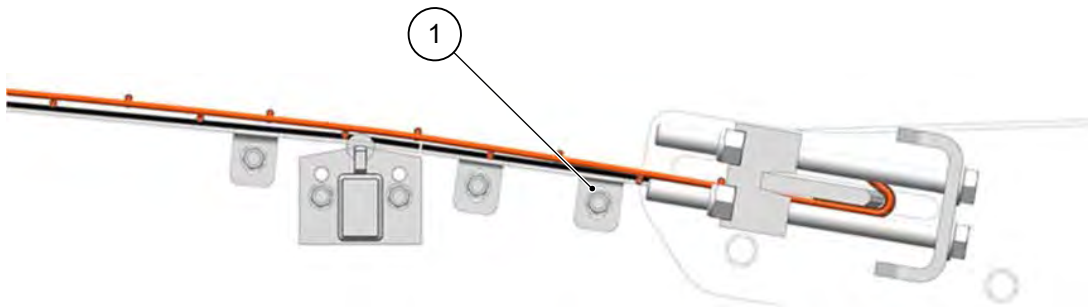


Figure 162. Fitting the end of the screen sealing strip

9. Evenly tighten the tensioners. On a heavy-wired mesh, make sure that the mesh hook sits tightly during tensioning.

NOTE: The correct mesh tension varies between different types of mesh and typically the correct tension can be determined as follows: tap the mesh with a tool and listen to the sound to find the correct tension. When the rattle stops and the sound becomes solid, the tension is correct.

10. Do not overtension the mesh. See [7.7.3.9 Retensioning screen meshes](#).

7.7.3.8 Installing a feed end mesh

The same procedure applies for each deck.



⚠ WARNING

PERSONAL INJURY HAZARD

Can cause death or serious injury.

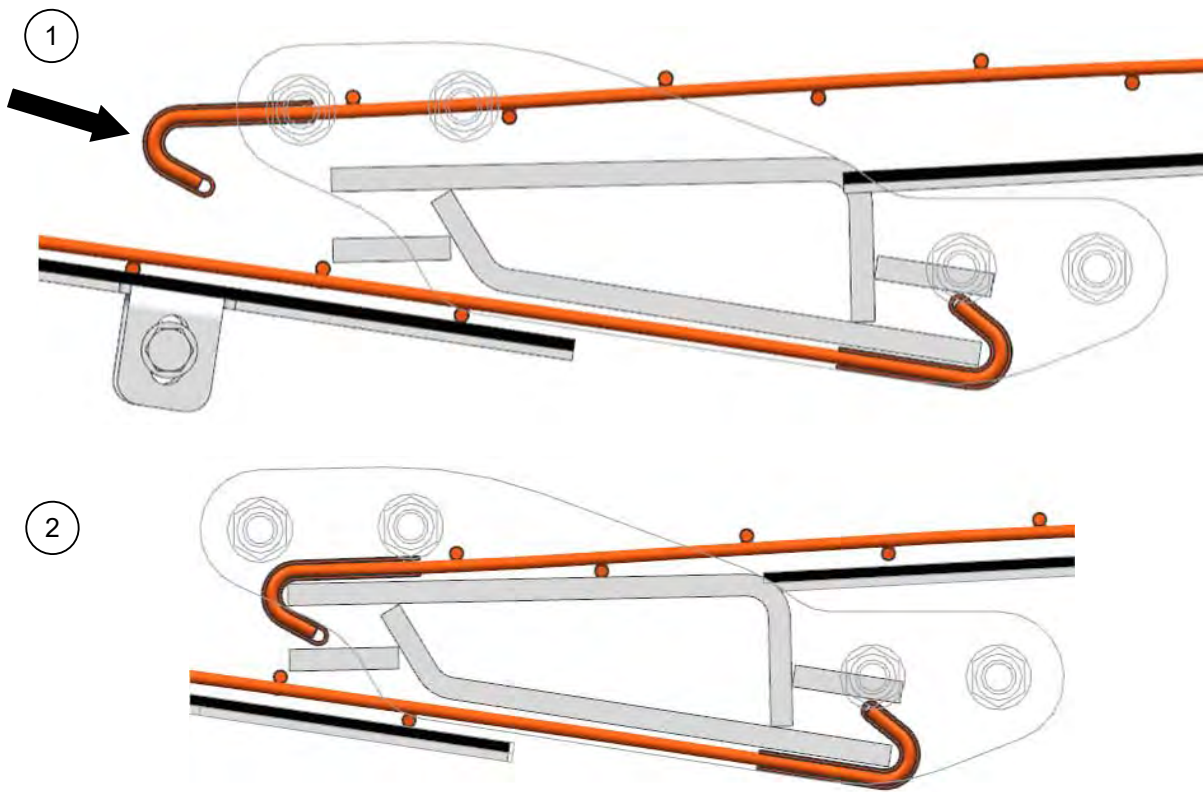
Wear eye protection and protective gloves when handling screen meshes.



NOTE: Install the discharge end mesh first, before installing the feed end mesh.

You can access the tension plates of the feed end by standing on the rear service platform (See C in the figure in [7.7.3 Screen mesh replacement](#)).

1. Make sure that you have done the preparations listed in [7.7.3.4 Preparing for screen mesh replacement](#).
2. Make sure that you have installed the discharge end mesh first.
3. Lift the mesh on top of the screen deck.
4. Slide the mesh slowly forward and over the beam.
5. Fit the mesh hook over the center beam. Make sure that the mesh hook is properly engaged over the center beam.



Callout	Description
1	Installing direction
2	Feed end mesh in installed position

Figure 163. Fitting the mesh hook over the center beam

6. At the feed end, fit the mesh hook over the tension plate. If the tension plate was removed, insert the tension plate into the slot. Use a tool to push or pull the tension plate.



NOTE: The tension plate is arched. The arched side of the plate must point outside.

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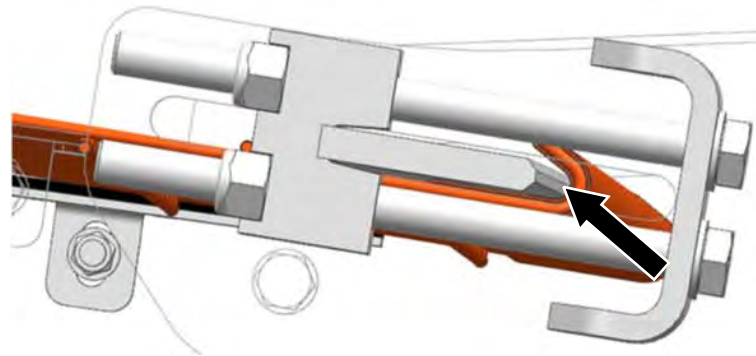


Figure 164. Tension plate



CAUTION

PERSONAL INJURY HAZARD

Can cause moderate injury or material damage.

Do not use your hands or fingers to push or pull the screen tension plate until the screen tension plate is clearly out of the possible pinch point between the plate and the surrounding structures.

7. Fit the tensioners to the tension plate and tighten the bolts slightly. Make sure the bolts are installed correctly.
8. Fit the end of the screen sealing strip (1) if it was adjusted downwards.

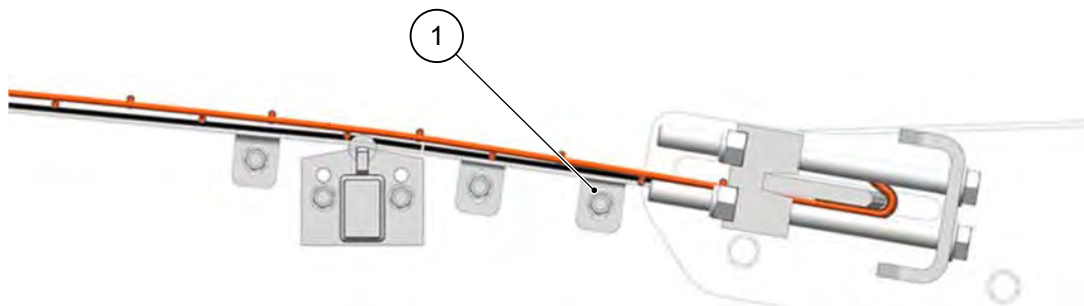


Figure 165. Fitting the end of the screen sealing strip

9. Evenly tighten the tensioners. On a heavy-wired mesh, make sure that the mesh hook sits tightly during tensioning.



NOTE: The correct mesh tension varies between different types of mesh and typically the correct tension can be determined as follows: tap the mesh with a tool and listen to the sound to find the correct tension. When the rattle stops and the sound becomes solid, the tension is correct.

10. Do not overtension the mesh. See [7.7.3.9 Retensioning screen meshes](#).

7.7.3.9 Retensioning screen meshes

Use this instruction for retensioning the screen meshes after screen mesh replacement.



NOTE: Be careful not to overtension the bolts.



NOTE: The correct mesh tension varies between different types of mesh and typically the correct tension can be determined as follows: tap the mesh with a tool and listen to the sound to find the correct tension. When the rattle stops and the sound becomes solid, the tension is correct.

1. After 10 minutes of operation, use a tool to make sure that the screen mesh bolts are tight.
2. Repeat after 1 hour of operation.

Check the tightening of the meshes daily.

7.7.3.10 Special meshes

Harp wires

Some harp wires are supplied with steel or plastic cross support strips, depending on the supplier.

Some harp screen media will need slight trimming of the support strips. Approximately 20 mm will need to be trimmed from each end of the cross support strips, so that the harp wire will sit flat onto the steel sealing strip bolted to the screen side plate.

When installing harp wire, make sure you align the screen profiles with the screen supports.

Pay special attention to tightening the harp wires carefully to avoid breaking them.

Rubber meshes

Some special tools may be required. Contact Metso.

Operating without the need for a mesh

If the screen is used in such a way that there is no need for a mesh on one of the decks, the deck must be covered with a mesh with such a mesh size which enables passing the material, that is, a slightly larger mesh size than the screen deck above.

7.7.4 Screen v-belt

Excluding the visual inspection the drive belt should be virtually service free.

If you replace the belt use the following instruction for tensioning.

Correct belt tension can be determined by pressing the belt with the force as shown in the table below. The following table shows the correct forces and deflections (X).

	Force	Deflection
New belt	50 N	8.24 mm
Used belt	50 N	10.24 mm

Adjust the tension from the adjustment bolts (1).

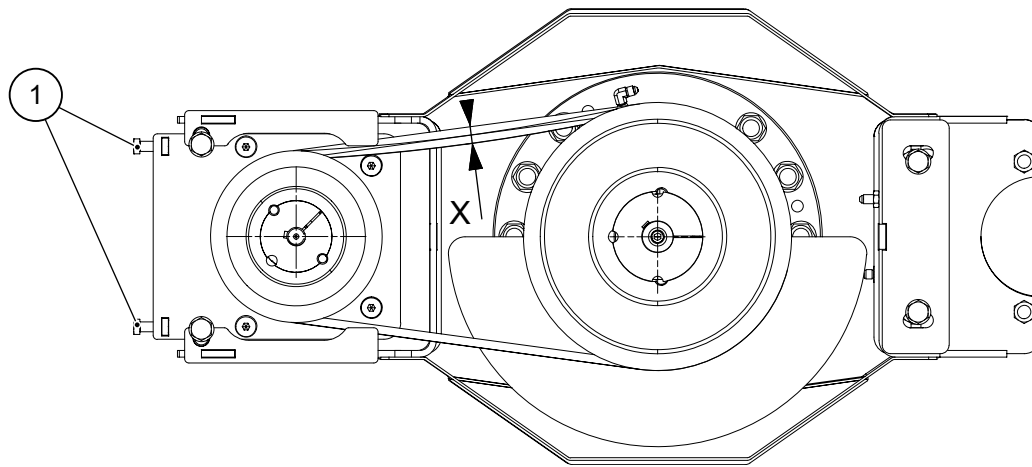


Figure 166. Screen v-belt



NOTE: If needed to remove for maintenance measure the tightness before removing and install back to the same tightness.

7.8 Conveyors



⚠ WARNING

FALLING HAZARD

Can cause death or serious injury.

Use a man lift and a safety harness to access high maintenance locations or when working outside the service platforms. Do not step on the handrails.

7.8.1 General conveyor belt maintenance



NOTE: Stop the process operations and remove the process material before making any adjustments, maintenance, or repair work.

1. Make sure that all conveyor guards are in place.
2. Make sure that the belt is free from obstructions or foreign articles.
3. Check the condition of the belt.
4. Make sure that the belt is running straight and that it is correctly tensioned.
5. Make sure that all return rollers are straight, that is, in a 90° (right) angle to the frame.
6. Check the end drum bearings for wear or damage, and replace if necessary.
7. Check the end drums for wear or damage and replace if necessary.
8. Make sure that all rollers are free from material build-up, and are running freely.

- 9. Replace any rollers that have defective bearings.
- 10. Clean all debris around the tail drum and keep this area clean.
- 11. Check the head drum belt scraper and screen feed plate, and adjust as required.
- 12. Check the tail drum belt scraper and return belt scraper, and adjust as required.
- 13. Check all rubber skirting, and adjust as required.

7.8.2 Side conveyor maintenance



⚠ WARNING

CRUSHING HAZARD
Can cause death or serious injury.
Do not go under the conveyor.



⚠ CAUTION

PROPERTY DAMAGE HAZARD
Can cause property damage.
Make sure that the conveyor forks always lay against the piston rods to avoid breaking of the fork.

- 1. Clean the areas with moving parts (1) regularly and especially before turning, lowering or lifting the side conveyor. Do not adjust the conveyor forks (2).

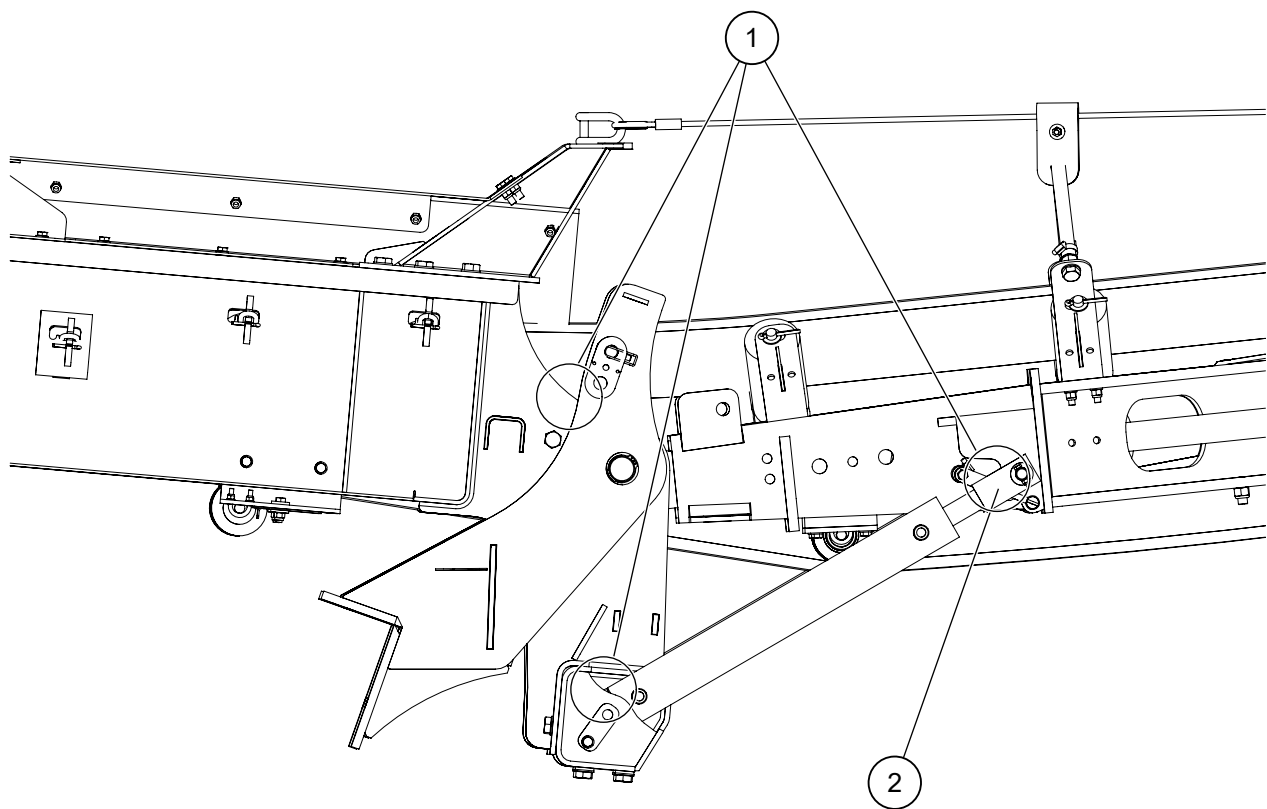
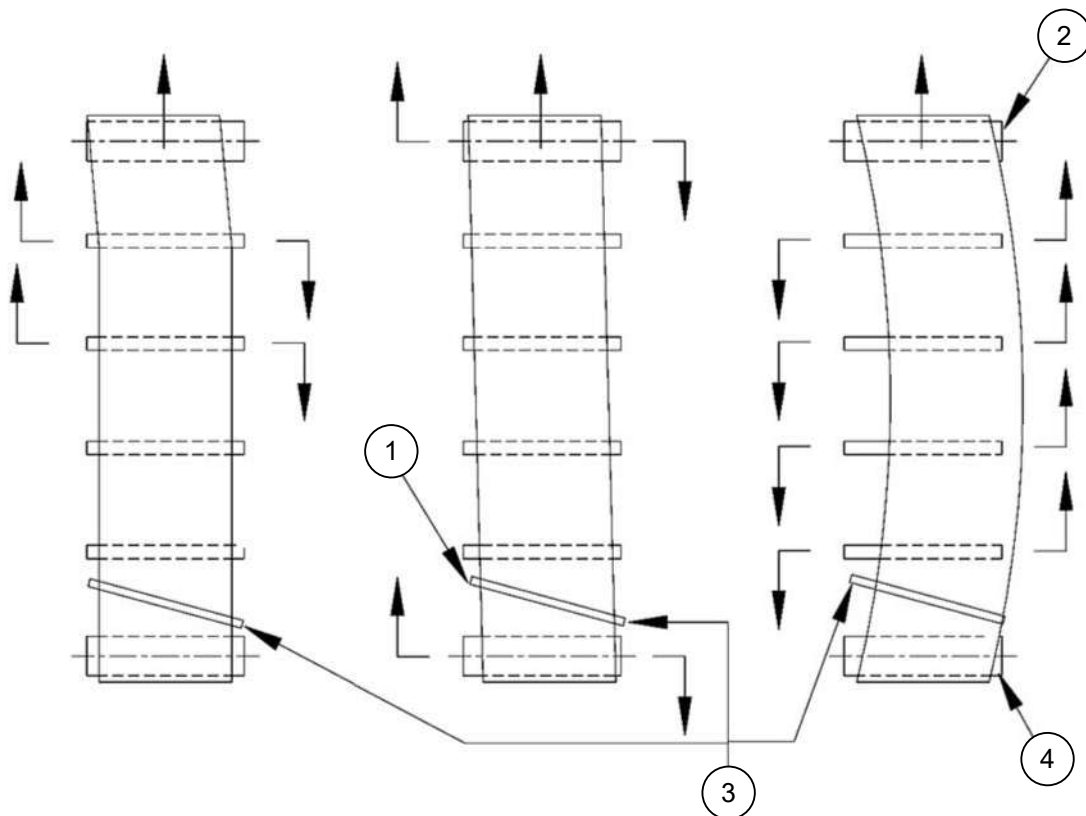


Figure 167. Side conveyor

7.8.3 Conveyor belt oblique alignment

 **NOTE:** Oblique travel caused by insufficient aligning of the rollers may cause fast deterioration of the conveyor.

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Callout	Description
1	Check tension
2	Head drum
3	Tail drum belt scraper
4	Tail drum

Figure 168. Conveyor belt oblique alignment

1. Align all end drums, rollers and return rollers at 90° right angles to the frame.
2. Check that all end drums and rollers are level to each other. Adjustment is made as indicated above by turning the troughed idlers and rollers in the direction of the arrow, until the belt is running straight and centered on the conveyor.
3. The return rollers may also cause oblique belt travel, and therefore they must be aligned at right angles to the frame, and the adjustment can then be made.
4. Check conveyor frame folding mechanisms for proper alignment and tightness of fit.

7.8.4 Conveyor belt tracking alignment

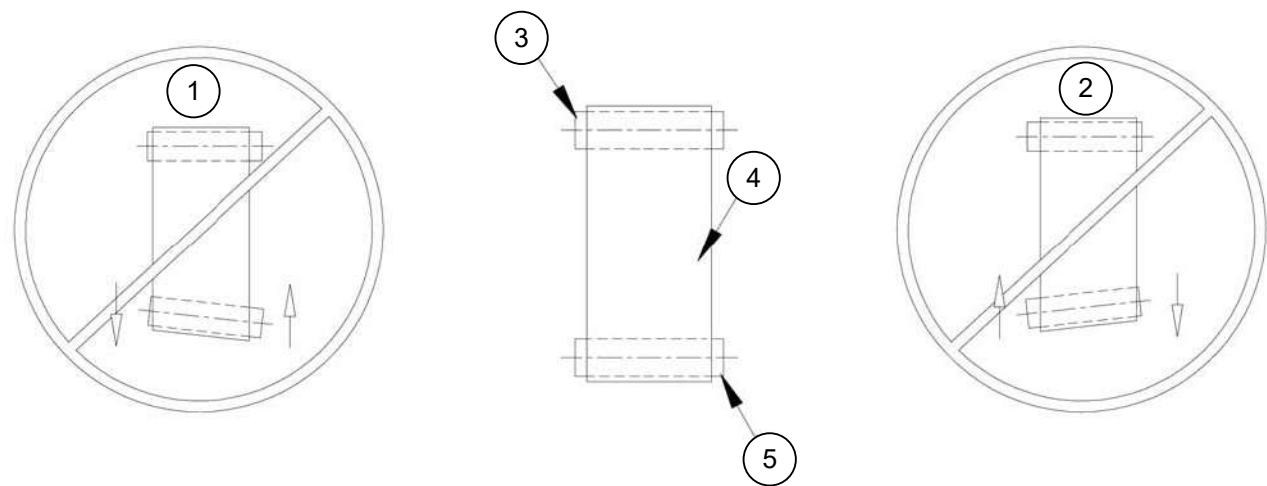


NOTE: Stop the process operations and remove the process material before making any adjustments, maintenance, or repair work.

If the conveyor belt runs off the center line, the direction of the belt wandering then determines in which direction the adjusters need to be adjusted.

The side conveyor adjusting bolts tend to move during transportation. Tail drum alignment may be necessary upon unfolding. The tail drums must be at a 90° (right) angle to the frame and aligned with the head drum for proper operation.

To adjust the belt for running off the center line, proceed as follows:



Callout	Description
1	Belt wandering left, adjust tail drum as shown
2	Belt wandering right, adjust tail drum as shown
3	Head drum
4	Belt
5	Tail drum

Figure 169. Conveyor belt tracking alignment

1. Level the machine.
2. Run the machine to determine the direction of the belt wandering.
3. Stop the machine.
4. Open the access guard door if required.
5. Loosen the tail drum bearing bolts if necessary. The tail drum bearing bolts should only be snug, to allow the adjustment of the bearing.
6. Tension the adjuster on one side and slacken the adjuster on the other side.
7. Close the guard door.
8. Start the machine.
9. Repeat the above steps until the belt runs straight. The tail drum bolts should be only snug after the final adjustment.
10. Check the belt tension.

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7.8.5 Belt tension

The conveyor belt tension is adjusted by relocating the drive pulley position. When adjusting the drive drum location, remember always to release the slide beam locking bolts from both side of the conveyor. This function allows the parts to move without causing any torsion to the drive motor.

A belt is properly tensioned when the sag of the loaded belt between two adjacent return rollers is 0.5 - 3% of the distance between the rollers when an empty belt is operating.

Sag can be difficult to measure accurately, because of the small distances involved. The practical rule of thumb is, "The proper tension is the lowest possible tension that will prevent drive pulley slippage and belt misalignment."

If the conveyor has a vertical curve, the conveyor belt should remain touching all carrying rollers with material. Without material in the vertical curve the gap between the belt and carrying roller must not be more than 30 mm.

7.8.6 Belt scraper

A scraper is a component that cleans the conveyor surface after the material has flown out from the conveyor belt.

- The surface of the conveyor belt has to be cleaned for preventing fine-grained material from returning back to the return rollers.
- The type of feed material affects the effectiveness of scraping, wear of the scraper, and the need for adjusting the scraper.
- The scraper wears mostly on the dirtiest surface of conveyor and less on the cleaner surface of conveyor.

Metso has also alternative scraping solutions. For scraping in extreme conditions, contact Metso.

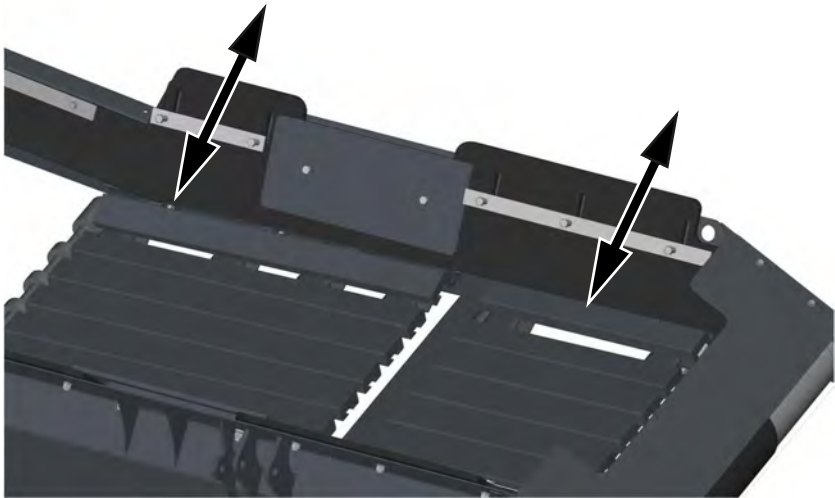
7.8.6.1 Belt scraper adjustment

Belt scraper tension and condition must be checked daily.

- Observe the wear of the scraper because at same time also the scraping force decreases.
- Replace the scraping element if it has worn out or if there is no play left in the retightening adjustment.
- Make sure that the tension mechanism works properly because it can be jammed or frozen in muddy and icy conditions.
- Keep the cleaning point of scraper clean. Make sure that no roots, steel wires, or other threadlike material get stuck between the conveyor belt and cleaner. This way you can maintain the effectiveness of scraping.
- Note that there must be enough scraping force for keeping the conveyor belt clean and the scraping element functional.

7.8.7 Skirt rubber adjustment

Relocate the skirt rubbers regularly to prevent leakage.



7.8.8 Bearing lubrication

The bearing size will affect the needed grease amount. In the following table, the amount of grease (in grams/ounces) is proportioned to the shaft diameter (in millimeters/inches).

Table 3: Bearing grease amount

Shaft diameter (mm / inch)	Amount of grease (g/oz / 40–50 h)
40 / 1 9/16	4 / 0.14
55 / 2 5/32	6 / 0.21
60 / 2 3/8	6 / 0.21
80 / 3 5/32	9 / 0.32

In practice, an appropriate amount of grease to each bearing is about 5-10 grams (0.17....0.35 ounces) in every 40 - 50 hours.

Use a multipurpose grease with an NLGI-class 2 rating and a good resistance to water, cold (-30°C/ - 22°F) and hot (continuous operating temperature +100°C/ 212°F).

The grease must have rust and oxidation (RO) inhibitors and it must contain EP-additives. Do not use grease containing molybdenum.

The minimum viscosity of the base oil must be 160 mm²/s (cSt) at 40°C or 0.248 in²/s at 104°F and minimum viscosity index 80.

7.8.9 Conveyor motion sensor

The conveyor motion sensors are mounted to the return roller of the lifting conveyor and product conveyor of the machine.

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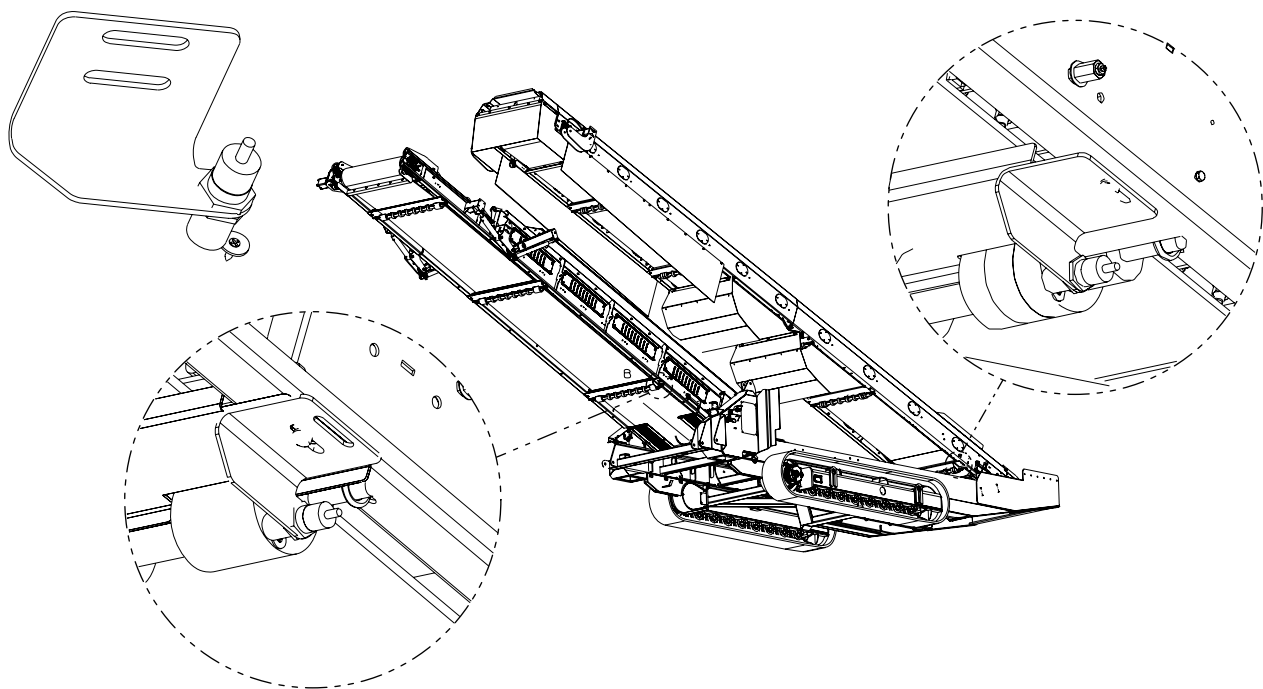


Figure 170. Conveyor motion sensor

The measuring range for the sensor is 0 – 4.0 m/s. If the parameter value is set to zero, measuring is not in use.

- 1. From the **main view** of the control panel display, tap **Information views** (1).
- 2. Tap **ST information** (2).

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Callout	Description
1	Information views
2	ST information view

Figure 171. ST information view

7.8.10 Adjusting the angle of product conveyor



 **WARNING**

CRUSHING HAZARD

Can cause death or serious injury.

Only trained and competent personnel are allowed to operate, maintain and service the machine. If operating procedures are unclear, contact Metso for assistance prior to operating.

Stay away from the range of moving machine parts. Make sure that nobody is in the restricted area when operating hydraulic devices.

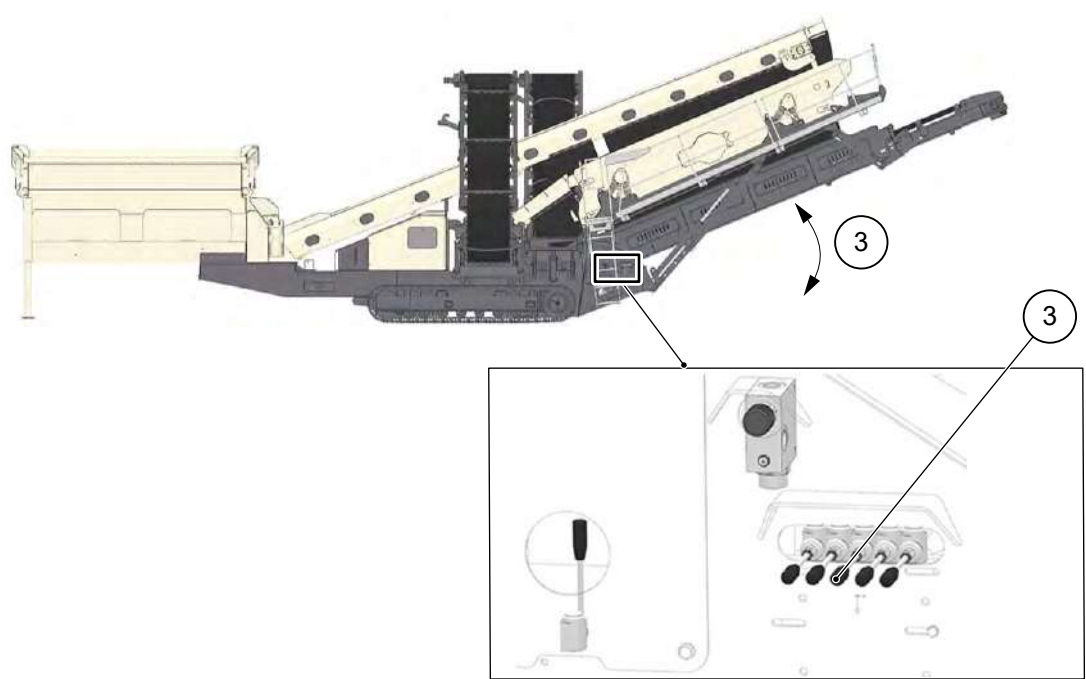
 **NOTE:** Stop the process operations and remove the process material before making any adjustments, maintenance, or repair work.

NOTE:

 The product conveyor angle adjustment is a manual function and works in conjunction with the lifting conveyor / screen angle hydraulics. The product conveyor angle can be independently adjusted by presetting the trestle pins before raising the screen angle. The angle of the product conveyor is relative to the sub-frame adjustment.

Function: Product conveyor adjustment is provided for stockpiling capacities and to reduce material rollback.

Description: The product conveyor is adjusted with the Product conveyor lifting and lowering control (3) located on the right side of the machine, on the screen support framework of the chassis at the product conveyor end of the machine.

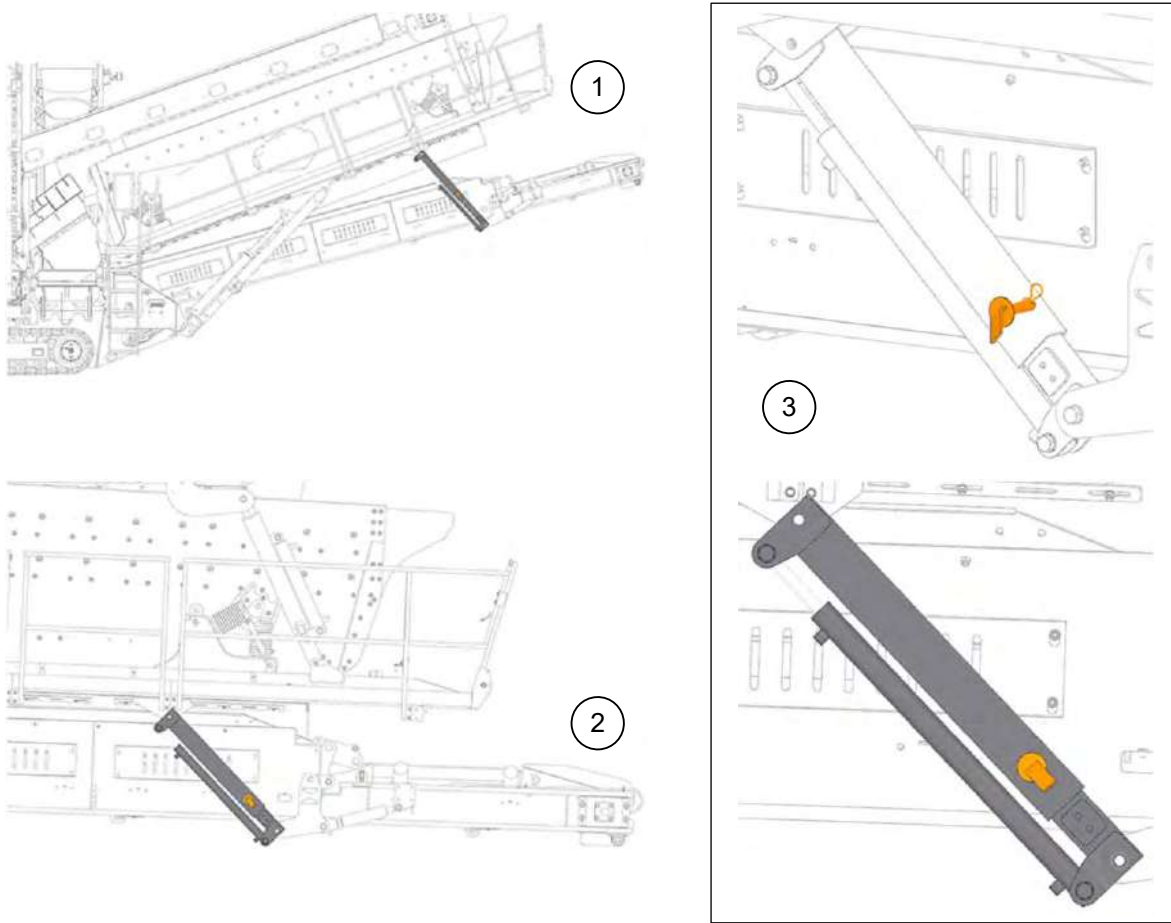


Callout	Description
3	Product conveyor lifting and lowering

Figure 172. Hand valve for product conveyor lifting and lowering

 **NOTE:** You may need to repeat this procedure for the proper product conveyor angle following the screen angle procedure.

1. Make sure that the hand valves are activated. For instructions, see [4.8 Hand valve activation](#).
2. Raise the product conveyor until the pressure is off from the locking pins (3) by using the **Product conveyor lifting and lowering control** (3).
3. Remove the locking pins and clips (3) from both sides of the product conveyor.



Callout	Description
1	Product conveyor in operating position
2	Product conveyor in transport position
3	Locking pins and clips

- Using the **Product conveyor lifting and lowering control** (3), adjust the angle of the product conveyor.
- Lock the product conveyor angle with the locking pins and clips (3) on both sides of the product conveyor.

 **NOTE:** Make sure that the locking pins are located at the same adjustment holes on each side of the conveyor. Failure to do this will cause twisting of the product conveyor frame and tracking of the conveyor belt will become difficult.

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7.8.11 Lifting the lifting conveyor (option)

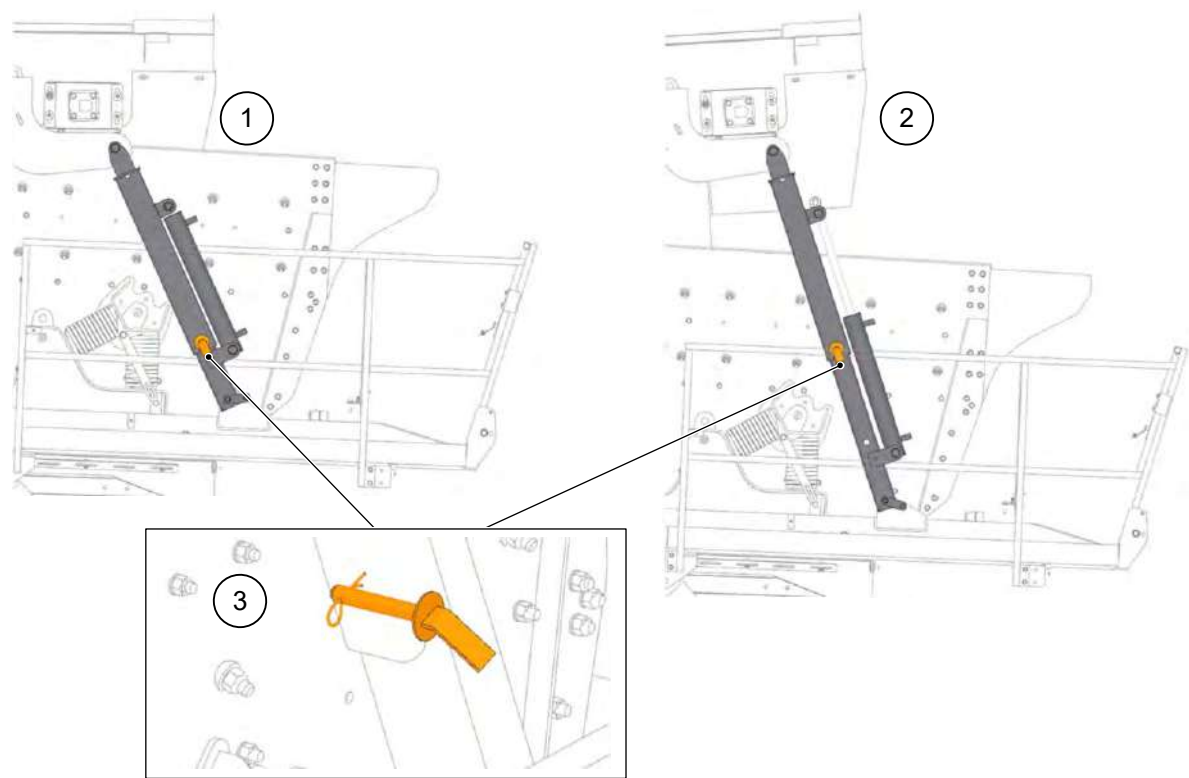


 **DANGER**

CRUSHING HAZARD

An unsecured lifting conveyor will cause death or serious injury.

Do not go under an unsecured raised conveyor. Make sure that the conveyor has been mechanically locked into place with the adjustment sleeves, pins, and clips on both sides of the conveyor before performing any maintenance.



Callout	Description
1	Lifting conveyor in operating position
2	Lifting conveyor in service position
3	Locking pin

Figure 173. Lifting conveyor in operating and service position

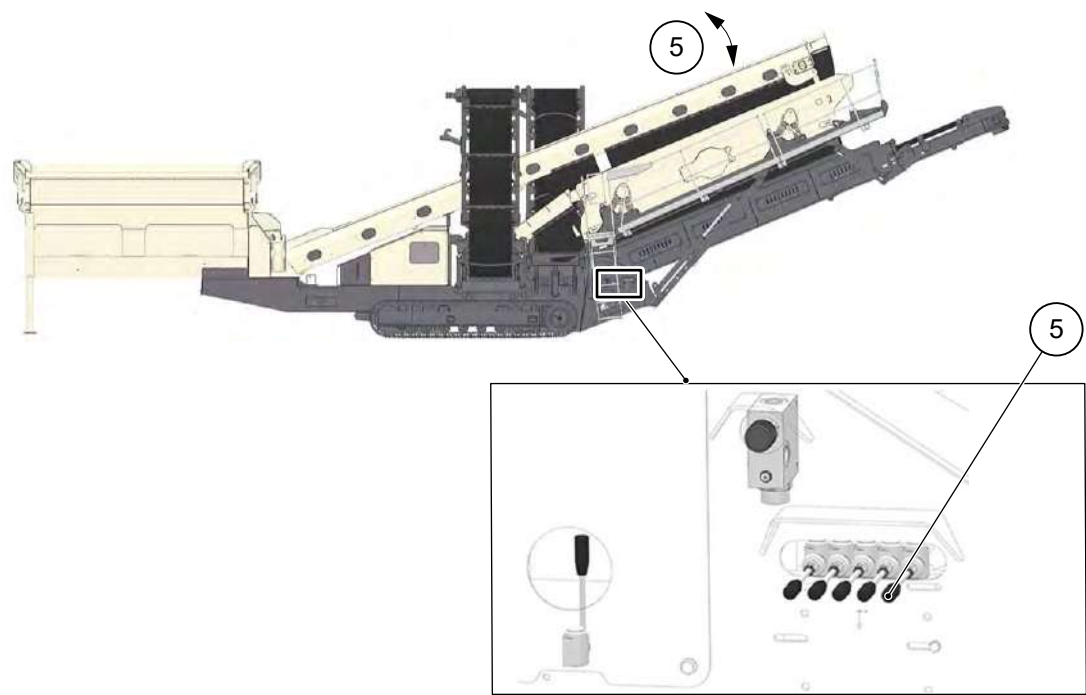


Figure 174. Hand valve for lifting the lifting conveyor

Callout	Description
5	Lifting conveyor lifting (option)

1. Make sure that the hand valves are activated. For instructions, see [4.8 Hand valve activation](#).
2. Remove the locking pin (3).
3. Using the **Lifting conveyor lifting (option) control** (5), lift the lifting conveyor upwards for getting room for service tasks.
4. Attach the locking pin back to its place and secure with the clip.
5. Do the service tasks.
6. After completing the service tasks, remove the locking pin (3).
7. Lower the lifting conveyor down to operating position by Using the **Lifting conveyor lifting (option) control** (5).
8. Attach the locking pin back to its place and secure with the clip.

7.9 Feeder

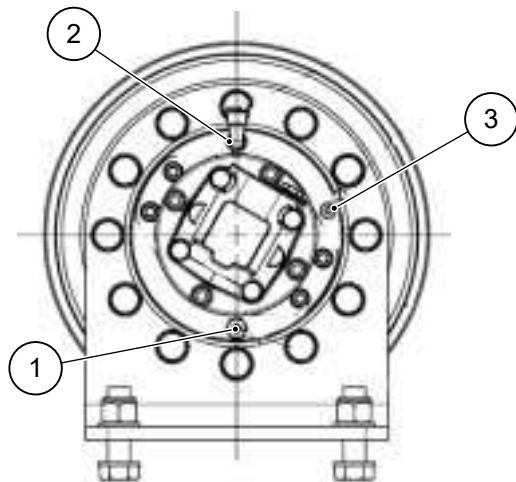
7.9.1 Hopper, grid bar and feeder belt

1. Ensure that all guards and doors are fitted and bolted securely before operation.
2. Check that the hopper, grid bars and feeder belt are free from obstructions or foreign articles.
3. Inspect the hopper, grid bars and feeder belt for wear or damage. Replace any worn or damaged parts.
4. Check that all grid bar bolts are tight and free from damage.

- 5. Inspect the grid location comb and ensure that it functions correctly.
- 6. Ensure that the feeder belt is tracking correctly.

7.9.2 Feeder gearbox

Position the feeder gear box so that the sight glasses are slightly off horizontally parallel.



Callout	Description
1	Oil draining plug
2	Oil filling plug
3	Oil level plug

Figure 175. Feeder gearbox

Oil level must be checked from the oil level plug.

If the oil level is correct, no oil is required.

Do not overfill.

The oil to be used in the gearbox is VG150.

Capacity: 1.3 litres.

The first oil change is after 50–100 hours, and after every 1000 hours to six months depending on the use.

7.9.3 Grid

7.9.3.1 Replacing the remote control transmitter batteries

This instruction is valid for machines with the standard tipping grid remote control. For more information, see [6.3.5.2 Tipping grid remote control \(standard\)](#).

Two 1.5-volt AAA alkaline batteries.

- 1. Before replacing the transmitter batteries, turn off the receiver by disconnecting its power supply.
- 2. To replace the batteries, undo the 3-mm battery compartment screw at the rear of the transmitter. Raise the cover at the end adjacent to the belt clip and swing the cover out and lift it off.

3. Replace the batteries. Make sure that the battery polarity symbols align with the symbols embossed in the bottom of the battery compartment.
4. Replace the cover, engage the small catches at the bottom edge of the cover with the slots on the lower edge of the battery compartment and fold the cover towards the belt clip and secure the cover with the 3-mm screw.

7.9.3.2 Programming the frequency of the remote control transmitter

This instruction is valid for machines with the standard tipping grid remote control. For more information, see [6.3.5.2 Tipping grid remote control \(standard\)](#).

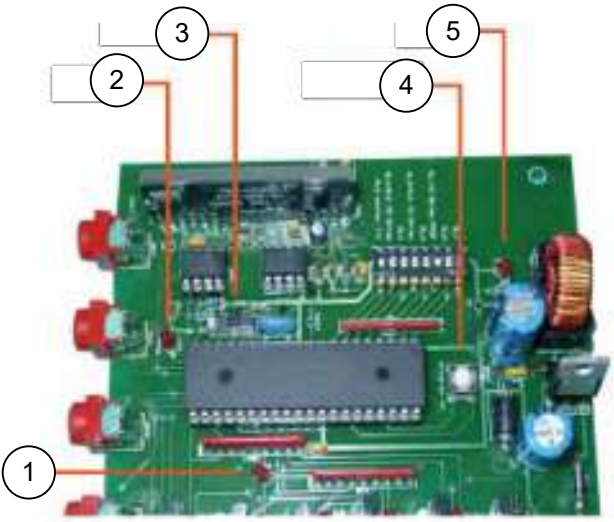


Figure 176. Programming the frequency



NOTE: Each transmitter has a unique operating code and if a transmitter or receiver is replaced, the receiver must be programmed to recognize the transmitter.

If a transmitter is taken from one system and used to operate another system by reprogramming the second system, disable the original system by removing the 2-amp fuse on the receiver circuit board and labeling the receiver with instructions to reprogram the receiver before putting it into service. Otherwise the situation could arise that one transmitter will operate two different systems.



NOTE: When programming, do not hold the transmitter too close to the receiver. The transmitter should be held at least 500 mm (19.7 in) away from the receiver.

See the figure above.

1. Remove the cover from the receiver unit casing by unscrewing the four fixing screws.
2. Make sure that “LED1” (5) is turned on. This led indicates that the receiver is supplied with power.
3. Locate the “Prog ID” (3) switch, the “Program ID” (4) push button, the “Prog LED” (2) and the “Valid Signal LED” (1).

4. Set the "Prog ID" (3) switch to the programming position by moving the switch lever to the left position. Press and release the "Program ID" (4) push button. The "Prog LED" (2) turns ON.
5. Arm the transmitter, if required, by operating the "ON" button twice within two seconds.
6. Press any transmitter operating button (except the "ON" button). The "Prog LED" will turn OFF and the "Valid Signal LED" (1) will turn on while the transmitter button is being pressed.
7. Release the transmitter button.
8. Set the "Prog ID" (3) switch to the operating position by moving the switch lever to the right position. The programming is now complete.
9. Replace the lid on the control unit casing and secure with the four screws.
10. Make sure the transmitter has two fresh 1.5-volt AAA alkaline batteries.

7.10 Tracks

7.10.1 Track tension

Check the track tensions. Adjust, if necessary.

Measure at the midpoint between the upper track supports. The correct track deflection is 25 mm (1 in).

Track tension can be increased by pumping more grease into the control cylinder with a grease gun. The tension is loosened by removing grease from the control cylinder and by moving the equipment, if needed.

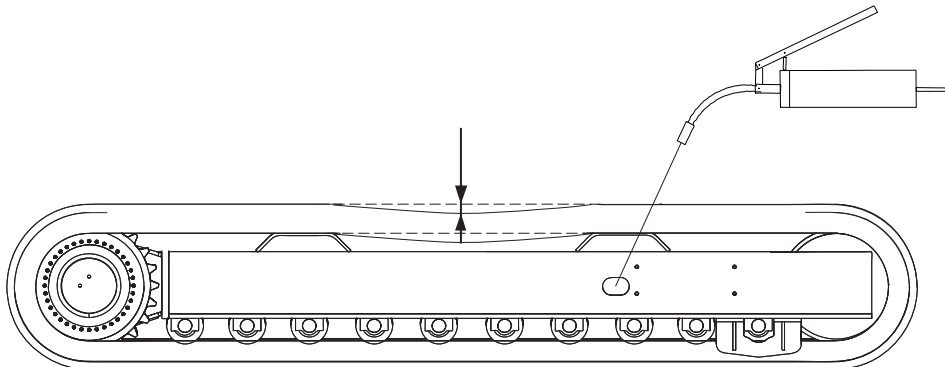


Figure 177. Check the track tension

7.10.2 Track gears

Check the track gear oil level every 1,000 hours or a minimum of twice a year. When the drain plug (1) is in the down position 'at 6 o'clock', the oil level must be on the level of the check plug (2).

Change the track gear oil every 2,000 hours or a minimum of once a year. The drain plug (1) must be in the down position. Open the drain plug and let the oil flow into the receiver. Clean and close the drain plug. Add new oil through the check plug (2), until the oil level reaches the level of the plug. Close the check plug. Check that there is no oil leaking from the plugs or the rotary oil seal.

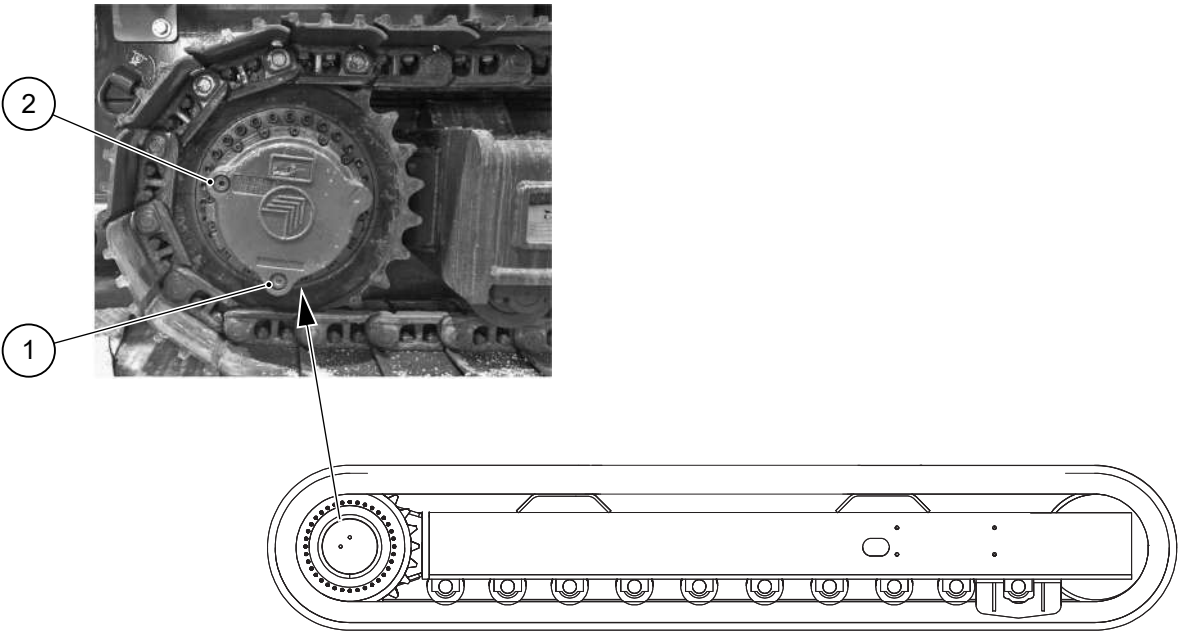


Figure 178. Track gear

7.10.3 Track shoe tightening

The tension of the track shoe tightening screws must be checked carefully using a torque wrench right at the beginning of operation.

Check the tension of the fastening screws for the first time after 8-16 operating hours, and the second time after 200 operating hours. After that, check the tension every 200 operating hours.

If the track shoes are bent or appear to be almost broken, they may be too wide for the ground in question. If the track shoes are bent or broken, the track system may get overloaded. This can damage the track shoes beyond repair. The track shoes do not require any other service.

Table 4: Track shoe tightening torque

Tightening torque, Dry (Nm)
250 (+-10)

7.11 Diesel engine

See the appended instruction manual of the Caterpillar engine for further engine maintenance instructions.



NOTE: For possible differences in the Stage V/ Tier 4 Final/ Tier 3/ Stage IIIA/ China Stage IV engines, see the Caterpillar instruction manual.

7.11.1 CAT OEM Model Information

Metso has made the Lokotrack ST3.8 service information available at CAT dealers through the OEM Service Interlink system. You can ask your CAT dealer to view it at <http://oeminterlink.cat.com>.

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If the OEM Model Information is available for your machine the following sticker should be attached to the main control panel.



7.11.2 Engine oil

7.11.2.1 Checking the engine oil level

1. Check the oil level from the dipstick on the side of the engine.
 - The engine oil level must be checked daily
 - The engine oil level must be between the marks ADD and FULL.
2. In Tier 4 Final/Stage V/China Stage IV engines, there is a Diesel Particulate Filter (DPF) and the engine oil used must be in accordance with standards API CJ-4, ACEA E9. Using the wrong oil quality can cause damage to the diesel particulate filter (DPF).



Figure 179. Check the oil level

7.11.2.2 Changing the engine oil

Change the engine oil every 250 operating hours.

The engine oil filter must be replaced in conjunction with every oil change.

Prerequisites:

- The engine must be slightly warm when changing the oil.
- If the engine is cold, warm it up by idle running for about three minutes. Shut the engine down before changing the oil.
- If the engine is hot following a continuous operating period, let it cool down for about 30 minutes before changing the oil. The time required to cool down the engine depends on the outside temperature.
- The drain location is shown in the following figure with the connection hose and hand valve (1).
- Note that some machines may not have the connection hose and hand valve installed.

1. Open the drain plug, and after that, open the hand valve.

Collect the used oil in a suitable container. Open the drain plug carefully and drain the oil into the container. Dispose of the used oil in accordance to local instructions, laws and regulations, as well as paying attention to environmental protection.

**WARNING****HOT LIQUID HAZARD**

Can cause death or serious injury.

Drained liquid can be hot. Wait for the machine to cool down before doing any maintenance or repair work.

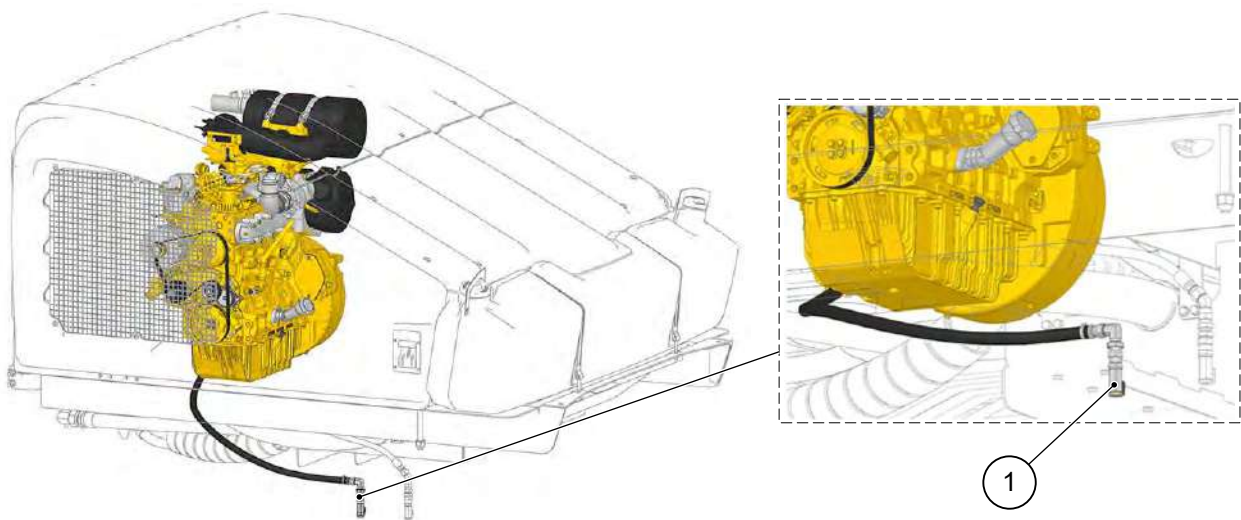


Figure 180. Draining valve example (with connection hose and hand valve)

2. Add new oil from the filler opening on the side or at the top of the engine.
Another alternative for adding new engine oil is through the connection hose (1), if you have a separate oil change pump at hand.
3. Check the correct engine oil level.
4. Make sure that the hand valve and drain plug are closed.

7.11.2.3 Replacing the engine oil filter

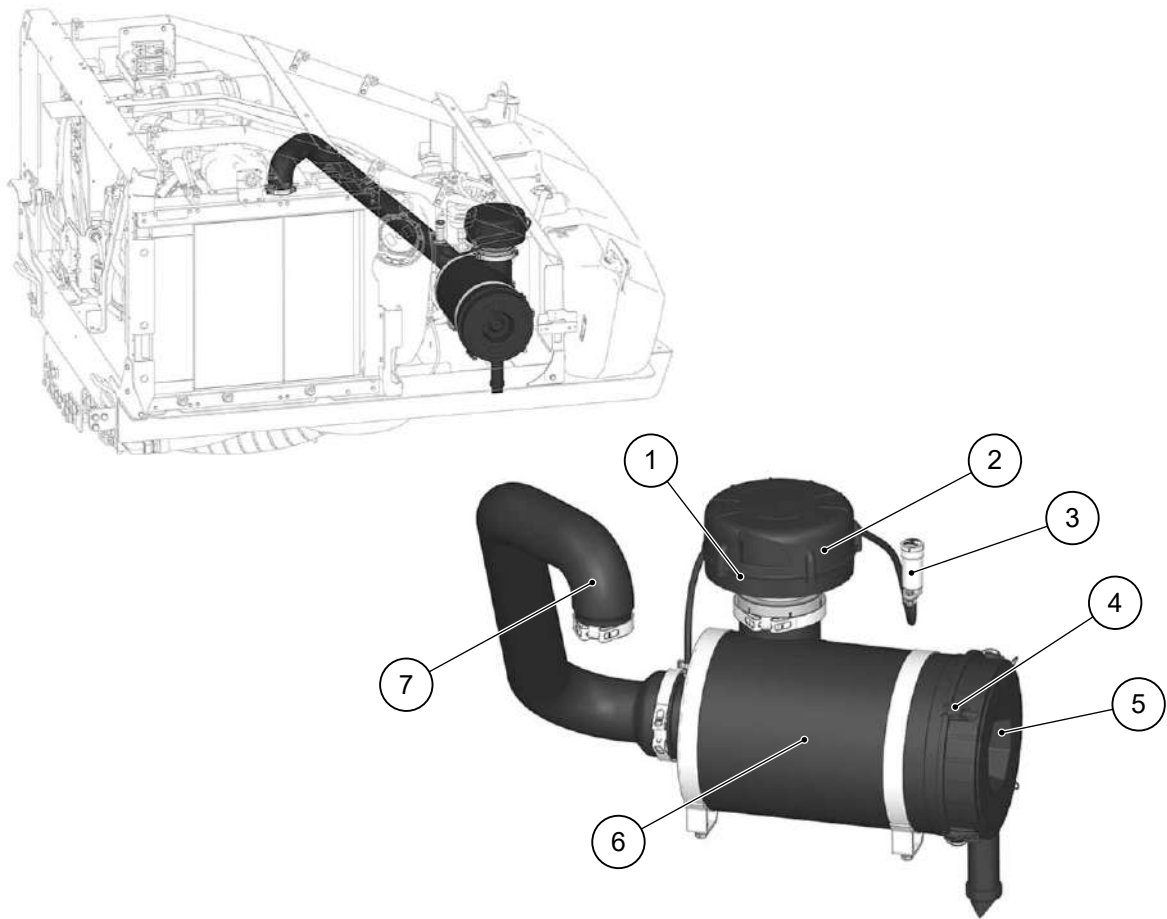
The engine oil filter must be replaced in conjunction with every oil change:

- 1. Before removing the filter, clean it carefully from the outside.
- 2. Remove the filter.
- 3. Use oil to lubricate the rubber seal of the new filter. Screw the filter element in place by hand until the seal touches the sealing face. Then tighten the filter again 1/2 - 3/4 turns. Be careful not to overtighten the filter.
- 4. Add new oil to the engine. Check the correct oil level.
- 5. Start the engine and run at low idle for 2 minutes. Check that there are no oil leaks.
- 6. Stop the engine and allow the oil to drain back to sump for a minimum of 10 minutes.
- 7. Check the correct oil level.

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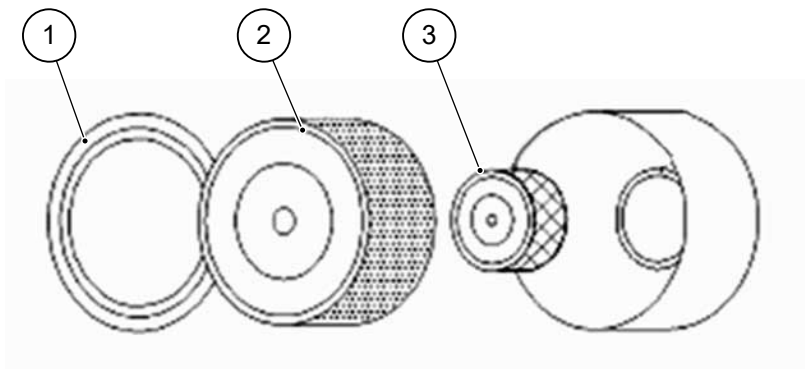
7.11.3 Air filter

Air filter and components



Callout	Description
1	Air in
2	Pre-cleaner
3	Service indicator If the indicator is showing red, replace the filter element and press “Reset”.
4	Latches
5	Filter cover
6	Filter housing
7	Pipe which transports clean air to the engine

Figure 181. Air filter



Callout	Description
1	Cover
2	Filter element
3	Safety element

Figure 182. Air filter – main inner components

Replacement interval

The operating life of the engine air filter depends significantly on the operating conditions. In extremely dusty conditions, the lifetime of the air filter can be less than the scheduled interval.

The recommended replacement interval for the air filter element (2) is 250 h, or whenever the air filter clogging alarm is tripped in the control system. See Figure *Air filter – main inner components*. Also replace the safety element (3) of the filter every third time the air filter is replaced. When opening the filter, check the condition and cleanliness of the seals and the corresponding surfaces.



NOTE: Always replace the clogged filter element with a new one. It is not allowed to clean the old filter element with compressed air.

The condition of the intake channels and connections must be checked regularly. The faultless condition of these ensures the purity of the intake air.

The machine is equipped with a pre-cleaning system and it must be inspected regularly. Visually check for any accumulation of dirt and debris in the pre-cleaner body. Clean the body, if necessary and check that the rotor inside the pre-cleaner is rotating freely. Use compressed air to clean. Do not aim the airstream directly into the tubes.



NOTE: When the engine is operated in dusty conditions, more frequent cleaning is required. Do not tap or strike the air cleaner element.



NOTE: When checking or replacing the elements, take extra precautions not to let any dust enter the intake channel.

Service indicator

Check the visual clogging indicator (3) for the clogged engine air filter daily.
If the indicator is showing red, replace the filter element and press “Reset”.

7.11.3.1 Replacing the air filter



CAUTION

PROPERTY DAMAGE HAZARD

Can cause moderate injury or property damage.

Always replace the clogged filter element with a new one. Clogged air filter might cause a serious engine damage.

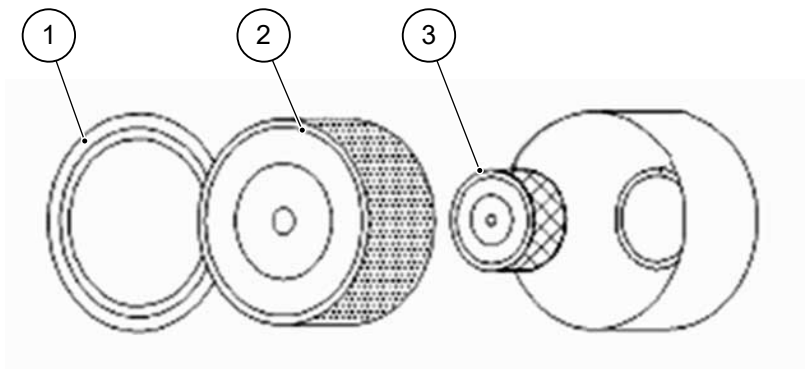
 *NOTE: Do not open the air filter housing when the engine is running.*

 *NOTE: A clogged air filter reduces the engine capacity, increases fuel consumption and harmful exhaust gases. Clogged air filter may also prevent the operation of the diesel particulate filter.*

 *NOTE: In very dusty conditions, observe the condition of the filter more often than usual.*

When replacing the air filter, do the following:

1. Read the section [7.11.3 Air filter](#).
2. Undo the filter housing latches to remove the cover (1). See the figure below.



Callout	Description
1	Cover
2	Filter element
3	Safety element

Figure 183. Air filter – main inner components

- 3. Check the condition and cleanliness of the seals and the corresponding surfaces.
- 4. Remove the primary filter element (2), and if needed, remove also the safety filter element (3).
- 5. Install the new filter elements.



NOTE: Make sure that the replacement filter size is correct. If the replacement filter is shorter than the original one, it might cause serious engine damage.

- 6. Close the air filter housing cover (1) carefully and make sure all latches are properly closed.

7.11.4 Engine coolant

Change the engine coolant when needed. Changing interval depends on coolant in use as well as operation conditions. For detailed information refer to the Caterpillar instruction manual.

7.11.5 Engine Valve Lash (Tier 3)

This maintenance is recommended by Caterpillar as part of lubrication and preventive maintenance schedule in order to help provide maximum engine life.



 **WARNING**

GENERAL HAZARD

Can cause death or serious injury.

Only trained and competent personnel are allowed to operate, maintain or service the machine. If operating procedures are unclear, contact Metso for assistance before operating the machine.



NOTE: Operation of Caterpillar engines with improper valve adjustments can reduce engine efficiency. This reduced efficiency could result in excessive fuel usage or shortened engine component life.



 **DANGER**

UNEXPECTED MOVEMENT HAZARD

Will cause death or serious injury.

Before starting any service, maintenance or repair work, make sure that the unit is stopped and locked out. Make sure that the unit is empty of material.



 **WARNING**

HOT SURFACE HAZARD

Can cause death or serious injury.

Wait for the machine to cool down before doing any maintenance or repair work.

Ensure that the engine is stopped before measuring the valve lash. To obtain an accurate measurement, allow the valves to cool before this maintenance is performed.

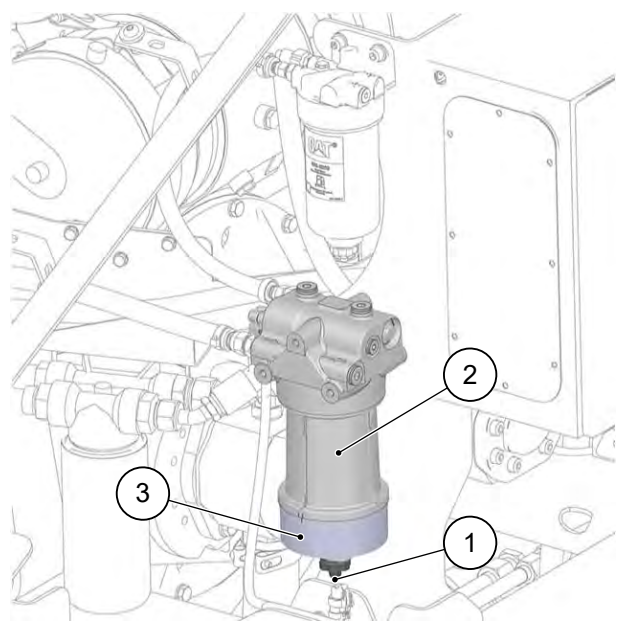
7.12 **Fuel system**

7.12.1 **Fuel filters**

7.12.1.1 **Draining the fuel water separator**

- 1. Open the drain valve (1). See the figure below. The drain valve is a self-bleeding valve.
- 2. Collect the draining water in a suitable container.
- 3. Close the drain valve.
- 4. Dispose of the drained water according to the local laws and regulations.

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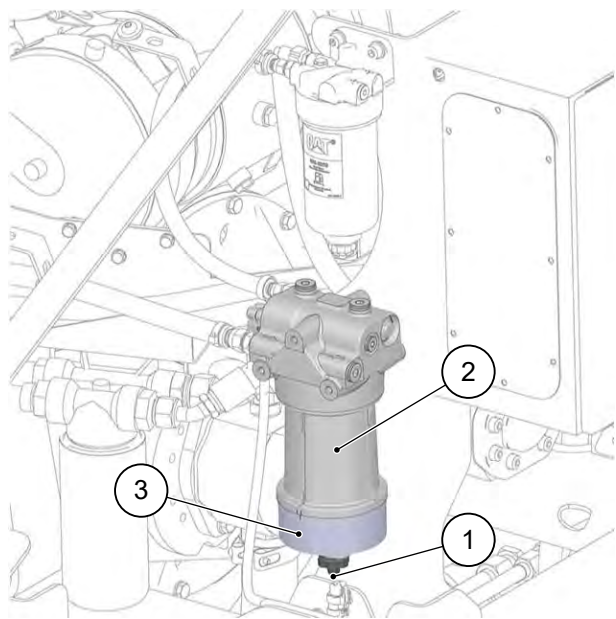


Callout	Description
1	Drain valve
2	Pre-filter unit
3	Water separator bowl

Figure 184. Fuel pre-filter and water separator

7.12.1.2 Replacing the fuel pre-filter

The pre-filter must be replaced every 250 operating hours, or monthly.



Callout	Description
1	Drain valve
2	Pre-filter unit
3	Water separator bowl

Figure 185. Fuel pre-filter and water separator

1. Shut down the engine.
2. Close the feed valve of the fuel tank.
3. Clean the pre-filter unit (2) from the outside. See the figure above.
4. Open the drain valve (1) of the pre-filter and drain the fuel from the filter cover into a suitable container. Close the drain valve.
5. Remove the water separator bowl (3) of the filter, and wash it with a suitable solvent detergent.
6. Remove the pre-filter element.
7. Clean the sealing face of the filter base. Make sure that the base is clear of old seal residues.
8. Install the new filter element by twisting it until the sealing touches the base. Then tighten the filter again by $\frac{3}{4}$ of a turn with a tool. Be careful not to overtighten the filter.
9. Install a clean water separator bowl to the new fuel filter. Notice the sealing ring when installing the water separator bowl.
10. Open the feed valve of the fuel tank.
11. Start the engine and check that there are no leaks.

7.12.1.3 Replacing the fine fuel filter

The fine filter must be replaced every 500 operating hours, or every 6 months.

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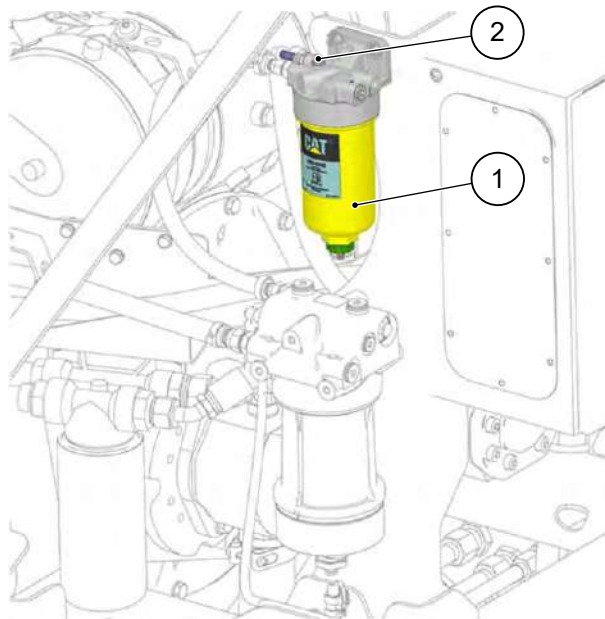


Figure 186. Fine fuel filter

If the engine has 2 fine fuel filters, replace both of them.

1. Shut down the engine.
2. Close the feed valve of the fuel tank.
3. Clean the filter unit (1) from the outside. See the figure above.
4. Open the bleed plug (2) slightly to bleed the residual pressure from the system.
5. Remove the used fine filter element.
6. Clean the sealing face of the filter base. Make sure that the base is clear of old seal residues.
7. Apply clean fuel to the seal of the new filter.
8. Install the new filter element by twisting it until the seal touches the base. Then tighten the filter again by $\frac{3}{4}$ of a turn. Be careful not to overtighten the filter.
9. Open the feed valve of the fuel tank and pre-fill the fuel system.

7.12.2 Breathers

Fuel tank breather is located between the fuel tank and hydraulic tank. The breather is scheduled to be replaced every 1000 hours.

Check the breather condition every 50 hours. If the breather is wet, it does not breathe and therefore it must be replaced immediately. Otherwise the replacement interval is 1000 hours.

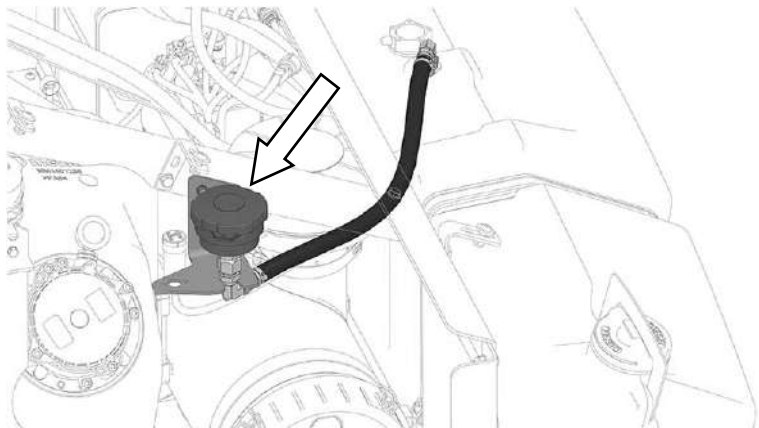


Figure 187. Fuel tank breather

7.13 Hydraulic system



⚠ WARNING

PERSONAL INJURY HAZARD
Can cause death or serious injury.

When checking a possible hydraulic leak, use paper or a suitable rigid plate. Do not use your hand.

If you start the engine when the machine is inside, make sure the ventilation is adequate for removing the exhaust gas. Also, make sure the diesel particulate filter regeneration is disabled.

Keep in mind that some solvents may cause a rash and some are highly flammable. Do not inhale solvent vapors. Use a respirator whenever necessary.

Keep the servicing site clean. Oil and water make the floor slippery and they are a risk when servicing the electrical system or using electric tools. Clothes stained by oil or grease catch fire easily.

Keep the machine and its equipment free of dirt and oil. Apart from reducing the risk of fire, it also makes the detection of damaged or loosened parts easier.

Check that the hydraulic hoses are free of abrasion damage.



⚠ WARNING

PRESSURIZED COMPONENT HAZARD
Can cause death or serious injury.

After the engine has been stopped, some pressure can remain in the hydraulic system and in the cooling system of the engine. Let the machine cool down sufficiently before opening pressurized components. Always make sure that the system is pressure-free before doing any checks, maintenance, or repair work.



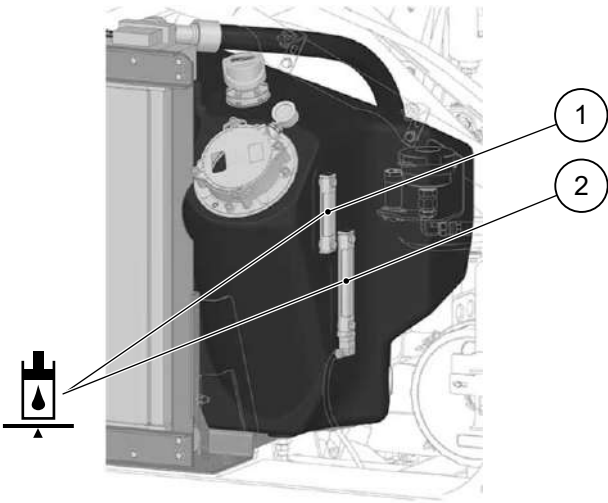
 **WARNING**

UNEXPECTED MOVEMENT HAZARD
Can cause death or serious injury or property damage.
Make sure no air enters the hydraulic system during refilling. Bleed the hydraulic system regularly to remove entrapped air. Always bleed the hydraulic system before use if the machine has not been used for a long period of time. Entrapped air may interfere with normal expected machine operation or cause a hazard during maintenance.

General instructions on servicing hydraulic equipment:

- Observe absolute cleanliness.
- Avoid using open containers.
- Use lint-free cleaning cloths.
- Check the hydraulic oil level.
- Observe the hydraulic oil temperature.
- Observe the operating temperature and noise of the hydraulic pumps and motors. If you detect abnormalities, determine the cause.
- Observe the hydraulic components, pipes, hoses and joints. Repair potential leaks immediately.
- Keep the coolers clean.
- Check the fastening of the pumps and tighten periodically.
- The hydraulic oil change interval can be extended if sufficient quality has been verified with a generally accepted inspection method. However, filters and the breather must be replaced according to the intervals given in the maintenance chart.
- Plug all disconnected hydraulic hoses during maintenance operations.

7.13.1 Checking the hydraulic oil level



Callout	Description
1	Maximum level
2	Minimum level

Figure 188. Hydraulic oil level

1. Check the hydraulic oil level daily.
2. If the hydraulic oil level is low, check around the machine for hydraulic oil leaks or if there are any other reasons for the low oil level.
3. If refilling is needed, see [7.13.2 Changing the hydraulic oil](#).

7.13.2 Changing the hydraulic oil

Change the hydraulic oil every 2000 hours.
For hydraulic oil types, see [7.16 Lubricant recommendations](#).



NOTE: During oil filling, make sure no air enters the system to avoid cavitation and unexpected movement.

1. Make sure the machine is in the transport position. Change the hydraulic oil while the machine is in transport position and make sure that the machine is on firm and level ground.
2. Shut down the engine and make sure that the hydraulic system is pressure-free.
3. Close the hydraulic shut-off valve.

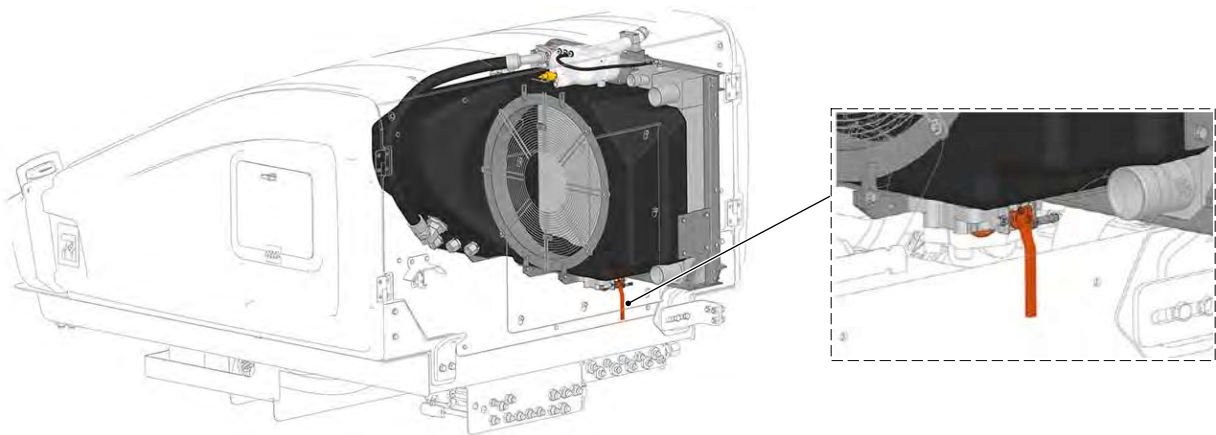


Figure 189. Hydraulic shut-off valve

4. Collect the used oil in a suitable container. Open the hydraulic tank drain plug (A) carefully and drain the oil from the tank into the container.
Dispose of the used oil in accordance to local instructions, laws and regulations, as well as paying attention to environmental protection.



WARNING

HOT LIQUID HAZARD
Can cause death or serious injury.
Drained liquid can be hot. Wait for the machine to cool down before doing any maintenance or repair work.

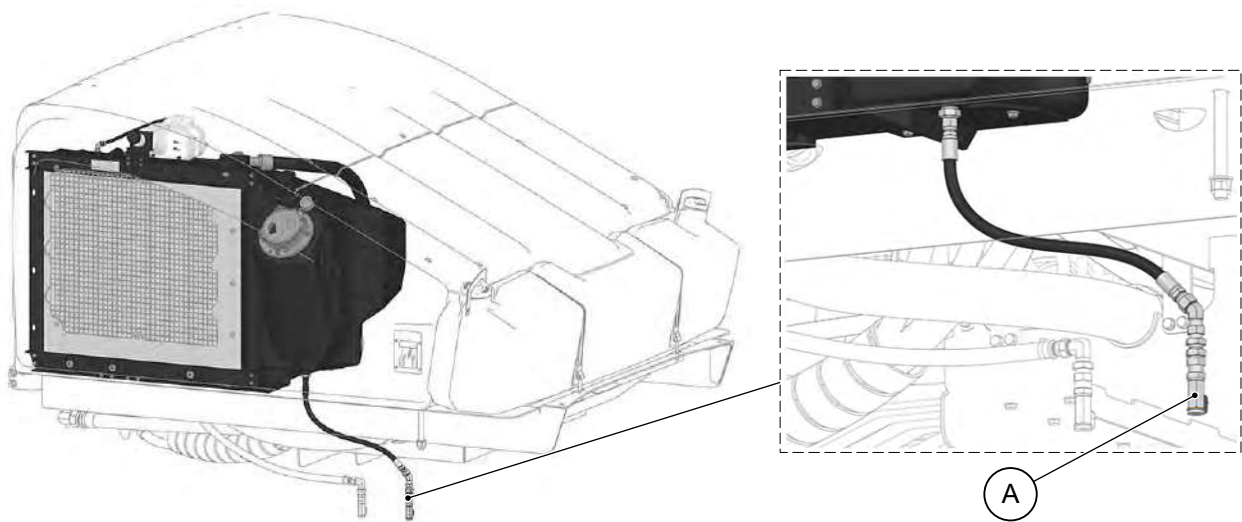
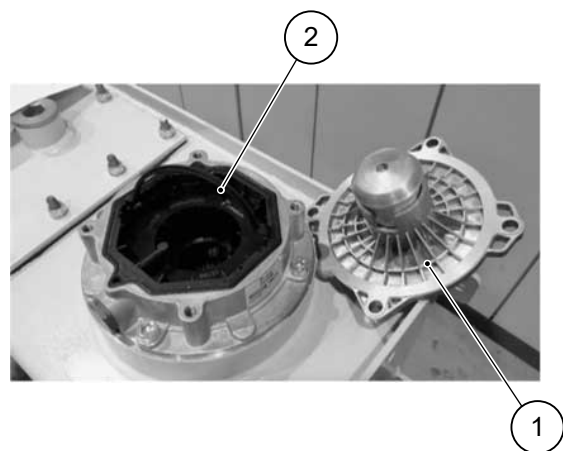


Figure 190. Hydraulic oil drain plug

5. Close the hydraulic tank drain plug.

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6. Clean the cover of the return filter and clean also the area around the cover of the return filter.
7. Undo the cover of the return filter. Open the four screws (8 mm hex socket) and remove the cover (1).



Callout	Description
1	Cover of the return filter
2	Filter element

Figure 191. Cover of the return filter and filter element

 **NOTE:** Keep the machine and its equipment free of dirt and oil.

8. Replace the filter element. For instructions, see [7.13.3 Changing the hydraulic oil filter](#).
9. Fill in the hydraulic oil. See the two possible ways (a and b) listed below.

 **NOTE:** The hydraulic oil must be filled in through the filter element, or alternatively through a filling connection.

 **NOTE:** Do not refill through the breather.

- a) Through the filter element (2) until the oil level marking.

 **NOTE:** Never fill in oil without the filter element to prevent contaminants from entering the system.

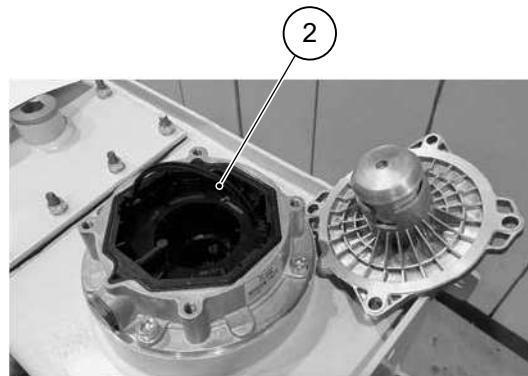


Figure 192. Filter element

- b) Through a filling connection (3) until the oil level marking.

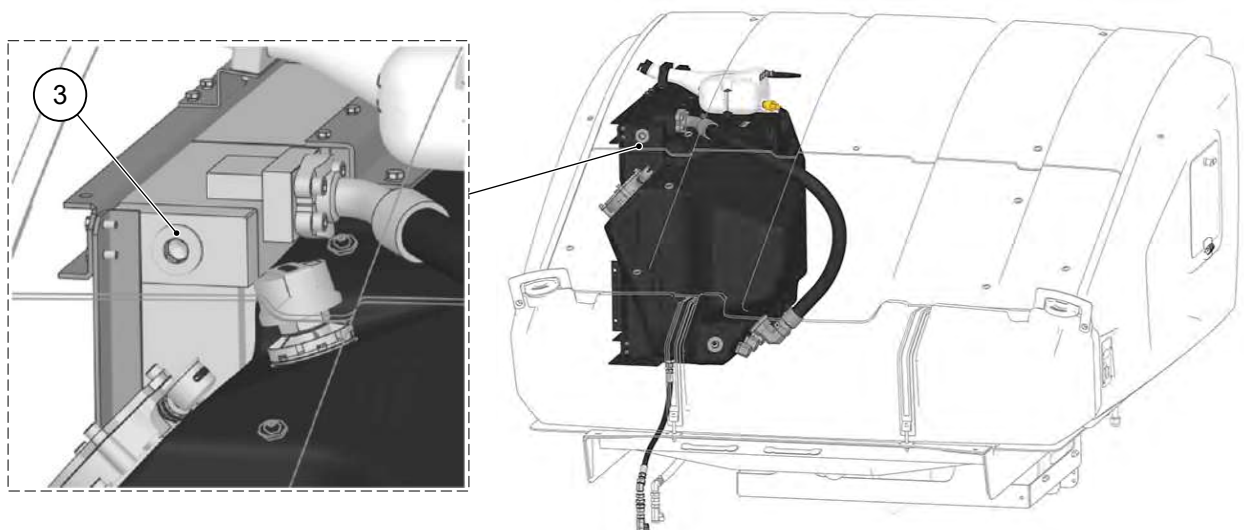


Figure 193. Filling connection



NOTE: It is forbidden to use the drain line for filling.

10. Install the cover of the return filter (1).
11. Open the hydraulic shut-off valve.
12. Check the hydraulic oil level and possible leaks.

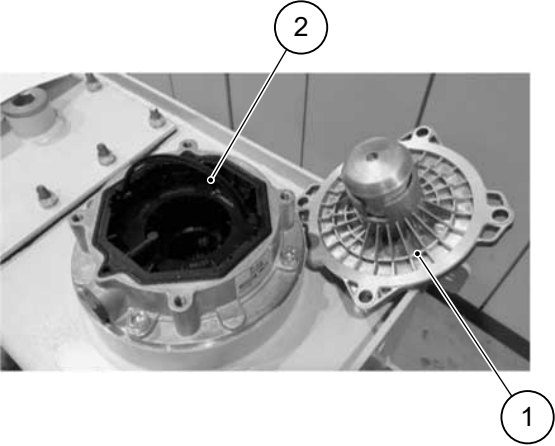
7.13.3 Changing the hydraulic oil filter

The filter is mounted to the hydraulic tank. The filter is a replaceable element, under a cover.

Proceed as follows:

1. Stop the engine and let the machine cool down. Make sure that the hydraulic system is pressure-free.
2. Clean the cover of the return filter and clean also the area around the cover of the return filter.

3. Undo the cover of the return filter. Open the four screws (8 mm hex socket) and remove the cover (1).



Callout	Description
1	Cover of the return filter
2	Filter element

Figure 194. Hydraulic oil filter element and cover



NOTE: Keep the machine and its equipment free of dirt and oil.

4. Pull the filter element (2) out from the filter housing.

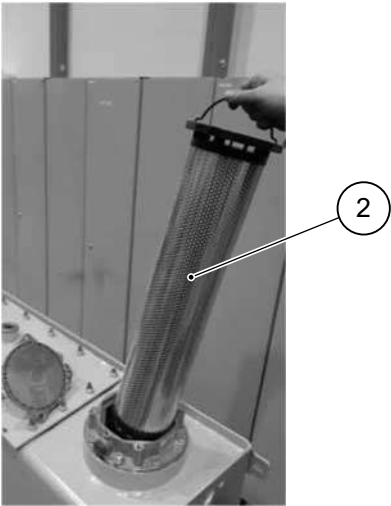


Figure 195. Filter element

5. Observe the condition of filter housing (3).

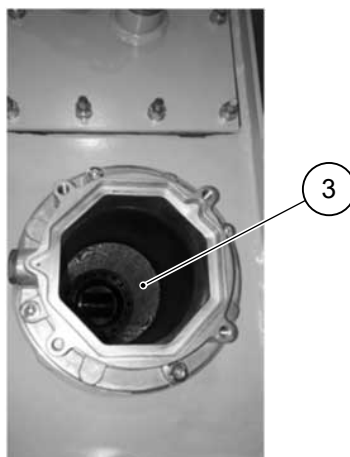


Figure 196. Filter housing

6. From the new filter element, check condition of seals and replace if needed.
7. Install the new filter element.
8. Install the cover of the return filter.
9. Make sure that there are no leaks in the hydraulic system.

7.13.3.1 Indicator for return filter pressure

The hydraulic system is equipped with an indicator for oil return filter.

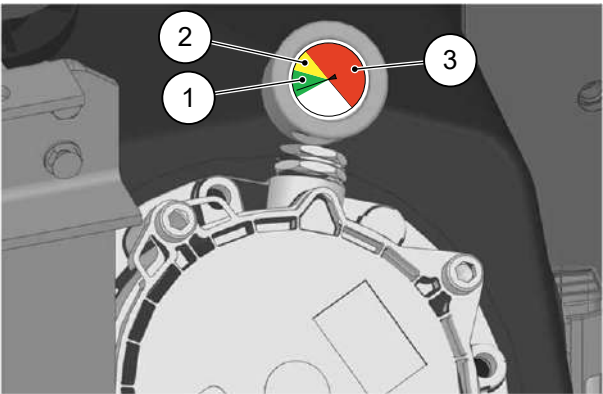


Figure 197. Location of indicator for oil return filter

Reading the indicator:

- Green
 - Normal operation
- Yellow

- The filter should be changed as soon as possible. Operation of machine not recommended before filter is changed. Some unfiltered oil may bypass the filter resulting in increased risk of damage to hydraulic components.
- Red
 - Do not use the machine until the filter is changed. All hydraulic fluid bypass the filter. There is a great risk of damaging the hydraulic components.



Callout	Description
1	Green
2	Yellow
3	Red

Figure 198. Reading the indicator

7.13.4 Breathers

The hydraulic tank breather is located on the top side of the hydraulic tank.

Check the breather condition every 50 hours. If the breather is wet, it does not breathe and therefore it must be replaced immediately. Otherwise the replacement interval is 1000 hours.

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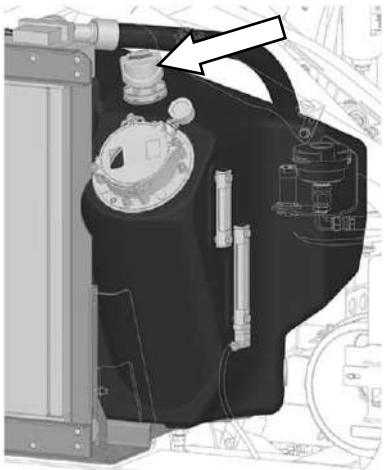


Figure 199. Hydraulic tank breather

Replacement instructions:

1. Open the cover by turning it counterclockwise.
2. Replace the filter element.
3. Close the cover by turning it clockwise.

7.13.5 Bleeding the hydraulic cylinder circuit



 **WARNING**

UNEXPECTED MOVEMENT HAZARD

Can cause death or serious injury or property damage.

Any trapped air in the conveyor control circuit will cause the conveyor to drop. When a cylinder, hose or other component is replaced or damaged, the circuit must be bled to release the trapped air. Make sure no one is in the restricted area when a conveyor is maneuvered.

The function of the cylinders can be fast and uncontrollable. This usually means that there is air inside the circuit, and the cylinder circuit needs to be bled.

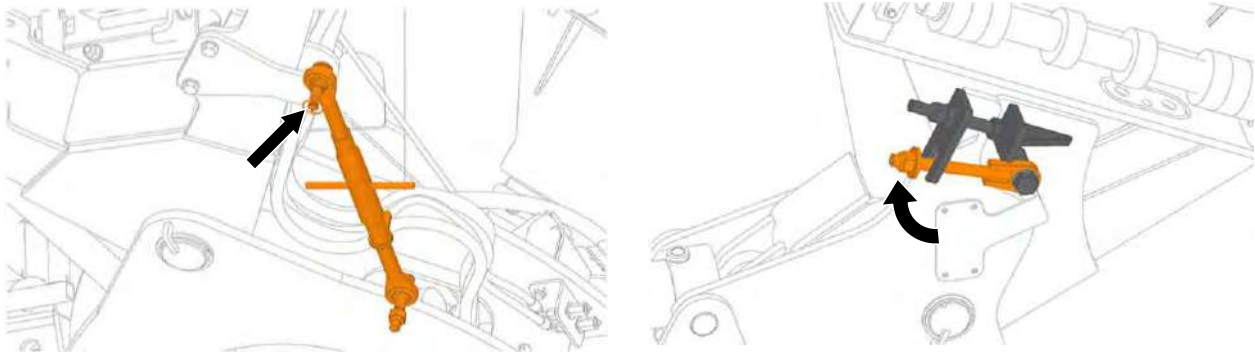
The cylinder circuit must be bled also, for example, when replacing the hose, the cylinder, or some other component.

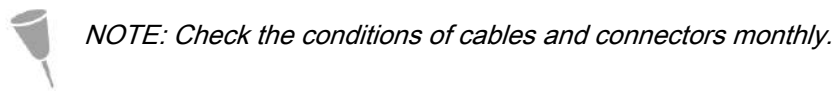
1. Always lock the movable module before removing a cylinder.
2. Disconnect the cylinder rod ends from their mountings.



NOTE: Make sure that the cylinder cannot fall.

3. Run the cylinders back and forth (at least three times) until all the air is expelled from the circuit.
4. Attach the cylinder rod ends back to their mountings.





7.14.1 Batteries



⚠ WARNING

FIRE HAZARD
Can cause death or serious injury.
The gas generated during charging is highly flammable. Do not use open fire as a light source when checking the electrolyte level of the battery.



⚠ WARNING

CORROSIVE SUBSTANCE HAZARD
Can cause death or serious injury.
The electrolyte consists of diluted sulfuric acid, which is extremely corrosive. Wear all appropriate personal protective equipment, for example, safety gloves, safety goggles, and protective overalls when handling the batteries. Do not spill the electrolyte on your skin or clothes.



⚠ WARNING

PRESSURIZED COMPONENT HAZARD
Can cause death or serious injury.
Only authorized personnel can adjust relief valves and refill the accumulator.

Batteries that function properly are a prerequisite for the operation of electrical devices. That is why they must be kept fully charged. The battery terminals must be cleaned frequently enough and lubricated with a suitable protective agent. The cable shoes must be kept well tightened and the liquid level must be monitored. Add distilled water, if necessary.

Checking the electrolyte level

The electrolyte levels of the batteries must be checked every 100 operating hours. The electrolyte surface must be approximately 10 mm above the plates. Add clean distilled water if necessary. By observing the water consumption you can determine whether the battery charging voltage is within the right limits. If no water is consumed, it implies that the charging limit is too low and that there is continuous undercharge of the batteries. If water is consumed excessively, the alternator is charging with overvoltage, which decreases the operating life of the batteries and lamps.

Checking the charge level

The charge level must be checked periodically with a hydrometer. Measuring must not take place immediately after water has been added, because water does not mix with the electrolyte until the batteries have been slightly charged. The specific weight of the electrolyte in a fully charged battery is approximately 1.28, and 1.20 if the state of charge is 50%. These values apply only at the temperature of +20°C (68°F).
The batteries must always be kept fully charged. A continuous undercharge condition causes the plates to sulphate, which decreases the charging capacity and power of the battery.

In addition, note that a battery freezes at the temperature of -25°C (-13°F) if the state of charge is 50%, and a depleted battery freezes at the temperature of -10°C (14°F).

Cleaning the batteries, terminals and cable shoes

You must clean these parts at least once a year. Battery terminals and cable shoes should be cleaned with special tools suitable for the job, which helps to keep their shape and contact area sufficiently wide. After the cleaning, battery terminals and cable clips must be protected from oxidation with a thin layer of Vaseline. Also check the fastening of the grounding wire to the frame, the fastening of the starting motor cables and the fastening of the generator and the voltage regulator wires. Clean and tighten any loosened connectors. Keep the outer surface of the batteries clean and dry.

7.14.2 Charging circuit

Check and tighten the wire connections at regular intervals. The generator and regulator only need periodical checking.

For an alternator, carefully follow these instructions:

- Do not remove the battery cables or any other charging circuit connections when the engine is running.
- Do not use the engine when the charging circuit wires are disconnected.
- When charging the batteries externally, disconnect the ground cable, and verify the correct polarity before connecting the batteries, additional batteries and the charger.
- When repairing electrical devices, disconnect the coupling cables of the batteries.
- Do not use the charging system with batteries disconnected from the circuit or with loose generator or battery connections.
- It is absolutely forbidden to polarize the alternator.
- Do not short any part of the circuit or do any measuring with equipment of small inner resistance.

When starting with the help of additional batteries, make sure the following:

- The battery voltages are similar.
- The terminals with the same name are connected to one another.

7.14.3 Starting circuit

Normally, the starting circuit does not require much servicing. Keep the engine clean and the wire connections tightened. The most important factors for the operation of the starting circuit are the condition and the charge level of the batteries.

7.15 e-Power maintenance



⚠ **WARNING**

ELECTRICAL HAZARD
Can cause death or serious injury.
Before starting any service, maintenance, or repair work, disconnect the power supply.



 WARNING

ELECTRICAL HAZARD

Can cause death or serious injury.

The lockout by turning the power selection main switch to the off position does not switch the voltage off the feed cable. The feed cable must be isolated before making any maintenance to the high voltage power system.



 WARNING

CRUSHING HAZARD

Can cause death or serious injury.

Do not go under the e-Power module when lowering it.



 WARNING

FALLING OBJECT HAZARD

Can cause death or serious injury.

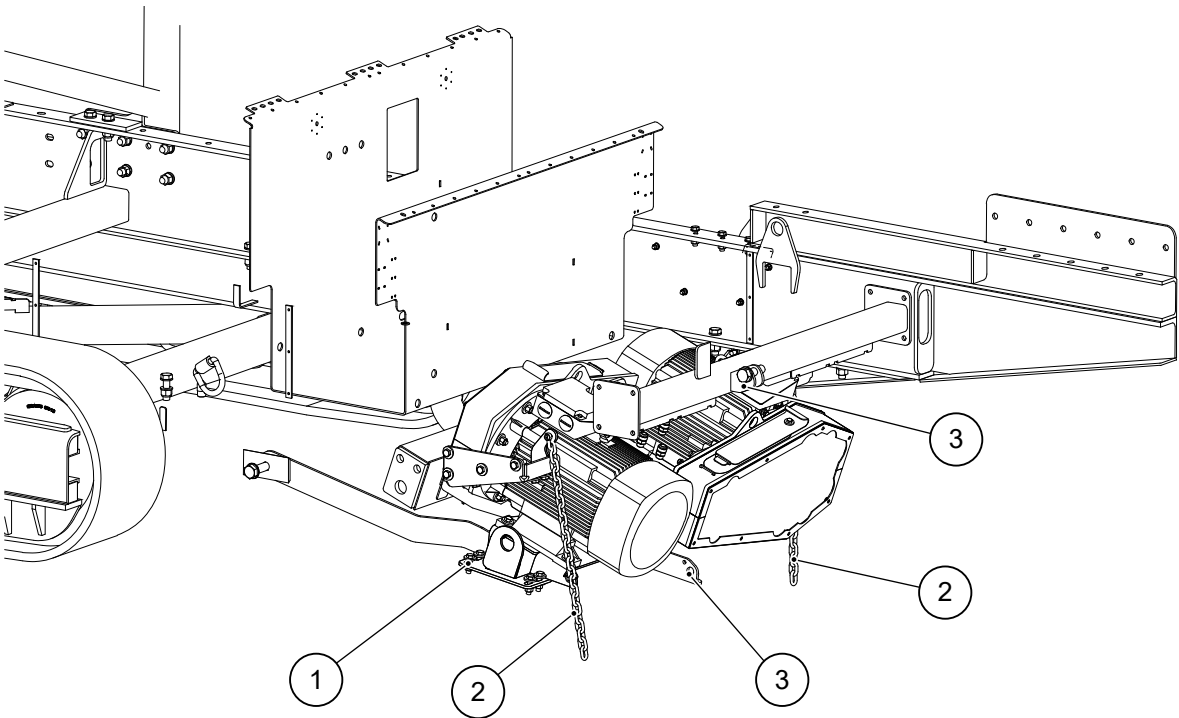
Always use approved lifting equipment with adequate capacity. All lifting operations must be performed by professionals. Do not go under a suspended load.

Operating the maintenance feature:

1. Disconnect the power supply and lock out the **main switch**. See [7.2 Lockout and tagout procedure](#).
2. Close the main hydraulic valve. Oil change recommended in case of pump failure.
3. Prepare a solid support for the module.
4. Make sure the subframe is properly supported. The unit weight is approx. 1000 kg.
5. Loosen the support chains for 3-5 links.
6. Open the fastening bolts from the outside of the frame. Be careful when removing the last bolts.
7. Lower the unit carefully by using the lowering device and observe all the hydraulic hoses and electric cables. Dismount cable and hydraulic fixings if needed.
8. Proceed step by step with the security chain and lowering device.
9. Lower on the solid support.

When lifting the module, proceed in reversed order.

- Shorten the support chain to shortest possible length.



Callout	Description
1	Fastening screws
2	Support chains
3	Lifting points

Figure 201. Maintenance feature components

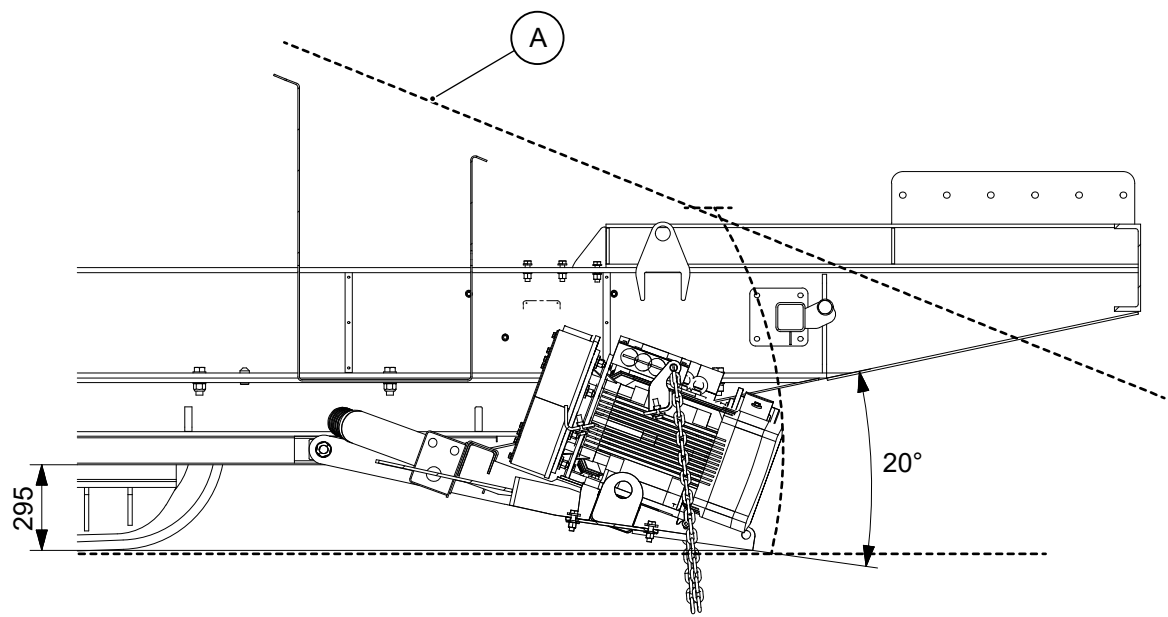


Figure 202. e-Power unit lowered (Lifting conveyor (A) not shown in the figure)

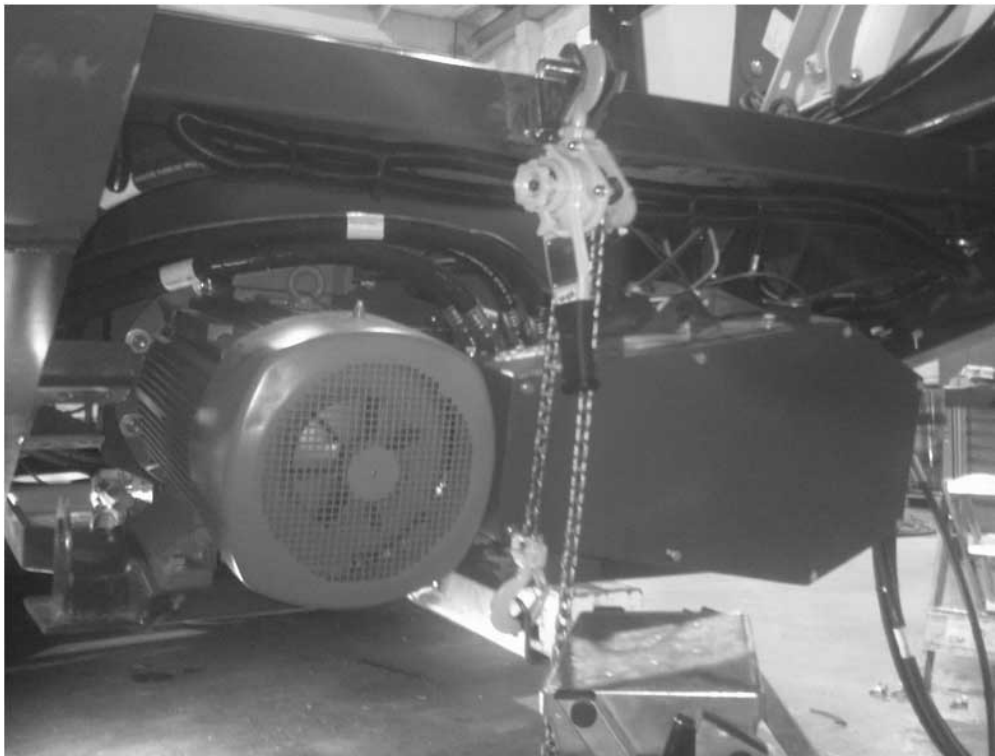


Figure 203. Chain hoist and lifting points

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7.15.1 e-Power unit greasing
Thrust bearing

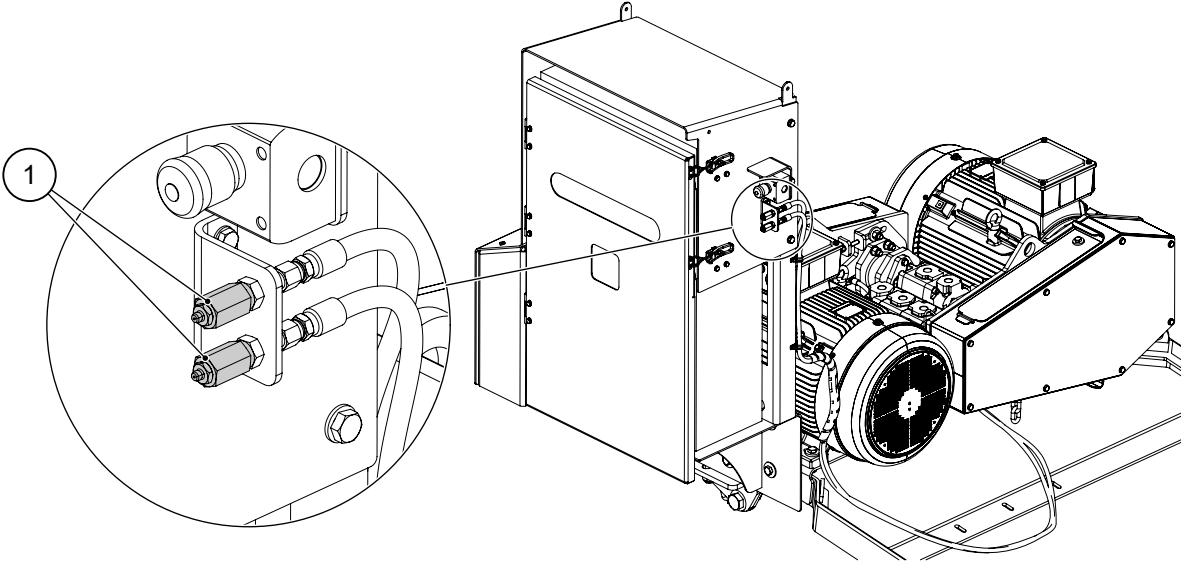


Figure 204. Thrust bearing plug (1)

Lubricate the thrust bearing on both sides of the unit.

Lubricate the thrust bearing NLGI EP2 grease. The grease amount is 20 g and greasing interval 1000 hours.

Electric motor

The grease for electric motor is special grease. Check the correct grease type from the type plate or from the motor manufacturer. Greasing interval is 4000 hours.

7.15.2 e-Power V-belt

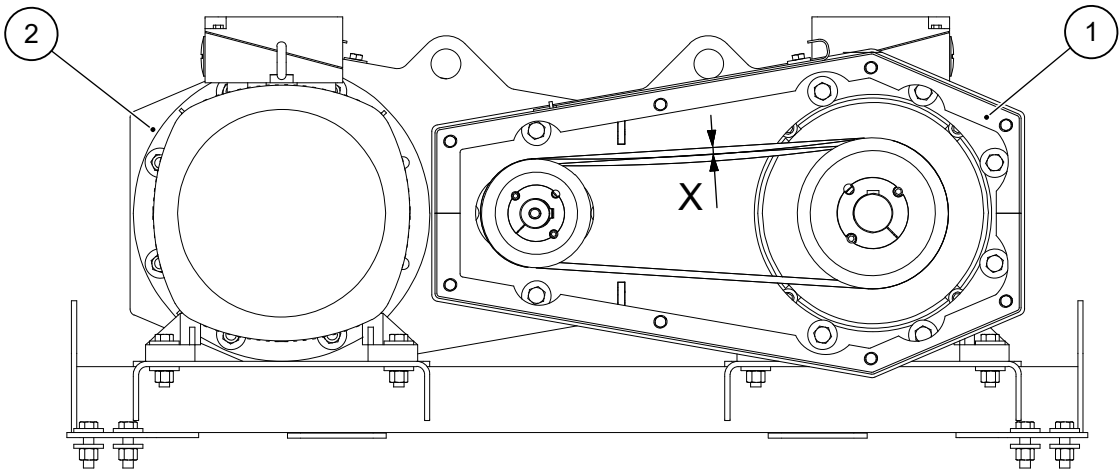
You can determine the belt tension by pressing the belt with a certain force. The table shows the correct forces and deflections (X).

Table 5: Pump motor assembly 1: Double pump

50 Hz	Force / Frequency	Deflection
New belt	50 N / 74.45 Hz	10.79 mm
Used belt	50 N / 65.30 Hz	13.54 mm
60 Hz	Force / Frequency	Deflection
New belt	50 N / 77.58 Hz	10.25 mm
Used belt	50 N / 68.04 Hz	12.74 mm

Table 6: Pump motor assembly 2: Triple pump

50 Hz	Force / Frequency	Deflection
New belt	50 N / 82.19 Hz	9.28 mm
Used belt	50 N / 72.09 Hz	11.63 mm
60 Hz	Force / Frequency	Deflection
New belt	50 N / 77.82 Hz	10.20 mm
Used belt	50 N / 68.26 Hz	12.67 mm



Callout	Description
1	Pump motor assembly 1
2	Pump motor assembly 2

Figure 205. e-Power V-belt tension

7.16 Lubricant recommendations

ENGINE OIL CLASSIFICATION	Caterpillar class ECF-3, General class API CJ-4, ACEA E9
ENGINE OIL SAE GRADE	See the diagram 'Engine oil viscosity' below.

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HYDRAULIC OIL TYPE	Basic requirements for the hydraulic oil quality: - the viscosity index should be at least 150 - minimum viscosity of 16 cSt at operating temperature - maximum viscosity of 900 cSt at starting temperature About hydraulic oil types and temperatures: - Unless otherwise indicated, the factory fill oil is a special hydraulic oil belonging to the ISO VG 46 class. The maximum operating temperature allowed for this oil type is approximately +80°C (176°F) and the minimum starting temperature allowed is approximately -20°C (-4°F). - In cold climate conditions when the operating temperature of the oil remains under +60°C (140°F), the use of a special hydraulic oil belonging to the ISO VG 32 class is recommended. The maximum operating temperature allowed for this oil type is approximately +65°C (149°F) and the minimum starting temperature allowed is approximately -30°C (-22°F) degrees. - In hot climate conditions when the ambient temperature exceeds +35°C (95°F), the use of a special hydraulic oil belonging to the ISO VG 68 class is recommended. The maximum operating temperature allowed for this oil type is approximately +90°C (194°F) and the minimum starting temperature allowed is approximately -9°C (16°F).
GREASE GENERAL OVERALL	NLGI EP 2 The use of greases containing molybdenum additives is prohibited.
SCREEN BEARINGS	SKF LGEP2
TRACK DRIVE	- Oil designation DIN 51517, part 3: CLP 220. - ISO viscosity DIN 51519: ISO - VG 220. - Kinematic viscosity at 40°C (104°F) degrees: Min. 198 mm²/s (cSt) Max. 242 mm² /s (cSt) - FZG test A /8.3/90 for DIN 51354: Min. breakdown load stage 12.
FEEDER DRIVE	VG150 GEAR OIL

Engine oil viscosity

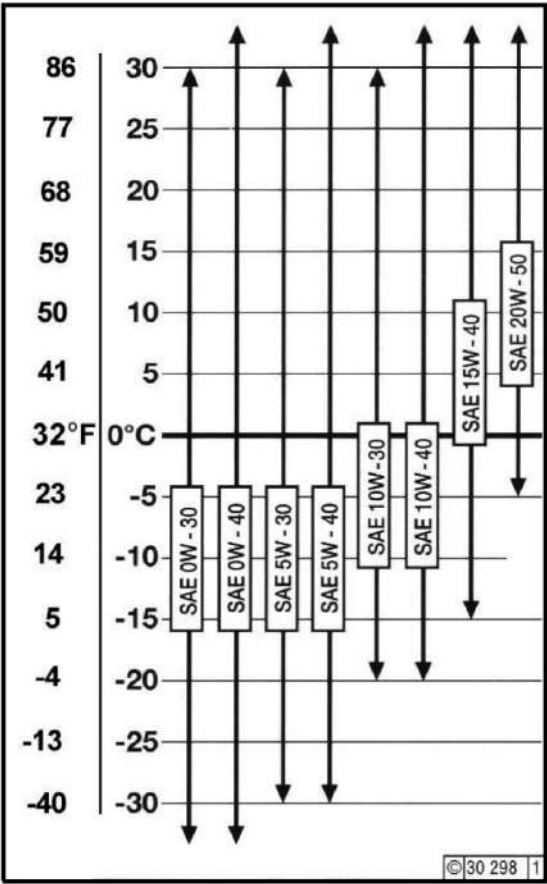


Figure 206. Engine oil viscosity

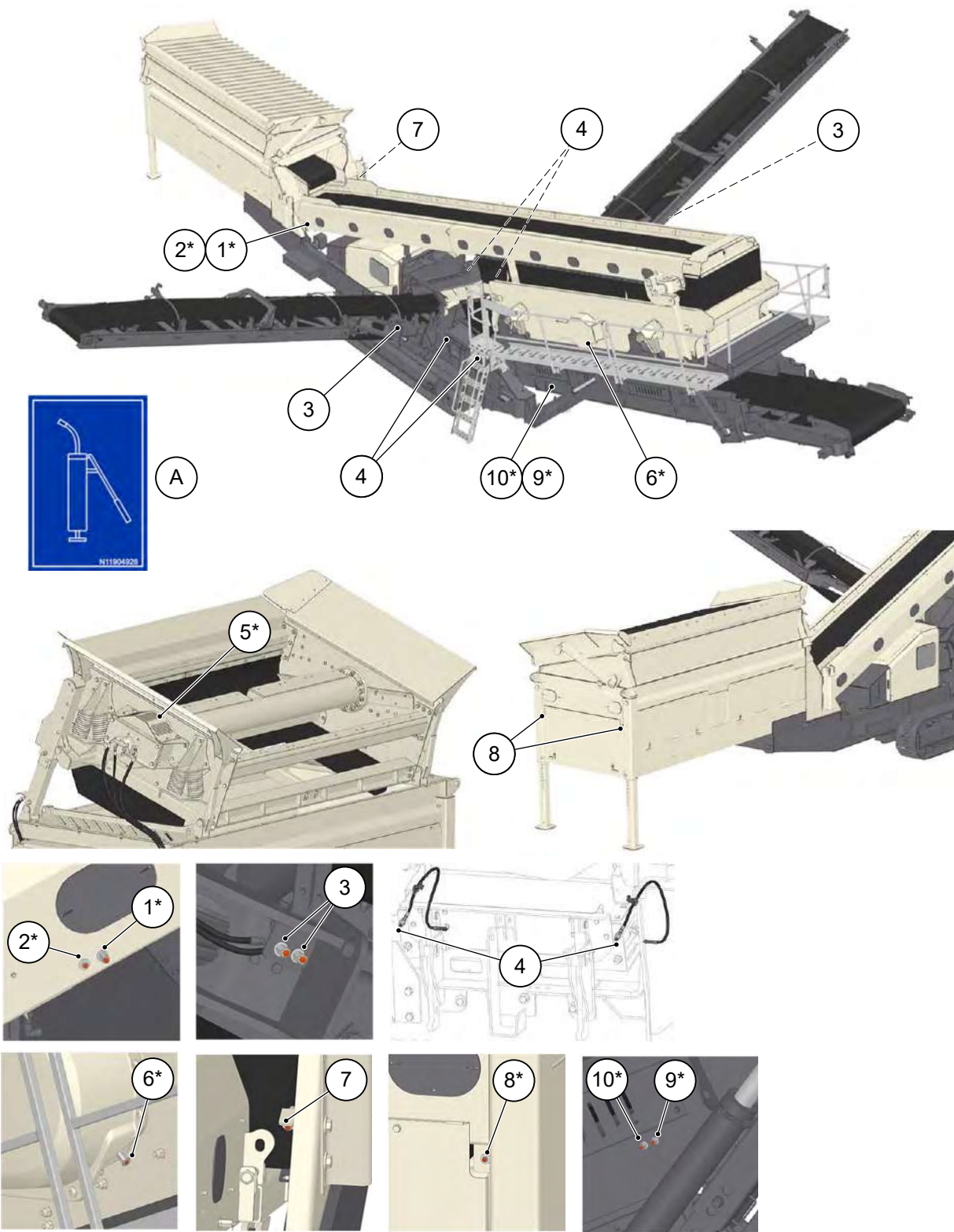
Lubrication oils are differentiated according to their performance and quality class. In common use, specifications are named after the API (American Petroleum Institute) and ACEA European Engine Oil sequences.

As the viscosity of the lubrication oil is dependent on temperature, the choice of SAE grade should be done according to the ambient temperature at the engine's operating site. To achieve the optimum operating behavior, take the oil viscosity diagram above as a guide. If the temperature falls temporarily below the limits of SAE grade selected, cold starting may be affected, but the engine will not be damaged.

To keep wear to a minimum, do not exceed application limits for extended periods of time. You can avoid oil changes dictated by season by using multi-grade lubrication oils. Multi-grade oils, particularly light flowing oils, also reduce fuel consumption.

7.17 Greasing the Lokotrack ST unit

1. Before greasing, stop the engine. For instructions, see [4.5 Stopping the engine](#).
2. Check the lubricant types from [7.16 Lubricant recommendations](#).
3. Do the greasing according to intervals in the table below.



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Table 7: Lokotrack ST3.8 greasing points

Callout	Greasing point	g/bearing	Schedule
1	Drive end of lifting conveyor	7 g*	50 h
2	Lifting conveyor bearings	6 g*	50 h
3	Drive end of side conveyors	6 g	50 h
4	Side conveyor bearings	4 g	50 h
5	Vibrating grid bearings (option)	40 g*	50 h
6	Vibrating element of screen	40 g*	50 h
7	Drive end of belt feeder	8 g	50 h
8	Belt feeder bearings	6 g*	50 h
9	Drive end of product conveyor	7 g*	50 h
10	Product conveyor bearings	6 g*	50 h

Greasing points marked with (*) mean that the greasing point is in the same location on both sides of the machine.

A grease gun produces typically about 2 g per shot. Greasing points are marked with sticker (A).

7.18 Welding



 **DANGER**

TOXIC GAS HAZARD

Will cause death or serious injury.

There are components made of manganese steel and components covered with zinc. Welding, grinding, or flame cutting these components generates gas that is extremely hazardous to health and causes poisoning.

You must do this kind of work outdoors or in well-ventilated premises equipped with local exhaust ventilation. Also wear respiratory protection.



⚠ WARNING

PERSONAL INJURY HAZARD

Can cause death or serious injury.

When welding, grinding or flame cutting, wear the appropriate personal protective equipment, such as eye protection or flame retardant clothing. Only operate on parts of the machine that have been cleaned for that particular purpose. Do not work on parts that contain flammable liquids (tanks, fluid pressure pipes or similar). Take the appropriate special precautions when welding or grinding near such parts.



⚠ WARNING

FIRE HAZARD

Can cause death or serious injury.

Make sure a fire extinguisher is easily accessible at all times.

When arc welding, do the following:

1. Shut down the engine.
2. Turn the **ON/OFF switch** to the “0” position.
3. Remove the earth cable of the batteries.
4. Connect the earth cable of the welding power source to the part to be welded, if possible, and make sure that the current does not flow through bearings, joints or electrical devices.

7.19 Washing Lokotrack ST3.8

The Lokotrack ST3.8 unit can be cleaned with a pressure washer, but obey the following:

- Perform the lockout and tagout procedure before washing.
- Do not let the water jet enter the air intake or exhaust pipe. Ceramic element in the exhaust system may damage (only in Stage V / Tier 4 Final / China Stage IV engines).
- Do not direct a jet of water onto the rods of the hydraulic cylinders to prevent corrosion.
- Do not direct a jet of water onto the display when washing the equipment with a pressure washer. If there is moisture around the electronic components after washing, disconnect the plugs and socket arrangements and dry the connectors.
- Do not direct a jet of water to a cooler from too close distance. That will damage the cooler.
- Hydraulic valve block must be washed with extreme care. Water in the valve control pin may cause control voltage faults.
- Do not wash the inside of the noise encapsulation (if installed). Use compressed air instead.



CAUTION

PERSONAL INJURY HAZARD

Can cause moderate injury or property damage.

Regularly remove any material from insides of the housing. Take special caution when opening the hatches. Handling the hatches and doors may require two persons. Make sure to remove or lock the doors open for service tasks.

- When washing the unit with 400 V electric system inform the supervisor first. Be extremely cautious when washing electric cabinets, generators and electric motors. Prevent water from entering cooling air channels of the electric cabinets.



WARNING

ELECTRICAL HAZARD

Can cause death or serious injury.

Do not use high water pressure when cleaning the exteriors of the electric cabinets. Make sure the cabinet doors are properly closed.

Before taking the machine into operation, the safety devices as well as the basic functions of Lokotrack ST3.8 must be checked.

It is recommended to use a banksman to secure the safety of the first start after washing. Connect the drive control device to the unit. The banksman must be ready to use the remote stop in the drive control device if some unexpected movement happens.

7.20 Tightening torques, recommendations

Strength class/Size		8.8
M-thread		
M6		9.8 Nm
M8		24 Nm
M10		47 Nm
M12		81 Nm
M16		198 Nm
M20		386 Nm

Torques without lubrication. Conversion factor to ft lbs: 1 Nm = 0.74 ft lbs.

8 Terminology

Throughout this instruction manual, technical terms are used to describe the screening unit, its components and its operation. These terms are defined herein with the intent of avoiding any confusion or misunderstanding.

Feeder

Capacity: Transport ability of vibrator in tons per hour.

Sorting capacity: Sorting ability of vibrator in tons per hour.

Feeding end: The end of the screen, where material is fed into.

Discharge end: The end of the screen, where material is discharged from.

Vibrator: The mechanism in the vibrating device that makes the screen vibrate.

Grizzly: Grating structure in the vibrating device that separates the fine matter from the fed material.

Screen deck: Cloth structure in vibrating device that sorts the fed material into fractions.

Screen

Feed: The raw material to be crushed, such as the rock type (limestone, basalt, granite, etc.) or man-made materials such as concrete and asphalt. The feed size is typically denoted in terms of a size distribution or based on an average top (maximum) size.

Product size: The size of the material after it has been crushed. Similarly to the feed size, the product size is typically denoted in terms of a size distribution or based on an average top (maximum) size.

Capacity: The output of the screen in tons per hour. The capacity of the crusher depends on factors such as the type of feed (material type, size distribution, fracture characteristics, moisture content, etc.), type of operation (feed availability, feed arrangement) and discharge setting.

Feed opening: The opening where the feed material is fed into the crusher. The feed opening has two dimensions: a width and a depth. The feed opening depth is a critical dimension because it dictates the maximum feed size a given jaw crusher model can accept.

Maximum recommended feed size: As a general guideline, the maximum average recommended feed size should be about 80% of the feed opening depth. Such measures will ensure that any bridging events resulting from oversized feed are kept to a minimum. A rock hammer is recommended for applications where the maximum feed size is regularly close to the feed opening depth.

Conveyor

Arching/ Crown-faced: Enlargement of the diameter in the middle of a pulley which helps to center the belt. Also referred to as crown-faced.

Back stop device: Prevents the belt from running backwards if there is loss of power with material on the belt. Typically accomplished by adding a check valve into the hydraulic circuit.

Belt: The belt is used to convey the material.

Belt speed: The distance traveled in a given time.

Belt tension mechanism: A slide that allows for adjusting the belt tension by moving the head or tail pulley.

Discharge area: A point where the material drops off the conveyor.

Discharge chute: Guides the outflowing material.

Discharge height: Vertical free distance from the conveyor discharge end to the ground.

Drive drum/ Drive pulley: Transmits the torque of the drive motor to the belt by friction. Bends the belt to the return side of the conveyor. Located at the discharge or head end of the conveyor.

Drive drum bearing: The number and location of the bearings varies according to the conveyor type. In some applications the drive motor can be used as a bearing.

Drive drum coating/ Lagging: The drive drum coating is a rubber coating on the surface of the drive drum. The coating can also be made of rubber discs or strips. Also referred to as lagging.

Drive motor: A hydraulic driven motor, which rotates the drive drum.

Dust cover: A shield for preventing the dust spreading to the surroundings.

Emergency stop: Emergency stop push button or a switch with a trip line for stopping the conveyor.

Guide roller: Prevents the edge of the belt from hitting the conveyor's structure.

Impact beam/ Impact bar: A beam, located at the charging point underneath the belt. Equalizes the impact of the dropping material.

Lifting angle: An angle, which the conveyor lifts the material (Too steep of an angle may cause the material to roll downwards).

Load point: A point where the material drops on to the conveyor. The structure of the load point varies according to a stress of the dropping material flow. There may be several load points.

Maintenance hatch: Maintenance and inspection accesses located along the conveyor frame.

Pinch guard/ Nip guard: Device designed to eliminate or reduce the possibility of injury by blocking the pinch/nip hazard.

Plow/ Plough: A cleaning device located underneath the belt before the tail pulley. Prevents material from getting caught between the belt and the tail pulley.

Pre-scraper/ Pre-cleaner: Cleans the belt with a carved blade against the surface of the drive drum.

Return roller/ Return idler: Supports the belt on the return side. Guides the belt. Adjustment of the return idlers can correct belt tracking.

Rip stop belt: Belt contains steel wire (diameter of 3 mm) across the width of the belt at every 300 mm to prevent rips in the conveyor belt longer than 300 mm.

Roller assembly/ Idler assembly: Supports the belt on the material flow side and guides the belt. Adjustment of the troughing idlers can correct belt tracking.

Rotation detector: A sensor indicating the rotation of the conveyor, crusher or feeder.

Scraper: Device used to clean residual material from the material side of the belt after the point of discharge.

Skirt rubber: A longitudinal rubber seal located between the belt and the conveyor's frame for preventing the overflow of the material.

Slide bar/ Slider bed: A beam, or an array of beams, along which the belt slides. Supports the belt on the material flow side. Similar to an impact bed.

Tail pulley: Bends the belt back to the drive side. Located at the feed end of the conveyor.

Water spray system: A system for reducing the amount of fugitive dust by directing a fine water spray onto the material.

Wing pulley: A pulley with openings on the cylinder face. The dirt and stones that fall to the return side of the belt can enter these openings and fall to the ground rather than being trapped and causing damage to the belt.

Engine module

CSE: Constant Speed Engine

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9 Troubleshooting

9.1 System display does not start

Cause

Battery is empty, the main switch is in OFF position, or battery clamps are not attached.

Remedy

There is no power in the system.

1. Make sure that the main switch is in ON position. See [9.9.1 Making sure that the main switch is ON](#).
2. For charging the battery, see [9.9.6 Charging the battery of Lokotrack ST unit](#).
3. For jump starting, see [9.9.8 Jump starting the engine with another machine or vehicle](#).
4. For jump starting, see [9.9.9 Starting the engine with jump starter](#).
5. Make sure that the battery clamps are attached. See [9.9.5 Making sure that the battery clamps are attached](#).

9.2 Engine start failed

Cause

Engine did not start.

Remedy

Engine start is prevented.

1. Make sure that the main switch is in ON position. See [9.9.1 Making sure that the main switch is ON](#).
2. Make sure that the emergency stop buttons are not pressed down. See [9.9.2 Making sure that the emergency stop buttons are not pressed down](#).
3. Make sure that the remote stop button is not pressed down. See [9.9.3 Making sure that remote stop button is not pressed down](#).

Cause

Hydraulic oil level is too low.

Remedy

Engine start is prevented.

1. See [9.9.15 Checking the hydraulic oil level and possible leaks](#).

Cause

Hydraulic shut-off valve is closed.

Remedy

Engine start is prevented.

1. See [9.9.16 Opening the hydraulic shut-off valve](#).

Cause
Hydraulic oil temperature is too high.
Remedy

Engine start is prevented.

- See [9.9.17 Recovering from too high hydraulic oil temperature.](#)

9.3 Radio control device is not working

Cause
The battery of radio control device is empty or the battery charge level is low.
Remedy

Radio control device cannot be used.

- See [9.9.7 Charging the battery of radio control device.](#)

9.4 Track drive does not work

Cause
Manual valve mode is activated.
Remedy

The machine cannot be driven to any direction.

- Check if the manual valves are on. See [9.9.4 Checking if the manual valves are on.](#)

Cause
Process is not stopped.
Remedy

The machine cannot be driven to any direction.

- Check if the process is running. See [9.9.19 Checking if process in running.](#)

Cause
Manual controls are active.
Remedy

The machine cannot be driven to any direction.

- Check if manual controls are active. See [9.9.18 Checking if manual controls are active.](#)

Cause
Drive control device or radio control device was connected before starting the engine.
Remedy

The machine cannot be driven to any direction.

- Reconnect/Reactivate the control device.

9.5 Engine is not running properly or it suddenly stopped

Cause

Fuel tank is empty.

Remedy

The machine cannot be driven.

1. See [9.9.10 Checking the fuel level](#).

Cause

When driving on a sloping surface or onto a trailer truck, the automation system may stop the machine if the hydraulic fluid or the coolant level is too low.

Remedy

The machine cannot be driven.

1. See [9.9.14 Correcting too large inclination angle of the machine](#).

9.6 System display shows an alarm

Cause

Engine did not start.

Remedy

Engine start is prevented.

1. See [9.9.11 Handling alarms](#).

9.7 System display shows an 'A17: Remote stop active' alarm

Cause

Remote stop button is pressed down.

Remedy

Engine start is prevented.

1. See [9.9.12 Handling the 'A17: Remote stop active' alarm](#).

9.8 System display shows an emergency stop alarm

Cause

One or more emergency stop buttons are pressed down.

Remedy

Engine start is prevented.

1. See [9.9.13 Handling the emergency stop alarm](#).

9.9 Corrective actions

9.9.1 Making sure that the main switch is ON

1. Locate the main switch.

You can find it from the right side of the machine, near the main control center.



Figure 207. Main switch in ON position

2. Turn the main switch clockwise to ON position (if it is not in the ON position yet).

9.9.2 Making sure that the emergency stop buttons are not pressed down

1. Check that the emergency stop buttons are not pressed down.
For the locations of emergency stop buttons, see [2.2.5 Emergency stop locations](#).
2. If an emergency stop button is pressed down, reactivate it by pulling the red knob.



Figure 208. Emergency stop button

9.9.3 Making sure that remote stop button is not pressed down

If the remote stop button is pressed down, a message “A17: Remote stop active” is displayed in the top left corner of the main control panel display.

1. From the drive control device or from the radio control device, make sure that the remote stop button is not pressed down.
For the location of remote stop button, see [2.2.6 Remote stop locations](#).
2. If the remote stop button is pressed down, reactivate it by pulling the red or black knob depending on the control device you are using.

9.9.4 Checking if the manual valves are on

If the manual valves are on, the message field on the top left corner of main control panel display shows “W51: Hand valves are in use”.

If the manual valves are on, track driving does not work.

1. Check that the message “W51: Hand valves are in use” is not shown in the display indicating that the manual valves are on.
2. Make sure that the manual valves are off.



Figure 209. Manual valves ON/OFF push button

9.9.5 Making sure that the battery clamps are attached

1. Locate the battery, and check if the battery clamps are attached properly.

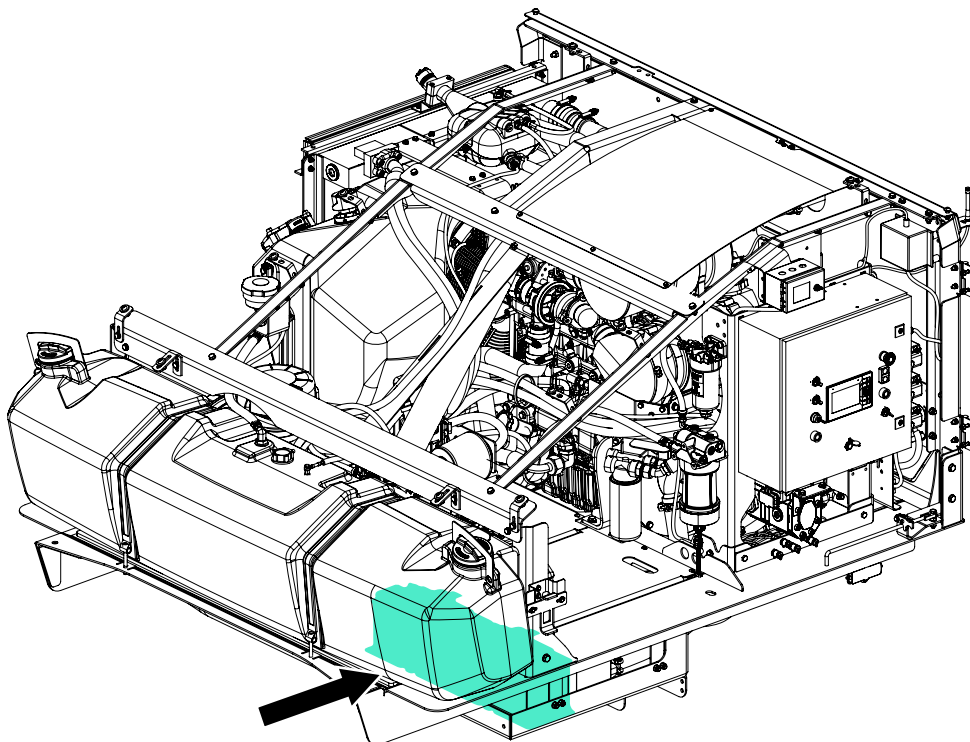


Figure 210. Lokotrack ST3.8 battery location

2. If the battery clamps are loose, attach them.

9.9.6 Charging the battery of Lokotrack ST unit

1. If the batteries (24 V_{DC}) of the machine need to be charged, locate the battery and remove the + cable from the battery during charging to avoid damage to the electrical system.

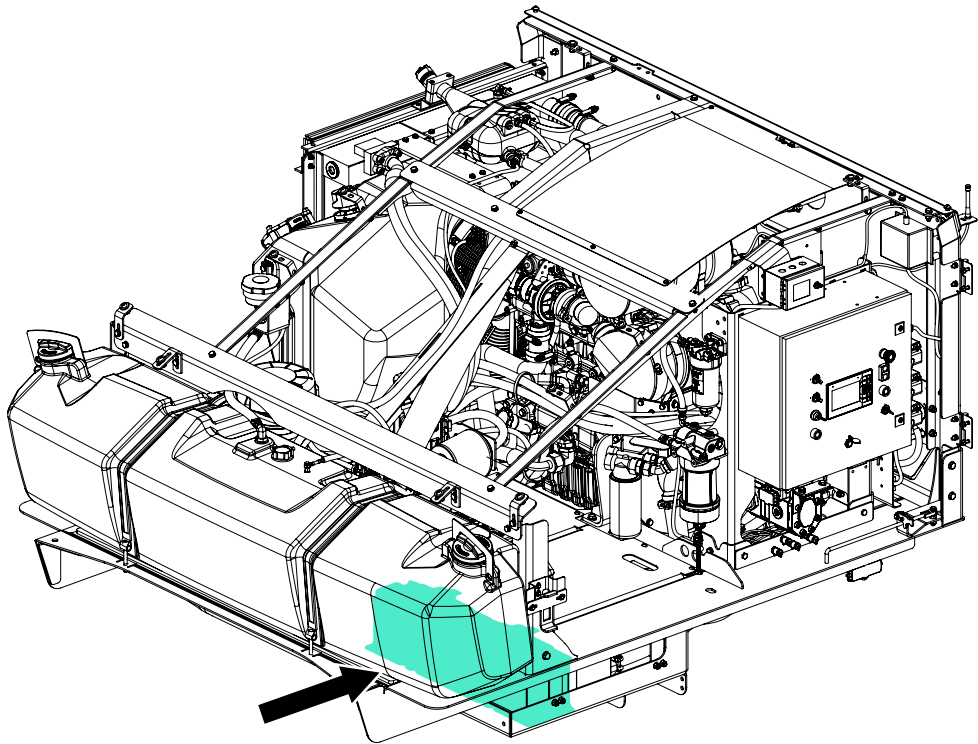


Figure 211. Lokotrack ST3.8 battery location

2. Charge the battery according to the instructions of the battery charger manufacturer.

9.9.7 Charging the battery of radio control device

The operation LED of radio control device indicates the following operational condition and status:

- Continuous green: Transmitter is ON, but not yet operational.
- Flashing green: Transmitter is operational.
- Red light blinking: Low battery

Fast charging:

1. Insert the discharged battery into the battery compartment and snap into place. The charge LED flashes for 2 seconds, then stays lit.
2. Press FAST CHARGE. The FAST CHARGE LED also lights up and stays lit. When the READY LED lights up and the CHARGE and FAST CHARGE LEDs turn OFF, your battery is fully charged.



NOTE: Charging time may take up to 5 hours depending on your battery condition.

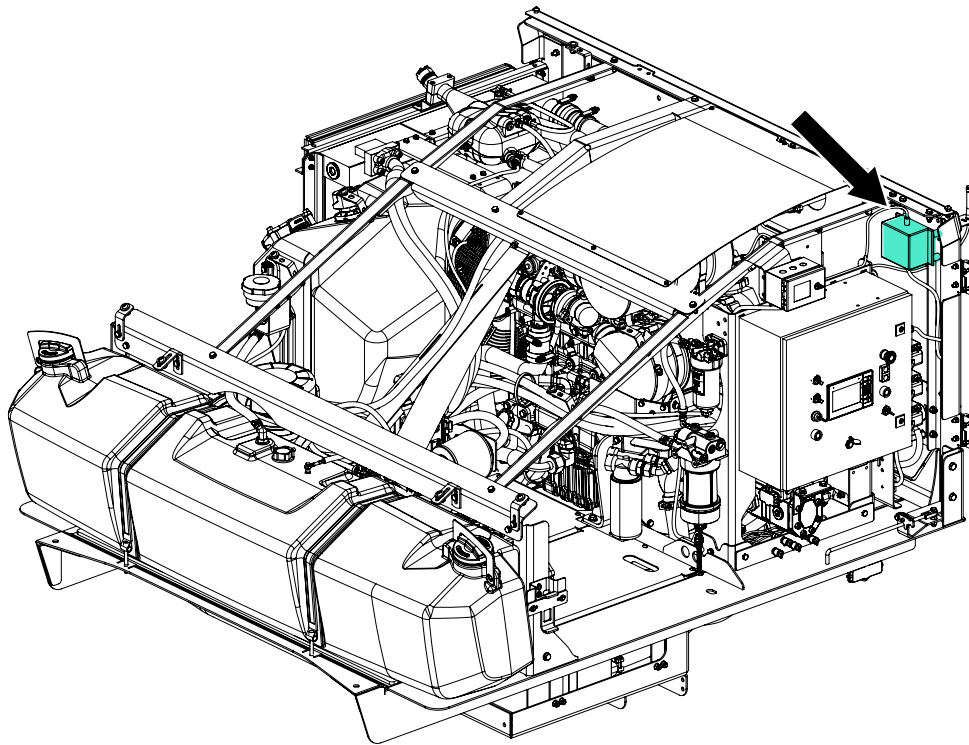


Figure 212. Charging location of radio control device

The exact charging location might vary depending on the features of the machine. The charging location is orange in color.

9.9.8 Jump starting the engine with another machine or vehicle

Jump starting can be used for starting the engine if the batteries (24 V_{DC}) are too weak to start the engine. For jump starting, you need jumper cables.

For the location of the battery of the machine, see [9.9.6 Charging the battery of Lokotrack ST unit](#).

1. Make sure that both machines/vehicles are turned off.
2. Connect one end of the red (positive) jumper cable to the positive terminal on the stalled battery.
3. Connect the other red (positive) cable to the positive terminal of the working battery.
4. Connect one end of the black (negative) jumper cable to the negative terminal of the working battery.
5. Connect the other black (negative) cable to the negative terminal of the stalled battery.
6. Start the engine that is doing the jump starting. Run for two to three minutes before starting the stalled machine.
7. Remove the cables in reverse order.
8. Keep the jumped engine running for at least 30 minutes to give the battery a sufficient time to recharge.

9.9.9 Starting the engine with jump starter

Follow the jump starter manufacturer's instructions.

For the location of the battery of the machine, see [9.9.6 Charging the battery of Lokotrack ST unit](#).

1. Connect the jump cables to the portable jump starter while it is still in the off position.

If the cables are permanently attached to the unit, you can ignore this step.

2. Connect the positive (red) jumper clamp to the positive terminal of the vehicle’s battery and the negative (black) clamp to the negative terminal of the stalled battery.
Make sure that the clamps are properly connected so that when the vehicle starts, they are not shaken loose and possibly lead to the cables touching each other and shorting the jump starter.
3. Turn the jump starter on.
4. Turn on the ignition and try to start the vehicle.
If the engine does not start immediately, do not crank the engine for more than about five seconds.
Pushing the jump starter to crank your engine for longer periods can cause overheating and damage the battery of the device. Allow 2-3 minutes between 5 second attempts to allow the battery bank of the jump starter to cool down, and also for the voltage to recover.
5. After the engine has started, switch the jump starter off.
6. Remove the negative jumper cable, and then remove the positive cable.

9.9.10 Checking the fuel level

If the fuel level is low, a message “W54: Fuel level low” is displayed in the **message field** on the top left corner of the main control panel display.

1. Check the fuel level from the **Message field** (1) of main control panel display. Another way is to tap **Information views** (2), and then tap **Engine information** (3) and check the value (4).
- If there is no fuel, or the fuel level is very low, refill. Make sure that no dust or dirt enters the fuel tank through the refill opening

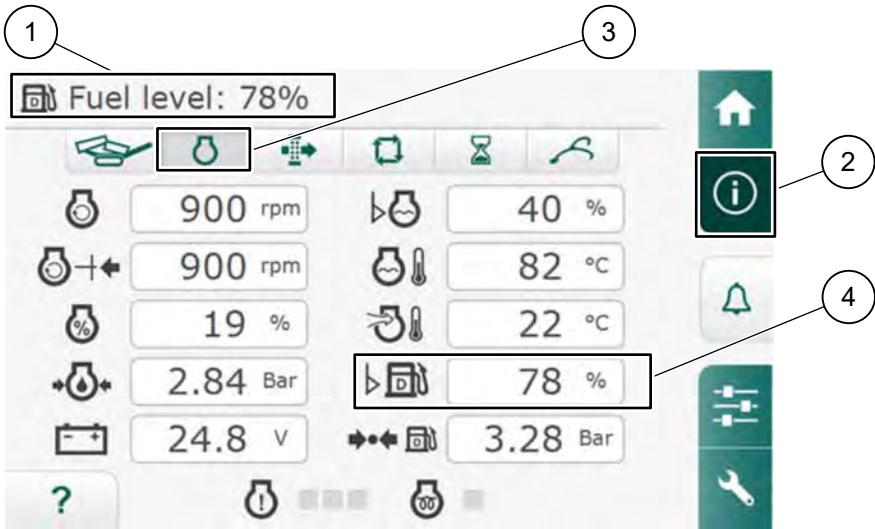


Figure 213. Fuel level

9.9.11 Handling alarms



NOTE: Reading and understanding the alarm messages as well as the using the help information will help you to understand functions of the machine.



NOTE: If there is a malfunction that is preventing the track driving, it must be fixed before proceeding. If necessary, contact Metso.

In a problem situation, check if there are any active alarms.

1. From the **main view**, check if the alarm indicator (1) is red or grey.
 - a) Red color: Active alarm or warning.
 - b) Grey color: No active alarm.

If the **alarm indicator** (1) is red, proceed to the next step.

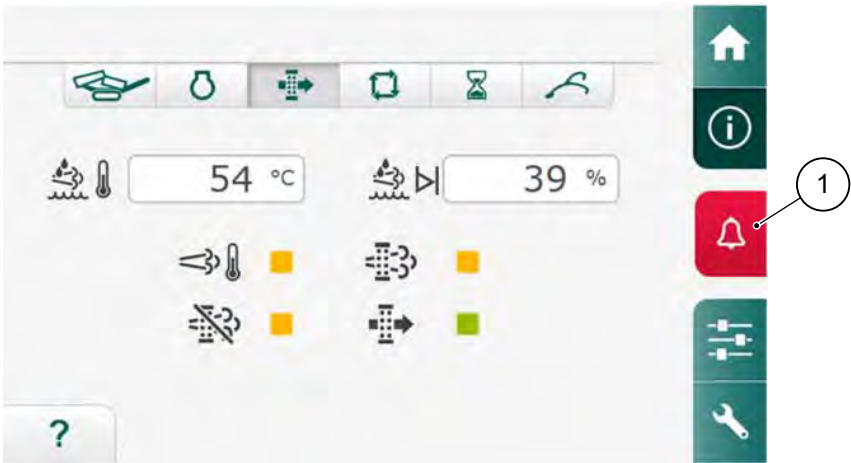
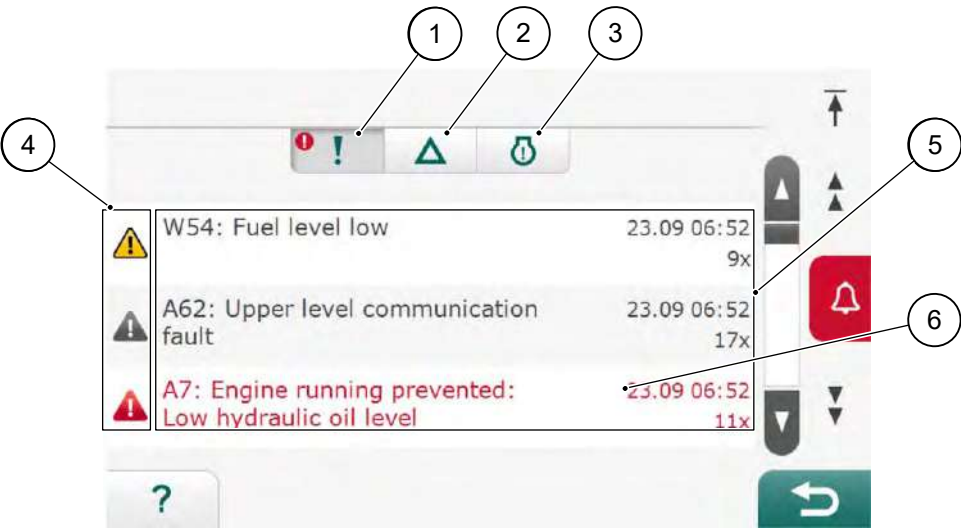


Figure 214. **Main view**

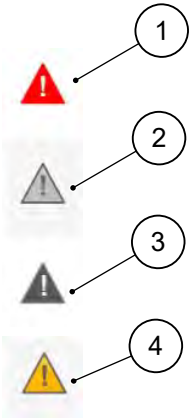
2. See the list field (5) for alarm descriptions. By tapping any row, you get specific information about the alarm/warning.

You do not need to acknowledge alarms or warnings. They will change inactive automatically after the cause has been fixed.



Callout	Description	Callout	Description
1	List of alarms and warnings (red dot indicates active alarm)	4	Message type and activity
2	List of all events (alarms, warnings, and event messages)	5	List field
3	List of diagnostic messages of the engine	6	Tap any row to get specific information about the alarm/warning

Figure 215. Alarm view



Callout	Description	Callout	Description
1	Active alarm: (red message text), red icon	3	Inactive alarm: (black message text), dark-grey icon
2	Inactive warning: (grey message text), light-grey icon	4	Active warning: (black message text), black-yellow icon

Figure 216. Alarm view symbols and descriptions

9.9.12 **Handling the 'A17: Remote stop active' alarm**

If the A17: Remote stop active alarm is active, the remote stop button in drive control device or in radio control device is pressed down.

1. Reactivate the remote stop button by pulling the red or black knob depending on the control device you are using.
For the location of remote stop button, see [2.2.6 Remote stop locations](#).

9.9.13 **Handling the emergency stop alarm**

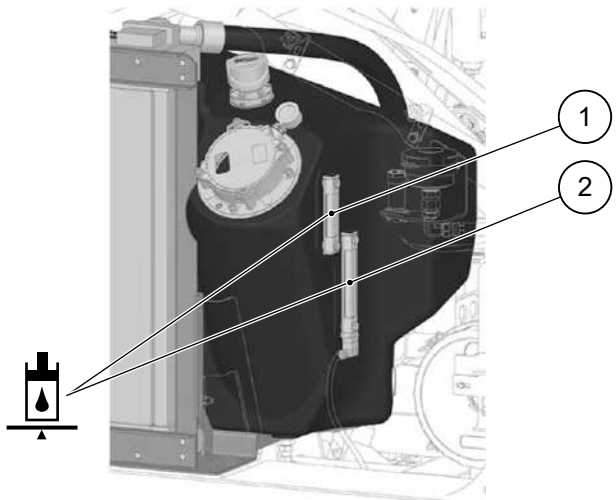
If the emergency stop alarm is active, one or more emergency stop buttons are pressed down.

1. Reactivate the emergency stop buttons by pulling the red knob.
For the locations of emergency stop buttons, see [2.2.5 Emergency stop locations](#).

9.9.14 **Correcting too large inclination angle of the machine**

If too large inclination angle is preventing the driving of the machine, do the following:

1. Examine the hydraulic oil level from the sight glasses 1 and 2. Add hydraulic oil, if necessary.



Callout	Description
1	Maximum level
2	Minimum level

Figure 217. Hydraulic oil level

2. Make sure that coolant level is between MIN and MAX markings. Add coolant, if necessary.

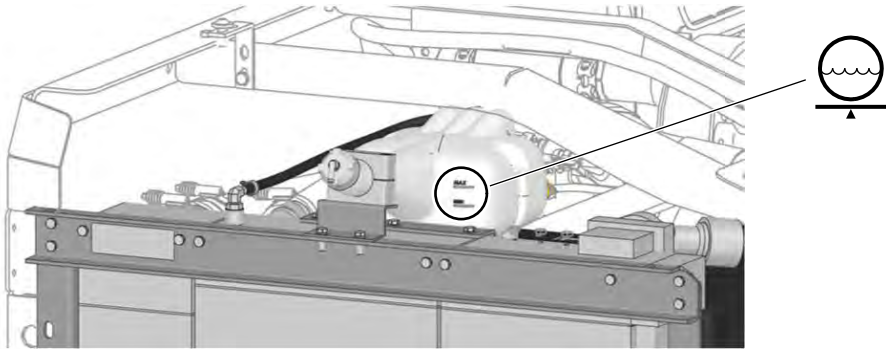


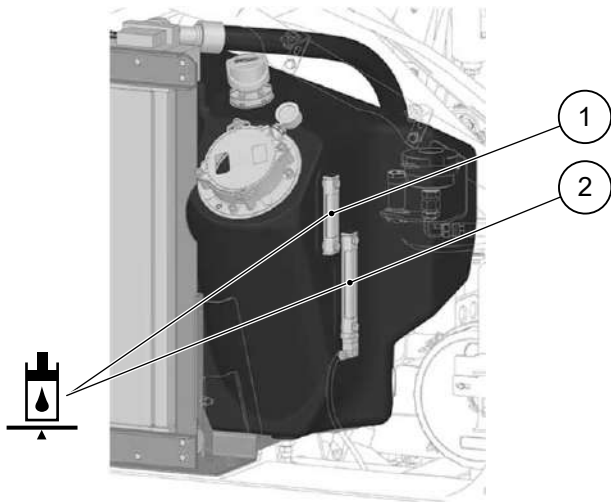
Figure 218. Engine coolant level indicator

3.
- If neither refilling the hydraulic oil nor engine coolant does not solve the problem, consider arranging help from a third party, for example a hoist, crane, or another vehicle which could be used for moving the machine to more even ground.

9.9.15 Checking the hydraulic oil level and possible leaks

If the hydraulic oil level is too low, an alarm, for example, “A7 Engine running prevent: Low hydraulic oil level” is displayed on the main control panel display.

1.
- Check the hydraulic oil level from the sight glasses 1 and 2.



Callout	Description
1	Maximum level
2	Minimum level

Figure 219. Hydraulic oil level

2.
- Inspect the machine visually for leaks.
3.
- If needed, repair the leak and refill.

4. Make sure that the inclination angle of the machine is not too large. See [5.2 Preparing for driving](#) and [9.9.14 Correcting too large inclination angle of the machine](#).
5. Try starting the engine again.

9.9.16 Opening the hydraulic shut-off valve

If the hydraulic shut-off valve is closed, a message “A5: Engine running prevented: Hydraulic main valve closed” is displayed in the **message field** on the top left corner of the main control panel display.

1. If the hydraulic shut-of valve is closed, open it.

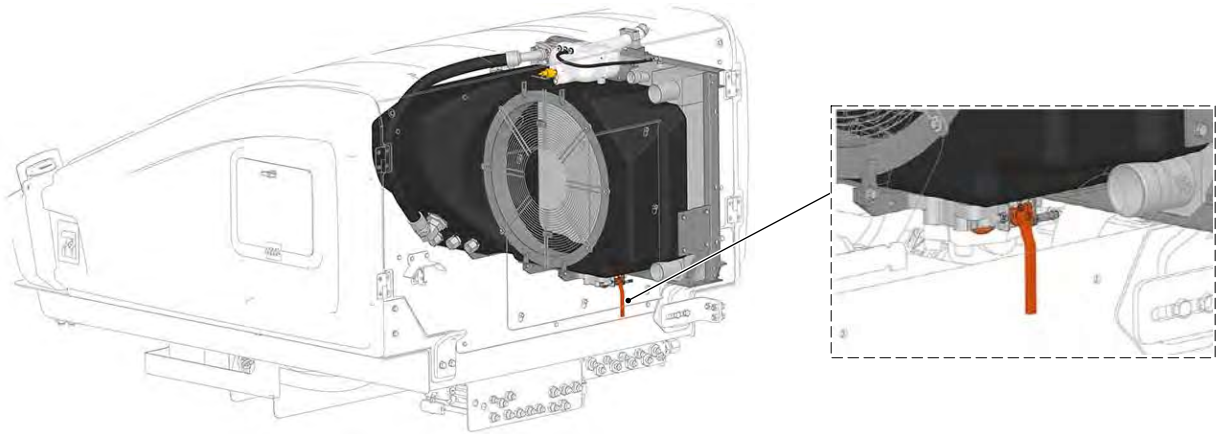


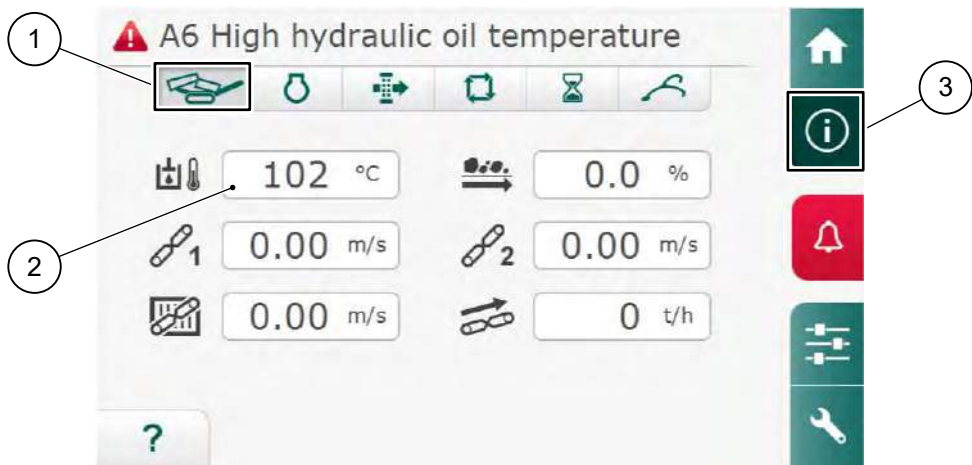
Figure 220. Location of hydraulic shut-off valve

9.9.17 Recovering from too high hydraulic oil temperature

If the hydraulic oil temperature is too high, a message “A6: Process running prevented: Too high hydraulic oil temperature” or “A3: Engine running prevented: Too high hydraulic oil temperature” is displayed in the message field on the top left corner of the main control panel display.

Check the hydraulic oil temperature by doing the following:

1. From the **Main view** of the control panel display, tap **Information views** (3).
2. Tap **ST information** (1).



Callout	Description
1	ST information view
2	Hydraulic oil temperature
3	Information views

Figure 221. ST information view

The hydraulic oil temperature is shown in the hydraulic oil temperature field (2).

3. Wait for the hydraulic oil to cool down until the temperature is below +60°C (140°F).
4. Try starting the engine again.



NOTE: If the hydraulic oil temperature rises repeatedly too high, the root cause must be solved. If needed, contact Metso.

9.9.18 Checking if manual controls are active

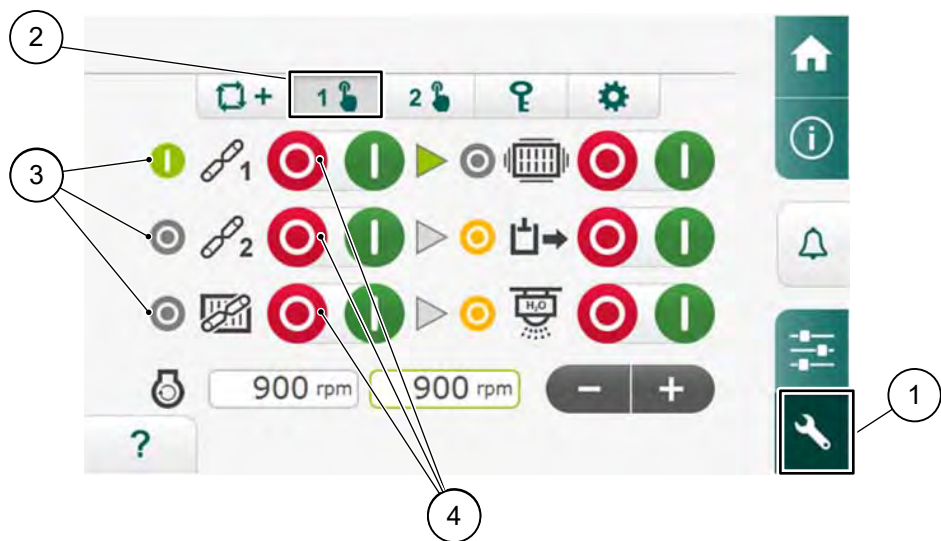
If manual controls are active, a message “W53: Track drive not allowed: Manual controls are active” is displayed in the message field on the top left corner of the main control panel display.

To check if manual controls are active, do the following:

1. From the **main view** of the control display, tap **Process control views** (1), and then tap **Manual controls one view** (2).
2. If the warning “W53: Track drive not allowed: Manual controls are active” is active, the Status symbols (3) have some other color than grey or yellow.

For enabling track driving, tap the **Stop button** (4) for those devices that have some other color than grey or yellow in their status symbol.

- a) Wait for the status symbol to get grey color, and then you can activate the track driving again.



Callout	Description
1	Process control views
2	Manual controls one view
3	Status symbols of devices
4	Stop button for devices

Figure 222. Manual controls one view

9.9.19 Checking if process in running

If screening process is running, a message “W52: Track drive not allowed: Process is not stopped” is displayed in the message field on the top left corner of the main control panel display.

Track driving is not possible if the screening process is running.

1. Push the Process stop button from the main control panel to stop the screening process and to enable track driving.

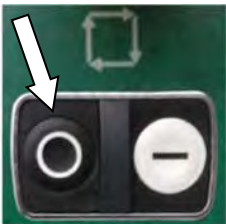


Figure 223. Process stop button

9.10 Testing unit functions

You can use manual control functions described below for example for troubleshooting when the engine is not running.

You can activate a function and continue troubleshooting by measuring the voltage. You can test the electrical continuity from the logic output to the solenoid of hydraulic valve.



NOTE: If the manual valves or track driving are activated, manual controls cannot be used.

1. To start the manual control functions, do the following: From the main control display, select the **Process control views** (7), and then select the **Manual controls one view** (1). See the figure below.

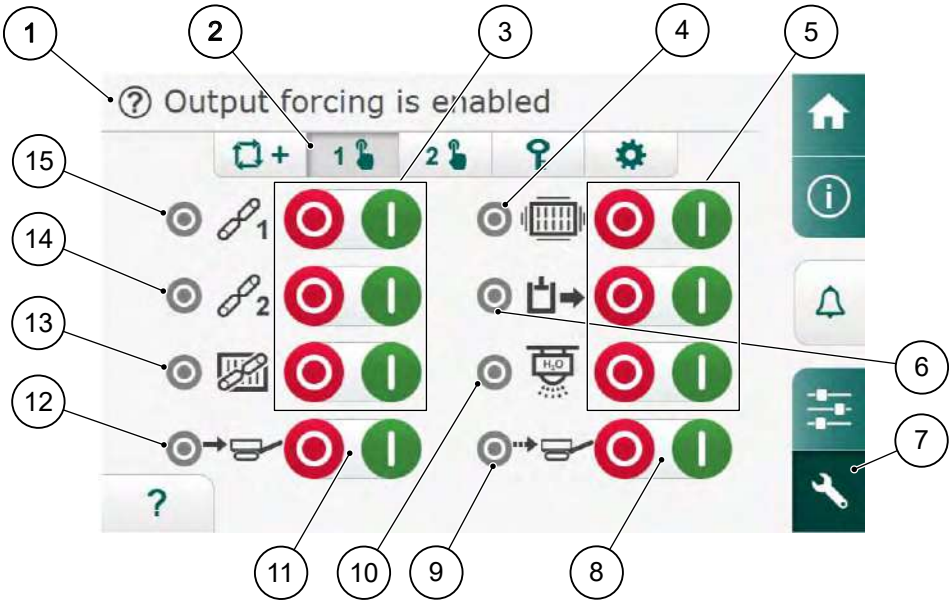
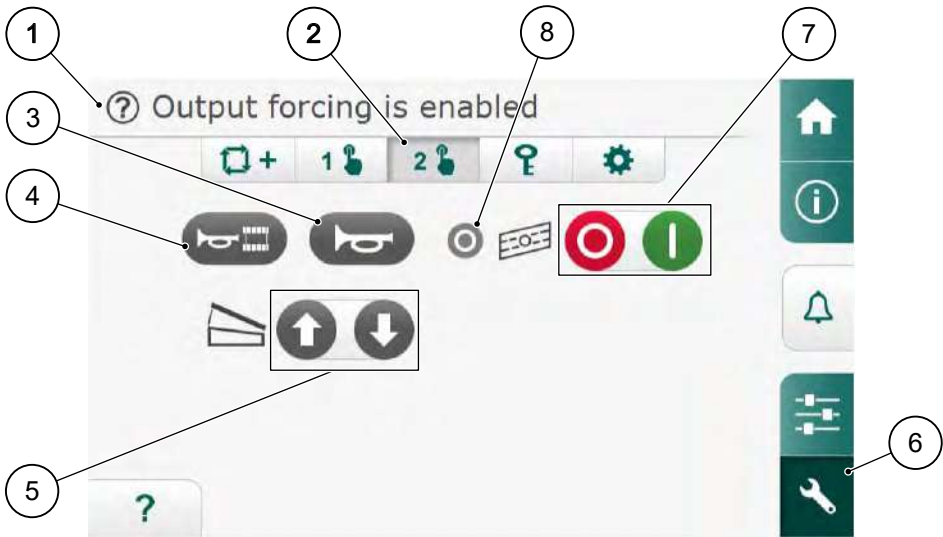


Figure 224. Manual controls - force control

Callout	Description	Callout	Description
1	Info field which indicates that force control is enabled	2	Manual controls one view
3	Start and stop buttons of main devices	4	Status indicator of vibrating grid (running/ stopped)
5	Start and stop buttons of optional devices	6	Status indicator of hydraulic power take off (running/stopped)
7	Process control views	8	Start and stop buttons of preceding unit running to minimum speed - test
9	Preceding unit running to minimum speed - test	10	Status indicator of high pressure water spray system (running/stopped)
11	Start and stop of preceding unit running to minimum speed - test	12	Stop preceding unit feeder - test
13	Conveyor circuit 3 test: - ST4.8, ST4.10, ST3.8, ST3.5: Status indicator of lifting conveyor (running/ stopped) - ST2.4, ST2.8: Status indicator of side conveyor, undersize (running/stopped)	14	Conveyor circuit 2 test: - ST4.8, ST4.10: Status indicator of bottom deck side conveyor and top deck side conveyor (running/stopped) - ST3.8, ST3.5: Status indicator of bottom deck side conveyor (running/ stopped)

Callout	Description	Callout	Description
			ST2.4, ST2.8: Status indicator of underscreen conveyor (running/stopped)
15	Conveyor circuit 1 test: - ST4.8, ST4.10: Status indicator of product conveyor and middle deck side conveyor (running/stopped) - ST3.8, ST3.5: Status indicator of product conveyor and top deck side conveyor (running/stopped) - ST2.4, ST2.8: Status indicator of top deck side conveyor and side conveyor, midsize (running/stopped)		

2. Tap **Manual controls two** (2) for manual control functions of screen, horn, and grid tilt.



Callout	Description	Callout	Description
1	Info field which indicates that force control is enabled	2	Manual controls two view
3	Horn (audible start alarm signal for starting the process)	4	Horn (audible start alarm signal for track driving)
5	Grid tilt (lifting and lowering grid manually)	6	Process control views
7	Start and stop buttons of screen	8	Screen test

Figure 225. Manual controls two - force control

10 Decommissioning and disposal

- Disposal of waste

Waste materials, such as oil, battery acids and cleaning fluids etc. must be removed carefully using suitable containers to prevent any hazard to people, animals or environment. The hazardous material must be removed to a suitable waste collection plant for disposal or recycling.

- Storage of the machines

The machine must be stored in a dry and covered area.

- Disposal of the machine

Whenever a machine is taken out of use, being dismantled or disposed of, all hazardous materials, such as oils, battery acids, fuels etc. must be carefully removed first to eliminate any danger to life and the environment. The hazardous materials must be removed to a suitable waste collection plant for disposal or recycling. Dispose of the machine so that there is no danger to life or the environment.

Metso

Metso

P.O. Box 1000, 02231 Espoo, Finland
Tel +358 20 484 100
www.metso.com

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Metso

Remote IC

Doc No. D100026308 Revision: 3

Original instructions

INSTRUCTION MANUAL

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Metso

Address: P.O. Box 1000
02231 Espoo, Finland

Telephone: +358 20 484 100

Internet: www.metso.com

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1 Introduction

This manual provides instructions for Remote IC, manufactured by Metso. With Remote IC, you can monitor and control Metso crushers and screens (check the availability from your local sales representative) from the convenience and safety of your excavator or loader cabin.

The manual includes important information on the correct, safe, and economical use of Remote IC. Following these instructions helps avoid hazardous situations, reduces repair costs and downtime and increases the reliability and service life of the equipment.

This manual must be complemented by instructions made necessary by national regulations relating to safety and environmental protection.

This manual must always be kept at the equipment location and made available to operators as required. In addition to this manual and safety instructions specific to the country and location in which the equipment is operated, generally accepted rules for safe and professional operation must be taken into account.

All persons working with the equipment must read these operating instructions and follow them.

Because of the continuous development of the product, the manufacturer reserves a right to alter the technical specifications written in this manual, without any advance information. In case of conflicts between different language versions, the English version of this manual is the original and prevails.

1.1 Generic requirements for Remote IC

Make sure that the following generic requirements for the Remote IC are met:

- Remote IC is installed in all the machines to be controlled on the site.
- Remote IC is compatible with the latest update of the following automation systems:
 - IC790C/IC860C (software must be updated to version 1.1)
 - IC400, IC600, IC700, IC800 or IC900
 - mIC
- Remote IC is not compatible with ICr.
- Remote IC is only compatible with Android smart devices.
- In case of multiple machines, the antennas need to be in line of sight from each other.



DANGER

ELECTRICAL HAZARD

Electrical systems can be very dangerous. Will cause death or serious injury.

Only competent and qualified electricians are allowed to carry out electrical installation, maintenance or repair work.

2 Setting up

2.1 Setting up Remote IC



NOTE: Make sure that all optional hardware (Metrics gateway and Wi-Fi router) are installed on all the machines to be used with Remote IC.

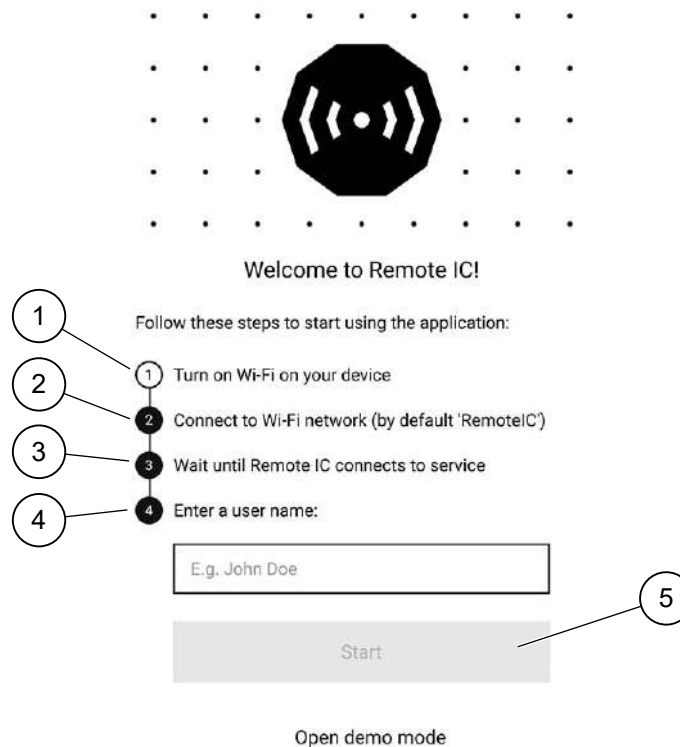
If there are multiple machines to be used with Remote IC, make sure the antennas are in line of sight from each other.

1. Download Remote IC application to your Android device from Google Play.



NOTE: Remote IC language is the same as device language.

- 2. Follow the instructions for first time use:**



- Make sure that your mobile device's Wi-Fi is on (1) and mobile data is off.
- Connect your device to "RemotelC" Wi-Fi network (2).



NOTE: The default password for the Remote IC Wi-Fi network is "metso salasana".

Notice that the average range for good Wi-Fi reception is around 50—80 m or possibly further depending on the environment.

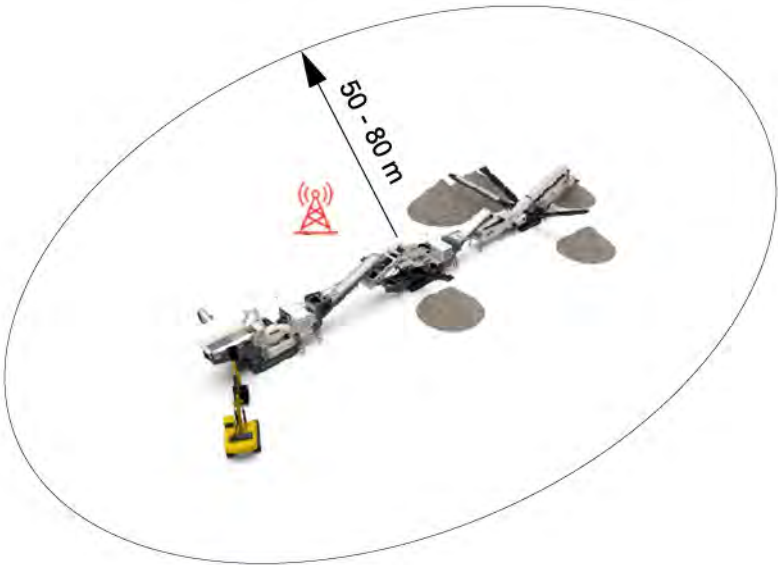


Figure 1. Average Wi-Fi range

Your mobile device may ask for your confirmation before connecting to the Remote IC network, especially if your device uses mobile data.
If the Wi-Fi network is not available, refer to the [5 Troubleshooting](#) section. You can also tap **Open demo mode** from the bottom of the screen to explore Remote IC in demo mode.

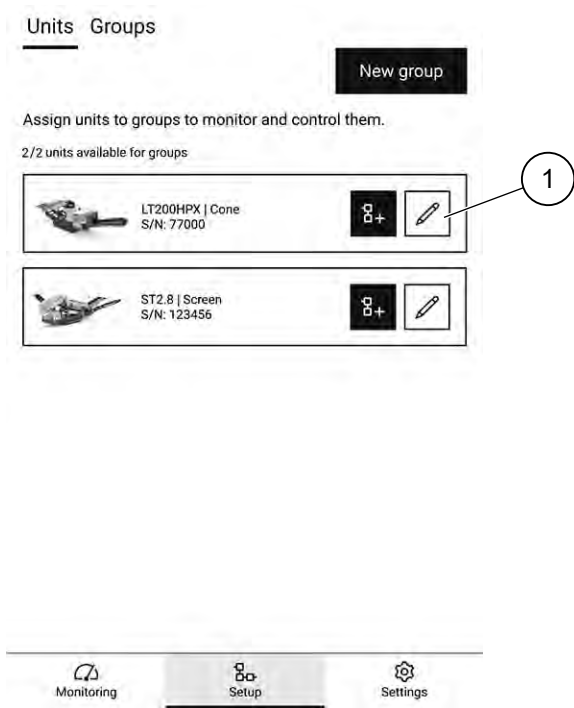


NOTE: Only mobile devices should be connected to the Remote IC network. Do not connect other devices such as computers to the network.

- c) After the device has connected to service (3), create a user name (4) and tap **Start** (5).
After the setup, Remote IC will show **Monitoring view**.

2.2 Setting up process

1. Tap **Setup** from the bottom of the screen.
2. Check that the machine models in **Units view** are correct. Remote IC automatically shows all the machines that are available for setup and their serial numbers. If your machine is not shown, refer to the Troubleshooting section.



3. If the model of the machine is not detected automatically or is incorrect, tap the machine's edit icon (callout (1) in figure above). In **Edit machine** view, you can manually select the correct model from the model drop-down menu (2) and also name the machine (3). Tap **Save** to save changes.

Edit machine



3

Name

2

Model

LT120E

Serial number

789555

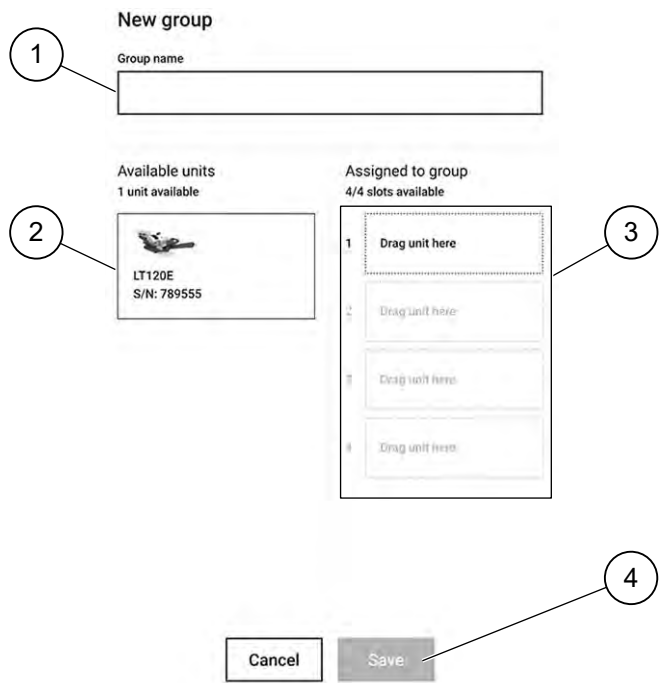
Cancel

Save



NOTE: Selected crusher model determines the gauges and alarm limits used with the machine.

4. To a create a new group, tap **New group** from the top right corner of the screen in **Setup view**.
5. Name the new group (1), and then drag and drop the machines from the **Available units** slots (2) to a process (3) in correct order.





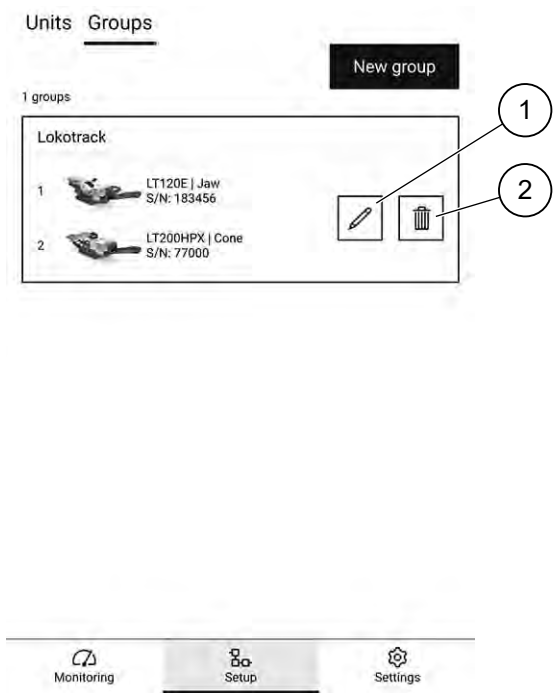
NOTE: The machines must be in correct order in the process so that the process pauses and starts correctly.

6. When the machines are in right order, tap **Save** (callout (4) in figure above).



NOTE: You can create multiple groups for different machine groups on the site.

7. If you want to change a process later, tap the edit icon (1) of the correct group.



8. If you want to delete a process, tap the delete icon (callout (2) in figure above) of the group. Deleting the process automatically puts the process on hold and makes the connected machines available for setup.



*NOTE: Deleting a process is only possible if nobody is controlling it (status of the group is **Free**).*

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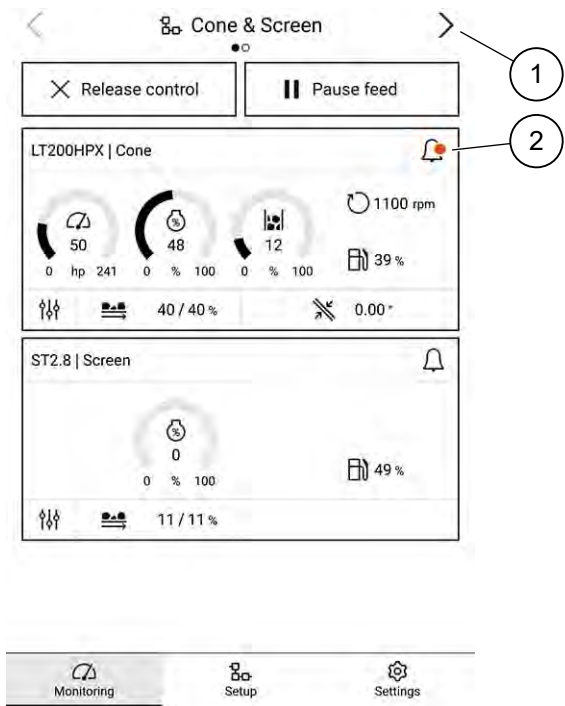
3 Monitoring process

You must set up a process before you can monitor it. Refer to [2.2 Setting up process](#).

Groups view shows the available processes to monitor and control.

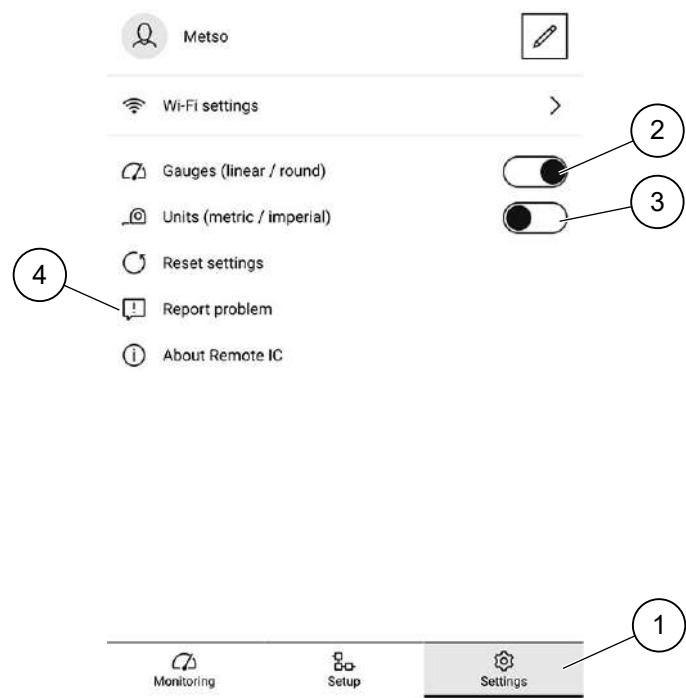
3.1 Viewing process information

1. Tap **Monitoring** to view the process. If you have created multiple processes, you can switch between them using the arrows (callout (1) in figure below) on either side of the process name.
2. In **Monitoring view**, you can view the most important parameters for each machine type, such as power consumption, cavity level, feed rate, crusher speed, fuel level and crusher setting. A red dot on the alarm symbol (2) appears if a certain value is outside limits. The value also has a red color.



3. If you want to change the gauges or the measurement units in **Monitoring view**, tap **Settings** (1) and select desired gauges (2) and units (3).

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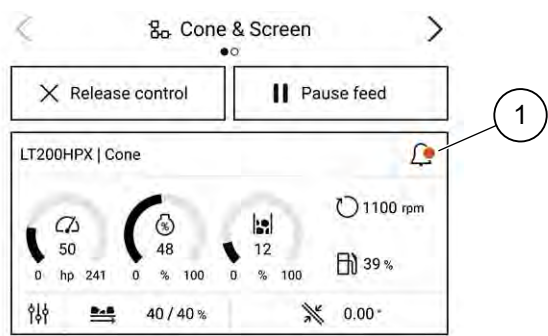


4. If you face a problem during operation, tap **Report problem** (callout (4) in the figure above).

3.2 Viewing alarms

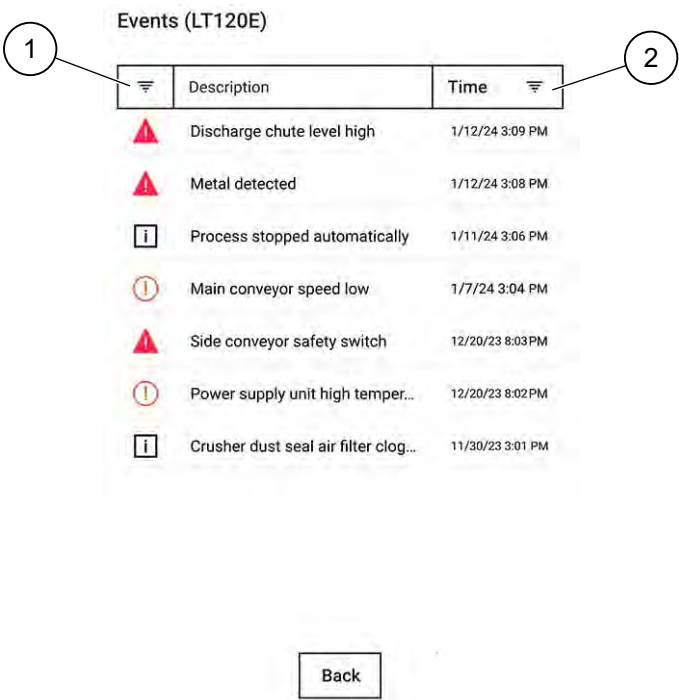
1. If the machine has a red dot on the alarm symbol (1), tap the symbol to view alarms.

 *NOTE: Each machine has its own alarm symbol and list.*

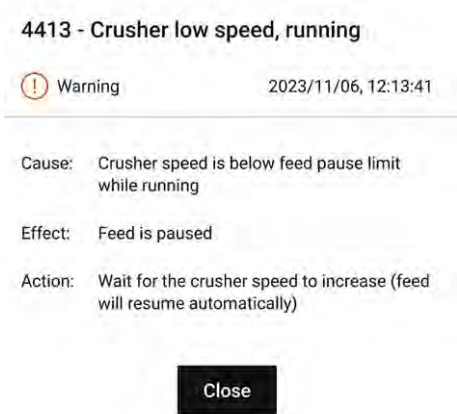


A list of alarms related to the machine opens.

2. You can sort the alarms either by alarm type (1) or the time of the alarm (2).



3. Tap any alarm row to view alarm event details.



4 Controlling process

In Remote IC, you can control following items:

- Process
- Crusher setting/Closed Side Setting (CSS)
- Feed settings and feed control percent.

You must set up a process before you can control it. Refer to [2.2 Setting up process](#).

4.1 Taking control of a process



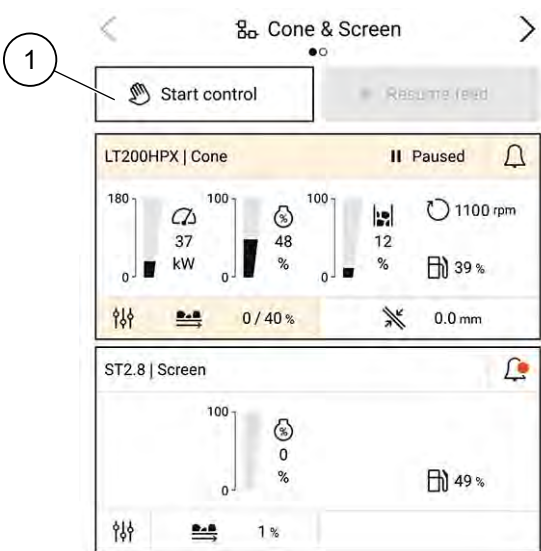
 **DANGER**

GENERAL HAZARD
Will cause death or serious injury.
In a dangerous situation, stop the machine with the emergency stop button, the key switch of the machine, or with the remote stop button (located on either the radio control box or the remote control box).

For safety reasons, only one person at a time can control the process. Previous control must be released before it can be taken by another person. Releasing control will automatically pause the process.

 **NOTE:** If your machines have IC400, IC600, IC700, IC800 or IC900 automation systems, make sure from the main control center that radio control is switched on before you take control of a process. If you have problems controlling the process, refer to the Troubleshooting section.

1. To take control of a group, select the desired group from **Monitoring view** and tap **Start control** (1).



 **NOTE:** You must stay within the Wi-Fi network range to keep control of the process. If you go out of range, control will be automatically released.

4.2 Starting and stopping feed



 **WARNING**

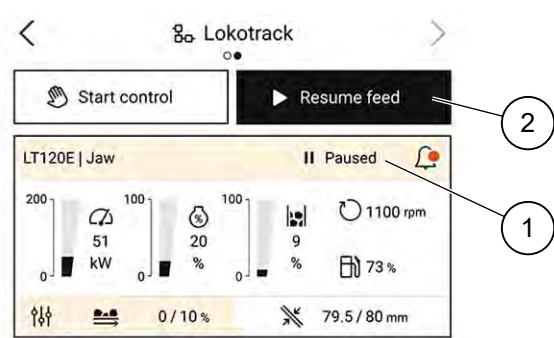
PERSONAL INJURY HAZARD

Can cause death or serious injury.

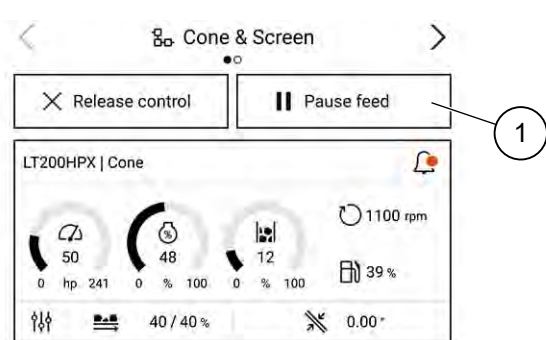
Before starting the machine, make sure that there are no persons in the area whose safety may be endangered. Walk around the machine and make sure that there is nobody on, by or below the machine. Warn everybody nearby before starting.

You can check the process/feed status from **Monitoring view** icon (callout (1) in the figure below).

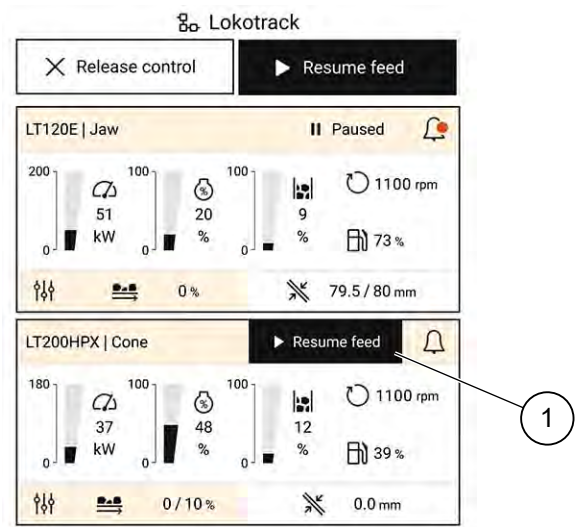
1. To start the feed, tap **Resume feed** (1).



2. To pause the feed, tap **Pause feed**.



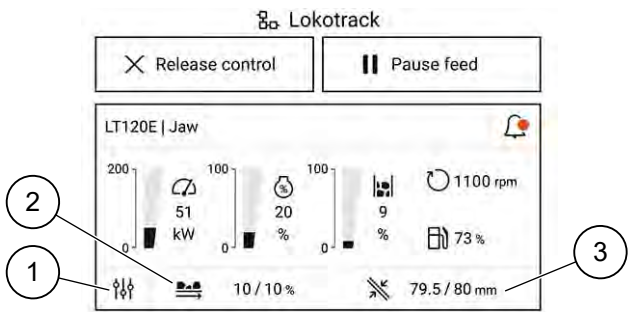
If the process is paused and the second machine of the group is selected from the machine's automation system to be operated manually, the second machine has its own button for resuming feed (1):



4.3 Changing crusher and feed settings

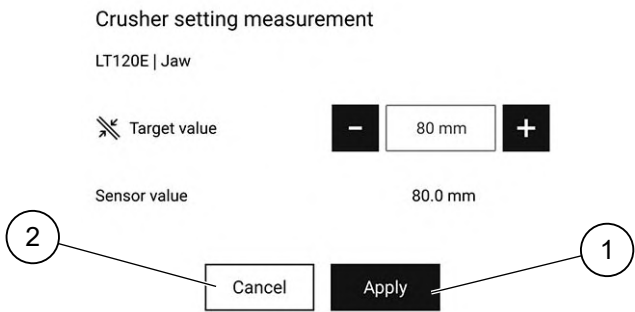
 **NOTE:** Changing crusher setting is not possible with some crusher models.

1. In the **Monitoring view**, tap the corresponding icon for feed settings (1), feed control percent (2), or crusher setting (3).



A separate dialog opens where you can change the values.

2. Tap **Apply** (1) to confirm the changes or **Cancel** (2) if you want to keep the original values.



 **NOTE:** If the second machine in the group is selected from the automation system to operate automatically, feed control percent and crusher setting cannot be changed manually (buttons in the dialog are grey).

4.4 Changing Wi-Fi settings

 **NOTE:** Wi-Fi settings cannot be changed when the process is running.

1. Tap **Settings** from the bottom right corner of the screen and then tap **Wi-Fi settings**.
2. In **Wi-Fi settings view**, you can change the Wi-Fi network name (1) and password (2). You can also restore default Wi-Fi setting (3).

Wi-Fi settings

Changes made to Wi-Fi settings affect all connected devices.
Make sure only required devices are connected to network.

1

Name

2-26 characters

Enter new Wi-Fi name

2

Password

8-63 characters

Enter new Wi-Fi password

3

Restore default Wi-Fi settings

3. Tap **Save** to make the changes.
The application will give you a confirmation that the settings have been updated successfully.
Connection problems may also cause the Wi-Fi setting change to fail completely or partially. After the connection is restored, change the settings again for the machines that had a failed change.

4.5 Releasing control

1. In **Monitoring view**, tap **Release control** (1) to give control to another person.

1

 Lokotrack

 Release control

 Pause feed

A confirmation dialog opens.

2. Tap **Release** to proceed or **Cancel** to keep control.

16 (22)

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5 Troubleshooting

5.1 Machines are not available in Setup view

Remedy:

1. Wait a few minutes for the machines to automatically set up Remote IC Wi-Fi network and connect to the Remote IC backend system.
2. Make sure that the machines are within the range of the Remote IC Wi-Fi, i.e. the machine that your mobile device is connected to.

5.2 Remote IC Wi-Fi network is not available

Remedy:

1. Check that the Remote IC hardware in the control center is powered on and that you can find "RemoteIC" Wi-Fi network from you Android device.

5.3 Remote IC Wi-Fi network has poor range

Remedy:

1. Connect the Remote IC antenna to the Wi-Fi access point.

5.4 I cannot get past the first time use view

Remedy:

1. Make sure your mobile device's Wi-Fi is turned on and is connected to the Remote IC Wi-Fi network.

5.5 I cannot take control of a process

Remedy:

1. See who is controlling the process from **Monitoring view** and ask them to release control. Only person at a time can control a process.
2. If the user who was previously controlling the process is no longer on the site and forgot to release control, wait until control is automatically released and you can tap **Start control**.

5.6 I am controlling a process, but I cannot resume feed

Remedy:

1. If your machines have IC790C or IC860C automation system:
 - a) Go to **Parameters and settings view** and tap **Parameters**.
 - b) In **General parameters view**, tap **General**.
 - c) Change parameter **External modbus interface** (G3440) value to 2.
 - d) Make sure that remote control is activated. From **Main view**, tap **Control**, and then tap **Process controls**. You can see remote control status from **Process controls view**.
2. If your machines have IC400, IC600, IC700, IC800 or IC900 automation system:
 - a) Make sure from the main control center that radio control is switched on.
 - b) Go to **Parameters and settings view**.

- c) Select **Crusher parameter settings**.
- d) Change parameter **Upper level CAN communication** (GS46) to 2.
- 3. If your machines have mIC automation system:
 - a) Go to **Process control view** and tap **General parameters** button.
 - b) Change parameter **Upper level CAN communication** (G9) value to 2.

5.7 I am controlling a process, but I cannot change crusher or feed settings

Remedy:

- 1. Check that it is possible to change the settings in your machine model.
- 2. If your machines have IC790C or IC860C automation system:
 - a) In **Feed and setting view**, make sure from the bottom left corner that the machine is in automatic control mode.
 - b) Make sure that remote control is activated. From **Main view**, tap **Control**, and then tap **Process controls**. You can see remote control status from **Process controls view**.
- 3. If your machines have IC400, IC600, IC700, IC800 or IC900 automation system:
 - a) Make sure from the main control center that radio control is switched on.
 - b) From the **Main view** in your control system display, select **Process functions**.
 - c) In **Process control view**, change **Automatic mode (A)** to **Manual mode (M)**.
 - d) Make sure you return the control system display to **Main view**.

5.8 Problem with the connection/feeder keeps pausing

Remedy:

- 1. If your machines have IC790C or IC860C automation system:
 - a) Go to **Parameters and settings view** and tap **Parameters**.
 - b) In **General parameters view**, tap **General**.
 - c) Change parameter **External modbus interface** (G3440) value to 1 (only monitoring) so you can monitor process but cannot control it.
- 2. If your machines have IC400, IC600, IC700, IC800 or IC900 automation system:
 - a) Make sure from the main control center that radio control is switched on.
 - b) Go to **Parameters and settings view**.
 - c) Select **Crusher parameter settings**.
 - d) Change parameter **Upper level CAN communication** (GS46) value to 1 (only monitoring) so you can monitor process but cannot control it.
- 3. If your machines have mIC automation system:
 - a) Go to **Process control view** and tap **General parameters** button.
 - b) Change parameter **Upper level CAN communication** (G9) value to 1 (only monitoring) so you can monitor process but cannot control it.



NOTE: If the upper level communication value is 1, machines must be connected with a communication cable.



NOTE: The upper level communication value should never be 0.

If you are controlling process and leaving from site, you must change parameters to 1 so process will not pause because of automation system losing its control position.

5.9 Mobile device loses connection with machines

Remedy:

- 1. To make sure that the machine groups are not interfering with each other's processes and causing connection problems, give the groups different Wi-Fi network names:
 - a) Turn off Wi-Fi routers from all machines except the group whose network name you want to change. This can be done by turning off the switch on the outside of the cover box.
 - b) Change the Wi-Fi network name of the remaining group. Refer to [4.4 Changing Wi-Fi settings](#).
 - c) Turn the Wi-Fi routers back on.The groups are now in different networks and monitoring/controlling a group requires connecting to its network.

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6

Spare parts

Contact Metso Sales and Service for ordering spare parts.
For information on the spare parts for the automation system, refer to the spare part document.

6.1 Spare part order

The following information is required for ordering spare parts:

- serial number of the screen
- serial number of the crusher or
- spare part number (check this from the spare part document)

Metso

Metso

P.O. Box 1000, 02231 Espoo, Finland
Tel +358 20 484 100
www.metso.com

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DIESEL ENGINE

Support material, for example Diesel engine manuals can be found from the USB delivered as a part of the new equipment documentation.

Some of the material is only available in English.



COMMERCIAL COMPONENTS

Support material, for example commercial item manuals can be found from the USB delivered as a part of the new equipment documentation.

Some of the material is only available in English.