Operation & Maintenance Manual

Rosenqvist CD200

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Original instructions

PANDROL

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Thank you for choosing CD200!

You are now the owner of a quality product from Rosenqvist Rail AB.

PREFACE

This manual aims to help you get to know your new CD200, to use it in the best way and to maintain it properly for a long lifetime. It also presents important safety regulations and warnings.

The manual is intended for people who handle and operate CD200. It is originally written in Swedish and then translated into the local language by Rosenqvist Rail AB. Rosenqvist Rail AB reserves the right to change specifications, equipment, instructions and maintenance guidelines without prior notice.

CD200 contains an engine from Subaru. An owner & maintenance manual from Subaru is therefore included with the product. Please refer to this manual for information regarding the engine.

The manual contains instructions about the following topics:

- Installation
- Operation
- Safety features and warnings
- Maintenance and troubleshooting

IMPORTANT!

This manual contains ordered actions, e.g.

1. Do this
2. …and then this…
3. …and finally this

These actions **must** be done in the numerical order presented.

REVISION NOTES

Date	Revision	Notes
2016-06-23	P04	New layout, updated information, new pictures, added E-CLIPS work head
2016-11-11	P05	Added CD200 Electric

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1 SAFETY INFORMATION

1.1 General

- Warnings and safety precautions described in this document shall only be considered as a minimum. National conditions, standards and regulations override conditions, standards and regulations described in this document.
- Work with the machine is only to be carried out by qualified personnel, well-informed and educated in general railway workmanship and specifically in the conditions, standards and regulations on specific rail track.
- The machine may only be used for its specified purpose.
- Any adjustments or service on the machine is only allowed to be done by qualified personnel that have read and understood this manual and have had training and information from Pandrol AB.

1.2 Safety Actions

- Read and understand all safety regulations and warnings before installation, operating or performing maintenance on this machine.
- Locate stop buttons, emergency stop buttons and keys before installation, operating or performing maintenance on this machine. The emergency stop button is not allowed to be used to stop the machine normally.
- The machine is never to be used as a transport vehicle for personnel or equipment.
- Be sure that unqualified persons are not in the operating area during installation, use or maintenance.
- Safety regulations regarding personnel in operating area for the CD200 are valid for this machine.
- Use standards and regulations, accident prevention regulations and regulations concerning special ambient conditions (e.g. areas potentially endangered by explosive materials, heavy pollution or corrosive influences).
- It is of great importance that all service, component replacements or other operations in the electronic or hydraulic systems are accomplished by qualified personnel only.
- The use of solvents as cleaning agents and the use of lubricants can involve health and/or safety hazards. The manufacturers of the solvents and lubricants should be contacted for safety data. The recommended precautions and procedures of the manufacturers should be followed.
- The use of an air jet, which must be less than 8 bar, to blow parts clean or to blow them dry after being cleaned with a solvent will cause particles of dirt and/or droplets of the cleaning solvent to be airborne. These conditions may cause skin and/or eye irritation.
- When using an air jet do not direct it toward another person. Improper use of air jet could result in bodily injury.
- The machine is not allowed to be used on a track that is open for traffic.
- Before maintenance work on the machine, disconnect the battery connections.
- Caution shall be exercised when the operator leaves the machine especially when adjacent track is trafficked and can endanger the safety.
- The rail wheels are shorting the rails and the machine could therefore affect railway signals, e.g. crossings can be affected. National and local regulations are to be followed.

- Personal eye protection must be worn when undertaking work.
- Personal ear protection must be worn when undertaking work.
- All personnel except for the operator are to be kept at least 3 m from machine when working.
- Operators and service personnel should wear appropriate protective equipment, such as gloves, goggles and overalls. Skin exposed to hydraulic oils should be washed immediately.
- All personnel should be made aware of the contents of the product data sheets relating to the hydraulic oil used.
- Pandrol AB recommends the use of biodegradable oils and greases, in order to minimize the environmental impact in case of an oil leakage.
- CD200 is only to be used by trained personnel, thoroughly familiar with and trained in general railway workmanship.
- The equipment should be operated according to the conditions and standard regulations applying to the track they are working on.
-

1.2.1 Safety Equipment

The machine is to be equipped with safety equipment according to national requirements.

1.3 General Warnings

- Incorrect installation of this equipment may be dangerous and may result in severe personal injuries.
- Incorrect operation of this equipment may be dangerous and may result in severe personal injuries.
- Incorrect maintenance of this equipment may be dangerous and may result in severe personal injuries.

1.4 Specific Warnings

1.4.1 Moving Parts

When operated, some parts of the CD200 are moving. Moving parts can cause personal injury. To avoid accidents, follow the guidelines below:

- Keep hands etc. away from moving parts when operating the machine
- Make sure no unauthorized personnel are in the working area when working the machine

WARNING! Moving parts - risk of crushing

1.4.2 Pressurized Hydraulic Oil

High pressure fluid is present in operational hydraulic systems. Fluids under high pressure are dangerous and can cause serious injury.

To avoid accidents, follow the guidelines below:

- Only qualified technicians or engineers are allowed to make modifications, repairs or adjustments to the hydraulic system.
- Always wear appropriate personal protection equipment.
- Shut the engine off and drain the hydraulic system before doing any maintenance work on the hydraulic system.

WARNING! Pressurized hydraulic oil - risk of personal injuries

1.4.3 Live Current

Contact with electric parts can damage the equipment if live current is present. To avoid accidents, follow the guidelines below:

- If electricity needs to be connected for testing purposes: keep hands, tools etc. away from all electrical parts.

In any other case:

1. Shut off the vehicle engine
2. Disconnect the battery terminals

1.4.4 CD200 Electric

The machine is equipped with an electric motor. The power connected to the machine must be as specified in the technical data. Any other can cause cruzial damage to the motor, machine and the operator.

The electric cable connected to the machine must be assembled by an electrician and not be damaged in any way.

The cable must be checked on a daily basis to ensure no damage is done.

WARNING! Live current - risk for damage on equipment and/or people

1.4.5 Machine in Operation

Special precautions must be taken to ensure that operation of the machine will not result in severe injury and/or damage to the equipment.

To avoid accidents, make sure no one is in the vicinity of the machine before operation is started.

1.4.6 Operator Leaves the Machine Unattended

When the operator leaves the machine unattended, the machine must always be parked horizontally on the ground, or when it is still on the track with the work head onto ballast or the sleeper. This is to ensure that the machine doesn't fall over or run away along the track.

1.5 Qualified Personnel

The CD200 is only to be used by trained personnel, thoroughly familiar with and trained in general railway workmanship. The equipment should be operated according to the conditions and standard regulations applying to the track they are working on.

The equipment must be serviced, maintained, or in any way modified only by trained personnel, who are familiar with the Operation & Maintenance Manual and have received training and information from Pandrol AB.

In order to avoid personal injury and/or material damage, everyone involved with assembling, starting-up or overhaul must possess relevant knowledge of the following

- The automation technology sector
- Dealing with dangerous voltages
- Using standards and regulations, accident prevention regulations and regulations concerning special ambient conditions (e.g. areas potentially endangered by explosive materials, heavy pollution or corrosive influences)..

WARNING!

- Touching parts that are subject to high voltage may cause grave damage to health
- All maintenance and service on the electric or hydraulic system is to be carried out by qualified personnel

1.6 Warning Labels and Information Symbols

Below are examples of warning labels and information symbols on the machine. If any of these labels become damaged or lost, they are to be replaced with new original warning labels that are available from Pandrol AB.

Read manual before use
(item no. 710016)

Wear safety goggles
(item no. 710048)

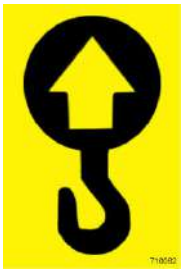
Wear hearing protection
(item no. 710052)

WARNING: Risk of crushing
(item no. 710019)

WARNING: Oil pressure
(item no. 710020)

Do not ride or stand on machine
(item no. 710021)

Emergency stop
(item no. 710014)



Lifting point
(item no. 710062)

WARNING: Electrical danger
(item no. 710018)

2 GENERAL DESCRIPTION

The Clip Driver CD200 is designed and manufactured for clipping and de-clipping PANDROL FASTCLIP and FASTCLIP FE, or PANDROL E-CLIP (depending on how the machine is equipped). Switching from clipping to de-clipping is easy since the Clip Driver CD200 uses the same head for both clipping and de-clipping and it is also easy to setup for different rail gauges and inclinations.

The Clip Driver CD200 is rapid and easy to use and it is ergonomically operated by one single operator. The Clip Driver CD200 can clip on both rails by sliding the unit from one side to the other. The clipping capacity is up to 30 sleepers per minute. The CD200 can be separated into 2 pieces to allow for transport and easier handling.

From here on the Clip Driver CD200 is named only CD200.

2.1 Main Components

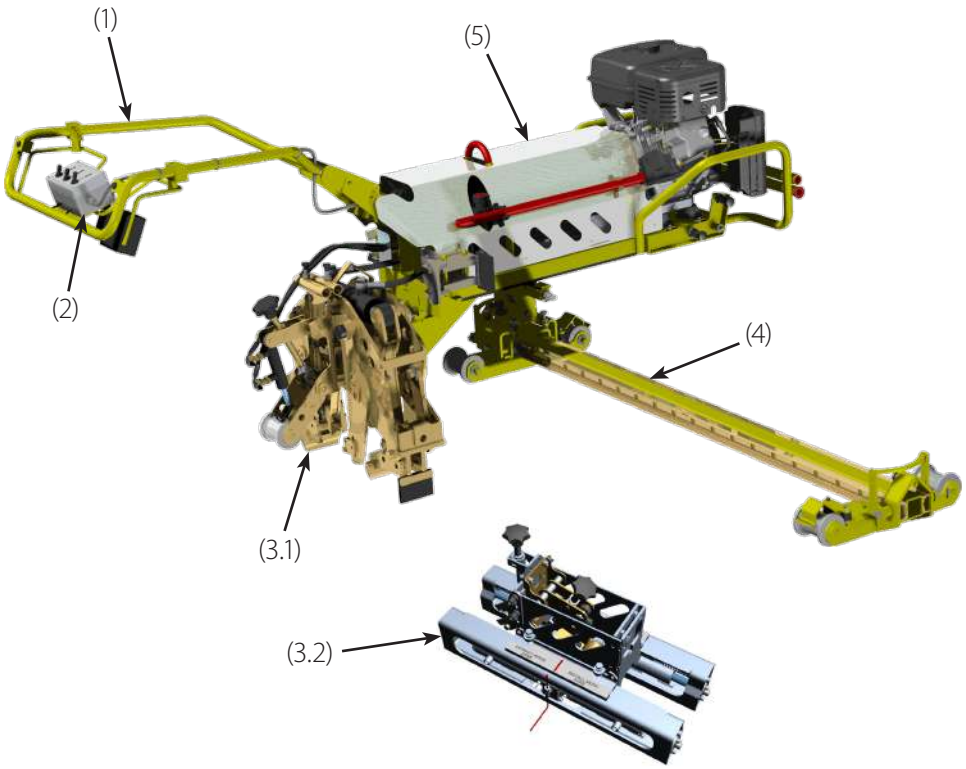


Fig. 1

Table 1

Item	Description	Item	Description
(1)	Height adjustable handlebar	(3.2)	Work head e-CLIPS
(2)	Control panel	(4)	Trolley unit
(3.1)	Work head FC/FE	(5)	Main unit

** Please note that the machine pictured above may be fitted with extra equipment. Rosenqvist Rail AB reserves the right to change any technical details without prior notice.*

2.2 Technical Specifications

Table 2

		Clip Driver CD200 Fastclip & Fastclip FE	**Clip Driver CD200** e-CLIP	**Clip Driver CD200** Electric
Measurements	Length	2177 mm		
	Height	1173 mm	1180 mm	1173 mm
	Width	2138 mm		
	Weight	279 kg	284 kg	275 kg
Measurements (packaged)	Length	2040 mm		
	Height	1140 mm		
	Width	870 mm		
	Weight	346 kg	351 kg	341 kg
Performance	Track gauge	1067-1600 mm		
	No of clips being installed/ extracted at the same time	2 clips per cycle		
	Capacity (up to)	30 sleepers/min	10 sleepers/min	20 sleepers/min
Engine	Manufacturer	Subaru		SEW-EURODRIVE
	Model	EX40		FRN100L4
	Type	Air-cooled, 4-stroke single cylinder, overhead camshaft		Frequency controlled AC motor
	Power	7,0 kW @ 3600 rpm		4.0kW 5.4HP
	Fuel	Automotive gasoline (unleaded)		Nomn. curr AC 7,3 A. 400 V AC. Infeed AC 3x400V ±10%. Freq 50-60Hz ±10%.
	Fuel tank capacity	11 litre		
Electronics	Voltage	12 volt DC		12/24V DC
	Ground	Negative		Negative
Hydraulics	Pump	Double gear pump		
	Max flow	27 l/min		
	Max pressure	235 bar		
	Hydraulic tank volume	8-9 litre		
Noise data	Noise level, idle running	71 dB(A)		
	Noise level, full speed	92 dB(A)		
Vibration data	Clipping	4,3 m/s^2		
	De-clipping	3,15 m/s^2		

3 MACHINE COMPONENTS

3.1 Main Unit

The Main Unit is the heart of CD200. It contains the engine, all central hydraulic components such as pump, block and valves and almost all electronics. The handle bar with the operator controls is also mounted on the Main Unit.

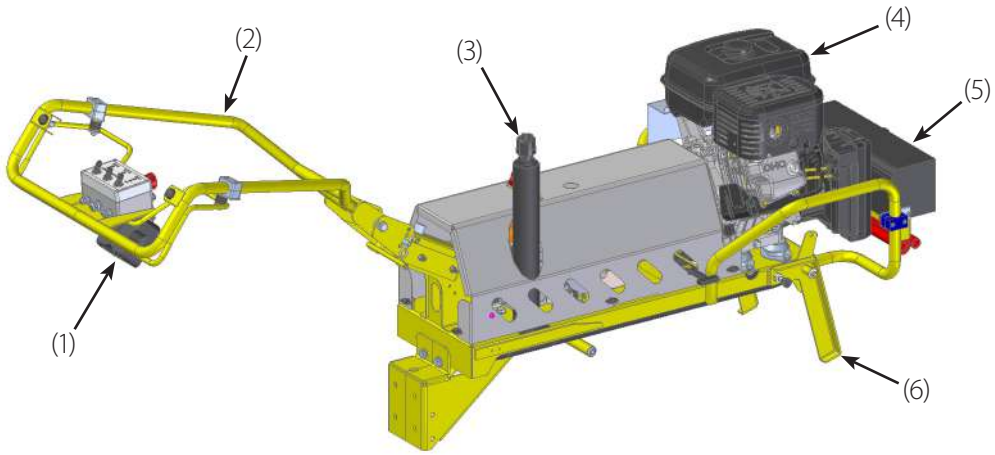


Fig. 2

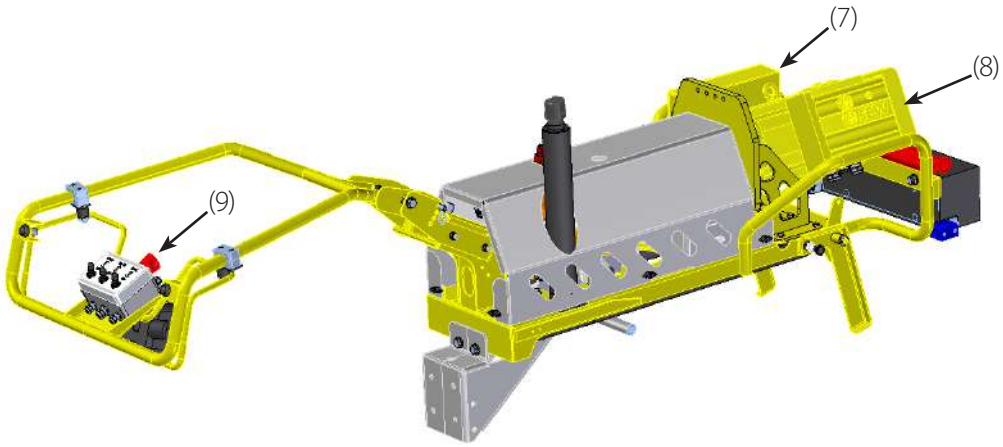


Fig. 3

Table 3

Item	Description	Item	Description
(1)	Working light	(6)	Support leg
(2)	Handle bar	(7)	Control box
(3)	Hydraulic tank	(8)	Motor
(4)	Engine	(9)	Emergency stop button
(5)	Accessory box		

3.2 Trolley

The trolley for the CD200 supports the machine and guides it along the track. The Trolley also enables the operator to switch direction as well as slide the main unit across to the opposite rail in a convenient manner. When setup correctly, the trolley gives the machine the right inclination independent of direction of travel or chosen rail for operation.

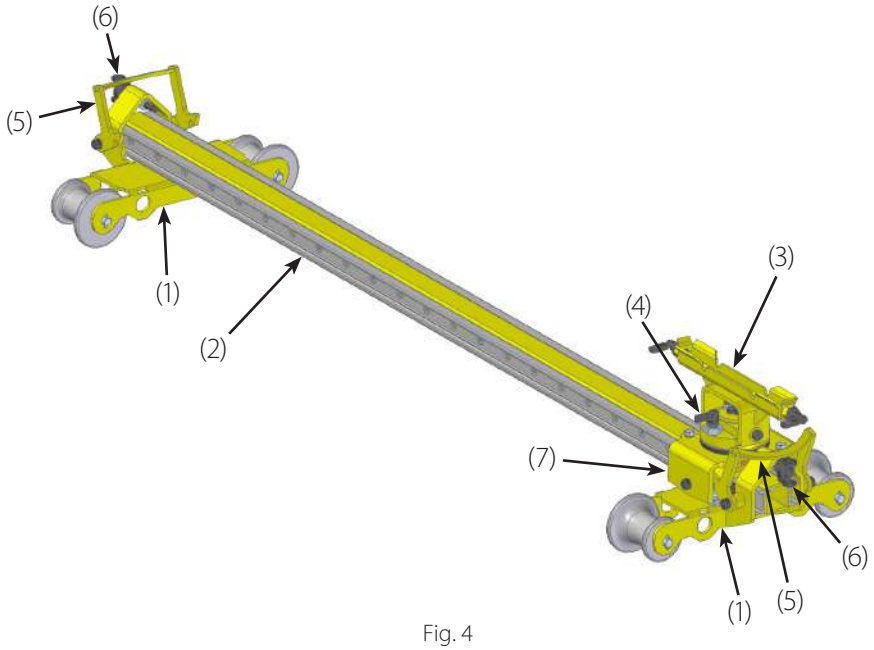


Fig. 4

Table 4

Item	Description	Item	Description
(1)	Wheel bracket	(5)	Latch for slide carriage / Handle
(2)	Slide bar	(6)	Setting bolt for slide carriage locking
(3)	Connection tray	(7)	Slide carriage
(4)	Lock pin for rotation		

3.3 Controls

The CD200 is operated by the operator by a control panel, a dead-mans-handle, and two buttons all located handy on the adjustable handlebar. The CD200 has four different work modes as will be explained below.

WARNING! Do not operate the machine before performing the setup procedure.

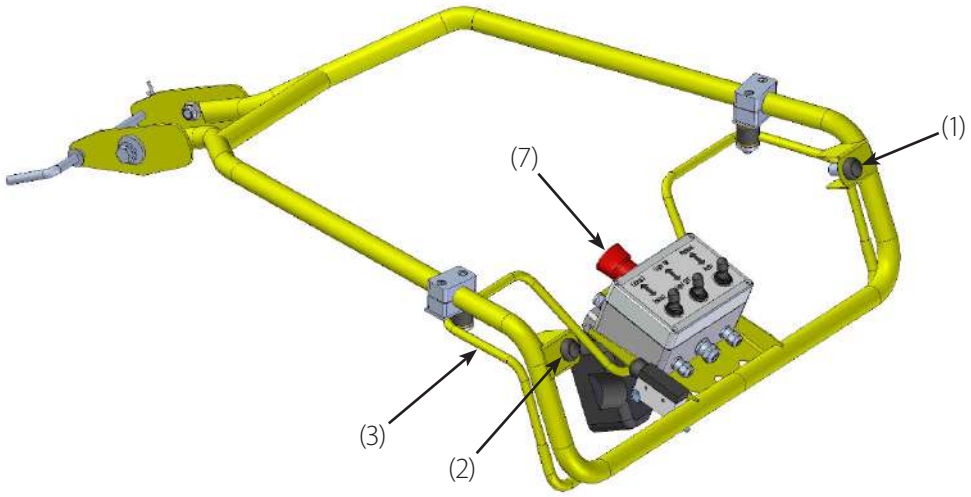


Fig. 5

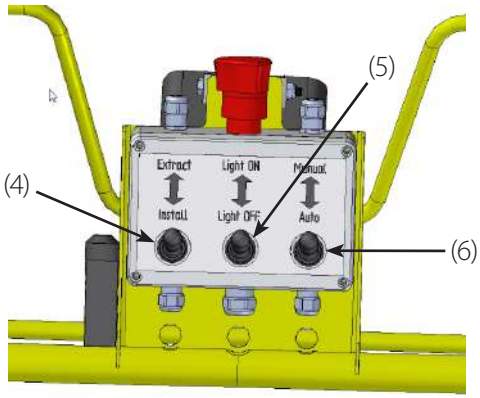


Fig. 6

Table 5

Item	Description	Item	Description
(1)	Push button 1	(5)	Light switch
(2)	Push button 2	(6)	Manual/auto switch
(3)	Dead-mans-handle/sleeper lift function	(7)	Emergency stop button
(4)	Extract/Install switch		

3.4 Controls CD200 Electric

The machine is driven by electric power. and needs to be connected to an electric outlet according to technical data.

To start the CD200, connect to electric outlet (2), Nomn. curr AC 7,3 A. 400 V AC. Infeed AC 3x400V ±10%. Freq 50-60Hz ±10%.

Press green button (3) and the electric motor starts. If the emergencybutton is activated, release and press the blue button (1) before starting the CD200.

Stopp the motor by pushing the red button (4).

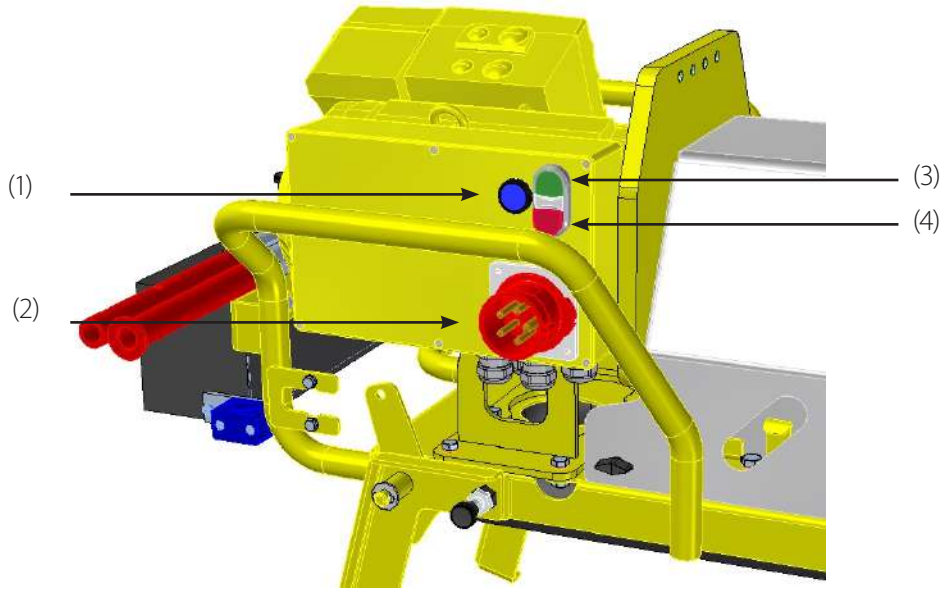


Fig. 7

Table 6

Item	Description	Item	Description
(1)	Reset	(3)	On
(2)	Power connection	(4)	Off

The machine is equipped with an electric motor. The power connected to the machine must be as specified in the technical data. Any other can cause cruzial damage to the motor, machine and the operator.

The electric cable connected to the machine must be assembled by an electrician and not be damaged in any way.

The cable must be checked on a daily basis to ensure no damage is done.

The description below makes references to Table 5.

Mode 1: Manual Clipping

Set switch 6 to Manual. Set switch 4 to Install. Push button1 to do the clipping operation. Push button 2 to retract the arms of the work head. This mode is used when the operator is setting up the machine or for some other reason want to do a manual operation.

Mode 2: Manual De-clipping

Set switch 6 to Manual. Set switch 4 to Extract. Push button 2 to do the de-clipping operation. Push button 1 to retract the arms of the work head. This mode is used when the operator is setting up the machine or for some other reason want to do a manual operation.

Mode 3: Auto Clipping

Set switch 6 to Auto. Set switch 4 to Install. Push button 1 to start the clipping cycle, release the button immediately. The retraction of the arms of the work head is done automatically. This mode is used for normal clipping operation.

Mode 4: Auto De-clipping

Set switch 6 to Auto. Set switch 4 to Extract. Push button 2 to start the de-clipping cycle, release the button immediately. The retraction of the arms of the work head is done automatically. This mode is used for normal de-clipping operation.

The dead-mans-handle needs to be pressed in towards the handlebar at all normal use. This allows the machine to rest on the jockey wheel. If the handle is released, the machine sinks down on the ground to prevent runaway on track or to allow for sleeper lifting (see chapter 6.1.3 for sleeper lifting procedure).

The battery switch shall always be turned off when leaving the machine (see Fig. 8).

Fig. 8

3.5 Electrical System

The electrical system on the CD200 is robust and built with high quality components. It requires a minimum of maintenance and is well protected from wear and climate impact.

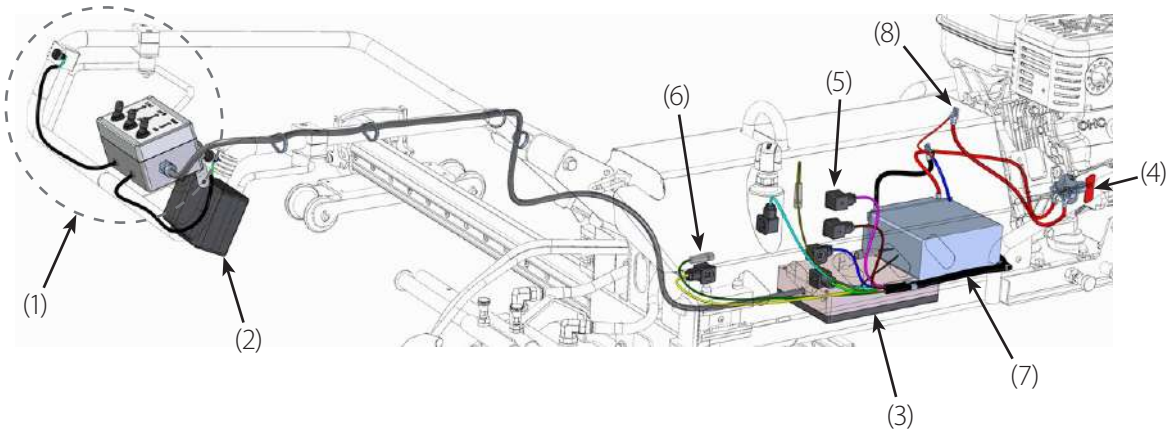


Fig. 9

Table 7

Item	Description	Item	Description
(1)	Controls	(5)	Valve connectors
(2)	Work light	(6)	Pressure sensor connectors
(3)	Relay box	(7)	Battery
(4)	Battery switch	(8)	Fuse 10A

3.6 FASTCLIP-equipped Machine

3.6.1 Work Head FC/FE

The work head is designed to be able to both clip up and de-clip PANDROL FASTCLIP and FASTCLIP FE. It is adjustable to facilitate different rail sections (from S49 all the way up to 141 RE, rail heights from 149-189 mm).

The work head uses the rail head as a datum when it is configured for de-clipping. The work head can easily be set up for clipping or de-clipping by changing the shoes and turning the mechanical stops 180 degrees.

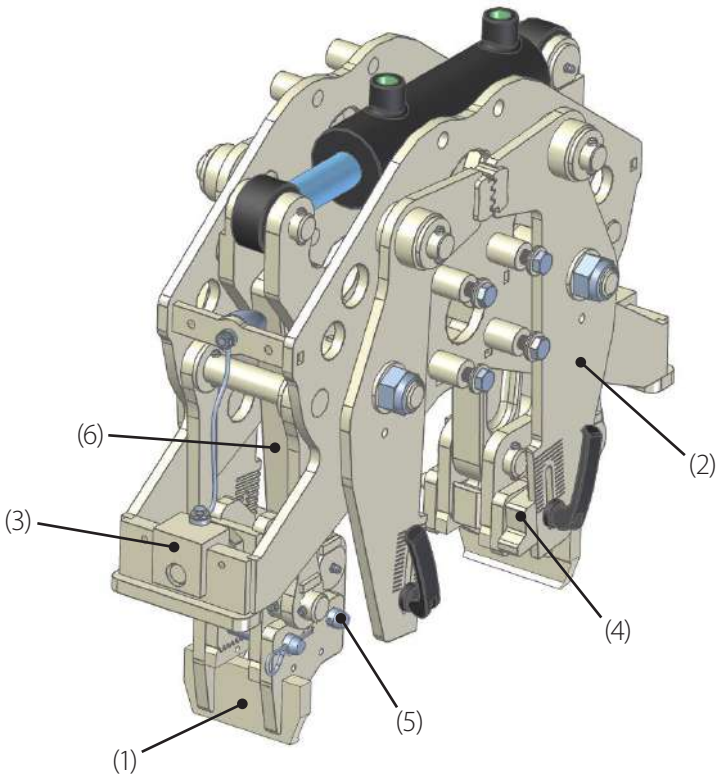


Fig. 10

Table 8

Item	Description	Item	Description
(1)	Clipping shoe	(4)	Adjustable datum part
(2)	Datum arm	(5)	Double pin for shoe
(3)	Mechanical stop for de-clipping	(6)	Main arm

3.6.2 Sleeper Lifter FC/FE

The sleeper lifter device enables the machine to lift low laying sleepers up to 50 mm. This is done in a certain sequence described in chapter 6.1.3. This device also includes an adjustment mechanism to accommodate for different rail section heights. When the dead-mans-handle/ sleeper lifter control is pressed in towards the handlebar, the cylinder takes its fully extended position, which is the normal operation position.

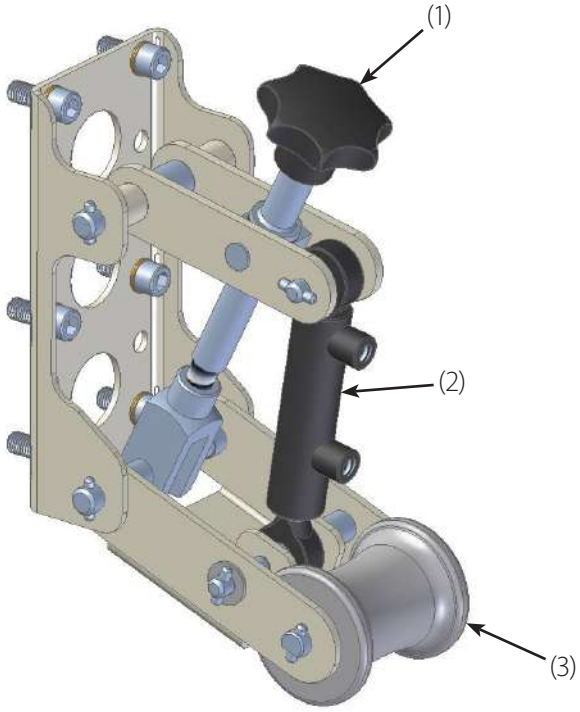


Fig. 11

Table 9

Item	Description	Item	Description
(1)	Height adjustment mechanism	(3)	Jockey wheel
(2)	Sleeper lift cylinder		

3.6.3 Hydraulic System FC/FE

The hydraulic system has a double gear-pump assembly, which maximizes the power output and enables rapid work cycles. The purpose-built valve block assembly, together with the control system, gives the machines its unique features. The return filter (5) is of the type "spin-on", which is easily changed whenever required (see chapter 11 for maintenance). The hydraulic reservoir (3) is also a part of the machine structure.

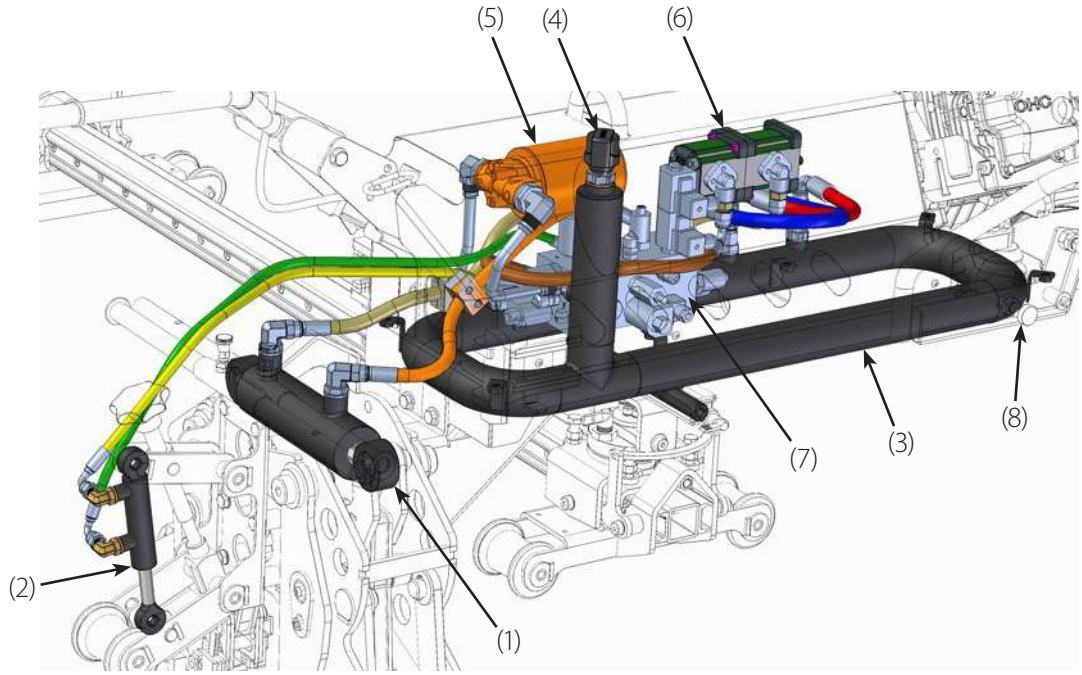


Fig. 12

Table 10

Item	Description	Item	Description
(1)	Clipping/De-clipping cylinder	(5)	Return filter
(2)	Sleeper lifter cylinder	(6)	Pump assembly
(3)	Hydraulic fluid reservoir	(7)	Valve block assembly
(4)	Breather filter/ filler cap	(8)	Drain plug

3.7 E-CLIPS-equipped Machine

3.7.1 Work Head e-CLIPS

The work head is designed to be able to both clip up and de-clip e-CLIPS. It is also designed to be able to work on rails with different rail heights.

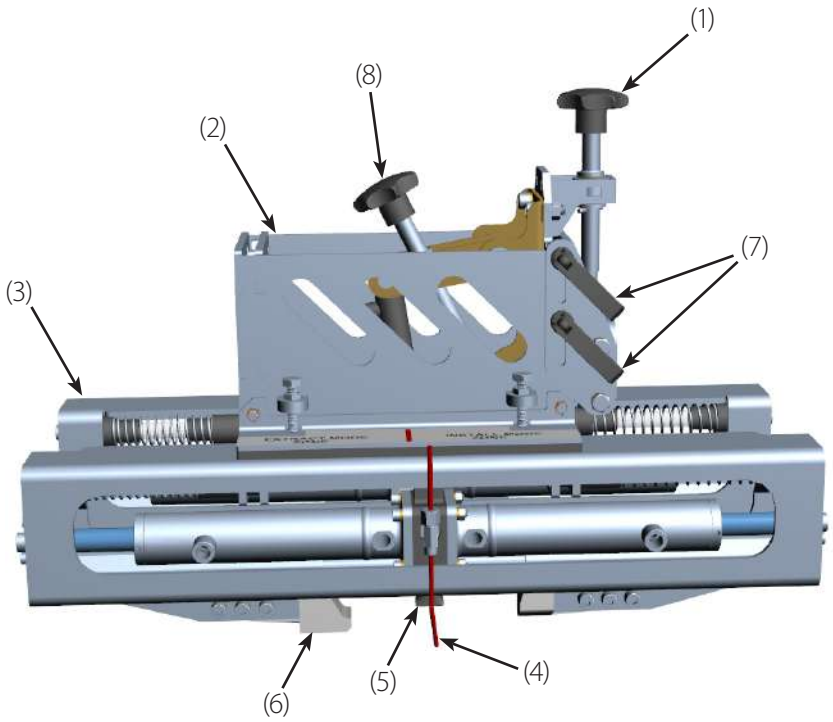


Fig. 13

Table 11

Item	Description	Item	Description
(1)	Parallel adjustment knob	(5)	Double hook
(2)	Tower	(6)	Datum piece
(3)	Frame	(7)	Quick locking mechanism
(4)	Indicator	(8)	Height adjustment knob

3.7.2 Indicator

The indicator (1) indicates the position of the double hook relative to the E-CLIPS.

When the indicator is in the INSTALL MODE ZONE (3), the tool is ready to install the clips. The indicator will move towards the center mark (4) during the clipping operation. The clips are installed when it reaches the center mark. It will then move back to the starting position and the cycle is complete.

When the indicator is in the EXTRACT MODE ZONE (3), the tool is ready to extract the clips. The indicator will move towards the center mark (4) during the de-clipping operation. The clips are extracted when it reaches the center mark. It will then move back to the starting position and the cycle is complete.

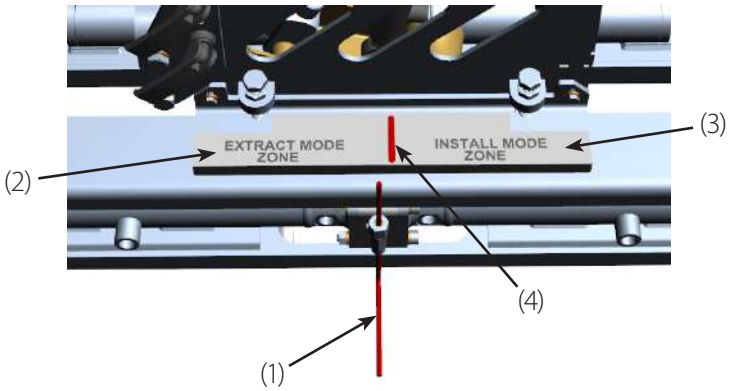


Fig. 14

Table 12

Item	Description	Item	Description
(1)	Indicator	(3)	Install Mode Zone
(2)	Extract Mode Zone	(4)	Center mark

3.7.3 Work Head Lifting Mechanism e-CLIPS

The work head is in the operating position (low) when the dead-mans-handle is not pressed. When it is pressed in towards the handle bar, the lifting cylinder (2) will extract to its full length and the work head will rise above the clips. In this position CD200 can easily be pushed towards the next sleeper.

This mechanism is also used to adjust the machine to different rail heights and also to make sure the work head is parallel to the rail.

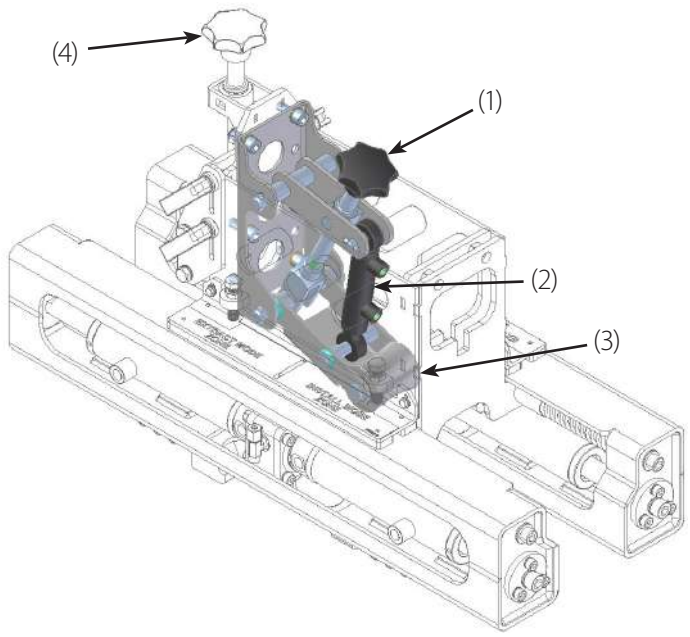


Fig. 15

Table 13

Item	Description	Item	Description
(1)	Height adjustment knob	(3)	Support wheel
(2)	Lifting cylinder	(4)	Parallelity adjustment knob

3.7.4 Hydraulic System e-CLIPS

Schematic picture of the hydraulic system on an e-CLIPS equipped machine. The difference between FC/FE (see chapter 3.5.3) is four horizontal cylinders coupled in parallel that work in pairs.

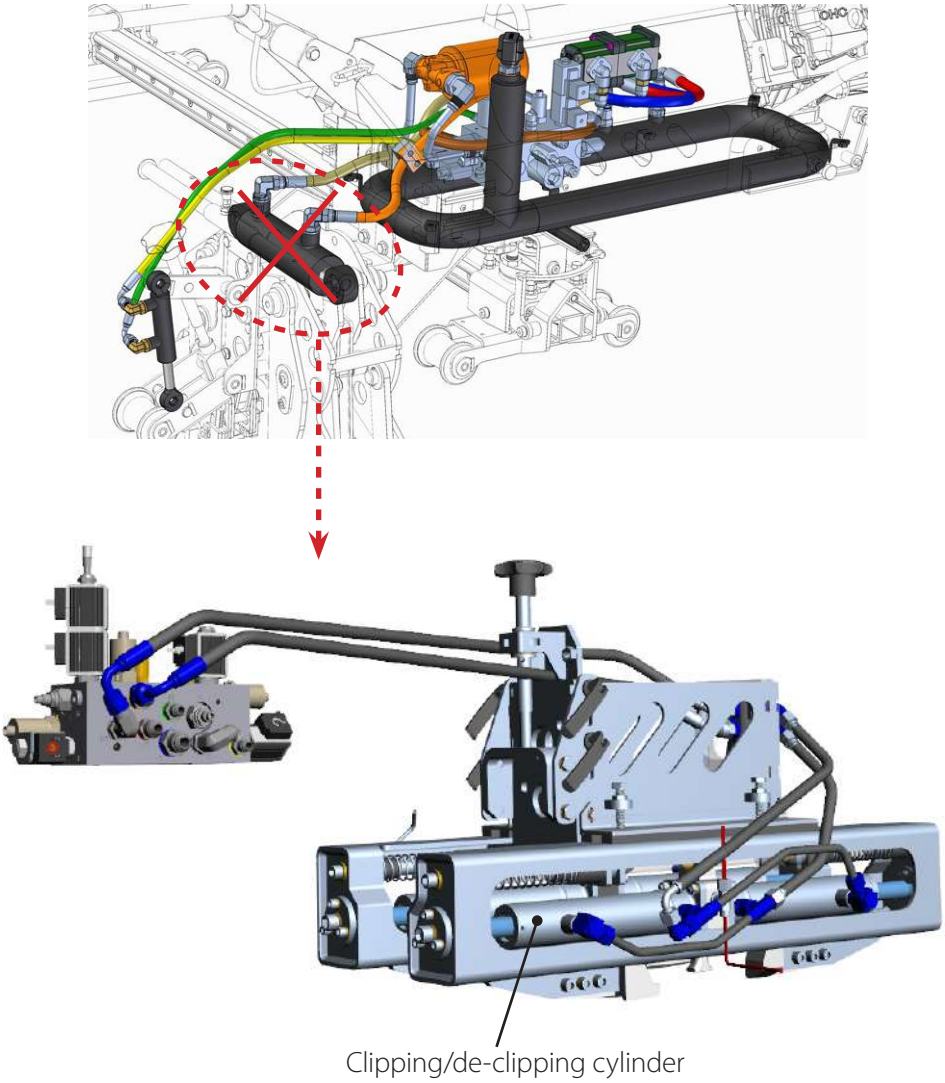


Fig. 16

4 TRANSPORT AND PARKING

4.1 Preparing for Transport or Storage

When CD200 is to be transported or stored off-track, the trolley should first be disconnected from rest of the machine (see Fig. 17 CD200 disassembled prior to transport or storage) .

Fig. 17

3.8 Parking on the Track

When the CD200 is to be parked on track, the work head (see Fig. 18 for FC/FE and Fig. 19 for e-CLIP) has to rest with the shoes onto a sleeper or the ballast. This is to ensure that the machine does not fall over or run away along the track.

Fig. 18

Fig. 19:

4.2 Parking Off-Track

When the CD200 is not being used on the track, it must be parked on a level ground standing on the work head and on the two support legs (see Fig. 20). The support legs are folded down by removing the locking pin and turning the support leg. The support legs are secured with the locking pin in the lower position.

Fig. 20: Parked off track (FC/FE work head)

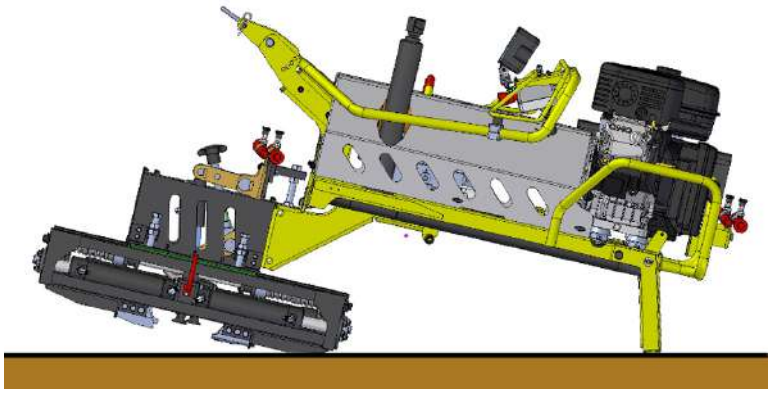


Fig. 21: Parked off track (E-CLIPS work head)

Fig. 22: Support leg

5 INSTALLATION ON TRACK

5.1 General

The CD200 must be adjusted for the type of rail and clip assembly it is to be used on before operation on track. The interaction between the clips on the track and the steel shoes on the de-clipping and the clipping arms must be checked in order not to damage the clips and insulators.

WARNING!

- CD200 must only be operated by trained personnel and with experienced workmanship.
- All safety precautions and other requirements is the responsibility of the equipment operator.
- Operation or preparation for use can be dangerous and may cause serious personal injuries if not correctly performed. All safety and necessary precautions shall be taken by the operator of the machine. The machine operator is also responsible that nobody interferes with CD200 whilst in use and powered.
- When the CD200 operates on track, the de-clipping shoes follow the rail web (just above rail foot on the inside of the rail). The machine operator must at all times check that the shoes do not collide with fish plates, welds or other related installations in the rail, causing serious damages to the CD200 or the rail infrastructure.

5.2 On/Off Tracking

1. Choose a suitable place with as little interfering obstacles and with as firm and flat ground as possible.
2. Lift the trolley by the handles/latches and put the trolley on track and make sure it cannot run away. Secure the handle/latch to the slide carriage on the side that is to be worked on first.

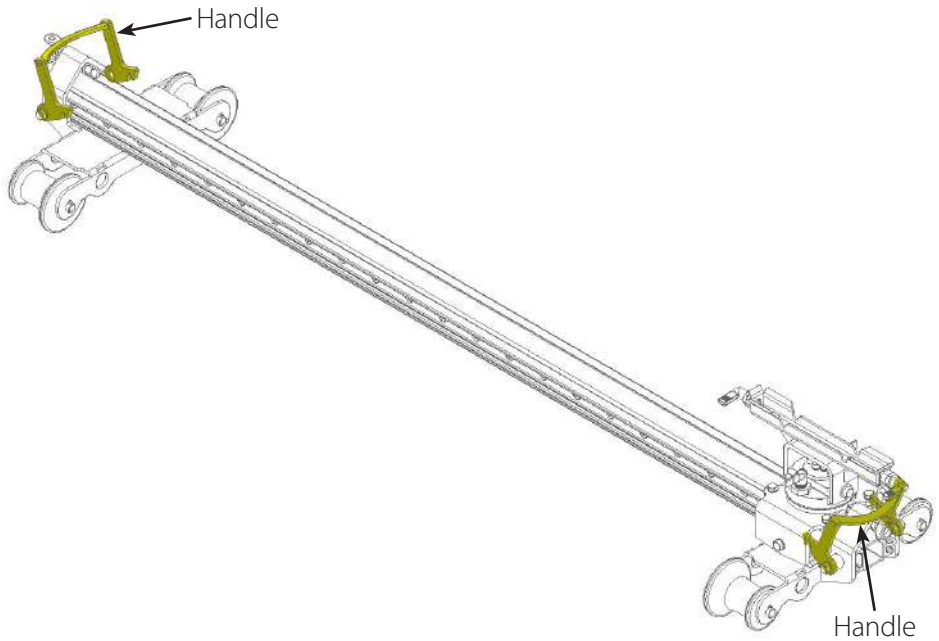


Fig. 23

3. Lift the main unit by the lifting eye with a suitable crane.

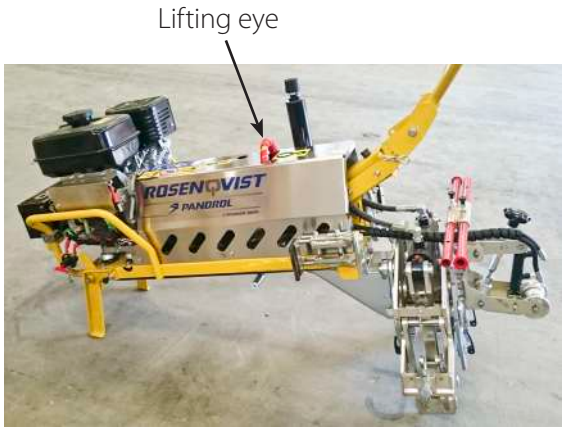


Fig. 24

4. Guide the main unit to the right position over the trolley.
5. Release the two locking mechanisms and lower down the corresponding part on the main unit in the connection tray and secure the two locking mechanisms.

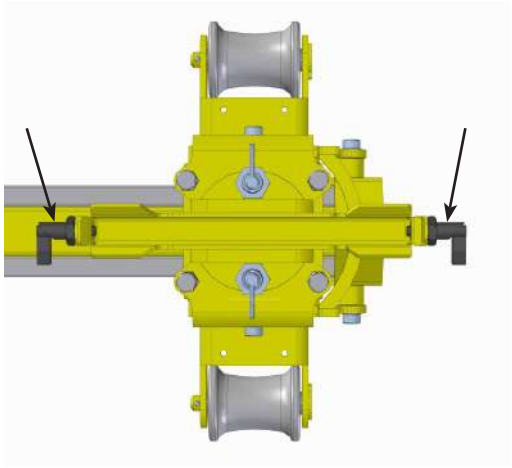


Fig. 25

For off-tracking: execute the procedure in the reverse order.

WARNING!

- The CD200 shall always be lifted in its lifting eye located on the top of the main unit. The red handles are intended for emergency use only or for guiding the main unit into the correct position.
- When longer transportation is necessary, fasten the machine safely on to a loader platform or lorry, standing upright on its supporting legs.
- Only qualified personnel are allowed to operate the lifting machinery.
- The lifting zone has to be clear when lifting is taking place.
- Ground conditions, inclination etc. should be evaluated prior to lifting the machine to reduce the risk of rolling over.

5.2.1 Off-tracking Using Emergency Handles

There are four red emergency handles that can be used to quickly move the machine off track.

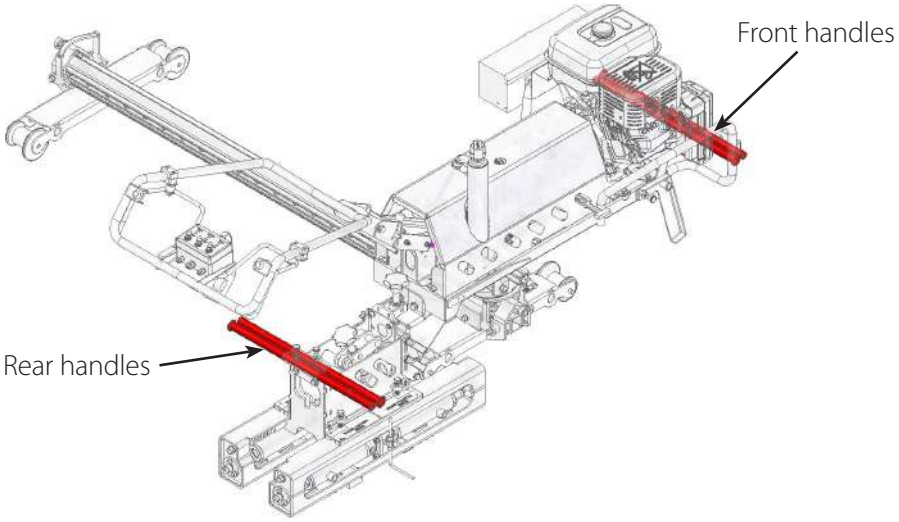


Fig. 26

1. Pull the locking pin up.
2. Pull the handle out until the locking pin lands in the next hole on the handle.
3. Lift the machine to a spot on a safe distance from the track.

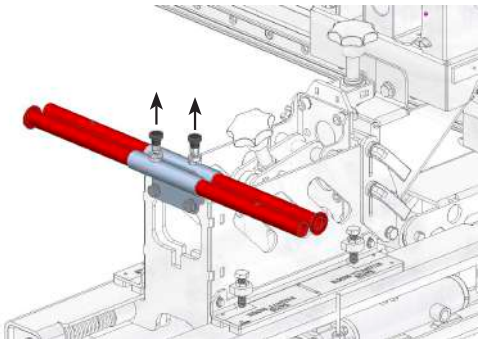


Fig. 27

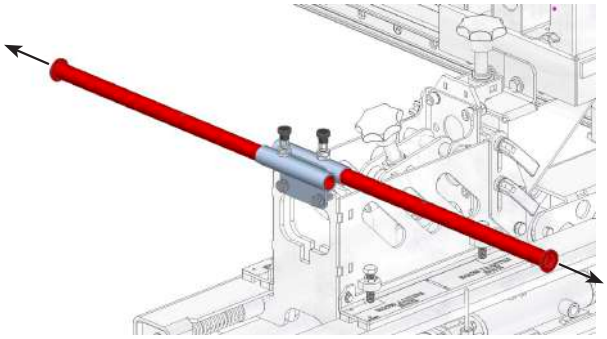


Fig. 28

5.3 Changing the Inclination

Inclination is preset depending on rail inclination. To be changed, the inclination pieces (4) needs to be replaced. To check the inclination setting, see inscription on the inclination piece.

There are three different options: 1:20, 1:30 and 1:40, see spare parts manual or consult Rosenqvist Rail AB for more information

To change the inclination pieces:

1. Unscrew the horizontal bolt (1) and open the latch (2).
2. Unscrew the four vertical bolts (3) and replace the inclination pieces on both sides (4).
3. Tighten the four vertical bolts (3), put the latch (2) back and tighten the horizontal bolt (1).

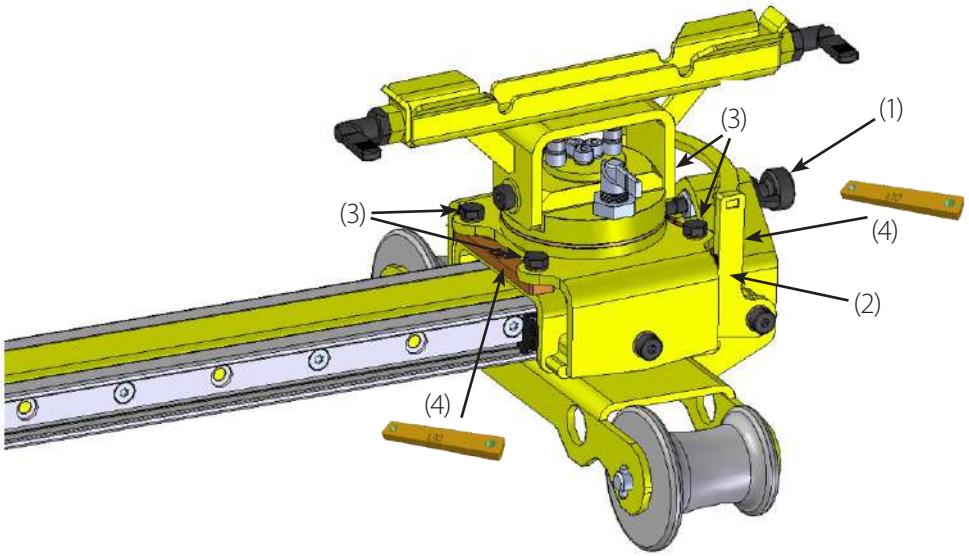


Fig. 29

5.4 Changing Direction of Operation

CD200 is designed to make it quick and easy to change the direction of operation on track.

1. Open the two rotation locking screws on the slide carriage.

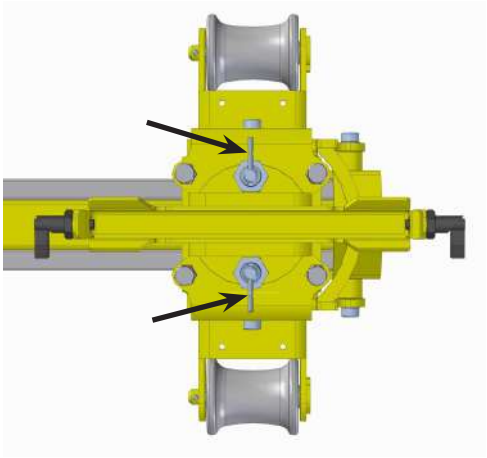


Fig. 30

2. Turn the machine around 180 degrees.

   NOTE! Do NOT lift the machine in the handle bar since this may damage it. Use the emergency handles for this purpose instead (see chapter 5.2.1).

3. The rotation locking screws will automatically lock with a clicking sound when the machine has been turned around. Check that the machine is firmly secured in the correct position before starting to operate the machine.

WARNING! There is a risk that the operator and/or machine is brought outside set safety zone while changing the direction of operation. Consider this and make sure the change of direction is carried out within the safety zone, e.g. between the rails or on the side that is in the safety zone.

5.5 Changing Rail Side of Operation

With CD200 it's quick and easy to change the rail side of operation.

1. Make sure the latch for the slide carriage is open on the unoccupied side of the trolley (Fig. 29).
2. Open the latch on the occupied side of the trolley.

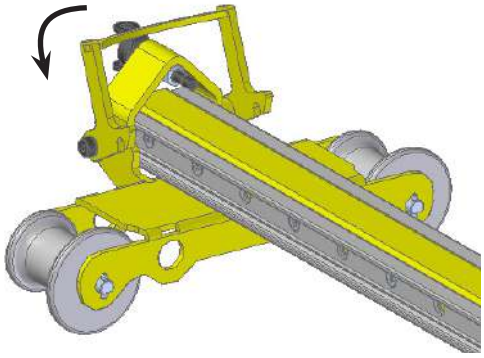


Fig. 31

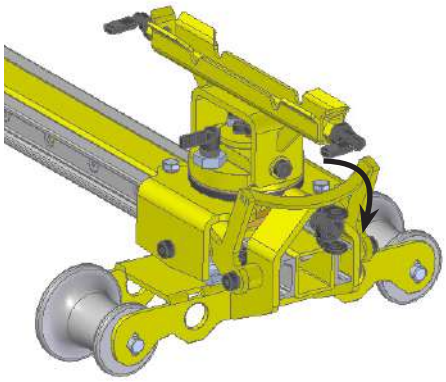


Fig. 32

3. Slide the slide carriage with the main unit over to the other side of the trolley.

   NOTE! Do NOT lift the machine in the handle bar since this may damage it. Use the emergency handles for this purpose instead (see chapter 5.2.1).

4. Close the latch to lock the slide carriage in the new position.

   NOTE! Consider the rail inclination when locking the slide carriage in position; the main unit has to be tilted slightly to match the inclination, otherwise it will not be possible to get it firmly locked.

There should be some force required to close the latch. If it locks too easily the slide carriage will not be rigidly locked. This can be adjusted using the setting bolt for the slide carriage.

1. Loosen the lock nut.
2. Adjust the setting bolt until the desired latch locking force is obtained and there's no gap in between the setting bolt and the slide carriage.
3. Tighten the lock nut.

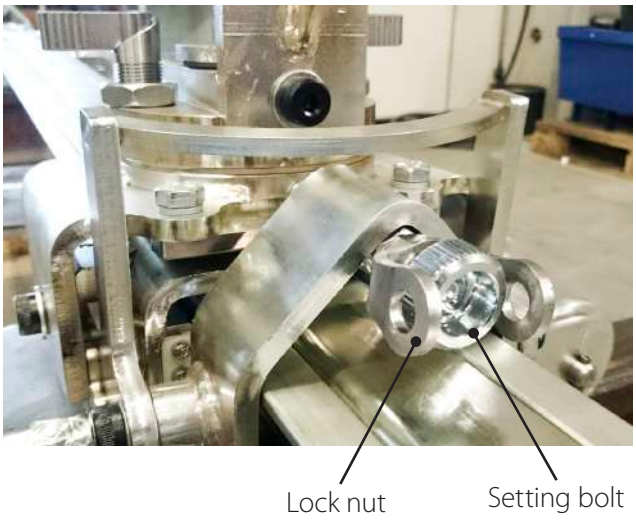


Fig. 33

6 OPERATION (FASTCLIP-EQUIPPED MACHINE)

6.1 Clipping

6.1.1 Settings Before Clipping

1. Install the clipping shoe (1) in the correct position for the current clip assembly. Correct positions are presented in Table below. The current position can be determined using the scale on the side of the shoe (2).

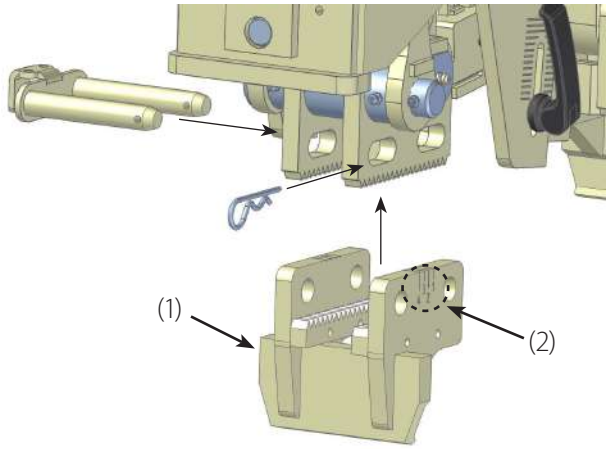


Fig. 34

Table 14

Clip Type	Rail Type	No.
FASTCLIP FE	UIC60	2
FASTCLIP FE	S49/S54	4
FASTCLIP FC1501	UIC60	2
FASTCLIP FC1504/1604	UIC60	1
FASTCLIP FC1501	S49/S54	3

***NOTE!** The machine is NOT limited to the combinations stated in this table. These combinations are only examples.*

2. Make sure the mechanical stops (3) for de-clipping are inactive, i.e. bolt pointing outwards on both sides.

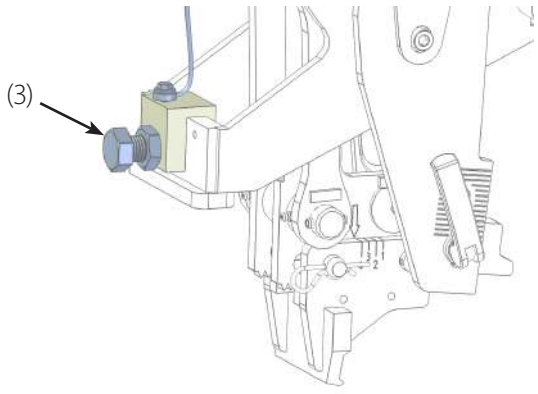


Fig. 35

3. Activate the dead-mans-handle and check that the clipping shoes are in the right height relative the clip. This depends on the type and dimension of the actual rail. If necessary, adjust the height of the work head with the adjustment mechanism on the sleeper lifter (Fig. 37). The dimension "A" in Fig. 36 is recommended to be 10-13 mm for FASTCLIP FE and 8-11 mm for FASTCLIP FC.

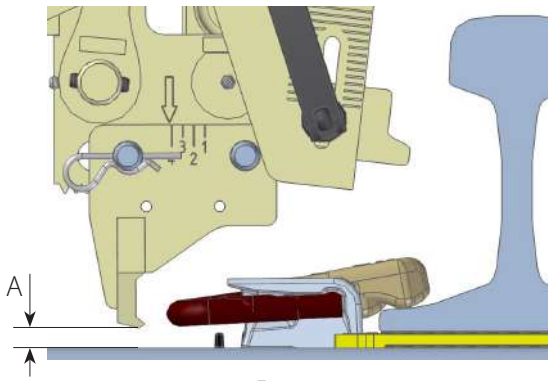


Fig. 36

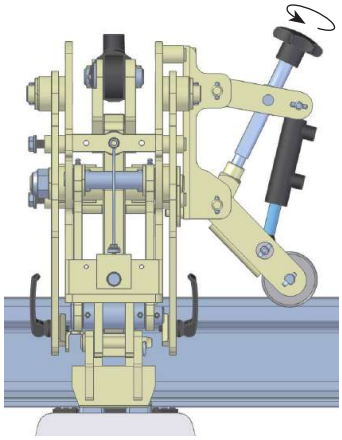


Fig. 37

After clipping the FASTCLIP shall be in the position recommended by Pandrol. Measure its position and check with prescription documentation from Pandrol Rail Fastenings Ltd.

WARNING! To avoid injury, ensure the engine is turned off before adjusting anything on the machine.

6.1.2 Clipping Operation

1. Make sure all settings described in previous chapters are performed.
2. Set the machine in manual clipping mode.
3. Hold the dead-mans-handle and start by clipping up one rail seat in the manual mode by the button on the right hand side on the handlebar. The button on the left hand side retracts the clipping arms.
4. Make sure that the installed FASTCLIPS are free from any damage, both on clip and insulators.
5. Set the machine in auto clipping mode.
6. Push the machine to the next sleeper and trigger the clipping cycle by the button on the right hand side on the handlebar. The arms will now retract automatically.

6.1.3 Sleeper Lifting Operation

If a sleeper is more than about 10 mm low, a sleeper lifting operation is required.

1. Release the dead-mans-handle and let the work head be lowered so that the shoes reach down to the sleeper level (Fig. 38).
2. Active the clipping cycle.
3. When the shoes are locked onto the back of the clips and have stopped moving, grab the dead-mans-handle and the sleeper will be lifted up towards the rail (Fig. 39).
4. When the sleeper is lifted, the clipping operation will be completed automatically.
5. Move on to the next sleeper and repeat the sequence if necessary.

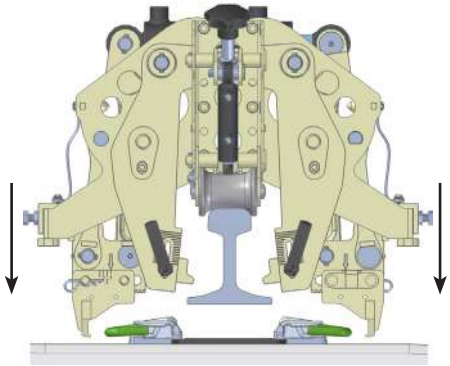


Fig. 38

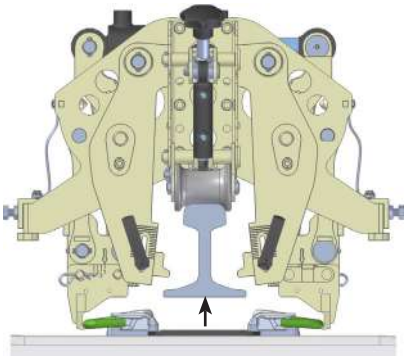


Fig. 39

NOTE! FASTCLIPS secure the rail to the sleepers and are therefore a key element of the railway infrastructure. It is very important that operators and supervision staff

- check that clipping/de-clipping shoes have been correctly adjusted as described in this manual
- check that the installed clips have not been damaged during installation and that they have been properly installed in accordance to recommendations from Pandrol UK Ltd

6.2 De-clipping

6.2.1 Settings Before De-clipping

WARNING! To avoid injury, ensure the engine is turned off before adjusting the work head.

1. Install the de-clipping shoe (1) in the right position for the current clip assembly. The current position can be determined using the scale on the side of the shoe (2).

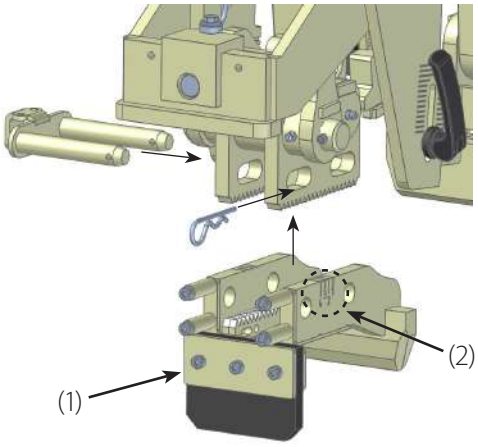


Fig. 40

2. Make sure the mechanical stops (3) for de-clipping are active, i.e. bolt pointing inwards on both sides

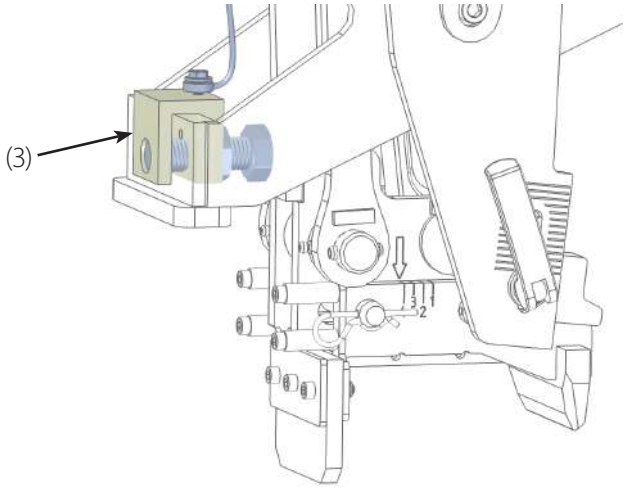


Fig. 41

3. Activate the dead-mans-handle and check that the de-clipping shoes are in the right height relative the clip. This depends on the type and dimension of the current rail. If necessary, adjust the height of the work head with the adjustment mechanism on the sleeper lifter. There should be a gap of about 5 mm between the tip of the de-clipping pad and the foot of the rail.

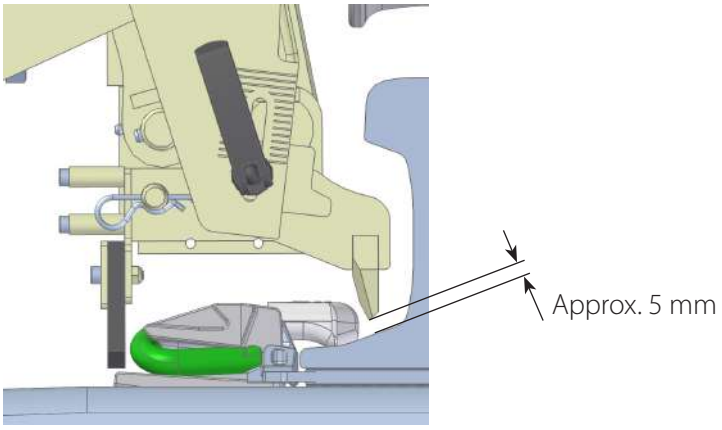


Fig. 42

4. Position the work head over the center of a clip assembly.
5. Start de-clipping in manual mode by pressing the button on the left hand side of the handlebar.
6. Run the de-clipping until the datum arms (4) close. The four datum pieces (5) should now fit the profile of the lower parts of the head of the rail. Adjust if necessary.

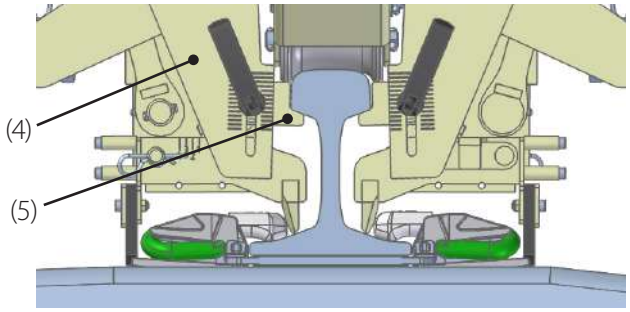


Fig. 43

7. Open the arms by pushing the button on the right hand side. Adjust the four datum pieces by first opening the cam lever and then positioning the datum pieces for the current rail type.

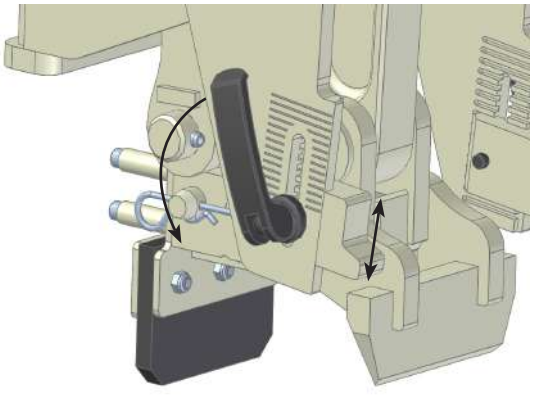


Fig. 44

8. Position the work head in BETWEEN two sleepers and run the clipping/de-clipping arms against the mechanical stop bolt (3). Check the position of the de-clipping pad relative the foot of the rail. Adjust the bolt of the mechanical stop if the clips are not fully extracted.

Adjusting the Rubber Stop

The rubber stop (1) can be turned around to accommodate for different types of clips.

1. Unscrew the four screws (2).
2. Turn the rubber stop assembly around into the desired position (1).
3. Tighten the screws.

Repeat the procedure on the other side of the work head.

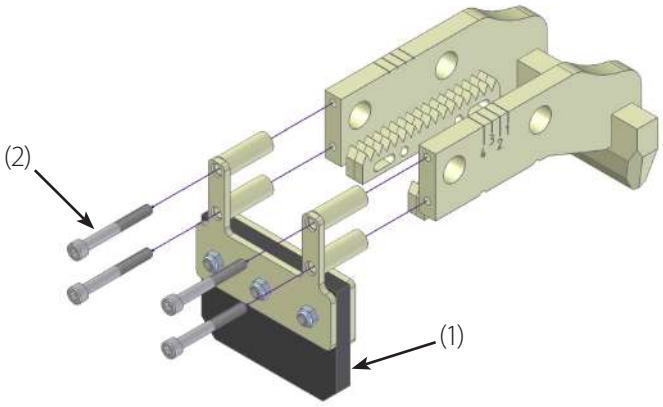


Fig. 45: Rubber stop set up for FASTCLIP FC

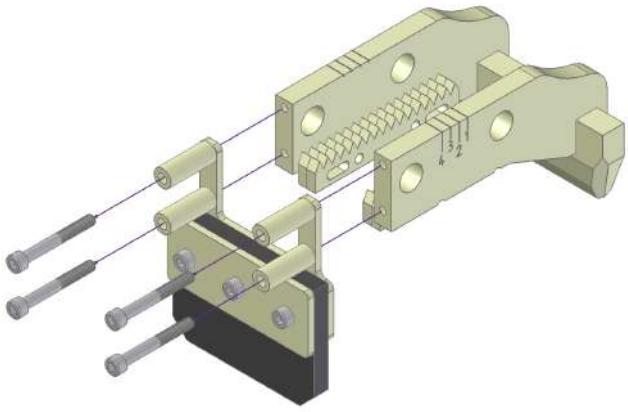


Fig. 46: Rubber stop set up for FASTCLIP FE

6.2.2 De-clipping Operation

1. Make sure all settings described in previous chapters are performed.
2. Set the machine in manual de-clipping mode.
3. Hold the dead-mans-handle and start by de-clipping one rail seat in the manual mode by the button on the left hand side on the handlebar. The button on the right retracts the clipping/ de-clipping arms.
4. Make sure that the extracted FASTCLIP is free from any damage, both on clip and insulators.
5. Set the machine in auto de-clipping mode.
6. Push the machine to the next sleeper and trigger the de-clipping cycle by the button on the left hand side on the handlebar. The arms will now retract automatically.

6.3 Storing the shoes when not being used

There are double pins on both sides of the fairing on the main unit. These can be used to store the work shoes not being used to make them easily and quickly accessible for use.

Fig. 47: Storing shoes not being used

7 OPERATION (E-CLIPS-EQUIPPED MACHINE)

7.1 Settings Before Operation

Make sure the work head is parallel to the rail (see Fig. 46). Adjust the work head according to the instructions below if necessary.

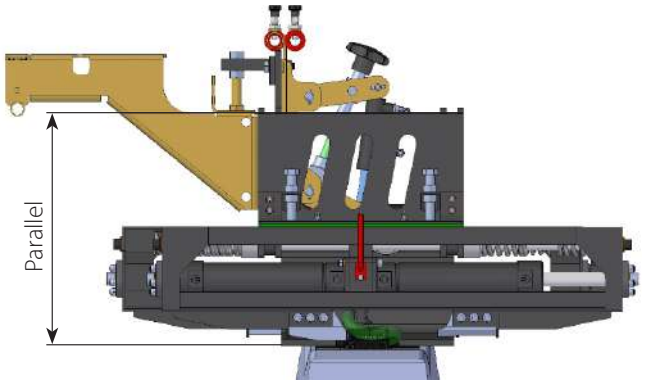


Fig. 48

All item numbers in the section below are references to Fig. 49 if not otherwise stated.

1. Open the four cam levers (3).
2. Adjust the height using the parallelity adjustment knob (1).
3. It is correctly adjusted when the work head is parallel to the rail in accordance with Fig. 46.
4. Tighten the cam levers (3).
5. Tune the height of the work head using the height adjustment knob (2). It is correctly adjusted when the double hook is 2-3 mm above the shoulder (see Fig. 50).

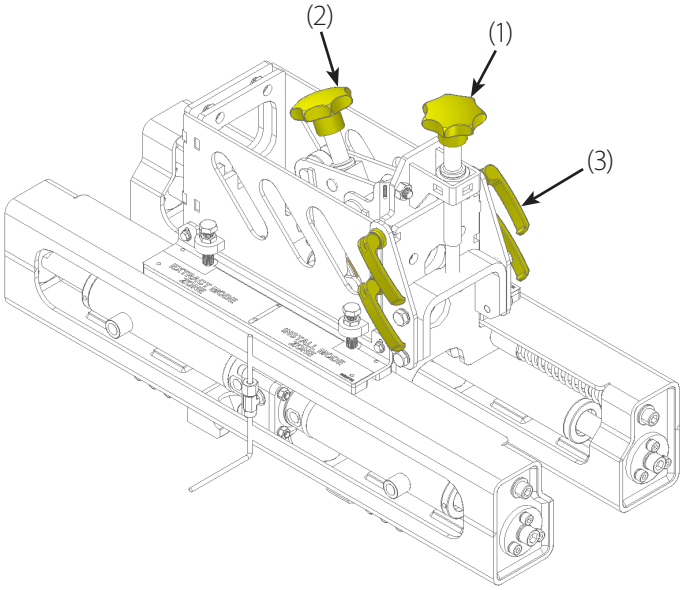


Fig. 49

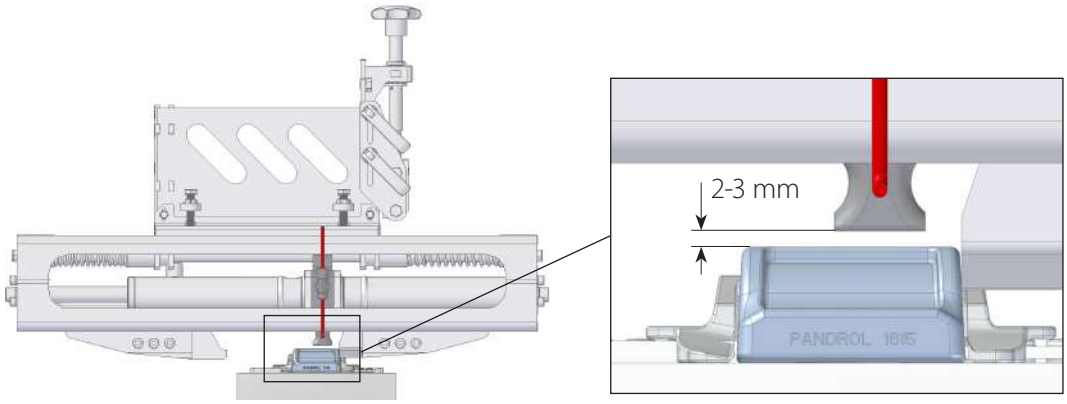


Fig. 50

7.1.1 Adjusting the Sliding Plate

Make sure the sliding plate is correctly adjusted relative to the frame. There should be no gap between the sliding plate (3) and the frame. The frame has to be able to slide easily making it possible for the indicator to center with the center mark. This should be checked on a weekly basis.

When adjustments have to be done:

1. Loosen the four hex head bolts (1).
2. Loosen the two locking nuts (3).
3. Adjust the adjustment screws (2) until the required friction between the frame and the sliding plate (3) is obtained.
4. Tighten the locking nuts (3).
5. Tighten the hex head bolts (1).

Repeat the procedure on the other side of the work head.

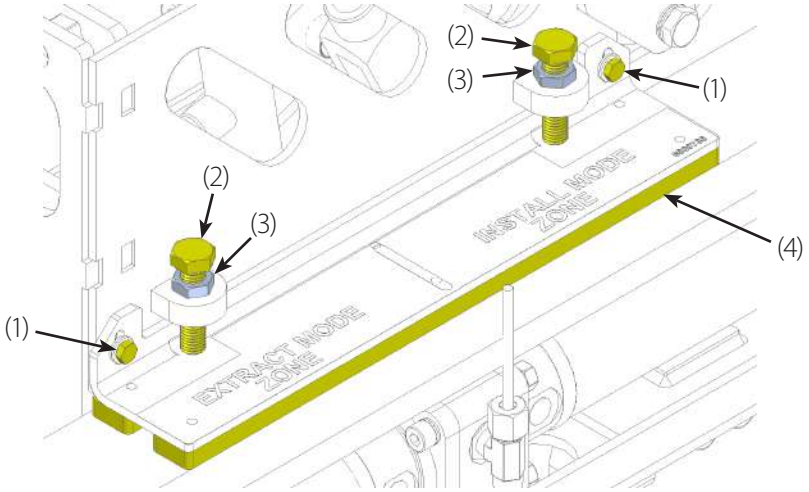


Fig. 51

Table 15

Item	Description	Item	Description
(1)	Hex Head Bolt	(3)	Locking Nut
(2)	Adjustment Screw	(4)	Sliding Plate

7.2 Clipping

WARNING! To avoid injury, ensure the engine is turned off before adjusting the work head.

1. Make sure all the necessary adjustments according to previous chapters have been done.
2. Set the machine in manual clipping mode.
3. Start the clipping sequence with clipping one pair of clips in manual mode by pushing the button on the right hand side of the handle bar. Then push the button on the left hand side to return the double hook to the starting position.
4. Make sure that the installed E-CLIPS have not been damaged during the installation, neither on the clips nor on the insulators.

   If any damage is discovered, go back to step 1.
5. Set the machine in automatic clipping mode.
6. Activate the dead-mans-handle, push the machine to the next sleeper and release the dead-mans-handle. Start the clipping sequence by pushing the button on the right hand side. The double hook will now return automatically.

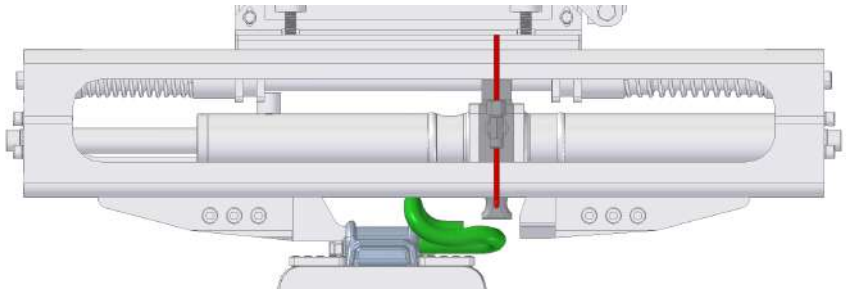


Fig. 52: Work head open and placed over clips. Make sure the indicator is in INSTALL MODE ZONE.

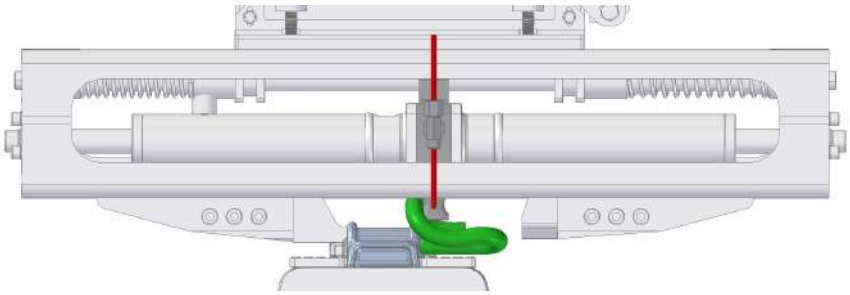


Fig. 53: The double hook installs the clip by pushing it into the correct position.

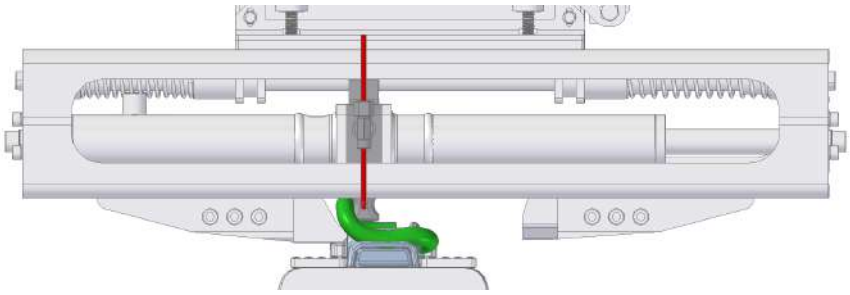


Fig. 54: The clipping sequence finishes and the clip is installed. The double hook will now return to the starting position and the indicator will be back in INSTALL MODE ZONE.

7.3 De-clipping

WARNING! To avoid injury, ensure the engine is turned off before adjusting the work head.

1. Make sure all the necessary adjustments according to previous chapters have been done.
2. Set the machine in manual de-clipping mode.
3. Start the de-clipping sequence with de-clipping one pair of clips in manual mode by pushing the button on the left hand side of the handle bar. Then push the button on the right hand side to return the double hook to the starting position.
4. Make sure that the extracted E-CLIPS have not been damaged during the installation, neither on the clips nor on the insulators.

   If any damage is discovered, go back to step 1.
5. Set the machine in automatic de-clipping mode.
6. Activate the dead-mans-handle, push the machine to the next sleeper and release the dead-mans-handle. Start the de-clipping sequence by pushing the button on the left hand side. The double hook will now return automatically.

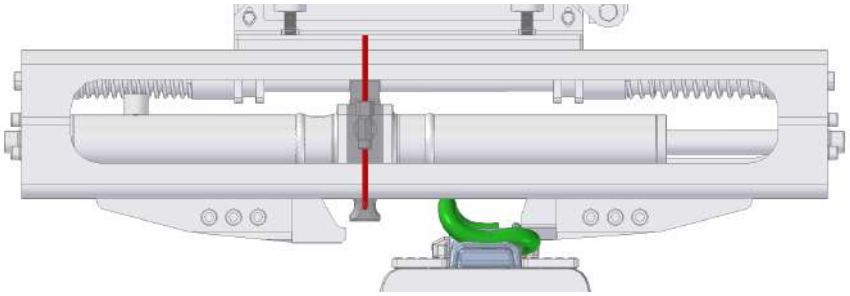


Fig. 55: Work head open and placed over clips. Make sure the indicator is in EXTRACT MODE ZONE.

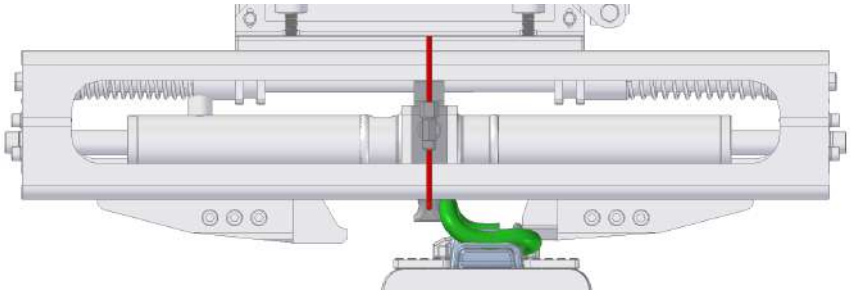


Fig. 56: The double hook extracts the clip by pulling it out of the shoulder.

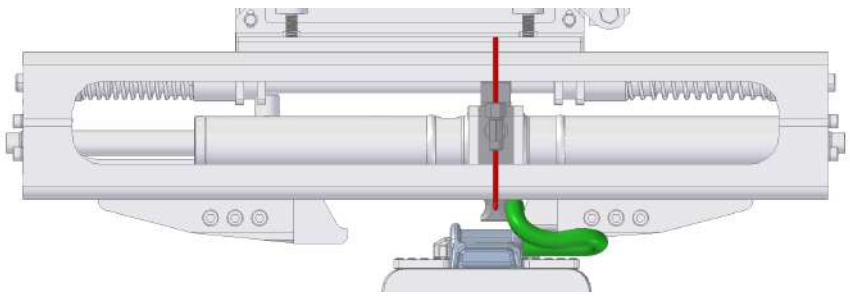


Fig. 57: The de-clipping sequence finishes and the clip has been extracted. The double hook will now return to the starting position and the indicator will be back in EXTRACT MODE ZONE.

8 TROUBLESHOOTING

8.1 Clips are moving before sleeper is lifted and preventing installation

Possible causes:

- Sleeper stuck in ballast
- "Pad to clip locking pressure" to high

Solution:

- Lift only free laying sleepers
- Adjust "Pad to clip locking pressure" down by turning screw on cartridge (2) counter-clockwise. Factory setting 25 bar.

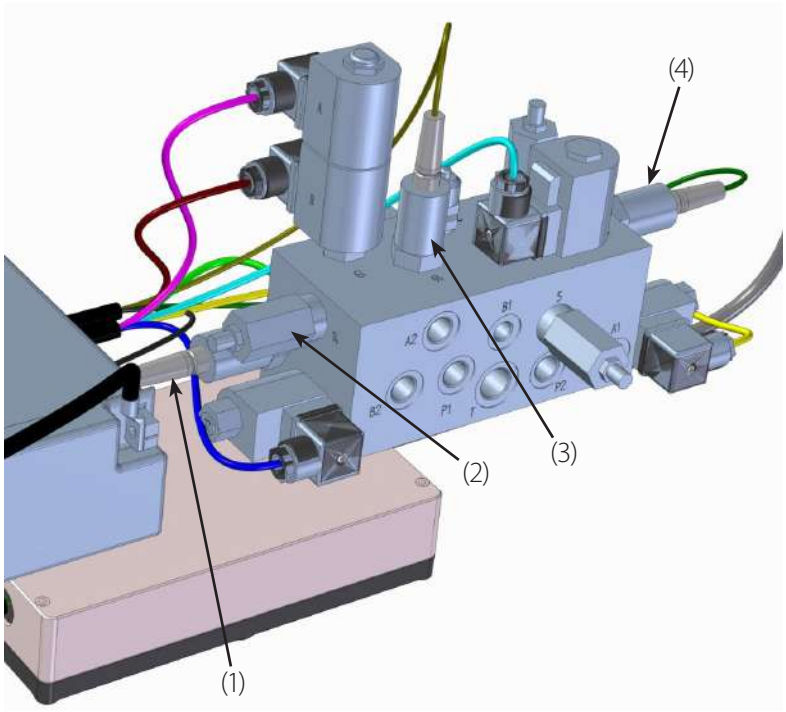


Fig. 58

Table 16

Item	Description	Item	Description
(1)	Pressure switch for de-clipping function	(3)	Pressure switch for clipping function
(2)	Pressure reducing valve	(4)	Pressure switch for sleeper lifting function

WARNING! Hydraulic oil can cause dermatitis! Wear protective clothing and gloves when working with hydraulic systems

8.2 Clips are being installed before sleeper is fully lifted

Possible causes:

- Sleeper stuck in ballast
- The pressure switch for the sleeper lifter is set to low

Solution:

- Lift only free laying sleepers
- Pressure switch for clipping function may need to be adjusted. This adjustment should only be done after consulting a retailer or Rosenqvist Rail AB.

8.3 Clips are not being fully installed

Possible causes:

- Clipping shoe not in correct position
- Clipping pressure to low

Solution:

- Change position of clipping shoe
- Pressure switch for clipping function may need to be adjusted. This adjustment should only be done after consulting a retailer or Rosenqvist Rail AB.

8.4 Clips are being over driven

Possible causes:

- Clipping pressure to high

Solution:

- Pressure switch for clipping function may need to be adjusted. This adjustment should only be done after consulting a retailer or Rosenqvist Rail AB.

8.5 Clipping shoe rides over clip on one side

Possible causes:

- Inclination setting is wrong.

Solution:

- Set inclination according to chapter 5.3.

8.6 The tools are stuck to the rail

Possible causes:

- Electrical fault
- Out of fuel
- Faulty engine

Solution:

The tools are emergency opened by pressing down the valve through the cover (see Fig. 59) while pulling the main arms outward so that the grip around the track recedes.

This can and shall only be done with the machine turned off (hydraulics, electricity and engine) e.g. after using the emergency stop button.

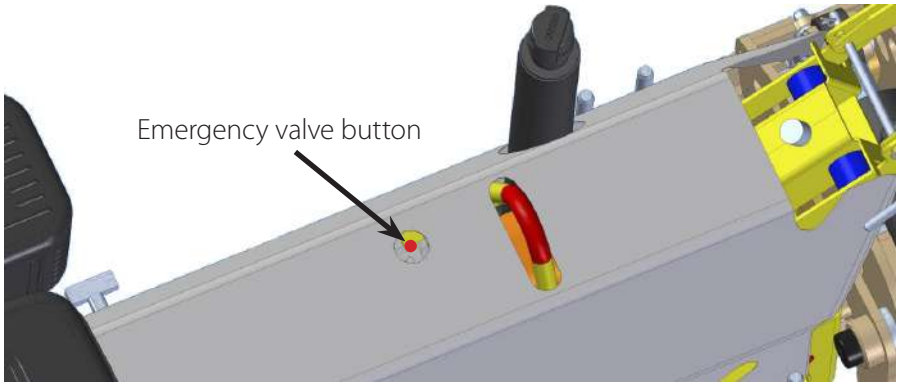


Fig. 59

9 MAINTENANCE

9.1 General

MAINTENANCE AND OVERHAUL IS TO BE CARRIED OUT BY QUALIFIED PERSONNEL ONLY

The CD200 is designed for the absolute minimum of maintenance. All its components have been chosen for a long working-life and high quality.

The CD200 requires:

- A minor maintenance before and after every working shift
- A lubrication every 40 hours or once a week
- A more comprehensive overhaul after 500 hours or once a year

Warranty is based on parts and spares delivered by Rosenqvist Rail AB.

WARNING!

- All adjustments work, overhaul and service must take place with the engine turned off, cooled down and with working tools disengaged. Failure to do so could lead to fatal injury.
- It is of great importance that qualified personnel accomplish all service and overhaul

9.2 Maintenance Schedule

Item	Servicing Action	Frequency		
		Each time used	Once a week or every 40 hours	Once a year or every 500 hours
Hydraulic oil	Check, level 50 mm from top**	X		
Hydraulic oil	Oil change***			X
Hydraulic return oil filter	Change filter canister			X
Tank breather filter	Change filter canister			X
Entire unit	Check for oil leakage	X		
Screws and nuts	Check/tighten if needed	X		
Grease points on work head	Lubricate with grease SKF LEGP 2 or equivalent		X	
Roller surface on slide bar	Clean and lubricate with oil spray*		X	
Bolts	Lubricate with oil spray*		X	
Engine	See Subaru EX40 manual	X	X	X
Warning labels	Replace worn and replace missing labels	X		

**) CRC5-56 or similar*

***) Let the machine rest at least on hour before checking level*

****) Recommended hydraulic oil:*

*At temperatures **below 25 °C** is oil of viscosity grade 46 recommended*

*At temperatures **above 25 °C** is oil of viscosity grade 68 recommended*

It is **very important** that the service intervals are thoroughly followed to guarantee the safety and the performance of the machine

9.3 Grease Points

9.3.1 FASTCLIP-equipped Machine

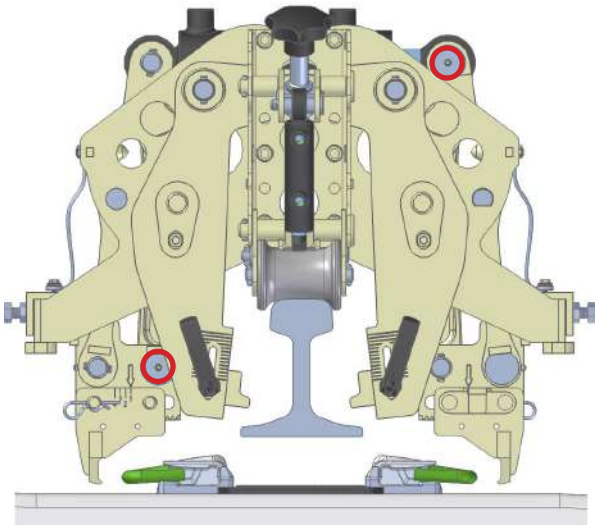


Fig. 60: Grease points visible from the backside

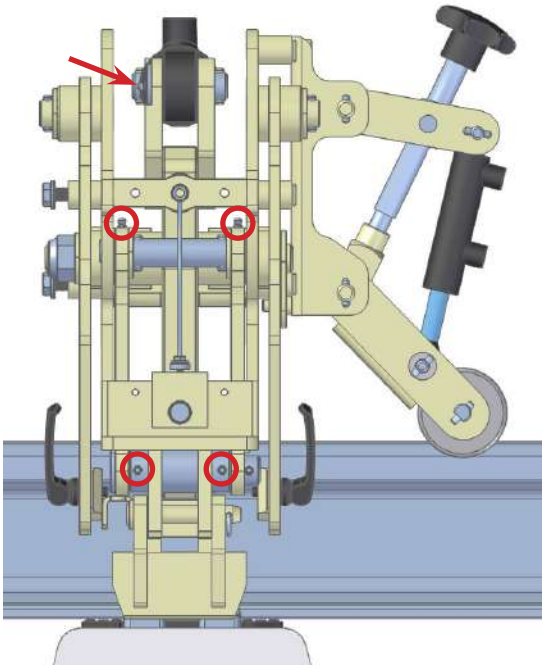


Fig. 61: Grease points visible from the side

9.3.2 E-CLIPS-equipped Machine

The E-CLIPS work head does not have any grease points.

10 MOUNTING TORQUE FOR SCREWS & NUTS

The preload force must be maintained at a level where the tensile stress and the intensity of the torsional stress do not exceed the screws yield stress for the specific material. Its main function is to clamp together the assembled parts and produce friction force between the assembled parts.

At Pandrol AB we mainly use steel screws and nuts. The table below shows the nominal tightening torque in Nm for the screws and nuts that are used

These torques do not apply to wheel bearings!

Table 17

Thread diameter [mm]	**Tightening Torque** (per bolt grade) [Nm]		
	Grade 8.8	Grade 10.9	Grade 12.9
5	5,7	8,1	9,7
6	9,8	14	17
8	24	33	40
10	47	65	79
12	81	114	136
14	128	181	217
16	197	277	333
18	275	386	463
20	385	541	649
22	518	728	874
24	665	935	1120
27	961	1350	1620
30	1310	1840	2210
33	1770	2480	2980
36	2280	3210	3850

IMPORTANT! Check that all bolts and nuts are tightened at least every 8 hours until 80 hours have been reached. If necessary, use spanner to tighten.

11 WARRANTY AND SERVICE

11.1 Warranty

All products from Pandrol AB are subject to a 12 month warranty.

The warranty does not apply if the product defect or flaw in question exists because of or is a result of improper use, tampering, or unauthorized modification, or if the product has been exposed to fire, electrical storms or excessive voltage.

11.2 Service

Service is offered after the expiration of the warranty as well. Please contact Pandrol AB.

11.3 Contact

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