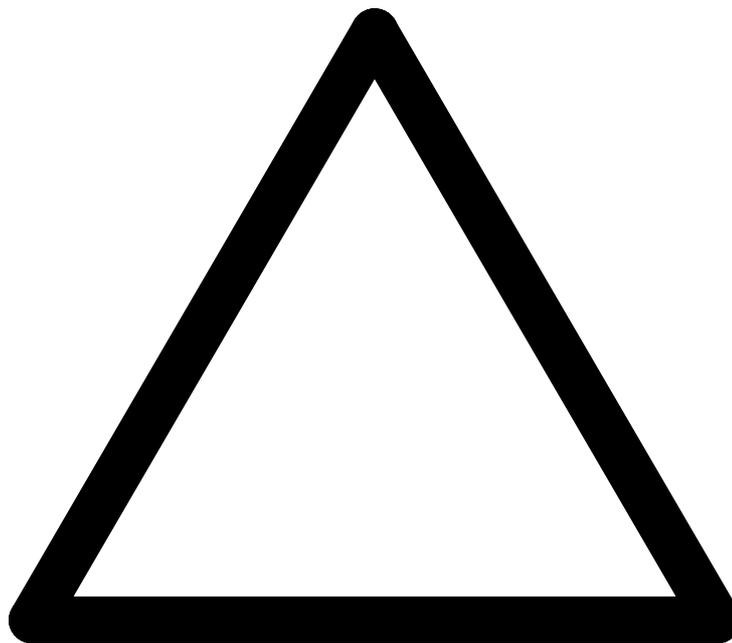


# Atlas Copco

PowerROC T30 E

Safety



## SAFETY INSTRUCTIONS

- Before starting, read all instructions carefully.
- Special attention must be paid to information alongside this symbol.
- Only use genuine Atlas Copco parts.



1250 0071 04

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**Translation of original instructions.**

**Atlas Copco Rock Drills AB  
SE-70191 Örebro, Sweden**

# Safety

1. Foreword .....	5
Rig documentation.....	5
The Manual.....	5
2. Contents.....	6
Contents, target group and objective .....	6
3. Safety regulations.....	7
General safety regulations .....	7
Special safety regulations during maintenance work .....	8
Special safety regulations for the compressor .....	8
Pressure vessel.....	9
Intended Use.....	9
Guarantee.....	10
Warnings.....	10
Description.....	10
Heading.....	11
4. Risk areas of the rig.....	12
Description .....	12
Risk Areas .....	12
Tramming.....	12
Floor drilling.....	13
Working in the risk areas of the rig .....	13
Description.....	13
Specific expertise.....	13
Special procedures .....	14
5. Emergency stop.....	15
Function.....	15
Emergency stop location .....	15
Drill rig .....	15
6. Fire fighting.....	16
Fire extinguishers .....	16
Description.....	16
Location of fire extinguisher .....	17
In case of fire .....	17
Fire extinguishers.....	17
7. Signs.....	19
General .....	19
Prohibition signs.....	19
Warning signs .....	19
General warning signs .....	19

## Safety

Service work .....	20
Stability .....	21
Regulatory signs .....	21
General regulatory signs .....	21
Information signs .....	23
ID plate .....	24
8. Rig stability .....	26
Drill rig spirit level .....	26
9. Noise and vibrations .....	27
Noise and vibration declaration .....	27
Declared Values .....	27
Risk assessment, noise .....	28
Risk assessment, vibration .....	29
10. Declaration .....	30
EC - Declaration of conformity .....	30
Individual machine and safety components .....	30
Other applicable directives .....	30
Harmonised standards which have been applied .....	30
Issuer .....	30

# 1. Foreword

## Rig documentation

The complete rig documentation comprises:

- a manual for the rig
- instructions for different components
- a spare parts catalogue for the rig
- spare parts lists for different components
- diagrams

## The Manual

The complete manual covers:

- Safety
- Operator's instructions
- Maintenance instructions
- Maintenance schedules

The manual is part of the complete delivery of a drill rig and its peripheral equipment

The manual does not replace the necessary training for the drill rig or its peripheral equipment.

## **2. Contents**

### **Contents, target group and objective**

The Safety section contains safety-related information intended to be used by everyone operating the rig and its peripheral equipment.

The objective of the safety chapter is to prevent accidents by providing information on the safety aspects concerning the rig and its peripheral equipment.

## 3. Safety regulations

### General safety regulations

- Read all instructions and follow them.
- Special attention must be paid to the Safety section and all the warnings in the manual.
- Only personnel trained for the equipment are permitted to use it.
- It is essential that personnel observe general and local safety, health and traffic regulations.
- The equipment may only be used for the purpose described in these instructions.
- Locate the fire extinguisher(s) and ensure they are filled.
- Always use a helmet, hearing protection and protective safety glasses during tramming and other work on the rig. Observe local regulations.
- Always check the safety equipment and emergency stop after tramming the rig and also before the start of each shift.
- Engine emissions are toxic. Good ventilation is essential when the engine is running.
- Switch off the engine before refuelling. Do not handle flammable liquids near hot surfaces, sparks or a naked flame.
- The drill rig must only be used, maintained and repaired by personnel well conversant with the equipment and the dangers involved.
- Never carry out service or maintenance work while the drill rig is running.
- Checks and adjustments that need to be made while the rig is running must be performed by the two people. One person must then be in the operating position and have a good overview of the work being carried out and be able to reach an emergency stop easily.
- Only step on designated areas when servicing the drill rig. Never stand on open service hatches.
- Ensure that pneumatic, water and hydraulic systems are depressurised before starting any maintenance work on the system.
- To prevent injury during service and maintenance work, components that could move or fall down must be securely supported or strapped in place.
- Do not use any equipment if a fault is indicated by the system, call for service personnel.
- Observe the drill rig warning signals whenever you are in the vicinity of the drill rig.
- Before starting to use the drill, make sure there is nobody inside the risk area of the drill rig, that the drill rig has been maintained in accordance with the maintenance schedule in force, that all control levers, emergency stops and fire extin-

## Safety

### 3. Safety regulations

guishers are working satisfactorily, that warning signs and safety labels are in place, clean and fully legible. Report any damage and defects immediately. Do not operate the system before all the faults have been rectified.

- All work performed with the drill rig involves impact on the surrounding environment, e.g. in the form of vibrations and landslide. Work must always be carried out with great caution and in accordance with safety regulations in force.
- When replacing hydraulic hoses, make sure the new ones are fitted with crimped couplings, are in the right quality category and are the correct dimension.
- When handling drill bits and drill steel on the rig the rotation must be off. Rock drill rotation must not be used during manual handling of bits and rods.
- All hatches must be closed during operation so that they do not disrupt the flow of cooling air or reduce noise suppression. A hatch may only be kept open for a short period of time, e.g. for inspection or adjustment.
- On rigs equipped with an exhaust cleaning unit, the exhaust gases have a very high temperature. Observe extra caution due to the risk of personal injury and fire.

## Special safety regulations during maintenance work

Normally the engine must be switched off and the main power contactor must be off during service and maintenance work on the rig.

- Parts of the rig, e.g. engine and compressor, may become very hot. Make sure that they have cooled to room temperature before carrying out service and maintenance work.

When the engine has to be running to enable the work to be performed, the following special safety requirements apply:

- The work must be performed by at least two people.
- One person must then be assigned to monitor the work. The monitoring person must be located at the operator's station and have immediate access to an emergency stop.
- The working area must be well illuminated.
- Communication between the two individuals must take place in a rapid and reliable manner.
- Observe the strictest cleanliness during maintenance and repair work.

## Special safety regulations for the compressor

- If there is any indication or suspicion that an internal part of the compressor is overheated then the rig must be stopped, but do not open any inspection hatches until sufficient cooling time has elapsed. This is to avoid spontaneous combustion of oil mist when oxygen is added.

- Make sure that safety valves and other overpressure devices are not damaged. Avoid clogging with paint, carbonised oil or other dirt which could disrupt compressor function.
- Pressure and control gauges must be checked regularly with regard to their accuracy. They must be replaced when the permitted tolerances are exceeded.
- The safety devices must be tested in accordance with the description in the maintenance manual in order to ensure that they are in good condition.
- When operating in a dusty environment, position the rig so that dust is not blowing against it.
- Close the compressor's air outlet valve before connecting or disconnecting a hose. Make sure that the hose is fully vented before disconnection. Before blowing compressed air through a hose or air line, make sure that the open end is being held steady. Impact from a loose end could cause damage.
- Do not use any external force on the air outlet valves, e.g. by pulling hoses or installing auxiliary equipment directly onto a valve, e.g. a water separator or a lubricating device etc.
- Distribution lines and air hoses must be the correct dimension and be suitable for the working pressure. Never use broken, damaged or worn hoses. Only use hose couplings and clamps that are the correct type.
- Before removing the oil filler plug, make sure that the pressure is released by opening an air outlet valve.

## Pressure vessel

- Observe local regulations regarding re-inspection.
- Vessel walls subject to pressure must not be exposed to welding or heat treatment.
- The vessel is equipped with, and must only be used with the required safety equipment, such as pressure gauges, overpressure control devices, safety valves etc.
- Installation, design and connections must not be changed.

## Intended Use

The drill rig is only designed for drilling in surface applications, e.g. stone quarries and construction sites. All other use shall be considered as undesignated and forbidden.

Examples of undesignated and forbidden use:

- Lifting and transporting goods
- Lifting and transporting people
- Supporting objects
- Cleaning slopes and drill locations using the feeder
- Using the boom to help the drill rig climb inclines

## Safety

### 3. Safety regulations

The manufacturer is not responsible for damage caused thereby and warns against incorrect use. Correct use also involves following the operation, service and maintenance instructions prescribed by the manufacturer.

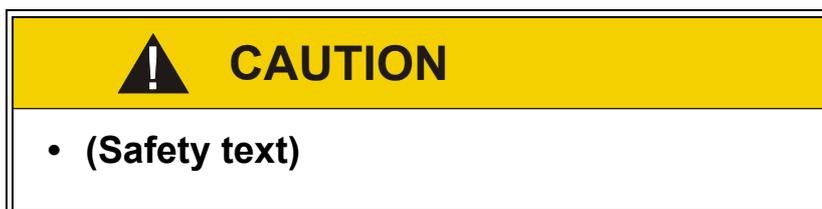
## Guarantee

- Use only Atlas Copco original parts. Any damage or operational interruptions caused by using spare parts of other manufacture than Atlas Copco will not be covered by warranty or product liability.
- Atlas Copco renounces any responsibility for damage caused by unauthorised modification to the rig and its equipment.
- Overloading the rig can result in damage to machinery which is not noticed during normal usage. Such damage is not covered by the guarantee.
- The manufacturer is not liable for damage caused by inappropriate use.
- Damage that occurs as a result of substandard repairs, as well as injury to personnel or damage to equipment that is attributable to older unrepaired damage, is not covered by the guarantee.

## Warnings

### Description

The manuals contain warnings. The warnings are framed and contain a safety text preceded by a warning symbol and a heading (danger, warning and caution).



## Heading

- The **Danger** heading indicates an imminent risk of serious or lethal injury if the warning is not heeded.
- The **Warning** heading indicates a risk or dangerous course of action that can lead to serious or lethal injury if the warning is not heeded.
- The **Caution** heading indicates a risk or dangerous course of action that can lead to personal injury or damage to property if the warning is not heeded.

## Safety

### 4. Risk areas of the rig

# 4. Risk areas of the rig

## Description

The risk areas of the rig are zones within or around the rig where a person is exposed to risk of injury and health hazards.

The following points must be observed for the risk areas of the factory delivered rig to apply:

- good ventilation must be provided while the diesel engine is running.
- hearing protection, protective safety glasses and helmet must be used in the vicinity of the rig when the rig is operating.

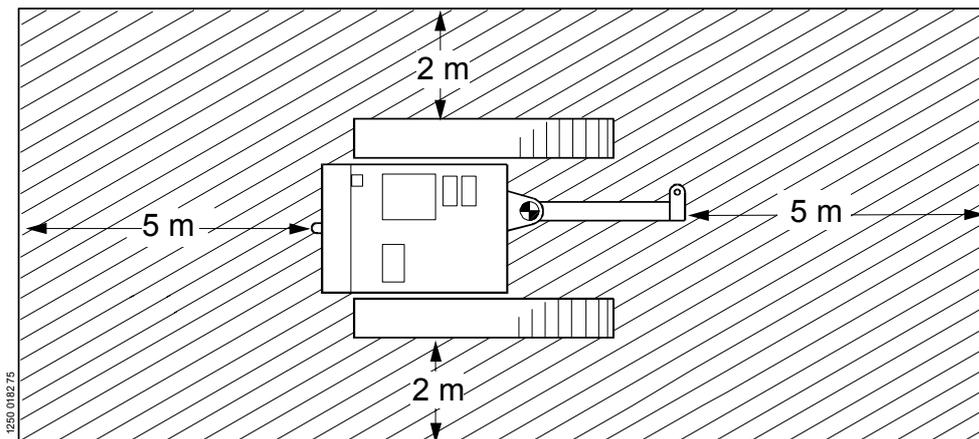
## Risk Areas

### Tramming

#### *Note*

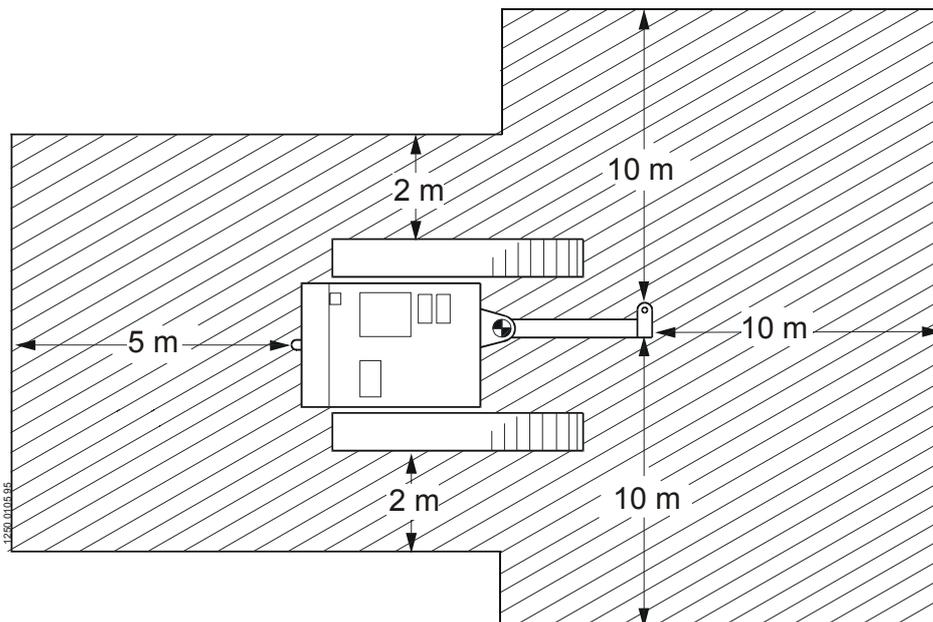
*Observe the following when tramming the drill rig:*

- *Make sure nobody is in front of the drill rig's direction of travel*
- *Make sure nobody is within the risk area of the drill rig*



*Figure: Risk area during tramming.*

## Floor drilling



*Figure: Risk area during floor drilling.*

## Working in the risk areas of the rig

### Description

Fault finding or working in the rig's risk area involves risk. Accordingly, always carry out the fault finding or the work with great care and accuracy. For further safety regulations, [see Safety, Safety regulations](#).

#### Note

*Pay attention to the rig's warning signals when you are in the vicinity of the rig, [see Safety, Warning signals](#).*

### Specific expertise

Specific expertise is required for:

- **the electrical system**
  - Diagnosis of and work on the electrical system must only be performed by appropriately authorised electricians.
- **air and hydraulic systems**
  - Maintenance and repair work must only be performed by specially trained personnel.

## **Safety**

### 4. Risk areas of the rig

## **Special procedures**

Exercise extra caution and accuracy when diagnosis or work is to be performed at the same time as one or more of the following points are applicable:

- the diesel engine is started
- the hydraulic pumps are running
- the hydraulic system is pressurised
- the pneumatic system is pressurised
- the water system is pressurised

If one or more of the above criteria must be fulfilled in order to carry out fault finding or certain work then special steps must be taken:

- The work must be carried out by at least two people, one of which must be at the operating station and have a good view of the work.

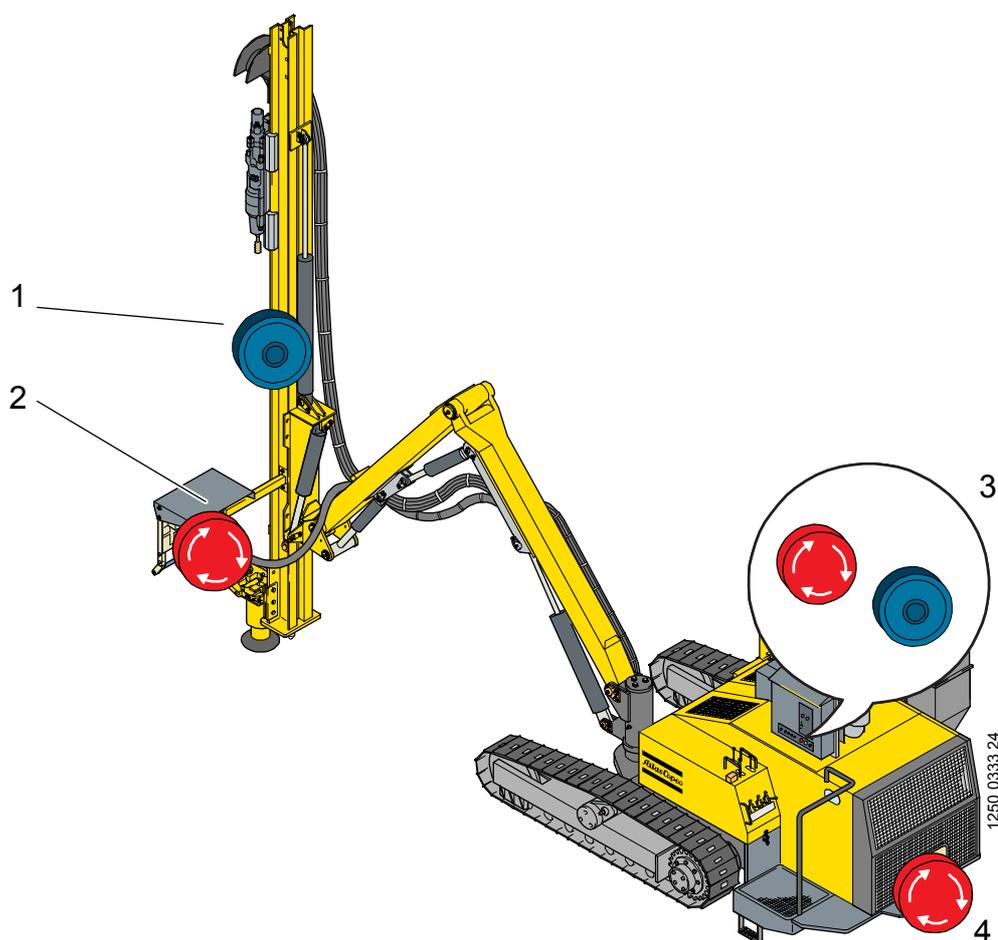
# 5. Emergency stop

## Function

In the event of a hose fracture, accident or other emergency situation the diesel engine, and thus the hydraulic pump, can be stopped immediately by pressing one of the rig's emergency stops.

## Emergency stop location

### Drill rig



*Figure: Emergency stop location.*

- 1 Reset button and emergency stop cable on feeder
- 2 Emergency stop button on front control panel
- 3 Emergency stop button and reset button on diesel panel
- 4 Emergency stop button on winch

## Safety

### 6. Fire fighting

# 6. Fire fighting

## Fire extinguishers

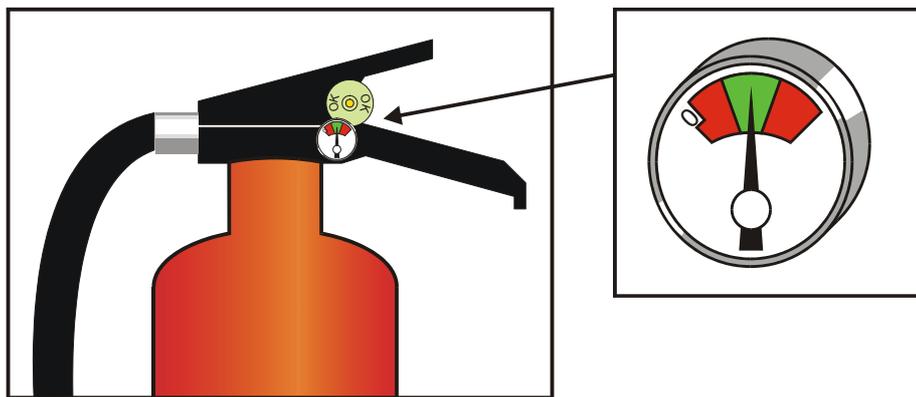
### Description

The rig is equipped with handheld fire extinguishers for fires of class ABC.

#### *Note*

*If the fire extinguisher has been used then it must be replaced with a new one immediately.*

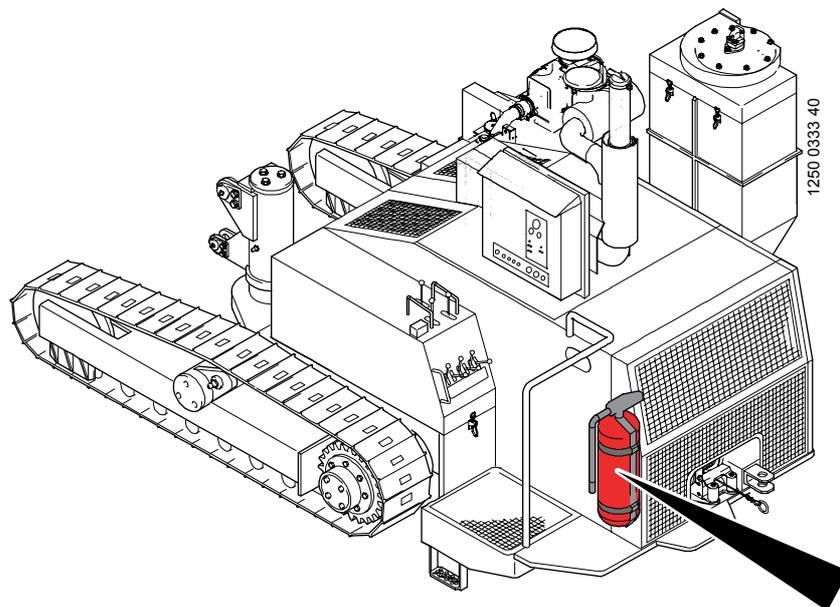
*Check regularly that the needle on the gauge is within the green zone and make sure that the fire extinguisher is replaced as soon as the needle approaches the red zone.*



1250 0098 88

*Figure: Fire extinguisher gauge*

## Location of fire extinguisher



*Figure: Location of fire extinguisher.*

The drill rig is equipped with a fire extinguisher (A-B-C powder).

Class A-B-C fires can be put out.

### **Note**

*The variant of the fire extinguisher that is supplied depends on the different national regulations. It is therefore essential to follow the instructions on the fire extinguisher.*

### **Note**

*The fire extinguishers supplied with the drill rig should be considered as “Delivery fire extinguishers”. If the fire extinguishers are not approved by local stipulations, they must be replaced with locally approved ones.*

## In case of fire

### Fire extinguishers

#### **Note**

*Above all, follow local regulations, stipulations and legislation in case of fire.*

1. Activate the emergency stop by depressing the button. This is the quickest method of stopping the rig.

## **Safety**

### 6. Fire fighting

2. Use the handheld fire extinguisher to extinguish the fire, follow the manufacturer's instructions.
3. Carry out the following steps if it is possible and without danger:
  - a. Turn off the rig's battery isolation switch.
4. Do not restart the rig until the cause of the fire has been established and any faults rectified.
5. After extinguishing, replace the hand-held fire extinguisher with a new, approved hand-held fire extinguisher.

# 7. Signs

## General

It is essential that all the rig signs are in the correct locations, are clean and are fully legible.

## Prohibition signs

*Table: Prohibition signs*

Symbol	Description	Symbol	Description
 <p>1250 0098 91</p>	<p><b>Prohibition sign</b></p> <ul style="list-style-type: none"> <li>• No admittance.</li> <li>• No admittance to unauthorised personnel.</li> <li>• Violation can cause personal injury.</li> </ul>	 <p>1250 0098 97</p>	<p><b>Prohibition sign</b></p> <ul style="list-style-type: none"> <li>• Don't step here.</li> </ul>

## Warning signs

### General warning signs

*Table: General warning signs*

Symbol	Description	Symbol	Description
 <p>1250 0099 81</p>	<p><b>Warning sign</b></p> <ul style="list-style-type: none"> <li>• High noise level.</li> <li>• Can cause permanent hearing impairment.</li> <li>• Use approved ear defenders.</li> </ul>	 <p>1250 0101 89</p>	<p><b>Warning sign</b></p> <ul style="list-style-type: none"> <li>• Slip risk</li> </ul>

# Safety

## 7. Signs

Symbol	Description	Symbol	Description
 <p>1250 0100 13</p>	<p><b>Warning sign</b></p> <ul style="list-style-type: none"> <li>• Danger of scalding and pressure.</li> <li>• Can cause serious injuries.</li> <li>• The pressure must be released before the cap can be removed.</li> </ul>	 <p>1250 0100 14</p>	<p><b>Warning sign</b></p> <ul style="list-style-type: none"> <li>• Danger of air pressure.</li> <li>• Can cause serious injuries.</li> <li>• The pressure must be released before the cap is removed.</li> </ul>
 <p>1250 0099 79</p>	<p><b>Warning sign</b></p> <ul style="list-style-type: none"> <li>• Danger of moving and rotating parts.</li> <li>• Could cause severe injuries.</li> <li>• Keep out of the machine's working area when it is in operation.</li> </ul>	 <p>1250 0098 98</p>	<p><b>Warning sign</b></p> <ul style="list-style-type: none"> <li>• Danger of swinging and crushing parts.</li> <li>• Could cause severe injuries.</li> <li>• Keep out of the hazardous area during operation.</li> </ul>

## Service work

*Table: Warning sign, service work*

Symbol	Description
 <p>1250 0099 85</p>	<p><b>Warning sign</b></p> <ul style="list-style-type: none"> <li>• In the event of a breakdown or during service work the boom falls diagonally.</li> <li>• Injuries and damage to machinery could occur.</li> <li>• During service work the boom must be secured in place with straps or supports.</li> </ul>

## Stability

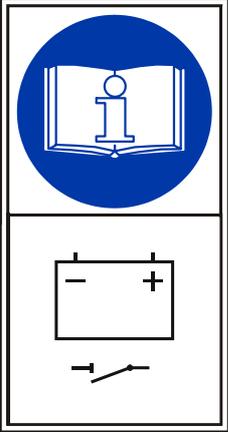
*Table: Warning sign, stability*

Symbol	Description
 <p>1250 0103 01</p>	<p><b>Warning sign</b></p> <ul style="list-style-type: none"> <li>Stability</li> </ul>

## Regulatory signs

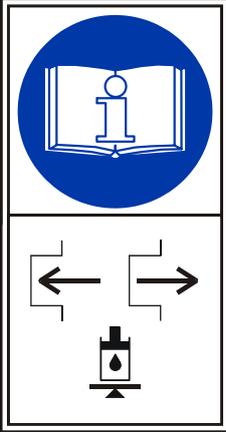
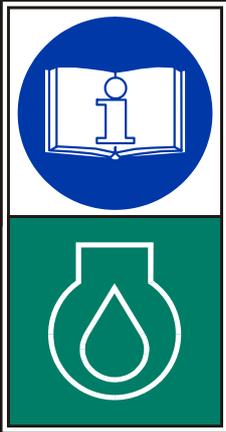
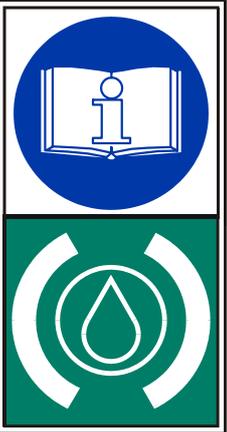
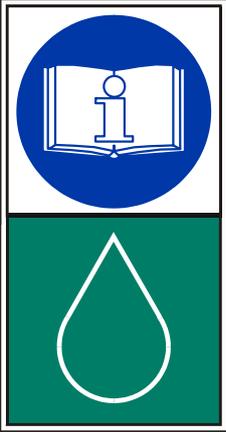
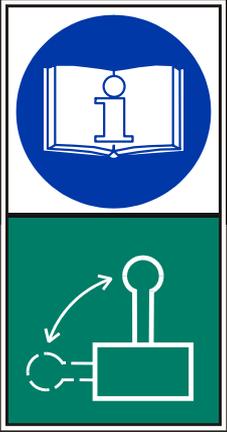
### General regulatory signs

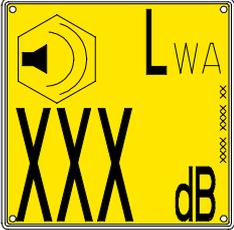
*Table: General regulatory signs*

Symbol	Description	Symbol	Description
 <p>1250 0099 89</p>	<p><b>Regulatory sign</b></p> <ul style="list-style-type: none"> <li>Read the instructions.</li> <li>Incorrect use of the machine may cause personal injury and damage to machinery.</li> <li>Observe the indications given by the warning signs and follow given instructions in order to avoid serious injuries.</li> </ul>	 <p>1250 0099 92</p>	<p><b>Regulatory sign</b></p> <ul style="list-style-type: none"> <li>Read the instructions.</li> <li>This drill rig is equipped with a battery isolation switch.</li> </ul>

# Safety

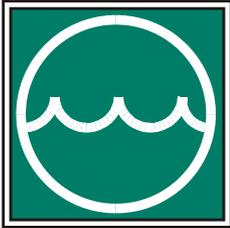
## 7. Signs

Symbol	Description	Symbol	Description
 <p>1250 0100 09</p>	<p><b>Regulatory sign</b></p> <ul style="list-style-type: none"> <li>• Read the instructions.</li> <li>• The carrier's battery supplies the hydraulic oil level switch with current.</li> <li>• The battery isolation switch must be turned on when drilling is in progress.</li> <li>• Switch off the battery isolation switch when the drill rig is not in operation. If this is not done the battery will be discharged.</li> </ul>	 <p>1250 0099 91</p>	<p><b>Regulatory sign</b></p> <ul style="list-style-type: none"> <li>• Read the instructions.</li> <li>• The hydraulic system must be filled with hydraulic oil.</li> </ul>
 <p>1250 0099 93</p>	<p><b>Regulatory sign</b></p> <ul style="list-style-type: none"> <li>• Read the instructions.</li> <li>• Fill with engine oil.</li> </ul>	 <p>1250 0100 11</p>	<p><b>Regulatory sign</b></p> <ul style="list-style-type: none"> <li>• Read the instructions.</li> <li>• Fill with brake fluid.</li> </ul>
 <p>1250 0100 10</p>	<p><b>Regulatory sign</b></p> <ul style="list-style-type: none"> <li>• Read the instructions.</li> <li>• Fill with lubricating oil.</li> </ul>	 <p>1250 0101 41</p>	<p><b>Regulatory sign</b></p> <ul style="list-style-type: none"> <li>• Read the instructions.</li> <li>• Emergency stop.</li> </ul>

Symbol	Description	Symbol	Description
	<b>Regulatory sign</b> <ul style="list-style-type: none"> <li>Information noise level.</li> </ul>		

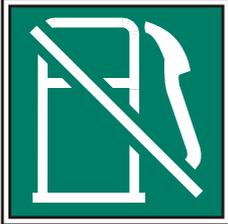
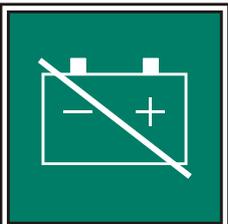
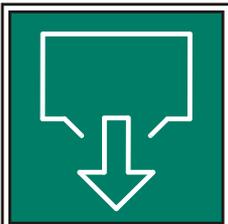
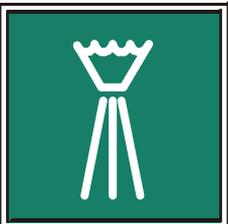
## Information signs

*Table: Information signs*

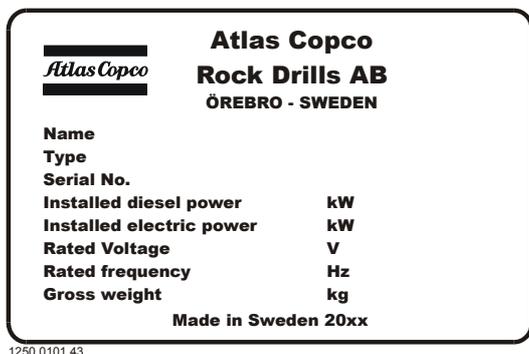
Symbol	Description	Symbol	Description
	<b>Information sign</b> Fire extinguishers.		<b>Information sign</b> Activator instruction for fire fighting system.
	<b>Information sign</b> Emergency exit.		<b>Information sign</b> Lifting eye.
	<b>Information sign</b> Water inlet.		<b>Information sign</b> Air intake.

# Safety

## 7. Signs

Symbol	Description	Symbol	Description
 1250 0098 96	<b>Information sign</b> Fuel.	 1250 0100 15	<b>Information sign</b> Fuel cock.
 1250 0301 60	<b>Information sign</b> Fuel with low sulphur content.	 1250 0301 72	<b>Information sign</b> Engine oil
 1250 0100 28	<b>Information sign</b> Battery isolation switch.	 1250 0100 29	<b>Information sign</b> Draining.
 1250 0049 09	<b>Information sign</b> Washer fluid	 8915 0021 72	<b>Information sign</b> Lubrication point.

## ID plate



*Figure: the drill rig's ID plate*

The plate advises:

- Address
- Type of drill rig
- Serial number
- Installed power
- Total weight of drill rig
- CE marking
- Identity plates

All electrical components have their own sign with an identifying name.



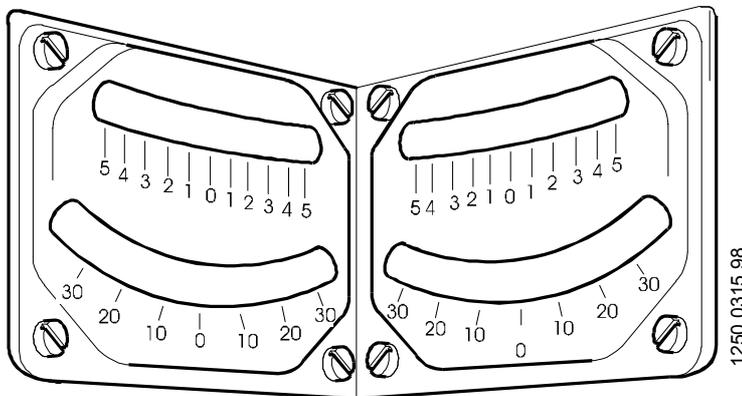
Figure: Example of identity plate

## 8. Rig stability

### Drill rig spirit level

!**CAUTION**

- The gradient meter shows the chassis frame inclination and not the actual ground inclination.



*Figure: Drill rig spirit level.*

The drill rig spirit level indicates the angle at which the drill rig is standing. The drill rig can tip over if the specified inclination angles for the drill rig are exceeded. The inclination angles are described in the Operator's manual.

# 9. Noise and vibrations

## Noise and vibration declaration

DECLARED NOISE EMISSION VALUES	Drilling , free field
A-weighted sound power, $L_{WA}$ (reference 1 pW) in decibels <b>(declaration for single values)</b>	128
A-weighted emission sound pressure level $L_{pA}$ (reference 20 $\mu$ Pa), measured in decibels at 1 metre distance. <b>(dual-number declaration)</b>	105 $\pm$ 6
<p>The values were determined in accordance with the sound test code in EN 791 based on the basic standards ISO 3744, ISO 11201 and ISO 11203 (at 1 metre distance, free field, remote control, service) and ISO 2631-1.</p> <p><b>Dual-number</b></p> <p>The declared noise emission values are, when they are combined, the sum of measured values and uncertainty. They represent an upper limit of the range, in which measured values are likely to be included.</p> <p><b>Single values</b></p> <p>The sum of a measured value and of the associated uncertainty represents an upper limit of the range, in which measured values are likely to be included.</p> <p><b>Note</b></p> <p><i>The sound power is equivalent to the guaranteed sound power level referred to in 2000/14/EC for drill rigs intended for surface applications.</i></p>	

## Declared Values

These declared values were obtained by testing in accordance with the stated standards and are suitable for comparison with the declared values of other machines tested in accordance with the same standards. These declared values are not adequate for use in risk assessments and values measured in individual work places may be higher. The actual exposure values and risk of harm experienced by an individual user are unique and depend upon the way the user works, reflections from walls, road conditions, as well upon the exposure time and the physical condition of the user.

Atlas Copco cannot be held liable for the consequences of using the declared values, instead of values reflecting the actual exposure, in an individual risk assessment in a work place situation over which Atlas Copco has no control.

This machine can affect health adversely due to whole-body vibration and noise if its use is not handled correctly. An EU Guide on the management of vibration is available in ISO/TR 25398 and hearing protectors in EN 458.

## Safety

### 9. Noise and vibrations

Atlas Copco recommend a programme of health surveillance to detect early symptoms which may relate to vibration and noise exposure, so that management procedures can be modified to help prevent future impairment.

## Risk assessment, noise

### Factors that could reduce the risk from the noise levels:

- Select correct ear protectors or plugs see EN 458.
- Carry out maintenance on the ear protectors regularly (half yearly replacement of seals)
- Goggles and spectacles will reduce effect of the ear protectors use helmet goggles or ear plugs instead.
- Insert the ear plugs properly (wrong size or incorrect insertion can reduce the damping effect).
- Take into account the higher noise level due to acoustic reflections from walls and roof in the calculation. This can be between 1 to 12 dB higher, depending on:
  - if the machine has cabin or canopy
  - the size (height and width) of the mine drift/tunnel
  - The characteristics of the noise source
  - the rock's acoustic absorption factor in the mine/tunnel
  - low-frequency noise levels during the tramming of machines with canopy underground
- Working hours.
- Breaks and quiet areas

### Higher levels of noise than stated in this manual are likely to occur:

- when working underground
- during drilling in harder rock compared to the test site.
- during the removal of drill steel or drill bit by means of percussion drilling.
- during the use of compressed air to clean rock surfaces etc.

### Noise can result in:

- permanent hearing loss
- tinnitus
- fatigue and stress
- balance problems
- poor attention
- impaired ability to communicate
- impaired ability to perceive acoustic signals

### Notes on the combination of noise and other factors:

- Vibration and noise in combination can cause higher health risks.
- Exposure outside working hours could increase the risk of noise injury.
- Sensitive (e.g. pregnant) people and those already with impaired hearing may need protection at lower levels.
- Exposure to ototoxic substances and noise may increase the risk of hearing damage (even under 80 dB). For example; styrene, toluene and xylene, and certain solvent mixtures are ototoxic. Certain fuels such as kerosene and certain metals such as mercury and lead, have also been proven to be potentially ototoxic.

## Risk assessment, vibration

Factors that affect whole-body vibration primarily consist of hardness in the rock, machine anchorage and vibration-related conditions at the local worksite.

For more information about how to combat the vibration levels at your worksite, see ISO/TR 25398.

### **Guideline for reducing vibration levels during use:**

- Use the proper type, size of machine with optional equipment and attachment/tools for the task.
- Drill rigs are not intended for the transport of personnel, use appropriate vehicles for this purpose.
- Keep the ground in good condition:
  - Remove larger stones and obstacles.
  - Fill holes and ditches.
  - Provide machines and schedule times in order to maintain the condition of the terrain.
- Adjust speed and tramming, and choose suitable routes to minimise vibration levels.
  - Reduce speed in rough terrain.
  - Drive around obstacles and uneven ground.
- Minimise vibration during long work shifts:
  - Follow the instructions for drilling method and work area.
  - Adapt the power and rotation energy in order to avoid unnecessary wear on the drill bit.
- Other risk factors may also be cause back pain. They can be reduced by;
  - Make sure there are good seating options and sitting positions at the control station.
  - Provide breaks to reduce long periods of sitting.
  - Avoid jumping from down from the machine.
  - Minimise repeated handling and lifting of heavy objects.

## **Safety**

### 10. Declaration

# **10. Declaration**

## **EC - Declaration of conformity**

### *Note*

*Only applies to rigs delivered within the EU.*

### **Individual machine and safety components**

We, Atlas Copco Rock Drills AB, Örebro, Sweden, declare that the machine to which this declaration relates is in conformity with demands specified in the Council of the European Union Directive 2006/42/EC of 17 May 2006.

### **Other applicable directives**

- 2004/108/EC Electromagnetic Compatibility (EMC)
- 2000/14/EC, Annex V Noise emission in the environment by equipment for use outdoors

### **Harmonised standards which have been applied**

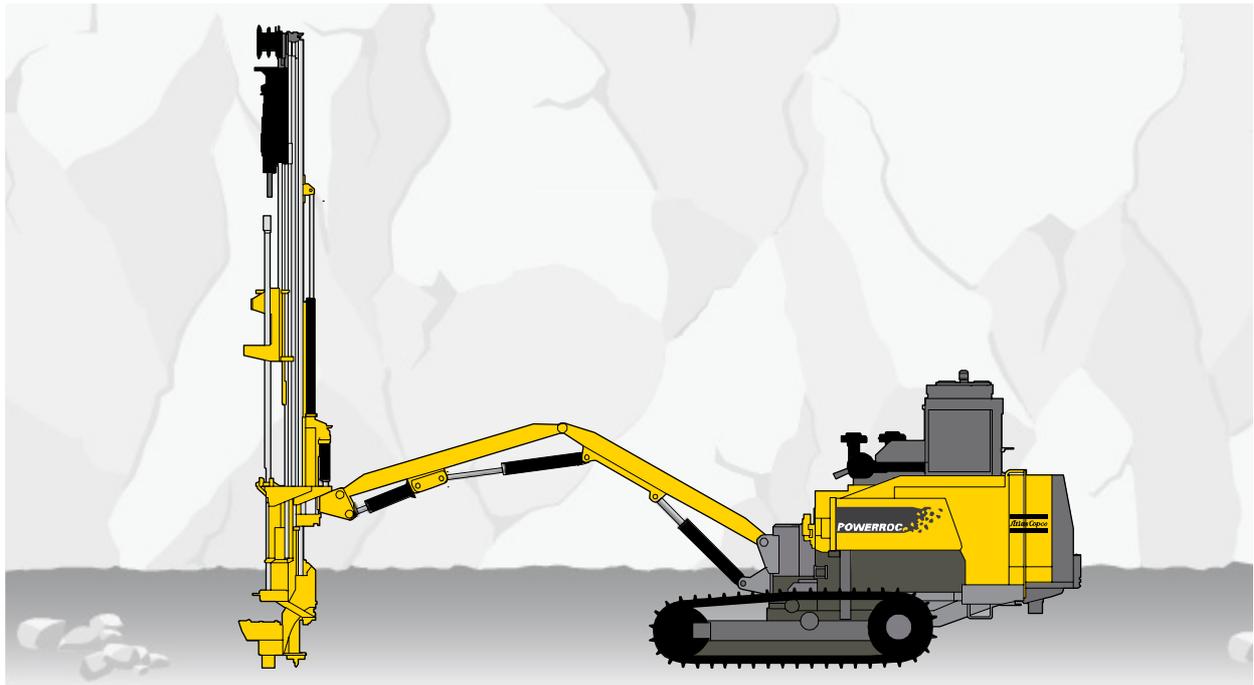
- EN 791 Drill rigs - Safety

### **Issuer**

The issuer's signature, position, place and date of issuance will be found on the original.

# Atlas Copco

## PowerROC T30 E Tier 4 Operator's instructions



## SAFETY INSTRUCTIONS

- Before starting, read all instructions carefully.
- Special attention must be paid to information alongside this symbol.
- Only use genuine Atlas Copco parts.



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**Translation of original instructions.**

**Atlas Copco Rock Drills AB  
SE-70191 Örebro, Sweden**

# Safety

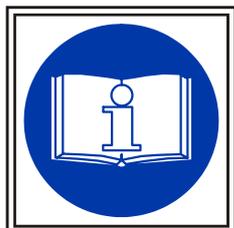
Reference..... 5

## Safety

## Reference

*Note*

*Always read the information in the Safety document before starting to use the rig or starting maintenance work.*



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## Safety

# Operator's instructions

1. General .....	11
Foreword.....	11
Principal components .....	12
General system description.....	13
General rig description .....	13
Wagon frame with track frames.....	14
Power pack.....	15
Boom system .....	15
Dust collector.....	15
Electrical system.....	15
Hydraulic system .....	16
Air system.....	18
Identification of the drill rig .....	18
2. Technical data.....	20
PowerROC T30 E.....	20
Dimensions .....	22
Dimensions (-01) .....	22
Transport dimensions .....	22
Service ranges .....	23
3. Daily checks .....	27
Foreword.....	27
Extra safety check.....	27
Safety .....	27
Checklist .....	29
Before Starting.....	30
Safety .....	30
Drill rig .....	30
Hydraulic oil .....	31
Lubrication.....	31
Engine oil.....	32
Compressor oil.....	33
Functionality test after start .....	33
Emergency stop.....	33
Function test while drilling.....	35
Limit sensors.....	35
Hydraulic hoses to rock drill.....	35
Rock drill .....	36
Diesel control panel .....	36
Dust collector (DCT) .....	36
Drill rig .....	37
Hydraulic oil filter .....	37
4. Control.....	38

## Operator's instructions

Controls .....	38
General.....	38
Pressure gauges I .....	38
Pressure gauges II .....	40
Front control panel.....	41
Electrical control box.....	42
Control lever for rod handling .....	44
Rear control panel.....	45
Diesel panel.....	48
Other controls .....	51
Electric cabinet .....	51
Electrical cabinet for dust collector .....	52
5. Operating.....	53
Diesel engine starting .....	53
Stopping the diesel engine.....	55
Tramming .....	58
Checking after tramming.....	60
Using the winch when tramming.....	61
General.....	62
Preparation .....	63
Tramming up inclines .....	64
Tramming down inclines .....	64
6. Before drilling .....	65
Safety.....	65
Loading the rod carousel .....	65
Setting up for drilling .....	67
Preparations for drilling.....	69
7. Drilling .....	70
Start of drilling.....	70
Checks during drilling .....	71
Removing the coupling sleeve.....	71
Rod adding.....	72
Rod adding with RHS.....	72
Continued drilling.....	74
Unthreading and extracting .....	74
Unthreading and extracting with RHS.....	75
Changing drill bit.....	76
Action in case of drilling problems .....	77
Drilling problems.....	77
High coupling sleeve temperature .....	77
Difficulties in loosening the coupling sleeve.....	78
Hole deflection.....	78
8. Options .....	79
Thread lubrication.....	79

Thread lubrication with brushes .....	79
Function .....	79
Operation.....	80
Adjusting.....	81
Hole Quality System HQS 9.....	81
General.....	81
Specification .....	82
Assembly and basic setting.....	82
Application .....	83
Diagnostics .....	84
ROC-ANGIE .....	84
General.....	84
What is aiming? .....	85
Preparations for assembly.....	86
Assembly .....	86
Conditions.....	86
Adjust ROC-ANGIE to a zero reading.....	87
Installation .....	88
Aiming examples .....	88
Technical data .....	90
Electric filler pump.....	91
Electric pump for filling fuel .....	91

## Operator's instructions

# 1. General

## Foreword

This instruction manual is part of the complete delivery of the drill rig. It provides information on the design and operation of the drill rig and contains advice and the measures necessary to keep the rig operational. This instruction manual is no replacement for thorough training on the drill rig.

This instruction manual should be read in advance by all persons who are to operate or repair the drill rig or carry out maintenance on it.

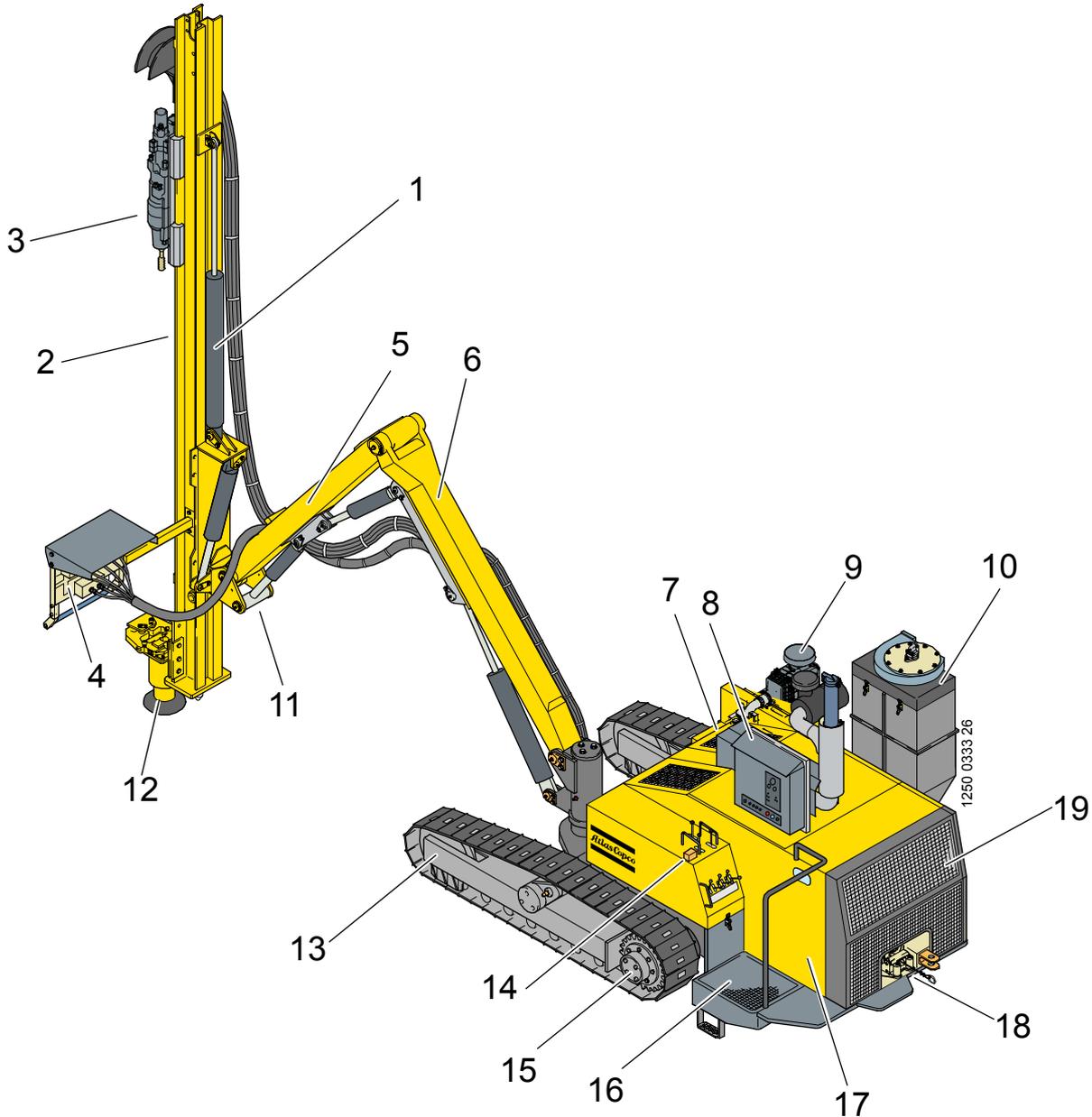
See separate instructions for documentation on the rock drill/rotation unit, the diesel engine and certain other components.

For other questions refer to the local Atlas Copco company office. Addresses and telephone numbers are in the Maintenance instructions.

# Operator's instructions

## 1. General

# Principal components



*Figure: Principal components.*

*Table: Principal components*

Position	Component	Position	Component
1	Feed cylinder	11	Boom head
2	Feeder	12	Drill support
3	Rock drill	13	Track frame
4	Front control panel	14	Rear control panel
5	Outer boom	15	Power Pack
6	Inner boom	16	Operator platform

<b>Position</b>	<b>Component</b>	<b>Position</b>	<b>Component</b>
7	Fuel tank	17	Diesel engine
8	Electrical cabinet with control panel for diesel engine	18	Winch
9	Air filter	19	Compressor
10	Dust collector		

**Note**

*When the rig is equipped with rod handling (optional equipment) the front control panel is fitted on a separate swing arm.*

## **General system description**

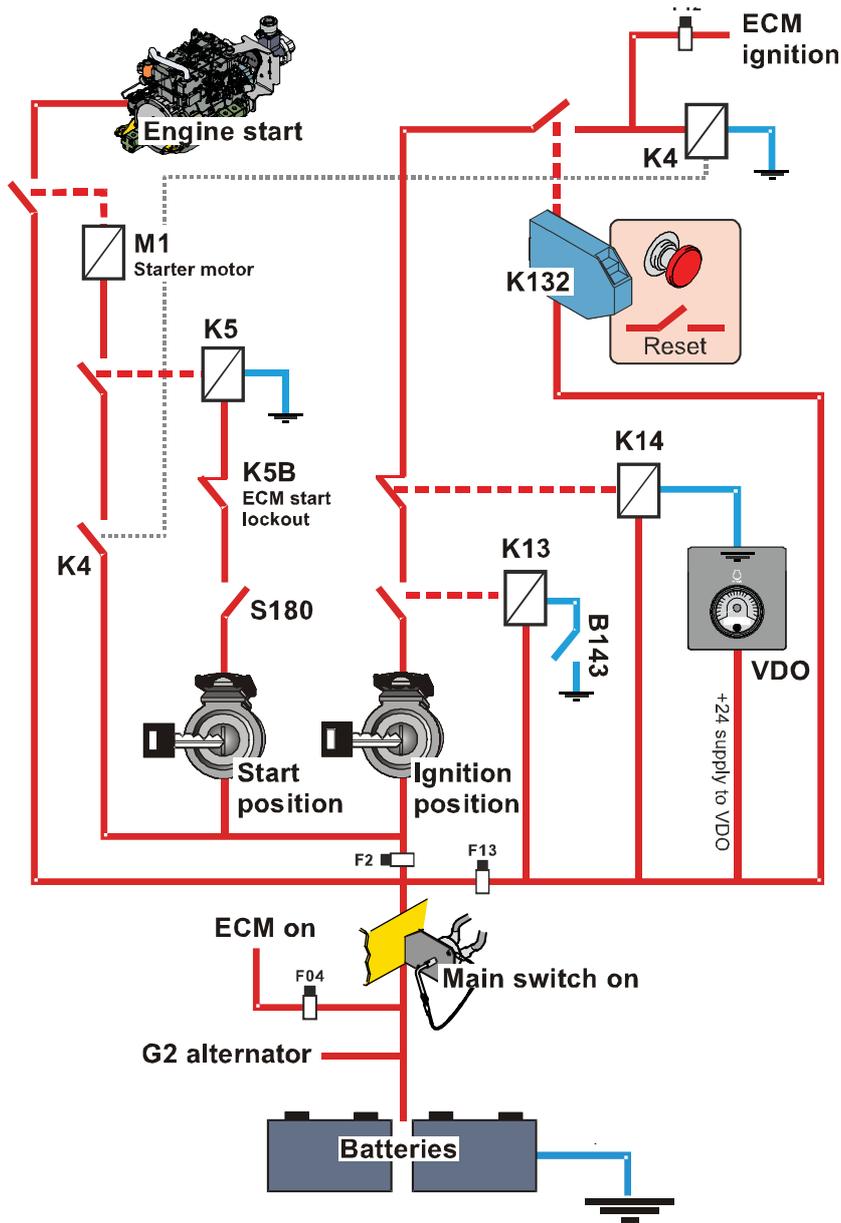
### **General rig description**

The drill rig is a fully diesel-hydraulic rig designed for drilling on surface applications such as stone quarries and construction sites.

The drill rig consists of the following main components: (See illustration under General Description)

# Operator's instructions

## 1. General



*Figure: General Description*

Position	Component
K5	Starter relay
K4	Ignition relay
K132	Safety relay
K13	Relay for hydraulic oil level
K14	Relay for compressor temperature

## Wagon frame with track frames

The diesel engine, chassis, dust collector, hydraulic system, air system and boom system are mounted on the wagon frame.

The chassis frame comprises a frame with the operator's platform mounted on the left-hand side. Controls for tramming are installed on the operator's platform.

The track frames are carried on journals in the wagon frame. When tramming on uneven ground the drill rig is balanced by means of two compensating cylinders.

Each track frame has its own service brake. The brakes are operated by two separate control systems.

The body covers the diesel engine, the compressor, the different lubrication tanks, the valves and the hydraulic hoses. Inspection covers allow easy access to the different machine components.

The dust collector is mounted at the back of the rig on the right-hand side.

## Power pack

This hydraulic drill rig is powered by a turbocharged, water-cooled diesel engine.

The diesel engine is equipped with a monitoring system that includes automatic shut-down functions.

The drill rig is driven by two tramming motors with gears. The tramming motors with gears are mounted in the track frames.

The hydraulic pumps and the compressor are driven by a diesel engine.

## Boom system

The boom system consists of inner/outer boom bodies, boom head, feed holder and associated hydraulic cylinders. The boom system is controlled by directional valves for positioning the feed with the rock drill at different distances and directions.

## Dust collector

The hydraulically driven dust collector features automatic cleaning and consists of a filter unit, pre-separator, suction fan and suction hose.

## Electrical system

The 24 V electrical system is supplied with current by an alternator and two batteries.

The electrical system comprises starting equipment, work lights, electric controls and safety devices.

## Operator's instructions

### 1. General

The emergency stop buttons/cables are connected in series with the diesel engine cut-out system. As soon as an emergency stop button/cable is activated, the diesel engine will be stopped immediately. Reset the emergency stop buttons before restarting the engine. The engine cannot be started while one of the emergency stops is still activated.

For further details, see separate wiring diagram.

For details of the diesel engine, see separate diesel engine instructions.

## Hydraulic system

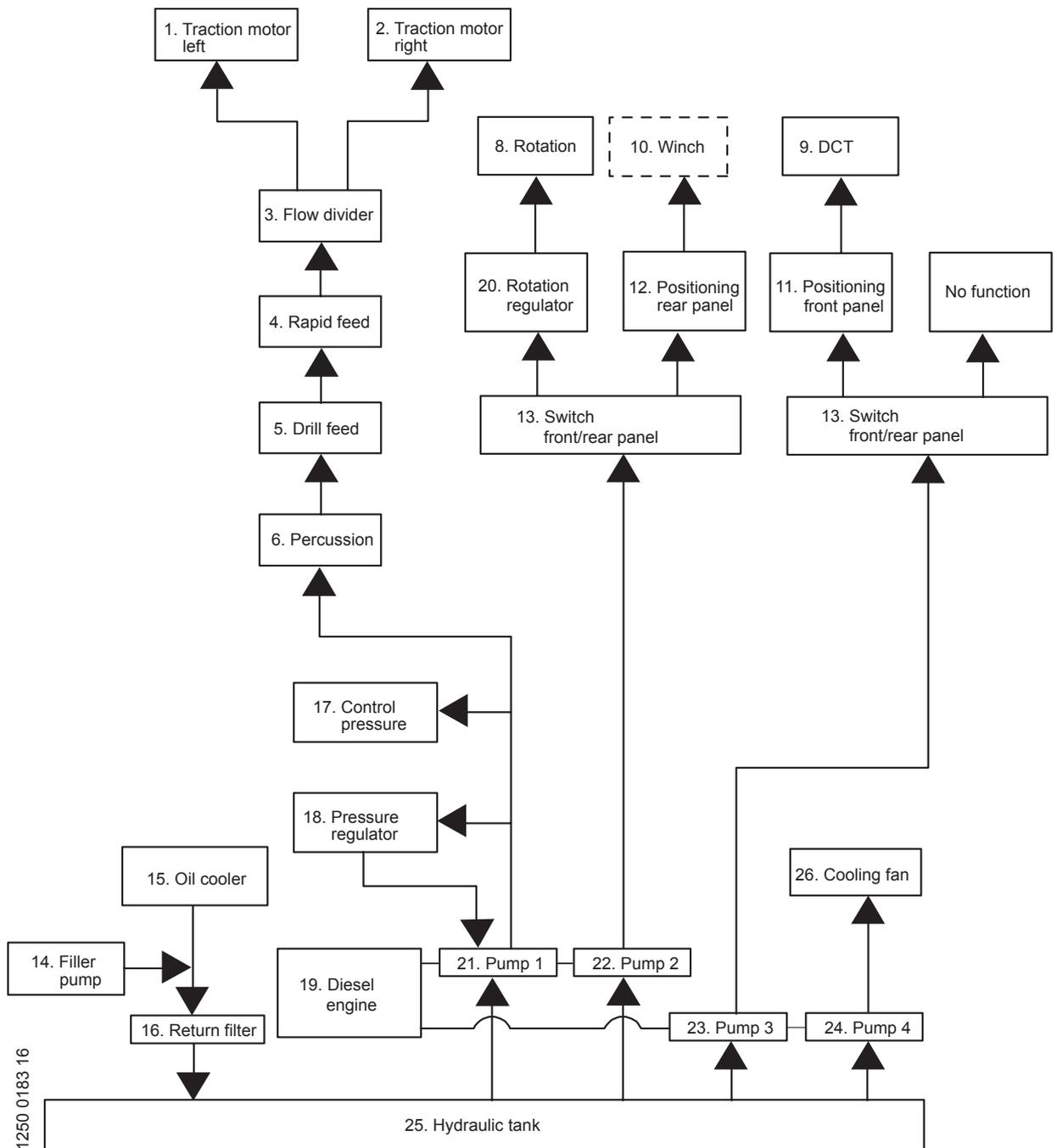
The hydraulic system comprises four hydraulic pumps, oil cooler, hydraulic oil tank, valves, hoses, etc.

The four hydraulic pumps create hydraulic pressure as follows:

### Table: Hydraulic pumps

Pump no.	Description
1	Percussion, tramming, drill feed
2	Rotation, panel selector, winch
3	Cylinder positioning, dust collector
4	Cooling fan

(For further details, see hydraulic system diagram)



*Figure: Block diagram, hydraulic system*

*Table: Hydraulic systems*

1	Tramming motor, left	14	Filler pump
2	Tramming motor, right	15	Filter
3	Flow distributor	16	Return filters
4	Rapid feed	17	Control pressure
5	Drill Feed	18	Pressure control
6	Percussion	19	Diesel engine

## Operator's instructions

### 1. General

7	RPC-F	20	Rotation control
8	Rotation	21	Pump 1
9	DCT (Dust collector)	22	Pump 2
10	Winch	23	Pump 3
11	Positioning, front panel	24	Pump 4
12	Positioning, rear panel	25	Hydraulic Tank
13	Panel selector	26	Cooling fan

## Air system

The air system consists of the compressor with oil separator, hoses and valves. The compressor is belt-driven from the diesel engine.

The compressor element is lubricated by an air-oil mixture. The mixture is separated in the oil separator.

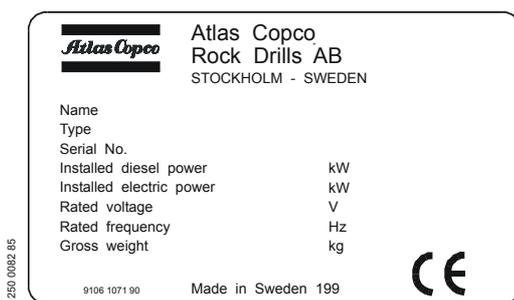
The system delivers air for flushing the borehole, cleaning the dust collector filter and to the rock drill lubrication system (ECL).

Pump configuration, see separate instructions

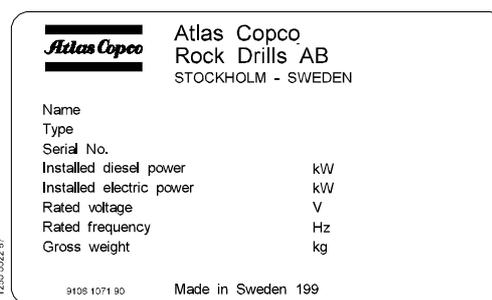
## Identification of the drill rig

Data plates are affixed to the front part of the chassis frame and the right-hand side of the boom support.

Table:



*Figure: Data plate for CE approved rig*



*Figure: Data plate for non-CE approved rig*

- They contain the following information:
  - Address
  - Type of drill rig
  - Serial number
  - Installed power
  - Total weight of drill rig

- CE marking if applicable

## 2. Technical data

### PowerROC T30 E

#### Weight (standard equipped without drill steel and optional equipment)

PowerROC T30 E	
Weight with RHS and counterweights	11500 kg
Winch	280 kg

#### Performance

Diesel engine, Cummins QSB 4.5 Tier 4	
power output at 2000 rpm	116 kW
Temperature range in operation	-25 °C to +50 °C
Tramming speed, max.	1,1/3,1 km/h
Thrust	95/37 kN
Ground pressure, average	0.15 N/mm <sup>2</sup>
Ground clearance	340 mm
Max. hydraulic pressure	230 bar
Track oscillation	±15°
Noise level	
Idling (800 rpm)	97 dB(A)
Full engine speed (2000 rpm)	106 dB(A)
Drilling (2000 rpm)	124 dB(A)
LWA (guaranteed value in accordance with 2000/14/EC)	128 dB(A)

#### Inclination angles

##### *Note*

*Stability is specified with respect to CE standards stipulating that rigs must not be operated on inclinations steeper than 20 degrees without the use of a winch.*

Inclination angles - tramming	
downward/upward, max. without winch	20°/20°
downward/upward, max. with winch	30°/30°
laterally, max.	20°/20°
Inclination angles for drill rig when drilling:	
longitudinally, max. (Upward/Downward)	20°/20°
Lateral (left/right)	4°/10°

**Hydraulic systems**

Hydraulic oil cooler for max. ambient temperature +50°C

**Electrical system**

Voltage 24 V  
Batteries  
Voltage 2 x 12 V/185 Ah  
Working lights  
Voltage 24 V/70W  
Alternator  
Voltage 28V/55Ah

**Air system**

Compressor: XA 70  
Max. air pressure 8.5 bar  
Free air delivery at 7 bar 95 l/s  
Working pressure 7 bar

**Capacities**

Hydraulic oil reservoir 200 l  
Hydraulic systems  
total 250 l  
Fuel tank 270 l  
Traction gear 3 l  
Compressor oil 20 l  
Lubricating oil tank 10 l  
Diesel engine 11 l  
Engine cooling system 31 l

**Others**

Fire extinguisher  
A-B-C powder 1 x 6 kg

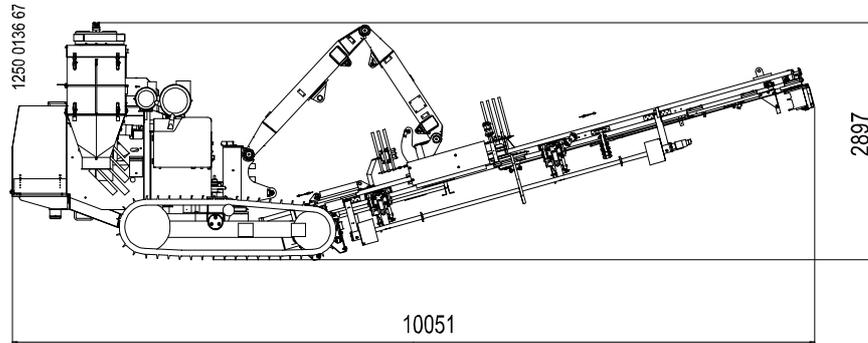
# Operator's instructions

## 2. Technical data

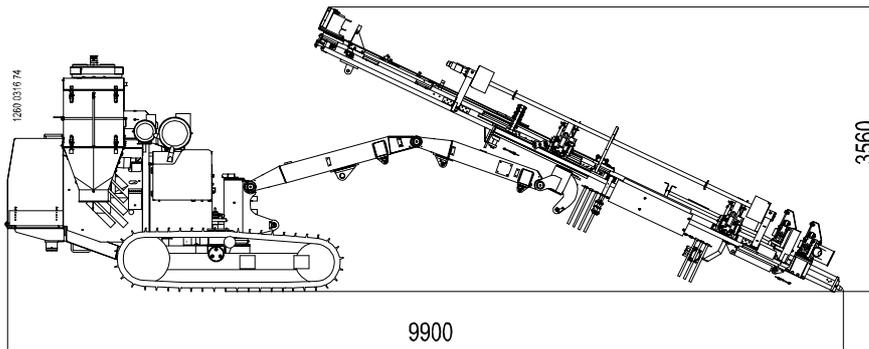
# Dimensions

## Dimensions (-01)

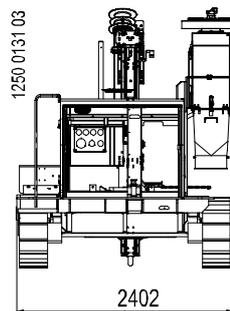
### Transport dimensions



*Figure: Transport alternative 1*

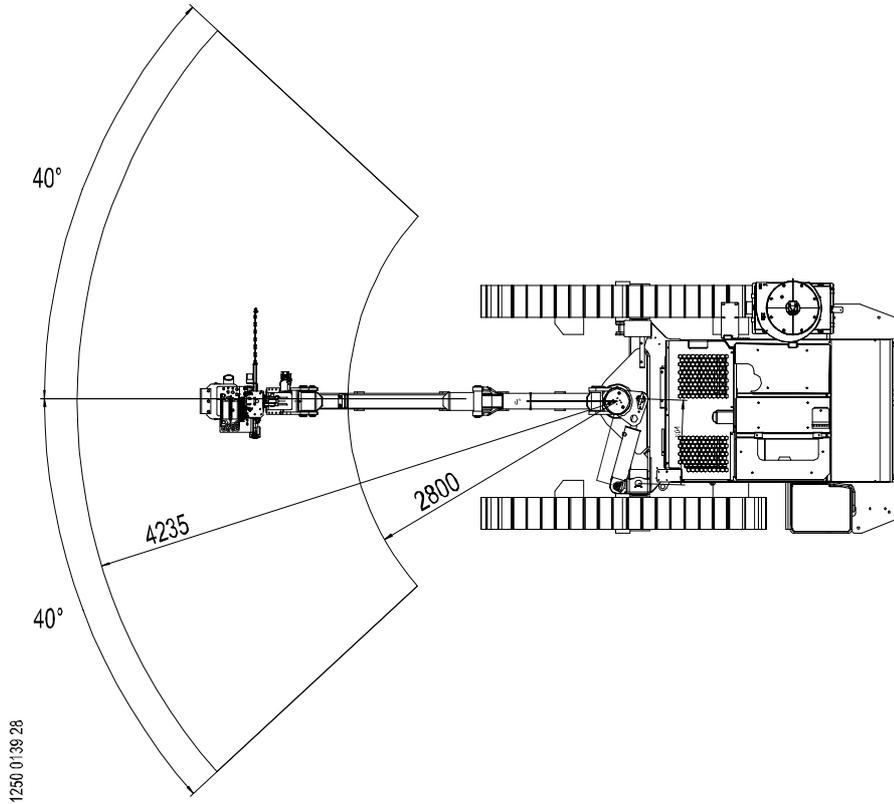


*Figure: Transport alternative 2*



*Figure:*

Service ranges

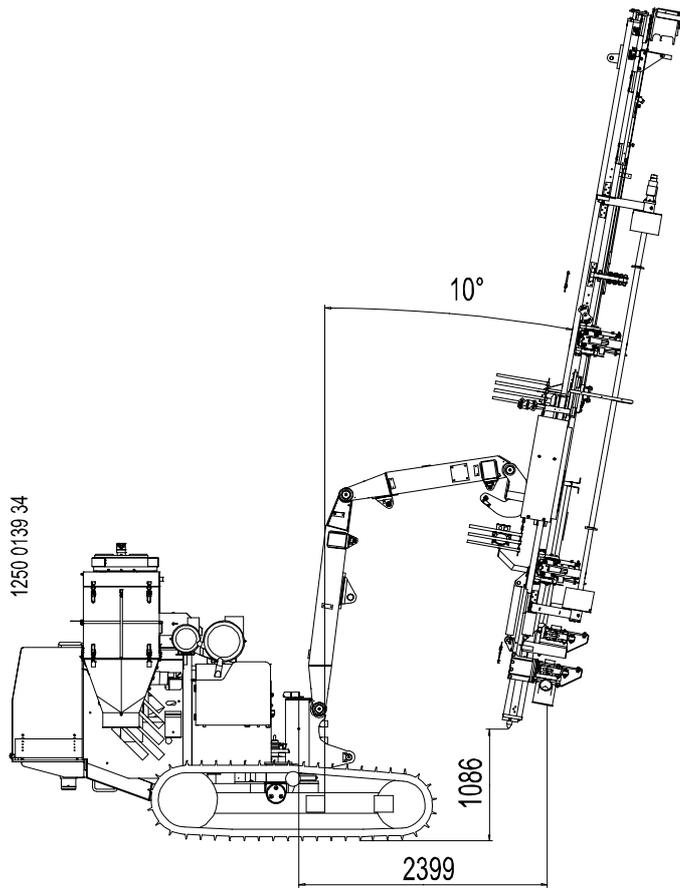


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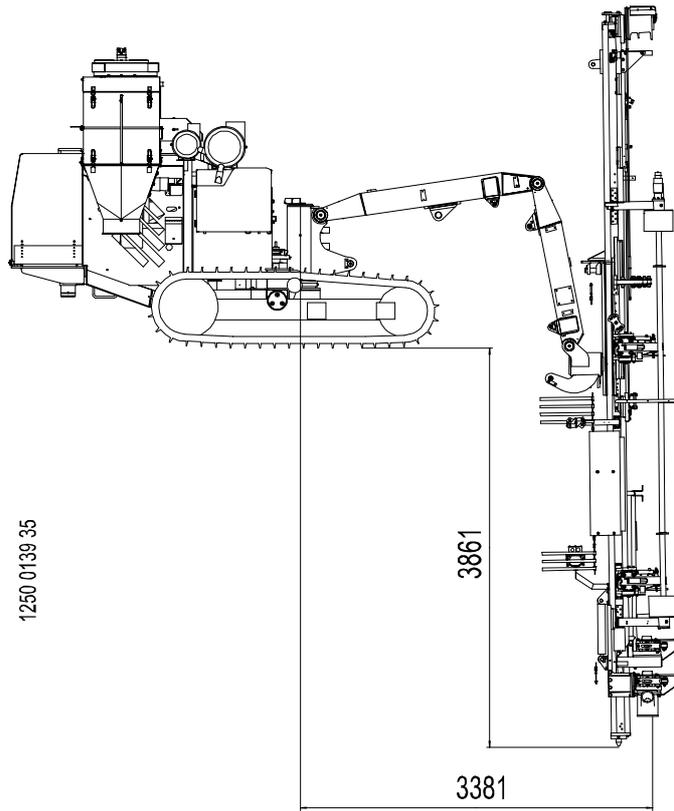
*Figure:*

# Operator's instructions

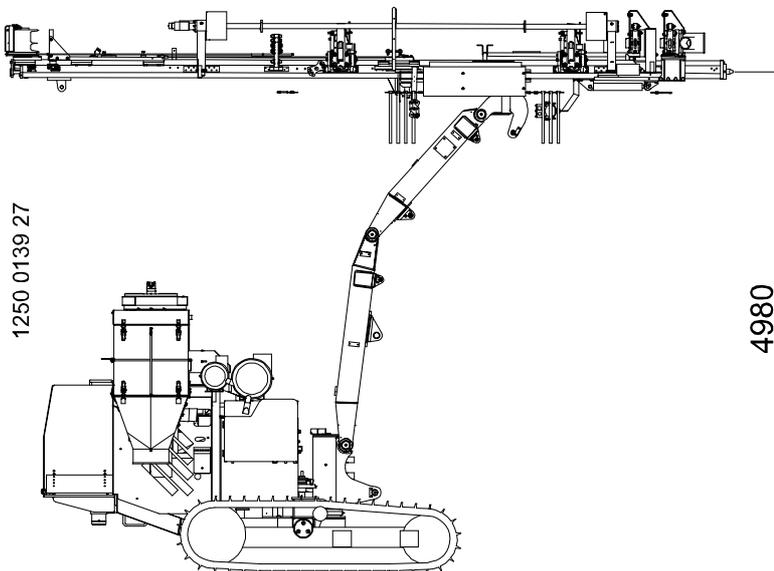
## 2. Technical data



*Figure:*



*Figure:*



*Figure:*

# Operator's instructions

## 2. Technical data

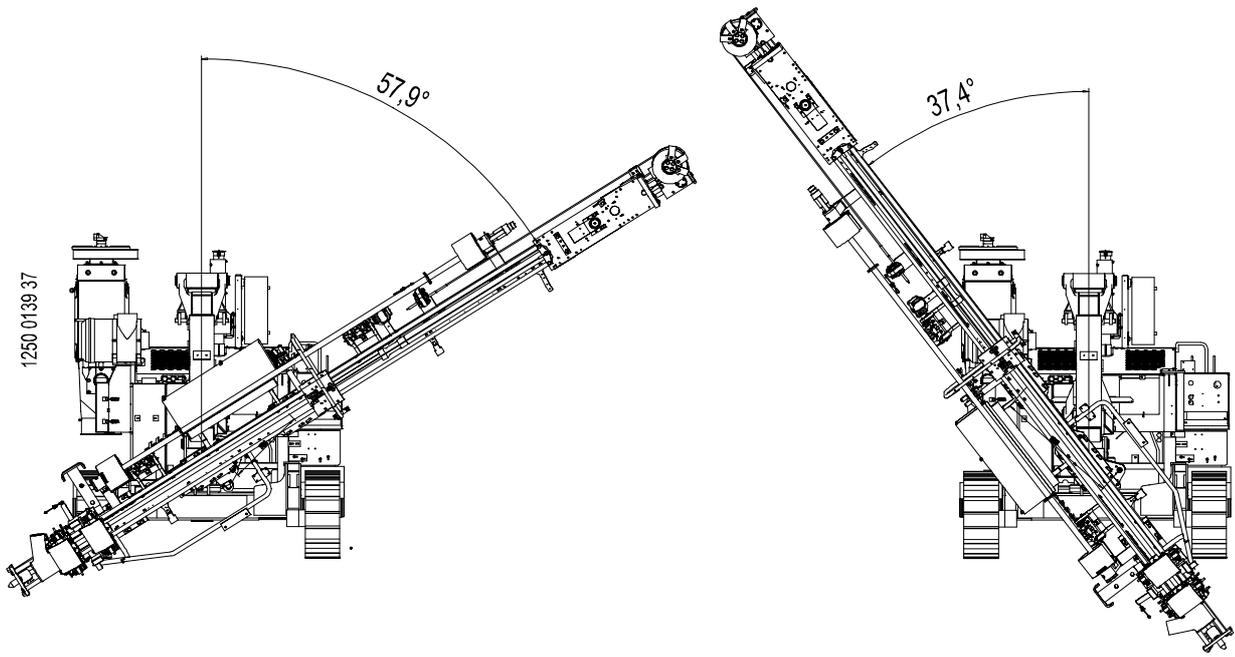


Figure:

## 3. Daily checks

### Foreword

This chapter provides instructions for daily inspection and maintenance to be carried out by the operator before each shift.

Regarding weekly inspections and other maintenance tasks, see separate instructions "Maintenance schedules".

### Extra safety check

#### Safety

 <b>DANGER</b>
<ul style="list-style-type: none"><li>• <b>Danger of moving parts</b></li><li>• <b>Risk of serious personal injury</b></li><li>• <b>Set all levers and switches in neutral position before preparing start-up</b></li><li>• <b>Perform the extra safety check without the engine running</b></li></ul>

 <b>DANGER</b>
<ul style="list-style-type: none"><li>• <b>The side hatches on the drill rig are not dimensioned for extra weight</b></li><li>• <b>Risk of serious personal injury</b></li><li>• <b>Standing, sitting or leaning on the side hatches can result in serious injury</b></li><li>• <b>The side hatches must be closed when work is carried out on top of the rig</b></li></ul>

## **Operator's instructions**

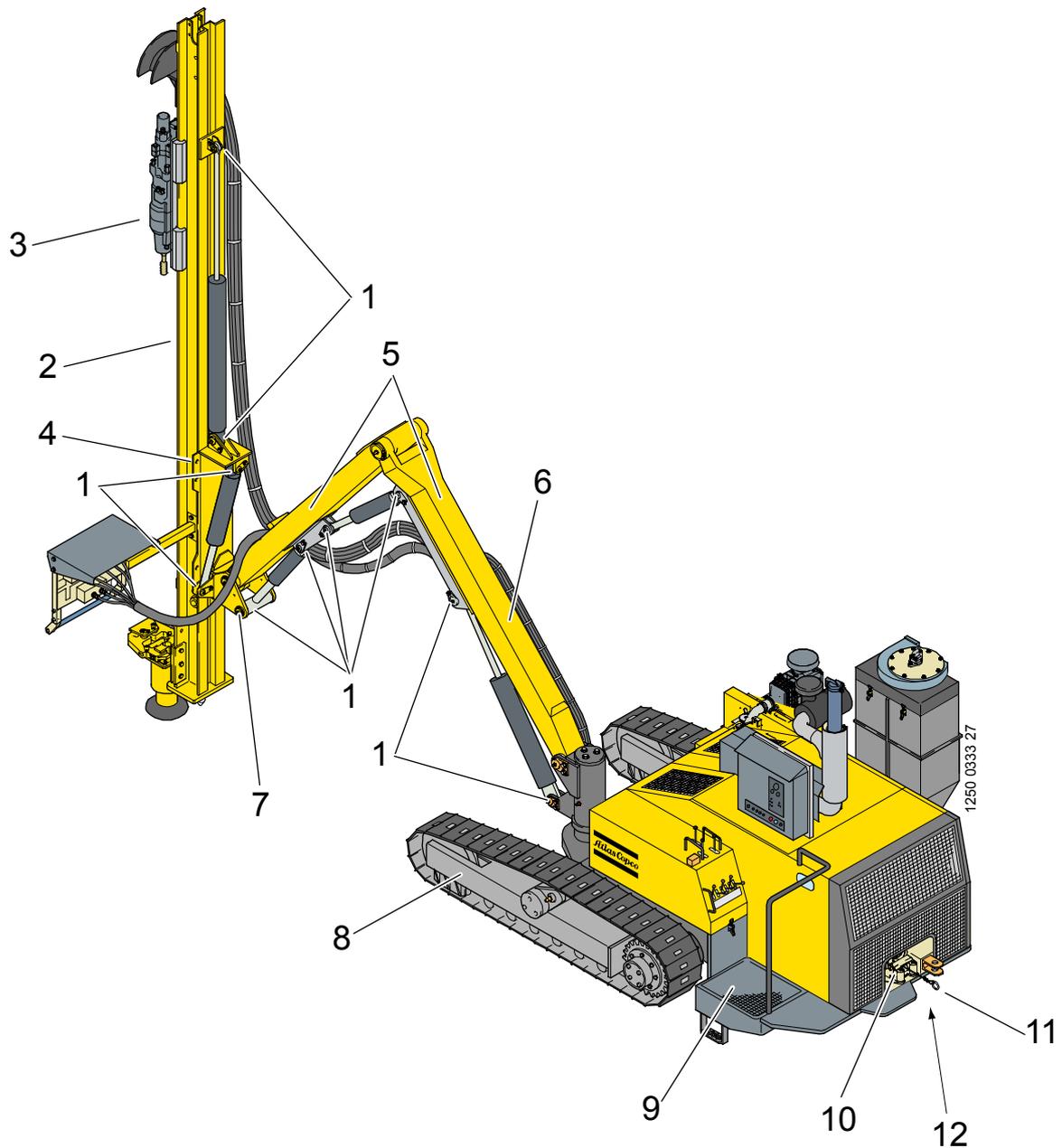
### 3. Daily checks

Before each shift starts an extra and thorough visual safety check should be carried out in order to detect:

- Damage that could give rise to structural weakness or cracks.
- Wear that could have the same consequences.
- Cracks or fractures in materials or welded joints.

If the drill rig has been subjected to abnormally high stresses, vital load-bearing components may have been damaged. From a safety viewpoint, it is therefore especially important to check the following points (see illustration: Check points).

## Checklist



*Figure: Check points.*

*Table: Checklist*

Position	Component	Position	Component
1	Cylinder mountings	8	Track frames with attachments
2	Feed wire with attachments	9	Operator platform with attachments
3	Rock drill with cradle	10	Winch with brackets
4	Feed holder with brackets	11	Winch
5	Boom	12	Jack

## Operator's instructions

### 3. Daily checks

Position	Component	Position	Component
6	Boom bracket with pin	*	All emergency stops
7	Boom head		

## Before Starting

### Safety

 **WARNING**

- **Danger of moving parts**
- **Can cause serious personal injury**
- **Set all levers and switches in NEUTRAL position before start-up preparations**
- **Carry out the procedures with the engine switched off**

 **WARNING**

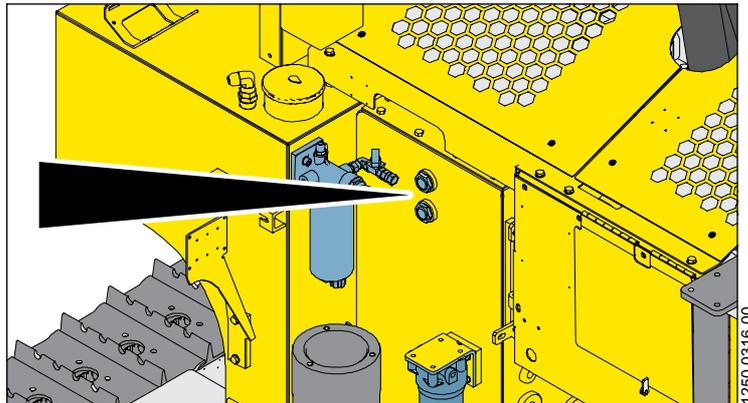
- **Dangerous compressed air**
- **Can cause serious injury**
- **Release the pressure in the tank before removing the filler plug**

### Drill rig.

*Table: Drill rig.*

Check point	Inspection	Instructions
Drill rig.	Visual check	Check for any signs of leaks, damage, breakage or cracks.

## Hydraulic oil

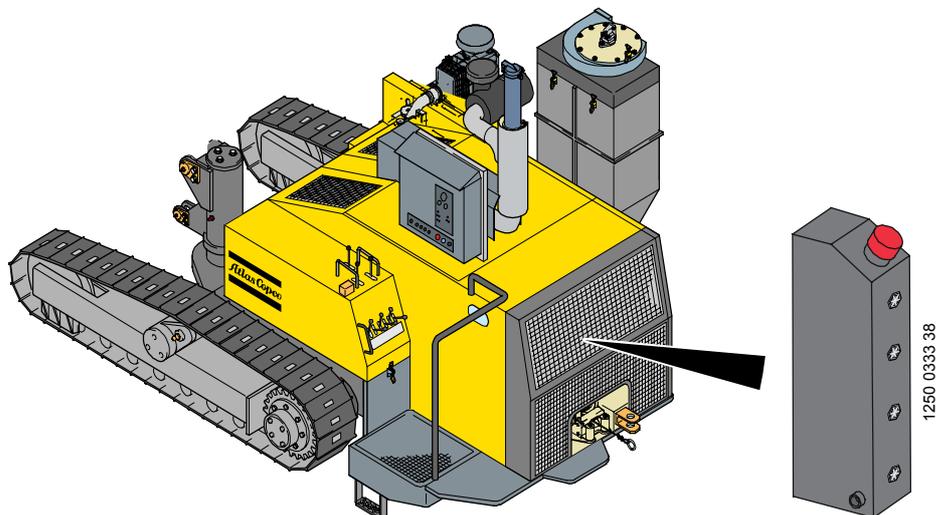


*Figure: Hydraulic oil reservoir*

*Table: Hydraulic oil reservoir.*

Check point	Inspection	Instructions
Hydraulic oil	Oil level	Top up as necessary. See Maintenance Instructions; Oils.
Hydraulic oil	Leakage	Check leakage at the tank and pumps.

## Lubrication



*Figure: Lubricating oil tank.*

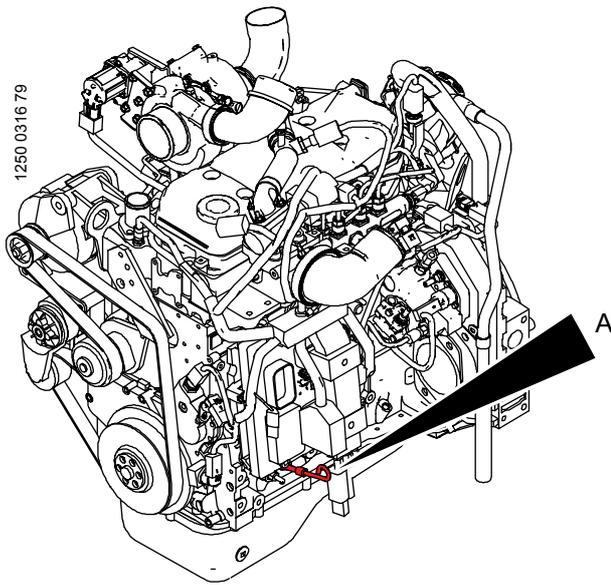
*Table: Lubricating oil tank.*

Check point	Inspection	Instructions
Lubrication	Oil level	Top up as necessary. See Maintenance Instructions; Oils.

## Operator's instructions

### 3. Daily checks

## Engine oil

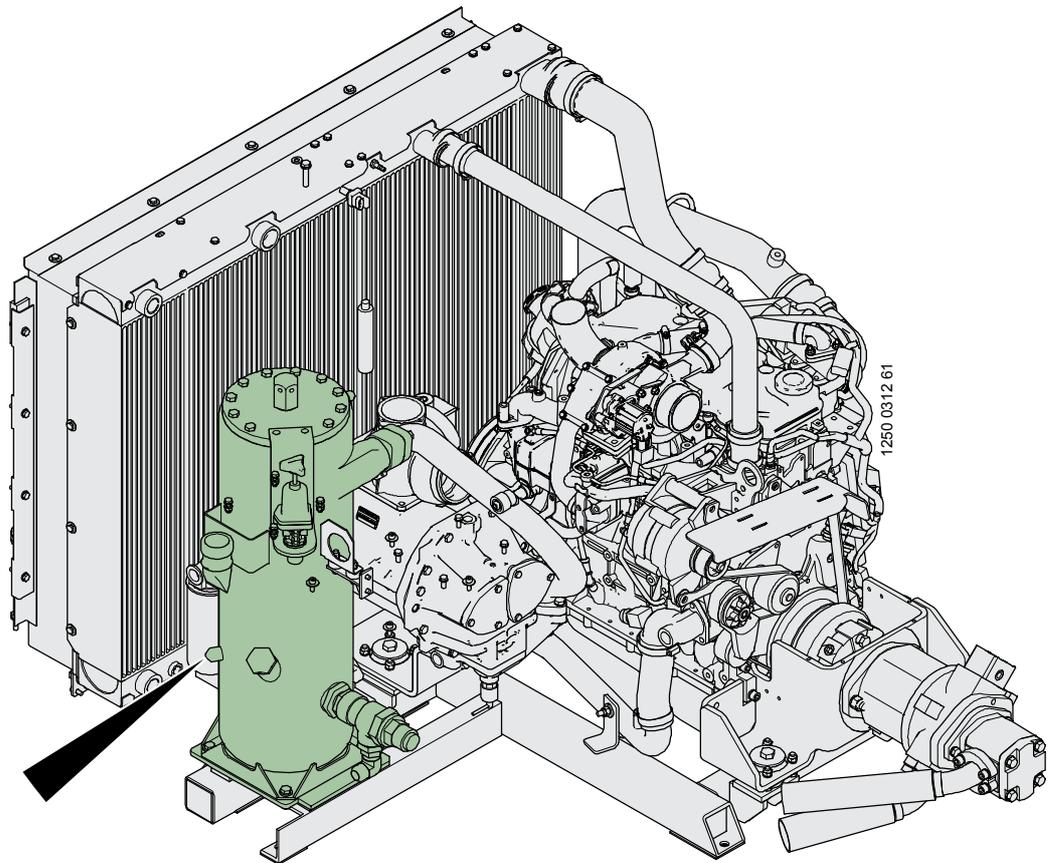


*Figure: Diesel engine.*

*Table: Diesel engine.*

Check point	Inspection	Instructions
Engine oil	Oil level (A)	Top up as necessary. See Maintenance Instructions; Oils.
Engine oil	Engine	Check for leaks.

## Compressor oil



*Figure: Compressor air tank.*

*Table: Compressor.*

Check point	Inspection	Instructions
Compressor oil	Oil level	Top up as necessary. See Maintenance Instructions; Oils.

## Functionality test after start

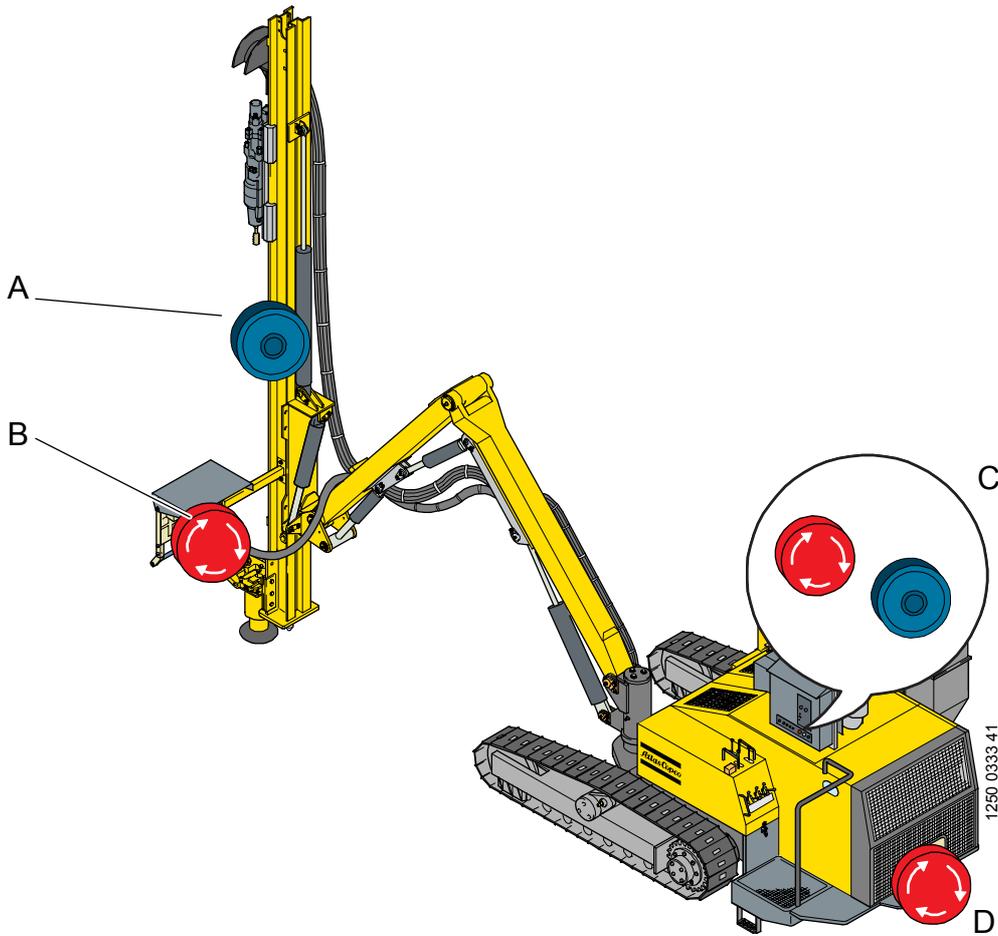
### Emergency stop

*Note*

*The emergency stop buttons and the emergency stop bar must be checked before each shift and after tramping.*

# Operator's instructions

## 3. Daily checks



*Figure: Emergency stop*

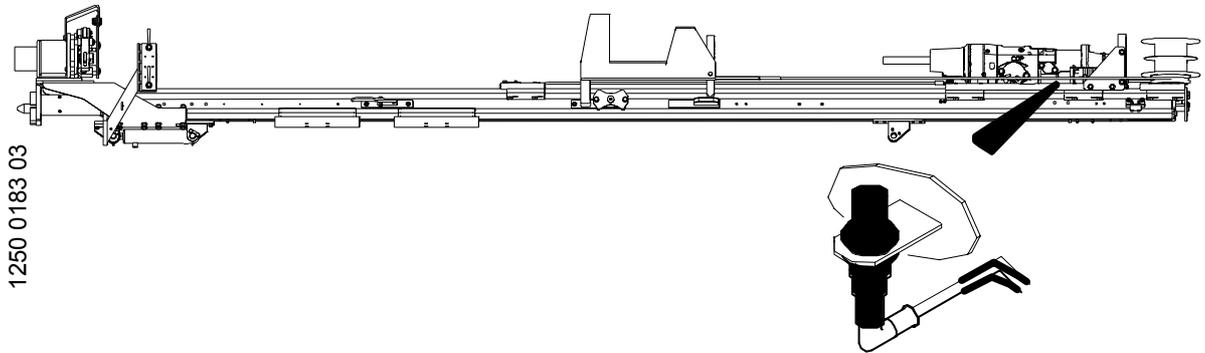
- A Reset button and emergency stop cable on feeder
- B Emergency stop button on front control panel
- C Emergency stop button and reset button on diesel panel
- D Emergency stop button on winch

*Table: Emergency stop.*

Check point	Inspection	Instructions
Emergency stop	Function	Check each emergency stop button individually. The engine must stop! The previous emergency stop must always be reset before restarting and checking the next one.

# Function test while drilling

## Limit sensors



*Figure: Limit sensors.*

*Table: Limit sensors.*

Check point	Inspection	Instructions
Limit position sensors (all)	Function	The cradle must stop level with the limit position sensor.

## Hydraulic hoses to rock drill

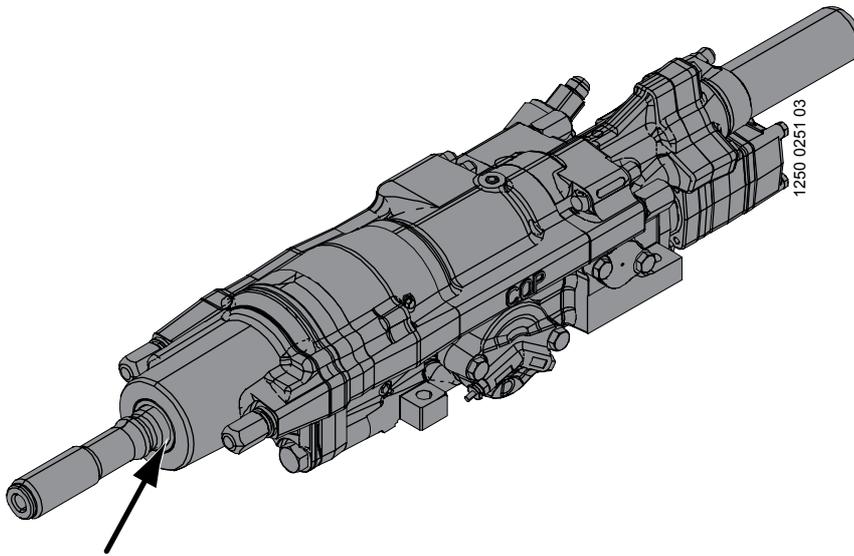
*Table: Hydraulic hoses.*

Check point	Inspection	Instructions
Hydraulic hoses to rock drill.	Abnormal vibration in hydraulic hoses.	Check the accumulator. For further details see "Maintenance instructions" for the rock drill".

## Operator's instructions

### 3. Daily checks

## Rock drill



*Figure: Rock drill.*

*Table: Rock drill.*

Check point	Inspection	Instructions
Rock drill	Visual check	Make sure that oil trickles out between the front and the shank adapter.

## Diesel control panel

*Table: Diesel control panel.*

Check point	Inspection	Instructions
Diesel control panel	Visual check	Check that no fault indicator lamp is on. In the event of a fault indication, stop the rig and rectify the fault.

## Dust collector (DCT)

*Table: Dust collector (DCT).*

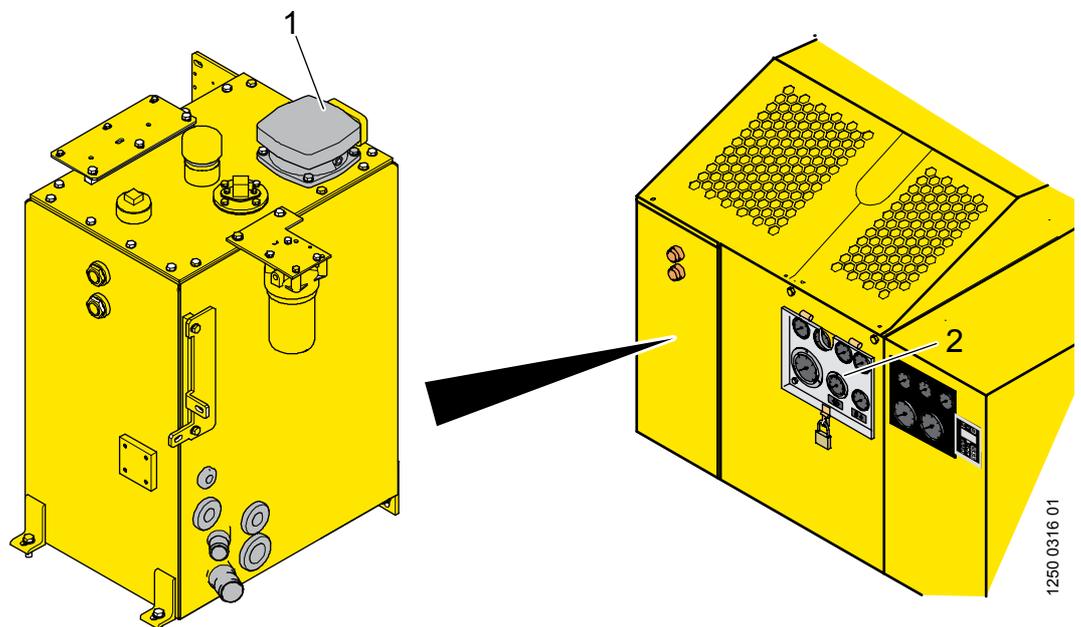
Check point	Inspection	Instructions
Dust collector (DCT)	Suction ability and filter cleaning	In case of dust formation: Check the filter in the filter holder and suction hose and also the drill steel support's drill gasket.

## Drill rig

*Table: Drill rig.*

Check point	Inspection	Instructions
Drill rig	Visual check	Look for any signs of leaks. -Hydraulic systems -Fuel system -Cooling system -Compressor

## Hydraulic oil filter



*Figure: Hydraulic oil filter and manometer.*

*Table: Hydraulic oil filter.*

Check point	Inspection	Instructions
Hydraulic oil filter (1)	Visual check	If the needle on the <b>return oil filter pressure</b> gauge (2) is in the red, the filter must be changed. Call a service technician.

### **Note**

*The return oil filter pressure gauge (2) is only reliable when the oil has reached a temperature of at least 40 °C (104 °F)*

## Operator's instructions

### 4. Control

# 4. Control

## Controls

### General

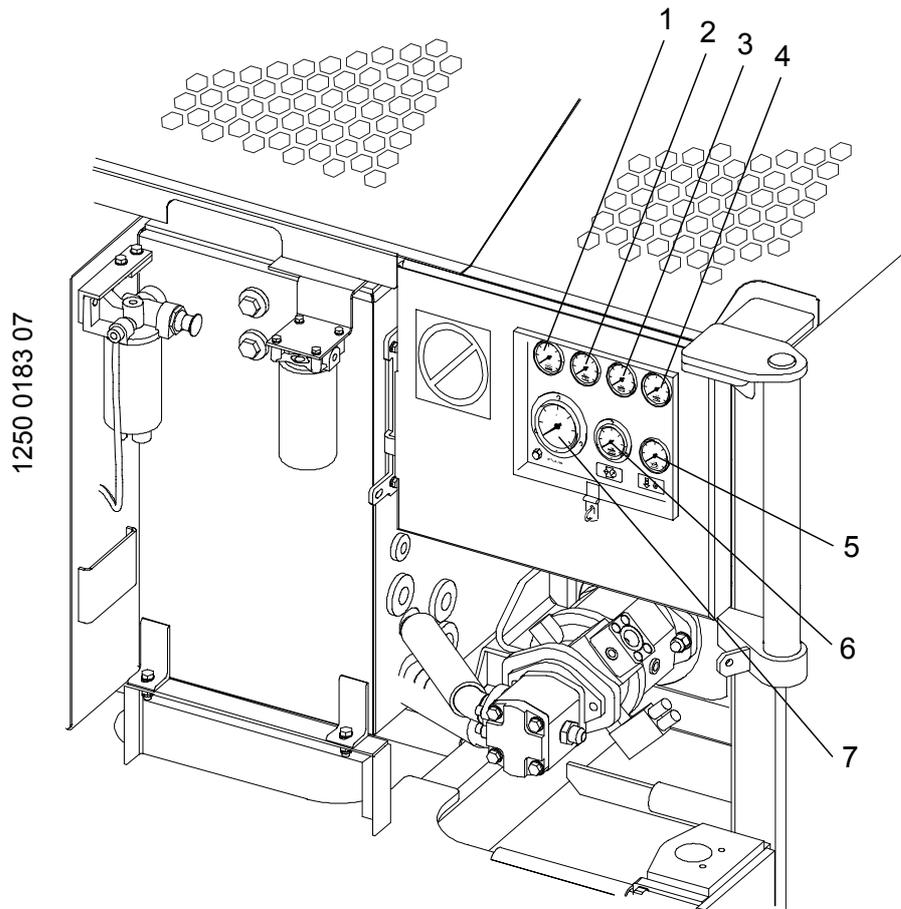
*Table: Overview.*

- 1 Pressure gauges
- 2 Front control panel
- 3 Rear control panel
- 4 Electrical cabinet with diesel panel

### Pressure gauges I

*Note*

*The pressure gauges must be checked during drilling.*



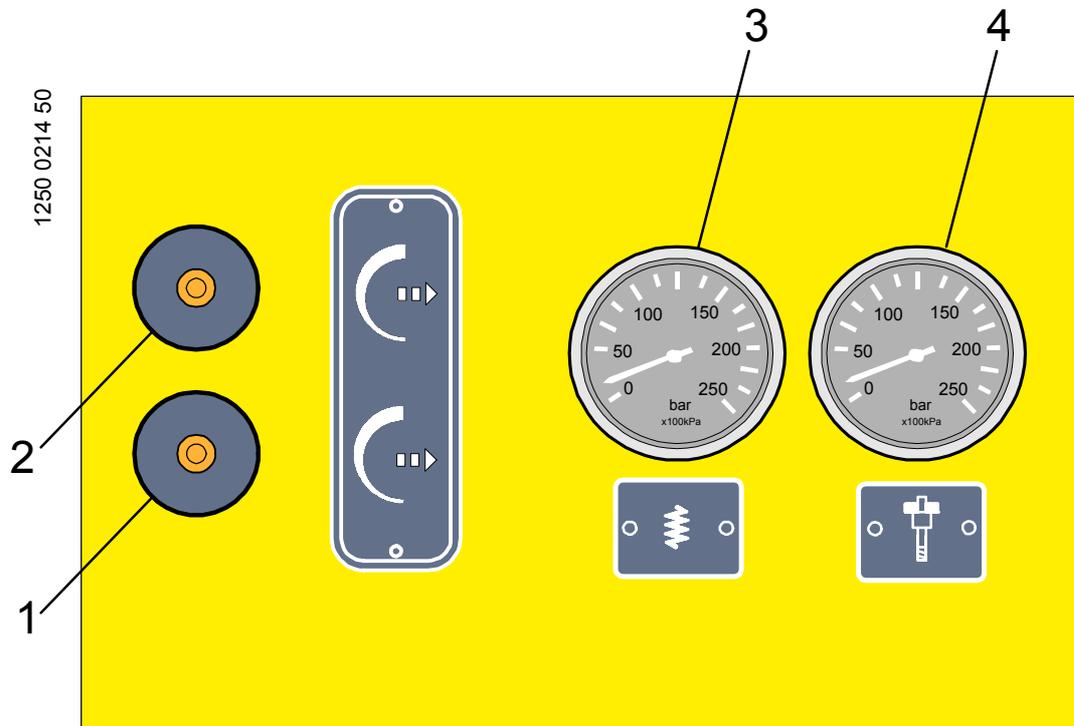
*Figure: Pressure gauge panel*

- 1 Pump pressure, pump 1  
(Percussion, traction motors, feeder and control pressure too high, and low speed to traction motor)
- 2 Pump pressure, pump 2  
(Rotation motor, panel selector and winch)
- 3 Pump pressure, pump 3  
(Dust collector motor, positioning cylinders and rod handling)
- 4 Pump pressure, pump 4 (cooling fan)
- 5 Hydraulic Oil Temp
- 6 Pressure, return oil filter
- 7 ECL pressure

## Operator's instructions

### 4. Control

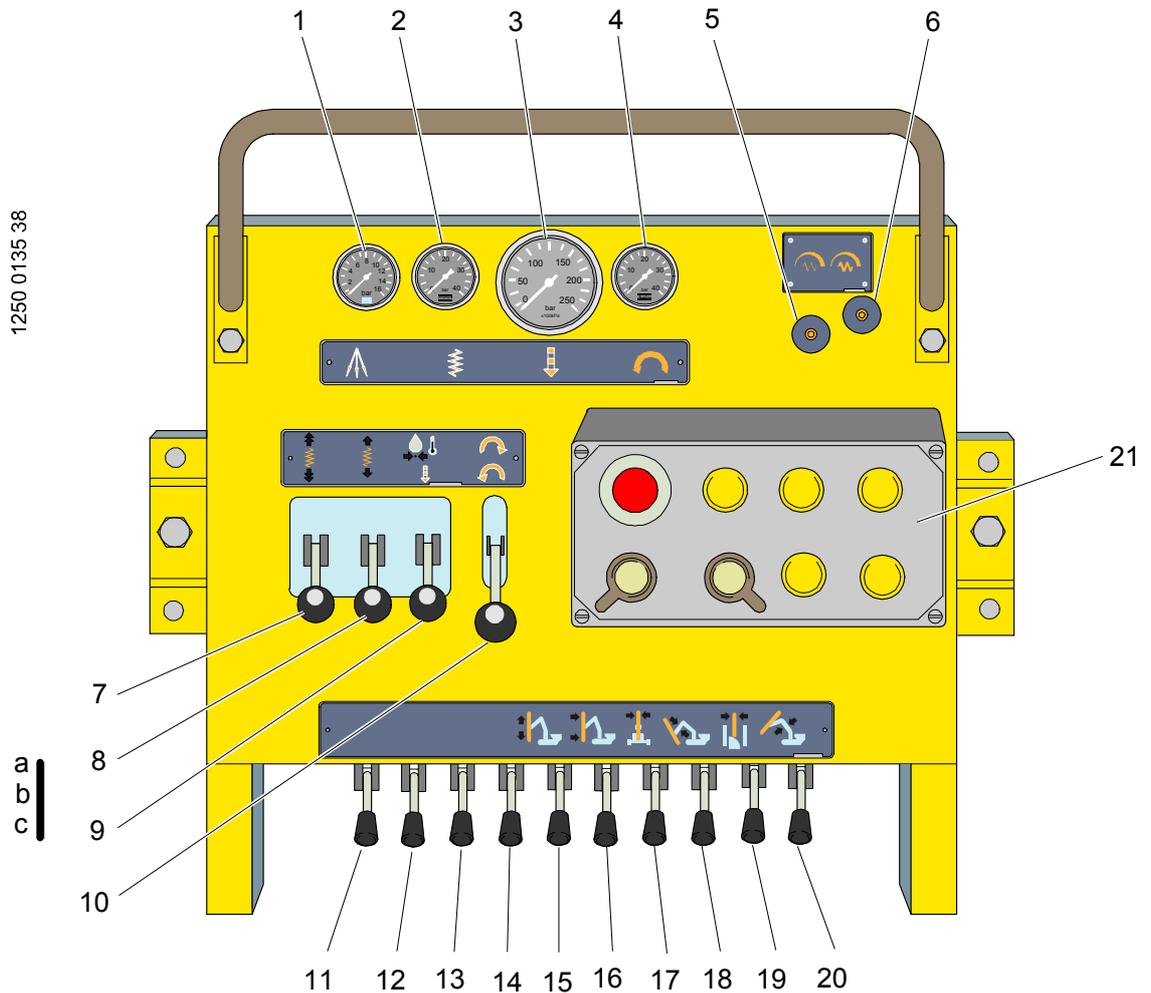
## Pressure gauges II



*Figure: Pressure gauge panel*

- 1 Regulation of high percussion pressure
- 2 Regulation of low percussion pressure
- 3 Feed pressure (only for COP 1640)
- 4 Damper pressure (only for COP 1640)

## Front control panel



*Figure: Front control panel*

*Table: Front control panel*

- 1 Pressure gauge, flushing air pressure
- 2 Drill feed pressure gauge
- 3 Percussion pressure gauge
- 4 Rotation pressure gauge
  
- 5 Pressure valve, low drill feed pressure
  - a LOWER (anticlockwise)
  - b RAISE (clockwise)
- 6 Pressure valve, high drill feed pressure
  - a LOWER (anticlockwise)
  - b RAISE (clockwise)

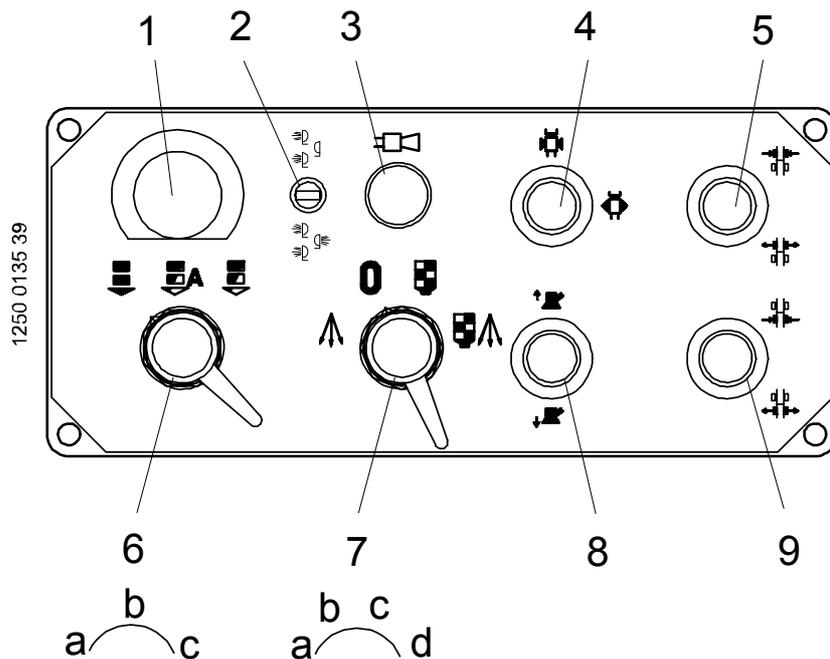
## Operator's instructions

### 4. Control

- 7 Rapid feed
  - a UP
  - b NEUTRAL
  - c DOWN
- 8 Feed
  - a RETURN FEED
  - b NEUTRAL
  - c DRILL FEED
- 9 Percussion mechanism
  - a HEATING (hydraulic oil)
  - b NEUTRAL
  - c PERCUSSION MECHANISM
- 10 Rotation
  - a BACKWARD ROTATION (clockwise)
  - b NEUTRAL
  - c DRILL ROTATION (anticlockwise)
- 11 Not used
- 12 Not used
- 13 Swing arm, front control panel (optional equipment with RAS)
- 14 Not used
- 15 Feed extension
- 16 Feed dump
- 17 Feed tilt
- 18 Boom extension
- 19 Boom tilt
- 20 Boom lift
- 21 Electrical control box

## Electrical control box

The electrical control box is fitted on the front control panel.



*Figure: Electrical control box*

*Table: Electrical control box*

- 1 Emergency stop
- 2 Work lights
- 3 Signal Horn
- 4 Sleeve retainer, closing/opening
- 5 Upper drill steel support, closing/opening (only with RAS)
  
- 6 Switch, percussion pressure
  - a FULL PERCUSSION PRESSURE/DRILL FEED PRESSURE
  - b AUTOMATIC CONTROL OF PERCUSSION PRESSURE (normal drilling conditions)
  - c REDUCED PERCUSSION PRESSURE/DRILL FEED PRESSURE (used when collaring)
  
- 7 Switch, dust collector and flushing air
  - a FLUSHING AIR ON (device for screw-cutting oil activated when water flushes up out of the hole)
  - b ZERO (filter cleaning on/flushing air off/device for screw-cutting oil off/dust collector off/threading on)
  - c DUST COLLECTOR ON
  - d DUST COLLECTOR ON/FLUSHING AIR ON (device for screw-cutting oil activated)
  
- 8 Suction hood, up/down

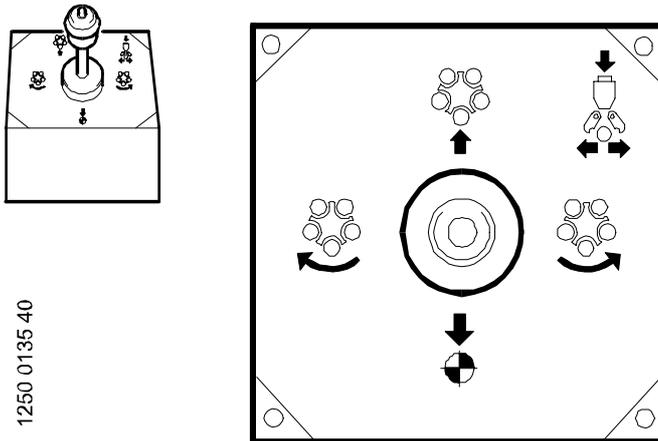
## Operator's instructions

### 4. Control

#### 9 Lower drill steel support, closing/opening

## Control lever for rod handling

The control lever is fitted on a separate box located on the right-hand side of the front control panel.



*Figure: Control lever for rod handling*

*Table: Control lever for rod handling*

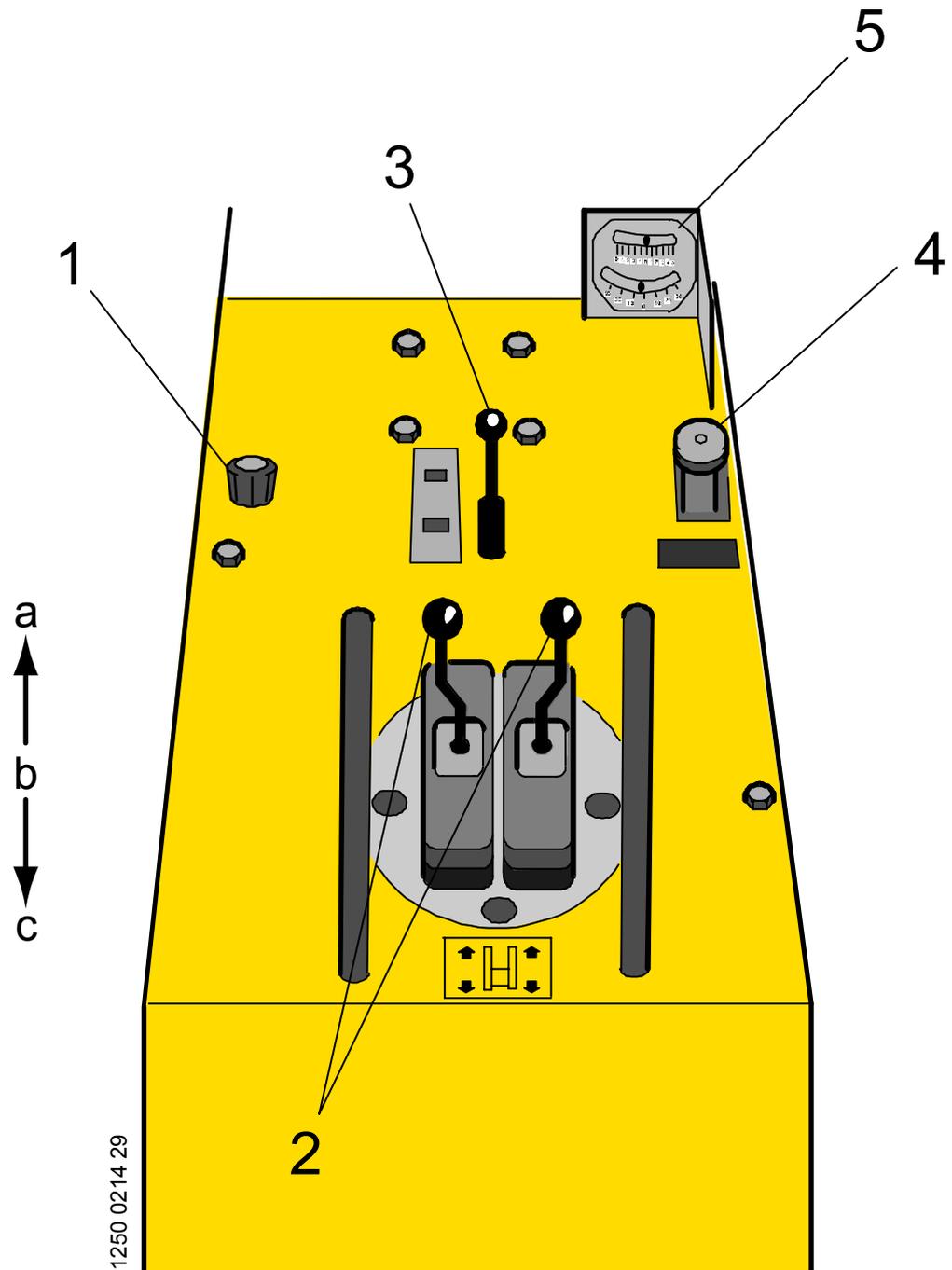
#### Lever positions

Centre	NEUTRAL POSITION/LOOSE GRIP
Front	ARM TO MAGAZINE
Rear	ARM TO DRILL CENTRE/HARD GRIP
Left	ROTATE CAROUSEL CLOCKWISE
Right	ROTATE CAROUSEL ANTICLOCKWISE

#### Top contact

Depressed	OPEN GRIPPER
Not depressed	CLOSED GRIPPER

## Rear control panel



*Figure: Rear control panel, operating controls*

# Operator's instructions

## 4. Control

Table: Rear control panel, operating controls

- 1 Knob, propulsion speed (changes volume to traction motors)
  - clockwise=fast
  - anticlockwise=slow
- 2 Operating controls (left and right crawler tracks)
  - a FORWARD
  - b NEUTRAL
  - c REVERSE
- 3 Winch controls
  - a WIND ON
  - c UNWIND
- 4 Valve, winch pressure
  - clockwise=pressure increase
  - anticlockwise=pressure reduction
- 5 Inclinator

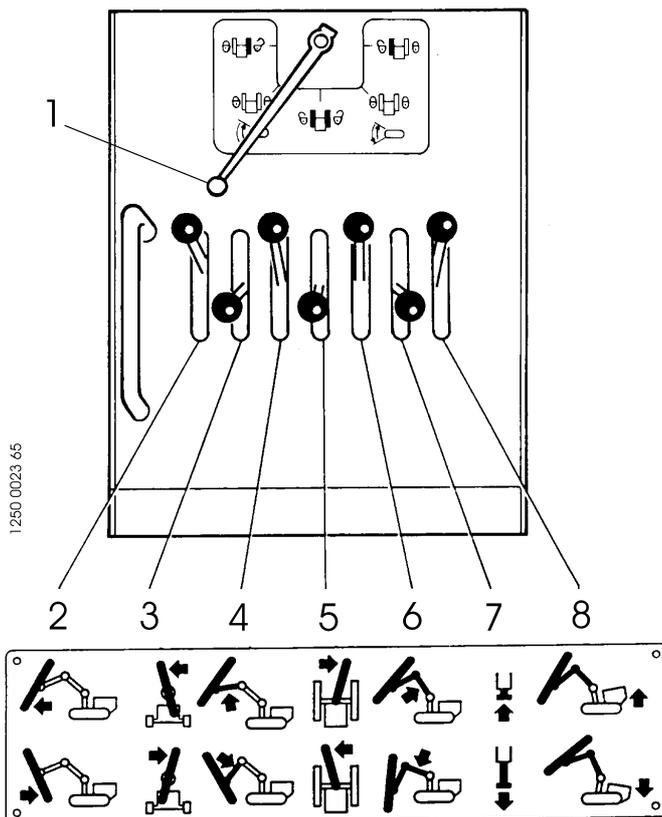


Figure: Rear control panel, controls for track oscillation and positioning

Table: Rear control panel, controls for track oscillation and positioning

- 1 Controls for track oscillation cylinders
  - a RIGHT CYLINDER OPEN

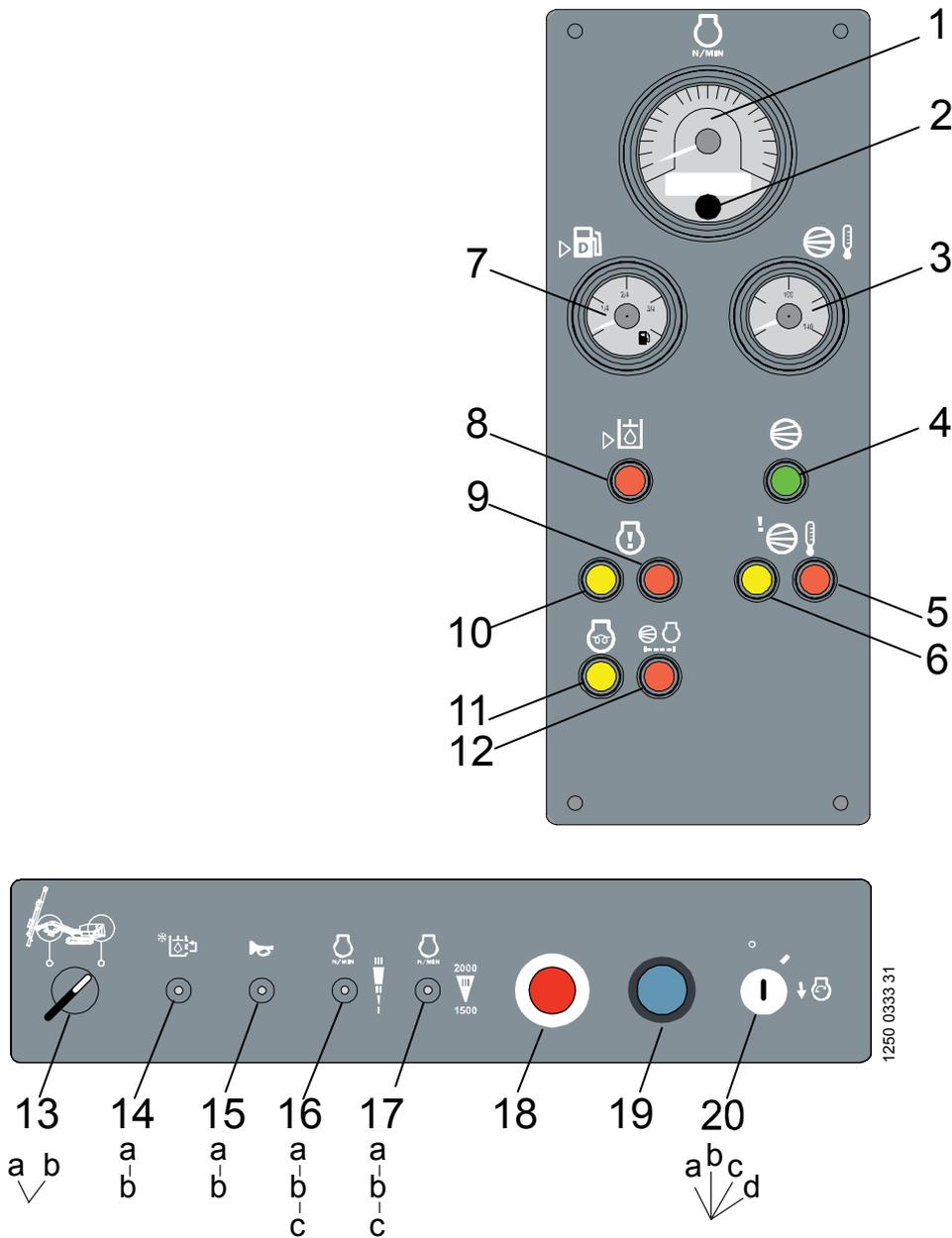
- b BOTH CYLINDERS CLOSED
- c BOTH CYLINDERS OPEN
- d BOTH CYLINDERS CLOSED
- e LEFT CYLINDER OPEN

- 2 Feed dump
- 3 Feed tilt
- 4 Boom extension
- 5 Boom tilt
- 6 Boom lift
- 7 Jacks (optional equipment)
- 8 Track oscillation

# Operator's instructions

## 4. Control

### Diesel panel



*Figure: Diesel panel*

#### **Note**

*Pay attention to the diesel panel when in operation*

#### Table:

- 1 EMC (Engine Monitoring System) VDO, tachometer with display. To scroll between the menus on the display, press button (2) on the VDO instrument.
- 2 Button for display
- 3 Gauge for compressor temperature.

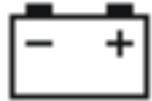
- 4 Green indicator lamp for compressor. The lamp illuminates when the compressor is switched on.
- 5 Red alarm lamp for compressor. High compressor temperature. Diesel engine is switched off.
- 6 Yellow alarm lamp for compressor. Read the error message on the VDO instrument.
- 7 Fuel level gauge (volume)
- 8 Red alarm lamp for low hydraulic oil level. Diesel engine is switched off.
- 9 Red alarm lamp for diesel engine. Diesel engine is switched off. Read the error message on the VDO instrument.
- 10 Yellow alarm lamp for the diesel engine. The diesel engine is in a critical situation. Read the error message on the VDO instrument.
- 11 Yellow indicator lamp for preheating the diesel engine. The lamp illuminates when preheating is activated.
- 12 Red indicator lamp for clogged compressor filter and engine air filter. Stop the engine and replace the filter cartridge.
- 13 Switch: Compressor charging/Positioning. Reconnect to charge and select the panel from which the boom system shall be positioned.
- 14 Manual cold start (optional equipment)
- 15 Signal Horn
- 16 Speed selector. 3 positions.  
a: variable engine speed  
b: 1500 rpm  
c: 1200 rpm
- 17 Engine speed increase. Used when button (16) is in the position for "variable engine speed" (a).
- 18 Emergency stop. Switches off the diesel engine (reset before restart)
- 19 Reset button. (Reset before restart!)
- 20 Ignition key.

*Table: Symbols*

Symbol	Description	Symbol	Description
	<b>Hour counter</b> Shows the total number of hours for the diesel engine, as well as shift memory, by holding the button depressed for 5 seconds.		<b>Fault codes</b> Fault codes are stored here until the ignition is switched off.

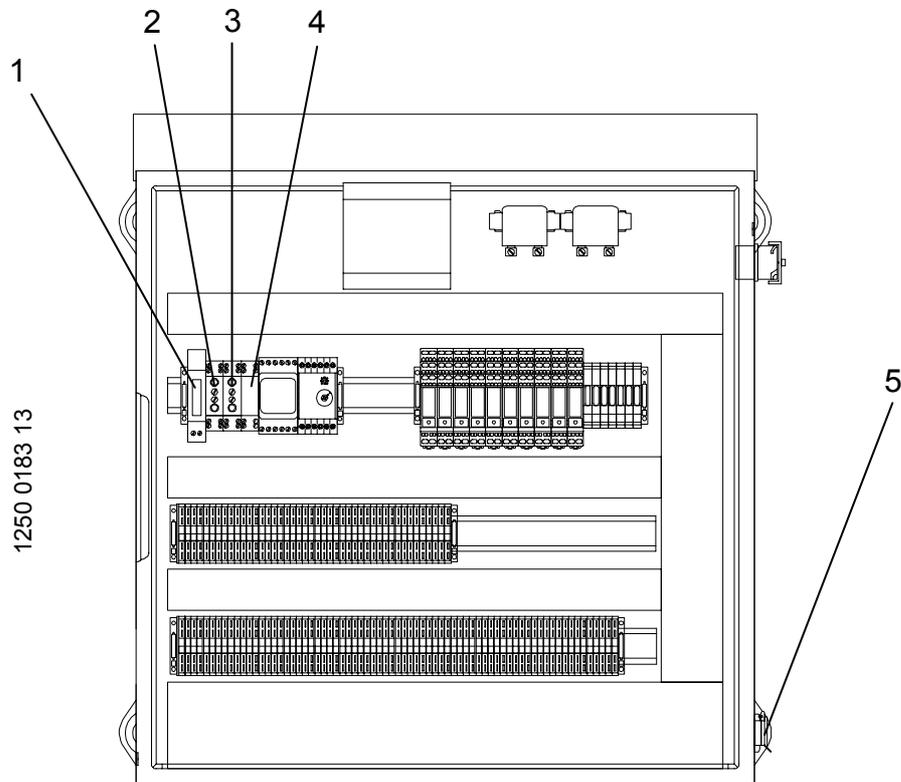
# Operator's instructions

## 4. Control

Symbol	Description	Symbol	Description
	<b>Tachometer</b> Shows the current speed of the diesel engine.		<b>Fuel level gauge</b> Shows the quantity of diesel available in the tank. The level is shown on the analogue instrument. A lamp starts to flash on the instrument when 75 litres remain.
	<b>Hydraulic Oil Temp</b> Shows the current temperature of the hydraulic oil.		<b>Compressor temperature</b> Shows the temperature of the compressor. At 115 °C the instrument triggers an alarm, at 120 °C the diesel engine is switched off.
	<b>Voltmeter</b> Measures and shows how many volts the rig's batteries have.		<b>Oil Pressure Gauge</b> Shows the oil pressure in the diesel engine to one decimal place.
	<b>Coolant temperature</b> Shows coolant temperature.		<b>Turbo Pressure</b> Shows the diesel engine's charge pressure for the turbocharger.
	<b>fuel consumption</b> Shows the current fuel consumption for the diesel engine in litres per hour.		<b>Load</b> Shows the current load on the diesel engine in %.
	<b>Fuel pressure</b> Shows the fuel pressure for the diesel engine on the high pressure side, (only available in certain systems).		<b>Fault codes</b> Only shown if there is one or more fault codes from the diesel engine. To proceed to Cummins PTC codes, double-click on one of the panel's buttons. If there are several codes then access the next one by clicking again. The code can be acknowledged by holding a button depressed for 5 seconds.

# Other controls

## Electric cabinet



1250 0183 13

*Figure: Electric cabinet.*

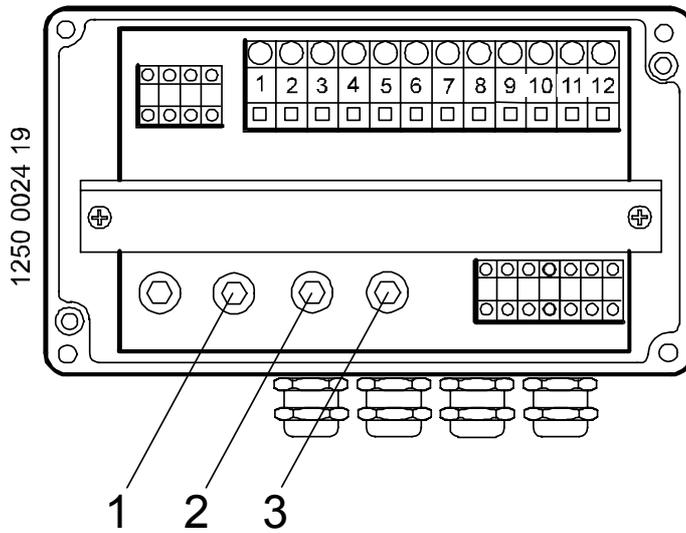
Table:

1	Hour meter for rock drill
2	Potentiometer Lubricating oil pump (ECL)
3	Potentiometer Screw-cutting oil (ECG)
4	Voltage indicator
5	Electrical socket 24V

## Operator's instructions

### 4. Control

## Electrical cabinet for dust collector



*Figure: Electrical cabinet for dust collector*

Table:

- 1 Potentiometer **Interval time**
- 2 Potentiometer **Pulse time**
- 3 Potentiometer **Total cleaning cycle**

# 5. Operating

## Diesel engine starting

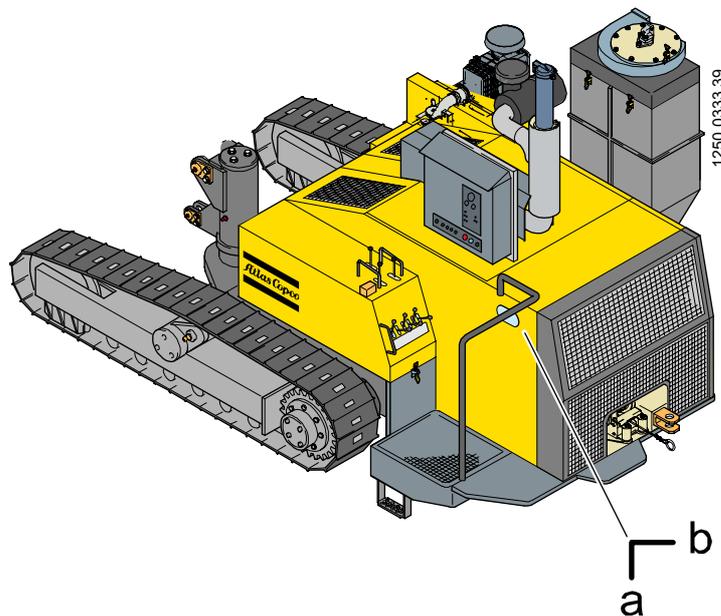
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*N.B.*

*Monitor pressure gauges and display for diesel engine when in operation.*

---

1. Activate the drill rig's main power contactor (position a).



*Figure: Drill rig main power contactor.*

**Note**

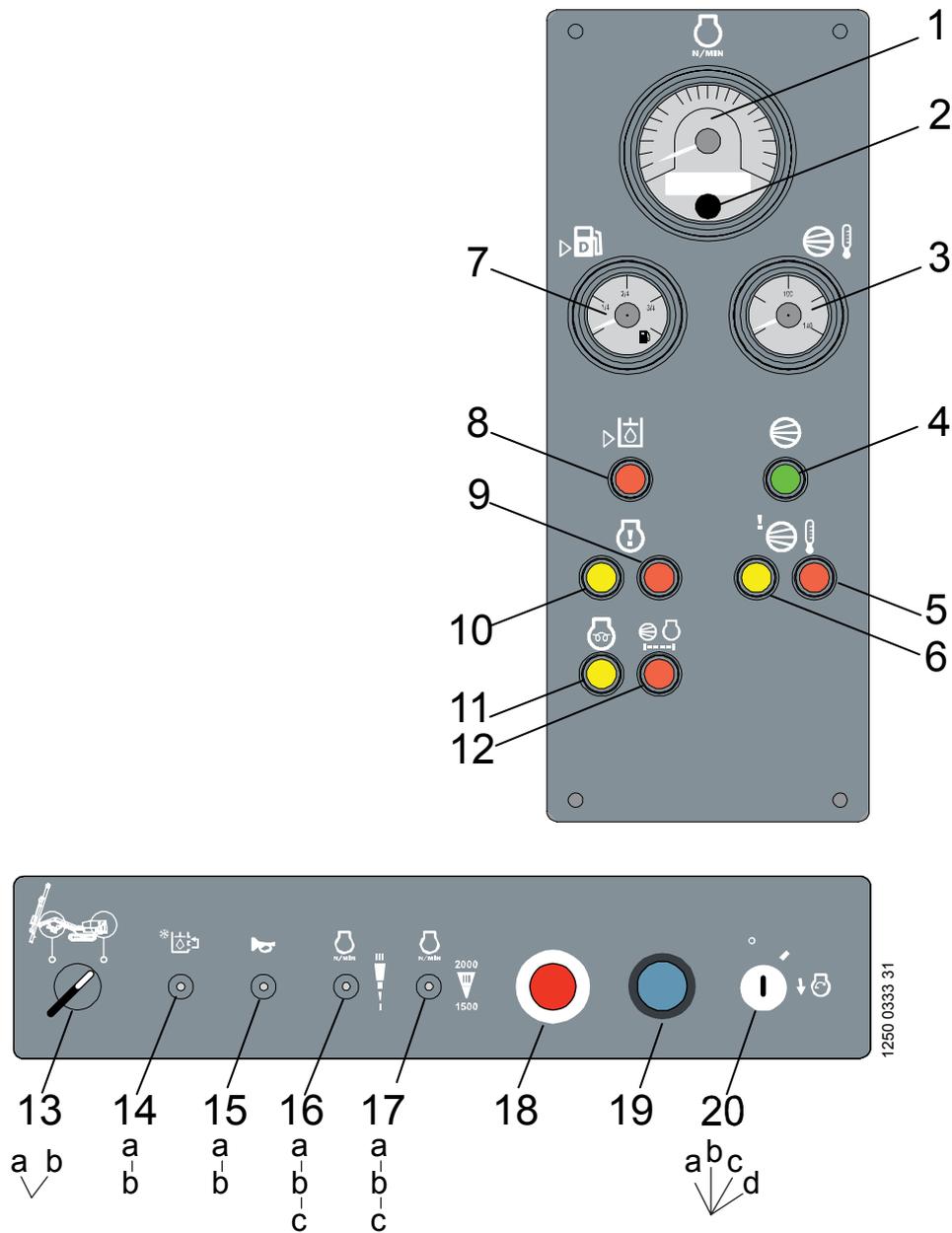
*Note*

*Always deactivate the drill rig's main power contactor after stopping the diesel engine.*

## Operator's instructions

### 5. Operating

- Set the switch for **Compressor charging/Positioning** (13) to position (b) COMPRESSOR OFF/POSITIONING REAR CONTROL PANEL.



*Figure: Diesel panel*

- Press the **Reset button** (19).
- Turn the **Ignition key** (20) to PREHEATING position (c).
  - Preheating lamp** (11) and **Alarm lamps** (9) and (10) are switched on.
- When the **preheating lamp** (11) is switched off, turn the **ignition key to START position** (d).

**Note**

*Manual cold start: If cold start (optional equipment) is installed, the hydraulic pumps are disengaged when the engine is started. The hydraulic pumps are engaged when the engine speed reaches 1200 rpm. In very cold weather the engine may need to be warmed up for a longer time with disengaged pumps. In which case, activate manual cold starting with button (14) before the ignition key is turned to ignition position. At which point, the hydraulic pumps remain deactivated until the button is released.*

6. Once the engine has started, release the **Ignition key** , which will spring back to DRIVE POSITION (c).

**Note**

*Should the engine fail to start, stop trying after 20 seconds and wait one minute before trying again.*

7. Check the hydraulic oil temperature (must be preheated to at least 20 °C (68 °F)).

**Note**

*If any of the fault indicator lamps on the diesel panel light up, turn off the engine and rectify the fault indicated by the symbol that is on.*

## Stopping the diesel engine

---

**N.B.**

*Allow the engine to idle a few minutes before turning it off if it is warm.*

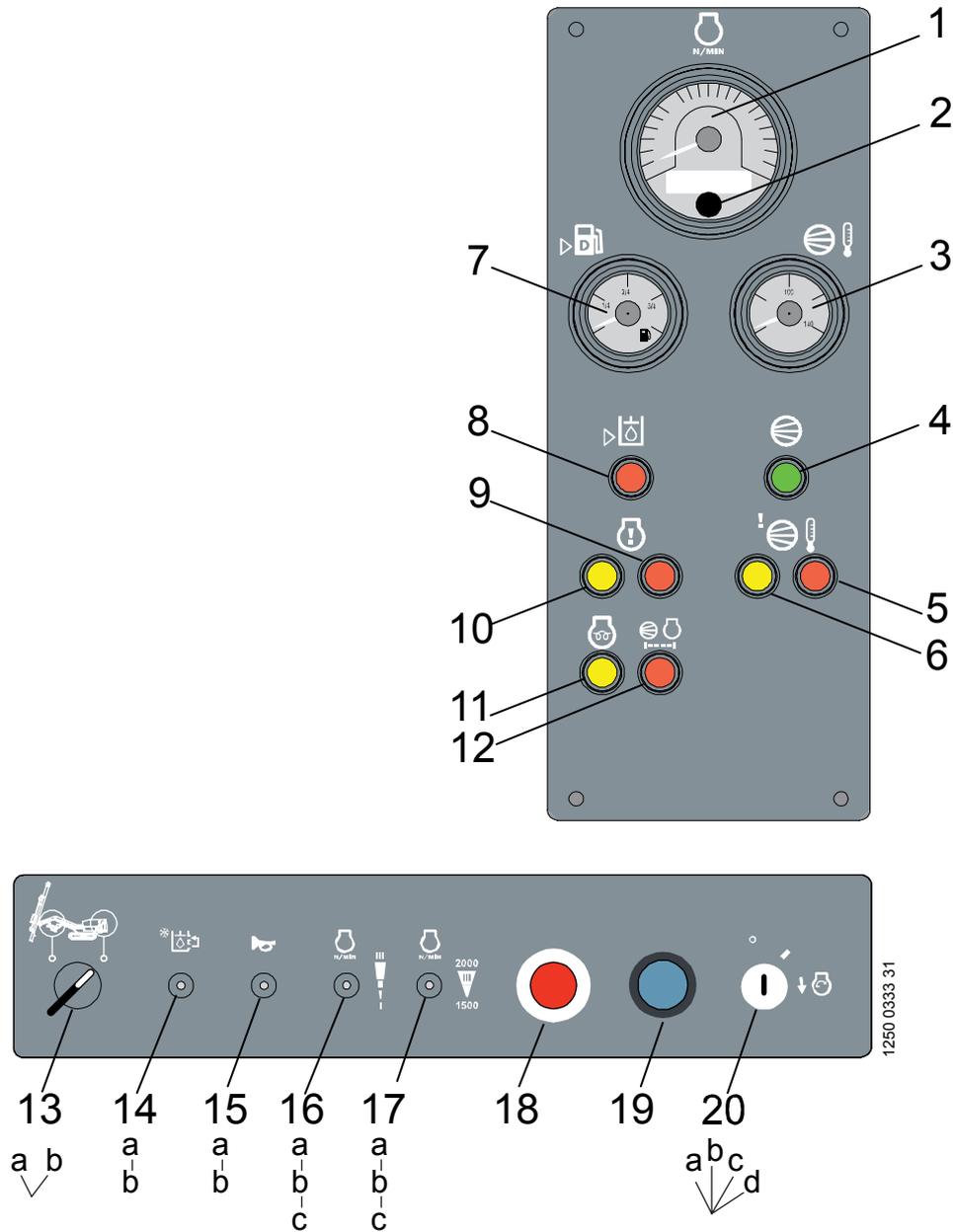
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1. All controls to NEUTRAL position.

## Operator's instructions

### 5. Operating

- Set the switch for **Compressor charging/Positioning** (13) to position (b) COMPRESSOR OFF/POSITIONING REAR CONTROL PANEL.



*Figure: Diesel panel*

- Set the Speed selection switch (16) in 1200 rpm(c) position.
- Turn the **Ignition key** (20) to OFF position (b).

5. Deactivate the drill rig's main power contactor (position a).

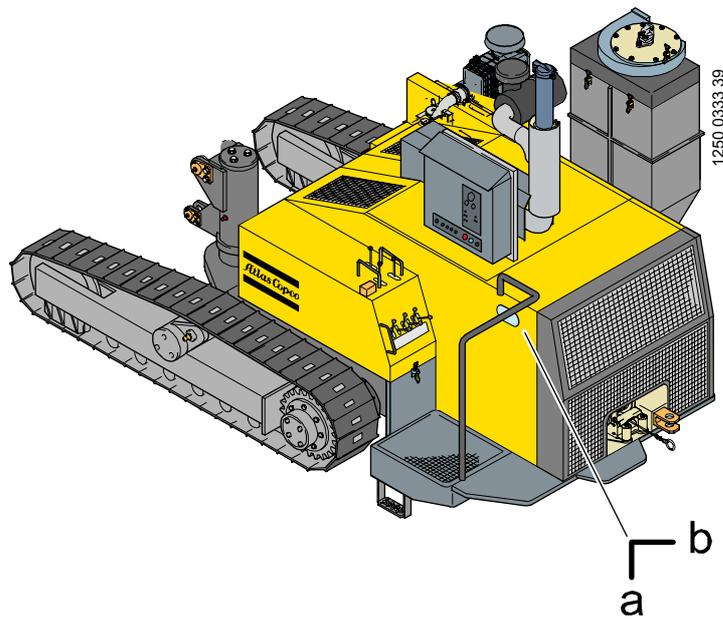


Figure: Drill rig main power contactor.

## Tramming



### WARNING

- Risk of dumping
- May cause severe personal injury and damage to property
- Keep the feeder in tramming position and the boom inside the limits of the crawler tracks
- Keep the track oscillation pedals open
- Angles for Downward/Upward/Longitudinal **CANNOT** be combined with each other
- Do not exceed the inclination angles, See technical data
- Note the gradient meters' values
- Never operate the drill rig from the down side



### WARNING

- Risk of dumping
- May cause severe personal injury and damage to property
- Ensure that unauthorised personnel are outside of the working area
- Always check the ground where the rig shall travel

**WARNING**

- **Danger of accidental operation**
- **May cause serious personal injury and damage to property**
- **The operator must always have an overview of the drill rig and the remote control box**
- **Always check that the controls are correctly adjusted before operating**

---

***N.B.***

*All emergency stop buttons and the emergency stop cable must be checked after all tramming (see the chapter Daily checks - Function test).*

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---

***N.B.***

*If the drill rig is operated from the platform, the speed must always be adapted to the terrain.*

---

1. Raise the hydraulic jack.
2. The lever for the track oscillation cylinders must remain in BOTH CYLINDERS OPEN position.
3. The switch for Compressor charging/Positioning must be in the position for COMPRESSOR CHARGING OFF/POSITIONING REAR CONTROL PANEL.
4. Position the boom system and feeder as compactly as possible. The feeder must be parallel with the outer boom.
5. Adjust the tramming speed control to suit the prevailing terrain conditions
6. Operate the Traction control levers in order to tram the drill rig in the desired direction.

***Note***

*A horn and a beacon indicate that the drill rig is reversing.*

***Note***

*If one crawler track is operated while the other is stationary the tracks are subjected to unnecessary stresses. This should therefore be avoided.*

## **Operator's instructions**

### 5. Operating

## **Checking after tramming**

All emergency stop cables and all emergency stops must be checked after tramming.

## Using the winch when tramming



### WARNING

- Risk from dumping and moving parts
- May cause serious personal injury and damage to property
- Ensure that unauthorised personnel are outside of the working area
- Never use the winch with less than three turns remaining on the winch drum



### WARNING

- Risk from dumping and cable failure
- May cause serious personal injury and damage to property
- The anchorage point must be firm and secure (pay attention to local regulations)
- The safety hook must not be able to slide or detach from its attachment point
- A damaged cable or hook must not be used
- Check that the winch locking mechanism is fully engaged in the drum before use, following the attachment of the cable eye on the anchorage point

## Operator's instructions

### 5. Operating

 **WARNING**

- **Danger of accidental operation**
- **May cause serious personal injury and damage to property**
- **The operator must always have an overview of the drill rig**
- **Always check that the controls are correctly adjusted before operating**

## General

The winch can be used as an additional safety feature, either to provide extra thrust when tramping up or down a slippery slope, or as an extra brake when tramping down an incline.

### *Note*

*The winch should not be used for any other purpose.*

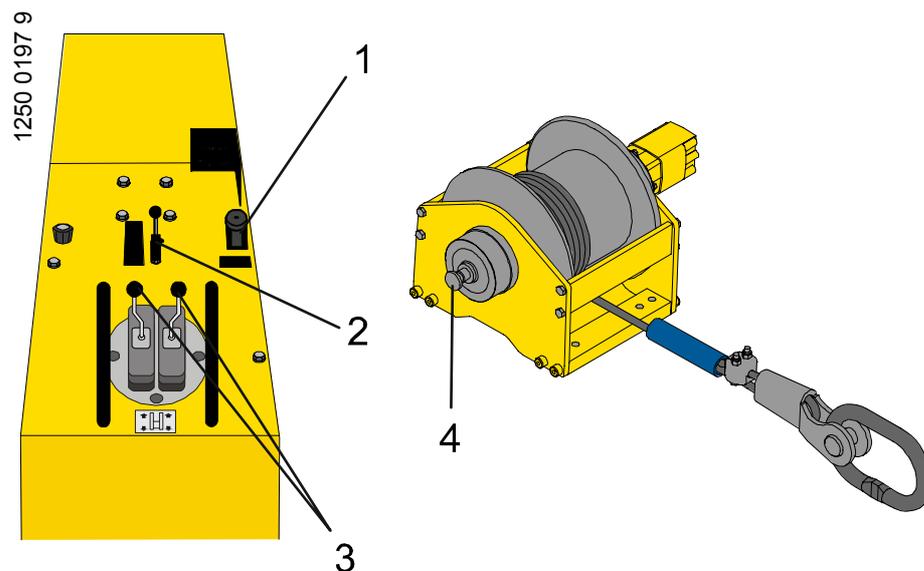
## Preparation

!**WARNING**

- Risk of dumping
- May cause serious personal injury and damage to property
- The angles for Downward/Upward/Lateral **MUST NOT** be combined with each other
- Do not exceed the inclination angles, See technical data
- Never operate the machine from the down side

!**WARNING**

- Risk of dumping
- May cause serious personal injury and damage to property
- Keep the winch cable continuously taugt



*Figure: Rear control panel and winch*

## Operator's instructions

### 5. Operating

1. Disengage the winch drum by pulling out and turning the disengagement lever (4) a quarter-turn to a locked position.
2. Pull out the wire and fasten the eye to the anchorage point.
3. Lift, turn back and press the disengagement lever. Check that drum is **not** disengaged by checking that the lever is **fully** depressed.

## Tramming up inclines

1. Set the winch pressure regulator (1) to the desired pressure.
2. Activate the winch circuit by setting the winch lever (2) to WIND ON position.
3. Reverse up the incline using the tramming levers. Make sure that the wire is kept taut constantly.
4. Adjust the pressure of the winch motor in order to attain sufficient thrust by gradually turning the pressure regulator (1) clockwise.

## Tramming down inclines

1. Set the winch pressure regulator (1) to maximum pressure by turning it fully clockwise.
2. Activate the winch circuit by setting the winch lever (2) to WIND ON position
3. Tram down the incline using the tramming levers. Make sure that the wire is kept taut constantly.
4. Reduce the winch cable pressure gradually until the drill rig can be driven smoothly down the incline with a suitable counterbalance from the winch. Make sure that the cable remains taut constantly.

## 6. Before drilling

### Safety

**WARNING**

- **May cause severe personal injury**
- **Ensure that unauthorised personnel are not within the working area**
- **Do not approach the area surrounding rod/pipe gripper or carousel**
- **Always use lifting assistance when loading and unloading the carousel**
- **Do not approach the area surrounding rod/pipe when the drill steel support is closed during loading**
- **Two persons are required to load and unload the carousel**
- **Follow the instructions carefully**

### Loading the rod carousel

1. Position the feed beam horizontally with the levers for boom lift, boom extension and feed tilt.
2. Insert the rod handling arms into the carousel by moving the rod handling lever forwards.
3. Rotate the rod carousel anticlockwise to its end position by moving the rod handling lever to the right. Following which, set the lever in neutral position.
4. Rapid feed the rock drill to its lower position by moving the lever for rapid feed to DOWN position. Following which, reset the lever in NEUTRAL position.
5. Open the upper and lower drill steel supports with their respective push buttons.
6. Insert the first drill rod through the drill steel supports (use suitable lifting equipment to lift the drill steel) and then close them.
7. Fully thread the shank adapter into the drill rod's sleeve using the lever for DRILL ROTATION.

## Operator's instructions

### 6. Before drilling

8. Rapid feed the rock drill backwards until the drill rod is almost out of the upper drill steel support by moving the lever for rapid feed to UP position. Following which, reset the lever to NEUTRAL position.
9. Open the rod handling grippers and move the rod handling arms to drill centre by pressing in the top contact on the rod handling lever and moving it backwards. Following which, reset the lever in centre position and release the top contact. The grippers are now in drill centre and have loose grip.
10. Rapid feed backwards until the rock drill has reached its end position.
11. Activate hard grip by moving the rod handling lever backwards.
12. If the sleeve retainer is in use then it must now be locked.  
  
The sleeve retainer is an option and is only used when drill steels with loose sleeves are used.
13. Unthread the shank adapter from the drill rod by moving the rotation lever to BACKWARD ROTATION position. Following which, reset the lever to NEUTRAL position.
14. If the sleeve retainer is in use then it must now be opened.
15. If there is already a rod in the carousel then the carousel must be rotated until there is an empty space.
16. Insert the drill rod into the carousel by moving the rod handling lever forwards. The top contact must not be depressed.
17. Repeat the procedure until the required number of drill rods are in the carousel.

## Setting up for drilling



### WARNING

- Risk of dumping
- May cause severe personal injury and damage to property
- Keep the track oscillation cylinders locked
- Do not lower the hydraulic jack too much, the rear sections of the track frames must stand firmly against the ground
- The angles for Downward/Upward/Lateral, specified in Technical data, must NOT be combined
- Do not exceed the angles of inclination, see Technical data
- Note the gradient meters' values
- Never operate the drill rig from the down side
- Ensure that unauthorised personnel are not within the working area

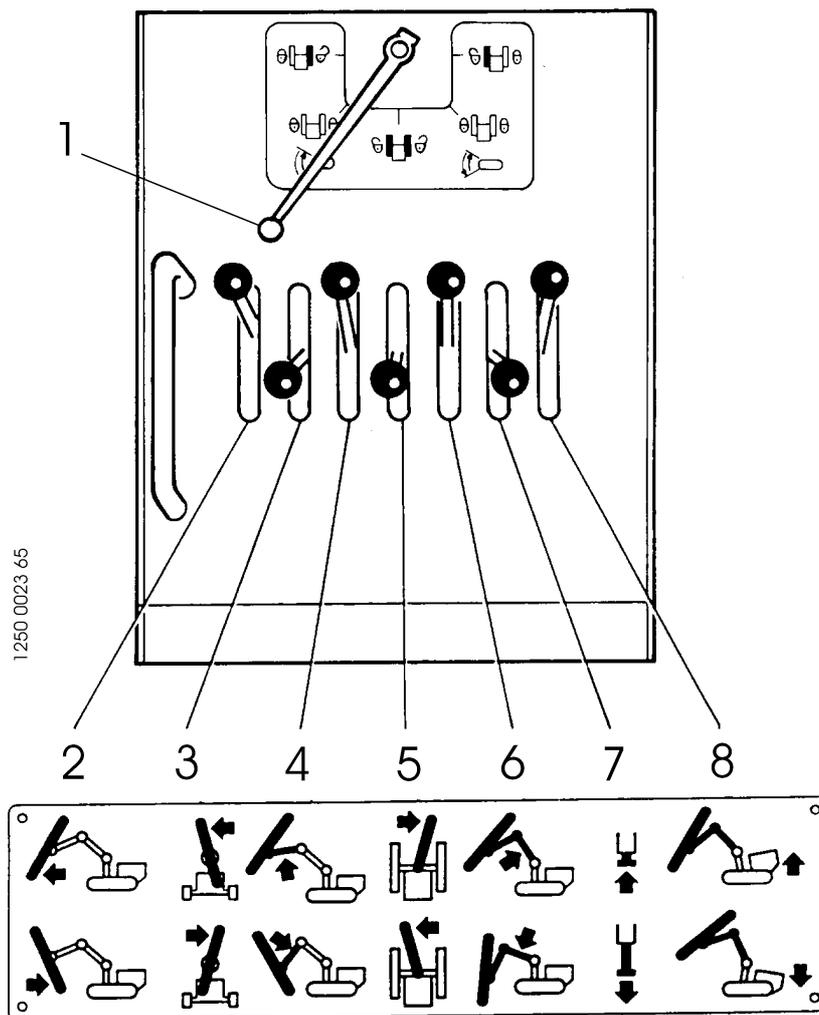


### CAUTION

- Risk of feed beam bending
- To avoid overloading the feeder, do not use the cylinder alone for lowering the boom, or the cylinder for feed extension individually to place the feeder against the ground
- Do not raise the front section of the track frame from the ground

## Operator's instructions

### 6. Before drilling



*Figure: Rear control panel*

1. Unlock the track oscillation using the track oscillation lever (1).
2. Align the drill rig horizontally using the track oscillation lever (8).
3. Set the track oscillation lever to BOTH CYLINDERS CLOSED position.
4. Lower the jack to the ground.
5. Raise the feed beam fully using the feed extension cylinder.
6. Position the feeder.
7. Set the feed spike firmly against the ground without lifting the drill rig by manoeuvring the levers for boom lowering and feed extension alternately and in steps.

#### **Note**

*Do not lift the drill rig with the feeder!*

## **Preparations for drilling**

1. Set the switch for Compressor charging/Positioning to COMPRESSOR ON/POSITIONING FRONT CONTROL PANEL position.
2. Set all controls for feed and drilling in NEUTRAL position.
3. Set the switch for Percussion pressure to REDUCED PERCUSSION PRESSURE/DRILL FEED PRESSURE position.
4. Set the switch for Dust collector and flushing air to ZERO position.
5. Set the sleeve retainer control in OPEN position.
6. Set the drill steel support control in OPEN position.
7. Insert a drill rod with drill bit and screw it into the rock drill.
8. Set the drill steel support control in CLOSED position.

## 7. Drilling

### Start of drilling

**WARNING**

- **Danger of moving and rotating parts**
- **Can cause serious personal injury**
- **Ensure that unauthorised personnel are outside of the working area**
- **Stay away from the rotating drill rod**

1. Set the switch for percussion pressure to REDUCED PERCUSSION PRESSURE/ DRILL FEED PRESSURE position.
2. Set the switch for dust collector and flushing air to DUST COLLECTOR ON/ FLUSHING AIR ON position.

**Note**

*Switch off the dust collector immediately if water flushes up from the hole. Water and dust can clog the hoses and filters.*

3. Set the lever for rotation in DRILL ROTATION position.
4. Set the percussion mechanism lever in PERCUSSION MECHANISM position.
5. Set the lever for feed in DRILL FEED position.

**Note**

*Apply DRILL FEED carefully until the drill bit has entered solid rock.*

**Note**

*Collaring with constant feed can make the drill bit veer off in the wrong direction, resulting in hole deflection and extra strain on the drill string.*

6. Automatic percussion pressure can be activated after reaching homogenous rock. Set the switch for percussion pressure to AUTOMATIC REGULATION OF PERCUSSION PRESSURE position.
7. When the coupling sleeve approaches the drill steel support, move the drill steel support lever to OPEN position.

8. Continue drilling until the coupling sleeve has come half way into the drill steel support. Move the rotation and feed levers to NEUTRAL position at the same time.

## Checks during drilling

Monitor drilling performance and pay particular attention to the points below:

Should anything out of the ordinary occur, stop drilling and clear up the trouble or ask service personnel to investigate.

### 1. Rock drill:

- Abnormal impact hose vibration.
  - Check the pressure in the rock drill accumulators.
- Check that the shank adapter is sufficiently lubricated.
  - Lubricating oil/air should leak out from the shank adapter. Lubricating oil pressure should be between 2 and 10 bar on the ECL pressure gauge.
- Abnormal leakage from the rock drill.
- Note that the shank adapter has a “float position”, i.e. it is pressed out about 4-6 mm from the subframe.
- If damper pressure is lower than 35 bar or higher than 120 bar, percussion will stop automatically ( **For drill rig COP 1800/2150/2550/4050 series** )
  - Stop drilling immediately and ask service personnel to investigate.
  - If the rig is equipped with ECL collection, the ECL collection lamps on the display should be checked.

### 2. The borehole:

- If water emerges from the drill hole
  - Switch off DCT to protect the filters

## Removing the coupling sleeve

1. Make sure the rotation and feed levers are in NEUTRAL position.

*Note*

*Note*

*If the coupling sleeve is loosened, air will blow out of it.*

2. Hold the percussion mechanism lever in PERCUSSION MECHANISM position for a few seconds until the coupling sleeve has come loose and then move the lever to NEUTRAL position.

## Operator's instructions

### 7. Drilling

3. Make sure that the switch for dust collector and flushing air is in ZERO position.

## Rod adding

 **WARNING**

- **Danger of accidental operation**
- **May cause serious personal injury and damage to property**
- **The operator must always control of the rig and the remote control box**
- **Always check that the controls are correctly adjusted before operating**
- **Always deactivate the remote control box when not in use**
- **The rock drill must never be moving during rod adding**

Rod adding takes place manually.

## Rod adding with RHS

 **WARNING**

- **Crushing hazard**
- **Danger of rotating parts**
- **Do not stay in the vicinity if the rod grippers**

1. Close the upper drill steel support in order to lock the sleeve.
2. Unthread the shank adapter from the sleeve by setting the rotation lever in ROTATION position and the feed lever in RETURN FEED position.
3. When the shank adapter is unthreaded, the levers for feed and rotation are set in NEUTRAL position.

4. Move the rock drill up by setting the lever for rapid feed in UP position. Once the rock drill has reached its upper position, set the lever in NEUTRAL position.
5. Move in a new drill steel from the carousel to drill centre by moving the control lever for rod handling backwards. If there is no drill steel in the rod grippers then the carousel must first be rotated.
6. Thread the shank adapter fully into the new drill steel by setting the rotation lever in DRILL ROTATION position. Following which, reset the lever to NEUTRAL position.
7. Move rod handling lever to centre position. The rod grippers then adopt loose grip with a lower gripping force that allows the drill steel to rotate in the grippers.
8. Thread the new drill steel into the drill string by setting the rotation lever in DRILL ROTATION position. Following which, reset the lever to NEUTRAL position.
9. Open the gripper by holding the top button depressed and then moving the arm into the carousel by moving the rod handling lever to forward. Hold the button depressed throughout the whole action.
10. If necessary, rotate a new drill steel into the rod gripper.
11. Open both drill steel supports before the drilling is resumed.
12. Raise the cradle approx. 100mm by moving the feed lever to RETURN FEED position.
13. Set the switch for percussion pressure to REDUCED PERCUSSION PRESSURE/DRILL FEED PRESSURE position.
14. Set the switch for dust collector and flushing air to DUST COLLECTOR ON/FLUSHING AIR ON position.
15. Set the lever for rotation in DRILL ROTATION position.
16. Set the lever for feed to DRILL FEED.
17. Set the lever for percussion mechanism in PERCUSSION MECHANISM position.
18. When the coupling sleeve has passed the drill steel support it must be closed. Set the lever for drill steel support in CLOSED position.
19. Set the switch for percussion pressure in AUTOMATIC REGULATION OF PERCUSSION PRESSURE position.

## Operator's instructions

### 7. Drilling

## Continued drilling

1. Raise the cradle approx. 100mm by moving the Rotation/Feed lever to RETURN FEED position.
2. Percussion pressure must be low when starting drilling. Prepare by setting the switch for percussion pressure to REDUCED PERCUSSION PRESSURE position.
3. Set the DCT selector to DUST COLLECTOR+FLUSHING AIR position.
4. Move the Rotation/Feed lever to DRILL ROTATION position.
5. Move the Rotation/Feed lever to DRILL FEED position.
6. Start percussion by moving the percussion mechanism lever to PERCUSSION MECHANISM position.

Drilling now starts.

7. Once the coupling sleeve has passed the drill steel support it must be closed in order to obtain better control of the drill string. Move the drill steel support lever to CLOSED position.
8. Normalise percussion pressure by setting the percussion pressure switch in AUTOMATIC REGULATION OF PERCUSSION PRESSURE position.

Drill until the coupling sleeve reaches the drill steel support and repeat the procedure with removing, jointing and continued drilling until you have reached the desired hole depth.

## Unthreading and extracting

Knock loose the joints before extraction.

1. Open the drill steel support fully by moving the drill steel support lever to OPEN position.
2. Pull up the drill string until the sleeve is in the drill steel support by holding the rapid feed lever in UP position.
3. Close the drill steel support by moving the drill steel support lever to CLOSED position.
4. Unscrew the shank adapter from the upper coupling sleeve by holding the rotation lever in BACKWARD ROTATION position.
5. Raise the rock drill about 10cm by holding the rapid feed lever in UP position.

6. Unscrew the rod and put it to one side.
7. Lower the rock drill by holding the rapid feed lever in the DOWN position and then thread the shank adapter into the coupling sleeve that is fastened in the drill steel support by holding the rotation lever in DRILL ROTATION position.

Continue from step 1 until the drill string has been extracted.

## Unthreading and extracting with RHS

Knock loose the joints before extraction.

1. Open both drill steel supports with their respective push buttons.
2. Set the switch for dust collector and flushing air in FLUSHING AIR ON position. If air blows out from the coupling sleeve then the thread has loosened.
3. Rapid feed up until the sleeve has reached the upper drill steel support by holding the lever for rapid feed in UP position.
4. Set the lever for rapid feed in NEUTRAL position and close both drill steel supports with their respective push buttons.
5. Hold the top contact on the control lever for rod handling pressed in so that the grippers open, and then move the lever backwards so that the gripper arm reaches drill centre. Grip the drill steel firmly with the rod grippers.  
  
If a steel is already in the grippers then the carousel must first be rotated clockwise to the next empty position.
6. Tighten the joint between the shank adapter and the upper rod slightly by holding the rotation lever in DRILL ROTATION position for a few brief intervals.
7. Move the rod handling lever to neutral position. The rod grippers then adopt guide position with a lower gripping force that allows the drill steel to rotate in the grippers.
8. Unscrew the drill steel fully from the sleeve in the drill steel support by holding the rotation lever in BACKWARD ROTATION position.
9. Rapid feed backwards until the rock drill stops at the correct height for the drill steel to be moved into the carousel from drill centre by holding the lever for rapid feed in UP position.
10. Reactivate hard grip on the rod grippers by moving the rod handling lever backwards.
11. If drill steel with loose sleeves is used and the rig is equipped with sleeve retainer (optional equipment), it must be closed now.

## Operator's instructions

### 7. Drilling

12. Unscrew the shank adapter fully from the drill steel. Hold the rotation lever in BACKWARD ROTATION position. Move the lever back to NEUTRAL once the shank adapter has been unthreaded.
13. If a sleeve retainer is in use then it must now be opened.
14. Reposition the drill steel from drill centre to the carousel by moving the rod handling lever forwards.
15. Rotate the carousel so that an empty position in the carousel is ready for the next drill steel by quickly moving the rod handling lever to the left. Following which, set the lever in neutral position.
16. Rapid feed down until the shank adapter stops directly above the sleeve in the drill steel support by holding the lever for rapid feed in DOWN position. Following which, set the lever in NEUTRAL position.
17. Thread the shank adapter into the sleeve by simultaneously holding the feed lever in DRILL FEED position, and the rotation lever in DRILL ROTATION position. When the shank adapter is threaded in the levers are set in NEUTRAL position.
18. Repeat steps 1 - 16 until only one drill steel remains.

#### *Note*

*Observe caution when the drill bit is extracted from the hole so that it is not drawn through the drill gasket.*

## Changing drill bit

**WARNING**

- **Moving parts**
- **Risk of personal injury, clothing can be trapped**
- **Stop rock drill rotation when changing bits**

---

#### *N.B.*

*Never start percussion with the drill bit free without any resistance.*

---

1. Operate the feeder until the spike is approx. 10 cm from the rock.
2. Make sure that the rotation lever is in neutral.

3. Move the drill bit forward until it is pressed against the rock.
4. Switch on high percussion pressure for several seconds.
5. Switch off percussion pressure when the drill bit has loosened. If the percussion pressure is engaged for too long then the drill steel can detach from the shank adapter.
6. Unscrew the old drill bit by hand and replace with a new one.

## Action in case of drilling problems

### Drilling problems

If the following trouble occurs during drilling:

- Hot coupling sleeves (loose coupling sleeves).
- Difficulties in uncoupling the coupling sleeves.
- Hole deflections

### High coupling sleeve temperature

#### *Note*

*Coupling sleeve temperature must not exceed 120 °C (248 °F).*

1. Excessive coupling sleeve temperature is indicated by:
  - a. Measuring with a thermometer
  - b. Oil dripping from the rock drill vaporises on the coupling sleeve
  - c. The coupling sleeve changes colour
2. Depending on the layers of the rock, temperature can vary even within a small area. High coupling sleeve temperature is usually due to a poor relationship between drill feed pressure, percussion pressure and rotation pressure. The following solutions are recommended to reduce coupling sleeve temperature.
  - a. Check the condition of the drill bit; an overdrilled bit gives less torque in the coupling sleeve.

Grind the drill bit.
  - b. Change to a drill bit with ballistic buttons.
  - c. If the rock is too hard for ballistic bits, then...

## Operator's instructions

### 7. Drilling

reduce rotation speed as much as possible without causing the drill string to rotate jerkily

check the drill feed pressure and set it to the recommended value.

Reduce percussion pressure to below the basic setting (5-10 bar). A reasonable reduction in penetration rate must be accepted.

- d. Check and/or adjust damper pressure so that the shank adapter is in "float position".

## Difficulties in loosening the coupling sleeve

The best method of loosening the coupling sleeve is to "drill" the last few centimetres without feed pressure and rotation, leaving percussion active for a few seconds to break loose the coupling sleeve.

- Make sure the RPC-F system is set correctly. An RPC-F system that is set too high causes excessive torque in the coupling sleeve.

## Hole deflection

1. Try to drill with as low a drill feed pressure as possible.
2. Check the condition of the drill bit.
3. Use TAC pipes, drop centre bits.
4. Only use flushing air and rotation during overload.
5. Drill the first drill steel with reduced drilling for at least half of the drill steel in order to minimise hole deflection at the start of the hole.

# 8. Options

## Thread lubrication

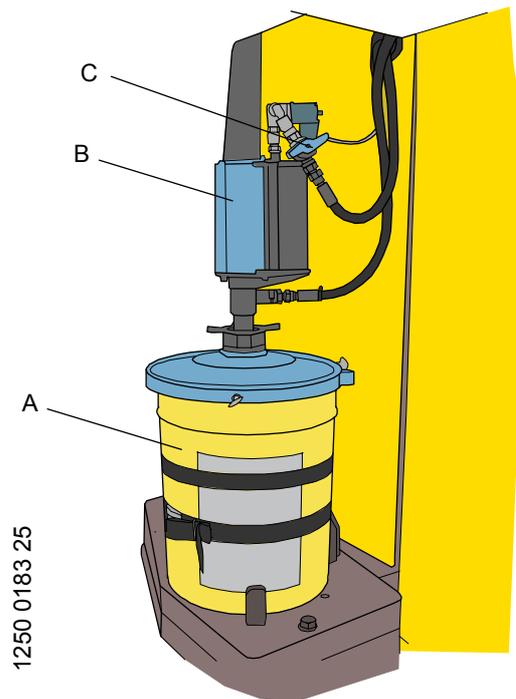
### Thread lubrication with brushes

#### Function

Drill steel threads are lubricated using two brushes (C) mounted on the RHS carousel lower bracket.

Grease comes from a pump (B) located in a grease container (A) at the rear on the right-hand side of the rig. The pump is driven by compressed air from the drill rig's compressor.

The pump can be activated manually or automatically.

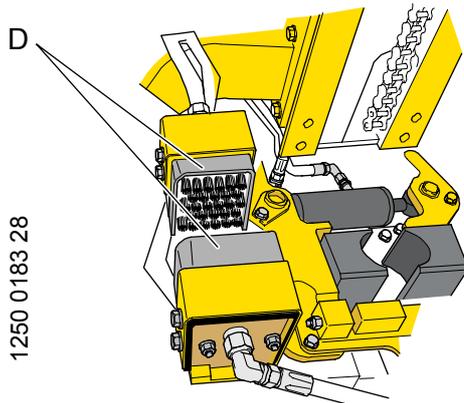


*Figure: Thread lubrication system.*

- A Grease tank.
- B Pump.
- C Cock.

## Operator's instructions

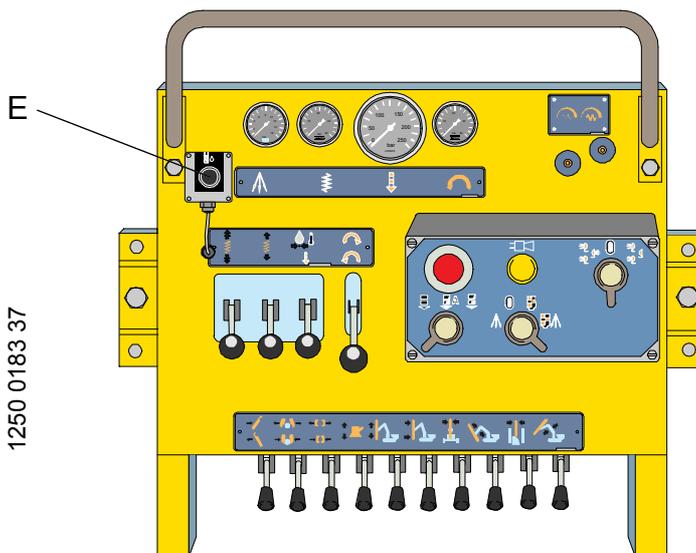
### 8. Options



*Figure: Brushes for thread lubrication.*

### Operation

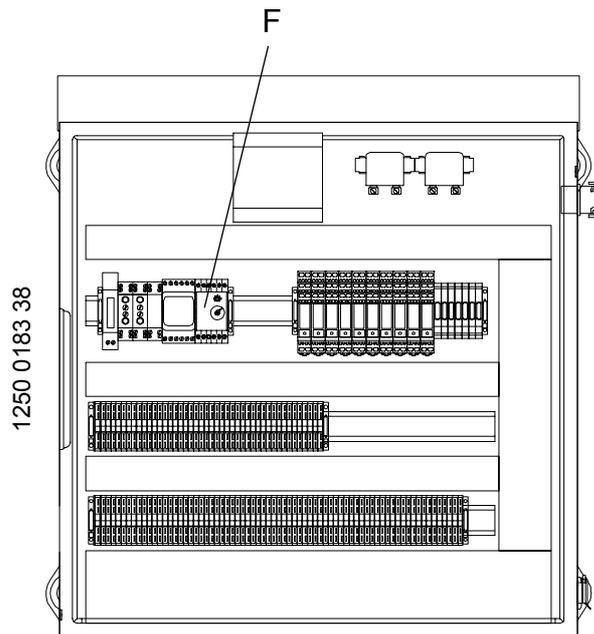
During normal use, the system will operate automatically. The grease pump will then operate when the rod handling lever is in position to move a rod to the drill centre. This means that each time a rod is moved out from the carousel, a certain amount of grease will be pumped to the brushes that the rod threads subsequently pass.



*Figure: Front control panel*

If it is necessary to pump more grease to the brushes, the system can be operated manually. The grease pump will then be active as long as the button (E) on the front control panel is held depressed.

## Adjusting



*Figure: Electric cabinet*

Adjust the quantity of grease pumped out using a relay (F) in the electrical cabinet.

Basic setting: position B, time interval 1-10 seconds, pulse time 3 seconds. Increase the pulse time to increase the quantity of grease.

The entire system can be turned off by stopping the supply of air with the cock (C).

We recommend using Atlas Copco Secoroc thread grease A for lubrication of drill steel threads.

## Hole Quality System HQS 9

### General

HQS 9 is a system for measuring drill hole bearing. The system comprises:

- Control box with fitted rotating sight. The left-hand display on the control box shows the drill angle in the sight line and the right-hand display shows the drill angle across the sight line.
- Mounting bracket
- Power supply cable

## Operator's instructions

### 8. Options

## Specification

Power supply	12V - 28V DC
Current usage	0.04A
Operating temperature	-20 - +50 °C
Enclosing	IP65
Angle measurement:	
Measurement range	2 * 20°
Measurement accuracy	0.5°

## Assembly and basic setting

Fit the instrument on the feeder so that it is easy to read the two displays and adjust the sight. The brown cable connects to the drill rig's electrical system. Use a 1A fuse. The white cable connects to ground.

Before connecting the instrument to the power supply, the instrument must be in setup mode. This is reached by pressing the accompanying magnet towards the SE mark on the left-hand side of the front panel. Following which, the power supply can be connected.

When the left-hand display shows "SE 1", the instrument is in configuration mode. There are two different configuration modes, "SE 1" and "SE 2". Switch between "SE 1" and "SE 2" by pressing the magnet towards the SE mark. The right-hand display shows the selected values. Switch values by pressing the magnet towards the // mark.

The first configuration mode, "SE 1", specifies the direction of the control box in relation to the drill rig.

*Table: Meaning of the values shown in the right-hand display in configuration mode "SE 1"*

Value	Meaning
1	Front of the box forward
2	Front of the box to the right
3	Front of the box forward
4	Front of the box to the left

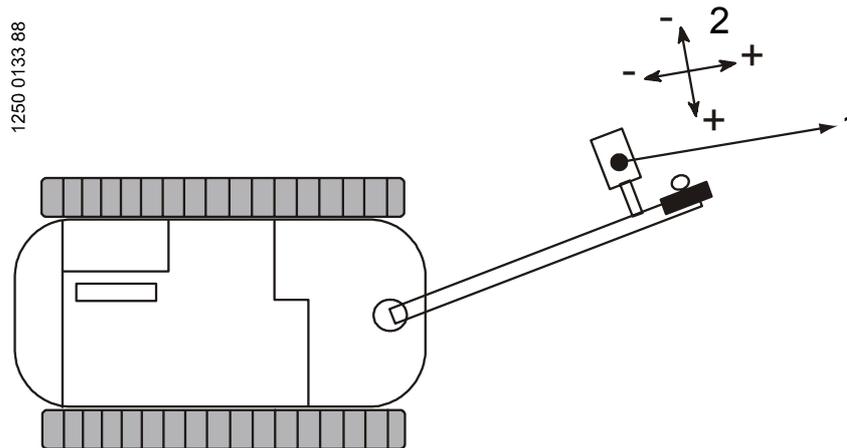
The instrument's resolution is specified in configuration mode "SE 2".

When the desired values are set the power supply is switched off for 5 seconds. Following which, the instrument starts in normal mode.

Align the boom straight forward. Then turn the sight so that it is parallel to the boom and drill rig. Reset the instrument by pressing the magnet to the // mark until both displays are blank.

Instrument is now ready for use.

## Application



*Figure:*

- 1 Line of sight
- 2 Drilling angles that are shown

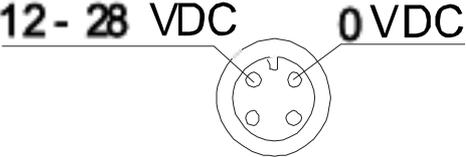
- Set up drill rig for drilling with the feeder approximately aligned.
- Adjust the sight so that it points in the drilling direction. Aim at an object as far away as possible that is easy to remember. The displays now show all drilling angles in relation to the line of sight.
- Adjust the feeder so that it is positioned in the right drilling angles.
- Bore.

## Operator's instructions

### 8. Options

## Diagnostics

Table:

FAULT	ACTION
No angles are indicated and there is no lighting in the displays	Check the voltage between 0 VCD and 12-28 VCD on the power supply cable's connection to the instrument. The voltage should be 12 to 28 V.  
The displays show no signs or irrelevant signs and the lighting is switched on.	Restart the instrument by disconnecting the power supply for 30 seconds. If the instrument still does not work, replace the instrument.

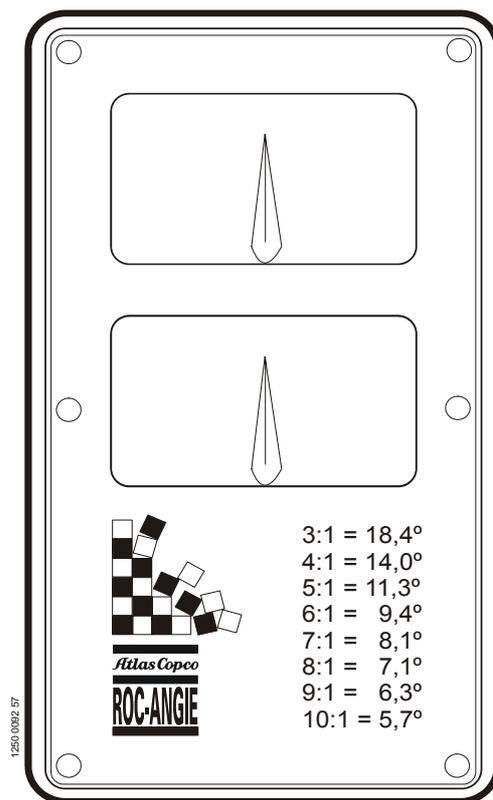
## ROC-ANGIE

### General

ROC-ANGIE measures forward/rearward and right/left angles from the feeder's vertical position.

If straight vertical holes are drilled then it is unnecessary to aim ROC-ANGIE.

The drill rig can stand in any direction at all relative to the bench if ROC-ANGIE is correctly aimed.



*Figure: ROC-ANGIE*

## What is aiming?

If it were possible to align the drill rig in the same direction for each new hole it would not be necessary to aim ROC-ANGIE. For the drill operator to be able to adjust the forward/rearward and left/right angle in exactly the same way at all holes is however difficult, even with a compass and especially on the top face of the stope.

The solution to this problem is simple. Instead of aiming the entire drill rig in a special direction at each hole, ROC-ANGIE can be turned round a vertical axis and aligned in the desired direction.

Is a compass needed? Not if you can find an object at a distance of a hundred metres to use as an aiming point. You can use a tree, a telegraph pole or similar. The further away it is the better.

If you cannot find an aiming point you can use a compass or make your own aiming point with a pole or the like. If you use a compass, remember that the steel in the drill rig can affect the compass needle.

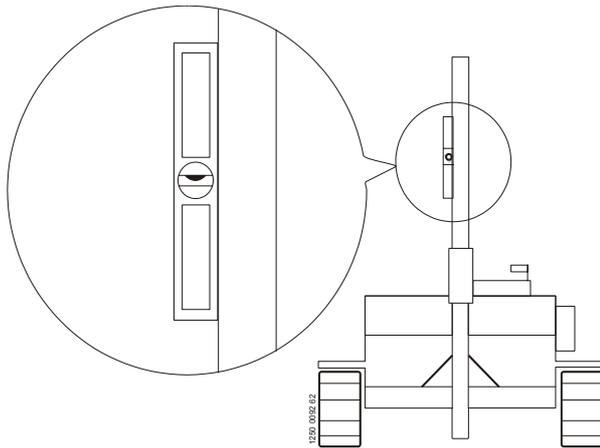
It is extremely important to aim ROC-ANGIE in the blasting direction or parallel with the direction of the drill hole. If ROC-ANGIE is aimed, the angles shown in the receiver are always relative to the aiming point, not to the drill rig.

## Operator's instructions

### 8. Options

## Preparations for assembly

1. Set the feed in a vertical position with the aid of a spirit level. Adjust forward/rearward for a precise vertical reading.
2. Adjust left/right for a precise vertical reading.
3. Check that both left/right and forward/rearward are still vertical.



*Figure:*

## Assembly

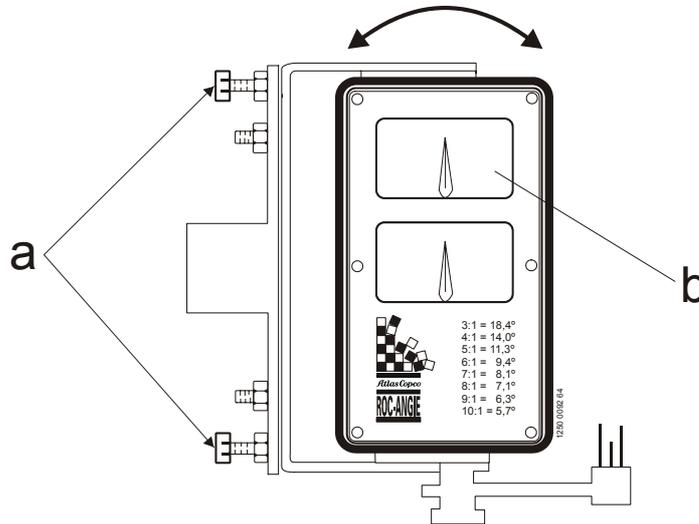
1. Mount the retaining yoke/bracket or welded beam on the feeder at such a height that the receiver is easy to read. To facilitate matters, mount ROC-ANGIE on the same side as the drill operator.
2. Position ROC-ANGIE in the retaining yoke and tighten the bolts. If everything is correct, both scales should now show  $0^\circ$  even if ROC-ANGIE is rotated round its own axis. If this is not the case, proceed to the “adjustment” section.

## Conditions

The feed must be in a precisely vertical position, both left/right and forward/rearward. See the “assembly” section.

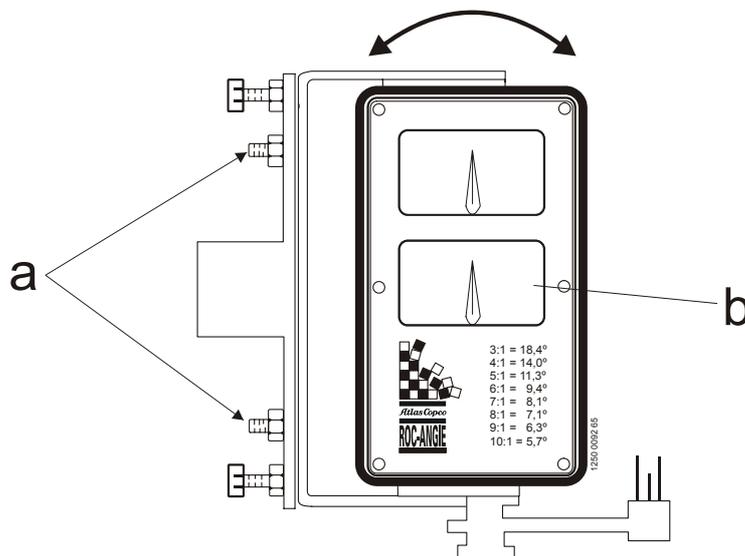
## Adjust ROC-ANGIE to a zero reading

1. Loosen and retighten all bolts by hand. Look at the upper scale and adjust (a) the left/right bolts to an exact zero reading on the (b) upper scale. Tighten the left/right bolts by hand.



*Figure:*

2. Look at the (b) lower scale and adjust ROC-ANGIE forward/rearward to an exact zero reading. Tighten the (a) forward/rearward bolts by hand. Check left/right, forward/rearward once again and adjust as necessary. Tighten all bolts using a torque wrench.



*Figure:*

### Note

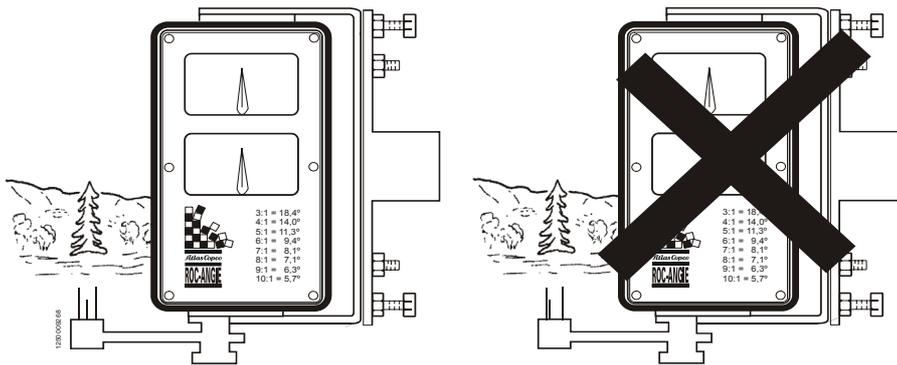
Perform a final check by rotating ROC-ANGIE around its own axis while observing the two scales - they should show 0° in all directions.

## Operator's instructions

### 8. Options

## Installation

1. Choose an aiming point (the further away, the better).
2. Loosen the handle on the top of ROC-ANGIE.
3. Look through the aim and turn ROC-ANGIE around until the centre arrow in the aim is exactly in the middle of the tree and between the two outer arrows. If necessary, adjust the aim or move it to the other side by undoing the knob at the bottom of ROC-ANGIE.

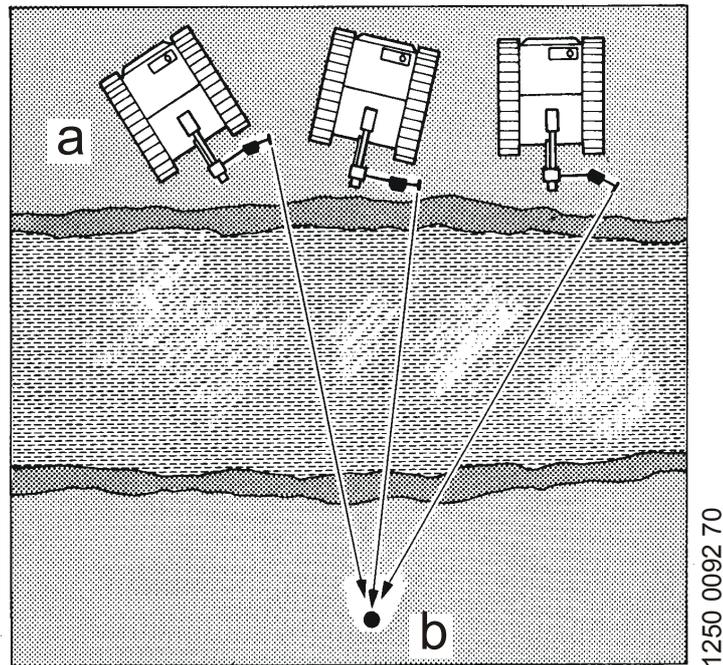


*Figure:*

4. Lock the handle.
5. Adjust the feeder to the correct angle.
6. Start drilling.

## Aiming examples

Two different ways of aiming ROC-ANGIE are described below. In the first example the aiming point is in line with the blasting direction.



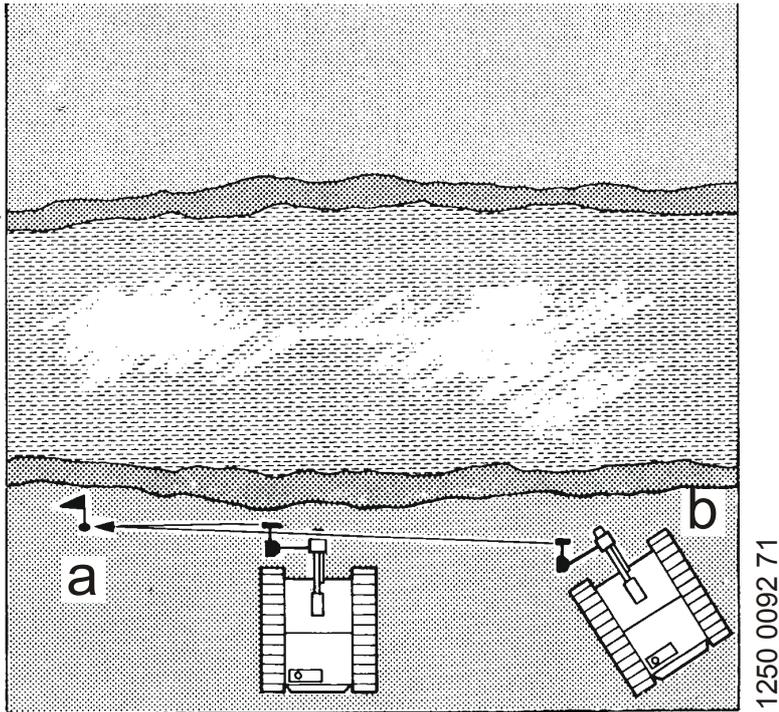
*Figure: Example 1*

- a Bench
- b Reference Point

In the second example the aiming point is parallel with the bench. Which method to use? That will often depend on the nature of the terrain and the distance to the aiming point.

## Operator's instructions

### 8. Options



*Figure: Example 2*

- a Stick in drill hole
- b Bench

#### **Note**

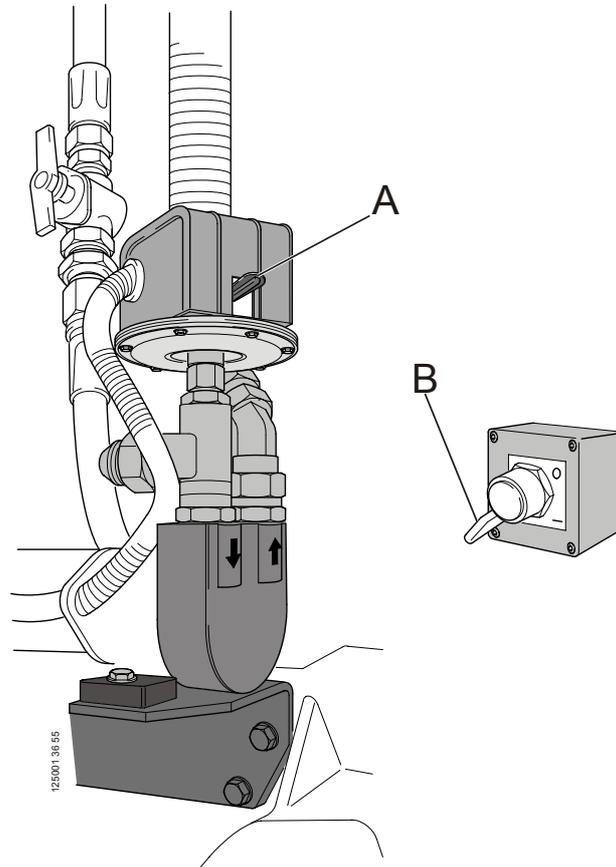
*The aiming point should be at a distance of at least 100 m.*

## Technical data

Measurement range	20°
Precision	9.2°
Weight, including bracket	5.0 kg
Dimensions:	
Width	130 mm
Height	230 mm
Depth	105 mm
Temperature range	-50 °C to 70 °C
Enclosing	IP 65 standard

## Electric filler pump

### Electric pump for filling fuel



*Figure: Electric filler pump*

The pump is used to fill fuel.

1. Make sure that the hose and the filter are clean.
2. Connect the attached hose to the fuel source.
3. Move switch (B) to position 1.
4. Activate switch (A) to start filling.

The electric filler pump will stop automatically when the drill rig fuel tank is full. It will also stop if the source of fuel runs out.