Original instructions

IC Truck
Cummins Eu 5

RCD 100
RCD 120
RCD 140
RCD 150
RCD 160
RCD 180
RCD 100 / 1200
RCD 120 / 1200
RCD 140 / 1200
RCD 150 / 1200
RCD 160 / 1200
RCD 180 / 900



5410 5411 5412 5413 5414 5415
5416 5417 5418 5419 5420 5421

first in intralogistics

5001 801 1624 EN - 07/2024 - 04

Address of manufacturer and contact details

STILL GmbH
Berzeliusstraße 10
22113 Hamburg, Germany
Tel. +49 (0) 40 7339-0
Fax: +49 (0) 40 7339-1622
Email: info@still.de
Website: http://www.still.de

Made in China

Rules for the operating company of industrial trucks

In addition to these operating instructions, a code of practice containing additional information for the operating companies of industrial trucks is also available.

This guide provides information for handling industrial trucks:

- Information on how to select suitable industrial trucks for a particular area of application
- Prerequisites for the safe operation of industrial trucks
- Information on the use of industrial trucks
- Information on transport, initial commissioning and storage of industrial trucks

Internet address and QR code

The information can be accessed at any time by pasting the address **https://m.still.de/vdma** in a web browser or by scanning the QR code.

Abbreviations

Below is a list of abbreviations used in this manual

ACM	Aftertreatment Control Module
API	American Petroleum Institute
BITA	British Industrial Truck Association
CAN	Controller Area Network
CPC	Comon Powertrain Controler
ECM	Engine Control Module
FDE	Truck Data Acquisition Module
LED	Light Emitting Diode
LVDT	Linear Variable Displacement Transformer
MCM	Motor Control Module
PIN	Personal Identification Number
PPE	Personal Protective Equipment
RPM	Revolutions Per Minute
STVZO	Straßenverkehrs-Zulassungs-Ordnung (Road Traffic Licensing Regulations)
VDMA	Verband Deutscher Maschinen- und Anlagenbau (German Engineering Association)
LS	Load Sensing

1 Introduction

Truck data . . . 2

Your industrial truck . . . 3
Technical Description . . . 3
General . . . 5
Conformity marking . . . 6
Declaration that reflects the content of the declaration of conformity . . . 7
Nameplate . . . 8

Use of the truck . . . 10
Commissioning . . . 10
Improper use . . . 10
Precautions . . . 10
Description of use and climatic conditions . . . 11

Information about documentation . . . 12
Documentation scope . . . 12
Supplementary documentation . . . 12
Issue date and topicality of the operating instructions . . . 13
Copyright and trademark rights . . . 13
Explanation of signal terms used . . . 14
Date of edition and latest update of this manual . . . 15
List of abbreviations . . . 15

Environmental considerations . . . 18
Packaging . . . 18
Disposal of components and batteries . . . 18

EMC – Electromagnetic compatibility . . . 19

Servicing and spare parts . . . 19

Modifications and retrofitting . . . 19

Using attachments . . . 21

Using working platforms . . . 21

2 Safety

Definition of terms used for responsible persons . . . 24
Operating company . . . 24
Specialist . . . 24
Drivers . . . 25

Basic principles for safe operation . . . 27
Insurance cover on company premises . . . 27
Modifications and retrofitting . . . 19

Warning regarding non-original parts . . . 29
Damage, faults . . . 29
Medical devices . . . 29
Emissions . . . 29
Vibrations . . . 30
Wheels and tyres . . . 30

Residual risks . . . 32
Residual dangers, residual risks . . . 32
Special risks associated with using the truck and attachments . . . 33
Overview of hazards and countermeasures . . . 36
Danger to employees . . . 38

Safety tests . . . 40
Carrying out regular inspections on the truck . . . 40
Insulation testing . . . 40

Safety regulations for handling consumables . . . 42
Exhaust gases . . . 42
Safety guidelines for using the truck . . . 42
Safety regulations in case of accidental lateral tipping . . . 42
Safety regulations when driving . . . 43
Permissible consumables . . . 45
Oils . . . 45
Hydraulic fluid . . . 46
Battery acid . . . 46

Non-ionising radiation . . . 47

Medical equipment . . . 47

3 Overview

General view of Truck . . . 50

Safety devices and warning labels . . . 51

Control components . . . 52

Switch panel . . . 53

4 Operation

Service plan before initial commissioning . . . 56

Instructions for running-in . . . 56

Pre-shift checks . . . 56

Pre-shift check item . . . 57

Standard equipment 58
Entering and exiting the truck 58
Driver's cab 59
Tilt Cab_Face Lift. 60
Standard driver's seat and comfort driver's seat 63
Luxury driver's seat with automatic weight setting 65
Adjusting the armrest. 68
Adjusting the steering column 69
Seat belt 69
Display unit-Parker 72
Starting and stopping the engine. 74
Emergency off switch 78
Driving 79
Joystick with central lever operation 81
Joystick with single lever operation 87
Steering 91
Horn. 92
Service brake. 92
Parking brake 93
Particulate filter regeneration. 94
Override switch 99
Mirrors 99
Window heater. 100
Heating system, air conditioning 100
Battery access - opening. 108
Trailer coupling 109
To tow the truck. 110
Emergency exit 112

Optional equipment 113
Drive controller 113
5100 040 Multifunction Joystick. 115
6240 005 Load weight display (the weight error of (+ / - 100 kg)) 116
Forklift information management. 117
Lighting 127
Lighting options 130
BlueSpot^{TM} 133
12v Power 134
24v Power 135
12/24v Power. 135
Mechless 1DIN truck radio with USB/AUX/Bluetooth 136
4470 005 Cab vent fan 24v 137
4460 005 Illuminated A4 clipboard 138

4210 010 Buddy seat. 139
4480 005 Storage unit 139
4450 005 With cup holder 140
4202 085 Deluxe Fabric Height Adjustable Heated Suspension Seat 140
Adjusting the driver's seat with rotating device 144
Safety equipment. 145
Fire extinguisher in the cabin. 146
Fire suppression system 147
6310 005 Tire pressure monitoring system 149
Tyre pressure detection system (new) 159
7330 015 Reversing warning system 166
1390 010 Plastic wheel stud covers with movement indicator 167
Operating optional attachments. 167
Coil boom 168
Cold Climate Options. 170
7306 005 Central lubrication system – steer/mast/tilt 177
User instruction 179
Indicator lights 180
Maintenance instructions. 182
Mounting instructions for lowering the lifting heads into the end beams of 178 series spreaders. 186
Multifunctional handle _ 178 spreader. 188

Working with a load 189
Mast, lifting device and attachment controls 189
Load centre distance and load capacity 189
Capacity rating plate 189
Additional capacity rating plate 192
Picking up a load 192
Lifting a load 193
Travelling with load 194
Transporting suspended loads 195
Deposit the load. 197
Before leaving the truck unattended 198

Loading/transporting 199
Hoisting the truck. 199
Transporting the truck 200

Decommissioning the truck 205
Measures before taking the truck out of operation 205
Taking the truck out of service (note) 205
Putting the truck back into service. 206
Disposal of old trucks 207

5 Maintenance

General maintenance . . . 210
Safety information regarding servicing work . . . 210
Inspection and maintenance data . . . 210
Recommended consumables . . . 211
Common rail engine safety warnings . . . 225

Service plan . . . 226
Regular maintenance . . . 226
Service plan table . . . 227
Preparatory tasks . . . 233
Clean the truck . . . 233

Engine . . . 235
Filling fuel . . . 235
Air filter - check . . . 235
Coolant level - check . . . 237
Checking the engine oil level . . . 237
Radiator . . . 239
Fuel filter and oil-water separator . . . 239
Oil and filter . . . 244
Radiator pressure cap . . . 247
Cooling system . . . 248
Aftertreatment diesel exhaust fluid tank filter . . . 258
Belt tensioner . . . 260
Drive belt . . . 262
Rubber damper . . . 265
Overhead mechanism . . . 265
Aftertreatment diesel particulate filter . . . 269
Aftertreatment diesel exhaust fluid injector filter . . . 270

Running gear and drive train . . . 274
Transmission oil level check . . . 274
Check the tyres for damage and foreign objects . . . 274
Tighten the wheel fasteners . . . 275
Locations for jacks when changing wheels . . . 275
Wheel removal — drive axle . . . 276
Wheel refitting — drive axle . . . 280
Check the parking brake for proper operation . . . 285
Brake control mechanism . . . 285
Clean and lubricate the steering axle . . . 286

Chassis and bodywork . . . 288
Filling the windscreen washer bottle . . . 288
Check the condition of structured components . . . 288

Driver's compartment 289
Check seat belt for condition and correct operation (option) 289
Driver’s seat switch 290

Controls 0

Electrical system 291
Check the battery / batteries 291
Check electric cables, connectors and connections for condition and tightness 291

Hydraulic system 292
Hydraulic system: oil level check 292
Hydraulic system: check for leaks 292
Hydraulic tank breather filter - check 293

Lifting system 294
Lubricate the mast and tilt cylinder pivots 294
Lubricate fork carriage cylinder bearings 295
Check the tension of double hoses 296
Check and adjust mast chains, lubricate with chain spray 296
Lubricate the lift mast bearings 297

Troubleshooting 299
Troubleshooting guide (Hydraulic system) 299

6 Technical data

Truck dimensions 302

Overview of type sheets - 600 mm load centre 303

Overview of type sheets - 1200 mm load centre 310

Description of technical datasheet 316

1

Introduction

Truck data

We recommend that you record all basic fork-lift truck data in the following table so that it is available if required by the sales network or authorised service centre.

Type	
Serial number	
Date of delivery	

Your industrial truck

Technical Description

General

The 1411 range of fork trucks with Cummins engine offer the ability to lift capacities up to 16 or 18 tonnes, with lift capacities up to 16 tonnes available at 1200 mm load centre, with lift capacities up to 18 tonnes available at 600 mm. These products are based on 3 wheelbases and use modular components, ensuring the final configured product delivers the optimum balance between weight and manoeuvrability.

Engine

Powered by a new Cummins turbo charged diesel IC engine, The unit is coupled directly to the truck`s ZF 'Ergomatic' transmission which along with the control system controls power output between the load-dependent hydraulic pumps and motion.

Some of the heat generated by the engine is absorbed by the engine coolant flowing through the passages in the cylinder block and cylinder head. Heat is then removed from the engine coolant as it flows through the heat exchanger.

NOTE

It is not permitted to make changes to the engine and its aftertreatment parts.

Electronic engine management

The engine and drive control system are monitored by the truck controller and status is displayed on the truck status display monitor.

In addition to the engine, the engine control module also monitors itself. Depending on the malfunctions/failures which occur, warning and information displays are displayed on the tuck status display monitor. The malfunction is stored in the fault memory and if necessary a safety and emergency mode is automatically selected. If the electronic engine management control detects a fault, the fault code is stored in the control units. It can then be read by a service partner.

Steering

The steering is a hydrostatic power system, which operates the rear wheels with the steering wheel via the steering cylinder.

Brake System

The truck park brake system is a spring applied, pressure release fail-safe system, controlled by the operator via a switch located on the arm rest. The park brake will not release unless the operator has their foot on the service brake pedal to ensure safe operation.

The service brake is a pressure applied, spring release system, operated by connected pedals located either side of the steering column.

Both park and service brake circuits are powered by a fixed displacement gear pump mounted on the front of the main work hydraulic pump. This gear pump is fed by the hydraulic oil reservoir located on the right-hand side of the truck, The oil passes through a pressure filter before feeding the controlling valves. The excess and return oil flow from the brake circuits flushes and cools the oil immersed wet disk brakes in the front drive axle before returning to the oil reservoir via the return filter.

Using sensors, audible and visual warnings will occur in the event of low brake pressure, or if a fault is present in the brake system.

Hydraulic system

A single or tandem (depending on truck variant) variable displacement, load sensing work hydraulic pump is mounted directly to the transmission. The back pump feeds both steering and work hydraulic functions while the front pump (if fitted) feeds the work hydraulic system. These pumps are fitted with

pressure compensators which act as safety valves so that in the event of higher than expected pressure flow is reduced to zero and the maximum pressure is maintained at 310 bar.

An externally mounted in-line priority valve ensures the steering function has priority over work hydraulic functions.

The main hydraulic valve is a group of advanced CANbus controlled, load-independent proportional valves and include primary and secondary relief valves that prevent overload of the hydraulic circuits.

To improve and enhance the safe design of the hydraulic system the control valves are fitted with LVDT spool position feedback sensors which enable the valves to monitor their own condition and broadcast any errors over the CANbus.

The mast lift/lower section incorporate “leak free” valves to eliminate the possibility of mast creep when carrying heavy loads.

A combination cooler ensures that the temperatures are kept optimum for the transmission, engine water and charge air. The cooling direction and cooler location have been carefully developed with the aim of minimising the size of the cooling pack and maintaining best in class cooling performance. The cooled air direction pulls ambient clean air from above the rear of the truck and drives warm air down through the engine bay over the engine and finally out at the front.

Lift mast

The standard mast is a double open centre non-free lift type with twin lift and tilt cylinders, lift chains mounted on each side and are attached to the carriage.

Lift movement is achieved when the lift cylinders extend and the lift chains pull on the carriage, during this extension the inner mast section slides inside channels of the outer section.

The whole mast and carriage assembly is mounted and pivots on two pins that are fixed and located within the fabrications of the drive axle and chassis, Hydraulic operated side shifting is available with a choice of fork section, style and attachment type.

Electrical system

The main truck`s electrical system is 24 volts, this potential is delivered by two 12 v 95 AH batteries connected in series, Charge is provided by the engine mounted alternator and the charge current is controlled by a solid state rectifier.

Electronic/electrical installation

Parker control system allow:

- sensitive, smooth driving and reversing,

- automatic engine speed control to match the hydraulic power requirements,

- fast service due to self-diagnostics,

- greatest possible operational reliability.

Driving cab

The steel frame of the driver`s cab has been constructed to function as the load guard and has been tested to exceed the International safety standards. Driver entry is provided via the steps located to the left side of the truck. Steps are also fitted to the right side of the truck for access. The right cab door can to be used as an emergency exit and is provided for the use of a passenger where the optional passenger seat is fitted and located to the rear left of the cab floor.

The cab and doors have large glazed areas and allow the driver maximum all round visibility during driving and lifting operations.

Screen wiper and washers are fitted to the front, top and rear screens with demist functions as part of the cab heater or the optional climate control system.

An optional passenger seat can be fitted in the right rear corner of the cab.

An optional fire extinguisher can be fitted in the cab if required.

The guard rails is the standard configuration if the truck equipped with the ordinary glass.

Battery access

A compartment for battery access is located on the left side of the truck, which allows you to:

- check the truck batteries
- fill the windscreen washer reservoirs

General

The industrial truck described in these operating instructions conforms with the applicable standards and safety regulations.

The industrial truck is fitted with state-of-the-art technology. Following these operating instructions will allow the industrial truck to be handled safely. By complying with the specifications in these operating instructions, the functionality and the approved features of the industrial truck will be retained.

Get to know the technology, understand it and use it safely - these operating instructions provide the necessary information and help to avoid accidents and to keep the truck ready for operation beyond the warranty period.

Therefore:

– Before commissioning the industrial truck, read the operating instructions and follow the instructions.

– Always follow all the safety information contained in the operating instructions and on the industrial truck.

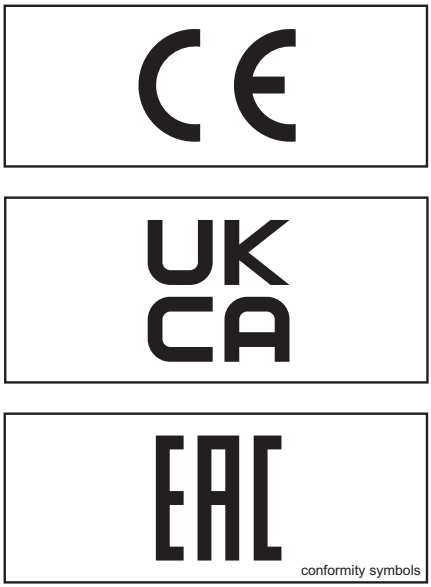
Conformity marking

The manufacturer uses the conformity marking to document the conformity of the industrial truck with the relevant directives at the time of placing on the market:

- CE: in the European Union (EU)
- UKCA: in the United Kingdom (UK)
- EAC: in the Eurasian Economic Union

The conformity marking is applied to the nameplate. A declaration of conformity is issued for the EU and UK markets.

An unauthorised structural change or addition to the industrial truck can compromise safety, thus invalidating the declaration of conformity.



conformity symbols

Declaration that reflects the content of the declaration of conformity

Declaration

STILL GmbH
Berzeliusstraße 10
22113 Hamburg Germany

We declare that the specified machine conforms to the most recent valid version of the directives specified below:

Industrial truck type	**corresponding to these operating instructions**
Model	**corresponding to these operating instructions**

– "Machinery Directive 2006/42/EC" [1)]
– "Supply of Machinery Safety Regulations 2008, 2008 No. 1597" [2)]

Personnel authorised to compile the technical documents:

See declaration of conformity

STILL GmbH

[1)] For the markets of the European Union, the EU candidate countries, the EFTA States and Switzerland.
[2)] For the United Kingdom market.

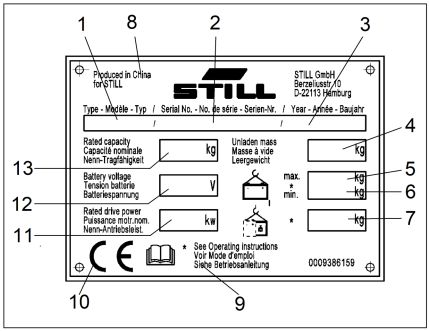
The declaration of conformity document is supplied with the industrial truck. The declaration shown explains the conformity with the provisions of the EC Machinery Directive and the Supply of Machinery Safety Regulation 2008, 2008 No. 1597.

An unauthorised structural change or addition to the industrial truck can compromise safety, thus invalidating the declaration of conformity.

The declaration of conformity must be carefully stored and made available to the responsible authorities if necessary. It must also be handed over to the new owner if the industrial truck is sold on.

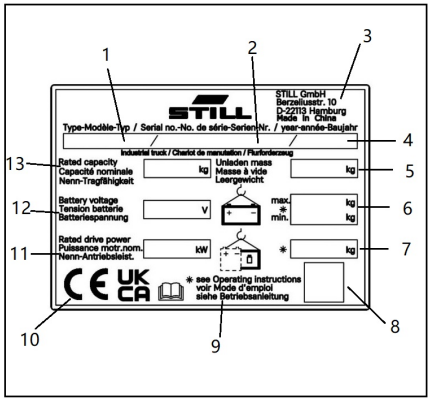
Nameplate

Nameplate, variant 1



1 Type
2 Serial number
3 Year of manufacture
4 Unladen mass in kg
5 Max. permissible battery weight in kg (for electric trucks only)
6 Min. permissible battery weight in kg (for electric trucks only)
7 Own mass (self weight) in kg without battery
8 Manufacturer
9 Refer to technical data listed in this operating instructions for more detailed information
10 CE label
11 Rated drive power in kW
12 Battery voltage in V
13 Rated capacity

Nameplate, variant 2



1 Type
2 Serial number
3 Manufacturer
4 Year of manufacture
5 Unladen mass in kg
6 permissible battery weight in kg (for electric trucks only) Max./Min.
7 Own mass (self weight) in kg without battery
8 Data matrix code
9 Refer to technical data listed in this operating instructions for more detailed information
10 Conformity marking: CE mark for the markets of the EU, the EU candidate countries, the EFTA States and Switzerland UKCA mark for the United Kingdom market EAC mark for the Eurasian Economic Union market
11 Rated drive power in kW

12 Battery voltage in V
13 Rated capacity

NOTE

- *It is possible for there to be multiple conformity markings on the nameplate.*
- *The EAC mark may also be located in the immediate vicinity of the nameplate.*

NOTE

Nameplate provided according to collocation requirements.

Use of the truck

Commissioning

Commissioning is the initial intended use of the truck.

The necessary steps for the commissioning vary depending on the model and equipment of the truck. These steps require preparatory work and adjustment work that cannot be performed by the operating company. See also the chapter entitled "Definition of responsible persons".

– To commission the truck, contact the authorised service centre.

Improper use

The operating company or driver, and not the manufacturer, is liable for any hazards caused by improper use.

NOTE

Please note the definition of the following responsible persons: "operating company" and "driver".

Use for purposes other than those described in these operating instructions is prohibited.



⚠ DANGER

There is a risk of fatal injury from falling off the truck while it is moving!

– It is prohibited to carry passengers on the truck.

The truck may not be operated in areas where there is a risk of explosion, in areas that cause corrosion or in areas that are particularly dusty.

Stacking or unstacking on inclined surfaces or ramps is not permitted.

Precautions

– Do not drive on steep slopes, to prevent the load from slipping off.
– The truck must be switched off when left unattended. Key (or key code) must be

removed when the truck is unattended to prevent unauthorised use.

– When using this truck, pay attention to the surroundings and do not become distracted.
– Please pay attention to the moving parts of the truck to prevent your hands from being crushed.

Description of use and climatic conditions

Normal use

- Indoor and outdoor use
- Ambient temperature of -20°C to +40°C
- Altitude of no higher than 2000 m.

Information about documentation

Documentation scope

- Operating instructions
- Operating instructions for attachment parts (special equipment)
- Spare parts list

These operating instructions describe all measures necessary for the safe operation and proper maintenance of the truck in all possible variants at the time of printing. Special designs to meet customer requirements are documented in separate operating instructions. If you have any questions, please contact your service centre.

Enter the production number and the year of production located on the nameplate in the field provided:

Production no. .....

Year of production .....

Please quote these numbers for all technical enquiries.

Operating instructions are provided with each truck. These instructions must be stored carefully and must be available to the driver and operator at all times.

If the operating instructions are lost, the operator must immediately request a replacement from the manufacturer.

The spare parts list can be reordered there as a spare part.

Personnel responsible for operating and maintaining the equipment must be familiar with these operating instructions.

The operating company (see the chapter “Definition of responsible persons”) must ensure that all operators have received, read and understood these instructions.

Thank you for reading and complying with these operating instructions. If you have any questions or suggestions for improvements, or if you have found any faults, please contact your service centre.

Supplementary documentation

This industrial truck can be fitted with a **C**ustomer **O**ption (**CO**) that deviates from the standard equipment and the variants.

This CO may consist of:

- Special sensors
- A special attachment
- A special towing device
- Customised attachments

When fitted with a CO, the industrial truck is provided with additional documentation. This may take the form of an insert or separate operating instructions.

The original operating instructions for this industrial truck are valid for the operation of standard equipment and variants without restriction. The operational and safety

information in the original operating instructions continues to be valid in its entirety unless it is countermanded in this additional documentation.

The requirements for the qualification of personnel as well as the time for maintenance may vary. This is defined in the additional documentation.

– If you have any questions, contact your authorised service centre.

Issue date and topicality of the operating instructions

The issue date and the version of these operating instructions can be found on the title page.

STILL is constantly engaged in the further development of trucks. These operating instructions are subject to change, and any claims based on the information and/or illustrations contained in them cannot be asserted.

Please contact your authorised service centre for technical support relating to your truck.

Copyright and trademark rights

These instructions, including excerpts thereof, must not be reproduced, translated or made accessible to third parties, except with the express written approval of the manufacturer.

Explanation of signal terms used

⚠ DANGER

Indicates procedures that must be strictly adhered to in order to prevent the risk of fatalities.

⚠ WARNING

Indicates procedures that must be strictly adhered to in order to prevent the risk of injuries.

⚠ CAUTION

Indicates procedures that must be strictly adhered to in order to prevent material damage and/or destruction.

NOTE

For technical requirements that require special attention.

ENVIRONMENT NOTE

To prevent environmental damage.

Date of edition and latest update of this manual

The publication date of these operating instructions is printed on the cover sheet.

The manufacturer makes continuous efforts to improve its industrial trucks with modifications. The manufacturer reserves the right to make such additions to the contents of the truck's operating instructions in a timely manner.

To receive technical assistance, please contact the service centre authorised by your closest manufacturer.

List of abbreviations

This list of abbreviations applies to all types of operating instructions. Not all of the abbreviations that are listed here will necessarily appear in these operating instructions.

Abbreviation	Meaning	Explanation
ArbSchG	Arbeitsschutzgesetz	German implementation of EU occupational health and safety directives
Betr-SichV	Betriebssicherheitsverordnung	German implementation of the EU working equipment directive
BG	Berufsgenossenschaft	German insurance company for the company and employees
BGG	Berufsgenossenschaftlicher Grundsatz	German principles and test specifications for occupational health and safety
BGR	Berufsgenossenschaftliche Regel	German rules and recommendations for occupational health and safety
DGUV	Berufsgenossenschaftliche Vorschrift	German accident prevention regulations
CE	Communauté Européenne	Confirms conformity with product-specific European directives (CE labelling)
CEE	Commission on the Rules for the Approval of the Electrical Equipment	International commission on the rules for the approval of electrical equipment
DC	Direct Current	Direct current
DFÜ	Datenfernübertragung	Remote data transfer
DIN	Deutsches Institut für Normung	German standardisation organisation
EG	European Community	
EN	European standard	
FEM	Fédération Européene de la Manutention	European Federation of Materials Handling and Storage Equipment

Abbreviation	Meaning	Explanation
F_{max}	maximum Force	Maximum power
GAA	Gewerbeaufsichtsamt	German authority for monitoring/issuing regulations for worker protection, environmental protection, and consumer protection
GPRS	General Packet Radio Service	Transfer of data packets in wireless networks
ID no.	Identification number	
ISO	International Organization for Standardization	International standardisation organisation
K_{pA}	Uncertainty of measurement of sound pressure levels	
LAN	Local Area Network	Local area network
LED	Light Emitting Diode	Light emitting diode
L_p	Sound pressure level at the workplace	
L_{pAZ}	Average continuous sound pressure level in the driver's compartment	
LSP	Load centre of gravity	Distance of the centre of gravity of the load from the front face of the fork backs
MAK	Maximum workplace concentration	Maximum permissible air concentrations of a substance at the workplace
Max.	Maximum	Highest value of an amount
Min.	Minimum	Lowest value of an amount
PIN	Personal Identification Number	Personal identification number
PPE	Personal protective equipment	
SE	Super-Elastic	Superelastic tyres (solid rubber tyres)
SIT	Snap-In Tyre	Tyres for simplified assembly, without loose rim parts
StVZO	Straßenverkehrs-Zulassungs-Ordnung	German regulations for approval of vehicles on public roads
TRGS	Technische Regel für Gefahrstoffe	Ordinance on hazardous materials applicable in the Federal Republic of Germany
UKCA	United Kingdom Conformity Assessed	Confirms conformity with the product-specific directives that apply in the United Kingdom (UKCA labelling)
VDE	Verband der Elektrotechnik Elektronik Informationstechnik e. V.	German technical/scientific association
VDI	Verein Deutscher Ingenieure	German technical/scientific association

Abbreviation	Meaning	Explanation
VDMA	Verband Deutscher Maschinen- und Anlagenbau e. V.	German Mechanical Engineering Industry Association
WLAN	Wireless LAN	Wireless local area network

Environmental considerations

Packaging

During delivery of the truck, certain parts are packaged to provide protection during transport. This packaging must be removed completely prior to initial start-up.

ENVIRONMENT NOTE

The packaging material must be disposed of properly after delivery of the truck.

Disposal of components and batteries

The truck is composed of different materials. If components or batteries need to be replaced and disposed of, they must be:

- disposed of,
- treated or
- recycled in accordance with regional and national regulations.

NOTE

The documentation provided by the battery manufacturer must be observed when disposing of batteries.

ENVIRONMENT NOTE

We recommend working with a waste management company for disposal purposes.

EMC – Electromagnetic compatibility

Electromagnetic compatibility (EMC) is a key quality feature of the truck.

EMC involves

- limiting the emission of electromagnetic interference to a level that ensures the troublefree operation of other equipment in the environment.
- ensuring sufficient resistance to external electromagnetic interference so as to guarantee proper operation at the planned usage location under the electromagnetic interference conditions to be expected there .

An EMC test thus firstly measures the electromagnetic interference emitted by the truck and secondly checks it for sufficient resistance to electromagnetic interference with reference to the planned usage location . A number of electrical measures are taken to ensure the electromagnetic compatibility of the truck .

⚠ CAUTION

The EMC regulations for the truck must be observed.

When replacing truck components the protective EMC components must be installed and connected again.

Servicing and spare parts

For questions relating to scheduled maintenance and repairs to forklift trucks, please contact the authorised service network.

The authorised service network has personnel trained by the manufacturer, original spare parts and the tools necessary to carry out maintenance and repairs.

Servicing by the authorised service network and the use of original spare parts retain the technical properties of the forklift truck in the long term.

Only original spare parts provided by the manufacturer may be used for maintenance and repairs performed on forklift trucks. The use of non-original spare parts invalidates the warranty and renders the customer responsible for any accidents due to the incompatibility of the non-original parts.

Modifications and retrofitting

If the truck will be used for work that is not listed in the directives or in these instructions, convert or retrofit the truck for this purpose as required. Any structural modification can impair the handling and stability of the truck, and can result in accidents.

Modifications and retrofitting

Any modifications that adversely affect the stability, the load capacity or the circumferential view of the truck require written approval from the manufacturer.

The following components may only be modified with prior written approval from the manufacturer:

- Brakes
- Steering
- Operating devices
- Safety systems
- Equipment variants
- Attachments

The truck may only be converted with written approval from the manufacturer. If necessary, obtain approval from the relevant authorities.

– Only the authorised service centre is permitted to perform welding work on the truck.

We warn against installing and using restraint systems that have not been approved by the manufacturer.

– Contact the authorised service centre before converting or retrofitting the truck.

The operating company is only permitted to make modifications to the truck independently if the manufacturer goes into liquidation and the company is not taken over by another legal person.

The operating company must also fulfil the following prerequisites:

- Design documents, test documents and assembly instructions associated with the modification must be permanently archived and remain accessible at all times.
- The capacity rating plate, the decal information, the hazard warnings and the operating instructions must be checked to ensure that they are consistent with the modifications and must be amended if required.
- Modifications must be designed, checked and implemented by a design office that specialises in industrial trucks. The design office must comply with the standards and directives valid at the time that modifications are made.

Decal information with the following data must be permanently affixed to the truck so that it is clearly visible:

- Type of modification
- Date of modification
- Name and address of the company that carried out the modification

Using attachments

The truck can be equipped with attachments.

Please ask your authorised service centre about using these attachments. The following points must be addressed during the consultation:

- Is the attachment suitable for the truck?
- How will the attachment affect the load capacity of the truck? A residual load capacity rating plate must be created

⚠ CAUTION

Attaching a crane arm changes the original intended use of the forklift truck, which may not be designed for transporting free-swinging suspended loads. The use of this kind of equipment requires specific approval; the CE Declaration of Conformity is also required for any forklift trucks fitted with this kind of equipment. If this kind of equipment is to be used, you must contact your authorised service centre.

Using working platforms

⚠ WARNING

The use of working platforms is regulated by national law. The use of working platforms is only permitted by virtue of the jurisdiction in the country of use.

– Observe national legislation.

– Before using working platforms, consult the national regulatory authorities.

2

Safety

Definition of terms used for responsible persons

Operating company

The operating company is the natural or legal person or group who operates the truck or on whose authority the truck is used.

The operating company must ensure that the truck is only used for its proper purpose and in compliance with the safety regulations set out in these operating instructions.

The operating company must ensure that all users read and understand the safety information.

The operating company is responsible for the scheduling and correct performance of regular safety checks.

We recommend that the national performance specifications are adhered to.

Specialist

A qualified person is defined as a service engineer or a person who fulfils the following requirements:

- A completed vocational qualification that demonstrably proves their professional expertise. This proof should consist of a vocational qualification or a similar document.
- Professional experience indicating that the qualified person has gained practical experience of industrial trucks over a proven period during their career During this time, this person has become familiar with a wide range of symptoms that require checks to be carried out, such as based on the results of a hazard assessment or a daily inspection
- Recent professional involvement in the field of the industrial truck test in question and an appropriate further qualification are essential. The qualified person must have experience of carrying out the test in question or of carrying out similar tests. Moreover, this person must be aware of the latest technological developments regarding the industrial truck to be tested and the risk being assessed

Drivers

This truck may only be driven by suitable persons who are at least 18 years of age, have been trained in driving, have demonstrated their skills in driving and handling loads to the operating company or an authorised representative, and have been specifically instructed to drive the truck. Specific knowledge of the truck to be operated is also required.

The training requirements under §3 of the Health and Safety at Work Act and §9 of the plant safety regulations are deemed to have been satisfied if the driver has been trained in accordance with BGG (General Employers' Liability Insurance Association Act) 925. Observe the national regulations for your country.

Driver rights, duties and rules of behaviour

The driver must be trained in his rights and duties.

The driver must be granted the required rights.

The driver must wear protective equipment (protection suit, safety footwear, safety helmet, industrial goggles and gloves) that is appropriate for the conditions, the job and the load to be lifted. Solid footwear should be worn to ensure safe driving and braking.

The driver must be familiar with the operating instructions and have access to them at all times.

The driver must:

- have read and understood the operating manual
- have familiarised himself with safe operation of the truck
- be physically and mentally able to drive the truck safely

⚠ DANGER

The use of drugs, alcohol or medications that affect reactions impair the ability to drive the truck!

Individuals under the influence of the aforementioned substances are not permitted to perform work of any kind on or with the truck.

Prohibition of use by unauthorised persons

The driver is responsible for the truck during working hours. He must not allow unauthorised persons to operate the truck.

When leaving the truck, the driver must secure it against unauthorised use, e.g. by pulling out the key.

Basic principles for safe operation

Insurance cover on company premises

The company premises are very often restricted public traffic areas.

NOTE

It is advisable to review the operational liability insurance so that insurance covers the truck with respect to third parties in the event of damage caused in restricted public traffic areas.

Modifications and retrofitting

If the industrial truck will be used for work that is not listed in the directives or in these instructions, the industrial truck must be converted or retrofitted for this purpose as required. Any structural modification can impair the handling and stability of the industrial truck, and can result in accidents.

Any modifications that adversely affect stability, load capacity and the circumferential view from the industrial truck require written approval by the manufacturer.

The following components may only be modified with prior written approval from the manufacturer:

- Brakes
- Steering
- Operating devices
- Safety systems
- Equipment variants
- Attachments

The industrial truck may be converted only with written approval by the manufacturer. If necessary, obtain approval from the relevant authorities.

– Only the authorised service centre is permitted to perform welding work on the industrial truck.

We warn against installing and using restraint systems that have not been approved by the manufacturer.

– Contact the authorised service centre before converting or retrofitting the truck.

Only the authorised service centre is permitted to perform welding work on the industrial truck.



⚠ DANGER

Risk of explosion from additional holes in the area surrounding the battery!

Explosive gases can escape and can lead to potentially fatal injuries if they explode. Sealing bores with plugs is not sufficient to prevent gas from escaping.

– Do not drill holes in the area surrounding the battery.

The operating company is permitted to make modifications to the industrial truck independently only if the manufacturer goes into liquidation and is not taken over by another legal person.

The operating company must also fulfil the following prerequisites:

- Design documents, test documents and assembly instructions associated with the modification must be permanently archived and remain accessible at all times.
- The capacity rating plate, the decal information, the hazard warnings and the operating instructions must be checked to ensure that they are consistent with the modifications and must be amended if required.
- Modifications must be designed, checked and implemented by a design office that specialises in industrial trucks. The design office must comply with the standards and directives valid at the time that modifications are made.

Decal information with the following data must be permanently affixed to the industrial truck so that it is clearly visible:

- Type of modification
- Date of modification
- Name and address of the company that carried out the modification

Warning regarding non-original parts

Original parts, attachments and accessories are specially designed for this truck. We draw your attention to the fact that parts, attachment parts and accessories supplied by other companies have not been tested or approved by STILL.

⚠ CAUTION

The installation or use of such products may have a negative impact on the design of the truck and thus impair active or passive driving safety.

We recommend that you obtain approval from the manufacturer and, if applicable, from the relevant regulatory authorities before installing such parts. The manufacturer accepts no liability for any damage caused by the use of non-original parts and non-original accessories.

Damage, faults

Any damage or faults observed on the truck or the accessories must be reported immediately to the responsible personnel. The truck and accessories must never be used before they are correctly reconditioned as they cannot be guaranteed to be safe for operating or driving.

The safety mechanisms and switches must never be removed or disabled. The predefined setpoint values must not be modified.

Work on the electric installation (e.g. connecting a radio, additional lights or other accessories) is permitted only with the approval of the manufacturer.

Medical devices

The operation of medical devices, for example pacemakers or hearing aids, can be impaired. Check with your doctor or manufacturer if the medical devices are sufficiently protected against electromagnetic interference.

Emissions

Noise emission values

Calculated during the test cycle performed in accordance with standard EN 12053

Acoustic pressure level on the driver's compartment		
ECH 15	L_{PAZ}	<70

NOTE

Lower or higher noise values may occur when using industrial trucks , e.g. due to the mode of operation, environmental factors and other sources of noise.

Vibrations

Vibrations to which the hands and arms are exposed

The following value is valid for all truck models:

- Vibration characteristics < 2.5 m/s^2

NOTE

It is mandatory to specify the hand-arm vibrations, even where the values do not indicate any danger, as in this case.

⚠ CAUTION

The value expressed above can be used to compare forklift trucks of the same category. It cannot be used to determine the operator's daily exposure to vibrations during real operation of the truck; these vibrations depend on the conditions of use (floor conditions, method of use etc.) and therefore daily exposure must be calculated using data from the place of use.

Wheels and tyres

⚠ DANGER

Risk to stability!

Failure to observe the following information and instructions can lead to a loss of stability. The truck may tip over — risk of accident!

The following factors can lead to a loss of stability and are therefore **prohibited**:

- Wheels not approved by the manufacturer
- Excessive wear to the tyres
- Tyres of inferior quality
- Changes to the wheel rims
- Combination of wheels from different manufacturers

The following rules must be observed to ensure stability:

- Only use wheels with equal and permitted levels of wear to the tyres.
- Only use tyres of the original tyre type.
- Only use wheels approved by the manufacturer.
- Only use high-quality products.

When changing wheels, always ensure that this does not cause the truck to tilt to one side (e.g. always replace right and left wheels at the same time). Changes must only be made following consultation with the manufacturer.

Wheels approved by the manufacturer can be found on the spare parts list. If other wheels are to be used, authorisation from the manufacturer must be obtained beforehand.

– Contact your authorised service centre regarding this matter.

Residual risks

Residual dangers, residual risks

Despite working with care and complying with the standards and regulations, the possibility of other dangers arising when using the truck cannot be ruled out.

The truck and all other system components comply with current safety requirements. Even when the industrial truck is used in accordance with its intended use and all instructions provided are followed, some residual risk cannot be excluded.

A residual risk cannot be excluded even beyond the narrow limits of the danger area that the truck itself represents. In order to be able to react immediately in the event of a malfunction, an incident, a breakdown etc., persons in the danger area must pay increased attention to the truck.

⚠ WARNING

All persons in the danger area of the truck must be aware of the dangers posed by the truck.

In addition, your attention is drawn to the safety regulations given in these operating instructions.

Risks can include:

- Escape of consumables due to leakages, rupture of lines and containers etc.
- Risk of accident when driving over difficult ground such as gradients, very smooth or uneven surfaces, or with poor visibility etc.
- Falling, tripping etc. on the truck, especially in wet weather, with leaking consumables or on icy surfaces
- Risk of fire and explosion from the batteries and electrical voltages
- Human error resulting from failure to observe the safety regulations
- Unrepaired damage or faulty and worn components
- Insufficient maintenance and testing
- Use of incorrect consumables
- Exceeding test intervals

If the operating company negligently or intentionally fails to comply with these require-

ments, this can lead to an accident. In this case, the manufacturer is exempt from liability.

Stability

The stability of the truck has been tested to the latest technological standards. If the truck is used in the proper manner and in accordance with its intended use, the stability of the truck is guaranteed. These standards only take into account the dynamic and static tipping forces that can arise when used in accordance with the specified operating rules and intended use. The danger of exceeding the moment of tilt and losing stability due to improper or incorrect operation can never be ruled out.

The loss of stability can be avoided or minimised by complying with following principles:

- Always secure the load against slipping, e.g. by lashing.
- Always transport unstable loads in suitable containers.
- Always drive slowly when cornering.
- Drive with the load lowered.
- On trucks fitted with a sideshift, align and transport loads such that the load centre of gravity is positioned centrally to the truck.
- Avoid turning and diagonally driving across slopes or gradients.
- Never have the load facing downhill when travelling on slopes or gradients.
- Always take great care when transporting suspended loads.
- Do not drive over ramp edges or steps.

Special risks associated with using the truck and attachments

Approval from the manufacturer and attachment manufacturer must be obtained each time the truck is used in a manner that falls outside the scope of normal use, and in cases where the driver is not certain that he can

use the truck correctly and without the risk of accidents.

Overview of hazards and countermeasures

NOTE

This table is intended to help evaluate the hazards in your facility and applies to all drive types. It does not claim to be complete.

– Observe the national regulations for the country in which the truck is being used.

Hazard	Course of action	Check note √ done - Not applicable	Notes
Truck equipment does not comply with local regulations	Testing	O	If in doubt, consult the responsible factory inspectorate or employers' liability insurance association
Driver's lack of skills or qualifications	Driver training (sit-on and stand-on)	O	DGUV principle 308-001 VDI 3313 driver's licence
Usage by unauthorised persons	Access with key only for authorised persons	O	
Truck not safe for operation	Periodic inspection and rectification of defects	O	German Ordinance on Industrial Safety and Health (BetrSichV)
Risk of falling when using working platforms	Compliance with national regulations (different national laws)	O	German Ordinance on Industrial Safety and Health (BetrSichV) and employer's liability insurance associations
Impaired visibility due to load	Application planning	O	German Ordinance on Industrial Safety and Health (BetrSichV)
Contamination of breathable air	Assessment of diesel exhaust gases	O	Technical Regulations for Hazardous Substances (TRGS) 554 and the German Ordinance on Industrial Safety and Health (BetrSichV)
	Assessment of LPG exhaust gases	O	German threshold limit values list (MAK-Liste) and the German Ordinance on Industrial Safety and Health (BetrSichV)

Hazard	Course of action	Check note √ done - Not applicable	Notes
Impermissible usage (improper usage)	Provide operating instructions	O	German Ordinance on Industrial Safety and Health (BetrSichV) and German Health and labour protection law (ArbSchG)
	Written notice of instruction to driver	O	German Ordinance on Industrial Safety and Health (BetrSichV) and German Health and labour protection law (ArbSchG)
	German Ordinance on Industrial Safety and Health (BetrSichV), observe the operating instructions	O	
When fuelling			
a) Diesel	German Ordinance on Industrial Safety and Health (BetrSichV), observe the operating instructions	O	
b) LPG	DGUV regulation 79, observe the operating instructions	O	
When charging the drive battery	German Ordinance on Industrial Safety and Health (BetrSichV), observe the operating instructions	O	VDE 0510-47 (= DIN EN 62485-3): In particular - Ensure adequate ventilation - Insulation value within the permissible range
When using battery chargers	German Ordinance on Industrial Safety and Health (BetrSichV), DGUV rule 113-001 and observe the operating instructions	O	German Ordinance on Industrial Safety and Health (BetrSichV) and DGUV rule 113-001
When parking LPG trucks	German Ordinance on Industrial Safety and Health (BetrSichV),	O	German Ordinance on Industrial Safety and Health (BetrSichV) and DGUV rule 113-001

Hazard	Course of action	Check note √ done - Not applicable	Notes
	DGUV rule 113-001 and observe the operating instructions		
When operating driverless transport systems			
Roadway quality inadequate	Clean/clear roadways	O	German Ordinance on Industrial Safety and Health (BetrSichV)
Loading equipment incorrect/slipped	Reposition load on pallet	O	German Ordinance on Industrial Safety and Health (BetrSichV)
Unpredictable driving behaviour	Employee training	O	German Ordinance on Industrial Safety and Health (BetrSichV)
Routes blocked	Mark routes Keep roadways clear	O	German Ordinance on Industrial Safety and Health (BetrSichV)
Routes intersect	Announce right-of-way rule	O	German Ordinance on Industrial Safety and Health (BetrSichV)
No person detection when placing goods into stock and removing goods from stock	Employee training	O	German Ordinance on Industrial Safety and Health (BetrSichV)

Danger to employees

According to the German Ordinance on Industrial Safety and Health (BetrSichV) and labour protection law (ArbSchG), the operating company must determine and assess hazards during operation, and establish the labour protection measures required for employees (BetrSichVO). The operating company must therefore draw up appropriate operating instructions (§ 6 ArbSchG) and nominate a person who is responsible for these operating instructions. Drivers must be informed of the operating instructions that apply to them.

NOTE

Please note the definition of the following responsible persons: "operating company" and "driver".

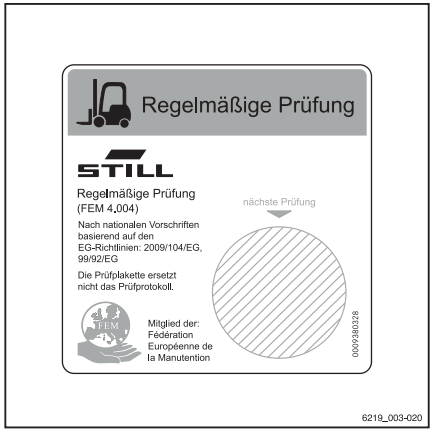
The design and equipment of the truck comply with the standards and directives required for CE conformity. The design and equipment also comply with the standards and directives necessary for the UKCA compliance that is required in the United Kingdom. The design and equipment are therefore not part of the required scope of the hazard assessment. The same applies to attachments with their own CE labelling and UKCA labelling. The operating company must, however, select the type and equipment of the trucks so as to comply with the local provisions for deployment.

The result of the hazard assessment must be documented (§ 6 ArbSchG). In the case of truck applications involving similar hazard situations, the results may be summarised. Refer to the chapter entitled "Overview of hazards and countermeasures", which provides advice on complying with this regulation. The overview specifies the primary hazards that, in the event of non-compliance, are the most frequent causes of accidents. If other major hazards are present as a result of the specific operating conditions, these hazards must also be taken into consideration.

The conditions of use for trucks are broadly similar in many plants, so the hazards can be summarised in one overview. Observe the information provided by the relevant employers' liability insurance association on this subject.

Safety tests

Carrying out regular inspections on the truck ▷



The operating company must ensure that the truck is checked by a specialist at least once a year or after particular incidents.

As part of this inspection, the technical condition of the truck must be completely tested with regard to accident safety. In addition, the truck must be thoroughly checked for damage that may have been caused by improper use. A test log must be created. The results of the inspection must be retained at least until a further two inspections have been carried out.

The inspection date is indicated by an adhesive label on the truck.

– Arrange for the authorised service centre to perform regular testing on the truck.
– Observe the guidelines for tests carried out on the truck in accordance with FEM 4.004.

The operating company is responsible for ensuring that any defects are remedied without delay.

– Notify your authorised service centre.

NOTE

In addition, observe the national regulations for the country of use.

Insulation testing

The insulation of the truck must have sufficient insulation resistance. For this reason, insulation testing in accordance with DIN EN 1175 and DIN 43539, VDE 0117 and VDE 0510 must be conducted at least once yearly as part of the FEM testing.

The insulation testing results must be at least the test values given in the following two tables.

– For insulation testing, contact the authorised service centre.

The exact procedure for this insulation testing is described in the workshop manual for this truck.

NOTE

The truck's electrical system and drive batteries must be checked separately.

Test values for the drive battery

Component	Recommended test voltage	Measurements		Nominal voltage U_{Batt}	Test values
Battery	50 VDC	Batt+ Batt-	Battery tray	24 volts	> 1200 Ω
	100 VDC			48 volts	> 2400 Ω
	100 VDC			80 volts	> 4000 Ω

Test values for the entire truck

Nominal voltage	Test voltage	Test values for new trucks	Minimum values over the duration of the service life
24 volts	50 VDC	Min. 50 kΩ	> 24 kΩ
48 volts	100 VDC	Min. 100 kΩ	> 48 kΩ
80 volts	100 VDC	Min. 200 kΩ	> 80 kΩ

Safety regulations for handling consumables

Exhaust gases

⚠ CAUTION

Risk to health from exhaust gases! Exhaust gases from internal combustion engines are harmful to your health. In particular, the soot particles contained in the diesel exhaust gas can cause cancer. Letting the combustion engine idle runs a risk of poisoning from the CO, CH and NO_x components contained in the exhaust gas

Modern exhaust gas treatment systems (e.g. catalytic converters, particle filters or comparable systems) can clean exhaust gases in a way that reduces the health hazard and risk of poisoning when operating the truck.

– Observe the national laws and regulations when using trucks with an internal combustion engine in entirely or partially enclosed working areas.

– Always ensure sufficient ventilation.

Safety guidelines for using the truck

- The operator must be trained and qualified according to national regulations. The operator must have knowledge of the operation and performance of the truck. The operator must use the truck with due care in accordance with their driving ability and experience.
- Any defect (squeaking, leaks etc.) must be promptly reported because, if neglected, it could cause more serious malfunctions.
- Carry out the checks indicated in the "Daily checks" chapter.

ENVIRONMENT NOTE

Report any oil and/or battery fluid leaks: they are dangerous and highly polluting.

⚠ CAUTION

If you notice a burning smell, stop the truck and press the emergency stop button.

Safety regulations in case of accidental lateral tipping

If as a result of incorrect manoeuvring the truck appears to be tipping over sideways, carefully follow the instructions below:

a) Do not leave the forklift truck.

b) Tilt your head forward and move your body in the opposite direction to which the forklift is tipping.

c) Remain firmly seated, grip the steering wheel and dig your heels in. Wait until the truck has reached a stable position before leaving the truck.

Safety regulations when driving

Driving conduct

The driver must follow the public rules of the road when driving in company traffic.

The speed must be appropriate to the local conditions.

For example, the driver must drive slowly around corners, in tight passageways, when driving through swing-doors, at blind spots, or on uneven surfaces.

The driver must always maintain a safe braking distance from vehicles and persons in front, and must always have the truck under control. Stopping suddenly, turning quickly and overtaking at dangerous or blind spots must be avoided.

– Initial driving practice must be carried out in an empty space or on a clear roadway.

The following are forbidden during driving:

- Allowing arms and legs to hang outside the truck
- Leaning the body over the outer contour of the truck
- Climbing out of the truck
- Moving the driver's seat
- Adjusting the steering column
- Releasing the seat belt
- Disabling the restraint system
- Raising the load higher than 300 mm above the ground (with the exception of manoeuvring processes during the placement into stock/removal from stock of loads)
- Using electronic devices, for example radios, mobile phones etc.

⚠ WARNING

The use of multimedia and communication equipment as well as playing these devices at an excessive volume during travel or when handling loads can affect the operator's attention. There is a risk of accident!

– Do not use devices during travel or when handling loads.

– Set the volume so that warning signals can still be heard.

⚠ WARNING

In areas where use of mobile phones is prohibited, use of a mobile phone or radio telephone is not permitted.

– Switch off the devices.

Visibility when driving

The driver must look in the drive direction and have a sufficient view of the driving lane.

Particularly for reverse travel, the driver must be sure that the driving lane is clear.

When transporting goods that impair visibility, the driver must drive the truck in reverse.

If this is not possible, a second person acting as a guide must walk in front of the truck.

In this case the driver must only move at walking pace and with extra care. The truck must be stopped immediately if eye contact with the guide is lost.

Rear-view mirrors are only to be used for observing the road area behind the truck and not for reverse travel. If visual aids (mirror, monitor) are necessary to achieve sufficient visibility, it is necessary to practise using them. For reverse travel using visual aids, extra care should be taken.

When using attachments, special conditions apply; see the chapter entitled "Fitting attachments".

Any glass (variant, e.g. windscreen) and mirrors must always be clean and free of ice.

Permissible consumables

⚠ WARNING

Consumables can be dangerous.

It is necessary to follow the safety regulations when handling these substances.

Refer to the maintenance data table for the permissible substances necessary for operation.

Oils



⚠ DANGER

Oils are flammable!

- Follow the statutory regulations
- Do not allow oils to come into contact with hot motor parts.
- No smoking, fires or flames!



⚠ DANGER

Oils are toxic!

- Avoid contact and consumption
- In case of inhalation of steam or fumes, breathe fresh air immediately.
- After contact with the eyes, rinse thoroughly with water (for at least 10 minutes) and then consult an eye specialist.
- If swallowed, do not induce vomiting. Seek immediate medical attention.



⚠ WARNING

Prolonged intensive contact with the skin can result in loss of skin oils and cause irritation.

- Avoid contact and consumption.
- Wear protective gloves!
- After any contact, wash the skin with soap and water and then apply a skin care product.
- Immediately change soaked clothing and shoes.

⚠ WARNING

There is a risk of slipping on spilled oil, particularly when combined with water!

- Collect spilled oil immediately using an oil-binding agent and dispose of it in accordance with regulations.

ENVIRONMENT NOTE

Oils are water pollutants!

Always store oil in containers that comply with the applicable regulations.

Avoid spilling oils.

Collect spilt oil immediately using an oil binding agent and dispose of it in accordance with regulations.

Dispose of old oils according to the applicable regulations.

Hydraulic fluid



⚠ WARNING

During operation of the forklift truck, hydraulic fluids are pressurised and are hazardous to your health.

- Do not spill these fluids!
- Follow the statutory regulations
- Do not allow the fluids to come into contact with hot motor parts.
- Do not allow to come into contact with the skin.
- Avoid inhaling the spray
- Penetration of pressurised fluids into the skin is particularly dangerous if these fluids escape at high pressure due to leaks in the hydraulic system. In case of such injury, seek medical advice immediately.
- To avoid injury, use appropriate personal protective equipment (e.g. protective gloves, industrial goggles, skin protection and skin care products).



ENVIRONMENT NOTE

Hydraulic fluid is a water-polluting substance!

Always store hydraulic fluid in containers complying with the regulations.

Avoid spilling.

Spilt hydraulic fluid should be removed with oil-binding agents at once and disposed of according to the regulations.

Dispose of old hydraulic fluid according to regulations.

Battery acid



⚠ WARNING

Battery acid contains dissolved sulphuric acid. This is toxic.

- Avoid touching or swallowing the battery acid at all costs.
- In case of injury, seek medical advice immediately.



⚠ WARNING

Battery acid contains dissolved sulphuric acid. This is corrosive.

- When working with battery acid, use appropriate PSA (rubber gloves, apron, protection goggles).
- When working with battery acid, never wear a watch or jewellery.
- Do not allow any acid to get onto clothing or skin or into the eyes. If this does happen, rinse immediately with plenty of clean water.
- In case of injury, seek medical advice immediately.
- Immediately rinse away spilt battery acid with plenty of water.
- Follow the statutory regulations.

ENVIRONMENT NOTE

- Dispose of used battery acid in line with the applicable regulations.

Non-ionising radiation

If the forklift truck is fitted at the factory or at a later date with equipment that emits non-ionising radiation (such as radio transmitters, RFID transmitters, data terminals, scanners etc.), the compatibility of this equipment with medical devices (such as pacemakers and hearing aids) must be tested and verified.

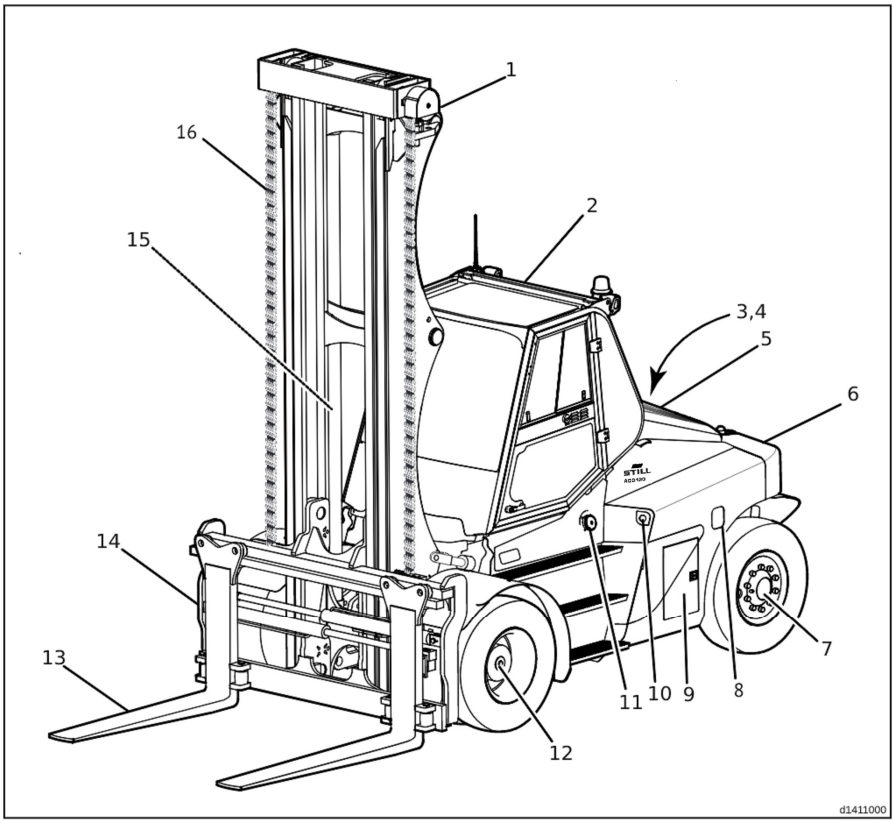
Medical equipment

When a driver is wearing medical equipment, e.g. heart pacemaker or hearing aids, the operation of this equipment may be affected. A doctor or the manufacturer of the medical equipment should be asked whether the equipment is sufficiently protected against electromagnetic interference.

3

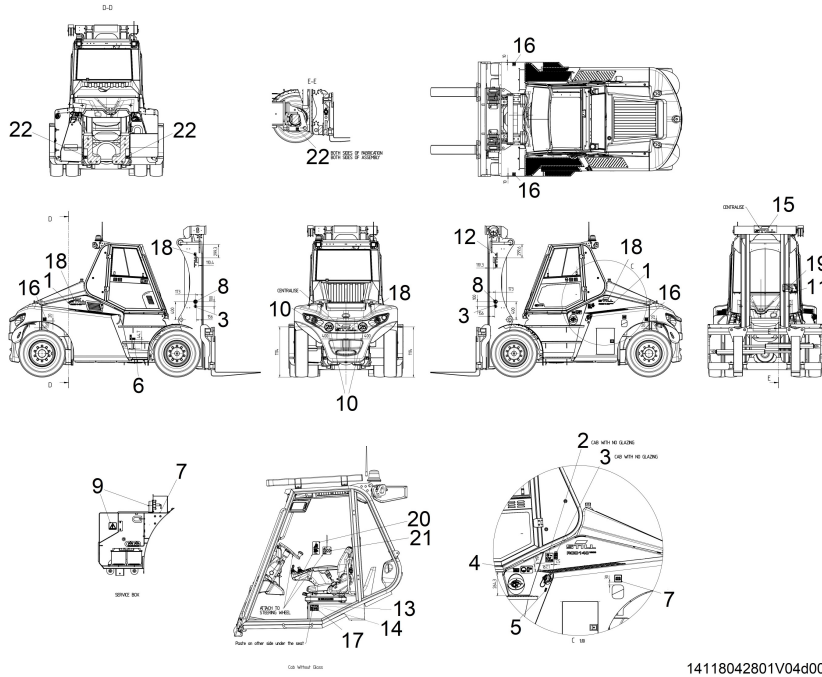
Overview

General view of Truck



1	Lift Mast
2	Cab
3, 4	Hydraulic cooler, Radiator
5	Radiator Grille
6	Counterweight
7	Steer axle
8	Battery isolator
9	Battery compartment
10	Adblue® filler
11	Fuel filler
12	Drive axle
13	Forks
14	Fork carriage
15	Lift cylinder
16	Lift chains

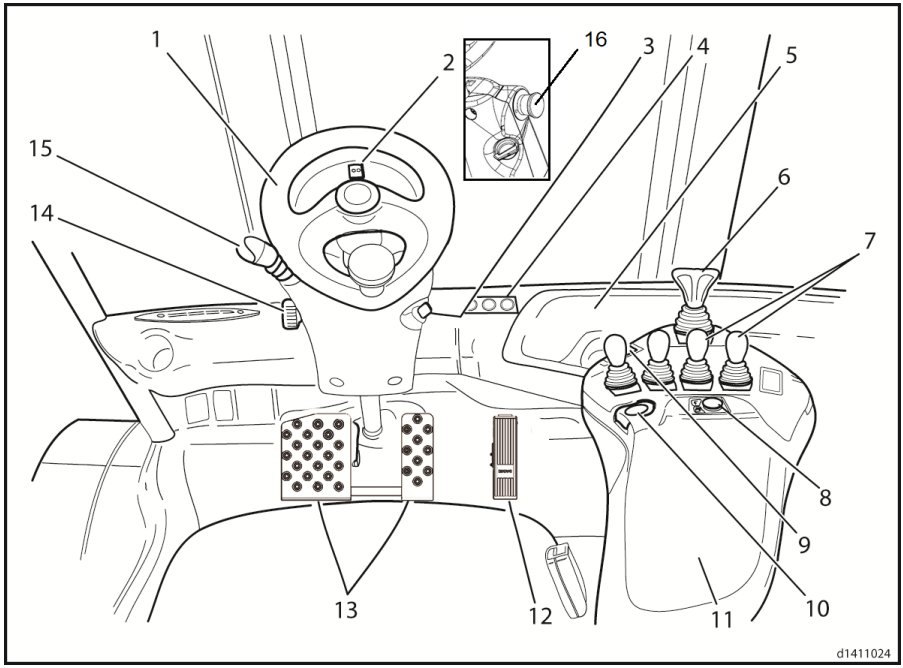
Safety devices and warning labels



14118042801V04d001

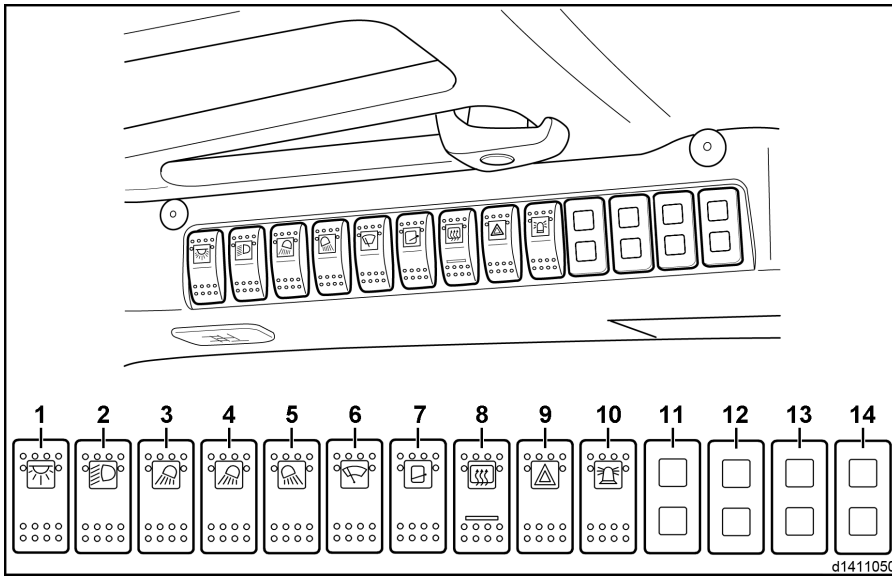
1	Type label	13	Made in China label (for export with CE/UK-CA)
2	label 'lwa 105dB cab with no glazing	14	Importer (for UK)
3	Label,read the operating manual	15	Still logo
4	Diesel oil indicator sticke	16	Tyre pressure label
5	label 'adblue	17	Nameplate
6	label 'SAE 10W-30	18	Still logo
7	label 'BATTERY ISOLATOR	19	Label,read the operating manual
8	“Do not stand under forks” label	20	Wheel torque card
9	label - electrical danger	21	Label,read the operating manual
10	label '25 km/h	22	symbol insert 'ISO 3287-16x12
11	Label,read the operating manual		
12	Still logo		

Control components



1	Steering wheel	10	Horn
2	Turn indicator	11	Handhold
3	Key switch/start switch	12	Accelerator pedal
4	Heater control (climate control)	13	Brake pedal
5	Storage area	14	Clamping screw for steering column adjustment
6	Direction lever	15	Multiple function electrical control lever
7	Central control levers (joysticks)	16	Emergency off switch
8	Driver control unit (optional)		
9	Parking brake switch		

Switch panel



The switch panel is mounted at the top right of the overhead guard.

1 Terminal board light and interior lighting
2 Standard or higher lighting
3 Working spotlight position 1/2
4 Working spotlight position 3/4 or working spotlight position 5/6
5 Working spotlight position 7/8
6 Front windscreen wiper and rear window wiper — continuous operation on/off (interval depends on the drive direction and the washer system is always activated)
7 Roof panel wiper - intermittent mode or continuous operation on/off (washer system is activated)
8 Rear window heating
9 Strobe beacon
10 Rotating beacon, flashing beacon or BlueSpot
11 Blank
12 Blank
13 Blank
14 Blank

NOTE

The configuration of the switch panel and arrangement of individual switches may vary, depending on the version. Observe the switch symbols.

4

Operation

Service plan before initial commissioning

Engine
Fill up with fuel
Check engine oil level
Check engine coolant level
Fill with Adblue® and check for leaks
Drive mechanism and transmission system
Check the oil level in the gearbox
Check the level of drive axle oil.
Tighten the wheel fasteners
Check the tyre pressure
Check the brake system
Check the steering system
Electrics — Electronics
Check the condition of the batteries
Hydraulic system
Check the oil level in the hydraulic system
Lifting system
Check the lifting system and attachments

Instructions for running-in

The truck can be operated immediately.

However, when driving during the first 50 operating hours, avoid subjecting both the working hydraulics and the drive unit to high continuous loads.

Pre-shift checks

Carrying out the following checks as part of your daily routine will help to keep the forklift truck in good condition. These checks are supplemental and do not replace periodic maintenance work.

NOTE

If, when carrying out the daily checks, you discover a defect or you are unsure whether the truck will function properly, do not use the truck and contact the technical service department.

Pre-shift check item

Engine
Check fuel level
Check AdBlue® fluid level
Check engine oil level
Check engine coolant level
Check the forklift for leaks (visual inspection)
Visually inspect whether the engine emits black smoke. If there is black smoke, contact an authorised service partner immediately.
Drive mechanism and transmission system
Check that the adjusting mechanism on the steering column is secure
Check the service brake system
Check the parking brake system
Check the tyres and rims (profile, external damage, air pressure and tightness of wheel fasteners)
Check the condition of the antistatic belt (only when using tyres that are not antistatic)
Chassis and bodywork
Washer system: Check the fill level in the container, and check the wipers
Driver's cab
Check the condition of the driver's seat and seat belt (visual inspection)
Check the controls settings
Electrics — Electronics
Check the electrical system (such as lighting, alarm system)
Check the functionality of the emergency off switch
Hydraulic system
Check the oil level in the hydraulic system
Check the forklift for leaks (visual inspection)
Lifting system
Check the pallet fork and door frame for damage (such as bending, cracks, wear etc.)

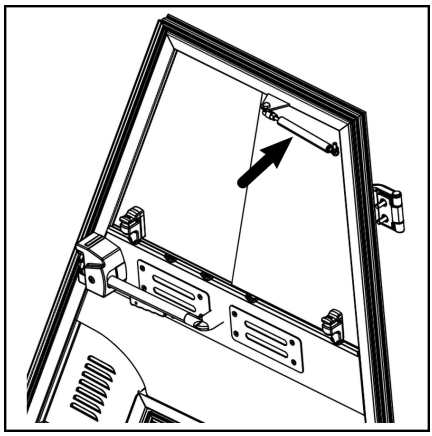
Standard equipment

Entering and exiting the truck

Entering the cab

– Open the cab door.

Both left and right cab doors are equipped with gas springs to limit movement when the cab door is fully open. ▷



– Use handrails where fitted to climb the steps and enter the cab.

– Enter the cab in a forward direction.

– Close the cab door.

Exiting the cab

– Open the cab door.

– Exit the cab in a backwards direction.

– Use handrails where fitted to climb down the steps and exit the cab.

– Close the cab door.

⚠ WARNING

Risk of injury from entering and exiting the truck incorrectly.

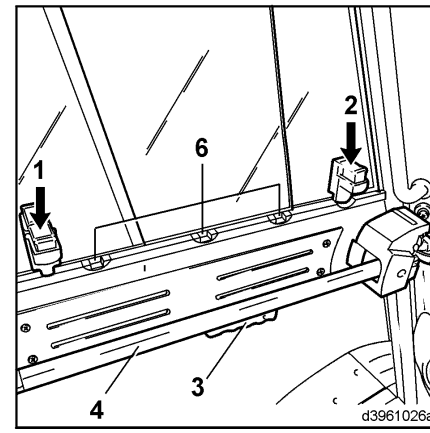
Face the truck when entering and exiting.

Driver's cab

Opening the cab door

– Push handle (3) upwards.

– Open driver's door outwards.

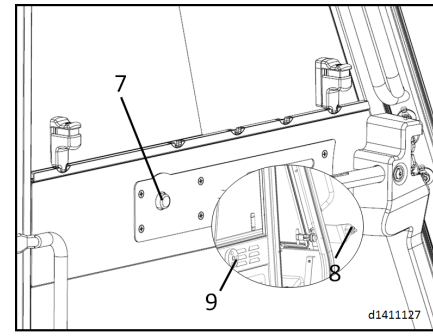


Secure the cab's door

– Open the door.

– Open the door fully rearward until spring loaded plunger(8) locks into retainer(9).

– Press the button(7) inside the cab to release the door. Pull the door outwards.



Closing the cab door

NOTE

To make it easier to close the door, open the side window slightly.

– Lift lever (1) inside the cab, or pull down the lever on the door retainer (3) to release (2). Pull the door outwards.

– Grip the rod (4) and pull the door towards you until the interlock engages.

Opening/closing the side window

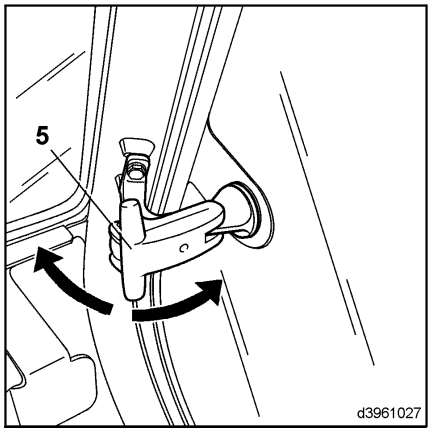
– Press button (1) or (2).

– Keep the knob pressed, slide the side window into the desired position until it engages in one of the grooves (6).

Follow a similar procedure to close the side window.

Opening the quarter window

– Pull the lever (5) forwards. ▷



The window will open.

– Push the lever (5) backwards.

The window will close.

Tilt Cab_Face Lift

The cab can be tilted forward to allow access to the engine compartment.

To tilt the cab forward

⚠ CAUTION

When tilting, if the cab strikes the lift mast, the cab will be damaged.

Before tilting the cab, ensure that the lift mast is tilted fully forward.

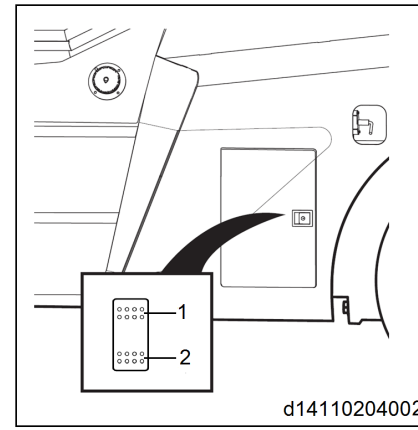
NOTE

If the truck is equipped with a lift mast tilt angle potentiometer, there is a safety option to prevent the lift mast from tilting fully forward.

- *Starting from the -10° position, the lift mast tilts forward by 5° and then stops.*
- *To tilt the lift mast forward to the maximum tilt angle of 15°, the driver must first return the operating lever to the neutral position and then tilt the operating lever forward.*

– Raise the forks approximately 3 feet (1 m) and tilt the lift mast fully forward.

– Switch off the engine and exit the cab.
– Remove any loose components from the cab.
– Open the battery case, the switch is inside the battery case.
– Push electrical switch (1) to tilt the cab fully forward. Push and hold the switch, until the cab is fully tilted. ▷

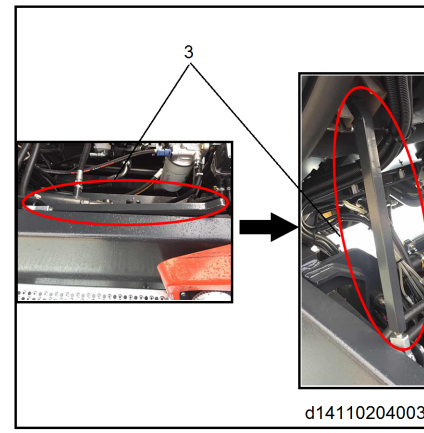


– Once the cab is raised, pull strut rod (3) up and secure it in the trough to prevent the cab from falling. ▷

⚠ WARNING

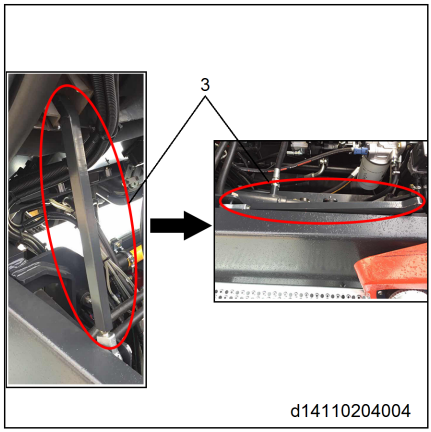
The cab is heavy and can cause injury if someone is below the cab during lowering.

Stand clear of the cab and do not approach when it is partially tilted, or being raised or lowered. The cab must be locked in the fully tilted position, and the tilt handle must be properly inserted into the safety ring before maintenance can begin.

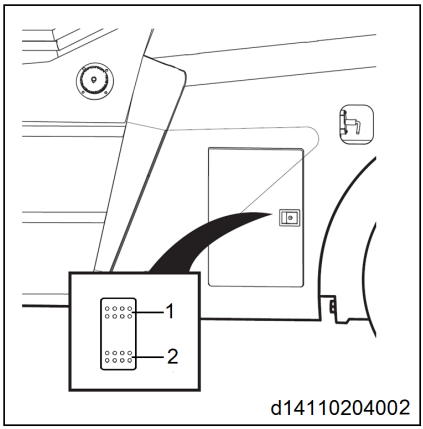


To lower the cab

– Remove strut rod (3) from the trough and return it to its original position. ▷



– Push lowering button (2) of the electrical switch to lower the cab into working position. Push and hold the switch, until the cab is fully lowered. ▷



Standard driver's seat and comfort driver's seat

⚠ WARNING

Risk of accident when adjusting the seat during travel. Back injury possible due to incorrect seat adjustment.

Do not adjust the driver's seat while driving.

– Before starting up the truck and whenever changing drivers, adjust the seat for the individual weight of the driver.

– Check that all of the settings have property engaged.

NOTE

Sitting for long periods of time puts a lot of pressure on the spine. This pressure can be relieved by performing simple therapeutic exercises at regular intervals.

NOTE

Do not place any objects in the adjustment range of the driver's seat.

Longitudinal adjustment

– Pull the lever (1) upwards.

– Move the driver's seat backwards or forwards on the rails to find the most comfortable position for the driver in relation to the steering wheel and the accelerator pedals.

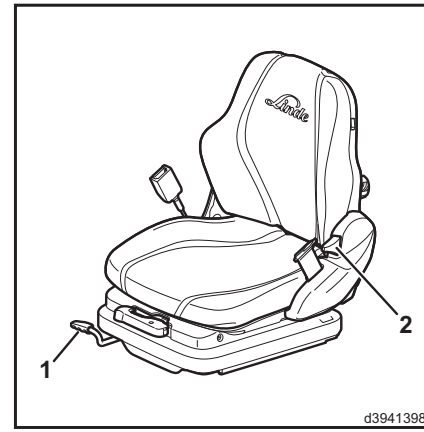
– Allow the lever (1) to engage.

Adjusting the seat backrest

– Push the lever (2) upwards and hold it in place.

– Move the seat backrest forwards or backwards until a comfortable seat position for the driver is found.

– Release the lever (2).



Setting the driver's weight



NOTE

The relevant driver's weight must be set when the driver's seat is occupied.

– Check the weight setting in the inspection window (4).

The correct driver's weight has been set when the arrow is in the centre position in the inspection window (4).

Set the driver's weight as necessary.

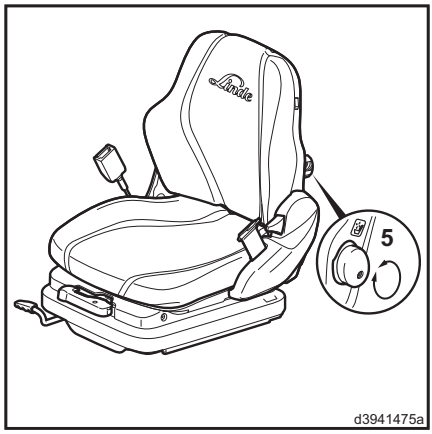
– Pull out the lever (3).

Move the lever to set the driver's weight for the suspension.

– Move the lever (3) upwards for a heavier weight.

– Move the lever (3) downwards for a lighter weight.

Adjusting the lumbar support (only with a comfort driver's seat)



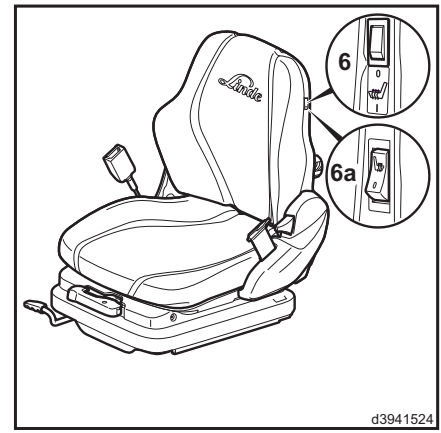
NOTE

The lumbar support enables the seat backrest contour to be optimally adapted to the driver's body.

– Turn the knob (5) to the left or right.

The extent to which the lower and upper areas of the backrest are curved is adjusted individually.

Activating the seat heater (only with a comfort driver's seat)



Variant 1

– Push the switch (6) downwards to activate the seat heater.

– Push the switch (6) upwards to deactivate the seat heater.

NOTE

The maximum temperature is predefined.

Variant 2

– Push the switch (6a) upwards to activate the seat heater.

– Push the switch (6a) downwards to deactivate the seat heater.

NOTE

The maximum temperature is predefined.

Luxury driver's seat with automatic weight setting

⚠ WARNING

Risk of accident when adjusting the seat during travel. Back injury possible due to incorrect seat adjustment.

Do not adjust the driver's seat while driving.

– Before starting up the truck and whenever changing drivers, adjust the seat for the individual weight of the driver.

– Check that all of the settings have property engaged.

NOTE

Sitting for long periods of time puts a lot of pressure on the spine. This pressure can be relieved by performing simple therapeutic exercises at regular intervals.

NOTE

Do not place any objects in the adjustment range of the driver's seat.

Longitudinal adjustment

– Pull the lever (1) upwards.

– Move the driver's seat backwards or forwards on the rails to find the most comfortable position for the driver in relation to the steering wheel and the accelerator pedals.

– Allow the lever (1) to engage.



Adjusting the seat backrest

– Push the lever (2) upwards and hold it in place.

– Move the seat backrest forwards or backwards until a comfortable seat position for the driver is found.

– Release the lever (2).

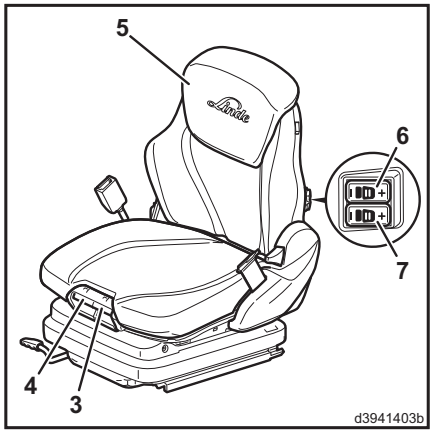
Setting the driver's weight

The correct driver's weight will be set automatically if the ignition is switched on and the driver's seat is occupied.

Adjusting the seat angle

– Pull the lever (3) upwards.

The seat base is moved to the desired position by applying pressure to the seat base or removing pressure from it.



Adjusting the seat depth

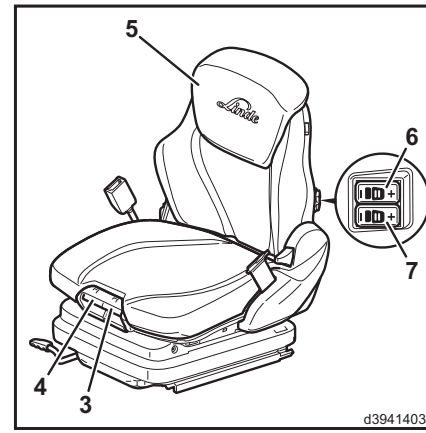
– Pull the lever (4) upwards.

The seat base can be moved to the desired position by sliding the seat base forwards or backwards.

Adjusting the backrest extension

– Push the backrest extension (5) in or pull it out for individual adjustment.

Adjusting the lumbar support ▷



NOTE

The lumbar support enables the seat backrest contour to be optimally adapted to the driver's body.

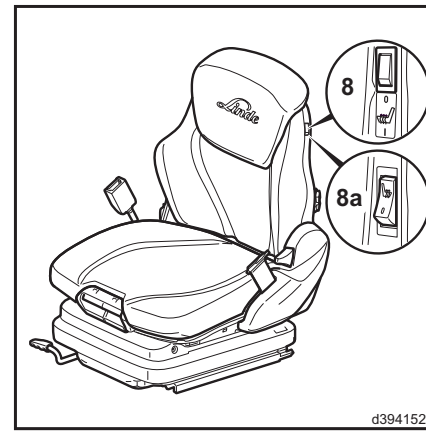
– Press button (6).

The extent to which the upper area of the backrest is curved is adjusted individually.

– Press button (7).

The extent to which the lower area of the backrest is curved is adjusted individually.

Activating the seat heater (luxury driver's seat) ▷



Variant 1

– Push the switch (8) downwards to activate the seat heater.

– Push the switch (8) upwards to deactivate the seat heater.

NOTE

The maximum temperature is predefined.

Variant 2

– Push the switch (8a) upwards to activate the seat heater.

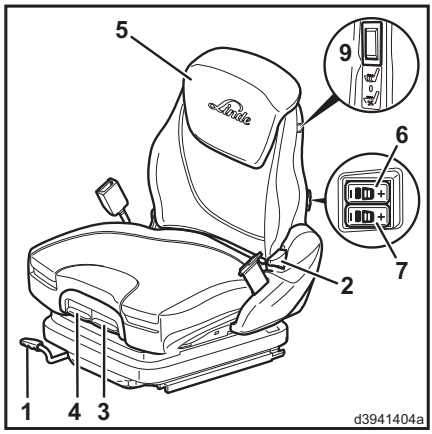
– Push the switch (8a) downwards to deactivate the seat heater.

NOTE

The maximum temperature is predefined.

Luxury active driver's seat with automatic weight setting

The luxury active driver's seat is operated in the same way as the luxury driver's seat. The only difference is the way in which the seat heater is activated.



Activating the seat heater (luxury active driver's seat)

– Push the switch (9) upwards to activate the seat heater.

– Push the switch (9) to the centre position to deactivate the seat heater.

Activating the seat air conditioning (luxury active seat)

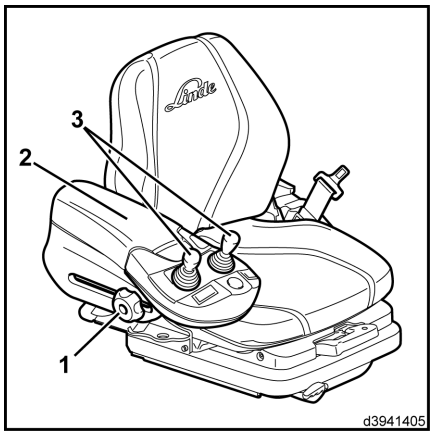
– Push the switch (9) downwards to activate the seat air conditioning.

– Push the switch (9) to the centre position to deactivate the seat air conditioning.

NOTE

The maximum temperature is predefined.

Adjusting the armrest



⚠ DANGER

Risk of accident: It is not possible to operate the truck safely when the armrest (2) is loosened.

Only adjust the armrest when the truck is stationary.

Before attempting to drive the truck, ensure that the armrest is screwed firmly in place with the clamping screw (1).

NOTE

Adjust the armrest so that all operating devices can be actuated safely.

– Sit on the driver's seat and release the clamping screw (1).

– Move the armrest (2) upwards/downwards and forwards/backwards until the arm is

comfortably supported and the joysticks (3) can be easily reached.

– Tighten the clamping screw (1).

Adjusting the steering column

⚠ DANGER

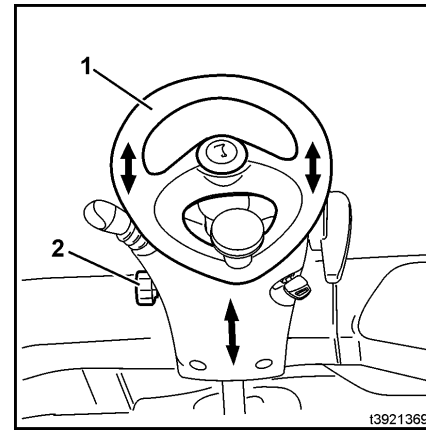
Safe driving is not guaranteed with the clamping screw open.

Only adjust the steering column when the vehicle is stationary.

Before attempting to drive the truck, ensure that the steering column is screwed firmly in place with the clamping screw (2).

Angle adjustment

– Undo the clamping screw (2) anticlockwise. ▷
– Move the steering wheel (1) into the required position.
– Tighten the clamping screw (2) clockwise.



Height adjustment

– Undo the clamping screw (2) anticlockwise.
– Move the steering wheel (1) into the required position by pulling it upwards or pushing it downwards.
– Tighten the clamping screw (2) clockwise.

Seat belt



⚠ DANGER

There is a risk to life if the driver leaves the vehicle in an uncontrolled manner.

For this reason, the seat belt must always be worn when operating the truck! The seat belt should only be worn by one person.

⚠ WARNING

The seat belt must function perfectly.

For this reason, the belt should not become twisted, trapped or tangled. The belt buckle and belt retractor should be protected from foreign bodies, damage and dirt.

NOTE

Driver's cabs with fixed closed doors or bracket doors meet the safety requirements for driver restraint systems. The seat belt may also be used. It must, however, be fastened when driving with doors that are open or have been removed. PVC doors do not constitute a driver restraint system. For trucks with the "speed reduction" special function, the seat belt must be worn even at the reduced speed.

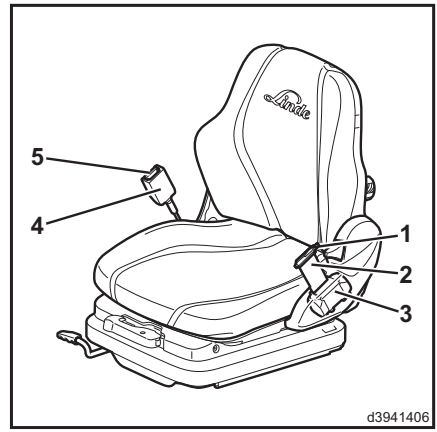
The automatic blocking mechanism prevents the belt from being extended whenever the industrial truck is on a steep slope. It is then not possible to pull the belt any further out of the retractor. To release the automatic blocking mechanism, carefully move the industrial truck so that it is no longer positioned on a slope.

While using the truck (e.g. driving, operating the lift mast etc.), the driver should adopt a sitting position as far back as possible so that his/her back rests against the seat backrest. The automatic blocking mechanism for the belt retractor offers sufficient freedom of movement on the seat for normal use of the truck.

Fastening the seat belt

– Pull the seat belt (2) smoothly out of the retractor to the left. ▷
– Position belt over the lap, not over the stomach.
– Snap the buckle guide (1) into place in the buckle (4).
– Check seat belt tension.

The belt must fit close to the body.



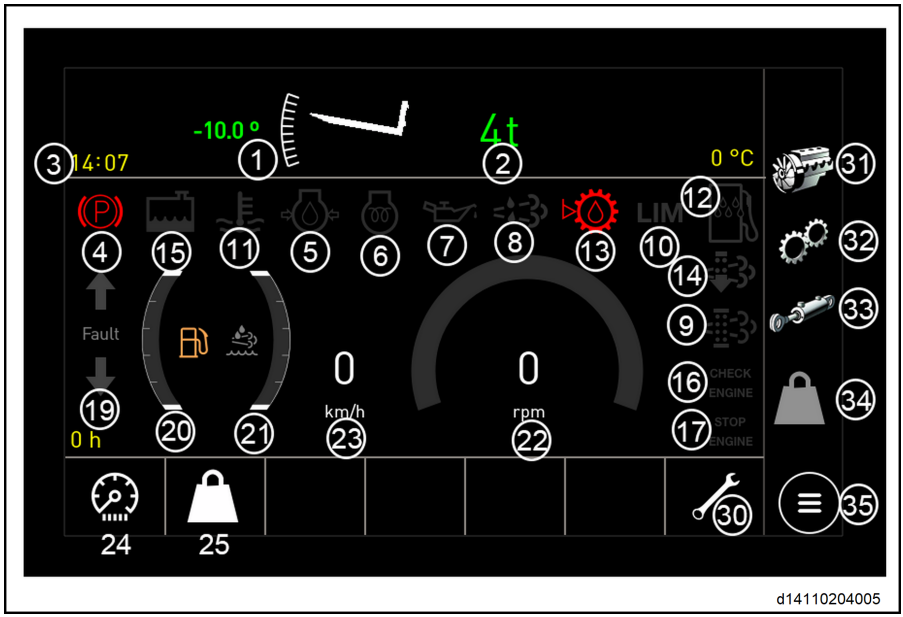
Unfastening the seat belt

– Push the red button (5) on the buckle (4).
– Manually feed the buckle guide (1) back into the retractor (3).

NOTE

The automatic blocking mechanism may be triggered if the web belt runs in too quickly and the buckle guide strikes the housing. The web belt cannot be pulled out with the usual force.

Display unit-Parker



1	Mast angle	16	Engine error indicator light (low)
2	Load weight display	17	Engine error indicator light (high)
3	Time display	19	Speed gear
4	Parking brake	20	Fuel gauge
5	Engine oil pressure warning light	21	Urea gauge
6	Preheat light	22	Engine RPM gauge
7	Engine oil level	23	Driving speeds
8	DEF alarm light	24	Easy interface switching
9	DPF alarm light	25	One touch weighing
10	DEF limit torque indicator	30	Service interface
11	Engine water temperature warning light	31	Engine interface
12	DEF alarm light	32	Transmission interface
13	Transmission oil level light	33	Hydraulic interface
14	DPF regeneration indicator light	34	Weighing interface
15	Coolant level	35	System parameter interface

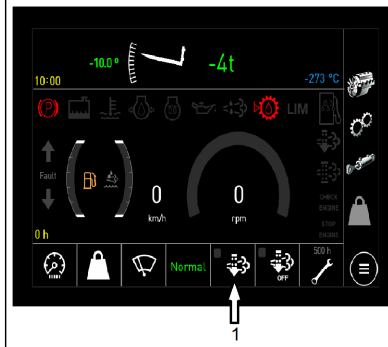
The touchscreen display unit is mounted to the top right-hand side of the cabin. It is positioned within the driver's field of vision and provides centralised information about all functions of the truck. Once the key switch has been switched on, a self-test of the display unit is then performed. During the self-test, all indicator lights and the displays are activated.

NOTE

Versions of the display unit icon arrangement layout may vary due to continuous updates and improvements to the product. Display unit for reference purposes only, actual specifications apply.

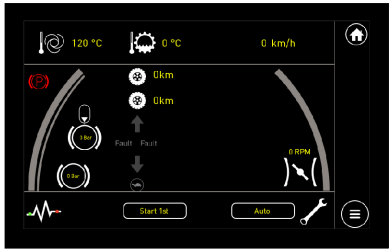
Engine interface

When DPF requires regeneration, start regeneration by pushing the (1) button on the display unit.



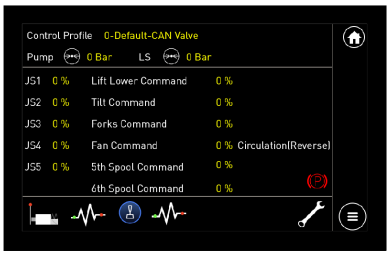
d14110204009

Transmission interface



d14110204010

Hydraulic interface ▷



d14110204011

Starting and stopping the engine

Starting the engine

⚠ DANGER

Danger of poisoning!

Do not leave the engine running in unventilated areas.

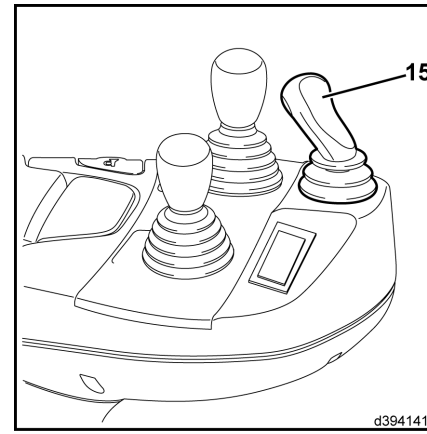
NOTE

Where possible, avoid frequently starting and stopping the engine over short periods of time, since this prevents the internal combustion engine from reaching its operating temperature. Frequent cold starts increase wear.

– Sit on the driver's seat.

– Fasten the seat belt (if seat belt is fitted).

– Move the actuating lever (joystick and drive direction (15)) into the neutral position. ▷



– Apply park brake (if not already applied) by pressing park brake switch (1) ▷
– Insert ignition key into the ignition and starting switch and turn it from the zero position to position "I".

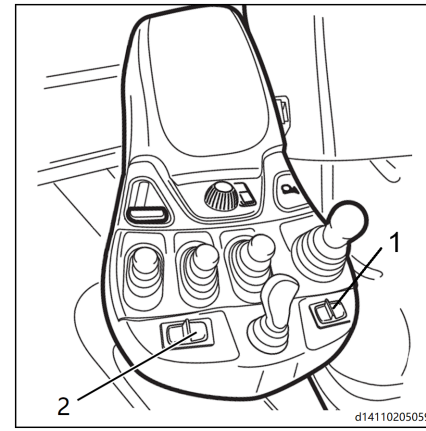
Electrical system start-up.

– Turn the key to position "II".

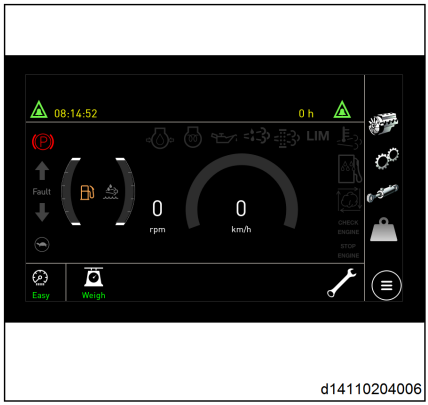
You have to wait for the display to boot up to start the truck

As soon as the engine starts:

– Release the key. Do not engage the starter continuously for more than 30 seconds.



– The forklift will display the screen when it starts.
– The display unit will then show the tachometer screen displaying: engine rpm, fuel level, Adblue® level, neutral and park brake status.



⚠ CAUTION

Danger of poisoning!

Do not leave the engine running in unventilated areas.

If the engine fails to start:

– Ensure that the preheating process is complete. Depending on the truck version, temperature and altitude, preheating may require up to one minute or more. Once the preheating process is complete, engage the starter until the engine runs at idle speed. Do not engage the starter continuously for more than 30 seconds.

NOTE

A block against repeat starting is active and the engine cannot be started.

– Always leave the ignition switched on until the symbol goes out.
– Then try to restart.

To protect the battery, wait at least one minute between each starting procedure. If the engine still does not start after a third attempt to start it, refer to the section entitled "Troubleshooting - diesel engine".

The engine speed is controlled automatically, depending on the load on the engine.

NOTE

Do not allow the engine to warm up at idling speed. When under load, drive the truck at a brisk speed. The engine will quickly reach its operating temperature.

Switching off the engine

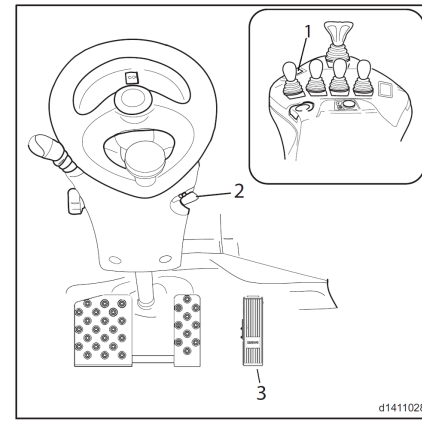
⚠ CAUTION

For engines with a turbocharger, there is a risk that the high speed of the turbocharger shaft (≥ 100,000 rpm at full load) could cause the shaft bearing to run dry through lack of lubrication, thus damaging it.

Do not switch off engine under full load, but rather allow it to run on for a few minutes at low speed.

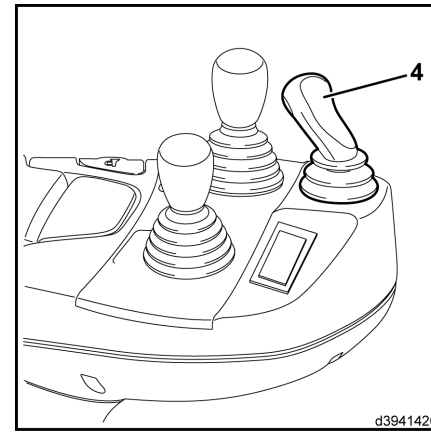
– Remove your foot from the accelerator pedal (3).

– Apply park brake by pressing park brake switch (1) ▷



– Move the direction selection lever to the neutral position. ▷

– Turn the ignition key to the zero position.



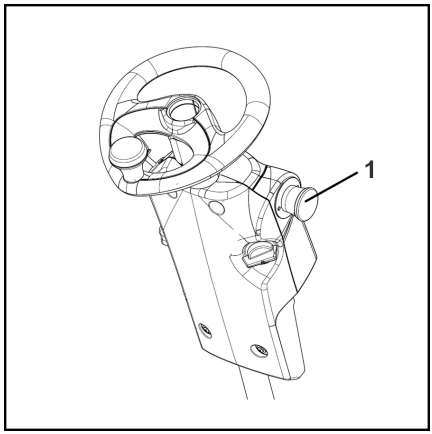
NOTE

The brake is applied automatically when the engine is switched off.

– Remove the ignition key when leaving the truck.

Emergency off switch

The emergency off switch can only be used in emergency situations and must not be disconnected during emergency stops.



⚠ WARNING

Risk of accident.

When the emergency off switch(1) is pressed, the parking brake is automatically applied, causing the vehicle to come to an emergency stop.

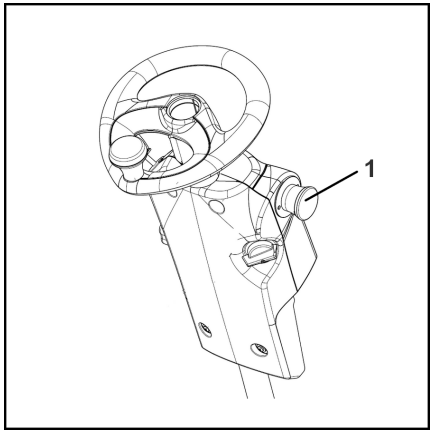
When the vehicle comes to a quick stop, the stability of the load is greatly reduced.

– Make sure that people around you are in a safe position before pressing the emergency off switch(1).
– If the emergency off switch(1) is pressed, be careful with the load.

NOTE

The engine will not be off when operating the emergency off switch.

– Press the emergency off switch(1) to stop the vehicle or hydraulic functions.
– Pull up the emergency off switch(1) to resume driving or hydraulic functions.



Function testing

NOTE

Check the functionality of the emergency off switch daily as part of the daily checks.

– Press the emergency off switch(1) to confirm that the vehicle is not moving or the hydraulic functions are not working.
– Turn off the engine key switch and reset the emergency off switch(1) to return the vehicle to service.

Driving

⚠ CAUTION

Risk of truck tip over.

Before driving on steeper slopes, consult your service partner.

Travel on long slopes over 15% is not allowed as a rule due to the prescribed minimum brake applications and truck stability characteristics.

The climbing ability rates given in the technical datasheet were derived from the tractive force of the truck and they apply only for crossing obstacles and for short differences in level.

Always accommodate your driving style to suit the conditions of the roadway (rough surfaces, etc), especially hazardous work areas and the load.

⚠ WARNING

If the driver is distracted, there is a risk that accidents or injuries may occur.

When the truck is in operation, no electronic devices (such as mobile phones) may be used.

⚠ CAUTION

Danger of damage to the cab door.

Ensure the cab door is secured in the closed position.

⚠ CAUTION

Danger of accident while reversing.

Take extra care.

Clean the rear-view mirror and adjust it to the proper position before starting to operate the truck. Please note that the rear-view mirror is only used to check the area near the truck before driving off and to check the condition of the rear of the vehicle. Reversing is only allowed with a direct view in the reverse direction of travel.

– Always look in the direction of travel and have an adequate overview of the road ahead, including to the sides when steering.

When driving, ensure that the road ahead is clear.

If goods obstructing vision are being transported, drive the truck with the load trailing. If this is not possible, a second person shall walk in front of the truck as a guide.

The truck should then only be driven at walking speed with particular caution being exercised. If visibility aids (e.g. mirrors, camera/monitor) are required, to ensure adequate sight, then training should be given for driving with these aids.

– Start the engine using ignition key.
– Elevate the forks slightly and tilt the mast back.
– Release the parking brake by stepping on the brake pedal and then pressing the parking brake switch.

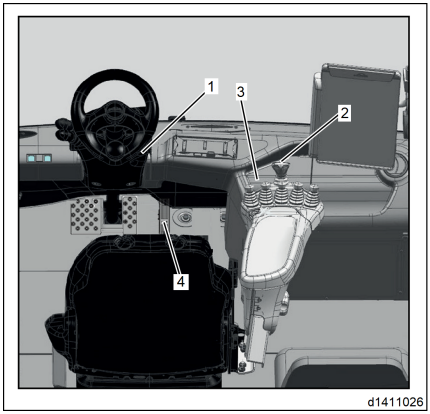
NOTE

Applying the foot brake while releasing the park brake prevents accidental truck movement.

Single pedal

Forward travel

– Ensure that the pedal area inside the cabin is clear of obstruction and debris before attempting to drive the truck.
– Push direction lever (2) forward.
– Depress the accelerator pedal (4) gently. Truck speed depends on how far the pedal is depressed.



NOTE

Quick flooring of the accelerator pedal is not recommended as the maximum acceleration rate is controlled automatically.

Reverse travel

– Pull direction lever (2) back.
– Depress accelerator pedal (4). The truck will reverse at a speed depending on the position of the accelerator pedal.

NOTE

Stop the truck before driving in reverse.

Stopping

– Release accelerator pedal (4) and press the brake pedal.

– When dismounting from the truck with the engine running, for example, in order to briefly perform some action in close vicinity to the truck (opening a gate, unhitching a trailer etc.), always apply the parking brake using switch (3) and release the seat belt. Shut down the engine if making a longer stop. When leaving the truck unattended, remove the ignition key (1).

Joystick with central lever operation



⚠ WARNING

There is a risk of becoming trapped between parts due to the moving lift mast or attachment.

For this reason, never reach into or enter the lift mast or the area between the lift mast and the truck.

The lifting system and attachments must only ever be used for their intended purpose.

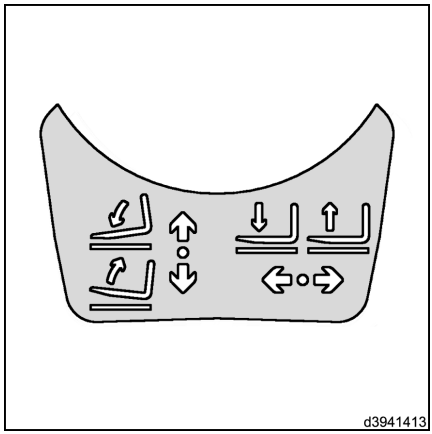
Drivers must be trained in how to operate the lifting system and attachments.

Take note of the maximum lift height.

NOTE

Extreme loading of the internal combustion engine leads to a slight delay in executing the working hydraulics due to the associated decrease in the number of revolutions. Where the engine is loaded for an extended period, the joystick must be switched to the neutral position in order to release the working hydraulics again.

Operating the lifting and tilting equipment



NOTE

On the version with central lever operation, moving the joystick to an intermediate position (approx. 45°) will activate both functions at the same time (e.g. lifting and tilting).

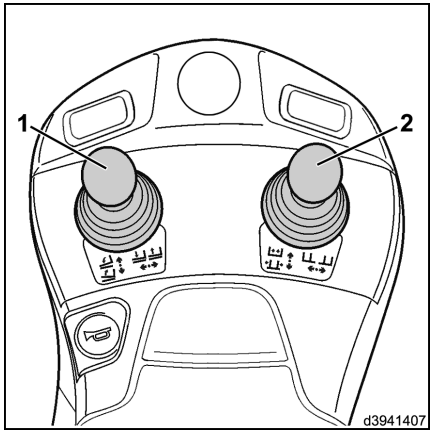
– Take note of the switching symbols with directional arrows.

The joystick must always be operated gently, and never in a jerking motion. The deflection of the joystick is used to determine the lifting/lowering and tilting speed. Once the joystick is released, it automatically returns to its initial position.

NOTE

Joysticks only function when the engine is running and the driver is sitting in the driver's seat.

Lifting the fork carriage



DANGER

When lifting and lowering the fork arms, there is an increased risk of falling and crushing.

For this reason, do not step onto the raised fork arms.

– Push the joystick (1) to the right.

Lowering the fork carriage

– Push the joystick (1) to the left.

Tilting the lift mast forwards

– Push the joystick (1) forwards.

Tilting the lift mast backwards

– Pull the joystick (1) backwards.

Operating attachments

Attachments can be fitted to the truck as special equipment (e.g. sideshift, fork prong positioner, clamp etc.). Observe the working pressure and operating instructions for the attachment. An additional joystick (cross lever) is fitted for operating these attachments.

⚠ CAUTION

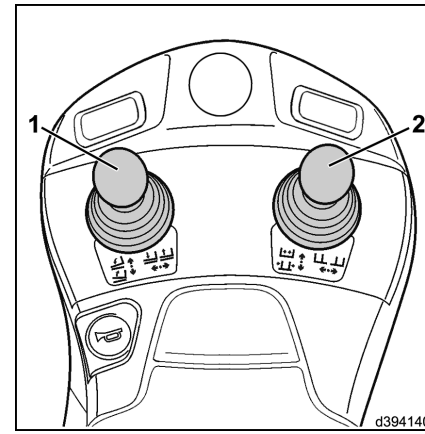
Attachments alter the load capacity and stability of the truck.

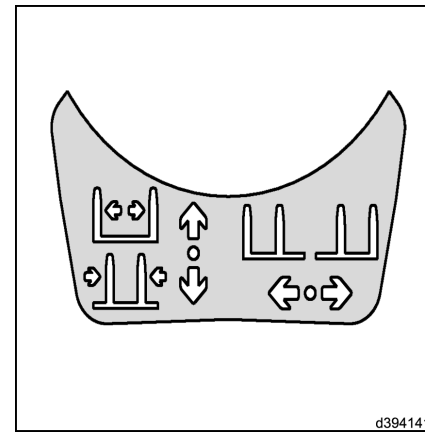
Attachments that are not supplied with the truck may only be used if the service partner has confirmed that the arrangement in terms of load capacity and stability ensures safe operation.

NOTE

The methods of operating the attachments described here are examples. The configuration of the joystick may vary depending on your truck's equipment.

– Take note of the switching symbols with directional arrows.





Operating the sideshift

NOTE

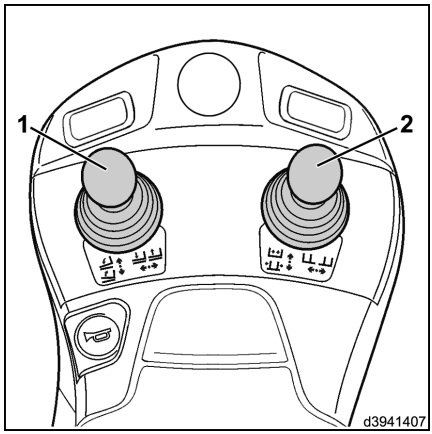
To prevent damage, do not operate the sideshift when the fork arms are on the ground.

– Push the joystick (2) to the left.

The sideshift moves to the left.

– Push the joystick (2) to the right.

The sideshift moves to the right.



Operating the fork prong positioner

NOTE

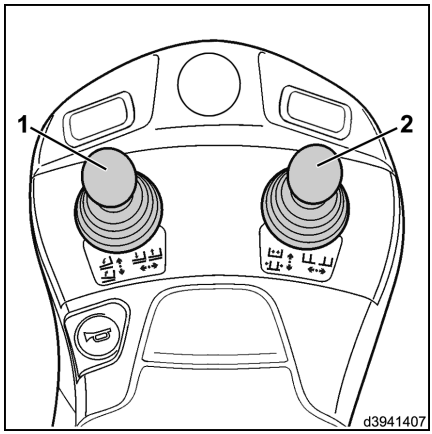
To prevent damage, do not operate the fork prong positioner with a load or when the fork arms are on the ground. Do not use the fork prong positioner as a clamp.

– Push the joystick (2) forwards.

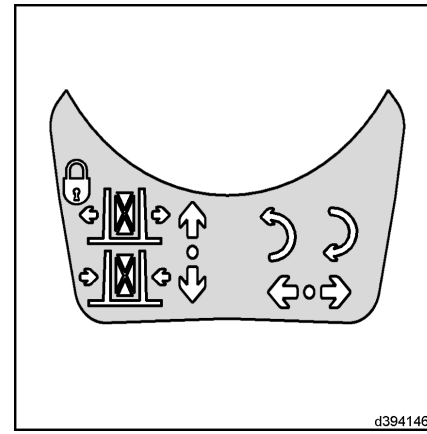
The fork arms move outwards.

– Pull the joystick (2) backwards.

The fork arms move inwards.



Operating the rotator (optional equipment)



DANGER

Stability jeopardised.

Only pick up loads such that they can be turned in the load centre of gravity.

If loads are picked up off-centre, the residual load capacity may be exceeded when making a turning movement.

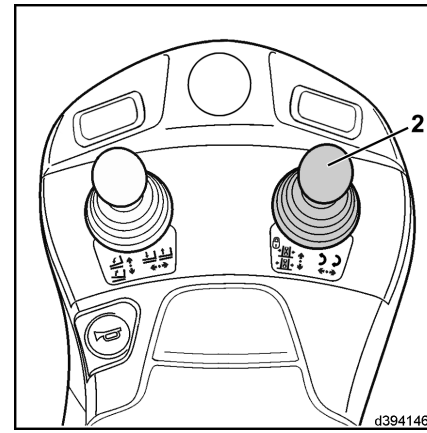
When turning, the actual centre of gravity of the load must therefore not be more than 100 mm (truck rated capacity below 6300 kg) or 150 mm (truck rated capacity between 6300 kg and 10,000 kg) outside the pivot point!

NOTE

Ensure that there is sufficient distance when turning to prevent damage.

– Take note of the switching symbols with directional arrows.

– Push the joystick (2) to the left.

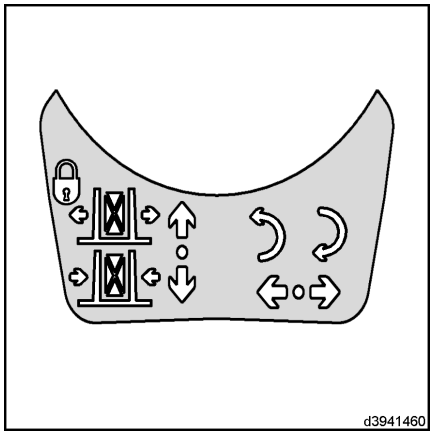


The truck moves anti-clockwise.

– Push the joystick (2) to the right.

The truck moves clockwise.

Operating the clamp (optional equipment) ▷



⚠ DANGER

Increased risk of accident from a falling load.

For attachments that hold a load by exerting pressure on it (e.g. a bale clamp), a lockable joystick must be used.

If your truck is not fitted with this equipment, please contact your service partner.

– Take note of the switching symbols with directional arrows.

Joystick with single lever operation



⚠ WARNING

There is a risk of becoming trapped between parts due to the moving lift mast or attachment.

Never reach into or enter the lift mast or the area between the lift mast and the truck.

The lifting system and attachments must only ever be used for their intended purpose.

Drivers must be trained in how to operate the lifting system and attachments.

Take note of the maximum lift height.

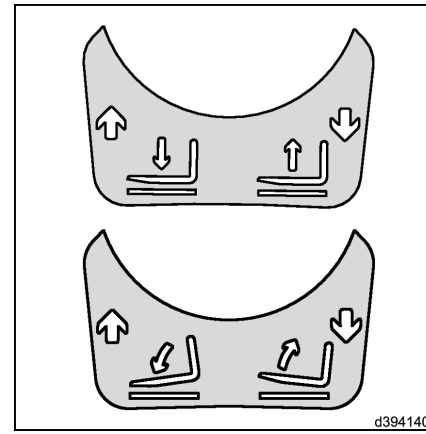
Operating the lifting and tilting equipment

– Observe the symbols with directional arrows.

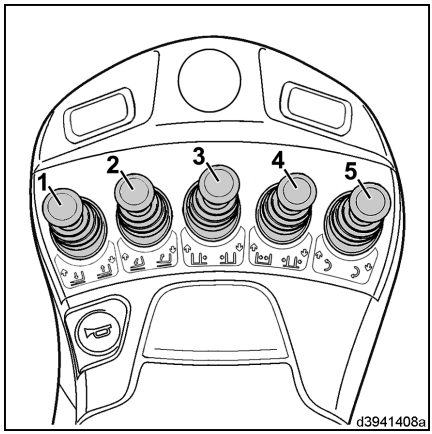
The joystick must always be operated gently, and never in a jerking motion. The deflection of the joystick is used to determine the lifting/lowering and tilting speed. Once the joystick is released, it automatically returns to its initial position.

NOTE

Joysticks only function when the engine is running and the driver is sitting in the driver's seat.



Lifting the fork carriage



⚠ DANGER

When lifting and lowering the fork arms, there is an increased risk of falling and crushing.

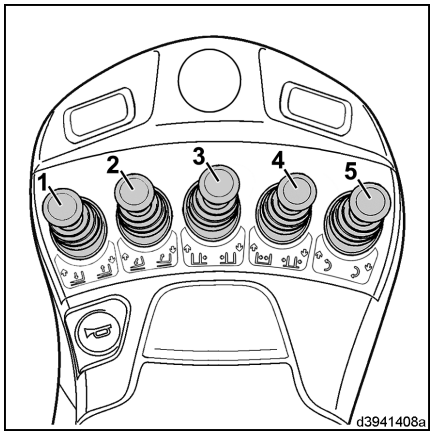
Do not step onto the raised fork arms.

– Pull the joystick (1) backwards.

Lowering the fork carriage

– Push the joystick (1) forwards.

Tilting the lift mast forwards



– Push the joystick (2) forwards.

NOTE

If the truck equipped with a mast angle potentiometer, there is a safety option to prevent mast tilting forward fully.

- *Tilting the mast forward starting at -10°, the mast will move forward 5°, then stops.*
- *Only when the driver returns the joystick to the neutral position and tilt forward again, the mast will continue to move to the maximum forward degree of 15°.*

Tilting the lift mast backwards

– Pull the joystick (2) backwards.

Operating attachments

Attachments can be fitted to the truck as special equipment (e.g. sideshift, fork prong positioner, rotator, clamp etc.). Observe the working pressure and operating instructions for the attachment. Additional joysticks are fitted for operating these attachments.

⚠ CAUTION

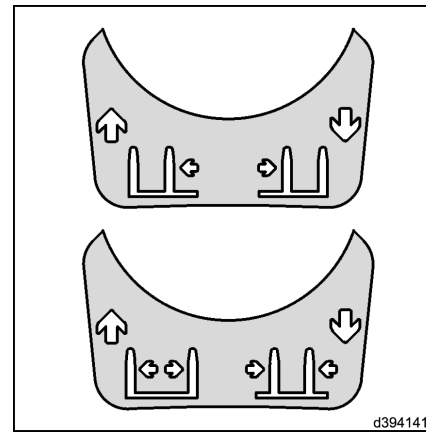
Danger of instability of the truck.

Attachments that are not supplied with the truck may only be used if the service partner has confirmed that the arrangement in terms of load capacity and stability ensures safe operation. Attachments alter the load capacity and stability of the truck.

NOTE

The methods of operating the attachments described here are examples. The configuration of the joystick may vary depending on your truck's equipment.

– Observe the symbols with directional arrows. ▷



Operating the sideshift ▷

NOTE

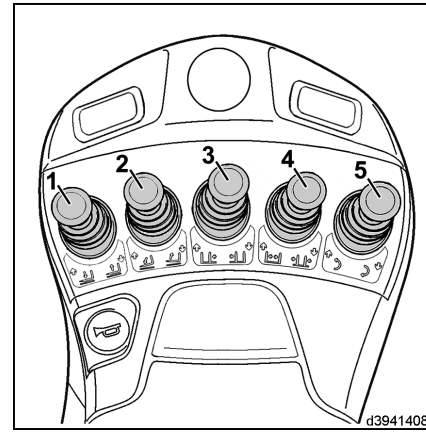
Do not operate the sideshift when the fork arms are on the ground.

– Push the joystick (3) forwards.

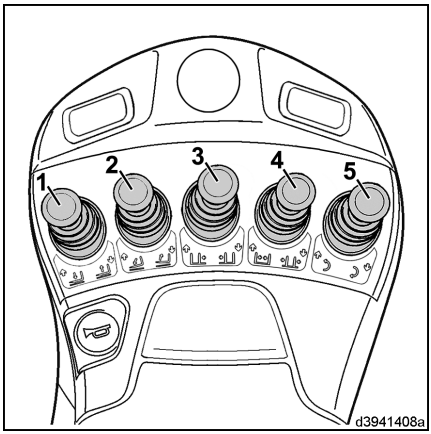
The sideshift moves to the left.

– Pull the joystick (3) backwards.

The sideshift moves to the right.



Operating the fork positioner



NOTE

To prevent damage, do not operate the fork positioner with a load or when the fork arms are on the ground. Do not use the fork positioner as a clamp.

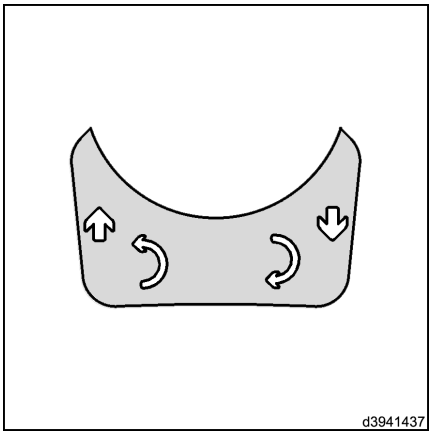
– Push the joystick (4) forwards.

The fork arms move outwards.

– Pull the joystick (4) backwards.

The fork arms move inwards.

Operating the rotator (optional equipment)



⚠ DANGER

Danger of instability of the truck.

Only pick up loads such that they can be turned in the load centre of gravity.

If loads are picked up off-centre, the residual load capacity may be exceeded when making a turning movement.

When turning, the actual centre of gravity of the load must therefore not be more than 100 mm (truck rated capacity below 6300 kg) or 150 mm (truck rated capacity between 6300 kg and 10,000 kg) outside the pivot point!

NOTE

Ensure that there is sufficient distance when turning to prevent damage.

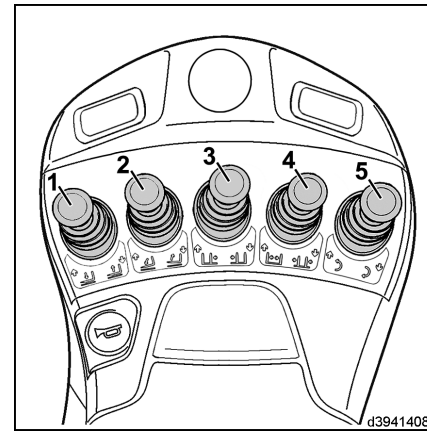
– Observe the symbols with directional arrows.

– Push the joystick (5) forwards. ▷

The truck moves anti-clockwise.

– Pull the joystick (5) backwards.

The truck moves clockwise.



Operating the clamp (optional equipment) ▷

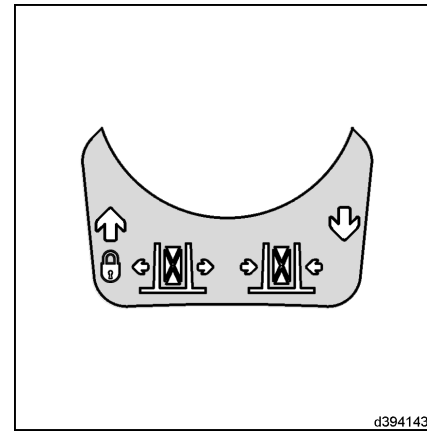
⚠ DANGER

Increased risk of accident from a falling load.

For attachments that perform a clamping function (e.g. a bale clamp), a lockable joystick must be used.

If your truck is not fitted with this equipment, please contact your service partner.

– Take note of the switching symbols with directional arrows.



Steering

Hydrostatic steering means that very little effort is required to turn the steer wheels of the truck. This is particularly advantageous when driving in narrow aisles.

– Start the truck.

– Turn the steering wheel to the left and right through the full cycle.

NOTE

The truck is fitted with steering acceleration which automatically adjusts the turning speed according to the speed that the steering wheel is turned.

⚠ CAUTION

Risk of accident.

Do not rely on the steering wheel position.

If the steering wheel is turned to the left three times quickly, and then three times to the right slowly, the truck will not return to its original direction.

– Always look at the direction of the truck. Do not rely on the steering wheel position.

NOTE

To avoid unnecessary tyre wear, turn the steering only when the truck is moving.

Contact your service partner if steering requires too much effort or if there is too much play in the steering.

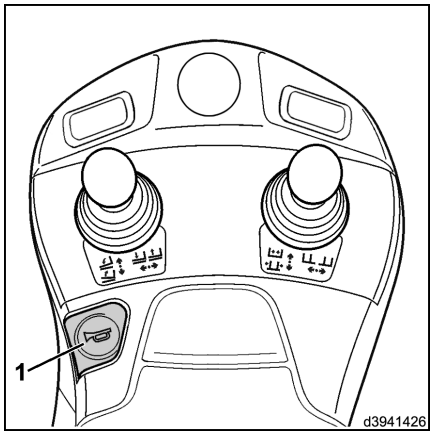
– Do not continue to operate the truck with faulty steering.

Horn ▷

Operating the horn

When operating at blind corners and junctions, a horn serves as warning signal.

– Press the horn button(1) on the armrest.



Service brake ▷

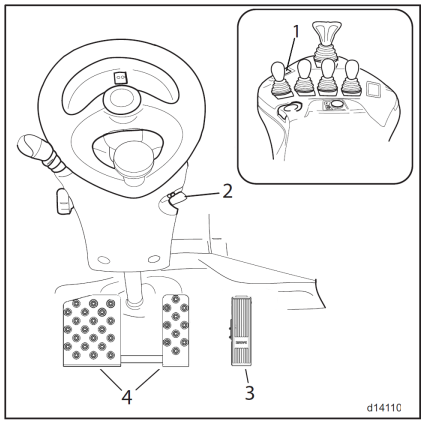
To operate the service brake:

– Release accelerator pedal (3) and allow it to return to its rest position.

– Depress either brake pedal (4).

⚠ CAUTION

In case of an emergency, switching off the ignition key (2) will apply the handbrake, bringing the truck to a complete stop and disabling all hydraulic functions.

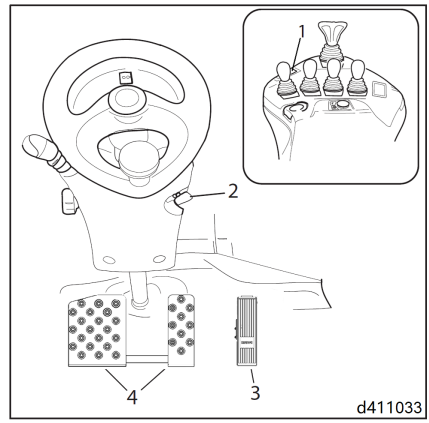


⚠ WARNING

This action should only be attempted in an emergency and could result in the truck becoming unstable and / or the loss of load from the fork arms.

Parking brake

The parking brake is operational at speeds below 3 km/h, the switch (1) is mounted in the front of the armrest.



To apply the parking brake manually:

– To apply the parking brake, press brake pedal(4) and hold parking brake switch (1) until the parking brake warning symbol on the truck display monitor illuminates.

– To release the parking brake, depress service brake pedal (4) and then press parking brake switch (1). This is a safety system to prevent unintended release of the parking brake.

⚠ WARNING

Risk of accident.

If the braking system is becoming faulty or worn, contact your authorised dealer. Do not drive your truck with faulty brakes.

Automatic parking brake operation

– Set up the automatic parking brake function.

NOTE

Specialist knowledge is required for setting up the automatic parking brake function. Contact your service partner.

If set up the automatic parking brake function:

When forward or reverse gear is selected, and the throttle pedal is pressed, the parking brake indicator will extinguish.

When stationary, with the service brake applied and in gear, following a period of 5 or more than 5 seconds, the parking brake will automatically engage and the indicator will flash.

NOTE

The interval time can be adjusted. Contact your service partner to do the adjustment.

⚠ CAUTION

Danger of personal injury and damage to the truck.

Always check that the park brake (manual or automatic) is applied before leaving the truck.

⚠ CAUTION

Danger of personal injury and damage to the truck.

Don't parking the truck on an unattended incline.

Particulate filter regeneration

⚠ DANGER

Risk of fire and explosion!

Do not handle the fuel (e.g. refuel the truck) during the regeneration process.

⚠ CAUTION

During regeneration, high temperatures occur in the particulate filter, the exhaust system and in their vicinity.

Do not operate the truck near flammable materials. Do not touch: danger of burns.

– Check the cleanliness of the exhaust pipe every day. Clean as required.
– When operating the truck, look out for leakages in the exhaust system. If you notice any leakage, switch off the truck immediately. Please contact your authorised dealer.

regenerative

Regeneration is the process of converting soot collected by an aftertreatment diesel particulate filter (DPF) into carbon dioxide.

The regeneration process requires heat, and there are two types of regeneration: passive and active regeneration.

Passive regeneration

Passive regeneration takes place when the exhaust gas temperature naturally increases enough such that the soot collected by the aftertreatment diesel particulate filter (DPF) oxidises faster than the soot can be collected.

Passive regeneration usually occurs when the truck is travelling at high speeds and/or under heavy loads.

Active regeneration

⚠ DANGER

During the regeneration process, the exhaust gas temperature is high. Risk of burn injury!

During the regeneration process, the exhaust gas temperature can reach 816°C and the surface temperature of the exhaust system can exceed 740°C, which is enough to ignite or melt conventional materials and can cause burns. The engine speed will increase and may reach 100 to 1500 rpm. Please follow these instructions to avoid fire, property damage, burns or other serious injury.

⚠ WARNING

When the engine is running and the truck slows down or stops, follow the precautions for regeneration.

Active regeneration takes place whenever the truck is in motion, and the exhaust gas temperature will remain high after the truck has stopped.

Active regeneration is more likely to occur at low speeds, under light loads or in stop-and-go duty cycles.

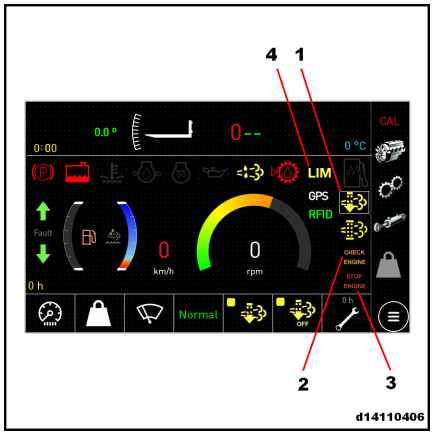
The turbocharger noise increases during active regeneration, and if the exhaust gas temperature is too high, the high engine temperature indicator light in the display unit will illuminate.

Particulate filter - Manual regeneration

Manual regeneration is a method of active regeneration.

If the engine does not reach a high enough temperature during operation, the continuous regeneration process cannot be initiated.

Thus, if dust has built up in the particulate filter, manual regeneration must be performed once engine regeneration indicator light (1) start flashing. ▷



NOTE

Regeneration must be performed as soon as possible after a warning has been issued. This extends the service life of the particulate filter. If load level 4 is reached, switch off the truck immediately. Please contact your authorised dealer.

When soot accumulates in the particulate filter, the following levels are activated:

Level	Warning function
Level 1	- On the display unit (1), the regeneration request indicator light (1) will light up.
Level 2	- On the display unit (1), the regeneration request indicator light (1) flashes.
Level 3	- On the display unit (1), the regeneration request indicator light (1) flashes. - The engine fault indicator light (2) lights up. - The engine fault indicator light (4) lights up.
Level 4	- On the display unit (1), the regeneration request light (1) will turn on. - The engine fault indicator light (2) will turn on and remain on. - The engine restriction indicator light (4) will turn on and remain on. - The engine stop indicator light (3) lights up. - Driving is restricted. - If the particulate filter cannot be regenerated on the truck, please contact your authorised dealer for disposal.

Preparatory work for regeneration

– Choose a suitable location to park the truck.

It is best to park it on a surface that will not burn or melt due to high exhaust gas temperatures (e.g. clean concrete or gravel, not on grass or tarmac).

– Park the truck away from anything that may burn, melt or explode.

- Ensure that there are no objects within 61 cm of the exhaust gas outlet.
- Objects that may burn, melt or explode must be kept at least 152 cm away from the exhaust gas outlet (e.g. petrol, paper,

plastic, fabric, compressed air canisters, hydraulic lines, etc.).

- Ensure that there are no gases or vapours in the vicinity that could burn, explode or cause a fire (e.g. liquefied petroleum gas [LPG], petrol vapours, oxygen, nitrous oxide).

– Park the vehicle safely. Put the truck in park. Set wheel chocks at the front and rear of at least one tyre.

– Set up a safe exhaust area. If bystanders can enter this area, barriers must be installed to keep people at least 152 cm away from the exhaust gas outlet during manual regeneration. When indoors, attach an exhaust pipe rated for at least 816°C.

– Keep a fire extinguisher nearby.

– Check the exhaust system surfaces. Confirm that nothing is on or near the exhaust system surfaces (such as tools, rags, grease or debris).

– Confirm that the truck complies with the following conditions:

- The accelerator pedal is released
- Release the brake pedal
- The parking brake is activated
- The vehicle speed is 0 mph
- The accelerator pedal is released

NOTE

Request regeneration only when the parking brake is applied.

Starting regeneration

– Press the display instrument starting regeneration button (1), the manual regeneration indicator light (2) will turn on and remains on. ▷

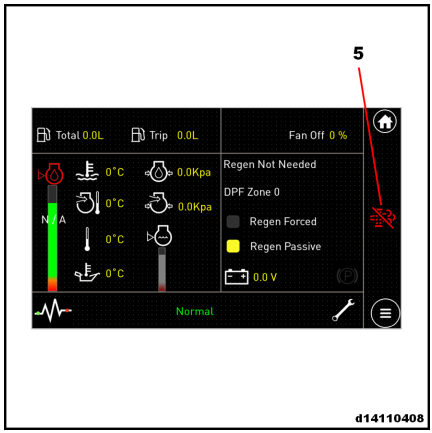


- Once manual regeneration has been initiated, the engine speed will increase and the turbocharger noise will increase.
- The high exhaust system temperature indicator light (3) may illuminate during manual regeneration as the exhaust temperature increases.
- Manual regeneration requires the engine speed to be increased around 1000 to 1400 rpm. The time required for manual regeneration varies depending on how full the aftertreatment DPF is, but typically takes between 45 minutes and 1.5 hours to complete.
- When the aftertreatment DPF has finished regenerating, the engine will automatically return to normal idle speed.
- Once manual regeneration is complete, the exhaust and surface temperatiure will remain high for 3-5 minutes

– Monitor the truck and surrounding area during the manual regeneration process. If any unsafe conditions occur, stop the regeneration process immediately.

The regeneration process can be interrupted by performing the following actions:

– Press the inhibit regeneration button (4). The inhibit regeneration indicator light (5) in the display unit lights up. ▷



NOTE

Once the unsafe condition has been resolved, press the inhibit regeneration switch (4), the inhibit regeneration indicator light (5) will then turn off.

- *Prolonged activation of the inhibit regeneration switch will result in the DPF becoming clogged as active regeneration cannot take place.*

For safety reasons, the regeneration process can also be interrupted by performing the following actions:

– Turn the ignition key to the zero position.

– Release the parking brake.

– Actuate the accelerator pedal or joystick.

NOTE

After interrupting regeneration, regeneration must be requested again.

Override switch

The forklift management system will detect a fault in the system, force the forklift into "fault protection" mode or stop whatever caused the fault Using the control button, the operator can manoeuvre the forklift quickly to return the machine to safety.



NOTE

Override switch (1) can only be used by authorised personnel, these personnel can be evaluatied and are responsible for reducing load times

⚠ CAUTION

Beware of risk of injury to personnel and damage to the truck.

Use with extreme caution. Some safety devices are deactivated when the override switch is activated.

Mirrors

⚠ CAUTION

Risk of collision.

Do not operate the truck if visibility is impaired.

Rear view mirrors should be cleaned and adjusted to suit the operator before commencement of operation, and it should be noted that they are only provided for checking the vicinity of the truck before moving off, and to monitor the rear traffic area.

Reversing is only allowed with a direct view in the reverse direction of travel.

Window heater

Switching on the rear window heating

– Press push button (1).

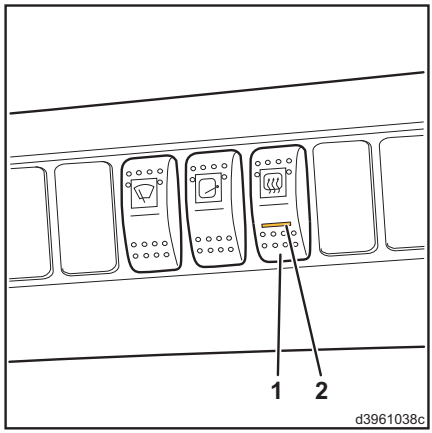
Dummy (2) test.

– Dummy (1) test.

The rear window heating is switched off.

– Dummy (1) test.

The rear window heating is in operation for a further 15 minutes.



Heating system, air conditioning

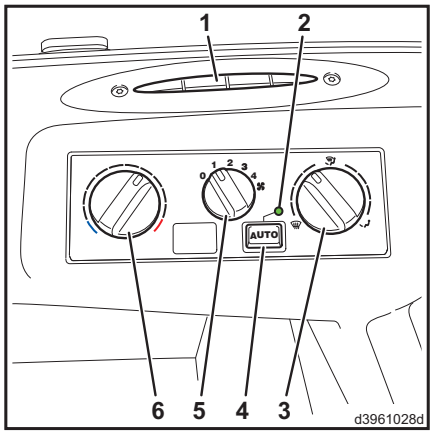
Heating operation

Operating options:

- Manual heating operation
- Automatic heating operation

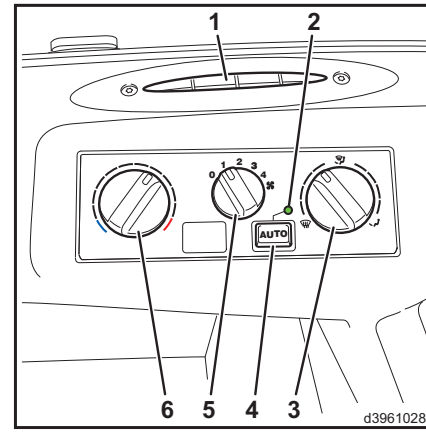
Operating devices for the heating system

- Cab air nozzle (1)
- Function display (2)
- Turning knob (3) for setting the vent positions: window defrosting – footwell ventilation
- Push button (4) for switching the automatic function on and off
- Turning knob (5) for adjusting the blower levels: levels 0 to 4
- Turning knob (6) for temperature control: left-hand end position ≙ cold / right-hand end position ≙ hot
- Left-hand and right-hand cab air nozzles (not shown)



Manual heating operation

Push button (4) for automatic operation must be switched off.



Switching on the heating system

– Turn the turning knob (5).

The blower is switched on and the air flow is set to the selected level.

Normal heating operation:

– Use the turning knob (6) to adjust the temperature.

– Use the turning knob (5), the turning knob (3) and the left-hand and right-hand cab air nozzles (not shown) to adjust the air flow and air distribution.

Settings for demisting the windows

– Turn the turning knob (6) to hot (right-hand end position).

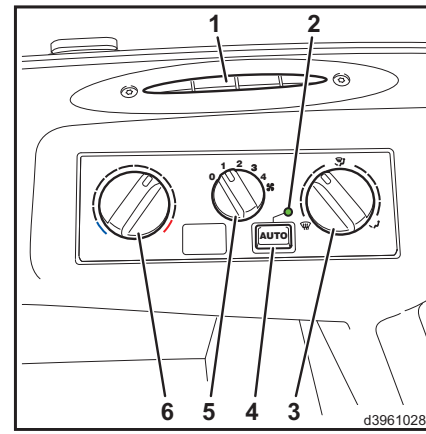
– Turn the turning knob (3) to window defrosting (left-hand end position).

– Turn the turning knob (5) to level 4.

– Open the left-hand and right-hand cab air nozzles (not shown) and direct the fins so that they are pointing towards the door windows.

Automatic heating operation

– Use the turning knob (6) to adjust the temperature.



– Presh the push button (4).

The automatic heating is switched on and the function display (2) lights up in green. The set temperature and the blower level are controlled automatically.

– Use the turning knob (3) and the left-hand and right-hand cab air nozzles (not shown) to adjust the air distribution.

NOTE

If the position of the turning knob (5) for the blower levels is changed, the heating system automatically switches to "manual heating operation".

⚠ CAUTION

If the function display (2) flashes five times after switching on and then goes out, there is a malfunction affecting the automatic heating.

Contact your service partner.

Switching off heating operation

– Turn the turning knob (5) to level 0.

The heating operation is switched off.

NOTE

When the automatic heating is switched on and the position of turning knob (5) is set to level 0, the position of turning knob (5) for the blower level must first be changed and then turned to level 0 to switch off heating operation.

Heating/air conditioning operation

Operating options:

- Manual air conditioning operation
- Automatic air conditioning operation
- Manual heating operation
- Automatic heating operation

⚠ CAUTION

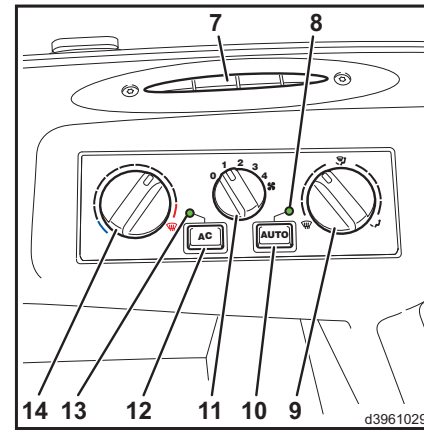
Damage to the compressor!

Switch on the air conditioning every four weeks for at least ten minutes. Doing so will prevent seizing of the bearings in the compressor.

The air conditioning must be serviced once a year by the service partner.

It is normal for condensation water to build up in the hoses and under the truck when the air conditioning is in operation.

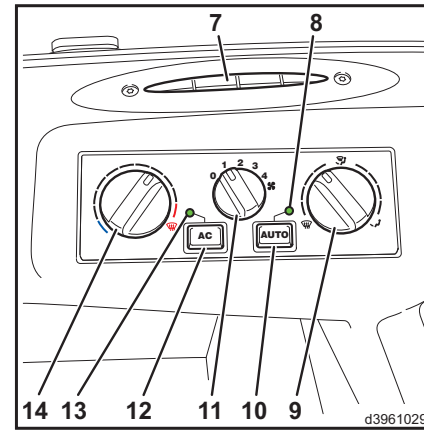
Operating devices for heating/air conditioning operation ▷



- Cab air nozzle (7)
- Function display (8)
- Turning knob (9) for setting the vent positions: window defrosting – footwell ventilation
- Push button (10) for switching the automatic function on and off
- Turning knob (11) for adjusting the blower levels: levels 0 to 4
- Push button (12) for switching the air conditioning on and off
- Function display (13)
- Turning knob (14) for temperature control and automatic window defrosting: left-hand end position ≙ cold / right-hand position ≙ hot / right-hand end position ≙ automatic window defrosting
- Left-hand and right-hand cab air nozzles (not shown)

Manual air conditioning operation

Push button (10) for automatic operation must be switched off. ▷



Switching on the air conditioning

– Turn the turning knob (11).

The blower is switched on and the air flow is set to the selected level.

– Presh the push button (12).

The air conditioning is switched on and the function display (13) lights up in green.

The air conditioning works only when the engine is running and the turning knob (11) is switched on (level 1 to 4). The fans on the condenser in the roof are switched on as necessary. It is possible for these fans to come to a standstill from time to time.

⚠ CAUTION

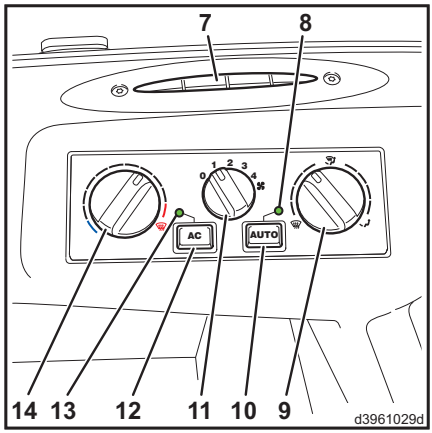
If the function display (13) flashes five times after switching on and then goes out, there is an malfunction affecting the air conditioning.

Contact your service partner.

NOTE

Condensation water in the evaporator can create a musty smell. Switching off the air conditioning ten minutes before completing the journey and keeping the blower running will dry out the condensation water, thus preventing the musty smell.

Normal heating and air conditioning operation: ▷



- Use the turning knob (14) to adjust the temperature.
- Use the turning knob (11), the turning knob (9) and the left-hand and right-hand cab air nozzles (not shown) to adjust the air flow and air distribution.

NOTE

On cool, humid days, the heater and air conditioning can be used to dehumidify the air in the cab. By operating the heater and the air conditioning simultaneously, the heater can counteract the cooling effect. This produces a more pleasant temperature inside the cab and prevents misting of the windows.

Settings for maximum cooling in the cab

- Switch on the air conditioning.
- Turn the turning knob (14) to cold (left-hand end position).
- Turn the turning knob (9) to window defrosting (left-hand end position).
- Turn the turning knob (11) to level 4.
- Open the left-hand and right-hand cab air nozzles (not shown).
- Close the windows and doors.

NOTE

A significant difference between the internal temperature and the outside temperature increases the physical stress put on the driver. To reduce the risk of illness, the difference between the internal temperature and the outside temperature must not exceed six degrees.

Automatic air conditioning operation

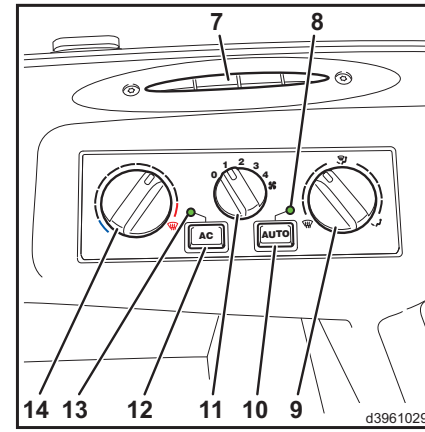
– Use the turning knob (14) to adjust the temperature. ▷

– Presh the push button (10).

The automatic air conditioning is switched on and the function displays (8) and (13) illuminate in green. The set temperature and the blower level are controlled automatically.

– Use the turning knob (9) and the left-hand and right-hand cab air nozzles (not shown) to adjust the air distribution.

The air conditioning operates only if the engine is running. The fans on the condenser in the roof are switched on as necessary. It is possible for these fans to come to a standstill from time to time.



NOTE

If the position of the turning knob (11) for the blower levels is changed, the turning knob (14) is turned to the automatic window defrosting position (right-hand end position) or push button (10) is used to switch off the automatic function, the air conditioning automatically switches to "manual air conditioning operation". If the push button (12) is used to switch off the air conditioning, the heating system automatically switches to "automatic heating operation".

⚠ CAUTION

If the function displays (8) or (13) flash five times after switching on and then go out, there is a malfunction affecting the automatic heating/air conditioning or the air conditioning.

Contact your service partner.

NOTE

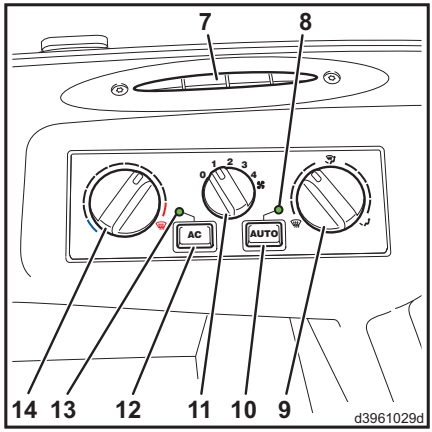
Condensation water in the evaporator can create a musty smell. Switching off the air conditioning ten minutes before completing the journey and keeping the blower running will dry out the condensation water, thus preventing the musty smell.

NOTE

A significant difference between the internal temperature and the outside temperature increases the physical stress put on the driver. To reduce the risk of illness, the difference between the internal temperature and the outside temperature must not exceed six degrees.

Manual heating operation

The push button (12) for the air conditioning and the push button (10) for the automatic mode must be switched off.



Switching on the heating system

– Turn the turning knob (11).

The blower is switched on and the air flow is set to the selected level.

Normal heating operation:

– Use the turning knob (14) to adjust the temperature.

– Use the turning knob (11), the turning knob (9) and the left-hand and right-hand cab air nozzles (not shown) to adjust the air flow and air distribution.

Settings for window defrosting/demisting the windows

– Turn the turning knob (14) to the automatic window defrosting position (right-hand end position).

The blower speed is automatically set to level 4 and the function display (13) lights up in green.

– Turn the turning knob (9) to window defrosting (left-hand end position).

– Open the left-hand and right-hand cab air nozzles (not shown) and direct the fins so that they are pointing towards the door windows.

Automatic heating operation

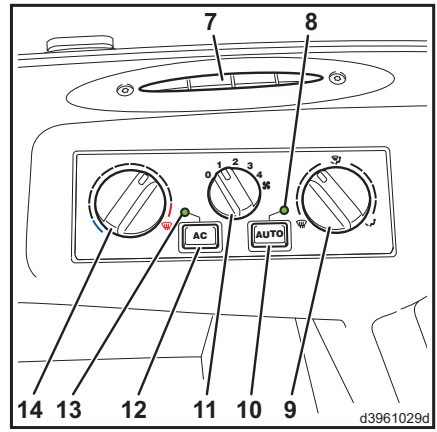
The push button (12) for the air conditioning must be switched off.

– Use the turning knob (14) to adjust the temperature.

– Press the push button (10) and then press the push button (12).

The automatic heating is switched on and the automatic air conditioning is switched off. The function display (8) lights up in green. The set temperature and the blower level are controlled automatically.

– Use the turning knob (9) and the left-hand and right-hand cab air nozzles (not shown) to adjust the air distribution.



NOTE

If the position of the turning knob (11) for the blower levels is changed or the turning knob (14) is turned to the automatic window defrosting position (right-hand end position), the heating system automatically switches to "manual heating operation". Windscreen defrosting can be performed only in manual mode.

⚠ CAUTION

If the function display (8) flashes five times after switching on and then goes out, there is a malfunction affecting the automatic heating.

Contact your service partner.

Switching off heating/air conditioning operation

– Turn the turning knob (11) to level 0.

The heating and air conditioning operation is switched off.

NOTE

When the automatic air conditioning or the automatic heating is switched on and the position of turning knob (11) is set to level 0, the position of turning knob (11) for the blower level must first be changed and then turned to level 0 to switch off heating/air conditioning operation.

NOTE

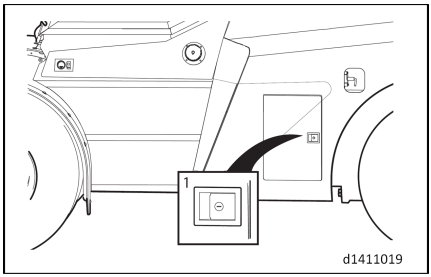
If the rotary knob (14) is set to the automatic window defrosting position (right-hand end position), the position of the turning knob (14) must first be changed and then the rotary knob (11) must be turned to level 0 to switch off heating/air conditioning operation.

Battery access - opening

– Batteries are located in a compartment on the rear left side of the truck.

– Check that door swing area is free from obstruction.

– Open door.



Battery access - closing

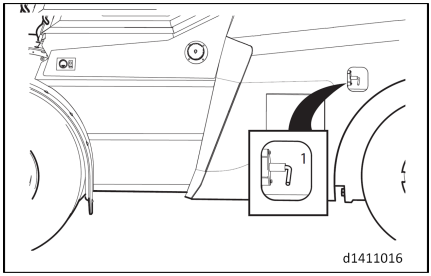
– Close door.

Batteries - isolate

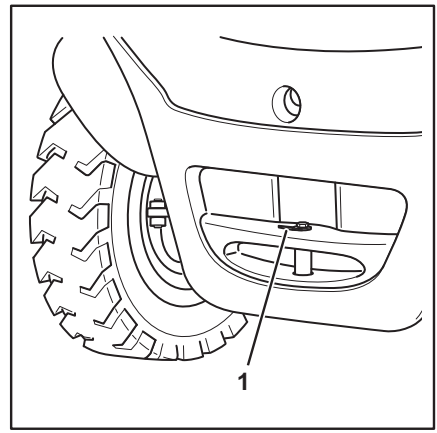
The battery isolator is located to the rear of the battery access compartment.

– To isolate the batteries, rotate handle (1) 90° anti clockwise. The batteries are now isolated.

– To restore battery power, return handle (1) to original position.



Trailer coupling



NOTE

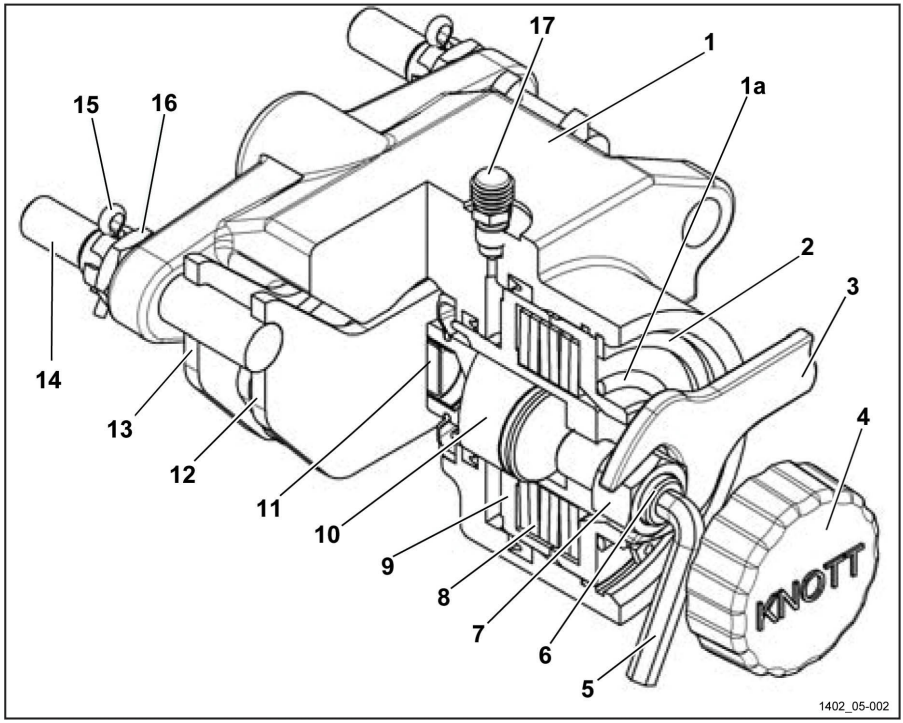
The trailer coupling should only be used to tow light trailers inside the plant working area.

– Lift tow pin (1).

– Place towbar in coupling recess.

– Push tow pin (1) down to engage the draw-bar and the lower retaining hole.

To tow the truck



1	Caliper body	9	Piston
1a	O-ring seal	10	Thrust bolt
2	Circlip	11	Magnet
3	Wrench (24/30 mm)	12	Friction pad
4	Screw-cap	13	Friction pad
5	Allen key wrench (8/10 mm)	14	Guide bolt
6	Adjusting screw	15	Split-pin
7	Lock-nut	16	Castellated nut
8	Spring stack	17	Bleed nipple

NOTE

Read and understand this maintenance procedure before starting any work. If you are unsure of any aspect of this procedure, contact your service partner.

Safety conditions

The maintenance procedures that follow may involve the assembly and or movement of heavy hydraulic equipment, excitation of

hydraulic systems and movement of heavy vehicles. It is the responsibility of all personnel concerned with these procedures to maintain safe working practices.

NOTE

Unless otherwise stated all component parts must be inspected at disassembly for re-use if serviceable.

Emergency release of parking brake

⚠ DANGER

Risk of crush injuries and or death

Do not work on or under a truck unless it is prevented from any movement.

- Park truck on suitable level ground.
- Before any maintenance is started, make sure the truck is completely immobilised, (not able to move).
- Place chocks under wheels.
- Remove ignition key from cab of truck.
- Do not allow unauthorized personnel to enter the cab.

⚠ WARNING

Risk of personal injury.

Brake disc rotors and friction pads can become **very hot**.

- make sure all component parts are cool before starting any maintenance.
- Release screw-cap (4).
- Release lock-nut (7).

NOTE

40 to 70 Nm is required to release the brake using adjustment screw (6).

- Turn adjustment screw (6) anticlockwise until brake disc rotor is free.
- If the truck is to remain in this condition for any length of time, refit screw-cap (4)

hand tight to protect the mechanism from contaminants.

NOTE

Before the truck can be used, the parking brake must be re-adjusted - refer to the training manual.

Emergency exit

The right side cab door can be used as the emergency exit.

– Open the cab door.

– Exit the cab in a backwards direction.

– Use handrails where fitted to climb down the steps and exit the cab.

– Close the cab door.

⚠ WARNING

Risk of injury from entering and exiting the truck incorrectly.

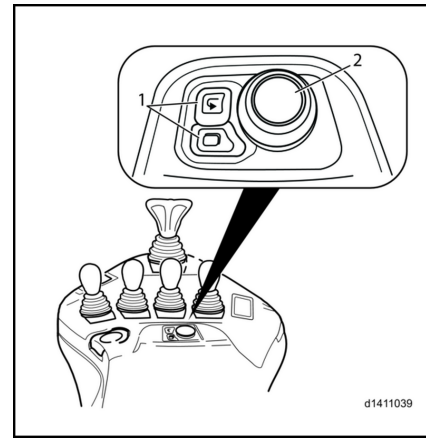
Face the truck when entering and exiting.

Optional equipment

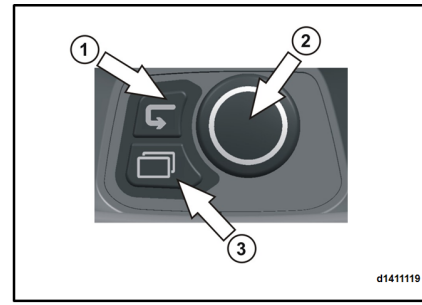
Drive controller

NOTE

The truck status display unit can be navigated in two ways, described below is using the buttons on the armrest.



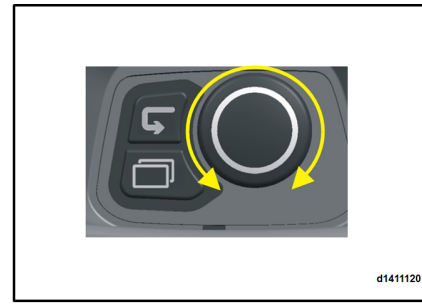
The drive controller is operated using the rotary/push button (2), the "Back" button (1) and the "Switch" button (3).



Turning the rotary/push button

Turning the rotary/push button to the left or right allows the following actions to be carried out:

- Scroll between menu items
- Change values continuously or in increments (brightness, digit value or numerical value)



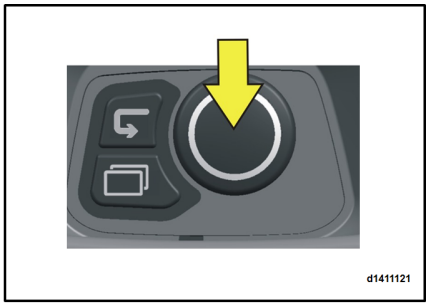
Pressing the rotary/push button

Briefly pressing the rotary/push button allows the following actions to be carried out:

- Select menu item
- Activate or deactivate a function
- Acknowledge a message

Pressing the rotary/push button for longer than two seconds activates the following functions:

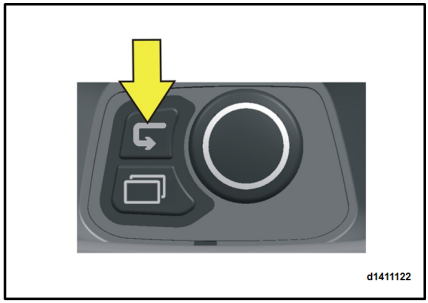
- Program position (tilt angle, lift height, lift limits)
- Assign or overwrite favourite position
- Select function or display after entering the PIN code
- Delete programmed values
- Delete favourite
- Set new time/date or PIN code
- Reset consumption



"Back" button

Briefly pressing the "Back" button allows the following actions to be carried out:

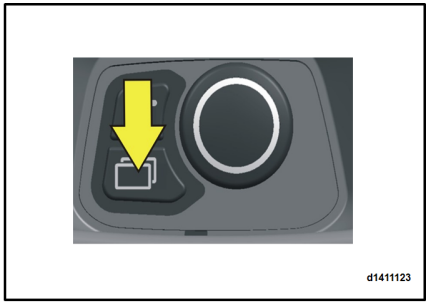
- Go back one menu level
- Acknowledge a message



"Switch" button

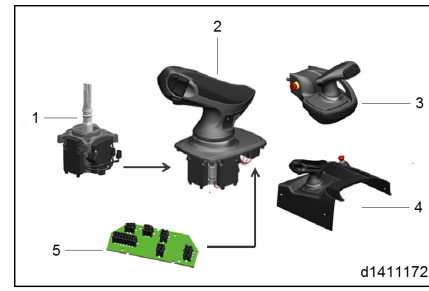
Briefly pressing the "Switch" button allows the following actions to be carried out:

- Switch between favourites
- Jump from the menu item to the favourites last used



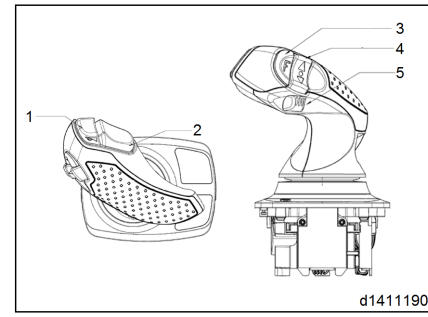
5100 040 Multifunction Joystick

Joystick 4Plus modular concept (Elobau)



1 KION Basis Module
2 Multifunction Lever
3 Multifunction Lever with housing for Counterbalance trucks
4 Multifunction Lever with housing for Reach trucks
5 Electronic Module with CAN

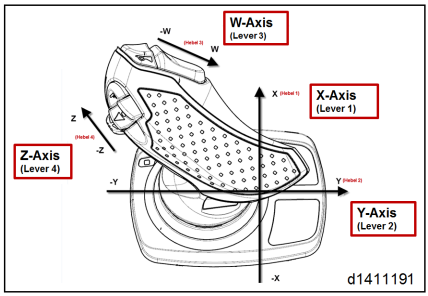
Actuation buttons



1 Signal-horn
2 Tilting
3 Function button
4 Drive direction
5 Side shift

Controlled axes

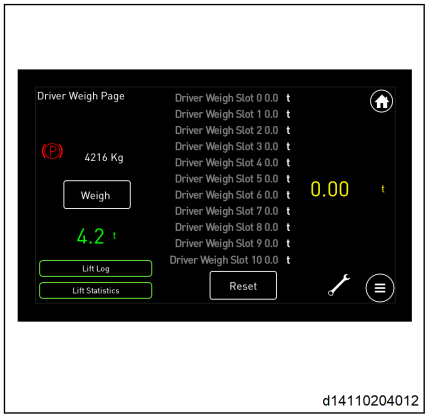
Power Supply	
Operating voltage (min.)	9V
Nominal Voltage	12V / 24V
Operating voltage (max.)	38V
Power consumption (max.)	1,8W



Multifunction Lever Environmental specification

Environmental Conditions	
Protection class	IP65 (mounted)
Storage Temperature	-35°C to +85°C
Environmental temperature	-35°C to +75°C
Suitable for cold store application	ΔT up to 60K
EMC immunity according to EN12895	36V/m
ESD: Contact discharge to the sensor housing (CD) Air discharge (AD)	 15kV from 150pF 25kV from 150pF
Magnetic field immunity: Tested according to EN61000-4-8 Level 5:	1000 A/m 3s (0Hz) 30 A/m 3s (50Hz)

6240 005 Load weight display (the weight error of (+ / - 100 kg))



Determining and displaying the load weight

To increase the accuracy of the load weight display, the following conditions must be met:

- The truck must be on a flat, level surface and must be stationary
- The lift mast must be in a vertical position
- The hydraulic oil in the truck must be at operating temperature
- The fork carriage must not be raised more than 1.70 m above the ground The load weight display does not show reliable values at heights above 1.70 m
- The raised load must be stationary

NOTE

Reliable display of the load weight cannot be guaranteed for light loads of less than 100 kg.

Forklift information management

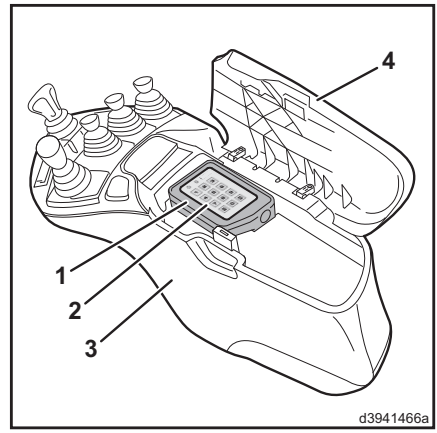
Access control PIN

The forklift data acquisition (FDE) input device (1) is located in the armrest console (3).

The input device has a 12-digit keypad (2).

With the standard setting, a 5-digit PIN is allocated to the respective driver to ensure that the forklift can only be operated by authorised personnel.

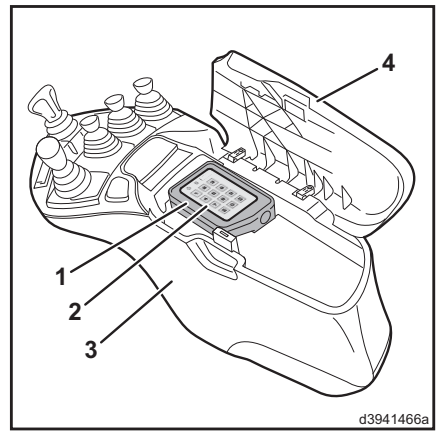
The forklift can only be started after entering this PIN and possibly a status code (depending on the setting).



NOTE

The PIN can be 5 to 8 digits long. Before entering the PIN, contact your fleet manager to check the number of digits in the PIN and to find out about the forklift settings.

Forklift data acquisition - standard setting (PIN)

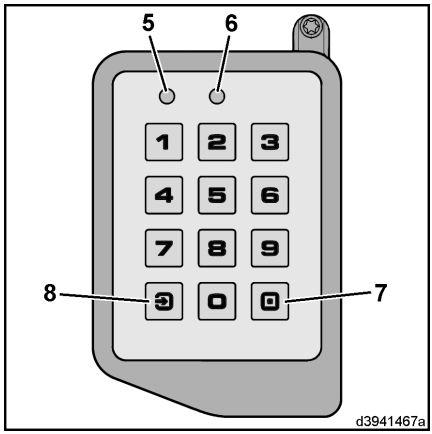


Log in and start the engine:

– Apply the parking brake.

– Open the armrest support (4) sideways to the right

– Press the Reset button (8) (or any other button) to activate the input unit from stand-by mode ▷



NOTE

If a number button is pressed to activate the device, this number is registered as the first digit of the PIN.

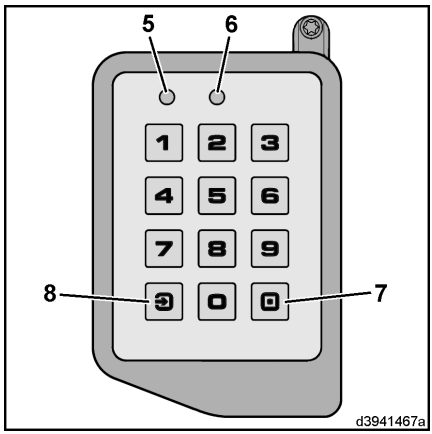
LED (5) and LED (6) flash green alternately.

NOTE

If no PIN is entered, the input device reverts to standby mode after 60 seconds (factory setting). This delay time can be changed. Contact your fleet manager.

– Enter personal PIN (factory setting = 0 0 0 0 0).

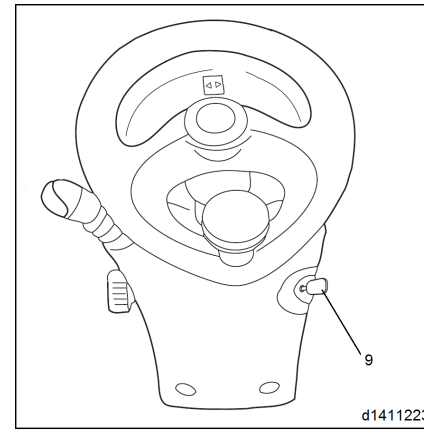
LED (5) and LED (6) both light up green. ▷



NOTE

If an incorrect PIN is entered, LED (5) and LED (6) flash red. After a delay time, the input unit reverts to login mode and the two LEDs flash green alternately. If an incorrect PIN is entered, the delay time increases after each incorrect attempt. If an error occurred while entering the PIN code, press the Reset button (8) to clear the PIN code entered.

– Turn rotating knob (9)to switch setting "II" and start the engine ▷



NOTE

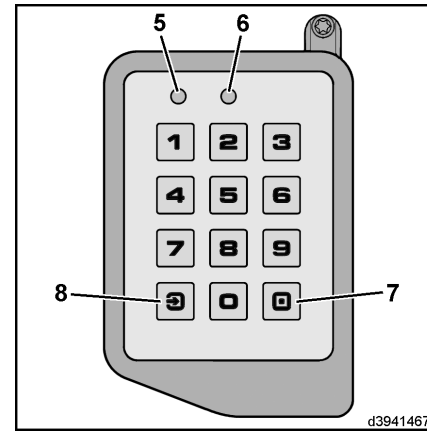
If the forklift does not start correctly the first time, you can start it again before rotating knob (9) returns to zero. The PIN code will not be kept once the delay time has elapsed.

NOTE

If LED (5) lights up red and LED (6) lights up green, the data must be read out. Inform your fleet manager immediately.

– Close armrest support (4)

Switch off the engine and log out: ▷



⚠ CAUTION

Unwarranted use by unauthorised personnel.

When parking and leaving the forklift, the driver must log out.

– Apply the parking brake.

– Open the armrest support (4) sideways to the right

– Press the Log in/ESC button (7)

The engine is switched off, and LED (5) and (6) turn off.

– Close armrest support (4)

– Turn rotating knob (9) to switch setting "0"

NOTE

If the driver leaves the driver's seat, the engine and power supply are switched off after the delay time elapses. If the driver switches off the engine using rotating knob (9), the forklift can be restarted within the delay time without having to re-enter the PIN. This delay time can be changed. Contact your fleet manager.

Activate the power supply:

– Press and hold the Log in/ESC button (7) for more than 2 seconds.

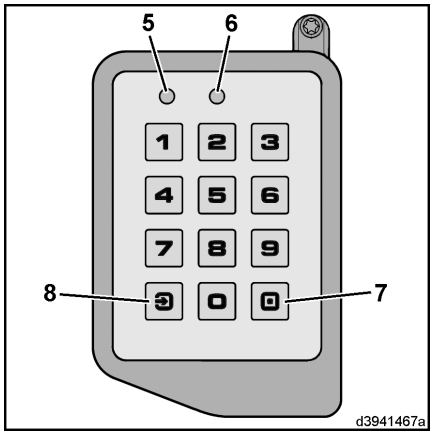
LED (5) lights up yellow, and LED (6) flashes green.

– Turn rotating knob (9) to switch setting "0"

The engine is switched off.

– Turn rotating knob (9) to switch setting "I"

The power supply remains switched on for approx. 60 seconds (e.g. for lighting).

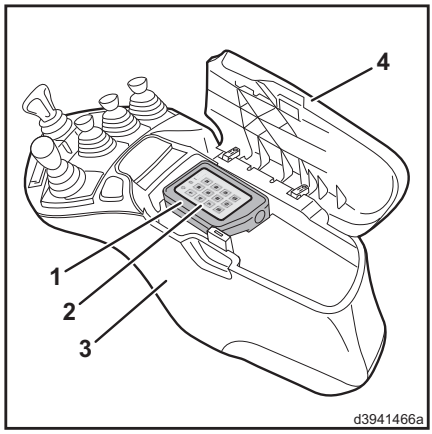


Forklift data acquisition - special setting (PIN and status code)

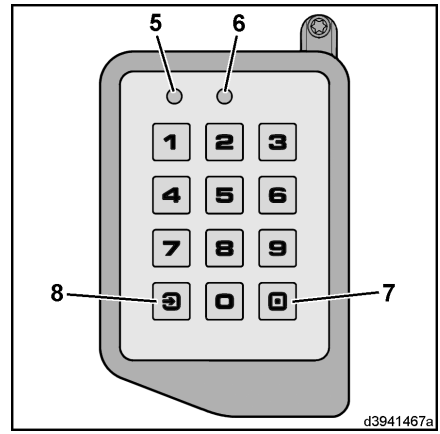
Log in and start the engine:

– Apply the parking brake.

– Open the armrest support (4) sideways to the right



– Press the Reset button (8) (or any other button) to activate the input unit from stand-by mode ▷



NOTE

If a number button is pressed to activate the device, this number is registered as the first digit of the PIN.

LED (5) and LED (6) flash green alternately.

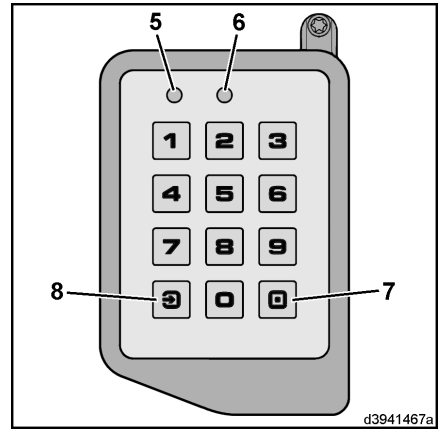
NOTE

If no PIN is entered, the input device reverts to standby mode after 60 seconds (factory setting). This delay time can be changed. Contact your fleet manager.

– Enter personal PIN (factory setting = 0 0 0 0 0) and status code.

To set up a forklift correctly, the PIN should be as follows: 0 0 0 0 0 0.

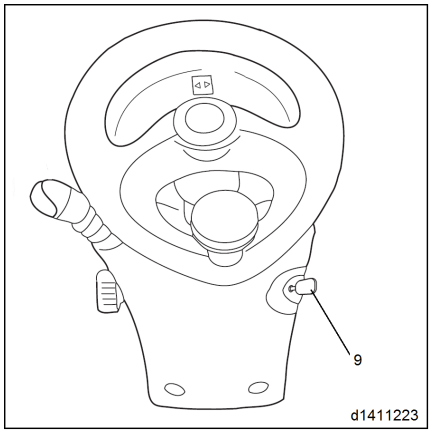
LED (5) and LED (6) both light up green. ▷



NOTE

If an incorrect PIN is entered, LED (5) and LED (6) flash red. After a delay time, the input unit reverts to login mode and the two LEDs flash green alternately. If an incorrect PIN is entered, the delay time increases after each incorrect attempt. If an error occurred while entering the PIN code, press the Reset button (8) to clear the PIN code entered.

– Turn rotating knob (9)to switch setting "II" and start the engine ▷



NOTE

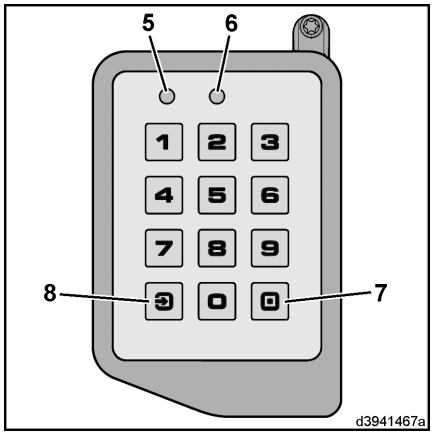
If the forklift does not start correctly the first time, you can start it again before rotating knob (9) returns to zero. The PIN code will not be kept once the delay time has elapsed.

NOTE

If LED (5) lights up red and LED (6) lights up green, the data must be read out. Inform your fleet manager immediately.

– Close armrest support (4)

Switch off the engine and log out: ▷



⚠ CAUTION

Unwarranted use by unauthorised personnel.

When parking and leaving the forklift, the driver must log out.

– Apply the parking brake.

– Open the armrest support (4) sideways to the right

– Press the Log in/ESC button (7)

The engine is switched off, and LED (5) and (6) turn off.

– Close armrest support (4)

– Turn rotating knob (9) to switch setting "0"

NOTE

If the driver leaves the driver's seat, the engine and power supply are switched off after the delay time elapses. If the driver switches off the engine using rotating knob (9), the forklift can be restarted within the delay time without having to re-enter the PIN. This delay time can be changed. Contact your fleet manager.

Activate the power supply:

– Press and hold the Log in/ESC button (7) for more than 2 seconds.

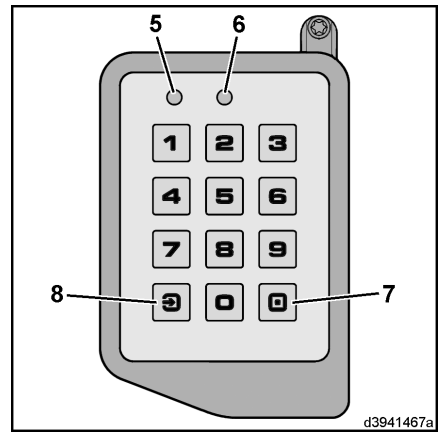
LED (5) lights up yellow, and LED (6) flashes green.

– Turn rotating knob (9) to switch setting "0"

The engine is switched off.

– Turn rotating knob (9) to switch setting "I"

The power supply remains switched on for approx. 60 seconds (e.g. for lighting).



Status code

NOTE

The status code indicates the status of the forklift.

The following codes are available:

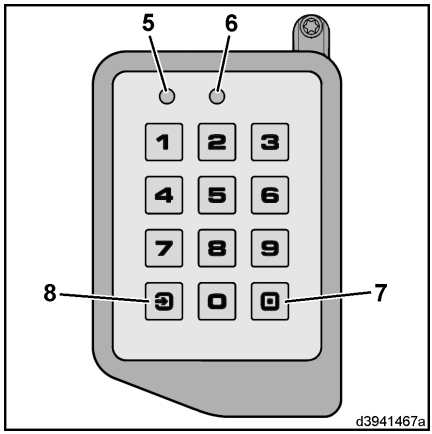
- 0 = forklift OK
- 1 = request service (forklift cannot be started)
- 2 = request maintenance (forklift can be started)
- 3 = Problem with driving
- 4 = Problem with lifting
- 5 = Problem with steering
- 6 = Accident damage
- 7 = User-defined
- 8 = User-defined
- 9 = User-defined

Status messages 7, 8 and 9 can be defined individually by the user. Contact your fleet manager to find out the definition of these status messages.

NOTE

If you only notice one of these statuses (e.g. a problem with driving) after having entered status code 0 (forklift OK), you must log out.

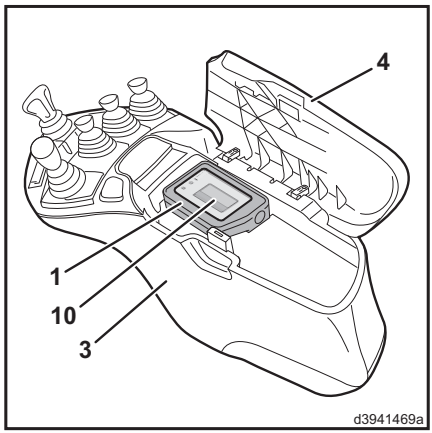
– Press [Reset] button (8).
– Log in again with status message [3] (problem with driving)



Access Control RFID Dual

The forklift data acquisition (FDE) input device (1) is located in the armrest console (3).

The input device features a reading area (10) onto which the corresponding transponder (chip or magnetic stripe card) must be placed. The forklift can only be started once the transponder has been placed onto the reading area.



Log in and start the engine:

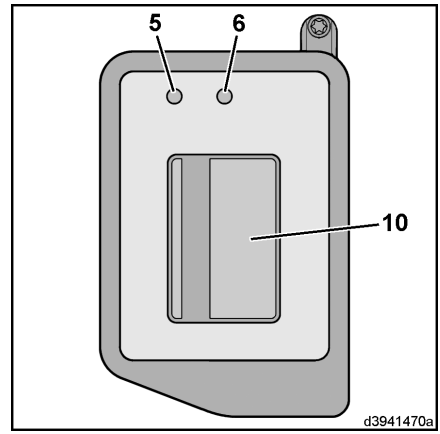
– Apply the parking brake.

– Open the armrest support (4) sideways to the right

– Place the valid transponder onto the reading area (10).

Data is read in, and LED (5) and LED (6) both light up green.

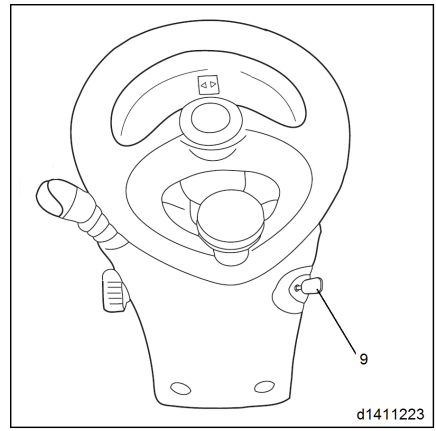
– Remove transponder.



NOTE

If LED (5) and LED (6) flash red, the transponder is invalid or there is a reading error. After a delay time, the input unit reverts to login mode and the two LEDs flash green alternately. If the transponder used is invalid, the delay time increases after each use. The input device is reactivated automatically when a valid transponder is placed on the reading area and read in. LED (5) and LED (6) both light up green.

– Turn rotating knob (9)to switch setting "II" and start the engine



NOTE

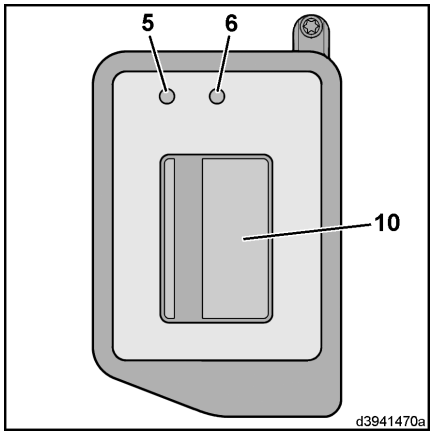
If the forklift does not start correctly the first time, it can be restarted before rotating knob (9) returns to zero. The engine can no longer be started once the delay time has elapsed.

NOTE

If LED (5) lights up red and LED (6) lights up green, the data must be read out. Inform your fleet manager immediately.

– Close armrest support (4)

Switch off the engine and log out:



⚠ CAUTION

Unwarranted use by unauthorised personnel.

When parking and leaving the forklift, the driver must log out.

– Apply the parking brake.
– Open the armrest support (4) sideways to the right
– Place the valid transponder onto the reading area (10).

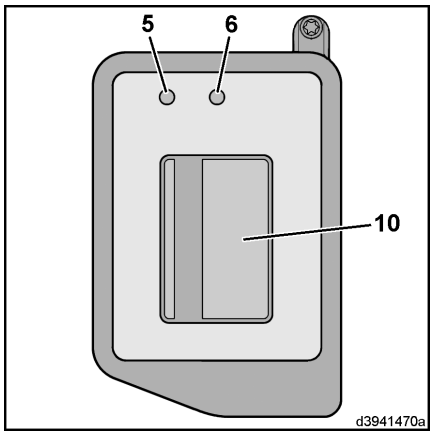
The engine is switched off, and LED (5) and (6) turn off.

– Remove transponder.
– Close armrest support (4)
– Turn rotating knob (9) to switch setting "0"

NOTE

If the driver leaves the driver's seat, the engine and power supply are switched off after the delay time elapses. If the driver switches off the engine using rotating knob (9), the forklift can be started during the delay time without placing a valid transponder on the reading area again. This delay time can be changed. Contact your fleet manager.

Activate the power supply:



– Place a valid transponder on the reading area (10) and hold it there for longer than 2 seconds

LED (5) lights up yellow, and LED (6) flashes green.

– Turn rotating knob (9) to switch setting "0"

The engine is switched off.

– Turn rotating knob (9) to switch setting "I"

The power supply remains switched on for approx. 60 seconds (e.g. for lighting).

NOTE

If another valid transponder is placed on the reading area within 60 seconds, the engine can be started again.

LED status display

Function:	LED (5)	LED (6)
Standby mode	Off	Off
Input prompt: PIN/transponder	LED (6) flashes green alternately	LED (5) flashes green alternately
No error when reading in PIN/transponder; engine can be started	Lights up green	Lights up green
Error when reading in PIN/transponder: engine cannot be started	Flashes red	Flashes red
Enter standby mode	Lights up red once	Lights up green once
Power supply active for 60 seconds	Lights up yellow	Flashes green
Need to read data — memory is 90% full	Flashes red	Lights up green
Need to read data — memory is 100% full	Lights up red	Lights up green
Speed reduction via shock sensor	Flashes red slowly	Flashes green slowly

Lighting

NOTE

The arrangement of the individual switches on the console on the upper right-hand side of the overhead guard may vary, depending on the version. Observe the switch symbols.

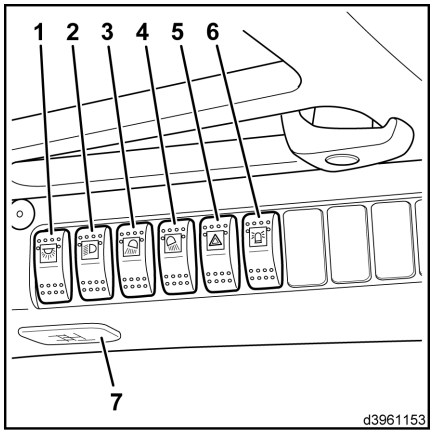
Switching on the terminal board and interior lighting

– Move the toggle switch (1) to the centre position.

The terminal board lighting is switched on.

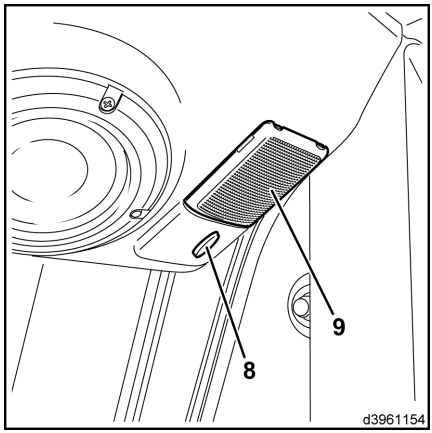
– Switch the toggle switch (1) as far as it will go.

The interior lighting (7) is switched on.



– Press the push button(8).

– The interior lighting (9) is switched on.



NOTE

If the pressure switch (8) has previously been actuated, the two interior lights (7) and (9) may be switched on and off via toggle switch (1).

Switching on the lighting

– Move the toggle switch (2) to the centre position.

The sidelights and licence plate lamp are switched on.

– Switch the toggle switch (2) as far as it will go.

The dipped beams, sidelights and licence plate lamps are switched on.

Switching on the working spotlight

– Press toggle switch (3) or (4) (depending on the version).

Switching on the hazard warning system

– Press the toggle switch (5).

Switching on the rotating beacon/flashing beacon

Depending on the equipment, there are three different versions.

Version 1

– Press the toggle switch (6).

Set the toggle switch (6):

- Level 0: light "OFF"
- Level 1: light "ON" for reverse travel
- Level 2: light in continuous operation

Version 2

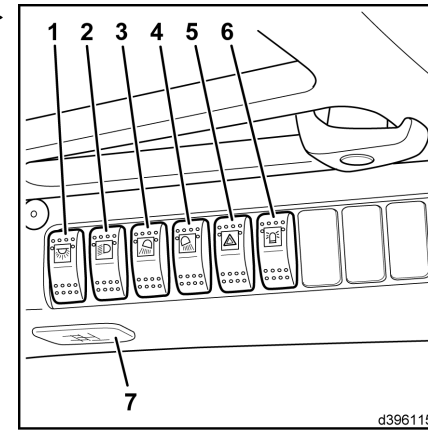
– Switch on the key switch.

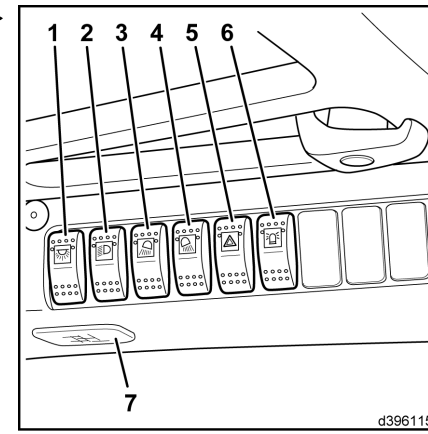
The light is always in operation.

Version 3

– Switch on the key switch and press the reverse pedal.

The light is in operation for reverse travel only.





NOTE

If the truck is to be operated on public roads, the rotating beacon/flashing beacon must be switched off.

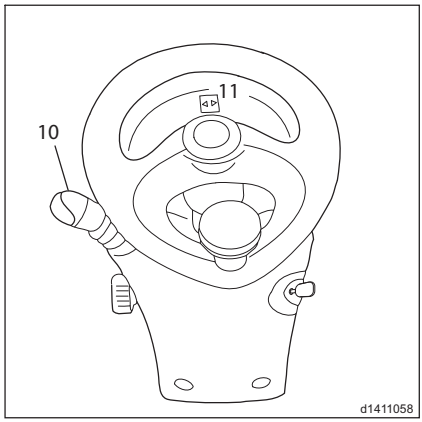
Switching on the direction indicators

– Push lever (10) up.

The direction indicators flash on the right of the truck. Indicator (11) flashes.

– Push lever (10) down.

The direction indicators flash on the left of the truck. Indicator (11) flashes.



Lighting options

NOTE

The arrangement of the individual switches on the console on the upper right-hand side of the overhead guard may vary, depending on the version. Observe the switch symbols.

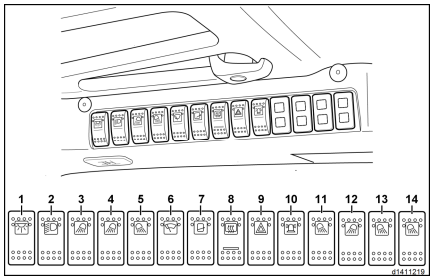
Switching on the full road lighting

– Press the toggle switch(2)

- 6100 005 Full road lighting
- 6100 010 Full road lighting (with stone guards)

Set the toggle switch(2) :

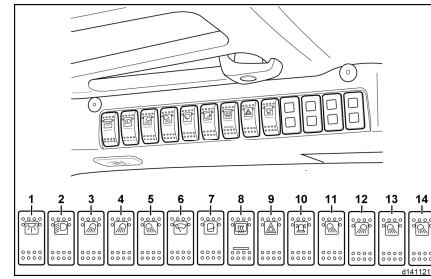
- Level 0 : Light "OFF"
- Level 1 : open the low beam
- Level 2 : open the high beam



Open the rear lights only

– Press the toggle switch(4)

- 6100 015 Rear lights only
- 6100 020 Rear lights only (with stone guards)



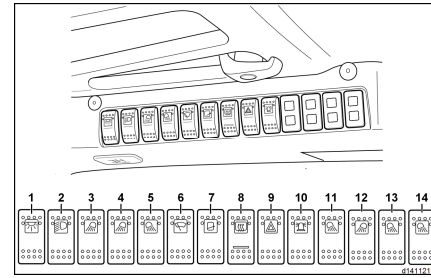
Open the mast mounted front facing lamps

NOTE

According to the height of the frame, the mast lamp has different positions for the customers to choose.

– Press the toggle switch (3)

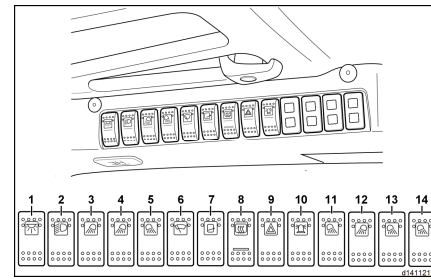
- 6103 005 Mast mounted front facing lamps
- 6103 010 Mast mounted front facing LED lamps
- 6105 005 Mast mounted front facing lamps >5m mast
- 6105 010 Mast mounted front facing LED lamps >5m mast



Open the cab mounted rear facing lamps

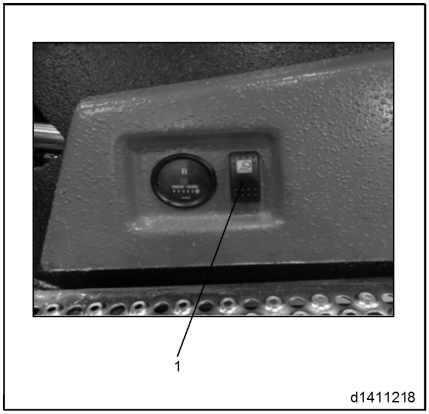
– Press the toggle switch(13)

- 6104 005 Cab mounted rear facing lamps
- 6104 010 Cab mounted rear facing LED lamps

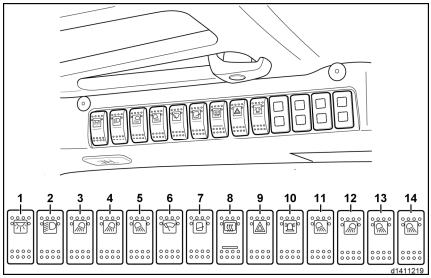


Open the step lights

– Version 1: press the toggle switch next to the pedal (1) ;



– Version 2: Press the toggle switch(12)。



- 6106 005 Step lights
- 6106 010 Step lights (LED)

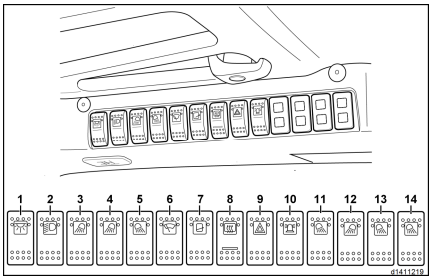
NOTE

There are two ways to open the step lights, the toggle switch next to the pedal and toggle switch on the panel. The two are parallel connections.

Open the reverse warning light

When the forklift is reversed, the reverse warning lights will automatically light up. But LED Reverse warning light need switch.

– Press the toggle switch(10)



The optional model is as follows :

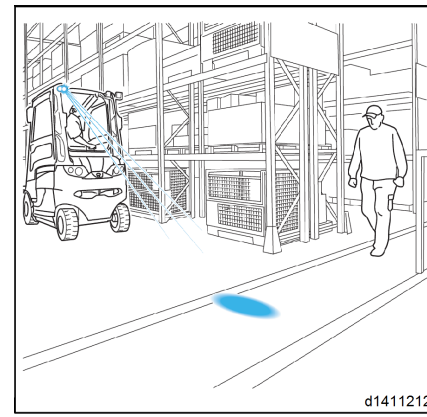
- 6104 015 Reverse warning light x 2
- 6104 020 LED Reverse warning light x 2

BlueSpot™

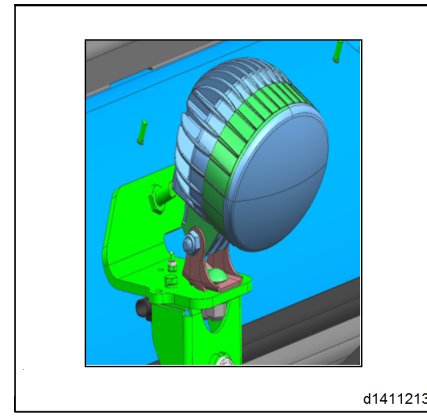
NOTE

Customers can choose Bluespot Front & Rear or Bluespot Rear according to the needs .

The BlueSpot™ comprises a visual warning unit that enables the early detection of trucks in driving areas with low visibility (such as drive lanes and high racks), as well as at blind junctions.



The BlueSpot™ is mounted above on the right-hand or left-hand support on a support mounting. It projects a high-power dot of light or arrow (LED technology) onto the ground. It is not affected by jolts and vibrations. The system allows pedestrians to notice an approaching truck at an early stage.



NOTE

The BlueSpot™ can be installed for forwards and reverse travel.

⚠ CAUTION

Do not look directly into the BlueSpot™.

Switching on the BlueSpot™

Depending on the equipment fitted, there are two different ways to activate the BlueSpot™:

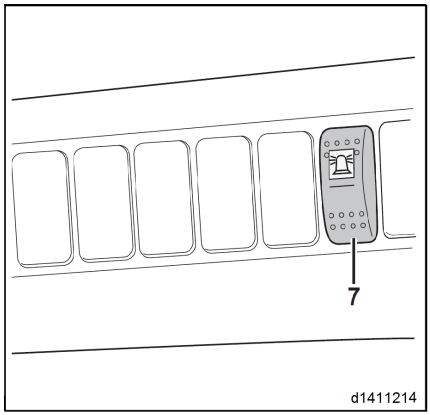
Version 1 (When choosing 7118 005 Bluespot Rear)

– Switch on the key switch.

BlueSpot™ is always in operation.

Version 2 (When choosing 7118 015 Blue-spot Front & Rear)

– Move the toggle switch (7) ▷



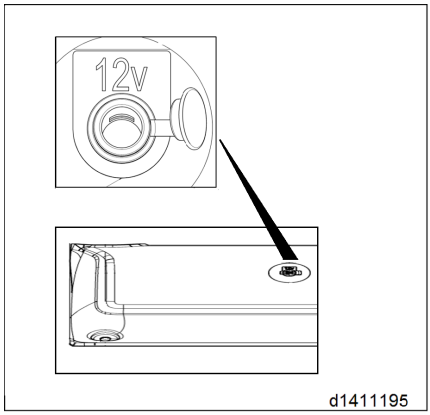
Switch settings for the toggle switch :

- Level 0: BlueSpot™ OFF ;
- Level 1: BlueSpot™ ON .

NOTE

If the truck is to be operated on public roads, the BlueSpot™ must be switched off.

12v Power ▷



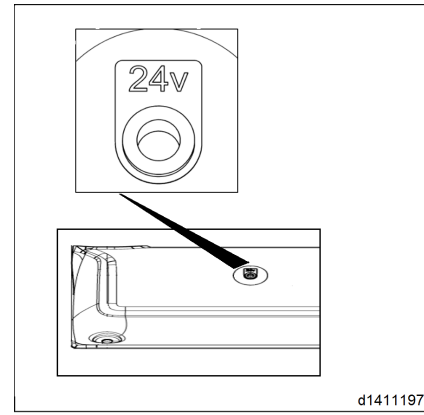
The optional types are as follows :

- 4412 020 1x12V - 20mm

24v Power

The optional types are as follows :

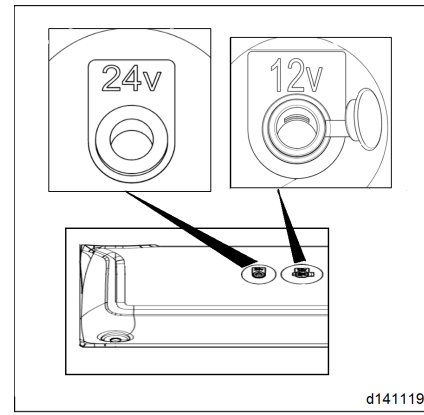
- 4412 015 1x24V - 20mm



12/24v Power

The optional types are as follows :

- 4412 030 2x12/24V - 20mm



Mechless 1DIN truck radio with USB/AUX/Bluetooth ▷

- 4401 005 FM Radio/USB/Bluetooth
- 4401 010 FM Radio/CD/USB/Bluetooth
- 4401 015 DAB Radio/USB/Bluetooth

Robust mechless 1DIN 24 Volt truck radio with USB(2x)/Bluetooth/AUX Fixed panel with well legible LCD display Ideal for trucks due to 24 V direct connection Clear, lucid and easy to use.



d1411174

Description

– Robust mechless 1DIN 24 Volt car radio with USB(2x)/Bluetooth/AUX
– Fixed panel with well legible LCD display
– Ideal for trucks due to 24 V direct connection
– Clear, lucid and easy to use
– Integrated Bluetooth hands-free system with external microphone
– A2DP Bluetooth audio playback
– MP3 playback via USB port
– Front AUX input
– 2 channel amplifier with 2 x 40 W (max.)
– Rotary control for volume
– RDS
– Steering wheel control input (interfaces for many vehicles optional)
– ISO terminal
– i-Mode: Select the tracks on your i-Phone directly via the control buttons of the radio

Specifications

Fixed panel with LCD display

Front USB/AUX, rear USB

Bluetooth firmware updatable via USB

A2DP Bluetooth audio playback

MP3 playback via USB

MP3 ID3 display: track, artist, album

MP3 folder and file display

MP3 song/file/character search

4 channels x 40 W (max.)

Rotary control for volume

System EQ

PLL tuner with 18 FM and 6 AM presets

2 channels x 2 V line-out

ISO terminal, 24 Volt direct connection

RDS

Phone mute

Last memory

Last position

Dimensions (W x H x D): 186 x 56 x 95 mm

4470 005 Cab vent fan 24v

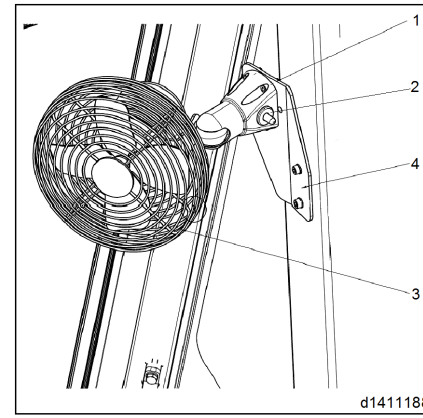
Position

The fan is mounted on the left column of the cab

Switch

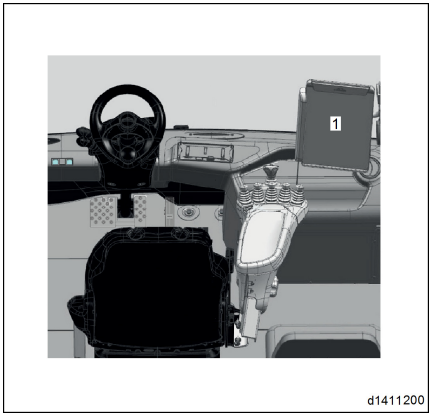
Set the fan switch(2)

- Level 0: "OFF" ;
- Level 1: low speed ;
- Level 2: high speed。



1 Support fan
2 Switch
3 Fan
4 Socket head screw

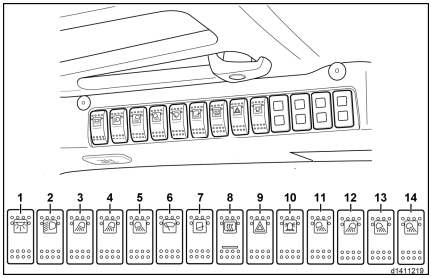
4460 005 Illuminated A4 clipboard ▷



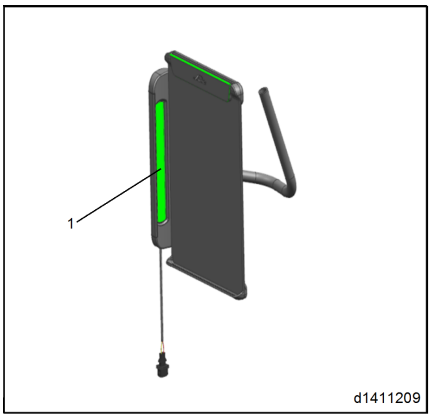
1 Illuminated A4 clipboard

Open the illuminated A4 clipboard

– Press the toggle switch(1) ; ▷

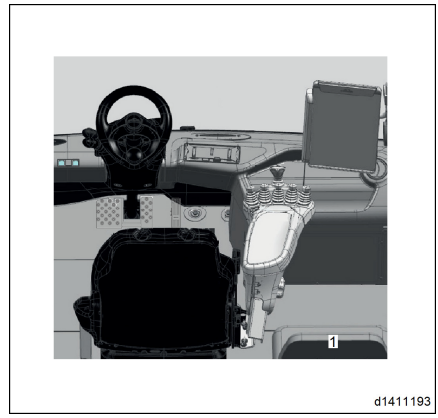


– The light on the side of illuminated A4 clipboard (1) is bright. ▷



4210 010 Buddy seat

The buddy seat(1)is located in the right rear of the cab.

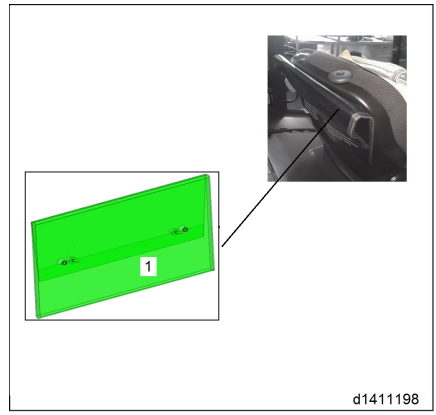


4480 005 Storage unit

Includes document holder(1), additional storage(3) and cup holder(2).

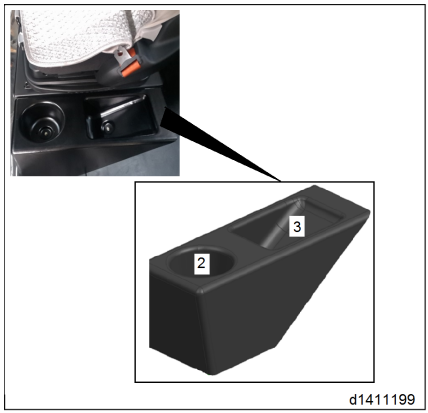
Document holder

This document holder has a lighting function.



1 Document holder

Additional storage and cup holder



2 Cup holder
3 Storage

4450 005 With cup holder

NOTE

When the cup holder and the fire extinguisher is all needed , The cup holder is placed on the door frame on the left of the cab.



1 With cup holder

4202 085 Deluxe Fabric Height Adjustable Heated Suspension Seat

Air suspension with compressor in 24 Volt;

Fabric Alto, climate system passive;

suspension stroke 80 mm, with height adjustment;

Mechanical lumbar support;

Seatbelt with orange webbing and buckle switch;

Seat switch (operator presence detector);

Fore-and aft adjustment: 210 mm;

Seat heating

Backrest angle measured 12° , seat angle measured 6°

⚠ WARNING

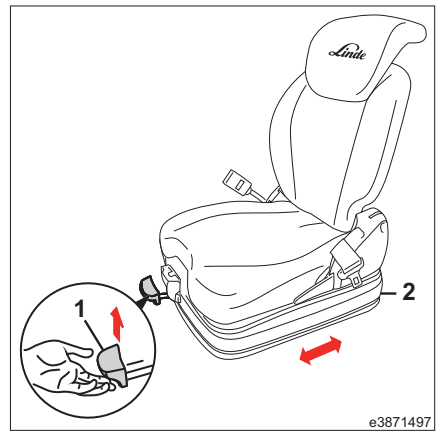
Incorrect seat adjustment may cause injury to the driver's back. The setting devices for the driver's seat must not be used during operation.

Before starting up the truck and whenever changing drivers, adjust the seat for the individual weight of the driver. Only adjust the driver's seat when the truck is stationary.

NOTE

Sitting for long periods of time puts a lot of pressure on the spine. Try to compensate for this by performing regular, simple gymnastic movements.

Longitudinal adjustment ▷



⚠ WARNING

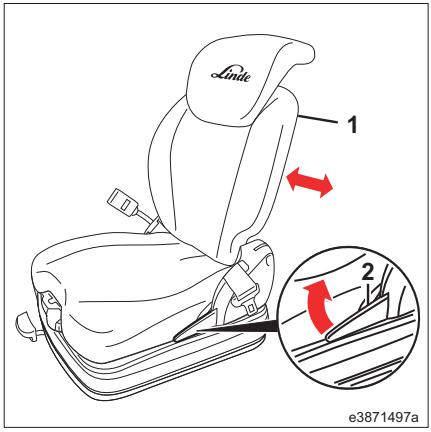
There is a risk of crushing if the lever is grasped fully.

Only grasp the lever by the trough provided for this purpose.

– Pull the lever (1) upwards.
– Move the driver's seat (2) forwards or backwards on the runners to give the driver the most comfortable position in relation to the steering wheel and the accelerator pedals.
– Allow the lever (1) to click back into place.

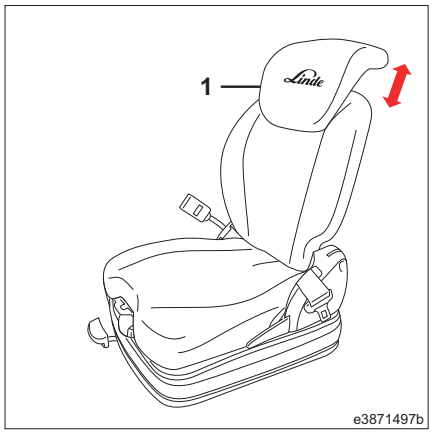
Adjusting the seat backrest

– Pull the lever (2) up and hold.
– Swivel the seat backrest (1) forwards or backwards to find a comfortable seat position for the driver.
– Release the lever (2).

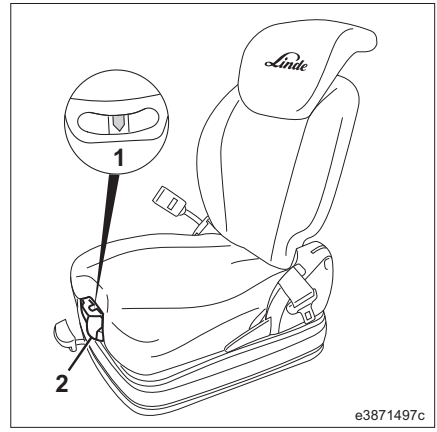


Adjusting the backrest extension

– Push the backrest extension (1) in or pull it out for individual adjustment.



Setting the driver's weight



NOTE

The individual driver's weight must be set when the driver's seat is under load.

– Sit on the driver's seat.

– Check the weight adjustment in the inspection window (1).

The correct driver's weight has been set when the arrow is in the centre position in the inspection window (1).

Adjust the driver's weight as necessary.

– Pull the lever (2) upwards to increase the weight.

– Press the lever (2) downwards to decrease the weight.

Adjusting the seat height

Adjust the seat height as required.

– Pull the lever (2) upwards.

The seat moves upwards.

– Push the lever (2) downwards.

The seat moves downwards.

NOTE

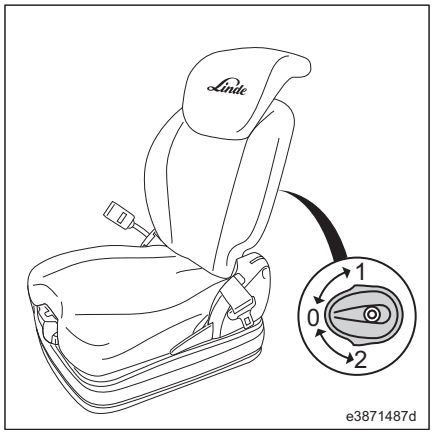
After making the adjustment, the arrow in the inspection window (1) may deviate slightly from the centre position.

Adjusting the lumbar support

The lumbar support enables the seat backrest contour to be adapted as effectively as possible to the driver's body.

– Turn the turning knob to the left or right.

The extent to which the lower and upper areas of the backrest are curved is adjusted individually.



Activating the seat heater

– Push the switch (1) downwards into position **"I"**.

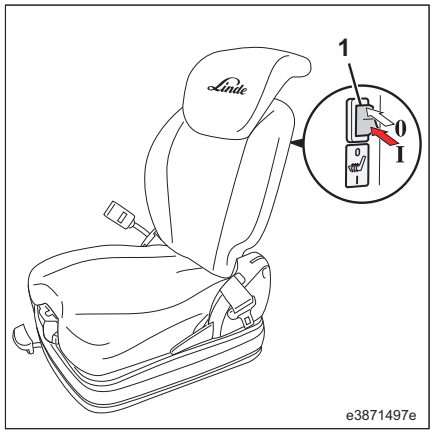
The seat heater is switched on.

– Push the switch (1) upwards into position **"0"**.

The seat heater is switched off.

NOTE

The maximum temperature is pre-set.



Adjusting the driver's seat with rotating device

- 4202 005 Rotating Seat Plate – 10 deg to right
- 4202 010 Rotating Seat Plate – 17 deg to right

⚠ CAUTION

The driver's seat must not swivel while the industrial truck is in use.

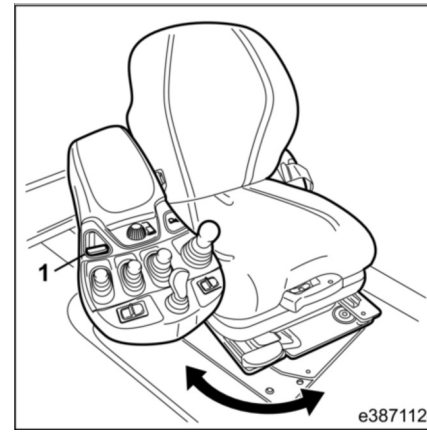
It should therefore be ensured that the rotating device is locked.

The driver's seat with rotating device offers better rear visibility during reverse travel over long distances. This allows the driver to maintain an ergonomic seating position.

When driving forwards for long distances, it is recommended that you return the seat to the straight-ahead position.

The rotating device is maintenance free.

– Pull locking lever (1) backwards. ▷



The rotating device is enabled and allows the seat to be swivelled, either by:

- 10° to the right, lockable at 0° and 10°

  or
- 17° to the right, lockable at 0° and 17°

– Turn the driver's seat to the right and allow the locking bolt to engage audibly in the interlock.

Safety equipment

7105 005 Absent Driver Isolator

Absent driver isolator will automatically brake when the forklift is stopped for 5 seconds.

NOTE

In the process of forklift upslope or downhill, this function can prevent the occurrence of slope sliding.

7105 010 Absent Driver Shutdown

Before the factory, the system is set to the driver no longer seat for 3 minutes, the engine automatically stops turning. and forklift flame-out.

7105 015 Seatbelt Sequence Interlock

– Open the key switch to the 1 Level when the driver sits on the seat.
– After hearing a buzzer behind the cab, Tie up the seat belt.
– Then open the key switch to the 2 Level and the forklift can start normally.

Fire extinguisher in the cabin ▷

NOTE

If the truck is equipped with a fire-fighting system, be sure that you are familiar with how to use it in an emergency.

NOTE

Fire extinguishers do expire. Please check the instruction manual for expiry information. Please contact an authorised service partner if there is any problem with the device.

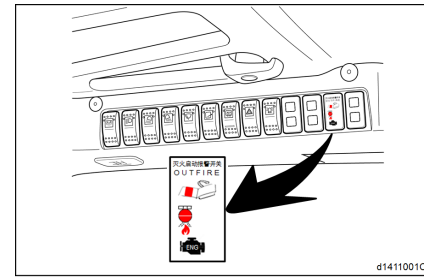


Note: In this example, the fire extinguisher weighs 2 kg.

Fire suppression system

7110 005 Automatic fire suppression system with additional manual activation switch in the cabin

Location of the switch ▷



The main function of the switch:

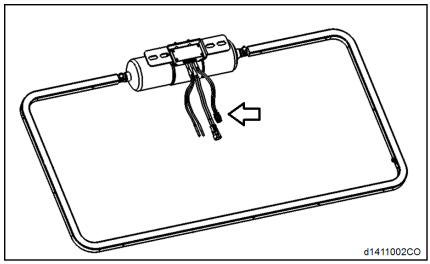
- **Power status indicator:** the green power indicator lights after normal power supply on.
- **Fire suppression system line detection function:** When the Fire suppression system line is not connected or shorted circuit to ground, the yellow indicator lights and the buzzer sounds and flash once about 5s. After the circuit back to normal, it will be recovered automatically.
- **Manual fire fighting capabilities:** Crash the button cover and hold the switch for 1-2 seconds to start the fire suppression system.
- **Fire suppression feedback function:** The red indicator lights and the buzzer sounds after spraying fire suppression device is activated.
- **Failure protection function:** Function modules isolated from each other, even if the switch occurs functional failure, the system still ensure the effectiveness of the manually start function.

7110 010 Automatic fire suppression system ▷



Maintenance

The blasting fuse of the fire suppression system should be checked whether ageing when doing the regular maintenance.



6310 005 Tire pressure monitoring system

The monitor is fixed on the right side in the cabin.



Programming of Monitor

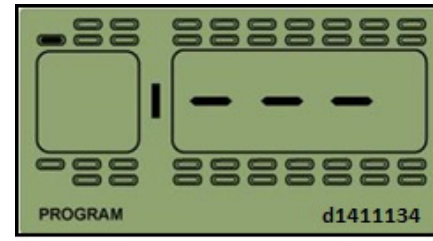
Programming of Transmitter ID

NOTE

If the user wants to program a new transmitter into the monitor, the operation should be finished in programming mode. At this time, make sure the transmitter to be programmed has not been screwed onto the valve yet. Screw on transmitters until the programming has been finished and the monitor returns to normal mode.

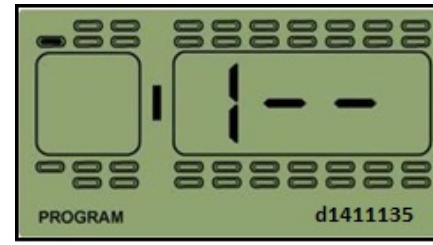
Each transmitter has 4 groups of ID, for example when program the transmitter with ID of 001 001 001 158 to front right tire position, the user only needs to input the last 3 digits “158”. Monitor will record the rest 3 groups of ID automatically. Operation steps are as following:

– After monitor is powered, the screen will display “NSP”, press P for 3 seconds to access the system programming mode, the first interface is for ID programming as shown below:



– Press any of the four arrow keys to choose the tire position which needs to be programmed with a transmitter.

– Then press S for 3 seconds to start programming and the digit flashes, then press up or down arrow key to adjust the number.



– Once finish programming of the first digit, press → to start programming the second digit which flashes. Press up or down arrow key to adjust the number. ▷

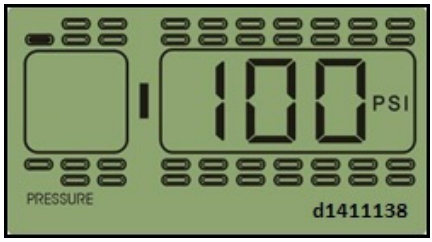


– Press → again to program the third digit which flashes. Press up or down arrow key to adjust the value. ▷
– When finish programming these 3 digits, press S for 3 seconds to save with the screen flashes twice, beep buzzes twice. Then it will automatically switch to next tire position.
– Repeat the above operations to program ID of other transmitters.

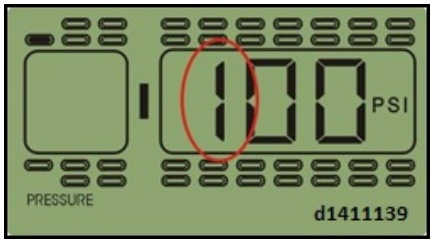


Standard Pressure Programming

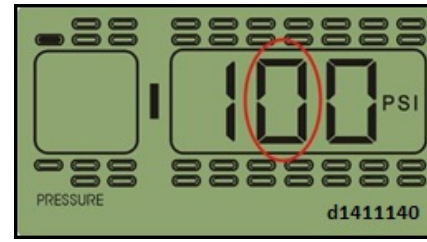
– When finish programming ID, press P to access the standard pressure programming mode.
– Then press any of the four arrow keys to choose the desired tire position. ▷



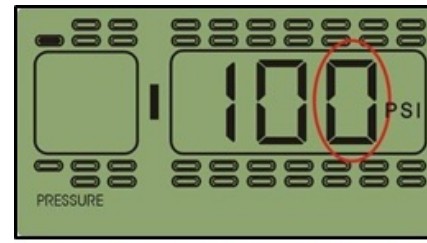
– Then press S for 3 seconds to set the first digit which flashes. Press up or down arrow key to adjust the value to 1. ▷



– Once finished programming the first number, press → to program the second digit which flashes and then press up or down arrow key to adjust the value to 0. ▷

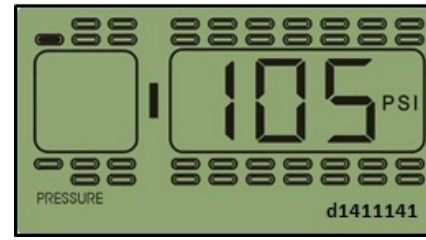


– Once finished programming the second number, press → to program the third digit which flashes and then press up or down arrow key to adjust the value to 5. Then press S for 3 seconds to save the setting. ▷



NOTE

The default standard pressure is set to 100 psi in factory.



System Time Programming

NOTE

The system clock was preset in the factory. It is the base of the alarm record, user can check the current date and time as follows:

– 1. When finish programming the standard pressure, press P to access interface for inquiry and programming of time/date, the first interface displays the year, 1 07 stands for the year 2007: ▷



– Press ↓ key to access the second interface, 211 stands for November. ▷



– Press the ↓ key to access the third interface, 312 stands for 12th day. ▷



– Press the ↓ key to access the fourth interface, 416 stands for 16 O'clock. ▷



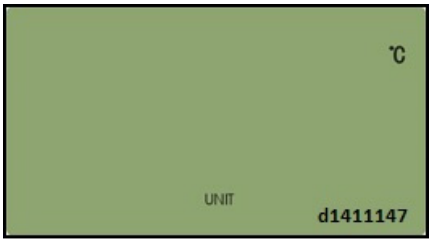
– Press the ↓ key to access the fifth interface, 533 stands for 33 mins. ▷



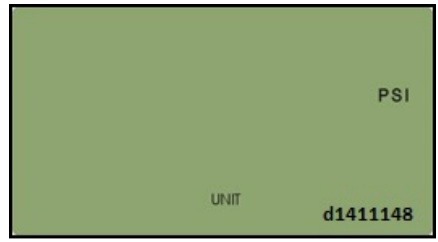
Under any interface of system time inquiry, press S for 3 seconds to start programming. For example change the year to "09", under the year interface, press S for 3 seconds, the second digit flashes, press up or down arrow key to adjust the value. Then press → key, the third number flashes, then press the up or down arrow key to adjust the value to"9". At last press S for 3 seconds to save the change with screen flashes twice and beep buzzes twice. Then it automatically switches to next interface for programming.

Programming of Temperature and Pressure Unit

– After program the system time, press P to access interface for programming temperature and pressure unit. The first interface displays the temperature unit. ▷

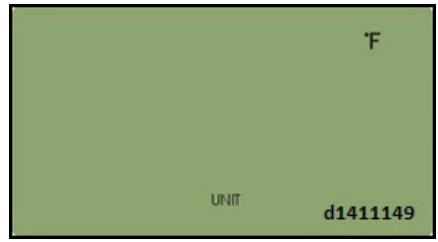


At this time, press up or down arrow key to switch to the pressure unit interface. ▷



– Under any interface displaying temperature or pressure, press S key for 3 seconds to start programming. Take change the temperature unit as an example: under the temperature unit interface, press S key for 3 seconds, the temperature unit “°C” starts flashing. Press up or down arrow key to select the needed temperature unit.

After select the desired unit, press S key for 3 seconds to save with the beep buzzes twice. Temperature unit will stop flashing. ▷



Deletion of transmitter ID

– When finish programming temperature and pressure unit, press P to access the transmitter deletion interface. Only the programmed and received transmitter will be shown and only the last 3 ID digits will be shown: ▷



– Press any of the four arrow keys to locate the tire position to be deleted.

– Press S key for 3 seconds to delete with the screen flashes twice and beep buzzes twice to confirm the deletion. Then it automatically switches to next transmitter location.

NOTE

After programming, press P key for 3 seconds to return to normal mode.

System Function

– Full-time Monitoring

TPMS ST@HD can monitor the tire pressure and temperature whether the vehicle is running or parked. Therefore to keep the driver informed of the tire state and realize full-time monitoring.

– High Pressure Alarm ▷



Function :

the system will issue the high pressure alarm when the tire pressure is 25% higher than the standard.

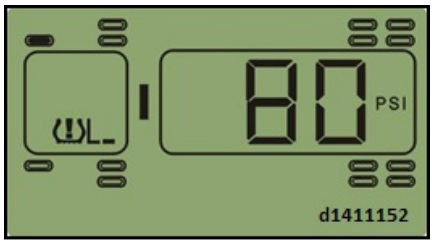
Alarm mode:

the alarm lamp flashes, high pressure warning icon, tire position icon and the audible alarm turn on together.

Treatment:

press any key to stop the audible alarm. The red alarm lamp remains on and the display reverts to the normal mode. At this time user should properly adjust the tire pressure to the normal level. The red alarm lamp goes off only when the tire pressure returns to the normal level.

– Low pressure level 1 alarm ▷



Function:

the system will issue low pressure level 1 alarm when the tire pressure is 12.5% lower than the standard.

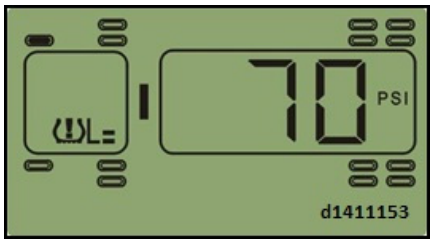
Alarm mode:

the alarm lamp flashes, low pressure level 1 alarm icon, tire position icon and the audible alarm turn on together.

Treatment:

press any key to stop the audible alarm. The red alarm lamp remains on and the display reverts to the normal mode. At this time the user should adjust the tire pressure to normal level as soon as possible. The red alarm lamp goes off only when the tire pressure returns to normal level.

– Low pressure level 2 alarm ▷



Function:

the system will issue low pressure level 2 alarm when the tire pressure is 25% lower than the standard.

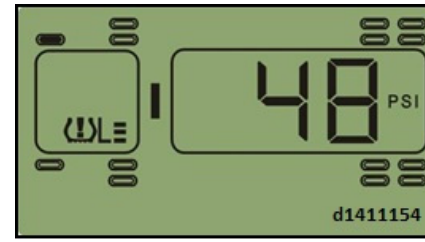
Alarm mode:

the alarm lamp flashes, low pressure level 2 alarm icon, tire position icon and the audible alarm turn on together.

Treatment:

press any key to stop the audible alarm. The red alarm lamp remains on and the display reverts to the normal mode. The user should slow down the vehicle and drive to a service shop to inflate the tire. The red alarm lamp goes off only when the tire pressure returns to normal level.

– Low pressure level 3 alarm ▷



Function:

the system will issue low pressure level 3 alarm when the tire pressure is 50% lower than the standard.

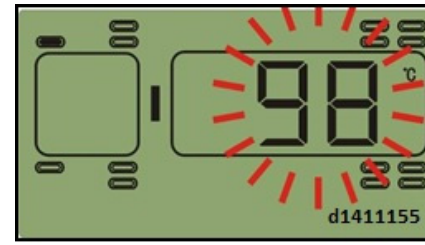
Alarm mode:

the alarm lamp flashes, low pressure level 3 alarm icon, tire position icon and the audible alarm turn on together.

Treatment:

press any key to stop the audible alarm. The red alarm lamp remains on and the display reverts to the normal mode. The user should slow down the vehicle and replace the tire with a spare tire. The red alarm lamp goes off only when the tire pressure returns to normal level.

– High Temperature Alarm ▷



Function:

When the temperature around the transmitter equals or exceeds 90°C, the system will issue the high temperature alarm.

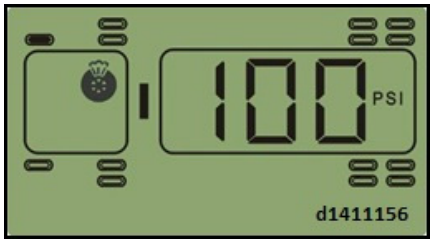
Alarm mode:

the alarm lamp and temperature value flashes, tire position icon and the audible alarm turn on together.

Treatment:

press any key to stop the audible alarm. The red alarm lamp remains on and the display reverts to the normal mode. The driver should slow down and properly cool down the tire. The red alarm lamp goes off automatically when the temperature returns to normal level.

– Quick Leak Alarm ▷



Function:

the system will issue a quick leak alarm when the pressure drops more than 2.8 psi within 12 seconds.

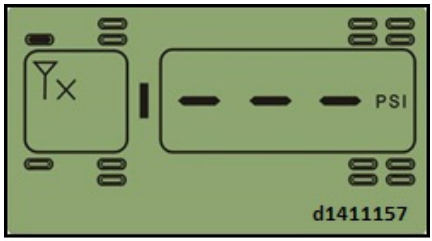
Alarm mode:

the alarm lamp flashes and the audible alarm turns on, the tire position icon flashes.

Treatment:

press any key to stop the audible alarm and the system reverts to normal mode. Then slow down and check the correspondent tire.

– Transmitter Trouble Alarm ▷



Function:

If one transmitter fails to work, or the monitor cannot receive the data because of the RF interference for 20 minutes, the system will issue a transmitter trouble alarm.

Alarm mode:

the audible alarm turns on, the red alarm lamp flashes, and transmitter trouble alarm icon appears.

Treatment:

press any key to stop the audible alarm. Then the system reverts to the normal mode.

NOTE

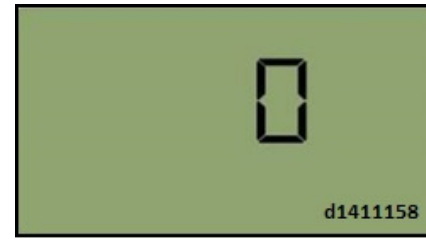
The red alarm lamp goes off automatically when the communication between the transmitter and monitor returns to normal state.

Auxiliary Functions in Normal Mode

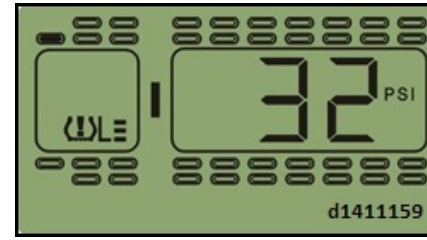
Alarm Record Inquiry

– Under normal mode or pressure inquiry interface, press P and S at the same time for 3 seconds to access the alarm record inquiry interface. The screen with “0” is the most recent alarm record.
– Under alarm record inquiry interface, Press → key to check through the record. If there is no operation within 3 seconds, it will automatically display the record data (pressure, temperature and time) in turn, each data displays 3 seconds.

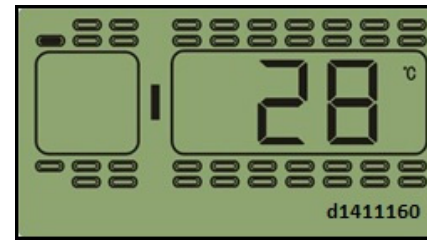
▷



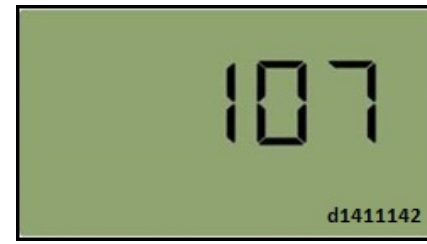
Pressure ▷



Temperature ▷



Time (year) ▷



Optional equipment

Time (month) ▷



Time (date) ▷



Time (hour) ▷



Time (minute) ▷



Then it will display the next alarm record in the same way as above.

– Press P and S at the same time to exit.

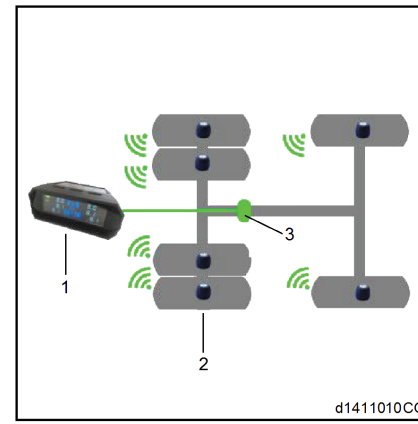
Tyre pressure detection system (new) ▷



1 External sensor
2 Host
3 Hub
4 Repeater

Product installation status ▷

- The sensor is external and can be locked onto the valve, resolving the issue of being unable to install a built-in sensor on the tyre valve.
- The sensor uses a separate display, making installation easy. The relay module can be placed directly inside the vehicle.
- The entire package in easy to install and maintain.
- The system can warn when the tyre pressure is too low or too high, when the temperature of the tyres is too high and when there is a slow air leak.



1 Display
2 Sensor
3 Relay module

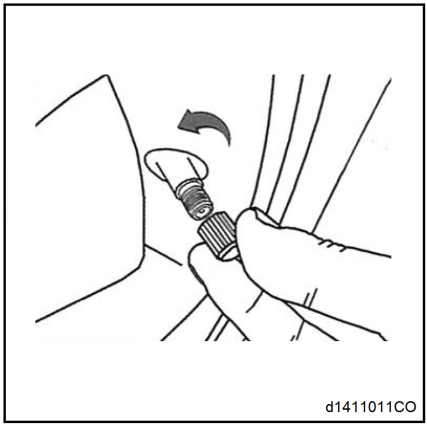
Technical data

Display	Frequency	433.9 MHz
	Operating voltage	5 V
	Operating temperature	-20–70°C
Sensor	Frequency	433.9 MHz
	Operating voltage	2.2–3.3 V
	Operating temperature	-40-125 °C

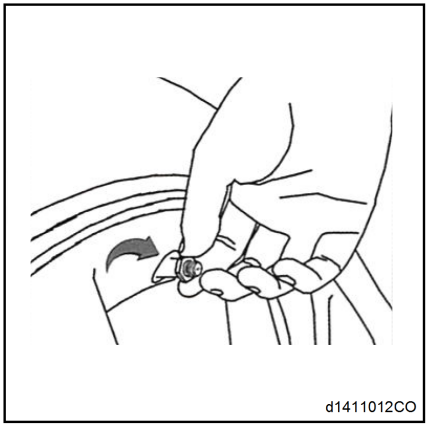
	Pressure range	0–12 bar
	Pressure accuracy	±0.1 bar
	Temperature accuracy	± 1°C

Sensor installation

– Unscrew the valve dust cap. ▷



– Screw on the anti-tamper hexagon nut. ▷



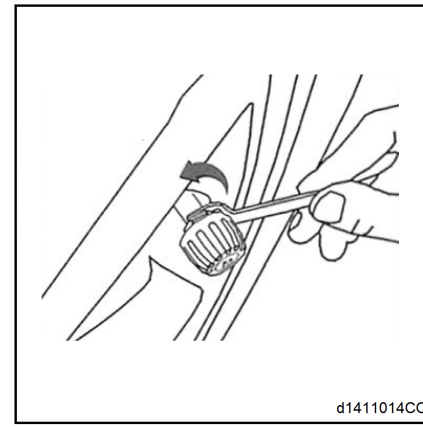
– Screw on the sensor. ▷



– Close the hexagon nut by turning in the opposite direction. ▷

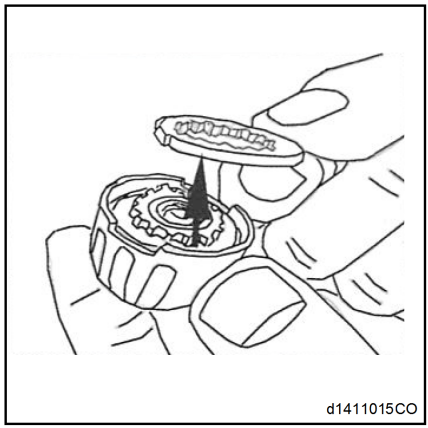
NOTE

After installing, spray with soapy water to check for leaks.

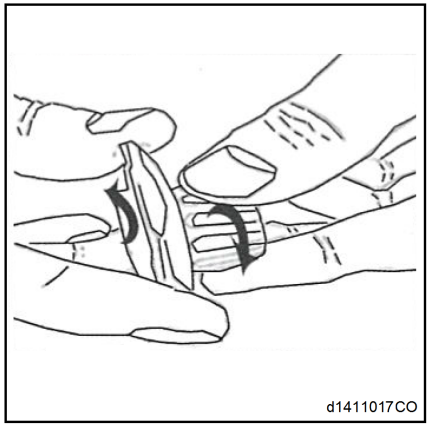


Replacing the battery

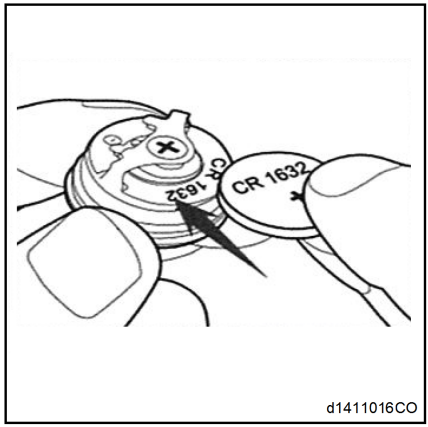
– Remove the anti-tamper shim. ▷



– Use a cover-opening wrench to open the external cover. ▷

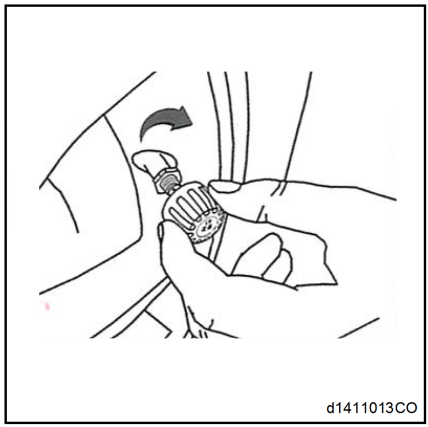


– Replace with a new button cell battery. ▷



d1411016CO

– Re-install the sensor. ▷


d1411013CO

Product introduction

– The host is connected to the on-board ACC power supply.
– Press and hold “◂”+“▸” to turn on and off.
– When turned on, the system displays data from the previous use. The data updates as soon as the tyres start to turn.
– Tyre pressure increases as the temperature of the tyre rises when moving.
– The system matches automatically and can be used direct from the factory.
– Press “◂” or “▸” to display tyre pressure or temperature.

Factory settings

Pressure unit	Bar
Tyre pressure upper limit	11.0 bar
Tyre pressure lower limit	9.0 bar
High temperature warning value	75℃

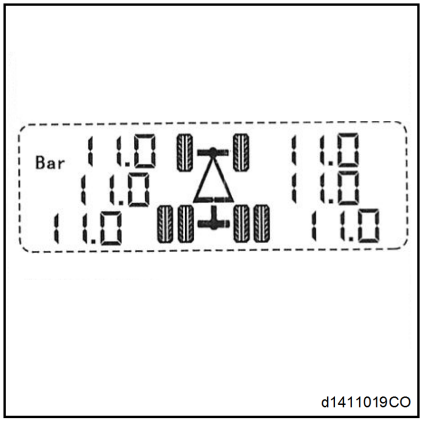
Entering and exiting setup

– In standby mode, press and hold “SET” for 3 seconds. The system will beep twice and then enter setup mode.
– In setup mode, press and hold “SET” for 3 seconds. The system will beep four times and then exit setup mode.
– If the system is not operated for 60 seconds in setup or matching mode, the system will beep four times and then exit setup mode.

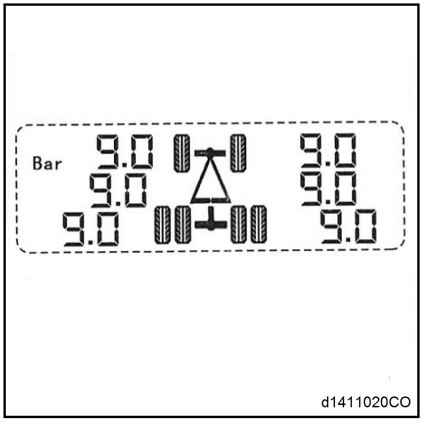
Setup options

Press and hold “SET” for 3 seconds to enter setup mode, then press “SET” again to select from the following four options:

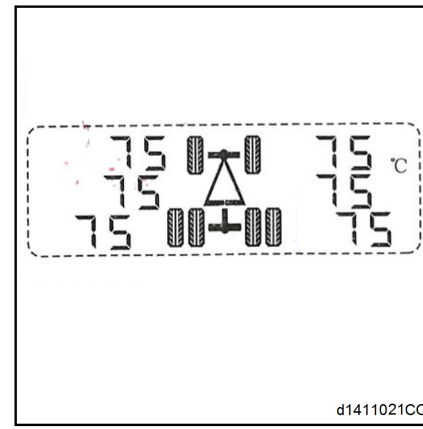
– Upper pressure limit: press and hold “SET” to enter setup mode as shown in the figure: when “11.0” flashes, press “◂” or “▸” to select the pressure value. ▷



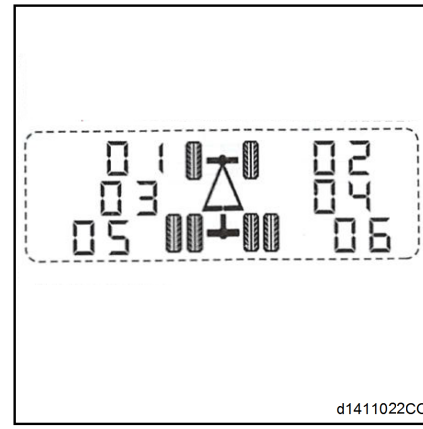
– Lower pressure limit: after entering setup mode, press “SET” again as shown in the figure: when “9.0” flashes, press “◂” or “▸” to select the pressure value. ▷



– Upper temperature limit: after entering set-up mode, press “SET” again twice, as shown in the figure: when the temperature “75” flashes, press “◂” or “▸” to select the temperature value. ▷



– Switching tyres (use with caution): in stand-by mode, press “SET” 5 times in succession. After hearing three beeps or the production date, as shown in the figure: the tyre flashes but the number does not flash, showing selection options for tyres 1-6. Press “◂” or “▸” to select the tyre number, then press “SET” once. The tyre and number will flash together and ID number setup will be shown. Press “◂” or “▸” to select the ID number, then press “SET” once. ▷



⚠ WARNING

Do not use this product while driving.

Exit the vehicle and check the tyres as soon as possible when the system issues a warning.

Tyre pressure and temperature will increase when driving.

Do not rely solely on this product for tyre safety. You should carry out regular tyre checks.

7330 015 Reversing warning system

The reversing warning system is consist of buzzer, controller, sensors.

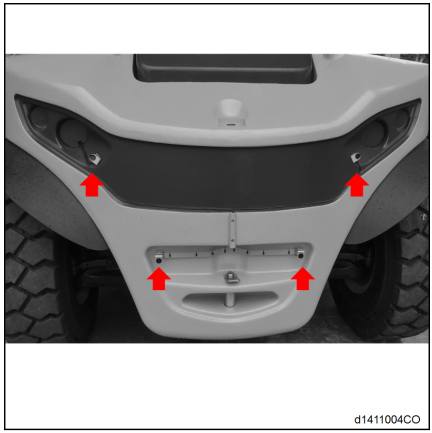
Segmented regions are close to the obstacle distance:

- 150CM security zone
- 120CM security zone
- 100CM warning area
- 80CM warning area
- 60CM warning area
- 30CM danger zone



d1411003CO

7160 990 The sensors are installed on the counterweight of the truck.

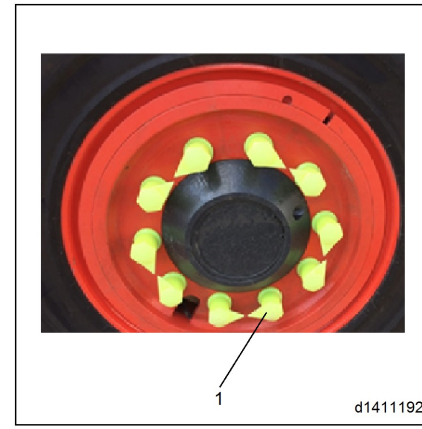

d1411004CO

6433 010 The buzzer is installed at the rear of the driver cabin. ▷



1390 010 Plastic wheel stud covers with movement indicator ▷

Plastic wheel stud covers with movement indicator(1) can prevent bolts from rusting



Operating optional attachments

Attachments can be installed as optional equipment. Observe the working pressure and operating instructions for the attachments.

NOTE

Affix a label indicating the truck load capacity with attachment, and a symbol label of the respective attachment on the windscreen to the right of the driver for every attachment. Symbols on the label can vary, depending on the controlled function.

⚠ CAUTION

Danger of damage to equipment.

Attachments not supplied with the truck may only be employed if an authorised dealer ascertains that safe operation is assured in respect of load capacity and stability.

NOTE

If the installation of an attachment changes the normal sequence of operation as described in this manual, follow the instructions supplied by truckmaker or the manufacturer of the attachment. If the customer desires the attachment operation with the central control levers, a label showing the movements possible with the control levers must be affixed on the screen to the right of the driver.

Coil boom

Integrally mast mounted

- 3670 005 Coil Boom – 1000mm long (177)
- 3670 010 Coil Boom – 1000mm long (178)
- 3670 015 Coil Boom – 1000mm long (179)

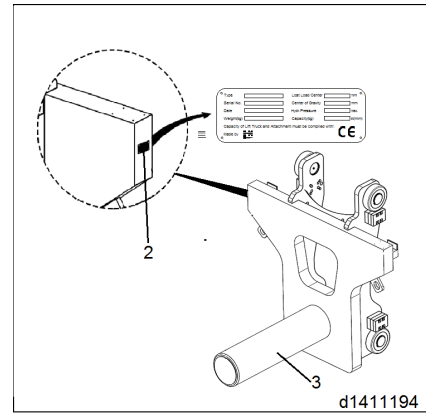
NOTE

These operating instructions or excerpts thereof may only be copied, translated or transmitted to third parties after prior written approval by the manufacturer.

NOTE

The operating company or driver, and not the manufacturer, is liable if the truck is used in a manner that is not permitted.

– Observe labels (2) on coil boom (3) for load centre and load lift height information. ▷



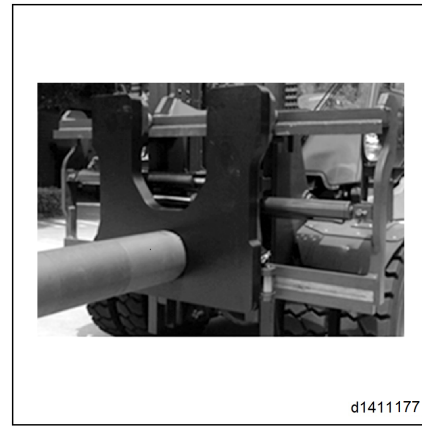
– This is another flat face carrier mounted kind of coil boom. ▷

- 3670 105 FF Coil boom - 1000 mm long(177)
- 3670 110 FF Coil boom - 1000 mm long(178)
- 3670 115 FF Coil boom - 1000 mm long(179)

⚠ CAUTION

Adjust all operating functions accordingly when maximum weight is being handled.

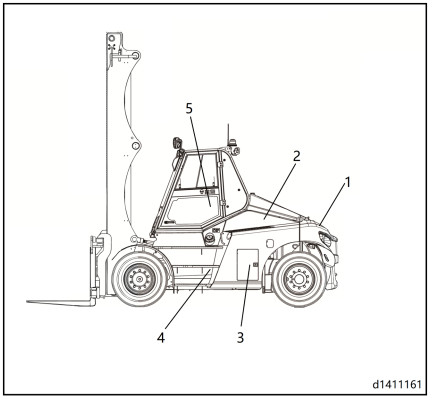
Danger of damage to equipment and personnel.



Cold Climate Options

NOTE

All mains powered heating devices are 220v rated, and the truck will come supplied with a suitable 110/220v converter when required.

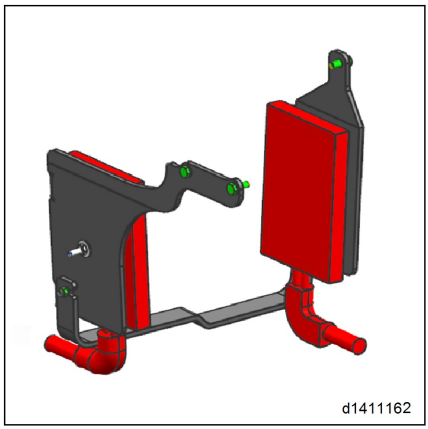


1 Engine Pre-heater
2 Hydraulic Oil Pre-heater
3 Battery Heaters
4 Diesel Fuel Heater
5 Cabin Pre-heater

Engine Pre-heater

220v, 150w (x2) Heater Pad.

Mounted on brackets and contacting the oil pan.



Hydraulic Oil Pre-heater

- 6407 010 Hydraulic oil heater - 500 W
- 6407 020 Hydraulic oil heater - 1000 W

220v

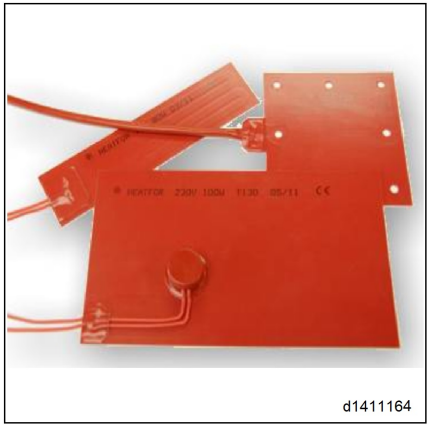
Depending on tank size



6403 010 Battery Heaters

220v, 190w (x4)

Self-adhesive Silicone Mats Size - 300x100x1.5mm.



6404 010 Diesel Fuel Pre-filter

24v, 350w.

Heater cartridge with internal temperature controlled switch.



Cabin Pre-heater

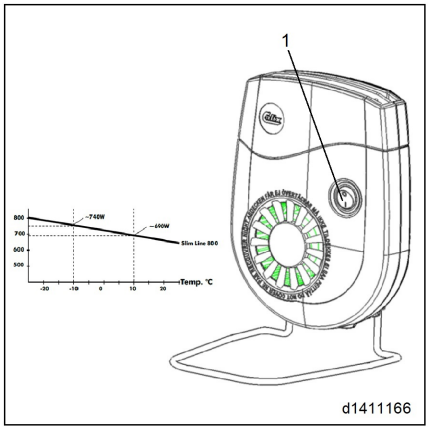
NOTE

There are two options to preheat the cab.

The first selection: Cab Pre-heater.

- 4409 010 Cab Pre-heater 220 V
- 4409 015 Cab Pre-heater 110 V

– Press the switch (1)



The second selection: 4409 005 Webasto Water Heater .

– Use Oval timer to set heating time, please see below for Oval timer operation. ▷



Operation:

– Operation of the timer is designed so that the symbols flash rapidly in the setting mode. If no button is pressed within 5 seconds, the displayed time will be saved. The display changes at high speed when the (1) and(2) buttons are pressed for more than 2 seconds.

– Whenever the power supply to the timer is disconnected, all previously programmed settings will be lost.

Switching On:

– Manually: by pressing the "Manual Operation" (3)button (continuous heating mode). The heating time and the symbol for heating operation are displayed. The heating time display disappears after 10 seconds.

– Automatically: upon reaching the preset starting time for heating. The program number and the symbol for heating are displayed.

Switching Off:

– Manually: by pressing the "Manual Operation" (3)button.

– Automatically: via the programmed end time. The display field goes out when the heating time expires.

Setting the Time

– This function is not available when heating mode is active! Press and hold the (4)button. Press the "Forward" (2)or "Reverse"(1) button as well. The time of the day is displayed and the clock symbol flashes.

– Set the time via the "Forward"(2) or "Reverse"(1) buttons. The set time is saved when the display goes out or by pressing the button.

Viewing the Time:

– Press the "Forward"(2) or "Reverse"(1) button.

Program Start of Heating

– Press the (4)button. Press the "Forward"(2) or "Reverse"(1) buttons within 10 seconds until the required time for starting heating operation is displayed.

– If a different program number is required, the(4) button must be pressed within 10 seconds.

Default start settings:

Time 1: 06:00 hours or 6:00 am;

Time 2: 16:00 hours or 4:00 pm;

Time 3: 22:00 hours or 10:00 pm

⚠ CAUTION

The default settings are overwritten when new values are entered. The preset times are saved until changed. The default settings are restored when the timer is disconnected from the on-board power supply.

Deactivate Preset Time:

– Briefly press the (4)button.

Select Preset Time:

– Press the button (4)within 10 seconds until the program number with the required preset time is displayed. The active mode (heating) and the program number flash.

Set Heating Duration Time:

– Press and hold the (4)button. Press the "Forward"(2) or "Reverse"(1) button as well. Release both buttons. The time and clock symbol are displayed.

– Press and hold the (4)button again. Press the "Forward"(2) or "Reverse"(1) button as well. Release both buttons. The preset time is displayed and the heating symbol and ventilation symbol flash.

– Set the heating time via the "Forward"(2) or "Reverse"(1) buttons. The set heating time is saved when the display goes out or by pressing the (4)button.

⚠ CAUTION

The default settings are restored when the timer is disconnected from the on-board power supply. In this case, the timer will revert to the default heating duration time setting of 30 minutes.

Set Remaining Time:

– The active remaining time can be changed between 10 minutes and 60 minutes via the "Forward"(2) or "Reverse"(1) buttons when heating mode is active.

Changing the Operating Mode

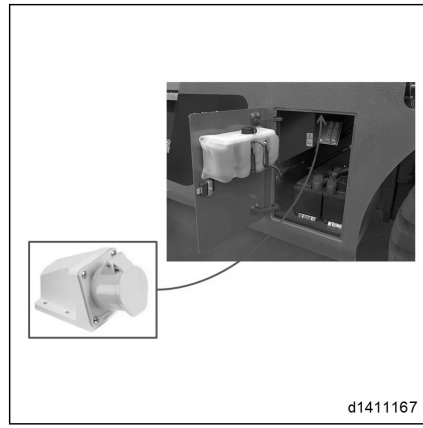
⚠ CAUTION

Ventilation mode is not available on the BlueHeat heater. The ventilation mode is only available with certain heater versions. This information is provided in the event mode of operation is inadvertently changed. Press the (4)button. Press the(4) button again and hold it. The last mode (heating or ventilation) is displayed. Press the "Forward"(2) or "Reverse"(1) button as well to change back and forth between heating or ventilation mode.

Mains Power Connection

The optional model is as follows :

- 6400 010 Ext. Power supply - 110V
- 6400 020 Ext. Power supply - 240V



⚠ CAUTION

110/230v 3 pin female socket mounted in the battery box for easy connection to mains power.

⚠ CAUTION

If required, a 110/230v converter secured and hidden above battery box, and remains with truck.

⚠ CAUTION

All trucks are fitted with “Safety Cut-out Relay” to stop the engine being started when pre-heaters are still connected to the mains electricity.

Cold climate package instruction

– This should be set before installed. ▷

Electrify the temperature control switch, press "set" button for 3-5 seconds to enter setting page, adjust the number to 35°C by triangular button, then press "set" button to finish setting.

Position : In battery box.



d1411168

Electrify preheater socket. ▷

Position : In battery box.


d1411169

Circuit breaker should be switched on in the first time. ▷

Position : Under radiator

The circuit breaker can cut off and connect the load circuit, and cut off the fault circuit, ensure the safe operation. In case of overloading or abnormal operation of electrical appliances, if a fault occurs, the circuit breaker will automatically turn off the switch to play the role of protecting electrical appliances and wires.

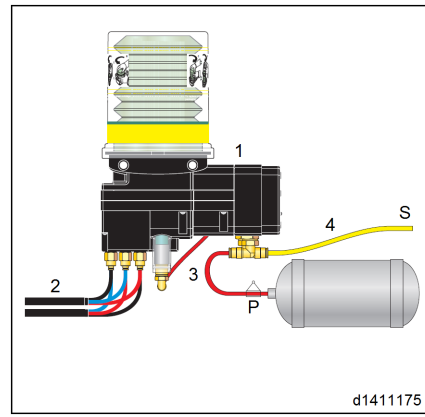


7306 005 Central lubrication system – steer/mast/tilt

Main components

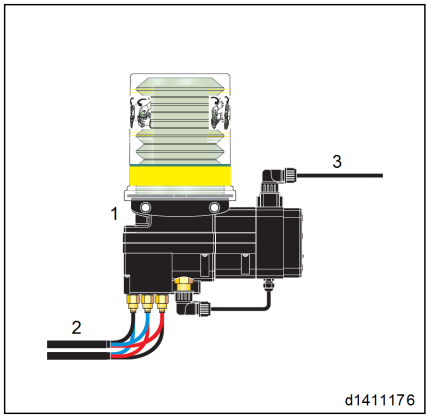
The central lubrication system has two versions: a pneumatic plunger pump and an electrical gear pump.

A pneumatic plunger pump system has the following components. ▷



1 Pump unit.
2 Grease lines from the metering units to the individual grease points.
3 Air lines to the pump.
4 Brake-counter, if installed.
5 Installation bracket for the pump (not shown).

An electrical gear pump system has the following components ▷



1 Pump unit.
2 Grease lines from the metering units to the individual grease points.
3 Electrical cable to the pump.
4 Installation bracket for the pump (not shown).

The CompAlube pump unit

The pump unit is the heart of the CompAlube greasing system. It is a very compact unit in which the most important components are integrated. The pump unit requires virtually no maintenance and is easy to install and put into service.

Maintenance

Introduction

The maintenance of the Groeneveld CompAlube greasing system can be combined with the normal maintenance on the vehicle or the machine.

⚠ CAUTION

The automatic greasing system significantly reduces the time and effort spent on manual greasing. However, do not forget that universal joints, for instance, must still be greased by hand.

Periodic check

- Check the grease-pressure indicator (must be green) or the control lamp (must not be lit).
- Check the grease level in the grease cartridge (replace the cartridge time or refill the cartridge through the filling connection).
- Check the pump unit for damage and leakage.
- Check the grease lines for damage and leakage.
- Check the condition of the grease points on the vehicle. There must be sufficient fresh grease present.
- Perform a test cycle to check the system operation. Note that every time you perform a test cycle a small amount of grease is supplied to the grease points (do not perform a test cycle too often).

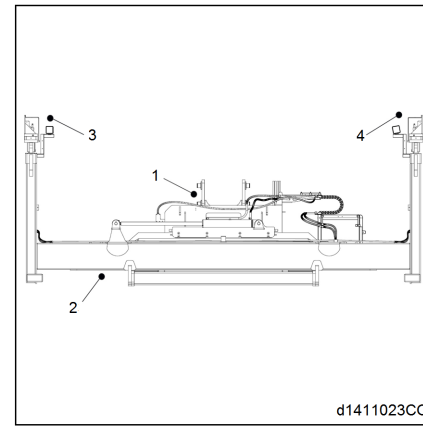
⚠ WARNING

If you use a high-pressure air or water gun to clean the vehicle, do not spray directly onto the greasing system pump unit. Water oo dirt might enter the pump unit through the vent openings.

User instruction

The following is a description of the spreader and how it's intended to be operated. This instruction should help the driver to quickly obtain maximum productivity from the truck and spreader.

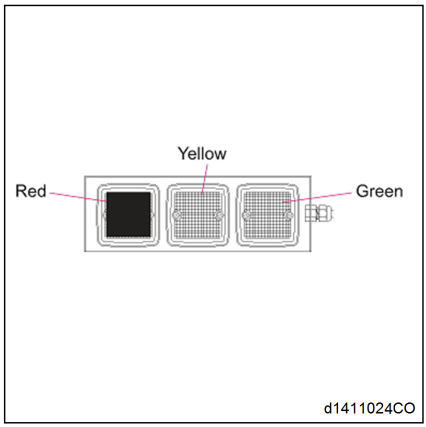
- The models 178SP1000 empty container handlers are designed for the safe handling of empty containers by vertical twist locks, which are entered into the top pockets of the containers corner castings.
- The spreader engages the container from the top by inserting the twist locks into the top pockets of the corner castings.
- The spreaders have a capacity of 8 tons and can handle empty 20' ISO containers.
- Various heights of container (8ft,8ft6",9ft, 9ft6") can be handled by these spreaders.
- The floating heads can slide up and down giving the spreader mechanical pile slope, which enables the angle of the spreader to be moved up and down 1.5°in the 20ft position. The pile slope feature gives the driver the possibility of entering the highest twist lock first and then lowering the spreader until the twist lock at the other end of the spreader enters the corner casting at the opposite end of the container.



1 Transmission frame
2 main beam
3 The swing arm lock button
4 The swing arm lock button

Indicator lights

There are three indicator lights on the spreader. ▷



Green - ”LOCKED” (Both twist locks are completly engaged and locked into the corner castings of the container.) It is safe to lift the container.

Yellow - ”SEATED” (The twist locks are both located correctly in the corner castings of the container and the spreader has been lowered so that it rests, unsupported on the container) when the yellow light has switched on it is then possible to activate the twist locks to the Locked position. As long as the yellow light is NOT switched on the twist lock activation circuit is inactive.

Red - ”NOT LOCKED” (Both twist locks have turned to the Not Locked position and the spreader can be safely lifted and removed from the container.)

Starting work with the spreader

Each work shift should be started by making a visual check of the unit (this must be part of the daily routine.) Possible damage will in this way be discovered at an early stage and enable repairs to be carried out at much lower cost.

⚠ WARNING

Never use the unit unless all safety devices function correctly.

– Check the operation of the twist locks and of the ”LOCKED” and ”NOT LOCKED”.

– Activate the twist locks to the ”NOT LOCKED” position.

Lifting a container

– With the twist locks in the Not Locked position drive the machine up to a stack of containers and raise the spreader until it is possible to enter one of the twist locks into the top aperture of one of the containers upper corner castings. Raise or lower the

other end of the spreader until the opposite twistlock is lined up with the corner.

– Casting at the opposite end of the container. The spreader should now be lowered un- til the spreader rests unsupported on the container with the twist locks in the corner castings. In this position the yellow indicator light on the rear of the spreader should switch on. This situation is termed as the spreader being Seated and the yellow light tells the driver that the spreader is now ready to have the twist locks activated so that they lock onto the container.

– Press the lock button. The twist locks will turn and the indicator light will show that they are in the Locked mode. The white light will switch on indicating that it is safe to lift the container.

- If neither the Green (Locked light) nor the Red (Not locked) light switches on, then the lift interrupt function will be activated which will stop the truck from lifting.
- The spreader PCB (printed circuit board) is equipped with a unit that will cause the indicator lights to flash in cases where a sensor is not correctly adjusted or if a sensor is faulty.
- If a seated sensor is either incorrectly adjusted or if one of the seated sensors if faulty, the seated light only will flash and warn the driver that something is wrong.
- If either the Locked or the Not Locked sensors are badly adjusted or faulty then both the Locked and Not Locked lights will flash simultaneously.

NOTE

In cases where the indicator lights flash the systems should be investigated and corrected immediately. Never use a spreader with faulty safety systems.

Detach a container

When detaching a container, find a suitable level site on which to unload the contai- ner. (The trucks mast should be as near to vertical as possible during the depositing of a container) Lower the spreader slowly until it rests unsupported on the container and the Seated

light illuminates and then activate the twist locks to the Not Locked position. The twist locks will turn and the red indicator light for Not Locked will illuminate. It is now possible to lift the twist locks free of the corner castings and reverse the machine away from the container.

The spreader is in the Not Locked mode and is ready for picking up the next container.

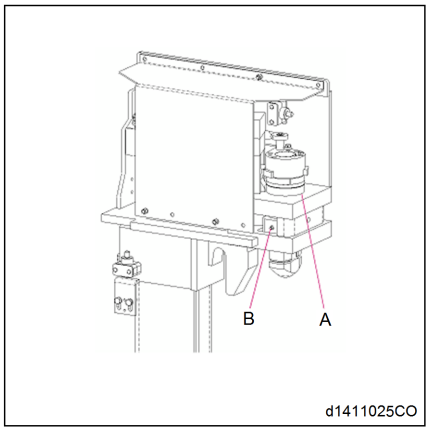
Maintenance instructions

Multipurpose grease (EP2)

Position 1

Twistlock assemblies

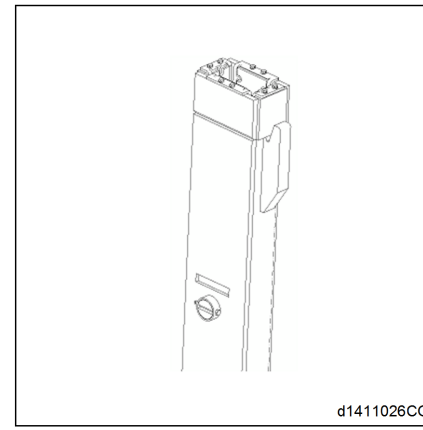
- No of grease points 4 per spreader.
- Interval-every 500 hours.
- 1 grease nipple per sleeve (see arrow “A”).
- 1 grease nipple per twistlock (see arrow “B”).
- Check for wear and possible damage of the twistlook and twistlook sleeve replace if in doubt.



Position 2

End beam slider pads

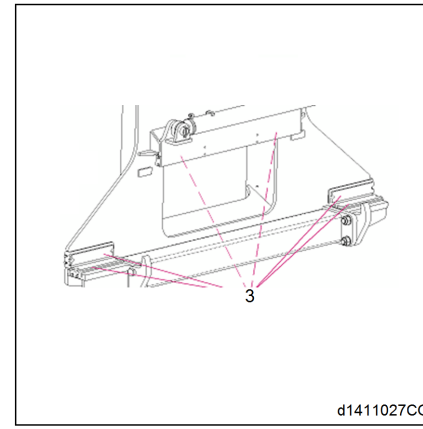
- Check for wear and possible damage of the twistlook and twistlook sleeve replace if in doubt.
- Interval-every 500 HOURS
- No greasing necessary



Position 3

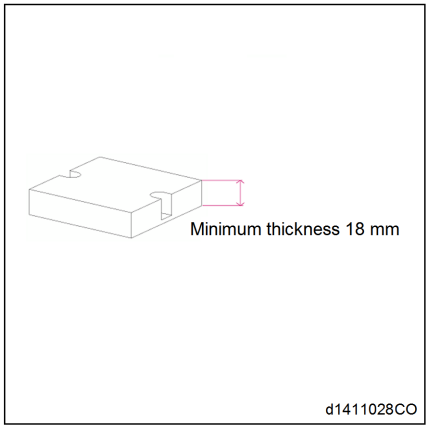
Upper side shift slider pads and lower side shift slider pads

- Every 500 hours or check for wear of the nylon wear pads and replace before metal to metal contact between the carriage and the spreader frame occurs.
- No greasing necessary.

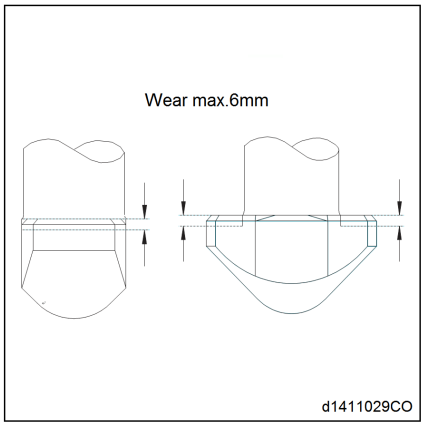


General maintenance instructions

– The nylon wear pads should be inspected for wear at the same time as their tracks are lubricated. The pads should be replaced when their thickness is reduced to minimum 18 mm. ▷



– Twist locks are wearing parts and need inspecting on a regular basis. Lubrication of the twist locks is recommended at monthly intervals and it is also recommended that they are inspected for wear and damage at the same time. ▷



– Should be replaced if this dim. is less than 25mm, The drawing shows where the heads of the twist locks wear. When the worn part exceeds the area indicated by cross- hatching the twist locks should be replaced.

Generally it is recommended that twist locks be replaced after a max. use of 5000 working hours or 80 000 TWL-cycles.

– The extension cylinder support has wear pads under it. These should also be inspected on a regular basis and replaced when their thickness is reduced to minimum 18 mm.

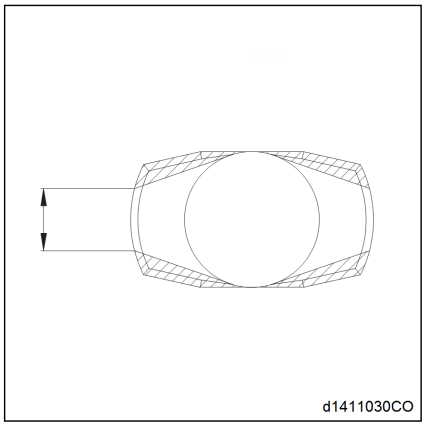
– Maintenance of the stop cylinders if fitted, consists of checking all mounting bolts for tightness and inspection for leakage from the cylinder.

– The side shift wear pads should be inspected for wear at the same time as lubrication is carried out. The wear pads should be replaced when their thickness is reduced to minimum 18 mm.

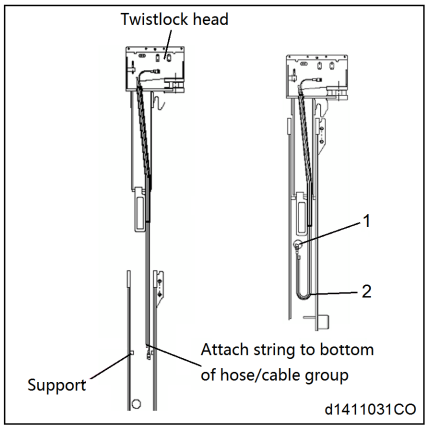
– Other recommended spreader maintenance is:

- Inspect the main spreader components for damage, cracks and distortion.
- Check the signal and safety systems for correct operation.
- Check the hydraulic pressures periodically.
- Check all hydraulic cylinders for leakage and reseal if necessary.
- Inspect all hydraulic hoses for damage and leakage. Replace if faulty.

▷



Mounting instructions for lowering the lifting heads into the end beams of 178 series spreaders.



- To start with it is better to tie a 2 meter long piece of string round the hoses and cable that stick out of the bottom of the head and attach a nut to the other end of the string.
- Lift the head high enough to allow the hoses and cable to be lowered into the vertical end beam so that the string drops through the support half way down the inside of the end beam.
- Lower the head into the end beam and at the same time draw the hoses and cable through the support by pulling them through with the string.
- it should be noted that ,when removing the heads from the end beams ,care should taken that the electric plug and the hose ends do not get caught on the support and subsequently become damaged.
- Feed the string through the short tube bend(1) in the side of the end beam and draw the hoses anf cable up through the tube and out through the side of the beam ,where they can be connected to the hoses and cable that run in the energy chain.
- Make sure that the hoses and cable(2) make an even bend that can move up and down with the movement of the heads.
- Removal of the heads is the revers of the above procedure but care must be taken to ensure that the hoses have been disconnected from the energy chain and that they have been pushed back into the end beam so that they hang straight down before the heads lifted out.

Storage of spreaders where it is necessary to have the spreader standing outside for periods longer than 3 months

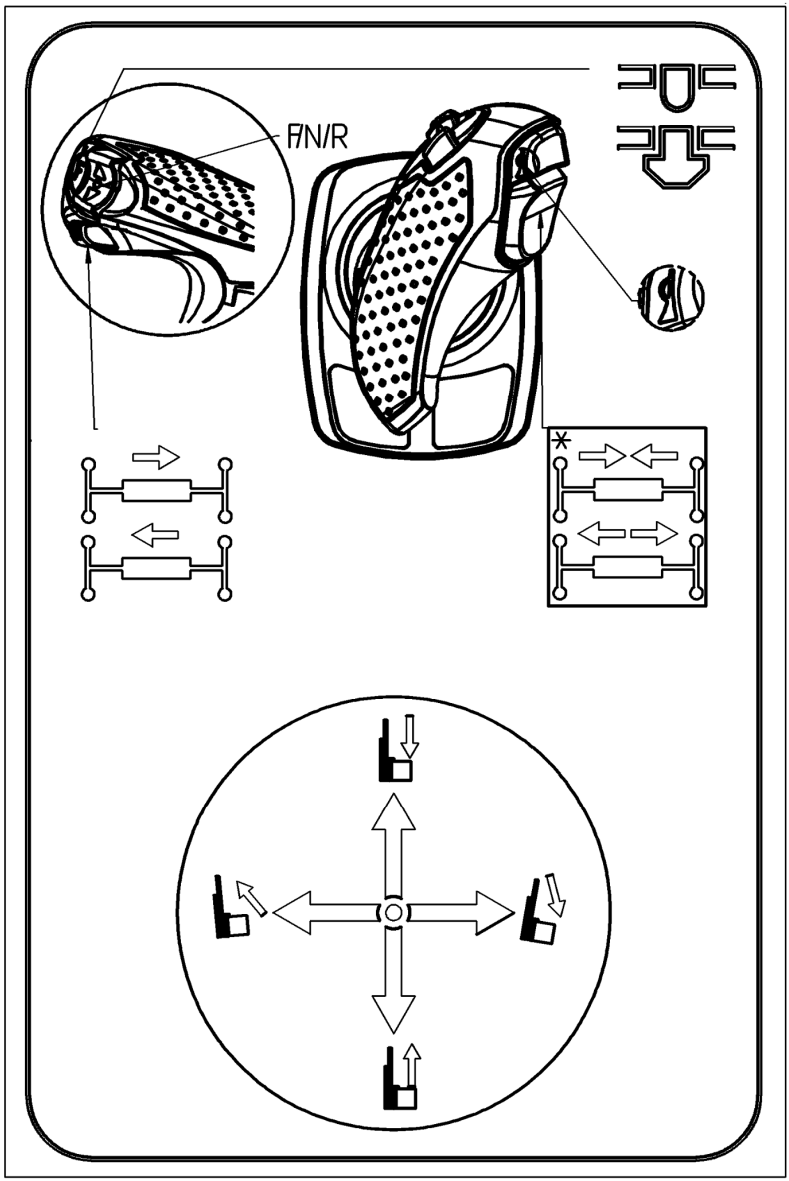
When storing an 178 spreader for longer periods of time, the following precautions should be taken:

- All chromed piston rods must be activated to the closed position so that the rods are stored inside the cylinder where this is possible. If it is not possible to retract the rod into the cylinder (for example the twist-lock cylinders) then the exposed part of the chromed rod should be sprayed with a rust inhibitor similar to.
- All grease points must be pumped full of molybdenum saturated grease.
- Grease all sliding surfaces by brushing on a suitable layer of grease.
- Grease all sliding surfaces by brushing on a suitable layer of grease.
- Where possible it would be advisable to equip the electric box with a heater (this could be a small electric bulb for ex. 40 watt which is allowed to burn constantly).
- Spray all electric connections both inside and outside of the box with a self- drying lubricant. This will efficiently protect electric connections against corrosion.

⚠ CAUTION

Efficient rust inhibitors often dry with time and should therefore be removed by a solvent before using the spreader again. Failure to do this can cause damage to the seals of the cylinders with subsequent leakage to follow.

Multifunctional handle _ 178 spreader



d1411032CO

Working with a load

Mast, lifting device and attachment controls

⚠ CAUTION

Danger of damage to the truck.

Use the lifting device and attachments only for authorised applications. The operator must be trained in the handling of the lifting device and attachments

Always move the central control lever (joystick) smoothly and slowly. How far the control lever is moved determines the lifting, lowering and tilting speed. The control lever returns to the neutral position automatically when released.

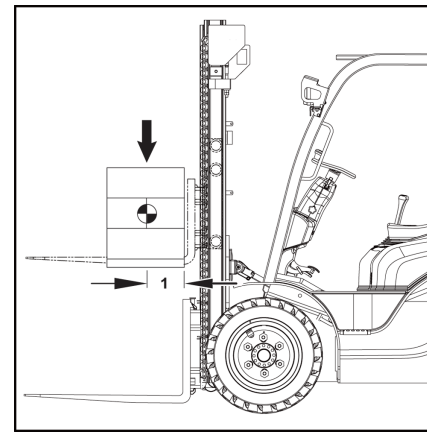
NOTE

Observe the symbols with direction arrows.

Load centre distance and load capacity

Before lifting goods, the relationship between the weight, load centre of gravity distance and maximum lift height of the goods must be understood.

– Load centre distance refers to the distance between the vertical plane of the fork arms and the centre of gravity of the loads (1). ▷



NOTE

The centre of gravity is not necessarily located at the centre of the load.Load capacity refers to the weight of loads that can be safely lifted to a required height within the given load centre distance.

Capacity rating plate

Before loading

Before lifting any load, please read the information on the forklift's capacity rating plate.

⚠ DANGER

Risk of loss of stability.

The parameters on the capacity rating plate apply to compact and uniform loads. These load limits must not be exceeded. Exceeding the load limits will affect the stability of the forklift and the strength of the fork arms and lift mast.

If the forklift is equipped with attachments, please read and follow the information on the additional capacity rating plate of each attachment (refer to the "Additional capacity rating plate" chapter for details).

NOTE

Refer to the "Summary diagram of labels" chapter for the location of the capacity rating plate.

The load capacity of a forklift depends on:

- Type of the lift mast (standard, duplex, triplex)
- Lifting height of the installed lift mast
- Tyres of the front axle
- Whether attachments or additional equipment are used
- Maximum permissible backward tilting angle of the lift mast
- Size and load capacity of the fork arms
- Size of load, offset in gravitational or geometric centre

If one of these parameters is changed, this can have a significant impact on the load capacity.

If the forklift has been modified, the load capacity rating must be determined again, and it may be necessary to replace the capacity rating plate.

– Please contact your authorised dealer.

NOTE

The forklift's load capacity will also be restricted under the following circumstances:

- *Transporting loads in level 6 or greater winds*

The maximum permissible load capacity is dependent on the load centre of gravity distance (the distance between the load's gravity centre

and the vertical plane of the fork arms), the height of the gravity centre and the lift height.

NOTE

The capacity rating plate below is only an example.

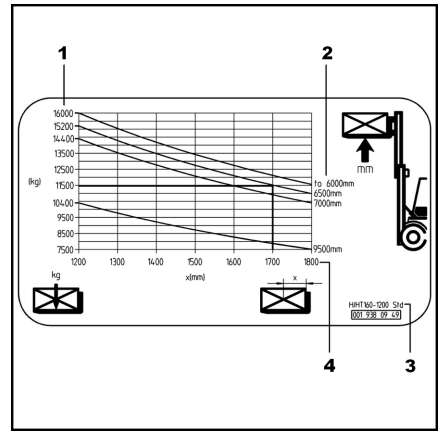
Label example:

Load centre of gravity distance 1700mm

Lift height: 6500mm

- Draw a vertical line from the 1700mm load centre of gravity distance coordinate to where it crosses the diagonal line representing the 6500mm lift height.
- The reading at the point where the coordinate intersects with the horizontal line that passes through this point of intersection is the maximum permitted load.
- In this case, the reading for the maximum permitted load is 11500kg

Corresponding loads relative to other lift heights and load centre of gravity distances can also be obtained in this way. This value relates to an evenly distributed load on two fork arms.



1 Maximum lift load (unit: kg)
2 Lift height (unit: mm)
3 Forklift model (based on forklift model and lift mast series)
4 Load centre of gravity distance from fork surface (unit: mm)

Additional capacity rating plate

⚠ DANGER

Risk of loss of stability.

Using attachments will restrict the load capacity. Therefore, an additional capacity rating plate must be attached to a position that is visible to the driver.

If the plate is missing, or if any information about the truck, attachments and load capacity does not match the actual value, please contact your service partner.

Using attachments may affect the permitted maximum driving speed. When replacing attachments, be sure to always check the permitted maximum driving speed and make necessary adjustments. Alternatively, you can set the truck to permanently drive at the lowest allowable speed.

If preassembled fork carriage is used, then the relevant values on the additional capacity rating plate should be further reduced.

– Please contact an authorised service partners to determine the truck's new load capacity.

NOTE

The additional capacity rating plate has different data for different truck series, lift mast series, and attachments. Please refer to the "Capacity rating plate" chapter on how to read the additional capacity rating plate.

Picking up a load



⚠ DANGER

Fall and crush hazard

Standing on the fork arms is strictly prohibited.

It is strictly prohibited to use the forks, pallets or other devices for lifting people (as required by Chinese regulations).

National regulations for the location of use must be observed. The truck can be equipped with an approved working platform for lifting people, if permitted by national regulations in the location of use. Please contact your local authorised service partner.



⚠ DANGER

Danger due to falling load. Risk of fatal injury in the extension area of the lift mast.

When transporting loads, there must be no one in the danger area.

When stacking and unstacking, people must not stand or walk under a raised load.

Always keep the load lowered and the mast tilted backwards when driving forklift trucks. Look out for people.

⚠ DANGER

When a load is raised, it is not permitted for anyone to stand beneath the suspended load.

⚠ DANGER

Incorrectly positioned loads pose a risk of falling.

Loads should be arranged so that they do not project beyond the truck loading area and cannot slip, topple over or fall off. If there is a risk of small-sized loads falling between the crossmembers of the overhead guard, use an appropriate load backrest or install a guard grille on the overhead guard.

Make sure that there is sufficient room for extension above the lift mast.



⚠ DANGER

There is a risk of crushing as the lift mast or attachments may move.

For this reason, never reach into or enter the lift mast, or the area between the lift mast and the forklift.

The lifting system and attachments should only be used for their intended purpose.

Drivers must be instructed in the operation of the lifting system and attachments.

Take note of the maximum lift height.

⚠ DANGER

Overloading and tipping hazard

Strictly adhere to the permissible load indicated on the load rating plate.

⚠ DANGER

Risk of tipping!

– Do not tilt the lift mast backwards with the load raised and when the lift height is high.

Lifting a load ▷

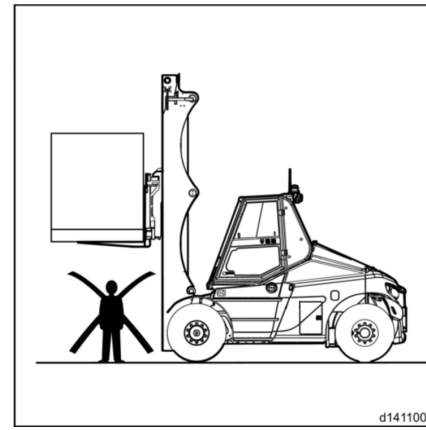


⚠ DANGER

Danger due to falling load. Risk of fatal injury in the area of the extended lift mast.

There must be no-one in the working area when moving loads.

Always drive the truck with the load lowered and tilted to the rear. Look out for people.

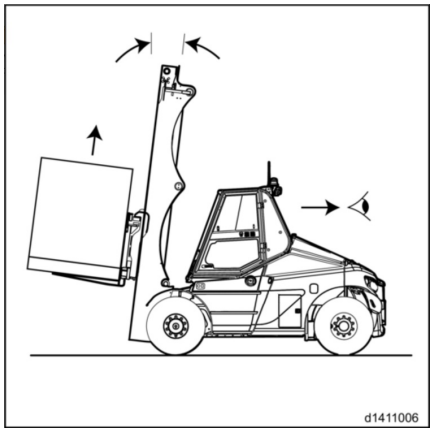


– Approach the load to be lifted as carefully and accurately as possible.
– Put the mast in the vertical position.
– Lift or lower the fork carriage to the correct height.
– If necessary, adjust the fork spread.
– Carefully insert the forks under the load so that load is centred and contacts the fork

face, if possible. **Do not touch adjacent loads.**

– Apply the parking brake.
– Elevate the mast until the load rests on the forks.
– Tilt the mast back slightly.
– Release the parking brake.
– Operate the lift truck in reverse until the load is clear.
– Tilt the mast fully back.
– Lower the mast to the travelling position.

▷



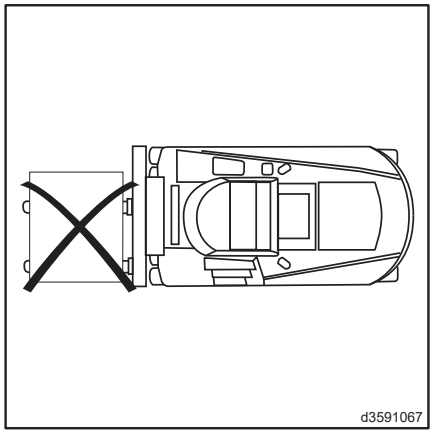
NOTE

If the truck is equipped with duplex mast or triplex mast, the line break safety valve will be locked when the attachment is under the impact load and the mast lower function is disabled, to resume the lower function, just lift the mast a little.

Travelling with load

– Do not travel with the load laterally displaced (e.g. with a sideshift).
– Transport the load near the ground.

▷



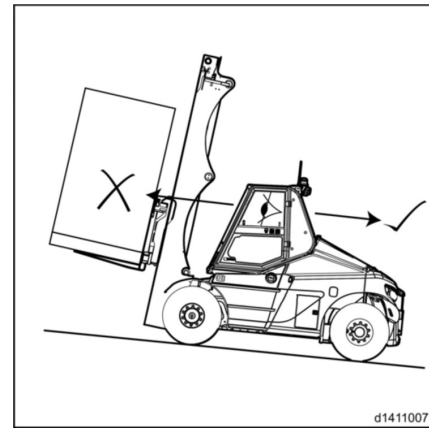
– Always travel with the load uphill on upgrades and down grades, never travel or turn across a slope.
– If visibility is reduced work with a guide.
– Operate the truck in reverse if the load being transported is stacked so high as to obstruct forward vision.

NOTE

When the forks are fully lowered the truck speed is restricted and braking performance is adjusted accordingly. Normal speeds and functions are restored when the forks are raised.

– Always travel with the load uphill on upgrades and down grades, never travel or turn across a slope.

▷



Transporting suspended loads

The transport of suspended loads is only permitted with the approval of the truck manufacturer.

National regulations may restrict the transport of suspended loads; in Italy, for example. In this case, contact the relevant authorities.

If there are no country-specific regulations for suspended loads in the country of use, the following instructions for safe handling must be observed.

⚠ DANGER

Risk of accident!

Suspended loads that begin to swing can result in the following risks:

- Poor braking conditions and steering conditions
- Tipping forward over the drive wheels
- Tipping over crosswise to the drive direction
- Risk of crushing of accompanying persons
- Poor visibility

⚠ DANGER

Loss of stability!

Slipping or swinging suspended loads can lead to a loss of stability and cause the truck to tip over.

– When transporting suspended loads, observe the following instructions.

Instructions for transporting suspended loads:

- Swinging of the load must be prevented by correctly selecting the driving speed and driving style (careful steering, braking).
- Suspended loads must be fastened to the truck in such a way that the harness cannot shift or release and cannot be damaged.
- When transporting suspended loads, suitable aids (e.g. guy wires or supporting poles) must be available so that accompanying persons can guide suspended loads and prevent the loads from swinging.
- Take particular care to ensure that there is no one in the drive direction in the driving lane
- There must be no persons placed at risk if the load begins to swing.

⚠ DANGER

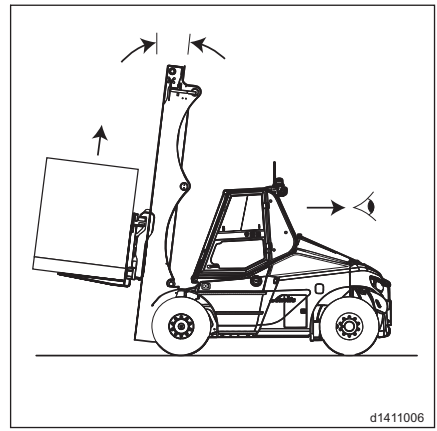
Risk of accident!

When transporting suspended loads, never perform or end driving and load movements abruptly.

Never drive on ascents or descents with a suspended load.

Transporting containers holding fluids as hanging loads is not permitted.

Deposit the load



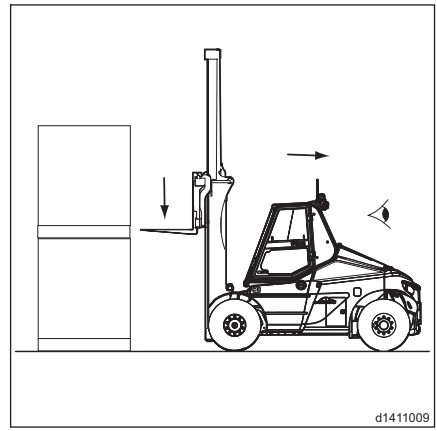
⚠ DANGER

There is a risk of accident when the lift mast is tilted forwards.

The load's centre of gravity and the tilting moment may change when the lift mast tilts forwards or the load slides. The forklift may tip forwards.

– Only tilt the lift mast forwards with the load raised when it is directly above the storage position.
– When tilting the lift mast forwards, take special care to ensure that the forklift does not tip forwards and that the load does not slide.

– Approach the stack or device receiving the load as carefully and as accurately as possible.
– Elevate the fork carriage to the correct height.
– Put the mast in the vertical position.
– Carefully move into the stack.
– Lower the load on to the stack, until the forks are clear of the load.
– Reverse the forklift away from the stack until clear.
– Lower the mast to the travel position.

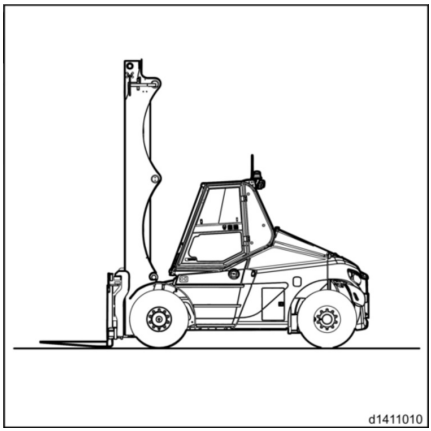


⚠ WARNING

Risk of personal injury and damage to property.

Do not leave the forklift unattended when the load is raised.

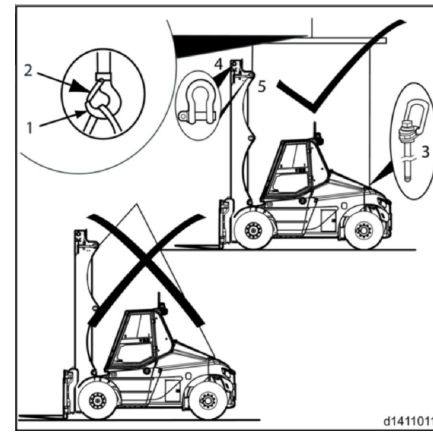
Before leaving the truck unattended ▷



– Deposit the load and lower the fork carriage.
– Tilt the mast to the vertical position, the forks must touch the ground.
– Apply the parking brake.
– Stop the engine and remove the ignition key.
– Lock the cab doors.

Loading/transporting

Hoisting the truck ▷



NOTE

When loading the truck by crane make sure nobody are within the working range of the crane! Only use hoisting equipment and loading crane with sufficient lifting capacity. For the truck weight see the manufacturer's name plate.

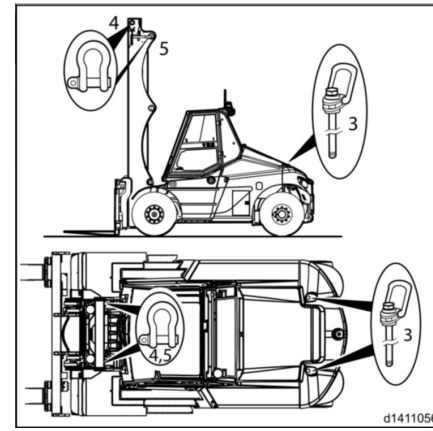
⚠ WARNING

Danger of personal injury and damage.

Do not step under the elevated load!

Attach lifting slings at the four points shown.

– Attach appropriate load rings to lifting points (3 & 4). ▷



NOTE

If the truck is fitted with a 5 m mast or lower, use upper lifting point (5). If the truck is fitted with 5 m mast or higher use lifting point (4).

– Attach two appropriate lifting shackles to the front lifting points (4 or 5) (see note above).

– Attach the slings to crane hook (1).

⚠ CAUTION

After attaching slings to the lifting hook, safety lock (2) must close to prevent 'lash slip'.

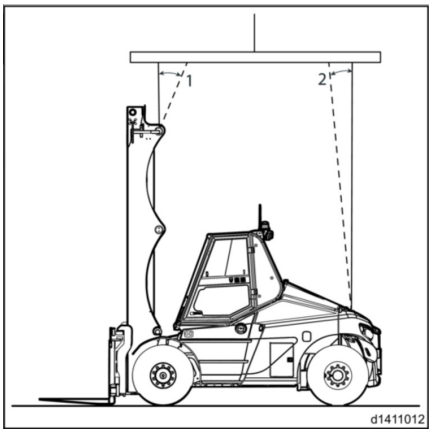
When the truck is hoisted the slings must not foul the cabin or any attachments fitted.

⚠ WARNING

Danger of truck tipping over and damage to truck lifting points.

The maximum angle for sling (1) is 40°. The maximum angle for sling (2) is 16°. Do not exceed these angles.

– Observe maximum sling angles when hoisting the truck. ▷



Transporting the truck

⚠ WARNING

Danger of damage and personal injury.

Do not step under the elevated load.

– When loading the truck make sure a safe distance is observed.

⚠ CAUTION

Danger of damage.

Only use transportation equipment with sufficient load capacity. For the truck weight, see the manufacturer's dataplate.

⚠ CAUTION

The minimum required strength of ropes/chains is 5 tonnes.

⚠ CAUTION

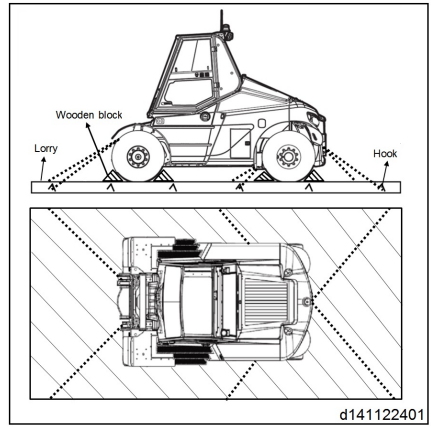
When transporting the truck, check that the truck is properly supported on blocks and securely fastened with load chains.

Transportation by loader truck

When the height of the mast is high, it must usually be removed.

When transporting in a loader truck, heavy chains or ropes are required. In this case, six chains are usually sufficient to secure the fork-lift truck.

– Six load chains are required to secure the forklift truck. ▷

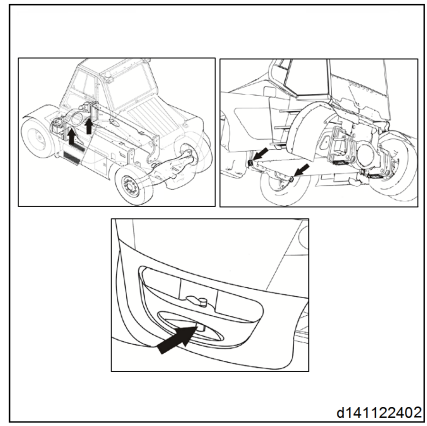


– Attach appropriate load chains to the tie down points as shown, and to appropriate tie down points on the transport equipment. ▷

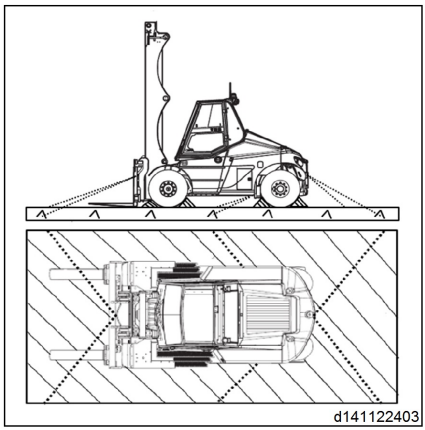
When the height of the mast is low, it does not need to be removed.

NOTE

The inner mast, outer mast, fork and fork carriage must be secured using suitable ropes to prevent them from shaking during transportation.



– Six load chains are required to secure the forklift truck. ▷

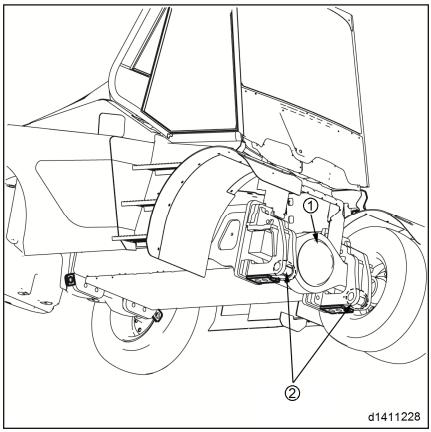


Transportation by freight container

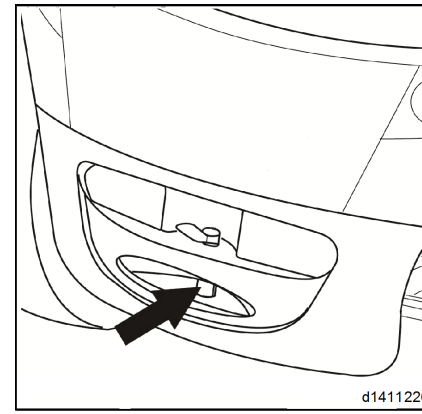
When transporting the truck in a freight container, the mast must be removed.

Secure the truck using ropes

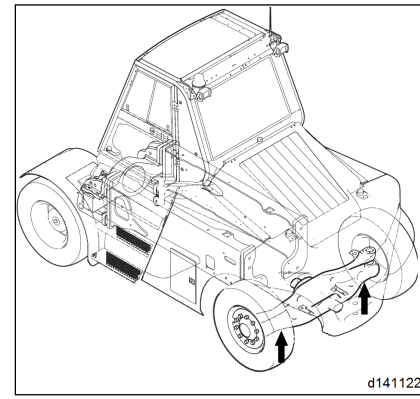
– Secure the front of the vehicle using 8 ropes. As shown in the figure, attach 2 ropes to the tie down points at positions (1) and (2) on both sides, cross over the ropes and attach them to the appropriate tie down points on the transport equipment. ▷



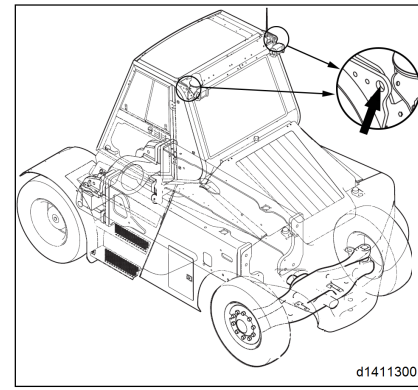
– As shown in the figure, attach 2 ropes to the tie down points at the rear of the vehicle, cross over the ropes and attach them to the appropriate tie down points on the transport equipment. ▷



– As shown in the figure, attach 2 ropes to the tie down points at the rear of the vehicle, cross over the ropes and attach them to the appropriate tie down points on the transport equipment. ▷

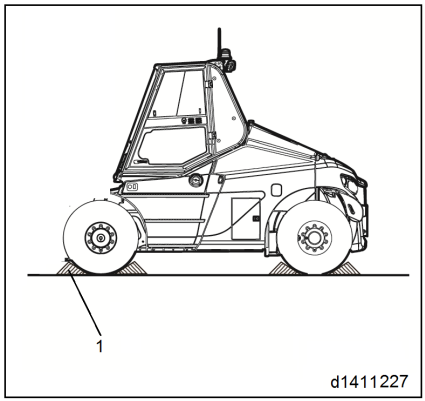


– As shown in the figure, attach ropes to the driver's cab tie down points and secure them to the appropriate tie down points on the transport equipment. ▷



Using wooden wedges to immobilise the truck

– Use wooden wedges (1) to immobilise the front and rear of the vehicle. ▷



Decommissioning the truck

Measures before taking the truck out of operation

If the truck is taken out of operation for over 2 months, it must be parked in a well ventilated, frost-free, clean and dry room and the following measures must be carried out.

- Thoroughly clean the truck.
- Fully elevate the fork carriage several times, tilt the mast forward and back and if fitted, operate the attachment several times.
- Lower the forks on a support until the chains are slack.
- Check the hydraulic oil level and add oil, if needed.
- Add diesel fuel.
- Apply a thin film of oil or grease on all unpainted mechanical parts.
- Lubricate the truck as described in the maintenance section of this manual.
- Check the condition and electrolyte level of the battery. Coat the battery terminals with non-acidic grease. (Follow the instructions of the battery manufacturer).
- Spray all open electrical contacts with a suitable contact spray.

⚠ CAUTION

Danger of tyre deformation.

Block up the truck so that all wheels are clear of the ground.

NOTE

Do not use plastic foil as this enhances the formation and collection of condensation water.

NOTE

If the vehicle is to be taken out of operation for a week or more, isolate the battery.

NOTE

If the vehicle is to be taken out of operation for over 6 months, contact your service partner for further measures.

Mast and load lifting device removal

⚠ DANGER

Danger of damage or injury.

This work must only be carried out by the trained personnel of your authorised dealer. Do not attempt to remove the mast or lifting device.

Taking the truck out of service (note)

If the vehicle is to be taken out of operation for three months or more, The engine should be started once a month and fully elevate the fork carriage several times, Tilt the mast forward and back several times, if the mast with attachment, operate the attachment several times .

Putting the truck back into service

– Thoroughly clean the truck as described in the maintenance section of this manual.
– Lubricate the truck.
– Coat the battery terminals with non-acidic grease.
– Check the condition of the battery / batteries.
– Check the engine oil for condensation water and change the oil, if necessary.
– Check the hydraulic oil for condensation water and change the oil, if necessary.
– Reconnect the battery.

NOTE

The digital clock display must be reset whenever the battery isolator has been used.

– Perform the same services as for commissioning.
– Return the truck to service.

NOTE

If the truck has to be jump started, refer to section entitled "Jump start procedure".

Disposal of old trucks

The disposal of old trucks is regulated in directive 2000/53/EC from the European Parliament and Council.

We therefore recommend having this work carried out in an approved recycling plant. If you would like to carry out this work yourself, you must obtain approval from the relevant authorities as per articles 9, 10 and 11 of directive 75/442/EEC.

In addition, the following minimum requirements must be observed:

- The locations in which old trucks are stored before treatment must be areas suited to this task with impervious surfaces. These areas are also to be equipped with collection devices and separators for leaking fluids and degreasing cleaning materials
- The locations for treatment must be areas suited to this task with impervious surfaces. These areas must also be equipped with collection devices and separators for leaking fluids and degreasing cleaning materials. Suitable storage areas must be available for disassembled and partially oil-smeared parts, as well as for tyres including fire protection measures. Suitable storage tanks for fluids such as fuel, AdBlue® (urea solution), engine oil, hydraulic oil, cooling fluid and fluids from air conditioning systems must also be provided
- In order to dispose of harmful substances from the old trucks, the batteries and LPG container must be removed. The following must also be removed, collected and stored separately: fuel, AdBlue® (urea solution), engine oil, cooling fluid, hydraulic oil and fluids from air conditioning systems
- The following parts are to be collected separately and recycled: catalytic converters, metal components containing copper and aluminium, tyres, large plastic components (consoles, fluid containers) and glass

NOTE

The operating company is responsible for adherence to the directives as well as additional country-specific regulations.

5

Maintenance

General maintenance

Safety information regarding servicing work

The truck will remain ready for operation at all times only if the small amount of servicing work is performed at regular intervals and in accordance with the information in the operating instructions.

Only qualified persons authorised by the manufacturer may carry out servicing work.

You can agree to have this work performed on the basis of an agreement with your service partner.

Whenever performing work, the truck must be parked on a flat surface and secured so that it cannot roll away. The engine must be switched off and the key removed.

No modifications, in particular attachments or conversions, may be made to the truck without the manufacturer's approval.

Once all work on the truck is complete, function checking and a test run must be performed.

⚠ DANGER

Risk of accident when working on the lift mast.

- Secure the raised fork carriage or lift mast to prevent accidental lowering.
- Whenever work is carried out at the front of the truck, secure the lift mast to prevent it tilting backwards.

⚠ WARNING

Risk of injury due to the doors falling shut.

Open doors and prevent them from closing.

⚠ CAUTION

The truck must always be properly labelled.

Missing or damaged identification plates and/or adhesive labels must be replaced. For the location or order number, see the spare parts catalogue.

ENVIRONMENT NOTE

Observe the information regarding the use of consumables.

Service intervals

The specified service intervals depend on the operating conditions and application conditions, and on the consumables used. In certain circumstances, the service intervals can be changed.

In all cases, the "Regular Service tasks" must be performed once per year.

When operating in extreme conditions (e.g. heat, cold or dust), the service intervals must be reduced.

- Contact your service partner.

Inspection and maintenance data

No	Assembly	Aids / Fluids and lubricants	Filling capacity / Settings
1	Engine	Engine oil	26.6 l
2	Fuel tank	Diesel	Approx. 250 l
3	Adblue tank	Adblue	Approx. 40 l
4	Cooling system	Antifreeze / water	Approx. 17 l
5	Working hydraulic system oil tank	Hydraulic oil	Approx. 180l

6	Transmission	Transmission oil	Approx. 20 l
7	Drive axle	Gear oil	Approx. 25 l
8	Battery	Maintenance free	Maintenance free
9	Tyres	Air	10 bar
10	Wheel nuts		680 Nm
11	Lift chains / mast channels	Chain spray	As required

Recommended consumables

NOTE

Using consumables of a lower grade than that recommended in the table may damage the truck and will void the warranty. If in doubt, contact your authorised dealer for replacement.

Diesel fuel

⚠ WARNING

Do not mix petrol, ethanol or ethanol/petrol blends with diesel. Doing so may cause an explosion.

⚠ CAUTION

The tolerances of the diesel fuel injection system are extremely precise. Therefore, it is extremely important to keep the fuel clean and free of dirt and water. Dirt or water in the fuel system may cause serious damage to the fuel pump and injector.

⚠ CAUTION

Light fuel oil may reduce fuel economy or damage fuel system components.

⚠ CAUTION

Do not use diesel fuel mixed with motor oil in engines equipped with aftertreatment systems. Otherwise, the maintenance intervals of the aftertreatment system will be shortened.

⚠ CAUTION

For the aftertreatment system to work properly, a diesel fuel with a very low sulphur content must be used. Failure to use an ultra-low-sulphur diesel fuel may cause damage to the aftertreatment system.

We recommend using ASTM Grade 2D fuel. Optimum engine performance can be achieved using Grade 2D diesel.

Once the engine has been optimised, an exhaust aftertreatment system can be used to reduce emissions to a level that complies with Tier 4 Final/Stage IV off-road emission standards. Ultra-low sulphur diesel (ULSD) must be used; the sulphur content limit for this is 15 ppm in the United States and 10 ppm in Europe. Failure to do so will result in permanent damage to the engine and the aftertreatment system in a short period of time. Such damage will cause the engine to become inoperable and affect the warranty for the engine.

ASTM S-15 defines ultra-low sulphur diesel (ULSD) as diesel fuel with a maximum sulphur content of 0.0015% (15 ppm). There are no acceptable alternatives.

When the working temperature is below 0°C [32°F], acceptable performance can be achieved using a mix of Grades 2D and 1D diesel fuel.

The following table lists acceptable fuel alternatives for this engine.

Acceptable fuel - Cummins® fuel system									
Grade 1D diesel (1) (2)	Grade 2D diesel (2)	Grade 1K kerosene	Jet-A	Jet-A1	JP-5	JP-8	Jet-B	JP-4	CITE
Acceptable	Acceptable	Does not meet standards	Does not meet standards	Does not meet standards	Does not meet standards	Does not meet standards	Does not meet standards	Does not meet standards	Does not meet standards
48-34(3)	40-24(3)	50-35(3)	51-37(3)	51-37(3)	48-36(3)	51-37(3)	57-45(3)	57-45(3)	57-45(3)

- 1. Any adjustments made to the fuel system to compensate for the decrease in performance caused by the use of alternative fuels are not covered by the warranty.
- 2. The winter blend diesel fuel supplied by commercial petrol stations is a mixture of Grades 1D and 2D diesel, which is acceptable for use.
- 3. British Thermal Unit (BTU)/American Petroleum Institute (API) gravity - Fuels with a low API gravity have a high BTU. As a rule of thumb, for every rise in API gravity of 10 degrees, the BTU will reduce by 3-5%; for every rise in fuel temperature of one degree, the API gravity will also increase by 0.7 degrees. The reduction in BTU is approximately equal to the percentage of power loss. Using a fuel with a higher API gravity will result in a higher than normal level of fuel consumption.

"A" indicates the fuel meets standards only when the fuel lubricity is sufficient. This means that the BOCLE measured using the ASTM D6078 Scuffing Load Ball-on-Cylinder Lubricity Evaluator (SLBOCLE) should be 3100 or higher. The ASTM D6079/ISO 12156 high frequency reciprocating rig (HFRR) can also be used to measure lubricity. With this method, the fuel wear mark diameter must be less than or equal to 0.45 mm [0.02 in].

NOTE

When the working temperature is below 0°C [32°F], Cummins recommends a minimum diesel cetane value of 45, and a minimum value of 42 when the working temperature is above 0°C [32°F].

NOTE

Using diesel with a cetane value below the recommended minimum will cause starting difficulties, instability and large amounts of white smoke. To ensure normal engine operation in low temperature environments, the correct diesel cetane value must be clearly specified.

NOTE

All fuels permitted for use are required to have sufficient fuel lubricity. This means that the BOCLE measured using the ASTM D6078 Scuffing Load Ball-on-Cylinder Lubricity Evaluator (SLBOCLE) should be 3100 or higher. The ASTM D6079 ISO 12156 High Frequency Reciprocating Rig (HFRR) can also be used to measure lubricity. With this method, the fuel wear mark diameter must be less than or equal to 0.45 mm [0.02 in].

A ULSD/biodiesel blend supplied by a BQ-9000 certified supplier with a mixture ratio of B20 (20% biodiesel) can be used.

Diesel exhaust fluid recommendations and specifications

⚠ WARNING

It is unlawful to tamper with or remove any component of the aftertreatment system. It is also illegal to use a Diesel exhaust fluid (DEF) that does not meet the specifications provided or to use a truck/equipment that runs without diesel exhaust fluid (DEF).

⚠ WARNING

Diesel exhaust fluid (DEF) contains urea. Do not get this substance in your eyes. Should these substances come into contact with eyes, rinse immediately with plenty of water for at least 15 minutes. Do not inhale. If the diesel exhaust fluid is accidentally inhaled, consult a doctor immediately.

⚠ WARNING

Do not attempt to make diesel exhaust fluid by mixing agricultural-grade urea with water. Agricultural-grade urea does not meet the required specifications and may damage the aftertreatment system.

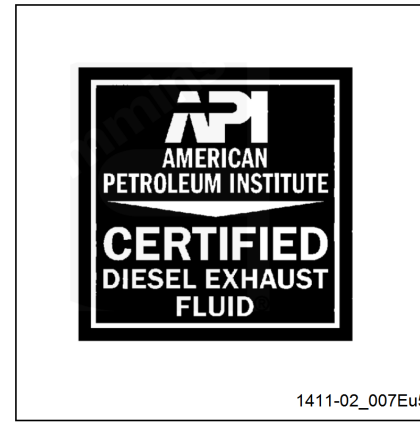
The use of diesel exhaust fluid in accordance with ISO 22241-1 is required. There are no acceptable alternatives.

NOTE

The DIN 70070 standard can be referenced here. The diesel exhaust fluid specification limit given in this standard is the same as ISO 22241-1.

Cummins is not responsible for any malfunction or damage caused by illegal operation or negligence. These include, but are not limited to, use of diesel exhaust fluid without the correct designation; lack of aftertreatment maintenance; improper storage or shutdown methods; unauthorised modifications to the engine or aftertreatment system. Cummins is also not responsible for malfunctions caused by the use of incorrect diesel exhaust fluid or water, dirt or other contaminants in the diesel exhaust fluid.

American Petroleum Institute (API)-certified DEF is highly recommended for engines with SCR technology operating in the US and Canada. As shown in the diagram, this type of diesel exhaust fluid can be identified by the symbol on the container/meter.



1411-02_007Eu5

Fleetguard® diesel exhaust fluid is recommended to ensure proper use of the diesel exhaust fluid (DEF). Fleetguard® is available in a variety of container sizes, from small to bulk.

Other common names for diesel exhaust fluid (DEF):

- Urea
- AUS 32 (aqueous urea solution 32)
- AdBlue
- Nitrogen oxide reducing agent
- Catalyst solution
- DEF

Regardless of how the diesel exhaust fluid is referred to, it must comply with the specifications specified in the overview section of this procedure.

Storage

NOTE

The following information is for reference only and should be used as a guideline. There are many factors that determine the shelf life of diesel exhaust fluid (DEF), with temperature and time being the two main decisive factors. When in doubt, check the concentration of the diesel exhaust fluid (DEF), refer to the test section of this procedure, or replace it with a well-known, premium diesel exhaust fluid (DEF).

DEF has a certain shelf life, both in the diesel exhaust fluid tank of the truck and in storage/bulk/transport containers.

The following conditions are ideal for maintaining DEF quality and shelf life during long-term transport and storage:

- Storage temperature between -5°C and 25°C (23°F to 77°F)
- Stored in a sealed container to avoid contamination
- Avoid direct sunlight

Under these conditions, the minimum shelf life of DEF is 18 months. If the storage temperature is higher and storage period is longer than the ideal conditions, then the shelf life will be reduced by six months for every 5°C [9°F] higher than the maximum storage temperature specified above.

Long-term storage in trucks (more than six months) is not recommended. If long-term storage is required, it is recommended that the diesel exhaust fluid is periodically tested to ensure that the concentration does not exceed the specifications. Perform the test in this procedure.

NOTE

In order to prevent deterioration of the diesel exhaust fluid (DEF) during storage in the DEF tank, locate and plug the vents of the DEF tank to isolate it from the atmosphere.

Handling

Diesel exhaust fluid is harmless to handle; however, DEF may corrode certain materials over time, such as carbon steel, iron, zinc, nickel, copper, aluminium and magnesium.

- Ensure that only approved containers are used to transport and store the diesel exhaust fluid. Polyethylene and polypropylene containers are recommended.
- If the diesel exhaust fluid overflows, immediately rinse and clean with water.
- Avoid prolonged contact with skin. If contact with skin occurs, immediately wash the skin with soap and water. If not rinsed immediately, the diesel exhaust fluid will dry and leave a white film that is more difficult to wash off.

NOTE

Allow spilled diesel exhaust fluid to air dry or wipe only with a cloth. The spilled DEF will leave behind a white residue. Failure to properly clean spilled diesel exhaust fluid may result in an incorrect diagnosis of a leakage in the diesel exhaust fluid injection system.

Prior to using containers, funnels or other receptacles for dispensing, handling or storing diesel exhaust fluid, ensure they are thoroughly cleaned to remove any contaminants and then rinse with distilled water.

NOTE

Do not use tap water to rinse the containers used to transport the diesel exhaust fluid. Tap water pollutes the diesel exhaust fluid. If distilled water is not available, first rinse with tap water and then re-rinse with diesel exhaust fuel.

Handling

If handling of DEF is required, verify the regulations stipulated by the local authorities regarding proper handling processes and requirements.

Testing

The correct concentration of diesel exhaust fluid is critical to proper operation of the engine and the aftertreatment system.

Test the concentration of the diesel exhaust fluid using a Cummins Diesel Exhaust Fluid Refractometer. Follow the instructions that are supplied with the service tool.

Urea concentration percentage: 32.5 +/- 0.7%

The above specification allows for tolerance, variability and calibration of the refractometer when testing concentrations of diesel exhaust fluid.

If the concentration of diesel exhaust fluid does not meet this specification, drain the diesel exhaust fluid tank, rinse with distilled water and refill with new and/or well-known, premium diesel exhaust fluid. Re-check the concentration of diesel exhaust fluid.

The concentration of the diesel exhaust fluid must be checked under the following conditions:

- The vehicle has been stored for a long period of time
- It is suspected that water has been added to the diesel exhaust fluid tank.

Contaminant/treatment solution is incorrect

⚠ CAUTION

Do not add water or any other liquid other than as specified to the diesel exhaust fluid (DEF) tank. This may cause damage to the aftertreatment system.

If incorrect liquids are added to the diesel exhaust fluid tank, including but not limited to:

- Water
- Diesel fuel
- Hydraulic oil
- Coolant
- Windshield washer fluid

contact your authorized dealer to determine the correct repair procedure.

If only water has been added to the diesel exhaust fluid (DEF) tank, drain the diesel exhaust fluid, rinse with distilled water, and refill with new and/or well-known, premium diesel exhaust fluid. Re-check the concentration of diesel exhaust fuel after refilling. Perform the test in this procedure.

Freezing

⚠ CAUTION

Do not add any chemicals/additives to the diesel exhaust fluid to prevent freezing. If chemicals/additives are added to the diesel exhaust fluid, it may result in damage to the aftertreatment system.

Diesel exhaust fluid freezes at around -11°C [12°F]. The vehicle's diesel exhaust fluid system is designed to meet this characteristic and does not require any intervention by the vehicle operator.

Engine oil grade

⚠ CAUTION

If the intervals for replacing the oil and filters are extended in excess of recommended values, the service life of the engine will be reduced due to factors including corrosion, deposit build-up and wear.

Using high-quality engine oil and changing the oil and filters at suitable intervals are key factors in maintaining engine performance and durability. If the intervals for replacing the oil and filters are extended in excess of recommended values, the service life of the engine will be reduced due to factors including corrosion, deposit build-up and wear. Follow the below procedure to determine the appropriate oil change interval for your application.

NOTE

This responsibility is borne by the user. If these recommendations are ignored, the warranty will be affected.

⚠ CAUTION

The sulphur content of fuel should not exceed 0.5% (mass). If the sulphur content is greater than 0.5%, please contact your authorized dealer.

API: American Petroleum Institute

CES: Cummins® Engineering Standard

It is recommended to use Society of Automotive Engineers (SAE) 15W-40 heavy-duty engine oil that complies with or exceeds CES 20081 and American Petroleum Institute (API) CJ-4, such as Valvoline Premium Blue™ (USA) or Valvoline Premium Blue® Extra (International).

To determine if the engine oil complies with CES 20081, check the label on the back of the oil bottle for the CES 20081 specification. If bulk oil is required, please contact the supplier for the oil specification and ensure that it complies with CES 20081.

The following illustration also shows the API service symbol found on oil bottles. The upper part of the symbol indicates the applicable

oil type. The middle part indicates the SAE oil viscosity grade. The following table shows how to compare CES to API grade.

CES	API	Notes
CES-20081	CJ-4/SL	Minimum oil grade required.

NOTE

Engine oils that comply with API CJ-4/SL may not comply with the requirements of CES 20081. In addition to complying with API CJ-4/SL, it is important to ensure that the engine oils also comply with CES 20081.

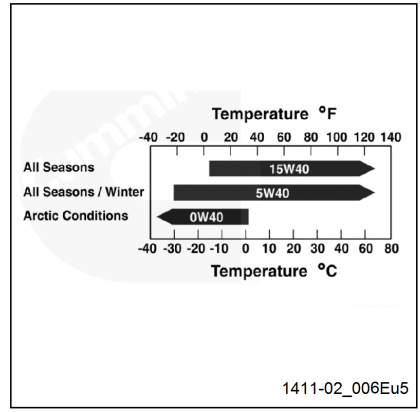
It is recommended to use 15W-40 multi-grade oil for normal applications at ambient temperatures above -15°C [5°F]. Using multi-grade oil can reduce sediment build up and improve engine cranking performance in low temperature conditions, as well as improve engine durability at high temperatures by maintaining lubrication. As has already been proven, using multi-grade oil can reduce oil consumption by about 30% compared to single-grade oil. Therefore, the use of multi-grade oil is very important to ensure that the engine meets the applicable emission requirements.

⚠ CAUTION

If the intervals for replacing the oil and filters are extended in excess of recommended values, the service life of the engine will be reduced due to factors including corrosion, deposit build-up and wear.

The use of "synthetic engine oil" is permitted (made using API Category 3 or 4 basic materials), but it has the same performance and viscosity limitations as petroleum (mineral)-based engine oils. The time interval for changing the synthetic engine oil must be the same as for petroleum (mineral)-based engine oils.

Viscosity of oil



Although the preferred viscosity grade is 15W-40, multi-grade oils with lower viscosities can be used in cold climates. Refer to the attached diagram. All oils with a viscosity grade below 15W-40 must also comply with CES 20081 requirements.

It is recommended to use API Category 3 and 4 synthetic engine oils for Cummins® engines operating at ambient temperatures below -25°C [-13°F]. Synthetic 0W-30 engine oils that comply with API Category 3 and 4 standards can be used when operating at ambient temperatures no higher than 0°C [32°F]. 0W-30 multi-viscosity oils do not provide the same level of fuel dilution prevention as higher grade multi-grade oils. Cylinder wear may increase when using 0W-30 oils under high load conditions.

The oil film of these oils is thinner than that of 15W-40 oils, so the high-quality Fleetguard® filter must be used at temperatures of 20°C [70°F] or above. Some oil suppliers may state that these oils provide better fuel economy. Cummins does not endorse nor object to any products not manufactured by Cummins. These statements are between the customer and the oil supplier. The oil supplier must promise that the oil will provide satisfactory performance for Cummins® engines, otherwise the oil should not be used.

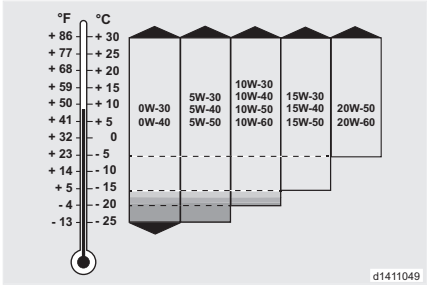
Use of break-in oil in new engines

Using specialised break-in oil with new or reinstalled Cummins® engines is not recommended. Use the same type of oil during the break-in period as during normal operation.

Use of aftermarket oil additives

Use of aftermarket oil additives is not recommended. The premium full-additive engine oil technology currently in use is very mature, and the precise amount of additives mixed into the oil meets strict requirements. These oils meet the performance characteristics of lubricant industry standards. The use of aftermarket oil additives to improve engine oil performance is not necessary and, in some cases, may reduce the ability of the finished engine to protect the engine.

Oil operating temperatures



The first recommendation is to use 15W-40 multi-grade oil for normal applications at ambient temperatures above -15°C [5°F]. Using multi-grade oil can reduce sediment build up and improve engine cranking performance in low temperature conditions, as well as improve engine durability at high temperatures by maintaining lubrication. As has already been proven, using multi-grade oil can reduce oil consumption by about 30% compared to single-grade oil. Using multi-grade oil can therefore ensure that engines meet applicable emission requirements. Although the preferred viscosity grade is 15W-40, multi-grade oils with lower viscosities can be used in cold climates.

Oils with 10W-30 viscosities must meet the 3.5 cSt minimum high temperature/high shear viscosity, as well as Cummins® and Mack™ test requirements for piston ring/cylinder liner wear. They are therefore suitable for temperature ranges greater than 10W-30 engine oils that meet the earlier API performance classification requirements. The oil film of these oils is thinner than that of 15W-40 oils, so the highest quality Fleetguard® filter must be used at temperatures of over 20°C [70°F]. Some oil suppliers may state that these oils provide better fuel economy.

NOTE

Oil additives of any kind must not be added to any of the above mentioned engine oils. Their use jeopardizes the warranty.

Mixing of different oil brands should be avoided.

Hydraulic oil

The recommended hydraulic oils are Shell Spirax S4 TXM and SAE 10W-30 UTTO。

If it is difficult to obtain imported hydraulic oils, use a similar high-quality UTTO oil of a different brand.

If in doubt, contact your authorised dealer for replacement.

Only the above-mentioned oils are approved by the manufacturer. If other hydraulic oils are used or mixed, serious damage can result.

Driveline oils

Gearbox

The recommended hydraulic oils are Shell Spirax S4 TXM and SAE 10W-30 UTTO。 Only use oils on ZF-List of Lubricants TE-ML 03 (see www.zf.com) for Powershift transmissions 3 WG-116/131/161/171. Only the above-mentioned oils are approved by the manufacturer. If other hydraulic oils are used or mixed, serious damage can result.

Drive axle

Lubricant minimum requirement L .

hypoid gear oil according to API GL-5 and API MT-1 or hypoid gear oil according to SAE J2360 and API MT-1 .

From -10℃ to +30℃	Single-grade oils SAE 90 or Multigrade oils SAE 75W-90 / SAE 80W-90 / SAE 85W-90
Permanently less than -10℃	Multigrade oils SAE 75W-85 / SAE 75W-90
Permanently over +30℃	Single-grade oils SAE 140 or Multigrade oils SAE 75W-140 / SAE 80W-140 / SAE 85W-140

NOTE

Important – On axles with self-locking differentials, a noise is produced if normal oils are used. In case of abnormal noises and in case of a jerky roll off of the tyres, use gear oil EP with additives of the “Limited Slip” type conforming to specification M 2C - 104 A

Lubricating grease

Heavy duty grease with additives EP and MOS2. Designation according to DIN 51825-KPF 2K-20 (see the Parts Catalogue for the order number). Any mixing with grease types other than lithium-based greases is not allowed.

Coolant

Use of a fully proportioned antifreeze/coolant that comply with the Cummins Engineering Standard (CES) 14603 is recommended.

Typically, antifreeze/coolants that comply with American Society for Testing and Materials (ASTM) 4985 (GM6038M technical specification) or ASTM D6210 can be used in engines covered in this manual.

Low-silicate antifreeze/coolants that comply with ASTM D4985 (GM6038M technical specifications) are not applicable for extended maintenance intervals.

We recommend filling the cooling system with a mixture of high-quality water and pure antifreeze at a 50/50 ratio, or pure coolant.

Using high-quality water is essential for maintaining the performance of the cooling system. Excessive levels of calcium and magnesium will cause scaling problems, and excessive chloride and sulphates can cause corrosion in the cooling system.

Water quality	
Calcium and magnesium (hardness)	Calculated using ($CaCO_3$ + $MgCO_3$); maximum content is 170 ppm.
Chlorides	Calculated using (Cl); content is 40 ppm
Sulphates	Calculated using (SO_4); content is 100 ppm.

We recommend using Fleetguard® Compleat. Two forms of ethylene glycol (ethylene and propylene) can be used.

Pure antifreeze must be mixed with high-quality water in a 50/50 ratio (operating range of 40-60%). The freezing point of the 50/50 ratio pure antifreeze and water mixture is -36°C [-33°F] and the boiling point is 108°C [226°F], which completely satisfies the requirements for North America. At a concentration of 68%, glycol antifreeze coolant reaches the actual minimum freezing point. If the concentration is higher, the freezing point of the solution will

also increase, which increases the possibility of silicone formation.

A refractometer must be used to accurately measure the freezing point of the antifreeze. Use Fleetguard® Refractometer

Do not use a floating hydrometer. The data obtained using a floating hydrometer is incorrect.

Do not use sealing additives in the coolant system. The use of sealing additives will result in:

- The formation of blockages in the low coolant flow area
- Blockages in the radiator and oil cooler
- Possible damage to the water pump seals

Do not use soluble oil in the cooling system. The use of soluble oil will result in:

- Corrosion of brass and copper
- Damage to heat exchange surfaces
- Damage to seals and hoses

Battery grease

Non-acidic grease (pole grease).

Chain spray

Chain spray.

Electrical contact grease

For use on all electrical connections.

Common rail engine safety warnings

⚠ DANGER

FUEL SYSTEM UNDER HIGH PRESSURE – DANGER TO LIFE

Do not work on the fuel system when the engine is running.

The pressure in the fuel system may still be as high as several hundred bar, even after the engine has been switched off. Therefore, the common rail system can only be removed when the fuel pressure is fully released.

It is prohibited to loosen the injection line or the high pressure line when the engine is running.

⚠ DANGER

HIGH-PRESSURE FUEL SYSTEM LEAKS – DANGER TO LIFE

In the event of leakage, switch off the truck immediately and contact a service partner.

Maintenance work on the engine must be carried out by authorised professional technicians.

Service plan

Regular maintenance

The following maintenance will help improve the forklift's condition and ensure it works properly.

Operators shall carry out this maintenance work as often as possible, in accordance with the operating environment.

- Clean the forklift (as required).
- Drain water from the fuel pre-filter.
- Clean and lubricate all pivots, bearings and hinges.
- Clean and lubricate the steering axle (please see the **Service schedule for service times**).
- Check and tighten the wheel fasteners (see the section "Tightening Wheel Fasteners").
- Clean the lift mast chain and apply chain spray.

Service plan table

Note on servicing work
Servicing work requires specialised knowledge and special tools. Please contact an authorised service partner

Preparations
Clean the forklift as required.
Check that all labels are complete and legible.
Read out and delete error memory.
Reset the maintenance interval

Conduct maintenance after the first 100 hours of operation
Engine
Check the condition of the radiator hose
Check the cooling system hose for tightening to prevent leaks
Change the engine oil and filter
Drive mechanism and transmission system
Change the transmission filter
Check the transmission, pumps, valves and lines for leaks
Check the installation of the drive axle
Check the steering axle hub
Hydraulic system
Change the brake pressure filter
Replace the brake return oil filter
Replace the bypass hydraulic oil filter
Replace the cooler oil return filter
Check the oil level in the hydraulic system
Check the hydraulic system, pumps, valves and lines for leaks
Check the pre-load of the double hoses

Conduct maintenance every 750 hours of operation
Engine
Check the radiator cover
Check the belt for wear or damage, replace as required
Check the battery and battery cables
Change the fuel filter
Change the fuel pre-filter
Change the engine oil and filter.
Clean engine
Check whether the engine emits black smoke. If there is black smoke, use an instrument to detect emissions.
Drive mechanism and transmission system
Clean and lubricate the steering axle
Chassis and bodywork
Clean and lubricate all bearings, shafts and joints
Clean and lubricate door hinges
Lifting system
Clean and lubricate the mast, tilt cylinder shafts and bearings
Clean, lubricate and check side shift function works properly
Lubricate the lift mast bearings

Conduct maintenance every 1500 hours of operation (additional maintenance items)
Engine
Check the DEF filter
Check the DEF injector and filter, and replace them if needed
Check the rubber shock absorber
Change the air filter and safety filter
Drive mechanism and transmission system
Replace the transmission oil and filter
Check the transmission, pumps, valves and lines for leaks
Change the gearbox oil

Conduct maintenance every 1500 hours of operation (additional maintenance items)
Check the drive axle and retaining bolts
Check the steering axle hub
Check and adjust the steer stops if necessary
Check mounting of the steer axle and steering king pin
Check the functionality of the braking system (park brake and driving brake)
Chassis and bodywork
Check the condition of the chassis mount
Check the cab mountings
Check the driver's cab tilt function
Check security of cab tilt pump handle and safety lock pin
Check the condition of welded structures/components
Driver's cab
Check pedals for smooth operation and ensure there is no excessive play
Check the condition and function of the seat belt
Check the functionality of the driver seat switch
Electrical system
Check the condition of the electric cables, cable connectors and connections, and check that they are securely fitted
Check the condition of the batteries
Hydraulic system
Change the brake pressure filter
Replace the brake return oil filter
Replace the bypass hydraulic filter
Replace the cooler oil return filter
Check the oil level in the hydraulic system
Check the hydraulic system, pumps, valves and lines for leaks
Check the pre-load of the double hoses
Lifting system
Check the condition of the lift mast, lift mast chain, lift cylinders and end stops, and check that they are correctly mounted and working correctly.
Check the fork arms and arm safety devices

Conduct maintenance every 2250 hours of operation (additional maintenance items)
Engine
Change the coolant

Conduct maintenance every 3000 hours of operation (additional maintenance items)
Engine
Replace the turbocharger*
Replace the air intake throttle valve*
Change the common rail pipe*
Change the injector*
Change the injection pump*
Replace the diesel oxidation catalyst (DOC)*
Replace the diesel particulate filter (DPF)*
Replace the differential pressure sensor*
Replace the exhaust temperature sensor*
Replace the selective catalytic reduction converter (SCR)*
Replace the carbamide (urea) jet pump*
Replace the reactor weight sensor*
Replace the nitrogen oxide sensor*
Replace the EGR valve*
Replace the engine control module*
Hydraulic system
Change the hydraulic breather filter
Replace the brake suction filter
Change the hydraulic oil
Check the hydraulic pump mounting bolts
Lifting system
Check the forks
Check the mounting of the mast
Check the tension of lift mast hoses

Conduct maintenance every 3000 hours of operation (additional maintenance items)
Hydraulic system
Replace the hydraulic breather filter
Replace the brake suction filter
Change the hydraulic oil
Check the hydraulic pump mounting bolts
Lifting system
Check the forks
Check the mounting of the mast
Check the tension of lift mast hoses

Conduct maintenance every 4500 hours of operation.
Engine
Adjust the valve clearance
Replace the DEF filter

Conduct maintenance every 6000 hours of operation (additional maintenance items)
Lifting system
Replace the lift chain (to be carried out every 6000 hours of operation or once the chain stretch reaches 2%)

Subsequent tasks
Check and adjust the date and time of the display unit
Carry out a functional test, including a test drive
Attach a maintenance sticker

⚠ CAUTION

*In accordance with Chinese national environmental protection standard HJ 1014-2020, replace the emission-related parts and components to comply with emission requirements.

Use instruments to test the parts and components after 3000 hours of use or every 5 years. If they still meet the emission requirements, no replacement is needed.

Preparatory tasks

Clean the truck

NOTE

How often the truck needs cleaning depends on its use. If used with very aggressive media like salt water, fertilizer, chemicals, cement, etc., the truck should be cleaned carefully and more often.

⚠ WARNING

Danger of damage to the bearings

Hot steam or intensive degreasing solutions should be used with utmost care. The grease in sealed for life bearings may dissolve and leak out. Since re-greasing is not possible, this will result in damage to the bearing..

⚠ CAUTION

Protect all electrical components and the air filter intake from the ingress of steam, water etc., when cleaning.

Protective clothing and eye protection must be worn.

Clean the cabin floor and ensure that no debris is allowed to obstruct the operation of the pedals.

Clean especially the oil filler areas and the lubrication points prior to servicing.

When cleaning with compressed air, remove sticking dirt with a cold cleaner.

When cleaning the truck with de-greasing solutions, allow sufficient time for the cleaner to soak in, then flush off with a strong water jet.

After cleaning the engine, allow it to run warm to dry off and to ensure there are no malfunctions due to water ingress.

Clean and spray the lifting chains

NOTE

The lifting chains must be cleaned if the dust covering the chain prevents penetration of the lubricant.

– Place a container under the mast.

– Clean the chain using paraffin derivatives such as washing petrol, wear protective clothing and observe the manufacturer's safety notes.
– When using a steam jet, use without using additives.
– After cleaning, blow dry the chain at once to remove any water in the chain links and on the surface. During this procedure the chain should be moved several times.
– Spray Linde chain spray immediately, move the chain while spraying by raising and lowering the fork carriage.

NOTE

Lifting chains are safety components. The use of cold cleaners, chemical cleaning agents and caustic or acidic and chlorinated fluids can be a direct cause of damage to the chain.

NOTE

Trucks in service in the food industry must be lubricated with an oil approved for the food industry instead of chain spray.

Engine

Filling fuel

⚠ CAUTION

Danger of costly damage to the engine.

Components that are damaged due to incorrect fuel filling are not covered by warranty.

Filling fuel

⚠ CAUTION

Risk of fire.

Follow local regulations for handling diesel fuel.

Stop the engine before filling fuel. No smoking or naked flames when filling fuel. Do not spill or allow fuel to contact hot parts.

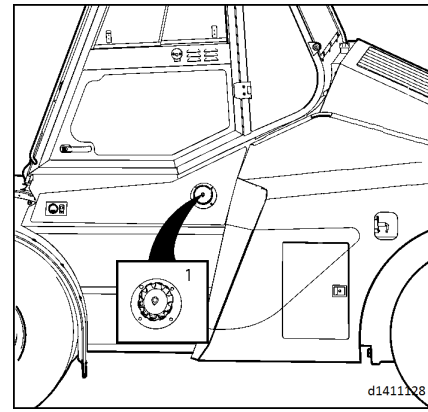
– Turn the ignition off.

– The fuel tank filler cap is located on the left side of the truck (1). ▷

– Remove fuel cap

– Fill the tank with clean diesel fuel (see recommended fuels).

– Refit the filler cap.



NOTE

Maximum fuel capacity - 250 l (approx).

Air filter - check

⚠ WARNING

Risk of choking.

Do not start the engine with the filter element removed.

Wear a protective mask for all service work carried out on the air intake system.

⚠ CAUTION

Risk of damage to the air filter.

Do not clean the filter element.

– Clean the filter casing with a damp cloth.

If a warning message is displayed on the truck status display unit stating the air filter is blocked, stop the engine at once and renew the air filter.

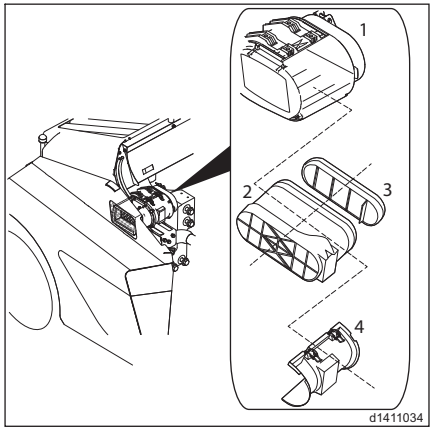
⚠ CAUTION

Risk of engine damage.

Do not continue to work with a blocked filter.

A dirty filter element decreases engine performance. Regular filter servicing is essential for the engine.

– Tilt the cab and open the engine access cover.
– Release clamps on filter casing (1) and remove filter end cover (4).
– Pull out the air filter element (2) and safety element (3).
– Inspect and re-use if serviceable. Replace if necessary.



Coolant level - check

Checking the coolant level

⚠ CAUTION

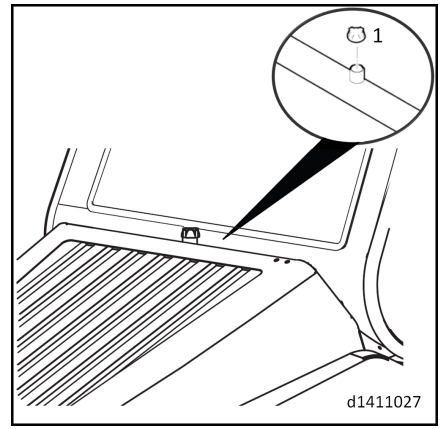
Risk of scalding!

Do not remove the filler cap if the reservoir is hot or when the engine is running. Follow the instructions for handling fluids and lubricants.

NOTE

When the coolant level is too low or the coolant is too hot, the truck status display monitor will display a warning, coolant level must be checked.

– Open cooler cap(1) and inspect the coolant's level and quality. ▷



Checking the engine oil level

⚠ CAUTION

Risk of personal injury.

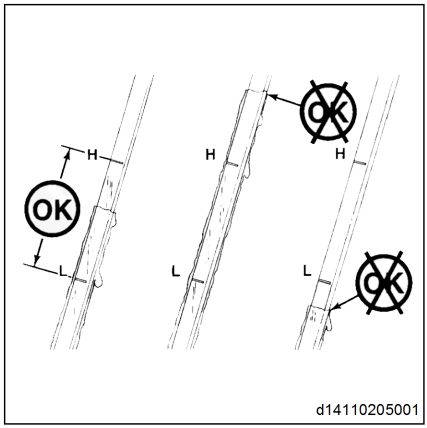
Follow the instructions for handling fluids and lubricants.

When checking the oil level, the engine must be in a horizontal position to ensure that the measured value is accurate.

A correct reading can only be obtained when the engine is off.

Wait at least 15 minutes after the engine has been switched off before checking the oil level. This time allows the oil to flow back to the oil sump.

– Park the forklift on level ground.
– Tilt the cabin.
– Remove the dipstick from the engine.
– Use a clean cloth to dry the dipstick.
– Re-insert the dipstick, and remove it once more. The oil level should be between the two marks on the dipstick.
– If necessary, top up the oil.
– Remove the filler cap from the filling opening. Pour oil into the filling opening until a suitable level of oil is reached.



Engine oil capacity of a standard engine (six-cylinder): 6.7 litre engines (high-capacity oil pan)

Applies only to oil pan	23.7 L
Overall system	26.2 L
Between maximum and minimum oil level markings (on the engine oil dipstick)	8.56 L

– Replace the cap and return the cabin to its original position.

⚠ WARNING

Engine oil is a flammable substance.

Do not allow engine oil to come into contact with engine components that are hot. When adding oil, take care to avoid leakage.

⚠ CAUTION

Using the wrong oil can damage the engine.

Only use oil meeting the specifications noted in the “Specifications for Fluids and Lubricants” section.

⚠ CAUTION

Adding excessive oil to the engine may result in damage to the engine.

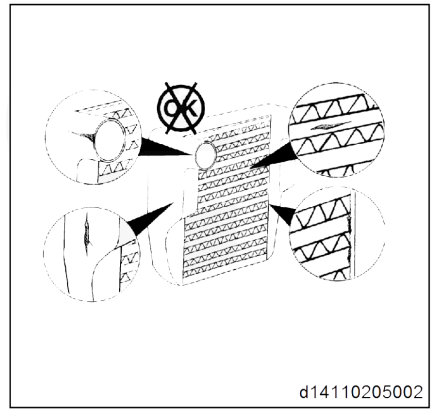
Do not add too much oil into the engine. Drain excess engine oil, if necessary.

⚠ CAUTION

Running the engine when the oil level is below the L (low oil level) indicator or above the H (high oil level) indicator is strictly prohibited, as this can lead to a deterioration in engine performance or damage to the engine.

Radiator

Check there is no dirt or debris blocking the radiator (CAC) chip. Check for cracks, holes or other damage. If you find damage, please contact your authorized dealer. ▷



Fuel filter and oil-water separator ▷

General

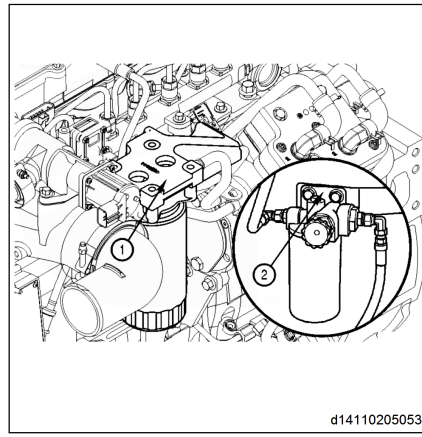
This engine uses a dual fuel filter system.

The pressure fuel filter is only used for filtering; pressure is applied to it from the gear pump installed on the engine fuel pump.

NOTE

Some types of applications use the filter mounted on the pressure side of the undercarriage.

The suction fuel filter is an oil-water separator. It is positioned between the gear pump installed on the engine fuel pump and the OEM fuel tank. This filter is not pressurised, but it



1 The fuel filter
2 The oil-water separator

works as a vacuum. Use the following steps to measure the maximum inlet pressure and test the suction fuel filter.

NOTE

Some types of applications use the engine-mounted suction filter.

Filling the fuel system: a certain amount of air will be introduced into the fuel system when servicing or changing fuel and/or high-pressure fuel system components. The fuel system can be filled using a manual injection pump. For refuelling steps, see the refuelling section of this procedure.

Preparation procedure

⚠ WARNING

The fuel is flammable. When working on the fuel system, ensure that there are no cigarettes, open flames, lights, electric arc devices and switches in the work area and that the area is ventilated to minimise the possibility of serious injury or death.

Do not drain the fuel system when the engine is hot; this can cause fuel to splash onto the hot exhaust manifold and cause a fire.

Explosive gases may escape from the battery. To reduce the possibility of injury, make sure the engine compartment is well ventilated before carrying out maintenance on the battery. To reduce the possibility of arcing, remove the negative (-) battery cable first and connect it last.

Wear suitable safety glasses and a protective mask when using compressed air. Flying debris and dirt may cause personal injury.

Wear safety glasses or a protective mask as well as protective clothing when using steam cleaners. Hot steam can cause serious personal injury.

⚠ CAUTION

Clean the area around the filter before disassembly. Dirt or debris may cause damage to the fuel system.

– Disconnect the battery cables.
– Clean the area around the fuel filter.
– If necessary, disconnect the water-in-fuel sensor wiring harness.

Removal

⚠ WARNING

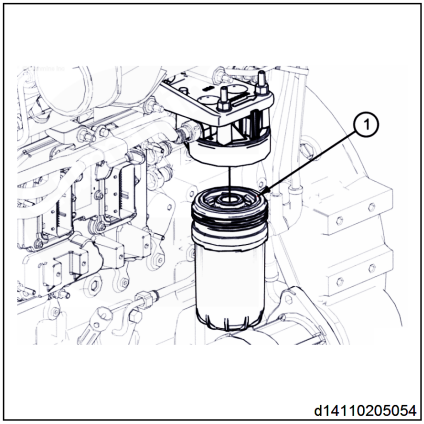
Diesel fuel may be flammable, depending on the environment. To reduce the risk of fire that could result in serious personal injury, death or property damage, do not allow smoking, sparks or open flames in the area (for example, beacons, electrical switches or welding equipment) when inspecting the fuel system, or performing maintenance or repairs.

– Disconnect the wiring harness from the water-in-fuel sensor, if fitted.

– Loosen and remove the fuel filter.

– Ensure that sealing ring (1) is not stuck in the filter base. ▷

– If necessary, use the O-ring removal tool to remove the seal.



Installation

⚠ CAUTION

Do not use a pre-filled pressurised fuel filter unless you are using a clean block-type plug. Fill the fuel system after installing the fuel filter. Pre-filling the pressurised fuel filter may cause debris to enter the fuel system and damage the fuel system components.

NOTE

If applicable, use a clean block-style plug to plug the filter prior to assembly and pre-fill the pressure and suction sides of the filter with clean fuel. You cannot put fuel directly into the filter because this will allow unfiltered fuel to enter the system and cause damage to fuel system components.

– Use the correct fuel filter.

– Use clean engine oil to lubricate the fuel filter's O-ring seal.

⚠ CAUTION

If the filter is put on too tight, it can distort the thread and cause damage to the filter or filter housing.

– If fitted, connect the water-in-fuel sensor.

– The engine warning lights will come on if the water-on-fuel sensor is not compatible or is disconnected.

Final steps

⚠ WARNING

Explosive gases may escape from the battery. To reduce the possibility of injury, make sure the engine compartment is well ventilated before carrying out maintenance on the battery. To reduce the possibility of arcing, remove the negative (-) battery cable first and connect it last.

– If necessary, connect the wiring harness to the water-in-fuel sensor.

– Connect the battery cables.

Filling

⚠ WARNING

The fuel pump high pressure fuel lines and fuel rails contain highly pressurised fuel. Never loosen any pipe connections while the engine is running. Doing so may result in personal injury and damage to property.

⚠ CAUTION

Do not engage the starter motor for more than 30 seconds at a time. Leave an interval of 2 minutes between each attempt at starting the engine.

NOTE

Some vehicles are fitted with engine starter motor protection features. If the starter motor is engaged for 30 seconds or more without the engine starting up, the starter motor will lock to prevent operation and to allow the starter motor to cool down properly. At this time, the WAIT TO START indicator light will flash on and off for two minutes, if fitted. The starter motor will be allowed to run again after the indicator light has stopped flashing.

NOTE

To prevent damage to the manual injection pump seals, electronics spray cleaner, or equivalent, and compressed air should be used to clean the fuel pump head and injection pump before filling the fuel system.

– After cleaning the filter or draining the fuel tank: ensure that there is fuel in the fuel tank.

– Rotate anticlockwise to unlock the manual fuel injection pump handle. Apply pressure to the fuel injection pump lever until you feel firm amount resistance and cannot depress the lever further (approximately 140 to 150 times [for a dry filter]) or 20 to 60 times [for a pre-filled filter]).

– Lock the manual fuel injection pump lever.

– Start the engine. If the engine does not start after 30 seconds, disconnect the key switch.

– Apply pressure to the fuel injector pump again and repeat the above steps until the engine starts.

– The engine may not run smoothly for the first few minutes after starting up and may produce an increased noise level. This is normal and is due to air being expelled from the system.

NOTE

After changing the fuel filter, error code 559 may be displayed due to the presence of air in the system. It is necessary to run the engine until all the air has been expelled and use the INSITE™ service tool to clear the error code before dispatching the vehicle.

– Run the engine. Check for leaks.

Oil and filter

Discharge

⚠ WARNING

Some state and federal agencies in the United States have determined that used motor oils are carcinogenic and can cause reproductive diseases. Avoid inhaling oil vapour, accidental swallowing and prolonged exposure to used oil. If the oil is no longer used, it should be disposed of in accordance with local environmental regulations.

⚠ WARNING

To reduce the possibility of personal injury, skin should be protected from direct contact with hot oil.

When the specified time to change the oil is reached, both the oil and filter should be replaced. See the maintenance procedures to find the correct replacement interval for your application type.

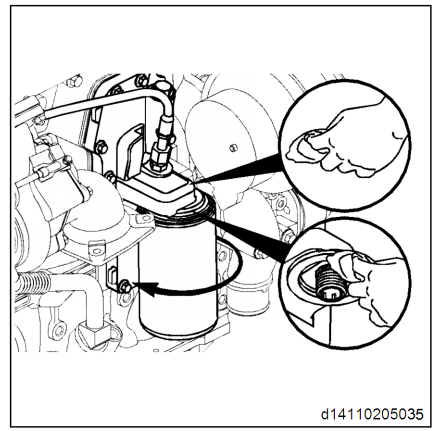
NOTE

For most engines, use a container that holds at least 20 litres [21 quarts] of oil. Some engines may be equipped with an increased capacity sump, which requires a container that holds 28 litres of oil.

– Run the engine until the water temperature reaches 60°C [140°F].
– Shut the engine off.
– Remove the oil drain plug. Immediately drain the oil to ensure that all oil and suspended dirt in the engine is removed.

Removal

– Clean the area around the oil filter housing. ▷
– Use the oil filter wrench to remove the oil filter.
– Clean the surface of the filter housing gasket.



NOTE

The O-ring may be stuck to the filter base. Make sure this O-ring is removed before installing a new filter.

Installation

Using the correct oil filter.

⚠ CAUTION

If there is no oil in the filter before oil is pumped into the filter when starting the engine, the engine may be damaged due to lack of lubrication.

– Coat the surface of the filter gasket with clean 15W-40 oil.
– Fill the filter with clean 15W-40 oil.
– Coat the sealing surface of the gasket with a thin layer of oil before installing the filter.

NOTE

Be careful not to allow debris to enter the filter along with the oil. If using an oil supply with a metal or plastic seal under the cover, remove the seal carefully. Using a knife or sharp object to puncture the seal may result in debris entering the oil container.

⚠ CAUTION

Excessive mechanical tightening of the filter can damage the thread or the filter element seal.

– Install the filter into the oil filter housing. Tighten the filter until the seals touch the surface of the filter holder.

– After the gasket touches the filter housing, tighten by a further 3/4 to 1 turn.

Filling

Clean and check the thread and sealing surface of the oil drain plug. If damaged, use a new sealing washer.

– Install the oil sump drain plug.

Industrial application type:

Steel oil sump drain plug torque			
	N m		ft-lb
M18	60	Min.	44
M22	80	Min.	59

Cast aluminium oil sump drain plug torque			
	N m		ft-lb
M22	60	Min.	44

NOTE

The Cummins® engine uses premium 15W-40 thickened motor oils such as Valvoline® Premium Blue® or similar.

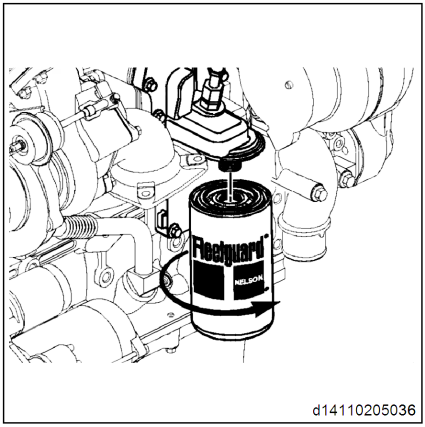
– Use a clean engine oil to top the engine up to an appropriate level.

NOTE

The total system capacity is the sum of the oil sump capacity and the oil filter capacity.

Some application types use have small differences in the capacity of the oil sumps used, so the total oil capacity must be adjusted accordingly. If you have any questions, please contact your authorized dealer.

– Allow the engine to idle and check the drain plug for leaks. If the oil filter seal has been replaced, check the seal for leaks.



NOTE

Engine oil pressure must be displayed on the meter within 15 seconds of starting the engine. If the oil pressure is not displayed within 15 seconds, immediately turn off the engine to avoid engine damage. Confirm that the sump oil level is correct.

– Shut the engine off. Wait approximately 5 minutes for the oil to recirculate from the upper part of the engine. Check the oil level again.

If necessary, add oil to the high oil level (H) mark on the oil gauge.

Radiator pressure cap

General

This cooling system uses a pressure cap to prevent the coolant from boiling. Ensure you know the right radiator pressure cap for your application type.

Incorrect or faulty pressure caps will result in loss of coolant and overheating of the engine.

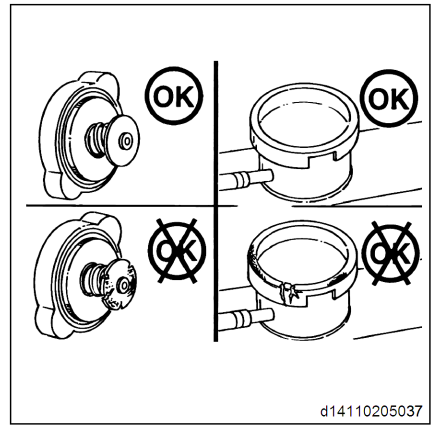
Checking if you can continue to use the pressure cap ▷

Ensure you are using the correct radiator pressure cap.

– Check the rubber seal of the pressure cap for damage.

– Check the radiator filler neck for the presence of cracks or other damage.

Test the radiator cap pressure. The pressure cap must indicate that it can seal properly at pressures of 14 kPa [2 psi]. If not, it must be replaced. Incorrect or faulty pressure caps will result in loss of coolant and overheating of the engine.



Cooling system

General

⚠ WARNING

Do not open the radiator pressure cap when the engine is hot. Wait until the coolant temperature has dropped to 50°C [120°F] before removing the pressure cap. Otherwise, the high temperature coolant or steam may cause personal injury.

NOTE

We recommend using coolant that complies with the Cummins Emission Solution (CES) 14604 or 14439 standards.

NOTE

Do not use sealing additives to fix leaks in the cooling system. This will cause blockages in the cooling system and impede coolant flow, causing the engine to overheat.

The engine coolant level must be checked every day.

⚠ CAUTION

Do not add cold coolant to the engine when the engine is hot. This will damage the engine casting. Wait until the engine coolant has reached 50°C [120°F] or less before adding coolant.

For some types of applications in coolant recovery systems, check that the coolant inside the recovery tank is at an appropriate level to ensure the engine temperature.

Many coolant recovery/expansion tanks are made from semi-transparent material so you can check the coolant level without removing the radiator cap.

NOTE

Some radiators have two filler necks. Both filler necks must be filled when discharging the cooling system.

When not using coolant recovery system applications, the top water tank of the radiator is used to check and top up coolant levels. Do

not remove the radiator cap when the cooling system is hot.

Check and refill the cooling system when it has cooled down enough to touch (lower than 49°C [120°F]). Coolant level should remain in the lower part of the filling opening. You should only refill using Cummins' recommended pre-mix ratio coolant.

Discharging

⚠ WARNING

Do not open the radiator pressure cap when the engine is hot. Wait until the coolant temperature has dropped to 50°C [120°F] before removing the pressure cap. Otherwise, the high temperature coolant or steam may cause personal injury.

– Park the vehicle on a level surface.

– Before beginning maintenance, switch off equipment connected to the heating system's coolant flow valve, so that the engine is separated from the vehicle's cooling system. This will prevent heater circuit output and reduce the chances of the refilling process producing gas pockets.

– In some types of applications (where there are several feet of piping and multiple heater cores), it may be difficult to expel the air.

NOTE

If you change the coolant or flush the cooling system, the coolant flow valve will need to remain open and connected to the heating system to fully drain the system.

NOTE

Any special requirements for coolant draining or refilling may be marked on the cooling system access port or near the vehicle's refill lid.

– Remove all filler caps from the cooling system to allow the coolant to completely drain.

⚠ WARNING

The coolant is poisonous. Do not allow children or pets to come into contact with coolant. If the coolant is no longer to be used, it should be disposed of in accordance with local environmental regulations.

– Open the radiator drain valve and the drain valve at the bottom of the engine oil cooler housing to drain the cooling system. For most applications, a 57 litre [15 gallon] drain pan in sufficient.
– Close the drain valve once the cooling system is fully drained.
– Check for damaged hoses and loose or damaged hose clamps. Replace as needed.
– Check the radiator for leaks, damage or scale. Clean or replace as needed.

Flushing

⚠ CAUTION

The system must be properly filled to prevent airlock, which could result in severe engine damage. When filling, air must be expelled from the engine coolant channel. Allow 2 to 3 minutes for the air to be expelled, then add the mixture until the liquid level reaches the top.

Be sure to bleed air while in the process of refilling.

- Some one-way thermostat ball valves allow air to escape through the thermostat when the thermostat is turned off.
- The vent connector is connected to the top water tank/coolant recovery tank of the cooling system and is located near the water outlet.

A refill speed of at most 19 litres [5 gallons] per minute is enough to completely expel the air.

NOTE

Do not fit the radiator cap. During this process, the engine should run without the pressure cap on.

⚠ WARNING

The coolant is poisonous. Do not allow children or pets to come into contact with coolant. Handle coolant in accordance with local laws and regulations.

⚠ WARNING

Do not stand near the reserve water tank or radiator when running the engine with the pressure cap removed. If the vehicle is fitted with a filling door on the side of the reserve water tank, it must remain closed, as the coolant will expand.

⚠ WARNING

Do not operate the engine when the pressure cap is removed and the temperature exceeds 93°C [200°F]. This may result in engine damage due to pump cavitation and local boiling.

⚠ CAUTION

Before replenishing the coolant, allow the system to return to ambient temperature. This will ensure that sufficient coolant is supplied to the pump whenever it is in operation.

⚠ CAUTION

Before the vehicle is returned to service, do not release system pressure when the system is hot to immediately “top up” the system. The system will not be able to produce the required pressure through coolant expansion. This may result in engine damage due to pump cavitation and local boiling.

Use Restore™ and Restore Plus™ mix solution (or market equivalents) to fill the cooling system to regulation capacity or level.

– Unless otherwise noted, all shutoff valves must be returned to the open position once the system has been completely refilled before draining begins. This will help to ensure that as much air is bled from the cooling system as possible.
– Do not start the engine. Wait for 2 to 3 minutes to allow the system to naturally vent the air and stabilise the coolant level.
– Add water until the liquid reaches the full (FULL) mark.

– Set all cab heater switches to high to allow coolant to flow through the heater core at maximum flow. The blower must be turned on.

When the cooling system filling cap is removed:

- Run the engine at a low idling speed for 2 minutes
- Turn off the engine and add water until the level reaches the FULL mark

When the cooling system filling cap is removed:

- Start the engine.

NOTE

After starting the cold engine, slowly increase the engine speed (rpm) to provide the bearings with adequate lubrication and stabilise the oil pressure.

– Run the engine at high idling speed until the thermostat turns on.

– Allow the engine to run at a low idling speed for 2 minutes before turning it off. This is to cool the piston, cylinder, bearings and turbocharger parts.

– Turn off the engine and check the coolant level in accordance with the equipment manufacturer's servicing information. Where necessary, bring the level back down to the full (FULL) mark.

– Install the cooling system filling cap.

– Run the engine for 1 to 1½ hours with the engine coolant temperature above 80°C [176°F].

– Turn off the engine. Allow the coolant temperature to fall to 50° C [122° F] before draining the cooling system. 排放冷却系统。

– Drain the cooling system.

⚠ WARNING

Do not stand near the reserve water tank or radiator when running the engine with the pressure cap removed. If the vehicle is fitted with a filling door on the side of the reserve water tank, it must remain closed, as the coolant will expand.

⚠ CAUTION

Do not operate the engine when the pressure cap is removed and the temperature exceeds 93°C [200°F]. This may result in engine damage due to pump cavitation and local boiling.

NOTE

Do not fit the radiator cap.

– Use good-quality water to fill the cooling system to the capacity or level recommended by the equipment manufacturer's maintenance information.

– Unless otherwise noted, all shut-off valves must be returned to the open position when the system is refilled and the air bleeding process is about to begin. This will help to ensure that as much air is bled from the cooling system as possible.

– Do not start the engine. Wait for 2 to 3 minutes to allow the system to naturally vent the air and stabilise the coolant level.

– Add water until the liquid reaches the full (FULL) mark.

– Set all cab heater switches to high to allow coolant to flow through the heater core at maximum flow. The blower must be turned on.

– When the cooling system filling cap is removed:

• Run the engine at a low idling speed for 2 minutes
• Turn off the engine and add water until the level reaches the FULL mark

– When the cooling system filling cap is removed:

• Start the engine.
• Run the engine at high idling speed until the thermostat turns on.

NOTE

After starting the cold engine, slowly increase the engine speed (rpm) to provide the bearings with adequate lubrication and stabilise the oil pressure.

– Allow the engine to return to low idle for 2 minutes before turning it off. This is to cool the piston, cylinder, bearings and turbocharger parts.

– Shut the engine off Allow the cooling system temperature to fall to 50°C [122°F].

– Drain the cooling system.

NOTE

If the drained water is still very dirty, you will need to flush the system again until the drained water is clean.

Filling

⚠ CAUTION

The system must be properly filled to prevent airlock, which could result in severe engine damage. When filling, air must be expelled from the engine coolant channel. Allow 2 to 3 minutes for the air to be expelled, then add the mixture until the liquid level reaches the top.

Ensure that the air is expelled during the filling process:

- Some one-way thermostat ball valves allow air to escape through the thermostat when the thermostat is turned off.
- The vent connector is connected to the top water tank/coolant recovery tank of the cooling system and is located near the water outlet.

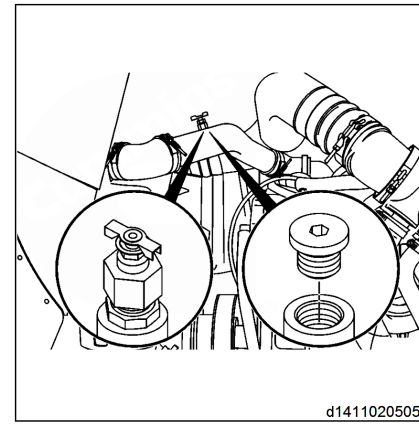
The system is designed for a maximum fill rate of 19 litres [5 gallons] per minute.

NOTE

Some engines may not be fitted with a manual vent valve; the valve opens to ensure proper filling. The upper radiator hose is the usual position for the vent valve.

– If applicable, open the manual vent valve before filling the cooling system.

– You must close the manual vent valve after proper filling has been completed.



⚠ CAUTION

Do not use water as a coolant on its own. Only using water as a coolant will cause corrosion damage to the engine.

⚠ WARNING

Do not open the radiator pressure cap when the engine is hot. Wait until the coolant temperature has dropped to 50°C [122°F] before removing the pressure cap. Otherwise, the high temperature coolant or steam may cause personal injury.

⚠ WARNING

Do not stand near the reserve water tank or radiator when running the engine with the pressure cap removed. If the vehicle is fitted with a filling door on the side of the reserve water tank, it must remain closed, as the coolant will expand.

⚠ CAUTION

Do not operate the engine when the pressure cap is removed and the temperature exceeds 93°C [200°F]. This may result in engine damage due to pump cavitation and local boiling.

⚠ CAUTION

When using the filling door on a vehicle equipped with a reserve water tank, filling is not recommended when the system is hot. Although the liquid level may be replenished to the bottom of the filling door when the system is hot, there may be insufficient coolant when the operating temperature is low. This may result in pump cavitation and will increase the likelihood of damage to the engine.

⚠ CAUTION

Before replenishing the coolant, allow the system to return to ambient temperature. This will ensure that sufficient coolant is supplied to the pump whenever it is in operation.

⚠ CAUTION

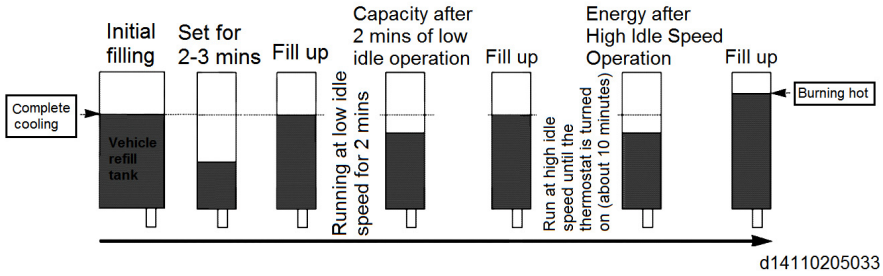
If sufficient cooling time is not given after releasing the pressure from the cooling system when replenishing the coolant, the engine or engine components may be damaged. System pressure is only produced when coolant temperature rises. Turning off the cooling system when hot will not produce pressure.

– Remove the cooling system filling cap.

– Fill the cooling system to the specified volume or level using a mixture of 50% water and 50% ethylene glycol or propylene glycol-based antifreeze.

Sequence of coolant filling and draining operations

Operating steps of coolant filling and exhaust



NOTE

If all coolant discharged from the system has been collected, an equal amount or more of coolant must be added to the system. If there is still coolant left from the system after the filling, it indicates that there are air pockets, which must be bled from the system before the vehicle can be used again.

Unless otherwise noted, all shut-off valves must be returned to the open position when the system is refilled and the air bleeding process is about to begin. This will help to ensure that as much air is bled from the cooling system as possible.

– Do not start the engine. Wait for 2 to 3 minutes to allow the system to naturally vent the air and stabilise the coolant level.

– Fill with a 50/50 mixture to return the coolant level to the cold full mark.

– Set all cab heater switches to high to allow coolant to flow through the heater core at maximum flow. The blower must be turned on.

– When the cooling system filling cap is removed:

- Run the engine at a low idling speed for 2 minutes
- Turn off the engine and fill with the 50/50 mixture to return the coolant level to the cold full mark

– With the radiator pressure cap off:

- Start the engine.
- Run the engine at a high idling speed until the thermostat turns on

NOTE

After starting the cold engine, slowly increase the engine speed (rpm) to provide the bearings with adequate lubrication and stabilise the oil pressure.

– Idle the engine for 2 minutes before turning it off. This is to cool the piston, cylinder, bearings and turbocharger parts.

- Shut the engine off
- Add coolant until the liquid level reaches the hot full mark
- It is the user's responsibility to check the coolant cold level and top up if necessary

NOTE

Some applications may require an additional 10 minutes of high idle time to fully discharge all the air in the system.

– Allow the engine to cool down to 50°C [176°F]. Install the pressure cap. Run the engine until the water temperature reaches 80°C [176°F] and check for coolant leaks.

Aftertreatment diesel exhaust fluid tank filter

General

The diesel exhaust fluid (DEF) injector filter is a 40-micron filter used to prevent foreign substances suspended in the DEF from getting into the injection system. Debris can cause permanent damage and premature failure in the aftertreatment DEF injector. The aftertreatment DEF injector is a maintenance item.

NOTE

See the maintenance information for the DEF tank filter maintenance interval. In ordinary environments, we recommend changing the DEF tank filter every 2000 hours. In dusty environments, we recommend inspecting the filter every 1500 hours and changing the filter if it is dirty.

Preparation procedure

⚠ WARNING

Diesel exhaust fluid (DEF) contains urea. Do not allow this substance to get into your eyes. Should these substances come into contact with eyes, rinse immediately with plenty of water for at least 15 minutes. Do not swallow. If you accidentally swallow DEF, go to hospital immediately.

⚠ WARNING

Explosive gases may escape from the battery. To reduce the possibility of injury, make sure the engine compartment is well ventilated before carrying out maintenance on the battery. To reduce the possibility of arcing, remove the negative (-) battery cable first and connect it last.

⚠ CAUTION

Do not use pressure washers or steam cleaners on the unit. Pressure washing or steam cleaning can damage the unit. Use compressed air to remove loose debris.

– Disconnect the battery.

– Contact a authorized service provider to remove the DEF tank assembly to conduct maintenance on the DEF reservoir filter.

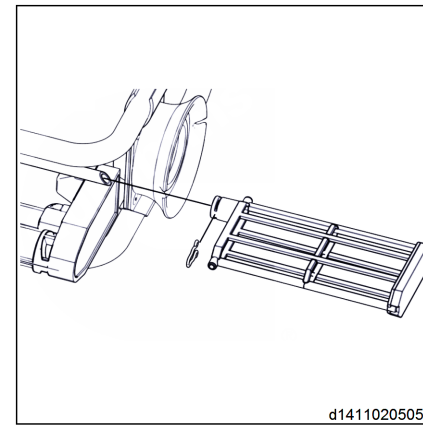
Removal

NOTE

You should only remove the DEF tank filter if you discover symptoms that need further investigation or when it has reached its service interval.

– Remove the clips from the DEF tank filter inlet. ▷

– Remove the DEF tank filter.


d14110205057

NOTE

If you are removing the DEF tank filter as part of a service interval, discard the DEF tank filter and the O-ring.

Cleaning and checking whether the unit can still be used

NOTE

Check for dirt and debrids in the filling opening filter. This filter is the first point of contact with other filters.

– If you suspect that the DEF injection system has been contaminated through the DEF, inspect the DEF tank filter before discarding the filter.

– Check for evidence of DEF contamination in the DEF tank filter. Determine whether contaminated fluid has passed through the injection system from the filter's appearance and smell.

– Please contact a authorized dealer for more information on contaminated DEF.

– Check for debris in the DEF filter. If there is obvious debris, check the aftertreatment DEF injector filter.

– Check the DEF tank filter for cracks and other damage.

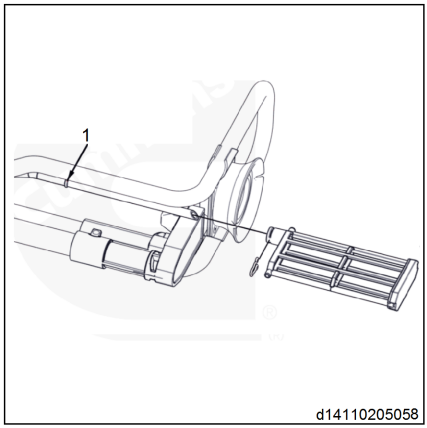
– If there are cracks, check the aftertreatment DEF injector filter.

NOTE

Discard the DEF tank filter after completing the check.

Assembly

– Install O-ring (1) into the socket on the DEF tank sensor hose. ▷



– Plug the DEF tank filter inlet port into the DEF tank sensor hose.

– Install the clips onto the notches on the DEF tank.

⚠ WARNING

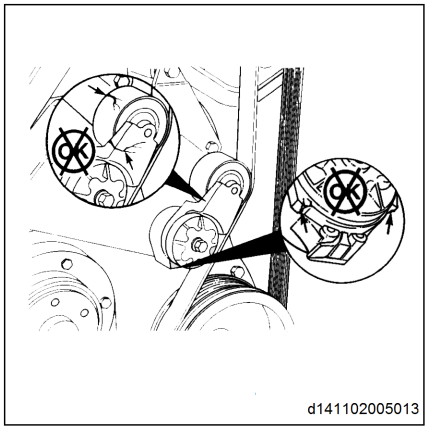
Explosive gases may escape from the battery. To reduce the possibility of injury, make sure the engine compartment is well ventilated before carrying out maintenance on the battery. To reduce the possibility of arcing, remove the negative (-) battery cable first and connect it last.

– Contact a authorized service provider to install the DEF quality sensor.

– Connect the battery.

Belt tensioner

With the engine off, check the tensioner arm, belt pulley and stop block for cracks. If cracks are discovered, the tensioner must be replaced. ▷

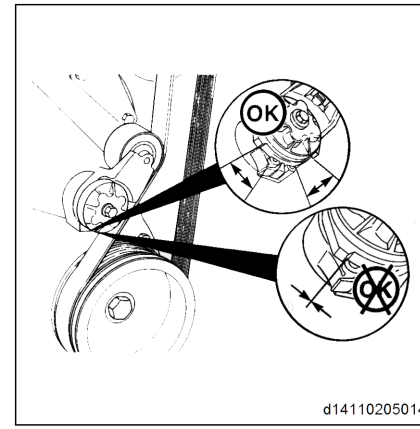


With the belt installed, check that the two tensioner arm stop blocks are not in contact with the spring housing stop blocks. If there is contact with any stop block:

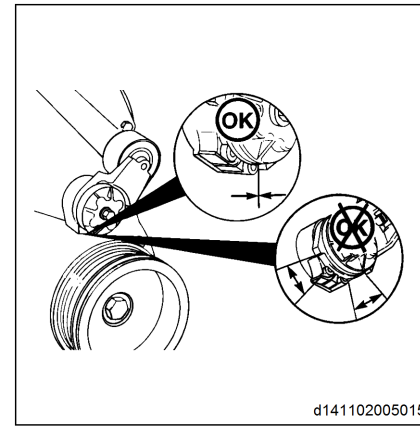
- Verify that the part number of the belt is correct.
- If an incorrect belt has been installed, replace it.

If the tensioner arm stop blocks are still in contact with the spring housing stop blocks after replacing the belt, replace the tensioner. ▷

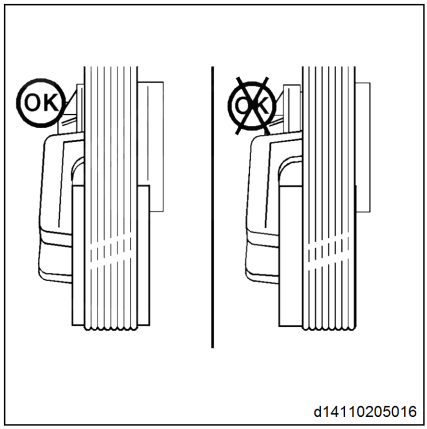
With the belt removed, check whether there is any contact between the tensioner arm stop blocks and spring housing stop blocks. If there is no contact, the tensioner must be replaced.



If the tensioner arm stop blocks are still in contact with the spring housing stop blocks after replacing the belt, the tensioner must be replaced. ▷



Check the position of the drive belt on the belt tensioner pulley. The belt should be positioned in the centre, or close to the centre, of the belt pulley. Misalignment of the belt, either too far forward or too far back, may result in wear to the belt, belt slipping or uneven wear to the tensioner bushing. ▷



Drive belt

Maintenance and checks

V-ribbed belt

⚠ CAUTION

Ensure the engine is switched off and all starting mechanisms are isolated before carrying out any checks. Routine belt checks can be carried out using a suitable opening. Do not remove any protective covers.

Belts should be checked daily. Check the belt for intersecting cracks. Horizontal cracks (along the width of the belt) are acceptable. Vertical cracks (along the length of the belt) that intersect with horizontal cracks are not acceptable. If the belt is worn or parts of the belt are missing, it should be replaced.

Belt damage may be caused by the following:

- Incorrect tension
- Incorrect specifications and length
- Belt pulley is not aligned
- Incorrect installation
- Poor operating environment
- Oil or grease on the belt.

Toothed belt

Belts should be checked daily. If the belt is cracked, worn or has parts missing, it should be replaced. Small cracks are acceptable.

Adjust belts with smooth, shiny surfaces; this shows that the belt is slipping. After correctly installing and tightening the belt, the belt pulley and belt will wear evenly.

Belt damage may be caused by the following:

- Incorrect tension
- Incorrect specifications and length
- Belt pulley is not aligned
- Incorrect installation
- Poor operating environment
- Oil or grease on the belt.

Measuring the belt tension at the centre of the belt pulley

– Select the correct gauge and tension according to the width of belt used.

Drive belt tension gauge

SAE belt specifications	New belt tension	Old belt tension range*
	N	N
0.380 in	620	270 to 490
0.440 in	620	270 to 490
1/2 in	620	270 to 490
11/16 in	620	270 to 490
3/4 in	620	270 to 490
7/8 in	620	270 to 490
4 rib	620	270 to 490
5 rib	670	270 to 530
6 rib	710	290 to 580
8 rib	890	360 to 710
10 rib	1110	440 to 890
12 rib	1330	530 to 1070
12 rib K section belt	1330	890 to 1070
31 rib	1668	1330 to 1560

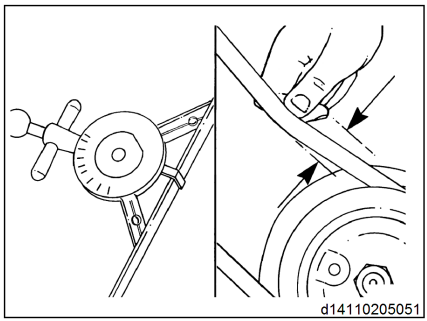
NOTE

This chart does not apply to automatic belt tensioners.

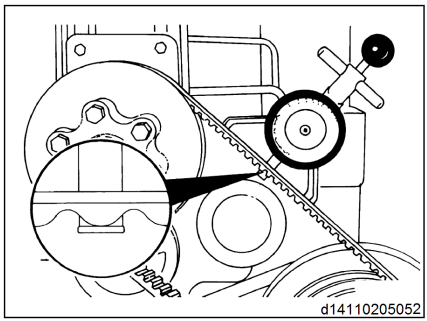
A belt is considered old when it has been used for 10 minutes or more.

If the old belt tension is less than the minimum, tighten the belt to the old belt tension maximum.

– Alternative method (deflection method) - Apply a force of 110 N [25 lb] on the V-belt between the pulleys to check the belt tension. If the deflection from the centre of the belt pulley for each inch of the belt exceeds the belt thickness, the belt tension must be adjusted. ▷



– For toothed belts, make sure the belt tension gauge is installed so that the centre tension bar is directly above the apex of a tooth. Other positions will result in incorrect measurements. ▷



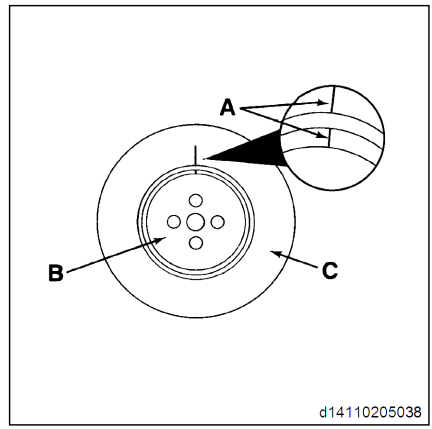
Rubber damper

Checking

Check the marking lines (A) on the damper hub (B) and inertial component (C). If the deviation between the two lines exceeds 1.59 mm, the damper must be replaced.

Check the rubber components for signs of ageing. If the rubber block has been lost or the elastic component exceeds 3.18 mm below the metal surface, replace the damper.

Check whether the damper ring on the hub has moved forward. If it has, replace the damper.



Overhead mechanism

Preparation procedure

⚠ WARNING

Explosive gases may escape from the battery. To reduce the possibility of injury, make sure the engine compartment is well ventilated before carrying out maintenance on the battery. To reduce the possibility of arcing, remove the negative (-) battery cable first and connect it last.

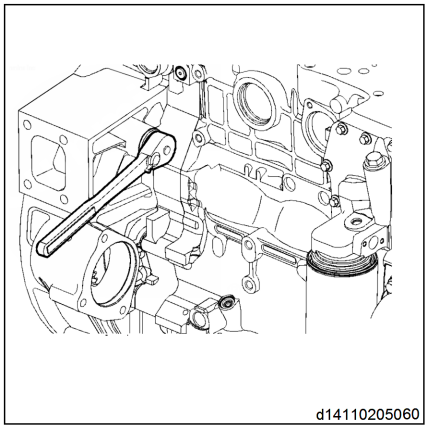
– Disconnect the battery.

– Remove the rocker arm cover and gasket.

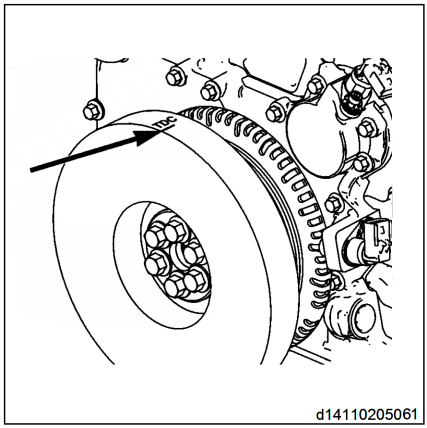
Adjustment

Engine coolant temperature must be below 60 C [140°F]

– Use the keyboard tool (part number 5299073) to rotate the crankshaft until no.1 cylinder is at top dead centre (TDC).
– The TDC indicator light is on the shock absorber.

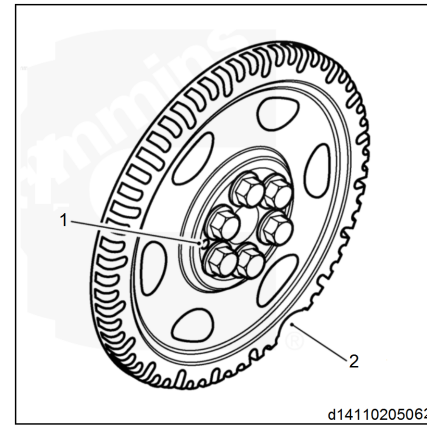

d14110205060

– Align the shock absorber to get the TDC pointer at 12 o'clock.

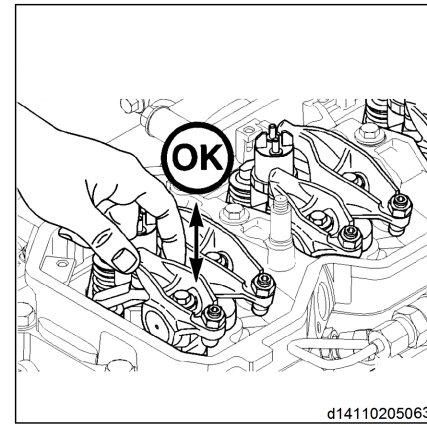


d14110205061

– If TDC is not marked on the shock absorber or crankshaft speed indicator ring, align the large notch on the crankshaft speed indicator ring with the 5-o'clock position (2). You will see the locating pin (1) at the 9 o'clock position. Check whether the two rocker arms of the no. 1 cylinder are loose. If they are not loose, turn the crankshaft 360 degrees and then check again. ▷



– If both the no.1 rocker arms are loose, then proceed to the next step. If the no.1 rocker arms are not loose, turn the crankshaft 360 degrees and then proceed to the next step. ▷
– Be sure to check the engine designation plate for the correct valve clearance (overhead mechanism) technical specifications.
– The engine designation plate is typically located on the engine rocker arm cover. However, it may also be located on the left side of the gear housing.



If both rocker arms are loose when the no.1 cylinder is at TDC, you can check the below rocker arm valve clearance (overhead mechanism):

(E = exhaust, I = intake) 1I, 1E, 2I and 3E, 4I and 5E.

Overhead mechanism inspection limits			
	mm		in
Intake	0.152	Min.	0.006
	0.381	Max.	0.015
Exhaust	0.381	Min.	0.015
	0.762	Max.	0.030

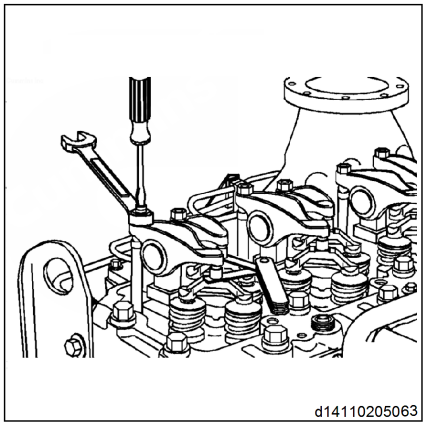
Checking the overhead mechanism setting values is generally the first step in troubleshooting. As long as the measured clearance value is within the above range, the settings do not need to be adjusted during the checks.

If you can feel a certain resistance when the feeler slides between the jumper plate and rocker arm bearing, the clearance is correct.

– Insert the feeler gauge between the jumper plate and rocker arm bearing (overhead mechanism). If the measured value exceeds specifications, then loosen the locknut and adjust the clearance to nominal specifications.

Valve clearance (overhead mechanism)			
	mm		in
Intake	0.254	Nominal	0.010
Exhaust	0.508	Nominal	0.020

– Tighten to locknut and measure the clearance again. (Torque value: 24 n•m [212 in-lb]) ▷


d14110205063

Final steps

⚠ WARNING

Explosive gases may escape from the battery. To reduce the possibility of injury, make sure the engine compartment is well ventilated before carrying out maintenance on the battery. To reduce the possibility of arcing, remove the negative (-) battery cable first and connect it last.

– Install the rocker arm and gasket covers.

– Connect the battery.

– Run the engine. Check for leaks.

Aftertreatment diesel particulate filter

General

⚠ WARNING

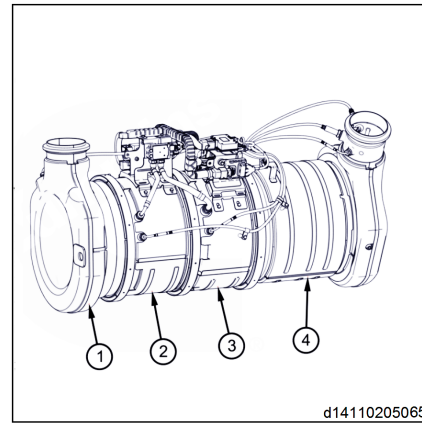
Substances captured in the split-type diesel particulate filter and/or diesel particulate filter may contain high concentrations of metals. The main metals are zinc and molybdenum, but controlled multi-ring aromatic hydrocarbons may also be included. These substances must be sorted and processed in accordance with local laws and regulations. In addition, exhaust filter maintenance must only be carried out by qualified personnel due to the presence of the above-mentioned chemical substances and other potentially toxic elements (such as calcium, zinc, phosphorus, silicon, sulphur and iron oxide).

⚠ CAUTION

The aftertreatment diesel particulate filter core is composed of brittle material. Do not drop or knock the side of the aftertreatment system because this could damage the catalytic core.

This procedure contains general information due to the wide range of exhaust aftertreatment applications. The images in this document do not show all types of applications that are in use.

The aftertreatment exhaust assembly is composed of four sections. These sections are: ▷



NOTE

If the aftertreatment DPF needs to be replaced due to further damage from engine oil or fuel, then cleaning needs to be carried out from the turbocharger outlet to the aftertreatment DOC exhaust pipe.

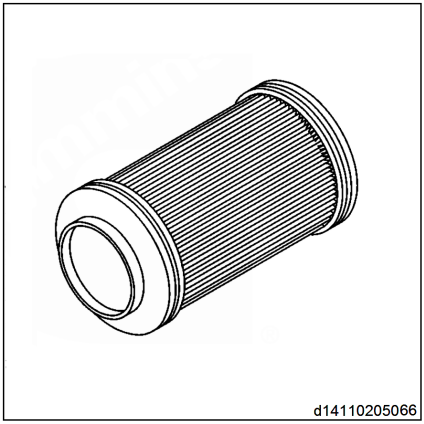
Maintenance and checks

If the aftertreatment DPF has been removed and cleaned and is deemed to still be usable (in accordance with “Aftertreatment Diesel Oxidation Catalyst and Aftertreatment Diesel Particulate Filter Continued Use Guidelines”, Bulletin Number 4021600), then the aftertreatment DPF should be returned to Cummins.

Authorized service providers do not endorse the ash-cleaning functions of localised air-cleaning machines. All DPFs that need the have ash cleaned from them should be returned to a authorized service provider in exchange for a new/ReCon® DPF。 Do not use unapproved cleaning methods to clean the DPF.

1 The aftertreatment diesel oxidation catalyst (DOC)
2 The aftertreatment diesel particulate filter (DPF)
3 The decomposition reaction tube
4 The selective catalytic reducer (SCR)

Aftertreatment diesel exhaust fluid injector filter ▷



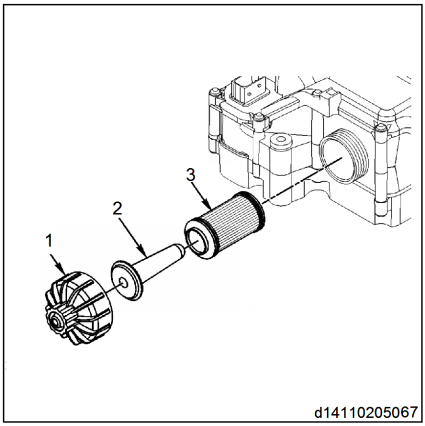
General

The diesel exhaust fluid (DEF) injector filter prevents substances suspended in the DEF from getting into the injection system.

Debris can cause permanent damage and premature wear to the aftertreatment DEF injector and the aftertreatment injector valve. The aftertreatment DEF injector is a maintenance item.

Please contact a authorized service provider regarding incorrect or contaminated DEF handling.

The aftertreatment DEF injector filter is composed of the following components: ▷



1 The aftertreatment DEF injector filter cap
2 The aftertreatment DEF injector filter balance cartridge
3 The aftertreatment DEF injector filter element.

Initial inspection

Locate the aftertreatment DEF injector on the vehicle; note the round filter cap.

NOTE

The aftertreatment DEF injector may be located in different areas, depending on the vehicle. Locate the DEF tank and then follow the DEF line to locate the aftertreatment DEF unit.

Check the aftertreatment DEF filter cap seals and the surrounding exhaust area for signs of leaks.

DEF leaks leave a white sediment. If you find any sediment, see the “Cleaning and Continued Use Checks” section of this procedure.

Preparation procedure

⚠ WARNING

Diesel exhaust fluid (DEF) contains urea. Do not allow this substance to get into your eyes. Should these substances come into contact with eyes, rinse immediately with plenty of water for at least 15 minutes. Do not swallow. If you accidentally swallow DEF, go to hospital immediately.

⚠ WARNING

Explosive gases may escape from the battery. To reduce the possibility of injury, make sure the engine compartment is well ventilated before carrying out maintenance on the battery. To reduce the possibility of arcing, remove the negative (-) battery cable first and connect it last.

⚠ WARNING

Once connected, the aftertreatment DEF injector and DEF lines on the aftertreatment DEF injector valve will be under low pressure and must not be disconnected before the system purification process has completed while the engine is running or after the engine has stopped. Disconnecting the DEF lines while under low pressure may cause DEF to spray out.

⚠ WARNING

Wear suitable safety glasses and a protective mask when using compressed air. Flying debris and dirt may cause personal injury.

NOTE

Do not disconnect the vehicle battery before the DEF system has completed the emptying cycle. Before disassembling and/or disconnecting any part, wait 5 minutes after the ignition switch has been turned to OFF (disconnected) so that the aftertreatment diesel exhaust liquid injection system expels the diesel exhaust fluid from inside the system. The emptying cycle is automatic and will work without any intervention. During the emptying cycle, the aftertreatment diesel exhaust fluid injector will emit audible pump pressure noise

NOTE

Do not use pressure washers or steam cleaners on the unit. Use compressed air to remove loose debris.

Removal

NOTE

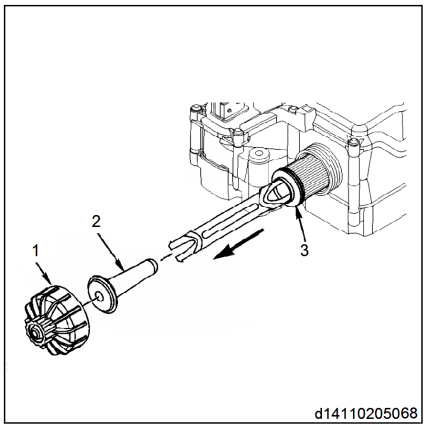
There may be DEF residue in the filter housing. We recommend placing collection containers under the DEF filter cap.

– Disconnect the battery.

– Remove the DEF filter cap (1). You can use a 27 mm wrench to help remove the cap. ▷

– Remove the aftertreatment DEF filter balance cartridge (2).

– Remove the old aftertreatment DEF injector filter element (3). The filter comes with a one-time repair tool that can assist with removing the filter. Use the appropriate tools as indicated by the colour of the filter plastic. When you insert the tool, you will hear a “click” sound indicating that the tool has connected properly with the filter.



NOTE

The filter element and balance cartridge must be discarded and replaced with new ones if you remove them from the aftertreatment DEF injector, regardless of their condition.

Cleaning and checking whether the unit can still be used

– Check the aftertreatment DEF injector filter cap for cracks or holes that may form leaks in the DEF channel.

– Check the thread on the aftertreatment DEF injector cap.

– Replace the aftertreatment DEF injector filter cap if the thread is damaged.

– Check the thread of the aftertreatment DEF injector. This is especially important if the thread cap of the aftertreatment DEF injector is damaged.

– Replace the entire aftertreatment DEF injector unit if the thread of the DEF injector unit is damaged.

NOTE

Never operate the vehicle after removing the DEF cap.

Clean the cap and thread of the new aftertreatment DEF injector with warm water and a clean cloth.

Installation

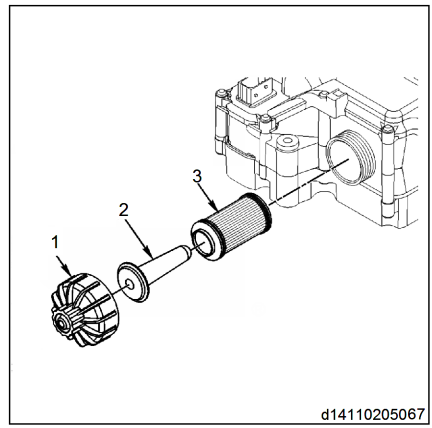
NOTE

There is no need to lubricate the DEF filter O-ring.

– Slide the DEF filter balance cartridge (2) into the DEF filter element (3)。

– Insert the assembly into the aftertreatment DEF injector.

– Install and tighten the cap (1). You can use a 27 mm wrench to install and tighten the filter cap. (Torque Value: 20 n•m [177 in-lb])



WARNING

Explosive gases may escape from the battery. To reduce the possibility of injury, make sure the engine compartment is well ventilated before carrying out maintenance on the battery. To reduce the possibility of arcing, remove the negative (-) battery cable first and connect it last.

– Connect the battery.

– Perform an aftertreatment diesel exhaust fluid leak test using the INSITE™ e-service tool engine control module diagnostic test.

– Pre-fill the system. Check for leaks.

Running gear and drive train

Transmission oil level check

⚠ CAUTION

Follow the precautions for handling fluids and lubricants.

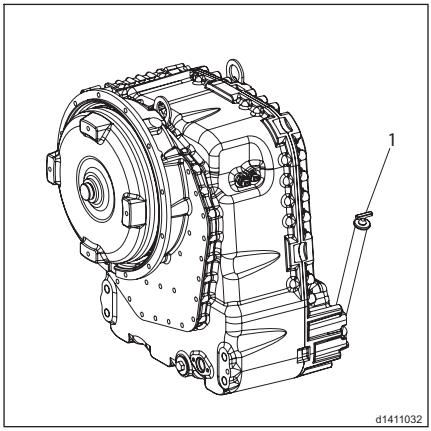
Wear protective equipment.

NOTE

Check the oil at operating temperature >40°C and with engine running. Do not check when the engine is cold.

Make sure truck is on level ground. Park brake on and wheels chocked. Engine must be running

- Tilt the cab and open the engine access covers.
- Remove dipstick (1) and wipe with a clean cloth. ▷
- Fully re-insert dipstick (1) and remove it again.
- The oil level should be between the Min. and Max. markings.
- Add oil if required.
- Replace engine covers and lower the cab.



NOTE

When transmission oil level is low a warning is displayed on the truck status display unit, the engine management system restricts the truck to low speed operation.

Check the tyres for damage and foreign objects

⚠ CAUTION

Low tyre inflation pressure reduces tyre service life and the stability of the truck.

Do not operate the truck with low tyre pressure.

⚠ CAUTION

Risk of death due to explosive force.

Refer to Wheel and Tyre removal and fitting procedures.

– Check the tyres for signs of damage or wear - visual check.

– Renew worn or damaged tyres.

Tighten the wheel fasteners

⚠ CAUTION

Risk of accident.

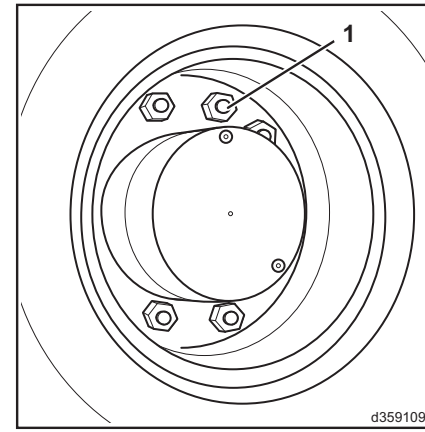
The wheel fasteners must be tightened before initial use and after removing and installing wheels, or repairing the wheel fasteners.

The wheel fasteners must then be retightened at least every 100 hours of operation.

– Check the specific torque for the tyre connection and, if necessary, alternately tighten the wheel fasteners.

NOTE

- *Refer to the "Inspection and maintenance data" section to tighten the torque*
- *A box-end wrench with an extension rod is needed to tighten the front wheel nuts*



Locations for jacks when changing wheels

⚠ CAUTION

Risk of accident.

Only use a jack with sufficient lifting capacity. The capacity of the jack should be 25,000 kg minimum.

⚠ CAUTION

Risk of accident.

Refer to the procedure for removing and installing wheels.

⚠ CAUTION

Risk of accident.

When working under the truck, secure the chassis with wooden blocks. Do not rely solely on the jack.

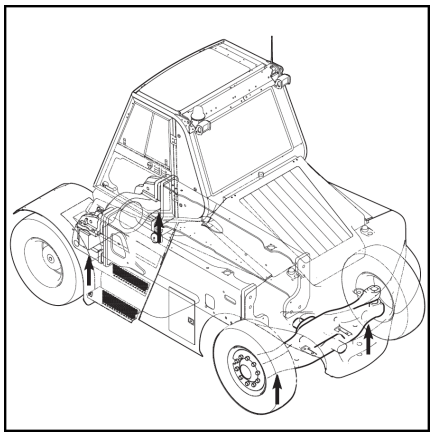
NOTE

The truck should only be jacked up at jacking points indicated (↑). When jacking up the front of the truck, chock the rear wheels with plastic blocks.

– To jack up the front of the truck, place the jack under the drive axle.

– To jack up the rear of the truck, place the jack under the steer axle.

▷



Wheel removal — drive axle

Refer to your local/national authority guidelines.

For example: OSHA (Occupational Safety and Health Administration)/EUWA (Association of European Wheel Manufacturers)/HSE (Health and Safety Executive).

⚠ CAUTION

Wear personal protective equipment (PPE).

Do not carry out these procedures without PPE.

⚠ DANGER

Risk of death due to explosive force.

Always ensure that the multi-piece rim wheel has been raised off the ground by methods of hydraulically raising the vehicle before deflating/inflating the multi-piece rim wheel. Secure the raised truck with an axle support device.

⚠ DANGER

Risk of death due to explosive force.

Before demounting a multi-piece rim wheel from a vehicle the operator must completely deflate the tyre by removing the valve core. Always check that the tyre is fully deflated using a tyre pressure gauge. NOTE: the valve may become blocked with ice. Check that the valve stem has not frozen.

⚠ DANGER

Risk of death due to explosive force.

Always use a restraining device during tyre deflation/inflation on multi-piece rim wheels. If a restraining device is not being used then tyres must be deflated/inflated using remote control inflation equipment. Employees must not remain in the wheel rim separation trajectory zone.

⚠ DANGER

Risk of death due to explosive force.

Fully deflate the tyre before carrying out a thorough examination of suspected damage to any wheel or tyre.

Removing an outer drive wheel

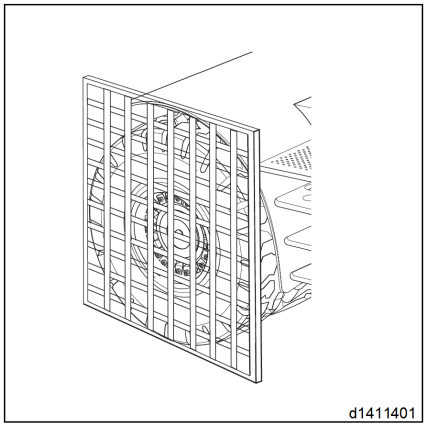
– Park the truck on level ground in a safe working area.

– Chock the wheels.

– Isolate the ignition/batteries.

– Jack up the truck at the jack points and secure with an axle support device. DO NOT RELY ON JUST THE JACK.

– Place a protection device around the wheel assembly being removed. ▷



– Remove the valve cores and fully deflate the tyres (see warnings). ▷

⚠ DANGER

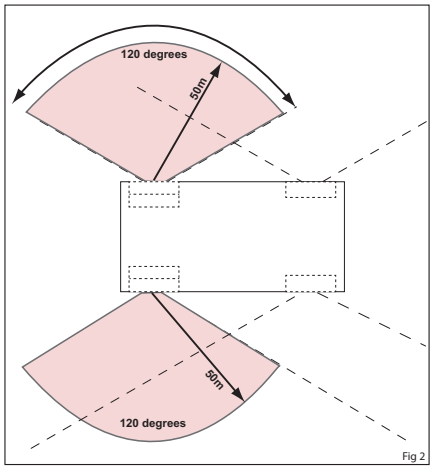
Risk of death due to explosive force.

Do not allow anyone to enter the area shown in Fig. 2 during deflation of the tyre.

⚠ CAUTION

Ensure the valve stem has not frozen during deflation.

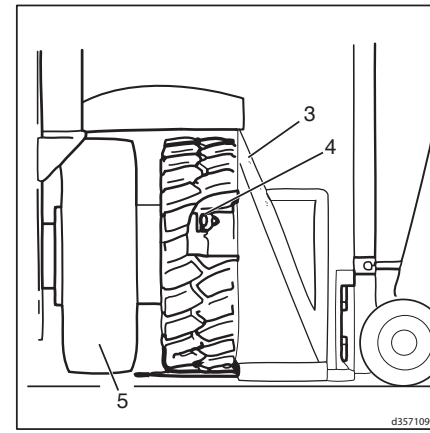
If necessary use antifreeze to prevent the valve stem freezing.



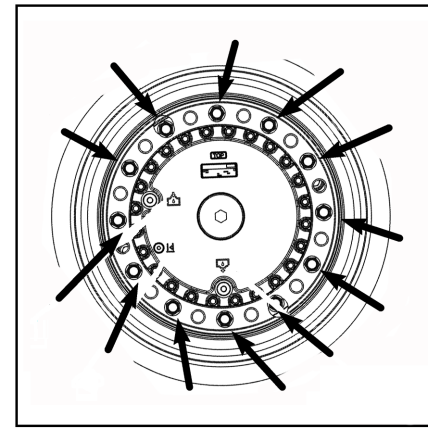
– Use a tyre pressure gauge to ensure the tyres are fully deflated.

– Remove the protection device.

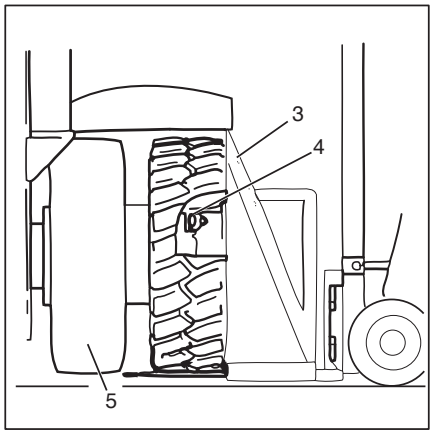
– Carefully drive the forks of a second truck with holder (3) under the outer drive wheel.
– Slowly lift the forks until the wheel rests on them. (Do not touch the inner drive wheel(5).)



– Remove all wheel fasteners(1).



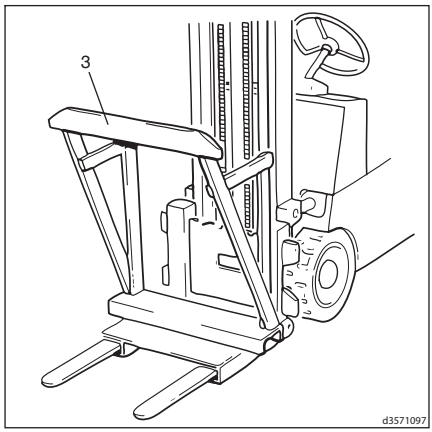
– Tilt outer wheel (4) against holder (3) and secure it. ▷
– Carefully reverse the truck with the tyre and deposit it.



Removing an inner drive wheel

– Remove the outer drive wheel.

– Carefully drive the forks of a second truck with a holder (3) under the inner drive wheel (5). ▷
– Slowly lift the forks until the wheel rests on them.
– Tilt the inner wheel against the holder and secure it.
– Carefully reverse the truck with the tyre clear of the truck.



Wheel refitting — drive axle

Refer to your local/national authority guidelines.

For example: OSHA (Occupational Safety and Health Administration)/EUWA (Association of European Wheel Manufacturers)/HSE (Health and Safety Executive).

⚠ CAUTION

Wear personal protective equipment (PPE).

Do not carry out these procedures without PPE.

⚠ DANGER

Risk of death due to explosive force.

Always ensure that the multi-piece rim wheel has been raised off the ground by methods of hydraulically raising the vehicle before deflating/inflating the multi-piece rim wheel. Secure the raised truck with an axle support device.

⚠ DANGER

Risk of death due to explosive force.

Always use a restraining device during tyre deflation/inflation on multi-piece rim wheels. If a restraining device is not being used then tyres must be deflated/inflated using remote control inflation equipment. Employees must not remain in the wheel rim separation trajectory zone.

Mounting an inner drive wheel

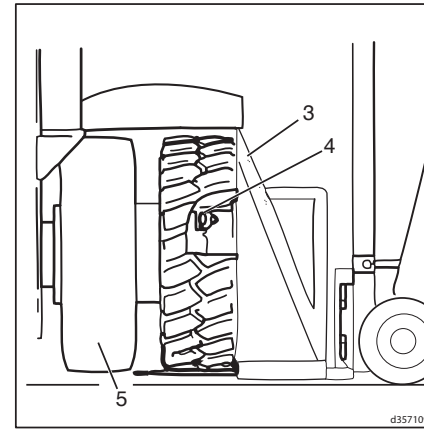
NOTE

Only use tyres approved by the manufacturer.

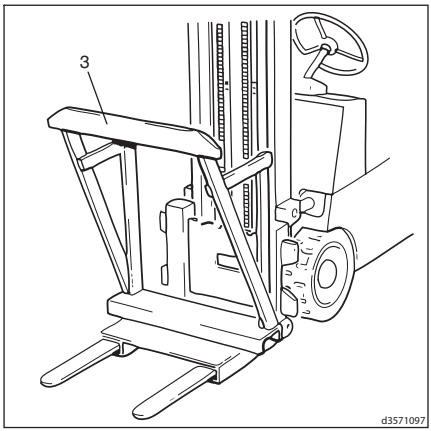
– Put the inner wheel (5) on the forks of a second truck and secure it on the holder (3).

– Clean the mating surface on the hub and rim.

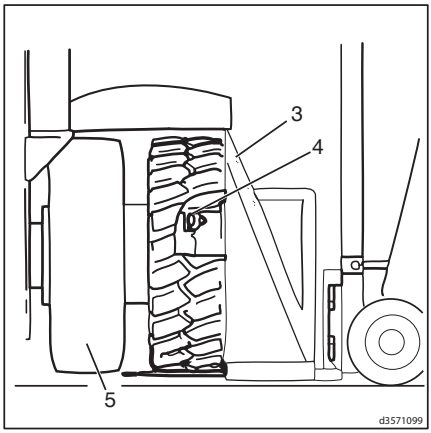
▷



– Carefully drive the truck with the wheel (5) to the wheel hub and align it. ▷



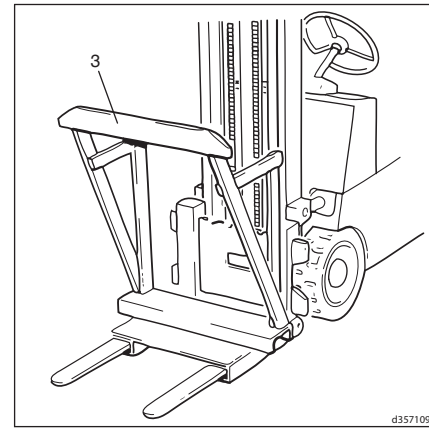
– Align the wheel (5) on the hub. ▷
– Slowly lower the forks until the drive wheel sits on the hub.
– Carefully reverse the second truck.
– Install the spacer ring.



Mounting an outer drive wheel

– Put the outer wheel on the forks of a second truck and secure it in place.

– Clean the mating surface on the hub and rim.

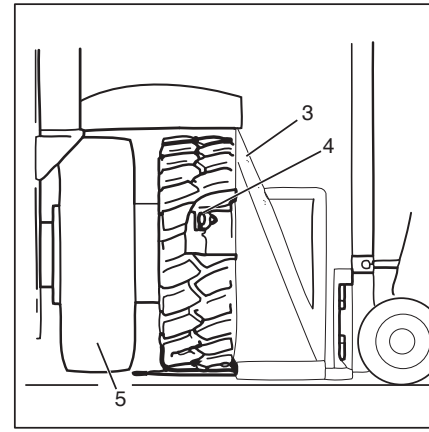


– Carefully drive the truck with the wheel (4) to the wheel hub and align it.

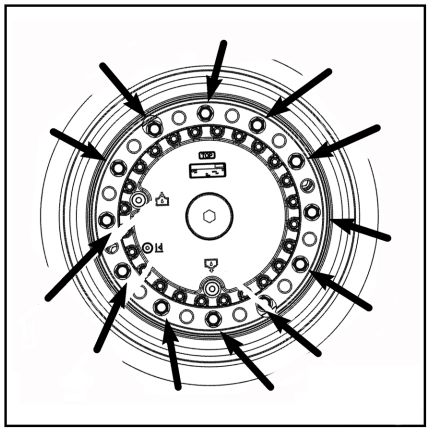
– Slide the wheel (4) over the wheel hub.

– Remove the wheel retainer on the holder (3).

– Align the wheel (4) on the hub.



– Tighten the wheel fastenings in a cross pattern to the required torque and place the wheel assembly on the hub. ▷

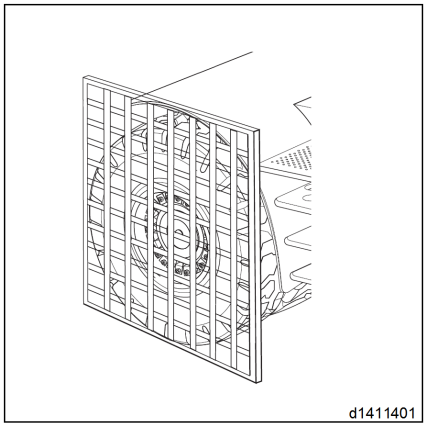


NOTE

Please refer to the Inspection and Maintenance Data table for the front wheel nut torque.

– Tighten the remaining wheel fastenings.
– Tighten all wheel fastenings diagonally across.
– Slowly lower the forks.
– Carefully reverse the second truck.

– Place the protection device around the wheel assembly. ▷



– Make sure the track area is clear.
– Inflate the tyres to 10 bar at the inflation valve.
– Inspect the wheel assembly to ensure the lock ring is correctly seated.

⚠ DANGER

Risk of death due to explosive force.

Do not hammer any part of the rim wheel while the tyre is pressurised.

– Remove the protection device.
– Remove the axle support and jack.
– After refitting the wheel, tighten the wheel fasteners, which must be retightened at least every 100 hours of operation.
– Check tyres for defects every day.
– Check tyre pressures every week.

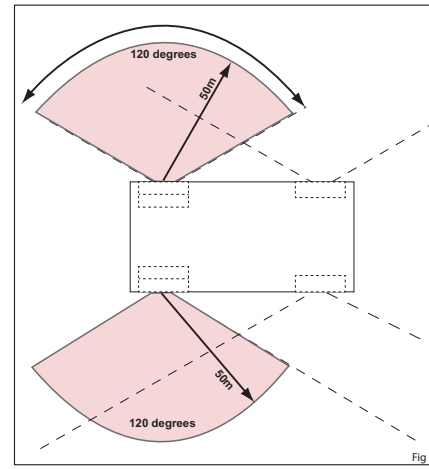


Fig 2

Check the parking brake for proper operation

– Drive the lift truck with the maximum load onto a 15 % slope.
– Apply the parking brake. The truck should not move.
– Release the parking brake.
– Stop the engine. The lift truck should not move.

NOTE

If the parking brake is not operating correctly, contact your service partner.

Brake control mechanism

NOTE

These checks must take place every service interval, PLUS after any component replacement, PLUS after any adjustment.

– Check the operation and adjustment of brake pedals.

NOTE

Ensure brake pedal movement is not obstructed.

– Adjust the brake pedal stops, to allow correct operation.
– Start the engine and test the handbrake, switch off the engine.
– Start the engine, test the foot brake, switch off the engine

NOTE

Specialist knowledge is required to carry out these procedures, please contact your service partner.

Clean and lubricate the steering axle

Cleaning the steering axle

– Lower the fork carriage fully. Park the truck properly.
– Press the emergency off switch.
– Thoroughly clean the steering axle with water or a cold-water detergent.

NOTE

After cleaning with a steam jet, lubrication is always recommended.

ENVIRONMENT NOTE

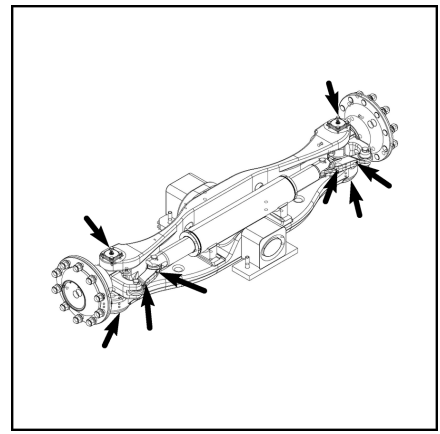
Follow recommendations regarding the use of consumables.

Lubricating the steering axle

NOTE

Lubricate with lubricating grease. Please refer to the "Recommended fuels and oils table" chapter.

– Lubricate the connecting rods and steering knuckles by adding grease via the grease nipples.
– Fill grease gun with grease until fresh grease overflows.

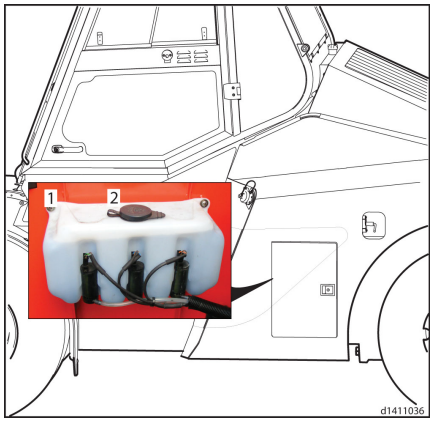


NOTE

Regularly filling lubricating grease in small amounts is better than filling lubricating grease in large amounts on an infrequent basis.

Chassis and bodywork

Filling the windscreen washer bottle



- Open battery access door to access the washer bottle (1).
- Open filler cap (2) top up if necessary.
- Replace filler cap (2).
- Close battery access door.

Check the condition of structured components

⚠ CAUTION

Danger of injury or accident.

Work on the truck on level ground. Lower the carriage, stop the engine and put the parking brake on when working.

⚠ CAUTION

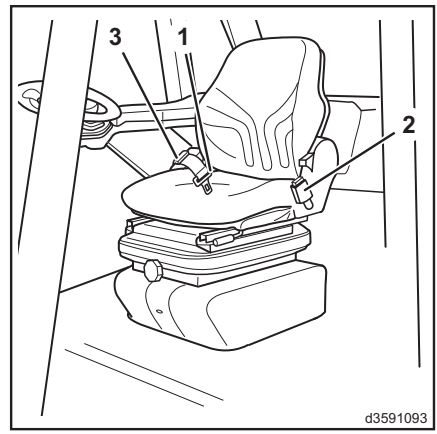
Danger of fall injuries.

This maintenance procedure requires to be carried out at heights of more than 2 metres. Use suitable access equipment.

- Examine the structural components of the truck to assure their integrity. Inspection should cover all areas of the main structures and their connections. Attention should be given to welds and material adjoining welds, particularly at changes of section, bolted interfaces and sliding pad pressure points.
- Examine the mast, lift and tilt cylinders, anchor and bearing points for damage, wear, missing lock bolts, metal fatigue, etc.
- Examine the bearings for damage, missing retaining rings and abnormal wear.

Driver's compartment

Check seat belt for condition and correct operation (option) ▷



NOTE

For safety reasons the condition and proper operation of the retention system should be inspected regularly (monthly).

Under extreme operating conditions this check is required daily before taking the truck into operation.

– Pull belt (1) out fully and inspect for fraying.
– Check lock (2) for correct operation and the retractor for proper return of the belt.
– Check covers for damage.
– Check the automatic lock.
– Park the truck on level ground.
– Pull out the belt with a jerk. The automatic lock should prevent the belt from unrolling from retractor (3).
– Slide the seat fully forward.
– Tilt the backrest fully forward.

⚠ CAUTION

Danger of injury.

Do not operate the truck with a faulty seat belt. Have a defective seat belt replaced immediately by your authorised dealer.

To prevent accidents, check that all adjustments are properly engaged before operating the truck.

Do not operate the seat adjusting devices while operating the truck.

Seat belts must be applied before operation of the truck.

After an accident, the seat belt must be inspected renewed if necessary. In the case of seat belts attached to the operator seat, the seat and mounting of the seat must also be inspected by qualified personnel.

Nuts and bolts should be checked regularly for tightness.

An unstable seat can indicate loose bolts or other faults.

If any malfunctions in the operation of the seat are detected (e.g. seat cushioning), contact your service partner immediately to eliminate the cause.

If the seat belt is not checked, you put your health in danger and there is a higher risk of accidents.

Driver's seat switch

NOTE

This switch will not prevent the startup of the truck whether the driver is seated or not.

This is activated when the driver leaves the seat while driving. When this happens the transmission will disengage and the truck will come to rest quickly.

To reset the switch

– Sit back on the driver's seat.

– Put the gear lever into neutral.

– Select forward or reverse gear.

Normal operation is restored.

Electrical system

Check the battery / batteries

⚠ CAUTION

Battery electrolyte is very caustic.

Avoid any contact with battery electrolyte. If electrolyte comes into contact with clothing, skin or eyes, flush the areas in question immediately with water. In case of eye contact see a doctor at once! Neutralize any spilled battery acid immediately!

– Check the battery / batteries for cracks in the casings, and leaked electrolyte.
– Remove any corrosion on battery terminals and check the connections for tight seating.
– Tighten the terminals and coat with non-acidic grease.

Check electric cables, connectors and connections for condition and tightness

– Examine cable connections for looseness and corrosion.
– Inspect the earth lead for loose connection.
– Examine the electrical wiring for chaffing and loose connections.

NOTE

Corroded connections and cracked cables lead to a drop in voltages, which may cause starting difficulties.

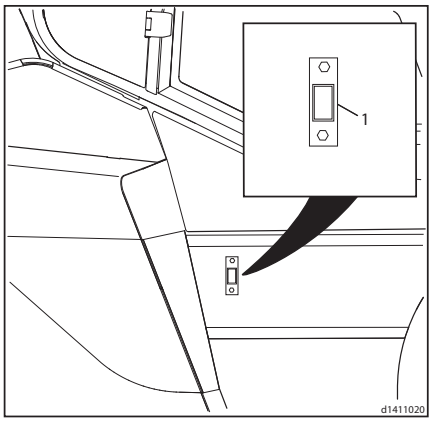
– Remove corrosion and replace cracked cables.

Hydraulic system

Hydraulic system: oil level check ▷

– Park the truck on level ground and lower the forks to the ground.

– Check sight glass (1) on the right side of the chassis. Add oil if necessary.

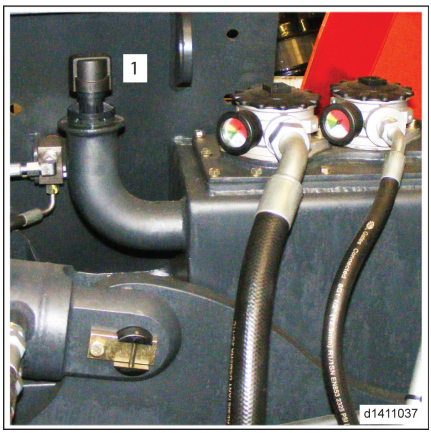


NOTE

Mast should be vertical when checking oil level.

Adding Hydraulic oil

– Remove hydraulic tank breather/filler (1) to add oil. ▷



NOTE

Observe the sight glass and fill to maximum.

Hydraulic tank capacity - 180 l approx.

Hydraulic system: check for leaks

⚠ WARNING

Risk of burns and scolds.

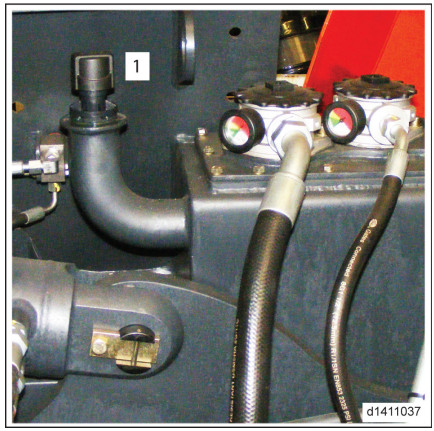
Beware of hot engine and exhaust components. Wear protective equipment.

NOTE

It is necessary to ensure that all relevant pipes are disconnected and take preventive measures to disconnect pipes before opening the radiator. It is suggested that this operation be performed by Authorized Service Provider.

– Park the truck.
– Tilt the cab.
– Open the radiator cover.
– Check all connections between the oil tank, pumps and control valves for leaks.
– Re-tighten the connections if necessary.
– Check the lift, tilt and steering cylinders for leaks.
– Replace porous hoses.
– Check lines for scuffing and replace if necessary.

Hydraulic tank breather filter - check ▷



NOTE

The truck should be at normal operating temperature, and the oil level should be correct. Raise and lower the mast twice in quick succession before performing this check.

– Slowly unscrew breather filter (1) located on the top of the hydraulic oil tank, allowing the air to escape before removing fully.

NOTE

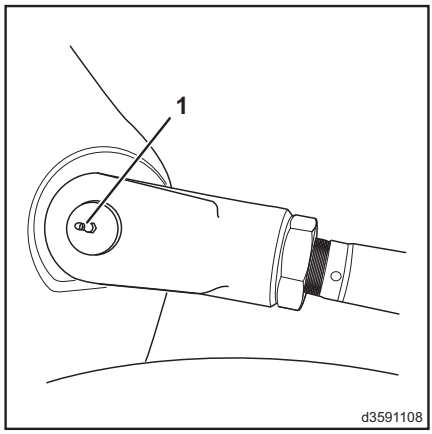
In a dusty atmosphere it may be necessary to renew the filter earlier.

– If air is not heard to escape, replace breather filter (1).
– Discard used filter according to local authority guidelines

Lifting system

Lubricate the mast and tilt cylinder pivots

Lubricate the mast pivot pins ▷



⚠ CAUTION

Danger of damage to the truck.

Take the weight off each pivot pin in turn using a suitable jack to ensure the optimum ingress of grease.

NOTE

Lubricate with grease according to the lubricant recommendations.

– Lubricate mast pivot pin (1) through the front of the mast.

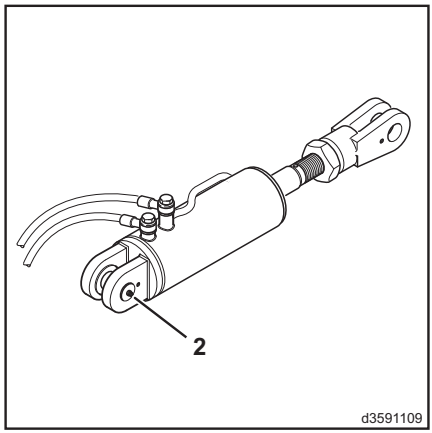
– Lubricate with grease gun until new grease is visible at the bearing.

⚠ CAUTION

Danger of accident.

Refer to safety notes on securing the mast when working on the front of the machine.

Lubricate the tilt cylinder pivots ▷



NOTE

Lubricate with grease according to the lubricant recommendations.

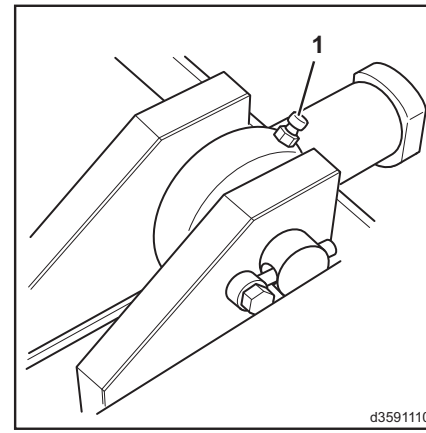
– Lubricate tilt cylinder pivots (2), two points.

– Access to the bottom two points is from the side of the tilt cylinder recess under the cab.

– Access to the top two points is on either side of the mast.

– Lubricate with grease gun until new grease is visible at the bearing.

Lubricate fork carriage cylinder bearings



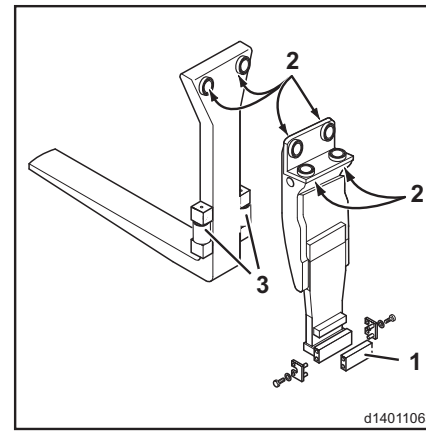
NOTE

Ensure that the forkspread is retracted sufficiently to allow access to the greasing points.

– Lubricate the universal carriage cylinders bearing (1). Two points each cylinder.

– Lubricate with grease gun until new grease is visible at the bearing.

Check the fork carrier slider pads



– Check the clearance at slider pads (1), fitted to the base of the fork carriers.

– Slider pads (1) should be changed when clearance exceeds 2 mm.

Lubricate the fork roller bearings

– Lubricate the fork roller bearings (2). Four points each fork carrier

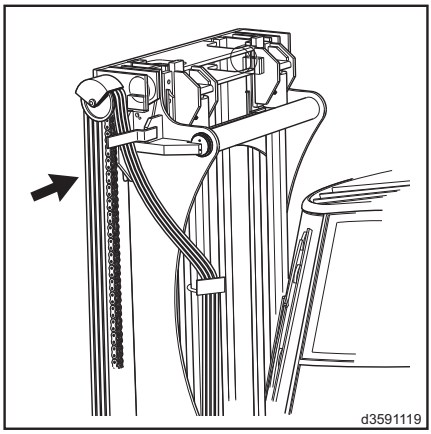
– Lubricate with grease gun until new grease is visible at the bearing.

Lubricate the fork lower rollers

– Lubricate the fork lower rollers (3).

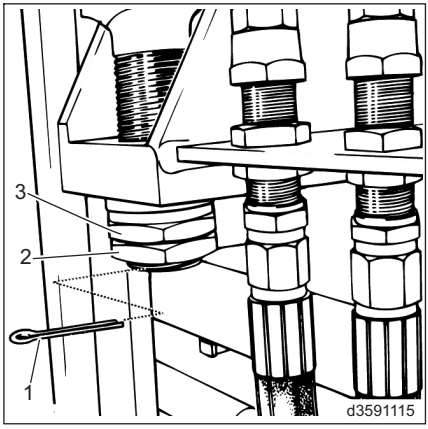
– Lubricate with grease gun until new grease is visible at the bearing.

Check the tension of double hoses ▷



– The tension of the double hoses should be 5-10 mm per meter, referred to initial length.
– Adjust the tension of the hoses to the specified dimension by sliding them in the clamps.

Check and adjust mast chains, lubricate with chain spray ▷



NOTE

After some time in service the lifting chains stretch and therefore must be checked and adjusted as necessary on the left and right sides of the mast.

– Clean the mast chains.
– Put the mast vertical.
– Remove split pin (1).
– Release locknuts (2).
– Using nuts (3), adjust the chains to allow a clearance of 12 mm (1/2 inch) between the fork heels and the floor.
– Tighten locknuts (2).
– Fit new split pin (1).

NOTE

Ensure both chains are adjusted equally.

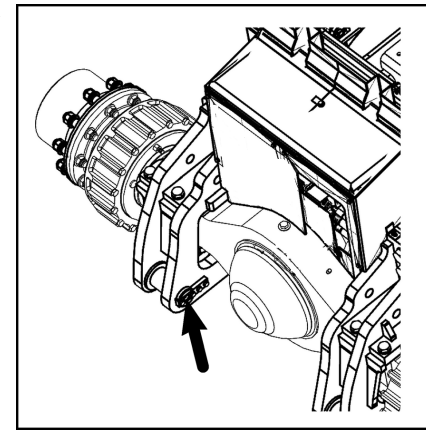
– Spray channel surfaces, pulleys and chains with Linde chain spray.

NOTE

Trucks in service in the food industry must be lubricated with an oil approved for the food industry instead of chain spray.

Lubricate the lift mast bearings

– Use a grease gun to fill the lift mast bearings with grease until fresh grease overflows.



NOTE

Refer to the "Recommended fuels and oils" table for oil types.

NOTE

Regularly filling lubricating grease in small amounts is better than filling lubricating grease in large amounts on an infrequent basis.

Troubleshooting

Troubleshooting guide (Hydraulic system)

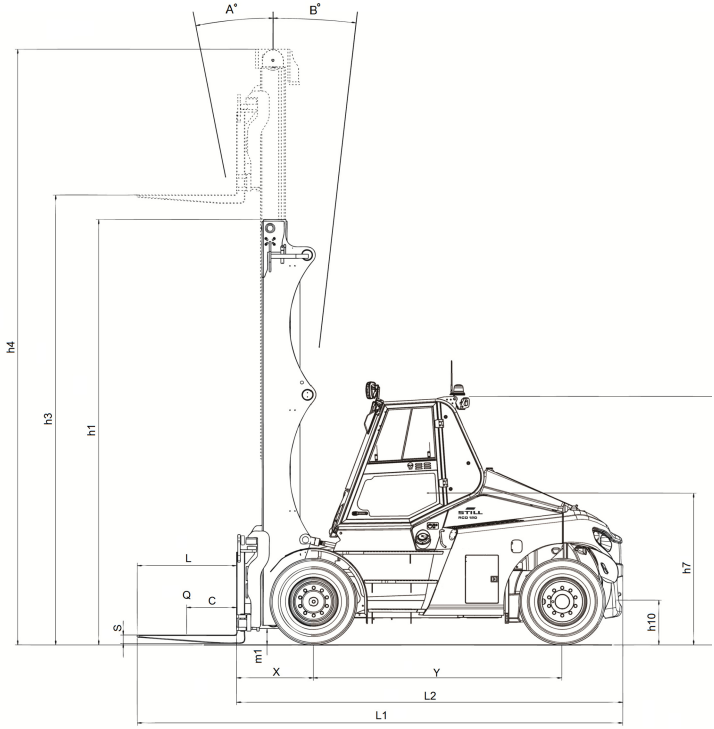
Abnormal noise	Suction filter restricted.	Renew the filter.
	Suction hoses leaking, oil foaming.	Tighten lines. Replace suction hoses. Check oil level, top up if necessary.
	Incorrect oil viscosity, low oil level in tank or in hydraulic pump.	Change oil, be sure to use the correct viscosity, top up oil.
	Hydraulic pump or motor failure, seals defective, causing air intake.	Contact your service partner.
No or too low pressure in system	Pipe broken or leaking.	Replace or tighten line.
	Oil of low viscosity, causing high leakage losses.	Change oil, be sure to use oil of correct viscosity.
	Oil temperature warning lamp illuminated.	Check oil level, clean oil cooler.
	Pump suction defective, noise.	Change oil, top up oil. Contact your service partner.
	Pump failure, leakages, pressure valves do not close, valve seat damage.	Contact your service partner.
Oil pressure fluctuating	Mast does not extend completely or retracts slightly after being extended.	Top up hydraulic oil.
	Cause as under abnormal noise.	See abnormal noise.
	Pressure limiting valves or boost pressure valves sticking.	Contact your service partner.
	Lift and tilt cylinders have tight spots.	Contact your service partner.
No oil flow or low oil flow	Filter restricted (if accompanied by noise).	Clean or replace filter.
	Pipe broken or leaking.	Tighten or replace line.
	Hydraulic system overheating.	Check oil level, use specified oil, clean oil cooler, if needed.
	Valves restricted.	Contact your service partner.
	Pump failure, leakages, pressure limiting valves do not close, valve seat damaged.	Contact your service partner.

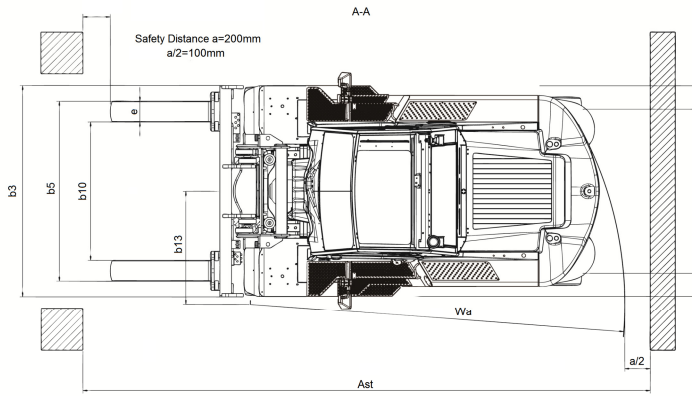
Hydraulic oil temperature too high	Oil level too low or oil cooler defective.	Check oil level, if necessary top up oil. Clean cooler and check for leaks. If defective, contact your service partner.
	Pump failure, valves leaking.	Contact your service partner.

6

Technical data

Truck dimensions





Overview of type sheets - 600 mm load centre

All data refers to standard equipment with standard lift masts.
All data must be observed without fail.

1 Key data				
1.1	Manufacturer			Still
1.2	Manufacturer's type designation			RCD100Ds/600
				RCD120Ds/600
				RCD140Ds/600
				RCD150Ds/600
				RCD160Ds/600
				RCD180Ds/600
1.3	Drive			Diesel
1.4	Operation			Seated
1.5	Load capacity/load	RCD100Ds	Q [t]	10
		RCD120Ds		12
		RCD140Ds		14
		RCD150Ds		15
		RCD160Ds		16
		RCD180Ds		18
1.6	Load centre of gravity	RCD100Ds、RCD120Ds、RCD140Ds、RCD160Ds、RCD180Ds	c [mm]	600
1.8	Load distance	RCD100Ds、RCD120Ds	x [mm]	847
		RCD140Ds、RCD150Ds、RCD160Ds、RCD180Ds		884
1.9	Wheelbase	RCD100Ds、RCD120Ds、RCD140Ds	y [mm]	3000
		RCD150Ds、RCD160Ds、RCD180Ds		3250

2 Weight				
2.1	Net weight	RCD100Ds	kg	16299
		RCD120Ds		16453

2 Weight				
		RCD140Ds		19082
		RCD150Ds		19253
		RCD160Ds		19721
		RCD180Ds		21591
2.2	Axle load with front/rear load	RCD100Ds	kg	23150/3149
		RCD120Ds		26163/2290
		RCD140Ds		30496/2586
		RCD150Ds		31500/2753
		RCD160Ds		32935/2786
		RCD180Ds		36144/3447
2.3	Axle load without front/rear load	RCD100Ds	kg	8327/7971
		RCD120Ds		8375/8078
		RCD140Ds		9570/9511
		RCD150Ds		9651/9602
		RCD160Ds		9629/10091
		RCD180Ds		9675/11916

3 Wheels, chassis frame				
3.1	Standard tyres: solid rubber, super elastic, pneumatic, polyurethane Option tyres (Maximum speed: 25km/h): 1370 035 Super Elastic Solid Tyre 1200-20/8.5, 1370 020 Super Elastic Solid Tyre 1200-24/8.5			p/p
3.2	Front tyre size	RCD100Ds、 RCD120Ds		10.00 x 20 / 16pr
		RCD140Ds、 RCD150Ds、 RCD160Ds、 RCD180Ds		12.00 x 20 / 20pr
3.3	Rear tyre size	RCD100Ds、 RCD120Ds		10.00 x 20 / 16pr
		RCD140Ds、 RCD150Ds、 RCD160Ds、 RCD180Ds		12.00 x 20 / 20pr
3.4	Wheels, number, front/rear (x = driven)	RCD100Ds、 RCD120Ds、 RCD140Ds、 RCD150Ds、 RCD160Ds、 RCD180Ds		4x/2
3.6	Front track width	RCD100Ds、 RCD120Ds、 RCD140Ds、	b_{10} [mm]	1874

3 Wheels, chassis frame				
		RCD150Ds、RCD160Ds、RCD180Ds		
3.7	Rear track width	RCD100Ds、RCD120Ds、RCD140Ds、RCD150Ds、RCD160Ds、RCD180Ds	b_{11} [mm]	1970
3.8	Rolling radius	RCD100Ds、RCD120Ds	r_1 [mm]	539
		RCD140Ds、RCD150Ds、RCD160Ds、RCD180Ds		569

4 Basic dimensions				
4.1	Lift mast/fork carriage tilt, forwards/backwards		α/β (°)	15/10
4.2	Height with lift mast retracted	RCD100Ds、RCD120Ds	h_1 [mm]	3404
		RCD140Ds、RCD150Ds、RCD160Ds、RCD180Ds		3736
4.4	Lift	RCD100Ds、RCD120Ds、RCD140Ds、RCD150Ds、RCD160Ds、RCD180Ds	h_3 [mm]	4000
4.5	Height with lift mast extended	RCD100Ds、RCD120Ds	h_4 [mm]	5329
		RCD140Ds、RCD150Ds、RCD160Ds、RCD180Ds		5661
4.7	Height above overhead guard (cab)	RCD100Ds、RCD120Ds	h_6 [mm]	3010
		RCD140Ds、RCD150Ds、RCD160Ds、RCD180Ds		3035
4.8	Seated height/standing height	RCD100Ds、RCD120Ds	h_7 [mm]	1974

4 Basic dimensions				
		RCD140Ds、RCD150Ds、RCD160Ds、RCD180Ds		2004
4.12	Coupling height	RCD100Ds、RCD120Ds	h_{10} [mm]	550
		RCD140Ds、RCD150Ds、RCD160Ds、RCD180Ds		580
4.19	Total length	RCD100Ds、RCD120Ds	l_1 [mm]	5984
		RCD140Ds		6066
		RCD150Ds、RCD160Ds		6316
		RCD180Ds		6516
4.20	Length including fork back	RCD100Ds、RCD120Ds	l_2 [mm]	4584
		RCD140Ds		4666
		RCD150Ds、RCD160Ds		4916
		RCD180Ds		5071
4.21	Total width	RCD100Ds、RCD120Ds	b_1	2530
		RCD140Ds、RCD150Ds、RCD160Ds、RCD180Ds		2565
4.22	Fork arm dimensions	RCD100Ds、RCD120Ds	s/e/l [mm]	90 x 200 x 1400
		RCD140Ds、RCD150Ds、RCD160Ds、RCD180Ds		100 x 200 x 1400
4.23	Fork carriage according to ISO 2328, class/form A, BHyd			Hydraulic fork positioner
4.24	Fork carriage width	RCD100Ds、RCD120Ds、RCD140Ds、RCD150Ds、RCD160Ds、RCD180Ds	b_3 [mm]	2545
4.25	Fork spread	RCD100Ds、RCD120Ds	b_5 [mm]	610 / 2274

4 Basic dimensions				
		RCD140Ds、RCD150Ds、RCD160Ds、RCD180Ds		620 / 2220
4.31	Ground clearance with load under lift mast	RCD100Ds、RCD120Ds	m_1 [mm]	172
		RCD140Ds、RCD150Ds、RCD160Ds、RCD180Ds		200
4.32	Ground clearance at centre of wheel-base	RCD100Ds、RCD120Ds	m_2 [mm]	346
		RCD140Ds、RCD150Ds、RCD160Ds、RCD180Ds		376
4.33	Aisle width for pallet 1000 x 1200 cross-wise	RCD100Ds、RCD120Ds	A_{st} [mm]	6149
		RCD140Ds		6186
		RCD150Ds、RCD160Ds		6422
		RCD180Ds		6596
4.34	Aisle width for pallet 800 x 1200 length-wise	RCD100Ds、RCD120Ds	A_{st} [mm]	6349
		RCD140Ds		6386
		RCD150Ds、RCD160Ds		6622
		RCD180Ds		6796
4.35	Turning radius	RCD100Ds、RCD120Ds、RCD140Ds	W_a [mm]	4102
		RCD150Ds、RCD160Ds		4338
		RCD180Ds		4512
4.36	Smallest pivot point distance	RCD100Ds、RCD120Ds、RCD140Ds	b_{13} [mm]	1362
		RCD150Ds、RCD160Ds、RCD180Ds		1405

5 Performance data				
5.1	Driving speed with/without load	RCD100Ds	km/h	27.9/29.1
		RCD120Ds		27.6/29.1
		RCD140Ds		28.3/30.2
		RCD150Ds		28.3/30.2
		RCD160Ds		28.1/30.1
		RCD180Ds		28.1/29.8
5.2	Lifting speed with/without load	RCD100Ds、RCD120Ds、RCD150Ds	m/s	0.40/0.42
		RCD140Ds、RCD180Ds		0.37/0.40
		RCD160Ds		0.37/0.42
5.3	Lowering speed with/without load	RCD100Ds、RCD120Ds、RCD150Ds、RCD160Ds	m/s	0.45/0.40
		RCD140Ds、RCD180Ds		0.42/0.38
5.5	Tractive force with/without load	RCD100Ds	kN	98.5/100.5
		RCD120Ds		98.3/100.6
		RCD140Ds		92.8/95.5
		RCD150Ds		103.0/105.9
		RCD160Ds		102.7/105.8
		RCD180Ds		102.6/105.3
5.7	Climbing capability with/without load	RCD100Ds	%	41.3/80.8
		RCD120Ds		37.6/79.7
		RCD140Ds		29.8/59.3
		RCD150Ds		32.2/67.7
		RCD160Ds		30.6/65.3
		RCD180Ds		30.3/55.6
5.10	Service brake			Wet disc

6.Battery voltage, rated capacity				
6.1		RCD100Ds、RCD120Ds、RCD140Ds、RCD150Ds、RCD160Ds、RCD180Ds	V/aH	2 x 12 / 95

7 Drive/engine			
7.1	Engine manufacturer/model		Cummins B6.7 Eu5
7.2	Engine power rating in accordance with ISO 1585	kW	129
7.3	Nominal speed	rpm	2200
7.4	Number of cylinders/displacement	cm^3	6/6700

8 Other			
8.1	Traction controller type		Torque converter 3/3
8.2	Working pressure for attachments	bar	250
8.3	Oil flow for attachments	l/min	5-130
8.4	Noise level at the driver's ear	dB (A)	70
8.5	Tow coupling, type/model	∅ (mm)	50

Overview of type sheets - 1200 mm load centre

All data refers to standard equipment with standard lift masts.
All data must be observed without fail.

1 Key data				
1.1	Manufacturer			Still
1.2	Manufacturer's type designation			RCD100Ds/ 1200
				RCD120Ds/ 1200
				RCD140Ds/ 1200
				RCD150Ds/ 1200
				RCD160Ds/ 1200
1.3	Drive			Diesel
1.4	Operation			Seated
1.5	Load capacity/load	RCD100Ds	Q [t]	10
		RCD120Ds		12
		RCD140Ds		14
		RCD150Ds		15
		RCD160Ds		16
1.6	Load centre of gravity	RCD100Ds、RCD120Ds、RCD140Ds、RCD150Ds、RCD160Ds	c [mm]	1200
1.8	Load distance	RCD100Ds、RCD120Ds	x [mm]	884
		RCD140Ds、RCD150Ds、RCD160Ds		929
1.9	Wheelbase	RCD100Ds	y [mm]	3000
		RCD120Ds、RCD140Ds		3250
		RCD150Ds、RCD160Ds		3500

2 Weight				
2.1	Net weight	RCD100Ds	kg	19273
		RCD120Ds		20725

2 Weight				
		RCD140Ds		22113
		RCD150Ds		21981
		RCD160Ds		22785
2.2	Axle load with front/rear load	RCD100Ds	kg	27238/2036
		RCD120Ds		30464/2261
		RCD140Ds		33565/2548
		RCD150Ds		34553/2428
		RCD160Ds		36156/2629
2.3	Axle load without front/rear load	RCD100Ds	kg	10141/9133
		RCD120Ds		10769/9956
		RCD140Ds		10394/11719
		RCD150Ds		10429/11552
		RCD160Ds		10424/12362

3 Wheels, chassis frame				
3.1	Sdandard tyres: solid rubber, super elastic, pneumatic, polyurethane Option tyres (Maximum speed: 25km/h): 1370 035 Super Elastic Solid Tyre 1200-20/8.5, 1370 020 Super Elastic Solid Tyre 1200-24/8.5			p/p
3.2	Front tyre size	RCD100Ds、 RCD120Ds、 RCD140Ds、 RCD150Ds、 RCD160Ds		12.00 x 20 / 20pr
3.3	Rear tyre size	RCD100Ds、 RCD120Ds、 RCD140Ds、 RCD150Ds、 RCD160Ds		12.00 x 20 / 20pr
3.4	Wheels, number, front/rear (x = driven)	RCD100Ds、 RCD120Ds、 RCD140Ds、 RCD150Ds、 RCD160Ds		4x/2
3.6	Front track width	RCD100Ds、 RCD120Ds、 RCD140Ds、 RCD150Ds、 RCD160Ds	b_{10} [mm]	1874

3 Wheels, chassis frame				
3.7	Rear track width	RCD100Ds、RCD120Ds、RCD140Ds、RCD150Ds、RCD160Ds	b_{11} [mm]	1970
3.8	Rolling radius	RCD100Ds、RCD120Ds、RCD140Ds、RCD150Ds、RCD160Ds	r_1 [mm]	569

4 Basic dimensions				
4.1	Lift mast/fork carriage tilt, forwards/backwards		α/β (°)	15/10
4.2	Height with lift mast retracted	RCD100Ds、RCD120Ds、RCD140Ds、RCD150Ds、RCD160Ds	h_1 [mm]	3736
4.4	Lift	RCD100Ds、RCD120Ds、RCD140Ds、RCD150Ds、RCD160Ds	h_3 [mm]	4000
4.5	Height with lift mast extended	RCD100Ds、RCD120Ds、RCD140Ds、RCD150Ds、RCD160Ds	h_4 [mm]	5661
4.7	Height above overhead guard (cab)	RCD100Ds、RCD120Ds、RCD140Ds、RCD150Ds、RCD160Ds	h_6 [mm]	3035
4.8	Seated height/standing height	RCD100Ds、RCD120Ds、RCD140Ds、RCD150Ds、RCD160Ds	h_7 [mm]	2004
4.12	Coupling height	RCD100Ds、RCD120Ds、RCD140Ds、RCD150Ds、RCD160Ds	h_{10} [mm]	580
4.19	Total length,	RCD100Ds	l_1 [mm]	6984
		RCD120Ds		7316

4 Basic dimensions				
		RCD140Ds		7516
		RCD150Ds、RCD160Ds		7766
4.20	Length including fork back	RCD100Ds	l_2 [mm]	4584
		RCD120Ds		4916
		RCD140Ds		5116
		RCD150Ds、RCD160Ds		5366
4.21	Total width	RCD100Ds、RCD120Ds、RCD140Ds、RCD150Ds、RCD160Ds	b_1	2565
4.22	Fork arm dimensions	RCD100Ds、RCD120Ds	s/e/l [mm]	100 x 200 x 2400
		RCD140Ds、RCD150Ds、RCD160Ds		100 x 250 x 2400
4.23	Fork carriage according to ISO 2328, class/form A, B			Hydraulic fork positioner
4.24	Fork carriage width	RCD100Ds、RCD120Ds、RCD140Ds、RCD150Ds、RCD160Ds	b_3 [mm]	2545
4.25	Fork spread	RCD100Ds、RCD120Ds、RCD140Ds、RCD150Ds、RCD160Ds	b_5 [mm]	620 / 2220
		RCD100Ds、RCD120Ds、RCD140Ds、RCD150Ds、RCD160Ds		720 / 2290
4.31	Ground clearance with load under lift mast	RCD100Ds、RCD120Ds、RCD140Ds、RCD150Ds、RCD160Ds	m_1 [mm]	200
4.32	Ground clearance at centre of wheel-base	RCD100Ds、RCD120Ds、RCD140Ds、RCD150Ds、RCD160Ds	m_2 [mm]	376

4 Basic dimensions				
4.33	Aisle width for pallet 1000 x 1200 cross-wise	RCD100Ds	A_{st} [mm]	6186
		RCD120Ds		6422
		RCD140Ds		6641
		RCD150Ds、RCD160Ds		6883
4.34	Aisle width for pallet 800 x 1200 length-wise	RCD100Ds	A_{st} [mm]	6386
		RCD120Ds		6622
		RCD140Ds		6841
		RCD150Ds、RCD160Ds		7038
4.35	Turning radius	RCD100Ds	W_a [mm]	4102
		RCD120Ds		4338
		RCD140Ds		4512
		RCD150Ds、RCD160Ds		4754
4.36	Smallest pivot point distance	RCD100Ds	b_{13} [mm]	1362
		RCD120Ds、RCD140Ds		1405
		RCD150Ds、RCD160Ds		1448

5 Performance data				
5.1	Driving speed with/without load	RCD100Ds	km/h	28.8/30.1
		RCD120Ds		28.4/29.9
		RCD140Ds		28.1/29.8
		RCD150Ds		27.9/29.8
		RCD160Ds		27.7/29.7
5.2	Lifting speed with/without load	RCD100Ds	m/s	0.37/0.40
		RCD120Ds、RCD140Ds、RCD150Ds		0.40/0.42
		RCD160Ds		0.37/0.42
5.3	Lowering speed with/without load	RCD100Ds	m/s	0.42/0.38
		RCD120Ds、RCD140Ds、RCD150Ds、RCD160Ds		0.45/0.40
5.5	Tractive force with/without load	RCD100Ds	N	93.5/95.5
		RCD120Ds		92.9/95.2
		RCD140Ds		102.6/105.3
		RCD150Ds		102.4/105.4

5 Performance data				
		RCD160Ds		102.1/105.2
5.7	Climbing capability with/without load	RCD100Ds	%	34.4/58.5
		RCD120Ds		30.2/53.0
		RCD140Ds		30.3/55.6
		RCD150Ds		29.4/56.0
		RCD160Ds		27.8/53.4
5.10	Service brake			Wet disc

6 Battery voltage, rated capacity				
6.1		RCD100Ds、RCD120Ds、RCD140Ds、RCD150Ds、RCD160Ds	V/aH	2 x 12 / 95

7 Drive/engine			
7.1	Engine manufacturer/model		Cummins B6.7 Eu5
7.2	Engine power rating in accordance with ISO 1585	kW	129
7.3	Nominal speed	rpm	2200
7.4	Number of cylinders/displacement	cm^3	6/6700

8 Other			
8.1	Traction controller type		Torque converter 3/3
8.2	Working pressure for attachments	bar	250
8.3	Oil flow for attachments	l/min	5-130
8.4	Noise level at the driver's ear	dB (A)	70
8.5	Tow coupling, type/model	∅ (mm)	50

Description of technical datasheet

⚠ CAUTION

The parameters listed in the technical datasheet are examples of parameters for a specific configuration model in this range and are for reference only.

The model configuration delivered to the user may differ from the technical datasheet. For details, please refer to the forklift product datasheet provided with the vehicle or in the sales contract/quotation signed externally by the manufacturer or with the delivery receipt.

A

Activating the seat heater. 144
Additional capacity rating plate. 192
Address of manufacturer. I
Adjusting the backrest extension. 142
Adjusting the driver's seat with rotating device. 144
Adjusting the lumbar support. 144
Adjusting the seat backrest. 142
Adjusting the seat height. 143
Adjusting the steering column. 69
Air conditioning operation. 102
  Automatic. 105
  Manual. 103
  Operating devices. 103
Air filter - check. 235
Armrest
  Adjusting. 68
Attachments
  Special risks. 33

B

Battery
  Disposal. 18
Battery access - closing. 108
Battery access - opening. 108
Battery acid. 46
Before leaving the truck unattended. . . . 198
Brake control mechanism. 285

C

Cab door
  closing. 59
  opening. 59
Capacity rating plate. 189
Changes to the industrial truck. 27
Changes to the truck. 19
Check and adjust mast chains, lubricate with chain spray. 296
Check electric cables, connectors and connections for condition and tightness. . . 291
Check seat belt for condition and correct operation (option). 289
Check the battery / batteries. 291
Check the condition of structured components. 288
Check the parking brake for proper operation. 285
Check the tension of double hoses. 296
Check the tyres for damage and foreign objects. 274
Clean and lubricate the steering axle. . . 286
Clean the truck. 233
Cold Climate Options. 170
Commissioning. 10
Conformity marking. 6
Consumables. 45
  Oil Safety Information. 45
  Safety information for handling battery acid. 46
  Safety information for handling hydraulic fluid. 46
Contact details. I
Control components. 52
Coolant level - check. 237
Copyright and trademark rights. 13

D

Damage, faults. 29
Danger to employees. 38
Date of edition of this manual. 15
Declaration of conformity. 7
Definition of terms used for responsible persons. 24
Deposit the load. 197
Description of technical datasheet. 316
Description of use and climatic conditions. 11
Display unit-Parker. 72
Disposal
  Battery. 18
  Components. 18
Disposal of old trucks. 207
Documentation scope. 12
Drive controller
  Operation. 113
Driver rights, duties and rules of behaviour. 25
Drivers. 25
Driver's cab. 59
Driver's seat (luxury active driver's seat with automatic weight setting)
  Activating the seat air conditioning. . . . 68
  Activating the seat heater. 68
  Adjusting. 68

Driver's seat (luxury driver's seat with automatic weight setting). 65
Activating the seat heater. 67
Adjusting the backrest extension. 66
Adjusting the lumbar support. 67
Adjusting the seat angle. 66
Adjusting the seat backrest. 66
Adjusting the seat depth. 66
Longitudinal adjustment. 66
Setting the driver's weight. 66
Driver's seat (standard seat and comfort seat). 63
Activating the seat heater (only with a comfort seat). 65
Adjusting the lumbar support (only with a comfort seat). 64
Adjusting the seat backrest. 63
Longitudinal adjustment. 63
Setting the driver's weight. 64
Driver's seat switch. 290

E

EC declaration of conformity in accordance with the Machinery Directive. 7
EMC – Electromagnetic compatibility. . . . 19
Emergency exit. 112
Emergency off switch. 78
Emergency release of parking brake. . . . 111
Engine
Starting. 74
Switching off. 77
Entering and exiting the truck. 58

F

Filling fuel. 235
Filling the windscreen washer bottle. . . . 288
Fire extinguisher in the cabin. 146
Fire suppression system. 147
Forklift data acquisition, special setting PIN and status code. 120
Forklift data acquisition, standard setting PIN. 117
Forklift data management. 117

G

General. 5
General View of Truck. 50

H

Hazards and countermeasures. 36
Heating/air conditioning operation. 102
Automatic air conditioning operation. 105
Automatic heating operation. 107
Manual air conditioning operation. . . . 103
Manual heating operation. 106
Operating devices. 103
Switching off. 107
Heating operation. 100
Automatic. 101
Manual. 101
Operating devices. 100
Switching off. 102
Hoisting the truck. 199
Horn. 92
Hydraulic fluid. 46
Hydraulic system: check for leaks. 292
Hydraulic system: oil level check. 292
Hydraulic tank breather filter - check. . . . 293

I

Improper use. 10
Inspection and maintenance data. 210
Insulation testing. 40
Drive battery test values. 41
Test values for the truck. 41
Insurance cover on company premises. . . 27

J

Joystick
Central lever operation. 81
Single lever operation. 87

L

Lifting a load. 193
Lifting the fork carriage
Central lever operation. 82
Single lever operation. 88
Lighting
Switching on. 129
List of abbreviations. 15
Load centre distance and load capacity. 189
Locations for jacks when changing wheels. 275
Longitudinal adjustment. 141

Lowering the fork carriage
Central lever operation. 82
Single lever operation. 88
Lubricate fork carriage cylinder bearings. 295
Lubricate the lift mast bearings. 297
Lubricate the mast and tilt cylinder pivots. 294

M

Mast and load lifting device removal. . . . 205
Mast, lifting device and attachment controls. 189
Measures before taking the truck out of operation. 205
Medical devices. 29
Medical equipment. 47
Mirrors. 99

N

Nameplate. 8

O

Oils. 45
Operating attachments
Central lever operation. 83
Single lever operation. 88
Operating company. 24
Operating instructions
Issue date. 13
Operating optional attachments. 167
Operating the clamp
Central lever operation. 86
Single lever operation. 91
Operating the fork positioner
Single lever operation. 90
Operating the fork prong positioner
Central lever operation. 84
Operating the lifting and tilting equipment
Central lever operation. 82
Single lever operation. 87
Operating the rotator
Central lever operation. 85
Single lever operation. 90
Operating the sideshift
Central lever operation. 84
Single lever operation. 89
Override switch. 99
Overview of type sheets - 1200 mm load centre. 310
Overview of type sheets - 600 mm load centre. 303

P

Packaging. 18
Parking brake. 93
Particulate filter
Manual regeneration. 95
Particulate filter regeneration. 94
Picking up a load. 192
Pre-shift check item. 57
Pre-shift checks. 56
Precautions. 10
Prohibition of use by unauthorised persons. 26
Putting the truck back into service. 206

Q

Quarter window
Opening. 60

R

Regular inspections. 40
Residual dangers. 32
Residual risks. 32
Retrofitting. 19, 27
Reversing warning system. 166

S

Safety devices and warning labels. 51
Safety information regarding servicing work. 210
Safety inspection. 40
Safety regulations when driving. 43
Safety warnings. 225
Scope of service
Before initial commissioning. 56
Scope of the documentation
CO solutions. 12
Seat belt
Fastening. 71
Unfastening. 71
Service brake. 92
Service intervals. 210
Service plan
Regular maintenance. 226
Service plan table. 227
Setting the driver's weight. 143

Side window
Closing. 59
Opening. 59
Signal terms. 14
Special risks. 33
Stability. 33
Status code. 123
Steering. 91
Storage unit. 139
Switching on the direction indicators. . . . 130
Switching on the flashing beacon. 129
Switching on the hazard warning system. 129
Switching on the rear window heating. . . 100
Switching on the rotating beacons. 129
Switching on the terminal board and interior lighting. 128
Switching on the working spotlight. 129
Switch panel. 53

T

Taking the truck out of service (note) . . 205
Tighten the wheel fasteners. 275
Tilting the lift mast backwards
Central lever operation. 83
Single lever operation. 88
Tilting the lift mast forwards
Central lever operation. 83
Single lever operation. 88
Tire pressure monitoring system. 149
To tow the truck. 110
Trailer coupling. 109
Transmission oil level check. 274
Transporting suspended loads. 195
Travelling with load. 194
Troubleshooting guide (Hydraulic system). 299

U

Update of this manual. 15
Use keypad for forklift data acquisition. . 117
Using working platforms. 21

W

Warning regarding non-original parts. . . . 29
Wheels and tyres
Safety principles. 30
With cup holder. 140

STILL GmbH

5001 801 1624 EN - 07/2024 - 04