PANDROL

CD200 IQ

OPERATION AND MAINTENANCE MANUAL

ENG_OMM_CD200IQ_P03

11 February 2022

Partners in excellence

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1. Review of maintenance plan

A nominated competent engineer identified by the owner should review the maintenance plan in this manual and its logs (Exam list check list A-C), as a minimum, every 12 months and the records retained for audit purposes.

The review shall include assessment of frequency and content of each job description and of component failure in this manual.

The review should be documented in written format and include decided actions upon the maintenance of the vehicle in question. The “Exam check list” A-C at the end of this document is to be used.

Regular reviews of the performance of the vehicle, reviews of maintenance activities, changes of use or frequency of use of the vehicle, and external information could all lead to changes in the plan.

Each change of the plan should be authorised by log a nominated competent engineer and where reasonably practical the change should be agreed by the OEM. The amended plan needs to be re-certificated. It is recommended that the plan is kept as a live document, with each change authorised by the competent engineer, who should decide if the amendment is serious (and requires re-certification immediately) or whether several changes can be bundled together and re-certificated at an annual review.

The users of the maintenance plan are encouraged to contribute to the review process.

2. Introduction

2.1 General

The purpose of this manual is to provide the owner and its users with the essential knowledge for carrying out routine maintenance procedures necessary for the proper working of the machine and for the purposes for which it is intended. All the information contained in this manual must be READ and UNDERSTOOD before undertaking any attempt to maintain the machine.

It is recommended that maintenance/overhaul is performed by qualified personnel from Pandrol AB or personnel that have been trained by Pandrol AB. The manual referrers to a fully equipped CD200 IQ, some of the tools are optional and this particular machine may miss a few of the features.

Read the safety instruction in the user manual and shut off the machine before performing any maintenance. See chapter “Start and Stop” in the operator´s manual

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.

Any adjustments or service on the machine only allowed to be done by qualified personnel that have read and understood this manual and have had training and information from Pandrol AB.

A copy of this manual must be kept with the machine at all times as it provides essential maintenance and safety information, and details the mandatory requirements for the general use of the machine.

In case of replacement of spare parts, always use Pandrol original spare parts to ensure that the machine fulfil the correct safety requirements at all times. Incorrect spare parts will affect the warranty of the machine.

To ensure that correct oils and grease are being used, see chapter “Technical Specifications” in the operator´s manual for information of oil and grease specifications, volumes and colour coding.

This manual is written according to the RIS-1530-PLT standard.

Training on how to use and work with the CD200IQ can be found on our YouTube channel, ”Training CD200IQ”.

2.2 New version/manual

SSUE	PR NUMBER	DATE	BY	COMMENTS	REVIEWED
P01	N/A	05-11-20	Lena Sohlin	New manual	
P02		02-12-20	Lena Sohlin	Updated to Pandrol graphic	
P03		11-02-22	Lena Sohlin	Uppdated with offset workhead FC	

Authored by:

Lena Sohlin, Technical Communications Officer, Equipment & Control.

Reviewed by:

Approved by:

2.3 Safety Actions Prior to Working on the CD200 IQ

- Prior to transportation, ensure that the pathway is free of obstructions or trip hazards.
- When lifting or carrying machinery or equipment, adhere to the permissible per-person lifting weight. It is the responsibility of the operating company to ensure that the national safety regulations and guidelines of the trade associations in the respective countries are observed. The values stated in the warning notices of these operating instructions relate to regulations in United Kingdom.
- Ensure that a risk assessment has been carried out and that the following aspects with regard to operators and the transport task have been considered: – Frequency of transport – Age – Gender – Operator's state of health – Uneven flooring – Poorly lit worksites – Bad weather – Working under time pressure – etc.
- Observe the relevant guidelines on lifting and transporting heavy machinery or equipment.
- Mechanical aids to lifting are always the preferred method of handling where possible, e.g. hoists, tail lift, rail trolleys et
- Your Safety and the persons who work with you are within your responsibility.
- Read and understand all safety regulations and warnings stated both in the operator manual and in this manual before any installation, operating or performing maintenance on this machine.
- Locate the emergency stop button before installation, operating or performing maintenance on this machine.
- Only qualified personnel are permitted to operate the machine during operation.
- The machine is never to be used as a transport vehicle for personnel or equipment.
- The machine is not to be used to recover other vehicles or equipment.
- Make sure that no unauthorized persons are located within the operating area during installation, use or maintenance.
- Safety regulations regarding authorized personnel within the operating area of the CD200 IQ are valid for this attachment.
- Improper operation and maintenance of this equipment can be dangerous and could result in personnel injury.
- 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. And that only original spare parts are being used
- 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.
- Personal protection clothing and eye protection must be worn when undertaking work. Read chapter 2.6 in this manual for detailed information of protection clothing.
- When placing CD200IQ on track, choose a suitable place with as little interfering obstacles and with as firm and flat ground as possible. If the permissible per-person lifting weight is exceeded when lifting or carrying, there is a risk of injuring muscles, tendons, joints or bones.
- Ensure that the road to the workplace is safe and free from interfering obstacles to avoid accidents.
- **The modules should only be manually handled in an emergency situation.** Always use the handles to lift the modules. Always use two hands and address the modules symmetrically. Do not twist the spine when handling. Do not carry any of the modules more than 3 meters without a rest, or without using a mechanical aid. Contact your Health and Safety Advisor for more information.

2.3.1 Safety Equipment

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

Text within brackets ( ) refers to number in figure unless otherwise specified.

The machine is equipped with one emergency stop button (1).

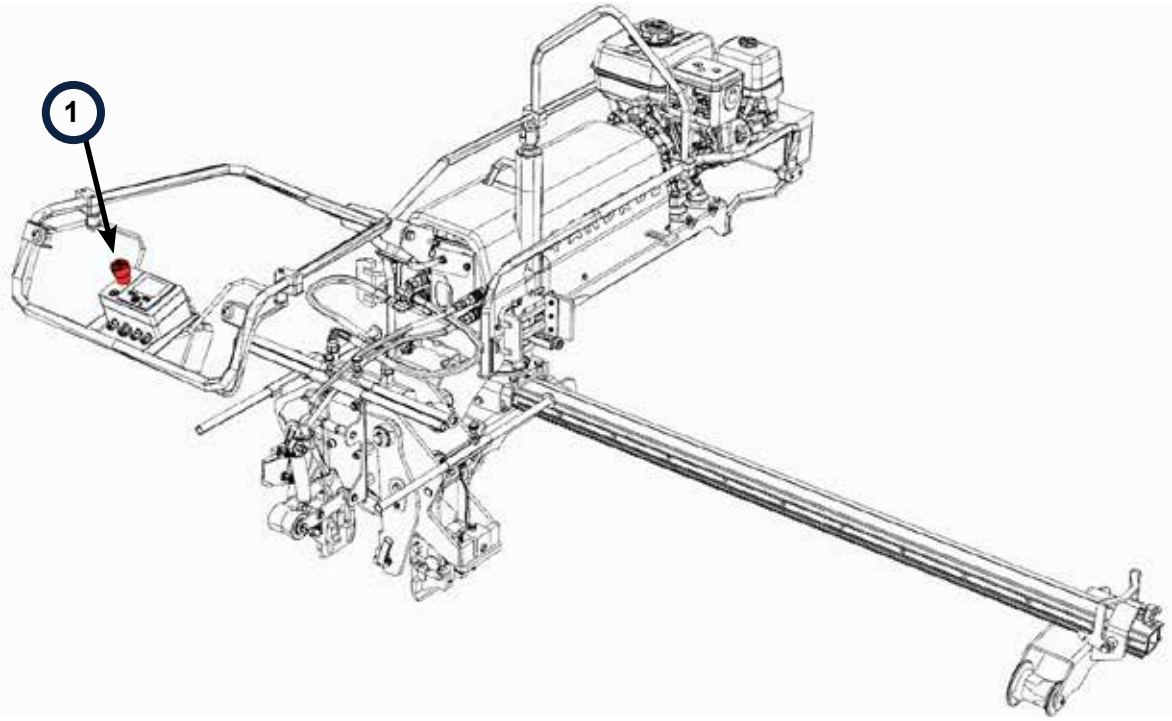


Figure 1. Safety equipment

Item	Description
1	Emergency stop button

2.3.2 Control System

The control system of the CD200 IQ is configured to avoid simultaneous operations that could cause damage to the vehicle or equipment or injury of personnel.

2.4 Safety warnings

2.4.1 Moving Parts

WARNING! – Risk of crushing

During operation, parts of the machine are moving. Moving parts can cause serious personal injury.

To avoid accidents, follow the guideline below:

1. Keep away from the machine and moving parts when operating the machine.

2.4.2 Pressurised Hydraulic Oil

WARNING – Pressurised hydraulic oil

Hydraulic oil under high pressure is present in the hydraulic system. Fluids under high pressure are dangerous and can cause serious personal.

To avoid accidents, follow the guidelines below:

1. Always shut off the engine before carrying out any maintenance work. See chapter “Start and stop” in the operator´s manual.
2. Always wear appropriate personal-protection according to chapter 2.6 in this manual.

2.4.3 Live Current

DANGER! – Live current

High voltage live current is very dangerous and can cause serious injury or death of a person. Contact with electric parts can damage the equipment if live current is present.

Always ensure that there is no live current present in the power lines or the third rail!

2.4.4 Vehicle in Operation

DANGER – Machine in operation

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

To avoid accidents, make sure that no unauthorized personnel are within 5 meters of the machine when operation is started.

2.4.5 Danger due to unergonomic operation

WARNING – With some activities there is a risk of injuring muscles, tendons, joints or bones if the necessary caution is not exercised with the controls. Avoid adverse movements and poor posture. Avoid static postures of the thumb and hand when using the controls.

2.4.6 Danger due to manual handling

WARNING - To decrease the footprint of the machine on the transportation vehicle the trolley can be manually handled and then put on track and the rest of the machine put on top of it using a crane/hoist. This is the only permitted manual handling in the normal course of events. Alternatively it can be left on the machine and it can all be mechanically handled.

In an emergency the machine could be manhandled off the track as a whole unit (poerpack/tool) by 8 people.

In the event of lifting equipment failure ONLY it can be broken down into modules.

2.4.7 Danger due to noise

WARNING – Risk of permanent damage, particularly to hearing, if the user does not continuously wear suitable hearing protection. Wear hearing protection. See noice data in section 3.3.

2.4.8 Danger due to vibration

WARNING – The transmission of vibrations to the human body is harmful to health. Wear padded gloves. Include other vibration-free activities with mainly vigorous use of the muscles during the work process. See vibration data in section 3.3.

2.5 Safety Conditions

Safety Condition “Isolated” SCI

- Machine secure by brake.
- Main engine and emergency recovery engine stopped and starter key removed.
- Isolate battery.
- Allow engine to cool.

Safety Condition “Braked” SCB

- Machine secured by brake.
- Main engine and emergency recovery engine stopped and starter key removed.

Safety Condition (Engine) “Running” SCR

- Machine secured by parking brake.
- The engine may be running to meet the requirements of a particular job, or there is no safety risk when doing the job while an engine is running.
- Place barriers and signs to keep unauthorized persons away from the working area.

Safety Condition “Moving” SCM

- Machine moving to meet requirements of job, or liable to move.
- Ensure that unauthorized personnel are kept away from the machine.

Safety Check after Completing an Examination

- Check that the brake is applied.
- Check that all access panels and safety catches/clips are secured.
- Ensure that all tools and work items have been removed.
- Remove all portable containers of inflammable fluids and gases from the machine.
- Remove any tags used during examinations.

2.6 Personal Protective Equipment (PPE)

Items of PPE provided for maintenance tasks must be worn as appropriate. These include:

- Safety Boots
- Hard Hats
- Safety Glasses

- Gloves
- Ear defenders

2.7 Battery Precautions

- Maintenance tasks or repairs on batteries must NOT be carried out when the battery is on charge or being discharged. Before commencing any work on the batteries, ensure that the power has been switched OFF and that the battery is ISOLATED and not being charged.
- The gases generated by a battery on charge are highly inflammable. Keep flames away from batteries. Do not smoke in the vicinity of batteries. Where a battery is found to be or is suspected to be overheated, extreme caution should be taken to prevent ignition and ample time must be allowed for the dispersal of the gases.
- Metal parts of a battery are LIVE. Use insulated spanners on battery connections. Never place tools or metal objects on the batteries.
- To avoid short circuits when removing the battery, cables in the battery box should be tied back and insulated after being disconnected.
- Take care to keep electrolyte away from eyes, skin and clothing. Protective clothing and goggles must be worn during ALL battery repairs.
- If electrolyte enters the eyes it should be washed out immediately with the specified irrigation fluid using either an eye sachet or a bottle with an eye irrigator bath. For skin burns the affected area should be immediately washed with copious quantities of clean running water. In all cases, immediate medical attention must be obtained and medical staff informed that battery electrolyte is concerned.
- Clothing soaked with electrolyte must be removed immediately.
- Only pure distilled or de-ionised water may be used for topping up battery cells.
- Ensure that all cables used for battery charging are maintained in good condition. When in use, they MUST be positioned so that they do not present a danger to personnel or damage cables and equipment.
- Disposal of electrolyte must be strictly in accordance with the Local arrangements made between the Depot concerned and the Local Government Authority.

2.8 Remedial Work

- Equipment repaired or changed must be tested for correct operation after fitting to the vehicle.
- All work shall be carried out in accordance with the job descriptions in this schedule, supplemented by the base machine manuals.
- Only material called up on approved drawings, parts lists and specifications shall be used for repairing machines. Where equipment is to be tested following repair, this shall be carried out using the authorized test equipment provided.
- Equipment removed for repair must be protected against damage and handled with care.
- Following any reportable incident or accident involving the machine a detailed examination must be carried out around the damaged or suspected damaged area. Testing of brakes, and lifting of vehicles, together with gauging of axles and wheels shall be carried out as appropriate or called for by the specialist engineer appointed to investigate the incident. Any tests/checks called for shall be carried out in accordance with the appropriate job description in this schedule and all details recorded.
- If any components on the following systems have been disturbed, a functional test MUST be carried out on the relevant system AFTER ALL work is completed and BEFORE the unit is returned to service:
  - Braking Equipment
  - Rail Guidance

2.9 Minimum Facilities

Clean, dry, covered accommodation for dealing with wheel set, bearings, mechanical hydraulic and electrical components etc.

- Adequate illumination for inspection of components and under frames.
- Cleaning facilities which will not cause damage to the components.
- Jacking facilities for raising the machine.
- Handling facilities for removal and refitting of components such as engines.
- Protection from the weather of vulnerable areas of the vehicles and its components.
- Any specific requirements additional to those listed are identified in the applicable job description.
- A suitable length of straight level rail track for carrying out brake tests.

2.10 Competence

Staff competence

Work on the CD200 IQ 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 and only on specified rail types.

In order to carry out this maintenance plan in a manner that will achieve the required safety and quality, the following minimum level of competence required is:

- For all activities the person leading the task must be able to follow and carry out the instruction detailed in this document.
- All Safety Critical Work must be carried out by persons competent in accordance with:

1. ORR Railway safety publication 1 “Developing and Maintaining staff competence” March 2007.
2. Duty holders safety critical work competence management system
3. The railways and other guided transport system (safety) Regulations
4. Staff undertaking this work must have been trained to handle the CD200 IQ

2.11 Technical Data

Hydraulic system	**Hydraulic oil flow** **Hydraulic oil pressure**	**17 l/min** **215 bar**
Length		2177 mm
Height		1173 mm
Width		2138 mm
Total weight	with tools for clipping and declipping **Pandrol FASTCLIP**	254 kg
Total weight	with tools for clipping and declipping **Pandrol e-CLIP**	272 kg
Weight Power pack		103 kg
Weight Trolley		54 kg
Weight FC tool		97 kg
Weight e-Clip tool		115 kg

3. General Description

3.1 Intended Use

The Clip Driver CD200 IQ 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 IQ uses the same head for both clipping and de-clipping and it is also easy to setup for different rail gauges and inclinations. Choose the type of tool in the control panel (2).

The Clip Driver CD200 IQ is rapid and easy to use and it is ergonomically operated by one single operator. The Clip Driver CD200 IQ 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 IQ can be separated into 3 pieces.

3.2 Main Components

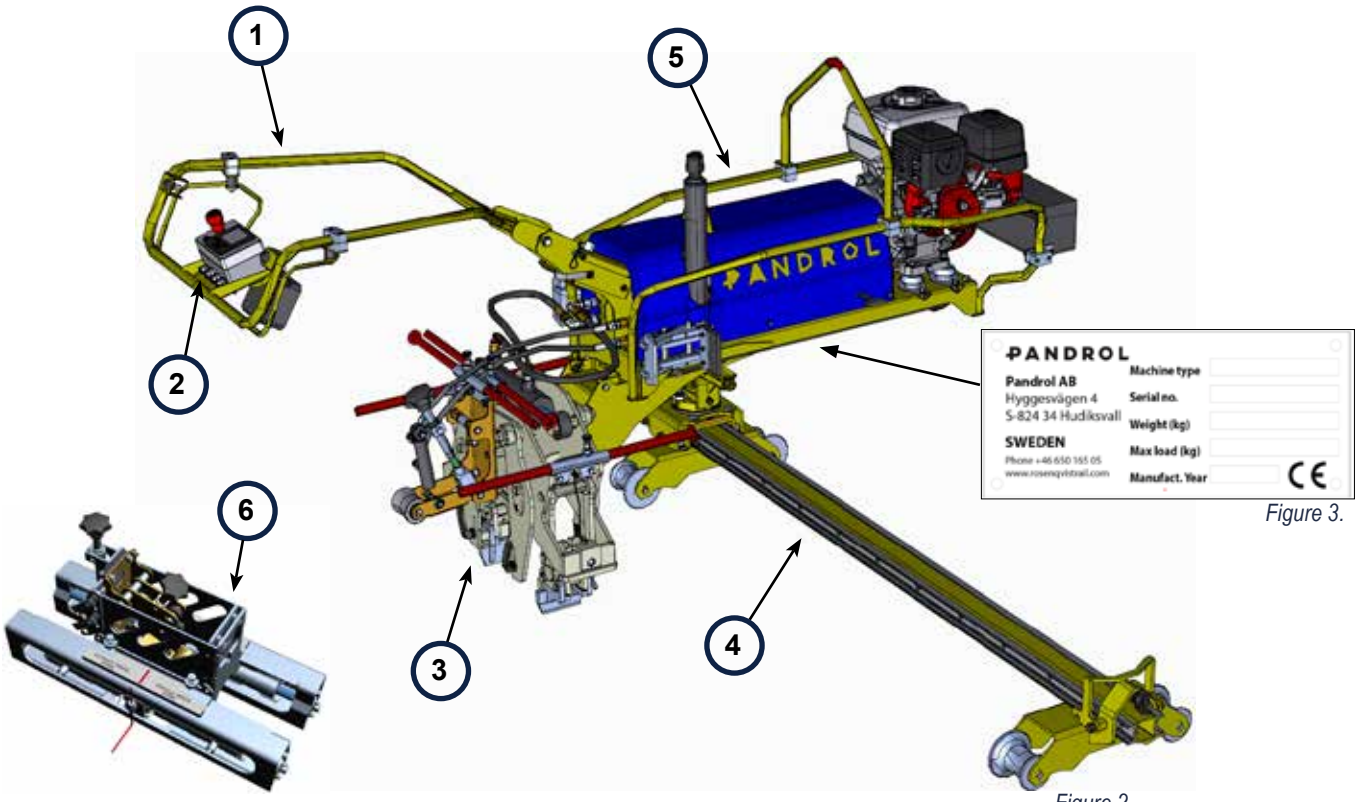


Figure 3.

Figure 4. e-clip workhead

Figure 2.

Table 1

Item	Description	Item	Description
(1)	Height adjustable handlebar	(4)	Trolley unit
(2)	Control panel	(5)	Main unit
(3)	Work head FC/FE	(6)	e-clip workhead

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

3.3 Technical Specifications

CD200 IQ		Fastclip 5014300 e-Clip 5014699 (Honda)	Fastclip 5014853 (Briggs & Stratton)
Measurements	Length	2202 mm	
	Height	fastclip 1142 mm / e-CLIP 1103 mm	
	Width	2111 mm	
	Weight Power pack	103 kg	
	Weight Trolley	54 kg	
	Weight Tool, Fastclip	97 kg	
	Weight Tool, e-CLIP	115 kg	
Performance	Track gauge	1067-1600 mm	
	No of clips being installed/extracted at the same time, 2 clips per cycle		
	Capacity: Fastclip (up to) 30 sleepers/min / e-CLIP (up to) 10 sleepers/min		
Engine	Manufacturer	Honda	Briggs & Stratton
	Model	GX 270	XR1450 / 19N1
	Type	Air-cooled, 4-stroke single cylinder, overhead camshaft	Air-cooled, 4-stroke single cylinder, overhead camshaft
	Power	5,1 kW @ 3600 rpm	-
	Max gross torque	-	19,77 Nm @2600 rpm
	Fuel	Automotive gasoline (unleaded)	Automotive gasoline (unleaded)
	Fuel tank capacity	5,3 litre	5,3 litre
Electronics	Voltage	12 volt DC	
	Ground	Negative	
Hydraulics	Pump	Gear pump	
	Max flow	17 l/min	
	Max pressure	120 bar / Boost 215 bar	
	Hydraulic tank volume	8-9 litre	
Noise data	Noise level, idle running	69 dB (A)	
	Noise level, full speed	91 dB (A)	
Vibration data	Clipping	4,31 m/s²	
	De-clipping	4,65 m/s²	

Maximum travelling speed	3 mph
Maximum working speed	0,5 mph
Maximum travelling speed through S&C	3 mph
Maximum travelling speed through raised check rails	3 mph
Maximum working cant	150 mm
Maximum working gradient	1:25
Minimum radius	80 m
Maximum ON/OFF track gradient	1:25
Maximum ON/OFF track cant	100 mm
May be used under LIVE overhead lines	Yes
May travel on LIVE 3 or 4 rail lines	No
May be used on isolated 4/4 rail lines	See ECC
May be used adjacent to running line	Yes
Not permitted outside of a possession	

Table 2

3.4 Drawings Fastclip

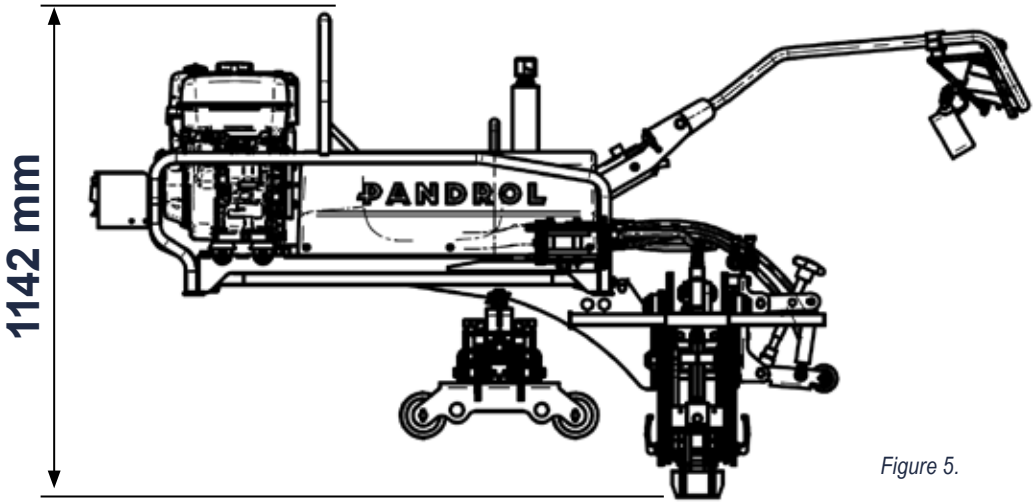


Figure 5.

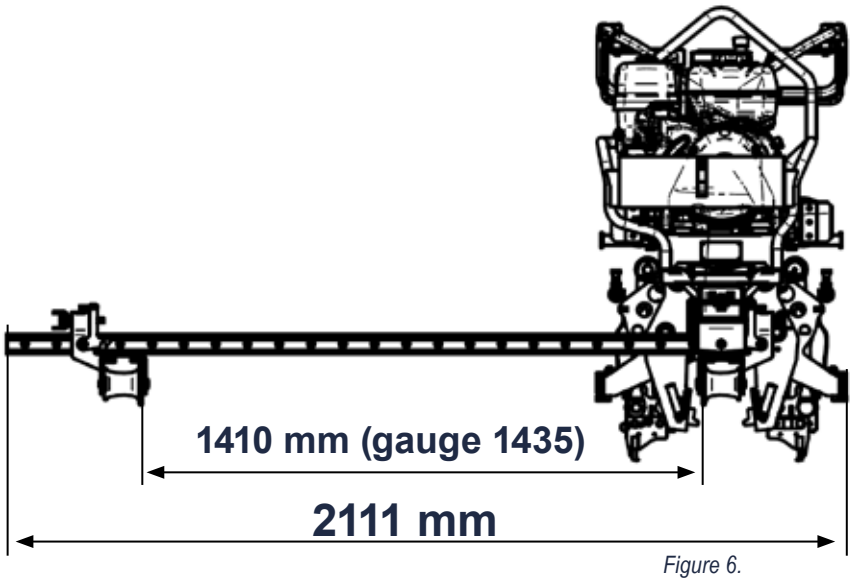


Figure 6.

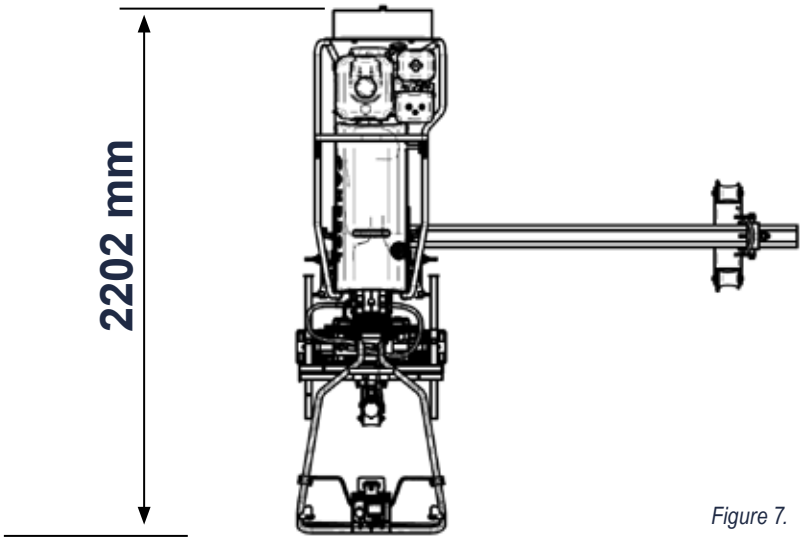
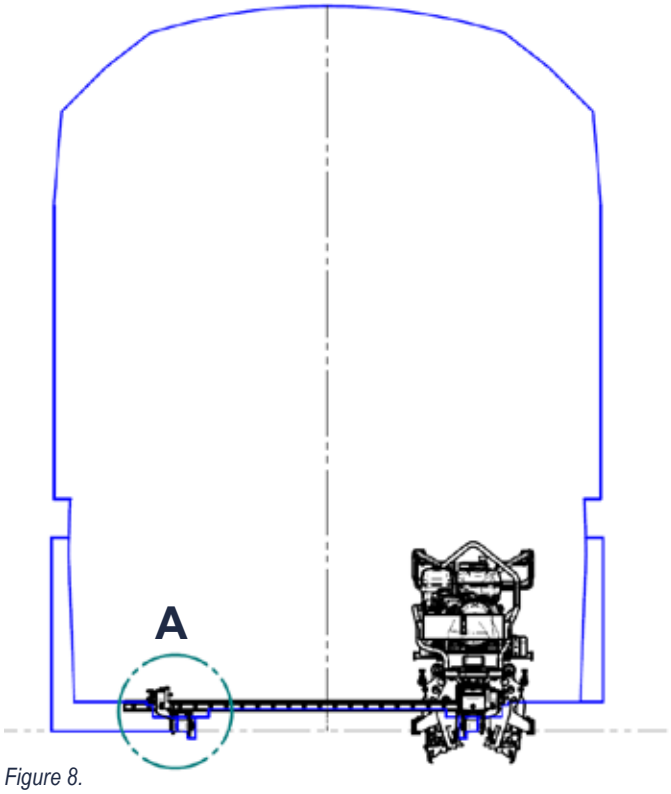


Figure 7.

3.5 Plant gauge Fastclip



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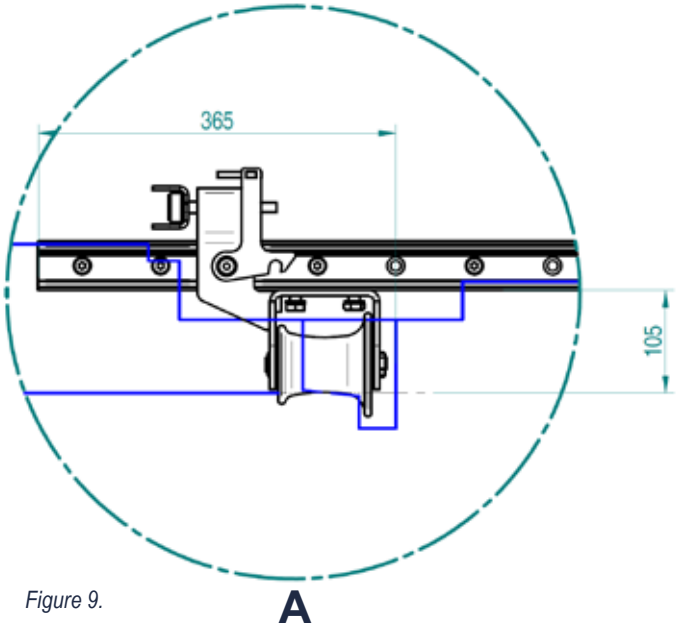


Figure 9.

3.6 W6a gauge Fastclip

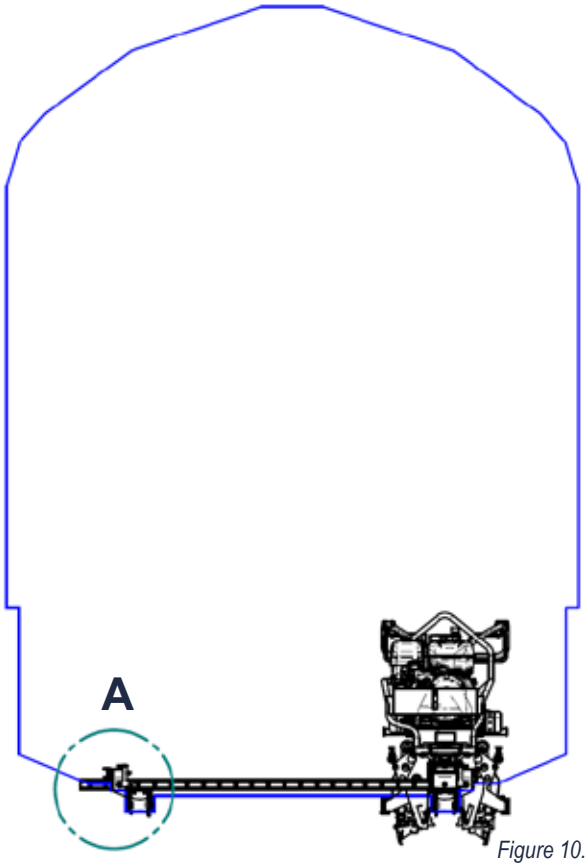


Figure 10.

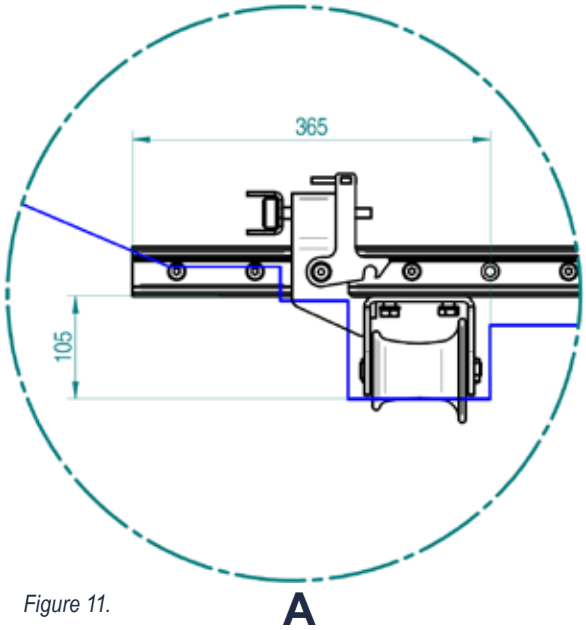
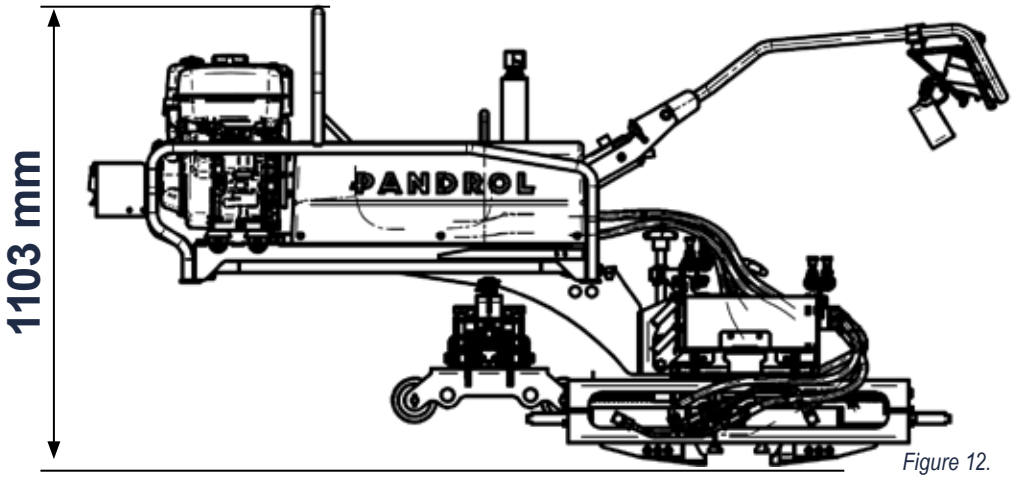


Figure 11.

3.7 Drawings e-CLIP



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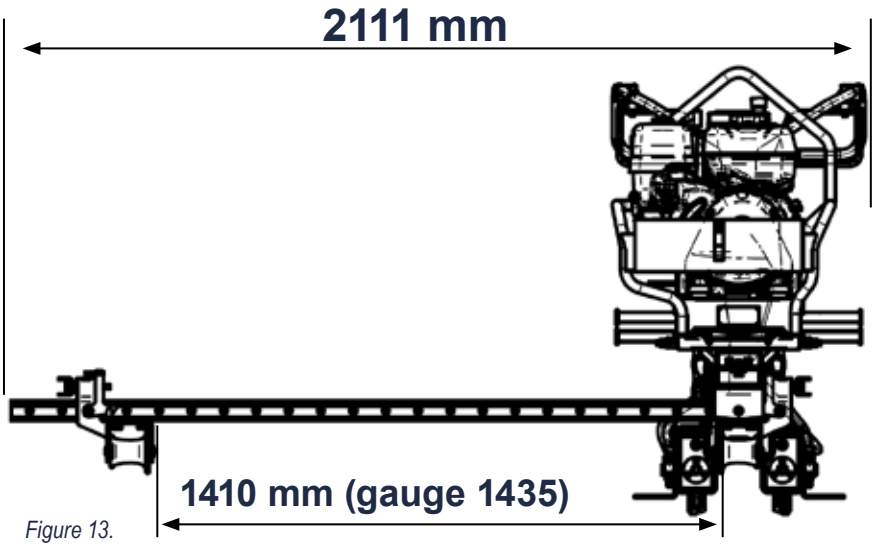


Figure 13.

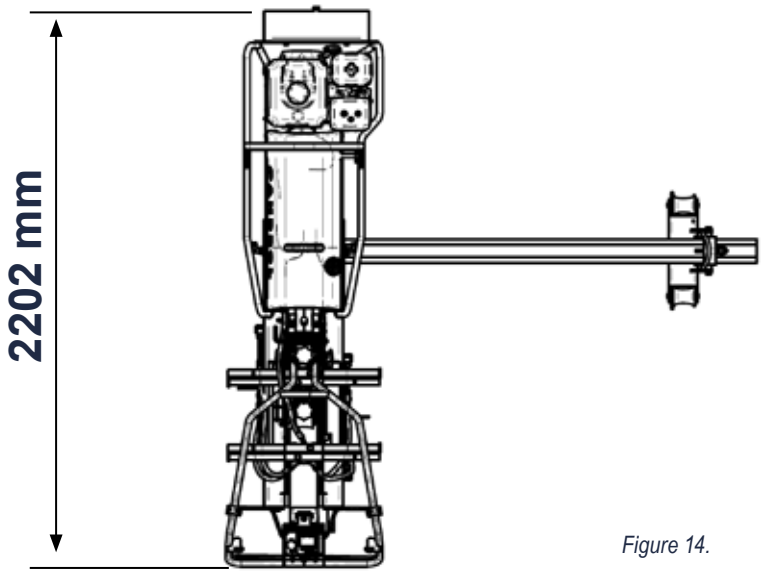


Figure 14.

3.8 Plant gauge e-CLIP

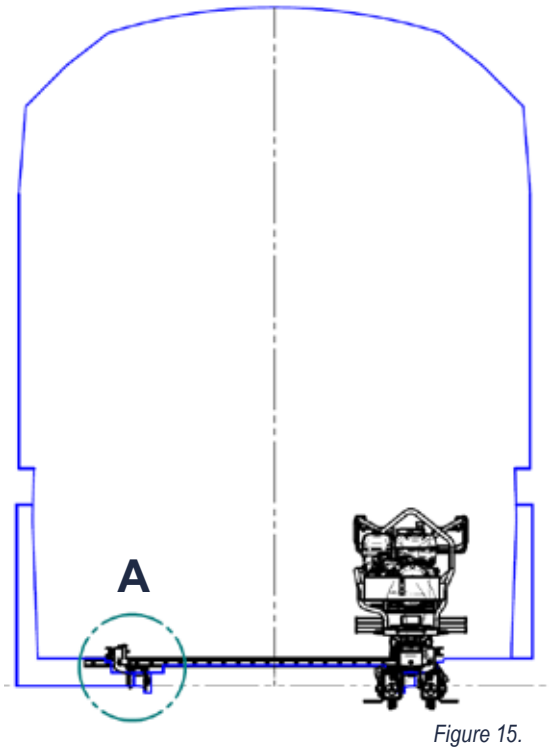


Figure 15.

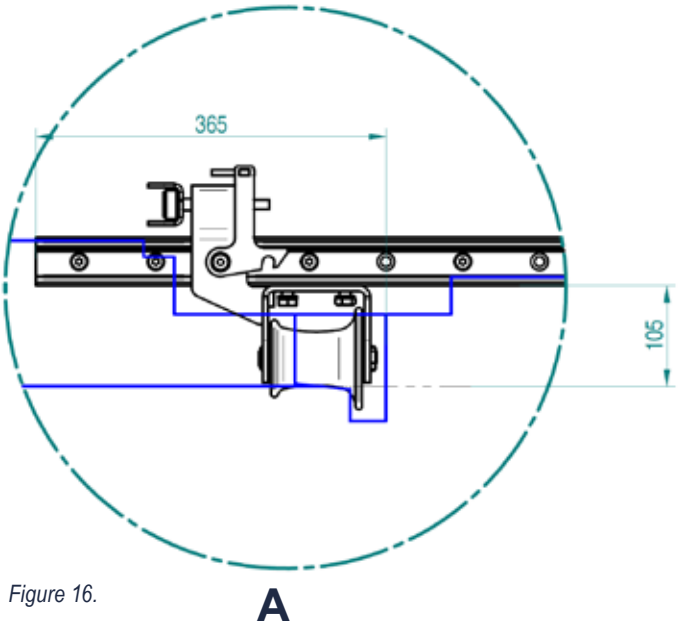


Figure 16.

3.9 W6a gauge e-CLIP

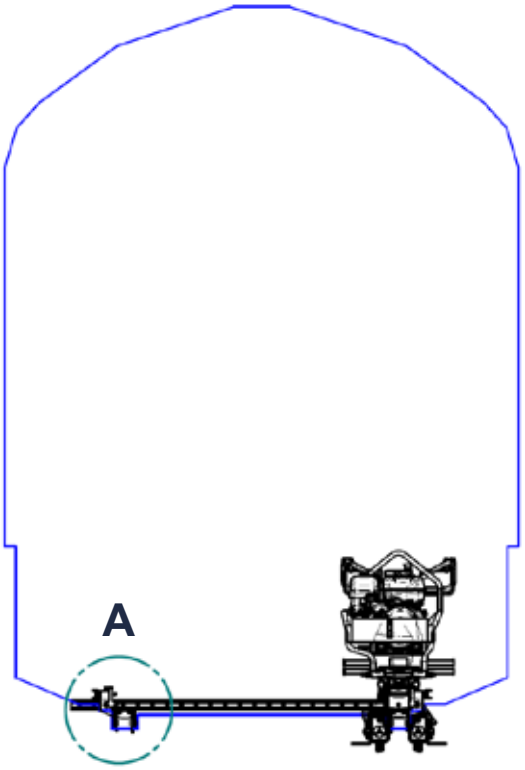


Figure 17.

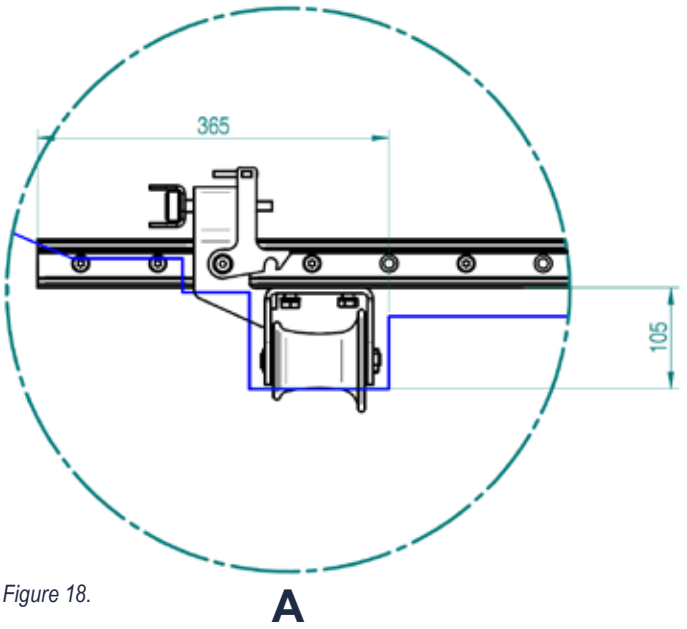


Figure 18.

4. Machine Component

4.1 Main Unit

The Main Unit is the heart of CD200 IQ. 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.

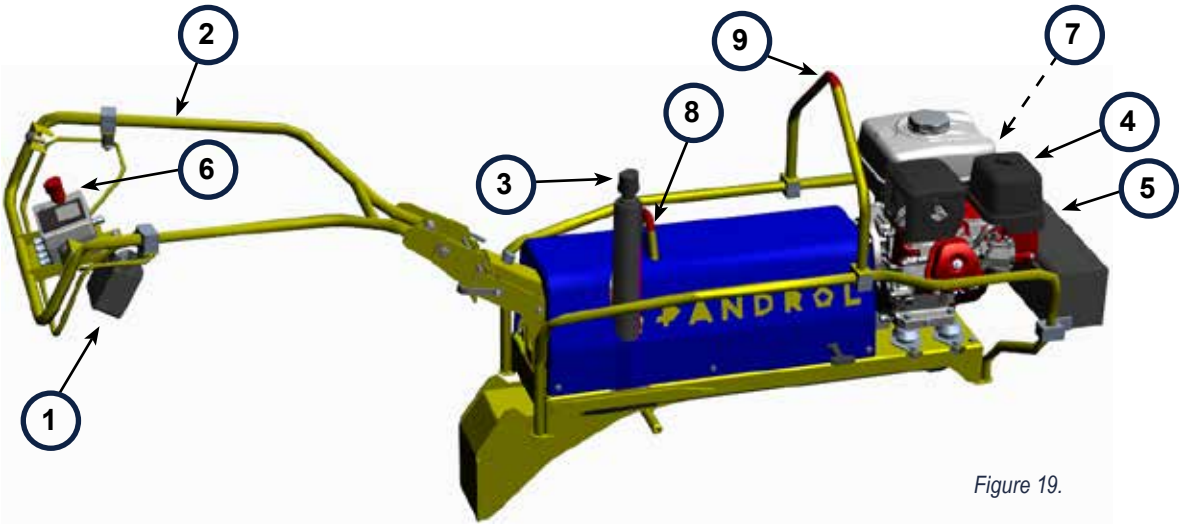


Figure 19.

Item	Description
(1)	Working light
(2)	Handle bar
(3)	Hydraulic tank
(4)	Engine
(5)	Accessory box
(6)	Emergency stop button
(7)	Start key, motor
(8)	Lifting point, complete machine
(9)	Lifting point, power pack

Table 3

4.2 Trolley

The trolley for the CD200 IQ 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. The connection tray needs to be secured in position prior to moving the trolley. The slide carriage/ connection tray has no automatic lock and the load of the trolley is unbalanced therefor extra care needs to be taken when handling the heavy end of the trolley.

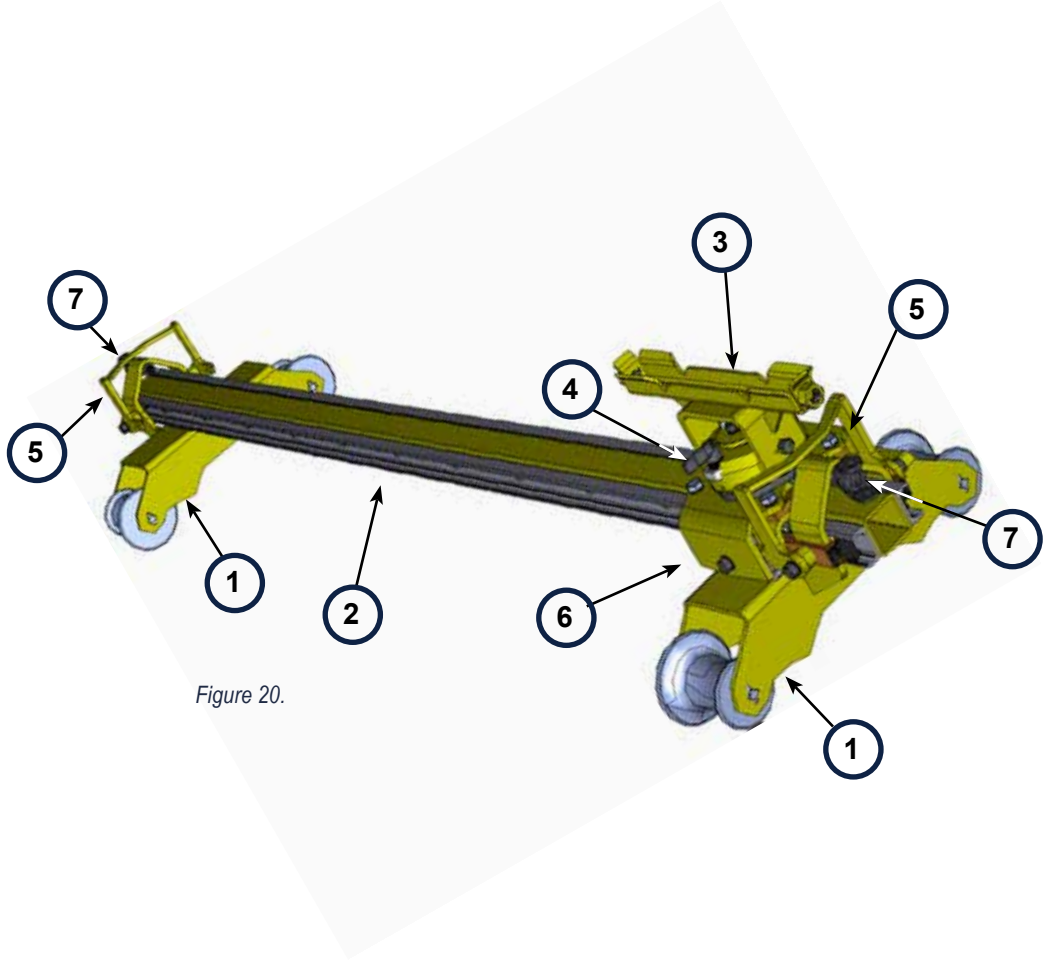


Figure 20.

Table 4

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

4.3 Workhead

4.2.1 Workhead FC/FE

The work head is designed to be able to both clip up and de-clip PANDROL FASTCLIP and FASTCLIP FE.

Table 5

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

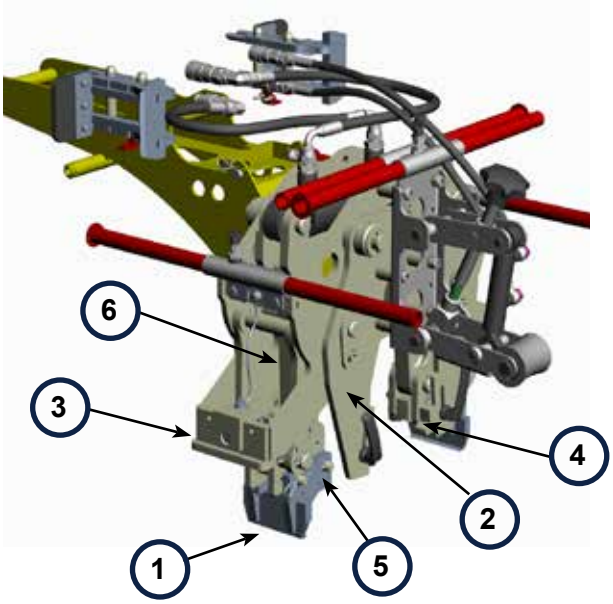


Figure 21.

4.3.1 Workhead OFFSET FC/FE

The work head is designed to be able to both clip up and de-clip PANDROL FASTCLIP and FASTCLIP FE.

Specific settings se chapter 8.6

Figure 22. example OFFSET

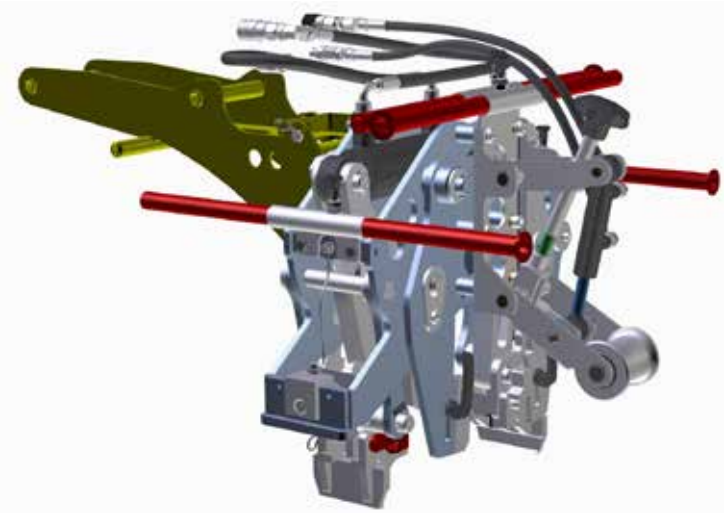


Figure 23. Offset workhead

4.4 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. 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.

Table 6

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

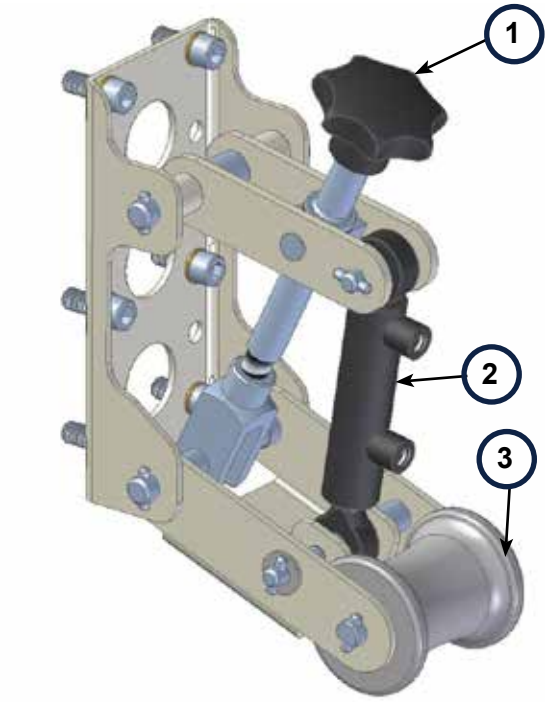


Figure 24.

4.5 Workhead 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. For details on workhead see 5.7.

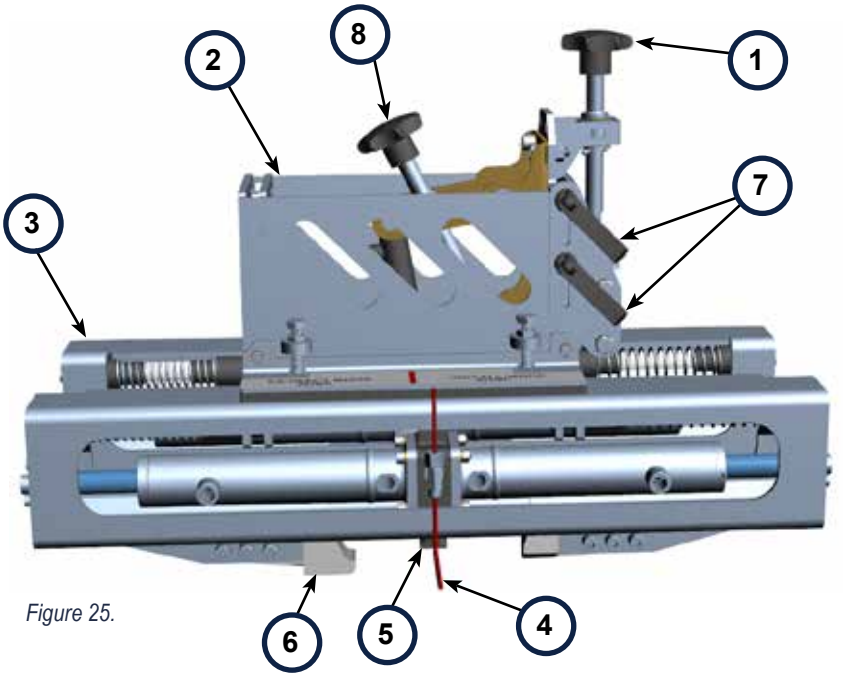


Figure 25.

Table 7

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

4.5.1 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.

4.5.2 Work Head Lifting Mechanism e-CLIPS

Table 8

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

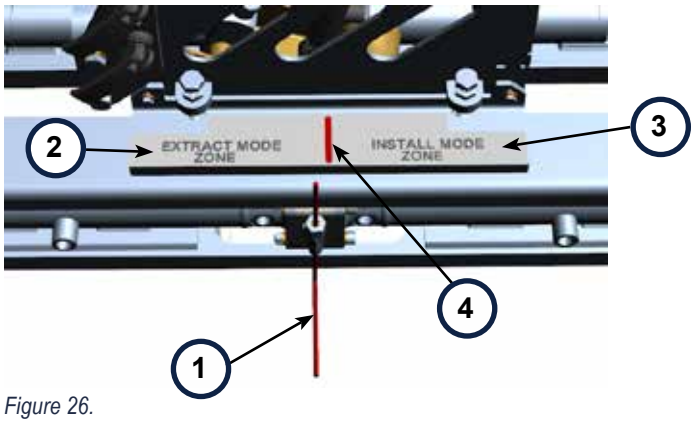


Figure 26.

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 IQ 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.

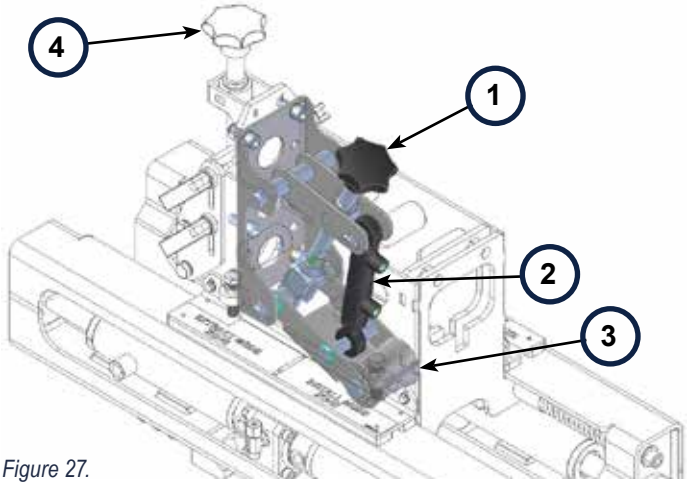


Figure 27.

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

Table 9

4.6 Brake

4.6.1 Brake Trolley

When removing the machine from the trolley there is a possibility that the trolley can run along the track. For that reason the CD200 IQ is equipped with brakes that will automatically stop the trolley from running away when removing the machine. The brake is activated as long as the handle (1) is not pressed down. The trolley is always in parked position from the beginning.

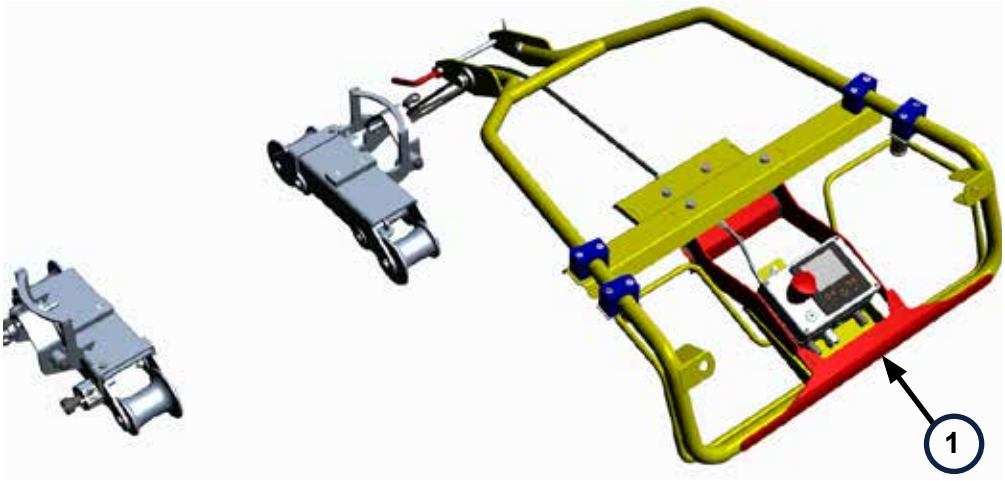


Figure 28.

5. Controls

The CD200 IQ 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 IQ has four different work modes as will be explained below.

WARNING!

Do not operate the machine before performing the setup procedure.

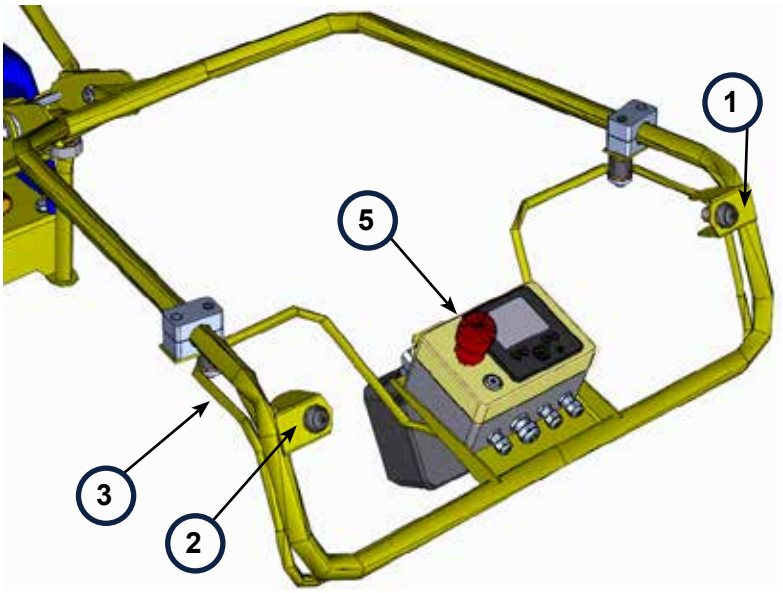


Figure 29.

NOTE that the choices in this chapter are made through pressing a button below the display, not on the display/ screen itself.

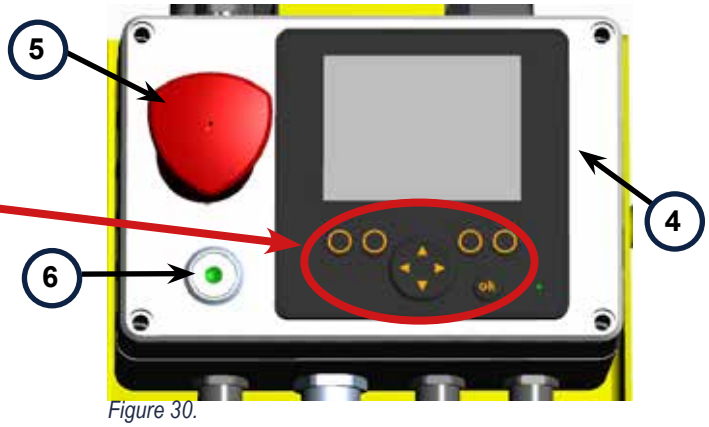


Figure 30.

Item	Description	Item	Description
(1)	Push button 1	(5)	Emergency stop button
(2)	Push button 2	(6)	Start button, control system
(3)	Dead-mans-handle/sleeper lift function		
(4)	Control panel		

Table 10

5.1 Control panel

The CD200 IQ is operated by the operator by a control panel.

Start control system →

Figure 31.

NOTE that the choices in this chapter are made through pressing a button below the display, not on the display/screen itself.

FASTCLIP

Ext – Put the machine in de-clipping mode, press the left button.

Inst – Put the machine in Install mode, presss the right button.

Figure 32.

Figure 33.

e-CLIP

Ext – Put the machine in de-clipping mode, press the left button.

Inst – Put the machine in Install mode, presss the right button.

Figure 34.

Figure 35.

Auto - Click the right or left button once to perform an install operation, if the xtend operation is selected click the left button once.

Manual - Manually perform an install or extend action by holding the right or left button.

Figure 36.

Figure 37.

Light on – Turn the light on.

Light off – Turn the light off.

Figure 38.

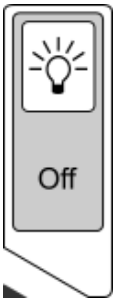


Figure 39.

Boost on – During manual mode more power will be used.

Boost off – No boost

Boost on will give the Clipping/De-clipping more pressure/power.

Figure 40.

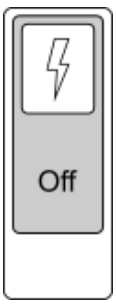


Figure 41.

NOTE that the choices in this chapter are made through pressing a button below the display, not on the display/ screen itself.

Push the button 3 seconds to start the system

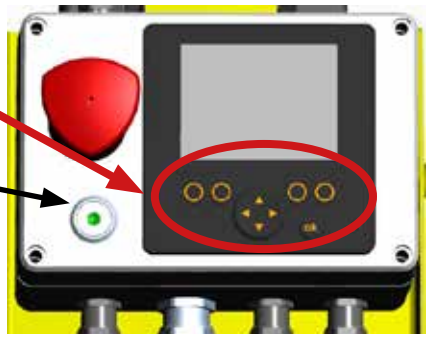


Figure 42.

Manual Clipping

Set button (**2**), to Man.

Set button (**1**), to Inst.

Push button (**5**), to do the clipping operation. Push button (**6**), 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.

Manual De-clipping

Set the button (**2**), to Man.

Set button (**1**), to Ext.

Push button (**5**) to do the de-clipping operation. Push button (**6**) 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.

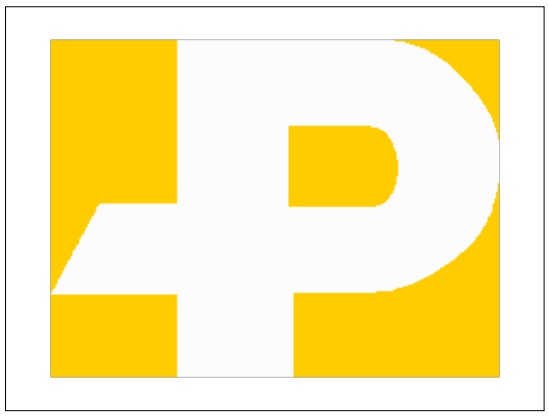


Figure 43.

Auto Clipping

Set the button (**2**), to Auto.

Set button (**1**), to Inst.

Push button (**5**) 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.

Auto De-clipping

Set the button (**2**), to Auto.

Set button (**1**), to Ext.

Push button (**5**) 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.

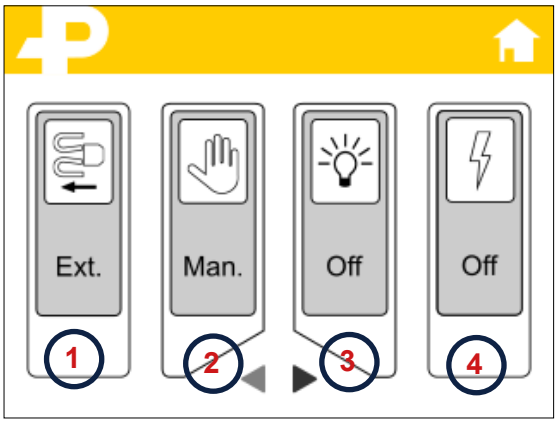


Figure 44.

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.

Sleeper lift

Lower the tool towards the sleeper. Push button (**5**) until the tool is pressed against the clip. Check that the tool is firmly seated. Lift the tool and release the button when the clip is installed. The tool retracts to origin position when the button is released.

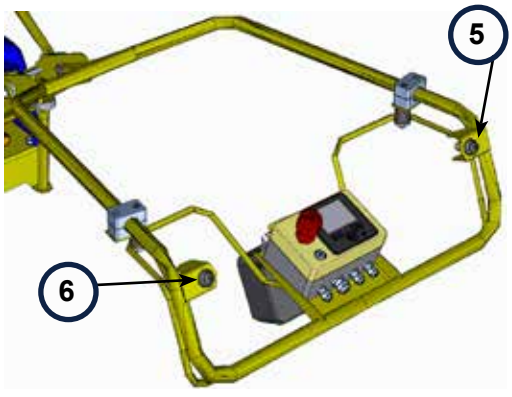


Figure 45.

Extra information and changing between FASTCLIP and e-CLIP.

Extra information can be viewed by pushing the buttons as well as language settings.

NOTE that the choices in this chapter are made through pressing a button below the display, not on the display/screen itself.

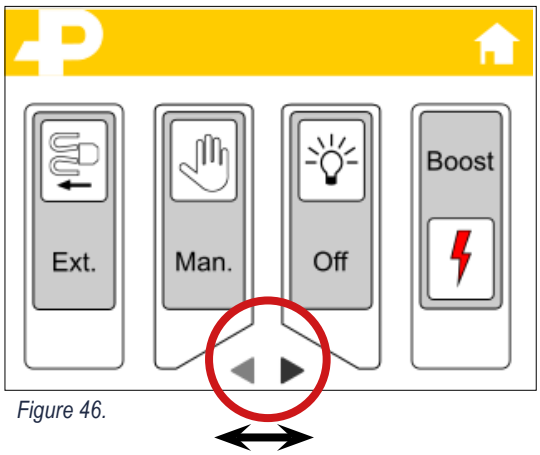


Figure 46.

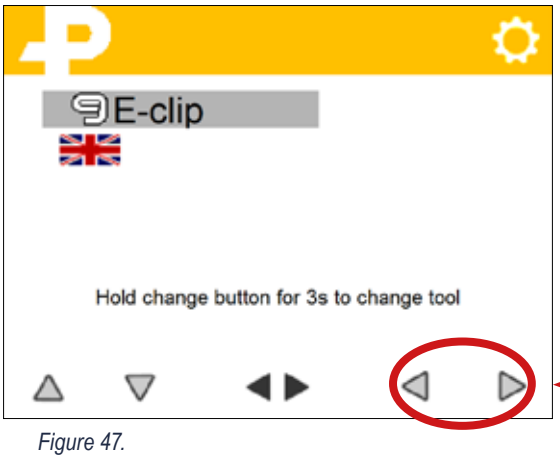


Figure 47.

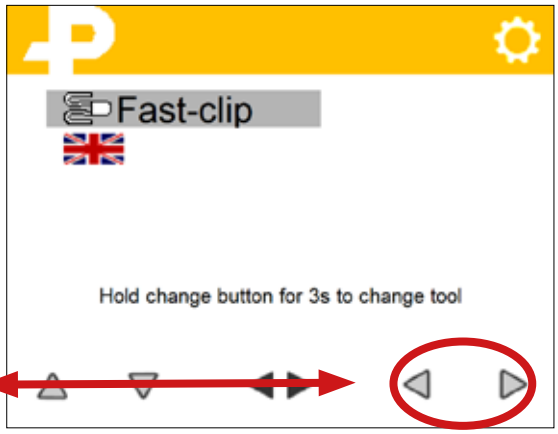


Figure 48.

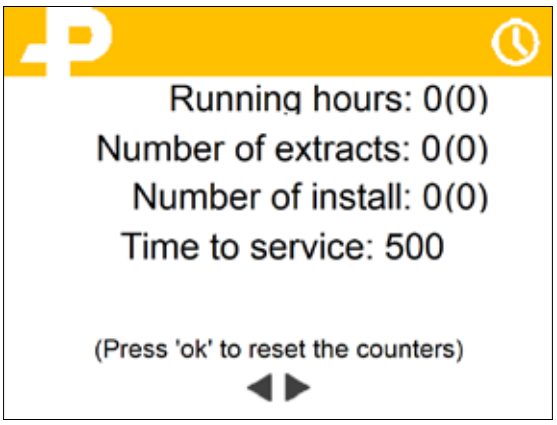


Figure 49.

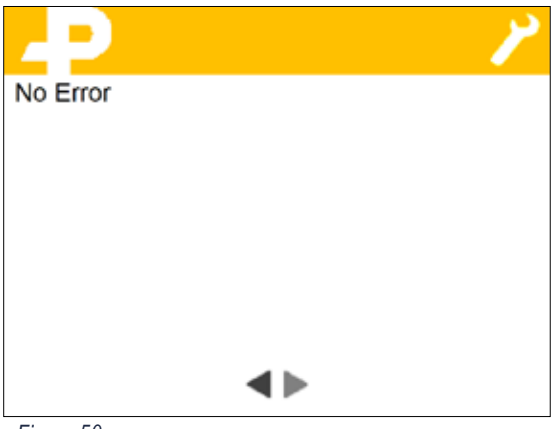


Figure 50.

5.2 Electrical System

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

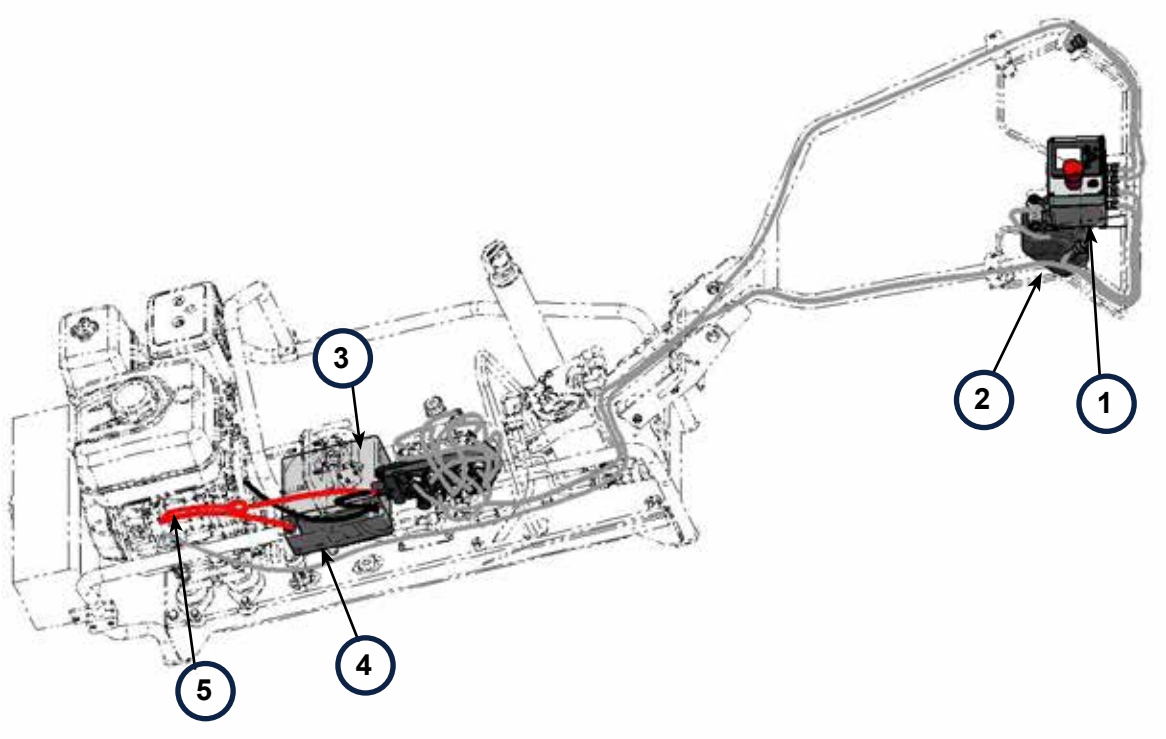


Figure 51.

Item	Description	Item	Description
(1)	Controls	(4)	Battery
(2)	Work light	(5)	Fuse 10A
(3)	I/O unit		

Table 11

5.3 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. The hydraulic reservoir (3) is also a part of the machine structure.

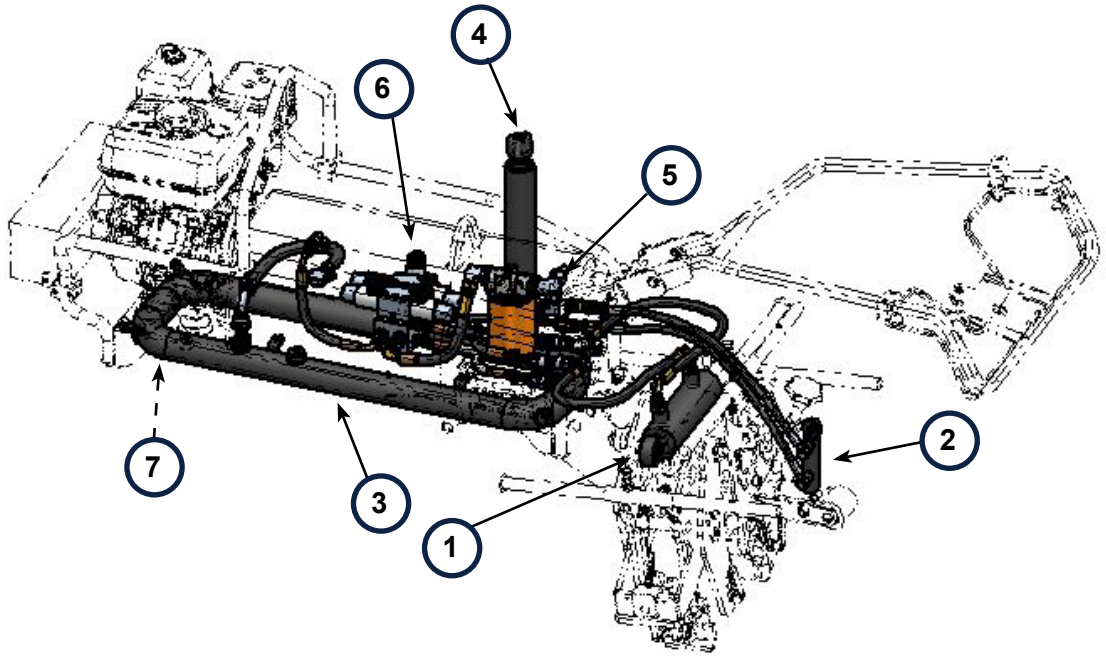


Figure 52.

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

Table 12

5.3.1 Hydraulic System e-CLIPS

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

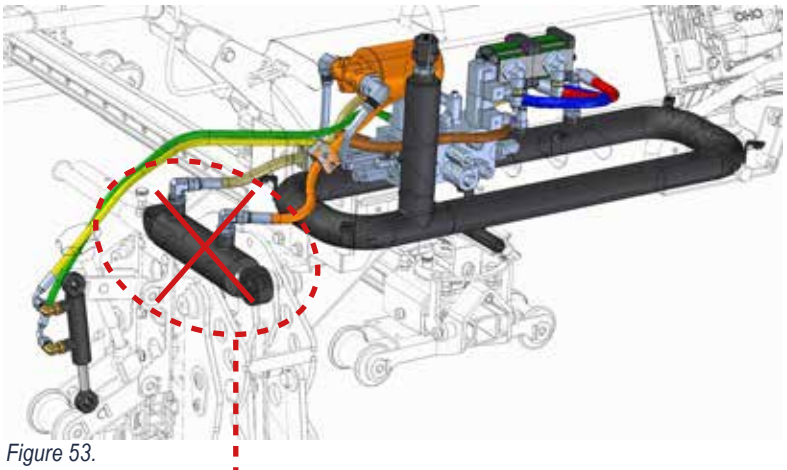


Figure 53.

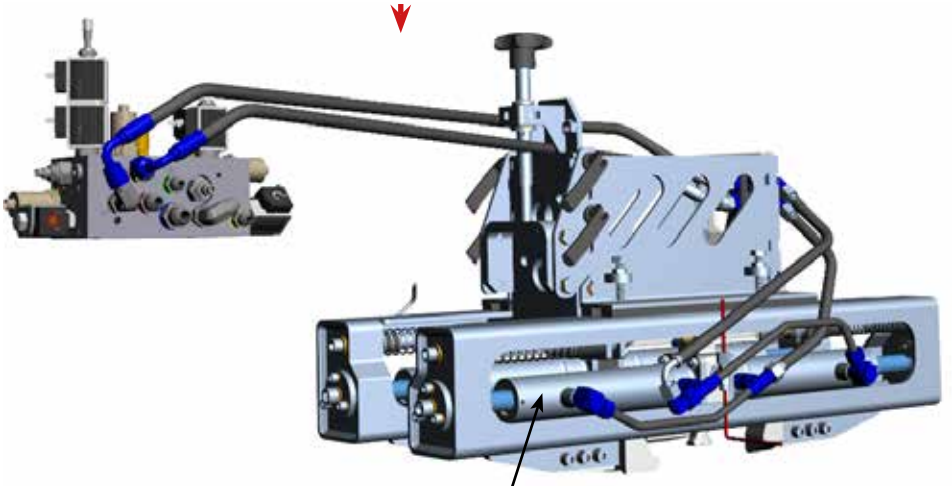


Figure 54.

6. Transport and Parking

6.1 Preparing for Transport or Storage

When CD200 IQ is to be transported or stored off-track,ensure that the machine is safely rested on surface. CD200 IQ should only be lifted mechanically. Use appropriate slings/chains and lifting accessories when lifting CD200 IQ

WARNING!

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.

When placing CD200IQ on track, choose a suitable place with as little interfering obstacles and with as firm and flat ground as possible.

Ensure that the road to the workplace is safe and free from interfering obstacles to avoid accidents.

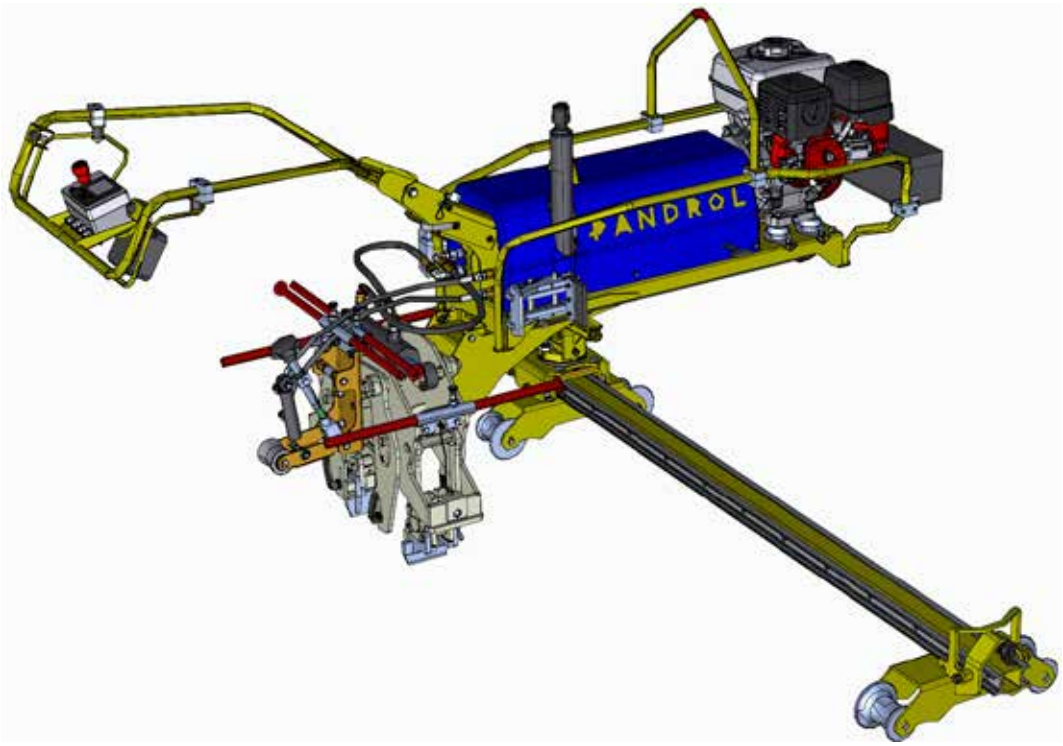


Figure 55.

6.2 Parking on the Track

When the CD200 IQ is to be parked on track, the work head 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.

6.3 Parking Off-Track

When the CD200 IQ is not being used on the track, it must be parked on a level ground standing on the work head.

6.4 Storage

CD200 IQ and the individual parts should only be lifted mechanically. Use appropriate slings/chains and lifting accessories when lifting CD200 IQ.

The CD200 IQ can be stored as follows:

- complete unit
- separated into 2 parts (power pack/tool and trolley)
- separated into 3 parts (power pack, tool and trolley).

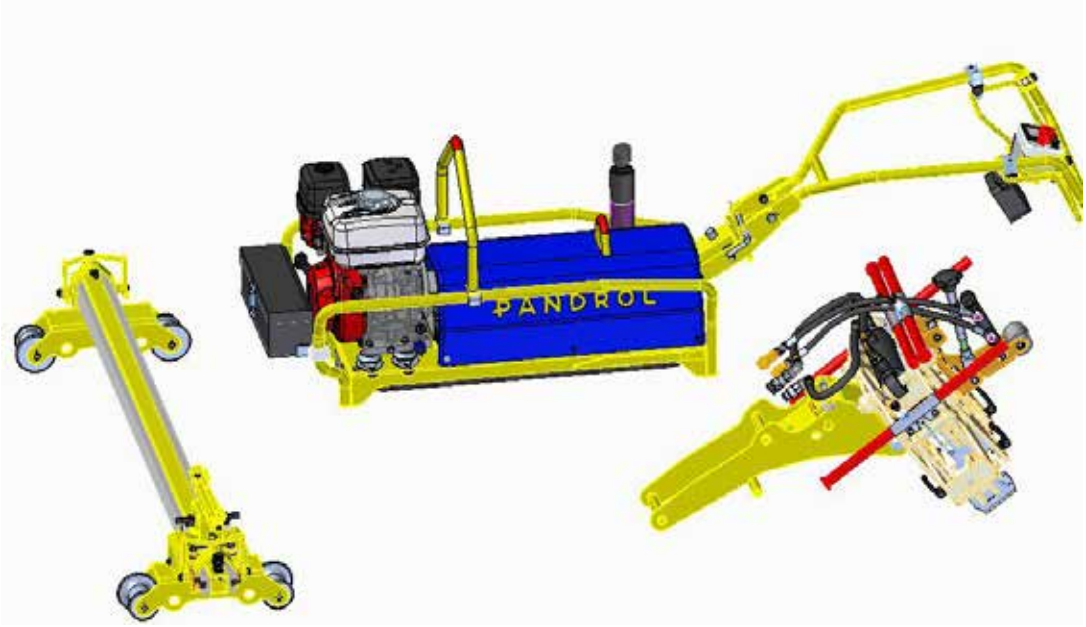


Figure 56.

1. The powerpack is slided into and locked onto the working head.

2. The locking hatch is located on the working tool, ”Figure 57.”

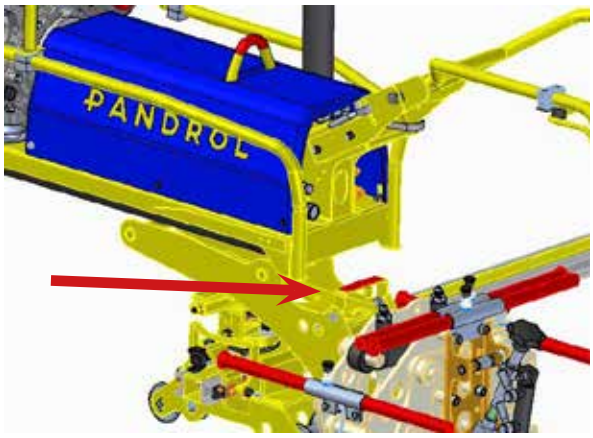


Figure 57. Locking hatch

3. Disconnect the brake wire from the trolley.

Figure 58.

4. Disconnect the hydraulic hoses between the power pack and the work tool.

5. Unlock the powerpack from the working tool by turning/pulling the hatch and then slide the powepack backwards.

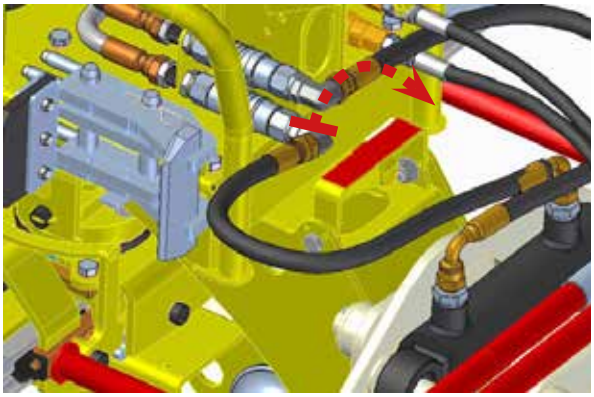


Figure 59. Open

6. Slide out of position ”Figure 60.”

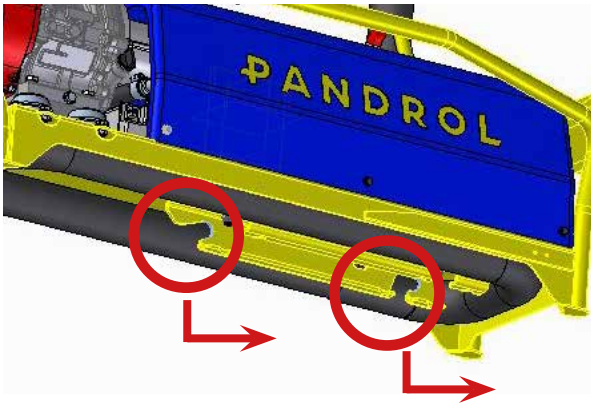


Figure 60.

1. Unlock the tool from the trolley by opening/turning the hatches on the trolley ”Figure 59”
2. Use a mechanical tool to lift the workhead out of it’s position. Place on steady surface.

Figure 61.

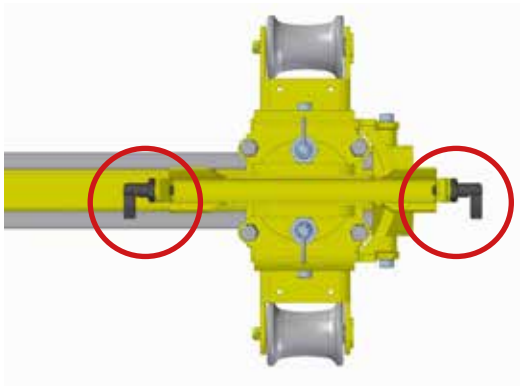


Figure 62.

7. Installation on Track

7.1 General

The CD200 IQ 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!

The CD200 shall always be lifted in its lifting eye located on the top of the main unit see weight labels on machine.

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.

When placing CD200IQ on track, choose a suitable place with as little interfering obstacles and with as firm and flat ground as possible.

Ensure that the road to the workplace is safe and free from interfering obstacles to avoid accidents.

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 IQ whilst in use and powered.

When the CD200 IQ 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 IQ or the rail infrastructure.

7.2 On/Off Tracking

The CD200iQ should be mechanically handled with the exception of the trolley.

The trolley can be lifted mechanically or manually, depending on the specifics of the work site. It is preferable for the trolley to be mechanically handled.

Only in the event that the mechanical handling aid fails or is not available can the powerpack and work tool be lifted manually. The same applies under emergency conditions.

Use appropriate slings/chains and lifting accessories when lifting CD200IQ.

1. Choose a suitable place with as little interfering obstacles and with as firm and flat ground as possible.
2. Lift the trolley with a suitable crane or manually by the handles/latches and put the trolley on track. The trolley is automaticalled braked. Secure the handle/latch to the slide carriage on the side that is to be worked on first. The slide carriage has no automatic lock and the load of the trolley is unbalanced.
3. Release the hatches on the trolley, figure 64

Figure 63. Manually handling

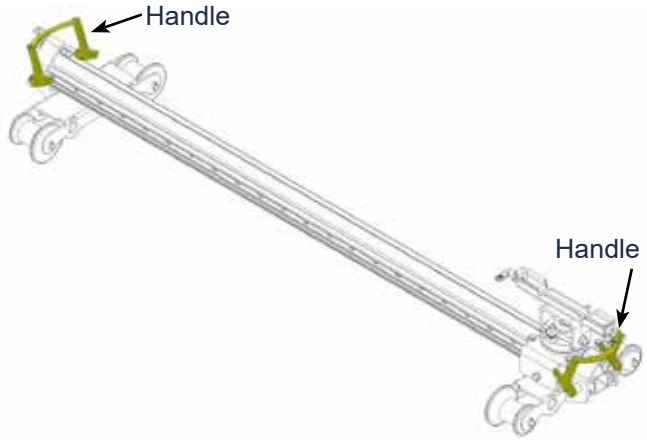


Figure 64.

Figure 65. Mechanically handling

Figure 66. Mechanically handling

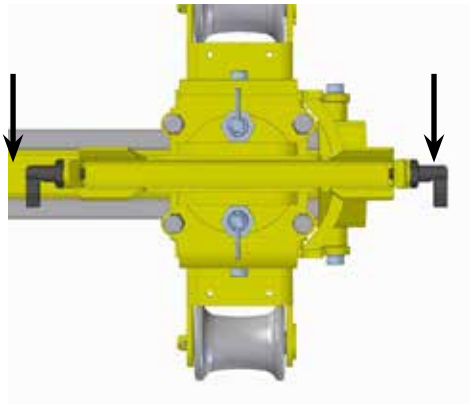


Figure 67.

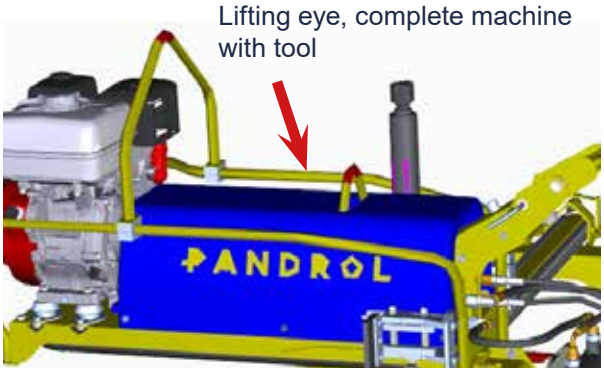


Figure 68.

4. Lift the power pack and tool in lifting eye figure 65, mechanically with a suitable crane.

5. Place carefully on connection tray on trolley, figure 67, 68, 69, 70, 71. The powerpack with tool is well balanced and easy to guide into position.

Figure 69.

Figure 70.

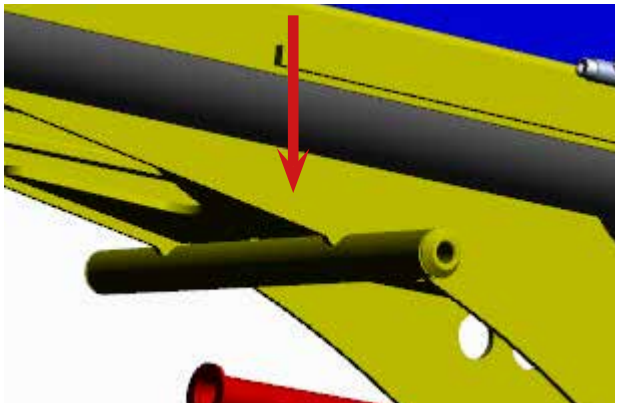


Figure 71.

Figure 72.

6. Lock the hatches on the trolley, figure 71.

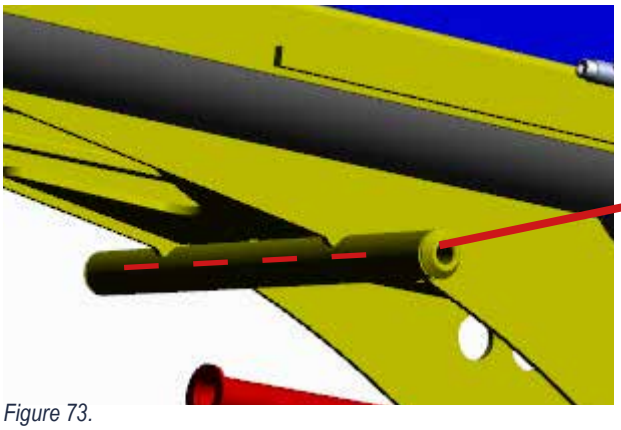


Figure 73.

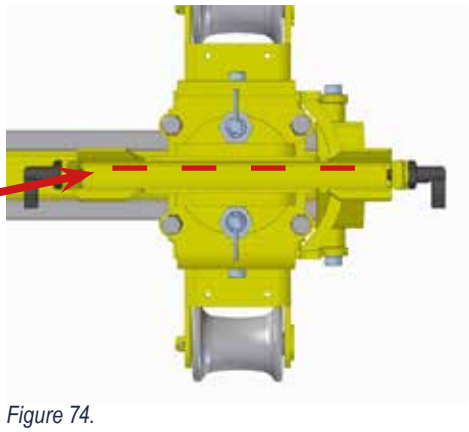


Figure 74.

7. Make sure that the power pack is firmly locked.
8. Connect the brake wire to the trolley, figure 72, 73.
9. Connect the braking wire by turning the locking knob (3) and push in the locking wire (2). The trolley is automatically in braked position.
10. Install the plug (4) on the opposite side to release the brake. The plug is used to unlock the brake on the side that has no locking wire. When changing sides, remove the plug (4) by turning the locking knob and pulling out the plug. Fit brake wire (2).
11. To move the CD200IQ and release the brake, push down the red handle (1). As soon as the handle is released, the machine is braked, release = locked.

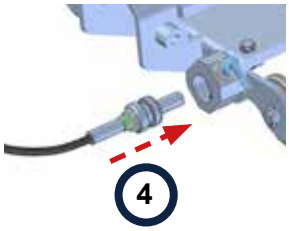


Figure 75.

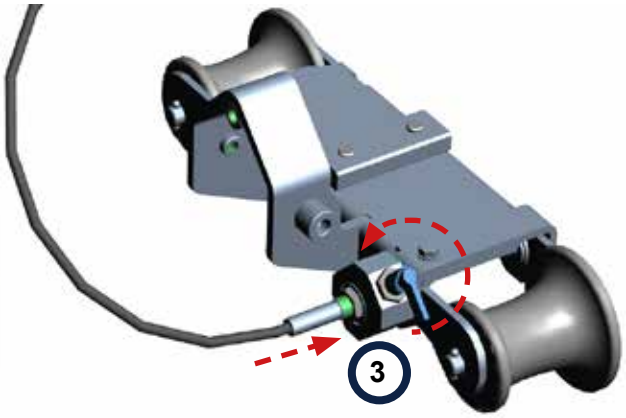


Figure 76.

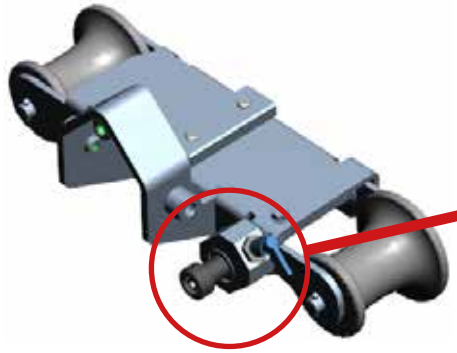


Figure 77.

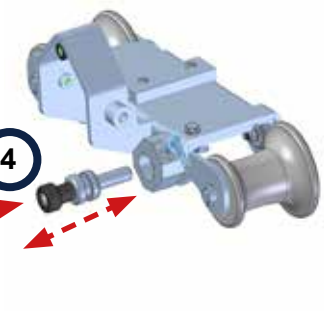


Figure 78.

7.3 EMERGENCY OPERATION - Off-tracking using handles

7.3.1 Lifting device not available

There are handles that can be used to quickly move the machine off track if an not forseable emergency situation arise and no lifting device is available.

To lift the CD200IQ it has to be separated into 2 parts. Powerpack/tool and trolley.

Emergency handles are locaded on the machine, overview figure 76.

Lifting the powerpack with tool requires 8 persons and the load should be addressed face on, symmetrically, and handled with two hands at all times.Team lifting of this nature should be controlled by one person, who should control the handling operation giving clear instructions.

Lifting the trollet requires 2 persons and with two hands at all times. The slide carriage has no automatic lock and the load of the trolley is unbalanced.

The modules are not to be handled up and down stairs.

Clear the site of all obstacles prior to commencing any handling.

WARNING!

THIS PROCEDURE IS ONLY MEANT FOR EMERGENCY SITUATIONS WHERE NO OTHER LIFTING OPTION IS AVAILABLE TO AVOID SERIOUS ACCIDENT ON TRACK! MAKE SURE YOU ARE FAMILIAR WITH ”CHAPTER 2, INTRODUCTION, SAFETY”

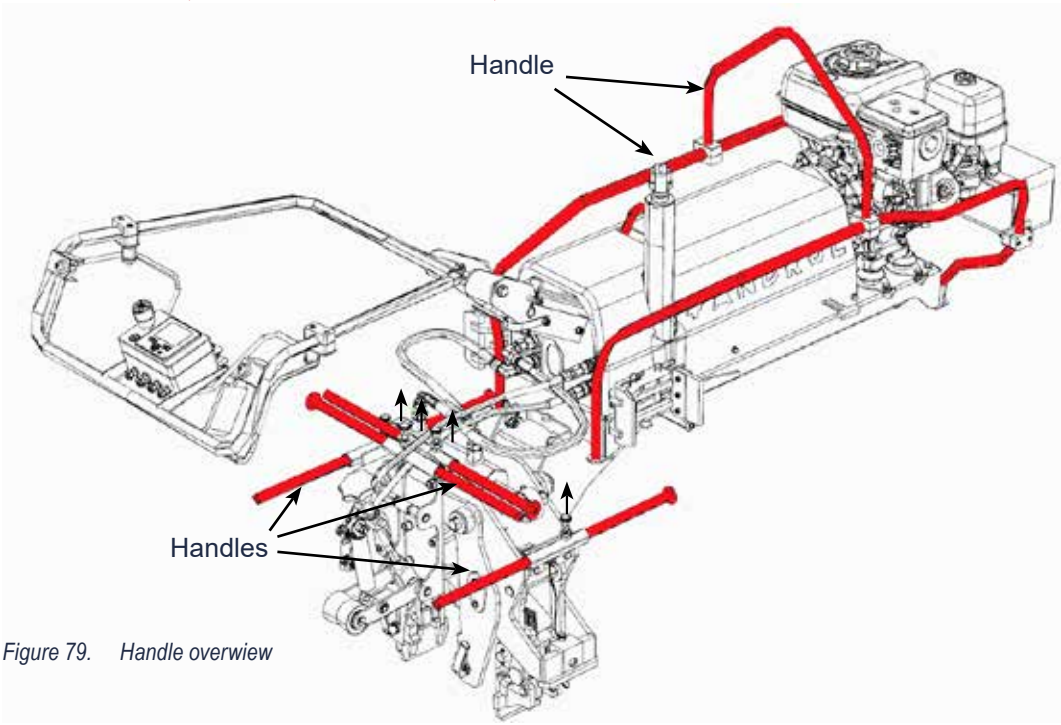


Figure 79. Handle overwiew

WARNING!

Heavy lift. 8 persons needed for lift.

Lifting handles see ”Figure 76.”

Weight FASTCLIP 254 kg. Weight e-CLIP 272 kg.

1. Separate the machine from the trolley by turning the hatches on both sides, figure 77 The powerpack/tool is now released from the trolley.
2. Lift the powerpack/tool in the handles straight up and carry to safe location, maximum **3 meters**. Put the powerpack/tool on the ground.
3. Lift the trolley, (2 person lift) in the handles and carry to safe location, maximum 3 meters. The slide carriage has no automatic lock and the load of the trolley is unbalanced.

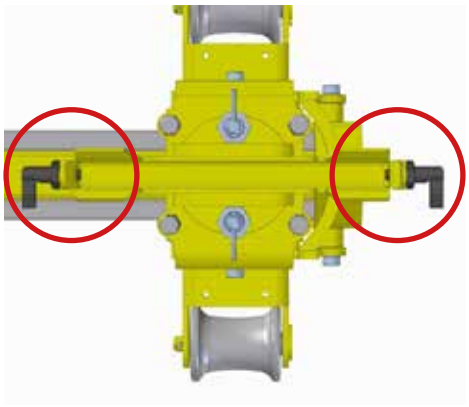


Figure 80.

7.3.2 Lifting equipment breakes down

In this type of emergency time is not of the essence and it will be appropriate to break the machine down into modules.

The modules are not to be handled up and down stairs.

Clear the site of all obstacles prior to commencing any handling.

To lift the CD200IQ it can in this case be separated into 3 parts. Powerpack, tool and trolley.

Emergency handles are locaded on the machine and tool, see chapter 7.4.

Lifting the powerpack requires 4 persons and the load should be addressed face on, symmetrically, and handled with two hands at all times.Team lifting of this nature should be controlled by one person, who should control the handling operation giving clear instructions.

Lifting the tool (e-CLIP or fastclip) requires 4 persons and the load should be addressed face on, symmetrically, and handled with two hands at all times.Team lifting of this nature should be controlled by one person, who should control the handling operation giving clear instructions.

Lifting the trolley requires 2 persons and with two hands at all times. The slide carriage has no automatic lock and the load of the trolley is unbalanced.

For instructions how to separate the CD200 IQ into three parts see chapter 6.4 Storage.

Lift the powerpack, tool, trolley in the handles straight up and carry to safe location, maximum 5 meters. Put the powerpack, tool , trolley on the ground. The slide carriage has no automatic lock and the load of the trolley is unbalanced.

7.4 Weight distribution

There are handles that can be used to quickly move the machine off track if an not forseable emergency situation arise and no lifting device is available.

WARNING!

Heavy lift.

4 persons needed for lift.

Lifting handles see ”Figure 78.”

Weight 103 kg.

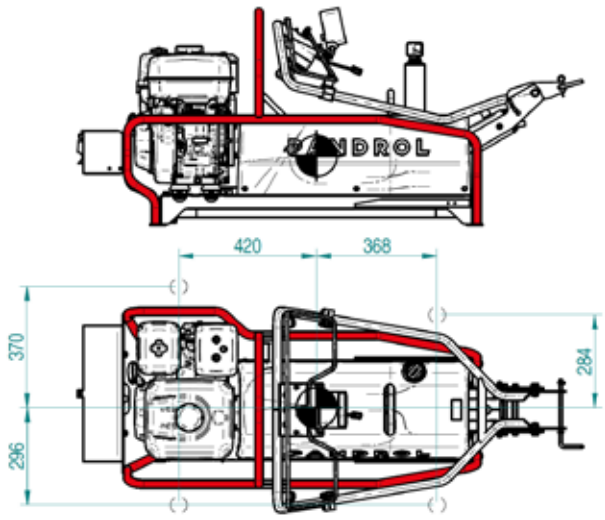


Figure 81.

Lifting load, figure 79.

Point 1, 22 kg

Point 2, 27 kg

Point 3, 27,5 kg

Point 4, 26,5 kg

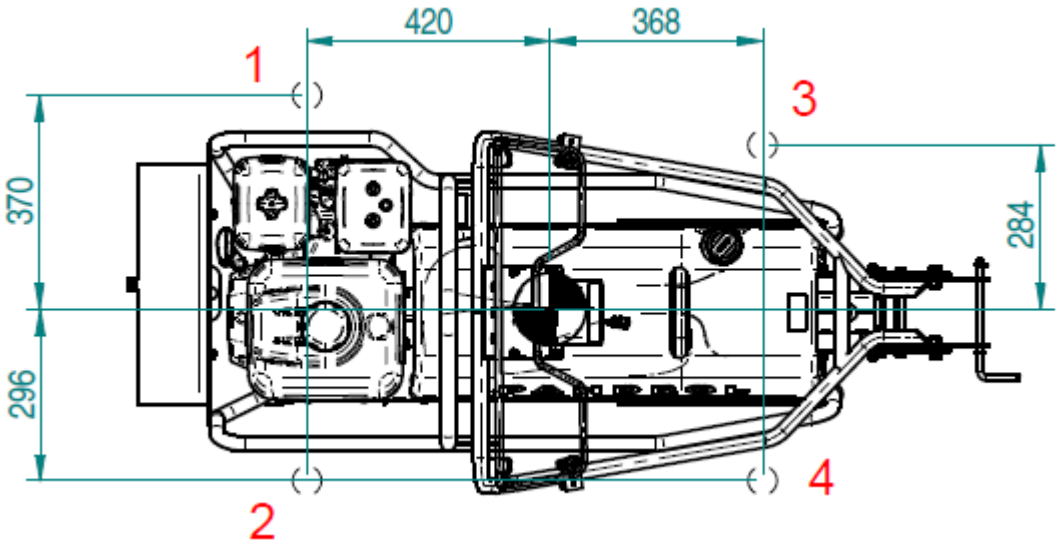


Figure 82.

WARNING!

Fastclip Tool/work head

Heavy lift.

4 persons needed for lift.

Lifting handles see ”Figure 80.”

Weight 97 kg.

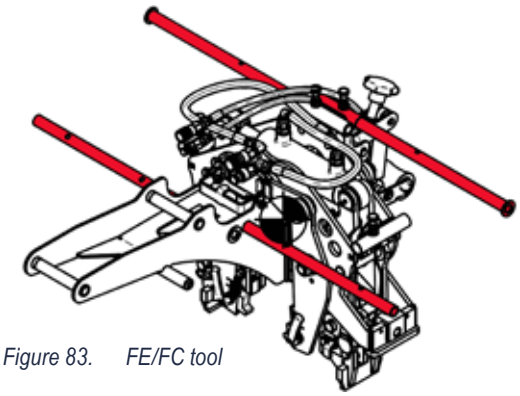


Figure 83. FE/FC tool

Lifting load, figure 81:

Point 1, 22 kg

Point 2, 22 kg

Point 3, 26,5 kg

Point 4, 26,5 kg

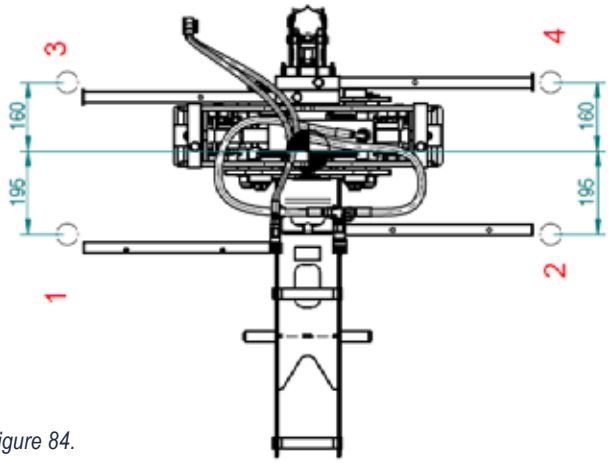


Figure 84.

WARNING!

e-CLIP Tool/work head

Heavy lift.

4 persons needed for lift.

Lifting handles see ”Figure 82.”

Weight 115 kg.

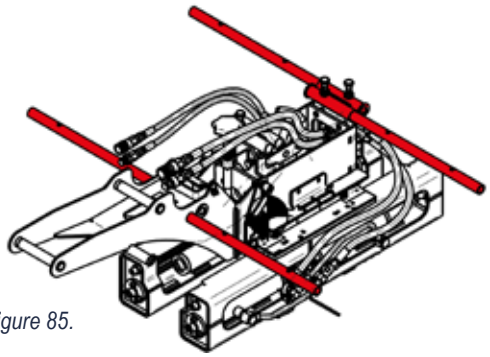


Figure 85.

Lifting load, figure 83:

Point 1, 24 kg

Point 2, 24 kg

Point 3, 33,5 kg

Point 4, 33,5 kg

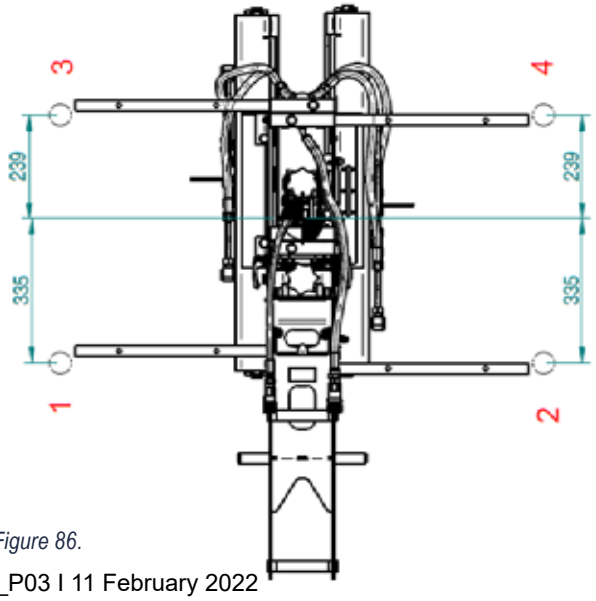


Figure 86.

WARNING!

Heavy lift.

Load is unbalanced and unstable.

2 persons needed for lift. Lifting handles see ”Figure 84.”

Weight 54 kg.

Lifting load, figure 85.

Point 1, 32,5 kg

Point 2, 21,5 kg

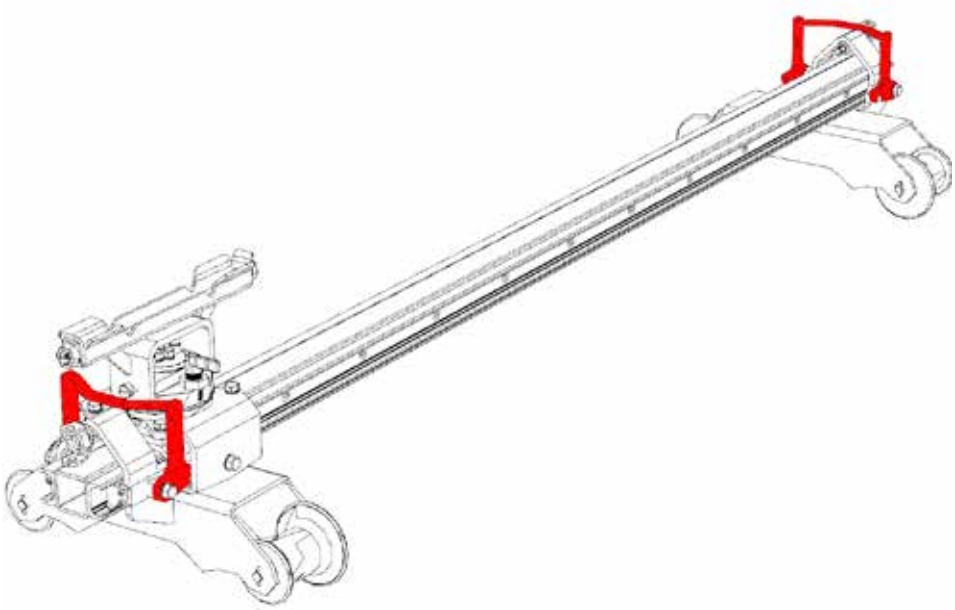


Figure 87. Trolley

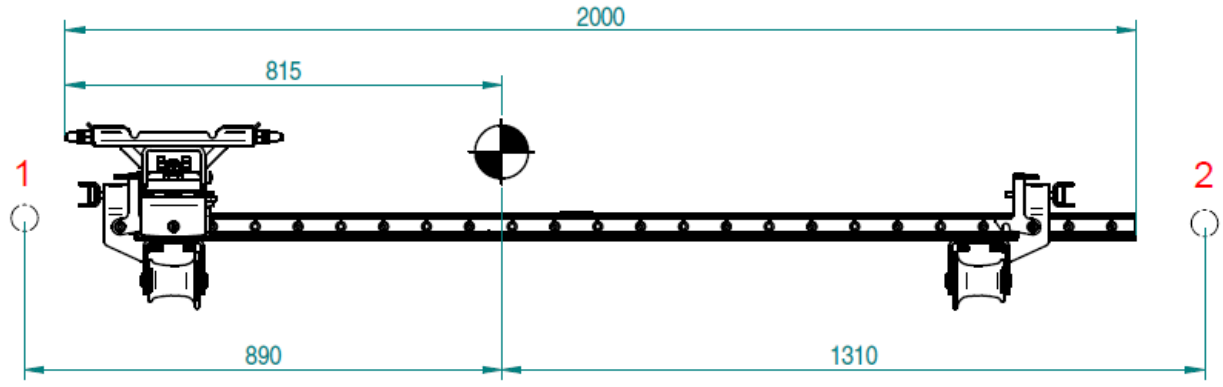


Figure 88.

7.5 CoG Center of gravity

Complete machine

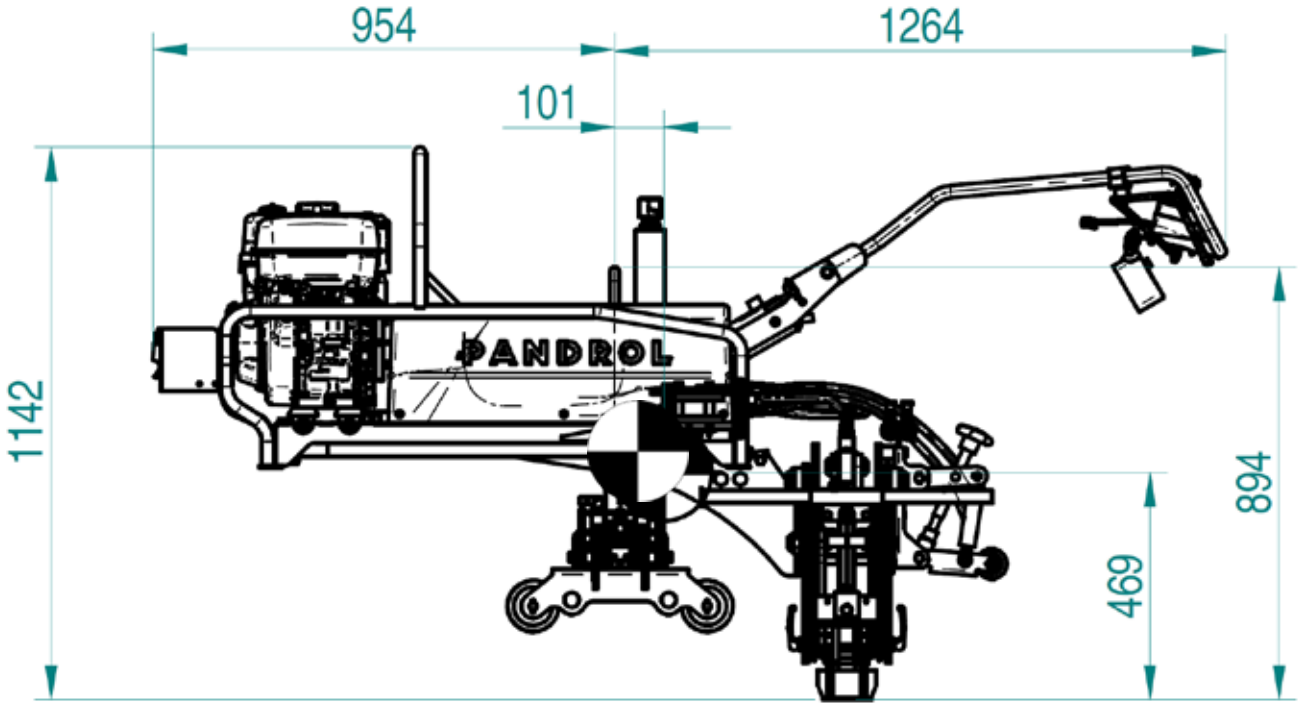


Figure 89.

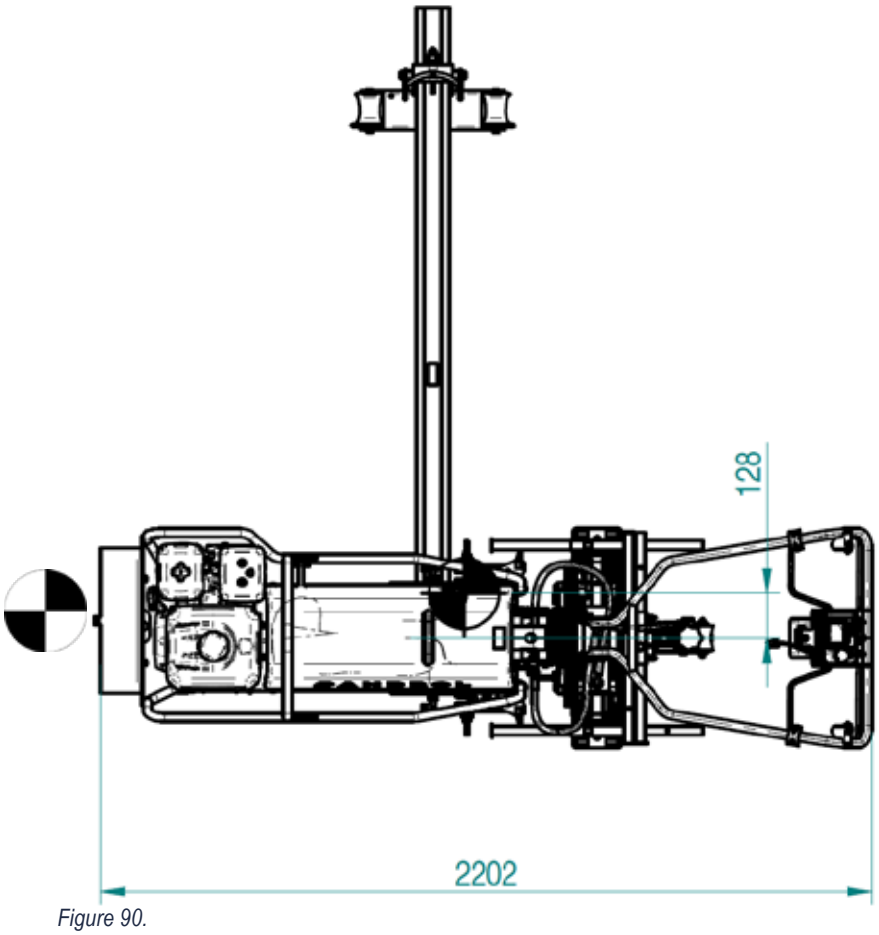


Figure 90.

7.6 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 Pandrol 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).

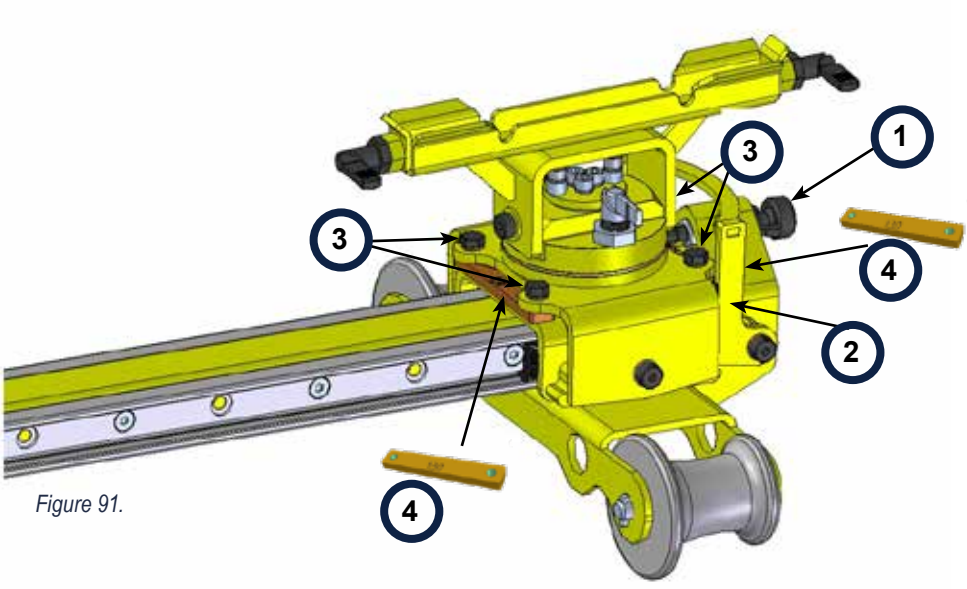


Figure 91.

7.7 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, figure 88.
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

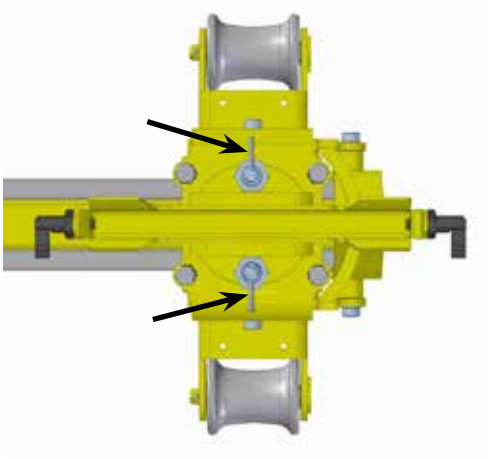


Figure 92.

Figure 93.

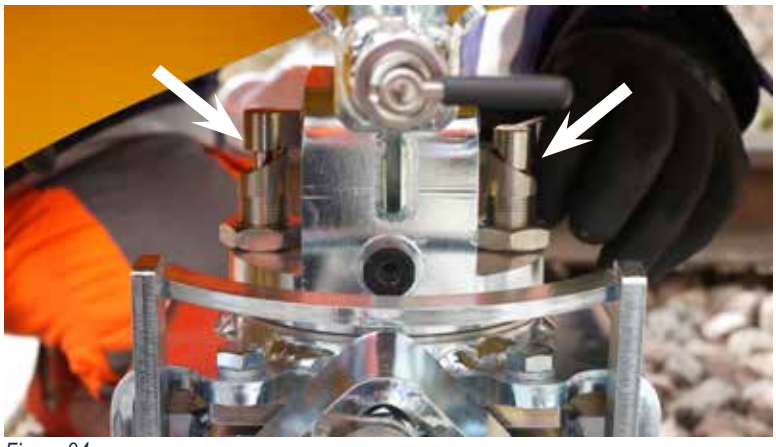


Figure 94.

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.

handles for this purpose instead.

3. Use the emergency handles to turn the machine around. One hand on the handle and the other on the emergency handle to keep a good balance while turning the machine around.
4. 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

Figure 95.

Figure 96.

Figure 97.

Figure 98.

7.8 Changing Rail Side of Operation

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

1. Make sure the latch, figure 96, for the slide carriage is open on the unoccupied side of the trolley.
2. Open the latch on the occupied side of the trolley.

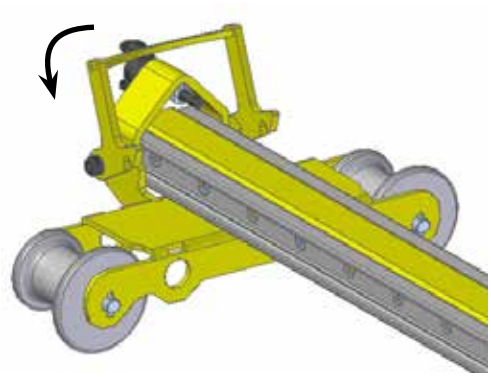


Figure 99.

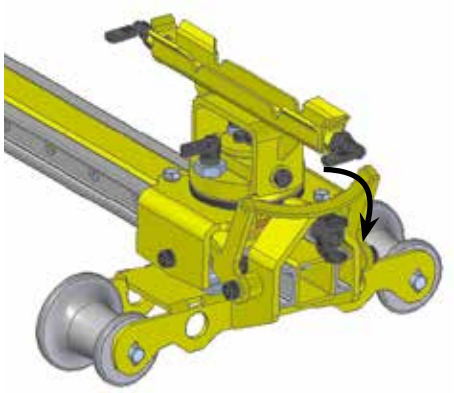


Figure 100.

Figure 101.

3. Disconnect the brake wire, figure 99.

Figure 102.

Figure 103.

Figure 104.

Figure 105.

4. Slide the slide carriage with the main unit over to the other side of the trolley. Use the emergency handles on the tool. One hand on the handle and the other on the emergency handle to keep a good balance

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

5. 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.

6. Loosen the lock nut.
7. 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.
8. Tighten the locking nut.
9. Connect the brake wire.

Figure 106.

Figure 107.

Figure 108.

Figure 109.

8. Operation (FASTCLIP- Machine)

8.1 Clipping

8.1.1 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).
2. Make sure the mechanical stops (3) for de-clipping are inactive, i.e. bolt pointing outwards on both sides.

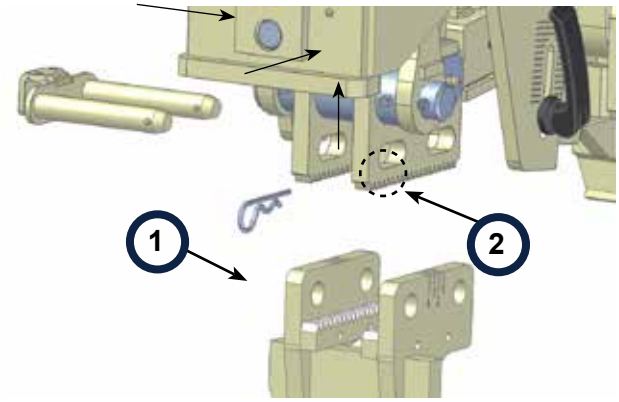


Figure 110.

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

Table 13

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

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

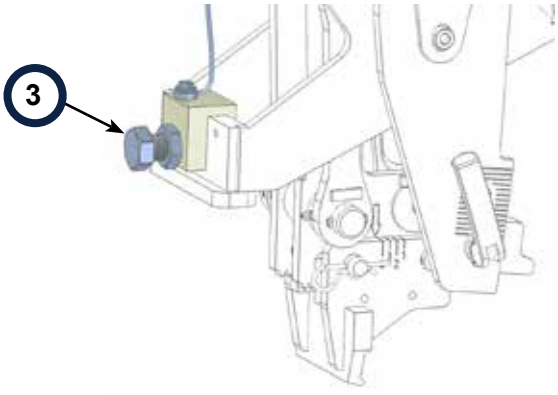


Figure 111.

adjustment mechanism on the sleeper lifter. The dimension “A” in Fig. 109 is recommended to be 10-13 mm for FASTCLIP FE and 8-11 mm for FASTCLIP FC.

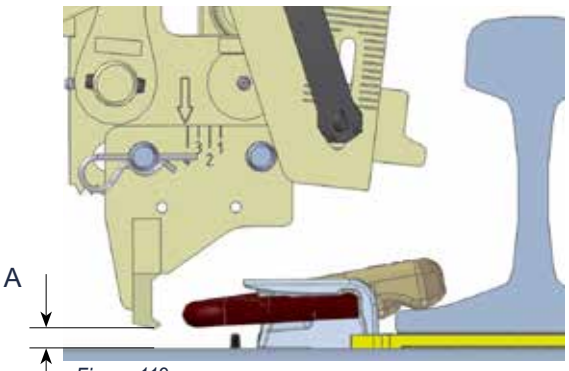


Figure 112.

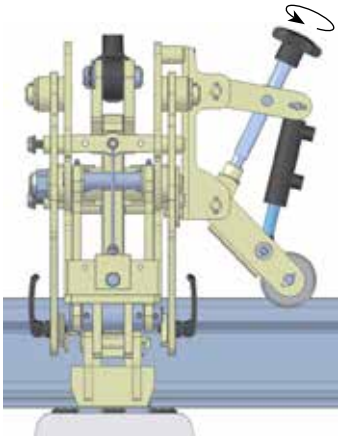


Figure 113.

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.

8.2 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.

8.3 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.
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.
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.

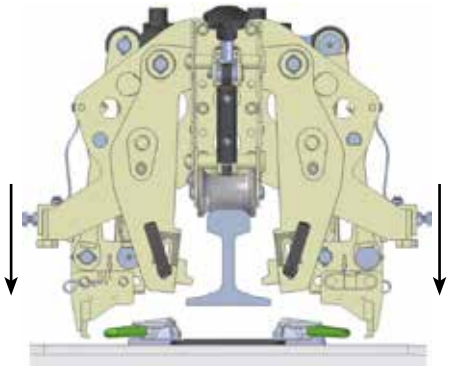


Figure 114.

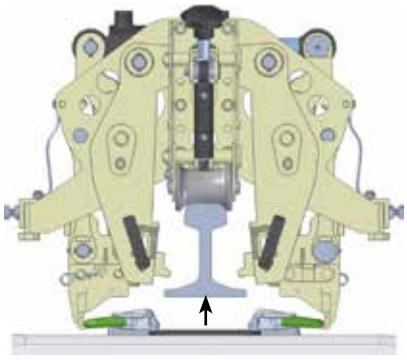


Figure 115.

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

8.4 De-clipping

8.4.1 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).

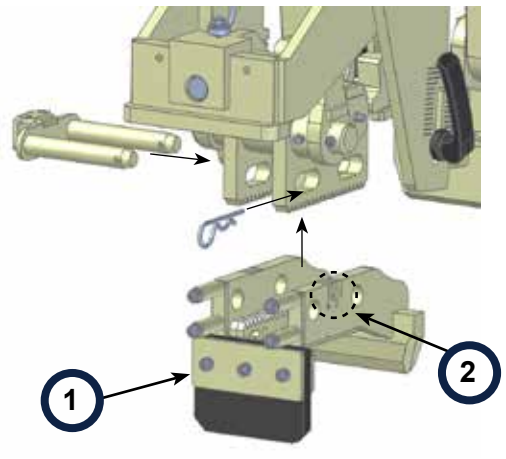


Figure 116.

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

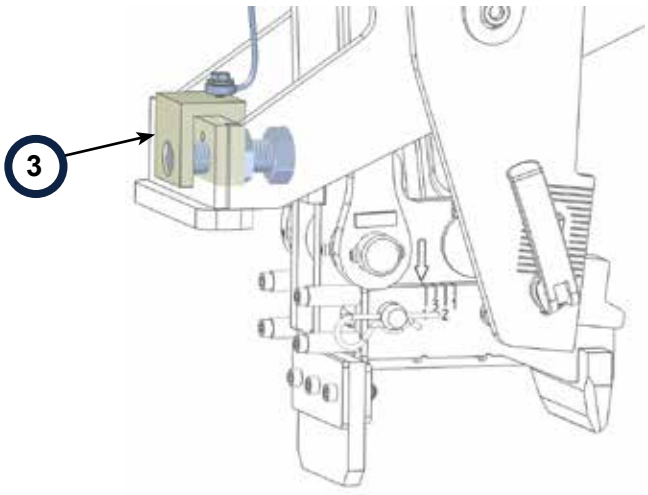


Figure 117.

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.

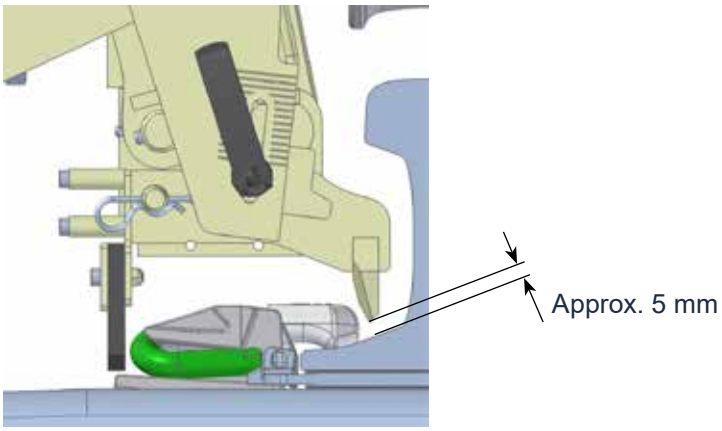


Figure 119.

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.

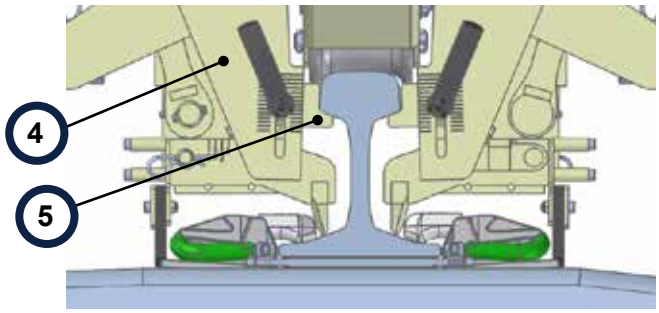


Figure 118.

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.

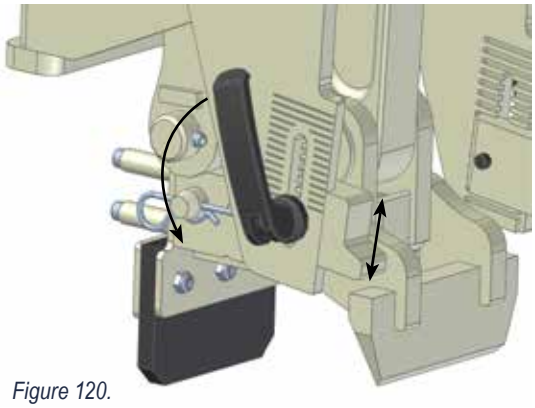


Figure 120.

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.

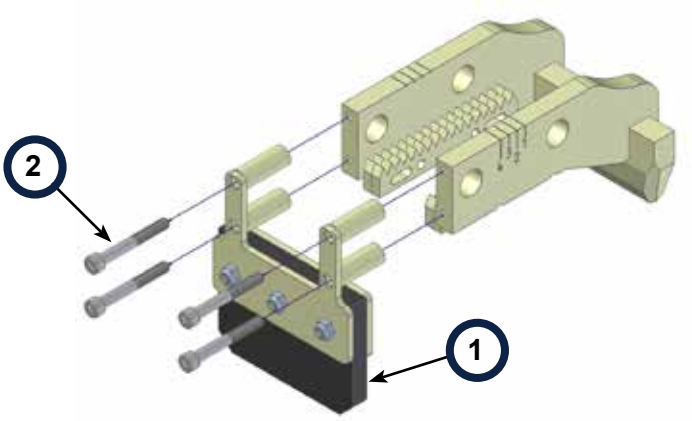


Figure 122. : Rubber stop set up for FASTCLIP FC

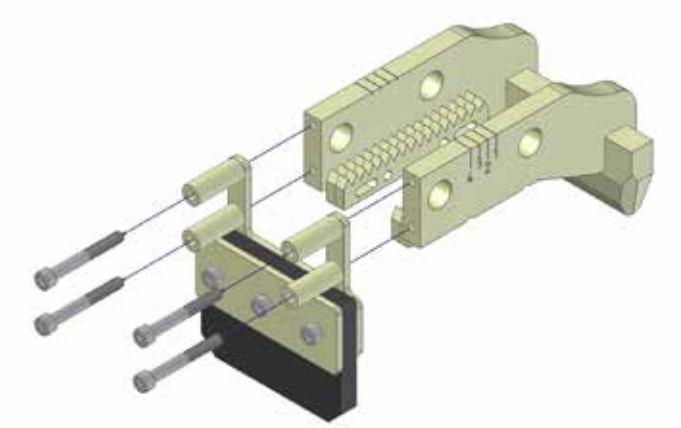


Figure 121. : Rubber stop set up for FASTCLIP FE

8.4.2 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.

8.5 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.

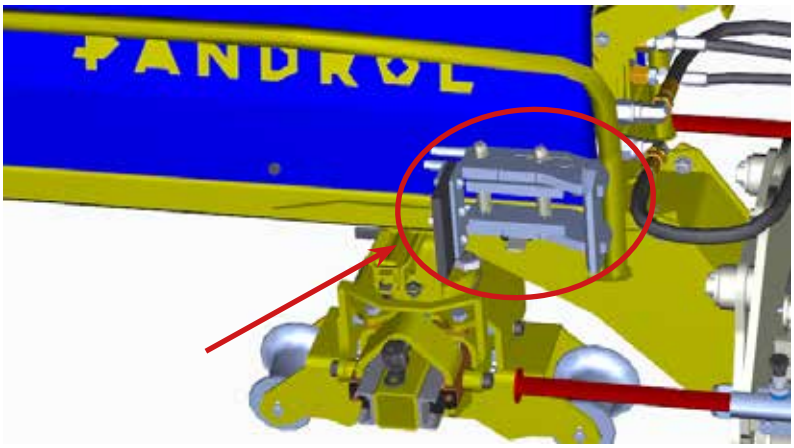


Figure 123. : Storing shoes not being used

9. Workhead Fastclip Offset

9.1 Offset workhead

Settings for offset workhead is the same as for the FE/FC workhead (chapter 8), except for the adjustable heelplates when using clipping tool, see below.

Figure 124.

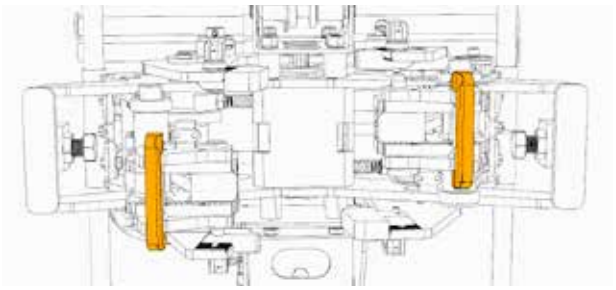


Figure 125. Offset tool

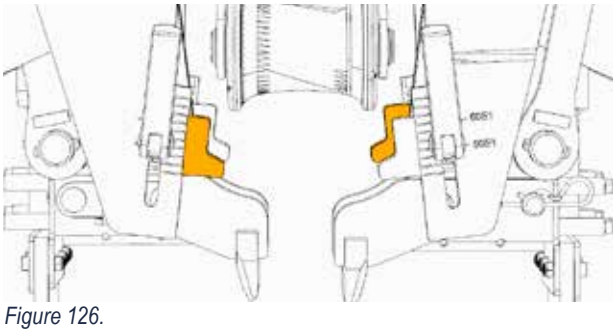


Figure 126.

9.2 Adjustment for clipping/de-clipping-tool (offset)

Figure 127: De-clipping set-up

Figure 128: Clipping set-up

Depending on Clipping/de-clipping see below:

Loosen the cam lever (1) and replace the heelplates (2) to (3), fasten the heelplate by locking the cam lever.

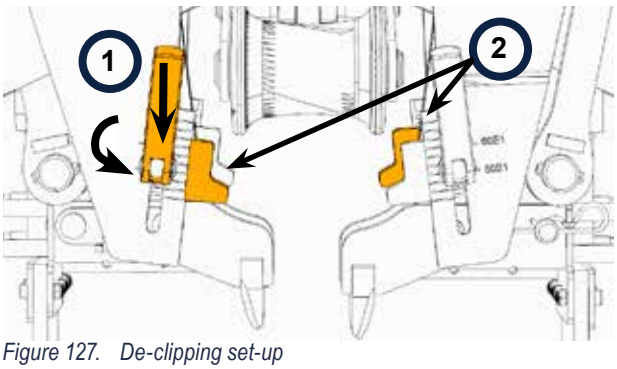


Figure 127. De-clipping set-up

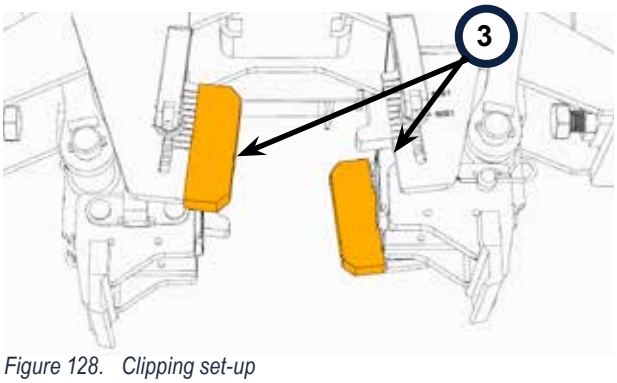


Figure 128. Clipping set-up

10. Troubleshooting

10.1 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 Pandrol AB.

10.2 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 Pandrol AB.

10.3 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 Pandrol AB.

10.4 Clipping shoe rides over clip on one side

Possible causes:

- Inclination setting is wrong.

Solution: Set inclination according to chapter .

10.5 The tools are stuck to the rail

Possible causes:

- Electrical fault
- Out of fuel
- Faulty engine

Solution:

The tools can be forced to be opened if a emergency occurs by removing cover and pushing button on valve.

(1) Clipping/Declipping tool

(2) Sleeper lift

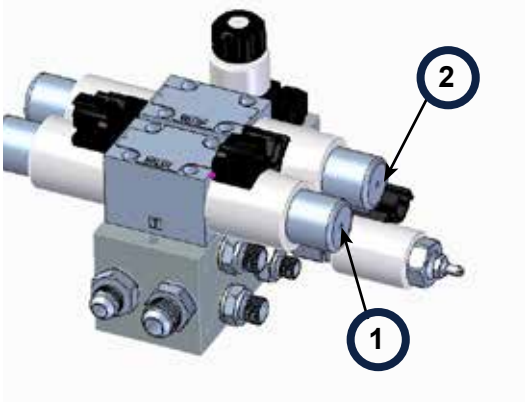


Figure 129.

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.

12. Contact

Address	Telephone	nternet and E-mail
Pandrol AB	Tel.: +46 (0) 650 165 05	www.rosenqvistrail.com
Hyggesvägen 4		info.rosenqvistrail@pandrol.com
824 35 Hudiksvall		
SWEDEN		

13. Maintenance

13.1 Definition of Maintenance Terms

Term	Action Required
Adjust	Correct to defined limits
Change	Remove the original and fit a new or overhauled part or assembly in its place
Check	Determine a particular nominated condition before, during orafter repair e.g. completeness, security, position
Clean	Remove all dirt and deposits
Defective	Any fault or faults in a component or assembly, e.g. structural fractures or weld fractures, which may prevent the component or assembly from fulfilling its designed purpose
Dismantle	Take to pieces
Examine	Determine general condition before repair e.g. wear, cracks, splits, leaks, scoring, erosion, breaks, distortion, looseness
Gauge	Measure. Note ‘gauge’ can also mean inside of rail
Inspect	Determine general condition after repair and attention i.e. conformity to required standards
Lubricate	Apply lubrication
Overhaul	Do what is necessary to make an assembly or sub-assembly re-usable i.e. dismantle, strip, clean, examine, fit new parts, re-assembly, test and inspect as required
Paint	To impart colour to a surface
Re-assemble	Put together
Record	Put down in writing a finding from examination, test, inspection or special checks
Rectify	To set right
Refit	Put back and re-connect
Replace	Remove, scrap original part and put new part in its place.
Remove	Disconnect and take off
Repair	Restore an original part to the required condition by hand tooling, machining, build-up, welding, patching, bending, setting, heat-treating, re-securing etc. **NOTE!** Any type of repair work must be carried out by Pandrol own personnel.
Strip	Remove covering, i.e. paint, polish, fabric
Test	Prove correct operation by trial
Report	Convey to the Maintenance Supervisor the condition of the item examined.

13.2 Categories of Work

The job descriptions are split into two parts.

13.2.1 Scheduled Work

Scheduled work is mandatory and shall be done at the intervals defined.

13.2.2 Arising Work

Arising work is that work which is to be done to rectify any defects found in the course of carrying out scheduled work.

13.3 Remounting/Assembling

Remount/assemble parts of the vehicle in opposite order of dismounting/disassembling unless otherwise stated in any of the relevant sections. Use only new fasteners as described in this chapter. Lubricate all parts during and after remounting with proper lubricant.

13.4 Fasteners

When assembling parts and when mounting parts on vehicle always use new fasteners, such as screws, nuts, washers, roll pins, securing plates etc. Make sure - and confirm with the Parts List - that all fasteners are of the same dimension and quality as the ones previously used on the device being replaced, overhauled or mounted on the coupler. Make sure that there are at least 2 threads from the screw protruding through the nut in screw/nut applications. Tighten screws to correct torque (if not specified, follow the screw suppliers recommendations). Recommended tightening torques are listed below.

It is essential to check that all bolts, in a multi-hole fixing, carry their allotted proportion of the load. Unless otherwise specified, they shall first be tightened in a staggered pattern from the centre outwards and subsequently re-tightened in the same sequence. ”Tightening patterns, multi holes fixing” This second tightening is necessary since bolts may lose tension when adjacent bolts are tightened.

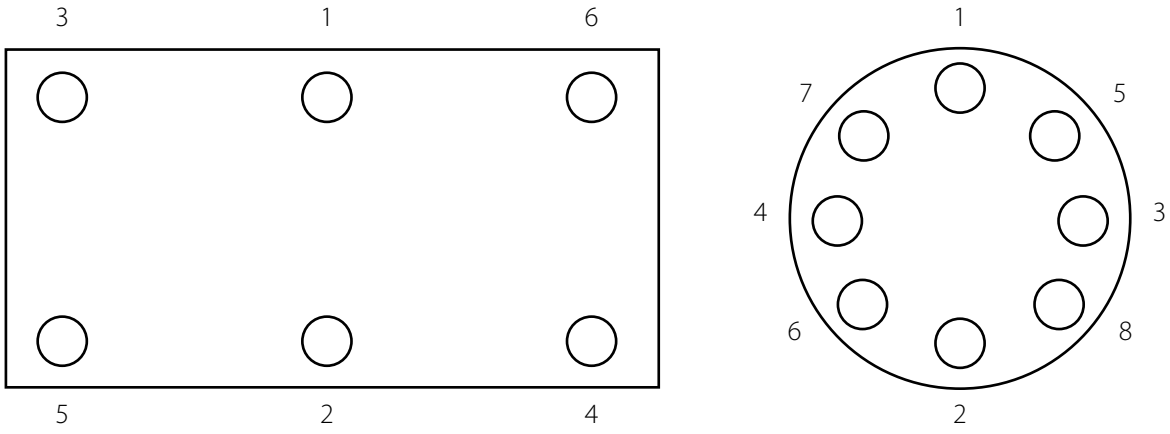


Figure 130. Tightening patterns, multi holes fixing

	TORQUE			
	8.8 fzb, grade 5 and Class 80	Class 70	8.8 fzb, grade 5 and Class 80	Class 70
Dimension Metric	**Nm**	**Nm**	**Lbft**	**lbft**
M5	4.7	4.1	3.7	3
M6	8	7	6	5
M8	20	17	15	12.5
M10	40	33	30	24
M12	70	57	52	42
M16	170	140	125.5	103
M20	330	273	243.5	201
M24	580	472	428	348
M30	1130	930	833	686
Dimension UNC	**Nm**	**Nm**	**Lbft**	**lbft**
1/4”	10	8	7.5	6
5/16”	20	16	15	12
3/8”	35	28	26	21
7/16”	55	43	41	32
1/2”	80	66	59	49
9/16”	115	94	85	69
5/8”	160	131	118	97
3/4”	280	231	207	170
7/8”	450	369	332	272
1”	660	553	487	408

13.5 Maintenance and service

This chapter describes the scope of maintenance and service that is necessary in order to maintain performance and reliability of the machine. The following procedures must be properly accomplished for equipment warranty conditions to apply. This scheduled maintenance shall also assist in maintaining product performance over an extended period of time.

After the service has been carried out the logbook shall be filled up. Test- and protocol documents shall be added as appendix to the service documentation and the logbook.

13.5.1 Maintenance Supplies

Lubricants and solvents to be used during maintenance and servicing are described in respective chapter. Do not use other lubricants and solvents than the one described in this manual, and on other places on the vehicle than the ones described. Manufacturer instructions for applying the lubricants, as well as safety instructions are to be followed without exceptions.

WARNING! – Personnel Danger

Many lubricants and solvents produce aggressive fumes when exposed to open air, and may have a corrosive effect on the human skin, eyes etc. Read and follow warning labels on containers.

13.5.2 Maintenance intervals

The machine is to be examined at frequencies no greater than the limits set below.

Exam Code	Operating hours
A	Before use / Every 8 hours/daily
B	Weekly / Every 40 hours
C	Yearly / Every 500 hours

13.5.3 Job letter allocation

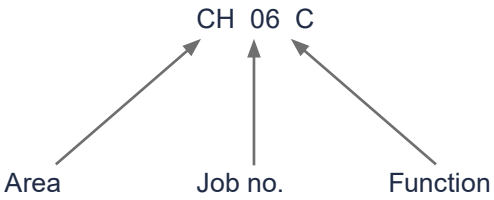
Code	Area
CH	Chassis and tools
EL	Electrics
FU	Fuel
HY	Hydraulics
EN	Engine
WH	Wheels
BR	Brakes
MI	Miscellaneous

13.5.4 Function code

The allocation of the function code is given below.

Letter	Content of job
T	Test
C	Check
V	Visual check
P	Procedure
R	Replace
L	Lubricate
E	Examine
W	Wash

13.5.5 Job code example



13.5.6 Safety code

Safety code for each job is one of the four identified safety conditions.

Code	Safety condition
SCI	Isolated
SCR	Engine Running
SCM	Moving
SCB	Braked

13.5.7 Maintenance Schedule

The following schedule describes the minimum recommended maintenance to be regularly performed. More frequent maintenance may be required if environmental or other conditions so dictate.

Job title	Type of check	Safety code	A	B	C	job no.
Chassis and tools						
Labels and warning signs	Visual check	SCB	X	X	X	CH01V
Paint	Visual check	SCB			X	CH02V
Frame	Visual check	SCB			X	CH03V
Sign of leakage	Visual check	SCB	X	X	X	CH04V
Abnormal sounds	Check	SCM	X	X	X	CH05C
Tighten screws, nuts, bolts	Check	SCB	X	X	X	CH06C
Lubrication, chassis and tools	Lubricate	SCB		X	X	CH07L
FE/FC tool	Check	SCB		X	X	CH08C
e-Clip tool	Check	SCB		X	X	CH10C
Retention pins	Check	SCB		X	X	CH11C
Centre lifting point	Check	SCB		X	X	CH12C
Power unit lifting point	Check	SCB		X	X	CH13C
Tool lifting point	Check	SCB		X	X	CH14C
Trolley lifting point	Check	SCB		X	X	CH15C
Trolley surface on slide bar	Lubricate	SCB		X	X	CH16L
Electrics						
Control panel	Visual check	SCI	X	X	X	EL01V
Lights and direction lamps	Visual check	SCR	X	X	X	EL02V
Emergency stop buttons	Visual check	SCB	X	X	X	EL03V
Emergency stop buttons	Test	SCR		X	X	EL04T
Electric cables	Visual check	SCI		X	X	EL05V
Battery	Examine	SCI		X	X	EL06E
Job title	**Type of check**	**Safety code**	**A**	**B**	**C**	**job no.**
Hydraulics						
Hydraulic oil level	Visual check	SCB	X	X	X	HY01V
Hydraulic cylinder and hoses	Check	SCB			X	HY02C
Hydraulic pump	Visual check	SCR			X	HY03V
Hydraulic filters	Check	SCB			X	HY04R
Hydraulic oil change	Check	SCB			X	HY05C
Hydraulic oil pressure and flow	Test	SCR			X	HY06T

Engine						
Main engine	Check	SCI	X	X	X	EN01C
Engine mountings	Visual check	SCB	X	X	X	EN02V
Wheels						
Wheels	Check	SCB		X	X	WH01C
Wheels	Examine	SCB			X	WH02E
Wheel height adjustment	Procedure	SCB			X	WH03P
Wheel load measurement	Test	SCB			X	WH04T
Brakes						
Brake function test	Test	SCM		X	X	BR01T
Brake pads	Examine	SCB			X	BR02E
Brakes test	Test	SCM			X	BR03T
Miscellaneous						
Emergency equipment	Visual check	SCB			X	MI01V
Log book, Manuals, Certificates	Check	SCB			X	MI04C
Function check	Check	SCM			X	MI05C
Washing	Washing	SCB		X	X	MI06W

13.6 Maintenance Job List

CH01V Safety labels and warnings signs – Visual check

Job no. CH01V				
A	B	C		

To improve safety, warning labels are attached on the vehicle where there is an increased risk. If any of these labels are damage or lost, they must be replaced with new original warning labels that can be ordered from Pandrol AB. Labels depending on configuration.

Figure 131.

Figure 132.

Figure 133.

Figure 134.

710048

710051

710017

710052

710135

710019

710020

710187

CD200IQ No lift special UK

710021

Sound level CD200IQ

710143

710176

710175

Complete machine Fastclip

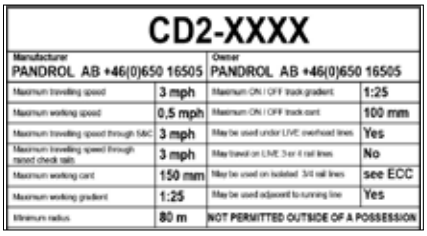
710062

710178

710177

Complete machine e-clip

Do not manually handle



CD2-XXXX			
Manufacturer PANDROL AB +46(0)650 16505		Owner PANDROL AB +46(0)650 16505	
Maximum travelling speed	3 mph	Maximum ON / OFF track gradient	1:25
Maximum working speed	0,5 mph	Maximum ON / OFF track cant	100 mm
Maximum travelling speed through S&C	3 mph	May be used under LIVE overhead lines	Yes
Maximum travelling speed through raised check rails	3 mph	May travel on LIVE 3 or 4 rail lines	No
Maximum working cant	150 mm	May be used on isolated 3/4 rail lines	see ECC
Maximum working gradient	1:25	May be used adjacent to running line	Yes
Minimum radius	80 m	NOT PERMITTED OUTSIDE OF A POSSESSION	

CD200IQ Data panel

CD200 IQ

CD200 IQ Blå

PANDROL

5014338

Lyftkrok

CH02V Paint work – Visual check

Job no. CH02V				
	B	C		

Safety condition: SCB

Scheduled work

1. Check the condition of painted areas.
2. The red paint must not due to safety be worn out or discoloured.

Arising work

1. Clean the red painted areas.
2. Repaint areas affected by corrosion or discolouration.

CH03V Frame – Visual check

Job no. CH03V				
	B	C		

Safety condition: SCB

Scheduled work

1. Visually check vehicle frame for cracks.

Arising work

1. Contact Pandrol technical support team for repairs.

CH04V Sign of leakage – Visual check

Job no. CH04V				
A	B	C		

Safety condition: SCB

Scheduled work

1. Visually check the machine for leakage after standing still for a period of time.
2. Visually check the area underneath the machine for leakage after standing still for a period of time.

Arising work

1. Identify leaks and rectify.
2. Clean the affected area.

CH05C Abnormal sounds – Check

Job no. CH05C				
A	B	C		

Safety condition: SCM

Scheduled work

Check for abnormal sounds while operating all hydraulic functions of the machine.

Arising work

1. Investigate what is causing the sound.

CH06C Tighten bolts – Check

Job no. CH06C				
	B	C		

Safety condition: SCB

Scheduled work

1. Tighten loose bolts according to section 3.4 Fasteners in chapter 3. Maintenance.

Arising work

1. Tighten loose bolts according to section 3.4 Fasteners in chapter 3. Maintenance.

CH07L Lubrication, tool

Job no. CH07L				
	B	C		

Safety condition: SCB

Scheduled work

1. Lubricate all grease fittings,
2. Grease with Shell Alvania EP2, BP Energrease LS-EP-2 or similar through all grease fittings. Use a grease gun and apply until fresh grease is pressed out. Wipe off excess grease.

Arising work

1. Replace damaged grease nipples with new nipples.

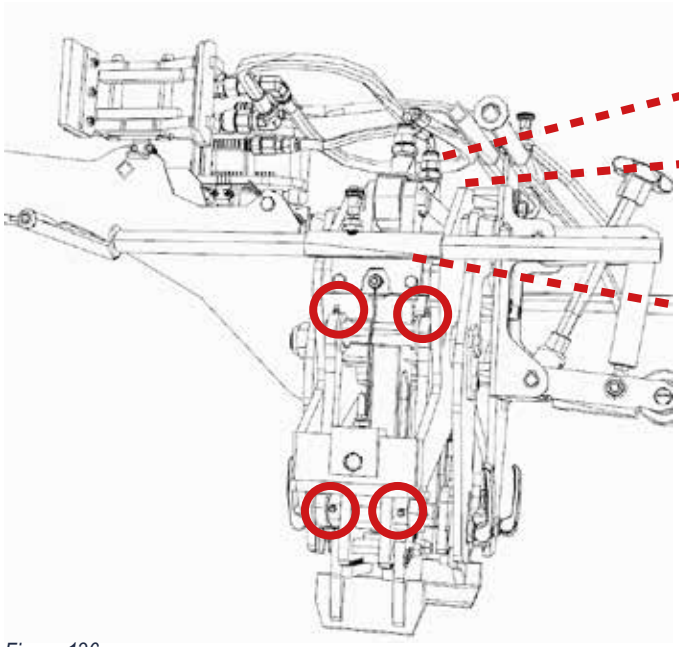


Figure 136.

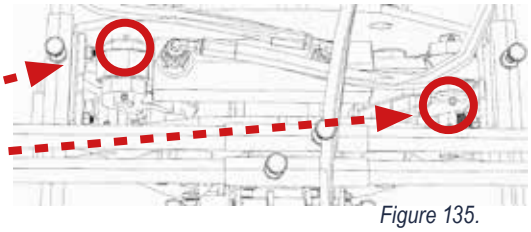


Figure 135.

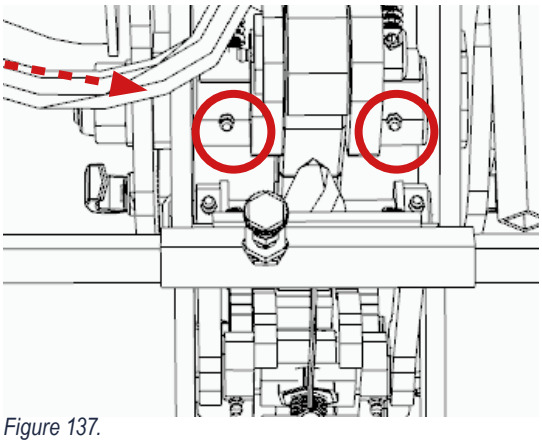


Figure 137.

REMARK: e-Clip too has no lubrication points/grease nipples.

CH08C FE/FC tool – Check

Job no. CH08C				
	B	C		

Safety condition: SCB

Scheduled work

1. Check that the clipping pads they are free from damages if in use.

Arising work

1. Replace if necessary.

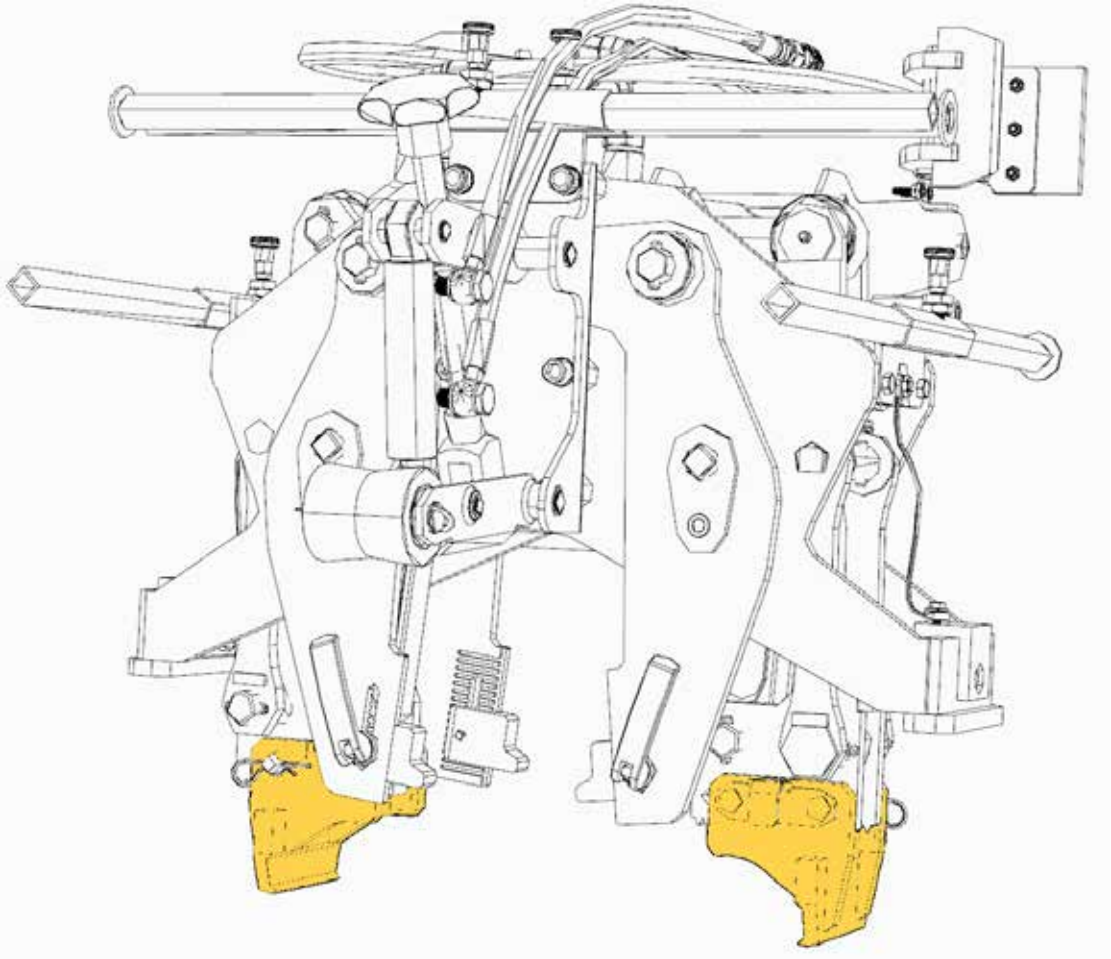


Figure 138. Inspection FE/FC tool

CH09C e-Clip tool – Check

Job no. CH09C				
	B	C		

Safety condition: SCB

Scheduled work

1. Check that the installation pads are free from damages if in use.

Arising work

1. Replace if necessary.

CH10C Retention pins

Job no. CH10C				
	B	C		

Safety condition: SCB

Scheduled work

1. Inspect the retention pins and ensure that they are in good condition.
2. Ensure that all elements on the exterior of the vehicle are secured

Arising work

1. Replace retention pins if damaged or broken.
2. Fit retention pin if there is no retention pin.

CH11C Centre Lifting Point complete machine

Job no. CH11C				
	B	C		

Safety condition: SCB

Scheduled work

1. Check that the centre lifting yoke and brackets are free from damages

Arising work

1. Replace damaged parts.

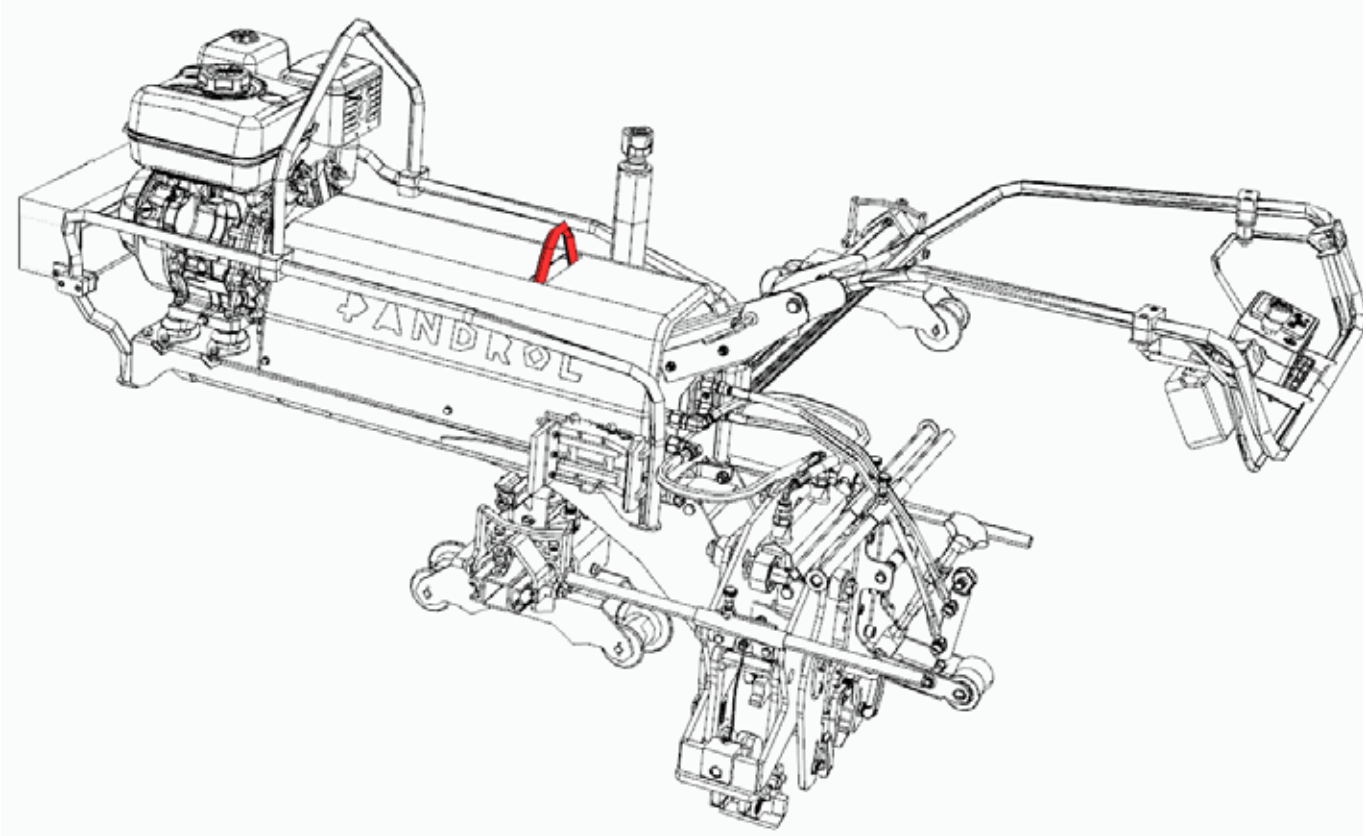


Figure 139. Centre lifting point

CH12C Power unit Lifting Point

Job no. CH12C				
	B	C		

Safety condition: SCB

Scheduled work

1. Check that the lifting yoke and brackets are free from damages

Arising work

1. Replace damaged parts.

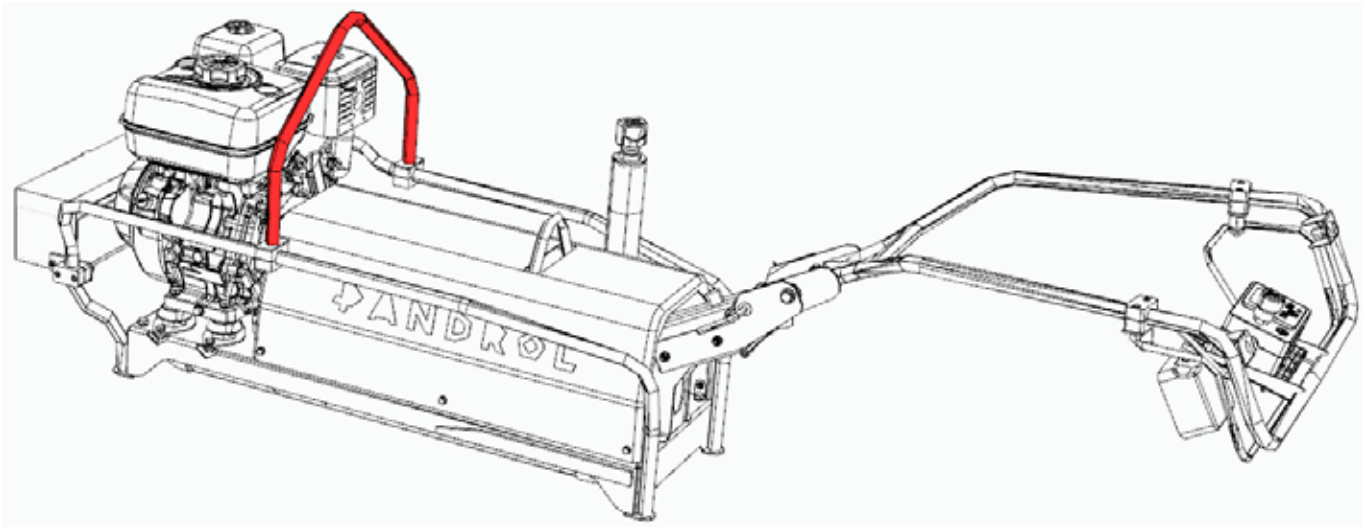


Figure 140. Motor lifting point

CH13C Tool Lifting Point

Job no. CH13C				
	B	C		

Safety condition: SCB

Scheduled work

1. Check that the tool lifting handles and brackets are free from damages

Arising work

1. Replace damaged parts.

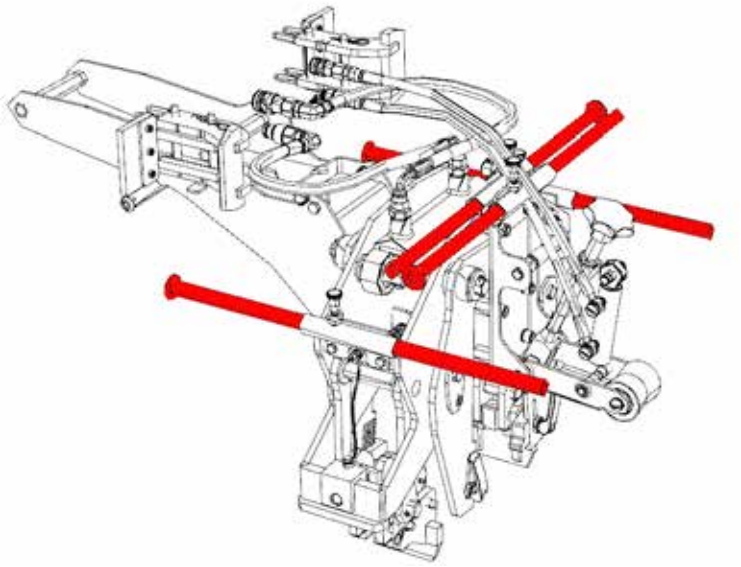


Figure 141. Tool lifting point

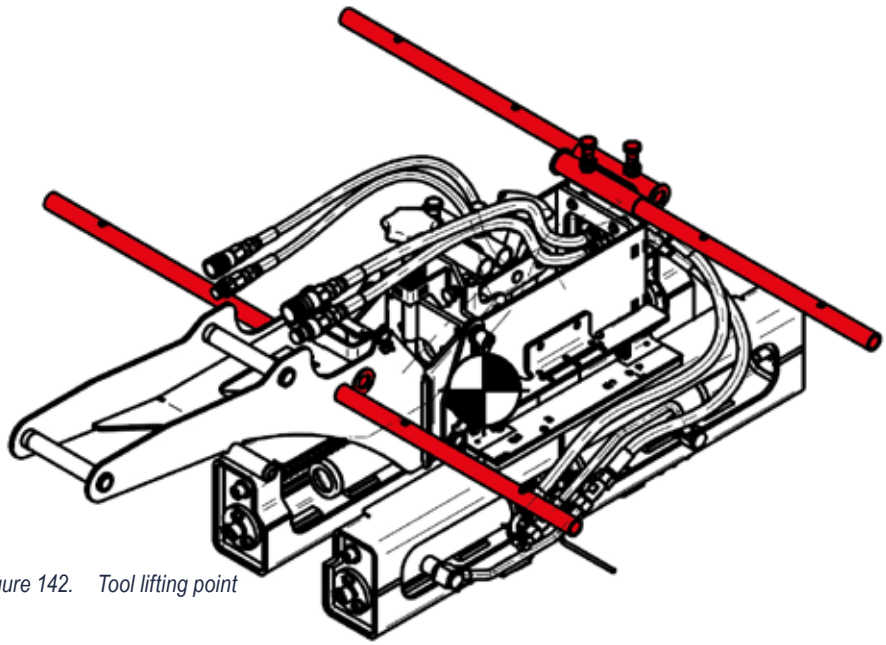


Figure 142. Tool lifting point

CH14C Trolley Lifting Point

Job no. CH14C				
	B	C		

Safety condition: SCB

Scheduled work

1. Check that the trollety lifting handles and brackets are free from damages

Arising work

1. Replace damaged parts.

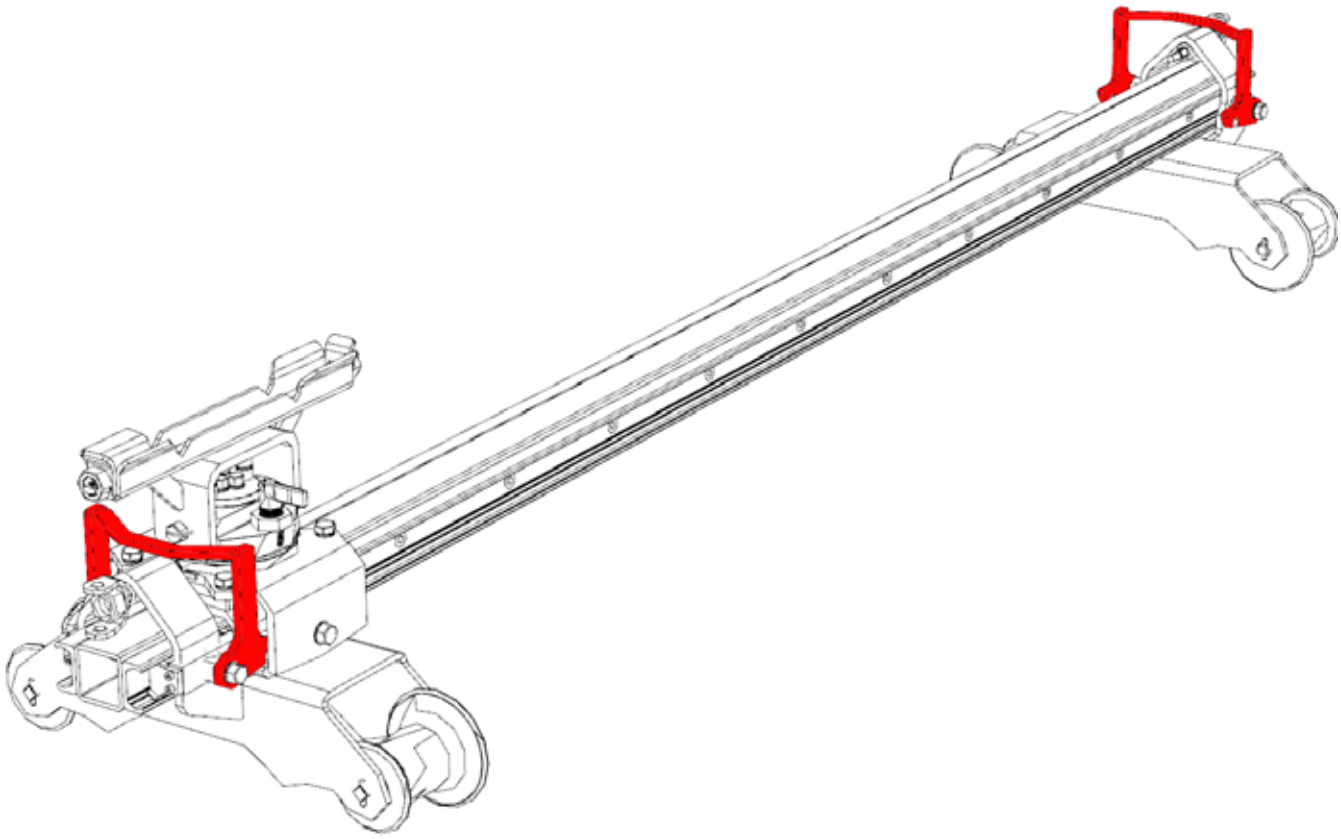


Figure 143. Trolley lifting points

CH15L Trolley surface on slide bar

Job no. CH15L				
	B	C		

Safety condition: SCB

Scheduled work

1. Inspect the surface on slide bar and check that it is free from damage..

Arising work

1. Replace if damaged or broken.
2. Clean and lubricate with oil spray (CRC6-56 or similar).

EL01V Control panel

Job no. EL01V				
A	B	C		

Safety condition: SCR

Scheduled work

1. Check control panel for cracks and other damages.
2. Check that the control panel are working correctly.

Arising work

1. Replace defective parts or whole panel assembly if needed.
2. Investigate fault, correct and retest.

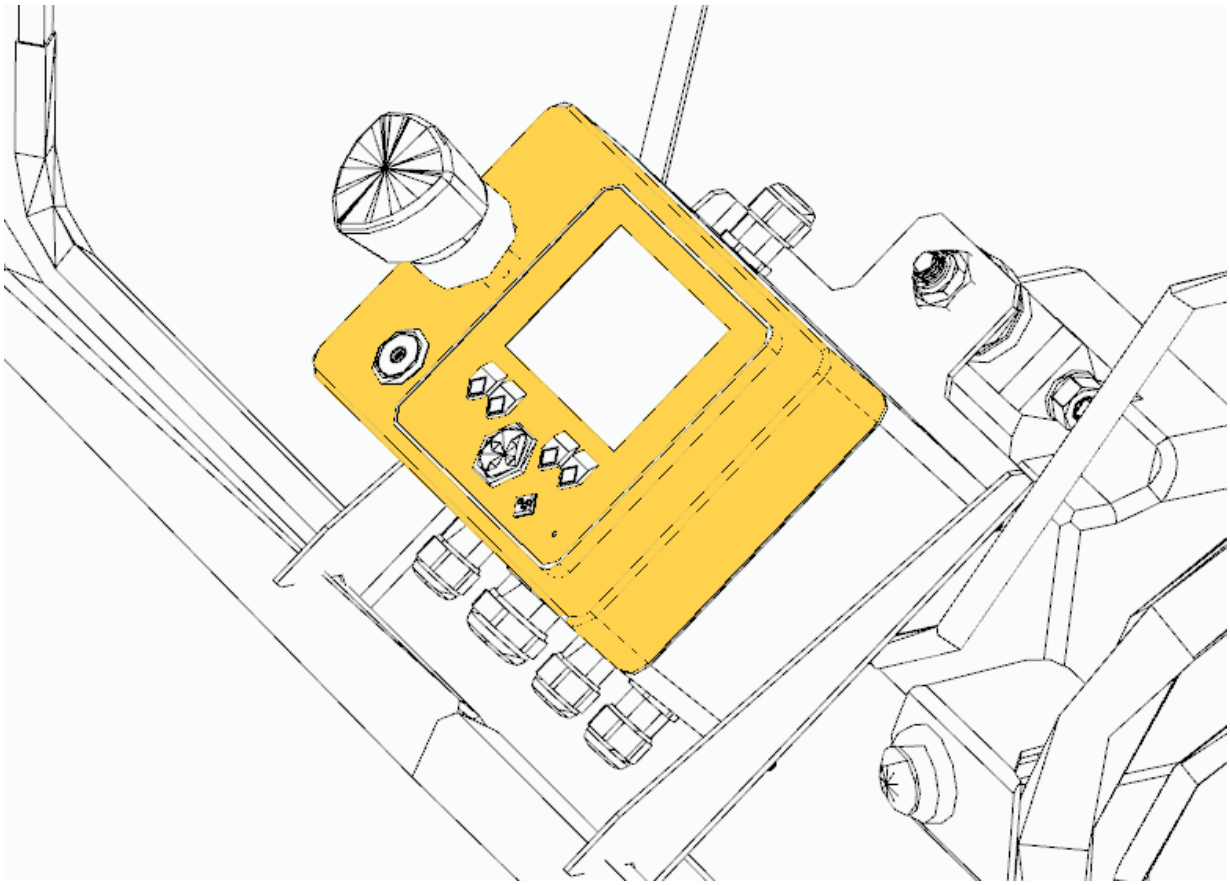


Figure 144. Control panel

EL02V Light – Visual check

Job no. EL02V				
A	B	C		

Safety condition: SCR

Scheduled work

1. Check lenses for cracks and other damages.
2. Check that the light are working correctly.

Arising work

1. Replace defective parts or whole lamp assembly if needed.
2. Investigate fault, correct and retest.

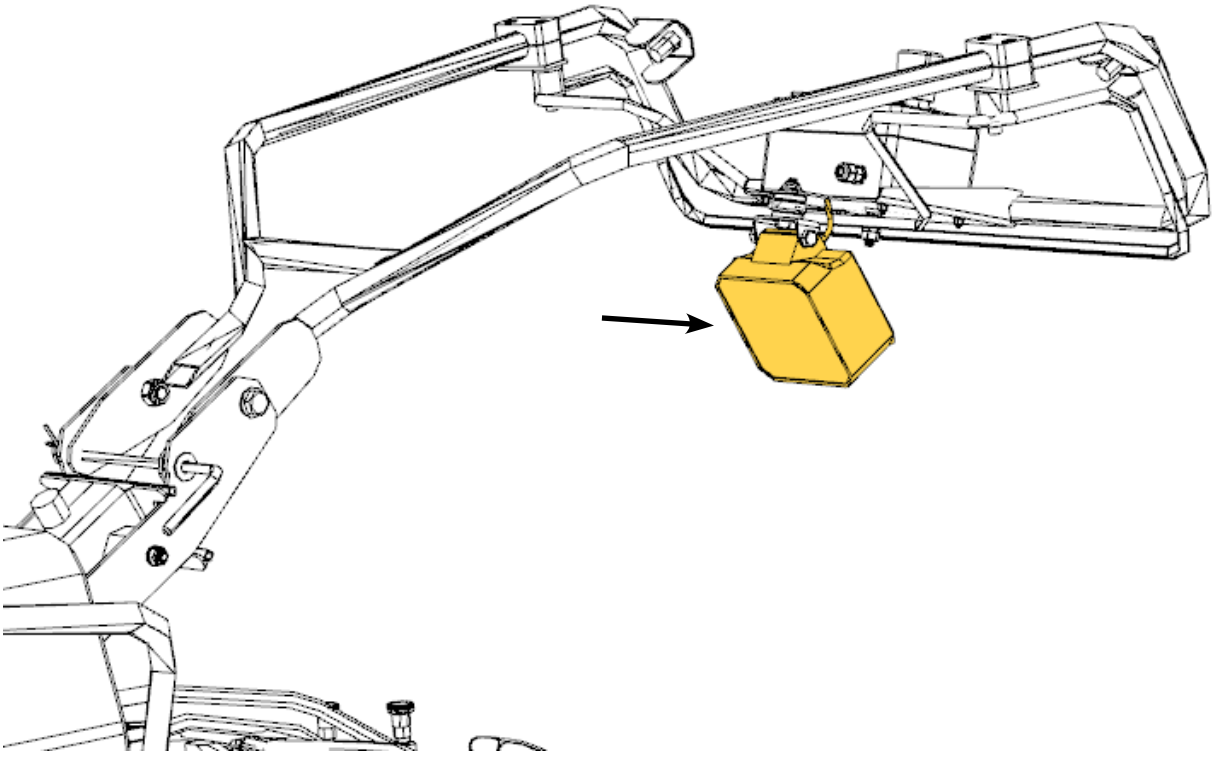


Figure 145. Light

EL03V Emergency stop button – Visual check

Job no. EL03V				
A				

Safety condition: SCB

Scheduled work

1. Visually check emergency stop button is present and free from damage.

Arising work

1. Replace defective parts. Test replaced emergency stop buttons according to job EL04T.

Location	No. of Emergency stop buttons
Handle bar	1

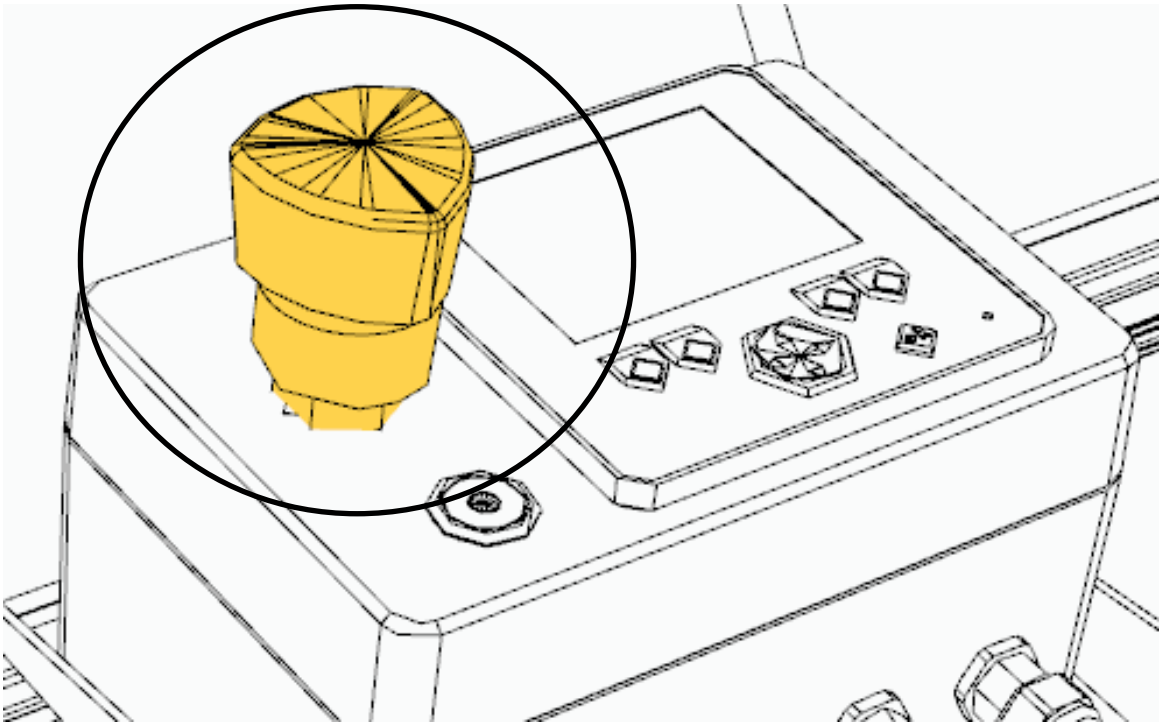


Figure 146. Emergency stops

EL04T Emergency stop button – Test

Job no. EL04T				
	B	C		

Safety condition: SCB

Scheduled work (with the machine on the track)

1. Test emergency stop button and ensure that the engine is stopped. Work lights shall remain lit.

Arising work

1. Report any faults to the supervisor rectify and retest

Location	No of E-stops
Handle bar	1

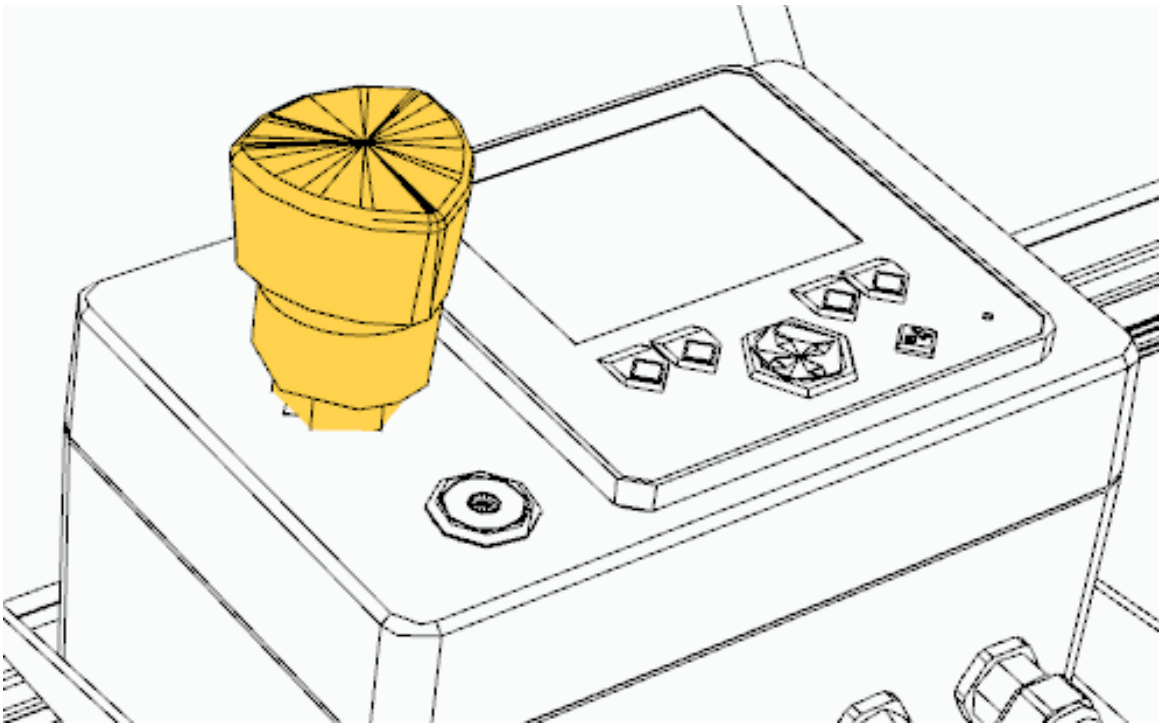


Figure 147. Emergency stops

EL05V Electric cables – Visual check

Job no. EL05V				
	B	C		

Safety condition: SCI

Scheduled work

1. Wherever accessible, examine wiring, looms, plugs and sockets and jumper leads. The following conditions are unacceptable:
   - Damaged insulation.
   - Damaged plugs or sockets.
   - Unsecured looms or wires.
   - Loose connections.
   - Corrosion.

Arising work

1. Replace any broken or damaged components and re-tighten loose fixings. Apply protection wax or grease on terminations and contact surfaces. Carry out job EL06E after renewing any cable or fixing.

EL06E Battery – Examine

Job no. EL06E				
	B	C		

Safety condition: SCI

Scheduled work

Examine the batteries as follows:

1. Examine the main cables. Check that they are secure and not in contact with sharp edges, as this causes damage.
2. Check that the connections are tight and not corroded.
3. Examine the battery for signs of leakage and/or overheating.

Arising work

1. Re-secure cables if loose or damaged. If damage is localised, repair with suitable tape or sleeve.
2. Clean corroded terminals and grease with vaseline or similar product. Tighten loose connections.
3. Replace battery if showing signs of leakage or overheating.

Weight battery 7 kg.

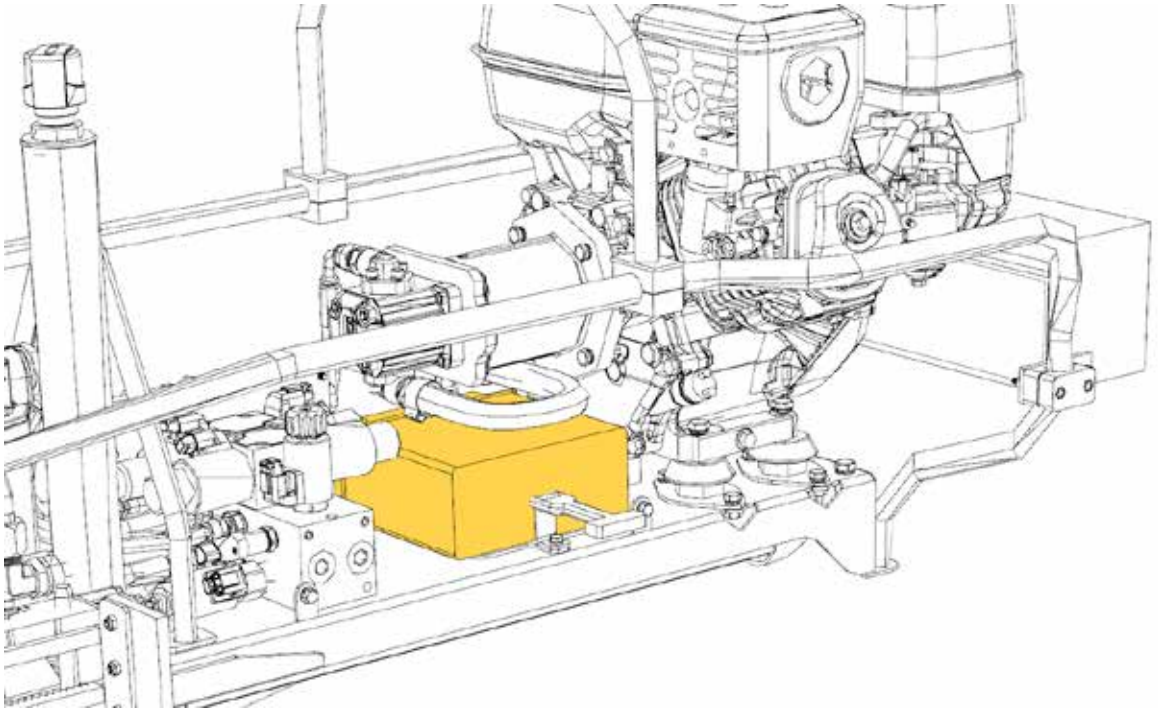


Figure 148. Battery position

HY01V Hydraulic oil level – Visual check

Job no. HY01V				
A	B	C		

Safety condition: SCB

Scheduled work

1. Check the hydraulic oil level with the oil dipstick.

Arising work

1. Clean the area around the filler cap and fill it up with hydraulic oil

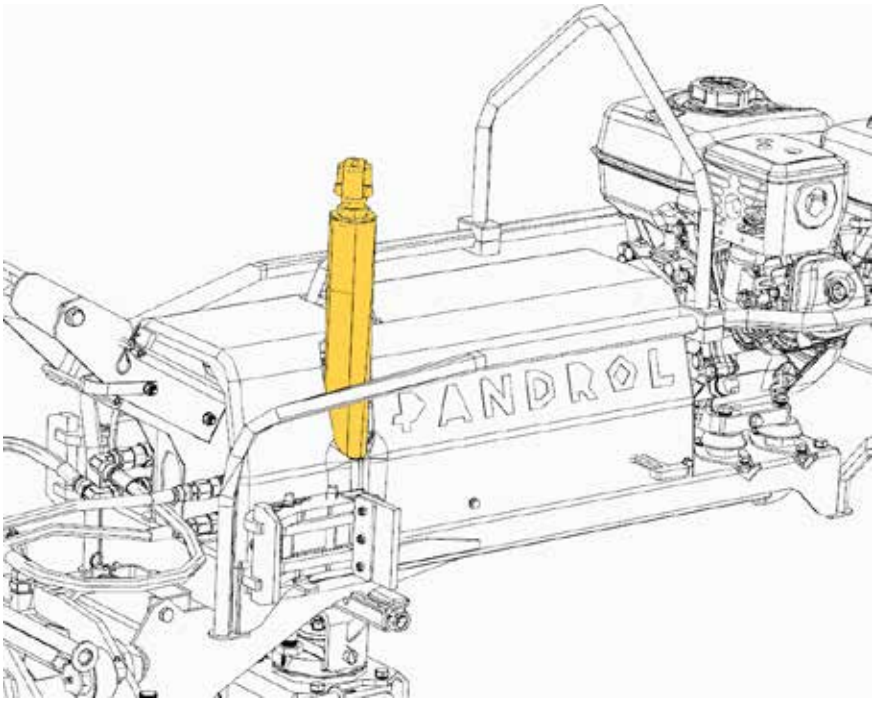


Figure 149. Hydraulic tank

HY02C Hydraulic cylinders and hoses – Check

Job no. HY02C				
		C		

Safety condition: SCB

Scheduled work

Examine all hydraulic cylinders, hoses, couplings and connection. Check for

1. Leaks
2. Signs of damage on the piston rod and the cylinder.
3. Damaged seal
4. Loose fittings
5. Cuts, wear, spits on hoses

Arising work

1. Retighten loose fittings or replace leaking components.
2. Change defective cylinders as follows:
   - Set the machine so that the cylinder to be repaired/replaced is accessible.
   - Ensure that the hydraulic pressure is released by stopping engine and operating controls.
   - Replace defective items.
3. Replace damaged seals and re-secure loose items.
4. Tighten loose fittings and check that leaks have been repaired.
5. Replace any defective hose.

HY03V Hydraulic pump – Visual check

Job no. HY03V				
		C		

Safety condition: SCB

Scheduled work

1. Check that the pump are securely mounted.
2. Check for leaks.
3. Check for loose fittings.
4. Check hosing and connections.

Arising work

1. Re-secure loose items.
2. Run the engine to check there are no leaks.
3. Re-secure loose fittings.
4. Replace damaged hoses and connections.

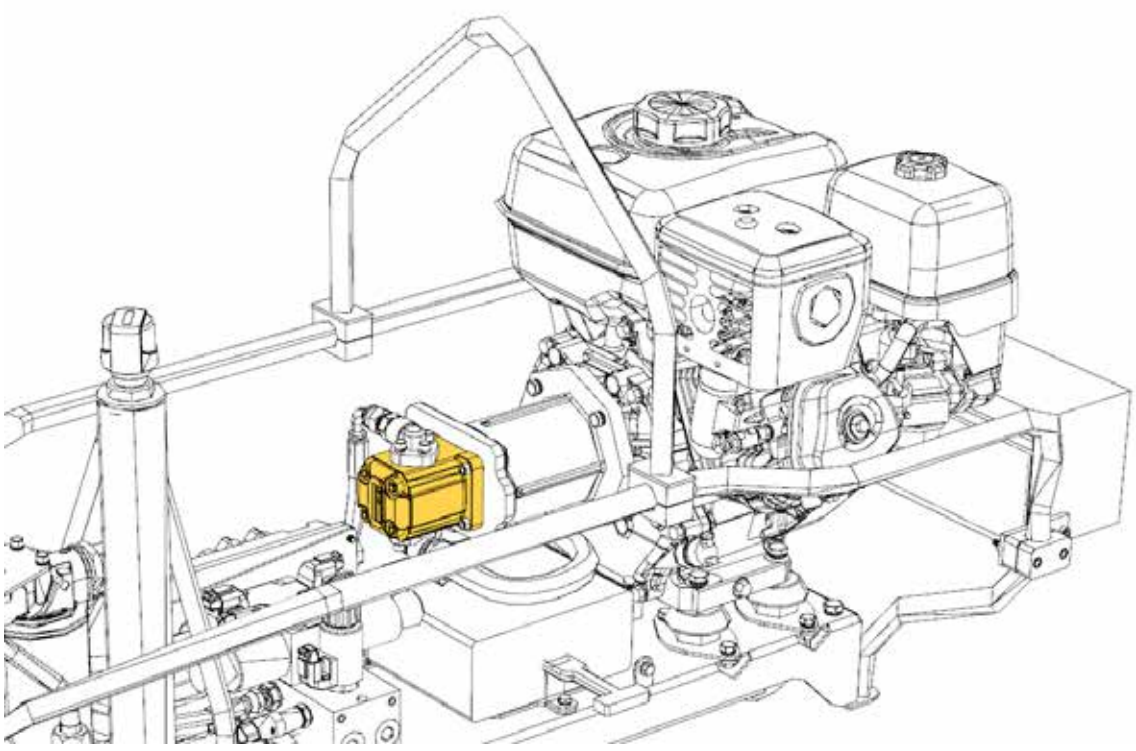


Figure 150. Location of the hydraulic pump

HY04R Hydraulic filters – Check

Job no. HY04R				
		C		

Safety condition: SCB

Scheduled work

Check the following filters:

1. Breather filter

2. Return line filter

Arising work

1. 1-2 Replace the filter.

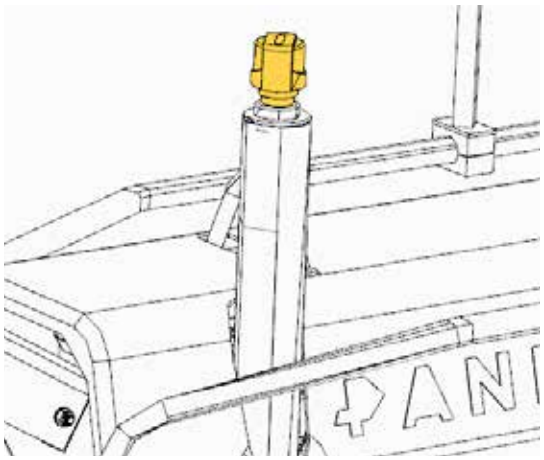


Figure 151. Breather filter position

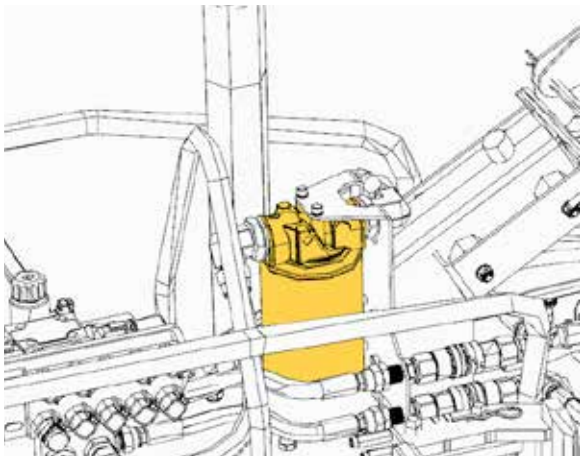


Figure 152. Return line filter positions

HY05C Hydraulic oil change

Job no. HY05C				
		C		

Safety condition: SCB

Scheduled work

1. Drain hydraulic system through drain plug fitted at the bottom of the hydraulic tank.
   NOTE!
   Drain only in approved container with the capacity according to the hydraulic system volume.
2. Replace hydraulic filters.
3. Fill the hydraulic oil tank with oil according to specification below. The oil volume in the hydraulic tank is approximately 7 litres.

Hydraulic oil specification

The oil used for filling must be clean. Do not mix different oils. Hydraulic oil that is approved for Pandrol products must comply with one of the following standards or equivalents:

-DIN 51524 part 3
-SS 15 54 34
-ISO 11158 HV
Example: Shell Tellus S2 M46, BP Bartran HV 46.

Suppliers of hydraulic oil must verify that the quality and performance of the oil complies with the above standards. When changing from mineral oil to a non polluting synthetic oil, or when changing to biodegradable oil, contact Pandrol.

Recommended environmentally friendly oil:

Panolin HLP SYNTH 46.

Viscosity of oil

The viscosity of the oil is of great importance to achieve high efficiency of the hydraulic system. The naming of the oil in the table below: 32, 46 or 68 tells the viscosity of that oil at 40° C (reference temperature).

Viscosity of oil at 40° C	Temperature range
32	-25°C to 75°C
46	-15°C to 90°C
68	-5°C to 90°C

When working in artic condition consider an oil with lower viscosity than the 32 oil in the table above.

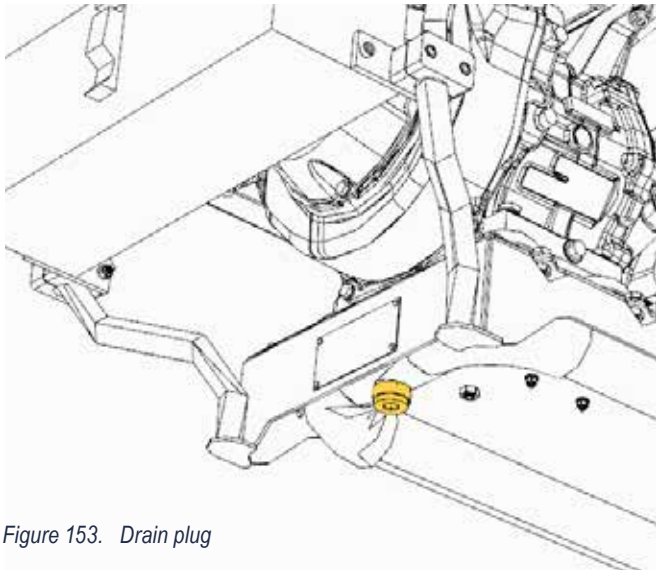


Figure 153. Drain plug

HY06T Hydraulic flow and pressure – Test .

Job no. HY06T				
		C		

Safety condition: SCR

Scheduled work

Flow measurement procedure for hydraulic pumps

Conditions for flow measurements:

1. Take appropriate precautions to make sure not to contaminate the hydraulic oil. Make sure to perfectly clean areas and surfaces of where the flow test equipment will be connected to the hydraulic system.
2. Use a flowmeter, manometer and flow restriction valve rated for the specific flow and pressure excited by the pump. Make sure that the measuring devices are calibrated.

   Pressure test:
   Connect a pressure gauge to the pressure quick coupler. Start the engine and set it to max revolution. Read out the value and check according to the table.

   Flow test:
   Connect the flow meter to the quick couplers. Start the engine at full speed. Read out the value and check according to the table.

The pump can be considered in good condition if maximum flow is not less than 90% of nominal.

Pump	P1
Flow l/m	17
System pressure	215 BAR

EN01C Engine

Job no. EN01C				
A	B	C		

Safety condition: SCB

Scheduled work

Please read the engine user manual for maintenance instructions.

EN02V Engine mountings

Job no. EN02V				
A	B	C		

Safety condition: SCB

Scheduled work

1. Visually check the condition of rubber mountings.
2. Check bolt connections on the engine fastening brackets.

Arising work

1. Replace worn rubber mountings
2. Tighten bolts according to section 3.4 Fasteners in chapter 3. Maintenance.

WH01C Wheels – Check

Job no. WH01C				
		C		

Safety condition: SCB

Scheduled work

1. Check the wheels for signs of pitting, scoring, flat spots and other damages.

Arising work

2. See job WH02E.

WH02E Wheels – Examine

Job no. WH02E				
		C		

Safety condition: SCB

Scheduled work

1. Using a calibrated gauge, check that the back-to-back measurement is within tolerance at the top and bottom positions of the wheels, record findings on table 1. Note! This can only be measured with the machine sitting on the rails.
2. Turn the trolley upside down. Clean the entire wheel flange and tread, removing,grease, corrosion and debris. Rotate the wheel and check that there is no sign of axial or radial play in the bearings, or noises or harshness.
3. Rotate the wheel slowly by hand, and examine all surfaces of the wheel, checking for cracks, cavities, metal migration and flats.The acceptable limits for all wheel parameters are found in, Wheel Examine Record Form.
4. Usa a profile gauge ”Figure 147. Profile template” to check that the wheel profile is within limit ”Figure 146. Wear limit max 3 mm”

Arising Work

1. If back-to-back dimension is out of tolerance adjust with shims.
2. If axial or radial play in the bearing exceeds 0,05 mm, or noise or harshness is detected, dismantle and replace the bearings and rectify the defects. Note! This work must be carried out in a workshop.
3. Replace worn wheels in pairs or re-profile in pairs. **NOTE!**
   If flat is >30 mm, remove from service immediately. If flat is 20-30 mm, remove from service on completion of work.

Figure 155. Profile template

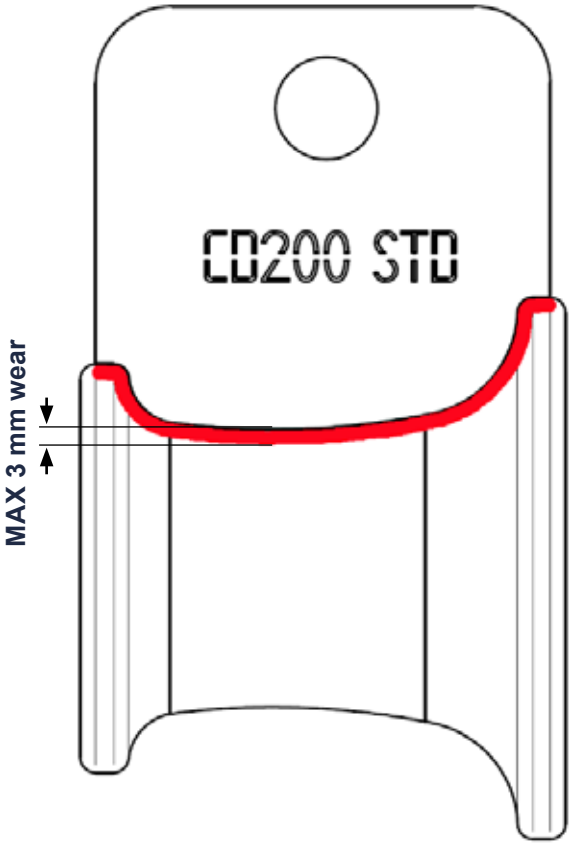


Figure 154. Wear limit max 3 mm

DESCRIPTIVE CLAUSE A

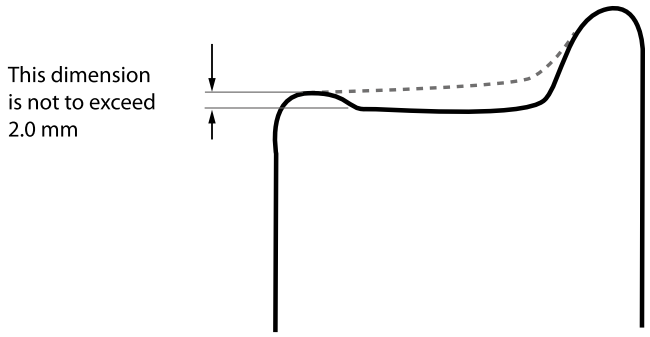


Figure 156. Limit for false flange

1 Cracks

Cracks normally have a jagged saw tooth type of surface profile with sharp edges. Cracks will normally form at the tread chamfer in an axial direction (across the thread) ”Figure 128. Wheel with crack”.

No cracks are permitted. Replace wheels unless the cracks can be completely removed by re-profiling.

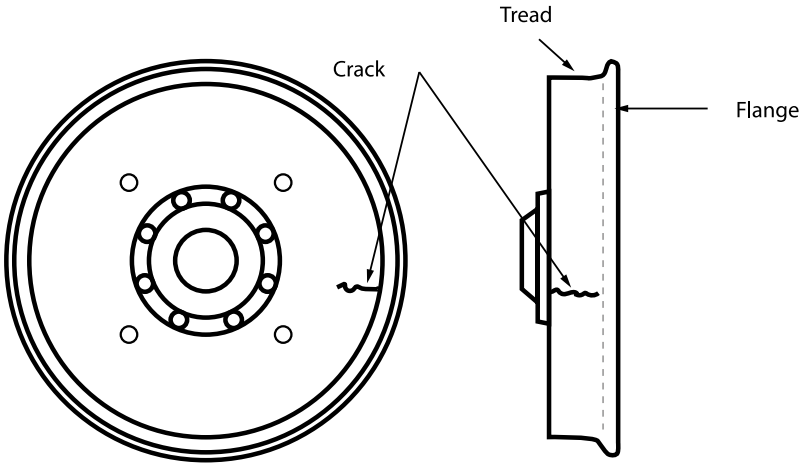


Figure 157. Wheel with crack

2 Cavities

Rolling contact fatigue causes microscopic subsurface cracks which develop into a localised network ”Figure 150. Microscopic cracks”Over a long period small sections or spalls break away leaving cavities ”Figure 151 Cavities” . Record the number and length of the cavities. Take action if the length of any cavity exceeds 15 mm, or if two cavities are within 50 mm of each other and their combined length exceeds 15 mm. Re-profile wheels to remove cavities and cracks, otherwise replace the wheels.

Figure 158. Microscopic cracks

Figure 159. Cavities

3. Migration

Material migration results from a rolling action that forces the surface material sideways. This can occur in two places:

3.1. Tread Rollover

This forms on the tread chamfer ”Figure 153. Rollover”. The maximum allowable is 5 mm. Associated with this are circumferential cracks ”Figure 152. Circumferential cracking limit associated with rollover” which do not affect the integrity of the wheel.

3.2. Migration down the flange

Shown in ”Figure 154. Migration down the flange” where the extreme edges have flaked off. This does not affect the integrity of the wheel. These defects are removed when re-profiling becomes necessary to restore the wheel profile

Figure 160. Circumferential cracking limit associated with rollover

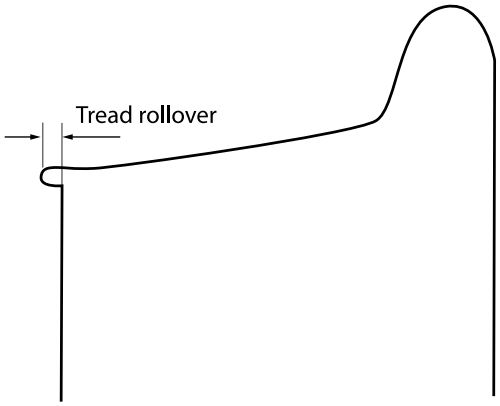


Figure 161. Rollover

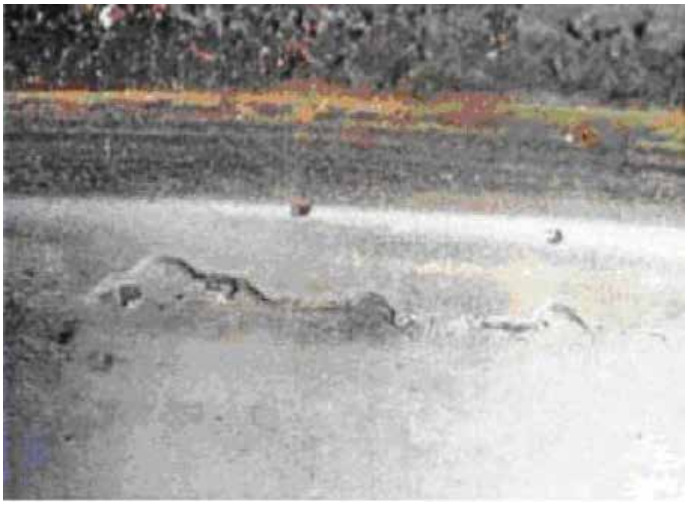


Figure 162. Migration down the flange

Wheel examination record form

Please copy this page and use it when the wheels are to be examined.

Rail wheels		

Wheel Examination Record Form					
Vehicle no:			Date:		
Location:			Examiner:		
Document number:					
Type of defect	**Allowable limit**	**Record findings here**			
		Tick if none is found (X)	**Record details if found**		
Cracks	None allowed				
Cavities	15 mm length				
Migration	5 mm tread roll over, otherwise no limit				
Flats	20 mm				
Back to back	See back to back below *				
Record amount of wear					
Wear/defect	**Limit (mm)**	**Axle 1**		**Axle 2**	
		Left	Right	Left	Right
False flange	2 mm				
Flats	20 mm				
***Back to back**					

BR01T Brake function test

Job no. BR01T				
	B	C		

Safety condition: SCM

Scheduled work

1. Before the test, ensure that the brakes are in working condition by visually inspect that the braking pads are in correct position, and not worn out. Also ensure that the brake releases and apply correctly.
2. Run the machine forward at transport speed, release the lever to apply the brakes.
3. Run the machine backward at transport speed, release the lever to apply the brakes.
4. Make sure that the brakes are operating effectively and that the machine fully stops.

Arising work

1. Report any faults to the supervisor.

BR02E Brake pads – Examine

Job no. BR02E				
		C		

Safety condition: SCB

Scheduled work

1. Use a calibrated measuring device measure the thickness on the brake pads ensuring there is a minimum of 2 mm friction material remaining.

Arising work

1. If the pad is worn to less than 2 mm thickness, replace the pad.

Rail brake test form

Please copy this page and use it when brake test is performed.

Rail Brake Test Form				
Vehicle no:		Date:		
Location:		Examiner:		
Document number:				
The brake test form applies to RIS-1530 and the European standard EN15746-2	Machine category	9A	9B	9C
Machine speed		Maximum stopping distance		
kph		m		
0,5 (working speed)		0,5		
3 (walking speed)		0,5		
Specify condition for test				
	Tick to specify		Comments	
Straight track	Yes	No		
Inclination	0 ‰	Near 0 ‰		
Track condition	Dry	Wet		
Test results (BR04T) Including park brake pull test				
The machinemust stand perfectly still before measuring the brake distance.				
Speed	Result no 1	Result no 2	Result no 3	Comment
0,5 kph (working speed)				
3 kph (walking speed)				
Park brake pull test result (done annualy or after repair)				
		Yes	No	Approved

MI01V Emergency equipment – Visual check

Job no. MI01V				
		C		

Safety condition: SCB

Scheduled work

1. Check that all required safety items according to national and local regulations are present.

Arising work

2. Replace missing or faulty/expired items.

MI02C Log book, Manuals, Certificates – Visual check

Job no. MI02C				
		C		

Safety condition: SCB

Scheduled work

1. Check that the operator´s manual, the maintenance manual, the log book and certification are stored in the dossier. The dossier shall be stored inside the box.
2. Check that the log book has least 3 clear blank pages.
3. Check that all faults in log book have been cleared or recorded for future action.

Arising work

1. Report to Supervisor who will take appropriate action.
2. Replace log book, take the old log book to the Supervisor.
3. Clear outstanding faults where possible. Supervisor to endorse remaining faults with intended action

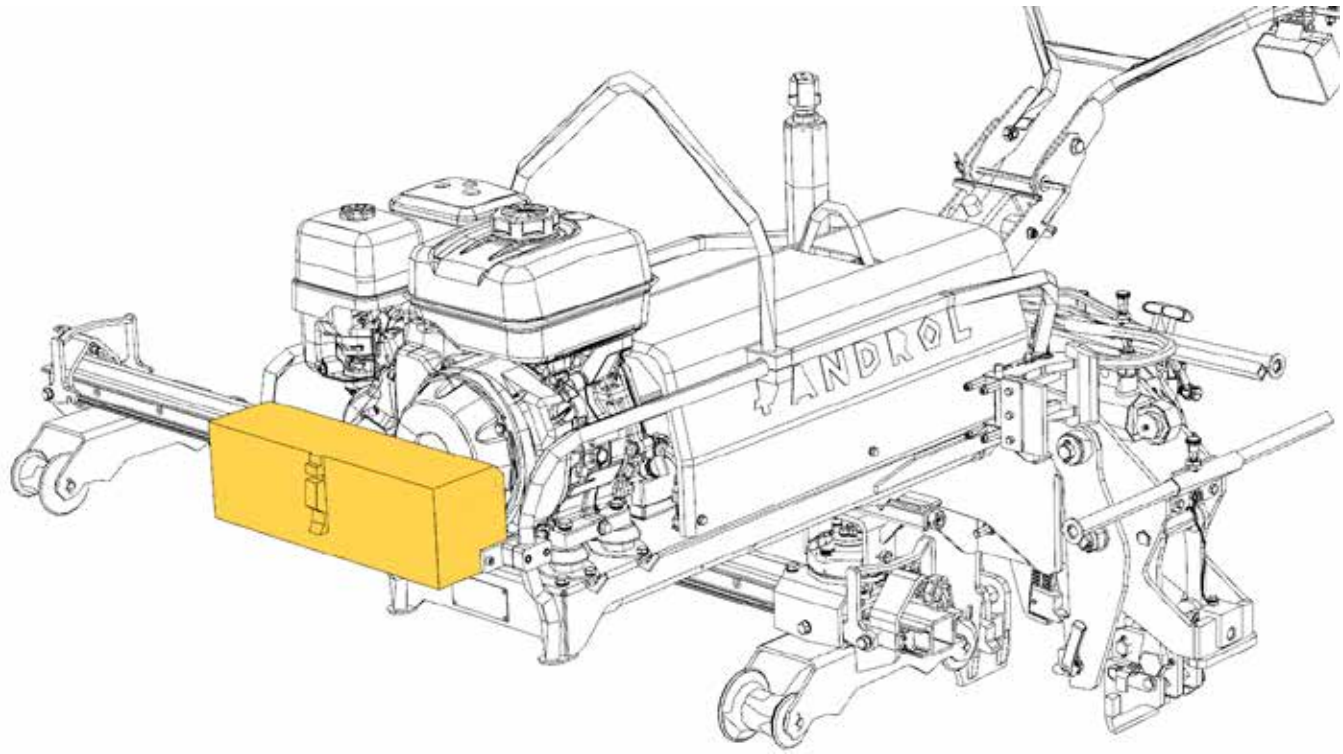


Figure 163. Dossier storage

MI03C Function check – Check

Job no. MI03C				
		C		

Safety condition: SCB

Scheduled work

1. This check must be carried out after maintenance and before putting into service.
2. On-track the machine according operation instructions.
3. Operate the machine forward and reverse according to operator instruction.
4. Check that all controls operate according to operating instructions and that there are no inappropriate or uncontrolled movements.

Arising work

1. 1-4 Rectify and retest

MI04W Washing

Job no. MI04W				
	B	C		

Safety condition: SCB

Scheduled work

1. Wash with warm water and mildly floating neutral solvents as washing up liquids and soap solutions. Do not wash with high-pressure water.
2. Dry the vehicle.
3. Grease and lubricate after drying.

A – exam check list

Machine No:			Location:	
Depot:			Date:	
Operation/Filter:			Signature:	
Job no.	SC	Title	Completed (X)	Notes
CH01V	SCB	Labels and warning signs		
CH04V	SCB	Sign of leakage		
CH05C	SCM	Abnormal sounds		
EL01V	SCI	Control panel		
EL02V	SCR	Lights and direction lamps		
EL03V	SCB	Emergency stop buttons		
HY01V	SCB	Hydraulic oil level		
EN01C	SCI	Main engine		
EN02V	SCB	Engine mountings		
Safety condition “Isolated” SCI Safety condition (Engine) “Running” SCR Safety condition “Moving” SCM Safety condition “Braked” SCB				

B – exam check list

Machine No:			Location:	
Depot:			Date:	
Operation/Filter:			Signature:	
Job no.	SC	Title	Completed (X)	Notes
CH01V	SCB	Labels and warning signs		
CH04V	SCB	Sign of leakage		
CH05C	SCM	Abnormal sounds		
CH06C	SCB	Tighten bolts, screws, nuts		
CH07L	SCB	Lubrication, chassis and tools		
CH08C	SCB	FE/FC tool		
CH09C	SCB	e-Clip tool		
CH10C	SCB	Retention pins		
CH11C	SCB	Centre lifting point		
CH12C	SCB	Power unit lifting point		
CH13C	SCB	Tool lifting point		
CH14C	SCB	Trolley lifting point		
CH15L	SCB	Trolley surface on slide bar		
EL01V	SCB	Control panel		
EL02V	SCR	Lights and direction lights		
EL03V	SCB	Emergency stop buttons		
EL04T	SCR	Emergency stop buttons		
EL05V	SCI	Electric cables		
EL06E	SCI	Battery		
FU01V	SCB	Fuel level		
HY01V	SCB	Hydraulic oil level		
EN01C	SCI	Engine		
EN02V	SCB	Engine mountings		
WH01C	SCB	Wheels		
BR01T	SCM	Brake function test		
MI04W	SCB	Washing		

Safety condition “Isolated” SCI
Safety condition (Engine) “Running” SCR
Safety condition “Moving” SCM
Safety condition “Braked” SCB

C–exam check list

Machine No:			Location:	
Depot:			Date:	
Operation/Filter:			Signature:	
Job no.	SC	Title	Completed (X)	Notes
CH01V	SCB	Labels and warning signs		
CH02V	SCB	Paint		
CH03V	SCB	Frame		
CH04V	SCB	Sign of leakage		
CH05C	SCM	Abnormal sounds		
CH06C	SCB	Tighten bolts, screws, nuts		
CH07L	SCB	Lubrication, chassis and tools		
CH08C	SCB	FE/FC tool		
CH09C	SCB	e-clip tool		
CH10L	SCB	Retention pins		
CH11C	SCB	Centre lifting point		
CH12C	SCB	Power unit lifting point		
CH13C	SCB	Tool lifting point		
CH14C	SCB	Trolley lifting point		
CH15L	SCB	Trolley surface on slide bar		
EL01V	SCB	Control panel		
EL02V	SCR	Lights and direction lamps		
EL03V	SCB	Emergency stop buttons		
EL04T	SCB	Emergency stop buttons		
EL05V	SCI	Electric cables		
EL06E	SCI	Battery		
HY01V	SCB	Hydraulic oil level		
HY02C	SCB	Hydraulic cylinders and hoses		

The list continue on next page →

C–exam check list

HY03V	SCR	Hydraulic pump		
HY04R	SCB	Hydraulic filters		
HY05C	SCB	Hydraulic oil change		
HY06T	SCR	Hydraulic oil pressure and flow		
EN01C	SCI	Engine		
EN02V	SCB	Engine mountings		
WH01C	SCB	Wheels		
WH02E	SCB	Wheels		
BR01T	SCM	Brake function test		
BR02E	SCB	Brake pads		
BR03T	SCM	Brake test		
MI01V	SCB	Emergency equipment		
MI02C	SCB	Log book, manuals, certificates		
MI03C	SCM	Function test		
MI04W	SCB	Washing		
Safety condition “Isolated” SCI Safety condition (Engine) “Running” SCR Safety condition “Moving” SCM Safety condition “Braked” SCB				

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