SCORPION
6030
6035
7030
7035

Operator’s Manual

Service & Parts

2 Safety

2.1 Safety symbols and signal words

Explanation

The following symbol identifies safety instructions. It is used for warning against potential personal risk or danger.

DANGER

DANGER identifies a situation causing death or serious injury if it is not avoided.

Consequences in case of non-observance.

► Avoidance of injury or death.

WARNING

WARNING identifies a situation that can cause death or serious injury if it is not avoided.

Consequences in case of non-observance.

► Avoidance of injury or death.

CAUTION

CAUTION identifies a situation that can cause injury if it is not avoided.

Consequences in case of non-observance.

► Avoidance of injury.

NOTICE

NOTICE identifies a situation that causes damage to the machine if it is not observed.

► Avoidance of damage to property.

2.7 Attachment operation

Attachments

- Use only attachments that are certified for the machine or its protective equipment (for example a shatter protection).
- All other attachments require the machine manufacturer's release.
- The danger zone and the work zone depend on the attachment used – see the Operator's Manual of the attachment.
- Secure the load.
- Do not overload attachments.
- Check the correct position of the lock.

Operation

- Carrying persons on/in an attachment is prohibited.
- Installing a work platform is prohibited.
  - Exception: The machine is certified and equipped with the necessary safety equipment.
- Attachments and counterweights modify handling, as well as the steering and braking capability of the machine.
- The operator must be familiar with these modifications and act accordingly.
- Before starting work, operate the attachment to check that it works correctly.
- Before putting the attachment into operation, ensure that nobody is in danger.
- Lower the attachment to the ground before leaving the operator seat.

Removing and fitting attachments

- Before uncoupling or coupling hydraulic connections:
  - Stop the engine
  - Release the pressure in the operating hydraulics
- Picking up and lowering attachments to the ground requires special care:
  - Pick up and safely lock the attachment in accordance with the Operator's Manual.
  - Lower the attachment only to firm, level ground and secure it to prevent it from tipping over or rolling away.
- Put the machine and the attachment into operation only if:
  - The protective equipment has been installed and is functional.
  - The connections for the lights and the hydraulic system have been established and are functional.
- Perform a visual check of the lock after locking the attachment.
- There must be nobody between the machine and the equipment when picking up or lowering an attachment to the ground.

Working near electric supply lines

- Before performing any work, the operator must check whether there are any electric supply lines in the job site.
- If there are electric supply lines, only a machine with cabin may be used (Faraday cage).
- Keep a safe distance from existing electric supply lines.
- If this is not possible, the operator must take other safety measures (for example switching off the current) in agreement with the operating company or owner of the supply lines.
- If supply lines are exposed, they must be fastened, supported and secured accordingly.
- If live supply lines are touched nevertheless:
  - Do not leave/touch the cabin (Faraday cage)
  - If possible, drive the machine out of the danger zone
  - Warn others against approaching and touching the machine
  - Have the live wire de-energized
  - Do not leave the machine until the supply lines that have been touched or damaged have been safely de-energized

Working near non-electric supply lines

- Before performing any work, the operator must check whether there are any non-electric supply lines in the job site.
- If there are non-electric supply lines, the operator must take safety measures (for example switching off the supply line) in agreement with the operating company or owner of the supply lines.
- If supply lines are exposed, they must be fastened, supported and secured accordingly.

Driving licence

Telehandlers may be driven on public roads only if the operator has a driving licence as defined by national traffic regulations.

§ 5 StVZO (German traffic regulations) requires the following driving licences for telehandler operation:

- Driving licence category **L** (new, European Union)
  - Self-propelled work machines **up to 25 kph**
  - Agricultural or forestry tractors **up to 40 kph** (with trailer 25 kph)
- Driving licence category **C** (new, European Union)
  - Motor vehicles over 3500 kg (with trailers up to 750 kg)
- Driving licence category **CE** (new, European Union)
  - Motor vehicles over 3500 kg (with trailers over 750 kg)
- Driving licence category **T** (new, European Union)
  - Self-propelled work machines for agriculture and forestry **up to 40 kph**
  - If certified as agricultural or forestry tractors **up to 60 kph**

Observe and follow the legal regulations of your country.

Identification

§ 3 FZV (German vehicle licensing ordinance) requires self-propelled work machines with maximum speeds **over 20 kph** to be fitted with their own numberplates **in accordance with §8 FZV (German vehicle licensing ordinance)**.

Art. 4b of FZV (German vehicle licensing ordinance) requires owners of self-propelled work machines with maximum speeds **below 20 km/h** to affix their first name, surname and place of residence (company and registered office) in indelible print on the left side of their machines.

Observe and follow the legal regulations of your country.

Symbols

Fig. 6

The "Book" symbol on the signs and type labels indicates that the Operator's Manual contains more detailed information and explanations.

Type labels

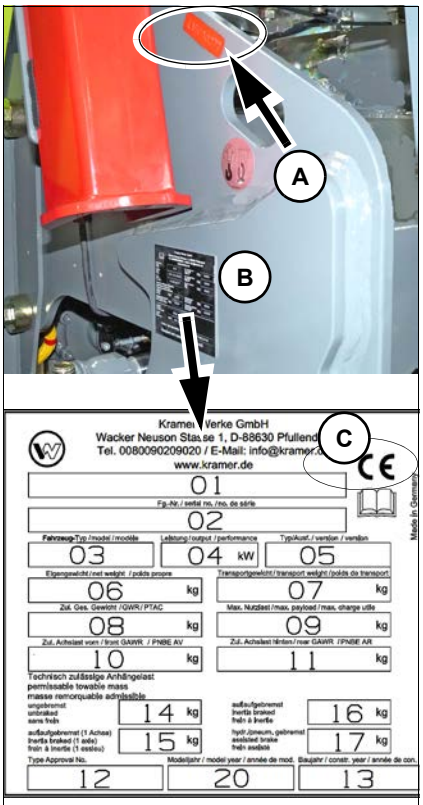


Fig. 7

Serial number

The serial number **A** is stamped on the machine frame (next to the mudguard attachment, at the front right). It is also located on the type label **B**.

The **CE** mark **C** on the type label means that the machine meets the requirements of the Machine Directive and that the conformity procedure has been performed.

Example: type label indications

1. Machine designation	Telehandlers
2. Serial no.	415 11 xxxx
3. Machine model	415
4. Output kW (hp)	100 (135 hp)
5. Machine model/version	415-11_6030
6. Dead weight (kg)	–
7. Transport weight (kg)	–
8. Permissible maximum weight (kg)	8,500 (18,739 lbs.)
9. Maximum payload (kg)	–
10. Front axle weight rating (kg)	6,000 (13,227.5 lbs.)
11. Rear gross axle weight rating (kg)	6,000 (13,227.5 lbs.)
12. Check number of EC approval (only for machines with agricultural and forestry licence)	e1*2003/37*xxxx*[1]
13. Year of construction	2016
14. Gross unbraked trailer weight rating[2] (kg)	–
15. Gross trailer weight rating (kg) overrun brake (1 axle)	–
16. Gross trailer weight rating overrun brake (kg)	–
17. Gross trailer weight rating (kg) (hydraulically/pneumatically braked)	–
20. Model year	2016

1. Refer to the machine documentation (National Type Approval or Data Confirmation) for the corresponding EC standard + approval number.
2. Ball hitch option

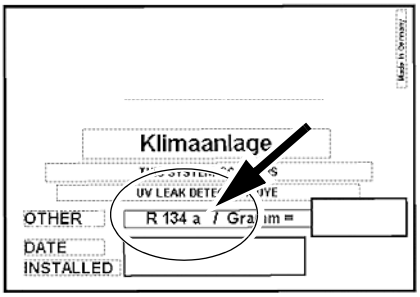


Fig. 43

Information label for air conditioning system refill (option)

Use only the refrigerants (see arrow) indicated on the label for refilling the air conditioning system.

Fixed in the engine compartment on the side cover of the radiator (coolant).

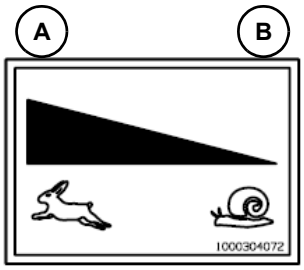


Fig. 44

Notice sign of the low-speed control function (optional)

A = maximum travel speed

B = standstill

Fixed near the joystick, right in the cabin .

– see chapter 5 “Low-speed control (option)” on page 5-23.

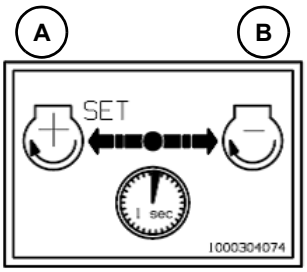


Fig. 45

Notice sign the manual throttle (optional)

A = Increase the engine speed

B = Reduce the engine speed

Fixed near the joystick, right in the cabin .

– see chapter 5 “Manual throttle (option)” on page 5-9.

Fig. 46

Wheel nut information label

1. Torque setting 400 Nm (295.0 ft lbs).
2. Do not oil wheel nuts and bolts!
3. Retighten the wheel nuts to the specified torque after one operating hour.
4. Retighten the wheel nuts to the specified torque every 10 operating hours (5 times to 50 operating hours since a wheel change)
   – see chapter 7 “Mounting the wheels” on page 7-87,
   – see chapter 9 “Tightening torques” on page 9-18.

Fixed on the rims.

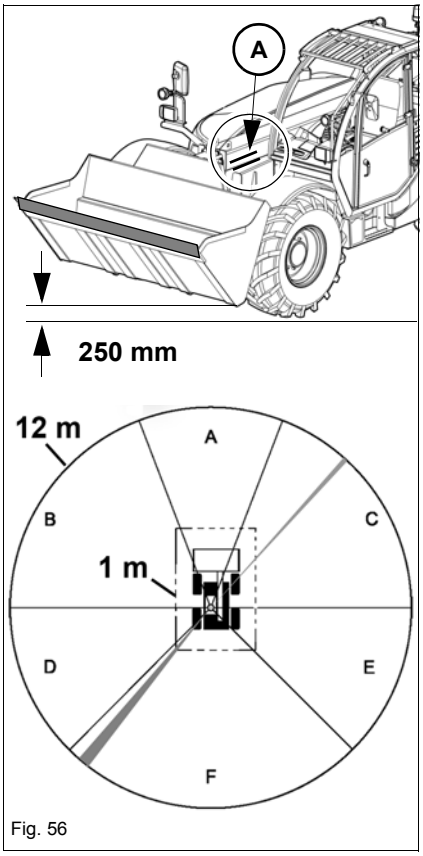


Fig. 56

The line-of-sight describes the visible area that the operator can see from the operator's seat, also with the help of mirrors and a camera (optional) – *see "Camera (option)" on page 4-20*.

Information

The line of sight was determined according to ISO 5006 (road use) and DIN EN 15830:2012 (work use).

The figure below describes the existing field of vision restrictions within a radius of 12 m (4,724 in) when the boom is extended, with the bucket in transport position 250 mm (9.8 in).

- The areas shaded in grey in sector **C** and sector **F** show the field of vision restrictions in a 12 m (4,724.4 in) radius.
- The dotted area of the 1 m line shows the field of view restrictions at a height of 1.5 m (59.0 in).

Information

In sector **A** vision must not be obstructed outside a radius of 12 m of the field of vision.

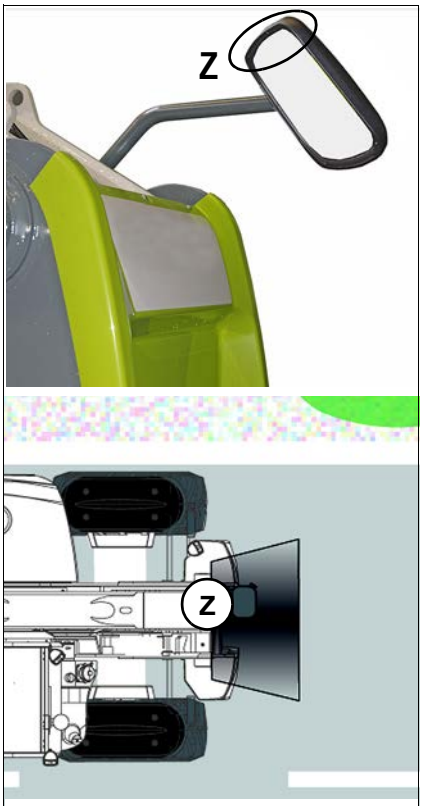


Fig. 71

Adjusting the rear mirrors (option)

Information

The rear mirror is mandatory in connection with a trailer coupling (option) and must be used when hitching and unhitching a trailer.

1. Position the **rear** mirror (option) so that the rear of the machine and the trailer coupling can be seen at the upper edge **Z** of the mirror.

Information

When adjusting the mirror, ensure that the visible area behind the machine can be seen as close as possible at the rear of the machine.

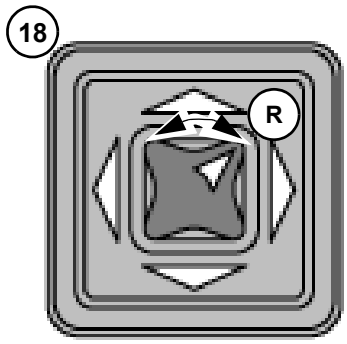


Fig. 72

Electric mirror adjustment (option)

The right exterior mirror can be electronically adjusted by pressing the rocker switch **18**.

Switch **18** is located on the console on the right.

Operate as follows:

- Turn the switch to position **R** (front right mirror).

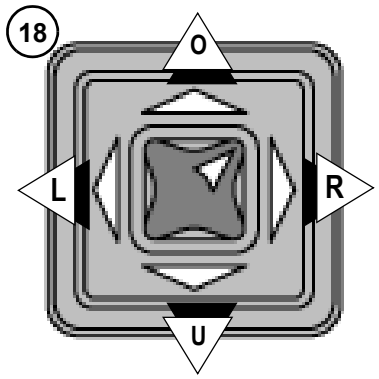


Fig. 73

- Turn rocker switch in the required direction:
  - ➥ **O** = mirror moves upward
  - ➥ **U** = mirror moves downward
  - ➥ **R** = mirror moves to the right
  - ➥ **L** = mirror moves to the left

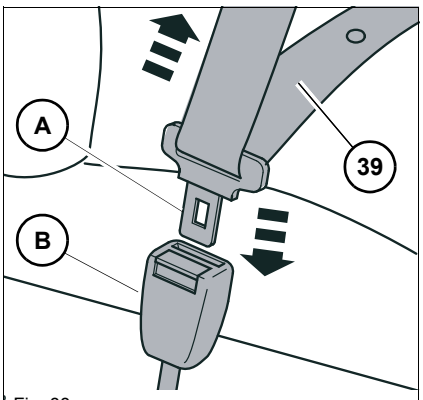


Fig. 88

Fastening the seat belt

1. Sit down on the operator seat.
2. Hold seat belt **39** at buckle latch **A** and run it steadily over the hips to buckle **B**.
3. Insert buckle latch **A** into buckle **B** until it engages audibly ***(pull test).***
4. Tighten the safety belt by pulling at its end.
   ➥ The seat belt must not be twisted and must run tightly over the hips!

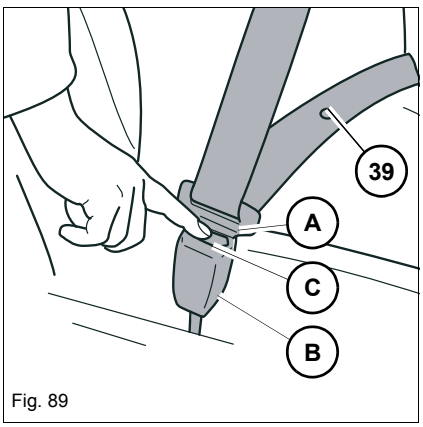


Fig. 89

Unfastening the seat belt

1. Hold seat belt **39**.
2. Press red button **C** on buckle **B**.
   ➥ Latch **A** is released from buckle **B.**
3. Slowly return the seat belt to the retractor.

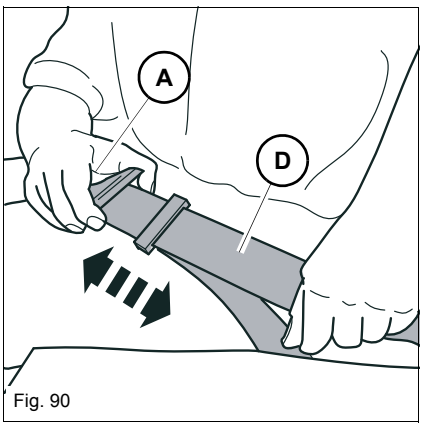


Fig. 90

Longer/shorter seat belt adjustment

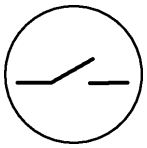
1. Hold buckle latch **A** at a right angle to the seat belt and pull the seat belt to the required length.
2. To shorten the lap belt, just pull the free end **D** of the belt.

Information

When pulled slowly, the automatic safety belt offers full freedom of movement. It locks however during abrupt braking.
The automatic seat belt may also lock when passing through potholes or uneven terrain.

Overview of control elements in cabin		Page
47	Brake/inching pedal	*5-11*
48	Multi-function switch – indicators, high beam/headlight flasher, windscreen wipers, horn	*5-25*, *5-34*
49	Door lock	*4-2*
50	Central electrics (relays, fuse box, etc.)	
51	Switch console (front left)	*4-40*
52	Steering electronics	
53	Brake fluid reservoir	*7-83*
54	Air vents – front cabin ventilation	*5-36*
55	Socket (cigarette lighter)	
56	Front work lights (right standard/left optional)	*5-27*

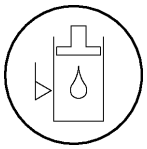
Instrument panel with control elements

93 

Indicator light (green) – front socket (option)

Illuminates if the front socket is activated

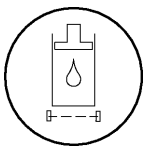
– see chapter 5 “Front socket (option)” on page 5-161.

94 

Warning light (red) – hydraulic oil level (option)

Illuminates if the consumed volume is too high (tipping trailer, for example) or if the level in the hydraulic oil tank is too low

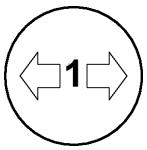
– see chapter 7 “Hydraulic oil level monitoring (option)” on page 7-64.

95 

Warning light (red) – hydraulic oil filter dirt

Illuminates if the resistance of the oil flow in the return filter is too high

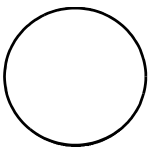
– see chapter 7 “Monitoring the hydraulic oil filter” on page 7-64.

96 

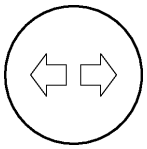
Indicator light (green) – trailer operation indicator light (option)

Flashes intermittently when the turn indicators are used and a front or rear attachment is connected electrically

– see chapter 5 “Turn indicators” on page 5-30 and *“Information on using the ball hitch” on page 5-162*.

97 

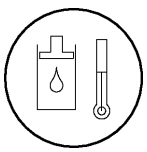
Not assigned

98 

Indicator light (green) – turn indicator on the right/left

Flashes intermittently when the turn indicators are used

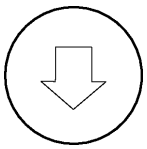
– see chapter 5 “Turn indicators” on page 5-30.

99 

Warning light (red) – hydraulic oil temperature

Illuminates if the temperature in the hydraulic system is too high

– see chapter 7 “Cleaning the radiator” on page 7-53 and *“Important information on the hydraulic system” on page 7-63*.

100 

Indicator light (green) – reverse machine travel

Illuminates if reverse machine travel is enabled.

Flashes at travel speeds over 15 km/h (9.3 mph)

– see chapter 5 “Selecting a travel direction and starting machine travel” on page 5-17.

Running-in period

The machine is equipped with an automatic thermal overload protection for the engine oil, drive and work hydraulics oil, which avoids putting the machine into operation in a cold state at high diesel engine speed.

- At temperatures below −10 °C (14 °F) , the maximum diesel engine speed is automatically limited to 1500 rpm.
- At temperatures between -10°C (14°F) and 10°C (50°F), the diesel engine idling speed is slightly increased until it reaches 10°C (50°F).
- At temperatures over 10 °C (50 °F), the diesel engine can run without any restriction.

Handle the machine carefully during its first **100 operating hours**.

- Do not put a cold diesel engine under load.
- Avoid loading the diesel engine at idling speed.
- Do not run the diesel engine at high speed for extended periods.
- Increase the load gradually while varying the diesel engine speed.
- Full travel speed (machine dynamics) is reached as soon as the temperature of the drive system reaches 20–30°C (68–86°F).
- Strictly observe maintenance schedules and carry out (or have carried out) the specified maintenance work
- *– see chapter 7 “Maintenance overview” on page 7-4*.

NOTICE

If the oil temperature of the drive hydraulics is too high >105°C (>221°F), travel speed (machine travel dynamics) is automatically reduced by 50% until the oil temperature is below 105°C (221°F) in order to avoid damage to the drive hydraulics.

► Have the cause for the high oil temperature checked or repaired by an authorized service centre under all circumsances.

Check lists

These checklists are not intended to be exhaustive; they are only intended to help you to fulfill your obligation to exercise due care.

The checking and monitoring work listed below is described in greater detail in the following chapters of the Operator’s Manual.

If questions are answered with NO, first rectify the cause of the malfunction before starting or continuing work.

Avoiding running the engine under low-load conditions

NOTICE

The running behaviour of the engine can be negatively affected if it runs at increased speed and at less than 20% of the load! Effects:

- ► Operating temperature is not reached
- ► Increased lube oil consumption
- ► Lube oil in exhaust system, and therefore dirt accumulation in the engine
- ► Blue smoke in exhaust
- ► Run the engine in regular operation at loads of over 20 %

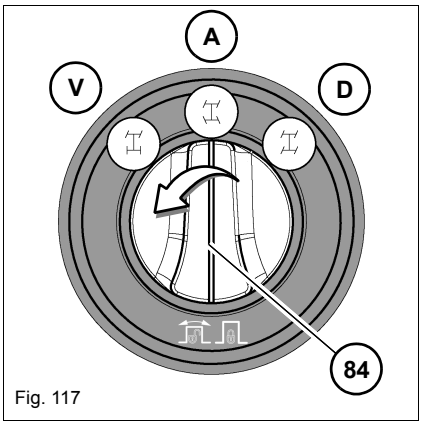


Fig. 117

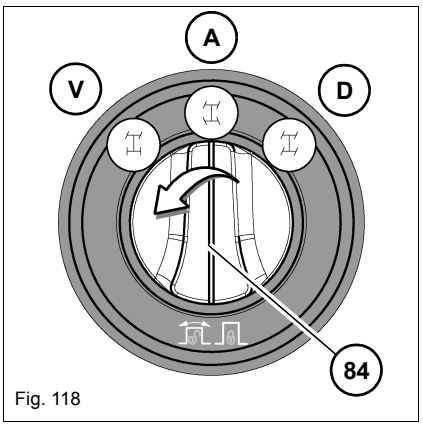


Fig. 118

Synchronizing the steering system after restarting the diesel engine (start synchronization)

1. Start the diesel engine.
   ➥ Indicator lights **A**, **V and D** flash.
2. Perform machine travel at increased walking pace and **slowly** turn the steering wheel to the left and/or right until the wheels of the front and rear axles have passed through the straight-ahead position from both directions.
   ➥ The front and rear axle wheels are automatically aligned to each other.
   ➥ The indicator light of the selected steering mode illuminates permanently, the other two are switched off.
   ➥ The selected steering mode is synchronized.

Synchronizing the steering system after changing the steering mode

1. Press rotary switch **84** and select a steering mode – see *"Front axle steering" on page 5-5*, *"4 wheel steering" on page 5-6* or *"Diagonal steering (crab steering)" on page 5-7*.
   ➥ The indicator light of the **selected steering mode** flashes.
2. Perform machine travel at increased walking pace and **slowly** turn the steering wheel to the left and/or right until the wheels of the front and rear axles have passed through the straight-ahead position from both directions.
   ➥ The indicator light of the selected steering mode illuminates permanently, the other two are switched off.
   ➥ The selected steering mode is synchronized.

Information

Travel speed is automatically reduced during steering synchronisation to 7 km/h for safety reasons!

Fig. 129

Release the parking brake

1. Sit down on the operator seat.
2. Press down the brake/inching pedal **47**.

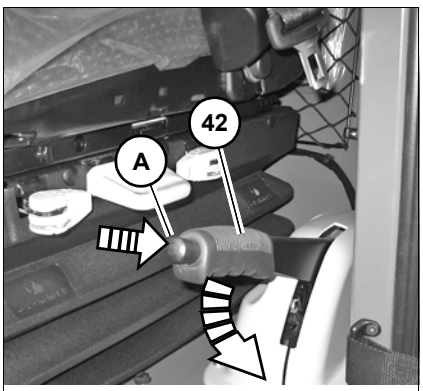


Fig. 130

3. Raise parking brake lever **42** a little.
4. Press button **A** and lower parking brake lever **42** as far as it will go.
   ➥ Indicator light **69** on the indicating instrument goes out.
   ➥ The machine is ready for travel operation.

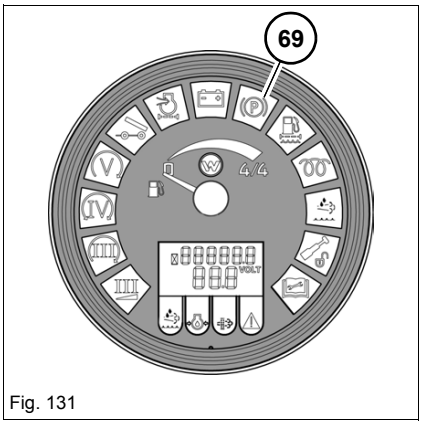


Fig. 131

After releasing the parking brake:

1. Press the accelerator pedal gently and carefully release the brake pedal (smooth start of machine travel).
   Ensure that the machine does not roll back, in particular when starting machine travel on a slope.

Low-speed control (option)

Fig. 142

The travel speed can be set continuously up to 20 km/h (12.4 mph) with the low-speed control.

This function is especially useful for operation of hydraulically driven attachments (for example a rotary broom, rotary hoe) in order to ensure continuous travel speed.

The low-speed control feature can be combined with the manual throttle (option)
– see "Manual throttle (option)" on page 5-9.

Travel speed is set via creep gear controller **19** at constant engine speed.

Information

The voltage regulator **19** is only enabled after speed range or has been selected
– see "Overview of speed ranges" on page 5-15!

Lever position	Remarks
Lever forward (**A**)	**Base position** ➥ Max. speed 20 km/h (12.4 mph) Position for normal working.
Lever backward (**B**)	**Zero position** ➥ Standstill Suitable for moving off from a standstill with hydraulic attachments (for example a road milling machine) at high engine speed.

Reducing speed

1. Slowly pull the voltage regulator **19** backward (**B**).
   ➥ The travel speed is steplessly reduced.

Increasing speed

1. Slowly push the voltage regulator **19** forward (**A**).
   ➥ The travel speed is steplessly increased.

Information

After use, put the low-speed control back in base position.

► Push the voltage regulator **19** forward until it stops **A**.

Backup warning system

WARNING

Injury hazard to persons in the danger zone!

Persons in the danger zone are possibly not seen and can be injured during backward machine travel.

- ► Adjust the existing visual aids (for example the rearview mirrors) correctly.
- ► Work particularly carefully when reversing the machine.
- ► Interrupt work immediately if persons enter the danger zone.

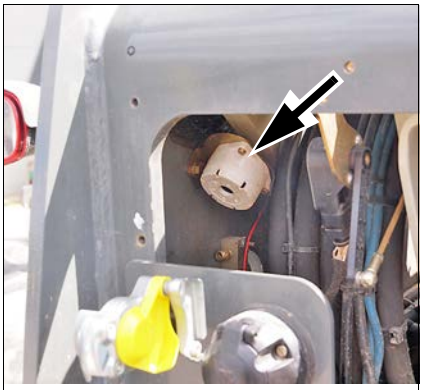


Fig. 156

The backup warning system consists of a signal transmitter fitted at the rear of the telehandler.

The signal transmitter generates an acoustic signal when shifting into reverse.

The acoustic level is about 103 dB (A) at a distance of 1 m (39.3 in) and at a frequency of 2800 Hz.

Information

According to EN 1459, it is requirement for all vehicles for permitted for use on public roads to be fitted with a reversing alarm.

According to the standard, a signal must sound when starting a reverse movement.

If permitted as a tractor (**LoF** = Agricultural or forestry certification) the reversing alarm is available as an option.

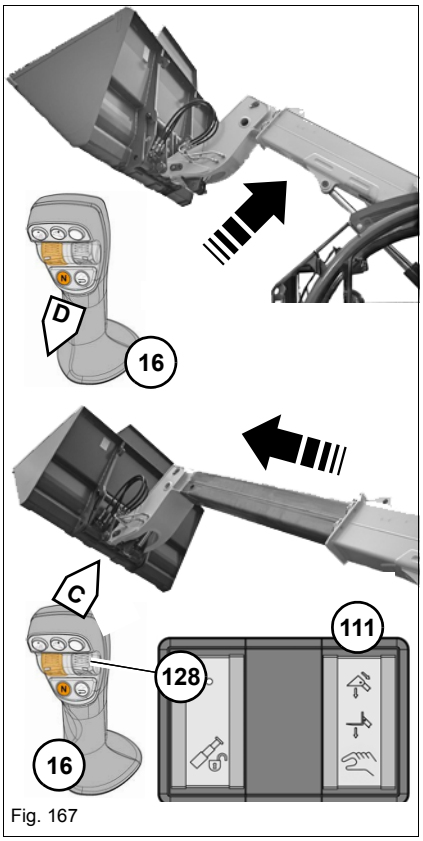


Fig. 167

Raising the loader unit/extending the telescopic boom

WARNING

Failure to observe the overload control indicator and the load diagram results in a tipping hazard!

Failure to observe this can cause serious injury or death.

- ► Carefully retract and lower the telescopic arm before the orange and red LEDs illuminate in the display.
- ► Do not perform any jerky movements with the joystick.

NOTICE

Raising and lowering the loader unit with the attachment tilted in or out to the limit puts machine components under heavy loads. Over the long term, this causes system malfunctions and damage to the loader unit.

- ► Do not tilt the tilt ram in or out to the limit when the loader unit is raised or lowered!
- ► The manufacturer shall not be liable for damage due to misapplications.

1. Preselect an operating mode with toggle switch **111**
   – *see "Overload control in bucket mode" on page 5-47*,
   – *see "Overload control in fork-lift mode" on page 5-48*,
   – *see "Overload control in manual operation mode" on page 5-49*.
2. Raise the retracted telescopic arm to the required height. To do this: pull the joystick **16 D** backwards.
   ➥ If it is tilted in, the bucket is moved parallel to its initial position as the loading system is raised.
3. Extend the telescopic boom. To do this: press switch (potentiometer) **128** on joystick **16** forward **C** until reaching the required telescopic arm length.

Hydraulic oil volume setting (option)

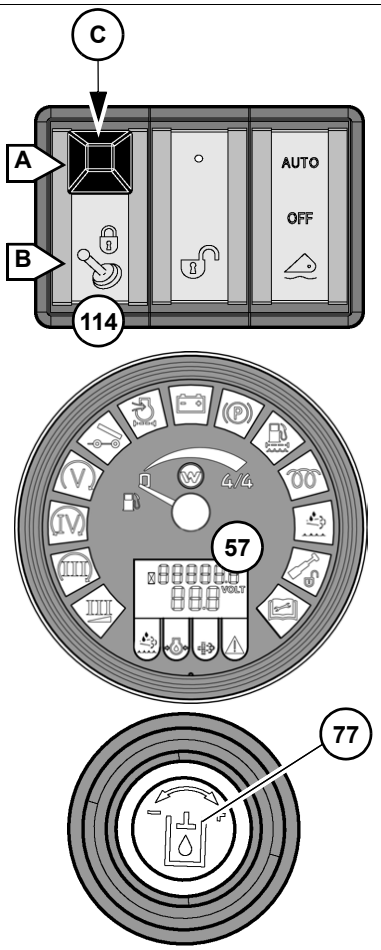


Fig. 179

The hydraulic function of the attachments can be individually adjusted for each individual control circuit with the oil volume setting.

The oil volume setting requires the following conditions to be fulfilled:

- Diesel engine in operation.
- Operator on seat.
- Joystick lock for road travel disabled with switch **114** (position **A**).

Information

The oil volumes of the separate control circuits are pre-set at the factory.

The oil volumes are displayed in percent (%) in the digital display **57** of the indicator after selecting the control circuits!

► The 3rd control circuit is set to 100 %.

► Each of the additional control circuits is set to an oil volume of 20 %.

Information

The oil quantities are saved permanently unless they are changed manually.

► For safety reasons, after every engine restart, the control circuits (apart from the 3rd control circuit) must be reactivated and the adjusted oil volume reconfirmed with the rotary switch **77**.

► If other control circuits are used with a running diesel engine, these circuits do not have to be confirmed any more with rotary switch **77** provided that they were already being used.
The adjusted oil volumes are immediately available as soon as the control circuit is activated.

Information

The oil volumes of the separate control circuits can be set only during machine operation to increase/reduce, for example, the number of revolutions of a sweeper.

Additional rear hydraulic control circuit IV (double-action, optional)

WARNING

Connecting the flexible lines incorrectly results in incorrect operation and/or uncontrolled movements of the attachment!

Failure to observe this can cause serious injury or death.

- ► Follow the instructions in the Operator's Manual of the attachment manufacturer.
- ► Check the response direction of the control elements before using the attachment.

NOTICE

Damage to hydraulic system due to dirty plug couplings and coupling sockets!

- ► Remove the dirt and dust from the plug couplings and coupling sockets before connecting an attachment!
- ► Replace missing protective caps.

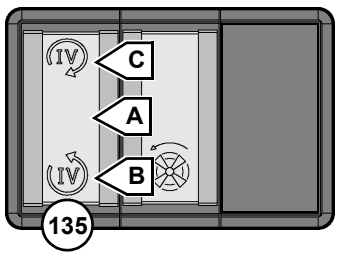


Fig. 194

1. Lower the loader unit and apply the parking brake.
2. Stop the engine, but do **not** switch off ignition.
3. Release the pressure at the plug couplings:
   Press switch **135** to positions **B** or **C**.
   - ➥ The indicator light in the switch illuminates.
   - ➥ Pressure in hydraulic lines is released.
4. Stop the engine and remove the starting key.
5. Connect the attachment to the plug couplings **+ or −** as required.
6. Putting the additional control circuit into operation
   – see "Operation of additional rear control circuit IV" on page 5-64.

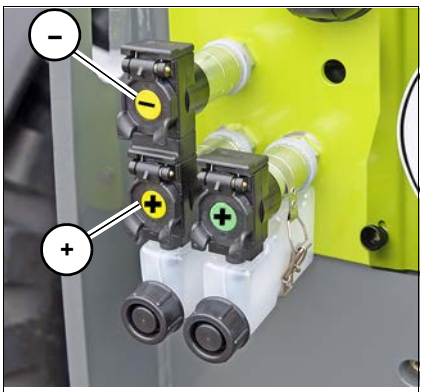


Fig. 195

Information

The rapid action couplings can be released, however they cannot be reconnected if the pressure in the hydraulic lines has not been released.

- ► Release the pressure in the system and the pressure lines when installing or removing an attachment.

Removing an attachment from the quickhitch with hydraulic locking

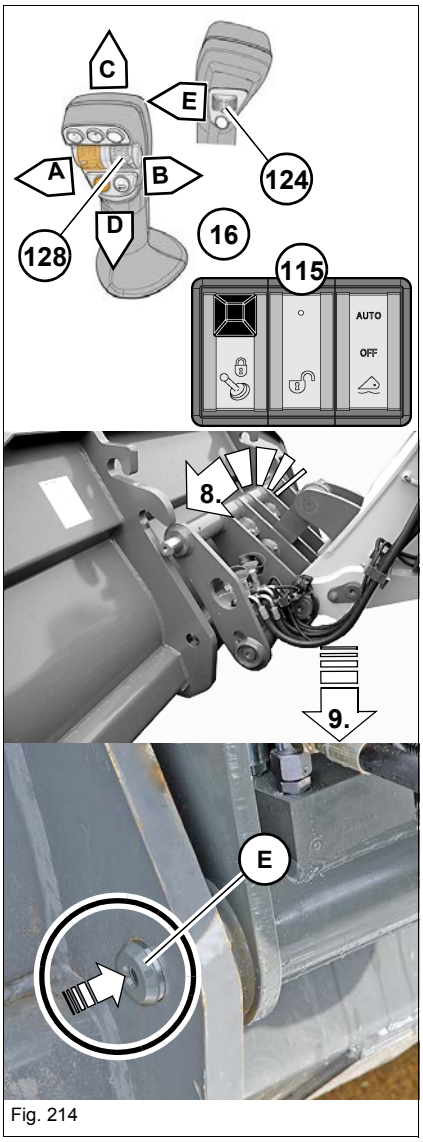


Fig. 214

WARNING

The attachment can tip over after lowering it to the ground!

Failure to observe this can cause serious injury or death.

- ► Uncouple all flexible lines from the attachment.
- ► Lower the attachment to the ground and ensure it cannot tip over.

NOTICE

In order to avoid damage to the attachment drillings, follow the order of unlocking – *see "Locking and unlocking an attachment" on page 5-57*.

1. Drive the telehandler to the drop-off position.
2. Fully retract the telescopic arm. To do this, press toggle switch (potentiometer) **128** backwards until the telescopic arm is fully retracted.
3. Lower telescopic boom. To do this: push the joystick **16** forward to position **C** until the attachment is about 5–10 cm (1.9–3.9 in) horizontally above the ground.
4. Press and hold push button **115** at the bottom.
5. At the same time push the toggle switch **124** in the joystick **16** to the right as seen as in the travel direction (two-handed operation).
   ➥ Lock bolt **E** moves out of the centre bores of the attachment.
6. After unlocking: **release** toggle switch **124** first.
7. Then release push button **115**.
8. Tilt the quick coupler system slightly forwards. To do this, press joystick **16** to the right in position **B**.
9. Fully lower the telescopic boom. To do this, press joystick **16** forwards in position **B**.
10. Reverse the telehandler away from the attachment.

Example: Load diagram with KRAMER quick coupler system for model 415-11_6030

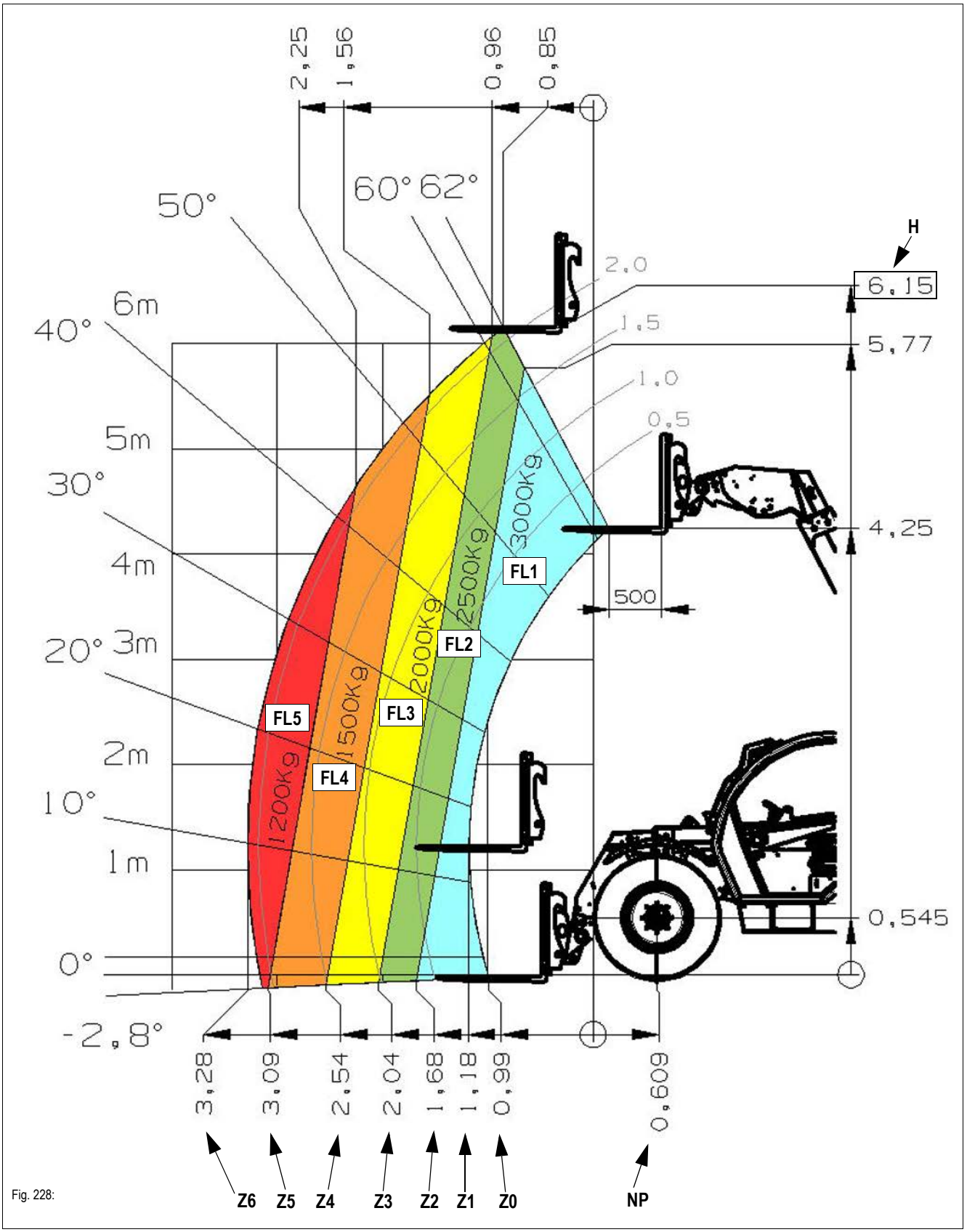


Fig. 228:

Fitting attachments from other manufacturers (optional) for model 415-11_6035

Quickhitches for attachments from other manufacturers

The following quick coupler systems can be purchased from your dealer and installed by an authorised service centre:

- Quickhitch for VOLVO attachments
- Quickhitch for MANITOU attachments
- Quickhitch for MATBRO attachments
- Quickhitch for JCB Q-fit attachments
- **Important!**
  Only approved attachments with an approved load diagram may be used with the quick coupler system from another manufacturer.
- If other attachments are used, conformity (stability test) in accordance with the EC machine guideline or the EN 474-3 standard must be checked and documented by an authorized service centre.
  In the case of non-EU countries, follow and apply the national regulations of these countries.
- For stability testing, see the following pages.
- Warranty and the operation licence become void if non-approved attachments are installed, or if parts of the quickhitch or attachment (with a prescribed condition or quality, or the operation of which can put persons at risk) are subsequently modified or replaced.
- In addition to the Operator's Manual, observe and instruct the operator in all other generally applicable, legal and other mandatory regulations relevant to accident prevention and environmental protection.

Important information on fitting attachments from other manufacturers

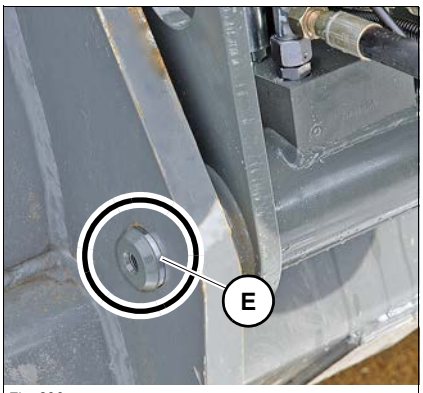


Fig. 236:

WARNING

Accident hazard if the attachments are not locked!

Can cause serious injury or death.

► Check whether lock pins **E are visible on either side** in the mounting bores of the attachment.

Example: Control plan for attachments from other manufacturers for model415-11_6035

Machine model: **Serial no.:** **Job no.:** **Stability**		**Attachment type:** **Attachment no.:** **Actual value**	**Date:** **Tester:** **Remarks**
Wheelbase [mm]			
Front left wheel [N]			
Front right wheel [N]		Front axle =	
Rear left wheel [N]			
Rear right wheel [N]		Rear axle =	
Technical data	**Specified**	**Actual value**	**Remarks**
Tilt-in angle (lower position)			
Tilt-out angle (upper position)			
Distance between centre of gravity of payload and centre of front axle [mm]			
Capacity as per type label [l]			
Gamma as per type label			
Weight of attachment [kg]			
Attachment functions			**Remarks**
Hitching the attachment onto the wheel loader			
Mechanically OK	Yes	No	
Hydraulically OK	Yes	No	
Electrically OK	Yes	No	
Mechanical stops (tilt out/tilt in) existing and functional			
OK	Yes	No	
Hose routing (length, damage, age)			
OK	Yes	No	
Nominal width of pressure line [mm]		10	
Nominal width of return line [mm]		10	
Pressures	**Specified**	**Actual value**	**Remarks**
At idling speed [bar]			Oil 50 °C
Under full load [bar]			Oil 50 °C
Permissible hydraulic pressures not exceeded at nominal load of boundary states [bar]			
Other remarks:			

Load diagram for pallet forks from other manufacturers for model 415-13

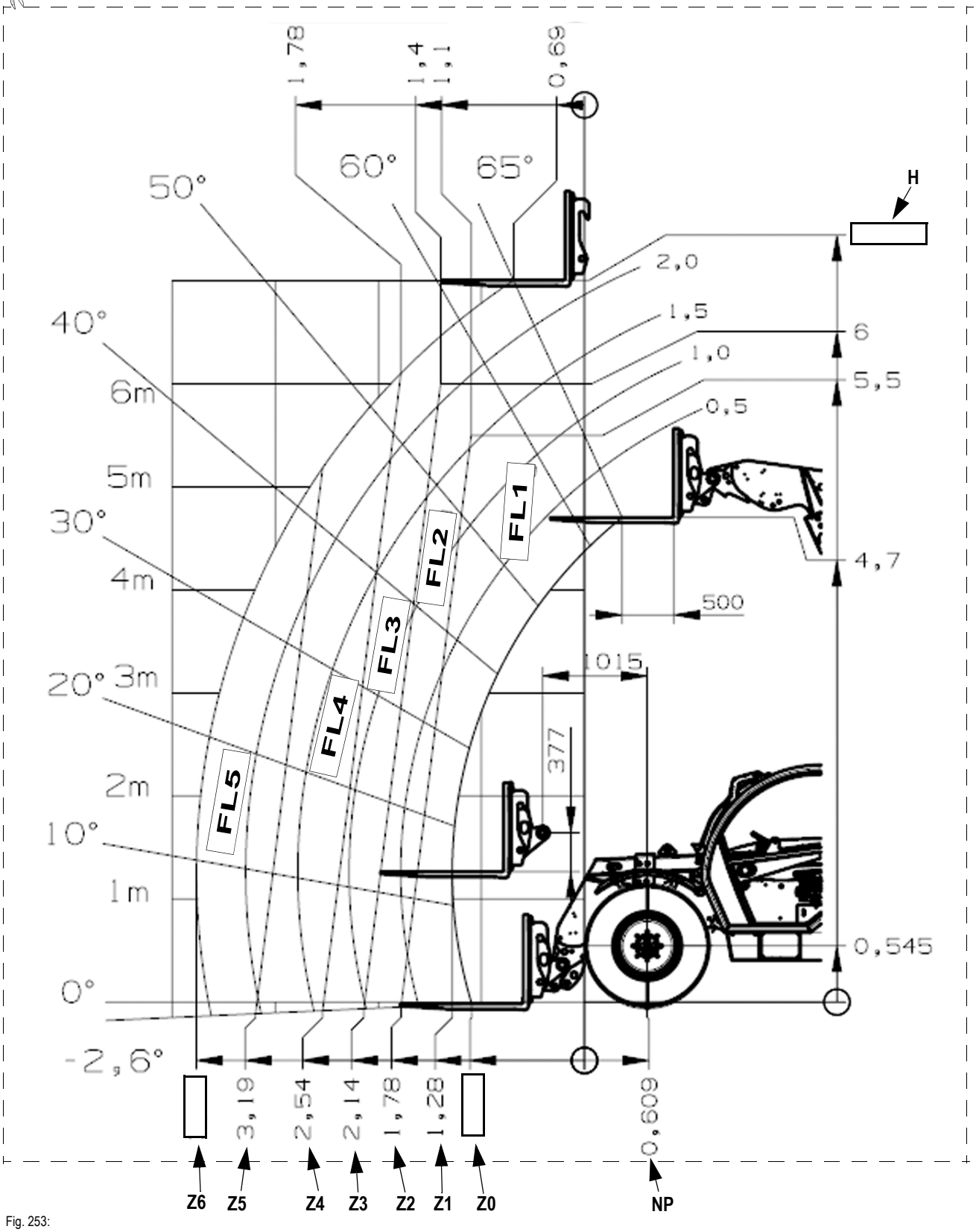


Fig. 253:

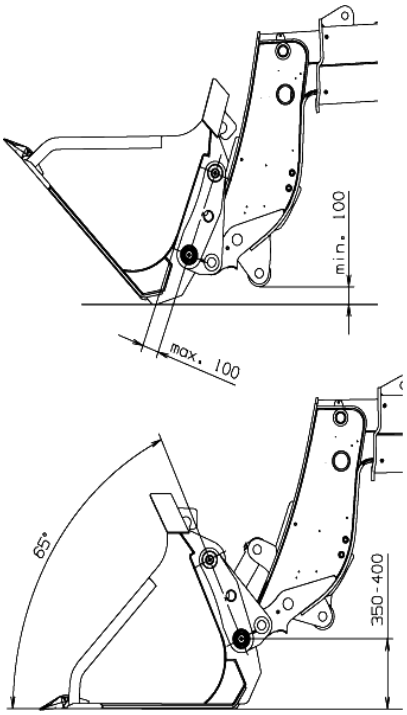


Fig. 261

Calculation of stability for attachments from other manufacturers (bucket) for model 415-15

Maximum authorised bucket payloads = pallet forks payloads – bucket weight.

- ➥ Bucket kerb weight, see type label affixed on bucket.
- ➥ Pallet forks payload *– see "Load diagram for pallet forks from other manufacturers for model 415-15" on page 5-124*.

Example: telescopic boom retracted

Payload 3,500 kg (7,716.0 lb) (see pallet forks load diagram) – 600 kg (1,322.7 lb) (bucket dry weight) = 2,900 kg (6,393.2 lb) actual payload in bucket

Example: telescopic boom extended

Payload 1,200 kg (2,645.5.0 lb) (see pallet forks load diagram) – 600 kg (1,322.7 lb) (bucket dry weight) = 600 kg (1,322.7 lb) actual payload in bucket

Information

A **Separate Certification for Vehicles (Germany)** issued by the specific authorities is necessary if the dimensions (length/ width), material density and loads of the authorised attachments
– see chapter 3 "Fields of application and use of attachments" on page 3-12 are **not** in compliance with the requirements!

Observe the legal regulations of your country.

Working with a standard bucket

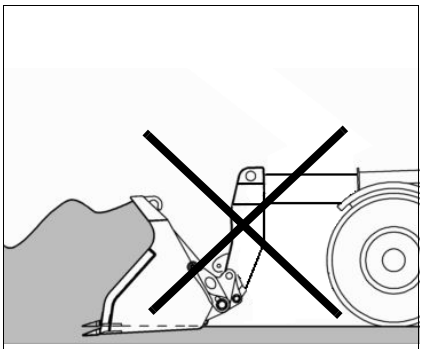


Fig. 269

NOTICE

In order to minimize the risk of damage to machine and environment, push and pull material only with the telescopic boom completely retracted!

- ► Fully retract the telescopic boom.
- ► Material may only be picked up with the bucket at slow speed (below 3 km/h (1.8 mph) and only with a fully retracted telescopic arm!
- ► At greater heights with an extended telescopic arm, drive into the material only if the speed is below 1 km/h (0.6 mph) and the material is mainly picked up with the operating hydraulics!

NOTICE

Dirt on the slide surfaces of the extended telescopic boom causes increased wear.

- ► Do not completely tilt in a full bucket if the telescopic boom is extended.

Failure to observe the instructions specified above can cause serious damage to the machine. The manufacturer does not give any warranty for any such damage.

Machine travel with the bucket fully tilted out

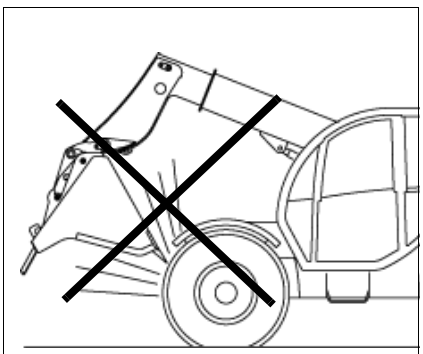


Fig. 270

NOTICE

In order to avoid damage to the tyres, do not move the machine with the bucket fully tilted out!

- ► Tilt in the bucket and lower it to transport position

Working with the pallet forks

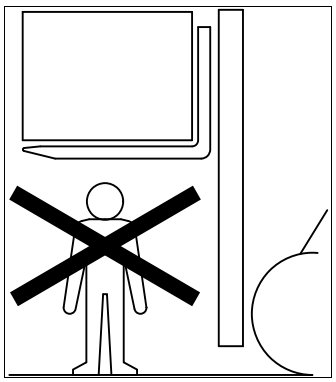


Fig. 296

Conduct and safety instructions

In addition, observe the safety instructions on field of view restriction
– *see chapter 4 “Field of vision during work operation” on page 4-10*.

WARNING

Accident hazard due to pallet fork arms!

Pallet fork arms can cause serious injury or death during machine travel on public roads.

► Remove the pallet forks before performing machine travel on public roads and transport them separately.

WARNING

There is a risk of an accident due to hidden fork tips!

Failure to observe this can cause serious injury or death.

► Adjust the fork arms on the fork frame in such a way that the fork tips are in the field of view of the operator when picking up a load.

- Stay clear of suspended loads!
- Do not transport persons in the attachment.
- The pallet forks may not be used for applications with lifting gear!
- Follow the safety instructions in the Operator’s Manual of the attachment!
- Before starting work, ensure that the fork arms on the fork frame are safely locked! Secure with locking lever against sliding sideways!
- Do not engage the fork arms in the exterior notches of the fork frame.
- Never use bent, cracked or otherwise damaged fork arms/pallet forks!
- Do not overload the attachment or the machine, observe the load diagram!
- Ensure machine stability
  – *see “Overload control” on page 5-39*
- Never exceed the maximum load!
- Installing and operating a work platform is prohibited.

Working with a crane jib (option)

Important safety instructions for working with a jib crane

Shaft rings, containers, pipes, etc., can be repositioned and transported with a crane jib and suitable lifting gear (belts, cables, chains).

Take the following precautionary measures into account:

- Before starting work, check whether the load stabiliser is switched off!
  ➥ Switching off the load stabiliser automatically enables the hose burst valve
  – see "Load stabilizer for loader unit (option)" on page 5-131.
- Bear in mind the notes in chapter 2 Safety instructions
  "Lifting gear applications" on page 2-9.
- Pick up and set down loads only on firm and level ground.
- Wear protective gloves.
- Ensure that the ratchet safely engages in the hook as you hook up the lifting gear (belts, rope, chains).
- Use only tested and undamaged lifting gear.
- Before raising a load, observe the load diagram and the overload control display
  ➥ *– see "Overload control" on page 5-39*.
- Avoid a jerky movement of the load when lifting and setting down the load.
- Ensure that the load does not oscillate during transport. To do this:
  - Do not travel faster than 6 km/h (3.7 mph) with a load.
  - Transport the load close to the ground.
  - Bear in mind the wind conditions.
  - Do not move loading system and telescopic arm during transport.
- Ensure that the load is not left hanging during transport.
- Persons guiding the load must stay in visual contact with the machine operator.
- Do not transport loads on public roads.

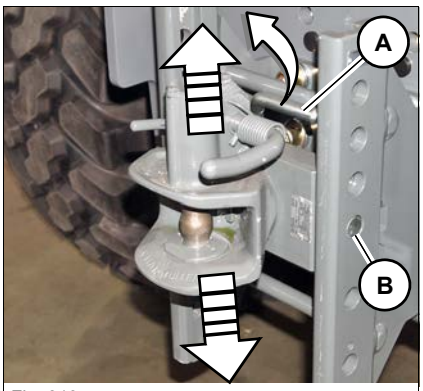


Fig. 319

Adjusting the height-adjustable ball hitch (optional)

Before hitching a trailer, adjust the height of the trailer coupling to the height of the trailer drawbar.

1. Put the trailer drawbar in a horizontal position.
2. Pull lever **A** upward.
3. Slide the ball hitch upward or downward until it is at the same height as the trailer lug (at the middle of the tow hitch).
4. Release lever A.
   ➥ Lock pins **B** must engage on either side.

Information

The height-adjustable ball hitch can be completely removed if necessary. To do this: unlock the ball hitch with lever **A** and remove it with an upward movement.

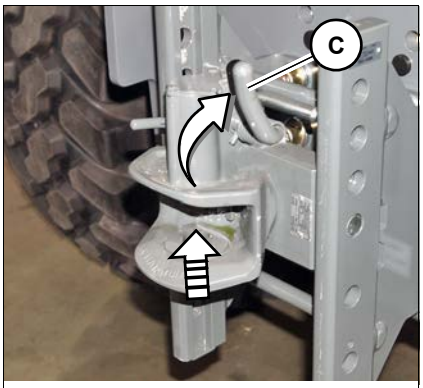


Fig. 320

Opening the automatic ball hitch (optional)

CAUTION

Accident hazard due to coupling pin snapping down!

Not observing this can lead to injuries!

► Do not touch the coupling pin with your hands.

1. Press lever **C** upward until the coupling pin audibly engages in the open position.

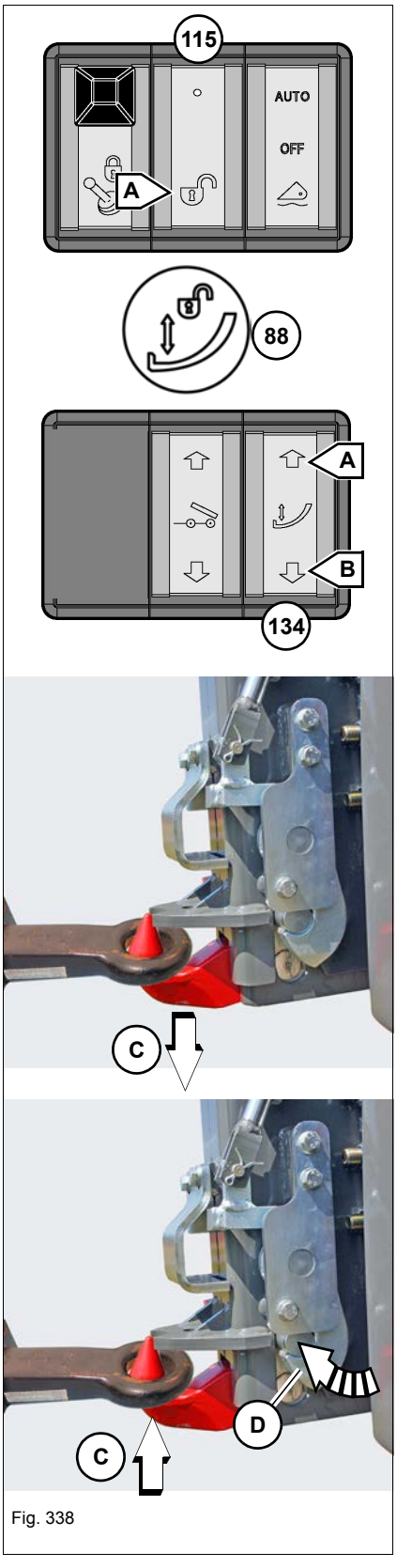


Fig. 338

Preparing to uncouple the trailer

1. Park the machine and the trailer on level ground.
2. Apply the parking brake.
3. Stop the engine.
4. Secure the trailer with the trailer brake and wheel chocks to prevent it from rolling away.
5. Put the support under the trailer draw-bar or fold down attached support.
6. Decouple all hydraulic hoses and compressed air hoses.
7. Disconnect the cables of the trailer lights from the machine.

Unhitching the trailer

NOTICE

To prevent damage to the hitch ball hitch, do not lower ball hitch to the ground. Otherwise, the vehicle will be lifted at the rear and damage can occur with the ball hitch bending.

1. Start the diesel engine.
2. Adjust field of view to the ball hitch with rear-view mirror *– see chapter 4 “Adjusting the rear mirrors (option)” on page 4-19*.
3. Open ball hitch. To do this, **134** press and hold touch button in position **B**.
   At the same time, press touch button briefly with your other hand **115 into** position **A** until the towing pins have disengaged (two-handed operation).
   ➥ Rotating beacon **88 illuminates.**
4. Release touch button **134** when the uncoupling position has been reached.
5. When looking at the mirror attached at the rear, carefully drive away from the trailer until the trailer hook **C** is free.

Close the ball hitch

1. To do this, press and hold touch button **134** in position **A**, until the ball hitch ***audibly*** encounters resistance and automatically locks.
   ➥ Towing hook **C** rises to the end position.
   ➥ Warning light **88** illuminates.
2. If the trailer hook is locked **D </15083></15085**, release touch button **134**.
   ➥ Warning light **88** goes out.

Information

If the autohitch ball hitch is unlocked (rotating beacon **88** illuminates), only “Snail mode” (max. 7 km/h) (4.3 mph) is possible for safety reasons!

Performing machine travel with the hydraulic trailer brake

WARNING

Performing machine travel too fast can cause serious accidents! The trailer brake can overheat on longer downhill stretches with the brake/inching pedal pressed only halfway through!

Failure to observe this can cause serious injury or death.

- ► Reduce the travel speed early enough before turning or downhill machine travel.
- ► Reduce engine speed: remove your foot from the accelerator pedal.
- ► Brake the tractor-trailer combination by braking intermittently. To do this: fully press brake/inching pedal **47** briefly several times.
- ► Select the next lower speed range .

Fig. 350

When the machine is braked with brake/inching pedal **47**, oil pressure is applied to the hydraulic braking system of the trailer to brake it.

The parking brake has no effect on the trailer braking system.

If the travel speed is reduced with brake-inch pedal **47**, oil pressure is applied to the trailer braking system after about 20% of the pedal travel. This “advance action” slightly brakes the trailer, and the tractor-trailer combination is held in a taut line.

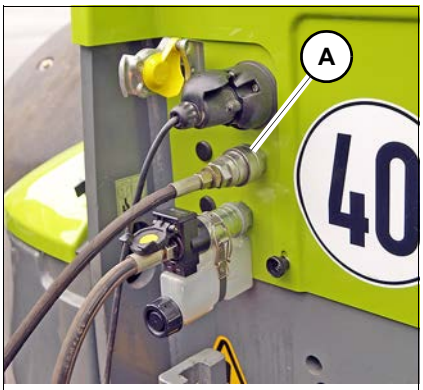


Fig. 351

Uncoupling the trailer brake hose:

1. Park the machine and the trailer on level ground.
2. Apply parking brake.
3. Stop the engine.
4. Stop the engine and remove the key.
5. Secure the trailer with wheel chocks.
6. Apply the trailer parking brake.
7. Disconnect the electric and hydraulic connections from the tractor vehicle to the trailer.
8. Close the flat connector plugs on the machine and the trailer with the protection caps provided.
9. Unhitch the trailer – *see “Unhitching the trailer” on page 5-165*.

Menu overview

Menu	Functions
Functions	• Selects a language. • Selects a colour system. • Adjusts image orientation. • Switches automatic display dimming ON/OFF. • Resets the settings.
Image	• Sets the contrast. • Sets the brightness. • Sets the colour. • Sets the colour tone.
Mirroring	For each camera: – Sets the normal/mirrored display mode.
SPLIT 1, SPLIT 2, PIP, TRIPLE, QUAD	For each display mode and display range: – Selects the camera image to be displayed.
TRIGGER	For each trigger input: – Selects the mode to be displayed when enabling the input. – Sets the delay time until the trigger view is disabled.
CAM/mode	– Selects the current camera or display mode to be displayed.
System menu	– Hides the system menu.

Function menu

Submenu	Description
Language	Selects a language.
System	Selects a colour system. • PAL • NTSC
Direction	Adjusts image orientation. • 0 Normal view. • 180 Image rotated by 180°.
Dimmer	Switches automatic display dimming ON/OFF. • AUTO Automatic display dimming by CDS sensor. • OFF Manual display dimming with DIM push button.
Reset	Resets the screen to the preset values.

6 Transport

6.1 Towing the machine

Information on towing

WARNING

Accident hazard due to towing!

Can cause serious injury or death.

- ► The machine may only be towed using suitable towing equipment (towing bar or cable) in connection with suitable towing facilities, such as a towing coupling, hooks and eyes.
- ► Ensure that no one is between the vehicles during towing.
- ► Max. towing distance 300 m (11,811.0 in)
- ► Max. towing speed is walking pace.
- ► Have a recovery service or an authorized service centre tow the machine away if necessary.

WARNING

Accident hazard when pulling trailer loads!

Pulling trailer loads with the towing device can cause accidents, serious injury or death.

- ► Do not use the towing gear to tow trailer loads.

Disabling the variable displacement pump

NOTICE

The high pressure (HP) valves must be opened in order to avoid damage (high pressure) to the variable displacement pump when towing away the machine.

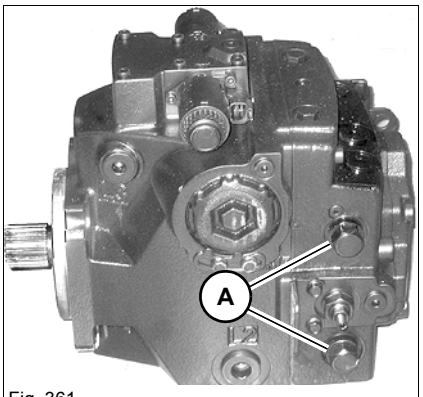


Fig. 361

Disabling the variable displacement pump (neutral position)

1. Apply the parking brake.
2. Stop the diesel engine.
3. Switch off the starter and remove the starting key.
4. Switch the variable displacement pump to towing operation. To do this: unscrew the high-pressures valves **A** 3 – 4 revolutions.

Safety prop for telescopic boom

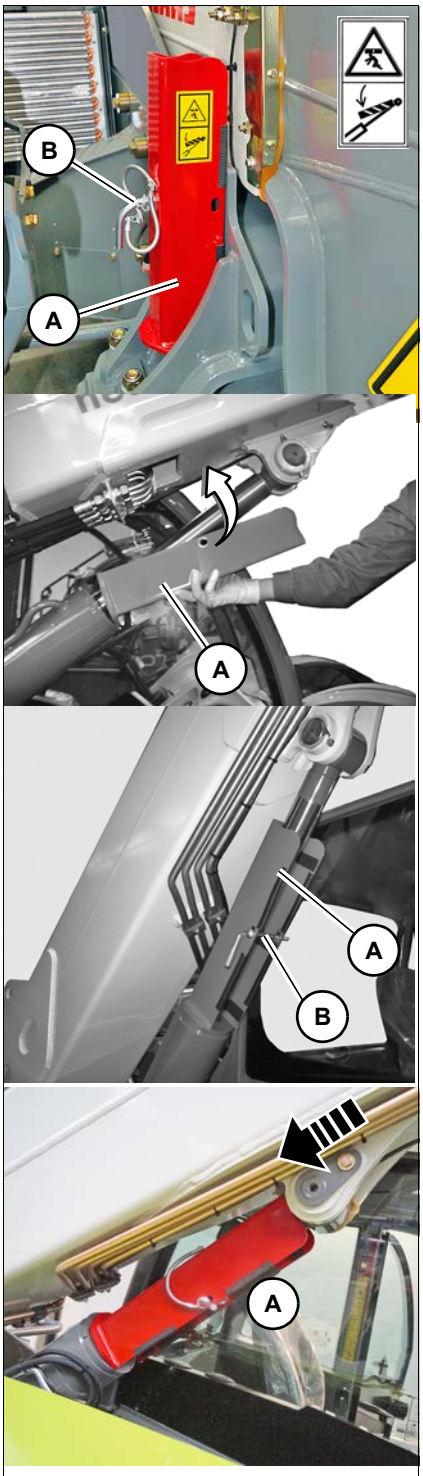


Fig. 368

Installing the safety prop onto the lift cylinder

WARNING

Assembly and maintenance jobs on the raised telescopic arm not secured by a prop!

Failure to observe this can cause serious injury or death.

► Install safety prop **A** (supplied with the machine) onto the extended lift ram and secure it with pin **B** (or a screw, see figure).

NOTICE

Install it as shown in *Fig. 368* in order to avoid damage to the piston rod and the safety prop!

► Opening showing downward!

The safety prop is located at the front right of the machine frame over the axle mounting.

1. Park the machine on firm and level ground.
2. Empty the attachment (bucket).
3. Tilt in the attachment.
4. Retract the telescopic boom.
5. Raise the telescopic boom.
6. Remove the safety prop from its storage place.
   - Remove the safety bolt before **B** the pin can be turned out of the tapped bore.
7. Install the safety prop over the piston rod of the extended lift ram.
8. Lock the safety prop with pin **B** and secure it with the safety pin.
9. Carefully lower the boom onto the prop (**without applying any pressure**) **at diesel engine standstill** with the emergency lowering feature *– see chapter 5 "Emergency lowering of loader unit in case of diesel engine breakdown" on page 5-157*.
10. After carrying out mainten, remove the safety strut from the lift cylinder and fasten it in its storage place again (front right machine frame)!

Explanation of symbols on the maintenance label

Affixed on the cabin

Symbol	Explanation
	Before starting maintenance, follow the safety instructions in the Operator's Manual!
	Before starting maintenance, read the "Maintenance" chapter in the Operator's Manual!
	Visual check! Check wear parts and screwed fittings at regular intervals. Retighten loose connections immediately and replace worn wear parts.
	Check tyres for damage, inflation pressure and tread depth!
	Perform a functional check of the light system!
	Check radiator for engine coolant and hydraulic oil for dirt. Clean if necessary!
	Check the coolant. Add coolant if necessary!
	Leakage check: Check for tightness, leaks and chafing: pipes, flexible lines and threaded fittings. Rectify if necessary!
	Check condition and initial tension of V-belt. Retension or replace it if necessary!
	Compress the dust valve.
	Check engine oil level. Add oil if necessary!
	Leakage check: Check the fuel/water trap. Drain water if necessary.
	Check hydraulic oil level. Add oil if necessary!
	Leakage check: Urea tank, urea lines and filters! (Only with exhaust level IV diesel engine)
	Carry out a check of the braking system!
	Check the brake fluid. Add fluid if necessary!
	Lubrication service: Lubricate the subassemblies concerned.

Cleaning with washing solvents

- Ensure sufficient room ventilation.
- Wear suitable protective clothing.
- Do not use flammable liquids, such as gasoline or diesel.

Cleaning with compressed air

- Work carefully.
- Wear safety glasses and protective clothing.
- Do not aim the compressed air at the skin or at other people.
- Do not use compressed air for cleaning your clothing.

Cleaning with a high-pressure cleaner or steam jet

- Electric components and damping material must be covered and not directly exposed to the jet.
- Cover the vent filter on the hydraulic oil reservoir and the filler caps for fuel, hydraulic oil, etc.
- Cover the piston rods of the hydraulic cylinders
  (the scraper bar is not water resistant, and water in the guide bushing causes corrosion and damage to the piston rod).
- Protect the following components from moisture:
  - Engine
  - Electrical components such as the alternator, oil pressure switches, wiring, electric/electronic parts, etc.
  - Control devices and seals
  - Air intake filters, etc.

Cleaning with flammable anticorrosion agents and sprays

- Ensure sufficient room ventilation.
- Do not use unprotected lights or open flames.
- Do not smoke.

Central lubrication system (option)

Functional description of the central lubrication system

The central lubrication system allows you to lubricate all lubrication points of the machine in one single step.

Information

The central lubrication system is only operational when the engine is running.

Maintenance intervals – *see "Maintenance plan" on page 7-4*.
Specifications and fill quantities
– *see "Fluids and lubricants" on page 7-14*.

- The yellow LED illuminates for 1.5 seconds upon switching on ignition to indicate functional readiness of the controls (switch-on check). It stays lit during the entire lubrication procedure.
- The integrated electronic control unit has a data memory for saving the times that have been set or that have elapsed. The time is taken and saved if the starter is switched off during lubrication or during a break. The remaining lubrication time or break time is read from the memory upon switching the starter on again, and lubrication is resumed where it was interrupted.

Time control

- Break and lubrication times can be set with the time-dependent control of the central lubrication system. Break times are the periods between two lubrication times.

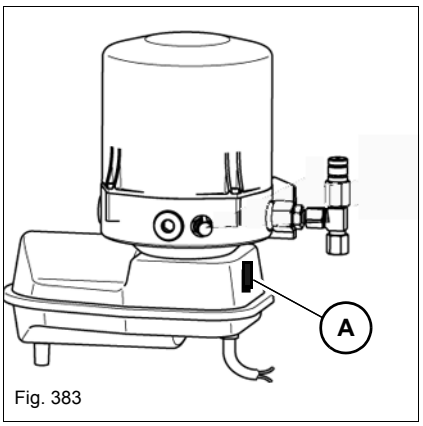


Fig. 383

Information

Pressing the push button **A** on the side of the pump starts intermediate lubrication at any time if the starter is switched on. This also serves as a functional check.
The pump then immediately starts with a lubrication cycle. The lubrication or break time that has elapsed so far or that has been saved is reset and starts over again.
A lubrication system malfunction can also be reset by pressing the intermediate lubrication switch, and the pump restarts lubrication.

Repair work

Repair work on the central lubrication system may only be performed by authorized service centers!

7.8 Engine lubrication system

Important safety instructions regarding the engine lubrication system

CAUTION

Injury hazard due to hot and moving engine parts!

Hot and moving engine parts can cause injury.

- ► Before opening the engine hood, stop the engine and remove the ignition switch key.
- ► Let the engine cool down.
- ► Wear protective equipment.

CAUTION

Burn hazard due to hot engine oil!

Splashes of hot oil can cause burns to the skin.

- ► Let the engine cool down.
- ► Wear protective equipment.

- Follow the safety instructions and country-specific regulations when handling lube oil!
- Dispose of drained lube oil correctly. Do not allow used oil to seep into the ground!
- Perform a test run every time work has been performed!
- Check for leaks and correct lube oil pressure, and then check the lube oil level in the diesel engine!

Cleaning the radiator

CAUTION

Burn hazard during maintenance on a hot engine and radiator!

Non-observance of these instructions can cause serious injury.

- ► Wear protective gloves and eye protection.
- ► Let the radiator cool down at least 10 minutes after stopping the diesel engine.

Information

Maintenance intervals – *see "Maintenance plan" on page 7-4*.

NOTICE

Dirt on the radiator fins reduces the radiator's heat dissipation capacity and can cause damage to the engine and the hydraulic system!

- ► Check and clean the outside of the radiator once a day.
- ► Clean the radiator more frequently in dusty or dirty work conditions.
- ► Do not clean in closed premises.

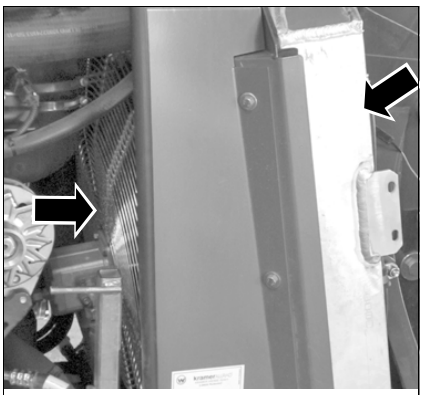


Fig. 401

1. Park the machine on level ground.
2. Lower the telescopic boom fully.
3. Apply the parking brake.
4. Stop the engine and remove the starting key.
5. Let the engine cool down.
6. Open the engine cover.
7. Clean the radiator fins by blowing compressed air from either side of the radiator.
8. Remove dirt in the intake area of the radiator.

Information

In order to ensure the radiator's cooling capacity, do not damage the radiator fins as you clean them with a compressed-air gun!

7.12 Hydraulic system

Important information on the hydraulic system

CAUTION

Burn hazard due to hot hydraulic oil!

Hot hydraulic oil can cause burns to the skin.

- ► Release the residual pressure in the hydraulic system.
- ► Let the engine cool down.
- ► Wear protective equipment.

CAUTION

Injury hazard due to maintenance!

There is a danger of injury.

- ► Secure the raised telescopic arm on the hydraulic cylinder with a prop to prevent unintentional lowering.
- ► Release the pressure in all utility lines carrying hydraulic oil prior to any maintenance and repair work. To do this:
  - Lower the attachments to the ground.
  - Stop the engine and remove the starting key.
  - Apply the parking brake.
  - Move all operating levers of the hydraulic pressure release valves several times.
- ► Only perform work on the hydraulic control system when the engine is switched off.

NOTICE

Contaminated hydraulic oil, lack of oil or wrong hydraulic oil poses a risk of serious damage to the hydraulic system!

- ► Take care to avoid dirt when working!
- ► Always add hydraulic oil using the filling screen!
- ► Only use authorised oils of the same type.
- ► Always add hydraulic oil before the level gets too low.
- ► If the hydraulic system is filled with biodegradable oil, then only use biodegradable oil of the same type for adding oil – observe the sticker on the hydraulic oil reservoir.
- ► Have the hydraulic oil replaced by an authorized service centre only.

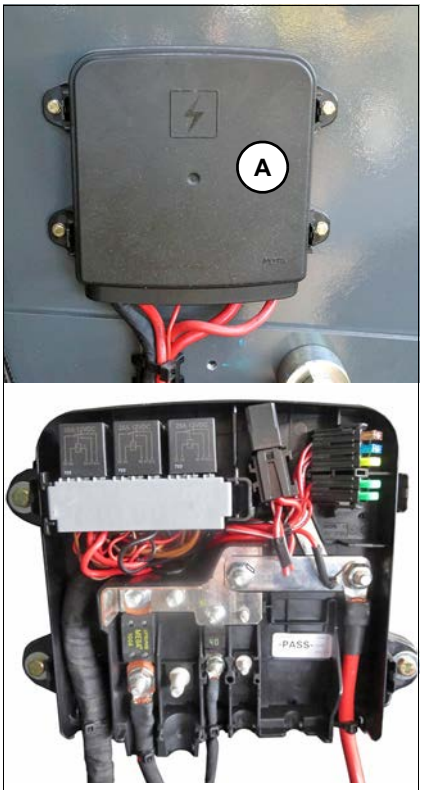


Fig. 422

Checking/replacing fuses and relays in main fuse box

The main fuse box is located in the engine compartment.

NOTICE

Blown fuses or relays indicate overloading or short circuits. The electrical system must therefore be checked before installing the new fuse!

► Only use fuses with the specified load capacity (amperage).

1. Apply the parking brake.
2. Stop the engine and remove the starting key.
3. Remove cover **A** from the main fuse box.
4. Removing defective fuse and/or relay from the relay bracket.
   - Main fuse and relay descriptions and output indications *– see chapter 9 “Main fuse box with relays” on page 9-13*.
   - To change the relay, remove the grey relay bracket.
5. Install new fuses or relay in relevant relay bracket.
6. Mount cover on fuse box.
7. Check the electrical system for correct function.

Checking/adding brake fluid

The brake-fluid reservoir is located on the left underneath the instrument panel trim.

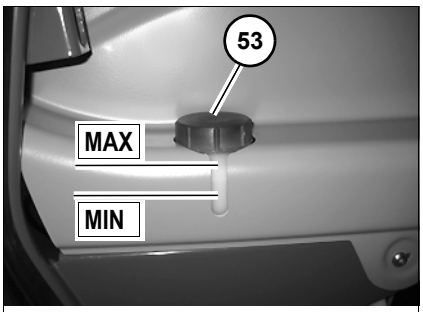


Fig. 432

DANGER

An incorrect brake fluid grade or an insufficient brake fluid level can impair the safety of the braking system.

- ► Check the brake fluid in the reservoir at regular intervals.
- ► The brake fluid must comply with the SAE specification **(ATF Suffix A)**.
- ► Contact an authorised service centre immediately if the brake fluid level is lower than allowed (below MIN).
- ► The brake fluid must be replaced every 2 years by an authorized service centre.

Add fluid if the level is below the **MAX** mark:

1. Clean the area around the cover.
2. Open tank cover **53**.
3. Add brake fluid up to the **MAX** mark.
4. Close the tank cover.
5. Check the braking system for leaks and correct function.

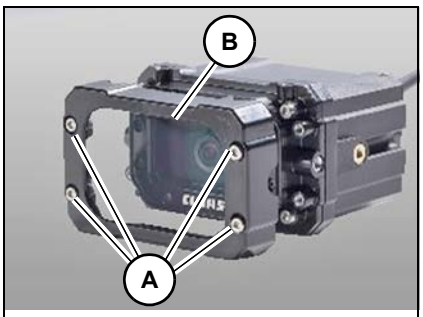


Fig. 440

Replacing the front glass of the camera

Replace the front glass of the camera if the image is of a poor quality due to dirt on the camera.

1. Park the machine safely.
2. Completely remove the 4 hexagon socket bolts (**A**) at the front of the camera.
   Circlips prevent the bolts from falling.
3. Take out the dirty front glass (**B**) to the front.
4. Install a clean front glass.
5. Retighten the 4 hexagon socket bolts (**A**).

Applying the protective anticorrosion coating

Bear in mind the following instructions as you apply the anti corrosion protection:

- Carefully cover all fastening surfaces and elements to which the anti corrosion protection may not be applied
  – see “Components coated with anticorrosive wax” on page 7-100!
- Apply ELASKON products with a brush or commercially available spray equipment.
- The protective ELASKON coating can be removed with an ELASKON cleanser if necessary.
- Spots are difficult to remove from clothing.
- Affix a “Wet paint!” or a similar sign to newly coated vehicles.

Treatment of oxidised surfaces

If in spite of all precautionary measures some components should be affected by corrosion (oxidized), treat the oxidized area follows:

Electric connections

- Remove the remaining protective wax at the oxidised area with an ELASKON cleanser.
- Apply an oxide solvent (for example ELASKON Multi 80) to the affected area.
- Treat the contact surfaces of the connection with for example ELASKON Multi 80.
- Establish the connection.
- Apply/spray anti corrosion wax onto the electric connection from all sides.

Sheet-metal parts

- Remove the remaining protective wax at the oxidised area with an ELASKON cleanser.
- Remove all remaining corrosion and paint coating from the affected area down to the bare material, otherwise the protective coating will not adhere properly.
- Clean the affected area with a cleaning solvent, and apply a 2-component prime coating and then a 2-component paint coating.
- Then preserve the area with anti corrosion wax.

Error code	Cause/Impact	Troubleshooting	Category
103	**Handbrake switch** Signal inputs at control unit are in an inadmissible range ➥ Handbrake does not release	1. Check F013 fuses. 2. Check plug connections 3. Restart vehicle. **If the error cannot be rectified,** stop the vehicle immediately and have the error rectified by an authorised service centre.	**Critical error**
104	**Switch raise/lower tipping trailer** Signal inputs at control unit are in an inadmissible range ➥ Tipping trailer raising/lowering is locked	1. Check F021 fuses. 2. Check plug connections 3. Restart vehicle. **If the error cannot be rectified,** the vehicle can be operated again. Have error rectified by an authorized service centre when the opportunity arises.	**Non-critical error**
105	**Auto hitch switch for raising/lowering** Signal inputs at control unit are in an inadmissible range ➥ Autohitch raising/lowering is locked		
106	**Four wheel cut-off switch** Signal inputs at control unit are in an inadmissible range ➥ Four wheel cutoff out of function		
107	**Hydraulic motor speed sensor** Signal inputs at control unit are in an inadmissible range ➥ Max. travel speed is reduced to about 7 kph	1. Check plug connections 2. Restart vehicle. **If the error cannot be rectified,** the vehicle can be operated again. Have error rectified by an authorized service centre when the opportunity arises.	**Non-critical error**
108	**Hydraulic oil temperature sensor** Voltage level at control unit is in an inadmissible range ➥ Error message is displayed	1. Check plug connections 2. Restart vehicle. **If the error cannot be rectified,** stop the vehicle immediately and have the error rectified by an authorised service centre.	**Critical error**

Error code	Cause/Impact	Troubleshooting	Category
234	**Charge-air temperature** Load air temperature is in an inadmissible range ➥ Error message is displayed	1. Check plug connections 2. Restart vehicle. **If the error cannot be rectified,** the vehicle can be operated again. Have the error rectified by an authorized service centre.	**Non-critical error**
235	**Load pressure regulation** Error detected in load pressure regulation ➥ Error message is displayed	Vehicle can be operated again Have the error rectified by an authorized service centre.	**Non-critical error**
236	**ECU temperature error** ECU temperature is in an inadmissible range ➥ Error message is displayed		
237	**Starter switch** Starter switch actuated too long ➥ Error message is displayed		
241	**Manual throttle** Manual throttle signal range exceeded; Battery short circuit ➥ Error message is displayed		
242	**Air filter differential pressure** Air filter differential pressure sensor error ➥ Error message is displayed	1. Check plug connections 2. Restart vehicle. **If the error cannot be rectified,** stop the vehicle immediately and have the error rectified by an authorised service centre.	**Critical error**
243	**Coolant level** Coolant level too low ➥ Error message is displayed	1. Adding coolant **If the error cannot be rectified,** stop the vehicle immediately and have the error rectified by an authorised service centre.	**Critical error**
244	**Ambient-air temperature** Sensor values for the ambient air temperature are in an inadmissible range ➥ Error message is displayed	1. Check plug connections 2. Restart vehicle. **If the error cannot be rectified,** stop the vehicle immediately and have the error rectified by an authorised service centre.	**Critical error**

Error code	Cause/Impact	Troubleshooting	Category
405	**Creep gear potentiometer** Voltage level at control unit is outside the permissible range ➥ Drive: restricted functionality ➥ Creep speed not functioning	1. Check plug connections 2. Restart vehicle. **If the error cannot be rectified,** the vehicle can be operated again. Have error rectified by an authorized service centre when the opportunity arises.	**Non-critical error**
406	**Hydraulic pump speed sensor** Voltage level at control unit is outside the permissible range ➥ Drive: restricted functionality		
407	**Hydraulic pump swivel angle sensor** Hydraulic pump swivel angle sensor defective	–	–
408	**Speed range switch** Voltage level at control unit is outside the permissible range ➥ Drive: restricted functionality	1. Check plug connections 2. Restart vehicle. **If the error cannot be rectified,** the vehicle can be operated again. Have error rectified by an authorized service centre when the opportunity arises.	**Non-critical error**
409	**Gearbox speed sensor** Voltage level at control unit is outside the permissible range ➥ Drive: restricted functionality		
410	**Sensor for direction of rotation of gearbox** Voltage level at control unit is outside the permissible range ➥ Drive: restricted functionality		

Error code	Cause/Impact	Troubleshooting	Category
815	**Oscillating-axle interlock** Voltage level at control unit is in an inadmissible range ➥ Oscillating axle interlock is not functioning	1. Check plug connections 2. Restart vehicle. **If the error cannot be rectified,** the vehicle can be operated again. Have error rectified by an authorized service centre when the opportunity arises.	**Non-critical error**
816	**Tilt ram angle sensor** Signal at the control unit is in an inadmissible range or is implausible ➥ Bucket-repositioning automatics not functioning	1. Check plug connections 2. Check mechanical attachment. 3. Restart vehicle. **If the error cannot be rectified,** the vehicle can be operated again. Have error rectified by an authorized service centre when the opportunity arises.	**Non-critical error**
817	**Bucket repositioning indicator light** Voltage level at control unit is in an inadmissible range ➥ Bucket repositioning indicator light malfunctioned	1. Check plug connections 2. Restart vehicle. **If the error cannot be rectified,** the vehicle can be operated again. Have error rectified by an authorized service centre when the opportunity arises.	**Non-critical error**

9.4 Brakes

Service brake

Designation	
Design	Foot-operated hydraulic disc brake
Location	Front axle input Optional on rear axle
Brake fluid	Special hydraulic fluid based on basic mineral oil (ATF Suffix A) *– see “Fluids and lubricants” on page 7-14*

Parking brake

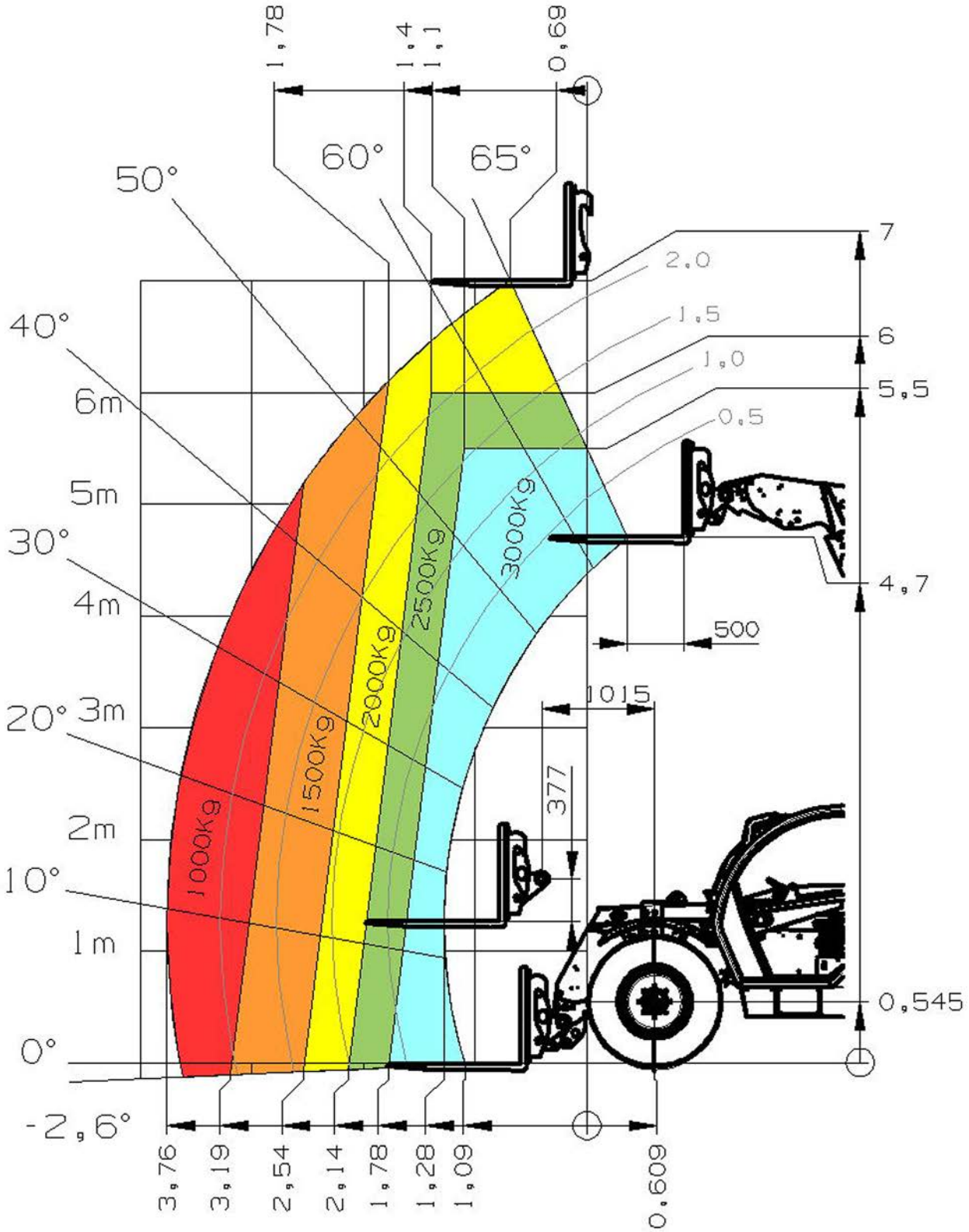
Designation	
Design	Manual mechanical disc brake at front axle input

PROFI CAM/PROFI CAM PLUS (option)

Screen			
Designation	**PROFI CAM**	**PROFI CAM PLUS**	
Screen diagonal	●	●	7 in (178 mm)
Resolution	●	●	1440 x 234 pixels (336 960 pixels)
Brightness	●	●	500 cd/m²
Image format	●	●	16 : 9 (wide screen)
Viewing angle	●	●	100° vertically, 120° horizontally
Display mode	●	●	Normal/mirrored
Camera inputs	●	●	4
Operating voltage	●	●	10 - 30 V direct current
Power consumption at 12 V	●	●	520 mA
Operating temperature	●	●	-20 - 70 °C
Trigger inputs	●	●	3
Trigger signal voltage	●	●	10 - 15 V direct current
Brightness regulator	●	●	Integrated CDS sensor, automatic/manual
Size (width x height x depth)	●	●	181 mm x 122 mm x 24 mm (7.12 x 4.8 x 0.9 in)
Weight	●	●	450 g (0.99 lb)
Shock resistance	●	●	15 g (0.33 lb)
Connection	●	●	Bayonet connector
Length of connecting line	●	●	4 m (157.4 in)
Degree of protection	●	●	IP54 Dust and spray-water protected

Load for pallet forks, model 415-13

Load centre 500 mm (19.6 in) with pallet forks 1000297357



Example for load diagram – see page *5-148*.